

## DESCRIPTION

The MXN3380 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.

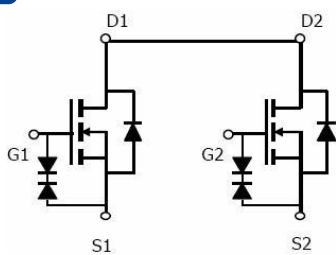
## GENERAL FEATURES

- $V_{DS}=18V$ ,  $I_D=17A$   
 $R_{DS(ON)}(Typ.)=8.0m\Omega$  @  $V_{GS}=2.5V$   
 $R_{DS(ON)}(Typ.)=6.6m\Omega$  @  $V_{GS}=3.1V$   
 $R_{DS(ON)}(Typ.)=6.0m\Omega$  @  $V_{GS}=3.8V$   
 $R_{DS(ON)}(Typ.)=5.5m\Omega$  @  $V_{GS}=4.5V$   
 ESD Rating: 4000V HBM
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

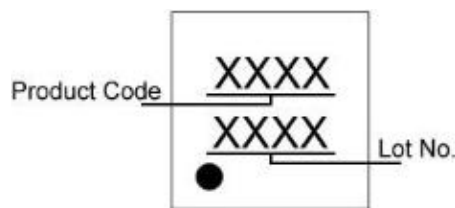
## APPLICATION

- PWM applications
- Load switch
- Battery management

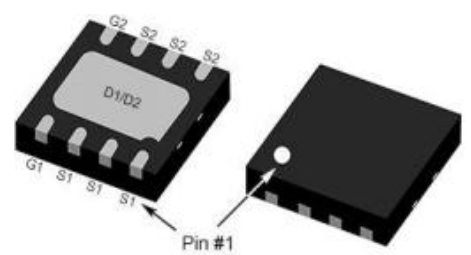
## PINOUT



Schematic diagram



Marking



DFN3X3-8L top & bottom view

## ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MXN3380	-55°C to 150°C	DFN3X3-8L	-

## ABSOLUTE MAXIMUM RATINGS ( $T_C=25^\circ C$ 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 ( $T_A=25^\circ C$ )	$I_D$	17	A
Drain Current-Continuous	$I_D$	45	A
Pulsed Drain Current <sup>(Note1)</sup>	$I_{DM}$	90	A
Maximum Power Dissipation ( $T_A=25^\circ C$ )	$P_D$	3.6	W
Maximum Power Dissipation	$P_D$	31	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^\circ C$

## THERMAL RESISTANCE

Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4	$^\circ C/W$
Thermal Resistance, Junction-to-Ambient <sup>(Note2)</sup>	$R_{\theta JA}$	34.7	$^\circ C/W$

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

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


**ELECTRICAL CHARACTERISTICS** ( $T_C=25^\circ\text{C}$  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	$R_{DS(ON)}$	$V_{GS}=2.5V, I_D=5A$	7.0	8.0	10.5	m $\Omega$
		$V_{GS}=3.1V, I_D=5A$	5.6	6.6	9.0	m $\Omega$
		$V_{GS}=3.8V, I_D=5A$	5.0	6.0	8.0	m $\Omega$
		$V_{GS}=4.5V, I_D=5.5A$	4.5	5.5	7.0	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=5A$	15	-	-	S
<b>Dynamic Characteristics</b> <sup>(Note3)</sup>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V, F=1.0MHz$	-	1450	-	pF
Output Capacitance	$C_{oss}$		-	350	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	320	-	pF
Gate Resistance	$R_g$	$V_{DS}=0V, V_{GS}=0V, F=1.0MHz$	-	1	-	K $\Omega$
<b>Switching Characteristics</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=2A, R_L=1\Omega, V_{GS}=4.5V, R_G=3\Omega$	-	10	-	nS
Turn-on Rise Time	$t_r$		-	40	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	67	-	nS
Turn-Off Fall Time	$t_f$		-	31	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=7A, V_{GS}=4.5V$	-	15	-	nC
Gate-Source Charge	$Q_{gs}$		-	3.5	-	nC
Gate-Drain Charge	$Q_{gd}$		-	5.5	-	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>	$I_S$		-	-	15	A

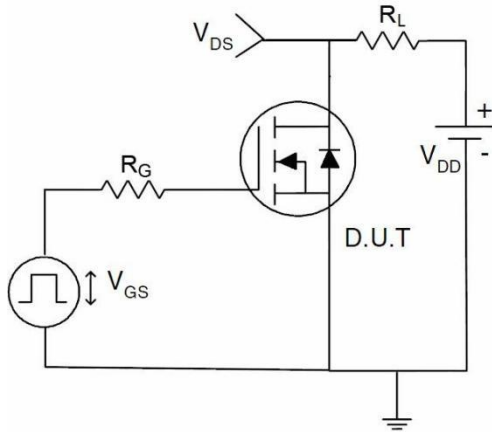
Note 1. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

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

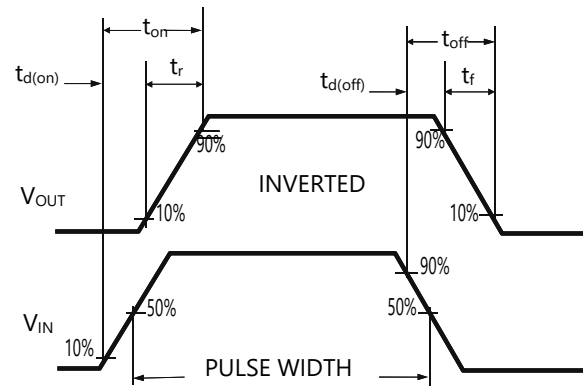
Note 3. Guaranteed by design, not subject to product.

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

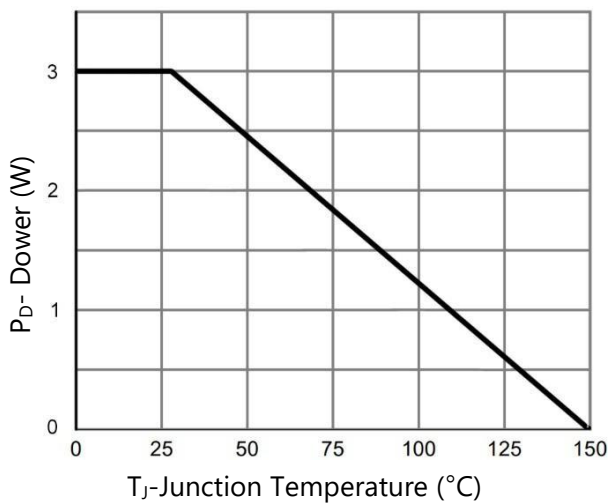
**Figure 1. Switching Test Circuit**



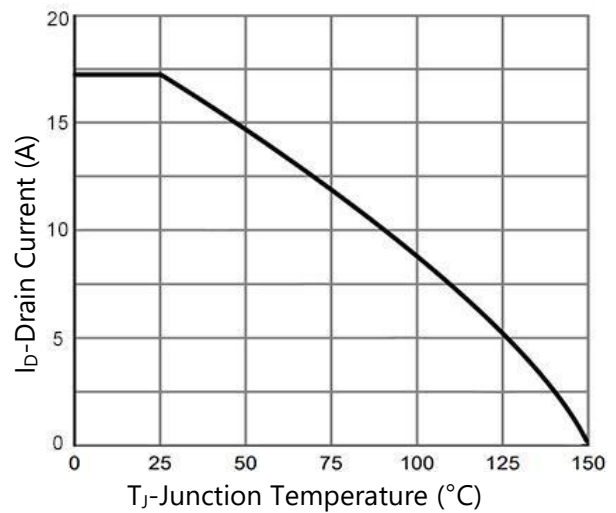
**Figure 2. Switching Waveform**



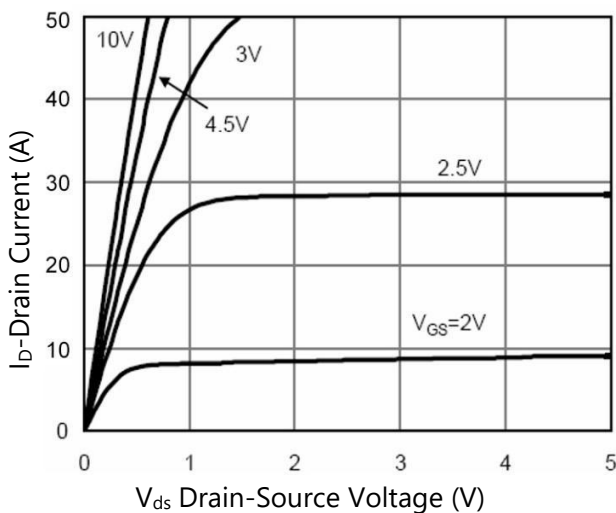
**Figure 3. Power Dissipation**



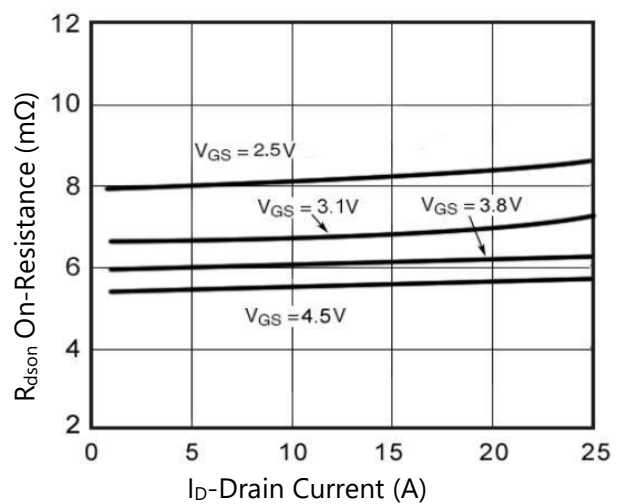
**Figure 4. Drain Current**



**Figure 5. Output Characteristics**



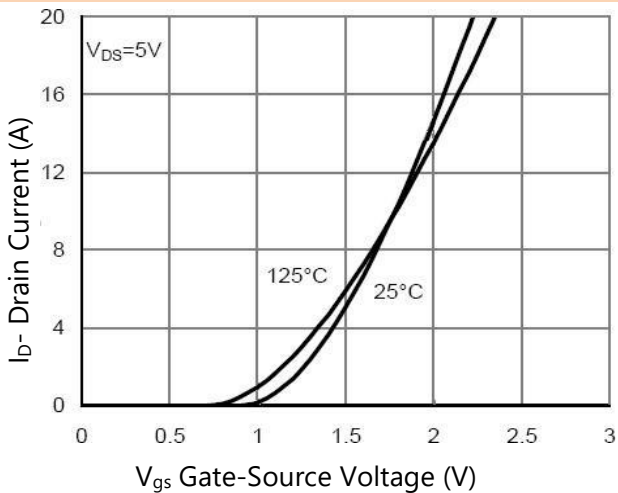
**Figure 6. R<sub>dson</sub> vs Drain Current**



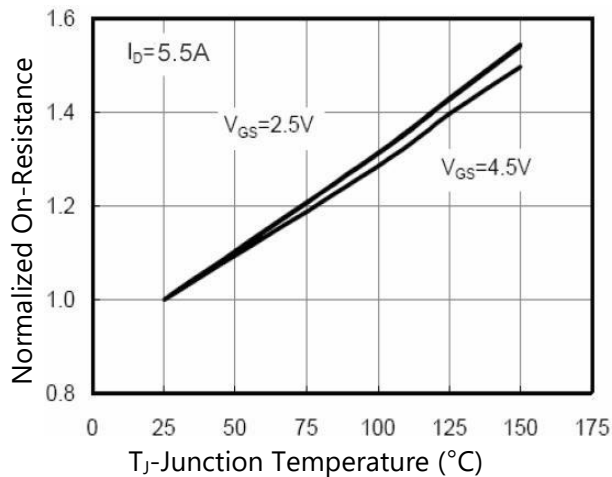


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

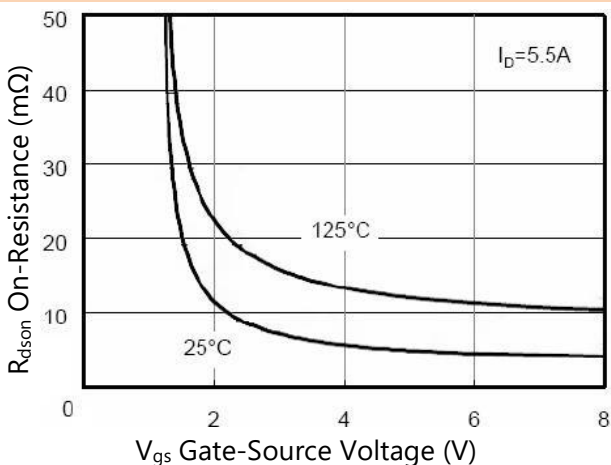
**Figure 7. Transfer Characteristics**



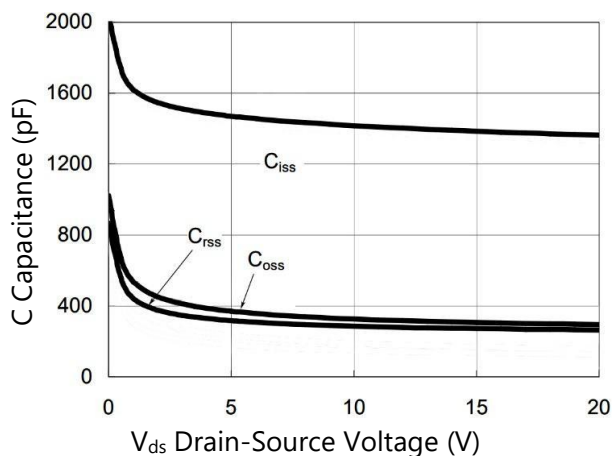
**Figure 8. R<sub>dson</sub> vs Junction Temperature**



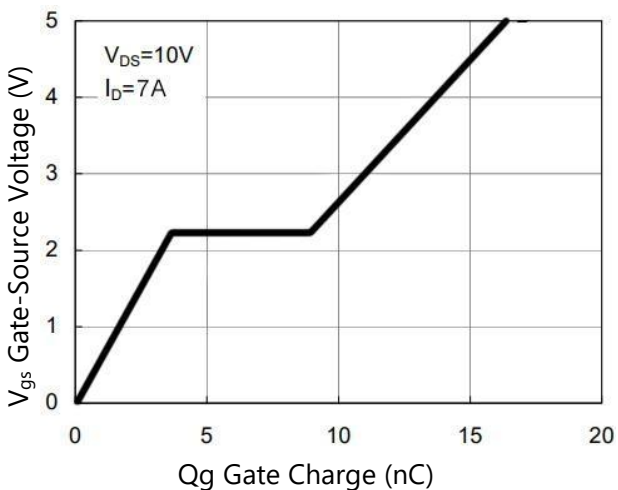
**Figure 9. R<sub>dson</sub> vs V<sub>GS</sub>**



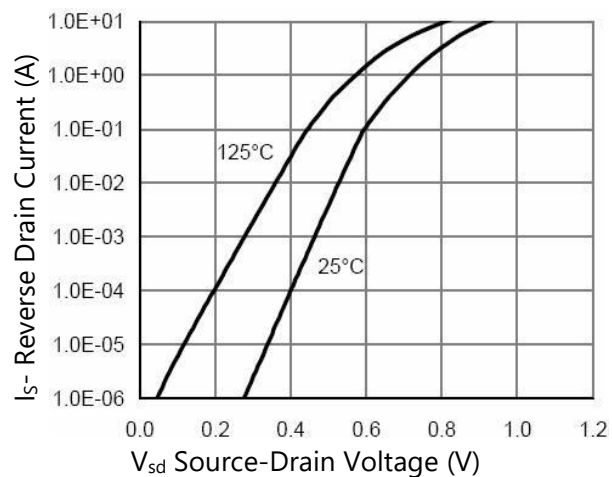
**Figure 10. Capacitance vs V<sub>DS</sub>**



**Figure 11. Gate Charge**



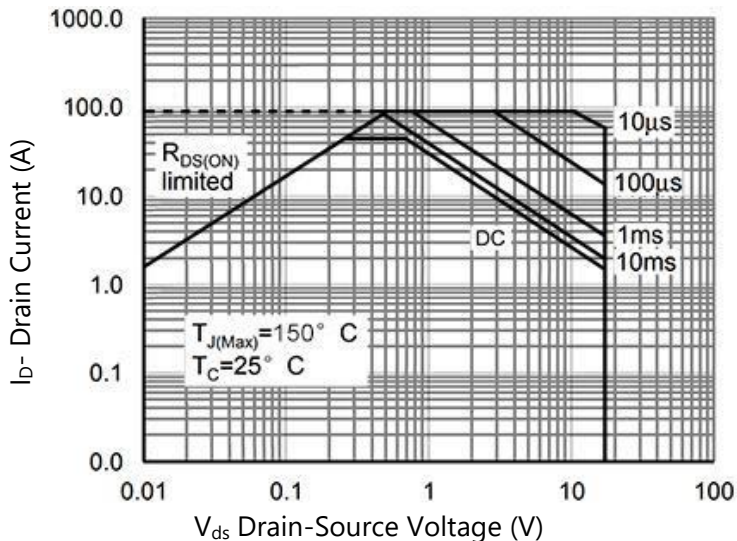
**Figure 12. Source- Drain Diode Forward**



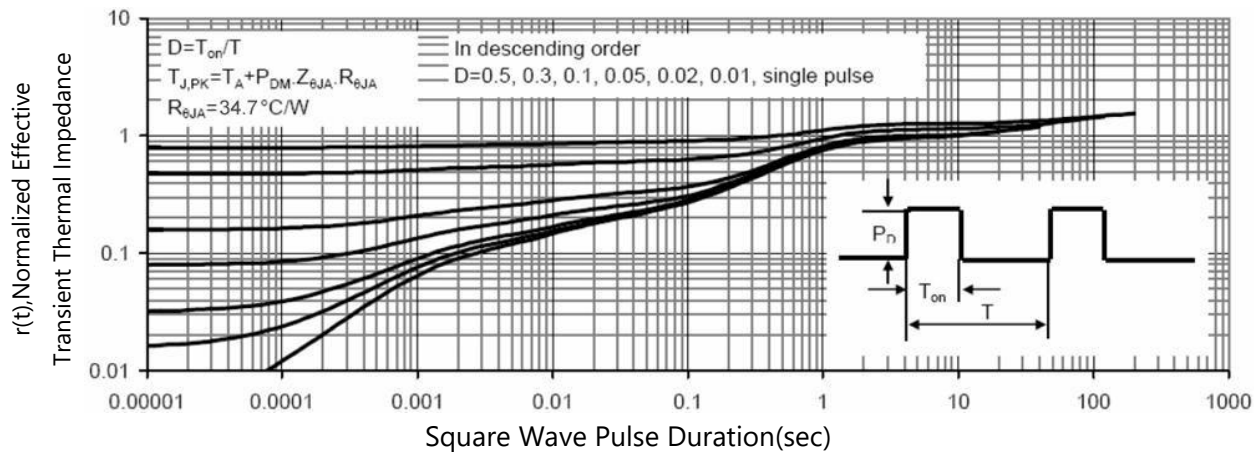


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**Figure 13. Safe Operation Area**

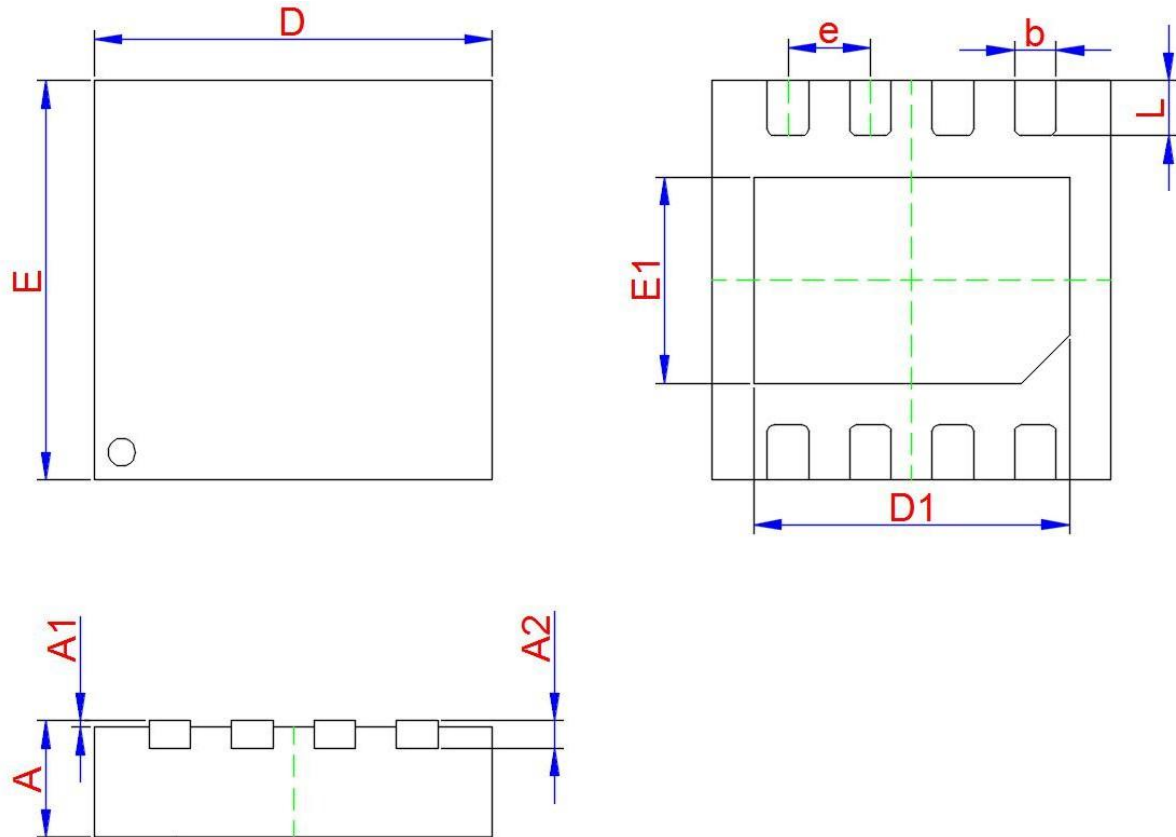


**Figure 14. Normalized Maximum Transient Thermal Impedance**



**PACKAGE INFORMATION**

DFN3X3-8L



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	0.250	0.300	0.350
E	2.924	3.000	3.076
D1	2.200	2.300	2.400
E1	2.924	3.000	3.076
k	1.400	1.500	1.600
b	0.650 TYP.		
e	0.350	0.400	0.450
L	0.700	0.750	0.800