

# TCQ Series



## Automotive Conductive Polymer Chip Capacitors



### 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, Vr, (up to 500 or 1000 hours see reference table)
- Basic reliability 1%/1000hrs@85°C Vr with 60% confidence level
- -55 to +125°C operation temperature
- Full voltage range: 4-35V
- DCL 0.1 CV
- 3x reflow 260°C compatible

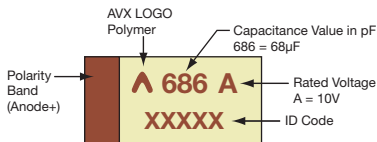


### APPLICATIONS

- 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±0.20 (0.008)	W+0.20 (0.008) -0.10 (0.004)	H+0.20 (0.008) -0.10 (0.004)	W1±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

**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 = ±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:	±20%
Leakage Current DCL:	0.1CV
Temperature Range:	-55°C to +125°C
Reliability:	1% per 1000 hours at 85°C, Vr with 0.1Ω/V series impedance 60% confidence level Meets requirements of AEC-Q200 (for humidity 85°C/85%RH, Vr 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 <sub>R</sub> ) @ 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)	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	
<b>4 Volt @ 105°C</b>												
TCQD227M004#0025	D	220	4	88	6	25	3	3000	2100	1350	750	1000
TCQY227M004#0025	Y	220	4	88	6	25	3	2720	1904	1224	680	500
<b>6.3 Volt @ 105°C</b>												
TCQB226M006#0070	B	22	6.3	13.2	6	70	3	1336	935	601	334	500
TCQB336M006#0070	B	33	6.3	19.8	6	70	3	1336	935	601	334	500
TCQB476M006#0070	B	47	6.3	28.2	6	70	3	1336	935	601	334	500
TCQD157M006#0025	D	150	6.3	90	6	25	3	3000	2100	1350	750	1000
TCQD157M006#0040	D	150	6.3	90	6	40	3	2372	1660	1067	593	1000
<b>10 Volt @ 105°C</b>												
TCQD686M010#0025	D	68	10	68	6	25	3	3000	2100	1350	750	1000
TCQD686M010#0040	D	68	10	68	6	40	3	2372	1660	1067	593	1000
TCQD107M010#0025	D	100	10	100	6	25	3	3000	2100	1350	750	1000
TCQD107M010#0040	D	100	10	100	6	40	3	2372	1660	1067	593	1000
<b>16 Volt @ 105°C</b>												
TCQD336M016#0070	D	33	16	52.8	6	70	3	1793	1255	807	448	1000
TCQD476M016#0070	D	47	16	75.2	6	70	3	1793	1255	807	448	1000
<b>20 Volt @ 105°C</b>												
TCQD226M020#0070	D	22	20	44	6	70	3	1793	1255	807	448	1000
<b>25 Volt @ 105°C</b>												
TCQD156M025#0070	D	15	25	37.5	6	70	3	1793	1255	807	448	1000
<b>35 Volt @ 105°C</b>												
TCQD106M035#0070	D	10	35	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.

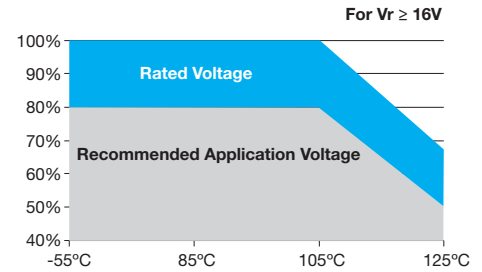
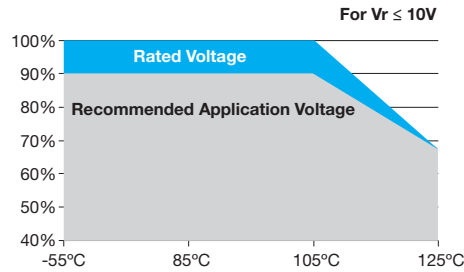
For typical weight and composition see page 218.

**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		
	≤85°C	105°C	125°C
≤10V	90%	90%	67%
≥16V	80%	80%	50%



### QUALIFICATION TABLE

TEST	TCQ series (Temperature range -55°C to +105°C/125°C)									
	Condition			Characteristics						
<b>Endurance</b>	Determine after application of 125°C temperature, 2/3 rated voltage for 1000 +48/-0 hours and then 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 +10/-20% of initial value for $V_r \leq 10V$ within +20/-30% of initial value for $V_r \geq 16V$					
				DF	2 x initial limit					
				ESR	2 x initial limit					
<b>Storage Life</b>	125°C, 0V, 1000h			Visual examination	no visible damage					
				DCL	2x initial limit					
				ΔC/C	within +10/-20% of initial value for $V_r \leq 10V$ within +20/-30% of initial value for $V_r \geq 16V$					
				DF	2 x initial limit					
				ESR	2 x initial limit					
<b>Biased Humidity</b>	Determine after leaving for 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	2 x initial limit					
				ΔC/C	within +35/-5% of initial value					
				DF	1.5 x initial limit					
				ESR	2 x initial limit					
<b>Temperature Stability</b>	Step	Temperature(°C)	Duration(min)		+20°C	-55°C	+20°C	+85°C	+125°C	+20°C
	1	+20±2	15							
	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%	±5%
	4	+85+3/-0	15	DF	IL*	IL*	IL*	1.2 x IL*	1.5 x IL*	IL*
	5	+125+3/-0	15							
<b>Surge Voltage</b>	Test temperature: 125°C +3/0°C Surge voltage: 1.3x 2/3x rated voltage at 125°C 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 +10/-20% of initial value for $V_r \leq 10V$ within +20/-30% of initial value for $V_r \geq 16V$					
				DF	initial limit for $V_r \leq 10V$ 1.25x initial limit for $V_r \geq 16V$					
				ESR	1.25 x initial limit					

\*Initial Limit

For use outside of recommended conditions and special request, please contact manufacturer.