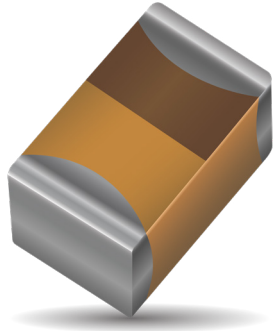


# TPC Series

## Low ESR TACmicrochip®



### FEATURES

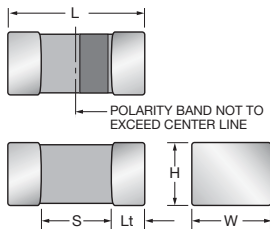
- Low ESR TACmicrochip® Capacitor
- Smallest and Low Profile Tantalum
- 100% Surge Current Tested
- CV Range: 1.0-100µF / 3-25V
- 4 Case Sizes Available
- Power Supply Applications



### APPLICATIONS

- Portable Controller with Elevated Power Requirements

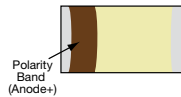
### CASE DIMENSIONS: millimeters (inches)



Code	EIA Code	EIA Metric	L+0.20 (0.008) -0.00 (0.000)	W+0.15 (0.006) -0.00 (0.000)	H+0.15 (0.006) -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> <sub>-0.00</sub> (0.020 <sup>+0.008</sup> <sub>-0.000</sub> )	0.50 <sup>+0.20</sup> <sub>-0.00</sub> (0.020 <sup>+0.008</sup> <sub>-0.000</sub> )	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>
Type	Case Size	Capacitance Code	Tolerance	Rated DC Voltage	Packaging	ESR in mΩ
TACmicrochip®	See table above	pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	K=±10% M=±20%	003=3Vdc 004=4Vdc 006=6.3Vdc 010=10Vdc 016=16Vdc 020=20Vdc 025=25Vdc	R, P = 7" Standard Tin Termination Plastic Tape X, Q = 4¼" Standard Tin Termination Plastic Tape A, M = 7" Gold Termination Plastic Tape F, N = 4¼" Gold Termination Plastic Tape	

### 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:	Tin Plating over Nickel (standard), Gold Plating over Nickel option available upon request							

# TPC Series

## Low ESR TACmicrochip®



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

Capacitance		Voltage Rating DC (V <sub>R</sub> ) at 85°C						
µF	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(2000)	
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.

Released ratings, (ESR ratings in mOhms in parentheses)

Note: Voltage ratings are minimum values. KYOCERA AVX reserves the right to supply higher voltage ratings in the same case size, to the same reliability standards.

### RATINGS & PART NUMBER REFERENCE

Part Number	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)			Product Category	MSL
										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	0.043	0.039	0.017	3	1
TPCR336*003#1800	R	33	3	85	2	125	1.0	10	1800	0.158	0.142	0.063	2	1
TPCR476*003#1500	R	47	3	85	2	125	1.5	10	1500	0.173	0.156	0.069	3	1
<b>4 Volt @ 85°C</b>														
TPCL226*004#5000	L	22	4	85	2.7	125	0.9	6	5000	0.071	0.064	0.028	3	1
TPCR226*004#1800	R	22	4	85	2.7	125	0.9	8	1800	0.158	0.142	0.063	1	1
TPCH336*004#1500	H	33	4	85	2.7	125	1.3	14	1500	0.163	0.147	0.065	3	1
TPCR336*004#1500	R	33	4	85	2.7	125	1.3	10	1500	0.173	0.156	0.069	2	1
TPCR107*004#1000	R	100	4	85	2.7	125	4.0	30	1000	0.212	0.191	0.085	3	1
<b>6.3 Volt @ 85°C</b>														
TPCK225*006#8000	K	2.2	6.3	85	4	125	0.5	8	8000	0.043	0.039	0.017	3	1
TPCL225*006#5000	L	2.2	6.3	85	4	125	0.5	6	5000	0.071	0.064	0.028	1	1
TPCL106*006#4000	L	10	6.3	85	4	125	0.6	10	4000	0.079	0.071	0.032	3	1
TPCR156*006#1800	R	15	6.3	85	4	125	0.9	8	1800	0.158	0.142	0.063	1	1
TPCR226*006#1500	R	22	6.3	85	4	125	1.4	10	1500	0.173	0.156	0.069	1	1
TPCR476*006#1800	R	47	6.3	85	4	125	3.0	20	1800	0.158	0.142	0.063	3	1
<b>10 Volt @ 85°C</b>														
TPCL105*010#5000	L	1.0	10	85	7	125	0.5	6	5000	0.071	0.064	0.028	1	1
TPCL225*010#5000	L	2.2	10	85	7	125	0.5	6	5000	0.071	0.064	0.028	1	1
TPCL335*010#5000	L	3.3	10	85	7	125	0.5	8	5000	0.071	0.064	0.028	2	1
TPCL475*010#5000	L	4.7	10	85	7	125	0.5	10	5000	0.071	0.064	0.028	2	1
TPCH106*010#2500	H	10	10	85	7	125	1.0	8	2500	0.126	0.113	0.050	2	1
TPCL106*010#4000	L	10	10	85	7	125	1.0	20	4000	0.079	0.071	0.032	3	1
TPCR106*010#1800	R	10	10	85	7	125	1.0	8	1800	0.158	0.142	0.063	1	1
TPCR156*010#1500	R	15	10	85	7	125	1.5	10	1500	0.173	0.156	0.069	1	1
TPCR226*010#1500	R	22	10	85	7	125	2.2	14	1500	0.173	0.156	0.069	2	1
TPCR336*010#1500	R	33	10	85	7	125	3.3	20	1500	0.173	0.156	0.069	3	1
<b>16 Volt @ 85°C</b>														
TPCL225*016#5000	L	2.2	16	85	10	125	0.5	10	5000	0.071	0.064	0.028	1	1
TPCR106*016#1800	R	10	16	85	10	125	1.6	10	1800	0.158	0.142	0.063	2	1
<b>20 Volt @ 85°C</b>														
TPCR475*020#2000	R	4.7	20	85	13	125	0.9	8	2000	0.150	0.135	0.060	1	1
<b>25 Volt @ 85°C</b>														
TPCR105*025#3000	R	1.0	25	85	17	125	0.5	8	3000	0.122	0.110	0.049	1	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 259.

**NOTE: KYOCERA 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 – CATEGORY 1

TEST	TPC 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	1.5 x initial limit					
				ESR	1.5 x initial limit					
Humidity	Store at 40°C and 90-95% relative humidity for 1344 hours, with no applied voltage. Stabilize at room temperature and humidity for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta C/C$	within $\pm 5\%$ 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	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%	+15/-0%
	3	+20	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*
	4	+85	15	ESR	IL*	1.25 x IL*	IL*	1.25 x IL*	2 x IL*	IL*
	5	+125	15							
6	+20	15								
Surge Voltage	Apply 1.3x rated voltage (Ur) at 85°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000 $\Omega$			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta C/C$	within $\pm 10\%$ 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	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 $\pm 15\%$ of initial value					
				DF	1.5 x initial limit					
				ESR	1.5 x initial limit					
Humidity	Store at 40°C and 90-95% relative humidity for 1344 hours, with no applied voltage. Stabilize at room temperature and humidity for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	initial limit					
				$\Delta C/C$	within $\pm 10\%$ 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	15	DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*
	2	-55	15		$\Delta C/C$	n/a	+0/-15%	$\pm 5\%$	+15/-0%	+20/-0%
	3	+20	15	DF	IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*	IL*
	4	+85	15	ESR	IL*	1.25 x IL*	IL*	1.25 x IL*	2 x IL*	IL*
	5	+125	15							
6	+20	15								
Surge Voltage	Apply 1.3x rated voltage (Ur) at 85°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000 $\Omega$			Visual examination	no visible damage					
				DCL	1.5 x initial limit					
				$\Delta C/C$	within $\pm 15\%$ of initial value					
				DF	1.5 x initial limit					
				ESR	1.5 x initial limit					

\*Initial Limit

# TPC Series

## Low ESR TACmicrochip®



### QUALIFICATION TABLE – CATEGORY 3

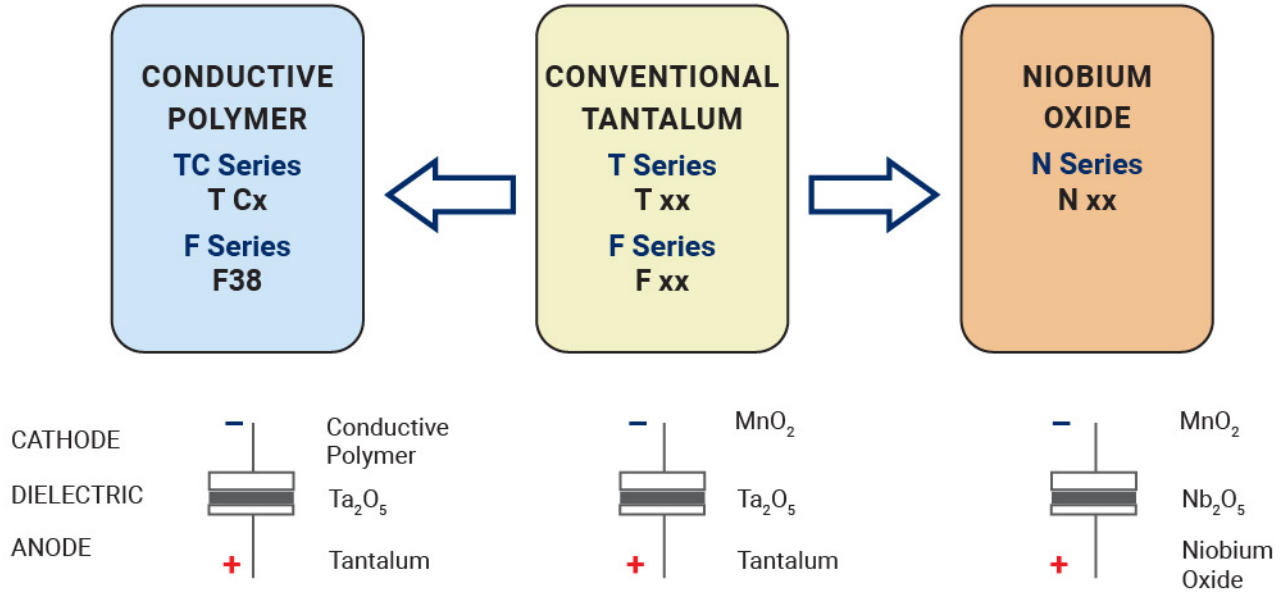
TEST	TPC series (Temperature range -55°C to +125°C)									
	Condition			Characteristics						
<b>Endurance</b>	Apply rated voltage (Ur) at 85°C and / or category voltage (Uc) at 125°C for 2000 hours through a circuit impedance of $\leq 0.1\Omega/V$ . Stabilize at room temperature for 1-2 hours before measuring.			Visual examination	no visible damage					
				DCL	1.25 x initial limit					
				$\Delta C/C$	within $\pm 30\%$ of initial value					
				DF	1.5 x initial limit					
				ESR	1.5 x initial limit					
<b>Humidity</b>	Store at 40°C and 90-95% relative humidity for 1344 hours, with no applied voltage. 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 $\pm 30\%$ 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	15	DCL	IL*	n/a	IL*	10 x IL*	12.5 x IL*	IL*
	2	-55	15		$\Delta C/C$	n/a	+0/-25%	$\pm 5\%$	+20/-0%	+25/-0%
	3	+20	15	DF		IL*	1.5 x IL*	IL*	1.5 x IL*	2 x IL*
	4	+85	15	ESR	IL*	1.25 x IL*	IL*	1.25 x IL*	2 x IL*	1.5 x IL*
	5	+125	15							
	6	+20	15							
<b>Surge Voltage</b>	Apply 1.3x rated voltage (Ur) at 85°C for 1000 cycles of duration 6 min (30 sec charge, 5 min 30 sec discharge) through a charge / discharge resistance of 1000 $\Omega$			Visual examination	no visible damage					
				DCL	2 x initial limit					
				$\Delta C/C$	within $\pm 30\%$ of initial value					
				DF	2 x initial limit					
				ESR	2 x initial limit					

\*Initial Limit

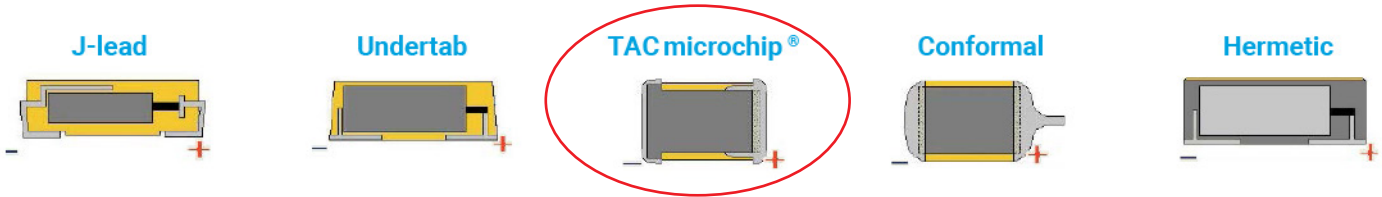
# TPC Series

## Low ESR TACmicrochip®

### SOLID ELECTROLYTE CAPACITOR ROADMAP



### FIVE CAPACITOR CONSTRUCTION STYLES



### SERIES LINE UP : CONVENTIONAL SMD MnO<sub>2</sub>

