R60

MKT Series

METALLIZED POLYESTER FILM CAPACITOR MULTIPURPOSE APPLICATIONS

Typical application: blocking, coupling, decoupling, by-passing, interference suppression in low voltage applications (i.e.:AUTOMOTIVE)
PRODUCT CODE: **R60**

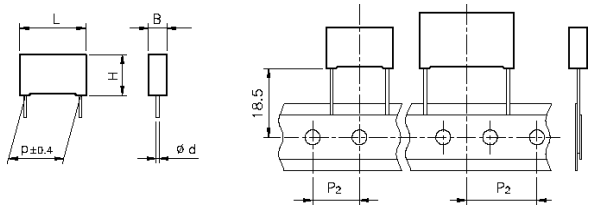
NOTE: Special version, in compliance with DIN 44122 is available upon request.

Construction:

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

Loose Taped

Fig.1 Fig.2



⌀ d ± 0.05	p = 10	p > 10
	0.6	0.8

All dimensions are in mm.

PRODUCT CODE SYSTEM

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

1	2	3	4	5	6	7	8	9	10	11	12	13	14
R	6	0										–	

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%

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: 55/100/56 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

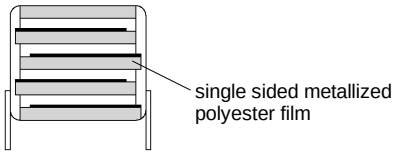


Table 1 (for more detailed information, please refer to page 16)

Standard packaging style	Lead length (mm)	Taping style P_2 (mm)	Taping style Fig. (No.)	Taping style Pitch (mm)	Ordering code (Digit 10 to 11)
AMMO-PACK		12.70	1	10.0/15.0	DQ
AMMO-PACK		19.05	2	22.5	DQ
REEL ⌀ 355mm		12.70	1	10.0/15.0	GY
REEL ⌀ 500mm		12.70	1	10.0/15.0	CK
REEL ⌀ 500mm		19.05	2	22.5/27.5	CK
Loose, short leads	4^{+2}				AA
Loose, long leads (p=10mm)	$17^{+1/-2}$				Z3
Loose, long leads	30^{+5}				40
(p ≥ 15mm)	$25^{+2/-1}$				50

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

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MKT Series

METALLIZED POLYESTER FILM CAPACITOR
MULTIPURPOSE APPLICATIONS

PRODUCT CODE: **R60**

NEW

STACKED VERSION

Rated Cap.	63Vdc/40Vac				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
1.0µF	4.0	9.0	13.0	10.0	50	6.3 E3	R60DF4100--6--
1.5µF	5.0	11.0	13.0	10.0	50	6.3 E3	R60DF4150--6--
2.2µF	5.0	11.0	13.0	10.0	50	6.3 E3	R60DF4220--6--
3.3µF	6.0	12.0	13.0	10.0	50	6.3 E3	R60DF4330--6--

Rated Cap.	100Vdc/63Vac				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
0.33µF	4.0	9.0	13.0	10.0	75	15 E3	R60EF3330--6--
0.47µF	4.0	9.0	13.0	10.0	75	15 E3	R60EF3470--6--
0.68µF	4.0	9.0	13.0	10.0	75	15 E3	R60EF3680--6--
1µF	5.0	11.0	13.0	10.0	75	15 E3	R60EF4100--6--
1.5µF	5.0	11.0	13.0	10.0	75	15 E3	R60EF4150--6--

Rated Cap.	160Vdc/90Vac				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
0.22µF	4.0	9.0	13.0	10.0	100	32 E3	R60GF3220--6--
0.33µF	4.0	9.0	13.0	10.0	100	32 E3	R60GF3330--6--
0.47µF	5.0	11.0	13.0	10.0	100	32 E3	R60GF3470--6--
0.68µF	6.0	12.0	13.0	10.0	100	32 E3	R60GF3680--6--

Mechanical version and packaging (Table 1)
Internal use
Tolerance: J (±5%); K (±10%); M (±20%)

Rated Cap.	250Vdc/160Vac				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
0.10µF	4.0	9.0	13.0	10.0	150	75 E3	R60IF3100--6--
0.15µF	4.0	9.0	13.0	10.0	150	75 E3	R60IF3150--6--
0.22µF	5.0	11.0	13.0	10.0	150	75 E3	R60IF3220--6--
0.33µF	5.0	11.0	13.0	10.0	150	75 E3	R60IF3330--6--
0.47µF	6.0	12.0	13.0	10.0	150	75 E3	R60IF3470--6--

Rated Cap.	400Vdc/200Vac				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
0.033µF	4.0	9.0	13.0	10.0	175	140 E3	R60MF2330--6--
0.047µF	4.0	9.0	13.0	10.0	175	140 E3	R60MF2470--6--
0.068µF	4.0	9.0	13.0	10.0	175	140 E3	R60MF2680--6--
0.10µF	5.0	11.0	13.0	10.0	175	140 E3	R60MF3100--6--
0.15µF	6.0	12.0	13.0	10.0	175	140 E3	R60MF3150--6--

Rated Cap.	630Vdc/220*Vac				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
1000pF	4.0	9.0	13.0	10.0	200	250 E3	
1500pF	4.0	9.0	13.0	10.0	200	250 E3	
2200pF	4.0	9.0	13.0	10.0	200	250 E3	
3300pF	4.0	9.0	13.0	10.0	200	250 E3	
4700pF	4.0	9.0	13.0	10.0	200	250 E3	
6800pF	4.0	9.0	13.0	10.0	200	250 E3	
0.010µF	4.0	9.0	13.0	10.0	200	250 E3	R60PF2100--6--
0.015µF	4.0	9.0	13.0	10.0	200	250 E3	R60PF2150--6--
0.022µF	4.0	9.0	13.0	10.0	200	250 E3	R60PF2220--6--
0.033µF	5.0	11.0	13.0	10.0	200	250 E3	R60PF2330--6--
0.047µF	5.0	11.0	13.0	10.0	200	250 E3	R60PF2470--6--

In progress

Mechanical version and packaging (Table 1)
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_R), 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_R /V.
The pulse characteristic K_0 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 109).

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METALLIZED POLYESTER FILM CAPACITOR
MULTIPURPOSE APPLICATIONS

PRODUCT CODE: **R60**

WOUND VERSION

Rated Cap.	63Vdc/40Vac B	H	L	p	Max dv/dt (V/µs)	Max K_0 (V^2/µs)	Part Number
0.47µF	4.0	9.0	13.0	10.0	6.0	0.75 E3	R60DF3470--3--
0.68µF	4.0	9.0	13.0	10.0	6.0	0.75 E3	R60DF3680--3--
1.0µF	5.0	11.0	13.0	10.0	6.0	0.75 E3	R60DF4100--3--
1.5µF	6.0	12.0	13.0	10.0	6.0	0.75 E3	R60DF4150--3--
0.68µF	5.0	11.0	18.0	15.0	2.5	0.32 E3	R60DI 3680--3--
1.0µF	5.0	11.0	18.0	15.0	2.5	0.32 E3	R60DI 4100--3--
1.5µF	5.0	11.0	18.0	15.0	2.5	0.32 E3	R60DI 4150--3--
2.2µF	6.0	12.0	18.0	15.0	2.5	0.32 E3	R60DI 4220--3--
3.3µF	7.5	13.5	18.0	15.0	2.5	0.32 E3	R60DI 4330--3--
3.3µF	9.0	12.5	18.0	15.0	2.5	0.32 E3	R60DI 4330--L--
4.7µF	8.5	14.5	18.0	15.0	2.5	0.32 E3	R60DI 4470--3--
4.7µF	13.0	12.0	18.0	15.0	2.5	0.32 E3	R60DI 4470--L--
6.8µF	10.0	16.0	18.0	15.0	2.5	0.32 E3	R60DI 4680--3--
3.3µF	6.0	15.0	26.5	22.5	1.5	0.19 E3	R60DN4330--3--
4.7µF	7.0	16.0	26.5	22.5	1.5	0.19 E3	R60DN4470--3--
6.8µF	7.0	16.0	26.5	22.5	1.5	0.19 E3	R60DN4680--3--
10.0µF	8.5	17.0	26.5	22.5	1.5	0.19 E3	R60DN5100--3--
15.0µF	11.0	20.0	26.5	22.5	1.5	0.19 E3	R60DN5150--3--
10.0µF	9.0	17.0	32.0	27.5	1.0	0.13 E3	R60DR5100--3--
15.0µF	11.0	20.0	32.0	27.5	1.0	0.13 E3	R60DR5150--3--
22.0µF	13.0	22.0	32.0	27.5	1.0	0.13 E3	R60DR5220--3--
33.0µF	14.0	28.0	32.0	27.5	1.0	0.13 E3	R60DR5330--3--
47.0µF	18.0	33.0	32.0	27.5	1.0	0.13 E3	R60DR5470--3--
68.0µF	22.0	37.0	32.0	27.5	1.0	0.13 E3	R60DR5680--3--
22.0µF	11.0	22.0	41.5	37.5	0.8	0.10 E3	R60DW5220--3--
33.0µF	13.0	24.0	41.5	37.5	0.8	0.10 E3	R60DW5330--3--
47.0µF	16.0	28.5	41.5	37.5	0.8	0.10 E3	R60DW5470--3--
68.0µF	19.0	32.0	41.5	37.5	0.8	0.10 E3	R60DW5680--3--
100.0µF	24.0	44.0	41.5	37.5	0.8	0.10 E3	R60DW6100--3--

Rated Cap.	100Vdc/63Vac B	H	L	p	Max dv/dt (V/µs)	Max K_0 (V^2/µs)	Part Number
0.33µF	4.0	9.0	13.0	10.0	9.0	1.8 E3	R60EF3330--3--
0.47µF	5.0	11.0	13.0	10.0	9.0	1.8 E3	R60EF3470--3--
0.68µF	6.0	12.0	13.0	10.0	9.0	1.8 E3	R60EF3680--3--
0.33µF	5.0	11.0	18.0	15.0	3.0	0.6 E3	R60EI 3330--3--
0.47µF	5.0	11.0	18.0	15.0	3.0	0.6 E3	R60EI 3470--3--
0.68µF	5.0	11.0	18.0	15.0	3.0	0.6 E3	R60EI 3680--3--
1.0µF	5.0	11.0	18.0	15.0	3.0	0.6 E3	R60EI 4100--3--
1.5µF	7.5	13.5	18.0	15.0	3.0	0.6 E3	R60EI 4150--3--
2.2µF	8.5	14.5	18.0	15.0	3.0	0.6 E3	R60EI 4220--3--
2.2µF	9.0	12.5	18.0	15.0	3.0	0.6 E3	R60EI 4220--L--
3.3µF	10.0	16.0	18.0	15.0	3.0	0.6 E3	R60EI 4330--3--
3.3µF	13.0	12.0	18.0	15.0	3.0	0.6 E3	R60EI 4330--L--
4.7µF	11.0	19.0	18.0	15.0	3.0	0.6 E3	R60EI 4470--3--
1.5µF	6.0	15.0	26.5	22.5	2.0	0.4 E3	R60EN4150--3--
2.2µF	6.0	15.0	26.5	22.5	2.0	0.4 E3	R60EN4220--3--
3.3µF	7.0	16.0	26.5	22.5	2.0	0.4 E3	R60EN4330--3--
4.7µF	8.5	17.0	26.5	22.5	2.0	0.4 E3	R60EN4470--3--
6.8µF	10.0	18.5	26.5	22.5	2.0	0.4 E3	R60EN4680--3--
10.0µF	13.0	22.0	26.5	22.5	2.0	0.4 E3	R60EN5100--3--
4.7µF	9.0	17.0	32.0	27.5	1.5	0.3 E3	R60ER4470--3--
6.8µF	9.0	17.0	32.0	27.5	1.5	0.3 E3	R60ER4680--3--
10.0µF	11.0	20.0	32.0	27.5	1.5	0.3 E3	R60ER5100--3--
15.0µF	13.0	22.0	32.0	27.5	1.5	0.3 E3	R60ER5150--3--
22.0µF	14.0	28.0	32.0	27.5	1.5	0.3 E3	R60ER5220--3--
33.0µF	18.0	33.0	32.0	27.5	1.5	0.3 E3	R60ER5330--3--
47.0µF	22.0	37.0	32.0	27.5	1.5	0.3 E3	R60ER5470--3--
15.0µF	11.0	22.0	41.5	37.5	1.0	0.2 E3	R60EW5150--3--
22.0µF	13.0	24.0	41.5	37.5	1.0	0.2 E3	R60EW5220--3--
33.0µF	16.0	28.5	41.5	37.5	1.0	0.2 E3	R60EW5330--3--
47.0µF	19.0	32.0	41.5	37.5	1.0	0.2 E3	R60EW5470--3--
68.0µF	24.0	44.0	41.5	37.5	1.0	0.2 E3	R60EW5680--3--

Mechanical version and packaging (Table 1)
Internal use
Tolerance: J (±5%); K (±10%); M (±20%)

Rated Cap.	160Vdc/90Vac B	H	L	p	Max dv/dt (V/µs)	Max K_0 (V^2/µs)	Part Number
0.22µF	4.0	9.0	13.0	10.0	15.0	4.80 E3	R60GF3220--3--
0.33µF	5.0	11.0	13.0	10.0	15.0	4.80 E3	R60GF3330--3--
0.47µF	6.0	12.0	13.0	10.0	15.0	4.80 E3	R60GF3470--3--
0.33µF	5.0	11.0	18.0	15.0	9.0	2.90 E3	R60GI 3330--3--
0.47µF	5.0	11.0	18.0	15.0	9.0	2.90 E3	R60GI 3470--3--
0.68µF	5.0	11.0	18.0	15.0	9.0	2.90 E3	R60GI 3680--3--
1.0µF	7.5	13.5	18.0	15.0	9.0	2.90 E3	R60GI 4100--3--
1.5µF	8.5	14.5	18.0	15.0	9.0	2.90 E3	R60GI 4150--3--
1.5µF	9.0	12.5	18.0	15.0	9.0	2.90 E3	R60GI 4150--L--
2.2µF	10.0	16.0	18.0	15.0	9.0	2.90 E3	R60GI 4220--3--
2.2µF	13.0	12.0	18.0	15.0	9.0	2.90 E3	R60GI 4220--L--
3.3µF	11.0	19.0	18.0	15.0	9.0	2.90 E3	R60GI 4220--3--
1.5µF	6.0	15.0	26.5	22.5	5.5	1.70 E3	R60GN4150--3--
2.2µF	7.0	16.0	26.5	22.5	5.5	1.70 E3	R60GN4220--3--
3.3µF	8.5	17.0	26.5	22.5	5.5	1.70 E3	R60GN4330--3--
4.7µF	11.0	20.0	26.5	22.5	5.5	1.70 E3	R60GN4470--3--
6.8µF	13.0	22.0	26.5	22.5	5.5	1.70 E3	R60GN4680--3--
3.3µF	9.0	17.0	32.0	27.5	3.0	0.96 E3	R60GR4330--3--
4.7µF	9.0	17.0	32.0	27.5	3.0	0.96 E3	R60GR4470--3--
6.8µF	11.0	20.0	32.0	27.5	3.0	0.96 E3	R60GR4680--3--
10.0µF	15.0	24.5	32.0	27.5	3.0	0.96 E3	R60GR5100--3--
15.0µF	18.0	33.0	32.0	27.5	3.0	0.96 E3	R60GR5150--3--
22.0µF	22.0	37.0	32.0	27.5	3.0	0.96 E3	R60GR5220--3--
10.0µF	11.0	22.0	41.5	37.5	2.0	0.64 E3	R60GW5100--3--
15.0µF	13.0	24.0	41.5	37.5	2.0	0.64 E3	R60GW5150--3--
22.0µF	16.0	28.5	41.5	37.5	2.0	0.64 E3	R60GW5220--3--
33.0µF	19.0	32.0	41.5	37.5	2.0	0.64 E3	R60GW5330--3--
47.0µF	24.0	44.0	41.5	37.5	2.0	0.64 E3	R60GW5470--3--

Rated Cap.	250Vdc/160Vac B	H	L	p	Max dv/dt (V/µs)	Max K_0 (V^2/µs)	Part Number
0.068µF	4.0	9.0	13.0	10.0	20	10.0 E3	R60IF 2680--3--
0.10µF	4.0	9.0	13.0	10.0	20	10.0 E3	R60IF 3100--3--
0.15µF	4.0	9.0	13.0	10.0	20	10.0 E3	R60IF 3150--3--
0.22µF	5.0	11.0	13.0	10.0	20	10.0 E3	R60IF 3220--3--
0.33µF	6.0	12.0	13.0	10.0	20	10.0 E3	R60IF 3330--3--
0.10µF	5.0	11.0	18.0	15.0	12	6.0 E3	R60II 3100--3--
0.15µF	5.0	11.0	18.0	15.0	12	6.0 E3	R60II 3150--3--
0.22µF	5.0	11.0	18.0	15.0	12	6.0 E3	R60II 3220--3--
0.33µF	5.0	11.0	18.0	15.0	12	6.0 E3	R60II 3330--3--
0.47µF	6.0	12.0	18.0	15.0	12	6.0 E3	R60II 3470--3--
0.68µF	7.5	13.5	18.0	15.0	12	6.0 E3	R60II 3680--3--
0.68µF	9.0	12.5	18.0	15.0	12	6.0 E3	R60II 3680--L--
1.0µF	8.5	14.5	18.0	15.0	12	6.0 E3	R60II 4100--3--
1.0µF	13.0	12.0	18.0	15.0	12	6.0 E3	R60II 4100--L--
1.5µF	10.0	16.0	18.0	15.0	12	6.0 E3	R60II 4150--3--
0.47µF	6.0	15.0	26.5	22.5	8	4.0 E3	R60IN 3470--3--
0.68µF	6.0	15.0	26.5	22.5	8	4.0 E3	R60IN 3680--3--
1.0µF	6.0	15.0	26.5	22.5	8	4.0 E3	R60IN 4100--3--
1.5µF	7.0	16.0	26.5	22.5	8	4.0 E3	R60IN 4150--3--
2.2µF	10.0	18.5	26.5	22.5	8	4.0 E3	R60IN 4220--3--
3.3µF	11.0	20.0	26.5	22.5	8	4.0 E3	R60IN 4330--3--
1.5µF	9.0	17.0	32.0	27.5	5	2.5 E3	R60IR 4150--3--
2.2µF	9.0	17.0	32.0	27.5	5	2.5 E3	R60IR 4220--3--
3.3µF	11.0	20.0	32.0	27.5	5	2.5 E3	R60IR 4330--3--
4.7µF	13.0	22.0	32.0	27.5	5	2.5 E3	R60IR 4470--3--
6.8µF	14.0	28.0	32.0	27.5	5	2.5 E3	R60IR 4680--3--
10.0µF	18.0	33.0	32.0	27.5	5	2.5 E3	R60IR 5100--3--
15.0µF	22.0	37.0	32.0	27.5	5	2.5 E3	R60IR 5150--3--
4.7µF	11.0	22.0	41.5	37.5	4	2.0 E3	R60IW 4470--3--
6.8µF	13.0	24.0	41.5	37.5	4	2.0 E3	R60IW 4680--4--
10.0µF	16.0	28.5	41.5	37.5	4	2.0 E3	R60IW 5100--3--
15.0µF	19.0	32.0	41.5	37.5	4	2.0 E3	R60IW 5150--3--
22.0µF	20.0	40.0	41.5	37.5	4	2.0 E3	R60IW 5220--3--
33.0µF	24.0	44.0	41.5	37.5	4	2.0 E3	R60IW 5330--3--

Mechanical version and packaging (Table 1)
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_R), 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_R /V.
The pulse characteristic K_0 depends on the voltage wave-form and in any case it cannot overcome the value given in the above table.

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METALLIZED POLYESTER FILM CAPACITOR
MULTIPURPOSE APPLICATIONS

PRODUCT CODE: **R60**

WOUND VERSION

Rated Cap.	400Vdc/200Vac				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
0.015µF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2150--3--
0.022µF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2220--3--
0.033µF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2330--3--
0.047µF	4.0	9.0	13.0	10.0	30.0	24.0 E3	R60MF2470--3--
0.068µF	5.0	11.0	13.0	10.0	30.0	24.0 E3	R60MF2680--3--
0.10µF	6.0	12.0	13.0	10.0	30.0	24.0 E3	R60MF3100--3--
0.047µF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 2470--3--
0.068µF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 2680--3--
0.10µF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 3100--3--
0.15µF	5.0	11.0	18.0	15.0	20.0	16.0 E3	R60MI 3150--3--
0.22µF	6.0	12.0	18.0	15.0	20.0	16.0 E3	R60MI 3220--3--
0.33µF	7.5	13.5	18.0	15.0	20.0	16.0 E3	R60MI 3330--3--
0.33µF	9.0	12.5	18.0	15.0	20.0	16.0 E3	R60MI 3330--L--
0.47µF	8.5	14.5	18.0	15.0	20.0	16.0 E3	R60MI 3470--3--
0.47µF	13.0	12.0	18.0	15.0	20.0	16.0 E3	R60MI 3470--L--
0.68µF	11.0	19.0	18.0	15.0	20.0	16.0 E3	R60MI 3680--3--
0.22µF	6.0	15.0	26.5	22.5	10.0	8.0 E3	R60MN3220--3--
0.33µF	6.0	15.0	26.5	22.5	10.0	8.0 E3	R60MN3330--3--
0.47µF	6.0	15.0	26.5	22.5	10.0	8.0 E3	R60MN3470--3--
0.68µF	7.0	16.0	26.5	22.5	10.0	8.0 E3	R60MN3680--3--
1.0µF	10.0	18.5	26.5	22.5	10.0	8.0 E3	R60MN4100--3--
1.5µF	11.0	20.0	26.5	22.5	10.0	8.0 E3	R60MN4150--3--
0.68µF	9.0	17.0	32.0	27.5	8.5	3.4 E3	R60MR3680--3--
1.0µF	9.0	17.0	32.0	27.5	8.5	3.4 E3	R60MR4100--3--
1.5µF	10.0	20.0	32.0	27.5	8.5	3.4 E3	R60MR4150--3--
2.2µF	13.0	22.0	32.0	27.5	8.5	3.4 E3	R60MR4220--3--
3.3µF	14.0	28.0	32.0	27.5	8.5	3.4 E3	R60MR4330--3--
4.7µF	18.0	33.0	32.0	27.5	8.5	3.4 E3	R60MR4470--3--
6.8µF	22.0	37.0	32.0	27.5	8.5	3.4 E3	R60MR4680--3--
3.3µF	11.0	22.0	41.5	37.5	6.0	2.4 E3	R60MW4330--3--
4.7µF	13.0	24.0	41.5	37.5	6.0	2.4 E3	R60MW4470--3--
6.8µF	16.0	28.5	41.5	37.5	6.0	2.4 E3	R60MW4680--3--
10.0µF	19.0	32.0	41.5	37.5	6.0	2.4 E3	R60MW5100--3--
15.0µF	24.0	44.0	41.5	37.5	6.0	2.4 E3	R60MW5150--3--

Rated Cap.	630Vdc/220*Vac				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
4700pF	4.0	9.0	13.0	10.0	40	50 E3	R60PF1470--3--
6800pF	4.0	9.0	13.0	10.0	40	50 E3	R60PF1680--3--
0.010µF	4.0	9.0	13.0	10.0	40	50 E3	R60PF2100--3--
0.015µF	4.0	9.0	13.0	10.0	40	50 E3	R60PF2150--3--
0.022µF	5.0	11.0	13.0	10.0	40	50 E3	R60PF2220--3--
0.033µF	6.0	12.0	13.0	10.0	40	50 E3	R60PF2330--3--
0.047µF	6.0	12.0	13.0	10.0	40	50 E3	R60PF2470--3--
0.033µF	5.0	11.0	18.0	15.0	25	31 E3	R60PI 2330--3--
0.047µF	5.0	11.0	18.0	15.0	25	31 E3	R60PI 2470--3--
0.068µF	6.0	12.0	18.0	15.0	25	31 E3	R60PI 2680--3--
0.10µF	7.5	13.5	18.0	15.0	25	31 E3	R60PI 3100--3--
0.15µF	8.5	14.5	18.0	15.0	25	31 E3	R60PI 3150--3--
0.10µF	6.0	15.0	26.5	22.5	12	15 E3	R60PN3100--3--
0.15µF	6.0	15.0	26.5	22.5	12	15 E3	R60PN3150--3--
0.22µF	7.0	16.0	26.5	22.5	12	15 E3	R60PN3220--3--
0.33µF	10.0	18.5	26.5	22.5	12	15 E3	R60PN3330--3--
0.33µF	9.0	17.0	32.0	27.5	10	12 E3	R60PR3330--3--
0.47µF	11.0	20.0	32.0	27.5	10	12 E3	R60PR3470--3--
0.68µF	13.0	22.0	32.0	27.5	10	12 E3	R60PR3680--3--
1.0µF	14.0	28.0	32.0	27.5	10	12 E3	R60PR4100--4--
1.5µF	18.0	33.0	32.0	27.5	10	12 E3	R60PR4150--3--
2.2µF	22.0	37.0	32.0	27.5	10	12 E3	R60PR4220--3--
1.0µF	11.0	22.0	41.5	37.5	8	9.6 E3	R60PW4100--3--
1.5µF	13.0	24.0	41.5	37.5	8	9.6 E3	R60PW4150--3--
2.2µF	16.0	28.5	41.5	37.5	8	9.6 E3	R60PW4220--3--
3.3µF	20.0	40.0	41.5	37.5	8	9.6 E3	R60PW4330--3--
4.7µF	24.0	44.0	41.5	37.5	8	9.6 E3	R60PW4470--3--

Mechanical version and packaging (Table 1)
Internal use
Tolerance: J (±5%); K (±10%); M (±20%)

Rated Cap.	1000Vdc/250Vac*				Max dv/dt	Max K_0	Part Number
	B	H	L	p	(V/µs)	(V^2/µs)	
1000pF	4.0	9.0	13.0	10.0	60	120 E3	R60QF1100--0--
1500pF	4.0	9.0	13.0	10.0	60	120 E3	R60QF1150--0--
2200pF	4.0	9.0	13.0	10.0	60	120 E3	R60QF1220--0--
3300pF	4.0	9.0	13.0	10.0	60	120 E3	R60QF1330--0--
4700pF	5.0	11.0	13.0	10.0	60	120 E3	R60QF1470--0--
6800pF	6.0	12.0	13.0	10.0	60	120 E3	R60QF1680--0--
0.010µF	5.0	11.0	18.0	15.0	30	60 E3	R60QI 2100--0--
0.015µF	5.0	11.0	18.0	15.0	30	60 E3	R60QI 2150--3--
0.022µF	6.0	12.0	18.0	15.0	30	60 E3	R60QI 2220--3--
0.033µF	7.5	13.5	18.0	15.0	30	60 E3	R60QI 2330--3--
0.033µF	9.0	12.5	18.0	15.0	30	60 E3	R60QI 2330--L--
0.047µF	10.0	16.0	18.0	15.0	30	60 E3	R60QI 2470--0--
0.047µF	13.0	12.0	18.0	15.0	30	60 E3	R60QI 2470--L--
0.068µF	11.0	19.0	18.0	15.0	30	60 E3	R60QI 2680--0--
0.033µF	6.0	15.0	26.5	22.5	15	30 E3	R60QN2330--0--
0.047µF	6.0	15.0	26.5	22.5	15	30 E3	R60QN2470--0--
0.068µF	7.0	16.0	26.5	22.5	15	30 E3	R60QN2680--3--
0.10µF	8.5	17.0	26.5	22.5	15	30 E3	R60QN3100--3--
0.15µF	13.0	22.0	26.5	22.5	15	30 E3	R60QN3150--0--
0.15µF	9.0	17.0	32.0	27.5	12	24 E3	R60QR3150--3--
0.22µF	11.0	20.0	32.0	27.5	12	24 E3	R60QR3220--3--
0.33µF	13.0	22.0	32.0	27.5	12	24 E3	R60QR3330--3--
0.47µF	14.0	28.0	32.0	27.5	12	24 E3	R60QR3470--3--
0.68µF	18.0	33.0	32.0	27.5	12	24 E3	R60QR3680--3--
1.0µF	22.0	37.0	32.0	27.5	12	24 E3	R60QR4100--3--
0.47µF	11.0	22.0	41.5	37.5	10	20 E3	R60QW3470--3--
0.68µF	13.0	24.0	41.5	37.5	10	20 E3	R60QW3680--3--
1.0µF	16.0	28.5	41.5	37.5	10	20 E3	R60QW4100--3--
1.5µF	20.0	40.0	41.5	37.5	10	20 E3	R60QW4150--3--
2.2µF	24.0	44.0	41.5	37.5	10	20 E3	R60QW4220--3--

Mechanical version and packaging (Table 1)
Internal use
Tolerance: J (±5%); K (±10%); M (±20%)

All dimensions are in mm

Note 1: If the working voltage (V) is lower than the rated voltage (V_R), 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_R/V. The pulse characteristic K_0 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 109).

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R60

MKT Series

METALLIZED POLYESTER FILM CAPACITOR
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 has to be applied.

Capacitance range: 1000pF to 100µF

Capacitance values:
E6 series (IEC 60063 Norm).

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

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

Pitch (mm)	10	15	22.5	27.5	37.5
L(nH) ≈	9	10	18	18	22

Dissipation factor (DF):
$tg\delta \times 10^{-4}$ at +25°C ±5°C

kHz	C ≤ 1µF	C > 1µF
1	≤ 100	≤ 100
10	≤ 150	

Insulation resistance:

Test conditions

Temperature: +25°C ± 5°C
Voltage charge time: 1 min
Voltage charge: 50 Vdc for V_R < 100 Vdc
100 Vdc for V_R ≥ 100 Vdc

Performance

For V_R ≤ 100 Vdc

≥ 3750 MΩ for C ≤ 0.33µF (50000 MΩ)*
≥ 1250 s for C > 0.33µF (5000 s)*

For V_R >100 Vdc

≥ 30000 MΩ for C ≤ 0.33µF (50000 MΩ)*
≥ 10000 s for C > 0.33µF (17000 s)*

*Typical value

Test voltage between terminations:
$1.6 \times V_R$ applied for 2 s at +25°C ± 5°C

TEST METHOD AND PERFORMANCE

Damp heat, steady state:

Test conditions

Temperature: +40°C ± 2°C
Relative humidity (RH): 93% ± 2%
Test duration: 56 days

Performance

Capacitance change |ΔC/C|: ≤ 5%
DF change (Δtgδ): $\leq 50 \times 10^{-4}$ at 1kHz
Insulation resistance: ≥ 50% of initial limit.

Endurance:

Test conditions

Temperature: +100°C ± 2°C
Test duration: 2000 h
Voltage applied: $1.25 \times V_C$

Performance

Capacitance change |ΔC/C|: ≤ 5%
DF change (Δtgδ): $\leq 50 \times 10^{-4}$ at 10kHz for C ≤ 1µF
$\leq 30 \times 10^{-4}$ at 1kHz for C > 1µF
Insulation resistance: ≥ 50% of initial limit.

Resistance to soldering heat:

Test conditions

Solder bath temperature: +260°C ± 5°C
Dipping time (with heat screen):10 s ± 1 s

Performance

Capacitance change |ΔC/C|: ≤ 2%
DF change (Δtgδ): $\leq 50 \times 10^{-4}$ at 10kHz for C ≤ 1µF
$\leq 30 \times 10^{-4}$ at 1kHz for C > 1µF
Insulation resistance: ≥ initial limit.

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

Storage: standard environmental conditions (see page 11).

Performance

Capacitance change |ΔC/C|: ≤ 3% for C ≤ 0.1µF
≤ 2% for C > 0.1µF

RELIABILITY:

Reference MIL HDB 217

Application conditions:

Temperature: +40°C ± 2°C
Voltage: $0.5 \times V_R$
Failure rate: ≤ 5 FIT
(1 FIT = 1×10^{-9} failures/components × h)

Failure criteria:

Short or open circuit
Capacitance change |ΔC/C|: >10%
DF change (Δtgδ): >2 × initial limit.
Insulation resistance: <0.005 × initial limit.

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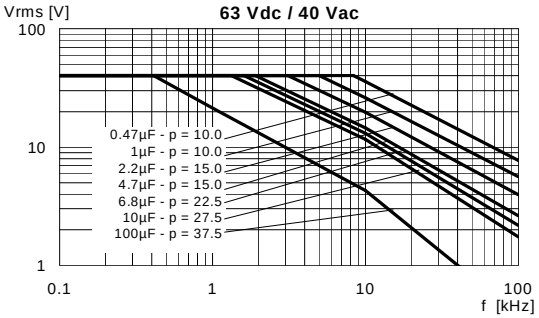
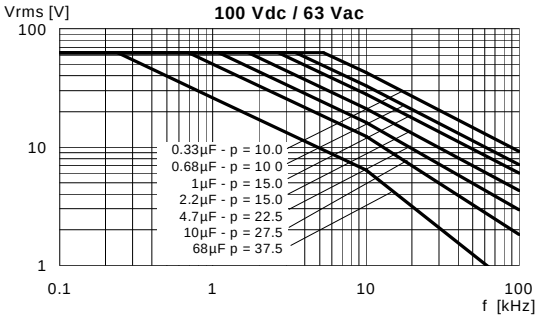
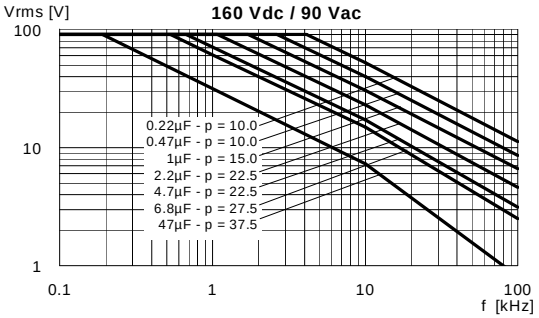
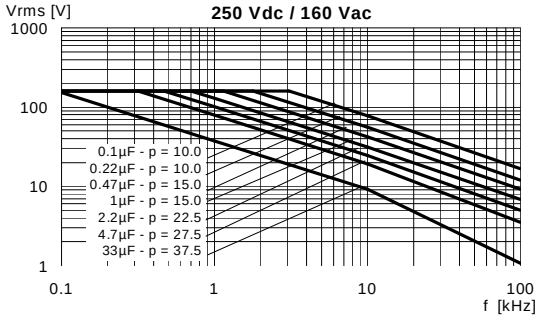
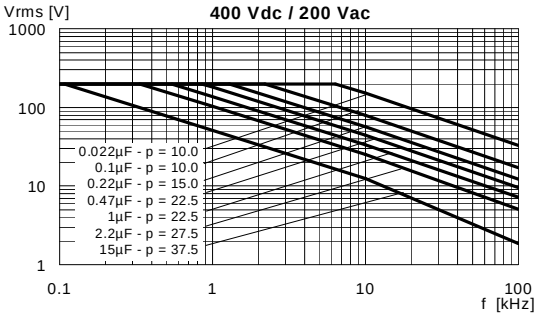
MAX. VOLTAGE (Vr.m.s.) VERSUS FREQUENCY (sinusoidal wave-form / $T_h \leq 40°C$)

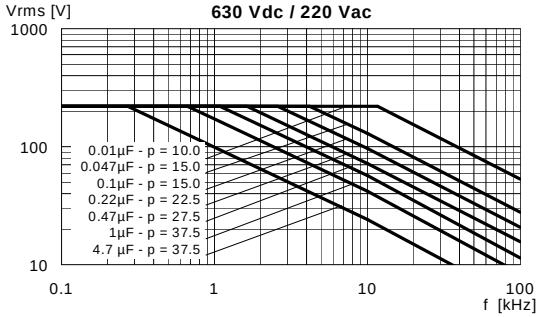


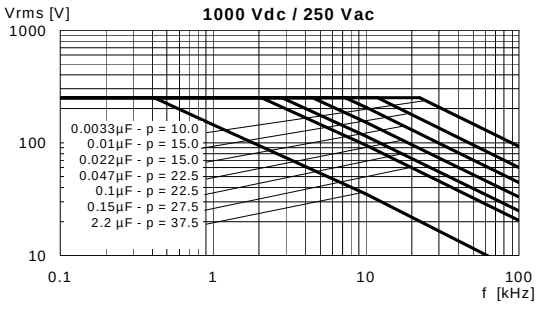












Note: p (pitch) in mm.

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