

Ød ±0.05	p = 10	p > 10	p = 37.5
	0.6	0.8	1.0

All dimensions are in mm.

**PRODUCT CODE SYSTEM**

The part number, comprising 14 digits, is formed as follows:



- Digit 1 to 3 Series code.
- Digit 4 d.c. rated voltage:  
D = 63V E = 100V G = 160V I = 250V  
M = 400V P = 630V Q = 1000V
- Digit 5 Pitch:  
F = 10mm; I = 15mm; N = 22.5mm; R = 27.5mm;  
W = 37.5mm
- Digit 6 to 9 Digits 7 - 8 - 9 indicate the first three digits of Capacitance value and the 6th digit indicates the number of zeros that must be added to obtain the Rated Capacitance in pF.
- Digit 10 to 11 Mechanical version and/or packaging (table 1)
- Digit 12 Identifies the dimensions and electrical characteristics.
- Digit 13 Internal use
- Digit 14 Capacitance tolerance:  
J = 5%; K = 10%; M = 20%.

Table 1 (for more detailed information, please refer to page 14)

Standard packaging style	Lead length (mm)	Taping style			Ordering code (Digit 10 to 11)
		P <sub>2</sub> (mm)	Fig. (No.)	Pitch (mm)	
AMMO-PACK		12.70	1	10.0/15.0	DQ
AMMO-PACK		19.05	2	22.5	DQ
REEL Ø 355mm		12.70	1	10.0/15.0	GY
REEL Ø 500mm		12.70	1	10.0/15.0	CK
REEL Ø 500mm		19.05	2	22.5/27.5	CK
Loose, short leads	4 <sup>+2</sup>				AA
Loose, long leads (p < 10mm)	17 <sup>+1/-2</sup>				Z3
Loose, long leads (p ≥ 15mm)	30 <sup>+5</sup> 25 <sup>+2/-1</sup>				40 50

Note: Ammo-pack is the preferred packaging for taped version.

**METALLIZED POLYESTER FILM CAPACITOR  
D.C. MULTIPURPOSE APPLICATIONS**

**Typical applications:** blocking, coupling, decoupling, by-passing, interference suppression in low voltage applications (i.e.: AUTOMOTIVE).

PRODUCT CODE: R60

**Note:** Special version, in compliance with DIN 44122 is available upon request.

**Construction:**

- **STACKED technology for pitch 10mm**  
(Rated Voltage from 63 to 630Vdc)
- **WOUND technology from pitch 10 to 27.5mm**  
(Rated Voltage from 63 to 1000Vdc)

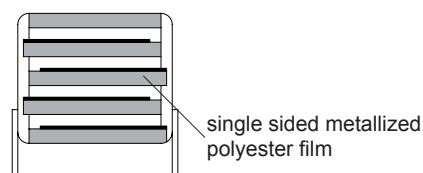
Pitch (mm)	Box thickness (B) (mm)	Maximum dimensions (mm)		
		B max	H max	L max
10.0	All	B + 0.2	H + 0.1	L + 0.2
15.0	<7.5	B + 0.2	H + 0.1	L + 0.3
15.0	≥7.5	B + 0.2	H + 0.1	L + 0.5
22.5	All	B + 0.2	H + 0.1	L + 0.3
27.5	All	B + 0.2	H + 0.1	L + 0.3
37.5	All	B + 0.3	H + 0.1	L + 0.3

**GENERAL TECHNICAL DATA**

- Dielectric:** polyester film (polyethylene terephthalate).
- Plates:** aluminium layer deposited by evaporation under vacuum.
- Winding:** non-inductive type.
- Leads:** tinned wire.
- Protection:** plastic case, thermosetting resin filled.  
Box material is solvent resistant and flame retardant according to UL94 V0.
- Marking:** Manufacturer's logo, capacitance, tolerance, D.C. rated voltage.
- Climatic category:** 55/105/56 IEC 60068-1
- Operating temperature range:** -55 to +105°C  
For stacked technology an upper operating temperature of +125°C is allowed for a max. operating time of 1000h.

**Related documents:** IEC 60384-2

**Winding scheme**



**METALLIZED POLYESTER FILM CAPACITOR  
D.C. MULTIPURPOSE APPLICATIONS**

PRODUCT CODE: R60

**STACKED VERSION**

Rated Cap.	63Vdc/40Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
1.0 μF	4.0	9.0	13.0	10.0	50	6.3 E3	R60DF4100--6--
1.5 μF	5.0	11.0	13.0	10.0	50	6.3 E3	R60DF4150--6--
2.2 μF	5.0	11.0	13.0	10.0	50	6.3 E3	R60DF4220--6--
3.3 μF	6.0	12.0	13.0	10.0	50	6.3 E3	R60DF4330--6--

Rated Cap.	100Vdc/63Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.33 μF	4.0	9.0	13.0	10.0	75	15 E3	R60EF3330--6--
0.47 μF	4.0	9.0	13.0	10.0	75	15 E3	R60EF3470--6--
0.68 μF	4.0	9.0	13.0	10.0	75	15 E3	R60EF3680--6--
1.0 μF	5.0	11.0	13.0	10.0	75	15 E3	R60EF4100--6--
1.5 μF	5.0	11.0	13.0	10.0	75	15 E3	R60EF4150--6--

Rated Cap.	160Vdc/90Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.22 μF	4.0	9.0	13.0	10.0	100	32 E3	R60GF3220--6--
0.33 μF	4.0	9.0	13.0	10.0	100	32 E3	R60GF3330--6--
0.47 μF	5.0	11.0	13.0	10.0	100	32 E3	R60GF3470--6--
0.68 μF	6.0	12.0	13.0	10.0	100	32 E3	R60GF3680--6--

Mechanical version and packaging (Table1) \_\_\_\_\_  
 Internal use \_\_\_\_\_  
 Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

Rated Cap.	250Vdc/160Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.10 μF	4.0	9.0	13.0	10.0	150	75 E3	R60IF3100--6--
0.15 μF	4.0	9.0	13.0	10.0	150	75 E3	R60IF3150--6--
0.22 μF	5.0	11.0	13.0	10.0	150	75 E3	R60IF3220--6--
0.33 μF	5.0	11.0	13.0	10.0	150	75 E3	R60IF3330--6--
0.47 μF	6.0	12.0	13.0	10.0	150	75 E3	R60IF3470--6--

Rated Cap.	400Vdc/200Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.033 μF	4.0	9.0	13.0	10.0	175	140 E3	R60MF2330--6--
0.047 μF	4.0	9.0	13.0	10.0	175	140 E3	R60MF2470--6--
0.068 μF	4.0	9.0	13.0	10.0	175	140 E3	R60MF2680--6--
0.10 μF	5.0	11.0	13.0	10.0	175	140 E3	R60MF3100--6--
0.15 μF	6.0	12.0	13.0	10.0	175	140 E3	R60MF3150--6--

Rated Cap.	630Vdc/220*Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.010 μF	4.0	9.0	13.0	10.0	200	250 E3	R60PF2100--6--
0.015 μF	4.0	9.0	13.0	10.0	200	250 E3	R60PF2150--6--
0.022 μF	4.0	9.0	13.0	10.0	200	250 E3	R60PF2220--6--
0.033 μF	5.0	11.0	13.0	10.0	200	250 E3	R60PF2330--6--
0.047 μF	5.0	11.0	13.0	10.0	200	250 E3	R60PF2470--6--

Mechanical version and packaging (Table1) \_\_\_\_\_  
 Internal use \_\_\_\_\_  
 Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

All dimensions are in mm.

Note: If the working voltage (V) is lower than the rated voltage (V<sub>R</sub>), the capacitor may work at higher dv/dt. In this case the maximum value allowed is obtained multiplying the above value (see table dv/dt) with the ratio V<sub>R</sub>/V.  
 The pulse characteristic K<sub>0</sub> depends on the voltage wave-form and in any case it cannot overcome the value given in the above table.

\*Not suitable for across-the-line applications. Please refer to Interference Suppression Capacitors (page 151).

METALLIZED POLYESTER FILM CAPACITOR  
D.C. MULTIPURPOSE APPLICATIONS

PRODUCT CODE: R60

WOUND VERSION

Rated Cap.	63Vdc/40Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.68 μF	5.0	11.0	18.0	15.0	2.5	0.32 E3	R60DI 3680--3--
1.0 μF	5.0	11.0	18.0	15.0	2.5	0.32 E3	R60DI 4100--3--
1.5 μF	5.0	11.0	18.0	15.0	2.5	0.32 E3	R60DI 4150--3--
2.2 μF	6.0	12.0	18.0	15.0	2.5	0.32 E3	R60DI 4220--3--
3.3 μF	7.5	13.5	18.0	15.0	2.5	0.32 E3	R60DI 4330--3--
3.3 μF	9.0	12.5	18.0	15.0	2.5	0.32 E3	R60DI 4330--L--
4.7 μF	8.5	14.5	18.0	15.0	2.5	0.32 E3	R60DI 4470--3--
4.7 μF	13.0	12.0	18.0	15.0	2.5	0.32 E3	R60DI 4470--L--
6.8 μF	10.0	16.0	18.0	15.0	2.5	0.32 E3	R60DI 4680--3--
3.3 μF	6.0	15.0	26.5	22.5	1.5	0.19 E3	R60DN4330--3--
4.7 μF	7.0	16.0	26.5	22.5	1.5	0.19 E3	R60DN4470--3--
6.8 μF	7.0	16.0	26.5	22.5	1.5	0.19 E3	R60DN4680--3--
10.0 μF	8.5	17.0	26.5	22.5	1.5	0.19 E3	R60DN5100--3--
15.0 μF	11.0	20.0	26.5	22.5	1.5	0.19 E3	R60DN5150--3--
10.0 μF	9.0	17.0	32.0	27.5	1.0	0.13 E3	R60DR5100--3--
15.0 μF	9.0	17.0	32.0	27.5	1.0	0.13 E3	R60DR5150--4--
22.0 μF	11.0	20.0	32.0	27.5	1.0	0.13 E3	R60DR5220--4--
33.0 μF	13.0	22.0	32.0	27.5	1.0	0.13 E3	R60DR5330--4--
47.0 μF	14.0	28.0	32.0	27.5	1.0	0.13 E3	R60DR5470--4--
68.0 μF	18.0	33.0	32.0	27.5	1.0	0.13 E3	R60DR5680--4--
100.0 μF	22.0	37.0	32.0	27.5	1.0	0.13 E3	R60DR6100--0--
22.0 μF	11.0	22.0	41.5	37.5	0.8	0.10 E3	R60DW5220--3--
33.0 μF	11.0	22.0	41.5	37.5	0.8	0.10 E3	R60DW5330--4--
47.0 μF	13.0	24.0	41.5	37.5	0.8	0.10 E3	R60DW5470--4--
68.0 μF	19.0	32.0	41.5	37.5	0.8	0.10 E3	R60DW5680--3--
100.0 μF	19.0	32.0	41.5	37.5	0.8	0.10 E3	R60DW6100--4--
150.0 μF	20.0	40.0	41.5	37.5	0.8	0.10 E3	R60DW6150--0--
220.0 μF	24.0	44.0	41.5	37.5	0.8	0.10 E3	R60DW6220--0--

Rated Cap.	160Vdc/90Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.33 μF	5.0	11.0	18.0	15.0	9.0	2.90 E3	R60GI 3330--3--
0.47 μF	5.0	11.0	18.0	15.0	9.0	2.90 E3	R60GI 3470--3--
0.68 μF	5.0	11.0	18.0	15.0	9.0	2.90 E3	R60GI 3680--3--
1.0 μF	7.5	13.5	18.0	15.0	9.0	2.90 E3	R60GI 4100--3--
1.5 μF	8.5	14.5	18.0	15.0	9.0	2.90 E3	R60GI 4150--3--
1.5 μF	9.0	12.5	18.0	15.0	9.0	2.90 E3	R60GI 4150--L--
2.2 μF	10.0	16.0	18.0	15.0	9.0	2.90 E3	R60GI 4220--3--
2.2 μF	13.0	12.0	18.0	15.0	9.0	2.90 E3	R60GI 4220--L--
3.3 μF	11.0	19.0	18.0	15.0	9.0	2.90 E3	R60GI 4330--3--
1.5 μF	6.0	15.0	26.5	22.5	5.5	1.70 E3	R60GN4150--3--
2.2 μF	7.0	16.0	26.5	22.5	5.5	1.70 E3	R60GN4220--3--
3.3 μF	8.5	17.0	26.5	22.5	5.5	1.70 E3	R60GN4330--3--
4.7 μF	11.0	20.0	26.5	22.5	5.5	1.70 E3	R60GN4470--3--
6.8 μF	13.0	22.0	26.5	22.5	5.5	1.70 E3	R60GN4680--3--
3.3 μF	9.0	17.0	32.0	27.5	3.0	0.96 E3	R60GR4330--3--
4.7 μF	9.0	17.0	32.0	27.5	3.0	0.96 E3	R60GR4470--3--
6.8 μF	9.0	17.0	32.0	27.5	3.0	0.96 E3	R60GR4680--4--
10.0 μF	9.0	17.0	32.0	27.5	3.0	0.96 E3	R60GR5100--4--
15.0 μF	11.0	20.0	32.0	27.5	3.0	0.96 E3	R60GR5150--4--
22.0 μF	13.0	22.0	32.0	27.5	3.0	0.96 E3	R60GR5220--4--
33.0 μF	14.0	28.0	32.0	27.5	3.0	0.96 E3	R60GR5330--0--
47.0 μF	18.0	33.0	32.0	27.5	3.0	0.96 E3	R60GR5470--0--
68.0 μF	22.0	37.0	32.0	27.5	3.0	0.96 E3	R60GR5680--0--
10.0 μF	11.0	22.0	41.5	37.5	2.0	0.64 E3	R60GW5100--3--
15.0 μF	11.0	22.0	41.5	37.5	2.0	0.64 E3	R60GW5150--4--
22.0 μF	11.0	22.0	41.5	37.5	2.0	0.64 E3	R60GW5220--4--
33.0 μF	13.0	24.0	41.5	37.5	2.0	0.64 E3	R60GW5330--4--
47.0 μF	16.0	28.5	41.5	37.5	2.0	0.64 E3	R60GW5470--4--
68.0 μF	19.0	32.0	41.5	37.5	2.0	0.64 E3	R60GW5680--0--
100.0 μF	20.0	40.0	41.5	37.5	2.0	0.64 E3	R60GW6100--0--
150.0 μF	30.0	45.0	41.5	37.5	2.0	0.64 E3	R60GW6150--0--

Rated Cap.	100Vdc/63Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.33 μF	5.0	11.0	18.0	15.0	3.0	0.6 E3	R60EI 3330--3--
0.47 μF	5.0	11.0	18.0	15.0	3.0	0.6 E3	R60EI 3470--3--
0.68 μF	5.0	11.0	18.0	15.0	3.0	0.6 E3	R60EI 3680--3--
1.0 μF	5.0	11.0	18.0	15.0	3.0	0.6 E3	R60EI 4100--3--
1.5 μF	7.5	13.5	18.0	15.0	3.0	0.6 E3	R60EI 4150--3--
2.2 μF	8.5	14.5	18.0	15.0	3.0	0.6 E3	R60EI 4220--3--
2.2 μF	9.0	12.5	18.0	15.0	3.0	0.6 E3	R60EI 4220--L--
3.3 μF	10.0	16.0	18.0	15.0	3.0	0.6 E3	R60EI 4330--3--
3.3 μF	13.0	12.0	18.0	15.0	3.0	0.6 E3	R60EI 4330--L--
4.7 μF	11.0	19.0	18.0	15.0	3.0	0.6 E3	R60EI 4470--3--
1.5 μF	6.0	15.0	26.5	22.5	2.0	0.4 E3	R60EN4150--3--
2.2 μF	6.0	15.0	26.5	22.5	2.0	0.4 E3	R60EN4220--3--
3.3 μF	7.0	16.0	26.5	22.5	2.0	0.4 E3	R60EN4330--3--
4.7 μF	8.5	17.0	26.5	22.5	2.0	0.4 E3	R60EN4470--3--
6.8 μF	10.0	18.5	26.5	22.5	2.0	0.4 E3	R60EN4680--3--
10.0 μF	13.0	22.0	26.5	22.5	2.0	0.4 E3	R60EN5100--3--
4.7 μF	9.0	17.0	32.0	27.5	1.5	0.3 E3	R60ER4470--3--
6.8 μF	9.0	17.0	32.0	27.5	1.5	0.3 E3	R60ER4680--3--
10.0 μF	9.0	17.0	32.0	27.5	1.5	0.3 E3	R60ER5100--4--
15.0 μF	11.0	20.0	32.0	27.5	1.5	0.3 E3	R60ER5150--4--
22.0 μF	13.0	22.0	32.0	27.5	1.5	0.3 E3	R60ER5220--4--
33.0 μF	14.0	28.0	32.0	27.5	1.5	0.3 E3	R60ER5330--4--
47.0 μF	18.0	33.0	32.0	27.5	1.5	0.3 E3	R60ER5470--4--
68.0 μF	22.0	37.0	32.0	27.5	1.5	0.3 E3	R60ER5680--0--
15.0 μF	11.0	22.0	41.5	37.5	1.0	0.2 E3	R60EW5150--4--
22.0 μF	11.0	22.0	41.5	37.5	1.0	0.2 E3	R60EW5220--4--
33.0 μF	13.0	24.0	41.5	37.5	1.0	0.2 E3	R60EW5330--4--
47.0 μF	16.0	28.5	41.5	37.5	1.0	0.2 E3	R60EW5470--4--
68.0 μF	19.0	32.0	41.5	37.5	1.0	0.2 E3	R60EW5680--5--
100.0 μF	20.0	40.0	41.5	37.5	1.0	0.2 E3	R60EW6100--0--
150.0 μF	24.0	44.0	41.5	37.5	1.0	0.2 E3	R60EW6150--0--

Rated Cap.	250Vdc/160Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.10 μF	5.0	11.0	18.0	15.0	12	6.0 E3	R60II 3100--3--
0.15 μF	5.0	11.0	18.0	15.0	12	6.0 E3	R60II 3150--3--
0.22 μF	5.0	11.0	18.0	15.0	12	6.0 E3	R60II 3220--3--
0.33 μF	5.0	11.0	18.0	15.0	12	6.0 E3	R60II 3330--3--
0.47 μF	6.0	12.0	18.0	15.0	12	6.0 E3	R60II 3470--3--
0.68 μF	7.5	13.5	18.0	15.0	12	6.0 E3	R60II 3680--3--
0.68 μF	9.0	12.5	18.0	15.0	12	6.0 E3	R60II 3680--L--
1.0 μF	8.5	14.5	18.0	15.0	12	6.0 E3	R60II 4100--3--
1.0 μF	13.0	12.0	18.0	15.0	12	6.0 E3	R60II 4100--L--
1.5 μF	10.0	16.0	18.0	15.0	12	6.0 E3	R60II 4150--3--
0.47 μF	6.0	15.0	26.5	22.5	8	4.0 E3	R60IN 3470--3--
0.68 μF	6.0	15.0	26.5	22.5	8	4.0 E3	R60IN 3680--3--
1.0 μF	6.0	15.0	26.5	22.5	8	4.0 E3	R60IN 4100--3--
1.5 μF	7.0	16.0	26.5	22.5	8	4.0 E3	R60IN 4150--3--
2.2 μF	10.0	18.5	26.5	22.5	8	4.0 E3	R60IN 4220--3--
3.3 μF	11.0	20.0	26.5	22.5	8	4.0 E3	R60IN 4330--3--
1.5 μF	9.0	17.0	32.0	27.5	5	2.5 E3	R60IR 4150--3--
2.2 μF	9.0	17.0	32.0	27.5	5	2.5 E3	R60IR 4220--3--
3.3 μF	9.0	17.0	32.0	27.5	5	2.5 E3	R60IR 4330--4--
4.7 μF	9.0	17.0	32.0	27.5	5	2.5 E3	R60IR 4470--4--
6.8 μF	11.0	20.0	32.0	27.5	5	2.5 E3	R60IR 4680--4--
10.0 μF	13.0	22.0	32.0	27.5	5	2.5 E3	R60IR 5100--4--
15.0 μF	14.0	28.0	32.0	27.5	5	2.5 E3	R60IR 5150--4--
22.0 μF	18.0	33.0	32.0	27.5	5	2.5 E3	R60IR 5220--0--
33.0 μF	22.0	37.0	32.0	27.5	5	2.5 E3	R60IR 5330--0--
4.7 μF	11.0	22.0	41.5	37.5	4	2.0 E3	R60IW 4470--3--
6.8 μF	11.0	22.0	41.5	37.5	4	2.0 E3	R60IW 4680--4--
10.0 μF	11.0	22.0	41.5	37.5	4	2.0 E3	R60IW 5100--4--
15.0 μF	13.0	24.0	41.5	37.5	4	2.0 E3	R60IW 5150--4--
22.0 μF	16.0	28.5	41.5	37.5	4	2.0 E3	R60IW 5220--4--
33.0 μF	19.0	32.0	41.5	37.5	4	2.0 E3	R60IW 5330--4--
47.0 μF	20.0	40.0	41.5	37.5	4	2.0 E3	R60IW 5470--0--
68.0 μF	24.0	44.0	41.5	37.5	4	2.0 E3	R60IW 5680--0--

Mechanical version and packaging (Table1) \_\_\_\_\_  
Internal use \_\_\_\_\_  
Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

Mechanical version and packaging (Table1) \_\_\_\_\_  
Internal use \_\_\_\_\_  
Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

All dimensions are in mm.

Note: If the working voltage (V) is lower than the rated voltage (V<sub>R</sub>), the capacitor may work at higher dv/dt. In this case the maximum value allowed is obtained multiplying the above value (see table dv/dt) with the ratio V<sub>R</sub>/V.  
The pulse characteristic K<sub>0</sub> depends on the voltage wave-form and in any case it cannot overcome the value given in the above table.

**METALLIZED POLYESTER FILM CAPACITOR  
D.C. MULTIPURPOSE APPLICATIONS**

PRODUCT CODE: R60

**WOUND VERSION**

Rated Cap.	400Vdc/200Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
0.015 μF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2150--3--
0.022 μF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2220--3--
0.033 μF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2330--3--
0.047 μF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2470--3--
0.068 μF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2680--4--
0.068 μF	5.0	11.0	13.0	10.0	30.0	24.0 E3	R60MF2680--3--
0.10 μF	5.0	11.0	13.0	10.0	30.0	24.0 E3	R60MF3100--4--
0.10 μF	6.0	12.0	13.0	10.0	30.0	24.0 E3	R60MF3100--3--
0.15 μF	6.0	12.0	13.0	10.0	30.0	24.0 E3	R60MF3150--3--
0.022 μF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 2220--3--
0.047 μF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 2470--3--
0.068 μF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 2680--3--
0.10 μF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 3100--3--
0.15 μF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 3150--3--
0.22 μF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 3220--4--
0.22 μF	6.0	12.0	18.0	15.0	20.0	16.0 E3	R60MI 3220--3--
0.33 μF	7.5	13.5	18.0	15.0	20.0	16.0 E3	R60MI 3330--3--
0.33 μF	9.0	12.5	18.0	15.0	20.0	16.0 E3	R60MI 3330--L--
0.47 μF	7.5	13.5	18.0	15.0	20.0	16.0 E3	R60MI 3470--4--
0.47 μF	8.5	14.5	18.0	15.0	20.0	16.0 E3	R60MI 3470--3--
0.47 μF	9.0	12.5	18.0	15.0	20.0	16.0 E3	R60MI 3470--L1-
0.47 μF	13.0	12.0	18.0	15.0	20.0	16.0 E3	R60MI 3470--L--
0.68 μF	10.0	16.0	18.0	15.0	20.0	16.0 E3	R60MI 3680--4--
0.68 μF	11.0	19.0	18.0	15.0	20.0	16.0 E3	R60MI 3680--3--
0.68 μF	13.0	12.0	18.0	15.0	20.0	16.0 E3	R60MI 3680--L--
1.0 μF	11.0	19.0	18.0	15.0	20.0	16.0 E3	R60MI 4100--3--
0.22 μF	6.0	15.0	26.5	22.5	10.0	8.0 E3	R60MN3220--3--
0.33 μF	6.0	15.0	26.5	22.5	10.0	8.0 E3	R60MN3330--3--
0.47 μF	6.0	15.0	26.5	22.5	10.0	8.0 E3	R60MN3470--3--
0.68 μF	6.0	15.0	26.5	22.5	10.0	8.0 E3	R60MN3680--4--
0.68 μF	7.0	16.0	26.5	22.5	10.0	8.0 E3	R60MN3680--3--
1.0 μF	8.5	17.0	26.5	22.5	10.0	8.0 E3	R60MN4100--4--
1.0 μF	10.0	18.5	26.5	22.5	10.0	8.0 E3	R60MN4100--3--
1.5 μF	10.0	18.5	26.5	22.5	10.0	8.0 E3	R60MN4150--4--
1.5 μF	11.0	20.0	26.5	22.5	10.0	8.0 E3	R60MN4150--3--
2.2 μF	13.0	22.0	26.5	22.5	10.0	8.0 E3	R60MN4220--3--
0.68 μF	9.0	17.0	32.0	27.5	8.5	3.4 E3	R60MR3680--3--
1.0 μF	9.0	17.0	32.0	27.5	8.5	3.4 E3	R60MR4100--3--
1.5 μF	9.0	17.0	32.0	27.5	8.5	3.4 E3	R60MR4150--4--
2.2 μF	11.0	20.0	32.0	27.5	8.5	3.4 E3	R60MR4220--4--
3.3 μF	13.0	22.0	32.0	27.5	8.5	3.4 E3	R60MR4330--4--
4.7 μF	14.0	28.0	32.0	27.5	8.5	3.4 E3	R60MR4470--4--
6.8 μF	18.0	33.0	32.0	27.5	8.5	3.4 E3	R60MR4680--4--
10.0 μF	22.0	37.0	32.0	27.5	8.5	3.4 E3	R60MR5100--4--
3.3 μF	11.0	22.0	41.5	37.5	6.0	2.4 E3	R60MW4330--3--
4.7 μF	11.0	22.0	41.5	37.5	6.0	2.4 E3	R60MW4470--4--
6.8 μF	13.0	24.0	41.5	37.5	6.0	2.4 E3	R60MW4680--4--
10.0 μF	16.0	28.5	41.5	37.5	6.0	2.4 E3	R60MW5100--4--
15.0 μF	24.0	44.0	41.5	37.5	6.0	2.4 E3	R60MW5150--3--
22.0 μF	24.0	44.0	41.5	37.5	6.0	2.4 E3	R60MW5220--4--
33.0 μF	30.0	45.0	41.5	37.5	6.0	2.4 E3	R60MW5330--4--

Rated Cap.	630Vdc/220*Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
4700 pF	4.0	9.0	13.0	10.0	40	50 E3	R60PF 1470--3--
6800 pF	4.0	9.0	13.0	10.0	40	50 E3	R60PF 1680--3--
0.010 μF	4.0	9.0	13.0	10.0	40	50 E3	R60PF 2100--3--
0.015 μF	4.0	9.0	13.0	10.0	40	50 E3	R60PF 2150--3--
0.022 μF	4.0	9.0	13.0	10.0	40	50 E3	R60PF 2220--4--
0.022 μF	5.0	11.0	13.0	10.0	40	50 E3	R60PF 2220--3--
0.033 μF	5.0	11.0	13.0	10.0	40	50 E3	R60PF 2330--4--
0.033 μF	6.0	12.0	13.0	10.0	40	50 E3	R60PF 2330--3--
0.047 μF	6.0	12.0	13.0	10.0	40	50 E3	R60PF 2470--3--
0.033 μF	5.0	11.0	18.0	15.0	25	31 E3	R60PI 2330--3--
0.047 μF	5.0	11.0	18.0	15.0	25	31 E3	R60PI 2470--3--
0.068 μF	5.0	11.0	18.0	15.0	25	31 E3	R60PI 2680--4--
0.068 μF	6.0	12.0	18.0	15.0	25	31 E3	R60PI 2680--3--
0.10 μF	6.0	12.0	18.0	15.0	25	31 E3	R60PI 3100--4--
0.10 μF	7.5	13.5	18.0	15.0	25	31 E3	R60PI 3100--3--
0.10 μF	9.0	12.5	18.0	15.0	25	31 E3	R60PI 3100--L--
0.15 μF	7.5	13.5	18.0	15.0	25	31 E3	R60PI 3150--4--
0.15 μF	8.5	14.5	18.0	15.0	25	31 E3	R60PI 3150--3--
0.22 μF	8.5	14.5	18.0	15.0	25	31 E3	R60PI 3220--4--
0.22 μF	10.0	16.0	18.0	15.0	25	31 E3	R60PI 3220--3--
0.33 μF	10.0	16.0	18.0	15.0	25	31 E3	R60PI 3330--3--
0.10 μF	6.0	15.0	26.5	22.5	12	15 E3	R60PN3100--3--
0.15 μF	6.0	15.0	26.5	22.5	12	15 E3	R60PN3150--3--
0.22 μF	6.0	15.0	26.5	22.5	12	15 E3	R60PN3220--4--
0.22 μF	7.0	16.0	26.5	22.5	12	15 E3	R60PN3220--3--
0.33 μF	7.0	16.0	26.5	22.5	12	15 E3	R60PN3330--5--
0.33 μF	8.5	17.0	26.5	22.5	12	15 E3	R60PN3330--4--
0.33 μF	10.0	18.5	26.5	22.5	12	15 E3	R60PN3330--3--
0.47 μF	10.0	18.5	26.5	22.5	12	15 E3	R60PN3470--4--
0.47 μF	11.0	20.0	26.5	22.5	12	15 E3	R60PN3470--3--
0.68 μF	11.0	20.0	26.5	22.5	12	15 E3	R60PN3680--4--
0.68 μF	13.0	22.0	26.5	22.5	12	15 E3	R60PN3680--3--
0.33 μF	9.0	17.0	32.0	27.5	10	12 E3	R60PR3330--3--
0.47 μF	9.0	17.0	32.0	27.5	10	12 E3	R60PR3470--4--
0.68 μF	11.0	20.0	32.0	27.5	10	12 E3	R60PR3680--4--
1.0 μF	11.0	20.0	32.0	27.5	10	12 E3	R60PR4100--5--
1.5 μF	18.0	33.0	32.0	27.5	10	12 E3	R60PR4150--3--
2.2 μF	18.0	33.0	32.0	27.5	10	12 E3	R60PR4220--4--
3.3 μF	22.0	37.0	32.0	27.5	10	12 E3	R60PR4330--4--
4.7 μF	22.0	37.0	32.0	27.5	10	12 E3	R60PR4470--4--
1.0 μF	11.0	22.0	41.5	37.5	8	9.6 E3	R60PW4100--3--
1.5 μF	11.0	22.0	41.5	37.5	8	9.6 E3	R60PW4150--4--
2.2 μF	13.0	24.0	41.5	37.5	8	9.6 E3	R60PW4220--4--
3.3 μF	16.0	28.5	41.5	37.5	8	9.6 E3	R60PW4330--4--
4.7 μF	19.0	32.0	41.5	37.5	8	9.6 E3	R60PW4470--4--
6.8 μF	20.0	40.0	41.5	37.5	8	9.6 E3	R60PW4680--0--
10.0 μF	24.0	44.0	41.5	37.5	8	9.6 E3	R60PW5100--4--

Mechanical version and packaging (Table1) \_\_\_\_\_  
Internal use \_\_\_\_\_  
Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

Mechanical version and packaging (Table1) \_\_\_\_\_  
Internal use \_\_\_\_\_  
Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

All dimensions are in mm.

Note: If the working voltage (V) is lower than the rated voltage (V<sub>R</sub>), the capacitor may work at higher dv/dt. In this case the maximum value allowed is obtained multiplying the above value (see table dv/dt) with the ratio V<sub>R</sub>/V.  
The pulse characteristic K<sub>0</sub> depends on the voltage wave-form and in any case it cannot overcome the value given in the above table.

\* Not suitable for across-the-line applications. Please refer to Interference Suppression Capacitors (page 151).

**METALLIZED POLYESTER FILM CAPACITOR  
D.C. MULTIPURPOSE APPLICATIONS**

PRODUCT CODE: R60

**WOUND VERSION**

Rated Cap.	1000Vdc/250Vac* Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
1000 pF	4.0	9.0	13.0	10.0	60	120 E3	R60QF 1100--0--
1500 pF	4.0	9.0	13.0	10.0	60	120 E3	R60QF 1150--0--
2200 pF	4.0	9.0	13.0	10.0	60	120 E3	R60QF 1220--0--
3300 pF	4.0	9.0	13.0	10.0	60	120 E3	R60QF 1330--0--
4700 pF	5.0	11.0	13.0	10.0	60	120 E3	R60QF 1470--0--
6800 pF	6.0	12.0	13.0	10.0	60	120 E3	R60QF 1680--0--
0.010 μF	5.0	11.0	18.0	15.0	30	60 E3	R60QI 2100--0--
0.015 μF	5.0	11.0	18.0	15.0	30	60 E3	R60QI 2150--3--
0.022 μF	6.0	12.0	18.0	15.0	30	60 E3	R60QI 2220--3--
0.033 μF	7.5	13.5	18.0	15.0	30	60 E3	R60QI 2330--3--
0.033 μF	9.0	12.5	18.0	15.0	30	60 E3	R60QI 2330--L--
0.047 μF	10.0	16.0	18.0	15.0	30	60 E3	R60QI 2470--0--
0.047 μF	13.0	12.0	18.0	15.0	30	60 E3	R60QI 2470--L--
0.068 μF	11.0	19.0	18.0	15.0	30	60 E3	R60QI 2680--0--
0.033 μF	6.0	15.0	26.5	22.5	15	30 E3	R60QN2330--0--
0.047 μF	6.0	15.0	26.5	22.5	15	30 E3	R60QN2470--0--
0.068 μF	7.0	16.0	26.5	22.5	15	30 E3	R60QN2680--3--
0.10 μF	8.5	17.0	26.5	22.5	15	30 E3	R60QN3100--3--
0.15 μF	13.0	22.0	26.5	22.5	15	30 E3	R60QN3150--0--
0.15 μF	9.0	17.0	32.0	27.5	12	24 E3	R60QR3150--3--
0.22 μF	9.0	17.0	32.0	27.5	12	24 E3	R60QR3220--4--
0.33 μF	11.0	20.0	32.0	27.5	12	24 E3	R60QR3330--4--
0.47 μF	13.0	22.0	32.0	27.5	12	24 E3	R60QR3470--4--
0.68 μF	14.0	28.0	32.0	27.5	12	24 E3	R60QR3680--4--
1.00 μF	18.0	33.0	32.0	27.5	12	24 E3	R60QR4100--4--
1.50 μF	22.0	37.0	32.0	27.5	12	24 E3	R60QR4150--4--
0.47 μF	11.0	22.0	41.5	37.5	10	20 E3	R60QW3470--3--
0.68 μF	11.0	22.0	41.5	37.5	10	20 E3	R60QW3680--4--
1.00 μF	13.0	24.0	41.5	37.5	10	20 E3	R60QW4100--4--
1.50 μF	16.0	28.5	41.5	37.5	10	20 E3	R60QW4150--4--
2.20 μF	19.0	32.0	41.5	37.5	10	20 E3	R60QW4220--3--
3.30 μF	24.0	44.0	41.5	37.5	10	20 E3	R60QW4330--0--
4.70 μF	30.0	45.0	41.5	37.5	10	20 E3	R60QW4470--4--

All dimensions are in mm.

Note 1: If the working voltage (V) is lower than the rated voltage (V<sub>R</sub>), the capacitor may work at higher dv/dt. In this case the maximum value allowed is obtained multiplying the above value (see table dv/dt) with the ratio V<sub>R</sub>/V. The pulse characteristic K<sub>0</sub> depends on the voltage wave-form and in any case it cannot overcome the value given in the above table.

Note 2: Rated voltages higher than 1000Vdc are available upon request.

\* Not suitable for across-the-line applications. Please refer to Interference Suppression Capacitors (page 151).

Mechanical version and packaging (Table1) \_\_\_\_\_  
 Internal use \_\_\_\_\_  
 Tolerance: J (±5%); K (±10%); M (±20%) \_\_\_\_\_

**METALLIZED POLYESTER FILM CAPACITOR  
D.C. MULTIPURPOSE APPLICATIONS**

PRODUCT CODE: **R60**

**ELECTRICAL CHARACTERISTICS**

**Rated voltage ( $V_R$ ):** 63 Vdc - 100 Vdc - 160 Vdc - 250 Vdc  
400 Vdc - 630 Vdc - 1000 Vdc .

**Rated temperature ( $T_R$ ):** +85°C

**Temperature derated voltage:**

for temperatures between +85°C and the upper operating temperature ( +105°C for wound technology and +125°C for stacked technology) a decreasing factor of 1.25% per degree °C on the rated voltage  $V_R$  (d.c. and a.c.) has to be applied.

**Capacitance range:** 1000pF to 220 $\mu$ F

**Capacitance values:**

E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz):  
 $\pm 5\%$  (J);  $\pm 10\%$  (K);  $\pm 20\%$  (M).

**Total self-inductance (L):** (lead length ~2mm)

Pitch (mm)	10	15	22.5	27.5	37.5
L(nH) $\approx$	9	10	18	18	22

**Dissipation factor (DF):**

$\text{tg}\delta \cdot 10^{-4}$  at +25°C  $\pm 5^\circ\text{C}$

kHz	C $\leq 1\mu\text{F}$	C $> 1\mu\text{F}$
1	$\leq 100$	$\leq 100$
10	$\leq 150$	

**Insulation resistance:**

**Test conditions**

Temperature: +25°C  $\pm 5^\circ\text{C}$   
Voltage charge time: 1 min  
Voltage charge: 50 Vdc for  $V_R < 100$  Vdc  
100 Vdc for  $V_R \geq 100$  Vdc

**Performance**

**For  $V_R \leq 100$  Vdc**  
 $\geq 3750 \text{ M}\Omega$  for C  $\leq 0.33\mu\text{F}$  (50000 M $\Omega$ )\*  
 $\geq 1250 \text{ s}$  for C  $> 0.33\mu\text{F}$  (5000 s)\*

**For  $V_R > 100$  Vdc**  
 $\geq 30000 \text{ M}\Omega$  for C  $\leq 0.33\mu\text{F}$  (50000 M $\Omega$ )\*  
 $\geq 10000 \text{ s}$  for C  $> 0.33\mu\text{F}$  (17000 s)\*

\*Typical value

**Test voltage between terminations:**

1.6x $V_R$  applied for 2 s at +25°C  $\pm 5^\circ\text{C}$

**TEST METHOD AND PERFORMANCE**

**Damp heat, steady state:**

**Test conditions**

Temperature: +40°C  $\pm 2^\circ\text{C}$   
Relative humidity (RH): 93%  $\pm 2\%$   
Test duration: 56 days

**Performance**

Capacitance change  $|\Delta C/C|$ :  $\leq 5\%$   
DF change ( $\Delta \text{tg}\delta$ ):  $\leq 50 \times 10^{-4}$  at 1kHz  
Insulation resistance:  $\geq 50\%$  of initial limit.

**Endurance:**

**Test conditions**

Temperature: +105°C  $\pm 2^\circ\text{C}$   
Test duration: 2000 h  
Voltage applied: 1.25x $V_C$

**Performance**

Capacitance change  $|\Delta C/C|$ :  $\leq 5\%$   
DF change ( $\Delta \text{tg}\delta$ ):  $\leq 50 \times 10^{-4}$  at 10kHz for C $\leq 1\mu\text{F}$   
 $\leq 30 \times 10^{-4}$  at 1kHz for C $> 1\mu\text{F}$

Insulation resistance:  $\geq 50\%$  of initial limit.

**Resistance to soldering heat:**

**Test conditions**

Solder bath temperature: +260°C  $\pm 5^\circ\text{C}$   
Dipping time (with heat screen): 10 s  $\pm 1$  s

**Performance**

Capacitance change  $|\Delta C/C|$ :  $\leq 2\%$   
DF change ( $\Delta \text{tg}\delta$ ):  $\leq 50 \times 10^{-4}$  at 10kHz for C $\leq 1\mu\text{F}$   
 $\leq 30 \times 10^{-4}$  at 1kHz for C $> 1\mu\text{F}$

Insulation resistance:  $\geq$  initial limit.

**Long term stability** (after two years):

**Storage:** standard environmental conditions (see page 12).

**Performance**

Capacitance change  $|\Delta C/C|$ :  $\leq 3\%$  for C  $\leq 0.1\mu\text{F}$   
 $\leq 2\%$  for C  $> 0.1\mu\text{F}$

**RELIABILITY:**

Reference MIL HDB 217

**Application conditions:**

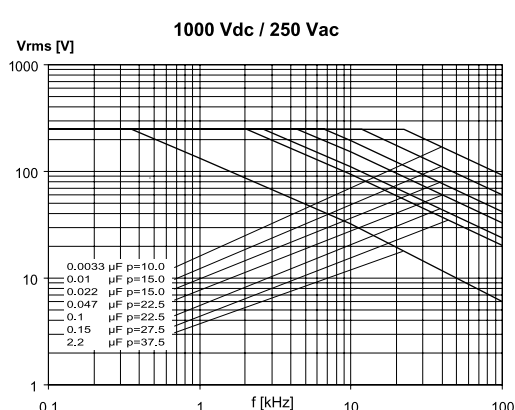
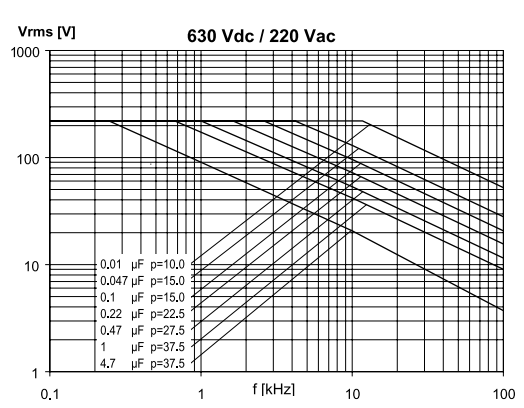
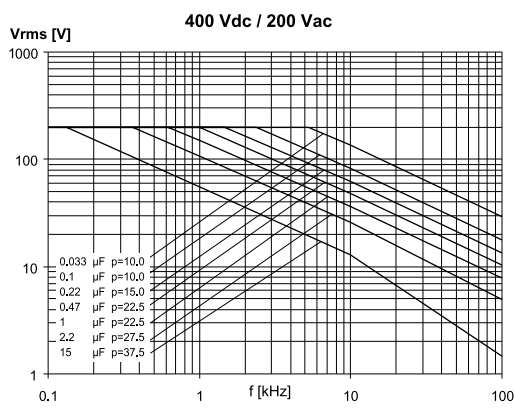
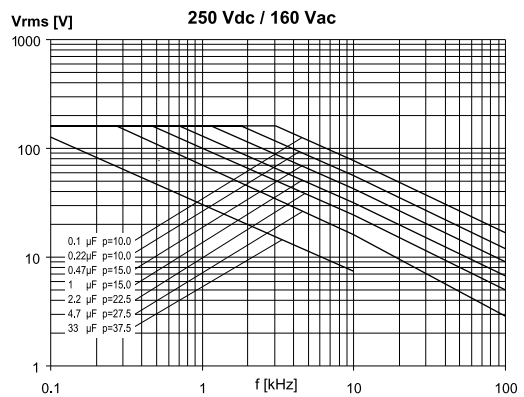
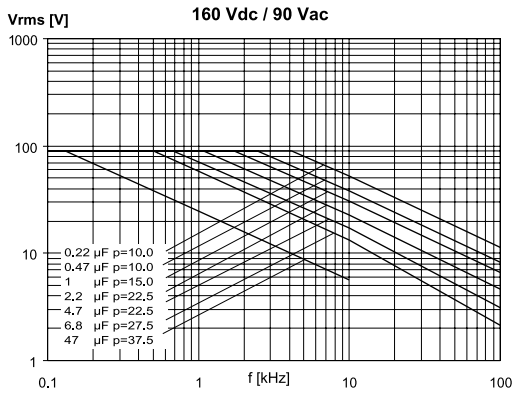
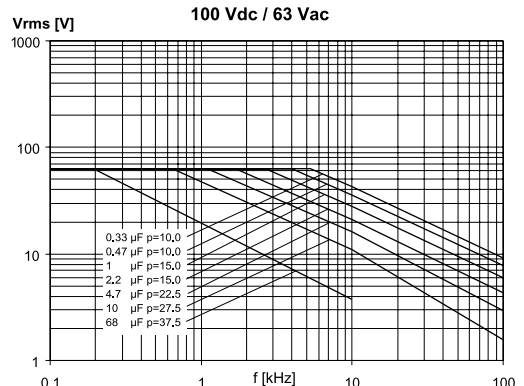
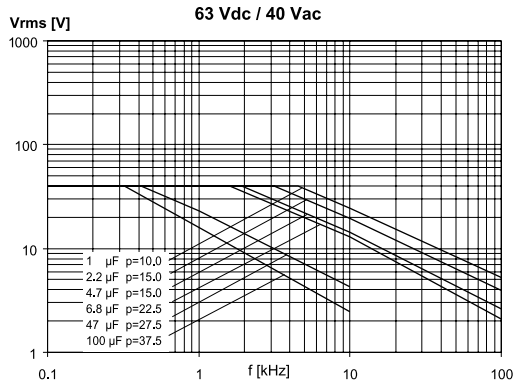
Temperature: +40°C  $\pm 2^\circ\text{C}$   
Voltage: 0.5x $V_R$   
Failure rate:  $\leq 5$  FIT  
(1 FIT =  $1 \times 10^{-9}$  failures/componentsxh)

**Failure criteria:**

Short or open circuit  
Capacitance change  $|\Delta C/C|$ :  $> 10\%$   
DF change ( $\Delta \text{tg}\delta$ ):  $> 2 \times$  initial limit.  
Insulation resistance:  $< 0.005 \times$  initial limit.



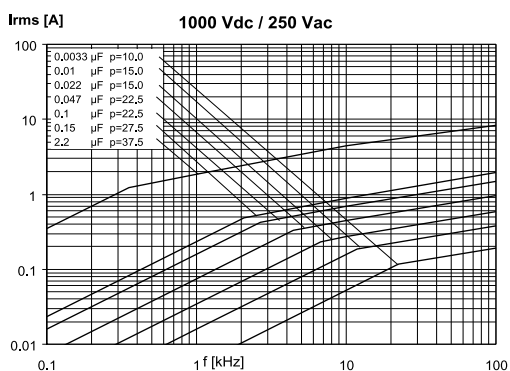
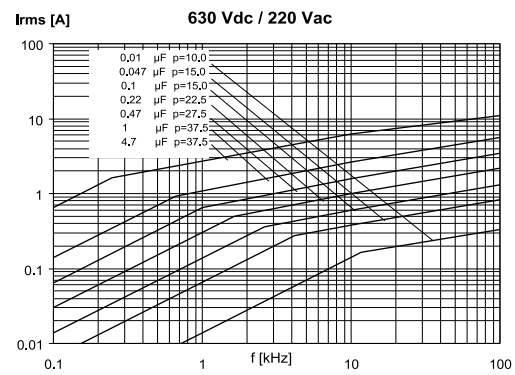
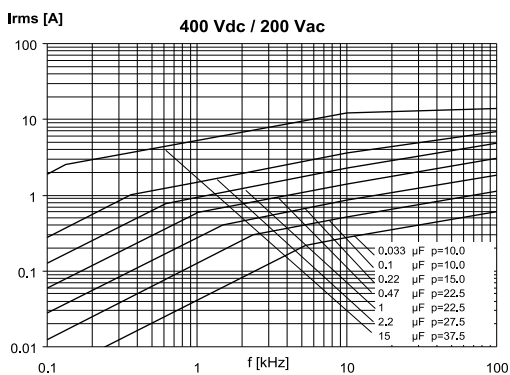
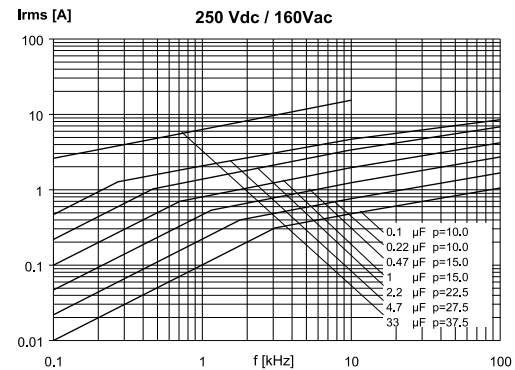
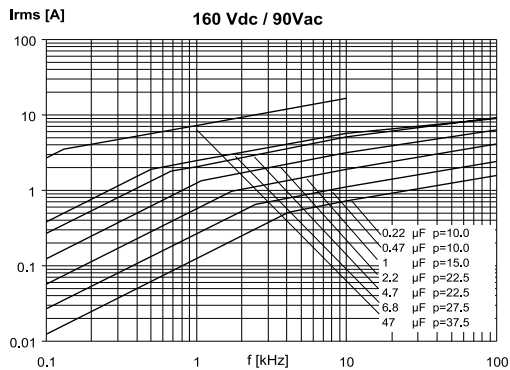
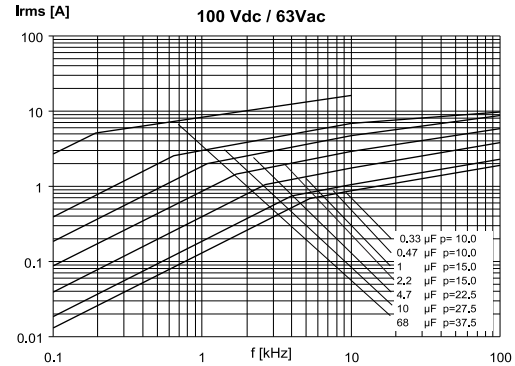
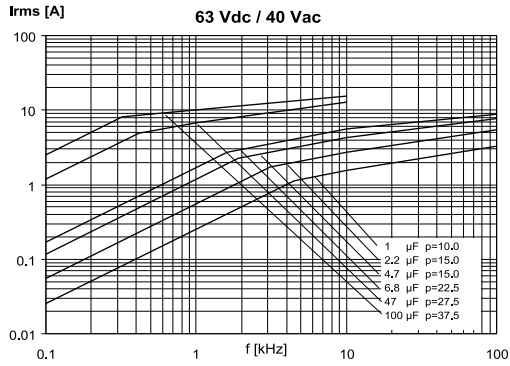
MAX. VOLTAGE (Vr.m.s.) VERSUS FREQUENCY (sinusoidal wave-form / Th ≤ 40°C)



Note: p (pitch) in mm.

**METALLIZED POLYESTER FILM CAPACITOR**  
**D.C. MULTIPURPOSE APPLICATIONS**  
PRODUCT CODE: **R60**

MAX. CURRENT (I<sub>r.m.s.</sub>) VERSUS FREQUENCY (sinusoidal wave-form / Th ≤ 40°C)



Note: p (pitch) in mm.