Material Declaration Data Sheet

RM02 (0201 Package Size)

Lead-Free, RoHS Compliant Thick Film Chip Resistor

Date: **August 20, 2010**
Component Weight (mg): **1.1298**

Max Temp: **260°C** (Contact factory for detailed soldering recommendations.)
MSL: **1**

BOM Item	Material	CAS Number	Material Weight (mg)	Material PPM of Component	Material % of BOM Item	BOM Item Weight (mg)	BOM Item % of Component
Ceramic Substrate	aluminum oxide	1344-28-1	0.8489	751,366	96.00%	0.8843	78.27%
	silicon oxide	7631-86-9	0.0177	15,653	2.00%		
	magnesium oxide	1309-48-4	0.0088	7,827	1.00%		
	calcium oxide	1305-78-8	0.0088	7,827	1.00%		
Inner termination layer	silver	7440-22-4	0.0576	51,023	76.33%	0.0755	6.68%
	palladium	7440-05-3	0.0008	684	1.02%		
	boron trioxide	1303-86-2	0.0039	3,421	5.12%		
	silicon dioxide	14808-60-7	0.0078	6,886	10.30%		
	lead oxide	1317-36-8	0.0055	4,833	7.23%		
Resistive element	ruthenium oxide	12036-10-1	0.0061	5,432	27.19%	0.0226	2.00%
	silver	7440-22-4	0.0033	2,951	14.78%		
	palladium	7440-05-3	0.0010	855	4.28%		
	boron trioxide	1303-86-2	0.0032	2,865	14.35%		
	silicon dioxide	14808-60-7	0.0066	5,859	29.34%		
	lead oxide	1317-36-8	0.0023	2,010	10.06%		
Pre-coat	boron trioxide	1303-86-2	0.0052	4,576	25.48%	0.0203	1.80%
	silicon dioxide	14808-60-7	0.0105	9,281	51.67%		
	lead oxide	1317-36-8	0.0026	2,267	12.62%		
	copper oxide	1317-38-0	0.0009	813	4.52%		
	magnesium oxide	1309-48-4	0.0012	1,026	5.71%		
Over-coat	epoxy	67762-95-2	0.0367	32,504	100.00%	0.0367	3.25%
Middle termination layer	nickel	7440-02-0	0.0321	28,441	100.00%	0.0321	2.84%
Outer termination layer	tin	7440-31-5	0.0583	51,600	100.00%	0.0583	5.16%
Total Weight			1.1298				

Note: Lead oxide contained in glass frit is part of the thick film formulations. This lead content is covered by exemption 5 of the Directive Annex ("lead in glass of…electronic components…").
Weights are approximate.

Material Declaration Data Sheet

RM04 (0402 Package Size)

Lead-Free, RoHS Compliant Thick Film Chip Resistor

Date: **August 20, 2010**
Component Weight (mg): **1.3701**

Max Temp: **260°C** (Contact factory for detailed soldering recommendations.)
MSL: **1**

BOM Item	Material	CAS Number	Material Weight (mg)	Material PPM of Component	Material % of BOM Item	BOM Item Weight (mg)	BOM Item % of Component
Ceramic Substrate	aluminum oxide	1344-28-1	1.0141	740,177	96.00%	1.0564	77.10%
	silicon oxide	7631-86-9	0.0211	15,420	2.00%		
	magnesium oxide	1309-48-4	0.0106	7,710	1.00%		
	calcium oxide	1305-78-8	0.0106	7,710	1.00%		
Inner termination layer	silver	7440-22-4	0.0689	50,266	76.33%	0.0902	6.59%
	palladium	7440-05-3	0.0009	674	1.02%		
	boron trioxide	1303-86-2	0.0046	3,371	5.12%		
	silicon dioxide	14808-60-7	0.0093	6,784	10.30%		
	lead oxide	1317-36-8	0.0065	4,761	7.23%		
Resistive element	ruthenium oxide	12036-10-1	0.0073	5,351	27.19%	0.0270	1.97%
	silver	7440-22-4	0.0040	2,907	14.78%		
	palladium	7440-05-3	0.0012	843	4.28%		
	boron trioxide	1303-86-2	0.0039	2,823	14.35%		
	silicon dioxide	14808-60-7	0.0079	5,772	29.34%		
	lead oxide	1317-36-8	0.0027	1,980	10.06%		
Pre-coat	boron trioxide	1303-86-2	0.0107	7,809	24.00%	0.0446	3.25%
	silicon dioxide	14808-60-7	0.0217	15,838	48.67%		
	lead oxide	1317-36-8	0.0097	7,080	21.76%		
	copper oxide	1317-38-0	0.0011	801	2.46%		
	magnesium oxide	1309-48-4	0.0014	1,011	3.11%		
Over-coat	epoxy	67762-95-2	0.0439	32,022	100.00%	0.0439	3.20%
Middle termination layer	nickel	7440-02-0	0.0384	28,019	100.00%	0.0384	2.80%
Outer termination layer	tin	7440-31-5	0.0697	50,871	100.00%	0.0697	5.09%
Total Weight			1.3701				

Note: Lead oxide contained in glass frit is part of the thick film formulations. This lead content is covered by exemption 5 of the Directive Annex ("lead in glass of…electronic components…").
Weights are approximate.

Material Declaration Data Sheet

RM06 (0603 Package Size)

Lead-Free, RoHS Compliant Thick Film Chip Resistor

Date: **August 20, 2010**
Component Weight (mg): **2.3385**

Max Temp: **260°C** (Contact factory for detailed soldering recommendations.)
MSL: **1**

BOM Item	Material	CAS Number	Material Weight (mg)	Material PPM of Component	Material % of BOM Item	BOM Item Weight (mg)	BOM Item % of Component
Ceramic Substrate	aluminum oxide	1344-28-1	1.7568	751,251	96.00%	1.8300	78.26%
	silicon oxide	7631-86-9	0.0366	15,651	2.00%		
	magnesium oxide	1309-48-4	0.0183	7,826	1.00%		
	calcium oxide	1305-78-8	0.0183	7,826	1.00%		
Inner termination layer	silver	7440-22-4	0.1193	51,016	76.33%	0.1563	6.68%
	palladium	7440-05-3	0.0016	684	1.02%		
	boron trioxide	1303-86-2	0.0080	3,421	5.12%		
	silicon dioxide	14808-60-7	0.0161	6,885	10.30%		
	lead oxide	1317-36-8	0.0113	4,832	7.23%		
Resistive element	ruthenium oxide	12036-10-1	0.0127	5,431	27.19%	0.0467	2.00%
	silver	7440-22-4	0.0069	2,951	14.78%		
	palladium	7440-05-3	0.0020	855	4.28%		
	boron trioxide	1303-86-2	0.0067	2,865	14.35%		
	silicon dioxide	14808-60-7	0.0137	5,858	29.34%		
	lead oxide	1317-36-8	0.0047	2,010	10.06%		
Pre-coat	boron trioxide	1303-86-2	0.0107	4,576	25.48%	0.0420	1.80%
	silicon dioxide	14808-60-7	0.0217	9,279	51.67%		
	lead oxide	1317-36-8	0.0053	2,266	12.62%		
	copper oxide	1317-38-0	0.0019	812	4.52%		
	magnesium oxide	1309-48-4	0.0024	1,026	5.71%		
Over-coat	epoxy	67762-95-2	0.0760	32,499	100.00%	0.0760	3.25%
Middle termination layer	nickel	7440-02-0	0.0665	28,437	100.00%	0.0665	2.84%
Outer termination layer	tin	7440-31-5	0.1210	51,743	100.00%	0.1210	5.17%
Total Weight			2.3385				

Note: Lead oxide contained in glass frit is part of the thick film formulations. This lead content is covered by exemption 5 of the Directive Annex ("lead in glass of…electronic components…").
Weights are approximate.

Material Declaration Data Sheet

RM10 (0805 Package Size)

Lead-Free, RoHS Compliant Thick Film Chip Resistor

Date: **August 20, 2010**
Component Weight (mg): **5.0334**

Max Temp: **260°C** (Contact factory for detailed soldering recommendations.)
MSL: **1**

BOM Item	Material	CAS Number	Material Weight (mg)	Material PPM of Component	Material % of BOM Item	BOM Item Weight (mg)	BOM Item % of Component
Ceramic Substrate	aluminum oxide	1344-28-1	3.6960	734,295	96.00%	3.8500	76.49%
	silicon oxide	7631-86-9	0.0770	15,298	2.00%		
	magnesium oxide	1309-48-4	0.0385	7,649	1.00%		
	calcium oxide	1305-78-8	0.0385	7,649	1.00%		
Inner termination layer	silver	7440-22-4	0.2630	52,251	75.34%	0.3491	6.94%
	palladium	7440-05-3	0.0035	695	1.00%		
	boron trioxide	1303-86-2	0.0175	3,477	5.01%		
	silicon dioxide	14808-60-7	0.0356	7,073	10.20%		
	lead oxide	1317-36-8	0.0295	5,861	8.45%		
Resistive element	ruthenium oxide	12036-10-1	0.0221	4,391	25.49%	0.0867	1.72%
	silver	7440-22-4	0.0120	2,384	13.84%		
	palladium	7440-05-3	0.0030	596	3.46%		
	boron trioxide	1303-86-2	0.0133	2,642	15.34%		
	silicon dioxide	14808-60-7	0.0270	5,364	31.14%		
	lead oxide	1317-36-8	0.0093	1,848	10.73%		
Pre-coat	boron trioxide	1303-86-2	0.0302	6,000	25.36%	0.1191	2.37%
	silicon dioxide	14808-60-7	0.0614	12,199	51.55%		
	lead oxide	1317-36-8	0.0151	3,000	12.68%		
	copper oxide	1317-38-0	0.0055	1,093	4.62%		
	magnesium oxide	1309-48-4	0.0069	1,371	5.79%		
Over-coat	epoxy	67762-95-2	0.1590	31,589	100.00%	0.1590	3.16%
Middle termination layer	nickel	7440-02-0	0.1665	33,079	100.00%	0.1665	3.31%
Outer termination layer	tin	7440-31-5	0.3030	60,198	100.00%	0.3030	6.02%
Total Weight			5.0334				

Note: Lead oxide contained in glass frit is part of the thick film formulations. This lead content is covered by exemption 5 of the Directive Annex ("lead in glass of…electronic components…").
Weights are approximate.

Material Declaration Data Sheet

RM12 (1206 Package Size)

Lead-Free, RoHS Compliant Thick Film Chip Resistor

Date: **August 20, 2010**
Component Weight (mg): **10.2568**

Max Temp: **260°C** (Contact factory for detailed soldering recommendations.)
MSL: **1**

BOM Item	Material	CAS Number	Material Weight (mg)	Material PPM of Component	Material % of BOM Item	BOM Item Weight (mg)	BOM Item % of Component
Ceramic Substrate	aluminum oxide	1344-28-1	7.9968	779,658	96.00%	8.3300	81.21%
	silicon oxide	7631-86-9	0.1666	16,243	2.00%		
	magnesium oxide	1309-48-4	0.0833	8,121	1.00%		
	calcium oxide	1305-78-8	0.0833	8,121	1.00%		
Inner termination layer	silver	7440-22-4	0.5370	52,356	76.96%	0.6978	6.80%
	palladium	7440-05-3	0.0072	702	1.03%		
	boron trioxide	1303-86-2	0.0358	3,490	5.13%		
	silicon dioxide	14808-60-7	0.0726	7,078	10.40%		
	lead oxide	1317-36-8	0.0452	4,407	6.48%		
Resistive element	ruthenium oxide	12036-10-1	0.0463	4,514	25.85%	0.1791	1.75%
	silver	7440-22-4	0.0252	2,457	14.07%		
	palladium	7440-05-3	0.0073	712	4.08%		
	boron trioxide	1303-86-2	0.0269	2,623	15.02%		
	silicon dioxide	14808-60-7	0.0546	5,323	30.49%		
	lead oxide	1317-36-8	0.0188	1,833	10.50%		
Pre-coat	boron trioxide	1303-86-2	0.0454	4,426	25.38%	0.1789	1.74%
	silicon dioxide	14808-60-7	0.0923	8,999	51.59%		
	lead oxide	1317-36-8	0.0227	2,213	12.69%		
	copper oxide	1317-38-0	0.0082	799	4.58%		
	magnesium oxide	1309-48-4	0.0103	1,004	5.76%		
Over-coat	epoxy	67762-95-2	0.3070	29,931	100.00%	0.3070	2.99%
Middle termination layer	nickel	7440-02-0	0.2000	19,499	100.00%	0.2000	1.95%
Outer termination layer	tin	7440-31-5	0.3640	35,489	100.00%	0.3640	3.55%
Total Weight			10.2568				

Note: Lead oxide contained in glass frit is part of the thick film formulations. This lead content is covered by exemption 5 of the Directive Annex ("lead in glass of…electronic components…").
Weights are approximate.

Material Declaration Data Sheet

RM14 (1210 Package Size)

Lead-Free, RoHS Compliant Thick Film Chip Resistor

Date: **August 20, 2010**
Component Weight (mg): **16.6241**

Max Temp: **260°C** (Contact factory for detailed soldering recommendations.)
MSL: **1**

BOM Item	Material	CAS Number	Material Weight (mg)	Material PPM of Component	Material % of BOM Item	BOM Item Weight (mg)	BOM Item % of Component
Ceramic Substrate	aluminum oxide	1344-28-1	12.7968	769,774	96.00%	13.3300	80.18%
	silicon oxide	7631-86-9	0.2666	16,037	2.00%		
	magnesium oxide	1309-48-4	0.1333	8,018	1.00%		
	calcium oxide	1305-78-8	0.1333	8,018	1.00%		
Inner termination layer	silver	7440-22-4	0.8379	50,403	76.95%	1.0889	6.55%
	palladium	7440-05-3	0.0112	674	1.03%		
	boron trioxide	1303-86-2	0.0558	3,357	5.12%		
	silicon dioxide	14808-60-7	0.1134	6,821	10.41%		
	lead oxide	1317-36-8	0.0706	4,247	6.48%		
Resistive element	ruthenium oxide	12036-10-1	0.1032	6,208	25.86%	0.3990	2.40%
	silver	7440-22-4	0.0560	3,369	14.04%		
	palladium	7440-05-3	0.0163	981	4.09%		
	boron trioxide	1303-86-2	0.0599	3,603	15.01%		
	silicon dioxide	14808-60-7	0.1217	7,321	30.50%		
	lead oxide	1317-36-8	0.0419	2,520	10.50%		
Pre-coat	boron trioxide	1303-86-2	0.1046	6,292	25.41%	0.4117	2.48%
	silicon dioxide	14808-60-7	0.2123	12,771	51.57%		
	lead oxide	1317-36-8	0.0521	3,134	12.65%		
	copper oxide	1317-38-0	0.0190	1,143	4.62%		
	magnesium oxide	1309-48-4	0.0237	1,426	5.76%		
Over-coat	epoxy	67762-95-2	0.6430	38,679	100.00%	0.6430	3.87%
Middle termination layer	nickel	7440-02-0	0.2665	16,031	100.00%	0.2665	1.60%
Outer termination layer	tin	7440-31-5	0.4850	29,175	100.00%	0.4850	2.92%
Total Weight			16.6241				

Note: Lead oxide contained in glass frit is part of the thick film formulations. This lead content is covered by exemption 5 of the Directive Annex ("lead in glass of…electronic components…").
Weights are approximate.

Material Declaration Data Sheet

RM20 (2010 Package Size)

Lead-Free, RoHS Compliant Thick Film Chip Resistor

Date: **August 20, 2010**
Component Weight (mg): **26.2064**

Max Temp: **260°C** (Contact factory for detailed soldering recommendations.)
MSL: **1**

BOM Item	Material	CAS Number	Material Weight (mg)	Material PPM of Component	Material % of BOM Item	BOM Item Weight (mg)	BOM Item % of Component
Ceramic Substrate	aluminum oxide	1344-28-1	20.2656	773,307	96.00%	21.1100	80.55%
	silicon oxide	7631-86-9	0.4222	16,111	2.00%		
	magnesium oxide	1309-48-4	0.2111	8,055	1.00%		
	calcium oxide	1305-78-8	0.2111	8,055	1.00%		
Inner termination layer	silver	7440-22-4	1.5135	57,753	78.95%	1.9171	7.32%
	palladium	7440-05-3	0.0202	771	1.05%		
	boron trioxide	1303-86-2	0.1008	3,846	5.26%		
	silicon dioxide	14808-60-7	0.2048	7,815	10.68%		
	lead oxide	1317-36-8	0.0778	2,969	4.06%		
Resistive element	ruthenium oxide	12036-10-1	0.2020	7,708	27.36%	0.7384	2.82%
	silver	7440-22-4	0.1097	4,186	14.86%		
	palladium	7440-05-3	0.0320	1,221	4.33%		
	boron trioxide	1303-86-2	0.1058	4,037	14.33%		
	silicon dioxide	14808-60-7	0.2149	8,200	29.10%		
	lead oxide	1317-36-8	0.0740	2,824	10.02%		
Pre-coat	boron trioxide	1303-86-2	0.1806	6,891	25.40%	0.7109	2.71%
	silicon dioxide	14808-60-7	0.3667	13,993	51.58%		
	lead oxide	1317-36-8	0.0900	3,434	12.66%		
	copper oxide	1317-38-0	0.0327	1,248	4.60%		
	magnesium oxide	1309-48-4	0.0409	1,561	5.75%		
Over-coat	epoxy	67762-95-2	0.8840	33,732	100.00%	0.8840	3.37%
Middle termination layer	nickel	7440-02-0	0.3000	11,448	100.00%	0.3000	1.14%
Outer termination layer	tin	7440-31-5	0.5460	20,835	100.00%	0.5460	2.08%
Total Weight			26.2064				

Note: Lead oxide contained in glass frit is part of the thick film formulations. This lead content is covered by exemption 5 of the Directive Annex ("lead in glass of…electronic components…").
Weights are approximate.

Material Declaration Data Sheet

RM25 (2512 Package Size)

Lead-Free, RoHS Compliant Thick Film Chip Resistor

Date: **August 20, 2010**
Component Weight (mg): **44.0062**

Max Temp: **260°C** (Contact factory for detailed soldering recommendations.)
MSL: **1**

BOM Item	Material	CAS Number	Material Weight (mg)	Material PPM of Component	Material % of BOM Item	BOM Item Weight (mg)	BOM Item % of Component
Ceramic Substrate	aluminum oxide	1344-28-1	32.8608	746,731	96.00%	34.2300	77.78%
	silicon oxide	7631-86-9	0.6846	15,557	2.00%		
	magnesium oxide	1309-48-4	0.3423	7,778	1.00%		
	calcium oxide	1305-78-8	0.3423	7,778	1.00%		
Inner termination layer	silver	7440-22-4	2.3783	54,045	79.54%	2.9900	6.79%
	palladium	7440-05-3	0.0317	720	1.06%		
	boron trioxide	1303-86-2	0.1585	3,602	5.30%		
	silicon dioxide	14808-60-7	0.3217	7,310	10.76%		
	lead oxide	1317-36-8	0.0998	2,268	3.34%		
Resistive element	ruthenium oxide	12036-10-1	0.3619	8,224	26.75%	1.3528	3.07%
	silver	7440-22-4	0.1965	4,465	14.53%		
	palladium	7440-05-3	0.0573	1,302	4.24%		
	boron trioxide	1303-86-2	0.1976	4,490	14.61%		
	silicon dioxide	14808-60-7	0.4013	9,119	29.66%		
	lead oxide	1317-36-8	0.1382	3,140	10.22%		
Pre-coat	boron trioxide	1303-86-2	0.6141	13,955	25.40%	2.4174	5.49%
	silicon dioxide	14808-60-7	1.2467	28,330	51.57%		
	lead oxide	1317-36-8	0.3061	6,956	12.66%		
	copper oxide	1317-38-0	0.1113	2,529	4.60%		
	magnesium oxide	1309-48-4	0.1392	3,163	5.76%		
Over-coat	epoxy	67762-95-2	1.6060	36,495	100.00%	1.6060	3.65%
Middle termination layer	nickel	7440-02-0	0.5000	11,362	100.00%	0.5000	1.14%
Outer termination layer	tin	7440-31-5	0.9100	20,679	100.00%	0.9100	2.07%
Total Weight			44.0062				

Note: Lead oxide contained in glass frit is part of the thick film formulations. This lead content is covered by exemption 5 of the Directive Annex ("lead in glass of…electronic components…").
Weights are approximate.