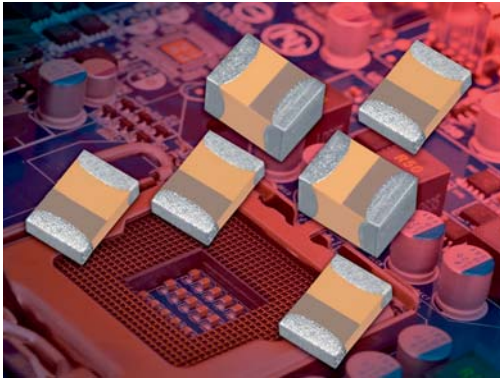


# TPC Series



## Low ESR TACmicrochip®



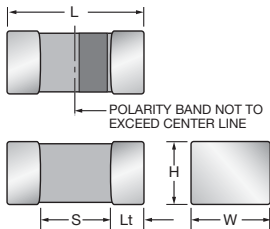
### FEATURES

- Low ESR TACmicrochip® capacitor
- Smallest and low profile tantalum
- CV range: 1.0-100µF / 3-25V
- 4 case sizes available
- Power supply applications



### APPLICATIONS

- Portable controller with elevated power requirements

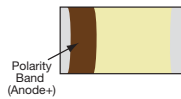


### CASE DIMENSIONS: millimeters (inches)

Code	EIA Code	EIA Metric	L+0.20 (0.008) -0.00 (0.000)	W+0.15 (0.008) -0.00 (0.000)	H+0.15 (0.008) -0.00 (0.000)	Termination Spacing(S)	Minimum Termination Length (Lt)
H	0805	2012-10	2.00 (0.079)	1.35 (0.053)	1.00 (0.039) max	0.70 (0.028) min	0.15 (0.006)
K	0402	1005-07	1.00 (0.039)	0.50 <sup>+0.20</sup> -0.00 (0.020 <sup>+0.008</sup> -0.000)	0.50 <sup>+0.20</sup> -0.00 (0.020 <sup>+0.008</sup> -0.000)	0.40 (0.016) min	0.10 (0.004)
L	0603	1608-10	1.60 (0.063)	0.85 (0.033)	0.85 (0.033)	0.55 (0.022) min	0.15 (0.006)
R	0805	2012-15	2.00 (0.079)	1.35 (0.053)	1.35 (0.053)	0.70 (0.028) min	0.15 (0.006)

### MARKING

#### H, K, L, R CASE



### HOW TO ORDER

<b>TPC</b>	<b>R</b>	<b>106</b>	<b>*</b>	<b>010</b>	<b>R</b>	<b>1800</b>
<b>Type</b> TACmicrochip®	<b>Case Size</b> See table above	<b>Capacitance Code</b> pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	<b>Tolerance</b> K=±10% M=±20%	<b>Rated DC Voltage</b> 003=3Vdc 004=4Vdc 006=6.3Vdc 010=10Vdc 016=16Vdc 020=20Vdc 025=25Vdc	<b>Packaging</b> R, P = 7" Standard Tin Termination Plastic Tape X, Q = 4 1/4" Standard Tin Termination Plastic Tape A, M = 7" Gold Termination Plastic Tape F, N = 4 1/4" Gold Termination Plastic Tape	<b>ESR in mΩ</b>

### TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C								
Capacitance Range:	1.0 µF to 100 µF								
Capacitance Tolerance:	±10%; ±20%								
Leakage Current DCL:	0.01CV or 0.5µA whichever is the greater								
Rated Voltage (V <sub>R</sub> )	≤ +85°C:	3	4	6.3	10	16	20	25	
Category Voltage (V <sub>C</sub> )	≤ +125°C:	2	2.7	4	7	10	13	17	
Surge Voltage (V <sub>S</sub> )	≤ +85°C:	3.9	5.2	8	13	20	26	32	
Surge Voltage (V <sub>S</sub> )	≤ +125°C:	2.6	3.2	5	8	12	16	20	
Temperature Range:	-55°C to +125°C								
Reliability:	1% per 1000 hours at 85°C, V <sub>R</sub> with 0.1Ω/V series impedance, 60% confidence level								
Termination Finish:	Nickel and Tin Plating (standard), Nickel and Gold Plating option available upon request								

### CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Voltage Rating DC ( $V_R$ ) at 85°C						
$\mu\text{F}$	Code	3.0V	4.0V	6.3V	10V	16V	20V	25V
1.0	105				L(5000)			R(3000)
1.5	155							
2.2	225			K(8000)/L(5000)	L(5000)	L(5000)		
3.3	335				L(5000)			
4.7	475	K(8000)			L(5000)		R(1500)*	
6.8	685							
10	106			L(4000)	H(2500) L(4000),R(1800)	R(1800)		
15	156			R(1800)	R(1500)			
22	226		L(5000)/R(1800)	R(1500)	R(1500)			
33	336	R(1800)	H(1500)/R(1500)		R(1500)			
47	476	R(1500)		R(1800)				
68	686							
100	107		R(1000)					

Codes shown are examples of ESR values offered on certain CV and case size. Other codes and ESR values available upon request.

Available Ratings, (ESR ratings in mOhms in brackets)

Engineering samples - please contact manufacturer

\*Code 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

# TPC Series



## Low ESR TACmicrochip®

### 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)			Product Category
											25°C	85°C	125°C	
<b>3 Volt @ 85°C</b>														
TPCK475*003#8000	K	4.7	3	85	2	125	0.5	12	8000	1	0.043	0.039	0.017	3
TPCR336*003#1800	R	33	3	85	2	125	1.0	10	1800	1	0.158	0.142	0.063	2
TPCR476*003#1500	R	47	3	85	2	125	1.5	10	1500	1	0.173	0.156	0.069	3
<b>4 Volt @ 85°C</b>														
TPCL226*004#5000	L	22	4	85	2.7	125	0.9	6	5000	1	0.071	0.064	0.028	3
TPCR226*004#1800	R	22	4	85	2.7	125	0.9	8	1800	1	0.158	0.142	0.063	1
TPCH336*004#1500	H	33	4	85	2.7	125	1.3	14	1500	1	0.163	0.147	0.065	3
TPCR336*004#1500	R	33	4	85	2.7	125	1.3	10	1500	1	0.173	0.156	0.069	2
TPCR107*004#1000	R	100	4	85	2.7	125	4.0	30	1000	1	0.212	0.191	0.085	3
<b>6.3 Volt @ 85°C</b>														
TPCK225*006#8000	K	2.2	6.3	85	4	125	0.5	8	8000	1	0.043	0.039	0.017	3
TPCL225*006#5000	L	2.2	6.3	85	4	125	0.5	6	5000	1	0.071	0.064	0.028	1
TPCL106*006#4000	L	10	6.3	85	4	125	0.6	10	4000	1	0.079	0.071	0.032	3
TPCR156*006#1800	R	15	6.3	85	4	125	0.9	8	1800	1	0.158	0.142	0.063	1
TPCR226*006#1500	R	22	6.3	85	4	125	1.4	10	1500	1	0.173	0.156	0.069	1
TPCR476*006#1800	R	47	6.3	85	4	125	3.0	20	1800	1	0.158	0.142	0.063	3
<b>10 Volt @ 85°C</b>														
TPCL105*010#5000	L	1.0	10	85	7	125	0.5	6	5000	1	0.071	0.064	0.028	1
TPCL225*010#5000	L	2.2	10	85	7	125	0.5	6	5000	1	0.071	0.064	0.028	1
TPCL335*010#5000	L	3.3	10	85	7	125	0.5	8	5000	1	0.071	0.064	0.028	2
TPCL475*010#5000	L	4.7	10	85	7	125	0.5	10	5000	1	0.071	0.064	0.028	2
TPCH106*010#2500	H	10	10	85	7	125	1.0	8	2500	1	0.126	0.113	0.050	2
TPCL106*010#4000	L	10	10	85	7	125	1.0	20	4000	1	0.079	0.071	0.032	3
TPCR106*010#1800	R	10	10	85	7	125	1.0	8	1800	1	0.158	0.142	0.063	1
TPCR156*010#1500	R	15	10	85	7	125	1.5	10	1500	1	0.173	0.156	0.069	1
TPCR226*010#1500	R	22	10	85	7	125	2.2	14	1500	1	0.173	0.156	0.069	2
TPCR336*010#1500	R	33	10	85	7	125	3.3	20	1500	1	0.173	0.156	0.069	3
<b>16 Volt @ 85°C</b>														
TPCL225*016#5000	L	2.2	16	85	10	125	0.5	10	5000	1	0.071	0.064	0.028	1
TPCR106*016#1800	R	10	16	85	10	125	1.6	10	1800	1	0.158	0.142	0.063	2
<b>20 Volt @ 85°C</b>														
TPCR475*020#1500	R	4.7	20	85	13	125	0.9	8	1500	1	0.173	0.156	0.069	1
<b>25 Volt @ 85°C</b>														
TPCR105*025#3000	R	1.0	25	85	17	125	0.5	8	3000	1	0.122	0.110	0.049	1

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, 0.5V RMS with a maximum DC bias of 2.2 volts.

DCL is measured at rated voltage after 5 minutes.

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.**

### QUALIFICATION TABLE – CATEGORY 1

TEST	TPC 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	1.5 x initial limit						
				ESR	1.5 x initial limit						
Humidity	Determine after storage without applied voltage at 40±2°C and 90-95% relative humidity for 1344 +48/-0 hours and then recovery 1-2 hours at room temperature			Visual examination	no visible damage						
				DCL	initial limit						
				ΔC/C	within ±5% of initial value						
				DF	1.2 x initial limit						
				ESR	1.2 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%	+15/-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	IL*	1.25 x IL*	IL*	1.25 x IL*	2 x IL*	IL*
	5	+125+3/-0	15								
	6	+20±2	15								
Surge Voltage	Test temperature: 85°C+3/0°C Test 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% of initial value						
				DF	initial limit						
				ESR	initial limit						

\*Initial Limit

### QUALIFICATION TABLE – CATEGORY 2

TEST	TPC 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 ±15% of initial value						
				DF	1.5 x initial limit						
				ESR	1.5 x initial limit						
Humidity	Determine after storage without applied voltage at 40±2°C and 90-95% relative humidity for 1344 +48/-0 hours and then recovery 1-2 hours at room temperature			Visual examination	no visible damage						
				DCL	initial limit						
				ΔC/C	within ±10% of initial value						
				DF	1.2 x initial limit						
				ESR	1.2 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/-15%	±5%	+15/-0%	+20/-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	IL*	1.25 x IL*	IL*	1.25 x IL*	2 x IL*	IL*
	5	+125+3/-0	15								
	6	+20±2	15								
Surge Voltage	Test temperature: 85°C+3/0°C Test 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	1.5 x initial limit						
				ΔC/C	within ±15% of initial value						
				DF	1.5 x initial limit						
				ESR	1.5 x initial limit						

\*Initial Limit

### QUALIFICATION TABLE – CATEGORY 3

TEST	TPC series (Temperature range -55°C to +125°C)										
	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 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 ±30% of initial value						
				DF	1.5 x initial limit						
				ESR	1.5 x initial limit						
<b>Humidity</b>	Determine after storage without applied voltage at 40±2°C and 90-95% relative humidity for 1344 +48/-0 hours and then recovery 1-2 hours at room temperature			Visual examination	no visible damage						
				DCL	2 x initial limit						
				ΔC/C	within ±30% of initial value						
				DF	1.5 x initial limit						
				ESR	1.25 x initial limit						
<b>Temperature Stability</b>	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/-25%	±5%	+20/-0%	+25/-0%	±20%
	3	+20±2	15	DF		IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	1.5 x IL*
	4	+85+3/-0	15		ESR	IL*	1.25 x IL*	IL*	1.25 x IL*	2 x IL*	1.5 x IL*
	5	+125+3/-0	15								
	6	+20±2	15								
<b>Surge Voltage</b>	Test temperature: 85°C+3/0°C Test 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	2 x initial limit						
				ΔC/C	within ±30% of initial value						
				DF	2 x initial limit						
				ESR	2 x initial limit						

\*Initial Limit