MPF71 – IGBT Snubber Capacitors

Features

- **Dielectric** – Low Loss Polypropylene
- **Electrode** - Aluminium Foil plus metallized Polypropylene
- **Coil** - Non inductively wound series connection
- **Leads** - Radial Copper Wires OR Copper Lugs
- **Construction** - Rectangular plastic box, Resin sealed
- **Markings** - ***El-Ci-Ar*** logo, Capacitance, Voltage, Type
- **Capacitor Tolerance** - 10% (K), 5% (J)
- **Dissipation Factor** <= 0.0001 at 1KHz at 25°C
- **Test Voltage** – 1.6 x Vr for 2 sec
- **Temperature Range from** -55°C to +105°C
- **IEC Specification** – IEC 384-17
- **Insulation Resistance** ≥ 100 GΩ for C <= 0.33uF
  ≥ 20 GΩ for C ≥ 0.33uF (At 25°C and test voltage of 500 VDC for 1 minute)

TAN δ (DISSIPATION FACTOR) AT 25°C

FREQUENCY (KHz)	CR < 0.1 µF	0.1uF <Cr < 1uF
At 1 KHz	0.05 %	0.0 5%
At 10 KHz	0.1 %	0.1 %
At 100 KHz	0.3 %	0.5 %

Application

IGBT protection circuits in

- Snubber networks
- Power Electronics
- Energy Conversion
- SMPS

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Life Testing

DC Conditions

Loading at elevated Temperature – Loaded at 1.25 times of rated DC Voltage at 105 °C for 1000 hrs

After the test: - Change in Capacitance Δ c/c ≤ 3% of initial value.

– Change in Tan δ ≤ 0.002

– Insulation Resistance ≥ 50% of initial value

AC Conditions

Loading at elevated Temperature – Loaded at 1.25 times of rated DC Voltage at 70 °C for 1000 hrs

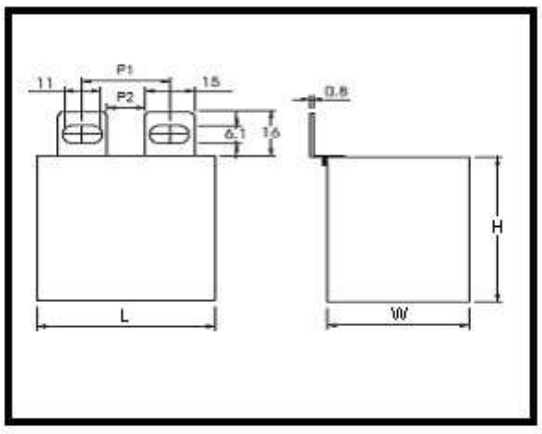
After the test: - Change in Capacitance Δ c/c ≤ 3% of initial value.

– Change in Tan δ ≤ 0.002

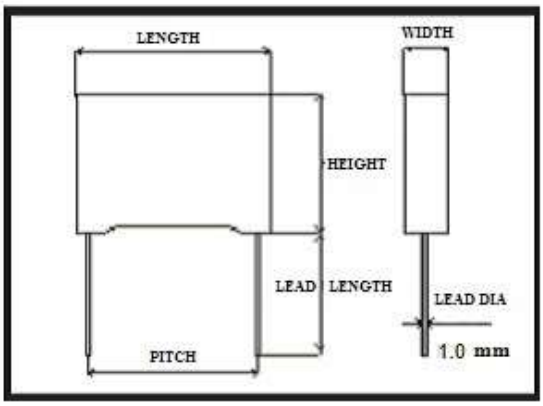
– Insulation Resistance ≥ 50% of initial value

Approvals

Capacitors are tested as per IEC 384-17



L TYPE



W TYPE

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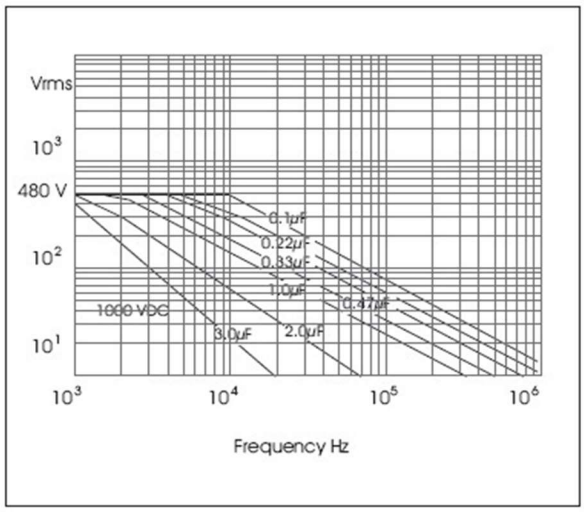
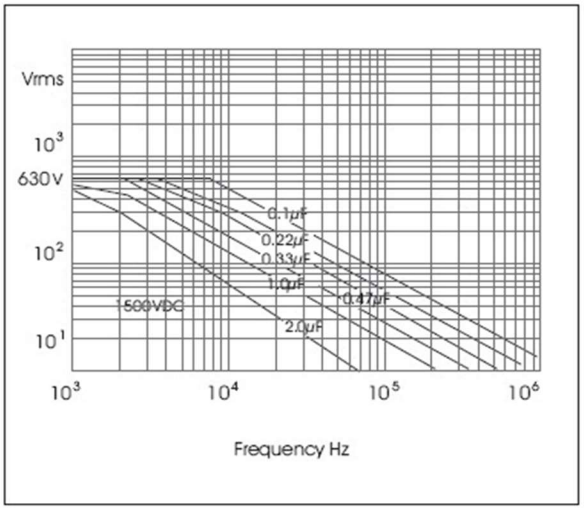
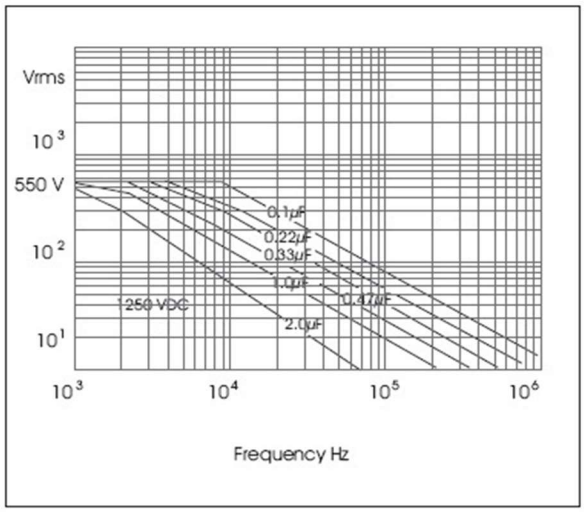
Rated voltage VDC	Rated Voltage VAC	Rated Cap. (µfd)	Maximum Dimensions (mm)			Dv/dt V/µsec	I Peak Amps	Terminal Styles	P1 (± 1 mm)	P2 (± 1 mm)	Pitch (W type) (mm)
			W	H	L						
1000	500	0.22	17.0	29.0	42.0	1200	264	W,L	25.0	9.0	38.0
1000	500	0.47	17.0	29.0	42.0	1000	470	W,L	25.0	9.0	38.0
1000	500	0.68	20.0	36.0	42.0	900	612	W,L	25.5	9.0	38.0
1000	500	1.0	24.0	38.0	45.0	900	900	L	25.0	9.0	--
1000	500	1.5	35.0	42.0	45.0	900	1350	L	27.0	11.5	--
1000	500	2.0	34.0	44.0	44.0	600	1200	L	27.0	11.5	--
1000	500	3.0	43.0	50.0	54.0	600	1800	L	32.5	17.5	
1000	500	4.0	43.0	61.0	54.0	600	2400	L	32.5	17.5	
1000	500	5.0	43.0	61.0	54.0	600	3000	L	32.5	17.5	
1250	550	0.22	17.0	29.0	42.0	1400	308	W,L	25.0	9.0	38.0
1250	550	0.47	17.0	29.0	42.0	1200	564	W,L	25.0	9.0	38.0
1250	550	0.68	20.0	36.0	42.0	1100	748	W,L	25.5	9.0	38.0
1250	550	1.0	24.0	38.0	45.0	1100	1100	L	25.0	9.0	--
1250	550	1.5	35.0	42.0	45.0	1000	1500	L	27.0	11.5	--
1250	550	2.0	34.0	44.0	44.0	800	1600	L	27.0	11.5	--
1250	550	3.0	43.0	61.0	54.0	700	2100	L	32.5	17.5	--
1500	600	0.22	17.0	29.0	42.0	1500	330	W,L	25.0	9.0	38.0
1500	600	0.33	24.5	27.5	42.5	1400	462	L	25.5	9.0	--
1500	600	0.47	20.0	36.0	42.0	1400	658	L	25.5	9.0	--
1500	600	0.68	35.0	42.0	45.0	1300	884	L	27.0	11.5	--
1500	600	1.0	43.0	50.0	54.0	1200	1200	L	32.5	17.5	--
1500	600	2.0	43.0	50.0	54.0	900	1800	L	32.5	17.5	--
1500	600	3.0	43.0	61.0	54.0	800	2400	L	32.5	17.5	--
2000	750	0.1	17.0	29.0	42.0	1900	190	W	25.0	9.0	38.0
2000	750	0.15	17.0	29.0	42.0	1900	285	W	25.0	9.0	38.0
2000	750	0.22	20.0	36.0	42.0	1900	418	L	25.5	8.5	--
2000	750	0.33	30.0	45.0	45.0	1800	594	L	27.0	11.5	--
2000	750	0.47	30.0	45.0	45.0	1700	799	L	27.0	11.5	--
2000	750	1.0	43.0	50.0	54.0	1500	1500	L	32.5	17.5	--
2000	750	2.0	43.0	61.0	54.0	1000	2000	L	32.5	17.5	--

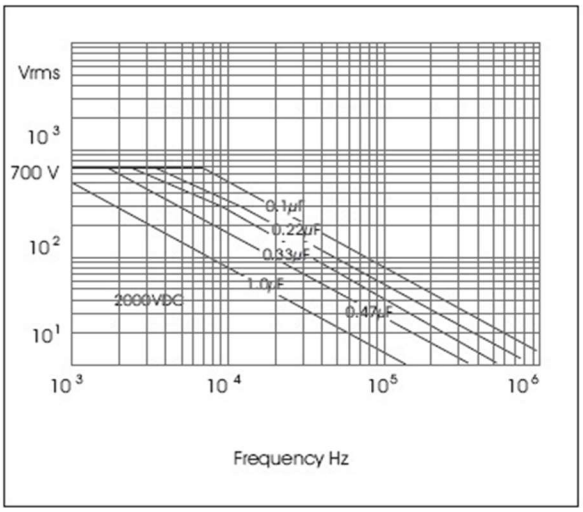
CUSTOM DESIGNED CAPACITORS AVAILABLE ON REQUEST

Characteristics Curves









Accelerated Pulse Handling

Test Conditions:
A capacitor under test will be charged through an impedance of a magnitude greater than the discharging impedance. The capacitor under test will be charged to the rated DC voltage and discharged through impedance capable of producing a minimum voltage gradient with time (DV/DT). The test will be performed in accordance with the requirements for the voltage gradient multiplier and charge and discharge cycles as listed below.

Voltage Gradient Multiplier	Test Cycles
6x	100
4x	1000
2x	1 million

Example:

An El-Ci-Ar MPF 71 part rated 1.0 uF 1,000 VDC has a DV/DT rating of 900 volts per microsecond. This part would Be capable of withstanding 100 cycles at a minimum of 5,400 volts/microsecond, 1000 cycles at 3,600 volts/microsecond, or 1 million cycles at 1,800 volts/microsecond.

Performance Criteria After Testing

Capacitance Delta < 3%
Tangent of loss angle < 150% of original measured value

Why Use Snubber Capacitors?

With the evolution of power technology, new higher speed Insulated Gate Bipolar Transistors (IGBTs) make it possible for high power converters to operate up to 10 kHz or more. IGBTs are replacing the slower Darlington transistors, simplifying circuit design and reducing cost. IGBT power modules are now being designed into AC and DC motor drive inverters, uninterruptible power systems, electric vehicles and alternate energy production systems. A power system containing IGBTs must be designed so the transient voltages caused by the high di/dt that occurs at gate turn off is minimized. Left uncontrolled, this transient voltage can exceed the blocking voltage rating of the IGBT and cause it to fail. To reduce the transient voltage, either di/dt or the parasitic DC bus inductance of the power circuit must be reduced. This is best achieved by decoupling the parasitic bus inductance using a non-inductive wound film capacitor mounted as near as possible to the IGBT module terminals. Snubber capacitors, constructed of polypropylene film dielectric and aluminum foil plus metallized polypropylene film, are the optimal capacitor design for IGBT applications. While film/foil capacitors are often used because of their superior current carrying capability, they fail in a short circuit mode, which may cause damage to the IGBT module. El-Ci-Ar's snubber capacitors combine high current carrying capability with low inductance, low dielectric losses and capacitance stability across a wide frequency range. They offer the self-healing property of metallized film (not failing in a short circuit mode) with the high peak current carrying capability (dv/dt) of film/foil construction.