

TPS Automotive Range



Low ESR - Automotive Product Range



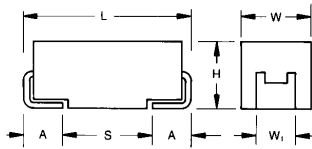
FEATURES

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



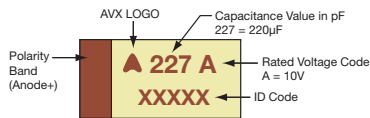
APPLICATIONS

- 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 See table above	Capacitance Code pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	Tolerance K = ±10% M = ±20%	Rated DC Voltage 006 = 6.3Vdc 010 = 10Vdc 016 = 16Vdc 020 = 20Vdc	Packaging T = Automotive Lead Free 7" Reel U = Automotive Lead Free 13" Reel	ESR in mΩ	Dry Pack Option (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 (V)	50V (T)
0.15	154							
0.22	224							A(7000)
0.33	334						A(6000)	A(7000)
0.47	474					A(7000)	A(6000)	A(6500), B(6000)
0.68	684					A(6000)	A(6000)	B(4000)
1.0	105			A(6200)	A(3000)	A(4000)	A(3000), B(2000)	B(3000), C(2500)
1.5	155				A(3000)	A(3000)	A(3000), B(2500)	C(1500,2000)
2.2	225		A(1800)	A(1800,3500)	A(3000), B(1700)	A(2500), B(900,1200,2500)	B(750,1500,2000), C(1000)	C(1500), D(1200)
3.3	335	A(2100)		A(3500), B(2500)	A(2500), B(1300)	B(750,1500,2000)	B(1000), C(700)	C(1000), D(800)
4.7	475		A(1400), B(1400)	A(2000), B(800,1500)	A(1800), B(750,1000)	B(700,900), C(700)	B(700,1500), C(600), D(700)	C(800), D(250,500,700)
6.8	685		A(1800), B(1300)	A(1500), B(600,1200)	B(600,1000), C(700)	B(700), C(500,600,700)	C(350), D(400,500)	D(500,600)
10	106	A(1500), B(1500)	A(900,1800), B(1000)	A(1000), B(500,800), C(500)	B(500,1000), C(500,700)	B(1800), C(300,500), D(500)	C(600), D(300)	D(500), E(250,300,400,500)
15	156	A(700,1500)	A(1000), B(450,600), C(700)	B(500,800) C(300,700)	B(500), C(400,450)	C(220,300), D(300)	D(300)	E(250)
22	226	A(300,500,900), B(375,600), C(500)	A(900), B(400,500,700), C(180,300)	B(400,600), C(300,375), D(500), D(700)	B(400,600), C(400), D(200,300)	C(275,400), D(200,300)	D(200,300,400), E(200,300)	
33	336	A(600), B(250,350,450,600)	B(250,425,500,650), C(375,500)	B(500), C(225,300), D(200)	C(300), D(160,200)	D(200,300)	D(200,300), E(250,300)	
47	476	B(250,350,500), C(300)	B(250,350,500,650), C(200,350), D(100,300)	C(350), D(100,200)	D(200)	D(125,150,250), E(125)	E(200,250)	
68	686	B(250,350,500), C(150,200)	C(200,300), D(150)	C(200), D(150)	D(150,200,300), E(125,150,200)	E(200)		
100	107	B(250,400), C(150), D(300)	C(100,150,200), D(100,125,150)	D(80,100,125,150), E(100,125,150)	E(100,150,200)	E(150)		
150	157	C(100,150,200,250), D(125)	D(85,100), E(100)	E(100)				
220	227	D(100,125)	D(100,150), E(70,100,125,150)	E(100,150)				
330	337	D(45,50,70,100), 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)						

Note for designers - for the highlighted ratings, higher voltage options are now available in the same case size and are recommended for new designs.

Released ratings, (ESR ratings in mOhms in parentheses)

Note: Voltage ratings are minimum values. AVX reserves the right to supply higher voltage 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)	100kHz RMS Current (A)			MSL
										25°C	85°C	125°C	
TPSD476*025T0250V	D	47	25	85	17	125	11.8	6	250	0.775	0.697	0.310	3
TPSE476*025T0125V	E	47	25	85	17	125	11.8	6	125	1.149	1.034	0.460	3
TPSE686*025T0200V	E	68	25	85	17	125	17	6	200	0.908	0.817	0.363	3
TPSE107*025T0150V	E	100	25	85	17	125	25	10	150	1.049	0.944	0.420	3
35 Volt @ 85°C													
TPSA334*035T6000	A	0.33	35	85	23	125	0.5	4	6000	0.112	0.101	0.045	1
TPSA474*035T6000	A	0.47	35	85	23	125	0.5	4	6000	0.112	0.101	0.045	1
TPSA684*035T6000	A	0.68	35	85	23	125	0.5	4	6000	0.112	0.101	0.045	1
TPSA105*035T3000	A	1	35	85	23	125	0.5	4	3000	0.158	0.142	0.063	1
TPSB105*035T2000	B	1	35	85	23	125	0.5	4	2000	0.206	0.186	0.082	1
TPSA155*035T3000	A	1.5	35	85	23	125	0.5	6	3000	0.158	0.142	0.063	1
TPSB155*035T2500	B	1.5	35	85	23	125	0.5	6	2500	0.184	0.166	0.074	1
TPSB225*035T0750	B	2.2	35	85	23	125	0.8	6	750	0.337	0.303	0.135	1
TPSB225*035T1500	B	2.2	35	85	23	125	0.8	6	1500	0.238	0.214	0.095	1
TPSB225*035T2000	B	2.2	35	85	23	125	0.8	6	2000	0.206	0.186	0.082	1
TPSC225*035T1000	C	2.2	35	85	23	125	0.8	6	1000	0.332	0.298	0.133	1
TPSB335*035T1000	B	3.3	35	85	23	125	1.2	6	1000	0.292	0.262	0.117	1
TPSC335*035T0700	C	3.3	35	85	23	125	1.2	6	700	0.396	0.357	0.159	1
TPSB475*035T0700	B	4.7	35	85	23	125	1.6	6	700	0.348	0.314	0.139	1
TPSB475*035T1500	B	4.7	35	85	23	125	1.6	6	1500	0.238	0.214	0.095	1
TPSC475*035T0600	C	4.7	35	85	23	125	1.6	6	600	0.428	0.385	0.171	1
TPSD475*035T0700V	D	4.7	35	85	23	125	1.6	6	700	0.463	0.417	0.185	3
TPSC685*035T0350	C	6.8	35	85	23	125	2.4	6	350	0.561	0.505	0.224	1
TPSD685*035T0400V	D	6.8	35	85	23	125	2.4	6	400	0.612	0.551	0.245	3
TPSD685*035T0500V	D	6.8	35	85	23	125	2.4	6	500	0.548	0.493	0.219	3
TPSC106*035T0600	C	10	35	85	23	125	3.5	6	600	0.428	0.385	0.171	1
TPSD106*035T0300V	D	10	35	85	23	125	3.5	6	300	0.707	0.636	0.283	3
TPSD156*035T0300V	D	15	35	85	23	125	5.3	6	300	0.707	0.636	0.283	3
TPSD226*035T0200V	D	22	35	85	23	125	7.7	6	200	0.866	0.779	0.346	3
TPSD226*035T0300V	D	22	35	85	23	125	7.7	6	300	0.707	0.636	0.283	3
TPSD226*035T0400V	D	22	35	85	23	125	7.7	6	400	0.612	0.551	0.245	3
TPSE226*035T0200V	E	22	35	85	23	125	7.7	6	200	0.908	0.817	0.363	3
TPSE226*035T0300V	E	22	35	85	23	125	7.7	6	300	0.742	0.667	0.297	3
TPSD336*035T0200V	D	33	35	85	23	125	11.6	6	200	0.866	0.779	0.346	3
TPSD336*035T0300V	D	33	35	85	23	125	11.6	6	300	0.707	0.636	0.283	3
TPSE336*035T0250V	E	33	35	85	23	125	11.6	6	250	0.812	0.731	0.325	3
TPSE336*035T0300V	E	33	35	85	23	125	11.6	6	300	0.742	0.667	0.297	3
TPSE476*035T0200V	E	47	35	85	23	125	16.5	6	200	0.908	0.817	0.363	3
TPSE476*035T0250V	E	47	35	85	23	125	16.5	6	250	0.812	0.731	0.325	3
50 Volt @ 85°C													
TPSA224*050T7000	A	0.22	50	85	33	125	0.5	4	7000	0.104	0.093	0.041	1
TPSA334*050T7000	A	0.33	50	85	33	125	0.5	4	7000	0.104	0.093	0.041	1
TPSA474*050T6500	A	0.47	50	85	33	125	0.5	4	6500	0.107	0.097	0.043	1
TPSB474*050T6000	B	0.47	50	85	33	125	0.5	4	6000	0.119	0.107	0.048	1
TPSB684*050T4000	B	0.68	50	85	33	125	0.5	4	4000	0.146	0.131	0.058	1
TPSB105*050T3000	B	1	50	85	33	125	0.5	6	3000	0.168	0.151	0.067	1
TPSC105*050T2500	C	1	50	85	33	125	0.5	4	2500	0.210	0.189	0.084	1
TPSC155*050T1500	C	1.5	50	85	33	125	0.8	6	1500	0.271	0.244	0.108	1
TPSC155*050T2000	C	1.5	50	85	33	125	0.8	6	2000	0.235	0.211	0.094	1
TPSC225*050T1500	C	2.2	50	85	33	125	1.1	8	1500	0.271	0.244	0.108	1
TPSD225*050T1200V	D	2.2	50	85	33	125	1.1	6	1200	0.354	0.318	0.141	3
TPSC335*050T1000	C	3.3	50	85	33	125	1.6	6	1000	0.332	0.298	0.133	1
TPSD335*050T0800V	D	3.3	50	85	33	125	1.7	6	800	0.433	0.390	0.173	3
TPSC475*050T0800	C	4.7	50	85	33	125	2.4	6	800	0.371	0.334	0.148	1
TPSD475*050T0250V	D	4.7	50	85	33	125	2.4	6	250	0.775	0.697	0.310	1
TPSD475*050T0500V	D	4.7	50	85	33	125	2.4	6	500	0.548	0.493	0.219	3
TPSD475*050T0700V	D	4.7	50	85	33	125	2.4	6	700	0.463	0.417	0.185	3
TPSD685*050T0500V	D	6.8	50	85	33	125	3.4	6	500	0.548	0.493	0.219	3
TPSD685*050T0600V	D	6.8	50	85	33	125	3.4	6	600	0.500	0.450	0.200	3
TPSD106*050T0500V	D	10	50	85	33	125	5	6	500	0.548	0.493	0.219	3
TPSE106*050T0250V	E	10	50	85	33	125	5	6	250	0.812	0.731	0.325	3
TPSE106*050T0300V	E	10	50	85	33	125	5	6	300	0.742	0.667	0.297	3
TPSE106*050T0400V	E	10	50	85	33	125	5	6	400	0.642	0.578	0.257	3
TPSE106*050T0500V	E	10	50	85	33	125	5	6	500	0.574	0.517	0.230	3
TPSE156*050T0250V	E	15	50	85	33	125	7.5	6	250	0.812	0.731	0.325	3

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 274.

NOTE: AVX reserves the right to supply higher voltage ratings 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	Apply rated voltage (Ur) at 85°C and / or category voltage (Uc) at 125°C for 2000 hours through a circuit impedance of $\leq 0.1\Omega/V$. Stabilize at room temperature for 1-2 hours before measuring.			Visual examination	no visible damage						
				DCL	1.25 x initial limit						
				$\Delta C/C$	within $\pm 10\%$ of initial value						
				DF	initial limit						
				ESR	1.25 x initial limit						
Storage Life	Store at 125°C, no voltage applied, for 2000 hours. Stabilize at room temperature for 1-2 hours before measuring.			Visual examination	no visible damage						
				DCL	1.25 x initial limit						
				$\Delta C/C$	within $\pm 10\%$ of initial value						
				DF	initial limit						
				ESR	1.25 x initial limit						
Humidity	Store at 65°C and 95% relative humidity for 500 hours, with no applied voltage. Stabilize at room temperature and humidity for 1-2 hours before measuring.			Visual examination	no visible damage						
				DCL	1.5 x initial limit						
				$\Delta C/C$	within $\pm 10\%$ of initial value						
				DF	1.2 x initial limit						
				ESR	1.25 x initial limit						
Biased Humidity	Apply rated voltage (Ur) at 85°C, 85% relative humidity for 1000 hours. Stabilize at room temperature and humidity for 1-2 hours before measuring.			Visual examination	no visible damage						
				DCL	2 x initial limit						
				$\Delta C/C$	within $\pm 10\%$ 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	15	DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*	
	2	-55	15	$\Delta C/C$	n/a	+0/-10%	$\pm 5\%$	+10/-0%	+12/-0%	$\pm 5\%$	
	3	+20	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*	
	4	+85	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	15								
	6	+20	15								
Surge Voltage	Apply 1.3x category voltage (Uc) at 125°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000 Ω .			Visual examination	no visible damage						
				DCL	initial limit						
				$\Delta C/C$	within $\pm 5\%$ of initial value						
				DF	initial limit						
				ESR	1.25 x initial limit						
Mechanical Shock	MIL-STD-202, Method 213, Condition F			Visual examination	no visible damage						
				DCL	initial limit						
				$\Delta C/C$	within $\pm 5\%$ of initial value						
				DF	initial limit						
				ESR	1.25 x initial limit						
Vibration	MIL-STD-202, Method 204, Condition D			Visual examination	no visible damage						
				DCL	initial limit						
				$\Delta C/C$	within $\pm 5\%$ of initial value						
				DF	initial limit						
				ESR	1.25 x initial limit						

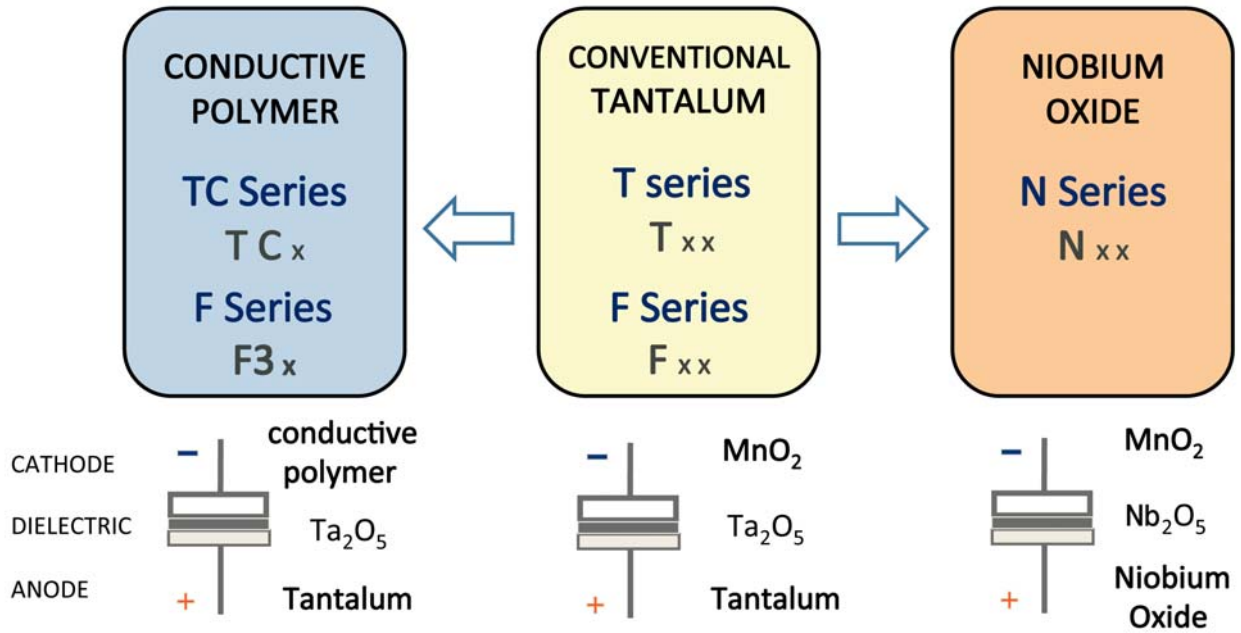
*Initial Limit

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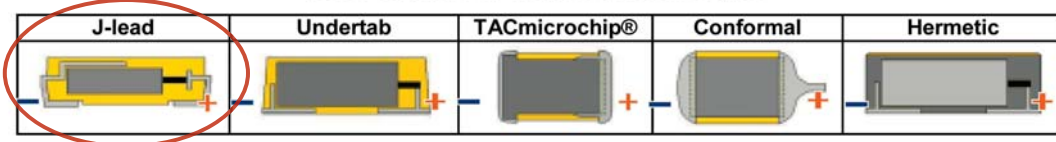


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AVX SOLID ELECTROLYTIC CAPACITOR ROADMAP



Five Capacitor Construction Styles



SERIES LINE UP: CONVENTIONAL SMD MnO₂

