

PEC ModCap HF series (high frequency)

Series/Type:ModCap HFOrdering code:B25647A*Date:March 2025Version:7.0

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Rated capacitance: 380 ... 1850 µF Rated DC Voltage: 900 ... 2000 V DC

Construction

- Dielectric: 100% Bio-based Polypropylene film
- Plastic case and cover (UL 94 V-0, Fire & smoke EN 45545-2HL2 R22-HL3R23)
- Non PCB, PU Resin (UL 94 V-0, Fire & smoke EN 45545-2 HL2 R22-HL3R23)
- Segmented film available upon request.

Features

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

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

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 HL3 R23, Fire safety standard

Terminals

Optimized low inductance flat female terminals M6

Certifications

- UL Recognized up to 85 °C
- ISCC certification with 100% Bio-based PP film*

Packing

Construction C: 4 capacitors per box

* (Mass balance approach).







B25647A* ModCap HF



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Technical data and specifications

Characteristics Rated capacitance C_N Up to 1850 µF (see table) Tolerance K (±10%) 900 to 2000 V (see table) Rated voltage range U_N Ripple voltage Ur Up to 424 Vpeak-peak Operation bandwidth 1) 2) Up to 100 kHz (see table) Rated current I_R (3 kHz) Inductance ESL (1 MHz)²⁾ 8 nH 1.4 K/W Thermal Resistance Rth 3)

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} (Thot-Spot) considering natural convection and no transfer of heat through the terminals.

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			
UTC (Isolation)	4 kV			
UTC (Extinction)	2.5 kV (<10pC)			
The average applied voltage shall not be higher t	han 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 (UTT)	1.5 • U _N , DC, 10 s (room temperature)

Design data		
Weight approx.	$3.6 \pm 0.1 \text{ kg}$	
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			

B25647A*

ModCap HF



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Climatic category 40/75/56				
Θ min	-40 °C			
Θ max	+75 °C			
Storage temperature	−40 °C +85 °C			
θ hotspot max.	+90 °C (up to +105 °C with conditions defined in page 6)			
Humidity	av. rel. < 93% 25 g/m ³ max.			
Time test	56 days			
Maximum altitude	2000 m, higher altitude to be requested			

Life expectancy

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

(*) $U_{\text{N}},\,I_{\text{N}}$ and 70 °C T_{amb} (80 °C mean dielectric temperature)

Electrical characteristics and ordering codes

U N V	C _R μF	In A	ls kA	Î kA	Dimensions LxWxH mm	Design / PU	Ordering code
900	1850	210	225	5	205x90x170	C / 4pcs	B25647A9198K003
1000	1520	200	220	5	205x90x170	C / 4pcs	B25647A1158K003
1100	1200	190	215	5	205x90x170	C / 4pcs	B25647A1128K003
1250	940	180	210	5	205x90x170	C / 4pcs	B25647A1947K003
1350	880	170	205	5	205x90x170	C / 4pcs	B25647A1887K003
1600	640	160	198	5	205x90x170	C / 4pcs	B25647A1647K003
1800	470	150	195	5	205x90x170	C / 4pcs	B25647A1477K003
2000	380	140	190	5	205x90x170	C / 4pcs	B25647A2387K003

Remark: version with segmented film available upon request.

Connection via External Busbar

Connecting all independent capacitances by external overlapped busbar.

Customer busbar shall connect externally the terminals to the appropriate polarity according to the electrical connection diagram below:



Note: the sketch in the label is the physical representation of the position of the terminals.

B25647<u>A*</u>

ModCap HF



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1.8 1.7 1.6 1.5 1.4 1.3 1.2 1.1 **ESR (mOhm)** 6.0 8.0 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 Frequency(kHz) - 1800 V -2000 V

ESR vs frequency ESR up to 150 kHz

ESR up to 350 kHz



B25647A* ModCap HF



B25647A*

ModCap HF

Film capacitors – Power Electronic Capacitors

PEC ModCap HF series (high frequency)

1.05 1.00 0.95 0.90

Lifetime expectancy for different operational temperatures

(*) Homogeneous dielectric temperatures

Performance at high temperature

Life expectancy at high temperature		
θ _{hotspot} max.	+105°C	
Max. continuous voltage	0.6 x U _N	
Lifetime	Up to 50 000 h, with C-loss 3%	



B25647A*

ModCap HF

Film capacitors – Power Electronic Capacitors PEC ModCap HF series (high frequency)

Dimensional drawings

Construction C





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Cautions and warnings

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.
- 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.

Please read the <u>Operating and safety instructions</u> before use.

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B25<u>647A*</u>

ModCap HF

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