Solid Tantalum Surface Mount Chip Capacitors, Molded Case, Ultra Flat Low Profile

FEATURES

- Small size, low profile
- Terminations: 100 % matte tin
- MSL level: 1 (UA case size), 3 (UB case size)
- Compatible with "high volume" automatic pick and place equipment
- Material categorization: for definitions of compliance please see www.vishay.com/doc?99912

Pb-free

RoHS COMPLIANT

HALOGEN FREE Available

GREEN (5-2008) Available

PERFORMANCE / ELECTRICAL CHARACTERISTICS

Operating Temperature: -55 °C to +125 °C (above 85 °C, voltage derating is required)

Capacitance Range: 0.1 μF to 220 μF

Capacitance Tolerance: ± 10 %, ± 20 %

Voltage Rating: 2.5 V_{DC} to 35 V_{DC}

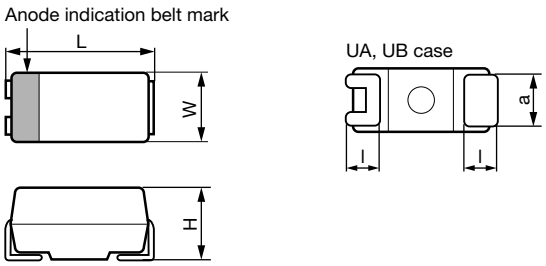
APPLICATIONS

- Industrial
- General purpose

ORDERING INFORMATION

TMCU	A	1G	107	M	TR	(2)	F
TYPE	CASE CODE	DC VOLTAGE RATING AT +85 °C	CAPACITANCE (μF)	CAPACITANCE TOLERANCE	PACKAGING POLARITY	(OPTIONAL)	TERMINAL CODE
	See Ratings and Case Codes table.	0E = 2.5 V 0G = 4 V 0J = 6.3 V (7 V) 1A = 10 V 1C = 16 V 1D = 20 V 1E = 25 V 1V = 35 V	This is expressed in picofarads. The first two digits are the significant figures. The third is the number of zeros to follow.	K = ± 10 % M = ± 20 %	TR = 7" reel, cathodes close to perforation side	Halogen-free (special order)	F = lead (Pb)-free terminations

DIMENSIONS in inches [millimeters]



CASE CODE	EIA SIZE	L	W	H	l	a
UA	3216-12	0.126 ± 0.008 [3.2 ± 0.2]	0.063 ± 0.008 [1.6 ± 0.2]	0.047 max. [1.2 max.]	0.030 ± 0.012 [0.8 ± 0.3]	0.047 ± 0.008 [1.2 ± 0.2]
UB	3528-12	0.138 ± 0.008 [3.5 ± 0.2]	0.110 ± 0.008 [2.8 ± 0.2]	0.047 max. [1.2 max.]	0.030 ± 0.012 [0.8 ± 0.3]	0.071 ± 0.008 [1.8 ± 0.2]

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RATINGS AND CASE CODES								
µF	2.5 V	4 V	6.3 V (7 V)	10 V	16 V	20 V	25 V	35 V
0.10								UA
0.15								UA
0.22								UA
0.33							UA	
0.47							UA	
0.68						UA	UA	
1.0						UA / UB	UA	UA / UB
1.5					UA	UA / UB	UB	UB
2.2					UA / UB	UA / UB	UB	UB
3.3					UA / UB	UA / UB	UB	
4.7				UA	UA / UB	UB	UB	
6.8				UA	UA / UB	UB		
10			UA	UA	UA / UB			
15	UA	UA	UA	UA / UB	UB			
22	UA	UA	UA / UB	UA / UB	UB			
33	UA / UB	UA / UB	UA / UB	UB				
47	UA / UB	UA / UB	UA / UB	UB				
68	UB	UA / UB	UB					
100	UB	UA / UB	UB					
150	UB	UB						
220	UB	UB						

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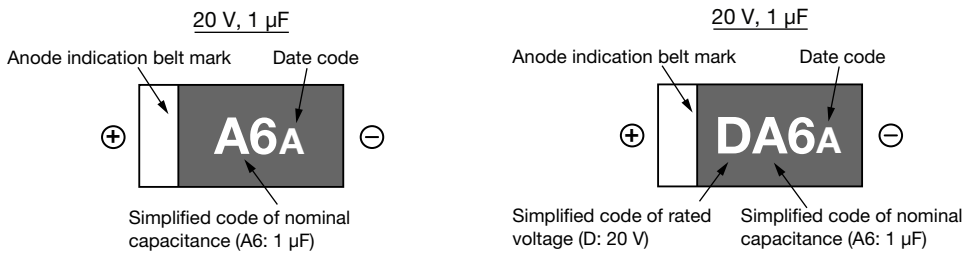
MARKING



CAPACITANCE AND VOLTAGE MARKING

µF	2.5 V	4 V	6.3 V	10 V	16 V	20 V	25 V	35 V
0.10								VA5
0.15								VE5
0.22								VJ5
0.33							EN5	
0.47							ES5	
0.68						DW5	EW5	
1.0						DA6 (1) / A6 (2)	EA6	VA6
1.5					CE6	DE6 (1) / E6 (2)	EE6	VE6
2.2					CJ6 (1) / J6 (2)	DJ6	EJ6	VJ6
3.3					CN6	DN6	EN6	
4.7				AS6	CS6	DS6	ES6	
6.8				AW6	CW6	DW6		
10			JA7	AA7	CA7			
15	eE7	GE7	JE7	AE7	CE7			
22	eJ7	GJ7	JJ7	AJ7	CJ7			
33	eN7	GN7	JN7	AN7				
47	eS7	GS7	JS7	AS7				
68	eW7	GW7	JW7					
100	eA8	GA8	JA8					
220	eE8	GE8						
330	eJ8	GJ8						

Notes

(1) Marking on UA case

(2) Marking on UB case

DATE CODE

YEAR	MONTH											
	1	2	3	4	5	6	7	8	9	10	11	12
2013	A	B	C	D	E	F	G	H	J	K	L	M
2014	N	P	Q	R	S	T	U	V	W	X	Y	Z
2015	a	b	c	d	e	f	g	h	j	k	l	m
2016	n	p	q	r	s	t	u	v	w	x	y	z

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STANDARD RATINGS						
CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C (µA)	MAX. DF AT +25 °C, 120 Hz (%)	MAX. ESR AT +25 °C, 100 kHz (Ω)	MAX. RIPPLE, 100 kHz I_{RMS} (A)
2.5 V_{DC} AT +85 °C; 1.6 V_{DC} AT +125 °C						
15	UA	TMCUA0E156(1)TRF	0.5	8	3.0	0.161
22	UA	TMCUA0E226(1)TRF	0.6	8	1.8	0.208
33	UA	TMCUA0E336(1)TRF	1.7	12	1.8	0.208
33	UB	TMCUB0E336(1)TRF	0.8	12	1.7	0.238
47	UA	TMCUA0E476(1)TRF	2.4	18	1.8	0.208
47	UB	TMCUB0E476(1)TRF	1.2	12	1.7	0.238
68	UB	TMCUB0E686(1)TRF	1.7	15	1.7	0.238
100	UB	TMCUB0E107(1)TRF	5.0	20	1.1	0.295
150	UB	TMCUB0E157(1)TRF	7.5	30	1.1	0.295
220	UB	TMCUB0E227(1)TRF	11.0	30	1.1	0.295
4 V_{DC} AT +85 °C; 2.5 V_{DC} AT +125 °C						
15	UA	TMCUA0G156(1)TRF	0.6	8	3.0	0.161
22	UA	TMCUA0G226(1)TRF	0.9	8	1.8	0.208
33	UA	TMCUA0G336(1)TRF	2.6	12	1.8	0.208
33	UB	TMCUB0G336(1)TRF	1.3	12	1.7	0.238
47	UA	TMCUA0G476(1)TRF	3.8	18	1.8	0.208
47	UB	TMCUB0G476(1)TRF	1.9	12	1.7	0.238
68	UA	TMCUA0G686(1)TRF	5.4	30	4.0	0.140
68	UB	TMCUB0G686(1)TRF	2.7	15	1.7	0.238
100	UA	TMCUA0G107MTRF	20.0	30	2.9	0.164
100	UB	TMCUB0G107(1)TRF	8.0	20	1.1	0.295
150	UB	TMCUB0G157(1)TRF	12.0	30	1.1	0.295
220	UB	TMCUB0G227MTRF	17.6	30	1.1	0.295
6.3 V_{DC} (7 V_{DC}) AT +85 °C; 4 V_{DC} AT +125 °C						
10	UA	TMCUA0J106(1)TRF	0.7	8	4.0	0.140
15	UA	TMCUA0J156(1)TRF	1.1	8	2.9	0.164
22	UA	TMCUA0J226(1)TRF	2.8	12	2.9	0.164
22	UB	TMCUB0J226(1)TRF	1.4	10	1.7	0.238
33	UA	TMCUA0J336(1)TRF	4.2	20	2.9	0.164
33	UB	TMCUB0J336(1)TRF	2.3	10	1.7	0.238
47	UA	TMCUA0J476MTRF	5.9	20	2.9	0.164
47	UB	TMCUB0J476(1)TRF	3.3	12	1.7	0.238
68	UB	TMCUB0J686(1)TRF	8.6	20	1.7	0.238
100	UB	TMCUB0J107MTRF	12.6	20	1.1	0.295
10 V_{DC} AT +85 °C; 6.3 V_{DC} AT +125 °C						
4.7	UA	TMCUA1A475(1)TRF	0.5	6	4.0	0.140
6.8	UA	TMCUA1A685(1)TRF	0.7	6	4.0	0.140
10	UA	TMCUA1A106(1)TRF	1.0	8	4.0	0.140
15	UA	TMCUA1A156(1)TRF	3.0	12	2.9	0.164
15	UB	TMCUB1A156(1)TRF	1.5	10	2.8	0.185
22	UA	TMCUA1A226MTRF	4.4	18	2.9	0.164
22	UB	TMCUB1A226(1)TRF	2.2	10	1.7	0.238
33	UB	TMCUB1A336(1)TRF	6.6	12	1.7	0.238
47	UB	TMCUB1A476MTRF	9.4	30	1.7	0.238
16 V_{DC} AT +85 °C; 10 V_{DC} AT +125 °C						
1.5	UA	TMCUA1C155(1)TRF	0.5	6	8.8	0.094
2.2	UA	TMCUA1C225(1)TRF	0.5	6	7.7	0.101
2.2	UB	TMCUB1C225(1)TRF	0.5	6	6.6	0.121
3.3	UA	TMCUA1C335(1)TRF	0.5	6	7.7	0.101
3.3	UB	TMCUB1C335(1)TRF	0.5	6	4.0	0.155
4.7	UA	TMCUA1C475(1)TRF	0.8	8	4.0	0.140
4.7	UB	TMCUB1C475(1)TRF	0.8	6	4.0	0.155

Note

- Part number definition:
  (1) Tolerance: For 10 % tolerance, specify “K”; for 20 % tolerance, change to “M”

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STANDARD RATINGS

CAPACITANCE (µF)	CASE CODE	PART NUMBER	MAX. DCL AT +25 °C (µA)	MAX. DF AT +25 °C, 120 Hz (%)	MAX. ESR AT +25 °C, 100 kHz (Ω)	MAX. RIPPLE, 100 kHz I_{RMS} (A)
16 V_{DC} AT +85 °C; 10 V_{DC} AT +125 °C						
6.8	UA	TMCUA1C685(1)TRF	1.1	12	4.0	0.140
6.8	UB	TMCUB1C685(1)TRF	1.1	6	4.0	0.155
10	UA	TMCUA1C106MTRF	1.6	18	3.3	0.154
10	UB	TMCUB1C106(1)TRF	1.6	8	2.8	0.185
15	UB	TMCUB1C156(1)TRF	4.8	12	2.8	0.185
22	UB	TMCUB1C226MTRF	7.0	18	1.7	0.238
20 V_{DC} AT +85 °C; 13 V_{DC} AT +125 °C						
0.68	UA	TMCUA1D684(1)TRF	0.5	4	19.8	0.063
1.0	UA	TMCUA1D105(1)TRF	0.5	4	16.5	0.069
1.0	UB	TMCUB1D105(1)TRF	0.5	4	8.8	0.104
1.5	UA	TMCUA1D155(1)TRF	0.5	6	16.5	0.069
1.5	UB	TMCUB1D155(1)TRF	0.5	6	8.8	0.104
2.2	UA	TMCUA1D225(1)TRF	0.5	6	7.7	0.101
2.2	UB	TMCUB1D225(1)TRF	0.5	6	6.6	0.121
3.3	UA	TMCUA1D335MTRF	0.7	6	7.7	0.101
3.3	UB	TMCUB1D335(1)TRF	0.7	6	4.0	0.155
4.7	UB	TMCUB1D475(1)TRF	0.9	6	4.0	0.155
6.8	UB	TMCUB1D685MTRF	1.4	6	2.8	0.185
25 V_{DC} AT +85 °C; 16 V_{DC} AT +125 °C						
0.33	UA	TMCUA1E334(1)TRF	0.5	4	26.4	0.054
0.47	UA	TMCUA1E474(1)TRF	0.5	4	22.0	0.060
0.68	UA	TMCUA1E684(1)TRF	0.5	8	19.8	0.063
1.0	UA	TMCUA1E105(1)TRF	0.5	8	16.5	0.069
1.5	UB	TMCUB1E155(1)TRF	0.5	6	8.8	0.104
2.2	UB	TMCUB1E225(1)TRF	0.6	6	6.6	0.121
3.3	UB	TMCUB1E335(1)TRF	0.8	6	4.0	0.155
4.7	UB	TMCUB1E475MTRF	1.2	6	4.0	0.155
35 V_{DC} AT +85 °C; 22 V_{DC} AT +125 °C						
0.10	UA	TMCUA1V104(1)TRF	0.5	4	40.0	0.044
0.15	UA	TMCUA1V154(1)TRF	0.5	4	40.0	0.044
0.22	UA	TMCUA1V224(1)TRF	0.5	4	40.0	0.044
1.0	UA	TMCUA1V105MTRF	0.5	8	16.5	0.069
1.0	UB	TMCUB1V105(1)TRF	0.5	6	8.8	0.104
1.5	UB	TMCUB1V155(1)TRF	0.5	6	8.8	0.104
2.2	UB	TMCUB1V225MTRF	0.8	6	6.6	0.121

Note

- Part number definition:
  (1) Tolerance: For 10 % tolerance, specify “K”; for 20 % tolerance, change to “M”

RECOMMENDED VOLTAGE DERATING GUIDELINES (for temperature below +85 °C)

CAPACITOR VOLTAGE RATING	OPERATING VOLTAGE
2.5	1.2
4.0	2.0
6.3 (7.0)	3.1 (3.5)
10	5.0
16	8.0
20	10.0
25	12.5
35	17.5

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POWER DISSIPATION

CASE CODE	MAXIMUM PERMISSIBLE POWER DISSIPATION AT +25 °C (W) IN FREE AIR
UA	0.078
UB	0.096

STANDARD PACKAGING QUANTITY

CASE CODE	UNITS PER 7" REEL
UA	3000
UB	3000

PERFORMANCE CHARACTERISTICS

ITEM	CONDITION	POST TEST PERFORMANCE				
Temperature characteristics	Measure the specified characteristics in each stage		Specified initial value	-55 °C	+85 °C	+125 °C
		Capacitance change	-	-12 % to 0 %	0 % to 10 %	0 % to 12 %
		Dissipation factor (%), maximum	4	5	4	5
			6	8	6	6
			8	12	10	12
			10	14	12	14
			12	16	14	16
			18	34	20	22
			20	38	22	24
			30	60	30	40
		Leakage current	Refer to Standard Ratings table	-	1000 % specified initial value or less	1250 % specified initial value or less
Solder heat resistance	Solder Dip 260 °C ± 5 °C, 10 s ± 1 s Reflow 260 °C, 10 s ± 1 s	Capacitance change	Within ± 5 % of initial value			
		Dissipation factor	Initial specified value or less			
		Leakage current	Initial specified value or less			
Moisture resistance no load	Leave at 40 °C and 90 % to 95 % RH for 500 h	Capacitance change	Within ± 10 % of initial value			
		Dissipation factor	Initial specified value or less			
		Leakage current	Initial specified value or less			
High temperature load	85 °C. The rated voltage is applied for 2000 h	Capacitance change	Within ± 10 % of initial value			
		Dissipation factor	Initial specified value or less			
		Leakage current	Shall not exceed 125 % of initial specified value			
Thermal shock	Leave at -55 °C, normal temperature, 125 °C, and normal temperature for 30 min., 3 min, 30 min, and 3 min. Repeat this operation 5 times running.	Capacitance change	Within ± 5 % of initial value			
		Dissipation factor	Initial specified value or less			
		Leakage current	Initial specified value or less			
Moisture resistance load	Leave at 40 °C and 90 % to 95 % RH. The rated voltage applied for 500 h	Capacitance change	Within ± 10 % of initial value			
		Dissipation factor	Shall not exceed 150 % of initial specified value			
		Leakage current	Shall not exceed 200 % of initial specified value			
Failure rate	85 °C. The rated voltage is applied through a protective resistor of 1 Ω/V.	1 % / 1000 h				

Note

- Test conditions per JIS C5101-1

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