DESCRIPTION

The MXD20N03 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.

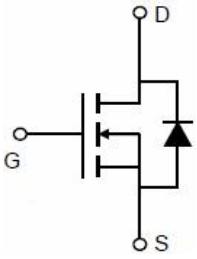
GENERAL FEATURES

- V_{DS}=30V, I_D=20A
  $R_{DS(ON)}$(Typ.)=28.5mΩ @ V_{GS}=4.5V
  $R_{DS(ON)}$(Typ.)=15.6mΩ @ V_{GS}=10V

APPLICATION

- Battery protection
- Load switch
- Uninterruptible power supply

PINOUT



Schematic diagram

Marking and pin Assignment


TO-252-3L top view

ORDERING INFORMATION

Part Number	StorageTemperature	Package	Devices Per Reel
MXD20N03	-55°C to 150°C	TO-252-3L	2500

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	30	V
Gate-Source Voltage	V_{GS}	±20	V
Drain Current-Continuous(V_{GS}=10V, T_C=25°C)(Note1)	I_D	20	A
Drain Current-Continuous(V_{GS}=10V, T_C=100°C)(Note1)	I_D	12	A
Drain Current-Continuous(V_{GS}=10V, T_A=25°C)(Note1)	I_D	7.3	A
Drain Current-Continuous(V_{GS}=10V, T_A=70°C)(Note1)	I_D	5.8	A
Pulsed Drain Current(Note2)	I_{DM}	50	A
Single Pulse Avalanche Energy(Note3)	E_{AS}	8.1	mJ
Avalanche Current	I_{AS}	12.7	A
Total Power Dissipation(T_C=25°C)(Note4)	P_D	20.8	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)	$R_{\theta JC}$	6	°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}=12.7A
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	30	32	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=24V, V_{GS}=0V	-	-	1	μA
		V_{DS}=24V,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	1.2	1.6	2.5	V
Drain-Source On-State Resistance(Note2)	$R_{DS(ON)}$	V_{GS}=10V, I_D=10A	-	15.6	25	mΩ
		V_{GS}=4.5V, I_D=8A	-	28.5	38	mΩ
Forward Transconductance	g_{FS}	V_{DS}=5V, I_D=10A	-	5.5	-	S
Dynamic Characteristics						
Input Capacitance	C_{iss}	V_{DS}=15V, V_{GS}=0V, F=1.0MHz	-	216	-	pF
Output Capacitance	C_{oss}		-	62	-	pF
Reverse Transfer Capacitance	C_{rss}		-	51	-	pF
Gate Resistance	R_g	V_{DS}=0V, V_{GS}=0V, F=1.0MHz	-	2.3	-	Ω
Switching Characteristics						
Turn-on Delay Time	$t_{d(on)}$	V_{DD}=15V, I_D=10A, V_{GS}=10V,R_G=3.3Ω	-	1.6	-	nS
Turn-on Rise Time	t_r		-	15.8	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	13	-	nS
Turn-Off Fall Time	t_f		-	4.8	-	nS
Total Gate Charge	Q_g	V_{DS}=15V, I_D=10A, V_{GS}=4.5V	-	4.9	-	nC
Gate-Source Charge	Q_{gs}		-	1.66	-	nC
Gate-Drain Charge	Q_{gd}		-	1.85	-	nC
Drain-Source Diode Characteristics						
Continuous Source Current(Note1、3)	I_S	V_G=V_D=0V, Force Current	-	-	24	A
Pulsed Source Current(Note2、3)	I_{SM}		-	-	50	A
Diode Forward Voltage(Note2)	V_{SD}	V_{GS}=0V, I_S=1A	-	-	1.2	V
Reverse Recovery Time	t_{rr}	IF=10A, dI/dt=100A/μs	-	8.7	-	nS
Reverse Recovery Charge	Q_{rr}		-	1.95	-	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%
Note3. The data is theoretically the same as ID and IDM , in real applications , should be limited by total power dissipation.

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Switching Time Waveform

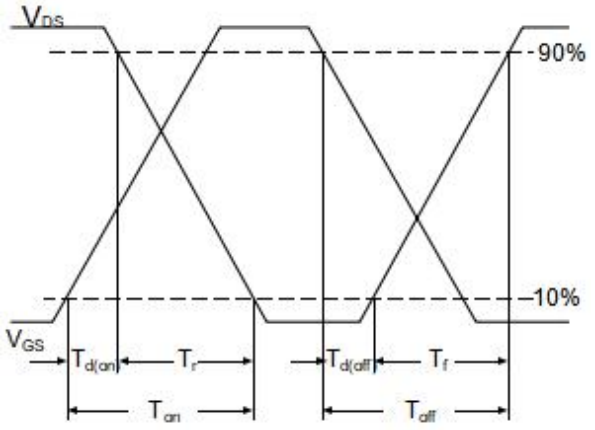


Figure 2. Unclamped Inductive Switching Waveform

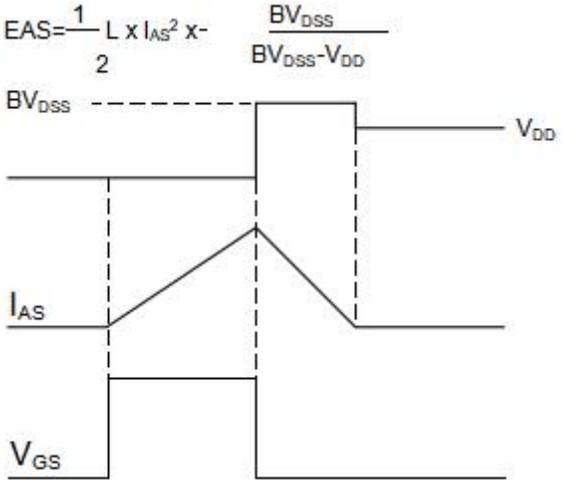


Figure 3. Output Characteristics

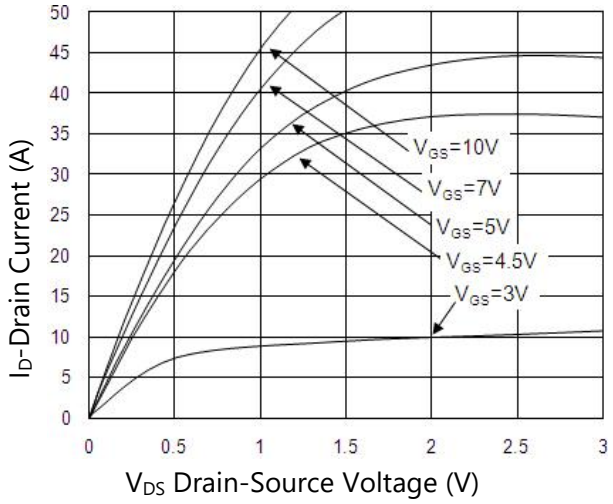


Figure 4. Rdson vs Gate-Source Voltage

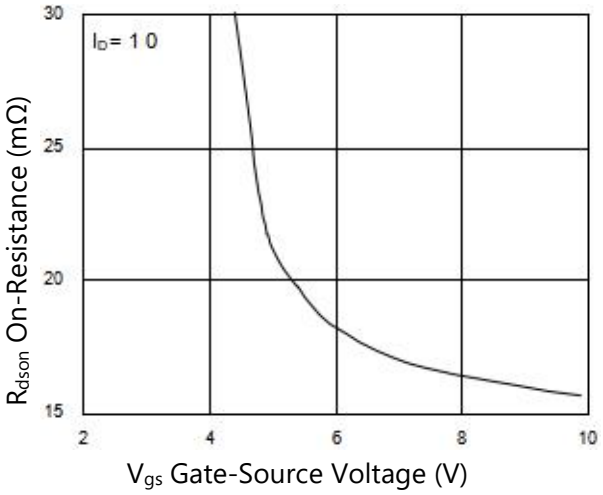


Figure 5. Forward Characteristics of Reverse

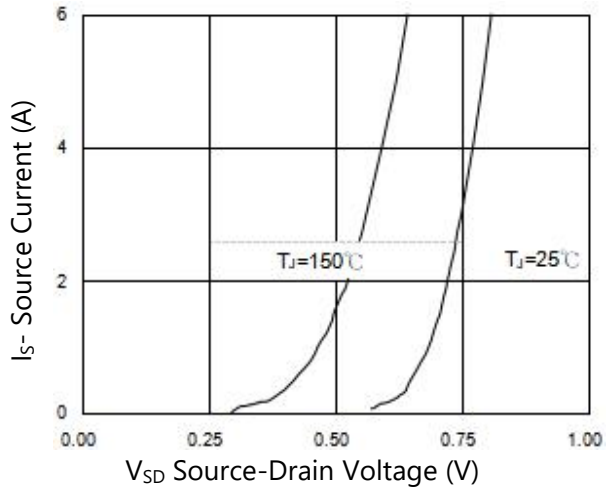
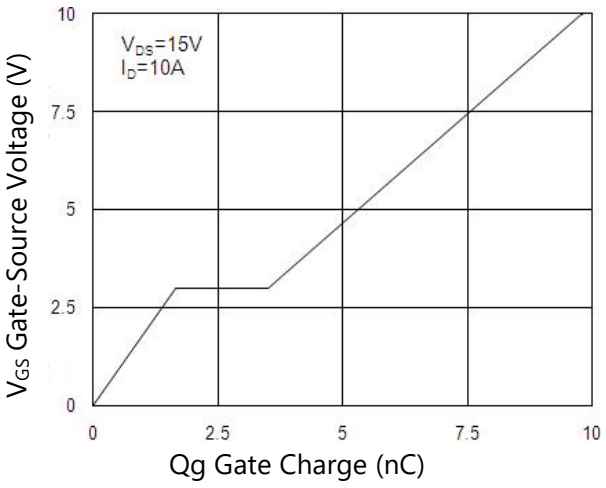


Figure 6. Gate Charge



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

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

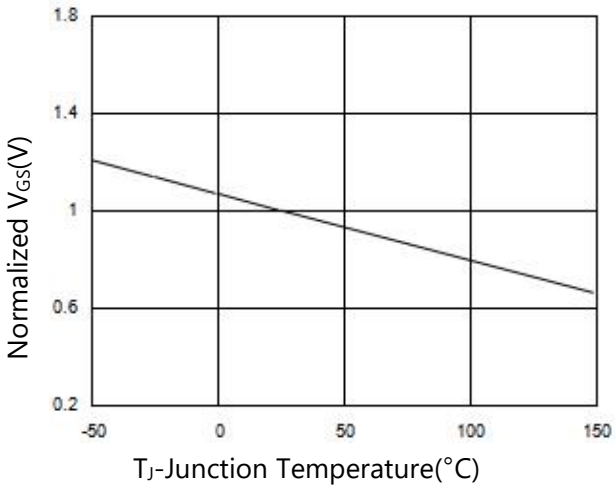


Figure 8. R_{DSON} vs Junction Temperature

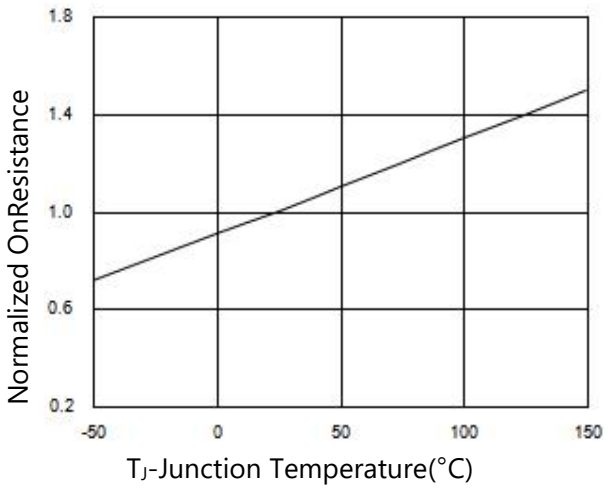


Figure 9. Capacitance vs V_{DS}

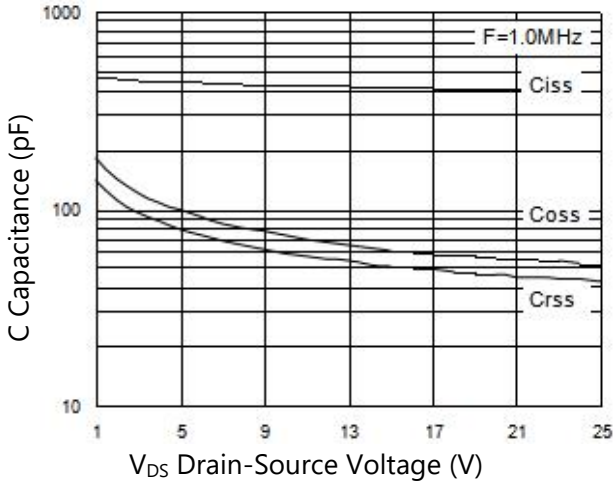


Figure 10. Safe Operation Area

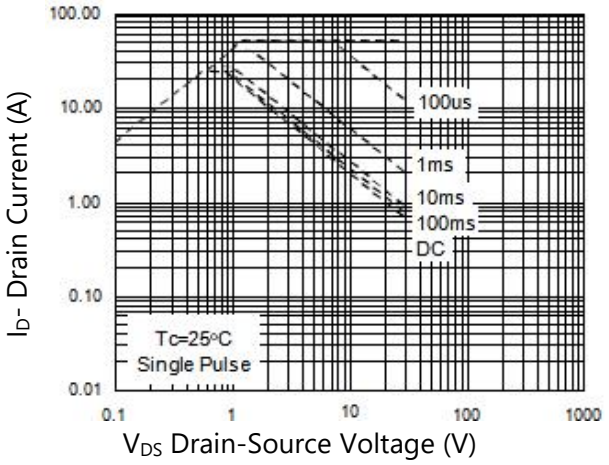
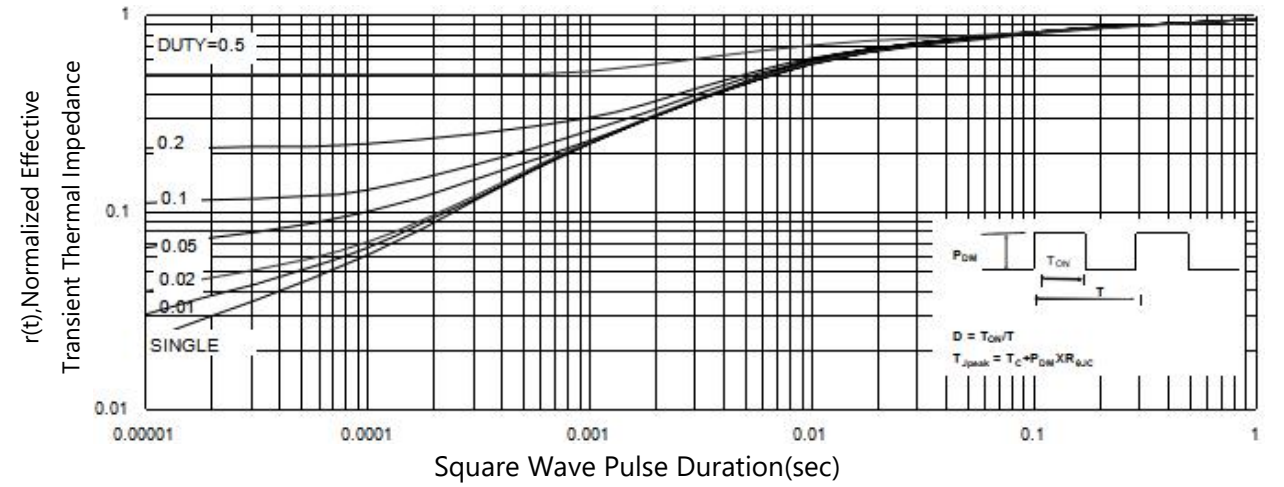
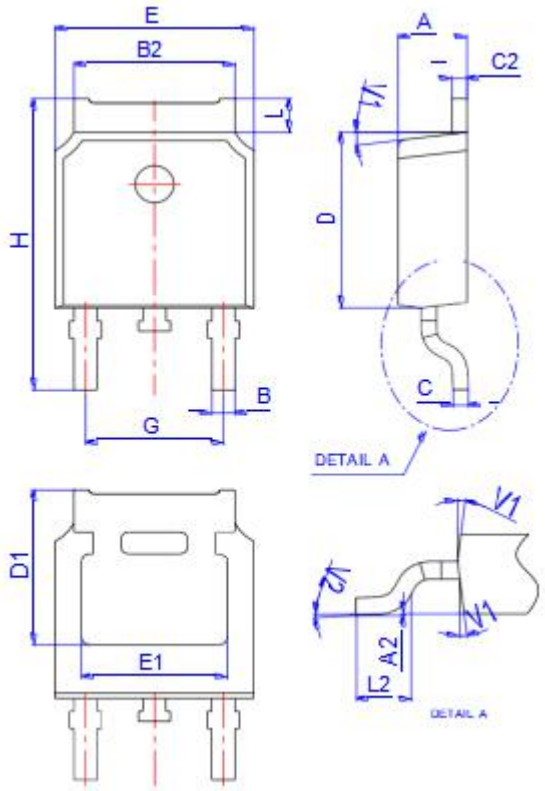


Figure 11. Normalized Maximum Transient Thermal Impedance



PACKAGE INFORMATION

TO-252-3L



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°