Film capacitors – High power capacitors – ModCap

ModCap HF series (high frequency)

Series/Type:	**B25647**
Ordering code:	**B25647A****K***
Date:	May, 2022
Version:	1.0 – Preliminary data

Preliminary data

Construction

- Dielectric: Polypropylene film
- Non PCB, PU Resin (UL 94 V-0, Fire & smoke EN 45545-2 HL2 R22-HL3R23)
- Plastic case and cover (UL 94 V-0, Fire & smoke EN 45545-2HL2 R22-HL3R23)

Features

- Modular design
- High frequency performance, fully compatible with SiC semiconductors
- Self-healing technology
- Over-voltage capability

Typical applications

- DC link for renewable energy converters (solar, wind)
- DC link for traction applications (tramway, metro, light train inverters)
- DC link for industrial motor drive

Terminals

- Optimized low inductance flat female terminals M6

Certifications

- UL Recognized

Technical data and specifications

Characteristics	
Rated capacitance C_N	Up to 1850 µF (see table)
Tolerance	K (±10%)
Rated voltage range U_N	900 to 1600 V (see table)
Ripple voltage U_r	Up to 424 $V_{peak-peak}$
Operation bandwidth [1) 2)]	Up to 100 kHz
Rated current I_R (3 kHz)	(see table)
Inductance ESL (1 MHz) [2)]	8 nH
R_{th} [3)]	1.4 K/W

1) RMS current value that corresponds to components above 100 kHz limited to 10% of total RMS. Maximum continuous losses defined for rated current at 3 kHz should not be exceed. ESR vs frequency graph available in page 5 for losses calculation according to a specific current spectrum. For more accurate thermal calculation, please ask for FEA simulation according to your specific operation conditions.

2) Connecting all independent capacitances by external overlapped busbar as described in page 4.

3) Calculated from T_{amb} to Thot-Spot considering natural convection and no transfer of heat through the terminals.

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Maximum ratings	
Maximum permissible voltage (U_{max})	U_N +10% (30% of on-load daily duration) U_N +15% (up to 30 min daily) U_N +20% (up to 5 min daily) U_N +30% (up to 1 min daily)
Maximum permissible peak voltage	U_N +50% for 30 ms is permitted 1000 times during the lifetime of the capacitors
U_{TC} (Isolation)	4 kV

The average applied voltage shall not be higher than the specified voltage.
It should be recognised that any significant period of operation at voltages above the rated one would reduce overall life.

Test data	
Voltage test between terminals (U_{TT})	1.5 • U_N, DC, 10 s (room temperature)

Design data	
Weight approx.	3.8 kg
Filling	Non-PCB, PU resin
Fixing	4 x Ø 6.5 mm

Terminals	
Terminations	8 x M6 x 25 x 30 mm, contact area 60 mm^2
Max. torque	6 Nm

Climatic category 40/75/56	
Θ min	–40 ºC
Θ max	+75 ºC
Storage temperature	–40 ºC ...+85 ºC
Θ $_{hotspot}$ max.	+90 ºC
Humidity	av. rel. < 93% 25 g/m^3 max.
Time test	56 days
Maximum altitude	2000 m, higher altitude to be requested

Preliminary data

Life expectancy

Lifetime (*)	Up to 200 000 hours
End of life criteria	C-loss: 3%

(*) U_N, and 80 ºC mean dielectric temperature

Reference standards

IEC 61071:2017	International Standard Capacitors for power electronics
IEC 61881-1:2010	International Standard Railway Applications-Rolling stock equipment-Capacitors for power electronics

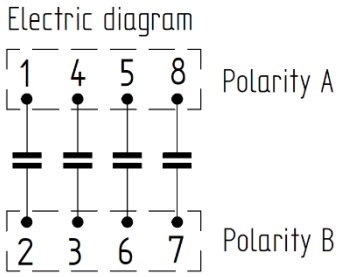
Values and ordering codes

U_N V	C_R µF	I_N A	I_S kA	Î kA	Dimensions LxWxH mm	Ordering code
900	1850	210	225	5	205x90x170	B25647A9198K003
1000	1520	200	220	5	205x90x170	B25647A1158K003
1100	1200	190	215	5	205x90x170	B25647A1128K003
1250	940	180	210	5	205x90x170	B25647A1947K003
1350	880	170	205	5	205x90x170	B25647A1887K003
1600	640	160	200	5	205x90x170	B25647A1647K003

ESR vs frequency

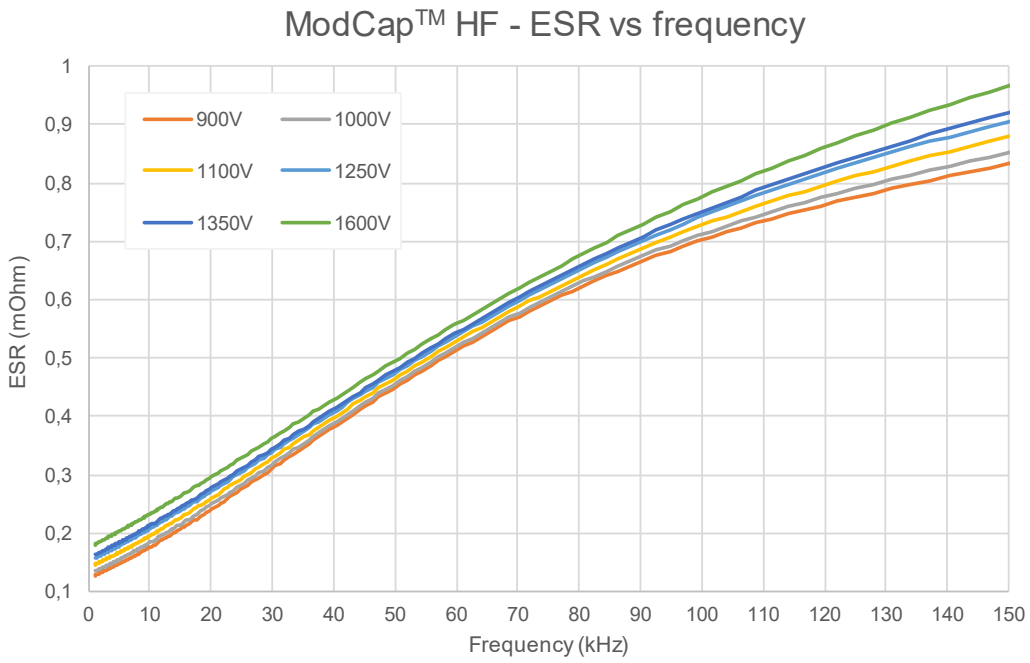
Connecting all independent capacitances by external overlapped busbar.

Tested busbar characteristics: copper, 1.5 mm thickness, 0.3 mm insulation thickness between copper plates, insulation distance: 3.5 mm

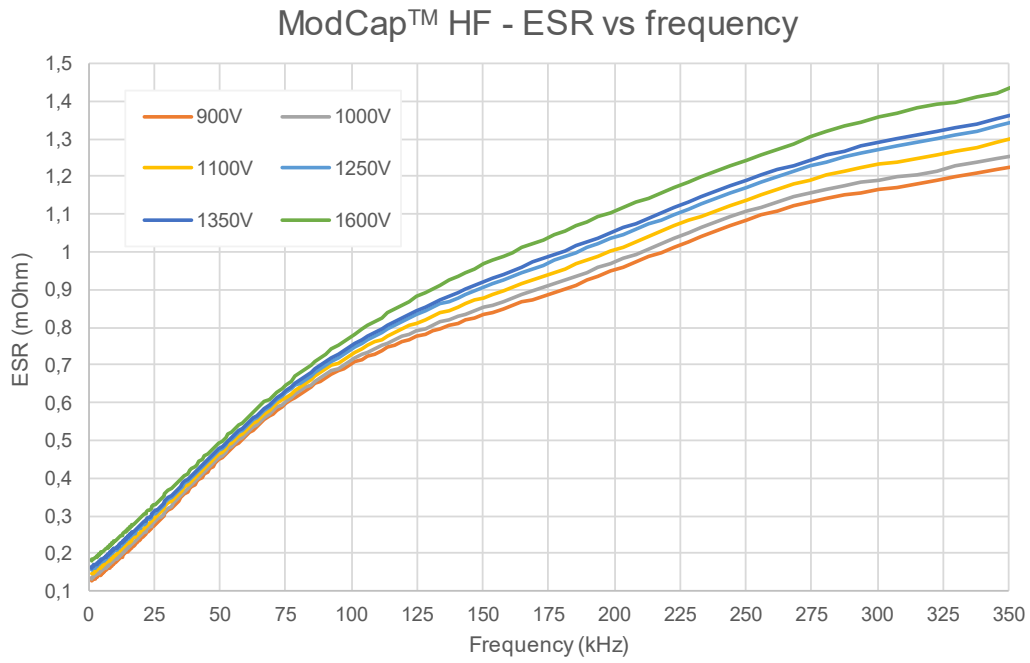


Preliminary data

ESR till 150 kHz



ESR till 350 kHz



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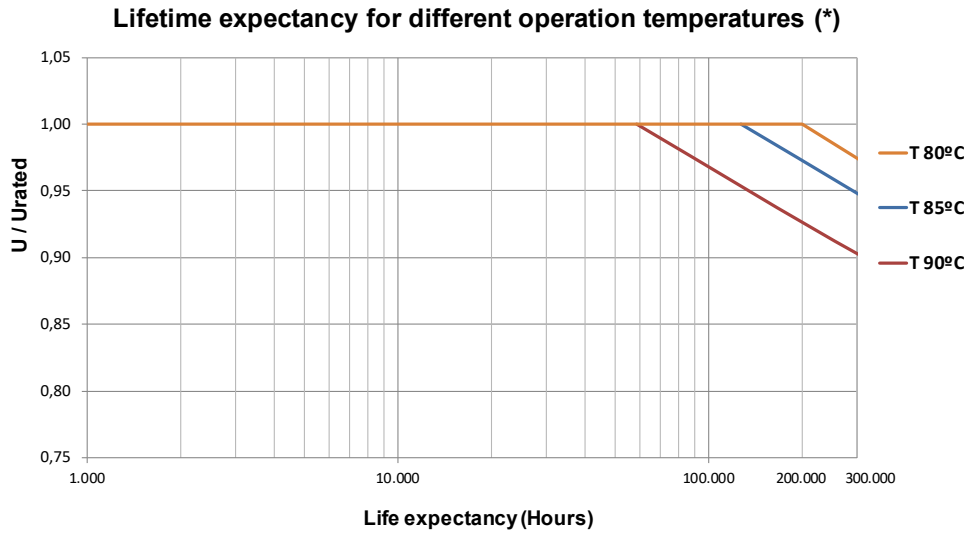
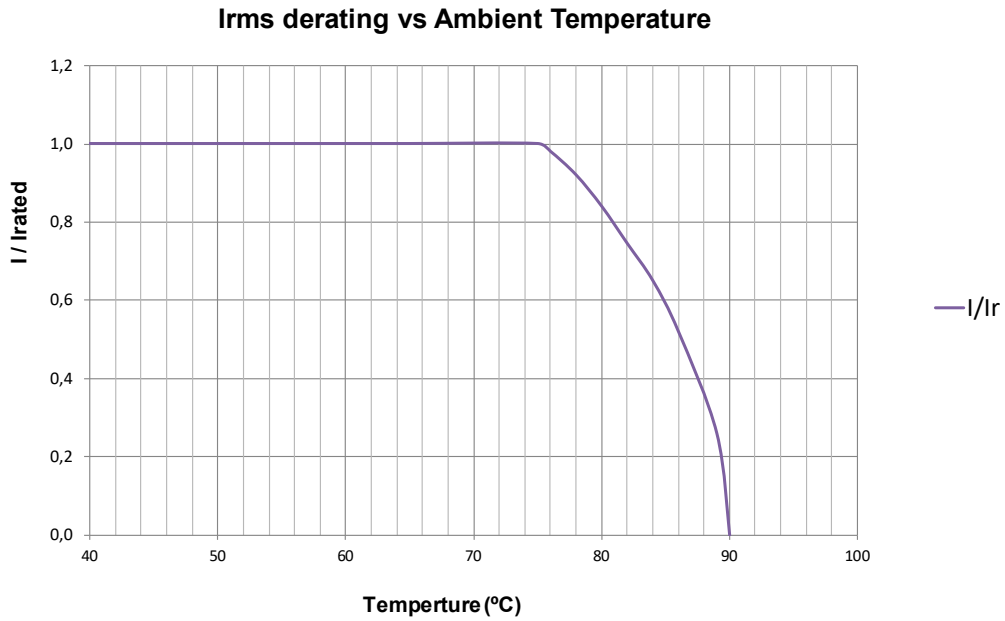
Lifetime expectancy



(*) Homogeneous dielectric temperatures

Derating vs temperature



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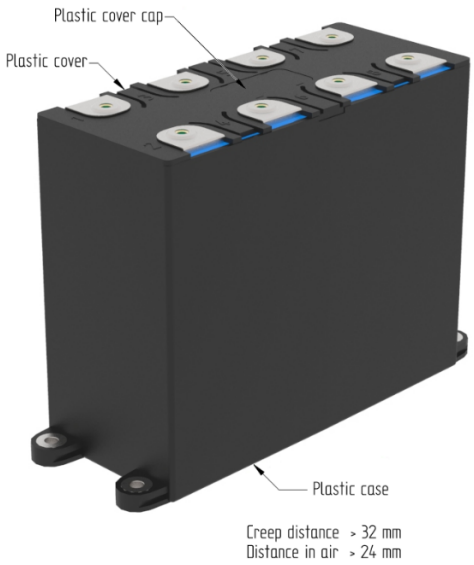
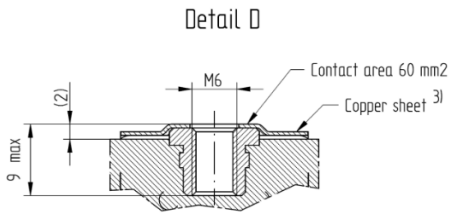
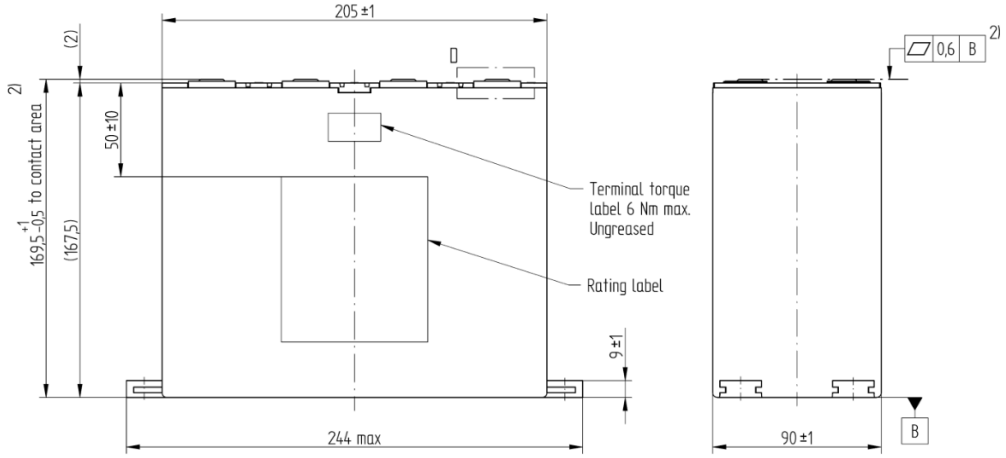
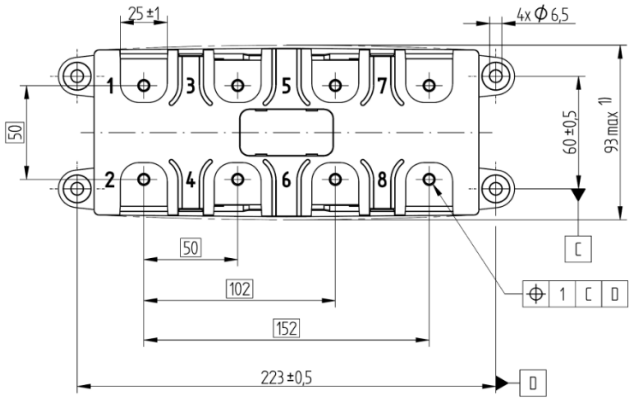
Dimensional drawings









All internal capacitances to be connected in parallel by external overlapped busbar

1) For max. heating
2) After tightening
3) Copper sheet is flexible and will adapt to the plastic top after tightening

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Preliminary data

General safety recommendations

When employed in power electronics applications, the capacitors run with high energy and high currents.

The energy stored in capacitors may be lethal. To prevent any risks of shocks, the capacitor should be discharged with adequate means by qualified people and short-circuited between terminals before handling.

The capacitor can contain dangerous residual charges even after long time without operation. For this reason, the electrical terminals must remain short-circuited until the capacitors are connected in the operating circuit.

TDK Electronics cannot predict all possible stresses that a power electronic capacitors can be subjected to. There is a remaining probability of power electronic capacitors showing malfunction due to excess temperature, overvoltage, wrong application, wrong installation, faulty maintenance, mechanical damage, operation at the limits of the specification or other reasons.

Transportation and handling

- The electrical terminals must not be used for grabbing or suspending the capacitor during transportation and handling.
- Do not handle the capacitor before it is discharged.
- Handle capacitors carefully, because they may still be charged even after disconnection due to faulty discharging devices.
- Protect the capacitor properly against over current and short circuit.
- Failure to follow cautions may result, worst case, in premature failures, bursting and fire.
- Capacitor subjected to Dual Use Category 3A201.

Fixing

- The threaded screw 4x Ø 6.5 mm in the bottom of the capacitor must be used for fixing.

Storage and operating conditions

Capacitors must never be stored outside the specified temperature and humidity ranges.
Capacitors may not be stored in corrosive atmospheres, particularly not when chlorides, sulfides, acids, alkalis, salts, organic solvents, or similar substances are present.

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