

MDD05N06C

60V N-Channel Enhancement Mode MOSFET

1. Description

This N-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 $R_{DS(on)}$ = 41 m Ω at V_{GS} = 10 V, I_D = 5A
- Low Reverse Recovery Charge, Q_{rr}
- Pb-free plating

3. Application

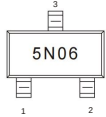
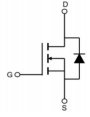
- Load Switch
- PWM Application
- DC-DC converters
- Power Management

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}	± 20	V
Continuous Drain Current (Note 1)	I_D	5	A
Pulsed Drain Current (Note 2)	I_{DM}	20	A
Thermal Resistance, steady-state	$R_{\theta JA}$	50	$^{\circ}\text{C}/\text{W}$
Junction Temperature	T_J	$-55 \sim +150$	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	$-55 \sim +150$	$^{\circ}\text{C}$

Note: 1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating, pulse width limited by max. junction temperature.

5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
1	G	Gate			5N06	SOT-23-3
2	S	Source				
3	D	Drain				

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	$V_{GS}=\pm 20V$	—	—	± 100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=60V, V_{GS}=0V$	—	—	1	μA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.2	—	2.3	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=5A$	—	32	41	m Ω
		$V_{GS}=4.5V, I_D=4A$	—	44	50	m Ω

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS}=0V$	—	880	—	pF
C_{oss}	Output Capacitance	$V_{DS}=30V$	—	65	—	pF
C_{rss}	Reverse Transfer Capacitance	$f=1.0MHz$	—	58	—	pF
Q_g	Total Gate Charge	$V_{GS}=0-10V$	—	23	—	nC
Q_{gs}	Gate Source Charge	$V_{DS}=30V$	—	4.2	—	nC
Q_{gd}	Gate Drain Charge	$I_D=5A$	—	5.1	—	nC

8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	$V_{GS}=10V$	—	10.8	—	ns
t_r	Turn on Rise Time	$V_{DD}=30V$	—	18	—	ns
$t_{d(off)}$	Turn Off Delay Time	$I_D=5A$	—	32	—	ns
t_f	Turn Off Fall Time	$R_G=3\Omega$	—	23	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$I_S=5A, V_{GS}=0V$	—	0.8	1.2	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F=5A$	—	18	—	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$di/dt=100A/\mu s$	—	12	—	nC

10. Test Circuits And Waveforms

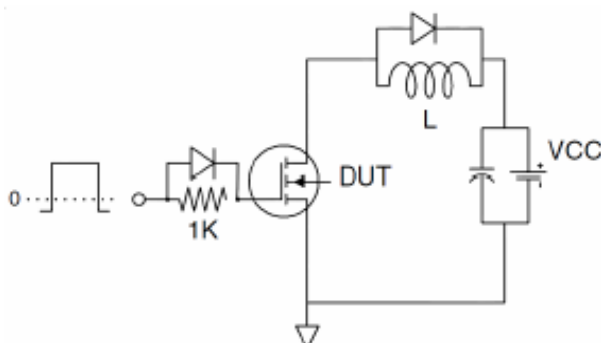


Figure 1. Gate Charge test Circuit

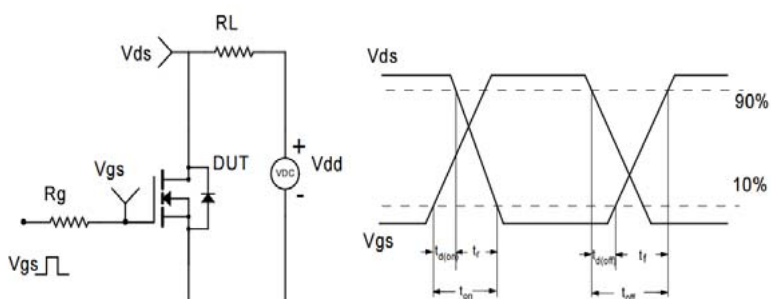


Figure 2. Switching time test circuit & waveforms

The curve above is for reference only.

11. Electrical Characteristics Diagrams

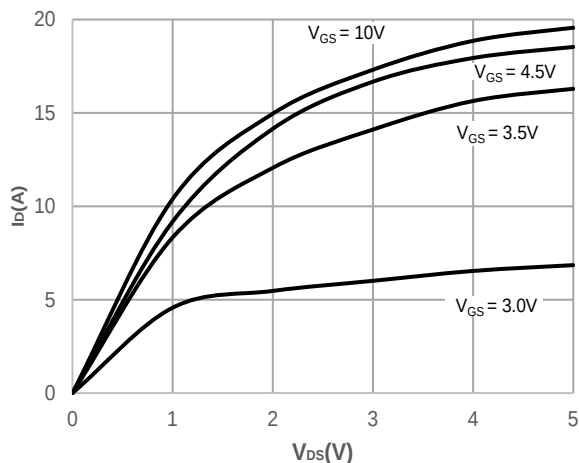


Figure 1. Typ. output characteristics

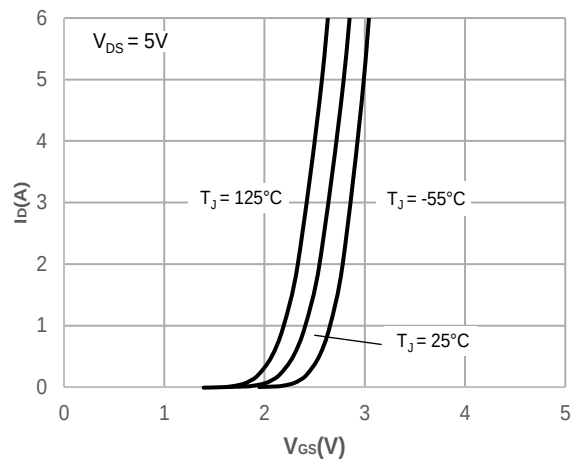


Fig 2. Transfer Charhacteristics

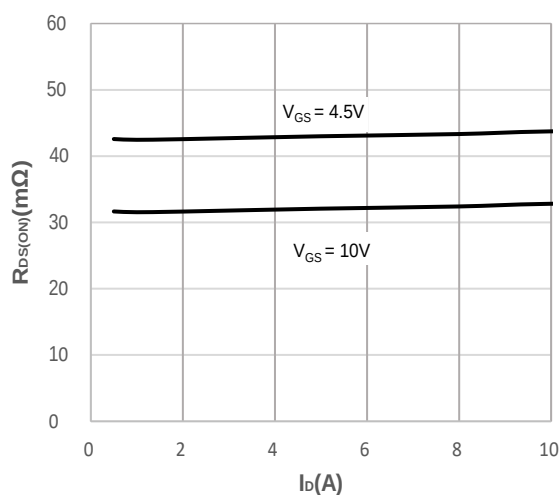


Fig 3. $R_{DS(on)}$ vs I_D Characteristics

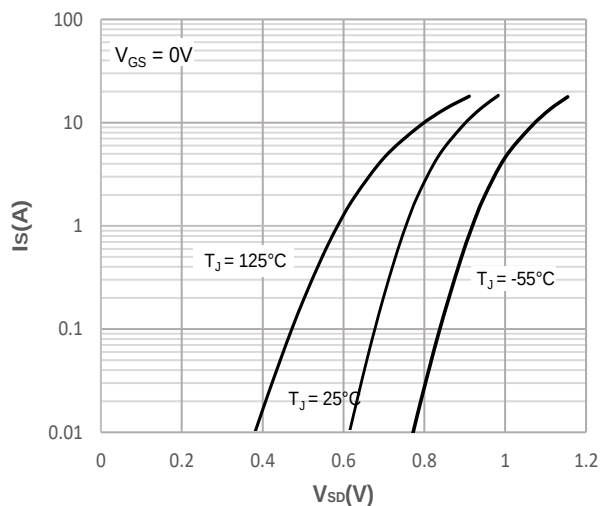


Fig 4. Source current Characteristics

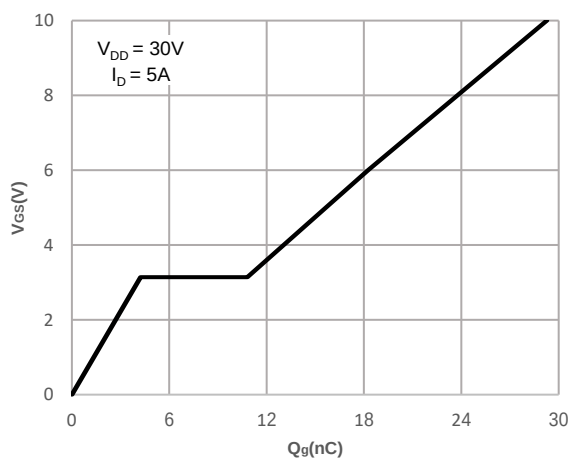


Fig 5. Gate Charge Characteristics

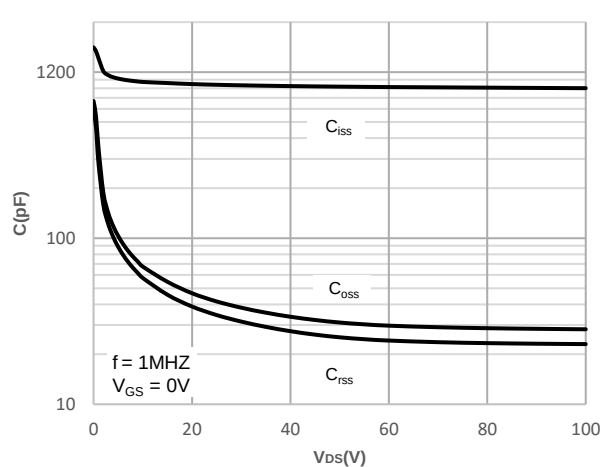
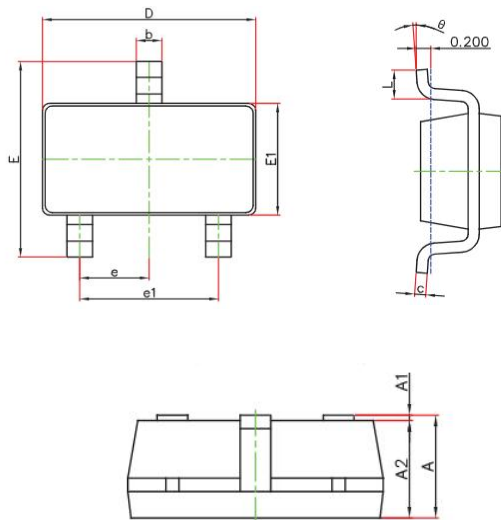


Fig 6. Capacitance Characteristics

The curve above is for reference only

12. Outline Drawing

SOT-23-3 Package Outline Dimensions



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E1	1.500	1.700	0.059	0.067
E	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

13. Important Notice and Disclaimer

Microdiode Semiconductor (Shenzhen) reserves the right to make changes to this document and its products and specifications at any time without notice. Customers should obtain and confirm the latest product information and specifications before final design, purchase or use.

Microdiode Semiconductor (Shenzhen) makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does Microdiode Semiconductor (Shenzhen) assume any liability for application assistance or customer product design. Microdiode Semiconductor (Shenzhen) does not warrant or accept any liability with products which are purchased or used for any unintended or unauthorized application. No license is granted by implication or otherwise under any intellectual property rights of Microdiode Semiconductor (Shenzhen).

Microdiode Semiconductor (Shenzhen) products are not authorized for use as critical components in life support devices or systems without express written approval of Microdiode Semiconductor (Shenzhen).