



## 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 $\mu$ F (see table)
Tolerance	K ( $\pm$ 10%)
Rated voltage range $U_N$	900 to 1600 V (see table)
Ripple voltage $U_r$	Up to 424 V <sub>peak-peak</sub>
Operation bandwidth <sup>1) 2)</sup>	Up to 100 kHz
Rated current $I_R$ (3 kHz)	(see table)
Inductance ESL (1 MHz) <sup>2)</sup>	8 nH
$R_{th}$ <sup>3)</sup>	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 exceeded. 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.

**Preliminary data**

<b>Maximum ratings</b>	
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.

<b>Test data</b>	
Voltage test between terminals ( $U_{TT}$ )	$1.5 \cdot U_N$ , DC, 10 s (room temperature)

<b>Design data</b>	
Weight approx.	3.8 kg
Filling	Non-PCB, PU resin
Fixing	4 x $\varnothing$ 6.5 mm

<b>Terminals</b>	
Terminations	8 x M6 x 25 x 30 mm, contact area 60 mm <sup>2</sup>
Max. torque	6 Nm

<b>Climatic category 40/75/56</b>	
$\ominus$ min	-40 °C
$\ominus$ max	+75 °C
Storage temperature	-40 °C ... +85 °C
$\Theta$ hotspot max.	+90 °C
Humidity	av. rel. < 93% 25 g/m <sup>3</sup> 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 °C 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**

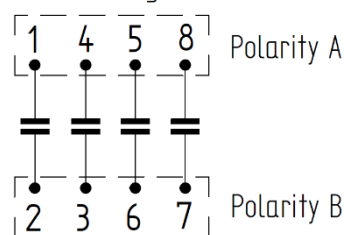
$U_N$ V	$C_R$ $\mu\text{F}$	$I_N$ A	$I_s$ kA	$\hat{I}$ kA	Dimensions LxWxH mm	Ordering code
900	1850	210	225	5	205x90x170	<a href="#">B25647A9198K003</a>
1000	1520	200	220	5	205x90x170	<a href="#">B25647A1158K003</a>
1100	1200	190	215	5	205x90x170	<a href="#">B25647A1128K003</a>
1250	940	180	210	5	205x90x170	<a href="#">B25647A1947K003</a>
1350	880	170	205	5	205x90x170	<a href="#">B25647A1887K003</a>
1600	640	160	200	5	205x90x170	<a href="#">B25647A1647K003</a>

**ESR vs frequency**

Connecting all independent capacitances by external overlapped busbar.

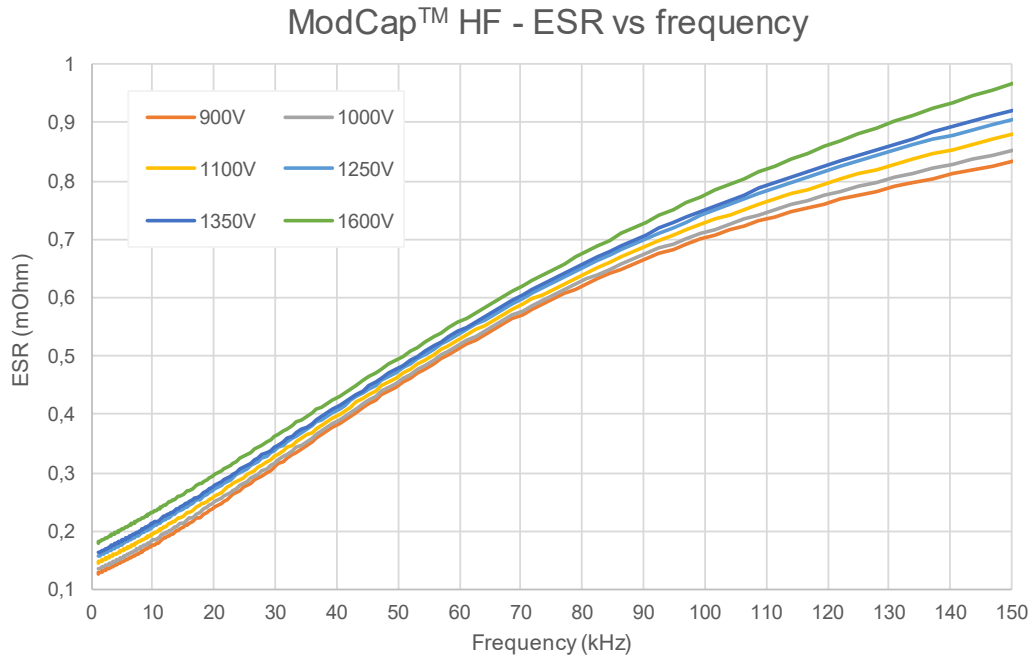
Tested busbar characteristics: copper, 1.5 mm thickness, 0.3 mm insulation thickness between copper plates, insulation distance: 3.5 mm

Electric diagram

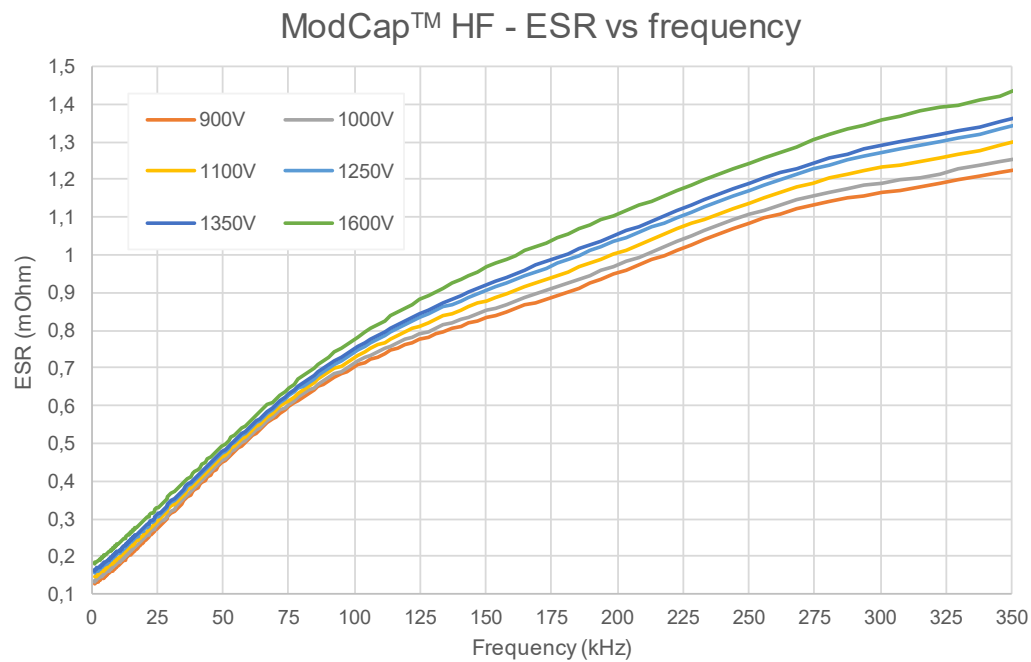


Preliminary data

ESR till 150 kHz

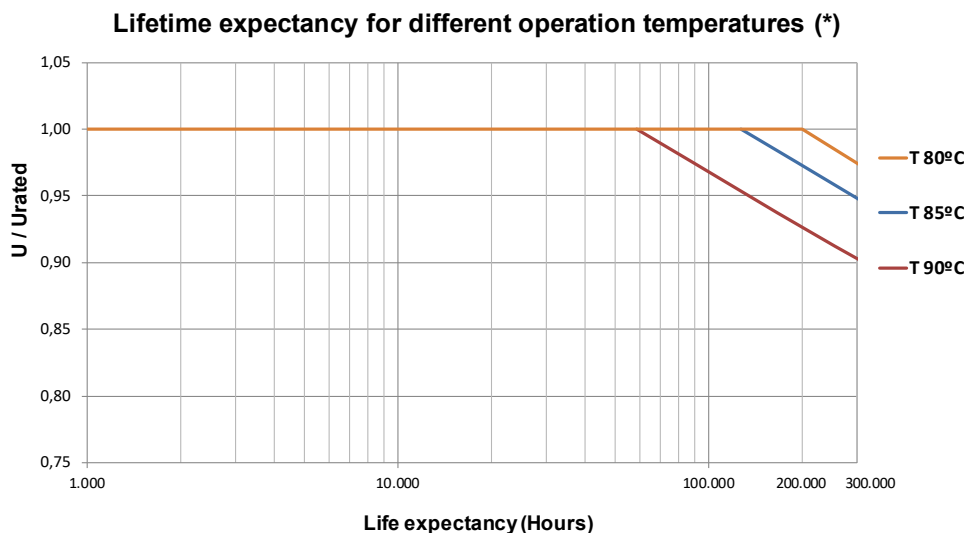


ESR till 350 kHz



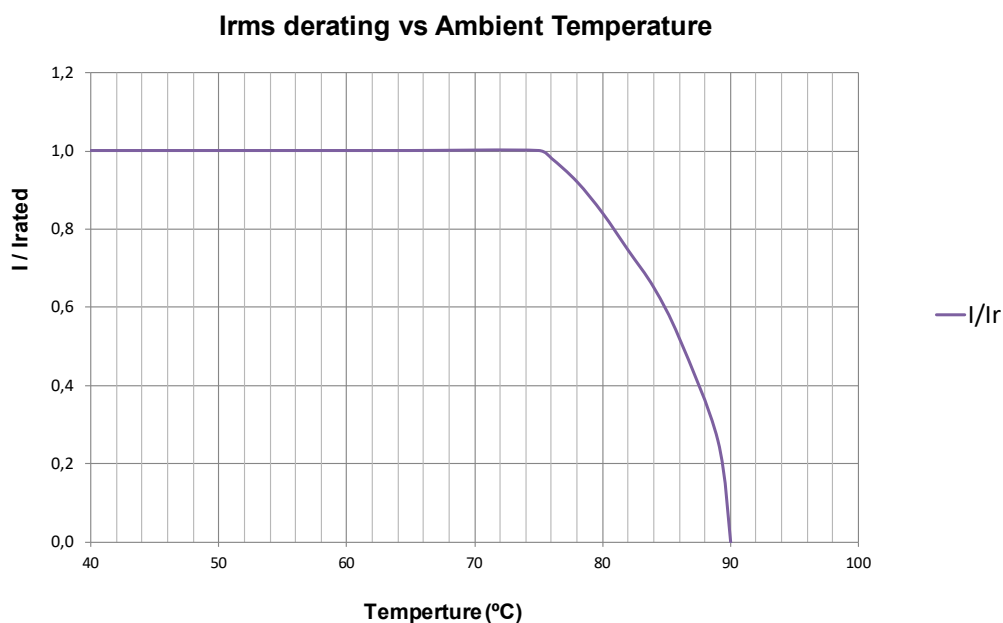
Preliminary data

Lifetime expectancy



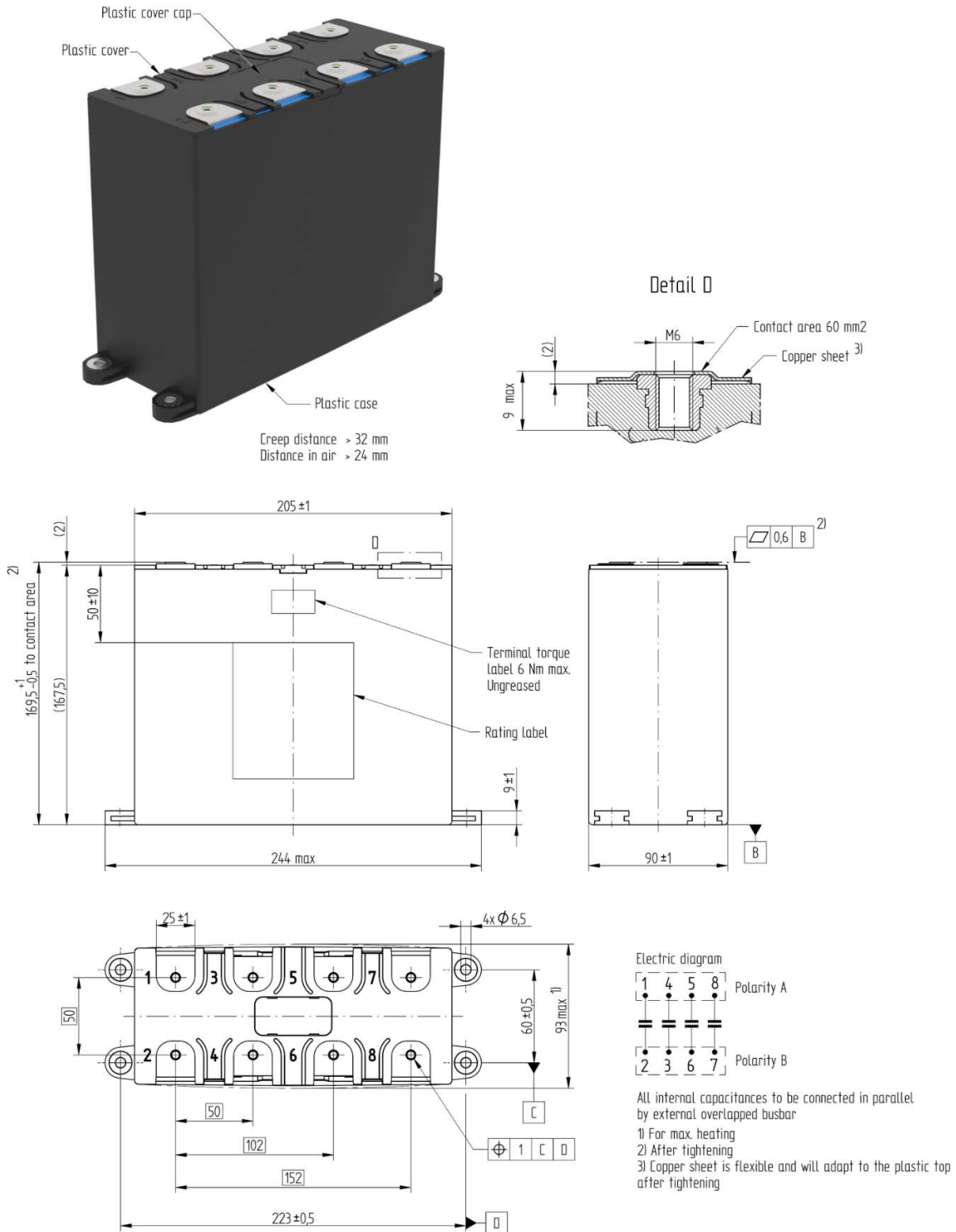
(\*) Homogeneous dielectric temperatures

Derating vs temperature



Preliminary data

Dimensional drawings



## 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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## Important notes

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