

Multilayer Chip Varistor



◆ Features

1. SMD type suitable for high density mounting
2. Excellent clamping ratio and quick response time (<0.5ns)
3. Excellent solderability (Ni, Sn plating)
5. Low clamping voltage
6. High transient current capability
7. Meet IEC 61000-4-2, 61000-4-4, and 61000-4-5 standard
8. Compact size for EIA 0201/0402/0603/0805/1206
9. ROHS Compliant.



◆ Application

1. Applications for Mother Board, Notebook, Cellular Phone, PDA, handheld device, DSC, DV, Scanner, and Set-Top Box...etc.
2. Transient voltage protection for IC and transistor.
3. ESD and I/O protection.
4. EFT and burst protection.

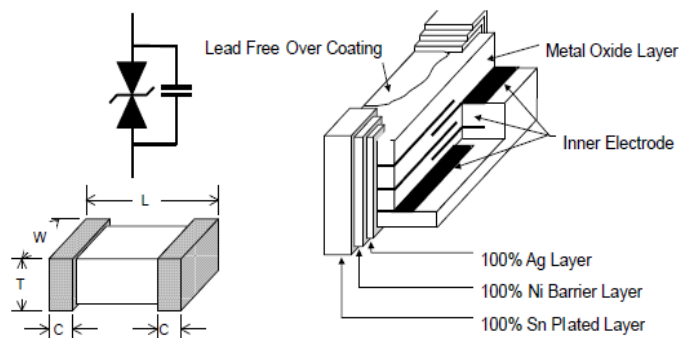
◆ PRODUCT IDENTIFICATION

CMRD	1005	V05	C0R1	M	S	P
(1)	(2)	(3)	(4)	(5)	(6)	(7)

- (1) Series Type
- (2) Chip Size (mm) :Length X Width
- (3) Working Voltage: V05=5V; V18=18V
- (4) Capacitance Code: 0R1=0.1pF; 5R0=5pF; 100=10pF; 101=100pF
- (5) Capacitance Tolerance: M=±20%, N=±30%
- (6) Company Code
- (7) Packaging: P – Embossed paper tape, 7" reel
E – Embossed plastic tape, 7" reel

◆ Dimensions Unit: mm

Size (EIA)	0603 (0201)	1005 (0402)	1608 (0603)
L	0.60±0.05	1.00±0.15	1.60±0.20
W	0.30±0.05	0.50±0.10	0.80±0.20
T	0.30±0.05	0.50±0.10	0.80±0.20
C	0.20±0.10	0.25±0.15	0.30±0.20



◆ Specifications

Part Number	Max. Working Voltage (<20μA)		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
	DC	AC RMS	@1mA DC	8/20μs	ESD	Energy 10/1000μs	Peak Current 8/20μs	@0.5Vrms, 1MHz
	V _{WDC} (V)	V _{WAC} (V)	V _B (V)	VC ^{*1} (V)	VC ^{*2} (V)	E _T	I _P (A)	C (pF)
CMRD0603 TYPE								
CMRD0603V05C0R5NSP	5.5	4	100~160	-	-	-	-	0.5
CMRD0603V05C1R0NSP	5.5	4	100~160	-	-	-	-	1.0
CMRD0603V05C2R0MSP	5.5	4	60~80	-	-	-	-	2.0
CMRD0603V05C3R0MSP	5.5	4	60~80	-	-	-	-	3.0
CMRD0603V05C150MSP	5.5	4	10~14	18	23	0.005	1	15
CMRD0603V05C220MSP	5.5	4	10~14	18	23	0.005	1	22
CMRD0603V05C330MSP	5.5	4	10~14	18	23	0.01	3	33
CMRD0603V05C400MSP	5.5	4	10~14	18	23	0.01	5	40
CMRD0603V05C500MSP	5.5	4	10~14	18	23	0.01	5	50
CMRD0603V09C0R5NSP	9	6.4	100~160	—	—	—	—	0.5
CMRD0603V09C1R0NSP	9	6.4	100~160	—	—	—	—	1.0
CMRD0603V09C2R0NSP	9	6.4	60~80	—	—	—	—	2.0
CMRD0603V09C150MSP	9	6.4	11~16	20	26	0.005	1	15
CMRD0603V09C220MSP	9	6.4	11~16	20	26	0.005	1	22
CMRD0603V09C330MSP	9	6.4	11~16	20	26	0.01	3	33
CMRD0603V09C400MSP	9	6.4	11~16	20	26	0.01	5	40
CMRD0603V09C500MSP	9	6.4	11~16	20	26	0.01	5	50
CMRD0603V18C5R0MSP	18	12.7	22~28	40	48	0.003	1	5.0
CMRD0603V18C100MSP	18	12.7	22~28	40	48	0.005	1	10
CMRD0603V26C3R0MSP	26	18.4	31~38	58	70	0.003	1	3.0
CMRD0603V26C5R0MSP	26	18.4	31~38	58	70	0.003	1	5.0
CMRD1005 TYPE								
CMRD1005V05C0R5NSP	5.5	4	100~160	-	-	-	-	0.5
CMRD1005V05C1R0NSP	5.5	4	100~160	-	-	-	-	1.0
CMRD1005V05C2R0NSP	5.5	4	60~80	-	-	-	-	2.0
CMRD1005V05C3R0MSP	5.5	4	31~38	58	70	0.003	1	3.0
CMRD1005V05C5R0MSP	5.5	4	22~28	40	48	0.003	1	5.0
CMRD1005V05C100MSP	5.5	4	22~28	40	48	0.005	2	10
CMRD1005V05C120MSP	5.5	4	22~28	40	48	0.005	2	12
CMRD1005V05C180MSP	5.5	4	10~14	18	23	0.005	3	18
CMRD1005V05C300MSP	5.5	4	10~14	18	23	0.005	5	30
CMRD1005V05C500MSP	5.5	4	10~14	18	23	0.01	10	50
CMRD1005V05C181MSP	5.5	4	10~14	18	23	0.05	20	180

◆ Specifications

Part Number	Max. Working Voltage (<20μA)		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
	DC	AC RMS	@1mA DC	8/20μs	ESD	Energy 10/1000μs	Peak Current 8/20μs	@0.5Vrms, 1MHz
	V _{WDC} (V)	V _{WAC} (V)	V _B (V)	V _C ^{*1} (V)	V _C ^{*2} (V)	E _T	I _P (A)	C (pF)
CMRD1005 TYPE								
CMRD1005V05C231MSP	5.5	4	10~14	18	23	0.05	20	230
CMRD1005V05C361MSP	5.5	4	10~14	18	23	0.05	20	360
CMRD1005V09C0R5NSP	9	6.4	100~160	-	-	-	-	0.5
CMRD1005V09C1R0NSP	9	6.4	100~160	-	-	-	-	1.0
CMRD1005V09C2R0NSP	9	6.4	60~80	-	-	-	-	2.0
CMRD1005V09C3R0MSP	9	6.4	31~38	58	70	0.003	1	3.0
CMRD1005V09C5R0MSP	9	6.4	22~28	40	48	0.003	1	5.0
CMRD1005V09C100MSP	9	6.4	22~28	40	48	0.005	2	10
CMRD1005V09C120MSP	9	6.4	22~28	40	48	0.005	2	12
CMRD1005V09C180MSP	9	6.4	11~16	20	26	0.005	3	18
CMRD1005V09C300MSP	9	6.4	11~16	20	26	0.005	5	30
CMRD1005V09C500MSP	9	6.4	11~16	20	26	0.01	10	50
CMRD1005V09C800MSP	9	6.4	11~16	20	26	0.02	15	80
CMRD1005V09C101MSP	9	6.4	11~16	20	26	0.05	20	100
CMRD1005V09C121MSP	9	6.4	11~16	20	26	0.05	20	120
CMRD1005V09C151MSP	9	6.4	11~16	20	26	0.05	20	150
CMRD1005V09C231MSP	9	6.4	11~16	20	26	0.05	20	230
CMRD1005V14C0R5NSP	14	10	100~160	-	-	-	-	0.5
CMRD1005V14C1R0NSP	14	10	100~160	-	-	-	-	1.0
CMRD1005V14C2R0NSP	14	10	60~80	-	-	-	-	2.0
CMRD1005V14C3R0MSP	14	10	31~38	58	70	0.003	1	3.0
CMRD1005V14C5R0MSP	14	10	22~28	40	48	0.003	1	5.0
CMRD1005V14C100MSP	14	10	16~22	30	39	0.005	2	10
CMRD1005V14C120MSP	14	10	16~22	30	39	0.005	2	12
CMRD1005V14C180MSP	14	10	16~22	30	39	0.005	3	18
CMRD1005V14C300MSP	14	10	16~22	30	39	0.01	5	30
CMRD1005V14C500MSP	14	10	16~22	30	39	0.02	10	50
CMRD1005V14C800MSP	14	10	16~22	30	39	0.03	15	80
CMRD1005V14C101MSP	14	10	16~22	30	39	0.05	20	100
CMRD1005V14C121MSP	14	10	16~22	30	39	0.05	20	120
CMRD1005V14C161MSP	14	10	16~22	30	39	0.05	20	160
CMRD1005V18C0R5NSP	18	12.7	100~160	-	-	-	-	0.5
CMRD1005V18C1R0NSP	18	12.7	100~160	-	-	-	-	1.0

◆ Specifications

Part Number	Max. Working Voltage (<20μA)		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
	DC	AC RMS	@1mA DC	8/20μs	ESD	Energy 10/1000μs	Peak Current 8/20μs	@0.5Vrms, 1MHz
	V _{WDC} (V)	V _{WAC} (V)	V _B (V)	V _C ^{*1} (V)	V _C ^{*2} (V)	E _T	I _P (A)	C (pF)
CMRD1005 TYPE								
CMRD1005V18C2R0NSP	18	12.7	60~80	-	-	-	-	2.0
CMRD1005V18C3R0MSP	18	12.7	31~28	58	70	0.003	1	3.0
CMRD1005V18C5R0MSP	18	12.7	22~28	40	48	0.005	2	5.0
CMRD1005V18C100MSP	18	12.7	22~28	40	48	0.005	2	10
CMRD1005V18C150MSP	18	12.7	22~28	40	48	0.005	2	15
CMRD1005V18C180MSP	18	12.7	22~28	40	48	0.01	5	18
CMRD1005V18C300MSP	18	12.7	22~28	40	48	0.02	10	30
CMRD1005V18C500MSP	18	12.7	22~28	40	48	0.02	10	50
CMRD1005V18C101MSP	18	12.7	22~28	40	48	0.05	20	100
CMRD1005V26C0R5NSP	26	18.4	100~160	-	-	-	-	0.5
CMRD1005V26C1R0NSP	26	18.4	100~160	-	-	-	-	1.0
CMRD1005V26C2R0NSP	26	18.4	60~80	-	-	-	-	2.0
CMRD1005V26C3R0MSP	26	18.4	31~38	58	70	0.003	1	3.0
CMRD1005V26C100MSP	26	18.4	31~38	58	70	0.005	2	10
CMRD1005V26C120MSP	26	18.4	31~38	58	70	0.005	2	12
CMRD1005V26C180MSP	26	18.4	31~38	58	70	0.02	5	18
CMRD1005V26C300MSP	26	18.4	31~38	58	70	0.03	10	30
CMRD1005V26C500MSP	26	18.4	31~38	58	70	0.03	10	50
CMRD1608 TYPE								
CMRD1608V05C0R5NSP	5.5	4	100~160	-	-	-	-	0.5
CMRD1608V05C1R0NSP	5.5	4	100~160	-	-	-	-	1.0
CMRD1608V05C2R0NSP	5.5	4	60~80	-	-	-	-	2.0
CMRD1608V05C3R0MSP	5.5	4	31~38	58	70	0.003	1	3.0
CMRD1608V05C5R0MSP	5.5	4	22~28	40	48	0.003	1	5.0
CMRD1608V05C100MSP	5.5	4	22~28	40	48	0.005	2	10
CMRD1608V05C120MSP	5.5	4	22~28	40	48	0.005	2	12
CMRD1608V05C180MSP	5.5	4	10~14	18	23	0.005	3	18
CMRD1608V05C300MSP	5.5	4	10~14	18	23	0.005	5	30
CMRD1608V09C0R5NSP	9	6.4	100~160	-	-	-	-	0.5
CMRD1608V09C1R0NSP	9	6.4	100~160	-	-	-	-	1.0
CMRD1608V09C2R0NSP	9	6.4	60~80	-	-	-	-	2.0
CMRD1608V09C3R0MSP	9	6.4	31~38	58	70	0.003	1	3.0
CMRD1608V09C5R0MSP	9	6.4	22~28	40	48	0.003	1	5.0

◆ Specifications

Part Number	Max. Working Voltage (<20μA)		Varistor Voltage	Max. Clamping Voltage		Rated Single Pulse Transient		Typical Capacitance
	DC	AC RMS	@1mA DC	8/20μs	ESD	Energy 10/1000μs	Peak Current 8/20μs	@0.5Vrms, 1MHz
	V _{WDC} (V)	V _{WAC} (V)	V _B (V)	V _C ^{*1} (V)	V _C ^{*2} (V)	E _T	I _P (A)	C (pF)
CMRD1608 TYPE								
CMRD1608V09C100MSP	9	6.4	22~28	40	48	0.005	2	10
CMRD1608V09C120MSP	9	6.4	22~28	40	48	0.005	2	12
CMRD1608V09C180MSP	9	6.4	11~16	20	26	0.005	3	18
CMRD1608V09C300MSP	9	6.4	11~16	20	26	0.005	5	30
CMRD1608V09C500MSP	9	6.4	11~16	20	26	0.01	10	50
CMRD1608V14C0R5NSP	14	10	100~160	-	-	-	-	0.5
CMRD1608V14C1R0NSP	14	10	100~160	-	-	-	-	1.0
CMRD1608V14C2R0NSP	14	10	60~80	-	-	-	-	2.0
CMRD1608V14C100MSP	14	10	16~22	30	39	0.005	2	10
CMRD1608V14C120MSP	14	10	16~22	30	39	0.005	2	12
CMRD1608V14C180MSP	14	10	16~22	30	39	0.005	3	18
CMRD1608V14C300MSP	14	10	16~22	30	39	0.01	5	30
CMRD1608V14C500MSP	14	10	16~22	30	39	0.02	10	50
CMRD1608V14C800MSP	14	10	16~22	30	39	0.03	15	80
CMRD1608V18C0R5NSP	18	12.7	100~160	-	-	-	-	0.5
CMRD1608V18C1R0NSP	18	12.7	100~160	-	-	-	-	1.0
CMRD1608V18C2R0NSP	18	12.7	60~80	-	-	-	-	2.0
CMRD1608V18C3R0MSP	18	12.7	22~27	40	48	0.003	1	3.0
CMRD1608V18C5R0MSP	18	12.7	22~28	40	48	0.003	1	5.0
CMRD1608V18C100MSP	18	12.7	22~28	40	48	0.003	1	10
CMRD1608V18C180MSP	18	12.7	22~28	40	48	0.005	5	18
CMRD1608V18C300MSP	18	12.7	22~28	40	48	0.02	10	30
CMRD1608V18C600MSP	18	12.7	22~28	40	48	0.02	10	60
CMRD1608V18C800MSP	18	12.7	22~28	40	48	0.03	15	80
CMRD1608V18C101MSP	18	12.7	22~28	40	48	0.05	20	100
CMRD1608V26C3R0MSP	26	18.4	31~38	58	70	0.003	1	3.0
CMRD1608V26C180MSP	26	18.4	31~38	58	70	0.02	5	18
CMRD1608V26C300MSP	26	18.4	31~38	58	70	0.03	10	30
CMRD1608V26C500MSP	26	18.4	31~38	58	70	0.03	10	50

※*1: V_c, Maximum peak voltage across the varistor measured at a specified pulse current and waveform.

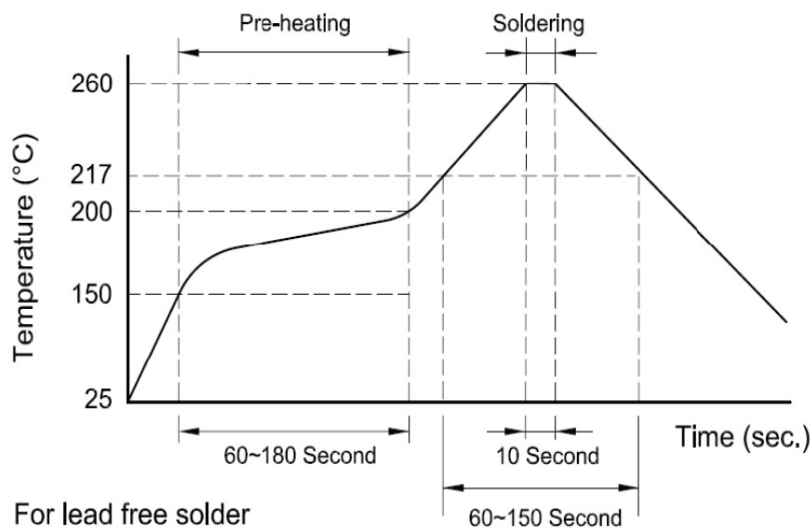
Energy Rating	Pulse & Waveform
0.00- 0.05 Joule	1A, 8/20μs
0.10 Joule	2A, 8/20μs
0.20- 0.50 Joule	5A, 8/20μs

※*2: V_c, Maximum peak voltage across the varistor measured at 30ns after initiation of pulse on IEC61000-4-2 30A/8kV.

◆ Environmental Performance

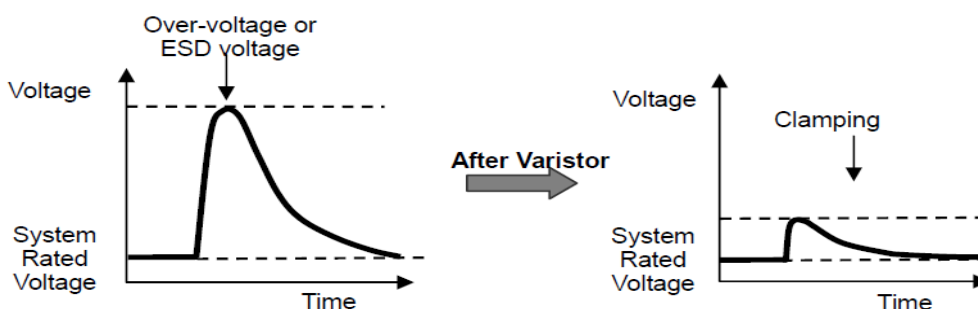
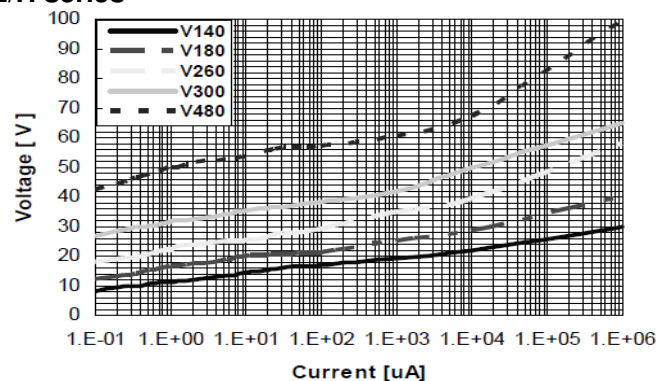
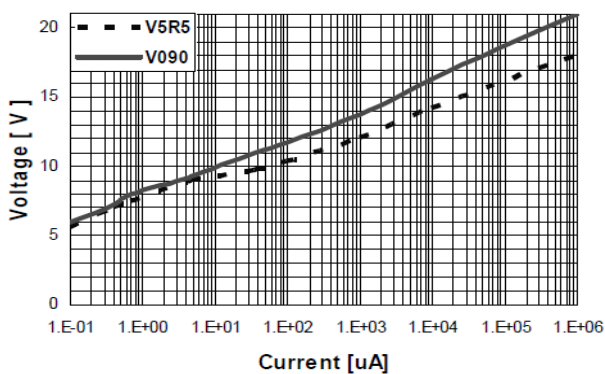
Item	Specifications	Test Condition
Bias Humidity	$\Delta V_v / V_v \leq \pm 10 \%$	90%RH, 40°C, Rated Voltage, 1000 hrs
Thermal Shock		-40°C to 85°C, 30 min. cycle, 5 cycles
Full Load Voltage		Rated Voltage, 85°C, 1000 hrs

◆ Recommendable reflow soldering



◆ Typical Electrical Characteristics

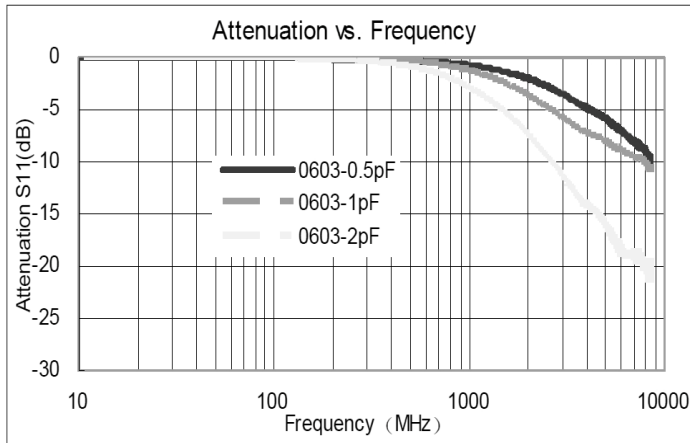
CMRD-A/E/H series



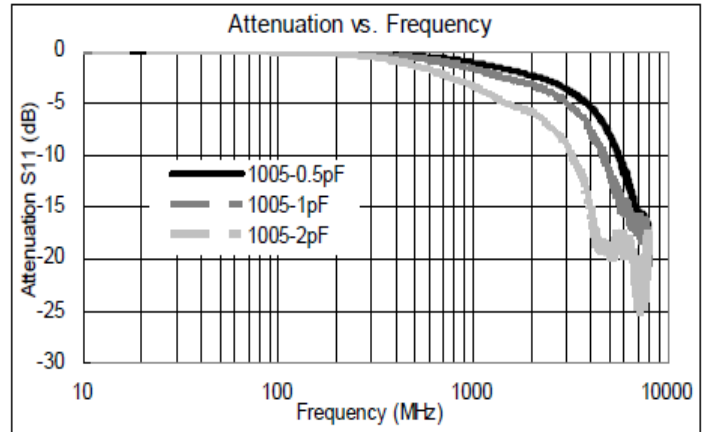
◆ Typical Electrical Characteristics

Ultra low capacitance type: CMRD0603/1005/1608 series, C=0.5pF, 1pF, 2pF

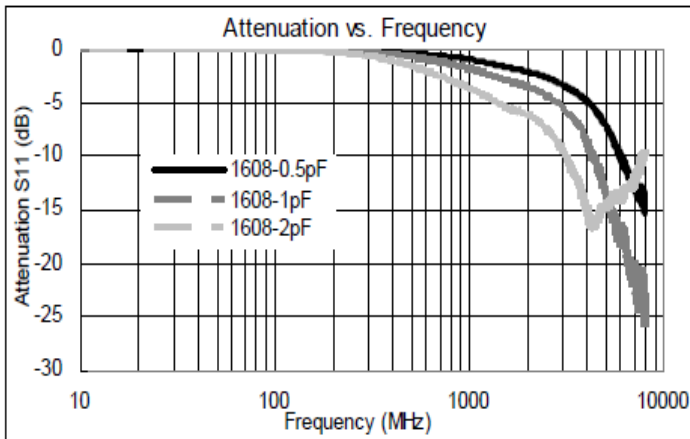
CMRD0603 series



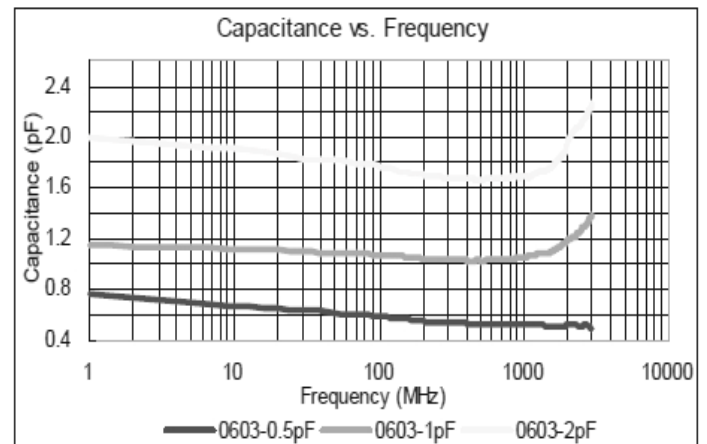
CMRD1005 series



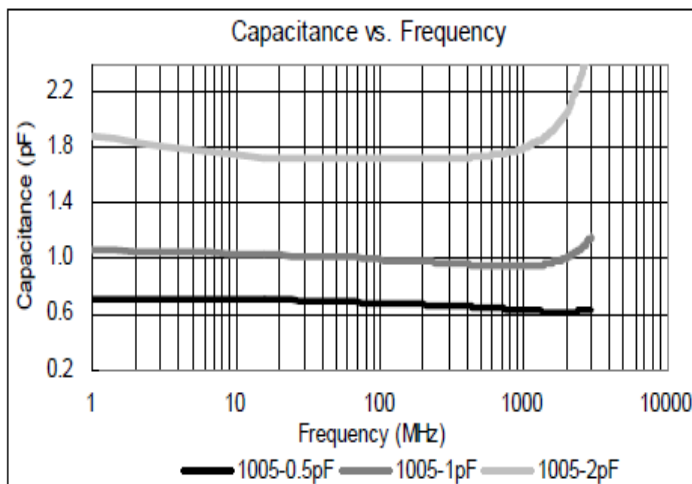
CMRD1608 series



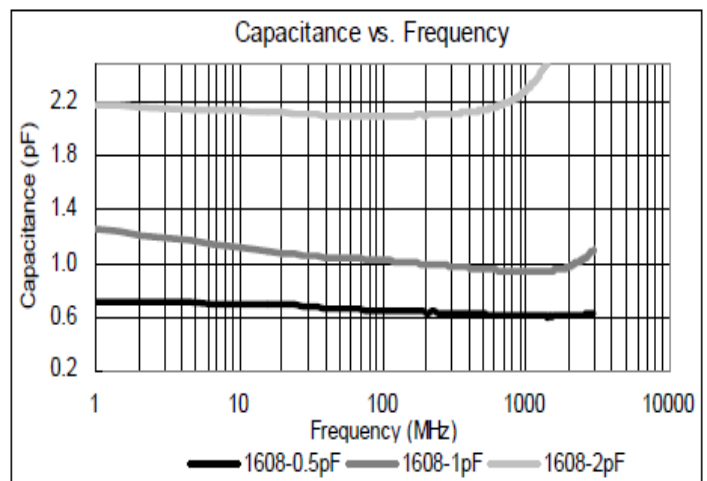
CMRD0603 series



CMRD1005 series



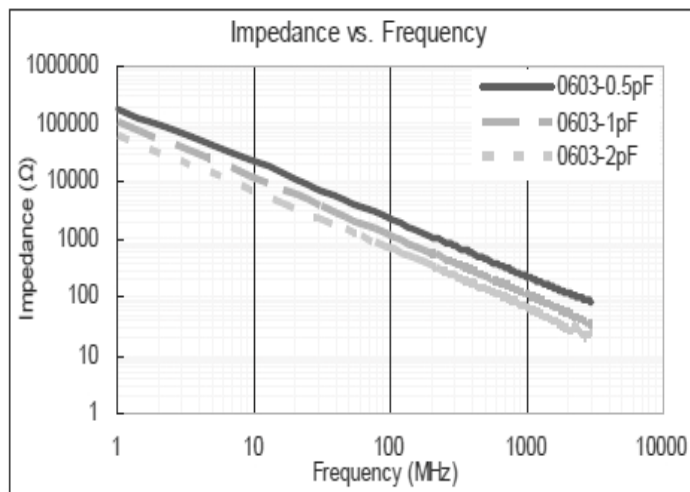
CMRD1608 series



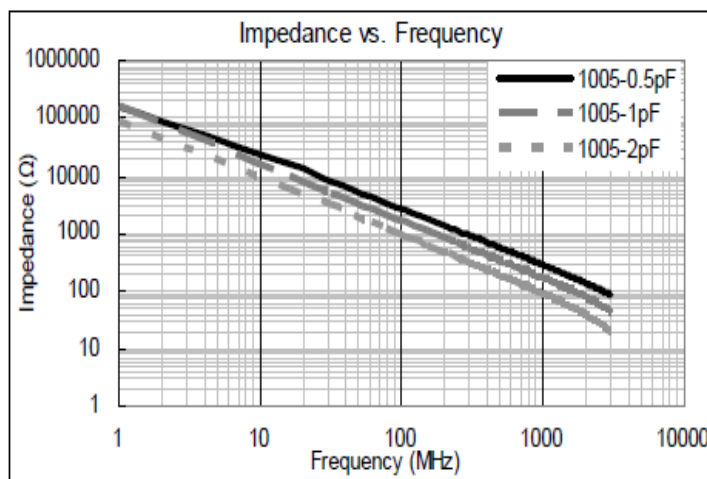
◆ Typical Electrical Characteristics

Ultra low capacitance type: CMRD0603/1005/1608 series, C=0.5pF, 1pF, 2pF

CMRD0603 series



CMRD1005 series



CMRD1608 series

