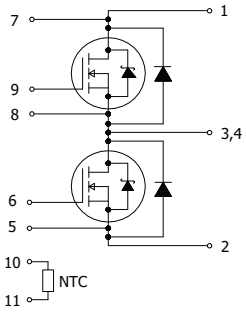
DASMM450N120BH3

SiC MOSFET Power Module

Preliminary

Features

- V_{DSS} = 1200V
- $R_{DS(ON)}$ < 5.8 mΩ@ V_{GS} = 15 V
- Fully Avalanche Rated
- Pb Free & RoHS Compliant
- Isolation Type Package
- Electrically Isolation base plate
- Full SiC Solution
  (SiC MOSFET + SiC Schottky Diode)

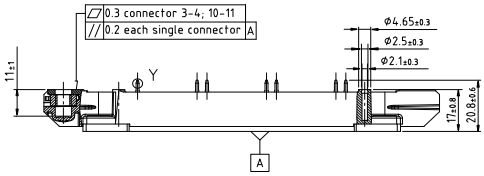


HBA-15262

Dimensions in mm (1 mm = 0.0394")

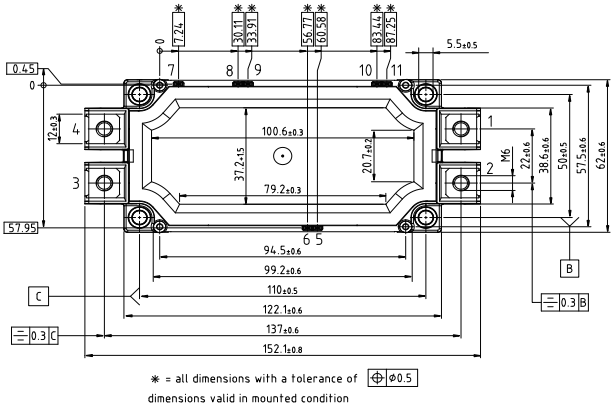
Applications

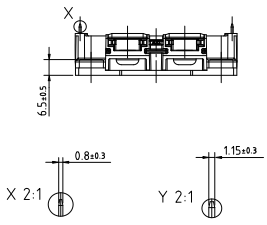
- Solar Inverters
- Power Converters
- Motor Drive
- Switch Mode Power Supplies
- Battery Chargers



Absolute Maximum Ratings (Tc=25°C unless otherwise noted)

Parameter		Symbol	Ratings	Unit
Drain-Source Voltage		V_{DS}	1200	V
Gate-Source Voltage		V_{GS}	-10/+20	V
Drain Current-Continuous	@ T_C =25°C @ T_C =100°C	I_D	450 300	A
Drain Current-Pulsed	@ T_C =25°C	I_{DM}	900	A
Maximum Power Dissipation		P_D	1875	W
Storage Temperature Range		T_{STG}	-40 to +150	°C
Operating Junction Temperature Range		T_{VJ}	-40 to +150	°C
Thermal Resistance, Junction-to-Case		$R\theta_{JC}$	0.08	°C/W
Isolation Voltage (A.C. 1 minute) between All Terminals and Baseplate		V_{iso}	2500	V
Mounting torque	Module Base to Heatsink (M5) Busbar to Terminal (M6)	M_d	3~6 2.5~5	N_m





Electrical Characteristics @ T_{VJ} =25°C (unless otherwise specified)

Parameter	Symbol	Conditions		Min.	Typ.	Max.	Unit
OFF Characteristics							
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS} =0V , I_{DS} =0.1mA		1200	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} =0V , V_{DS} =1200V		-	-	200	μA
Gate-Body Leakage	I_{GSS}	V_{GS} =20V , V_{DS} =0V		-	-	500	nA
ON Characteristics							
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS} =V_{GS} , I_{DS} =8mA		1.6	2.1	4	V
Drain-Source On-State Resistance	$R_{DS(on)}$	V_{GS} =15V , I_{DS} =150A		-	5.8	-	mΩ
Internal Gate Resistance	$R_{G(int)}$			-	2.45	-	Ω
Dynamic Characteristics							
Input Capacitance	C_{iss}	V_{DS} =800V V_{GS} =0V V_{AC} =1V Freq.=1MHz		-	20	-	nF
Output Capacitance	C_{oss}			-	1.8	-	
Reverse Transfer Capacitance	C_{rss}			-	0.2	-	
Total Gate Charge	Q_g	V_{DS} =600V V_{GS} =-4V/+15V I_{DS} =300A		-	550	-	nC
Gate to Source Charge	Q_{gs}			-	178	-	
Gate to Drain Charge	Q_{gd}			-	276	-	
Switching Characteristics							
Turn-On Delay Time	$t_{d(on)}$	V_{DD} = 600V V_{GS} = -4/+15V I_{DS} = 300A R_G = 2.2 Ω	T_{VJ} =25°C	-	96	-	ns
			T_{VJ} =125°C	-	97	-	
Rise Time	t_r		T_{VJ} =25°C	-	72	-	
			T_{VJ} =125°C	-	79	-	
Turn-Off Delay Time	$t_{d(off)}$		T_{VJ} =25°C	-	146	-	
			T_{VJ} =125°C	-	167	-	
Fall Time	t_f		T_{VJ} =25°C	-	19.8	-	
			T_{VJ} =125°C	-	19.2	-	
Turn-On Switching Energy	E_{on}	V_{DD} = 600V V_{GS} = -4V/+15V I_D = 300A $R_{G(ext)}$ = 2.2 Ω	T_{VJ} =25°C	-	2.4	-	mJ
			T_{VJ} =125°C	-	2.6	-	
Turn-Off Switching Energy	E_{off}		T_{VJ} =25°C	-	9.75	-	
			T_{VJ} =125°C	-	9.78	-	
SiC Schottky Diode Characteristics , at T_J = 25°C , unless otherwise specified							
Continuous Diode Fwd Current	I_{SDC}	V_{GS} = 0V		-	300	-	A
Drain-Source Reverse Voltage	V_{SD}	I_{SD} = 300A , V_{GS} = 0V		-	1.8		V
MOSFET Forward Recovery Charge	Q_{rr}	V_{DD} = 600V , I_{SD} = 300A V_{GS} = 0V , di/dt = 7488A/μs	T_{VJ} =25°C	-	4.5	-	nC
			T_{VJ} =125°C	-	6.4	-	
MOSFET Peak Forward Recovery Current	I_{rr}	V_{DD} = 600V , I_{SD} = 300A V_{GS} = 0V , di/dt = 7488A/μs	T_{VJ} =25°C	-	137	-	A
			T_{VJ} =125°C	-	172	-	
MOSFET Reverse Recovery Time	T_{rr}	V_{DD} = 600V , I_{SD} = 300A V_{GS} = 0V , di/dt = 7488A/μs	T_{VJ} =25°C	-	51.5	-	ns
			T_{VJ} =125°C	-	59.2	-	

Notes:

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle > 2%.

Typical Characteristics

Fig.1 Output Characteristics at T_J = 25°C

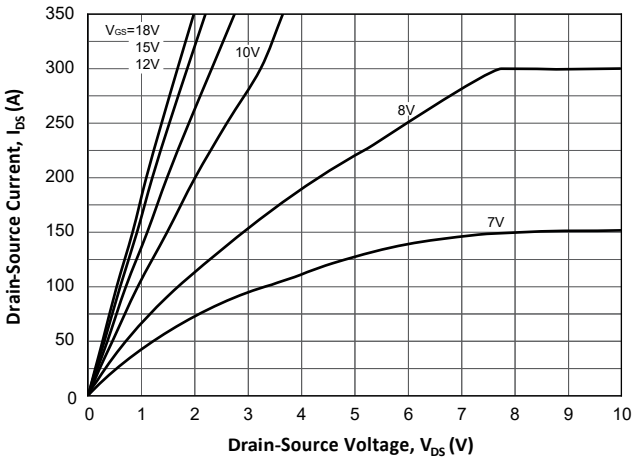


Fig.2 Output Characteristics at T_J =125°C

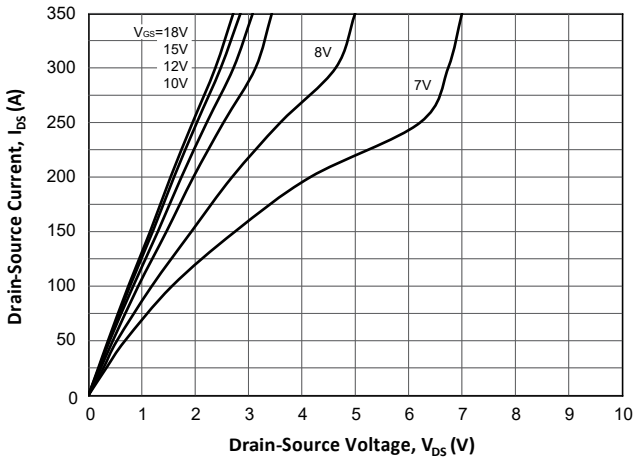


Fig.3 Drain Source on Resistance

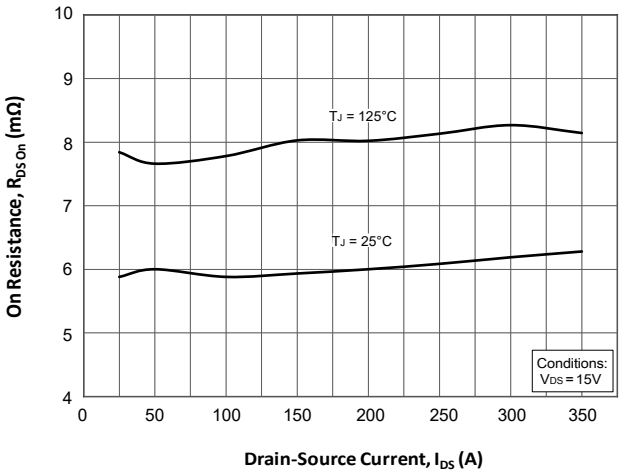


Fig.4 Transfer Characteristics

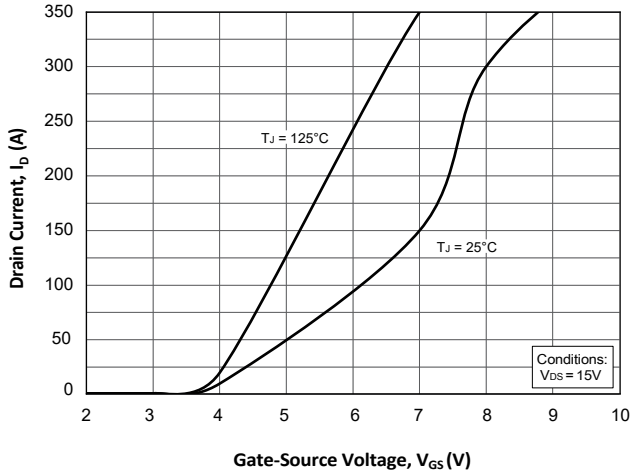


Fig.5 Capacitances vs. Drain-Source Voltage

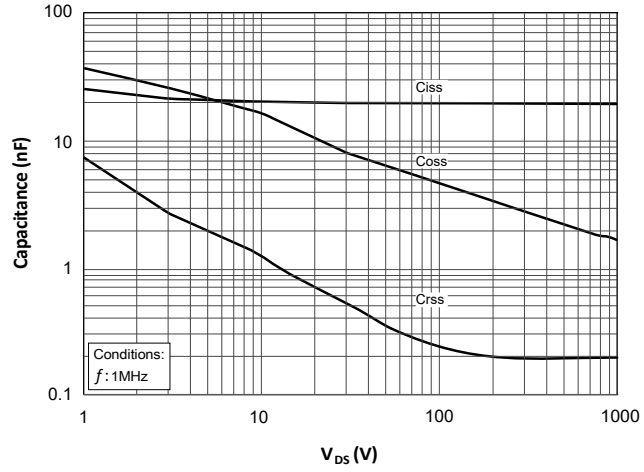
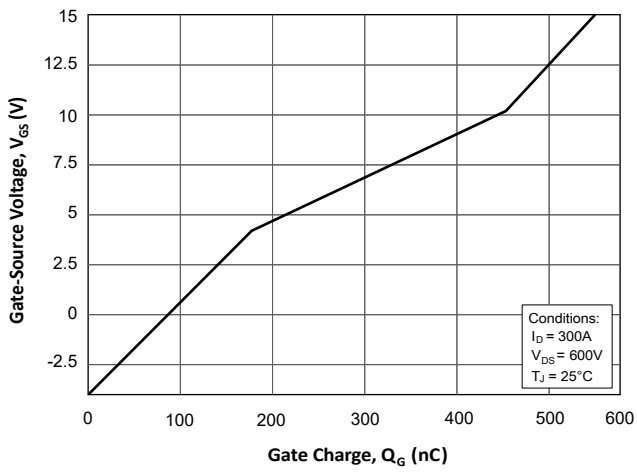


Fig.6 Gate Charge Characteristics



Typical Characteristics

Fig.7 Switching losses vs RG change

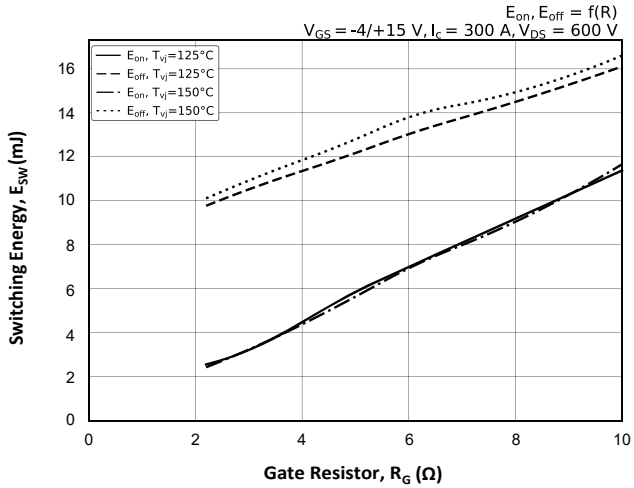


Fig.8 Reverse Energy loss vs. Drain Current

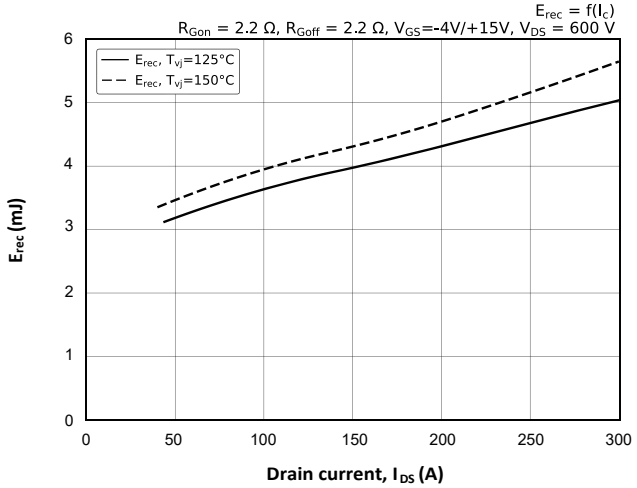


Fig.9 SReverse Energy loss vs RG Change

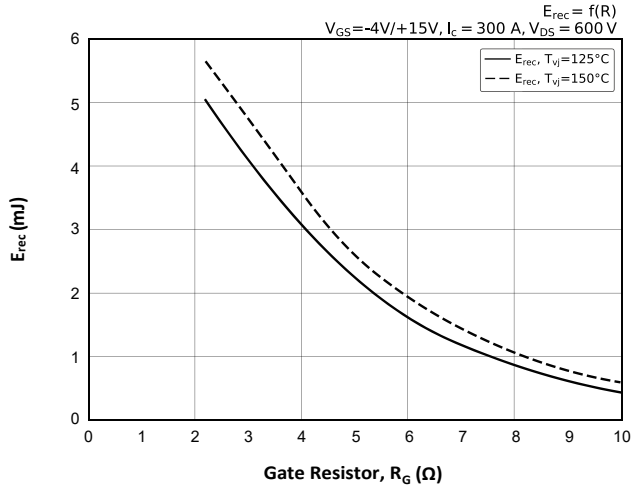


Fig.10 Switching Timer vs RG Change

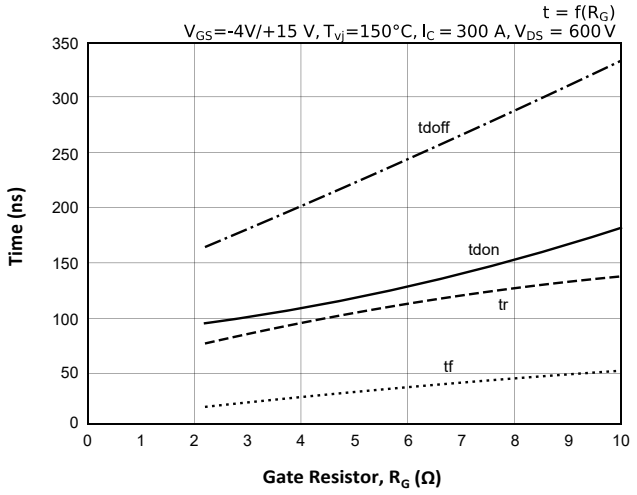


Fig.11 Clamped Inductive Switching Energy vs. Drain Current

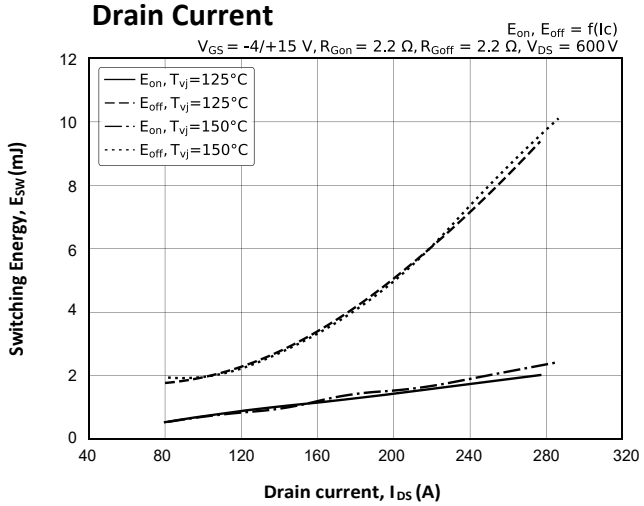
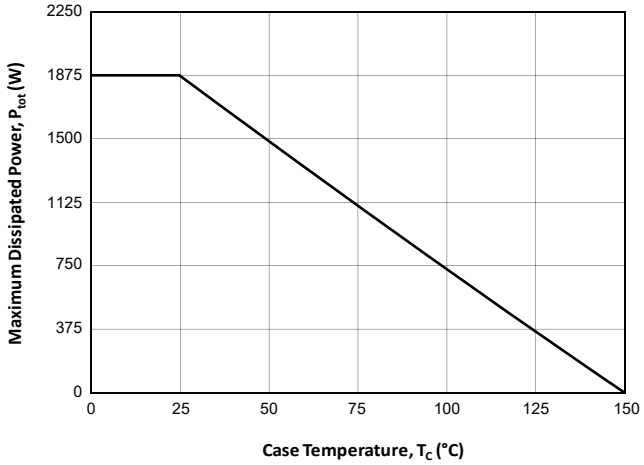


Fig.12 Max. Power Dissipation (MOSFET) Derating vs. Case Temperature



Typical Characteristics

Fig.13 SiC Schottky Diode curves T_J =25°C

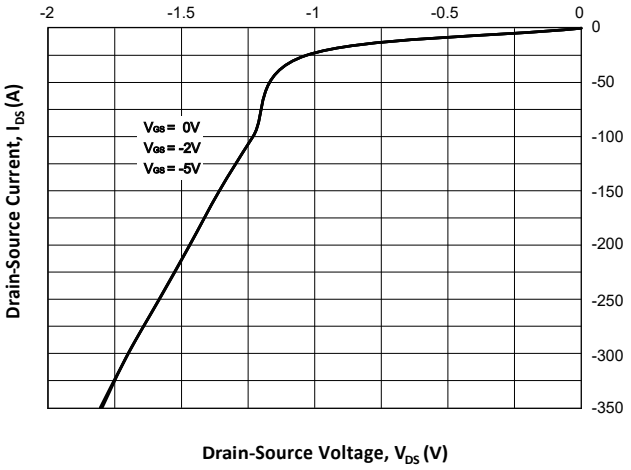


Fig.14 SiC Schottky Diode curves T_J = 125°C

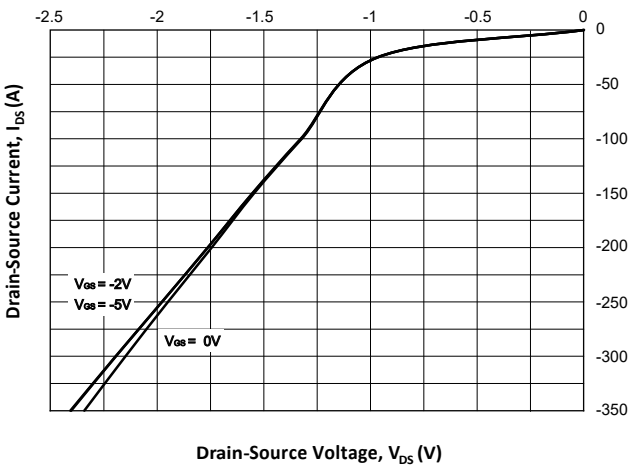
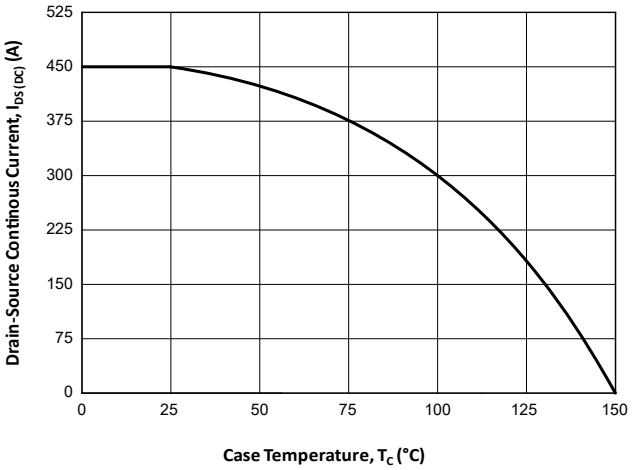


Fig.15 Continuous Drain Current (MOSFET) vs. Case Temperature



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