

DESCRIPTION

The MX3416 is N-channel MOS Field Effect Transistor designed for load switching applications with ESD Protected Gate.

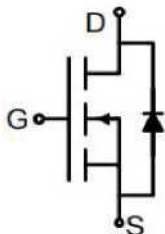
GENERAL FEATURES

- $V_{DS}=20V$, $I_D=6A$
 $R_{DS(ON)}(Typ.)=18m\Omega$ @ $V_{GS}=2.5V$
 $R_{DS(ON)}(Typ.)=14m\Omega$ @ $V_{GS}=4.5V$
- Ultra Low On-Resistance
- ESD Protected Gate

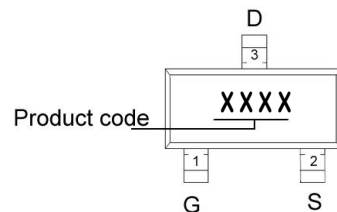
APPLICATION

- Battery protection
- Load switch

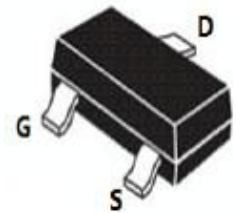
PINOUT



Schematic diagram



Marking and Pin Assignment



SOT23-3L top view

ORDERING INFORMATION

Device	Storage Temperature	Package	Devices Per Reel
MX3416	-55°C to 150°C	SOT23-3L	3000

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}	± 10	V
Drain Current(DC) at $T_C=25^\circ C$	$I_{D(DC)}$	6	A
Drain Current-Continuous @ Current-Pulsed ^(Note1)	$I_{DM(pluse)}$	24	A
Maximum Power Dissipation($T_C=25^\circ C$)	P_D	1.4	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	$^\circ C$

THERMAL RESISTANCE

Thermal Resistance, Junction-to-Ambient ^(Note2)	$R_{\theta JA}$	90	$^\circ C/W$
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Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.


ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$ unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
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On/Off Characteristics

Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=250\mu A$	20	22	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=20V, V_{GS}=0V$	-	-	1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 10V, V_{DS}=0V$	-	-	± 10	μA
Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=250\mu A$	0.5	0.7	1.1	V
Drain-Source On-State Resistance	$R_{DS(on)}$	$V_{GS}=2.5V, I_D=4A$	-	18	26	$m\Omega$
		$V_{GS}=4.5V, I_D=4A$	-	14	20	$m\Omega$

Dynamic Characteristics

Forward Transconductance	g_{FS}	$V_{DS}=5V, I_D=4.5A$	4	-	-	S
Input Capacitance	C_{iss}	$V_{DS}=8V, V_{GS}=0V,$ $F=1.0MHz$	-	410	-	pF
Output Capacitance	C_{oss}		-	85	-	pF
Reverse Transfer Capacitance ^(Note4)	C_{rss}		-	72	-	pF
Total Gate Charge	Q_g	$V_{DS}=10V, I_D=6A,$ $V_{GS}=4.5V$	-	10	-	nC
Gate-Source Charge	Q_{gs}		-	2.8	-	nC
Gate-Drain Charge	Q_{gd}		-	1.8	-	nC

Switching Characteristics

Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=10V, I_D=1A,$ $V_{GS}=5V, R_G=3\Omega$	-	25	-	nS
Turn-on Rise Time	t_r		-	42	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	36	-	nS
Turn-Off Fall Time	t_f		-	37	-	nS

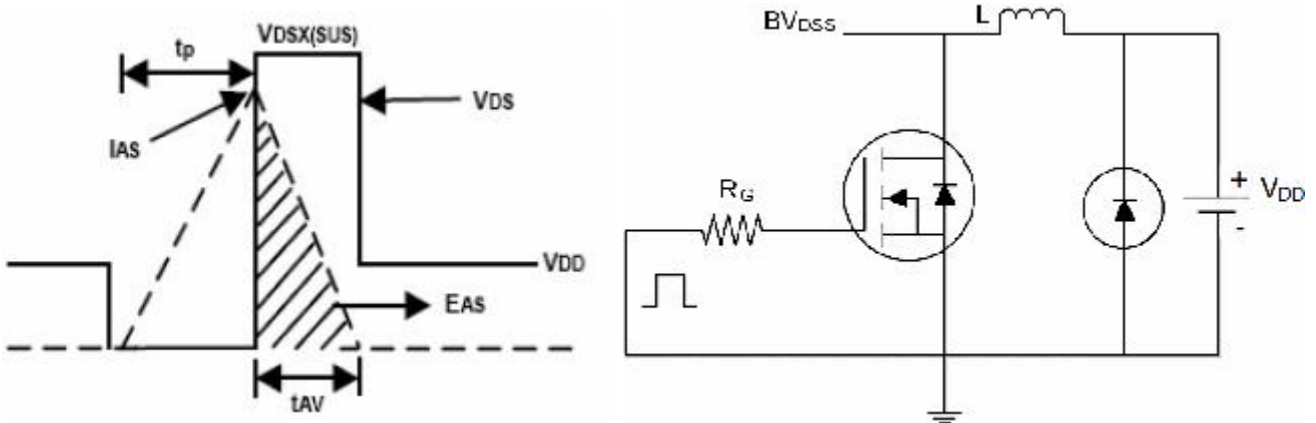
Source-Drain Diode Characteristics

Source-Drain Current(Body Diode)	I_{SD}		-	-	1.7	A
Forward On Voltage ^(Note 1)	V_{SD}	$V_{GS}=0V, I_{SD}=1A$	-	-	1.2	V

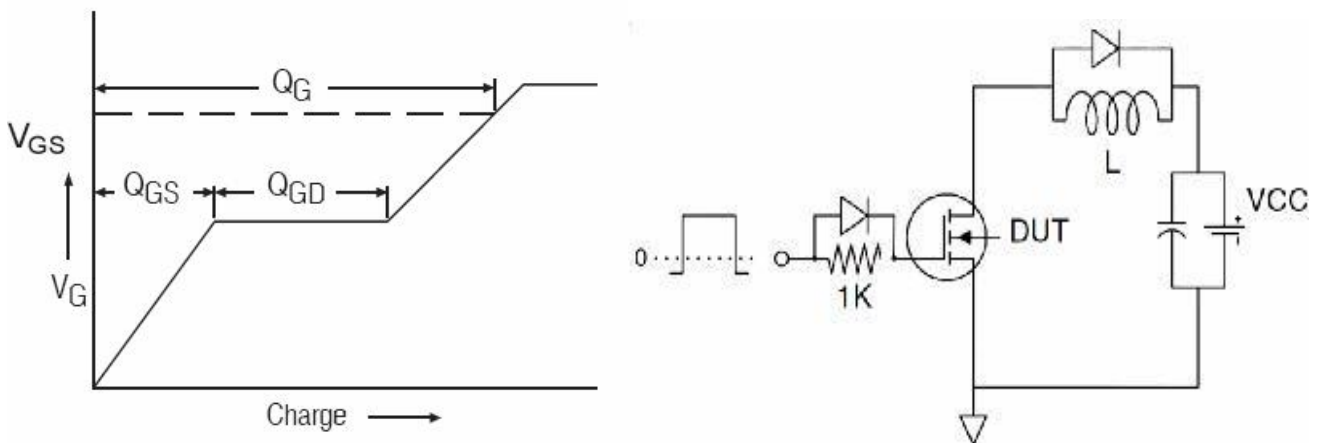
Note 1. Pulse Test: Pulse Width $\leq 300\mu s$, Duty Cycle $\leq 2\%$. $R_G=25\Omega$, Starting $T_J=25^\circ C$

TEST CIRCUIT

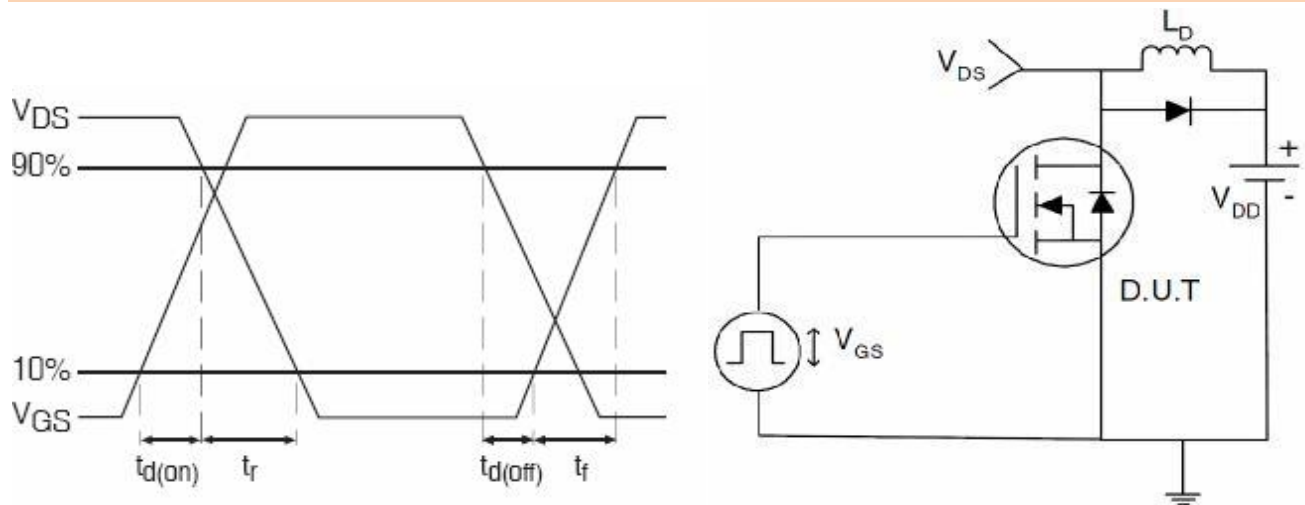
1、EAS test Circuit



2、Gate charge test Circuit



3、Switch Time Test Circuit



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Output Characteristics

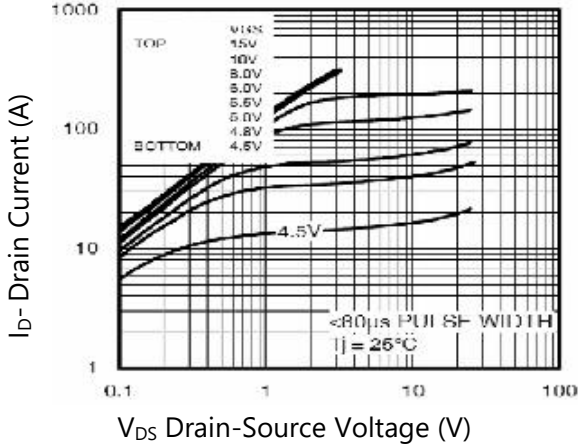


Figure 2. Transfer Characteristics

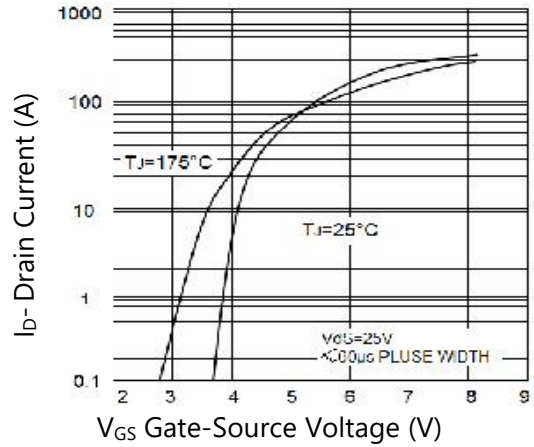


Figure 3. BV_{DSS} vs Junction Temperature

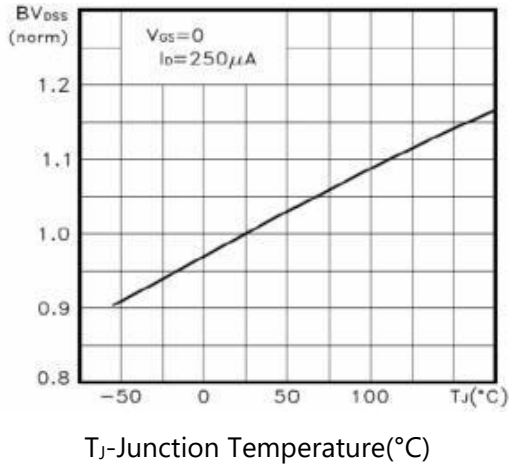


Figure 4. Power Dissipation

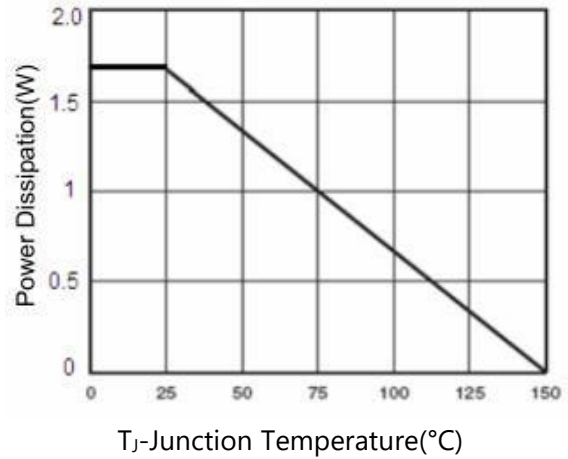


Figure 5. Gate Charge

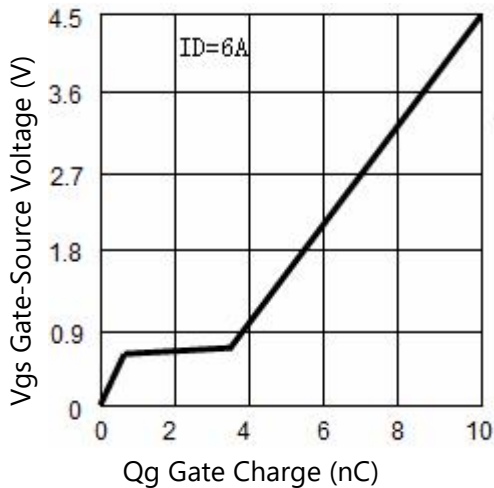
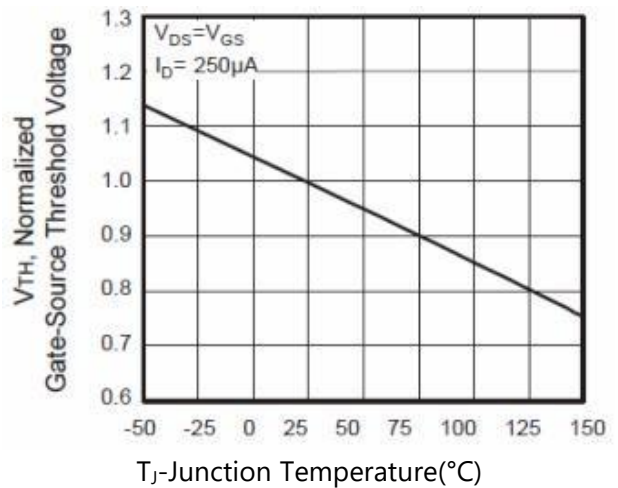


Figure 6. $V_{GS(th)}$ vs Junction Temperature



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. Capacitance vs Vds

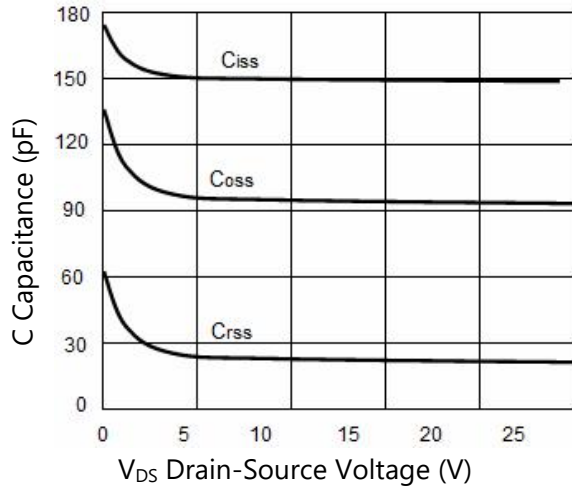


Figure 8. Source-Drain Diode Forward

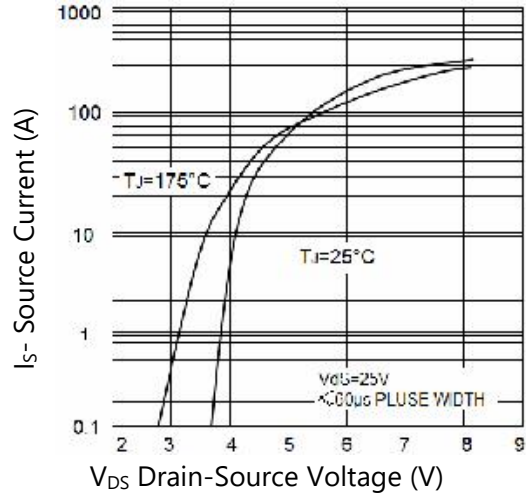


Figure 9. Safe Operation Area

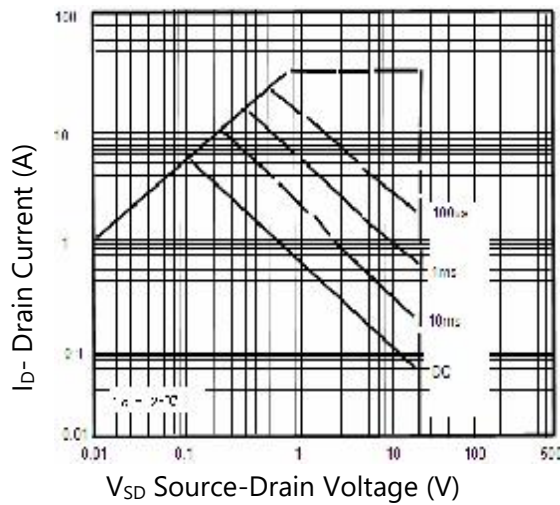
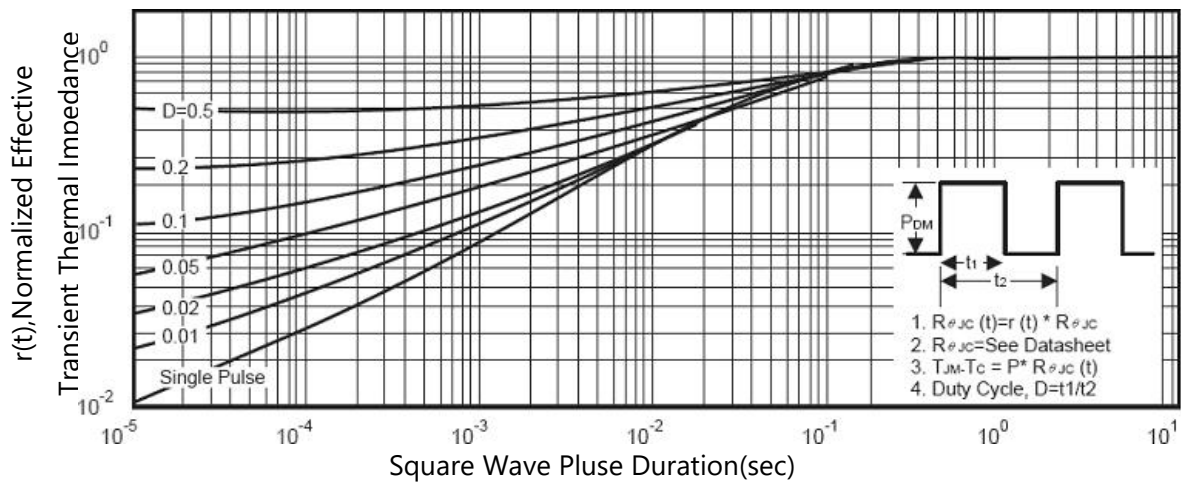
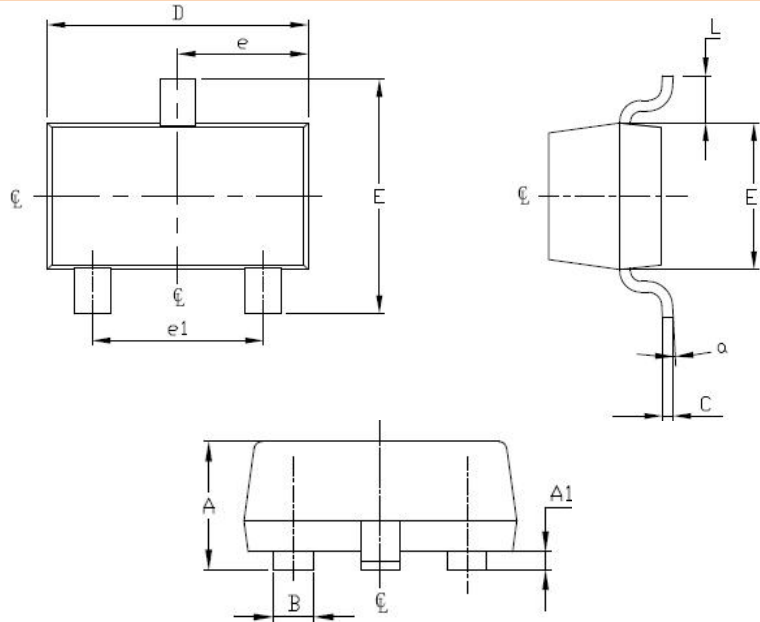


Figure 10. Normalized Maximum Transient Thermal Impedance



 **PACKAGE INFORMATION**

SOT23-3L



Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	0.9	1.0	1.1
A1	0.00	0.06	0.1
B	0.3	0.4	0.5
C	0.07	0.09	0.18
D	2.8	2.9	3.04
E	2.1	2.33	2.64
E1	1.2	1.3	1.4
e	1.4	1.45	1.5
e1	1.80	1.90	2.00
L	0.45	0.54	0.63
α	0°	2.5°	7°