MMN600DB012B

120V 600A N-ch Power MOSFET Module

February 2017 Preliminary RoHS Compliant

PRODUCT FEATURES

☐ $R_{DS(ON).typ}$=0.45mΩ@V_{GS}=10V

☐ 175℃operating temperature

☐ Low Gate Charge Minimize Switching Loss

☐ Fast Recovery body Diode

☐ 10K Ω Gate Protected Resistance Inside

☐ Inside the module,each MOSFET chip has a gate resistance:10Ω

APPLICATIONS

☐ High efficiency DC/DC Converters

☐ Synchronous Rectifier

Type	V_{DS}	I_D	$R_{DS(ON).max}$ T_J=25℃	T_{Jmax}	Marking	Package
MMN600DB012B	120V	600A	0.6mΩ	175℃	MMN600DB012B	NDB

ABSOLUTE MAXIMUM RATINGS(T_C =25°C *unless otherwise specified*)

Symbol	Parameter/Test Conditions		Values	Unit
V_{DSS}	Drain - Source Voltage	T_J=25℃	120	V
V_{GSS}	Gate - Source Voltage		±20	
I_D	Continuous Drain Current	T_C=25℃	905	A
		T_C=110℃	600	
I_{DM}	Pulsed Drain Current at V_{GS}=10V	Limited by T_{Jmax}	1200	
P_D	Maximum Power Dissipation		1500	W
E_{AS}	Single Pulse Avalanche Energy	V_{DD}=50V,L=1mH	7200	mJ

THERMAL AND MODULE CHARACTERISTICS (T_C =25°C *unless otherwise specified*)

Symbol	Parameter/Test Conditions		Values	Unit
R_{thJC}	Thermal resistance,junction to case Per MOSFET		0.1	K/W
T_{Jmax}	Max. Junction Temperature		175	℃
T_{STG}	Storage Temperature Range		-40～125	
V_{isol}	Isolation Breakdown Voltage	AC, 50Hz(R.M.S), t=1minute	3000	V
Torque	to heatsink	Recommended（M5）	2.5～5	Nm
	to terminal	Recommended（M5）	2.5～5	
Weight			240	g

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MOSFET

ELECTRICAL CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions			Min.	Typ.	Max.	Unit
$V_{(BR)DSS}$	Drain Source Breakdown Voltage	V_{GS}=0V, I_D=2mA		120			V
$R_{DS(ON)}$	Drain Source ON Resistance	V_{GS}=10V, I_D=600A(chip)			0.45	0.6	mΩ
I_{DSS}	Drain Source Leakage Current	V_{DS}=120V,V_{GS}=0V				2	mA
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}= V_{DS} , I_D=2mA		3.0		5.0	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±20V		-2		2	mA
R_{gint}	Integrated Gate Resistor				1.5		Ω
Q_g	Total Gate Charge	V_{DD}=60V, I_D=600A , V_{GS}=10V			1264	1690	nC
Q_{gs}	Gate Source Charge				416		nC
Q_{gd}	Gate Drain Charge				296		nC
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f =1MHz			86		nF
C_{oss}	Output Capacitance				23.5		nF
C_{rss}	Reverse Transfer Capacitance				2.35		nF
$t_{d(on)}$	Turn on Delay Time	V_{DD}=60V,I_D=300A, R_G =5Ω, V_{GS}=10V, (Inductive Load)	T_J=25℃		264		ns
t_r	Rise Time				200		ns
$t_{d(off)}$	Turn off Delay Time				395		ns
t_f	Fall Time				156		ns

Source-Drain BODY-DIODE CHARACTERISTICS *(T_C=25°C unless otherwise specified)*

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit
I_{SD}	Continuous Source Drain Current				600	A
I_{SDM}	Pulse Source Drain Current	Limited by T_{Jmax}			1200	A
V_{SD}	Forward Voltage	I_S=600A , V_{GS}=0V		0.9	1.2	V
t_{rr}	Reverse Recovery time	I_F=300A , V_{GS}=0V dI$_F$/dt=-1000A/μs		162		ns
Q_{RR}	Reverse Recovery Charge			6900		nC

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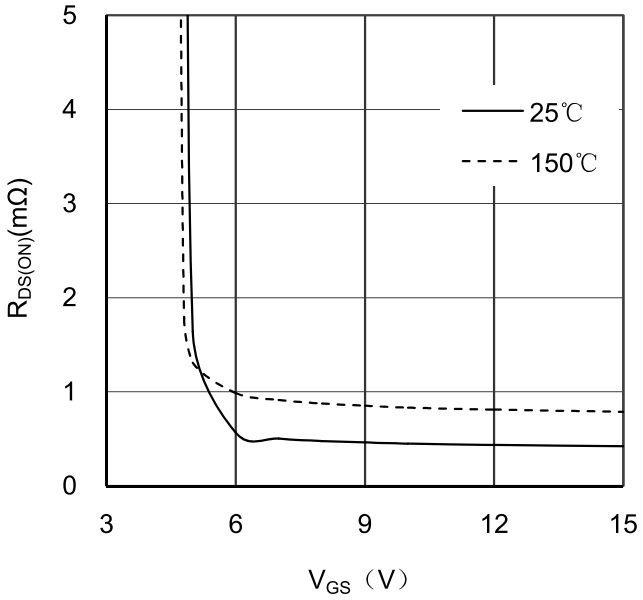

Figure 1. Typical $R_{DS(ON)}$ vs Gate Voltage

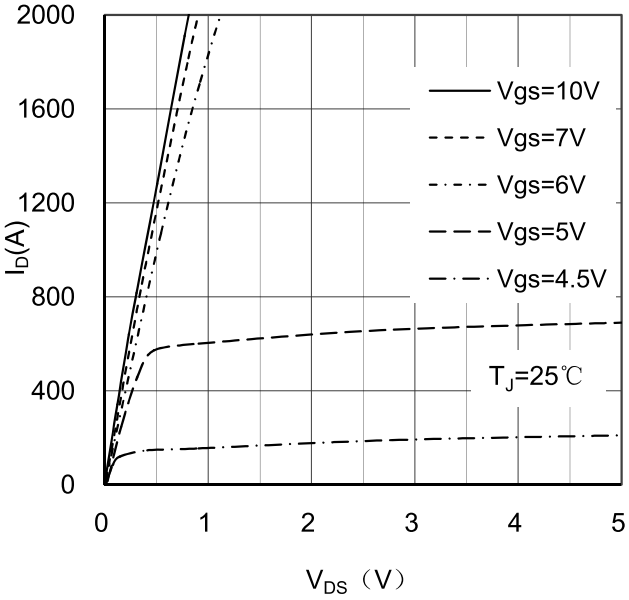

Figure 2. Typical Output Characteristics

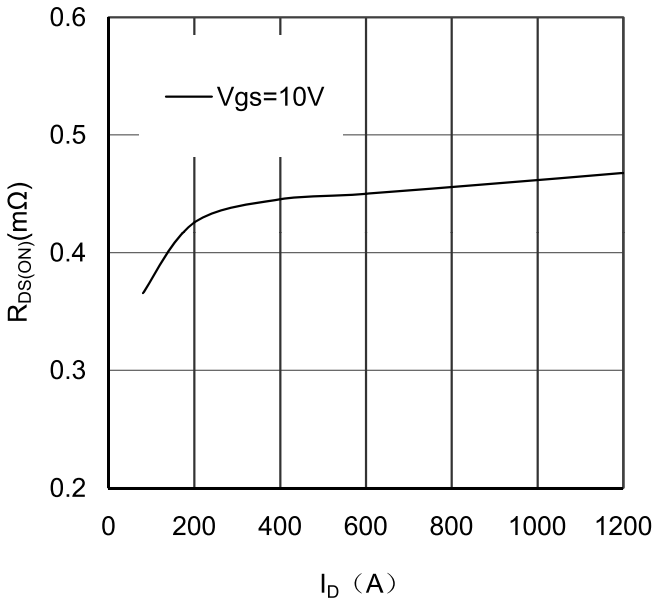

Figure 3. Drain-Source ON Resistance vs I_D

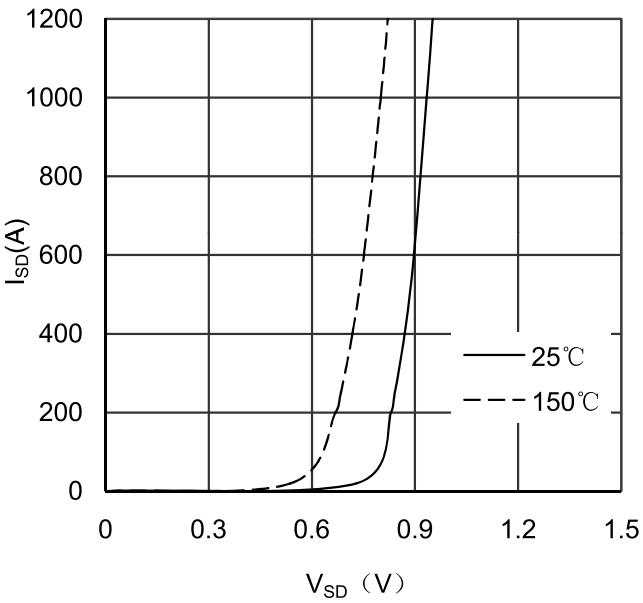

Figure 4. Source-Drain Voltage

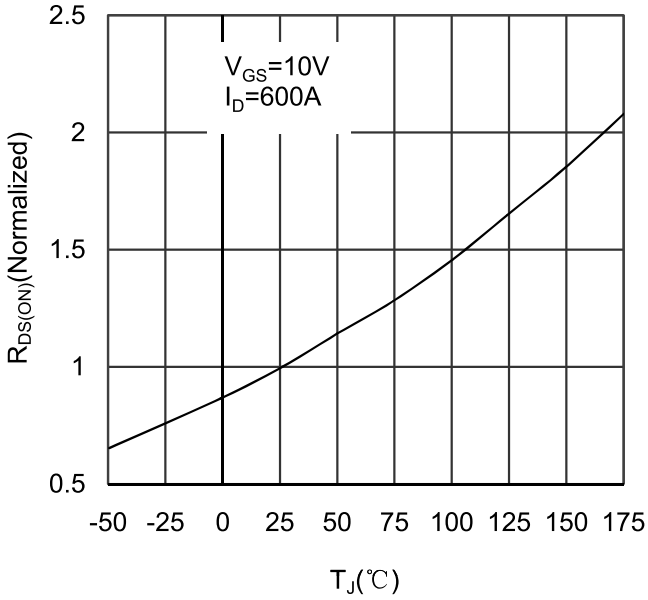

Figure 5. Drain-Source ON Resistance vs Junction Temperature

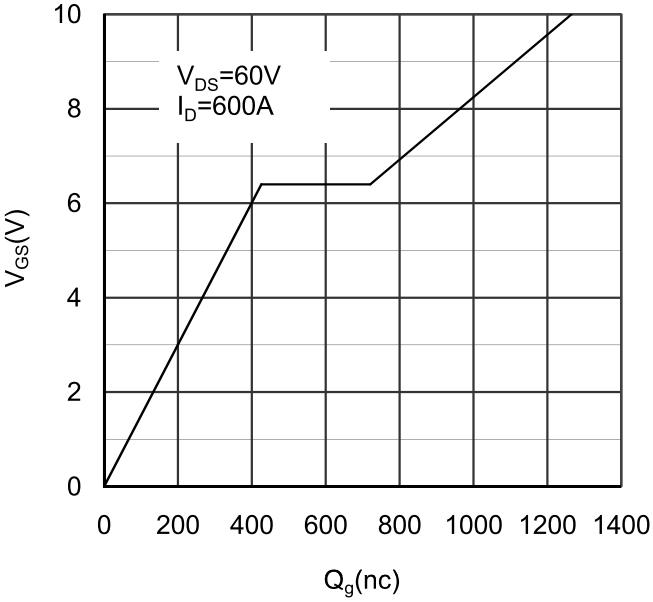

Figure 6. Gate Charge characteristics

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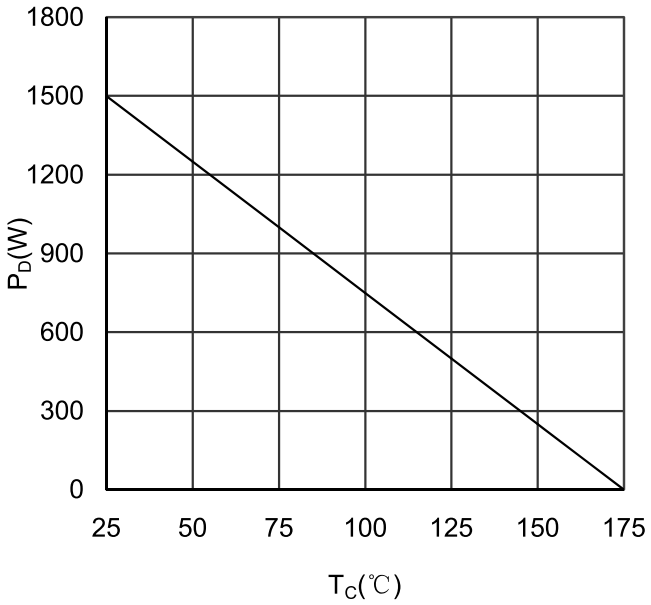

Figure 7. Maximum Power Dissipation vs Case Temperature

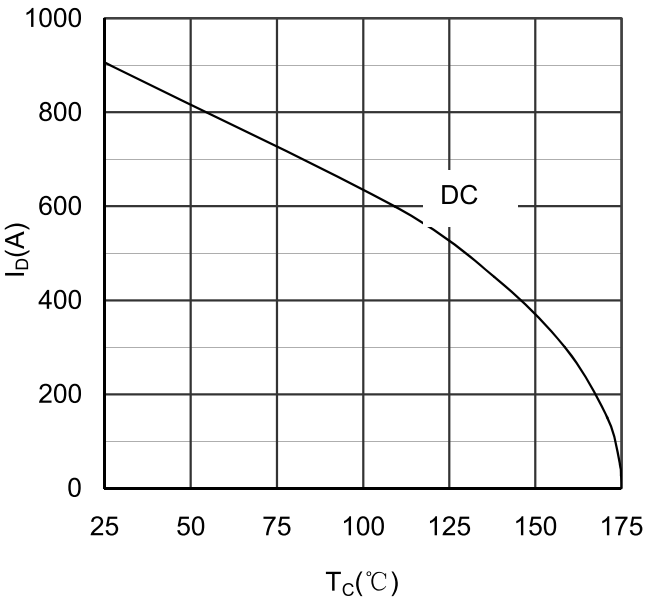

Figure 8. Maximum Continuous Drain Current vs Case Temperature

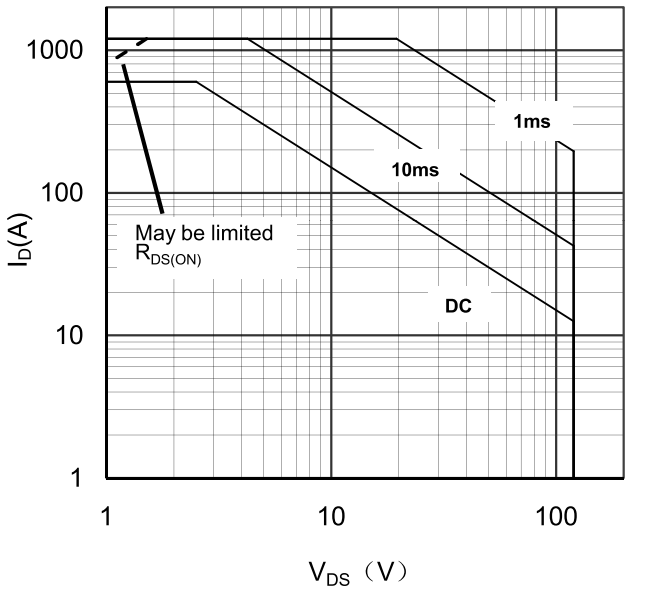

Figure 9. Maximum Forward Safe Operation Area

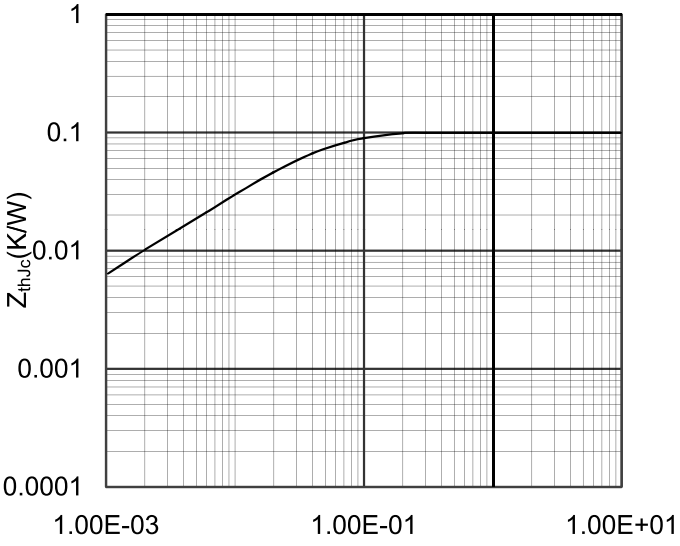

Figure 10. Transient Thermal Impedance

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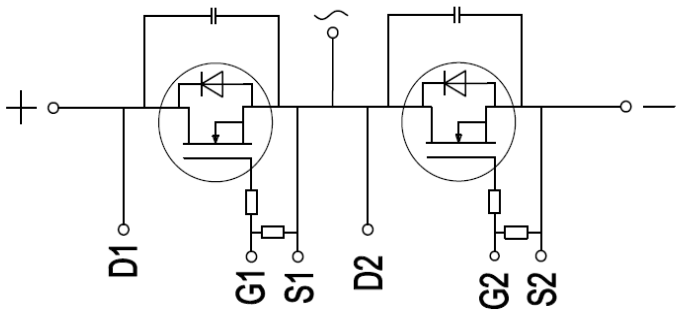
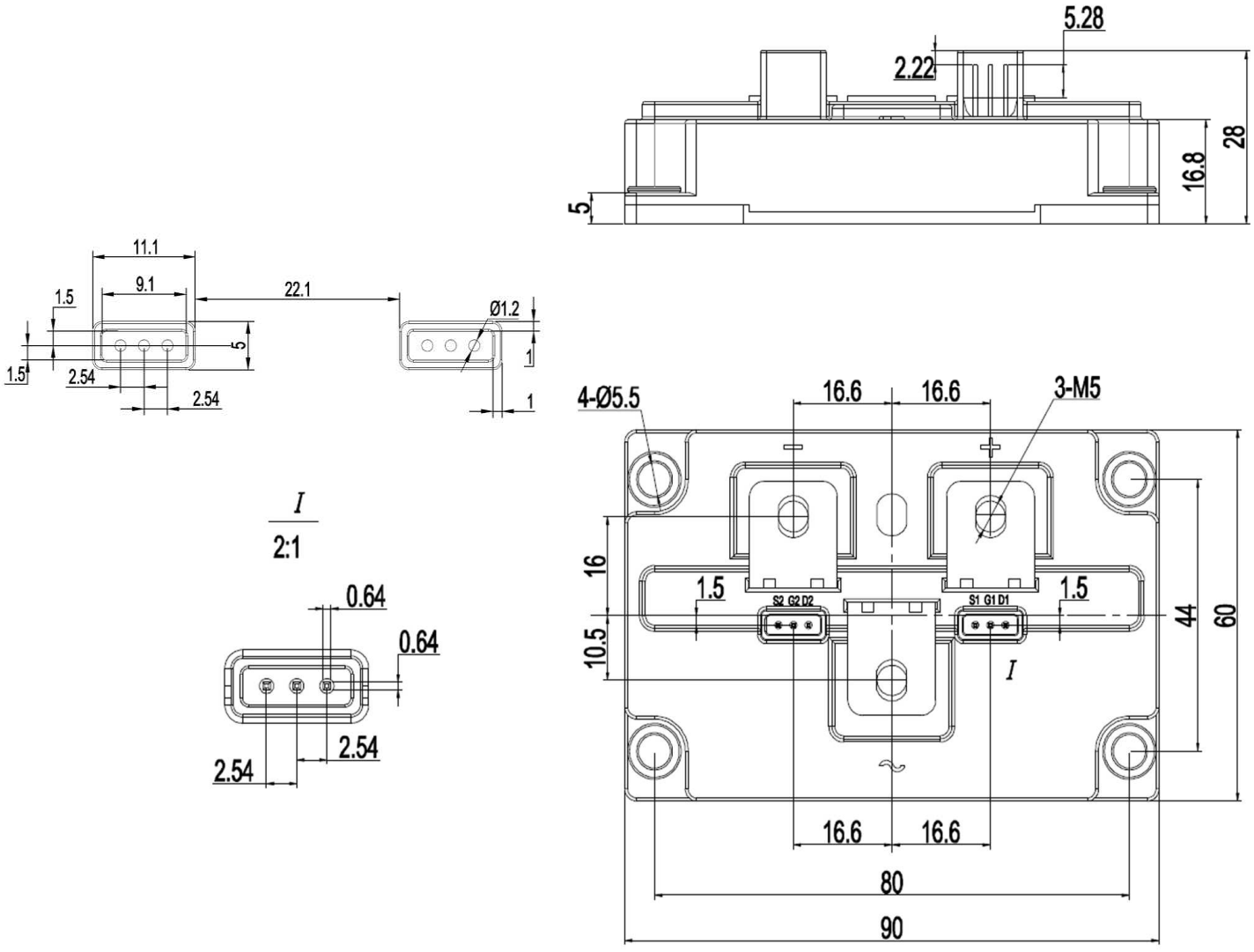


Figure 11. Circuit Diagram



Dimensions in (mm)

Figure 12. Package Outline

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