Attracting Tomorrow

ModCap MF

DCR Modular | New Modular High Frequency Series

TDK Electronics Components, S.A.U.
Aluminum and Film Capacitors Business Group
Product Marketing
Malaga, Spain
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Introducing the New Modular Standard Series Highlights

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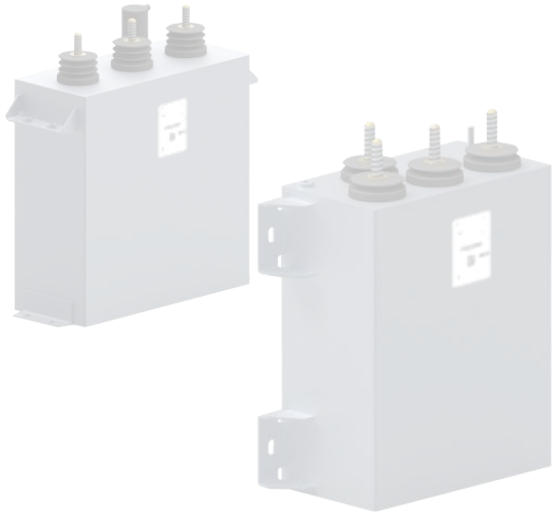
ModCap MF

- Compact solution with very high energy density
- Low ESL (<14 nH) to avoid use of additional snubbers
- Traction, industrial drives & renewable energies
- Reduce losses based on low ESR vs frequency
- Sustainable product ISCC certified
- Product developed according to fire safety standards
- Reduce time to market & lead time
- Cost saving solution
- Reduce weight & volume
- Finite elements analysis

ModCap MF Series | B25645A*

~ AC filter

= DC link/DC filter



MKK HP

ModCap MF | MKK DCR | MKK DCi-R | MKK DCi-H

ModCap MF Series | B25645A*
DC-Link Applications

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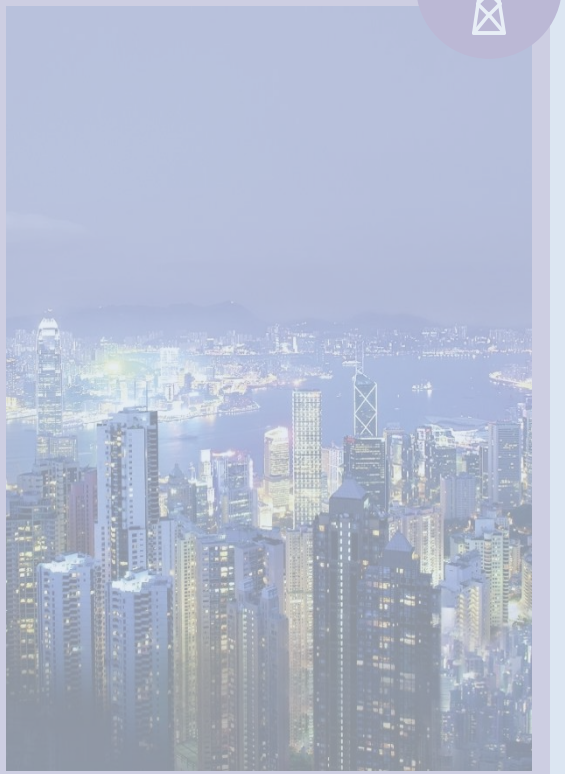
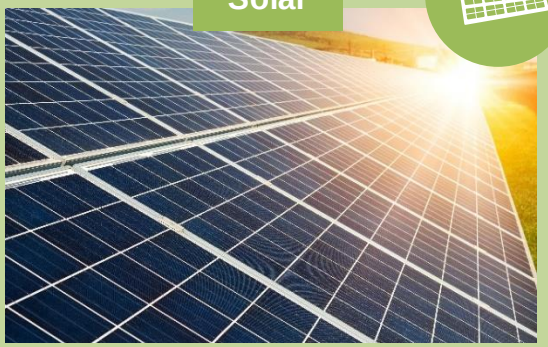
Energy transmission

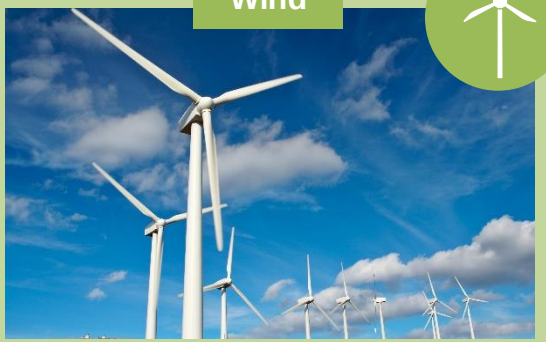


Renewable energies

Solar

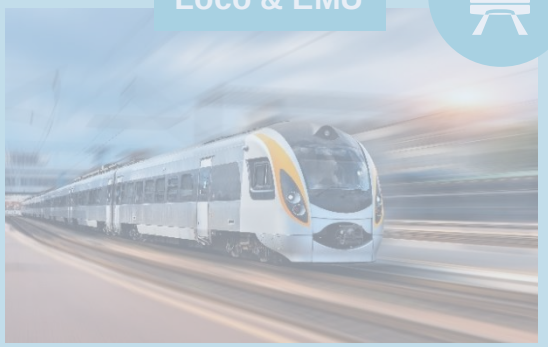


Wind



Traction

Loco & EMU



Light trains

Industry

LV

MV

General Overview
B25645A* Series

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= ModCap HF (dry-modular-high frequency)

NEW

UL Recognized

Recommended applications

Features

- Capacitance range from 350 up to 3900 µF
- Voltage range from 900 up to 2300 V DC
- Low ESL <14 nH
- Temperature range up to 90 °C hotspot
- IEC 61071, IEC 61881-1, EN 45545-2 HL3 R23 (fire and smoke)
- UL recognized
- Filled with polyurethane resin (dry technology)
- Plastic case (open), Flat windings
- Sustainable product with 100% bio-based polypropylene film

Benefits

- High energy density, ultra compact solution
- Modular concept for parallel connection
- Snubber avoidance / low voltage overshoot
- Lifetime up to 200,000 hours
- Finite elements analysis available for the whole series
- Cost oriented solution
- Reduced time to market & lead time

Construction A
Simplified Drawing & 3-D

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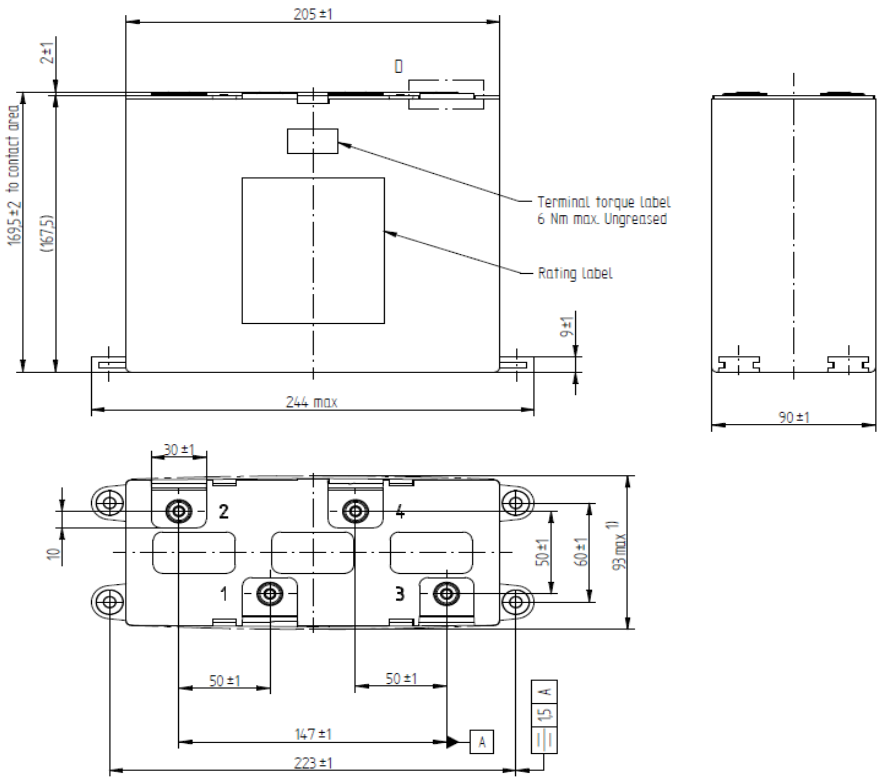
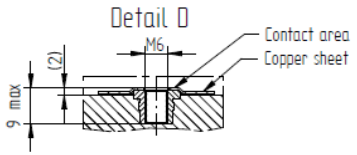
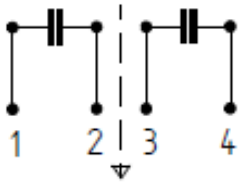
Main dimensions: 243 x 169.5 x 90 mm



Terminal



Electric diagram



No active insulation
between 1-3 and 2-4

Construction B
Simplified Drawing & 3-D

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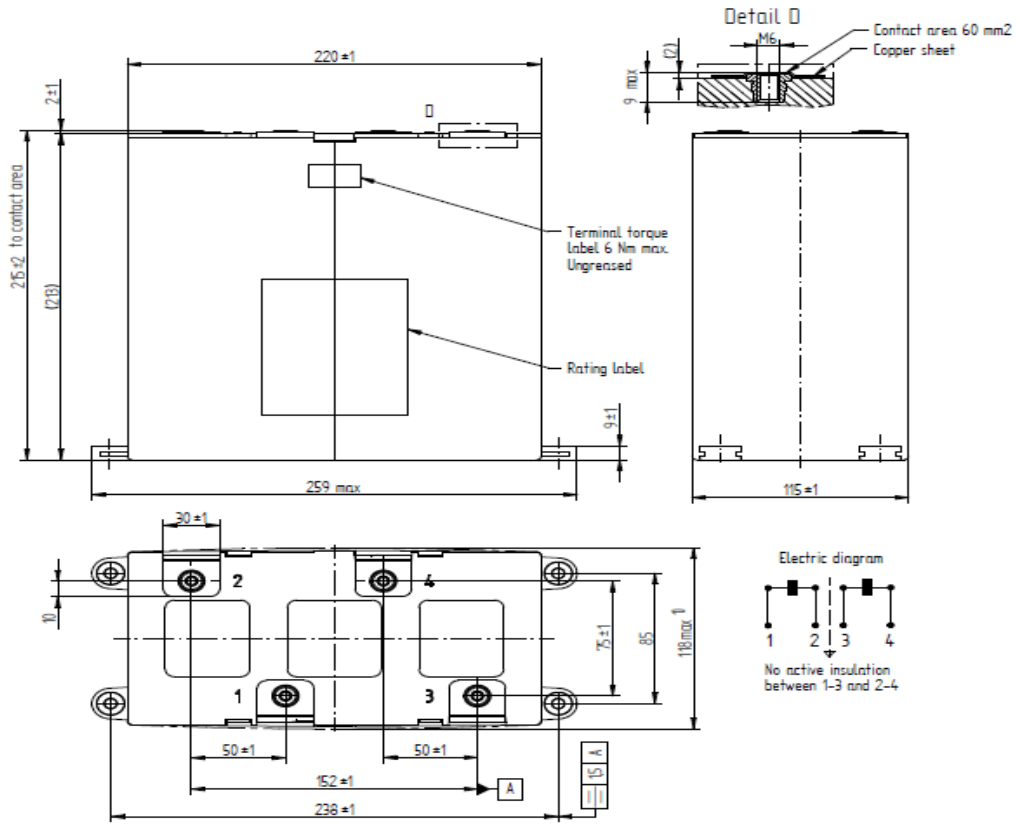
Main dimensions: 258 x 215 x 115 mm



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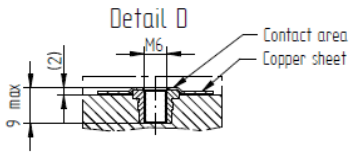

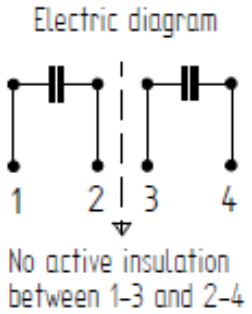

Highlights: Compactness, Low ESL & Higher Operation Temperature

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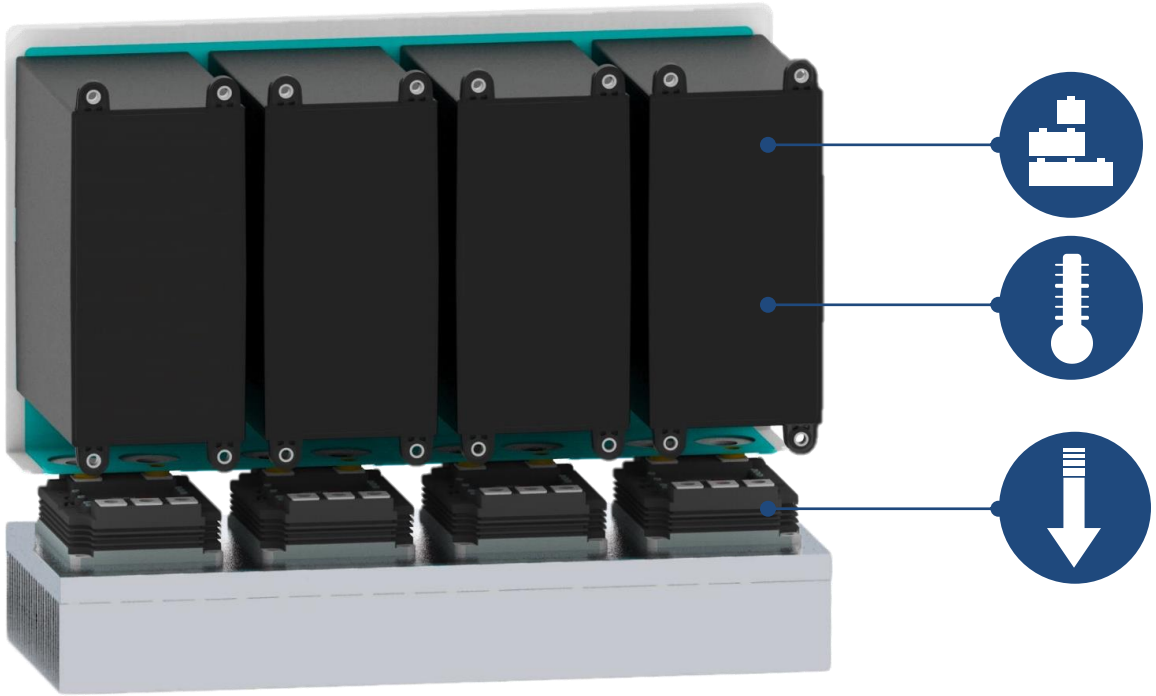
Compact power unit



- Capacitors can be mounted very close to the power modules to reduce loop inductance.
  - ➔ Ultra compact solution
  - ➔ **Less investment on cooling**
- Very short connection between capacitor and semiconductor
  - ➔ **Low ESL (<14 nH)**
  - ➔ **Possible snubber capacitors avoidance**

Electromagnetic Behavior of Modular Standard Series

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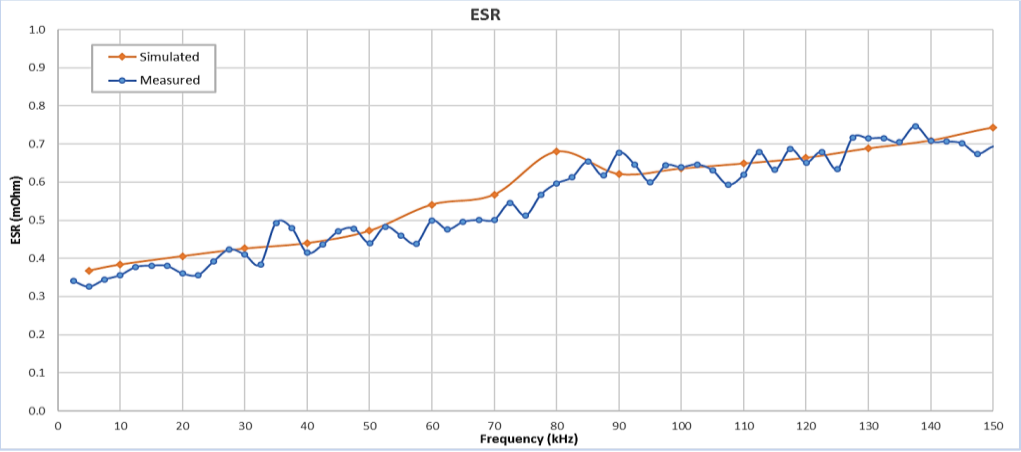
Electromagnetic: Modelling

Customer input
Current-frequency spectrum

TDK input
Capacitor design

Simulation
Capacitor electrical model: including ESL and ESR vs frequency
Total losses and its internal distribution (must for accurate thermal simulation)

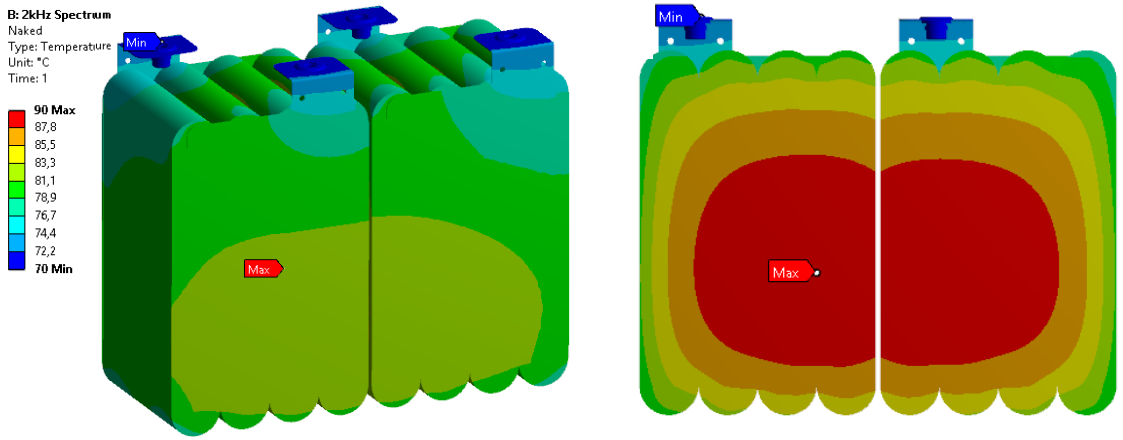


Customer benefits

- Electromagnetic model available for specific simulation according to current-frequency spectrum defined by the customer.
- Capacitor electrical model available in time and frequency domain
- Losses at defined current-frequency spectrum and its internal distribution
- Graphs with simulated ESR fully available for further thermal calculations by calculating losses all along the complete range of frequency

Thermal Behavior of Modular MF Series

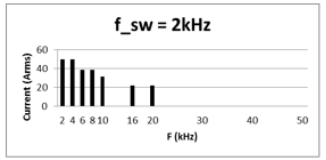
Thermal: Hot spot & temperature maping



- Capacitance: 1 mF
- Current: 155 A
- Power losses: **11 W**
- DeltaT = **15 K**

Boundary conditions considered:
- Ambient temp: 70 ºC
- Busbar temp: 80 ºC
- Natural convection

Current spectrum considered



Customer benefits

- Thermal model available for specific simulation according to spectrum and boundary conditions defined by the customer.
- Thermal simulations to be integrated as part of the type test report.
- Thermal simulations may reduce the complexity and time of technical approvals, no further specific thermal stability test on lab.
- Detailed temperature mapping allows customer to estimate in advance hot spot areas
- Thermal simulation to be done as per specific customer requirements (customized current spectrum and thermal boundary conditions)
- Heating transference from bus bar may be analyzed in advance

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Ordering Code System

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Nominal voltage (V)	Capacitance ±10% (µF)	Nominal current (A)	Surge current (kA)	Repetitive peak current (kA)	Dimensions (L x W x H, mm)	Con-struction	Part number
900	2075	200	225	5	205x90x170	A	**B25645A9218K003**
	3900	155	250	5	220x115x215	B	**B25645A9398K003**
1000	1705	190	220	5	205x90x170	A	**B25645A1178K003**
	3210	150	245	5	220x115x215	B	**B25645A1328K003**
1100	1330	180	215	5	243x169.5x90	A	**B25645A1138K003**
	2525	140	240	5	258x215x115	B	**B25645A1258K003**
1250	1045	170	210	5	243x169.5x90	A	**B25645A1118K003**
	1985	135	235	5	258x215x115	B	**B25645A1198K003**
1350	980	160	205	5	243x169.5x90	A	**B25645A1108K013**
	1865	130	230	5	258x215x115	B	**B25645A1188K003**
1600	710	150	200	5	243x169.5x90	A	**B25645A1757K003**
	1375	120	225	5	258x215x115	B	**B25645A1138K013**
1800	525	140	195	5	243x169.5x90	A	**B25645A1567K003**
	1025	115	220	5	258x215x115	B	**B25645A1108K003**
2000	415	130	185	5	243x169.5x90	A	**B25645A2447K003**
	820	110	210	5	258x215x115	B	**B25645A2827K003**
2300	335	120	175	5	243x169.5x90	A	**B25645A2367K003**
	670	105	200	5	258x215x115	B	**B25645A2677K003**

www.tdk-electronics.tdk.com