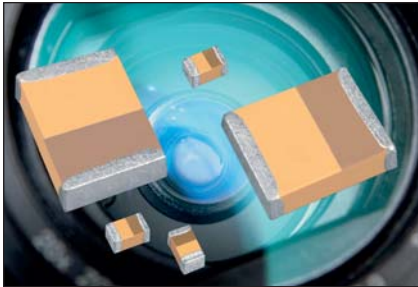


# TLC Series



## Tantalum Solid Electrolytic Chip Capacitors Consumer Series



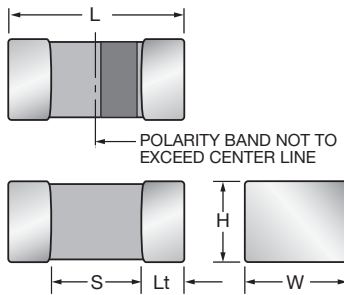
### FEATURES

- High capacitance vs. voltage ratio
- Super high volumetric efficiency
- CV range: 0.47-220 $\mu$ F / 2-35V
- 12 case sizes available
- Consumer applications (portable handheld electronics, cellular phones, digital equipments etc.)



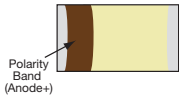
### APPLICATIONS

- Consumer portable applications with space limitations

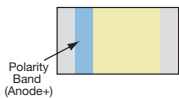


### MARKING

A, D, H, J, K, L, M, R, T,  
U, V, Z CASE



### E CASE



### CASE DIMENSIONS: millimeters (inches)

Code	EIA Code	EIA Metric	L+0.20 (0.008) -0.00 (0.000)	W+0.15 (0.006) -0.00 (0.000)	H+0.15 (0.006) -0.00 (0.000)	Termination Spacing(S)	Minimum Termination Length (Lt)
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 (0.071) min	0.15 (0.006)
D	1206	3216-06	3.20 ± 0.20 (0.126 ± 0.008)	1.60 ± 0.20 (0.063 ± 0.008)	0.60 (0.024) max	1.80 (0.071) min	0.15 (0.006)
E	0201	0603-03	0.60 ± 0.12 (0.024 ± 0.005)	0.33 ± 0.02 (0.013 ± 0.001)	0.33 ± 0.02 (0.013 ± 0.001)	0.20 (0.008) min	0.10 (0.004)
H	0805	2012-10	2.00 (0.079)	1.35 (0.053)	1.00 (0.039) max	0.70 (0.028) min	0.15 (0.006)
J	0603	1608-08	1.60 (0.063)	0.85 (0.033)	0.75 (0.030) max	0.55 (0.022) min	0.15 (0.006)
K	0402	1005-07	1.00 (0.039)	0.50 +0.20 -0.00 (0.020 +0.008 -0.000)	0.50 +0.20 -0.00 (0.020 +0.008 -0.000)	0.40 (0.016) min	0.10 (0.004)
L	0603	1608-10	1.60 (0.063)	0.85 (0.033)	0.85 (0.033)	0.55 (0.022) min	0.15 (0.006)
M	0803	2008-10	2.00 (0.079)	0.85 (0.033)	0.85 (0.033)	0.70 (0.028) min	0.15 (0.006)
R	0805	2012-15	2.00 (0.079)	1.35 (0.053)	1.35 (0.053)	0.70 (0.028) min	0.15 (0.006)
T	1210	3528-12	3.50 ± 0.20 (0.138 ± 0.008)	2.80 +0.20 -0.10 (0.110 +0.008 -0.004)	1.20 (0.047) max	2.00 (0.079) min	0.15 (0.006)
U	0805	2012-06	2.00 (0.079)	1.35 (0.053)	0.60 (0.024) max	0.70 (0.028) min	0.15 (0.006)
V	1206	3216-08	3.20 ± 0.20 (0.126 ± 0.008)	1.60 ± 0.20 (0.063 ± 0.008)	0.75 (0.030) max	1.80 (0.071) min	0.15 (0.006)
Z	0602	1605-07	1.60 (0.063)	0.50 +0.20 -0.00 (0.020 +0.008 -0.000)	0.50 +0.20 -0.00 (0.020 +0.008 -0.000)	0.55 (0.022) min	0.15 (0.006)

Under development

### HOW TO ORDER

**TLC**

↓

Type

**L**

↓

Case Size  
See table above

**226**

↓

Capacitance Code  
pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)

**M**

↓

Tolerance  
M=±20%

**006**

↓

Rated DC Voltage  
002=2Vdc  
003=3Vdc  
004=4Vdc  
006=6.3Vdc  
008=8Vdc  
010=10Vdc  
016=16Vdc  
020=20Vdc  
025=25Vdc  
035=35Vdc

**R**

↓

Packaging  
R, P = 7" Standard Tin Termination Plastic Tape  
X, Q = 4 1/4" Standard Tin Termination Plastic Tape  
A, M = 7" Gold Termination Plastic Tape  
F, N = 4 1/4" Gold Termination Plastic Tape  
H = Chip Tray (waffle)

**TA**

↓

Standard Suffix  
OR  
**4000**  
↓  
ESR in mΩ

## Tantalum Solid Electrolytic Chip Capacitors Consumer Series

### TECHNICAL SPECIFICATIONS

Technical Data:	All technical data relate to an ambient temperature of +25°C											
Capacitance Range:	0.47 $\mu$ F to 220 $\mu$ F											
Capacitance Tolerance:	$\pm$ 20%											
Rated Voltage ( $V_R$ )	-55°C $\leq$ +40°C:	2	3	4	6.3	8	10	16	20	25	35	
Category Voltage ( $V_C$ )	at 85°C:	1	1.5	2	3.2	4	5	8	10	12.5	17.5	
Category Voltage ( $V_C$ )	at 125°C:	0.4	0.6	0.8	1.3	1.6	2	3.2	4	5	7	
Temperature Range:	-55°C to +125°C with category voltage											
Reliability:	0.2% per 1000 hours at 85°C, 0.5x $V_R$ with 0.1 $\Omega/V$ series impedance with 60% confidence level											

### CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

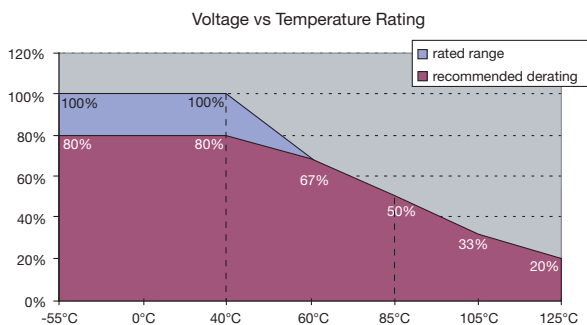
Capacitance		Voltage Rating DC ( $V_R$ ) to 40°C									
$\mu$ F	Code	2.0V	3.0V	4.0V	6.3V	8V	10V	16V	20V	25V	35V
0.47	474				E			K			
1.0	105				E			K		L	R
2.2	225						K		H	R	
3.3	335							L			
4.7	475			K	K/U		J				
6.8	685		K	K			U				
10	106		K	J/K/Z	J/K/Z		U	V	R		
15	156	K	K*	K			H/L				
22	226	J	J	K*/U	L/U		L/M				
33	336			L/U	H/L/L(4000)/U/V	L	H				
47	476	L	L/R	H/L	H/R/V	D	H/R				
68	686			R	R		R*				
100	107			I*/R	D*/I*/R/T		R*/T				
150	157			R*	R*		A*				
220	227	R*		R*/T							

Available Ratings, (ESR ratings in mOhms in brackets)

Engineering samples - please contact manufacturer

\*Codes under development - subject to change.

Note: Voltage ratings are minimum values. AVX reserves the right to supply higher ratings in the same case size, to the same reliability standards.



# TLC Series



## Tantalum Solid Electrolytic Chip Capacitors Consumer Series

### RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (µA)	ESR Max. @ 100kHz (Ω)	MSL	100kHz RMS Current (mA)		
										25°C	85°C	125°C
<b>2 Volt @ 40°C</b>												
TLCK156M002#TA	K	15	2	40	0.4	125	0.5	15	3	32	28	13
TLCJ226M002#TA	J	22	2	40	0.4	125	0.5	7.5	3	52	46	21
TLCL476M002#TA	L	47	2	40	0.4	125	0.9	7.5	3	58	52	23
<b>3 Volt @ 40°C</b>												
TLCK685M003#TA	K	6.8	3	40	0.6	125	0.5	15	3	32	28	13
TLCK106M003#TA	K	10	3	40	0.6	125	0.5	15	3	32	28	13
TLCJ226M003#TA	J	22	3	40	0.6	125	0.7	7.5	3	52	46	21
TLCL476M003#TA	L	47	3	40	0.6	125	1.4	7.5	3	58	52	23
TLCR476M003#TA	R	47	3	40	0.6	125	3.0	7.5	3	77	70	31
<b>4 Volt @ 40°C</b>												
TLCK475M004#TA	K	4.7	4	40	0.8	125	0.5	15	3	32	28	13
TLCK685M004#TA	K	6.8	4	40	0.8	125	0.5	15	3	32	28	13
TLCJ106M004#TA	J	10	4	40	0.8	125	0.5	7.5	3	52	46	21
TLCK106M004#TA	K	10	4	40	0.8	125	0.5	15	3	32	28	13
TLCZ106M004#TA	Z	10	4	40	0.8	125	0.5	15	3	37	33	15
TLCK156M004#TA	K	15	4	40	0.8	125	3.0	15	3	32	28	13
TLCU226M004#TA	U	22	4	40	0.8	125	0.9	12	3	54	49	22
TLCL336M004#TA	L	33	4	40	0.8	125	1.3	7.5	3	58	52	23
TLCU336M004#TA	U	33	4	40	0.8	125	2.6	9	3	62	56	25
TLCH476M004#TA	H	47	4	40	0.8	125	1.9	5	3	89	80	36
TLCL476M004#TA	L	47	4	40	0.8	125	1.9	7.5	3	58	52	23
TLCR686M004#TA	R	68	4	40	0.8	125	2.7	5	3	95	85	38
TLCR107M004#TA	R	100	4	40	0.8	125	4.0	5	3	95	85	38
TLCT227M004#TA	T	220	4	40	0.8	125	8.8	1	3	200	180	80
<b>6.3 Volt @ 40°C</b>												
TLCE474M006HTA	E	0.47	6.3	40	1.3	125	1.0	60	3	13	12	5
TLCE105M006HTA	E	1	6.3	40	1.3	125	1.0	60	3	13	12	5
TLCK475M006#TA	K	4.7	6.3	40	1.3	125	0.5	15	3	32	28	13
TLCU475M006#TA	U	4.7	6.3	40	1.3	125	0.5	5	3	84	75	33
TLCJ106M006#TA	J	10	6.3	40	1.3	125	0.6	7.5	3	52	46	21
TLCK106M006#TA	K	10	6.3	40	1.3	125	3.1	15	3	32	28	13
TLCZ106M006#TA	Z	10	6.3	40	1.3	125	0.6	15	3	37	33	15
TLCL226M006#TA	L	22	6.3	40	1.3	125	1.4	7.5	3	58	52	23
TLCU226M006#TA	U	22	6.3	40	1.3	125	2.8	12	3	54	49	22
TLCH336M006#TA	H	33	6.3	40	1.3	125	2.0	5	3	89	80	36
TLCL336M006#TA	L	33	6.3	40	1.3	125	2.1	7.5	3	58	52	23
TLCL336M006#4000	L	33	6.3	40	1.3	125	2.1	4	3	79	71	32
TLCU336M006#TA	U	33	6.3	40	1.3	125	10.4	7.5	3	68	61	27
TLCV336M006#TA	V	33	6.3	40	1.3	125	4.2	5	3	84	75	33
TLCH476M006#TA	H	47	6.3	40	1.3	125	3.0	5	3	89	80	36
TLCR476M006#TA	R	47	6.3	40	1.3	125	6.0	5	3	95	85	38
TLCV476M006#TA	V	47	6.3	40	1.3	125	6.0	15	3	48	43	19
TLCR686M006#TA	R	68	6.3	40	1.3	125	4.3	5	3	95	85	38
TLCR107M006#TA	R	100	6.3	40	1.3	125	6.0	5	3	95	85	38
TLCT107M006#TA	T	100	6.3	40	1.3	125	31.5	15	3	52	46	21
<b>8 Volt @ 40°C</b>												
TLCL336M008#TA	L	33	8	40	1.6	125	26.4	10	3	50	45	20
TLCD476M008#TA	D	47	8	40	1.6	125	18.8	7	3	71	64	28
<b>10 Volt @ 40°C</b>												
TLCK225M010#TA	K	2.2	10	40	2	125	0.5	15	3	32	28	13
TLCJ475M010#TA	J	4.7	10	40	2	125	0.5	10	3	45	40	18
TLCU685M010#TA	U	6.8	10	40	2	125	0.7	5	3	84	75	33
TLCU106M010#TA	U	10	10	40	2	125	1.0	5	3	84	75	33
TLCH156M010#TA	H	15	10	40	2	125	1.5	5	3	58	52	23
TLCL156M010#TA	L	15	10	40	2	125	1.5	7.5	3	89	80	36
TLCL226M010#TA	L	22	10	40	2	125	11	10	3	50	45	20
TLCM226M010#TA	M	22	10	40	2	125	2.2	7.5	3	63	57	25
TLCH336M010#TA	H	33	10	40	2	125	3.3	5	3	89	80	36
TLCH476M010#TA	H	47	10	40	2	125	23.5	7.5	3	73	66	29
TLCR476M010#TA	R	47	10	40	2	125	4.7	5	3	95	85	38
TLCT107M010#TA	T	100	10	40	2	125	10	1	3	200	180	80
<b>16 Volt @ 40°C</b>												
TLCK474M016#TA	K	0.47	16	40	3.2	125	0.5	15	3	32	28	13
TLCK105M016#TA	K	1	16	40	3.2	125	0.8	15	3	32	28	13
TLCL335M016#TA	L	3.3	16	40	3.2	125	0.5	7.5	3	58	52	23
TLCV106M016#TA	V	10	16	40	3.2	125	1.6	2	3	132	119	53

# TLC Series



## Tantalum Solid Electrolytic Chip Capacitors Consumer Series

### RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance (µF)	Rated Voltage (V)	Rated Temperature (°C)	Category Voltage (V)	Category Temperature (°C)	DCL Max. (µA)	ESR Max. @ 100kHz (Ω)	MSL	100kHz RMS Current (mA)		
										25°C	85°C	125°C
<b>20 Volt @ 40°C</b>												
TLCH225M020#TA	H	2.2	20	40	4	125	0.5	7.5	3	89	80	36
TLCR106M020#TA	R	10	20	40	4	125	0.6	5	3	95	85	38
<b>25 Volt @ 40°C</b>												
TLCL105M025#TA	L	1.0	25	40	5	125	0.5	7.5	3	58	85	23
TLCR225M025#TA	R	2.2	25	40	5	125	0.6	5	3	95	85	38
<b>35 Volt @ 40°C</b>												
TLCR105M035#TA	R	1.0	35	40	7	125	0.5	5	3	95	85	38

Moisture Sensitivity Level (MSL) is defined according to J-STD-020.

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.

DCL allowed to move up to 2.00 times the limit post mounting.

For typical weight and composition see page 223.

**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.**

### QUALIFICATION TABLE

TEST	TLC series (Temperature range -55°C to +125°C)											
	Condition				Characteristics							
Endurance	Determine after application of rated voltage for 2000 +48/-0 hours at 40±2°C and then leaving 1-2 hours at room temperature. Also determine of 85°C temperature, category voltage for 2000 +48/-0 hours and then leaving 1-2 hours at room temperature. Power supply impedance to be ≤0.1Ω/V.				Visual examination		no visible damage					
					DCL		1.25 x initial limit					
					ΔC/C		within ±30% of initial value					
					ESR		1.5 x initial limit					
Humidity	Determine after storage without applied voltage at 40±2°C and 90-95% relative humidity for 56 days and then recovery 1-2 hours at room temperature.				Visual examination		no visible damage					
					DCL		2 x initial limit					
					ΔC/C		±30% of initial value					
					ESR		1.25 x initial limit					
Temperature Stability	Step	Temperature°C	Duration (min)	Voltage Applied								
	1	+20±2	15	N/A	+20°C	-55°C	+20°C	+40°C	+60°C	+85°C	+125°C	+20°C
	2	-55+0/-3	15	N/A	DCL							
	3	+20±2	15	N/A								
	4	+40+2/-0	15	V <sub>R</sub>	IL*	n/a	IL*	1.25 x IL*	1.25 x IL*	1.25 x IL*	1.25 x IL*	IL*
	5	+60+2/-0	15	0.66 x V <sub>R</sub>	ΔC/C							
	6	+85+3/-0	15	0.50 x V <sub>R</sub>								
	7	+125+3/-0	15	0.20 x V <sub>R</sub>	n/a	+0/-25%	±5%	+10/-0%	+10/-0%	+20/-0%	+25/-0%	+20/-10%
8	+20±2	15	N/A	ESR								
Surge Voltage	Test temperature: 40°C+3/0°C Test voltage: 1.3 x rated voltage Series protection resistance 1000±100Ω Discharge resistance: 1000Ω Number of cycles: 1000x Cycle duration: 6 min; 30 sec charge, 5 min 30 sec discharge				Visual examination		no visible damage					
					DCL		2 x initial limit					
					ΔC/C		within ±30% of initial value					
					ESR		1.25 x initial limit					

\*Initial Limit