



**THE DATASHEET OF  
F971E475MCC**



# F97 Series



## Resin-Molded Chip, Improved Reliability J-Lead



### FEATURES

- Compliant to the RoHS2 directive 2011/65/EU
- Compliant to AEC-Q200
- Improved reliability - FR=0.5%/1000hrs
- SMD J-lead



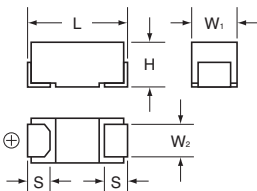
### APPLICATIONS

- Automotive electronics (Engine ECU)
- Industrial equipment

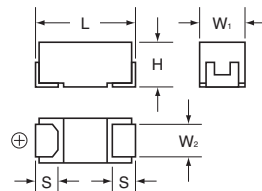
### CASE DIMENSIONS: millimeters (inches)

Code	EIA Code	EIA Metric	L	W <sub>1</sub>	W <sub>2</sub>	H	S
A	1206	3216-18	3.20 ± 0.20 (0.126 ± 0.008)	1.60 ± 0.20 (0.063 ± 0.008)	1.20 ± 0.10 (0.047 ± 0.004)	1.60 ± 0.20 (0.063 ± 0.008)	0.80 ± 0.20 (0.031 ± 0.008)
B	1210	3528-21	3.50 ± 0.20 (0.138 ± 0.008)	2.80 ± 0.20 (0.110 ± 0.008)	2.20 ± 0.10 (0.087 ± 0.004)	1.90 ± 0.20 (0.075 ± 0.008)	0.80 ± 0.20 (0.031 ± 0.008)
C	2312	6032-27	6.00 ± 0.20 (0.236 ± 0.008)	3.20 ± 0.20 (0.126 ± 0.008)	2.20 ± 0.10 (0.087 ± 0.004)	2.50 ± 0.20 (0.098 ± 0.008)	1.30 ± 0.20 (0.051 ± 0.008)
N	2917	7343-30	7.30 ± 0.20 (0.287 ± 0.008)	4.30 ± 0.20 (0.169 ± 0.008)	2.40 ± 0.10 (0.094 ± 0.004)	2.80 ± 0.20 (0.110 ± 0.008)	1.30 ± 0.20 (0.051 ± 0.008)

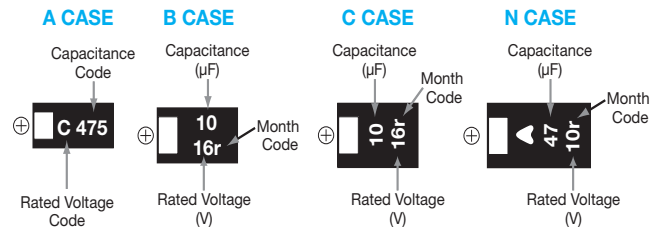
#### A, B CASE



#### C, N CASE



### MARKING



### HOW TO ORDER

<b>F97</b>	<b>1C</b>	<b>335</b>	<b>M</b>	<b>A</b>	
Type	Rated Voltage	Capacitance Code	Tolerance	Case Size	Packaging
		pF code: 1st two digits represent significant figures, 3rd digit represents multiplier (number of zeros to follow)	K = ±10% M = ±20%	See table above	See Tape & Reel Packaging Section

### TECHNICAL SPECIFICATIONS

Category Temperature Range:	-55 to +125°C
Rated Temperature:	+85°C
Capacitance Tolerance:	±20%, ±10% at 120Hz
Dissipation Factor:	Refer to next page
ESR 100kHz:	Refer to next page
Leakage Current:	After 1 minute's application of rated voltage, leakage current at 20°C is not more than 0.01CV or 0.5µA, whichever is greater. After 1 minute's application of rated voltage, leakage current at 85°C is not more than 0.1CV or 5µA, whichever is greater. After 1 minute's application of derated voltage, leakage current at 125°C is not more than 0.125CV or 6.3µA, whichever is greater.
Capacitance Change By Temperature	+15% Max. at +125°C +10% Max. at +85°C -10% Max. at -55°C

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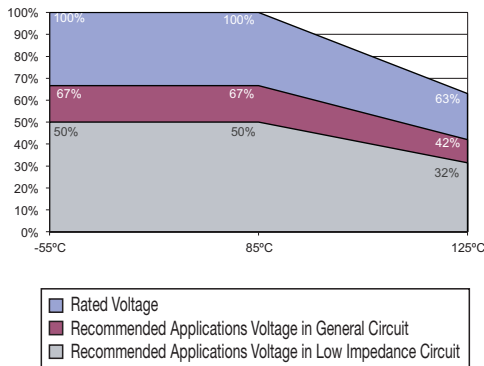
### CAPACITANCE AND RATED VOLTAGE RANGE (LETTER DENOTES CASE SIZE)

Capacitance		Rated Voltage					
μF	Code	6.3V (0J)	10V (1A)	16V (1C)	20V (1D)	25V (1E)	35V (1V)
0.33	334						A
0.47	474						A
0.68	684				A	A	A
1.0	105			A	A	A	B
1.5	155			A	A		B
2.2	225		A	A	A	B	B
3.3	335	A	A	A	B	B	C
4.7	475	A	A/B	A/B	A/B	C	C
6.8	685	A/B	B	B	C	C	N
10	106		A/B	A/B/C	C	C/N	N
15	156	B	B	A/C	N	N	
22	226	A/B	A/B	B/C/N	C/N	N	
33	336	A/C	B/C/N	B/C/N			
47	476	B/C	B/C/N	C/N			
68	686	N	N				
100	107	N	C				
150	157	C					

Released ratings

Please contact to your local AVX sales office when these series are being designed in your application.

Voltage vs Temperature Rating



# F97 Series



## Resin-Molded Chip, Improved Reliability J-Lead

### RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance (μF)	Rated Voltage (V)	DCL (μA)	DF @ 120Hz (%)	ESR @ 100kHz (Ω)	100kHz RMS Current (mA)			*1 ΔC/C (%)	MSL
							25°C	85°C	125°C		
<b>6.3 Volt</b>											
F970J335#AA	A	3.3	6.3	0.5	4	4.5	129	116	52	*	3
F970J475#AA	A	4.7	6.3	0.5	6	4.0	137	123	55	*	3
F970J685#AA	A	6.8	6.3	0.5	6	3.5	146	132	59	*	3
F970J685#BA	B	6.8	6.3	0.5	6	2.5	184	166	74	*	3
F970J156#BA	B	15	6.3	0.9	6	2.0	206	186	82	*	3
F970J226#AA	A	22	6.3	1.4	12	2.5	173	156	69	*	3
F970J226#BA	B	22	6.3	1.4	8	1.9	212	190	85	*	3
F970J336#AA	A	33	6.3	2.1	12	2.5	173	156	69	*	3
F970J336#CC	C	33	6.3	2.1	6	1.1	316	285	126	*	3
F970J476#BA	B	47	6.3	3.0	8	1.0	292	262	117	*	3
F970J476#CC	C	47	6.3	3.0	6	0.9	350	315	140	*	3
F970J686#NC	N	68	6.3	4.3	6	0.6	500	450	200	*	3
F970J107#NC	N	100	6.3	6.3	8	0.6	500	450	200	*	3
F970J157#CC	C	150	6.3	9.5	12	0.7	396	357	159	*	3
<b>10 Volt</b>											
F971A225#AA	A	2.2	10	0.5	4	5.0	122	110	49	*	3
F971A335#AA	A	3.3	10	0.5	4	4.5	129	116	52	*	3
F971A475#AA	A	4.7	10	0.5	6	4.0	137	123	55	*	3
F971A475#BA	B	4.7	10	0.5	6	2.8	174	157	70	*	3
F971A685#BA	B	6.8	10	0.7	6	2.5	184	166	74	*	3
F971A106#AA	A	10	10	1.0	6	3.0	158	142	63	*	3
F971A106#BA	B	10	10	1.0	6	2.0	206	186	82	*	3
F971A156#BA	B	15	10	1.5	6	2.0	206	186	82	*	3
F971A226#AA	A	22	10	2.2	15	3.0	158	142	63	*	3
F971A226#BA	B	22	10	2.2	8	1.9	212	190	85	*	3
F971A336#BA	B	33	10	3.3	8	1.9	212	190	85	*	3
F971A336#CC	C	33	10	3.3	6	1.1	316	285	126	*	3
F971A336#NC	N	33	10	3.3	6	0.7	463	417	185	*	3
F971A476#BA	B	47	10	4.7	10	1.0	292	262	117	*	3
F971A476#CC	C	47	10	4.7	8	0.9	350	315	140	*	3
F971A476#NC	N	47	10	4.7	6	0.7	463	417	185	*	3
F971A686#NC	N	68	10	6.8	6	0.6	500	450	200	*	3
F971A107#CC	C	100	10	10.0	10	0.7	396	357	159	*	3
<b>16 Volt</b>											
F971C105#AA	A	1	16	0.5	4	7.5	100	90	40	*	3
F971C155#AA	A	1.5	16	0.5	4	6.3	109	98	44	*	3
F971C225#AA	A	2.2	16	0.5	4	5.0	122	110	49	*	3
F971C335#AA	A	3.3	16	0.5	4	4.5	129	116	52	*	3
F971C475#AA	A	4.7	16	0.8	8	4.0	137	123	55	*	3
F971C475#BA	B	4.7	16	0.8	6	2.8	174	157	70	*	3
F971C685#BA	B	6.8	16	1.1	6	2.5	184	166	74	*	3
F971C106#AA	A	10	16	1.6	8	3.5	146	132	59	*	3
F971C106#BA	B	10	16	1.6	6	2.1	201	181	80	*	3
F971C106#CC	C	10	16	1.6	6	1.5	271	244	108	*	3
F971C156#AA	A	15	16	2.4	12	3.5	146	132	59	±10	3
F971C156#CC	C	15	16	2.4	6	1.2	303	272	121	*	3
F971C226#BA	B	22	16	3.5	8	1.9	212	190	85	*	3
F971C226#CC	C	22	16	3.5	8	1.1	316	285	126	*	3
F971C226#NC	N	22	16	3.5	6	0.7	463	417	185	*	3
F971C336#BA	B	33	16	5.3	10	2.1	201	181	80	*	3
F971C336#CC	C	33	16	5.3	8	1.1	316	285	126	*	3
F971C336#NC	N	33	16	5.3	6	0.7	463	417	185	*	3
F971C476#CC	C	47	16	7.5	10	1.1	316	285	126	*	3
F971C476#NC	N	47	16	7.5	8	0.7	463	417	185	*	3
<b>20 Volt</b>											
F971D684#AA	A	0.68	20	0.5	4	7.6	99	89	40	*	3
F971D105#AA	A	1	20	0.5	4	7.5	100	90	40	*	3
F971D155#AA	A	1.5	20	0.5	4	6.7	106	95	42	*	3
F971D225#AA	A	2.2	20	0.5	6	6.3	109	98	44	*	3
F971D335#BA	B	3.3	20	0.7	4	3.1	166	146	66	*	3
F971D475#AA	A	4.7	20	0.9	8	4.0	137	123	55	*	3
F971D475#BA	B	4.7	20	0.9	6	2.8	174	157	70	*	3
F971D685#CC	C	6.8	20	1.4	6	1.8	247	222	99	*	3
F971D106#CC	C	10	20	2.0	6	1.5	271	244	108	*	3
F971D156#NC	N	15	20	3.0	6	0.7	463	417	185	*	3
F971D226#CC	C	22	20	4.4	8	1.1	316	285	126	*	3
F971D226#NC	N	22	20	4.4	6	0.7	463	417	185	*	3
<b>25 Volt</b>											
F971E684#AA	A	0.68	25	0.5	4	7.6	99	89	40	*	3
F971E105#AA	A	1	25	0.5	4	7.5	100	90	40	*	3
F971E225#BA	B	2.2	25	0.6	4	3.8	150	135	60	*	3
F971E335#BA	B	3.3	25	0.8	4	3.5	156	140	62	*	3
F971E475#CC	C	4.7	25	1.2	6	1.8	247	222	99	*	3

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### RATINGS & PART NUMBER REFERENCE

AVX Part No.	Case Size	Capacitance (μF)	Rated Voltage (V)	DCL (μA)	DF @ 120Hz (%)	ESR @ 100kHz (Ω)	100kHz RMS Current (mA)			*1 ΔC/C (%)	MSL
							25°C	85°C	125°C		
F971E685#CC	C	6.8	25	1.7	6	1.8	247	222	99	*	3
F971E106#CC	C	10	25	2.5	6	1.6	262	236	105	*	3
F971E106#NC	N	10	25	2.5	6	1.0	387	349	155	*	3
F971E156#NC	N	15	25	3.8	6	0.7	463	417	185	*	3
F971E226#NC	N	22	25	5.5	6	0.7	463	417	185	*	3
<b>35 Volt</b>											
F971V334#AA	A	0.33	35	0.5	4	12.0	79	71	32	*	3
F971V474#AA	A	0.47	35	0.5	4	10.0	87	78	35	*	3
F971V684#AA	A	0.68	35	0.5	4	7.6	99	89	40	*	3
F971V105#BA	B	1	35	0.5	4	4.0	146	131	58	*	3
F971V155#BA	B	1.5	35	0.5	4	4.0	146	131	58	*	3
F971V225#BA	B	2.2	35	0.8	4	3.8	150	135	60	*	3
F971V335#CC	C	3.3	35	1.2	4	2.0	235	211	94	*	3
F971V475#CC	C	4.7	35	1.6	6	1.8	247	222	99	*	3
F971V685#NC	N	6.8	35	2.4	6	1.0	387	349	155	*	3
F971V106#NC	N	10	35	3.5	6	1.0	387	349	155	*	3

\*1: ΔC/C Marked “\*”

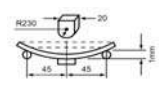
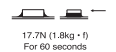
Item	All Case (%)
Damp Heat	±10
Temperature cycles	±5
Resistance soldering heat	±5
Surge	±5
Endurance	±10
Load Humidity	±10

#: “M” for ±20% tolerance, “K” for ±10% tolerance.

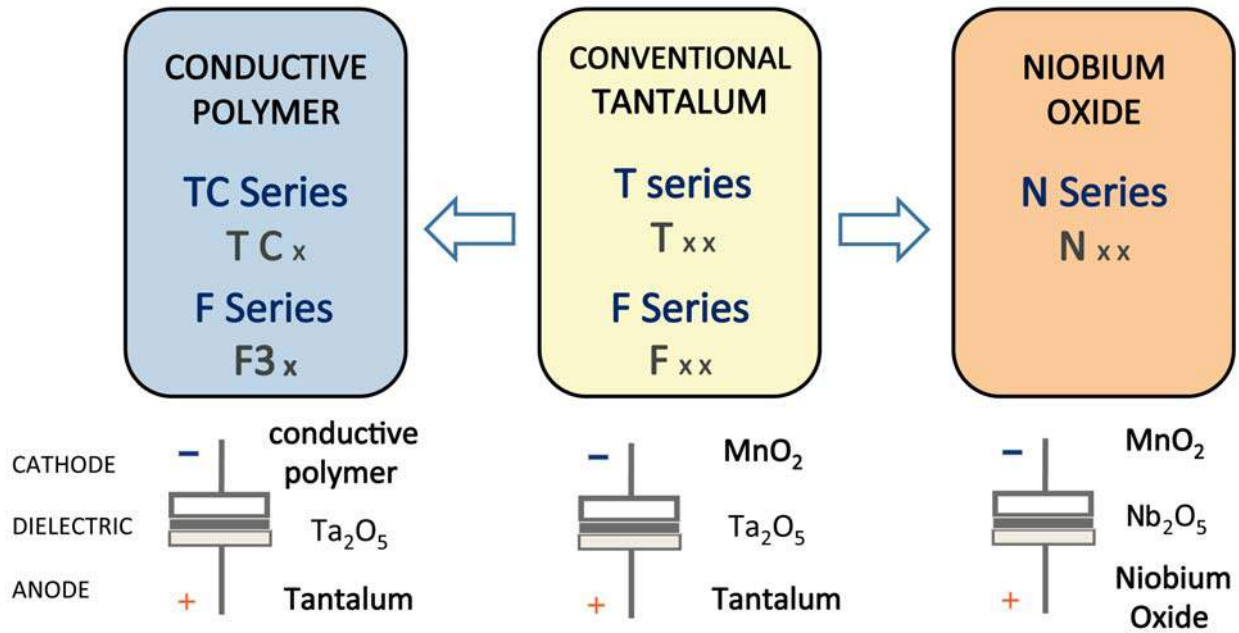
Moisture Sensitivity Level (MSL) is defined according to J-STD-020.

### QUALIFICATION TABLE

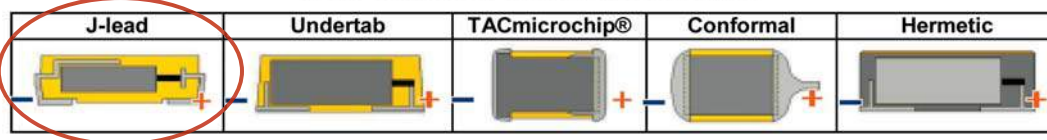
TEST	F97 series (Temperature range -55°C to +125°C)	
	Condition	
<b>Damp Heat (Steady State)</b>	At 85°C, 85% R.H., 1000 hours (No voltage applied) Capacitance Change ..... Refer to page 110 (*1) Dissipation Factor ..... Initial specified value or less Leakage Current ..... 125% or less than the initial specified value	
<b>Load Humidity</b>	After 1000 hour’s application of rated voltage in series with a 33Ω resistor at 85°C, 85% R.H., capacitors meet the characteristics requirements table below. Capacitance Change ..... Refer to page 110 (*1) Dissipation Factor ..... 120% or less than the initial specified value Leakage Current ..... 200% of less than the initial specified value	
<b>Temperature Cycles</b>	At -55°C / +125°C, 30 minutes each, 1000 cycles Capacitance Change ..... Refer to page 109 (*1) Dissipation Factor ..... Initial specified value or less Leakage Current ..... Initial specified value or less	
<b>Resistance to Soldering Heat</b>	10 seconds reflow at 260°C, 5 seconds immersion at 260°C. Capacitance Change ..... Refer to page 110 (*1) Dissipation Factor ..... Initial specified value or less Leakage Current ..... Initial specified value or less	
<b>Solderability</b>	After immersing capacitors completely into a solder pot at 245°C for 2 to 3 seconds, more than 3/4 of their electrode area shall remain covered with new solder.	
<b>Surge</b>	After application of surge voltage in series with a 33Ω resistor at the rate of 30 seconds ON, 30 seconds OFF, for 1000 successive test cycles at 85°C, capacitors shall meet the characteristic requirements in the table above. Capacitance Change ..... Refer to page 110 (*1) Dissipation Factor ..... Initial specified value or less Leakage Current ..... Initial specified value or less	
<b>Endurance</b>	After 2000 hours’ application of rated voltage in series with a 3Ω resistor at 85°C, or derated voltage in series with a 3Ω resistor at 125°C, capacitors shall meet the characteristic requirements in the table above. Capacitance Change ..... Refer to page 110 (*1) Dissipation Factor ..... Initial specified value or less Leakage Current ..... Initial specified value or less	
<b>Shear Test</b>	After applying the pressure load of 17.7N for 60 seconds horizontally to the center of capacitor side body which has no electrode and has been soldered beforehand on a substrate, there shall be found neither exfoliation nor its sign at the terminal electrode..	
<b>Terminal Strength</b>	Keeping a capacitor surface-mounted on a substrate upside down and supporting the substrate at both of the opposite bottom points 45mm apart from the center of capacitor, the pressure strength is applied with a specified jig at the center of the substrate so that substrate may bend by 1mm as illustrated. Then, there shall be found no remarkable abnormality on the capacitor terminals.	
<b>Failure Rate</b>	0.5% per 1000 hours at 85°C, V <sub>R</sub> with 0.1Ω/V series impedance, 60% confidence level.	



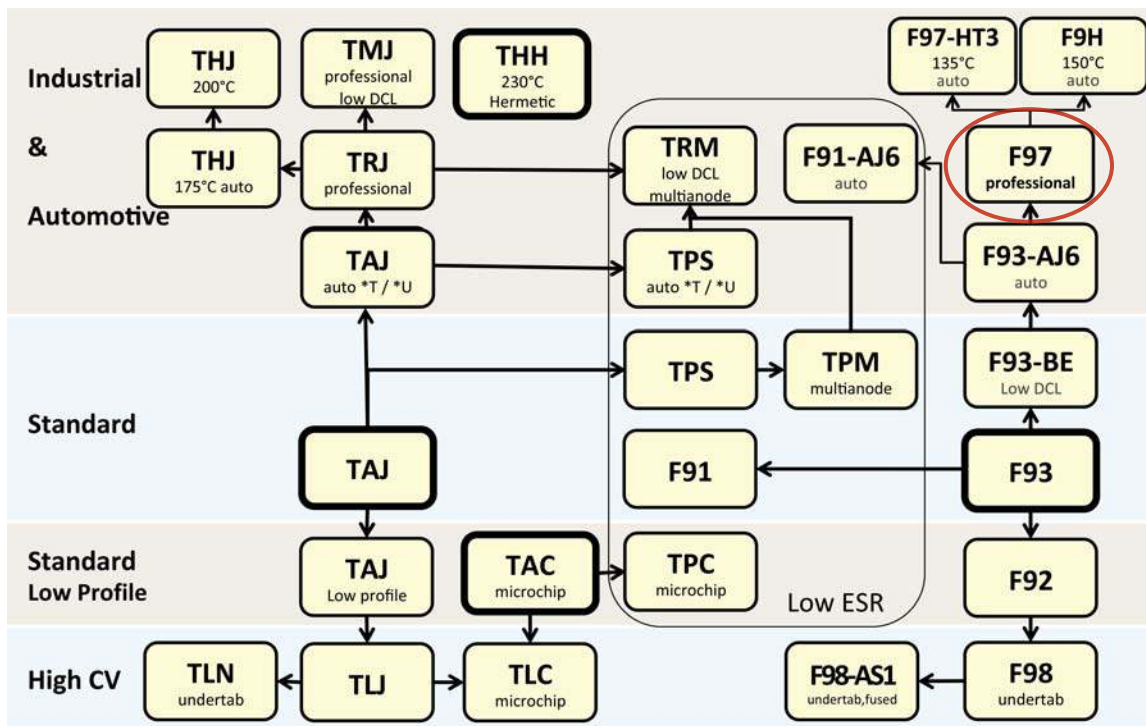
### AVX SOLID ELECTROLYTE CAPACITOR ROADMAP



### Five Capacitor Construction Styles



### SERIES LINE UP: CONVENTIONAL SMD MnO<sub>2</sub>



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