

FEATURES

- Conductive polymer electrode
- Benign failure mode under recommended use conditions
- Robust design for automotive applications
- Meets requirements of AEC-Q200
- Humidity 85°C/85%RH, V_r (up to 500 or 1000 hours see reference table)
- Basic reliability 1%/1000hrs@85°C V_r with 60% confidence level
- -55 to +125°C operation temperature
- Full voltage range: 4-35V
- DCL 0.1 CV
- 3x reflow 260°C compatible

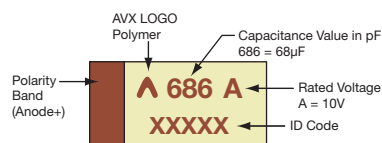


APPLICATIONS

- Automotive, DC/DC converters, Telecommunications, Industrial
- Reference AVX polymer guide for more information.

MARKING

B, D, Y CASE



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

CASE DIMENSIONS: millimeters (inches)

Code	EIA Code	EIA Metric	$L \pm 0.20$ (0.008)	$W \pm 0.20$ (0.008) -0.10 (0.004)	$H \pm 0.20$ (0.008) -0.10 (0.004)	$W_1 \pm 0.20$ (0.008)	$A \pm 0.30$ (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

TCQ

Type

B

Case Size
See table above

476

Capacitance Code
pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)

M

Tolerance
 $M = \pm 20\%$

006

Rated DC Voltage
004 = 4Vdc
006 = 6.3Vdc
010 = 10Vdc
016 = 16Vdc
020 = 20Vdc
025 = 25Vdc
035 = 35Vdc

#

Packaging
R = Pure Tin 7" Reel
S = Pure Tin 13" Reel

0070

ESR in mΩ

TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C
Capacitance Range:	4.7 µF to 220 µF
Capacitance Tolerance:	$\pm 20\%$
Leakage Current DCL:	0.1CV
Temperature Range:	-55°C to +125°C
Reliability:	1% per 1000 hours at 85°C, V_R with 0.1Ω/V series impedance 60% confidence level Meets requirements of AEC-Q200 (for humidity 85°C/85%RH, V_R details see reference table)

TCQ Series

Automotive Conductive Polymer Chip Capacitors

CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V _R) @ 105°C						
μF	Code	4V (G)	6.3V (J)	10V (A)	16V (C)	20V (D)	25V (E)	35V (V)
3.3	335							
4.7	475							B(200)*
6.8	685						B(200)*	
10	106					B(200)*		D(70)
15	156						D(70)	
22	226		B(70)	B(70)*		D(70)		
33	336		B(70)	B(70)*	D(70)			
47	476		B(70)	B(70)*	D(70)			
68	686			D(25,40)				
100	107			D(25,40)				
150	157		D(25,40)					
220	227	D(25), Y(25)						

Available Ratings, (ESR ratings in mOhms in brackets)

*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 Temp. °C	DCL (μA) Max	DF % Max	ESR Max (mΩ) @100kHz	MSL	100kHz RMS Current (mA)				Humidity 85°C/85%RH Vr (hrs)	
									25°C	85°C	105°C	125°C		
4 Volt														
TCQD227M004#0025	D	220	4	125	88	6	25	3	3000	2100	1350	750	1000	
TCQY227M004#0025	Y	220	4	125	88	6	25	3	2720	1904	1224	680	500	
6.3 Volt														
TCQB226M006#0070	B	22	6.3	125	13.2	6	70	3	1336	935	601	334	500	
TCQB336M006#0070	B	33	6.3	125	19.8	6	70	3	1336	935	601	334	500	
TCQB476M006#0070	B	47	6.3	125	28.2	6	70	3	1336	935	601	334	500	
TCQD157M006#0025	D	150	6.3	125	90	6	25	3	3000	2100	1350	750	1000	
TCQD157M006#0040	D	150	6.3	125	90	6	40	3	2372	1660	1067	593	1000	
10 Volt														
TCQD686M010#0025	D	68	10	125	68	6	25	3	3000	2100	1350	750	1000	
TCQD686M010#0040	D	68	10	125	68	6	40	3	2372	1660	1067	593	1000	
TCQD107M010#0025	D	100	10	125	100	6	25	3	3000	2100	1350	750	1000	
TCQD107M010#0040	D	100	10	125	100	6	40	3	2372	1660	1067	593	1000	
16 Volt														
TCQD336M016#0070	D	33	16	125	52.8	6	70	3	1793	1255	807	448	1000	
TCQD476M016#0070	D	47	16	125	75.2	6	70	3	1793	1255	807	448	1000	
20 Volt														
TCQD226M020#0070	D	22	20	125	44	6	70	3	1793	1255	807	448	1000	
25 Volt														
TCQD156M025#0070	D	15	25	125	37.5	6	70	3	1793	1255	807	448	1000	
35 Volt														
TCQD106M035#0070	D	10	35	125	35	6	70	3	1793	1255	807	448	1000	

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.

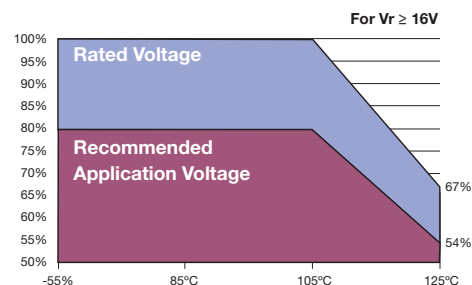
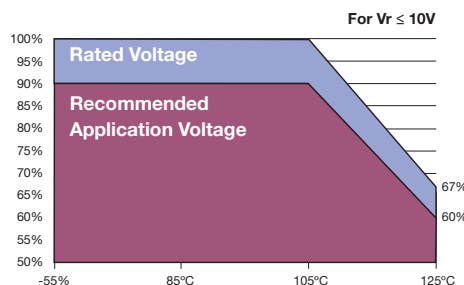
For typical weight and composition see page 218.

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 V_r .

Rated voltage	Operating Temperature		
	$\leq 85^\circ\text{C}$	105°C	125°C
$\leq 10\text{V}$	90%	90%	60%
$\geq 16\text{V}$	80%	80%	54%



QUALIFICATION TABLE

TEST	TCQ series (Temperature range -55°C to 125°C)									
	Condition			Characteristics						
Endurance	Determine after application of 125°C temperature, $2/3$ rated voltage for 1000 $\pm 48/-0$ hours and then leaving 1-2 hours at room temperature. Power supply impedance to be $\leq 0.1\Omega/\text{V}$.			Visual examination	no visible damage					
				DCL	2 x initial limit					
				$\Delta\text{C/C}$	within $+10/-20\%$ of initial value					
				DF	2 x initial limit					
				ESR	2 x initial limit					
Storage Life	125°C , 0V, 1000h			Visual examination	no visible damage					
				DCL	2x initial limit					
				$\Delta\text{C/C}$	within $+10/-20\%$ of initial value					
				DF	2 x initial limit					
				ESR	2 x initial limit					
Biased Humidity	Determine after leaving for 1000 (500) hours at $85\pm 2^\circ\text{C}$, 85% relative humidity and rated voltage and then recovery 1-2 hours at room temperature.			Visual examination	no visible damage					
				DCL	2 x initial limit					
				$\Delta\text{C/C}$	within $+35/-5\%$ of initial value					
				DF	1.5 x initial limit					
				ESR	2 x initial limit					
Temperature Stability	Step	Temperature $^\circ\text{C}$	Duration(min)		$+20^\circ\text{C}$	-55°C	$+20^\circ\text{C}$	$+85^\circ\text{C}$	$+125^\circ\text{C}$	$+20^\circ\text{C}$
	1	$+20\pm 2$	15	DCL	IL*	n/a	IL*	$10 \times \text{IL}^*$	$12.5 \times \text{IL}^*$	IL*
	2	$-55+0/-3$	15							
	3	$+20\pm 2$	15	$\Delta\text{C/C}$	n/a	$\pm 20\%$	$\pm 5\%$	$\pm 20\%$	$\pm 30\%$	$\pm 5\%$
	4	$+85+3/-0$	15	DF	IL*	IL*	IL*	$1.2 \times \text{IL}^*$	$1.5 \times \text{IL}^*$	IL*
	5	$+125+3/-0$	15							
	6	$+20\pm 2$	15							
Surge Voltage	Test temperature: $125^\circ\text{C} \pm 3/0^\circ\text{C}$ Surge voltage: $1.3 \times 2/3 \times$ rated voltage at 125°C Charge/Discharge resistance: $1000\pm 100\Omega$ Number of cycles: 1000x Cycle duration: 6 min; 30 sec charge, 5 min 30 sec discharge			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta\text{C/C}$	within $+10/-20\%$ of initial value for $V_r \leq 10\text{V}$ within $+20/-30\%$ of initial value for $V_r \geq 16\text{V}$					
				DF	initial limit for $V_r \leq 10\text{V}$ $1.25 \times$ initial limit for $V_r \geq 16\text{V}$					
				ESR	$1.25 \times$ 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.