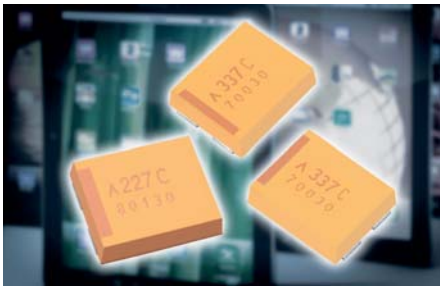
TCN Series

Conductive Polymer Solid Electrolytic Chip Capacitors Undertab Series



FEATURES

- Conductive polymer electrode
- Benign failure mode under recommended use conditions
- Lower ESR
- Undertab terminations layout:
  - High Volumetric Efficiency
  - High PCB assembly density
  - High capacitance in smaller dimensions
- 3x reflow 260°C compatible
- 8 case sizes available

LEAD-FREE
LEAD-FREE COMPATIBLE COMPONENT

RoHS COMPLIANT

APPLICATIONS

- Consumer applications (e.g. mobiles, MP3 etc.)

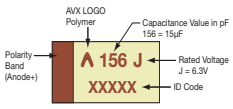
CASE DIMENSIONS: millimeters (inches)

Code	EIA Code	EIA Metric	L±0.20 (0.008)	W+0.20 (0.008) -0.10 (0.004)	H max.	W_P±0.10 (0.004)	W_N±0.10 (0.004)	A_P±0.10 (0.004)	A_N±0.10 (0.004)	S Min.
N	0805	2012-10	2.05 (0.081)	1.30 (0.051)	1.00 (0.039)	1.00 (0.039)	1.00 (0.039)	0.85 (0.033)	0.85 (0.033)	0.40 (0.016)
K	1206	3216-10	3.20 (0.126)	1.60 (0.063)	1.00 (0.039)	1.30 (0.051)	1.30 (0.051)	1.15 (0.045)	1.15 (0.045)	0.90 (0.035)
S	1206	3216-12	3.20 (0.126)	1.60 (0.063)	1.20 (0.047)	1.30 (0.051)	1.30 (0.051)	1.15 (0.045)	1.15 (0.045)	0.90 (0.035)
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)
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)

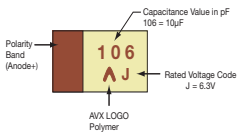
W_1 dimension applies to the termination width for A dimensional area only.

MARKING

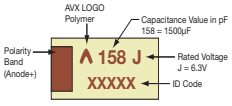
K, L, S, T, X CASE

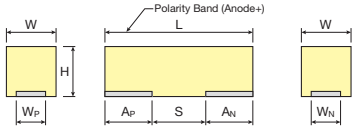


N CASE



3, 4 CASE





HOW TO ORDER

TCN	L	157	M	006	R	0200
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** 006 = 6.3Vdc 016 = 16Vdc 025 = 25Vdc 035 = 35Vdc	**Packaging** R = Pure Tin 7" Reel S = Pure Tin 13" Reel	**ESR in mΩ**

TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C						
Capacitance Range:	1.0 µF to 1500 µF						
Capacitance Tolerance:	±20%						
Leakage Current DCL:	0.1CV						
Rated Voltage (V_R)	≤ +85°C:	4	6.3	10	16	25	35
Category Voltage (V_C)	≤ +105°C:	3.2	5	8	13	20	28
Surge Voltage (V_S)	≤ +85°C:	5.2	8	13	21	33	46
Surge Voltage (V_S)	≤ +105°C:	4	6	10	16	25	35
Temperature Range:	-55°C to +105°C						
Reliability:	1% per 1000 hours at 85°C, V_R 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 / 0.66DC to 105°C					
µF	Code	4V (G)	6.3V (J)	10V (A)	16V (C)	25V (E)	35V (V)
1.0	105						O*
4.7	475					N(500)	L(300)/T(200)
10	106						T(200)
15	156			N(500)*			
22	226			N(500)*		T(200)/X*	X(100)*
33	336	N(500)*	K(500)*/N(500)*	K(500)*/N(500)*	L(200)/T(200)		
47	476	N(500)*	K(500)*/M(250)* N(500)*	K(500)*/S(500)*	L(250)/T(150,200)	X(100)	X(100)
68	686	K(500)*/N(500)*	K(500)*/S(500)*	G(150)*/L(150)* S(500)*			
100	107	K(500)*/S(500)*	G(200)* K(200,250) L(200)/S(250)	G(150)*/L(150)* S(150)*/T(150)*		3(70)/4(100)	4(100)
150	157	G(200)*/L(200)* S(500)*	K(200)*/L(200) S(250)/T(200)	G(150)*/H(150)* T(150)*	X(100)	4(70)	
220	227	G(200)*/L(150)* S(200)*/T(150)*	H(100,200)* T(200)	H(150)*	4(70)		
330	337	H(150)*/T(150)*	H(200)*		4(70)		
470	477	H(150)*	X(50)		4(100)		
1000	108		X(200)/3(100) 4(55)				
1500	158		4(55)				

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.

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RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Cap (µF)	Rated Voltage (V)	Maximum Operating Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max. @ 100kHz (mΩ)	MSL	100kHz RMS Current (mA)			Product Category
									45°C	85°C	105°C	
6.3 Volt @ 85°C												
TCNK107M006#0200	K	100	6.3	105	60	10	200	3	700	500	300	3
TCNK107M006#0250	K	100	6.3	105	60	10	250	3	600	400	300	3
TCNL107M006#0200	L	100	6.3	105	60	10	200	3	700	500	300	3
TCNS107M006#0250	S	100	6.3	85	60	10	250	3	600	400	–	5
TCNL157M006#0200	L	150	6.3	105	90	10	200	3	700	500	300	3
TCNS157M006#0250	S	150	6.3	85	90	10	250	3	600	400	–	5
TCNT157M006#0200	T	150	6.3	105	90	10	200	3	700	500	300	3
TCNT227M006#0200	T	220	6.3	85	132	10	200	3	700	500	–	5
TCNX477M006#0050	X	470	6.3	85	282	10	50	3	1900	1300	–	5
TCNX108M006#0200	X	1000	6.3	85	600	30	200	3	900	600	–	5
TCN3108M006#0100	3	1000	6.3	105	600	20	100	4	1200	840	480	3
TCN4108M006#0055	4	1000	6.3	85	600	20	55	4	1860	1302	–	5
TCN4158M006#0055	4	1500	6.3	85	900	20	55	4	1860	1302	–	5
16 Volt @ 85°C												
TCNL336M016#0200	L	33	16	85	52.8	6	200	3	700	500	–	5
TCNT336M016#0200	T	33	16	85	52.8	6	200	3	700	500	–	5
TCNL476M016#0250	L	47	16	85	75.2	6	250	3	600	400	–	5
TCNT476M016#0150	T	47	16	85	75.2	6	150	3	800	600	–	5
TCNT476M016#0200	T	47	16	85	75.2	6	200	3	700	500	–	5
TCNX157M016#0100	X	150	16	85	240	6	100	3	1300	900	–	5
TCN4227M016#0070	4	220	16	105	352	20	70	4	1650	1155	660	2
TCN4337M016#0070	4	330	16	105	528	20	70	4	1650	1155	660	3
TCN4477M016#0100	4	470	16	85	752	20	100	4	1380	966	–	5
25 Volt @ 85°C												
TCNN475M025#0500	N	4.7	25	105	11.8	10	500	3	400	300	200	3
TCNT226M025#0200	T	22	25	105	55	6	200	3	700	500	300	3
TCNX476M025#0100	X	47	25	105	117.5	6	100	3	1300	900	600	2
TCN3107M025#0070	3	100	25	105	250	6	70	4	1440	1008	576	2
TCN4107M025#0100	4	100	25	105	250	6	100	4	1380	966	552	2
TCN4157M025#0070	4	150	25	105	375	6	70	4	1650	1155	660	2
35 Volt @ 85°C												
TCNL475M035#0300	L	4.7	35	105	16.5	6	300	3	600	400	300	2
TCNT475M035#0200	T	4.7	35	85	16.5	10	200	3	700	500	–	5
TCNT106M035#0200	T	10	35	85	35	10	200	3	700	500	–	5
TCNX476M035#0100	X	47	35	105	164.5	10	100	3	1300	900	600	2
TCN4107M035#0100	4	100	35	105	350	10	100	4	1380	966	552	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.

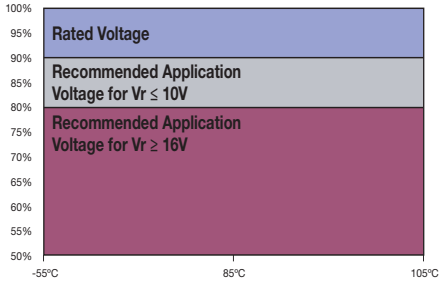
For typical weight and composition see page 223.

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.

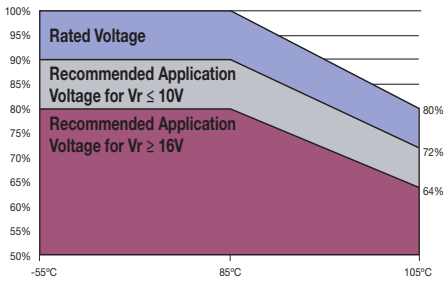
RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of Vr

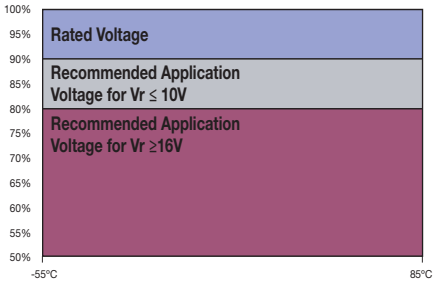
Product Category 2



Product Category 3



Product Category 5



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Conductive Polymer Solid Electrolytic Chip Capacitors Undertab Series

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

TEST	Condition	Characteristics	
Endurance	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. For CATEGORY 2: Rated voltage for 2000 +48/-0 hours For CATEGORY 3: 0.8x rated 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 ±20% of initial value
		DF	1.5 x initial limit
		ESR	2 x initial limit
Storage Life	105°C, 0V, 2000h	Visual examination	no visible damage
		DCL ($V_R \leq 75V$)	1.25 x initial limit
		DCL ($V_R > 75V$)	2 x initial limit
		ΔC/C	within ±20% of initial value
		DF	1.5 x initial limit
		ESR	2 x initial limit
Humidity	Determine after storage without applied voltage at 65±2°C and 95±2% relative humidity for 500hrs 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
2	-55+0/-3	15
3	+20±2	15
4	+85+3/-0	15
5	+105+3/-0	15
6	+20±2	15

	+20°C	-55°C	+20°C	+85°C	+105°C	+20°C
DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*
ΔC/C	n/a	+0/-20%	±5%	+20/-0%	+30/-0%	±5%
DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*

Surge Voltage	Test temperature: 105°C+3/0°C For CATEGORY 2: Surge voltage: 1.3x rated voltage at 105°C For CATEGORY 3: Surge voltage: 1.3x 0.8x rated voltage at 105°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 Vr ≤ 10V within +20/-30% of initial value for Vr ≥ 16V
		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	
Endurance	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 ±20% of initial value
		DF	1.5 x initial limit
		ESR	2 x initial limit
Storage Life	85°C, 0V, 2000h	Visual examination	no visible damage
		DCL	1.25 x initial limit
		ΔC/C	within ±20% of initial value
		DF	1.5 x initial limit
		ESR	2 x initial limit
Humidity	Determine after storage without applied voltage at 65±2°C and 95±2% relative humidity for 500hrs 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

Temperature Stability

Step	Temperature°C	Duration(min)
1	+20±2	15
2	-55+0/-3	15
3	+20±2	15
4	+85+3/-0	15
5	+20±2	15

	+20°C	-55°C	+20°C	+85°C	+20°C
DCL	IL*	n/a	IL*	10 x IL*	IL*
ΔC/C	n/a	+0/-20%	±5%	+20/-0%	±5%
DF	IL*	1.5 x IL*	IL*	1.5 x IL*	IL*

Surge Voltage	Test temperature: 85+3/0°C Surge voltage: 1.3x 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 +10/-20% of initial value for Vr ≤ 10V within +20/-30% of initial value for Vr ≥ 16V
		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.

OCEAN CHIPS
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