

150 kVA 3-phase SiC Power Stack Evaluation Kit

SOLUTIONS FOR POWER MANAGEMENT

STACK REFERENCE DATASHEET

COOLED, CONNECTED,
PROTECTED, FILTERED,
AND ASSEMBLED BY:



POWERED BY:



CONTROLLED BY:



Mersen SiC Power Stack Evaluation Kits help inverter designers save time and confusion in selecting individual components and can greatly benefit from a solution that is optimally pre-designed for their specific applications.

Part Number: SiC-Eval-Kit-150

FEATURES*

- 16 kW/L power density
- Up to 130°C T_j
- Peak efficiency 98%
- SiC MOSFET power modules:
 - Microchip® MSCSM120AM042CD3AG
- AgileSwitch® 2ASC-12A2HP Gate Driver core
- 700 VDC / 200 A_{RMS}
- Compact water cooled
- Up to 20 kHz switching frequency

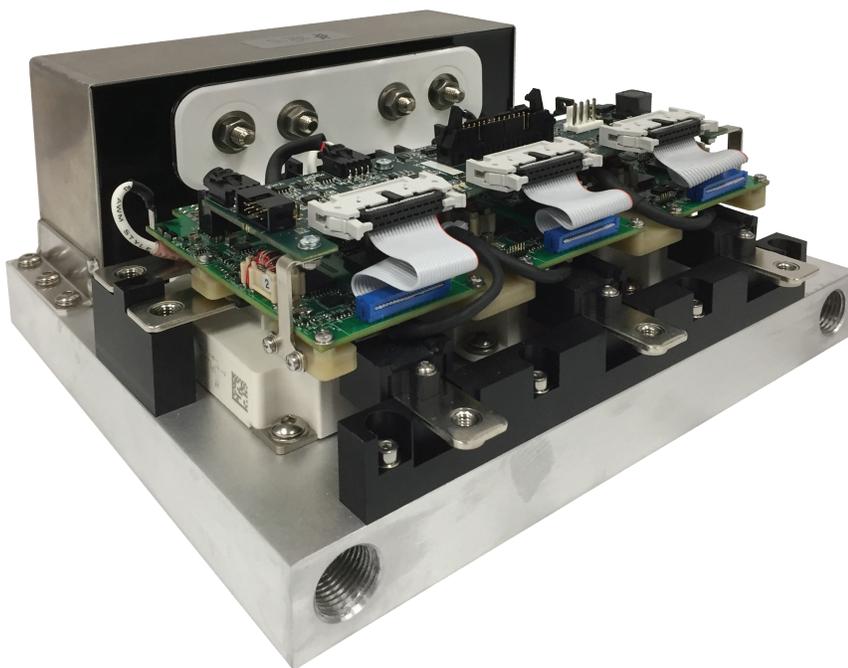
BENEFITS

- Power modules, bus bar, cooling, gate drivers, and capacitors can now be optimally designed together in one step to answer electrical, mechanical, and thermal challenges of the system.

APPLICATIONS

- E-Mobility
- DC smart grid
- Industrial
- Renewable energies

* Customization or derating can be studied on request



PART NUMBER: SIC-EVAL-KIT-150

TECHNICAL SPECIFICATIONS

Electrical		Min	Typ.	Max	Unit
Modules	3x SiC MOSFET half-bridge modules (Microchip®)		1200		V
Vo	Three Phase Output Voltage, VDC > 700V		480		V _{RMS}
Io	Flow: 4 l/min, Coolant: 50% Water/50% Glycol, Tcoolant = 70 C, VDC = 700V, fsw = 15kHz		200		A _{RMS}
VDC	DC Bus Voltage/ DC Supply Voltage		700	800	V
fsw	Switching frequency, PWM type	10	15	20	kHz
Cdc	DC Link Capacitor, 760uF, 1100V	0.65	0.7	0.75	mF
Cdd*	EMC decoupling capacitors		0.68		µF
Viso	Power Terminals to chassis, DC, 1 min		3000	4000	V
Cooling and Environment		Min	Typ.	Max	Unit
Tsto	Storage Temperature	-40		85	°C
Tair*	Ambient air temperature. See Note 1.	-40		65	°C
T coolant	Coolant inlet temperature, derate > 70°C	-40		105	°C
IP	Enclosure Ingress Protection		IP00		
dp	Pressure Drop, nominal flow 4 ltr/min		29		mbar
P	Power dissipated to liquid coolant		2400	3000	W
Altitude	VDC = 800V			4000	m
Humidity	No condensation, Pollution Degree 2	5		85	%
Discharge of DC Bus (Optional)		Min	Typ.	Max	Unit
tdis	No active discharge to VDC < 50V			30	min
tadis	With active discharge to VDC < 50V			5	S
Control Interface					
Gate Driver	AgileSwitch 2ASC-12A2HP – 1200V Dual-Channel Augmented High Performance SiC Core				
Mechanical		Min	Typ.	Max	Unit
Height			131		mm
Length			272		mm
Width			259		mm
Weight	Average value		18		kg
Tt	Fastener torque for power terminals		TBD		Nm
T1	Torque for TBD		TBD		Nm
Vibration	According to IEC60721			5	m/s ²
Shock	According to IEC60721			40	m/s ²

Note 1: The maximum air temperature will be determined by the DC Bus capacitors; forced cooling may be needed.

DISCLAIMER AND IMPORTANT NOTES: Silicon Carbide (SiC) Evaluation Kit 150kVA

Note: This SiC evaluation kit is a high voltage and high temperature power electronic device that is meant to serve as an evaluation tool preferably in a lab setting for users to conduct experiment on SiC stack performance. It is important to note that the kit should be handled and operated by qualified technicians or engineers. As this kit is a fragile device, when not in use it should be stored in an area with ambient storage temperature ranging from -40 to +40 degree Celsius. Also, special care should be given during transportation to avoid damaging the electronics and use of electrostatic discharge (ESD) bags is highly recommended.

It is important to note that this kit is not designed to meet any safety or industrial standards and is not meant to be used as a production qualified device.

CAUTION

Please ensure that appropriate safety procedures are followed when operating this board, as any of the following can occur if you handle or use this board without following proper safety precautions:

- Death
- Serious injury
- Electrocution
- Electrical shock
- Electrical burns
- Severe heat burns

IMPORTANT NOTES

Purposes and Use

Mersen (on behalf of itself and its affiliates, "Mersen") reserves the right to make changes to the evaluation kit without prior notice.

This kit should not be used as production item or be used as all or part of a finished product. This kit should be handled and operated by qualified technical engineers.

NO WARRANTY

Mersen SiC Stack Evaluation Kit (hereinafter referred to as the "Equipment") is provided on an

"AS IS" basis, and therefore there is no warranty of any kind whatsoever, whether express or implied, statutory, or otherwise, including but not limited to any warranty of merchantability, non-infringement, satisfactory quality, accuracy, or fitness for a particular purpose. Mersen does not guarantee that the Equipment will properly operate.

LIMITATION OF LIABILITY

Mersen shall be not liable to the Buyer and any third party for any damages of any kind in connection with the use of the Equipment including but not limited to indirect or consequential damages such as loss of profits, loss of data, loss of production, loss of revenue and business interruption losses, arising out of or relating to the supply of the Equipment.

Mersen shall not be held liable for any and all damages arising from or in connection with the misuse of the Equipment by Buyer, its employees, customers or others.

To the fullest extent permitted by the applicable law, the total cumulative liability of Mersen and its agents or employees, arising from or in connection with the supply of the Equipment from any cause whatsoever whether based on contract, tort, strict liability, any warranty or otherwise, shall, in no event and under no circumstances, exceed the total payments made by Buyer pursuant to the supply of the Equipment, and effectively received by Mersen at the time of Buyer's claim.

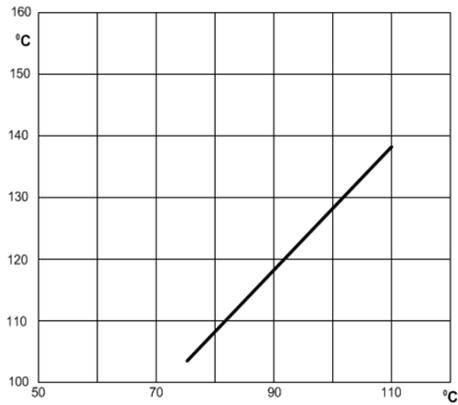
INDEMNIFICATION

The Equipment is not serially manufactured product and is in course of development. It can be used for evaluation of power conversion process using SiC power modules in the laboratories only. In this result and to the extent permitted by applicable law, the liability of Mersen with respect to product safety, product liability, technical performance, reliability, shelf life or non-infringement of intellectual property rights of third parties is expressly excluded.

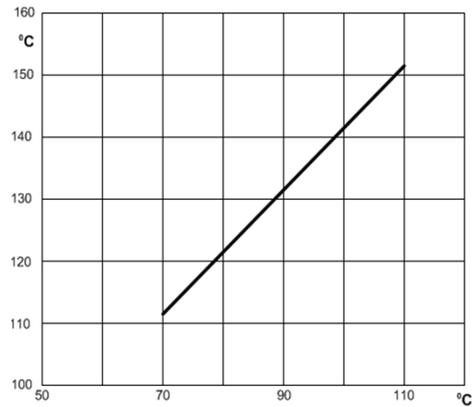
For additional information please contact philippe.roussel@mersen.com

COOLING PERFORMANCE

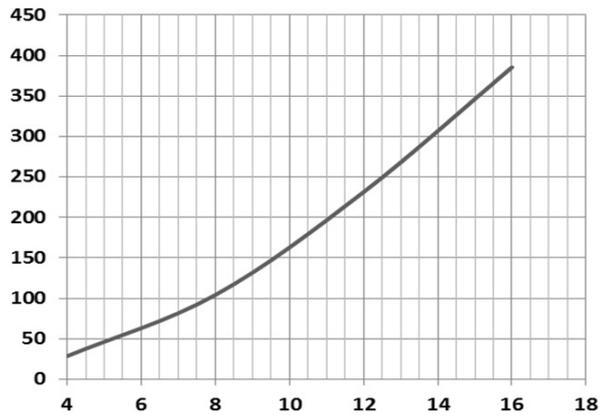
FET T_j vs Coolant inlet Temperature.
R_{th} = .012 K/W, I_o = 200A, f_{sw} = 15 kHz



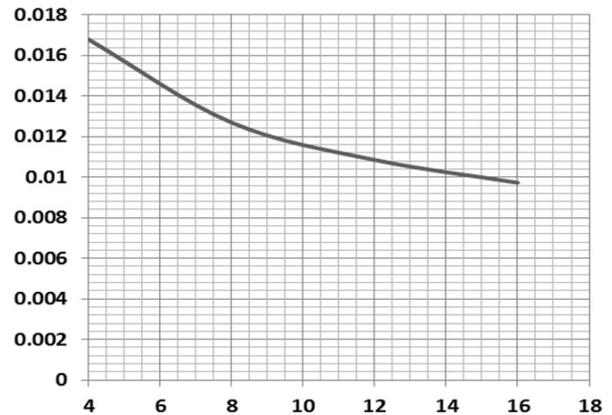
FET T_j vs Coolant inlet Temperature.
R_{th} = .0168 K/W, I_o = 200A, f_{sw} = 15 kHz



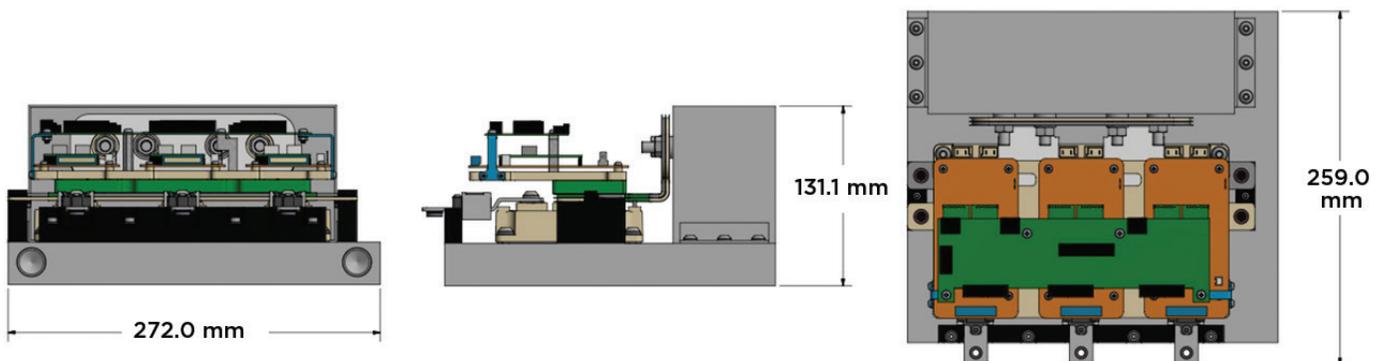
Pressure Drop, mBar, vs Flow Rate, liters/min



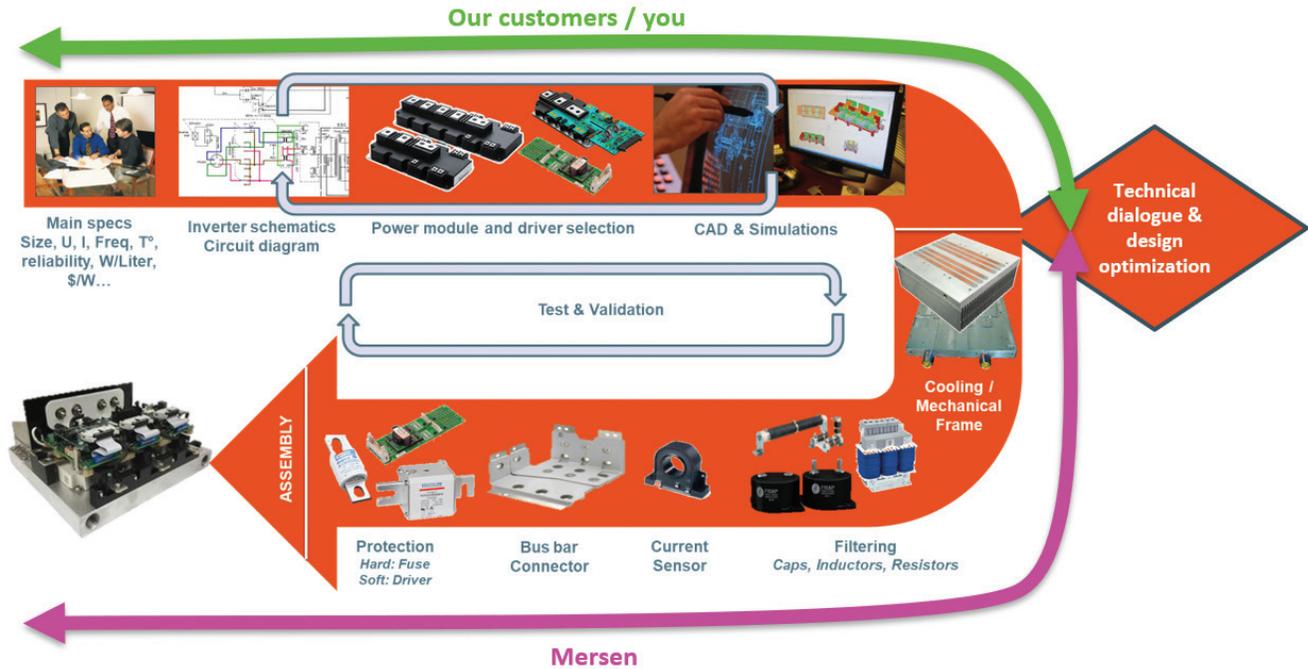
Cold Plate R_{th}, °C/W, vs Flow Rate, liters/min



DIMENSIONS



TYPICAL DESIGN CYCLE

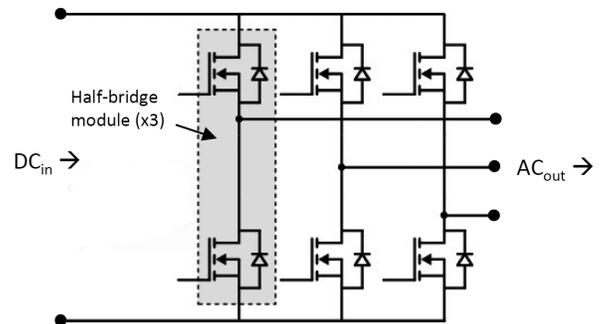


TARGETED CUSTOMERS

- Inverter / Stack design-house and R&D lab with limited or no production capability.
- OEM / stack and inverter manufacturers: specialists and generalists
- System Integrators

POSSIBLE CUSTOMIZATION AND ADAPTATION (UPON REQUEST)

- Overall dimensions and form-factor of the mechanical frame
- Bracket and hardware for integration
- SiC MOSFET module model and type
- 1700V SiC module
- Air-cooling (instead or liquid-cooled)
- Increase of F_{sw} , I_{nom} or V_{dc}
- Integration of output filter inductors
- Test and qualification
- Purchase of individual stand-alone components only (no assembly service)



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More information at:
<https://ep-us.mersen.com/products/engineering/inverterstack-design-optimization-assembly>