MMN400A006U1

60V 400A N-ch Power MOSFET Module

August 2016 | Preliminary | RoHS Compliant

PRODUCT FEATURES

☐ $R_{DS(ON).typ}$=0.35mΩ@V_{GS}=10V

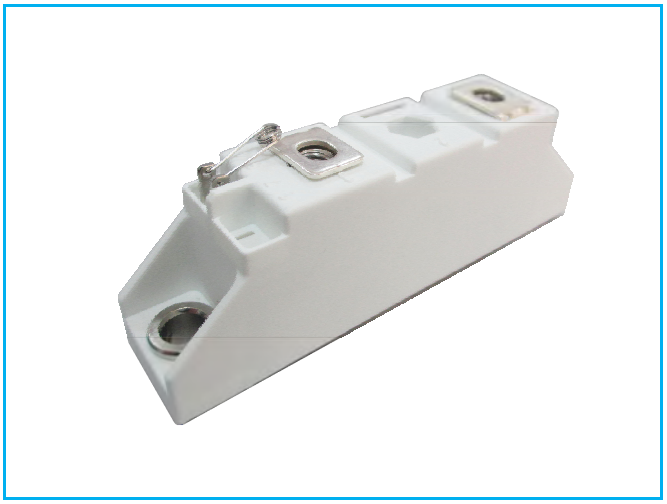
☐ 175℃operating temperature

☐ Low Gate Charge Minimize Switching Loss

☐ Fast Recovery body Diode

☐ 20K Ω Gate Protected Resistance Inside

☐ Inside the module,each MOSFET chip has a gate resistance:2.2Ω



APPLICATIONS

☐ High efficiency DC/DC Converters

☐ ISG EV Products

☐ UPS inverter

Type	V_{DS}	I_D	$R_{DS(ON).max}$ T_J=25℃	T_{Jmax}	Marking	Package
MMN400A006U1	60V	400A	0.75mΩ	175℃	MMN400A006U1	NA

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

Symbol	Parameter/Test Conditions		Values	Unit
V_{DSS}	Drain - Source Voltage	T_J=25℃	60	V
V_{GSS}	Gate - Source Voltage		±20	
I_D	Continuous Drain Current	T_C=25℃, T_{Jmax}=175℃	610	A
		T_C=110℃, T_{Jmax}=175℃	400	
I_{DM}	Pulsed Drain Current at V_{GS}=10V	Limited by T_{Jmax}	800	
P_D	Maximum Power Dissipation	T_C=25℃, T_{Jmax}=175℃	1000	W
E_{AS}	Single Pulse Avalanche Energy	V_{DD}=50V,L=1mH	TBD	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		0.15	K/W
T_{Jmax}	Max. Junction Temperature		175	℃
T_{STG}	Storage Temperature Range		-40～125	
Torque	to heatsink	Recommended（M5）	2.5～5	Nm
	to terminal	Recommended（M5）	2.5～5	
Weight			110	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=1mA		60			V
$R_{DS(ON)}$	Drain Source ON Resistance	V_{GS}=10V, I_D=400A			0.35	0.75	mΩ
I_{DSS}	Drain Source Leakage Current	V_{DS}=60V,V_{GS}=0V				2	mA
$V_{GS(th)}$	Gate Threshold Voltage	V_{GS}= V_{DS} , I_D=1mA		2.0		4.0	V
I_{GSS}	Gate Leakage Current	V_{DS}=0V,V_{GS}=±20V		-2		2	mA
R_{gint}	Integrated Gate Resistor				1.05		Ω
Q_g	Total Gate Charge	V_{DD}=30V, I_D=200A , V_{GS}=10V			675		nC
Q_{gs}	Gate Source Charge				223		nC
Q_{gd}	Gate Drain Charge				208		nC
C_{iss}	Input Capacitance	V_{DS}=25V, V_{GS}=0V, f =1MHz			37		nF
C_{oss}	Output Capacitance				5		nF
C_{rss}	Reverse Transfer Capacitance				1.8		nF
$t_{d(on)}$	Turn on Delay Time	V_{DD}=30V,I_D=300A, R_G =1.5Ω, V_{GS}=10V, Resistive Load	T_J=25℃		170		ns
t_r	Rise Time				210		ns
$t_{d(off)}$	Turn off Delay Time				260		ns
t_f	Fall Time				80		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				400	A
I_{SDM}	Pulse Source Drain Current	Limited by T_{Jmax}			800	A
V_{SD}	Forward Voltage	I_S=400A , V_{GS}=0V		0.85	1.2	V
t_{rr}	Reverse Recovery time	I_F=100A , V_{GS}=0V dI$_F$/dt=-100A/μs		140		ns
Q_{RR}	Reverse Recovery Charge			550		nC

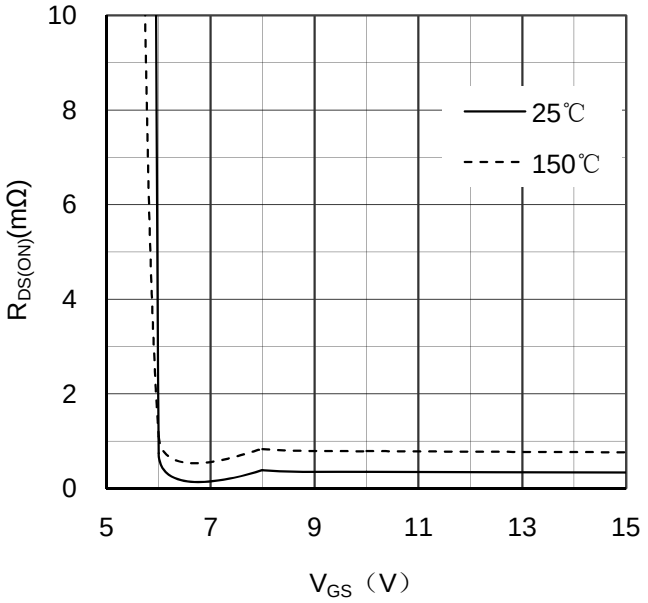


Figure 1. Typical $R_{DS(ON)}$ vs Gate Voltage

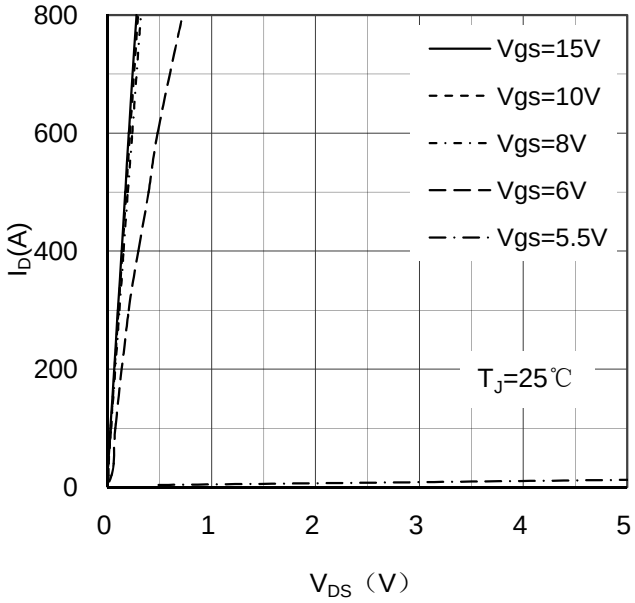


Figure 2. Typical Output Characteristics

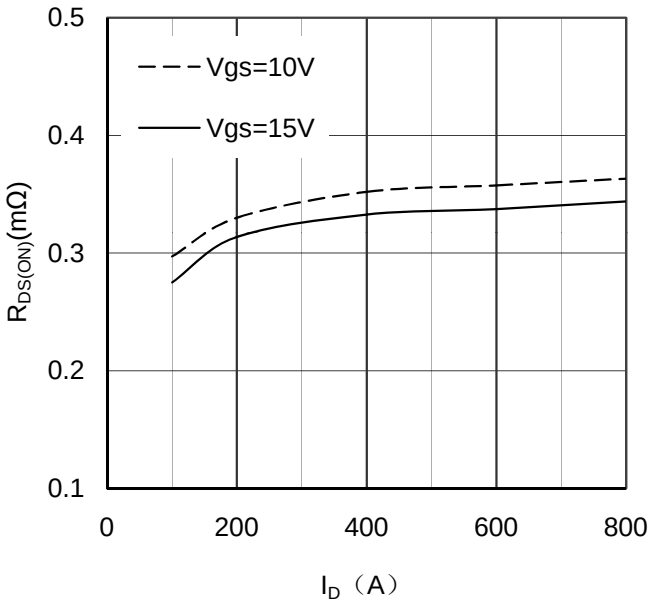


Figure 3. Drain-Source ON Resistance vs I_D

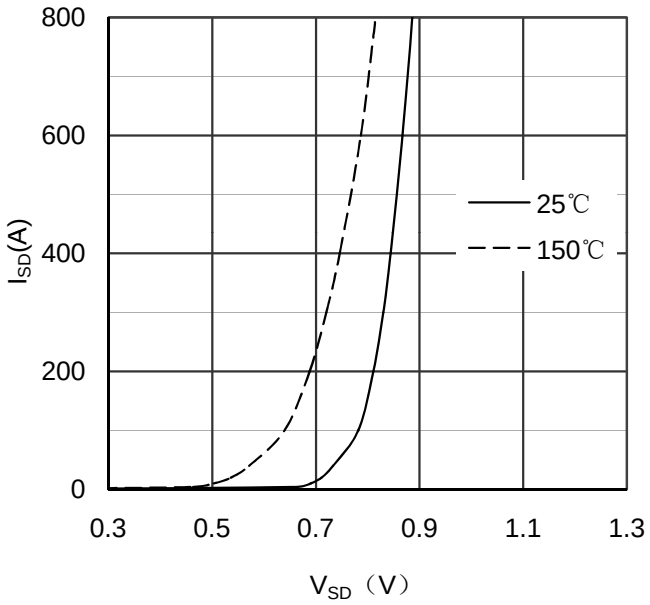


Figure 4. Source-Drain Voltage

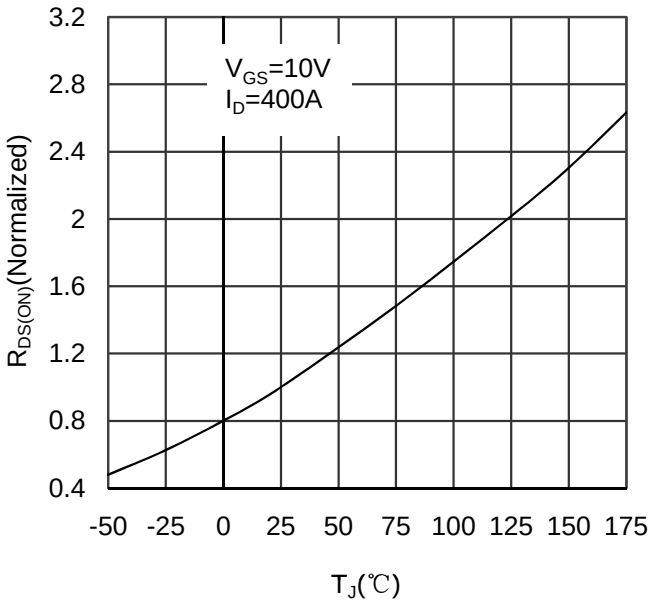


Figure 5. Drain-Source ON Resistance vs Junction Temperature

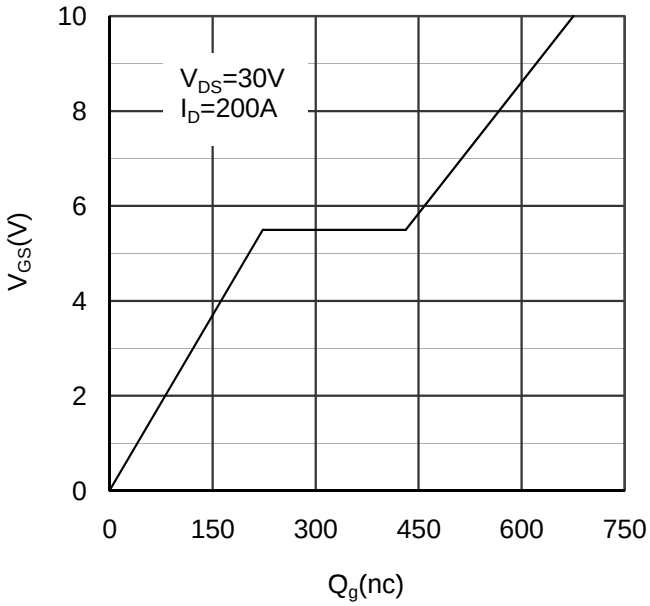


Figure 6. Gate Charge characteristics

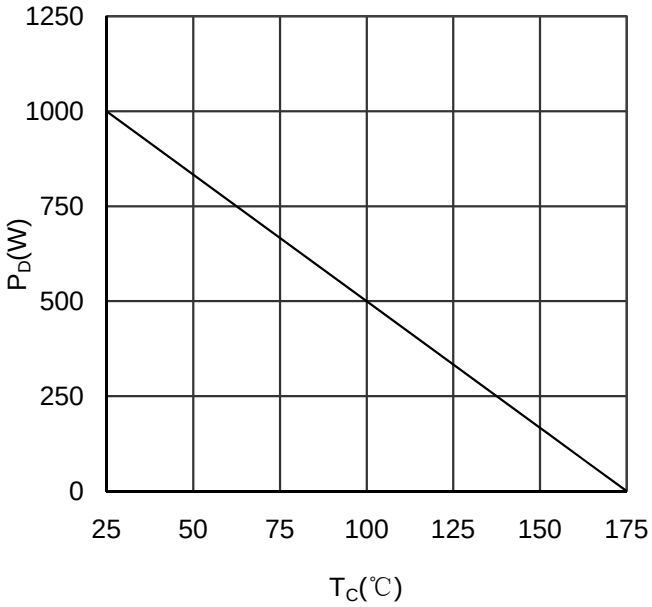


Figure 7. Maximum Power Dissipation vs Case Temperature

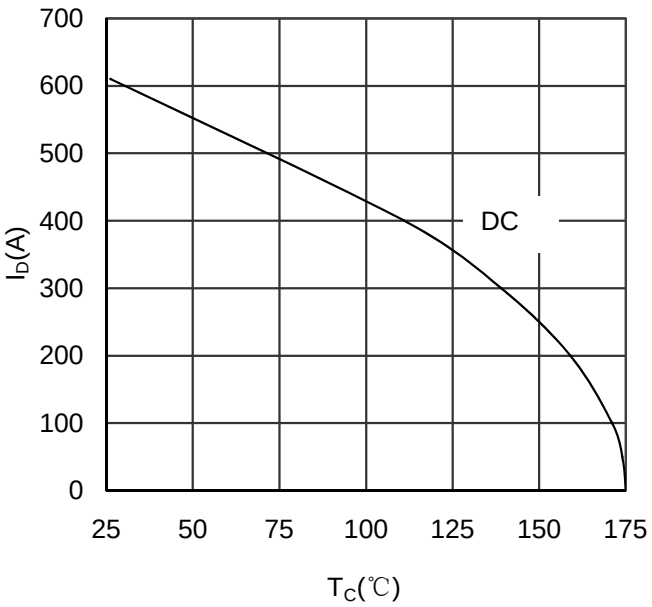


Figure 8. Maximum Continuous Drain Current vs Case Temperature

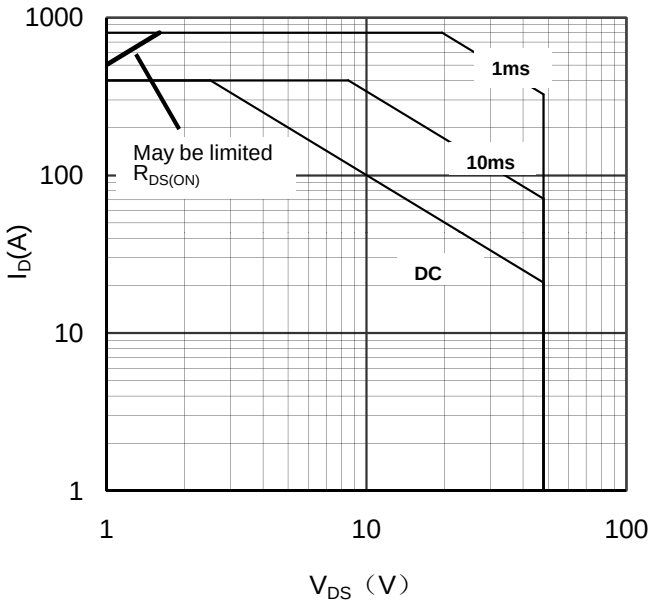


Figure 9. Maximum Forward Safe Operation Area

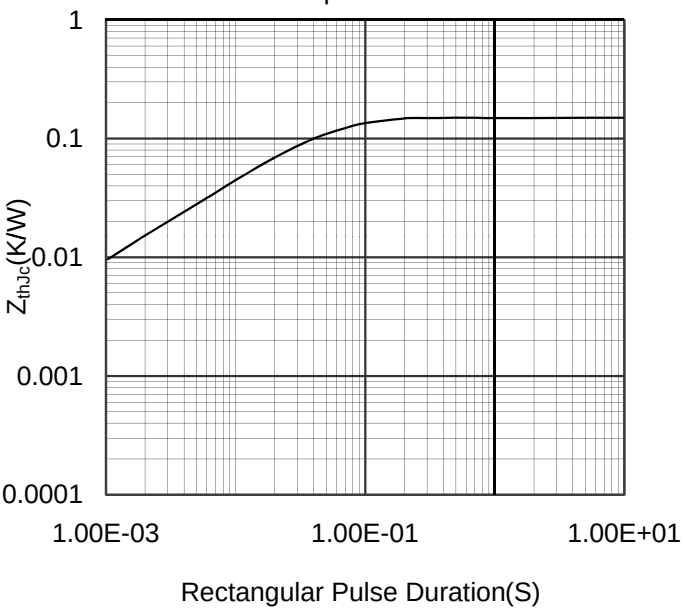


Figure 10. Transient Thermal Impedance

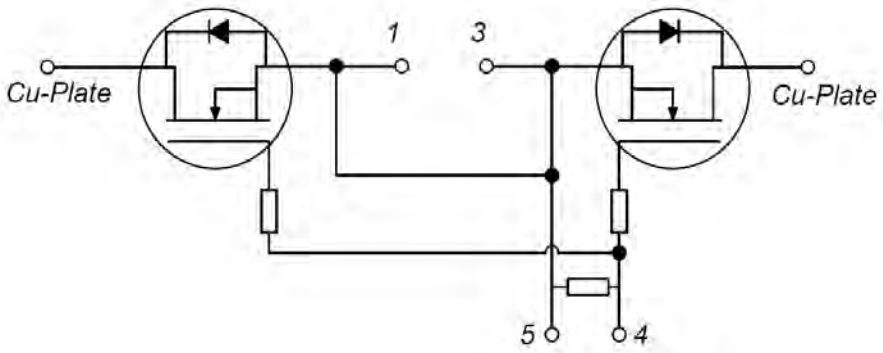
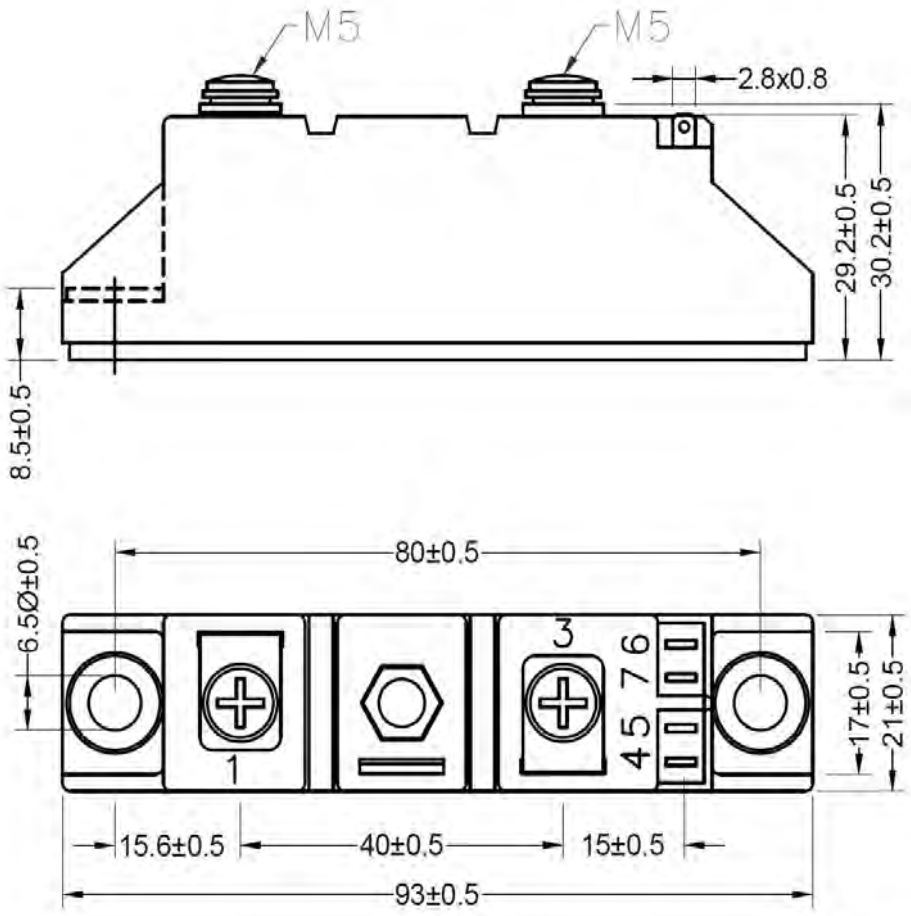


Figure 11. Circuit Diagram



Dimensions in (mm)

Figure 12. Package Outline