

## DESCRIPTION

The MXN2380 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.

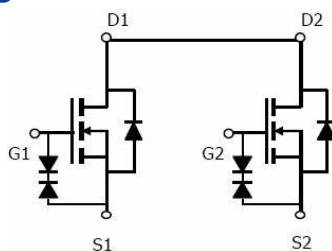
## GENERAL FEATURES

- $V_{DS}=18V, I_D=7A$   
 $R_{DS(ON)}(Typ.)=19m\Omega @ V_{GS}=2.5V$   
 $R_{DS(ON)}(Typ.)=14.5m\Omega @ V_{GS}=3.8V$   
 $R_{DS(ON)}(Typ.)=14.2m\Omega @ V_{GS}=4.2V$   
 $R_{DS(ON)}(Typ.)=14m\Omega @ V_{GS}=4.5V$   
 ESD Rating: 4000V HBM
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

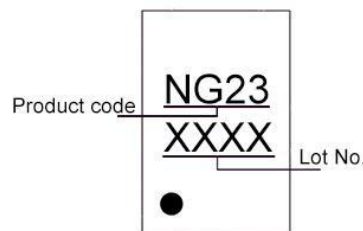
## APPLICATION

- PWM applications
- Load switch
- Power management

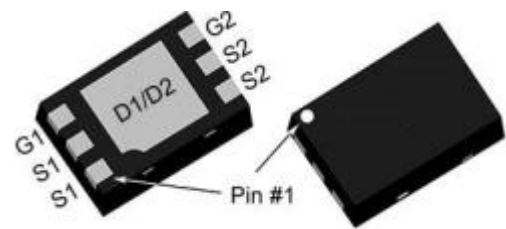
## PINOUT



Schematic diagram



Marking and pin Assignment



DFN2X3-6L top & bottom view

## ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MXN2380	-55°C to 150°C	DFN2X3-6L	-

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	18	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	7	A
Pulsed Drain Current <sup>(Note1)</sup>	$I_{DM}$	30	A
Maximum Power Dissipation	$P_D$	1.25	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>	$R_{\theta JA}$	100	$^\circ C/W$
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Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

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



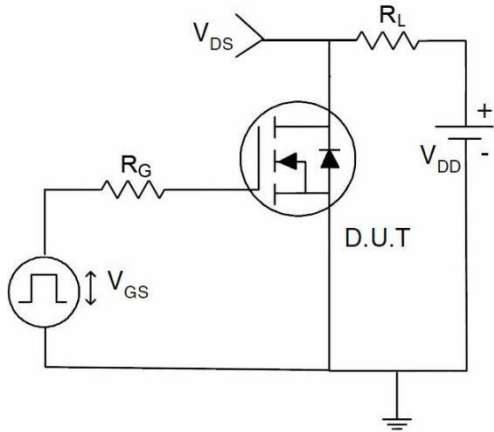
**ELECTRICAL CHARACTERISTICS** ( $T_A=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	-	18	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=16V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
<b>On Characteristics</b> <sup>(Note2)</sup>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.45	0.7	1.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=2.5V, I_D=5.5A$	17	19	24	m $\Omega$
		$V_{GS}=3.8V, I_D=5.5A$	13	14.5	18	m $\Omega$
		$V_{GS}=4.2V, I_D=6.5A$	12.5	14.2	17	m $\Omega$
		$V_{GS}=4.5V, I_D=6.5A$	12	14	16	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=7A$	18	-	-	S
<b>Dynamic Characteristics</b> <sup>(Note3)</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V, F=1.0MHz$	-	760	-	pF
Output Capacitance	$C_{oss}$		-	205	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	190	-	pF
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=2A, R_L=1\Omega, V_{GS}=4.5V, R_G=3\Omega$	-	6	-	nS
Turn-on Rise Time	$t_r$		-	13	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	52	-	nS
Turn-Off Fall Time	$t_f$		-	16	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=5A, V_{GS}=4.5V$	-	10	-	nC
Gate-Source Charge	$Q_{gs}$		-	1.1	-	nC
Gate-Drain Charge	$Q_{gd}$		-	4	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage <sup>(Note2)</sup>	$V_{SD}$	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Diode Forward Current <sup>(Note1)</sup>	$I_S$		-	-	7	A

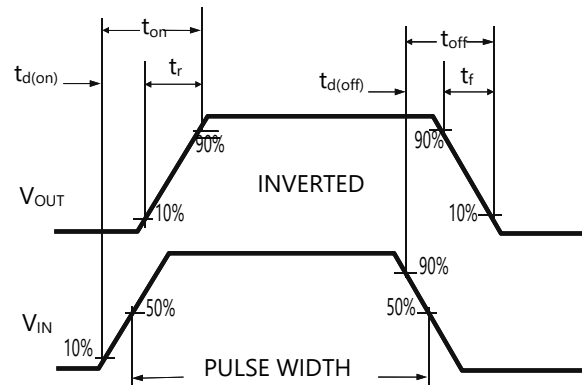
Note 1. Surface Mounted on FR4 Board,  $t \leq 10$  sec.  
 Note 2. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .  
 Note 3. Guaranteed by design, not subject to product.

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

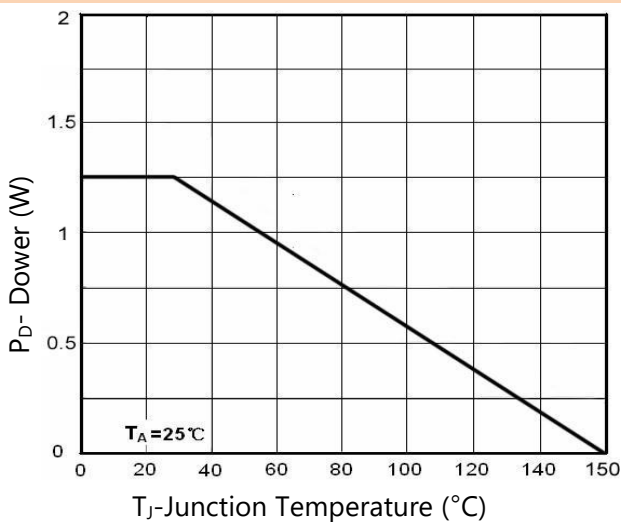
**Figure 1. Switching Test Circuit**



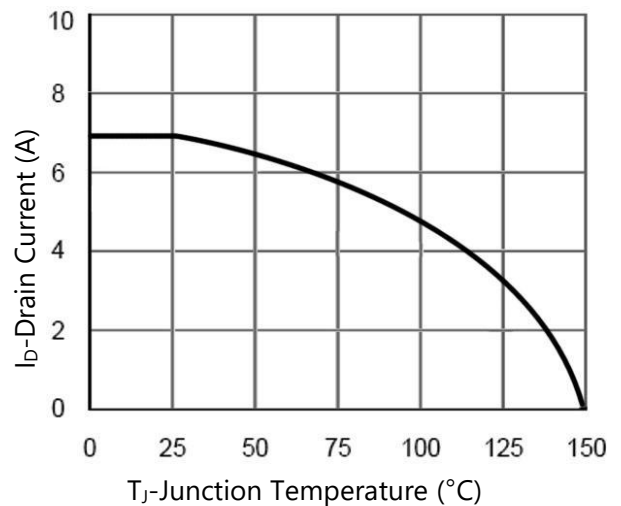
**Figure 2. Switching Waveform**



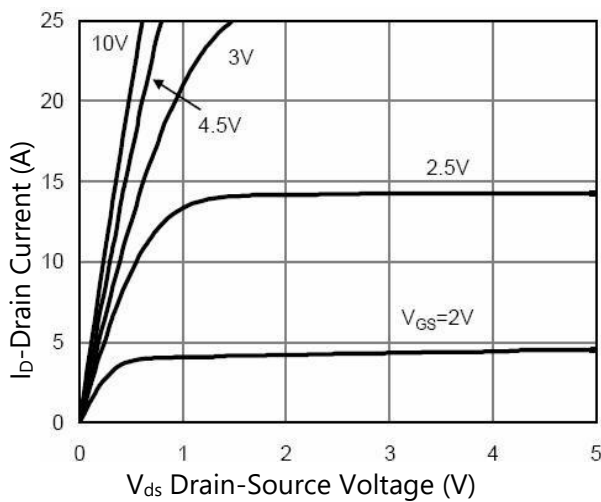
**Figure 3. Power Dissipation**



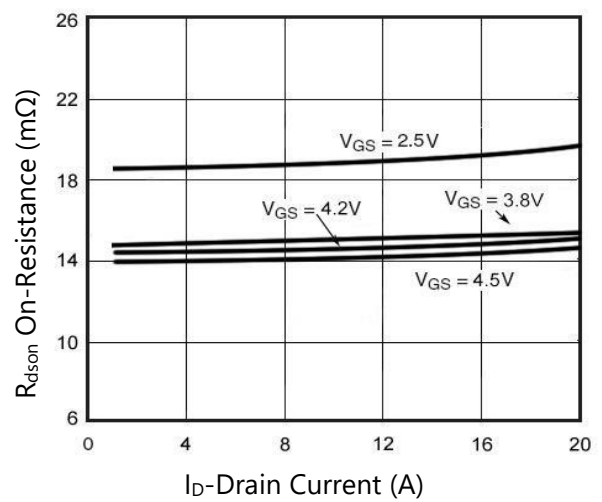
**Figure 4. Drain Current**



**Figure 5. Output Characteristics**



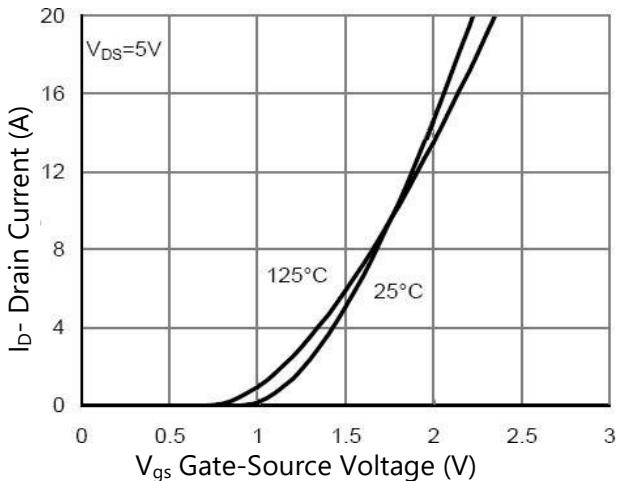
**Figure 6. R<sub>ds(on)</sub> vs Drain Current**



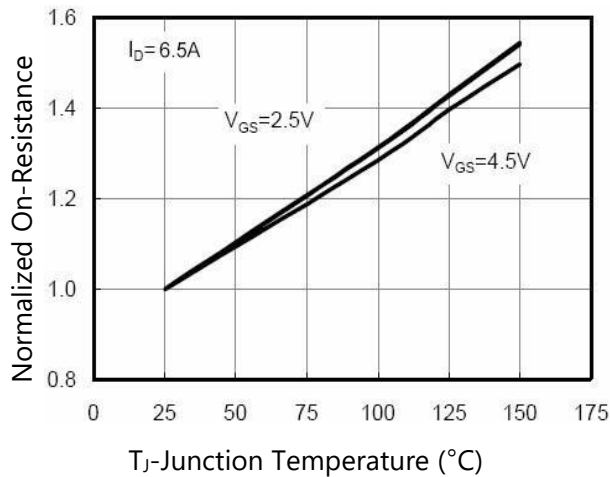


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

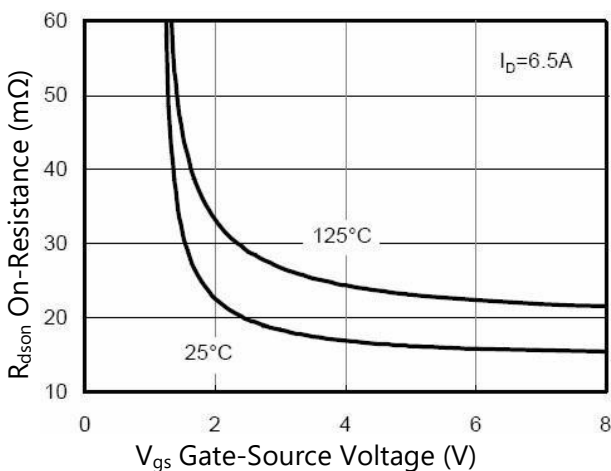
**Figure 7. Transfer Characteristics**



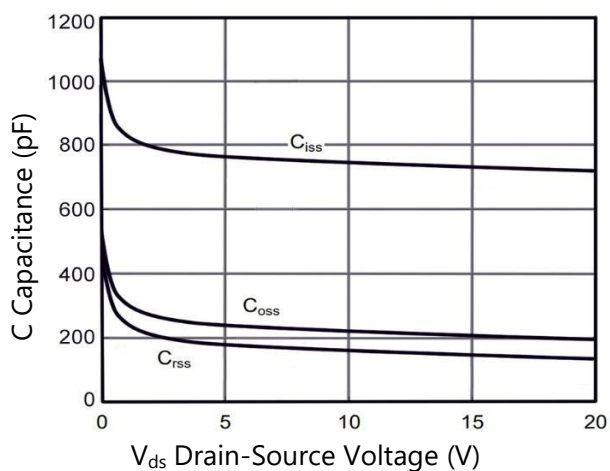
**Figure 8. R<sub>dson</sub> vs Junction Temperature**



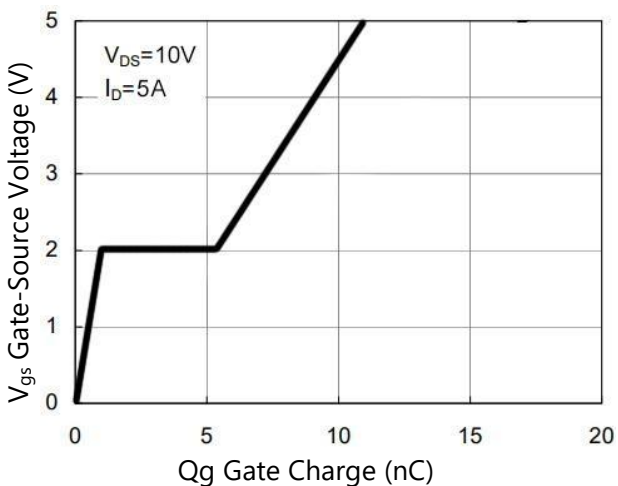
**Figure 9. R<sub>dson</sub> vs V<sub>GS</sub>**



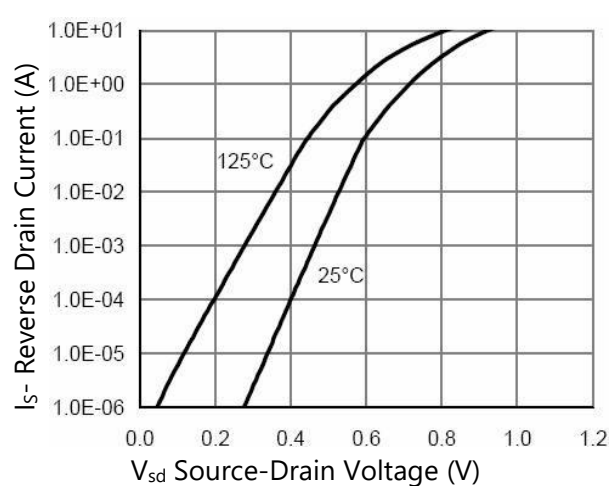
**Figure 10. Capacitance vs V<sub>DS</sub>**



**Figure 11. Gate Charge**

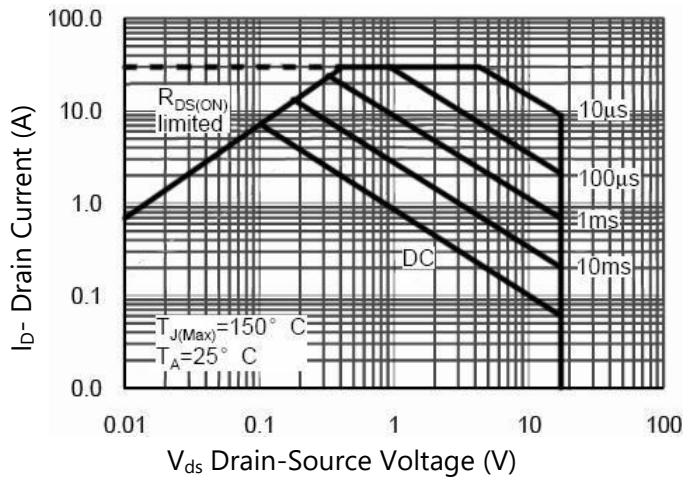


**Figure 12. Source- Drain Diode Forward**

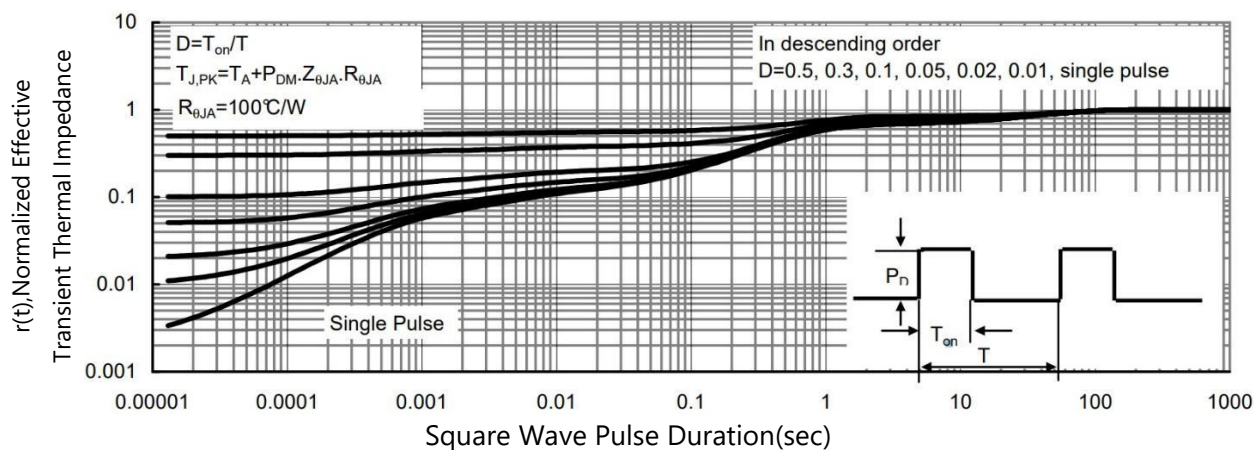


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**Figure 13. Safe Operation Area**

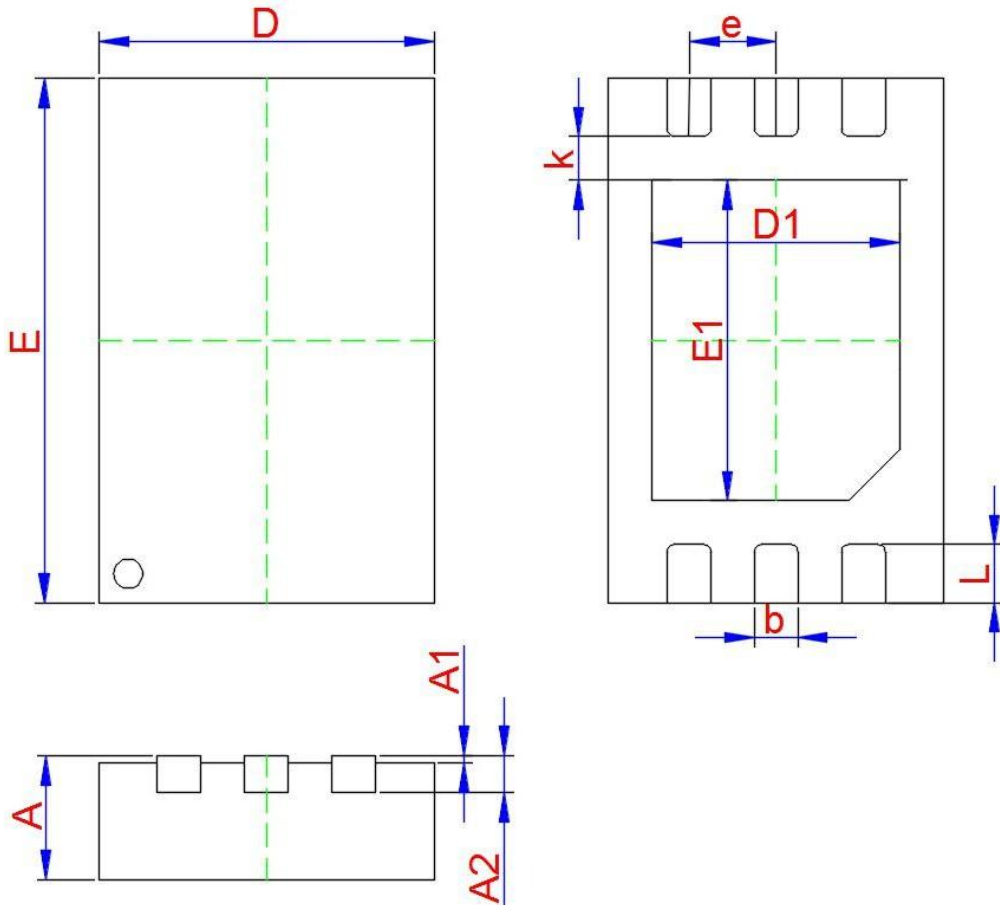


**Figure 14. Normalized Maximum Transient Thermal Impedance**



**PACKAGE INFORMATION**

DFN2X3-6L



Symbol	Dimensions in Millimeters		
	Min.	Typ.	Max.
A	0.700	0.750	0.800
A1	0.000	0.020	0.050
A2	0.203 TYP.		
D	1.950	2.000	2.050
E	2.950	3.000	3.050
D1	1.450	1.500	1.550
E1	1.650	1.700	1.750
k	0.200 MIN.		
b	0.200	0.250	0.300
e	0.500 TYP.		
L	0.300	0.350	0.400