2008 Catalog

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Jan 2008
300dpi

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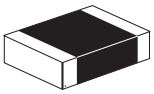
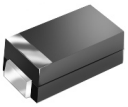
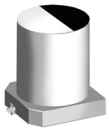
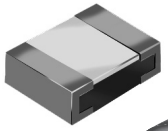
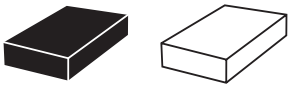
Find It Fast

Series	Description	View	WebCode	Page
SC	Ceramic Chip Capacitor			7
SD	Molded Tantalum		XD1	8
SE	Aluminum Capacitor			9
SR	Resistor Chip			10
SRM	Melf Resistor		XD1	11
SCC	Black & White Chips			12
SS	Solderable Gold & Tin Chips			13

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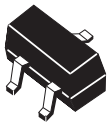
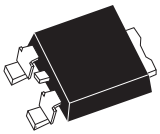
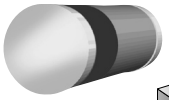
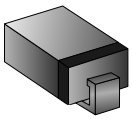
SOT	Transistor		XD1	14
DPAK	Power Discrete		XD1	15
SOD, SM	Melf Diode/Rectifier		XD1	16
SMA~SMC	Rectangular Diode/Rectifier		XD1	17

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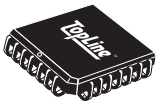
Series	Description	View	WebCode	Page
PLCC	Chip Carrier		XP1	18
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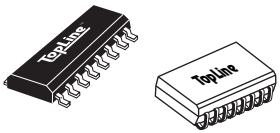
SOIC	Gull Wing			20
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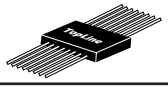
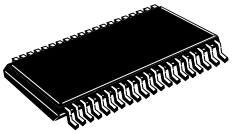
FP	Flat Pack		XF1	22
MSOP	Mini Small Outline Package		XS1	23
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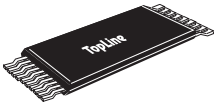
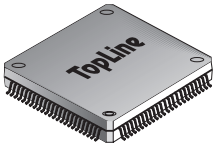
TSOP	Type 1		XO1	26
TSOP	Type 2		XO1	27
TQFP	Thin Quad Flat Pack			28
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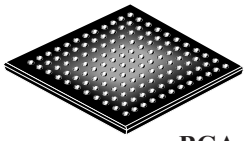
BGA	1.27mm Pitch	 BGA	XJ1	46-47
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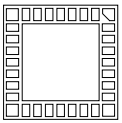
LGA	Land Grid Array	 QFN		53
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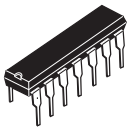
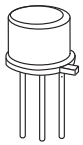
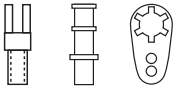
DIP	Dual Inline Package		XN1	57
TO	Transistor		XT1	58
Terminal	Solder Terminals		XR1	59
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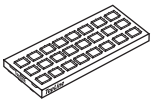
Matrix Component Trays			XZ1	61-64
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Solder Practice Kits

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Lead Free Kits & Components

Pb-Free
Lead-Free
RoHs Compliant

Most Kits and Components
are available with Lead-Free Option.
Please send Inquiry

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900000	QFP Lead Straightener		XK1	160

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Lead Free Pb RoHS Pb-Free

Ceramic Chip Capacitor

Dummy Component Ordering Information

Chip Size Inch	Chip Size Metric	Tape Info Width	Tape Info Pitch	Bulk Chip Case XD1	Bulk Chip Case Qty	4" (100mm) Tape & Reel Part Number XM1	4" Qty	7" (180mm) Tape & Reel Part Number XD1	7" Qty	13" (330mm) Tape & Reel Part Number XD1	13" Qty
Paper Tape											
01005	0402	8mm	2mm	-	-	SC01005P4A	500	SC01005P7A	20,000	-	-
0201	0603	8mm	2mm	-	-	SC0201P4A	500	SC0201P7A	15,000	-	-
0402	1005	8mm	2mm	SC0402F	50,000	SC0402P4A	500	SC0402P7A	10,000	SC0402P13A	50,000
0603	1608	8mm	4mm	SC0603F	15,000	SC0603P4A	500	SC0603P7A	4000	SC0603P13A	10,000
0805	2012	8mm	4mm	SC0805F-.6	10,000	SC0805P4A	500	SC0805P7A	4000	SC0805P13A	10,000
0805	2012	8mm	4mm	SC0805F-1.25	5000						
1206	3216	8mm	4mm	SC1206F	4000	SC1206P4A	500	SC1206P7A	4000	SC1206P13A	10,000
Plastic Tape											
0805	2012	8mm	4mm	-		SC0805E4A	500	SC0805E7A	3000	SC0805E13A	10,000
1206	3216	8mm	4mm	-		SC1206E4A	500	SC1206E7A	3000	SC1206E13A	10,000
1210	3225	8mm	4mm	-		SC1210E4A	500	SC1210E7A	3000	SC1210E13A	10,000
1812	4532	12mm	8mm	-		SC1812E4A	100	SC1812E7A	1000	SC1812E13A	4000
2225	5664	12mm	8mm	-		SC2225E4A	100	SC2225E7A	1000	SC2225E13A	4000
Lead-Free Sn100											
01005	0402	8mm	2mm	-	-	SC01005P4A-TIN	500	SC01005P7A-TIN	20,000	-	-
0201	0603	8mm	2mm	-	-	SC0201P4A-TIN	500	SC0201P7A-TIN	15000	-	-
0402	1005	8mm	2mm	-	-	SC0402P4A-TIN	500	SC0402P7A-TIN	10000	-	-
0603	1608	8mm	4mm	-	-	SC0603P4A-TIN	500	SC0603P7A-TIN	4000	-	-
0805	2012	8mm	4mm	-	-	SC0805E4A-TIN	500	SC0805E7A-TIN	4000	-	-
1206	3216	8mm	4mm	-	-	SC1206E4A-TIN	500	SC1206E7A-TIN	4000	-	-
1210	3225	8mm	4mm	-	-	SC1210E4A-TIN	500	SC1210E7A-TIN	4000	-	-
1812	4532	12mm	8mm	-	-	SC1812E4A-TIN	100	SC1812E7A-TIN	1000	-	-
2225	5664	12mm	8mm	-	-	SC2225E4A-TIN	100	SC2225E7A-TIN	1000	-	-

Dimension Tolerance L x W	
0201 ± 0.03mm	0805 ± 0.15mm
0402 ± 0.05mm	1206 ± 0.15mm
0603 ± 0.1mm	1210 ± 0.30mm

	Height (H)		Height (H)		Height (H)
01005	0.2mm ± 0.03	0603	0.8mm ± 0.1	1210	1.25~1.5mm
0201	0.3mm ± 0.03	0805	0.6~1.25mm	1812	2.0mm MAX
0402	0.5mm ± 0.1	1206	0.6~1.25mm	2225	2.0mm MAX

INFO

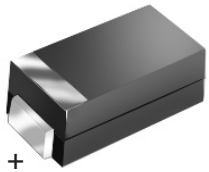
Other sizes such as 0504, 1805, 1806, 2220 are available on special order

The chip size code is the component's LxW dimensions. Example: 0805 = .08" x .05".

Chip size may also be expressed in metric code. Example: 2012 = 2.0mm x 1.2mm.

Lead Free Option: Sn100 add -TIN to end of part number.

Tantalum Capacitor Molded Case



Dummy Component Ordering Information

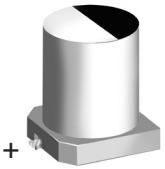
Chip Size		Tape Info		Bulk Part Number		4" (100mm) Tape & Reel Part Number		7" (180mm) Tape & Reel Part Number	
Metric	Code	Width	Pitch	XM0	Qty	XM1	Qty	XD1	Qty
3216	A	8mm	4mm	SD3216X-100	100	SD3216E4A	250	SD3216E7A	2000
3528	B	8mm	4mm	SD3528X-100	100	SD3528E4A	250	SD3528E7A	2000
6032	C	12mm	8mm	SD6032X-50	50	SD6032E4A	100	SD6032E7A	500
7343	D	12mm	8mm	SD7343X-50	50	SD7343E4A	100	SD7343E7A	500
1608	J	8mm	4mm	-	-	-	-	SD1608E7A	4000
2012	P/R	8mm	4mm	-	-	SD2012E4A	250	SD2012E7A	2500/3000

Dimensions			
Case	Length	Width	Height
A	3.2mm	1.6mm	1.6mm
B	3.5mm	2.8mm	1.9mm
C	6.0mm	3.2mm	2.5mm
D	7.3mm	4.3mm	2.8mm
J	1.6mm	0.8mm	0.8mm
P/R	2.0mm	1.2mm	1.2mm

INFO

Molded tantalum capacitors are available in six standard footprints. All sizes meet EIA/IECQ dimensions.
The positive (+) terminal is oriented away from the sproket holes.
Nomenclature: The metric code specifies the LxW dimensions in millimeters. Example 3528 = 3.5mm x 2.8mm
Lead Free Option: Sn100 add -TIN to end of part number.

Aluminum Capacitor



Dummy Component Ordering Information

Case Diameter	Maximum Height	Tape Info Width	Tape Info Pitch	7" (180mm) Tape & Reel Part Number XM1	Qty	13" (330mm) Tape & Reel Part Number XD1	Qty
3mm	5.5mm	12mm	8mm	SE3E7A	100	SE3E13A	2000
4mm	5.5mm	12mm	8mm	SE4E7A	100	SE4E13A	2000
5mm	5.5mm	12mm	12mm	SE5E7A	100	SE5E13A	1000
6.3mm	5.5mm	16mm	12mm	SE6E7A	100	SE6E13A	1000
8mm	6.0mm	16mm	12mm	SE8E7A	100	SE8E13A	1000
8mm	10mm	24mm	16mm	SE9E7A	100	SE9E13A	500
10mm	10mm	24mm	16mm	SE10E7A	100	SE10E13A	300-500
10mm	14~22mm	32mm	20mm	-	-	SE11E13A	250-300
12.5mm	14mm	32mm	24mm	-	-	SE12E13A	200-250
12.5mm	17mm	32mm	24mm	-	-	SE13E13A	150-200
12.5mm	22mm	32mm	24mm	-	-	SE14E13A	125-150
16mm	17mm	44mm	28mm	-	-	SE16E13A	125-150
16mm	22mm	44mm	28mm	-	-	SE17E13A	75-100
18mm	17mm	44mm	32mm	-	-	SE18E13A	125-150
18mm	22mm	44mm	32mm	-	-	SE19E13A	75-100
20mm	17mm	44mm	36mm	-	-	SE20E13A	50

INFO

Aluminum electrolytic capacitors are available in 16 case sizes. Aluminum capacitors are polarized devices and require proper orientation during placement. The negative terminal (black mark on top of component) faces the sprocket holes on the carrier tape. For 15" (380mm) reel change "E13A" to "E15P"

Lead Free Option: Sn97/Bi3.0 add -SnBi to end of part number for 3mm ~ 10mm case diameter.

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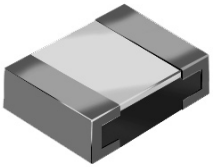
Resistor Chip



Lead Free Pb RoHS Pb-Free

Dummy Component Ordering Information

Chip Size Inch	Chip Size Metric	Tape Info Width	Tape Info Pitch	Bulk Chip Case Part Number XD1	Bulk Chip Case Qty	4" (100mm) Tape & Reel Part Number XM1	4" (100mm) Qty	7" (180mm) Tape & Reel Part Number XD1	7" (180mm) Qty	13" (330mm) Tape & Reel Part Number XD1	13" (330mm) Qty
Paper Tape											
01005	0402	8mm	2mm	-	-	SR01005P4A	1000	SR01005P7A	20,000	-	-
0201	0603	8mm	2mm	-	-	SR0201P4A	1000	SR0201P7A	10,000	-	-
0402	1005	8mm	2mm	SR0402F	50,000	SR0402P4A	1000	SR0402P7A	10,000	SR0402P13A	50,000
0603	1608	8mm	4mm	SR0603F	25,000	SR0603P4A	1000	SR0603P7A	5,000	SR0603P13A	10,000
0805	2012	8mm	4mm	SR0805F	10,000	SR0805P4A	1000	SR0805P7A	5,000	SR0805P13A	10,000
1206	3216	8mm	4mm	SR1206F	5,000	SR1206P4A	1000	SR1206P7A	5,000	SR1206P13A	10,000
1210	3225	8mm	4mm	-	-	SR1210P4A	1000	SR1210P7A	5,000	-	-
Plastic Tape											
1210	3225	8mm	4mm	-	-	SR1210E4A	1000	SR1210E7A	4,000	-	-
2010	5025	12mm	4mm	-	-	SR2010E4A	250	SR2010E7A	4,000	-	-
2512	6332	12mm	4mm	-	-	-	-	SR2512E7A	4,000	-	-
2512	6332	12mm	8mm	-	-	SR2512E4A	250	SR2512E7A	2,000	-	-
Zero OHM											
01005	0402	8mm	2mm	-	-	-	-	SR01005P7A-ZERO	20,000	-	-
0201	0603	8mm	2mm	-	-	-	-	SR0201P7A-ZERO	10,000	-	-
0402	1005	8mm	2mm	-	-	-	-	SR0402P7A-ZERO	10,000	-	-
0603	1608	8mm	4mm	-	-	-	-	SR0603P7A-ZERO	5,000	-	-
0805	2012	8mm	4mm	-	-	-	-	SR0805P7A-ZERO	5,000	-	-
1206	3216	8mm	4mm	-	-	-	-	SR1206P7A-ZERO	5,000	-	-
Lead Free Pb Sn100											
01005	0402	8mm	2mm	-	-	SR01005P4A-TIN	1000	SR01005P7A-TIN	20,000	-	-
0201	0603	8mm	2mm	-	-	SR0201P4A-TIN	1000	SR0201P7A-TIN	10,000	-	-
0402	1005	8mm	2mm	-	-	SR0402P4A-TIN	1000	SR0402P7A-TIN	10,000	-	-
0603	1608	8mm	4mm	-	-	SR0603P4A-TIN	1000	SR0603P7A-TIN	5,000	-	-
0805	2012	8mm	4mm	-	-	SR0805P4A-TIN	1000	SR0805P7A-TIN	5,000	-	-
1206	3216	8mm	4mm	-	-	SR1206P4A-TIN	1000	SR1206P7A-TIN	5,000	-	-

Dimension Tolerance

0402 ± 0.05mm
0603 ~ 2512 ± 0.15mm

Height (H)

01005	0.12mm ± 0.02	0603	0.45mm ± 0.10	1210	0.55mm ± 0.15
0201	0.23mm ± 0.03	0805	0.55mm ± 0.1	2010	0.55mm +/-0.15
0402	0.35mm ± 0.05	1206	0.55mm ± 0.1	2512	0.55mm +/-0.15

INFO

Resistor chips are available in seven standard sizes. Bulk Feeder cassettes are for placement by high-speed chip shooters. Zero ohm jumpers available for continuity checking.

The chip size code approximates the LxW dimensions in inches. Example: 0805 = .08” x .05”.

Pb Lead Free Option: Sn100 add -TIN to end of part number.

MELF Resistor

Dummy Component Ordering Information

Size Code Inch	Size Code Name	Size Length x Dia.	Tape Info Width	Tape Info Pitch	4" (100mm) Tape & Reel Part Number XM1	Qty	7" (180mm) Tape & Reel Part Number XD1	Qty
Plastic Tape								
0604		1.6 x 1.0mm	8mm	4mm	SRM0604E4A	500	SRM0604E7P	3000
0805	Micro	2.2 x 1.1 mm	8mm	4mm	SRM0805E4A	500	SRM0805E7P	3000
1206	Mini	3.2 x 1.6mm	8mm	4mm	SRM1206E4A	500	SRM1206E7P	3000
1406	Mini	3.5 x 1.4mm	8mm	4mm	SRM1406E4A	500	SRM1406E7P	3000
2308	MELF	5.9 x 2.2mm	12mm	4mm	SRM2308E4A	250	SRM2308E7P	1500
Lead Free Sn100								
0805	Micro	2.2 x 1.1	8mm	4mm	SRM0805E4A-TIN	500	SRM0805E7A-TIN	3000
1206	Mini	3.2 x 1.6	8mm	4mm	SRM1206E4A-TIN	500	SRM1206E7A-TIN	3000
2308	MELF	5.9 x 2.2	12mm	4mm	SRM2308E4A-TIN	250	SRM2308E7A-TIN	2000
Zero OHM								
0805	Micro	2.2 x 1.1	8mm	4mm	SRM0805E4A-ZERO	500	SRM0805E7A-ZERO	3000
1206	Mini	3.2 x 1.6	8mm	4mm	SRM1206E4A-ZERO	500	SRM1206E7A-ZERO	3000
2308	MELF	5.9 x 2.2	12mm	4mm	SRM2308E4A-ZERO	250	SRM2308E7A-ZERO	2000

Cross Reference

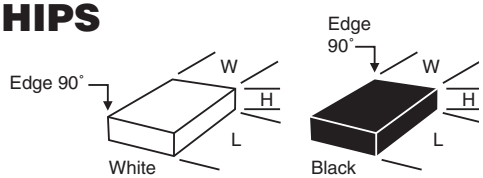
Code	TopLine
0102	SRM0805
0204	SRM1206
0207	SRM2308

INFO

MELF resistors are cylindrical. Extra care is required during placement to prevent rolling during assembly. These devices are often called by their nicknames relative to size such as micro-melf, mini-melf and melf. Nomenclature: MELF = Metal Electrode Face Bonded. Lead Free version is tin over nickel plating.

Lead Free Option: Sn100 add -TIN to end of part number.

Black & White Ceramic Chips



Dummy Component Ordering Information

Chip Size Inch	Chip Size Metric	Tape Mat'l	Taping Info Width	Taping Info Pitch	XD1 7" (180mm) Tape & Reel Part Number	Qty
White Chips						
01005	0402	Paper	8mm	2mm	SCC01005P7A-WHITE	20,000
0201	0603	Paper	8mm	2mm	SCC0201P7A-WHITE	15,000
0402	1005	Paper	8mm	2mm	SCC0402P7A-WHITE	10,000
0603	1608	Paper	8mm	4mm	SCC0603P7A-WHITE	4,000
0805	2012	Plastic	8mm	4mm	SCC0805E7A-WHITE	4,000
1206	3216	Paper	8mm	4mm	SCC1206P7A-WHITE	4,000
Black Chips						
01005	0402	Paper	8mm	2mm	SCC01005P7A-BLACK	20,000
0201	0603	Paper	8mm	2mm	SCC0201P7A-BLACK	15,000
0402	1005	Paper	8mm	2mm	SCC0402P7A-BLACK	10,000
0603	1608	Paper	8mm	4mm	SCC0603P7A-BLACK	4,000
0805	2012	Plastic	8mm	4mm	SCC0805E7A-BLACK	4,000
1206	3216	Paper	8mm	4mm	SCC1206P7A-BLACK	4,000

Inch Dimensions:

Inch Code	L	W	H	Tol
01005	0.016	0.008	0.008	+/- 0.001
0201	0.0225	0.0115	0.0115	+/- 0.001
0402	0.036	0.019	0.019	+/- 0.003
0603	0.058	0.031	0.029	+/- 0.003
0805	0.075	0.052	0.037	+/- 0.003
1205	0.119	0.060	0.048	+/- 0.003

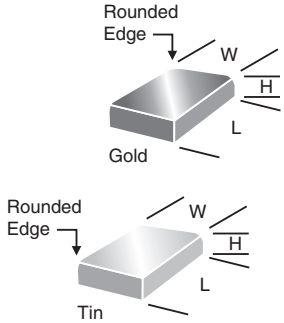
Metric Dimensions:

Metric Code	L	W	H	Tol
0402	0.41	0.20	0.20	+/- 0.025
0603	0.57	0.29	0.29	+/- 0.025
1005	0.91	0.48	0.48	+/- 0.076
1608	1.47	0.79	0.74	+/- 0.076
2012	1.91	1.32	0.94	+/- 0.076
3216	3.02	1.52	1.22	+/- 0.076

INFO

Placement Ceramic Chips are available in 6 case sizes and in 2 colors: White and Black.
Right angle 90˚ edges for accurate placement by vision equipment. No terminations. Non-Solderable.
White chips are mounted on a dark substrate such as blue Nitto tape.
Black chips are mounted on a light substrate. Excellent contrast. Easy for vision equipment to see.

Gold & Tin Solderable Chips Fully Conductive



Dummy Component Ordering Information

Chip Size Inch	Chip Size Metric	Tape Mat'l	Taping Info Width	Taping Info Pitch	XD1 7" (180mm) Tape & Reel Part Number	Qty
Gold Chips						
01005	0402	Paper	8mm	2mm	SS01005P7A-GOLD	20,000
0201	0603	Paper	8mm	2mm	SS0201P7A-GOLD	15,000
0402	1005	Paper	8mm	2mm	SS0402P7A-GOLD	10,000
0603	1608	Paper	8mm	4mm	SS0603P7A-GOLD	4,000
0805	2012	Plastic	8mm	4mm	SS0805E7A-GOLD	4,000
1206	3216	Paper	8mm	4mm	SS1206P7A-GOLD	4,000
Tin Chips						
01005	0402	Paper	8mm	2mm	SS01005P7A-TIN	20,000
0201	0603	Paper	8mm	2mm	SS0201P7A-TIN	15,000
0402	1005	Paper	8mm	2mm	SS0402P7A-TIN	10,000
0603	1608	Paper	8mm	4mm	SS0603P7A-TIN	4,000
0805	2012	Plastic	8mm	4mm	SS0805E7A-TIN	4,000
1206	3216	Paper	8mm	4mm	SS1206P7A-TIN	4,000

Inch Dimensions:

Inch Code	L	W	H	Tol
01005	0.016	0.008	0.008	+/- 0.002
0201	0.023	0.012	0.012	+/- 0.002
0402	0.040	0.020	0.020	+/- 0.003
0603	0.062	0.035	0.035	+/- 0.003
0805	0.075	0.052	0.037	+/- 0.003
1206	0.120	0.060	0.048	+/- 0.003

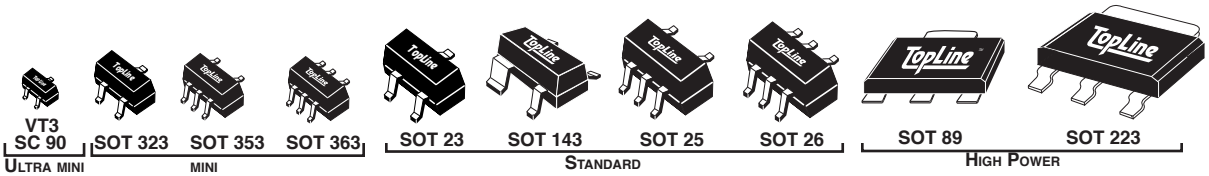
Metric Dimensions:

Metric Code	L	W	H	Tol
0402	0.40	0.20	0.20	+/- 0.050
0603	0.50	0.30	0.30	+/- 0.050
1005	1.00	0.50	0.50	+/- 0.076
1608	1.50	0.90	0.90	+/- 0.076
2012	1.91	1.32	0.94	+/- 0.076
3216	3.02	1.52	1.22	+/- 0.076

INFO

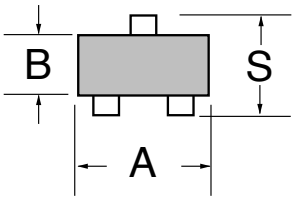
- Fully conductive chips available in 2 plating materials: Gold (Au) and Tin (Sn).
- Smooth, rounded edges for soldering.
- Ceramic substrate fully metalized plating on all sides. Fully solderable using standard reflow.
- Use for a variety of applications requiring zero ohm conductivity on all sides. Lead Free. RoHS compliant.

SOT Transistor

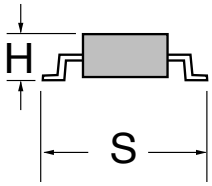


Dummy Component Ordering Information

Nbr Leads	Tape Info Width	Tape Info Pitch	Device Reference SOT	Device Reference SC	Device Reference TO	Body Size Nominal (mm) A	B	S	H	4" (100mm) Tape & Reel Part Number XM1	Qty	7" (180mm) Tape & Reel Part Number XD1	Qty
3	8mm	4mm	-	-	-	1.2	0.8	1.2	0.5	-	-	VT3E7A	8000
3	8mm	4mm	SOT346	SC59	TO236AA	2.9	1.6	2.8	1.1	-	-	SC59E7A	3000
3	8mm	4mm	SOT323	SC70	-	2.0	1.25	2.1	0.9	-	-	SC70E7A	3000
3	8mm	4mm	SOT416	SC75A/SC90	-	1.6	0.8	1.6	0.7	-	-	SC90E7A	3000
3	8mm	4mm	SOT23	-	TO236AB	2.9	1.3	2.4	.95	SOT23E4A	500	SOT23E7A	3000
5	8mm	4mm	SOT23-5	SC74A	-	2.9	1.6	2.8	1.1	SOT25E4A	500	SOT25E7A	3000
6	8mm	4mm	SOT23-6	SC74	SOT457	2.9	1.6	2.8	1.1	SOT26E4A	500	SOT26E7A	3000
3	12mm	8mm	SOT89	SC62	TO243AA	4.5	2.5	4.0	1.5	SOT89E4A	200	SOT89E7A	1000
4	8mm	4mm	SOT143	-	TO253AA	2.9	1.6	2.8	.95	SOT143E4A	500	SOT143E7A	3000
3	16mm	8mm	SOT223	SC73	TO261AA	6.5	3.6	7.0	1.6	SOT223E4A	100	SOT223E13A	2500
3	8mm	4mm	SOT323	SC70	-	2.0	1.25	2.1	0.9	SOT323E4A	500	SOT323E7A	3000
4	8mm	4mm	SOT343	-	-	2.0	1.25	2.1	0.9	-	-	SOT343E7A	3000
5	8mm	4mm	SOT353	SC88A	-	2.0	1.25	2.1	0.9	SOT353E4A	500	SOT353E7A	3000
6	8mm	4mm	SOT363	SC88	-	2.0	1.25	2.1	0.9	SOT363E4A	500	SOT363E7A	3000
8	8mm	4mm	SOT23-8	-	-	2.9	1.6	2.9	1.2	-	-	SOT28E7A	3000

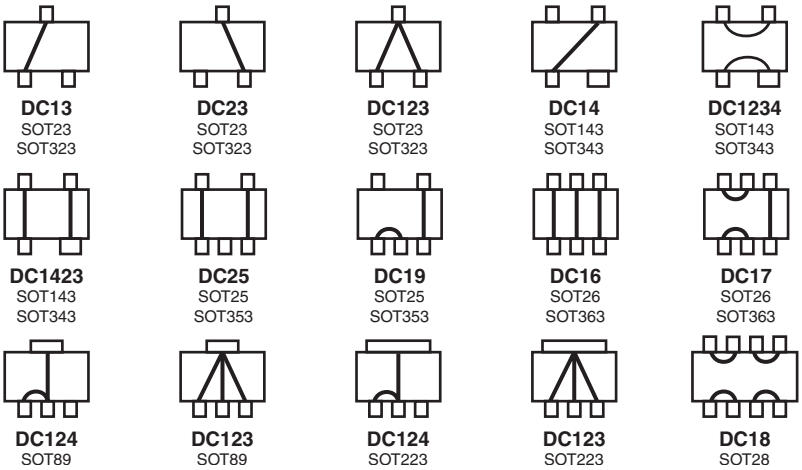


Top View



Side View

Daisy Chain - TopView



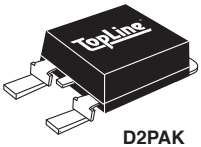
INFO

TopLine offers a full range of SOT devices conforming to JEDEC (TO) and EIAJ (SC) standards. 3-lead devices are commonly used for diodes or transistors. 5- and 6-lead devices are used for integrated circuits or diode arrays. Nomenclature: SOT = Small Outline Transistor.

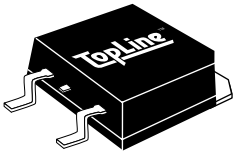
Lead Free Option: Sn100 add -TIN to end of part number.

DPAK Power Device

DPAK



D2PAK

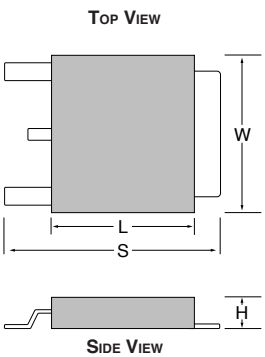


D3PAK

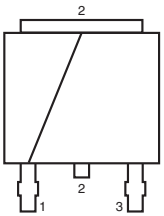
Dummy Component Ordering Information

Pacakge Size Nominal (mm)				JEDEC	Tape Info		7" (180mm) Tape & Reel Part Number		13" (330mm) Tape & Reel Part Number	
L	W	H	S	SMD Device	Width	Pitch	XM1	Qty	XD1	Qty
6	6.5	2.3	10	TO-252AA	16mm	8mm	DPAK-E7A	100	DPAK-E13A	2500
9.2	10	4.4	15	TO-263AB	24mm	16mm	D2PAK-E7A	100	D2PAK-E13A	500~800
9.2	10	4.4	15	5-LEAD	24mm	16mm	-		D2PAK-5-E13A	500~800
9.2	10	4.4	15	7-LEAD	24mm	16mm	-		D2PAK-7-E13A	500-800
14	16	4.7	18.8	TO-268AA	24mm	24mm	-		D3PAK-E13A*	500

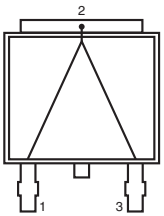
* For Reference. Check for Availability



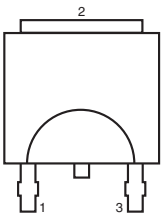
Daisy Chain Options



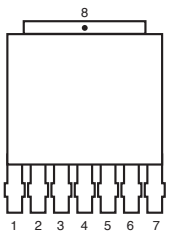
DC12
DPAK
D2PAK



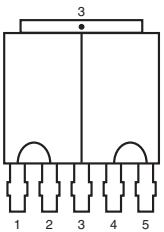
DC123
DPAK
D2PAK



DC13
DPAK
D2PAK



D2PAK7



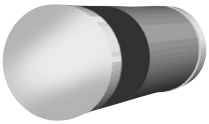
DC1245
D2PAK5

INFO

DPAKs are large packages used for power devices such as rectifiers and transistors. The D^2PAK is the Surface Mount equivalent of the TO-220 and the D^3PAK is the SMD equivalent of TO-247. Call for availability on D^3PAK.

Lead Free Option: Sn100 add -TIN to end of part number.

MELF & mini MELF Diodes



Dummy Component Ordering Information

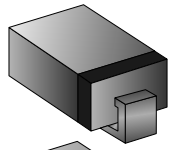
Device	Size Dia. x L	Tape Info Width	Tape Info Pitch	4" (100mm) Tape & Reel Part Number XM1	Qty	7" (180mm) Tape & Reel Part Number XD1	Qty	13" (330mm) Tape & Reel Part Number XD1	Qty
mini MELF DO-213AA (LL34)	1.6 x 3.5mm	8mm	4mm	SOD80E4A	500	SOD80E7A	2500	SOD80E13A	10,000
MELF DO-213AB (LL35/LL41)	2.5 x 5mm	12mm	4mm	SM1E4A-GLASS	250	SM1E7A-GLASS	1500	SM1E13A-GLASS	5000
MELF DO-213AB (SM1)	2.5 x 5mm	12mm	4mm	SM1E4A-PLASTIC	250	SM1E7A-PLASTIC	1750	SM1E13A-PLASTIC	5000

INFO

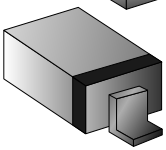
MELF and Mini Melf diodes are cylindrical cases constructed of glass or plastic. The SOD80 glass package is commonly used lower power diodes. The SM1 package is used for high current rectifiers and zener diodes.
Nomenclature: DO = Diode Outline

Lead Free Option: Sn100 add -TIN to end of part number.

Rectangular Diode



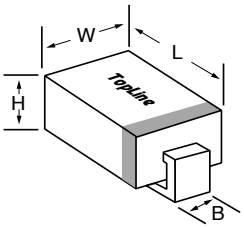
C-Bend Lead



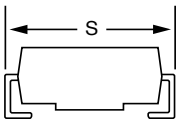
Gull-Wing Lead

Dummy Component Ordering Information

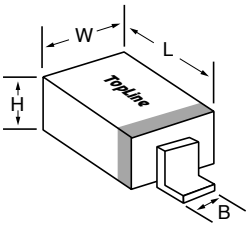
Package Size Nominal (mm) L	W	H	S	B	JEDEC Device	Tape Width Width	Pitch	7" (180mm) Tape & Reel Part Number XD1	Qty	13" (330mm) Tape & Reel Part Number XD1	Qty
Gull Wing Lead											
0.8	0.6	0.4	1.0	0.2	SOD923	8mm	2mm	SOD923E7A	8000	-	-
1.0	0.6	0.5	1.4	0.3	SOD723	8mm	2mm	SOD723E7A	8000	-	-
1.2	0.8	0.6	1.6	0.3	SOD523	8mm	4mm	SC79E7A	3000	-	-
1.7	1.25	0.7	2.5	0.3	SOD323	8mm	4mm	SOD323E7A	3000	SOD323E13A	10,000
2.7	1.5	1.3	3.6	0.7	SOD123	8mm	4mm	SOD123E7A	3000	SOD123E13A	-
4.3	2.6	2.2	6.1	1.4	DO215AC	12mm	4mm	SMAG-E7A	1800	SMAG-E13A	5000
4.3	3.6	2.3	6.2	2.0	DO215AA	12mm	8mm	SMBG-E7A	1000	SMBG-E13A	2500
7.0	6.0	2.3	10	3.0	DO215AB	16mm	8mm	SMCG-E7A	900	SMCG-E13A	2500
C-Bend Lead (Modified J-Lead)											
4.3	2.6	2.2	5.0	1.5	DO214AC	12mm	4mm	FM1E7A	1500	FM1E13A	5000 - 7500
4.3	2.6	2.2	5.0	1.5	DO214AC	12mm	4mm	SMAJ-E7A	1800	SMAJ-E13A	5000 - 7500
4.3	3.6	2.3	5.4	2.0	DO214AA	12mm	8mm	SMBJ-E7A	750	SMBJ-E13A	3000 - 3200
7.0	6.0	2.3	8.0	3.0	DO214AB	16mm	8mm	SMCJ-E7A	850	SMCJ-E13A	3000 - 3500



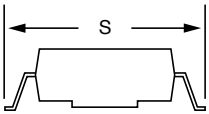
C-Bend (modified J)



Side View



Gull Wing Lead

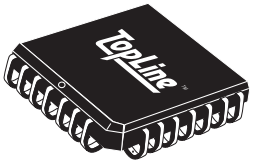


Side View

INFO

Rectangular diodes and rectifiers are available in Gull-wing and C-bend leads (J-leads). C-bend leads are similar to J-leads. For 4” reels, change part numbers from E7A to E4A.
Substitutability: DO214AC = SOD106A = SMA = FM1.
Lead Free Option add -TIN to end of part number.

PLCC
Plastic Leaded Chip Carrier

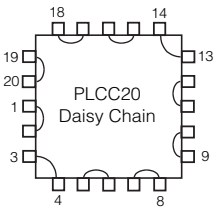


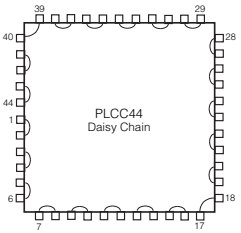
J-Lead 50mil pitch

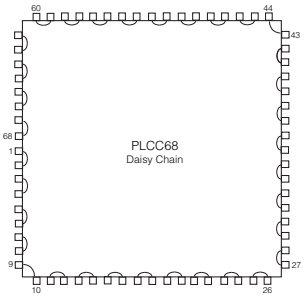
Dummy Component Ordering Information

Nbr Leads	Body Size Inches	Tape Info Width	Tape Info Pitch	Tube Part Number XP1	Tube Qty	7" (180mm) Tape & Reel Part Number XM1	7" Qty	13" (330mm) Tape & Reel Part Number XP1	13" Qty
*18	.29” x .43”	24mm	12mm	PLCC18SM	36	-	-	-	-
18	.29” x .49”	24mm	12mm	PLCC18M	36	PLCC18E7A	100	PLCC18E13A	1000
20	.35” sq.	16mm	12mm	PLCC20M	46~50	PLCC20E7A	100	PLCC20E13A	1000
28	.45” sq.	24mm	16mm	PLCC28M	37~40	PLCC28E7A	100	PLCC28E13A	500-1000
32	.45” X .55”	24mm	16mm	PLCC32M	30~34	PLCC32E7A	100	PLCC32E13A	500-750
44	.65” sq.	32mm	24mm	PLCC44M	25~28	PLCC44E7A	100	PLCC44E13A	400-500
52	.75” sq.	32mm	24mm	PLCC52M	24~25	PLCC52E7A	50	PLCC52E13A	500
68	.95” sq.	44mm	32mm	PLCC68M	17~20	PLCC68E7A	50	PLCC68E13A	250
84	1.15” sq.	44mm	36mm	PLCC84M	14~17	PLCC84E7A	50	PLCC84E13A	250

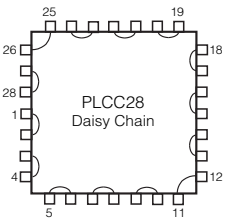
*PLCC18S short version is an obsolete design.

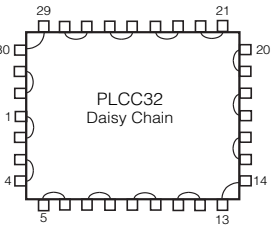


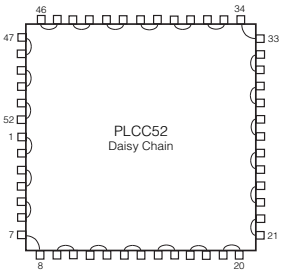


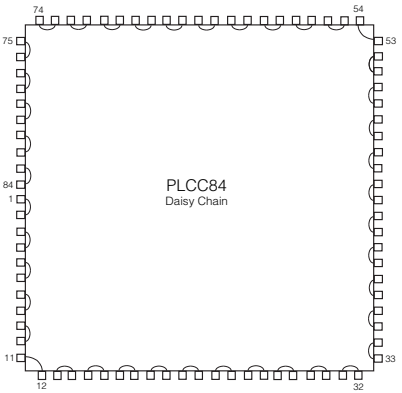


PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)









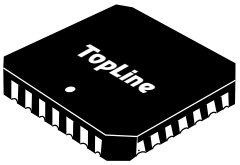
INFO

Standard plating on leads is Sn85/Pb15. Lead pitch is 50 mils (1.27mm). Tube and reel quantities may vary.

For completely isolated (no internal connections) add - ISO to the end of part number.

Lead Free. Add suffix to part number: -Tin = Sn100

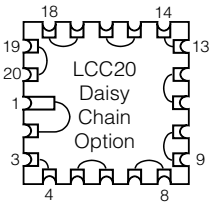
LCC
Leadless Chip Carrier

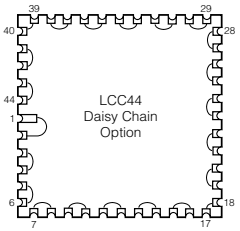


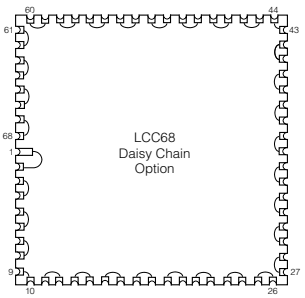
Dummy Component Ordering Information

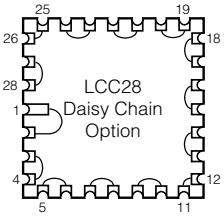
Nbr Leads	Lead Pitch	Case Sizes Inches	XL1 Bulk Part Number
20	50 mils	.35” SQ	LCC20B50SQ.35
28	50 mils	.45” SQ	LCC28B50SQ.45
32	50 mils	.45” x .55”	LCC32B50R.45x.55
44	50 mils	.65” SQ	LCC44B50SQ.65
52	50 mils	.75” SQ	LCC52B50SQ.75
68	50 mils	.95” SQ	LCC68B50SQ.95
84	50 mils	1.15” SQ	LCC84B50SQ1.15

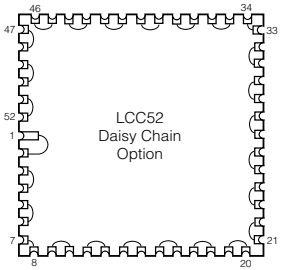
Optional Daisy Chain

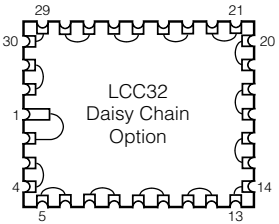








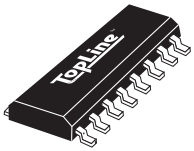




Part Number

Options	Part Nbr Suffix
With Lid	Blank
Without Lid	-N
Gold Leads	Blank
Solder Coat Leads	-SC
Completely Isolated	-ISO
Daisy Chain	-DE

SO - Small Outline Gull Wing



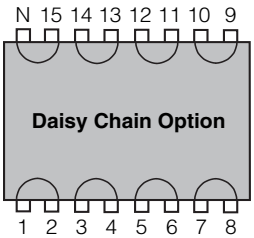
50 mil Pitch (1.27mm)

Dummy Component Ordering Information

Nbr Leads	Body Width Mils	Body Width Metric	Tape Info Width	Tape Info Pitch	Tube Part Number XS1	Tube Qty	4" (100mm) Tape & Reel Part Number XM1	4" Qty	13" (330mm) Tape & Reel Part Number XS1	13" Qty
8	150	3.9mm	12mm	8mm	SO8M	96~100	SO8E4A	100	SO8E13A	2500
8	210	5.3mm	16mm	12mm	SOP8M	100	-	-	SOP8E13A	2000
14	150	3.9mm	16mm	8mm	SO14M	50~56	SO14E4A	100	SO14E13A	2500
14	208	5.3mm	16mm	12mm	SOP14M	45	-	-	SOP14E13A	2000
14	220	5.6mm	24mm	12mm	SOM14M	58	-	-	SOM14E13A	2000
16	150	3.9mm	16mm	8mm	SO16M	45~50	SO16E4A	100	SO16E13A	2500
16	208	5.3mm	16mm	12mm	SOP16M	43	-	-	SOP16E13A	2000
16	220	5.6mm	24mm	12mm	SOM16M	42	SOM16E4A	100	SOM16E13A	2000
16	300	7.5mm	16mm	12mm	SOL16M	47	SOL16E4A	100	SOL16E13A	1000
18	300	7.5mm	24mm	12mm	SOL18M	41~42	-	-	SOL18E13A	1000
20	300	7.5mm	24mm	12mm	SOL20M	38	SOL20E4A	100	SOL20E13A	1000
20	430	11.0mm	44mm	16mm	HSOP20M-F	30	-	-	HSOP20E13AF	1000
24	300	7.5mm	24mm	12mm	SOL24M	31~33	SOL24E4A	100	SOL24E13A	1000
28	300	7.5mm	24mm	12mm	SOL28M	26~27	SOL28E4A	100	SOL28E13A	1000
28	330	8.4mm	24mm	16mm	SOW28M	26~27	-	-	SOW28E13A	1000
32	300	7.5mm	32mm	16mm	SOL32M	22~25	-	-	SOL32E13A	1000
32	330	8.4mm	32mm	16mm	SOW32M	22~25	-	-	SOW32E13A	1000
32	450	11.4mm	44mm	16mm	SOY32M	22~25	-	-	SOY32E13A	500
40	450	11.4mm	44mm	16/24mm	SOY40M	18	-	-	SOY40E13A	500
44	525	13.3mm	44mm	24mm	SOZ44M	17	-	-	SOZ44E13A	500

QUICK GUIDE BODY WIDTH

SERIES	MILS	MM	SERIES	MILS	MM
SO	150	3.9	SOW	330~350	8.4~8.9
SOP	208	5.3	SOX	400	10.16
SOM	220	5.6	SOY	450	11.4
SOL	300	7.5	SOZ	525	13.3



PART NUMBER

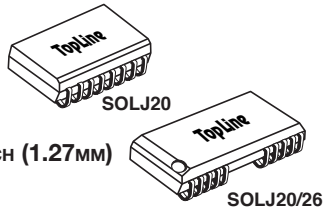
Options	Suffix
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)

INFO

TopLine supplies gull-wing packages with 50mil (1.27) lead pitch in a variety of pin counts and body widths. Standard plating on leads is Sn85/Pb15. For completely isolated (no internal connections) add -ISO to end of part number.

Lead Free. Add suffix to part number: B = Sn/Bi, -Tin = Sn100

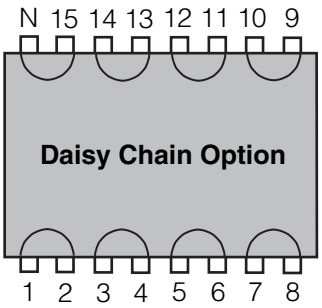
SOJ - Small Outline J-Lead



50 mil Pitch (1.27mm)

Dummy Component Ordering Information

Nbr Leads	Body Width Mils	Body Width Metric	Tape Info Width	Tape Info Pitch	Tube Part Number XS1	Tube Qty	4" (100mm) Tape & Reel Part Number XM1	4" Qty	13" (330mm) Tape & Reel Part Number XS1	13" Qty
18	300	7.5mm	24mm	12mm	SOLJ18M	41	-	-	SOLJ18E13A	1000
20	300	7.5mm	24mm	12mm	SOLJ20M	33~37	-	-	SOLJ20E13A	1000
24	300	7.5mm	24mm	12mm	SOLJ24M	31	-	-	SOLJ24E13A	1000
20/26	300	7.5mm	24mm	12mm	SOLJ20/26M	27	SOLJ20/26E4A	100	SOLJ20/26E13A	1000
24/26	300	7.5mm	24mm	12mm	SOLJ24/26M	25~30	-	-	SOLJ24/26E13A	1000
28	300	7.5mm	24mm	12mm	SOLJ28M	25~27	SOLJ28E4A	100	SOLJ28E13A	1000
28	400	10.0mm	24/32mm	16mm	SOXJ28M	25~26	-	-	SOXJ28E13A	1000
32	300	7.5mm	32mm	16mm	SOLJ32M	22~23	-	-	SOLJ32E13A	1000
32	400	10.0mm	32mm	16mm	SOXJ32M	22~23	-	-	SOXJ32E13A	500~1000
36	400	10.0mm	44mm	16mm	SOXJ36M	22	-	-	SOXJ36E13A	500~1000
40	400	10.0mm	44mm	16mm	SOXJ40M	15~18	-	-	SOXJ40E13A	500~1000
42	400	10.0mm	44mm	16mm	SOXJ42M	16~17	-	-	SOXJ42E13A	500~1000
44	400	10.0mm	44mm	16mm	SOXJ44M	17	-	-	SOXJ44E13A	500~1000



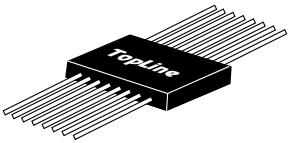
PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)

INFO

TopLine supplies a variety of SOJ packages with 50 mil (1.27mm) lead pitch. The DRAM package uses 20 leads on a 26-pin body (6-leads missing) or 24 leads on a 28-lead body. Tube quantities may vary. For completely isolated (no internal connections) add -ISO to end of part number. Solder plating on leads is Sn85/Pb15.

Lead Free Option: Sn100 add -TIN to end of part number.

Flat Pack

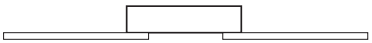


Dummy Component Ordering Information

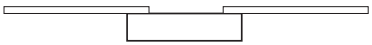
Nbr Leads	Case Size	Lead Pattern	Lead Braze	XF1 Part Number
50 mil Pitch				
10	.25” SQ	All Straight	Bottom	FP10C50SQ.25B
10	.25” SQ	All Straight	Side	FP10F50SQ.25S
14	.26” x .34”	All Straight	Side	FP14C50R.26x.34S
16	.25” x .38”	All Straight	Side	FP16C50R.25x.38S
20	.27” x .40”	L-Ends	Side	FP20F50R.27x.40S
20	.27” x .50”	All Straight	Side	FP20F50R.27X.50S
24	.27” x .40”	L-Ends	Side	FP24C50R.27x.40S
24	.30” x .50”	All Straight	Side	FP24C50R.30x.50S
24	.40” x .50”	All Straight	Bottom	FP24F50R.40X.50B
24	.40” x .60”	All Straight	Bottom	FP24F50R.40X.60B
28	.40” x .72”	All Straight	Side	FP28F50R.40x.72S
28	.50” x .72”	All Straight	Side	FP28F50R.50x.72S
32	.40” x .820”	All Straight	Bottom	FP32F50R.40X.82B
42	.64” x 1.06”	All Straight	Top	FP42F50R.64x1.06T

Lead Locations

Side/Sandwich
Code S



Bottom Brazed
Code B

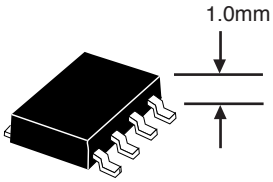


Top Brazed
Code T

Part Number

Packaging	Code	Lead Plating	Part Nbr Suffix
Carrier	C	Gold	Blank
Lead Frame	F	Solder Coat	-SC
		Daisy Chain	-DE
		Without Lid	-N

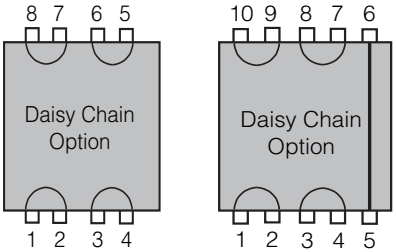
MSOP
Gull Wing
Miniature Small Outline Package



Dummy Component Ordering Information

Nbr Leads	Body Width Mils	Body Width Metric	Tape Info Width	Tape Info Pitch	Lead Pitch mils	Lead Pitch mm	Tube Part Number XS1	Tube Qty	7" (180mm) Tape & Reel Part Number XS1	Tape & Reel Qty
8	118	3mm	12mm	8mm	25.6mils	0.65mm	MSOP8M	50~98	MSOP8E7A	3000
10	118	3mm	12mm	8mm	19.7mils	0.50mm	MSOP10M	50~98	MSOP10E7A	3000

Daisy Chain available
add -DE to end of part number

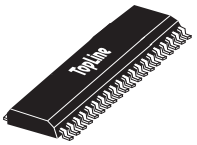


PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)

INFO

Solder plated leadsSn85/Pb15. For Daisy Chain add -DE to end of part number
For completely isolated (no internal connections) add -ISO to end of part number.
Lead Free. Suffix -Tin = Sn100

SSOP
Shrink Small Outline Packages



Dummy Component Ordering Information

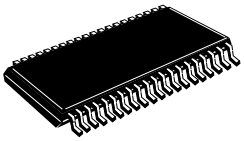
Body Width	Nbr Lead Leads	Nbr Lead Pitch	Tape Info Width	Tape Info Pitch	Tube Part Number XS1	Qty	13" (330mm) Tape & Reel Part Number XS1	Qty
150mil (3.9mm)	16	0.636mm	12mm	8mm	QSOP16M25	99	QSOP16E13A25	1000
	20	0.636mm	16mm	8/12mm	QSOP20M25	55	QSOP20E13A25	1000
	24	0.636mm	16mm	8/12mm	QSOP24M25	55	QSOP24E13A25	1000
	28	0.636mm	16mm	8/12mm	QSOP28M25	48	QSOP28E13A25	1000
	40	0.5mm	16mm	8mm	QVSOP40M19.7	48	QVSOP40E13A19.7	1000
	48	0.4mm	16mm	8mm	QVSOP48M15.7	48	QVSOP48E13A15.7	1000
	80	0.5mm	24mm	12mm	QVSOP80M19.7	24	QVSOP80E13A19.7	1000
208 mil (5.3mm)	8	.65mm	12mm	8mm	SSOP8M25	160	SSOP8E13A25	2500
	14		12/16mm	12mm	SSOP14M25	77	SSOP14E13A25	1000
	16		12/16mm	12mm	SSOP16M25	77	SSOP16E13A25	1000
	20		16mm	12mm	SSOP20M25	66	SSOP20E13A25	1000
	24		16mm	12mm	SSOP24M25	59	SSOP24E13A25	1000
	28		16/24mm	12mm	SSOP28M25	47	SSOP28E13A25	1000
300 mil (7.5mm)	34	1.0mm	24mm	12/16mm	SSOP34M40	27	SSOP34E13A40	1000
	36	0.8mm	24mm	12/16mm	SSOP36M30	31	SSOP36E13A30	1000
	44	0.8mm	32mm	12/16mm	SSOP44M30	27	SSOP44E13A30	1000
	48	1.0mm	32mm	12/16mm	SSOP48M40	30	SSOP48E13A40	1000
	48	0.636mm	32mm	12/16mm	SSOP48M25	30	SSOP48E13A25	1000
	56	0.636mm	32mm	12/16mm	SSOP56M25	26	SSOP56E13A25	1000
270mil (6.8mm)	16	0.8mm	16mm	12mm	PFP16M30F	68	PFP16E13A30F	1000
433mil (11mm) Exposed Heat Sink	20	1.27mm	44mm	24mm	HSOP20M	30	HSOP20E13A	500
	24	1.0mm	44mm	24mm	HSOP24M40	30	HSOP24E13A40	500
	30	0.8mm	44mm	24mm	HSOP30M30	30	HSOP30E13A30	500
	36	0.65mm	44mm	24mm	HSOP36M25	30	HSOP36E13A25	500
	44	0.65mm	44mm	24mm	HSOP44M25	30	HSOP44E13A25	500

INFO

SSOP - Shrink Small Outline Packages in 0.65mm (25.7 mil) and 0.80mm (31.5 mil) lead pitch.
Package height is 1.63mm for 150 mil wide body, 1.75mm for 208 mil wide body and 2.3mm high for 300 mil wide body. The QSOP package is a true 25.0 mil lead pitch (0.636mm). Standard plated leadsSn85/Pb15.

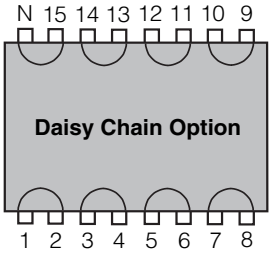
Lead Free Option. B = Sn/Bi. F = NiPd. -TIN = Sn100.

TSSOP
Thin Shrink Small Outline Package



Dummy Component Ordering Information

Body Length	Nbr Lead Leads	Nbr Lead Pitch	Tape Info Width	Tape Info Pitch	Tube Part Number XS1	Tube Part Number Qty	13" (330mm) Tape & Reel Part Number XS1	13" (330mm) Tape & Reel Part Number Qty
173 mil (4.4mm) Wide								
3.0mm	8	0.65mm	12/16mm	8mm	TSSOP8M25	100	TSSOP8E13A25	1000-3000
5.0mm	14	0.65mm	12/16mm	8mm	TSSOP14M25	96	TSSOP14E13A25	1000-3000
5.0mm	16	0.65mm	12/16mm	8mm	TSSOP16M25	90-96	TSSOP16E13A25	1000-3000
6.5mm	20	0.65mm	16mm	8/12mm	TSSOP20M25	74-76	TSSOP20E13A25	1000-3000
7.8mm	24	0.65mm	16mm	8/12mm	TSSOP24M25	62-63	TSSOP24E13A25	1000-3000
9.7mm	28	0.65mm	16mm	8/12mm	TSSOP28M25	50	TSSOP28E13A25	1000-3000
7.8mm	30	0.5mm	16mm	8/12mm	TSSOP30M19.7	62	TSSOP30E13A19.7	1000-3000
9.7mm	38	0.5mm	16mm	8/12mm	TSSOP38M19.7	49-50	TSSOP38E13A19.7	1000-3000
11.3mm	44	0.5mm	24mm	12mm	TSSOP44M19.7	42	TSSOP44E13A19.7	1000-3000
9.7mm	48	0.4mm	16mm	8/12mm	TSSOP48M15.7	50	TSSOP48E13A15.7	1000-3000
11.3mm	56	0.4mm	24mm	12mm	TSSOP56M15.7	42	TSSOP56E13A15.7	1000-3000
240 mil (6.1mm) Wide								
9.7mm	28	0.65mm	24mm	12mm	TSSOPW28M25	50	TSSOPW28E13A25	1000-3000
11.0mm	32	0.65mm	24mm	12mm	TSSOP32M25	44	TSSOP32E13A25	1000-3000
12.5mm	38	0.65mm	24mm	12mm	TSSOP38M25	39	TSSOP38E13A25	1000-3000
12.5mm	48	0.5mm	24mm	12mm	TSSOP48M19.7	39	TSSOP48E13A19.7	1000-3000
14.0mm	56	0.5mm	24mm	12mm	TSSOP56M19.7	35	TSSOP56E13A19.7	1000-3000
17.0mm	64	0.5mm	24mm	12mm	TSSOP64M19.7	28	TSSOP64E13A19.7	1000-3000
17.0mm	80	0.4mm	24mm	12mm	TSSOP80M15.7	28	TSSOP80E13A15.7	1000-3000



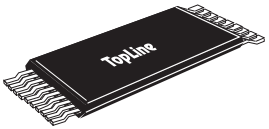
PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)

INFO

TopLine supplies TSSOP - Thin Shrink Small Outline Packages in 1.0mm height. Tape width and pitch may vary. Tube quantities may vary. Call TopLine for details. Standard plated leads Sn85/Pb15.

Lead Free. Suffix -B = Sn/Bi, suffix -TIN = Sn100.

TSOP - Type 1
Thin Small Outline Package



Dummy Component Ordering Information

Lead Nbr	Lead Pitch	Case Size Includes Leads	Tape Info Width	Tape Info Pitch	Tray Part Number XO1	Qty	13" (330mm) Tape & Reel Part Number XO1	Qty
28	0.55mm	8 x 13.4mm	24mm	12mm	TSOP28ST21.6-T1	234	TSOP28SE13A21.6-T1	1000
28/32	0.5mm	8 x 20mm	32mm	12/16mm	TSOP28/32T19.7-T1	156	TSOP28/32E13A19.7-T1	1000
32	0.5mm	8 x 20mm	32mm	12/16mm	TSOP32T19.7-T1	156	TSOP32E13A19.7-T1	1000
32	0.5mm	8 x 13.4mm	24mm	12mm	TSOP32ST19.7-T1	234	TSOP32SE13A19.7-T1	1000
40	0.5mm	10 x 14mm	24mm	16mm	TSOP40ST19.7-T1	160	TSOP40SE13A19.7-T1	1000
40	0.5mm	10 x 20mm	32mm	16mm	TSOP40T19.7-T1	120	TSOP40E13A19.7-T1	1000
48	0.5mm	12 x 20mm	32mm	16mm	TSOP48T19.7-T1	96	TSOP48E13A19.7-T1	1000
56	0.5mm	14 x 20mm	32mm	24mm	TSOP56T19.7-T1	96	TSOP56E13A19.7-T1	1000

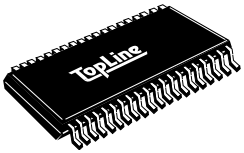
PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Alloy42	A42
Lead Free	-TIN (Sn100)

INFO

TopLine offers TSOP-Type 1 packages in lead counts from 28 to 56. Package thickness is 1.0mm with maximum seated height of 1.2mm. Type 1 indicates leads extending from narrow end of body. For Daisy Chain available on special order, add -DE to end of part number. For completely isolated (no internal connections) add -ISO to end of part number. TSOP contain internal die. Standard plated leads Sn85/Pb15.

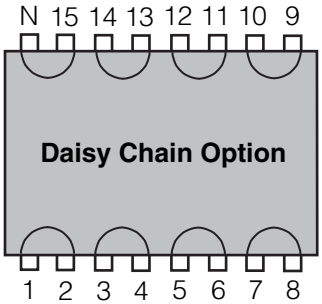
Lead Free. Suffix -B = Sn/Bi, suffix -TIN = Sn100.

TSOP - Type 2
Thin Small Outline Package



Dummy Component Ordering Information

Lead Nbr	Lead Pitch	Case Size Excludes Leads	Tape Info Width	Tape Info Pitch	Tray Part Number XO1	Qty	13" (330mm) Tape & Reel Part Number XO1	Qty
32	1.27mm	10 x 21.0mm	32mm	16mm	TSOP32T50-T2	117	TSOP32E13A50-T2	500~1000
40/44	0.8mm	10 x 18.4mm	32mm	16mm	TSOP40/44T30-T2	135	TSOP40/44E13A30-T2	500~1000
44	0.8mm	10 x 18.4mm	32mm	16mm	TSOP44T30-T2	135	TSOP44E13A30-T2	500~1000
44/50	0.8mm	10 x 21mm	32mm	16mm	TSOP44/50T30-T2	117	TSOP44/50E13A30-T2	500~1000
50	0.8mm	10 x 21mm	32mm	16mm	TSOP50T30-T2	117	TSOP50E13A30-T2	500~1000
54	0.8mm	10 x 22.2mm	32mm	16mm	TSOP54T30-T2	108	TSOP54E13A30-T2	500~1000
66	0.65mm	10 x 22.2mm	32mm	16mm	TSOP66T25-T2	108	TSOP66E13A25-T2	500-1000
86	0.5mm	10 x 22.2mm	32mm	16mm	TSOP86T19.7-T2	108	TSOP86E13A19.7-T2	500-1000

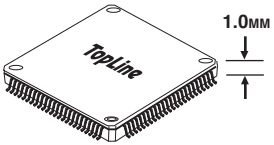


PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Alloy42	A42
Lead Free	-TIN (Sn100)

INFO

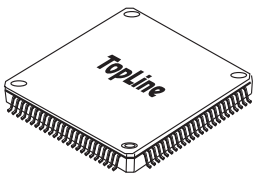
TSOP Type II have leads protruding from the wide side of the package. Maximum seated height is 1.2mm.
Tray and tape quantities may vary. TSOP contain internal die. Solder plated leadsSn85/Pb15.
Lead Free. Suffix -TIN = Sn100.

TQFP 1.0mm Thick
Thin Quad Flat Pack

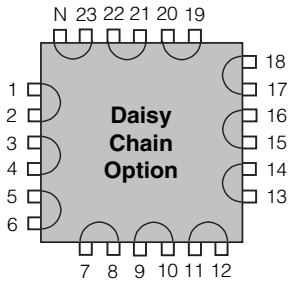


Dummy Component Ordering Information

Nbr Leads	Lead Pitch mm	Lead Pitch mils	Body Size A x B	Tape Info Width	Tape Info Pitch	Tray Part Number XQ1	Qty	13" (330mm) Tape & Reel Part Number XQ1	Qty
32	0.5	19.7	5mm	16mm	12mm	TQFP32T19.7	360	TQFP32E13A19.7	2500
32	0.8	31.5	7mm	16mm	12mm	TQFP32T30	250	TQFP32E13A30	1000
44	0.8	31.5	10mm	24mm	16mm	TQFP44T30	160	TQFP44E13A30	1000
48	0.5	19.7	7mm	16mm	12mm	TQFP48T19.7	250	TQFP48E13A19.7	1000
52	0.65	25.6	10mm	24mm	16mm	TQFP52T25	160	TQFP52E13A25	1000
64	0.4	15.7	7mm	16mm	12mm	TQFP64T15.7	250	TQFP64E13A15.7	1000
64	0.5	19.7	10mm	24mm	24mm	TQFP64T19.7	160	TQFP64E13A19.7	1000
64	0.8	31.5	14mm	24mm	16mm	TQFP64T30	90	TQFP64E13A30	1000
80	0.4	15.7	10mm	24mm	16mm	TQFP80T15.7	160	TQFP80E13A15.7	1000
80	0.5	19.7	12mm	24mm	24mm	TQFP80T19.7	119	TQFP80E13A19.7	1000
80	0.65	25.6	14mm	24mm	24mm	TQFP80T25	90	TQFP80E13A25	1000
100	0.5	19.7	14mm	24mm	24mm	TQFP100T19.7	90	TQFP100E13A19.7	1000
120	0.4	15.7	14mm	24mm	24mm	TQFP120T15.7	90	TQFP120E13A15.7	1000
128	0.4	15.7	14mm	24mm	24mm	TQFP128T15.7	90	TQFP128E13A15.7	1000
144	0.5	19.7	20mm	44mm	24mm	TQFP144T19.7	60	TQFP144E13A19.7	1000
176	0.4	15.7	20mm	44mm	24mm	TQFP176T15.7	60	TQFP176E13A15.7	1000



For “C” and “D” dimensions add 2.0mm to dimension “A” or “B”



Daisy Chain
available on special order
Add -DE to end of part number

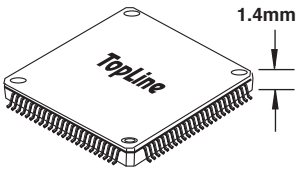
PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)

INFO

Thin Quad Flat Packs (TQFP) are 1.0mm thick. Lead length is 1.0mm per side. Add 2.0mm to body dimension for tip to tip of leads. For Daisy Chain “Even” add -DE to end of part number. For completely isolated (no internal connections) add -ISO to end of part number. Solder plating Sn85/Pb15.

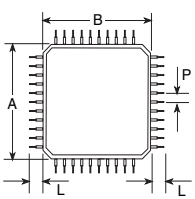
Lead Free. Suffix B= Sn/Bi, TIN = Sn100.

LQFP 1.4mm Thick Low Profile Quad Flat Pack

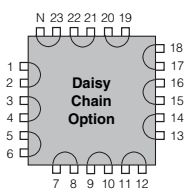


Dummy Component Ordering Information

Nbr Leads	Lead Pitch mm	Lead Pitch mils	Body Size A x B	Tape Info Width	Tape Info Pitch	Tray Part Number XQ1	Tray Qty	13" (330mm) Tape & Reel Part Number XQ1	Tape & Reel Qty
32	0.8	31.5	7mm	16mm	12mm	LQFP32T30	250	LQFP32E13A30	1000
44	0.8	31.5	10mm	24mm	16/24mm	LQFP44T30	160	LQFP44E13A30	1000
48	0.5	19.7	7mm	16mm	12mm	LQFP48T19.7	250	LQFP48E13A19.7	1000
52	0.65	25.6	10mm	24mm	16/24mm	LQFP52T25	160	LQFP52E13A25	1000
64	0.4	15.7	7mm	16mm	12mm	LQFP64T15.7	250	LQFP64E13A15.7	1000
64	0.5	19.7	10mm	24mm	16/24mm	LQFP64T19.7	160	LQFP64E13A19.7	1000
64	0.8	31.5	14mm	24mm	20/24mm	LQFP64T30	90	LQFP64E13A30	1000
80	0.4	15.7	10mm	24mm	16/24mm	LQFP80T15.7	160	LQFP80E13A15.7	1000
80	0.5	19.7	12mm	24mm	16/24mm	LQFP80T19.7	119	LQFP80E13A19.7	1000
80	0.65	25.6	14mm	24mm	20/24mm	LQFP80T25	90	LQFP80E13A25	1000
100	0.5	19.7	14mm	24mm	20/24mm	LQFP100T19.7	90	LQFP100E13A19.7	1000
100	0.65	25.6	14x20mm	44mm	24mm	LQFP100T25	72	LQFP100E13A25	1000
120	0.4	15.7	14mm	24mm	20/24mm	LQFP120T15.7	90	LQFP120E13A15.7	1000
128	0.4	15.7	14mm	24mm	20/24mm	LQFP128T15.7	90	LQFP128E13A15.7	1000
128	0.5	19.7	14x20mm	44mm	24mm	LQFP128T19.7	72	LQFP128E13A19.7	1000
144	0.5	19.7	20mm	44mm	24mm	LQFP144T19.7	60	LQFP144E13A19.7	1000
160	0.5	19.7	24mm	44mm	32mm	LQFP160T19.7	40	LQFP160E13A19.7	1000
176	0.4	15.7	20mm	44mm	24mm	LQFP176T15.7	60	LQFP176E13A15.7	1000
176	0.5	19.7	24mm	44mm	32mm	LQFP176T19.7	40	LQFP176E13A19.7	500
208	0.5	19.7	28mm	44mm	32mm	LQFP208T19.7	36	LQFP208E13A19.7	500
216	0.4	15.7	24mm	44mm	32mm	LQFP216T15.7	40	LQFP216E13A15.7	500
256	0.4	15.7	28mm	44mm	32mm	LQFP256T15.7	36	LQFP256E13A15.7	500



For dimension “C” or “D” add 2.0mm to dimension “A” or “B”.



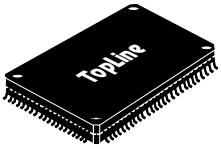
PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)

INFO

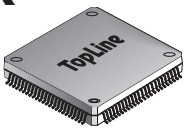
LQFPs are slightly thicker than TQFPs. Leads are 1.0mm long. Add 2.0mm to body size for total overall dimensions. For Daisy Chain “Even,” add -DE to end of part number. For completely isolated (no internal connections) add -ISO to end of part number. Standard plating Sn85/Pb15.

Lead Free. Suffix B = Sn/Bi, TIN = Sn100.

QFP
Quad Flat Pack



Rectangular Body



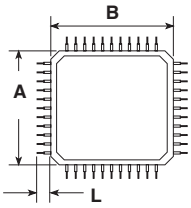
Square Body

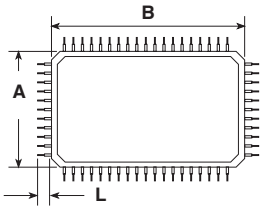
Lead Free
Pb
RoHS Pb-Free

Dummy Component Ordering Information

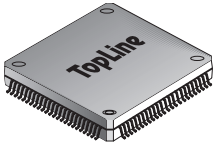
Nbr Leads	2xL FootPrint Adder mm	Lead Pitch mils	Lead Pitch mm	Tray Part Number XQ1	Qty	7" (180mm) Tape & Reel Part Number XM1	Qty	13" (330mm) Tape & Reel Part Number XQ1	Qty
10mm Square Body									
44	3.2mm	31.5	0.8	QFP44T30-3.2	96	QFP44E7A30-3.2	50	QFP44E13A30-3.2	750
44	3.9mm	31.5	0.8	QFP44T30-3.9	96	QFP44E7A30-3.9	50	QFP44E13A30-3.9	750
52	3.2mm	25.6	0.65	QFP52T25-3.2	96	-	-	QFP52E13A25-3.2	750
52	3.9mm	25.6	0.65	QFP52T25-3.9	96	-	-	QFP52E13A25-3.9	750
64	3.2mm	19.7	0.5	QFP64T19.7-3.2	96	-	-	-	-
14mm Square Body									
44	3.2mm	40	1.0	QFP44T40-3.2	84	-	-	QFP44E13A40-3.2	500
52	3.2mm	40	1.0	QFP52T40-3.2	84	-	-	QFP52E13A40-3.2	500
64	3.2mm	31.5	0.8	QFP64T30-3.2-2.0H	84	-	-	QFP64E13A30-3.2-2.0H	500
64	3.2mm	31.5	0.8	QFP64T30-3.2-2.7H	84	-	-	QFP64E13A30-3.2-2.7H	500
80	3.2mm	25.6	0.65	QFP80T25-3.2-2.0H	84	-	-	QFP80E13A25-3.2-2.0H	500
80	3.2mm	25.6	0.65	QFP80T25-3.2-2.7H	84	-	-	QFP80E13A25-3.2-2.7H	500
100	2.0mm	19.7	0.5	SQFP100T19.7-2.0	50	-	-	-	-
14mm x 20mm Rectangular Body									
64	3.2mm	40	1.0	QFP64T40-3.2	60	QFP64E7A40-3.2		QFP64E13A40-3.2	200
64	3.9mm	40	1.0	QFP64T40-3.9	66	QFP64E7A40-3.9	50	QFP64E13A40-3.9	200
80	3.9mm	31.5	0.8	QFP80T30-3.9	66	QFP80E7A30-3.9	50	QFP80E13A30-3.9	200
100	3.2mm	25.6	0.65	QFP100T25-3.2	66	QFP100E7A25-3.2	50	QFP100E13A25-3.2	200
100	3.9mm	25.6	0.65	QFP100T25-3.9	66	QFP100E7A25-3.9	50	QFP100E13A25-3.9	200
100	5.6mm	25.6	0.65	QFP100T25-5.6	60	-	-	-	-
128	3.2mm	19.7	0.5	QFP128T19.7-3.2	66	-	-	-	-

Body Size	Typical Thickness	Tape Info Width	Tape Info Pitch
10mm Sq.	2.0mm	24mm	16/24mm
14mm Sq.	2.0mm	32mm	24mm
14mm Sq.	2.7mm	32mm	24mm
14 x 20mm	2.7mm	44mm	32mm
28mm Sq.	3.6mm	44mm	40mm
32mm Sq.	3.8mm	56mm	44mm
40mm Sq.	3.8mm	-	-





QFP
Quad Flat Pack

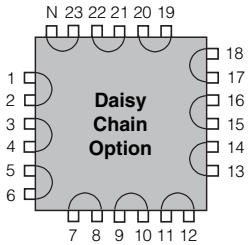


Lead Free Pb RoHS Pb-Free

Dummy Component Ordering Information

Nbr Leads	2xL FootPrint Adder mm	Lead Pitch mils	Lead Pitch mm	Tray Part Number XQ1	Qty	7" (180mm) Tape & Reel Part Number XM1	Qty	13" (330mm) Tape & Reel Part Number XQ1	Qty
28mm Square Body									
120	3.2mm	31.5	0.8	QFP120T30-3.2	24	-	-	QFP120E13A30-3.2	200
120	3.9mm	31.5	0.8	QFP120T30-3.9	24	QFP120E7A30-3.9	50	QFP120E13A30-3.9	200
128	3.2mm	31.5	0.8	QFP128T30-3.2	24	-	-	QFP128E13A30-3.2	200
128	3.9mm	31.5	0.8	QFP128T30-3.9	24	-	-	QFP128E13A30-3.9	200
136	3.2mm	25.6	0.65	QFP136T25-3.2	24	-	-	QFP136E13A30-3.2	200
144	2.6mm	25.6	0.65	QFP144T25-2.6	24	-	-	QFP144E13A25-2.6	200
144	3.2mm	25.6	0.65	QFP144T25-3.2	24	QFP144E7A25-3.2	50	QFP144E13A25-3.2	200
144	3.9mm	25.6	0.65	QFP144T25-3.9	24	-	-	QFP144E13A25-3.9	200
160	2.6mm	25.6	0.65	QFP160T25-2.6	24	-	-	QFP160E13A25-2.6	200
160	3.2mm	25.6	0.65	QFP160T25-3.2	24	QFP160E7A25-3.2	50	QFP160E13A25-3.2	200
160	3.9mm	25.6	0.65	QFP160T25-3.9	24	QFP160E7A25-3.9	50	QFP160E13A25-3.9	200
184	2.6mm	19.7	0.5	QFP184T19.7-2.6	24	-	-	QFP184E13A19.7-2.6	200
208	2.6mm	19.7	0.5	QFP208T19.7-2.6	24	QFP208E7A19.7-2.6	50	QFP208E13A19.7-2.6	200
256	2.6mm	15.7	0.4	QFP256T15.7-2.6	24	QFP256E7A15.7-2.6	50	QFP256E13A15.7-2.6	200
32mm Square Body									
240	2.6mm	19.7	0.5	QFP240T19.7-2.6	24	-	-	QFP240E13A19.7-2.6	200
40mm Square Body									
304	2.6mm	19.7	0.5	QFP304T19.7-2.6	12	-	-	-	-

Daisy Chain
available on special order
Add -DE to end of part number
See page 35



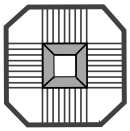
PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)

INFO

TopLine supplies a wide assortment of Quad Flat Packs in metric packages. Add 2 x L foot print to the body size for total tip-to-tip dimension. Coplanarity guaranteed to 4 mils (0.1mm). Tray quantities may vary. Some QFP contain internal die. For completely isolated (no internal connections) add -ISO to end of part number. Standard plating Sn85/Pb15.

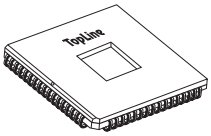
Lead Free option B = Sn/Bi, TIN = Sn100.

CERQUAD & CLCC
Ceramic Quad Flat Pack



CERQUAD

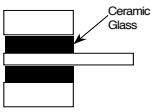
CLCC



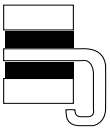
Dummy Component Ordering Information

Nbr Leads	Lead Pitch mils	Lead Pitch mm	Lead Style	Square Body Size Inch	Square Body Size Metric (mm)	Tray Part Number XC1
28	50	1.27	J-lead	0.45	11.5	CLCC28J50
44	50	1.27	J-lead	0.65	16.5	CLCC44J50
52	50	1.27	J-lead	0.75	19.0	CLCC52J50
68	50	1.27	J-lead	0.95	24.1	CLCC68J50
84	50	1.27	J-lead	1.15	29.3	CLCC84J50
44	50	1.27	Flat	0.562	14.3	CERQUAD44F50
52	50	1.27	Flat	0.75	19.0	CERQUAD52F50
68	50	1.27	Flat	0.95	24.1	CERQUAD68F50
84	25	0.635	Flat	0.65	16.5	CERQUAD84F25
84	50	1.27	Flat	1.06	27.0	CERQUAD84F50
132	25	0.635	Flat	0.95	24.1	CERQUAD132F25
132	25	0.635	Flat	0.87	22.1	CERQUAD132F25
132	25	0.635	Gull-wing	0.87	22.1	CERQUAD132G25
172	25	0.635	Flat	1.15	29.3	CERQUAD172F25
196	25	0.635	Flat	1.26	32.0	CERQUAD196F25
208	19.7	0.50	Gull-wing	1.10	28.0	CERQUAD208G19.7
256	20	0.508	Flat	1.46	37.1	CERQUAD256F20
304	20	0.508	Gull-wing	1.54	39.1	CERQUAD304G20
340	15	0.38	Flat	1.39	35.3	CERQUAD340F15

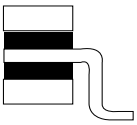
Note: To assure an accurate quotation, please complete the order form on next page. Lids sold separately. Leads may be solder coated or gold. Add -DE to end of part number for daisy chain.



Flat Lead on lead frame



J-lead CLCC



Gull-Wing with tie-bar

Part Number

Options	Part Nbr Suffix
With Lid	Blank
Without Lid	-N
Gold Leads	Blank
Solder Coat Leads	-SC
Completely Isolated	-ISO
Daisy Chain	-DE

CERQUAD SPECIFICATION FORM

Name _____ Title _____

Company _____ Phone _____

email _____ Fax _____

1. Quantity Required _____

2. Body Size _____ x _____ ❑ mm ❑ inch

3. Number of Leads_____

4. Lead Pitch _____ ❑ mm ❑ mils

5. Lead Plating Gold
   Solder Tinned Any Available

6. Lead Style
   - ❑ Flat (with tie Bar)
   - ❑ J-Lead
   - ❑ Gull-Wing with Tie-Bar

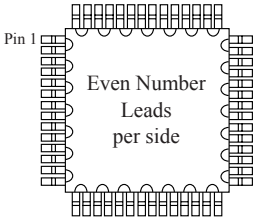
7. Need Delivery By _____

8. Cavity Location
   - ❑ Cavity Up ❑ Cavity Down
   - ❑ Any Available

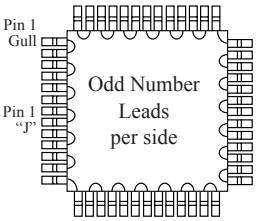
9. Lids
   - ❑ No lids (standard)
   - ❑ Attached lids are required
   - ❑ Any Available

❑ 10. Part Number _____

Typical Daisy Chain



Total Leads:
64, 80,
120, 144, 160,
208, 240, 256



Total Leads:
28, 44,
52, 68, 84,
100, 132, 164,
172, 196, 244

Additional Comments or Requirements:

_____

_____

_____

_____

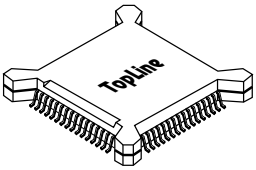
_____

_____

_____
Signature

FAX BACK TO TOPLINE 1-714-891-0321

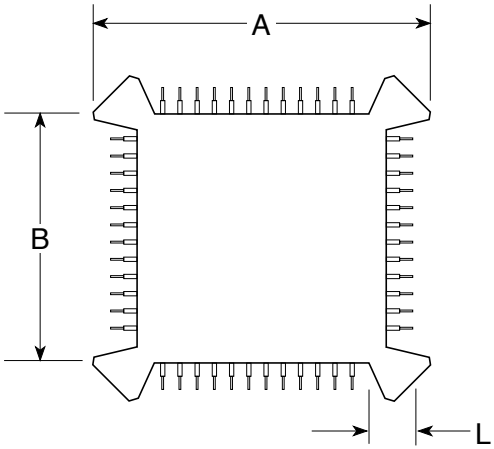
BQFP
Bumper Quad Flat Pack
True 25 mil Pitch



www.DUMMY.tv Document Center

Dummy Component Ordering Information

Nbr Leads	2xL Footprint Adder mm	Lead Pitch mm	B Body Size mm Sq.	Tray Part Number XQ1	Qty	7" (180mm) Tape & Reel Part Number XM1	Qty	13" (330mm) Tape & Reel Part Number XQ1	Qty
100	3.3	0.636	19	BQFP100T25	55	BQFP100E7A25	50	BQFP100E13A25	300
132	3.3	0.636	24.1	BQFP132T25	36	BQFP132E7A25	50	BQFP132E13A25	300

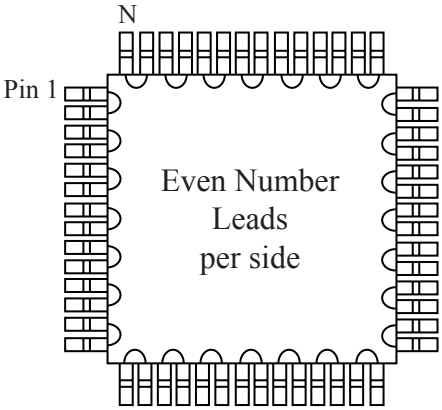


INFO

BQFP Bumper Quad Flat Packs are built to JEDEC (non-metric) standards with true 25mil (0.636mm) lead pitch. The bumpers protect leads from damage during transport in the carrier. Plating Sn85/Pb15.

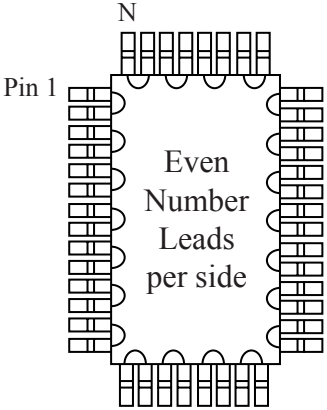
QFP
Daisy Chain

Square Body



Total Number Leads
24, 32, 48, 64, 80, 120, 128, 144
160, 168, 176, 184, 208, 216, 240, 256, 304

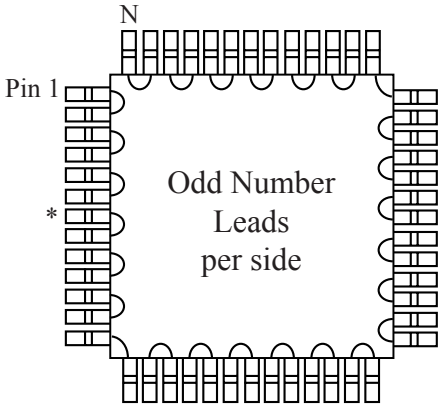
Rectangle Body



Total Number Leads
80, 100, 128

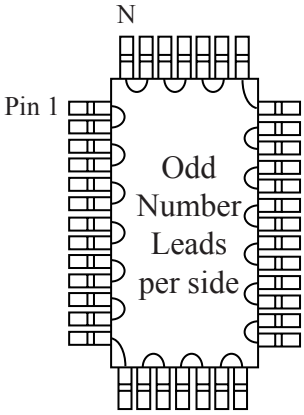
Not to Scale

Square Body



Total Number Leads
28, 44, 52, 68, 84, 100, 132, 164, 172, 196, 244
* Location of Pin 1 for CLCC J-Lead

Rectangle Body



Total Number Leads
64

FLIP CHIP

DUMMY COMPONENT ORDERING INFORMATION

Nbr Bumps	Bump Information Pitch	High	Ø Dia	Material	Die Size Metric	Notes	Die per Bumped 5" Wafer Qty	Waffle 2" SQ Tray Part Number XI1	Qty
48	457µm	140	178µm	Eutectic	6.3mm SQ	PB18	236	FC48D6.3E457	25
88	204µm	107	102µm	Eutectic	5.08mm SQ	PB08	340	FC88G5.08E204	36
96	457µm	140	178µm	Eutectic	12.7mm SQ	PB18	46	FC96D12.7E457	9
112	152µm	85	88µm	Eutectic	5.08mm SQ	PB06	340	FC112K5.08E152	36
176	204µm	107	102µm	Eutectic	10.2mm SQ	PB08	81-85	FC176G10E204	9
220	204µm	125	102µm	Eutectic	10.2 x 15.25mm	PB08	45-48	FC220G10x15E204	6
317	254µm	119	102µm	Eutectic	5.08mm SQ	FA10	340	FC317G5.08E254	36
1268	254µm	119	102µm	Eutectic	10.2mm SQ	FA10	81-85	FC1268G10E254	9
2853	254µm	119	102µm	Eutectic	15.0mm SQ	FA10	28	FC2853G15E254	4
5072	254µm	119	102µm	Eutectic	20.0mm SQ	FA10	18	FC5072G20E254	4

PART NUMBERING SYSTEM

FC 48 D 6.3 E 457 - DC

Flip Chip

FC = Standard Flip Chip
FCW = Bumped Wafer
FCQ = Quartz Flip Chip
FCWQ = Quartz Wafer
FCN = Bumpless Chip
FCWN = Bumpless Wafer

Number Bumps

Actual Count

Bump Diameter

A = 100 x 127µm
B = 115µm SQ
C = 160µm
D = 190µm
E = 56µm SQ
H = 105µm SQ
K = 88µm
G = 100-135µm
R = 100µm SQ
T = 50µm SQ

Die Size

In millimeter
6.3 = 6.3mm SQ
10 x 15 = 10mm x 15mm

Bump Material

E = Eutectic Sn63
G = Gold over Nickel
C = Lead Free Sn/Ag/Cu
A = Aluminum (Bumpless)

Bump Pitch

in µm
(1000m = 1.0µm)

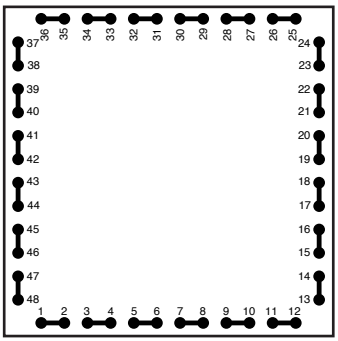
Daisy Chain

INFO

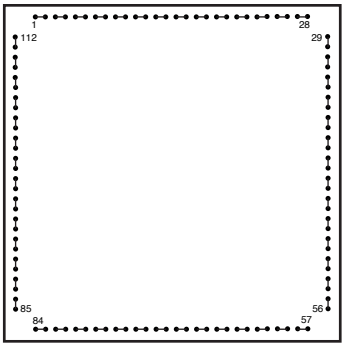
Eutectic 63/37 SnPb allows repeatable bump collapse of 25-40µm for a typical 125µm tall bump. Flip Chips are available with daisy chain (-DC). For bumped wafers, change prefix of part number to FCW. For bumpless flip chip for wire bonding, change suffix to FCN.

Lead Free available, change "E" to "C" in part number for Sn96.8/Ag2.6/Cu0.6 -SAC266 - Lead Free Eutectic Bumps.

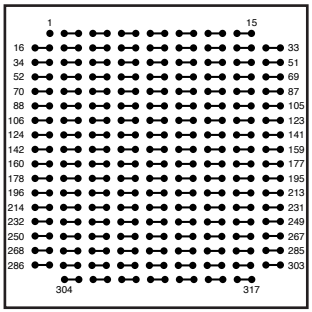
Flip Chip (Bump View)



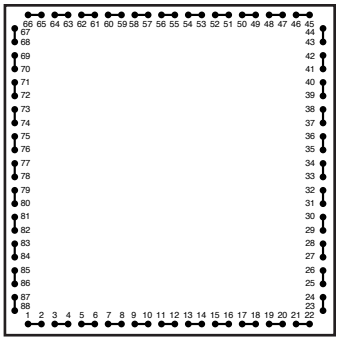
FC48 (PB18 - 250x250)



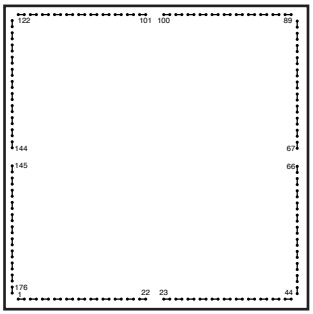
FC112 (PB06 -200x200)



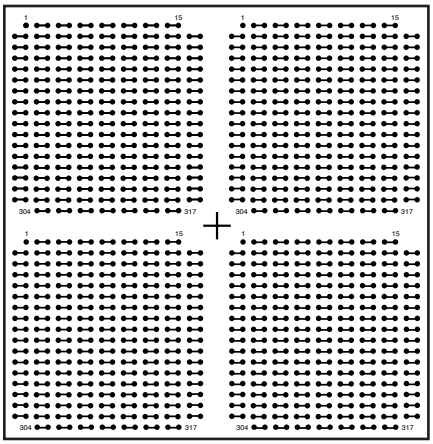
FC317 (FA10-200x200)



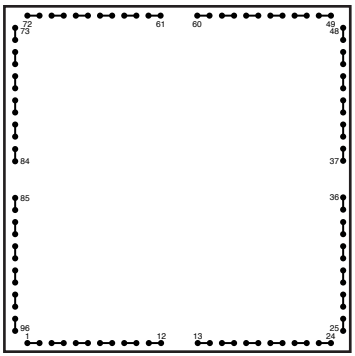
FC88 (PB08 - 200x200)



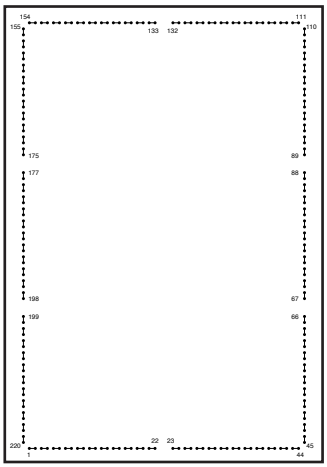
FC176 (PB08 - 400x400)



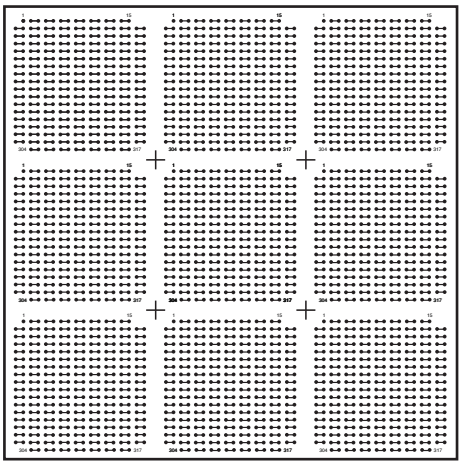
FC1268 (FA10 - 400x400)



FC96 (PB18 - 500x500)

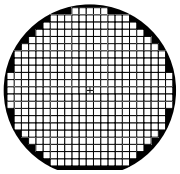


FC220 (PB08 - 400x600)



FC2853 (FA10 - 600x600)

Mechanical Grade Dummy Wafer and Die



Dummy Wafer Ordering Information

Wafer Diameter	Wafer Type	Wafer in Jar Part Number	Wafer in Cassette Part Number	Die Nitto Tape & Ring Part Number
4-inch (100mm)	Mirrored/Polished Wafer	WM4-J	WM4-C	-
	Wafer with Etched Pattern	WE4- mm x mm - J	WE4- mm x mm -C	-
	Wafer with Sawn Mirror Die	-	-	WMD4- mm x mm -NTR
	Wafer with Sawn Etched Die	-	-	WED4- mm x mm -NTR
5-inch (125mm)	Mirrored/Polished Wafer	WM5-J	WM5-C	-
	Wafer with Etched Pattern	WE5- mm x mm - J	WE5- mm x mm -C	-
	Wafer with Sawn Mirror Die	-	-	WMD5- mm x mm -NTR
	Wafer with Sawn Etched Die	-	-	WED5- mm x mm -NTR
6-inch (150mm)	Mirrored/Polished Wafer	WM6-J	WM6-C	-
	Wafer with Etched Pattern	WE6- mm x mm - J	WE6- mm x mm -C	-
	Wafer with Sawn Mirror Die	-	-	WMD6- mm x mm -NTR
	Wafer with Sawn Etched Die	-	-	WED6- mm x mm -NTR
8-inch (200mm)	Mirrored/Polished Wafer	WM8-J	WM8-C	-
	Wafer with Etched Pattern	WE8- mm x mm - J	WE8- mm x mm -C	-
	Wafer with Sawn Mirror Die	-	-	WMD8- mm x mm -NTR
	Wafer with Sawn Etched Die	-	-	WED8- mm x mm -NTR
12-inch (300mm)	Mirrored/Polished Wafer	WM12-J	WM12-C	-
	Wafer with Etched Pattern	-	WE12-mm x mm-C	-
	Wafer with Sawn Mirror Die	-	-	WMD12- mm x mm -NTR
	Wafer with Sawn Etched Die	-	-	WED12-mm x mm-NTR

Typical Wafer Thickness Before Back Grinding

4” wafer = 525μm (20 mils)
5” wafer = 625μm (24 mils)
6” wafer = 680μm (27 mils)
8” wafer = 725μm (29 mils)
12” wafer = 825μm (32 - 33mils)

Options

Back Grinding: Add suffix -BG after wafer size in part number

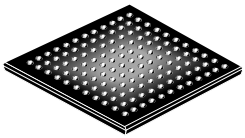
Blue Nitto Tape = NT suffix
Blue Nitto Tape & Ring = NTR suffix
Ultra Violet Tape & Ring = UVR suffix
Die in 2” Waffle Pack: Add -WP2 to part number
Etch Die: ED (sawn)
Mirror Die = MD (sawn)

TopLine®

BGA
Maximum Ball Count

Rows **Matrix**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**
6x6	20	32	36																				
7x7	24	40	49																				
8x8	28	48	60	64																			
9x9	32	56	72	80	81																		
10x10	36	64	84	96	100																		
11x11	40	72	96	112	120	121																	
12x12	44	80	108	128	140	144																	
13x13	48	88	120	144	160	168	169																
14x14	52	96	132	160	180	192	196																
15x15	56	104	144	176	200	216	224	225															
16x16	60	112	156	192	220	240	252	256															
17x17	64	120	168	208	240	264	280	288	289														
18x18	68	128	180	224	260	288	308	320	324														
19x19	72	136	192	240	280	312	336	352	360	361													
20x20	76	144	204	256	300	336	364	384	396	400													
21x21	80	152	216	272	320	373	392	416	432	440	441												
22x22	84	160	228	288	340	384	420	448	468	480	484												
23x23	88	168	240	304	360	408	448	480	504	520	528	529											
24x24	92	176	252	320	380	432	476	512	540	560	572	576											
25x25	96	184	264	336	400	456	504	544	576	600	616	624	625										
26x26	100	192	276	352	420	480	532	576	612	640	660	672	676										
27x27	104	200	288	368	440	504	560	608	648	680	704	720	728	729									
28x28	108	208	300	384	460	528	588	640	684	720	748	768	780	784									
29x29	112	216	312	400	480	552	616	672	720	760	792	816	832	840	841								
30x30	116	224	324	416	500	576	644	704	756	800	836	864	884	896	900								
31x31	120	232	336	432	520	600	672	736	792	840	880	912	936	952	960	961							
32x32	124	240	348	448	540	624	700	768	828	880	924	960	988	1008	1020	1024							
33x33	128	248	360	464	560	648	728	800	864	920	968	1008	1040	1064	1080	1088	1089						
34x34	132	256	372	480	580	672	756	832	900	960	1012	1056	1092	1120	1140	1152	1156						
35x35	136	264	384	496	600	696	784	864	936	1000	1056	1104	1144	1176	1200	1216	1224	1225					
36x36	140	272	396	512	620	720	812	896	972	1040	1100	1152	1196	1232	1260	1280	1292	1296					
37x37	144	280	408	528	640	744	840	928	1008	1080	1144	1200	1248	1288	1320	1344	1360	1368	1369				
38x38	148	288	420	544	660	768	868	960	1044	1120	1188	1248	1300	1344	1380	1408	1428	1440	1444				
39x39	152	296	432	560	680	792	896	992	1080	1160	1232	1296	1352	1400	1440	1472	1496	1512	1520	1521			
40x40	156	304	444	576	700	816	924	1024	1116	1200	1276	1344	1404	1456	1500	1536	1564	1584	1596	1600			
41x41	160	312	456	592	720	840	952	1056	1152	1240	1320	1392	1456	1512	1560	1600	1632	1656	1672	1680	1681		
42x42	164	320	468	608	740	864	980	1088	1188	1280	1364	1440	1508	1568	1620	1664	1700	1728	1748	1760	1764		
43x43	168	328	480	624	760	888	1008	1120	1224	1320	1408	1488	1560	1624	1680	1728	1768	1800	1824	1840	1848	1849	
44x44	172	336	492	640	780	912	1036	1152	1260	1360	1452	1536	1612	1680	1740	1792	1836	1872	1900	1920	1932	1936	
45x45	176	344	504	656	800	936	1064	1184	1296	1400	1496	1584	1664	1736	1800	1856	1904	1944	1976	2000	2016	2024	2025

CSP
Ball Grid Array
0.5mm Pitch



Dummy Component Ordering Information

Fig	Nbr Balls	Body Size	Ball Allignment	Height	Ball Matrix	Substrate	Tray Part Number XJ1	Qty
1	6	1.5 x 1.0mm	Full	0.65mm	3 x 2	Si	CSP6E7A.5-DC023	Reel
2	40	5mm	2-Row	1.24mm	8 x 8	BT	CSP40T.5-DC082	624
3	56	6mm	2-Row	1.24mm	10 x 10	BT	CSP56T.5-DC102	608
4	84	6mm	3-Row	1.1mm	10 x 10	BT	CSP84T.5-DC104	608
5	84	7mm	3-Row	1.1mm	12 x 12	BT	CSP84T.5-DC123	476
6	96	8mm	2-Row	1.24mm	14 x 14	Pi	fBGA96T.5-DC144	360
7	108	7mm	3-Row	1.1mm	12x12	BT	CSP108T.5-DC124	476
8	132	8mm	3-Row	1.1mm	14 x 14	BT	CSP132T.5-DC145	360
9	228	12mm	3-Row	1.1mm	22 x 22	BT	LBGA228T.5-DC222	189
10	288	12mm	4-Row	1.1mm	22 x 22	BT	LBGA288T.5-DC221	189
11	484	12mm	Full	1.1mm	22 x 22	BT	LBGA484T.5-DC229	189
12	2025	25mm	Full	1.8mm	45 x 45	BT	LBGA2025T.5-DC459	44
13	2025	21mm	0.4mm Pitch	1.8mm	45 x 45	BT	LBGA2025T.4-DC459	60

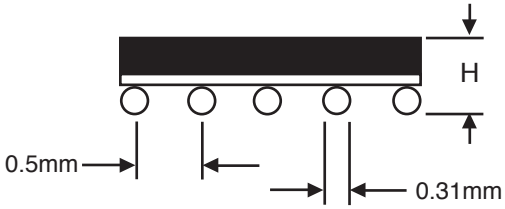
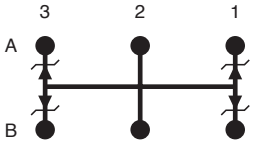


fig. 1



CSP6E7A.5-DC023

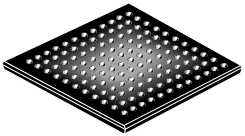
INFO

fBGA - Flex Polyimide substrate. Total package height 1.02mm. Ball diameter is 0.3mm.
For Interior Die, add suffix -D to end of part number

CSP - BT substrate. Total package height 1.24mm. Ball diameter is 0.3mm.
For Internal Die, add suffix -D to end of part number

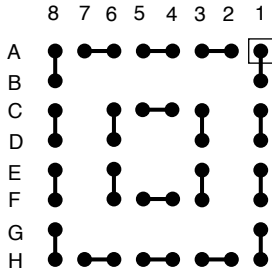
Pb - Lead free option: Add “C” after pitch in part number for SnAgCu balls.

CSP
Ball Grid Array
0.5mm Pitch



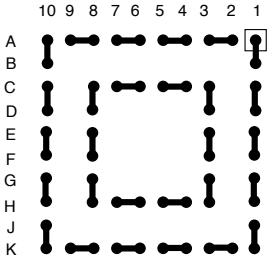
Ball View

fig. 2



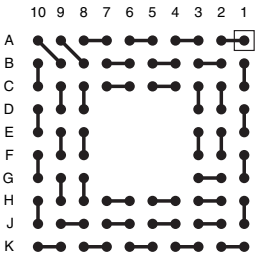
CSP40T.5-DC082

fig. 3



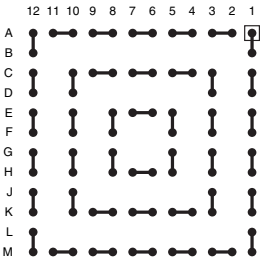
CSP56T.5-DC102

fig. 4



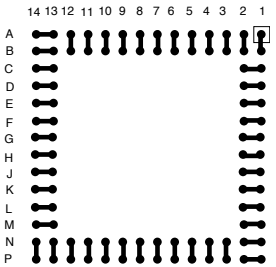
CSP84T.5-DC104

fig. 5



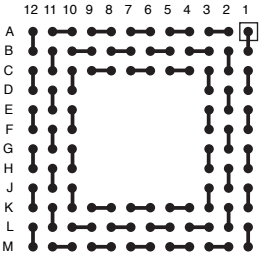
CSP84T.5-DC123

fig. 6



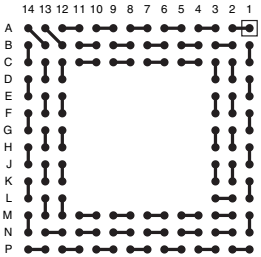
fBGA96T.5-DC144

fig. 7



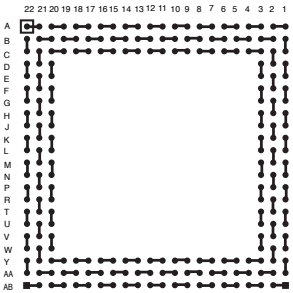
CSP108T.5-DC124

fig. 8



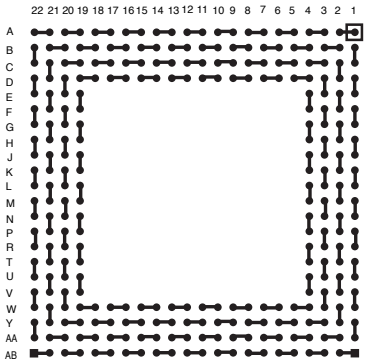
CSP132T.5-DC145

fig. 9



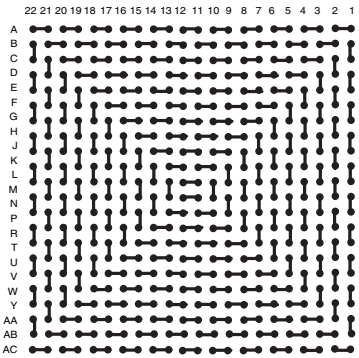
LBGA228T.5-DC222

fig. 10



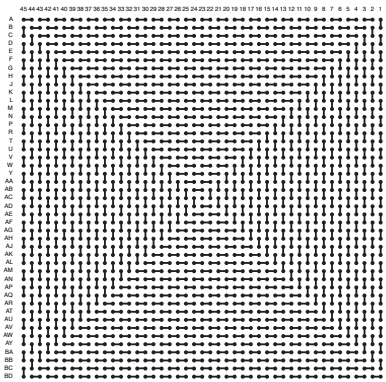
LBGA288T.5-DC221

fig. 11



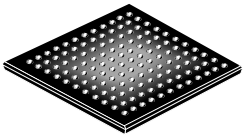
LBGA484T.5-DC229

fig. 12~13



LBGA2025T.5-DC459
LBGA2025T.4-DC459

BGA & CSP
Ball Grid Array
0.75~0.8mm Pitch

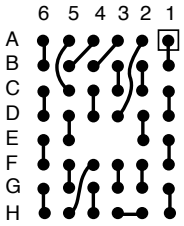


Dummy Component Ordering Information

Fig	Nbr Balls	Body Size	Ball Pattern	Pitch	Ball Matrix	Substrate	Tray Part Number XJ1	Qty
1A	46	6 x 7mm	Full	0.75mm	6 x 8	BT	BGA46T.75-DC24	160
1C	48	6 x 7mm	Full	0.75mm	6 x 8	BT	BGA48T.75-ISO-6x8	160
2	36	6mm	Full		6 x 6	BT	BGA36T.8-DC069	608
1B	48	8 x 9mm	Full		6 x 8	FR4	LBGA48T.8-DC689	297
3	49	7mm	Full		7 x 7	BT	BGA49T.8-DC077	476
4	64	8mm	Full		8 x 8	BT	BGA64T.8-DC089	360
5	81	8mm	Full		9 x 9	BT	BGA81T.8-DC099	360
6	100	10mm	Full		10 x 10	BT	BGA100T.8-DC109	250
7	112	10mm	4-Row	0.8mm	11 x 11	FR4	LBGA112T.8-DC114	184
8	144	12mm	Full		12 x 12	FR4	LBGA144T.8-DC128	189
9	144	13mm	4-Row		13 x 13	FR4	LBGA144T.8-DC134	168/198
10	175	13mm	4-Row		15 x 15	BT	BGA175T.8-DC153	160
11	208	15mm	4-Row		17 x 17	BT	BGA208T.8-DC170	126
12	280	17mm	5-Row		19 x 19	FR4	LBGA280T.8-DC195	90
13	532	23mm	7-Row		26 x 26	FR4	LBGA532T.8-DC266	60
14	2025	40mm	Full		45 x 45	BT	LBGA2025T.8-DC459D	21
15	2025	32.5mm	Full	0.65mm	45 x 45	BT	LBGA2025T.65DC459D	24

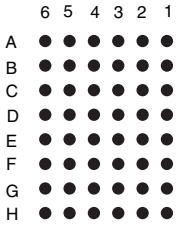
Ball View

fig. 1A



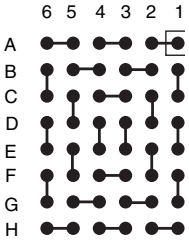
BGA46T.75-DC24

fig. 1C



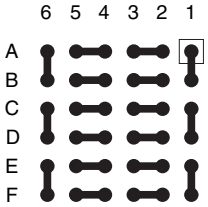
BGA48T.75-ISO-6x8

fig. 1B



LBGA48T.8-DC689

fig. 2



BGA36T.8-DC069

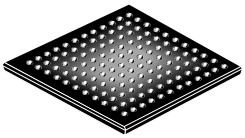
INFO

BGA - Near CSP dimensions on rigid BT substrate with molding compound.
Eutectic Sn63 solder balls 0.46mm diameter. (0.75mm Pitch is 0.3mm ball diameter)

LBGA -FR4 features near CSP dimensions with unencapsulated body.
Eutectic Sn63 solder balls 0.46mm diameter.

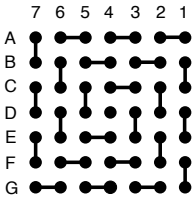
-Lead free option: Add “C” after pitch in part number for SnAgCu balls.

BGA & & CSP
Ball Grid Array
0.75~0.8mm Pitch



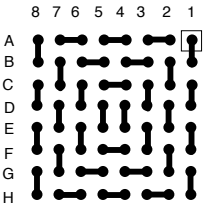
Ball View

fig. 3



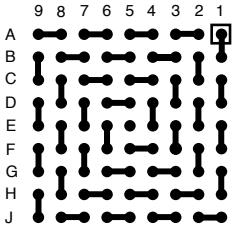
BGA49T.8-DC077

fig. 4



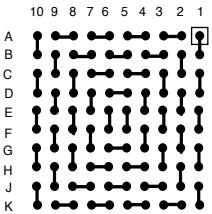
LBGA64T.8-DC089

fig. 5



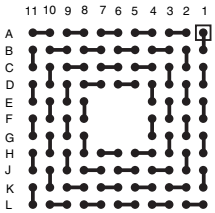
BGA81T.8-DC099

fig. 6



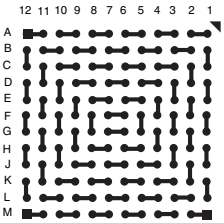
BGA100T.8-DC109

fig. 7



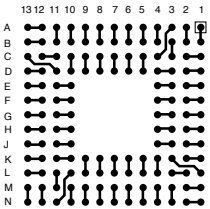
LBGA112T.8-DC114

fig. 8



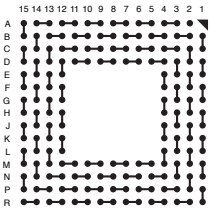
LBGA144T.8-DC128

fig. 9



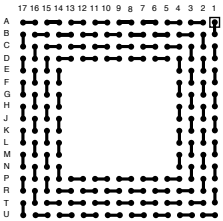
LBGA144T.8-DC134

fig. 10



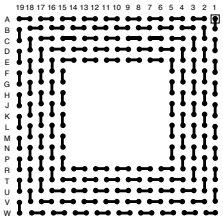
BGA175T.8-DC153

fig. 11



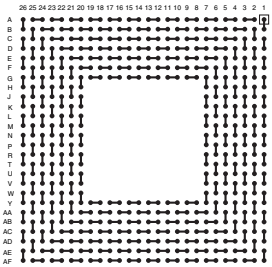
LBGA208T.8-DC170

fig. 12



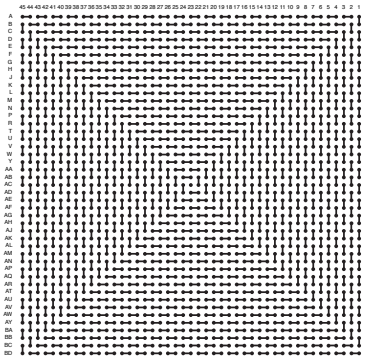
LBGA280T.8-DC195

fig. 13



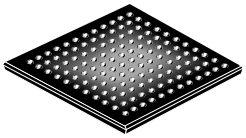
LBGA532T.8-DC266

fig. 14~15



LBGA2025T.8-DC459
LBGA2025T.65-DC459

BGA
Plastic Ball Grid Array
1.0mm Pitch



Lead Free Pb RoHS Pb-Free

Dummy Component Ordering Information

Fig	Nbr Balls	Body Size	Ball Pattern	Center Ball	Ball Matrix	Tray Part Number XJ1 Standard	Tray Part Number XJ1 Unencapsulated	Qty
1	81	10mm	Full Array	NA	9 x 9	BGA81T1.0-ISO	-	250
2	100	11mm	Full Array	NA	10 x 10	BGA100T1.0-ISO	-	176
3	144	13mm	Full Array	NA	12 x 12	BGA144T1.0	LBGA144T1.0-DC128	160/168
4	160	15mm	4-Row	NA	14 x 14	BGA160T1.0-DC147A	-	126
5	192	17mm	4-Row	NA	16 x 16	BGA192T1.0-DC160A	-	90
6	196	15mm	Full Array	NA	14 x 14	BGA196T1.0-DC149A	-	126
7	208	17mm	4-Row	4 x 4	16 x 16	BGA208T1.0-DC164A	-	90
8	256	17mm	Full Array	NA	16 x 16	BGA256T1.0-DC169A	-	90
9	288	23mm	4-Row	NA	22 x 22	BGA288T1.0-DC221	-	60
10	324	23mm	4-Row	6 x 6	22 x 22	BGA324T1.0-DC224	-	60
11	388	27mm	4-Row	6 x 6	26 x 26	BGA388T1.0-DC264	-	40
12	400	21mm	Full Array	NA	20 x 20	-	LBGA400T1.0-DC209	60
13	484	23mm	Full Array	NA	22 x 22	-	LBGA484T1.0-DC229A	60
14	672	27mm	Full Array	NA	26 x 26	-	LBGA672T1.0-DC268	40
15	676	27mm	Full Array	NA	26 x 26	BGA676T1.0-DC269	-	40
16	900	31mm	Full Array	NA	30 x 30	-	LBGA900T1.0-DC309	27
17	1156	35mm	Full Array	NA	34 x 34	-	LBGA1156T1.0-DC349	24
18	1600	42.5mm	Full Array	NA	40 x 40	-	LBGA1600T1.0-DC409	12
19	1936	45mm	Full Array	NA	44 x 44	-	LBGA1936T1.0-DC449	12
-	10,000	115mm	Full Array	NA	100 x 100	-	LBGA10000T1.0-BUS	4

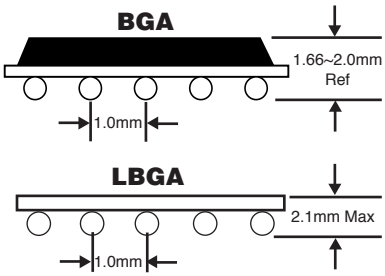
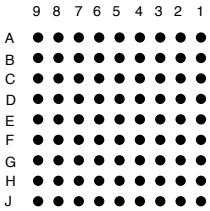
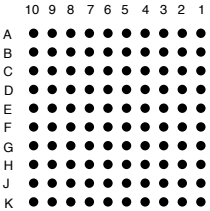


Fig. 1



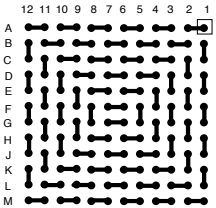
BGA81T1.0-ISO

Fig. 2



BGA100T1.0-ISO

Fig. 3



LBGA144T1.0-DC128

INFO

BGA - Standard BGA plastic packages should be baked at 125˚C for 24 hours prior to assembly to prevent delamination and the “popcorn” phenomena during the assembly process. Solder balls are eutetic Sn63 SnPb 25mil (0.63mm)

LBGA- Unencapsulated profile laminate Ball Grid Arrays offer the lowest cost when placement practice is the primary concern. Includes daisy chain laminate substrate with 25mil (0.63mm) Sn63.

Pb - Lead Free Option: Add “C” after pitch in part number for SnAgCu balls.

BGA
Plastic Ball Grid Array
1.0mm Pitch Ball View

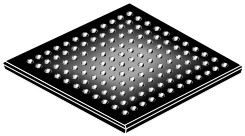
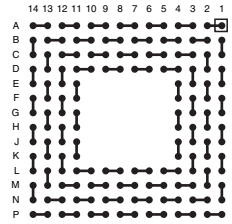
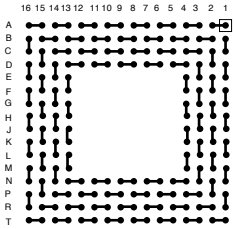


Fig. 4



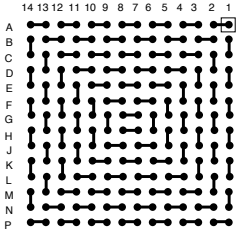
BGA160T1.0-DC147A

Fig. 5



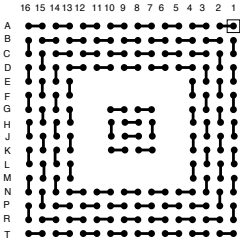
BGA192T1.0-DC160A

Fig. 6



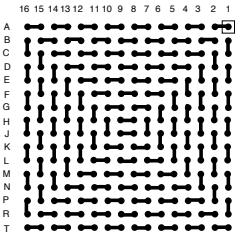
BGA196T1.0-DC149A

Fig. 7



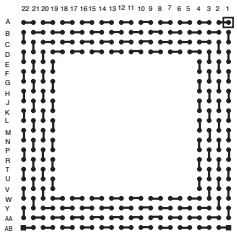
BGA208T1.0-DC164A

Fig. 8



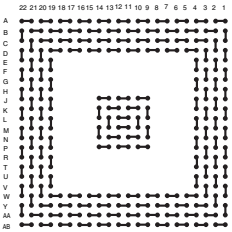
BGA256T1.0-DC169A

Fig. 9



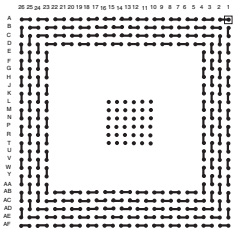
BGA288T1.0-DC221

Fig. 10



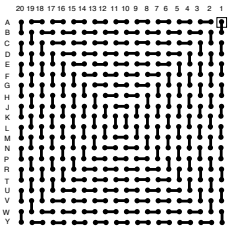
BGA324T1.0-DC224

Fig. 11



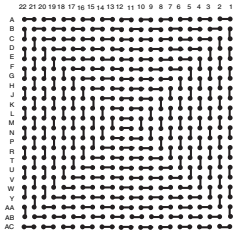
BGA388T1.0-DC264

Fig. 12



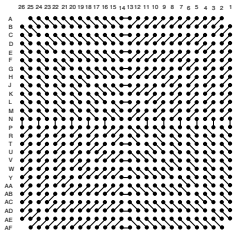
LBGA400T1.0-DC209

Fig. 13



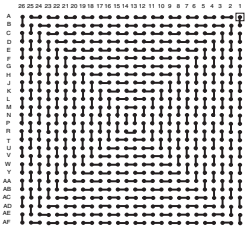
LBGA484T1.0-DC229A

Fig. 14



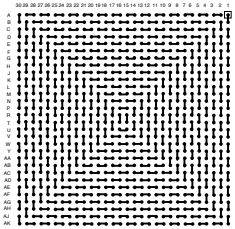
LBGA672T1.0-DC268

Fig. 15



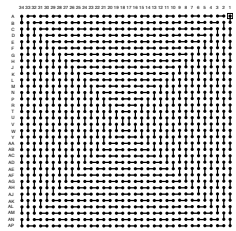
BGA676T1.0-DC269

Fig. 16



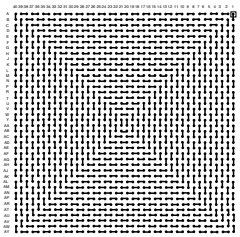
LBGA900T1.0-DC309

Fig. 17



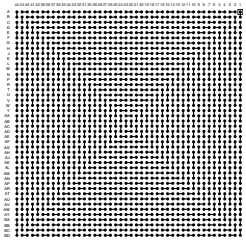
LBGA1156T1.0-DC349

Fig. 18



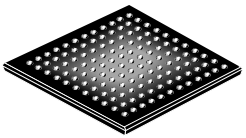
LBGA1600T1.0-DC409

Fig. 19



LBGA1936T1.0-DC449

BGA
Plastic Ball Grid Array
1.27mm Pitch



Lead Free Pb RoHS Pb-Free

Dummy Component Ordering Information

Fig	Nbr Balls	Body Size	Ball Pattern	Center Ball	Ball Matrix	Tray Part Number Standard (XJ1)	Tray Part Number Unencapsulated	Qty
1	208	23mm	4-Row	-0-	17 x 17	BGA208T1.27-DC170	-	60
2	208	23mm	4-Row	-0-	17 x 17	BGA208T1.27-DC171	-	60
3	217	23mm	4-Row	3 x 3	17 x 17	BGA217T1.27-DC172	-	60
4	217	23mm	4-Row	3 x 3	17 x 17	BGA217T1.27-DC174	-	60
5	256	27mm	4-Row	-0-	20 x 20	BGA256T1.27-DC200	-	40
6	256	21mm	Full	-0-	16 x 16	-	LBGA256T1.27-DC61	60
7	272	27mm	4-Row	4 x 4	20 x 20	BGA272T1.27-DC202	-	40
8	352	35mm	4-Row	-0-	26 x 26	BGA352T1.27-DC70	-	24
9	357	25mm	Full	NA	19 x 19	-	LBGA357T1.27-DC73	24
10	388	35mm	4-Row	6 x 6	26 x 26	BGA388T1.27-DC72	-	24
11	1225	45mm	Full	-0-	35 x 35	-	LBGA1225T1.27-DC359	12

Side View

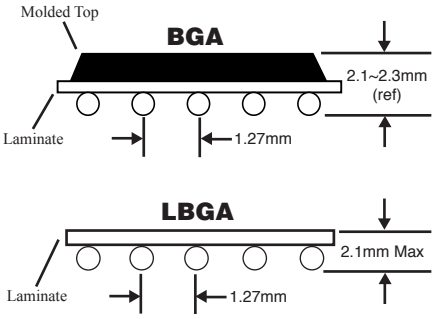
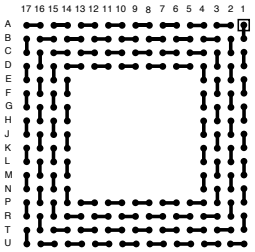
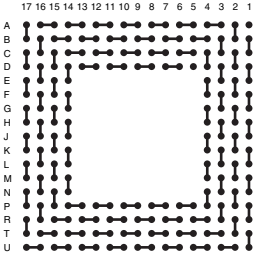


Fig. 1



BGA208T1.27-DC170

Fig. 2



BGA208T1.27-DC171

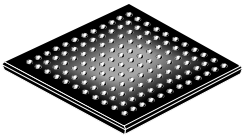
INFO

BGA - Standard BGA plastic packages should be baked at 125˚C for 24 hours prior to assembly to prevent delamination and the “popcorn” phenomena during the assembly process. Solder balls are eutetic Sn63/Pb37 30mil (0.75mm)

LBGA - Laminate Ball Grid Arrays offer the lowest cost when placement practice is the primary concern. Includes daisy chain laminate with 30mil (0.75mm) Sn63/Pb37 balls for soldering at 210˚C.

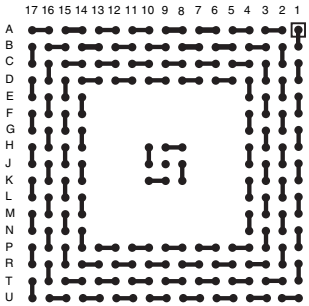
Pb - Lead Free available. SnAgCu = Add “C” after pitch in part number.

BGA
Plastic Ball Grid Array
1.27mm Pitch



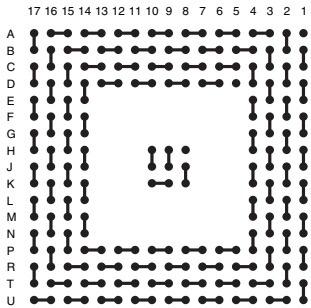
Ball View

Fig. 3



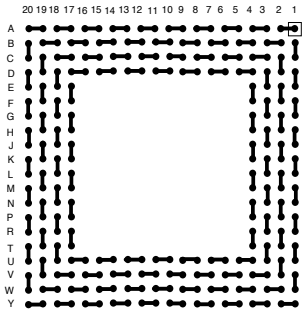
BGA217T1.27-DC172

Fig. 4



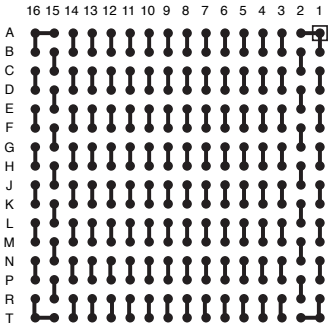
BGA217T1.27-DC174

Fig. 5



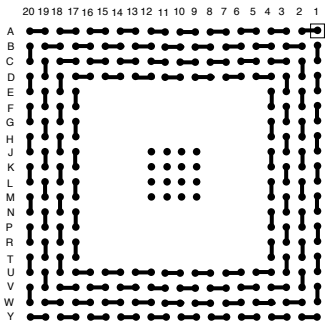
BGA256T1.27-DC200

Fig. 6



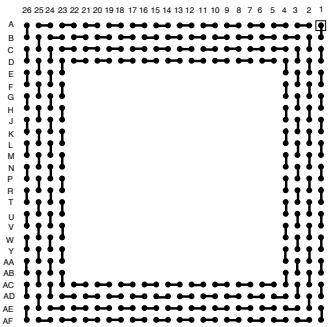
LBGA256T1.27-DC61

Fig. 7



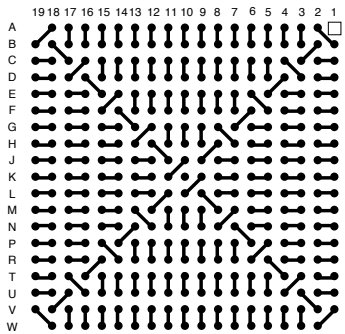
BGA272T1.27-DC202

Fig. 8



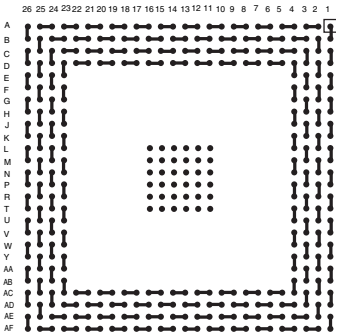
BGA352T1.27-DC70

Fig. 9



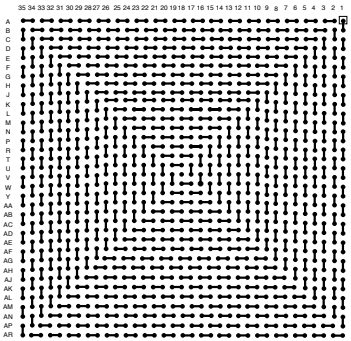
LBGA357T1.27-DC73

Fig. 10



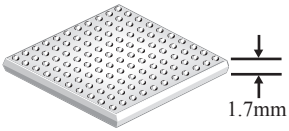
BGA388T1.27-DC72

Fig. 11



LBGA1225T1.27-DC359

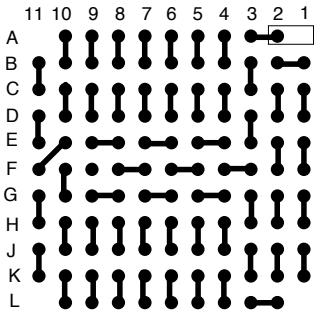
CBGA
Ceramic Ball Grid Array
1.27mm Pitch



Dummy Component Ordering Information

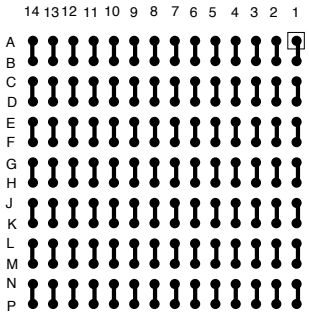
Fig	Nbr Balls	Body Size	Ball Pattern	Ball Matrix	Tray Part Number Low Temp 210˚C XJ1 62/36/2 SnPbAg	Tray Part Number High Temp 320˚C XJ1 10/90 SnPb	Qty
1	121	15mm	Full Grid	11 x 11	CBGA121T1.27L-DC5	CBGA121T1.27-DC5	126
2	196	18.5mm	Full Grid	14 x 14	CBGA196T1.27L-DC11	CBGA196T1.27-DC11	84
3	256	21mm	Full Grid	16 x 16	CBGA256T1.27L-DC61	CBGA256T1.27-DC61	60
4	304	21 x 25mm	Full Grid	16 x 19	CBGA304T1.27L-DC63	CBGA304T1.27-DC63	55
5	361	25mm	Full Grid	19 x 19	CBGA361T1.27L-DC71	CBGA361T1.27-DC71	44
6	400	27mm	Full Grid	20 x 20	CBGA400T1.27L-DC21	CBGA400T1.27-DC21	40
7	625	32.5mm	Full Grid	25 x 25	-	CBGA625T1.27-DC81	24
8	1089	42.5mm	Full Grid	33 x 33	-	CBGA1089T1.27-DC339	12

Fig. 1



CBGA121T1.27-DC5
(Ball View)

Fig. 2



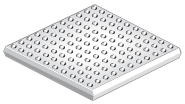
CBGA196T1.27-DC11
(Ball View)

INFO

Ceramic Ball Grid Arrays are not sensitive to moisture and do not require baking prior to assembly. Ball diameter is 30 mils (0.75mm). Standard ball material is Sn10/Pb90 for high temperature soldering at 320˚C to ceramic substrate. For low temperature soldering at 210˚C to laminate substrate, specify Sn62/Pb36/Ag2 solder balls by adding -L to part number. Caution advised CTE mismatch > 25mm.

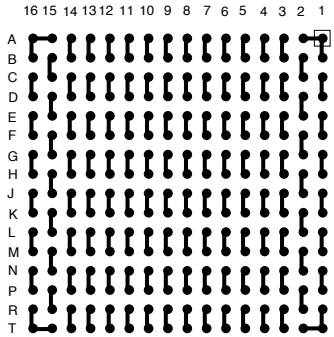
Lead free available with SnAgCu balls. Add“C” after pitch in part number

CBGA - Ceramic Ball Grid Array - 1.27mm Pitch



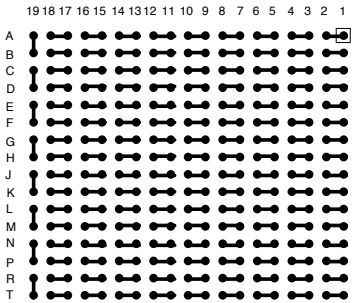
(Ball View)

Fig. 3



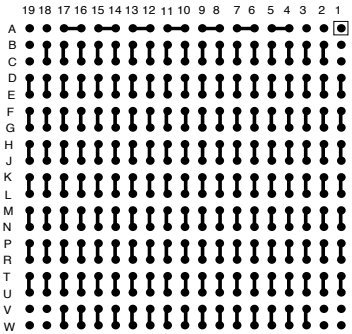
CBGA256T1.27-DC61

Fig. 4



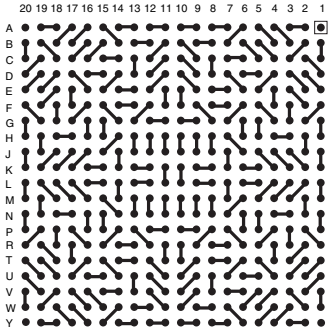
CBGA304T1.27-DC63

Fig. 5



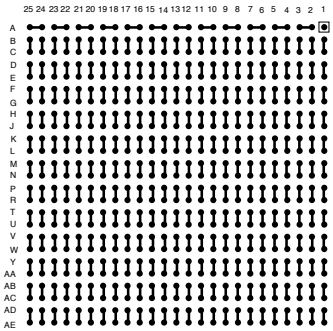
CBGA361T1.27-DC71

Fig. 6



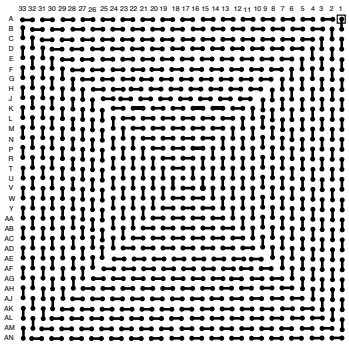
CBGA400T1.27-DC21

Fig. 7



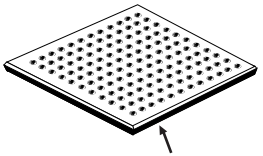
CBGA625T1.27-DC81

Fig. 8



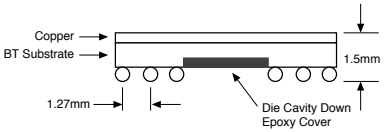
CBGA1089T1.27-DC339

SBGA
Metal Ball Grid Array
1.27mm Pitch



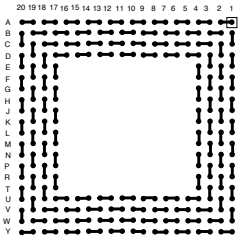
Dummy Component Ordering Information

Fig	Nbr Balls	Body Size	Ball Pattern	Pitch	Ball Matrix	Die Size mini-max	Tray Part Number XJ1	Qty
1	256	27mm	4-Row	1.27mm	20 x 20	6.8 - 9.8mm	SBGA256T1.27-DC200	40
2	304	31mm	4-Row	1.27mm	23 x 23	8.0 - 11mm	SBGA304T1.27-DC230	27
3	352	35mm	4-Row	1.27mm	26 x 26	11.3 - 14.3mm	SBGA352T1.27-DC70	24
4	432	40mm	4-Row	1.27mm	31 x 31	9.7 - 12.7mm	SBGA432T1.27-DC314	21
5	480	37.5mm	5-Row	1.27mm	29 x 29	10 - 14mm	SBGA480T1.27-ISO	21
6	560	42.5mm	5-Row	1.27mm	33 x 33	14.3 - 17.3mm	SBGA560T1.27-DC87	12
7	600	45mm	5-Row	1.27mm	35 x 35	15 - 18mm	SBGA600T1.27-DC355	12



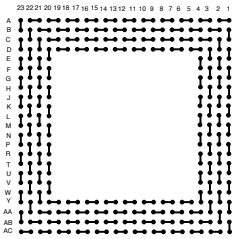
Ball View
Daisy Chain

Fig. 1



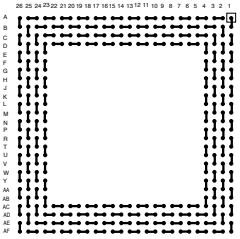
SBGA256T1.27-DC200

Fig. 2



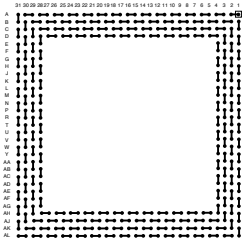
SBGA304T1.27-DC230

Fig. 3



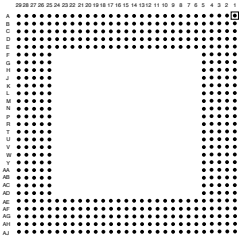
SBGA352T1.27-DC70

Fig. 4



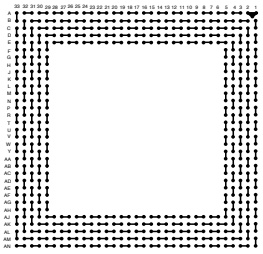
SBGA432T1.27-DC314

Fig. 5



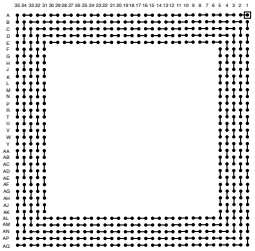
SBGA480T1.27-ISO

Fig. 6



SBGA560T1.27-DC87

Fig. 7

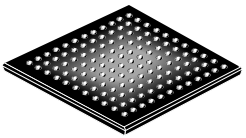


SBGA600T1.27-DC355

INFO

S-BGA - Copper Heat Spreader has superior thermal performance. Die is mounted cavity down.
Substrate is BT. For Polymide Tape dielectric, change part number to TBGA.
Dummy units are supplied with internal die.
- Lead Free Available: Add “C” after pitch in part number for SnAgCu balls.

BGA
Plastic Ball Grid Array
1.5mm Pitch



Dummy Component Ordering Information

Fig	Nbr Balls	Body Size	Ball Pattern	Ball Matrix	Tray Part Number: XJ1 Standard	Tray Part Number: XJ1 Unencapsulated	Qty
1	169	23mm	Full Array	13 x 13	BGA169T1.5-DC10	-	60
2	225	27mm	Full Array	15 x 15	BGA225T1.5-DC15	-	40
3	400	35mm	Full Array	20 x 20	-	LBGA400T1.5-DC20	24

BGA Daisy Chain Patterns (Ball View) - Illustrations Not To Scale

Side View

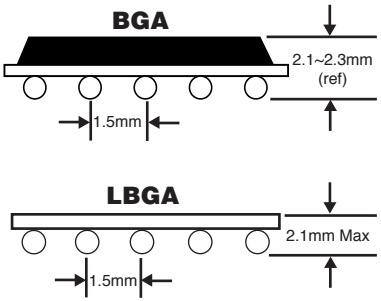
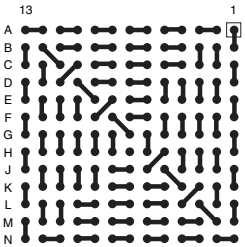
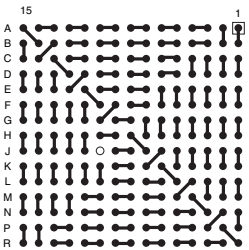


Fig. 1



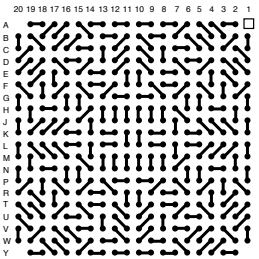
BGA169T1.5-DC10

Fig. 2



BGA225T1.5-DC15

Fig. 3



LBGA400T1.5-DC20

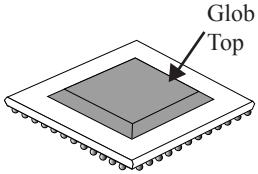
INFO

BGA - Standard BGA plastic packages should be baked at 125˚C for 24 hours prior to assembly to prevent delamination and the “popcorn” phenomena during the assembly process. Solder balls are eutetic 63/37 SnPb 30mil (0.75mm)

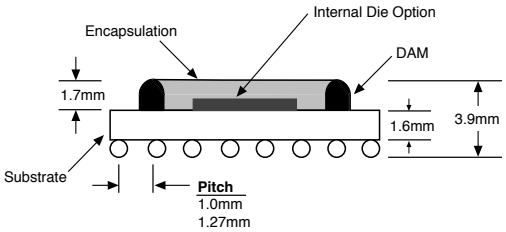
LBGA - Unencapsulated laminate Ball Grid Arrays offer the lowest cost when placement practice is the primary concern. Includes daisy chain laminate substrate with 30mil (0.75mm) SnPb balls for soldering at 210˚C. Since there is no molded or encapsulated top.

Pb - Lead Free Available: Add “C” after pitch in part number for SnAgCu balls.

eBGA
Liquid Encapsulated



Nbr Balls	Body Size	Ball Pattern	Center Ball	Ball Matrix	Tray Part Number XJ1	Qty
1.27mm Pitch						
357	25mm	Full	NA	19 x 19	eBGA357T1.27D73D	44
420	35mm	5-Row	NA	26 x 26	eBGA420T1.27D85D	24
480	35mm	6-Row	NA	26 x 26	eBGA480T1.27D90D	24
540	42.5mm	5-Row	NA	32 x 32	eBGA540T1.27D80D	12
560	42.5mm	5-Row	NA	33 x 33	eBGA560T1.27D87D	12
676	35mm	Full	NA	26 x 26	eBGA676T1.27D269D	24
1089	42.5mm	Full	NA	33 x 33	eBGA1089T1.27D339D	12
1225	45mm	Full	NA	35 x 35	eBGA1225T1.27D359D	12
1.0mm Pitch						
416	31mm	4-Row	NA	30 x 30	eBGA416T1.0D304D	27
480	35mm	4-Row	NA	34 x 34	eBGA480T1.0D344D	24
484	23mm	Full	NA	22 x 22	eBGA484T1.0D229AD	60
580	35mm	5-Row	NA	34 x 34	eBGA580T1.0D345D	24
592	42.5mm	4-Row	NA	41 x 41	eBGA592T1.0D414D	12
620	37.5mm	5-Row	NA	36 x 36	eBGA620T1.0D365D	21
640	45mm	4-Row	NA	44 x 44	eBGA640T1.0D444D	12
672	27mm	Full	NA	26 x 26	eBGA672T1.0D268D	40
720	42.5mm	5-Row	NA	41 x 41	eBGA720T1.0D415D	12
780	45mm	5-Row	NA	44 x 44	eBGA780T1.0D445D	12
900	31mm	Full	NA	30 x 30	eBGA900T1.0D309D	27
1156	35mm	Full	NA	34 x 34	eBGA1156T1.0D349D	24
1444	40mm	Full	NA	38 x 38	eBGA1444T1.0D389D	21
1600	42.5mm	Full	NA	40 x 40	eBGA1600T1.0D409D	12
1936	45mm	Full	NA	44 x 44	eBGA1936T1.0D449D	12



Part Number Configuration

eBGA	1225	T	1.27	D	359	D
Type	**Balls**	**Trays**	**Pitch**		**Circuit**	**Die**
eBGA = Liquid Encapsulated			mm		Daisy Chain	Blank = No Die D = Internal Die
				Ball Matl D = Sn62 Eutectic F = Sn96 Lead Free C = SnAgCu Lead Free		

LGA
Land Grid Array Specification Form

TopLine®

Lead Free Pb RoHS Pb-Free

Name _____ Title _____

Company _____ Phone _____

Email _____ Fax _____

1. Quantity Required _____

2. Body Size _____ x _____mm

3. Number I/O Pads _____

4. Pitch ❑ 1.27mm ❑ 1.0mm ❑ 0.8mm ❑ 0.5mm

5. Pad Material
- ❑ Sn63/Pb37
- ❑ Sn100 Tin
- ❑ Ni-Au (gold)
- ❑ Cu100 with OSP

6. Pad Diameter
- ❑ Standard
- ❑ other _____ mm

7. Solder Mask
- ❑ None ❑ Taiyo PSR4000 AUS5

8. Solder Mask Opening _____

9. Substrate Thickness
- ❑ 1.5mm ❑ 0.6mm
- ❑ 0.8mm ❑ 0.4mm
- ❑ other _____

10. Application
- ❑ Insertion into Socket
- ❑ Ball Attach by Customer
- ❑ Solder to mother board

11. Circuit
- ❑ Daisy Chain
- ❑ All Pads Shorted
- ❑ All Pads Isolated
- ❑ Any Available

12. Substrate Material
- ❑ FR4 ❑ BT
- ❑ Ceramic ❑ Other_____

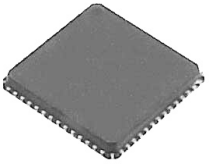
Part Number Configuration

LGA	625	T	1.27	- DC61	G	8
Substrate	**I/O**	**Packaging**	**Pitch**	**Circuit**	**Pad Material**	**Substrate**
Plastic		T = Trays	mm	DC = Daisy Chain Pads BUS = All Pads Shorted ISO = All Pads Isolated	Blank = Sn63/Pb37 T = Sn100 Tin G = Ni-Au Gold C = Cu100 OSP	15 = 1.5mm thick (Standard) 8 = 0.8mm thick 6 = 0.6mm thick 4 = 0.4mm thick

INFO

LGA - Land Grid Arrays for socket insertion, Ball Attach and soldering to mother board.
Available in a variety of configurations and pad heights. Contact TopLine for details.

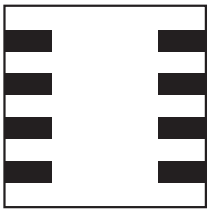
Leadless QFN



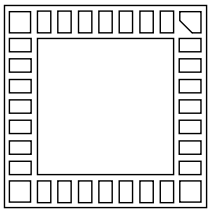
Dummy Component Ordering Information

Body Size SQ	Nbr Lead Leads	Nbr Lead Pitch	Tape Info Width	Tape Info Pitch	Tray Part Number	Qty	XU1 Tube Part Number	Qty
QFN								
2mm	6	0.5mm			DFN6E7A.5	Reel	DFN6B.5	Bulk
2mm	8	0.5mm			DFN8E7A.5	Reel	DFN68B.5	Bulk
2mm	6	0.65mm	8mm	8mm	DFN6E7A.65	Reel	DFN6B.65	Bulk
2mm	8	0.5mm			DFN8E7A.5	Reel	DFN8B.5	Bulk
3mm	10	0.5mm			DFN10T.5	490	DFN10M.5	121
3mm	12	0.5mm			QFN12T.5	490	QFN12M.5	121
4mm	12	0.65mm			QFN12T.65	490	QFN12M.65	91
3mm	16	0.5mm			QFN16T.5	490	QFN16M.5	121
4mm	16	0.65mm			QFN16T.65	490	QFN16M.65	91
5mm	16	0.8mm			QFN16T.8	490	QFN16M.8	73
4mm	20	0.5mm	12mm	8mm	QFN20T.5	490	QFN20M.5	91
4mm	24	0.5mm			QFN24T.5	490	QFN24M.5	91
6mm	24	0.8mm			QFN24T.8	490	QFN24M.8	61
5mm	28	0.5mm			QFN28T.5	490	QFN28M.5	73
5mm	32	0.5mm			QFN32T.5	490	QFN32M.5	73
6mm	28	0.65mm			QFN28T.65	490	QFN28M.65	61
8mm	32	0.8mm			QFN32T.8	260	QFN32M.8	46
7mm	32	0.65mm			QFN32T.65	260	QFN32M.65	42
6mm	40	0.5mm	16mm	12mm	QFN40T.5	490	QFN40M.5	61
7mm	44	0.5mm			QFN44T.5	260	QFN44M.5	52
8mm	44	0.65mm			QFN44T.65	260	QFN44M.65	46
7mm	48	0.5mm			QFN48T.5	260	QFN48M.5	42
8mm	52	0.5mm			QFN52T.5	260	QFN52M.5	37
8mm	56	0.5mm			QFN56T.5	260	QFN56M.5	37
9mm	64	0.5mm			QFN64T.5	260	QFN64M.5	33
10mm	68	0.5mm	24mm	16mm	QFN68T.5	168	QFN68M.5	30
10mm	72	0.5mm			QFN72T.5	168	QFN72M.5	30

Bottom View of Pads



DFN - Dual Side



QFN

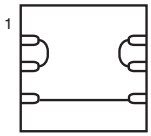
PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)
Lead Free	-F (NiPd)
Lead Free	-G (NiAu)

INFO

Perimeter lead CSP utilize lead frame in an epoxy molded plastic case. Offered with daisy chain, add -DE to end of part number. Available in tubes, trays and on reels.
Standard Lead Plating 85Sn/15Pb.
Lead Free. Suffix -TIN = Sn100 G = Ni-Au, “F” = NiPdAu

TopLine®

Daisy Chain (Top View)



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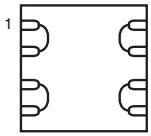

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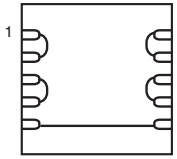

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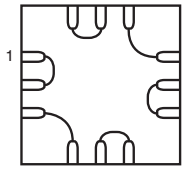

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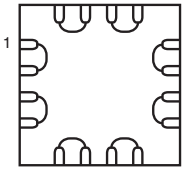

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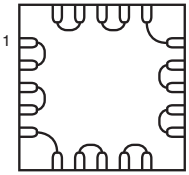

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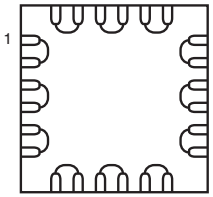

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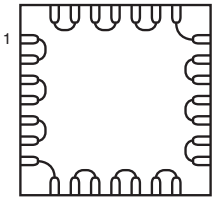

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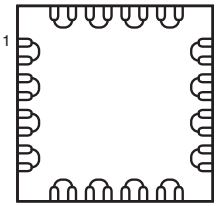

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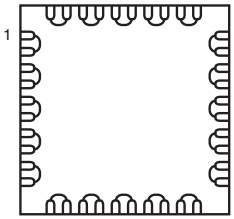

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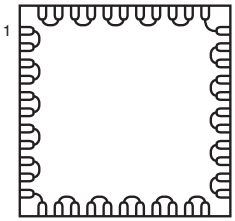

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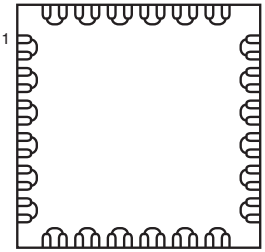

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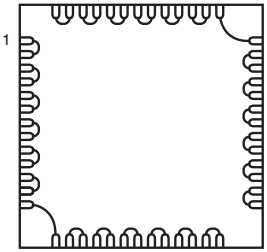

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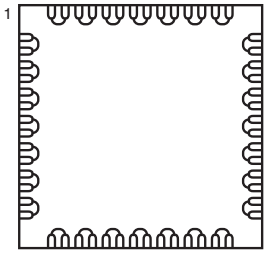

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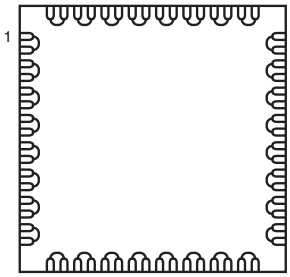

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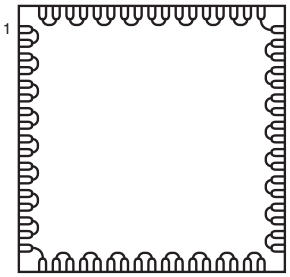

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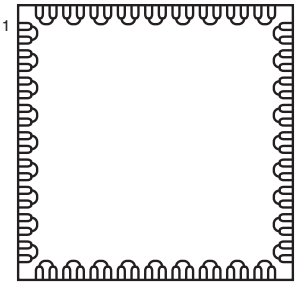
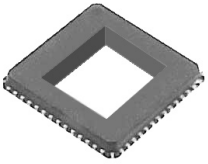


72L

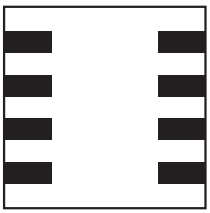
Open Cavity QFN Attach Your Die



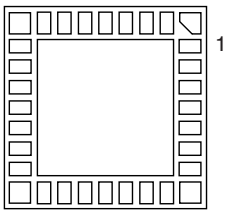
Dummy Component Ordering Information

Body Size SQ	Nbr Lead Leads	Nbr Lead Pitch	Die Pad Size mm	Part Number	Ceramic Lid Part Nbr (optional)
Open Cavity					
3mm	10	0.5mm	1.36x2.20	OC-DFN10T.5GN	CL-3x3
3mm	12	0.65mm	1.36 SQ	OC-QFN12T.65G-N	CL-3x3
4mm	12	0.8mm	2.30 SQ	OC-QFN12T.8G-N	CL-4x4
3mm	16	0.5mm	1.36 SQ	OC-QFN16T.5G-N	CL-3x3
4mm	16	0.65mm	2.30 SQ	OC-QFN16T.65G-N	CL-4x4
5mm	16	0.8mm	3.10 SQ	OC-QFN16T.8G-N	CL-5x5
4mm	20	0.5mm	2.30 SQ	OC-QFN20T.5G-N	CL-4x4
5mm	20	0.65mm	3.30 SQ	OC-QFN20T.65G-N	CL-5x5
4mm	24	0.5mm	2.30 SQ	OC-QFN24T.5G-N	CL-4x4
5mm	24	0.65mm	3.14 SQ	OC-QFN24T.65G-N	CL-5x5
5mm	28	0.5mm	3.10 SQ	OC-QFN28T.5G-N	CL-5x5
6mm	28	0.65mm	4.24 SQ	OC-QFN28T.65G-N	CL-6x6
7mm	28	0.8mm	5.20 SQ	OC-QFN28T.8G-N	CL-7x7
5mm	32	0.5mm	3.30 SQ	OC-QFN32T.5G-N	CL-5x5
7mm	32	0.65mm	5.20 SQ	OC-QFN32T.65G-N	CL-7x7
8mm	32	0.8mm	6.00 SQ	OC-QFN32T.8G-N	CL-8x8
6mm	36	0.5mm	4.24 SQ	OC-QFN36T.5G-N	CL-6x6
6mm	40	0.5mm	4.24 SQ	OC-QFN40T.5G-N	CL-6x6
7mm	44	0.5mm	5.20 SQ	OC-QFN44T.5G-N	CL-7x7
7mm	48	0.5mm	5.20 SQ	OC-QFN48T.5G-N	CL-7x7
8mm	52	0.5mm	6.00 SQ	OC-QFN52T.5G-N	CL-8x8
8mm	56	0.5mm	6.00 SQ	OC-QFN56T.5G-N	CL-8x8

Bottom View of Pads



OC-DFN - Dual Side



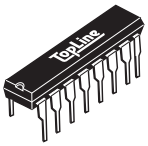
OC-QFN (Open Cavity)

PART NUMBER	
Suffix	**Feature**
-N	Open Cavity
G	Gold (NiAU)

INFO

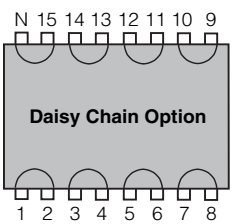
Perimeter lead QFN and DFN utilize lead frame in an epoxy molded plastic case.
Open cavity. Attach and wire bond your own die.
Standard Plating Wire Bondable Gold. Bonding Diagram available.
Lead Free

DIP
Dual Inline Package



Dummy Component Ordering Information

Nbr Leads	Case Length Inch	Case Length Metric	Tube Part Number XN1	Qty
300 mil Wide Body				
2	.100	2.54mm	DIP2M3	200
8	.360”	9.1mm	DIP8M3	50
14	.760”	19.3mm	DIP14M3	25
16	.760”	19.3mm	DIP16M3	25
18	.890”	22.6mm	DIP18M3	21
20	.960”	24.1mm	DIP20M3	18
24	1.25”	31.7mm	DIP24M3	15
28	1.35”	34.5mm	DIP28M3	14
600 mil Wide Body				
24	1.25”	31.7mm	DIP24M6	15
28	1.45”	36.8mm	DIP28M6	13
32	1.65”	41.9mm	DIP32M6	11
40	2.05”	52.0mm	DIP40M6	9
48	2.40”	60.9mm	DIP48M6	9
SDIP 70mil Pitch				
30	.4” x 1.095”	10.16 x 27.8mm	SDIP30M4	20
42	.6” x 1.45”	15.24 x 36.8mm	SDIP42M6	14
52	.6” x 1.81”	15.24 x 46.0mm	SDIP52M6	11
56	.3” x 2.06”	15.24 x 52.3mm	SDIP56M6	9
64	.75” x 2.27”	19.05 x 57.6mm	SDIP64M7.5	9



Daisy Chain
available on special order
Add -DE to end of part number

PART NUMBER	
Options	**Suffix**
Standard	Blank
Daisy Chain	-DE
Isolated	-ISO
Lead Free	-TIN (Sn100)

INFO

TopLine supplies DIP Plastic Dual Inline Packages with lead pitch of 0.100” (2.54mm). Also available with Ceramic Case on special order, by adding “CER” prefix to front of part number. SDIP packages have lead pitch of 0.07” (1.778mm). For completely isolated (no internal connections) add -ISO to end of part number.

For Lead Free option, add -TIN to end of part number.

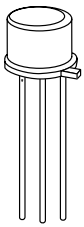
TO
Transistor

Dummy Component Ordering Information

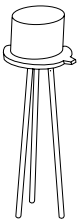
Material		Bulk Part Number		Tube Part Number		Tape & Reel Part Number	
Case	Lead	XT1	Qty	XT1	Qty	XT1	Qty
Metal	Solder	TO5	25	-	-	-	-
Metal	Solder	TO18	25	-	-	-	-
Metal	Solder	TO39	25	-	-	-	-
Metal	Solder	TO75	25	-	-	-	-
Plastic	Solder	TO92	100	-	-	TO92T	2000
Plastic	Solder	TO92-.2”	100	-	-	TO92T-.2”	2000
Metal	Solder	TO99	25	-	-	-	-
Plastic	Solder	TO220-3	25	TO220M-3	50	TO220T-3	1000

For Lead Free add -TIN to end of part number.

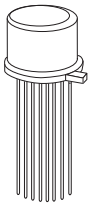
TO5 (1.25” lead length)
TO39 (.75” lead length)

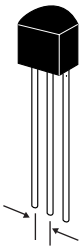


TO18

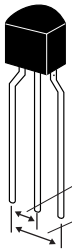


TO75 6 Lead
TO99 8 Lead

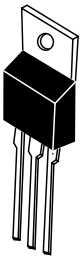




TO92



TO92T-.2



TO220

TopLine®

Solder Terminals
For Hand Soldering Proficiency

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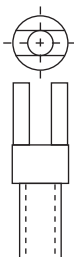
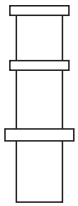
IPC COMPLIANT

Dummy Component Ordering Information

Terminal Type	XM0 Bulk Part Number PN	QTY	XM0 Bulk Part Number PN	QTY	XM0 Bulk Part Number PN	QTY	XM0 Bulk Part Number PN	QTY
Bifurcated	103005	5	103025	25	103100	100	103999	1000
Gold Cup	104005	5	104025	25	104100	100	104999	1000
Hook	105005	5	105025	25	105100	100	105999	1000
Pierced	106005	5	106025	25	106100	100	106999	1000
Turret	107005	5	107025	25	107100	100	107999	1000
20 AWG Wire Black	108020	5FT	108120	100 FT	108520	1000 FT	108920	5000 FT
22 AWG Wire Red	108022	5FT	108122	100 FT	108522	1000 FT	108922	5000 FT
24 AWG Wire Yellow	108024	5FT	108124	100 FT	108524	1000 FT	108924	5000 FT
26 AWG Wire Blue	108026	5FT	108126	100 FT	108526	1000 FT	108926	5000 FT
Terminal Holder	109000	1	-		-		-	
Kit of Above	102000	1	-	-	-	-	-	-
Kit without Terminal Holder	101000	1	-	-	-	-	-	-

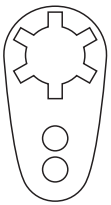


Bifurcated Terminal
Brass
SnPb

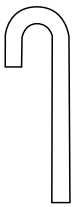


Turret Terminal
Brass
SnPb

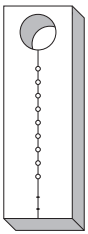
Gold Cup Terminal
Brass
Au-Ni



Pierced Terminal
Brass
SnPb



Hook Terminal
Copper
SnPb



Terminal Holder
FR4

INFO

IPC style terminals for hand soldering proficiency.
Also available in kit form

TopLine®

Axial Lead Components

CF - Resistor

DO - Diode

Dummy Component Ordering Information

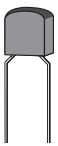
Size Inch Dia x L	Size Metric Dia x L	Lead Dia.	Body	Bulk Part Number XA1	Qty	Tape Part Number XA1	Qty
.062” x .145”	1/8 Watt Size	0.5mm	Epoxy	CF18	100	CF18A	5000
.090” X .250”	1/4 Watt Size	0.6mm	Epoxy	CF14	100	CF14A	5000
.140” X .375”	1/2 Watt Size	0.6mm	Epoxy	CF12	100	CF12A	2500
.220” X .630”	1 Watt Size	0.8mm	Epoxy	CF100	100	CF100A	1K
Glass Case							
.070” X .154”	1.78 X 3.9mm	.020”	Glass	DO35	100	DO35A	5000
.107x.205”	2.72 x 5.2mm	.031”	Glass	DO41-GLASS	100	DO41A-GLASS	2500
Molded Case							
.107” x .205”	2.72 x 5.2mm	.031”	Molded	DO41	100	DO41A	2500
.209” x .374”	5.3 x 9.5mm	.051”	Molded	DO201AD	100	DO201AD-A	1200

Radial Lead Components

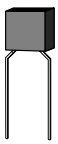
Dummy Component Ordering Information

Lead Space Inch	Lead Space Metric	Case Size Inch	Case Size Metric	Tube Part Number XR1	Qty	Bulk Part Number XR1	Qty	Tape Part Number XR1	Qty
		.2” SQ	5mm SQ	-	-	NR1	100	NR1A	2000
		.2” x .28”	5 x 7mm	-	-	EH5x7	100	EH5x7A	2000
.1”	2.5mm	.2” x .6”	5 x 15mm	RS6M	35-40	RS6	300	Call	Call
		.2” x .8”	5 x 20mm	RS8M	25-30	RS8	200	Call	Call
		.2” x 1.0”	5 x 26mm	RS10M	20-24	RS10	150	Call	Call
		.2” SQ	5mm	-		CK05	100	CK05T	2000
		.2” SQ	5mm	-		NR2	100	NR2A	2000
		.3” SQ	7.60mm	-		CK06	100	CK06T	1500
.2”	5.7mm	.2 x .31	5 x 8mm	-		DD2	100	DD2T	1000
		.20 x .43	5 x 11mm	-	EH5x11	-	100	EH5X11A	1000
		.06 x .15	1/8w	-	-	CFR18	100	CFR18-AVI	2000

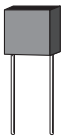
NR



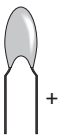
CK05



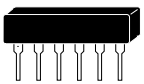
CK06



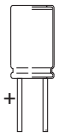
DD2



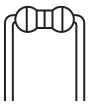
RS



EH



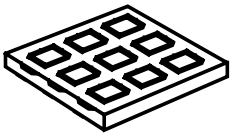
CFR



INFO

Lead Free Option: Sn100 add -TIN to end of part number.

Waffle Trays for Bare Die



WP	2 -	5.0 x 5.0 x 0.8	B	Option
Series	**Tray Size**	**Pocket Dimension (mm)**	**Type**	**Material**
WP = Waffle Pack	2 = 2" SQ 4 = 4" SQ	Length x Width x Depth of Tray Bottom (blank if bottom tray)	B = Bottom Tray K = Set of Bottom, Cover + Clips	Blank = Black (standard) A = Amber N = Natural

Cover Suffix

COVER = Standard Black Cover

Clip Holds Covers + Bottom

CLIP1 = Single Clip Holds Tray + Cover
CLIP2 = Clip Pair Holds Tray + Cover
CLIP5 = Clip Pair Holds 5 Trays + Cover
CLIP6 = Clip Pair Holds 6 Trays + Cover
CLIP10 = Clip Pair Holds 10 Trays + Cover

Insert

INSERT-PAPER = Rice Paper
INSERT-TYVEK = White

Accessories

JIGTRAY = Jedec size holds 10 WP2
LABEL = 1.5" SQ Removable (Roll = 1000)

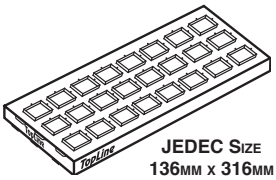
Waffle Tray Capacity (example)*

Pocket Size Sq	2" Square WP2		4" Square WP4	
	Matrix	Pockets	Matrix	Pockets
1mm Sq	20 x 20	400	30 x 30	900
2mm Sq	10 x 10	100	29 x 30	870
3mm Sq	10 x 10	100	20 x 20	400
4mm Sq	8 x 8	64	16 x 16	256
5mm Sq	7 x 7	49	12 x 12	144
6mm Sq	6 x 6	36	11 x 11	121
6mm Sq	5 x 5	25	10 x 10	100
7mm Sq	6 x 6	36	10 x 10	100
7mm Sq	5 x 5	25	10 x 10	100
8mm Sq	4 x 4	16	9 x 9	81
9mm Sq	4 x 4	16	8 x 8	64
10mm Sq	3 x 3	9	7 x 7	49
12mm Sq	3 x 3	9	6 x 6	36
13mm Sq	3 x 3	9	6 x 6	36
14mm Sq	3 x 3	9	5 x 5	25
15mm Sq	2 x 2	4	5 x 5	25
17mm Sq	2 x 2	4	4 x 4	16
19mm Sq	2 x 2	4	4 x 4	16
21mm Sq	2 x 2	4	3 x 3	9

*OTHER SIZES AVAILABLE

TopLine®

Matrix Trays For BGA Ball Grid Array



JEDEC Size
136mm x 316mm

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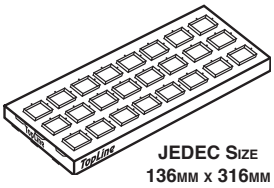
Tray Ordering Information

Component Size per Tray	Components Row Column	Matrix XZ1	Tray Part Number
5 x 5mm	576	16 x 36	BGATRAY5mm-16x36
5 x 5mm	624	16 x 39	BGATRAY5mm-16x39
5 x 5mm	640	16 x 40	BGATRAY5mm-16x40
6 x 6mm	360	12 x 30	BGATRAY6mm-12x30
6 x 6mm	608	16 x 38	BGATRAY6mm-16x38
7 x 7mm	416	13 x 32	BGATRAY7mm-13x32
7 x 7mm	476	14 x 34	BGATRAY7mm-14x34
8 x 8mm	348	12 x 29	BGATRAY8mm12x29
8 x 8mm	360	12 x 30	BGATRAY8mm-12x30
9 x 9mm	250	10 x 25	BGATRAY9mm-10x25
10 x 10mm	184	8 x 23	BGATRAY10mm-8x23
10 x 10mm	240	10 x 24	BGATRAY10mm-10x24
10 x 10mm	250	10 x 25	BGATRAY10mm-10x25
11 x 11mm	176	8 x 22	BGATRAY11mm-8x22
12 x 12mm	189	9 x 21	BGATRAY12mm-9x21
12 x 12mm	198	9 x 22	BGATRAY12mm-9x22
13 x 13mm	160	8 x 20	BGATRAY13mm-8x20
14 x 14mm	152	8 x 19	BGATRAY14mm-8x19
14 x 14mm	119	7 x 17	BGATRAY14mm-7x12
15 x 15mm	126	7 x 18	BGATRAY15mm-7x18
16 x 16mm	119	7 x 17	BGATRAY16mm-7x17
17 x 17mm	90	6 x 15	BGATRAY17mm-6x15
19 x 19mm	84	6 x 14	BGATRAY19mm-6x14
21 x 21mm	60	5 x 12	BGATRAY21mm-5x12
23 x 23mm	60	5 x 12	BGATRAY23mm-5x12
25 x 25mm	44	4 x 11	BGATRAY25mm-4x11
27 x 27mm	40	4 x 10	BGATRAY27mm-4x10
31 x 31mm	27	3 x 9	BGATRAY31mm-3x9
35 x 35mm	24	3 x 8	BGATRAY35mm-3x8
37.5 x 37.5mm	21	3 x 7	BGATRAY37.5mm-3x7
40 x 40mm	21	3 x 7	BGATRAY40mm-3x7
42.5 x 42.5mm	12	2 x 6	BGATRAY42.5mm-2x6
45 x 45mm	12	2 x 6	BGATRAY45mm-2x6
47.5 x 47.5mm	12	2 x 6	BGATRAY47.5mm-2x6
6 x 7mm	160	10 x 16	BGATRAY6x7-10x26
6 x 8mm	260	10 x 26	BGATRAY6x8-10x26
7 x 9mm	325	13 x 25	BGATRAY7x9mm-13x25
14 x 22mm	84/96	7 x 12 6 x 14 8 x 12	BGATRAY14x22-6x14
21 x 25mm	55	5 x 11	BGATRAY21x25-5x11

INFO

Specify minimum temperature rating: 50˚C, 75˚C, 125˚C, 130˚C, 140˚C, 150˚C or 180˚C

Matrix Trays for QFP & MLF



JEDEC Size
136mm x 316mm

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Document Center

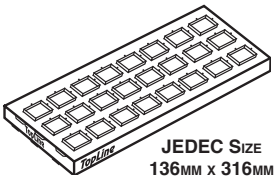
Tray Ordering Information

Component Body Size	Component Height	Components Per Tray	Matrix Column x Row	Tray Part Number XZ1
QFP Tray				
10mm Sq.	2.0-2.7mm	96	6 x 16	QTRAY10mm-6x16
14mm Sq.	2.0-2.7mm	84	6 x 14	QTRAY14mm-6x14
14 x 20mm	2.7mm	66	6 x 11	QTRAY14x20mm-6x11
28mm Sq.	3.6mm	24	3 x 8	QTRAY28mm-3x8
32mm Sq.	3.8mm	24	3 x 8	QTRAY32mm-3x8
40mm Sq.	3.8mm	12	3 x 4	QTRAY40mm-3x4
LQFP Tray				
7mm Sq.		250	10 x 25	LQTRAY7mm-10x25
10mm Sq.		160	8 x 20	LQTRAY10mm-8x20
12mm Sq.		119	7 x 17	LQTRAY12mm-7x17
14mm Sq.	1.4mm	90	6 x 15	LQTRAY14mm-6x15
14 x 20mm		72	6 x 12	LQTRAY14x20mm-6x12
20mm Sq.		60	5 x 12	LQTRAY20mm-5x12
24mm Sq.		40	4 x 10	LQTRAY24mm-4x10
28mm Sq.		36	4 x 9	LQTRAY28mm-4x9
TQFP Tray				
5mm Sq.		360	12 x 30	TQTRAY5mm-12x30
7mm Sq.		250	10 x 25	TQTRAY7mm-10x25
10mm Sq.		160	8 x 20	TQTRAY10mm-8x20
12mm Sq.	1.0mm	119	7 x 17	TQTRAY12mm-7x17
14mm Sq.		90	6 x 15	TQTRAY14mm-6x15
14 x 20mm		72	6 x 12	TQTRAY14x20mm-6x12
20mm Sq.		60	5 x 12	TQTRAY20mm-5x12
QFN/SLP/MLF Tray				
3mm Sq.		490	14 x 35	QFNTRAY3mm-14x35
4mm Sq.		540	15 x 36	MLFTRAY4mm-15x36
4mm Sq.		490	14 x 35	QFNTRAY4mm-14x35
5mm Sq.		490	14 x 35	MLFTRAY5mm-14x35
6mm Sq.	0.9mm	490	14 x 35	MLFTRAY6mm-14x35
7mm Sq.		260	10 x 26	MLFTRAY7mm-10x26
8mm Sq.		260	10 x 26	MLFTRAY8mm-10x26
9mm Sq.		260	10 x 26	MLFTRAY9mm-10x26
10mm Sq.		168	8 x 21	MLFTRAY10mm-8x21

INFO

Specify minimum temperature rating at time of ordering: 50˚C, 75˚C, 125˚C, 130˚C, 140˚C, 150˚C or 180˚C

Matrix Trays for TSOP



JEDEC Size
136mm x 316mm

Tray Ordering Information

Component Size	Component Height	Components Per Tray	Matrix Row x Column	Tray Part Number XZ1
Type 1 (Including Leads)				
8 x 13.4mm	1.0-1.2mm	234	13 x 18	TTRAY8x13.4mm-13x18
10 x 14mm		160	16 x 10	TTRAY10x14mm-16x10
6 x 16mm		240	15 x 16	TTRAY6x16mm-15x16
8 x 16mm		195	15 x 13	TTRAY8x16mm-15x13
10 x 16mm		150	15 x 10	TTRAY10x16mm-10x15
12 x 16mm		120	15 x 8	TTRAY12x16mm-15x8
14 x 16mm		112	16 x 7	TTRAY14x16mm-16x7
8 x 20mm		156	12 x 13	TTRAY8x20mm-12x13
10 x 20mm		120	12 x 10	TTRAY10x20mm-12x10
12 x 20mm		96	12 x 8	TTRAY12x20mm-12x8
14 x 20mm		96	12 x 8	TTRAY14x20mm-12x8
Type II (Body Size)				
.3” x .675” (7.62 x 17.1mm)	1.0-1.2mm	176	11 x 16	TT2TRAY7.6x17-1116
.4” x .725” (10.16 x 18.4mm)		135	9 x 15	TT2TRAY10x18.4-9x15
.4” x .825” (10.16 x 20.95mm)		117	9 x 13	TT2TRAY10x21-9x13
.4” x .875” (10.16 x 22.22)		108	9 x 12	TT2TRAY10x22-9x12
.4” x 1.02” (10.16 x 26mm)		99	9 x 11	TT2TRAY10x26-9x11

Tray for J-Lead, PLCC, LCC and CLCC

Component Size	Component Height	Components Per Tray	Matrix Row x Column	Tray Part Number XZ1
PLCC44	4.4mm	40	4 x 10	PLCC44TRAY-4x10
PLCC52	4.4mm	36	4 x 9	PLCC52TRAY-4x9
PLCC68	4.4mm	21	3 x 7	PLCC68TRAY-3x7
PLCC84	4.4mm	21	3 x 7	PLCC84TRAY-3x7

Kit Part Numbering System

WebCode XK1

Lead Free
Pb-Free RoHs

926

Series

900	=	QFP Lead Template
901	=	FC176 Flip Chip
902	=	FC88 Flip Chip
903	=	FC317 Flip Chip
904	=	FC220 Flip Chip
905	=	CBGA Ceramic Substrates
906	=	FC96 Ceramic
907	=	FC96 Lamanate
908	=	FC48 Ceramic
909	=	FC48 Flip Chip
910	=	Beginner Throughhole
911	=	FC112 Flip Chip
912	=	Recertification Mix Tech
913	=	Multilayer Throughhole
914	=	Mixed Technology 2
915	=	Multipurpose Throughhole
916	=	Multipurpose Throughhole
917	=	BGA121, 352, 400 (obsolete)
918	=	Unassigned *
919	=	Phillips Machine
920	=	Challenger 1 (see 928) *
921	=	µBGA TV46
922	=	TV74 (obsolete)
923	=	TV188 (obsolete) *
924	=	Beginners SMD
925	=	SMD Introductory
926	=	Practical Mixed Technology
927	=	Unassigned
928	=	Challenger 2
929	=	Jumbo Chip Set *
930	=	Advanced w/o QFP256
931	=	Advanced w/QFP256
932	=	µBGA TV62
933	=	Custom *
934	=	µBGA TV208
935	=	Stencil Eval. w/TQFP168
936	=	Stencil Evaluation
937	=	Econo I - BGA
938	=	Econo II - Mixed
939	=	Econo III - Mixed
940	=	Monster (see 948) *
941	=	Mydata *
942	=	Intertronic 2001
943	=	TQFP168 (obsolete)
944	=	Rework 2 Practice
945	=	PCMCIA
946	=	Universal BGA 1.27/1.5mm
947	=	BGA256/272/292/352/388
948	=	Monster 2 *
949	=	0201/0402 Chip
950	=	SMTA Saber
951	=	CBGA
952	=	TBGA *
953	=	Visual BGA & Flip Chip
954	=	Custom *
955	=	Custom *
956	=	Custom *
957	=	CBGA196/625 *
958	=	LBGA1089/1225
959	=	Custom *
960	=	Machine Diagnostic *
961	=	Fiducial Comparator
962	=	28mm QFP Assortment
963	=	Universal BGA .5~.8mm
964	=	0402/0603 Chip
965	=	Rework 1 Practice
966	=	BGA169/225 6L
967	=	BGA169/225
968	=	0805/1206 Chip
969	=	Mixed Technology 1
970	=	Display Boards
9705	=	Universal Bread Board *
971	=	Label for 970 *
972	=	Parts for Display
973	=	CCGA1089/CCGA1274*
974	=	eBGA1600/eBGA1936
976	=	BGA256 1.0mm/SBGA560
977	=	Metcal *
978	=	Rework 3 Practice
979	=	Unassigned *
980	=	PC Board Album *
981	=	Universal BGA 1.0/0.8mm
982	=	QFP208 Lead Free
983	=	0805/1206 Lead Free
984	=	0402/0603 Lead Free
985	=	BGA Lead Free *
986	=	Lead Free Multicomponent
999	=	Special/Custom *
9603	=	TSOP32 *
9613	=	BQFP132 *
9616	=	QFP160 *
9618	=	Rotational Test
9621	=	QFP208
9625	=	QFP256

025

Specifications

000	=	Single Pack Kit (Hand Solder)
001	=	Standard PC Board
002	=	Lead Free Tin Plated Board
003	=	Populated PC Board
004	=	X, Y, Theta Parts Placement ASCII File
005	=	Gerber File For Solder Paste Stencil
006	=	Immersion Silver Board (Lead Free)
007	=	Polyimide Board
008	=	OSP Copper Board Entek (Lead Free)
009	=	Ni Au PC Board
010	=	Kit Of 10
025	=	Kit Of 25
050	=	Kit Of 50
100	=	Kit Of 100

* = Not Shown in Catalog
See www.topline.tv

General Kit Information

FR-4 (Standard)

Epoxy-glass FR-4 is standard for most kits. Most Boards are double sided. Tg = 140˚C.

FR4 (High Temp)

High Temp (Tg = 170˚C ~ 180˚C) is used for Lead Free boards.

Polyimide (Optional)

For high temperatures during assembly or burn-in. Polymide Tg is 270˚C.

BT (Optional)

Bismaleimide Triazine available special order.

Copper Thickness

Usually 1.0 oz. of copper.

Hot Air Solder Leveling (Sn63)

Hot air solder leveling (HASL) during board fabrication gives boards a controlled plating flatness which assures coplanarity for fine pitch components.

Liquid Photo Imageable Solder Mask

Liquid photoimageable (LPI) soldermask with Sanwa Chemical SPSR-950. Taiyo PSR4000 AUS5 is available special order.

X,Y Theta: (Accessory)

Component placement data for pick and place machines. Free download.

Gerber Data: (Accessory)

For solder paste stencil. Free download.

Lead-Free (Optional)

Available in 4 finishes:
Sn100 - White Tin
AU (ENIG) Ni - Immersion Gold
Ag - Immersion Silver
OSP - ENTEK 106 Copper

Global Fiducials

A minimum of two global fiducials are located diagonally opposed as far apart as possible.

Local Fiducials

Used to locate the position of an individual.

General

Kits are supplied with enough components for one side of the board only.

OSP (Optional)

Organic Solder Preservative over bare copper such as ENTEK106 is available special order.

RoHS Banned Substances

Substance	Maximum Limit (ppm)
Cadmium (Cd)	100
Lead (Pb)	1000
Mercury (Hg)	1000
Hexavalent Chromium (Cr 6+)	1000
Polybrominated Biphenyls (PBB)	1000
Polybrominated Diphenyl Ethers (PBDE)	1000

About RoHS:
The European Union has adopted Directive 2002/95/EC – the Restriction of Hazardous Substances (RoHS) in electrical and electronic equipment. This legislation bans the use of lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB) or polybrominated diphenyl ethers (PBDE) in electrical and electronic devices after July 1, 2006 with certain exemptions.

Lead Free Boards
RoHS Compatible

TopLine offers Lead Free boards with 4 popular finishes compatible with RoHS.

Comparison of Lead Free Finishes

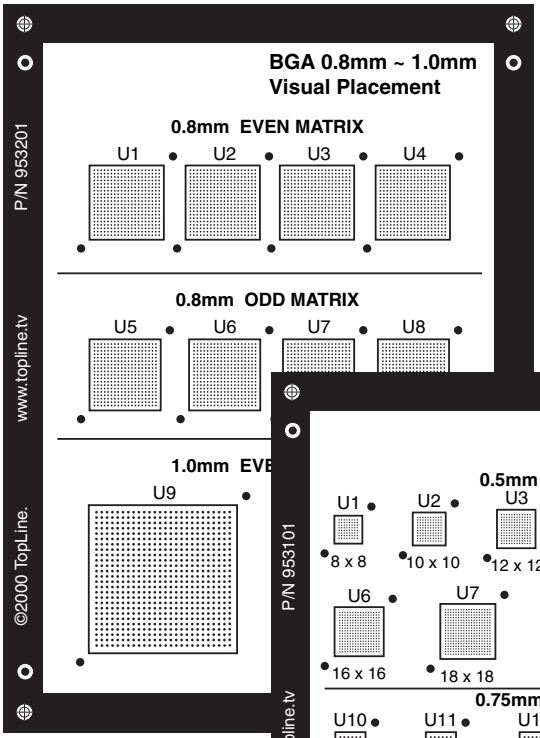
	Description	Advantages	Concerns
Sn	White Tin (also known as Immersion Tin)	• Low Cost • Widely Accepted • Re-workable • Good Flatness • Good Shelf Life	• Potential Whisker • Microscopic Voids
Ag	Immersion Silver	• Low Cost • Widely Accepted • Re-workable • Excellent Flatness • Excellent Wetting	• Shelf Life • Tarnishing
OSP Cu	Organic Solderability Preservative Entek 106	• Low Cost • Widely Accepted • Re-workable • Excellent Flatness	• Shelf Life • Degrades with Temperature • Handling Sensitivity • Flex Sensitive
Ni-Au	Electroless Nickel Immersion Gold (Also known as ENIG)	• Widely Accepted • Excellent Flatness • Very Long Shelf Life	• Added Cost • Difficulty with rework • More brittle solder joints

Comparison of Standard Finishes (with Pb)

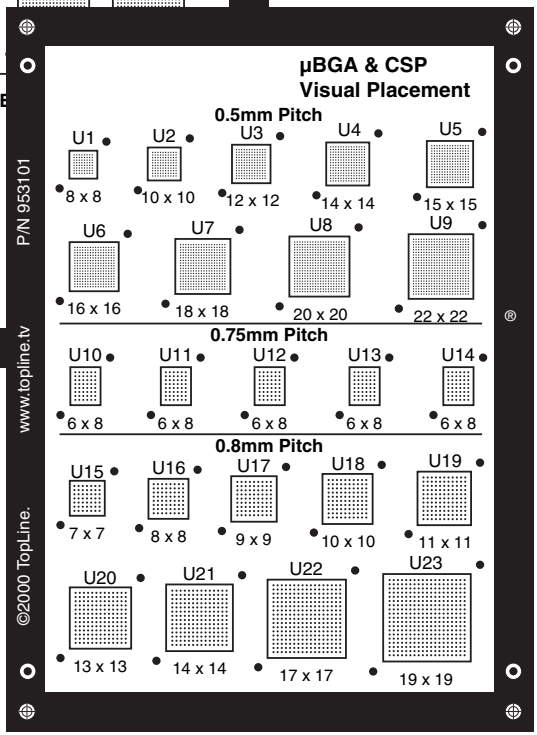
	Description	Advantages	Concerns
Sn/Pb	Hot Air Solder Level (also known as HASL)	• Low Cost • Widely Accepted • Re-workable • Good Shelf Life	• Flatness (Coplanarity) • Paste Misprints • Not RoHS Compatible

Visual Placement
see thru Acrylic Board

Lead Free
Pb-Free RoHs



Order 953201



Order 953101

Visual Placement Inspection Boards allow you to actually see if all the balls are aligned on the pads.

How to use:

1. Peel off protective cover from sticky tape on acrylic board.
2. Place BGA or Flip Chip
3. Turn board over and visually inspect for placement accuracy.
4. Remove BGA and start again.

See Page 69 for Ordering Information

Board Types
Choice of either sticky (preferred choice) or non-stick acrylic boards available.

Actual Size: 4” x 5.5” (100 x 140mm) .062” Thick

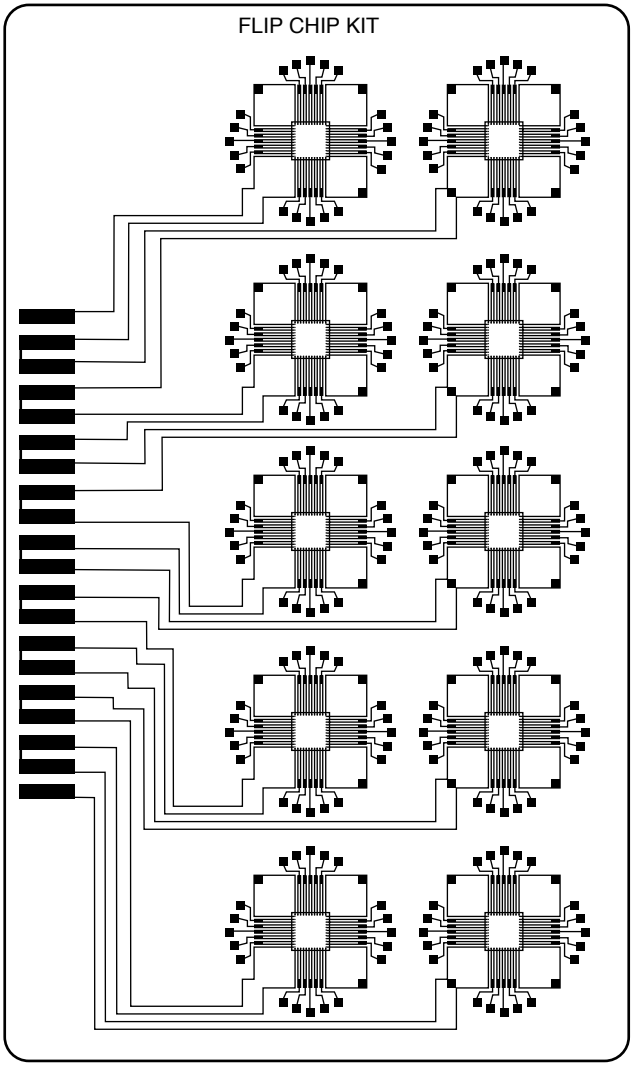
Visual Placement Inspection Kit
see thru Acrylic Board

Lead Free
Pb-Free RoHs

Kit Ordering Information

			Manual Assembly		or Machine Run	
	mil Pitch	mm Pitch	Sticky Acrylic Board	Kits with Components	Parts Placement Data	Gerber Data
µBGA & CSP		0.5mm 0.75mm 0.8mm	953101	953100	953104	953105
BGA		0.8mm 1.0mm	953201	953200	953204	953205
BGA		1.27mm 1.5mm	953001	953000	953004	953005
Flip Chip	8mil 10mil 18mil	204µm 254µm 457µm	953401	953400	953404	953405
Grid Lines	4mil 5mil 6mil 7mil 8mil 9mil 10mil 12mil 14mil 15mil 18mil 20mil	102µm 127µm 152µm 178µm 203.2µm 229µm 254µm 304.8µm 355.6µm 381µm 457µm 508µm	953501	-	953504	953505

Flip Chip Kits



Actual Size: 3.25” x 5.5” (83 x 140mm)

Laminate FR4 board for placement and daisy chain continuity testing after assembly.

Each board has coupon sites for mounting 10 flip chips.

Laminate board features multifunctional high temperature FR4 board (Tg = 170˚C)

Plating Options:

Ni-Au Standard

Cu-OSP Available

Board Thickness:

.031” - 0.78mm FC317

.062” - 1.57mm FC48~FC220

Note

Gerber Data is only available for laminate boards.

Flip Chip Kits

Kit Ordering Information

Contents	Manual Assembly and Machine Run						
	Order Number 901000 1 Kit	Order Number 902000 1 Kit	Order Number 903000 1 Kit	Order Number 904000 1 Kit	Order Number 907000 1 Kit	Order Number 909000 1 Kit	Order Number 911000 1 Kit
Laminate FR4 Board	1	1	1	1	1	1	1
FC48 457μm	0	0	0	0	0	25	0
FC88 204μm	0	36	0	0	0	0	0
FC96 457μm	0	0	0	0	9	0	0
FC152 152μm	0	0	0	0	0	0	36
FC176 204μm	9	0	0	0	0	0	0
FC220 204μm	0	0	0	10	0	0	0
FC317 254μm	0	0	36	0	0	0	0

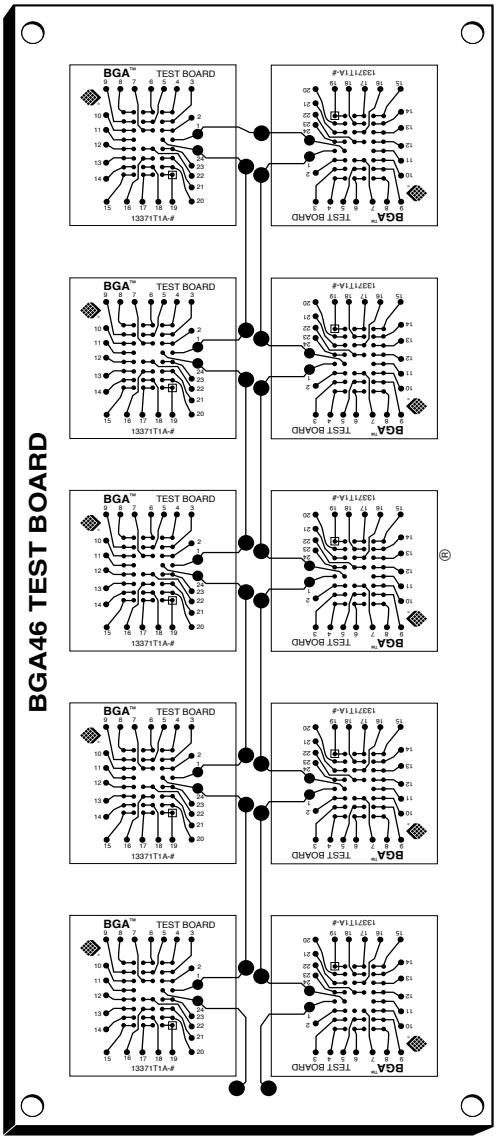
Note: 907001 is back side of 909001 board.
908001 is ceramic substrate for FC48.

Lead Free (Pb-Free) Option

Description	FC48	FC88	FC96	FC176	FC220	FC317	FC112
Lead Free Kit Gold Board + SnAgCu Flip Chip	909900	902900	907900	901900	904900	903900	911900
Spare Gold Board	909001	902001	907001	901001	904001	903001	911001
Standard Kit Gold Board + SnPb Flip Chip	909000	902000	907000	901000	904000	903000	911000

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

BGA46
0.75mm Test kit



Actual Size 2.75” x 6.5” (70 x 165mm)

Test board for 0.75mm pitch BGA46 chip scale components. Each board has 10 coupons which allow continuity testing of individual components as well as series test of all 10 components.

Parts are supplied in trays.

Pad	Diameter
Bump Site	.012” (.3mm)
Local Fiducial	.040” (1.0mm)

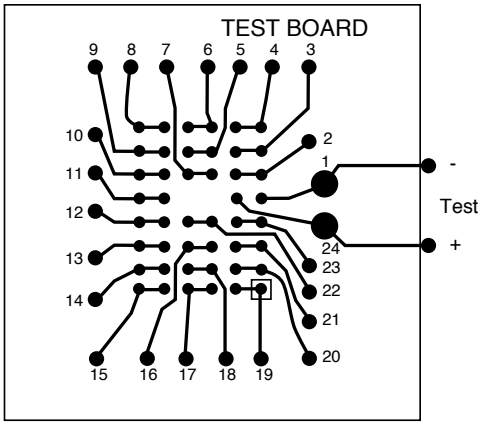
Features

Electroless Nickel Gold Plated
LPI Solder Mask
FR4 Board .03” (0.76mm)
Single Sided, 1/2 oz. copper
Tooling Holes .125”
Fiducial Marks

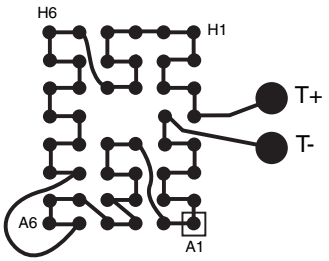
BGA46
0.75mm Test kit

Kit Ordering Information

Component	Pitch	Manual Assembly Number 921000 1 Kit	Machine Run Order Number 921010 10 Kits	Machine Run Order Number 921025 25 Kits	Machine Run Order Number 921050 50 Kits
Board		1	10	25	50
BGA46	0.75mm	10	100	250	500



Single PCB Test Coupon



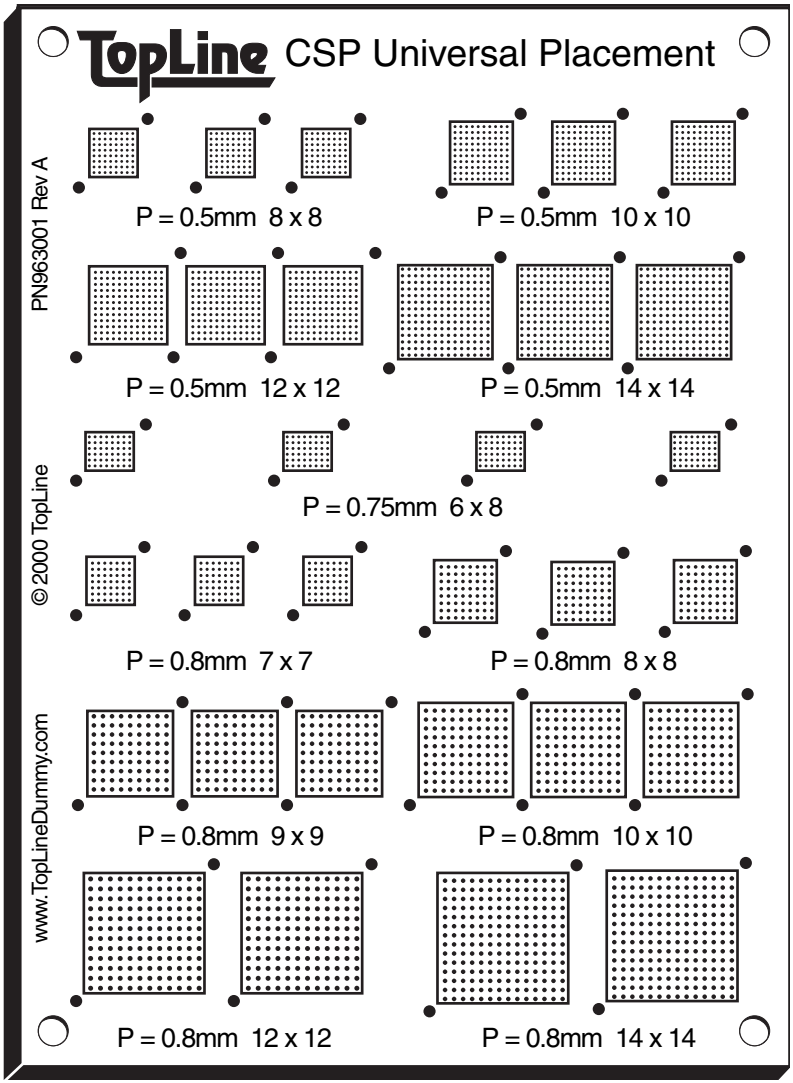
After Mounting to Test Board

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free Gold Board + SnAgCu BGA	921001	921900	921910	921925	921950	921999
Standard Gold Board + SnPb BGA	921001	921000	921010	921025	921050	921100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Universal CSP Kit
0.5~0.8mm Pitch



Actual Size 4” x 5.5” (100 x 140mm)

TopLine’s Universal CSP Kits provide pads capable of mounting 0.5mm, 0.75mm and 0.8mm pitch without daisy chain. Includes fiducial marks for vision equipment.

Uses soldermask defined pads.

Pad Geometry

Pad Dia.	Ball Dia.	Pitch
0.26mm	0.3mm	0.5mm
0.26mm	0.3mm	0.75mm
0.38mm	0.46mm	0.8mm

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes

Universal CSP Kit 0.5~0.8mm Pitch

Kit Ordering Information

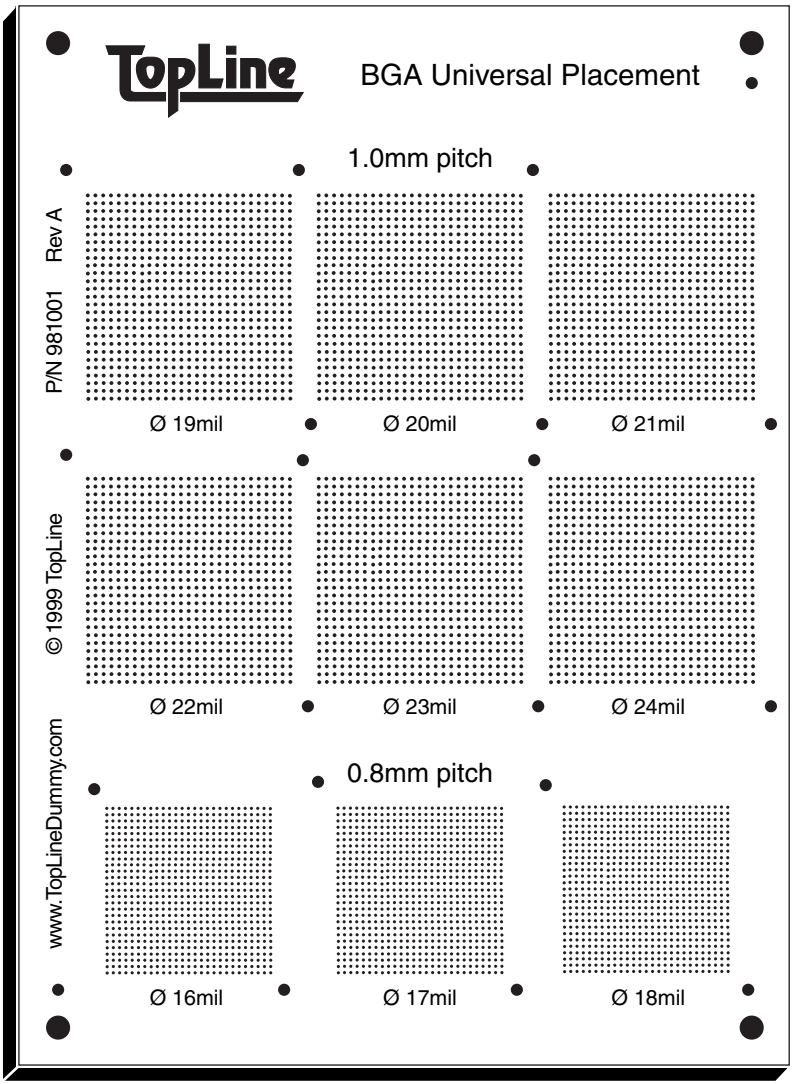
Component	Pitch	Manual Assembly Order Number 963000 1 Kit	Machine Run Order Number 963010 10 Kits	Machine Run Order Number 963025 25 Kits
Board		1	10	25
CSP	0.5mm	4	40	100
CSP	0.75mm	4	40	100
CSP	0.8mm	4	40	100

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	963002	963200	963210	963225	963250	963299
Ag – Silver	963006	963600	963610	963625	963650	963699
Cu – OSP	963008	963800	963810	963825	963850	963899
Au – Gold	963009	963900	963910	963925	963950	963999
Standard						
SnPb – HASL	963001	963000	963010	963025	963050	963100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Universal BGA Kit 0.8/1.0mm Pitch



Actual Size 4” x 5.5” (100 x 140mm)

TopLine’s Universal BGA kits are convenient to use. Includes non-daisy chain BGA components for 1.0mm and 0.8mm pitch for placement and solder practice.

Soldermask defined pads with varying aperatures from 16mil to 24mil diameter.

Features

LPI Solder Mask

FR4 Board .062”

Double Sided

Tooling Holes

Fiducial Marks

Universal BGA Kit 0.8/1.0mm Pitch

Kit Ordering Information

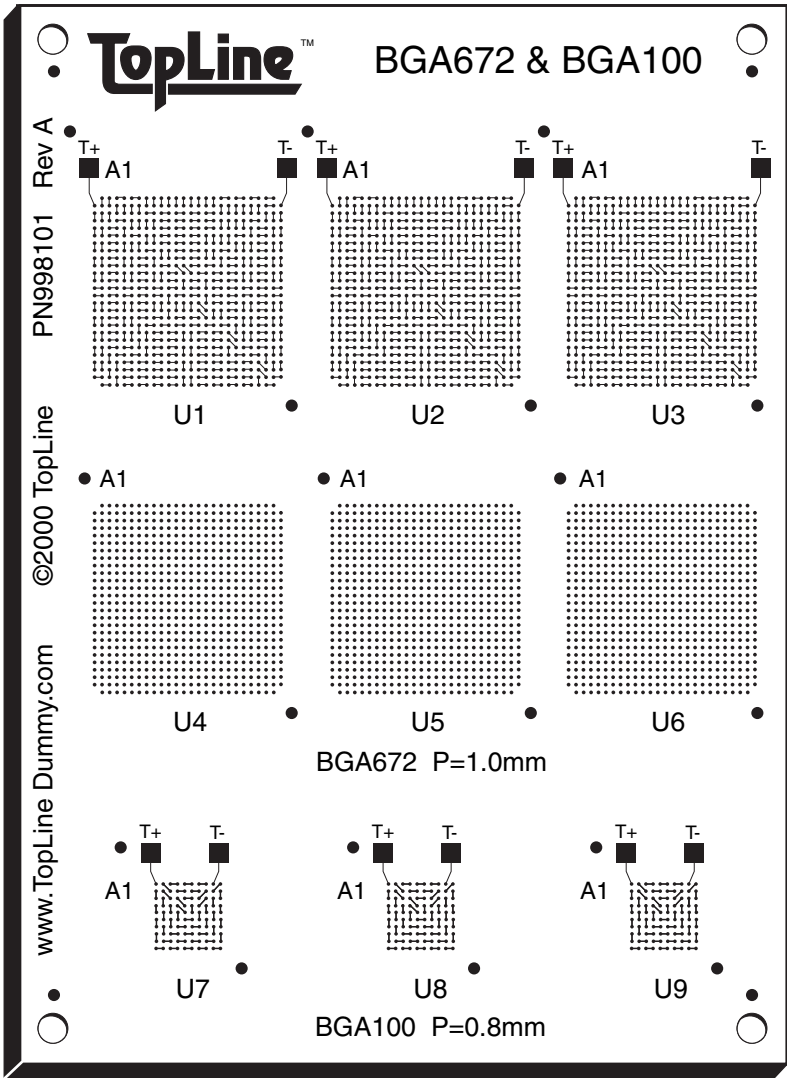
Component	Pitch	Manual Assembly: Order Number 981000 1 Kit	Machine Run: Order Number 981010 10 Kits	Machine Run: Order Number 981025 25 Kits
Board 981001	0.8/1.0mm	1	10	25
BGA	1.0mm	4	40	100
BGA	0.8mm	4	40	100

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	981002	981200	981210	981225	981250	981299
Ag – Silver	981006	981600	981610	981625	981650	981699
Cu – OSP	981008	981800	981810	981825	981850	981899
Au – Gold	981009	981900	981910	981925	981950	981999
Standard						
SnPb – HASL	981001	981000	981010	981025	981050	981100

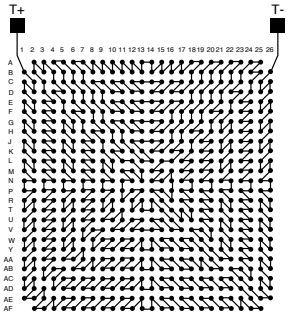
Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Fine Pitch BGA
with Daisy Chain Test
0.8mm - 1.0mm Pitch

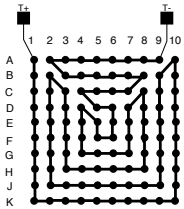


Actual Size 4” x 5.5 (100 x 140mm)

TopLine makes practicing with Fine Pitch Ball Grid Array technology accessible and affordable. Each board supports BGAs with 0.8mm and 1.0mm grid patterns and daisy chain test points to verify proper placement.



BGA672
AFTER ASSEMBLY



BGA100
AFTER ASSEMBLY

Features

LPI Solder Mask
FR4 Board .062”
Single Sided
Tooling Holes .125”
Fiducial Marks

Fine Pitch BGA with Daisy Chain Test 0.8mm - 1.0mm Pitch

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 998102 1 Kit	Manual Assembly: Order Number 998110 10 Kits	Machine Run: Order Number 998125 25 Kits	Machine Run: Order Number 998150 50 Kits	Machine Run: Order Number 998100 100 Kits
Board		1	10	25	50	100
BGA100	0.8mm	2	20	50	100	200
BGA672	1.0mm	2	20	50	100	200

Kits are supplied with only 2 BGAs for each daisy chain portion of PC Board.

Soldermask Defined Pads

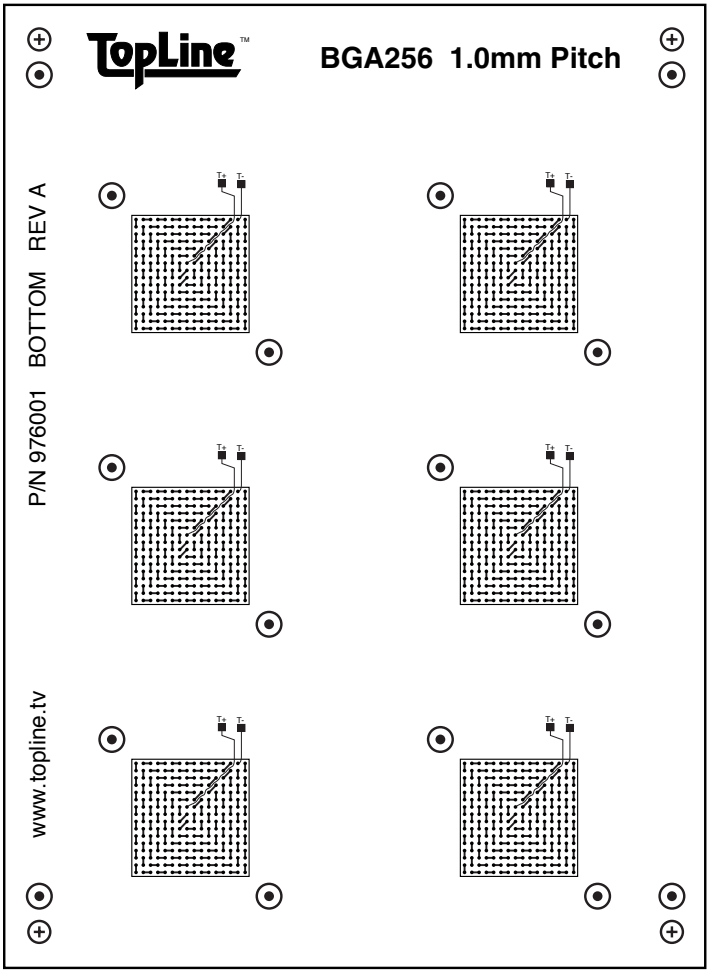
Pitch	Pad Dia.	Ball Dia.
0.8mm	0.38mm	0.46mm
1.0mm	0.508mm	0.63mm

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	998107	998200	998210	998225	998250	998299
Ag – Silver	998106	998600	998610	998625	998650	998699
Cu – OSP	998108	998800	998810	998825	998850	998899
Au – Gold	998109	998900	998910	998925	998950	998999
Standard						
SnPb – HASL	998101	998102	998110	998125	998150	998100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

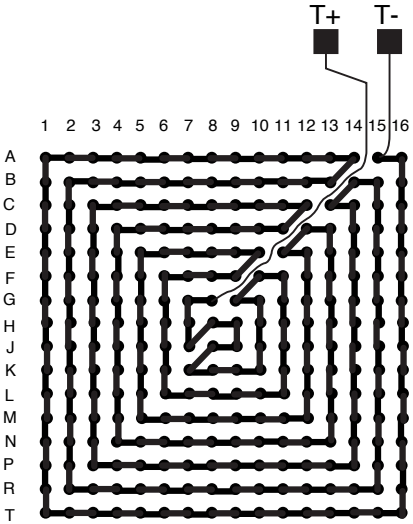
BGA256
Daisy Chain Kit
1.0mm Pitch



Actual Size: 4” x 5.5” (100 x 140mm)

Test board for 1.0mm pitch BGA256
Full Array with daisy chain.

Bottom side of board is for SBGA560 (not shown).



BGA256T1.0-DC169A
After Mounting

Features

LPI Solder Mask
Single Sided
Tooling Holes .125”
Fiducial Marks

BGA256
Daisy Chain Kit
1.0mm Pitch

Kit Ordering Information

Component	Ball Pitch	Manual Assembly: Order Number 976000 1 Kit	Manual Assembly: Order Number 976010 10 Kits	Machine Run: Order Number 976025 25 Kits	Machine Run: Order Number 976050 50 Kits	Machine Run: Order Number 976100 100 Kits
Board		1	10	25	50	100
BGA256	1.0mm	6	60	150	300	600

Kits are supplied with BGAs for one side of PC Board.

Soldermask Defined Pads

Component	Pitch	Pad Dia.	Ball Dia.
BGA256	1.0mm	0.63mm	0.6mm

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	976002	976200	976210	976225	976250	976299
Ag – Silver	976006	976600	976610	976625	976650	976699
Cu – OSP	976008	976800	976810	976825	976850	976899
Au – Gold	976009	976900	976910	976925	976950	976999
Standard						
SnPb – HASL	976001	976002	976010	976025	976050	976100

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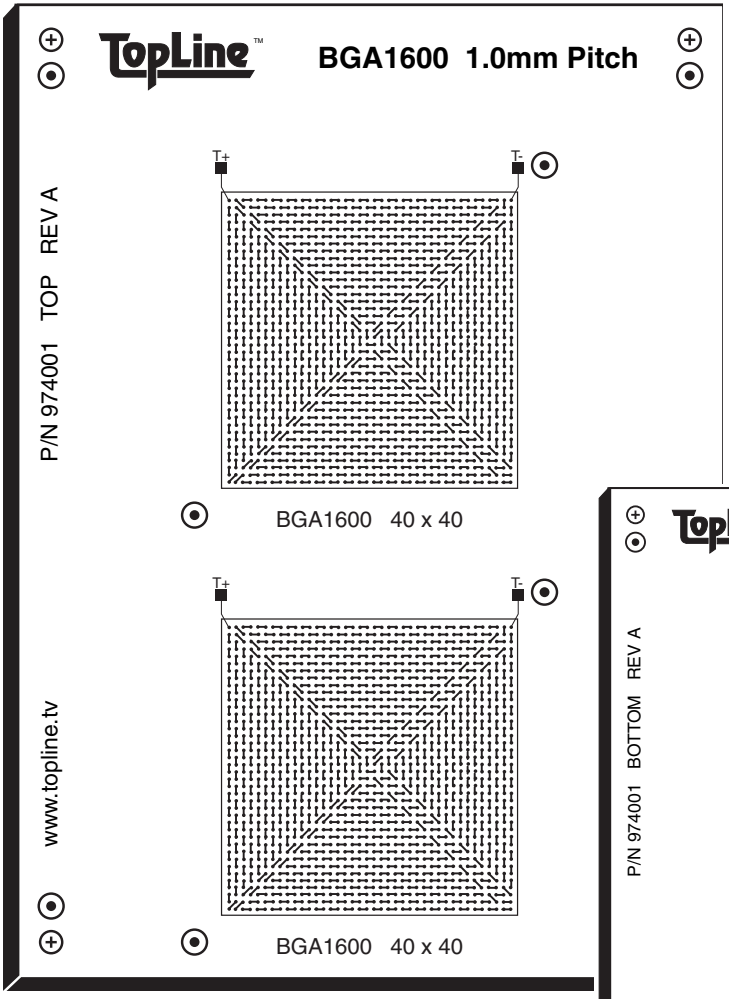
BGA1600/1936
Daisy Chain Kit
1.0mm Pitch

Lead Free
Pb-Free RoHs

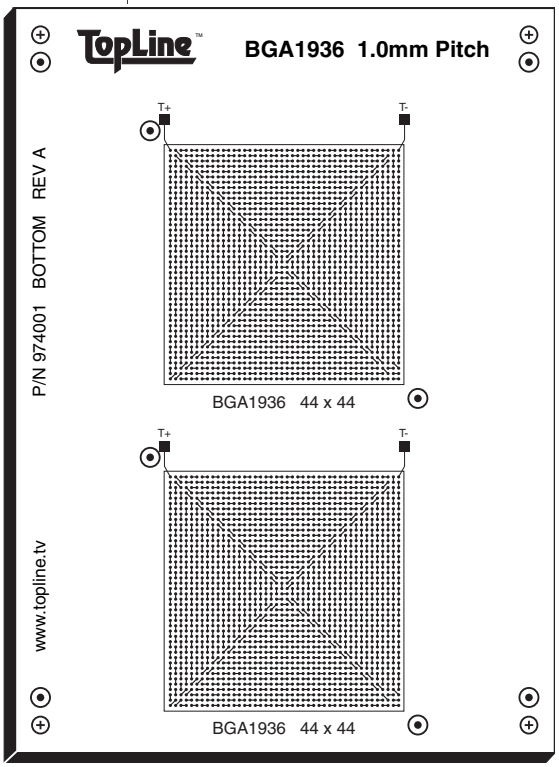
Top Side
Board

Lead Free
Pb
Available



Actual Size: 4” x 5.5” (100 x 140mm)

Bottom Side
Board



BGA1600/1936 Daisy Chain Kit 1.0mm Pitch

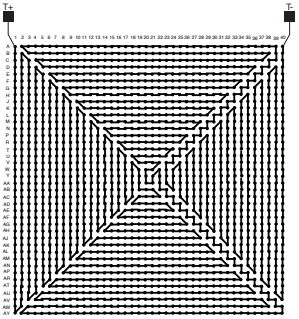
Kit Ordering Information

	Manual Assembly			OR Machine Run		
	Order Number 974000 1 Kit	Order Number 974600 1 Kit	Order Number 974900 1 Kit	Order Number 974200 1 Kit	Order Number 974260 1 Kit	Order Number 974290 1 Kit
Contents	Sn Pb Balls			Lead Free SnAgCu Balls		
BGA1600	2	2	0	2	2	0
BGA1936	2	0	2	2	0	2
Board Sn-Tin	1	1	1	1	1	1

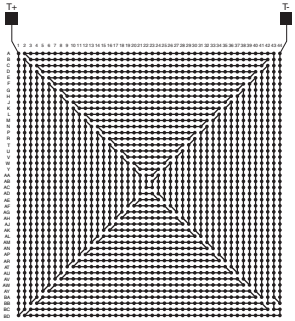
Select the kit that matches your requirements

Soldermask Defined Pads

Component	Pitch	Pad Dia.	Ball Dia.
BGA1600/1936	1.0mm	0.635mm	0.6mm



BGA1600T1.0-DC409
After Mounting



BGA1936T1.0-DC449
After Mounting

Optional Accessories

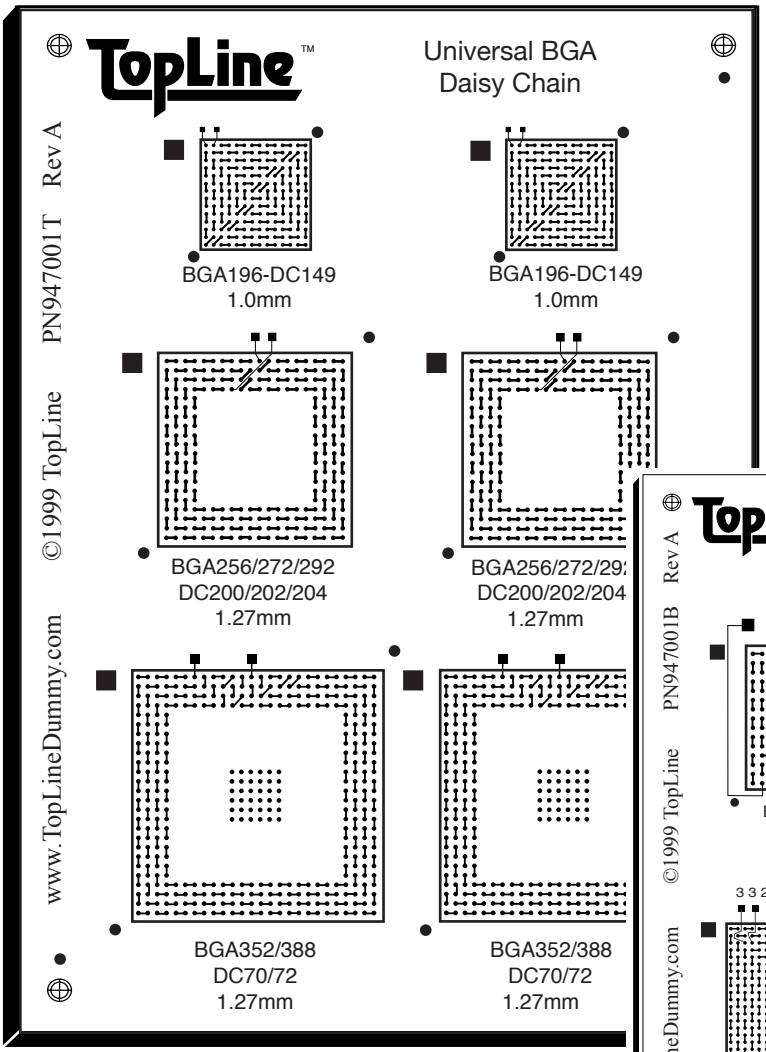
Parts Placement Data X,Y,Theta ASCII File ***Order Number*** **974004**	***Board Order Number***
Solder Paste Artwork Gerber File ***Order Number*** **974005**	***Sn - Tin*** ***974002***
	Ag - Silver ***974006***
	Cu - OSP ***974008***
	Au - Gold974009

Universal BGA Daisy Chain Kit 1.0/1.27mm Pitch

Lead Free
Pb-Free RoHs

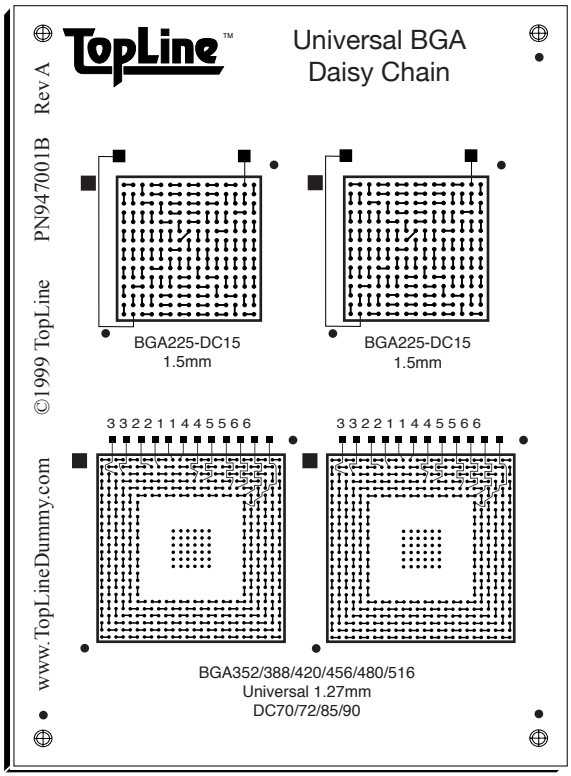
Lead Free
Pb
Available

Top Side Board



Actual Size: 4” x 5.5” (100 x 140mm)

Bottom Side Board



Universal BGA Daisy Chain Kit 1.0/1.27mm Pitch

Lead Free Pb Available

Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 947000 1 Kit	Manual Assembly: Order Number 947010 10 Kits	Machine Run: Order Number 947025 25 Kits	Machine Run: Order Number 947050 50 Kits	Machine Run: Order Number 947100 100 Kits
Board		1	10	25	50	100
BGA196	1.0mm	2	20	50	100	200
BGA256	1.27mm	2	20	50	100	200
BGA352	1.27mm	2	20	50	100	200

Kits are supplied with BGAs for top side of PC Board.

Soldermask Defined Pads

Component	Pitch	Pad Dia.	Ball Dia.
BGA196	1.0mm	0.508mm	0.63mm
others	1.27~1.5mm	0.61mm	0.75mm

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	947002	947200	947210	947225	947250	947299
Ag – Silver	947006	947600	947610	947625	947650	947699
Cu – OSP	947008	947800	947810	947825	947850	947899
Au – Gold	947009	947900	947910	947925	947950	947999
Standard						
SnPb – HASL	947001	947000	947010	947025	947050	947100

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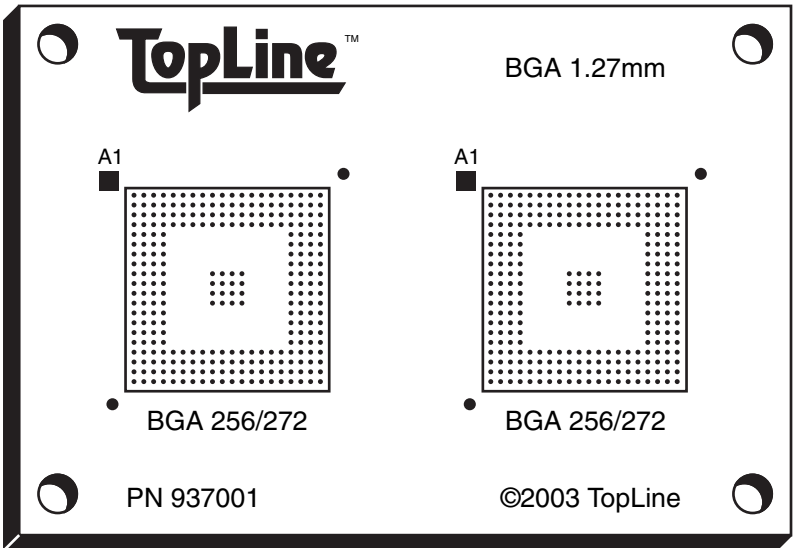
BGA256/BGA272
1.27mm Pitch



Actual Size 2.75” x 4.0” (70 x 100mm))

TopLine offers a low cost BGA kit for placement and rework practice. Popular BGA256/BGA272 without daisy chain. Use for hand solder or machine assembly

Features

FR4 Board
Double Sided
Tooling Holes
Fiducial Marks
LPI Soldermask
Pad Site .030” dia.

BGA256/BGA272
1.27mm Pitch

Kit Ordering Information

Component Selection	Ball Pitch	Manual Assembly or Machine Run				
		937000 Order Number 1 Kit	937010 Order Number 10 Kits	937020 Order Number 20 Kits	937040 Order Number 40 Kits	937080 Order Number 80 Kits
Board		1	10	20	40	80
BGA256/BGA272	1.27mm	2	20	40	80	160

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	20 Kits	40 Kits	80 Kits
Lead Free						
Sn – Tin	937002	937200	937210	937220	937240	937280
Ag – Silver	937006	937600	937610	937620	937640	937680
Cu – OSP	937008	937800	937810	937820	937840	937880
Au – Gold	937009	937900	937910	937920	937940	937980
Standard						
SnPb – HASL	937001	937000	937010	937020	937040	937080

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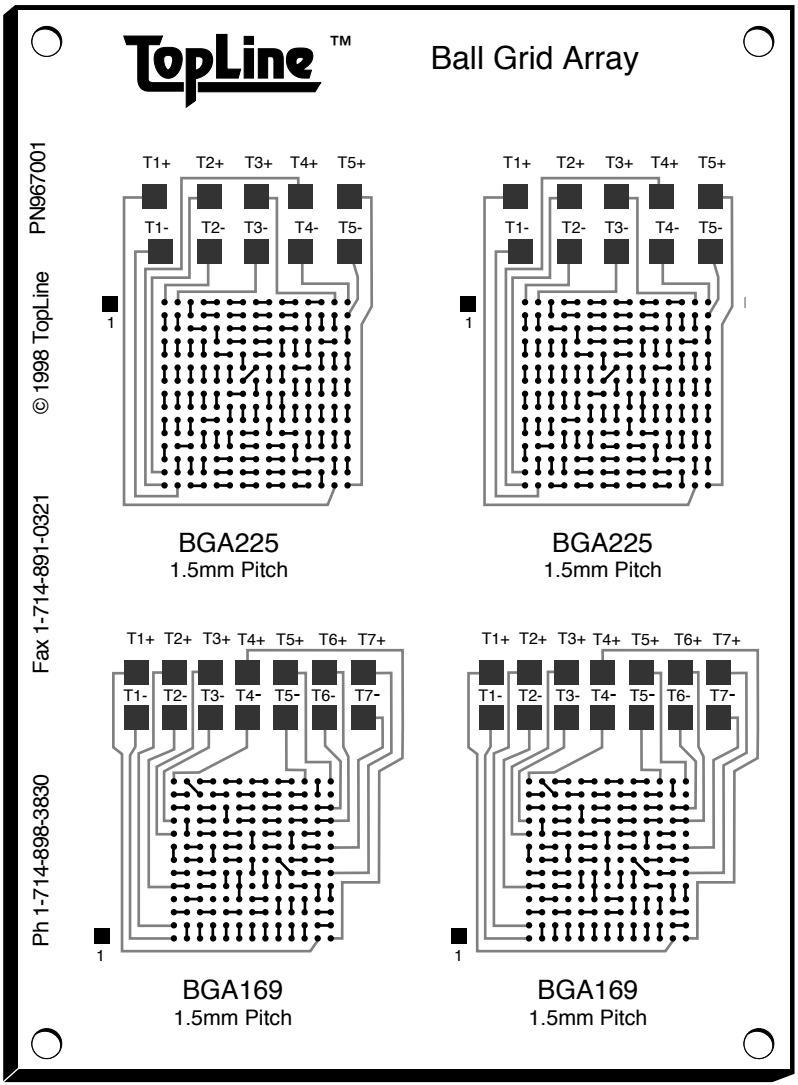
BGA169 & BGA225 with Daisy Chain Test 1.5mm Pitch



Actual Size 4” x 5.5 (100 x 140mm)

TopLine makes practicing with Ball Grid Array technology accessible and affordable. Each board supports four BGAs with 1.5mm grid pattern and daisy chain test points to verify proper placement.

Double sided board incorporates “two front side” design so only one solder paste stencil is needed.

Features

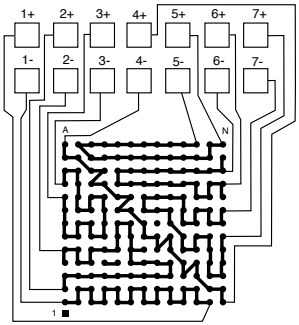
LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

BGA169 & BGA225
with Daisy Chain Test
1.5mm Pitch

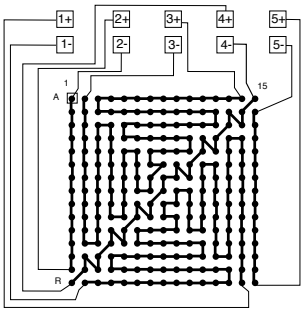
Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 967000 1 Kit	Machine Run: Order Number 967012 12 Kits	Order Number 967025 25 Kits	Order Number 967050 50 Kits	Order Number 967100 100 Kits
Board		1	12	25	50	100
BGA 169	1.5mm	2	25	50	100	200
BGA 225	1.5mm	2	25	50	100	200



BGA169
After Mounting To Test Board



BGA225
After Mounting To Test Board

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	12 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	967002	967200	967212	967225	967250	967299
Ag – Silver	967006	967600	967612	967625	967650	967699
Cu – OSP	967008	967800	967812	967825	967850	967899
Au – Gold	967009	967900	967912	967925	967950	967999
Standard						
SnPb – HASL	967001	967000	967012	967025	967050	967100

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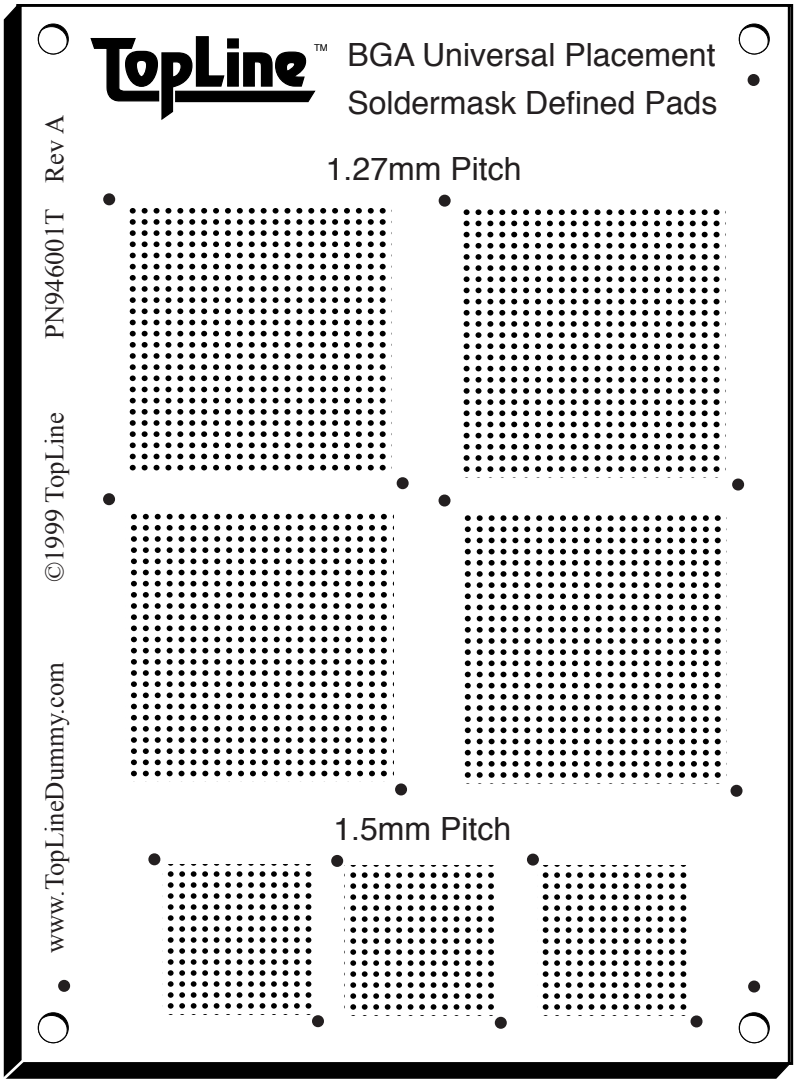
Universal BGA Kit
1.27mm & 1.5mm Pitch



Actual Size: 4” x 5.5” (100 x 140mm)

TopLine’s Universal BGA Kits are economical. Includes non-daisy-chain BGA components. Kit has 1.27mm and 1.5mm pitch for placement and solder practice.

Pad Geometries

Pad Dia.	Ball Dia.	Pitch
23mil	30mil	1.5 mm
23mil	30mil	1.27mm

Top Side-
Soldermask defined pads

Bottom Side-
Etched defined pads

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes

Universal BGA Kit 1.27mm & 1.5mm Pitch

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 946000 1 Kit	Machine Run: Order Number 946010 10 Kits	Machine Run: Order Number 946025 25 Kits
Board 946001	1.27/1.5mm	1	10	25
BGA169 or BGA225	1.5mm	4	40	100
BGA256 or BGA352	1.27mm	4	40	100

Lead Free (Pb-Free) Option

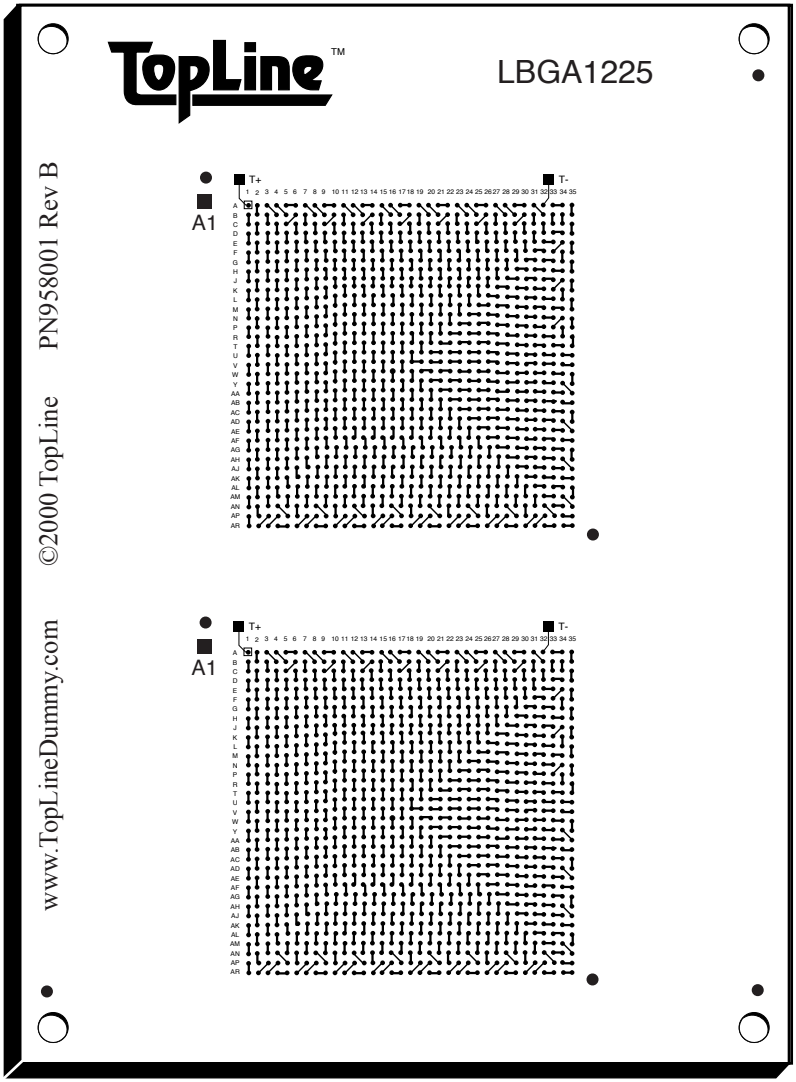
Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	946002	946200	946210	946225	946250	946299
Ag – Silver	946006	946600	946610	946625	946650	946699
Cu – OSP	946008	946800	946810	946825	946850	946899
Au – Gold	946009	946900	946910	946925	946950	946999
Standard						
SnPb – HASL	946001	946000	946010	946025	946050	946100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

LBGA1225
Daisy Chain Kit
1.27mm Pitch

Lead Free
Pb
Available

Lead Free
Pb-Free RoHs

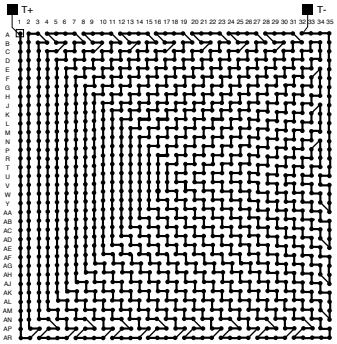


Actual Size: 4” x 5.5” (100 x 140mm)

Experiment with large size Ball Grid Arrays. Kit comes consits of PC Board with daisy chain and matching 45mm square LBGA Component with 1225 solder balls.

Top Side:
35 x 35 matrix LBGA1225

Bottom Side: LBGA1089
33 x 33 matrix: Not Shown



LBGA1225-DC359
After Mounting

Soldermask defined
pad diameter 0.6mm

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes
Fiducial Marks

LBGA1225
Daisy Chain Kit
1.27mm Pitch

Kit Ordering Information

Component	Pitch	Manual Assembly Order Number 958000 1 Kit	Machine Run Order Number 958012 12 Kits	Machine Run Order Number 958024 24 Kits
Board 958001		1	12	24
LBGA1225	1.27mm	2	24	48

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	958002	958200	958210	958225	958250	958299
Ag – Silver	958007	958600	958610	958625	958650	958699
Cu – OSP	958008	958800	958810	958825	958850	958899
Au – Gold	958009	958900	958910	958925	958950	958999
Standard						
SnPb – HASL	958001	958000	958010	958025	958050	958100

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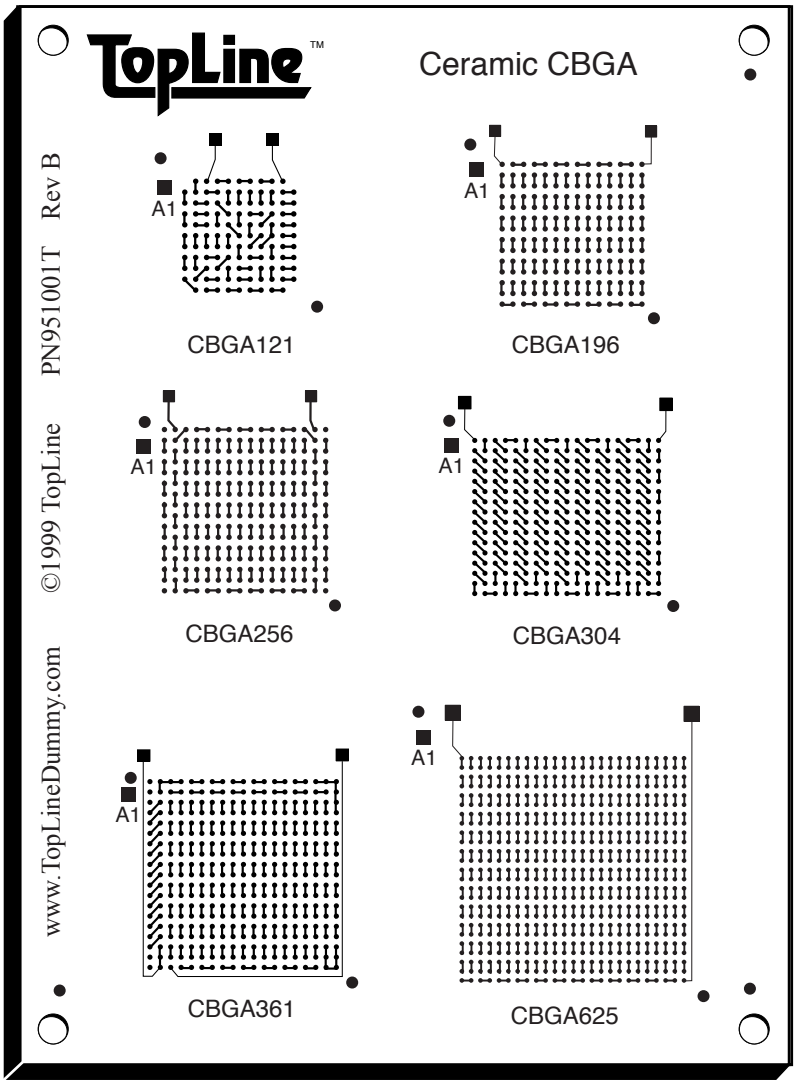
Ceramic CBGA Kit
1.27mm Pitch



Actual Size: 4” x 5.5” (100 x 140mm)

TopLine’s Ceramic Ball Grid Array. Kit includes one PC board and 6-different CBGAs.

New Rev “B” design is daisy chain, double sided with same land patterns on both sides of board.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Ceramic CBGA Kit
1.27mm Pitch

Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 951000 1 Kit	Manual Assembly: Order Number 951010 10 Kits	Machine Run: Order Number 951012 12 Kits	Machine Run: Order Number 951025 25 Kits
Board		1	10	12	25
CBGA121 11 x 11	1.27mm	1	10	12	25
CBGA196 14 x 14	1.27mm	1	10	12	25
CBGA256 16 x 16	1.27mm	1	10	12	25
CBGA304 21 x 25	1.27mm	1	10	12	25
CBGA361 19 x 19	1.27mm	1	10	12	25
CBGA625 25 x 25	1.27mm	1	10	12	25

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	12 Kits	25 Kits
Lead Free					
Sn – Tin	951002	951200	951210	951212	951225
Ag – Silver	951006	951600	951610	951612	951625
Cu – OSP	951008	951800	951810	951812	951825
Au – Gold	951009	951900	951910	951912	951925
Standard					
SnPb – HASL	951001	951000	951010	951012	951025

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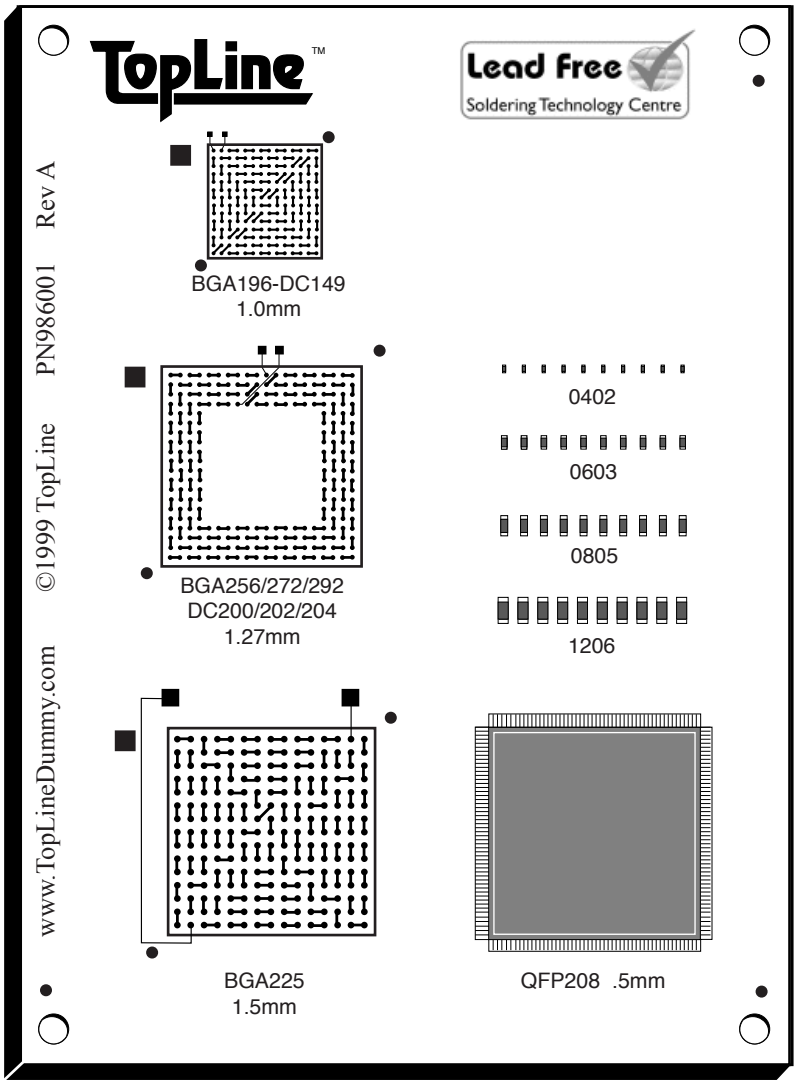
Lead Free Kit
Multicomponents



Actual Size 4” x 5.5 (100 x 140mm)

Practice Lead free assembly using fine-pitch components.

PC Board Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Assembly Methods

Machine Run
Hand Solder
Rework

Lead Free Kit Multicomponents

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 986000 1 Kit	Manual Assembly: Order Number 986010 10 Kits	Machine Run: Order Number 986024 24 Kits	Machine Run: Order Number 986050 50 Kits	Machine Run: Order Number 986100 100 Kits
Board		1	10	24	50	100
BGA196	1.0mm	1	10	24	50	100
BGA225	1.5mm	1	10	24	50	100
BGA256	1.27mm	1	10	24	50	100
QFP208	0.5mm	1	10	24	50	100
0402		10	100	250	500	1000
0603		10	100	250	500	1000
0805		10	100	250	500	1000
1206		10	100	250	500	1000

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	24 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	986002	986200	986210	986224	986250	986299
Ag – Silver	986006	986600	986610	986624	986650	986699
Cu – OSP	986008	986800	986810	986824	986850	986899
Au – Gold	986009	986900	986910	986924	986950	986999

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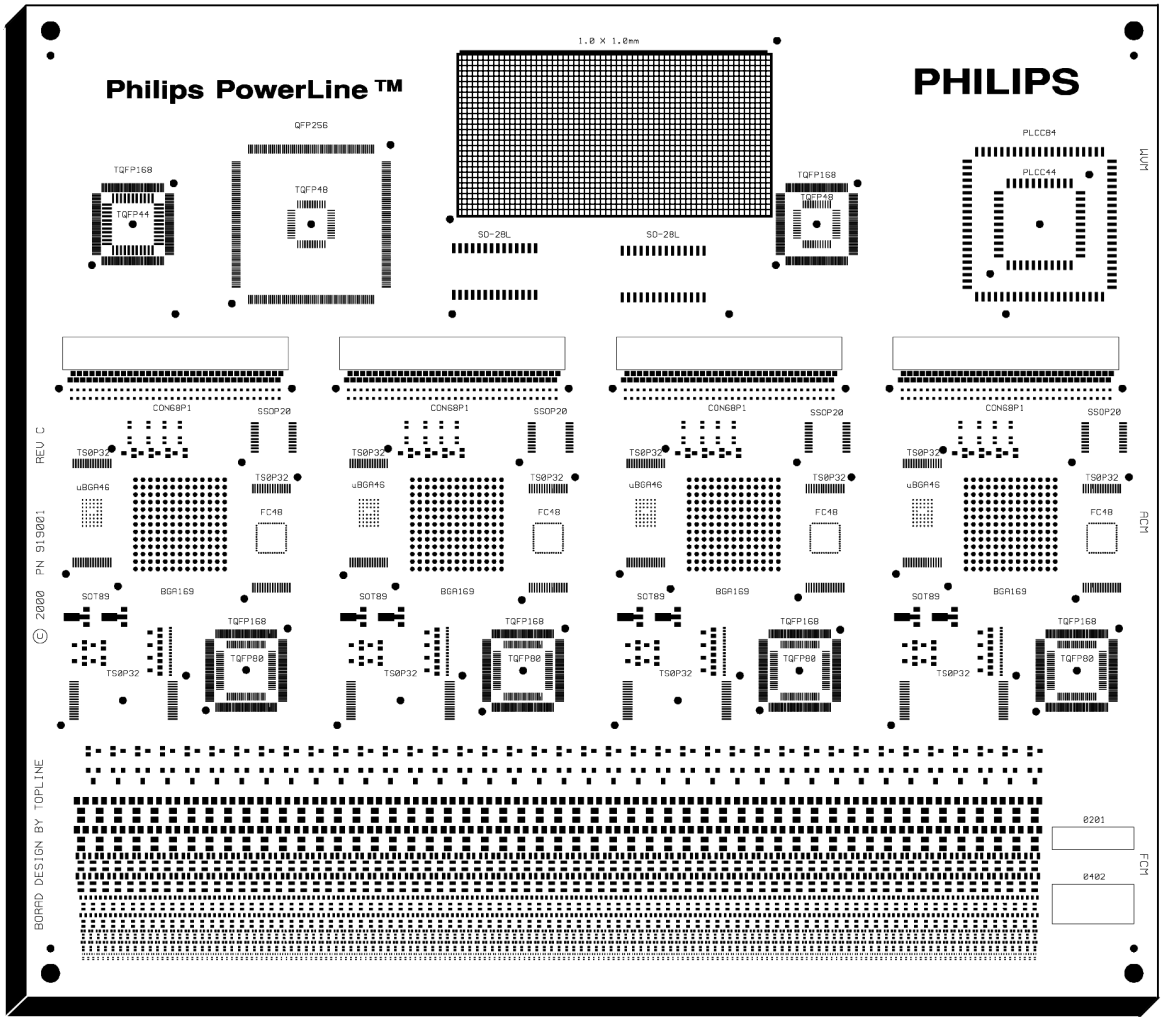
Large Machine Run Kit



Actual Size: 9” x 8” (230mm x 200mm)

Features

Single Sided
Black LPI Soldermask
Very High Density
0201 Chips

Large Machine Run Kit

Kit Ordering Information

Component	Per Board	Pitch	Machine Run Order Number 919010 10 Kit	Machine Run Order Number 919025 25 Kits	Machine Run Order Number 919050 50 Kits	Machine Run Order Number 919100 100 Kits
Board			10	25	50	100
LQFP168	6	0.3mm	0	0	0	0
QFP256	1	0.4mm	10	24	48	96
TQFP48	2	0.5mm	25	50	100	200
TQFP44	1	0.8mm	10	25	50	100
LQFP80	4	0.4mm	40	100	200	400
TSOP32	12	0.5mm	120	300	600	1,200
FLIP CHIP 48	4	457μm	0	0	0	0
μBGA46	4	0.75mm	40	99	198	396
BGA169	4	1.5mm	40	100	180	360
PLCC44	1	1.27mm	10	25	50	100
PLCC84	1	1.27mm	10	25	50	100
SOL28	2	1.27mm	20	50	100	200
SSOP20	4	0.65mm	40	100	200	400
SOT323	68		3,000	3,000	3,000	6,000
SOT23	40		3,000	3,000	3,000	6,000
SOT89	8		100	200	400	800
0201	600		5,000	15,000	30,000	60,000
0402	700		10,000	20,000	40,000	80,000
0603	500		5,000	15,000	25,000	50,000
0805	300		5,000	10,000	15,000	30,000
1206	200		5,000	10,000	15,000	20,000

Lead Free (Pb-Free) Option

Description	Spare Board	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free					
Sn – Tin	919002	919210	919225	919250	919299
Ag – Silver	919006	919610	919625	919650	919699
Cu – OSP	919008	919810	919825	919850	919899
Au – Gold	919009	919910	919925	919950	919999
Standard					
SnPb – HASL	919001	919010	919025	919050	919100

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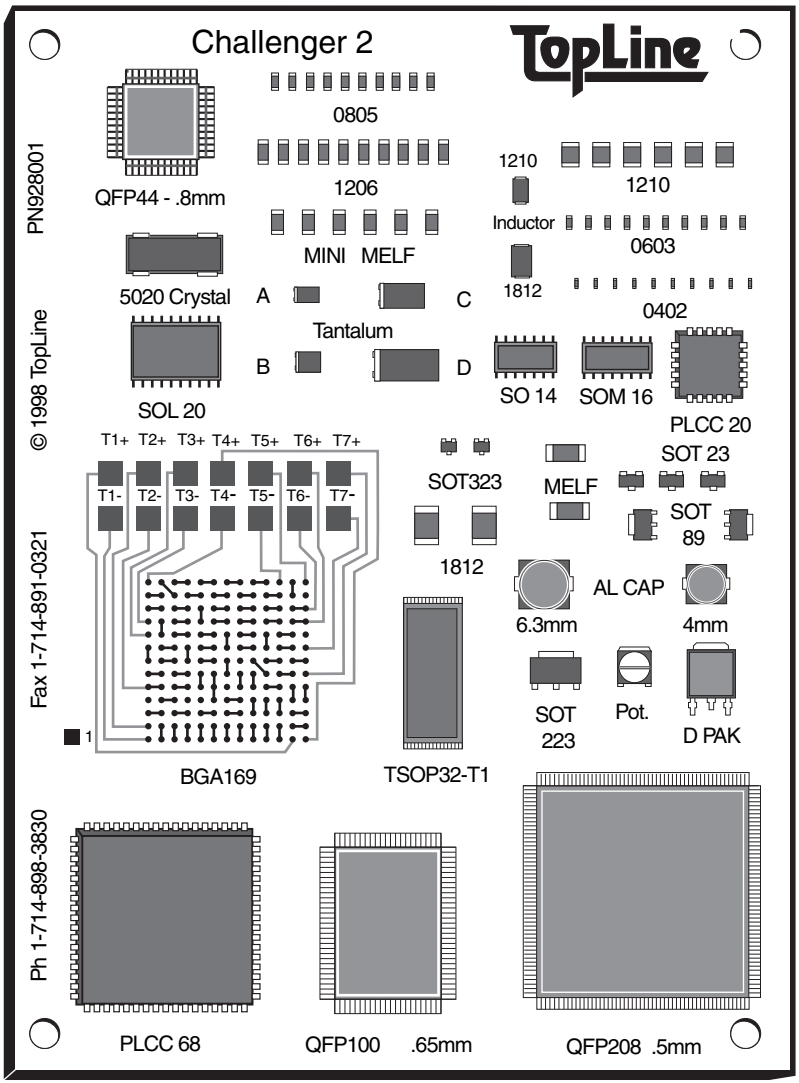
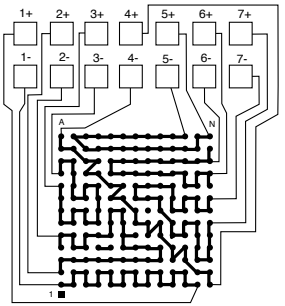
Challenger 2 Kit
Intermediate SMD



Actual Size: 4” x 5.5” (100 x 140mm)

The new Challenger 2 Kit gives you a wide selection of 33 different SMD packages. Includes BGA with daisy chain continuity test, fine-pitch components and many discrete components. Double-sided board incorporates “two-front-side” design so only one solder paste stencil is needed.

Put your machine to the test with the new Challenger 2 Kit.



BGA169 After Mounting

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Challenger 2 Kit
Intermediate SMD

Lead Free
Pb-Free RoHs

Kit Ordering Information

Lead Free Pb Available Component	Pitch	Manual Assembly Order Number 928000 1 Kit	Manual Assembly Order Number 928010 10 Kits	Machine Run Order Number 928025 25 Kits	Machine Run Order Number 928050 50 Kits	Machine Run Order Number 928100 100 Kits
Board		1	10	25	50	100
TSOP32	0.5mm	1	10	25	50	100
QFP208	0.5mm	1	10	25	50	100
QFP100	0.65mm	1	10	25	50	100
QFP44	0.8mm	1	10	25	50	100
PLCC20	1.27mm	1	10	25	50	100
PLCC68	1.27mm	1	10	25	50	100
SO14	1.27mm	1	10	25	50	100
SOM16	1.27mm	1	10	25	50	100
SOL20	1.27mm	1	10	25	50	100
BGA169	1.5mm	1	10	25	50	100
SOT23		3	30	75	150	400
SOT89		2	20	50	100	200
SOT223		1	10	25	50	100
SOT323		2	20	50	100	200
DPAK		1	10	25	100	100
Crystal		1	10	25	100	100
Tantalum A & B		1 ea.	10 ea.	25 ea.	50 ea.	100 ea.
Tantalum C & D		1 ea.	10 ea.	25 ea.	100 ea.	100 ea.
Aluminum Cap 4mm & 6.3mm		1 ea.	10 ea.	25 ea.	100 ea.	100 ea.
0402 & 0603 Chip		10 ea.	100 ea.	250 ea.	500 ea.	1000 ea.
0805 & 1206 Chip		10 ea.	100	150	500	1000
1206 mini MELF		6	60	150	500	500
1210 Chip		6	60	25	50	250
1210 Inductor		1	10	25	50	100
1812 Chip		1	10	25	50	100
1812 Inductor		1	10	25	50	100
1812 Potentiometer		1	10	25	50	100
2308 MELF		2	20	50	100	200

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	928002	928200	928210	928225	928250	928299
Ag – Silver	928006	928600	928610	928625	928650	928699
Cu – OSP	928008	928800	928810	928825	928850	928899
Au – Gold	928009	928900	928910	928925	928950	928999
Standard						
SnPb – HASL	928001	928000	928010	928025	928050	928100

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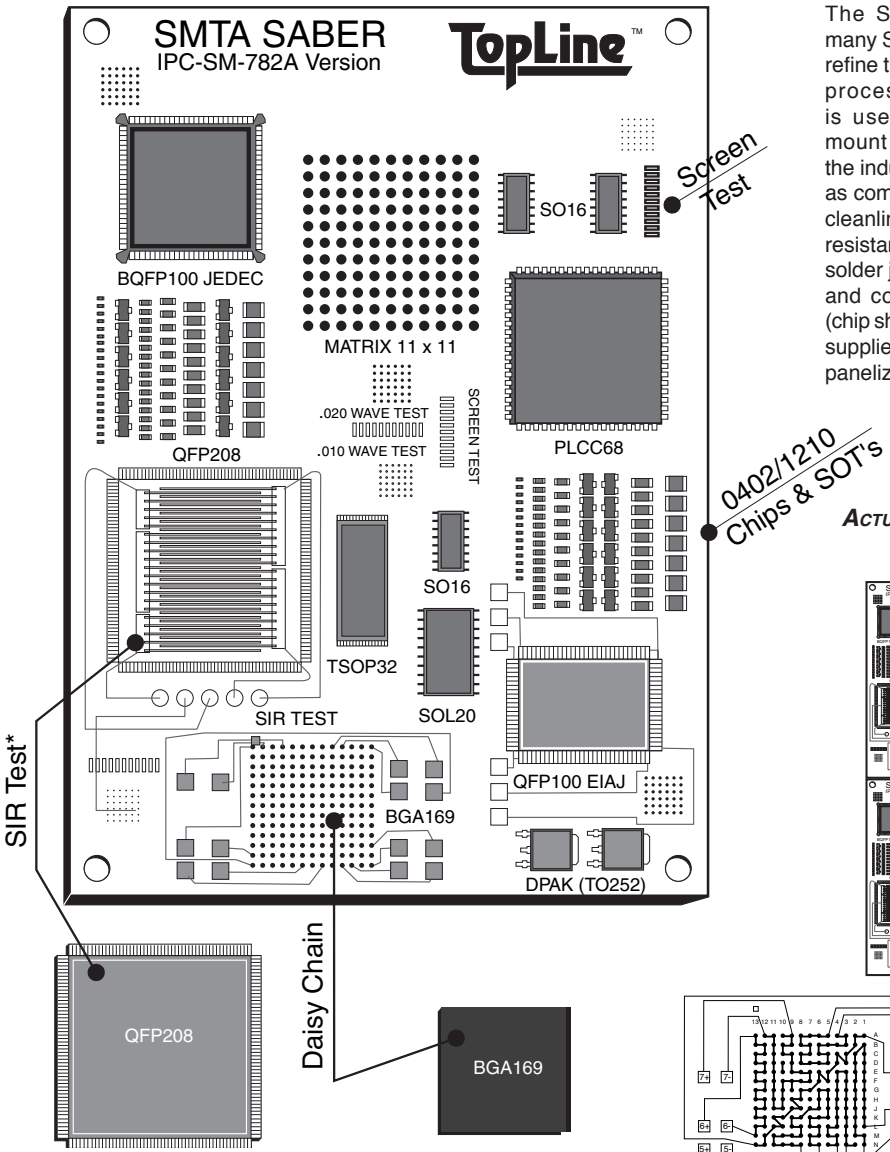
SABER 4-Board Array
Advanced Mixed Technology

TopLine®

Lead Free Pb Available

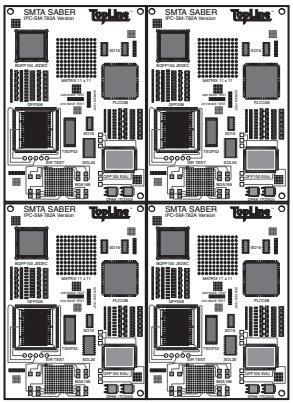
Lead Free Pb-Free RoHs

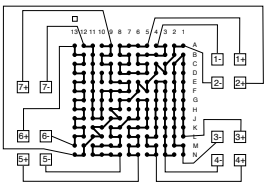


The SABER Board has helped many SMTA members to define and refine their surface mount assembly processes. The SABER Board is used by mainstream surface mount manufacturers throughout the industry to test capabilities such as component placement accuracy, cleanliness (SIR-surface insulation resistance), solder paste screening, solder joint integrity, wave soldering and component placement speed (chip shooting). The SABER Board is supplied as a snap-apart, four board panelized array.

Actual Panel Size:

8" x 11" (200 x 280mm)





BGA After Mounting (Top Side)

Features

LPI Solder
FR4 Board .062"
Double Sided
Tooling Holes .125"
Fiducial Marks
4-Board Routed Array

SABER 4-BOARD ARRAY ADVANCED MIXED TECHNOLOGY

KIT ORDERING INFORMATION

*BQFP100 only in SnPb Kit

Component	Pitch	Manual Assembly: Order Number 950000 4 Kits	Manual Assembly: Order Number 950012 12 Kits	Machine Run: Order Number 950024 24 Kits	Machine Run: Order Number 950048 48 Kits	Machine Run: Order Number 950096 96 Kits
SABER Array		1 Array	3 Arrays	6 Arrays	12 Arrays	24 Arrays
QFP208	0.5mm	4	12	25	50	100
TSOP32	0.5mm	4	12	25	50	100
QFP100	0.65mm	4	12	25	50	100
BQFP100*	25mil	4	12	25	50	100
BGA169	1.5mm	4	12	25	50	100
PLCC68	1.27mm	4	12	25	50	100
SO16	1.27mm	12	50	100	200	300
SOL20	1.27mm	4	12	50	50	100
DPAK	1.27mm	10	25	50	100	200
SOT23	1.27mm	100	300	500	1000	3000
0402/0603/0805/1206 Chip	-	100	500	1000	2000	5000
1210 Chip	-	100	200	500	1000	1000
DIP14 ~ 20	100mil	8	25	50	100	200

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10/12 Kits	24/25 Kits	48/50 Kits	96/100 Kits
4-Board Array						
Sn – Tin	950002	950200	950212	950224	950248	950296
Ag – Silver	950006	950600	950612	950624	950648	950696
Cu – OSP	950008	950800	950812	950824	950848	950896
Au – Gold	950009	950900	950912	950924	950948	950996
Standard						
SnPb – HASL	950001	950000	950012	950024	950048	950196
Single (1-up)						
Sn – Tin	950013	950201	950210	950225	950250	950299
Ag – Silver	950016	950601	950610	950625	950650	950699
Cu – OSP	950018	950801	950810	950825	950850	950899
Au – Gold	950007	950901	950910	950925	950950	950999
Standard						
SnPb – HASL	950003	950011	950010	950025	950050	950100

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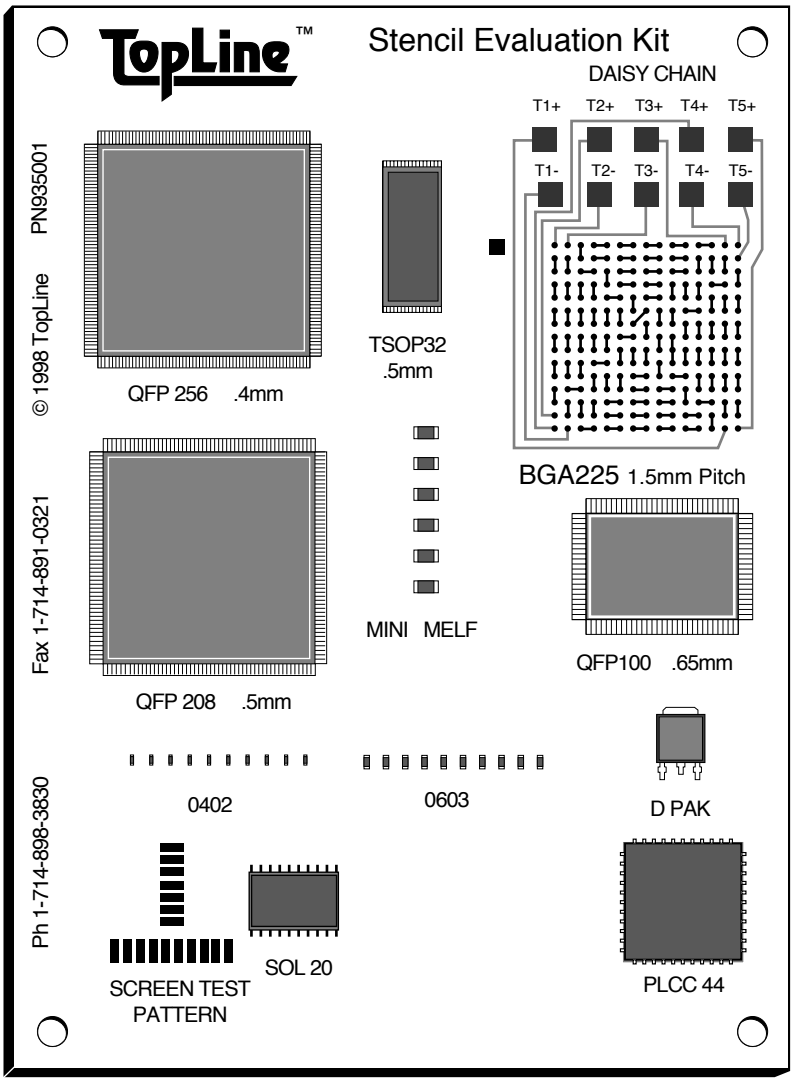
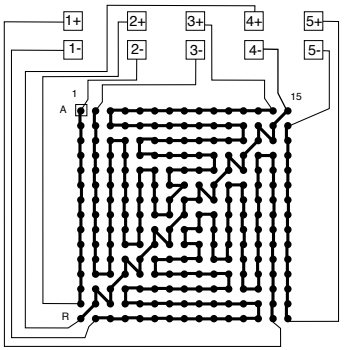
Stencil Evaluation Kit



Actual Size: 4” x 5.5” (100 x 140mm)

We supply the board and components. You provide the stencil. All kits include a ball grid array with daisy chain test and 0.4mm pitch QFP256.



BGA225
After Mounting To Test Board

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Stencil Evaluation Kit

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 936000 1 Kit	Manual Assembly: Order Number 936010 10 Kit	Machine Run: Order Number 936025 25 Kits	Machine Run: Order Number 936050 50 Kits	Machine Run: Order Number 936100 100 Kits
Board		1	10	25	50	100
LQFP168	0.3mm	0	0	0	0	0
QFP256	0.4mm	1	10	25	50	100
QFP208	0.5mm	1	10	25	50	100
TSOP32	0.5mm	1	10	25	50	100
QFP100	0.65mm	1	10	25	50	100
BGA225	1.5mm	1	10	25	50	100
PLCC44	50mil	1	10	25	50	100
SOL20	50mil	1	10	25	50	100
DPAK		1	10	25	50	100
0402 chip		10	100	250	500	1000
0603 chip		10	100	250	500	1000
mini Melf		6	60	150	300	600

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	935002	936200	936210	936225	936250	936299
Ag – Silver	935006	936600	936610	936625	936650	936699
Cu – OSP	935008	936800	936810	936825	936850	936899
Au – Gold	935009	936900	936910	936925	936950	936999
Standard						
SnPb – HASL	935001	936000	936010	936025	936050	936100

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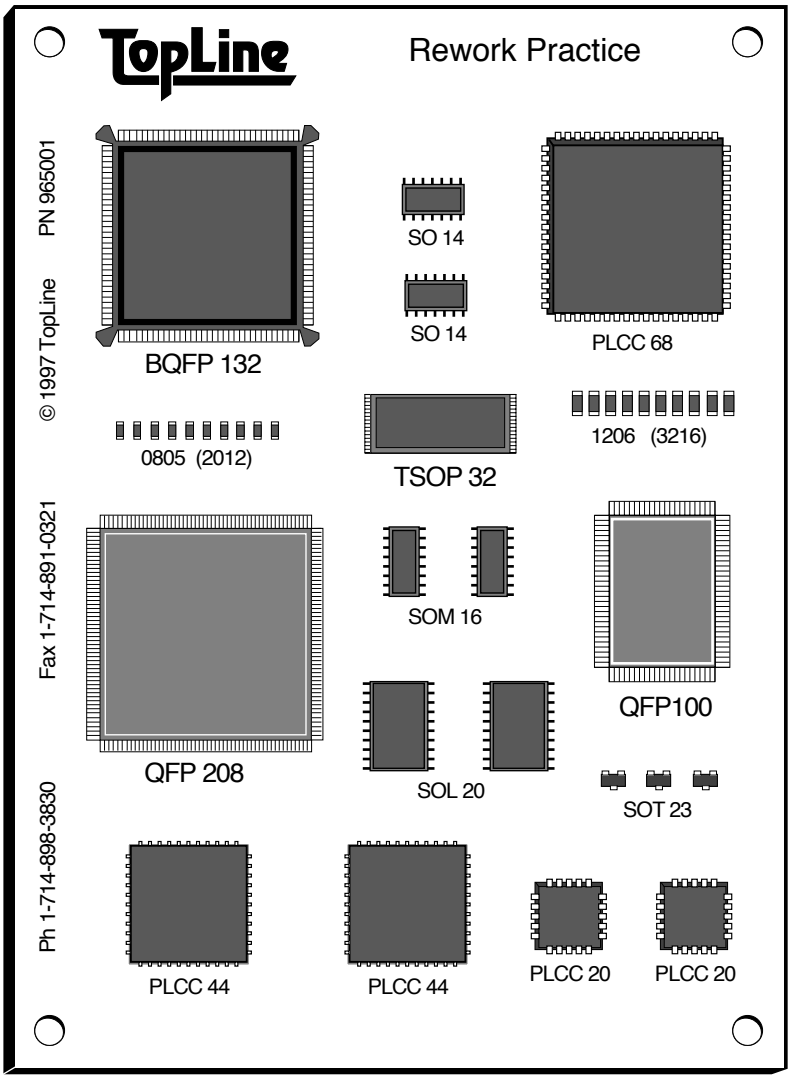
Rework 1 Practice Kit



Actual Size: 4” x 5.5” (100 x 140mm)

This Rework Practice Kit is designed for all skill levels. Includes fine-pitch components often found in real world rework situations.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Rework 1 Practice Kit

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 965000 1 Kit	Manual Assembly: Order Number 965010 10 Kits	Machine Run: Order Number 965026 25 Kits	Machine Run: Order Number 965050 50 Kits	Machine Run: Order Number 965100 100 Kits
Board		1	10	25	50	100
QFP208	0.5mm	1	10	25	50	100
TSOP32	0.5mm	1	10	25	50	100
QFP100	0.65mm	1	10	25	50	100
BQFP132*	25mils	1	10	25	50	100
PLCC20	50mils	2	25	50	100	200
PLCC44	50 mils	2	25	50	100	200
PLCC68	50mils	1	10	25	50	100
SO14	50mils	2	25	50	100	200
SOM16	50mils	2	25	50	100	200
SOL20	50mils	2	25	50	100	200
SOT23		10	100	500	500	500
0805 Chip		10	100	500	500	1000
1206 Chip		10	100	250	500	1000

*BQFP132 only in SnPb Kits

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	965002	965200	965210	965225	965250	965299
Ag – Silver	965006	965600	965610	965625	965650	965699
Cu – OSP	965008	965800	965810	965825	965850	965899
Au – Gold	965009	965900	965910	965925	965950	965999
Standard						
SnPb – HASL	965001	965000	965010	965025	965050	965100

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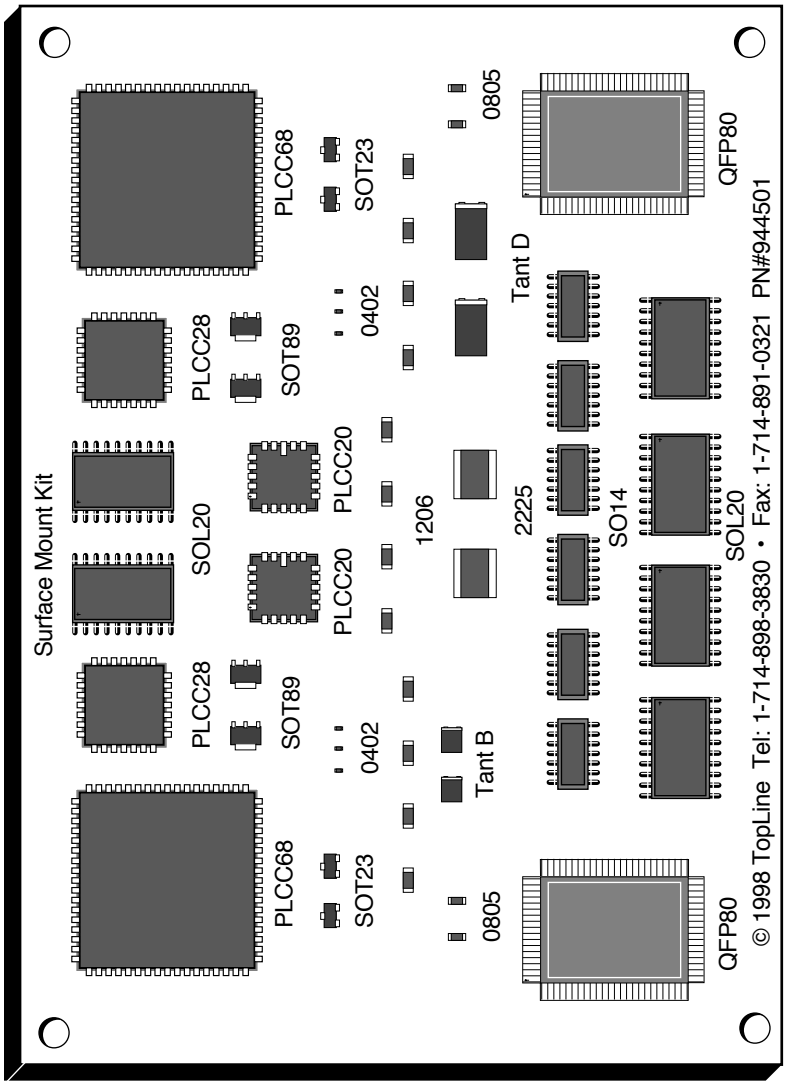
Rework 2 Practice Kit

Lead Free Pb-Free RoHs



Actual Size: 4” x 5.5” (100 x 140mm)

Topline provides this kit for rework practice. Kit contains popular components including fine pitch Quad Flat Pack. For manual assembly only.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Rework 2 Practice Kit

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 944500 1 Kit	Manual Assembly: Order Number 944510 10 Kits	Machine Run: Order Number 944525 25 Kits	Machine Run: Order Number 944550 50 Kits
Board		1	10	25	50
QFP80	0.8mm	2	20	50	100
PLCC20	1.27mm	2	20	50	100
PLCC28	1.27mm	2	20	50	100
PLCC68	1.27mm	2	20	50	100
SO14	1.27mm	6	60	150	300
SOL20	1.27mm	6	60	150	300
0402 Chips		6	60	150	300
0805 Chips		8	80	200	400
1206 Chips		12	120	300	600
2225 Cap		2	20	50	100
Tantalum 3528	B-Case	2	20	50	100
Tantalum 7343	D-Case	2	20	50	100
SOT23		4	40	100	400
SOT89		4	40	100	200

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	944502	944200	944210	944225	944250	944299
Ag – Silver	944506	944600	944610	944625	944650	944699
Cu – OSP	944508	944800	944810	944825	944850	944899
Au – Gold	944509	944900	944910	944925	944950	944999
Standard						
SnPb – HASL	944501	944500	944510	944525	944550	944599

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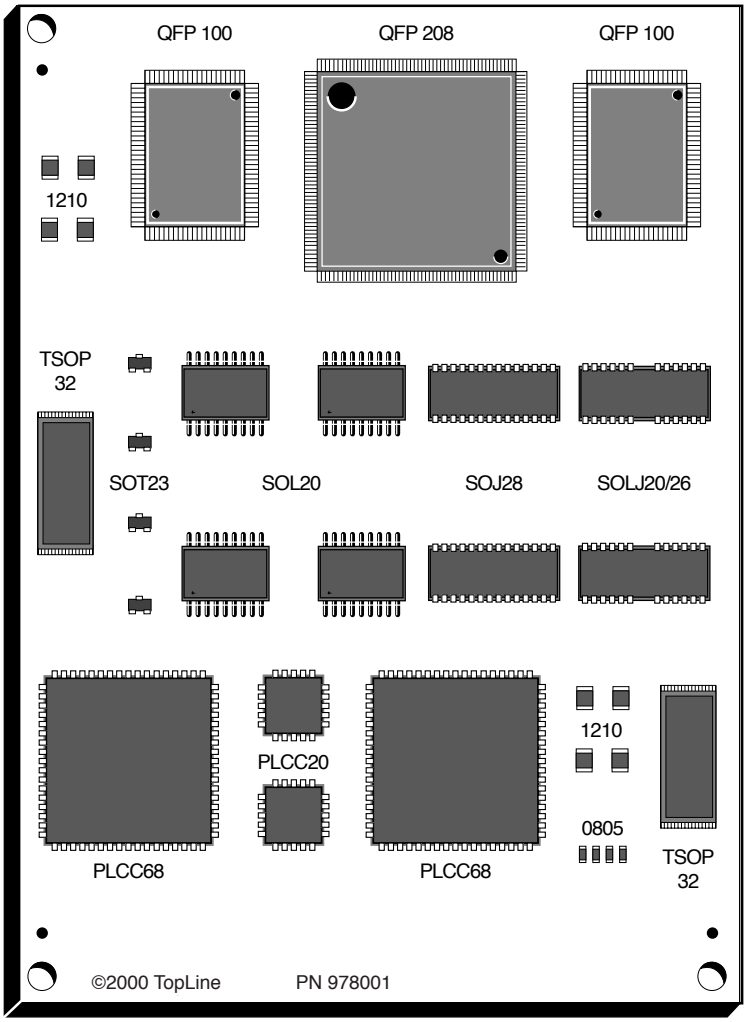
Rework 3 Practice Kit



Actual Size 4” x 5.5” (100 x 140mm)

This Rework Practice Kit is available populated and unassembled. Includes fine-pitch components often found in real work situations.

Features

- LPI Soldermask
- FR4 Board .062”
- Single Sided
- Tooling Holes
- Fiducial Marks

Rework 3 Practice Kit

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 978000 1 Kit	Manual Assembly: Order Number 978010 10 Kits	Machine Run: Order Number 978025 25 Kits	Machine Run: Order Number 978050 50 Kits	Machine Run: Order Number 978100 100 Kits
Board		1	10	25	50	100
QFP208	0.5mm	1	10	25	50	100
QFP100	0.65mm	2	20	50	100	200
TSOP32	0.5mm	2	20	50	100	200
PLCC20	50mil	2	20	50	100	200
PLCC68	50mil	2	20	50	100	200
SOL20	50mil	4	40	100	200	400
SOJ28	50mil	2	20	50	100	200
*SOJ20/26	50mil	2	20	50	100	200
SOT23		4	50	100	200	400
0805		4	50	100	200	400
1210		8	100	200	400	800

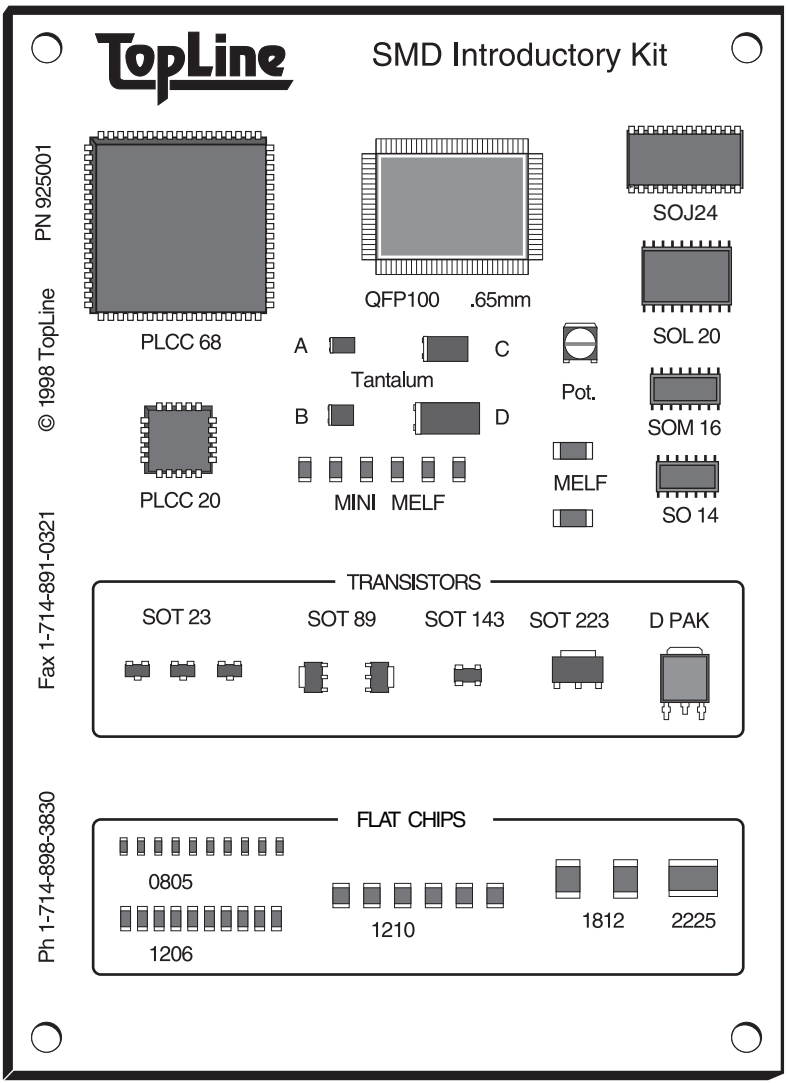
*SOJ20/26 only in SnPb Kits

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	978002	978200	978210	978225	978250	978299
Ag – Silver	978006	978600	978610	978625	978650	978699
Cu – OSP	978008	978800	978810	978825	978850	978899
Au – Gold	978009	978900	978910	978925	978950	978999
Standard						
SnPb – HASL	978001	978000	978010	978025	978050	978100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

SMD Introductory Kit



Actual Size: 4” x 5.5” (100mm x 140mm) Rev B

The SMD Introductory Kit includes a wide range of popular easy-to-handle components.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

SMD Introductory Kit

Lead Free
Pb-Free RoHs

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 925000 1 Kit	Manual Assembly: Order Number 925010 10 Kits	Machine Run: Order Number 925025 25 Kits	Machine Run: Order Number 925050 50 Kits	Machine Run: Order Number 925100 100 Kits
Board		1	10	25	50	100
QFP100	0.65mm	1	10	25	50	100
SO14	50mils	1	10	25	50	100
SOM16	50mils	1	10	25	50	100
SOL20	50mils	1	10	25	50	100
PLCC20	50mils	1	10	25	50	100
PLCC68	50mils	1	10	25	50	100
SOT23		3	30	75	250	300
SOT89		2	20	50	100	200
SOT143		1	10	25	50	100
SOT223		1	10	25	50	100
DPAK		1	10	25	50	100
Tantalum-A		1	10	25	50	100
Tantalum-B		1	10	25	50	100
Tantalum-C		1	10	25	50	100
Tantalum-D		1	10	25	50	100
MELF		2	20	50	100	200
mini-MELF		6	60	300	300	600
Potentiometer		1	10	25	50	100
0805 Chip		10	100	250	500	1000
1206 Chip		10	100	250	500	1000
1210 Chip		10	100	250	500	1000
1812 Chip		2	20	50	100	200
2225 Chip		1	10	25	50	100

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	925002	925200	925210	925225	925250	925299
Ag – Silver	925006	925600	925610	925625	925650	925699
Cu – OSP	925008	925800	925810	925825	925850	925899
Au – Gold	925009	925900	925910	925925	925950	925999
Standard						
SnPb – HASL	925001	925000	925010	925025	925050	925100

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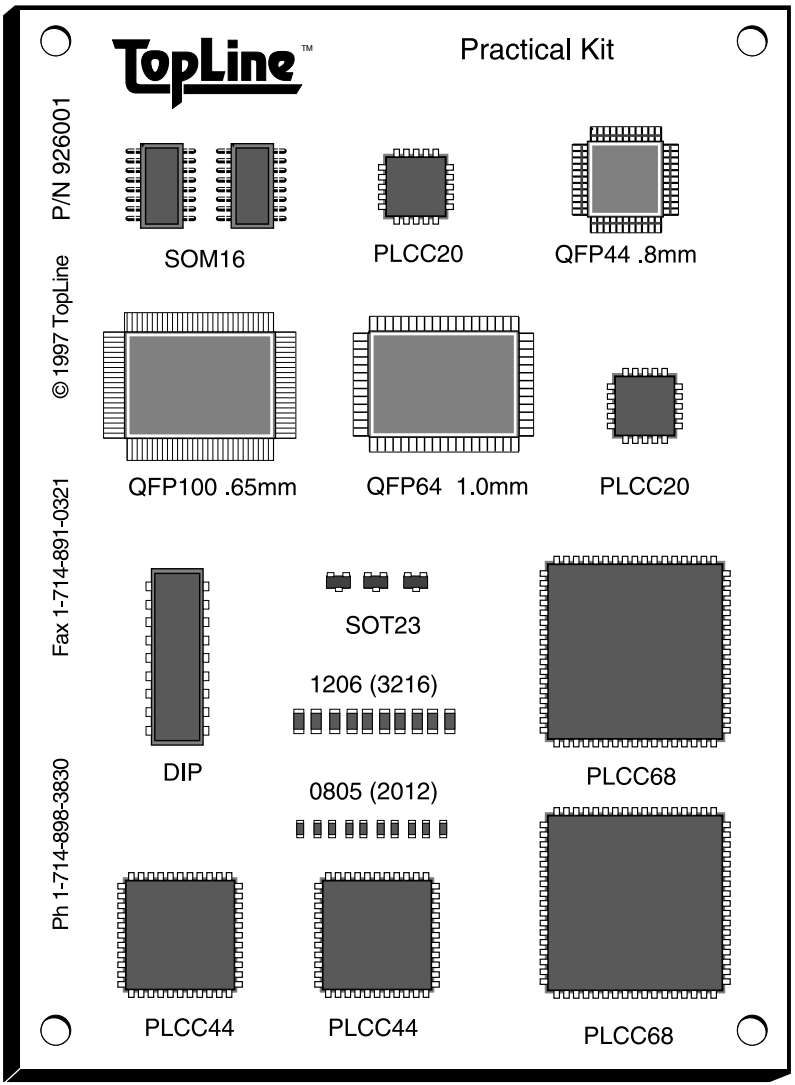
Practical Mixed Technology Kit



Actual Size: 4” x 5.5” (100 x 140mm)

A low-cost, mixed technology kit for rework and solder practice. Includes simple-to-handle components. Excellent for beginners. Can also be used for medium speed assembly.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks
Plated Throughholes

Practical Mixed Technology Kit

Kit Ordering Information

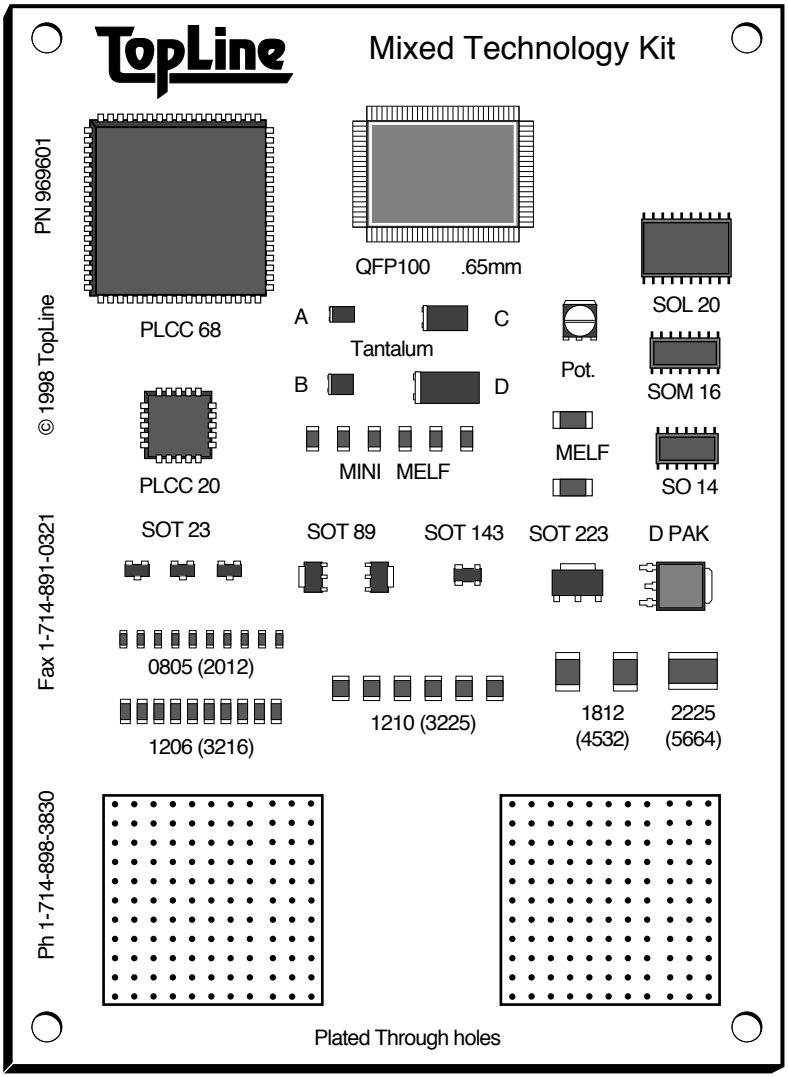
Component	Pitch	Manual Assembly: Order Number 926000 1 Kit	Manual Assembly: Order Number 926010 10 Kits	Machine Run: Order Number 926025 25 Kits	Machine Run: Order Number 926050 50 Kits	Machine Run: Order Number 926100 100 Kits
Board		1	10	25	50	100
QFP100	0.65mm	1	10	25	50	100
QFP44	0.80mm	1	10	25	50	100
QFP64	1.00mm	1	10	25	50	100
PLCC20	50mils	2	25	50	100	200
PLCC44	50mils	2	25	50	100	200
PLCC68	50mils	2	25	50	100	200
SOM16	50mils	2	25	50	100	200
DIP14~18	100mils	1	10	25	50	100
SOT23		10	50	500	500	500
0805 Chip		10	100	500	500	1000
1206 Chip		10	100	250	500	1000

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	926002	926200	926210	926225	926250	926299
Ag – Silver	926006	926600	926610	926625	926650	926699
Cu – OSP	926008	926800	926810	926825	926850	926899
Au – Gold	926009	926900	926910	926925	926950	926999
Standard						
SnPb – HASL	926001	926000	926010	926025	926050	925100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Mixed Technology 1 Kit



Actual Size: 4” x 5.5” (100 x 140mm)

Experiment with mixed technology. Combines easy-to-handle SMD components plus plenty of throughhole components on100mil grid.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks
Plated Throughholes

Mixed Technology 1 Kit

Lead Free
Pb-Free RoHs

Kit Ordering Information

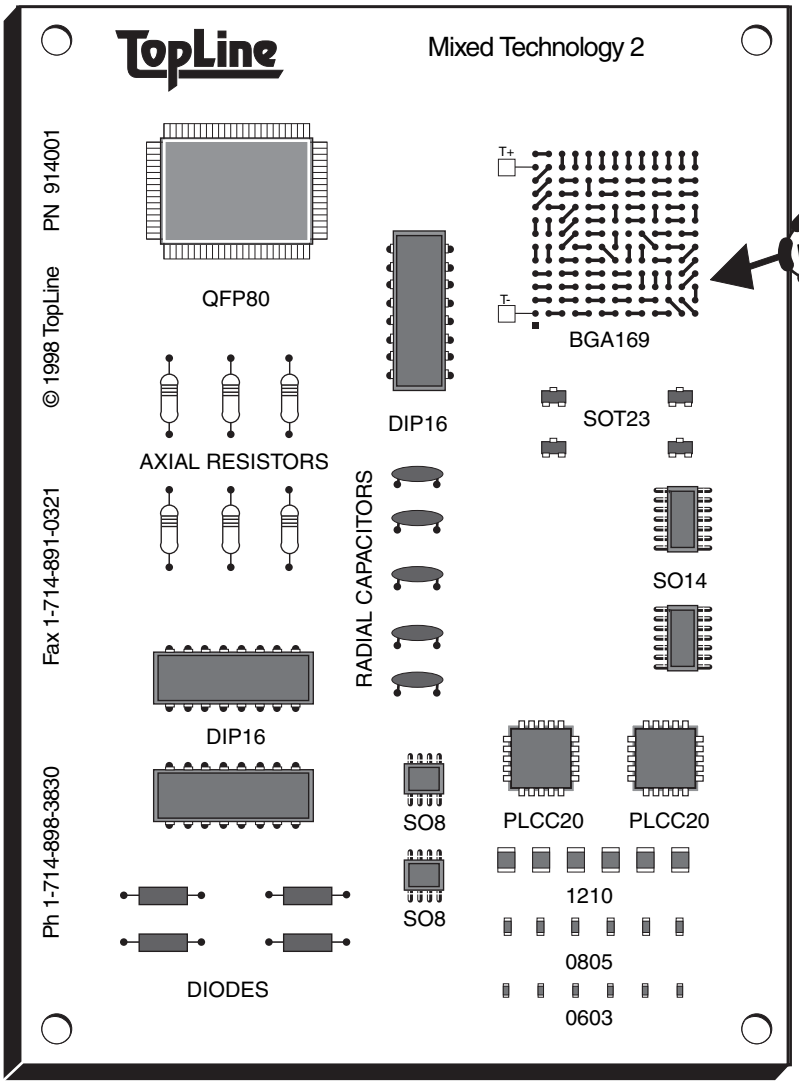
Component	Pitch	Manual Assembly: Order Number 969600 1 Kit	Manual Assembly: Order Number 969610 10 Kits	Machine Run: Order Number 969625 25 Kits	Machine Run: Order Number 969650 50 Kits	Machine Run: Order Number 969699 100 Kits
Board		1	10	25	50	100
QFP100	0.65mm	1	10	25	50	100
SO14	50mils	1	10	25	50	100
SOM16	50mils	1	10	25	50	100
SOL20	50mils	1	10	25	50	100
PLCC20	50mils	1	10	25	50	100
PLCC68	50mils	1	10	25	50	100
DIP14~20	100mils	4	40	100	200	400
SOT23 & SOT89		3	30	75	150	300
SOT143		1	10	25	50	100
SOT223		1	10	25	50	100
DPAK		1	10	25	50	100
Tantalum-A		1	10	25	50	100
Tantalum-B		1	10	25	50	100
Tantalum-C		1	10	25	50	100
Tantalum-D		1	10	25	50	100
MELF		2	20	50	100	200
mini-MELF		6	60	150	300	600
Potentiometer		1	10	25	50	100
0805 Chip		10	100	250	500	1000
1206 Chip		10	100	250	500	1000
1210 Chip		10	100	250	500	1000
1812 Chip		2	20	100	100	200
2225 Chip		1	10	25	50	100

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	969602	969200	969210	969225	969250	969299
Ag – Silver	969606	969700	969710	969725	969750	969799
Cu – OSP	969608	969800	969810	969825	969850	969899
Au – Gold	969609	969900	969910	969925	969950	969999
Standard						
SnPb – HASL	969601	969600	969610	969625	969650	969699

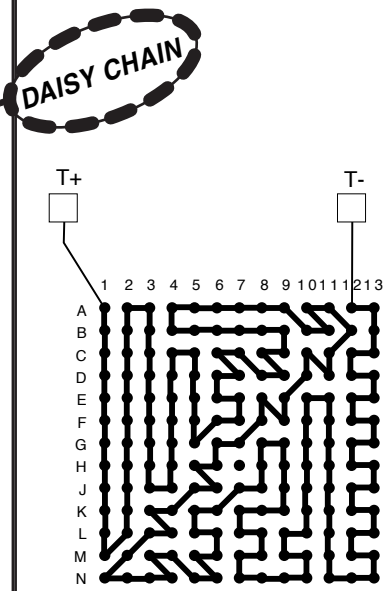
Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Mixed Technology 2 Kit



Actual Size: 4” x 5.5” (100 x 140mm)

The mixed technology 2 kit provides plenty of plated throughholes as well as BGA and an easy-to-solder



BGA169
After Mounting

Features

LPI Solder Mask
FR4 Board .062” (standard)
Single Sided
Tooling Holes .125”
Fiducial Marks
Plated Throughholes

Mixed Technology 2 Kit

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 914000 1 Kit	Manual Assembly: Order Number 914010 10 Kits	Machine Run: Order Number 914025 25 Kits	Machine Run: Order Number 914050 50 Kits	Machine Run: Order Number 914100 100 Kits
Board		1	10	25	50	100
QFP80	0.8mm	1	10	25	50	100
BGA169	1.5mm	1	10	25	50	100
SO8	1.27mm	2	25	50	100	200
SO14	1.27mm	2	25	50	100	200
PLCC20	50mil	2	25	50	100	200
SOT23		4	40	100	200	400
1210 Chip		6	60	150	300	600
0805 Chip		10	100	250	500	1000
0603 Chip		10	100	250	500	1000
Throughhole Components						
DIP16	100mil	3	30	75	150	300
1/4W Resistor	.50”	6	60	150	300	600
DO35 Diodes	.50”	4	40	200	200	400
Ceramic Cap	.20”	5	50	250	250	500

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	914002	914200	914210	914225	914250	914299
Ag – Silver	914006	914600	914610	914625	914650	914699
Cu – OSP	914008	914800	914810	914825	914850	914899
Au – Gold	914009	914900	914910	914925	914950	914999
Standard						
SnPb – HASL	914001	914000	914010	914025	914050	914100

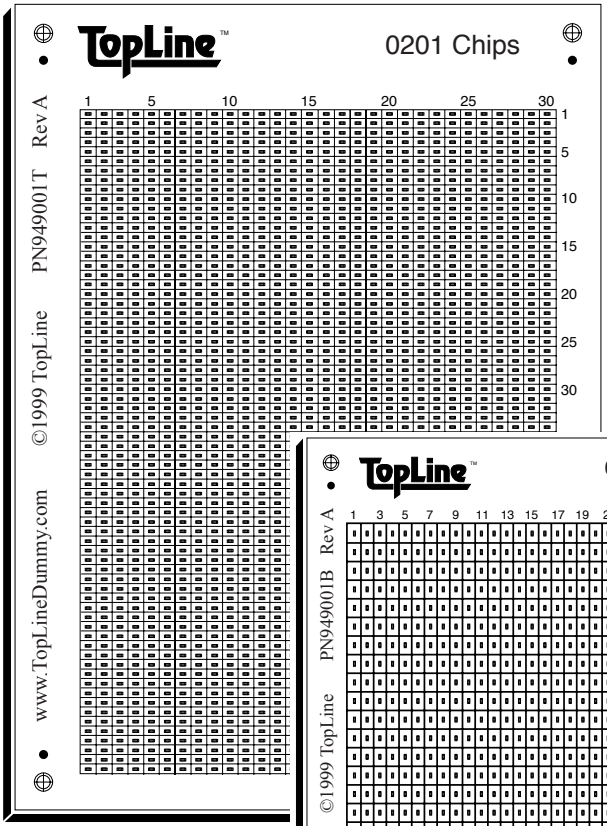
Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Chip Shooter Kit
0201 and 0402 Chips

Lead Free
Pb
Available

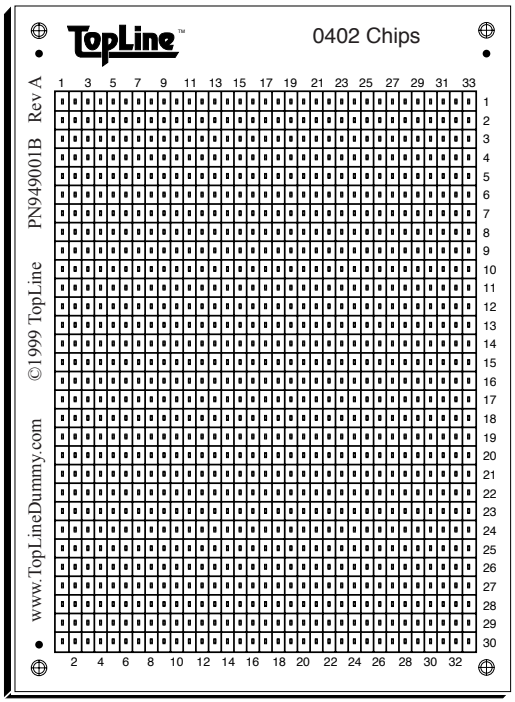
Lead Free
Pb-Free RoHs

Top Side of Board



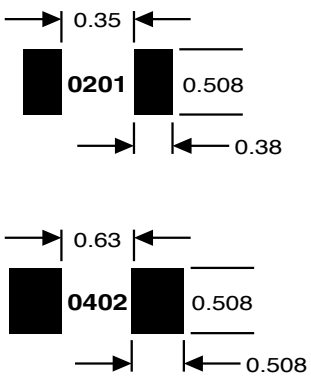
Put your machine to the test with TopLine's new 0201/0402 kits. Double sided board has 2000 pads for ultra-miniature 0201 chips on the front side and 1000 pads for 0402 chips on the back side. Components are supplied on 2mm pitch tape. Kit can be used for placement, soldering or epoxy dispenser testing.

Bottom Side of Board



Actual Size: 4" x 5.5" (100 x 140mm)

Pad Dimensions (mm)
Rev-A



Features

- LPI Solder Mask
- FR4 Board .062" thick
- Double Sided
- Tooling Holes .125"
- Fiducial Marks

Chip Shooter Kit
0201 and 0402 Chips

Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Tape Pitch	Machine Run: Order Number 949000 1 Kit	Order Number 949010 10 Kits	Order Number 949025 25 Kits	Order Number 949050 50 Kits	Order Number 949100 100 Kits
Board	-	1	10	25	50	100
0201 Chip	2mm	2000	15,000	45,000	100,000	200,000
0402 Chip	2mm	1000	10,000	25,000	50,000	100,000

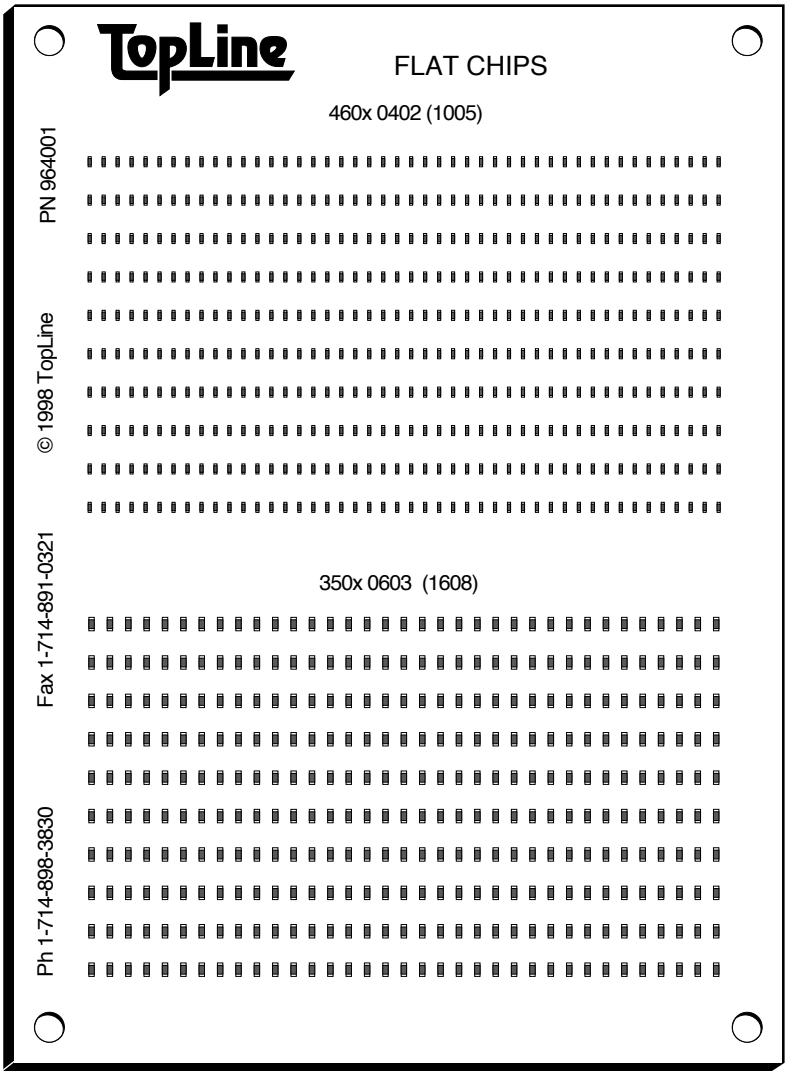
Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	949002	949200	949210	949225	949250	949299
Ag – Silver	949006	949600	949610	949625	949650	949699
Cu – OSP	949008	949800	949810	949825	949850	949899
Au – Gold	949009	949900	949910	949925	949950	949999
Standard						
SnPb – HASL	949001	949000	949010	949025	949050	949100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Chip Shooter Kit
0402 and 0603 Chips

Lead Free Pb-Free RoHs



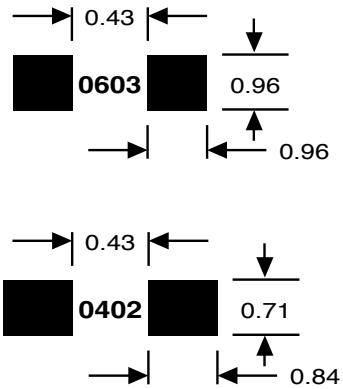
Actual Size: 4” x 5.5” (100 x 140mm)

TopLine has thousands of 0402 and 0603 resistors for your machine to place. 0402 chips are supplied on tape with 2mm pitch and the 0603 chips with 4mm pitch tape.

Double sided board has 460 pads for 0402 chip and 350 pads for 0603 chip per side. 1600 pads total!

This kit can be used for placement, soldering or epoxy dispenser testing.

Pad Dimensions (mm)
Rev-A



Features

LPI Solder Mask opening 0.076mm
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Chip Shooter Kit
0402 and 0603 Chips

Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Machine Run				
	Order Number 964000 1 Kit	Order Number 964010 10 Kits	Order Number 964025 25 Kits	Order Number 984050 50 Kits	Order Number 964100 100 Kits
Standard Kit					
Board Sn63	1	10	25	50	100
0402 Chip Resistor	1000	10,000	20,000	40,000	80,000
0603 Chip Resistor	1000	10,000	15,000	30,000	60,000

Lead Free (Pb-Free) Option

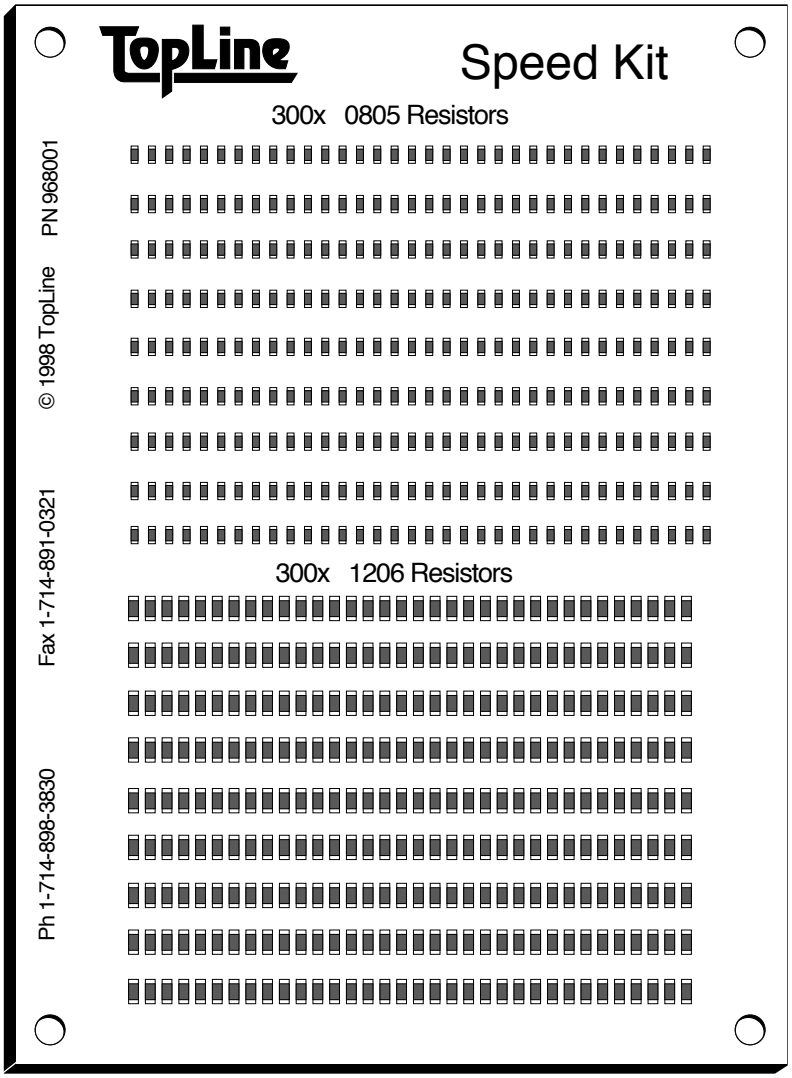
Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	964002	964200	964210	964225	964250	964299
Ag – Silver	964006	964600	964610	964625	964650	964699
Cu – OSP	964008	964800	964810	964825	964850	964899
Au – Gold	964009	964900	964910	964925	964950	964999
Standard						
SnPb – HASL	964001	964000	964010	964025	964050	964100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Note: 984001 is now 964002

Chip Shooter Kit
0805 and 1206 Chips

Lead Free
Pb-Free RoHs



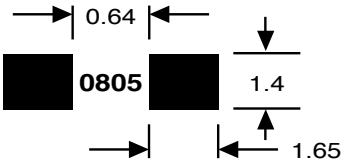
Actual Size: 4” x 5.5” (100 x 140mm)

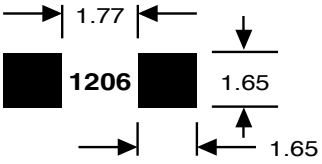
Put your machine to the test . This Kit is a low cost way for you to measure the component per hour (CPH) rating of pick & place machines. Use to benchmark and compare the performance of different machines.

Each side has land patterns for 300 each 0805 and 1206. Total of 1200 pads on the board.

This kit can be used for placement, soldering or epoxy dispenser testing.

Pad Dimensions (mm)
Rev-A





Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Chip Shooter Kit
0805 and 1206 Chips

Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Machine Run Order Number 968000 1 Kit	Order Number 968010 10 Kit	Order Number 968025 25 Kits	Order Number 968050 50 Kits	Order Number 968100 100 Kits
Standard Kit					
Board	1	10	25	50	100
0805 Chip Resistor	300	3,000	7,500	15,000	30,000
1206 Chip Resistor	300	3,000	7,500	15,000	30,000

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	968002	968200	968210	968225	968250	968299
Ag – Silver	968006	968600	968610	968625	968650	968699
Cu – OSP	968008	968800	968810	968825	968850	968899
Au – Gold	968009	968900	968910	968925	968950	968999
Standard						
SnPb – HASL	968001	968000	968010	968025	968050	968100

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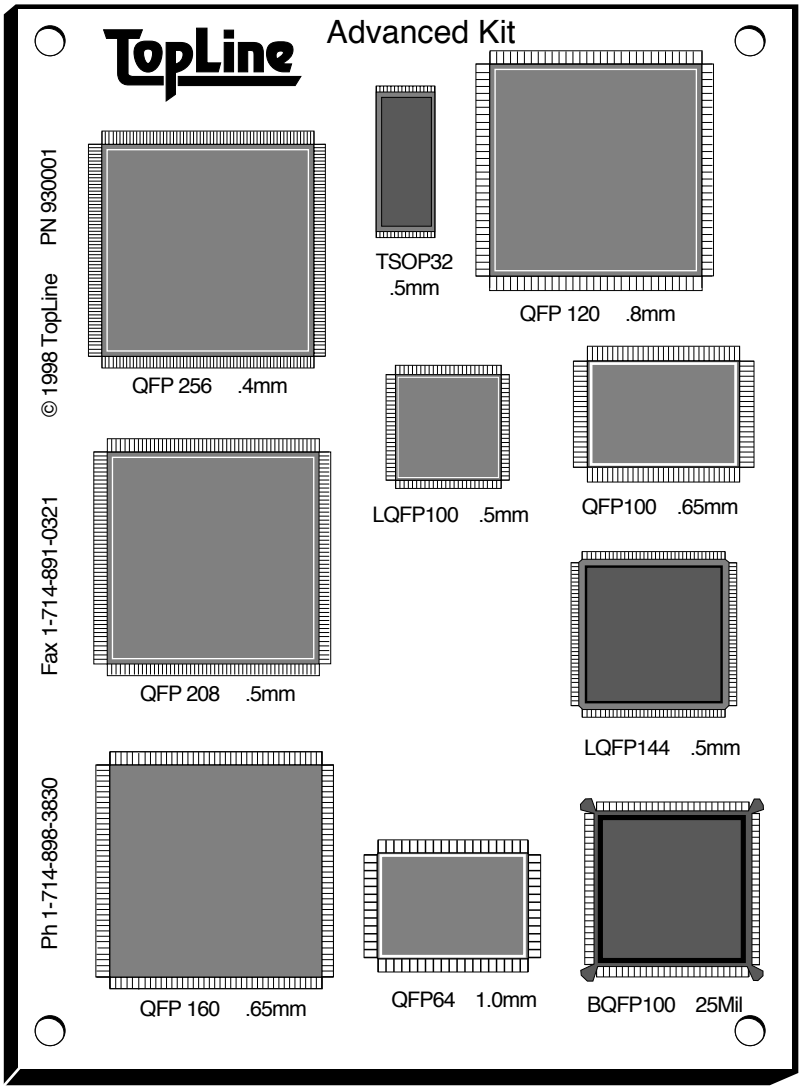
Note: 983001 is now 968002

Advanced SMD Kit for the Expert

Lead Free Pb-Free RoHs



Actual Size: 4” x 5.5 (100 x 140mm)

Put your machine through its paces with the Advanced SMD Kit. Includes a wide selection of fine-pitch parts from 0.4mm pitch. All components are packaged on tape and reel for machine run. Also available single packed for manual assembly.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Advanced SMD Kit for the Expert

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 931000 1 Kit	Manual Assembly: Order Number 931010 10 Kits	Machine Run: Order Number 931024 25 Kits	Machine Run: Order Number 931048 50 Kits	Machine Run: Order Number 931096 100 Kits
Board		1	10	24	48	96
QFP256	0.4mm	1	10	24	48	96
QFP208	0.5mm	1	10	24	48	96
LQFP144	0.5mm	1	10	24	48	96
LQFP100	0.5mm	1	10	24	48	96
TSOP32	0.5mm	1	10	24	48	96
QFP100	0.65mm	1	10	24	48	96
*BQFP100	25.0mil	1	10	24	48	96
QFP160	0.65mm	1	10	24	48	96
QFP120	0.8mm	1	10	24	48	96
QFP64	1.0mm	1	10	24	48	96

*BQFP100 only in SnPb Kit

Lead Free (Pb-Free) Option

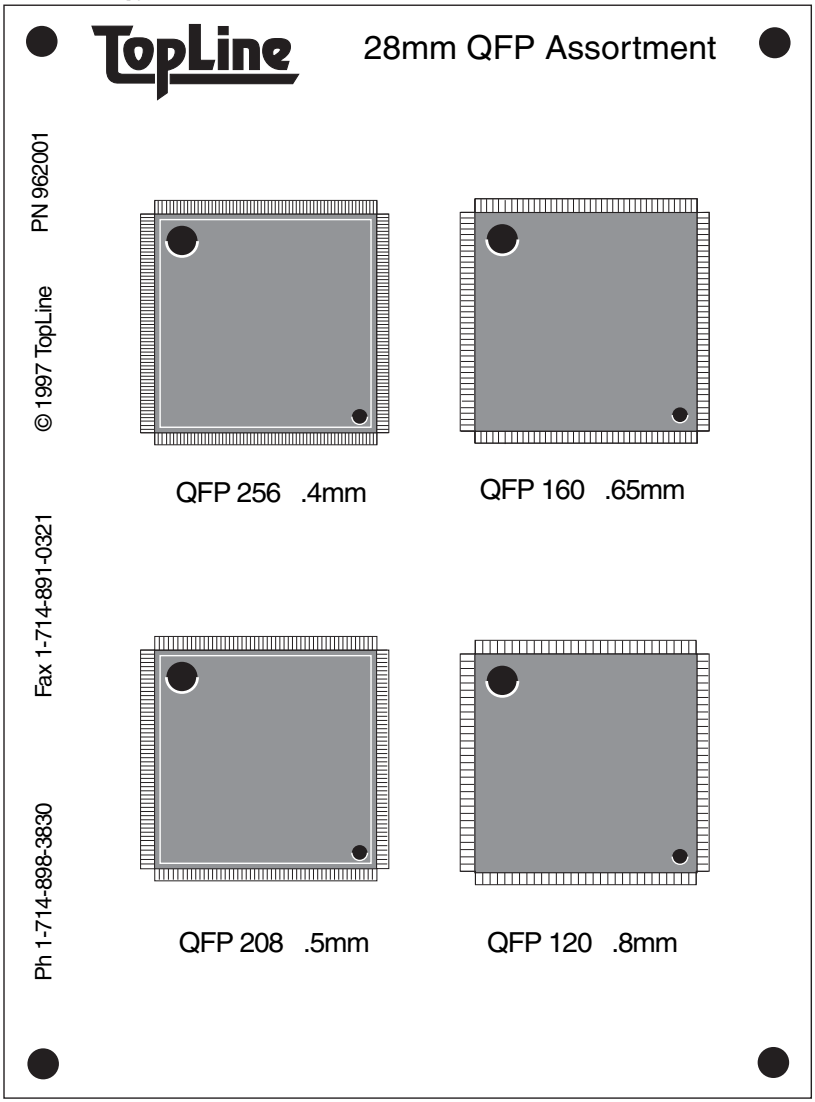
Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	930002	931200	931210	931225	931250	931299
Ag – Silver	930006	931600	931610	931625	931650	931699
Cu – OSP	930008	931800	931810	931825	931850	931899
Au – Gold	930009	931900	931910	931925	931950	931999
Standard						
SnPb – HASL	930001	931000	931010	931025	931050	931100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

28mm QFP Assortment Kit 0.4mm to 0.8mm Pitch

Lead Free Pb Available

Lead Free Pb-Free RoHs



Actual Size: 4” x 5.5” (100 x 140mm)

Try them all. We give you four different lead pitches: 0.4mm, 0.5mm, 0.65mm and 0.8mm. Experience the differences in levels as you progress to 0.4mm pitch.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

28mm QFP Assortment Kit 0.4mm to 0.8mm Pitch

TopLine®

Lead Free Pb Available

Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 962000 1 Kit	Manual Assembly: Order Number 962012 12 Kits	Machine Run: Order Number 962024 24 Kits	Machine Run: Order Number 962048 48 Kits	Machine Run: Order Number 962096 96 Kits
Board		1	12	24	48	96
QFP256	0.4mm	1	12	24	48	96
QFP208	0.5mm	1	12	24	48	96
QFP160	0.65mm	1	12	24	48	96
QFP120	0.80mm	1	12	24	48	96

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	12 Kits	24 Kits	48 Kits	96 Kits
Lead Free						
Sn – Tin	962002	962200	962212	962224	962248	962296
Ag – Silver	962007	962600	962612	962624	962648	962696
Cu – OSP	962008	962800	962812	962824	962848	962896
Au – Gold	962009	962900	962912	962924	962948	962996
Standard						
SnPb – HASL	962001	962000	962012	962024	962048	962096

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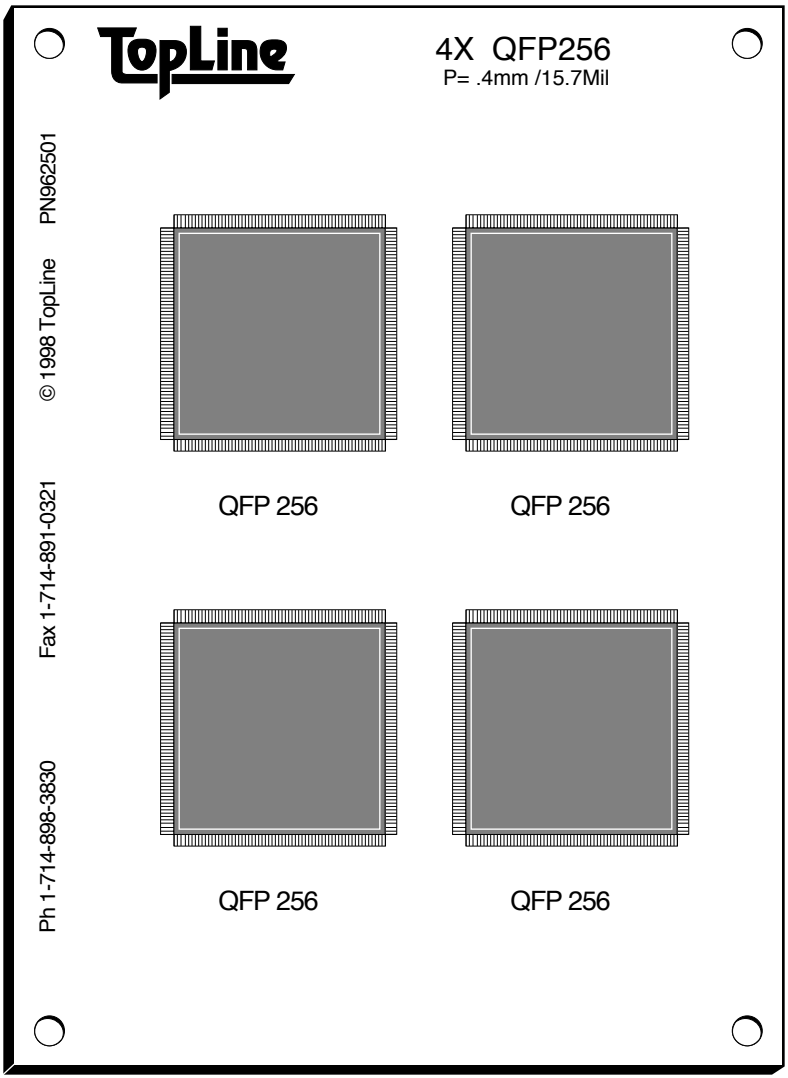
QFP256 Kit
0.4mm Pitch



Actual Size: 4” x 5.5” (100 x 140mm)

Be on the cutting edge with 0.4mm (15.7Mil) pitch. It’s guaranteed to push vision and soldering equipment to its limits.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

QFP256 Kit
0.4mm Pitch

Kit Ordering Information

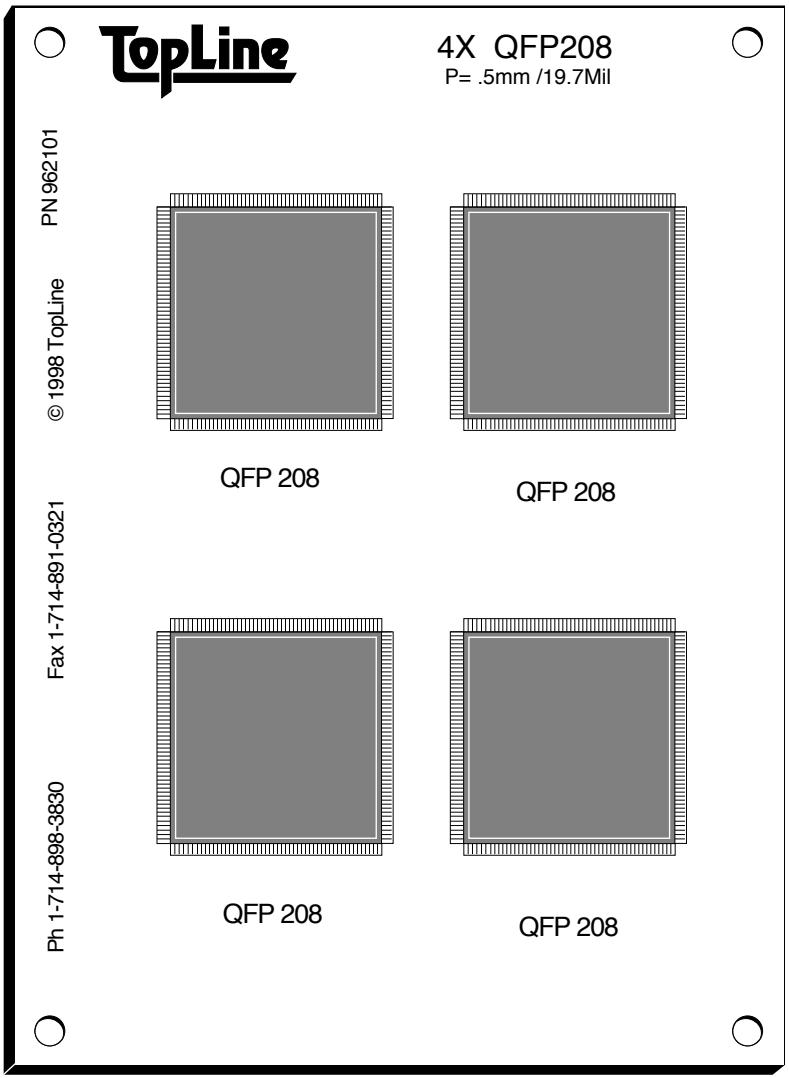
Component	1 Kit	Manual Assembly: Order Number 962500 12 Kits	Machine Run: Order Number 962512 24 Kits	Order Number 962524 48 Kits	Order Number 962548 96 Kits	Order Number 962596
Board		1	12	24	48	96
QFP256	0.4mm	4	48	96	192	384

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	12 Kits	24 Kits	48 Kits	96 Kits
Lead Free						
Sn – Tin	962502	962520	962521	962522	962525	962529
Ag – Silver	962507	962560	962561	962562	962565	962569
Cu – OSP	962508	962580	962581	962582	962585	962589
Au – Gold	962509	962590	962591	962592	962595	962599
Standard						
SnPb – HASL	962501	962500	962512	962524	962548	962596

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

QFP208 Kit
0.5mm Pitch



Practice assembling 0.5mm (19.7Mil) pitch. The QFP208 is a very popular package. Components are provided on tape and reel.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Actual Size: 4” x 5.5” (100 x 140mm)

QFP208 Kit
0.5mm Pitch

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 962100 1 Kit	Machine Run: Order Number 962112 12 Kits	Order Number 962124 24 Kits	Order Number 962148 48 Kits	Order Number 962196 96 Kits
Board		1	12	24	48	96
QFP208	0.5mm	4	48	96	192	384

Lead Free (Pb-Free) Option

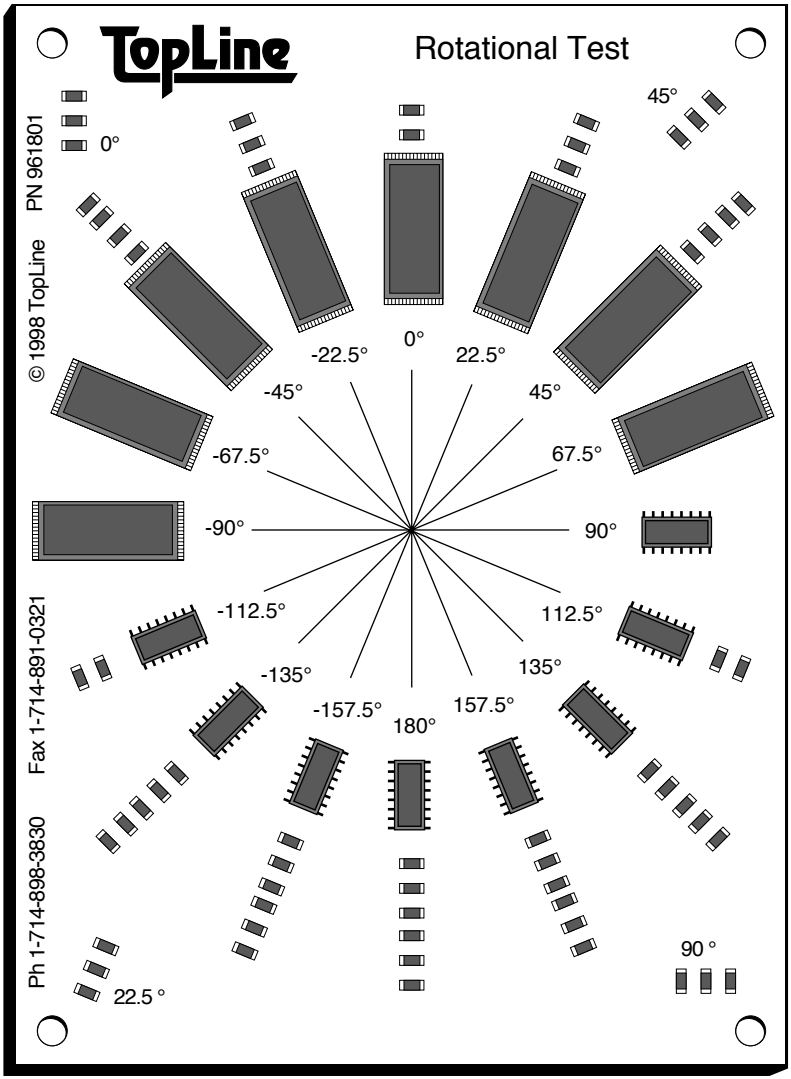
Description	Spare Board	1 Kit	12 Kits	24 Kits	48 Kits	96 Kits
Lead Free						
Sn – Tin	962102	962120	962121	962122	962125	962129
Ag – Silver	962107	962160	962161	962162	962165	962169
Cu – OSP	962108	962180	962181	962182	962185	962189
Au – Gold	962109	962190	962191	962592	962195	962199
Standard						
SnPb – HASL	962101	962100	962112	962124	962148	962196

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Note: 982001 is now 962102

Rotational Placement Kit

Tests Accuracy to ± 0.5°



Actual Size: 4” x 5.5” (100 x 140mm)

Be on target! Some problems do not become evident until you start rotating components. TopLine’s Rotational Placement Kit is designed to test the rotational accuracy on your system to ±0.5°.

Features

LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

Rotational Placement Kit

Tests Accuracy to ± 0.5°

Lead Free Pb-Free RoHs

Kit Ordering Information

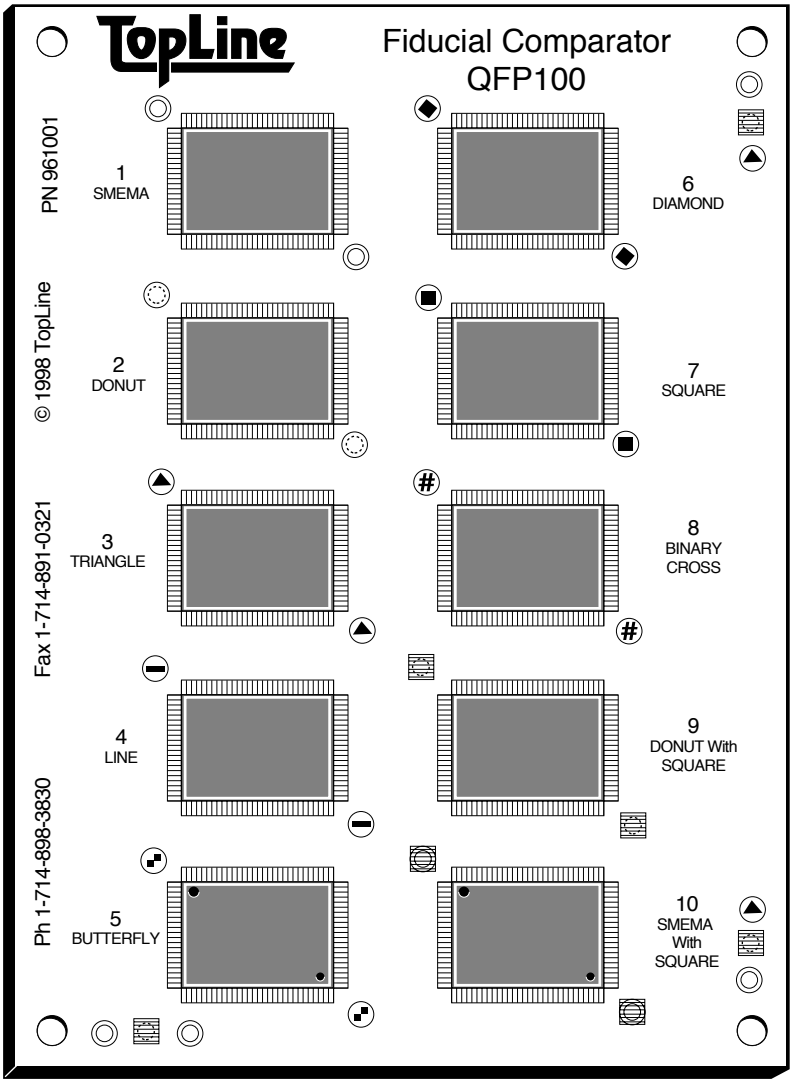
Component	Pitch	Manual Assembly: Order Number 961800 1 Kit	Machine Run: Order Number 961806 6 Kits	Order Number 961812 12 Kits	Order Number 961825 25 Kits
Board		1	6	12	25
TSOP32	0.5mm	8	50	100	200
SO16	1.27mm	8	50	100	200
1206 Chips		60	300	750	1500

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	12 Kits	25 Kits	50 Kits
Lead Free					
Sn – Tin	961802	-	961821	961822	961824
Ag – Silver	961807	-	961861	961862	961864
Cu – OSP	961808	-	961881	961882	961884
Au – Gold	961809	-	961891	961892	961894
Standard					
SnPb – HASL	961801	961800	961812	961825	961850

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Fiducial Evaluation Kit
QFP100
0.65mm Pitch



Find the right fiducial for your system. This kit includes an assortment of 10 different fiducial geometries and solder mask clearances to check compatability of your vision placement equipment. Don't take chances with your boards. "Zero-in" on the right fiducial by experimenting with our kit. Components are provided on tape and reel.

Features

LPI Solder Mask
FR4 Board .062"
Double Sided
Tooling Holes .125"
Fiducial Marks

Actual Size: 4" x 5.5" (100 x 140mm)

Fiducial Evaluation Kit
QFP100
0.65mm Pitch

Kit Ordering Information

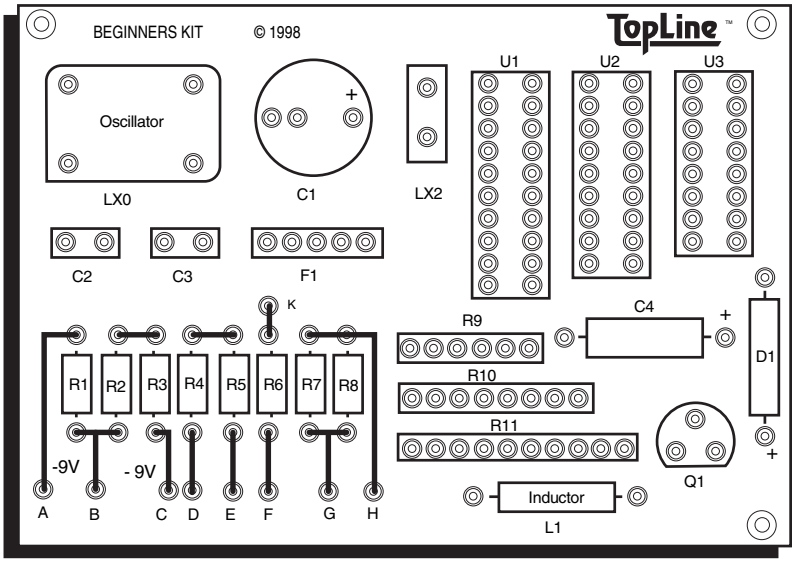
Component	Pitch	Manual Assembly: Order Number 961000 1 Kit	Machine Run: Order Number 961010 10 Kits	Order Number 961025 25 Kits	Order Number 961050 50 Kits
Board		1	10	25	50
QFP100	0.65mm	10	100	250	500

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits
Lead Free					
Sn – Tin	961002	-	961021	961022	961024
Ag – Silver	961006	-	961061	961062	961064
Cu – OSP	961008	-	961081	961082	961084
Au – Gold	961009	-	961091	961092	961094
Standard					
SnPb – HASL	961001	961000	961010	961025	961050

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Beginners Throughhole Kit



Actual Size: 2.75” x 4.0” (70 x 100mm)

The beginners Throughhole Kit is a low-cost, entry level kit for practicing with a wide range of components. Total of 24 easy-to-identify components are provided

Features

FR4 Board .062”
Single Sided
Tooling Holes .125”
Plated Throughholes

Beginners Throughhole Kit

Kit Ordering Information

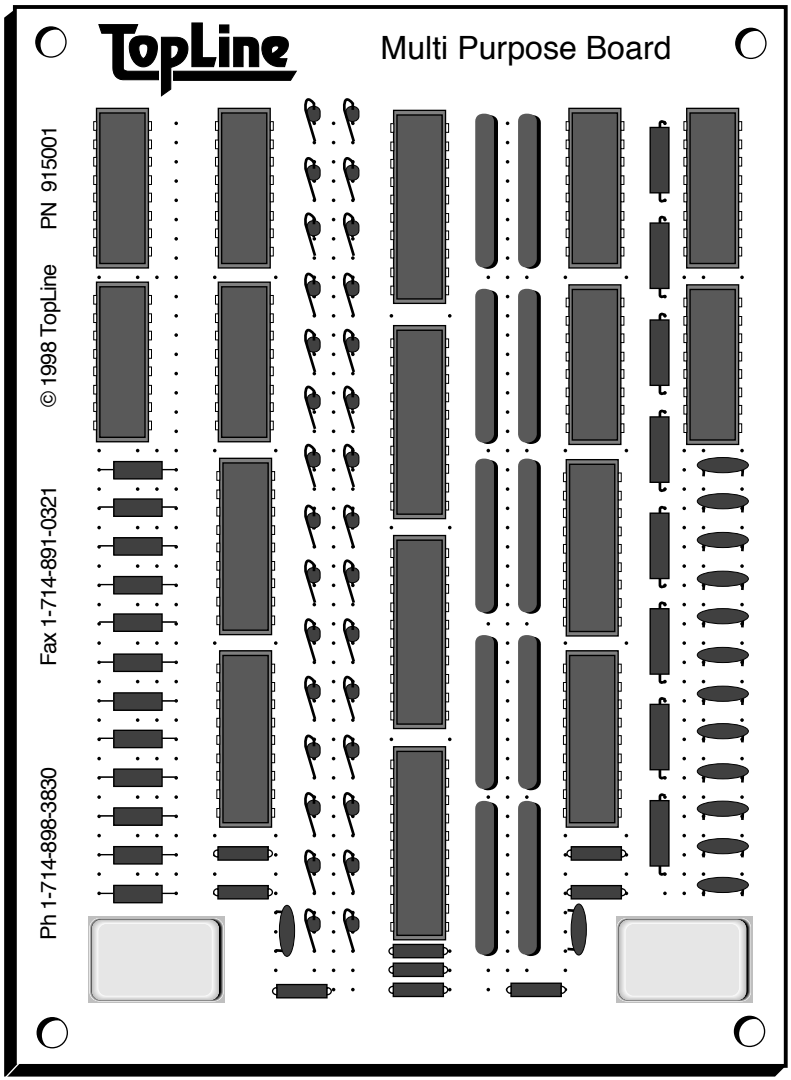
Component	Board Location	Manual Assembly: Order Number 910000 1 Kit	Order Number 910010 10 Kits	Order Number 910025 25 Kits	Order Number 910050 50 Kits	Order Number 910100 100 Kits
Board		1	10	25	50	100
Oscillator	LX0	1	10	25	50	100
Crystal	LX2	1	10	25	50	100
Radial Aluminum Cap	C1	1	10	25	50	100
Ceramic Capacitor	C2	1	10	25	50	100
Film Capacitor	C3	1	10	25	50	100
Axial Aluminum Cap	C4	1	10	25	50	100
Axial Inductor	L1	1	10	25	50	100
Resistor Network SIP6	R9	1	10	25	50	100
Resistor Network SIP8	R10	1	10	25	50	100
Resistor Network SIP10	R11	1	10	25	50	100
SAW Filter SIP5	F1	1	10	25	50	100
Transistor TO92	Q1	1	10	25	50	100
Rectifier DO35/DO41	D1	1	10	25	50	100
Integrated Circuit DIP16	U1	1	10	25	50	100
Integrated Circuit DIP18	U2	1	10	25	50	100
Integrated Circuit DIP20	U3	1	10	25	50	100
Resistor 1/8 W	R1-4	4	40	100	200	400
Resistor 1/4 W	R5-8	4	40	100	200	400

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	910003	910200	910210	910225	910250	910299
Ag – Silver	910006	910600	910610	910625	910650	910699
Cu – OSP	910008	910800	910810	910825	910850	910899
Au – Gold	910009	910900	910910	910925	910950	910999
Standard						
SnPb – HASL	910002	910000	910010	910025	910050	910100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Multipurpose Throughhole Kit



We supply the board and a wide assortment of components. This board has room for at least 200 different components. You decide where to insert the components.

Kits are available for machine or manual insertion.

Features

FR4 Board .062”
Double Sided
Tooling Holes .125”
920 Plated Throughholes

Actual Size: 4” x 5.5” (100 x 140mm)

Multipurpose Throughhole Kit

Kit Ordering Information

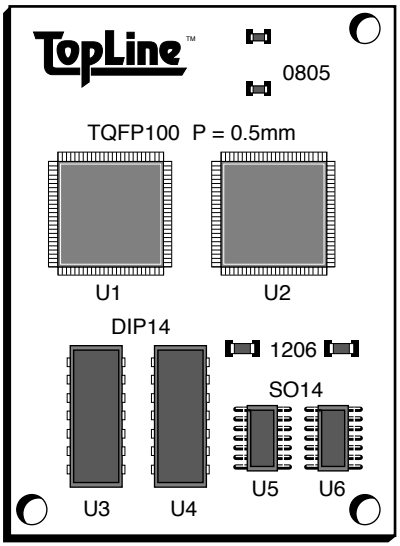
Component	Manual Assembly: Order Number 916000 1 Kit	Number 916025 25 Kits	Order Number 916050 50 Kits	Order Number 916100 100 Kits	Machine Run: Order Number 915050 50 Kits	Order Number 915100 100 Kits
Board	1	25	50	100	50	100
2-PIN DIP	25	400	800	1600	800	1600
8-PIN DIP	5	100	200	400	200	400
14-PIN DIP	5	100	200	400	200	400
16-PIN DIP	5	100	200	400	200	400
18-PIN DIP	5	100	200	400	200	400
20-PIN DIP	5	50	100	200	100	200
SIP Resistor Network	10	100	200	400	200	400
Oscillator	2	40	100	200	100	200
Radial Capacitor	10	250	500	1000	500	1000
Radial Inductor	10	250	500	1000	500	1000
1/8 W Axial Resistor	50	1000	2500	5000	2500	5000
1/4 W Axial Resistor	50	1000	2500	5000	2500	5000
1/2 W Axial Resistor	20	1000	2500	5000	2500	5000

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	915002	916200	916210	916225	916250	916299
Ag – Silver	915006	916600	916610	916625	916650	916699
Cu – OSP	915008	916800	916810	916825	916850	916899
Au – Gold	915009	916900	916910	916925	916950	916999
Standard						
SnPb – HASL	915001	916000	916010	916025	916050	916100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Econo Kit II
Mixed Technology for Soldering Certification



Actual Size: 1.62” x 2.0” (41 x 51mm)

TopLine offers an economical, mixed technology kit with fine pitch.

This kit is used by employment agencies for soldering certification.

Features

LPI Solder Mask
FR4 Board .062”
Single Sided
Tooling Holes .125”
Plated Throughholes

Econo Kit II
Mixed Technology for Soldering Certification

Lead Free Pb Available

Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 938000 1 Kit	Order Number 938010 10 Kits	Order Number 938025 25 Kits	Order Number 938050 50 Kits	Order Number 938100 100 Kits
Board		1	10	25	50	100
LQFP100	0.5mm	2	20	50	100	200
SO14	50mil	2	20	50	100	200
DIP14	100mil	2	20	50	100	200
0805 Chip		2	20	50	100	250
1206 Chip		2	20	50	100	250

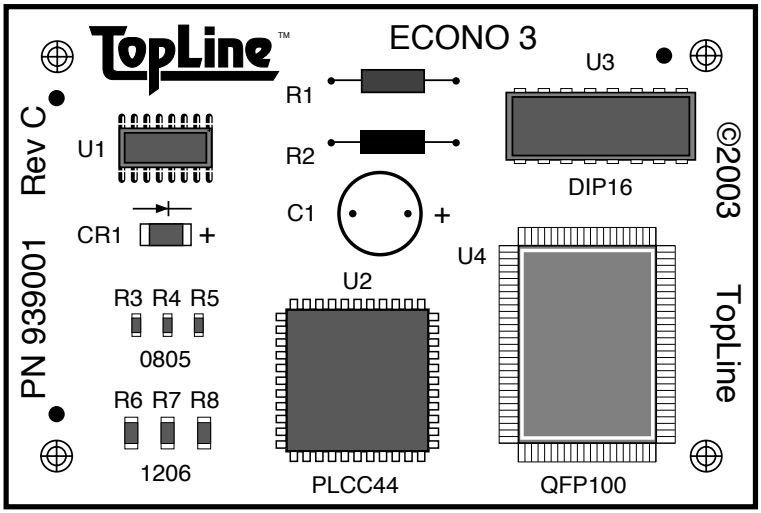
Note: Kits of 10, 25, 50 and 100 are bulk packed

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	938002	938200	938210	938225	938250	938299
Ag – Silver	938006	938600	938610	938625	938650	938699
Cu – OSP	938008	938800	938810	938825	938850	938899
Au – Gold	938009	938900	938910	938925	938950	938999
Standard						
SnPb – HASL	938001	938000	938010	938025	938050	938100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Econo Kit III
Mixed Technology for Soldering Certification



TopLine offers an economical, mixed technology kit with popular components including fine pitch.

This kit is used by employment agencies for soldering certification of assemblers.

Features

LPI Solder Mask
FR4 Board .062”
Single Sided
Plated Throughholes
Fiducial Marks
Tooling Holes

Actual Size: 2” x 3” (50mm x 76mm)

Econo Kit III
Mixed Technology for Soldering Certification

Lead Free Pb-Free RoHs

Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 939000 1 Kit	Order Number 939010 10 Kits	Order Number 939025 25 Kits	Order Number 939050 50 Kits	Order Number 939100 100 Kits
Board		1	10	25	50	100
QFP100	0.65mm	1	10	25	50	100
PLCC44	1.27mm	1	10	25	50	100
SO16	1.27mm	1	10	25	50	100
DIP16	2.54mm	1	10	25	50	100
0805 Chip		3	30	75	150	300
1206 Chip		3	30	75	150	300
MELF		1	10	25	50	100
1/4W resistor	.5 inch	2	20	50	100	200
AL CAP	.2 inch	1	10	25	50	100

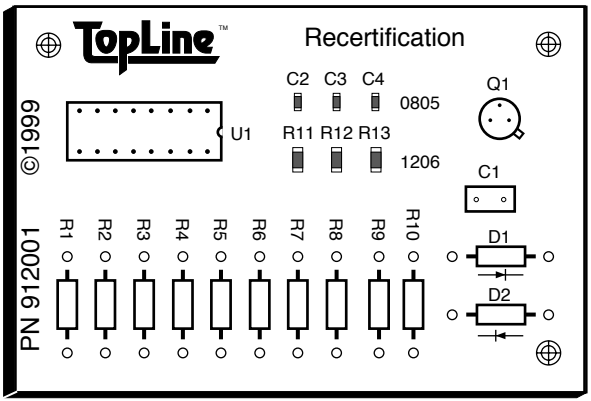
Note: Kits of 10, 25, 50 and 100 are bulk packed

Lead Free (Pb-Free) Option

Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	939002	939200	939210	939225	939250	939299
Ag – Silver	939006	939600	939610	939625	939650	939699
Cu – OSP	939008	939800	939810	939825	939850	939899
Au – Gold	939009	939900	939910	939925	939950	939999
Standard						
SnPb – HASL	939001	939000	939010	939025	939050	939100

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Econo IV Mixed Technology Recertification Kit



Actual Size: 2” x 3” (50 x 76mm)

The Econo IV Kit offers an economical mixed technology kit with simple components.

This kit is used for soldering re-certification of assemblers.

Features

LPI Solder Mask
FR4 Board .062”
Single Sided
Plated Throughholes
Tooling Holes

Econo IV Mixed Technology Recertification Kit

Kit Ordering Information

Manual Assembly

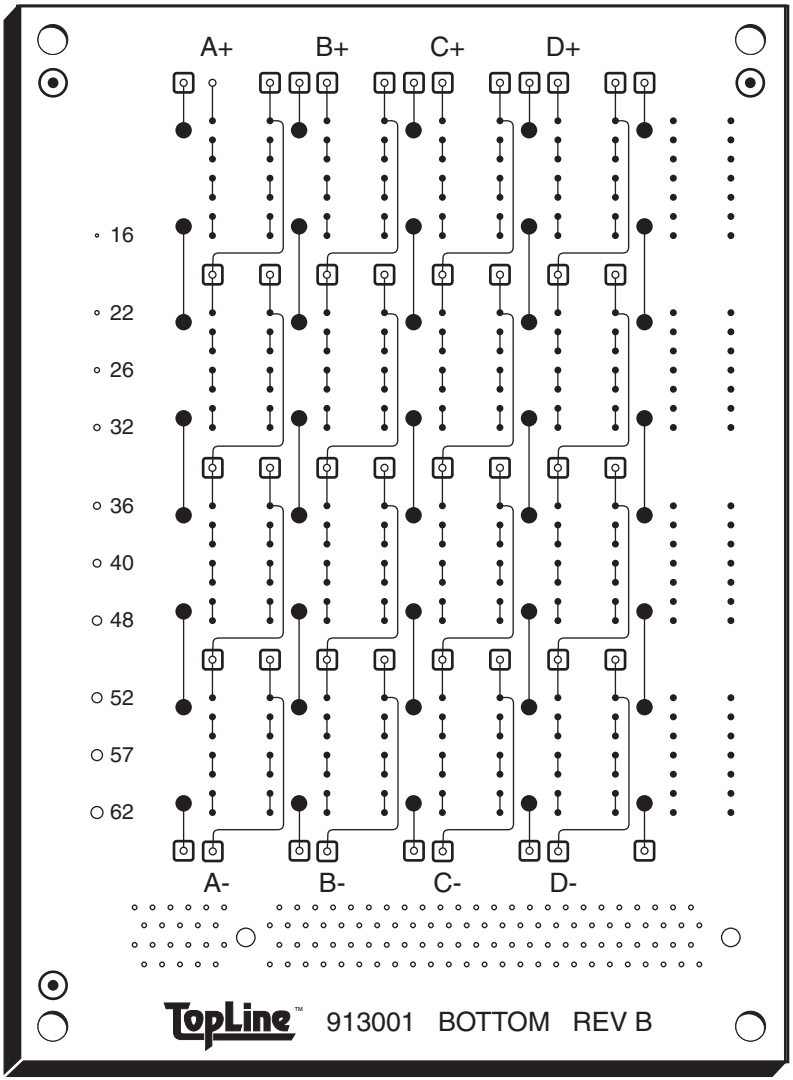
Component	Pitch	Order Number 912000 1Kit	Order Number 912010 10 Kits	Order Number 912025 25 Kits	Order Number 912050 50 Kits	Order Number 912100 100 Kits
Board		1	10	25	50	100
DIP16/18	IC	1	10	25	50	100
TO-5	Transistor	1	10	25	50	100
CK05	Capacitor	1	10	25	50	100
DO-35	Diode	2	20	50	100	200
0805 Chip	SMD	3	30	75	150	300
1206 Chip	SMD	3	30	75	150	300
1/4 W Resistor	Axial Lead	10	100	250	500	1000

Note: Kits of 10, 25, 50 and 100 are bulk packed.

Lead Free (Pb-Free) Option

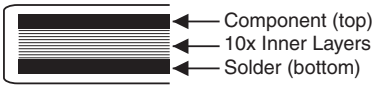
Description	Spare Board	1 Kit	10 Kits	25 Kits	50 Kits	100 Kits
Lead Free						
Sn – Tin	912002	912200	912210	912225	912250	912299
Ag – Silver	912006	912600	912610	912625	912650	912699
Cu – OSP	912008	912800	912810	912825	912850	912899
Au – Gold	912009	912900	912910	912925	912950	912999
Standard						
SnPb – HASL	912001	912000	912010	912025	912050	912100

12 Layer Lead Free Throughhole Kit Daisy Chain



Actual Size: 4.0” x 5.5” (100 x 140mm) 0.10” (2.5mm) thick

Side View



12-layer board designed with heat dissipating (thermal relief) inner layers, makes this board a challenge to solder. Boards available in 4 Lead Free finishes.

BOARD PLATING (Pb Free):
Sn100 – White Tin (Immersion Tin)
Ag - Immersion Silver
Cu - OSP (Entek 106)
Au - Gold Ni-Au (ENIG)
(Electroless Nickel, Immersion Gold)

DAISY CHAIN
DIP14
Zero Ohm 1⁄4 W Resistors
Go, No-Go Test Points

PLATED HOLES
Throughhole barrels with thermal relief are connected to all 10 inner layer copper ground planes for soldering capillary test.
10 holes with graduating sizes:
.016”- .062” (0.4mm ~1.6mm)

FEATURES
LPI Solder Mask
FR4 Board 0.10” (2.5mm) Thick
Tg = 175˚C 12 Layer
Copper ground plane inner layers
Tooling Holes
Fiducials Marks
450 Plated Holes

Thermal Relief Wagon Wheel

Inner Layer PTH

12 Layer Lead Free Throughhole Kit Daisy Chain

Kit Ordering Information

Component	Notes	Order Number 913216 16 Kits	Order Number 913232 32 Kits	Order Number 913248 48 Kits	Order Number 913264 64 Kits	Order Number 913296 96 Kits
		Machine Run				
*Board	Sn100	16	32	48	64	96
DIP14	Daisy Chain Test	256	512	768	1024	1536
DIP14	Non Daisy Chain	64	128	192	256	384
1/4 W Resistors	Zero Ohm	320	640	960	1280	1920
Connector AMP 1-5145154-2	120 Pin	16	32	48	64	96

*Note: Contact TopLine for combination kits with assortment of finishes: Sn, Ag, OSP, Au

Lead Free (Pb-Free) Option

Description	Spare Board	16 Kits	32 Kits	48 Kits	64 Kits	96 Kits
Lead Free						
Sn – Tin	913002	913216	913232	913248	913264	913296
Ag – Silver	913007	913616	913632	913648	913664	913696
Cu – OSP	913008	913816	913832	913848	913864	913896
Au – Gold	913009	913916	913932	913948	913964	913996

Free Solder Paste Gerber + Parts Placement download www.topline.tv/GerbersFree.cfm

Vampire Vacuum Pick & Place Tool

Order
#222444
WebCode XY1

ESD Safe!

The Elme *Turbo Vampire* hand-held vacuum pick-up tool is ideal for picking up and moving electronic components, large and small. Durable, lightweight and completely portable. The Vampire's fountain pen dimensions easily fit into your pocket. New high power probes have longer holding action for inserting components in sockets.

Check These Features

- Lifts up to 120 grams with 9mm Cup
- Ergonomically Designed for Comfort
- ESD Safe ≤100k Ω
- Heavy Duty Internal Piston for Longer Holding Action
- No Batteries Required

Order No.	Description
222444	Complete Vampire Tool, with the following: 1 - straight High Power tip with 9mm cup 1 - angled High Power tip with 9mm cup 1 - straight needle with 4mm and 6mm cups 1 - lubricant, instruction sheet and box
Probes	
222555	Spare Parts Set (3 pcs.) see fig.
223333	9mm High Power Straight Probe
222777	9mm High Power Angled Probe
223388	4mm Straight Probe
224444	4mm 45° Angled Probe
224442	1.5mm 45° Angled Probe
224443	1.5mm Straight Probe
Cups	
333335	4mm Cup
333336	6mm Cup
333334	9mm Cup

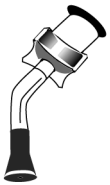
Spare Parts Set #222555

High Power Plastic Angled Probe #222777

High Power Plastic Straight Probe #223333

Straight Needle Probe (w/4mm cup) **#223388**

Additional Accessories



1.5mm 45° Angled Probe #224442

1.5mm Straight Probe #224443

4mm 45° Angled Probe #224444

Additional Cups

4mm Cup #333335

6mm Cup #333336

9mm Cup #333334

Continuous Duty SMD Vacuum Tool

Size:
6” x 3” x 2.5”
(15 x 7.6 x 6.3cm)

Compact, continuous duty vacuum pick up tool with self-contained internal pump. Ready to use. Just plug in the wall. Comes with 4-ft vacuum hose and set of 9 ESD safe conductive tips. Picks up almost every SMD component in use today. Whisper Quiet.

Order Number:
240000 - Vacuum Pump - 110VAC (V8000-HLD)
240016– Optional Bench Top Holder for Spare tips (VTH-16)
240009 - Spare Set of 9 Tips (VCS-9-ESD)

Description of Tips:
Angled: 2.4mm, 3.2mm, 4.8mm, 6.3mm, 9.5mm
Straight: 3.2mm, 6.3mm, 9.5mm and 12.7mmm

9 conductive ESD Safe tips

Conductive Plastic Desoldering Pump Innovative Construction

Elme VYPER

(Red:USI0090110)
Order Nr. 222102 (Single Pack)
222101 (Box of 25)

Dimensions:
- 7.5” (190mm) long x 0.9” (23mm) diameter.
- Aspiration Volume = 11.3cc
- Weight 45g (2 oz.)

The *Vyper* desoldering pump is the best on the market. Black conductive plastic body. Black teflon/carbon conductive tip. Easiest pump to clean and maintain. Once you try the *Vyper,* you’ll be convinced. ESD Safe.

TopLine®

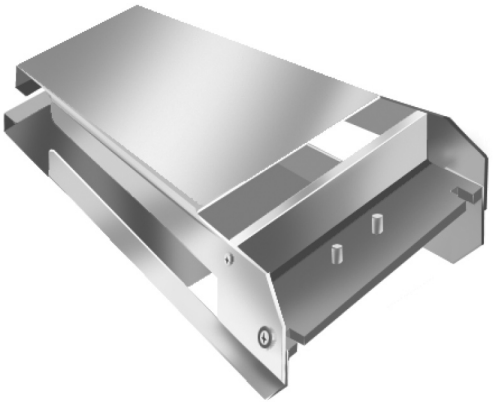
www.tapesplicer.com

SMD Tape Splicing Tool

Prevents line shutdown

TopLine On Board

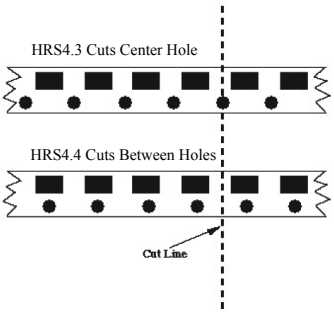
The HRS5 manual tape splicer joins together all sizes of SMD carrier tape.
Use during pick & place assembly to splice the end of a depleted reel to the beginning of a fresh reel of components without line shutdown. Fits all tape widths without tooling changes. Joins 8, 12, 16, 24, 32 & 44mm tape. Splices plastic, paper, or metal carrier tape. Completely portable. Hand-held.



HRS5 Tape Splicing Tool

Order No.	Description
210011	HRS5 Tool (Includes -100 pcs. HRS5.01 splicing tape and HRS4.3 cutting tool)
210003	Spare HRS4.3 Cutting Tool (Red)
210009	Spare HRS4.4 Cutting Tool (Green)
210002	HRS5.01 Splicing Tape (1000 pcs.) (with HRS4.02 cover tape included)
210005	Spare HRS4.02, 4.3x60mm Cover Tape (1000 pcs.) 8mm
210010	Spare HRS4.03, 7.3x60mm Cover Tape (500 pcs.) 12-44mm

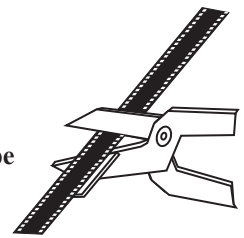
Cutting Tool Diagram



How to Use

See website www.tapesplicer.com for full color photos showing step-by-step instructions on how to use the HRS5.

Cuts SMD tape up to 24mm



ESD PC Board Holder Groundable - Adjustable

Elme PC40-WIRE

(USZ0040002)

Order Nr. 250601

Dimensions:

- 12” x 5” x 5” (300 x 120 x 120mm)
- Holds up to 10” wide boards

Bench mount PC Board holder. ESD Safe. Adjustable up to 10” (260mm) wide boards. Excellent for rework and assembly. Easy to mount onto any bench top. Includes grounding cord with 1M ohm resistor and grounding ring.

Be ESD Safe!

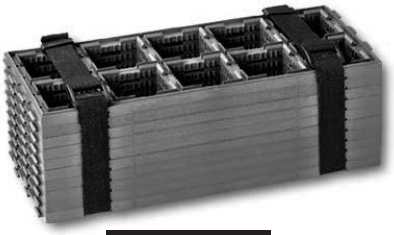
TRAY STRAPS ESD SAFE

elme YOUR STATIC CONTROL COMPANY

Size: 550mm x 25mm

Out performs all existing tray straps on the market. Does not loose ESD properties:

- Fits all JEDEC Matrix Trays
- Quick Release Buckle
- Clean Room Admissible
- Reusable & Recyclable
- Permanetly Conductive
- Black conductive polyproplyene
- Secures 10 to 12 trays



Order No. 885001

V-GRIP 01

ESD Static Control Chairs

Adjustable Height 18" to 22"

With self-braking castor wheels

ESD Lab Chair
Elme *VERA-JS1*
Order Number 873002

Clean Room Chair (Class 100)
Elme *CLEAN-JS1*
Order Number 879002

Adjustable Height 26" to 31"

With self-braking castor wheels and foot rest

ESD Lab Chair
Elme *VERA-JS1*
Order Number 875002

Clean Room Chair (Class 100)
Elme *CLEAN-JS1*
Order Number 881002

About ESD Lab Chairs

VERA Chairs eliminate tribocharging and provide continuous drainage of static to ground. Meets requirements of international ESD standards. Both seat and backrest are cushioned with a soft, durable inflammable ESD fabric, withstanding burns from irons or cigarettes. Ergonomic seating. Adjustable backrest floats with the movement of the operator for permanent contact. Pneumatic height adjustment and rugged metal structure. Allows the body to remain in the correct position for good posture.

No metal in the fabric, preventing short circuits between the fabric and the operator, thus increasing safety. Rear of the backrest has an ESD safe conductive plastic cover. ESD rubber wheels add more comfort and safety. Self-braking wheels reduce skid danger on hard floors.

About Clean Room Chairs

CLEAN Chairs are conductive and designed for up to class 100 clean room industrial applications. Static charge dissipates totally and continuously through the chair's structure to earth to provide ESD protection. Black vinyl covers are static dissipative and flame resistant. Does not create particle contamination. Back of the backrest is made with molded dissipative plastic. Not HEPA Filtered. Not intended for critical areas. ESD soft rubber wheels add more comfort and safety. Self-braking wheels reduce skid danger on hard floors.

ESD Features

Resistance surface fabric 0.5M < R < 0.8M ohm
Resistance to ground of the chair 0.5M < R < 1.0M ohm
Static decay time fabric < 0.5 sec

TopLine®

ESD Static Control Shoes

elme
YOUR STATIC CONTROL COMPANY

Washable!

Moccasin Slip-On

Elme *MOKA*

Order Number
White 8540xx **Black 8541xx**

Replace xx with Euro size - see below

Washable!

Luxury Clog

Elme *RADO*

Order Number
White 8580xx **Black 8581xx**

Replace xx with Euro size - see below

Washable!

Lace-Up Shoe

Elme *STRINGA*

Order Number
White 8583xx **Black 8582xx**

Replace xx with Euro size - see below

Euro to USA Size Conversion Chart

USA Men	USA Women	Part Nbr Euro xx
-	4	35
-	5-1/2	36
-	6	37
6	7	38
6-1/2	7-1/2	39
7-1/2	8-1/2	40
8-1/2	9-1/2	41
9	10	42
10	11	43
10-1/2	11-1/2	44
11-1/2	12-1/2	45
12	-	46
13	-	47

About ESD Shoes:

ESD shoes ensure constant drainage of static charges from the body to ground.
Static-dissipative inner soles and outer soles provide continuous electric contact of the foot to ground as required by ESD standards.
Comfortable and durable. Washable.

Resistance to ground < 3.5×10^7 Ohm

Be ESD Safe!

ESD Static Control Lab Coats & Mats

About Lab Coats:

PEQ coats are made with conductive fiber (96% cotton and 4% conductive fiber) for soft touch and durability while allowing the coat to efficiently drain static charges from the operator's body to ground, even after repeated washing.

Has 3-pockets.
No tribocharging.
Polyester free.

Acts as ESD shield, covering street clothes and preventing uncontrolled discharge. Does not generate static charges.

PEQ Series
Natural Cotton Fabric
Soft & Comfortable

Order Number				
	White		Blue	
Size	Short Smocks Elme PEQ905W	Long Coats Elme PEQ909W	Short Smocks Elme PEQ905B	Long Coats Elme PEQ909B
XS	819001	817001	820001	818001
S	819002	817002	820002	818002
M	819003	817003	820003	818003
L	819004	817004	820004	818004
XL	819005	817005	820005	818005
XXL	819006	817006	820006	818006

Roll: 75" x 33ft (1.9m x 10m) .1" (2.5mm) thick

Removable ESD Flooring

Elme 749 DUO ROLL
Order Number 823000

Double layer structure. Upper layer is static dissipative. Bottom layer is conductive. Perfect for semi-permanent installation. Does not require glue. Just lay on floor, connect a grounding cord and ready to use. Cut as required for floor mats under work benches. Withstands high temperatures up to 400˚C. Dark grey color with granulated, non-reflecting embossed surface to hide wear.

About Rubber Bench Mats:

Double layer mats cover tables and shelves. Upper ply is static dissipative. Black Conductive bottom layer drains static charges to ground. Flame Resistant to 440˚C without noxious outgassing. Resistant to chemicals and ageing.

Roll: 4ft x 33ft (1.2m x 10m) .08" (2mm) thick.

Rubber ESD Bench Mats

Elme 157 ROLL

Order Number	
Blue	**833000**
Beige	**833001**
Grey	**833002**

Lead Free Solder Wire and Solder Paste

Koki Lead Free Solder Wire
Model S03X7C-56M
No Clean Flux Core

Benefits of Cobalt Formulation:

- Remarkably extends life of soldering iron tips.
- Reduced flux splattering while soldering
- Improved solder wetting
- Compatible with all Lead Free components

Alloy: Sn99/Ag0.3/Cu0.7/Co0.03
Melting Point: 217~227˚C
Flux Content: 3.0%
Halide Content: 0.13%
Solder Spread Factor: >75%
Flux Type: ROM1

Order Number

-----Wire Dia.----- Metric	Inch	AWG	Spool	Order Nbr
0.3mm	0.012”	29	200gm	710003
0.4mm	0.016”	27	200gm	710004
0.5mm	0.020”	25	500gm	710005
0.6mm	0.024”	23	500gm	710006
0.8mm	0.031”	21	500gm	710008
1.0mm	0.040”	19	500gm	710010
1.2mm	0.047”	18	500gm	710012
1.6mm	.063”	14	500gm	710016

Koki Lead Free Solder Paste
Model S3X58-M406-3
No Clean

Benefits of Koki Formulation:

- Halide Free
- Maintains consistent viscosity in continual printing
- Complete solder wetting on micro-components
- Anti-voiding formula

Alloy: Sn96.5/Ag3.0/Cu0.5
Melting Point: 217-218°C
Type 4 Particle: 20~38µM
Halide Content: 0%
Flux: ROL0 11.5%
Initial Viscosity: 210Pa.s (without kneading)
Spread Factor: >85%
Tack Time: >72 hours
Shelf Life: 6 months @ <10°C

Order Number

Package	Gram	Order Nbr
Jar	500gm	700003
Cartridge	500gm	700500
Cartridge	600gm	700600
ProFlow	750gm	700750
Cartridge	1000gm	701000
Cartridge	1200gm	701200

500~600gm
Cartridge

750gm ProFlow
Cassette

Download Databook and MSDS and Questionnaire: www.topline.tv/koki.html

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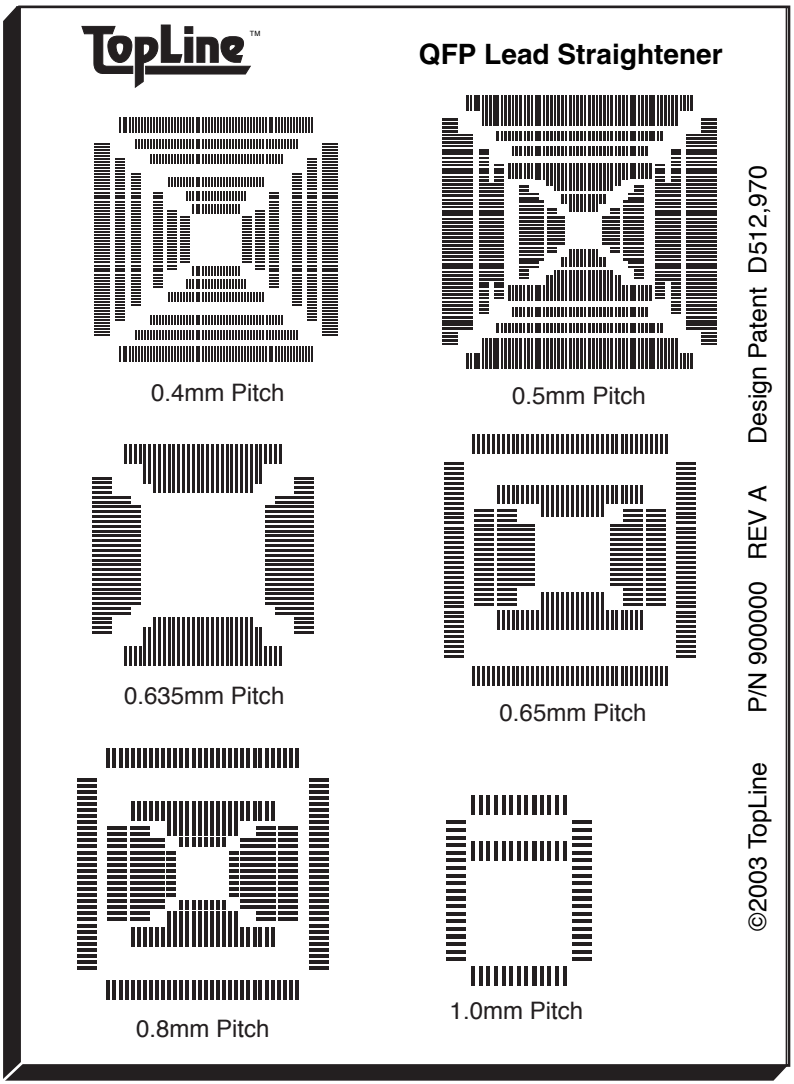
Universal QFP Lead Straightener Rework Tool



Actual Size: 4” x 5.5” (100 x 140mm) .048" (1.2mm) thick

Low cost Universal QFP Lead Straightener handles all QFP, TQFP and LQFP with pitch of 0.4mm to 1.0mm.

Complete set includes all template patterns.

Use standard hand tools such as dental picks and tweezers to adjust leads of QFP to match recessed template slots.

Great for rework and recovery of expensive QFP, TQFP and LQFP. Also use for incoming inspection.

Conductive heavy duty stainless steel construction - precision coplanarity. For use on benchtop.

Lead Count and Pitch Includes:

0.4mm	0.5mm	0.65mm	0.8mm
64L	32L	52L	32L
80L	48L	80L	44L
120L	64L	100L	64L
128L	80L	144L	80L
176L	100L	160L	120L
216L	128L		128L
256L	144L	**0.635mm**	
	160L	84L	**1.0mm**
	176L	100L	44L
	184L	132L	52L
	208L		64L
	240L		

Order Number: 900000

Design Patent D512,970