

# RF/Microwave Multilayer Capacitors (MLC)

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

### HOW TO ORDER

**CDR 12 B G 101 A F W S**

**Designation**  
Identifies established reliability, ceramic dielectric, fixed, and chip capacitors

**Style**  
Identifies dimensions of the capacitor and lead type, where applicable.

**Rated Temperature**  
-55°C to +125°C

**Voltage Temperature (TCC) Limits**  
G = +90 ±20 PPM/°C  
P = 0 ±30 PPM/°C

**Capacitance Code**  
The first two digits represent significant figures and the last digit specifies the number of zeros to follow. When fractional values of pF are required, the letter R shall be used to indicate the decimal point.

**Rated DC Voltage @ 125°C**  
A = 50 VDC    B = 100 VDC    C = 200 VDC  
D = 300 VDC    E = 500 VDC    K = 150 VDC

**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

**Termination Finish (Military Designations) Code**  
M = Palladium Silver (CDR11, CDR12, CDR13, CDR14)  
N = Gold over Nickel over Silver (CDR11, CDR13)  
S = Solder Coated, Final (CDR12, CDR14, CDR23, CDR25)  
T = Silver (CDR21, CDR22, CDR24)  
U = Solder Coated, Nickel Barrier (CDR12, CDR14)  
W = Solder plated, nickel barrier (CDR12, CDR14, not for new designs)  
Y = Base metallization-barrier metal-tin (100 percent)  
Z = Solder plated, Nickel Barrier (CDR12, CDR14)  
N and U Terminations preferred for best solderability, thermocompression bonding, leach and migration resistance, and shelf life for chips and pellets.

**Capacitance Tolerance Code**  
B = ±1 pF    C = ±.25 pF    D = ±.5 pF    F = ±1%  
G = ±2%    J = ±5%    K = ±10%    M = ±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-0R2--B--	0.1 pF to 0.2 pF	B	Characteristic BG (+90 ±20 PPM/°C) and Characteristic BP (0 ±30 PPM/°C)	A = 50 K = 150
CDR1-B-0R3K--- to CDR1-B-0R4---	0.3 pF to 0.4 pF	B, C		
CDR1-B-0R5K--- to CDR1-B-2R2---**	0.5 pF to 2.2 pF	B, C, D		
CDR1-B-2R4K--- to CDR1-B-6R2---***	2.4 pF to 6.2 pF	B, C, D		
CDR1-B-6R8K--- to CDR1-B-9R1---***	6.8 pF to 9.1 pF	B, C, J, K, M		
CDR1-B-100K--- to CDR1-B-101K---***	10 pF to 100 pF	F, G, J, K, M	BP	A = 50 B = 100
CDR1-BP111K--- to CDR1-BP621---***	110 pF to 620 pF	F, G, J, K, M		
CDR1-BP681A--- to CDR1-BP102---***	680 pF to 1000 pF	F, G, J, K, M		

**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-0R2--B--	0.1 pF to 0.2 pF	B	"Characteristic BG (+90 ±20 PPM/°C) and Characteristic BP (0 ±30 PPM/°C)"	
CDR1-B-0R3E--- to CDR1-B-0R4---	0.3 pF to 0.4 pF	B, C		
CDR1-B--0R5E--- 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		E = 500
CDR1-B-6R8E--- to CDR1-B-9R1---***	6.8 pF to 9.1 pF	B, C, J, K, M		
CDR1-B-100E--- to CDR1-B-101---***	10 pF to 100 pF	F, G, J, K, M		C = 200    D = 300
CDR1-B-111D--- to CDR1-B-201---***	110 pF to 200 pF			C = 200
CDR1-B-221C--- to CDR1-B-471C---***	220 pF to 470 pF			A = 50    B = 100
CDR1-B-511B--- to CDR1-B-621---***	510 pF to 620 pF			
CDR1-B-681A--- to CDR1-B-102A---***	680 pF to 1000 pF			
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.

- |                             |                            |                                 |                                |                          |
|-----------------------------|----------------------------|---------------------------------|--------------------------------|--------------------------|
| Архангельск (8182)63-90-72  | Ижевск (3412)26-03-58      | Магнитогорск (3519)55-03-13     | Пермь (342)205-81-47           | Сургут (3462)77-98-35    |
| Астана (7172)727-132        | Иркутск (395)279-98-46     | Москва (495)268-04-70           | Ростов-на-Дону (863)308-18-15  | Тверь (4822)63-31-35     |
| Астрахань (8512)99-46-04    | Казань (843)206-01-48      | Мурманск (8152)59-64-93         | Рязань (4912)46-61-64          | Томск (3822)98-41-53     |
| Барнаул (3852)73-04-60      | Калининград (4012)72-03-81 | Набережные Челны (8552)20-53-41 | Самара (846)206-03-16          | Тула (4872)74-02-29      |
| Белгород (4722)40-23-64     | Калуга (4842)92-23-67      | Нижний Новгород (831)429-08-12  | Санкт-Петербург (812)309-46-40 | Тюмень (3452)66-21-18    |
| Брянск (4832)59-03-52       | Кемерово (3842)65-04-62    | Новокузнецк (3843)20-46-81      | Саратов (845)249-38-78         | Ульяновск (8422)24-23-59 |
| Владивосток (423)249-28-31  | Киров (8332)68-02-04       | Новосибирск (383)227-86-73      | Севастополь (8692)22-31-93     | Уфа (347)229-48-12       |
| Волгоград (844)278-03-48    | Краснодар (861)203-40-90   | Омск (3812)21-46-40             | Симферополь (3652)67-13-56     | Хабаровск (4212)92-98-04 |
| Вологда (8172)26-41-59      | Красноярск (391)204-63-61  | Орел (4862)44-53-42             | Смоленск (4812)29-41-54        | Челябинск (351)202-03-61 |
| Воронеж (473)204-51-73      | Курск (4712)77-13-04       | Оренбург (3532)37-68-04         | Соли (862)225-72-31            | Череповец (8202)49-02-64 |
| Екатеринбург (343)384-55-89 | Липецк (4742)52-20-81      | Пенза (8412)22-31-16            | Ставрополь (8652)20-65-13      | Ярославль (4852)69-52-93 |
| Иваново (4932)77-34-06      | Киргизия (996)312-96-26-47 | Россия (495)268-04-70           | Казахстан (772)734-952-31      |                          |

# RF/Microwave Multilayer Capacitors (MLC)

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

**TABLE I - STYLES CDR11 AND CDR12 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	B	Characteristic BG (+90 ±20 PPM/°C) and Characteristic BP (0 ±30 PPM/°C)	500 = E
CDR2-B-0R3E--- to CDR2-B-0R4E---	0.3 pF to 0.4 pF	B, C		
CDR2-B-0R5E--- to CDR2-B-2R2E---**	0.5 pF to 2.2 pF	B, C, D		
CDR2-B-2R4E--- to CDR2-B-6R2E---***	2.4 pF to 6.2 pF	B, C, D		
CDR2-B-6R8E--- to CDR2-B-9R1E---***	6.8 pF to 9.1 pF	B, C, J, K, M		
CDR21-B-100E--- to CDR2-B-101E---***	10 pF to 100 pF	F, G, J, K, M		300 = D
CDR2-B-111D--- to CDR2-B-201D---***	110 pF to 200 pF			200 = C
CDR2-B-221C--- to CDR2-B-471C---***	220 pF to 470 pF			100 = B
CDR2-B-511B--- to CDR2-B-621B---***	510 pF to 620 pF			50 = A
CDR2-B-681A--- to CDR2-B-102A---***	680 pF to 1000 pF			
CDR2-BP112A-- to CDR2-BP512A---***	1100 pF to 5100 pF		BP	

\* 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 Styles	Case Size	Type	Outlines	Body Dimensions			Lead & Termination Dimensions & Materials		
				Length	Width	Thickness			
CDR 11	A	Chip CA		.055 ±.015 (1.4 ±0.38)		.020/.057 (0.51/1.45)	N = Gold Over Nickel Over Silver N is ATC's UNI-TERM®		
CDR 13	B	Chip CA	W/T is a Termination Surface	.110 ±.020 (2.79 ±0.51)		.030/.102 (0.76/2.59)			
CDE 12	A	Pellet P		.055 ±.025 (1.4 ±0.63)	.055 ±.015 (1.4 ±0.38)	.020/.057 (0.51/1.45)	S = Solder Coated, Final U = Solder Coated, Nickel Barrier U is ATC's BARRIER//CAP®		
CDR 14	B	Pellet P	W/T is a Termination Surface	.110 +.035 -.020 (2.79 +0.89 -0.51)	.110 ±.020 (2.79 ±0.51)	.030/.102 (0.76/2.59)			
CDR 12	A	Solder Plate W		.055 ±.015 (1.4 ±0.38)		.020/.057 (0.51/1.45)	W = Nickel Barrier, Solder Plate.		
CDR 14	B	Solder Plate W	W/T is a Termination Surface	.110 ±.020 (2.79 ±0.51)		.030/.102 (0.76/2.59)			
CDR 21	B	Microstrip MS		.135 ±.015 (3.43 ±0.38)	.110 ±.015 (2.79 ±0.38)	.060/.100 (1.52/2.54)	Termination T = Silver		
CDR 22	B	Axial Ribbon AR					Length	Width	Thickness
CDR 24	B	Radial Ribbon RR					min.	.093±.005 (2.36±0.13)	.004±.001 (0.10±0.03)
CDR 23	B	Radial Wire RW					.250 (6.35)		
CDR 25	B	Axial Wire AW					min.	#26 AWG	
							.50 (12.7)	.016 (.375) dia. nom.	

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.

# RF/Microwave Multilayer Capacitors (MLC)

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

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

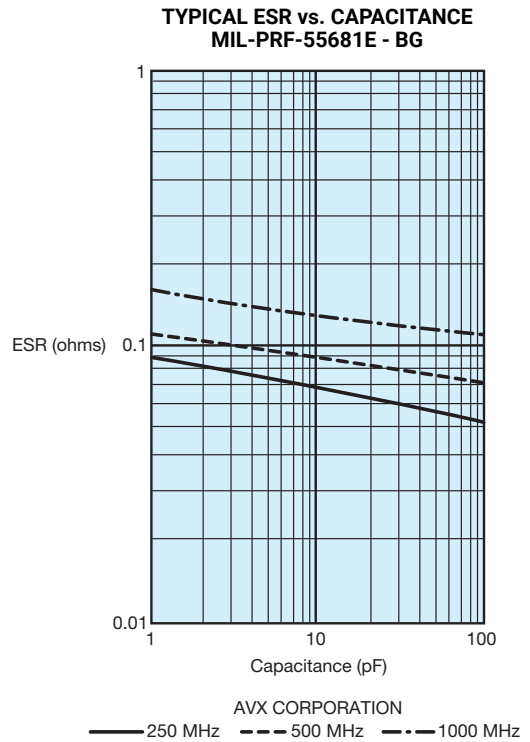
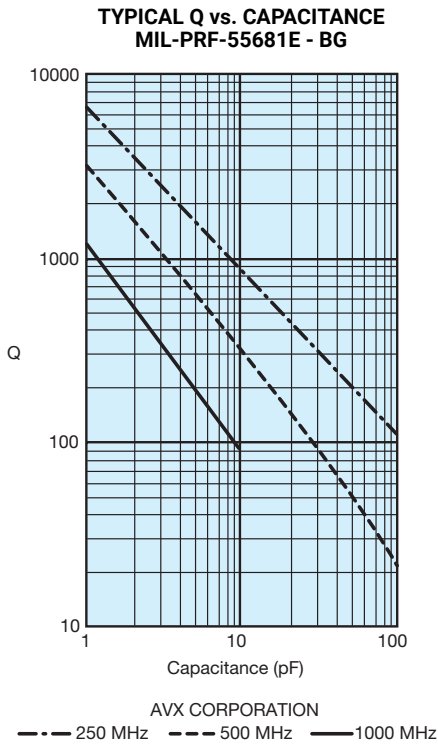
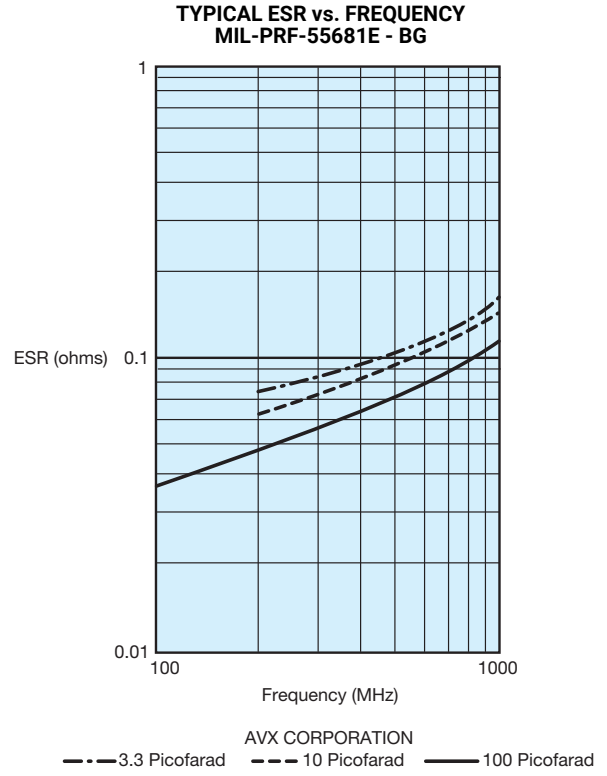
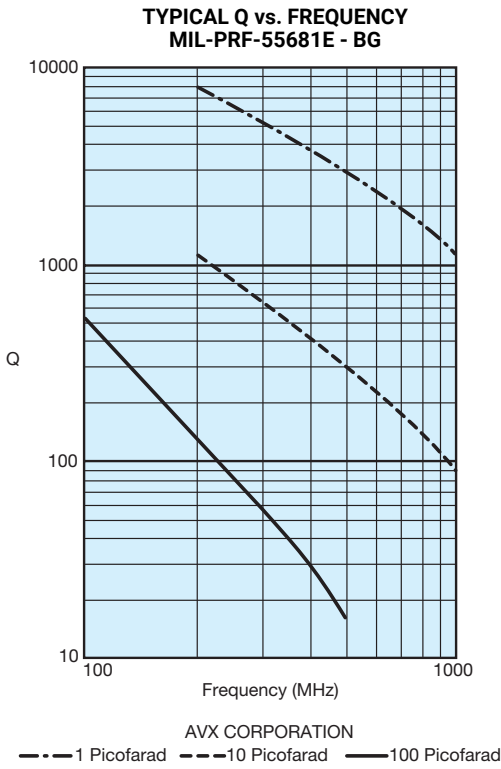
### PACKAGING

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

### TAPE & REEL

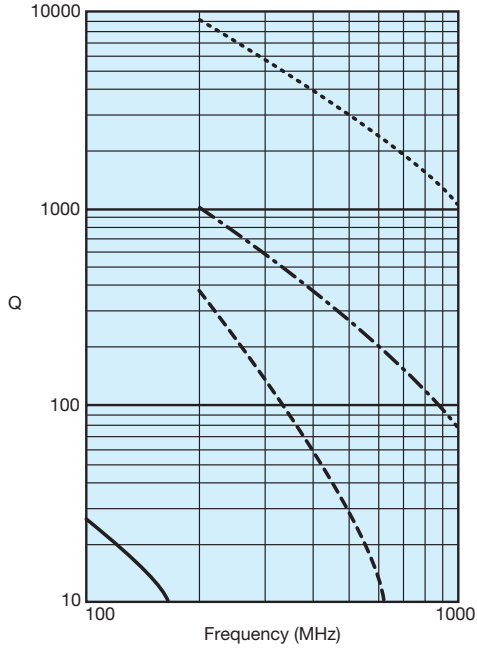
All tape and reel specifications are in compliance with EIA RS481 (equivalent to IEC 286 part 3).  
 Sizes CDR11/12 through 13/14.  
 – 8mm carrier  
 – 7" reel:  $\leq 0.040"$  thickness = 100, 300, 500, 1000, 2000\* pcs  
 $\leq 0.075"$  thickness = 100, 300, 500, 1000, 2000\* pcs  
 \* QTY 2000 only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

# RF/Microwave Multilayer Capacitors (MLC) Performance Curves



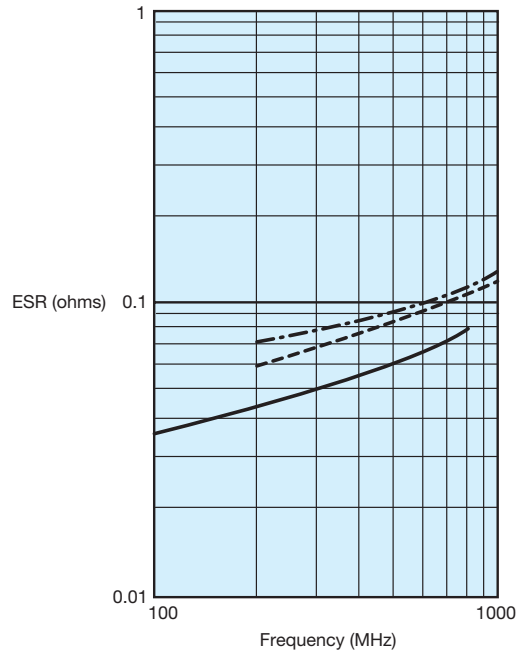
# RF/Microwave Multilayer Capacitors (MLC) Performance Curves

**TYPICAL Q vs. FREQUENCY  
MIL-PRF-55681E - BG**



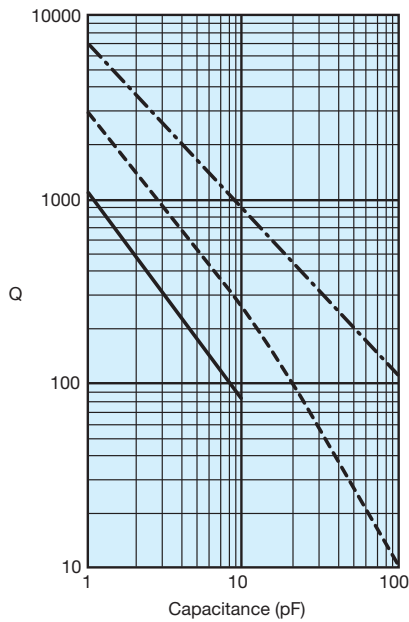
AVX CORPORATION  
 ..... 1 Picofarad    - - - - 10 Picofarad    - - - - 47 Picofarad    ——— 330 Picofarad

**TYPICAL ESR vs. FREQUENCY  
MIL-PRF-55681E - BG**



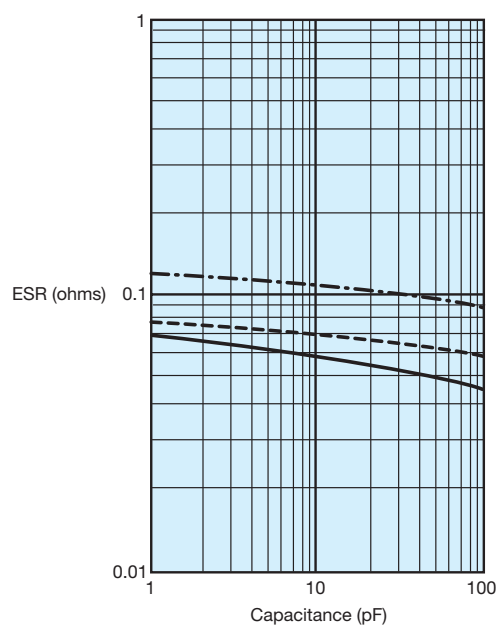
AVX CORPORATION  
 ..... 1 Picofarad    - - - - 15 Picofarad    ——— 100 Picofarad

**TYPICAL Q vs. CAPACITANCE  
MIL-PRF-55681E - BG**



AVX CORPORATION  
 ..... 250 MHz    - - - - 500 MHz    ——— 1000 MHz

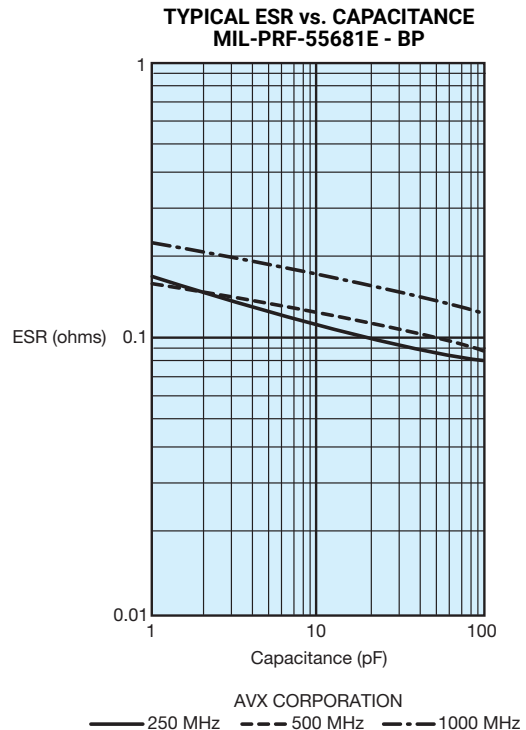
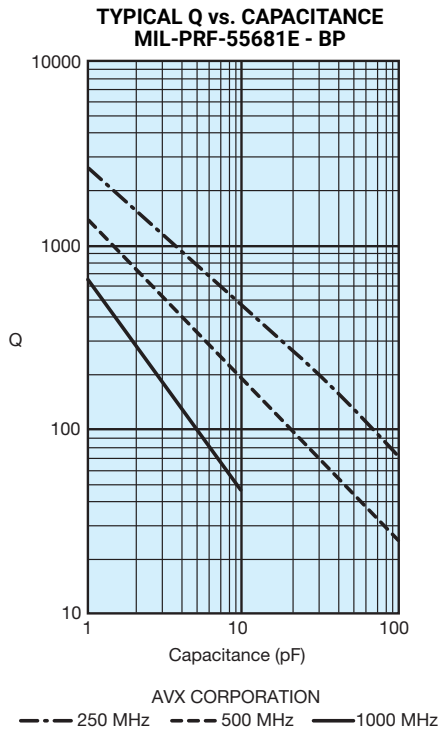
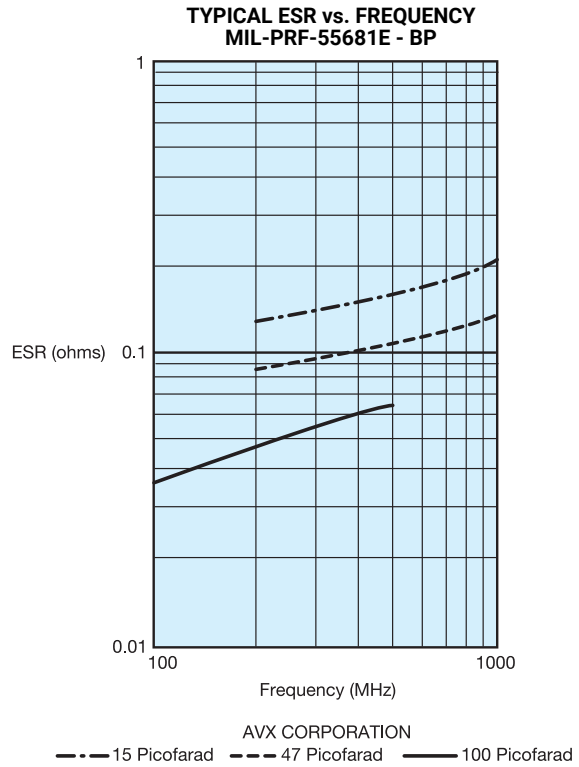
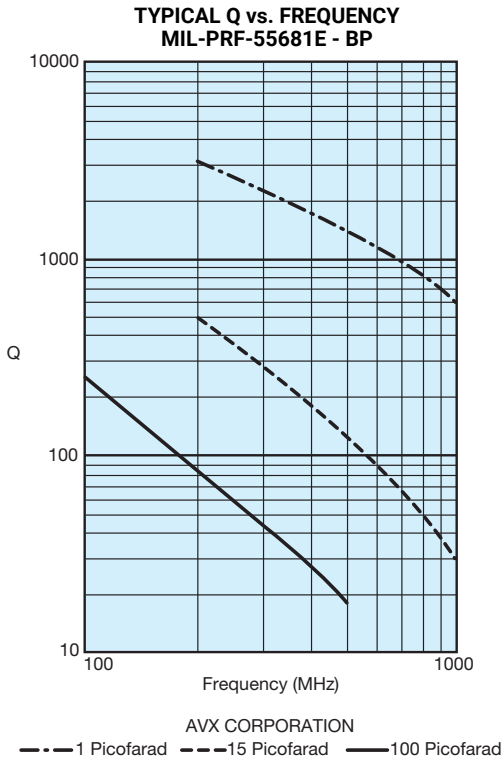
**TYPICAL ESR vs. CAPACITANCE  
MIL-PRF-55681E - BG**



AVX CORPORATION  
 ——— 250 MHz    - - - - 500 MHz    ..... 1000 MHz

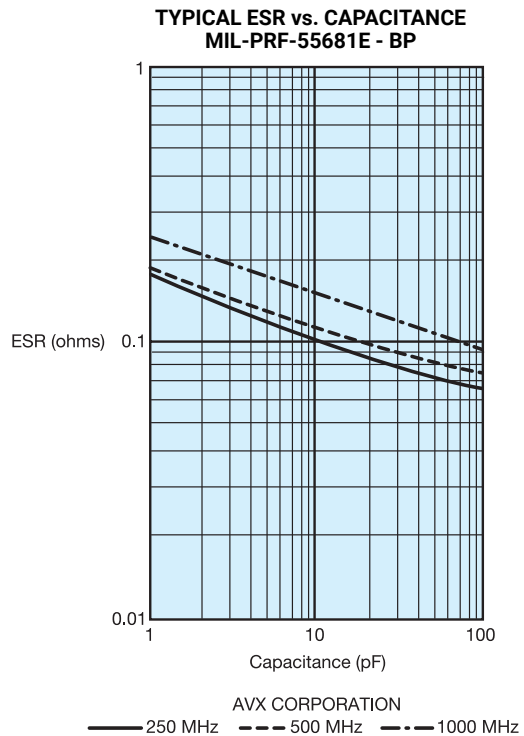
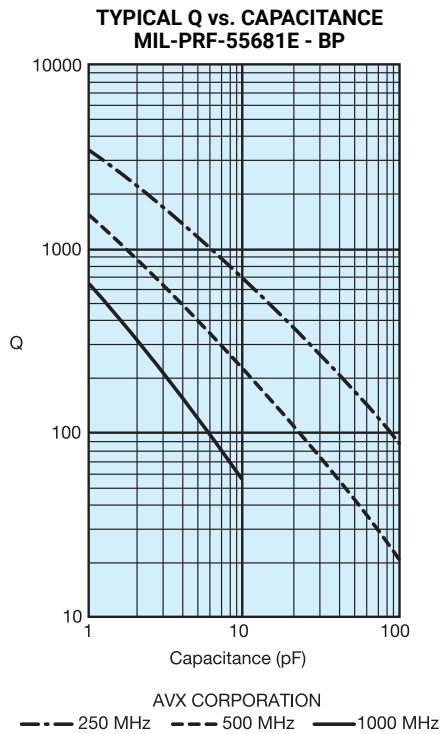
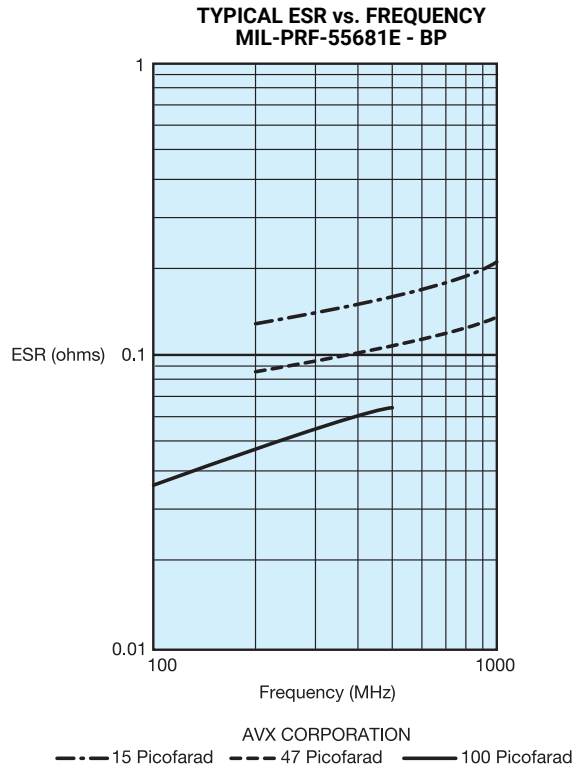
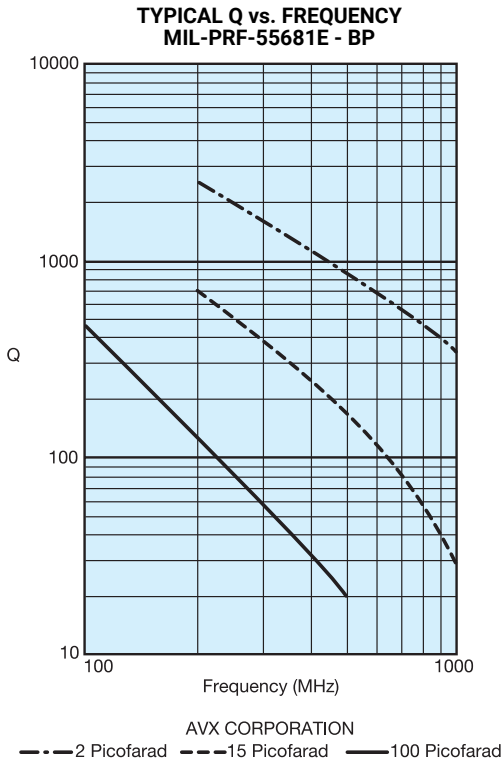
# RF/Microwave Multilayer Capacitors (MLC)

## Performance Curves



# RF/Microwave Multilayer Capacitors (MLC)

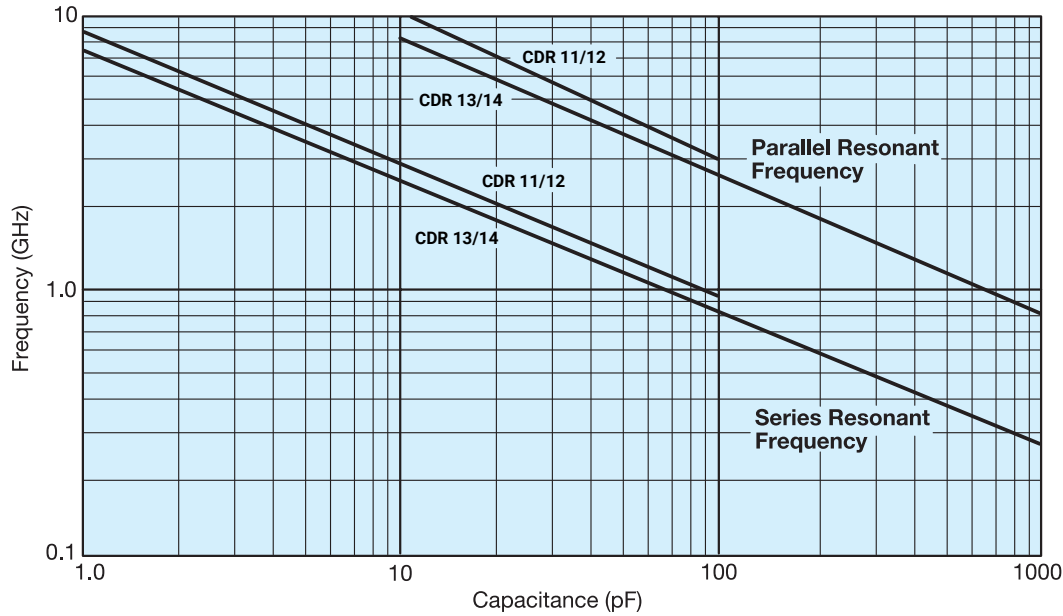
## Performance Curves



# RF/Microwave Multilayer Capacitors (MLC)

## Performance Curves

TYPICAL RESONANT FREQUENCY vs. CAPACITANCE  
(CDR11-14)



Архангельск (8182)63-90-72  
Астана (7172)727-132  
Астрахань (8512)99-46-04  
Барнаул (3852)73-04-60  
Белгород (4722)40-23-64  
Брянск (4832)59-03-52  
Владивосток (423)249-28-31  
Волгоград (844)278-03-48  
Вологда (8172)26-41-59  
Воронеж (473)204-51-73  
Екатеринбург (343)384-55-89  
Иваново (4932)77-34-06

Ижевск (3412)26-03-58  
Иркутск (395)279-98-46  
Казань (843)206-01-48  
Калининград (4012)72-03-81  
Калуга (4842)92-23-67  
Кемерово (3842)65-04-62  
Киров (8332)68-02-04  
Краснодар (861)203-40-90  
Красноярск (391)204-63-61  
Курск (4712)77-13-04  
Липецк (4742)52-20-81  
Киргизия (996)312-96-26-47

Магнитогорск (3519)55-03-13  
Москва (495)268-04-70  
Мурманск (8152)59-64-93  
Набережные Челны (8552)20-53-41  
Нижний Новгород (831)429-08-12  
Новокузнецк (3843)20-46-81  
Новосибирск (383)227-86-73  
Омск (3812)21-46-40  
Орел (4862)44-53-42  
Оренбург (3532)37-68-04  
Пенза (8412)22-31-16  
Россия (495)268-04-70

Пермь (342)205-81-47  
Ростов-на-Дону (863)308-18-15  
Рязань (4912)46-61-64  
Самара (846)206-03-16  
Санкт-Петербург (812)309-46-40  
Саратов (845)249-38-78  
Севастополь (8692)22-31-93  
Симферополь (3652)67-13-56  
Смоленск (4812)29-41-54  
Сочи (862)225-72-31  
Ставрополь (8652)20-65-13  
Казахстан (772)734-952-31

Сургут (3462)77-98-35  
Тверь (4822)63-31-35  
Томск (3822)98-41-53  
Тула (4872)74-02-29  
Тюмень (3452)66-21-18  
Ульяновск (8422)24-23-59  
Уфа (347)229-48-12  
Хабаровск (4212)92-98-04  
Челябинск (351)202-03-61  
Череповец (8202)49-02-64  
Ярославль (4852)69-52-93

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