

# Chip Solid MnO<sub>2</sub> Tantalum Capacitors – TC2 Series

Operating Temp.: -55°C~+125°C



## FEATURES

- Meets or exceeds EIA-535BAAC standard
- Self-healing capability, high reliability
- Excellent stability of capacitance during operating temperature range
- High volumetric efficiency
- 100% surge current test

## APPLICATIONS

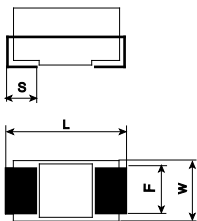
- Communication
- Consumer electronics
- Instruments
- Medical electronics

## PRODUCT IDENTIFICATION

<u>TC</u>	<u>212</u>	<u>B</u>	<u>105</u>	<u>M</u>	<u>035</u>	<u>B</u>																																			
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## SHAPE AND DIMENSIONS

Unit: mm [inch]



Case	EIA	L	W	H	F	S
A	3216-18	3.20±0.20 [.126±.008]	1.60±0.20 [.063±.008]	1.60±0.20 [.063±.008]	1.20±0.10 [.040±.004]	0.80±0.30 [.031±.012]
B	3528-21	3.50±0.20 [.138±.008]	2.80±0.20 [.110±.008]	1.90±0.20 [.075±.008]	2.20±0.10 [.087±.004]	0.80±0.30 [.030±.012]
C	6032-28	6.00±0.30 [.236±.012]	3.20±0.30 [.126±.012]	2.50±0.30 [.098±.012]	2.20±0.10 [.087±.004]	1.30±0.30 [.051±.012]
D	7343-31	7.30±0.30 [.287±.012]	4.30±0.30 [.169±.012]	2.80±0.30 [.110±.012]	2.40±0.10 [.094±.004]	1.30±0.30 [.051±.012]
E	7343-43	7.30±0.30 [.287±.012]	4.30±0.30 [.169±.012]	4.00±0.30 [.161±.012]	2.40±0.10 [.094±.004]	1.30±0.30 [.051±.012]

## TECHNICAL SPECIFICATION

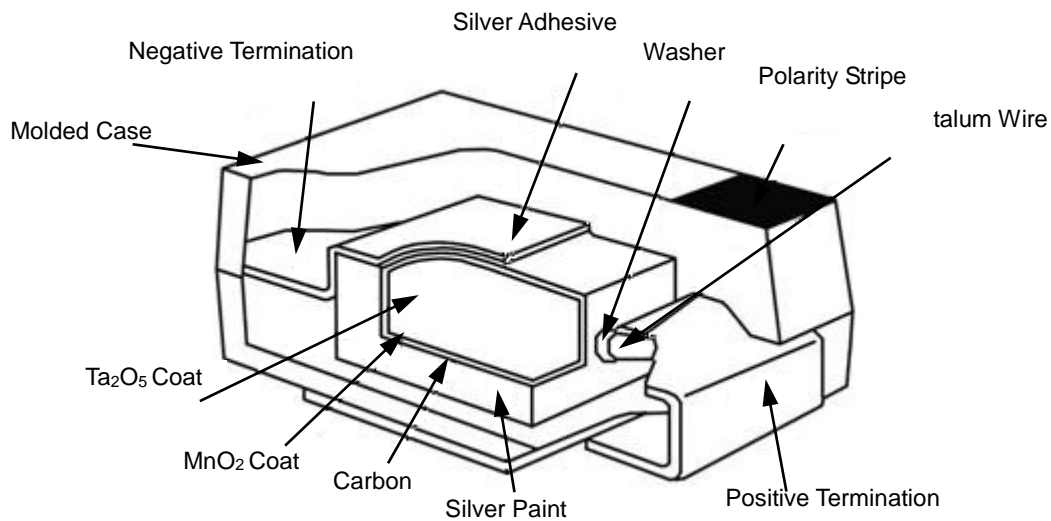
Item	SPEC									Test Condition
Operating Temp	-55°C~+125°C									
C <sub>R</sub> Range	0.10μF~680μF									25°C, 120Hz
C <sub>R</sub> Tolerance	±10% or ±20%									25°C, 120Hz
Rated Voltage (V <sub>R</sub> )	2.5V	4V	6.3V	10V	16V	20V	25V	35V	50V	85°C
Category Voltage (V <sub>C</sub> )	1.6V	2.5V	4V	6.3V	10V	13V	16V	20V	32V	125°C
Surge Voltage (V <sub>S</sub> )	3.3V	5.2V	8V	13V	20V	26V	32V	46V	65V	85°C
Surge Voltage (V <sub>s</sub> )	2.2V	3.4V	5V	8V	13V	16V	20V	28V	40V	125°C

## STANDARD C-V VALUE BY CASE CODE

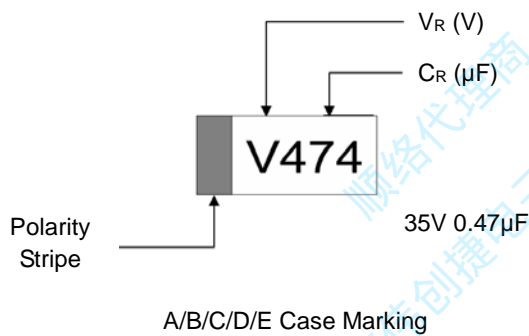
Rated Voltage (VR)	2.5	4	6.3	10	16	20	25	35	50	
Voltage Code	e	G	J	A	C	D	E	V	T	
CR (μF)	C Code	Case Code								
0.15	154								B	
0.22	224								B/A	
0.33	334						A	A	B/A	
0.47	474						A	B/A	C/B/A	
0.68	684					A	A	B/A	C/B/A	
1.0	105		A	A	A	A	B/A	B/A	C/B	
1.5	155		A	A	A	B/A	B/A	C/B	C/B	
2.2	225	A	A	A	B/A	B/A	C/B/A	C/B/A	D/C/B	
3.3	335	A	A	A	B/A	B/A	C/B/A	C/B	D/C/B	
4.7	475	A	A	B/A	C/B/A	C/B/A	C/B/A	D/C/B	D	
6.8	685	A	B/A	B/A	C/B/A	D/C/B/A	D/C/B	D/C	D	
10	106	A	B/A	B/A	C/B/A	C/B/A	D/C/B	D/C/B	E/D/C	
15	156	B/A	B/A	B/A	C/B/A	C/B	D/C	D/C/B	E/D	
22	226	A	B/A	B/A	C/B/A	D/C/B/A	D/C/B	D/C	E/D	
33	336	A	C/B/A	C/B/A	D/C/B/A	D/C/B	D/C	E/D	E	
47	476	A	C/B/A	C/B/A	D/C/B/A	D/C/B	E/D/C	E/D	E	
68	686	B/A	D/C/B	D/C/B	D/C/B	D	E/D	E		
100	107	B/A	D/C/B/A	D/C/B/A	D/C/B	D/C	E/D	E		
150	157	B	D/C/B	D/C/B	E/D/C	E/D	E			
220	227	B	D/C/B	E/D/C	E/D	E/D				
330	337		E/D/C/B	E/D	E/D	E				
470	477		E	E/D	E					

※: The first case code is standard product and the others are expansion products.

## CONSTRUCTION



## MARKING



### Rated Voltage Code

Rated Voltage( V <sub>R</sub> )	2.5	4	6.3	10	16	20	25	35	50
Code	e	G	J	A	C	D	E	V	T

### Capacitance Code

Capacitance (µF)	0.1	0.15	0.22	0.33	0.47	0.68	1.0	1.5	2.2	3.3	4.7	6.8
Code (A/B/C/D/E Case)	104	154	224	334	474	684	105	155	225	335	475	685
Capacitance (µF)	10	15	22	33	47	68	100	150	220	330	470	680
Code (A/B/C/D/E Case)	106	156	226	336	476	686	107	157	227	337	477	687

# SPECIFICATIONS

## TC211 TYPE

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
<b>2.5V, +85°C (1.6V @ +125°C)</b>					
10.0	A	TC211A106◎002	0.5	6.0	5.0
15.0	A	TC211A156◎002	0.5	6.0	6.0
15.0	B	TC211B156◎002	0.5	6.0	4.0
22.0	A	TC211A226◎002	0.6	6.0	4.0
33.0	A	TC211A336◎002	0.8	6.0	4.0
47.0	A	TC211A476◎002	1.2	10.0	4.0
68.0	A	TC211A686◎002	1.7	10.0	3.0
68.0	B	TC211B686◎002	1.7	6.0	2.0
100.0	A	TC211A107◎002	2.5	20.0	2.5
100.0	B	TC211B107◎002	2.5	8.0	1.5
150.0	B	TC211B157◎002	3.8	10.0	2.0
220.0	B	TC211B227◎002	5.5	18.0	2.0
<b>4V, +85°C (2.5V @ +125°C)</b>					
2.2	A	TC211A225◎004	0.5	6.0	8.0
3.3	A	TC211A335◎004	0.5	6.0	8.0
4.7	A	TC211A475◎004	0.5	6.0	8.0
6.8	A	TC211A685◎004	0.5	6.0	6.0
10.0	A	TC211A106◎004	0.5	6.0	6.0
10.0	B	TC211B106◎004	0.5	6.0	3.5
15.0	A	TC211A156◎004	0.6	6.0	4.0
15.0	B	TC211B156◎004	0.6	6.0	3.5
22.0	A	TC211A226◎004	0.9	6.0	4.0
22.0	B	TC211B226◎004	0.9	6.0	3.5
33.0	A	TC211A336◎004	1.3	6.0	4.0
33.0	B	TC211B336◎004	1.3	6.0	3.5
33.0	C	TC211C336◎004	1.3	6.0	1.8
47.0	A	TC211A476◎004	1.9	6.0	3.0
47.0	B	TC211B476◎004	1.9	6.0	3.0
47.0	C	TC211C476◎004	1.9	6.0	1.8
68.0	B	TC211B686◎004	2.7	6.0	3.5
68.0	C	TC211C686◎004	2.7	6.0	1.6
68.0	D	TC211D686◎004	2.7	6.0	0.8
100.0	A	TC211A107◎004	4.0	18.0	5.0
100.0	B	TC211B107◎004	4.0	8.0	2.0
100.0	C	TC211C107◎004	4.0	8.0	1.3
100.0	D	TC211D107◎004	4.0	8.0	0.8
150.0	B	TC211B157◎004	6.0	15.0	2.0
150.0	C	TC211C157◎004	6.0	8.0	1.2
150.0	D	TC211D157◎004	6.0	8.0	0.8
220.0	B	TC211B227◎004	8.8	18.0	0.5
220.0	C	TC211C227◎004	8.8	8.0	1.0
220.0	D	TC211D227◎004	8.8	8.0	0.8
330.0	B	TC211B337◎004	13.2	18.0	1.2
330.0	C	TC211C337◎004	13.2	8.0	1.2
330.0	D	TC211D337◎004	13.2	8.0	0.7
330.0	E	TC211E337◎004	13.2	8.0	0.8
470.0	E	TC211E477◎004	18.8	8.0	0.8
680.0	E	TC211E687◎004	27.2	8.0	0.5
<b>6.3V, +85°C (4.0V @ +125°C)</b>					
1.0	A	TC211A105◎006	0.5	6.0	14.0

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
1.5	A	TC211A155◎006□	0.5	6.0	8.0
2.2	A	TC211A225◎006□	0.5	6.0	8.0
3.3	A	TC211A335◎006□	0.5	6.0	8.0
4.7	A	TC211A475◎006□	0.5	6.0	6.0
6.8	A	TC211A685◎006□	0.5	6.0	6.0
6.8	B	TC211B685◎006□	0.5	6.0	3.5
10.0	A	TC211A106◎006□	0.6	6.0	4.0
10.0	B	TC211B106◎006□	0.6	6.0	3.5
15.0	A	TC211A156◎006□	0.9	6.0	4.0
15.0	B	TC211B156◎006□	0.9	6.0	3.5
22.0	A	TC211A226◎006□	1.3	6.0	4.0
22.0	B	TC211B226◎006□	1.3	6.0	3.5
33.0	A	TC211A336◎006□	2.1	8.0	4.5
33.0	B	TC211B336◎006□	2.1	6.0	3.0
33.0	C	TC211C336◎006□	2.1	6.0	1.8
47.0	A	TC211A476◎006□	3.0	8.0	3.5
47.0	B	TC211B476◎006□	3.0	6.0	3.0
47.0	C	TC211C476◎006□	3.0	6.0	1.6
68.0	B	TC211B686◎006□	4.3	10.0	1.2
68.0	C	TC211C686◎006□	4.3	6.0	1.2
68.0	D	TC211D686◎006□	4.3	6.0	0.8
100.0	A	TC211A107◎006□	6.3	20.0	4.0
100.0	B	TC211B107◎006□	6.3	10.0	3.0
100.0	C	TC211C107◎006□	6.3	8.0	1.2
100.0	D	TC211D107◎006□	6.3	8.0	0.8
150.0	B	TC211B157◎006□	9.5	15.0	1.0
150.0	C	TC211C157◎006□	9.5	8.0	1.2
150.0	D	TC211D157◎006□	9.5	8.0	0.8
220.0	B	TC211B227◎006Y	39.9	18.0	1.0
220.0	C	TC211C227◎006□	13.9	8.0	1.2
220.0	D	TC211D227◎006□	13.9	8.0	0.7
220.0	E	TC211E227◎006□	13.9	8.0	0.5
330.0	D	TC211D337◎006□	20.8	8.0	0.5
330.0	E	TC211E337◎006□	20.8	8.0	0.5
470.0	D	TC211D477◎006□	29.6	12.0	0.4
470.0	E	TC211E477◎006□	29.6	10.0	0.5
<b>10V, +85°C (6.3V @ +125°C)</b>					
1.0	A	TC211A105◎010□	0.5	4.0	13.0
1.5	A	TC211A155◎010□	0.5	6.0	8.0
2.2	A	TC211A225◎010□	0.5	6.0	8.0
3.3	A	TC211A335◎010□	0.5	6.0	6.0
4.7	A	TC211A475◎010□	0.5	6.0	6.0
4.7	B	TC211B475◎010□	0.5	6.0	3.5
6.8	A	TC211A685◎010□	0.7	6.0	6.0
6.8	B	TC211B685◎010□	0.7	6.0	3.5
10.0	A	TC211A106◎010□	1.0	6.0	4.0
10.0	B	TC211B106◎010□	1.0	6.0	3.5
10.0	C	TC211C106◎010□	1.0	6.0	1.8
15.0	A	TC211A156◎010□	1.5	6.0	6.0
15.0	B	TC211B156◎010□	1.5	6.0	3.5
15.0	C	TC211C156◎010□	1.5	6.0	1.8

# SPECIFICATIONS

## TC211 TYPE

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.	Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
22.0	A	TC211A226◎010□	2.2	8.0	4.0	47.0	C	TC211C476◎016□	7.5	6.0	1.2
22.0	B	TC211B226◎010□	2.2	6.0	3.0	47.0	D	TC211D476◎016□	7.5	6.0	0.8
22.0	C	TC211C226◎010□	2.2	6.0	1.8	68.0	D	TC211D686◎016□	10.8	6.0	0.8
33.0	A	TC211A336◎010□	3.3	15.0	6.0	100.0	C	TC211C107◎016□	16.0	10.0	1.0
33.0	B	TC211B336◎010□	3.3	6.0	3.5	100.0	D	TC211D107◎016□	16.0	8.0	0.7
33.0	C	TC211C336◎010□	3.3	6.0	1.6	150.0	D	TC211D157◎016□	24.0	12.0	0.7
33.0	D	TC211D336◎010□	3.3	6.0	0.8	150.0	E	TC211E157◎016□	24.0	8.0	0.5
47.0	A	TC211A476◎010□	4.7	15.0	4.0	220.0	D	TC211D227◎016□	35.2	15.0	0.9
47.0	B	TC211B476◎010□	4.7	6.0	1.0	220.0	E	TC211E227◎016□	35.2	10.0	0.5
47.0	C	TC211C476◎010□	4.7	6.0	1.2	330.0	E	TC211E337◎016□	52.8	10.0	0.5
47.0	D	TC211D476◎010□	4.7	6.0	0.8	20V, +85°C (13V @ +125°C)					
68.0	B	TC211B686◎010□	6.8	10.0	3.0	0.68	A	TC211A684◎020□	0.5	4.0	12.0
68.0	C	TC211C686◎010□	6.8	6.0	1.2	1.0	A	TC211A105◎020□	0.5	4.0	10.0
68.0	D	TC211D686◎010□	6.8	6.0	0.8	1.5	A	TC211A155◎020□	0.5	6.0	8.0
100.0	B	TC211B107◎010□	10.0	15.0	1.5	1.5	B	TC211B155◎020□	0.5	6.0	5.0
100.0	C	TC211C107◎010□	10.0	8.0	1.2	2.2	A	TC211A225◎020□	0.5	6.0	7.0
100.0	D	TC211D107◎010□	10.0	8.0	0.7	2.2	B	TC211B225◎020□	0.5	6.0	3.5
150.0	C	TC211C157◎010□	15.0	10.0	0.9	3.3	A	TC211A335◎020□	0.7	6.0	7.0
150.0	D	TC211D157◎010□	15.0	8.0	0.7	3.3	B	TC211B335◎020□	0.7	6.0	3.5
150.0	E	TC211E157◎010□	15.0	8.0	0.5	4.7	A	TC211A475◎020□	0.9	6.0	4.0
220.0	D	TC211D227◎010□	22.0	8.0	0.5	4.7	B	TC211B475◎020□	0.9	6.0	3.5
220.0	E	TC211E227◎010□	22.0	8.0	0.5	4.7	C	TC211C475◎020□	0.9	6.0	2.4
330.0	D	TC211D337◎010□	33.0	10.0	0.5	6.8	A	TC211A685◎020□	1.4	8.0	6.0
330.0	E	TC211E337◎010□	33.0	10.0	0.5	6.8	B	TC211B685◎020□	1.4	6.0	3.5
470.0	E	TC211E477◎010□	47.0	10.0	0.5	6.8	C	TC211C685◎020□	1.4	6.0	2.0
16V, +85°C (10V @ +125°C)						6.8	D	TC211D685◎020□	1.4	6.0	1.9
1.0	A	TC211A105◎016□	0.5	4.0	10.0	10.0	B	TC211B106◎020□	2.0	6.0	3.0
1.5	A	TC211A155◎016□	0.5	6.0	8.0	10.0	C	TC211C106◎020□	2.0	6.0	1.8
2.2	A	TC211A225◎016□	0.5	6.0	6.0	10.0	D	TC211D106◎020□	2.0	6.0	1.0
2.2	B	TC211B225◎016□	0.5	6.0	4.0	15.0	C	TC211C156◎020□	3.0	6.0	1.7
3.3	A	TC211A335◎016□	0.52	6.0	6.0	15.0	D	TC211D156◎020□	3.0	6.0	1.0
3.3	B	TC211B335◎016□	0.5	6.0	3.5	22.0	B	TC211B226◎020□	4.4	8.0	4.0
4.7	A	TC211A475◎016□	0.8	6.0	6.0	22.0	C	TC211C226◎020□	4.4	6.0	1.2
4.7	B	TC211B475◎016□	0.8	6.0	3.5	22.0	D	TC211D226◎020□	4.4	6.0	0.8
4.7	C	TC211C475◎016□	0.8	6.0	2.4	33.0	C	TC211C336◎020□	6.6	6.0	1.2
6.8	A	TC211A685◎016□	1.1	6.0	7.0	33.0	D	TC211D336◎020□	6.6	6.0	0.8
6.8	B	TC211B685◎016□	1.1	6.0	3.5	47.0	C	TC211C476◎020□	9.4	10.0	1.0
6.8	C	TC211C685◎016□	1.1	6.0	2.0	47.0	D	TC211D476◎020□	9.4	6.0	0.8
10.0	A	TC211A106◎016□	1.6	8.0	7.0	47.0	E	TC211E476◎020□	9.4	6.0	0.8
10.0	B	TC211B106◎016□	1.6	6.0	2.8	68.0	D	TC211D686◎020□	13.6	6.0	0.8
10.0	C	TC211C106◎016□	1.6	6.0	1.8	68.0	E	TC211E686◎020□	13.6	6.0	0.8
15.0	B	TC211B156◎016□	2.4	6.0	3.0	100.0	D	TC211D107◎020□	20.0	8.0	0.6
15.0	C	TC211C156◎016□	2.4	6.0	1.8	100.0	E	TC211E107◎020□	20.0	8.0	0.5
22.0	A	TC211A226◎016□	3.5	15.0	4.0	150.0	E	TC211E157◎020□	30.0	8.0	0.5
22.0	B	TC211B226◎016□	3.5	8.0	2.2	25V, +85°C (16V @ +125°C)					
22.0	C	TC211C226◎016□	3.5	6.0	1.6	0.33	A	TC211A334◎025□	0.5	4.0	15.0
22.0	D	TC211D226◎016□	3.5	6.0	0.8	0.47	A	TC211A474◎025□	0.5	4.0	14.0
33.0	B	TC211B336◎016□	5.3	8.0	2.0	0.68	A	TC211A684◎025□	0.5	4.0	10.0
33.0	C	TC211C336◎016□	5.3	6.0	1.2	1.0	A	TC211A105◎025□	0.5	4.0	8.0
33.0	D	TC211D336◎016□	5.3	6.0	0.8	1.0	B	TC211B105◎025□	0.5	4.0	5.0
47.0	B	TC211B476◎016□	7.5	18.0	1.0	1.5	A	TC211A155◎025□	0.5	6.0	10.0

# SPECIFICATIONS

## TC211 TYPE

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
1.5	B	TC211B155◎025□	0.5	6.0	5.0
2.2	A	TC211A225◎025□	0.6	6.0	6.0
2.2	B	TC211B225◎025□	0.6	6.0	4.5
2.2	C	TC211C225◎025□	0.6	6.0	3.5
3.3	A	TC211A335◎025□	0.8	6.0	7.0
3.3	B	TC211B335◎025□	0.8	6.0	3.5
3.3	C	TC211C335◎025□	0.8	6.0	2.5
4.7	A	TC211A475◎025□	1.2	8.0	6.0
4.7	B	TC211B475◎025□	1.2	6.0	2.0
4.7	C	TC211C475◎025□	1.2	6.0	2.4
6.8	B	TC211B685◎025□	1.7	6.0	3.0
6.8	C	TC211C685◎025□	1.7	6.0	1.9
6.8	D	TC211D685◎025□	1.7	6.0	1.2
10.0	B	TC211B106◎025□	2.5	6.0	3.0
10.0	C	TC211C106◎025□	2.5	6.0	1.5
10.0	D	TC211D106◎025□	2.5	6.0	1.0
15.0	B	TC211B156◎025□	3.8	8.0	4.0
15.0	C	TC211C156◎025□	3.8	6.0	1.5
15.0	D	TC211D156◎025□	3.8	6.0	1.0
22.0	C	TC211C226◎025□	5.5	6.0	1.4
22.0	D	TC211D226◎025□	5.5	6.0	0.8
33.0	D	TC211D336◎025□	8.3	6.0	0.8
33.0	E	TC211E336◎025□	8.3	6.0	0.7
47.0	D	TC211D476◎025□	11.7	6.0	0.8
47.0	E	TC211E476◎025□	11.7	6.0	0.7
68.0	E	TC211E686◎025□	17.0	6.0	0.7
100.0	E	TC211E107◎025□	25.0	10.0	1.2
35V, +85°C (20V @ +125°C)					
0.33	A	TC211A334◎035□	0.5	4.0	15.0
0.47	A	TC211A474◎035□	0.5	4.0	14.0
0.47	B	TC211B474◎035□	0.5	4.0	8.0
0.68	A	TC211A684◎035□	0.5	4.0	10.0
0.68	B	TC211B684◎035□	0.5	4.0	6.5
1.0	A	TC211A105◎035□	0.5	4.0	10.0
1.0	B	TC211B105◎035□	0.5	4.0	5.0
1.5	B	TC211B155◎035□	0.5	6.0	5.0
1.5	C	TC211C155◎035□	0.5	6.0	4.5
2.2	A	TC211A225◎035□	0.8	6.0	6.0
2.2	B	TC211B225◎035□	0.8	6.0	4.0
2.2	C	TC211C225◎035□	0.8	6.0	3.5
3.3	B	TC211B335◎035□	1.2	6.0	3.5
3.3	C	TC211C335◎035□	1.2	6.0	2.5

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
4.7	B	TC211B475◎035□	1.6	6.0	3.0
4.7	C	TC211C475◎035□	1.6	6.0	2.5
4.7	D	TC211D475◎035□	1.6	6.0	1.5
6.8	C	TC211C685◎035□	2.4	6.0	2.0
6.8	D	TC211D685◎035□	2.4	6.0	1.5
10.0	C	TC211C106◎035□	3.5	6.0	2.0
10.0	D	TC211D106◎035□	3.5	6.0	1.0
10.0	E	TC211E106◎035□	3.5	6.0	1.0
15.0	D	TC211D156◎035□	5.3	6.0	1.0
15.0	E	TC211E156◎035□	5.3	6.0	0.9
22.0	D	TC211D226◎035□	7.7	6.0	0.8
22.0	E	TC211E226◎035□	7.7	6.0	0.7
33.0	E	TC211E336◎035□	11.0	6.0	0.6
47.0	E	TC211E476◎035□	16.5	8.0	0.6
50V, +85°C (32V @ +125°C)					
0.15	B	TC211B154◎050□	0.5	4.0	16.0
0.22	A	TC211A224◎050□	0.5	4.0	18.0
0.22	B	TC211B224◎050□	0.5	4.0	14.0
0.33	A	TC211A334◎050□	0.5	4.0	15.0
0.33	B	TC211B334◎050□	0.5	4.0	10.0
0.47	A	TC211A474◎050□	0.5	4.0	12.0
0.47	B	TC211B474◎050□	0.5	4.0	9.0
0.47	C	TC211C474◎050□	0.5	4.0	8.0
0.68	A	TC211A684◎050□	0.5	4.0	10.0
0.68	B	TC211B684◎050□	0.5	4.0	8.0
0.68	C	TC211C684◎050□	0.5	4.0	7.0
1.0	B	TC211B105◎050□	0.5	6.0	6.0
1.0	C	TC211C105◎050□	0.5	4.0	5.5
1.5	B	TC211B155◎050□	0.8	6.0	4.5
1.5	C	TC211C155◎050□	0.8	6.0	3.5
2.2	B	TC211B225◎050□	1.1	6.0	2.0
2.2	C	TC211C225◎050□	1.1	6.0	3.5
2.2	D	TC211D225◎050□	1.1	6.0	2.5
3.3	B	TC211B335◎050□	1.7	6.0	5.0
3.3	C	TC211C335◎050□	1.7	6.0	3.0
3.3	D	TC211D335◎050□	1.7	6.0	2.0
4.7	D	TC211D475◎050□	2.4	6.0	1.5
6.8	D	TC211D685◎050□	3.4	6.0	1.2
10.0	D	TC211D106◎050□	5.0	6.0	1.0
10.0	E	TC211E106◎050□	5.0	6.0	0.7
15.0	E	TC211E156◎050□	7.5	6.0	0.7

# SPECIFICATIONS

## TC212 TYPE

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
2.5V, +85°C (1.6V @ +125°C)					
10.0	A	TC212A106@002□	0.5	6.0	4.0
15.0	A	TC212A156@002□	0.5	6.0	4.0
15.0	B	TC212B156@002□	0.5	6.0	3.0
22.0	A	TC212A226@002□	0.6	6.0	3.0
33.0	A	TC212A336@002□	0.8	6.0	3.0
47.0	A	TC212A476@002□	1.2	10.0	3.0
68.0	A	TC212A686@002□	1.7	10.0	2.5
68.0	B	TC212B686@002□	1.7	6.0	1.8
100.0	A	TC212A107@002□	2.5	20.0	2.0
100.0	B	TC212B107@002□	2.5	8.0	1.0
150.0	B	TC212B157@002□	3.8	10.0	1.5
220.0	B	TC212B227@002□	5.5	18.0	1.5
4V, +85°C (2.5V @ +125°C)					
2.2	A	TC212A225@004□	0.5	6.0	6.0
3.3	A	TC212A335@004□	0.5	6.0	6.0
4.7	A	TC212A475@004□	0.5	6.0	5.0
6.8	A	TC212A685@004□	0.5	6.0	4.0
10.0	A	TC212A106@004□	0.5	6.0	3.0
10.0	B	TC212B106@004□	0.5	6.0	1.5
15.0	A	TC212A156@004□	0.6	6.0	1.5
15.0	B	TC212B156@004□	0.6	6.0	1.2
22.0	A	TC212A226@004□	0.9	6.0	1.5
22.0	B	TC212B226@004□	0.9	6.0	0.6
33.0	A	TC212A336@004□	1.3	6.0	2.5
33.0	B	TC212B336@004□	1.3	6.0	0.5
33.0	C	TC212C336@004□	1.3	6.0	0.8
47.0	A	TC212A476@004□	1.9	6.0	2.0
47.0	B	TC212B476@004□	1.9	6.0	0.8
47.0	C	TC212C476@004□	1.9	6.0	1.0
68.0	B	TC212B686@004□	2.7	6.0	2.5
68.0	C	TC212C686@004□	2.7	6.0	0.5
68.0	D	TC212D686@004□	2.7	6.0	0.5
100.0	A	TC212A107@004□	4.0	18.0	3.0
100.0	B	TC212B107@004□	4.0	8.0	1.0
100.0	C	TC212C107@004□	4.0	8.0	0.35
100.0	D	TC212D107@004□	4.0	8.0	0.2
150.0	B	TC212B157@004□	6.0	15.0	1.0
150.0	C	TC212C157@004□	6.0	8.0	0.3
150.0	D	TC212D157@004□	6.0	8.0	0.2
220.0	B	TC212B227@004□	8.8	18.0	0.4
220.0	C	TC212C227@004□	8.8	8.0	0.5
220.0	D	TC212D227@004□	8.8	8.0	0.3
330.0	B	TC212B337@004□	13.2	18.0	0.7
330.0	C	TC212C337@004□	13.2	8.0	0.8
330.0	D	TC212D337@004□	13.2	8.0	0.2
330.0	E	TC212E337@004□	13.2	8.0	0.2
470.0	E	TC212E477@004□	18.8	8.0	0.2
680.0	E	TC212E687@004□	27.2	8.0	0.2
6.3V, +85°C (4.0V @ +125°C)					

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
1.0	A	TC212A105@006□	0.5	6.0	10.0
1.5	A	TC212A155@006□	0.5	6.0	6.0
2.2	A	TC212A225@006□	0.5	6.0	6.0
3.3	A	TC212A335@006□	0.5	6.0	6.0
4.7	A	TC212A475@006□	0.5	6.0	4.0
6.8	A	TC212A685@006□	0.5	6.0	3.5
6.8	B	TC212B685@006□	0.5	6.0	3.0
10.0	A	TC212A106@006□	0.6	6.0	2.0
10.0	B	TC212B106@006□	0.6	6.0	1.0
15.0	A	TC212A156@006□	0.9	6.0	2.0
15.0	B	TC212B156@006□	0.9	6.0	0.7
22.0	A	TC212A226@006□	1.4	6.0	2.5
22.0	B	TC212B226@006□	1.4	6.0	0.8
33.0	A	TC212A336@006□	2.1	8.0	1.5
33.0	B	TC212B336@006□	2.1	6.0	0.8
33.0	C	TC212C336@006□	2.1	6.0	0.3
47.0	A	TC212A476@006□	2.9	8.0	2.5
47.0	B	TC212B476@006□	2.9	6.0	0.5
47.0	C	TC212C476@006□	2.9	6.0	0.3
68.0	B	TC212B686@006□	4.3	10.0	0.65
68.0	C	TC212C686@006□	4.3	6.0	0.3
68.0	D	TC212D686@006□	4.3	6.0	0.2
100.0	A	TC212A107@006□	6.3	20.0	2.0
100.0	B	TC212B107@006□	6.3	10.0	1.5
100.0	C	TC212C107@006□	6.3	8.0	0.3
100.0	D	TC212D107@006□	6.3	8.0	0.2
150.0	B	TC212B157@006□	9.5	15.0	0.6
150.0	C	TC212C157@006□	9.5	8.0	0.3
150.0	D	TC212D157@006□	9.5	8.0	0.2
220.0	B	TC212B227@006□	39.9	18.0	0.7
220.0	C	TC212C227@006□	13.9	8.0	0.3
220.0	D	TC212D227@006□	13.9	8.0	0.15
220.0	E	TC212E227@006□	13.9	8.0	0.15
330.0	D	TC212D337@006□	20.8	8.0	0.15
330.0	E	TC212E337@006□	20.8	8.0	0.15
470.0	D	TC212D477@006□	29.6	12.0	0.15
470.0	E	TC212E477@006□	29.6	10.0	0.12
10V, +85°C (6.3V @ +125°C)					
1.0	A	TC212A105@010□	0.5	4.0	8.0
1.5	A	TC212A155@010□	0.5	6.0	6.0
2.2	A	TC212A225@010□	0.5	6.0	6.0
3.3	A	TC212A335@010□	0.5	6.0	4.0
4.7	A	TC212A475@010□	0.5	6.0	3.0
4.7	B	TC212B475@010□	0.5	6.0	1.5
6.8	A	TC212A685@010□	0.7	6.0	3.0
6.8	B	TC212B685@010□	0.7	6.0	1.2
10.0	A	TC212A106@010□	1.0	6.0	1.8
10.0	B	TC212B106@010□	1.0	6.0	0.8
10.0	C	TC212C106@010□	1.0	6.0	0.6
15.0	A	TC212A156@010□	1.5	6.0	4.0

# SPECIFICATIONS

## TC212 TYPE

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.	Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
15.0	B	TC212B156◎010□	1.5	6.0	0.7	33.0	D	TC212D336◎016□	5.3	6.0	0.5
15.0	C	TC212C156◎010□	1.5	6.0	0.5	47.0	B	TC212B476◎016□	7.5	18.0	0.7
22.0	A	TC212A226◎010□	2.2	8.0	2.5	47.0	C	TC212C476◎016□	7.5	6.0	0.8
22.0	B	TC212B226◎010□	2.2	6.0	1.0	47.0	D	TC212D476◎016□	7.5	6.0	0.5
22.0	C	TC212C226◎010□	2.2	6.0	0.4	68.0	D	TC212D686◎016□	10.8	6.0	0.5
33.0	A	TC212A336◎010□	3.3	15.0	4.0	100.0	C	TC212C107◎016□	16.0	10.0	0.7
33.0	B	TC212B336◎010□	3.3	6.0	1.0	100.0	D	TC212D107◎016□	16.0	8.0	0.5
33.0	C	TC212C336◎010□	3.3	6.0	0.4	150.0	D	TC212D157◎016□	24.0	12.0	0.4
33.0	D	TC212D336◎010□	3.3	6.0	0.25	150.0	E	TC212E157◎016□	24.0	8.0	0.15
47.0	A	TC212A476◎010□	4.7	15.0	1.5	220.0	D	TC212D227◎016□	35.2	15.0	0.6
47.0	B	TC212B476◎010□	4.7	6.0	0.65	220.0	E	TC212E227◎016□	35.2	10.0	0.2
47.0	C	TC212C476◎010□	4.7	6.0	0.3	330.0	E	TC212E337◎016□	52.8	10.0	0.2
47.0	D	TC212D476◎010□	4.7	6.0	0.22	20V, +85°C (13V @ +125°C)					
68.0	B	TC212B686◎010□	6.8	10.0	1.5	0.68	A	TC212A684◎020□	0.5	4.0	10.0
68.0	C	TC212C686◎010□	6.8	6.0	0.3	1.0	A	TC212A105◎020□	0.5	4.0	8.0
68.0	D	TC212D686◎010□	6.8	6.0	0.2	1.5	A	TC212A155◎020□	0.5	6.0	4.5
100.0	B	TC212B107◎010□	10.0	15.0	1.0	1.5	B	TC212B155◎020□	0.5	6.0	1.5
100.0	C	TC212C107◎010□	10.0	8.0	0.3	2.2	A	TC212A225◎020□	0.5	6.0	4.0
100.0	D	TC212D107◎010□	10.0	8.0	0.15	2.2	B	TC212B225◎020□	0.5	6.0	3.0
150.0	C	TC212C157◎010□	15.0	10.0	0.7	3.3	A	TC212A335◎020□	0.7	6.0	6.0
150.0	D	TC212D157◎010□	15.0	8.0	0.15	3.3	B	TC212B335◎020□	0.7	6.0	2.5
150.0	E	TC212E157◎010□	15.0	8.0	0.15	4.7	A	TC212A475◎020□	0.9	6.0	3.5
220.0	D	TC212D227◎010□	22.0	8.0	0.15	4.7	B	TC212B475◎020□	0.9	6.0	2.5
220.0	E	TC212E227◎010□	22.0	8.0	0.15	4.7	C	TC212C475◎020□	0.9	6.0	1.2
330.0	D	TC212D337◎010□	33.0	10.0	0.15	6.8	A	TC212A685◎020□	1.4	8.0	3.0
330.0	E	TC212E337◎010□	33.0	10.0	0.2	6.8	B	TC212B685◎020□	1.4	6.0	2.5
470.0	E	TC212E477◎010□	47.0	10.0	0.2	6.8	C	TC212C685◎020□	1.4	6.0	1.2
16V, +85°C (10V @ +125°C)						6.8	D	TC212D685◎020□	1.4	6.0	0.8
1.0	A	TC212A105◎016□	0.5	4.0	8.0	10.0	B	TC212B106◎020□	2.0	6.0	2.0
1.5	A	TC212A155◎016□	0.5	6.0	6.0	10.0	C	TC212C106◎020□	2.0	6.0	1.2
2.2	A	TC212A225◎016□	0.5	6.0	4.0	10.0	D	TC212D106◎020□	2.0	6.0	0.8
2.2	B	TC212B225◎016□	0.5	6.0	3.0	15.0	C	TC212C156◎020□	3.0	6.0	1.2
3.3	A	TC212A335◎016□	0.5	6.0	5.0	15.0	D	TC212D156◎020□	3.0	6.0	0.8
3.3	B	TC212B335◎016□	0.5	6.0	2.5	22.0	B	TC212B226◎020□	4.4	8.0	3.0
4.7	A	TC212A475◎016□	0.8	6.0	5.0	22.0	C	TC212C226◎020□	4.4	6.0	0.4
4.7	B	TC212B475◎016□	0.8	6.0	2.5	22.0	D	TC212D226◎020□	4.4	6.0	0.5
4.7	C	TC212C475◎016□	0.8	6.0	1.5	33.0	C	TC212C336◎020□	6.6	6.0	0.6
6.8	A	TC212A685◎016□	1.1	6.0	5.0	33.0	D	TC212D336◎020□	6.6	6.0	0.4
6.8	B	TC212B685◎016□	1.1	6.0	2.5	47.0	C	TC212C476◎020□	9.4	10.0	0.8
6.8	C	TC212C685◎016□	1.1	6.0	1.0	47.0	D	TC212D476◎020□	9.4	6.0	0.6
10.0	A	TC212A106◎016□	1.6	8.0	3.0	47.0	E	TC212E476◎020□	9.4	6.0	0.3
10.0	B	TC212B106◎016□	1.6	6.0	0.8	68.0	D	TC212D686◎020□	13.6	6.0	0.4
10.0	C	TC212C106◎016□	1.6	6.0	1.5	68.0	E	TC212E686◎020□	13.6	6.0	0.3
15.0	B	TC212B156◎016□	2.4	6.0	2.0	100.0	D	TC212D107◎020□	20.0	8.0	0.2
15.0	C	TC212C156◎016□	2.4	6.0	1.2	100.0	E	TC212E107◎020□	20.0	8.0	0.2
22.0	A	TC212A226◎016□	3.5	15.0	2.0	150.0	E	TC212E157◎020□	30.0	8.0	0.2
22.0	B	TC212B226◎016□	3.5	8.0	1.5	25V, +85°C (16V @ +125°C)					
22.0	C	TC212C226◎016□	3.5	6.0	1.2	0.33	A	TC212A334◎025□	0.5	4.0	12.0
22.0	D	TC212D226◎016□	3.5	6.0	0.6	0.47	A	TC212A474◎025□	0.5	4.0	10.0
33.0	B	TC212B336◎016□	5.3	8.0	1.0	0.68	A	TC212A684◎025□	0.5	4.0	6.0
33.0	C	TC212C336◎016□	5.3	6.0	1.0	1.0	A	TC212A105◎025□	0.5	4.0	6.0



# SPECIFICATIONS

## TC212 TYPE

Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.	Capacitance (μF)	Case	Part Number	DCL (μA) +25°C Max.	DF (%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
1.0	B	TC212B105◎025□	0.5	4.0	4.0	3.3	C	TC212C335◎035□	1.2	6.0	2.0
1.5	A	TC212A155◎025□	0.5	6.0	5.0	4.7	B	TC212B475◎035□	1.6	6.0	2.0
1.5	B	TC212B155◎025□	0.5	6.0	3.5	4.7	C	TC212C475◎035□	1.6	6.0	2.0
2.2	A	TC212A225◎025□	0.6	6.0	4.0	4.7	D	TC212D475◎035□	1.6	6.0	1.0
2.2	B	TC212B225◎025□	0.6	6.0	3.0	6.8	C	TC212C685◎035□	2.4	6.0	1.2
2.2	C	TC212C225◎025□	0.6	6.0	2.0	6.8	D	TC212D685◎035□	2.4	6.0	0.8
3.3	A	TC212A335◎025□	0.8	6.0	3.0	10.0	C	TC212C106◎035□	3.5	6.0	1.5
3.3	B	TC212B335◎025□	0.8	6.0	2.5	10.0	D	TC212D106◎035□	3.5	6.0	0.6
3.3	C	TC212C335◎025□	0.8	6.0	2.0	10.0	E	TC212E106◎035□	3.5	6.0	0.6
4.7	A	TC212A475◎025□	1.2	8.0	3.0	15.0	D	TC212D156◎035□	5.25	6.0	0.8
4.7	B	TC212B475◎025□	1.2	6.0	1.0	15.0	E	TC212E156◎035□	5.3	6.0	0.6
4.7	C	TC212C475◎025□	1.2	6.0	0.6	22.0	D	TC212D226◎035□	7.7	6.0	0.6
6.8	B	TC212B685◎025□	1.7	6.0	1.2	22.0	E	TC212E226◎035□	7.7	6.0	0.3
6.8	C	TC212C685◎025□	1.7	6.0	0.8	33.0	E	TC212E336◎035□	11.0	6.0	0.5
6.8	D	TC212D685◎025□	1.7	6.0	0.5	47.0	E	TC212E476◎035□	16.5	8.0	0.5
10.0	B	TC212B106◎025□	2.5	6.0	2.0	50V, +85°C (32V @ +125°C)					
10.0	C	TC212C106◎025□	2.5	6.0	1.4	0.15	B	TC212B154◎050□	0.5	4.0	12.0
10.0	D	TC212D106◎025□	2.5	6.0	0.8	0.22	A	TC212A224◎050□	0.5	4.0	15.0
15.0	B	TC212B156◎025□	3.8	8.0	3.0	0.22	B	TC212B224◎050□	0.5	4.0	12.0
15.0	C	TC212C156◎025□	3.8	6.0	1.2	0.33	A	TC212A334◎050□	0.5	4.0	12.0
15.0	D	TC212D156◎025□	3.8	6.0	0.8	0.33	B	TC212B334◎050□	0.5	4.0	8.0
22.0	C	TC212C226◎025□	5.5	6.0	1.0	0.47	A	TC212A474◎050□	0.5	4.0	8.0
22.0	D	TC212D226◎025□	5.5	6.0	0.6	0.47	B	TC212B474◎050□	0.5	4.0	6.0
33.0	D	TC212D336◎025□	8.3	6.0	0.6	0.47	C	TC212C474◎050□	0.5	4.0	5.0
33.0	E	TC212E336◎025□	8.3	6.0	0.5	0.68	A	TC212A684◎050□	0.5	4.0	8.0
47.0	D	TC212D476◎025□	11.7	6.0	0.4	0.68	B	TC212B684◎050□	0.5	4.0	5.0
47.0	E	TC212E476◎025□	11.7	6.0	0.4	0.68	C	TC212C684◎050□	0.5	4.0	4.0
68.0	E	TC212E686◎025□	17.0	6.0	0.3	1.0	B	TC212B105◎050□	0.5	6.0	4.0
100.0	E	TC212E107◎025□	25.0	10.0	0.7	1.0	C	TC212C105◎050□	0.5	4.0	3.5
35V, +85°C (20V @ +125°C)						1.5	B	TC212B155◎050□	0.8	6.0	3.5
0.33	A	TC212A334◎035□	0.5	4.0	12.0	1.5	C	TC212C155◎050□	0.8	6.0	2.5
0.47	A	TC212A474◎035□	0.5	4.0	10.0	2.2	B	TC212B225◎050□	1.1	6.0	1.5
0.47	B	TC212B474◎035□	0.5	4.0	6.0	2.2	C	TC212C225◎050□	1.1	6.0	3.0
0.68	A	TC212A684◎035□	0.5	4.0	6.0	2.2	D	TC212D225◎050□	1.1	6.0	2.0
0.68	B	TC212B684◎035□	0.5	4.0	6.0	3.3	B	TC212B335◎050□	1.7	6.0	3.0
1.0	A	TC212A105◎035□	0.5	4.0	8.0	3.3	C	TC212C335◎050□	1.7	6.0	2.0
1.0	B	TC212B105◎035□	0.5	4.0	2.0	3.3	D	TC212D335◎050□	1.7	6.0	1.0
1.5	B	TC212B155◎035□	0.5	6.0	4.0	4.7	D	TC212D475◎050□	2.4	6.0	0.8
1.5	C	TC212C155◎035□	0.5	6.0	3.0	6.8	D	TC212D685◎050□	3.4	6.0	0.7
2.2	A	TC212A225◎035□	0.8	6.0	3.0	10.0	D	TC212D106◎050□	5.0	6.0	0.7
2.2	B	TC212B225◎035□	0.8	6.0	3.0	10.0	E	TC212E106◎050□	5.0	6.0	0.4
2.2	C	TC212C225◎035□	0.8	6.0	2.5	15.0	E	TC212E156◎050□	7.5	6.0	0.4
3.3	B	TC212B335◎035□	1.2	6.0	3.0						

※◎:Capacitance tolerance code (K=±10%, M=±20%); □: Internal code (B=Black molded case, Laser marking; Y=Yellow molded case, Laser marking).

# TYPICAL FREQUENCY CHARACTERISTICS

