

General Technical Information/data

SPEL Power Electronics Capacitors are specially designed for use in DC-voltage environment with Non-sinusoidal waveforms of voltage and current, for DC Power Electronic Applications such as Switching circuits, DC filtering, and Renewable energy systems.

Construction

Available Rated Capacitance Value	40µF to 2600µF
Standard capacitance tolerance	±10%
Available Rated Voltage	700 VDC to 2400 VDC
Product Type/Dielectric	Non-polar, Self-Healing Metallized Polypropylene
Case Type	Round/Square, Aluminum /Metal/Plastic Can
Terminations	Male (M6 to M10), Female (M6 to M10)
Impregnation /Encapsulation	Non-PCB, Flame-Retardant PU (UL94,V-0)
Operating Temperature Range	-25 °C to +70/85 °C
Storage Temperature	-40 °C to +85 °C
Hot spot temperature	<= +85 °C @ Air temp 70 °C with I _{max-rms} = 220 Amps
Loss factor @ 50Hz	< 0.0002
Loss factor @14 KHz	<0.0005
Humidity	<95 %
Maximum altitude	2000 m above sea level
Useful Life (Lifetime)	>150 000h @ Air temp <65°C, at Rated Voltage and I _{rms} = 220 Amps max.
Failure rate (@ T _{amb} = 45°C	<300 FIT
Operating Mode	Continuous Operation
Safety Mechanism/Construction	In Accordance to UL810B
Reference Standard	EN 61071, IS: 13648:1993, Reaffirmed 2013

Test data

Mechanical Test	In accordance with IS:9000 (Part 8): 1981
Voltage between terminals U _{TT}	1.75 x Rated VDC for max. 10 seconds
Voltage between terminals and case U _{Tc}	(2 x Insulation Voltage+1000) VAC or 3000VAC @ 50 Hz. whichever is highest... for 60 seconds
Thermal Stability test	In accordance to IS: 13648
Cooling	Naturally air-cooled (or forced air cooling)
Degree of protection	Indoor mounting

Caution: Please read and follow Important notes at the end of this document.

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Typical/Specific Data pertaining to P2K2P0A4MKD1KN other than above

Capacitance Value	2200 μ F +/- 10% /1000 VDC
Type	SH. MPP, Dry PU Encapsulated NPCB
Encapsulation	Non-PCB, URECAST FR-M1+PU-MI (UL94,V-0)
Container	Square Aluminum Can, Powder Coated
Corrosion Protection	C3-H level protection
Product Application	DC-Link Capacitor for Power Convertor
Dielectric dissipation factor (tan δ)	<0.0002 measured at 50Hz. <0.0005 measured at 14 Khz.
Terminal type, size/ Max. torque	Tinned Brass Female M8 x 15, 6 Nm
Self-Inductance	<30 nH
ESR	<0.2 milli-Ohms
Max RMS Current	>=220 Amps (110 Amps per Terminal) from 2.5 & 5.0 Khz IGBT switching
Ripple Voltage	>300VAC peak to peak AC component
Surge DC Voltage	1700 VDC peak for 30mS
Peak Non-Repetitive Voltage	1200 V peak value @ 5 min per day max.
Max. Peak Current	>10 KA
Max. Surge Current	>50 KA
DC voltage test between terminals	1750 VDC for 10 seconds max.
AC voltage test between Terminal/Case	3000VAC @ 50 Hz. For 60 seconds
Weight	<= 25.0 Kgs.

TECHNOLOGY AND DESIGN

MPP-SH : MPP stands for Metallized Polypropylene, and SH is indicative of Self-healing properties/feature. A special high thermal grade Polypropylene with optimized profile of Aluminum/Zinc metallization is the best suitable material for Power Electronic applications. The unique properties of self-healing mechanism keeps the capacitor in full operative mode even after an electrical breakdown.

In event of breakdown in capacitor the so generate arc at that point evaporates the metallization around faulty area within microseconds and this fault area becomes nonconductive and gets isolated from rest of capacitor, and Capacitor is back to normal operating mode

Winding & Schooping : Winding of MPP Film into Element and then the process of metal spraying (schooping) is the most critical operation in capacitor manufacturing process. At SPEL we are equipped with the globally available the best capacitor winding machines from “METAR” a Swiss company.

Metal spraying is done with robotic assisted XY plotter system for uniform consistent deposition.

Assembly & Encapsulation: The Parallel connection of elements is accomplished by means of highly flexible copper material to fulfill the highest demands of current loads, low ohmic drop, and low inductive characteristics. This stack/assembly housed in case is vacuum encapsulated with UL94, V-0 certified Flame-retardant Polyurethane

Standards: The Product mentioned in this catalog is manufactured and tested in accordance with requirements as per EN 61071, IS: 13648:1993 Reaffirmed 2013, Construction in accordance to UL810B intended to reduce the risk of rupture and venting of the capacitor under internal fault conditions.

DEFINITIONS:

Rated capacitance (C_N): Rated capacitance 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: It is the capacitance range within which the actual capacitance may differ from rated capacitance (C_N).

Rated voltage (U_N) DC-capacitors: It 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.

Ripple voltage (U_R): It is peak to peak alternating component of unidirectional voltage.

Non-recurrent Surge Voltage (U_s): A peak voltage induced by a switching or any other disturbances of the system which is allowed for a limited number of times and for durations shorter than the basic period.

Peak voltage (U_{smax.}): It 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): It 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): The rms rated value of the insulation voltage of capacitive elements and terminals to case or earth. If not specified, then rms value of the insulating voltage is equivalent to the rated voltage divided by $\sqrt{2}$

Rated current (I_N): It 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): The admissible peak current induced by a switching or any other disturbance of the system which is allowed for a limited number of times.

CAUTION:

1. In case of dents of more than 1 mm depth or any other mechanical damage, capacitors must not be used at all.
2. Check tightness of the connections/terminals periodically.
3. The energy stored in capacitors may be lethal. To prevent any chance of shock, discharge and short-circuit the capacitor before handling
4. Failure to follow cautions may result, worst case, in premature failures, bursting and fire.
5. SPEL is not responsible for any kind of possible damages to persons or things due to improper installation and application of capacitors for power electronics.

SAFETY:

1. Electrical or mechanical misapplication of capacitors may be hazardous. Personal injury or property damage may result from bursting of the capacitor or from expulsion of oil or melted material due to mechanical disruption of the capacitor.
2. Ensure good, effective grounding for capacitor enclosures.
3. Observe appropriate safety precautions during operation (*self-recharging phenomena and the high energy contained in capacitors*).
4. Handle capacitors carefully, because they may still be charged even after disconnection.
5. The terminals of capacitors, connected bus bars and cables as well as other devices may also be energized.
6. Follow good engineering practice.
7. The capacitor should be installed in a way that mechanical damages and dents in the can are avoided.

STORAGE & OPERATING CONDITIONS:

1. Do not use or store capacitors in corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present.
2. In dusty environments, regular maintenance and cleaning especially of the terminals is required to avoid conductive path between phases and/or phases and ground.
3. The maximum storage temperature is 85 °C.

For more information/Drawings/support, please contact spel.capacitor@gmail.com or visit www.capacitorsite.com

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