



Dual N-Channel Enhancement Mode Power MOSFET **MXN3388L**

**DESCRIPTION**

The MXN3388L uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. It can be used in a wide variety of applications. It is ESD protected.

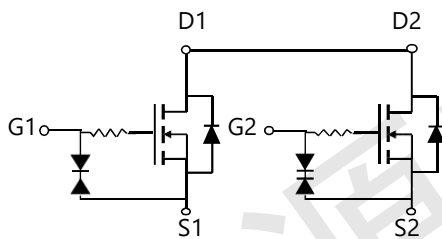
**GENERAL FEATURES**

- $V_{DS}=20V$ ,  $I_D=8A$   
 $R_{DS(ON)}(Typ.)=15.5m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)}(Typ.)=10.6m\Omega @ V_{GS}=3.8V$   
 $R_{DS(ON)}(Typ.)=10m\Omega @ V_{GS}=4.5V$   
 ESD Rating: 2000V HBM
- High density cell design for ultra low  $R_{dson}$
- Fully characterized Avalanche voltage and current

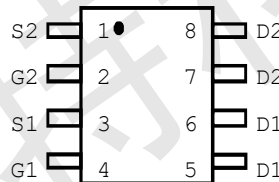
**APPLICATION**

- Power switching application
- Hard Switched and High Frequency Circuits
- Uninterruptible Power Supply

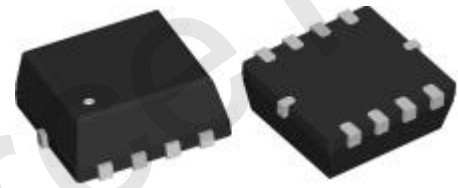
**PINOUT**



Schematic diagram



Pin Assignment



DFN3X3-8L top view

**ORDERING INFORMATION**

Part Number	Storage Temperature	Package	Devices Per Reel
MXN3388L	-55°C to 150°C	DFN3X3-8L	5000

**ABSOLUTE MAXIMUM RATINGS** ( $T_A=25^\circ C$  unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	20	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	8	A
Drain Current-Continuous( $T_A=100^\circ C$ )	$I_D(100^\circ C)$	6	A
Pulsed Drain Current <sup>(Note1)</sup>	$I_{DM}$	32	A
Maximum Power Dissipation	$P_D$	2.5	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

**THERMAL RESISTANCE**

Thermal Resistance, Junction-to-Ambient <sup>(Note2)</sup>	$R_{\theta JA}$	50	$^\circ C/W$
--	-----------------	----	--------------

Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

Note 2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.



### Dual N-Channel Enhancement Mode Power MOSFET **MXN3388L**



#### ELECTRICAL CHARACTERISTICS ( $T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
-----------	--------	------------	-----	-----	-----	------

#### Off Characteristics

Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	20	-	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=20V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$

#### On Characteristics (Note 3)

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.45	0.75	1.2	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=2.5V, I_D=4A$	-	15.5	22	$m\Omega$
		$V_{GS}=3.8V, I_D=6A$	-	10.6	15	$m\Omega$
		$V_{GS}=4.5V, I_D=6A$	-	10	13.5	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=8A$	-	15	-	S

#### Dynamic Characteristics (Note 4)

Input Capacitance	$C_{iss}$	$V_{DS}=15V, V_{GS}=0V,$ $F=1.0MHz$	-	735	-	$pF$
Output Capacitance	$C_{oss}$		-	83	-	$pF$
Reverse Transfer Capacitance (Note 4)	$C_{rss}$		-	81	-	$pF$

#### Switching Characteristics

Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=1A$ $V_{GS}=5V, R_G=6\Omega$	-	7.2	-	$nS$
Turn-on Rise Time	$t_r$		-	36	-	$nS$
Turn-Off Delay Time	$t_{d(off)}$		-	45	-	$nS$
Turn-Off Fall Time	$t_f$		-	15	-	$nS$
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=6A,$ $V_{GS}=4.5V$	-	11	-	$nC$
Gate-Source Charge	$Q_{gs}$		-	2.2	-	$nC$
Gate-Drain Charge	$Q_{gd}$		-	4.1	-	$nC$

#### Drain-Source Diode Characteristics

Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	3.5	A

Note 2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

Note 3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

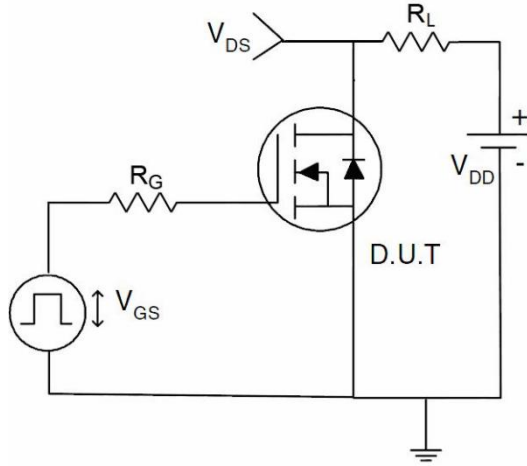
Note 4. Guaranteed by design, not subject to product.



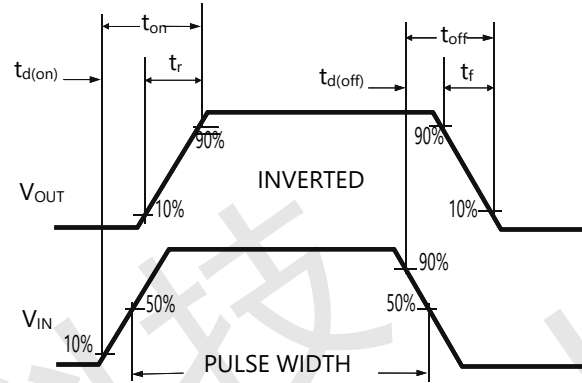
Dual N-Channel Enhancement Mode Power MOSFET **MXN3388L**

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

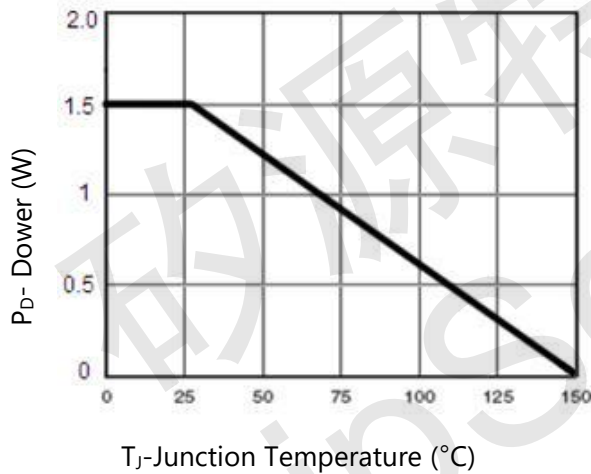
**Figure 1. Switching Test Circuit**



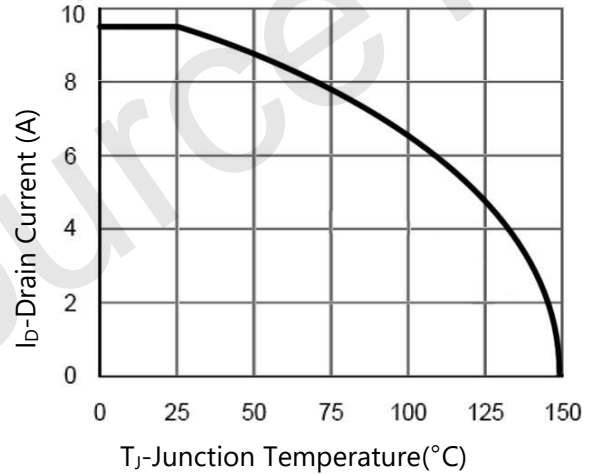
**Figure 2. Switching Waveform**



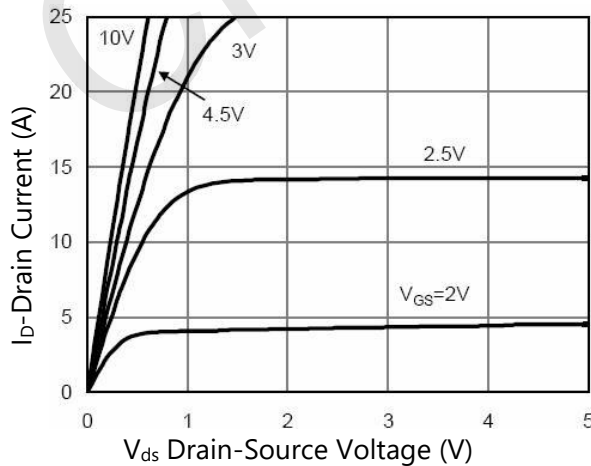
**Figure 3. Power Dissipation**



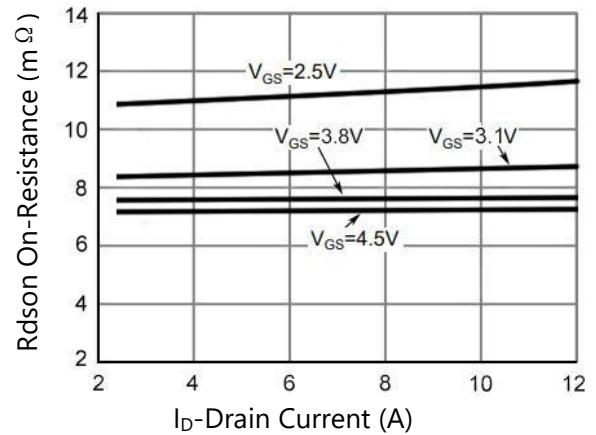
**Figure 4. Drain Current**



**Figure 5. Output Characteristics**



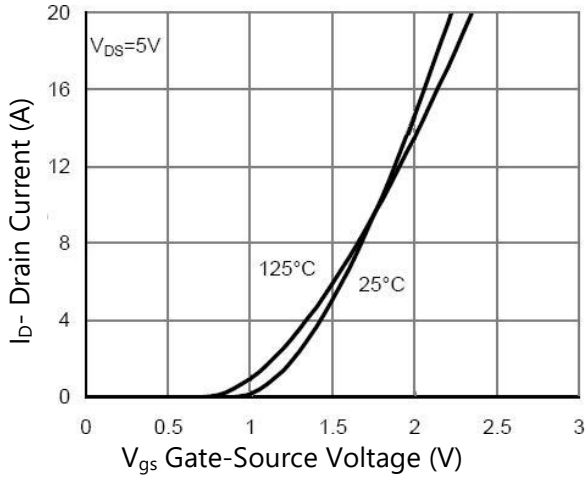
**Figure 6. R<sub>dson</sub> vs Drain Current**



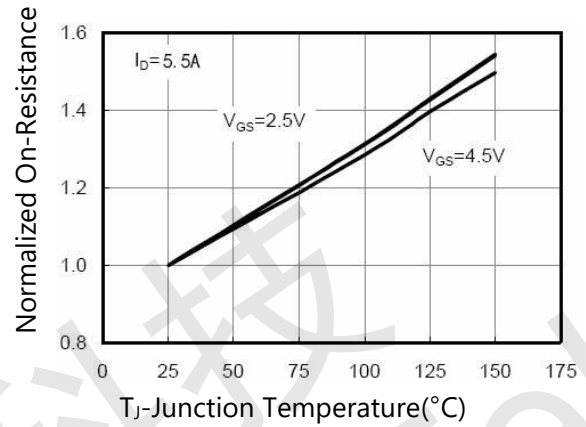


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

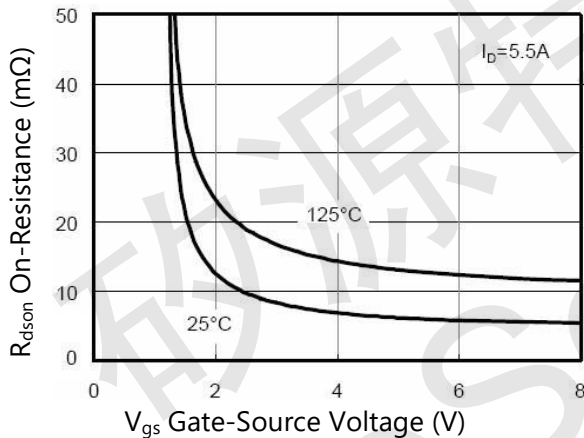
**Figure 7. Transfer Characteristics**



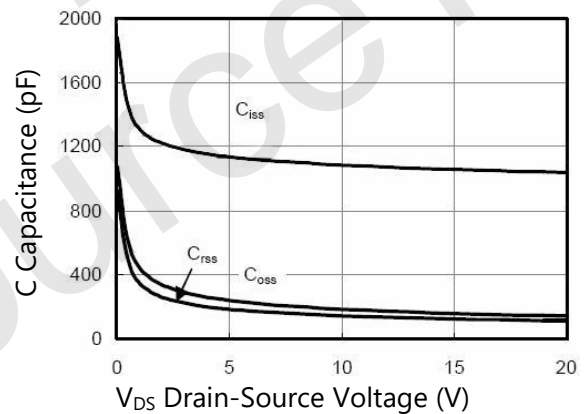
**Figure 8.  $R_{dson}$  vs Junction Temperature**



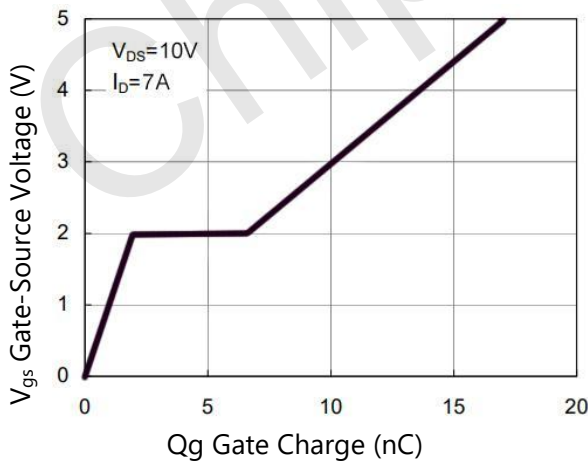
**Figure 9.  $R_{dson}$  vs  $V_{GS}$**



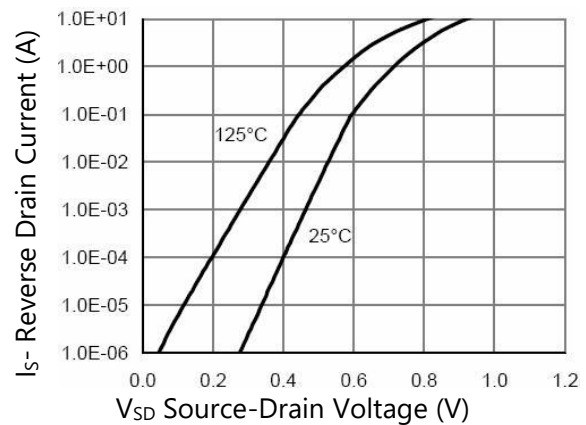
**Figure 10. Capacitance vs  $V_{DS}$**



**Figure 11. Gate Charge**



**Figure 12. Source- Drain Diode Forward**





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 13. Safe Operation Area

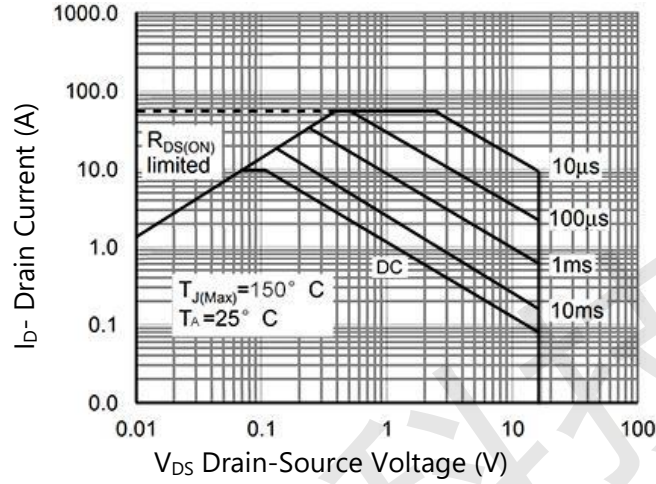
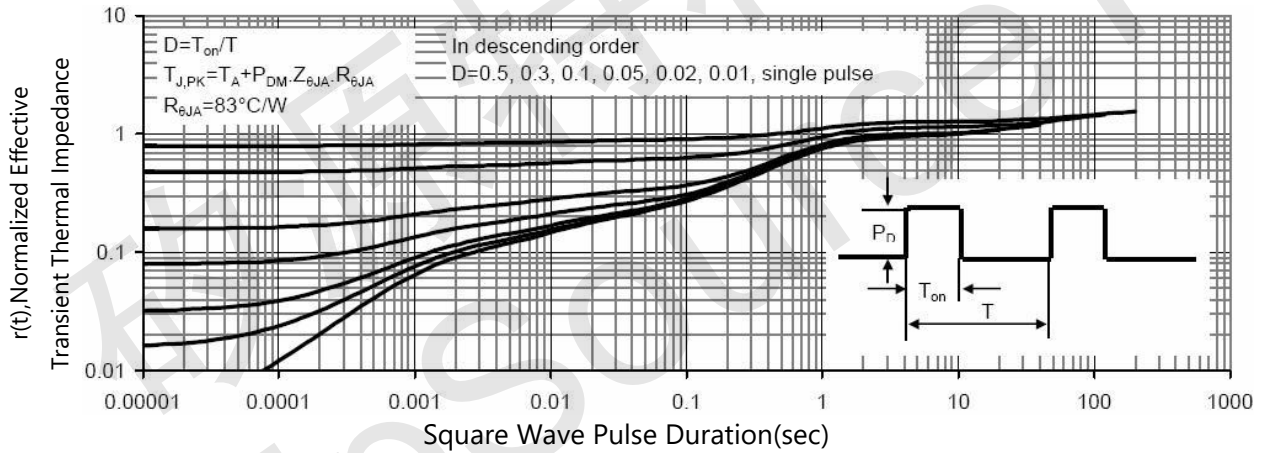


Figure 14. Normalized Maximum Transient Thermal Impedance

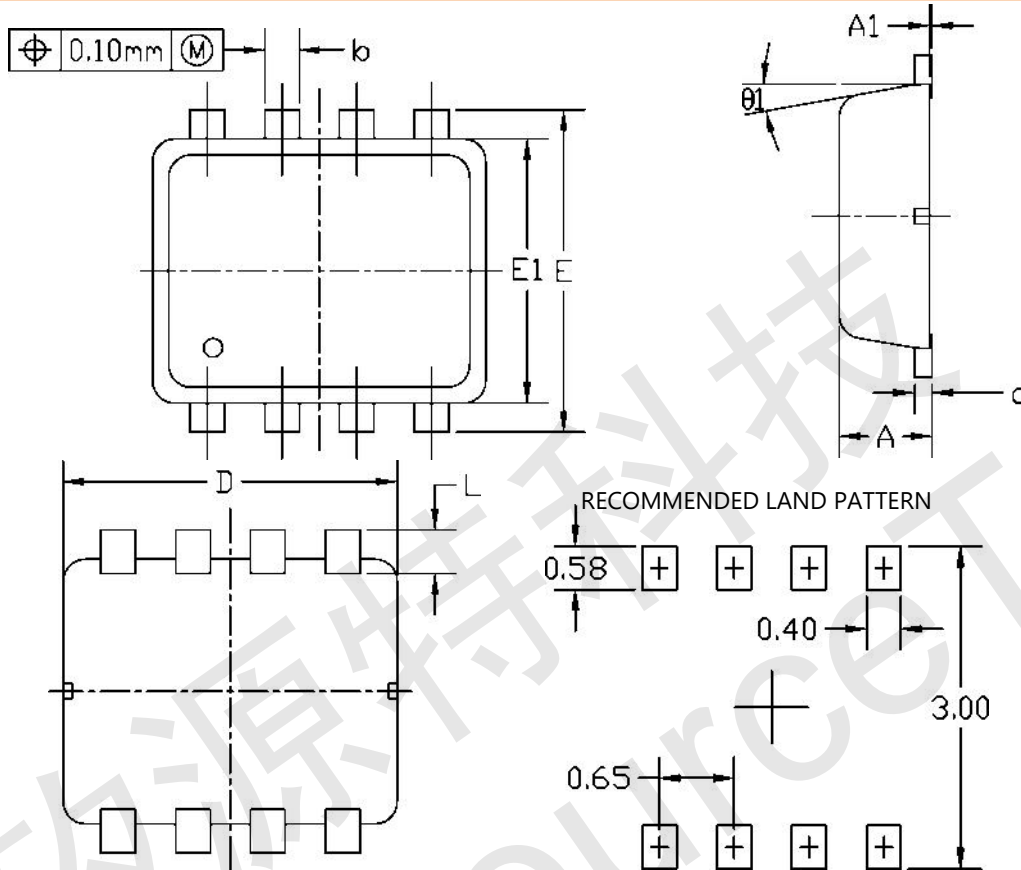




Dual N-Channel Enhancement Mode Power MOSFET **MXN3388L**

**PACKAGE INFORMATION**

DFN3X3-8L



SYMBOLS	DIMENSIONS IN MILLIMETERS			DIMENSIONS IN INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.70	0.80	0.90	0.028	0.031	0.035
A1	0.00	-	0.05	0.000	-	0.002
b	0.24	0.30	0.35	0.009	0.012	0.014
c	0.08	0.15	0.25	0.003	0.006	0.010
D	2.80	2.90	3.00	0.110	0.114	0.118
E	2.70	2.80	2.90	0.106	0.110	0.114
E1	2.20	2.30	2.40	0.0087	0.091	0.095
e	0.65 BSC			0.026 BSC		
L	0.20	0.38	0.45	0.008	0.015	0.018
01	0°	10°	12°	0°	10°	12°