Thin Film Precision Chip Resistors

Nickel Tin, Gold and SnPb terminations · COTS+ options

DESCRIPTION

SRT thin film chip resistors combine tight tolerance, very low temperature coefficient and long-term stability on an alumina substrate. They are available with three termination finishes and optional COTS+ screening for space and high reliability applications.



RoHS compliant with X (NiSn) and G (gold) terminations ; SnPb termination (I) exempted for high reliability applications.

APPLICATIONS

- Medical, testing and measurement equipment
- Industrial equipment, automatic controllers, converters
- Telecommunication devices, sensors

FEATURES

- Advanced thin film technology
- Very tight tolerance down to ±0.01 %
- Extremely low TCR down to ±1 ppm/°C
- Resistance range 1 Ω to 3 MΩ, E24 / E96 and non-standard values
- Advanced sulfur resistance verified according to ASTM B809
- Nickel barrier, Sn plated termination suitable for reflow and wave soldering (RoHS compliant)
- Gold plated termination (Ni barrier, min 0.2 µm Au) suitable for conductive epoxy bonding and wire bonding
- Electrolytic SnPb termination (min 10 % Pb) — whisker free, high reliability (space, medical)
- COTS+ options : class 1, 2 or 3 screening according to ECSS-Q-ST-60-13C

ELECTRICAL PARAMETERS

RESISTANCE RANGE :
1 Ω to 3 MΩ (E24 / E96 and non-standard values on request), by size, tolerance and TCR : see Electrical specifications

RESISTANCE TOLERANCE :
±0.01 %, ±0.05 %, ±0.1 %, ±0.25 %, ±0.5 %, ±1 %

TEMPERATURE COEFFICIENT (TCR) :
±1 to ±50 ppm/°C (+25 / +125 °C reference), see table

RATED POWER AT +70 °C :
1/32 W to 1 W by size — standard and high power ratings, see table

RATED CONTINUOUS WORKING VOLTAGE :
√(P × R) or maximum operating voltage of the table, whichever is lower

MAX OVERLOAD VOLTAGE :
2.5 × √(P × R) or maximum overload voltage of the table, whichever is lower (5 s)

OPERATING TEMPERATURE :
-55 °C, +155 °C — power derating from +70 °C to zero at +155 °C

INSULATION RESISTANCE :
> 1000 MΩ (100 Vdc, 1 min)

SULFUR RESISTANCE :
Advanced anti-sulfur design, verified according to ASTM B809

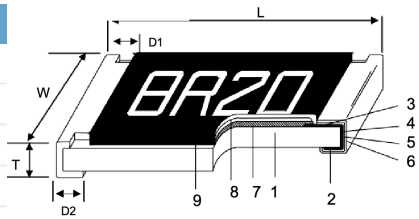
HOW TO ORDER

A	X	03	B	T	S	Y	1002	-	COTS1
SERIES	TERMINATION	SIZE	TOLERANCE	PACKAGING	TCR	POWER	RESISTANCE	MARKING	SPECIAL
A Thin film chip resistor	X Nickel Tin G Gold plated I SnPb plated	01 0201 02 0402 03 0603 05 0805 06 1206 13 1210 10 2010 12 2512	T ±0.01 % A ±0.05 % B ±0.1 % C ±0.25 % D ±0.5 % F ±1 %	T Tape & reel 7" B Bulk	5 ±1 ppm/°C X ±2 ppm/°C O ±3 ppm/°C S ±5 ppm/°C B ±10 ppm/°C N ±15 ppm/°C C ±25 ppm/°C D ±50 ppm/°C	Z 1/32 W N 1/20 W Y 1/16 W X 1/10 W W 1/8 W M 1/6 W V 1/4 W O 1/3 W U 1/2 W Q 3/4 W T 1 W	1002 = 10 kΩ (3 digits + multiplier) 4R70 = 4.7 Ω (R = decimal point) 0000 = 0 Ω jumper	- Standard marking N Unmarked	- Standard COTS1 COTS+ Class 1 COTS2 COTS+ Class 2 COTS3 COTS+ Class 3

Example : AX03BTSY1002COTS1 — 0603, ±0.1 %, tape & reel, ±5 ppm/°C, 1/16 W, 10 kΩ, COTS+ class 1. The power, N and special codes are omitted when not applicable.

DIMENSIONS IN MILLIMETERS

SIZE	CODE	L	W	T	D1	D2	WEIGHT G/1000
0201	01	0.58 ± 0.05	0.29 ± 0.05	0.23 ± 0.05	0.12 ± 0.05	0.15 ± 0.05	0.14
0402	02	1.00 ± 0.05	0.50 ± 0.05	0.30 ± 0.05	0.20 ± 0.10	0.20 ± 0.10	0.54
0603	03	1.55 ± 0.10	0.80 ± 0.10	0.45 ± 0.10	0.30 ± 0.20	0.30 ± 0.20	1.83
0805	05	2.00 ± 0.15	1.25 ± 0.15	0.55 ± 0.10	0.30 ± 0.20	0.40 ± 0.20	4.71
1206	06	3.05 ± 0.15	1.55 ± 0.15	0.55 ± 0.10	0.42 ± 0.20	0.35 ± 0.25	9.02
1210	13	3.10 ± 0.15	2.40 ± 0.15	0.55 ± 0.10	0.40 ± 0.20	0.55 ± 0.25	10.00
2010	10	4.90 ± 0.15	2.40 ± 0.15	0.55 ± 0.10	0.60 ± 0.30	0.50 ± 0.25	23.61
2010 (1/2W)	10	4.90 ± 0.15	2.40 ± 0.15	0.55 ± 0.10	0.60 ± 0.30	2.20 ± 0.25	26.68
2512	12	6.30 ± 0.15	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.30	0.50 ± 0.25	38.06
2512 (1W)	12	6.30 ± 0.15	3.10 ± 0.15	0.55 ± 0.10	0.60 ± 0.30	2.50 ± 0.25	44.65



1. Alumina substrate
2. Bottom electrode
3. Top electrode
4. Edge electrode
5. Barrier layer
6. External electrode
7. Resistor layer
8. Overcoat
9. Marking

ELECTRICAL SPECIFICATIONS

Resistance ranges by size, power rating, tolerance and TCR. Operating voltage = √(P × R) or maximum operating voltage, whichever is lower ; overload voltage = 2.5 × √(P × R) or maximum overload voltage, whichever is lower. Operating temperature -55 °C, +155 °C.

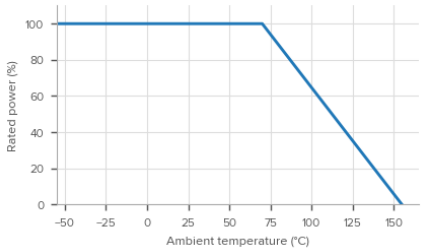
Standard grade

SIZE	POWER RATING	MAX. OP. V	MAX. OVERLOAD V	±0.01 %	±0.05 %	±0.1 %	±0.25 %	±0.5 %	±1 %	TCR PPM/°C
0201	1/32 W standard	15 V	30 V	–	–		22Ω–75kΩ			±25, ±50
0201	1/20 W high power	25 V	50 V	–	–		22Ω–75kΩ			±25, ±50
0402	1/16 W standard	50 V	100 V	49.9Ω–4.99kΩ		–	–	–	–	±1, ±2, ±3
						49.9Ω–20kΩ				±5
				49.9Ω–20kΩ			49.9Ω–100kΩ			±10, ±15
				–	49.9Ω–12kΩ		4Ω–511kΩ			±25, ±50
0402	1/10 W high power	50 V	100 V	49.9Ω–4.99kΩ		–	–	–	–	±1, ±2, ±3
						49.9Ω–20kΩ				±5
				49.9Ω–12kΩ			49.9Ω–100kΩ			±10, ±15
				–	49.9Ω–12kΩ		4.7Ω–255kΩ			±25, ±50
0603	1/16 W standard	50 V	100 V	24.9Ω–15kΩ		–	–	–	–	±1, ±2, ±3
						24.9Ω–60kΩ				±5
				24.9Ω–100kΩ	4.7Ω–332kΩ		4.7Ω–511kΩ			±10, ±15
				–	4.7Ω–332kΩ		1Ω–1MΩ			±25, ±50
0603	1/10 W high power	75 V	150 V	24.9Ω–15kΩ		–	–	–	–	±1, ±2, ±3
						24.9Ω–60kΩ				±5
				24.9Ω–100kΩ	4.7Ω–332kΩ		4.7Ω–511kΩ			±10, ±15
				24.9Ω–100kΩ	4.7Ω–332kΩ		1Ω–1MΩ			±25, ±50
0603	1/6 W high power	100 V	150 V	–			10Ω–332kΩ			±25, ±50
0805	1/10 W standard	100 V	200 V	24.9Ω–30kΩ		–	–	–	–	±1, ±2, ±3
						24.9Ω–150kΩ				±5
				24.9Ω–200kΩ			4.7Ω–1MΩ			±10, ±15
				–	4.7Ω–1MΩ		1Ω–2MΩ			±25, ±50
0805	1/8 W high power	150 V	300 V	24.9Ω–30kΩ		–	–	–	–	±1, ±2, ±3
						24.9Ω–150kΩ				±5
				24.9Ω–200kΩ	4.7Ω–511kΩ		4.7Ω–1MΩ			±10, ±15
				24.9Ω–200kΩ	4.7Ω–511kΩ		1Ω–1MΩ			±25, ±50
0805	1/4 W high power	150 V	300 V	–			10Ω–499kΩ			±25, ±50
1206	1/8 W standard	150 V	300 V	24.9Ω–49.9kΩ		–	–	–	–	±1, ±2, ±3
						24.9Ω–300kΩ				±5
				24.9Ω–499kΩ			4.7Ω–1.5MΩ			±10, ±15
				–	4.7Ω–1MΩ		1Ω–2.5MΩ			±25, ±50
1206	1/4 W high power	200 V	400 V	24.9Ω–49.9kΩ		–	–	–	–	±1, ±2, ±3
						24.9Ω–300kΩ				±5
				24.9Ω–499kΩ			4.7Ω–1MΩ			±10, ±15
				24.9Ω–499kΩ			1Ω–1MΩ			±25, ±50

Standard grade											
SIZE	POWER RATING	MAX. OP. V	MAX. OVERLOAD V	±0.01 %	±0.05 %	±0.1 %	±0.25 %	±0.5 %	±1 %	TCR PPM/°C
1206	1/3 W high power	200 V	400 V	–			10Ω–1MΩ			±25, ±50
1210	1/4 W standard	150 V	300 V	24.9Ω–49.9kΩ		–	–	–	–	±1, ±2, ±3
							24.9Ω–300kΩ			±5
				24.9Ω–499kΩ			4.7Ω–1MΩ			±10, ±15
				–	4.7Ω–1MΩ		1Ω–2.5MΩ			±25, ±50
1210	1/3 W high power	200 V	400 V	24.9Ω–49.9kΩ		–	–	–	–	±1, ±2, ±3
							24.9Ω–300kΩ			±5
				24.9Ω–499kΩ			4.7Ω–1MΩ			±10, ±15
				24.9Ω–499kΩ			1Ω–1MΩ			±25, ±50
2010	1/4 W standard	150 V	300 V	24.9Ω–100kΩ		–	–	–	–	±1, ±2, ±3
							24.9Ω–300kΩ			±5
				24.9Ω–499kΩ			4.7Ω–1MΩ			±10, ±15
				–	4.7Ω–1MΩ		1Ω–3MΩ			±25, ±50
2010	1/3 W high power	200 V	400 V	24.9Ω–49.9kΩ		–	–	–	–	±1, ±2, ±3
							24.9Ω–300kΩ			±5
				24.9Ω–499kΩ			4.7Ω–1MΩ			±10, ±15
				24.9Ω–499kΩ			1Ω–1MΩ			±25, ±50
2010	1/2 W high power (½ W version)	200 V	400 V	24.9Ω–2kΩ	4.7Ω–1MΩ			1Ω–1MΩ		±10, ±15, ±25, ±50
2512	1/2 W standard	150 V	300 V	24.9Ω–100kΩ		–	–	–	–	±1, ±2, ±3
							24.9Ω–300kΩ			±5
				24.9Ω–499kΩ			4.7Ω–1MΩ			±10, ±15
				–	4.7Ω–1MΩ		1Ω–3MΩ			±25, ±50
2512	3/4 W high power	200 V	400 V	24.9Ω–2kΩ	4.7Ω–2kΩ			1Ω–2kΩ		±10, ±15, ±25, ±50
2512	1 W high power (1 W version)	200 V	400 V	24.9Ω–2kΩ	4.7Ω–1MΩ			1Ω–1MΩ		±10, ±15, ±25, ±50

Lower resistance values (1 Ω to 10 Ω) available on request.

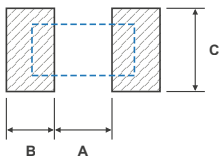
POWER DERATING



Rated power applies up to +70 °C, then decreases linearly to zero at +155 °C.

RECOMMENDED LAND PATTERN

SIZE	A	B	C
0201	0.25	0.30	0.40 ± 0.20
0402	0.50	0.50	0.60 ± 0.20
0603	0.80	1.00	0.90 ± 0.20
0805	1.00	1.00	1.35 ± 0.20
1206	2.00	1.15	1.70 ± 0.20
1210	2.00	1.15	2.50 ± 0.20
2010	3.60	1.40	2.50 ± 0.20
2010 (1/2W)	1.00	2.70	2.50 ± 0.20
2512	4.90	1.60	3.10 ± 0.20
2512 (1W)	1.00	3.55	3.10 ± 0.20



ENVIRONMENTAL CHARACTERISTICS

ITEM	REQUIREMENT	TEST METHOD
Temperature coefficient of resistance	As specified	MIL-STD-202 method 304 / IEC 60115-1 4.8 — +25/-55/+25/+125/+25 °C
Short time overload	ΔR ±0.05 % (tol. ≤ 0.05 %) / ±0.2 %	JIS-C-5201-1 4.13 — 2.5 × RCWV or max overload voltage, 5 s
Insulation resistance	> 9999 MΩ	MIL-STD-202 method 302 — 100 Vdc, 1 min
Endurance	ΔR ±0.05 % / ±0.2 % (±0.5 % high power)	MIL-STD-202 method 108 — 70 °C, RCWV 1000 h, 1.5 h on / 0.5 h off
Damp heat with load / biased humidity	ΔR ±0.05 % / ±0.3 %	MIL-STD-202 method 103 — 40 °C 90-95 % RH, 1000 h

ITEM	REQUIREMENT	TEST METHOD
High temperature exposure	**ΔR ±0.5 %**	MIL-STD-202 method 108 — +155 °C, 1000 h
Bending strength (board flex)	**ΔR ±0.05 % / ±0.1 %**	JIS-C-5201-1 4.33 — 3 mm (2 mm for 2010 / 2512), 60 s
Solderability	**95 % min coverage**	MIL-STD-202 method 208 / IEC 60115-1 4.17 — 245 ± 5 °C, 3 s
Resistance to soldering heat	**ΔR ±0.05 % / ±0.1 %**	MIL-STD-202 method 210 / IEC 60115-1 4.18 — 260 ± 5 °C, 10 s
Dielectric withstanding voltage	**By type**	MIL-STD-202 method 301 — max overload voltage, 1 min
Low temperature operation	**ΔR ±0.05 % / ±0.2 %**	JIS-C-5201-1 4.36 — 1 h at -65 °C then 45 min RCWV

HIGH RELIABILITY OPTIONS

COTS1 — COTS+ CLASS 1

- COTS+ Class 1 according to ECSS-Q-ST-60-13C

COTS2 — COTS+ CLASS 2

- COTS+ Class 2 according to ECSS-Q-ST-60-13C

COTS3 — COTS+ CLASS 3

- COTS+ Class 3 according to ECSS-Q-ST-60-13C

MARKING

- 0201 and 0402 : unmarked.
- 0603 : 3-digit code — E96 series code (2 digits) + multiplier letter ; E24 values marked with 3 digits (2 significant + multiplier).
- 0805 to 2512 : 4-digit code — 3 significant digits + multiplier (1002 = 10 kΩ), R = decimal point (4R70 = 4.7 Ω).
- Option N : unmarked on request (all sizes).

PACKAGING

7" reel (Ø 178 mm) — paper tape 8 mm for 0201 / 0402 (10 000 pcs), paper tape 8 mm for 0603 to 1210 (5 000 pcs), embossed plastic tape 12 mm for 2010 / 2512 (4 000 pcs). Bulk on request.

NOTES

- Resistors are not fail-safe : the resistance of a thin film resistor drifts towards open circuit under overload ; use a fuse in series where a short circuit failure mode would be hazardous.

REVISION HISTORY

REV	ISSUED	PREPARED BY
1	26/10/2026	PEF
2	28/10/2026	PEF

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