

# 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



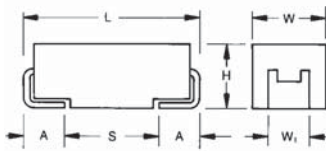
SnPb termination option is not RoHS compliant.



### 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>)



### CASE DIMENSIONS: millimeters (inches)

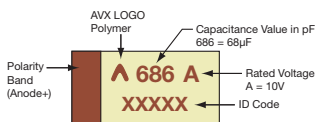
Code	EIA Code	EIA Metric	L±0.20 (0.008)	W+0.20 (0.008) -0.10 (0.004)	H+0.20 (0.008) -0.10 (0.004)	W <sub>1</sub> ±0.20 (0.008)	A+0.30 (0.012) -0.20 (0.008)	S Min.
B	1210	3528-21	3.50 (0.138)	2.80 (0.110)	1.90 (0.075)	2.20 (0.087)	0.80 (0.031)	1.40 (0.055)
D	2917	7343-31	7.30 (0.287)	4.30 (0.169)	2.90 (0.114)	2.40 (0.094)	1.30 (0.051)	4.40 (0.173)
T	1210	3528-12	3.50 (0.138)	2.80 (0.110)	1.20 (0.047) max.	2.20 (0.087)	0.80 (0.031)	1.40 (0.055)
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.

\*Codes under development

### MARKING

#### B, D, T, Y CASE



### 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 +25°C
Capacitance Range:	10µF to 220µF
Capacitance Tolerance:	±20%
Leakage Current DCL:	(J) 0.1CV
Temperature Range:	-55°C to +125°C
Basic Reliability:	0.5% per 1000 hours at 85°C, 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.



### CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V <sub>r</sub> )							
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)	T(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)							

Available Ratings, (ESR ratings in mOhms in brackets)

Engineering samples - please contact manufacturer

\*Codes under development – subject to change

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

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.

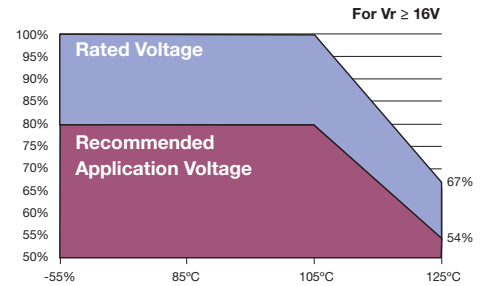
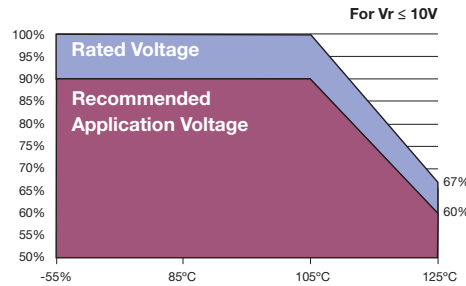
For typical weight and composition see page 223.

**NOTE: AVX reserves the right to supply a higher voltage rating 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	Determine after application of rated voltage for 2000 +48/-0 hours at 105±2°C. Also determine after application of 125°C temperature, 2/3 rated voltage for 2000 +48/-0 hours. After test leaving 1-2 hours at room temperature. Power supply impedance to be ≤0.1Ω/V.			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	125°C, 0V, 2000h			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	Determine after leaving for 500 or 1000 hours at 85±2°C, 85% relative humidity and rated voltage and then recovery 1-2 hours at room temperature.			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	Temperature°C	Duration(min)							
	1	+20±2	15	+20°C	-55°C	+20°C	+85°C	+125°C	+20°C	
	2	-55+0/-3	15	DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*
	3	+20±2	15		ΔC/C	n/a	±20%	±5%	±20%	±30%
	4	+85+3/-0	15	DF		IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*
	5	+125+3/-0	15							
6	+20±2	15								
Surge Voltage	Test temperature: 125°C±3/0°C Surge voltage: 1.3 x 2/3 rated voltage Charge/Discharge resistance: 1000±100Ω Number of cycles: 1000x Cycle duration: 6 min; 30 sec charge, 5 min 30 sec discharge			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 manufacturer.  
Initial measurement max. 1hr after the removal from dry pack or after pretreatment at 85°C for 24 hours.