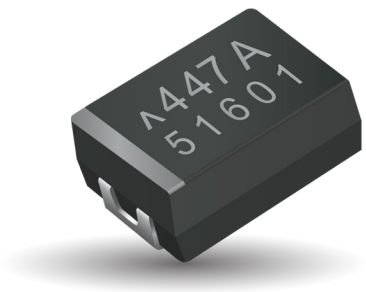
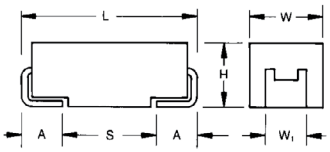
TCO Series

High Temperature Automotive Polymer Chip Capacitors





FEATURES

- Conductive Polymer Electrode
- Benign Failure Mode Under Recommended Use Conditions
- Robust Design for Automotive Applications
- Meets Requirements of AEC-Q200
- -55 to +150°C Operation Temperature
- Humidity 85°C/85%RH, Vr, 1000 Hours
- Basic Reliability 1%/1000hrs@85°C Vr with 60% Confidence Level
- DCL 0.1 CV
- 3x reflow 260°C Compatible
- 100% Surge Current Tested

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

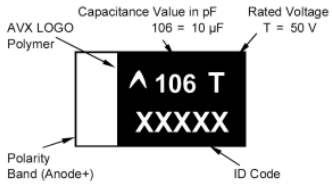
APPLICATIONS

DC/DC converters, Telecommunication (coupling/decoupling), Industrial & special, Automotive (body electronics, cabin controls, infotainment, comfort, after market etc)

Not recommended for use of conductive polymer parts in high power applications. For more information please see AVX automotive application guide at avx.com (see the link: http://www.avx.com/docs/techinfo/ApplicationGuides/Automotive-Application-Guide.pdf), or contact manufacturer.

AVX's qualification of TCO capacitors meets requirements of AEC-Q200. TCO series is manufactured in an IATF 16949 certified facility.

MARKING



CASE DIMENSIONS:

millimeters (inches)

Code	EIA Code	EIA Metric	L±0.20 (0.008)	W+0.20 (0.008) -0.10 (0.004)	H+0.20 (0.008) -0.10 (0.004)	W_1±0.20 (0.008)	A+0.30 (0.012) -0.20 (0.008)	S Min.
D	2917	7343-31	7.30 (0.287)	4.30 (0.169)	2.90 (0.114)	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)

W_1 dimension applies to the termination width for A dimensional area only.

HOW TO ORDER

TCO	D	106	M	050	#	0150	E
Type	**Case Size** See table above	**Capacitance Code** pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	**Tolerance** M = ±20%	**Rated DC Voltage** 050 = 50Vdc	**Packaging** R = Pure Tin 7" Reel S = Pure Tin 13" Reel	**ESR in mΩ**	**Additional Character** E = Black resin

TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C
Capacitance Range:	10 µF
Capacitance Tolerance:	±20%
Leakage Current DCL:	0.1CV
Temperature Range:	-55°C to +150°C
	Meets requirements of AEC-Q200

NOTE: Conductive Polymer Capacitors are designed to operate within the limits of the environmental conditions specified for each series. If operated continuously at their maximum temperature and / or humidity limit, or beyond these limits, capacitors may exhibit a parametric shift in capacitance and increases in ESR. These changes may occur earlier if the specified environmental conditions are exceeded. Similarly, their normal operational time period will be significantly extended if their general duty cycle includes operation below maximum temperature within humidity controlled environments. Careful attention should be paid to maximum temperature with associated high humidity environments as well as voltage derating, ripple current and current surges. Please reference the AVX Conductive Polymer Capacitor Guidelines for more information or contact factory for application assistance.

CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V_R) @ 105ºC		
µF	Code	25V (E)	35V (V)	50V (T)
10	106			D(150)
15	156			
22	226			
33	336			

Released ratings, (ESR ratings in mOhms in parentheses)
Note: Voltage ratings are minimum values. AVX reserves the right to supply higher volage ratings in the same case size, to the same reliability standards.

RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	Maximum Operating Temp. (°C)	DCL Max (µA)	DF Max (%)	ESR Max @ 100kHz (mΩ)	100kHz RMS Current (mA)					Humidity 85°C/85% RH, Vr (hrs)	MSL
								45ºC	85°C	105ºC	125°C	150°C		
50 Volt														
TCOD106M050#0150E	D	10	50	150	50	10	150	1225	857	551	306	184	1000	3

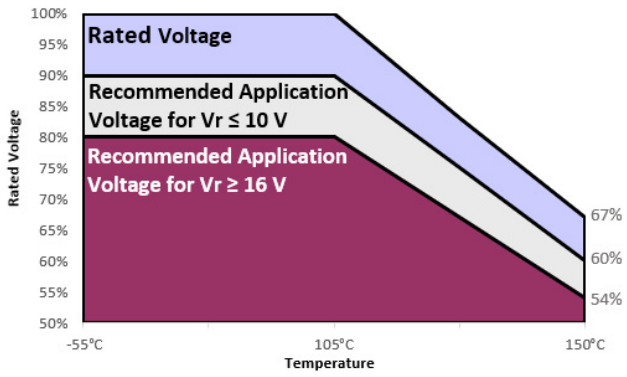
Moisture Sensitivity Level (MSL) is defined according to J-STD-020.
All technical data relates to an ambient temperature of +25C.

Capacitance and DF are measured at 120Hz, 0.5RMS with DC bias of 2.2 volts.
DCL is measured at rated voltage after 5 minutes.
ESR allowed to move up to 1.25 times catalog limit post mounting.
For typical weight and composition see page 259.

RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of Vr

Rated voltage	Operating Temperature		
	≤85°C	105°C	150°C
≤10V	90%	90%	60%
≥16V	80%	80%	54%

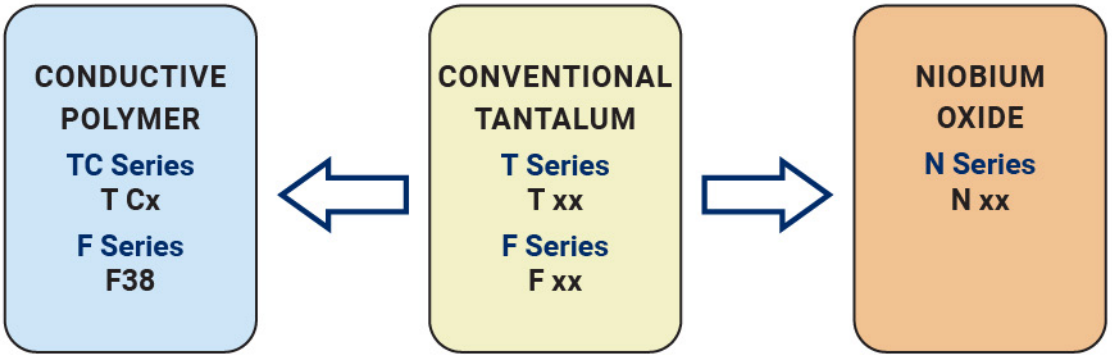


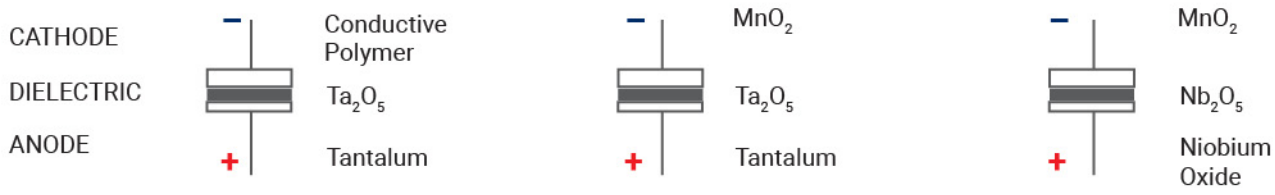
QUALIFICATION TABLE

TEST	TCO series (Temperature range -55°C to 150°C)								
	Condition			Characteristics						
Endurance	Apply rated voltage (Ur) at 105°C for 2000hrs and 2/3 rated voltage (Ur) at 150°C for 1000 hours through a circuit impedance of ≤0.1Ω/V. Stabilize at room temperature for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	2 x initial limit					
				ΔC/C	within +10/-20% of initial value					
				DF	2 x initial limit					
				ESR	2 x initial limit					
Storage Life	Store at 150°C, no voltage applied, for 1000 hours. Stabilize at room temperature for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	2x initial limit					
				ΔC/C	within +10/-20% of initial value					
				DF	2 x initial limit					
				ESR	2 x initial limit					
Biased Humidity	Apply rated voltage (Ur) at 85°C, 85% relative humidity for 1000 hours. Stabilize at room temperature and humidity for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	2 x initial limit					
				ΔC/C	within +35/-5% of initial value					
				DF	1.5 x initial limit					
				ESR	2 x initial limit					
Temperature Stability	Step	Temperature°C	Duration(min)		+20°C	-55°C	+20°C	+105°C	+150°C	+20°C
	1	+20	15	DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*
	2	-55	15	ΔC/C	n/a	±20%	±5%	±20%	±30%	±5%
	3	+20	15	DF	IL*	IL*	IL*	1.5 x IL*	1.5 x IL*	IL*
	4	+105	15							
	5	+150	15							
	6	+20	15							
Surge Voltage	Apply 1.3x 2/3x rated voltage (Ur) at 150°C for 1000 cycles, charge / discharge resistance 33Ω.			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within +10/-20% of initial value for Vr ≤ 10V within +20/-30% of initial value for Vr ≥ 16V					
				DF	initial limit for Vr ≤ 10V 1.25x initial limit for Vr ≥ 16V					
				ESR	1.25 x initial limit					
Mechanical Shock	MIL-STD-202, Method 213, Condition F			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within ±10% of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					
Vibration	MIL-STD-202, Method 204, Condition D			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within ±10% of initial value					
				DF	initial limit					
				ESR	1.25 x initial limit					

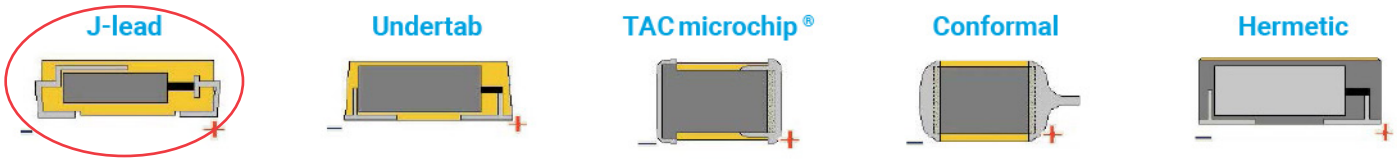
*Initial Limit
For use outside of recommended conditions and special request, please contact AVX.
Initial measurement max. 1hr after the removal from dry pack or after pretreatment at 85°C for 24 hours.

SOLID ELECTROLYTIC CAPACITOR ROADMAP





FIVE CAPACITOR CONSTRUCTION STYLES



SERIES LINE UP : Conductive Polymer