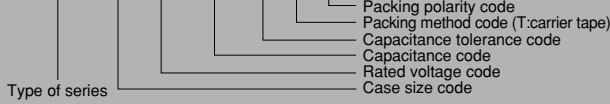## TMCS Series (Standard Tantalum Chip Capacitors)

The product is a standard type that has been most widely used among tantalum chip capacitors. The product has high solder heat resistance and is suitable for automatic mounting.
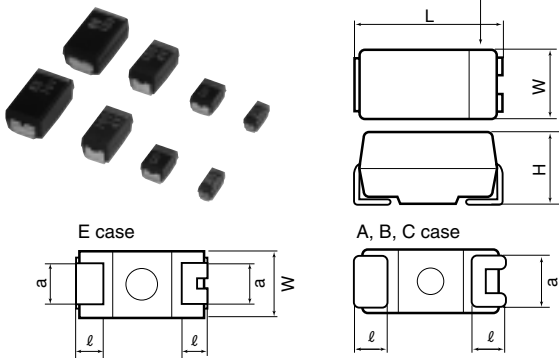
The product is provided with both excellent frequency characteristic and excellent impedance characteristics.

Product symbol : (Example) TMCS Series A case 16V 1μF ±20%

TMCS A 1C 105 M T R

- Packing polarity code
- Packing method code (T:carrier tape)
- Capacitance tolerance code
- Capacitance code
- Rated voltage code
- Case size code
- Type of series

Outline of drawings and dimensions

Anode indication belt mark

E case

A, B, C case

Dimensions (Unit: mm)

Case code	Case size L±0.2	W±0.2	H±0.2	ℓ±0.3	a±0.2
A	3.2	1.6	1.6	0.7	1.2
B	3.5	2.8	1.9	0.8	2.2
C	5.8	3.2	2.5	1.3	2.2
E	7.3	4.3±0.3	2.8	1.3	2.4

Standard value and case size

Capitance μF	Code	Rated voltage (V.DC) 4 OG	7 0J	10 1A	16 1C	20 1D	25 1E	35 1V	50 1H
0.10	104							A	A
0.15	154							A	B
0.22	224							A	B
0.33	334							A	B
0.47	474						A	B	C
0.68	684						A	B	C
1.0	105				A			B	C
1.5	155			A			B	C	E
2.2	225		A			B		C	E
3.3	335	A			B			C	
4.7	475			B			C	E	
6.8	685		B			C		E	
10	106	B			C		E		
15	156			C		E			
22	226		C		E				
33	336	C		E					
47	476		E						
68	686	E							

Product specifications

Product specifications	TMCS	Test conditions JIS C5102-1994
Operating temperature range	−55℃～+125℃	
Rated voltage	DC4～50V	85℃
Surge voltage	DC5～63V	85℃
Derated voltage	DC2.5～32V	125℃
Capacitance	0.1～68 μF	
Capacitance tolerance	±10% or 20%	Paragraph 7.8, 120 Hz
Leakage current	0.01 CV or 0.5 μA, whichever is larger or less	Paragraph 7.7, in 5 minutes after the rated voltage is applied.
tan δ	0.1～1.0 0.04 or less 1.5～68 0.06 or less	Paragraph 7.9, 120Hz
Surge withstanding voltage	△C/C ±5% or less tan δ Specified initial value or less LC Specified initial value or less	Paragraph 7.14

Temperature characteristics				
Specified initial value		−55	85	125
△C/C	−	−10～0%	0～+10%	0～+12%
tan δ	0.04	0.04	0.05	0.05
Value shown table or less	0.06	0.06	0.07	0.07
LC	0.01CV or 0.5μA or less	−	0.1CV or 5μA or less	0.125CV or 6.25μA or less

Paragraph 7.12

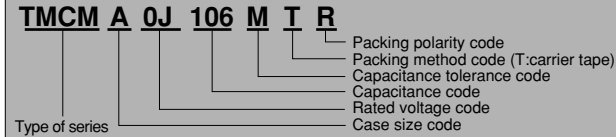| Solder heat resistance	△C/C ±5% or less tan δ Specified initial value or less LC Specified initial value or less	Dip 260±5℃ A,B case C,E case 10±1 sec. 5±0.5 sec. Reflow−260℃ 10±1 sec.
Moisture resistance leaving	△C/C ±5% or less tan δ Specified initial value or less LC Specified initial value or less	Paragraph 9.5, 40℃ 90～95％RH,500h
High-temperature load	△C/C ±10% or less tan δ Specified initial value or less LC 125% Specified initial value or less	Paragraph 9.10, 85℃ The rated voltage is applied for 2000 hours.
Thermal shock	△C/C ±5% or less tan δ Specified initial value or less LC Specified initial value or less	Leave at -55℃, normal temperature, 125℃, and normal temperature for 30 min., 3 min., 30 min., and 3 min. Repeat this operation 20 times running.
Moisture resistance load	△C/C ±10% or less tan δ 150% Specified initial value or less LC 125% Specified initial value or less	40℃, humidity 90 to 95%RH The rated voltage is applied for 500 hours.
Failure rate	1％／1000h	85℃. The rated voltage is applied (through a protective resistor of 1 Ω/V).

TMCM Series (Miniaturized Tantalum Chip Capacitors with Extended Capacitance Range)

A model type miniaturized chip capacitor developed on the basis of TMCS production technology ideal for high density component mounting applied in AV equipment.
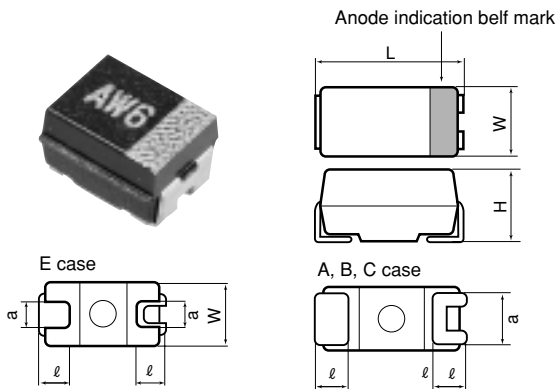
Features
• Super compact : Reduced size 1/2 to 1/3 in comparison with TMCS.

Product symbol : (Example) TMCM Series A case 7V 10μF ±20%

TMCM A 0J 106 M T R

- Packing polarity code
- Packing method code (T:carrier tape)
- Capacitance tolerance code
- Capacitance code
- Rated voltage code
- Case size code

Type of series

Outline of drawings and dimensions

Anode indication belf mark

L
W
H

E case
A, B, C case

Dimensions (Unit : mm)

Case code	Case size				
	L ±0.2	W ±0.2	H ±0.2	ℓ ±0.3	a ±0.2
A	3.2	1.6	1.6	0.7	1.0
B	3.5	2.8	1.9	0.8	2.0
C	5.8	3.2	2.5	1.3	2.2
E	7.3	4.3 ±0.3	2.8	1.3	2.4

Standard value and case size

Capacitance		Rated voltage (V.DC)								
		2.5	4	7	10	16	20	25	35	50
μF	Code	0E	0G	0J	1A	1C	1D	1E	1V	1H
0.15	154									A
0.22	224									A
0.33	334									
0.47	474								A	B
0.68	684							A	A	B
1.0	105						A	A	A	
1.5	155					A	A	A	B	C
2.2	225				A	A	A	B	B	C
3.3	335			A	A	A	A,B	B	B	E
4.7	475		A	A	A	A,B	A,B	B	C	E
6.8	685	A	A	A	A,B	A,B	B	C	C	
10	106	A	A	A,B	A,B	A,B	B,C	C	C,E	
15	156	A	A,B	A,B	A,B	B,C	C	C,E	E	
22	226	A,B	A,B	A,B	B,C	B,C	C,E	E	E	
33	336	A,B	A,B	A,B,C	B,C	C,E	E	E		
47	476	A,B	A,B,C	B,C	B,C,E	C,E	E			
68	686	B,C	B,C	B,C,E	C,E	E				
100	107	B,C	B,C,E	C,E	C,E	E				
150	157	B,C,E	C,E	C,E	D,E					
220	227	C,E	C,E	E	E					
330	337	E	D,E	E						
470	477	E	E							

Product specifications

Product specifications	TMCM	Test conditions JIS C5102-1994
Operating temperature range	−55℃～＋125℃	
Rated voltage	DC2.5～50V	85℃
Surge voltage	DC3.2～63V	85℃
Derated voltage	DC1.6～32V	125℃
Capacitance	0.15～470 μF	
Capacitance tolerance	±10% or 20%	Paragraph 7.8, 120 Hz
Leakage current	0.01CV or 0.5 μA, whichever is larger or less	Paragraph 7.7, in 5 minutes after the rated voltage is applied.
tan δ	0.15～1.0 0.04 or less ※1 1.5～68 0.06 or less 10～220 0.08 or less 330～470 0.10 or less	Paragraph 7.9, 120Hz
Surge withstanding voltage	△C/C ±5% or less tan δ Specified initial value or less LC Specified initial value or less	Paragraph 7.14

Temperature characteristics

Specified initial value	−55	85	125
△C/C	−	−10～0%	0～+10%	0～+12%
tan δ	0.04	0.09	0.07	0.09
Value from table or less	0.06	0.1	0.08	0.1
	0.08	0.12	0.1	0.12
	0.1	0.14	0.12	0.14
	0.12	0.16	0.14	0.16
LC	0.01CV or 0.5 μA or less	−	0.1CV or 5 μA or less	0.125CV or 6.25 μA or less

Paragraph 7.12

Solder heat resistance	△C/C ±5% or less tan δ Specified initial value or less LC Specified initial value or less	Dip 260±5℃ A,B case C,E case 10±1sec. 5±0.5sec. Reflow－260℃ 10±1sec.
Moisture resistance leaving	△C/C ±10% or less tan δ Specified initial value or less LC Specified initial value or less	Paragraph 9.5, 40℃ 90～95％RH,500h
High-temperature load	△C/C ±10% or less tan δ Specified initial value or less LC 125% Specified initial value or less	Paragraph 9.10, 85℃ The rated voltage is applied for 2000 hours.
Thermal shock	△C/C ±10% or less tan δ Specified initial value or less LC Specified initial value or less	Leave at -55℃, normal temperature, 125℃, and normal temperature for 30 min., 3 min., 30 min., and 3 min. Repeat this operation 20 times running.
Moisture resistance load	△C/C ±10% or less tan δ 150% Specified initial value or less LC 200% Specified initial value or less	40℃, humidity 90 to 95%RH The rated voltage is applied for 500 hours.
Failure rate	1％／1000h	85℃. The rated voltage is applied (through a protective resistor of 1Ω/V).

※1

Product name	tan δ
MA7V33 μF,MB7V68 μF,MB10V47 μF,MC7V150 μF,MC10V100 μF	0.1
MA2.5V47 μF,MA4V47 μF,MB2.5V100 μF,MB4V100 μF,MC4V220 μF	0.12

Standard product tables - TMCS and TMCM series

Standard product table - TMCS series

Rated voltage V.DC	Capacitance μF	tan δ	Leakage current μA	Case code	Product name
4	3.3	0.06	0.5	A	TMCSA0G335
	10	0.06	0.5	B	TMCSB0G106
	33	0.06	1.3	C	TMCSC0G336
	68	0.06	2.7	E	TMCSE0G686
7	2.2	0.06	0.5	A	TMCSA0J225
	6.8	0.06	0.5	B	TMCSB0J685
	22	0.06	1.5	C	TMCSC0J226
	47	0.06	3.3	E	TMCSE0J476
10	1.5	0.06	0.5	A	TMCSA1A155
	4.7	0.06	0.5	B	TMCSB1A475
	15	0.06	1.5	C	TMCSC1A156
	33	0.06	3.3	E	TMCSE1A336
16	1.0	0.04	0.5	A	TMCSA1C105
	3.3	0.06	0.5	B	TMCSB1C335
	10	0.06	1.6	C	TMCSC1C106
	22	0.06	3.5	E	TMCSE1C226
20	0.68	0.04	0.5	A	TMCSA1D684
	2.2	0.06	0.5	B	TMCSB1D225
	6.8	0.06	1.4	C	TMCSC1D685
	15	0.06	3.0	E	TMCSE1D156
25	0.47	0.04	0.5	A	TMCSA1E474
	1.5	0.06	0.5	B	TMCSB1E155
	4.7	0.06	1.2	C	TMCSC1E475
	10	0.06	2.5	E	TMCSE1E106

Rated voltage V.DC	Capacitance μF	tan δ	Leakage current μA	Case code	Product name
35	0.1	0.04	0.5	A	TMCSA1V104
	0.15	0.04	0.5	A	TMCSA1V154
	0.22	0.04	0.5	A	TMCSA1V224
	0.33	0.04	0.5	A	TMCSA1V334
	0.47	0.04	0.5	B	TMCSB1V474
	0.68	0.04	0.5	B	TMCSB1V684
	1.0	0.04	0.5	B	TMCSB1V105
	1.5	0.06	0.5	C	TMCSC1V155
	2.2	0.06	0.8	C	TMCSC1V225
	3.3	0.06	1.2	C	TMCSC1V335
	4.7	0.06	1.6	E	TMCSE1V475
	6.8	0.06	2.4	E	TMCSE1V685
50	0.1	0.04	0.5	A	TMCSA1H104
	0.15	0.04	0.5	B	TMCSB1H154
	0.22	0.04	0.5	B	TMCSB1H224
	0.33	0.04	0.5	B	TMCSB1H334
	0.47	0.04	0.5	C	TMCSC1H474
	0.68	0.04	0.5	C	TMCSC1H684
	1.0	0.04	0.5	C	TMCSC1H105
	1.5	0.06	0.8	E	TMCSE1H155
	2.2	0.06	1.1	E	TMCSE1H225

Standard product table - TMCM series

Rated voltage V.DC	Capacitance μF	tan δ	Leakage current μA	Case code	Product name
2.5	6.8	0.06	0.5	A	TMCMA0E685
	10	0.08	0.5	A	TMCMA0E106
	15	0.08	0.5	A	TMCMA0E156
	22	0.08	0.6	A	TMCMA0E226
	22	0.08	0.6	B	TMCMB0E226
	33	0.08	0.8	A	TMCMA0E336
	33	0.08	0.8	B	TMCMB0E336
	47	0.12	1.2	A	TMCMA0E476
	47	0.08	1.2	B	TMCMB0E476
	68	0.08	1.7	B	TMCMB0E686
	68	0.08	1.7	C	TMCMC0E686
	100	0.12	2.5	B	TMCMB0E107
	100	0.08	2.5	C	TMCMC0E107
	150	0.08	3.8	B	TMCMB0E157
	150	0.08	3.8	C	TMCMC0E157
	150	0.08	3.8	E	TMCME0E157
	220	0.08	5.5	C	TMCMC0E227
	220	0.08	5.5	E	TMCME0E227
	330	0.10	8.3	E	TMCME0E337
	470	0.10	11.8	E	TMCME0E477
4	4.7	0.06	0.5	A	TMCMA0G475
	6.8	0.06	0.5	A	TMCMA0G685
	10	0.08	0.5	A	TMCMA0G106
	15	0.08	0.6	A	TMCMA0G156
	15	0.08	0.6	B	TMCMB0G156
	22	0.08	0.9	A	TMCMA0G226
	22	0.08	0.9	B	TMCMB0G226
	33	0.08	1.3	A	TMCMA0G336
	33	0.08	1.3	B	TMCMB0G336
	47	0.12	1.9	A	TMCMA0G476
	47	0.08	1.9	B	TMCMB0G476
	47	0.08	1.9	C	TMCMC0G476
	68	0.08	2.7	B	TMCMB0G686
	68	0.08	2.7	C	TMCMC0G686
	100	0.12	4.0	B	TMCMB0G107
	100	0.08	4.0	C	TMCMC0G107
	100	0.08	4.0	E	TMCME0G107
	150	0.08	6.0	C	TMCMC0G157
	150	0.08	6.0	E	TMCME0G157
	220	0.12	8.8	C	TMCMC0G227
	220	0.08	8.8	E	TMCME0G227
	330	0.10	13.2	E	TMCME0G337
	470	0.10	18.8	E	TMCME0G477

Rated voltage V.DC	Capacitance μF	tan δ	Leakage current μA	Case code	Product name
7	3.3	0.06	0.5	A	TMCMA0J335
	4.7	0.06	0.5	A	TMCMA0J475
	6.8	0.06	0.5	A	TMCMA0J685
	10	0.08	0.7	A	TMCMA0J106
	10	0.08	0.7	B	TMCMB0J106
	15	0.08	1.1	A	TMCMA0J156
	15	0.08	1.1	B	TMCMB0J156
	22	0.08	1.5	A	TMCMA0J226
	22	0.08	1.5	B	TMCMB0J226
	33	0.10	2.3	A	TMCMA0J336
	33	0.08	2.3	B	TMCMB0J336
	33	0.08	2.3	C	TMCMC0J336
	47	0.08	3.3	B	TMCMB0J476
	47	0.08	3.3	C	TMCMC0J476
	68	0.10	4.8	B	TMCMB0J686
	68	0.08	4.8	C	TMCMC0J686
	68	0.08	4.8	E	TMCME0J686
	100	0.12	7.0	B	TMCMB0J107
	100	0.08	7.0	C	TMCMC0J107
	100	0.08	7.0	E	TMCME0J107
	150	0.10	10.5	C	TMCMC0J157
	150	0.08	10.5	E	TMCME0J157
	220	0.08	15.4	E	TMCME0J227
	330	0.10	23.1	E	TMCME0J337
10	2.2	0.06	0.5	A	TMCMA1A225
	3.3	0.06	0.5	A	TMCMA1A335
	4.7	0.06	0.5	A	TMCMA1A475
	6.8	0.06	0.7	A	TMCMA1A685
	6.8	0.06	0.7	B	TMCMB1A685
	10	0.08	1.0	A	TMCMA1A106
	10	0.08	1.0	B	TMCMB1A106
	15	0.08	1.5	A	TMCMA1A156
	15	0.08	1.5	B	TMCMB1A156
	22	0.08	2.2	B	TMCMB1A226
	22	0.08	2.2	C	TMCMC1A226
	33	0.08	3.3	B	TMCMB1A336
	33	0.08	3.3	C	TMCMC1A336
	47	0.10	4.7	B	TMCMB1A476
	47	0.08	4.7	C	TMCMC1A476
	47	0.08	4.7	E	TMCME1A476
	68	0.08	6.8	C	TMCMC1A686
	68	0.08	6.8	E	TMCME1A686
	100	0.10	10.0	C	TMCMC1A107
	100	0.08	10.0	E	TMCME1A107
	150	0.08	15.0	E	TMCME1A157
	220	0.08	22.0	E	TMCME1A227

Standard product tables - TMCM series

Standard product table - TMCM series

Rated voltage V.DC	Capacitance μF	tan δ	Leakage current μA	Case code	Product name
16	1.5	0.06	0.5	A	TMCMA1C155
	2.2	0.06	0.5	A	TMCMA1C225
	3.3	0.06	0.5	A	TMCMA1C335
	4.7	0.06	0.8	A	TMCMA1C475
	4.7	0.06	0.8	B	TMCMB1C475
	6.8	0.06	1.1	A	TMCMA1C685
	6.8	0.06	1.1	B	TMCMB1C685
	10	0.08	1.6	A	TMCMA1C106
	10	0.08	1.6	B	TMCMB1C106
	15	0.08	2.4	B	TMCMB1C156
	15	0.08	2.4	C	TMCMC1C156
	22	0.08	3.5	B	TMCMB1C226
	22	0.08	3.5	C	TMCMC1C226
	33	0.08	5.3	C	TMCMC1C336
	33	0.08	5.3	E	TMCME1C336
	47	0.08	7.5	C	TMCMC1C476
	47	0.08	7.5	E	TMCME1C476
	68	0.08	10.9	E	TMCME1C686
	100	0.08	16.0	E	TMCME1C107
20	1.0	0.04	0.5	A	TMCMA1D105
	1.5	0.06	0.5	A	TMCMA1D155
	2.2	0.06	0.5	A	TMCMA1D225
	3.3	0.06	0.7	A	TMCMA1D335
	3.3	0.06	0.7	B	TMCMB1D335
	4.7	0.06	0.9	A	TMCMA1D475
	4.7	0.06	0.9	B	TMCMB1D475
	6.8	0.06	1.4	B	TMCMB1D685
	10	0.08	2.0	B	TMCMB1D106
	10	0.08	2.0	C	TMCMC1D106
	15	0.08	3.0	C	TMCMC1D156
	22	0.08	4.4	C	TMCMC1D226
	22	0.08	4.4	E	TMCME1D226
	33	0.08	6.6	E	TMCME1D336
	47	0.08	9.4	E	TMCME1D476

Rated voltage V.DC	Capacitance μF	tan δ	Leakage current μA	Case code	Product name
25	0.68	0.04	0.5	A	TMCMA1E684
	1.0	0.04	0.5	A	TMCMA1E105
	1.5	0.06	0.5	A	TMCMA1E155
	2.2	0.06	0.6	B	TMCMB1E225
	3.3	0.06	0.8	B	TMCMB1E335
	4.7	0.06	1.2	B	TMCMB1E475
	6.8	0.06	1.7	C	TMCMC1E685
	10	0.08	2.5	C	TMCMC1E106
	15	0.08	3.8	C	TMCMC1E156
	15	0.08	3.8	E	TMCME1E156
	22	0.08	5.5	E	TMCME1E226
	33	0.08	8.3	E	TMCME1E336
35	0.47	0.04	0.5	A	TMCMA1V474
	0.68	0.04	0.5	A	TMCMA1V684
	1.0	0.04	0.5	A	TMCMA1V105
	1.5	0.06	0.5	B	TMCMB1V155
	2.2	0.06	0.8	B	TMCMB1V225
	3.3	0.06	1.2	B	TMCMB1V335
	4.7	0.06	1.6	C	TMCMC1V475
	6.8	0.06	2.4	C	TMCMC1V685
	10	0.08	3.5	C	TMCMC1V106
	10	0.08	3.5	E	TMCME1V106
	15	0.08	5.3	E	TMCME1V156
	22	0.08	7.7	E	TMCME1V226
50	0.15	0.04	0.5	A	TMCMA1H154
	0.22	0.04	0.5	A	TMCMA1H224
	0.47	0.04	0.5	B	TMCMB1H474
	0.68	0.04	0.5	B	TMCMB1H684
	1.5	0.06	0.8	C	TMCMC1H155
	2.2	0.06	1.1	C	TMCMC1H225
	3.3	0.06	1.7	E	TMCME1H335
	4.7	0.06	2.4	E	TMCME1H475

Seal indication TMCS series

A,B case	C,E case
A7a Simplified code of nominal capacitance（A7：10μF) Anode indication belt mark ⊖ ⊕ Lot indication (for manufacturing in January, 2003) ※The simplified code is subject to JIS C 5143 10.1.2.	10 16a Nominal capacitance value（10μF) Anode indication belt mark ⊖ ⊕ Lot indication (for manufacturing in January, 2003) Rated voltage（16V)

Seal indication TMCS series

A,B case	C,E case
GA7a Simplified code of rated voltage（G：4V) Anode indication belt mark ⊖ ⊕ Lot indication (for manufacturing in January, 2003) Simplified code of nominal capacitance（A7：10μF) ※The simplified code is subject to JIS C 5143 10.1.2.	15 16a Nominal capacitance value（15μF) Anode indication belt mark ⊖ ⊕ Lot indication (for manufacturing in January, 2003) Rated voltage（16V)

Lot indication

Month / Year	1	2	3	4	5	6	7	8	9	10	11	12
2000	n	p	q	r	s	t	u	v	w	x	y	z
2001	A	B	C	D	E	F	G	H	J	K	L	M
2002	N	P	Q	R	S	T	U	V	W	X	Y	Z
2003	a	b	c	d	e	f	g	h	j	k	l	m