

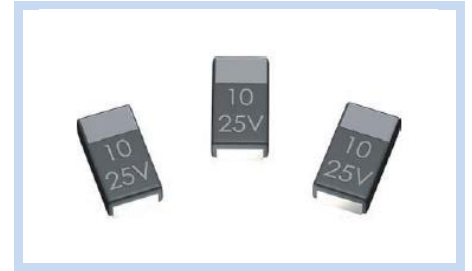
Tantalum Capacitors Low ESR SMD Type

TCL Series

MERITEK

FEATURE

- Operating Temperature: -55°C ~ +125°C
- Compatible with Automatic Pick and Place Equipment.
- Comply with EIA 535BAAC Standard
- Molded Case Available in A, B, C, D, E, P type



PART NUMBERING SYSTEM

TCL 106 M 35 D
(1) (2) (3) (4) (5)



No	item	Digit	Part Description	Series Reference
(1)	Meritek Series	TCL	Chip Tantalum Capacitors	Low ESR SMD Type
(2)	Capacitance	106	106: 10000000pF (10μF)	First 2 digits: Significant Third: Multiplier
(3)	Tolerance	M	M: ±20%	K: ±10%
(4)	Rated Voltage	35	35: 35VDC	2.5~50VDC, 02: 2.5VDC, 06:6.3VDC, 50: 50VDC
(5)	Case Size	D	D: 7343	A:3216, B:3528, C:6032, E:7343, P:2012

SPECIFICATIONS

Item	Characteristic
Operation Temp. Range	-55°C ~ +125°C
Rated Working Voltage	2.5 ~ 50VDC
Capacitance Tolerance	±20%(M), ±10%(K)
Dissipation Factor (tan δ)	See (Temperature Performance) below, Measured at 100 (120) Hz

RELIABILITY

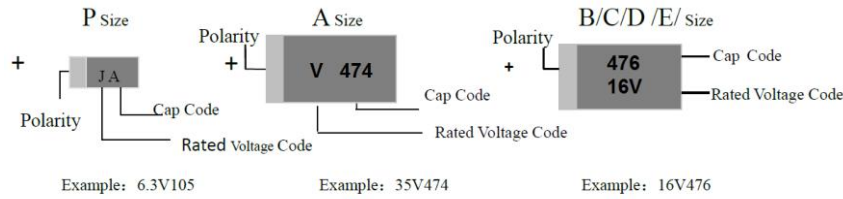
Item	Characteristic			Testing Condition						
Appearance	Complete Marking, Clear, Centered			Visual						
ESR	See Table 2			Measurement Frequency: 100(120)KHz						
Leakage Current	Less than 0.01CV or 0.5μA (whichever is greater)			Pressurize related voltage between two poles (Series connecting 1k current-limiting resistor) Read						
Solderability	Soldering Coverage Rate ≥ 95%			Dip Capacitor into flux for two seconds, then remove excessive amount of flux, dip capacitor into 245±3°C welding slot with 10mm depth for three seconds, withdraw capacitor, clean capacitor with proper amount of solution, use ten times the microscope to observe.						
Temperature Performance	Capacitance (μF)	Capacitance Change (%)			Max D.F (%)				Max DCL(μF)	
		-55°C	+85°C	+125°C	-55°C	+25°C	+85°C	+125°C	+85°C	+125°C
	≤1.0	-10	+10	+12	1.5* (+25°C)	See Table 2 Below	Below 1.5* (+25°C)	10* I ₀	12.5* I ₀	
	1.5 ~ 68									
	100~220									
330~470										
>470										

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PRODUCT MARK AND CODE



Code	e	G	J	A	C	D	E	V	T
Rated Voltage	2.5V	4V	6.3V	10V	16V	20V	25V	35V	50V

Cap (μF)	Cap Code	Cap (μF)	Cap Code	Cap (μF)	Cap Code	Cap (μF)	Cap Code
0.1	<u>A</u>	0.47	<u>S</u>	2.2	J	10	<u>A</u>
0.15	<u>E</u>	0.68	<u>W</u>	3.3	N	15	<u>E</u>
0.22	<u>J</u>	1	A	4.7	S	22	<u>J</u>
0.33	<u>N</u>	1.5	E	6.8	W	33	<u>N</u>

CAPACITANCE RANGE AND CASE CODE (TABLE 1)

VR (≤ +85°C)		2.5	4	6.3	10	16	20	25	35	50
VC (≤ +125°C)		1.7	2.5	4	6.3	10	13	16	23	33
VS (≤ +85°C)		3.2	5	8	13	20	26	32	46	65
VR (≤ +125°C)		2.2	3.4	5	8	12	16	20	26	38
Cap (μF)	Cap Code	Case Size								
0.1	104						P		A	A
0.15	154						P		A	A/B
0.22	224						P		A	A/B
0.33	334						P	A	A	B
0.47	474					P	P	A	A/B	B/C
0.68	684					P	P/A	A	A/B	B/C
1	105				P	P/A	P/A	A/B	A/B	B/C
1.5	155				P/A	P/A	P/A/B	A/B	A/B/C	C/D
2.2	225		P	P/A	P/A/B	P/A/B	A/B	A/B/C	B/C	C/D
3.3	335		P/A	P/A	P/A/B	A/B	A/B/C	A/B/C	B/C	D
4.7	475		P/A	P/A	P/A/B	A/B	A/B/C	B/C	B/C/D	D/E
6.8	685		P/A	P/A/B	P/A/B	A/B/C	B/C	B/C/D	C/D	D/E
10	106		P/A/B	P/A/B	P/A/B/C	A/B/C	B/C/D	C/D	C/D/E	D/E
15	156		A/B	A/B/C	A/B/C	B/C	B/C/D	C/D	D/E	
22	226		A/B/C	A/B/C	A/B/C	B/C/D	B/C/D	C/D	D/E	
33	336	A	A/B/C	A/B/C	A/B/C/D	B/C/D	C/D	D/E	E	
47	476	A	A/B/C	A/B/C/D	B/C/D	C/D	D/E	D/E	E	
68	686	A	B/C/D	B/C/D	B/C/D	C/D	D/E	E		
100	107	B	B/C/D	B/C/D	C/D	D/E	D/E	E		
150	157	B	B/C/D	C/D/E	D/E	D/E	E			
220	227	B/C/D	C/D	C/D/E	D/E	E				
330	337	C/D	D/E	D/E	D/E					
470	477	D	D/E	D/E	E					
680	687	D/E	D/E	E						
1000	108	D/E								

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STANDARD RATINGS (TABLE 2)

Part Number	Rated VDC	Case Size	Cap (µF)	DCL (µA) Max	DF (%) Max	ESR (Ω) Max (100KHz)
2.5V 85°C(1.7V 125°C)						
TCL336*02A	2.5	A	33	0.8	6	1.5
TCL476*02A	2.5	A	47	1.2	6	1.5
TCL686*02A	2.5	A	68	1.7	6	0.7
TCL107*02B	2.5	B	100	2.5	8	0.7
TCL157*02B	2.5	B	150	3.8	8	0.5
TCL227*02B	2.5	B	220	5.5	8	0.5
TCL227*02C	2.5	C	220	5.5	8	0.2
TCL227*02D	2.5	D	220	5.5	8	0.2
TCL337*02C	2.5	C	330	8.3	12	0.2
TCL337*02D	2.5	D	330	8.3	12	0.2
TCL477*02D	2.5	D	470	11.8	12	0.15
TCL687*02D	2.5	D	680	117	14	0.15
TCL687*02E	2.5	E	680	17	14	0.15
TCL108*02D	2.5	D	1000	25	14	0.15
TCL108*02E	2.5	E	1000	25	14	0.15
4.0v 85°C (2.5v 125°C)						
TCL225*04P	4.0	P	2.2	0.5	6	7
TCL335*04P	4.0	P	3.3	0.5	6	3
TCL335*04A	4.0	A	3.3	0.5	6	2.5
TCL475*04P	4.0	P	4.7	0.5	6	3
TCL75*04A	4.0	A	4.7	0.5	6	2
TCL685*04P	4.0	P	6.8	0.5	6	5
TCL685*04A	4.0	A	6.8	0.5	6	2
TCL106*04P	4.0	P	10	0.5	6	3
TCL106*04A	4.0	A	10	0.5	6	1.5
TCL106*04B	4.0	B	10	0.5	6	1
TCL156*04A	4.0	A	15	0.6	6	1.5
TCL156*04B	4.0	B	15	0.6	6	0.7
TCL226*04A	4.0	A	22	0.9	6	0.9
TCL226*04B	4.0	B	22	0.9	6	0.6
TCL226*04C	4.0	C	22	0.9	6	0.5
TCL336*04A	4.0	A	33	1.3	6	3
TCL336*04B	4.0	B	33	1.3	6	0.6
TCL336*04C	4.0	C	33	1.3	6	0.3
TCL476*04A	4.0	A	47	1.9	6	0.8
TCL476*04B	4.0	B	47	1.9	6	0.5
TCL476*04C	4.0	C	47	1.9	6	0.25
TCL686*04B	4.0	B	68	2.7	6	2
TCL686*04C	4.0	C	68	2.7	6	0.25
TCL686*04D	4.0	D	68	2.7	6	0.2
TCL107*04B	4.0	B	100	4	8	0.5
TCL107*04C	4.0	C	100	4	8	0.2
TCL107*04D	4.0	D	100	4	8	0.2
TCL157*04B	4.0	B	150	6	8	0.4

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STANDARD RATINGS (CONTINUE TABLE 2)

Part Number	Rated VDC	Case Size	Cap (µF)	DCL (µA) Max	DF (%) Max	ESR (Ω) Max (100KHz)
Continue 4.0v 85°C (2.5v 125°C)						
TCL157*04C	4.0	C	150	6	8	0.2
TCL157*04D	4.0	D	150	6	8	0.15
TCL227*04C	4.0	C	220	8.8	8	0.2
TCL227*04D	4.0	D	220	8.8	8	0.15
TCL337*04D	4.0	D	330	13.2	12	0.15
TCL337*04E	4.0	E	330	13.2	12	0.15
TCL477*04D	4.0	D	470	18.8	12	0.15
TCL477*04E	4.0	E	470	18.8	12	0.15
TCL687*04D	4.0	D	680	27.2	14	0.2
6.3v 85°C (4.0v 125°C)						
TCL225*06P	6.3	P	2.2	0.5	6	7
TCL225*06A	6.3	A	2.2	0.5	6	2.5
TCL335*06P	6.3	P	3.3	0.5	6	3
TCL335*06A	6.3	A	3.3	0.5	6	2.5
TCL475*06P	6.3	P	4.7	0.5	6	3
TCL475*06A	6.3	A	4.7	0.5	6	2
TCL685*06P	6.3	P	6.8	0.5	6	5
TCL685*06A	6.3	A	6.8	0.5	6	2
TCL685*06B	6.3	B	6.8	0.5	6	1.2
TCL106*06P	6.3	P	10	0.6	6	3
TCL106*06A	6.3	A	10	0.6	6	1.5
TCL106*06B	6.3	B	10	0.6	6	1
TCL156*06A	6.3	A	15	0.9	6	1.5
TCL156*06B	6.3	B	15	0.9	6	0.7
TCL156*06C	6.3	C	15	0.9	6	0.6
TCL226*06A	6.3	A	22	1.4	6	0.9
TCL226*06B	6.3	B	22	1.4	6	0.6
TCL226*06C	6.3	C	22	1.4	6	0.5
TCL336*06A	6.3	A	33	2.1	8	0.8
TCL336*06B	6.3	B	33	2.1	6	0.6
TCL336*06C	6.3	C	33	2.1	6	0.3
TCL476*06A	6.3	A	47	3	8	0.8
TCL476*06B	6.3	B	47	3	6	0.5
TCL476*06C	6.3	C	47	3	6	0.25
TCL476*06D	6.3	D	47	3	6	0.25
TCL686*06B	6.3	B	68	4.3	6	0.5
TCL686*06C	6.3	C	68	4.3	6	0.2
TCL686*06D	6.3	D	68	4.3	6	0.2
TCL107*06B	6.3	B	100	6.3	8	0.5
TCL107*06C	6.3	C	100	6.3	8	0.3
TCL107*06D	6.3	D	100	6.3	8	0.2
TCL157*06C	6.3	C	150	9.5	8	0.2
TCL157*06D	6.3	D	150	9.5	8	0.15
TCL157*06E	6.3	E	150	9.5	8	0.15

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STANDARD RATINGS (CONTINUE TABLE 2)

Part Number	Rated VDC	Case Size	Cap (μ F)	DCL (μ A) Max	DF (%) Max	ESR (Ω) Max (100KHz)
Continue 6.3v 85°C (4.0v 125°C)						
TCL227*06C	6.3	C	220	13.9	8	0.3
TCL227*06D	6.3	D	220	13.9	8	0.15
TCL227*06E	6.3	E	220	13.9	8	0.15
TCL337*06D	6.3	D	330	20.8	12	0.1
TCL337*06E	6.3	E	330	20.8	12	0.1
TCL477*06D	6.3	D	470	29.6	12	0.1
TCL477*06E	6.3	E	470	29.6	12	0.1
TCL687*06E	6.3	E	680	42.8	14	0.1
10v 85°C (6.3v 125°C)						
TCL105*10P	10	P	1	0.5	4	9
TCL155*10P	10	P	1.5	0.5	6	9
TCL155*10A	10	A	1.5	0.5	6	6
TCL225*10P	10	P	2.2	0.5	6	9
TCL225*10A	10	A	2.2	0.5	6	2
TCL225*10B	10	B	2.2	0.5	6	1.5
TCL335*10P	10	P	3.3	0.5	6	7
TCL335*10A	10	A	3.3	0.5	6	4
TCL335*10B	10	B	3.3	0.5	6	2
TCL685*10A	10	A	6.8	0.7	6	1.8
TCL685*10B	10	B	6.8	0.7	6	1.2
TCL106*10P	10	P	10	1	6	2
TCL106*10A	10	A	10	1	6	1.8
TCL106*10B	10	B	10	1	6	0.8
TCL106*10C	10	C	10	1	6	0.8
TCL156*10A	10	A	15	1.5	6	1.5
TCL156*10B	10	B	15	1.5	6	0.7
TCL156*10C	10	C	15	1.5	6	0.5
TCL226*10A	10	A	22	2.2	8	0.9
TCL226*10B	10	B	22	2.2	6	0.7
TCL226*10C	10	C	22	2.2	6	0.3
TCL336*10A	10	A	33	3.3	6	0.7
TCL336*10B	10	B	33	3.3	6	0.5
TCL336*10C	10	C	33	3.3	6	0.3
TCL336*10D	10	D	33	3.3	6	0.25
TCL476*10B	10	B	47	4.7	8	0.5
TCL476*10C	10	C	47	4.7	6	0.3
TCL476*10D	10	D	47	4.7	6	0.2
TCL686*10B	10	B	68	6.8	6	0.6
TCL686*10C	10	C	68	6.8	6	0.3
TCL686*10D	10	D	68	6.8	6	0.2
TCL107*10C	10	C	100	10	8	0.2
TCL107*10D	10	D	100	10	8	0.15
TCL157*10D	10	D	150	15	8	0.15
TCL157*10E	10	E	150	15	8	0.15

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STANDARD RATINGS (CONTINUE TABLE 2)

Part Number	Rated VDC	Case Size	Cap (μ F)	DCL (μ A) Max	DF (%) Max	ESR (Ω) Max (100KHz)
Continue 10v 85°C (6.3v 125°C)						
TCL227*10D	10	D	220	22	8	0.15
TCL227*10E	10	E	220	22	8	0.15
TCL337*10D	10	D	330	33	12	0.15
TCL337*10E	10	E	330	33	12	0.15
TCL477*10E	10	E	470	47	12	0.2
16v 85°C (10v 125°C)						
TCL474*16P	16	P	0.47	0.5	4	9
TCL684*16P	16	P	0.68	0.5	4	9
TCL105*16P	16	P	1	0.5	4	9
TCL105*16A	16	A	1	0.5	4	6
TCL155*16P	16	P	1.5	0.5	6	4
TCL155*16A	16	A	1.5	0.5	6	4
TCL225*16P	16	P	2.2	0.5	6	7
TCL225*16A	16	A	2.2	0.5	6	3
TCL225*16B	16	B	2.2	0.5	6	2
TCL335*16A	16	A	3.3	0.5	6	2
TCL335*16B	16	B	3.3	0.5	6	1.5
TCL475*16A	16	A	4.7	0.8	6	2
TCL475*16B	16	B	4.7	0.8	6	1.5
TCL685*16A	16	A	6.8	1.1	6	1.5
TCL685*16B	16	B	6.8	1.1	6	1.2
TCL685*16C	16	C	6.8	1.1	6	0.8
TCL106*16A	16	A	10	1.6	8	3
TCL106*16B	16	B	10	1.6	6	0.8
TCL106*16C	16	C	10	1.6	6	0.5
TCL156*16B	16	B	15	2.4	6	0.8
TCL156*16C	16	C	15	2.4	6	0.4
TCL226*16B	16	B	22	3.5	8	0.6
TCL226*16C	16	C	22	3.5	6	0.3
TCL226*16D	16	D	22	3.5	6	0.25
TCL336*16C	16	C	33	5.3	6	0.3
TCL336*16D	16	D	33	5.3	6	0.2
TCL476*16C	16	C	47	7.5	6	0.4
TCL476*16D	16	D	47	7.5	6	0.2
TCL686*16C	16	C	68	10.9	6	0.2
TCL686*16D	16	D	68	10.9	6	0.15
TCL107*16D	16	D	100	16	8	0.15
TCL107*16E	16	E	100	16	8	0.15
TCL157*16D	16	D	150	24	8	0.2
TCL157*16E	16	E	150	24	8	0.2
TCL227*16E	16	E	220	35.2	8	0.2
20v 85°C (13v 125°C)						
TCL104*20P	20	P	0.1	0.5	4	9
TCL154*20P	20	P	0.15	0.5	4	9

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STANDARD RATINGS (CONTINUE TABLE 2)

Part Number	Rated VDC	Case Size	Cap (μF)	DCL (μA) Max	DF (%) Max	ESR (Ω) Max (100KHz)
Continue 20v 85°C (13v 125°C)						
TCL224*20P	20	P	0.22	0.5	4	9
TCL334*20P	20	P	0.33	0.5	4	9
TCL474*20P	20	P	0.47	0.5	4	9
TCL684*20P	20	P	0.68	0.5	4	9
TCL684*20A	20	A	0.68	0.5	4	8
TCL105*20P	20	P	1	0.5	4	6
TCL105*20A	20	A	1	0.5	4	3
TCL155*20P	20	P	1.5	0.5	6	5
TCL155*20A	20	A	1.5	0.5	6	4
TCL155*20B	20	B	1.5	0.5	6	3
TCL225*20A	20	A	2.2	0.5	6	3
TCL225*20B	20	B	2.2	0.5	6	1.5
TCL335*20A	20	A	3.3	0.7	6	2.5
TCL335*20B	20	B	3.3	0.7	6	1.2
TCL335*20C	20	C	3.3	0.7	6	0.6
TCL475*20A	20	A	4.7	0.9	6	1.8
TCL475*20B	20	B	4.7	0.9	6	1
TCL475*20C	20	C	4.7	0.9	6	0.6
TCL685*20B	20	B	6.8	1.4	6	1
TCL685*20C	20	C	6.8	1.4	6	0.6
TCL106*20B	20	B	10	2	8	1
TCL106*20C	20	C	10	2	6	0.5
TCL106*20D	20	D	10	2	6	0.3
TCL156*20B	20	B	15	3	6	0.5
TCL156*20C	20	C	15	3	6	0.4
TCL156*20D	20	D	15	3	6	0.3
TCL226*20B	20	B	22	4.4	8	0.4
TCL226*20C	20	C	22	4.4	6	0.4
TCL226*20D	20	D	22	4.4	6	0.3
TCL336*20C	20	C	33	6.6	6	0.3
TCL336*20D	20	D	33	6.6	6	0.2
TCL476*20D	20	D	47	9.4	6	0.2
TCL476*20E	20	E	47	9.4	6	0.2
TCL686*20D	20	D	68	13.6	6	0.2
TCL686*20E	20	E	68	13.6	6	0.2
TCL107*20D	20	D	100	20	8	0.15
TCL107*20E	20	E	100	20	8	0.2
TCL157*20E	20	E	150	30	8	0.3
25v 85°C (16v 125°C)						
TCL334*25A	25	A	0.33	0.5	4	9
TCL474*25A	25	A	0.47	0.5	4	7
TCL684*25A	25	A	0.68	0.5	4	6
TCL105*25A	25	A	1	0.5	4	4
TCL105*25B	25	B	1	0.5	4	2

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STANDARD RATINGS (CONTINUE TABLE 2)

Part Number	Rated VDC	Case Size	Cap (μF)	DCL (μA) Max	DF (%) Max	ESR (Ω) Max (100KHz)
Continue 25v 85°C (16v 125°C)						
TCL155*25A	25	A	1.5	0.5	6	3
TCL155*25B	25	B	1.5	0.5	6	1.5
TCL225*25A	25	A	2.2	0.6	6	2
TCL225*25B	25	B	2.2	0.6	6	0.9
TCL225*25C	25	C	2.2	0.6	6	1.2
TCL335*25A	25	A	3.3	0.8	6	1.5
TCL335*25B	25	B	3.3	0.8	6	1.5
TCL335*25C	25	C	3.3	0.8	6	1.2
TCL475*25B	25	B	4.7	1.2	6	0.7
TCL475*25C	25	C	4.7	1.2	6	0.6
TCL475*25C	25	C	4.7	1.2	6	0.6
TCL685*25B	25	B	6.8	1.7	6	0.7
TCL685*25C	25	C	6.8	1.7	6	0.5
TCL685*25D	25	D	6.8	1.7	6	0.3
TCL106*25C	25	C	10	2.5	6	0.5
TCL106*25D	25	D	10	2.5	6	0.4
TCL156*25C	25	C	15	3.8	6	0.3
TCL156*25D	25	D	15	3.8	6	0.3
TCL226*25C	25	C	22	5.5	6	0.4
TCL226*25D	25	D	22	5.5	6	0.3
TCL336*25D	25	D	33	8.3	6	0.3
TCL336*25E	25	E	33	8.3	6	0.3
TCL476*25D	25	D	47	11.8	6	0.25
TCL476*25E	25	E	47	11.8	6	0.15
TCL686*25E	25	E	68	17	6	0.2
TCL107*25E	25	E	100	25	8	0.25
35v 85°C (23v 125°C)						
TCL104*35A	35	A	0.1	0.5	4	9
TCL154*35A	35	A	0.15	0.5	4	6
TCL224*35A	35	A	0.22	0.5	4	6
TCL334*35A	35	A	0.33	0.5	4	6
TCL474*35A	35	A	0.47	0.5	4	4
TCL474*35B	35	B	0.47	0.5	4	2.5
TCL684*35A	35	A	0.68	0.5	4	6
TCL684*35B	35	B	0.68	0.5	4	2.5
TCL105*35A	35	A	1	0.5	4	3
TCL105*35B	35	B	1	0.5	4	2
TCL155*35A	35	A	1.5	0.5	6	3
TCL155*35B	35	B	1.5	0.5	6	2.5
TCL155*35C	35	C	1.5	0.5	6	2
TCL225*35B	35	B	2.2	0.8	6	2
TCL225*35C	35	C	2.2	0.8	6	1
TCL335*35B	35	B	3.3	1.2	6	1
TCL335*35C	35	C	3.3	1.2	6	0.7

Tantalum Capacitors Low ESR SMD Type

TCL Series

MERITEK

STANDARD RATINGS (CONTINUE TABLE 2)

Part Number	Rated VDC	Case Size	Cap (μF)	DCL (μA) Max	DF (%) Max	ESR (Ω) Max (100KHz)
Continue 35v 85°C (23v 125°C)						
TCL475*35B	35	B	4.7	1.6	6	0.1
TCL475*35C	35	C	4.7	1.6	6	0.6
TCL475*35D	35	D	4.7	1.6	6	0.7
TCL685*35C	35	C	6.8	2.4	6	0.5
TCL685*35D	35	D	6.8	2.4	6	0.5
TCL106*35C	35	C	10	3.5	6	1.2
TCL106*35D	35	D	10	3.5	6	0.3
TCL106*35E	35	E	10	3.5	6	0.2
TCL156*35D	35	D	15	5.3	6	0.3
TCL156*35E	35	E	15	5.3	6	0.3
TCL226*35D	35	D	22	7.7	6	0.4
TCL226*35E	35	E	22	7.7	6	0.3
TCL336*35E	35	E	33	11.6	6	0.3
TCL476*35E	35	E	47	16.5	6	0.3
50v 85°C (33v 125°C)						
TCL104*50A	50	A	0.1	0.5	4	9
TCL154*50A	50	A	0.15	0.5	4	9
TCL154*50B	50	B	0.15	0.5	4	9
TCL224*50A	50	A	0.22	0.5	4	7
TCL224*50B	50	B	0.22	0.5	4	7
TCL334*50B	50	B	0.33	0.5	4	2.5
TCL474*50B	50	B	0.47	0.5	4	2
TCL474*50C	50	C	0.47	0.5	4	1.8
TCL684*50B	50	B	0.68	0.5	4	3
TCL684*50C	50	C	0.68	0.5	4	1.6
TCL105*50B	50	B	1	0.5	4	4
TCL105*50C	50	C	1	0.5	4	1.6
TCL155*50C	50	C	1.5	0.8	6	2
TCL155*50D	50	D	1.5	0.8	6	1
TCL225*50C	50	C	2.2	1.1	6	1.5
TCL225*50D	50	D	2.2	1.1	6	1.2
TCL335*50D	50	D	3.3	1.7	6	0.8
TCL475*50D	50	D	4.7	2.4	6	0.7
TCL475*50E	50	E	4.7	2.4	6	0.5
TCL685*50D	50	D	6.8	3.4	6	0.6
TCL685*50E	50	E	6.8	3.4	6	0.5
TCL106*50D	50	D	10	5	6	0.5
TCL106*50E	50	E	10	5	6	0.5

NOTE:

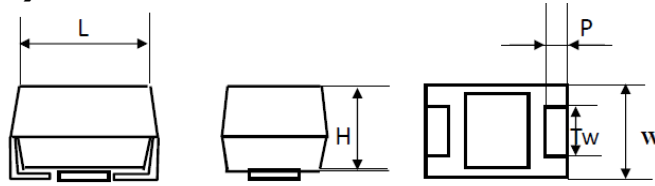
1. Indicates capacitance change of ±15% at 125°C
2. Indicates capacitance change of ± 20% at 125°C, (M-Class Only)
3. "*" Indicates the tolerance: K: ±10%, M: ±20%
4. All technical data measured at 25°C.
5. Capacitance and loss test conditions: U=1.7~2.2V, U partial = 0 ~ 1V (RMS), the measurement frequency: 100(120) Hz
6. The leakage current should be measured after 5 minutes application of rated voltage should ±125°C with voltage derating.

Tantalum Capacitors Low ESR SMD Type

TCL Series

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DIMENSIONS (Unit: mm)

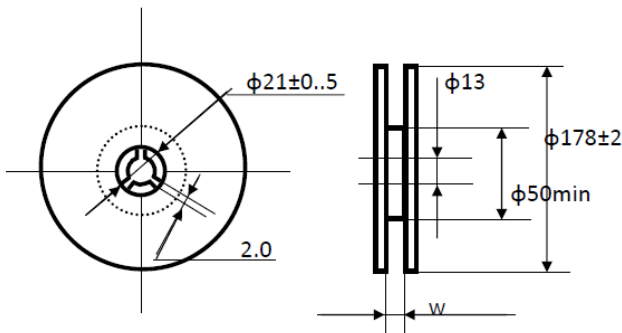


CASE	EIA SIZE	L	W	H	P	T _w
P	2012	2.0±0.2	1.2±0.2	1.2±0.2	0.5±0.3	1.2±0.1
A	3216	3.2±0.2	1.6±0.2	1.6±0.2	0.8±0.3	1.2±0.1
B	3528	3.5±0.2	0.8±0.2	1.9±0.2	0.8±0.3	2.2±0.1
C	6032	6.0±0.3	3.2±0.3	2.5±0.3	1.3±0.3	2.2±0.1
D	7343	7.3±0.3	4.3±0.3	2.8±0.3	1.0±0.3	2.0±0.1
E	7343	7.3±0.3	4.0±0.3	4.0±0.3	1.3±0.3	2.4±0.1

Unit: mm

PACKAGING DIMENSION

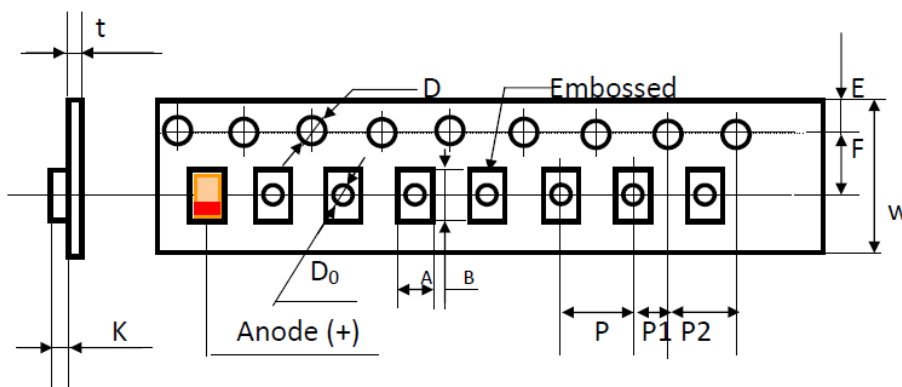
A. REEL DIMENSION



Case	W	QTY / Reel
P	8.4±1.5	3000
A, B	8.4±1.5	2000
C, D	12.4±2	500
E	12.4±2	400

Unit: mm

B. CARRIER TAPE DIMENSION



Case	W±0.3	F±0.1	E±0.1	P±0.1	P1±0.1	P2±0.1	D±0.1	D ₀ MIN	t±0.3	A±0.2	B±0.2	K±0.2
P	8	3.5	1.75	4	2	4	Ø1.5	Ø1.0	0.2	1.4	2.2	1.2
A	8	3.5	1.75	4	2	4	Ø1.5	Ø1.0	0.2	1.9	3.5	1.9
B	8	3.5	1.75	4	2	4	Ø1.5	Ø1.0	0.3	3.3	3.8	2.1
C	12	5.5	1.75	8	2	4	Ø1.5	Ø1.5	0.3	3.7	6.4	3.0
D	12	5.5	1.75	8	2	4	Ø1.5	Ø1.5	0.3	4.8	7.7	3.3
E	12	5.5	1.75	8	2	4	Ø1.5	Ø1.5	0.3	4.8	7.7	4.1

Unit: mm

APPLICATION NOTES

1. Power Dissipation

The actual power dissipated in capacitor is calculated using formula1.

formula1: $P=I^2 \times ESR$

Where:

P: power dissipation (Watts)

I: ripple current (A rms)

ESR: Equivalent Series Resistance (Ω)

Table:3

Case Code	Max. Power Dissipation Watts, 100KHz, at 25°C
P	0.025
A	0.075
B	0.085
C	0.110
D	0.150
E	0.150

2. Ripple Current

Using P Max from Table:3, maximum ripple current (A rms) may be determined as follow: formula2: $I=\sqrt{P/(ESR \times K \times F)}$

where:

K: Temperature Derating Factor (Table: 4),

F: Frequency Derating Factor (Table: 5),

ESR: Refer to Ratings

Table: 4 (Temperature Derating Factor)

Temperature	Temperature Derating Factor, K
25°C	1
85°C	0.9
125°C	0.4

Ripple voltage E is Calculated using formula3: formula3: $E=Z \times I$

Where:

E: Ripple Voltage,

Z: Impedance at specified frequency

Table: 5 (Frequency Derating Factor)

Type	10KHz	100KHz	500KHz	1MHz
MnO2	0.80	1.00	1.15	1.20
Polymer	0.75	1.00	1.10	1.30

3. Ripple Voltage

The ripple voltage that may be applied is limited by three criteria

a. The power dissipated in the ESR of the capacitor must not exceed the appropriate value specified in Table:3

b. The sum of DC voltage and peak value of the ripple voltage must no exceed the rated voltage.

c. The negative peak value of the ripple voltage must not exceed the permissible reverse voltage value specified in the follow section: Reverse Voltage

4. Reverse Voltage

Because the solid tantalum capacitor is of polar type, do not apply a reverse voltage to it. If reverse voltage cannot be avoided, it must be applied for a short time and must not exceed the following values:

a. 25°C, 10% max. of rated voltage or 1VDC, whichever is smaller.

b. 85°C, 5% max. of rated voltage or 0.5VDC, whichever is smaller.

c. 125°C, 1% max. of rated voltage or 0.1VDC, whichever is smaller.

d. The capacitors should not be operated continuously in reverse mode, even within these limits.

APPLICATION NOTES (CONTINUE)

5. Applied voltage

- For general application, apply 70% or less of the rated voltage to the capacitor.
- When the capacitor is used in power line or a low-impedance circuit, keep the applied voltage within 30% (50%max) of the rated voltage to avoid the adverse influence of inrush current.
- When using a chip-type capacitor at a temperature of 85°C or higher, calculate reduced voltage U_T from the following expression. Note, however, that the ambient temperature must not exceed 125°C.

$$U_T = V_0(U_R - U_C)(T - 85)/40$$

Where: U_R = rated voltage (V), U_C = derated voltage at 125°C, T: ambient temperature (°C)

6. Current (Series Resistance)

Reliability of tantalum capacitor is increased by inserting a series resistance of at least 3Ω/V into circuits where current flow is momentary (Switching circuit, charge/discharge circuits, etc) If the capacitor is in a low-impedance circuit, the voltage applied to the capacitor should be less than 1/2 to 1/3 or DC rated voltage.

7. In the Case of Short-Circuit

Manganese oxide tantalum capacitor (conventional tantalum capacitor) is heated and may generate fire and be burned depending upon its excess current, time and other factors. When designing the circuit, provide as much margin as possible to maintain capacitor reliability.

8. Product Soldering

SMT tantalum capacitor is suitable for reflow soldering, not suitable for wave flow soldering and hand soldering. Reflow soldering temperature must be $\leq 260^\circ\text{C}$ for 5 seconds < seconds. If hand soldering is necessary, soldering iron power should be $\leq 25\text{W}$, temperature < 300°C, soldering time < 3 seconds, it is prohibited to contact soldering iron top with product leads and main product, use melted tin solder to contact leaded soldering.