

# 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	EXTENDED VOLTAGE	5R1	5.1	B, C, D	EXTENDED VOLTAGE	390	39	F, G, J, K, M	3600	VOLTAGE	271	270	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				EXTENDED VOLTAGE	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	130	13	101		100	681	680												
2R1	2.1	150	15	111		110	751	750												
2R2	2.2	160	16	121		120	821	820												
2R4	2.4	EXTENDED VOLTAGE	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																

VRMS = 0.707 X 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 **3600** Laser Marking **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%

T = Tape and Reel, 250 pc qty. Please see last Column Mechanical Configuration Table for Box and Tray Options

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)	Silver-plated Copper Leads Dia. = $.032 \pm .002 (.813 \pm .051)$ $L_L = 2.25 (57.2) \text{ min.}$	Tray, 16 or 32 pcs	J16 J32		
700E	AW	Axial Wire							Silver-plated Copper Leads Dia. = $.032 \pm .002 (.813 \pm .051)$ $L_L = 1.0 (25.4) \text{ min.}$	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)	Leads are Attached with High Temperature Solder.	Tray, 16 or 32 pcs
700E	BN	Non-Mag Axial Wire						Silver-plated Copper Leads Dia. = .032 ± .002 (.813 ± .051) $L_L = 2.25$ (57.2) min.	Box, 20 pcs	B20
700E	RN	Non-Mag Radial Wire						Silver-plated Copper Leads Dia. = .032 ± .002 (.813 ± .051) $L_L = 1.0$ (25.4) min.	Tray, 16 or 64 pcs	J16 J64

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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

