

MDD50P02G

20V P-Channel Enhancement Mode MOSFET

1. Description

This P-Channel MOSFET is produced using MDD Semiconductor's advanced Power Trench process 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 $R_{DS(on)}$ = 8.5 mΩ at V_{GS} = -4.5 V, I_D =-15 A
- Extremely Low Reverse Recovery Charge, Qrr
- 100% UIS Tested
- 100% dVDS Tested

3. Application

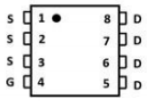
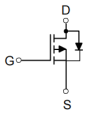
- Synchronous Rectification for ATX / Server / Telecom PSU
- Motor Drives and Uninterruptible Power Supplies
- DC-DC converters

4. Absolute Maximum Ratings(T_A=25°C unless otherwise noted)

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±12	V
Continuous Drain Current (Note 1)	I_D	-50	A
Pulsed Drain Current (Note 2)	I_{DM}	-200	A
Single Pulsed Avalanche Energy (Note 3)	E_{AS}	30.25	mJ
Thermal Resistance, steady-state	$R_{\theta JA}$	45	°C/W
Junction Temperature	T_J	-55~+150	°C
Storage Temperature	T_{stg}	-55~+150	°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°C, V_{DD}=-10V, L= 0.5mH, R_g= 25Ω, ID=-11A

5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
4	G	Gate			MDD 50P02G XXY: Date code	PDFN5*6-8L
5-8	D	Drain				
1-3	S	Source				

6. T_A=25°C unless otherwise specified

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$V_{(BR)DSS}$	Drain-Source Breakdown Voltage	V_{GS}=0V, I_D=-250μA	-20	—	—	V
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±12V	—	—	±100	nA
I_{DSS}	Drain-Source Leakage Current	V_{DS}=-20V, V_{GS}=0V	—	—	-1	μA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=VGS, I_D=-250μA	-0.45	-0.6	-0.95	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=-4.5V, I_D=-15A	—	5.8	8.5	mΩ
		V_{GS}=-2.5V, I_D=-10A	—	7.8	10.5	mΩ

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=-10V f=1.0MHz	—	2859	—	pF
C_{oss}	Output Capacitance		—	385	—	pF
C_{rss}	Reverse Transfer Capacitance		—	338	—	pF
Q_g	Total Gate Charge	V_{GS}=-4V V_{DS}=-10V I_D=-15A	—	50	—	nC
Q_{gs}	Gate Source Charge		—	8	—	nC
Q_{gd}	Gate Drain Charge		—	16	—	nC

8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	V_{GS} =-10V V_{DD}=-20V I_D=-10A R_G=3Ω	—	7	—	ns
t_r	Turn on Rise Time		—	105	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	135	—	ns
t_f	Turn Off Fall Time		—	175	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition		Typ	Max	Unit
V_{SD}	Drain-Source Diode Forward Voltage	I_S=-20A, V_{GS}=0V	—	-0.8	-1.2	V
t_{rr}	Body Diode Reverse Recovery Time	IF=-10A di/dt=-100A/μs	—	19	—	ns
Q_{rr}	Body Diode Reverse Recovery Charge		—	11	—	nC

10.Electrical Characteristics Diagrams

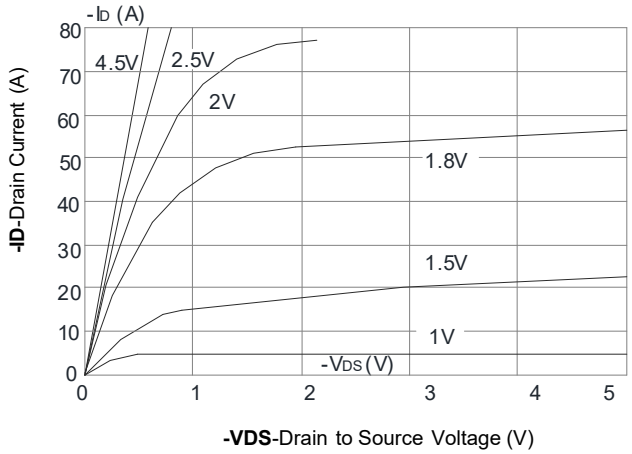


Figure 1. Typ. output characteristics

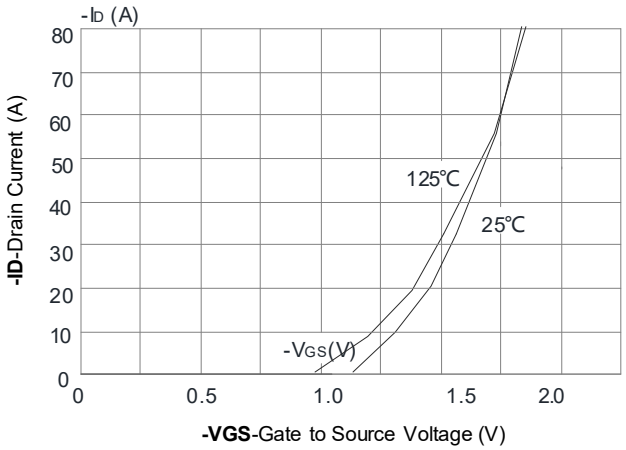


Figure 2. Typ. transfer characteristics

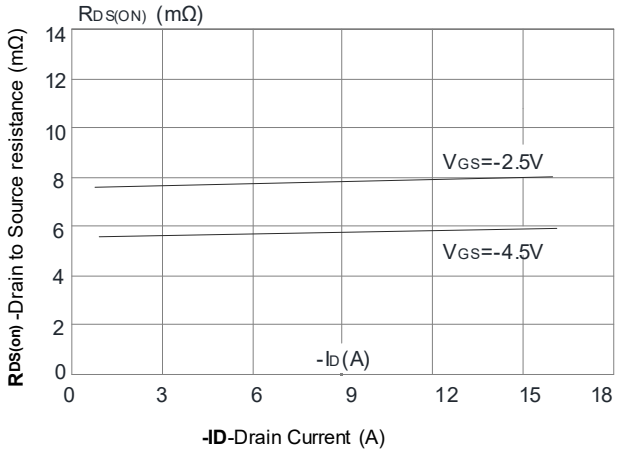


Figure 3. On-Resistance vs. Drain Current

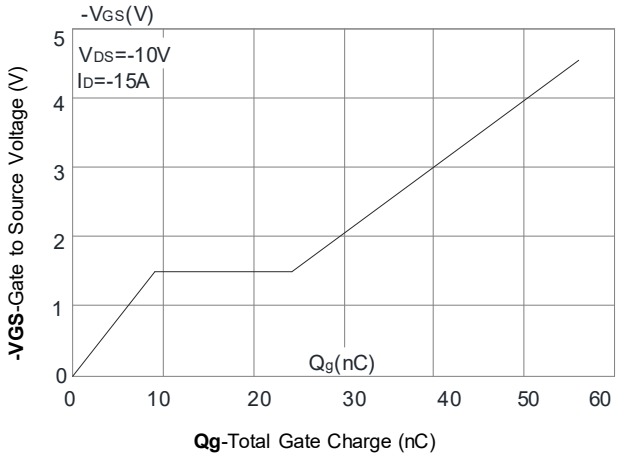


Figure 4. Gate Charge Characteristics

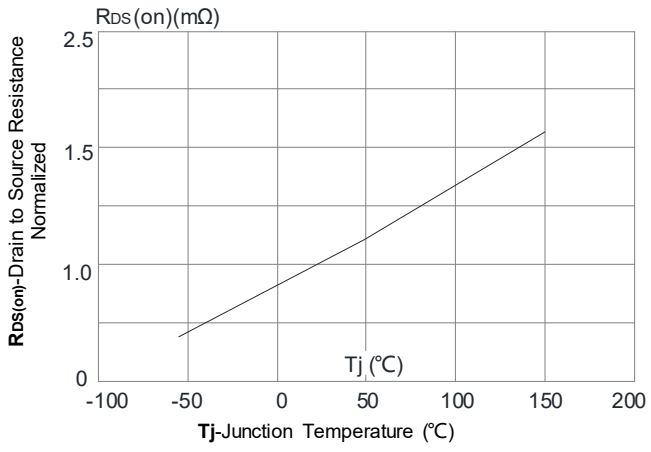


Figure 5. Normalized on Resistance vs. Junction Temperature

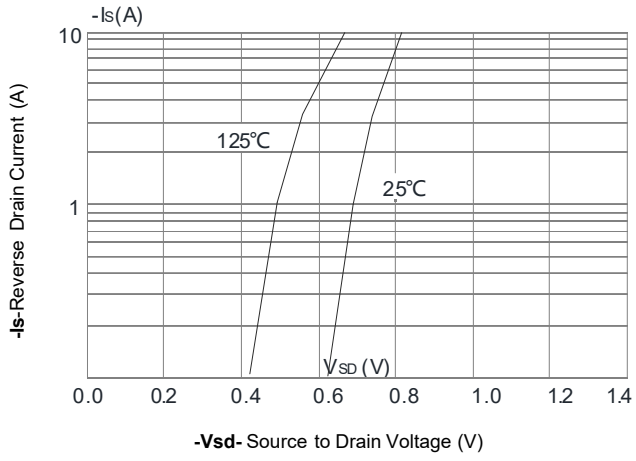


Figure 6. Forward characteristic of body diode

11.Test Circuits And Waveforms

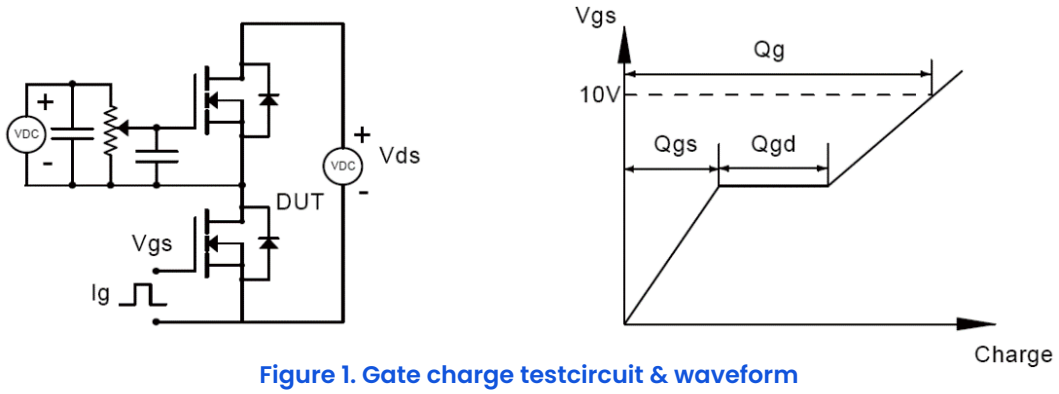


Figure 1. Gate charge testcircuit & waveform

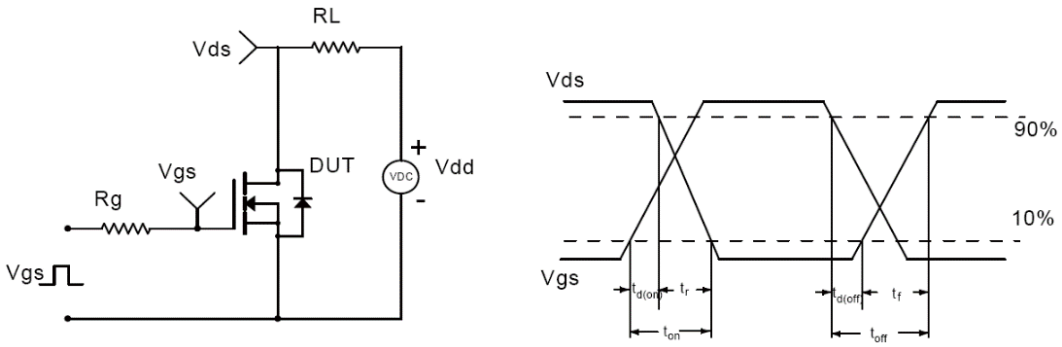


Figure 2.Switching time testcircuit & waveforms

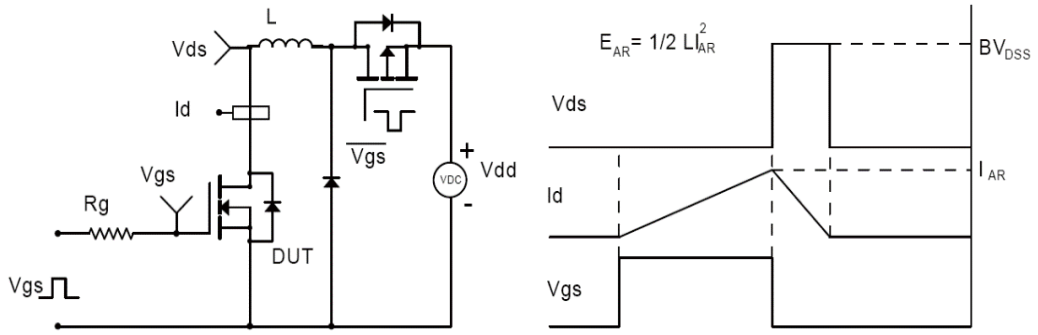


Figure 3.Unclamped inductive switching (UIS)test circuit & waveforms

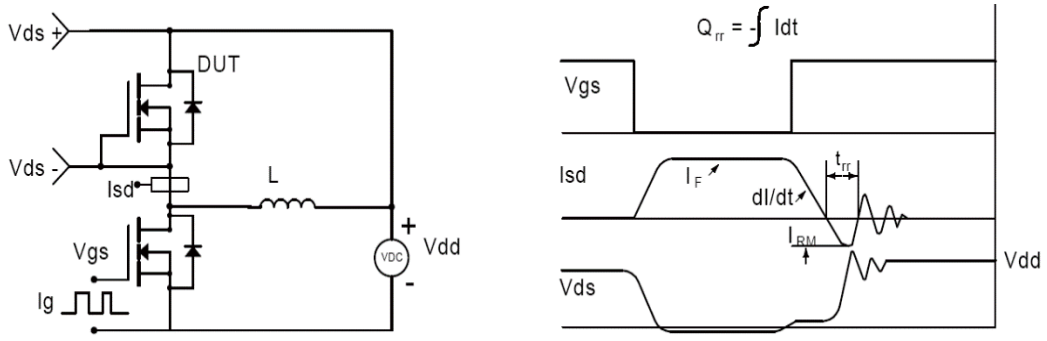
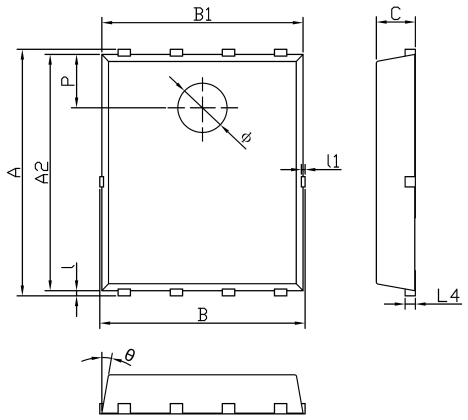


Figure 4. Diode reverse recoverytest circuit& waveforms

12. Outline Drawing

PDFN5*6-8L Package Outline Dimensions

PDFN5X6 Unit:mm



Dimensions In Millimeters			
Symbol	MIN	TYP	MAX
A	5.90	6.00	6.10
a	3.91	4.01	4.11
A2	5.70	5.75	5.80
B	4.90	5.00	5.10
b	3.375	3.475	3.575
B1	4.80	4.90	5.00
C	0.90	0.95	1.00
L	0.30	0.40	0.50
l	0.06	0.13	0.20
L1	1.10	–	–
l1	–	–	0.10
L2	1.17	1.27	1.37
L4	0.21	0.26	0.34
L6	0.51	0.61	0.71
L7	0.51	0.61	0.71
P	1.15	1.30	1.45
θ	8°	10°	12°
Φ	1.10	1.20	1.30

13. Important Notice and Disclaimer

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