ISO 9001:2015
TÜV SÜD

MKPP-I35P

Power-electronics DC / AC capacitors for general use

General characteristics

MKPP-I35P capacitors are power electronics capacitors designed for use in DC and AC circuits with values according to technical data. They can also be used in alternating voltage circuits with a non-sinusoidal shape. They meet the requirements of the EN 61071 standard concerning capacitors for power electronics devices.

The design of the capacitors minimizes the parasitic inductance, and the self-healing metallized film system improves the safety of capacitors.

The low inductance and series resistance of the capacitors allows their use in applications in which high current pulses will flow through the capacitors. Capacitors are made in a cylindrical casing of self-extinguishing glass-epoxy or plastic material, capacitor winding element is encapsulated with resin.

ATTENTION:
The capacitors are not equipped with a discharging device, voltage and energy level stored in capacitors is dangerous for human health and life. Be especially careful during assembly, service and maintenance of devices containing these capacitors.

*) - the dimensions and parameters of the capacitors may change

MIFLEX S.A.
ZAKŁADY PODZESPOŁÓW RADIOWYCH
99-300 KUTNO, ul.GRUNWALDZKA 3
Telephone: +48 24 355 11 00
Fax: +48 24 355 11 88
e-mail: miflexsa@miflex.com.pl

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Basic technical data

Capacitance range	0,1 ÷ 10uF - see tab. 1 other capacitances after individual agreement
Capacitance tolerance	J: ±5%
Dielectric dissipation factor (tgδ)	0,0002
Expected lifetime	150 000h @ θ_{hs} +70°C to U_{NDC}
Minimum operating temperature θ_{min}	-40°C
Maximum operating temperature θ_{max}	+85°C
Hottest ambient point θ_{hs}	+85°C
Insulation resistance	C x R_{is} ≥ 5000s
IEC climatic category	40/085/56
Humidity class	maximum relative humidity: 65% on average per year, occasionally 75%, 85% for 60 days a year, condensation is not allowed
Maximum operating altitude	2000m above sea level

Type and parameters of tests

Electrical strength between terminals U_{TT}	1,5U_{NDC}, 10s
Electrical strength between terminals and casing U_{TC}	4000V_{AC}, 60s
Endurance testing	according to EN 61071

Design data

Dielectric type	metallized polypropylene with self-healing properties
Filling	without PCB, solid PUR resin
Working position	any
Type of work	continuous
Cooling	natural or forced
Housing	glass-epoxy or plastic material, V0 or V2
Level of protection	IP00
Protection	no internal protection
Discharging device	none
Terminals type	axial, with internal thread, M6 or M8 (see table 1)
Tightening torques	4-7 Nm (see table 1)
Overload, maximum allowable voltage	1,10U_{NDC} 30% of working time in one day 1,15U_{NDC} 30 min /d 1,20U_{NDC} 5 min /d 1,30U_{NDC} 1 min /d 1,50U_{NDC} 30ms not more than 1000 times during the life time

Standards, directives, certificates

EN 61071 - Capacitors for power electronics
RoHS
REACH
UL 94

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Storage and use

It is suggested not to store capacitors for more than 5 years. After 1 year of storage, it is recommended to perform initial measurement of capacitance and tgδ factor before switching on the power supply.
The polypropylene film capacitors do not require electric forming before use (as in the case of electrolytic capacitors).

Storage conditions to be met:
- relative humidity: 75% on average per year
- maximum relative humidity: 95%, 30 days a year
- condensation: not allowed
- minimum storage temperature: -40 °C
- maximum storage temperature: +85 °C

Capacitors should be stored in closed rooms with no corrosive atmosphere (for example the presence of chlorides and gaseous sulphides, acids, alkaline substances, salts or equivalent substances are not permitted). Packed capacitors should be transported carefully, especially while using a forklift.

Terms and definitions

U_{NDC} - Rated DC voltage for which the capacitor has been designed for continuous operation.

U_{NAC} - Rated AC voltage for which the capacitor has been designed for continuous operation.

U_{RMS} - RMS effective voltage value on the capacitor.

U_S - Unique impact voltage. Peak value of voltage caused by switching operations or other disturbances in the system operation, with a duration shorter than the period of the basic course, the occurrence of which is allowed a limited number of times.

C_N - Rated capacity measured at 20°C±5°C at 1kHz frequency and 1V voltage.

E_n - Energy stored in the capacitor when charged at rated voltage.

I_{max} - Maximum effective value of the current during continuous operation.

$\hat{I}$ - Maximum peak current. Maximum, repeatable peak current value that can occur during continuous operation.

$\hat{I}_s$ - Maximum impact current. Peak value of current caused by switching operations or other disturbancesin the work of the system, with a duration shorter than the period of the basic course, the occurrence of which isacceptable in a limited number of times.

R_s - Series resistance. Resistance of capacitor current paths under specific operating conditions.

L_S - Self-inductance. Sum of inductances of all internal capacitor elements.

M_V - Maximum tightening torque.

θ_{amb} - The temperature of the cooling air. The temperature of the cooling air measured in the hottest spot of a capacitor bank, in conditions set at half the distance between two capacitors, in the case of a single capacitor, this is the temperature measured at a point about 0.1 m away from the housing in 2/3 of the height of the capacitor, measured from the base.

θ_{min} - The lowest operating temperature. The lowest temperature of the dielectric, at which voltage applied can be connected to the capacitor terminals.

θ_{max} - Maximum working temperature. The highest temperature of housing at which the capacitor can work.

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Terms and definitions

θ_{hs} - The temperature of the hottest point inside the capacitor. The temperature θ_{hs} can be estimated in accordance with the given formula. During operation, the temperature θ_{hs} cannot be exceeded. At rated load and not exceeding this temperature, the expected lifetime will be consistent with the given value with the statistical failure rate of 300FIT.

$$\theta_{hs}=\theta_{amb} + I^2_{max} \cdot R_{esr} \cdot R_{th}$$

R_{esr} - The equivalent series resistance of the capacitor, which in series with the capacitor of the capacity equivalent to capacitance of the considered capacitor, will cause in it a loss of power equal to the active power released in the capacitor under specific operating conditions.

R_{th} - Thermal resistance. Indicates how many degrees the temperature of the capacitor rises in the hottest point due to power losses.

P_{max} - Maximum power loss. Maximum power loss allowed at maximum temperature of the capacitor housing.

$$P_{max}=\frac{\theta_{hs}-\theta_{amb}}{R_{th}}$$

C_N [µF]	E_N [J]	I_{max} [A]	$\hat{I}$ [kA]	$\hat{I}_S$ [kA] 1)	R_S [mΩ]	L_S [nH]	L1 ±2 [mm]	L2 ±2 [mm]	D1±2 [mm]	D2 ±0.2 [mm]	thread [M]	M_V [Nm]	m [kg]	Dwg.	Index
U_{NDC}=3000V / U_{NAC}=1400V / U_{RMS}=1000V / U_S = 4500V 1)															
0,50	2,3	30	0,4	1,2	6,0	≤ 15	56	66	55	14	M6	4	0,22	1	I35PKA450J-A1
U_{NDC}=3200V / U_{NAC}=1050V / U_{RMS}=750V / U_S = 4800V 1)															
2,0	10,2	60	0,8	2,3	2,0	≤ 15	56	66	74	20	M8	7	0,44	1	I35PKE520J-A1
6,0	31	100	2,2	11	0,6	≤ 15	56	66	106	20	M8	7	0,73	1	I35PKE560J-A1
U_{NDC}=3600V / U_{NAC}=1400V / U_{RMS}=1000V / U_S = 4800V 1)															
10,0	65	100	6	15	1,6	≤ 15	98	108	116	20	M8	7	1,55	1	I35PKM610J-A1
U_{NDC}=3750V / U_{NAC}=2100V / U_{RMS}=1500V / U_S = 5600V 1)															
0,10	0,7	6	0,05	0,15	28	≤ 15	56	66	35	14	M6	4	0,11	1	I35PKP410J-A1
0,22	1,5	10	0,1	0,3	15	≤ 15	56	66	45	14	M6	4	0,16	1	I35PKP422J-A1
0,47	3,3	20	0,7	2,1	5,0	≤ 15	56	66	55	14	M6	4	0,22	1	I35PKP447J-A1
2,0	14	70	0,8	2,4	1,8	≤ 15	56	66	102	20	M8	7	0,71	1	I35PKP520J-A1

1) - no more than 1000 times during the life time

Other capacitances and voltages are possible - according to individual arrangements

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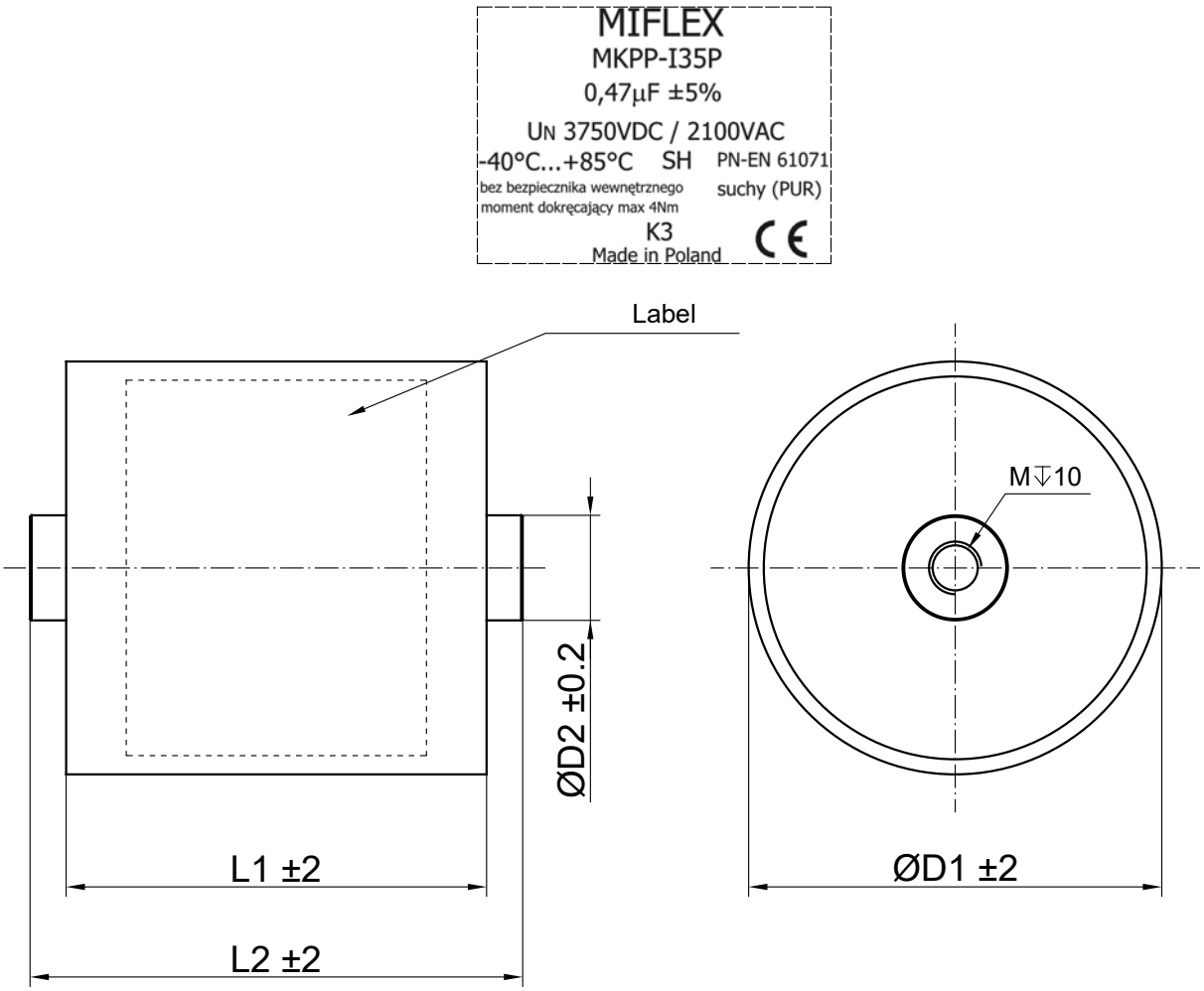
Drawing 1



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