

Tantalum Chip Capacitors

TCM series

Standard Tantalum Chip Capacitors.

TCM Series Molded Chip Tantalum Capacitors are designed for use in thick film hybrid circuits and for direct mounting on printed circuit boards.

Fully-molded construction has good resistance to mechanical stress and moisture.

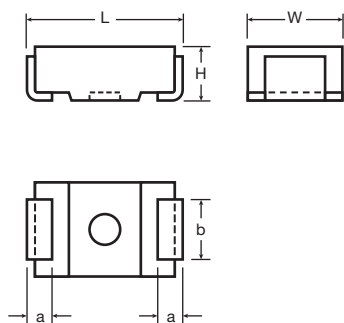
Specifications

Operating Temperature Range		-55°C – +125°C
Maximum Operating Temperature at Rated Voltage		+85°C
Leakage Current		0.01CV or 0.5µA max.
Dissipation Factor at 20°C and 120 Hz		Cap. ≤ 1.0µF less than 4% Cap. ≥ 1.5µF less than 6%
Humidity Test	Test Condition	Temp.: 60°C, humidity: 90 – 95% RH, duration: 500 hrs
	Capacitance Charge	Within 5% of the value before test
	Leakage Current	Not to exceed the value specified above
	Dissipation Factor	Not to exceed 125 % of the value specified above
High Temp. Load Test	Test Condition	Temp.: 85°C at rated voltage duration: 1,000 hrs
	Capacitance Charge	Within 10% of the value before test
	Leakage Current	Not to exceed 125 % of the value specified above
	Dissipation Factor	Not to exceed 125 % of the value specified above
	Solderability	260°C 10 sec. (Dip or Reflow) Within 5% of recorded value before test.
Reliability		Failure rate: Less than 1%/1,000 hours (60% CL)

Standard Ratings and Case Codes

W.V. Cap. (µF)	4	6.3	10	16	20	25	35	50
0.1							A	A
0.15							A	A,B
0.22							A	B
0.33							A	B
0.47						A	A,B	B,C
0.68					A	A	A,B	C
1.0				A	A	A	A,B	B,C
1.5			A	A	A	A,B	A,B,C	C
2.2		A	A	A,B	A,B	A,B,C	B,C	C,D
3.3	A	A	A	A,B	B,C	B,C	B,C	D
4.7	A	A	A,B	A,B,C	B,C	B,C	C,D	D
6.8	A	A,B	A,B,C	A,B,C	B,C	C,D	C,D	
10	A,B	A,B,C	A,B,C	B,C	B,C,D	C,D	C,D	
15	A,B,C	A,B,C	B,C	B,C,D	C,D	D	D	
22	A,B,C	A,B,C	A,B,C,D	B,C,D	C,D	C,D	D,E	
33	B,C	B,C,D	B,C,D	C,D	D	D,E		
47	B,C,D	B,C,D	B,C,D	C,D	D,E			
68	B,C,D	C,D	D	D	E			
100	B,C,D	C,D	C,D	D,E				
150	D	D	D,E	E				
220	D	D,E	D,E					
330	D	E						

Dimensions



Unit: mm (inch)					
Case Code	L	W	H	a	b
A	3.2 ± 0.2 (0.126 ± 0.008)	1.6 ± 0.2 (0.063 ± 0.008)	1.6 ± 0.2 (0.063 ± 0.008)	0.8 ± 0.3 (0.031 ± 0.012)	1.2 ± 0.2 (0.047 ± 0.008)
B	3.5 ± 0.2 (0.138 ± 0.008)	2.8 ± 0.2 (0.110 ± 0.008)	1.9 ± 0.2 (0.075 ± 0.008)	0.8 ± 0.3 (0.031 ± 0.012)	2.2 ± 0.2 (0.087 ± 0.008)
C	6.0 ± 0.2 (0.236 ± 0.008)	3.2 ± 0.2 (0.126 ± 0.008)	2.5 ± 0.2 (0.098 ± 0.008)	1.3 ± 0.3 (0.051 ± 0.012)	2.2 ± 0.2 (0.087 ± 0.008)
D	7.3 ± 0.2 (0.287 ± 0.008)	4.3 ± 0.2 (0.169 ± 0.008)	2.8 ± 0.2 (0.110 ± 0.008)	1.3 ± 0.3 (0.051 ± 0.012)	2.4 ± 0.2 (0.094 ± 0.008)
E	7.3 ± 0.2 (0.287 ± 0.008)	4.3 ± 0.2 (0.169 ± 0.008)	4.1 ± 0.2 (0.162 ± 0.008)	1.3 ± 0.3 (0.051 ± 0.012)	2.4 ± 0.2 (0.094 ± 0.008)

All components in this section are RoHS compliant per the EU directives and definitions.

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TCM SERIES DATA TABLE

Standard Part Numbers & Data

Cap. μ F	Case Code	Catalogue P/N	Max. DCL @ +25°C (μ A)	Max. DF @ +25°C 120 Hz (%)	Max. ESR 100 kHz (Ω)
4.0V DC					
3.3	A	TA 004 TCM 335 K or M A R	0.5	6	9.0
4.7	A	TA 004 TCM 475 K or M A R	0.5	8	7.5
6.8	A	TA 004 TCM 685 K or M A R	0.5	8	6.5
10	A	TA 004 TCM 106 K or M A R	0.5	8	6.0
10	B	TA 004 TCM 106 K or M B R	0.5	8	5.0
15	A	TA 004 TCM 156 K or M A R	0.6	8	4.0
15	B	TA 004 TCM 156 K or M B R	0.6	8	4.0
15	C	TA 004 TCM 156 K or M C R	0.6	8	3.0
22	A	TA 004 TCM 226 K or M A R	0.9	8	3.5
22	B	TA 004 TCM 226 K or M B R	0.9	8	2.5
22	C	TA 004 TCM 226 K or M C R	0.9	8	2.5
33	B	TA 004 TCM 336 K or M B R	1.4	8	2.8
33	C	TA 004 TCM 336 K or M C R	1.3	8	2.5
47	B	TA 004 TCM 476 K or M B R	1.9	8	2.5
47	C	TA 004 TCM 476 K or M C R	1.9	8	2.0
47	D	TA 004 TCM 476 K or M D R	1.9	8	1.8
68	B	TA 004 TCM 686 K or M B R	2.7	8	1.8
68	C	TA 004 TCM 686 K or M C R	2.7	8	1.6
68	D	TA 004 TCM 686 K or M D R	2.7	8	1.4
100	B	TA 004 TCM 107 K or M B R	4.0	8	1.6
100	C	TA 004 TCM 107 K or M C R	4.0	8	1.3
150	D	TA 004 TCM 157 K or M D R	8.0	8	0.9
220	D	TA 004 TCM 227 K or M D R	9.0	8	0.9
330	D	TA 004 TCM 337 K or M D R	13.2	8	0.7
6.3V DC					
2.2	A	TA 006 TCM 225 K or M A R	0.5	6	9.0
3.3	A	TA 006 TCM 335 K or M A R	0.5	8	7.0
4.7	A	TA 006 TCM 475 K or M A R	0.5	8	6.0
6.8	A	TA 006 TCM 685 K or M A R	0.5	8	5.0
6.8	B	TA 006 TCM 685 K or M B R	0.5	8	4.0
10	A	TA 006 TCM 106 K or M A R	0.6	8	4.0
10	B	TA 006 TCM 106 K or M B R	0.6	8	3.5
10	C	TA 006 TCM 106 K or M C R	0.6	8	2.6
15	A	TA 006 TCM 156 K or M A R	1.0	8	3.5
15	B	TA 006 TCM 156 K or M B R	1.0	8	3.0
15	C	TA 006 TCM 156 K or M C R	1.0	8	2.0

Note: All 6.3V Tantalums have P/N callouts as "006" but are rated at 6.3V.

Tantalum Chip Capacitors

TCM SERIES DATA TABLE Standard Part Numbers & Data

Cap. μF	Case Code	Catalogue P/N	Max. DCL @ +25°C (μA)	Max. DF @ +25°C 120 Hz (%)	Max. ESR 100 kHz (Ω)
6.3V DC (continued)					
22	A	TA 006 TCM 226 K or M A R	1.4	8	3.0
22	B	TA 006 TCM 226 K or M B R	1.4	8	2.5
22	C	TA 006 TCM 226 K or M C R	1.4	8	2.0
33	B	TA 006 TCM 336 K or M B R	2.1	8	2.4
33	C	TA 006 TCM 336 K or M C R	2.1	8	1.8
33	D	TA 006 TCM 336 K or M D R	2.1	8	1.6
47	B	TA 006 TCM 476 K or M B R	3.0	8	2.0
47	C	TA 006 TCM 476 K or M C R	3.0	8	1.8
47	D	TA 006 TCM 476 K or M D R	3.0	8	1.1
68	C	TA 006 TCM 686 K or M C R	4.3	8	1.6
68	D	TA 006 TCM 686 K or M C R	6.3	8	1.0
100	C	TA 006 TCM 107 K or M C R	6.3	8	1.0
100	D	TA 006 TCM 107 K or M D R	6.3	8	0.9
150	D	TA 006 TCM 157 K or M D R	9.5	8	0.9
220	D	TA 006 TCM 227 K or M D R	13.9	8	0.7
220	E	TA 006 TCM 227 K or M E R	13.9	8	0.9
330	E	TA 006 TCM 337 K or M E R	20.8	8	0.9
Note: All 6.3V Tantalums have P/N callouts as "006" but are rated at 6.3V.					
10V DC					
1.5	A	TA 010 TCM 155 K or M A R	0.5	6	10.0
2.2	A	TA 010 TCM 225 K or M A R	0.5	8	7.0
3.3	A	TA 010 TCM 335 K or M A R	0.5	8	6.5
4.7	A	TA 010 TCM 475 K or M A R	0.5	8	5.0
4.7	B	TA 010 TCM 475 K or M B R	0.5	8	4.0
6.8	A	TA 010 TCM 685 K or M A R	0.7	8	4.0
6.8	B	TA 010 TCM 685 K or M B R	0.7	8	3.0
6.8	C	TA 010 TCM 685 K or M C R	0.7	8	2.6
10	A	TA 010 TCM 106 K or M A R	1.0	8	3.5
10	B	TA 010 TCM 106 K or M B R	1.0	8	3.0
10	C	TA 010 TCM 106 K or M C R	1.0	8	2.5
15	B	TA 010 TCM 156 K or M B R	1.5	8	2.8
15	C	TA 010 TCM 156 K or M C R	1.5	8	2.0
22	A	TA 010 TCM 226 K or M A R	2.2	8	4.0
22	B	TA 010 TCM 226 K or M B R	2.2	8	2.5
22	C	TA 010 TCM 226 K or M C R	2.2	8	1.8
22	D	TA 010 TCM 226 K or M D R	2.2	8	1.5
33	B	TA 010 TCM 336 K or M B R	3.3	8	2.0
33	C	TA 010 TCM 336 K or M C R	3.3	8	1.6

TCM SERIES DATA TABLE

Standard Part Numbers & Data

Cap. μF	Case Code	Catalogue P/N	Max. DCL @ +25°C (μA)	Max. DF @ +25°C 120 Hz (%)	Max. ESR 100 kHz (Ω)
10V DC (continued)					
33	D	TA 010 TCM 336 K or M D R	3.3	8	1.1
47	B	TA 010 TCM 476 K or M B R	4.7	8	2.2
47	C	TA 010 TCM 476 K or M C R	4.7	8	1.6
47	D	TA 010 TCM 476 K or M D R	4.7	8	0.9
68	D	TA 010 TCM 686 K or M D R	6.8	8	0.9
100	C	TA 010 TCM 107 K or M C R	10.0	8	1.2
100	D	TA 010 TCM 107 K or M D R	10.0	8	0.9
150	D	TA 010 TCM 157 K or M D R	15.0	8	0.9
150	E	TA 010 TCM 157 K or M E R	15.0	8	0.9
220	D	TA 010 TCM 227 K or M D R	22.0	8	0.8
220	E	TA 010 TCM 227 K or M E R	22.0	8	0.9
16V DC					
1.0	A	TA 016 TCM 105 K or M A R	0.5	6	11.0
1.5	A	TA 016 TCM 155 K or M A R	0.5	8	8.0
2.2	A	TA 016 TCM 225 K or M A R	0.5	8	6.0
2.2	B	TA 016 TCM 225 K or M B R	0.5	8	5.5
3.3	A	TA 016 TCM 335 K or M A R	0.5	8	5.0
3.3	B	TA 016 TCM 335 K or M B R	0.5	8	4.5
4.7	A	TA 016 TCM 475 K or M A R	0.8	8	5.0
4.7	B	TA 016 TCM 475 K or M B R	0.8	8	4.0
4.7	C	TA 016 TCM 475 K or M C R	0.8	8	3.5
6.8	A	TA 016 TCM 685 K or M A R	1.1	8	3.5
6.8	B	TA 016 TCM 685 K or M B R	1.1	8	2.5
6.8	C	TA 016 TCM 685 K or M C R	1.1	8	2.5
10	B	TA 016 TCM 106 K or M B R	1.6	8	2.8
10	C	TA 016 TCM 106 K or M C R	1.6	8	2.0
15	B	TA 016 TCM 156 K or M B R	2.4	8	2.5
15	C	TA 016 TCM 156 K or M C R	2.4	8	1.8
15	D	TA 016 TCM 156 K or M D R	2.4	8	1.5
22	B	TA 016 TCM 226 K or M B R	3.5	8	2.4
22	C	TA 016 TCM 226 K or M C R	3.5	8	1.6
22	D	TA 016 TCM 226 K or M D R	3.5	8	1.1
33	C	TA 016 TCM 336 K or M C R	5.3	8	1.5
33	D	TA 016 TCM 336 K or M D R	5.3	8	0.9
47	C	TA 016 TCM 476 K or M C R	7.5	8	1.4
47	D	TA 016 TCM 476 K or M D R	7.5	8	0.9
68	D	TA 016 TCM 686 K or M D R	10.8	8	0.9
100	D	TA 016 TCM 107 K or M D R	16.0	8	0.9
100	E	TA 016 TCM 107 K or M E R	16.0	8	0.9
150	E	TA 016 TCM 157 K or M E R	24.0	8	0.9

Tantalum Chip Capacitors

TCM SERIES DATA TABLE Standard Part Numbers & Data

Cap. μF	Case Code	Catalogue P/N	Max. DCL @ +25°C (μA)	Max. DF @ +25°C 120 Hz (%)	Max. ESR 100 kHz (Ω)
20V DC					
0.68	A	TA 020 TCM 684 K or M A R	0.5	6	12.0
1.0	A	TA 020 TCM 105 K or M A R	0.5	6	9.0
1.5	A	TA 020 TCM 155 K or M A R	0.5	8	7.0
2.2	A	TA 020 TCM 225 K or M A R	0.5	8	6.0
2.2	B	TA 020 TCM 225 K or M B R	0.5	8	3.5
3.3	B	TA 020 TCM 335 K or M B R	0.7	8	3.5
3.3	C	TA 020 TCM 335 K or M C R	0.7	8	3.0
4.7	B	TA 020 TCM 475 K or M B R	1.0	8	3.0
4.7	C	TA 020 TCM 475 K or M C R	1.0	8	2.8
6.8	B	TA 020 TCM 685 K or M B R	1.4	8	3.0
6.8	C	TA 020 TCM 685 K or M C R	1.4	8	2.0
10	B	TA 020 TCM 106 K or M B R	2.0	8	2.5
10	C	TA 020 TCM 106 K or M C R	2.0	8	1.9
10	D	TA 020 TCM 106 K or M D R	2.0	8	1.3
15	C	TA 020 TCM 156 K or M C R	3.0	8	2.0
15	D	TA 020 TCM 156 K or M D R	3.0	8	1.1
22	C	TA 020 TCM 226 K or M C R	4.4	8	1.6
22	D	TA 020 TCM 226 K or M D R	4.4	8	0.9
33	D	TA 020 TCM 336 K or M D R	6.6	8	0.9
47	D	TA 020 TCM 476 K or M D R	9.4	8	0.9
47	E	TA 020 TCM 476 K or M E R	9.4	8	0.9
68	E	TA 020 TCM 686 K or M E R	13.6	8	0.9
25V DC					
0.47	A	TA 025 TCM 474 K or M A R	0.5	6	14.0
0.68	A	TA 025 TCM 684 K or M A R	0.5	6	10.0
1.0	A	TA 025 TCM 105 K or M A R	0.5	6	9.0

TCM SERIES DATA TABLE

Standard Part Numbers & Data

Cap. μ F	Case Code	Catalogue P/N	Max. DCL @ +25°C (μ A)	Max. DF @ +25°C 120 Hz (%)	Max. ESR 100 kHz (Ω)
25V DC (continued)					
1.5	A	TA 025 TCM 155 K or M A R	0.5	8	8.0
1.5	B	TA 025 TCM 155 K or M B R	0.5	8	5.0
2.2	A	TA 025 TCM 225 K or M A R	0.6	8	7.0
2.2	B	TA 025 TCM 225 K or M B R	0.6	8	4.5
2.2	C	TA 025 TCM 225 K or M C R	0.6	8	3.5
3.3	B	TA 025 TCM 335 K or M B R	0.8	8	3.5
3.3	C	TA 025 TCM 335 K or M C R	0.8	8	2.8
4.7	B	TA 025 TCM 475 K or M B R	1.2	8	3.0
4.7	C	TA 025 TCM 475 K or M C R	1.2	8	2.4
6.8	C	TA 025 TCM 685 K or M C R	1.7	8	2.0
6.8	D	TA 025 TCM 685 K or M D R	1.7	8	1.4
10	C	TA 025 TCM 106 K or M C R	2.5	8	1.8
10	D	TA 025 TCM 106 K or M D R	2.5	8	1.2
15	D	TA 025 TCM 156 K or M D R	3.8	8	1.0
22	C	TA 025 TCM 226 K or M C R	5.5	8	1.2
22	D	TA 025 TCM 226 K or M D R	5.5	8	0.9
33	D	TA 025 TCM 336 K or M D R	8.3	8	0.8
33	E	TA 025 TCM 336 K or M E R	8.3	8	0.9
35V DC					
0.1	A	TA 035 TCM 104 K or M A R	0.5	4	24.0
0.15	A	TA 035 TCM 154 K or M A R	0.5	4	21.0
0.22	A	TA 035 TCM 224 K or M A R	0.5	6	18.0
0.33	A	TA 035 TCM 334 K or M A R	0.5	6	15.0
0.47	A	TA 035 TCM 474 K or M A R	0.5	6	12.0
0.47	B	TA 035 TCM 474 K or M B R	0.5	6	10.0
0.68	A	TA 035 TCM 684 K or M A R	0.5	6	12.0
0.68	B	TA 035 TCM 684 K or M B R	0.5	6	10.0
1.0	A	TA 035 TCM 105 K or M A R	0.5	6	8.5
1.0	B	TA 035 TCM 105 K or M B R	0.5	6	7.5
1.5	A	TA 035 TCM 155 K or M A R	0.5	8	7.5
1.5	B	TA 035 TCM 155 K or M B R	0.5	8	5.5
1.5	C	TA 035 TCM 155 K or M C R	0.5	8	4.5

Tantalum Chip Capacitors

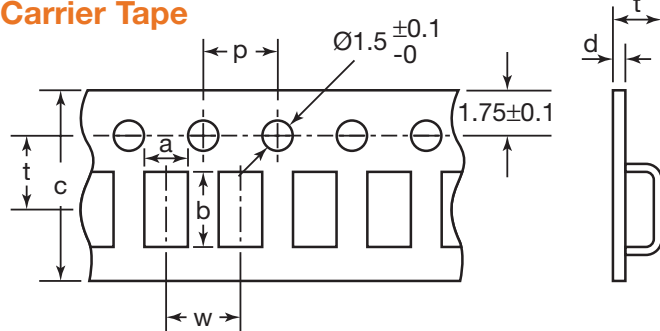
TCM SERIES DATA TABLE Standard Part Numbers & Data

Cap. μ F	Case Code	Catalogue P/N	Max. DCL @ +25°C (μ A)	Max. DF @ +25°C 120 Hz (%)	Max. ESR 100 kHz (Ω)
35V DC (continued)					
2.2	B	TA 035 TCM 225 K or M B R	0.8	8	4.5
2.2	C	TA 035 TCM 225 K or M C R	0.8	8	3.5
3.3	B	TA 035 TCM 335 K or M B R	1.2	8	4.0
3.3	C	TA 035 TCM 335 K or M C R	1.2	8	2.5
4.7	C	TA 035 TCM 475 K or M C R	1.6	8	2.2
4.7	D	TA 035 TCM 475 K or M D R	1.6	8	1.5
6.8	C	TA 035 TCM 685 K or M C R	2.4	8	2.0
6.8	D	TA 035 TCM 685 K or M D R	2.4	8	1.3
10	C	TA 035 TCM 106 K or M C R	3.5	8	1.6
10	D	TA 035 TCM 106 K or M D R	3.5	8	1.0
15	D	TA 035 TCM 156 K or M D R	5.3	8	0.9
22	D	TA 035 TCM 226 K or M D R	7.7	8	0.9
22	E	TA 035 TCM 226 K or M E R	7.7	8	0.9
50V DC					
0.1	A	TA 050 TCM 104 K or M A R	0.5	4	22.0
0.15	A	TA 050 TCM 154 K or M A R	0.5	4	18.0
0.15	B	TA 050 TCM 155 K or M B R	0.5	4	17.0
0.22	B	TA 050 TCM 224 K or M B R	0.5	6	14.0
0.33	B	TA 050 TCM 334 K or M B R	0.5	6	12.0
0.47	B	TA 050 TCM 474 K or M B R	0.5	6	9.0
0.47	C	TA 050 TCM 474 K or M C R	0.5	6	8.0
0.68	C	TA 050 TCM 684 K or M C R	0.5	6	7.0
1.0	B	TA 050 TCM 105 K or M B R	0.5	4	6.7
1.0	C	TA 050 TCM 105 K or M C R	0.5	6	5.5
1.5	C	TA 050 TCM 155 K or M C R	0.8	8	4.5
2.2	C	TA 050 TCM 225 K or M C R	1.1	8	3.5
2.2	D	TA 050 TCM 225 K or M D R	1.1	8	2.5
3.3	D	TA 050 TCM 335 K or M D R	1.7	8	2.0
4.7	D	TA 050 TCM 475 K or M D R	2.4	8	1.4

Tantalum Chip Capacitors

Taping Specifications

Carrier Tape



Carrier Tape Dimensions

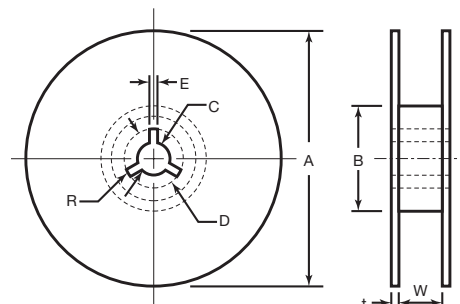
(Unit: mm)

CASE	a ± 0.1	b ± 0.1	c ± 0.2	t ± 0.1	p ± 0.1	w ± 0.1	d
A	1.9	3.9	8.0	2.0	4.0	4.0	0.2
B	3.1	3.9	8.0	2.3	4.0	4.0	0.2
C	3.9	6.3	12.0	2.7	4.0	8.0	0.3
D	4.6	7.7	12.0	3.3	4.0	8.0	0.3
E	4.6	7.7	12.0	4.2	4.0	8.0	0.3

Quantity per reel

Case Size	Reel Size	
	7"	13"
A	2,000 pcs	10,000 pcs
B	2,000 pcs	7,500 pcs
C, D, E	500 pcs	2,500 pcs
E	400 pcs	2,000 pcs

Reel



Reel Dimensions

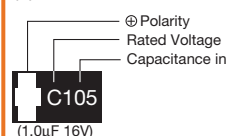
Case Size	A +0 -3.0	B -0	C ± 0.2	D ± 0.8	E ± 0.5	W ± 0.3	t ± 0.5	R
A, B,	180	60	13.0	21.0	2.0	9.0	2.0	1.0
C, D, E	330	60	13.0	21.0	2.0	13.0	2.0	1.0

How To Order

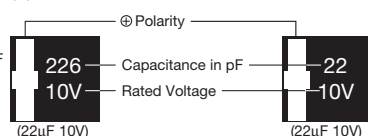
TA	035	TCM	105	M	B	R	-13
Tantalum	Rated Voltage 6.3V-006 (TCM series) 6.3V-6R3 (TCR series) 35V-035	Series TCM TCR	Capacitance in picofarads First two figures are significant. Third is the number of zeros to follow. 1.0 μ F - 105 22 μ F - 226 100 μ F - 107	Capacitance Tolerance \pm 20%: M \pm 10%: K	Case Code A, B, C, D, E	Packaging Tape R: See below.	For 13 inch reels add -13, leave blank for standard 7 inch reels

Marking*

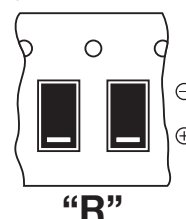
(1) A Case



(2) B, C, D, E Case



White bar indicates
positive terminal.



"R"

CODE	G	J	A	C	D	E	V	T
Rated Voltage	4V	6.3V	10V	16V	20V	25V	35V	50V

Standard termination finish for this product is 100% matte Tin (Sn)

* Marking codes can be either way depending on customer needs and what is available in stock. All 6.3V rated Tantalums will typically be marked as 6 or 6V.

All components in this section are RoHS compliant per the EUDirectives and definitions.

Please Note: Venkel offers Engineering Kits for this product. See page 117 for details.

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