

MDD16P02J

20V P-Channel Enhancement Mode MOSFET

1. Description

This P-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 $R_{DS(on)}$ = 20m Ω at V_{GS} = -4.5 V, I_D = -7 A
- Extremely Low Reverse Recovery Charge, Q_{rr}
- 100% UIS Tested
- RoHS Compliant

3. Application

- DC to DC conversion
- Low-side load switch
- Battery management
- Switching circuits

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

Parameter	Symbol	Value	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	± 12	V
Continuous Drain Current (Note 1)	I_D	-16	A
Pulsed Drain Current (Note 2)	I_{DM}	-64	A
Thermal Resistance, steady-state	$R_{\theta JA}$	50	$^{\circ}\text{C}/\text{W}$
Power Dissipation	P_D	2.6	W
Junction Temperature	T_J	-55~+150	$^{\circ}\text{C}$
Storage Temperature	T_{stg}	-55~+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.

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5. Pinning information

Pin	Symbol	Description	Simplified outline	Equivalent Circuit	Marking	Package
3	G	Gate			16P02J XXY: Date code	DFN2020-6L
1-2, 5-6	D	Drain				
4	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		$V_{GS}=0V, I_D=-250\mu A$	-20	—	—	V
I _{SS}	Gate-Source Leakage Current	Forward	$V_{GS}=12V$	—	—	-100	nA
		Reverse	$V_{GS}=-12V$	—	—	100	nA
I _{DSS}	Drain-Source Leakage Current		$V_{DS}=-20V, V_{GS}=0V$	—	—	-1	μA
$V_{GS(TH)}$	Gate Threshold Voltage		$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.45	-0.6	-1	V
R _{DS(ON)}	Drain-Source On-State Resistance		$V_{GS}=-4.5V, I_D=-7A$	—	15	20	m Ω
			$V_{GS}=-2.5V, I_D=-4A$	—	20	24	m Ω

7. Dynamic Electrical Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
C _{iss}	Input Capacitance	$V_{GS}=0V$	—	1830	—	pF
C _{oss}	Output Capacitance	$V_{DS}=-10V$	—	210	—	pF
C _{rss}	Reverse Transfer Capacitance	$f=1MHz$	—	185	—	pF
Q _g	Total Gate Charge	$V_{GS}=-4.5V$	—	15	—	nC
Q _{gs}	Gate Source Charge	$V_{DS}=-6V$	—	3.3	—	nC
Q _{gd}	Gate Drain Charge	$I_D=-10A$	—	3.5	—	nC

8. Switching Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
t _{d(on)}	Turn on Delay Time	$V_{GS}=-4.5V$	—	25	—	ns
t _r	Turn on Rise Time	$V_{DD}=-6V$	—	35	—	ns
t _{d(off)}	Turn Off Delay Time	$I_D=-10A$	—	120	—	ns
t _f	Turn Off Fall Time	$R_G=6\Omega$	—	95	—	ns

9. Source Drain Diode Characteristics

Symbol	Parameter	Condition	Min	Typ	Max	Unit
V _{SD}	Drain-Source Diode Forward Voltage	$I_S=-16A, V_{GS}=0V$	—	0.8	—	V

10. Test Circuits And Waveforms

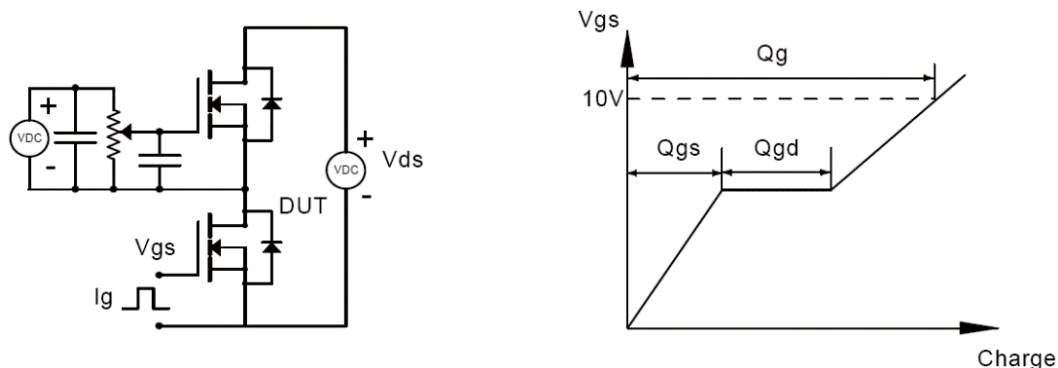


Figure 1. Gate charge test circuit & waveform

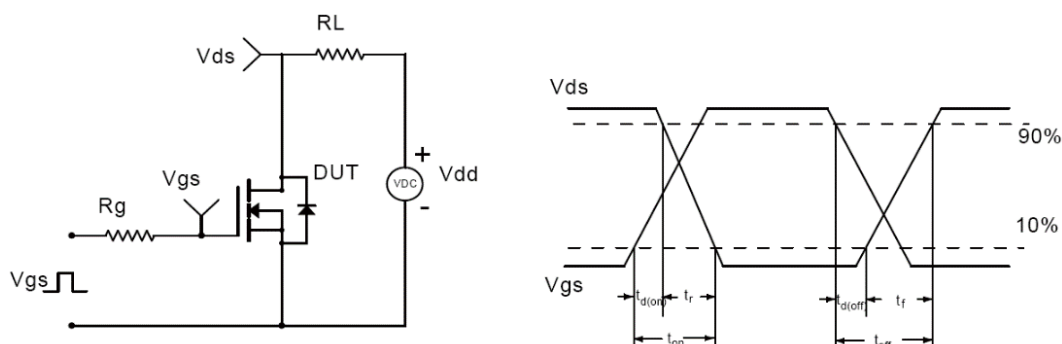


Figure 2. Switching time test circuit & waveforms

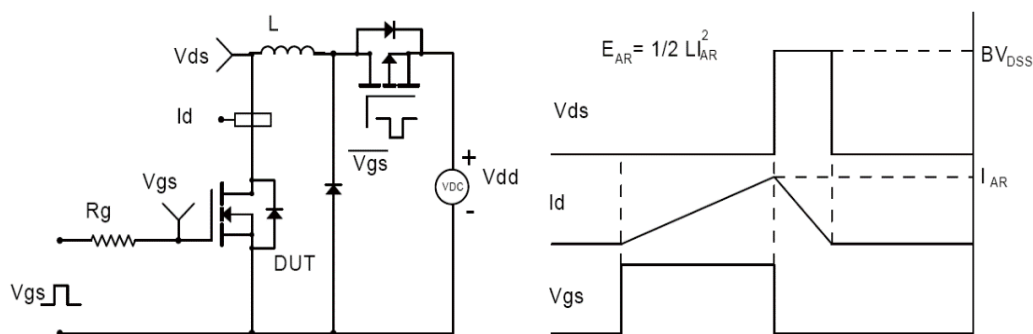


Figure 3. Unclamped inductive switching (UIS) test circuit & waveforms

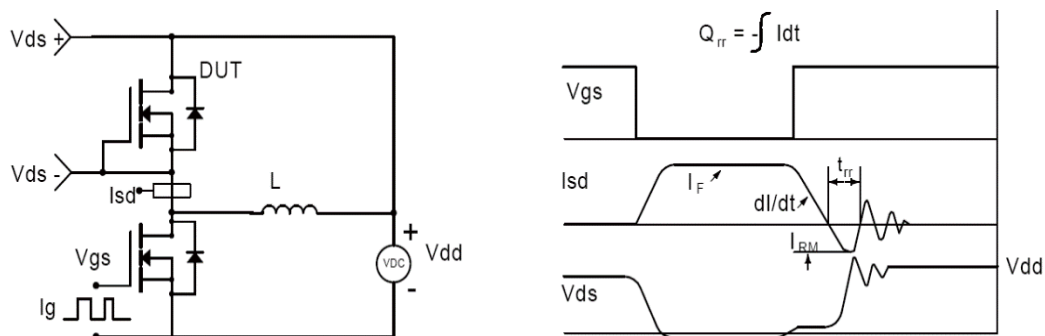


Figure 4. Diode reverse recovery test circuit & waveforms

II. Electrical Characteristics Diagrams

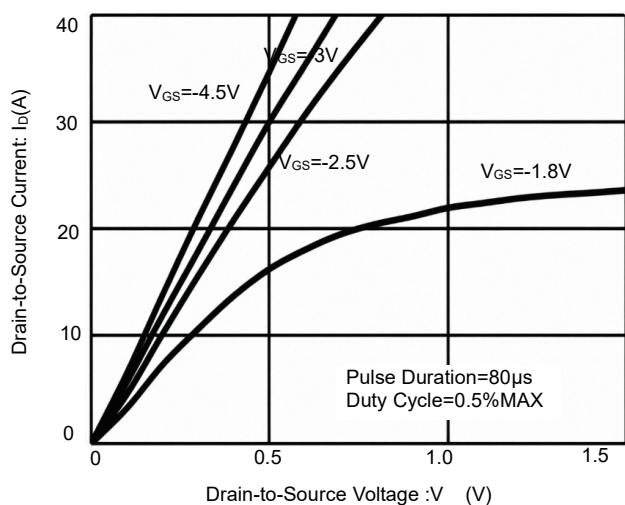


Figure 1. Typ. output characteristics

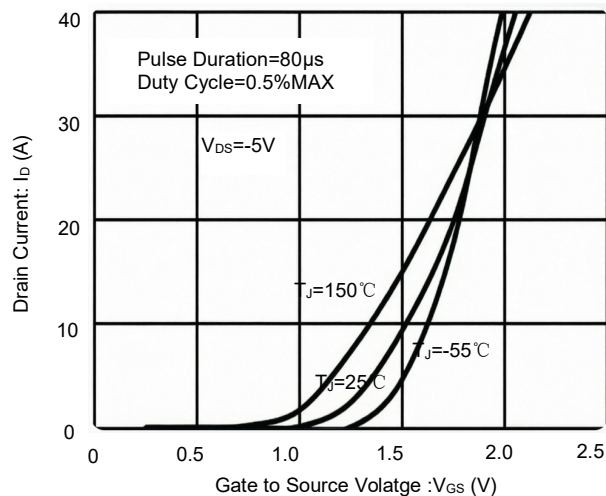


Figure 2. Typ. transfer characteristics

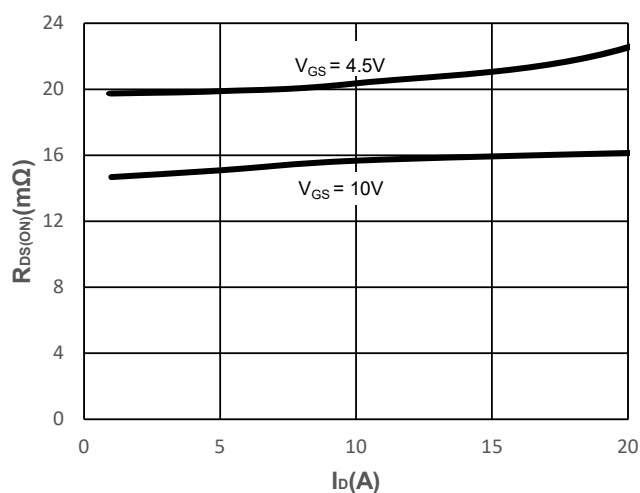


Figure 3. On-Resistance vs. Drain Current

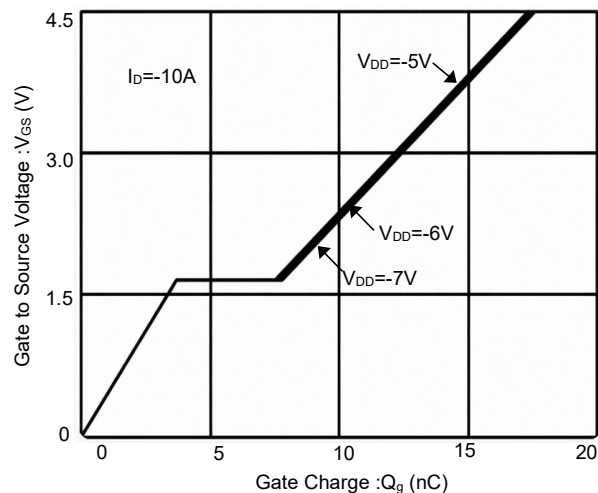


Figure 4. Gate Charge Characteristics

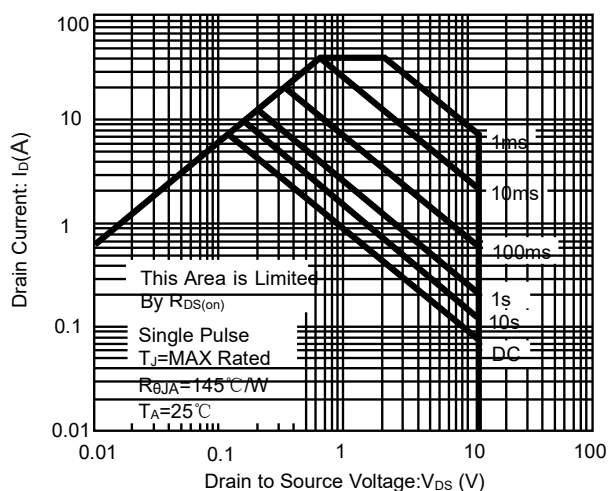


Figure 5. Maximum Safe Operating Area

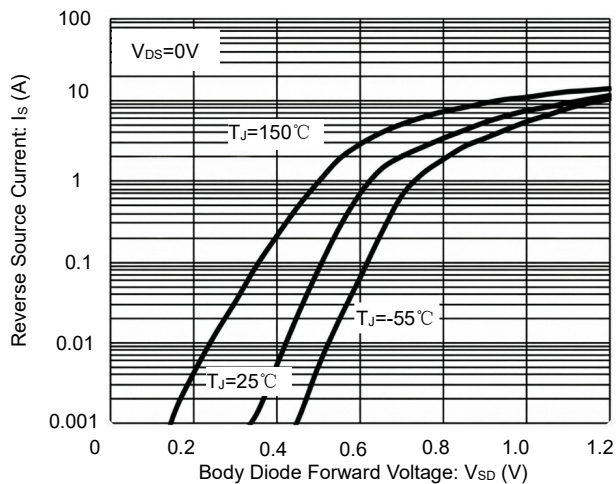
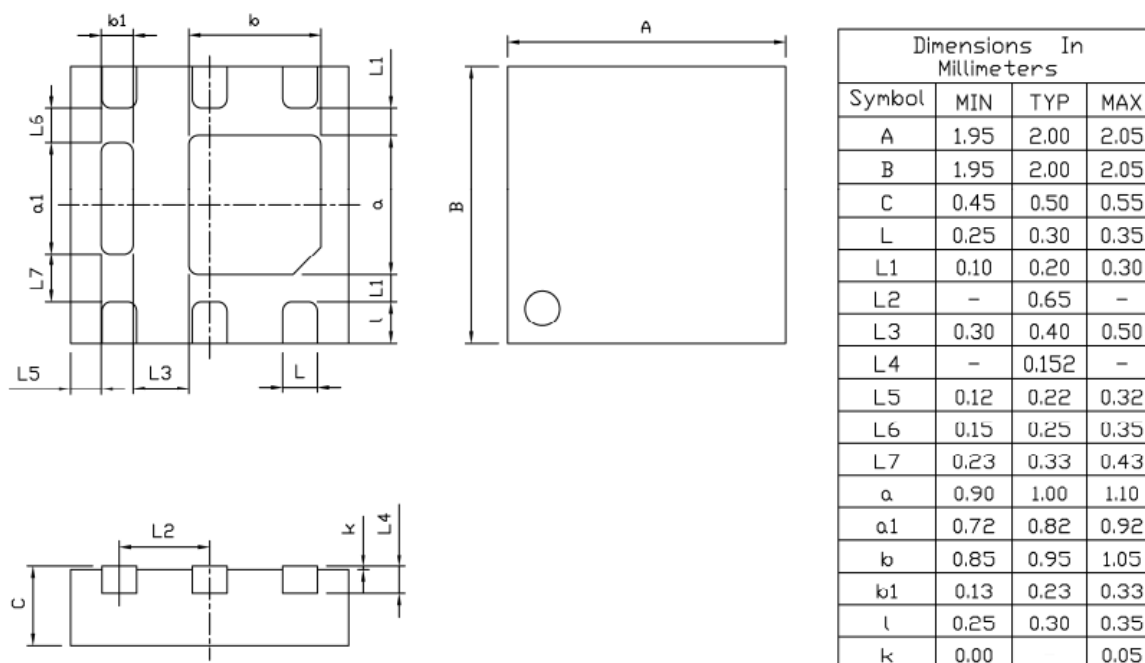


Figure 6. Forward characteristic of body diode

12. Outline Drawing

DFN2020 - 6L Package Outline Dimensions



13. Important Notice and Disclaimer

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