

### DESCRIPTION

The MX2012 uses advanced trench technology to provide excellent  $R_{DS(ON)}$  and low gate charge. It can be used in a wide variety of applications.

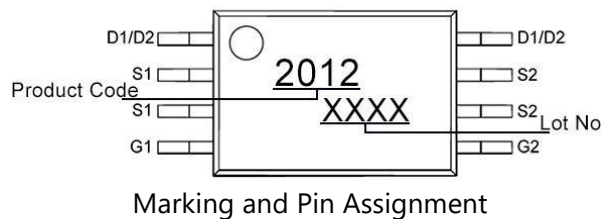
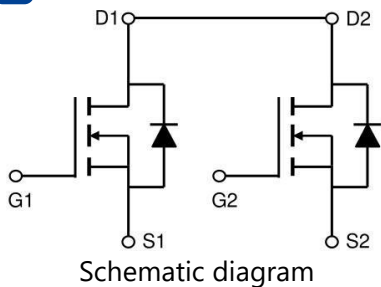
### GENERAL FEATURES

- $V_{DS}=18V$ ,  $I_D=12A$   
 $R_{DS(ON)}(Typ.)=10m\Omega$  @  $V_{GS}=2.5V$   
 $R_{DS(ON)}(Typ.)=9m\Omega$  @  $V_{GS}=3.8V$   
 $R_{DS(ON)}(Typ.)=8.5m\Omega$  @  $V_{GS}=4.5V$
- High Power and current handing capability
- Lead free product is acquired
- Surface Mount Package

### APPLICATION

- Battery protection
- Load switch

### PINOUT



### ORDERING INFORMATION

Part Number	Storage Temperature	Package	Devices Per Reel
MX2012	-55°C to 150°C	TSSOP-8	-

### 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	$I_D$	12	A
Pulsed Drain Current <sup>(Note1)</sup>	$I_{DM}$	36	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 RESISTANCE

Thermal Resistance, Junction-to-Ambient <sup>(Note2)</sup>	$R_{\theta JA}$	83	$^\circ C/W$
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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
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**Off Characteristics**

Drain-Source Breakdown Voltage	$BV_{DSS}$	$V_{GS}=0V, I_D=250\mu A$	-	18	-	V
Zero Gate Voltage Drain Current	$I_{DSS}$	$V_{DS}=15V, V_{GS}=0V$	-	-	1	$\mu A$
Gate-Body Leakage Current	$I_{GSS}$	$V_{GS}=\pm 12V, V_{DS}=0V$	-	-	$\pm 100$	nA

**On Characteristics** (Note 3)

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.45	0.65	1.0	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=2.5V, I_D=4A$	-	10	13	m $\Omega$
		$V_{GS}=3.8V, I_D=4A$	-	9	12	m $\Omega$
		$V_{GS}=4.5V, I_D=5A$	-	8.5	11	m $\Omega$
Forward Transconductance	$g_{FS}$	$V_{DS}=5V, I_D=6A$	-	15	-	S

**Dynamic Characteristics** (Note 4)

Input Capacitance	$C_{iss}$	$V_{DS}=10V, V_{GS}=0V, F=1.0MHz$	-	1420	-	pF
Output Capacitance	$C_{oss}$		-	350	-	pF
Reverse Transfer Capacitance	$C_{rss}$		-	330	-	pF

**Switching Characteristics**

Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, R_L=1.2\Omega, V_{GS}=10V, R_G=3\Omega$	-	2.5	-	nS
Turn-on Rise Time	$t_r$		-	7.2	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	49	-	nS
Turn-Off Fall Time	$t_f$		-	10.8	-	nS
Total Gate Charge	$Q_g$	$V_{DS}=10V, I_D=5A, V_{GS}=4.5V$	-	18	-	nC
Gate-Source Charge	$Q_{gs}$		-	2	-	nC
Gate-Drain Charge	$Q_{gd}$		-	4.7	-	nC

**Drain-Source Diode Characteristics**

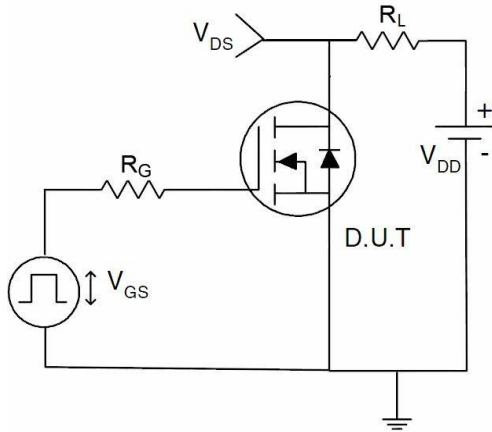
Diode Forward Voltage (Note 3)	$V_{SD}$	$V_{GS}=0V, I_S=1A$	-	-	1.2	V
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Note 3. Pulse Test: Pulse Width  $\leq 300\mu s$ , Duty Cycle  $\leq 2\%$ .

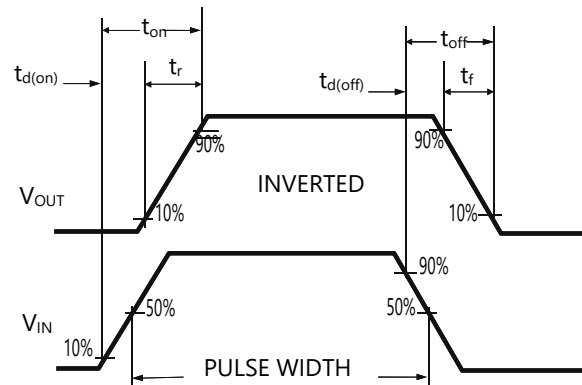
Note 4. Guaranteed by design, not subject to product.

**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

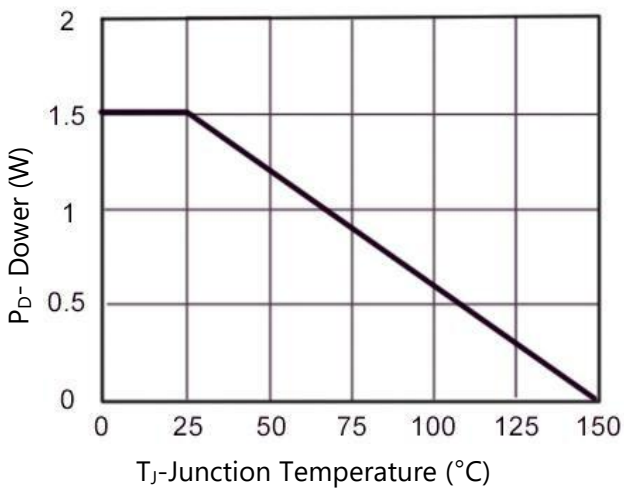
**Figure 1. Switching Test Circuit**



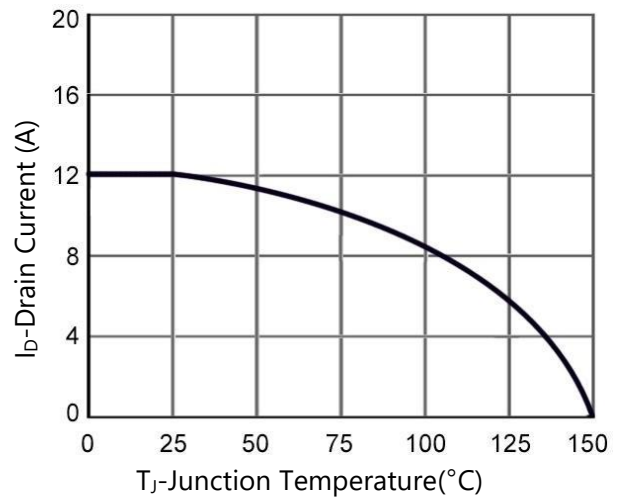
**Figure 2. Switching Waveform**



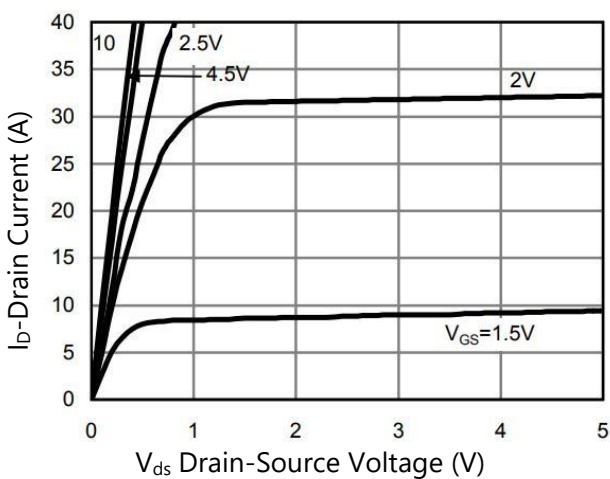
**Figure 3. Power Dissipation**



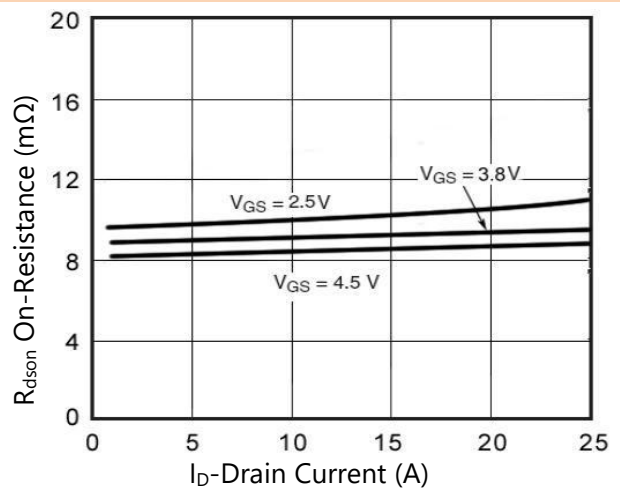
**Figure 4. Drain Current**



**Figure 5. Output Characteristics**



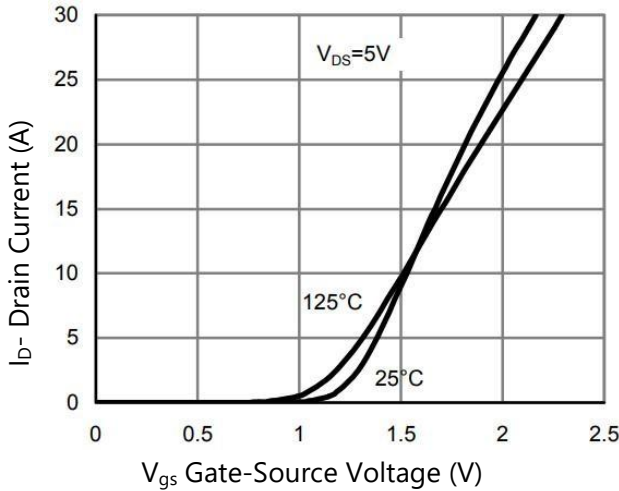
**Figure 6. R<sub>dson</sub> vs Drain Current**



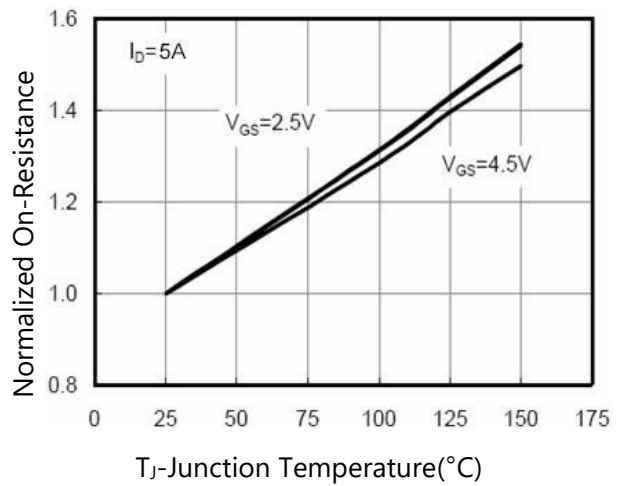


**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

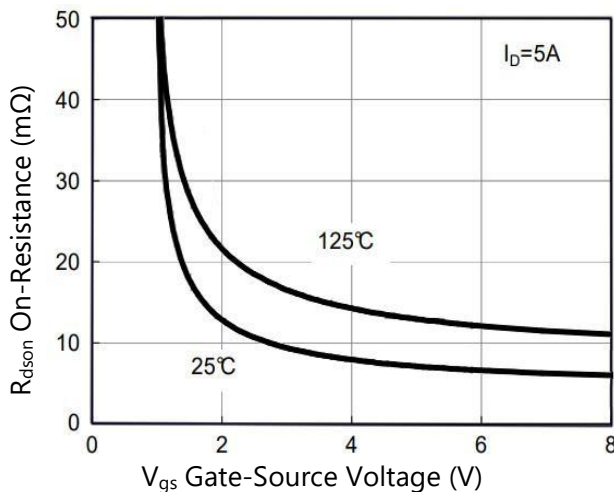
**Figure 7. Transfer Characteristics**



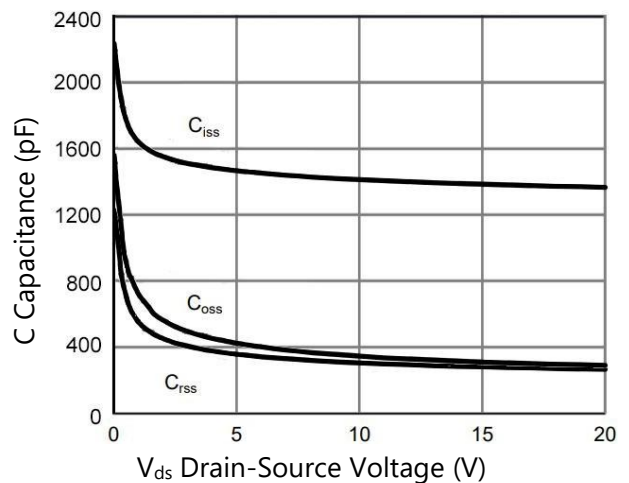
**Figure 8.  $R_{dson}$  vs Junction Temperature**



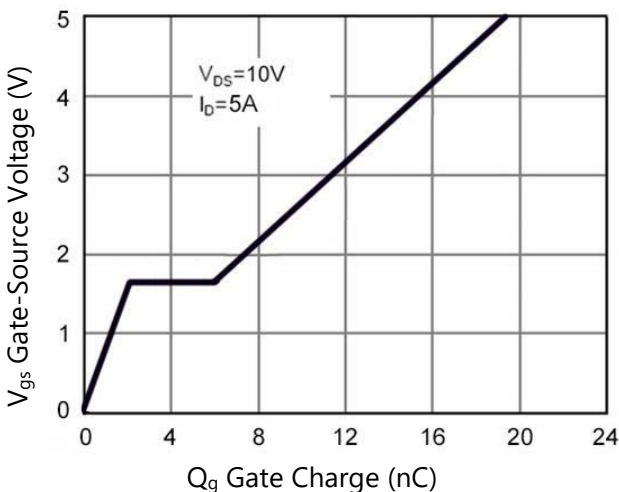
**Figure 9.  $R_{dson}$  vs  $V_{GS}$**



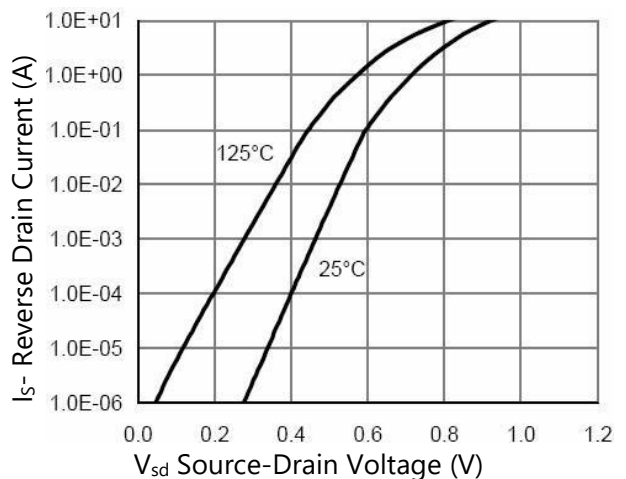
**Figure 10. Capacitance vs  $V_{ds}$**



**Figure 11. Gate Charge**

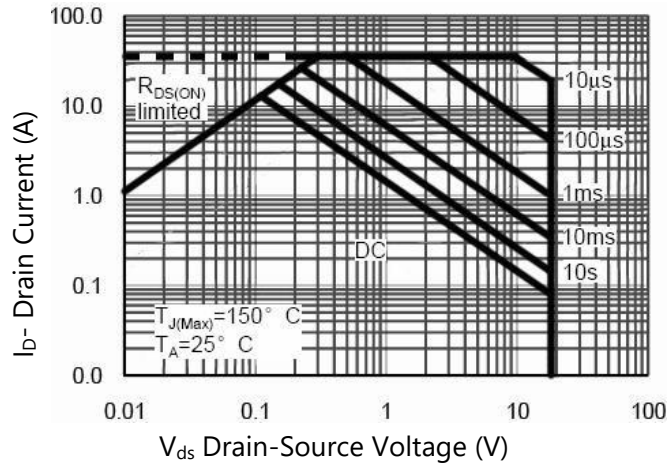


**Figure 12. Source-Drain Diode Forward**

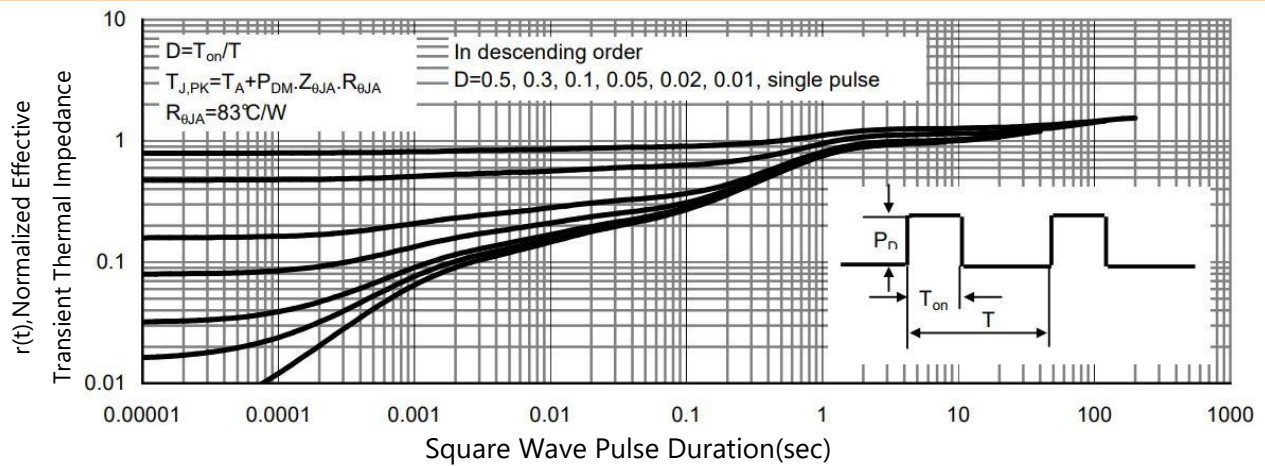


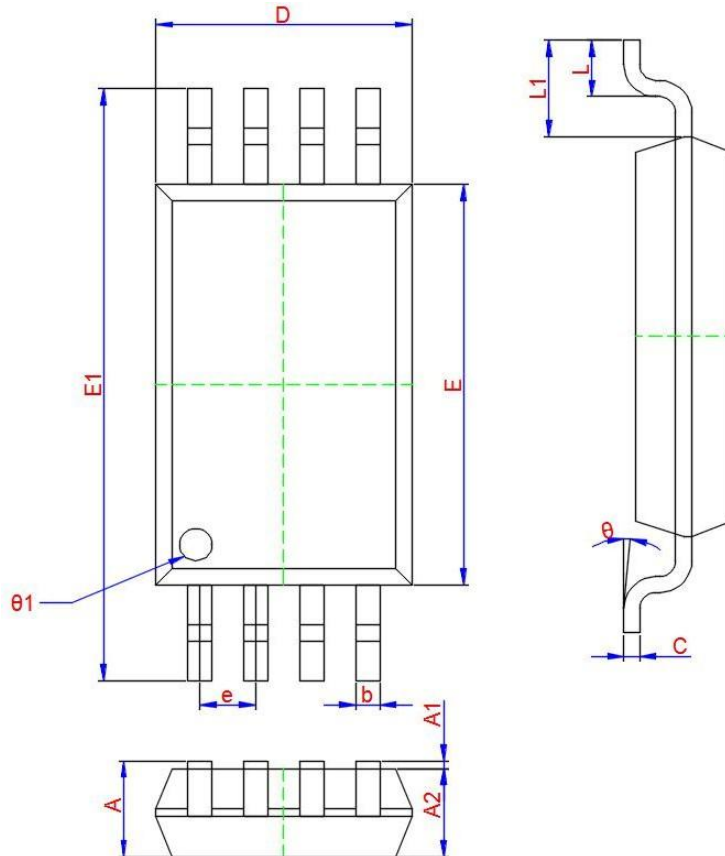
**TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS**

**Figure 13. Safe Operation Area**



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



**PACKAGE INFORMATION**
**TSSOP-8**


Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.000	1.150	1.200
A1	0.020	0.100	0.180
A2	0.900	1.000	1.100
b	0.170	0.220	0.270
c	0.122	0.127	0.132
L	0.400	0.600	0.800
D	2.870	2.970	3.070
E	4.300	4.400	4.500
E1	6.200	6.400	6.600
theta1	0.500	0.600	0.700
theta	0°	5°	10°
L1	1.00TYP		
e	0.65TYP		