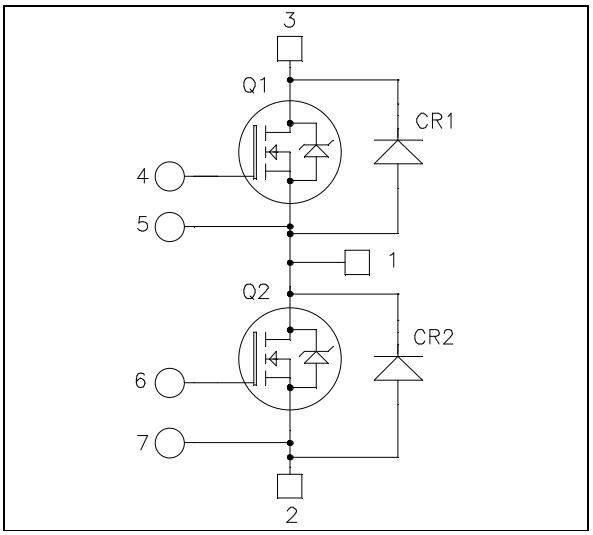
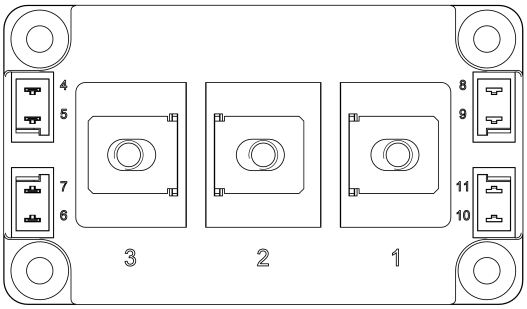
MSCSM170AM058CD3AG
Preliminary data

Phase leg
SiC Power Module

V_{DSS} = 1700V
R_{DSon} = 5.8mΩ typ @ Tj = 25°C
I_D = 348A @ Tc = 25°C





Application

- Welding converters
- Switched Mode Power Supplies
- Uninterruptible Power Supplies
- EV motor and traction drive

Features

- ***SiC Power MOSFET***
  - Low $R_{DS(on)}$
  - High temperature performance
- ***SiC Schottky Diode***
  - Zero reverse recovery
  - Zero forward recovery
  - Temperature Independent switching behavior
  - Positive temperature coefficient on VF
- Kelvin emitter for easy drive
- High level of integration
- AlN substrate for improved thermal performance
- M6 power connectors

Benefits

- High efficiency converter
- Stable temperature behavior
- Direct mounting to heatsink (isolated package)
- Low junction to case thermal resistance
- RoHS Compliant

All ratings @ T_j = 25°C unless otherwise specified

Absolute maximum ratings (Per SiC MOSFET)

Symbol	*Parameter*		*Max ratings*	*Unit*
V_{DSS}	Drain - Source Voltage		1700	V
I_D	Continuous Drain Current	T_c = 25°C	348	A
		T_c = 80°C	277	
I_{DM}	Pulsed Drain current		700	
V_{GS}	Gate - Source Voltage		-10/23	V
R_{DSon}	Drain - Source ON Resistance		7.5	mΩ
P_D	Power Dissipation	T_c = 25°C	1641	W

CAUTION: These Devices are sensitive to Electrostatic Discharge. Proper Handling Procedures Should Be Followed.

Electrical Characteristics (Per SiC MOSFET)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
I_{DSS}	Zero Gate Voltage Drain Current	V_{GS} = 0V , V_{DS} = 1700V			60	600	µA
$R_{DS(on)}$	Drain – Source on Resistance	V_{GS} = 20V I_D = 180A	T_j = 25°C		5.8	7.5	mΩ
			T_j = 175°C		10.5		
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 15 mA		1.8	3.3		V
I_{GSS}	Gate – Source Leakage Current	V_{GS} = 20 V, V_{DS} = 0V				600	nA

Dynamic Characteristics (Per SiC MOSFET)

Symbol	Characteristic	Test Conditions		Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS} = 0V V_{DS} = 1000V f = 1MHz			19.8		nF
C_{oss}	Output Capacitance				0.9		
C_{rss}	Reverse Transfer Capacitance				0.06		
Q_g	Total gate Charge	V_{GS} = -5/20V V_{Bus} = 850V I_D = 180A			1068		nC
Q_{gs}	Gate – Source Charge				294		
Q_{gd}	Gate – Drain Charge				162		
$T_{d(on)}$	Turn-on Delay Time	V_{GS} = -5/20V ; V_{Bus} = 900V I_D = 300A ; T_J =150°C R_{GON} = TBD Ω ; R_{GOFF} = TBD Ω			TBD		ns
T_r	Rise Time				TBD		
$T_{d(off)}$	Turn-off Delay Time				TBD		
T_f	Fall Time				TBD		
E_{on}	Turn on Energy	V_{GS} = -5/+20V V_{Bus} =900V ; I_D =300A R_{GON}=TBDΩ;R_{GOFF}=TBDΩ	T_j = 150°C		TBD		mJ
E_{off}	Turn off Energy		T_j = 150°C		TBD		
R_{Gint}	Internal gate resistance				0.98		Ω
R_{thJC}	Junction to Case Thermal Resistance					0.091	°C/W

Body diode ratings and characteristics (Per SiC MOSFET)

Symbol	Characteristic	Test Conditions	Min	Typ	Max	Unit
V_{SD}	Diode Forward Voltage	V_{GS} = 0V, I_{SD} = 180A		3.7		V
		V_{GS} = -5V, I_{SD} = 180A		3.9		
t_{rr}	Reverse Recovery Time	I_{SD} = 180A ; V_{GS} = -5V V_R = 1200V ; di_F/dt = 6000A/µs		TBD		ns
Q_{rr}	Reverse Recovery Charge			TBD		nC
I_{rr}	Reverse Recovery Current			TBD		A

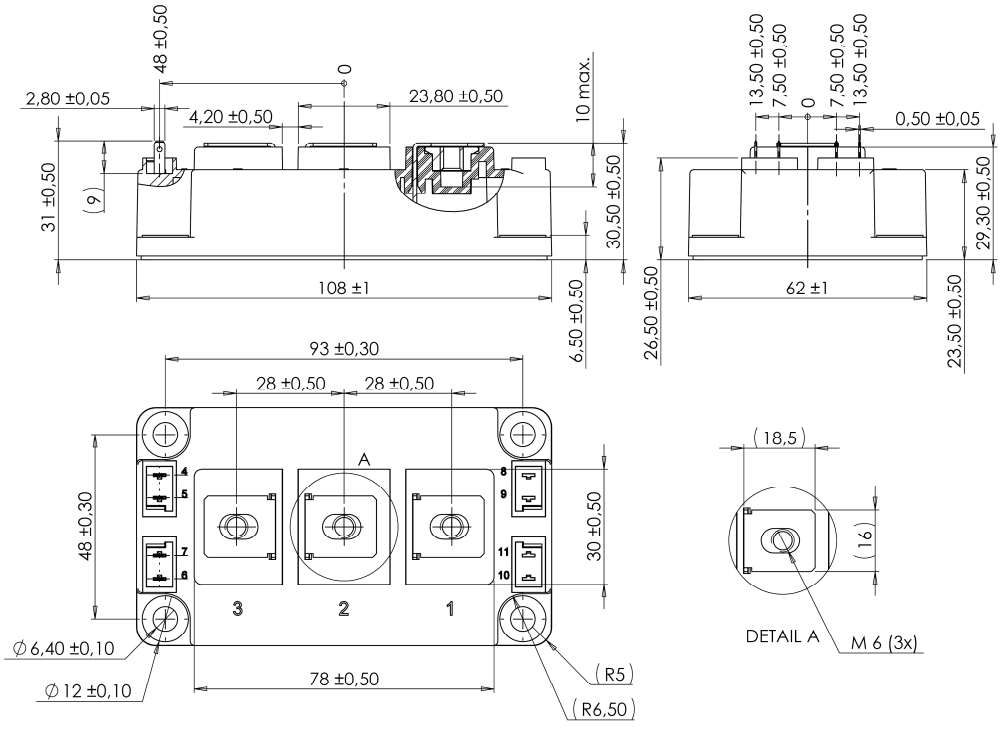
SiC schottky diode ratings and characteristics (Per SiC diode)

Symbol	*Characteristic*	*Test Conditions*		*Min*	*Typ*	*Max*	*Unit*
V_{RRM}	Peak Repetitive Reverse Voltage					1700	V
I_{RRM}	Reverse Leakage Current	V_R=1700V	T_j = 25°C		60	1200	µA
			T_j = 175°C		900		
I_F	Forward Current		Tc = 125°C		180		A
V_F	Diode Forward Voltage	I_F = 180A	T_j = 25°C		1.5	1.8	V
			T_j = 175°C		2.25		
Q_C	Total Capacitive Charge	V_R = 900V			1380		nC
C	Total Capacitance	f = 1MHz, V_R = 600V			1002		pF
		f = 1MHz, V_R = 900V			828		
R_{thJC}	Junction to Case Thermal Resistance					0.101	°C/W

Thermal and package characteristics

Symbol	*Characteristic*			*Min*	*Max*	*Unit*
V_{ISOL}	RMS Isolation Voltage, any terminal to case t =1 min, 50/60Hz			4000		V
T_J	Operating junction temperature range			-40	175	°C
T_{JOP}	Recommended junction temperature under switching conditions			-40	$T_J$max -25	
T_{STG}	Storage Temperature Range			-40	125	
T_C	Operating Case Temperature			-40	125	
Torque	Mounting torque	For terminals	M6	3	5	N.m
		To Heatsink	M6	3	5	
Wt	Package Weight				350	g

Package outline (dimensions in mm)



See application note 1908 - Mounting instructions for D3 & D4 power modules

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