



# Quick Guide to Solder Columns

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## About TopLine

TopLine manufactures many types of solder columns for high reliability and harsh applications. Solder columns are drop-in replacements for solder balls for ceramic or plastic semiconductor chip packages. We make solder columns in the USA.

## Why Solder Columns

Solder columns are drop-in replacements for solder balls for semiconductor chip packages. Solder columns are more reliable than solder balls for harsh applications. BGA solder balls can fracture under extreme thermal cycling, vibration and shock. Solder columns can absorb stress and strain caused by the mismatch of Coefficient of Thermal Expansion (CTE) when connecting a chip package to a Printed Circuit Board (PCB).

## Materials

Columns are comprised of a variety of pure solder alloys depending on the application and operating temperature. Solder columns are combined with a variety of copper alloys such as OFHC copper, palladium coated copper and beryllium copper for specific applications.

### Lead-Bearing Solder:

Lead-Tin (Pb/Sn)  
 Indium-Lead (In/Pb)

### Lead-Free (RoHS) Solder:

Tin-Antimony (Sn/Sb)  
 Indium-Tin (In/Sn)

## Solder Columns vs Solder Balls

Solder columns are cylindrically shaped structures. Solder balls are spherical. Solder columns are more compliant than solder balls. Columns are used for high reliability packages known as Column Grid Arrays (CGA). Solder columns were invented in the mid 1970s by IBM.

## Patents

TopLine invented a new generation of solder columns. We have multiple patents for different types of solder columns.

US 10,477,698	CN 111822899 B
US 10,937,752	CN 114055006 B
US 12,526,920	US 9,108,262
Other Patents Pending	US 9,629,259

## Attachment Tooling Flip-Pack® Pin-Pack®

TopLine makes cassettes that are pre-loaded with solder columns for quick release. Just remove the Flip-Pack cover and the columns gently load into corresponding tool-sets that correspond to the size and array of your package. Flip-Packs can be re-filled for multiple uses. TopLine also makes precision column attachment tool-sets.

## Column Attachment Services







TopLine's assembly partners offer DLA flight qualified column attachment services. Consult with TopLine engineering to discuss your exact needs.

## Find it Fast






CG9010U	CG8020C CG9010C	BC8020B BC9010B	CC172A CC172B	CU101G CU194G	MCS172G MCS172P
					
Plain Solder Column  Original IBM Design 50 Year Old Technology  Tin-Lead	Copper Wrap Column  40 Year Flight Heritage  Tin-Lead	Copper Braided Column  New Generation Strong – Long Life  Tin-Lead Lead Free	Copper Core Column  New High Thermal Conductivity  Tin-Lead Lead Free	Copper Pillar Copper Column  PoP Encapsulated Via Package on Package  Lead Free	Micro-Coil Spring  NASA Invented High Shock and Vibe  Tin-Lead Lead Free

**Columns are "Drop-in" Replacements for Solder Balls**

# Lead-Bearing Solder Columns

Image	Part Series	Core	Sleeve	Column Coating	Column Diameter	Column Length	Applications
	CG9010U	Pb90 Sn10	None	None	0.20 ~ 0.50mm	1.0~ 2.5mm	Heritage Column General Purpose Aerospace & Defense  Operating Temp -55°C to +125°C  Solder Paste: Sn63/Pb37 Reflow: 215°C to 235°C
	CG8020C	Pb80 Sn20	Copper Ribbon	Sn63 Pb37	0.30 ~ 0.56mm	1.0~ 5mm	Heritage Column General Purpose Aerospace & Defense  Operating Temp -55°C to +125°C  Solder Paste: Sn63/Pb37 Reflow: 200°C to 215°C
	CG9010C	Pb90 Sn10	Copper Ribbon	Sn63 Pb37	0.30 ~ 0.56mm	1.0~ 5mm	Heritage Column Robust - General Purpose Aerospace & Defense  Operating Temp -100°C to +125°C  Solder Paste: Sn63/Pb37 Reflow: 215°C to 235°C
	BC8020B	Pb80 Sn20	Copper Braid	Sn63 Pb37	0.30 ~ 0.50mm	1.0~ 12mm	New Generation Column Longer Life Aerospace & Defense  Operating Temp -55°C to +125°C  Solder Paste: Sn63/Pb37 Reflow: 200°C to 215°C
	BC9010B	Pb90 Sn10	Copper Braid	Sn63 Pb37	0.30 ~ 0.50mm	1.0~ 12mm	New Generation Column Robust - Longer Life Aerospace & Defense  Operating Temp -100°C to +150°C  Solder Paste: Sn63/Pb37 Reflow: 215°C to 235°C
	BC935M	Pb91.5 Sn5.0 Ag1.5	Copper Braid	Pb80 Sn20	0.30 ~ 0.50mm	1.0~ 12mm	New Generation Column High Operating Temperature Aerospace & Defense  Operating Temp -100°C to +180°C  Solder Paste: Sn63/Pb37 Paste Reflow: 215°C to 280°C








# Lead-Bearing Solder Columns

Image	Part Series	Core	Sleeve	Column Coating	Column Diameter	Column Length	Applications
	BC50N	In50 Pb50	Copper Braid	In97 Ag3	0.35 ~ 0.50mm	1.0 ~ 5mm	<p>New Generation Column Cryogenic Cold Lunar Surface Aerospace &amp; Defense</p> <p>Operating Temp -230°C to +140°C</p> <p>Solder Paste: Indium Alloy Reflow: 170°C to 180°C</p>
	CC172B	C172 Be-Cu	Copper Braid	Sn63 Pb37	0.25 ~ 0.50mm	1.0 ~ 12mm	<p>New Generation Column High Thermally Conductive Aerospace &amp; Defense</p> <p>Operating Temp -100°C to +125°C</p> <p>Solder Paste: Sn63/Pb37 Reflow: 200°C to 230°C</p>
	CC172M	C172 Be-Cu	Copper Braid	Pb80 Sn20	0.25 ~ 0.50mm	1.0 ~ 12mm	<p>New Generation Column High Thermally Conductive Aerospace &amp; Defense</p> <p>Operating Temp -100°C to +125°C</p> <p>Solder Paste: Sn63/Pb37 Reflow: 200°C to 230°C</p>
	CC172A	C172 Be-Cu	Copper Braid	Pb90 Sn10	0.25 ~ 0.50mm	1.0~ 12mm	<p>New Generation Column Cryogenic Cold Lunar Surface High Thermally Conductive Aerospace &amp; Defense</p> <p>Operating Temp -100°C to +125°C Solder Paste: Sn63/Pb37 Reflow: 200°C to 215°C</p>
	MCS172P	C172 Be-Cu	None	Sn60 Pb40	0.40 ~ 0.50mm	1.0~ 1.27mm	<p>Micro-Coil Spring High Shock and Vibe Aerospace &amp; Defense</p> <p>Operating Temp -100°C to +125°C</p> <p>Solder Paste: Sn63/Pb37 Reflow: 215°C to 230°C</p>



# Lead-Free RoHS Solder Columns

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Image	Part Series	Core	Sleeve	Column Coating	Column Diameter	Column Length	Applications
	BC8H	Sn91.5 Sb8.5	Copper Braid	Sn90 Ag3.5 Bi0.5 In6.0	0.30 ~ 1.00mm	1.0 ~ 5mm	New Generation Column Meets RoHS and REACH Aerospace & Defense Harsh Operating Commercial  Operating Temp -55°C to +125°C  Solder Paste: SAC305 Reflow: 230°C to 260°C
	CC172K	C172 Be-Cu	Copper Braid	Sn90 Ag3.5 Bi0.5 In6.0	0.25 ~ 0.50mm	1.0 ~ 12mm	High Thermally Conductive Harsh Operating Environment  Operating Temp -55°C to +150°C  Solder Paste: SAC305 Reflow: 230°C to 260°C
	CC172N	C172 Be-Cu	Copper Braid	In97 Ag3	0.25 ~ 0.50mm	1.0 ~ 12mm	Cryogenic Cold Lunar Surface High Thermally Conductive Aerospace & Defense  Operating Temp -273°C to +120°C  Solder Paste: Indium Alloy Reflow: 170°C to 185°C
	CC172Q	C172 Be-Cu	Copper Braid	In100	0.25 ~ 0.50mm	1.0~ 12mm	Cryogenic Cold Lunar Surface High Thermally Conductive Aerospace & Defense  Operating Temp -273°C to +120°C  Solder Paste: Indium Alloy Reflow: 170°C to 185°C
	CC172T	C172 Be-Cu	Copper Braid	In52 Sn48	0.25 ~ 0.50mm	1.0~ 12mm	Cryogenic Cold Lunar Surface High Thermally Conductive Aerospace & Defense  Operating Temp -150°C to +120°C  Solder Paste: Indium Alloy Reflow: 170°C to 185°C
	MCS172G	C172 Be-Cu	None	Ni Au	0.40 ~ 0.50mm	1.0~ 1.27mm	Micro-Coil Spring High Shock and Vibe Aerospace & Defense  Operating Temp -100°C to +125°C  Solder Paste: SAC305 Reflow: 230°C to 260°C
	C101G C194G	C101 C194W	None	Ni Au	0.20 ~ 0.40mm	1.0~ 5mm	Copper Pillar Column PoP – Package on Package Aerospace & Defense  Operating Temp -100°C to +200°C  Solder Paste: SAC305 Reflow: 230°C to 260°C