

MDD02P60A

60V P-Channel Enhancement Mode MOSFET

1. Description

This 60V P-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 $R_{DS(ON)}$
- 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 ($T_A=25^{\circ}\text{C}$ unless otherwise noted)

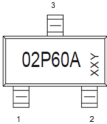
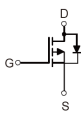
Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-60	V
Gate-Source Voltage	V_{GS}	± 20	V
Continuous Drain Current (Note 1)	I_D	-2.0	A
Pulsed Drain Current (Note 1)	I_{DM}	-8.0	A
Thermal Resistance, Junction-Ambient (Note 2)	$R_{\theta JA}$	75	$^{\circ}\text{C}/\text{W}$
Power Dissipation	P_D	1.7	W
Junction Temperature	T_J	-55~+150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-55~+150	$^{\circ}\text{C}$

- 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			02P60A XXY:Date Code	SOT-23
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 _{less}	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		$V_{DS}=V_{GS}, I_D=-250\mu A$	-1	-1.5	-2.5	V
R _{DS(ON)}	Drain-Source On-State Resistance		$V_{GS}=-10V, I_D=-1.8A$	—	140	178	m Ω
			$V_{GS}=-4.5V, I_D=-1.4A$	—	175	215	m Ω

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	$V_{GS}=0V$ $V_{DS}=-30V$ $f=1.0MHz$	—	450	—	pF
C _{oss}	Output Capacitance		—	27	—	pF
C _{rss}	Reverse Transfer Capacitance		—	22	—	pF
Q _g	Total Gate Charge	$V_{GS}=-10V$ $V_{DS}=-30V$ $I_D=-2A$	—	9	—	nC
Q _{gs}	Gate Source Charge		—	1.6	—	nC
Q _{gd}	Gate Drain Charge		—	1.9	—	nC

8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
t _{d(on)}	Turn on Delay Time	$V_{GS}=-10V$ $V_{DS}=-30V$ $I_D=-2A$ $R_G=3.3\Omega$	—	40	—	ns
t _r	Turn on Rise Time		—	35	—	ns
t _{d(off)}	Turn Off Delay Time		—	15	—	ns
t _f	Turn Off Fall Time		—	10	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V _{SD}	Drain-Source Diode Forward Voltage	$I_S=-2A, V_{GS}=0V$	—	-0.8	-1.2	V
I _{SD}	Source drain current(Body Diode)	$T_A=25^{\circ}\text{C}$	—	—	-2.0	A

10. Test Circuits And Waveforms

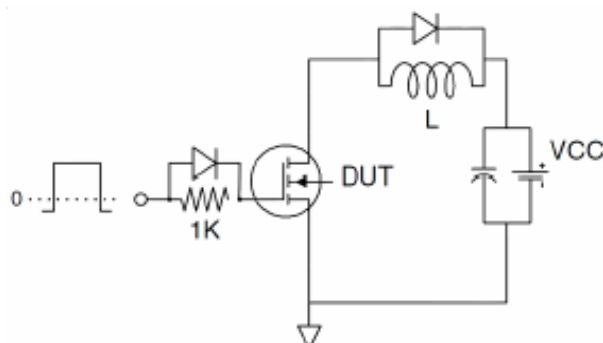


Figure 1. Gate Charge test Circuit

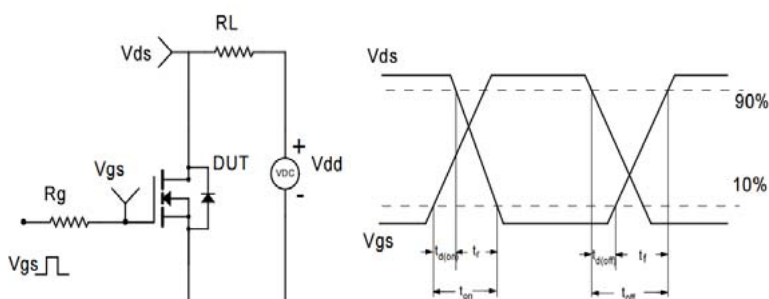


Figure 2. Switching time test circuit & waveforms

The curve above is for reference only.

11. Electrical Characteristics Diagrams

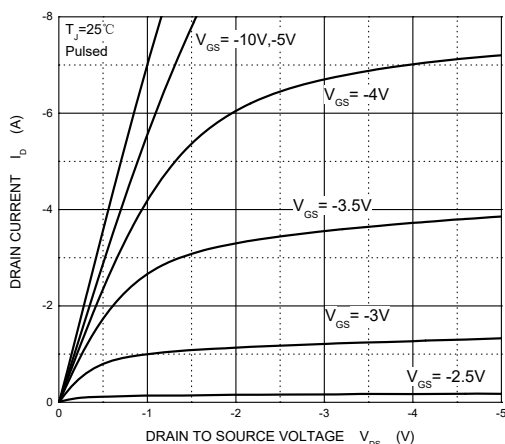


Figure 1. Typ. output characteristics

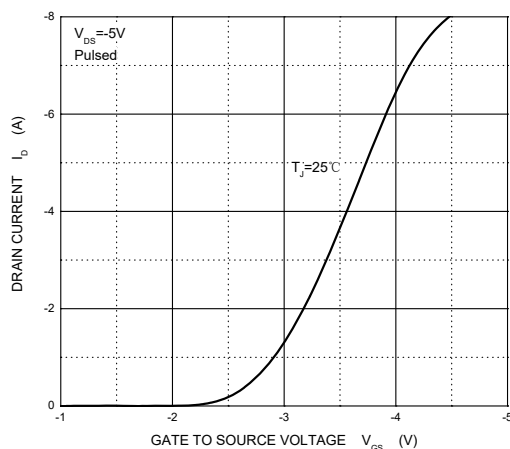


Fig 2. Transfer Charhacteristics

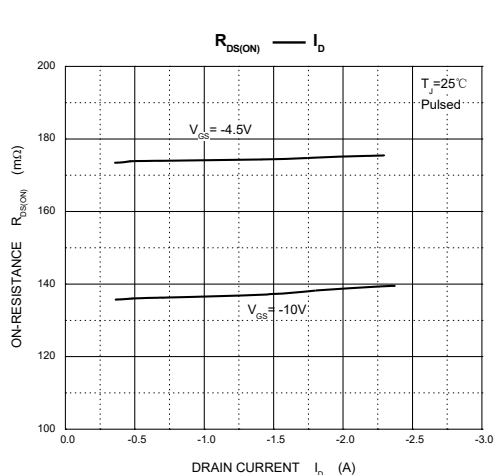


Fig 3. RDson vs I_D Characteristics

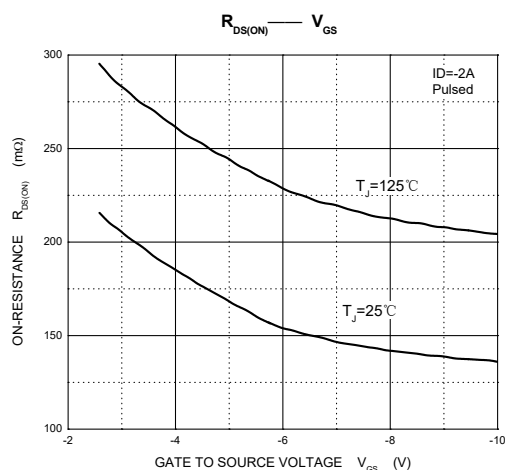


Fig 4. RDson vs V_{GS} Characteristics

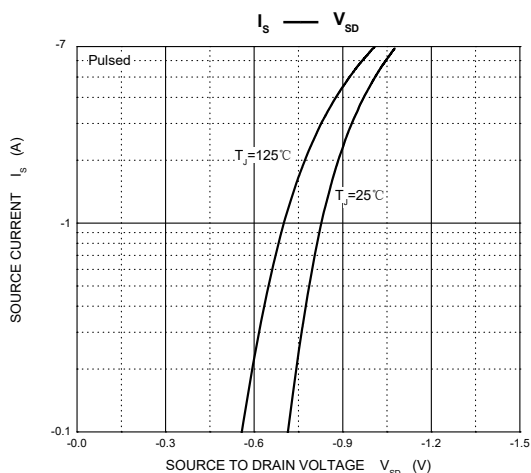


Fig 5. Source current Characteristics

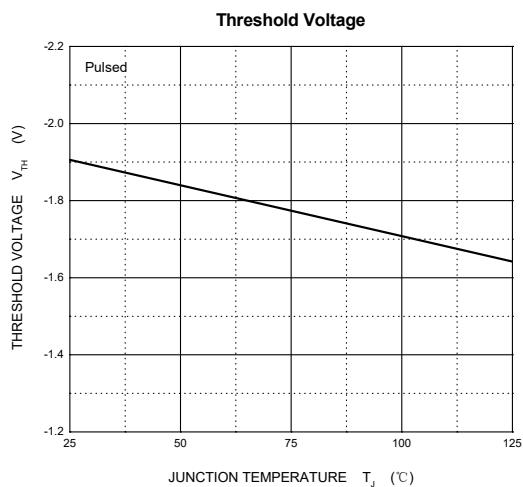
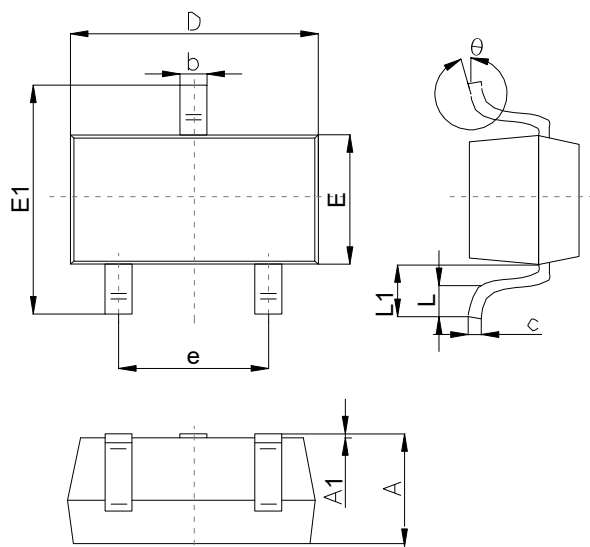


Fig 6. Typ. Threshold Voltage Characteristics

The curve above is for reference only

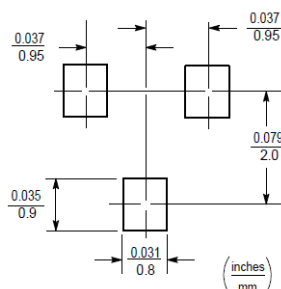
12. Outline Drawing

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: $\pm 0.05\text{mm}$.
3. The pad layout is for reference purposes only.

14. Important Notice and Disclaimer

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