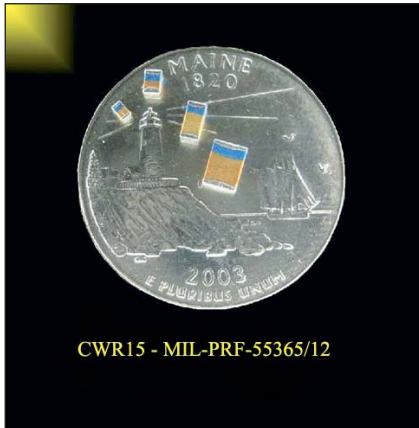


# TBC Series



## CWR15 MIL-PRF-55365/12 Established Reliability, COTS-Plus & Space Level



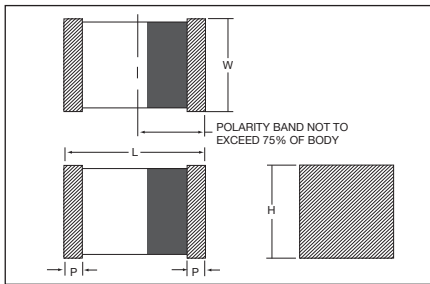
CWR15 - MIL-PRF-55365/12

AVX announces the world's smallest military approved tantalum chip capacitors. The CWR15 offers 0603, 0805 and 1206 case sizes in capacitance/voltage combinations previously only available in much larger packages. The revolutionary AVX TACmicrochip® technology offers designers significant

opportunity to downsize circuits for military and aerospace applications. The product is manufactured in the AVX Tantalum high reliability facility in Biddeford, Maine which is also home to the CWR09, CWR11, CWR19 and CWR29 product lines.

### CASE DIMENSIONS: millimeters (inches)

Case Code	Length (L)	Width (W)	Height (H)	Term. Width (W <sub>t</sub> ) ±0.10 (±0.004)
L	1.60+0.25/-0.15 (0.063+0.010/-0.006)	0.85+0.20/-0.10 (0.033+0.008/-0.004)	0.85+0.20/-0.10 (0.033+0.008/-0.004)	0.15+0.35/-0.00 (0.006+0.014/-0.000)
R	2.00+0.25/-0.15 (0.079+0.010/-0.006)	1.35+0.20/-0.10 (0.053+0.008/-0.004)	2.00+0.25/-0.15 (0.079+0.001/-0.006)	0.15+0.35/-0.00 (0.006+0.014/-0.000)
A	3.20±0.20 (0.126±0.008)	1.60±0.20 (0.063±0.008)	1.60±0.20 (0.063±0.008)	0.15+0.35/-0.00 (0.006+0.014/-0.000)



### CAPACITANCE AND RATED VOLTAGE, V<sub>R</sub> (VOLTAGE CODE) RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Voltage Rating DC (V <sub>R</sub> ) at 85°C				
μF	Code	4V (C)	6V (D)	10V (F)	15V (H)	20V (J)
0.33	334					
0.47	474			L		L
0.68	684			L		
1.0	105			L		
1.5	155			L		
2.2	225			L		
3.3	335		L	R		
4.7	475		L	R		
6.8	685	L	R	R		
10	106	R	R	R		
15	156	R	R	A		
22	226	R	A			
33	336	R	A			
47	476		A			
68	686	A				

Further extensions of the CWR15 product are planned for later in 2009. A new case size will be added, and the voltage range will be extended to 20 volts. Ratings of 100 μF at 4 volts to 10 μF at 20 volts will be included in this extension of the product line.

### HOW TO ORDER

#### COTS-PLUS & MIL QPL (CWR15):

TBC	L	685	*	004	C	□	#	@	0	^	++
<b>Type</b>	<b>Case Size</b>	<b>Capacitance Code</b> pF code: 1st two digits represent significant figures 3rd digit represents multiplier (number of zeros to follow)	<b>Capacitance Tolerance</b> M = ±20% K = ±10% J = ±5%	<b>Voltage Code</b> 004 = 4Vdc 006 = 6Vdc 010 = 10Vdc 015 = 15Vdc 020 = 20Vdc	<b>Standard or Low ESR Range</b> C = Std ESR	<b>Packaging</b> B = Bulk R = 7" T&R S = 13" T&R W = Waffle  See page 5 for additional packaging options.	<b>Inspection Level</b> S = Std. Conformance L = Group A  M = MIL (JAN) CWR15	<b>Reliability Grade</b> Weibull: B = 0.1%/1000 hrs. 90% conf. C = 0.01%/1000 hrs. 90% conf. D = 0.001%/1000 hrs. 90% conf. Z = Non-ER	<b>Qualification Level</b> 0 = N/A 9 = SRC9000	<b>Termination Finish</b> H = Solder Plated 0 = Fused Solder Plated 8 = Hot Solder Dipped 9 = Gold Plated 7 = Matte Sn (COTS-Plus only)	<b>Surge Test Option</b> 00 = None 23 = 10 Cycles, +25°C 24 = 10 Cycles, -55°C & +85°C 45 = 10 cycles, -55°C & +85°C before Weibull

#### CWR15 P/N CROSS REFERENCE:

CWR15	F	C	685	*	-	L	+
<b>Style</b>	<b>Voltage Code</b> C = 4Vdc D = 6Vdc F = 10Vdc	<b>Termination Finish</b> H = Solder Plated C = Hot Solder Dipped B = Gold Plated	<b>Capacitance Code</b> pF code: 1st two digits represent significant figures 3rd digit represents number of zeros to follow	<b>Capacitance Tolerance</b> J = ±5% K = ±10% M = ±20%  See page 5 for additional packaging options.	<b>Product Level Designator</b> Weibull B = 0.1 C = 0.01 D = 0.001	<b>Case Size</b>	<b>Surge Test Option</b> A = +25°C after Weibull B = -55°C & +85°C after Weibull C = -55°C & +85°C before Weibull

#### SPACE LEVEL OPTIONS TO SRC9000\*:

TBC	L	685	*	004	C	□	L	@	9	^	++
<b>Type</b>	<b>Case Size</b>	<b>Capacitance Code</b> pF code: 1st two digits represent significant figures 3rd digit represents multiplier (number of zeros to follow)	<b>Capacitance Tolerance</b> M = ±20% K = ±10% J = ±5%	<b>Voltage Code</b> 004 = 4Vdc 006 = 6Vdc 010 = 10Vdc 015 = 15Vdc 020 = 20Vdc 025 = 25Vdc 035 = 35Vdc 050 = 50Vdc	<b>Standard or Low ESR Range</b> C = Std ESR L = Low ESR	<b>Packaging</b> B = Bulk R = 7" T&R S = 13" T&R W = Waffle  See page 5 for additional packaging options.	<b>Inspection Level</b> L = Group A	<b>Reliability Grade</b> Weibull: B = 0.1%/1000 hrs. 90% conf. C = 0.01%/1000 hrs. 90% conf. D = 0.001%/1000 hrs. 90% conf.	<b>Qualification Level</b> 9 = SRC9000	<b>Termination Finish</b> H = Solder Plated 0 = Fused Solder Plated 8 = Hot Solder Dipped 9 = Gold Plated	<b>Surge Test Option</b> 00 = 10 Cycles, -55°C & +85°C 45 = 10 cycles, -55°C & +85°C before Weibull

\*Contact factory for AVX SRC9000 Space Level SCD details.

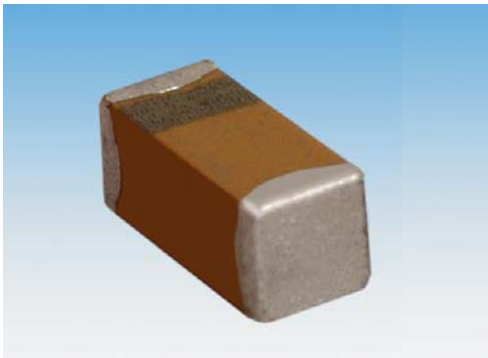
### TECHNICAL SPECIFICATIONS

Technical Data:	Unless otherwise specified, all technical data relate to an ambient temperature of 25°C						
Capacitance Range:	0.47 µF to 68 µF						
Capacitance Tolerance:	±5%; ±10%; ±20%						
Rated Voltage: (V <sub>R</sub> )	≤85°C:	4	6	10	15	20	
Category Voltage: (V <sub>C</sub> )	125°C:	2.7	4	7	10	13	
Surge Voltage: (V <sub>S</sub> )	≤85°C:	5.2	8	13	20	26	
	125°C:	3.4	5	8	13	16	
Temperature Range:	-55°C to +125°C						



# TBC Series

## TBC COTS-Plus

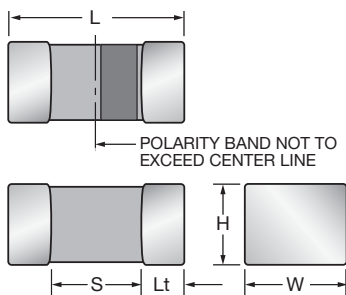


TBC COTS-Plus series extends the range of CWR15. TBC is available with Weibull grade “B” reliability and all MIL-PRF-55365 surge test options (“A”, “B” & “C”).

For Space Level applications, AVX SRC9000 ratings are available as shown in the rating table.

There are four termination finishes available: solder plated, fused solder plated, hot solder dipped and gold plated (these correspond to “H”, “K”, “C” and “B” termination, respectively, per MIL-PRF 55365).

### CASE DIMENSIONS: millimeters (inches)



Code	EIA Code	EIA Metric	Length (L)	Width (W)	Height (H)	Termination Spacing(S)	Minimum Termination Length (Lt)	Average Mass
A	1206	3216-18	3.20±0.20 (0.126±0.008)	1.60±0.20 (0.063±0.008)	1.60±0.20 (0.063±0.008)	1.80 min. (0.071 min.)	0.15 (0.006)	44.6mg
B	1210	3528-15	3.50 <sup>+0.20</sup> <sub>-0.20</sub> (0.138 <sup>+0.008</sup> <sub>-0.008</sub> )	2.80 <sup>+0.20</sup> <sub>-0.10</sub> (0.110 <sup>+0.008</sup> <sub>-0.004</sub> )	1.50 max.	2.00 min.	0.15 min.	90.0mg
K	0402	1005-07	1.00 <sup>+0.20</sup> <sub>-0.00</sub> (0.039 <sup>+0.008</sup> <sub>-0.000</sub> )	0.50 <sup>+0.20</sup> <sub>-0.00</sub> (0.020 <sup>+0.008</sup> <sub>-0.000</sub> )	0.50 <sup>+0.20</sup> <sub>-0.00</sub> (0.020 <sup>+0.008</sup> <sub>-0.000</sub> )	0.40 min. (0.016 min.)	0.10 (0.004)	2.0mg
L	0603	1608-10	1.60 <sup>+0.20</sup> <sub>-0.00</sub> (0.063 <sup>+0.008</sup> <sub>-0.000</sub> )	0.85 <sup>+0.15</sup> <sub>-0.00</sub> (0.033 <sup>+0.006</sup> <sub>-0.000</sub> )	0.85 <sup>+0.15</sup> <sub>-0.00</sub> (0.033 <sup>+0.006</sup> <sub>-0.000</sub> )	0.55 min. (0.022 min.)	0.15 (0.006)	8.6mg
R	0805	2012-15	2.00 <sup>+0.20</sup> <sub>-0.00</sub> (0.079 <sup>+0.008</sup> <sub>-0.000</sub> )	1.35 <sup>+0.15</sup> <sub>-0.00</sub> (0.053 <sup>+0.006</sup> <sub>-0.000</sub> )	1.35 <sup>+0.15</sup> <sub>-0.00</sub> (0.053 <sup>+0.006</sup> <sub>-0.000</sub> )	0.70 min. (0.027 min.)	0.15 (0.006)	29.9mg

### CAPACITANCE AND RATED VOLTAGE, V<sub>R</sub> (VOLTAGE CODE) RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Voltage Rating DC (V <sub>R</sub> ) at 85°C						
µF	Code	3V	4V	6V	10V	16V	20V	25V
0.33	334				K / L	L	L	L
0.47	474				L	L		
0.68	684				L	L		
1.0	105			K	L	L		
1.5	155				L	L		
2.2	225				L	L		
3.3	335				L / R		R	
4.7	475			L	L / R		R	
6.8	685			R	R			
10	106	R	R	R	R	R		
15	156		R		A			
22	226		R	R / A				
33	336	R	R	A				
47	476			A				
68	686		A					

# TBC Series



## TBC COTS-Plus

### HOW TO ORDER

#### COTS-PLUS:

TBC	L	685	*	004	C	□	#	@	0	^	++
<b>Type</b>	<b>Case Size</b>	<b>Capacitance Code</b> pF code: 1st two digits represent significant figures 3rd digit represents multiplier (number of zeros to follow)	<b>Capacitance Tolerance</b> M = ±20% K = ±10% J = ±5%	<b>Voltage Code</b> 004 = 4Vdc 006 = 6Vdc 010 = 10Vdc 015 = 15Vdc 020 = 20Vdc	<b>Standard or Low ESR Range</b> C = Std ESR	<b>Packaging</b> B = Bulk R = 7" T&R S = 13" T&R W = Waffle  See page 5 for additional packaging options.	<b>Inspection Level</b> S = Std. Conformance L = Group A	<b>Reliability Grade</b> Weibull: B = 0.1%/1000 hrs. 90% conf. C = 0.01%/1000 hrs. 90% conf. D = 0.001%/1000 hrs. 90% conf. Z = Non-ER  None required	<b>Qualification Level</b> 0 = N/A 9 = SRC9000	<b>Termination Finish</b> H = Solder Plated 0 = Fused Solder Plated 8 = Hot Solder Dipped 9 = Gold Plated 7 = Matte Sn (COTS-Plus only)	<b>Surge Test Option</b> 00 = None 23 = 10 Cycles, +25°C 24 = 10 Cycles, -55°C & +85°C 45 = 10 cycles, -55°C & +85°C before Weibull

#### SPACE LEVEL OPTIONS TO SRC9000\*:

TBC	L	685	*	004	C	□	L	@	9	^	++
<b>Type</b>	<b>Case Size</b>	<b>Capacitance Code</b> pF code: 1st two digits represent significant figures 3rd digit represents multiplier (number of zeros to follow)	<b>Capacitance Tolerance</b> M = ±20% K = ±10% J = ±5%	<b>Voltage Code</b> 004 = 4Vdc 006 = 6Vdc 010 = 10Vdc 015 = 15Vdc 020 = 20Vdc 025 = 25Vdc 035 = 35Vdc 050 = 50Vdc	<b>Standard or Low ESR Range</b> C = Std ESR L = Low ESR	<b>Packaging</b> B = Bulk R = 7" T&R S = 13" T&R W = Waffle  See page 5 for additional packaging options.	<b>Inspection Level</b> L = Group A	<b>Reliability Grade</b> Weibull: B = 0.1%/1000 hrs. 90% conf. C = 0.01%/1000 hrs. 90% conf. D = 0.001%/1000 hrs. 90% conf.	<b>Qualification Level</b> 9 = SRC9000	<b>Termination Finish</b> H = Solder Plated 0 = Fused Solder Plated 8 = Hot Solder Dipped 9 = Gold Plated	<b>Surge Test Option</b> 00 = 10 Cycles, -55°C & +85°C 45 = 10 cycles, -55°C & +85°C before Weibull

\*Contact factory for AVX SRC9000 Space Level SCD details.

### TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C										
Capacitance Range:	0.47 μF to 150 μF										
Capacitance Tolerance:	±10%; ±20%										
Leakage Current DCL:	0.01CV or 0.5μA whichever is the greater										
Rated Voltage (V <sub>R</sub> )	≧ +85°C:	2	3	4	5	6.3	10	16	20	25	
Category Voltage (V <sub>C</sub> )	≧ +125°C:	1.3	2	2.7	3.3	4	7	10	13	17	
Surge Voltage (V <sub>S</sub> )	≧ +85°C:	2.7	3.9	5.2	6.5	8	13	20	26	32	
Surge Voltage (V <sub>S</sub> )	≧ +125°C:	1.7	2.6	3.2	4	5	8	12	16	20	
Temperature Range:	-55°C to +125°C										



# TBC Series

## TBC COTS-Plus



RATING & PART NUMBER REFERENCE			Parametric Specifications by Rating				Typical Ripple Data by Rating											
AVX P/N	Case EIA / AVX	AVX SRC9000 P/N	Cap @ 120Hz µF @ 25°C	DC Rated Voltage @ +85°C V	ESR @ 100kHz @ +25°C Ohms	DCL max		DF Max		Power Dissipation W	25°C		85°C		125°C		150°C	
						+25°C (µA)	+85°C (µA)	+125°C (µA)	+25°C (%)		+85/125°C (%)	+25°C (100kHz) A	25°C (100kHz) A	85°C (100kHz) A	125°C (100kHz) A	25°C (100kHz) V	85°C (100kHz) V	125°C (100kHz) V
TBC R 156 * 003 C # @ 0 + + +	0805 R	TBC R 156 * 003 C L @ 9 + + +	15	3.0	6	0.5	5.0	6.3	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 336 * 003 C # @ 0 + + +	0805 R	TBC R 336 * 003 C L @ 9 + + +	33	3.0	6	1.0	9.9	12.4	10	20	15	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 106 * 004 C # @ 0 + + +	0805 R	TBC R 106 * 004 C L @ 9 + + +	10	4.0	6	0.5	5.0	6.3	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 156 * 004 C # @ 0 + + +	0805 R	TBC R 156 * 004 C L @ 9 + + +	15	4.0	6	0.6	6.0	7.5	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 226 * 004 C # @ 0 + + +	0805 R	TBC R 226 * 004 C L @ 9 + + +	22	4.0	6	0.9	8.8	11.0	15	30	23	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 336 B 004 C # @ 0 + + +	0805 R	TBC R 336 B 004 C L @ 9 + + +	33	4.0	6	1.3	13.2	16.5	10	20	15	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC A 686 * 004 C # @ 0 + + +	1206 A	TBC A 686 * 004 C L @ 9 + + +	68	4.0	1	2.7	27.2	34.0	15	30	23	0.040	0.20	0.18	0.08	0.20	0.18	0.08
TBC K 105 * 006 C # @ 0 + + +	0402 K	TBC K 105 * 006 C L @ 9 + + +	1.0	6.3	15	0.5	5.0	6.3	6	12	9	0.015	0.03	0.03	0.01	0.47	0.43	0.19
TBC L 475 * 006 C # @ 0 + + +	0603 L	TBC L 475 * 006 C L @ 9 + + +	4.7	6.3	10	0.5	5.0	6.3	8	16	12	0.045	0.09	0.08	0.03	0.50	0.45	0.20
TBC R 685 * 006 C # @ 0 + + +	0805 R	TBC R 685 * 006 C L @ 9 + + +	6.8	6.3	6	0.5	5.0	6.3	8	16	12	0.045	0.09	0.08	0.03	0.50	0.47	0.21
TBC R 106 * 006 C # @ 0 + + +	0805 R	TBC R 106 * 006 C L @ 9 + + +	10	6.3	6	0.6	6.3	7.9	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 226 K 006 C # @ 0 + + +	0805 R	TBC R 226 K 006 C L @ 9 + + +	22	6.3	6	1.4	13.9	17.3	15	30	23	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC A 336 K 006 C # @ 0 + + +	1206 A	TBC A 336 K 006 C L @ 9 + + +	33	6.3	6	2.1	20.8	26.0	10	20	15	0.040	0.08	0.07	0.03	0.49	0.44	0.20
TBC A 476 * 006 C # @ 0 + + +	1206 A	TBC A 476 * 006 C L @ 9 + + +	47	6.3	1	3.0	29.6	37.0	15	30	23	0.040	0.20	0.18	0.08	0.20	0.18	0.08
TBC K 474 * 010 C # @ 0 + + +	0402 K	TBC K 474 * 010 C L @ 9 + + +	0.47	10	15	0.5	5.0	6.3	6	12	9	0.015	0.03	0.03	0.01	0.47	0.43	0.19
TBC L 474 * 010 C # @ 0 + + +	0603 L	TBC L 474 * 010 C L @ 9 + + +	0.47	10	12	0.5	5.0	6.3	6	12	9	0.025	0.05	0.04	0.02	0.55	0.49	0.22
TBC L 684 * 010 C # @ 0 + + +	0603 L	TBC L 684 * 010 C L @ 9 + + +	0.68	10	10	0.5	5.0	6.3	6	12	9	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC L 105 * 010 C # @ 0 + + +	0603 L	TBC L 105 * 010 C L @ 9 + + +	1.0	10	10	0.5	5.0	6.3	6	12	9	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC L 155 * 010 C # @ 0 + + +	0603 L	TBC L 155 * 010 C L @ 9 + + +	1.5	10	10	0.5	5.0	6.3	6	12	9	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC L 225 * 010 C # @ 0 + + +	0603 L	TBC L 225 * 010 C L @ 9 + + +	2.2	10	10	0.5	5.0	6.3	6	12	9	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC L 335 * 010 C # @ 0 + + +	0603 L	TBC L 335 * 010 C L @ 9 + + +	3.3	10	6	0.5	5.0	6.3	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 335 * 010 C # @ 0 + + +	0805 R	TBC R 335 * 010 C L @ 9 + + +	3.3	10	6	0.5	5.0	6.3	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC L 475 * 010 C # @ 0 + + +	0603 L	TBC L 475 * 010 C L @ 9 + + +	4.7	10	10	0.5	4.7	5.9	10	20	15	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC R 475 * 010 C # @ 0 + + +	0805 R	TBC R 475 * 010 C L @ 9 + + +	4.7	10	6	0.5	4.7	5.9	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 685 * 010 C # @ 0 + + +	0805 R	TBC R 685 * 010 C L @ 9 + + +	6.8	10	6	0.7	6.8	8.5	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 106 * 010 C # @ 0 + + +	0805 R	TBC R 106 * 010 C L @ 9 + + +	10	10	6	1.0	10.0	12.5	8	16	12	0.040	0.08	0.07	0.03	0.49	0.44	0.20
TBC A 156 * 010 C # @ 0 + + +	1206 A	TBC A 156 * 010 C L @ 9 + + +	15	10	6	1.5	15.0	18.8	10	20	15	0.040	0.08	0.07	0.03	0.49	0.44	0.20
TBC L 474 * 016 C # @ 0 + + +	0603 L	TBC L 474 * 016 C L @ 9 + + +	0.47	16	10	0.5	5.0	6.3	6	12	9	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC L 684 * 016 C # @ 0 + + +	0603 L	TBC L 684 * 016 C L @ 9 + + +	0.68	16	10	0.5	5.0	6.3	6	12	9	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC L 105 * 016 C # @ 0 + + +	0603 L	TBC L 105 * 016 C L @ 9 + + +	1.0	16	10	0.5	5.0	6.3	6	12	9	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC L 225 * 016 C # @ 0 + + +	0603 L	TBC L 225 * 016 C L @ 9 + + +	2.2	16	10	0.5	5.0	6.3	10	20	15	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC R 106 * 016 C # @ 0 + + +	0805 R	TBC R 106 * 016 C L @ 9 + + +	10	16	6	1.6	16.0	20.0	10	20	15	0.025	0.05	0.05	0.02	0.50	0.45	0.20
TBC L 474 * 016 C # @ 0 + + +	0603 L	TBC L 474 * 016 C L @ 9 + + +	0.47	20	24	0.5	5.0	6.3	6	12	9	0.025	0.03	0.03	0.01	0.77	0.70	0.31
TBC R 335 * 020 C # @ 0 + + +	0805 R	TBC R 335 * 020 C L @ 9 + + +	3.3	20	6	0.7	6.6	8.3	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC R 475 M 020 C # @ 0 + + +	0805 R	TBC R 475 M 020 C L @ 9 + + +	4.7	20	6	0.9	9.4	11.8	8	16	12	0.045	0.09	0.08	0.03	0.52	0.47	0.21
TBC L 334 M 025 C # @ 0 + + +	0603 L	TBC L 334 M 025 C L @ 9 + + +	0.33	25	30	0.5	5.0	6.3	6	12	9	0.025	0.03	0.03	0.01	0.87	0.78	0.35

All technical data relates to an ambient temperature of +25°C. Capacitance and DF are measured at 120Hz, 0.5V RMS with a maximum DC bias of 2.2 volts. DCL is measured at rated voltage after 5 minutes.

**NOTE: AVX reserves the right to supply a higher voltage rating or tighter tolerance part in the same case size, to the same reliability standards.**

