

TCB SERIES

COTS-Plus Polymer Capacitor



FEATURES

- Robust design for long operation lifetime
- Statistical screening with Accelerated Ageing
- Surge testing level option
- - 55 to +125°C operation temperature
- Shock and Vibration by MIL-STD-202
- 3x reflow cycles according to J-STD-020



For RoHS compliant products,
please select correct termination
style.

APPLICATIONS

Long life time DC/DC converter applications in Telecommunications, Industrial, Avionics.

CASE DIMENSIONS:

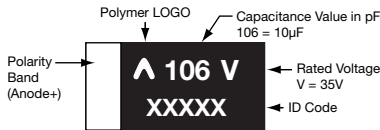
millimeters (inches)

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 ₁ ±0.20 (0.008)	A+0.30 (0.012) -0.20 (0.008)	S Min.
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)
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)
Y	2917	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.

MARKING

B, D, E, Y CASE



CAPACITANCE AND RATED VOLTAGE, V_R (VOLTAGE CODE) RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage								
µF	Code	2.5(e)	4V(G)	6.3V(J)	10V(A)	16V(C)	20V(D)	25V(E)	35V(V)	50V(T)
2.2	225									B(300)
4.7	475								B(150,200)	
10	106						B(150)	B(150)	D(70)	D(120)
15	156					B(90)	B(150)	D(70)	D(125)	
22	226			B(70)	B(70)	B(70)	B(150) (M) D(70)	D(100)	D(100)	
33	336			B(70)	B(70)	D(70)	D(70)	D(100)	E(65)	
47	476			B(70)	B(70) (M)	D(65)	D(70)	E(50)	E(75)	
68	686			B(70) (M)	D(25,70)	D(70)		E(60) (M)		
100	107	B(70)	B(70) (M)		D(25,55)		E(40)			
150	157			D(25,40)	D(25,55)	E(25,40)				
220	227		D(25,40) (M), Y(40)	D(25,40)	D(25,35)					
330	337		D(25,40)	D(25,40)	E(25, 50)					
470	477		D(25,40)	E(25, 50)	E(25, 50) (M)					
680	687			E(25, 50) (M)						

Released Ratings (M tolerance only) (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

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HOW TO ORDER

PART NUMBER:

TCB	D	107	*	010	C	R	S	Z	0	^	++	E
Type	Case Size See table on previous page	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 002 = 2.5Vdc 004 = 4Vdc 006 = 6.3Vdc 010 = 10Vdc 016 = 16Vdc 020 = 20Vdc 025 = 25Vdc 035 = 35Vdc 050 = 50Vdc	ESR C = Std ESR L = Low ESR	Packaging R = 7" T&R	Inspection Level S = Standard Conformance	Reliability Grade Z = Non-ER	Qualification Level 0 = N/A	Termination Finish 7 = 100% Tin H = Sn/Pb Non RoHS	Surge Test Option 00 = 4 cycles at 25°C +/- 5°C, after voltage ageing 23 = 10 cycles at 25°C +/- 5°C, after voltage ageing 24 = 10 cycles at -55°C -5°C, +0°C and +85°C +/- 5°C, after voltage ageing	Additional Character E = Black resin

TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C
Capacitance Range:	2.2µF to 680µF
Capacitance Tolerance:	±10%; ±20%
Leakage Current DCL:	0.1CV
Temperature Range:	-55°C to +125°C
Termination Finish:	Sn Plating or SnPb Plating (Non RoHS)

NOTE: Conductive Polymer Capacitors are designed to operate within the limits of the environmental conditions specified for each series. If operated continuously at their maximum temperature and / or humidity limit, or beyond these limits, capacitors may exhibit a parametric shift in capacitance and increases in ESR. These changes may occur earlier if the specified environmental conditions are exceeded. Similarly, their normal operational time period will be significantly extended if their general duty cycle includes operation below maximum temperature within humidity controlled environments. Careful attention should be paid to maximum temperature with associated high humidity environments as well as voltage derating, ripple current and current surges. Please reference the KYOCERA AVX Conductive Polymer Capacitor Guidelines for more information or contact factory for application assistance.

RATINGS & PART NUMBER REFERENCE

Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	Maximum Operating Temperature (°C)	DCL Max. (µA)	DF Max. (%)	ESR Max. @ 100kHz (mΩ)	100kHz RMS Current (mA)				MSL	Humidity 85°C/ 85%RH, Vr (hrs)
								45°C	85°C	105°C	125°C		
2.5 Volt													
TCBB107*002CRSZ0^++E	B	100	2.5	125	25	8	70	1300	900	600	300	3	1000
4 Volt													
TCBB107M004CRSZ0^++E	B	100	4	125	40	8	70	1300	900	600	300	3	1000
TCBD227M004LRSZ0^++E	D	220	4	125	88	8	25	3000	2100	1400	800	3	1000
TCBD227M004CRSZ0^++E	D	220	4	125	88	8	40	2400	1700	1100	600	3	1000
TCBY227*004CRSZ0^++E	Y	220	4	125	88	8	40	2200	1500	1000	600	3	500
TCBD337*004LRSZ0^++E	D	330	4	125	132	8	25	3000	2100	1400	800	3	1000
TCBD337*004CRSZ0^++E	D	330	4	125	132	8	40	2400	1700	1100	600	3	1000
TCBD477*004LRSZ0^++E	D	470	4	125	188	8	25	3000	2100	1400	800	3	1000
TCBD477*004CRSZ0^++E	D	470	4	125	188	8	40	2400	1700	1100	600	3	1000
6.3 Volt													
TCBB226*006CRSZ0^++E	B	22	6.3	125	13	8	70	1300	900	600	300	3	1000
TCBB336*006CRSZ0^++E	B	33	6.3	125	19	8	70	1300	900	600	300	3	1000
TCBB476*006CRSZ0^++E	B	47	6.3	125	28	8	70	1300	900	600	300	3	1000
TCBB686M006CRSZ0^++E	B	68	6.3	125	40.8	8	70	1300	900	600	300	3	1000
TCBD157*006LRSZ0^++E	D	150	6.3	125	90	8	25	3000	2100	1400	800	3	1000
TCBD157*006CRSZ0^++E	D	150	6.3	125	90	8	40	2400	1700	1100	600	3	1000
TCBD227*006LRSZ0^++E	D	220	6.3	125	132	8	25	3000	2100	1400	800	3	1000
TCBD227*006CRSZ0^++E	D	220	6.3	125	132	8	40	2400	1700	1100	600	3	1000
TCBD337*006LRSZ0^++E	D	330	6.3	125	198	8	25	3000	2100	1400	800	3	1000
TCBD337*006CRSZ0^++E	D	330	6.3	125	198	8	40	2400	1700	1100	600	3	1000
TCBE477*006LRSZ0^++E	E	470	6.3	125	296.1	10	25	3200	2200	1400	800	3	1000
TCBE477*006CRSZ0^++E	E	470	6.3	125	296.1	10	50	2200	1500	1000	600	3	1000
TCBE687M006LRSZ0^++E	E	680	6.3	125	428.4	10	25	3200	2200	1400	800	3	1000
TCBE687M006CRSZ0^++E	E	680	6.3	125	428.4	10	50	2200	1500	1000	600	3	1000

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RATINGS & PART NUMBER REFERENCE

Part No.	Case Size	Capacitance (μF)	Rated Voltage (V)	Maximum Operating Temperature (°C)	DCL Max. (μA)	DF Max. (%)	ESR Max. @ 100kHz (mΩ)	100kHz RMS Current (mA)				MSL	Humidity 85°C/ 85%RH, Vr (hrs)
								45°C	85°C	105°C	125°C		
10 Volt													
TCBB226*010CRSZ0^++E	B	22	10	125	22	8	70	1300	900	600	300	3	1000
TCBB336*010CRSZ0^++E	B	33	10	125	33	8	70	1300	900	600	300	3	1000
TCBB476M010CRSZ0^++E	B	47	10	125	47	8	70	1300	900	600	300	3	1000
TCBD686*010LRSZ0^++E	D	68	10	125	68	8	25	3000	2100	1400	800	3	1000
TCBD686*010CRSZ0^++E	D	68	10	125	68	8	70	1800	1300	800	500	3	1000
TCBD107*010LRSZ0^++E	D	100	10	125	100	8	25	3000	2100	1400	800	3	1000
TCBD107*010CRSZ0^++E	D	100	10	125	100	8	55	2000	1400	900	500	3	1000
TCBD157*010LRSZ0^++E	D	150	10	125	150	8	25	3000	2100	1400	800	3	1000
TCBD157*010CRSZ0^++E	D	150	10	125	150	8	55	2000	1400	900	500	3	1000
TCBD227*010LRSZ0^++E	D	220	10	125	220	8	25	3000	2100	1400	800	3	1000
TCBD227*010CRSZ0^++E	D	220	10	125	220	8	35	2500	1800	1100	600	3	1000
TCBE337*010LRSZ0^++E	E	330	10	125	330	10	25	3200	2200	1400	800	3	1000
TCBE337*010CRSZ0^++E	E	330	10	125	330	10	50	2200	1500	1000	600	3	1000
TCBE477M010LRSZ0^++E	E	470	10	125	470	10	25	3200	2200	1400	800	3	1000
TCBE477M010CRSZ0^++E	E	470	10	125	470	10	50	2200	1500	1000	600	3	1000
16 Volt													
TCBB156*016CRSZ0^++E	B	15	16	125	24	8	90	1200	800	500	300	3	1000
TCBB226*016CRSZ0^++E	B	22	16	125	35.2	8	70	1300	900	600	300	3	1000
TCBD336*016CRSZ0^++E	D	33	16	125	52	8	70	1800	1300	800	500	3	1000
TCBD476*016CRSZ0^++E	D	47	16	125	75	8	65	1900	1300	900	500	3	1000
TCBD686*016CRSZ0^++E	D	68	16	125	109	8	70	1800	1300	800	500	3	1000
TCBE157*016LRSZ0^++E	E	150	16	125	240	10	25	3200	2200	1400	800	3	1000
TCBE157*016CRSZ0^++E	E	150	16	125	240	10	40	2500	1800	1100	600	3	1000
20 Volt													
TCBB106*020CRSZ0^++E	B	10	20	125	20	8	150	900	600	400	200	3	1000
TCBB156*020CRSZ0^++E	B	15	20	125	30	8	150	900	600	400	200	3	1000
TCBB226M020CRSZ0^++E	B	22	20	125	44	8	150	900	600	400	200	3	1000
TCBD226*020CRSZ0^++E	D	22	20	125	44	8	70	1800	1300	800	500	3	1000
TCBD336*020CRSZ0^++E	D	33	20	125	66	8	70	1800	1300	800	500	3	1000
TCBD476*020CRSZ0^++E	D	47	20	125	94	8	70	1800	1300	800	500	3	1000
TCBE107*020CRSZ0^++E	E	100	20	125	200	10	40	2500	1800	1100	600	3	1000
25 Volt													
TCBB106*025CRSZ0^++E	B	10	25	125	25	8	150	900	600	400	200	3	1000
TCBD156*025CRSZ0^++E	D	15	25	125	37	8	70	1800	1300	800	500	3	1000
TCBD226*025CRSZ0^++E	D	22	25	125	55	8	100	1500	1100	700	400	3	1000
TCBD336*025CRSZ0^++E	D	33	25	125	82.5	8	100	1500	1100	700	400	3	1000
TCBE476*025CRSZ0^++E	E	47	25	125	117.5	10	50	2200	1500	1000	600	3	1000
TCBE686M025CRSZ0^++E	E	68	25	125	170	10	60	2000	1400	900	500	3	1000
35 Volt													
TCBB475*035LRSZ0^++E	B	4.7	35	125	16.5	8	150	900	600	400	200	3	1000
TCBB475*035CRSZ0^++E	B	4.7	35	125	16.5	8	200	800	600	400	200	3	1000
TCBD106*035CRSZ0^++E	D	10	35	125	35	8	70	1800	1300	800	500	3	1000
TCBD156*035CRSZ0^++E	D	15	35	125	52.5	8	125	1300	900	600	300	3	1000
TCBD226*035CRSZ0^++E	D	22	35	125	77	8	100	1500	1100	700	400	3	1000
TCBE336*035CRSZ0^++E	E	33	35	125	115.5	10	65	2000	1400	900	500	3	1000
TCBE476*035CRSZ0^++E	E	47	35	125	164.5	10	75	1800	1300	800	500	3	1000
50 Volt													
TCBB225*050CRSZ0^++E	B	2.2	50	125	11	10	300	600	400	300	200	3	1000
TCBD106*050CRSZ0^++E	D	10	50	125	50	10	120	1400	1000	600	400	3	1000

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, 0.5RMS with DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes.

ESR allowed to move up to 1.25 times catalog limit post mounting.

NOTE: KYOCERA AVX reserves the rights to supply higher voltage rating or tighter tolerance part in the same case size, to the same reliability standards.

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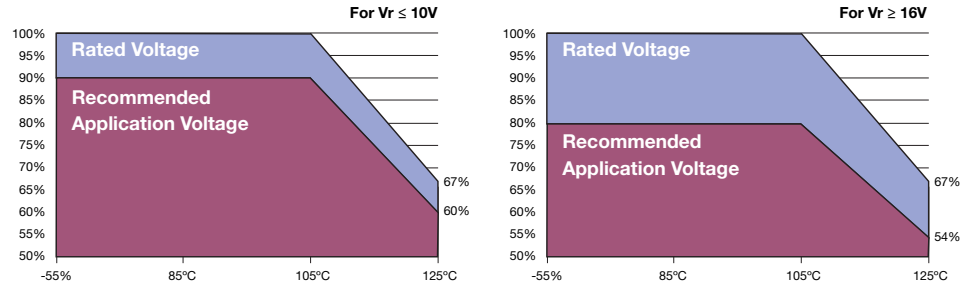
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RECOMMENDED DERATING FACTOR

Voltage and temperature derating as percentage of Vr.

Rated voltage	Operating Temperature		
	≤85°C	105°C	125°C
≤10V	90%	90%	60%
≥16V	80%	80%	54%



QUALIFICATION TABLE

TEST	TCB series (Temperature range -55°C to +125°C)									
	Condition			Characteristics						
Endurance	Determine after application of rated voltage for 2000 +48/-0 hours at 105±2°C. Also determine after application of 125°C temperature, 2/3 rated voltage for 2000 +48/-0 hours. Power supply impedance to be ≤ 0.1Ω/V.			Visual examination	no visible damage					
				DCL	1.25 x initial limit					
				ΔC/C	within +10/-20% of initial value					
				DF	initial limit					
				ESR	2 x initial limit					
Storage Life	125°C, 0V, 2000h			Visual examination	no visible damage					
				DCL	2 x initial limit					
				ΔC/C	within +10/-20% of initial value					
				DF	initial limit					
				ESR	2 x initial limit					
Biased Humidity	Determine after leaving for 500 or 1000 hours at 85±2°C, 85% relative humidity and rated voltage.			Visual examination	no visible damage					
				DCL	3 x initial limit					
				ΔC/C	within +35/-5% of initial value					
				DF	initial limit					
				ESR	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							
	3	+20±2	15	ΔC/C	n/a	+0/-20%	±5%	+20/-0%	+30/-0%	±5%
	4	+85±3/-0	15							
	5	+125±3/-0	15	DF	IL*	1.5 x IL* I	IL*	1.5 x IL*	2 x IL*	IL*
	6	+20±2	15							
Surge Voltage	Test temperature: 125°C±3/0°C Surge voltage: 1.3 x 2/3 rated voltage Charge/Discharge resistance: 1000±100Ω Number of cycles: 1000x Cycle duration: 6min; 30 sec charge, 5min 30 sec discharge			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within +5/-20% of initial value					
				DF	initial limit					
				ESR	1.25 x initial Limit					
Mechanical Shock/Vibration	MIL-STD-202, Method 213, Condition I, 100 G peak MIL-STD-202, Method 204, Condition D, 10 Hz to 2,000 Hz, 20 G peak			Visual examination	no visible damage					
				DCL	initial limit					
				ΔC/C	within ±10% of initial value					
				DF	initial limit					
				ESR	1.25 x initial Limit					

*Initial Limit

For use outside of recommended conditions and special request, please contact manufacturer.