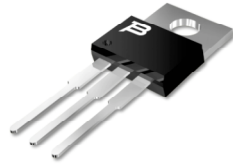


MATERIAL DECLARATION SHEET



Package Type	TO-220			
Product Line	TSP (Transistors & Thyristors)			
Compliance Date	November 30, 2004			
RoHS Compliant	Yes (-S suffix)	MSL	N/A	

Bourns TISP® and Transistor products complying with RoHS legislation are identified with a “-S” suffix in the part number e.g. TISP2290-S or TIP107-S.

No.	Construction Element (subpart)	Homogeneous Material	Material weight [g]	Homogeneous Material\ Substances	CASRN if applicable	Materials Mass %	Material Mass % of total unit wt.	Subpart mass of total wt. (%)
1	Encapsulation	Epoxy resin	0.564851	Fused Silica (SiO ₂)	60676-86-0	74.10	21.821	29.448
				OCN Epoxy resin	29690-82-2	14.00	4.123	
				Phenol Novolac resin	9003-35-4	6.20	1.826	
				Antimony Oxides	1309-64-4	3.00	0.883	
				Silica Quartz	14808-60-7	0.90	0.265	
				Brominated Polymer	68541-56-0	0.90	0.265	
				Carbon Black	1333-86-4	0.90	0.265	
2	Leadframe	Copper alloy	1.333741	Copper	7440-50-8	99.57	69.236	69.535
				Tin	7440-31-5	0.15	0.104	
				Phosphorous	7723-14-0	0.01	0.007	
				Nickel	7440-02-0	0.27	0.188	
3	Chip	Silicon	0.002019	Silicon	7440-21-3	97.28	0.102	0.105
				Aluminium	7429-90-5	1.73	0.002	
				Titanium	7440-32-6	0.17	0.0002	
				Nickel	7440-02-0	0.70	0.0007	
				Gold	7440-57-5	0.12	0.0001	
4	Die Attach	Solder	0.002477	Lead	7439-92-1	95.50	0.123	0.128
				Silver	7440-22-4	2.50	0.003	
				Tin	7440-31-5	2.00	0.0025	
5	Bond wires	Aluminium	0.000595	Aluminium	7429-90-5	99.99	0.031	0.031
6	Terminal Finish	Solder Dip	0.014400	Tin	7440-31-5	96.50	0.724	0.750
				Silver	7440-22-4	3.00	0.022	
				Copper	7440-50-8	0.50	0.004	
Total weight			1.918083					

MATERIAL DECLARATION SHEET



Reliable Electronic Solutions

RoHS Compliance Verification.

The substance content of Bourns products in TO-220 package has been verified for RoHS compliance. The following is a summary of analytical analysis reports from external laboratories provided to Bourns by its suppliers.

Substance	Analysis Method	Detect Limit	Unit	Material	Package Body	Leadframe	Die Attach Solder	Bond Wire	Termina Finish
Lead (Pb)	ICP-AES US EPA 3050B or other acid digestion.	2	ppm	Pb/Hg/Cd & Cr+6 Analysis Result	N.D.	N.D.	-	N.D.	215
Mercury (Hg)	ICP-AES or Mercury Analyzer US EPA 3052 or other acid digestion	2	ppm		N.D.	N.D.	N.D.	N.D.	N.D.
Cadmium (Cd)	ICP-AES EN1122, Method B:2001, US EPA 3050B or other acid digestion.	2	ppm		N.D.	3.5	N.D.	N.D.	N.D.
Hexavalent Chromium (Cr+6)	UV-Vis US EPA 7196A, US EPA 3060A	2	ppm		N.D.	N.D.	N.D.	N.D.	N.D.
Polybrominated biphenyls (PBBs)	GC/MS, ECDMS, LC/MS or HPLC/DAD	5	ppm	PBBs / PBDEs Analysis Result	N.D.	-	-	N.D.	-
Polybrominated diphenyl ethers (PBDEs)	GC/MS, ECDMS, LC/MS or HPLC/DAD	5	ppm		N.D.	-	-	N.D.	-

Note: N.D. = Not Detected (<Minimum detection limit)
 - = Not Applicable

Important remarks:

- RoHS exemptions** - Bourns TO-220 package utilizes a high Lead (Pb) content solder for internal contacting between the chip and leadframe. The Pb content of the solder exceeds 85% by weight and is exempt from the current EU RoHS directive 2002/95/EC and amending directive 2005/618/EC which recognize the technical barrier in replacing this material.
- It is the responsibility of the user to verify they are accessing the latest version.