

# RF/Microwave Capacitors

## RF/Microwave Multilayer Capacitors (MLC)

### 700E Series NPO Porcelain High RF Power Multilayer Capacitors



#### GENERAL DESCRIPTION

KYOCERA AVX, the industry leader, offers new improved ESR/ESL performance for the 700 E Series RF Capacitors. This high Q multilayer capacitor is ultra-stable under high RF current and voltage applications with NPO performance. High density porcelain construction provides a rugged, hermetic package.

KYOCERA AVX offers an encapsulation option for applications requiring extended protection against arc-over and corona.

#### FUNCTIONAL APPLICATIONS

- Bypass
- Impedance Matching
- Coupling
- DC Blocking
- Tuning

#### CIRCUIT APPLICATIONS

- HF/RF Power Amplifiers
- Plasma Chambers
- Transmitters
- Medical (MRI coils)
- Antenna Tuning

#### ENVIRONMENTAL CHARACTERISTICS

<b>Thermal Shock</b>	Mil-STD-202, Method 107, Condition A
<b>Moisture Resistance</b>	Mil-STD-202, Method 106
<b>Low Voltage Humidity</b>	Mil-STD-202, Method 103, condition A, with 1.5 VDC applied while subjected to an environment of 85°C with 85% relative humidity for 240 hours
<b>Life Test</b>	MIL-STD-202, Method 108, for 2000 hours, at 125°C. Voltage applied. 120% of WVDC for capacitors rated at 1250 volts DC or less. 100% of WVDC for capacitors rated above 1250 volts DC
<b>Termination Styles</b>	Available in various surface mount and leaded styles. See Mechanical Configurations
<b>Terminal Strength</b>	Terminations for chips and pellets withstand a pull of 10 lbs. min., 25 lbs. typical, for 5 seconds in direction perpendicular to the termination surface of the capacitor. Test per MIL-STD-202, method 211.

#### FEATURES

- Case E Size (.380" x .380")
- Capacitance Range 1pF to 2200pF
- Extended WVDC up to 7200 VDC
- Low ESR/ESL
- High Q
- High RF Power
- Ultra-Stable Performance
- High RF Current/Voltage
- Available with Encapsulation Option\*

\* For leaded styles only

#### PACKAGING OPTIONS



Tape & Reel



Tray  
(96 pcs)



#### ELECTRICAL SPECIFICATIONS

<b>Temperature Coefficient (TCC)</b>	0 ±30 PPM/°C (-55°C to +125°C)
<b>Capacitance Range</b>	1 pF to 2200 pF
<b>Operating Temperature</b>	-55°C to +125°C (No derating of working voltage).
<b>Quality Factor</b>	Greater than 10,000 (1 pF to 1000 pF) @ 1 MHz. Greater than 10,000 (1100 pF to 2200 pF) @ 1 KHz.
<b>Insulation Resistance (IR)</b>	1 pF to 2200 pF 10 <sup>5</sup> Megohms min. @ 25°C at 500 VDC 10 <sup>4</sup> Megohms min. @ 125°C at 500 VDC
<b>Working Voltage (WVDC)</b>	See Capacitance Values table
<b>Dielectric Withstanding Voltage (DWV)</b>	150% of WVDC for capacitors rated at 1250 volts DC or less for 5 seconds. 120% of WVDC for capacitors rated above 1250 Volts DC for 5 seconds
<b>Aging Effects</b>	None
<b>Piezoelectric Effects</b>	None
<b>Capacitance Drift</b>	± (0.02% or 0.02 pF), whichever is greater
<b>Retrace</b>	Less than ±(0.02% or 0.02 pF), whichever is greater.

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#### CAPACITANCE VALUES

Cap. Code	Cap. (pF)	Tol.	Rated WVDC		Cap. Code	Cap. (pF)	Tol.	Rated WVDC		Cap. Code	Cap. (pF)	Tol.	Rated WVDC		CAP. CODE	CAP. (pF)	TOL.	RATED WVDC	
			STD.	EXT.				STD.	EXT.				STD.	EXT.				STD.	EXT.
1R0	1.0	B, C, D	3600	7200	5R1	5.1	B, C, D	3600	7200	390	39	F, G, J, K, M	3600	7200	271	270	F, G, J, K, M	3600	N/A
1R1	1.1				5R6	5.6				430	4				301	300			
1R2	1.2				6R2	6.2				470	47				331	330			
1R3	1.3				6R8	6.8				510	51				361	360			
1R4	1.4				7R5	7.5				560	56				391	390			
1R5	1.5				8R2	8.2				620	62				431	430			
1R6	1.6				9R1	9.1				680	68				471	470			
1R7	1.7				100	10				750	75				511	510			
1R8	1.8				110	11				820	82				561	560			
1R9	1.9				120	12				910	91				621	620			
2R0	2.0	F, G, J, K, M	3600	7200	130	13	F, G, J, K, M	3600	7200	101	100	F, G, J, K, M	3600	7200	681	680	F, G, J, K, M	1000	N/A
2R1	2.1				150	15				111	110				751	750			
2R2	2.2				160	16				121	120				821	820			
2R4	2.4				180	18				131	130				911	910			
2R7	2.7				200	20				151	150				102	1000			
3R0	3.0				220	22				161	160				112	1100			
3R3	3.3				240	24				181	180				122	1200			
3R6	3.6				270	27				201	200				152	1500			
3R9	3.9				300	30				221	220				182	1800			
4R3	4.3				330	33				241	240				222	2200			
4R7	4.7	360	36																

$V_{RMS} = 0.707 \times WVDC$

• SPECIAL VALUES, TOLERANCES, MATCHING, AND CAPACITOR ASSEMBLIES ARE AVAILABLE. • KYOCERA AVX'S CUSTOM POWER CAPACITOR ASSEMBLY CATALOG, LISTS ASSEMBLY OPTIONS. • DIFFERENT WORKING VOLTAGES ARE AVAILABLE • ENCAPSULATION OPTION AVAILABLE. PLEASE CONSULT FACTORY.

#### HOW TO ORDER

Series **700** Case Size **E** Capacitance **391** Tolerance **K** Voltage Rating **W** Termination Style Code **3600** Laser Marking (Optional) **X\*\*** Packaging **T**

See mechanical dimensions below

EIA Capacitance Code in pF.  
First two digits = significant figures or "R" for decimal place.  
Third digit = number of zeros or after "R" significant figures

Capacitance Tolerance Code

Code	B	C	D	F	G	J	K	M
Tol.	±1 pF	±25 pF	±5 pF	±1%	±2%	±5%	±10%	±20%

**Packaging**  
 T = Tape and Reel, 250 pc qty. Please see last Column Mechanical Configuration Table for Box and Tray Options  
**Laser Marking (Optional)**  
**Voltage Rating**  
**Termination Style Code**  
 Please see 2nd Column Mechanical Configuration Table

\*\*Optional

The above part number refers to a 700 E Series (case size E) 390 pF capacitor, K tolerance (±10%), 3600 WVDC, with W termination (Tin /Lead, Solder Plated over Nickel Barrier), laser marking and Tape and Reel Packaging.

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#### MECHANICAL CONFIGURATION

Series & Case Size	Term. Code	Case Size & Type	Outline W/T is a Termination Surface	Body Dimensions inches (mm)			Lead and Termination Dimensions and Material		Pkg Type	Pkg Code	
				Length (L)	Width (W)	Thickness (T)	Overlap (Y)	Materials			
700E	W	Solder Plate		.380+.015-.010 (9.65±0.38-0.25)		170 (4.32) max.	.040 (1.02) max.	Tin/Lead, Solder Plated over Nickel Barrier Termination	T&R, 250 pcs Tray, 96 pcs	T J96	
700E	P	Pellet						.380+.040-.010 (9.65±1.02-0.25)	Heavy Tin/Lead Coated, over Nickel Barrier Termination	T&R, 250 pcs Tray, 96 pcs	T J96
700E	T	Solderable Nickel Barrier						.380+.015-.010 (9.65±0.38-0.25)	<b>RoHS Compliant</b> Tin Plated over Nickel Barrier Termination	T&R, 250 pcs Tray, 96 pcs	T J96
700E	MS	Microstrip		.380±.010 (9.65±0.25)		170 (4.32) max.	N/A	High Purity Silver Leads $L_L = .750 (19.05) \text{ min}$ $W_L = .350 \pm .010 (8.89 \pm 0.25)$ $T_L = .010 \pm .005 (0.25 \pm 0.13)$ Leads are Attached with High Temperature Solder.	Tray, 16 or 32 pcs	J16 J32	
700E	AR	Axial Ribbon						.380+.035-.010 (9.65±0.89-0.25)	Leads are Attached with High Temperature Solder.	Tray, 16 or 32 pcs	J16 J32
700E	AW	Axial Wire							Silver-plated Copper Leads Dia. = $.032 \pm .002 (.813 \pm .051)$ $L_L = 2.25 (57.2) \text{ min.}$	Box, 20 pcs	B20
700E	RW	Radial Wire						Silver-plated Copper Leads Dia. = $.032 \pm .002 (.813 \pm .051)$ $L_L = 1.0 (25.4) \text{ min.}$	Tray, 16 or 64 pcs	J16 J64	

Custom lead styles and lengths are available; consult factory. All leads are high purity silver attached with high temperature solder and are **RoHS** compliant.

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Series & Case Size	Term. Code	Case Size & Type	Outline W/T is a Termination Surface	Body Dimensions inches (mm)			Lead and Termination Dimensions and Material		Pkg Type	Pkg Code	
				Length (L)	Width (W)	Thickness (T)	Overlap (Y)	Materials			
700E	WN	Non-Mag Solder Plate		.380+.015-.010 (9.65+0.38-0.25)			.040 (1.02) max.	Tin/Lead, Solder Plated over Non-Magnetic Barrier Termination	T&R, 250 pcs Tray, 96 pcs	T J96	
700E	PN	Non-Mag Pellet		.380+.040-.010 (9.65+1.02-0.25)				Heavy Tin/Lead Coated, over Non-Magnetic Barrier Termination	T&R, 250 pcs Tray, 96 pcs	T J96	
700E	TN	Non-Mag Solderable Barrier		.380+.015-.010 (9.65+0.38-0.25)				<b>RoHS Compliant</b> Tin Plated over Non-Magnetic Barrier Termination	T&R, 250 pcs Tray, 96 pcs	T J96	
700E	MN	Non-Mag Microstrip		.380±.010 (9.65±0.25)		.170 (4.32) max.	N/A	High Purity Silver Leads $L_L = .750$ (19.05) min $W_L = .350 \pm .010$ (8.89 ± 0.25) $T_L = .010 \pm .005$ (0.25 ± 0.13) Leads are Attached with High Temperature Solder.	Tray, 16 or 32 pcs	J16 J32	
700E	AN	Non-Mag Axial Ribbon						.380+.035-.010 (9.65+0.89-0.25)	Silver-plated Copper Leads Dia. = $.032 \pm .002$ (.813 ± 0.051) $L_L = 2.25$ (57.2) min.	Box, 20 pcs	B20
700E	BN	Non-Mag Axial Wire							Silver-plated Copper Leads Dia. = $.032 \pm .002$ (.813 ± 0.051) $L_L = 1.0$ (25.4) min.	Tray, 16 or 64 pcs	J16 J64
700E	RN	Non-Mag Radial Wire									

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#### SUGGESTED MOUNTING PAD DIMENSIONS

Horizontal  
Electrode Orientation

Vertical  
Electrode Orientation

Mount Type	Case E				
	Pad Size	A Min.	B Min.	C Min.	D Min.
Vertical Mount	Normal	.185	.050	.325	.425
	High Density	.165	.030	.325	.385
Horizontal Mount	Normal	.405	.050	.325	.425
	High Density	.383	.030	.325	.385

Dimensions are in inches.

#### PERFORMANCE DATA

