DESCRIPTION

The MXD20N06 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 4.5V. This device is suitable for use as a Battery protection or in other Switching application.

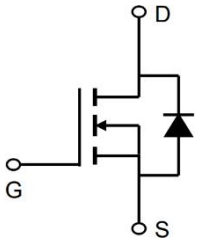
GENERAL FEATURES

- V_{DS}=60V, I_D=20A
  $R_{DS(ON)}$(Typ.)=40mΩ @ V_{GS}=4.5V
  $R_{DS(ON)}$(Typ.)=33mΩ @ V_{GS}=10V

APPLICATION

- Battery protection
- Load switch
- Uninterruptible power supply

PINOUT



Schematic diagram

Marking and pin Assignment


TO-252-3 top view

ORDERING INFORMATION

Part Number	StorageTemperature	Package	Devices Per Reel
MXD20N06	-55°C to 150°C	TO-252-3	2500

ABSOLUTE MAXIMUM RATINGS(T_C=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	60	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous(V_{GS}=10V)(Note1)	I_D	20	A
Drain Current-Continuous(V_{GS}=10V, T_C=100°C)(Note1)	I_D	13	A
Drain Current-Continuous(V_{GS}=10V, T_A=25°C)(Note1)	I_D	5	A
Drain Current-Continuous(V_{GS}=10V, T_A=70°C)(Note1)	I_D	4	A
Pulsed Drain Current(Note2)	I_{DM}	40	A
Single Pulse Avalanche Energy(Note3)	E_{AS}	22	mJ
Avalanche Current	I_{AS}	21	A
Total Power Dissipation(Note4)	P_D	31.3	W
Total Power Dissipation(T_A=25°C)(Note4)	P_D	2	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C
Thermal Resistance, Junction-to-Ambient(Note1)	$R_{\theta JA}$	62	°C/W
Thermal Resistance, Junction-to-Case(Note1)	$R_{\theta JC}$	4	°C/W

Note1. The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
Note2. The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
Note3. The E_{AS} data shows Max. rating . The test condition is V_{DD}=25V,V_{GS}=10V,L=0.1mH,I_{AS}=21A
Note4. The power dissipation is limited by 150°C junction temperature

ELECTRICAL CHARACTERISTICS(T_J=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=250μA	60	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=48V, V_{GS}=0V	-	-	1	μA
		V_{DS}=48V,V_{GS}=0V,T_J=55°C	-	-	5	
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±20V, V_{DS}=0V	-	-	±100	nA
On Characteristics						
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=250μA	1.0	-	2.5	V
Drain-Source On-State Resistance(Note2)	$R_{DS(ON)}$	V_{GS}=4.5V, I_D=7A	-	40	50	mΩ
		V_{GS}=10V, I_D=15A	-	33	40	mΩ
Forward Transconductance	g_{fs}	V_{DS}=5V, I_D=15A	-	25.3	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, F=1.0MHz	-	1027	-	pF
Output Capacitance	C_{oss}		-	65	-	pF
Reverse Transfer Capacitance	C_{rss}		-	46	-	pF
Gate Resistance	R_g	V_{DS}=0V,V_{GS}=0V,F=1.0MHz	-	2.5	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=30V, I_D=15A, V_{GS}=10V,R_G=3.3Ω	-	2.8	-	nS
Turn-on Rise Time	t_r		-	16.6	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	21.2	-	nS
Turn-Off Fall Time	t_f		-	5.6	-	nS
Total Gate Charge	Q_g	V_{DS}=48V, I_D=15A, V_{GS}=10V	-	19	-	nC
Gate-Source Charge	Q_{gs}		-	2.5	-	nC
Gate-Drain Charge	Q_{gd}		-	5	-	nC
Drain-Source Diode Characteristics						
Coninuous Source Current(Note1)(Note5)	I_S	V_G=V_D=0V, Force Current	-	-	20	A
Pulsed Source Current(Note2)(Note5)	I_{SM}		-	-	40	A
Diode Forward Voltage(Note2)	V_{SD}	V_{GS}=0V, I_S=1A	-	-	1.2	V
Reverse Recovery Time	t_{rr}	I_F=15A, dI/dt=100A/μs	-	12.2	-	nS
Reverse Recovery Charge	Q_{rr}		-	7.3	-	nC

Note1.The data tested by surface mounted on a 1 inch^2 FR-4 board with 2OZ copper.
Note2.The data tested by pulsed , pulse width ≦ 300us , duty cycle ≦ 2%
Note5.The data is theoretically the same as I_D and I_{DM} , in real applications , should be limited by total power dissipation

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 3. Switching Time Waveform

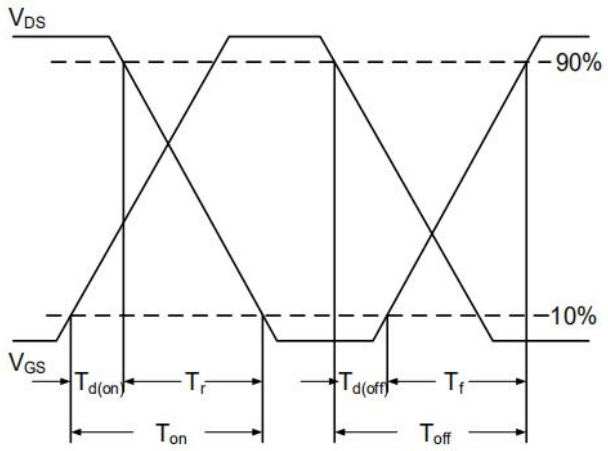


Figure 2. Unclamped Inductive Switching Waveform

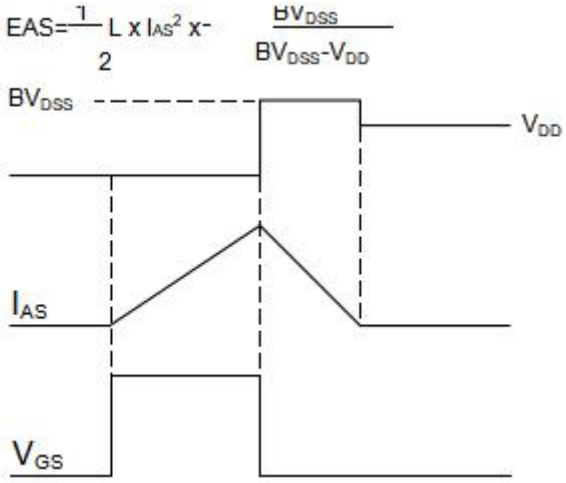


Figure 3. Output Characteristics

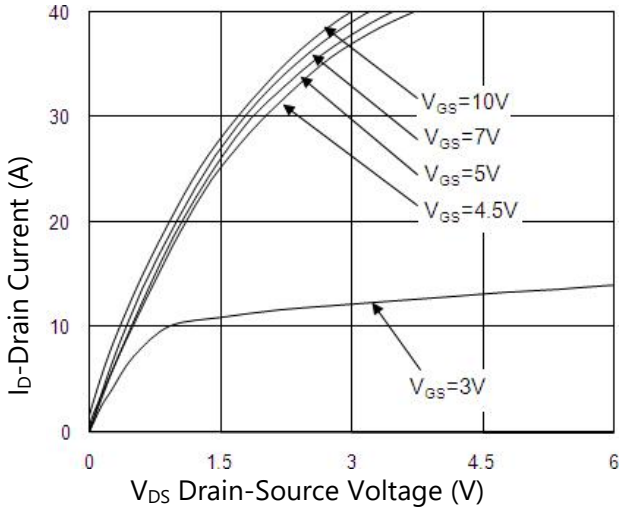


Figure 4. On-Resistance vs Drain Current

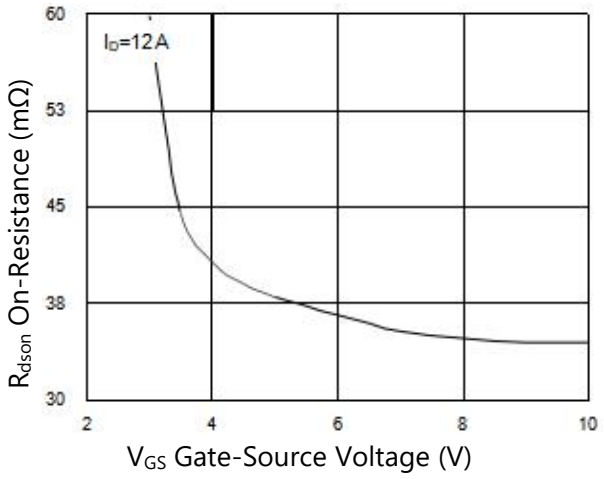


Figure 5. Forward Characteristics Of Reverse

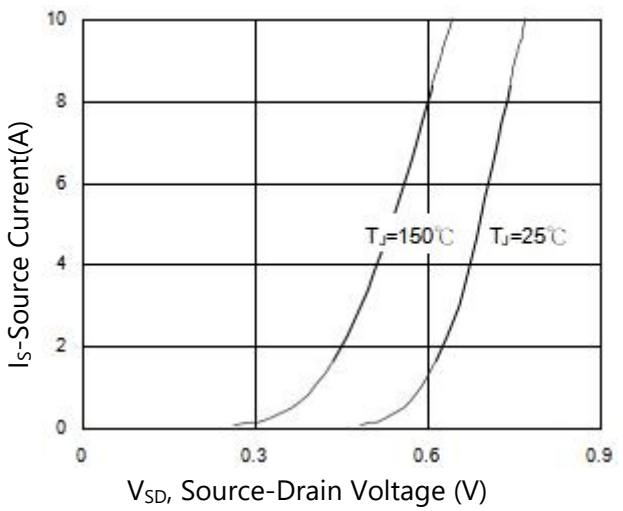
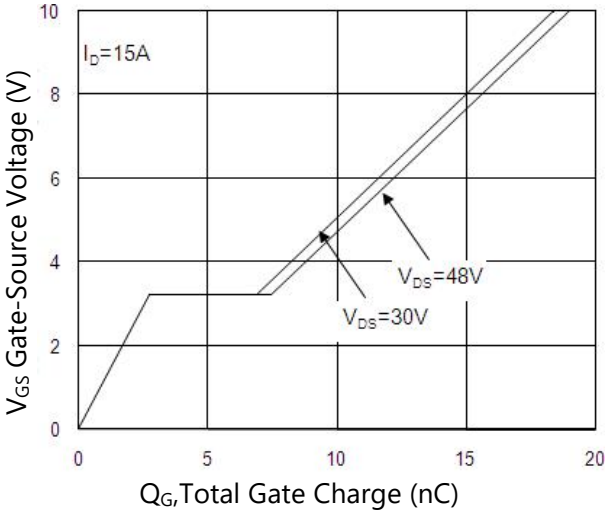


Figure 6. Gate Charge Characteristics



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. $V_{GS(th)}$ vs Junction Temperature

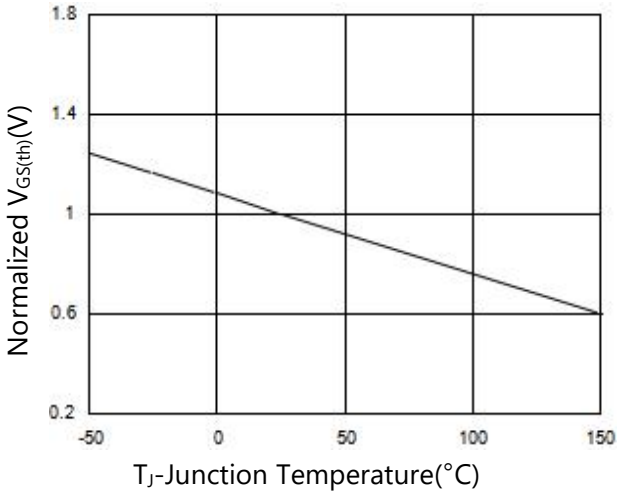


Figure 8. R_{DSON} vs Junction Temperature

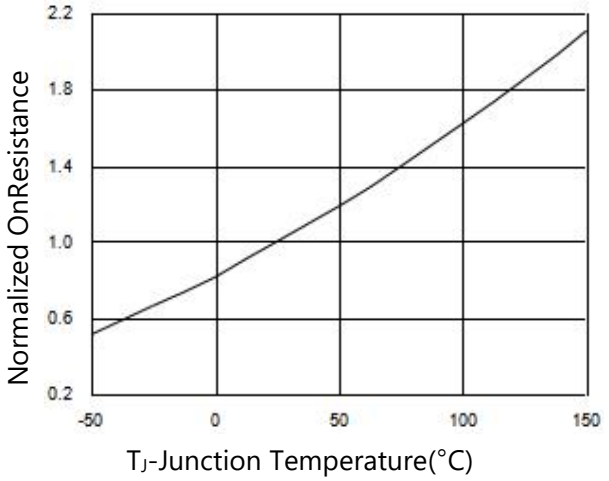


Figure 9. Capacitance

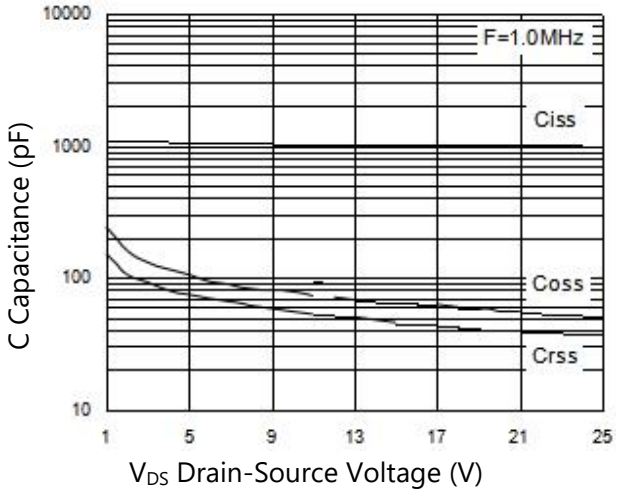


Figure 10. Safe Operation Area

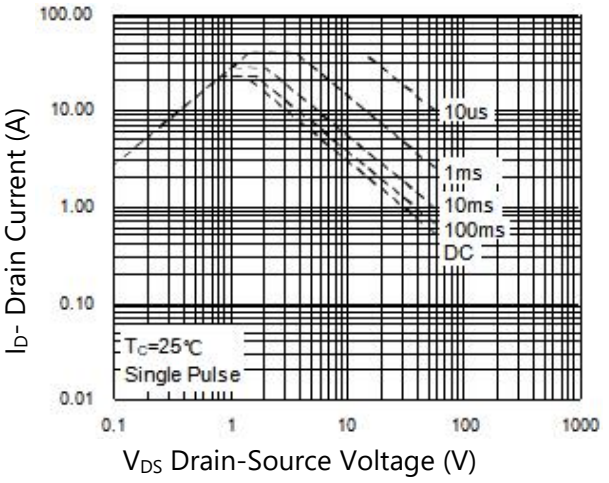
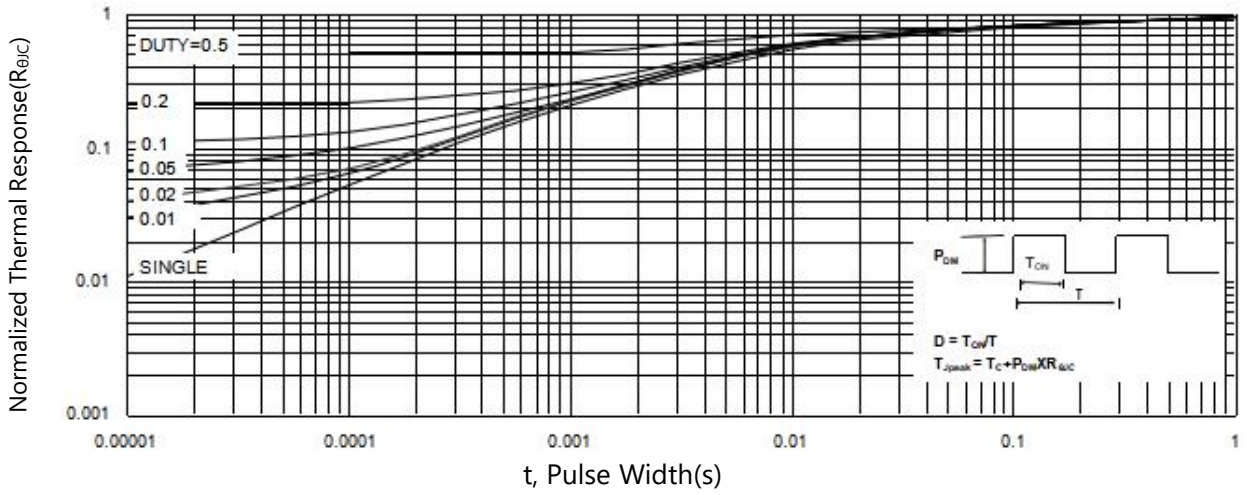
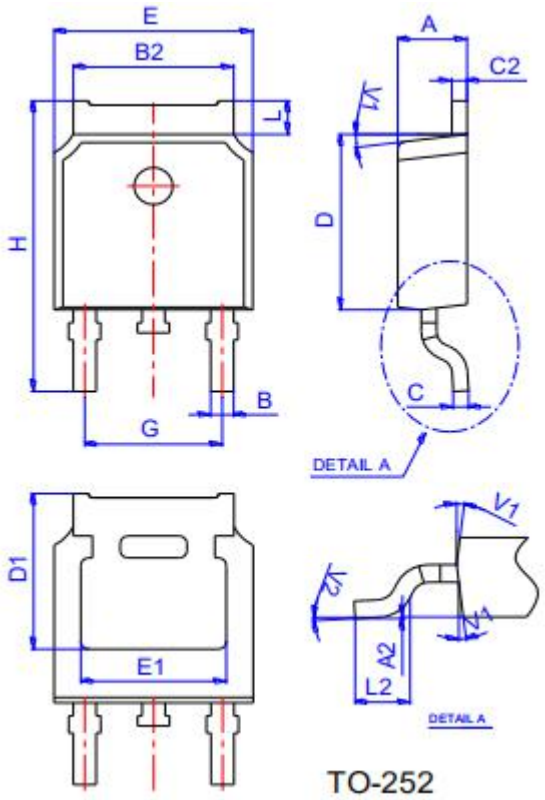


Figure 11. Normalized Maximum Transient Thermal Impedance



PACKAGE INFORMATION

TO-252-3



TO-252

Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	2.10	2.50	0.083	0.098
A2	0	0.10	0	0.004
B	0.66	0.86	0.026	0.034
B2	5.18	5.48	0.202	0.216
C	0.40	0.60	0.016	0.024
C2	0.44	0.58	0.017	0.023
D	5.90	6.30	0.232	0.248
D1	5.30REF		0.209REF	
E	6.40	6.80	0.252	0.268
E1	4.63	-	0.182	-
G	4.47	4.67	0.176	0.184
H	9.50	10.70	0.374	0.421
L	1.09	1.21	0.043	0.048
L2	1.35	1.65	0.053	0.065
V1	7°TYP		7°TYP	
V2	0°	6°	0°	6°