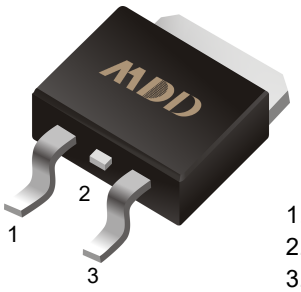
MDDG06R06D

60V N-Channel Enhancement Mode MOSFET

V_{DS}	60V
$I_{D(Tc=25℃)}$	70A
$R_{DS(on),max}$	6mΩ@V_{GS}=10V
$Q_{g,typ}$	30nC

TO-252



1. Gate
2. Drain
3. Source

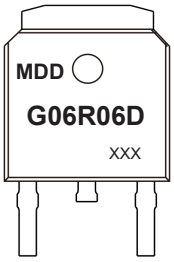
Features

- Low RDS(ON) & FOM
- Extremely low switching loss
- Excellent reliability and uniformity
- Fast switching and soft recovery

Application

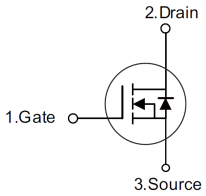
- PD charger
- Motor driver
- Switching voltage regulator
- DC-DC convertor
- Switched mode power supply

Marking



XXX: Date Code

Equivalent Circuit



Absolute Maximum Ratings (T_A=25℃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	70	A
Pulsed Drain Current (Note 2)	$I_{D,pulse}$	210	A
Continuous Diode Forward Current(Note 1)	I_S	70	A
Diode Pulsed Current(Note 2)	$I_{S,pulse}$	210	A
Thermal Resistance, Junction-Case	$R_{\theta JC}$	1.44	°C/W
ThermalResistance,Junction-Ambient(Note4)	$R_{\theta JA}$	62	°C/W
Single Pulsed Avalanche Energy(Note 5)	E_{AS}	66	mJ
Power Dissipation(Note 3)	P_D	87	W
Junction Temperature	T_J	-55 ~+150	℃
Storage Temperature	T_{stg}	-55 ~+150	℃

Note

1) Calculated continuous current based on maximum allowable junction temperature.
2) Repetitive rating; pulse width limited by max. junction temperature.
3) Pd is based on max. junction temperature, using junction-case thermal resistance.
4) The value of $R_{\theta JA}$ is measured with the device mounted on 1 in 2 FR-4 board with 2oz. Copper, in a still air environment with T_a=25 °C.
5) V_{DD}=30 V,V_{GS}=10 V, L=0.3 mH, starting T_j=25 °C.

Ta = 25℃ 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	uA
$V_{GS(TH)}$	Gate Threshold Voltage		V_{DS}=V_{GS}, I_D=250μA	1.0	--	2.5	V
$R_{DS(ON)}$	Drain-Source On-State Resistance		V_{GS}=10V, I_D=20A	--	4.7	6.0	mΩ
	Drain-Source On-State Resistance		V_{GS}=4.5V, I_D=10A	--	6.4	10	mΩ

Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=50V f=100kHz	--	2136	--	pF
C_{oss}	Output Capacitance		--	332	--	pF
C_{rss}	Reverse Transfer Capacitance		--	10.6	--	pF
Q_g	Total Gate Charge	V_{GS}=10V, V_{DS}=50V, I_D=25A	--	30	--	nC
Q_{gs}	Gate Source Charge		--	5.8	--	nC
Q_{gd}	Gate Drain Charge		--	6.1	--	nC
$V_{plateau}$	Gate plateau voltage		--	3.6	--	V

Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
$t_{d(on)}$	Turn on Delay Time	V_{GS}=10V, V_{DS} =50V, I_D=25A, R_G=2Ω	--	22.9	--	ns
t_r	Turn on Rise Time		--	6.5	--	ns
$t_{d(off)}$	Turn Off Delay Time		--	45.7	--	ns
t_f	Turn Off Fall Time		--	20.6	--	ns

Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V_{SD}	Drain-Source Diode Forward Voltage	I_S=20A, V_{GS}=0V	--	--	1.3	V
t_{rr}	Body Diode Reverse Recovery Time	IS=25A, VR=50V, dIs/dt=100A/μs	--	50.3	--	ns
Q_{rr}	Body Diode Reverse Recovery Charge		--	45.1	--	nC
I_{rrm}	Peak reverse recovery current		--	1.5	--	A

Electrical Characteristics Diagrams

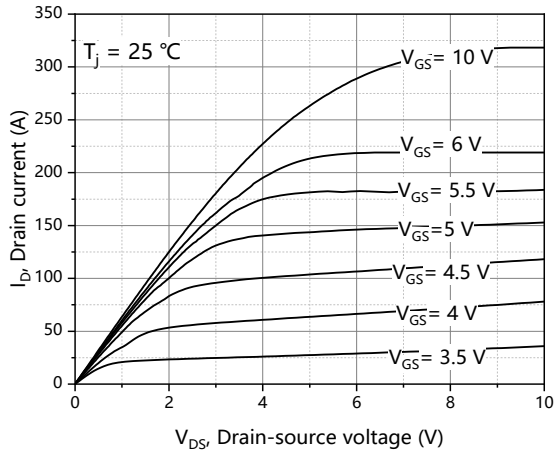


Figure 1. Typ. output characteristics

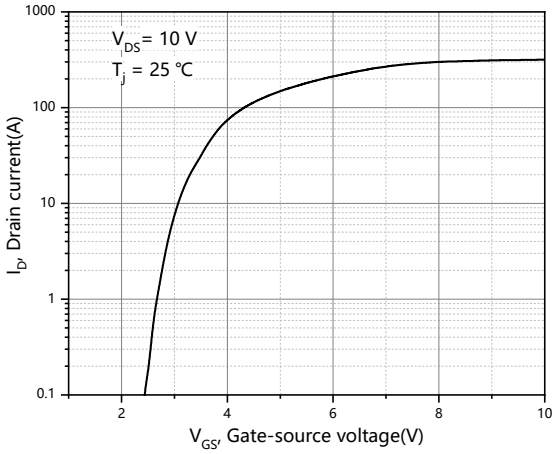


Figure 2. Typ. transfer characteristics

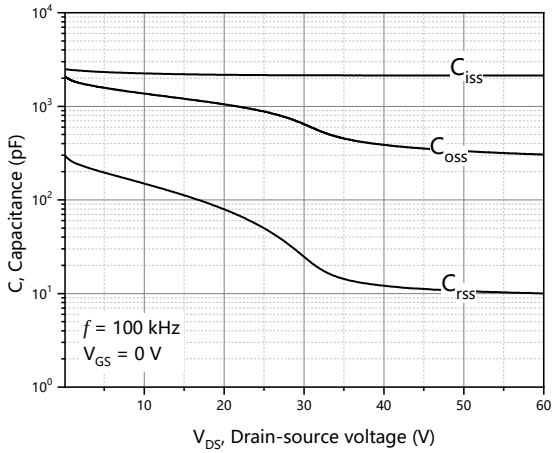


Figure 3. Typ. capacitances

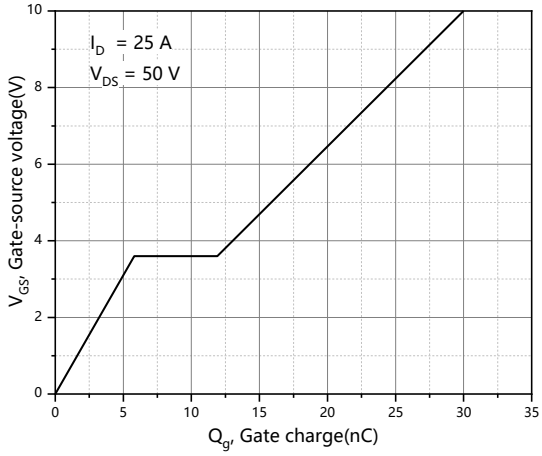


Figure 4. Typ. gate charge

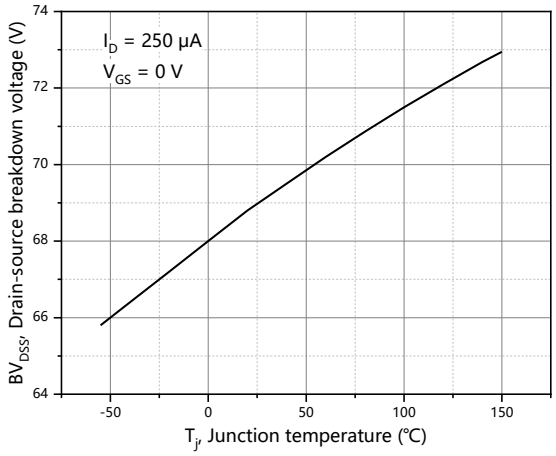


Figure 5. Drain-source breakdown voltage

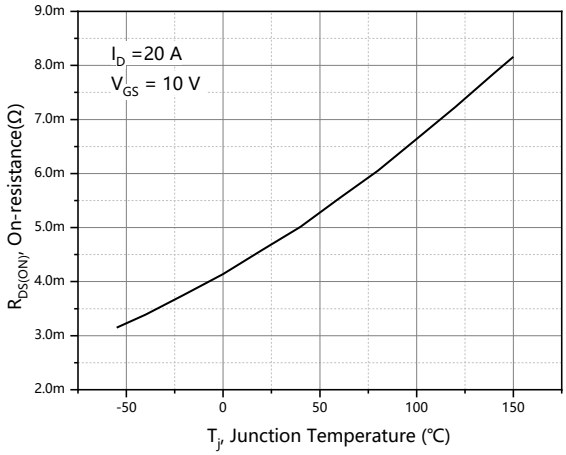


Figure 6. Drain-source on-state resistance

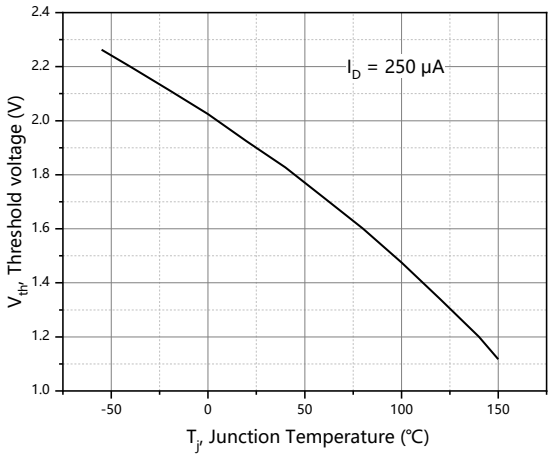


Figure 7. Threshold voltage

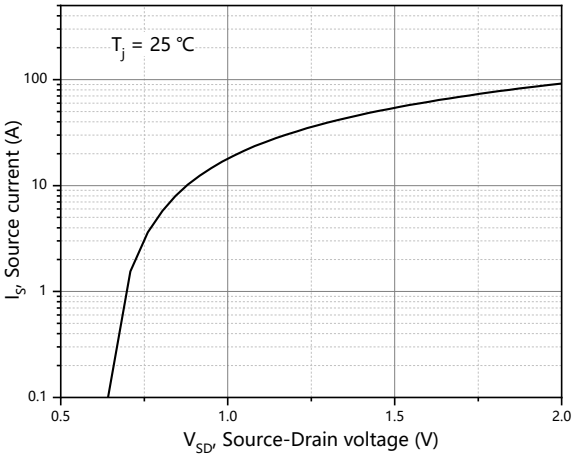


Figure 8. Forward characteristic of body diode

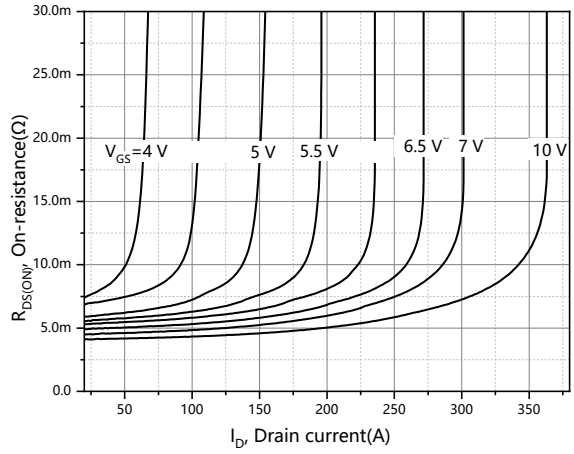


Figure 9. Drain-source on-state resistance

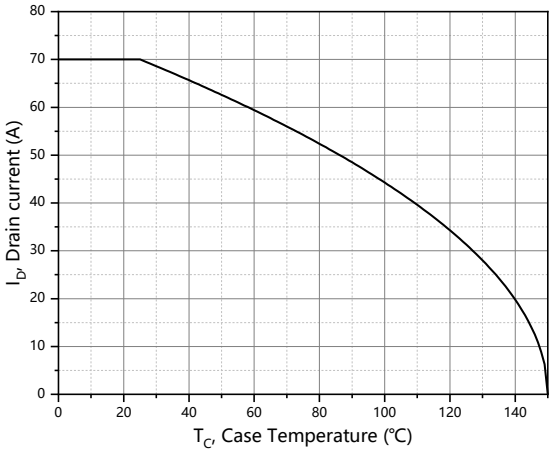


Figure 10. Drain current

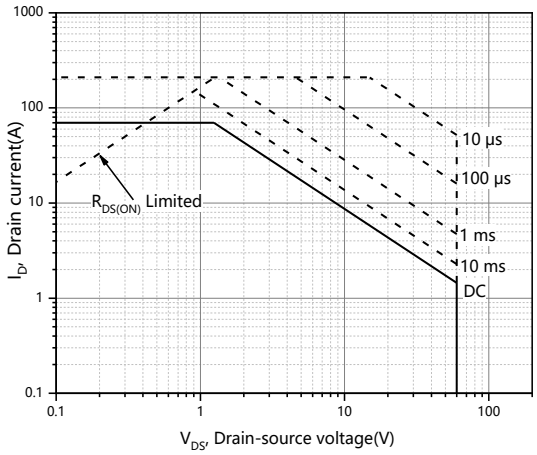


Figure 11. Safe operation area T_C=25 °C

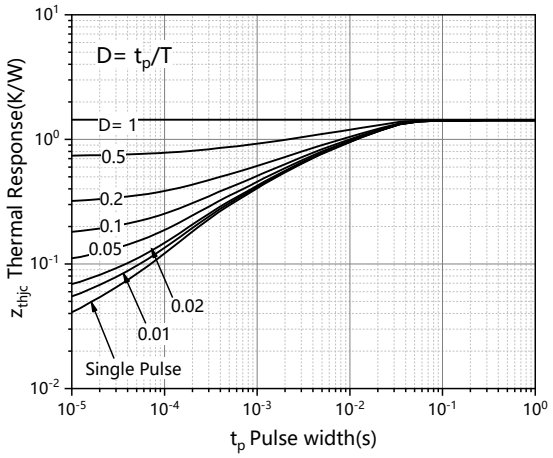


Figure 12. Max. transient thermal impedance

■ TEST CIRCUITS AND WAVEFORMS

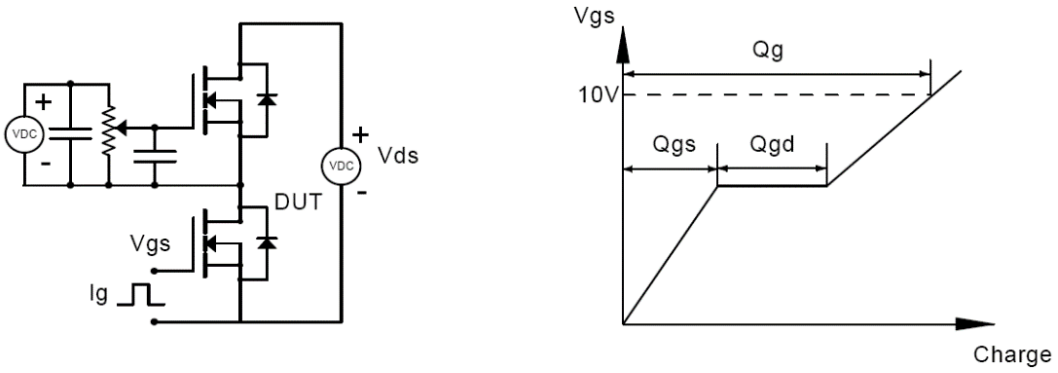


Figure 1. Gate charge test circuit & waveform

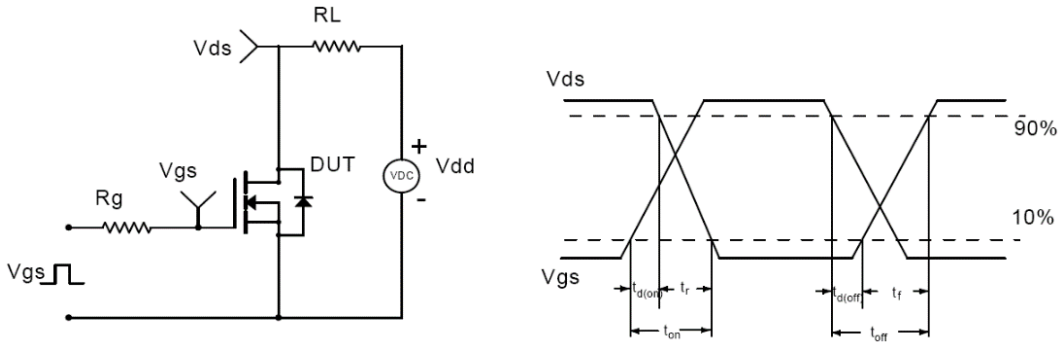


Figure 2. Switching time test circuit & waveforms

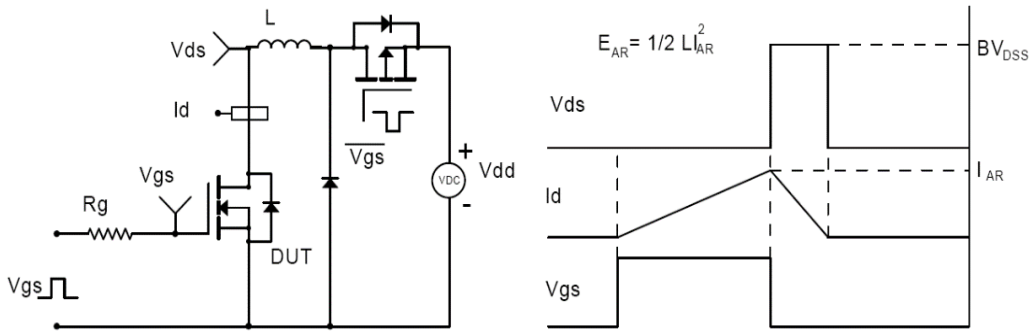


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

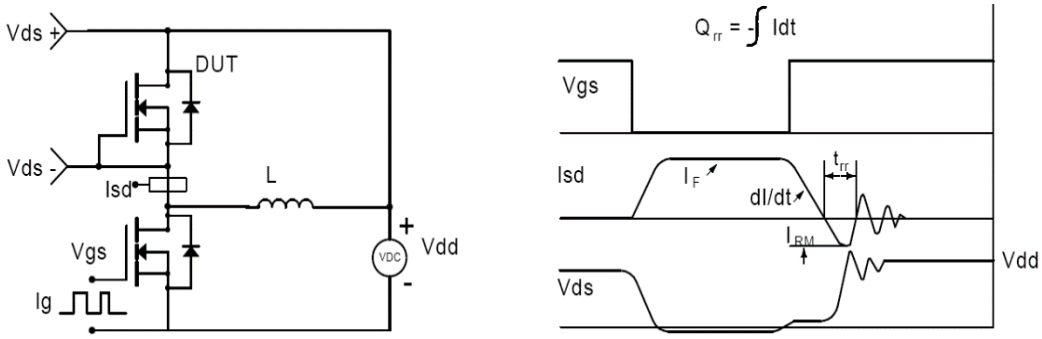
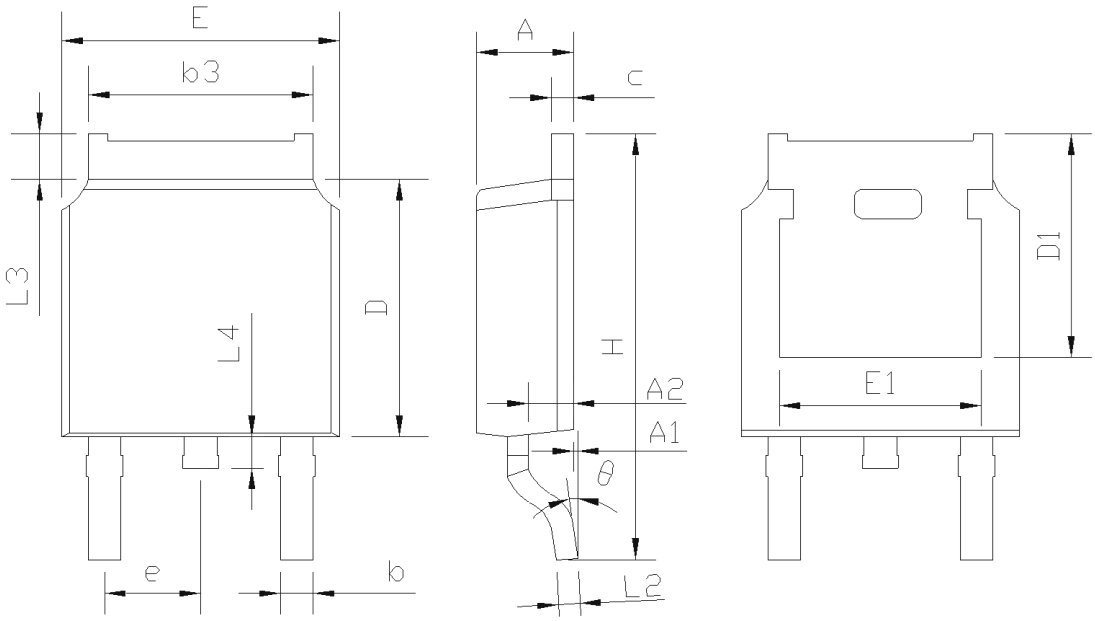


Figure 4. Diode reverse recovery test circuit & waveforms

The curve above is or reference only.

Outlitne Drawing

MOSFET TO-252 Package Outline Dimensions



SYMBOL	mm		
	MIN	NOM	MAX
A	2.20	2.30	2.38
A1	0.00	-	0.20
A2	0.97	1.07	1.17
b	0.68	0.78	0.90
b3	5.20	5.33	5.46
c	0.43	0.53	0.61
D	5.98	6.10	6.22
D1	5.30REF		
E	6.40	6.60	6.73
E1	4.63	-	-
e	2.286BSC		
H	9.40	10.10	10.50
L2	0.51BSC		
L3	0.88	-	1.28
L4	0.50	-	1.00
θ	0°	-	8°