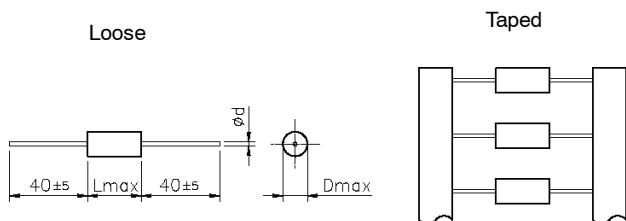


METALLIZED POLYESTER FILM CAPACITOR MULTIPURPOSE APPLICATIONS

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

PRODUCT CODE: A50

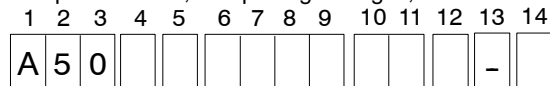


D max	< 7	≥ 7 < 16	≥ 16
∅ d ± 0.05	0.6	0.8	1

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%.

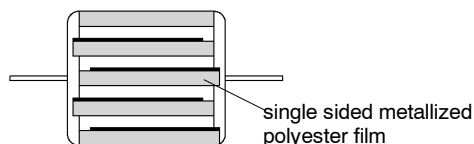
Table 1 (for more detailed information, please refer to page 13).

Standard packaging style	Ordering code (Digit 10 to 11)
Reel ∅ 355 mm	26
Loose	AA

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 epoxy resin end fill.
- Marking:** manufacturer's logo, series (1.50), dielectric code (MKT), capacitance, tolerance, D.C. rated voltage.
- Climatic category:** 55/100/56 IEC 60068-1
- Operating temperature range:** -55 to +105°C
- Related documents:** IEC 60384-2; CECC 30400

Winding scheme



Rated Cap.	50Vdc/30Vac		Max dv/dt (V/μs)	Max K ₀ (V ² /μs)	Part Number
	D	L			
0.47μF	5.0	11.0	4.0	0.50 E3	A50CF 3470--0--
0.68μF	5.0	11.0	4.0	0.50 E3	A50CF 3680--0--
1.0μF	6.5	11.0	4.0	0.50 E3	A50CF 4100--0--
1.5μF	7.0	14.0	4.0	0.50 E3	A50CH 4150--0--
2.2μF	8.0	14.0	4.0	0.50 E3	A50CH 4220--0--
3.3μF	7.5	20.5	2.0	0.25 E3	A50CK 4330--0--
4.7μF	8.5	20.5	2.0	0.25 E3	A50CK 4470--0--
6.8μF	10.0	20.5	2.0	0.25 E3	A50CK 4680--0--
10.0μF	12.0	20.5	2.0	0.25 E3	A50CK 5100--0--

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

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

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 K₀ depends on the voltage wave-form and in any case it cannot overcome the value given in the above table.

**MKT Series
METALLIZED POLYESTER FILM CAPACITOR
MULTIPURPOSE APPLICATIONS
PRODUCT CODE: A50**

Rated Cap.	100Vdc/63Vac		Max dv/dt (V/μs)	Max K ₀ (V ² /μs)	Part Number
	D	L			
0.10μF	5.0	11.0	5	1.0 E3	A50EF 3100--6--
0.15μF	5.0	11.0	5	1.0 E3	A50EF 3150--6--
0.22μF	5.0	11.0	5	1.0 E3	A50EF 3220--6--
0.33μF	6.0	14.0	5	1.0 E3	A50EH 3330--6--
0.47μF	6.0	14.0	5	1.0 E3	A50EH 3470--6--
0.68μF	7.0	14.0	5	1.0 E3	A50EH 3680--6--
1.0μF	7.0	20.5	3	0.6 E3	A50EK 4100--6--
1.5μF	8.0	20.5	3	0.6 E3	A50EK 4150--6--
2.2μF	9.5	20.5	3	0.6 E3	A50EK 4220--6--
3.3μF	9.5	28.0	2	0.4 E3	A50EQ 4330--6--
4.7μF	10.0	33.0	1	0.3 E3	A50ET 4470--6--
6.8μF	12.0	33.0	1	0.3 E3	A50ET 4680--6--
10.0μF	14.5	33.0	1	0.3 E3	A50ET 5100--6--

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

Rated Cap.	400Vdc/200Vac		Max dv/dt (V/μs)	Max K ₀ (V ² /μs)	Part Number
	D	L			
0.010μF	5.0	11.0	13.5	11.0 E3	A50MF 2100--6--
0.015μF	5.0	11.0	13.5	11.0 E3	A50MF 2150--6--
0.022μF	5.0	11.0	13.5	11.0 E3	A50MF 2220--6--
0.033μF	5.0	11.0	13.5	11.0 E3	A50MF 2330--6--
0.047μF	6.0	14.0	13.5	11.0 E3	A50MH2470--6--
0.068μF	6.0	14.0	13.5	11.0 E3	A50MH2680--6--
0.10μF	6.5	14.0	13.5	11.0 E3	A50MH3100--6--
0.15μF	6.0	20.5	10.0	8.0 E3	A50MK3150--6--
0.22μF	7.5	20.5	10.0	8.0 E3	A50MK3220--6--
0.33μF	8.5	20.5	10.0	8.0 E3	A50MK3330--6--
0.47μF	8.5	28.0	6.5	5.2 E3	A50MQ3470--6--
0.68μF	10.0	28.0	6.5	5.2 E3	A50MQ3680--6--
1.0μF	10.5	33.0	4.0	3.2 E3	A50MT 4100--6--
1.5μF	12.5	33.0	4.0	3.2 E3	A50MT 4150--6--
2.2μF	15.0	33.0	4.0	3.2 E3	A50MT 4220--6--
3.3μF	18.5	33.0	4.0	3.2 E3	A50MT 4330--6--

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 K₀ 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 105).

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

Rated Cap.	1000Vdc/250Vac*		Max dv/dt (V/μs)	Max K ₀ (V ² /μs)	Part Number
	D	L			
1000pF	6.5	14.0	50	100 E3	A50QH1100--6--
1500pF	6.5	14.0	50	100 E3	A50QH1150--6--
2200pF	6.5	14.0	50	100 E3	A50QH1220--6--
3300pF	6.5	14.0	50	100 E3	A50QH1330--6--
4700pF	7.5	14.0	50	100 E3	A50QH1470--6--
6800pF	8.0	14.0	50	100 E3	A50QH1680--6--
0.010μF	7.0	20.5	30	60 E3	A50QK 2100--6--
0.015μF	7.5	20.5	30	60 E3	A50QK 2150--6--
0.022μF	9.0	20.5	30	60 E3	A50QK 2220--6--
0.033μF	8.0	28.0	15	30 E3	A50QQ2330--6--
0.047μF	9.0	28.0	15	30 E3	A50QQ2470--6--
0.068μF	10.5	28.0	15	30 E3	A50QQ2680--6--
0.10μF	12.5	28.0	15	30 E3	A50QQ3100--6--
0.15μF	13.5	33.0	10	20 E3	A50QT 3150--6--
0.22μF	16.0	33.0	10	20 E3	A50QT 3220--6--
0.33μF	19.0	33.0	10	20 E3	A50QT 3330--6--
0.47μF	22.0	33.0	10	20 E3	A50QT 3470--6--

Mechanical version and packaging (Table 1)
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 has to be applied.

Capacitance range: 1000pF to 10µF

Capacitance values:

E6 series (IEC 60063 Norm).

Capacitance tolerances (measured at 1 kHz):

± 5% (J); ± 10% (K); ± 20% (M).

Total self-inductance (L):

max 1 nH per 1 mm lead and capacitor length.

Dissipation factor (DF):

tgδ × 10⁻⁴ at +25°C ± 5°C

kHz	C ≤ 0.1µF	0.1µF < C ≤ 1µF	C > 1 µF
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 ≥ 100 Vdc

Performance

For V_R ≤ 100 Vdc

≥ 3750 MΩ for C ≤ 0.33µF (50000 MΩ)*

≥ 1000 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 × 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): ≤ 50 × 10⁻⁴ at 1kHz

Insulation resistance: ≥ 50% of initial limit.

Endurance:

Test conditions

Temperature: +85°C ± 2°C

Test duration: 2000 h

Voltage applied: 1.25 × V_R

Performance

Capacitance change |ΔC/C|: ≤ 5%

DF change (Δtgδ): ≤ 30 × 10⁻⁴ at 10kHz for C ≤ 1µF

≤ 20 × 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): ≤ 30 × 10⁻⁴ at 10kHz for C ≤ 1µF

≤ 20 × 10⁻⁴ at 1kHz for C > 1µF

Insulation resistance: ≥ initial limit.

Long term stability (after two years):

Storage: standard environmental conditions (see page 10).

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 × V_R

Failure rate: ≤ 5 FIT

(1 FIT = 1 × 10⁻⁹ failures/components × h)

Failure criteria:

(according to DIN 44122)

Short or open circuit

Capacitance change |ΔC/C|: > 10%

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

Insulation resistance: < 0.005 × initial limit.

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

