

TPS Series III

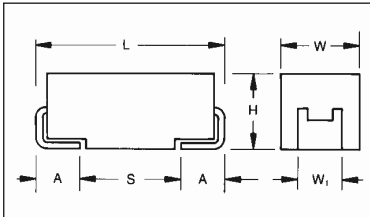
New Generation Low ESR



Current application trends in circuit designs for switch-mode power supplies, micro-processors, and digital circuits call for higher operating frequencies and smoother filtering. In order to function properly, components with low ESR, high capacitance and high reliability are required. The New Third generation TPS Low ESR series is based on the traditional MnO₂ process

that offers very low ESR levels previously only seen by other technologies. Further, continuous improvements in MnO₂ technology has allowed reductions in the resistance of the capacitor electrodes in order to further reduce ESR levels. Traditional MnO₂ technology guarantees excellent line and field performance, humidity stability and high electrical and thermal stress resistance.

CASE DIMENSIONS: millimeters (inches)



For part marking see page 157

| Code | EIA Code | L±0.20 (0.008) | W+0.20 (0.008) -0.10 (0.004) | H+0.20 (0.008) -0.10 (0.004) | W ₁ ±0.20 (0.008) | A+0.30 (0.012) -0.20 (0.008) | S Min. |
|------|----------|----------------|---------------------------------|---------------------------------|------------------------------|---------------------------------|--------------|
| B | 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 | 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 | 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 | 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) |
| V | 7361-38 | 7.30 (0.287) | 6.10 (0.240) | 3.45±0.30 (0.136±0.012) | 3.10 (0.120) | 1.40 (0.055) | 1.80 (0.071) |
| W* | 6032-15 | 6.00 (0.236) | 3.20 (0.126) | 1.50 (0.059) max. | 2.20 (0.087) | 1.30 (0.051) | 2.90 (0.114) |
| Y** | 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.

* Low Profile Version of C Case (max. height 1.5 [0.059])

** Low Profile Version of D Case (max. height 2.0 [0.079])

HOW TO ORDER

TPS

Type

D

Case Size
See table above

227

Capacitor Code
pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)

K

Capacitance Tolerance
K=±10%
M=±20%

010

Rated DC Voltage
002=2.5Vdc
004=4Vdc
006=6.3Vdc
010=10Vdc
016=16Vdc
020=20Vdc
025=25Vdc
035=35Vdc
050=50Vdc

R

Packaging
R = 7" T/R
(Lead Free since production date 1/1/04)
S = 13" T/R
(Lead Free since production date 1/1/04)
A = Gold Plating
7" Reel
B = Gold Plating
13" Reel

0050

Maximum ESR in Milliohms
See note below

NOTE: The EIA & CECC standards for low ESR Solid Tantalum Capacitors allow an ESR movement to 1.25 times catalog limit post mounting.

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: ±10%; ±20%

| Rated Voltage (V _R) | ≤ +85°C: | 2.5 | 4 | 6.3 | 10 | 16 | 20 | 25 | 35 | 50 |
|------------------------------------|-----------|-----|-----|-----|----|----|----|----|----|----|
| Category Voltage (V _C) | ≤ +125°C: | 1.7 | 2.7 | 4 | 7 | 10 | 13 | 17 | 23 | 33 |
| Surge Voltage (V _S) | ≤ +85°C: | 3.3 | 5.2 | 8 | 13 | 20 | 26 | 32 | 46 | 65 |
| Surge Voltage (V _S) | ≤ +125°C: | 2.2 | 3.4 | 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 0.1/V series impedance, 60% confidence level

Meets requirements of AEC-Q200



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CAPACITANCE AND RATED VOLTAGE, V_R (VOLTAGE CODE) RANGE LETTER DENOTES CASE SIZE (ESR in $m\Omega$)

SERIES III MATRIX

| Capacitance | | Rated Voltage DC (V_R) to 85°C | | | | | | | | |
|-------------|------|------------------------------------|----------------|--------------------|-----------------------------|-----------------------------|----------------|------------------|---------------------------|---------|
| μF | Code | 2.5V (e) | 4V (G) | 6.3V (J) | 10V (A) | 16V (C) | 20V (D) | 25V (E) | 35V (V) | 50V (T) |
| 4.7 | 475 | | | | | | | | | D(300) |
| 6.8 | 685 | | | | | | | | | |
| 10 | 106 | | | | | | | | D(125) | |
| 15 | 156 | | | | | | | D(100) | D(100) | |
| 22 | 226 | | | | | C(150) | C(100) | D(100) | D(125) E(125) | |
| 33 | 336 | | | | C(150) | W(140) | D(100) | D(100) E(100) | D(200) E(100) V(80) | |
| 47 | 476 | | | B(250) | W(125) | D(80) | D(75) E(70) | E(80) | V(100) | |
| 68 | 686 | | | W(110) | Y(70,100) | D(70) | D(70) | E(125) V(80) | | |
| 100 | 107 | | | C(75) Y(65,100) | C(75) D(50) Y(65,100) | D(60) E(55) Y(65,100) | V(60) | | | |
| 150 | 157 | | | D(50) | D(50) Y(65,100) | E(50) V(45) | | | | |
| 220 | 227 | D(45) | D(40) | D(50) Y(65,100) | D(50) E(50) | V(45,50) | | | | |
| 330 | 337 | | D(35) | D(45) | E(40) V(40) | | | | | |
| 470 | 477 | | D(45) E(35) | E(45) | E(45) V(40) | | | | | |
| 680 | 687 | | E(40) | E(45) V(35) | | | | | | |
| 1000 | 108 | E(30) | V(25) E(40) | | | | | | | |
| 1500 | 158 | V(30) | | | | | | | | |

Red - Developmental Ratings - subject to change

For TPS series and the case sizes C, D and E the ESR limits are printed on capacitor side in the following format:

T x x x - where x x x is ESR limit in milliohms i.e. T100 represents max. ESR of 100 milliohms.

ESR limits quoted in brackets (milliohms)

NOTE: The EIA & CECC standards for low ESR Solid Tantalum Capacitors allow an ESR movement to 1.25 times catalog limit post mounting.

TPS Series III



New Generation Low ESR

RATINGS & PART NUMBER REFERENCE

| AVX Part No. | Case Size | Capacitance (μF) | Rated Voltage (V) | DCL (μA) Max. | DF % Max. | ESR Max. (mΩ) @100kHz | 100kHz Ripple Current Ratings (A) | | | 100kHz Ripple Voltage Ratings (V) | | |
|------------------|-----------|------------------|-------------------|---------------|-----------|-----------------------|-----------------------------------|-------|-------|-----------------------------------|-------|-------|
| | | | | | | | 25°C | 85°C | 125°C | 25°C | 85°C | 125°C |
| TPSD227*002#0045 | D | 220 | 2.5 | 4.4 | 8 | 45 | 1.826 | 1.643 | 0.730 | 0.082 | 0.074 | 0.033 |
| TPSE108*002#0030 | E | 1000 | 2.5 | 20 | 14 | 30 | 2.345 | 2.111 | 0.938 | 0.070 | 0.063 | 0.028 |
| TPSV158*002#0030 | V | 1500 | 2.5 | 30 | 20 | 30 | 2.887 | 2.598 | 1.155 | 0.087 | 0.078 | 0.035 |
| TPSD227*004#0040 | D | 220 | 4 | 8.8 | 8 | 40 | 1.936 | 1.743 | 0.775 | 0.077 | 0.070 | 0.031 |
| TPSD337*004#0035 | D | 330 | 4 | 13.2 | 8 | 35 | 2.070 | 1.863 | 0.828 | 0.072 | 0.065 | 0.029 |
| TPSD477*004#0045 | D | 470 | 4 | 18.8 | 12 | 45 | 1.826 | 1.643 | 0.730 | 0.082 | 0.074 | 0.033 |
| TPSE477*004#0035 | E | 470 | 4 | 18.8 | 10 | 35 | 2.171 | 1.954 | 0.868 | 0.076 | 0.068 | 0.030 |
| TPSE687*004#0040 | E | 680 | 4 | 27.2 | 10 | 40 | 2.031 | 1.828 | 0.812 | 0.081 | 0.073 | 0.032 |
| TPSV108*004#0025 | V | 1000 | 4 | 40 | 16 | 25 | 3.162 | 2.846 | 1.265 | 0.079 | 0.071 | 0.032 |
| TPSB476*006#0250 | B | 47 | 6.3 | 3 | 6 | 250 | 0.583 | 0.525 | 0.233 | 0.146 | 0.131 | 0.058 |
| TPSW686*006#0110 | W | 68 | 6.3 | 4.3 | 6 | 110 | 0.905 | 0.814 | 0.362 | 0.099 | 0.090 | 0.040 |
| TPSC107*006#0075 | C | 100 | 6.3 | 6.3 | 6 | 75 | 1.211 | 1.090 | 0.484 | 0.091 | 0.082 | 0.036 |
| TPSY107*006#0100 | Y | 100 | 6.3 | 6.3 | 6 | 100 | 1.118 | 1.006 | 0.447 | 0.112 | 0.101 | 0.045 |
| TPSD157*006#0050 | D | 150 | 6.3 | 9.5 | 6 | 50 | 1.732 | 1.559 | 0.693 | 0.087 | 0.078 | 0.035 |
| TPSD227*006#0050 | D | 220 | 6.3 | 13.9 | 8 | 50 | 1.732 | 1.559 | 0.693 | 0.087 | 0.078 | 0.035 |
| TPSY227*006#0100 | Y | 220 | 6.3 | 13.9 | 10 | 100 | 1.118 | 1.006 | 0.447 | 0.112 | 0.101 | 0.045 |
| TPSD337*006#0045 | D | 330 | 6.3 | 20.8 | 8 | 45 | 1.826 | 1.643 | 0.730 | 0.082 | 0.074 | 0.033 |
| TPSE477*006#0045 | E | 470 | 6.3 | 29.6 | 10 | 45 | 1.915 | 1.723 | 0.766 | 0.086 | 0.078 | 0.034 |
| TPSE687*006#0045 | E | 680 | 6.3 | 42.8 | 10 | 45 | 1.915 | 1.723 | 0.766 | 0.086 | 0.078 | 0.034 |
| TPSV687*006#0035 | V | 680 | 6.3 | 42.8 | 14 | 35 | 2.673 | 2.405 | 1.069 | 0.094 | 0.084 | 0.037 |
| TPSC336*010#0150 | C | 33 | 10 | 3.3 | 6 | 150 | 0.856 | 0.771 | 0.343 | 0.128 | 0.116 | 0.051 |
| TPSW476*010#0125 | W | 47 | 10 | 4.7 | 6 | 125 | 0.849 | 0.764 | 0.339 | 0.106 | 0.095 | 0.042 |
| TPSY686*010#0100 | Y | 68 | 10 | 6.8 | 6 | 100 | 1.118 | 1.006 | 0.447 | 0.112 | 0.101 | 0.045 |
| TPSC107*010#0075 | C | 100 | 10 | 10 | 8 | 75 | 1.211 | 1.090 | 0.484 | 0.091 | 0.082 | 0.036 |
| TPSD107*010#0050 | D | 100 | 10 | 10 | 6 | 50 | 1.732 | 1.559 | 0.693 | 0.087 | 0.078 | 0.035 |
| TPSY107*010#0100 | Y | 100 | 10 | 10 | 6 | 100 | 1.118 | 1.006 | 0.447 | 0.112 | 0.101 | 0.045 |
| TPSD157*010#0050 | D | 150 | 10 | 15 | 6 | 50 | 1.732 | 1.559 | 0.693 | 0.087 | 0.078 | 0.035 |
| TPSY157*010#0100 | Y | 150 | 10 | 15 | 6 | 100 | 1.118 | 1.006 | 0.447 | 0.112 | 0.101 | 0.045 |
| TPSD227*010#0050 | D | 220 | 10 | 22 | 8 | 50 | 1.732 | 1.559 | 0.693 | 0.087 | 0.078 | 0.035 |
| TPSE227*010#0050 | E | 220 | 10 | 22 | 8 | 50 | 1.817 | 1.635 | 0.727 | 0.091 | 0.082 | 0.036 |
| TPSE337*010#0040 | E | 330 | 10 | 33 | 8 | 40 | 2.031 | 1.828 | 0.812 | 0.081 | 0.073 | 0.032 |
| TPSV337*010#0040 | V | 330 | 10 | 33 | 10 | 40 | 2.500 | 1.250 | 1.000 | 0.100 | 0.090 | 0.040 |
| TPSE477*010#0045 | E | 470 | 10 | 47 | 10 | 45 | 1.915 | 1.723 | 0.766 | 0.086 | 0.078 | 0.034 |
| TPSV477*010#0040 | V | 470 | 10 | 47 | 10 | 40 | 2.500 | 2.250 | 1.000 | 0.100 | 0.090 | 0.040 |
| TPSC226*016#0150 | C | 22 | 16 | 3.5 | 6 | 150 | 0.856 | 0.771 | 0.343 | 0.128 | 0.116 | 0.051 |
| TPSW336*016#0140 | W | 33 | 16 | 5.3 | 6 | 140 | 0.802 | 0.722 | 0.321 | 0.112 | 0.101 | 0.045 |
| TPSD476*016#0080 | D | 47 | 16 | 7.5 | 6 | 80 | 1.369 | 1.232 | 0.548 | 0.110 | 0.099 | 0.044 |
| TPSD686*016#0070 | D | 68 | 16 | 10.8 | 6 | 70 | 1.464 | 1.317 | 0.586 | 0.102 | 0.092 | 0.041 |
| TPSD107*016#0060 | D | 100 | 16 | 16 | 6 | 60 | 1.581 | 1.423 | 0.632 | 0.095 | 0.085 | 0.038 |
| TPSE107*016#0055 | E | 100 | 16 | 16 | 6 | 55 | 1.732 | 1.559 | 0.693 | 0.095 | 0.086 | 0.038 |
| TPSY107*016#0100 | Y | 100 | 16 | 16 | 8 | 100 | 1.118 | 1.006 | 0.447 | 0.112 | 0.101 | 0.045 |
| TPSV157*016#0045 | V | 150 | 16 | 24 | 6 | 45 | 2.357 | 2.121 | 0.943 | 0.106 | 0.095 | 0.042 |
| TPSV227*016#0050 | V | 220 | 16 | 35.2 | 8 | 50 | 2.236 | 2.012 | 0.894 | 0.112 | 0.101 | 0.045 |

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.
 * Insert K for ±10% and M for ±20% Capacitance Tolerance

Standard Plating – Insert R for 7" reel and S for 13" reel
 # Gold Plating – Insert A for 7" reel and B for 13" reel

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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RATINGS & PART NUMBER REFERENCE

| AVX Part No. | Case Size | Capacitance (μF) | Rated Voltage (V) | DCL (μA) Max. | DF % Max. | ESR Max. (mΩ) @100kHz | 100kHz Ripple Current Ratings (A) | | | 100kHz Ripple Voltage Ratings (V) | | |
|------------------|-----------|------------------|-------------------|---------------|-----------|-----------------------|-----------------------------------|-------|-------|-----------------------------------|-------|-------|
| | | | | | | | 25°C | 85°C | 125°C | 25°C | 85°C | 125°C |
| TPSC226*020#0100 | C | 22 | 20 | 4.4 | 6 | 100 | 1.049 | 0.944 | 0.420 | 0.105 | 0.094 | 0.042 |
| TPSD336*020#0100 | D | 33 | 20 | 6.6 | 6 | 100 | 1.225 | 1.102 | 0.490 | 0.122 | 0.110 | 0.049 |
| TPSD476*020#0075 | D | 47 | 20 | 9.4 | 6 | 75 | 1.414 | 1.273 | 0.566 | 0.106 | 0.095 | 0.042 |
| TPSE476*020#0070 | E | 47 | 20 | 9.4 | 6 | 70 | 1.535 | 1.382 | 0.614 | 0.107 | 0.097 | 0.043 |
| TPSD686*020#0070 | D | 68 | 20 | 13.6 | 6 | 70 | 1.464 | 1.317 | 0.586 | 0.102 | 0.092 | 0.041 |
| TPSV107*020#0060 | V | 100 | 20 | 20 | 8 | 60 | 2.041 | 1.837 | 0.816 | 0.122 | 0.110 | 0.049 |
| TPSD156*025#0100 | D | 15 | 25 | 3.8 | 6 | 100 | 1.225 | 1.102 | 0.490 | 0.122 | 0.110 | 0.049 |
| TPSD226*025#0100 | D | 22 | 25 | 5.5 | 6 | 100 | 1.225 | 1.102 | 0.490 | 0.122 | 0.110 | 0.049 |
| TPSD336*025#0100 | D | 33 | 25 | 8.3 | 6 | 100 | 1.225 | 1.102 | 0.490 | 0.122 | 0.110 | 0.049 |
| TPSE336*025#0100 | E | 33 | 25 | 8.3 | 6 | 100 | 1.285 | 1.156 | 0.514 | 0.128 | 0.116 | 0.051 |
| TPSE476*025#0080 | E | 47 | 25 | 8.3 | 6 | 80 | 1.436 | 1.293 | 0.574 | 0.115 | 0.103 | 0.046 |
| TPSE686*025#0125 | E | 68 | 25 | 17 | 6 | 125 | 1.149 | 1.034 | 0.460 | 0.144 | 0.129 | 0.057 |
| TPSV686*025#0080 | V | 68 | 25 | 17 | 6 | 80 | 1.768 | 1.591 | 0.707 | 0.141 | 0.127 | 0.057 |
| TPSD106*035#0125 | D | 10 | 35 | 3.5 | 6 | 125 | 1.095 | 0.986 | 0.438 | 0.137 | 0.123 | 0.055 |
| TPSD156*035#0100 | D | 15 | 35 | 5.3 | 6 | 100 | 1.225 | 1.102 | 0.490 | 0.122 | 0.110 | 0.049 |
| TPSD226*035#0125 | D | 22 | 35 | 7.7 | 6 | 125 | 1.095 | 0.986 | 0.438 | 0.137 | 0.123 | 0.055 |
| TPSE226*035#0125 | E | 22 | 35 | 7.7 | 6 | 125 | 1.149 | 1.034 | 0.460 | 0.144 | 0.129 | 0.057 |
| TPSD336*035#0200 | D | 33 | 35 | 11.6 | 6 | 200 | 0.866 | 0.779 | 0.346 | 0.173 | 0.156 | 0.069 |
| TPSE336*035#0100 | E | 33 | 35 | 11.6 | 6 | 100 | 1.285 | 1.156 | 0.514 | 0.128 | 0.116 | 0.051 |
| TPSD475*050#0300 | D | 4.7 | 50 | 2.4 | 6 | 300 | 0.707 | 0.636 | 0.283 | 0.212 | 0.191 | 0.085 |

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.
 * Insert K for ±10% and M for ±20% Capacitance Tolerance

Standard Plating – Insert R for 7" reel and S for 13" reel
 # **Gold Plating** – Insert A for 7" reel and B for 13" reel

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.

