

PRODUCT FEATURES

- $R_{DS(ON),typ}=1.1m\Omega@V_{GS}=10V$
- 175°C 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: 2.2 Ω



APPLICATIONS

- High efficiency DC/DC Converters
- ISG EV Products
- UPS inverter

Type	V_{DS}	I_D	$R_{DS(ON),max}$ $T_J=25^\circ C$	T_{Jmax}	Marking	Package
MMN400A010U1	100V	400A	1.4m Ω	175 $^\circ C$	MMN400A010U1	NA

ABSOLUTE MAXIMUM RATINGS ($T_C=25^\circ C$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Values	Unit
V_{DSS}	Drain - Source Voltage	$T_J=25^\circ C$	100
V_{GSS}	Gate - Source Voltage		± 20
I_D	Continuous Drain Current	$T_C=25^\circ C, T_{Jmax}=175^\circ C$	550
		$T_C=100^\circ C, T_{Jmax}=175^\circ C$	400
I_{DM}	Pulsed Drain Current at $V_{GS}=10V$	Limited by T_{Jmax}	800
P_D	Maximum Power Dissipation	$T_C=25^\circ C, T_{Jmax}=175^\circ C$	1071
E_{AS}	Single Pulse Avalanche Energy	$V_{DD}=50V, L=1mH$	3000

THERMAL AND MODULE CHARACTERISTICS ($T_C=25^\circ C$ unless otherwise specified)

Symbol	Parameter/Test Conditions	Values	Unit
R_{thJC}	Thermal resistance, junction to case Per MOSFET	0.14	K/W
T_{Jmax}	Max. Junction Temperature	175	$^\circ C$
T_{STG}	Storage Temperature Range	-40~125	
Torque	to heatsink	Recommended (M5)	2.5~5
	to terminal	Recommended (M5)	2.5~5
Weight		110	g

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MMN400A010U1

MOSFET

ELECTRICAL CHARACTERISTICS ($T_C=25^\circ\text{C}$ unless otherwise specified)

Symbol	Parameter/Test Conditions		Min.	Typ.	Max.	Unit	
$V_{(BR)DSS}$	Drain Source Breakdown Voltage	$V_{GS}=0V, I_D=1mA$	100			V	
$R_{DS(ON)}$	Drain Source ON Resistance	$V_{GS}=10V, I_D=300A$		1.1	1.4	m Ω	
I_{DSS}	Drain Source Leakage Current	$V_{DS}=100V, V_{GS}=0V$			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	$V_{DS}=0V, V_{GS}=\pm 20V$	-2		2	mA	
R_{gint}	Integrated Gate Resistor			1.2		Ω	
Q_g	Total Gate Charge	$V_{DD}=65V, I_D=300A, V_{GS}=10V$		660		nC	
Q_{gs}	Gate Source Charge			170		nC	
Q_{gd}	Gate Drain Charge			225		nC	
C_{iss}	Input Capacitance	$V_{DS}=25V, V_{GS}=0V, f=1MHz$		44		nF	
C_{oss}	Output Capacitance			3.05		nF	
C_{rss}	Reverse Transfer Capacitance			0.73		nF	
$t_{d(on)}$	Turn on Delay Time	$V_{DD}=50V, I_D=200A, R_G=5\Omega, V_{GS}=10V, \text{Resistive Load}$	$T_J=25^\circ\text{C}$		122		ns
t_r	Rise Time				88		ns
$t_{d(off)}$	Turn off Delay Time				540		ns
t_f	Fall Time				112		ns

Source-Drain BODY-DIODE CHARACTERISTICS ($T_C=25^\circ\text{C}$ 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	$I_S=300A, V_{GS}=0V$		1.0	1.2	V
t_{rr}	Reverse Recovery time	$I_F=200A, V_{GS}=0V$		130		ns
Q_{RR}	Reverse Recovery Charge	$di_F/dt=-140A/\mu s$		800		nC

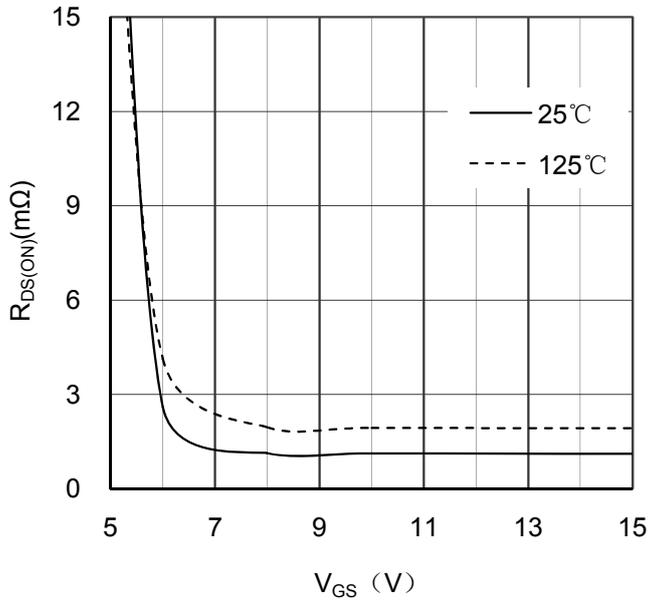


Figure 1. Typical $R_{DS(ON)}$ vs Gate Voltage

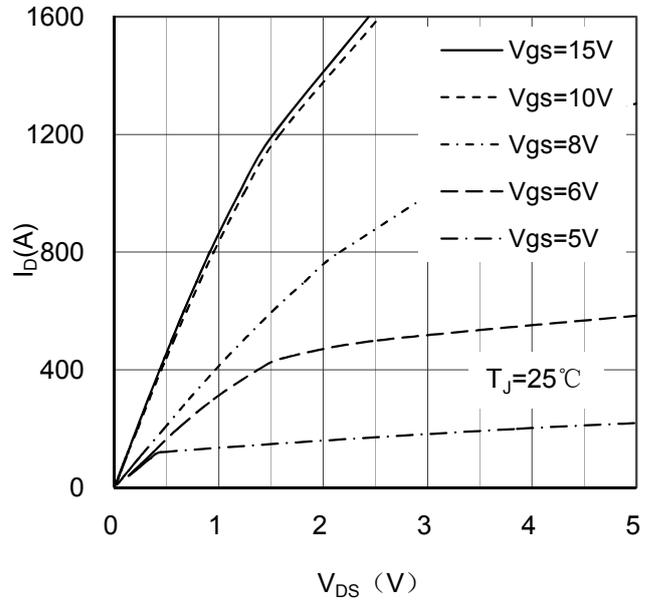


Figure 2. Typical Output Characteristics

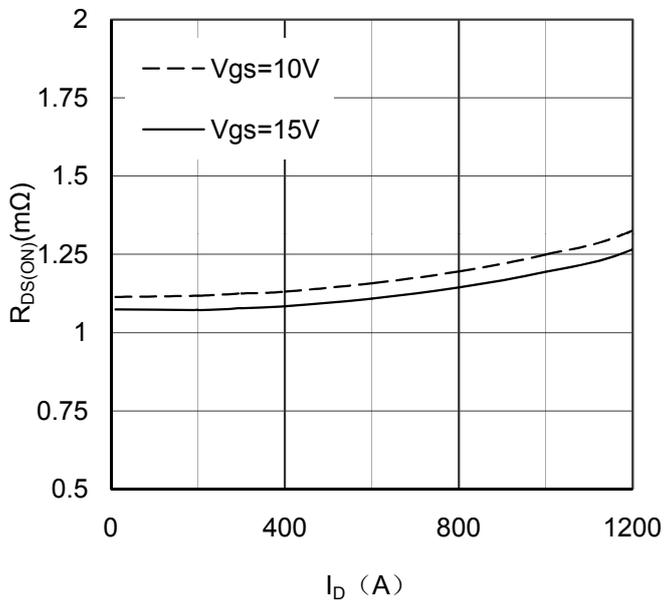


Figure 3. Drain-Source ON Resistance vs I_D

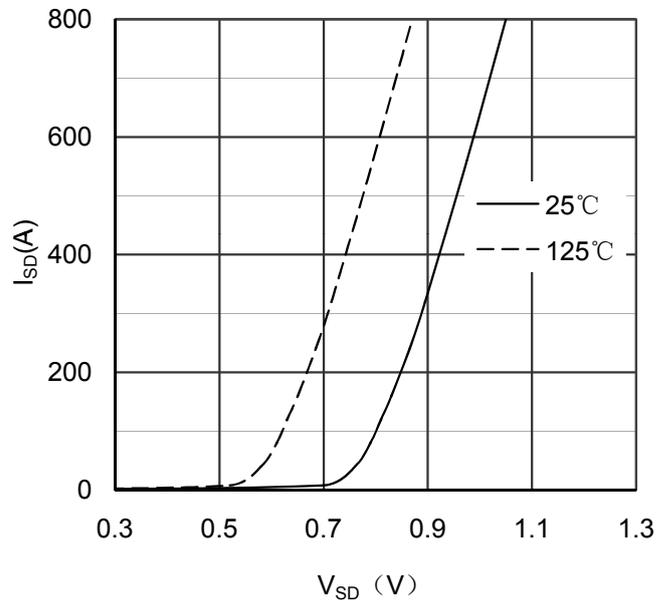


Figure 4. Source-Drain Voltage

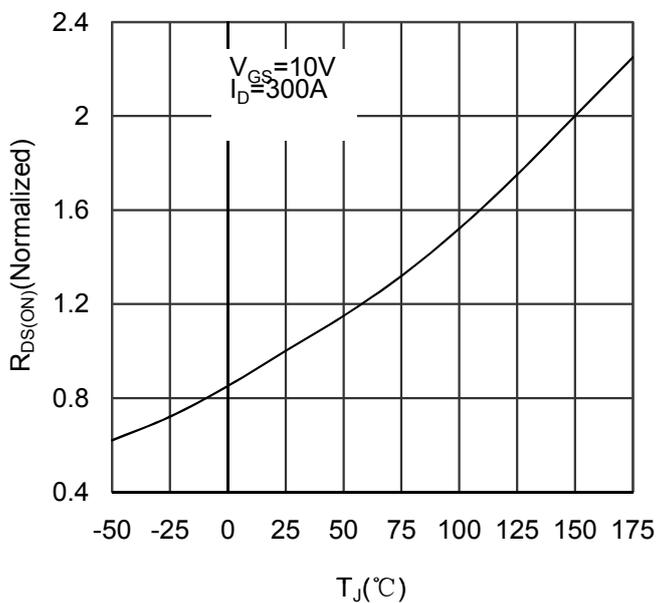


Figure 5. Drain-Source ON Resistance vs Junction Temperature

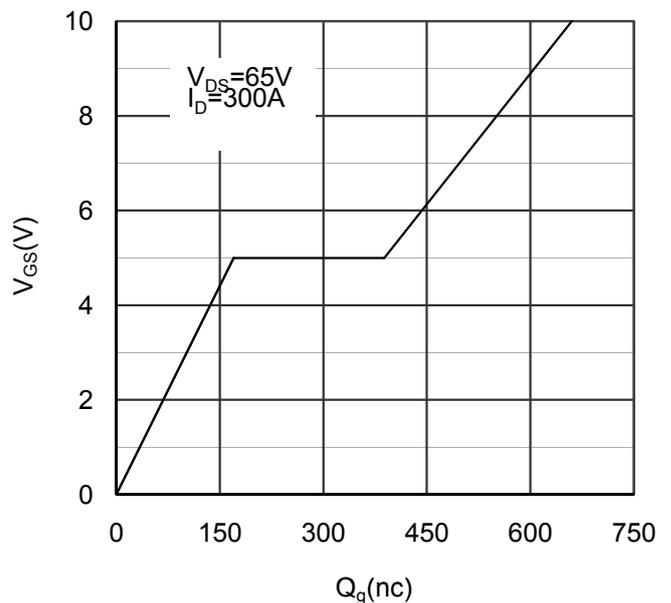


Figure 6. Gate Charge characteristics

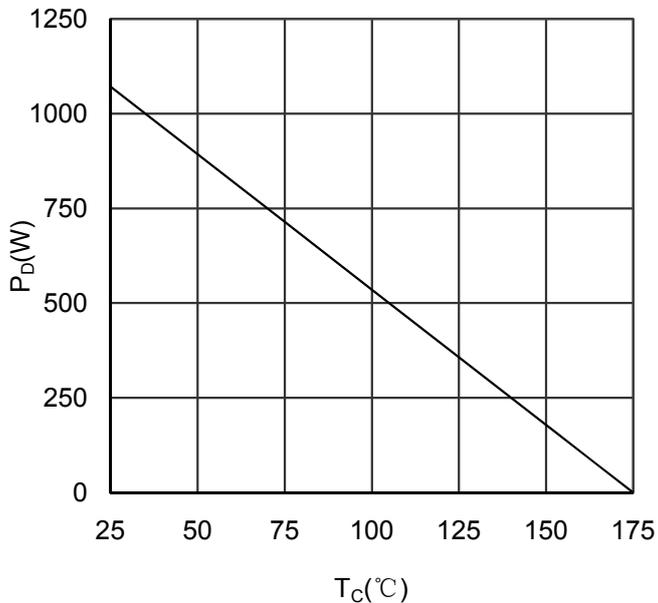


Figure 7. Maximum Power Dissipation vs Case Temperature

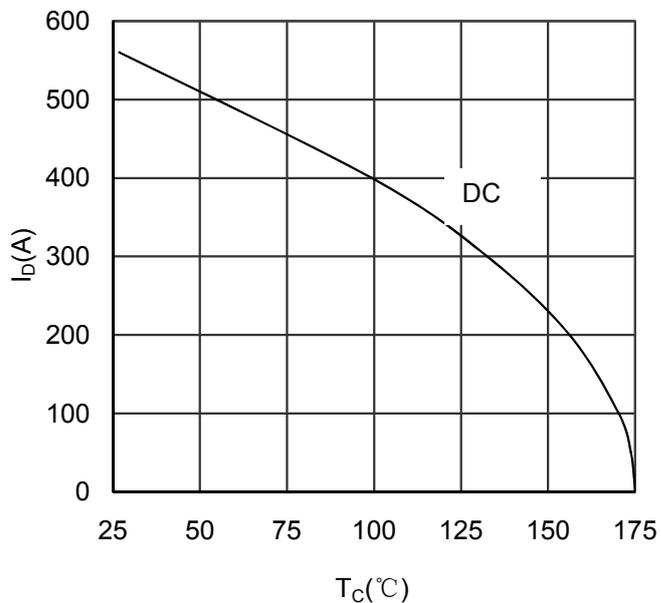


Figure 8. Maximum Continuous Drain Current vs Case Temperature

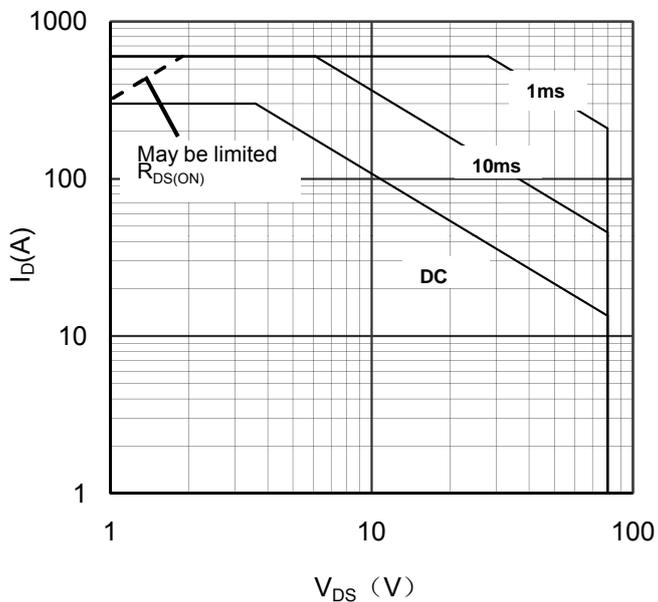


Figure 9. Maximum Forward Safe Operation Area

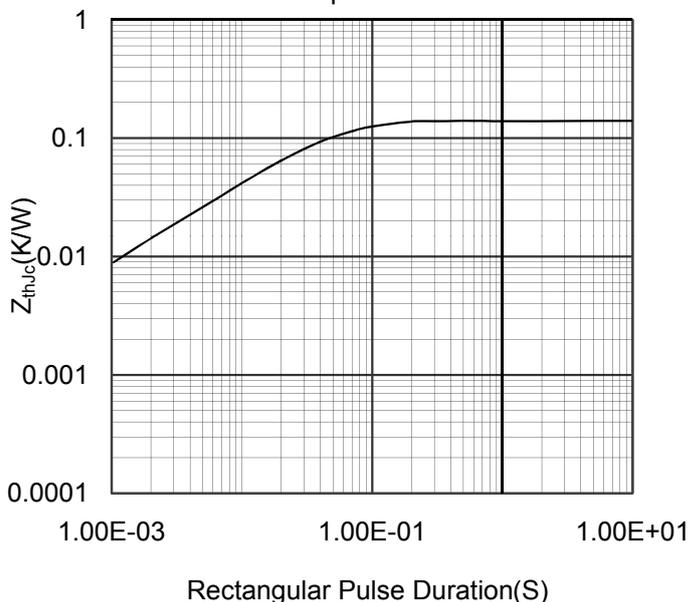


Figure 10. Transient Thermal Impedance

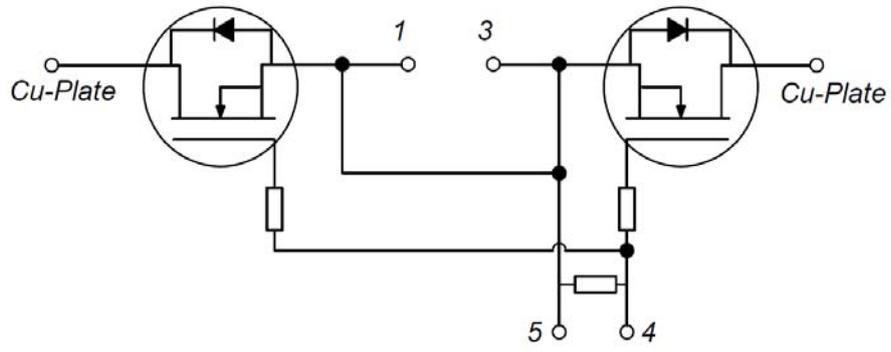
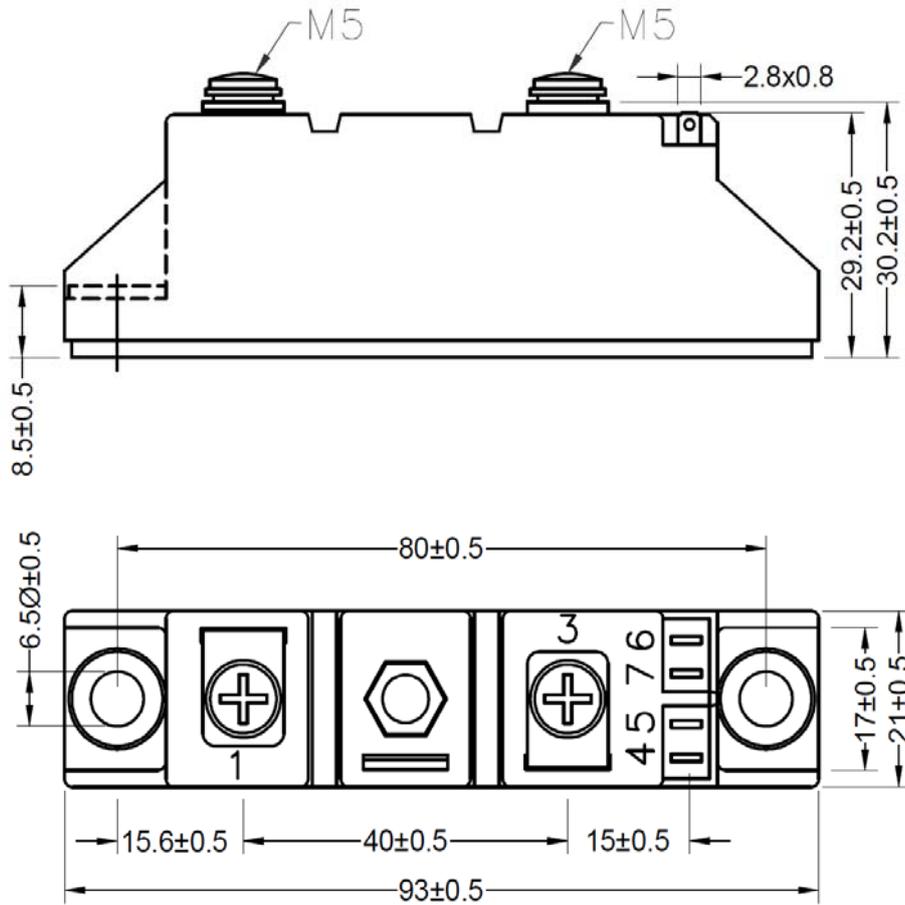


Figure 11. Circuit Diagram



Dimensions in (mm)
Figure 12. Package Outline