

# MDDG06R02G

60V N-Channel Enhancement Mode MOSFET

## 1. Description

This N-Channel MV MOSFET is produced using MDD Semiconductor's advanced Power Trench process that incorporates Shielded Gate technology. This process has been optimized to minimize on-state resistance and yet maintain superior switching performance with best in class soft body diode.

## 2. Features

- Max  $R_{DS(on)}$  = 2.5 m $\Omega$  at  $V_{GS} = 10$  V,  $I_D = 35$  A
- Extremely Low Reverse Recovery Charge,  $Q_{rr}$
- 100% UIS Tested
- 100% dVDS Tested

## 3. Application

- PWM Application
- Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter
- Battery management System

## 4. Absolute Maximum Ratings ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	$V_{DS}$	60	V
Gate-Source Voltage	$V_{GS}$	$\pm 20$	V
Continuous Drain Current (Note 1)	$I_D$	200	A
Pulsed Drain Current (Note 2)	$I_{DM}$	800	A
Single Pulsed Avalanche Energy (Note 3)	$E_{AS}$	342	mJ
Thermal Resistance, steady-state	$R_{\theta JA}$	42	$^\circ\text{C}/\text{W}$
Power Dissipation	$P_D$	156	W
Junction Temperature	$T_J$	-55~+150	$^\circ\text{C}$
Storage Temperature	$T_{stg}$	-55~+150	$^\circ\text{C}$

Note: 1) Calculated continuous current based on maximum allowable junction temperature.

2) Repetitive rating, pulse width limited by max. junction temperature.

3)  $E_{AS}$  condition :  $T_J=25^\circ\text{C}$ ,  $V_{DD}=30\text{V}$ ,  $V_{GS}=10\text{V}$ ,  $L=0.5\text{mH}$ ,  $R_g=25\ \Omega$ ,  $I_{AS}=37\text{A}$ .

### 5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
4	G	Gate			MDD G06R02G	PDFN5*6-8L
5-8	D	Drain				
1-3	S	Source				

### 6. $T_A=25^\circ\text{C}$ unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit	
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	$V_{GS}=0V, I_D=250\mu A$	60	—	—	V	
$I_{GSS}$	Gate-Source Leakage Current	Forward	$V_{GS}=20V$	—	—	100	nA
		Reverse	$V_{GS}=-20V$	—	—	-100	nA
$I_{DSS}$	Drain-Source Leakage Current	$V_{DS}=60V, V_{GS}=0V$	—	—	1	$\mu A$	
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.4	1.6	2.5	V	
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=35A$	—	2.0	2.5	m $\Omega$	
		$V_{GS}=4.5V, I_D=30A$	—	2.7	3.4	m $\Omega$	

### 7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$C_{iss}$	Input Capacitance	$V_{GS}=0V$	—	5600	—	pF
$C_{oss}$	Output Capacitance	$V_{DS}=25V$	—	2400	—	pF
$C_{rss}$	Reverse Transfer Capacitance	$f=1MHz$	—	110	—	pF
$Q_g$	Total Gate Charge	$V_{GS}=10V$	—	101	—	nC
$Q_{gs}$	Gate Source Charge	$V_{DS}=30V$	—	17	—	nC
$Q_{gd}$	Gate Drain Charge	$I_D=30A$	—	22	—	nC

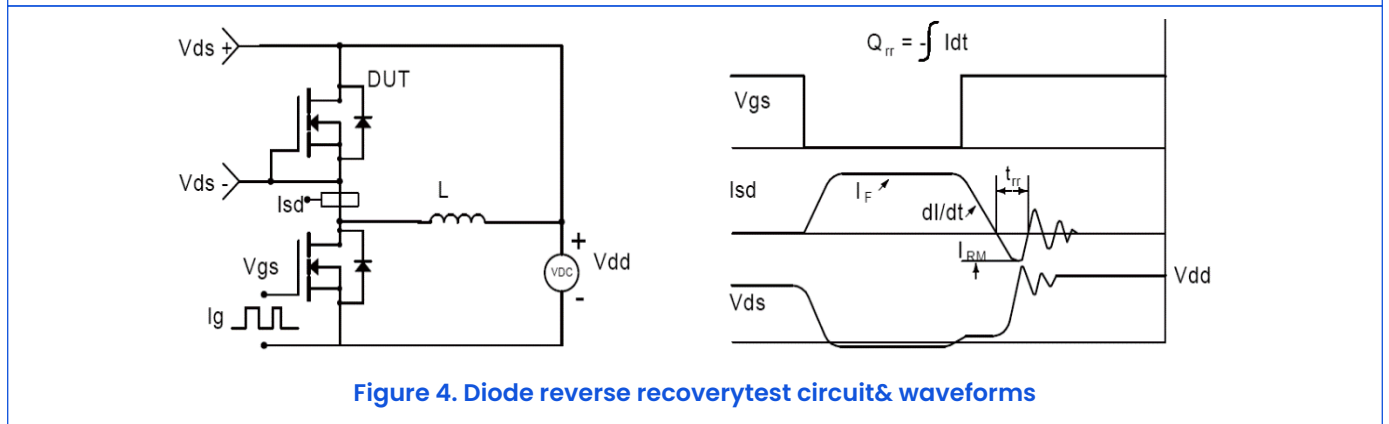
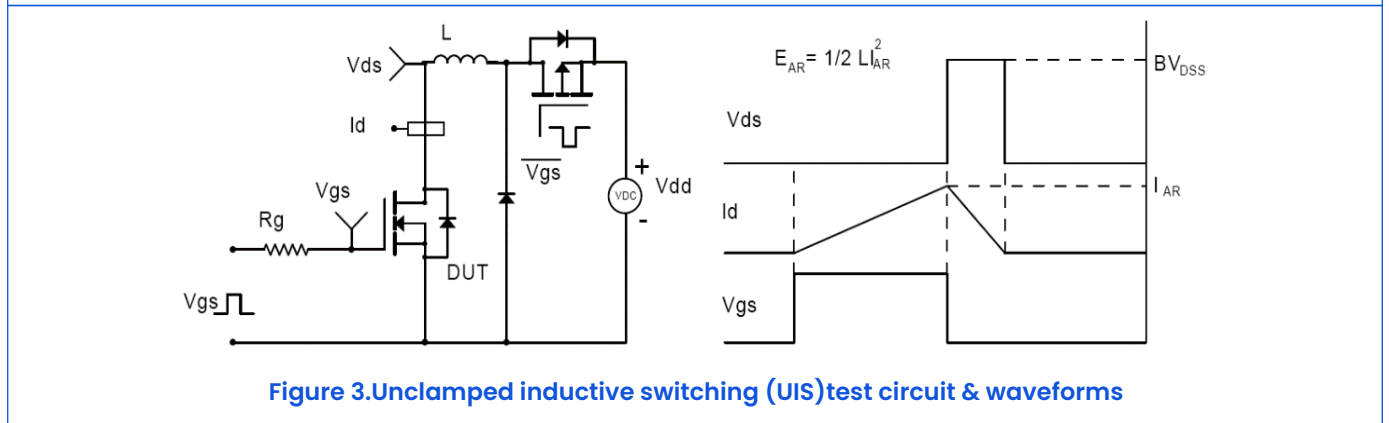
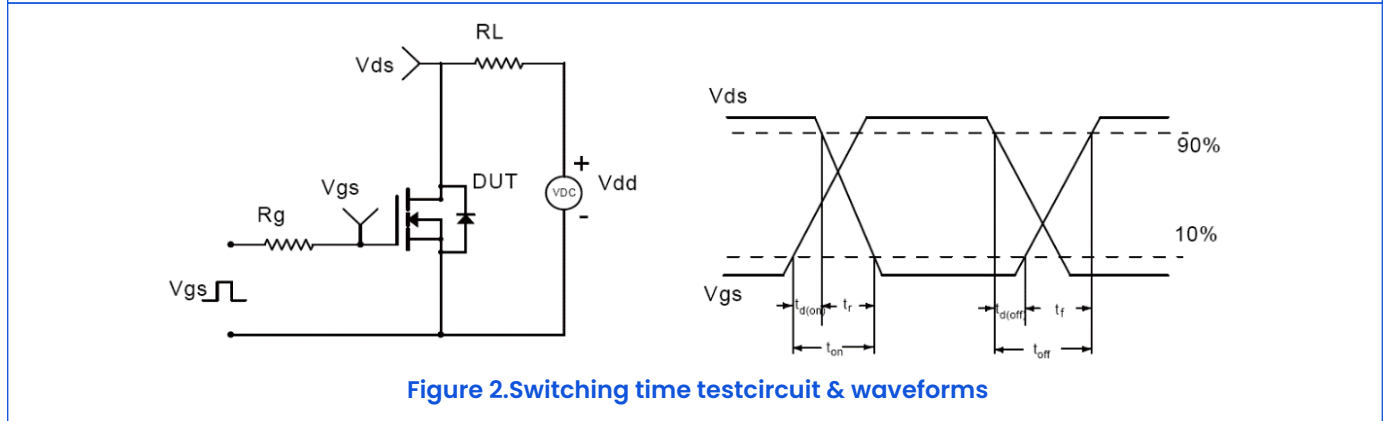
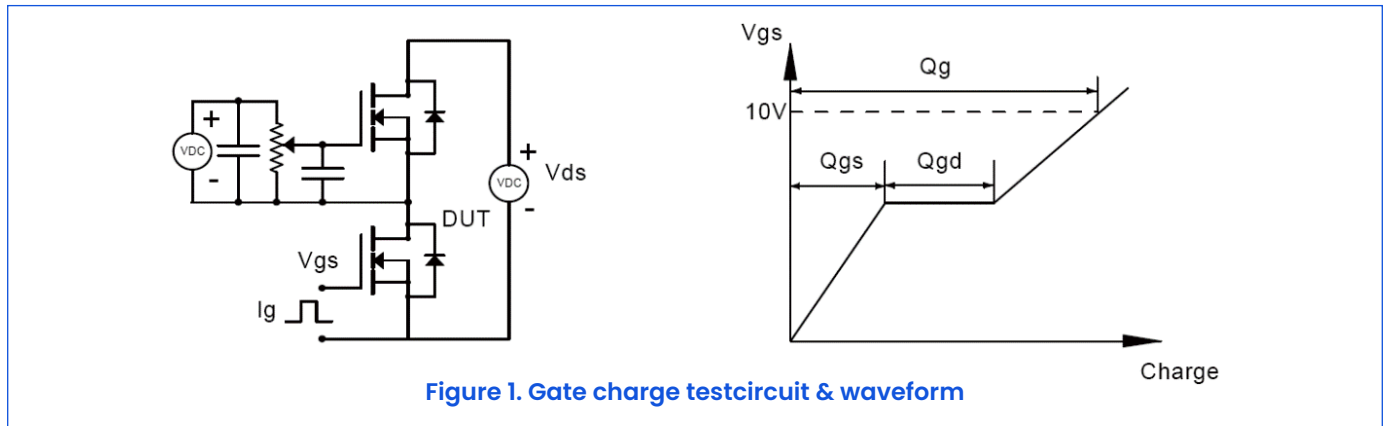
### 8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	$V_{GS}=10V$ $V_{DD}=30V$ $I_D=30A$ $R_G=3\Omega$	—	16	—	ns
$t_r$	Turn on Rise Time		—	38	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	78	—	ns
$t_f$	Turn Off Fall Time		—	95	—	ns

### 9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{SD}$	Drain-Source Diode Forward Voltage	$I_S=30A, V_{GS}=0V$	—	0.82	1.2	V
$t_{rr}$	Body Diode Reverse Recovery Time	$I_F=30A$	—	54.7	—	ns
$Q_{rr}$	Body Diode Reverse Recovery Charge	$di/dt=100A/\mu s$	—	60	—	nC

### 10. Test Circuits And Waveforms



### II. Electrical Characteristics Diagrams

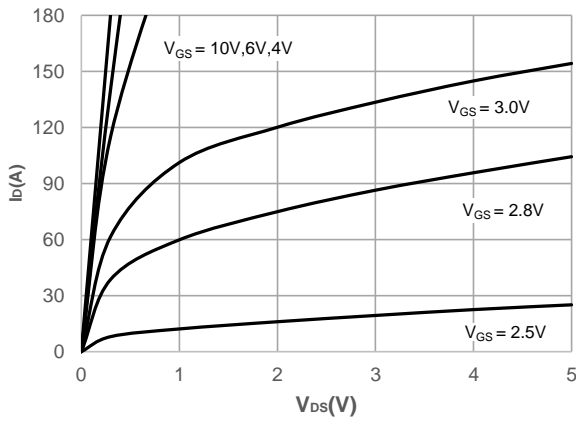


Figure 1. Typ. output characteristics

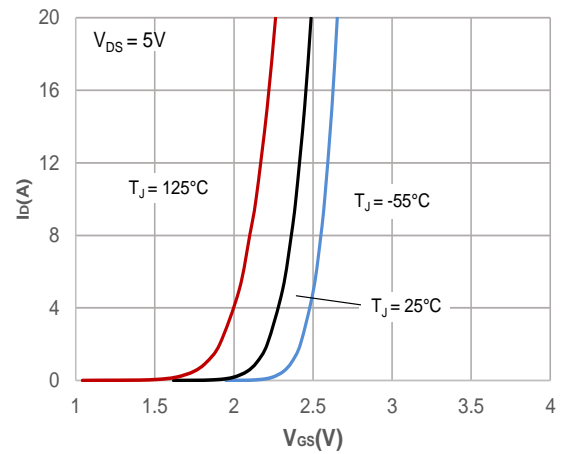


Figure 2. Typ. transfer characteristics

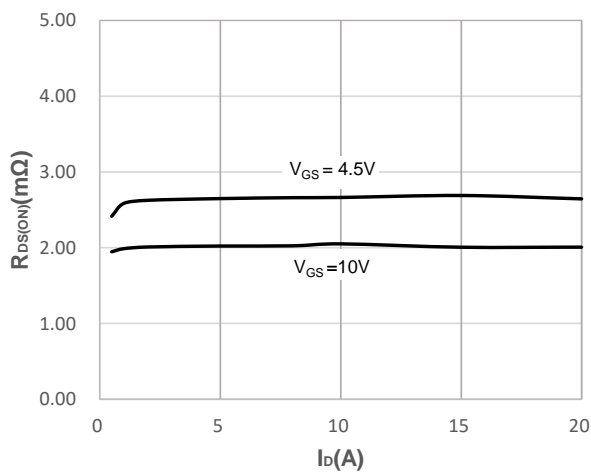


Figure 3. On-Resistance vs. Drain Current

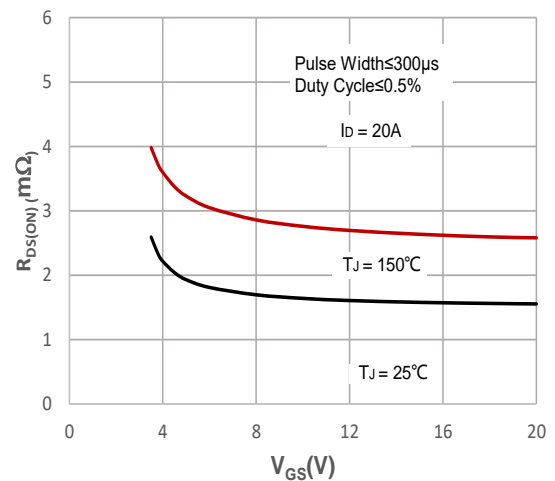


Figure 4. On-Resistance vs. Gate Voltage

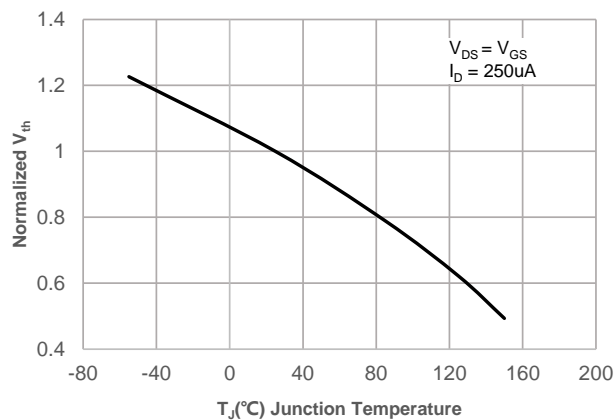


Figure 5. Normalized Threshold Voltage vs. Junction Temperature

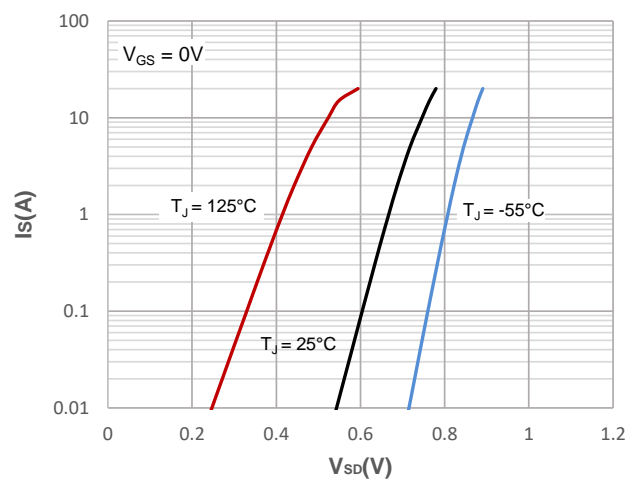
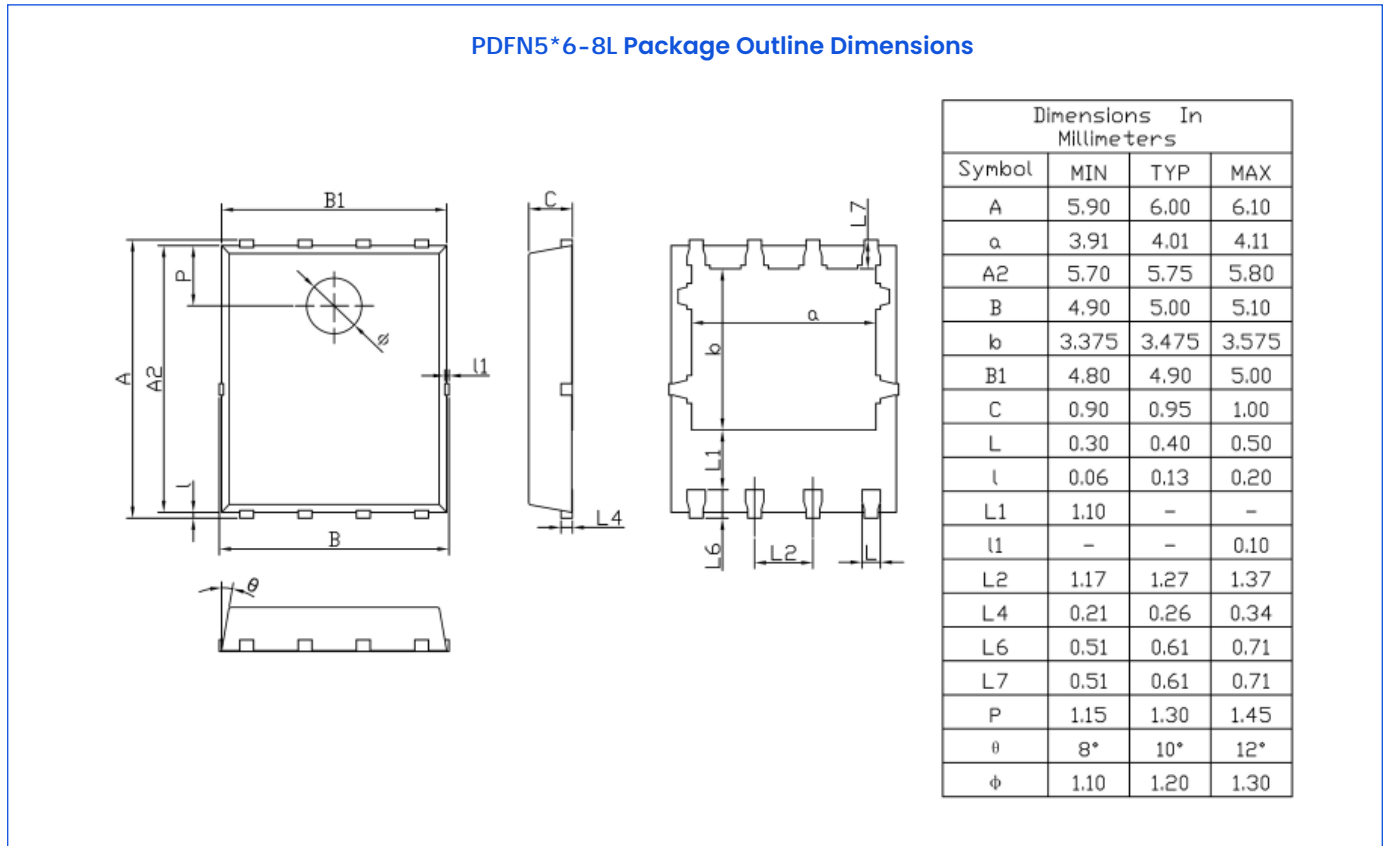


Figure 6. Forward characteristic of body diode

### 12. Outline Drawing



### 13. Important Notice and Disclaimer

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