TCR Series

Professional Conductive Polymer Chip Capacitors

FEATURES

- Conductive polymer electrode
- Benign failure mode under recommended use conditions
- Robust design for long operation lifetime
- AVX maverick part control Q-process with statistical screening
- Improved basic reliability 0.5%/1000hrs
- Humidity 85°C/85%RH, Vr, (up to 500 or 1000 hours see reference table)
- -55 to +125°C operation temperature
- DCL 0.1 CxV, 0.05CV on selected codes
- 3x reflow 260°C compatible
- Low ESR

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

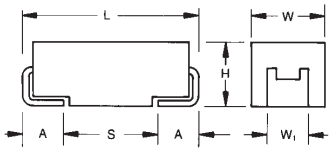
RoHS COMPLIANT

SnPb termination option is not RoHS compliant.

APPLICATIONS

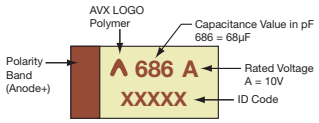
- Long life time DC/DC converter applications in Telecommunications, Industrial, Avionics

For additional information on Q-process please consult the AVX technical publication "Reaching the Highest Reliability for Tantalum Capacitors" (see the link: http://www.avx.com/docs/techinfo/Qprocess.pdf)



MARKING

B, D, Y CASE



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.
B	1210	3528-21	3.50 (0.138)	2.80 (0.110)	1.90 (0.075)	2.20 (0.087)	0.80 (0.031)	1.40 (0.055)
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)
Y	2917	7343-20	7.30 (0.287)	4.30 (0.169)	2.00 (0.079) max	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)
W1 dimension applies to the termination width for A dimensional area only.								

HOW TO ORDER

TCR	D	476	M	016	#	0070	J
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** 004 = 4Vdc 006 = 6.3Vdc 010 = 10Vdc 016 = 16Vdc 020 = 20Vdc 025 = 25Vdc 035 = 35Vdc 050 = 50Vdc	**Packaging** R = Pure Tin 7" Reel S = Pure Tin 13" Reel H = Tin Lead 7"Reel (contact manufacturer) K = Tin Lead 13" Reel (contact manufacturer)	**ESR in mΩ**	**DCL** J = 0.1CV

TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25ºC
Capacitance Range:	10µF to 220µF
Capacitance Tolerance:	±20%
Leakage Current DCL:	(J) 0.1CV
Temperature Range:	-55ºC to +125°C
Basic Reliability:	0.5% per 1000 hours at 85ºC, Vr with 0.1ΩV series impedance, 60% confidence level
Termination Finish:	Sn Plating (standard) and SnPb Plating upon request

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.

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CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V_R)							
µF	Code	4V (G)	6.3V (J)	10V (A)	16V (C)	20V (D)	25V (E)	35V (V)	50V (T)
10	106							D(70	D(120)
15	156						D(70)		
22	226		B(70)			D(70)			
33	336		B(70)		D(70)				
47	476		B(70)		D(70)				
68	686			D(70)					
100	107			D(70)					
150	157		D(40)						
220	227	D(40), Y(40)							

Released ratings, (ESR ratings in mOhms in parentheses)

Note: Voltage ratings are minimum values. AVX reserves the right to supply higher voltage 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 Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max @ 100kHz (mΩ)	100kHz RMS Current (mA)				Humidity 85°C/85%RH, Vr (hrs)	MSL
								45°C	85°C	105°C	125°C		
4 Volt													
TCRD227M004#0040J	D	220	4	125	88	6	40	2400	1700	1100	600	1000	3
TCRY227M004#0040J	Y	220	4	125	88	6	40	2200	1500	1000	600	500	3
6.3 Volt													
TCRB226M006#0070J	B	22	6.3	125	13	6	70	1300	900	600	300	500	3
TCRB336M006#0070J	B	33	6.3	125	19	6	70	1300	900	600	300	500	3
TCRB476M006#0070J	B	47	6.3	125	28	6	70	1300	900	600	300	500	3
TCRD157M006#0040J	D	150	6.3	125	90	6	40	2400	1700	1100	600	1000	3
10 Volt													
TCRD686M010#0070J	D	68	10	125	68	6	70	1800	1300	800	500	1000	3
TCRD107M010#0070J	D	100	10	125	100	6	70	1800	1300	800	500	1000	3
16 Volt													
TCRD336M016#0070J	D	33	16	125	52	6	70	1800	1300	800	500	1000	3
TCRD476M016#0070J	D	47	16	125	75	6	70	1800	1300	800	500	1000	3
20 Volt													
TCRD226M020#0070J	D	22	20	125	44	8	70	1800	1300	800	500	1000	3
25 Volt													
TCRD156M025#0070J	D	15	25	125	37	8	70	1800	1300	800	500	1000	3
35 Volt													
TCRD106M035#0070J	D	10	35	125	35	8	70	1800	1300	800	500	1000	3
50 Volt													
TCRD106M050#0120J	D	10	50	125	50	10	120	1400	1000	600	400	500	3

Moisture Sensitivity Level (MSL) is defined according to J-STD-020.

All technical data relates to an ambient temperature of +25°C. 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.

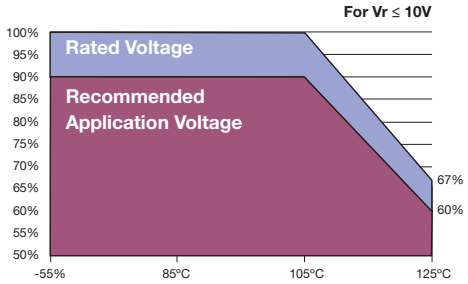
For typical weight and composition see page 261.

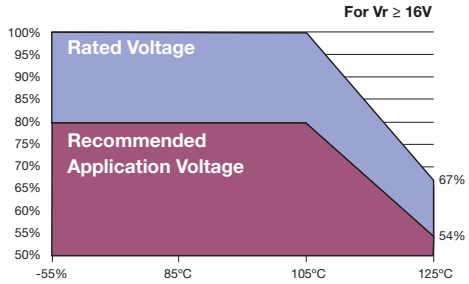
NOTE: AVX reserves the right to supply higher voltage ratings or tighter tolerance part in the same case size, to the same reliability standards.

RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of Vr.

Rated voltage	Operating Temperature		
	≤85°C	105°C	125°C
≤10V	90%	90%	60%
≥16V	80%	80%	54%





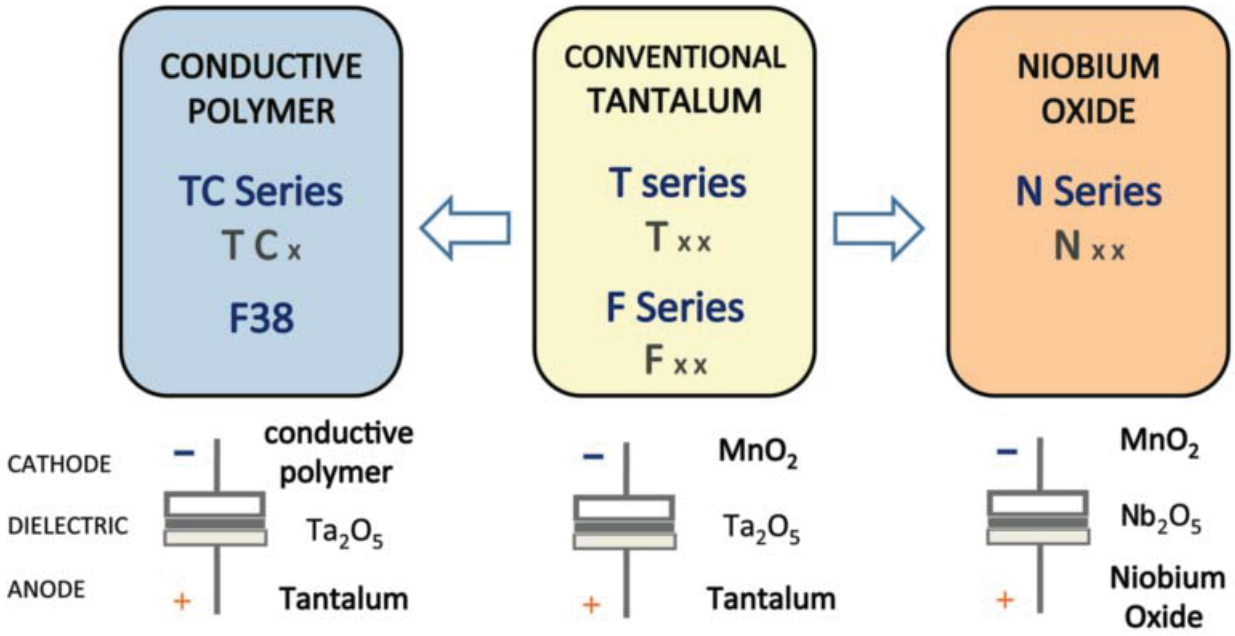
QUALIFICATION TABLE

TEST	TCR series (Temperature range -55°C to +125°C)		
	Condition	Characteristics	
Endurance	Apply rated voltage (Ur) at 105°C and / or 2/3 rated voltage (Ur) at 125°C for 2000 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 +20/-30% of initial value
		DF	2 x initial limit
		ESR	2 x initial limit
Storage Life	Store at 125°C, no voltage applied, for 2000 hours. Stabilize at room temperature for 1-2 hours before measuring.	Visual examination	no visible damage
		DCL	2 x initial limit
		ΔC/C	within ±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 500 or 1000 hours. Stabilize at room temperature and humidity for 1-2 hours before measuring.	Visual examination	no visible damage
		DCL	3 x initial limit
		ΔC/C	within +30/-20% of initial value
		DF	1.5 x initial limit
		ESR	2 x initial limit
Temperature Stability	Step 1: Temperature +20, Duration 15 min Step 2: Temperature -55, Duration 15 min Step 3: Temperature +20, Duration 15 min Step 4: Temperature +85, Duration 15 min Step 5: Temperature +125, Duration 15 min Step 6: Temperature +20, Duration 15 min		
			+20°C / -55°C / +20°C / +85°C / +125°C / +20°C
		DCL	IL* / n/a / IL* / 10 x IL* / 12.5 x IL* / IL*
		ΔC/C	n/a / ±20% / ±5% / ±20% / ±30% / ±5%
		DF	IL* / 1.5 x IL* / IL* / 1.5 x IL* / 2 x IL* / IL*
Surge Voltage	Apply 1.3 x 2/3 rated voltage (Ur) at 125°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000Ω	Visual examination	no visible damage
		DCL	initial limit
		ΔC/C	within +20/-30% of initial value
		DF	1.25 x initial limit
		ESR	1.25 x initial limit
Mechanical Shock/Vibration	MIL-STD-202, Method 213, Condition I, 100 G peak MIL-STD-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak	Visual examination	no visible damage
		DCL	initial limit
		ΔC/C	within ±10% of initial value
		DF	initial limit
		ESR	1.25 x initial limit

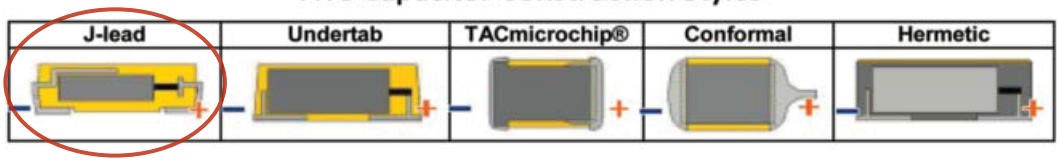
*Initial Limit

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.

AVX SOLID ELECTROLYTIC CAPACITOR ROADMAP



Five Capacitor Construction Styles



SERIES LINE UP: CONDUCTIVE POLYMER