Type 267 E Series

(No.P-267E-E005)

Type 267 is specially designed to SMD, based on our technology of chip tantalum capacitors acquired over many years. Fully-molded construction provides excellent mechanical protection, superior moisture resistance and high soldering heat resistance. Type 267 E Series has increased capacitance. Its volume efficiency is greatly improved compared to the same case size of M series.

FEATURES

1. Type 267 E Series has increased capacitance. Its volume efficiency is greatly improved compared to the same case size of M series.
2. Dimensional accuracy and symmetrical terminal structure suitable for high-density mounting ensures excellent "Self-Alignment".
3. Soldering: 260℃ for 10 seconds by re-flow soldering.
4. Lead-free and RoHS Compliant

RATING

Item	Rating
Category Temperature Range (Operating Temperature Range)	-55 ～ +125℃ (To be used at derated voltage when temperature exceeds 85℃. At 125°C, 2/3 × rated voltage)
Rated Temperature (Max. Operating Temp. at Rated Voltage)	+85°C
Rated Voltage	2.5 ～ 50 DCV
Nominal Capacitance	0.22 ～ 680 μF
Capacitance Tolerance	± 20%(M), ± 10%(K)
Failure Rate Level	1%/1000 h

ORDERING INFORMATION

267	E	1602	106	M	R	533
TYPE	SERIES	RATED VOLTAGE	CAPACITANCE	CAPACITANCE TOLERANCE	STYLE OF REELED PACKAGE	SPECIAL CODE

Marking	Rated voltage
2501	2.5VDC
4001	4DVC
6301	6.3DVC
1002	10VDC
1602	16VDC
2002	20VDC
2502	25VDC
3502	35VDC
5002	50VDC

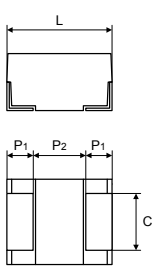
Marking	Capacitance	Marking	Capacitance
224	0.22 μF	226	22 μF
684	0.68 μF	336	33 μF
105	1.0 μF	476	47 μF
155	1.5 μF	686	68 μF
225	2.2 μF	107	100 μF
335	3.3 μF	157	150 μF
475	4.7 μF	227	220 μF
685	6.8 μF	337	330 μF
106	10 μF	477	470 μF
156	15 μF	687	680 μF

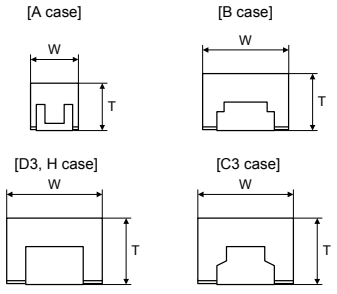
Marking	Capacitance Tolerance
K	±10%
M	±20%

（Taping specification）

Code	Reel Size	AnodeNotation
R	φ180 Reel	Feed hole: -
L	φ180 Reel	Feed hole: +
N	φ330 Reel	Feed hole: -
P	φ330 Reel	Feed hole: +

DIMENSIONS

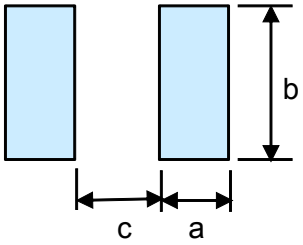




(mm)

Case code	EIA Code	L±0.2	W±0.2	T±0.2	P_1±0.2	P_2 min.	C±0.1
A	3216	3.2	1.6	1.6	0.75	1.4	1.2
B	3528	3.5	2.8	1.9	0.8	1.5	2.2
C3	6032	6	3.2	2.5	1.3	3	2.2
D3	7343	7.3	4.4	2.8	1.3	4	2.4
H	7343H	7.3	4.4	4.1	1.3	4	2.4

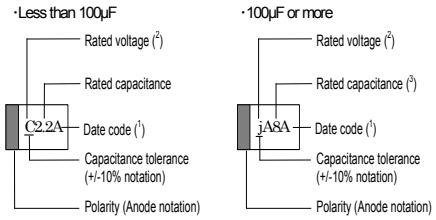
RECOMMENDED SOLDER PAD LAYOUT



Case code	EIA Code	a		b	c
		Flow	Reflow		
A	3216	3	2	1.5	1.5
B	3528	3.2	2	2.4	1.8
C3	6032	4.2	2.4	2.5	3.3
D3	7343	5.2	2.4	2.7	4.6
H	7343H	5.2	2.4	2.7	4.6

MARKING

[A case]



Note (1): Date codes are based on the Annex 1 Table 13 of JIS C 5101-1.

Note (2): Rated voltage codes

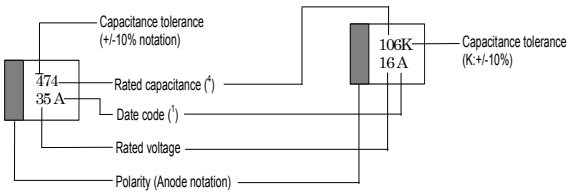
Rated voltage	2.5	4	6.3	10	16	20	25	35	50
code	e	g	j	A	C	D	E	V	H

Note (3): Rated capacitance codes

Capacitance μF	100	150	220	330	470	680
Code	A8	E8	J8	N8	S8	W8

Note (4): First two digits are significant figures of capacitance value(pF).Third digit is the number of zeros following.

[B case] [C3, D3, H case]



RATING AND CASE SIZE

Sep.,2017

R.V.(VDC) / Cap.(μF)	2.5	4	6.3	10	16	20	25	35	50
0.22									A
0.33									
0.47									
0.68								A	B
1.0							A	A	
1.5						A	A	A	
2.2					A	A	A	A, B	C3
3.3				A	A	A	A, B	B	
4.7			A	A	A	A, B	A, B		D3
6.8		A	A	A	A, B	A, B	B	C3	
10		A	A	A, B	A, B	B	B, C3	C3	
15	A	A	A, B	A, B	A, B	C3	C3	D3	
22	A	A, B	A, B	A, B	B, C3	C3	C3, D3	D3	
33	A, B	A, B	A, B	A, B, C3	B, C3	D3	D3		
47	A, B	A, B	A, B, C3	B, C3	C3, D3	D3			
68	A, B	A, B, C3	B, C3	B, C3, D3	C3, D3	H			
100	A, B	A, B, C3	A, B, C3, D3	B, C3, D3	D3, H	H	H		
150	B	B, C3, D3	B, C3, D3	C3, D3, H					
220	C3	B, C3, D3	C3, D3, H	C3, D3, H					
330		C3, D3	C3, D3, H	H					
470		C3, D3	D3	H					
680		D3	D3						

CATALOG NUMBERS AND RATING

Sep.,2017

Catalog Number (1)(2)	U_R VDC	U_S VDC		C_R μF	Case code	Leakage current(DCL) μA			Variation rate of cap.(ΔC/C)			Dissipation factor				ESR Ω		Surge		Resistance to soldering he		Resistance to solvent	Temp. cycling		Damp heat		Life	
		85℃	125℃			20℃	85℃	125℃	-55℃	85℃	125℃	-55℃	20℃	85℃	125℃	10kHz	100kHz	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%	ΔC/C%	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%
267E 2501 156 _ (1) _ (2)	2.5	3.3	2.2	15	A	0.5	5	6.3	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2501 226 _ (1) _ (2)	↓	↓	↓	22	A	0.6	6	6.9	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2501 336 _ (1) _ (2) 533	↓	↓	↓	33	A	0.8	8	10	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2501 336 _ (1) _ (2)	↓	↓	↓	33	B	0.8	8	10	±10	±10	±15	0.12	0.08	0.08	0.10	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2501 476 _ (1) _ (2) 533	↓	↓	↓	47	A	1.2	12	15	±10	±10	±15	0.15	0.08	0.08	0.10	4.0	3.6	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2501 476 _ (1) _ (2)	↓	↓	↓	47	B	1.2	12	15	±10	±10	±15	0.12	0.08	0.08	0.10	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2501 686 _ (1) _ (2) 533	↓	↓	↓	68	A	1.7	17	21	±20	±20	±20	0.30	0.18	0.18	0.22	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±15
267E 2501 686 _ (1) _ (2)	↓	↓	↓	68	B	1.7	17	21	±10	±10	±15	0.12	0.08	0.08	0.10	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2501 107 _ (1) _ (2) 534	↓	↓	↓	100	A	2.5	25	32	±20	±20	±20	0.30	0.18	0.18	0.22	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 2501 107 _ (1) _ (2) 533	↓	↓	↓	100	B	2.5	25	31	±10	±10	±15	0.25	0.12	0.12	0.12	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2501 157 _ (1) _ (2) 533	↓	↓	↓	150	B	3.8	38	47	±20	±20	±20	0.30	0.16	0.16	0.18	2.0	1.8	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 2501 227 _ (1) _ (2) 734	↓	↓	↓	220	C3	5.5	55	69	±10	±10	±15	0.22	0.12	0.12	0.14	1.0	0.9	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 4001 685 _ (1) _ (2)	4	5	3.2	6.8	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 106 _ (1) _ (2)	↓	↓	↓	10	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 156 _ (1) _ (2)	↓	↓	↓	15	A	0.6	6	7.5	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 226 _ (1) _ (2) 533	↓	↓	↓	22	A	0.9	9	11	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 226 _ (1) _ (2)	↓	↓	↓	22	B	0.9	9	11	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 336 _ (1) _ (2) 533	↓	↓	↓	33	A	1.3	13	17	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 336 _ (1) _ (2)	↓	↓	↓	33	B	1.3	13	17	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 476 _ (1) _ (2) 533	↓	↓	↓	47	A	1.9	19	24	±20	±20	±20	0.20	0.12	0.12	0.14	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±15
267E 4001 476 _ (1) _ (2)	↓	↓	↓	47	B	1.9	19	24	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 686 _ (1) _ (2) 534	↓	↓	↓	68	A	2.7	27	34	±20	±20	±20	0.30	0.18	0.18	0.22	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 4001 686 _ (1) _ (2) 533	↓	↓	↓	68	B	2.7	27	34	±10	±10	±15	0.20	0.10	0.10	0.10	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 4001 686 _ (1) _ (2) 720	↓	↓	↓	68	C3	2.7	27	34	±10	±10	±15	0.08	0.06	0.06	0.08	0.6	0.55	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 107 _ (1) _ (2) 534	↓	↓	↓	100	A	4.0	40	50	±20	±20	±20	0.30	0.18	0.18	0.22	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 4001 107 K _ (2) 533	↓	↓	↓	100	B	4.0	40	50	±20	±20	±20	0.22	0.12	0.12	0.14	2.0	1.8	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 4001 107 M _ (2) 533	↓	↓	↓	100	B	4.0	40	50	±10	±10	±15	0.25	0.12	0.12	0.12	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 4001 107 _ (1) _ (2) 720	↓	↓	↓	100	C3	4.0	40	50	±10	±10	±15	0.10	0.08	0.08	0.08	1.0	0.9	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 157 _ (1) _ (2) 534	↓	↓	↓	150	B	6.0	60	75	±20	±20	±20	0.34	0.18	0.18	0.20	2.0	1.8	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 4001 157 _ (1) _ (2) 734	↓	↓	↓	150	C3	6.0	60	75	±10	±10	±15	0.12	0.08	0.08	0.10	1.0	0.9	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 4001 157 _ (1) _ (2) 720	↓	↓	↓	150	D3	6.0	60	75	±10	±10	±15	0.10	0.08	0.08	0.08	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 227 M _ (2) 534	↓	↓	↓	220	B	8.8	88	110	±20	±20	±20	0.34	0.18	0.18	0.20	2.0	1.8	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 4001 227 _ (1) _ (2) 734	↓	↓	↓	220	C3	8.8	88	110	±10	±10	±15	0.22	0.12	0.12	0.14	1.0	0.9	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 4001 227 _ (1) _ (2) 720	↓	↓	↓	220	D3	8.8	88	110	±10	±10	±15	0.15	0.08	0.08	0.10	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 337 _ (1) _ (2) 735	↓	↓	↓	330	C3	13	132	165	±10	±10	±15	0.22	0.14	0.14	0.16	1.0	0.9	A	±15	A	±5	±10	A	±10	A	±10	B	±10
267E 4001 337 _ (1) _ (2) 734	↓	↓	↓	330	D3	13	132	165	±10	±10	±15	0.18	0.10	0.10	0.12	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 4001 477 _ (1) _ (2) 735	↓	↓	↓	470	C3	19	188	235	±30	±20	±20	0.36	0.26	0.26	0.30	1.0	0.9	A	±20	A	±10	±3	A	±20	C	±20	C	±20
267E 4001 477 _ (1) _ (2) 734	↓	↓	↓	470	D3	19	188	235	±15	±10	±15	0.22	0.18	0.18	0.20	0.5	0.45	A	±15	A	±10	±10	A	±20	A	±10	B	±15
267E 4001 687 _ (1) _ (2) 734	↓	↓	↓	680	D3	27	272	340	±15	±10	±15	0.22	0.18	0.18	0.20	0.5	0.45	A	±15	A	±10	±10	A	±20	A	±10	B	±15
267E 6301 475 _ (1) _ (2)	6.3	8	5	4.7	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 685 _ (1) _ (2)	↓	↓	↓	6.8	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 106 _ (1) _ (2)	↓	↓	↓	10	A	0.6	6	7.9	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 156 _ (1) _ (2) 533	↓	↓	↓	15	A	0.9	9	12	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 156 _ (1) _ (2)	↓	↓	↓	15	B	0.9	9	12	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 226 _ (1) _ (2) 533	↓	↓	↓	22	A	1.4	14	17	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 226 _ (1) _ (2)	↓	↓	↓	22	B	1.4	14	17	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 336 _ (1) _ (2) 533	↓	↓	↓	33	A	2.1	21	26	±20	±20	±20	0.20	0.12	0.12	0.14	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±15
267E 6301 336 _ (1) _ (2)	↓	↓	↓	33	B	2.1	21	26	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10

Catalog Number ([1])([2])	U_R VDC	U_S VDC		C_R µF	Case code	Leakage current(DCL) µA			ariation rate of cap.(ΔC/C)			Dissipation factor				ESR Ω		Surge		esistance to soldering he		Resistance to solvent	Temp. cycling		Damp heat		Life	
		85℃	125℃			20℃	85℃	125℃	-55℃	85℃	125℃	-55℃	20℃	85℃	125℃	10kHz	100kHz	DCL([3])	ΔC/C%	DCL([3])	ΔC/C%	ΔC/C%	DCL([3])	ΔC/C%	DCL([3])	ΔC/C%	DCL([3])	ΔC/C%
267E 6301 476 _[1] _[2] 534	6.3	8	5	47	A	3	30	37	±20	±20	±20	0.20	0.12	0.12	0.14	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 6301 476 _[1] _[2] 533	↓	↓	↓	47	B	3	30	37	±10	±10	±15	0.20	0.10	0.10	0.10	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 6301 476 _[1] _[2] 720	↓	↓	↓	47	C3	3	30	37	±10	±10	±15	0.08	0.06	0.06	0.08	0.6	0.55	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 686 _[1] _[2] 533	↓	↓	↓	68	B	4.3	43	54	±20	±10	±15	0.18	0.10	0.10	0.12	2.0	1.8	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 6301 686 _[1] _[2] 720	↓	↓	↓	68	C3	4.3	43	54	±10	±10	±15	0.08	0.06	0.06	0.08	1.0	0.9	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 107 _[1] _[2] 535	↓	↓	↓	100	A	6.3	126	157	±20	±20	±20	0.30	0.18	0.18	0.18	2.2	2.0	C	±20	C	±20	±3	C	±20	C	±20	C	±30
267E 6301 107 _[1] _[2] 534	↓	↓	↓	100	B	6.3	63	79	±20	±20	±20	0.22	0.12	0.12	0.14	2.0	1.8	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 6301 107 _[1] _[2] 734	↓	↓	↓	100	C3	6.3	63	79	±10	±10	±15	0.12	0.08	0.08	0.08	1.0	0.9	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 6301 107 _[1] _[2] 720	↓	↓	↓	100	D3	6.3	63	79	±10	±10	±15	0.10	0.08	0.08	0.08	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 157 _[1] _[2] 534	↓	↓	↓	150	B	9.5	95	118	±20	±20	±20	0.30	0.20	0.20	0.22	2.0	1.8	C	±20	C	±20	±3	C	±20	C	±20	C	±30
267E 6301 157 _[1] _[2] 734	↓	↓	↓	150	C3	9.5	95	118	±10	±10	±15	0.18	0.10	0.10	0.12	1.0	0.9	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 6301 157 _[1] _[2] 720	↓	↓	↓	150	D3	9.5	95	118	±10	±10	±15	0.15	0.08	0.08	0.10	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 227 _[1] _[2] 735	↓	↓	↓	220	C3	14	139	173	±10	±10	±15	0.22	0.14	0.14	0.16	1.0	0.9	A	±15	A	±5	±10	A	±10	A	±10	B	±10
267E 6301 227 _[1] _[2] 734	↓	↓	↓	220	D3	14	139	173	±10	±10	±15	0.15	0.08	0.08	0.10	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 227 _[1] _[2]	↓	↓	↓	220	H	14	139	173	±10	±10	±15	0.15	0.08	0.08	0.10	0.3	0.27	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 337 _[1] _[2] 735	↓	↓	↓	330	C3	21	208	260	±30	±20	±20	0.30	0.20	0.20	0.24	1.0	0.9	A	±20	A	±10	±3	A	±20	C	±20	C	±20
267E 6301 337 _[1] _[2] 734	↓	↓	↓	330	D3	21	208	260	±15	±10	±15	0.16	0.14	0.14	0.16	0.5	0.45	A	±15	A	±10	±10	A	±20	A	±10	B	±15
267E 6301 337 _[1] _[2]	↓	↓	↓	330	H	21	208	260	±10	±10	±15	0.15	0.08	0.08	0.10	0.3	0.27	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 6301 477 _[1] _[2] 734	↓	↓	↓	470	D3	30	296	370	±15	±10	±15	0.18	0.16	0.16	0.18	0.5	0.45	A	±15	A	±10	±10	A	±20	A	±10	B	±15
267E 6301 687 M _[2] 734	↓	↓	↓	680	D3	43	428	535	±15	±10	±15	0.24	0.20	0.20	0.24	0.5	0.45	A	±15	A	±10	±10	A	±20	A	±20	B	±20
267E 1002 335 _[1] _[2]	10	13	8	3.3	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 475 _[1] _[2]	↓	↓	↓	4.7	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 685 _[1] _[2]	↓	↓	↓	6.8	A	0.7	7	8.5	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 106 _[1] _[2] 533	↓	↓	↓	10	A	1	10	13	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 106 _[1] _[2]	↓	↓	↓	10	B	1	10	13	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 156 _[1] _[2] 533	↓	↓	↓	15	A	1.5	15	19	±20	±20	±20	0.20	0.12	0.12	0.14	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 1002 156 _[1] _[2]	↓	↓	↓	15	B	1.5	15	19	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 226 _[1] _[2] 533	↓	↓	↓	22	A	2.2	22	28	±20	±20	±20	0.20	0.12	0.12	0.14	2.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 1002 226 K _[2]	↓	↓	↓	22	B	2.2	22	28	±10	±10	±15	0.12	0.08	0.08	0.10	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 1002 226 M _[2]	↓	↓	↓	22	B	2.2	22	28	±10	±10	±15	0.08	0.06	0.06	0.08	2.0	1.8	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 336 _[1] _[2] 534	↓	↓	↓	33	A	3.3	33	41	±20	±20	±20	0.20	0.14	0.14	0.16	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 1002 336 _[1] _[2] 533	↓	↓	↓	33	B	3.3	33	41	±10	±10	±15	0.12	0.08	0.08	0.10	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 1002 336 _[1] _[2] 720	↓	↓	↓	33	C3	3.3	33	41	±10	±10	±15	0.08	0.06	0.06	0.08	0.6	0.55	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 476 _[1] _[2] 533	↓	↓	↓	47	B	4.7	47	59	±10	±10	±15	0.15	0.08	0.08	0.10	2.0	1.8	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 1002 476 _[1] _[2] 720	↓	↓	↓	47	C3	4.7	47	59	±10	±10	±15	0.08	0.06	0.06	0.08	1.0	0.9	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 686 _[1] _[2] 534	↓	↓	↓	68	B	6.8	68	85	±20	±20	±20	0.18	0.12	0.12	0.14	2.0	1.8	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 1002 686 _[1] _[2] 734	↓	↓	↓	68	C3	6.8	68	85	±10	±10	±15	0.12	0.10	0.10	0.12	1.0	0.9	A	±15	A	±5	±10	A	±10	A	±10	B	±10
267E 1002 686 _[1] _[2] 720	↓	↓	↓	68	D3	6.8	68	85	±10	±10	±15	0.08	0.06	0.06	0.08	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 107 _[1] _[2] 534	↓	↓	↓	100	B	10	100	125	±20	±20	±20	0.28	0.18	0.18	0.20	2.0	1.8	C	±20	C	±20	±3	C	±20	C	±20	C	±30
267E 1002 107 _[1] _[2] 734	↓	↓	↓	100	C3	10	100	125	±10	±10	±15	0.12	0.10	0.10	0.12	1.0	0.9	A	±15	A	±5	±10	A	±10	A	±10	B	±10
267E 1002 107 _[1] _[2] 720	↓	↓	↓	100	D3	10	100	130	±10	±10	±15	0.15	0.08	0.08	0.10	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 157 _[1] _[2] 735	↓	↓	↓	150	C3	15	150	188	±30	±20	±20	0.26	0.14	0.14	0.16	1.0	0.9	A	±20	A	±10	±3	A	±20	C	±20	C	±20
267E 1002 157 _[1] _[2] 734	↓	↓	↓	150	D3	15	150	188	±10	±10	±15	0.15	0.08	0.08	0.10	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 157 _[1] _[2]	↓	↓	↓	150	H	15	150	188	±10	±10	±15	0.15	0.08	0.08	0.10	0.3	0.27	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 227 _[1] _[2] 735	↓	↓	↓	220	C3	22	220	275	±30	±20	±20	0.26	0.14	0.14	0.16	1.0	0.9	A	±20	A	±10	±3	A	±20	C	±20	C	±20
267E 1002 227 _[1] _[2] 734	↓	↓	↓	220	D3	22	220	275	±15	±10	±15	0.15	0.10	0.10	0.12	0.5	0.45	A	±15	A	±10	±10	A	±20	A	±10	B	±15
267E 1002 227 _[1] _[2]	↓	↓	↓	220	H	22	220	275	±10	±10	±15	0.15	0.08	0.08	0.10	0.3	0.27	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 337 _[1] _[2]	↓	↓	↓	330	H	33	330	412	±10	±10	±15	0.15	0.10	0.10	0.12	0.3	0.27	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1002 477 _[1] _[2]	↓	↓	↓	470	H	47	470	588	±10	±10	±15	0.15	0.10	0.10	0.12	0.3	0.27	A	±5	A	±5	±3	A	±5	A	±5	B	±10

Catalog Number (1)(2)	U_R VDC	U_S VDC		C_R μF	Case code	Leakage current(DCL) μA			ariation rate of cap.(ΔC/C)			Dissipation factor				ESR Ω		Surge		esistance to soldering he		Resistance to solvent	Temp. cycling		Damp heat		Life	
		85℃	125℃			20℃	85℃	125℃	-55℃	85℃	125℃	-55℃	20℃	85℃	125℃	10kHz	100kHz	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%	ΔC/C%	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%
267E 1602 225 _[1] _[2]	16	20	13	2.2	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 335 _[1] _[2]	↓	↓	↓	3.3	A	0.5	5	6.6	±10	±10	±15	0.08	0.06	0.06	0.08	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 475 _[1] _[2]	↓	↓	↓	4.7	A	0.8	8	9.4	±10	±10	±15	0.12	0.08	0.08	0.10	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 685 _[1] _[2] 533	↓	↓	↓	6.8	A	1.1	11	14	±10	±10	±15	0.10	0.06	0.08	0.10	4.0	3.6	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 685 _[1] _[2]	↓	↓	↓	6.8	B	1.1	11	14	±10	±10	±15	0.08	0.06	0.06	0.08	2.2	2.0	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 106 _[1] _[2] 533	↓	↓	↓	10	A	1.6	16	20	±20	±20	±20	0.14	0.10	0.10	0.12	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 1602 106 _[1] _[2]	↓	↓	↓	10	B	1.6	16	20	±10	±10	±15	0.08	0.06	0.06	0.08	2.2	2.0	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 156 _[1] _[2] 533	↓	↓	↓	15	A	2.4	24	30	±20	±20	±20	0.18	0.12	0.12	0.14	4.0	3.6	A	±10	A	±10	±3	A	±20	C	±10	C	±20
267E 1602 156 _[1] _[2]	↓	↓	↓	15	B	2.4	24	30	±10	±10	±15	0.12	0.08	0.08	0.10	2.2	2.0	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 1602 226 _[1] _[2] 533	↓	↓	↓	22	B	3.5	35	44	±12	±10	±15	0.14	0.10	0.10	0.12	2.2	2.0	A	±15	A	±10	±3	A	±5	A	±5	B	±15
267E 1602 226 _[1] _[2] 720	↓	↓	↓	22	C3	3.5	35	44	±10	±10	±15	0.08	0.06	0.06	0.08	0.6	0.55	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 336 _[1] _[2] 533	↓	↓	↓	33	B	5.3	53	66	±10	±10	±15	0.14	0.10	0.10	0.12	2.0	1.9	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 1602 336 _[1] _[2] 720	↓	↓	↓	33	C3	5.3	53	66	±10	±10	±15	0.08	0.06	0.06	0.08	1.0	0.9	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 476 _[1] _[2] 734	↓	↓	↓	47	C3	7.5	75	94	±10	±10	±15	0.12	0.10	0.10	0.12	1.0	0.9	A	±15	A	±5	±10	A	±10	A	±10	B	±10
267E 1602 476 _[1] _[2] 720	↓	↓	↓	47	D3	7.5	75	94	±10	±10	±15	0.08	0.06	0.06	0.08	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 686 _[1] _[2] 734	↓	↓	↓	68	C3	11	109	136	±20	±15	±15	0.12	0.10	0.10	0.12	1.0	0.9	A	±15	A	±10	±3	A	±10	A	±15	B	±15
267E 1602 686 _[1] _[2] 720	↓	↓	↓	68	D3	11	109	136	±10	±10	±15	0.10	0.08	0.08	0.08	0.5	0.45	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 1602 107 _[1] _[2] 734	↓	↓	↓	100	D3	16	160	200	±15	±10	±15	0.12	0.10	0.10	0.12	0.5	0.45	A	±15	A	±10	±10	A	±20	A	±10	B	±15
267E 1602 107 _[1] _[2]	↓	↓	↓	100	H	16	160	200	±10	±10	±15	0.15	0.08	0.08	0.10	0.4	0.36	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 155 _[1] _[2]	20	26	16	1.5	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 225 _[1] _[2]	↓	↓	↓	2.2	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 335 _[1] _[2]	↓	↓	↓	3.3	A	0.7	7	8.3	±10	±10	±15	0.12	0.08	0.08	0.10	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 475 _[1] _[2] 533	↓	↓	↓	4.7	A	0.9	9	12	±10	±10	±15	0.10	0.06	0.08	0.10	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 475 _[1] _[2]	↓	↓	↓	4.7	B	0.9	9	12	±10	±10	±15	0.08	0.06	0.06	0.08	3.0	2.7	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 685 _[1] _[2] 533	↓	↓	↓	6.8	A	1.4	14	17	±15	±15	±15	0.14	0.10	0.10	0.10	5.0	4.5	A	±5	A	±5	±3	A	±15	A	±5	B	±15
267E 2002 685 _[1] _[2]	↓	↓	↓	6.8	B	1.4	14	17	±10	±10	±15	0.08	0.06	0.06	0.08	3.0	2.7	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 106 M _[2]	↓	↓	↓	10	B	2	20	25	±10	±10	±15	0.12	0.08	0.08	0.10	3.0	2.7	A	±5	A	±10	±3	A	±5	A	±5	B	±10
267E 2002 156 _[1] _[2] 720	↓	↓	↓	15	C3	3	30	38	±10	±10	±15	0.08	0.06	0.06	0.08	1.0	0.9	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 226 _[1] _[2] 720	↓	↓	↓	22	C3	4.4	44	55	±10	±10	±15	0.08	0.06	0.06	0.08	1.0	0.9	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 336 _[1] _[2] 720	↓	↓	↓	33	D3	6.6	66	83	±10	±10	±15	0.08	0.06	0.06	0.06	0.8	0.72	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 476 _[1] _[2] 720	↓	↓	↓	47	D3	9.4	94	117	±10	±10	±15	0.08	0.06	0.06	0.06	0.8	0.72	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 686 _[1] _[2]	↓	↓	↓	68	H	13.6	136	170	±10	±10	±15	0.08	0.06	0.06	0.08	0.4	0.36	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2002 107 _[1] _[2]	↓	↓	↓	100	H	20	200	250	±10	±10	±15	0.10	0.08	0.08	0.08	0.4	0.36	A	±5	A	±20	±3	A	±5	A	±5	B	±10
267E 2502 105 _[1] _[2]	25	32	20	1	A	0.5	5	6.3	±10	±10	±15	0.06	0.04	0.04	0.06	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 155 _1 _[2]	↓	↓	↓	1.5	A	0.5	5	6.3	±10	±10	±15	0.08	0.06	0.06	0.08	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 225 _1 _[2]	↓	↓	↓	2.2	A	0.6	6	6.9	±10	±10	±15	0.08	0.06	0.06	0.08	5.0	4.5	A	±10	A	±5	±3	A	±10	C	±10	B	±10
267E 2502 335 _[1] _[2] 533	↓	↓	↓	3.3	A	0.8	8	10	±10	±10	±15	0.08	0.06	0.06	0.08	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 335 _[1] _[2]	↓	↓	↓	3.3	B	0.8	8	10	±10	±10	±15	0.08	0.06	0.06	0.08	3.0	2.7	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 475 _[1] _[2] 533	↓	↓	↓	4.7	A	1.2	12	15	±10	±10	±15	0.08	0.06	0.06	0.08	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 475 _[1] _[2]	↓	↓	↓	4.7	B	1.2	12	15	±10	±10	±15	0.08	0.06	0.06	0.08	3.0	2.7	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 685 _[1] _[2]	↓	↓	↓	6.8	B	1.7	17	21	±10	±10	±15	0.12	0.08	0.08	0.10	3.0	2.7	A	±20	A	±20	±3	A	±20	C	±20	C	±20
267E 2502 106 _[1] _[2] 533	↓	↓	↓	10	B	2.5	25	31	±10	±10	±15	0.08	0.06	0.06	0.08	3.0	2.7	A	±10	A	±10	±3	A	±10	C	±10	B	±10
267E 2502 106 _[1] _[2] 720	↓	↓	↓	10	C3	2.5	25	31	±10	±10	±15	0.08	0.06	0.06	0.08	1.2	1.17	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 156 _[1] _[2] 720	↓	↓	↓	15	C3	3.7	38	48	±10	±10	±15	0.10	0.08	0.08	0.10	1.4	1.3	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 226 _[1] _[2] 734	↓	↓	↓	22	C3	5.5	55	69	±10	±10	±15	0.08	0.06	0.06	0.08	1.0	0.98	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 226 _[1] _[2] 720	↓	↓	↓	22	D3	5.5	55	69	±10	±10	±15	0.08	0.06	0.06	0.06	0.8	0.72	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 336 _[1] _[2] 720	↓	↓	↓	33	D3	8.3	83	104	±10	±10	±15	0.08	0.06	0.06	0.06	0.8	0.72	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 2502 107 _[1] _[2]	↓	↓	↓	100	H	25	250	312	±10	±10	±15	0.15	0.10	0.10	0.12	0.4	0.36	A	±5	A	±20	±3	A	±5	A	±5	B	±10

Catalog Number (1)(2)	U_R VDC	U_S VDC		C_R µF	Case code	Leakage current(DCL) µA			ariation rate of cap.(ΔC/C)			Dissipation factor				ESR Ω		Surge		esistance to soldering he		Resistance to solvent	Temp. cycling		Damp heat		Life	
		85℃	125℃			20℃	85℃	125℃	-55℃	85℃	125℃	-55℃	20℃	85℃	125℃	10kHz	100kHz	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%	ΔC/C%	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%	DCL(3)	ΔC/C%
267E 3502 684 _1 _2	35	44	28	0.68	A	0.5	5	6.3	±10	±10	±15	0.06	0.04	0.04	0.06	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 3502 105 _1 _2	↓	↓	↓	1	A	0.5	5	6.3	±10	±10	±15	0.06	0.04	0.04	0.06	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 3502 155 _1 _2	↓	↓	↓	1.5	A	0.5	5	6.6	±10	±10	±15	0.12	0.08	0.08	0.10	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 3502 225 _1 _2 533	↓	↓	↓	2.2	A	0.8	8	9.6	±10	±10	±15	0.08	0.06	0.06	0.08	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 3502 225 _1 _2	↓	↓	↓	2.2	B	0.8	8	9.6	±10	±10	±15	0.08	0.06	0.06	0.08	3.0	2.7	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 3502 335 _1 _2	↓	↓	↓	3.3	B	1.2	12	14	±10	±10	±15	0.08	0.06	0.06	0.08	3.0	2.7	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 3502 685 _1 _2 720	↓	↓	↓	6.8	C3	2.4	24	30	±10	±10	±15	0.08	0.06	0.06	0.08	1.2	1.17	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 3502 106 _1 _2 720	↓	↓	↓	10	C3	3.5	35	44	±10	±10	±15	0.08	0.06	0.06	0.06	1.4	1.3	A	±5	A	±10	±3	A	±5	C	±10	B	±10
267E 3502 156 _1 _2 720	↓	↓	↓	15	D3	5.3	53	66	±10	±10	±15	0.08	0.06	0.06	0.06	0.9	0.81	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 3502 226 _1 _2 720	↓	↓	↓	22	D3	7.7	77	96	±10	±10	±15	0.08	0.06	0.06	0.06	0.9	0.81	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 5002 224 _1 _2	50	63	40	0.22	A	0.5	5	6.3	±10	±10	±15	0.06	0.04	0.04	0.06	5.0	4.5	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 5002 684 _1 _2	↓	↓	↓	0.68	B	0.5	5	6.3	±10	±10	±15	0.06	0.04	0.04	0.06	3.0	2.7	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 5002 225 _1 _2 720	↓	↓	↓	2.2	C3	1.1	11	14	±10	±10	±15	0.08	0.06	0.06	0.08	1.2	1.2	A	±5	A	±5	±3	A	±5	A	±5	B	±10
267E 5002 475 _1 _2 720	↓	↓	↓	4.7	D3	2.4	24	29	±10	±10	±15	0.08	0.06	0.06	0.08	0.9	0.81	A	±5	A	±5	±3	A	±5	A	±5	B	±10

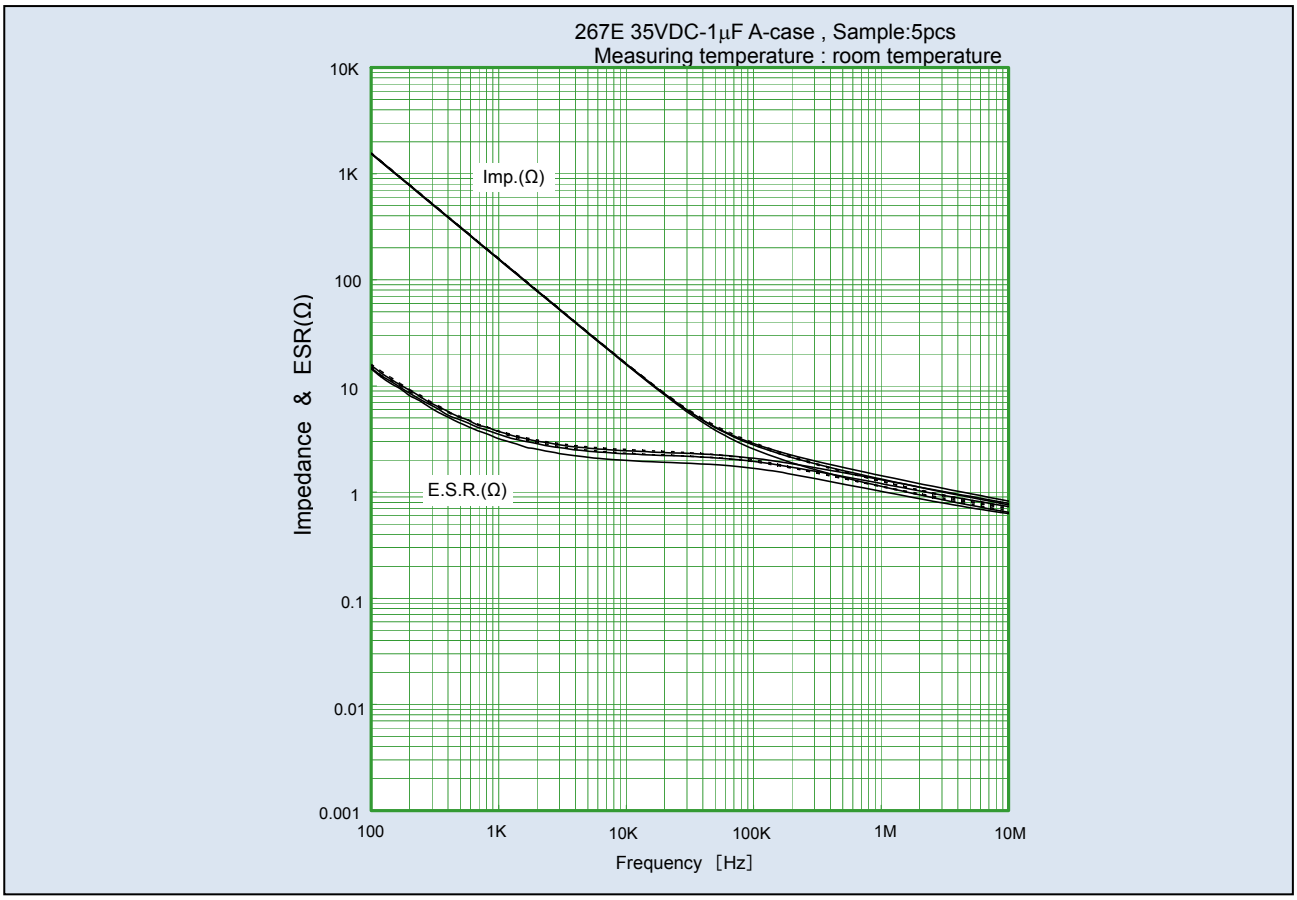
* UR = Rated Voltage US = Surge Voltage CR = Capacitance
Note1 : For Capacitance Tolerance, insert "K" or "M" into _1.
Note2 : For Reeled Package, insert "R", "L", "N" or "P" into _2.
Note3 : *DCL code : A=Shall not exceed the value of initial specification., B=Shall not exceed 1.25 times the value of initial specification.,C=Shall not exceed 2 times the value of initial specification.

PERFORMANCE

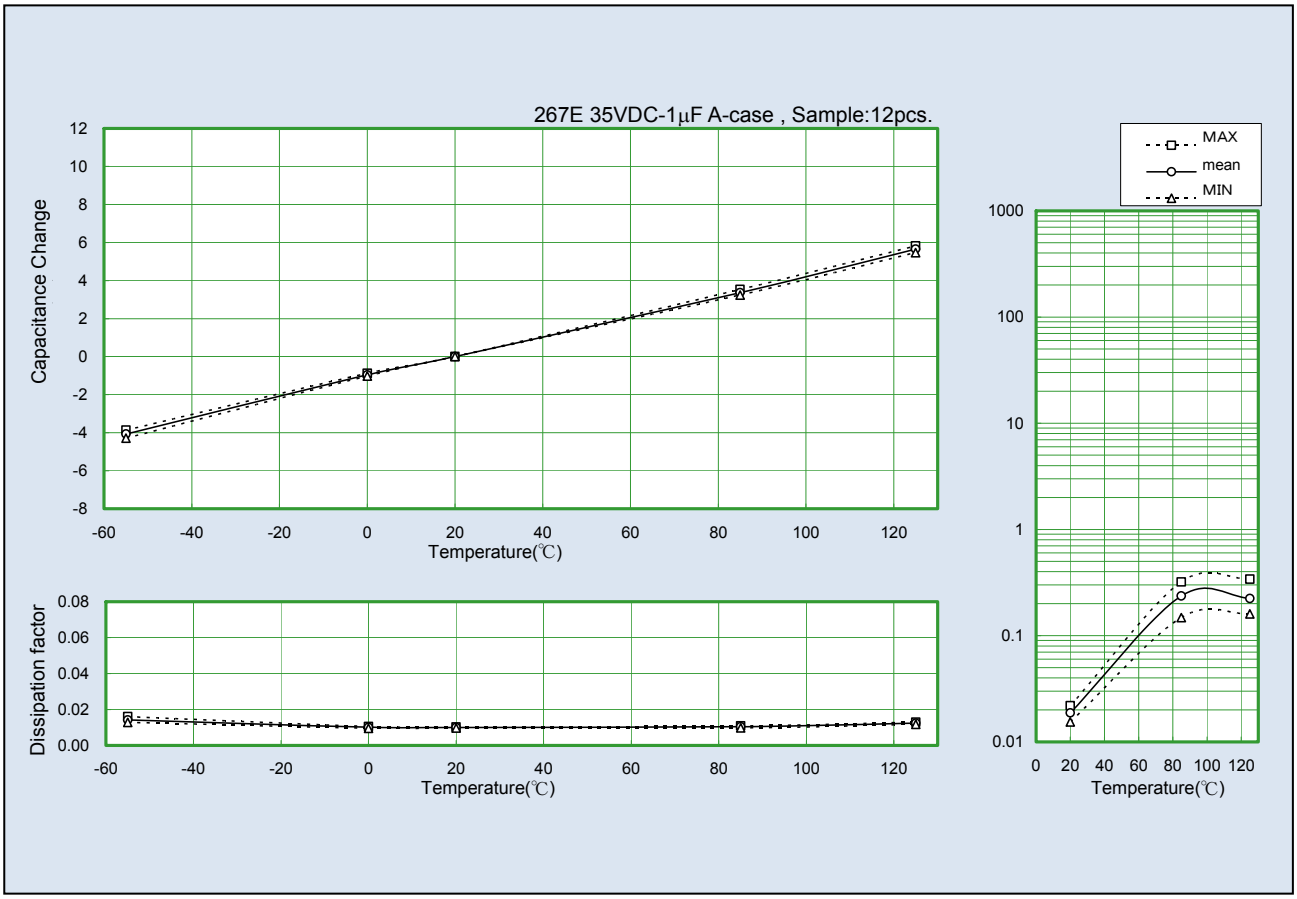
No.	Item			Performance	Test method
1	Leakage Current (μA)			Shall not exceed 0.01 CV or 0.5 whichever is greater.	JIS C 5101-1, 4.9 Applied Voltage : Rated Voltage for 5 min. Temperature : 20°C
2	Capacitance (μF)			Shall be within tolerance of the nominal value specified.	JIS C 5101-1, 4.7 Frequency : 120 Hz± 20% Voltage : 0.5Vrms+1.5 ~2VDC Temperature : 20°C
3	Dissipation Factor			Shall not exceed the values shown in CATALOG NUMBERS AND RATING.	JIS C 5101-1, 4.8 Frequency : 120 Hz± 20% Voltage : 0.5Vrms+1.5 ~2VDC Temperature : 20°C
4	ESR (Equivalent series resistance)			Shall not exceed the values shown in CATALOG NUMBERS AND RATING.	Frequency : 10 kHz or 100kHz Temperature : 20°C
5	Characteristics at High and				JIS C 5101-1, 4.29
		Step1	Leakage Current Capacitance Dissipation Factor	Shall not exceed the value in No.1. Shall be within the specified tolerance. Shall not exceed the values shown in CATALOG NUMBERS AND RATING.	Measuring temperature : 20 ± 2°C
		Step2	Capacitance Change Dissipation Factor	Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the values shown in CATALOG NUMBERS AND RATING.	Measuring temperature : -55±3 °C
		Step3	Leakage Current Capacitance Change Dissipation Factor	Shall not exceed the value in No.1. Shall be within ± 2% of the value at Step 1. Shall not exceed the values shown in CATALOG NUMBERS AND RATING.	Measuring temperature : 20 ± 2°C
		Step4	Leakage Current Capacitance Change Dissipation Factor	Shall not exceed the values shown in CATALOG NUMBERS AND RATING. Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the values shown in CATALOG NUMBERS AND RATING.	Measuring temperature : 85±2°C
		Step5	Leakage Current Capacitance Change Dissipation Factor	Shall not exceed the values shown in CATALOG NUMBERS AND RATING. Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the values shown in CATALOG NUMBERS AND RATING.	Measuring temperature : 125±2°C Measuring voltage : Derated voltage at 125°C
		Step6	Leakage Current Capacitance Change Dissipation Factor	Shall not exceed the value in No.1. Shall be within ± 2% of the value at Step 1. Shall not exceed the values shown in CATALOG NUMBERS AND RATING.	Measuring temperature : 20 ± 2°C
6	Surge		Leakage Current Capacitance Change Dissipation Factor Appearance	Shall not exceed the values shown in CATALOG NUMBERS AND RATING. Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the value in No.3. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.26 Test temperature and applied voltage : Half of specimens was set to 85 ± 2°C,the rest to125 ± 2°C Applied Voltage :DC surge voltage Series protective resistance : 1000 Ω Discharge resistance : 1000 Ω
7	Shear Test			No exfoliation between lead terminal and board.	JIS C 5101-1, 4.34 Capacitors mounted under conditions JIS C 5101-1, 4.33 are used as specimens. Soldering : Indirect heating ・Temperature : 240 ± 10°C ・Duration : 10s or less Applied pressure : 5N Duration : 10 ± 1 s
8	Substrate Bending Test		Capacitance Appearance	Initial value to remain steady during measurement. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.35 Bending : 3 mm Duration:5s
9	Vibration		Capacitance Appearance	Initial value to remain steady during measurement. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.17 Frequency range : 10 ~ 55 Hz Swing width : 1.5 mm Vibration direction :3 directions with mutually right-angled Duration : 2 hours in each of these mutually perpendicular directions (total 6 hours) Mounting :Solder terminal to the printed board
10	Shock			There shall be no intermittent contact of 0.5 ms or greater, short, or open. Nor shall there be any spark discharge, insulation breakdown, or evidence of mechanical damage.	JIS C 5101-1, 4.19 Peak acceleration : 490 m/s^2 Duration : 11 ms Wave form : Half-sine
11	Solderability			Shall be covered to over 3/4 of terminal surface by new soldering.	JIS C 5101-1, 4.15 Solder temperature : 230 ± 5°C Dipping time : 3 to 5 s Dipping depth : Terminal shall be dipped into melted solder.

No.	Item		Performance	Test method
12	Resistance to Soldering Heat	Leakage Current Capacitance Change Dissipation Factor Appearance	Shall not exceed the values shown in CATALOG NUMBERS AND RATING. Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the value in No.3. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.14 One of the following methods (a) Complete dipping method Solder temperature: 260 ± 5°C Dipping time: 10 ± 1 s (b) Terminal dipping method Solder temperature: 260 ± 5°C Dipping time: 10 ± 1 s
13	Component solvent resistance	Leakage Current Capacitance Change Dissipation Factor	Shall not exceed the value in No.1. Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the value in No.3.	JIS C 5101-1, 4.31 Temperature : 23 ± 5°C Dipping time : 5 ± 0.5 min. Conditioning : JIS C 0052 method 2 Solvent : 2-propanol (Isopropyl alcohol)
14	Solvent resistance of marking	Visual examination	After the test the marking shall be legible.	JIS C 5101-1, 4.32 Temperature : 23 ± 5°C Dipping time : 5 ± 0.5 min. Conditioning : JIS C 0052 method 1 Solvent : 2-propanol (Isopropyl alcohol) Rubbing material : cotton wool
15	Rapid Change of Temperature	Leakage Current Capacitance Change Dissipation Factor Appearance	Shall not exceed the values shown in CATALOG NUMBERS AND RATING. Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the value in No.3. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.16 Step 1 : -55 ± 3°C, 30 ± 3 min. Step 2 : 25^{+10}_{-5}°C, 3 min. max. Step 3 : 125 ± 2°C, 30 ± 3 min. Step 4 : 25^{+10}_{-5}°C, 3 min. max. Number of cycles : 5
16	Damp heat,Steady state	Leakage Current Capacitance Change Dissipation Factor Appearance	Shall not exceed the values shown in CATALOG NUMBERS AND RATING. Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the value in No.3. There shall be no evidence of mechanical damage.	IS C 5101-1, 4.22 Temperature : 40 ± 2°C Moisture : 90 ~ 95%RH Duration : 500^{+24}_{0} h
17	Endurance	Leakage Current Capacitance Change Dissipation Factor Appearance	Shall not exceed the values shown in CATALOG NUMBERS AND RATING. Shall be within the values shown in CATALOG NUMBERS AND RATING. Shall not exceed the value in No.3. There shall be no evidence of mechanical damage.	JIS C 5101-1, 4.23 Test temperature and applied voltage : 85 ± 2°C and rated voltage or 125 ± 3°C and 2/3 × rated voltage Duration : 2000^{+72}_{0} h Power supply impedance : 3 Ω or less

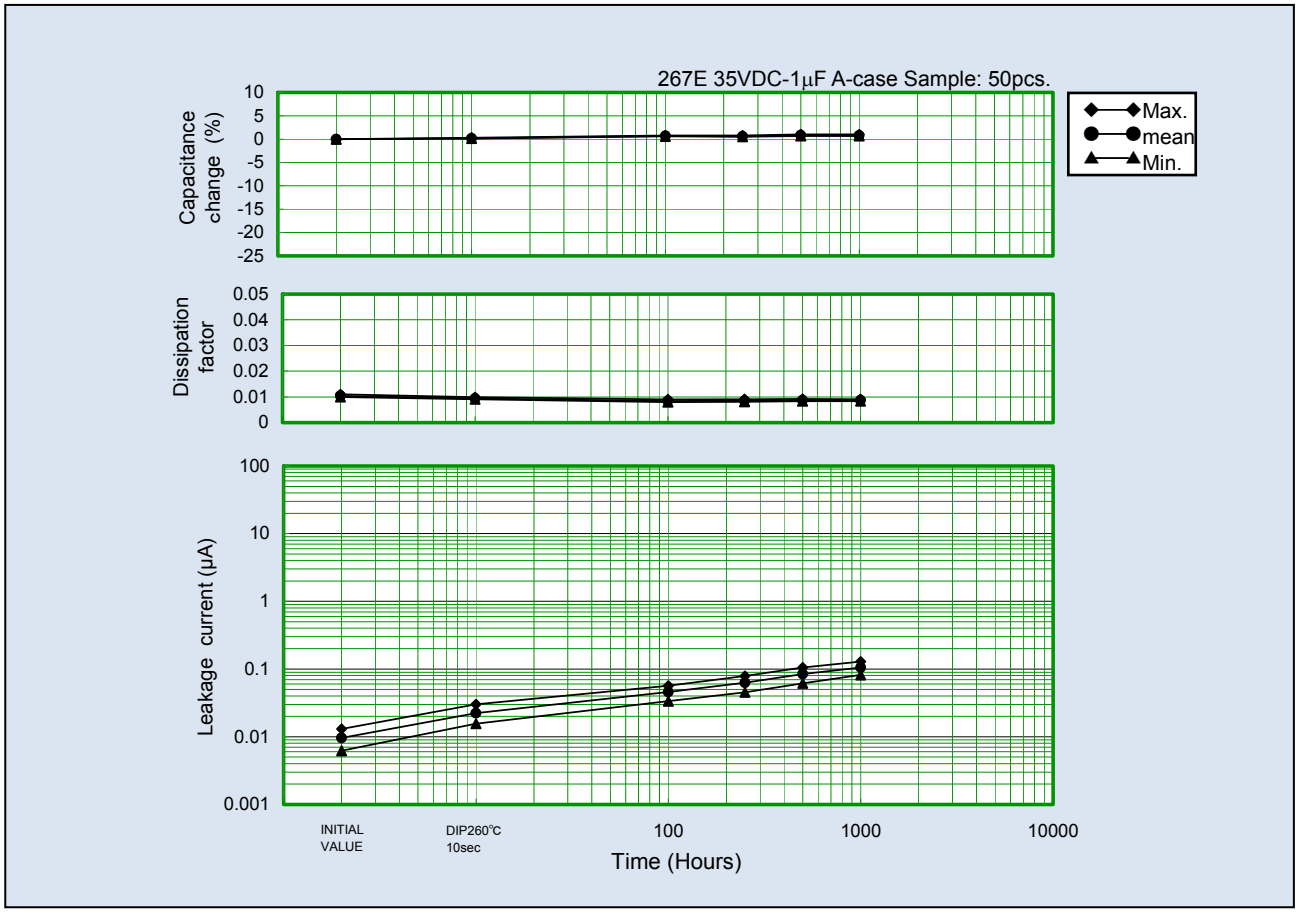
FREQUENCY CHARACTERISTICS



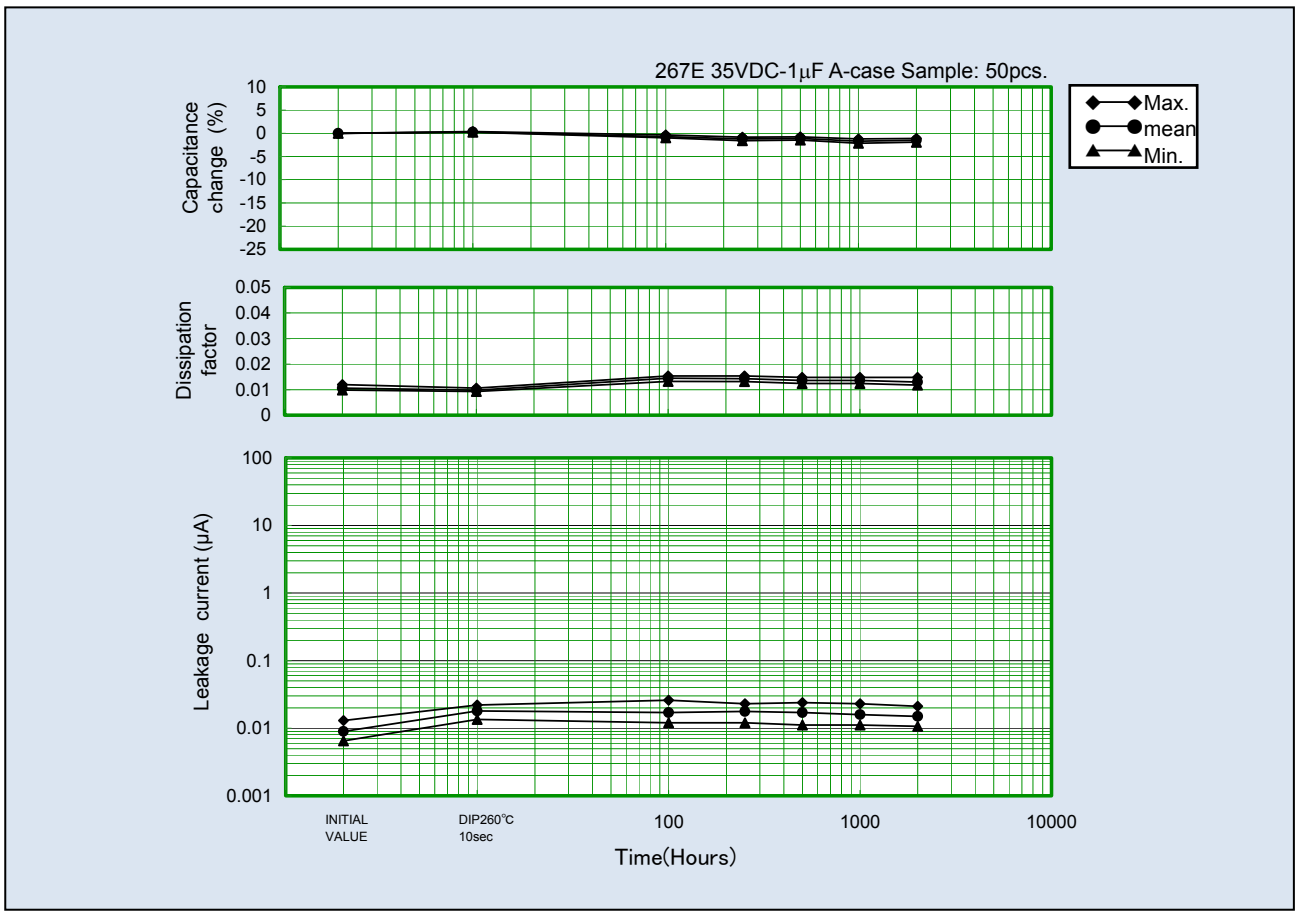
TEMPERATURE CHARACTERISTICS



DAMP HEAT, STEADY STATE 40℃, 95%RH



ENDURANCE 85℃, RATED VOLTAGE



Application Notes for Tantalum Solid Electrolytic Capacitor

1. Operating Voltage

Tantalum Solid Electrolytic Capacitor shall be operated at the rated voltage or lower.
Rated voltage: The "rated voltage" refers to the maximum DC voltage that is allowed to be continuously applied between the capacitor terminals at the rated temperature.
Surge voltage: The "surge voltage" refers to the voltage that is allowed to be instantaneously applied to the capacitor at the rated temperature or the maximum working temperature. The capacitor shall withstand the voltage when a 30-second cycle of application of the voltage through a 1000 Ω series resistance is repeated 1000 times in 6-minute periods.
When designing the circuit, the equipment's required reliability must be considered and appropriate voltage derating must be performed.

2. Application that contain AC Voltage

Special attention to the following 3 items.
(1) The sum of the DC bias voltage and the positive peak value of the AC voltage should not exceed the rated voltage.
(2) Reverse voltage should not exceed the allowable values of the negative peak AC voltage.
(3) Ripple current should not exceed the allowable values.

3. Reverse Voltage

Tantalum solid electrolytic capacitor is polarity. Please do not impress reverse voltage. As well, please confirm the potential of the tester beforehand when both ends of the capacitor are checked with the tester etc.

4. Permissible Ripple Current

The permissible ripple current and voltage at about 100 kHz or higher can be determined by the following formula from the permissible power loss (Pmax value)shown in Table 1 and the specified ESR value. However, when the expected
operating temperature is higher than room temperature, determine the permissible values multiplying the Pmax value by the specified multiplier (Table 2). For the permissible values at different frequencies, consult our Sales Department.

$P=I^2 \times ESR$ or $P=\frac{E^2 \times ESR}{Z^2}$

Permissible ripple current $Imax=\sqrt{\frac{P\,\max}{ESR}}\ (Arms)$

Permissible ripple voltage $Emax=\sqrt{\frac{P\,max}{ESR}} \times Z$

$= Imax \times Z\ (Vrms)$

Imax : Permissible ripple current at regulated frequency (Arms : RMS value)
Emax : Permissible ripple voltage at regulated frequency (Vrms : RMS value)
Pmax : Permissible power loss (W)
ESR : Specified ESR value at regulated frequency (Ω)
Z : Impedance at regulated frequency (Ω)

Table 1 Permissible power loss

Case size	Pmax (W)
A	0.045
B	0.050
C3	0.065
D3	0.085
H	0.100

Table 2 Pmax multiplier at each operating temperature

Operating temperature (℃)	Multiplier
25	1.0
55	0.9
85	0.8
125	0.4

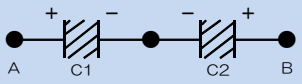
Note: Above values are measured at 0.8t glass epoxy board mounting in free air and may be changed depending on the kind of board, packing density, and air convection condition. Please consult us if calculated power loss value is different from above list of P max value.

5. Application on low-impedance circuit

The failure rate of low impedance circuit at 0.1Ω/V is about five times greater than that of a 1Ω/V circuit. To curtail this higher failure rate, tantalum capacitors used in low impedance circuits, such as filters for power supplies, particularly switching power supplies, or for noise by-passing, require that operating voltage be derated to less than half of the rated voltage. Actually, less than 1/3 of the rated voltage is recommended.

6. Non Polar Application(BACK TO BACK)

Tantalum capacitors can be used as a non-polar unit if two capacitors are connected "BACK-TO-BACK" when reserve voltage is applied at a more than permissible value, or in a purely AC circuit. The two capacitors should both be of the same rated voltage and capacitance tolerance, and they should both be twice the required capacitance value.



Ripple Voltage: Permissible Ripple Voltage shall not exceed the value allowed for either C1 or C2 (This will be the same, as the capacitors should be identical.)
Capacitance: (C1 × C2) / (C1 + C2)
Leakage Current: If terminal A is (+), the Leakage Current will be equal to C1's Leakage Current.
If terminal B is (+), the Leakage Current will be equal to C2's Leakage Current.

7. Soldering

7.1. Preheating

To obtain optimal reliability and solderability conditions, capacitors should be pre-heated at 130 to 200 °C for approximately 60 to 120 seconds.

7.2. Soldering

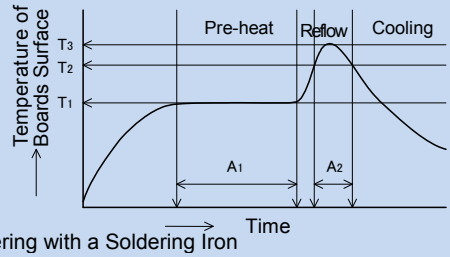
The body of the capacitor shall not exceed 260 °C during soldering.
(1) Reflow Soldering
Reflow soldering is a process in which the capacitors are mounted on a printed board with solder paste. There are two methods of Reflow Soldering: Direct and Atmospheric Heat.
· Direct Heat (Hot plate)
During the Direct Heat method, the capacitor has been positioned on a printed board, which is then placed upon a hot plate. The capacitor maintains a lower temperature than the substrate, which in turn stays at a lower temperature than the hot plate.

· Atmospheric Heat

a) VPS (Vapor Phase Soldering)
During VPS,the substrate is heated by an inert liquid with a high boiling point. The temperature of the capacitor's body and the temperature of the substrate are about the same as the atmosphere. This temperature should be below 240°C.

b) Near and Far IR Ray
Due to the heat absorption of the capacitor's body, the internal temperature of the capacitors may be 20 ~ 30°C higher than the setting temperature and may exceed 260°C. Temperature control is crucial in maintaining a temperature of 260 °C or lower.

c) Convention Oven
An infrared ray is the main source of heat in this process. The temperature of the substrate and the capacitors can be maintained at a similar level by the circulation of heated air, or an inert gas.



Temperature	Time
T1=130℃～200℃	A1= 60～120sec.
T2=220℃～230℃	A2＜60sec.
T3=～260℃	10 sec. or less than 10

Number of times：2 times max..

(2) Soldering with a Soldering Iron
Soldering with a soldering iron cannot be recommended due to the lack of consistency in maintaining temperatures and process times. If this method should be necessary, the iron should never touch the capacitor's terminals, and the temperature of the soldering iron should never exceed 350°C. The application of the iron should not exceed 5 seconds.

(3) Please consult us for other methods.

8. Cleaning

Cleaning by organic solvent may damage capacitor's appearance and performance.However, our capacitors are not effected even when soaked at 20 ~ 30°C 2-propanol for 5 minutes. When introducing new cleaning methods or changing the cleaning term, please consult us.

9. Protective Resin Coating

After components are assembled to substrate, a protective resin coating is sometimes applied. As this resin coating cures, it gives mechanical and thermal stress to Tantalum capacitors. This stress can cause damage to the capacitors, which affects their reliability. Before using a resin coating, proper research must be done in regards to the material and process to insure that excessive stress will not be applied to capacitors and other components.

10. Vibration

Approximately 300 G shall be applied to a capacitor, when dropped from 1 meter to a concrete floor.
Although capacitors are made to withstand this drop test, stress from shock due to falling or striking does cause damage to the capacitors and increases failure rates. Do not subject capacitors to this type of mechanical stress.

11. Ultrasonic cleaning

Matsuo does not recommend Ultrasonic cleaning. This may cause damage to the capacitors, and may even cause broken terminals. If the Ultrasonic cleaning process will be used, please note the following:
(1)The solvent should not be boiled. (Lower the ultrasonic wave output or use solvent with The high boiling point.)
(2)The recommended wattage is less than 0.5 watts per cm2.
(3)The cleaning time should be kept to a minimum. Also, samples must be swang in the solvlent. Please consult us.

12. Additional Notes

· When more than one capacitor is connected in series, a resistor that can distribute the voltage equally to the capacitors shall be connected in parallel.
· The capacitor cases shall not be cut even if the mounting space is insufficient.
· During a customers aging process, voltage should remain under the rated voltage at all times.
· Capacitors should never be touched or manipulated while operating.
· Capacitors are not meant to be dismantled.
· When testing capacitors, please examine the power source before conducting test to insure the tester's polarity and applied voltage.
· In the event of a capacitor burning, smoking, or emitting an offensive smell during operation, please turn the circuit "off" and keep hands and face away from the burning capacitor.
· If a capacitor be electrical shorted, it becomes hot, and the capacitor element may ignite. In this case, the printed board may be burnt out.
· Capacitors should be stored at room temperature under low humidity. Capacitors should never be stored under direct sunlight, and should be stored in an environment containing dust.
· If the capacitors will be operated in a humid environment, they should be sealed with a compound under proper conditions.
· Capacitors should not be stored or operated in environments containing acids, alkalis or active gasses.
· When capacitors are disposed of as "scrap" or waste, they should be treated as Industria Waste since they contain various metals and polymers.
· Capacitors submitted as samples should not be used for production purposes.

These application notes are prepared based on "Guideline of notabilia for fixed tantalum electrolytic capacitors with solid electrolyte for use in electronic equipment" (EIAJ RCR-2368) issued by Japan Electronics and Information Technology Industries Association (JEITA). For the details of the instructions (explanation, reasons and concrete examples), please refer to this guideline, or consult our Sales Department.

MATSUO ELECTRIC CO., LTD.

Please feel free to ask our Sales Department for more information on Tantalum Solid Electrolytic Capacitor.

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