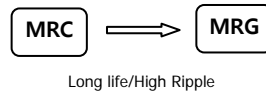


MRG series

Long Life High Ripple RoHS Compliant

- 105°C 2,000~5,000Hrs assured.
- Long life, High ripple
- For SMPS, IP-Board, Adaptor
- RoHS compliant
- Halogen-free capacitors are also available.

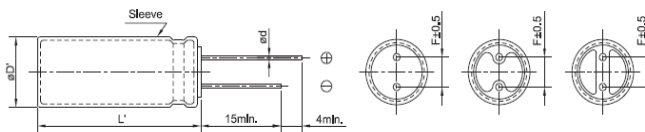


Specifications

Item	Characteristics			
Rated Voltage Range	160 ~ 400 Vdc	450 ~ 500 Vdc		
Operating Temperature Range	-40 ~ +105°C	-25 ~ +105°C		
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)			
Leakage Current	I=0.01CV+40(µA) at CV ≤ 1,000, I=0.04CV+100(µA) at CV > 1,000 (at 20°C, 1min) I=0.03CV+15(µA) at CV ≤ 1,000, I=0.02CV+25(µA) at CV > 1,000 (at 20°C, 5min) Where, I:Max. Leakage current(µA), C:Nominal capacitance(µF), V:Rated voltage(Vdc)			
Dissipation Factor(Tanδ)	Rated voltage (Vdc)	160 ~ 250	350 ~ 500	
	Tanδ (max.)	0.20	0.24	
Temperature characteristics (Max,impedance ratio)	Rated voltage (Vdc)	160 ~ 250	350 ~ 400	450 ~ 500
	Z(-25°C)/Z(20°C)	3	5	6
	Z(-40°C)/Z(20°C)	6	6	-
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for specified life times at 105°C5,000hrs. (2,000hrs for Ø6.3) Capacitance change ≤±20%of the initial value Tan δ ≤200% of the initial specified value Leakage current ≤The initial specified value			
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤±20% of the initial value Tanδ ≤200% of the initial specified value Leakage current ≤500%The initial specified value			

Dimensions

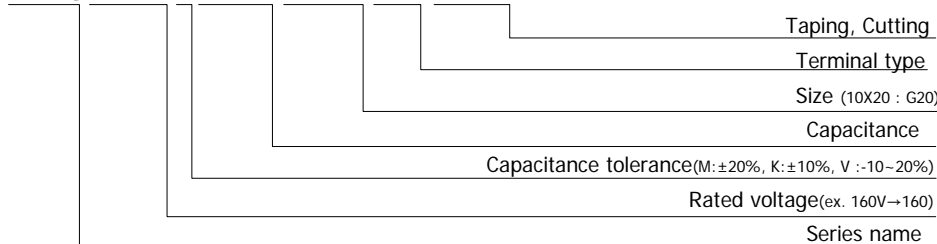
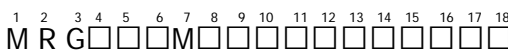
Unit(mm)



ØD	6.3	8	10	12.5	16	18	20	22
Ød	0.5	0.5	0.6	0.6	0.6	0.8	0.8	0.8
F	2.5	3.5	5.0	5.0	7.5	7.5	7.5	10.0
ØD'	ØD+0.5 max.							
L'	L+1.5 max			L+2.0 max				

- Printed black color letter on PET sky blue sleeve

Code numbering system



Ø6.3	E
Ø8	F
Ø10	G
Ø12.5	X
Ø16	J
Ø18	K
Ø20	L
Ø22	M



MRG series

■ Standard Ratings

Note1) Ripple current = mArms/105°C,120Hz

WV (Vdc)	Cap (uF)	Size ØxL(mm)	Tan δ	Ripple ¹⁾	Code No
160	22	10 x 20	0.20	192	MRG160□220G20CS□□□
	33	10 x 20	0.20	236	MRG160□330G20CS□□□
	47	12.5 x 20	0.20	312	MRG160□470X20CS□□□
	68	10 x 20	0.20	350	MRG160□680G20CS□□□
		12.5 x 25	0.20	409	MRG160□680X25CS□□□
	82	8 x 50	0.20	360	MRG160□820F50CS□□□
		12.5 x 25	0.20	346	MRG160□820X25CS□□□
	100	16 x 25	0.20	548	MRG160□101J25CS□□□
	150	16 x 25	0.20	701	MRG160□151J25CS□□□
	220	16 x 31.5	0.20	876	MRG160□221J32CS□□□
270	16 x 35.5	0.20	992	MRG160□271J36CS□□□	
330	18 x 31.5	0.20	1,110	MRG160□331K32CS□□□	
200	3.3	6.3 x 11	0.20	36	MRG200□3R3E11CS□□□
	10	8 x 11.5	0.20	75	MRG200□100F12CS□□□
	22	8 x 20	0.20	135	MRG200□220F20CS□□□
		10 x 20	0.20	192	MRG200□220G20CS□□□
	33	12.5 x 20	0.20	262	MRG200□330X20CS□□□
	47	12.5 x 20	0.20	312	MRG200□470X20CS□□□
	68	12.5 x 25	0.20	409	MRG200□680X25CS□□□
		8 x 50	0.20	320	MRG200□680F50CS□□□
	82	16 x 20	0.20	462	MRG200□820J20CS□□□
	100	16 x 25	0.20	548	MRG200□101J25CS□□□
150	16 x 25	0.20	701	MRG200□151J25CS□□□	
220	18 x 31.5	0.20	906	MRG200□221K32CS□□□	
250	6.8	8 x 11.5	0.20	70	MRG250□4R7F12CS□□□
	10	8 x 20	0.20	90	MRG250□100F20CS□□□
		10 x 20	0.20	130	MRG250□100G20CS□□□
	22	10 x 20	0.20	193	MRG250□220G20CS□□□
		12.5 x 20	0.20	214	MRG250□220X20CS□□□
	33	12.5 x 25	0.20	285	MRG250□330X25CS□□□
	47	8 x 50	0.20	250	MRG250□470F50CS□□□
		12.5 x 25	0.20	340	MRG250□470X25CS□□□
	68	16 x 25	0.20	452	MRG250□680J25CS□□□
	100	16 x 31.5	0.20	591	MRG250□101J32CS□□□
150	18 x 31.5	0.20	748	MRG250□151K32CS□□□	
220	18 x 35.5	0.20	936	MRG250□221K36CS□□□	
330	20 x 40	0.20	1,196	MRG250□331L40CS□□□	
350	6.8	8 x 15	0.20	65	MRG350□6R8F15CS□□□
	10	8 x 20	0.24	90	MRG350□100F20CS□□□
		10 x 20	0.24	126	MRG350□100G20CS□□□
	22	12.5 x 20	0.24	207	MRG350□220X20CS□□□
	33	8 x 50	0.24	245	MRG350□330F50CS□□□
		16 x 20	0.24	284	MRG350□330J20CS□□□
	47	16 x 25	0.24	364	MRG350□470J25CS□□□
	68	16 x 31.5	0.24	472	MRG350□680J32CS□□□
	100	18 x 31.5	0.24	591	MRG350□101K32CS□□□
	150	18 x 40	0.24	760	MRG350□151K40CS□□□
220	22 x 45	0.24	970	MRG350□221M45CS□□□	
400	1.0	6.3 x 11	0.24	19	MRG400□1R0E11CS□□□
	3.3	8 x 11.5	0.24	42	MRG400□3R3F12CS□□□
	6.8	8 x 15	0.24	66	MRG400□6R8F15CS□□□
	8.2	8 x 20	0.24	80	MRG400□8R2F20CS□□□
	10	10 x 16	0.24	85	MRG400□100G16CS□□□
	22	12.5 x 25	0.24	225	MRG400□220X25CS□□□
	27	8 x 50	0.24	240	MRG400□270F50CS□□□
	33	16 x 20	0.24	284	MRG400□330J20CS□□□
	47	16 x 25	0.24	364	MRG400□470J25CS□□□
	68	16 x 31.5	0.24	472	MRG400□680J32CS□□□
82	18 x 31.5	0.24	536	MRG400□820K32CS□□□	

WV (Vdc)	Cap (uF)	Size ØxL(mm)	Tan δ	Ripple ¹⁾	Code No
400	100	18 x 35.5	0.24	611	MRG400□101K36CS□□□
	120	18 x 40	0.24	680	MRG400□121K40CS□□□
	150	18 x 40	0.24	760	MRG400□151K40CS□□□
	180	20 x 40	0.24	855	MRG400□181L40CS□□□
	220	22 x 45	0.24	996	MRG400□221M45CS□□□
420	68	18 x 31.5	0.24	500	MRG420□680K32CS□□□
	82	18 x 31.5	0.24	560	MRG420□820K32CS□□□
	100	18 x 35.5	0.24	720	MRG420□101K36CS□□□
	120	18 x 40	0.24	740	MRG420□121K40CS□□□
	150	18 x 45	0.24	757	MRG420□151K45CS□□□
450	4.7	8 x 20	0.24	62	MRG450□4R7F20CS□□□
	8.2	10 x 25	0.24	121	MRG450□8R2G25CS□□□
	10	12.5 x 20	0.24	135	MRG450□100X20CS□□□
	22	8 x 50	0.24	230	MRG450□220F50CS□□□
	27	16 x 25	0.24	267	MRG450□270J25CS□□□
	33	16 x 31.5	0.24	319	MRG450□330J32CS□□□
	47	10 x 50	0.24	334	MRG450□470G50CS□□□
		18 x 25	0.24	368	MRG450□470K25CS□□□
	68	12.5 x 42.5	0.24	476	MRG450□680X43CS□□□
		18 x 31.5	0.24	500	MRG450□680K32CS□□□
	82	12.5 x 50	0.24	473	MRG450□820X50CS□□□
		18 x 31.5	0.24	560	MRG450□820K32CS□□□
	100	12.5 x 60	0.24	569	MRG450□101X60CS□□□
		18 x 35.5	0.24	720	MRG450□101K36CS□□□
	120	18 x 40	0.24	740	MRG450□121K40CS□□□
150	18 x 45	0.24	753	MRG450□151K45CS□□□	
	20 x 40	0.24	757	MRG450□151L40CS□□□	
180	22 x 50	0.24	910	MRG450□181M50CS□□□	
500	6.8	10 x 20	0.24	100	MRG500□6R8G20CS□□□
	10	12.5 x 20	0.24	135	MRG500□100X20CS□□□
	15	12.5 x 25	0.24	182	MRG500□150X25CS□□□
	22	12.5 x 30	0.24	238	MRG500□220X30CS□□□
	27	10 x 50	0.24	253	MRG500□270G50CS□□□
	33	18 x 25	0.24	308	MRG500□330K25CS□□□
		16 x 31.5	0.24	315	MRG500□330J32CS□□□
	39	12.5 x 50	0.24	358	MRG500□390X50CS□□□
	47	18 x 31.5	0.24	393	MRG500□470K32CS□□□
	56	12.5 x 60	0.24	440	MRG500□560X60CS□□□
	68	18 x 35.5	0.24	489	MRG500□680K36CS□□□
	82	18 x 40	0.24	544	MRG500□820K40CS□□□
	100	18 x 45	0.24	620	MRG500□101K45CS□□□
		20 x 40	0.24	618	MRG500□101L40CS□□□
	120	22 x 45	0.24	702	MRG500□121M45CS□□□
150	22 x 50	0.24	827	MRG500□151M50CS□□□	

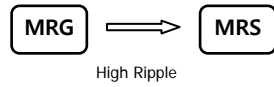
■ Rated ripple current multipliers

Frequency (Hz)	120	1K	10K	50K	100K
Factor	1.00	1.25	1.50	1.60	1.75

MRS series

- Long Life
- High Ripple
- RoHS Compliant

- 105°C 5,000Hrs assured.
- Long life, High ripple
- For SMPS, IP-Board, Adaptor
- RoHS compliant
- Halogen-free capacitors are also available.

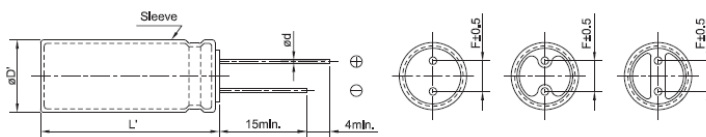


Specifications

Item	Characteristics													
Rated Voltage Range	160 ~ 400 Vdc	450 ~ 500 Vdc												
Operating Temperature Range	-40 ~ +105°C	-25 ~ +105°C												
Capacitance Tolerance	±20% (M) (at 20°C, 120Hz)													
Leakage Current	I=0.01CV+40(µA) at CV ≤ 1,000, I=0.03CV+100(µA) at CV > 1,000 (at 20°C, 1min) I=0.03CV+15(µA) at CV ≤ 1,000, I=0.02CV+25(µA) at CV > 1,000 (at 20°C, 5min) Where, I:Max. Leakage current(µA), C:Nominal capacitance(µF), V:Rated voltage(Vdc)													
Dissipation Factor(Tanδ)	<table border="1"> <tr> <td>Rated voltage (Vdc)</td> <td>160 ~ 250</td> <td>350 ~ 500</td> </tr> <tr> <td>Tanδ (max.)</td> <td>0.20</td> <td>0.24</td> </tr> </table> (at 20°C, 120Hz)		Rated voltage (Vdc)	160 ~ 250	350 ~ 500	Tanδ (max.)	0.20	0.24						
Rated voltage (Vdc)	160 ~ 250	350 ~ 500												
Tanδ (max.)	0.20	0.24												
Temperature characteristics (Max,impedance ratio)	<table border="1"> <tr> <td>Rated voltage (Vdc)</td> <td>160 ~ 250</td> <td>350 ~ 400</td> <td>450 ~ 500</td> </tr> <tr> <td>Z(-25°C)/Z(20°C)</td> <td>3</td> <td>5</td> <td>6</td> </tr> <tr> <td>Z(-40°C)/Z(20°C)</td> <td>6</td> <td>6</td> <td>-</td> </tr> </table> (at 120Hz)		Rated voltage (Vdc)	160 ~ 250	350 ~ 400	450 ~ 500	Z(-25°C)/Z(20°C)	3	5	6	Z(-40°C)/Z(20°C)	6	6	-
Rated voltage (Vdc)	160 ~ 250	350 ~ 400	450 ~ 500											
Z(-25°C)/Z(20°C)	3	5	6											
Z(-40°C)/Z(20°C)	6	6	-											
Load life	The following specifications shall be satisfied when the capacitors are restored to 20°C after the rated voltage is applied for specified life times at 105°C5,000hrs. Capacitance change ≤±20%of the initial value Tan δ ≤200% of the initial specified value Leakage current ≤The initial specified value													
Shelf life	The following specifications shall be satisfied when the capacitors are restored to 20°C after exposing them for 1,000 hours at 105°C without voltage applied. The rated voltage shall be applied to the capacitors for a minimum of 30 minutes at least 24 hours and not more than 48 hours before the measurements. Capacitance change ≤±20% of the initial value Tanδ ≤200% of the initial specified value Leakage current ≤500%The initial specified value													

Dimensions

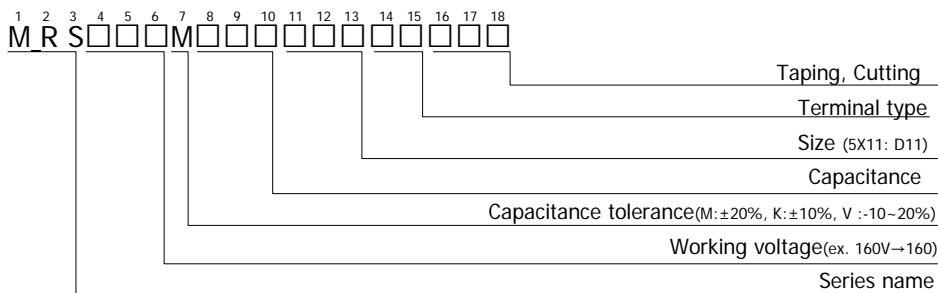
Unit(mm)



ØD	8	10	12.5	16	18	20	22
Ød	0.5	0.6	0.6	0.8	0.8	0.8	0.8
F	3.5	5.0	5.0	7.5	7.5	7.5	10.0
ØD'	ØD+0.5 max.						
L'	L+1.5 max		L+2.0 max				

- Printed silver color letter on PET dark green sleeve

Code numbering system



Ø8	F
Ø10	G
Ø12.5	X
Ø16	J
Ø18	K
Ø20	L
Ø22	M



MRS series

■ Standard Ratings Note1) Ripple current = mA rms/105°C, 120Hz

WV (Vdc)	Cap (uF)	Size ØxL (mm)	Tan δ	Ripple ¹⁾	Code No
160	33	10 x 20	0.20	236	MRS160□220G20CS□□□
	47	12.5 x 20	0.20	340	MRS160□470X20CS□□□
	68	12.5 x 25	0.20	436	MRS160□680X25CS□□□
	100	12.5 x 30	0.20	554	MRS160□101J30CS□□□
	150	16 x 25	0.20	738	MRS160□151J25CS□□□
	220	16 x 31.5	0.20	920	MRS160□221J32CS□□□
330	18 x 31.5	0.20	1,210	MRS160□331K32CS□□□	
200	22	8 x 20	0.20	155	MRS200□220F20CS□□□
	33	10 x 20	0.20	236	MRS200□330G20CS□□□
	47	12.5 x 20	0.20	340	MRS200□470X20CS□□□
	68	12.5 x 25	0.20	440	MRS200□680X25CS□□□
	100	12.5 x 30	0.20	550	MRS200□101X30CS□□□
	150	16 x 25	0.20	736	MRS200□151J25CS□□□
220	18 x 31.5	0.20	985	MRS200□221K32CS□□□	
250	10	8 x 15	0.20	96	MRS250□100F15CS□□□
		10 x 12.5	0.20	105	MRS250□100G13CS□□□
	22	10 x 16	0.20	165	MRS250□220G16CS□□□
	33	12.5 x 20	0.20	252	MRS250□330X20CS□□□
	47	12.5 x 25	0.20	376	MRS250□470X25CS□□□
	68	10 x 40	0.20	465	MRS250□680G40CS□□□
		12.5 x 30	0.20	463	MRS250□680X30CS□□□
	100	10 x 50	0.20	585	MRS250□101G50CS□□□
		16 x 25	0.20	591	MRS250□101J25CS□□□
	150	18 x 25	0.20	720	MRS250□151K25CS□□□
	180	12.5 x 50	0.20	860	MRS250□181X50CS□□□
		18 x 31.5	0.20	813	MRS250□181K32CS□□□
220	18 x 35.5	0.20	925	MRS250□221K36CS□□□	
350	10	8 x 20	0.24	120	MRS350□100F20CS□□□
		10 x 16	0.24	125	MRS350□100G16CS□□□
	22	12.5 x 20	0.24	230	MRS350□220X20CS□□□
	33	12.5 x 25	0.24	262	MRS350□330X25CS□□□
	47	12.5 x 30	0.24	380	MRS350□470X30CS□□□
	68	16 x 25	0.24	510	MRS350□680J25CS□□□
	100	18 x 31.5	0.24	745	MRS350□101K32CS□□□
	150	18 x 35.5	0.24	945	MRS350□151K36CS□□□
180	18 x 40	0.24	1,048	MRS350□181K40CS□□□	
400	6.8	8 x 15	0.24	90	MRS400□6R8F15CS□□□
	8.2	8 x 20	0.24	105	MRS400□8R2F20CS□□□
	10	10 x 16	0.24	125	MRS400□100G16CS□□□
		10 x 25	0.24	150	MRS400□150G25CS□□□
	15	12.5 x 16	0.24	142	MRS400□150X16CS□□□
		10 x 25	0.24	200	MRS400□220G25CS□□□
	27	12.5 x 20	0.24	250	MRS400□270X20CS□□□
	33	12.5 x 25	0.24	295	MRS400□330X25CS□□□
		16 x 20	0.24	305	MRS400□330J20CS□□□
	47	10 x 45	0.24	354	MRS400□470G45CS□□□
		12.5 x 35	0.24	375	MRS400□470X35CS□□□
	68	16 x 25	0.24	436	MRS400□470J25CS□□□
		12.5 x 40	0.24	475	MRS400□680X40CS□□□
	82	18 x 25	0.24	470	MRS400□680K25CS□□□
		18 x 31.5	0.24	700	MRS400□820K32CS□□□
	100	18 x 35.5	0.24	795	MRS400□101K36CS□□□
	120	18 x 40	0.24	912	MRS400□121K40CS□□□
	150	18 x 40	0.24	1,020	MRS400□151K40CS□□□
180	20 x 40	0.24	1,080	MRS400□181L40CS□□□	
220	20 x 45	0.24	1,200	MRS400□221L45CS□□□	

WV (Vdc)	Cap (uF)	Size ØxL (mm)	Tan δ	Ripple ¹⁾	Code No
450	4.7	8 x 20	0.24	79	MRS450□4R7F20CS□□□
	6.8	10 x 16	0.24	100	MRS450□6R8G16CS□□□
	8.2	10 x 16	0.24	122	MRS450□8R2G16CS□□□
	10	10 x 20	0.24	135	MRS450□100G20CS□□□
	15	10 x 25	0.24	185	MRS450□150G25CS□□□
	22	10 x 33	0.24	215	MRS450□220G33CS□□□
	27	12.5 x 25	0.24	260	MRS450□270X25CS□□□
		12.5 x 30	0.24	334	MRS450□330X30CS□□□
	47	16 x 25	0.24	340	MRS450□330J25CS□□□
		10 x 50	0.24	400	MRS450□470G50CS□□□
	68	12.5 x 40	0.24	405	MRS450□470X40CS□□□
		16 x 25	0.24	368	MRS450□470J25CS□□□
82	18 x 25	0.24	500	MRS450□680K25CS□□□	
	12.5 x 50	0.24	670	MRS450□820X50CS□□□	
100	18 x 31.5	0.24	650	MRS450□820K32CS□□□	
	12.5 x 60	0.24	750	MRS450□101X60CS□□□	
120	18 x 35.5	0.24	700	MRS450□101K36CS□□□	
	18 x 40	0.24	800	MRS450□121K40CS□□□	
150	18 x 45	0.24	920	MRS450□151K45CS□□□	
	20 x 40	0.24	930	MRS450□151L40CS□□□	
180	22 x 50	0.24	1,100	MRS450□181M50CS□□□	
500	27	10 x 50	0.24	305	MRS500□270G50CS□□□
	33	12.5 x 45	0.24	365	MRS500□330X45CS□□□
	39	12.5 x 50	0.24	425	MRS500□390X50CS□□□
	47	18 x 31.5	0.24	468	MRS500□470K32CS□□□
	56	12.5 x 60	0.24	515	MRS500□560X60CS□□□
	68	18 x 35.5	0.24	585	MRS500□680K36CS□□□
	82	18 x 40	0.24	653	MRS500□820K40CS□□□
		18 x 45	0.24	750	MRS500□101K45CS□□□
100	20 x 40	0.24	800	MRS500□101L40CS□□□	
	22 x 45	0.24	900	MRS500□121M45CS□□□	
150	22 x 50	0.24	980	MRS500□151M50CS□□□	

■ Rated ripple current multipliers

Frequency (Hz)	120	1K	10K	50K	100K
Factor	1.00	1.25	1.50	1.75	2.00