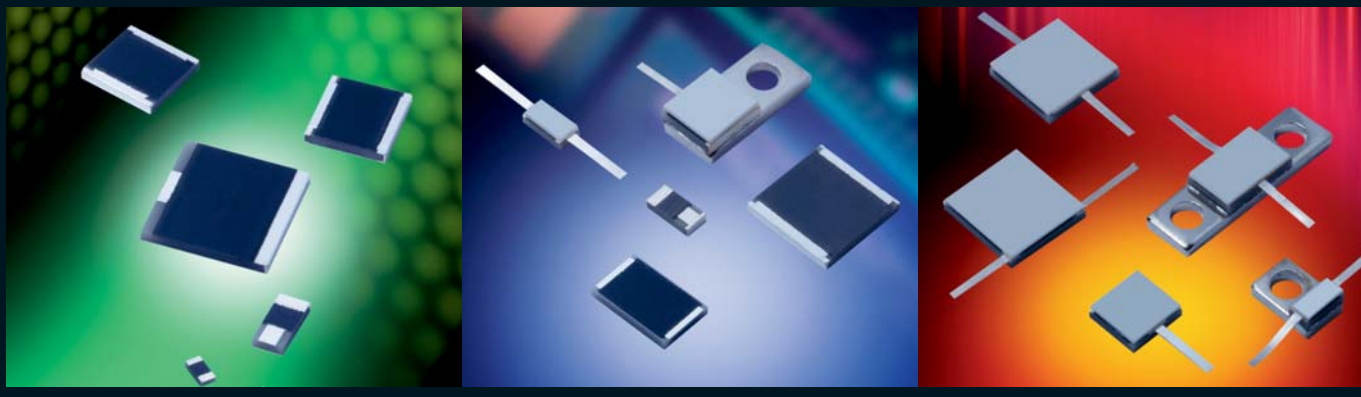
AVX **High Power Resistive Products**



Version 12.4

A KYOCERA GROUP COMPANY

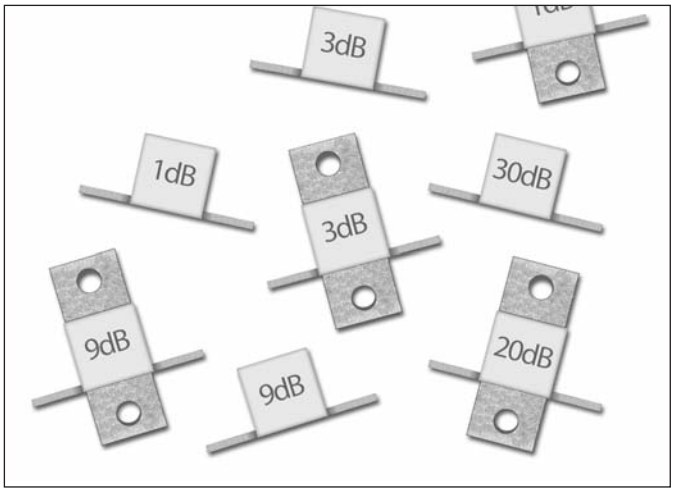
www.avx.com

Table of Contents

High Power Resistive Products

Attenuators

AVX introduces its line of High Power Attenuator Products. All products are designed and manufactured at our ISO 9001 Facilities. All products are qualified as per MIL-PRF-55342.



ELECTRICAL SPECIFICATIONS

Attenuation: 1 dB through 30 dB
Frequency Range: DC to 3 GHz
Input Power: up to 150 Watts
Operating Temperature Range: -55ºC through +150ºC

MECHANICAL SPECIFICATIONS

Package: Leaded and Flange Mounted
Substrate Material: Aluminum Nitride
Process: 100% Thin Film Processed
Resistive Material: Tantalum Nitride
Terminals: 100% Ag
Cover: Alumina
Mounting Flange: 100% Cu, Ni or Ag Plated
RoHS Compliant

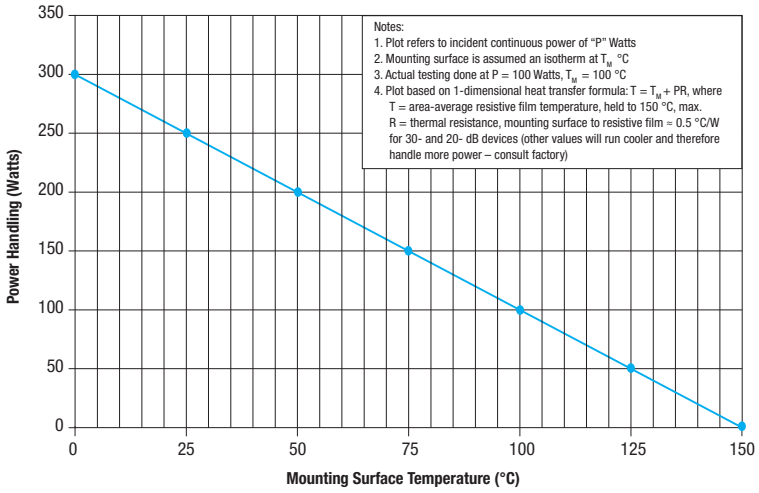
RoHS COMPLIANT

HOW TO ORDER

RP2	3740	A	01DB	F	P	BK
AVX Series RP1 RP2	**Case Size** 3740 0975	**Type** A = Attenuator	**Nominal Attenuation (dB)** See chart	**Tolerance** F = 1%	**Plating** P = Palladium	**Packaging** BK = Bulk

Contact factory for custom ratings and sizes.

Attenuator Power Handling vs. Mounting Surface Temperature



* Test Condition: With mounting surface temperature = 75°C, max. (see plot above). Actual test conditions are as follows: Flange attached to a large copper carrier whose surface, directly under the flange center, is held at 100°C; power applied = 100 Watts. Specification: The attenuation shall change no more that 0.2 dB during and after a 100-hr. Burn-in per MIL-PRF-55342.
** Attenuation vs. frequency as a function of temperature, -55°C to +125°C

High Power Resistive Products

Attenuators

FLANGE MOUNT ATTENUATORS – RP1 SERIES

GENERAL SPECIFICATIONS

Frequency Range: DC to 3 GHz

Input Power*: 150 Watts

Operating Temp Range: -55 to +150ºC

Attenuation Stability:** 0.0001 dB/dB/°C, Max.

Mounting Flange: Copper, Pd over Ni; other platings available

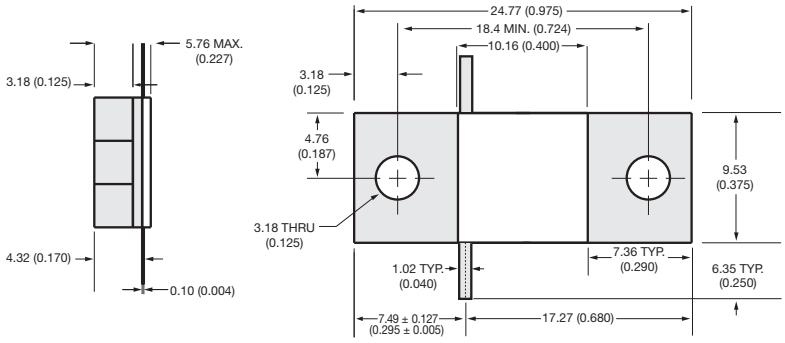
Resistive Elements: Tantalum Nitride

Substrate Material: Aluminum Nitride

Tabs: 99.99% Pure Silver, 0.25 (0.004) thick, Cover: Alumina

RoHS Compliant

Reliability: MIL-PRF-55342



mm (inches)

Mechanical Tolerance: ±0.25 (0.010) unless otherwise specified

AVX Part Number	Nominal Attenuation (dB)	Frequency Sensitivity (dB, max.)	Maximum Deviation from Nominal (dB)	VSWR (max.)
RP10975A01DBFPBK	1	± 0.25	+0.45 / -0.15	1.55:1
RP10975A02DBFPBK	2	±0.30	+0.50 / -0.30	1.50:1
RP10975A03DBFPBK	3	± 0.30	+0.60 / -0.30	1.50:1
RP10975A06DBFPBK	6	± 0.45	+0.80 / -0.20	1.40:1
RP10975A09DBFPBK	9	± 0.35	+0.70 / -0.20	1.30:1
RP10975A10DBFPBK	10	± 0.20	+0.40 / -0.30	1.40:1
RP10975A17DBFPBK	17	± 1.00	+1.00 / -1.20	1.30:1
RP10975A20DBFPBK	20	± 1.00	+1.00 / -1.20	1.30:1
RP10975A30DBFPBK	30	± 1.05	+1.75 / -1.20	1.25:1

For Attenuator Power Handling vs. Mounting Surface Temperature, see page 2.

LEADED CHIP ATTENUATORS – RP2 SERIES

GENERAL SPECIFICATIONS

Frequency Range: DC to 3 GHz

Input Power*: 150 Watts

Operating Temp Range: -55ºC to +150ºC

Attenuation Stability:** 0.0001 dB/dB/ºC, Max.

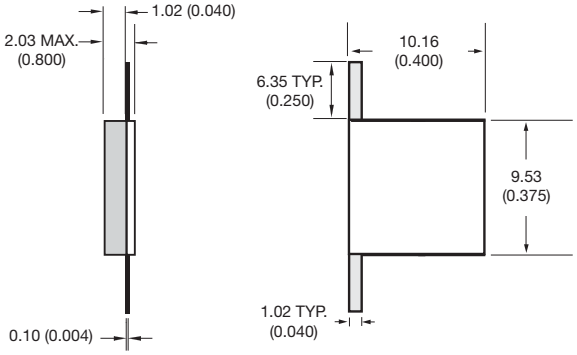
Resistive Elements: Tantalum Nitride

Substrate Material: Aluminum Nitride

Tabs: 99.99% Pure Silver, 0.10 (0.004) thick, Cover: Alumina

RoHS Compliant

Reliability: MIL-PRF-55342



Mechanical Tolerance: ±0.25 (0.010) unless otherwise specified

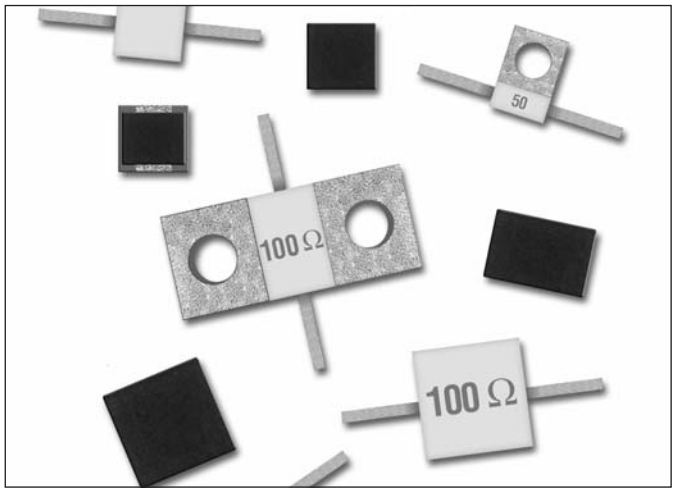
AVX Part Number	Nominal Attenuation (dB)	Frequency Sensitivity (dB, max.)	Maximum Deviation from Nominal (dB)	VSWR (max.)
RP23740A01DBFPBK	1	± 0.20	+0.45 / -0.15	1.55
RP23740A03DBFPBK	3	± 0.30	+0.60 / -0.30	1.50
RP23740A06DBFPBK	6	± 0.30	+0.60 / -0.20	1.30
RP23740A09DBFPBK	9	± 0.30	+0.60 / -0.20	1.30
RP23740A10DBFPBK	10	± 0.20	+0.40 / -0.30	1.25
RP23740A20DBFPBK	20	± 1.00	+1.00 / -1.20	1.25
RP23740A30DBFPBK	30	± 1.05	+1.75 / -1.20	1.25

For Attenuator Power Handling vs. Mounting Surface Temperature, see page 2.

High Power Resistive Products

Resistors

AVX introduces its line of High Power Resistive Products.
All products are designed and manufactured at our ISO 9001 Facilities.
All products are qualified as per MIL-PRF-55342.



ELECTRICAL SPECIFICATIONS

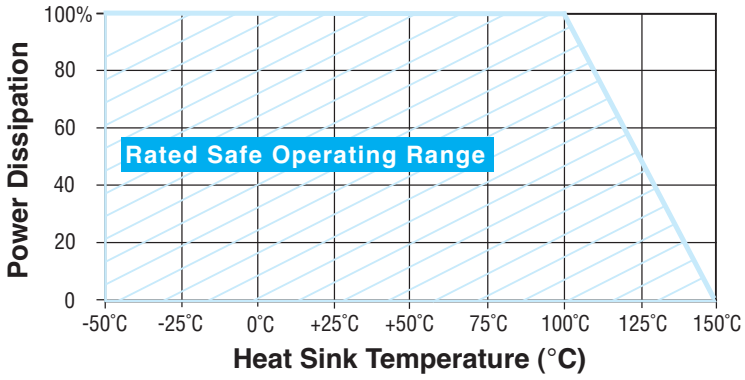
Resistance: 50 and 100 Ω standard (10 Ω - 200 Ω available)
Resistance Tolerance: ±5% standard (±2% available)
Power: 2 Watts through 250 Watts, 400 Watts, 800 Watts
Operating Temperature Range: -55ºC to +150ºC
Temperature Coefficient: < 150 ppm/ºC
Low Capacitance

MECHANICAL SPECIFICATIONS

Package: Surface Mount Chips, Chips, Leaded Chips, Flanged
Substrate Material: Aluminum Nitride
Process: Thin Film
Resistive Material: Tantalum
Terminals: Silver
Cover: Alumina
Mounting Flange: 100% Cu, Ni or Ag Plated
Mechanical Tolerance: ±0.13 (0.005)
SMT and Chip products, supplied on Tape and Reel
Non-Magnetic (exception RP4 and RP5 Style Surface Mount Resistors)
RoHS Compliant

RoHS COMPLIANT

POWER DERATING



High Power Resistive Products

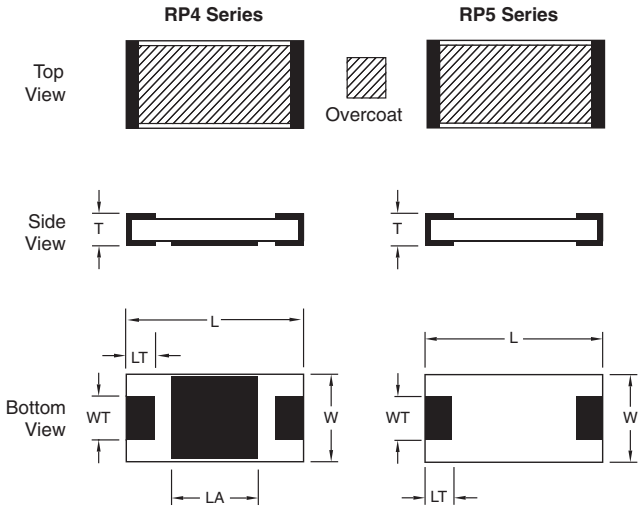
Resistors

SURFACE MOUNT CHIP RESISTORS – RP4 AND RP5 SERIES

GENERAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(contact factory for custom resistance values)
Resistive Tolerance: ±2% standard
Operating Temp Range: -55ºC to +150ºC
Temperature Coefficient: <150 ppm/ºC
Resistive Elements: Proprietary Thin Film
Substrate Material: Aluminum Nitride
Terminals: Silver over Nickel
RoHS Compliant
Reliability: MIL-PRF-55342
Tape and Reel Specifications: See Page 38

RoHS COMPLIANT



mm (inches)

AVX Part Number*	W ±0.25 (0.010)	L ±0.25 (0.010)	T ±0.13 (0.005)	WT ±0.13 (0.005)	LT ±0.13 (0.005)	LA ±0.13 (0.005)	Capacitance (pF)	Power Max** (Watts)
RP42010RxxxxGTTR	2.54 (0.100)	5.08 (0.200)	1.02 (0.040)	2.29 (0.090)	0.76 (0.030)	2.41 (0.095)	.95 pF	10W
RP42525RxxxxGTTR	6.22 (0.245)	6.22 (0.245)	1.02 (0.040)	3.05 (0.120)	1.02 (0.040)	2.79 (0.110)	1.85 pF	20W
RP43725RxxxxGTTR	6.35 (0.250)	9.53 (0.375)	1.02 (0.040)	3.05 (0.120)	1.27 (0.050)	4.95 (0.195)	3.0 pF	30W
RP43737RxxxxGTTR	9.40 (0.370)	9.40 (0.370)	1.02 (0.040)	9.14 (0.360)	1.27 (0.050)	4.95 (0.195)	3.5 pF	40W
RP52010RxxxxGTTR	2.54 (0.100)	5.08 (0.200)	1.02 (0.040)	2.29 (0.090)	0.76 (0.030)	–	–	4W
RP52525RxxxxGTTR	6.22 (0.245)	6.22 (0.245)	1.02 (0.040)	3.05 (0.120)	1.02 (0.040)	–	–	6W
RP53725RxxxxGTTR	6.35 (0.250)	9.53 (0.375)	1.02 (0.040)	3.05 (0.120)	1.27 (0.050)	–	–	8W
RP53737RxxxxGTTR	9.40 (0.370)	9.40 (0.370)	1.02 (0.040)	9.14 (0.360)	1.27 (0.050)	–	–	10W

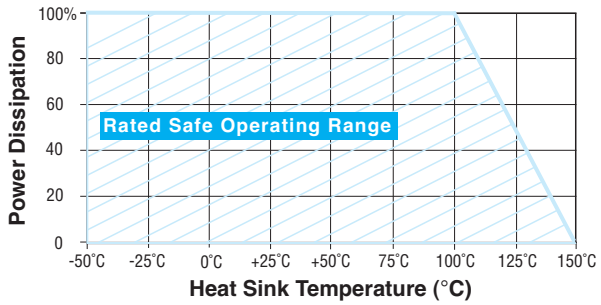
* xxxx denotes Ohm value.
** Test Condition: Chip soldered to a via patch on a 30-mil-thick Rogers RO4350 board; Land surfaces at 100ºC; maximum rated power applied.
Specification: The resistance of the film shall change no more than 0.5% during and after a 1000-hr. Burn-in per Mil-PRF-55342.

HOW TO ORDER

RP4	2010	R	XXXX	G	T	TR
AVX Series See chart above	**Case Size** See chart above	**Type** R = Resistor	**Value** 0050 = 50Ω 0100 = 100Ω	**Tolerance** J = ±5% G = ±2%	**Terminal** T = Silver over Nickel	**Packaging** TR = Tape & Reel

Contact factory for custom ratings and sizes.

POWER DERATING



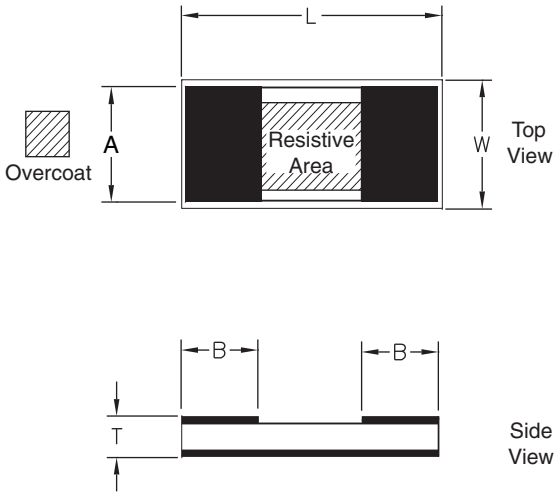
CHIP RESISTORS – RP3 SERIES

GENERAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(contact factory for custom resistance values)
Resistive Tolerance: ±5% standard (2% available)
Operating Temp Range: -55ºC to +150ºC
Temperature Coefficient: <150 ppm/ºC
Resistive Elements: Proprietary Thin Film
Substrate Material: Aluminum Nitride
Terminals: Silver
RoHS Compliant
Reliability: MIL-PRF-55342
Non-Magnetic
Tape and Reel Specifications: See Page 37

RoHS COMPLIANT

RP3 Series



mm (inches)

AVX Part Number*	W ±0.25 (0.010)	L ±0.25 (0.010)	T ±0.13 (0.005)	A ±0.13 (0.005)	B (Typ.)	Capacitance (pF)	Power Max** (Watts)
RP31005RxxxxJTTR	1.27 (0.050)	2.54 (0.100)	0.64 (0.025)	1.14 (0.045)	0.51 (0.020)	.75	5W
RP31206RxxxxJTTR	1.52 (0.060)	3.05 (0.120)	0.64 (0.025)	1.40 (0.055)	0.51 (0.020)	.90	15W
RP32010RxxxxJTTR	2.54 (0.100)	5.08 (0.200)	1.02 (0.040)	2.29 (0.090)	0.51 (0.020)	1.0	30W
RP32525RxxxxJTTR	6.22 (0.245)	6.22 (0.245)	1.02 (0.040)	3.30 (0.130)	0.51 (0.020)	2.0	60W
RP33725RxxxxJTTR	6.35 (0.250)	9.53 (0.375)	1.02 (0.040)	5.03 (0.198)	0.64 (0.025)	4.15	150W
RP33737RxxxxJTTR	9.40 (0.370)	9.40 (0.370)	1.02 (0.040)	8.38 (0.330)	0.64 (0.025)	6.0	250W

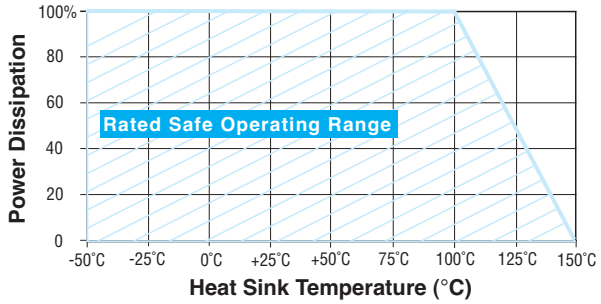
* xxxx denotes Ohm value.
** Test Condition: Chip soldered to a large copper carrier whose surface is at 100ºC; maximum rated power applied. Specification: The resistance of the film shall change no more than 0.5% during and after a 1000-hr. Burn-in per Mil-PRF-55342.

HOW TO ORDER

RP3	2010	R	XXXX	J	T	TR
AVX Series	**Case Size** See chart above	**Type** R = Resistor	**Value** 0050 = 50Ω 0100 = 100Ω	**Tolerance** J = ±5% G = ±2%	**Terminal** T = Silver	**Packaging** TR = Tape & Reel

Contact factory for custom ratings and sizes.

POWER DERATING



High Power Resistive Products

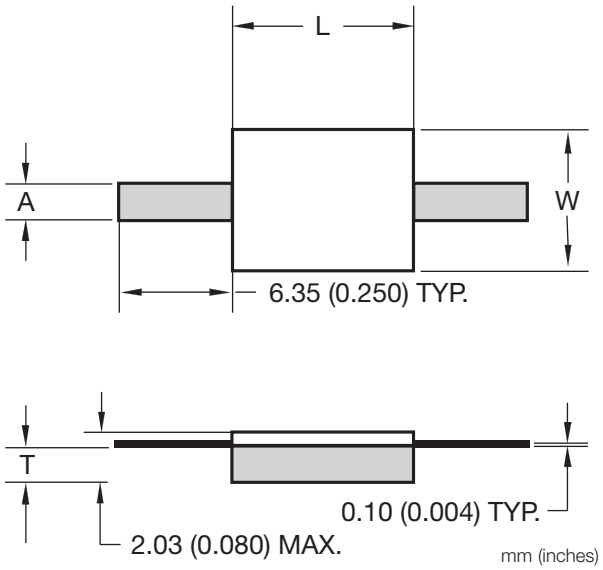
Resistors

LEADED CHIP RESISTORS – RP7 SERIES

GENERAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(contact factory for custom resistance values)
Resistive Tolerance: ±5% standard (2% available)
Operating Temp. Range: -55ºC to +150ºC
Temperature Coefficient: <150 ppm/ºC
Resistive Elements: Proprietary Thin Film
Substrate Material: Aluminum Nitride
Lead Terminals: Silver
Cover: Alumina
RoHS Compliant
Reliability: MIL-PRF-55342
Non-Magnetic

RoHS COMPLIANT



mm (inches)

mm (inches)

AVX Part Number*	W ±0.25 (0.010)	L ±0.25 (0.010)	T ±0.13 (0.005)	A	Capacitance (pF)	Power Max** (Watts)
RP72010RxxxxJTBK	2.54 (0.100)	5.08 (0.200)	1.02 (0.040)	1.02 (0.040)	1.0	30W
RP72335RxxxxJTBK	8.89 (0.350)	5.84 (0.230)	1.02 (0.040)	1.02 (0.040)	3.15	50W
RP72525RxxxxJTBK	6.45 (0.245)	6.22 (0.245)	1.02 (0.040)	1.02 (0.040)	2.0	60W
RP73725RxxxxJTBK	6.35 (0.250)	9.53 (0.375)	1.02 (0.040)	1.02 (0.040)	4.15	150W
RP73737RxxxxJTBK	9.40 (0.370)	9.40 (0.370)	1.02 (0.040)	1.02 (0.040)	6.0	250W

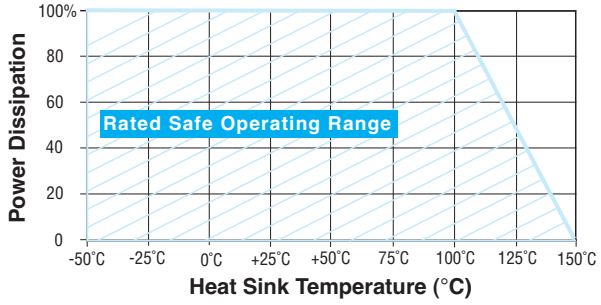
* xxxx denotes Ohm value.
** Test Condition: Chip soldered to a large copper carrier whose surface is at 100ºC; maximum rated power applied. Specification: The resistance of the film shall change no more than 0.5% during and after a 1000-hr. Burn-in per Mil-PRF-55342.

HOW TO ORDER

RP7	2010	R	XXXX	J	T	BK
AVX Series	**Case Size** See chart above	**Type** R = Resistor	**Value** 0050 = 50Ω 0100 = 100Ω	**Tolerance** J = ±5% G = ±2%	**Terminal** T = Silver	**Packaging** BK = Plastic Carrier

Contact factory for custom ratings and sizes.

POWER DERATING



FLANGE MOUNT RESISTORS

GENERAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(contact factory for custom resistance values)

Resistive Tolerance: ±5% standard (±2% available)

Power: 20-800 Watts

Capacitance: 1.0 pF

Operating Temperature Range: -55ºC to +150ºC

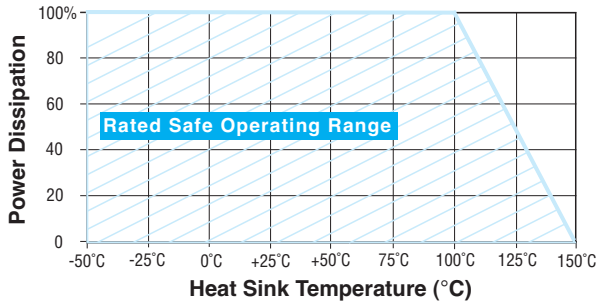
Temperature Coefficient: <150 ppm/ºC

HOW TO ORDER

RP6	0300	R	0100	J	N	BK
AVX Series	**Case Size**	**Type** R = Resistor	**Value** 0050 = 50Ω 0100 = 100Ω	**Tolerance** J = ±5% (G = ±2% available Consult Factory)	**Terminal** N = Silver	**Packaging** BK = Plastic Carrier

Contact factory for custom ratings and sizes.

POWER DERATING



FLANGE MOUNT RESISTOR – P/N: RP60300RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)

Resistive Tolerance: ±5% standard (±2% available)

Power: 20 Watts

Capacitance: 1.0 pF

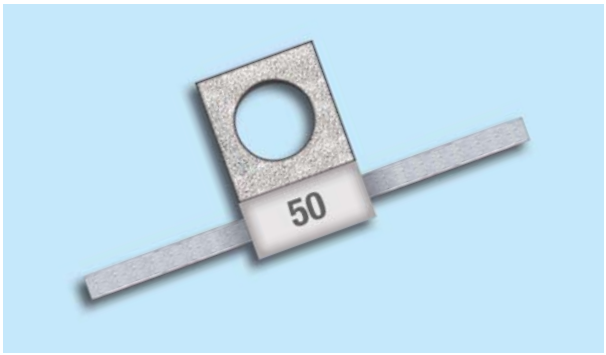
Operating Temperature Range: -55ºC to +150ºC

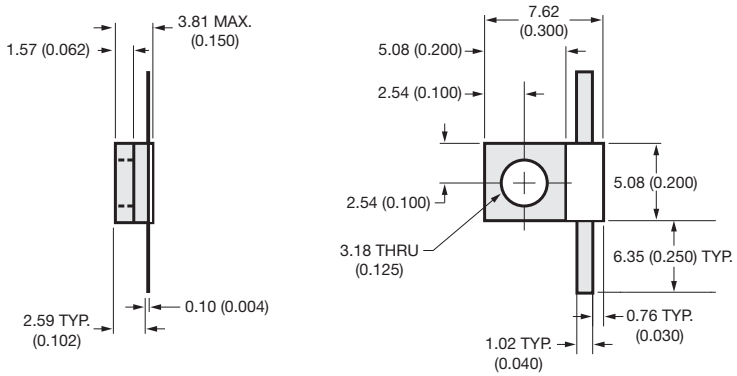
Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant

Non-Magnetic available





mm (inches)

FLANGE MOUNT RESISTOR – P/N: RP60302RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)

Resistive Tolerance: ±5% standard (±2% available)

Power: 20 Watts

Capacitance: 1.0pF

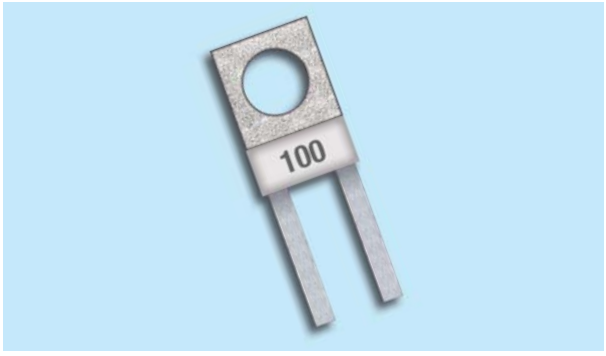
Operating Temperature Range: -55ºC to +150ºC

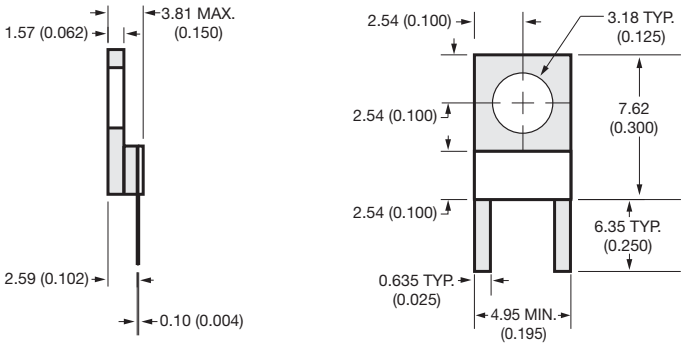
Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant

Non-Magnetic available





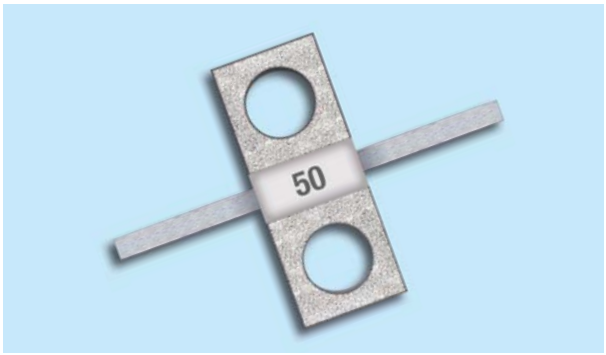
mm (inches)

For Part Number Code, see page 8.

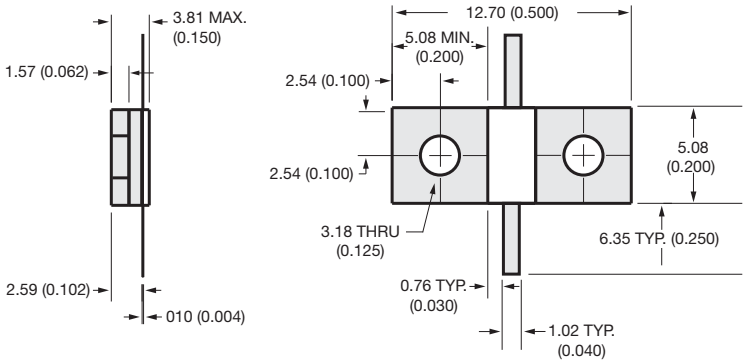
FLANGE MOUNT RESISTOR – P/N: RP60500RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)
Resistive Tolerance: ±5% standard (±2% available)
Power: 25 Watts
Capacitance: 1.0pF
Operating Temperature Range: -55ºC to +150ºC
Temperature Coefficient: <150 ppm/ºC
Tabs: Silver
RoHS Compliant
Non-Magnetic available



RoHS COMPLIANT

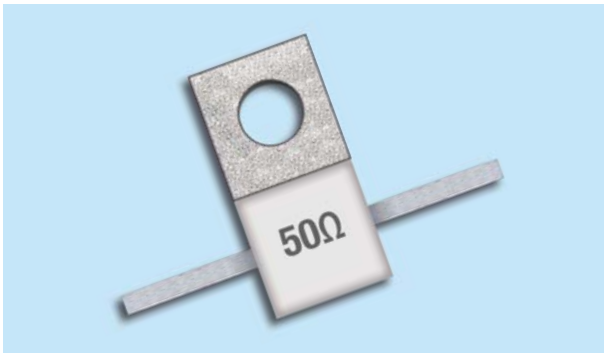


mm (inches)

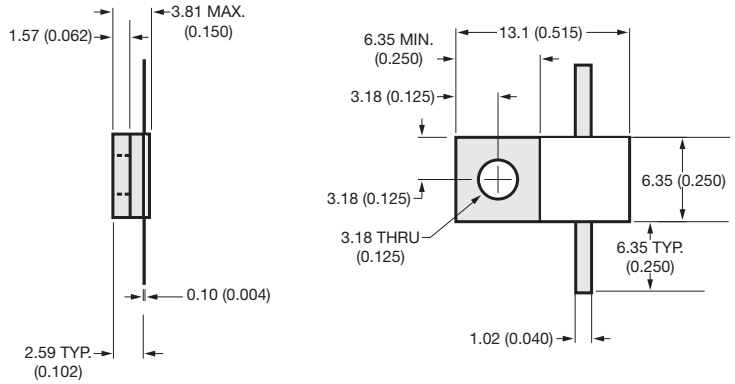
FLANGE MOUNT RESISTOR – P/N: RP60515RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)
Resistive Tolerance: ±5% standard (±2% available)
Power: 60 Watts
Capacitance: 2.0 pF
Operating Temperature Range: -55ºC to +150ºC
Temperature Coefficient: <150 ppm/ºC
Tabs: Silver
RoHS Compliant
Non-Magnetic available



RoHS COMPLIANT



mm (inches)

For Part Number Code, see page 8.

FLANGE MOUNT RESISTOR – P/N: RP60517RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)

Resistive Tolerance: ±5% standard (±2% available)

Power: 60 Watts

Capacitance: 2.2 pF

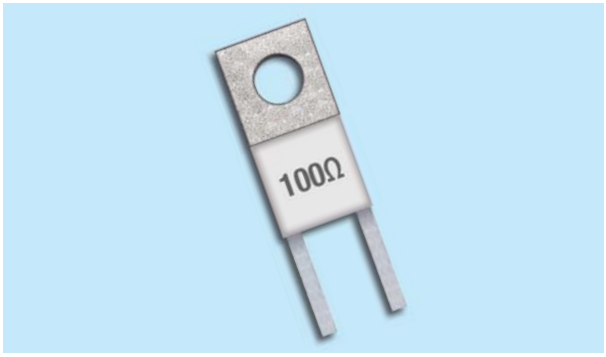
Operating Temperature Range: -55ºC to +150ºC

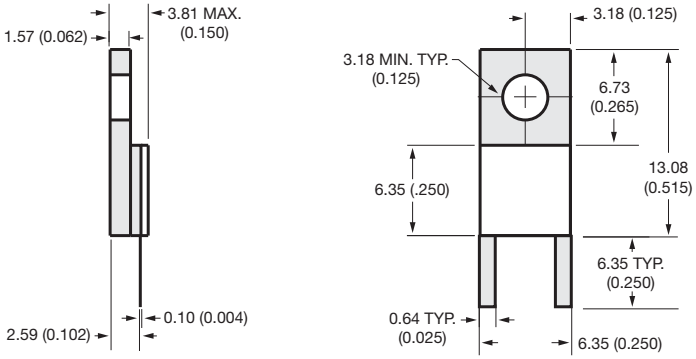
Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant

Non-Magnetic available





mm (inches)

FLANGE MOUNT RESISTOR – P/N: RP60560RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)

Resistive Tolerance: ±5% standard (±2% available)

Power: 75 Watts

Capacitance: 4.15 pF

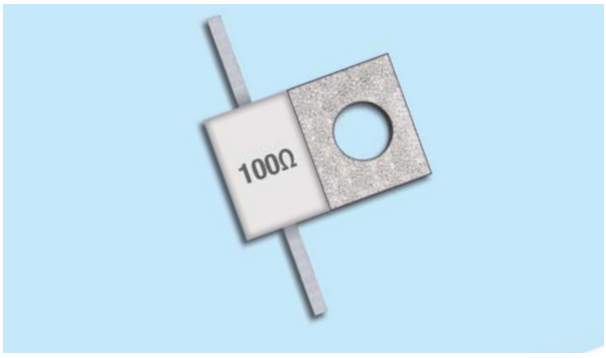
Operating Temperature Range: -55ºC to +150ºC

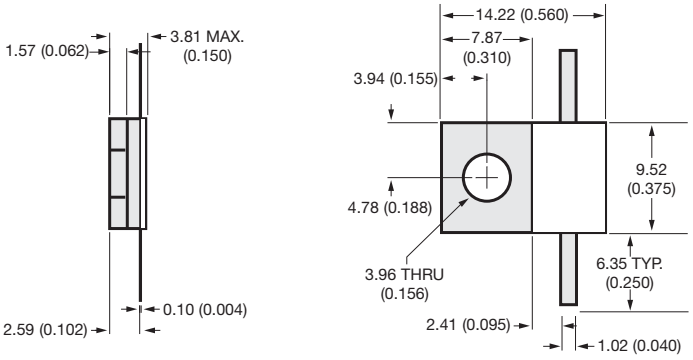
Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant

Non-Magnetic available





mm (inches)

For Part Number Code, see page 8.

FLANGE MOUNT RESISTOR – P/N: RP60562RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)

Resistive Tolerance: ±5% standard (±2% available)

Power: 75 Watts

Capacitance: 4.15 pF

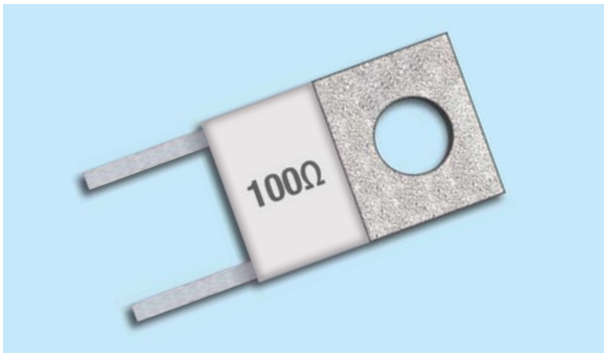
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

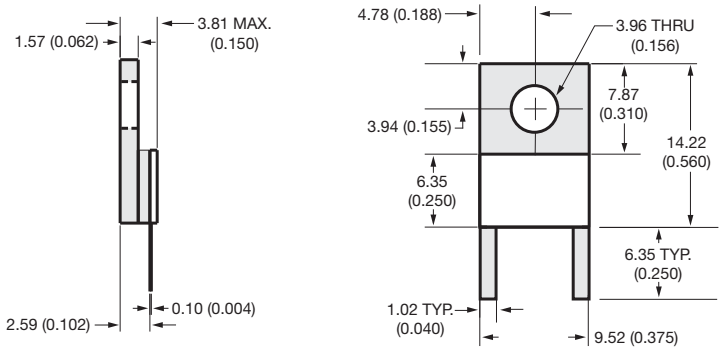
Tabs: Silver

RoHS Compliant

Non-Magnetic available



RoHS COMPLIANT



mm (inches)

FLANGE MOUNT RESISTOR – P/N: RP60800RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)

Resistive Tolerance: ±5% standard (±2% available)

Power: 100 Watts

Capacitance: 3.10 pF

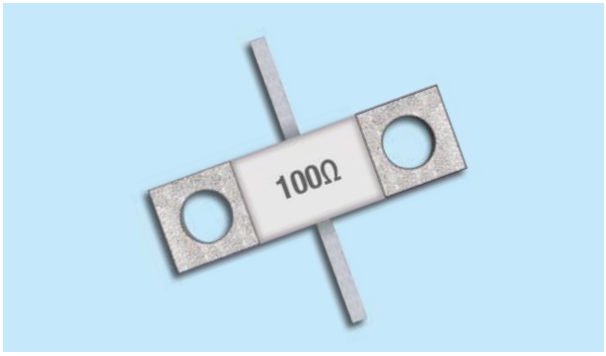
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

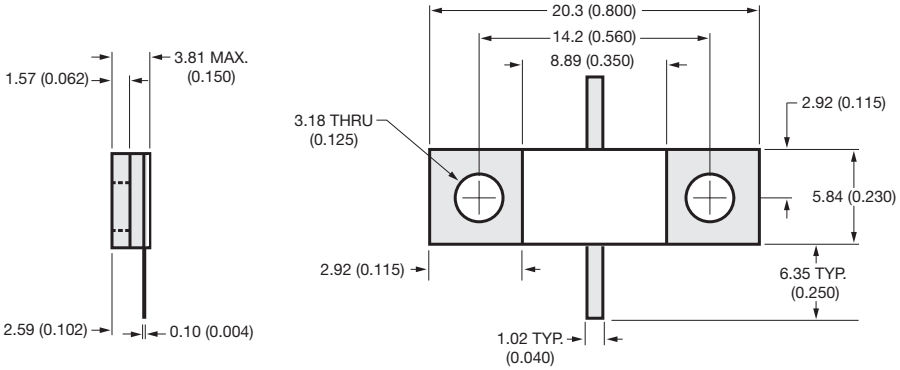
Tabs: Silver

RoHS Compliant

Non-Magnetic available



RoHS COMPLIANT



mm (inches)

For Part Number Code, see page 8.

FLANGE MOUNT RESISTOR – P/N: RP60870RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)

Resistive Tolerance: ±5% standard (±2% available)

Power: 150 Watts

Capacitance: 4.15 pF

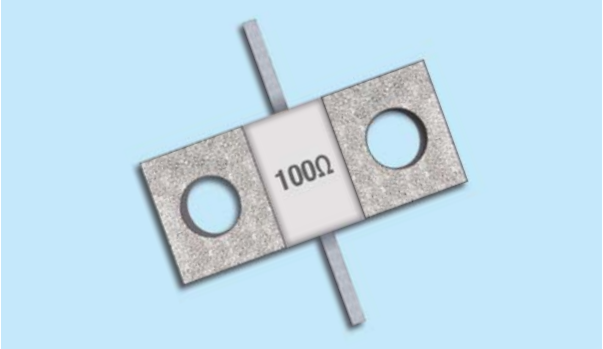
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

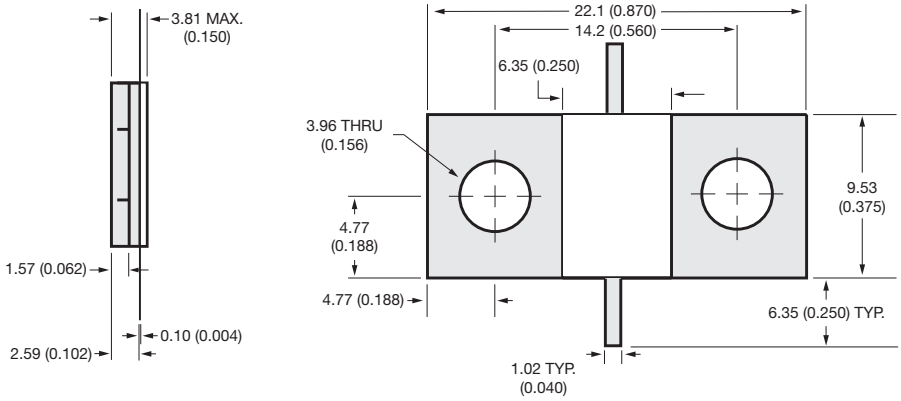
Tabs: Silver

RoHS Compliant

Non-Magnetic available



RoHS COMPLIANT



mm (inches)

FLANGE MOUNT RESISTOR – P/N: RP60975RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)

Resistive Tolerance: ±5% standard (±2% available)

Power: 250 Watts

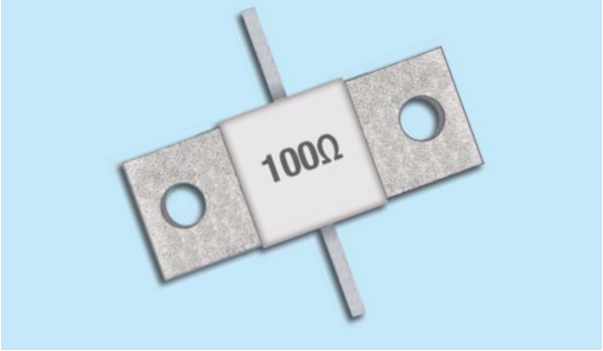
Capacitance: 6.5 pF

Operating Temperature Range: -55ºC to +150ºC

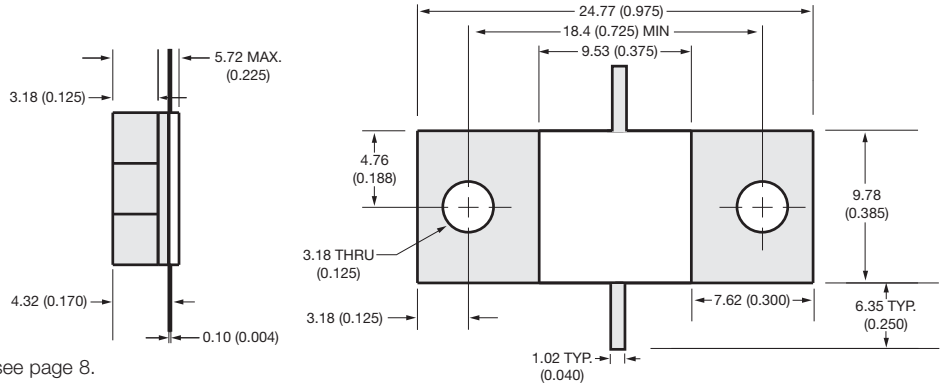
Temperature Coefficient: <150 ppm/ºC

RoHS Compliant

Non-Magnetic available



RoHS COMPLIANT



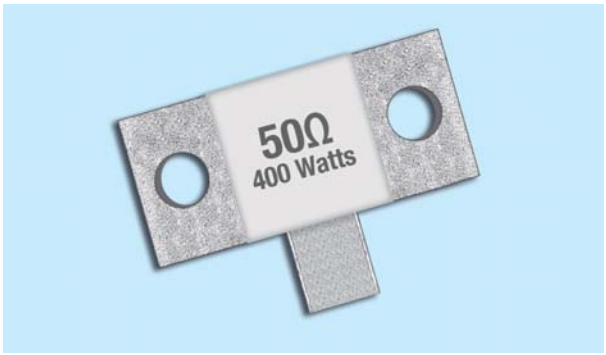
mm (inches)

For Part Number Code, see page 8.

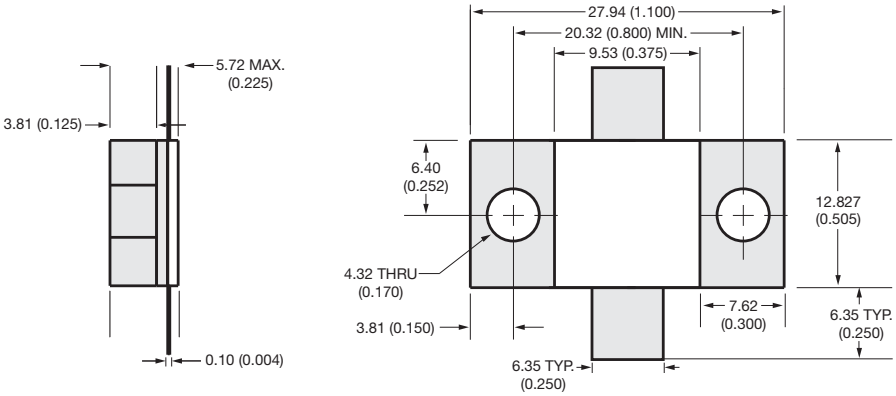
FLANGE MOUNT RESISTOR – P/N: RP601R1RXXXXJNBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)
Resistive Tolerance: ±5% standard (±2% available)
Power: 400 Watts
Capacitance: 9 pF
Operating Temperature Range: -55ºC to +150ºC
Temperature Coefficient: ±120 ppm/ºC
Tabs: Silver
Substrate Material: BeO
RoHS Compliant



RoHS COMPLIANT

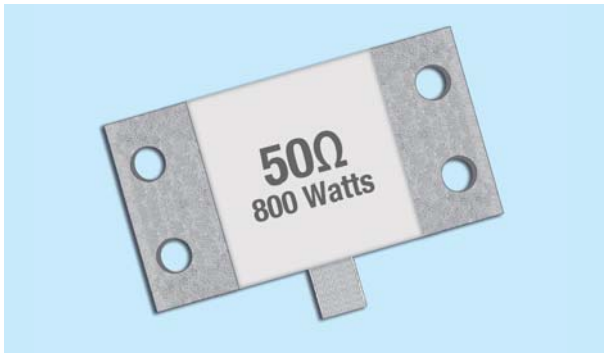


mm (inches)

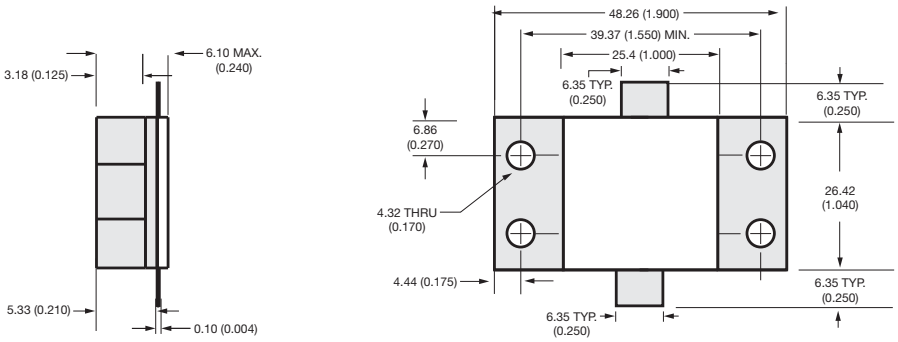
FLANGE MOUNT RESISTOR – P/N: RP601R9RXXXXJGBK

ELECTRICAL SPECIFICATIONS

Resistance: 50 and 100 Ω standard
(other resistance values available)
Resistive Tolerance: ±5% standard (±2% available)
Power: 800 Watts
Capacitance: 16 pF
Operating Temperature Range: -55ºC to +150ºC
Temperature Coefficient: ±120 ppm/ºC
Tabs: Silver
Substrate Material: BeO
RoHS Compliant



RoHS COMPLIANT



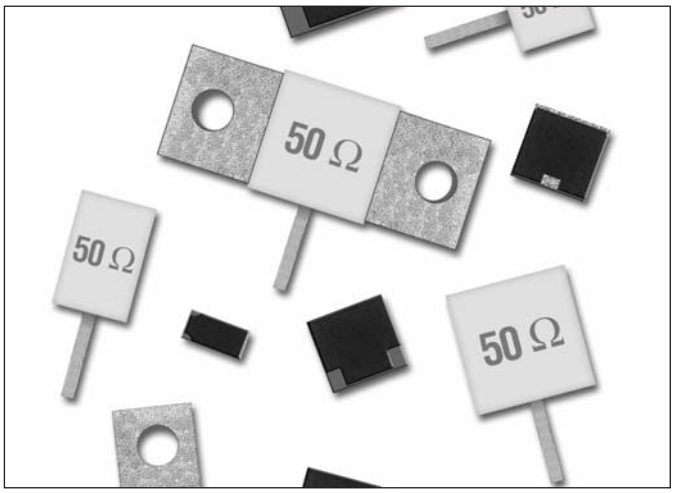
mm (inches)

For Part Number Code, see page 8.

High Power Resistive Products

Terminations

AVX introduces its complete line of High Power Termination Products. All Products are designed and manufactured at our ISO 9001 Facilities. All products are qualified as per MIL-PRF-55342.



ELECTRICAL SPECIFICATIONS

Resistance: 50 Ω standard (10 Ω - 200 Ω available)
Resistance Tolerance: ±5% standard (±2% available)
Power: 2 Watts through 225 Watts
Operating Temperature Range: -55ºC to +150ºC
Temperature Coefficient: < 150 ppm/ºC
Low VSWR

MECHANICAL SPECIFICATIONS

Package: Surface Mount Chips, Chips, Leaded Chips, Flange Mount
Substrate Material: Aluminum Nitride
Process: Thin Film
Resistive Material: Tantalum
Terminals: Silver
Cover: Alumina
Mounting Flange: 100% Cu, Ni or Ag Plated
Mechanical Tolerance: ±0.13 (0.005)
RoHS Compliant
SMT and Chip products, supplied on Tape and Reel

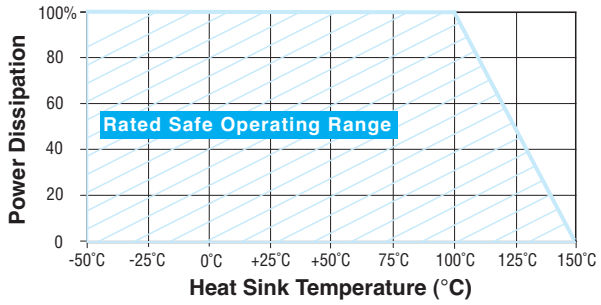
RoHS COMPLIANT

FLANGE MOUNT TERMINATIONS HOW TO ORDER

RPA	0300	T	0050	J	N	BK
AVX Series	**Case Size**	**Type** T = Termination	**Value** 0050 = 50Ω	**Tolerance** J = ±5% (G = ±2% available Consult Factory)	**Terminal** N = Silver	**Packaging** BK = Plastic Carrier

Contact factory for custom ratings and sizes.

POWER DERATING



FLANGE MOUNT TERMINATION – P/N: RPA0302T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 20 Watts

Frequency: DC to 18 GHz

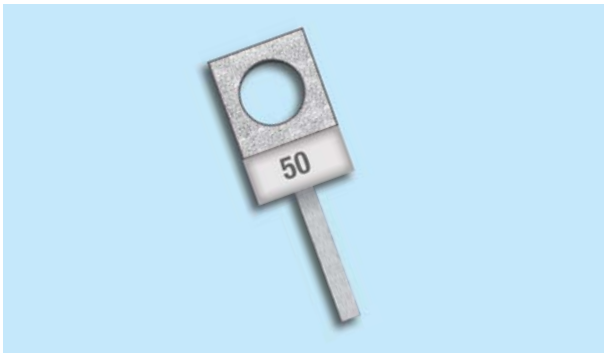
VSWR: 1.15:1 @ 15 GHz, 1.25:1 @ 18 GHz

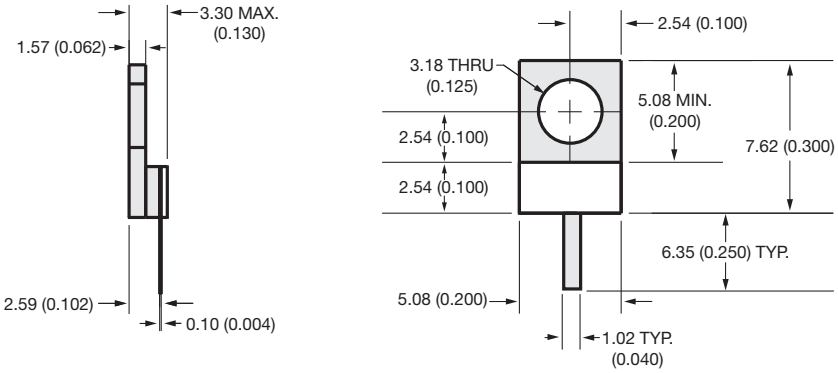
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant





mm (inches)

FLANGE MOUNT TERMINATION – P/N: RPA0500T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 25 Watts

Frequency: DC to 6.0 GHz

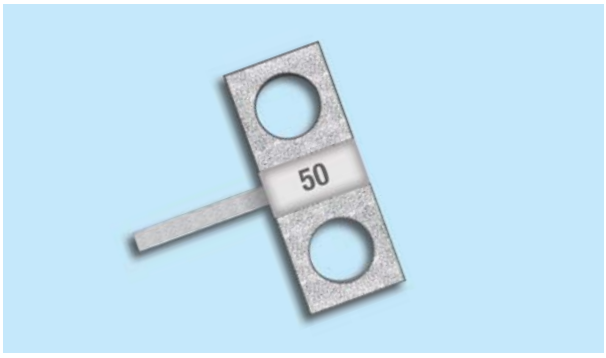
VSWR: 1.15:1 @ 4 GHz, 1.25:1 @ 6 GHz

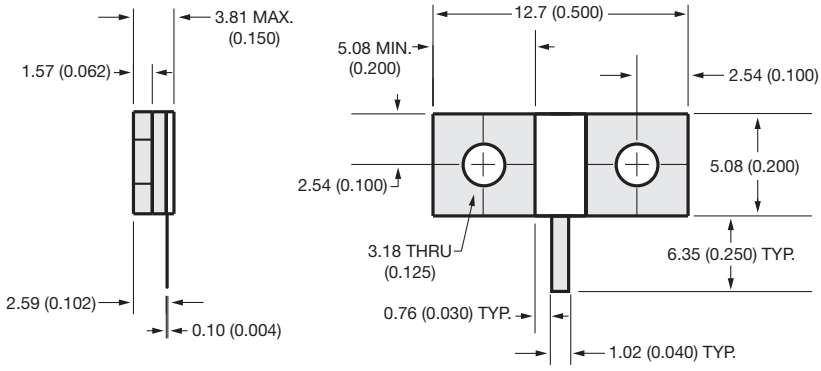
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant





mm (inches)

For Part Number Code, see page 16.

FLANGE MOUNT TERMINATION – P/N: RPA0515T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 60 Watts

Frequency: DC to 6.0 GHz

VSWR: 1.20:1 @ 4 GHz, 1.30:1 @ 6 GHz

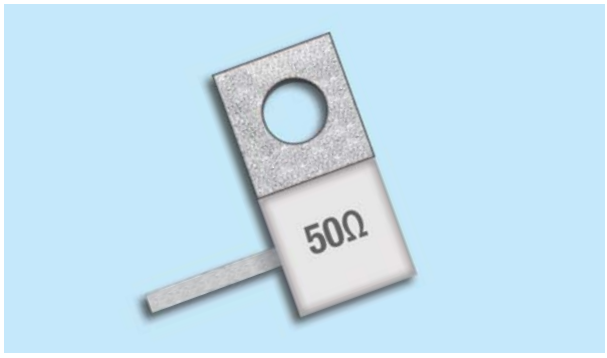
Operating Temperature Range: -55ºC to +150ºC

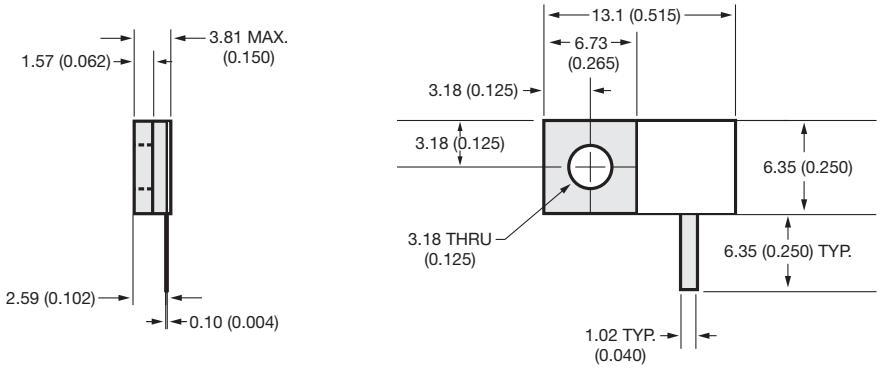
Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

LRoHS Compliant

RoHS COMPLIANT





mm (inches)

FLANGE MOUNT TERMINATION – P/N: RPA0516T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 60 Watts

Frequency: DC to 6 GHz

VSWR: 1.20:1 @ 4 GHz, 1.30:1 @ 6 GHz

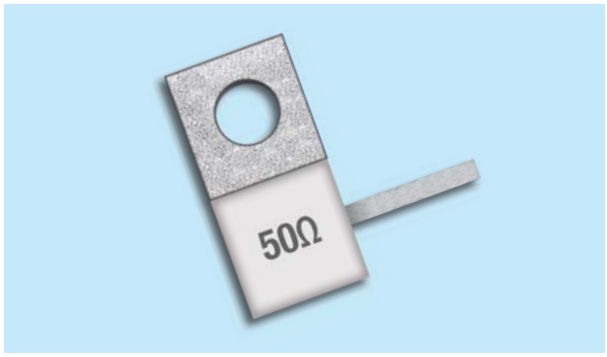
Operating Temperature Range: -55ºC to +150ºC

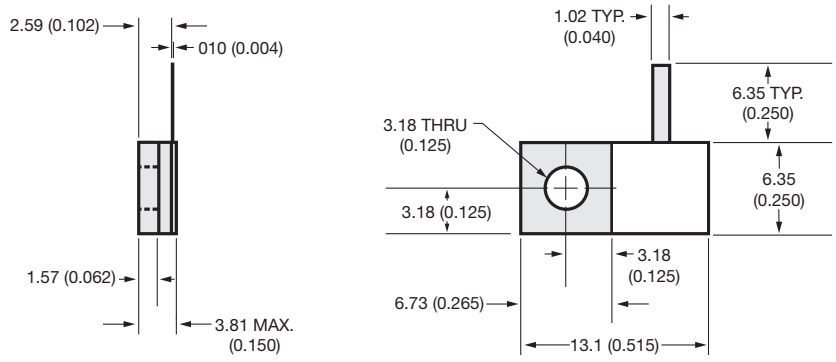
Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant

RoHS COMPLIANT





mm (inches)

For Part Number Code, see page 16.

FLANGE MOUNT TERMINATION – P/N: RPA0517T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 60 Watts

Frequency: DC to 6 GHz

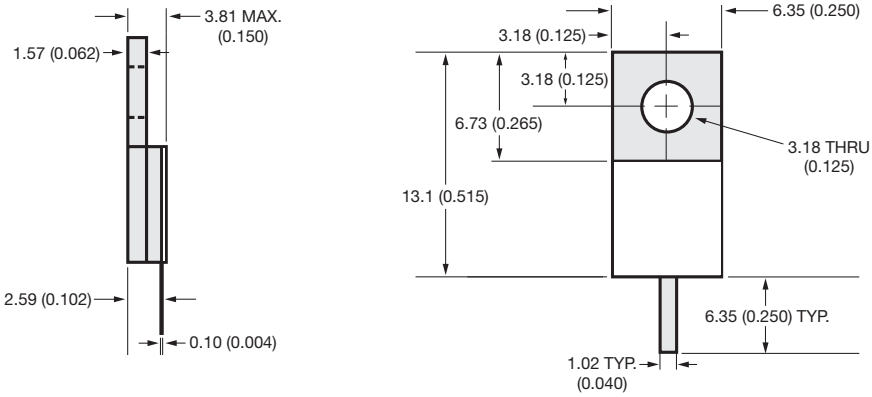
VSWR: 1.20:1 @ 4 GHz, 1.30:1 @ 6 GHz

Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant



mm (inches)

FLANGE MOUNT TERMINATION – P/N: RPA0560T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 75 Watts

Frequency: DC to 4 GHz

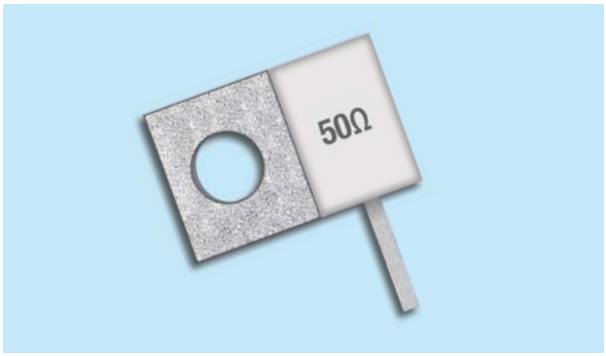
VSWR: 1.25:1

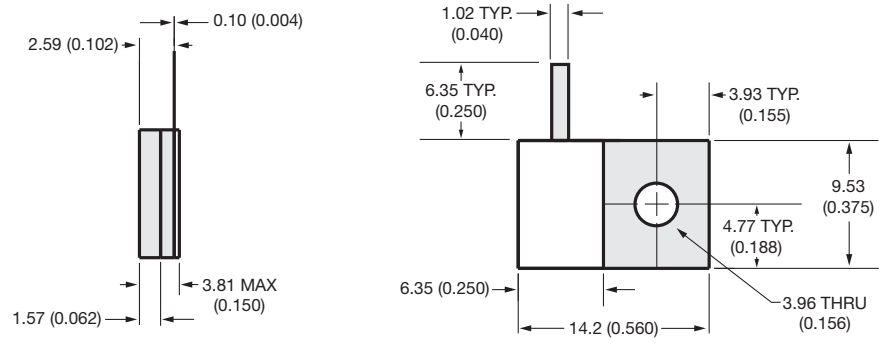
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant





mm (inches)

For Part Number Code, see page 16.

FLANGE MOUNT TERMINATION – P/N: RPA0561T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 75 Watts

Frequency: DC to 4.0 GHz

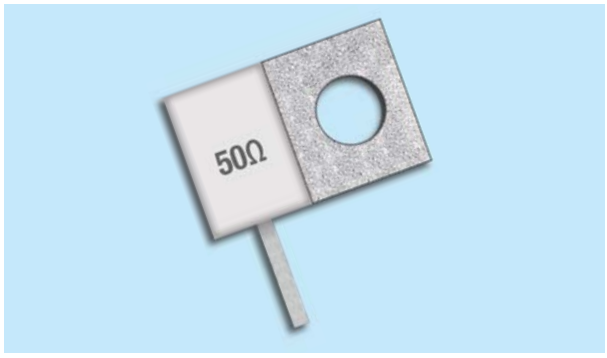
VSWR: 1.25:1

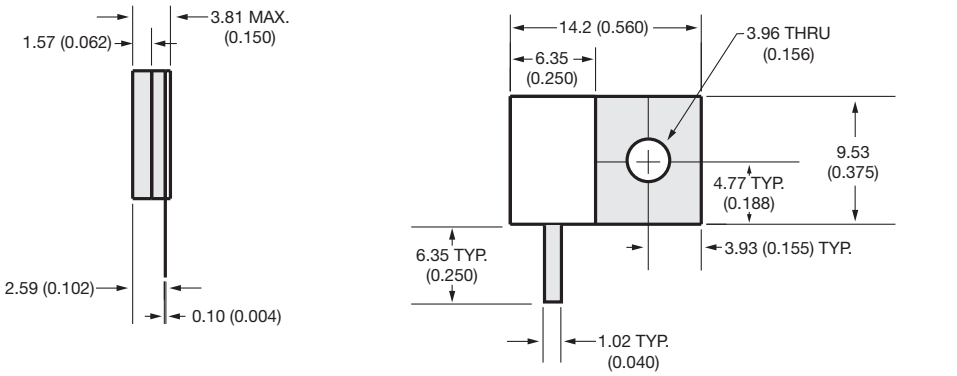
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant





mm (inches)

FLANGE MOUNT TERMINATION – P/N: RPA0800T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 50 Watts

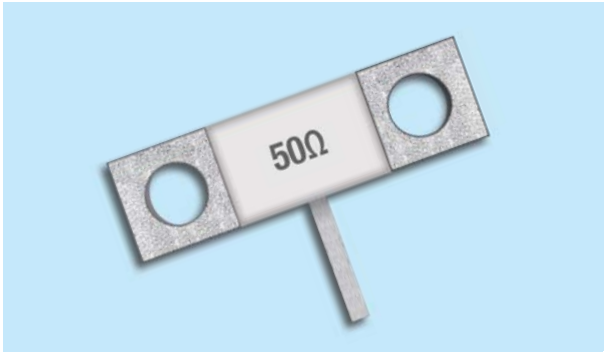
Frequency: DC to 6 GHz

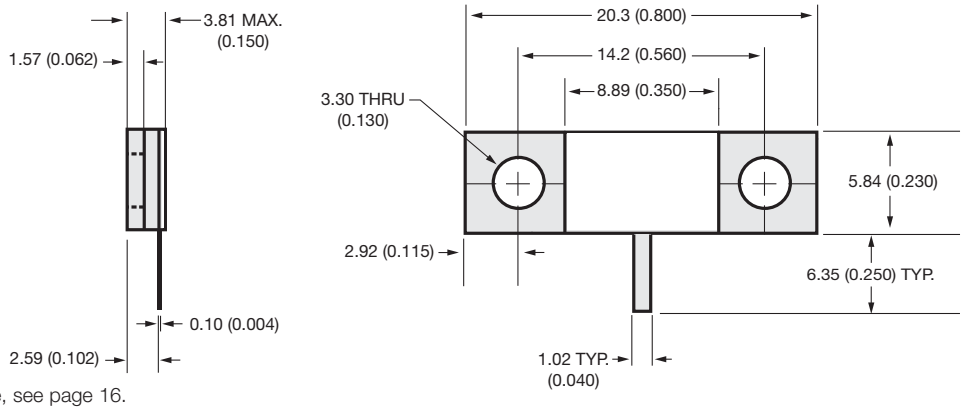
VSWR: 1.10:1 @ 4.5 GHz, 1.18:1 @ 6.0GHz

Operating Temperature Range: -55ºC to +150ºC

Tabs: Silver

RoHS Compliant





mm (inches)

For Part Number Code, see page 16.

FLANGE MOUNT TERMINATION – P/N: RPA0870T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 100 Watts

Frequency: DC to 4.0 GHz

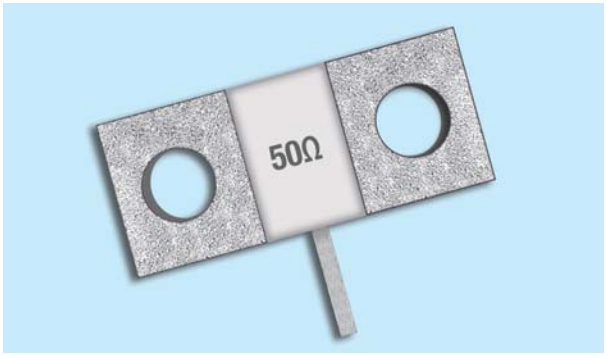
VSWR: 1.20:1

Operating Temperature Range: -55ºC to +150ºC

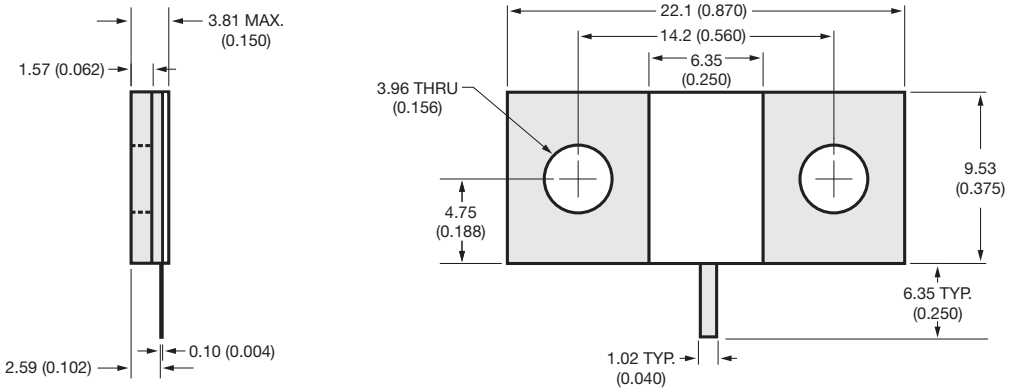
Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant



RoHS COMPLIANT



mm (inches)

FLANGE MOUNT TERMINATION – P/N: RPA01R1T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 400 Watts

Frequency: DC to 225 MHz

VSWR: 1.25:1

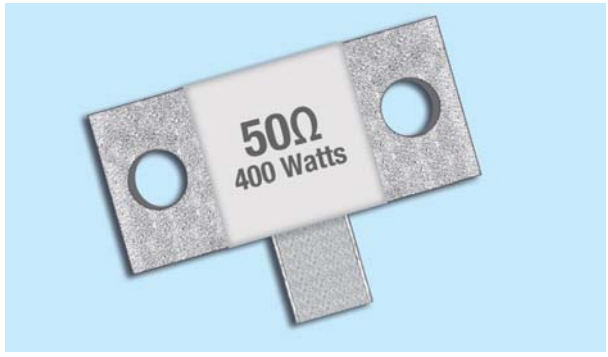
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: ±120 ppm/ºC

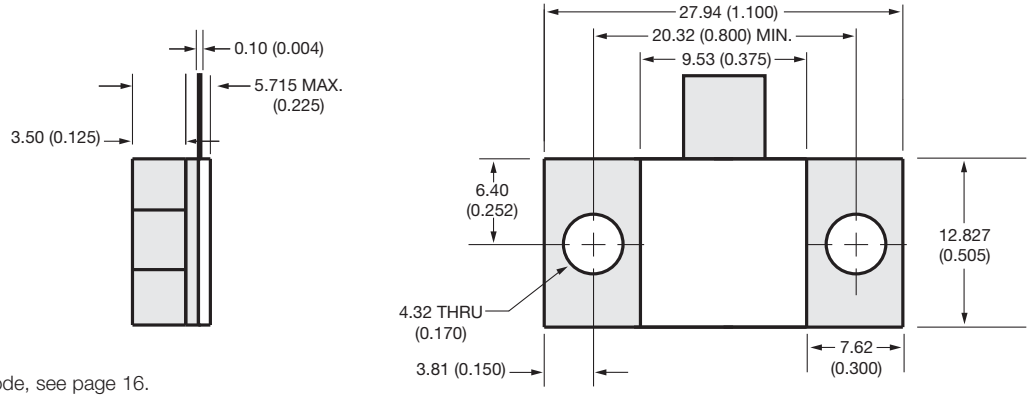
Tabs: Silver

Substrate Material: BeO

RoHS Compliant



RoHS COMPLIANT



mm (inches)

For Part Number Code, see page 16.

FLANGE MOUNT TERMINATION – P/N: RPA01R9T0050JGBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 800 Watts

Frequency: DC to 128 MHz

VSWR: 1.25:1

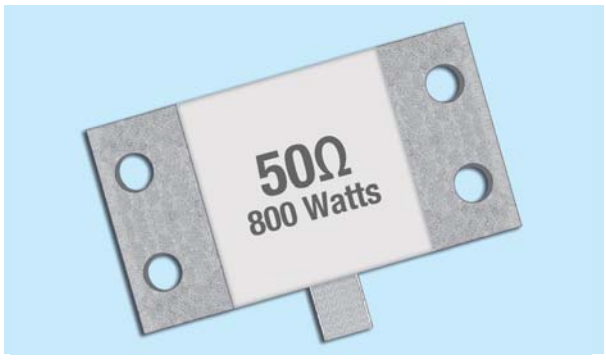
Operating Temperature Range: -55ºC to +150ºC

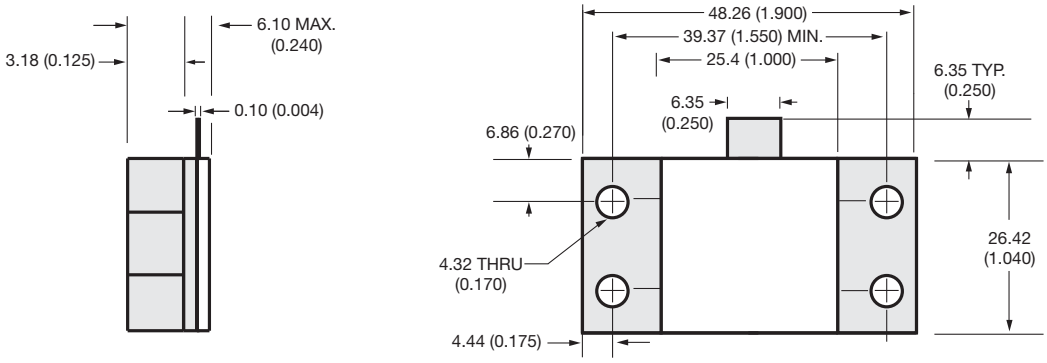
Temperature Coefficient: ±120 ppm/ºC

Tabs: Silver

Substrate Material: BeO

RoHS Compliant





mm (inches)

FLANGE MOUNT TERMINATION – P/N: RPA0300T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 20 Watts

Frequency: DC to 6 GHz

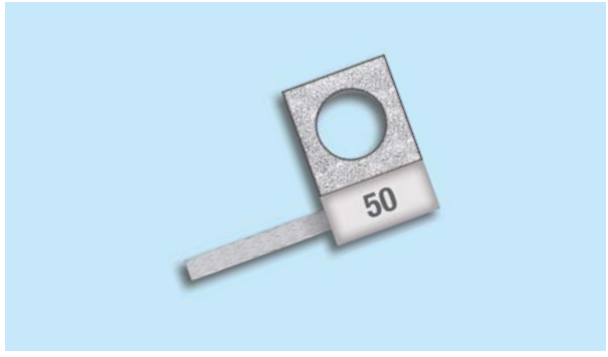
VSWR: 1.15:1 @ 4 GHz, 1.25:1 @ 6 GHz,

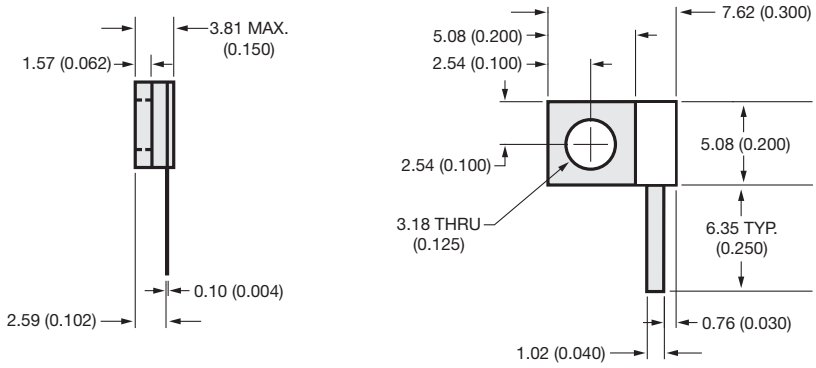
Operating Temperature Range: -55ºC to +150ºC

Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant





mm (inches)

For Part Number Code, see page 16.

FLANGE MOUNT TERMINATION – P/N: RPA0301T0050JNBK

ELECTRICAL SPECIFICATIONS

Nominal Impedance: 50 Ω ±5% standard
(contact factory for custom values)

Power: 20 Watts

Frequency: DC to 6 GHz

VSWR: 1.15:1 @ 4 GHz, 1.25:1 @ 6 GHz,

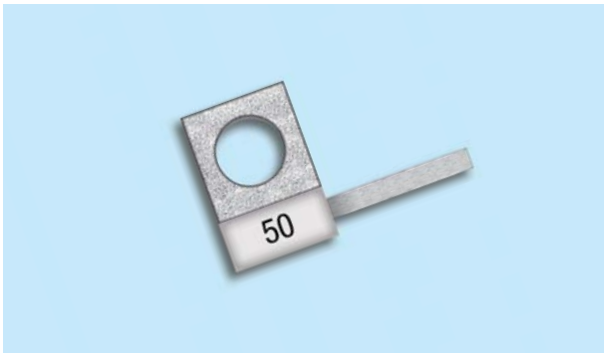
Operating Temperature Range: -55ºC to +150ºC

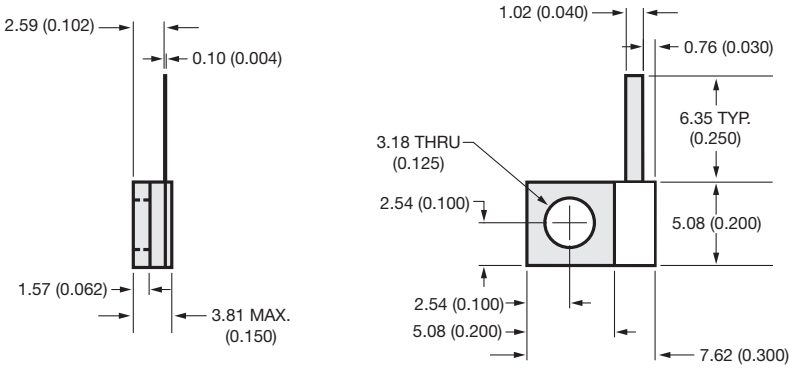
Temperature Coefficient: <150 ppm/ºC

Tabs: Silver

RoHS Compliant

RoHS COMPLIANT





mm (inches)

For Part Number Code, see page 16.

High Power Resistive Products

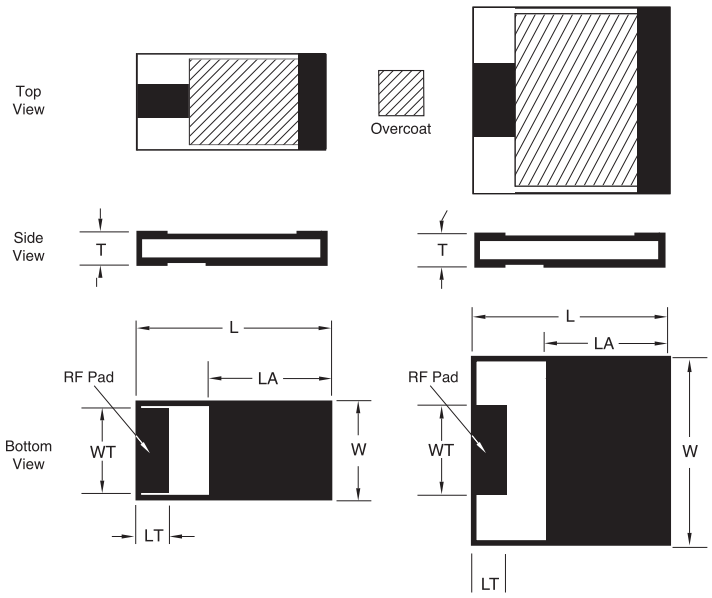
Terminations

SURFACE MOUNT CHIP TERMINATIONS – RP9 SERIES

GENERAL SPECIFICATIONS

Nominal Impedance: 50 Ω
Resistive Tolerance: ±2% standard
Operating Temp Range: -55ºC to +150ºC
Temperature Coefficient: ±150 ppm/ºC
Resistive Elements: Tantalum, Thin Film Processed
Substrate Material: Aluminum Nitride
Terminals: Silver over Nickel
RoHS Compliant
Reliability: MIL-PRF-55342
Tape and Reel Specifications: See Page 38

RP92010T0050GTTR **RP92525T0050GTTR**



mm (inches)

AVX Part Number	W ±0.25 (0.010)	L ±0.25 (0.010)	T ±0.13 (0.005)	LT ±0.13 (0.005)	WT ±0.13 (0.005)	LA ±0.13 (0.005)	Frequency Range (GHz)	VSWR (Typ.)	Power Max** (Watts)
RP92010T0050GTTR	2.54 (0.100)	5.08 (0.200)	1.02 (0.040)	1.02 (0.040)	2.29 (0.090)	2.92 (0.115)	DC - 3.0	1.20:1	10W
RP92525T0050GTTR	6.22 (0.245)	6.22 (0.245)	1.02 (0.040)	0.76 (0.030)	3.18 (0.125)	4.32 (0.170)	DC - 4.0	1.25:1	20W

** Test Condition: Chip soldered to a via patch on a 30-mil-thick Rogers RO4350 board; Land surfaces at 100°C; maximum rated power applied.
Specification: The resistance of the film shall change no more than 0.5% during and after a 1000-hr. Burn-in per Mil-PRF-55342.

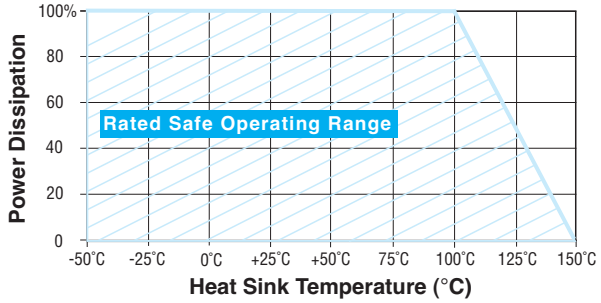
HOW TO ORDER

RP9	2010	T	0050	G	T	TR
AVX Series	**Case Size** See chart above	**Type** T = Termination	**Value** 0050 = 50Ω	**Tolerance** J = ±5% G = ±2%	**Terminal** T = Silver over Nickel	**Packaging** TR = Tape & Reel

RoHS COMPLIANT

Contact factory for custom ratings and sizes.

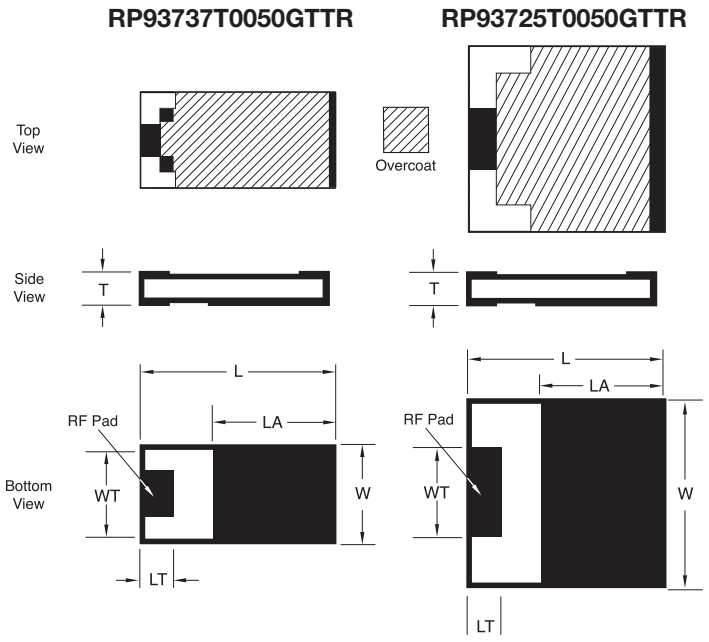
POWER DERATING



SURFACE MOUNT CHIP TERMINATIONS – RP9 SERIES

GENERAL SPECIFICATIONS

Nominal Impedance: 50 Ω
Resistive Tolerance: ±2% standard
Operating Temp Range: -55ºC to +150ºC
Temperature Coefficient: ±150 ppm/ºC
Resistive Elements: Tantalum, Thin Film Processed
Substrate Material: Aluminum Nitride
Terminals: Silver over Nickel
RoHS Compliant
Reliability: MIL-PRF-55342
Tape and Reel Specifications: See Page 38



mm (inches)

AVX Part Number	W ±0.25 (0.010)	L ±0.25 (0.010)	T ±0.13 (0.005)	LT ±0.13 (0.005)	WT ±0.13 (0.005)	LA ±0.13 (0.005)	Frequency Range (GHz)	VSWR (Typ.)	Power Max** (Watts)
RP93725T0050GTTR	6.35 (0.250)	9.53 (0.375)	1.02 (0.040)	1.27 (0.050)	3.18 (0.125)	6.60 (0.260)	DC - 2.2	1.20:1	30W
RP93737T0050GTTR	9.40 (0.370)	9.40 (0.370)	1.02 (0.040)	1.27 (0.050)	3.18 (0.125)	6.99 (0.275)	DC - 3.0	1.25:1	40W

** Test Condition: Chip soldered to a via patch on a 30-mil-thick Rogers RO4350 board; Land surfaces at 100°C; maximum rated power applied.
Specification: The resistance of the film shall change no more than 0.5% during and after a 1000-hr. Burn-in per Mil-PRF-55342.

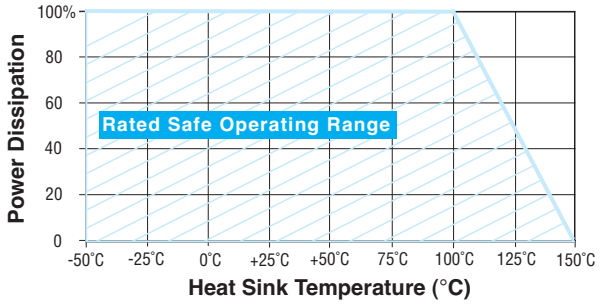
HOW TO ORDER

RP9	2010	T	0050	G	T	TR
AVX Series	**Case Size** See chart above	**Type** T = Termination	**Value** 0050 = 50Ω	**Tolerance** J = ±5% G = ±2%	**Terminal** T = Silver over Nickel	**Packaging** TR = Tape & Reel

RoHS COMPLIANT

Contact factory for custom ratings and sizes.

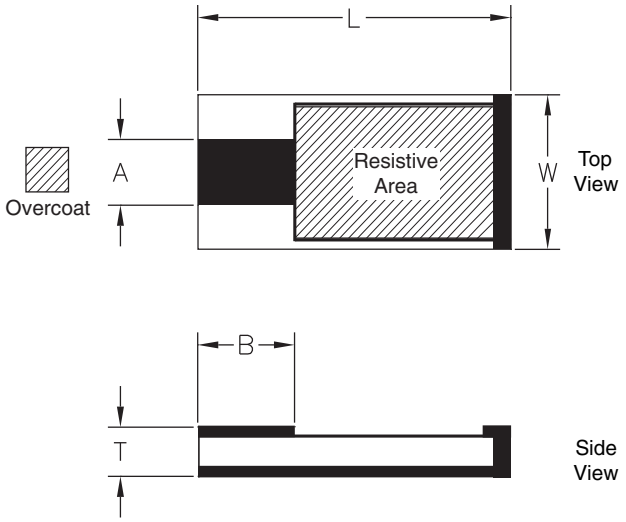
POWER DERATING



CHIP TERMINATIONS – RP8 SERIES

GENERAL SPECIFICATIONS

Nominal Impedance: 50 Ω
Resistive Tolerance: ±5% standard, ±2% available
Operating Temp Range: -55ºC to +150ºC
Temperature Coefficient: ±150 ppm/ºC
Resistive Elements: Tantalum, Thin Film Processed
Substrate Material: Aluminum Nitride
Terminals: Silver over Nickel
RoHS Compliant
Reliability: MIL-PRF-55342
Tape and Reel Specifications: See Page 38



mm (inches)

AVX Part Number	W ±0.25 (0.010)	L ±0.25 (0.010)	T ±0.13 (0.005)	A ±0.25 (0.010)	B (Typ.)	Frequency (GHz)	VSWR (Typ.)	Power Max** (Watts)
RP81020T0050JTTR	5.08 (0.200)	2.54 (0.100)	0.64 (0.025)	0.86 (0.034)	0.51 (0.020)	DC to 18.0	1.25:1	20W
RP82010T0050JTTR	2.54 (0.100)	5.08 (0.200)	1.02 (0.040)	1.27 (0.050)	1.52 (0.060)	DC to 4.0	1.20:1	30W
RP82525T0050JTTR	6.22 (0.245)	6.22 (0.245)	1.02 (0.040)	2.29 (0.090)	0.51 (0.020)	DC to 4.0	1.15:1	60W
RP82335T0050JTTR	8.89 (0.350)	5.84 (0.230)	1.02 (0.040)	2.54 (0.100)	0.76 (0.030)	DC to 4.0	1.15:1	100W
RP83725T0050JTTR	6.35 (0.250)	9.53 (0.375)	1.02 (0.040)	2.29 (0.090)	0.64 (0.025)	DC to 4.0	1.20:1	125W
RP83737T0050JTTR	9.40 (0.370)	9.40 (0.370)	1.02 (0.040)	3.05 (0.120)	0.64 (0.025)	DC to 2.0	1.25:1	150W

** Test Condition: Chip soldered to a via patch on a 30-mil-thick Rogers RO4350 board; Land surfaces at 100°C; maximum rated power applied.
Specification: The resistance of the film shall change no more than <2% during and after a 1000-hr. Burn-in per Mil-PRF-55342.

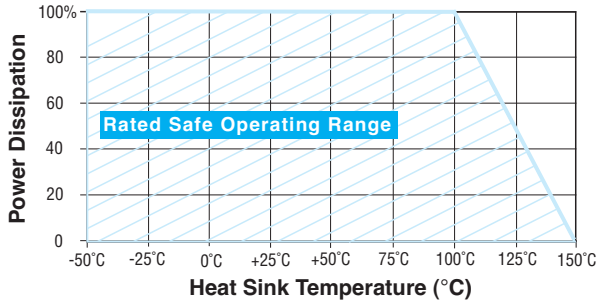
HOW TO ORDER

RP8	2010	T	0050	J	T	TR
AVX Series	**Case Size** See chart above	**Type** T = Termination	**Value** 0050 = 50Ω	**Tolerance** J = ±5% G = ±2%	**Terminal** T = Silver over Nickel	**Packaging** TR = Tape & Reel

RoHS COMPLIANT

Contact factory for custom ratings and sizes.

POWER DERATING



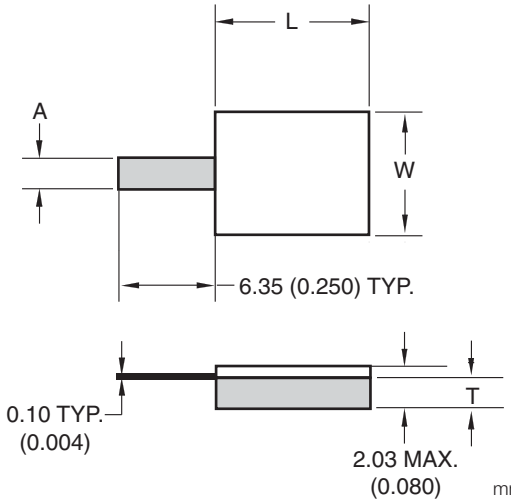
High Power Resistive Products

Terminations

LEADED CHIP TERMINATIONS – RPB SERIES

GENERAL SPECIFICATIONS

Nominal Impedance: 50 Ω
Resistive Tolerance: ±5% standard, ±2% available
Operating Temp Range: -55ºC to +150ºC
Temperature Coefficient: ±150 ppm/ºC
Resistive Elements: Tantalum, Thin Film Processed
Substrate Material: Aluminum Nitride
Terminals: Silver over Nickel
RoHS Compliant
Reliability: MIL-PRF-55342



mm (inches)

mm (inches)

AVX Part Number	W ±0.25 (0.010)	L ±0.25 (0.010)	T ±0.13 (0.005)	A ±0.13 (0.005)	Frequency (GHz)	Capacitance (pF)	Power Max** (Watts)
RPB1020T0050JTTR	5.08 (0.200)	2.54 (0.100)	0.64 (0.025)	1.02 (0.040)	DC to 18.0	1.25:1	20W
RPB2010T0050JTTR	2.54 (0.100)	5.08 (0.200)	1.02 (0.040)	1.02 (0.040)	DC to 4.0	1.20:1	30W
RPB2525T0050JTTR	6.22 (0.245)	6.22 (0.245)	1.02 (0.040)	1.02 (0.040)	DC to 4.0	1.15:1	60W
RPB2335T0050JTTR	8.89 (0.350)	5.84 (0.230)	1.02 (0.040)	1.02 (0.040)	DC to 4.0	1.15:1	100W
RPB3725T0050JTTR	6.35 (0.250)	9.53 (0.375)	1.02 (0.040)	1.02 (0.040)	DC to 4.0	1.20:1	125W
RPB3737T0050JTTR	9.40 (0.370)	9.40 (0.370)	1.02 (0.040)	1.02 (0.040)	DC to 2.0	1.25:1	200W

** Test Condition: Chip soldered to a via patch on a 30-mil-thick Rogers RO4350 board; Land surfaces at 100°C; maximum rated power applied.
Specification: The resistance of the film shall change no more than < 2% during and after a 1000-hr. Burn-in per Mil-PRF-55342.

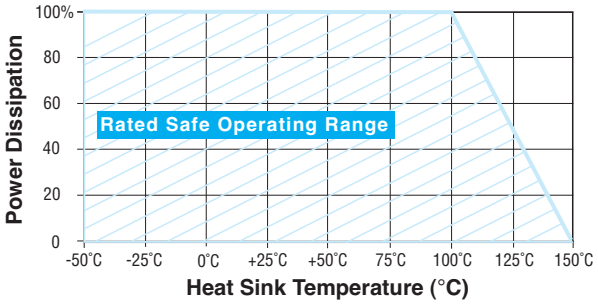
HOW TO ORDER

RPB	2010	T	0050	J	T	BK
AVX Series	**Case Size** See chart above	**Type** T = Termination	**Value** 0050 = 50Ω	**Tolerance** J = ±5% G = ±2%	**Terminal** T = Silver over Nickel	**Packaging** BK = Plastic Carrier

RoHS COMPLIANT

Contact factory for custom ratings and sizes.

POWER DERATING

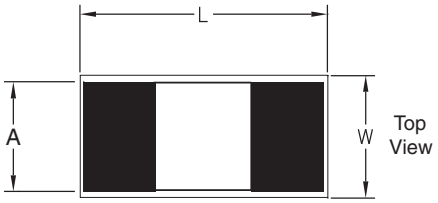


High Power Resistive Products

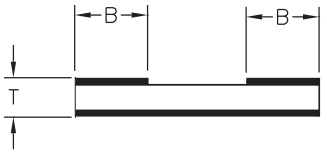
Jumpers

SPECIFICATIONS

Substrate Material: Aluminum Nitride
Terminals: Silver
Operating Temp Range: -55ºC to +150ºC
RoHS Compliant
Reliability: MIL-PRF-55342



Top View



Side View

mm (inches)

AVX Part Number	W ±0.25 (0.010)	L ±0.25 (0.010)	T ±0.13 (0.005)	A ±0.13 (0.005)	B (Typ.)
RP31206JXXXXJTTR	1.52 (0.060)	3.05 (0.120)	0.64 (0.025)	1.40 (0.055)	0.51 (0.020)
RP32010JXXXXJTTR	2.54 (0.100)	5.08 (0.200)	1.02 (0.040)	2.29 (0.090)	0.51 (0.020)
RP32525JXXXXJTTR	6.22 (0.245)	6.22 (0.245)	1.02 (0.040)	3.30 (0.130)	0.51 (0.020)
RP33725JXXXXJTTR	6.35 (0.250)	9.53 (0.375)	1.02 (0.040)	5.03 (0.198)	0.64 (0.025)
RP33737JXXXXJTTU	9.40 (0.370)	9.40 (0.370)	1.02 (0.040)	8.38 (0.330)	0.64 (0.025)

HOW TO ORDER

RP3	1206	J	XXXX	J	T	TR
AVX Series	**Case Size** See chart above	**Type** J = Jumper	**Value** 0100 = 100Ω	**Tolerance** J = ±5%	**Terminal** T = Silver	**Packaging** TR = Tape & Reel

RoHS COMPLIANT

Contact factory for custom ratings and sizes.

High Power Resistive Products

Resistive Products Design Kits

AVX's Resistive Products Design Kits contain a selection of High Power Chip Resistors and Terminations with standard values of 50 Ohm and 100 Ohm. Operating frequencies are from DC to 6 GHz. All designs are manufactured with Non-toxic Aluminum Nitride base substrates.

ORDER BY ITEM # BELOW

mm (inches)

Item #	Series Description	Part#	Sizes L x W x H	Power Handling Range	Resistance Value	Tol.	Qty
KIT-RP001	RP9 Series Surface Mount Chip Terminations	RP92010T0050GTTR	5.08 x 2.54 x 1.02 (0.200 x 0.100 x 0.040)	10 Watt	50 Ohm	±2%	2
		RP92525T0050GTTR	6.22 x 6.22 x 1.02 (0.245 x 0.245 x 0.040)	20 Watt	50 Ohm	±2%	2
	RP4 Series Surface Mount Chip Resistors	RP42525R0050GTTR	6.22 x 6.22 x 1.02 (0.245 x 0.245 x 0.040)	20 Watt	50 Ohm	±2%	2
		RP43737R0050GTTR	9.40 x 9.40 x 1.02 (0.370 x 0.370 x 0.040)	40 Watt	50 Ohm	±2%	2
		RP42010R0100GTTR	5.08 x 2.54 x 1.02 (0.200 x 0.100 x 0.040)	10 Watt	100 Ohm	±2%	2
		RP43725R0100GTTR	9.53 x 6.35 x 1.02 (0.375 x 0.250 x 0.040)	30 Watt	100 Ohm	±2%	2
KIT-RP002	RP8 Series Chip Terminations	RP82010T0050JTTR	5.08 x 2.54 x 1.02 (0.200 x 0.100 x 0.040)	30 Watt	50 Ohm	±5%	2
		RP83737T0050JTTR	9.40 x 9.40 x 1.02 (0.370 x 0.370 x 0.040)	150 Watt	50 Ohm	±5%	2
	RP3 Series Chip Resistors	RP31005R0100JTTR	2.54 x 1.27 x 6.35 (0.100 x 0.050 x 0.025)	5 Watt	100 Ohm	±5%	2
		RP33737R0100JTTR	9.40 x 9.40 x 1.02 (0.370 x N0.370 x 0.040)	250 Watt	100 Ohm	±5%	2
KIT-RP003	RPA Series Flange Mount Terminations	RPA0300T0050JNBK	7.62 x 5.08 x 2.59 (0.300 x 0.200 x 0.102) *Add flange dimensions per catalog	20 Watt	50 Ohm	±5%	2
	RP6 Series Flange Mount Resistors	RP60300R0100JNBK	7.62 x 5.08 x 2.59 (0.300 x 0.200 x 0.102) *Add flange dimensions per catalog	20 Watt	100 Ohm	±5%	2

High Power Resistive Products

Resistive Products Tape and Reel Specifications

RESISTIVE PRODUCTS QUALITY ASSURANCE

AVX is an ISO 9001 registered company that is dedicated to the Continuous Process Improvement for all of its products in order to satisfy the needs and expectations of its customers. All qualification testing is performed in accordance with MIL-PRF-55342, MIL-STD-883, and MIL-STD-202 methods. Group A, B and C testing are also available for Hi-Rel and Space level applications.

QUALIFICATION TEST SUMMARY

Visual, Mechanical Inspection: MIL-PRF-55342 para. 4.8.1.1

DC Resistance: MIL-PRF-55342 para. 4.8.2/MIL-STD-202 method 303

Power Handling: MIL-PRF-55342 para. 4.8.11.1

High Temperature Exposure: MIL-PRF-55342 para. 4.8.7

Tab Pull: MIL-PRF-55342 para. 4.8.13/MIL-STD-202 method 211

Solderability: MIL-PRF-55342 para. 4.8.12/MIL-STD-202 method 208

Bond Exposure, Shear Test: MIL-PRF-55342 para. 4.8.8/ANSI/J-STD-002 para. 4.2.2

Low Temperature Operation: MIL-PRF-55342 para. 4.8.5

Temperature Coefficient of Resistance (TCR): MIL-PRF-55342 para. 4.8.10/MIL-STD-202 method 304

Power Life Test: MIL-PRF-55342 para. 4.8.11.1

Moisture Resistance: MIL-PRF-55342 para. 4.8.9/MIL-STD-202 method 106

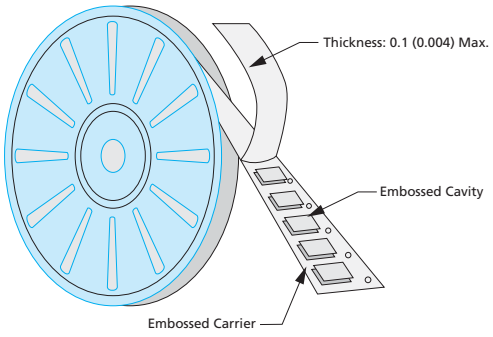
Resistance to Solvents: MIL-PRF-55342 para. 4.8.14/MIL-STD-202 method 215

Thermal Shock: MIL-PRF-55342 para. 4.8.3/MIL-STD-202 method 107

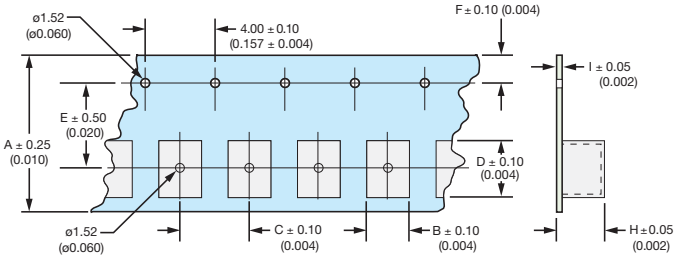
TAPE AND REEL SPECIFICATIONS

All AVX Resistive Surface Mount and Chip Products are supplied in tape & reel (1000 chips per reel) and are ideal for automated pick and place manufacturing applications.

PACKAGING



TAPE DIMENSIONS



mm (inches)

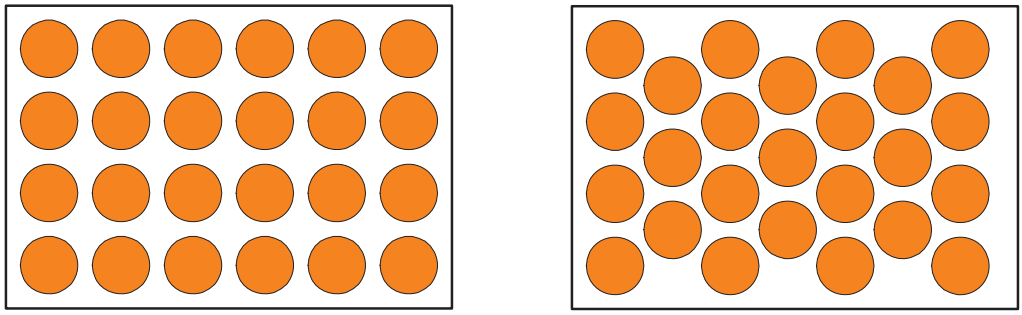
Chip Size	A Dim.	B Dim.	C Dim.	D Dim.	E Dim.	F Dim.	H Dim.	I Dim.	Pcs. / per reel
1206	8.13 (0.320)	2.03 (0.080)	4.06 (0.160)	3.56 (0.140)	3.56 (0.140)	1.78 (0.070)	0.08 (0.003)	0.254 (0.010)	1000
2010	11.9 (0.469)	3.05 (0.120)	4.06 (0.160)	5.59 (0.220)	5.46 (0.215)	1.78 (0.070)	1.78 (0.070)	0.254 (0.010)	1000
2525	11.9 (0.469)	7.11 (0.280)	8.13 (0.320)	7.11 (0.280)	5.46 (0.215)	1.78 (0.070)	1.78 (0.070)	0.254 (0.010)	1000
3725	15.2 (0.598)	7.11 (0.280)	8.13 (0.320)	9.91 (0.390)	9.91 (0.390)	1.78 (0.070)	1.78 (0.070)	0.254 (0.010)	1000*
3737	24.0 (0.945)	10.4 (0.409)	11.9 (0.469)	10.4 (0.409)	11.4 (0.449)	1.78 (0.070)	1.78 (0.070)	0.254 (0.010)	1000*

Orientation – all input terminals face towards the sprocket holes of the tape.
*500 pc. reels are available in these sizes.

CHIP ATTACHMENT AND PC BOARD RECOMMENDATIONS

For the mounting of chip or leaded devices, it is important to obtain a good solder joint between the device's ground plane and the heat sink that is free of voids. Pre-tinning of the device's ground plane and the heat sink is recommended. The following are AVX recommendations:

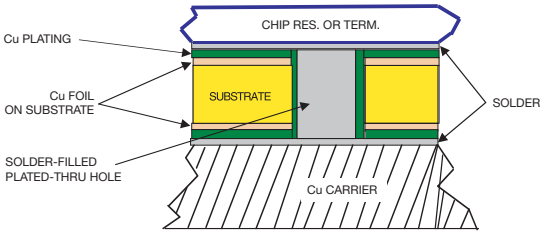
PC board: Rogers Corp. 4350 or FR4; 30 mils thick; 1/2-oz. (0.7-mils-thick) copper cladding



Rectangular via array **Triangular via array**

Figure 1: Rectangular and triangular via arrays

Pattern: Rectangular array. Notes – There are two possible uniform patterns, designated *Rectangular Array* and *Triangular Array* respectively. For optimum design, it must be determined which pattern places the most via holes under a chip. This consideration can become fairly complex, since vias that are even partially under a chip can still contribute significantly to heat conduction. AVX has developed some useful algorithms to aid in optimum via-patch design; customer assistance is available from the factory. For most – but not all – situations, the rectangular array yields better results than its triangular counterpart.



CROSS SECTION OF TYPICAL VIA HOLE

mm (inches)

ASSUMPTIONS			
Hole Dia	0.41 (0.016)	thick_sol	0.05 (0.002)
thick_Cu_Plate	0.05 (0.002)	kth_cu	9.9 W/(in °C)
kth_sub	0.02 W/(in °C)	thick_Cu_foil	0.02 (0.0007)
thick_sub	0.76 (0.030)	theta_1via_hole	35.1°C/Watt
k_sol	1.290 W/(in °C)		

Figure 2: Via-hole cross section and parameters

Via holes: See Figure 2. Structure – plated through with 2-mil copper, filled with Sn62, Sn63 or Sn96 solder; Diameter = 16 mils; edge-to-edge spacing = 0.5 x diameter = 8 mils; Notes – The minimum via hole diameter is generally a function of board thickness and is related to "walking" or breaking of the drill bit. The maximum via-hole diameter relates to the ability to wick up solder to the via's full length. Different PC board fabricators will have different design rules that apply.

VIA HOLE CALCULATIONS FOR SURFACE MOUNT RESISTORS AND TERMINATIONS

The calculated thermal resistance of each via, with the assumptions in **Figure 2**, is 35ºC/Watt. **Table 1** and **Table 2** below present calculated performance parameters of AVX's standard via patches for various sizes of RP9-style SMT chip terminations and RP4-style SMT chip resistors.

Assumptions:

1. No lateral heat transfer on surface.
2. Board is solder attached to an ideal heat sink.
3. Thermal resistance of each via is 35ºC/Watt.

NOTE: The screws shown are not calculated in the tables.

Table 1: Calculated Via-Patch Performance for RP9-Style Terminations

mm (inches)

Chip Type RP9 Size (L X W)	Rated Power of Chip (Watts)	Number of Vias	Thermal Resistance of Board (°C/Watt)	Temperature drop across board at rated Power (°C)
5.08 x 2.54 (0.200 x 0.100)	10	30	1.17	11.7
6.35 x 6.35 (0.250 x 0.250)	20	88	0.40	8.0
9.53 x 6.35 (0.375 x 0.250)	30	132	0.27	8.1
9.53 x 9.53(0.375 x 0.375)	40	204	0.17	6.9

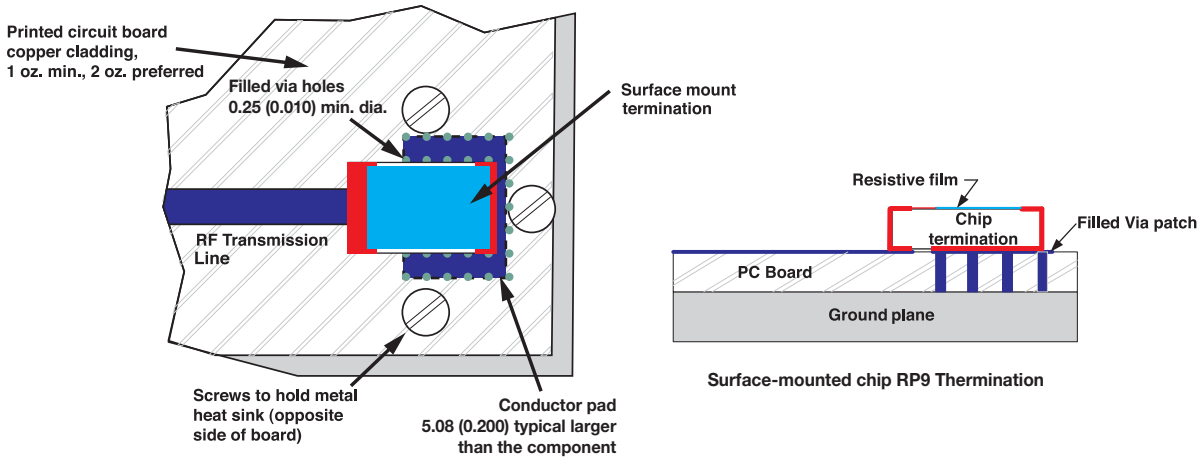


Figure 3

Assumptions:

1. No lateral heat transfer on surface of board.
2. Board is solder attached to an ideal heat sink.
3. Thermal resistance of each via is 35ºC/Watt.

Table 2: Calculated Via-Patch Performance for RP4-Style Resistors

mm (inches)

Chip Type RP4 Size (L X W)	Rated Power of Chip (Watts)	Number of Vias	Thermal Resistance of Board (°C/Watt)	Temperature drop across board at rated Power (°C)
5.08 x 2.54 (0.200 x 0.100)	10	20	1.75	17.5
6.35 x 6.35 (0.250 x 0.250)	20	48	0.73	14.6
9.53 x 6.35 (0.375 x 0.250)	30	96	0.36	10.8
9.53 x 9.53(0.375 x 0.375)	40	144	0.24	9.7

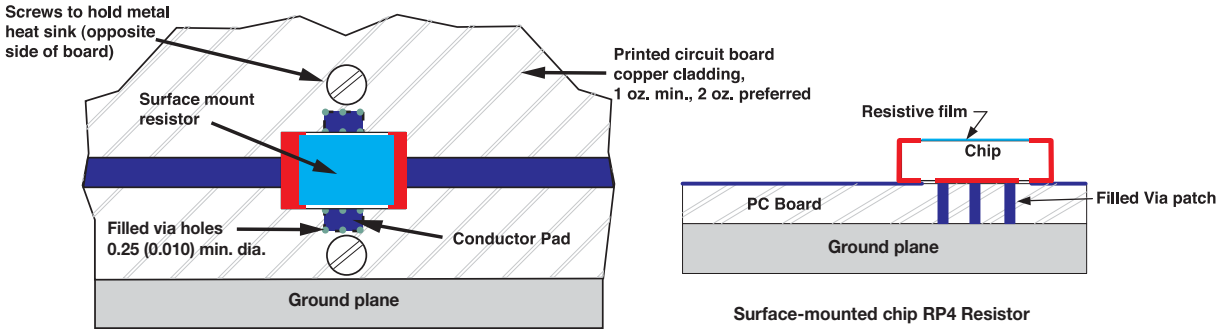


Figure 3

ATTACHMENT RECOMMENDATIONS FOR LEADED RESISTORS AND TERMINATIONS

When mounting chips, the solder interface to the mounting surface has a crucial bearing on performance. Even with very careful soldering technique, voids (porosity) and de-wetting are difficult to avoid. Using Scanning Acoustic Microscopy (SAM), radiographic analysis, and metallographic sectioning, AVX has studied solder joints made with a variety of techniques. One result is that where typical surface mount assembly techniques are used, such as those involving solder paste, porosity levels of 10–25% should be expected. Note that this directly transfers to the power rating of the part, i.e., its power handling capability will decrease in approximately the same proportion.

Here are some suggestions to improve solder joint integrity:

Avoid the use of hold-down clamps or springs. Loading the solder in compression during melting forces it out of the bond area and does not permit the "Z" direction movement required during solidification to reduce shrinkage porosity. Further, the thermal mass of the hold-down fixture may cause a lag in temperature, resulting in a cooler part and loss of solder in the bond area when the chip eventually reaches the correct temperature. (AVX solder type recommendations Sn62 or Sn96.)

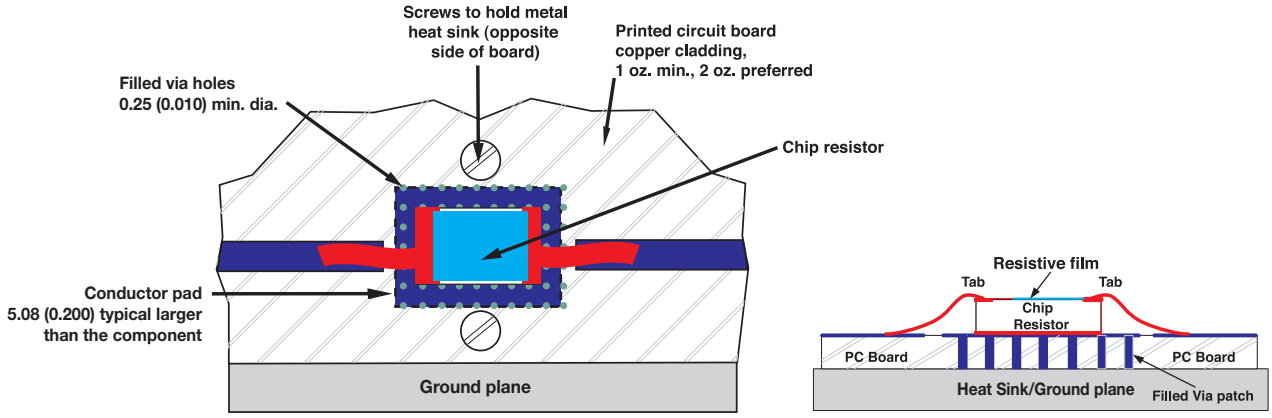


Figure 5: PC Board Mounted Chip Resistor

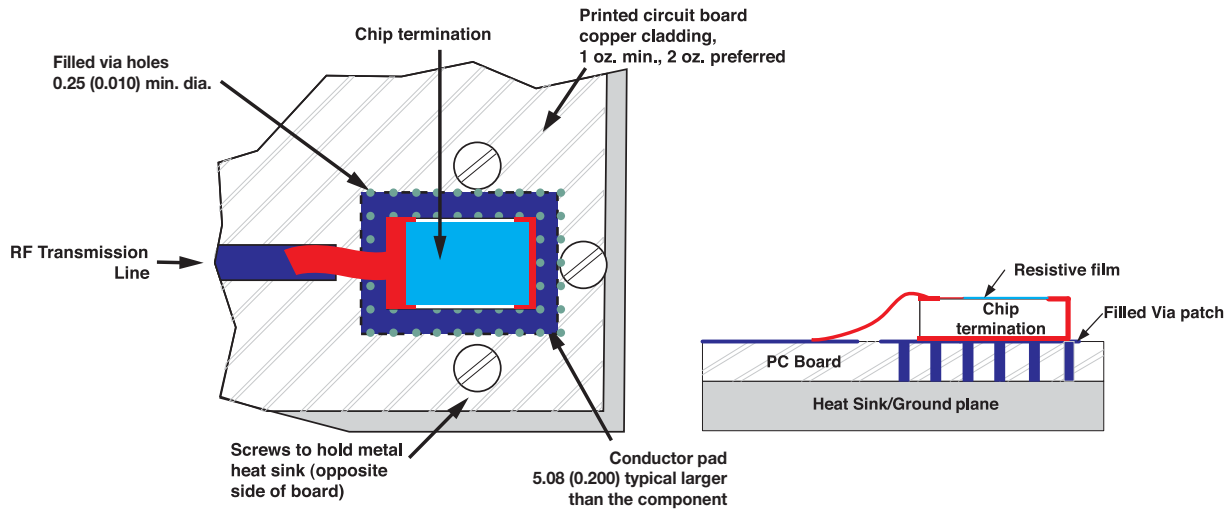


Figure 6: PC Board Mounted Chip Termination

ATTACHMENT RECOMMENDATIONS TO GROUND PLANE FOR LEADED AND FLANGED RESISTORS AND TERMINATIONS

Avoid introducing solder to the entire bond area prior to soldering, i.e. do not use a solder pre-form the same size as the entire resistor chip. Solder pre-form should be 5-10% smaller in size than the device's ground plane. Porosity reduction is enhanced by permitting the solder to wick through the joint area by capillary action, preferably from a central location.

Reduce the soldering time (temperature above solder melting point) to 20-30 seconds maximum in order to avoid scavenging of the silver plating, intermetallic formations, solder melting point alteration, etc. Reasonably good results have been achieved at AVX using lengths of solid Sn96 (Sn96.5/Ag3.5) wire, about 0.030" in diameter, placed in the center of the chip, with RMA flux applied to both chip and mounting surface. This process has been shown to result in porosity levels of 8-12%; optimized solder volumes may yield even better results.

Table 3: Recommended Solders

Alloy	Composition	Solidus	Liquidus
Sn62	62.5 Sn, 36.1 Pb, 1.4 Ag	179°C	179°C
Sn63	63 Sn, 37 Pb	183°C	183°C
Sn96	96 Sn, 4 Ag	221°C	221°C

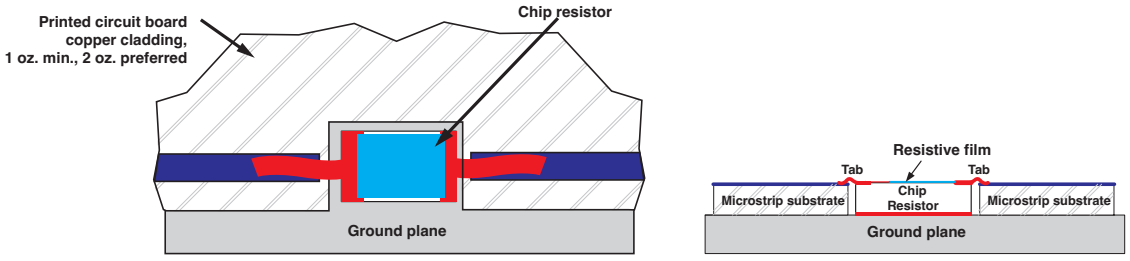


Figure 7: Ground plane Mounted Chip Resistor

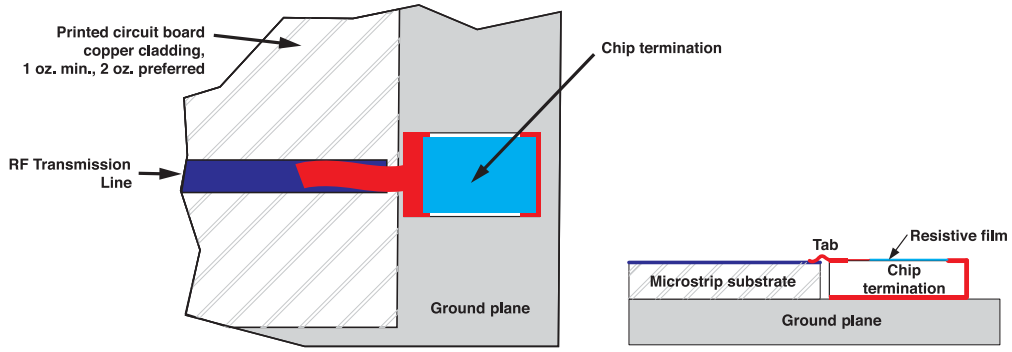
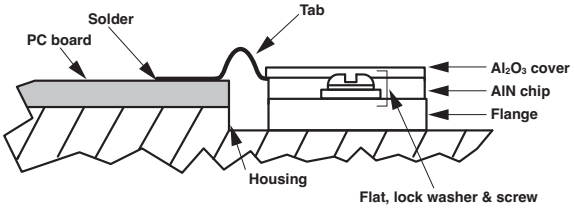


Figure 8: Ground plane Mounted Chip Termination

FLANGED RESISTORS AND TERMINATIONS



The area under the device should be flat to less than 0.001" and free of burrs and scratches. For maximum heat transfer from the device to the heat sink use either thermal grease or a thermal gasket. Keep the thickness of the grease to less than 0.002". Be sure to form a small loop in the tab, making sure you support it while doing so. This will act as a strain relief as the heat is dissipated and transferred to the housing and PC board. Seat the device into the thermal grease and install screws with lock and flat washers, torque as specified.

Thread No.	Mounting Torque
4-40	6 inch-lbs.
6-32	8 inch-lbs.
8-32	2 inch-lbs.
10-24	18 inch-lbs.

Position the tab over the circuit and solder in place.