

MDDG03R04Q

30V N-Channel Enhancement Mode MOSFET

1. Description

This N-Channel 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 $R_{DS(on)}$ = 4.3 m Ω at V_{GS} = 10 V, I_D = 20 A
- Extremely Low Reverse Recovery Charge, Q_{rr}
- 100% UIS Tested
- RoHS Compliant

3. Application

- Synchronous Rectification for ATX / Server / Telecom PSU
- Motor Drives and Uninterruptible Power Supplies
- Micro Solar Inverter

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Note 1)	I_D	80	A
Pulsed Drain Current (Note 2)	I_{DM}	300	A
Single Pulsed Avalanche Energy (Note 3)	E_{AS}	52.5	mJ
Thermal Resistance, steady-state	$R_{\theta JA}$	50	$^{\circ}\text{C}/\text{W}$
Power Dissipation	P_D	30	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.

3) E_{AS} condition : $T_J=25^{\circ}\text{C}$, $V_{DD}=15\text{V}$, $V_{GS}=10\text{V}$, $L=0.5\text{mH}$, $R_G=25\Omega$, $I_{AS}=14.5\text{A}$.

5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
4	G	Gate			MDD G03R04Q	PDFN3*3-8L
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	$V_{GS}=0V, I_D=250\mu A$	30	—	—	V
I_{SS}	Gate-Source Leakage Current	Forward $V_{GS}=20V$	—	—	100	nA
		Reverse $V_{GS}=-20V$	—	—	-100	nA
I_{DSS}	Drain-Source Leakage Current	$V_{DS}=30V, V_{GS}=0V$	—	—	1	μA
$V_{GS(TH)}$	Gate Threshold Voltage	$V_{DS}=V_{GS}, I_D=250\mu A$	1.0	1.5	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	$V_{GS}=10V, I_D=20A$	—	3.5	4.3	m Ω
		$V_{GS}=4.5V, I_D=15A$	—	5.5	6.9	m Ω

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	$V_{GS}=0V$	—	905	—	pF
C_{oss}	Output Capacitance	$V_{DS}=15V$	—	535	—	pF
C_{rss}	Reverse Transfer Capacitance	$f=1MHz$	—	24	—	pF
Q_g	Total Gate Charge	$V_{GS}=10V$	—	70	—	nC
Q_{gs}	Gate Source Charge	$V_{DS}=30V$	—	15	—	nC
Q_{gd}	Gate Drain Charge	$I_D=15A$	—	20	—	nC

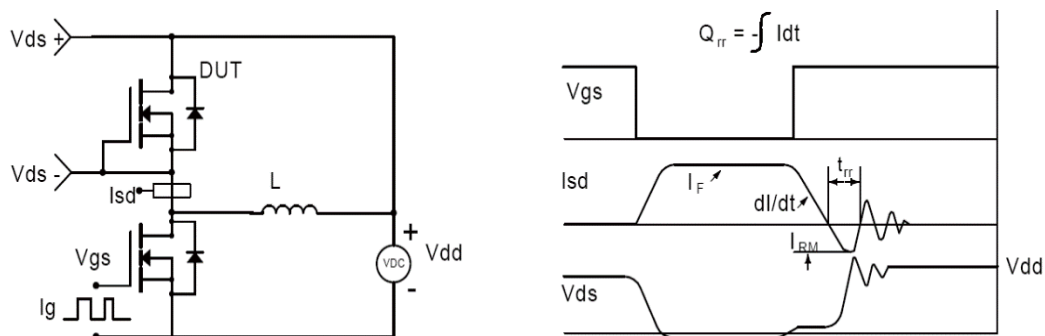
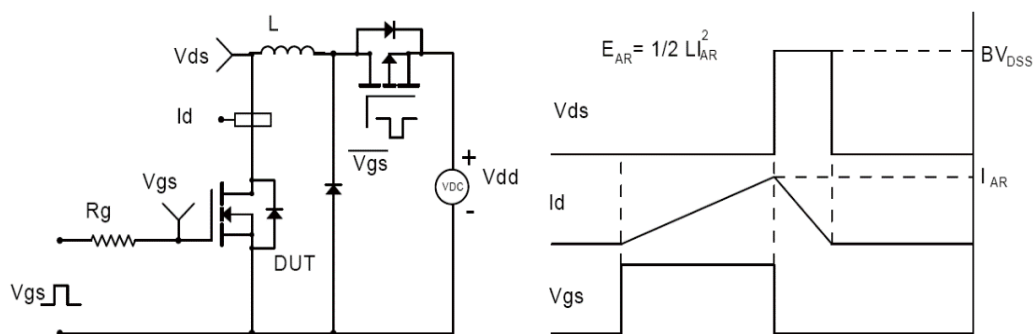
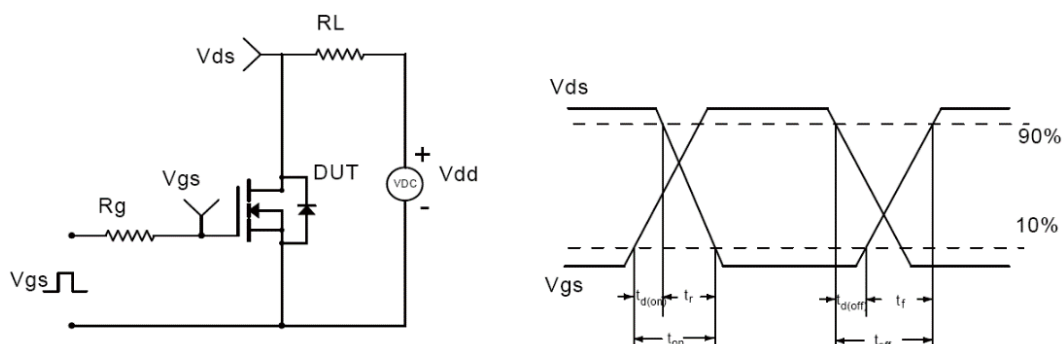
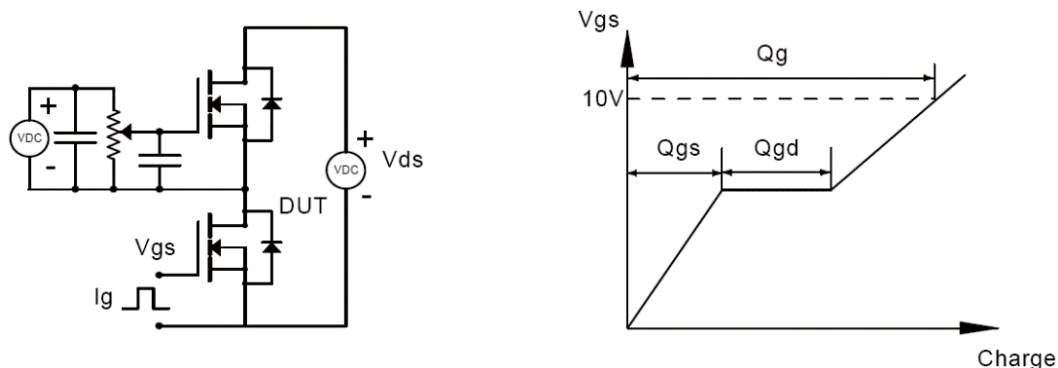
8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	$V_{GS}=10V$ $V_{DD}=15V$ $I_D=30A$ $R_G=3\Omega$	—	10	—	ns
t_r	Turn on Rise Time		—	25	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	50	—	ns
t_f	Turn Off Fall Time		—	22	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{SD}	Drain-Source Diode Forward Voltage	$I_S=30A, V_{GS}=0V$	—	0.8	—	V
t_{rr}	Body Diode Reverse Recovery Time	$I_F=20A$	—	20	—	ns
Q_{rr}	Body Diode Reverse Recovery Charge	$di/dt=100A/\mu s$	—	10	—	nC

10. Test Circuits And Waveforms



11. Electrical Characteristics Diagrams

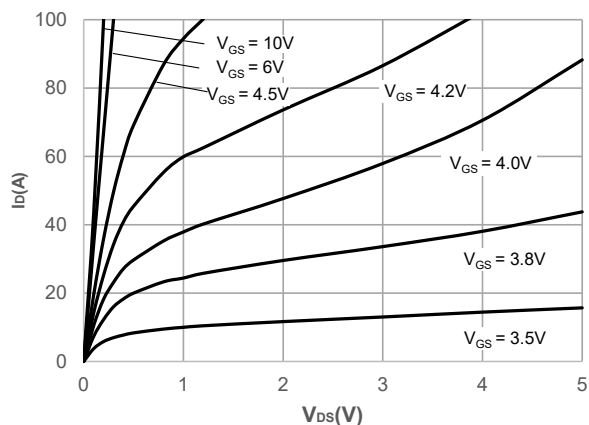


Figure 1. Typ. output characteristics

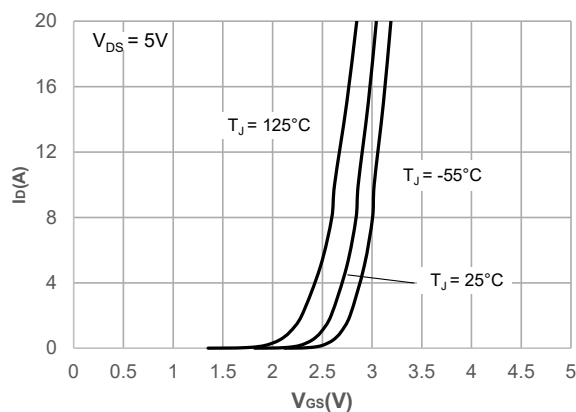


Figure 2. Typ. transfer characteristics

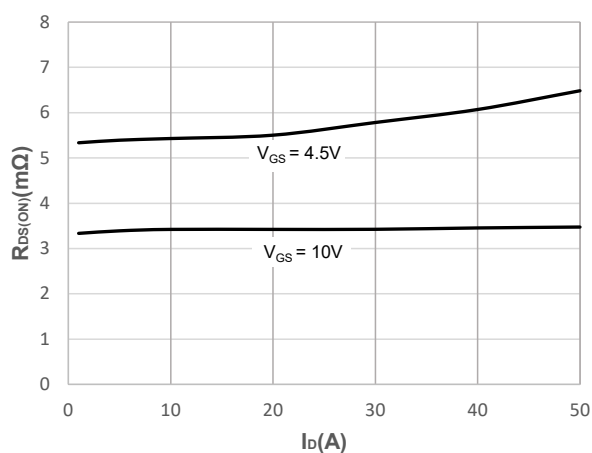


Figure 3. On-Resistance vs. Drain Current

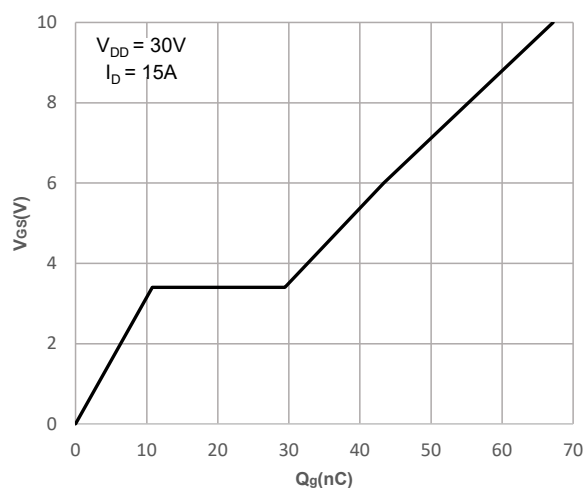


Figure 4. Gate Charge Characteristics

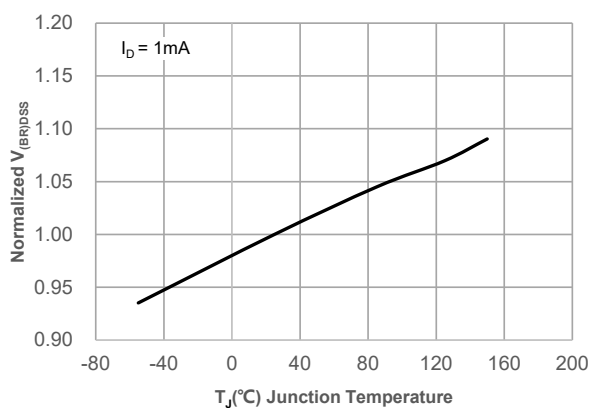


Figure 5. Normalized Breakdown Voltage vs. Junction Temperature

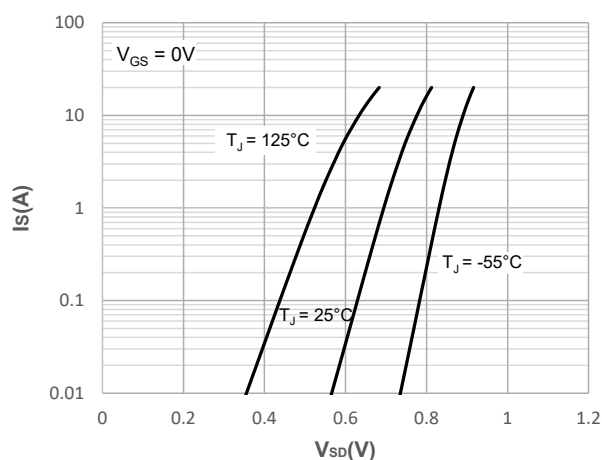
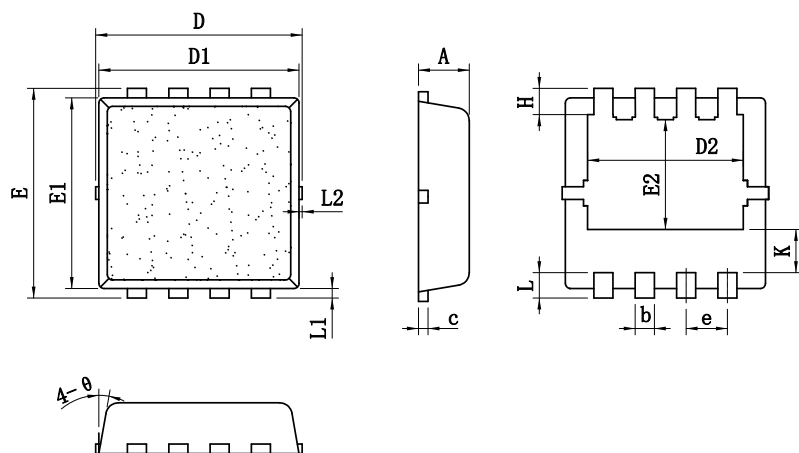


Figure 6. Forward characteristic of body diode

12. Outline Drawing

PDFN3*3-8L Package Outline Dimensions



* is the key control dimension

SYMBOL	mm		
	MIN	NOM	MAX
*A	0.70	0.80	0.90
*b	0.25	0.30	0.35
*c	0.10	0.15	0.20
D	3.25BSC		
*D1	3.05	3.15	3.25
D2	2.35	2.45	2.55
*e	0.55	0.65	0.75
E	3.30BSC		
*E1	2.90	3.00	3.10
E2	1.64	1.74	1.84
H	0.32	0.42	0.52
K	0.58	0.68	0.78
L	0.30	0.40	0.50
L1	0.10	0.15	0.20
L2	—	—	0.12
θ	8°	10°	12°

13. Important Notice and Disclaimer

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