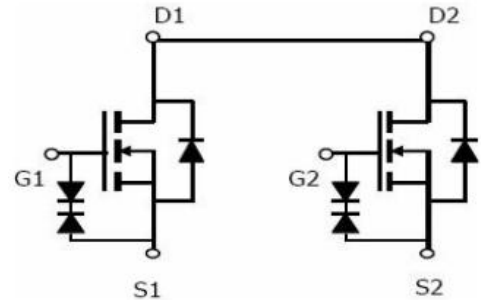




**N-Channel Enhancement Mode Power MOSFET**

**Description**

The MX2814 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..



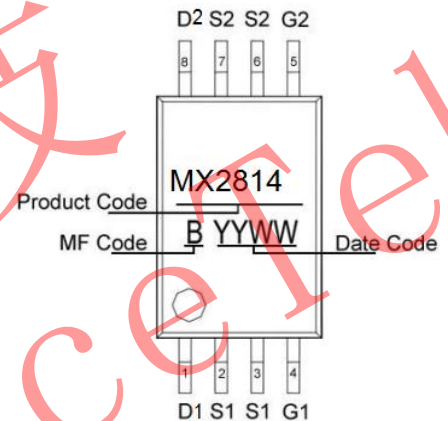
**Schematic diagram**

**General Features**

- ◆  $V_{DS} = 20V$ ,  $I_D = 8A$   
 @ $V_{GS} = 4.5V$   $R_{DS(ON)}(Typ.) = 11m\Omega$   
 @ $V_{GS} = 3.8V$   $R_{DS(ON)}(Typ.) = 12.5m\Omega$   
 @ $V_{GS} = 2.5V$   $R_{DS(ON)}(Typ.) = 14m\Omega$   
 ESD Rating: 2000V HBM
- ◆ High power and current handling capability
- ◆ Lead free product is acquired
- ◆ Surface mount package

**Application**

- ◆ PWM applications
- ◆ Load switch



**Marking and pin assignment**

**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-Pulsed (Note 1)	$I_{DM}$	34	A
Maximum Power Dissipation	$P_D$	1.5	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 To 150	$^\circ C$



**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	$R_{DS(on)}$	$V_{GS}=4.5V, I_D=7.0A$	9	11	14	m $\Omega$
		$V_{GS}=3.8V, I_D=6.0A$	11	12.5	15	m $\Omega$
		$V_{GS}=2.5V, I_D=5.5A$	13	14	18	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=7A$	-	20	-	S
<b>Dynamic Characteristics (Note4)</b>						
Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V,$ $F=1.0MHz$	-	1150	-	PF
Output Capacitance	$C_{oss}$		-	185	-	PF
Reverse Transfer Capacitance	$C_{rss}$		-	145	-	PF
<b>Switching Characteristics (Note 4)</b>						
Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, R_L=1.35\Omega$ $V_{GS}=5V, R_{GEN}=3\Omega$	-	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	$Q_g$	$V_{DS}=10V, I_D=7A,$ $V_{GS}=4.5V$	-	15	-	nC
Gate-Source Charge	$Q_{gs}$		-	0.8	-	nC
Gate-Drain Charge	$Q_{gd}$		-	3.2	-	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:**

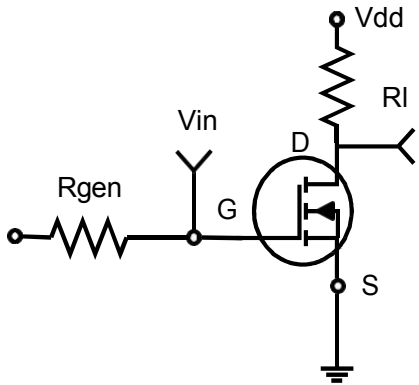
- a. surface mounted on FR4 board,  $t \leq 10sec$
- b. pulse test: pulse width  $\leq 300\mu s$ , duty  $\leq 2\%$
- c. guaranteed by design, not subject to production testing

**Thermal Characteristics**

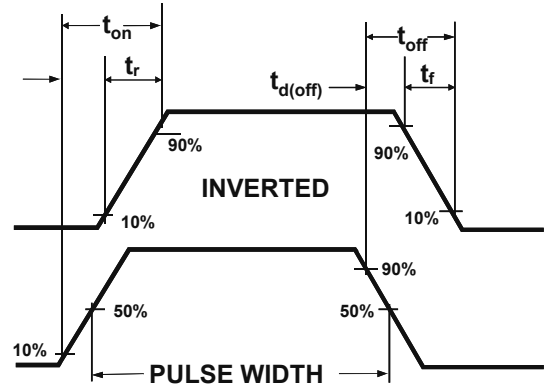
Thermal Resistance junction-to ambient	Rth JA	100	$^{\circ}C/W$
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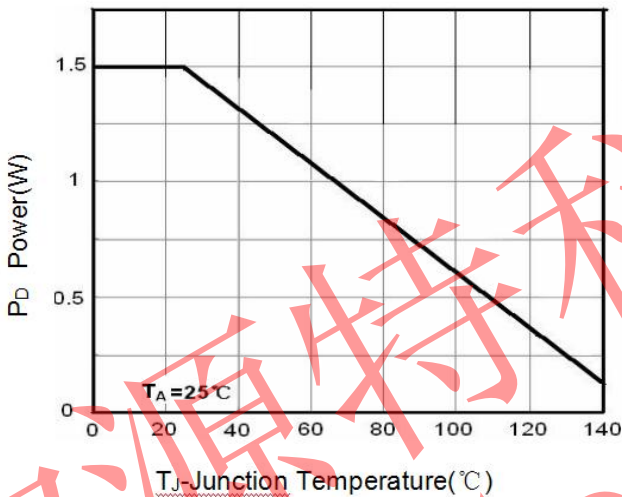
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**



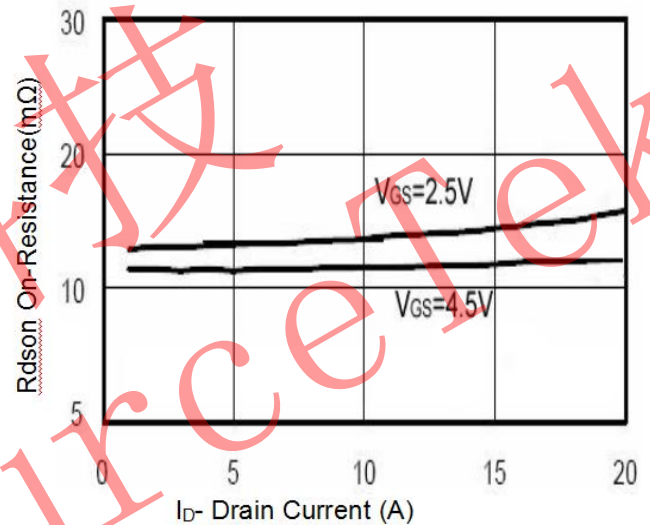
**Figure 1: Switching Test Circuit**



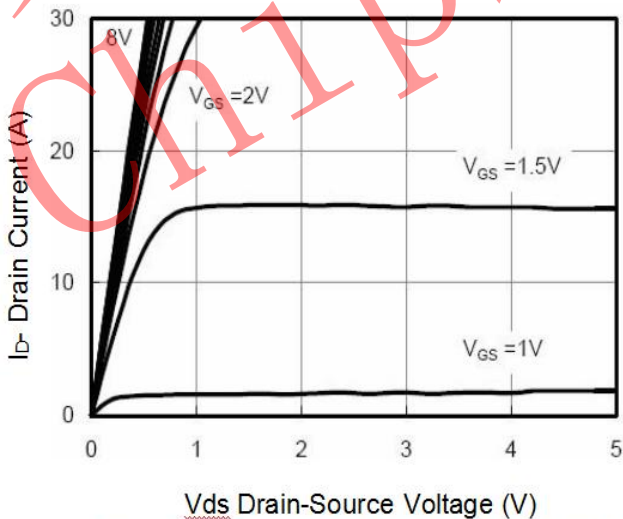
**Figure 2: Switching Waveforms**



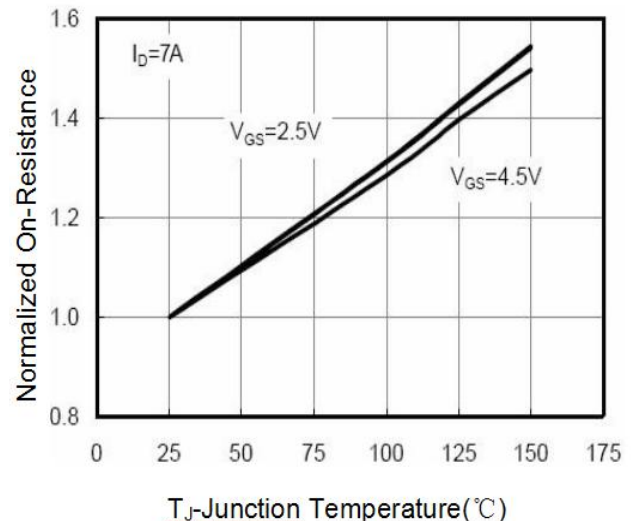
**Figure 3 Power Dissipation**



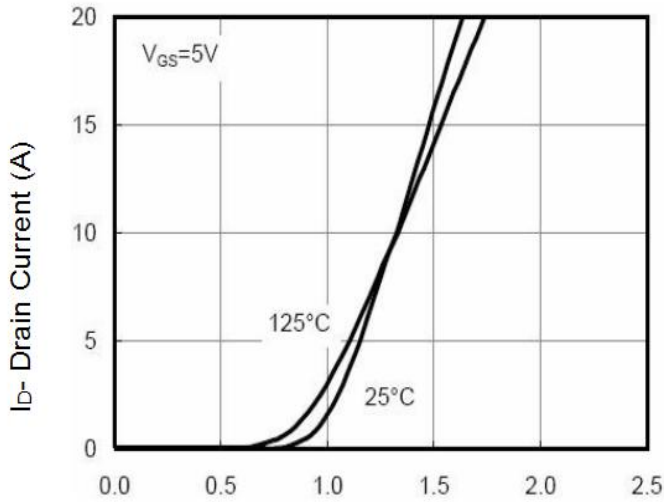
**Figure 6 Drain-Source On-Resistance**



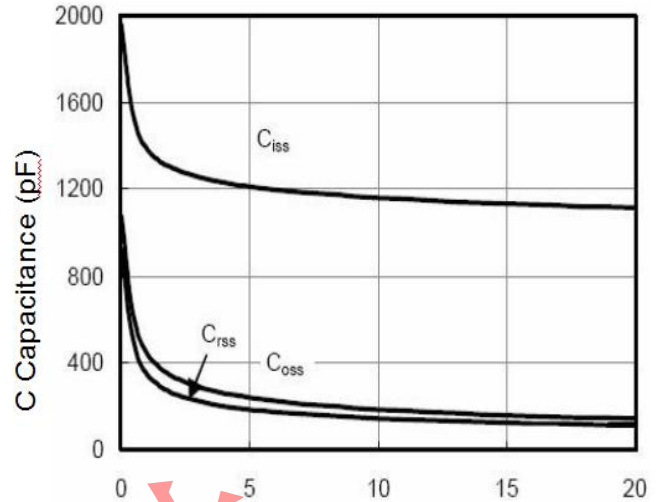
**Figure 5 Output CHARACTERISTICS**



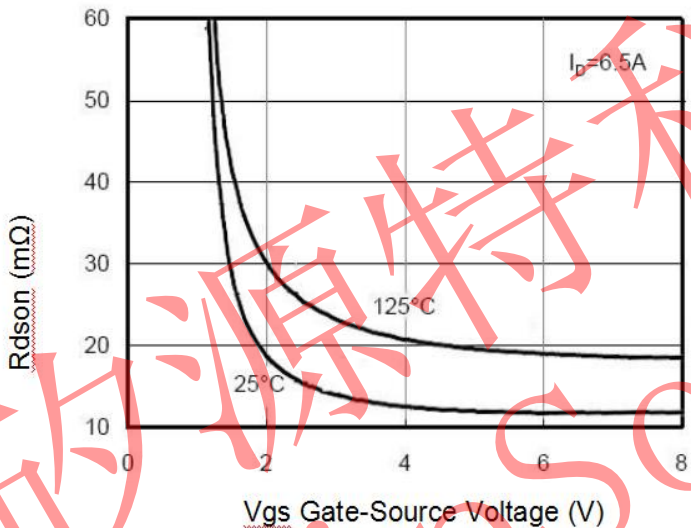
**Figure 8 Drain-Source On-Resistance**



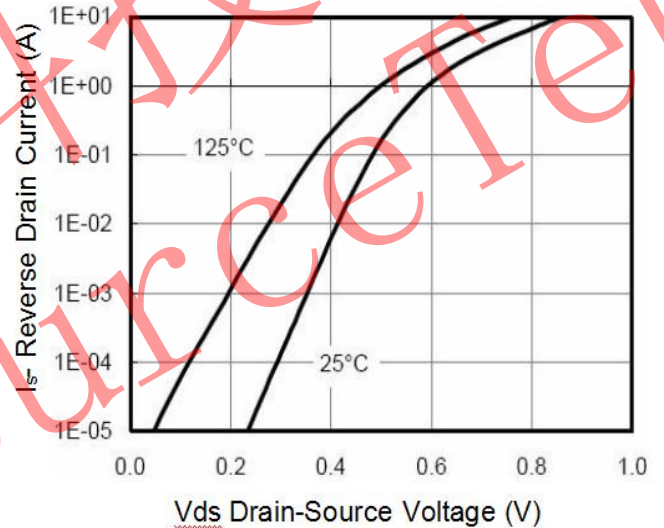
Vgs Gate-Source Voltage (V)  
**Figure 7 Transfer Characteristics**



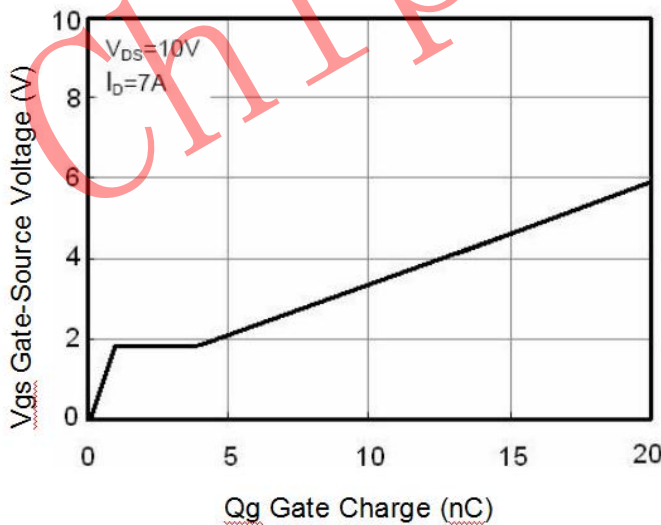
Vds Drain-Source Voltage (V)  
**Figure 8 Capacitance vs Vds**



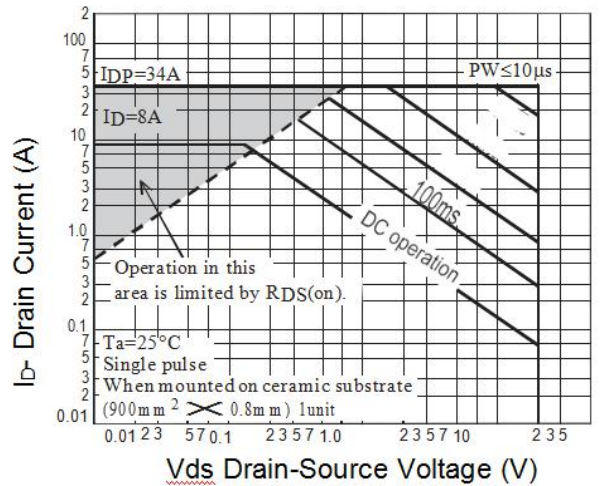
Vgs Gate-Source Voltage (V)  
**Figure 9 Rds(on) vs Vgs**



Vds Drain-Source Voltage (V)  
**Figure 10 Reverse Drain Current vs Vds**



Qg Gate Charge (nC)  
**Figure 11 Gate Charge**

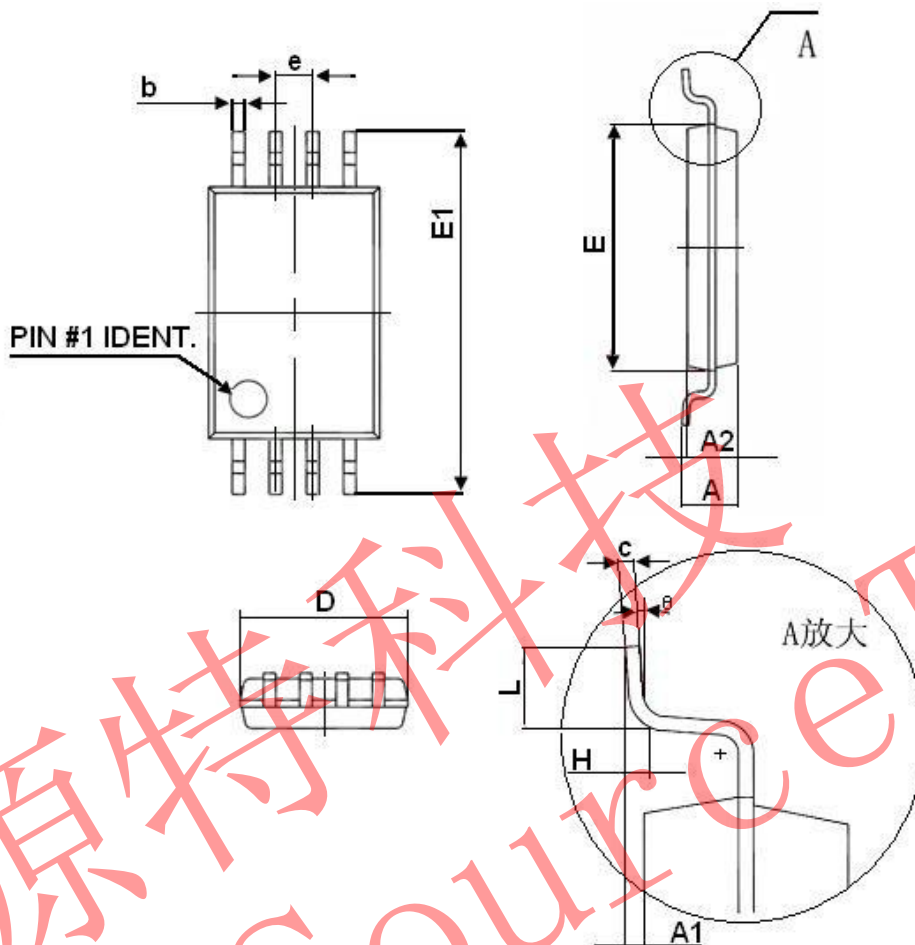


Vds Drain-Source Voltage (V)  
**Figure 13 Safe Operation**





## TSSOP-8 PACKAGE INFORMATION



Symbol	Dimensions In Millimeters	
	Min	Max
D	2.900	3.100
E	4.300	4.500
b	0.190	0.300
c	0.090	0.200
E1	6.250	6.550
A		1.100
A2	0.800	1.000
A1	0.020	0.150
e	0.65(BSC)	
L	0.500	0.700
H	0.25(TYP)	
Θ	1°	7°