

## DESCRIPTION

The MX2801 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 switching application and wide variety of other applications.

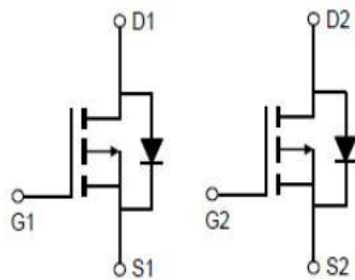
## GENERAL FEATURES

- $V_{DS}=-16V$ ,  $I_D=-7A$   
 $R_{DS(ON)}(Typ.)=24m\Omega @ V_{GS}=-2.5V$   
 $R_{DS(ON)}(Typ.)=18m\Omega @ V_{GS}=-4.5V$
- Advanced trench MOSFET process technology
- Ultra low on-resistance with low gate charge

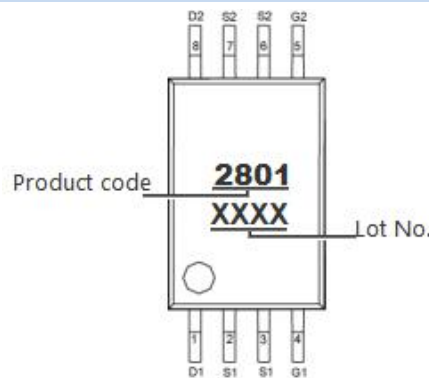
## APPLICATION

- PWM applications
- Load switch
- battery charge in cellular handset

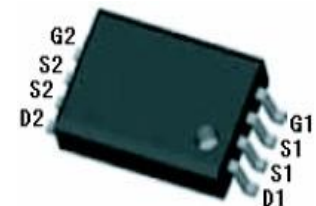
## PINOUT



Schematic diagram



Pin Assignment



TSSOP-8 top view

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

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	$V_{DS}$	-16	V
Gate-Source Voltage	$V_{GS}$	$\pm 12$	V
Drain Current-Continuous	$I_D$	-7	A
Drain Current-Pulsed <sup>(Note 1)</sup>	$I_{DM}$	-28	A
Maximum Power Dissipation	$P_D$	1.5	W
Operating Junction and Storage Temperature Range	$T_J, T_{STG}$	-55 to 150	$^{\circ}C$

## THERMAL CHARACTERISTIC

Thermal Resistance, Junction-to-Ambient <sup>(Note 2)</sup>	$R_{\theta JA}$	45	$^{\circ}C/W$
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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** ( $T_C=25^\circ\text{C}$  unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
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**Off Characteristics**

Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=-250\mu A$	-16	-20	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=-16V, V_{GS}=0V$	-	-	-1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA

**On Characteristics** (Note3)

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-0.4	-0.7	-1.0	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	$V_{GS}=-2.5V, I_D=-6A$	-	24	30	$m\Omega$
		$V_{GS}=-4.5V, I_D=-7A$	-	18	23	$m\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=-5V, I_D=-6A$	-	33	-	S

**Dynamic Characteristics** (Note4)

Input Capacitance	$C_{iss}$	$V_{DS}=-6V, V_{GS}=0V, F=1.0MHz$	-	1370	-	pF
Output Capacitance	$C_{oss}$		-	350	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	258	-	pF

**Switching Characteristics** (Note4)

Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-6V, R_L=-0.75\Omega, V_{GS}=-4.5V, R_{GEN}=3\Omega$	-	11	-	nS
Turn-on Rise Time	$t_r$		-	25	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	70	-	nS
Turn-Off Fall Time	$t_f$		-	42	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=-6V, I_D=-8A, V_{GS}=-4.5V$	-	13	-	nC
Gate-Source Charge	$Q_{gs}$		-	2	-	nC
Gate-Drain Charge	$Q_{gd}$		-	3	-	nC

**Drain-Source Diode Characteristics**

Diode Forward Voltage (Note3)	$V_{SD}$	$V_{GS}=0V, I_S=-1A$	-	-	-1.2	V
Diode Forward Current (Note2)	$I_S$		-	-	-3.5	A

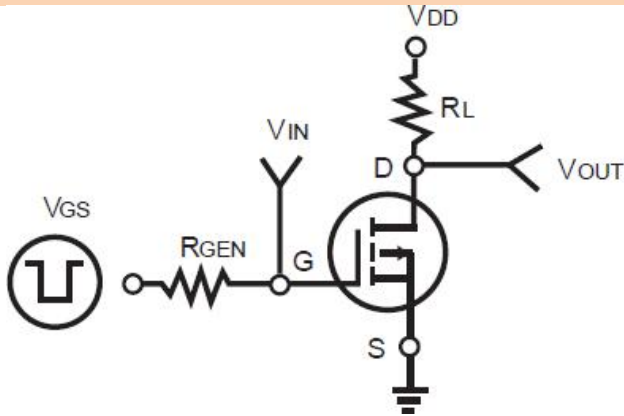
Note 2. Surface Mounted on FR4 Board,  $t \leq 10$  sec.

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

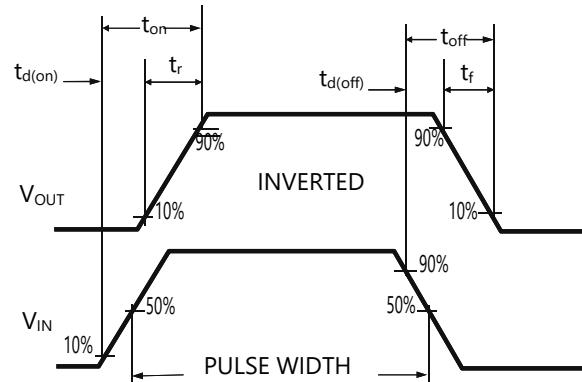
Note 4. Guaranteed by design, not subject to production

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

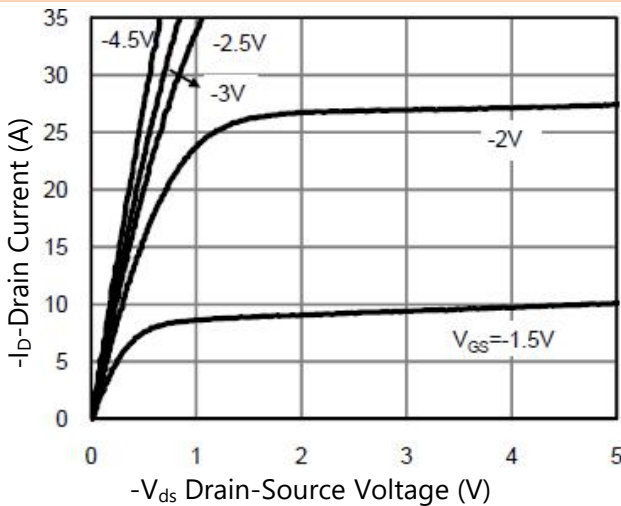
**Figure 1. Switching Test Circuit**



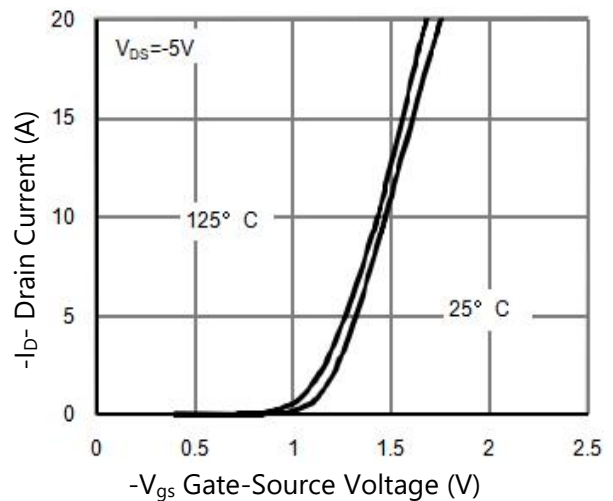
**Figure 2. Switching Waveform**



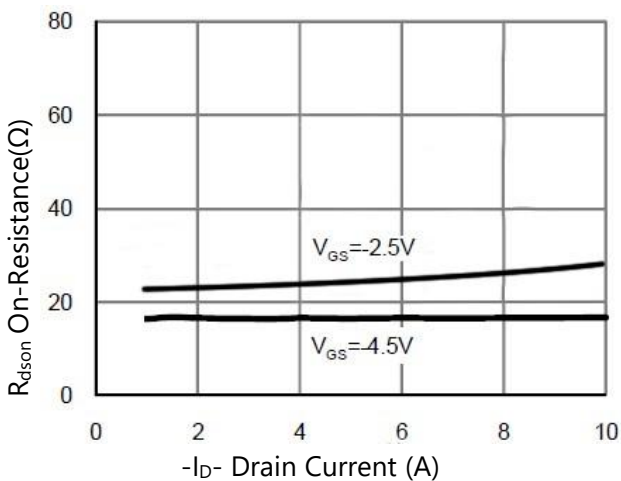
**Figure 3. On-Region Characteristics**



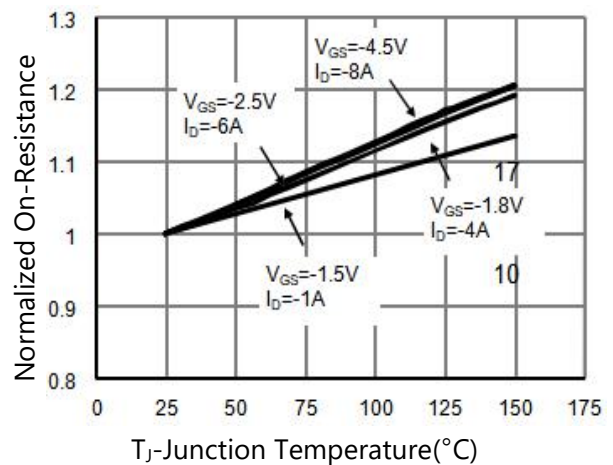
**Figure 4. Transfer Characteristics**



**Figure 5. Drain-Source On-Resistance**



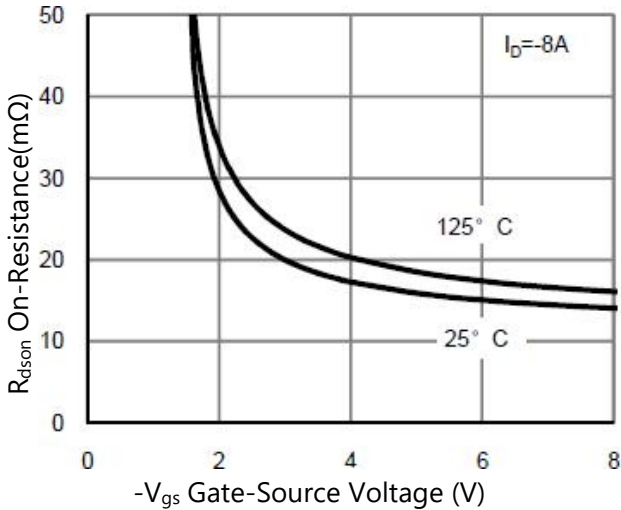
**Figure 6. On-Resistance vs Junction Temp.**



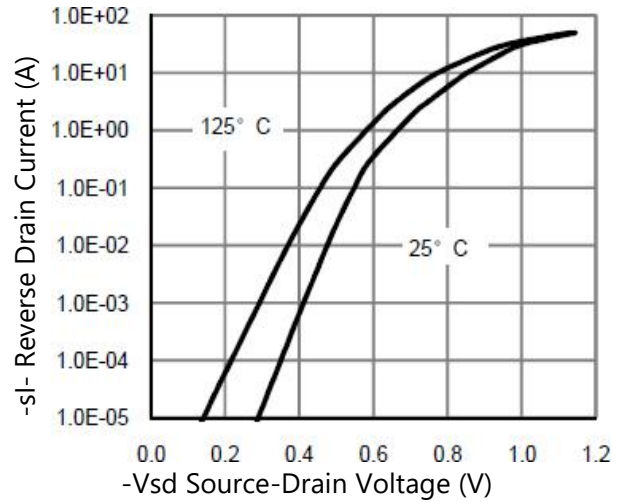


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

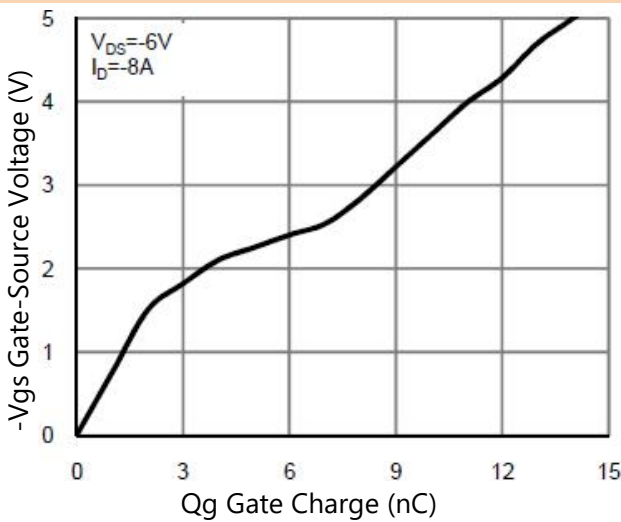
**Figure 7.  $R_{ds(on)}$  vs  $V_{gs}$**



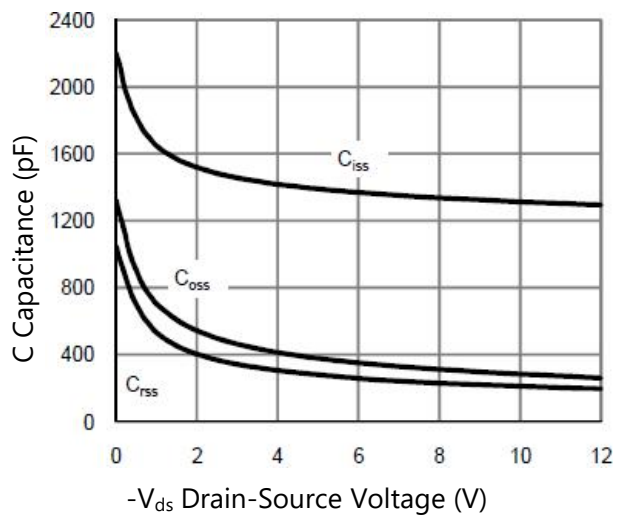
**Figure 8. Source- Drain Diode Forward**



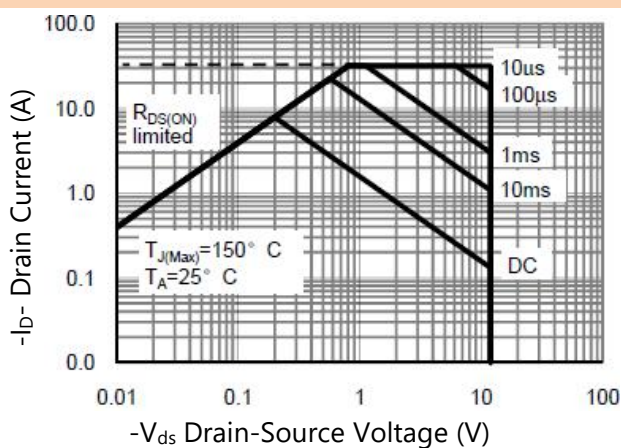
**Figure 9. Gate Charge**



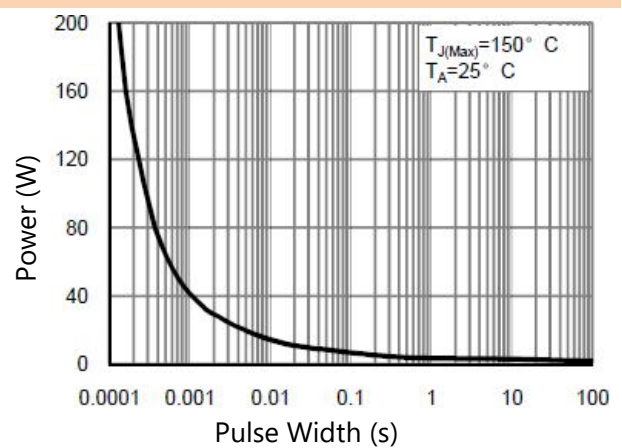
**Figure 10. Capacitance vs  $V_{ds}$**



**Figure 11. Safe Operation Area**



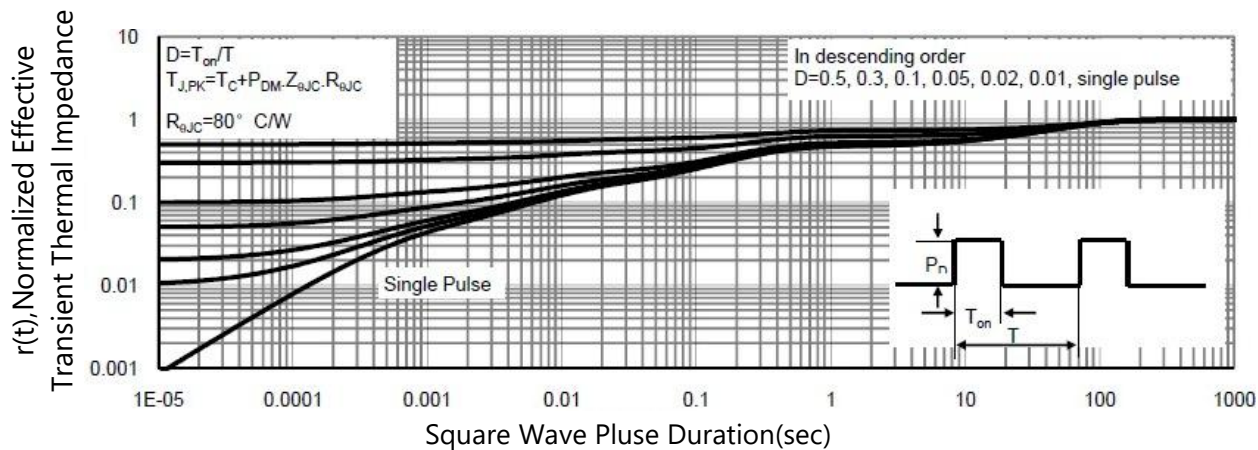
**Figure 12. Single Pulse Power Rating Junction-to Ambient**





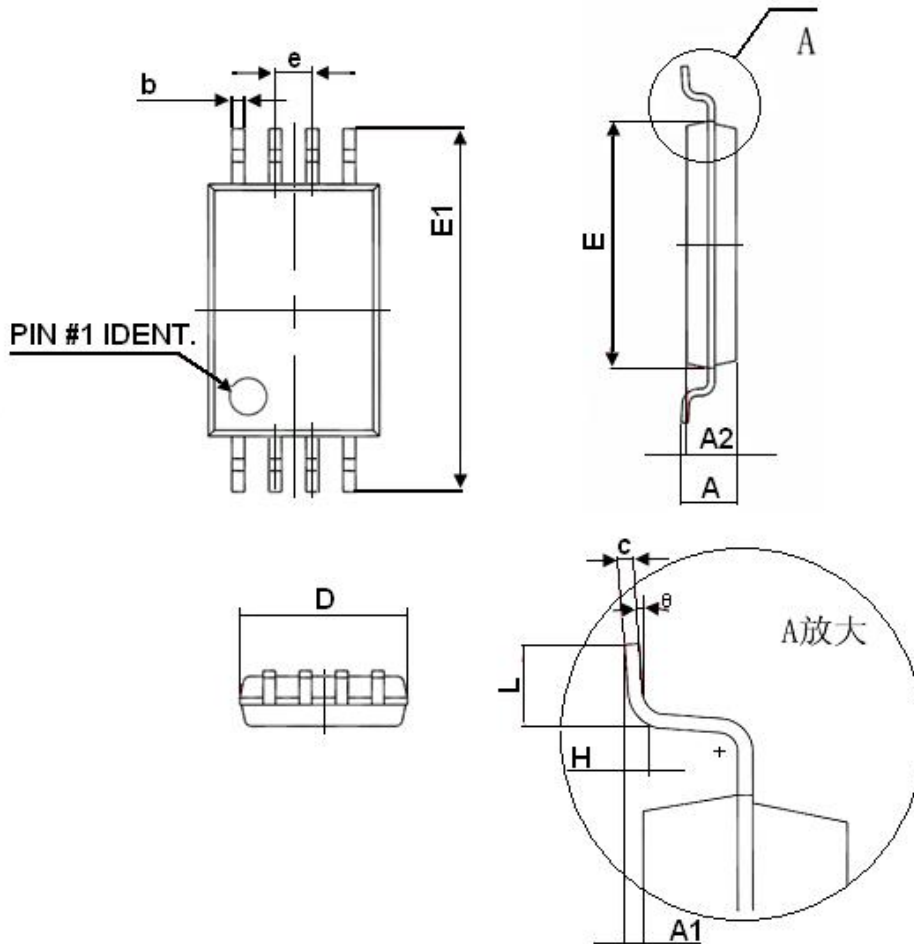
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**Figure 13. Normalized Maximum Transient Thermal Impedance**



**PACKAGE INFORMATION**

TSSOP-8



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)	
$\theta$	1°	7°