2004 Catalog

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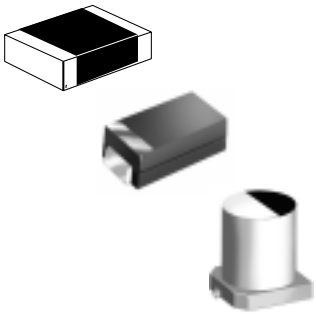
March 2004
72dpi

Find It Fast

Series	Description	View	WebCode	Page
SC	Ceramic Chip Capacitor		XD1	7
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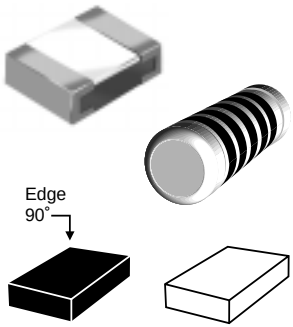
SR	Resistor Chip		XD1	10
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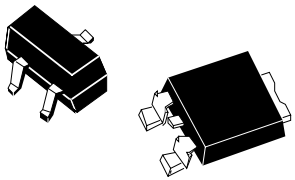
SOT	Transistor		XD1	14
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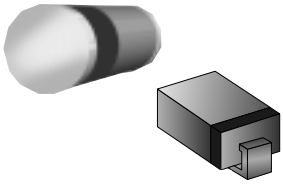
SOD, SM	Melf Diode/Rectifier		XD1	16
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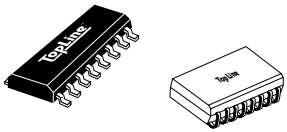
SOIC	Gull Wing			20
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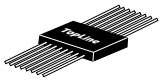
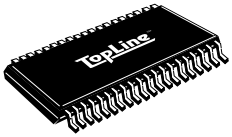
FP	Flat Pack		XF1	22
MSOP	Mini Small Outline Package		XS1	23
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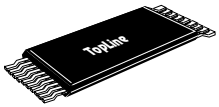
TSOP	Type 1		XO1	26
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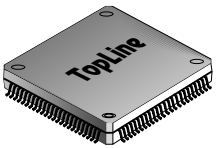
TQFP	Thin Quad Flat Pack			28
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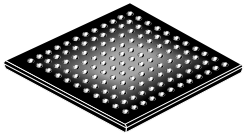
BGA	1.0mm Pitch	 BGA		44-45
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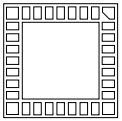
eBGA	Liquid Encapsulated	 Leadless CSP		52
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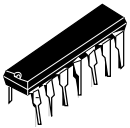
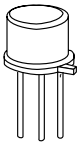
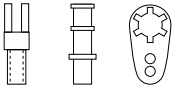
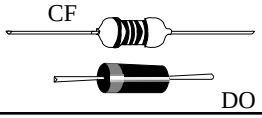
DIP	Dual Inline Package		XN1	57
TO	Transistor		XT1	58
Terminal	Solder Terminals		XR1	59
CF & DO	Resistors & Diodes		XA1	60

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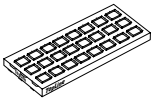
Matrix Component Trays			XZ1	61-64
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Solder Practice Kits

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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" (100mm) Qty	7" (180mm) Tape & Reel Part Number XD1	7" (180mm) Qty	13" (330mm) Tape & Reel Part Number XD1	13" (330mm) Qty
Paper Tape											
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											
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	-	-

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)

0201	0.3mm ± 0.03	0805	0.6~1.25mm
0402	0.5mm ± 0.1	1206	0.6~1.25mm
0603	0.8mm ± 0.1	1210	1.25~1.5mm

INFO

Ceramic chip capacitors are standard with Sn/Pb plated Nickel-Barrier terminations. Other sizes such as 0504, 1805, 1806, 2220 are available on special order. Also available lead-free with Sn 100% tin terminations.
Nomenclature: 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.

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	-	-	SD2012E7A	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

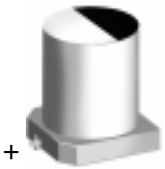
INFO

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

Standard plating is Sn/Pb. 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	200	SE3E13A	2000
4mm	5.5mm	12mm	8mm	SE4E7A	200	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 15 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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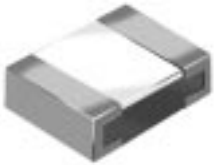
Resistor Chip



Lead Free Pb Dummy Components

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" Qty	7" (180mm) Tape & Reel Part Number XD1	7" Qty	13" (330mm) Tape & Reel Part Number XD1	13" Qty
Paper Tape											
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											
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											
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)

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
0603	0.45mm ± 0.10	1210	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. Also available Lead Free Sn100% Tin terminations. Nomenclature: The chip size code approximates the LxW dimensions in inches. Example: 0805 = .08” x .05”.

MELF Resistor

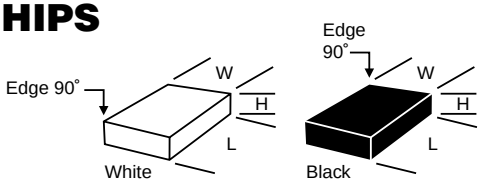
Dummy Component Ordering Information

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

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.

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	Bulk	Bulk	Bulk	SCC016008B-WHITE	5K~100K
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	Bulk	Bulk	Bulk	SCC016008B-BLACK	5K~100K
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.

INDUCTOR

MOLDED CASE

MULTILAYER INDUCTOR

DUMMY COMPONENT ORDERING INFORMATION

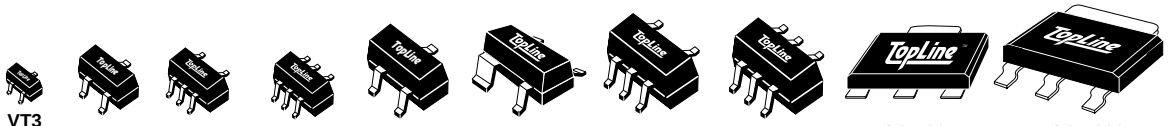
Chip Size Inch	Chip Size Metric	Height	Tape Info Width	Tape Info Pitch	4" (100mm) Tape & Reel Part Number XM1	Qty	7" (180mm) Tape & Reel Part Number XD1	Qty
MULTILAYER INDUCTOR								
0201	0603	0.3mm	8mm	2mm	SI0201P4A	500	SI0201P7A	15,000
0402	1005	0.5mm	8mm	2mm	SI0402P4A	500	SI0402P7A	10,000
0603	1608	0.8mm	8mm	4mm	SI0603E4A	250	SI0603E7A	4000
0805	2012	1.25mm	8mm	4mm	SI0805E4A	250	SI0805E7A	4000
1206	3216	1.60mm	8mm	4mm	SI1206E4A	250	SI1206E7A	2000
MOLDED CASE INDUCTOR								
1008	2520	1.8mm	8mm	4mm	SI1008E4A	250	SI1008E7A	2000
1210	3225	2.2mm	8mm	4mm	SI1210E4A	250	SI1210E7A	2000
1812	4532	3.2mm	12mm	8mm	SI1812E4A	100	SI1812E7A	500

INFO

Inductors are available in a variety of package types and sizes. Molded devices are useful for precision placement where vision processes are required. Multilayer devices handle and place the same as chip capacitors. Nomenclature: The chip size code approximates the LxW footprint dimensions.

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

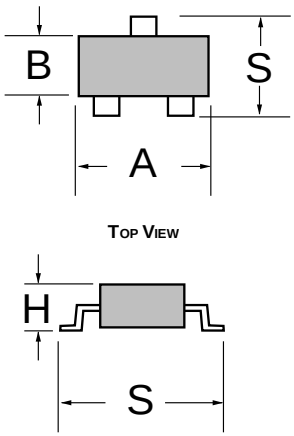
SOT Transistor



Ultra mini | mini | Standard | High Power

Dummy Component Ordering Information

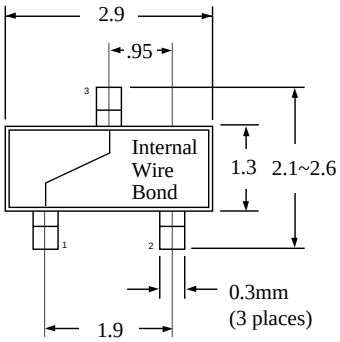
Nbr Leads	Tape Info Width	Tape Info Pitch	Device Reference SOT	Device Reference SC	Device Reference TO	Body Size Nominal (mm) A	B	S	H	4" (100mm) Tape & Reel Part Number XM1	Qty	7" (180mm) Tape & Reel Part Number XD1	Qty
3	8mm	4mm	-	-	-	1.2	0.8	1.2	0.5	-	-	VT3E7A	3000
3	8mm	4mm	-	SC59	TO236AA	2.9	1.6	2.8	1.1	-	-	SC59E7A	3000
3	8mm	4mm	SOT323	SC70	-	2.0	1.25	2.1	0.9	-	-	SC70E7A	3000
3	8mm	4mm	-	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	-	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	12mm	8mm	SOT223	SC73	TO261AA	6.5	3.6	7.0	1.6	SOT223E4A	100	SOT223E7A	1000-2500
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	1.3	2.4	.95	-	-	SOT28E7A	3000



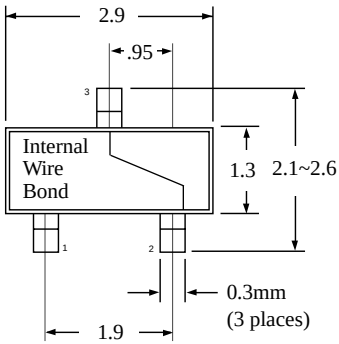
Top View

Side View

NEW *LEAD FREE SOT23 WITH DAISY CHAIN*



SOT23E7A-DC13-TIN
Top View



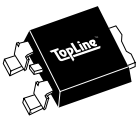
SOT23E7A-DC23-TIN
Top View

INFO

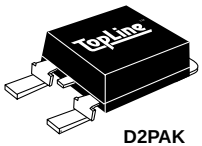
TopLine offers a full range of SOT devices conforming to JEDEC (TO) and EIAJ (SC) standards. 3-lead devices are commonly used for diodes or transistors. 5- and 6-lead devices are used for integrated circuits or diode arrays. Nomenclature: SOT = Small Outline Transistor. The TSOP6 is similar to SOT23 with 6-leads.

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

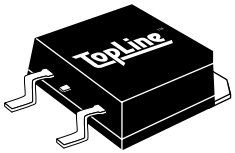
DPAK Power Device



DPAK



D2PAK



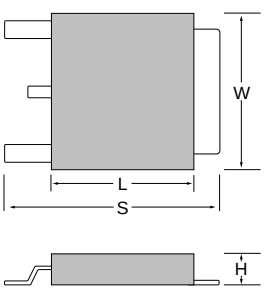
D3PAK

Dummy Component Ordering Information

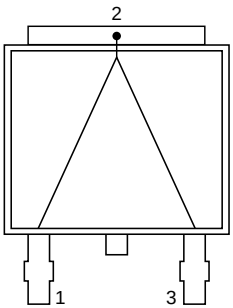
Pacakge Size Nominal (mm)				JEDEC	Tape Info		7" (180mm) Tape & Reel Part Number		13" (330mm) Tape & Reel Part Number	
L	W	H	S	SMD Device	Width	Pitch	XM1	Qty	XD1	Qty
6	6.5	2.3	10	TO-252AA	16mm	8mm	DPAK-E7A	100	DPAK-E13A	2500
9.2	10	4.4	15	TO-263AB	24mm	12mm	D2PAK-E7A	100	D2PAK-E13A	750~1000
9.2	10.4	4.4	15	3-LEAD	24mm	12mm	-		D2PAK-3-E13A	750~1000
9.2	10.4	4.4	15	4-LEAD	24mm	12mm	-		D2PAK-4-E13A	750~1000
9.2	10.4	4.4	15	5-LEAD	24mm	12mm	-		D2PAK-5-E13A	750~1000
14	16	4.7	18.8	TO-268AA	24mm	24mm	-		D3PAK-E13A*	500

* For Reference
Check for Availability

Top View



Side View



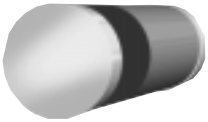
DC14
Daisy Chain Option
Top View

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 (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

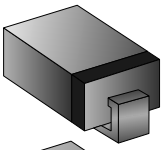
INFO

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

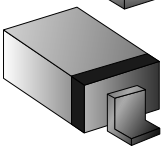
Lead Free suffix -Tin = Sn100

TopLine®

Rectangular Diode



C-Bend Lead

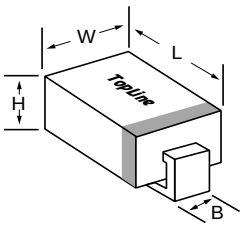


Gull-Wing Lead

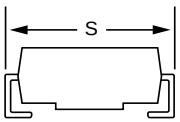
www.DUMMY.tv Document Center

Dummy Component Ordering Information

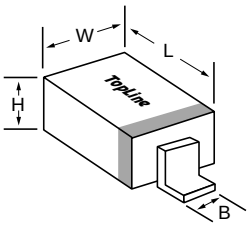
Package Size Nominal (mm) L	W	H	S	B	JEDEC Device	Tape Width Width	Pitch	7" (180mm) Tape & Reel Part Number XD1	Qty	13" (330mm) Tape & Reel Part Number XD1	Qty
Gull Wing Lead											
1.2	0.8	0.6	1.6	0.3	SOD523	8MM	4MM	SC79E7A	3000	-	-
1.7	1.25	0.7	2.5	0.3	SOD323	8mm	4mm	SOD323E7A	3000	SOD323E13A	10,000
2.7	1.5	1.3	3.6	0.7	SOD123	8mm	4mm	SOD123E7A	2500	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	7500
4.3	2.6	2.2	5.0	1.5	DO214AC	12mm	4mm	SMAJ-E7A	1800	SMAJ-E13A	7500
4.3	3.6	2.3	5.4	2.0	DO214AA	12mm	8mm	SMBJ-E7A	750	SMBJ-E13A	3200
7.0	6.0	2.3	8.0	3.0	DO214AB	16mm	8mm	SMCJ-E7A	850	SMCJ-E13A	3500



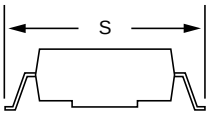
C-Bend (modified J)



Side View



Gull Wing Lead

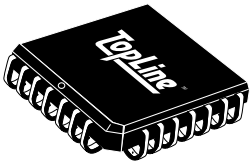


Side View

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.
Nomenclature: JEDEC DO = Diode Outline, SOD = Small Outline Diode.

PLCC
Plastic Leaded Chip Carrier

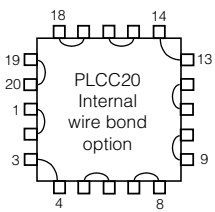


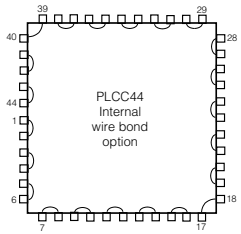
J-Lead 50mil pitch

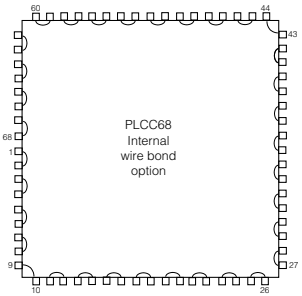
Dummy Component Ordering Information

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	500~900
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	500
52	.75” sq.	32mm	24mm	PLCC52M	24~25	PLCC52E7A	50	PLCC52E13A	500
68	.95” sq.	44mm	32mm	PLCC68M	17~20	PLCC68E7A	50	PLCC68E13A	250~500
84	1.15” sq.	44mm	36mm	PLCC84M	14~17	PLCC84E7A	50	PLCC84E13A	250

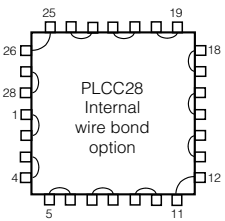
*PLCC18S short version is an obsolete design.

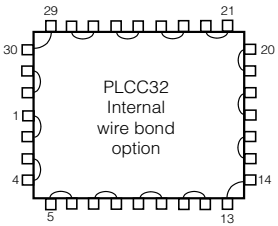


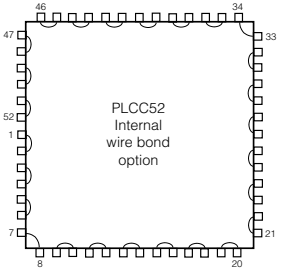


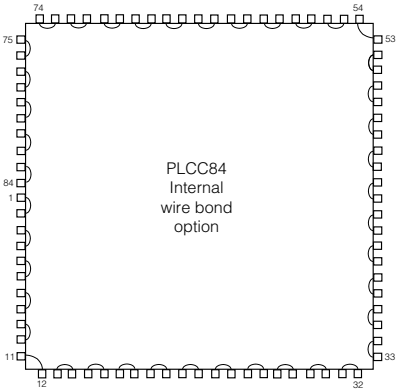


Daisy Chain
available on special order
Add -DE to end of part number









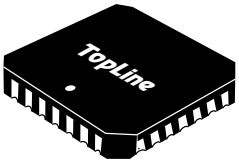
INFO

Standard plating on leads is Sn85/Pb15. Lead pitch is 50 mils (1.27mm). Tube and reel quantities may vary. Add prefix SOCKET in front of part number for PLCC Sockets.

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

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

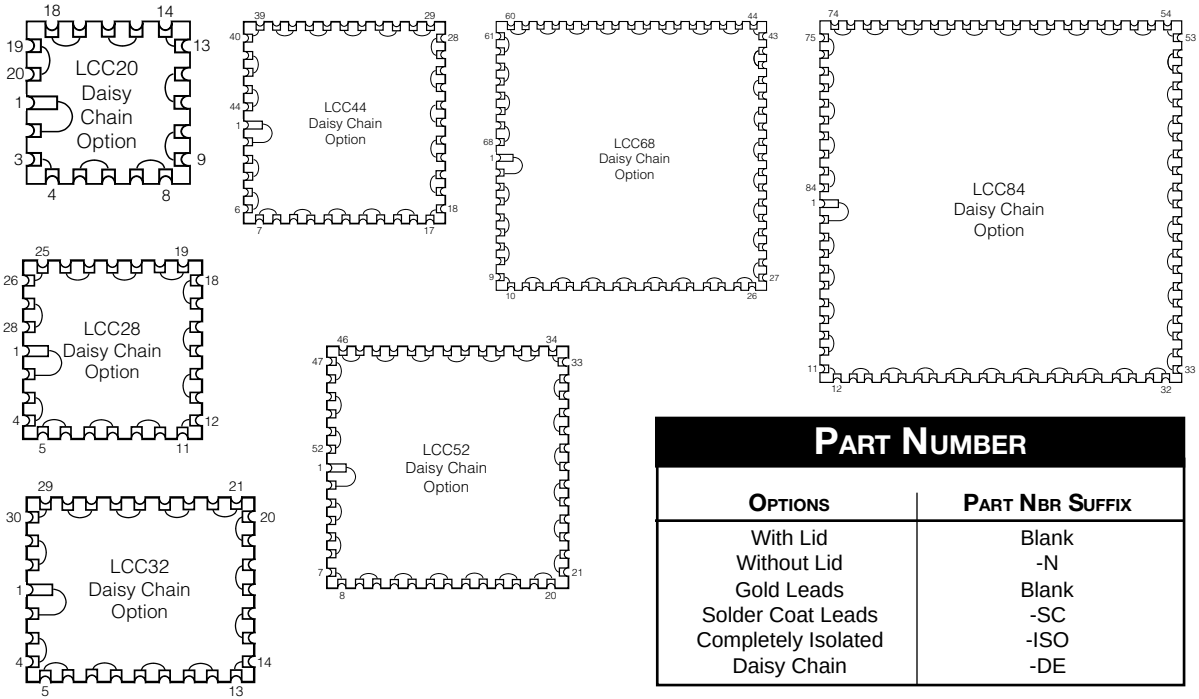
LCC
Leadless Chip Carrier



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

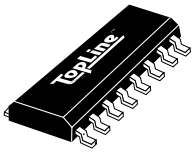
Optional Daisy Chain



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



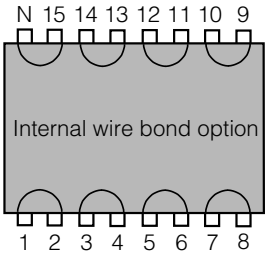
50 mil Pitch (1.27mm)

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
4	150	3.9mm	12mm	8mm	-	-	SO4E7A	750	SO4E13A	call
4	250	6.4mm	12mm	12mm	SOM4M	50	-	-	SOM4E13A	1500
8	150	3.9mm	12mm	8mm	SO8M	96~100	SO8E4A	100	SO8E13A	2500
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	400	10.1mm	32mm	16mm	SOX32M	22~25	-	-	SOX32E13A	1000
32	450	11.4mm	44mm	16mm	SOY32M	22~25	-	-	SOY32E13A	500
40	400	10.1mm	44mm	16/24mm	SOX40M	18	-	-	SOX40E13A	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



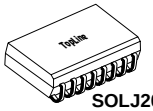
Daisy Chain
available on special order
Add -DE to end of part number

INFO

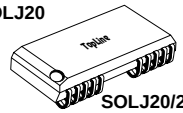
TopLine supplies gull-wing packages with 50mil (1.27) lead pitch in a variety of pin counts and body widths.
Standard plating on leads is Sn85/Pb15. For completely isolated (no internal connections) add -ISO to end of part number.

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

SOJ - Small Outline J-Lead



SOLJ20

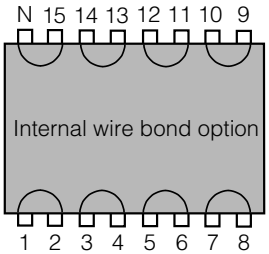


SOLJ20/26

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" (100mm) Qty	13" (330mm) Tape & Reel Part Number XS1	13" (330mm) Qty
18	300	7.5mm	24mm	12mm	SOLJ18M	41	-	-	SOLJ18E13A	1000
20	300	7.5mm	24mm	12mm	SOLJ20M	37	-	-	SOLJ20E13A	1000
20/26	300	7.5mm	24mm	12mm	SOLJ20/26M	25~30	SOLJ20/26E4A	100	SOLJ20/26E13A	1000
24/26	300	7.5mm	24mm	12mm	SOLJ24/26M	25~30	-	-	SOLJ24/26E13A	1000
24/28	400	10.0mm	24/32mm	16mm	SOXJ24/28M	26~30	-	-	SOXJ24/28E13A	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
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

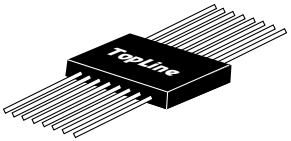


Daisy Chain
available on special order
Add -DE to end of part number

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.

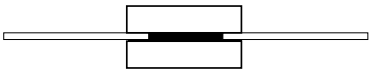
Flat Pack



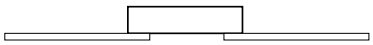
Dummy Component Ordering Information

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
14	.26” x .34”	All Straight	Side	M83401/03
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

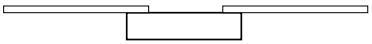
Lead Locations



Side/Sandwich
Code S



Bottom Brazed
Code B

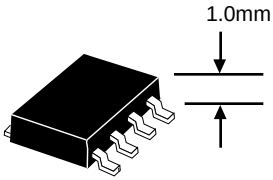


Top Brazed
Code T

Part Number

Packaging	Code	Lead Plating	Part Nbr Suffix
Carrier	C	Gold	Blank
Lead Frame	F	Solder Coat	-SC
		Daisy Chain	-DE

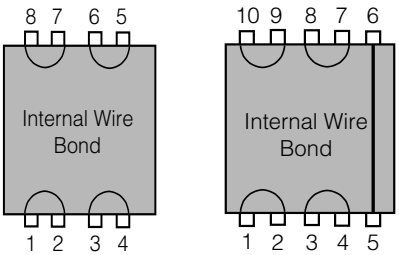
MSOP
Gull Wing
Miniature Small Outline Package



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

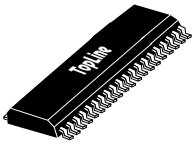
Daisy Chain available
add -DE to end of part number



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

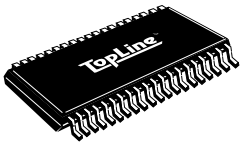
Body Width	Nbr Lead Leads	Nbr Lead Pitch	Tape Info Width	Tape Info Pitch	Tube Part Number XS1	Qty	13" (330mm) Tape & Reel Part Number XS1	Qty
150mil (3.9mm)	16	0.636mm	12mm	8mm	QSOP16M25	99	QSOP16E13A25	1000
	20	0.636mm	16mm	8/12mm	QSOP20M25	55	QSOP20E13A25	1000
	24	0.636mm	16mm	8/12mm	QSOP24M25	55	QSOP24E13A25	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	SSOP36M31.5	31	SSOP36E13A30	1000
	44	0.8mm	32mm	12/16mm	SSOP44M31.5	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
472 mil (12mm)	64	0.8mm	44mm	24mm	SSOP64M31.5	24	SSOP64E13A30	500
270mil (6.8mm)	16	0.8mm	24mm	16mm	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	HSOP30M31.5	30	HSOP30E13A30	500
	36	0.65mm	44mm	24mm	HSOP36M25	30	HSOP36E13A25	500
	44	0.65mm	44mm	24mm	HSOP44M25	30	HSOP44E13A25	500

INFO

TopLine supplies 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. Option B = Sn/Bi. Option C = Sn/Cu. Option -TIN = Sn100.

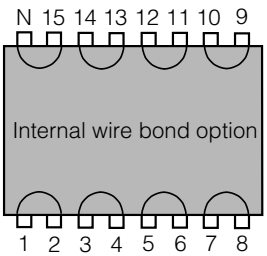
TSSOP
Thin Shrink Small Outline Package



Dummy Component Ordering Information

Body Length	Nbr Lead Leads	Nbr Lead Pitch	Tape Info Width	Tape Info Pitch	Tube Part Number XS1	Tube Qty	13" (330mm) Tape & Reel Part Number XS1	Tape & Reel 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	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	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

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

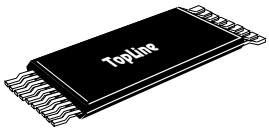


INFO

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.

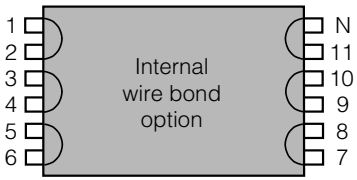
Lead Free. Suffix -B = Sn/Bi, suffix -C = Sn/Cu, suffix -TIN = Sn100.

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



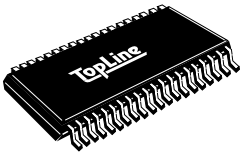
Daisy Chain
available on special order
Add -DE to end of part number

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 leadsSn85/Pb15.

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

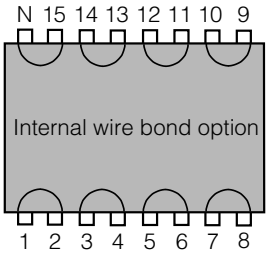
TSOP - Type 2
Thin Small Outline Package



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
20/26	1.27mm	7.6 x 17.14mm	24mm	12mm	TSOP20/26T50-T2	176	TSOP20/26E13A50-T2	500~1000
24/28	1.27mm	10 x 18.4mm	32mm	16mm	TSOP24/28T50-T2	135	TSOP24/28E13A50-T2	500~1000
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

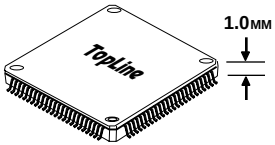
Daisy Chain
available on special order
Add -DE to end of part number



INFO

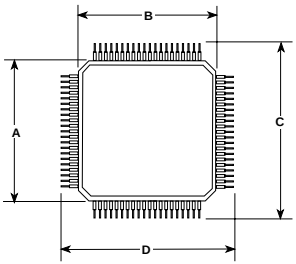
TSOP Type II have leads protruding from the wide side of the package. Maximum seated height is 1.2mm.
Tray and tape quantities may vary. TSOP contain internal die. Solder plated leadsSn85/Pb15.
Lead Free. Suffix -TIN = Sn100.

TQFP 1.0mm Thick
Thin Quad Flat Pack

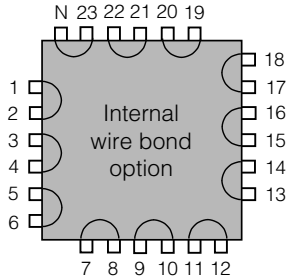


Dummy Component Ordering Information

Nbr Leads	Lead Pitch mm	Lead Pitch mils	Body Size A x B	Tape Info Width	Tape Info Pitch	Tray Part Number XQ1	Tray Qty	Tape & Reel Part Number XQ1	Tape & Reel 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



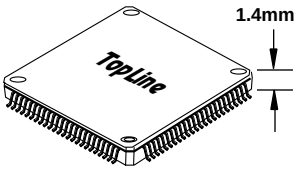
For “C” and “D” dimensions add
2.0mm to dimension “A” or “B”



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

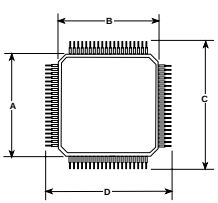
INFO Thin Quad Flat Packs (TQFP) are 1.0mm thick. Lead length is 1.0mm per side. Add 2.0mm to body dimension for tip to tip of leads. Tape quantities may vary. For Daisy Chain “Even” available on special order, add -DE to end of part number. For completely isolated (no internal connections) add -ISO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

LQFP 1.4mm Thick Low Profile Quad Flat Pack

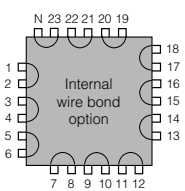


Dummy Component Ordering Information

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	0.5	19.7	5mm	16mm	12mm	LQFP32T19.7	360	LQFP32E13A19.7	2500
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”.



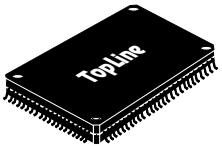
Daisy Chain “Even” available on special order Add -DE to end of part number

INFO

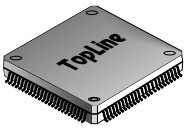
LQFPs are slightly thicker than TQFPs. Leads are 1.0mm long. Add 2.0mm to body size for total overall dimensions. For Daisy Chain “Even,” add -DE to end of part number. For completely isolated (no internal connections) add -ISO to end of part number. Standard plating Sn85/Pb15.

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

QFP
Quad Flat Pack



Rectangular Body

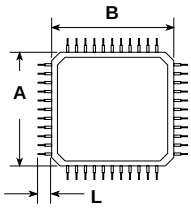


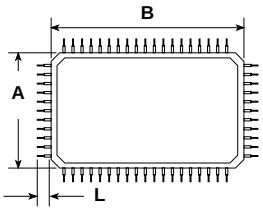
Square Body

Dummy Component Ordering Information

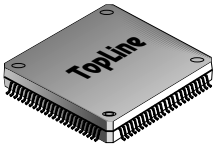
Nbr Leads	2xL FootPrint Adder mm	Lead Pitch mils	Lead Pitch mm	Tray Part Number XQ1	Qty	7" (180mm) Tape & Reel Part Number XM1	Qty	13" (330mm) Tape & Reel Part Number XQ1	Qty
10mm Square Body									
44	3.2mm	31.5	0.8	QFP44T30-3.2	96	QFP44E7A30-3.2	50	QFP44E13A30-3.2	750
44	3.9mm	31.5	0.8	QFP44T30-3.9	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	QFP44T40-4.3	84	-	-	QFP44E13A40-4.3	350
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	-	-
40mm Sq.	3.8mm	-	-





QFP
Quad Flat Pack

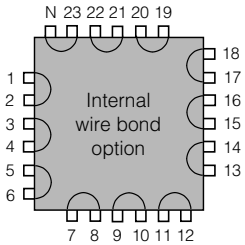


Lead Free
Pb
Dummy Components

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	-	-		
40mm Square Body									
304	2.6mm	19.7	0.5	QFP304T19.7-2.6	12	-	-	-	-

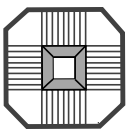
Daisy Chain
available on special order
Add -DE to end of part number
See page 35

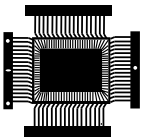


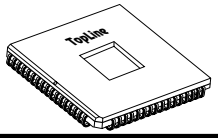
INFO TopLine supplies a wide assortment of Quad Flat Packs in metric packages. Add 2 x L foot print to the body size for total tip-to-tip dimension. Coplanarity guaranteed to 4 mils (0.1mm). Tray quantities may vary. Some QFP contain internal die. For completely isolated (no internal connections) add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

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

CERQUAD & CLCC
Ceramic Quad Flat Pack



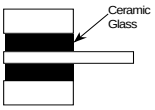




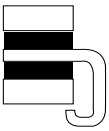
Dummy Component Ordering Information

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	Flat	.40	10.0	CERQUAD28F50
28	50	1.27	J-lead	.45	11.5	CLCC28J50
44	50	1.27	Flat	.562	14.3	CERQUAD44F50
44	50	1.27	J-lead	.65	16.5	CLCC44J50
52	50	1.27	Flat	.75	19.0	CERQUAD52F50
52	50	1.27	J-lead	.75	19.0	CLCC52J50
68	50	1.27	Flat	.95	24.1	CERQUAD68F50
68	50	1.27	J-lead	.95	24.1	CLCC68J50
84	25	0.635	Flat	.65	16.5	CERQUAD84F25
84	50	1.27	Flat	1.06	27.0	CERQUAD84F50
84	50	1.27	J-lead	1.15	29.3	CLCC84J50
132	25	0.635	Flat	.95	24.1	CERQUAD132F25
132	25	0.635	Gull-wing	.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	0.5	Flat	1.10	28.0	CERQUAD208F19.7
208	19.7	0.5	Gull-wing	1.10	28.0	CERQUAD208G19.7

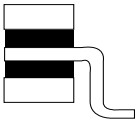
Note: To assure an accurate quotation, please complete the order form on next page. Ceramic lids sold separately. Leads may be solder coated, kovar or gold. Add -DE to end of part number for daisy chain.



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 _____
   - ❑ Alloy 42
   - ❑ 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 _____

Additional Comments or Requirements:

_____

_____

_____

_____

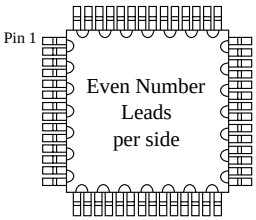
_____

_____

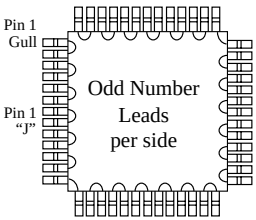
_____

Signature

Typical Daisy Chain



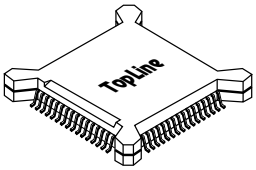
Total Leads:
64, 80,
120, 144, 160,
208, 240, 256



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

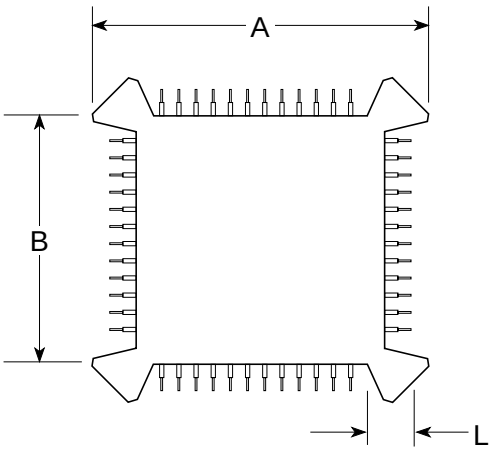
FAX BACK TO TOPLINE 1-714-891-0321

BQFP
Bumper Quad Flat Pack
True 25 mil Pitch



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

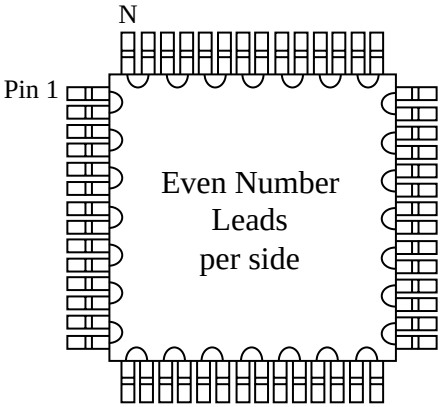


INFO

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.

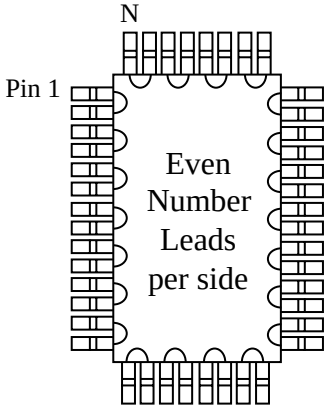
QFP
Daisy Chain

Square Body



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

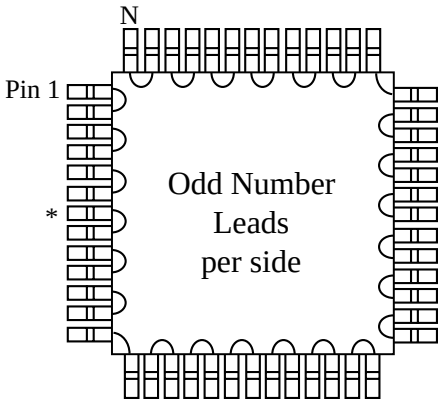
Rectangle Body



Total Number Leads
80, 100, 128

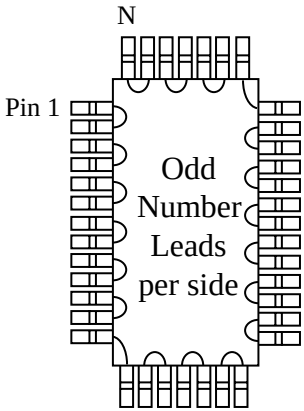
Not to Scale

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

Lead Free Pb Dummy Components

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	190µm	Eutectic	6.3mm SQ	PB18	236	FC48D6.3E457	25
88	204µm	125	135µm	Eutectic	5.08mm SQ	PB08	340	FC88G5.08E204	36
96	457µm	140	190µm	Eutectic	12.7mm SQ	PB18	46	FC96D12.7E457	9
112	152µm	85	88µm	Eutectic	5.08mm SQ	PB06	340	FC112K5.08E152	36
176	204µm	125	135µm	Eutectic	10.2mm SQ	PB08	80-86	FC176G10E204	9
220	204µm	125	135µm	Eutectic	10.2 x 15.25mm	PB08	46-50	FC220G10x15E204	6
317	254µm	119	135µm	Eutectic	5.08mm SQ	FA10	340	FC317G5.08E254	36
579	300µm	100	110µm	Eutectic	11.0mm SQ	WPA01	Wafer 8"	FC579G11E300-ISO	9
960	225µm	90	100µm	Eutectic	7.2mm SQ	VPA18	Wafer 8"	FC960G7.2E225-ISO	25
1268	254µm	119	135µm	Eutectic	10.2mm SQ	FA10	80-86	FC1268G10E254	9
2853	254µm	119	135µm	Eutectic	15.0mm SQ	FA10	28	FC2853G15E254	4
5072	254µm	119	135µm	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

Bump Pitch
in µm
(1000µm = 1.0mm)

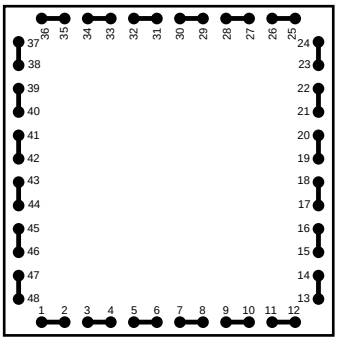
Daisy Chain

INFO

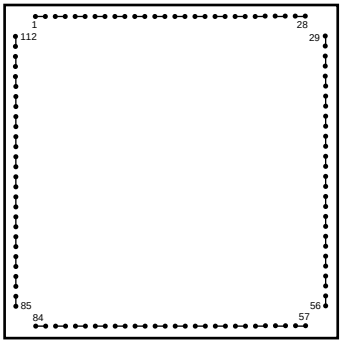
Eutectic 63/37 SnPb allows repeatable bump collapse of 25-40µm for a typical 125µm tall bump. Flip Chips are available with daisy chain (-DC). For bumped wafers, change prefix of part number to FCW. For bumpless flip chip for wire bonding, change suffix to FCN.

Lead Free available, change "E" to "C" in part number for Sn95.5/Ag3.5/Cu1.0 Lead Free Eutectic Bumps.

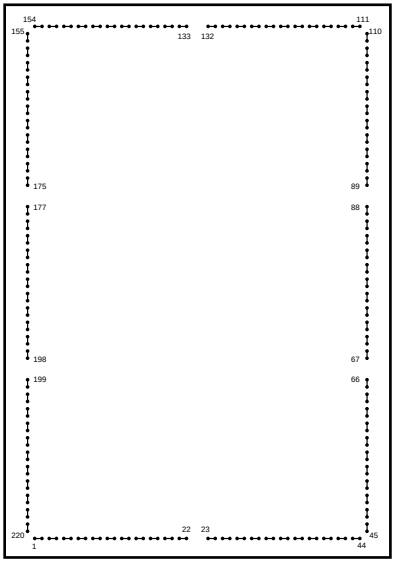
Flip Chip (Bump View)



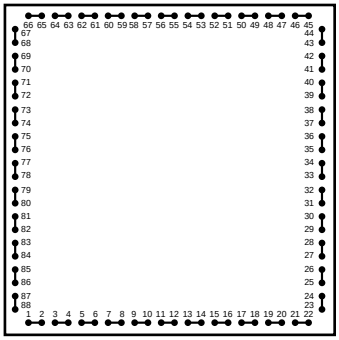
FC48 (PB18 - 250x250)



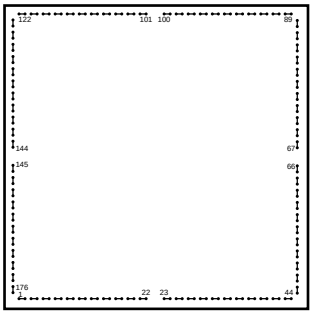
FC112 (PB06 -200x200)



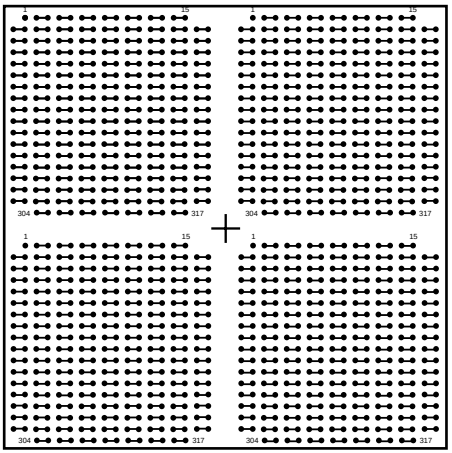
FC220 (PB08 - 400x600)



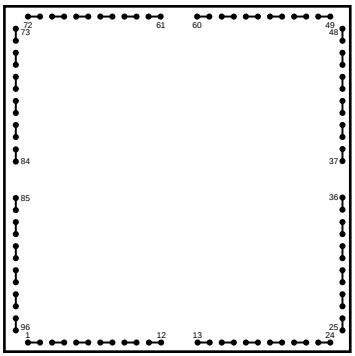
FC88 (PB08 - 200x200)



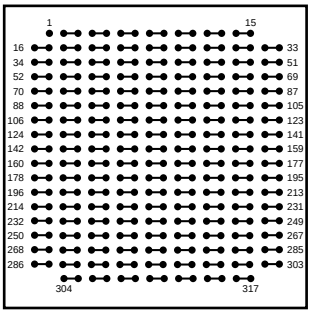
FC176 (PB08 - 400x400)



FC1268 (FA10 - 400x400)

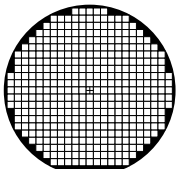


FC96 (PB18 - 500x500)



FC317 (FA10-200x200)

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 UV Tape 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 -UV
	Wafer with Sawn Etched Die	-	-	WED4- mm x mm -UV
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 -UV
	Wafer with Sawn Etched Die	-	-	WED5- mm x mm -UV
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 -UV
	Wafer with Sawn Etched Die	-	-	WED6- mm x mm -UV
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 -UV
	Wafer with Sawn Etched Die	-	-	WED8- mm x mm -UV
12-inch (300mm)	Mirrored/Polished Wafer	WM12-J	WM12-C	-
	Wafer with Etched Pattern	-	-	-
	Wafer with Sawn Mirror Die	-	-	WMD12- mm x mm -UV
	Wafer with Sawn Etched Die	-	-	-

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)

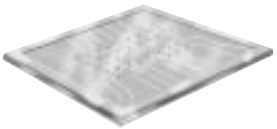
Options

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

Blue Nitto Tape & Ring = UVR suffix

Die in 2” Waffle Pack:
Etch Die: ED-10mm x 5mm -WP2
Mirror Die = MD-10mm x 5mm -WP2

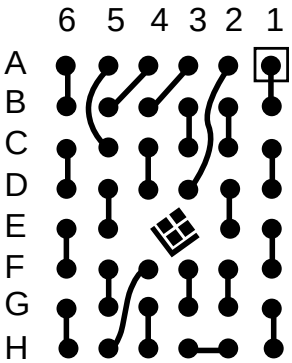
µBGA® CSP
Micro Ball Grid Array Chip Scale Package



Dummy Component Ordering Information

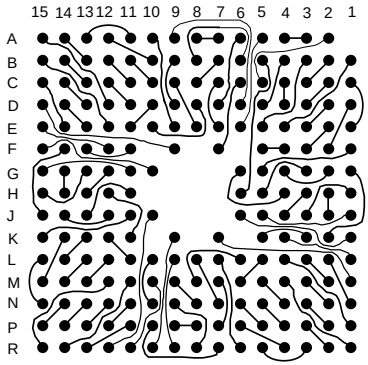
Fig	Nbr Balls	Pitch	Tape Info Width	Tape Info Pitch	Body Size	Ball Diameter	Bump Matrix	4" SQ Tray Part Number XJ1	Qty
Eutectic Sn63 Balls									
1	46	0.75mm	16mm	12mm	5.76 x 7.87mm	0.325mm	6 x 8	CSP46T.75-DC24	99
2	208	0.5mm			9.3mm SQ	0.300mm	15 x 15	CSP208T.5-DC156	49
Lead Free									
1	46	0.75mm	SnAg		5.76 x 7.87mm	0.325mm	6 x 8	CSP46T.75F-DC24	99
1	46	0.75mm	SnAgCu		5.76 x 7.87mm	0.325mm	6 x 8	CSP46T.75C-DC24	99
2	208	0.5mm	SnAg		9.3mm SQ	0.300mm	15 x 15	CSP208T.5F-DC156	49

Fig. 1



CSP46T.75-DC24
View of Bumps

Fig. 2

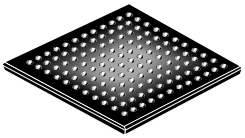


CSP208T.5-DC156
View of Bumps

INFO

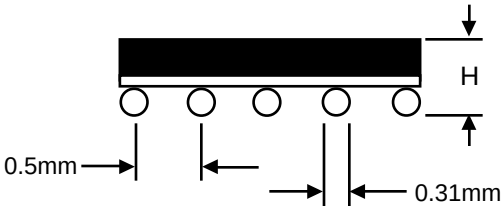
Tessera's µBGA® package is a chip scale package. Ball material - Eutetic 63Sn/37Pb. For Test Boards see kit section of catalog. Tray size is 4" (100mm) square. Rated at JEDEC Level 1 moisture insensitivity and does not require baking prior to assembly.

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	48	5mm	2-Row	1.24mm	8 x 8	BT	CSP48T.5-ISO	490
4	56	6mm	2-Row	1.24mm	10 x 10	BT	CSP56T.5-DC102	608
5	96	8mm	2-Row	1.24mm	14 x 14	Polyimide	fBGA96T.5-DC144	360
6	108	8mm	3-Row	1.24mm	14 x 14	BT	CSP108T.5-DC146	360



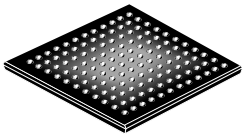
INFO

fBGA - Flex Polyimide substrate. Total package height 1.02mm. Ball diameter is 0.31mm.
For Interior Die, add suffix -D to end of part number

CSP - BT substrate. Total package height 1.24mm. Ball diameter is 0.31mm.
For Internal Die, add suffix -D to end of part number

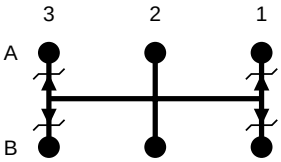
Pb - Lead free option: Add “C” after pitch in part number for SnAgCu balls.

CSP
Ball Grid Array
0.5mm Pitch



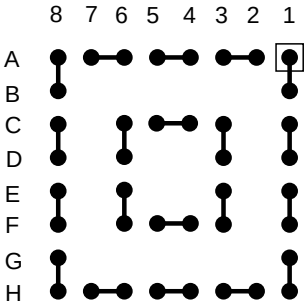
Ball View

fig. 1



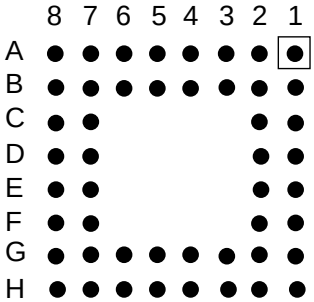
CSP6E7A.5-DC023

fig. 2



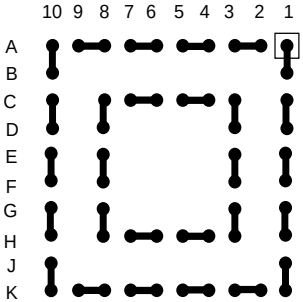
CSP40T.5-DC082

fig. 3



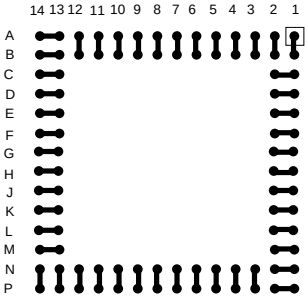
CSP48T.5-ISO

fig. 4



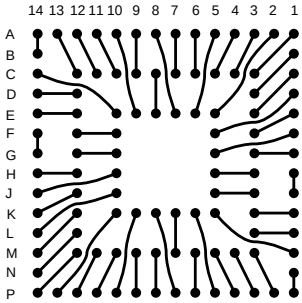
CSP56T.5-DC102

fig. 5



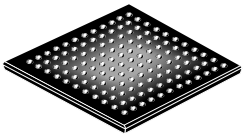
fBGA96T.5-DC144

fig. 6



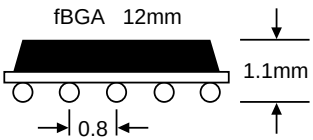
CSP108T.5-DC146

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
1C	48	8 x 9mm	Full		6 x 8	BT	BGA48T.8-ISO-6x8	297
3	49	7mm	Full		7 x 7	BT	BGA49T.8-DC077	476
4	64	8mm	Full		8 x 8	Polyimide	fBGA64T.8-DC089	360
5	81	9mm	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	Polyimide	fBGA112T.8-DC115	240/250
8	144	12mm	Full		12 x 12	BT	BGA144T.8-12x12	168
9	144	12mm	4-Row		13 x 13	Polyimide	fBGA144T.8-DC134	198
10	180	12mm	5-Row		14 x 14	Polyimide	fBGA180T.8-ISO	198
11	192	14mm	4-Row		16 x 16	BT	BGA192T.8-ISO	119/152
12	208	15mm	4-Row		17 x 17	FR4	LBGA208T.8-DC170	126
13	280	16mm	5-Row		19 x 19	Flex Polyimide	fBGA280T.8-DC195	119



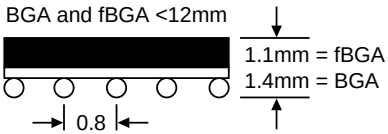
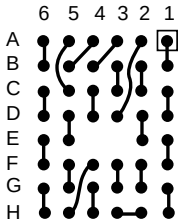
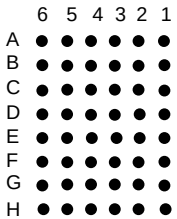


fig. 1A



BGA46T.75-DC24

fig. 1C

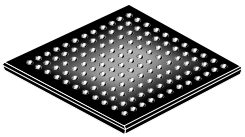


BGA48T.8-ISO-6x8
BGA48T.75-ISO-6x8

INFO

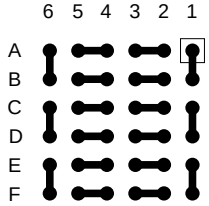
BGA - Near CSP dimensions on rigid BT substrate with molding compound.
Eutectic Sn63 solder balls 0.46mm diameter. (0.75mm Pitch is 0.3mm ball diameter)
fBGA -Flex Polyimide features near CSP dimensions with over-molded body.
Eutectic Sn63 solder balls 0.46mm diameter.
-Lead free option: Add “C” after pitch in part number for SnAgCu balls.

BGA & CSP
Ball Grid Array
0.75~0.8mm Pitch



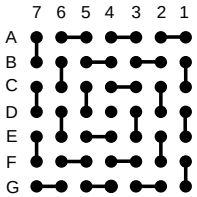
Ball View

fig. 2



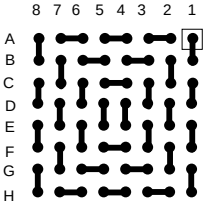
BGA36T.8-DC069

fig. 3



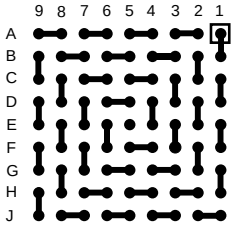
BGA49T.8-DC077

fig. 4



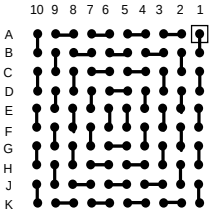
fBGA64T.8-DC089

fig. 5



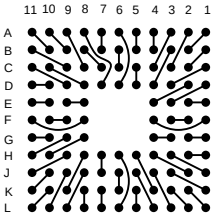
BGA81T.8-DC099

fig. 6



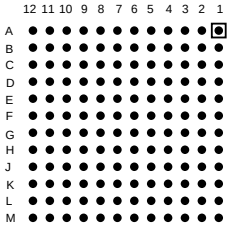
BGA100T.8-DC109

fig. 7



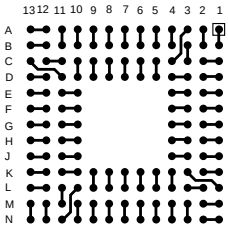
fBGA112T.8-DC115

fig. 8



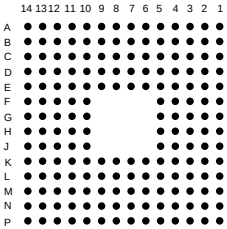
BGA144T.8-12x12

fig. 9



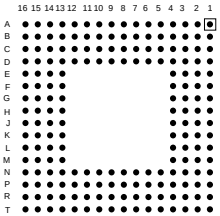
fBGA144T.8-DC134

fig. 10



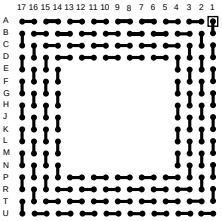
fBGA180T.8-ISO

fig. 11



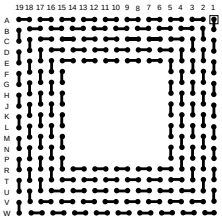
BGA192T.8-ISO

fig. 12



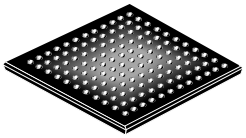
LBGA208T.8-DC170

fig. 13



fBGA280T.8-DC195

BGA
Plastic Ball Grid Array
1.0mm Pitch



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-DC128	-	160
4	156	15mm	4-Row	-0-	14 x 14	BGA156T1.0-DC140	-	126
5	160	15mm	4-Row	2 x 2	14 x 14	BGA160T1.0-DC142	-	126
6	192	17mm	4-Row	NA	16 x 16	BGA192T1.0-DC160A	-	90
7/8	196	15mm	Full Array	NA	14 x 14	BGA196T1.0-DC149A	LBGA196T1.0-DC149	126
9	208	17mm	4-Row	4 x 4	16 x 16	BGA208T1.0-DC164A	-	90
20	209	14x22mm	Full Array	NA	11 x 19	-	LBGA209T1.0-DC1119	84
10	256	17mm	Full Array	NA	16 x 16	BGA256T1.0-DC169A	-	90
11	288	23mm	4-Row	-0-	22 x 22	BGA288T1.0-ISO	-	60
12	324	23mm	4-Row	6 x 6	22 x 22	BGA324T1.0-ISO	-	60
13	400	21mm	Full Array	NA	20 x 20	eBGA400T1.0-D209D	LBGA400T1.0-DC209	60
14	484	23mm	Full Array	NA	22 x 22	eBGA484T1.0-D229AD	LBGA484T1.0-DC229A	60
15	672	27mm	Full Array	NA	26 x 26	eBGA672T1.0-D268D	LBGA672T1.0-DC268	40
16	900	31mm	Full Array	NA	30 x 30	eBGA900T1.0-D309D	LBGA900T1.0-DC309	27
17	1156	35mm	Full Array	NA	34 x 34	eBGA1156T1.0-D349D	LBGA1156T1.0-DC349	24
18	1600	42.5mm	Full Array	NA	40 x 40	eBGA1600T1.0-D409D	LBGA1600T1.0-DC409	12
19	1936	45mm	Full Array	NA	44 x 44	eBGA1936T1.0-D449D	LBGA1936T1.0-DC449	12

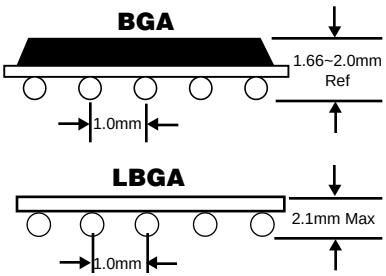
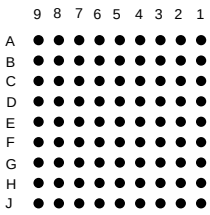
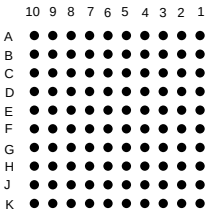


Fig. 1



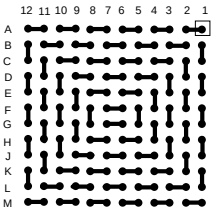
BGA81T1.0-ISO

Fig. 2



BGA100T1.0-ISO

Fig. 3



BGA144T1.0-DC128

INFO

BGA - Standard BGA plastic packages should be baked at 120˚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) Sn62 balls for soldering at 210˚C.

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

BGA
Plastic Ball Grid Array
1.0mm Pitch

Ball View

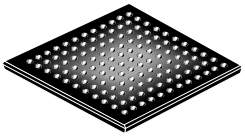
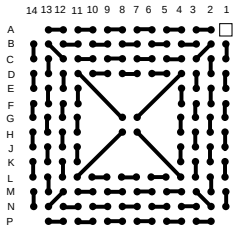
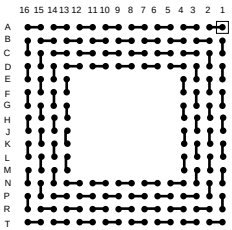


Fig. 4/5



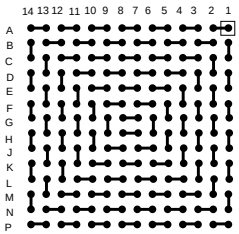
BGA156T1.0-DC140
BGA160T1.0-DC142

Fig. 6



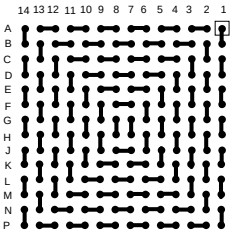
BGA192T1.0-DC160A

Fig. 7



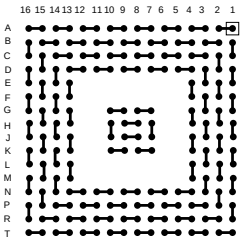
BGA196T1.0-DC149A

Fig. 8



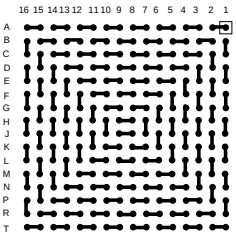
LBGA196T1.0-DC149

Fig. 9



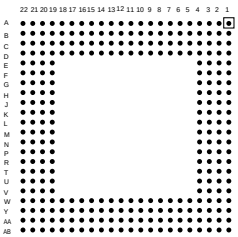
BGA208T1.0-DC164A

Fig. 10



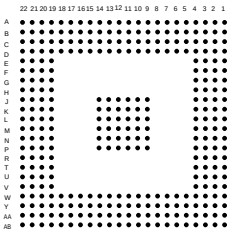
BGA256T1.0-DC169A

Fig. 11



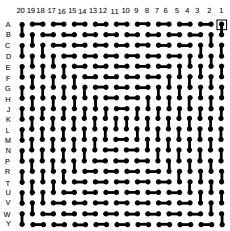
BGA288T1.0-ISO

Fig. 12



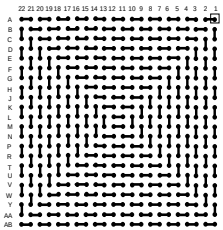
BGA324T1.0-ISO

Fig. 13



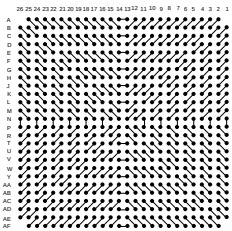
LBGA400T1.0-DC209

Fig. 14



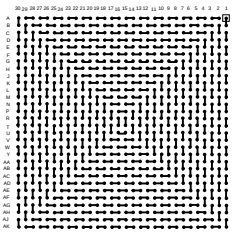
LBGA484T1.0-DC229A

Fig. 15



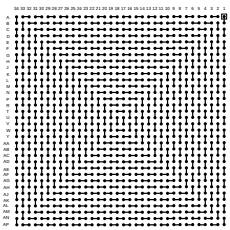
LBGA672T1.0-DC268

Fig. 16



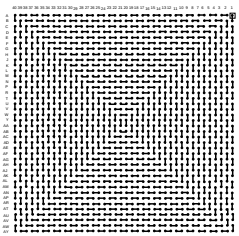
LBGA900T1.0-DC309

Fig. 17



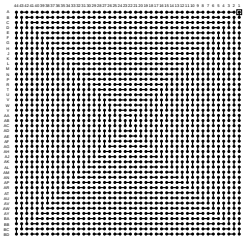
LBGA1156T1.0-DC349

Fig. 18



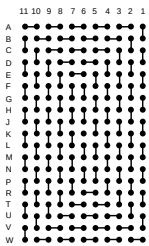
LBGA1600T1.0-DC409

Fig. 19



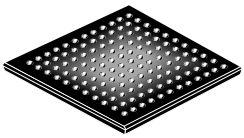
LBGA1936T1.0-DC449

Fig. 20



LBGA209T1.0-DC1119

BGA
Plastic Ball Grid Array
1.27mm Pitch

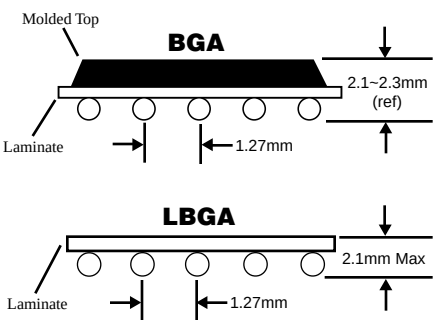


Dummy Component Ordering Information

Fig	Nbr Balls	Body Size	Ball Pattern	Center Ball	Ball Matrix	Tray Part Number Standard (XJ1)	Tray Part Number Unencapsulated	Qty
1	119	14 x 23mm	Full	NA	7 x 17	BGA119T1.27-DIE	-	84
2	208	23mm	4-Row	N/A	17 x 17	BGA208T1.27-DC170	-	60
3	217	23mm	4-Row	3 x 3	17 x 17	BGA217T1.27-DC171	-	60
4/5	256	27mm	4-Row	-0-	20 x 20	BGA256T1.27-DC200	LBGA256T1.27-DC200A	40
6	272	27mm	4-Row	4 x 4	20 x 20	BGA272T1.27-DC202	-	40
7	292	27mm	4-Row	6 x 6	20 x 20	BGA292T1.27	-	40
8	352	35mm	4-Row	-0-	26 x 26	BGA352T1.27-DC70	-	24
9	385	31mm	5-Row	5 x 5	23 x 23	BGA385T1.27	-	27
10	388	35mm	4-Row	6 x 6	26 x 26	BGA388T1.27-DC72	-	24
11	357	25mm	Full	NA	19 x 19	eBGA357T1.27-D73D	LBGA357T1.27-DC73	24
12	1225	45mm	Full	-0-	35 x 35	eBGA1225T1.27-D359D	LBGA1225T1.27-DC359	12

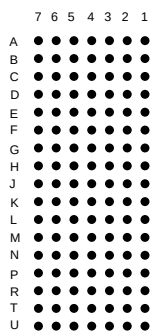
BGA Daisy Chain Patterns (Ball View) - Illustrations Not To Scale

Side View



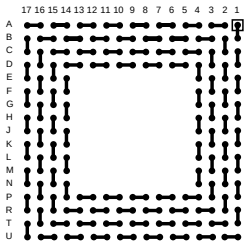
Ball View

Fig. 1



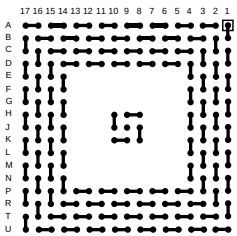
BGA119T1.27-DIE

Fig. 2



BGA208T1.27-DC170

Fig. 3



BGA217T1.27-DC171

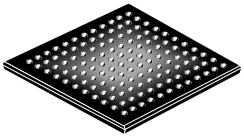
INFO

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 63/37 SnPb 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) 62/36/2 SnPbAg balls for soldering at 210˚C.

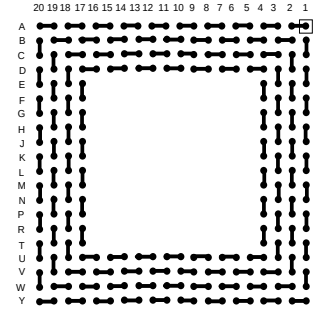
Pb - Lead Free available. SnAgCu = Add “C” after pitch in part number.

BGA
Plastic Ball Grid Array
1.27mm Pitch



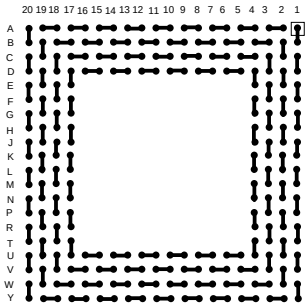
Ball View

Fig. 4



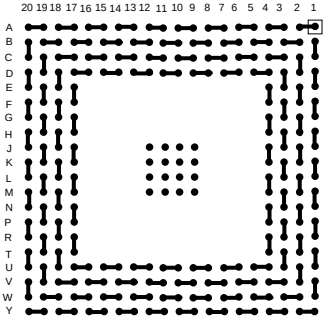
BGA256T1.27-DC200

Fig. 5



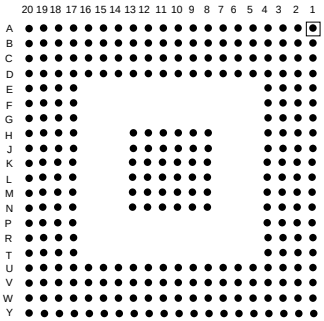
LBGA256T1.27-DC200A

Fig. 6



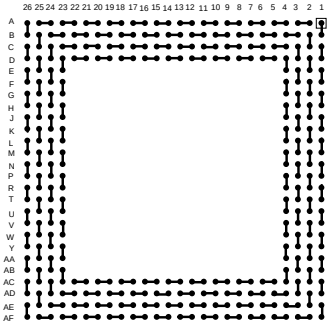
BGA272T1.27-DC202

Fig. 7



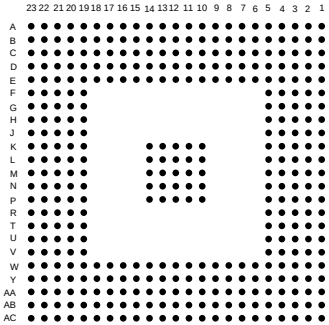
BGA292T1.27

Fig. 8



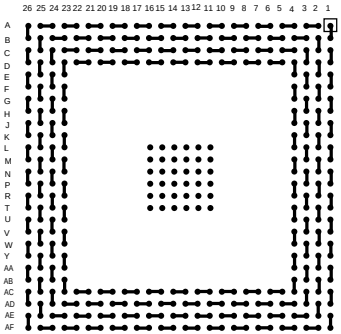
BGA352T1.27-DC70

Fig. 9



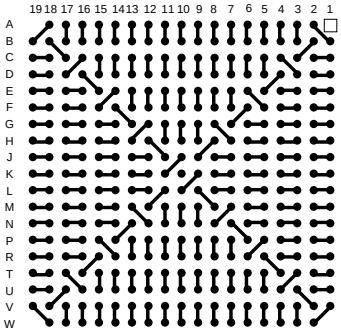
BGA385T1.27

Fig. 10



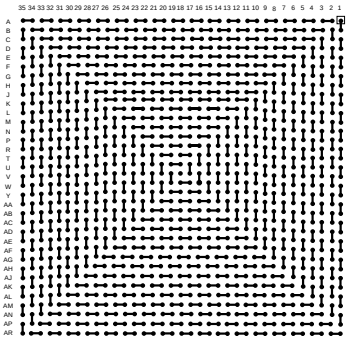
BGA388T1.27-DC72

Fig. 11



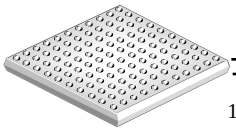
LBGA357T1.27-DC73

Fig. 12



LBGA1225T1.27-DC359

CBGA
Ceramic Ball Grid Array
1.27mm Pitch



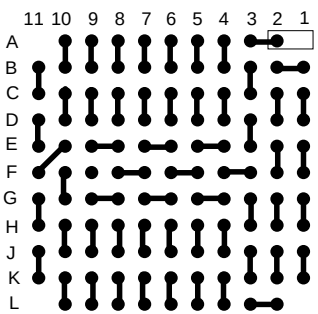
1.7mm max height

Lead Free Pb Dummy Components

Dummy Component Ordering Information

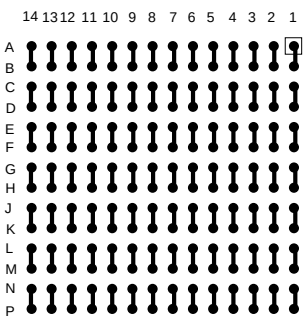
Fig	Nbr Balls	Body Size	Ball Pattern	Ball Matrix	Tray Part Number Low Temp 210˚C XJ1 62/36/2 SnPbAg	Tray Part Number High Temp 320˚C XJ1 10/90 SnPb	Qty
1	121	15mm	Full Grid	11 x 11	CBGA121T1.27L-DC5	CBGA121T1.27-DC5	126
2	196	19mm	Full Grid	14 x 14	CBGA196T1.27L-DC11	CBGA196T1.27-DC11	84
3	256	21mm	Full 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



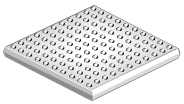
CBGA196T1.27-DC11
(Ball View)

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 10/90 SnPb for high temperature soldering at 320˚C to ceramic substrate. For low temperature soldering at 210˚C to laminate substrate, specify 62/36/2 SnPbAg solder balls by adding -L to part number. Custom sizes and ball counts available.

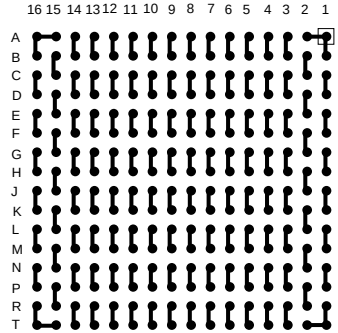
Lead free available with SnAgCu balls. Add“C” after pitch in part number

CBGA - Ceramic Ball Grid Array - 1.27mm Pitch



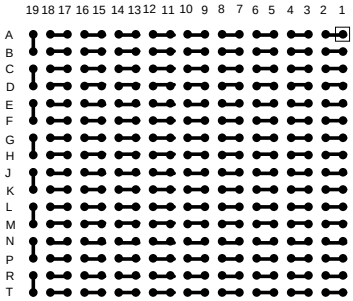
(Ball View)

Fig. 3



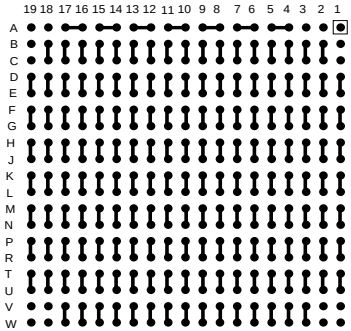
CBGA256T1.27-DC61

Fig. 4



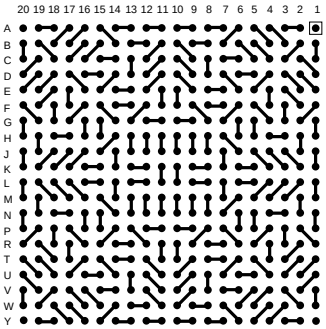
CBGA304T1.27-DC63

Fig. 5



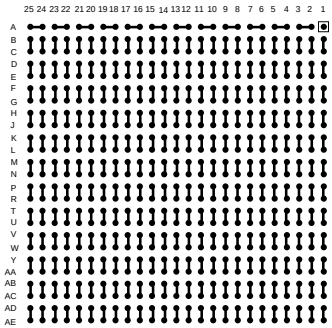
CBGA361T1.27-DC71

Fig. 6



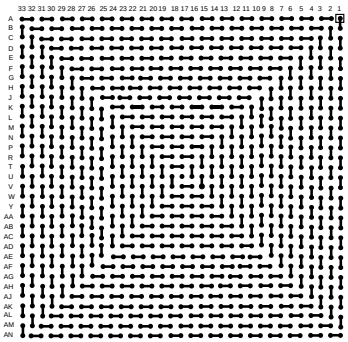
CBGA400T1.27-DC21

Fig. 7



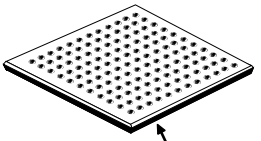
CBGA625T1.27-DC81

Fig. 8



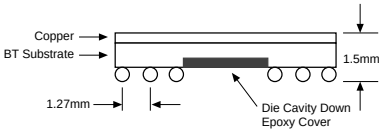
CBGA1089T1.27-DC339

S-BGA
Metal Ball Grid Array
1.27mm Pitch



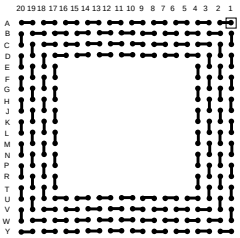
Dummy Component Ordering Information

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-DC335	12



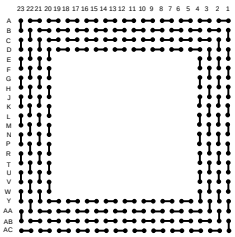
Ball View
Daisy Chain

Fig. 1



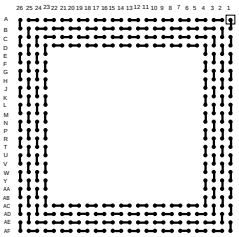
SBGA256T1.27-DC200

Fig. 2



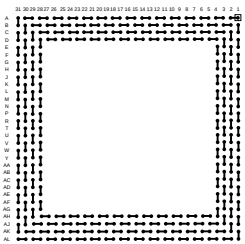
SBGA304T1.27-DC230

Fig. 3



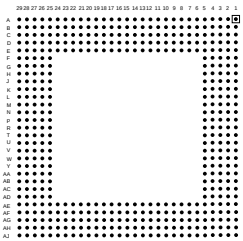
SBGA352T1.27-DC70

Fig. 4



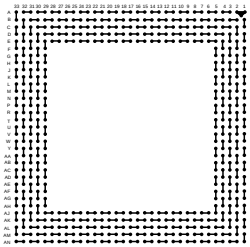
SBGA432T1.27-DC314

Fig. 5



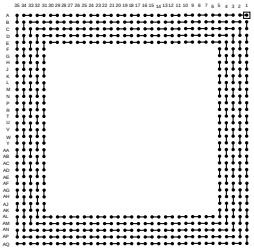
SBGA480T1.27-ISO

Fig. 6



SBGA560T1.27-DC87

Fig. 7

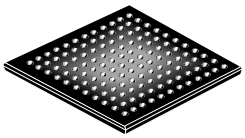


SBGA600T1.27-DC355

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	LBGA225T1.5-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

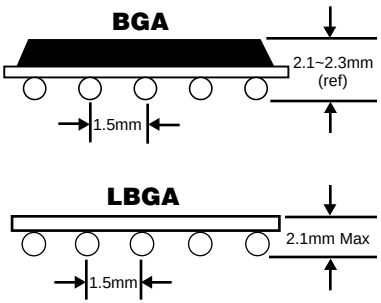
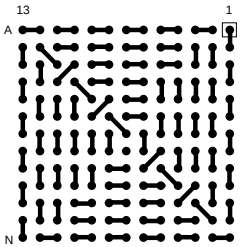
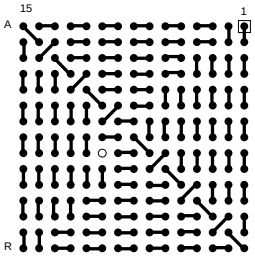


Fig. 1



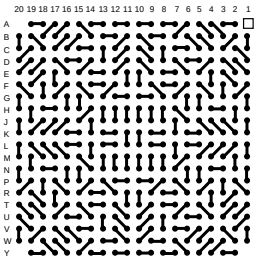
BGA169T1.5-DC10

Fig. 2



BGA225T1.5-DC15

Fig. 3



LBGA400T1.5-DC20

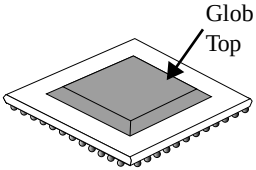
INFO

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)

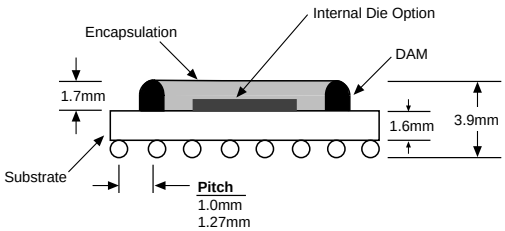
LBGA - Unencapsulated laminate Ball Grid Arrays offer the lowest cost when placement practice is the primary concern. Includes daisy chain laminate substrate with 30mil (0.75mm) 62/36/2 SnPbAg balls for soldering at 210˚C. Since there is no molded or encapsulated top, LBGA does not require baking prior to assembly.

- 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	12
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

CLGA
Ceramic Land Grid Array
Specification Form

TopLine™

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 ❑ other_____

5. Pad Material
- ❑ Palladium Silver (Standard)
- ❑ 5mil Raised Pad Sn62 (5mil high)
- ❑ Ball Attach by Customer

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

7. Markings
- ❑ None ❑ Standard

8. Need Delivery By _____

9. Ceramic Thickness
- ❑ 1.0mm (Standard)
- ❑ 1.5mm
- ❑ 3.0mm
- ❑ other _____

10. Application
- ❑ Hand Insertion into Socket
- ❑ Ball Attach by Customer
- ❑ other _____

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

Part Number Configuration

CLGA	625	T	1.27	- DC61	A	3
Substrate	**I/O**	**Packaging**	**Pitch**	**Circuit**	**Options**	**Substrate**
Ceramic		T = Trays	mm	DC = Daisy Chain Pads BUS = All Pads Shorted ISO = All Pads Isolated	Blank = Standard for Socket E = Raised Pad 5mil B = Ball Attach by Customer X = Customer Spec	Blank = 1.0mm thick (Standard) 2 = 1.5mm thick 3 = 3mm thick

INFO

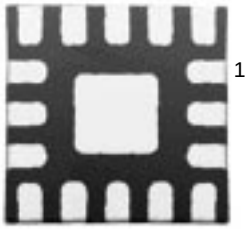
CLGA - Ceramic Land Grid Arrays for socket insertion and Ball Attach
Available in a variety of configurations and pad heights.
Contact TopLine for details.

Leadless QFN
MLF and SLP

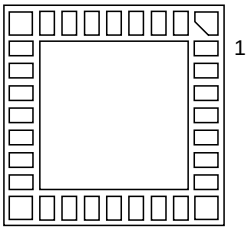
Dummy Component Ordering Information

Body Size SQ	Nbr Lead Leads	Nbr Lead Pitch	Tape Info Width	Tape Info Pitch	Tray Part Number	Qty	Tube Part Number	Qty
MLF								
3mm	16	0.5mm			MLF16T.5	714	MLF16M.5	100
4mm	20	0.5mm	12mm	8mm	MLF20T.5	540	MLF20M.5	75
4mm	24	0.5mm			MLF24T.5	540	MLF24M.5	75
5mm	28	0.5mm			MLF28T.5	490	MLF28M.5	60
5mm	32	0.5mm			MLF32T.5	490	MLF32M.5	60
6mm	36	0.5mm			MLF36T.5	490	MLF36M.5	50
6mm	40	0.5mm			MLF40T.5	490	MLF40M.5	50
7mm	44	0.5mm	16mm	12mm	MLF44T.5	260	MLF44M.5	43
7mm	48	0.5mm			MLF48T.5	260	MLF48M.5	43
8mm	52	0.5mm			MLF52T.5	260	MLF52M.5	37
8mm	56	0.5mm			MLF56T.5	260	MLF56M.5	37
9mm	64	0.5mm			MLF64T.5	260	MLF64M.5	33
10mm	68	0.5mm			MLF68T.5	168	MLF68M.5	30
10mm	72	0.5mm	24mm	16mm	MLF72T.5	168	MLF72M.5	30
SLP/QFN								
2mm	5	0.65mm	8mm	8mm	-	-	SLP5B.65	Bulk
2mm	6	0.65mm			-	-	SLP6B.65	Bulk
2mm	8	0.5mm			-	-	SLP8B.5	Bulk
3mm	10	0.5mm			SLP10T.5	490	SLP10M.5	121
3mm	12	0.5mm			SLP12T.5	490	SLP12M.5	121
3mm	16	0.5mm			SLP16T.5	490	SLP16M.5	121
4mm	16	0.65mm			SLP16T.65	540	SLP16M.65	91
4mm	20	0.5mm	12mm	8mm	SLP20T.5	540	SLP20M.5	91
4mm	24	0.5mm			SLP24T.5	540	SLP24M.5	91
5mm	28	0.5mm			SLP28T.5	490	SLP28M.5	73
5mm	32	0.5mm			SLP32T.5	490	SLP32M.5	73
6mm	28	0.65mm			SLP28T.65	490	SLP28M.65	61
6mm	40	0.5mm	16mm	12mm	SLP40T.5	490	SLP40M.5	61
8mm	44	0.65mm			SLP44T.65	260	SLP44M.65	46

Bottom View of Pads



MLF



QFN, MCC, SLP

INFO

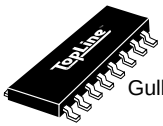
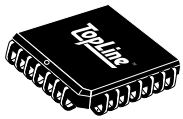
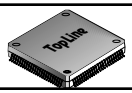
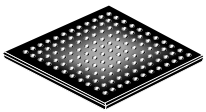
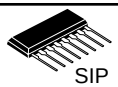
Bumpless Chip Carrier (BCC) also known as MLF. Perimeter lead CSP utilize lead frame in an epoxy molded plastic case. Offered with daisy chain, add -DE to end of part number. Available in tubes, trays and on reels. Standard Lead Plating 85Sn/15Pb.

Lead Free. Suffix -TIN = Sn100.

Lead Free Components

Check website for updates
www.topline.tv/leadfree.html

Dummy Component Ordering Information

Nbr Leads	Lead Pitch	Body Size	Lead Material	View	Package	Part Number	Qty
8		150mil	Sn100			SO8M-TIN	97
14		150mil	Sn100			SO14M-TIN	55
16	1.27mm	150mil	Sn100	 Gull	Tube	SO16M-TIN	48
16		300mil	Sn100			SOL16M-TIN	47
20		300mil	Sn100			SOL20M-TIN	38
28		300mil	Sn100			SOL28M-TIN	27
						Other SSOP, TSSOP available	
28		.45” SQ				PLCC28M-TIN	39
32		.45 x .55”				PLCC32M-TIN	32
44	1.27mm	.65” SQ	Sn100	 PLCC	Tube	PLCC44M-TIN	28
52		.75” SQ				PLCC52M-TIN	23
68		.95” SQ				PLCC68M-TIN	19
84		1.15” SQ				PLCC84M-TIN	16
208	0.5mm	28mm	Sn97/Bi3.0	 QFP	Tray	QFP208T19.7-B-2.6	24
208	0.5mm	28mm	Sn100			QFP208T19.7-TIN-2.6	24
						Other TQFP, LQFP, QFP available	
46	0.75mm	5.8x7.8mm	SnAg			CSP46T.75F-DC24	99
169	1.5mm	23mm	SnAgCu			BGA169T1.5C-DC10	60
196	1.0mm	15mm	SnAgCu		Tray	BGA196T1.0C-DC149A	126
225	1.5mm	27mm	SnAgCu			BGA225T1.5C-DC15	40
256	1.0mm	17mm	SnAgCu			BGA256T1.0C-DC169A	90
256	1.27mm	27mm	SnAgCu			BGA256T1.27C-DC200	40
272	1.27mm	27mm	SnAgCu			BGA272T1.27C-DC202	40
352	1.27mm	35mm	SnAgCu	 BGA		BGA352T1.27C-DC70	24
388	1.27mm	35mm	SnAgCu			BGA388T1.27C-DC72	24
						Other BGA available	
15	1.27mm	SIP	Ni-Pd	 SIP		HSIP15M-F	25
14	2.54mm	300mil	Tin Sn100	DIP	Tube	DIP14M3TIN-DE	25
16	2.54mm	300mil	Tin Sn100			DIP16M3TIN-DE	25
16	0.5mm	3mm	Tin Sn100			SLP16M.5-TIN-DE	123
20	0.5mm	4mm	Tin Sn100			SLP20M.5-TIN-DE	92
24	0.5mm	4mm	Tin Sn100		Tube	SLP24M.5-TIN-DE	92
28	0.5mm	5mm	Tin Sn100			SLP28M.5-TIN-DE	73
				QFN/SLP/MLF		Other SLP, MLF, MCC available	
48	457µm	6.3mm				FC48D6.3C457-DC	
88	204µm	5.08mm	Sn95.5/Ag3.5/Cu1.0	Flip Chip	Tray	FC88G5.08C204-DC	
317	254µm	5.08mm				FC317G5.08C254-DC	

Lead Free continued on page 56

Lead Free Components

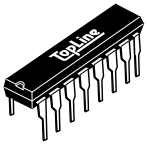
Check website for updates
www.topline.tv/leadfree.html

Dummy Component Ordering Information

Nbr Leads	Lead Pitch	Body Size	Lead Material	View	Package	Part Number	Qty
2	Capacitor	0201	Tin Sn100	Chip	Reel	SC0201P7A-TIN	15,000
		0402				SC0402P7A-TIN	10,000
		0603				SC0603P7A-TIN	4000
		0805				SC0805E7A-TIN	4000
		1206				SC1206E7A-TIN	4000
		1210				SC1210E7A-TIN	4000
		1812				SC1812E7A-TIN	1000
2	Resistor	0201	Tin Sn100	Chip	Reel	SR0201P7A-TIN	10000
		0402				SR0402P7A-TIN	10000
		0603				SR0603P7A-TIN	5000
		0805				SR0805P7A-TIN	5000
		1206				SR1206P7A-TIN	5000
		2010				SR2010E7A-TIN	4000
		2512				SR2512E7A-TIN	4000
2	Discrete Semi	SC79	Tin Sn100	SOT	Reel	SC79E7A-TIN	3000
3		SOT23				SOT23E7A-DC13-TIN	3000
3		SOT23				SOT23E7A-DC23-TIN	3000
3		SOT89				SOT89E7A-TIN	1000
3		SOT223				SOT223E7A-TIN	1000
3		SOT323				SOT323E7A-TIN	3000
3		DPAK				DPAK-E13A-TIN	2500
3		D2PAK				D2PAK-E13A-TIN	800
4		SOT143				SOT143E7A-TIN	3000
4		SOT343				SOT343E7A-TIN	3000
5		SOT25				SOT25E7A-TIN	3000
5		SOT353				SOT353E7A-TIN	3000
5		D2PAK-5				D2PAK5-E13A-TIN	800
6		SOT26				SOT26E7A-TIN	3000
6		SOT363				SOT363E7A-TIN	3000
2	Tant	A-Case	Sn100		Reel	SD3216E7A-TIN	2000
		B-Case				SD3528E7A-TIN	2000
		C-Case				SD6032E7A-TIN	500
		D-Case				SD7343E7A-TIN	500
2	Al Cap	4mm	SnBi		Reel	SE4E13A-SnBi	2000
		5mm				SE5E13A-SnBi	1000
		6mm				SE6E13A-SnBi	1000
		8x6mm				SE8E13A-SnBi	1000
		8x10mm				SE9E13A-SnBi	500
		10mm				SE10E13A-SnBi	500

Lead Free continued on page 55

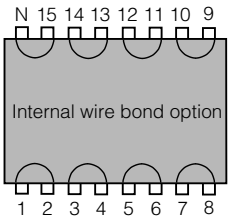
DIP / SDIP
Dual Inline Package



Lead Free
Pb
Dummy Components

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

INFO

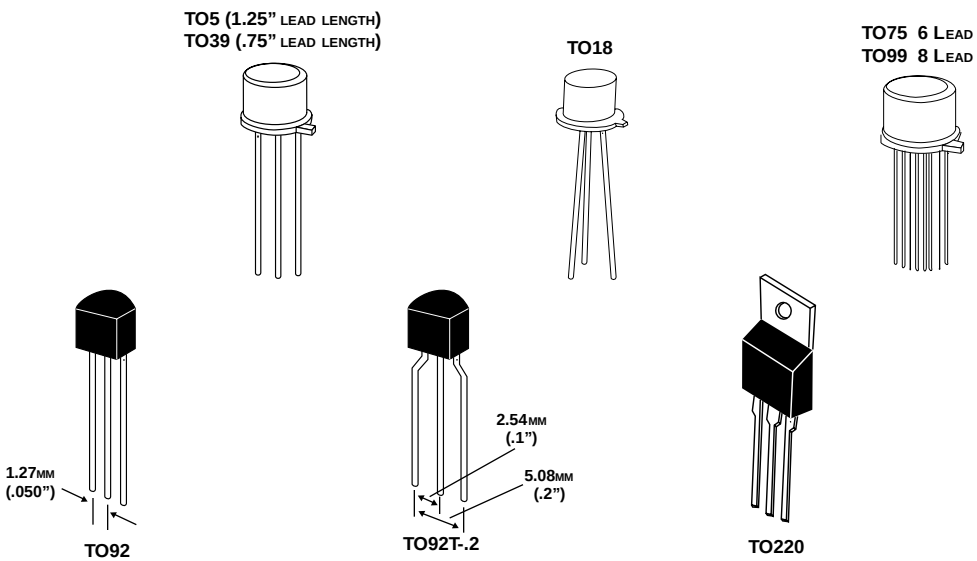
TopLine supplies DIP Plastic Dual Inline Packages with lead pitch of 0.100” (2.54mm). Also available with Ceramic Case on special order, by adding “CER” prefix to front of part number. SDIP packages have lead pitch of 0.07” (1.778mm). For completely isolated (no internal connections) add -ISO to end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

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

TO
TRANSISTOR

DUMMY COMPONENT ORDERING INFORMATION

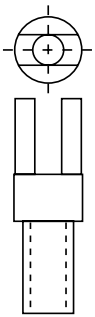
Material		Bulk Part Number		Tube Part Number		Tape & Reel Part Number	
CASE	LEAD	XT1	QTY	XT1	QTY	XT1	QTY
Metal	Solder	TO5	25	-	-	-	-
Metal	Solder	TO18	25	-	-	-	-
Metal	Solder	TO39	25	-	-	-	-
Metal	Solder	TO75	25	-	-	-	-
Plastic	Solder	TO92	100	-	-	TO92T	2000
Plastic	Solder	TO92-.2”	100	-	-	TO92T-.2”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



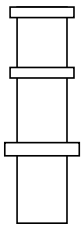
Solder Terminals

Dummy Component Ordering Information

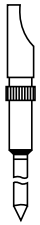
Terminal Type	XM0 Bulk Part Number PN	QTY	XM0 Bulk Part Number PN	QTY	XM0 Bulk Part Number PN	QTY	XM0 Bulk Part Number PN	QTY
Bifurcated	103005	5	103025	25	103100	100	103999	1000
Gold Cup	104005	5	104025	25	104100	100	104999	1000
Hook	105005	5	105025	25	105100	100	105999	1000
Pierced	106005	5	106025	25	106100	100	106999	1000
Turret	107005	5	107025	25	107100	100	107999	1000
Terminal Holder	109000	1	-		-		-	
20 AWG Wire	108020	5FT	108120	100 FT	108520	1000 FT	108920	5000 FT
22 AWG Wire	108022	5FT	108122	100 FT	108522	1000 FT	108922	5000 FT
24 AWG Wire	108024	5FT	108124	100 FT	108524	1000 FT	108924	5000 FT
26 AWG Wire	108026	5FT	108126	100 FT	108526	1000 FT	108926	5000 FT
Kit of Above	102000	1	102025	25	102100	100	102999	1000
Kit without Terminal Holder	101000	1	101025	25	101100	100	101999	1000



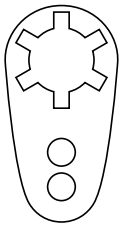
Bifurcated Terminal



Turret Terminal

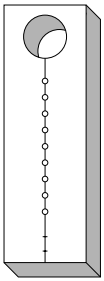


Gold Cup Terminal



Pierced Terminal

Hook Terminal



Terminal Holder

INFO

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

Axial Lead Components

CF - Resistor

DO - Diode

Dummy Component Ordering Information

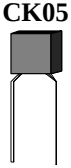
Size Inch Dia x L	Size Metric Dia x L	Lead Dia. Inch	Body	Bulk Part Number XA1	Qty	Tape & Reel Part Number XA1	Qty
.062” x .145”	1/8 Watt Size	.016”	Conformal	CF18	100	CF18T CF18A	Reel 5000 Ammo 5000
.090” X .250”	1/4 Watt Size	.025”	Conformal	CF14	100	CF14T CF14A	Reel 5000 Ammo 5000
.140” X .375”	1/2 Watt Size	.028”	Conformal	CF12	100	CF12T CF12A	Reel 2500 Ammo 2500
Glass Case .070” X .154”	1.78 X 3.9mm	.020”	0.5mm	DO35	100	DO35T	10,000
Molded Case .107” x .205”	2.72 x 5.2mm	.031”	0.8mm	DO41	100	DO41T	5000

Radial Lead Components

Dummy Component Ordering Information

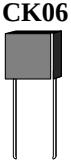
Lead Space Inch	Lead Space Metrix	Case Size Inch	Case Size Metric	Tube Part Number XR1	Qty	Bulk Part Number XR1	Qty	Tape & Reel Part Number XR1	Qty
.1”	2.54mm	.2” x .6” .2” x .8” .2” x 1.0”	5 x 15mm 5 x 20mm 5 x 26mm	RS6M RS8M RS10M	35-40 25-30 20-24	RS6 RS8 RS10	200 200 200	Call	Call
.2”	5.08mm	.2” SQ .3” SQ .2 x .31 .20 x .43	5.08mm 7.60mm 5 x 8mm 5 x 11mm	- - - -		CK05 CK06 DD2 -	100 100 100 100	CK05T CK06T DD2T EH5X11A	2000 1500 1000 1000

CK05



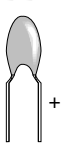
.2”

CK06



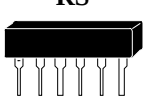
.2”

DD2



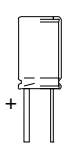
.2”

RS



.1”

EH



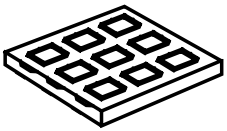
.2”

INFO

TopLine offers CF series low cost, commercial grade axial lead resistors with conformal coated case or mil-spec equivalent RC series carbon composition resistors in molded tubular case with flat ends.

TopLine®

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 **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)	Blank = Black (standard) A = Amber N = Natural

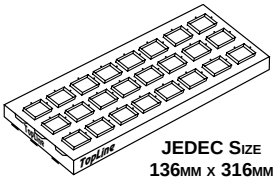
Waffle Tray Capacity (Example)*

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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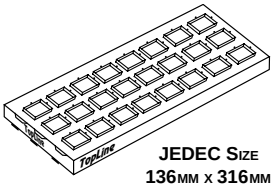
Tray Ordering Information

Component Size	Components per Tray	Matrix Row Column	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	429	13 x 33	BGATRAY6mm-13x33
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	260	10 x 26	BGATRAY9mm-10x26
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	160	8 x 20	BGATRAY14mm-8x20
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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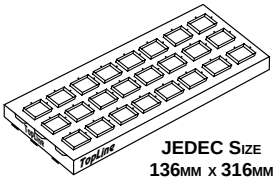
Tray Ordering Information

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				
5mm Sq.		360	12 x 30	LQTRAY5mm-12x30
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

926

Series

900	=	QFP Lead Template *
901	=	Multiple Flip Chip *
902	=	FC88 Laminate
903	=	FC317 Laminate
904	=	FC220 Laminate
905	=	CBGA Ceramic Substrates
906	=	FC96 Ceramic
907	=	FC96 Lamanate
908	=	FC48 Ceramic
909	=	FC48 Laminate
910	=	Beginner Throughhole
911	=	CCGA1089 Ceramic *
912	=	Recertification Mix Tech
913	=	Multilayer Throughhole DIP14
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	=	Lead Free Daisy Chain
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	=	Custom *
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 *

025

Specifications

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

9616	=	QFP160 *
9618	=	Rotational Test
9621	=	QFP208
9625	=	QFP256

* = Not Shown in Catalog

General Kit Information

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

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.

Gerber Data: (Accessory)
For solder paste stencil.

Lead-Free (Optional)
Available with Sn100 tin or gold over electroless nickel.

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 component.

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.

Standard Board Spec

Board Size: 5.5” x 4” (140mm x 100mm)

Layers: Double-sided

Board Material: FR4

Metalization: 1-ounce copper

Solder Mask: LPI (Liquid Photoimageable)

Silk Screen: White Ink

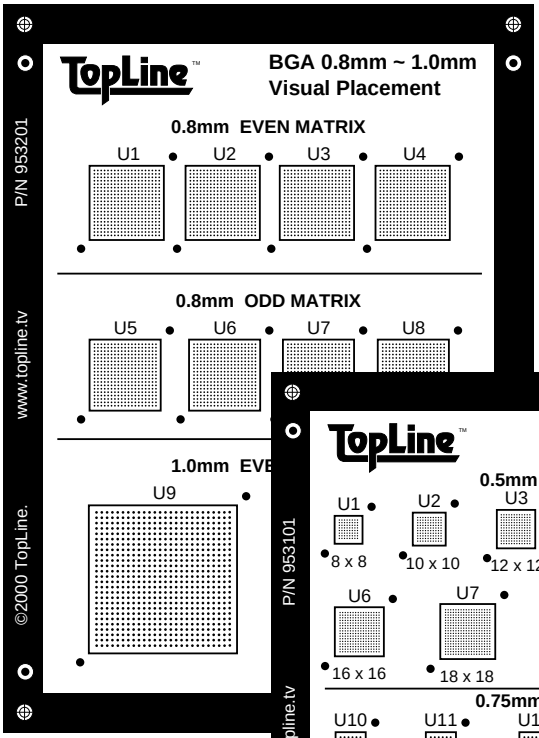
Tinning: HASL (Hot Air Solder Leveling)

Tooling Holes: .125” (3.18mm) 4-places

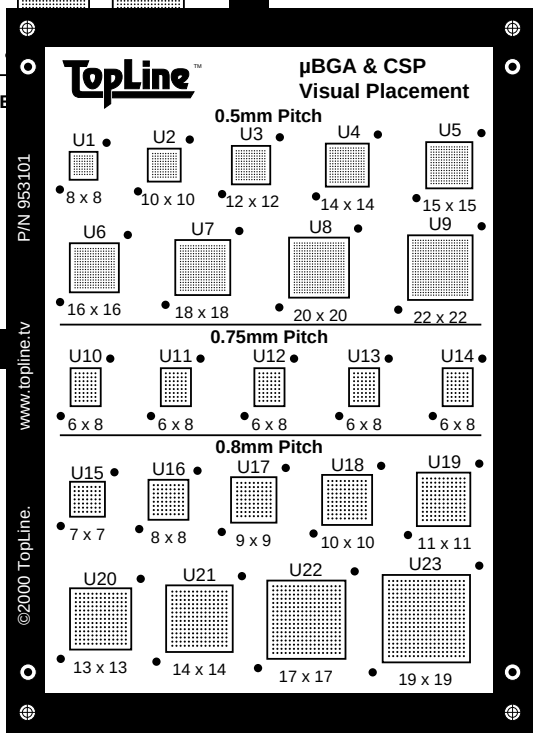
Stencil Information

In some cases, TopLine’s boards use 2-front sides, eliminating the need for separate “front” and “back” stencils.

Visual Placement
see thru Acrylic Board



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.

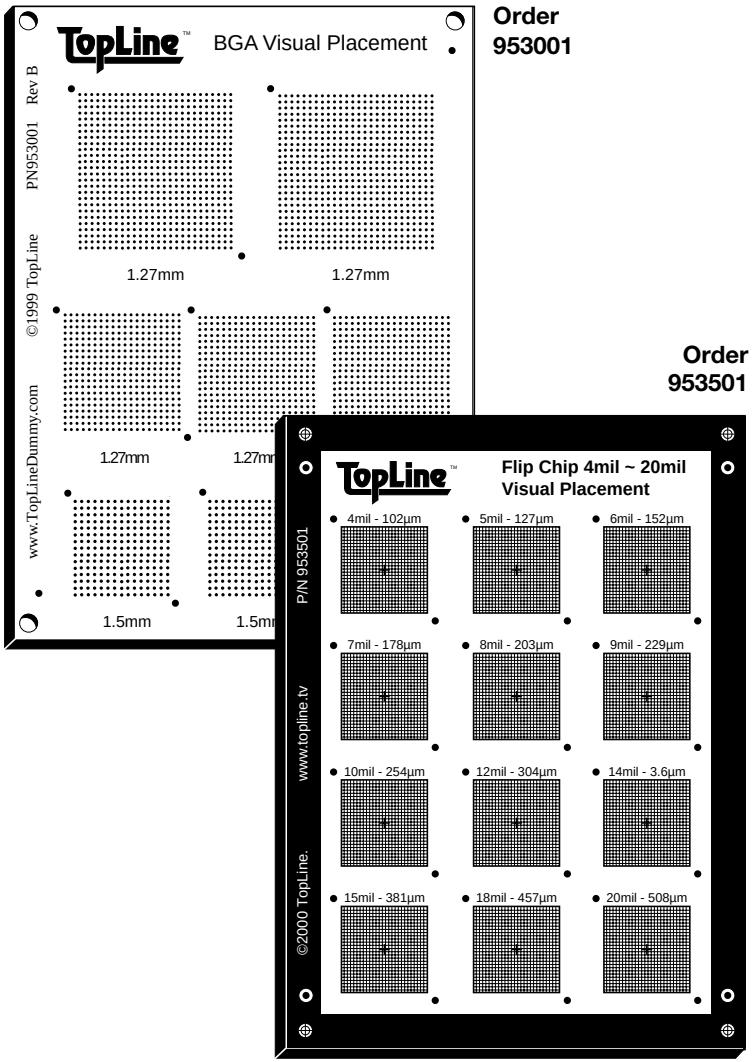
See Page 69 for Ordering Information

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



Order 953001

Order 953501

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

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

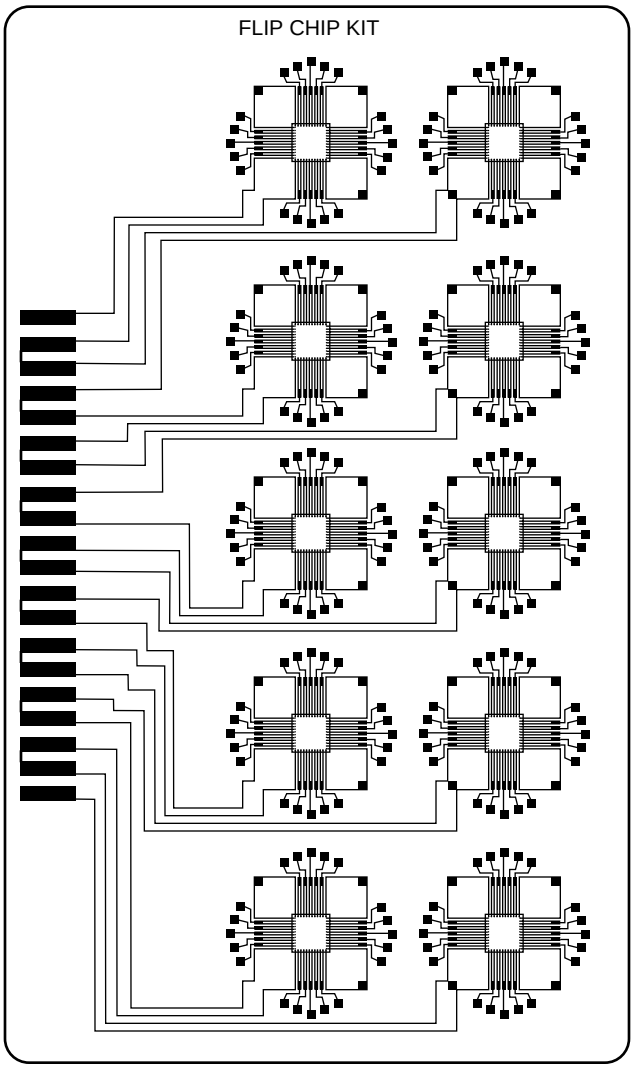
Choice of either sticky (preferred choice) or non-stick acrylic boards available.

Visual Placement Inspection Kit
see thru Acrylic Board

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

Plating Options:

Ni-Au Standard

Cu-OSP Available

Board Thickness:

.031” - 0.78mm Optional

.062” - 1.57mm Standard

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 908000 1 Kit	Order Number 909000 1 Kit
Laminate FR4 Board	1	1	1	1	1	0	1
Ceramic Board	0	0	0	0	0	1	0
FC48 457µm	0	0	0	0	0	25	25
FC88 204µm	0	36	0	0	0	0	0
FC96 457µm	0	0	0	0	9	0	0
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.
904001 is back side of 902001 board.
908001 is ceramic substrate for FC48.

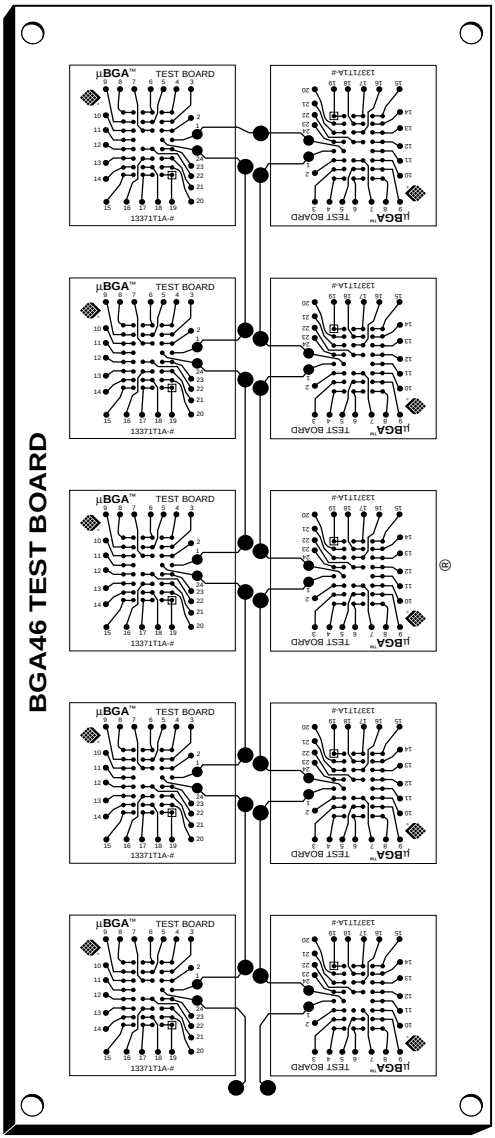
Spare Parts

Board Only	*Order Nbr*
FC176 204µm	*901001 FR4*
FC88 204µm	*902001 FR4*
FC317 254µm	*903001 FR4*
FC220 204µm	*904001 FR4*
FC96 457µm	*907001 FR4*
FC48 457µm	*908001 Ceramic*
FC48 457µm	*909001 FR4*

Optional Accessories

Board Type	*Placement*	*Gerber*
FC176	*901004*	*901005*
FC88	*902004*	*902005*
FC317	*903004*	*903005*
FC220	*904004*	*904005*
FC96	*907004*	*907005*
FC48	*909004*	*909005*

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)

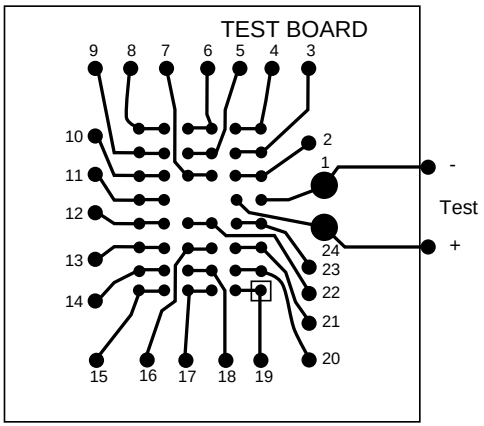
Features

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

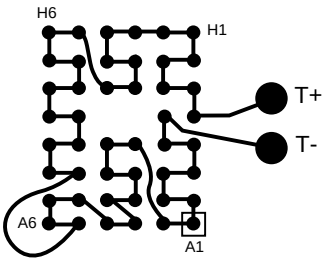
BGA46
0.75mm Test kit

Kit Ordering Information

Component	Pitch	Manual Assembly: Order 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

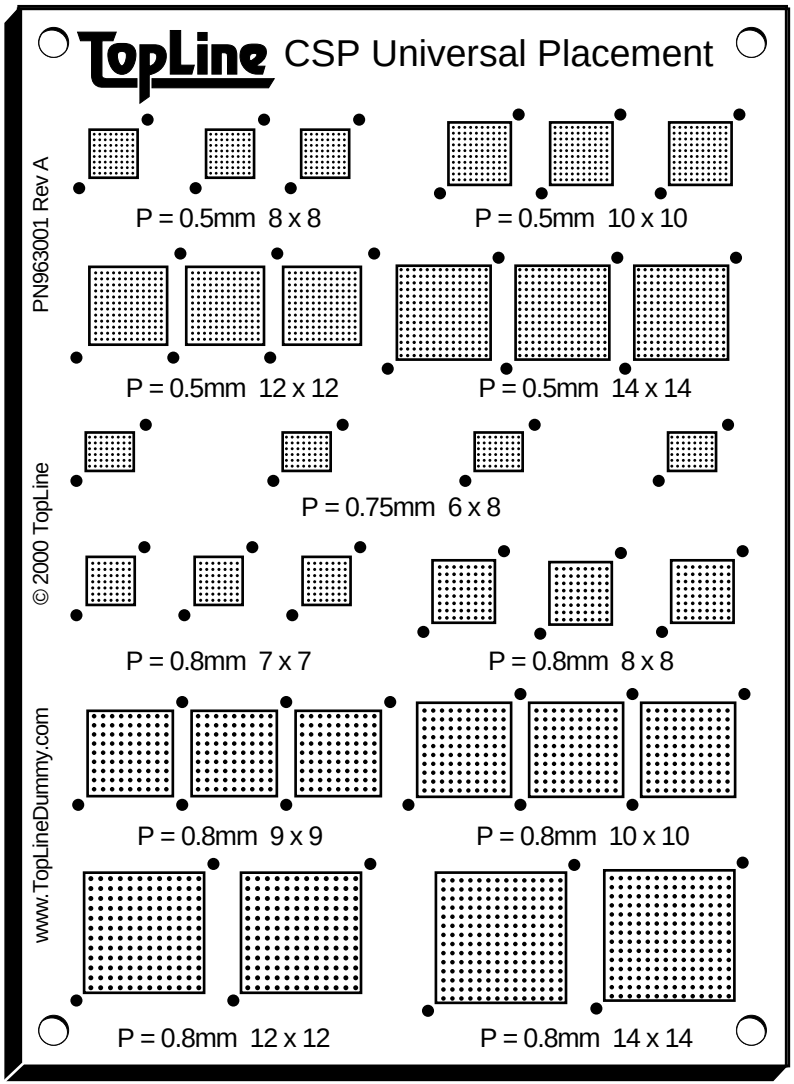


After Mounting to Test Board

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File ***Order Number*** **921004**	***PC Board*** ***Order Number*** **921001**
Solder Paste Artwork Gerber File ***Order Number*** **921005**	

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

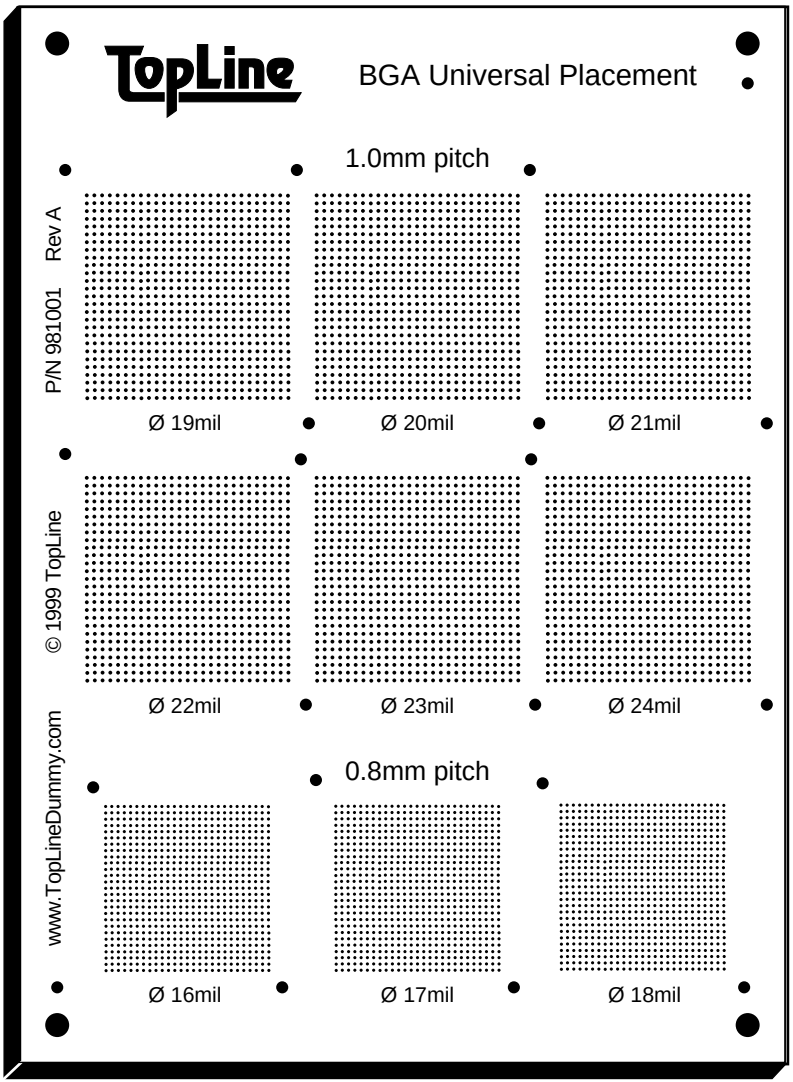
Kit Ordering Information

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

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File ***Order Number*** **963004** ***Solder Paste Artwork Gerber File*** ***Order Number*** **963005**	***PC Board*** ***Order Number*** **963001**

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

Hot Air Solder Leveling

LPI Solder Mask

FR4 Board .062”

Double Sided

Tooling Holes

Fiducial Marks

Universal BGA Kit 0.8/1.0mm Pitch

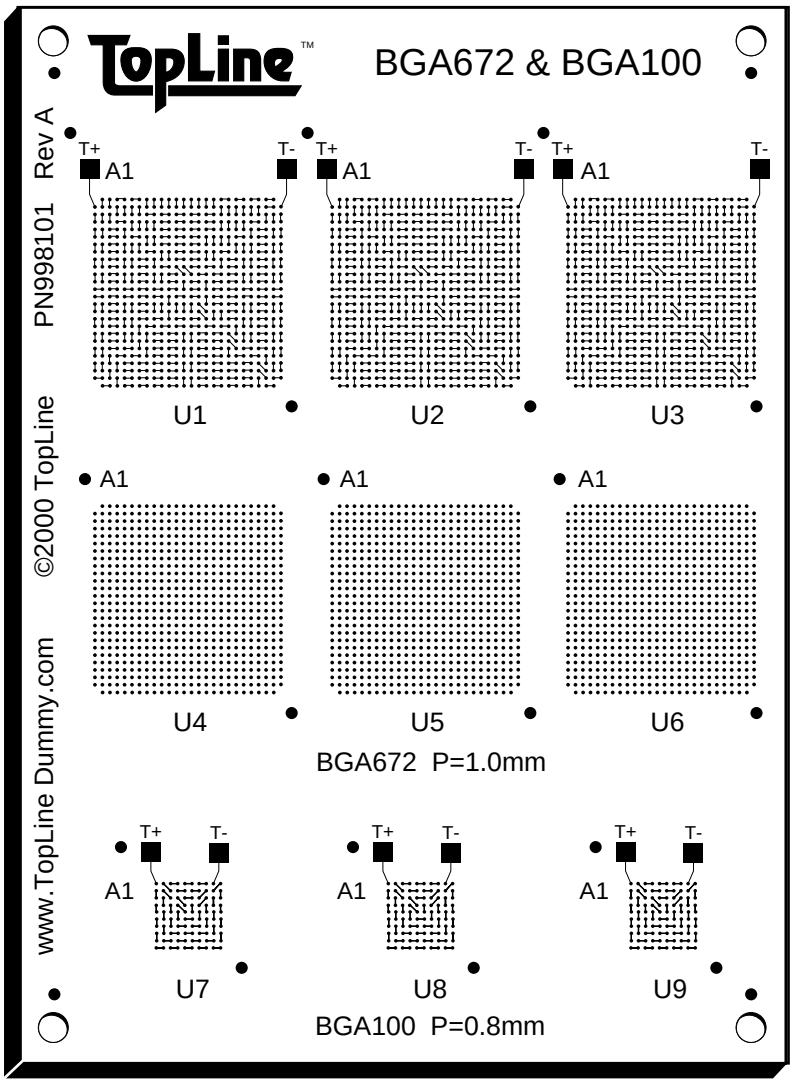
Kit Ordering Information

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

Optional Accessories

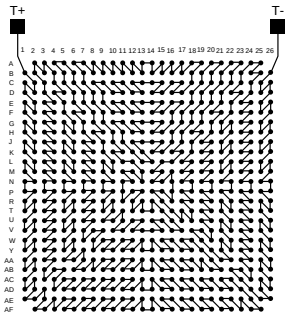
Parts Placement Data X,Y,Theta ASCII File ***Order Number*** **981004** ***Solder Paste Artwork Gerber File*** ***Order Number*** **981005**	***PC Board*** ***Order Number*** **981001**

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

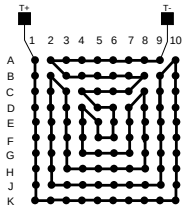


Actual Size 4” x 5.5 (100 x 140mm)

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

Hot Air Solder Leveling
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

		Manual Assembly		Machine Run		
Component	Pitch	Order Number 998102 1 Kit	Order Number 998110 10 Kits	Order Number 998125 25 Kits	Order Number 998150 50 Kits	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

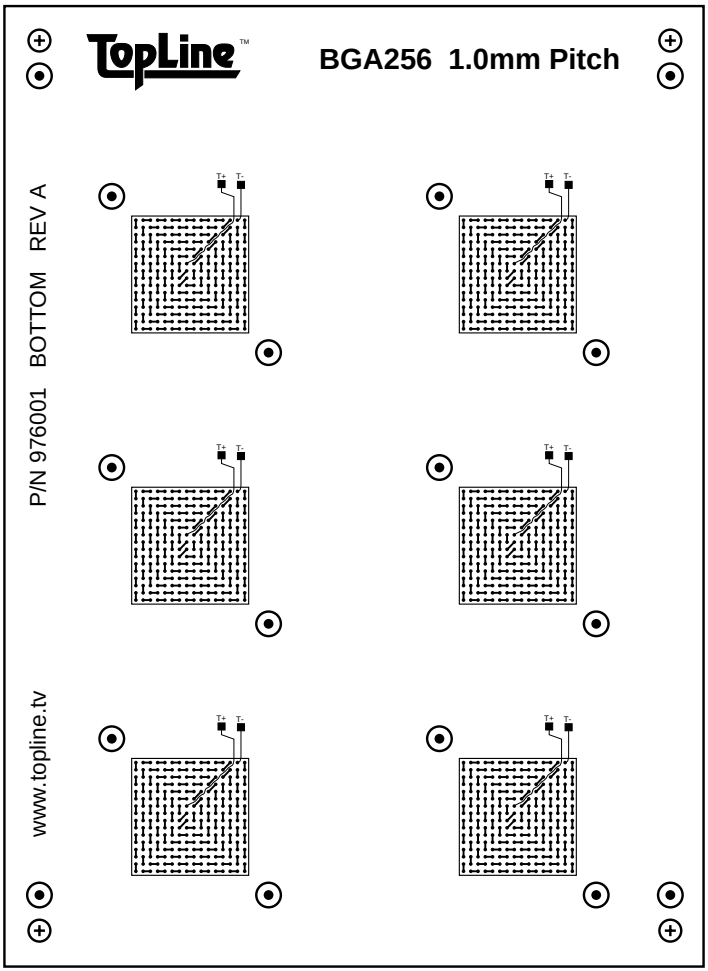
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **998104**

Solder Paste Artwork Gerber File
Order Number **998105**

PC Board
Order Number **998101**

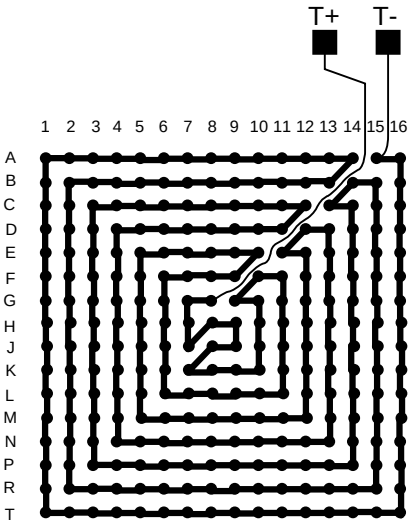
BGA256
Daisy Chain Kit
1.0mm Pitch



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

Optional Accessories

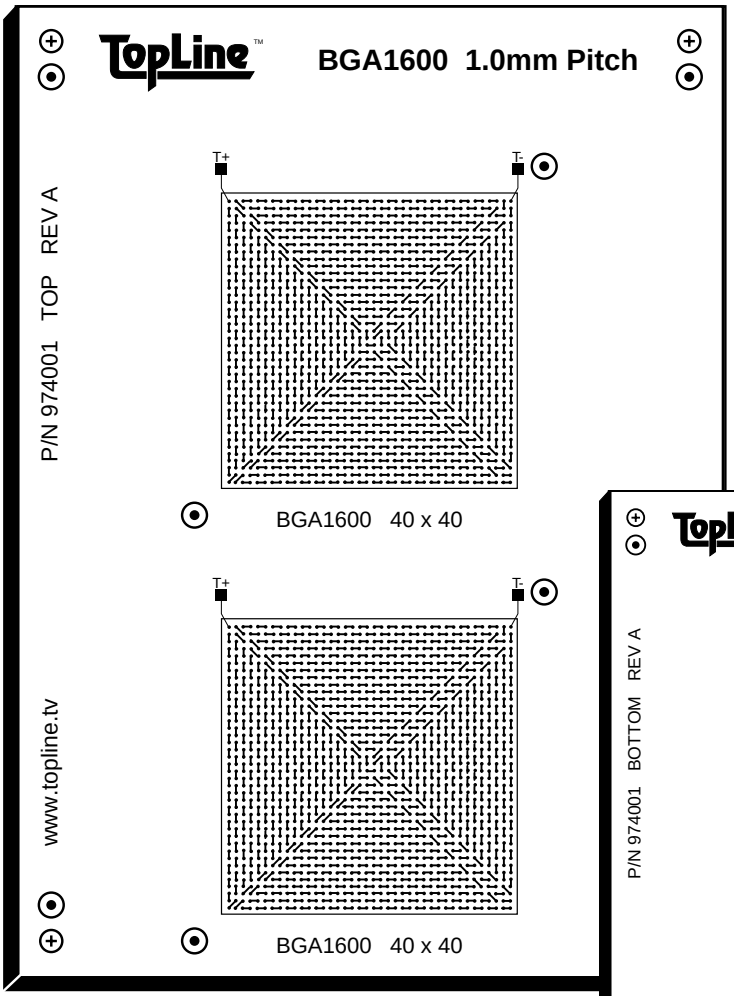
Parts Placement Data
X,Y,Theta ASCII File
Order Number **976004**

Solder Paste Artwork
Gerber File
Order Number **976005**

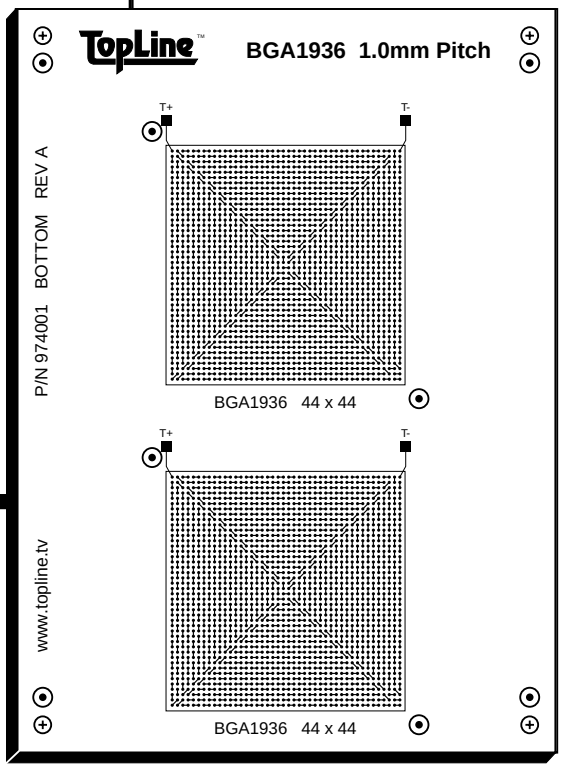
PC Board
Order Number **976001**

BGA1600/1936
Daisy Chain Kit
1.0mm Pitch

Top Side Board



Bottom Side Board



Actual Size: 4” x 5.5” (100 x 140mm)

BGA1600/1936
Daisy Chain Kit
1.0mm Pitch

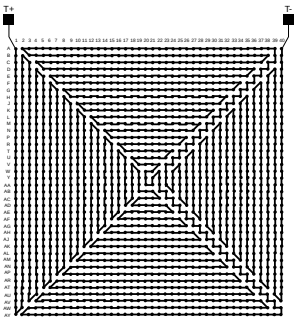
Kit Ordering Information

Component	Manual Assembly: Order Number 974000 1 Kit	Manual Assembly: Order Number 974600 1 Kit	Manual Assembly: Order Number 974900 1 Kit	Machine Run: Order Number 974012 12 Kits	Machine Run: Order Number 974612 12 Kits	Machine Run: Order Number 974912 12 Kits
Board	1	1	1	12	12	12
BGA1600 1.0mm	2	2	0	24	24	0
BGA1936 1.0mm	2	0	2	24	0	24

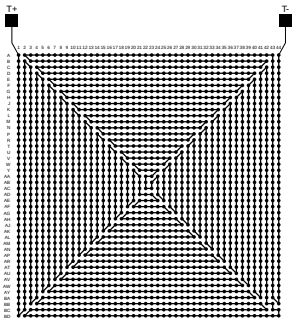
Select the kit that matches your requirements

Soldermask Defined Pads

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



BGA1600T1.0-DC409
After Mounting



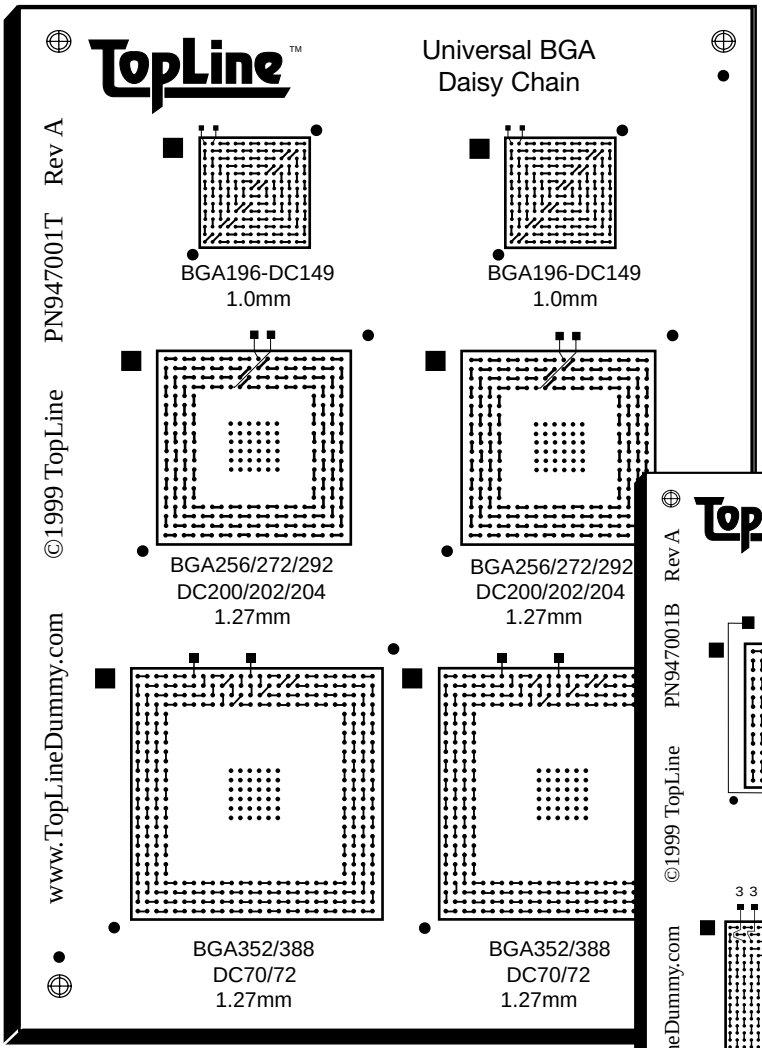
BGA1936T1.0-DC449
After Mounting

Optional Accessories

Parts Placement Data ***X,Y,Theta ASCII File*** ***Order Number*** **974004** ***Solder Paste Artwork*** ***Gerber File*** ***Order Number*** **974005**	***PC Board*** ***Order Number*** **974001**

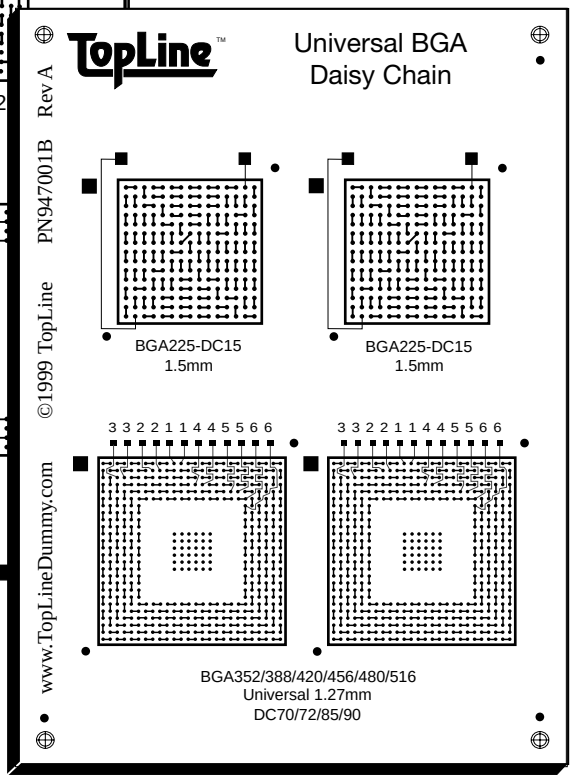
Universal BGA Daisy Chain Kit 1.0/1.27mm Pitch

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

Kit Ordering Information

		Manual Assembly		Machine Run		
Component	Pitch	Order Number 947000 1 Kit	Order Number 947010 10 Kits	Order Number 947025 25 Kits	Order Number 947050 50 Kits	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

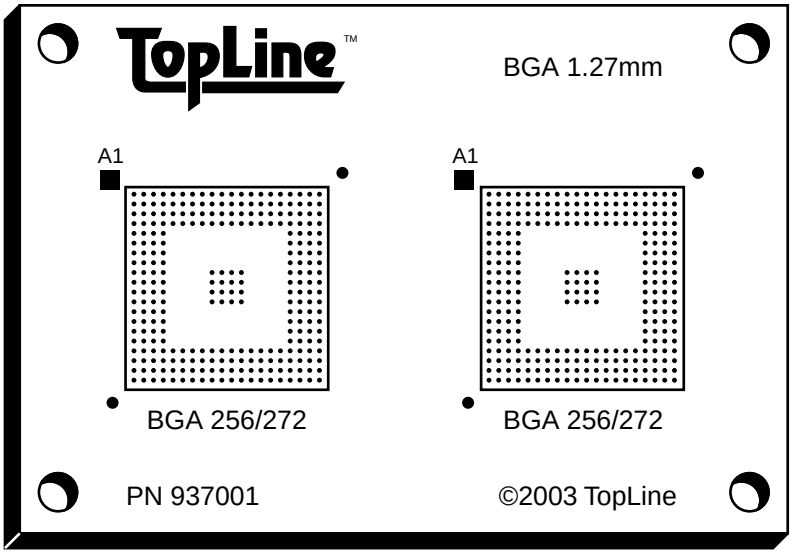
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **947004**

Solder Paste Artwork Gerber File
Order Number **947005**

PC Board Order Number **947001**

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

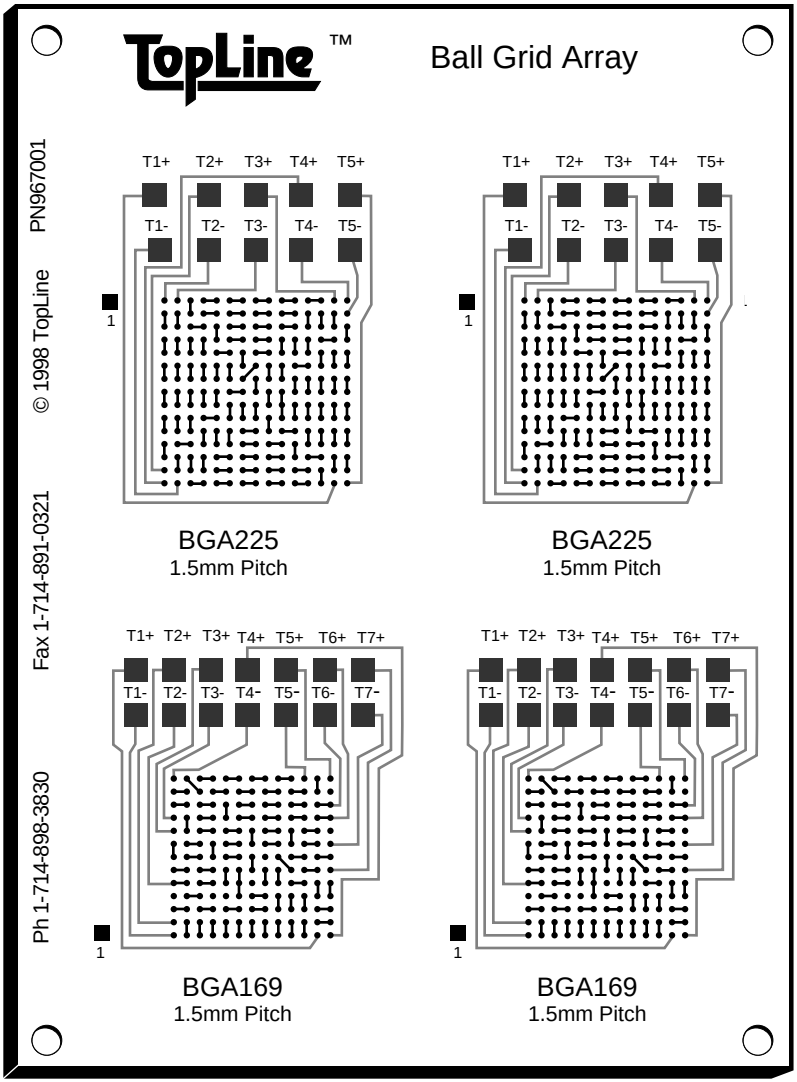
Kit Ordering Information

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

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File Order Number **937004** ***Solder Paste Artwork Gerber File Order Number*** **937005**	***PC Board Order Number*** **937001**

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.

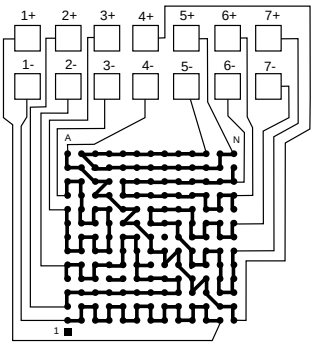
Features

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

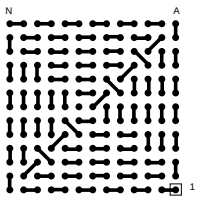
BGA169 & BGA225
with Daisy Chain Test
1.5mm Pitch

Kit Ordering Information

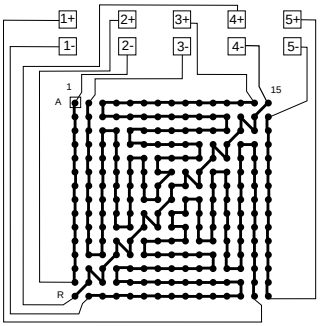
Component	Pitch	Manual Assembly: Order Number 967000 1 Kit	Machine Run: Order Number 967012 12 Kits	Order Number 967025 25 Kits	Order Number 967050 50 Kits	Order Number 967100 100 Kits
Board		1	12	25	50	100
BGA 169	1.5mm	2	25	50	100	200
BGA 225	1.5mm	2	25	50	100	200



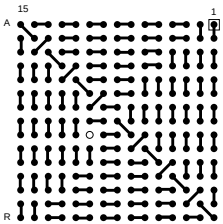
BGA169
After Mounting To Test Board



BGA169
View of Solder Balls



BGA225
After Mounting To Test Board

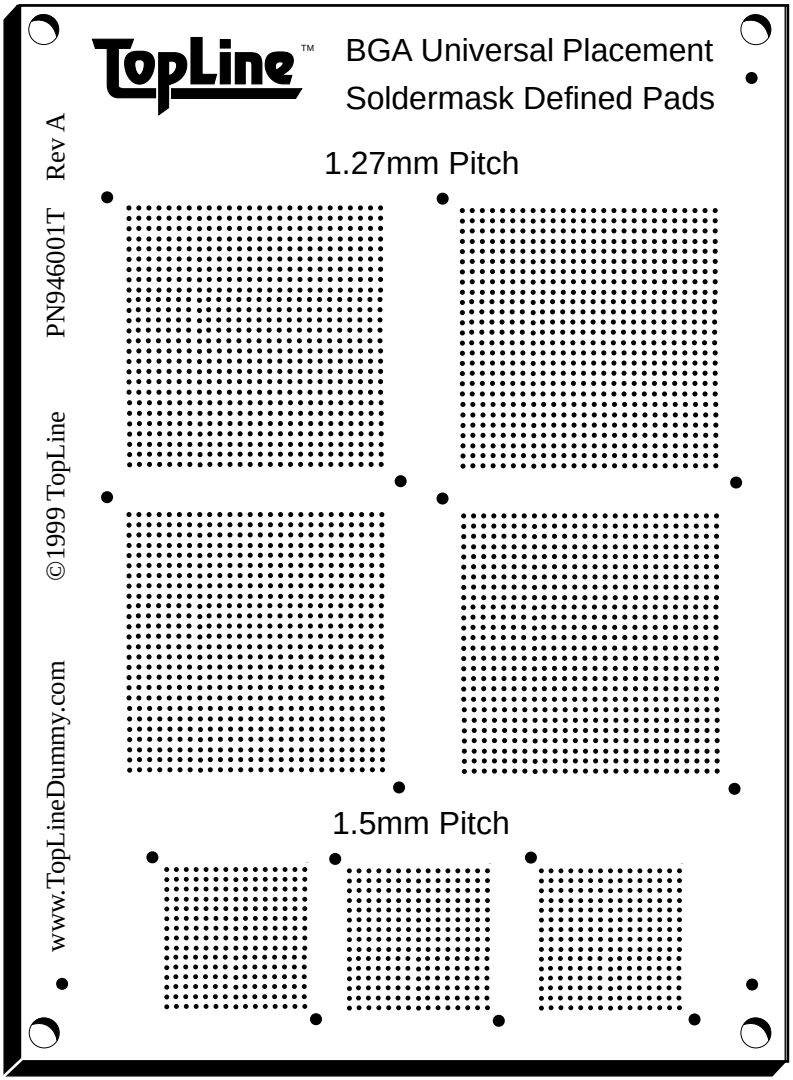


BGA225
View of Solder Balls

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File ***Order Number*** **967004**	***PC Board*** ***Order Number*** **967001**
Solder Paste Artwork Gerber File ***Order Number*** **967005**	

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
23mil	30mil	1.27mm

Top Side-
Soldermask defined pads

Bottom Side-
Etched defined pads

Features

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

Universal BGA Kit
1.27mm & 1.5mm Pitch

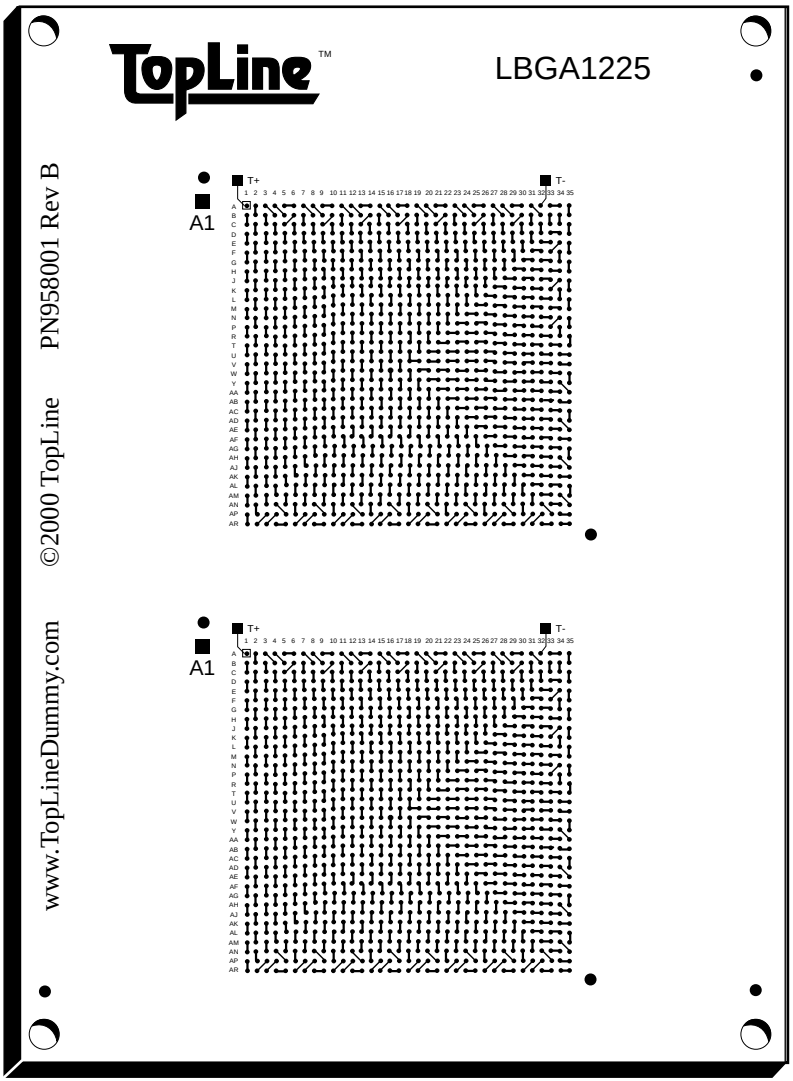
Kit Ordering Information

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

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File ***Order Number*** **946004** ***Solder Paste Artwork Gerber File*** ***Order Number*** **946005**	***PC Board*** ***Order Number*** **946001**

LBGA1225
Daisy Chain Kit
1.27mm Pitch

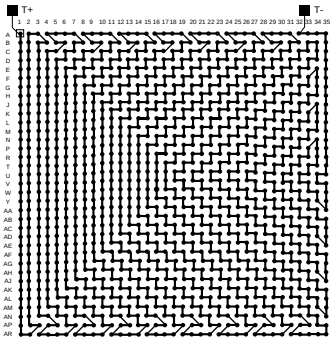


Actual Size: 4” x 5.5” (100 x 140mm)

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

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

LBGA1225
Daisy Chain Kit
1.27mm Pitch

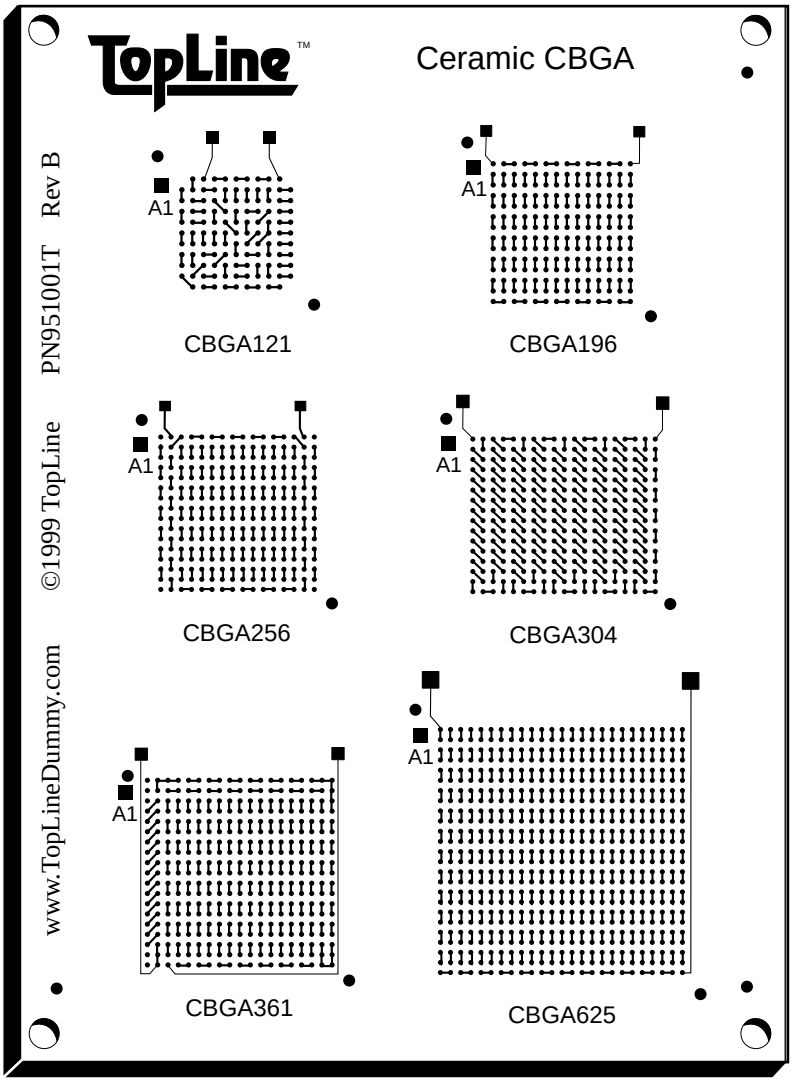
Kit Ordering Information

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

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File *Order Number* **958004**	*PC Board* *Order Number* **958001**
Solder Paste Artwork Gerber File *Order Number* **958005**	

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

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

Ceramic CBGA Kit
1.27mm Pitch

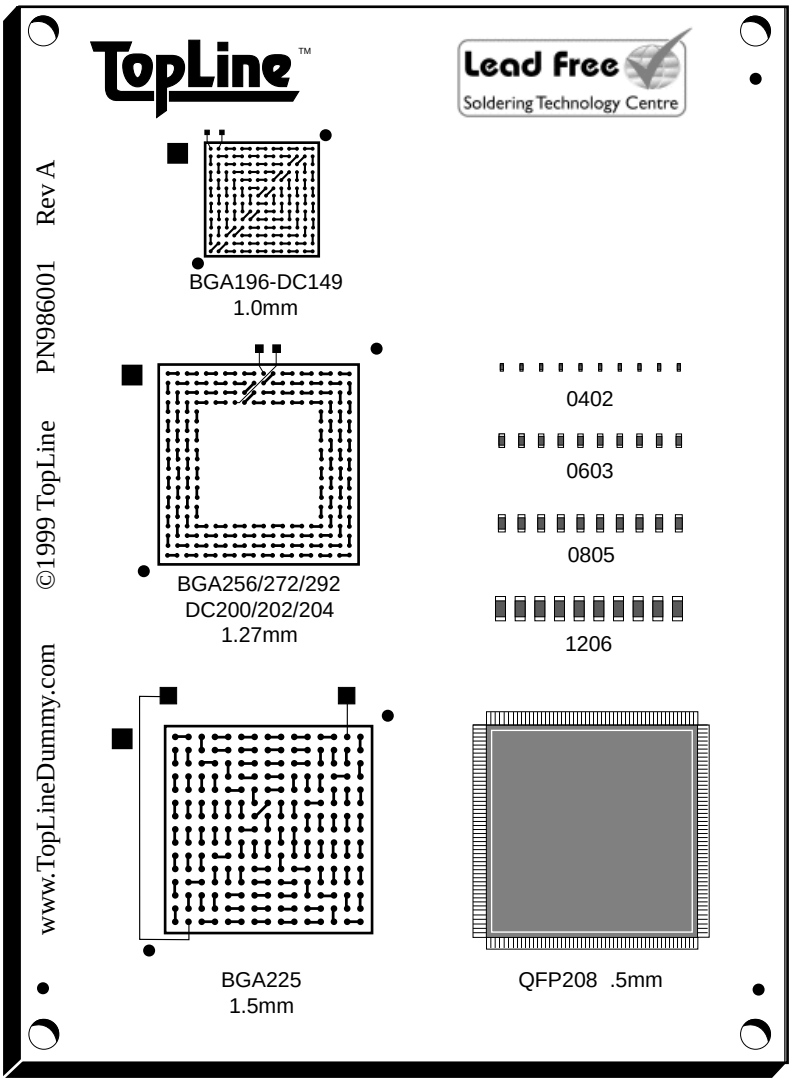
Kit Ordering Information

		Manual Assembly		Machine Run	
Component	Pitch	Order Number 951000 1 Kit	Order Number 951010 10 Kits	Order Number 951012 12 Kits	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

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File Order Number **951004 B** ***Solder Paste Artwork Gerber File Order Number*** **951005 B**	***PC Board Order Number*** **951001 B**

Lead Free Kit
Multicomponents



Actual Size 4” x 5.5 (100 x 140mm)

Practice Lead free assembly using fine-pitch components.

PC Board Features

Tin Plated (100% Sn)
LPI Solder Mask
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks

All kits include free Gerber file for stencil. Parts placement data included for machine run kits.

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
LBGA196	1.0mm	1	10	24	50	100
LBGA225	1.5mm	1	10	24	50	100
LBGA256	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
Gerber File		1	1	1	1	1
Parts Placement		0	0	1	1	1

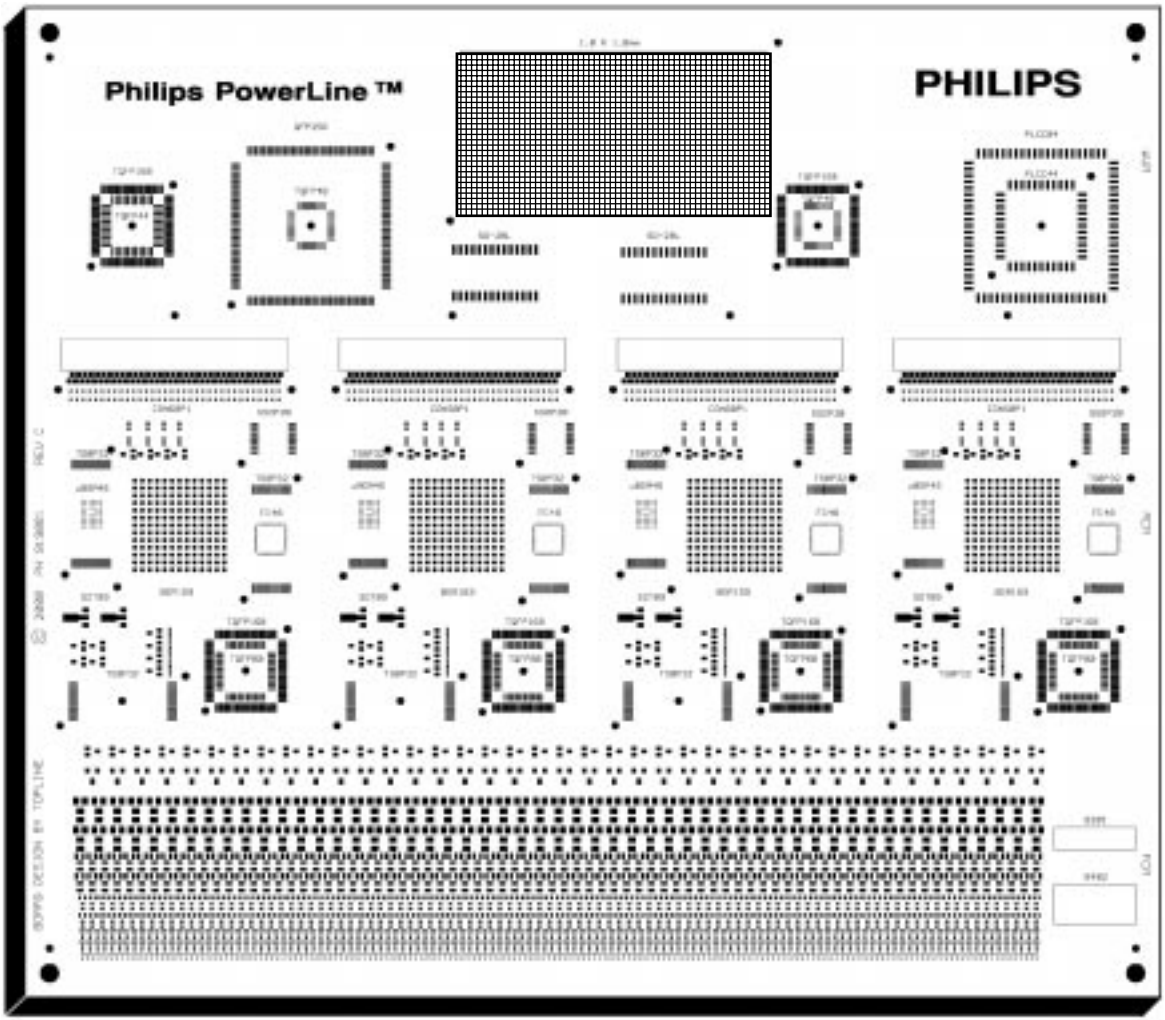
Optional Accessories

Parts Placement Data
X,Y,Theta ASCII File
Order Number **986004**

Solder Paste Artwork
Gerber File
Order Number **986005**

PC Board
Order Number **986001**

Large Machine Run Kit



Actual Size: 9” x 8” (230mm x 200mm)

Features

Single Sided
Black LPI Soldermask
Very High Density
0201 Chips
0.3mm Pitch TQFP

Large Machine Run Kit

Kit Ordering Information

Component	Per Board	Pitch	Machine Run Order Number 919010 10 Kit	Order Number 919025 25 Kits	Order Number 919050 50 Kits	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

This kit is for serious machine users.
It has everything.

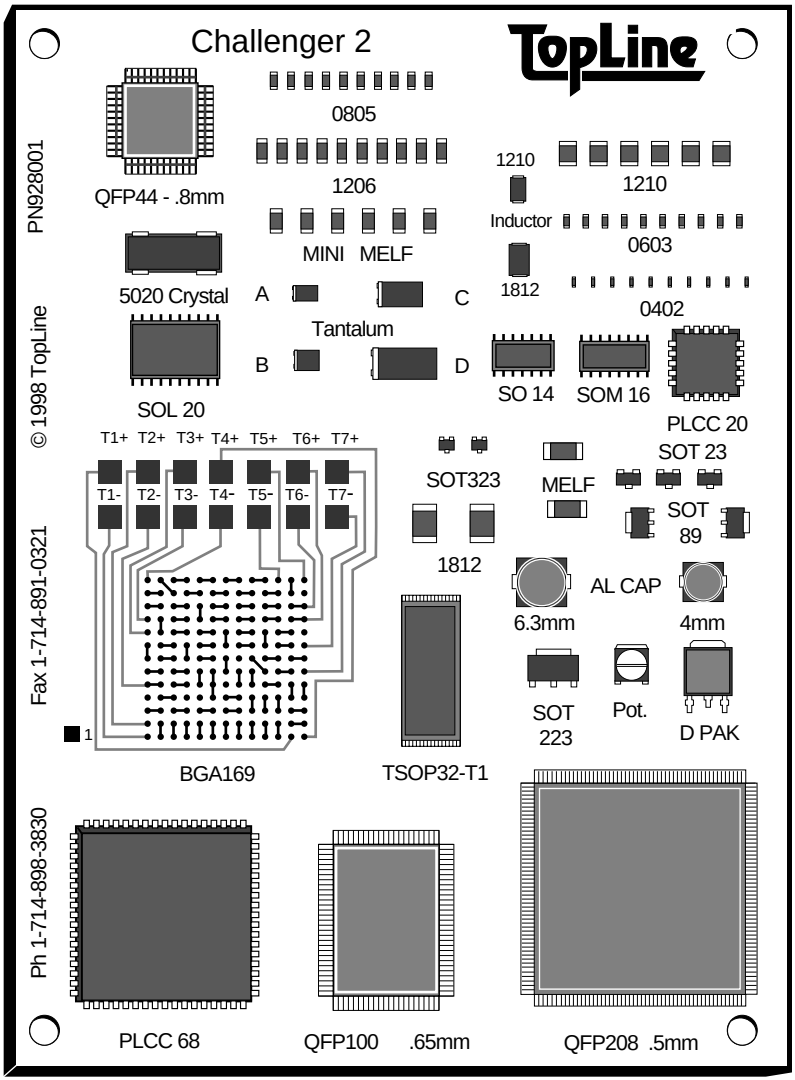
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **919004**

Solder Paste Artwork Gerber File
Order Number **919005**

PC Board
Order Number **919001**

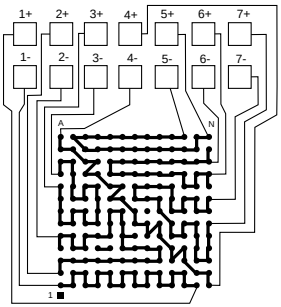
Challenger 2 Kit
Intermediate SMD



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

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

Challenger 2 Kit
Intermediate SMD

Kit Ordering Information

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

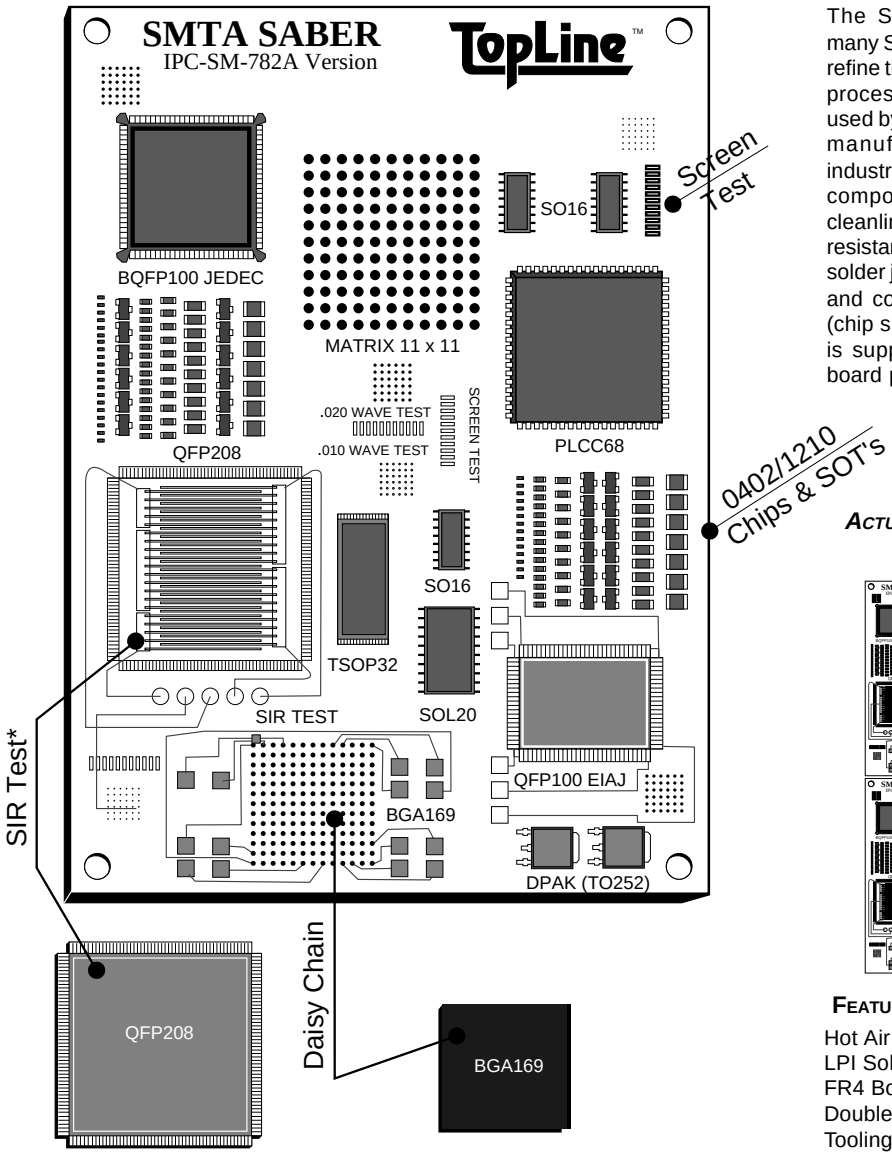
Optional Accessories

Parts Placement Data
X,Y,Theta ASCII File
Order Number **928004**

Solder Paste Artwork
Gerber File
Order Number **928005**

PC Board
Order Number **928001**

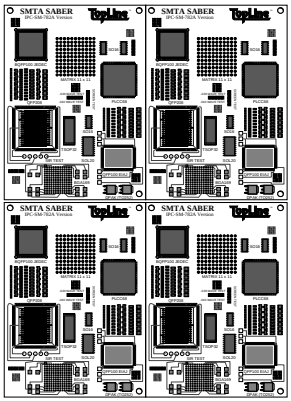
SABER 4-Board Array
Advanced Mixed Technology



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)



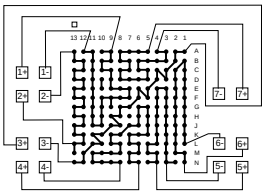
Features

Hot Air Solder Leveling
LPI Solder
FR4 Board .062”
Double Sided
Tooling Holes .125”
Fiducial Marks
4-Board Routed Array

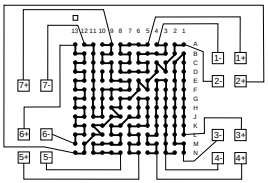
SABER 4-BOARD ARRAY ADVANCED MIXED TECHNOLOGY

KIT ORDERING INFORMATION

		MANUAL ASSEMBLY		MACHINE RUN		
COMPONENT	PITCH	ORDER NUMBER 950000 4 KITS	ORDER NUMBER 950012 12 KITS	ORDER NUMBER 950024 24 KITS	ORDER NUMBER 950048 48 KITS	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 Chip	-	100	500	1000	2000	5000
0603 Chip	-	100	500	1000	2000	5000
0805 Chip	-	100	500	1000	2000	5000
1206 Chip	-	100	250	1000	2000	5000
1210 Chip	-	100	200	500	1000	1000
DIP14 ~ 20	100mil	8	25	50	100	200



BGA AFTER MOUNTING (BACK SIDE)



BGA AFTER MOUNTING (TOP SIDE)

OPTIONAL ACCESSORIES

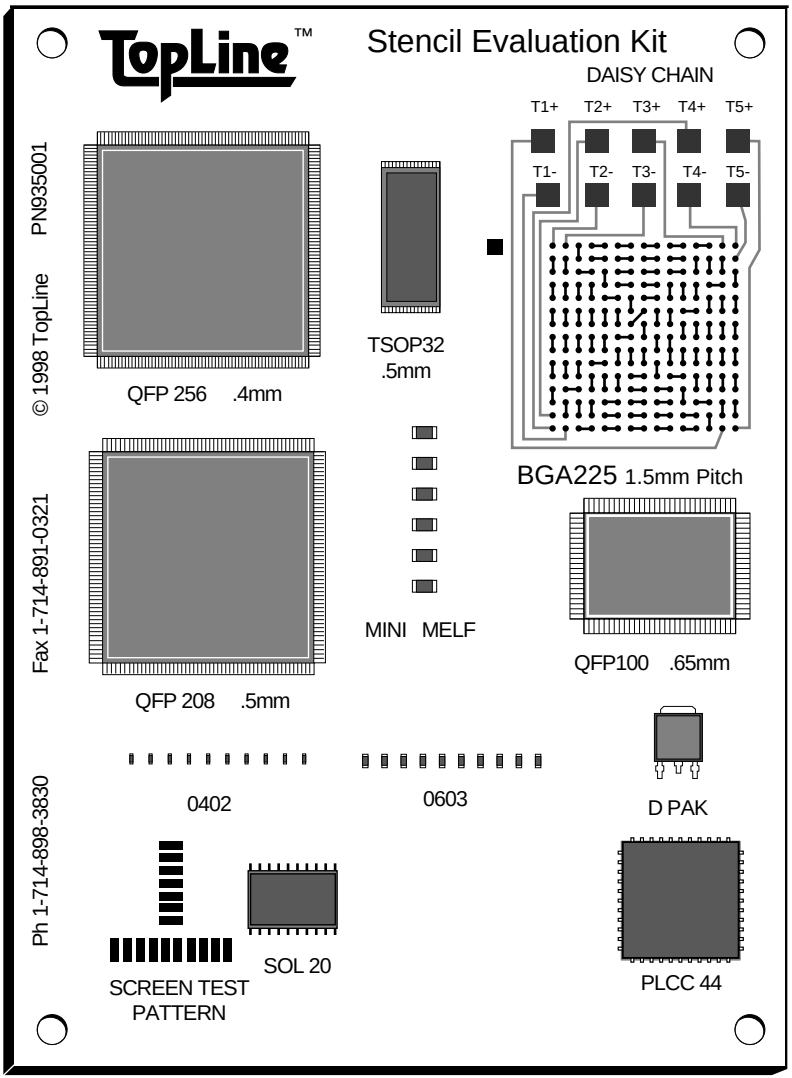
PARTS PLACEMENT DATA X,Y,THETA ASCII FILE
ORDER NUMBER **950004**

SOLDER PASTE ARTWORK GERBER FILE
ORDER NUMBER **950005**

4-BOARD PANELIZED ARRAY
ORDER NUMBER **950001**

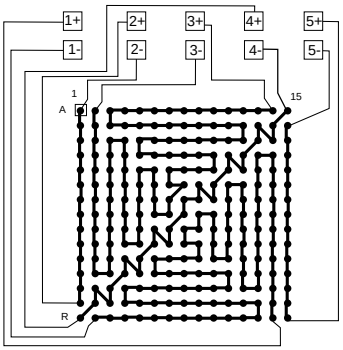
SINGLE BOARD NON-PANEL
ORDER NUMBER **950003**

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

Hot Air Solder Leveling
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	2500	500	1000
mini Melf		6	60	150	300	600

LQFP168 0.3mm pitch no longer available

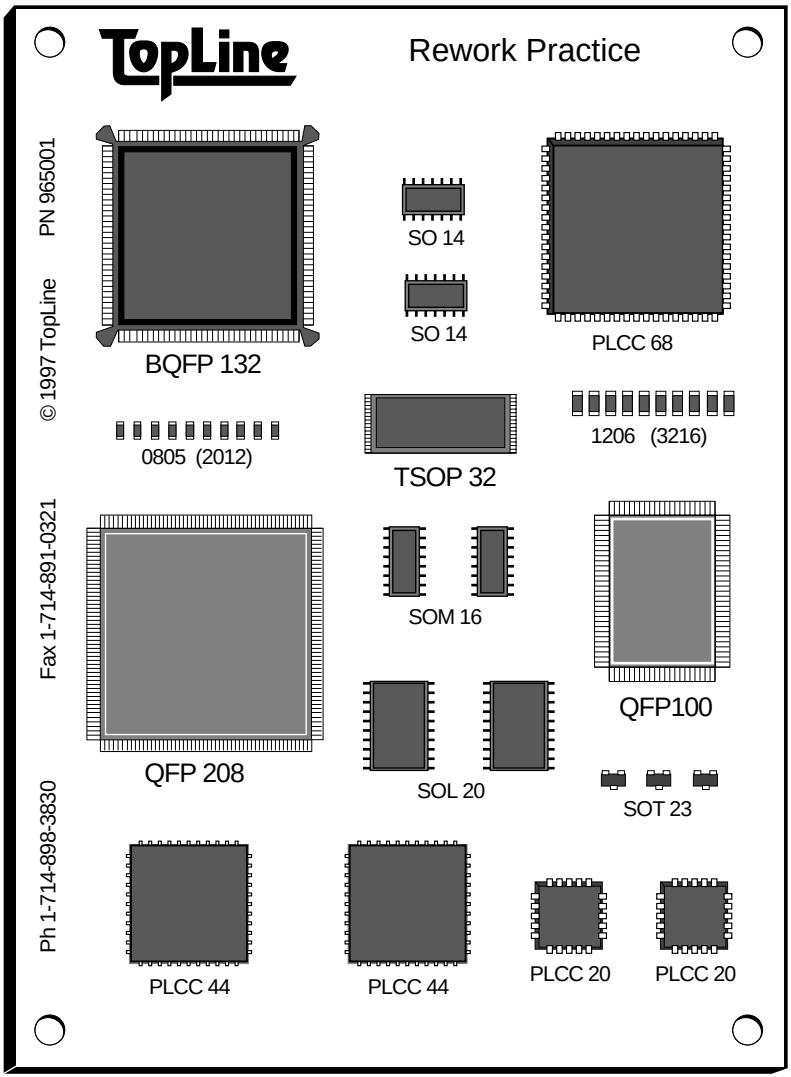
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **935004**

Solder Paste Artwork Gerber File
Order Number **935005**

PC Board
Order Number **935001**

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

Hot Air Solder Leveling
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

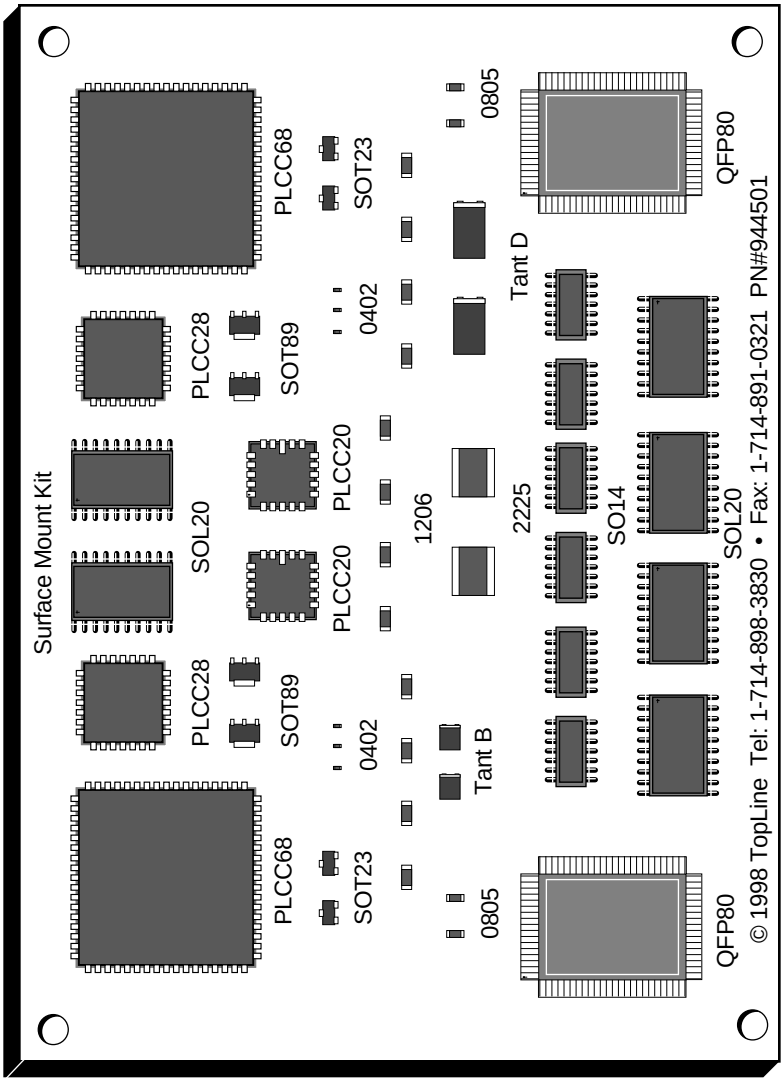
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **965004**

Solder Paste Artwork Gerber File
Order Number **965005**

PC Board Order Number **965001**

Rework 2 Practice Kit



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

- Hot Air Solder Leveling
- LPI Solder Mask
- FR4 Board .062”
- Double Sided
- Tooling Holes .125”
- Fiducial Marks

Rework 2 Practice Kit

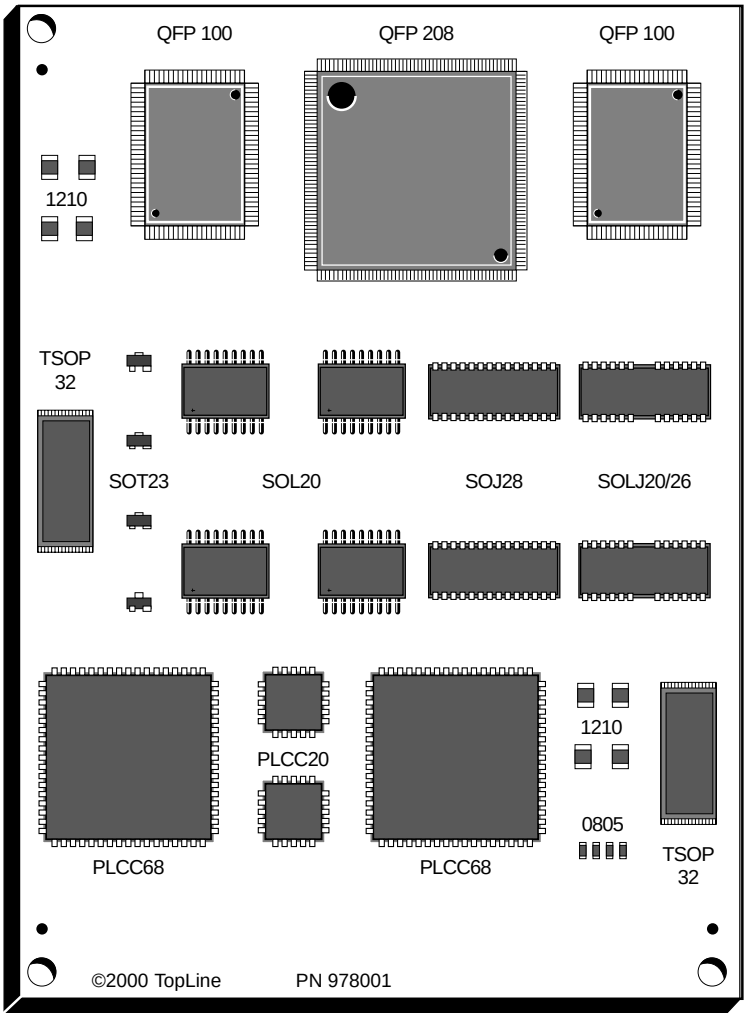
Kit Ordering Information

Component	Pitch	Manual Assembly: Order Number 944500 1 Kit	Order Number 944510 10 Kits	Order Number 944525 25 Kits	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	500
0805 Chips		8	80	200	500
1206 Chips		12	120	300	1000
2225 Cap		2	20	50	100
Tantalum 3528	B-Case	2	20	50	250
Tantalum 7343	D-Case	2	20	50	100
SOT23		4	40	100	500
SOT89		4	40	100	200

Optional Accessories

Solder Paste Artwork Gerber File Order Numberr **944505**	***PC Board Order Number*** **944501**

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

- Hot Air Solder Leveling
- 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	Manual Assembly: 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

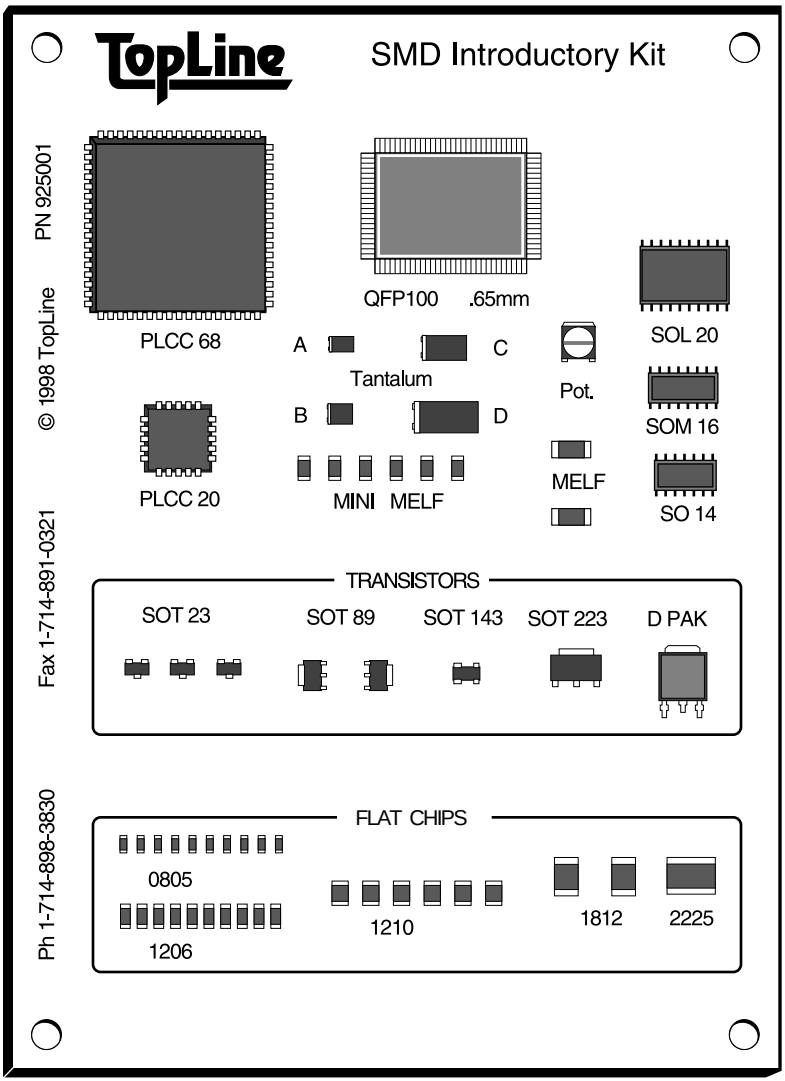
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **978004**

Solder Paste Artwork Gerber File
Order Number **978005**

PC Board
Order Number **978001**

SMD Introductory Kit



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

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

Features

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

SMD Introductory Kit

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	100	50	100
SOM16	50mils	1	10	100	50	100
SOL20	50mils	1	10	50	50	100
PLCC20	50mils	1	10	50	50	100
PLCC68	50mils	1	10	25	50	100
SOT23		4	30	250	500	500
SOT89		4	20	100	100	200
SOT143		10	10	100	100	100
SOT223		10	10	100	100	100
DPAK		1	10	50	100	100
Tantalum-A		2	10	100	100	250
Tantalum-B		2	10	100	100	250
Tantalum-C		2	10	100	100	100
Tantalum-D		2	10	100	100	100
MELF		10	20	250	250	250
mini-MELF		10	100	500	500	500
Potentiometer		1	10	100	100	100
0805 Chip		10	100	500	500	500
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	100	100	100

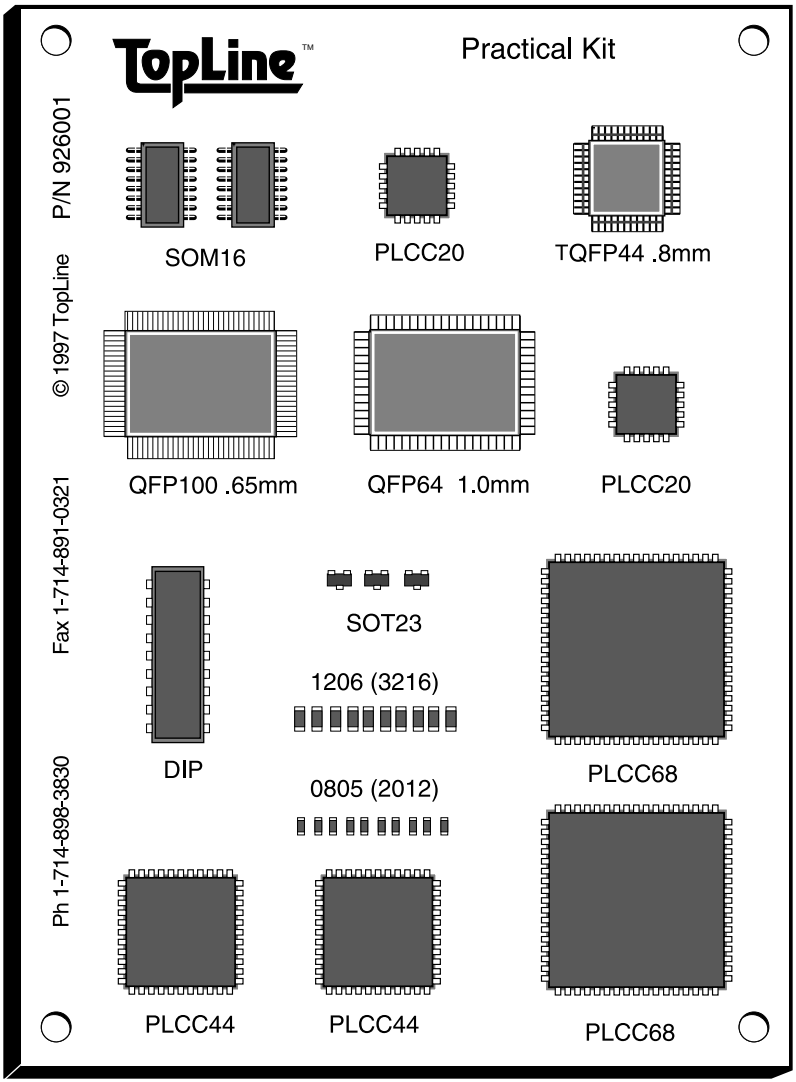
Optional Accessories

Parts Placement Data
X,Y,Theta ASCII File
Order Number **925004**

Solder Paste Artwork
Gerber File
Order Number **925005**

PC Board
Order Number **925001**

Practical Mixed Technology Kit



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

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

Actual Size: 4” x 5.5” (100 x 140mm)

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
TQFP44	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

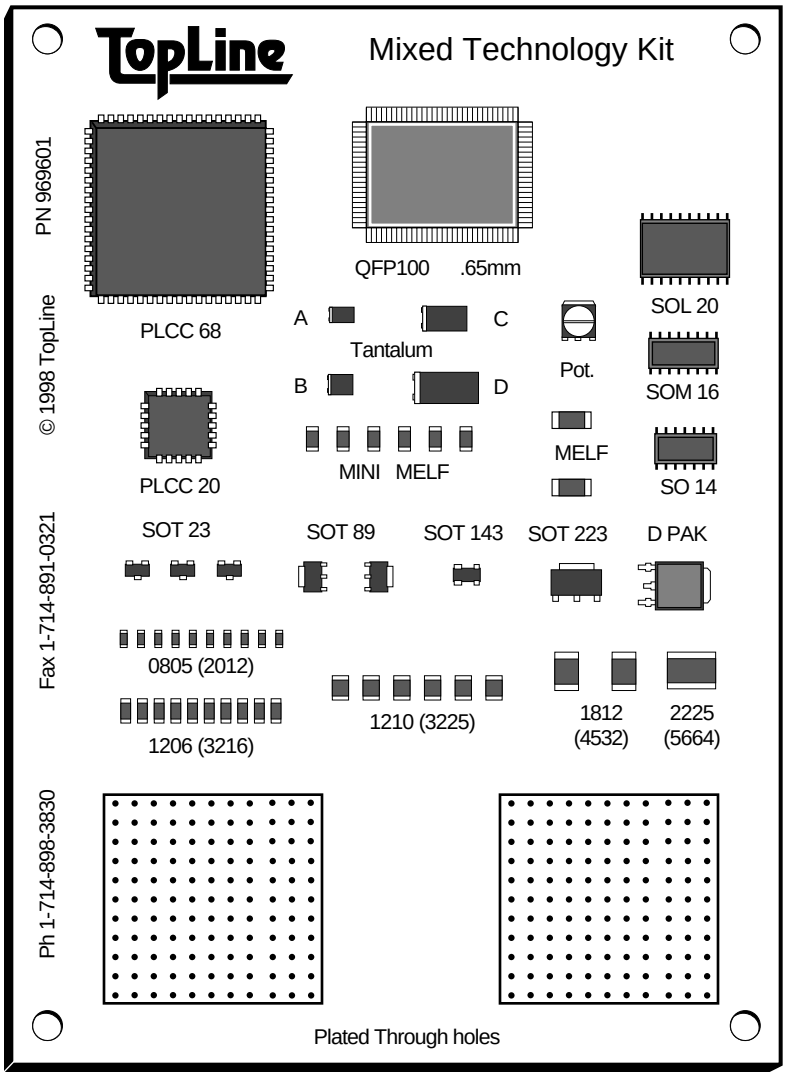
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **926004**

Solder Paste Artwork Gerber File
Order Number **926005**

PC Board
Order Number **926001**

Mixed Technology 1 Kit



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

Features

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

Actual Size: 4” x 5.5” (100 x 140mm)

Mixed Technology 1 Kit

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	250	500	500
SOT143		1	10	25	50	100
SOT223		1	10	25	50	100
DPAK		1	10	25	50	100
Tantalum-A		1	10	25	50	250
Tantalum-B		1	10	25	50	250
Tantalum-C		1	10	25	50	100
Tantalum-D		1	10	25	50	100
MELF		2	20	50	100	250
mini-MELF		6	60	500	500	500
Potentiometer		1	10	25	50	100
0805 Chip		10	100	500	500	500
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	100	100	100

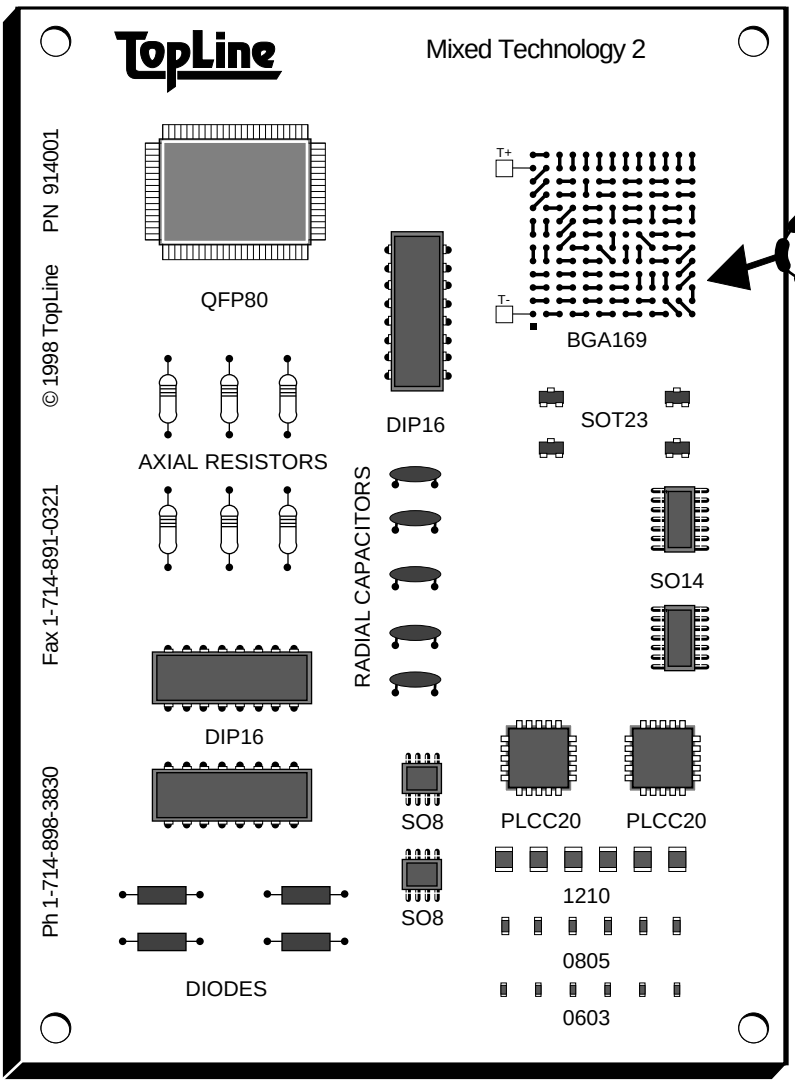
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **969604**

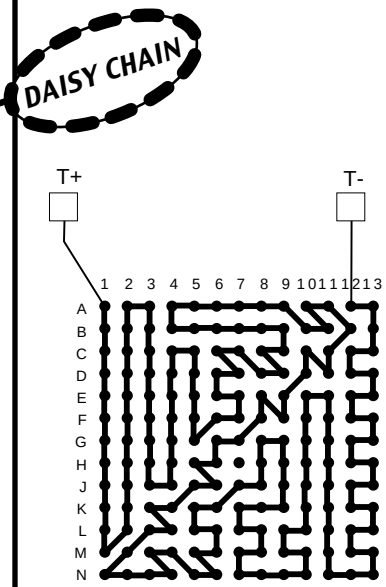
Solder Paste Artwork Gerber File
Order Number **969605**

PC Board
Order Number **969601**

Mixed Technology 2 Kit



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



BGA169
After Mounting

Features

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

Actual Size: 4” x 5.5” (100 x 140mm)

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	100	250	250	500
1210 Chip		10	100	500	500	1000
0805 Chip		10	100	500	500	1000
0603 Chip		10	100	500	500	1000
Throughhole Components						
DIP16	100mil	3	30	75	150	300
1/4W Resistor	.50”	10	50	500	1000	2500
DO35 Diodes	.50”	10	50	500	1000	2500
Ceramic Cap	.20”	10	50	500	1000	2500

Optional Accessories

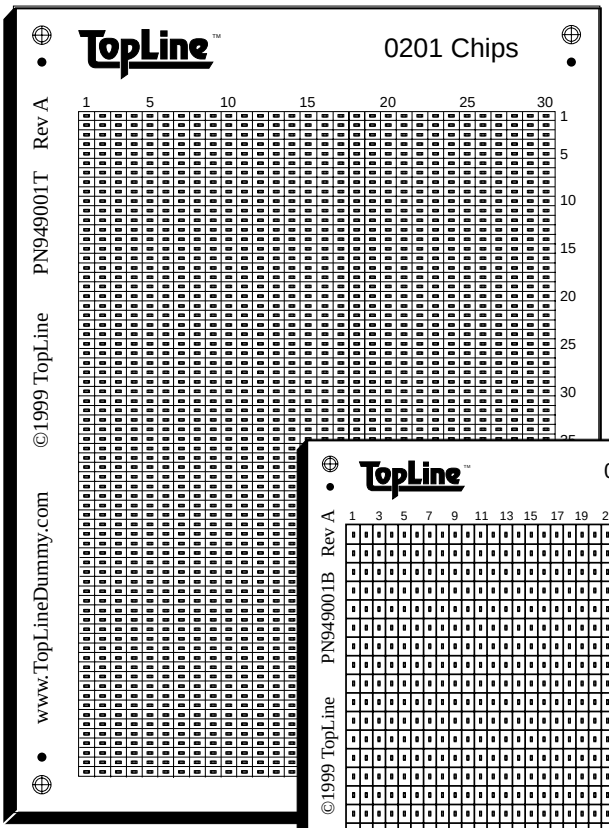
Parts Placement Data X,Y,Theta ASCII File
Order Number **914004**

Solder Paste Artwork Gerber File
Order Number **914005**

PC Board
Order Number **914001**

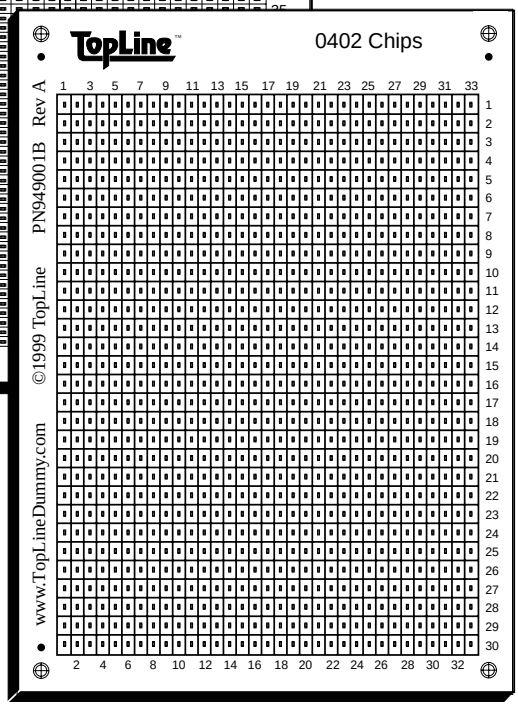
Chip Shooter Kit
0201 and 0402 Chips

Top Side of Board

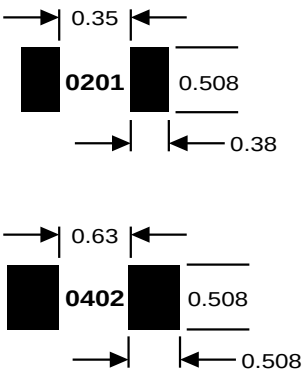


Put your machine to the test with TopLine's new 0201/0402 kits. Double sided board has 2000 pads for ultra-miniature 0201 chips on the front side and 1000 pads for 0402 chips on the back side. Components are supplied on 2mm pitch tape. Kit can be used for placement, soldering or epoxy dispenser testing.

Bottom Side of Board



Pad Dimensions (mm)
Rev-A



Features

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

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

Chip Shooter Kit
0201 and 0402 Chips

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

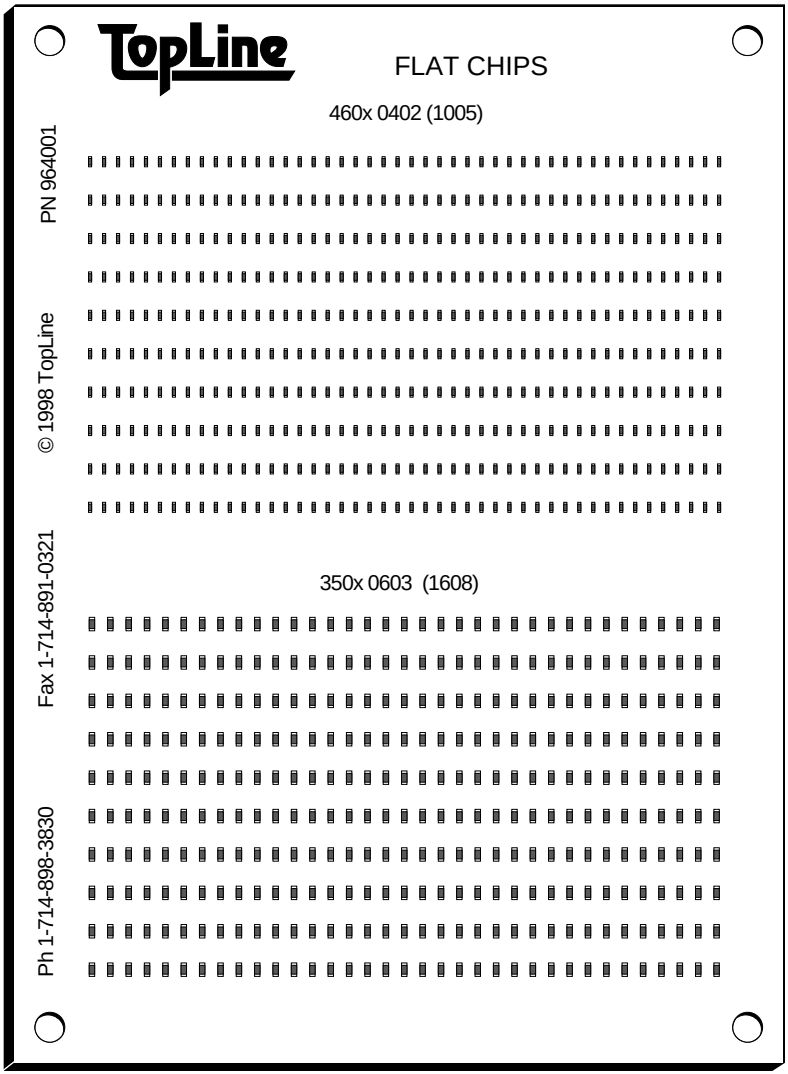
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **949004**

Solder Paste Artwork Gerber File
Order Number **949005**

PC Board
Order Number **949001**

Chip Shooter Kit
0402 and 0603 Chips



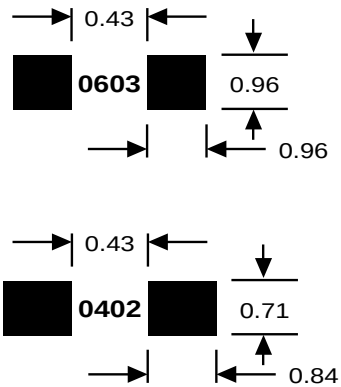
Actual Size: 4” x 5.5” (100 x 140mm)

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

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

Chip Shooter Kit
0402 and 0603 Chips

Kit Ordering Information

Component	Machine Run Order Number 964000 1 Kit	Order Number 984000 1 Kit	Order Number 964010 10 Kits	Order Number 984010 10 Kits	Order Number 964025 25 Kits	Order Number 984025 25 Kits
Standard Kit						
Board Sn63	1	-	10	-	25	-
0402 Chip Resistor	1000	-	10,000	-	20,000	-
0603 Chip Resistor	1000	-	10,000	-	15,000	-
Lead Free Kit						
Board Sn100 Tin Plated	-	1	-	10	-	25
0402 Chip Sn100 Tin	-	1000	-	10,000	-	20,000
0603 Chip Sn100 Tin	-	1000	-	10,000	-	15,000

Optional Accessories

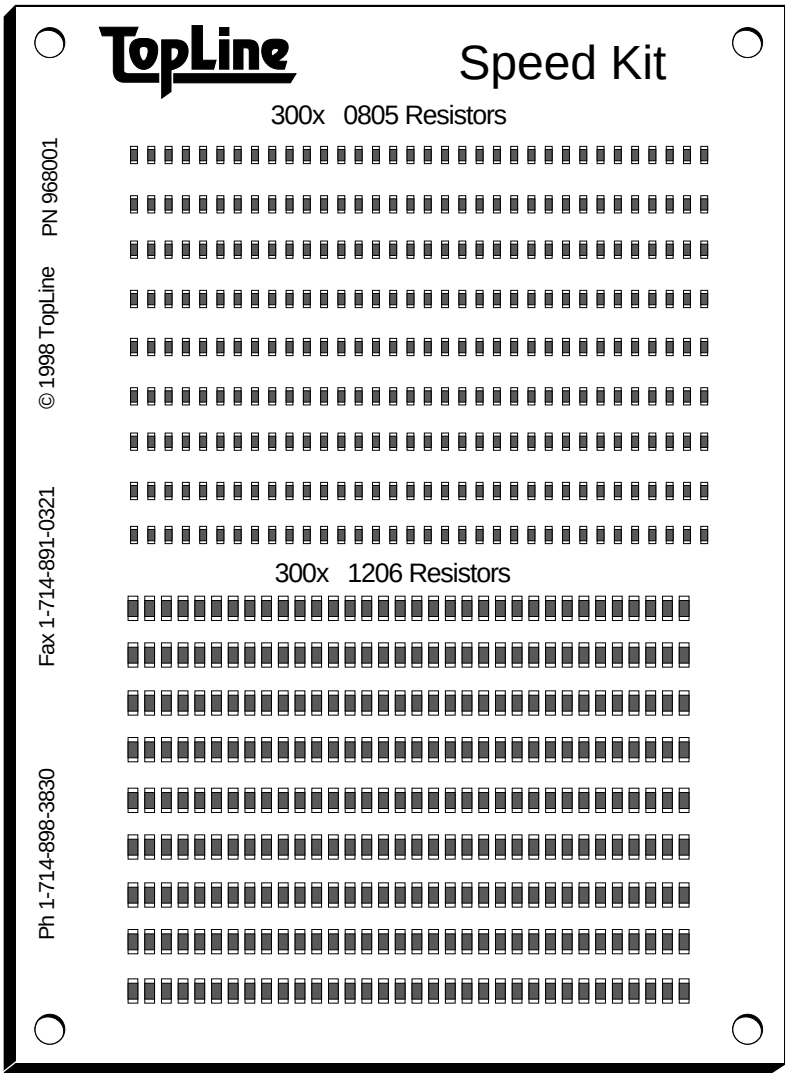
Parts Placement Data X,Y,Theta ASCII File
Order Number **964004**

Solder Paste Artwork Gerber File
Order Number **964005**

PC Board
Order Number **964001**

PC Board - Lead Free
Order Number **984001**

Chip Shooter Kit
0805 and 1206 Chips



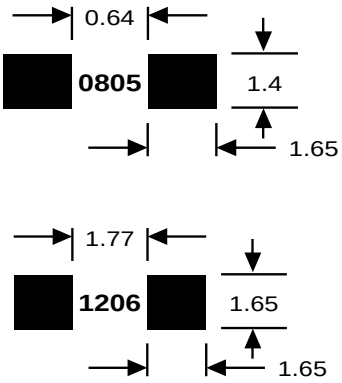
Actual Size: 4” x 5.5” (100 x 140mm)

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

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

Chip Shooter Kit
0805 and 1206 Chips

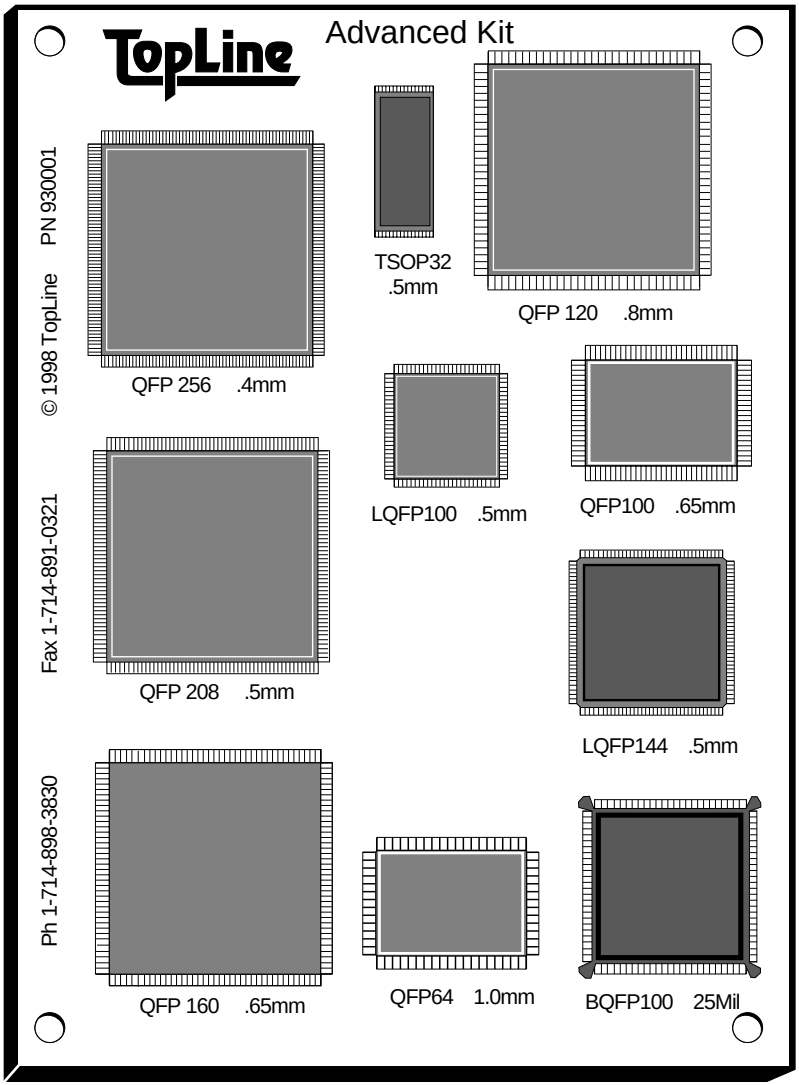
Kit Ordering Information

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 Sn63 HASL	1	10	25	50	100
0805 Chip Resistor	1000	10,000	25,000	50,000	100,000
1206 Chip Resistor	100	10,000	25,000	50,000	100,000

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File Order Number **968004** ***Solder Paste Artwork Gerber File Order Number*** **968005**	***PC Board Order Number*** **968001**

Advanced SMD Kit for the Expert



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

Hot Air Solder Leveling
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

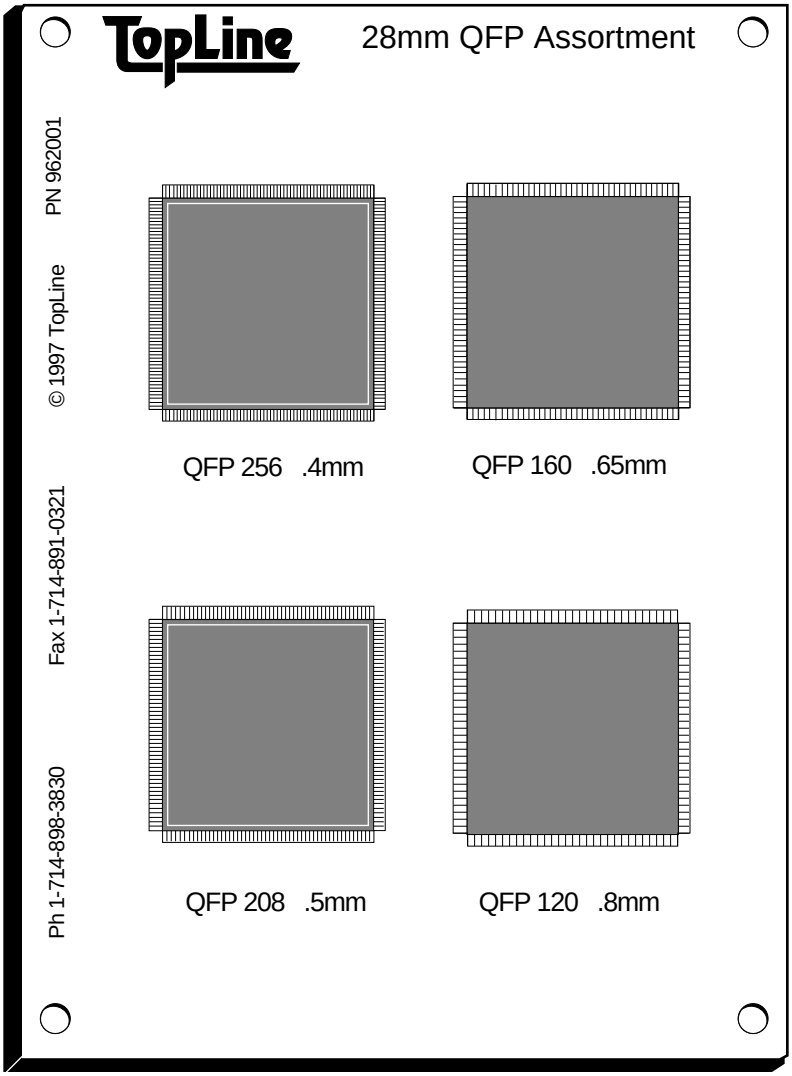
Optional Accessories

Parts Placement Data
X,Y,Theta ASCII File
Order Number 930004

Solder Paste Artwork
Gerber File
Order Number 930005

PC Board
Order Number 930001

28mm QFP Assortment Kit 0.4mm to 0.8mm Pitch



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

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

28mm QFP Assortment Kit 0.4mm to 0.8mm Pitch

Kit Ordering Information

		Manual Assembly		Machine Run		
Component	Pitch	Order Number 962000 1 Kit	Order Number 962012 12 Kits	Order Number 962024 24 Kits	Order Number 962048 48 Kits	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

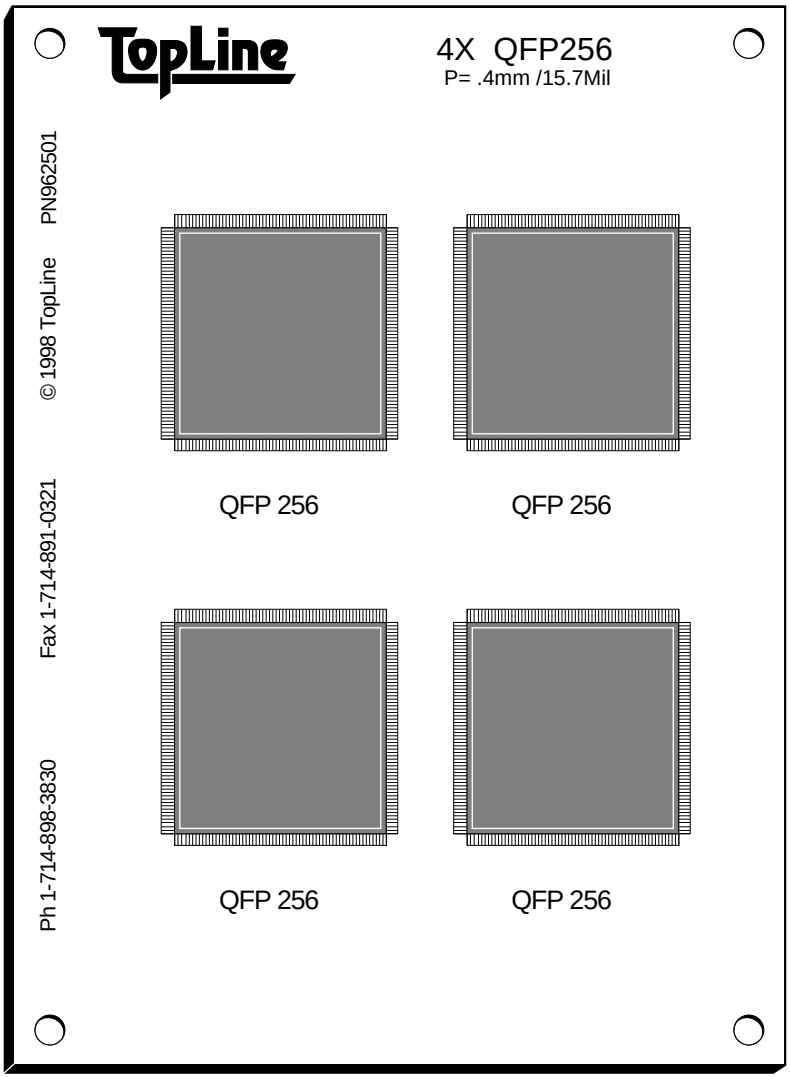
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **962004**

Solder Paste Artwork Gerber File
Order Number **962005**

PC Board
Order Number **962001**

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

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

QFP256 Kit
0.4mm Pitch

Kit Ordering Information

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

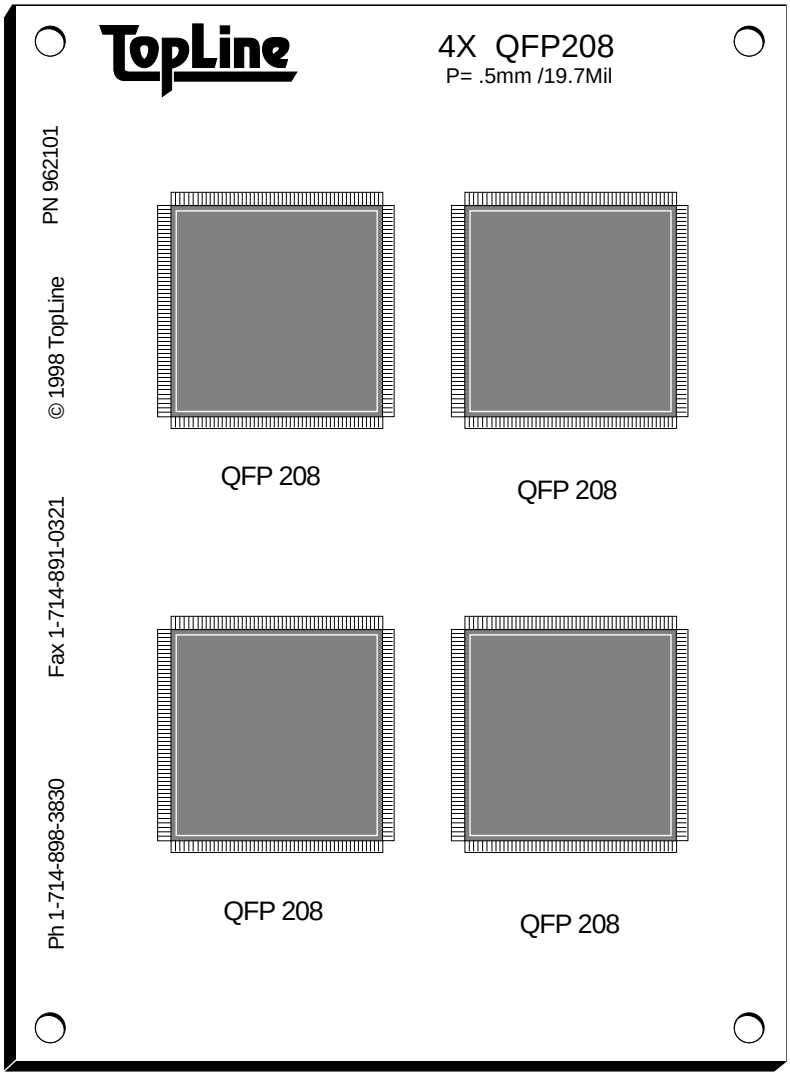
Optional Accessories

Parts Placement Data X,Y,Theta ASCII File
Order Number **962504**

Solder Paste Artwork Gerber File
Order Number **962505**

PC Board
Order Number **962501**

QFP208 Kit
0.5mm Pitch



Actual Size: 4” x 5.5” (100 x 140mm)

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

Features

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

QFP208 Kit
0.5mm Pitch

Kit Ordering Information

Component	Pitch	Manual Assembly	Machine Run			
		Order Number 962100 1 Kit	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

Optional Accessories

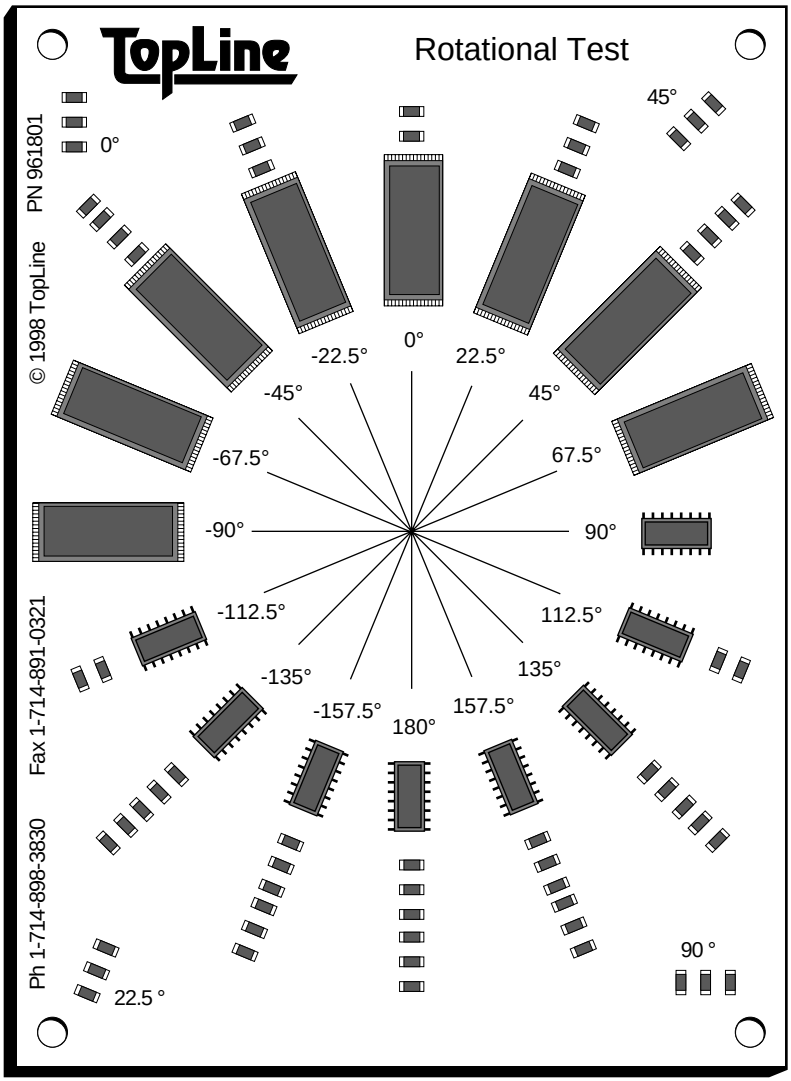
Parts Placement Data
X,Y,Theta ASCII File
Order Number **962104**

Solder Paste Artwork
Gerber File
Order Number **962105**

PC Board
Order Number **962101**

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

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

Rotational Placement Kit

Tests Accuracy to ± 0.5°

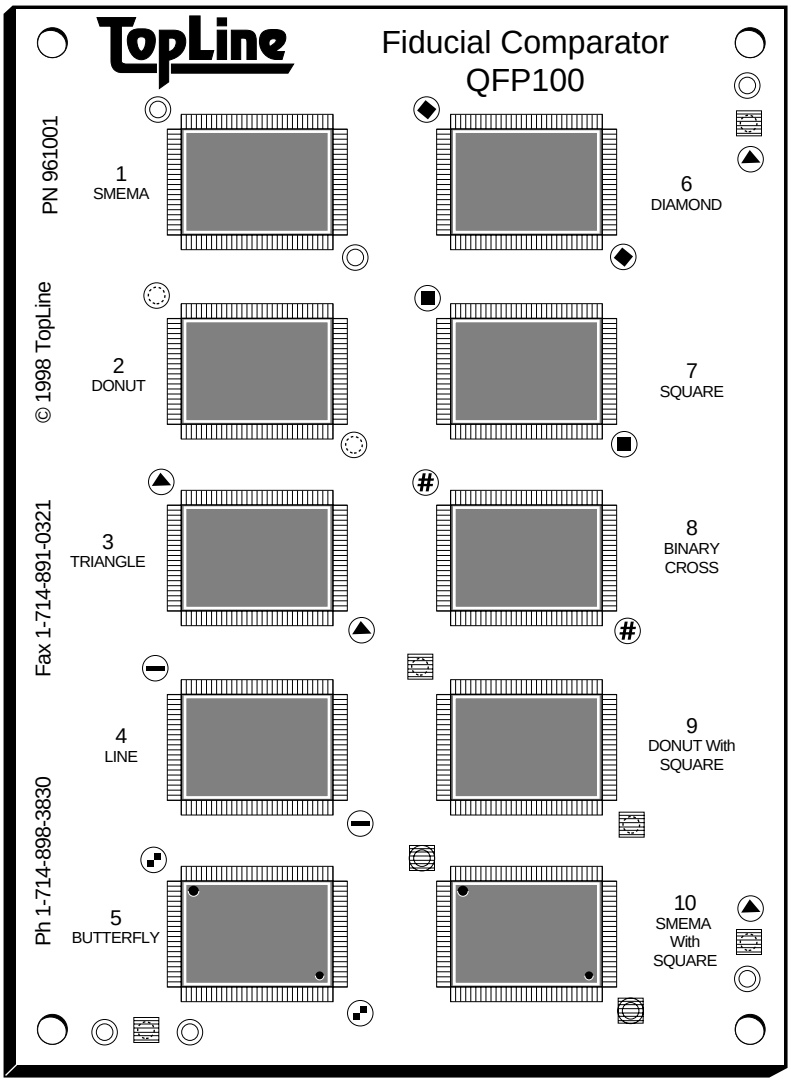
Kit Ordering Information

Component	Pitch	Manual Assembly	Machine Run			
		Order Number 961800 1 Kit	Order Number 961803 3 Kits	Order Number 961806 6 Kits	Order Number 961812 12 Kits	Order Number 961825 25 Kits
Board		1	3	6	12	25
TSOP32	0.5mm	8	25	50	100	200
SO16	1.27mm	8	25	50	100	200
1206 Chips		100	250	500	1000	5000

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File Order Number **961804** ***Solder Paste Artwork Gerber File Order Number*** **961805**	***PC Board Order Number*** **961801**

Fiducial Evaluation Kit
QFP100
0.65mm Pitch



Actual Size: 4” x 5.5” (100 x 140mm)

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

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

Fiducial Evaluation Kit
QFP100
0.65mm Pitch

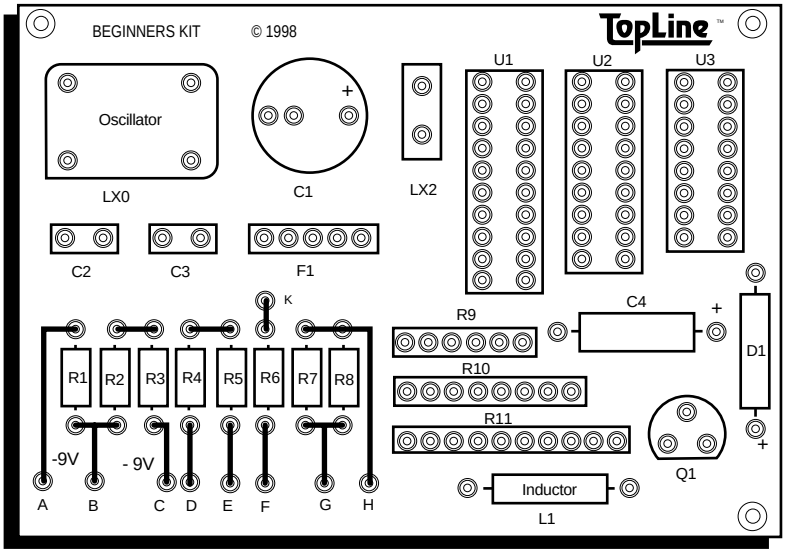
Kit Ordering Information

		Manual Assembly	Machine Run			
Component	Pitch	Order Number 961000 1 Kit	Order Number 961003 3 Kits	Order Number 961010 10 Kits	Order Number 961025 25 Kits	Order Number 961050 50 Kits
Board		1	3	10	25	50
QFP100	0.65mm	10	25	100	250	500

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File *Order Number* **961004** *Solder Paste Artwork Gerber File* *Order Number* **961005**	*PC Board* *Order Number* **961001**

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 in kit.

Features

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

Beginners Throughhole Kit

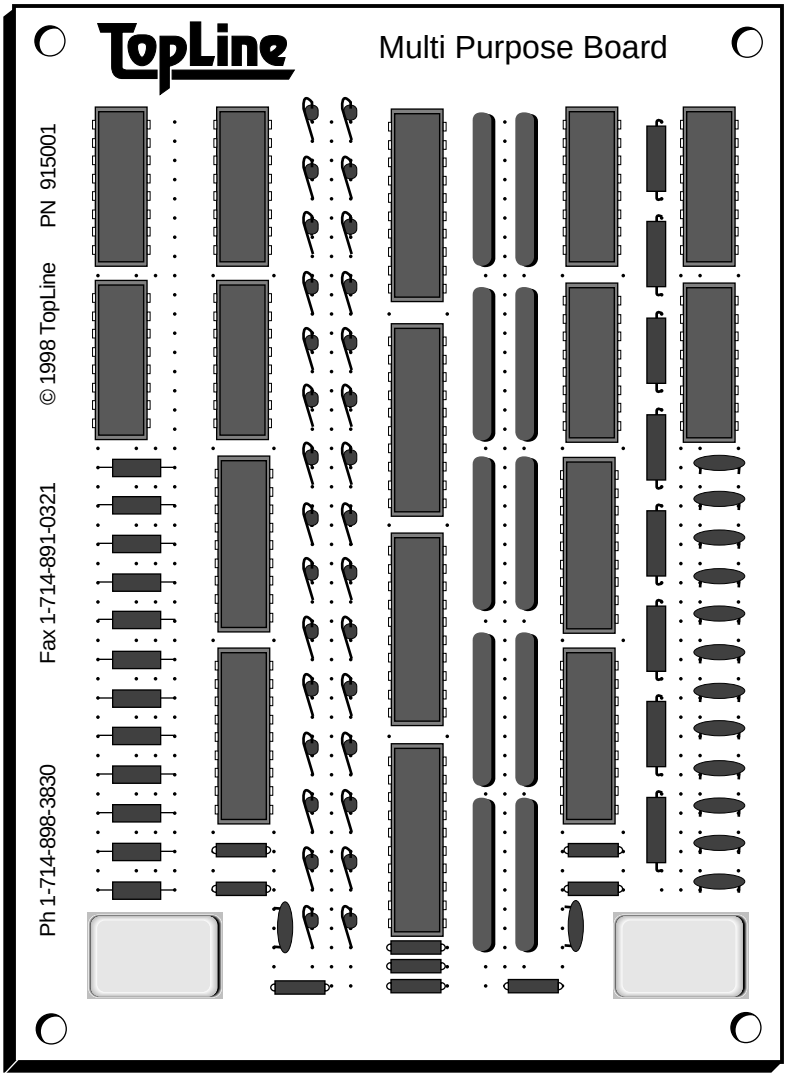
Kit Ordering Information

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

Spare Parts

Components	Quantity	Order Nbr
PC Board Only	**1**	**910002**

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”
Single Sided
Tooling Holes .125”
920 Plated Throughholes

Actual Size: 4” x 5.5” (100 x 140mm)

Multipurpose Throughhole Kit

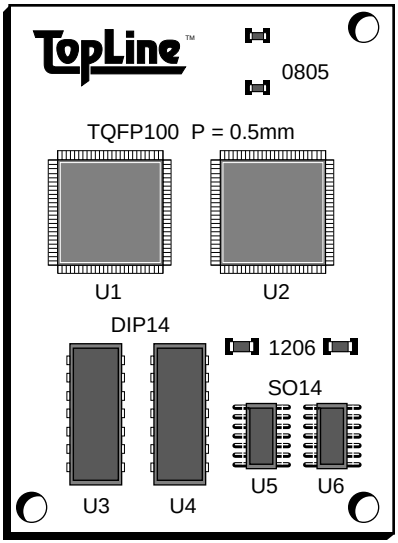
Kit Ordering Information

Component	Manual Assembly: Order Number 916000 1 Kit	Manual Assembly: Order Number 916025 25 Kits	Manual Assembly: Order Number 916050 50 Kits	Manual Assembly: Order Number 916100 100 Kits	Machine Run: Order Number 915050 50 Kits	Machine Run: 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
TOTAL PIECES	225	4500	10,500	21,000	10,500	21,500

Spare Parts

Components	Quantity	Order Nbr
PC Board Only	**1**	**915001**

Econo Kit II
Mixed Technology for Soldering Certification



Actual Size: 2" x 2.75" (50 x 70mm)

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

This kit is used by employment agencies for soldering certification.

Features

Hot Air Solder Leveling
LPI Solder Mask
FR4 Board .062"
Single Sided
Tooling Holes .125"
Plated Throughholes

Econo Kit II
Mixed Technology for Soldering Certification

Kit Ordering Information

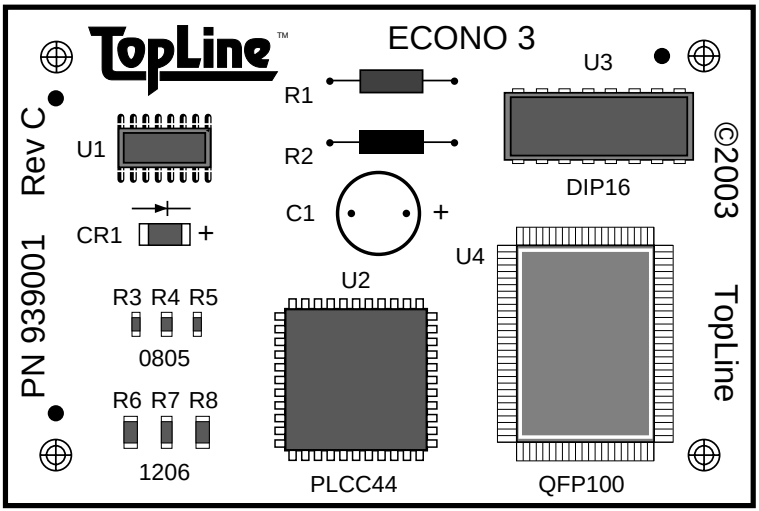
Component	Pitch	Manual Assembly: Order Number 938000 1 Kit	Order Number 938010 10 Kits	Order Number 938025 25 Kits	Order Number 938050 50 Kits	Order Number 938100 100 Kits
Board		1	10	25	50	100
LQFP100	0.5mm	2	20	50	100	200
SO14	50mil	2	20	50	100	200
DIP14	100mil	2	20	50	100	200
0805 Chip		2	20	50	100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

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

Spare Parts

Components	Quantity	Order Nbr
PC Board Only	**1**	**938001**

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

Hot Air Solder Leveling
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

Kit Ordering Information

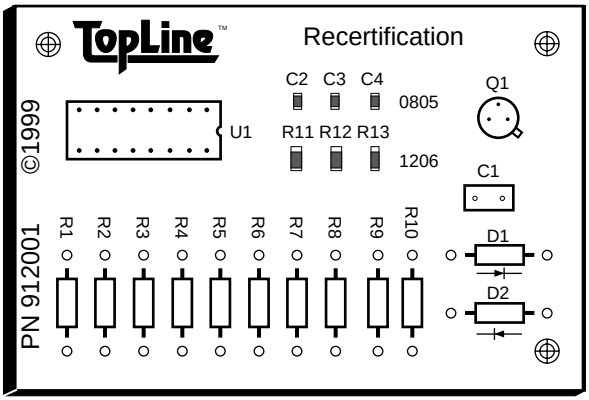
Component	Pitch	Manual Assembly: Order Number 939000 1Kit	Order Number 939010 10 Kits	Order Number 939025 25 Kits	Order Number 939050 50 Kits	Order Number 939100 100 Kits
Board		1	10	25	50	100
QFP100	0.65mm	1	10	25	50	100
PLCC44	1.27mm	1	10	25	50	100
SO16	1.27mm	1	10	25	50	100
DIP16	2.54mm	1	10	25	50	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

Optional Accessories

Parts Placement Data X,Y,Theta ASCII File ***Order Number*** **939004**	***Solder Paste Stencil*** ***Order Number*** **939001**
Solder Paste Artwork Gerber File ***Order Number*** **939005**	

Econo IV
Mixed Technology
Recertification Kit



Actual Size: 2” x 2.75” (50 x 70mm)

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

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

Features

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

Econo IV Mixed Technology Recertification Kit

Kit Ordering Information

Component	Pitch	Manual Assembly 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.

Optional Accessories

PC Board
Order Number **912001**

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 ≤100kΩ
- 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

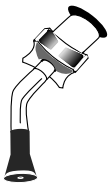
Spare Parts Set #222555

High Power Plastic Angled Probe #222777

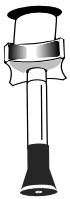
High Power Plastic Straight Probe #223333

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

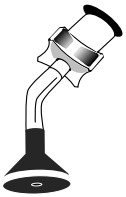
Additional Accessories



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

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.

Conductive Plastic Desoldering Pump Innovative Construction

Elme VYPER

(Red:USI0090110)

Order Nr. 222100

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

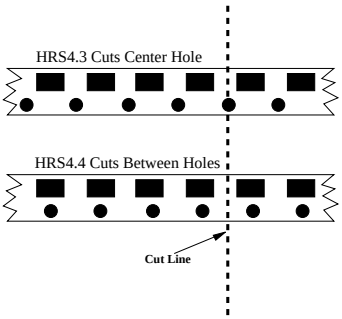
TopLine On Board

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

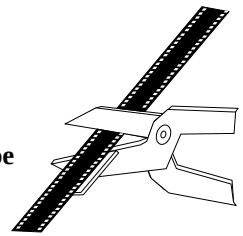
Order No.	Description
210011	HRS5 Tool (Includes -100 pcs. HRS5.01 splicing tape and HRS4.3 cutting tool)
210003	Spare HRS4.3 Cutting Tool (Red)
210009	Spare HRS4.4 Cutting Tool (Green)
210002	HRS5.01 Splicing Tape (1000 pcs.) (with HRS4.02 cover tape included)
210005	Spare HRS4.02, 4.3x60mm Cover Tape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

Cutting Tool Diagram



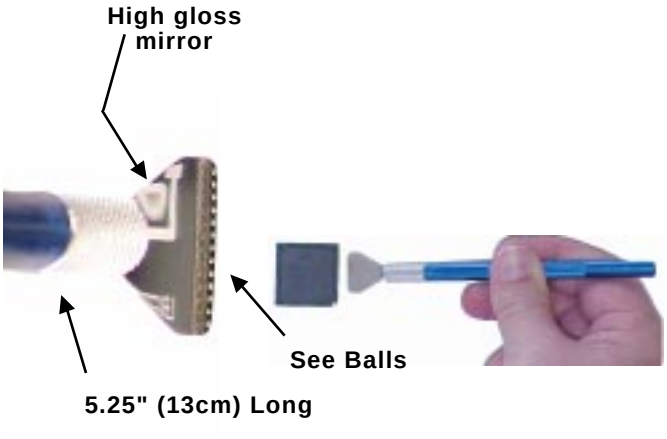
How to Use

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

BGA Inspection Tools



Order No.

BGA Mirror 301000

Highly polished stainless steel mirror allows inspection of perimeter balls after assembly of BGA to mother board. Works best when used with high intensity lamp and 10X magnifying lens.
Size: 5.25" (13cm) long.
Mirror surface is 0.7" (17.8mm) wide.

Be ESD Safe!

Tray Straps ESD Safe

Size: 550mm x 25mm

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

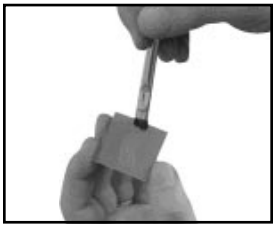
- Fits all JEDEC Matrix Trays
- Quick Release Buckle
- Clean Room Admissible
- Reusable & Recyclable
- Permanetly Conductive
- Black conductive polyproplyene
- Secures 10 to 12 trays

Order No. 885001

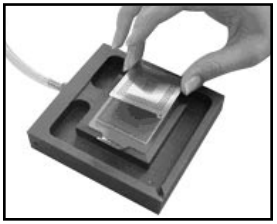
V-GRIP 01

BGA Reball RB-2000 Tool

Step by Step Instructions:



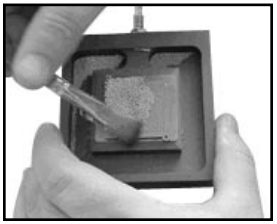
1. Evenly apply a thin layer of tacky flux to BGA without balls.



2. Place BGA on spatula tray with pads facing up. Place spatula on the base.

Vacuum will hold the parts.

Place and align the reball screen over the BGA. Flux will hold screen in place.



3. Pour solder spheres onto the reball screen. Brush balls into holes on the screen.

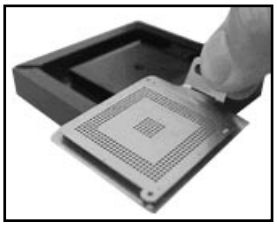
Brush off excess solder spheres into trough of vacuum base.

Benefits of RB-2000

- Easy to use. Low Cost
- Interchangeable ball screens
- Standard & Lead Free
- Accommodates all size BGA & CSP

Auxiliary Equipment Required

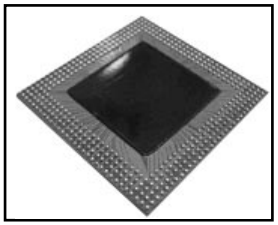
- Aquarium pump or vacuum source
- Batch Oven or Reflow Heat Source



4. Remove spatula tray (along with the BGA and reball screen) from the vacuum base.

Reflow BGA with the screen.

Remove the screen only after the BGA is cool.



5. The re-balled BGA is now ready. See next page for ordering details

See next page for ordering details

TopLine®

BGA Reball RB-2000 Tool

77xxxx Series Complete Kit
78xxxx Series Spare Ball Screen

How to Order

A Specific Order Number is assigned for each BGA Pitch and Ball Pattern

0.5mm

Reball Order#	Ball Matrix
775082	8x8 P2
775083	8x8 P2/3
775103	10x10 P2/3
775142	14x14 P2
775145	14x14 P3
775155	15x15 P5

0.75mm

Reball Order#	Ball Matrix
777689	6x8 Full
777688	6x8 Full-2

0.8mm

Reball Order#	Ball Matrix
778069	6x6 Full
778077	7x7 Full
778089	8x8 Full
778099	9x9 Full
77109	10x10 Full
778119	11x11 Full
778129	12x12 Full
778139	13x13 Full
778149	14x14 Full
778159	15x15 Full
778164	16x16 Full
778174	17x17 Full
778184	18x18 Full
778194	19x19 Full

1.0mm

Reball Order#	Ball Matrix
771089	8x8 Full
771099	9x9 Full
771109	10x10 Full
771129	12x12 Full
771142	14x14 P4+C2x2
771144	14x14 P4
771149	14x14 Full
771164	16x16 P4
771165	16x16 P4+C4x4
771169	16x16 Full
771226	22x22 P4+C6x6
771229	22x22 Full
771269	26x26 Full

1.27mm

Reball Order#	Ball Matrix
772717	7x17 Full
772118	11x11 Full-4
772149	14x14 Full
772169	16x16 Full
772173	17x17 P4+C3x3
772174	17x17 P4
772198	19x19 Full-4
772199	19x19 Full
772204	20x20 P4
772205	20x20 P4+C4x4
772206	20x20 P4+C6x6
772209	20x20 Full
772234	23x23 P4
772259	25x25 Full
772264	26x26 P4
772266	26x26 P4+C6x6
772315	31x31 P5
772335	33x33 P5
772339	33x33 Full
772355	35x35 P5

1.5mm

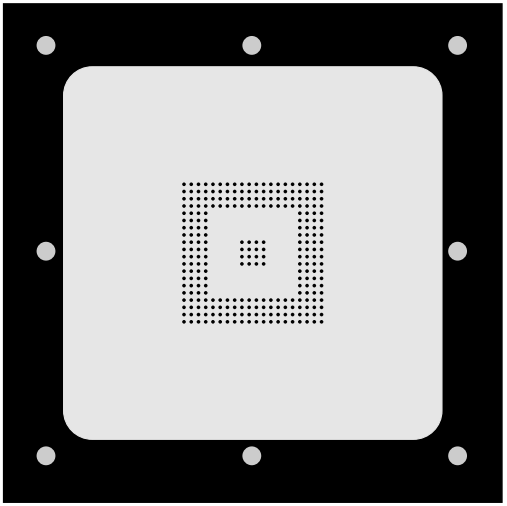
Reball Order#	Ball Matrix
773139	13x13 Full
773159	15x15 Full
773208	20x20 Full

77xxxx Series Kit Includes:

- Base *
- BGA Screen of your choice
- BGA Spatula
- Brush
- 5000 Spheres

* Requires external vacuum source such as an aquarium pump (not included)

BGA Rework Stencils



Frame style Airvac, Conceptronics, PDR and PMT.
Size: 2.75" (70mm)

Benefits of CPF

- Eliminates board warpage issues
- Superior alignment of BGA during rework
- Reduced courtyard requirements
- Consistent Paste Deposition
- Stencils available for BGA, CSP and QFN

Compatible with Rework Equipment:

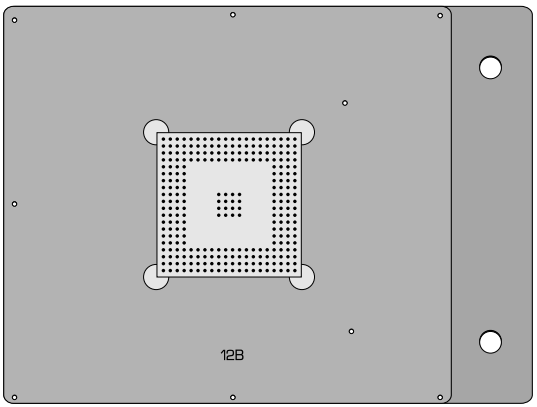
• Airvac	Order Stencil 70P###
• Conceptronics	Order Stencil 70P###
• PDR	Order Stencil 70P###
• PMT	Order Stencil 70P###
• Metcal	Order Stencil 71P###
• SRT	Order Stencil 72P###

Optional Clamp for Frame Stencils Available

Order Nbr: 790001

New process applies solder paste to the balls, instead of to the board.

1. Prepare Paste
2. Align BGA on CPF Stencil with finger or use optional Clamp
3. Apply Paste
4. Remove Optional Clamp from CPF stencil frame
5. Lift BGA from CPF stencil
6. Place BGA on board & reflow



Frameless BGA stencil for Metcal style
Size: 2.75" x 2.0" (70mm x 50mm))

BGA Rework Stencils

Order BGA CPF Stencils

0.5mm

CPF Order#	Ball Matrix
705082	8x8 P2
705083	8x8 P2/P3
705103	10x10 P2/3
705142	14x14 P2
705145	14x14 P3
705155	15x15 P5

0.75mm

CPF Order#	Ball Matrix
707689	6x8 full
707688	6x8 full -2

0.8mm

CPF Order#	Ball Matrix
708069	6x6 full
708077	7x7 full
708089	8x8 full
708099	9x9 full
708109	10x10 full
708119	11x11 full
708139	13x13 full
708149	14x14 full
708169	16x16 full
708179	17x17 full
708199	19x19 full

1.0mm

CPF Order#	Ball Matrix
701089	8x8 full
701099	9x9 full
701109	10x10 full
701129	12x12 full
701142	14x14 P4+C2x2
701144	14x14 P4
701149	14x14 full
701164	16x16 P4
701165	16x16 P4+C4x4
701169	16x16 full
701224	22x22 P4
701226	22x22 P4+C6x6
701229	22x22 full
701269	26x26 full

1.27mm

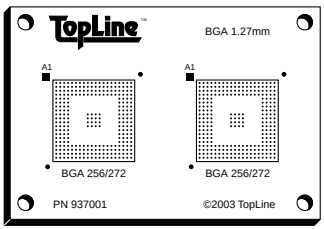
CPF Order#	Ball Matrix
702717	7x17 full
702118	11x11 full -4
702149	14x14 full
702169	16x16 full
702173	17x17 P4 +C3x3
702174	17x17 P4
702198	19x19 full -4
702199	19x19 full
702204	20x20 P4
702205	20x20 P4 + C4x4
702206	20x20 P4 + C6x6
702209	20x20 full
702234	23x23 P4
702259	25x25 full
702264	26x26 P4
702266	26x26 P4 +C6x6
702315	31x31 P5
702335	33x33 P5
702339	33x33 full
702355	35x35 P5

1.5mm

CPF Order#	Ball Matrix
703139	13x13 full
703159	15x15 full
703208	20x20 full -4

Custom Stencils Available

How to Order BGA Stencils
2nd Digit CPF Order Number
0=Airvac, Conceptronics, PDR, PMT
1=Metcal Compatible
2=SRT Compatible



PC Board in Kit

BGA Rework Practice Kit
Order# 790000

Kit includes the following:

- BGA Rework Stencil BGA272
- Paste Pallet
- Mini Inspection Mirror
- Paste Squeegee
- Practice PC Board & Dummy BGA272

Be ESD Safe!

ESD Static Control Products

elme
YOUR STATIC CONTROL COMPANY

Visit our ESD website
www.esd.tv

TopLine offers a full range of ESD Static Control Products:

Lab Coats & Smocks

Chairs & Seat Covers

PCB Holder Rework

Brushes

Mats

ESD Shoes

Lead Free Solder Paste

Koki Lead Free Solder Paste

S3X58-M405

- Sn96.5/Ag3.0/Cu0.5
- Melting Point: 217-218°C
- Type 4 Particle: 20~38uM
- Halide Content: 0%
- Flux: ROL0 11.5%
- Viscosity: 2000Ps
- Spread Factor: >85%
- Tack Time: >24 hours
- Shelf Life: 6 months @ <10°C

Koki lead free solder paste is a mixture of eutectic alloy **Sn96.6/Ag3.0/Cu0.5** plus a halide free, no-clean fluxing medium.

Standard Packages:

500gm
Jar

500~600gm
Cartridge

1000~1200gm
Cartridge

750gm ProFlow
Cassette

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

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Web Site www.intec.at

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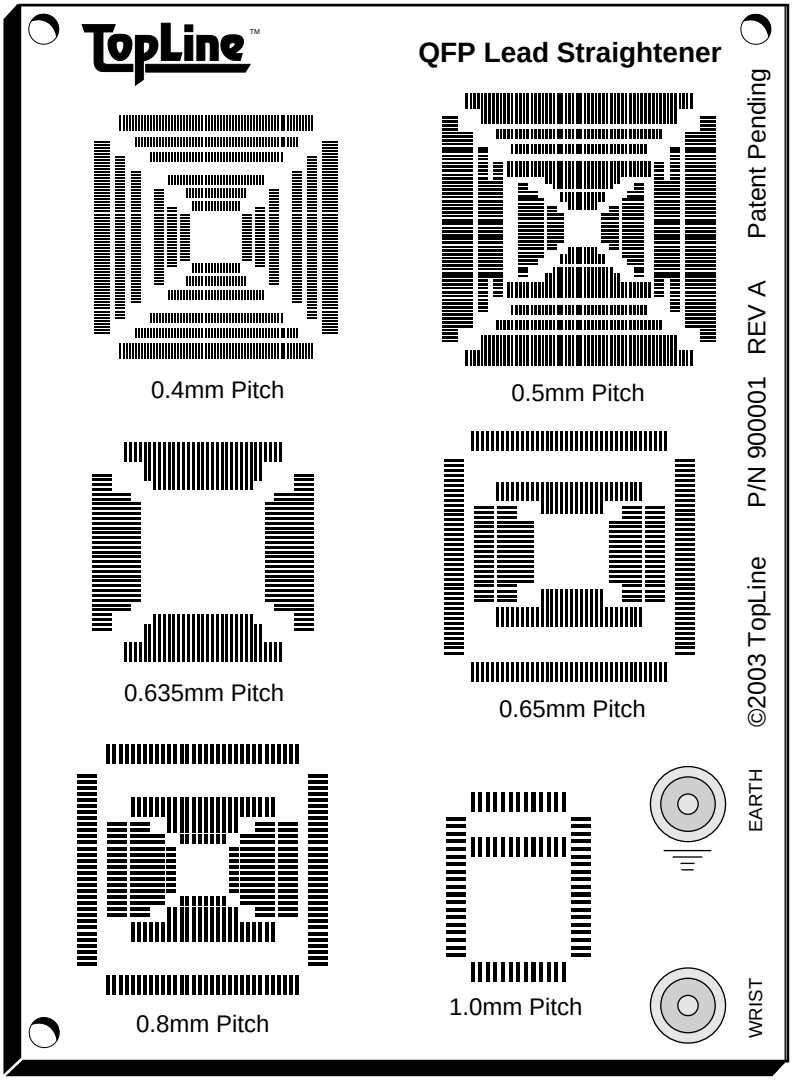
Universal QFP Lead Straightener



Actual Size: 4” x 5.5” (100 x 140mm)

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

Complete set includes 34 lead template patterns, ESD wristband and earth ground cord.

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.

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	52L
	208L	132L	64L
	240L		

Order Number: 900000 Set

Patent Pending