

All dimensions are in mm.

### METALLIZED POLYESTER FILM CAPACITOR HIGH PERFORMANCES - HIGH TEMPERATURE D.C. AND PULSE APPLICATIONS

#### STACKED VERSION

**Typical applications:** blocking, coupling, decoupling for a signal from DC to high frequency; pulse, logic and timing circuit, lamp capacitor for electronic compact lamps, inverter for LCD monitors, automotive DC motor suppression.

PRODUCT CODE: **RSB**

**p = 5mm**

Pitch (mm)	Box thickness (B) (mm)	Maximum dimensions (mm)		
		B max	H max	L max
5.0	<4.5	B +0.1	H +0.1	L +0.2
5.0	≥4.5	B +0.1	H +0.1	L +0.3

### 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:  
C = 50V D = 63V E = 100V I = 250V  
M = 400V W = 500V P = 630V
- Digit 5 Pitch: C = 5 mm
- 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%.

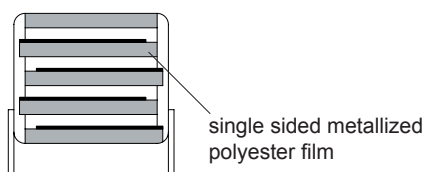
Table 1 (for more detailed information, please refer to page 14).

Standard packaging style	Lead length (mm)	Ordering code (Digit 10 to 11)
AMMO-PACK		DQ
Reel Ø 355 mm		CK
Loose, short leads	4 <sup>+1.5</sup>	AA
Loose, long leads	17 <sup>+1/-2</sup>	Z3

### 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.
- Marking:** Series (RSB) capacitance, tolerance, D.C. rated voltage.
- Climatic category:** 55/125/56 IEC 60068-1
- Operating temperature range:** -55 to +125°C
- Related documents:** IEC 60384-2

### Winding scheme



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Rated Cap.	50Vdc/30Vac Std dimensions				Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	B	H	L	p			
2.2μF	6.0	11.0	7.2	5.0	200	20 E3	RSBCC4220--1--

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			
0.10 μF	2.5	6.5	7.2	5.0	250	31.5 E3	RSBDC3100--0--
0.15 μF	2.5	6.5	7.2	5.0	250	31.5 E3	RSBDC3150--0--
0.22 μF	2.5	6.5	7.2	5.0	250	31.5 E3	RSBDC3220--1--
0.33 μF	3.5	7.5	7.2	5.0	250	31.5 E3	RSBDC3330--0--
0.47 μF	3.5	7.5	7.2	5.0	250	31.5 E3	RSBDC3470--1--
0.68 μF	4.5	9.5	7.2	5.0	250	31.5 E3	RSBDC3680--1--
1.0 μF	5.0	10.0	7.2	5.0	250	31.5 E3	RSBDC4100--1--
1.5 μF	6.0	11.0	7.2	5.0	250	31.5 E3	RSBDC4150--1--

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			
4700 pF	2.5	6.5	7.2	5.0	300	60 E3	RSBEC1470--0--
6800 pF	2.5	6.5	7.2	5.0	300	60 E3	RSBEC1680--0--
0.010 μF	2.5	6.5	7.2	5.0	300	60 E3	RSBEC2100--0--
0.015 μF	2.5	6.5	7.2	5.0	300	60 E3	RSBEC2150--0--
0.022 μF	2.5	6.5	7.2	5.0	300	60 E3	RSBEC2220--0--
0.033 μF	2.5	6.5	7.2	5.0	300	60 E3	RSBEC2330--0--
0.047 μF	2.5	6.5	7.2	5.0	300	60 E3	RSBEC2470--0--
0.068 μF	2.5	6.5	7.2	5.0	300	60 E3	RSBEC2680--1--
0.10 μF	3.5	7.5	7.2	5.0	300	60 E3	RSBEC3100--0--
0.15 μF	4.5	9.5	7.2	5.0	300	60 E3	RSBEC3150--0--
0.22 μF	5.0	10.0	7.2	5.0	300	60 E3	RSBEC3220--0--
0.33 μF	6.0	11.0	7.2	5.0	300	60 E3	RSBEC3330--0--
0.47 μF	6.0	11.0	7.2	5.0	300	60 E3	RSBEC3470--1--

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			
1000 pF	2.5	6.5	7.2	5.0	400	20 E4	RSBIC1100--0--
1500 pF	2.5	6.5	7.2	5.0	400	20 E4	RSBIC1150--0--
2200 pF	2.5	6.5	7.2	5.0	400	20 E4	RSBIC1220--0--
3300 pF	2.5	6.5	7.2	5.0	400	20 E4	RSBIC1330--0--
4700 pF	2.5	6.5	7.2	5.0	400	20 E4	RSBIC1470--0--
6800 pF	2.5	6.5	7.2	5.0	400	20 E4	RSBIC1680--0--
0.010 μF	2.5	6.5	7.2	5.0	400	20 E4	RSBIC2100--0--
0.015 μF	2.5	6.5	7.2	5.0	400	20 E4	RSBIC2150--0--
0.022 μF	3.5	7.5	7.2	5.0	400	20 E4	RSBIC2220--0--
0.033 μF	3.5	7.5	7.2	5.0	400	20 E4	RSBIC2330--0--
0.047 μF	4.5	9.5	7.2	5.0	400	20 E4	RSBIC2470--0--
0.068 μF	4.5	9.5	7.2	5.0	400	20 E4	RSBIC2680--0--
0.10 μF	5.0	10.0	7.2	5.0	400	20 E4	RSBIC3100--0--
0.15 μF	6.0	11.0	7.2	5.0	400	20 E4	RSBIC3150--0--

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

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			
1000 pF	2.5	6.5	7.2	5.0	600	48 E4	RSBMC1100--0--
1500 pF	2.5	6.5	7.2	5.0	600	48 E4	RSBMC1150--0--
2200 pF	2.5	6.5	7.2	5.0	600	48 E4	RSBMC1220--0--
3300 pF	2.5	6.5	7.2	5.0	600	48 E4	RSBMC1330--0--
4700 pF	2.5	6.5	7.2	5.0	600	48 E4	RSBMC1470--0--
6800 pF	3.5	7.5	7.2	5.0	600	48 E4	RSBMC1680--0--
0.010 μF	3.5	7.5	7.2	5.0	600	48 E4	RSBMC2100--0--
0.015 μF	3.5	7.5	7.2	5.0	600	48 E4	RSBMC2150--0--
0.022 μF	4.5	9.5	7.2	5.0	600	48 E4	RSBMC2220--0--
0.033 μF	5.0	10.0	7.2	5.0	600	48 E4	RSBMC2330--0--
0.047 μF	6.0	11.0	7.2	5.0	600	48 E4	RSBMC2470--0--

Rated Cap.	500Vdc/220Vac* 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	2.5	6.5	7.2	5.0	700	70 E4	RSBWC1100--0--
1500 pF	2.5	6.5	7.2	5.0	700	70 E4	RSBWC1150--0--
2200 pF	3.5	7.5	7.2	5.0	700	70 E4	RSBWC1220--0--
3300 pF	3.5	7.5	7.2	5.0	700	70 E4	RSBWC1330--0--
4700 pF	3.5	7.5	7.2	5.0	700	70 E4	RSBWC1470--0--
6800 pF	4.5	9.5	7.2	5.0	700	70 E4	RSBWC1680--0--
0.010 μF	5.0	10.0	7.2	5.0	700	70 E4	RSBWC2100--0--
0.015 μF	6.0	11.0	7.2	5.0	700	70 E4	RSBWC2150--0--

Rated Cap.	630Vdc/220Vac* 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	2.5	6.5	7.2	5.0	800	100 E4	RSBPC1100--0--
1500 pF	3.5	7.5	7.2	5.0	800	100 E4	RSBPC1150--0--
2200 pF	3.5	7.5	7.2	5.0	800	100 E4	RSBPC1220--0--
3300 pF	4.5	9.5	7.2	5.0	800	100 E4	RSBPC1330--0--
4700 pF	4.5	9.5	7.2	5.0	800	100 E4	RSBPC1470--0--
6800 pF	5.0	10.0	7.2	5.0	800	100 E4	RSBPC1680--0--
0.010 μF	6.0	11.0	7.2	5.0	800	100 E4	RSBPC2100--0--

Mechanical version and packaging (Table1) \_\_\_\_\_  
 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<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: The rated voltages from 250Vdc to 630Vdc are for pulse applications (i.e.: lamp capacitors).

\*Not suitable for across-the-line applications. Please refer to Interference Suppression Capacitors (page 145).

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HIGH PERFORMANCES - HIGH TEMPERATURE  
D.C. AND PULSE APPLICATIONS**

**STACKED VERSION**

p = 5 mm  
PRODUCT CODE: RSB

**ELECTRICAL CHARACTERISTICS**

**Rated voltage ( $V_R$ ):**

50 Vdc	63 Vdc	100 Vdc
250 Vdc	400 Vdc	500 Vdc
630 Vdc		

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

**Temperature derated voltage:**

for temperatures between +85°C and +125°C 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 2.2µF

**Capacitance values:** E6 series (IEC 60063 Norm).

**Capacitance tolerances** (measured at 1 kHz):

±5% (J); ±10% (K); ±20% (M).

**Total self-inductance (L):** ≈7nH

max 1 nH per 1 mm lead and capacitor length.

**Dissipation factor (DF):**

tgδ 10<sup>-4</sup> at +25°C ±5°C

kHz	C ≤ 0.1µF	C > 0.1µF
1	≤ 80	≤ 80
10	≤ 120	≤ 120
100	≤ 250	

**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**

≥ 15000 MΩ for C ≤ 0.33µF

≥ 5000 s for C > 0.33µF and ≤ 1µF

≥ 1000 s for C > 1µF

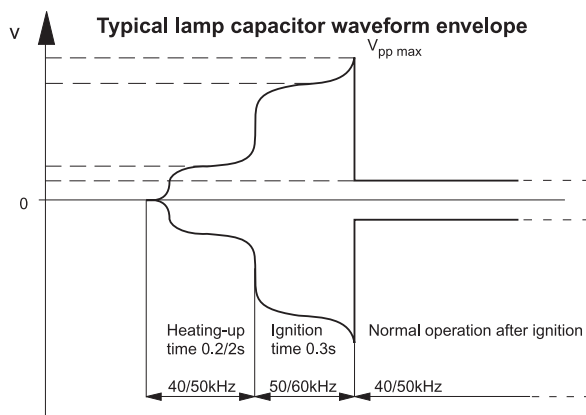
**For  $V_R > 100$  Vdc**

≥ 30000 MΩ

**Test voltage between terminations:**

1.6x $V_R$  applied for 2 s at +25°C±5°C.

**Electrical characteristics for use as lamp capacitors in lighting applications.**



**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): ≤ 50x10<sup>-4</sup> at 1kHz

Insulation resistance: ≥ 50% of initial limit.

**Endurance:**

**Test conditions**

Temperature: +125°C ±2°C

Test duration: 2000 h

Voltage applied: 1.25x $V_C$

**Performance**

Capacitance change |ΔC/C|: ≤ 5%

DF change (Δtgδ): ≤ 30x10<sup>-4</sup> at 10kHz for C ≤ 1µF

≤ 20x10<sup>-4</sup> 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): ≤ 30x10<sup>-4</sup> at 10kHz for C ≤ 1µF

≤ 20x10<sup>-4</sup> at 1kHz for C > 1µF

Insulation resistance: ≥ initial limit.

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

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

**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: 0.5x $V_R$

Failure rate: ≤ 1 FIT

(1 FIT = 1x10<sup>-9</sup> failures/components x h)

**Failure criteria:**

(according to DIN 44122)

Short or open circuit

Capacitance change |ΔC/C|: > 10%

DF change (Δtgδ): > 2 x initial limit.

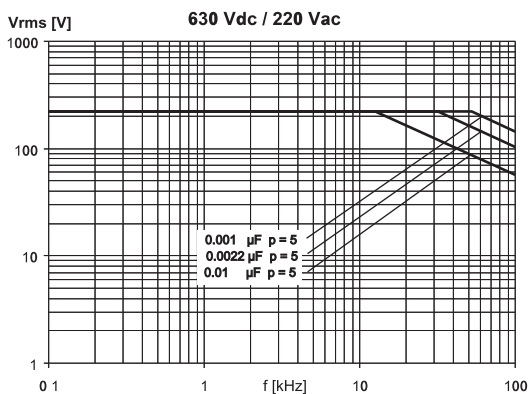
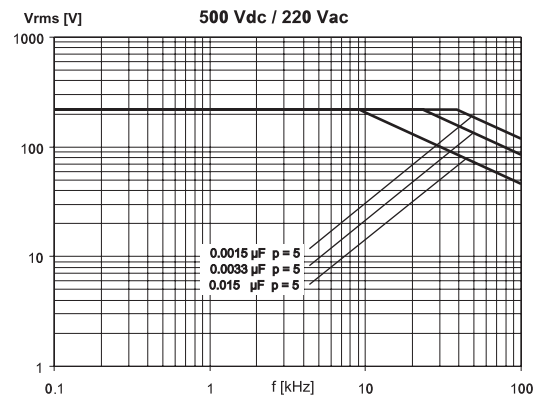
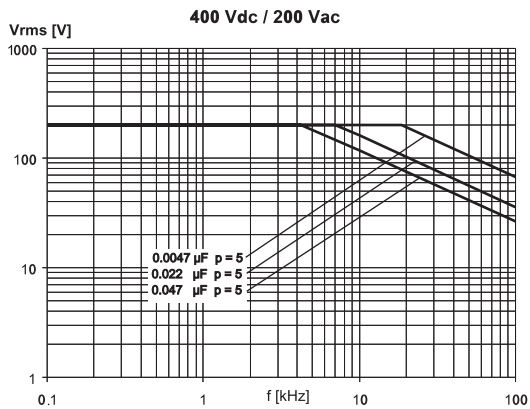
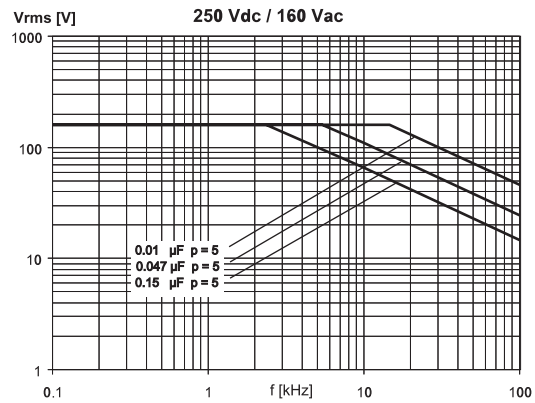
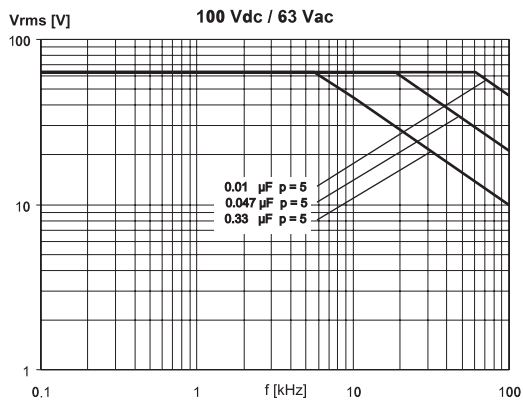
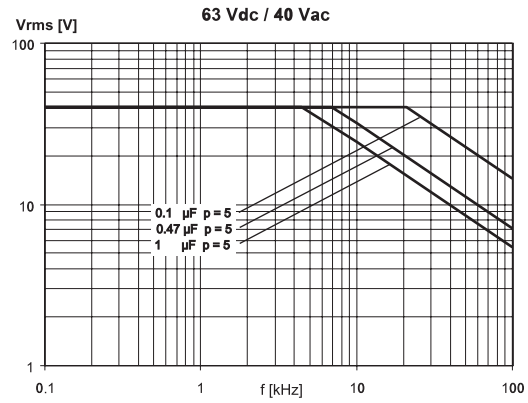
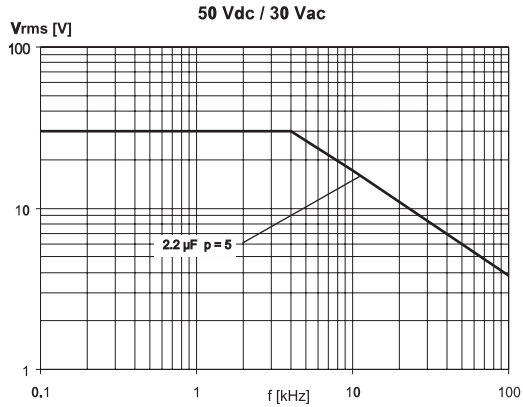
Insulation resistance: < 0.005 x initial limit.

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**p = 5 mm**  
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**MAX. VOLTAGE (Vr.m.s.) VERSUS FREQUENCY (sinusoidal wave-form / Th ≤ 85°C)**



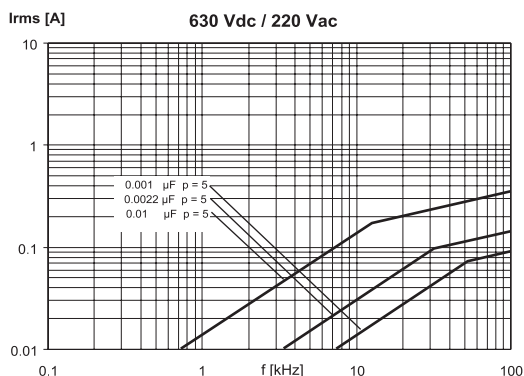
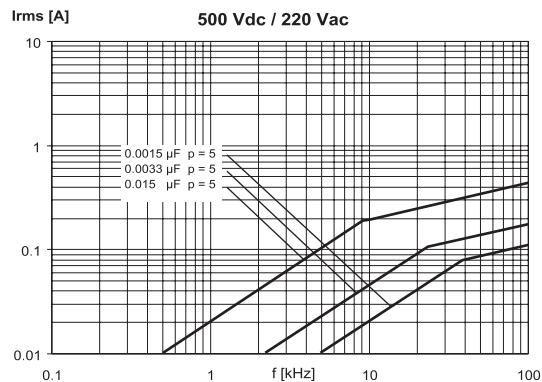
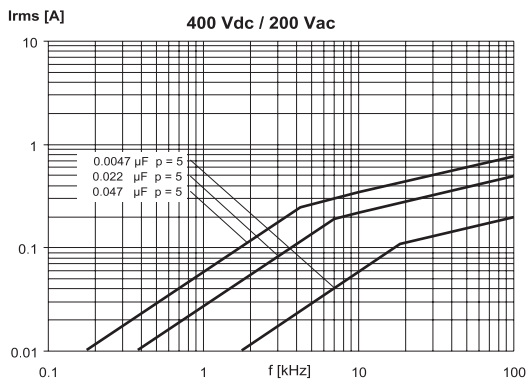
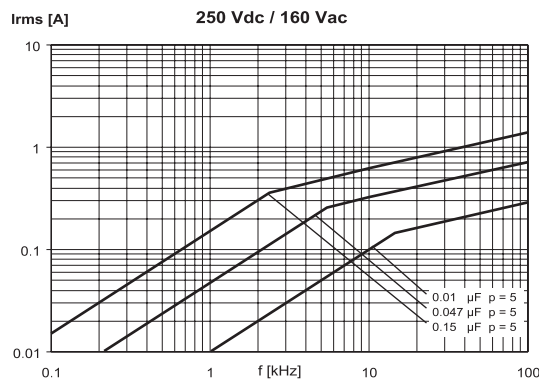
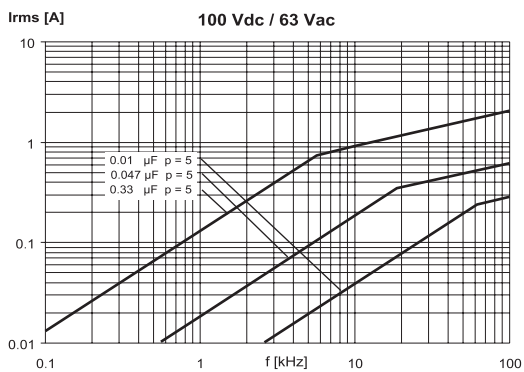
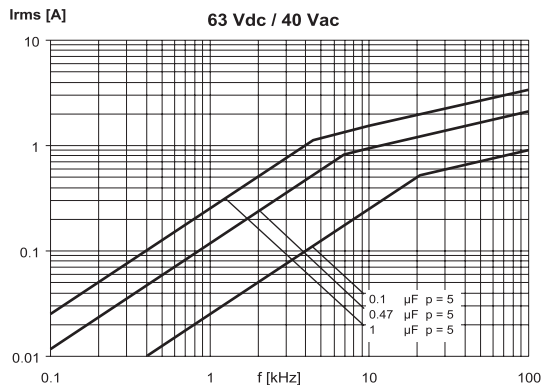
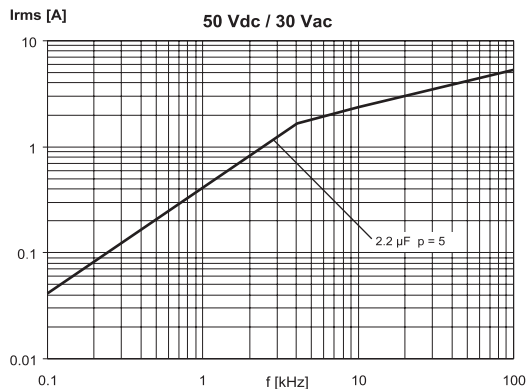
Note: p (pitch) in mm.

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**STACKED VERSION**

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PRODUCT CODE: **RSB**

MAX. CURRENT (I<sub>r.m.s.</sub>) VERSUS FREQUENCY (sinusoidal wave-form / Th ≤ 85°C)



Note: p (pitch) in mm.