



Film Capacitors – Power Electronic Capacitors

PEC ModCap UHP series (high frequency)

Series/Type:	ModCap UHP
Ordering code:	B25648A
Date:	May 2025
Version:	1

Rated capacitance: 470 ... 880 μ F
Rated DC Voltage: 1350... 1800 V DC

Construction

- Dielectric: Blended Ethylene-Propylene-Norborene film with 100% bio circular BOPP*
- Plastic case and cover (UL 94 V-0, Fire & smoke EN 45545-2 HL2 R22-HL3R23)
- Non PCB, PU Resin (UL 94 V-0, Fire & smoke EN 45545-2 HL2 R22-HL3R23)



Features

- Modular design
- High frequency performance, fully compatible with SiC semiconductors
- High temperature operation (+105 °C without derating)
- High current density
- Self-healing technology
- Over-voltage capability
- Very low ESL
- RoHS Compliant

Typical applications

- DC link applications with SiC power switches
- DC link for renewable energy converters (solar, wind, hydrolyzer, ESS)
- DC link for auxiliary drives traction applications
- DC link for industrial motor drive

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
- EN 45545-2, fire behaviour of materials and components

Terminals

- Optimized low inductance flat female terminals M6

Certifications

- UL recognition planned
- ISCC certification with Blended Ethylene-Propylene-Norborene film with 100% bio circular BOPP* planned

Delivery mode und packing unit

- Construction C: 4 capacitors per box

*Mass-balance approach

Technical data and specifications

Characteristics	
Rated capacitance C_N	Up to 880 μF (see table)
Tolerance	K ($\pm 10\%$)
Rated voltage range U_N	1350 to 1800 V (see table)
Ripple voltage U_r	Up to 282 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
Thermal Resistance R_{th} ³⁾	1.5 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 T_{HS} considering natural convection and no transfer of heat through the terminals at $T_{amb} = +75^\circ\text{C}$.

For further information about simulation capabilities and support on specific projects, please contact CAPSimulations@tdk.com

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
U_{TC} (Extinction)	2.5 kV (<10 pC)

The average applied voltage shall not be higher than the specified voltage.

It should be recognized that any significant period of operation at voltages above the rated one would reduce overall life.

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

Design data	
Weight approx.	3.6 ± 0.1 kg
Fixing	4 x $\varnothing 6.5$ 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_{amb} min	−40 °C
θ_{amb} max.	+75 °C
Storage temperature	−40 °C ... +105 °C
$\theta_{hotspot}$ max.	+105 °C
Humidity	RH < 93% Abs.Hum. < 25 g/m ³ without condensation (Max. values 30 days/year) RH < 45% Abs.Hum. < 18 g/m ³ without condensation (Mean values)
Time test	56 days
Maximum altitude	2000 m, higher altitude to be requested

Electrical characteristics and ordering codes

U _N V DC	C _R μF	I _N T _{amb} =+75 °C ⁴⁾ A _{RMS}	I _S kA	İ kA	Dimensions LxWxH mm	Design / PU	Ordering code
1350	880	205	205	5	205x90x170	C / 4pcs	B25648A1887K003
1600	640	190	175	5	205x90x170	C / 4pcs	B25648A1647K003
1800	470	180	150	5	205x90x170	C / 4pcs	B25648A1477K003

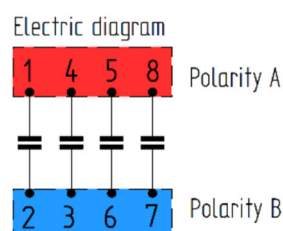
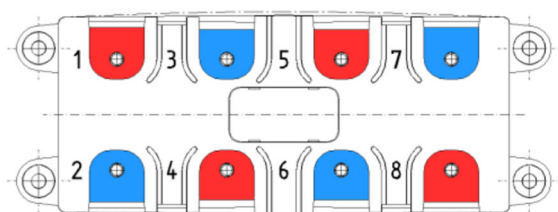
⁴⁾ Max. ripple current I_{RMS} at T_{amb} = +75 °C at 3 kHz for a ΔT_{HS-Amb} ≤ 30 °C when ESR = ESR_{max}, considering increase of ESR due to temperature, and not-aged capacitors. Considering natural convection (h = 12 W/m²K) and no transfer of heat through the terminals.

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Connection via external busbar

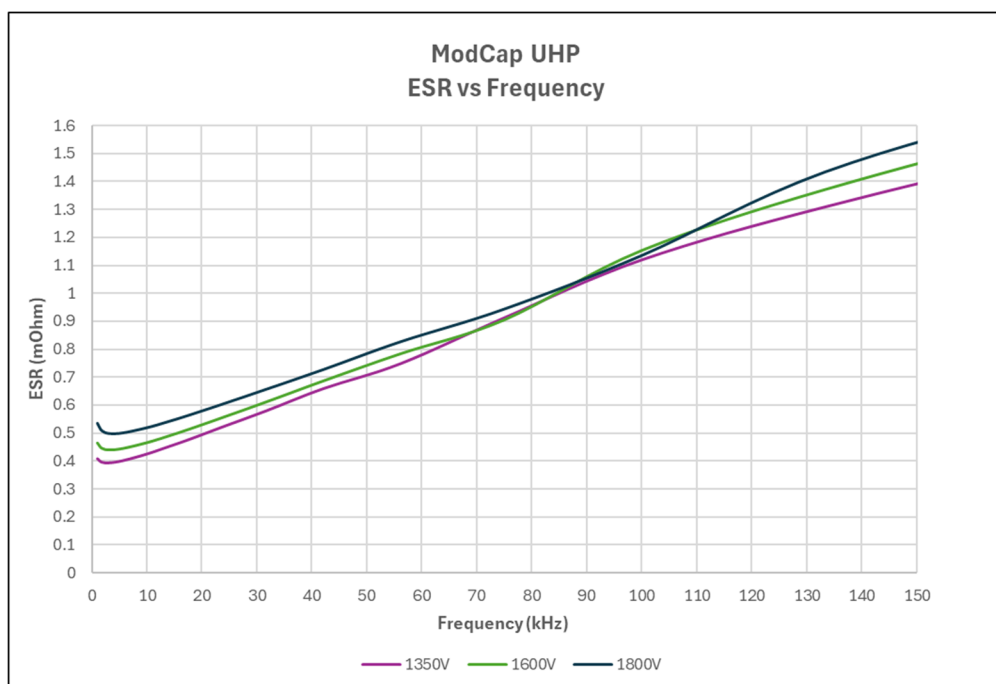
The ModCap is a modular solution with four independent capacitors to be connected with an external overlapped busbar.

The customer busbar shall connect the terminals according to the appropriate polarity as shown in the electrical connection diagram below.

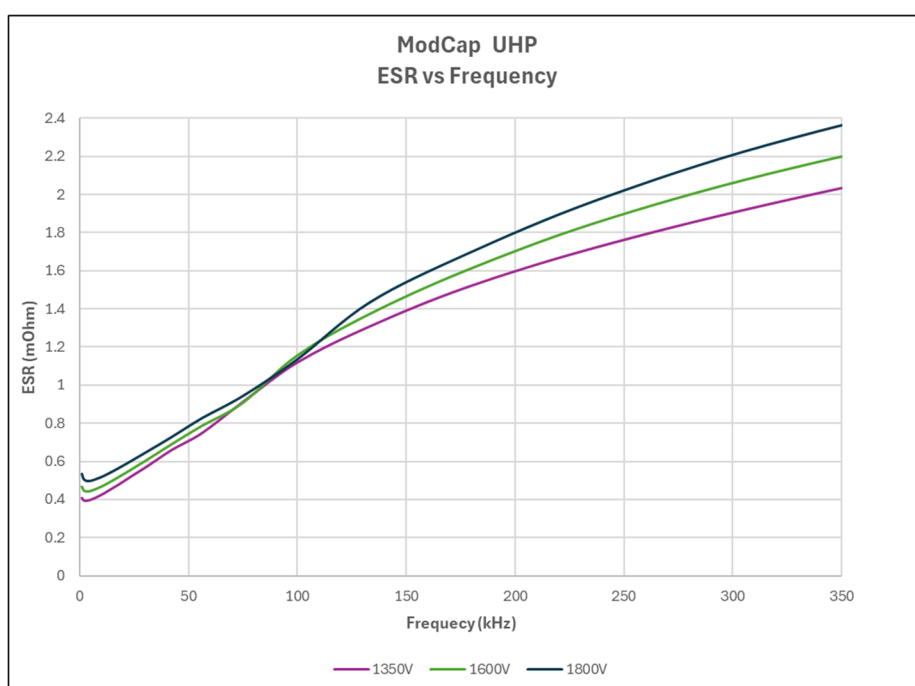


ESR vs frequency

ESR from 1 kHz up to 150 kHz



ESR from 1 kHz up to 350 kHz

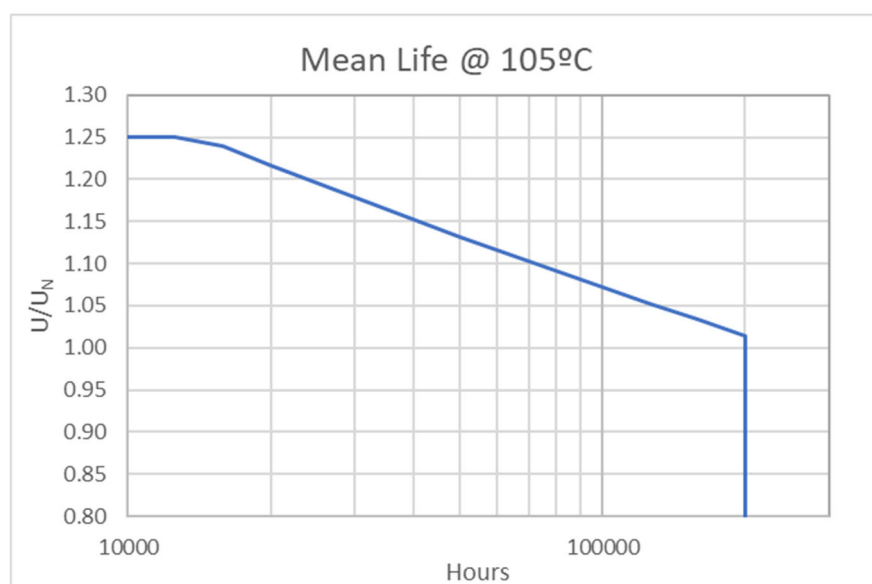


Life expectancy

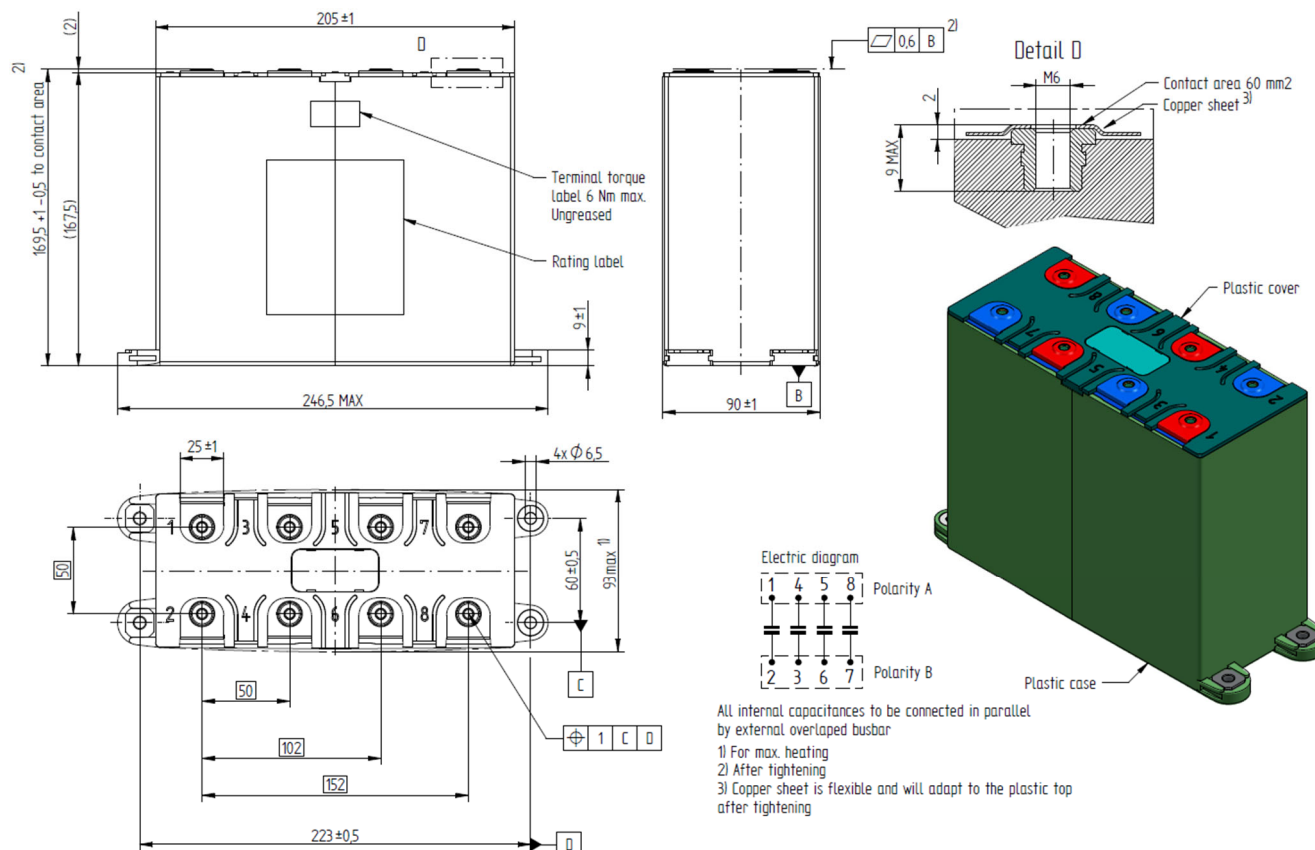
Mean Lifetime	@ U_N / +105 °C ⁵⁾	200.000 hours ⁶⁾
	@ other conditions	see graph
End of life criteria		Capacitance drop @ 120 Hz > -3% Increase of ESR @ 120 Hz > +50% Increase of ESR @ 1 kHz > +33%

⁵⁾ Considering continuous operation at +105 °C mean dielectric temperature.

⁶⁾ Lifetime limited to 200.000 h at +105 °C due to aging of encapsulating materials



Dimensional drawings



Dimensions in mm

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 capacitor 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, hold the capacitor body or fixing brackets.
- 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 condition

- 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.
- Please read the [Operating and safety instructions](#) before use.

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Important notes

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