



Product Family: [Tantalum Nitride Thin Film Chip Resistor](#)

Part Number Series: [AF Series](#)



Construction:

- High Purity Alumina Substrate
- TaN resistive element
- Anti-Sulfur (ASTM B09-95)
- Wrap around electrodes
- 100% matte tin over Ni terminations (RoHS compliant and Pb Free)

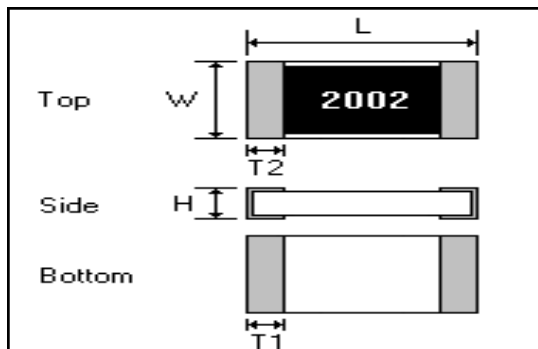
Features:

- 0402, 0603, 0805, 1206; E24 + E 96 values
- TCR's down to $\pm 10\text{ppm}/^\circ\text{C}$
- Resistance down to 10Ω available
- AEC Q200 Qualified—Automotive Grade

Description:

These AF Series precision chip resistors are AEC Q200 qualified, sulfur resistant, offer excellent performance and tolerance in TCR, current noise, and linearity for high frequency circuit applications and other applications requiring precision and stability. They are perfect for demanding applications where high reliability and sulfur resistance is a must, such as automotive applications. High volume manufacturing allows for lower costs for the customer.

Product Dimensions:



- No marking code for 0402 size
- 3- digit marking for 0603 size
- 4- digit marking for 0805 & 1206 size

Dimension	TF0402 (1005)	TF0603 (1608)	TF0805 (2012)	TF1206 (3216)
L	0.039 ± 0.004	0.061 ± 0.004	0.079 ± 0.004	0.122 ± 0.004
W	0.020 ± 0.002	0.031 ± 0.004	0.049 ± 0.004	0.063 ± 0.004
H	0.012 ± 0.004	0.018 ± 0.006	0.020 ± 0.006	0.024 ± 0.006
T1	0.012 ± 0.004	0.012 ± 0.006	0.016 ± 0.008	0.018 ± 0.008
T2	0.010 ± 0.006	0.012 ± 0.008	0.014 ± 0.008	0.018 ± 0.008

All dimensions are shown in inches, Metric case sizes are shown in parenthesis.

Part Numbering: Ex:AF0603AE2002B-T5

Product Designator	Size W x L English	Internal Code	Temp. Coefficient of Resistance (TCR)	Resistance Value	Resistance Tolerance	T&R Packaging Quantity
AF	0402 0603 0805 1206	A	Y = $\pm 10\text{ppm}/^\circ\text{C}$ X = $\pm 15\text{ppm}/^\circ\text{C}$ E = $\pm 25\text{ppm}/^\circ\text{C}$ Q = $\pm 50\text{ppm}/^\circ\text{C}$	For all sizes, use 4 digit code for all values. "R" denotes decimal position as necessary	A = $\pm 0.05\%$ B = $\pm 0.10\%$ C = $\pm 0.25\%$ D = $\pm 0.50\%$ F = $\pm 1.00\%$	-T5 = 5,000 PCS (0603, 0805, 1206) -T10 = 10,000 PCS (0402)

Electrical Specifications:

Type	AF0402	AF0603	AF0805	AF1206
English Size	0402	0603	0805	1206
Power	0.0625 Watt	0.15 Watt	0.2 Watt	0.4 Watt
Tolerance% (code)	$\pm 0.05(A)$, $\pm 0.1(B)$, $\pm 0.25(C)$, $\pm 0.5(D)$, $\pm 1(F)$			
Resistance Range (Ω)	40~35K	40~130K	10~350K	10~1M
Resistance Offering	E-24, E-96 Values			
TCR ppm/ $^{\circ}C$ (code)	$\pm 10(Y)$, $\pm 15(X)$, $\pm 25(E)$, $\pm 50(Q)$			
Max Operating Voltage	50 V	75 V	100 V	200 V
Operating Temp. Range	-55 $^{\circ}C$ ~ 155 $^{\circ}C$			
Packaging	10,000 pcs/reel	5,000 pcs/reel		

Reliability Specifications:

Test	Test Method	Specification
Short time overload (S.T.O.L) IEC60115-1 4.13	Permanent resistance change after a 5second application of a voltage 2.5 times RCWV or the maximum overload voltage specified in the above list, whichever is less.	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Resistance to soldering heat (R.S.H) AEC Q200-15	Un-mounted chips completely immersed for 10 \pm 1second in a SAC solder bath at 260 $^{\circ}C$ \pm 5 $^{\circ}C$	no visible damage $\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Solderability IEC 60068-2-58	Un-mounted chips completely immersed for 2 \pm 0.5 second in a SAC solder bath at 235 $^{\circ}C$ \pm 5 $^{\circ}C$	good tinning (>95% covered) no visible damage
Thermal Shock MIL-STD-202 Method 107	Test -55 $^{\circ}C$ to 125 $^{\circ}C$ / dwell time 15min/ Max transfer time 20sec 1000 cycles	no visible damage $\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Bias Humidity AEC Q200-7	1000 +48/-0 hours, loaded with 10% rated power in humidity chamber controller at +85 $^{\circ}C$ / 85%RH	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Load Life IEC60115-1 4.25	1000 +48/-0 hours, loaded with RCWV or Vmax in chamber controller 85 \pm 2 $^{\circ}C$, 1.5 hours on and 0.5 hours off	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Operational Life AEC Q200-8 MIL-STD-202 -108	1,000 hours at 125 \pm 2 $^{\circ}C$, loaded with rated power continuously	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
High Temperature Exposure AEC Q200-3	1000 hrs @ 125 $^{\circ}C$, un-powered	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Moisture Resistance AEC-Q200 -6 MIL-STD-202 Method 106	65 \pm 2 $^{\circ}C$, 80~100% RH, 10 cycles, 24 hours/ cycle	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Mechanical Shock MIL-STD-202 Method 213	1/2 Sine Pulse / 1500g Peak / Velocity 15.4ft/sec	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Vibration MIL-STD-202 Method 204	5 g's for 20 min , 12 cycles each of 3 orientations	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$
Terminal strength AEC-Q200-6	1 kg for 60 s	No broken
Board flex AEC-Q200-21	Bending 2mm for 60 sec	$\Delta R/R$ max. $\pm(0.1\%+0.02\Omega)$

Derating Curve:

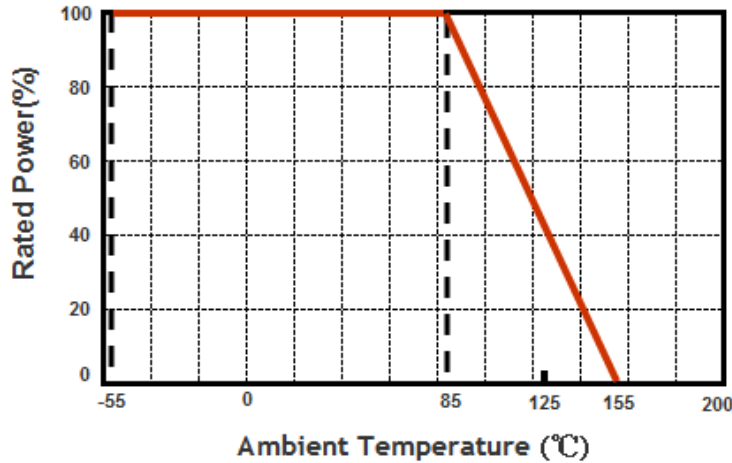


Fig.2 Maximum dissipation in percentage of rated power as a function of ambient temperature

Soldering Profile:

Profile Parameter	Sn-Pb Parts	Pb Free Parts
Average Ramp-Up Rate (T_{Smax} to T_P)	3°C/second max.	3°C/second max.
Preheat - Temperature Min (T_{Smin}) - Temperature Max (T_{Smax}) - Time (T_{Smin} to T_{Smax})	100°C 150°C 60-120 seconds	130°C 180°C 60-90 seconds
Time maintained above: - Temperature (T_L) - Time (t_L)	183°C 60-150 seconds	220°C 30-90 seconds
Peak Temperature (T_P)	225 - 240°C	260 ±5°C
Time within 5°C of actual Peak Temperature (T_P)	10-30 seconds	10-30 seconds
Ramp Down Rate	6°C/second max.	6°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

