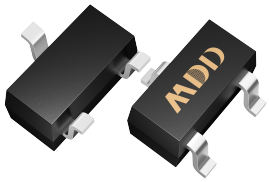


MDD05N40A

40V N-Channel Enhancement Mode MOSFET

1. Description

This 40V N-channel MOSFET is based on MDD's unique device design to achieve low $R_{DS(ON)}$, fast switching and excellent avalanche characteristics.

2. Features

- High dense cell design for extremely low RDS(ON)
- Exceptional on-resistance and maximum DC current capability

3. Application

- Load Switch for Portable Devices
- Battery Powered System
- DC-DC converter
- LCD Display inverter
- Portable Equipment

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

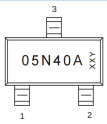
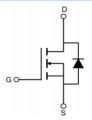
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	40	V
Gate-Source Voltage	V_{GS}	±20	V
Continuous Drain Current (Note 1)	I_D	5	A
Pulsed Drain Current (Note 1)	I_{DM}	20	A
Thermal Resistance, Junction-Ambient (Note 2)	$R_{\theta JA}$	100	°C/W
Power Dissipation	P_D	1.2	W
Junction Temperature	T_J	-55~+150	°C
Storage Temperature	T_{stg}	-55~+150	°C

- Stresses exceeding Maximum Ratings may damage the device.
- Maximum Ratings are stress ratings only.
- Functional operation above the Recommended Operating Conditions is not implied.
- Extended exposure to stresses above the recommended Operating Conditions may affect device reliability

Notes: 1.Pulse width limited by maximum allowable junction temperature

2.Surface Mounted on FR4 Board, t＜10 sec.

5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
1	G	Gate			05N40A XXY: Date code	SOT-23
2	S	Source				
3	D	Drain				

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	40	—	—	V
I_{GSS}	Gate-Source Leakage Current	V_{GS}=±20V	—	—	±100	nA
I_{DSS}	Drain-Source Leakage Current	V_{DS}=40V, V_{GS}=0V	—	—	1	μA
$V_{GS(TH)}$	Gate Threshold Voltage	V_{DS}=V_{GS}, I_D=250μA	1.0	1.6	2.2	V
$R_{DS(ON)}$	Drain-Source On-State Resistance	V_{GS}=10V, I_D=4A	—	27	34	mΩ
		V_{GS}=4.5V, I_D= 3A	—	34	44	mΩ

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C_{iss}	Input Capacitance	V_{GS}=0V V_{DS}=20V f=1.0MHz	—	370	—	pF
C_{oss}	Output Capacitance		—	50	—	pF
C_{rss}	Reverse Transfer Capacitance		—	38	—	pF
Q_g	Total Gate Charge	V_{GS}=0-10V V_{DS}=20V I_D=5A	—	11	—	nC
Q_{gs}	Gate Source Charge		—	2	—	nC
Q_{gd}	Gate Drain Charge		—	3	—	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=5A R_G=2.2Ω	—	8	—	ns
t_r	Turn on Rise Time		—	20	—	ns
$t_{d(off)}$	Turn Off Delay Time		—	13	—	ns
t_f	Turn Off Fall Time		—	2	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition		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	IF=5A di/dt=100A/μs	—	19	—	ns
Q_{rr}	Body Diode Reverse Recovery Charge		—	26	—	nC

10.Test Circuits And Waveforms

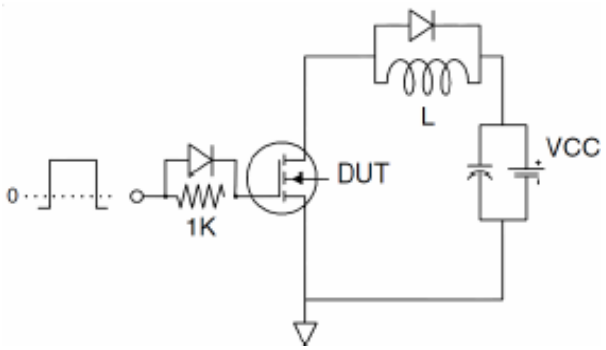


Figure 1. Gate Charge test Circuit

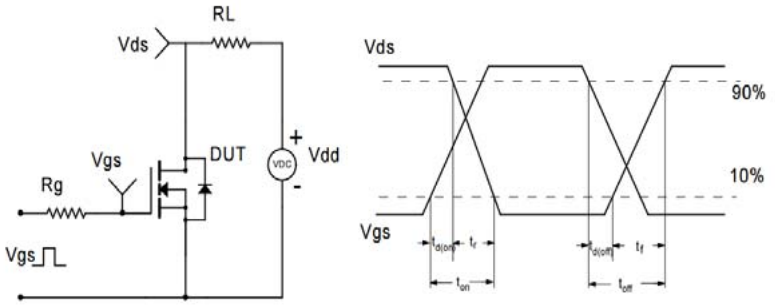


Figure 2. Switchingtime testcircuit & waveforms

The curve above is for reference only.

11.Electrical Characteristics Diagrams

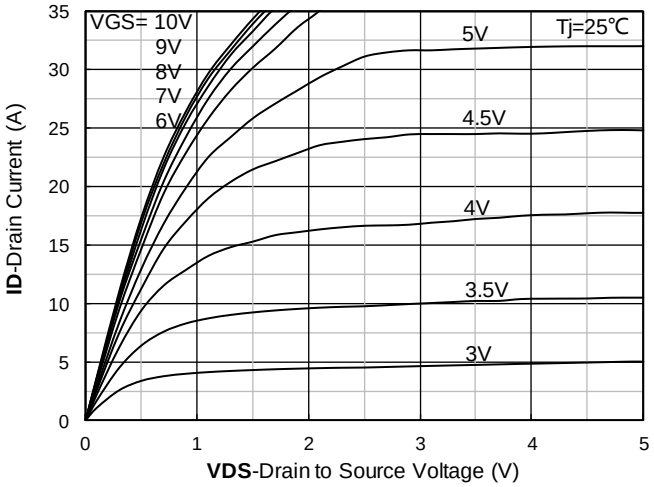


Figure1. Output Characteristics

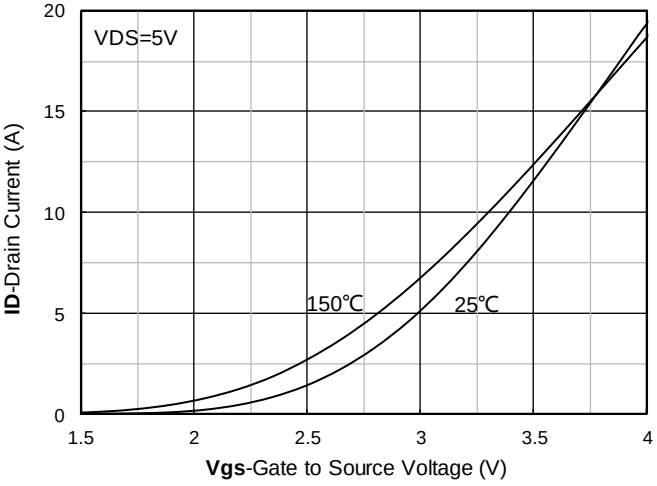


Figure2. TransferCharacteristics

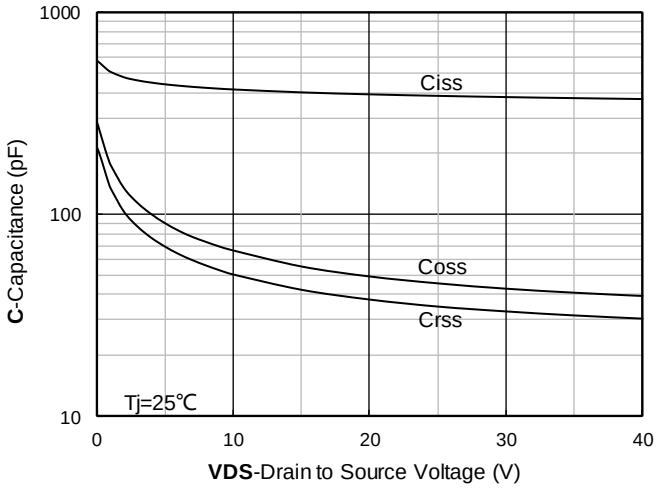


Figure3. Capacitance Characteristics

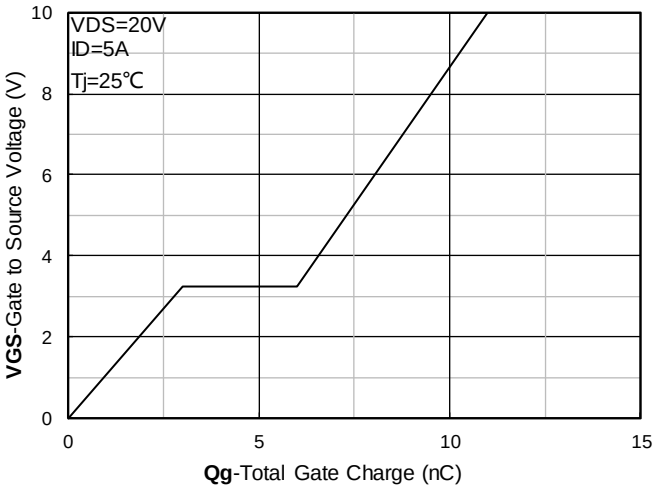


Figure4.Gate Charge

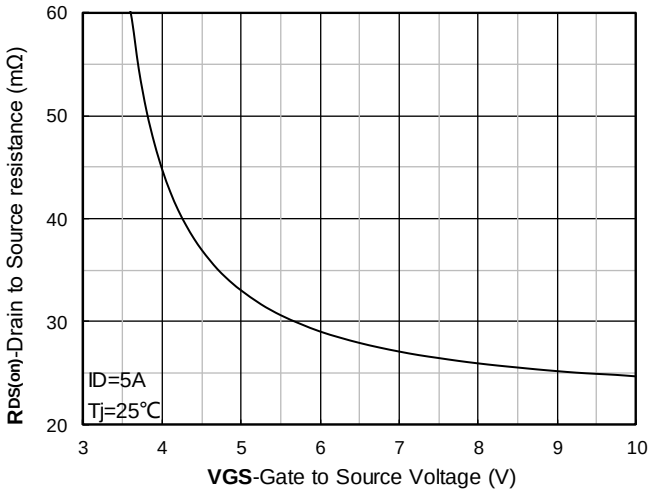


Figure5. On-Resistance vs Gate to SourceVoltage

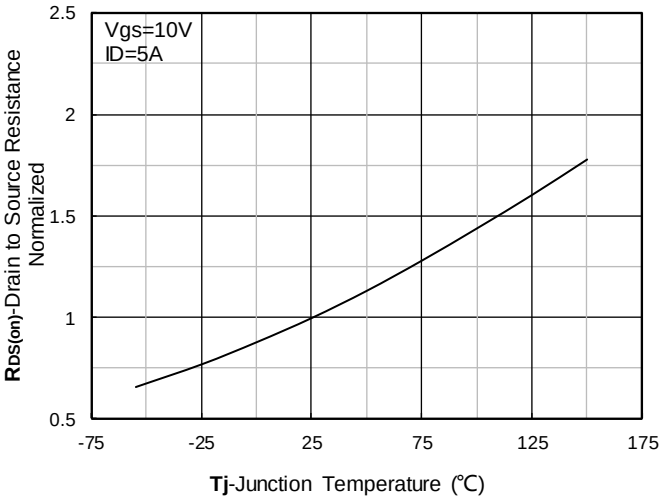


Figure6.Normalized On-Resistance

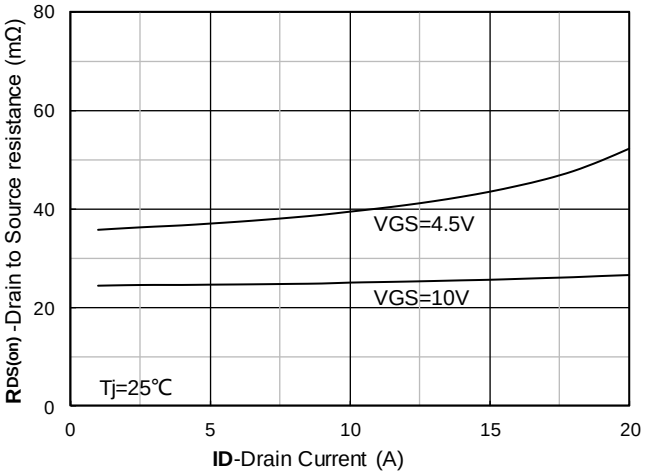


Figure7. RDS(on) VS Drain Current

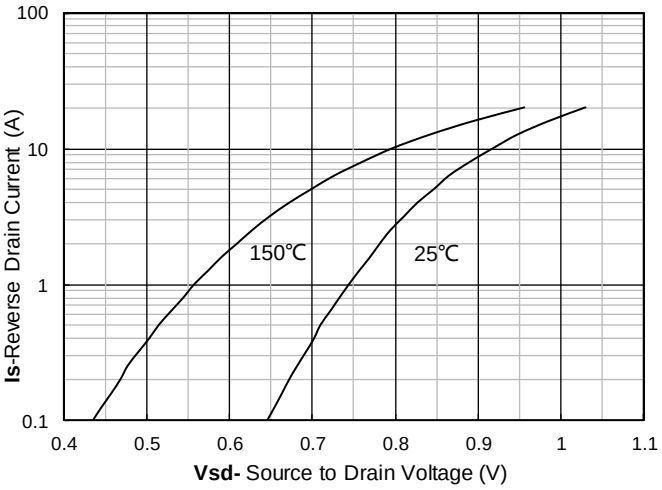


Figure8. Forward characteristics of reverse diode

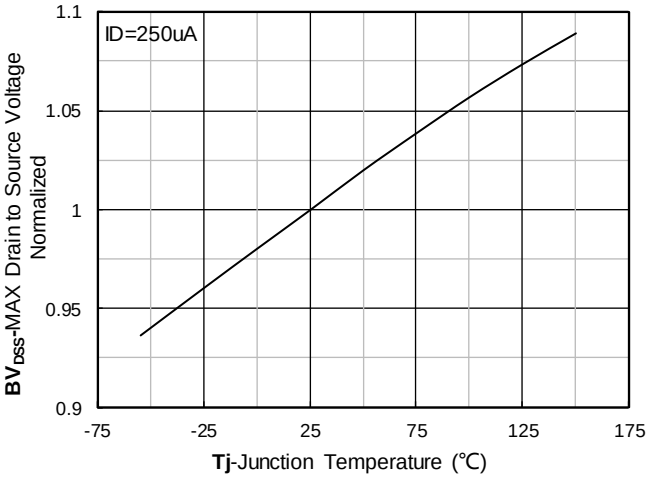


Figure9. Normalized breakdown voltage

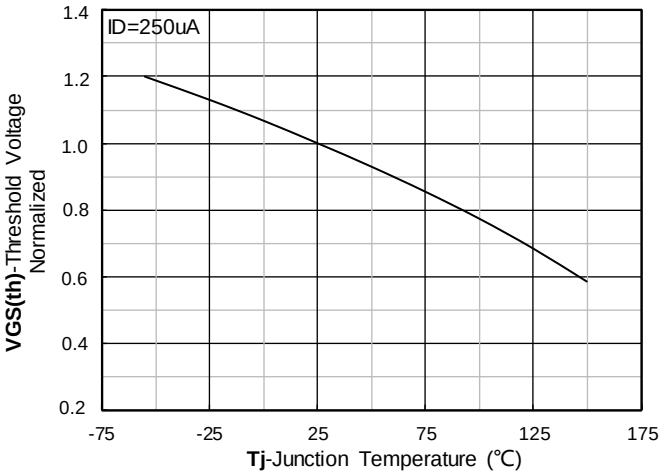


Figure10. Normalized Threshold voltage

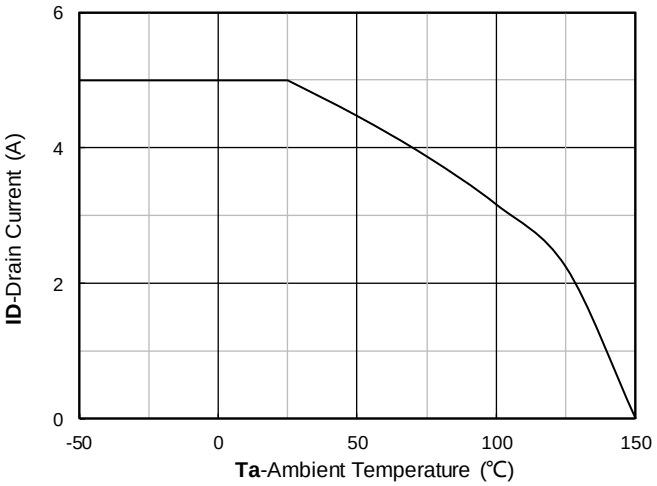


Figure9. Current Dissipation

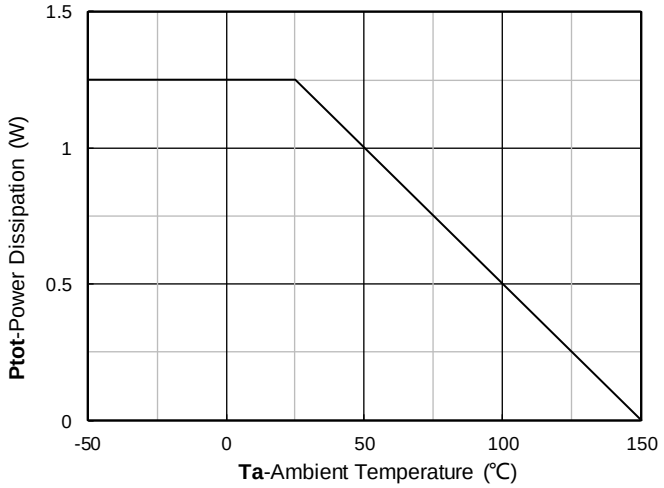
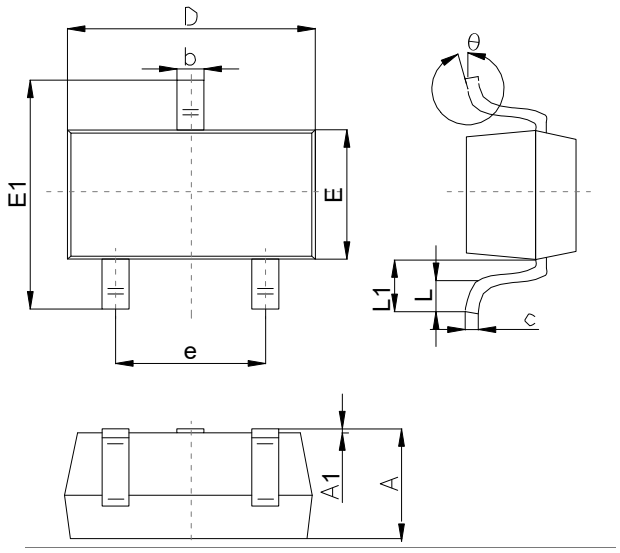


Figure10. Power Dissipation

The curves above are for reference only.

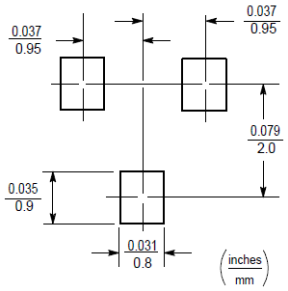
12. Outline Drawing

SOT-23 Package Outline Dimensions



Symbol	Dimensions In Millimeters		
	Min	Typ	Max
A	0.65		1.40
A1	0.00		0.20
b	0.30		0.55
c	0.08		0.20
D	2.70		3.10
E	1.15		1.65
E1	2.10		2.80
e	1.70		2.10
L	0.15		0.50
L1	0.35		0.70
θ	0°		12°

13. Suggested Pad Layout



Note:
1.Controlling dimension:in/millimeters.
2.General tolerance: ±0.05mm.
3.The pad layout is for reference purposes only.

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