

TPS Automotive Range



Low ESR - Automotive Product Range



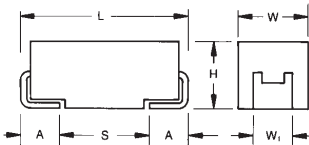
FEATURES

- Low ESR series of robust MnO₂ solid electrolyte capacitors
- CV range: 0.22-680µF / 6.3-50V
- 5 case sizes available
- Power supply applications



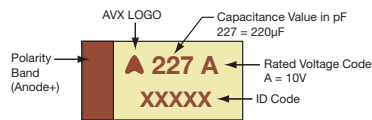
APPLICATIONS

- Power Supply
- Electric Window Control
- Battery Management Systems
- DC/DC Converter



MARKING

A, B, C, D, E CASE



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±0.20 (0.008)	A+0.30 (0.012) -0.20 (0.008)	S Min.
A	1206	3216-18	3.20 (0.126)	1.60 (0.063)	1.60 (0.063)	1.20 (0.047)	0.80 (0.031)	1.10 (0.043)
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)
C	2312	6032-28	6.00 (0.236)	3.20 (0.126)	2.60 (0.102)	2.20 (0.087)	1.30 (0.051)	2.90 (0.114)
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)
E	2917	7343-43	7.30 (0.287)	4.30 (0.169)	4.10 (0.162)	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

TPS	C	107	M	010	T	0150	V
Type	Case Size	Capacitance Code	Tolerance	Rated DC Voltage	Packaging	ESR in mΩ	Dry Pack Option
	See table above	pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	K = ±10% M = ±20%	006 = 6.3Vdc 010 = 10Vdc 016 = 16Vdc 020 = 20Vdc	T = Automotive Lead Free 7" Reel U = Automotive Lead Free 13" Reel		(D,E case sizes mandatory)

TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C								
Capacitance Range:	0.22 µF to 680 µF								
Capacitance Tolerance:	±10%; ±20%								
Rated Voltage (V _R)	≤ +85°C:	6.3	10	16	20	25	35	50	
Category Voltage (V _C)	≤ +125°C:	4	7	10	13	17	23	33	
Surge Voltage (V _S)	≤ +85°C:	8	13	20	26	32	46	65	
Surge Voltage (V _S)	≤ +125°C:	5	8	13	16	20	28	40	
Temperature Range:	-55°C to +125°C								
Environmental Classification:	55/125/56 (IEC 68-2)								
Reliability:	1% per 1000 hours at 85°C, V _R with 0.1Ω/V series impedance, 60% confidence level								
Termination Finished:	Sn Plating (standard), Gold and SnPb Plating upon request								
	Meets requirements of AEC-Q200								

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TPS AUTOMOTIVE RANGE CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage DC (V _r) to 85°C						
µF	Code	6.3V (J)	10V (A)	16V (C)	20V (D)	25V (E)	35V (M)	50V (T)
0.15	154							
0.22	224							A(700)
0.33	334						A(600)	A(700)
0.47	474					A(700)	A(600)	A(650), B(600)
0.68	684					A(600)	A(600)	B(400)
1.0	105			A(620)	A(300)	A(400)	A(300), B(200)	B(300), C(250)
1.5	155				A(300)	A(300)	A(300), B(250)	C(150,200)
2.2	225		A(180)	A(180,350)	A(300), B(170)	A(250), B(90,120,250)	B(750,1500,2000), C(100)	C(150), D(120)
3.3	335	A(210)		A(350), B(250)	A(250), B(130)	B(750,1500,2000)	B(100), C(70)	C(100), D(80)
4.7	475		A(140), B(140)	A(200), B(80,150)	A(180), B(75,100)	B(700,90), C(70)	B(700,150), C(60), D(70)	C(80), D(250,500,70)
6.8	685		A(180), B(130)	A(150), B(60,120)	B(60,100), C(70)	B(70), C(500,600,70)	C(35), D(40,50)	D(50,60)
10	106	A(150), B(150)	A(90,180), B(100)	A(100), B(50,80), C(50)	B(50,100), C(50,70)	C(300,50), D(50)	C(60), D(30)	D(50), E(250,300,400,50)
15	156	A(70,150)	A(100), B(45,60), C(70)	B(50,80), C(30,70)	B(50), C(40,45)	C(220,30), D(30)	D(30)	E(25)
22	226	A(500,90), B(375,600), C(50)	A(90), B(400,500,70), C(180,30)	B(400,60), C(300,375), D(50), D(70)	C(40), D(200,30)	C(275,40), D(200,30)	D(200,300,400), E(200,30)	
33	336	A(60), B(250,350,450,60)	B(250,425,500,650), C(375,50)	C(225,30), D(20)	C(30), D(160,20)	D(200,30)	E(250,30)	
47	476	B(250,350,500), C(30)	B(250,350,500,650), C(200,350), D(30)	C(35), D(150,20)	D(20)	D(125,150,250), E(125)		
68	686	B(250,350,500), C(150,20)	C(200,30), D(15)	C(20), D(15)	D(150,200,300), E(125,150,200)			
100	107	C(150), D(30)	C(150,200), D(100,125,15)	D(100,125,150), E(100,125,15)	E(100,150,200)			
150	157	C(150,200,250), D(125)	D(85,100), E(100)	E(100)				
220	227	D(100,125)	D(100,150), E(70,100,125,150)					
330	337	D(70,100), E(100,125,150)	E(50,60,100)					
470	477	D(45,60,100,200), E(45,50,60,100,200)						
680	687	E(45,60,100)						

Not recommended for new designs, higher voltage or smaller case size substitution are offered.

Available Ratings, (ESR ratings in mOhms in brackets)

Engineering samples - please contact manufacturer

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	Capacitance (µF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max. @ 100kHz (mΩ)	MSL	100kHz RMS Current (A)		
											25°C	85°C	125°C
35 Volt @ 85°C													
TPSA334*035T6000	A	0.33	35	85	23	125	0.5	4	6000	1	0.112	0.101	0.045
TPSA474*035T6000	A	0.47	35	85	23	125	0.5	4	6000	1	0.112	0.101	0.045
TPSA684*035T6000	A	0.68	35	85	23	125	0.5	4	6000	1	0.112	0.101	0.045
TPSA105*035T3000	A	1	35	85	23	125	0.5	4	3000	1	0.158	0.142	0.063
TPSB105*035T2000	B	1	35	85	23	125	0.5	4	2000	1	0.206	0.186	0.082
TPSA155*035T3000	A	1.5	35	85	23	125	0.5	6	3000	1	0.158	0.142	0.063
TPSB155*035T2500	B	1.5	35	85	23	125	0.5	6	2500	1	0.184	0.166	0.074
TPSB225*035T0750	B	2.2	35	85	23	125	0.8	6	750	1	0.337	0.303	0.135
TPSB225*035T1500	B	2.2	35	85	23	125	0.8	6	1500	1	0.238	0.214	0.095
TPSB225*035T2000	B	2.2	35	85	23	125	0.8	6	2000	1	0.206	0.186	0.082
TPSC225*035T1000	C	2.2	35	85	23	125	0.8	6	1000	1	0.332	0.298	0.133
TPSB335*035T1000	B	3.3	35	85	23	125	1.2	6	1000	1	0.292	0.262	0.117
TPSC335*035T0700	C	3.3	35	85	23	125	1.2	6	700	1	0.396	0.357	0.159
TPSB475*035T0700	B	4.7	35	85	23	125	1.6	6	700	1	0.348	0.314	0.139
TPSB475*035T1500	B	4.7	35	85	23	125	1.6	6	1500	1	0.238	0.214	0.095
TPSC475*035T0600	C	4.7	35	85	23	125	1.6	6	600	1	0.428	0.385	0.171
TPSD475*035T0700V	D	4.7	35	85	23	125	1.6	6	700	3	0.463	0.417	0.185
TPSC685*035T0350	C	6.8	35	85	23	125	2.4	6	350	1	0.561	0.505	0.224
TPSD685*035T0400V	D	6.8	35	85	23	125	2.4	6	400	3	0.612	0.551	0.245
TPSD685*035T0500V	D	6.8	35	85	23	125	2.4	6	500	3	0.548	0.493	0.219
TPSC106*035T0600	C	10	35	85	23	125	3.5	6	600	1	0.428	0.385	0.171
TPSD106*035T0300V	D	10	35	85	23	125	3.5	6	300	3	0.707	0.636	0.283
TPSD156*035T0300V	D	15	35	85	23	125	5.3	6	300	3	0.707	0.636	0.283
TPSD226*035T0200V	D	22	35	85	23	125	7.7	6	200	3	0.866	0.779	0.346
TPSD226*035T0300V	D	22	35	85	23	125	7.7	6	300	3	0.707	0.636	0.283
TPSD226*035T0400V	D	22	35	85	23	125	7.7	6	400	3	0.612	0.551	0.245
TPSE226*035T0200V	E	22	35	85	23	125	7.7	6	200	3	0.908	0.817	0.363
TPSE226*035T0300V	E	22	35	85	23	125	7.7	6	300	3	0.742	0.667	0.297
TPSE336*035T0250V	E	33	35	85	23	125	11.6	6	250	3	0.812	0.731	0.325
TPSE336*035T0300V	E	33	35	85	23	125	11.6	6	300	3	0.742	0.667	0.297
50 Volt @ 85°C													
TPSA224*050T7000	A	0.22	50	85	33	125	0.5	4	7000	1	0.104	0.093	0.041
TPSA334*050T7000	A	0.33	50	85	33	125	0.5	4	7000	1	0.104	0.093	0.041
TPSA474*050T6500	A	0.47	50	85	33	125	0.5	4	6500	1	0.107	0.097	0.043
TPSB474*050T6000	B	0.47	50	85	33	125	0.5	4	6000	1	0.119	0.107	0.048
TPSB684*050T4000	B	0.68	50	85	33	125	0.5	4	4000	1	0.146	0.131	0.058
TPSB105*050T3000	B	1	50	85	33	125	0.5	6	3000	1	0.168	0.151	0.067
TPSC105*050T2500	C	1	50	85	33	125	0.5	4	2500	1	0.210	0.189	0.084
TPSC155*050T1500	C	1.5	50	85	33	125	0.8	6	1500	1	0.271	0.244	0.108
TPSC155*050T2000	C	1.5	50	85	33	125	0.8	6	2000	1	0.235	0.211	0.094
TPSC225*050T1500	C	2.2	50	85	33	125	1.1	8	1500	1	0.271	0.244	0.108
TPSD225*050T1200V	D	2.2	50	85	33	125	1.1	6	1200	3	0.354	0.318	0.141
TPSC335*050T1000	C	3.3	50	85	33	125	1.6	6	1000	1	0.332	0.298	0.133
TPSD335*050T0800V	D	3.3	50	85	33	125	1.7	6	800	3	0.433	0.390	0.173
TPSC475*050T0800	C	4.7	50	85	33	125	2.4	6	800	1	0.371	0.334	0.148
TPSD475*050T0250V	D	4.7	50	85	33	125	2.4	6	250	1	0.775	0.697	0.310
TPSD475*050T0500V	D	4.7	50	85	33	125	2.4	6	500	3	0.548	0.493	0.219
TPSD475*050T0700V	D	4.7	50	85	33	125	2.4	6	700	3	0.463	0.417	0.185
TPSD685*050T0500V	D	6.8	50	85	33	125	3.4	6	500	3	0.548	0.493	0.219
TPSD685*050T0600V	D	6.8	50	85	33	125	3.4	6	600	3	0.500	0.450	0.200
TPSD106*050T0500V	D	10	50	85	33	125	5	6	500	3	0.548	0.493	0.219
TPSE106*050T0250V	E	10	50	85	33	125	5	6	250	3	0.812	0.731	0.325
TPSE106*050T0300V	E	10	50	85	33	125	5	6	300	3	0.742	0.667	0.297
TPSE106*050T0400V	E	10	50	85	33	125	5	6	400	3	0.642	0.578	0.257
TPSE106*050T0500V	E	10	50	85	33	125	5	6	500	3	0.574	0.517	0.230
TPSE156*050T0250V	E	15	50	85	33	125	7.5	6	250	3	0.812	0.731	0.325

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

*Please use "U" instead of "T" in the suffix letter for 13" reel packaging

Please use specific PN for automotive version – see "HOW TO ORDER".

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5V RMS with a maximum DC bias of 2.2 volts.

DCL is measured at rated voltage after 5 minutes.

The EIA & CECC standards for low ESR Solid Tantalum Capacitors allow an ESR movement to 1.25 times catalogue 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.

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QUALIFICATION TABLE

TEST	TPS automotive series (Temperature range -55°C to +125°C)										
	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 of 125°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% of initial value						
				DF	initial limit						
				ESR	1.25 x initial limit						
Storage Life	125°C, 0V, 2000h			Visual examination	no visible damage						
				DCL	1.25 x initial limit						
				ΔC/C	within ±10% of initial value						
				DF	initial limit						
				ESR	1.25 x initial limit						
Humidity	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	1.5 x initial limit						
				ΔC/C	within ±10% of initial value						
				DF	1.2 x initial limit						
				ESR	1.25 x initial limit						
Biased Humidity	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 ±10% of initial value						
				DF	1.2 x initial limit						
				ESR	1.25 x initial limit						
Temperature Stability	Step	Temperature°C	Duration(min)		+20°C	-55°C	+20°C	+85°C	+125°C	+20°C	
	1	+20±2	15	DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*	
	2	-55+0/-3	15	ΔC/C	n/a	+0/-10%	±5%	+10/-0%	+12/-0%	±5%	
	3	+20±2	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*	
	4	+85+3/-0	15	ESR	1.25 x IL*	2.5 x IL*	1.25 x IL*	1.25 x IL*	1.25 x IL*	1.25 x IL*	
	5	+125+3/-0	15								
	6	+20±2	15								
Surge Voltage	Test temperature: 125°C±3/0°C Test voltage: Category voltage at 125°C Surge voltage: 1.3 x category voltage at 125°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 ±5% of initial value						
				DF	initial limit						
				ESR	1.25 x initial limit						

*Initial Limit