### **RF/Microwave Multilayer Capacitors (MLC)** CDR Series – MIL-PRF-55681/4/5 (RF/Microwave Chips)



### **HOW TO ORDER**

	CDR	12	В	G	101	A	F	w	S T
<b>Designation</b> Identifies establisl reliability, ceramic fixed, and chip cap	dielectric,								Failure Rate Level           (Established at 90% confidence)           M = 1% per 1,000 hours         P = 0.1% per 1,000 hours           R = 0.01% per 1,000 hours         S = 0.001% per 1,000 hours
Style Identifies dimension capacitor and lead where applicable. Rated Tempera	d type,								Termination Finish (Military Designations) Code N = Gold over Nickel over Silver (CDR11, CDR13) S = Solder Coated, Final (CDR12, CDR14, CDR23, CDR25) T = Silver (CDR21, CDR22, CDR24)
-55°C to +125°C <b>Voltage Tempe</b> G = +90 ±20 PPM/°C P = 0 ±30 PPM/°C <b>Capacitance Co</b>	°C ode ——								<ul> <li>U = Solder Coated, Nickel Barrier (CDR12, CDR14)</li> <li>W = Solder plated, nickel barrier (CDR12, CDR14, not for new designs)</li> <li>Y = Base metallization-barrier metal-tin (100 percent)</li> <li>Z = Solder plated, Nickel Barrier (CDR12, CDR14) N and U Terminations preferred for best</li> </ul>
The first two digits digit specifies the values of pF are re the decimal point.	number of ze quired, the le	eros to	follow. V	Vhen fra	ictional				solderability, thermocompression bonding, leach and migration resistance, and shelf life for chips and pellets. Capacitance Tolerance Code
<b>Rated DC Volta</b> A = 50 VDC D = 300 VDC	B = 100 VD E = 500 VD	С	C = 20 K = 15						$B = \pm .1 \text{ pF}  C = \pm .25 \text{ pF}  D = \pm .5 \text{ pF}  F = \pm 1\%$ $G = \pm 2\%  J = \pm 5\%  K = \pm 10\%  M = \pm 20\%$

### **TABLE I - STYLES CDR11 AND CDR12 CAPACITOR CHARACTERISTICS**

Type Designation *	Capacitance Range (pF)	Capacitance Tolerance Available	Rated Temp. & Voltage-Temp Limits	Rated DC Voltage
CDR1-B-0R1KB to CDR1-B-0R2B	0.1 pF to 0.2 pF	В		
CDR1-B-0R3K to CDR1-B-0R4	0.3 pF to 0.4 pF	B, C	Characteristic BG	
CDR1-B-0R5K to CDR1-B-2R2**	0.5 pF to 2.2 pF	B, C, D	(+90 ±20 PPM/°C)	A = 50
CDR1-B-2R4K to CDR1-B-6R2***	2.4 pF to 6.2 pF	B, C, D	and Characteristic BP	K = 150
CDR1-B-6R8K to CDR1-B-9R1***	6.8 pF to 9.1 pF	B, C, J, K, M	(0 ±30 PPM/°C)	
CDR1-B-100K to CDR1-B-101K***	10 pF to 100 pF	F, G, J, K, M		
CDR1-BP111K to CDR1-BP621***	110 pF to 620 pF	F, G, J, K, M	BP	A = 50
CDR1-BP681A to CDR1-BP102***	680 pF to 1000 pF	F, G, J, K, M	۵P	B = 100

### **TABLE II - STYLES CDR13 AND CDR14 CAPACITOR CHARACTERISTICS**

Type Designation *	Capacitance Range (pF)	Capacitance Tolerance Available	Rated Temp. & Voltage-Temp Limits	Rated DC Voltage	
CDR1-B-0R1EB to CDR1-B-0R2B	0.1 pF to 0.2 pF	В			
CDR1-B-0R3E to CDR1-B-0R4	0.3 pF to 0.4 pF	B, C			
CDR1-B0R5E to CDR1-B-2R2**	0.5 pF to 2.2 pF	B, C, D		C = 200	
CDR1-B-2R4E to CDR1-B-6R2***	2.4 pF to 6.2 pF	B, C, D	"Characteristic BG	E = 500	
CDR1-B-6R8E to CDR1-B-9R1***	6.8 pF to 9.1 pF	B, C, J, K, M	(+90 ±20 PPM/°C)		
CDR1-B-100E to CDR1-B-101***	10 pF to 100 pF		and Characteristic BP		
CDR1-B-111D to CDR1-B-201***	110 pF to 200 pF		(0 ±30 PPM/°C)"	C = 200 D = 300	
CDR1-B-221C to CDR1-B-471C***	220 pF to 470 pF			C = 200	
CDR1-B-511B to CDR1-B-621***	510 pF to 620 pF	F, G, J, K, M		A = 50 B = 100	
CDR1-B-681A to CDR1-B-102A***	680 pF to 1000 pF			A = 50	
CDR1-BP112A to CDR1-BP512A***	1100 pF to 5100 pF		BP	A = 50	

\* Complete type designation will include additional symbols to indicate style, voltage-temperature limits, capacitance tolerance (where applicable), termination finish, and failure rate level.

\*\* Intermediate values in this category are in 0.1 pF steps.

\*\*\* Intermediate values in each category are given by the RETMA 5% Table.

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### TABLE III - STYLES CDR21-CDR25 CAPACITOR CHARACTERISTICS

Type Designation *	Capacitance Range (pF)	Capacitance Tolerance Available	Rated Temp. & Voltage-Temp Limits	Rated DC Voltage	
CDR2-B-0R1EB to CDR2-B-0R2EB	0.1 pF to 0.2 pF	В			
CDR2-B-0R3E to CDR2-B-0R4E	0.3 pF to 0.4 pF	B, C			
CDR2-B0R5E to CDR2-B-2R2E**	0.5 pF to 2.2 pF	B, C, D		500 = E	
CDR2-B-2R4E to CDR2-B-6R2E***	2.4 pF to 6.2 pF	B, C, D	Characteristic BG		
CDR2-B-6R8E to CDR2-B-9R1E***	6.8 pF to 9.1 pF	B, C, J, K, M	(+90 ±20 PPM/°C)		
CDR21-B-100E to CDR2-B-101E***	10 pF to 100 pF		and Characteristic BP		
CDR2-B-111D to CDR2-B-201D***	110 pF to 200 pF		(0 ±30 PPM/°C)	300 = D	
CDR2-B-221C to CDR2-B-471C***	220 pF to 470 pF	FOLKM		200 = C	
CDR2-B-511B to CDR2-B-621B***	510 pF to 620 pF	F, G, J, K, M		100 = B	
CDR2-B-681A to CDR2-B-102A***	680 pF to 1000 pF			50 = A	
CDR2-BP112A to CDR2-BP512A***	1100 pF to 5100 pF		BP	50 = A	

\* Complete type designation will include additional symbols to indicate style, voltage-temperature limits, capacitance tolerance

(where applicable), termination finish (T for styles CDR21, CDR22 and CDR24, and S for styles CDR23 and CDR25), and failure rate level.

Please note: Leaded devices CDR 21 through CDR 25 are available to the R Failure Rate Level only.

\*\* Intermediate values in this category are in 0.1 pF steps.

\*\*\* Intermediate values in each category are given by the RETMA 5% Table as follows: 10, 11, 12, 13, 15, 16, 18, 20, 22, 24, 27, 30, 33, 36, 39, 43, 47, 51, 56, 62, 68, 75, 82, 91.

### **TABLE I - STYLES CDR11 AND CDR12 CAPACITOR CHARACTERISTICS**

MIL-PRF-55681	Type		Outlines	Bo	Lead & Termination				
Styles	Size	Type	Outimes	Length	Width	Thickness	Dime	Dimensions & Materials	
CDR 11	A V	Chip CA	→ L  +- <sup>↑</sup> → T  +-			.020/.057 (0.51/1.45)	N = Gold Over Nickel Over Silver N is		
CDR 13	B P	Chip CA	W/T is a Termination Surface	.110 ±.020 (2.79 ±0.51)		.030/.102 (0.76/2.59)	ATC's UNI-TERM®		
CDE 12	A P	Pellet P		.055 ±.025 (1.4 ±0.63)	.055 ±.015 (1.4 ±0.38)	.020/.057 (0.51/1.45)	S = Solder Coated, Final		
CDR 14	B €	Pellet P		.110 +.035020 (2.79 +0.89 -0.51)	.110 ±.020 (2.79 ±0.51)	.030/.102 (0.76/2.59)	U = Solder Coated, Nickel E ATC's BARRIER//CAP®		
CDR 12	A	Solder Plate W	.055 ± (1.4 ±			.020/.057 (0.51/1.45)	W = Nickel Barrier, Solder Plate.		
CDR 14	B P	Solder Plate W	$ \begin{array}{c} \rightarrow \left  \begin{array}{c} L \\ \end{array} \right  \leftarrow \left  \begin{array}{c} - \end{array} \right  \end{array} \right  \downarrow \left  \end{array} \right  \leftarrow \\ W/T \text{ is a} \\ Termination Surface} \end{array} $	.110 ±.020 (2.79 ±0.51)		.030/.102 (0.76/2.59)			Plate.
CDR 21	B	Microstrip	$\downarrow \rightarrow   \downarrow   \leftarrow \downarrow \rightarrow   \leftarrow W_{L}   \leftarrow \downarrow \rightarrow   \leftarrow \to \to$				Termination T = Silver		
000021		MS					Length	Width	Thickness
CDR 22	B	Axial Ribbon					min.		
CDR 24	B	AR Radial Ribbon RR	$\begin{array}{c c} \hline & & \\ \hline \\ \hline$	.135 ±.015 (3.43 ±0.38)	.110 ±.015 (2.79 ±0.38)	.060/.100 (1.52/2.54)	.250 (6.35)	.093±.005 (2.36±0.13)	.004±.001 (0.10±0.03)
CDR 23	В	Radial Wire					Terminat	ions S = Solde	er Coated
		RW	┶╎╘╎╾╴╶╤╿┻╢ <del>┍</del> ╴				min.	n. #26 AWG	
CDR 25	В	Axial Wire AW	$ \begin{array}{c c} \rightarrow & L_{L} & \leftarrow \\ \hline & \underbrace{W} & \underbrace{W} & \bullet \\ \hline & & & \bullet \\ \hline & \rightarrow & L & \leftarrow & & \bullet \\ \end{array} $				.50 (12.7)	.0 (.3) dia. i	

All dimensions are in inches, except those in parentheses which are in millimeters.

All leads and ribbon are silver and are attached with high temperature solder.

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Style	Equiv. KYOCERA AVX Part No. Characteristics				
	BG	BP			
CDR11	100A	700A			
CDR12	100A	700A			
CDR13	100B	700B			
CDR14	100B	700B			

Style	Equiv. KYOCERA AVX Part No. Characteristics					
	BG	BP				
CDR21	100B MS	700B MS				
CDR22	100B AR	700B AR				
CDR23	100B RW	700B RW				
CDR24	100B RR	700B RR				
CDR25	100B AW	700B AW				

#### PACKAGING

Standard Packaging Quantity CDR11-12 = 100 pcs per waffle pack CDR13-14 = 100 pcs per waffle pack

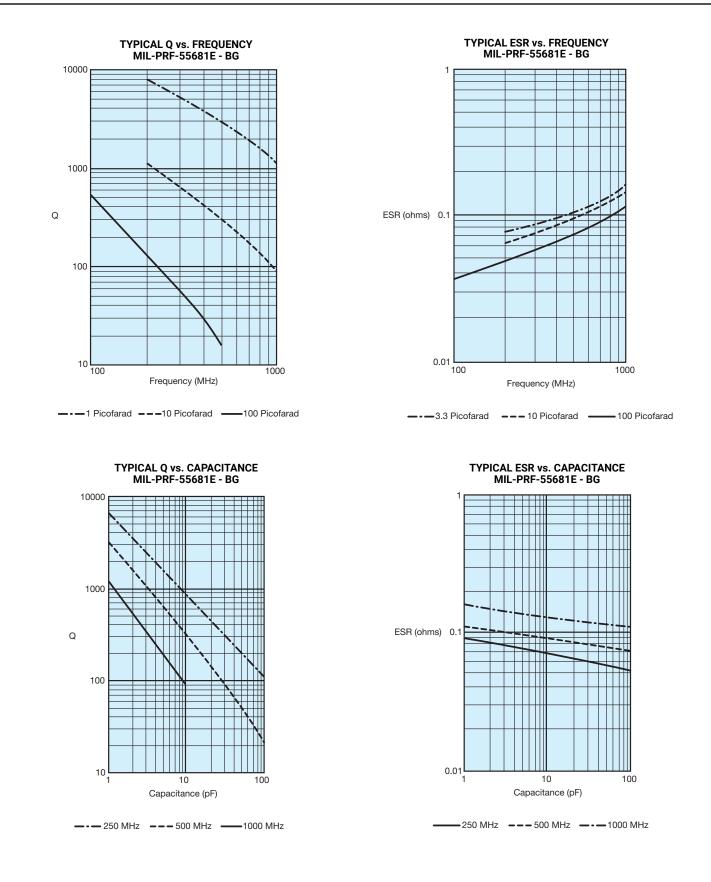
#### **TAPE & REEL**

All tape and reel specifications are in compliance with EIA RS481(equivalent to IEC 286 part 3). Sizes CDR11/12 through 13/14. - 8mm carrier - 7" reel: ≤0.040" thickness = 100, 300, 500, 1000, 2000\* pcs ≤0.075" thickness = 100, 300, 500, 1000, 2000\* pcs

\* QTY 2000 only applies to CDR11-12

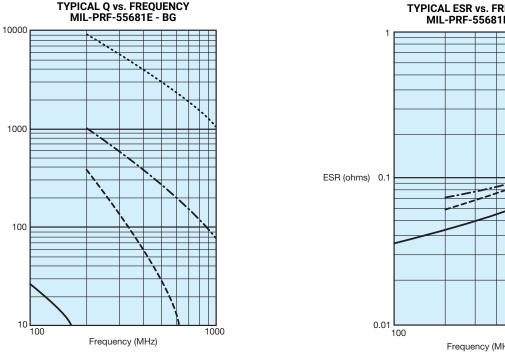
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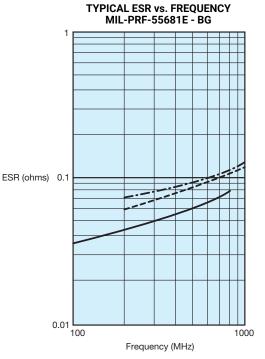


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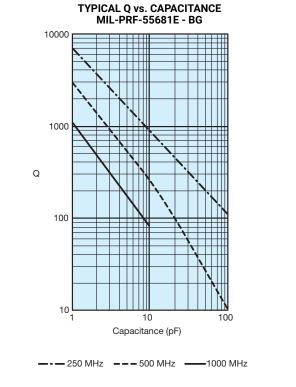
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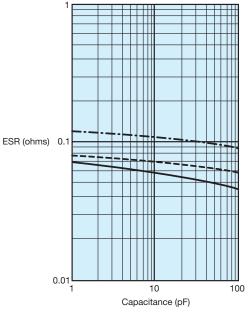
Q



---- 1 Picofarad ---- 15 Picofarad ----- 100 Picofarad



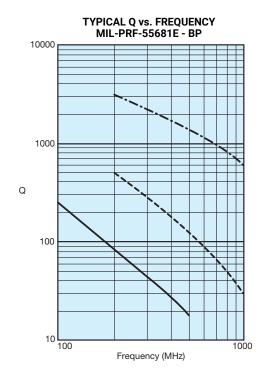
#### **TYPICAL ESR vs. CAPACITANCE** MIL-PRF-55681E - BG

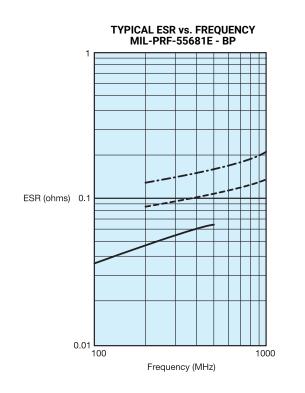


-250 MHz --- 500 MHz --- 1000 MHz

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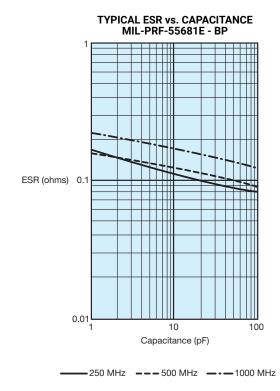




----- 1 Picofarad ----- 15 Picofarad ------ 100 Picofarad



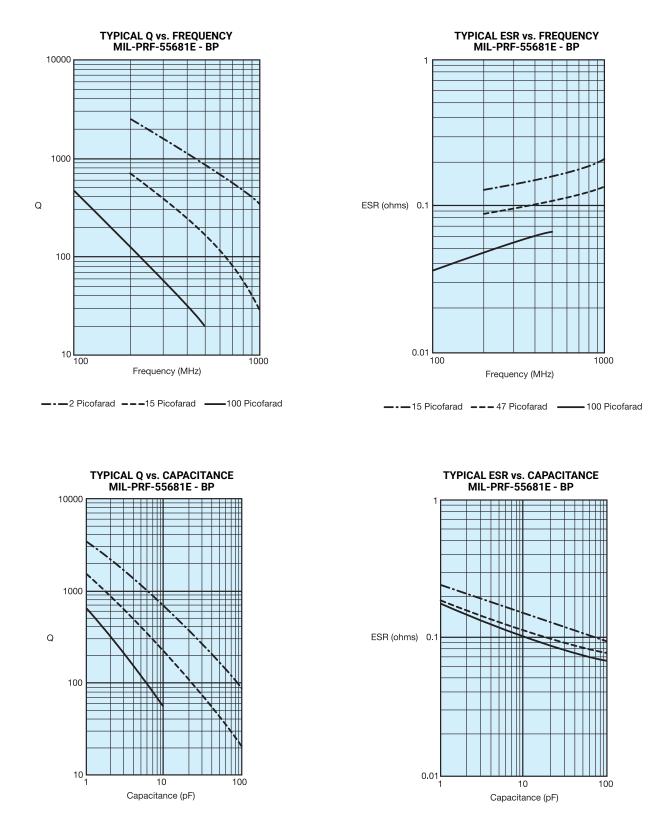
TYPICAL Q vs. CAPACITANCE MIL-PRF-55681E - BP



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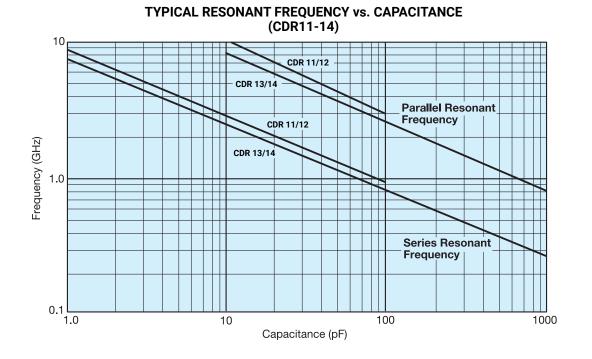


---- 250 MHz ---- 500 MHz ----- 1000 MHz

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-250 MHz --- 500 MHz --- 1000 MHz





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