

MDD30N06D

60V N-Channel Enhancement Mode POWER MOSFET

1. Description

This N-Channel MOSFET is produced using MDD's advanced Power Trench 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 $R_{DS(on)}$ = 31mΩ at V_{GS} = 10 V, I_D = 15 A
- Extremely Low Reverse Recovery Charge, Qg
- 100% UIS Tested
- RoHS Compliant

3. Application

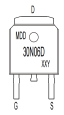
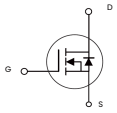
- Power Management in Telecom.,Industrial Automation
- Motor Drives and Uninterruptible Power Supplies
- Current Switching in DC/DC&AC/DC(SR) Sub-systems

4. Absolute Maximum Ratings(T_A=25°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	30	A
Single Pulsed Avalanche Energy (Note 3)	E_{AS}	27.6	mJ
Thermal Resistance. Junction to Ambient.	$R_{\theta JA}$	37	°C/W
Thermal Resistance. Junction to Case.	$R_{\theta JC}$	3.3	°C/W
Power Dissipation	P_D	37	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}=30V, V_{GS}=10V, L= 0.5mH, R_g= 25Ω, I_{AS}=10.5A.

5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
1	G	Gate			MDD 30N06D XXY: Date code	TO-252
2	D	Drain				
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	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	μA
$V_{GS(TH)}$	Gate Threshold Voltage		V_{DS}=VGS, I_D=250μA	1.1	1.5	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance		V_{GS}=10V, I_D=30A	—	25	31	mΩ
			V_{GS}=4.5V, I_D=20A	—	28	37	mΩ

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=30V f=1MHz	—	1422	—	pF
C_{oss}	Output Capacitance		_	60	_	pF
C_{rss}	Reverse Transfer Capacitance		_	52	_	pF
Q_g	Total Gate Charge	V_{GS}=0 to 10V V_{DS}=30V I_D=20A	—	28	—	nC
Q_{gs}	Gate Source Charge		—	6	—	nC
Q_{gd}	Gate Drain Charge		—	5	—	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=20A R_G=3Ω	_	6	_	ns
t_r	Turn on Rise Time		—	14	—	ns
$t_{d(off)}$	Turn Off Delay Time		_	26	_	ns
t_f	Turn Off Fall Time		—	4	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	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=20A di/dt=100A/μs	—	23	—	ns
Q_{rr}	Body Diode Reverse Recovery Charge		_	28	_	nC

10.Test Circuits And Waveforms

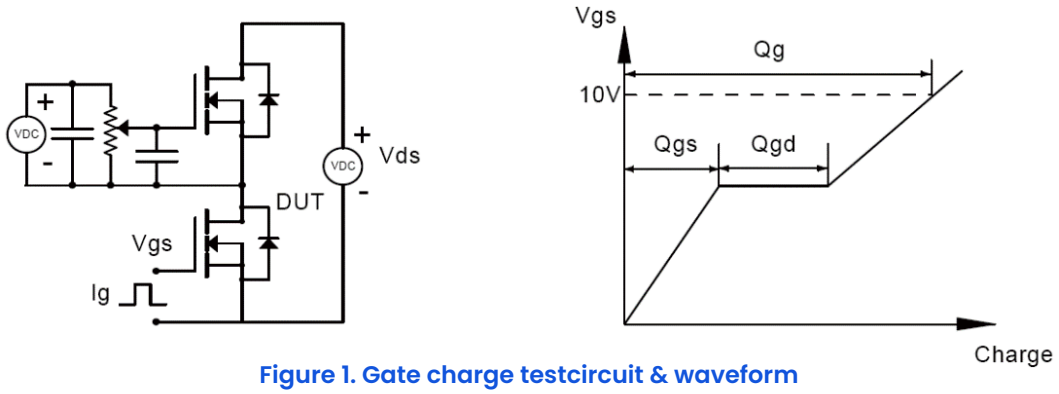


Figure 1. Gate charge testcircuit & waveform

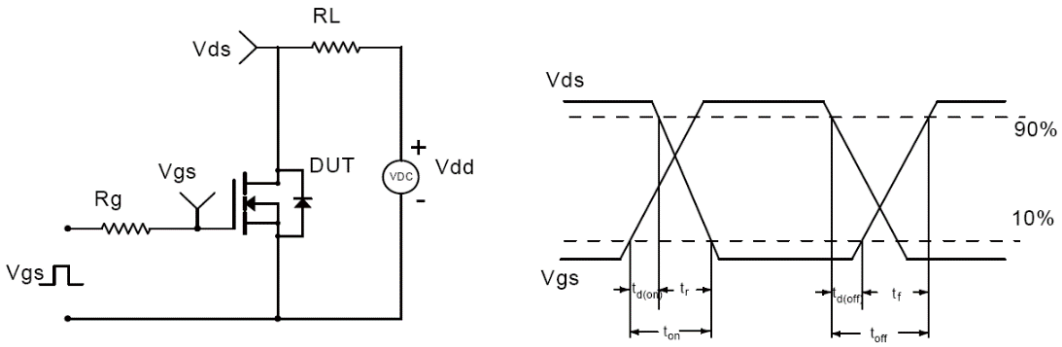


Figure 2.Switching time testcircuit & waveforms

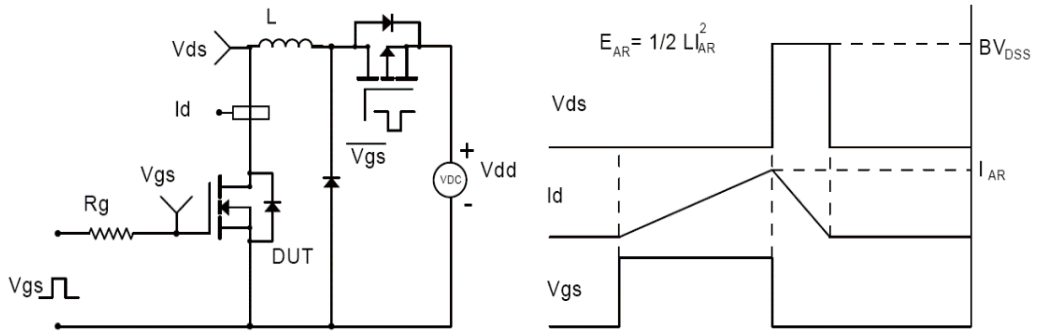


Figure 3.Unclamped inductive switching (UIS)test circuit & waveforms

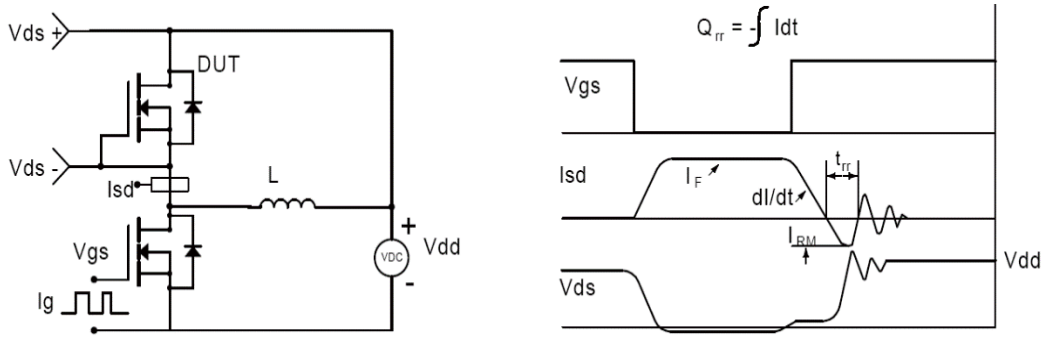


Figure 4. Diode reverse recoverytest circuit& waveforms

11.Electrical Characteristics Diagrams

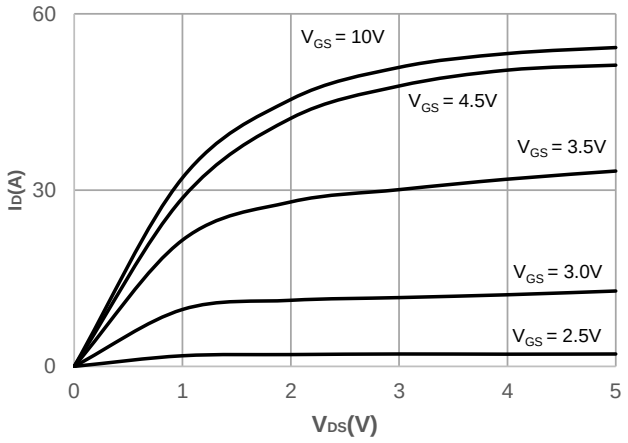


Figure 1. Typ. output characteristics

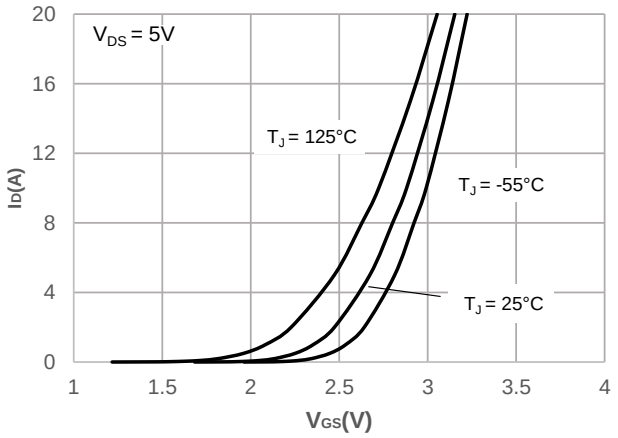


Figure 2. Typ. transfer characteristics

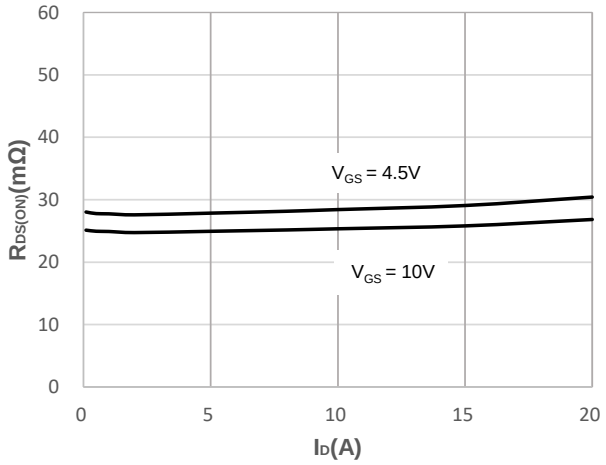


Figure 3. On-Resistance vs. Drain Current

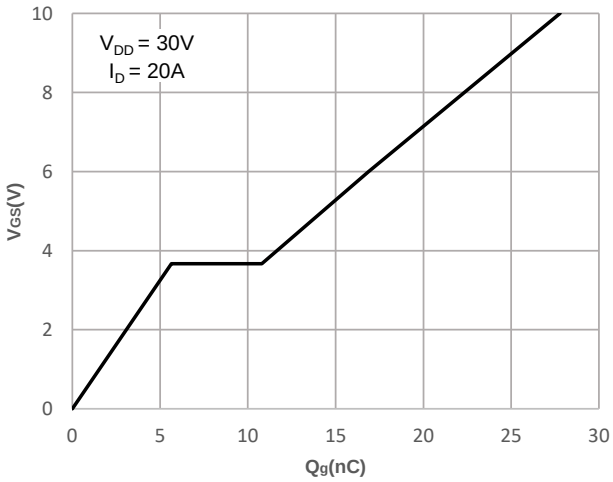


Figure 4. Gate Charge Characteristics

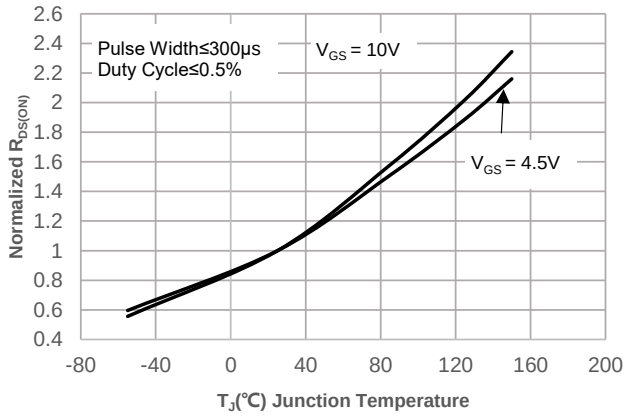


Figure 5. Normalized on Resistance vs. Junction Temperature

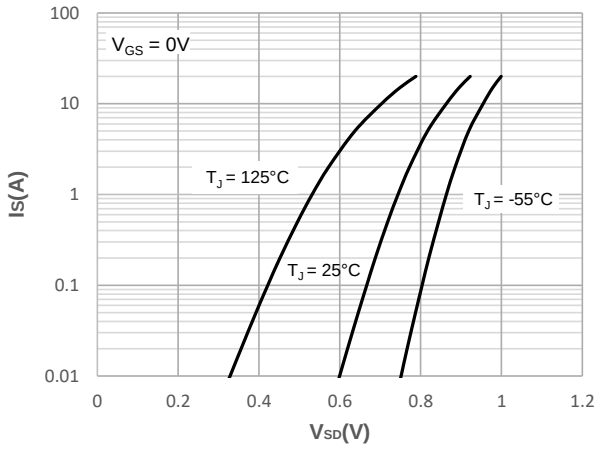


Figure 6. Forward characteristic of body diode

11.Electrical Characteristics Diagrams

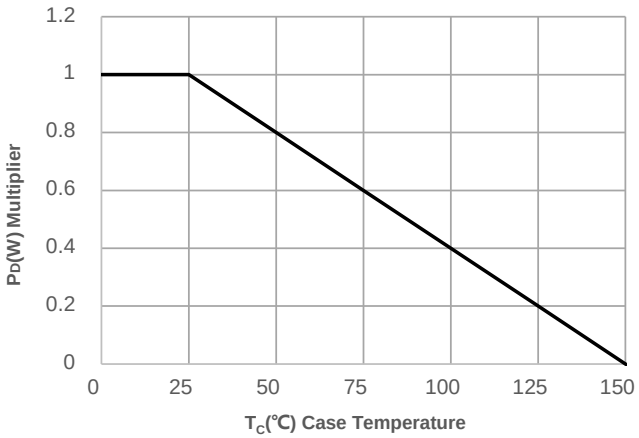


Figure 7. Power De-rating

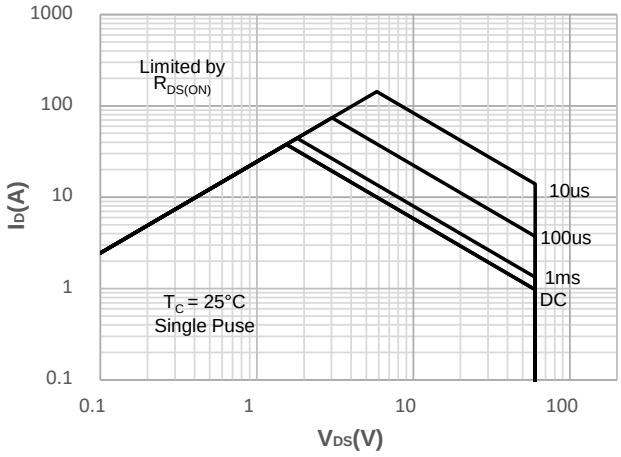


Figure 8. Maximum Safe Operating Area

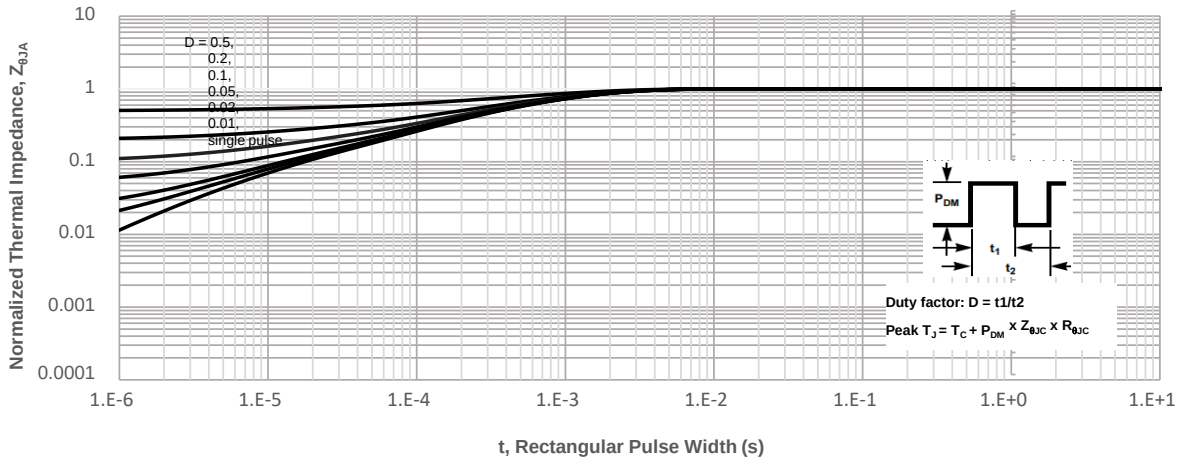


Figure 9. Normalized Maximum Transient Thermal Impedance

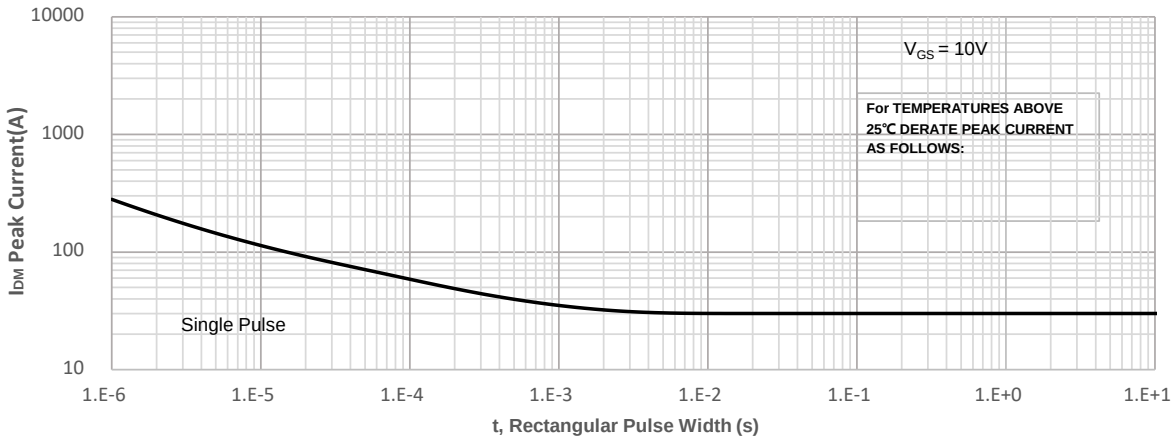
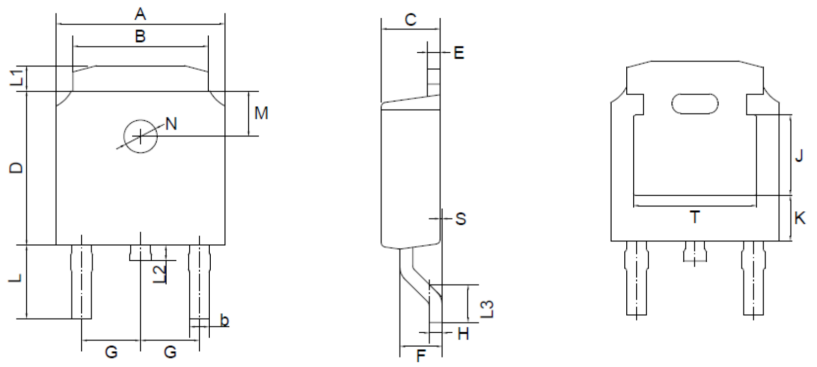


Figure 10. Peak Current Capacity

12. Outline Drawing

TO-252 Package Outline Dimensions



TO-252(D-PAK) mechanical data

UNIT		A	B	b	C	D	E	F	G	H	L	L1	L2	L3	S	M	N	J	K	T
mm	max	6.7	5.5	0.8	2.5	6.3	0.6	1.8	2.29 TYPICAL	0.55	3.1	1.2	1.0	1.75	0.1	1.8 TYPICAL	1.3 TYPICAL	3.16 ref.	1.80 ref.	4.83 ref.
	min	6.3	5.1	0.3	2.1	5.9	0.4	1.3		0.45	2.7	0.8	0.6	1.40	0.0					
mil	max	264	217	31	98	248	24	71	90 TYPICAL	22	122	47	39	69	4	71 TYPICAL	51 TYPICAL	124 ref.	71 ref.	190 ref.
	min	248	201	12	83	232	16	51		18	106	31	24	55	0					

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