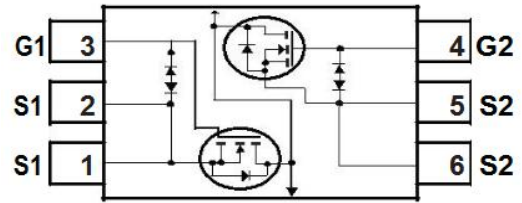




**Dual N-Channel Enhancement Mode Power MOSFET**

**Description**

The MXN2384 uses advanced trench technology to provide excellent  $R_{DS(ON)}$ , low gate charge and operation with gate voltages as low as 2.5V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected..



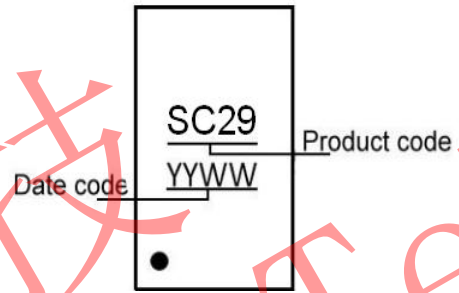
Schematic diagram

**General Features**

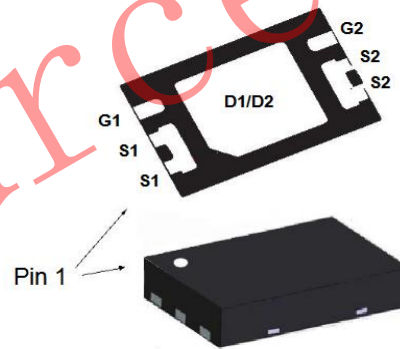
- ◆  $V_{DS} = 20V$ ,  $I_D = 9.5A$   
 @ $V_{GS} = 4.5V$   $R_{DS(ON)}(Typ.) = 7.8m\Omega$   
 @ $V_{GS} = 4.2V$   $R_{DS(ON)}(Typ.) = 8m\Omega$   
 @ $V_{GS} = 3.8V$   $R_{DS(ON)}(Typ.) = 8.3m\Omega$   
 @ $V_{GS} = 2.5V$   $R_{DS(ON)}(Typ.) = 11m\Omega$   
 ESD Rating: 2000V HBM
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

**Application**

- ◆ PWM applications
- ◆ Load switch



Marking Description



DFN2x3-6L Pin definition and Top / Bottom View

**Absolute Maximum Ratings (TA=25°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	$I_D$	9.5	A
Drain Current-Pulsed (Note 1)	$I_{DM}$	30	A
Maximum Power Dissipation	$P_D$	0.98	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	°C



**Electrical Characteristics** (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
<b>Off Characteristics</b>						
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	$I_{GSS}$	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	$\pm 10$	$\mu A$
<b>On Characteristics (Note 3)</b>						
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.45	0.7	0.95	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=5.5A$	6	7.8	9	m $\Omega$
		$V_{GS}=4.2V, I_D=5.5A$	6.5	8	9.5	m $\Omega$
		$V_{GS}=3.8V, I_D=5.0A$	7	8.3	10	m $\Omega$
		$V_{GS}=2.5V, I_D=5.0A$	9	11	12	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=5A$	-	20	-	S
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$	-	1647	-	PF
Output Capacitance	$C_{oss}$		-	170	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	148	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=15V, I_D=5.5A$ $V_{GS}=4.5V, R_{GEN}=6\Omega$	-	10	-	nS
Turn-on Rise Time	$t_r$		-	39.5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	65	-	nS
Turn-Off Fall Time	$t_f$		-	30	-	nS
Total Gate Charge	$Q_g$		$V_{DS}=15V, I_D=5.5A,$ $V_{GS}=4.5V$	-	22	-
Gate-Source Charge	$Q_{gs}$	-		3.1	-	nC
Gate-Drain Charge	$Q_{gd}$	-		8.2	-	nC
<b>Drain-Source Diode Characteristics</b>						
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
Diode Forward Current (Note 2)	$I_S$		-	-	7	A

**Notes:**

- surface mounted on FR4 board,  $t \leq 10sec$
- pulse test: pulse width  $\leq 300\mu s$ , duty  $\leq 2\%$
- guaranteed by design, not subject to production testing

**Thermal Characteristics**

Thermal Resistance junction-to ambient	Rth JA	126	$^{\circ}C/W$
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## TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

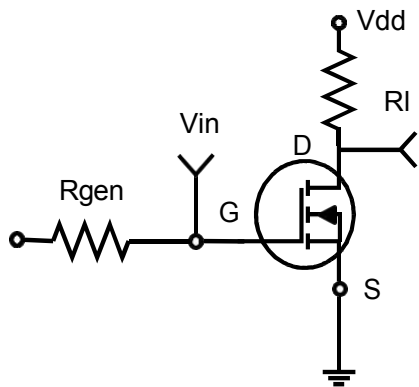


Figure 1: Switching Test Circuit

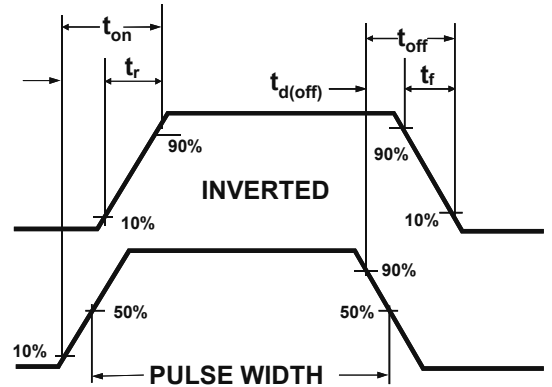


Figure 2: Switching Waveforms

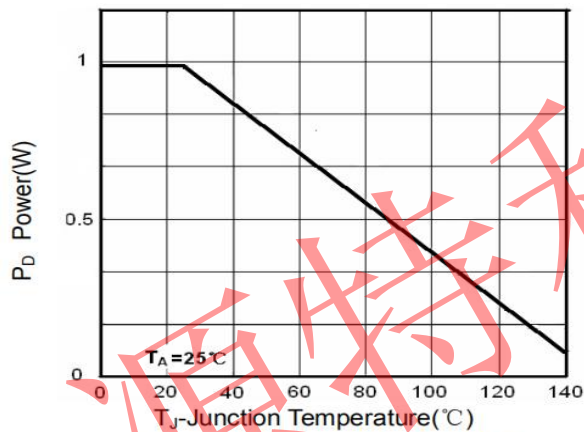


Figure 3 Power Dissipation

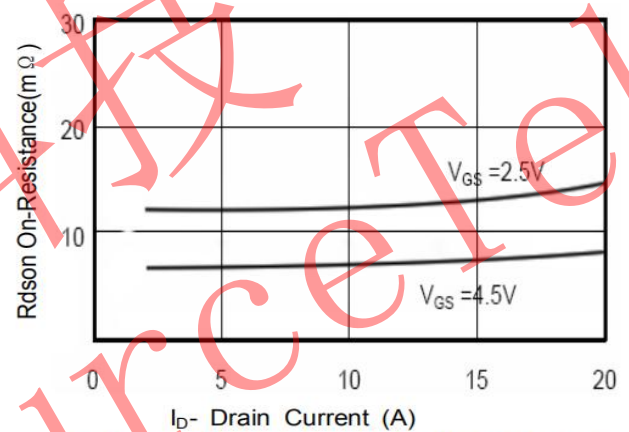


Figure 4 Drain-Source On-Resistance

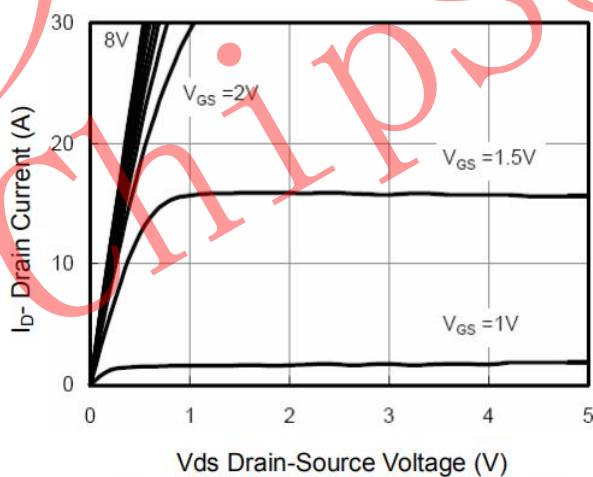


Figure 5 Output CHARACTERISTICS

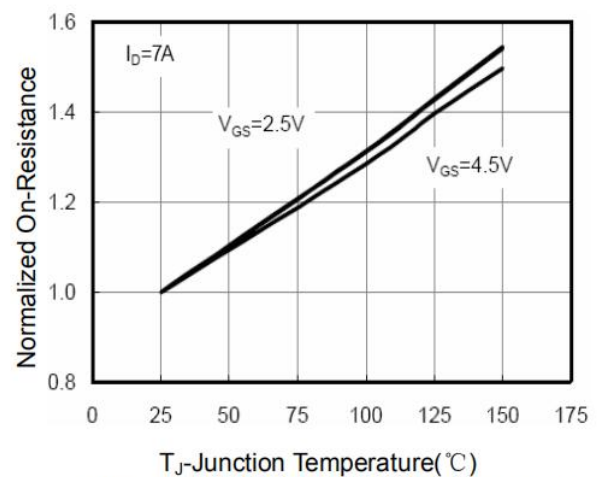
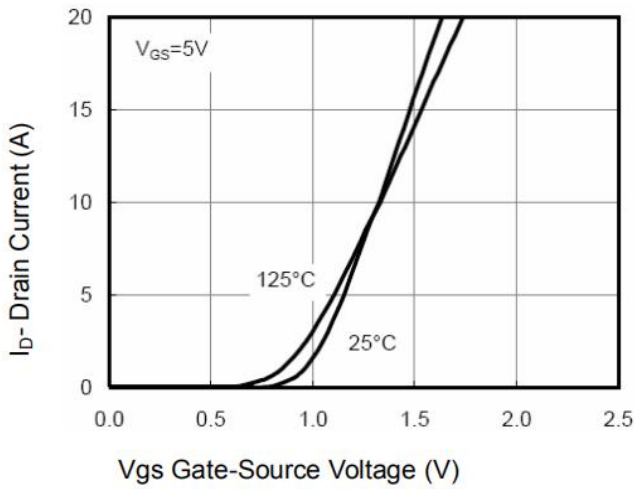
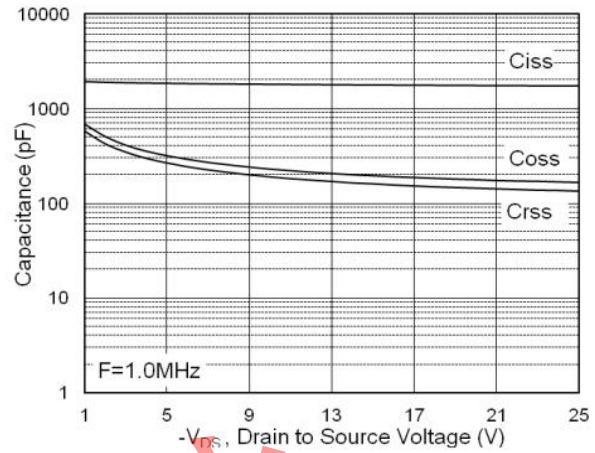


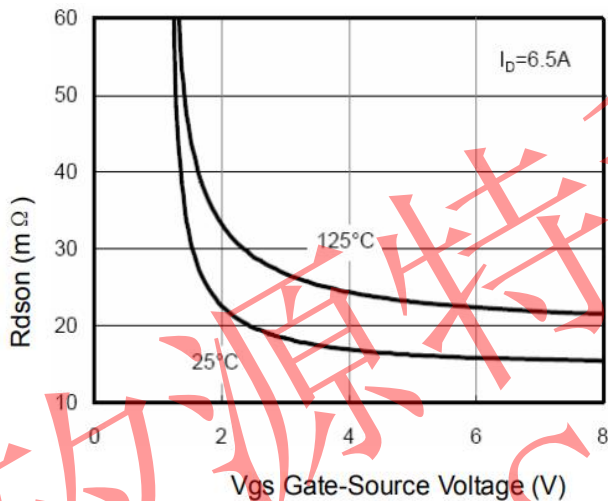
Figure 6 Drain-Source On-Resistance



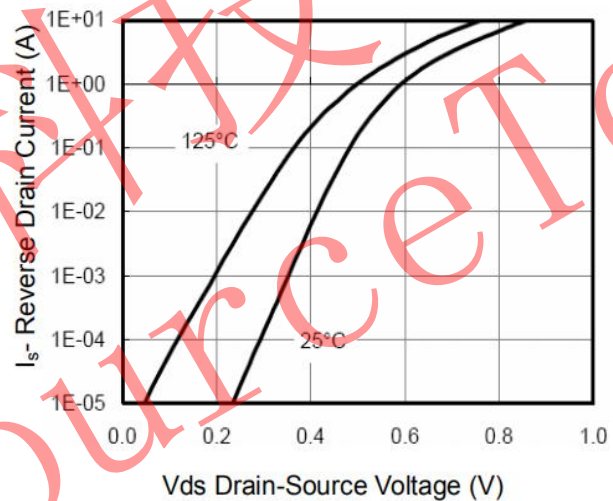
Vgs Gate-Source Voltage (V)  
**Figure 7 Transfer Characteristics**



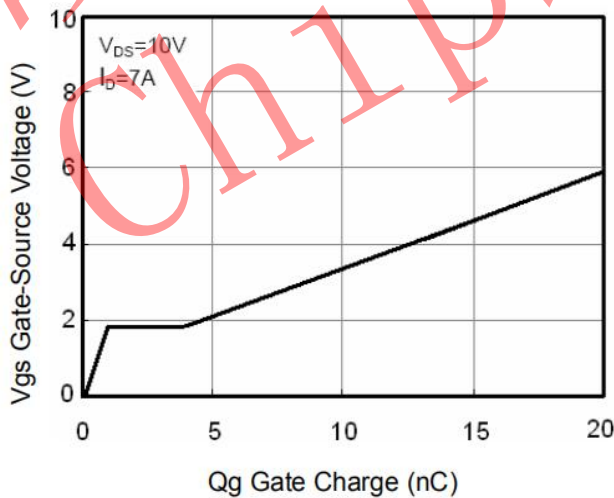
**Figure 8 Capacitance vs Vds**



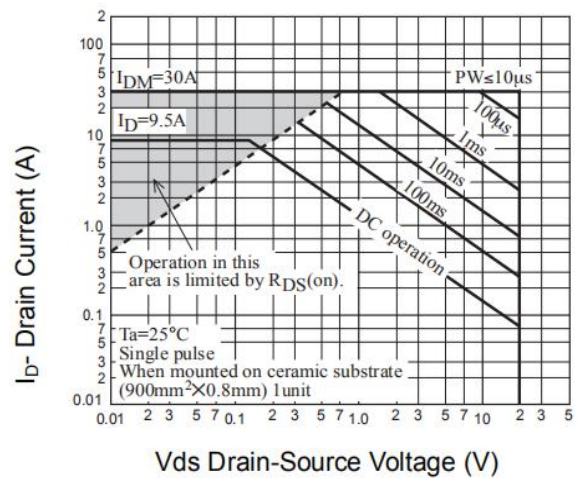
Vgs Gate-Source Voltage (V)  
**Figure 9 Rdson vs Vgs**



**Figure 10 Capacitance vs Vds**



**Figure 11 Gate Charge**

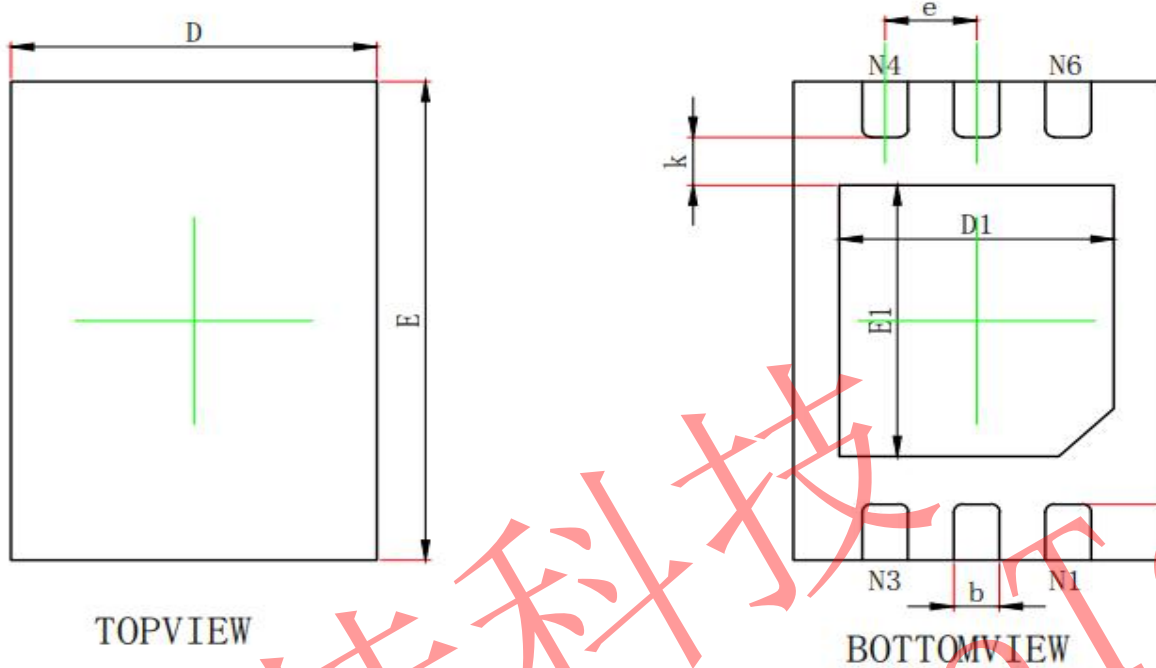


**Figure 12 Safe Operation Area**





DFNWB2×3-6L (P0.50T0.75) PACKAGE OUTLINED DIMENSIONS



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	0.700	0.800	0.028	0.031
A1	0.000	0.050	0.000	0.002
A3	0.203REF.		0.008REF.	
D	1.950	2.050	0.077	0.081
E	2.950	3.050	0.116	0.120
D1	1.450	1.550	0.057	0.061
E1	1.650	1.750	0.065	0.069
k	0.200MIN.		0.008MIN.	
b	0.200	0.300	0.008	0.012
e	0.500TYP.		0.020TYP.	
L	0.300	0.400	0.012	0.016