Thin Film Precision Chip Resistors — Automotive AEC-Q200

AEC-Q200 qualified · 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. Automotive grade qualified according to AEC-Q200, 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

- Automotive (AEC-Q200 grade)
- Medical, testing and measurement equipment
- Industrial equipment, automatic controllers, converters
- Telecommunication devices, sensors

FEATURES

- Qualified according to AEC-Q200
- Advanced thin film technology
- Very tight tolerance down to ±0.02 %
- Extremely low TCR down to ±5 ppm/°C
- Resistance range 10 Ω to 5.1 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 :
10 Ω to 5.1 MΩ (E24 / E96 and non-standard values on request), by size, tolerance and TCR : see Electrical specifications

RESISTANCE TOLERANCE :
±0.02 %, ±0.05 %, ±0.1 %, ±0.5 %

TEMPERATURE COEFFICIENT (TCR) :
±5 to ±100 ppm/°C (+25 / +125 °C reference), see table

RATED POWER AT +85 °C :
1/32 W to 1/4 W by size — standard, high power and ultra 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 +85 °C (standard / high power), +70 °C (ultra high power) to zero at +155 °C

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

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

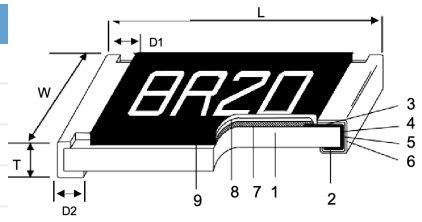
HOW TO ORDER

A	X	M	03	B	T	S	Y	1002	-	COTS1
SERIES	TERMINATION	GRADE	SIZE	TOLERANCE	PACKAGING	TCR	POWER	RESISTANCE	MARKING	SPECIAL
A Thin film chip resistor	X Nickel Tin G Gold plated I SnPb plated	M Automotive AEC-Q200	02 0402 03 0603 05 0805 06 1206	Q ±0.02 % A ±0.05 % B ±0.1 % D ±0.5 %	T Tape & reel 7" B Bulk	S ±5 ppm/°C B ±10 ppm/°C C ±25 ppm/°C D ±50 ppm/°C E ±100 ppm/°C	Z 1/32 W Y 1/16 W X 1/10 W W 1/8 W M 1/6 W V 1/4 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 : AXM03BTSY1002COTS1 — 0603 automotive, ±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
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



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

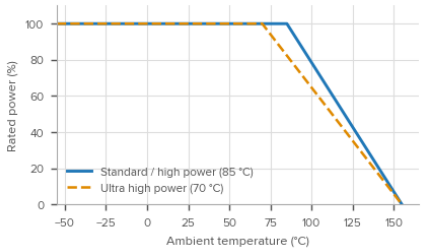
Resistance ranges by size, power rating, tolerance and TCR. Operating voltage = √(P × R) or maximum operating voltage, whichever is lower ; overload voltage = 2.5 × √(P × R) or maximum overload voltage, whichever is lower. Operating temperature -55 °C, +155 °C.

Automotive grade AEC-Q200

SIZE	POWER RATING	MAX. OP. V	MAX. OVERLOAD V	±0.02 %	±0.05 %	±0.1 %	±0.5 %	TCR PPM/°C
0402	1/32 W · 1/16 W · 1/8 W standard · high · ultra high	75 V	100 V			100Ω–3kΩ		±5
				100Ω–3kΩ		47Ω–100kΩ		±10
				100Ω–3kΩ		47Ω–100kΩ	47Ω–150kΩ	±25
				–	–	–	10Ω–47Ω	±100
0603	1/16 W · 1/10 W · 1/6 W standard · high · ultra high	100 V	200 V			100Ω–5.1kΩ		±5
				100Ω–5.1kΩ		47Ω–270kΩ		±10
				100Ω–5.1kΩ	47Ω–270kΩ	47Ω–332kΩ	47Ω–1MΩ	±25
				–	–	–	10Ω–47Ω	±50
0805	1/10 W · 1/8 W · 1/4 W standard · high · ultra high	150 V	300 V			100Ω–10.2kΩ		±5
				100Ω–10.2kΩ		47Ω–475kΩ		±10
				100Ω–10.2kΩ	47Ω–475kΩ		47Ω–2.7MΩ	±25
				–	–	–	10Ω–47Ω	±50
1206	1/8 W · 1/4 W standard · high	200 V	400 V			100Ω–33.2kΩ		±5
				100Ω–33.2kΩ		47Ω–1MΩ		±10
				100Ω–33.2kΩ	47Ω–1MΩ		47Ω–5.1MΩ	±25
				–	–	–	10Ω–47Ω	±50

Resistance ranges apply to the standard, high and ultra high power ratings. Rated power at +85 °C (standard / high) and +70 °C (ultra high).

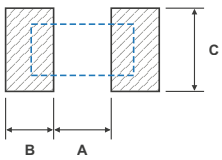
POWER DERATING



Rated power applies up to +85 °C (standard and high power ratings) or +70 °C (ultra high power), then decreases linearly to zero at +155 °C.

RECOMMENDED LAND PATTERN

SIZE	A	B	C
0402	0.50	0.50	0.60 ± 0.20
0603	1.00	1.00	1.20 ± 0.20
0805	1.20	1.40	1.65 ± 0.20
1206	2.20	1.40	2.00 ± 0.20



ENVIRONMENTAL CHARACTERISTICS

ITEM	AUTOMOTIVE AEC-Q200	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 % (≥ 47 Ω) / ±0.1 % (< 47 Ω)**	JIS-C-5201-1 4.13 — 2.5 × RCWV or max overload voltage, 5 s
Insulation resistance	**> 1000 MΩ**	MIL-STD-202 method 302 — 100 Vdc, 1 min
Endurance	**ΔR ±0.1 % (std) / ±0.25 % (high) / ±0.5 % (ultra high)**	MIL-STD-202 method 108 — 85 °C, RCWV 1000 h, 1.5 h on / 0.5 h off

ITEM	AUTOMOTIVE AEC-Q200	TEST METHOD
Damp heat with load / biased humidity	ΔR ±0.1 % / ±0.25 % / ±0.5 %	MIL-STD-202 method 103 — 85 °C / 85 % RH, 1000 h
High temperature exposure	ΔR ±0.1 % (≥ 47 Ω) / ±0.25 %	MIL-STD-202 method 108 — +155 °C, 1000 h
Temperature cycling	ΔR ±0.1 % (≥ 47 Ω) / ±0.25 %	JESD22 JA-104 — -55 / +125 °C, 1000 cycles
Bending strength (board flex)	ΔR ±0.1 %	JIS-C-5201-1 4.33 — 3 mm, 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 ±0.1 %	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
Terminal strength	No damage	AEC-Q200-006 — 1.8 kg, 60 s
Mechanical shock	ΔR ±0.1 %	MIL-STD-202 method 213 — half sine 100 g, 6 ms
Vibration	ΔR ±0.1 %	MIL-STD-202 method 204 — 5 g, 10-2000 Hz, 12 cycles × 3 axes
ESD	ΔR ±0.5 %	AEC-Q200-002 HBM — 0.2 kV (0402 / 0603), 1 kV (0805 / 1206)
Resistance to solvents	Marking unsmeared	MIL-STD-202 method 215

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

PACKAGING

7" reel (Ø 178 mm) — paper tape 8 mm for 0402 (10 000 pcs), paper tape 8 mm for 0603 to 1206 (5 000 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.

MARKING

- 0402 : unmarked.
- 0603 : 3-digit code — E96 series code (2 digits) + multiplier letter ; E24 values marked with 3 digits (2 significant + multiplier).
- 0805 / 1206 : 4-digit code — 3 significant digits + multiplier (1002 = 10 kΩ), R = decimal point (4R70 = 4.7 Ω).
- Option N : unmarked on request (all sizes).

REVISION HISTORY

REV	ISSUED	PREPARED BY
1	28/10/2026	PEF

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