VISHAY INTERTECHNOLOGY, INC.

DATA BOOK

POWER ELECTRONIC CAPACITORS

VISHAY ESTA

DC-Capacitors

www.vishay.com

SEMICONDUCTORS

RECTIFIERS
- Schottky (single, dual)
- Standard, Fast, and Ultra-Fast Recovery (single, dual)
- Bridge
- Superectifier®
- Sinterglass Avalanche Diodes

HIGH-POWER DIODES AND THYRISTORS
- High-Power Fast-Recovery Diodes
- Phase-Control Thyristors
- Fast Thyristors

SMALL-SIGNAL DIODES
- Schottky and Switching (single, dual)
- Tuner/Capacitance (single, dual)
- Bandswitching
- PIN

ZENER AND SUPPRESSOR DIODES
- Zener (single, dual)
- TVS (TRANSZORB®, Automotive, ESD, Arrays)

FETs
- Low-Voltage TrenchFET® Power MOSFETs
- High-Voltage TrenchFET® Power MOSFETs
- High-Voltage Planar MOSFETs
- JFETs

RF TRANSISTORS
- Bipolar Transistors (AF and RF)
- Dual Gate MOSFETs
- MOSMICs®

OPTOELECTRONICS
- IR Emitters and Detectors, and IR Receiver Modules
- Optocouplers and Solid-State Relays
- Optical Sensors
- LEDs and 7-Segment Displays
- Infrared Data Transceiver Modules
- Custom Products

ICs
- Power ICs
- Analog Switches
- RF Transceivers and Receiver Modules
- ICs for Optoelectronics

MODULES AND ASSEMBLIES
- Automotive Modules and Assemblies
- Power Modules (contain power diodes, thyristors, MOSFETs, IGBTs)
- DC/DC Converters

PASSIVE COMPONENTS

RESISTIVE PRODUCTS
- Foil Resistors
- Film Resistors
  - Metal Film Resistors
  - Thin Film Resistors
  - Thick Film Resistors
  - Metal Oxide Film Resistors
  - Carbon Film Resistors
- Wirewound Resistors
- Power Metal Strip® Resistors
- Chip Fuses
- Variable Resistors
  - Cermet Variable Resistors
  - Wirewound Variable Resistors
  - Conductive Plastic Variable Resistors
- Networks/Arrays
- Non-Linear Resistors
  - NTC Thermistors
  - PTC Thermistors
  - Varistors

MAGNETICS
- Inductors
- Transformers

CAPACITORS
- Tantalum Capacitors
  - Molded Chip Tantalum Capacitors
  - Coated Chip Tantalum Capacitors
  - Solid Through-Hole Tantalum Capacitors
  - Wet Tantalum Capacitors
- Ceramic Capacitors
  - Multilayer Chip Capacitors
  - Disc Capacitors
- Film Capacitors
- Power Capacitors
- Heavy-Current Capacitors
- Aluminum Capacitors
- Silicon RF Capacitors

STRAIN GAGE TRANSDUCERS AND STRESS ANALYSIS SYSTEMS
- PhotoStress®
- Strain Gages
- Load Cells
- Force Transducers
- Instruments
- Weighing Systems
- Specialized Strain Gage Systems

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Power Electronic Capacitors

GENERAL TECHNICAL INFORMATION

Basic Information 2
Technology, Design and Definitions 3
Technical Data 4

CAPACITOR TYPE DESCRIPTION 5

DIMENSIONAL DRAWINGS 8

REQUEST FOR QUOTATION 9

Power Electronic Capacitors

BASIC INFORMATION

Power electronic capacitors (PEC) are specially designed for DC-voltage and for non-sinusodial waveforms of voltages and currents.

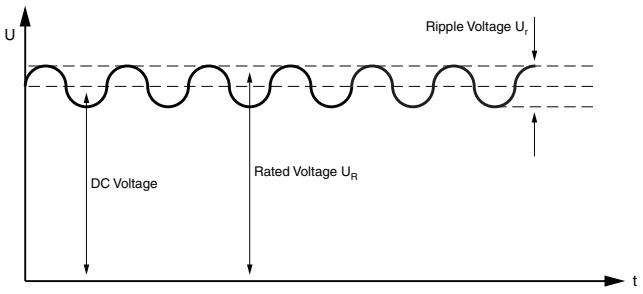
QUICK REFERENCE DATA	
DESCRIPTION	**VALUE**
Nominal case size (D x L in mm)	30 x 52 to 84 x 190
Rated capacitance range	0.1 µF to 470 µF
Tolerance	± 10 %
Rated voltage range U_N	400 V to 2400 V
Temperature range case	- 25 °C to + 70 °C
Storage temperature	- 40 °C to + 85 °C
Specification	IEC 61071-1
Useful life	100 000 h
Loss factor at 50 Hz	1.5×10^{-4}
Loss factor at 14 kHz	4.0×10^{-4}

FEATURES

- Very low stray inductance down to 10 nH
- Extremely low losses at high frequencies
- Low ESR < 4 mΩ
- Highest RMS current rating up to 100 kA
- High impulse discharge current capability
- Resistance to heavy-duty shock and vibration
- High reliability and life expectancy > 180 000 h/100 FIT
- Non-polar dielectric

DC APPLICATION

DC capacitors are periodically charged and discharged. This capacitor type is used to reduce the AC component of a DC voltage. Supporting or DC-filter capacitors are used for energy storage.

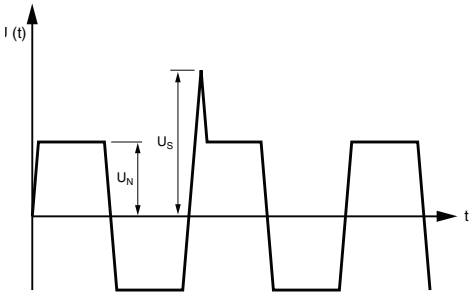


Definitions:

- **Rated voltage U_N**
  Maximum operating peak voltage of either polarity of a reversing or non reversing voltage.
- **Ripple voltage U_r**
  Peak to peak alternating component of the unidirectional voltage

AC APPLICATION

AC capacitors are periodically recharged during operation.
AC capacitors serve as damping or snubber capacitors for suppression of undesirable voltage spikes.
Communication capacitors quench the conductive state of thyristors.



Definitions:

- **Rated voltage U_N**
  Maximum operating peak voltage of either polarity of a reversing or non reversing voltage.
- **Non recurrent surge voltage U_S**
  Peak voltage induced by a switching or any other disturbance of the system which is allowed for a limited number of times and for durations shorter than the basic period.

TECHNOLOGY AND DESIGN

MKP-Dielectric

The favourite dielectric material for PEC is Polypropylene. It is a special high temperature Polypropylene film with a thin metallization on one side of the film. The metallization has a optimized structure in mixture of Aluminium/Zinc and in the ohmic profile which depends on the application and capacitor demands.

Selfhealing effect

As a result of the selfhealing effect, the capacitor is full operativ after an electrical breakdown. A breakdown generates a small electric arc which evaporates the metallization around the area of breakdown in only a view microseconds and at very low energy. The localized increase in gas pressure caused by the high temperature of the arc, blows off the gaseous metallization away from the breakdown point. By means of this process, a metall free, non-conductive isolation crescent is formed which enables continous full operation of the capacitor.

Winding element

All selfhealing capacitors comprising of one ore more individual cylindric winding elements. For contacting the elements in parallel or in series a solderable lead-free metall base layer is sprayed onto the front sides of the winding elements. The process of metall spraying is called "schooping". The connection of the windings in parallel or in series is accomplished by means of higly flexible copper material. In this way the capacitors are able to fullfill the most highest demands of current load, low inductive characteristics, low ohmic drop and shock and vibration fail proof.

Filling material

After mounting the stack of winding elements into the cases, the capacitors are dried under vacuum and gas impregnated with N2 (Nitrogen) before filling.

- Dry casting
  Most of the selfhealing capacitors in rectangular cases and a number of capacitors in cylindrical cans are filled with a soft resin mainly based on vegetable castor oil. The casting compound R 25 developed by Vishay remains elastic throughout the entire life of the capacitor.
  This elastic casting compound offers outstanding shock and vibration protection for the internal structure and long-lasting protection against the penetration of moisture into the electrical components of the capacitor.
  A very good thermal conductivity of the casting compound enables maximum capacitor loads under high temperature stress conditions.
  The casting compound can be treated as ordinary waste.
- Vegetable oil
  For capacitors with tear-off protection, preference is given to impregnation using a specially produced and stabilized vegetable oil.

STANDARDS

The capacitors listed in this catalog are subject to the international standards for “capacitors for power electronics”:

- IEC 61071-1; EN 61071-1
- IEC 61881; EN 61881

DEFINITIONS

Rated capacitance (C_N)

of a capacitor is the capacitance by which it is designated. The term is related to 20 °C capacitor temperature, 50 Hz and rated voltage.

Tolerance on capacitance

is the capacitance range within which the actual capacitance may differ from rated capacitance (CN).

Rated voltage (U_N)

is the maximum of mixed voltages or the peak of AC voltages for which the dielectric of capacitors is designed, adhering to the characteristics and other rated values specified. Rated voltage is not the rms value but the maximum or peak capacitor voltage.

Rated voltage (U_N) DC-capacitors

is the maximum operating peak voltage of either polarity but of a non-reversing type waveform, for which the capacitors have been designed, for continuous operation.

Periodic peak voltage (U_S)

is the periodically permissible peak voltage. The characteristic and permissible duration of exposure are given.

Peak voltage ($U_{smax.}$)

is the maximum voltage which may be allowed to occur across the capacitor sporadically and for a brief period, e.g. in the event of a fault. The characteristic and permissible load duration are given in most cases.

Ratio of voltage reversal (D)

is the ratio between the second voltage peak and the first voltage peak for dampened dying-out surge discharge, expressed as a percentage.

Rated insulation voltage (U_i)

is the rms AC voltage for which the insulation of the capacitor is designed and designed with terminal connected to case.

Rated current (I_N)

is the current by which the capacitor is designated and in particular for which its current paths are designed. Rated current is the maximum rms level of steady-state current.

Peak surge current (I_S)

is the maximum level of current which may be allowed to occur across the capacitor sporadically for a short period e.g. in the event of a fault. The characteristic and permissible duration are given.

Dielectric loss factor (tan δ_0)

is the loss factor of the dielectric which is assumed to be constant for the normal dielectrics and their operating frequency range.

Minimum temperature

The lowest temperature at the surface of the capacitor case (ready for operation) at which the capacitor may be switched on. Lower temperatures are usually permissible for transport and and storage.

Maximum temperature

The highest temperature which the hottest point of the capacitor case may reach during operation, including selfheating.

Reliability

The operating reliability of the capacitor is determined by the number of failures within an adequately large batch expected to occur after a specified time (life expectancy).
DIN 40040 has replaced the previous term “operating reliability” by the new term “reference reliability”.

Reference reliability

Reference reliability is expressed in terms of failure quota and respective load duration (not including storage times).
Reference reliability is the reliability for defined load (reference load). The reference exposure figure quoted relates to operation under nominal conditions and the application class given in the data lists.

Failure ratio

The failure ratio is the relationship between the number of failed capacitors and the total number of capacitors used.
It applies to a particular capacitor only and the load duration cited (life expectancy). The figure quoted in the data lists is an average which is generally not exceeded if examining an adequately large number of capacitors.

FIT

FIT = failures in time

The failure rate in FIT indicates the maximum failed components within 1×10^9 component operation hours.

TECHNICAL DATA

Operating Mode

continuous operation

Impregnation

vegetable oil

Operating Temperature Range

min./max. casing temperature: - 25/+ 70 °C
min./max. storage temperature:- 40/+ 75 °C
hot spot temperature: ≤ + 85 °C

Self-Discharge Time Constant

> 10 000 s

Life Expectancy with 3 % Failure Rate

100 000 h; hot spot maximum + 70 °C

Mounting Position

vertical/horizontal
upside down position: upon request only

Protection

overpressure tear-off fuse

Loss Factor

tan δ $< 10 \times 10^{-4}$

Capacitance Tolerance

± 10 %

Test Voltages

terminal/terminal
AC test voltage r.m.s. 1.5 U_N/10 s
DC test voltage 1.5 U_{NDC}/10 s

terminal/casing
2 x U_i + 1000 V or 2000 V, whichever is the highest value

Power Electronic Capacitors ESTAprop

EMKP 400 (U_N = 400 V, U_{rms} = 280 V, U_{DC} = 750 V, U_S = 1125 V)												
TYPE	**C_N [µF]**	**$I_{MAX.}$ [A]**	**dU/dt [V/µs]**	**R_S [mΩ]**	**$R_{\theta th}$ [K/W]**	**I [kA]**	**I_S [kA]**	**DIA. [mm]**	**HEIGHT H [mm]**	**WEIGHT [kg]**	**FIGURE**	**PACKING UNIT**
EMKP 400-15 IA	15	15	60	2.6	24.9	0.20	0.6	40	52	0.08	A	50
EMKP 400-22 IA	22	16	50	3.0	19.4	0.22	0.7	40	72	0.1	A	50
EMKP 400-33 IA	33	19	50	2.3	18.5	0.33	1.0	50	72	0.2	A	25
EMKP 400-47 IB	47	27	50	1.6	12.8	0.47	1.4	64	72	0.3	D	9
EMKP 400-68 IB	68	26	40	1.9	11.5	0.49	1.5	64	72	0.3	D	9
EMKP 400-100 IB	100	24	20	2.8	9.5	0.46	1.4	64	109	0.4	D	9
EMKP 400-150 IB	150	44	40	1.2	6.4	1.09	3.3	84	72	0.5	D	4
EMKP 400-220 IB	220	39	20	1.7	5.8	1.02	3.1	84	109	0.8	D	4
EMKP 400-330 IB	330	82	40	0.7	3.1	2.33	7.0	84	140	1.0	D	4
EMKP 400-470 IB	470	74	20	0.9	2.9	2.17	6.5	84	190	1.3	D	4

EMKP 650 (U_N = 650 V, U_{rms} = 460 V, U_{DC} = 1200 V, U_S = 1800 V)												
TYPE	**C_N [µF]**	**$I_{MAX.}$ [A]**	**dU/dt [V/µs]**	**R_S [mΩ]**	**$R_{\theta th}$ [K/W]**	**I [kA]**	**I_S [kA]**	**DIA. [mm]**	**HEIGHT H [mm]**	**WEIGHT [kg]**	**FIGURE**	**PACKING UNIT**
EMKP 650-4,7 IA	4.7	11	90	4.1	27.9	0.10	0.3	35	52	0.06	A	50
EMKP 650-6,8 IA	6.8	14	90	3.1	24.4	0.15	0.5	40	52	0.08	A	50
EMKP 650-10 IA	10	16	90	2.4	23.1	0.22	0.7	50	52	0.1	A	25
EMKP 650-15 IA	15	14	50	4.4	18.4	0.17	0.5	50	72	0.2	A	25
EMKP 650-22 IB	22	25	70	1.9	12.6	0.35	1.1	64	72	0.3	D	9
EMKP 650-33 IB	33	25	50	2.2	10.9	0.38	1.1	64	72	0.3	D	9
EMKP 650-47 IB	47	22	30	3.4	9.2	0.35	1.1	64	109	0.4	D	9
EMKP 650-68 IB	68	48	50	1.2	5.6	0.79	2.4	64	140	0.6	D	9
EMKP 650-100 IB	100	58	50	0.9	4.7	1.16	3.5	84	140	1.0	D	4
EMKP 650-150 IB	150	53	30	1.3	4.0	1.11	3.3	84	190	1.3	D	4

EMKP 950 (U_N = 950 V, U_{rms} = 670 V, U_{DC} = 1800 V, U_S = 2700 V)												
TYPE	**C_N [µF]**	**$I_{MAX.}$ [A]**	**dU/dt [V/µs]**	**R_S [mΩ]**	**$R_{\theta th}$ [K/W]**	**I [kA]**	**I_S [kA]**	**DIA. [mm]**	**HEIGHT H [mm]**	**WEIGHT [kg]**	**FIGURE**	**PACKING UNIT**
EMKP 950-0,10 IA	0.10	7	1800	7.8	37.0	0.04	0.1	30	52	0.05	A	100
EMKP 950-0,22 IA	0.22	9	1260	5.5	34.2	0.06	0.2	30	52	0.05	A	100
EMKP 950-0,33 IA	0.33	7	1270	8.0	39.2	0.04	0.1	30	52	0.05	A	100
EMKP 950-0,47 IA	0.47	6	360	10.3	45.8	0.04	0.1	30	52	0.05	A	100
EMKP 950-0,68 IA	0.68	7	360	7.5	39.6	0.06	0.2	30	52	0.05	A	100
EMKP 950-1,0 IA	1.0	9	360	5.5	32.8	0.08	0.2	30	52	0.05	A	100
EMKP 950-1,5 IA	1.5	11	360	4.0	31.3	0.13	0.4	40	52	0.08	A	50
EMKP 950-2,2 IA	2.2	14	360	3.1	24.9	0.19	0.6	40	52	0.1	A	50
EMKP 950-3,3 IA	3.3	17	360	2.4	23.2	0.28	0.8	50	52	0.1	B	25
EMKP 950-4,7 IA	4.7	16	250	3.1	19.5	0.27	0.8	50	72	0.2	B	25
EMKP 950-6,8 IA	6.8	18	170	3.0	16.2	0.27	0.8	50	72	0.2	B	25
EMKP 950-10 IB	10	25	170	2.0	11.9	0.40	1.2	64	72	0.3	D	9
EMKP 950-15 IB	15	22	100	3.1	10.2	0.36	1.1	64	109	0.4	D	9
EMKP 950-22 IB	22	29	100	2.4	7.5	0.53	1.6	64	109	0.4	D	9
EMKP 950-33 IB	33	36	100	1.9	6.4	0.80	2.4	84	109	0.8	D	4
EMKP 950-47 IB	47	80	170	0.7	3.3	1.88	5.6	84	140	1.0	D	4
EMKP 950-68 IB	68	67	100	1.0	3.3	1.64	4.9	84	190	1.3	D	4

EMKP 1200 (U_N = 1200 V, U_{rms} = 850 V, U_{DC} = 2250 V, U_S = 3375 V)												
TYPE	**C_N [µF]**	**$I_{MAX.}$ [A]**	**dU/dt [V/µs]**	**R_S [mΩ]**	**$R_{\theta th}$ [K/W]**	**I [kA]**	**I_S [kA]**	**DIA. [mm]**	**HEIGHT H [mm]**	**WEIGHT [kg]**	**FIGURE**	**PACKING UNIT**
EMKP 1200-0,68 SA	0.68	13	900	3.1	30.1	0.14	0.4	40	52	0.08	C	50
EMKP 1200-1,0 SA	1.0	16	900	2.4	24.0	0.21	0.6	40	52	0.08	C	50
EMKP 1200-1,5 SA	1.5	14	600	3.4	21.0	0.20	0.6	40	72	0.1	C	50
EMKP 1200-2,2 IA	2.2	17	600	2.7	20.1	0.29	0.9	50	72	0.2	B	25
EMKP 1200-3,3 IA	3.3	15	400	3.7	17.9	0.28	0.8	50	72	0.2	B	25
EMKP 1200-4,7 IB	4.7	34	600	1.2	11.3	0.62	1.9	50	127	0.3	D	25
EMKP 1200-6,8 IB	6.8	46	600	1.0	7.3	0.90	2.7	64	127	0.5	D	9
EMKP 1200-10 IB	10	62	600	0.8	5.1	1.32	4.0	64	127	0.5	D	9
EMKP 1200-15 IB	15	53	400	1.0	5.2	1.28	3.8	64	140	0.6	D	9
EMKP 1200-22 IB	22	65	400	0.8	4.3	1.87	5.6	84	140	1.0	D	4
EMKP 1200-33 IB	33	50	200	1.3	4.6	1.61	4.8	84	140	1.0	D	4
EMKP 1200-47 IB	47	67	200	1.1	3.1	2.29	6.9	84	190	1.3	D	4

EMKP 1450 (U_N = 1450 V, U_{rms} = 1030 V, U_{DC} = 2700 V, U_S = 4050 V)												
TYPE	**C_N [µF]**	**$I_{MAX.}$ [A]**	**dU/dt [V/µs]**	**R_S [mΩ]**	**$R_{\theta th}$ [K/W]**	**I [kA]**	**I_S [kA]**	**DIA. [mm]**	**HEIGHT H [mm]**	**WEIGHT [kg]**	**FIGURE**	**PACKING UNIT**
EMKP 1450-0,68 SA	0.68	15	1100	2.7	25.0	0.17	0.5	40	52	0.08	C	50
EMKP 1450-1,0 IA	1.0	17	1100	2.2	23.7	0.25	0.8	50	52	0.1	B	25
EMKP 1450-1,5 IA	1.5	15	700	3.0	20.8	0.24	0.7	50	72	0.2	B	25
EMKP 1450-2,2 IA	2.2	18	700	3.0	15.0	0.24	0.7	64	72	0.3	B	25
EMKP 1450-3,3 IB	3.3	30	700	1.6	10.5	0.52	1.6	64	72	0.3	D	9
EMKP 1450-4,7 IB	4.7	24	400	2.3	11.4	0.48	1.4	64	72	0.3	D	9
EMKP 1450-6,8 IB	6.8	55	700	0.9	5.9	1.08	3.2	64	109	0.4	D	9
EMKP 1450-10 IB	10	68	700	0.7	4.6	1.59	4.8	84	127	0.9	D	4
EMKP 1450-15 IB	15	59	400	0.9	4.6	1.53	4.6	84	140	1.0	D	4
EMKP 1450-22 IB	22	47	200	1.5	4.6	1.29	3.9	84	190	1.3	D	4
EMKP 1450-33 IB	33	63	200	1.2	3.2	1.93	5.8	84	190	1.3	D	4

EMKP 1650 (U_N = 1650 V, U_{rms} = 1170 V, U_{DC} = 3150 V, U_S = 4725 V)												
TYPE	**C_N [µF]**	**$I_{MAX.}$ [A]**	**dU/dt [V/µs]**	**R_S [mΩ]**	**$R_{\theta th}$ [K/W]**	**I [kA]**	**I_S [kA]**	**DIA. [mm]**	**HEIGHT H [mm]**	**WEIGHT [kg]**	**FIGURE**	**PACKING UNIT**
EMKP 1650-0,22 IA	0.22	9	1300	5.5	34.2	0.06	0.2	30	52	0.05	C	100
EMKP 1650-0,33 IA	0.33	11	1300	4.0	30.0	0.10	0.3	35	52	0.1	C	100
EMKP 1650-0,47 IA	0.47	13	1300	3.1	26.6	0.14	0.4	40	52	0.1	C	50
EMKP 1650-0,68 IA	0.68	15	1300	2.5	25.3	0.20	0.6	50	52	0.1	B	50
EMKP 1650-1,0 IA	1.0	14	800	3.6	22.3	0.19	0.6	50	72	0.2	B	50
EMKP 1650-1,5 IA	1.5	18	800	2.7	17.7	0.28	0.8	50	72	0.2	B	25
EMKP 1650-2,2 IB	2.2	45	1300	0.9	8.4	0.65	2.0	64	109	0.4	D	9
EMKP 1650-3,3 IB	3.3	38	800	1.2	8.3	0.61	1.8	64	127	0.5	D	9
EMKP 1650-4,7 IB	4.7	50	800	1.0	6.2	0.87	2.6	64	127	0.5	D	9
EMKP 1650-6,8 IB	6.8	60	800	0.8	5.3	1.26	3.8	84	127	0.9	D	4
EMKP 1650-10 IB	10	51	500	1.1	5.4	1.19	3.6	84	140	1.0	D	4
EMKP 1650-15 IB	15	41	300	1.7	5.0	1.02	3.1	84	190	1.3	D	4
EMKP 1650-22 IB	22	55	300	1.4	3.7	1.50	4.5	84	190	1.3	D	4

EMKP 2250 (U_N = 2250 V, U_{rms} = 1590 V, U_{DC} = 4050 V, U_S = 6075 V)												
TYPE	**C_N [µF]**	**$I_{MAX.}$ [A]**	**dU/dt [V/µs]**	**R_S [mΩ]**	**$R_{\theta th}$ [K/W]**	**I [kA]**	**I_S [kA]**	**DIA. [mm]**	**HEIGHT H [mm]**	**WEIGHT [kg]**	**FIGURE**	**PACKING UNIT**
EMKP 2250-0,22 SA	0.22	11	1600	4.5	29.4	0.08	0.2	35	52	0.06	C	100
EMKP 2250-0,33 SA	0.33	13	1600	3.3	25.2	0.13	0.4	40	52	0.1	C	50
EMKP 2250-0,47 IA	0.47	15	1600	2.6	24.2	0.18	0.5	50	52	0.1	B	25
EMKP 2250-0,68 IA	0.68	13	1000	3.9	21.4	0.16	0.5	50	72	0.2	B	25
EMKP 2250-1,0 IA	1.0	31	1600	1.2	13.0	0.38	1.1	50	109	0.3	B	25
EMKP 2250-1,5 IA	1.5	28	1000	1.7	11.6	0.36	1.1	50	127	0.3	B	25
EMKP 2250-2,2 IB	2.2	36	1000	1.4	8.3	0.52	1.6	64	127	0.5	E	9
EMKP 2250-3,3 IB	3.3	32	600	1.9	7.8	0.51	1.5	64	140	0.6	E	9
EMKP 2250-4,7 IB	4.7	42	600	1.4	6.0	0.72	2.2	64	140	0.6	E	9
EMKP 2250-6,8 IB	6.8	50	600	1.1	5.2	1.04	3.1	84	140	1.0	E	4
EMKP 2250-10 IB	10	68	600	0.9	3.5	1.53	4.6	84	140	1.0	E	4
EMKP 2250-15 IB	15	53	400	1.5	3.6	1.28	3.8	84	190	1.3	E	4

EMKP 2400 (U_N = 2400 V, U_{rms} = 1700 V, U_{DC} = 4500 V, U_S = 6750 V)												
TYPE	**C_N [µF]**	**$I_{MAX.}$ [A]**	**dU/dt [V/µs]**	**R_S [mΩ]**	**$R_{\theta th}$ [K/W]**	**I [kA]**	**I_S [kA]**	**DIA. [mm]**	**HEIGHT H [mm]**	**WEIGHT [kg]**	**FIGURE**	**PACKING UNIT**
EMKP 2400-0,22 SA	0.22	11	1800	4.1	28.8	0.09	0.3	40	52	0.08	C	100
EMKP 2400-0,33 IA	0.33	13	1800	3.1	26.7	0.14	0.4	50	52	0.1	B	25
EMKP 2400-0,47 IA	0.47	12	1100	4.7	23.7	0.12	0.4	50	72	0.2	B	25
EMKP 2400-0,68 IA	0.68	15	1100	3.6	19.1	0.18	0.5	50	72	0.2	B	25
EMKP 2400-1,0 IA	1.0	13	700	5.3	17.2	0.17	0.5	50	72	0.2	B	25
EMKP 2400-1,5 IB	1.5	50	1800	0.9	7.0	0.63	1.9	64	109	0.4	B	9
EMKP 2400-2,2 IB	2.2	41	1100	1.2	7.3	0.58	1.7	64	127	0.5	B	9
EMKP 2400-3,3 IB	3.3	51	1100	0.9	6.1	0.87	2.6	84	127	0.9	E	9
EMKP 2400-4,7 IB	4.7	42	700	1.3	6.2	0.80	2.4	84	140	1.0	E	9
EMKP 2400-6,8 IB	6.8	57	700	1.1	4.4	1.16	3.5	84	140	1.0	E	4
EMKP 2400-10 IB	10	44	400	1.8	4.3	0.97	2.9	84	190	1.3	E	4

STANDARD CAPACITORS IN CYLINDRICAL CASING, OIL IMPREGNATED, SELF-HEALING, WITH FUSE

Dimensional Drawings

Dimensional drawings of the bushing on last page of this datasheet.

Design IA

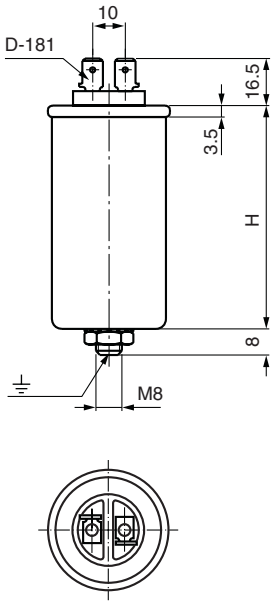


Figure A

Design IA

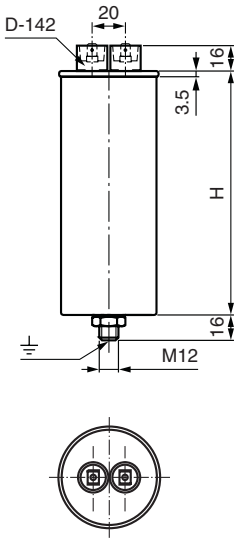


Figure B

Design SA

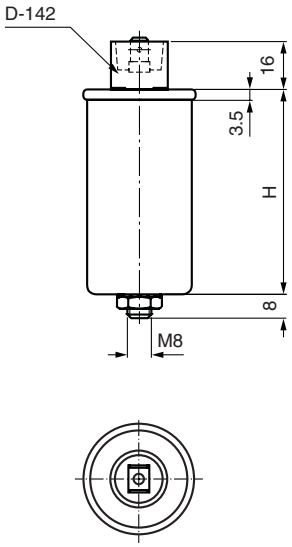


Figure C

Design IB

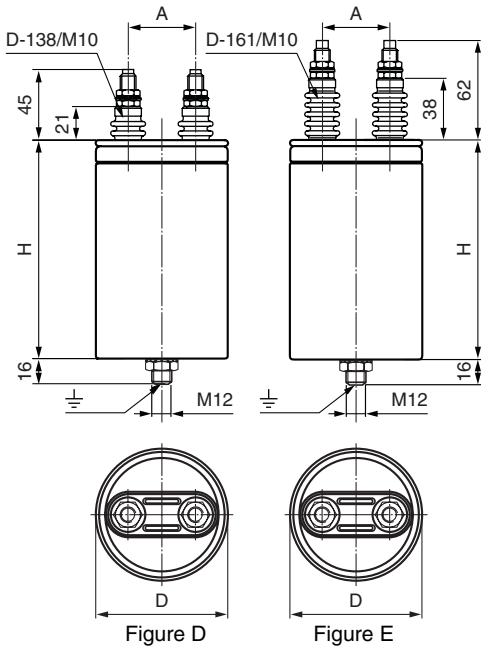


Figure D

Figure E

		VALUE		REMARKS
Capacitance	C	.....	µF	.....
- Tolerance		.....	%	.....
Voltage				
- Rated AC voltage	U_N	.....	V	.....
- Rated DC voltage	U_{NDC}	.....	V	.....
- Ripple voltage	U_r	.....	V	.....
- Pulse frequency	f_p	.....	Hz	.....
- Non-recurrent surge voltage	U_S	.....	V	.....
- Voltage rate of rise (repetitive)	dU/dt	.....	V/µs	.....
Current				
- Maximum peak current	$\in$	.....	A	.....
- Maximum RMS current	$I_{max.}$	.....	A	.....
- Maximum surge current	$\in_S$	.....	A	.....
Expected Life Time		.....	h	
Climatic Conditions				
- Operating temperature range		$\theta_{min.}$ ..... °C	$\theta_{max.}$ ..... °C	
- Ambient temperature/on.load-duration		Temperature 50 % to 60 %		..... °C
		Temperature 60 % to 70 %		..... °C
- Cooling	Forced cooling ☐		Natural cooling ☐	
Installation	Indoor ☐		Outdoor ☐	
Maximum Dimensions	L x W x H	.....		.....
Further Requirements				
- Qantity		.....	pieces	.....
- Request lead time		.....	weeks	.....
- Additional requirements				
- Application	.....			

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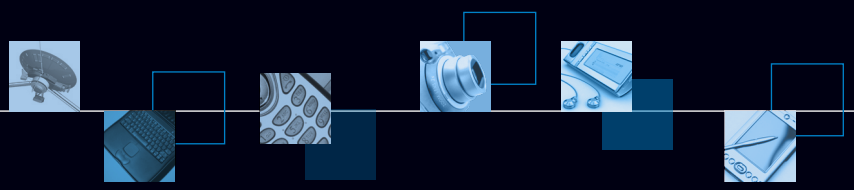

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