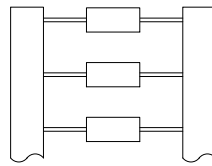
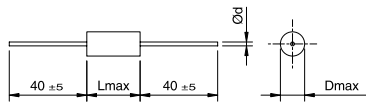


Loose

Taped



D max	<7	≥7<16	≥16
Ød ±0.05	0.6	0.8	1

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:  
C = 50V D = 63V E = 100V I = 250V  
M = 400V P = 630V Q = 1000V
- Digit 5 Length (mm):  
F=11; H=14; K=20.5; Q=28; T=33
- 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	Ordering code (Digit 10 to 11)
Reel Ø 355 mm	26
Loose	AA

Rated Cap.	50Vdc/30Vac		Max dv/dt (V/µs)	Max K <sub>0</sub> (V <sup>2</sup> /µs)	Part Number
	D <sub>max</sub>	L <sub>max</sub>			
0.47 µF	5.0	11.0	4.0	0.40 E3	A50CF 3470--0--
0.68 µF	5.0	11.0	4.0	0.40 E3	A50CF 3680--0--
1.0 µF	6.5	11.0	4.0	0.40 E3	A50CF 4100--0--
1.5 µF	7.0	14.0	4.0	0.40 E3	A50CH4150--0--
2.2 µF	8.0	14.0	4.0	0.40 E3	A50CH4220--0--
3.3 µF	7.5	20.5	2.0	0.20 E3	A50CK4330--0--
4.7 µF	8.5	20.5	2.0	0.20 E3	A50CK4470--0--
6.8 µF	10.0	20.5	2.0	0.20 E3	A50CK4680--0--
10.0 µF	12.0	20.5	2.0	0.20 E3	A50CK 5100--0--

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<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

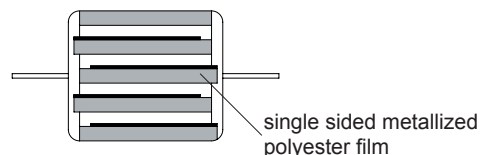
Typical applications: blocking, coupling, decoupling, by-passing, interference suppression in low voltage applications (i.e.:AUTOMOTIVE).

PRODUCT CODE: A50

### GENERAL TECHNICAL DATA

- Dielectric:** polyester film (polyethylene terephthalate).
- Plates:** aluminium layer deposited by evaporation under vacuum.
- Winding:** non-inductive type.
- Leads:** tinned wire.
- Protection:** polyester tape wrapping and thermosetting resin end fill.
- Marking:** Manufacturer's logo, series (1.50), dielectric code (MKT), capacitance, tolerance, D.C. rated voltage.
- Climatic category:** 55/105/56 IEC 60068-1
- Operating temperature range:** -55 to +105°C
- Related documents:** IEC 60384-2

### Winding scheme



Rated Cap.	63Vdc/40Vac		Max dv/dt (V/µs)	Max K <sub>0</sub> (V <sup>2</sup> /µs)	Part Number
	D <sub>max</sub>	L <sub>max</sub>			
0.33 µF	5.0	11.0	4.0	0.50 E3	A50DF 3330--6--
0.47 µF	6.0	14.0	4.0	0.50 E3	A50DH 3470--6--
0.68 µF	6.0	14.0	4.0	0.50 E3	A50DH 3680--6--
1.0 µF	7.0	14.0	4.0	0.50 E3	A50DH 4100--6--
1.5 µF	6.5	20.5	2.0	0.25 E3	A50DK 4150--6--
2.2 µF	8.0	20.5	2.0	0.25 E3	A50DK 4220--6--
3.3 µF	9.5	20.5	2.0	0.25 E3	A50DK 4330--6--
4.7 µF	9.5	28.0	1.5	0.19 E3	A50DQ 4470--6--
6.8 µF	11.0	28.0	1.5	0.19 E3	A50DQ 4680--6--
10.0 µF	11.5	33.0	1.0	0.13 E3	A50DT 5100--6--

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

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

PRODUCT CODE: **A50**

Rated Cap.	100Vdc/63Vac		Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	D <sub>max</sub>	L <sub>max</sub>			
0.10 μF	5.0	11.0	5.0	1.0 E3	A50EF 3100--6--
0.15 μF	5.0	11.0	5.0	1.0 E3	A50EF 3150--6--
0.22 μF	5.0	11.0	5.0	1.0 E3	A50EF 3220--6--
0.33 μF	6.0	14.0	5.0	1.0 E3	A50EH 3330--6--
0.47 μF	6.0	14.0	5.0	1.0 E3	A50EH 3470--6--
0.68 μF	7.0	14.0	5.0	1.0 E3	A50EH 3680--6--
1.0 μF	7.0	20.5	3.0	0.6 E3	A50EK 4100--6--
1.5 μF	8.0	20.5	3.0	0.6 E3	A50EK 4150--6--
2.2 μF	9.5	20.5	3.0	0.6 E3	A50EK 4220--6--
3.3 μF	9.5	28.0	2.0	0.4 E3	A50EQ 4330--6--
4.7 μF	10.0	33.0	1.0	0.3 E3	A50ET 4470--6--
6.8 μF	12.0	33.0	1.0	0.3 E3	A50ET 4680--6--
10.0 μF	14.5	33.0	1.0	0.3 E3	A50ET 5100--6--

Rated Cap.	250Vdc/160Vac		Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	D <sub>max</sub>	L <sub>max</sub>			
0.047 μF	5.0	11.0	10.0	5.0 E3	A50IF 2470--6--
0.068 μF	5.0	11.0	10.0	5.0 E3	A50IF 2680--6--
0.10 μF	5.5	14.0	10.0	5.0 E3	A50IH 3100--6--
0.15 μF	5.5	14.0	10.0	5.0 E3	A50IH 3150--6--
0.22 μF	6.5	14.0	10.0	5.0 E3	A50IH 3220--6--
0.33 μF	6.0	20.5	7.0	3.5 E3	A50IK 3330--6--
0.47 μF	7.0	20.5	7.0	3.5 E3	A50IK 3470--6--
0.68 μF	8.5	20.5	7.0	3.5 E3	A50IK 3680--6--
1.0 μF	8.5	28.0	4.0	2.0 E3	A50IQ 4100--6--
1.5 μF	10.0	28.0	4.0	2.0 E3	A50IQ 4150--6--
2.2 μF	11.0	33.0	2.5	1.3 E3	A50IT 4220--6--
3.3 μF	13.0	33.0	2.5	1.3 E3	A50IT 4330--6--
4.7 μF	15.5	33.0	2.5	1.3 E3	A50IT 4470--6--
6.8 μF	18.5	33.0	2.5	1.3 E3	A50IT 4680--6--
10.0 μF	22.0	33.0	2.5	1.3 E3	A50IT 5100--6--

Rated Cap.	400Vdc/200Vac		Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	D <sub>max</sub>	L <sub>max</sub>			
0.010 μF	5.0	11.0	13.5	11.0 E3	A50MF 2100--6--
0.015 μF	5.0	11.0	13.5	11.0 E3	A50MF 2150--6--
0.022 μF	5.0	11.0	13.5	11.0 E3	A50MF 2220--6--
0.033 μF	5.0	11.0	13.5	11.0 E3	A50MF 2330--6--
0.047 μF	6.0	14.0	13.5	11.0 E3	A50MH 2470--6--
0.068 μF	6.0	14.0	13.5	11.0 E3	A50MH 2680--6--
0.10 μF	6.5	14.0	13.5	11.0 E3	A50MH 3100--6--
0.15 μF	6.0	20.5	10.0	8.0 E3	A50MK 3150--6--
0.22 μF	7.5	20.5	10.0	8.0 E3	A50MK 3220--6--
0.33 μF	8.5	20.5	10.0	8.0 E3	A50MK 3330--6--
0.47 μF	8.5	28.0	6.5	5.2 E3	A50MQ 3470--6--
0.68 μF	10.0	28.0	6.5	5.2 E3	A50MQ 3680--6--
1.0 μF	10.5	33.0	4.0	3.2 E3	A50MT 4100--6--
1.5 μF	12.5	33.0	4.0	3.2 E3	A50MT 4150--6--
2.2 μF	15.0	33.0	4.0	3.2 E3	A50MT 4220--6--
3.3 μF	18.5	33.0	4.0	3.2 E3	A50MT 4330--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 cross-the-line applications. Please refer to Interference Suppression Capacitors (page 151).

Rated Cap.	630Vdc/220Vac*		Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	D <sub>max</sub>	L <sub>max</sub>			
1000 pF	5.0	11.0	20	25.0 E3	A50PF 1100--6--
1500 pF	5.0	11.0	20	25.0 E3	A50PF 1150--6--
2200 pF	5.0	11.0	20	25.0 E3	A50PF 1220--6--
3300 pF	5.0	11.0	20	25.0 E3	A50PF 1330--6--
4700 pF	5.0	11.0	20	25.0 E3	A50PF 1470--6--
6800 pF	5.0	11.0	20	25.0 E3	A50PF 1680--6--
0.010 μF	5.0	14.0	20	25.0 E3	A50PH 2100--6--
0.015 μF	5.0	14.0	20	25.0 E3	A50PH 2150--6--
0.022 μF	6.0	14.0	20	25.0 E3	A50PH 2220--6--
0.033 μF	6.0	20.5	15	19.0 E3	A50PK 2330--6--
0.047 μF	6.0	20.5	15	19.0 E3	A50PK 2470--6--
0.068 μF	7.0	20.5	15	19.0 E3	A50PK 2680--6--
0.10 μF	7.0	28.0	10	13.0 E3	A50PQ 3100--6--
0.15 μF	8.5	28.0	10	13.0 E3	A50PQ 3150--6--
0.22 μF	10.0	28.0	10	13.0 E3	A50PQ 3220--6--
0.33 μF	10.5	33.0	6	7.5 E3	A50PT 3330--6--
0.47 μF	12.0	33.0	6	7.5 E3	A50PT 3470--6--
0.68 μF	14.5	33.0	6	7.5 E3	A50PT 3680--6--
1.0 μF	17.5	33.0	6	7.5 E3	A50PT 4100--6--

Rated Cap.	1000Vdc/250Vac*		Max dv/dt (V/μs)	Max K <sub>0</sub> (V <sup>2</sup> /μs)	Part Number
	D <sub>max</sub>	L <sub>max</sub>			
1000 pF	6.5	14.0	50	100 E3	A50QH 1100--0--
1500 pF	6.5	14.0	50	100 E3	A50QH 1150--0--
2200 pF	6.5	14.0	50	100 E3	A50QH 1220--0--
3300 pF	6.5	14.0	50	100 E3	A50QH 1330--0--
4700 pF	7.5	14.0	50	100 E3	A50QH 1470--0--
6800 pF	8.0	14.0	50	100 E3	A50QH 1680--0--
0.010 μF	7.0	20.5	30	60 E3	A50QK 2100--0--
0.015 μF	7.5	20.5	30	60 E3	A50QK 2150--0--
0.022 μF	9.0	20.5	30	60 E3	A50QK 2220--0--
0.033 μF	8.0	28.0	15	30 E3	A50QQ 2330--0--
0.047 μF	9.0	28.0	15	30 E3	A50QQ 2470--0--
0.068 μF	10.5	28.0	15	30 E3	A50QQ 2680--0--
0.10 μF	12.5	28.0	15	30 E3	A50QQ 3100--0--
0.15 μF	13.5	33.0	10	20 E3	A50QT 3150--0--
0.22 μF	16.0	33.0	10	20 E3	A50QT 3220--0--
0.33 μF	19.0	33.0	10	20 E3	A50QT 3330--0--
0.47 μF	22.0	33.0	10	20 E3	A50QT 3470--0--

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

**ELECTRICAL CHARACTERISTICS**

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

50 Vdc 63 Vdc 100 Vdc 250 Vdc  
400 Vdc 630 Vdc 1000 Vdc

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

**Temperature derated voltage:**

for temperatures between +85°C and +105°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 10 $\mu$ F

**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):**  
tg $\delta$  10<sup>-4</sup> at +25°C ±5°C

kHz	C ≤ 0.1 $\mu$ F	0.1 $\mu$ F < C ≤ 1 $\mu$ F	C > 1 $\mu$ F
1	≤ 80	≤ 80	≤ 100
10	≤ 150	≤ 150	
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  $V_R \geq 100$  Vdc

**Performance**

**For  $V_R \leq 100$  Vdc**  
≥ 3750 M $\Omega$  for C ≤ 0.33 $\mu$ F (50000 M $\Omega$ )\*  
≥ 1000 s for C > 0.33 $\mu$ F (5000 s)\*

**For  $V_R > 100$  Vdc**  
≥ 30000 M $\Omega$  for C ≤ 0.33 $\mu$ F (50000 M $\Omega$ )\*  
≥ 10000 s for C > 0.33 $\mu$ F (17000 s)\*

\*Typical value

**Test voltage between terminations:**

1.6x $V_R$  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  $|\Delta C/C|$ : ≤ 5%  
DF change ( $\Delta \text{tg}\delta$ ): ≤ 50x10<sup>-4</sup> at 1kHz  
Insulation resistance: ≥ 50% of initial limit.

**Endurance:**

**Test conditions**

Temperature: +85°C ±2°C  
Test duration: 2000 h  
Voltage applied: 1.25x $V_R$

**Performance**

Capacitance change  $|\Delta C/C|$ : ≤ 5%  
DF change ( $\Delta \text{tg}\delta$ ): ≤ 30x10<sup>-4</sup> at 10kHz for C ≤ 1 $\mu$ F  
≤ 20x10<sup>-4</sup> at 1kHz for C > 1 $\mu$ F  
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  $|\Delta C/C|$ : ≤ 2%  
DF change ( $\Delta \text{tg}\delta$ ): ≤ 30x10<sup>-4</sup> at 10kHz for C ≤ 1 $\mu$ F  
≤ 20x10<sup>-4</sup> at 1kHz for C > 1 $\mu$ F  
Insulation resistance: ≥ initial limit.

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

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

**Performance**

Capacitance change  $|\Delta C/C|$ : ≤ 3% for C ≤ 0.1 $\mu$ F  
≤ 2% for C > 0.1 $\mu$ F

**RELIABILITY:**

Reference MIL HDB 217

**Application conditions:**

Temperature: +40°C ±2°C  
Voltage: 0.5x $V_R$   
Failure rate: ≤ 5 FIT  
(1 FIT = 1x10<sup>-9</sup> failures/components x h)

**Failure criteria:**

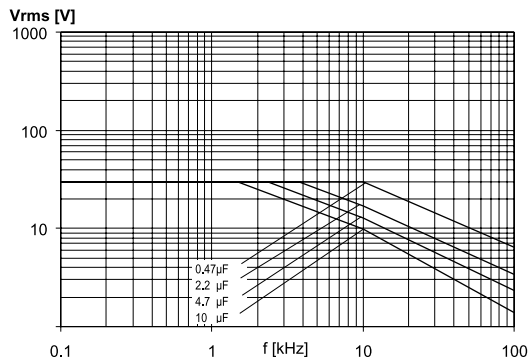
(according to DIN 44122)

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

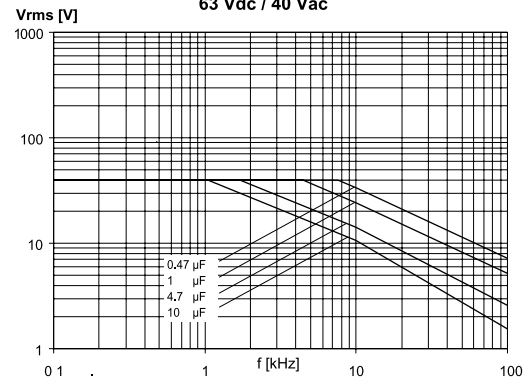
**METALLIZED POLYESTER FILM CAPACITOR**  
**D.C. MULTIPURPOSE APPLICATIONS**  
PRODUCT CODE: **A50**

MAX. VOLTAGE (Vr.m.s.) VERSUS FREQUENCY (sinusoidal wave-form /  $T_h \leq 40^\circ\text{C}$ )

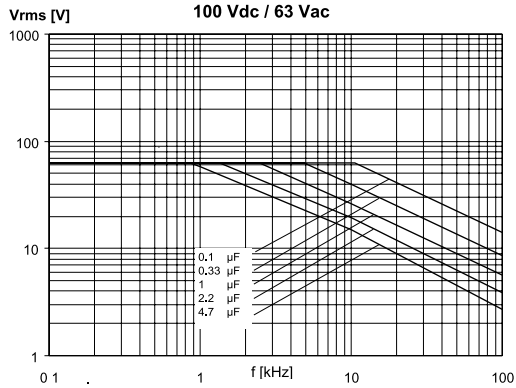
**50 Vdc / 30 Vac**



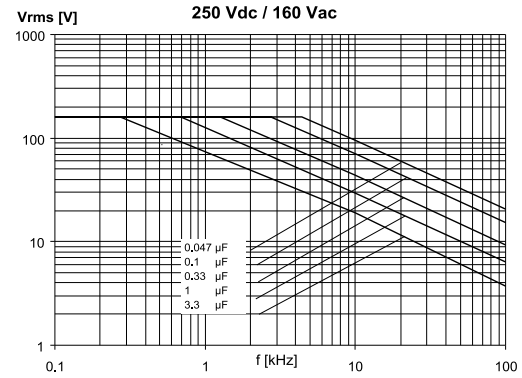
**63 Vdc / 40 Vac**



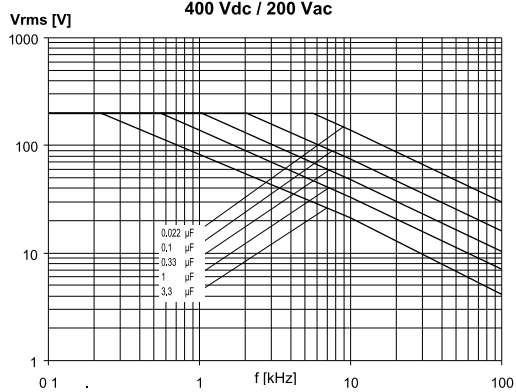
**100 Vdc / 63 Vac**



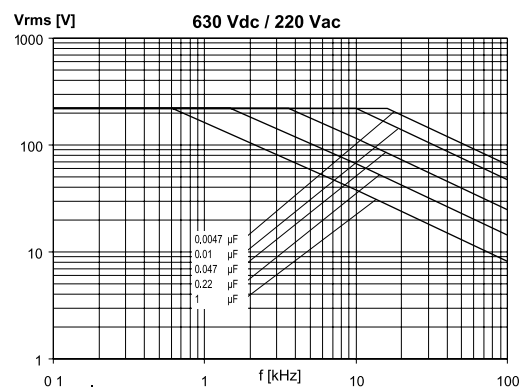
**250 Vdc / 160 Vac**



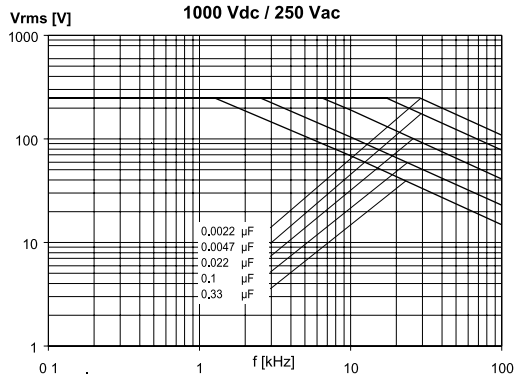
**400 Vdc / 200 Vac**



**630 Vdc / 220 Vac**



**1000 Vdc / 250 Vac**



**METALLIZED POLYESTER FILM CAPACITOR**  
**D.C. MULTIPURPOSE APPLICATIONS**  
PRODUCT CODE: **A50**

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

