

# J-CAP™ Series



## Highest Joules/cc Conductive Polymer Solid Electrolytic Chip Capacitors



### FEATURES

- Highest Energy per volume
- Conductive polymer electrode
- Benign failure mode under recommended use conditions
- Low ESR
- Undertab terminations layout:
  - High Volumetric Efficiency
  - Low profile case sizes
  - High capacitance in smaller dimensions
  - Close positioning of several parts for efficient high density PCB layout
- 3x reflow 260°C compatible



### APPLICATIONS

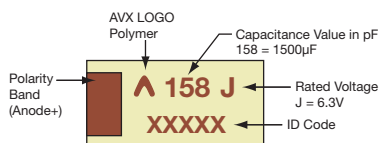
- Power backup for SSDs (MLC, SLC, EFD, PCIe), battery-powered portable equipment, industrial alarms, smart power meters, and mobile devices.

### CASE DIMENSIONS: millimeters (inches)

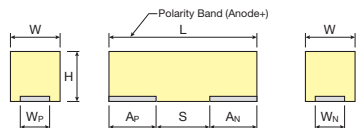
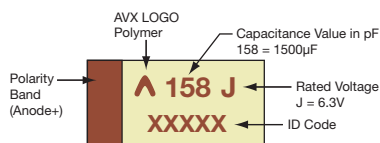
Code	EIA Code	EIA Metric	L±0.20 (0.008)	W+0.20 (0.008) -0.10 (0.004)	H max.	W <sub>P</sub> ±0.10 (0.004)	W <sub>N</sub> ±0.10 (0.004)	A <sub>P</sub> ±0.10 (0.004)	A <sub>N</sub> ±0.10 (0.004)	S Min.
L	1210	3528-10	3.50 (0.138)	2.80 (0.110)	1.00 (0.039)	2.50 (0.098)	2.10 (0.083)	1.15 (0.045)	1.35 (0.053)	1.00 (0.039)
T	1210	3528-12	3.50 (0.138)	2.80 (0.110)	1.20 (0.047)	2.50 (0.098)	2.10 (0.083)	1.15 (0.045)	1.35 (0.053)	1.00 (0.039)
H	1210	3528-15	3.50 (0.138)	2.80 (0.110)	1.50 (0.059)	2.50 (0.098)	2.10 (0.083)	1.15 (0.045)	1.35 (0.053)	1.00 (0.039)
X	2917	7343-15	7.30 (0.287)	4.30 (0.169)	1.50 (0.059)	3.25 (0.128)	3.25 (0.128)	2.00 (0.079)	3.20 (0.126)	2.10 (0.083)
3	2924	7361-15	7.30 (0.287)	6.10 (0.240)	1.50 (0.059)	4.75 (0.187)	4.75 (0.187)	2.00 (0.079)	3.20 (0.126)	2.10 (0.083)
4	2924	7361-20	7.30 (0.287)	6.10 (0.240)	2.00 (0.079)	4.75 (0.187)	4.75 (0.187)	2.00 (0.079)	3.20 (0.126)	2.10 (0.083)

### MARKING

#### 3, 4 CASE



#### H, L, T, X CASE



### MAXIMUM ENERGY PER CASE SIZE

Case Size	Approved (mJ)
L	4.7
T	6.5
H	2.6
X	18.2
3	19.6
4	38.8

### HOW TO ORDER

**TCN**

Type

**4**

Case Size  
See table above

**158**

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  
006 = 6.3Vdc  
016 = 16Vdc  
020 = 20Vdc  
025 = 25Vdc  
035 = 35Vdc  
050 = 50Vdc

**R**

Packaging  
R = Pure Tin 7" Reel

**0055**

ESR in mΩ

### TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C							
Capacitance Range:	4.7 µF to 1500 µF							
Capacitance Tolerance:	±20%							
Leakage Current DCL:	0.1CV							
Rated Voltage (V <sub>R</sub> )	≤ +85°C:	6.3	16	20	25	35	50	
Surge Voltage (V <sub>S</sub> )	≤ +85°C:	8	21	26	33	46	65	
Temperature Range:	-55°C to +105°C							
Reliability:	1% per 1000 hours at 85°C, V <sub>R</sub> with 0.1Ω/V series impedance 60% confidence level							

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 to 85°C, [mJ]				
µF	Code	6.3V (J)	16V (C)	20V (D)	25V (E)	35V (V)
4.7	475					L(300)/T(200) [1.8]
10	106					T(200) [3.9]
22	226				T(200) [4.3]	
33	336		L(200)/T(200) [3.3]		T(250) [6.5]	
47	476		L(250)/T(150,200) [4.7]		X(100) [9.2]	X(100) [18.2]
100	107	L(200) [1.2]			3(70)/4(100) [19.6]	4(100) [38.8]
150	157	L(200)/T(200) [1.7]	X(100) [14.9]		4(70) [29.3]	
220	227	H(170)/T(200) [2.6]	4(70) [21.8]	4(100) [34.7]		
330	337		4(70) [32.7]			
470	477	X(50) [5.4]				
1000	108	3(100) X(200)/4(55) [11.6]				
1500	158	4(55) [17.4]				

Available Ratings, (ESR ratings in mOhms in brackets) [Energy in mJ]

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	Product Category	ENERGY		
										Energy (mJ)	Energy/volume (mJ/cm³)	Energy/area (mJ/cm²)
<b>6.3 Volt @ 85°C</b>												
TCNL107M006#0200	L	100	6.3	105	60	10	200	3	3	1.2	118	11.8
TCNL157M006#0200	L	150	6.3	105	90	10	200	3	3	1.7	177	17.7
TCNT157M006#0200	T	150	6.3	105	90	10	200	3	3	1.7	147	17.7
TCNH227M006#0170	H	220	6.3	105	132	10	170	5	3	2.6	173	26.0
TCNT227M006#0200	T	220	6.3	85	132	10	200	3	5	2.6	216	26.0
TCNX477M006#0050	X	470	6.3	85	282	10	50	3	5	5.4	115	17.3
TCNX108M006#0200	X	1000	6.3	85	600	30	200	3	5	11.6	246	36.9
TCN3108M006#0100	3	1000	6.3	105	600	20	100	4	3	11.6	176	26.4
TCN4108M006#0055	4	1000	6.3	85	600	20	55	4	5	11.6	132	26.4
TCN4158M006#0055	4	1500	6.3	85	900	20	55	4	5	17.4	198	39.6
<b>16 Volt @ 85°C</b>												
TCNL336M016#0200	L	33	16	85	52.8	6	200	3	5	3.3	334	33.4
TCNT336M016#0200	T	33	16	85	52.8	6	200	3	5	3.3	277	33.4
TCNL476M016#0250	L	47	16	85	75.2	6	250	3	5	4.7	476	47.6
TCNT476M016#0150	T	47	16	85	75.2	6	150	3	5	4.7	395	47.6
TCNT476M016#0200	T	47	16	85	75.2	6	200	3	5	4.7	395	47.6
TCNX157M016#0100	X	150	16	85	240	6	100	3	5	14.9	316	47.4
TCN4227M016#0070	4	220	16	105	352	20	70	4	2	21.8	249	49.8
TCN4337M016#0070	4	330	16	105	528	20	70	4	3	32.7	374	74.7
<b>20 Volt @ 85°C</b>												
TCN4227M020#0100	4	220	20	85	440	10	100	4	5	34.7	389	77.9
<b>25 Volt @ 85°C</b>												
TCNT226M025#0200	T	22	25	105	55	6	200	3	3	4.3	364	43.9
TCNT336M025#0250	T	33	25	105	82.5	10	250	5	3	6.5	547	65.8
TCNX476M025#0100	X	47	25	105	117.5	6	100	3	2	9.2	195	29.3
TCN3107M025#0070	3	100	25	105	250	6	70	4	2	19.6	298	44.6
TCN4107M025#0100	4	100	25	105	250	6	100	4	2	19.6	219	43.9
TCN4157M025#0070	4	150	25	105	375	6	70	4	2	29.3	335	67.0
<b>35 Volt @ 85°C</b>												
TCNL475M035#0300	L	4.7	35	105	16.5	6	300	3	2	1.8	186	18.6
TCNT475M035#0200	T	4.7	35	85	16.5	10	200	3	5	1.8	154	18.6
TCNT106M035#0200	T	10	35	85	35	10	200	3	5	3.9	328	39.5
TCNX476M035#0100	X	47	35	105	165	10	100	3	2	18.2	387	58.0
TCN4107M035#0100	4	100	35	105	350	10	100	4	3	38.8	435	87.1

Energy is calculated by this formula (consider derating factor):

$$\text{Energy} = \frac{1}{2} C \times ((V_r \times X)^2 - V_x^2)$$

where C = Capacitance

V<sub>r</sub> = Rated Voltage

X = Recommended derating factor

V<sub>x</sub> = 3V (invariable)

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

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

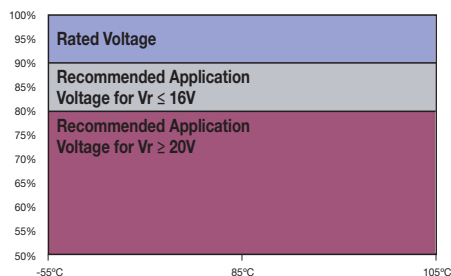
For typical weight and composition see page 226.

**NOTE: AVX reserves the right to supply a higher voltage rating in the same case size, to the same reliability standards.**

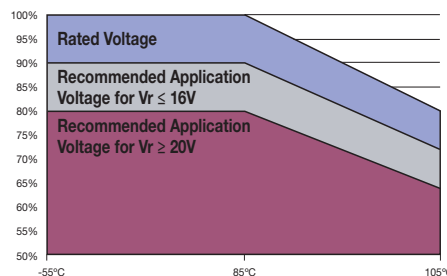
### RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of V<sub>r</sub>

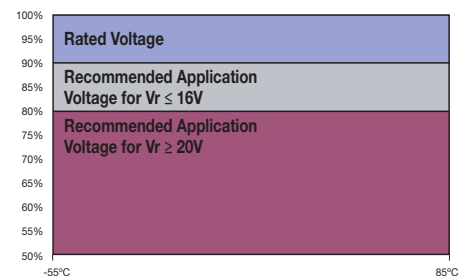
Product Category 2



Product Category 3



Product Category 5



### PRODUCT CATEGORY 2, 3 (TEMPERATURE RANGE -55°C TO +105°C)

TEST	Condition	Characteristics								
<b>Endurance</b>	Determine after application of rated voltage for 2000 +48/-0 hours at 85±2°C and then leaving 1-2 hours at room temperature. Also determine after application of 105°C temperature, category voltage for 2000 +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	1.25 x initial limit							
		ΔC/C	within +10/-20% of initial value for Vr ≤ 16V within ±20% of initial value for Vr ≥ 20V							
		DF	1.5 x initial limit							
		ESR	2 x initial limit							
<b>Storage Life</b>	105°C, 0V, 2000h	Visual examination	no visible damage							
		DCL	1.25 x initial limit							
		ΔC/C	within +10/-20% of initial value for Vr ≤ 16V within ±20% of initial value for Vr ≥ 20V							
		DF	1.5 x initial limit							
		ESR	2 x initial limit							
<b>Humidity</b>	Determine after storage without applied voltage at 65±2°C and 95±2% relative humidity for 500 hours 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							
<b>Temperature Stability</b>	Step	Temperature°C	Duration(min)							
	1	+20±2	15	+20°C	-55°C	+20°C	+85°C	+105°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	+0/-20%	±5%	+20/-0%	+30/-0%	±5%
	4	+85+3/-0	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*
	5	+105+3/-0	15							
	6	+20±2	15							
<b>Surge Voltage</b>	Test temperature: 105°C+3/0°C Test voltage: Category voltage at 105°C Surge voltage: 1.3 x category voltage at 105°C Series protection resistance 1000±100Ω Discharge resistance: 1000Ω 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 Vr ≤ 16V within +20/-30% of initial value for Vr ≥ 20V							
		DF	1.25 x initial limit							

\*Initial Limit

Initial measurement max. 1hr after the removal from dry pack or after pretreatment at 85°C for 24 hours.

### PRODUCT CATEGORY 5 (TEMPERATURE RANGE -55°C TO +85°C)

TEST	Condition	Characteristics							
<b>Endurance</b>	Determine after application of rated voltage for 2000 +48/-0 hours at 85±2°C and then leaving 1-2 hours at room temperature. Power supply impedance to be ≤ 0.1Ω/V.	Visual examination	no visible damage						
		DCL	1.25 x initial limit						
		ΔC/C	within +10/-20% of initial value for Vr ≤ 16V within ±20% of initial value for Vr ≥ 20V						
		DF	1.5 x initial limit						
		ESR	2 x initial limit						
<b>Storage Life</b>	85°C, 0V, 2000h	Visual examination	no visible damage						
		DCL	1.25 x initial limit						
		ΔC/C	within +10/-20% of initial value for Vr ≤ 16V within ±20% of initial value for Vr ≥ 20V						
		DF	1.5 x initial limit						
		ESR	2 x initial limit						
<b>Humidity</b>	Determine after storage without applied voltage at 65±2°C and 95±2% relative humidity for 500 hours and then recovery 1-2 hours at room temperature.	Visual examination	no visible damage						
		DCL	5 x initial limit						
		ΔC/C	within +40/-20% of initial value						
		DF	1.5 x initial limit						
		ESR	2 x initial limit						
<b>Temperature Stability</b>	Step	Temperature°C	Duration(min)						
	1	+20±2	15	+20°C	-55°C	+20°C	+85°C	+20°C	
	2	-55+0/-3	15	DCL	IL*	n/a	IL*	10 x IL*	IL*
	3	+20±2	15	ΔC/C	n/a	+0/-20%	±5%	+20/-0%	±5%
	4	+85+3/-0	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	IL*
	5	+20±2	15						
<b>Surge Voltage</b>	Test temperature: 85+3/0°C Test voltage: Rated voltage Surge voltage: 1.3 x rated voltage Series protection resistance 1000±100Ω. Discharge resistance: 1000Ω 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 Vr ≤ 16V within +20/-30% of initial value for Vr ≥ 20V						
		DF	1.25 x initial limit						

\*Initial Limit

Initial measurement max. 1hr after the removal from dry pack or after pretreatment at 85°C for 24 hours.

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