

# 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**

1	2	3	4	5	6	7
<b>TC</b>	<b>212</b>	<b>B</b>	<b>105</b>	<b>M</b>	<b>035</b>	<b>B</b>

**1** Type

TC	Solid Tantalum Chip Capacitor
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**2** Series

211	Industrial
212	Low ESR

**3** External Dimensions (L×W) (mm)

A	3.2×1.6
B	3.5×2.8
C	6.0×3.2
D/E	7.3×4.3

**4** Nominal Capacitance

Example	Nominal Value
105	1.0μF
106	1.0μF

**6** Rated DC Voltage

002	2.5Vdc
004	4Vdc
006	6.3Vdc
010	10Vdc
016	16Vdc
020	20Vdc
025	25Vdc
035	35Vdc
050	50Vdc

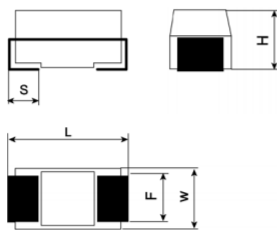
**5** Capacitance Tolerance

K	±10%
M	±20%

**7** Internal Code

B	Black Molded Case, Laser Marking
Y	Yellow Molded Case, Laser Marking

**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]

Chip Solid MnO<sub>2</sub> Tantalum Capacitor  
Chip Solid Polymer Tantalum Capacitor  
Chip Solid MnO<sub>2</sub> Tantalum Capacitor  
Chip Solid Polymer Tantalum Capacitor

**TECHNICAL SPECIFICATION**

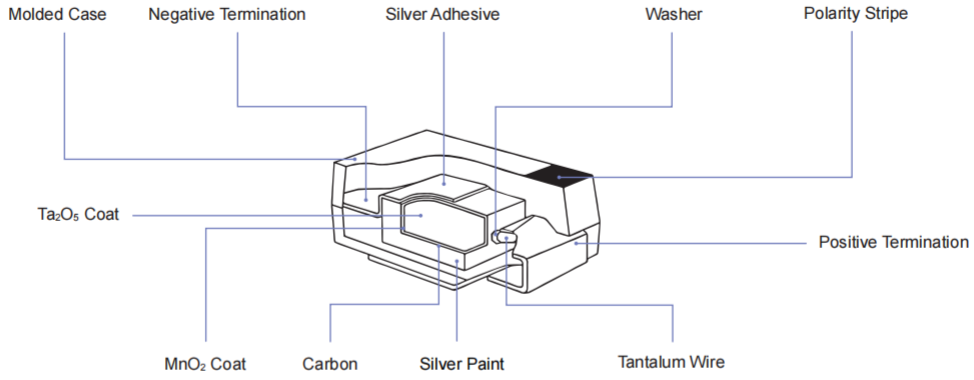
Item	SPEC										Test Condition
Operating Temp	-55°C ~+125°C										/
C <sub>R</sub> Range	0.15μF~680μF										25°C , 120Hz
C <sub>R</sub> Tolerance	±10% or ±20%										25°C , 120Hz
Rated Voltage (V <sub>R</sub> )	2.5V	4V	6.3V	10V	16V	20V	25V	35V	50V	85°C	
Category Voltage (V <sub>C</sub> )	1.6V	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**

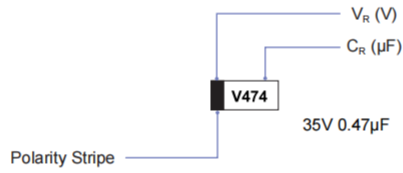
Rated Voltage (V <sub>R</sub> )	2.5	4	6.3	10	16	20	25	35	50	
Voltage Code	e	G	J	A	C	D	E	V	T	
C <sub>R</sub> (μF)	C Code	Case Code								
0.15	154								B	
0.22	224								B/A	
0.33	334						A	A	B/A	
0.47	474						A	B/A	C/B/A	
0.68	684					A	A	B/A	C/B/A	
1.0	105			A	A	A	A	B/A	B/A	C/B
1.5	155			A	A	A	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	E/D
15	156	B/A	B/A	B/A	C/B/A	C/B	D/C	D/C/B	E/D	E
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			
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					
680	687		E							

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

**CONSTRUCTION**



**MARKING**



A/B/C/D/E Case 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

Rated Cap (uF)	Case	Part Number	DCL(μA) +25°C Max.	DF(%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.	Rated Cap (uF)	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)						10V, +85°C (6.3V @ +125°C)											
10	A	TC211A106	0.5	6.0	5.0	1.0	A	TC211A105	0.5	4.0	13.0						
15	A	TC211A156	0.5	6.0	6.0	1.5	A	TC211A155	0.5	6.0	8.0						
15	B	TC211B156	0.5	6.0	4.0	2.2	A	TC211A225	0.5	6.0	8.0						
22	A	TC211A226	0.6	6.0	4.0	3.3	A	TC211A335	0.5	6.0	6.0						
33	A	TC211A336	0.8	6.0	4.0	4.7	A	TC211A475	0.5	6.0	6.0						
47	A	TC211A476	1.2	10.0	4.0	6.8	A	TC211A685	0.5	6.0	6.0						
68	A	TC211A686	1.7	10.0	3.0	6.8	B	TC211B685	0.5	6.0	3.5						
68	B	TC211B686	1.7	6.0	2.0	10	A	TC211A106	0.6	6.0	4.0						
100	A	TC211A107	2.5	20.0	2.5	10	B	TC211B106	0.6	6.0	3.5						
100	B	TC211B107	2.5	8.0	1.5	15	A	TC211A156	0.9	6.0	4.0						
150	B	TC211B157	3.8	10.0	2.0	15	B	TC211B156	0.9	6.0	3.5						
220	B	TC211B227	5.5	18.0	2.0	22	A	TC211A226	1.3	6.0	4.0						
4V, +85°C (2.5V @ +125°C)						22						B	TC211B226	1.3	6.0	3.5	
2.2	A	TC211A225	0.5	6.0	8.0	33	A	TC211A336	2.1	8.0	4.5						
3.3	A	TC211A335	0.5	6.0	8.0	33	B	TC211B336	2.1	6.0	3.0						
4.7	A	TC211A475	0.5	6.0	8.0	33	C	TC211C336	2.1	6.0	1.8						
6.8	A	TC211A685	0.5	6.0	6.0	47	A	TC211A476	3.0	8.0	3.5						
10	A	TC211A106	0.5	6.0	6.0	47	B	TC211B476	3.0	6.0	3.0						
10	B	TC211B106	0.5	6.0	3.5	47	C	TC211C476	3.0	6.0	1.6						
15	A	TC211A156	0.6	6.0	4.0	68	B	TC211B686	4.3	10.0	1.2						
15	B	TC211B156	0.6	6.0	3.5	68	C	TC211C686	4.3	6.0	1.2						
22	A	TC211A226	0.9	6.0	4.0	68	D	TC211D686	4.3	6.0	0.8						
22	B	TC211B226	0.9	6.0	3.5	100	A	TC211A107	6.3	20.0	4.0						
33	A	TC211A336	1.3	6.0	4.0	100	B	TC211B107	6.3	10.0	3.0						
33	B	TC211B336	1.3	6.0	3.5	100	C	TC211C107	6.3	8.0	1.2						
33	C	TC211C336	1.3	6.0	1.8	100	D	TC211D107	6.3	8.0	0.8						
47	A	TC211A476	1.9	6.0	3.0	150	B	TC211B157	9.5	15.0	1.0						
47	B	TC211B476	1.9	6.0	3.0	150	C	TC211C157	9.5	8.0	1.2						
47	C	TC211C476	1.9	6.0	1.8	150	D	TC211D157	9.5	8.0	0.8						
68	B	TC211B686	2.7	6.0	3.5	220	B	TC211B227	39.9	18.0	1.0						
68	C	TC211C686	2.7	6.0	1.6	220	C	TC211C227	13.9	8.0	1.2						
68	D	TC211D686	2.7	6.0	0.8	220	D	TC211D227	13.9	8.0	0.7						
100	A	TC211A107	4.0	18.0	5.0	220	E	TC211E227	13.9	8.0	0.5						
100	B	TC211B107	4.0	8.0	2.0	330	D	TC211D337	20.8	8.0	0.5						
100	C	TC211C107	4.0	8.0	1.3	330	E	TC211E337	20.8	8.0	0.5						
100	D	TC211D107	4.0	8.0	0.8	470	D	TC211D477	29.6	12.0	0.4						
150	B	TC211B157	6.0	15.0	2.0	470	E	TC211E477	29.6	10.0	0.5						
150	C	TC211C157	6.0	8.0	1.2	6.3V, +85°C (4.0V @ +125°C)											
150	D	TC211D157	6.0	8.0	0.8	1	A	TC211A105	0.5	6.0	14.0						
220	B	TC211B227	8.8	18.0	0.5												
220	C	TC211C227	8.8	8.0	1.0												
220	D	TC211D227	8.8	8.0	0.8												
330	B	TC211B337	13.2	18.0	1.2												
330	C	TC211C337	13.2	8.0	1.2												
330	D	TC211D337	13.2	8.0	0.7												
330	E	TC211E337	13.2	8.0	0.8												
470	E	TC211E477	18.8	8.0	0.8												
680	E	TC211E687	27.2	8.0	0.5												

**SPECIFICATIONS**

TC211 TYPE

Rated Cap (uF)	Case	Part Number	DCL(μA) +25°C Max.	DF(%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
22	A	TC211A226 Ⓞ 010 □	2.2	8.0	4.0
22	B	TC211B226 Ⓞ 010 □	2.2	6.0	3.3
22	C	TC211C226 Ⓞ 010 □	2.2	6.0	1.8
33	A	TC211A336 Ⓞ 010 □	3.3	15.0	6.0
33	B	TC211B336 Ⓞ 010 □	3.3	6.0	3.5
33	C	TC211C336 Ⓞ 010 □	3.3	6.0	1.6
33	D	TC211D336 Ⓞ 010 □	3.3	6.0	0.8
47	A	TC211A476 Ⓞ 010 □	4.7	15.0	4.0
47	B	TC211B476 Ⓞ 010 □	4.7	6.0	1.0
47	C	TC211C476 Ⓞ 010 □	4.7	6.0	1.2
47	D	TC211D476 Ⓞ 010 □	4.7	6.0	0.8
68	B	TC211B686 Ⓞ 010 □	6.8	10.0	3.0
68	C	TC211C686 Ⓞ 010 □	6.8	6.0	1.2
68	D	TC211D686 Ⓞ 010 □	6.8	6.0	0.8
100	B	TC211B107 Ⓞ 010 □	10.0	15.0	1.5
100	C	TC211C107 Ⓞ 010 □	10.0	8.0	1.2
100	D	TC211D107 Ⓞ 010 □	10.0	8.0	0.7
150	C	TC211C157 Ⓞ 010 □	15.0	10.0	0.9
150	D	TC211D157 Ⓞ 010 □	15.0	8.0	0.7
150	E	TC211E157 Ⓞ 010 □	15.0	8.0	0.5
220	D	TC211D227 Ⓞ 010 □	22.0	8.0	0.5
220	E	TC211E227 Ⓞ 010 □	22.0	8.0	0.5
330	D	TC211D337 Ⓞ 010 □	33.0	10.0	0.5
330	E	TC211E337 Ⓞ 010 □	33.0	10.0	0.5
470	E	TC211E477 Ⓞ 010 □	47.0	10.0	0.5
16V, +85°C (10V @ +125°C)					
1	A	TC211A105 Ⓞ 016 □	0.5	4.0	10.0
1.5	A	TC211A155 Ⓞ 016 □	0.5	6.0	8.0
2.2	A	TC211A225 Ⓞ 016 □	0.5	6.0	6.0
2.2	B	TC211B225 Ⓞ 016 □	0.5	6.0	4.0
3.3	A	TC211A335 Ⓞ 016 □	0.52	6.0	6.0
3.3	B	TC211B335 Ⓞ 016 □	0.5	6.0	3.5
4.7	A	TC211A475 Ⓞ 016 □	0.8	6.0	6.0
4.7	B	TC211B475 Ⓞ 016 □	0.8	6.0	3.5
4.7	C	TC211C475 Ⓞ 016 □	0.8	6.0	2.4
6.8	A	TC211A685 Ⓞ 016 □	1.1	6.0	7.0
6.8	B	TC211B685 Ⓞ 016 □	1.1	6.0	3.5
6.8	C	TC211C685 Ⓞ 016 □	1.1	6.0	2.0
10	A	TC211A106 Ⓞ 016 □	1.6	8.0	7.0
10	B	TC211B106 Ⓞ 016 □	1.6	6.0	2.8
10	C	TC211C106 Ⓞ 016 □	1.6	6.0	1.8
15	B	TC211B156 Ⓞ 016 □	2.4	6.0	3.0
15	C	TC211C156 Ⓞ 016 □	2.4	6.0	1.8
22	A	TC211A226 Ⓞ 016 □	3.5	15.0	4.0
22	B	TC211B226 Ⓞ 016 □	3.5	8.0	2.2
22	C	TC211C226 Ⓞ 016 □	3.5	6.0	1.6
22	D	TC211D226 Ⓞ 016 □	3.5	6.0	0.8
33	B	TC211B336 Ⓞ 016 □	5.3	8.0	2.0
33	C	TC211C336 Ⓞ 016 □	5.3	6.0	1.2
33	D	TC211D336 Ⓞ 016 □	5.3	6.0	0.8
47	B	TC211B476 Ⓞ 016 □	7.5	18.0	1.0

Rated Cap (uF)	Case	Part Number	DCL(μA) +25°C Max.	DF(%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
47	C	TC211C476 Ⓞ 016 □	7.5	6.0	1.2
47	D	TC211D476 Ⓞ 016 □	7.5	6.0	0.8
68	D	TC211D686 Ⓞ 016 □	10.8	6.0	0.8
100	C	TC211C107 Ⓞ 016 □	16.0	10.0	1.0
100	D	TC211D107 Ⓞ 016 □	16.0	8.0	0.7
150	D	TC211D157 Ⓞ 016 □	24.0	12.0	0.7
150	E	TC211E157 Ⓞ 016 □	24.0	8.0	0.5
220	D	TC211D227 Ⓞ 016 □	35.2	15.0	0.9
220	E	TC211E227 Ⓞ 016 □	35.2	10.0	0.5
330	E	TC211E337 Ⓞ 016 □	52.8	10.0	0.5
20V, +85°C (13V @ +125°C)					
0.68	A	TC211A684 Ⓞ 020 □	0.5	4.0	12.0
1	A	TC211A105 Ⓞ 020 □	0.5	4.0	10.0
1.5	A	TC211A155 Ⓞ 020 □	0.5	6.0	8.0
1.5	B	TC211B155 Ⓞ 020 □	0.5	6.0	5.0
2.2	A	TC211A225 Ⓞ 020 □	0.5	6.0	7.0
2.2	B	TC211B225 Ⓞ 020 □	0.5	6.0	3.5
3.3	A	TC211A335 Ⓞ 020 □	0.7	6.0	7.0
3.3	B	TC211B335 Ⓞ 020 □	0.7	6.0	3.5
4.7	A	TC211A475 Ⓞ 020 □	0.9	6.0	4.0
4.7	B	TC211B475 Ⓞ 020 □	0.9	6.0	3.5
4.7	C	TC211C475 Ⓞ 020 □	0.9	6.0	2.4
6.8	A	TC211A685 Ⓞ 020 □	1.4	8.0	6.0
6.8	B	TC211B685 Ⓞ 020 □	1.4	6.0	3.5
6.8	C	TC211C685 Ⓞ 020 □	1.4	6.0	2.0
6.8	D	TC211D685 Ⓞ 020 □	1.4	6.0	1.9
10	B	TC211B106 Ⓞ 020 □	2.0	6.0	3.0
10	C	TC211C106 Ⓞ 020 □	2.0	6.0	1.8
10	D	TC211D106 Ⓞ 020 □	2.0	6.0	1.0
15	C	TC211C156 Ⓞ 020 □	3.0	6.0	1.7
15	D	TC211D156 Ⓞ 020 □	3.0	6.0	1.0
22	B	TC211B226 Ⓞ 020 □	4.4	8.0	4.0
22	C	TC211C226 Ⓞ 020 □	4.4	6.0	1.2
22	D	TC211D226 Ⓞ 020 □	4.4	6.0	0.8
33	C	TC211C336 Ⓞ 020 □	6.6	6.0	1.2
33	D	TC211D336 Ⓞ 020 □	6.6	6.0	0.8
47	C	TC211C476 Ⓞ 020 □	9.4	10.0	1.0
47	D	TC211D476 Ⓞ 020 □	9.4	6.0	0.8
47	E	TC211E476 Ⓞ 020 □	9.4	6.0	0.8
68	D	TC211D686 Ⓞ 020 □	13.6	6.0	0.8
68	E	TC211E686 Ⓞ 020 □	13.6	6.0	0.8
100	D	TC211D107 Ⓞ 020 □	20.0	8.0	0.6
100	E	TC211E107 Ⓞ 020 □	20.0	8.0	0.5
150	E	TC211E157 Ⓞ 020 □	30.0	8.0	0.5
25V, +85°C (16V @ +125°C)					
0.33	A	TC211A334 Ⓞ 025 □	0.5	4.0	15.0
0.47	A	TC211A474 Ⓞ 025 □	0.5	4.0	14.0
0.68	A	TC211A684 Ⓞ 025 □	0.5	4.0	10.0
1	A	TC211A105 Ⓞ 025 □	0.5	4.0	8.0
1	B	TC211B105 Ⓞ 025 □	0.5	4.0	5.0
1.5	A	TC211A155 Ⓞ 025 □	0.5	6.0	10.0

Chip Solid MnO2  
Tantalum Capacitor  
Chip Solid Polymer  
Tantalum Capacitor  
Chip Solid MnO2  
Tantalum Capacitor  
Chip Solid Polymer  
Tantalum Capacitor

## SPECIFICATIONS

## TC211 TYPE

Rated Cap (uF)	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	B	TC211B106 Ⓞ 025 □	2.5	6.0	3.0
10	C	TC211C106 Ⓞ 025 □	2.5	6.0	1.5
10	D	TC211D106 Ⓞ 025 □	2.5	6.0	1.0
15	B	TC211B156 Ⓞ 025 □	3.8	8.0	4.0
15	C	TC211C156 Ⓞ 025 □	3.8	6.0	1.5
15	D	TC211D156 Ⓞ 025 □	3.8	6.0	1.0
22	C	TC211C226 Ⓞ 025 □	5.5	6.0	1.4
22	D	TC211D226 Ⓞ 025 □	5.5	6.0	0.8
33	D	TC211D336 Ⓞ 025 □	8.3	6.0	0.8
33	E	TC211E336 Ⓞ 025 □	8.3	6.0	0.7
47	D	TC211D476 Ⓞ 025 □	11.7	6.0	0.8
47	E	TC211E476 Ⓞ 025 □	11.7	6.0	0.7
68	E	TC211E686 Ⓞ 025 □	17.0	6.0	0.7
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	A	TC211A105 Ⓞ 035 □	0.5	4.0	10.0
1	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

Rated Cap (uF)	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	C	TC211C106 Ⓞ 035 □	3.5	6.0	2.0
10	D	TC211D106 Ⓞ 035 □	3.5	6.0	1.0
10	E	TC211E106 Ⓞ 035 □	3.5	6.0	1.0
15	D	TC211D156 Ⓞ 035 □	5.3	6.0	1.0
15	E	TC211E156 Ⓞ 035 □	5.3	6.0	0.9
22	D	TC211D226 Ⓞ 035 □	7.7	6.0	0.8
22	E	TC211E226 Ⓞ 035 □	7.7	6.0	0.7
33	E	TC211E336 Ⓞ 035 □	11.0	6.0	0.6
47	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	B	TC211B105 Ⓞ 050 □	0.5	6.0	6.0
1	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	D	TC211D106 Ⓞ 050 □	5.0	6.0	1.0
10	E	TC211E106 Ⓞ 050 □	5.0	6.0	0.7
15	E	TC211E156 Ⓞ 050 □	7.5	6.0	0.7



**SPECIFICATIONS**

TC212 TYPE

Rated Cap (uF)	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	A	TC212A106	0.5	6.0	4.0
15	A	TC212A156	0.5	6.0	4.0
15	B	TC212B156	0.5	6.0	3.0
22	A	TC212A226	0.6	6.0	3.0
33	A	TC212A336	0.8	6.0	3.0
47	A	TC212A476	1.2	10.0	3.0
68	A	TC212A686	1.7	10.0	2.5
68	B	TC212B686	1.7	6.0	1.8
100	A	TC212A107	2.5	20.0	2.0
100	B	TC212B107	2.5	8.0	1.0
150	B	TC212B157	3.8	10.0	1.5
220	B	TC212B227	5.5	18.0	1.5
4V, +85°C (2.5V @ +125°C)					
2.2	A	TC212A225	0.5	6.0	6.0
3.3	A	TC212A335	0.4	5.5	6.0
4.7	A	TC212A475	0.5	6.0	5.0
6.8	A	TC212A685	0.5	6.0	4.0
10	A	TC212A106	0.5	6.0	3.0
10	B	TC212B106	0.5	6.0	1.5
15	A	TC212A156	0.6	6.0	1.5
15	B	TC212B156	0.6	6.0	1.2
22	A	TC212A226	0.9	6.0	1.5
22	B	TC212B226	0.9	6.0	0.6
33	A	TC212A336	1.3	6.0	2.5
33	B	TC212B336	1.3	6.0	0.5
33	C	TC212C336	1.3	6.0	0.8
47	A	TC212A476	1.9	6.0	2.0
47	B	TC212B476	1.9	6.0	0.8
47	C	TC212C476	1.9	6.0	1.0
68	B	TC212B686	2.7	6.0	2.5
68	C	TC212C686	2.7	6.0	0.5
68	D	TC212D686	2.7	6.0	0.5
100	A	TC212A107	4.0	18.0	3.0
100	B	TC212B107	4.0	8.0	1.0
100	C	TC212C107	4.0	8.0	0.35
100	D	TC212D107	4.0	8.0	0.2
150	B	TC212B157	6.0	15.0	1.0
150	C	TC212C157	6.0	8.0	0.3
150	D	TC212D157	6.0	8.0	0.2
220	B	TC212B227	8.8	18.0	0.4
220	C	TC212C227	8.8	8.0	0.5
220	D	TC212D227	8.8	8.0	0.3
330	B	TC212B337	13.2	18.0	0.7
330	C	TC212C337	13.2	8.0	0.8
330	D	TC212D337	13.2	8.0	0.2
330	E	TC212E337	13.2	8.0	0.2
470	E	TC212E477	18.8	8.0	0.2
680	E	TC212E687	27.2	8.0	0.2
6.3V, +85°C (4.0V @ +125°C)					
1	A	TC212A105	0.5	6.0	10.0

Rated Cap (uF)	Case	Part Number	DCL(μA) +25°C Max.	DF(%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
1.5	A	TC212A155	0.5	6.0	6.0
2.2	A	TC212A225	0.5	6.0	6.0
3.3	A	TC212A335	0.5	6.0	6.0
4.7	A	TC212A475	0.5	6.0	4.0
6.8	A	TC212A685	0.5	6.0	3.5
6.8	B	TC212B685	0.5	6.0	3.0
10	A	TC212A106	0.6	6.0	2.0
10	B	TC212B106	0.6	6.0	1.0
15	A	TC212A156	0.9	6.0	2.0
15	B	TC212B156	0.9	6.0	0.7
22	A	TC212A226	1.4	6.0	2.5
22	B	TC212B226	1.4	6.0	0.8
33	A	TC212A336	2.1	8.0	1.5
33	B	TC212B336	2.1	6.0	0.8
33	C	TC212C336	2.1	6.0	0.3
47	A	TC212A476	2.9	8.0	2.5
47	B	TC212B476	2.9	6.0	0.5
47	C	TC212C476	2.9	6.0	0.3
68	B	TC212B686	4.3	10.0	0.65
68	C	TC212C686	4.3	6.0	0.3
68	D	TC212D686	4.3	6.0	0.2
100	A	TC212A107	6.3	20.0	2.0
100	B	TC212B107	6.3	10.0	1.5
100	C	TC212C107	6.3	8.0	0.3
100	D	TC212D107	6.3	8.0	0.2
150	B	TC212B157	9.5	15.0	0.6
150	C	TC212C157	9.5	8.0	0.3
150	D	TC212D157	9.5	8.0	0.2
220	B	TC212B227	39.9	18.0	0.7
220	C	TC212C227	13.9	8.0	0.3
220	D	TC212D227	13.9	8.0	0.15
220	E	TC212E227	13.9	8.0	0.15
330	D	TC212D337	20.8	8.0	0.15
330	E	TC212E337	20.8	8.0	0.15
470	D	TC212D477	29.6	12.0	0.15
470	E	TC212E477	29.6	10.0	0.12
10V, +85°C (6.3V @ +125°C)					
1	A	TC212A105	0.5	4.0	8.0
1.5	A	TC212A155	0.5	6.0	6.0
2.2	A	TC212A225	0.5	6.0	6.0
3.3	A	TC212A335	0.5	6.0	4.0
4.7	A	TC212A475	0.5	6.0	3.0
4.7	B	TC212B475	0.5	6.0	1.5
6.8	A	TC212A685	0.7	6.0	3.0
6.8	B	TC212B685	0.7	6.0	1.2
10	A	TC212A106	1.0	6.0	1.8
10	B	TC212B106	1.0	6.0	0.8
10	C	TC212C106	1.0	6.0	0.6
15	A	TC212A156	1.5	6.0	4.0
15	B	TC212B156	1.5	6.0	0.7
15	C	TC212C156	1.5	6.0	0.5

Chip Solid MnO2  
Tantalum Capacitor  
Chip Solid Polymer  
Tantalum Capacitor  
Chip Solid MnO2  
Tantalum Capacitor  
Chip Solid Polymer  
Tantalum Capacitor

## SPECIFICATIONS

## TC212 TYPE

Rated Cap (uF)	Case	Part Number	DCL(μA) +25°C Max.	DF(%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
22	A	TC212A226 Ⓞ 010 □	2.2	8.0	2.5
22	B	TC212B226 Ⓞ 010 □	2.2	6.0	1.0
22	C	TC212C226 Ⓞ 010 □	2.2	6.0	0.4
33	A	TC212A336 Ⓞ 010 □	3.3	15.0	4.0
33	B	TC212B336 Ⓞ 010 □	3.3	6.0	1.0
33	C	TC212C336 Ⓞ 010 □	3.3	6.0	0.4
33	D	TC212D336 Ⓞ 010 □	3.3	6.0	0.25
47	A	TC212A476 Ⓞ 010 □	4.7	15.0	1.5
47	B	TC212B476 Ⓞ 010 □	4.7	6.0	0.65
47	C	TC212C476 Ⓞ 010 □	4.7	6.0	0.3
47	D	TC212D476 Ⓞ 010 □	4.7	6.0	0.22
68	B	TC212B686 Ⓞ 010 □	6.8	10.0	1.5
68	C	TC212C686 Ⓞ 010 □	6.8	6.0	0.3
68	D	TC212D686 Ⓞ 010 □	6.8	6.0	0.2
100	B	TC212B107 Ⓞ 010 □	10.0	15.0	1.0
100	C	TC212C107 Ⓞ 010 □	10.0	8.0	0.3
100	D	TC212D107 Ⓞ 010 □	10.0	8.0	0.15
150	C	TC212C157 Ⓞ 010 □	15.0	10.0	0.7
150	D	TC212D157 Ⓞ 010 □	15.0	8.0	0.15
150	E	TC212E157 Ⓞ 010 □	15.0	8.0	0.15
220	D	TC212D227 Ⓞ 010 □	22.0	8.0	0.15
220	E	TC212E227 Ⓞ 010 □	22.0	8.0	0.15
330	D	TC212D337 Ⓞ 010 □	33.0	10.0	0.15
330	E	TC212E337 Ⓞ 010 □	33.0	10.0	0.2
470	E	TC212E477 Ⓞ 010 □	47.0	10.0	0.2
16V, +85°C (10V @ +125°C)					
1	A	TC212A105 Ⓞ 016 □	0.5	4.0	8.0
1.5	A	TC212A155 Ⓞ 016 □	0.5	6.0	6.0
2.2	A	TC212A225 Ⓞ 016 □	0.5	6.0	4.0
2.2	B	TC212B225 Ⓞ 016 □	0.5	6.0	3.0
3.3	A	TC212A335 Ⓞ 016 □	0.5	6.0	5.0
3.3	B	TC212B335 Ⓞ 016 □	0.5	6.0	2.5
4.7	A	TC212A475 Ⓞ 016 □	0.8	6.0	5.0
4.7	B	TC212B475 Ⓞ 016 □	0.8	6.0	2.5
4.7	C	TC212C475 Ⓞ 016 □	0.8	6.0	1.5
6.8	A	TC212A685 Ⓞ 016 □	1.1	6.0	5.0
6.8	B	TC212B685 Ⓞ 016 □	1.1	6.0	2.5
6.8	C	TC212C685 Ⓞ 016 □	1.1	6.0	1.0
10	A	TC212A106 Ⓞ 016 □	1.6	8.0	3.0
10	B	TC212B106 Ⓞ 016 □	1.6	6.0	0.8
10	C	TC212C106 Ⓞ 016 □	1.6	6.0	1.5
15	B	TC212B156 Ⓞ 016 □	2.4	6.0	2.0
15	C	TC212C156 Ⓞ 016 □	2.4	6.0	1.2
22	A	TC212A226 Ⓞ 016 □	3.5	15.0	2.0
22	B	TC212B226 Ⓞ 016 □	3.5	8.0	1.5
22	C	TC212C226 Ⓞ 016 □	3.5	6.0	1.2
22	D	TC212D226 Ⓞ 016 □	3.5	6.0	0.6
33	B	TC212B336 Ⓞ 016 □	5.3	8.0	1.0
33	C	TC212C336 Ⓞ 016 □	5.3	6.0	1.0
33	D	TC212D336 Ⓞ 016 □	5.3	6.0	0.5

Rated Cap (uF)	Case	Part Number	DCL(μA) +25°C Max.	DF(%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
47	B	TC212B476 Ⓞ 016 □	7.5	18.0	0.7
47	C	TC212C476 Ⓞ 016 □	7.5	6.0	0.8
47	D	TC212D476 Ⓞ 016 □	7.5	6.0	0.5
68	D	TC212D686 Ⓞ 016 □	10.8	6.0	0.5
100	C	TC212C107 Ⓞ 016 □	16.0	10.0	0.7
100	D	TC212D107 Ⓞ 016 □	16.0	8.0	0.5
150	D	TC212D157 Ⓞ 016 □	24.0	12.0	0.4
150	E	TC212E157 Ⓞ 016 □	24.0	8.0	0.15
220	D	TC212D227 Ⓞ 016 □	35.2	15.0	0.6
220	E	TC212E227 Ⓞ 016 □	35.2	10.0	0.2
330	E	TC212E337 Ⓞ 016 □	52.8	10.0	0.2
20V, +85°C (13V @ +125°C)					
0.68	A	TC212A684 Ⓞ 020 □	0.5	4.0	10.0
1	A	TC212A105 Ⓞ 020 □	0.5	4.0	8.0
1.5	A	TC212A155 Ⓞ 020 □	0.5	6.0	4.5
1.5	B	TC212B155 Ⓞ 020 □	0.5	6.0	1.5
2.2	A	TC212A225 Ⓞ 020 □	0.5	6.0	4.0
2.2	B	TC212B225 Ⓞ 020 □	0.5	6.0	3.0
3.3	A	TC212A335 Ⓞ 020 □	0.7	6.0	6.0
3.3	B	TC212B335 Ⓞ 020 □	0.7	6.0	2.5
4.7	A	TC212A475 Ⓞ 020 □	0.9	6.0	3.5
4.7	B	TC212B475 Ⓞ 020 □	0.9	6.0	2.5
4.7	C	TC212C475 Ⓞ 020 □	0.9	6.0	1.2
6.8	A	TC212A685 Ⓞ 020 □	1.4	8.0	3.0
6.8	B	TC212B685 Ⓞ 020 □	1.4	6.0	2.5
6.8	C	TC212C685 Ⓞ 020 □	1.4	6.0	1.2
6.8	D	TC212D685 Ⓞ 020 □	1.4	6.0	0.8
10	B	TC212B106 Ⓞ 020 □	2.0	6.0	2.0
10	C	TC212C106 Ⓞ 020 □	2.0	6.0	1.2
10	D	TC212D106 Ⓞ 020 □	2.0	6.0	0.8
15	C	TC212C156 Ⓞ 020 □	3.0	6.0	1.2
15	D	TC212D156 Ⓞ 020 □	3.0	6.0	0.8
22	B	TC212B226 Ⓞ 020 □	4.4	8.0	3.0
22	C	TC212C226 Ⓞ 020 □	4.4	6.0	0.4
22	D	TC212D226 Ⓞ 020 □	4.4	6.0	0.5
33	C	TC212C336 Ⓞ 020 □	6.6	6.0	0.6
33	D	TC212D336 Ⓞ 020 □	6.6	6.0	0.4
47	C	TC212C476 Ⓞ 020 □	9.4	10.0	0.8
47	D	TC212D476 Ⓞ 020 □	9.4	6.0	0.6
47	E	TC212E476 Ⓞ 020 □	9.4	6.0	0.3
68	D	TC212D686 Ⓞ 020 □	13.6	6.0	0.4
68	E	TC212E686 Ⓞ 020 □	13.6	6.0	0.3
100	D	TC212D107 Ⓞ 020 □	20.0	8.0	0.2
100	E	TC212E107 Ⓞ 020 □	20.0	8.0	0.2
150	E	TC212E157 Ⓞ 020 □	30.0	8.0	0.2
25V, +85°C (16V @ +125°C)					
0.33	A	TC212A334 Ⓞ 025 □	0.5	4.0	12.0
0.47	A	TC212A474 Ⓞ 025 □	0.5	4.0	10.0
0.68	A	TC212A684 Ⓞ 025 □	0.5	4.0	6.0
1	A	TC212A105 Ⓞ 025 □	0.5	4.0	6.0



**SPECIFICATIONS**

TC212 TYPE

Rated Cap (uF)	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
1.5	A	TC212A155 ○ 025 □	0.5	6.0	5.0
1.5	B	TC212B155 ○ 025 □	0.5	6.0	3.5
2.2	A	TC212A225 ○ 025 □	0.6	6.0	4.0
2.2	B	TC212B225 ○ 025 □	0.6	6.0	3.0
2.2	C	TC212C225 ○ 025 □	0.6	6.0	2.0
3.3	A	TC212A335 ○ 025 □	0.8	6.0	3.0
3.3	B	TC212B335 ○ 025 □	0.8	6.0	2.5
3.3	C	TC212C335 ○ 025 □	0.8	6.0	2.0
4.7	A	TC212A475 ○ 025 □	1.2	8.0	3.0
4.7	B	TC212B475 ○ 025 □	1.2	6.0	1.0
4.7	C	TC212C475 ○ 025 □	1.2	6.0	0.6
6.8	B	TC212B685 ○ 025 □	1.7	6.0	1.2
6.8	C	TC212C685 ○ 025 □	1.7	6.0	0.8
6.8	D	TC212D685 ○ 025 □	1.7	6.0	0.5
10	B	TC212B106 ○ 025 □	2.5	6.0	2.0
10	C	TC212C106 ○ 025 □	2.5	6.0	1.4
10	D	TC212D106 ○ 025 □	2.5	6.0	0.8
15	B	TC212B156 ○ 025 □	3.8	8.0	3.0
15	C	TC212C156 ○ 025 □	3.8	6.0	1.2
15	D	TC212D156 ○ 025 □	3.8	6.0	0.8
22	C	TC212C226 ○ 025 □	5.5	6.0	1.0
22	D	TC212D226 ○ 025 □	5.5	6.0	0.6
33	D	TC212D336 ○ 025 □	8.3	6.0	0.6
33	E	TC212E336 ○ 025 □	8.3	6.0	0.5
47	D	TC212D476 ○ 025 □	11.7	6.0	0.4
47	E	TC212E476 ○ 025 □	11.7	6.0	0.4
68	E	TC212E686 ○ 025 □	17.0	6.0	0.3
35V, +85°C (20V @ +125°C )					
0.33	A	TC212A334 ○ 035 □	0.5	4.0	12.0
0.47	A	TC212A474 ○ 035 □	0.5	4.0	10.0
0.47	B	TC212B474 ○ 035 □	0.5	4.0	6.0
0.68	A	TC212A684 ○ 035 □	0.5	4.0	6.0
0.68	B	TC212B684 ○ 035 □	0.5	4.0	6.0
1	A	TC212A105 ○ 035 □	0.5	4.0	8.0
1	B	TC212B105 ○ 035 □	0.5	4.0	2.0
1.5	B	TC212B155 ○ 035 □	0.5	6.0	4.0
1.5	C	TC212C155 ○ 035 □	0.5	6.0	3.0
2.2	A	TC212A225 ○ 035 □	0.8	6.0	3.0
2.2	B	TC212B225 ○ 035 □	0.8	6.0	3.0
2.2	C	TC212C225 ○ 035 □	0.8	6.0	2.5
3.3	B	TC212B335 ○ 035 □	1.2	6.0	3.0

Rated Cap (uF)	Case	Part Number	DCL(μA) +25°C Max.	DF(%) +25°C 120Hz Max.	ESR(Ω) +25°C 100kHz Max.
3.3	C	TC212C335 ○ 035 □	1.2	6.0	2.0
4.7	B	TC212B475 ○ 035 □	1.6	6.0	2.0
4.7	C	TC212C475 ○ 035 □	1.6	6.0	2.0
4.7	D	TC212D475 ○ 035 □	1.6	6.0	1.0
6.8	C	TC212C685 ○ 035 □	2.4	6.0	1.2
6.8	D	TC212D685 ○ 035 □	2.4	6.0	0.8
10	C	TC212C106 ○ 035 □	3.5	6.0	1.5
10	D	TC212D106 ○ 035 □	3.5	6.0	0.6
10	E	TC212E106 ○ 035 □	3.5	6.0	0.6
15	D	TC212D156 ○ 035 □	5.25	6.0	0.8
15	E	TC212E156 ○ 035 □	5.3	6.0	0.6
22	D	TC212D226 ○ 035 □	7.7	6.0	0.6
22	E	TC212E226 ○ 035 □	7.7	6.0	0.3
33	E	TC212E336 ○ 035 □	11.0	6.0	0.5
47	E	TC212E476 ○ 035 □	16.5	8.0	0.5
50V, +85°C (32V @ +125°C )					
0.15	B	TC212B154 ○ 050 □	0.5	4.0	12.0
0.22	A	TC212A224 ○ 050 □	0.5	4.0	15.0
0.22	B	TC212B224 ○ 050 □	0.5	4.0	12.0
0.33	A	TC212A334 ○ 050 □	0.5	4.0	12.0
0.33	B	TC212B334 ○ 050 □	0.5	4.0	8.0
0.47	A	TC212A474 ○ 050 □	0.5	4.0	8.0
0.47	B	TC212B474 ○ 050 □	0.5	4.0	6.0
0.47	C	TC212C474 ○ 050 □	0.5	4.0	5.0
0.68	A	TC212A684 ○ 050 □	0.5	4.0	8.0
0.68	B	TC212B684 ○ 050 □	0.5	4.0	5.0
0.68	C	TC212C684 ○ 050 □	0.5	4.0	4.0
1	B	TC212B105 ○ 050 □	0.5	6.0	4.0
1	C	TC212C105 ○ 050 □	0.5	4.0	3.5
1.5	B	TC212B155 ○ 050 □	0.8	6.0	3.5
1.5	C	TC212C155 ○ 050 □	0.8	6.0	2.5
2.2	B	TC212B225 ○ 050 □	1.1	6.0	1.5
2.2	C	TC212C225 ○ 050 □	1.1	6.0	3.0
2.2	D	TC212D225 ○ 050 □	1.1	6.0	2.0
3.3	B	TC212B335 ○ 050 □	1.7	6.0	3.0
3.3	C	TC212C335 ○ 050 □	1.7	6.0	2.0
3.3	D	TC212D335 ○ 050 □	1.7	6.0	1.0
4.7	D	TC212D475 ○ 050 □	2.4	6.0	0.8
6.8	D	TC212D685 ○ 050 □	3.4	6.0	0.7
10	D	TC212D106 ○ 050 □	5.0	6.0	0.7
10	E	TC212E106 ○ 050 □	5.0	6.0	0.4
15	E	TC212E156 ○ 050 □	7.5	6.0	0.4

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

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**TYPICAL FREQUENCY CHARACTERISTICS**

