P-Channel Enhancement Mode Power MOSFET **MX3415L**

DESCRIPTION

The MX3415L 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 applications.

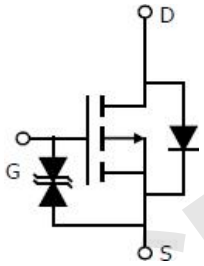
GENERAL FEATURES

- V_{DS}=-20V, I_D=-4A
  $R_{DS(ON)}$(Typ.)=42mΩ @ V_{GS}=-2.5V
  $R_{DS(ON)}$(Typ.)=32mΩ @ V_{GS}=-4.5V
- High Power and current handing capability
- Lead free product is acquired
- ESD Rating 4000V HBM

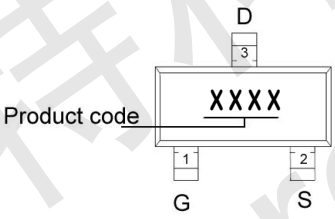
APPLICATION

- PWM applications
- Load switch
- Power management

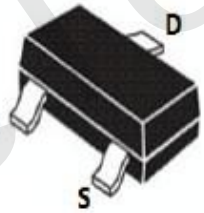
PINOUT



Schematic diagram



Marking and pin Assignment



SOT-23 top view

ORDERING INFORMATION

Part Number	StorageTemperature	Package	Devices Per Reel
MX3415L	-55°C to 150°C	SOT-23	3000

ABSOLUTE MAXIMUM RATINGS(T_A=25°C unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-20	V
Gate-Source Voltage	V_{GS}	±10	V
Drain Current-Continuous(T_C=25°C)	I_D	-4	A
Pulsed Drain Current(Note1)	I_{DM}	-30	A
Maximum Power Dissipation(T_C=25°C)	P_D	1.4	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to 150	°C

THERMAL RESISTANCE

Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$	90	°C/W

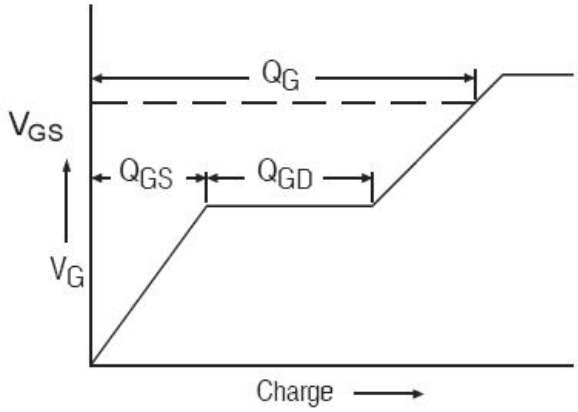
Note 1. Repetitive Rating: Pulse width limited by maximum junction temperature.

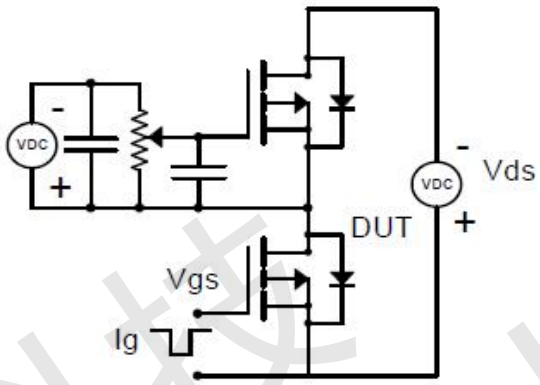
ELECTRICAL CHARACTERISTICS(T_A=25°C unless otherwise noted)

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
On/Off Characteristics						
Drain-Source Breakdown Voltage	BV_{DSS}	V_{GS}=0V, I_D=-250μA	-20	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	V_{DS}=-20V, V_{GS}=0V	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	V_{GS}=±10V, V_{DS}=0V	-	-	±10	μA
Gate Threshold Voltage	$V_{GS(th)}$	V_{DS}=V_{GS}, I_D=-250μA	-0.45	-0.65	-1.1	V
Drain-Source On-State Resistance	$R_{DS(ON)}$	V_{GS}=-2.5V, I_D=-4A	-	42	58	mΩ
		V_{GS}=-4.5V, I_D=-4A	-	32	42	mΩ
Dynamic Characteristics						
Forward Transconductance	g_{FS}	V_{DS}=-5V, I_D=-4A	-	12	-	S
Input Capacitance	C_{iss}	V_{DS}=-10V, V_{GS}=0V, F=1.0MHz	-	1084	-	pF
Output Capacitance	C_{oss}		-	140	-	pF
Reverse Transfer Capacitance	C_{rss}		-	111	-	pF
Total Gate Charge	Q_g	V_{DS}=-10V, I_D=-4A, V_{GS}=-4.5V	-	11	-	nC
Gate-Source Charge	Q_{gs}		-	1.4	-	nC
Gate-Drain Charge	Q_{gd}		-	3.4	-	nC
Switching Characteristics(Note4)						
Turn-on Delay Time	$t_{d(on)}$	V_{DS}=-10V, V_{GS}=-4.5V, R_L=2.5Ω, R_G=3Ω	-	26	-	nS
Turn-on Rise Time	t_r		-	19	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	51	-	nS
Turn-Off Fall Time	t_f		-	62	-	nS
Drain-Source Diode Characteristics						
Source-Drain Current(Body Diode)	I_{SD}		-	-	-4	A
Diode Forward Voltage(Note 3)	V_{SD}	V_{GS}=0V, I_S=-4A	-	-	-1.2	V

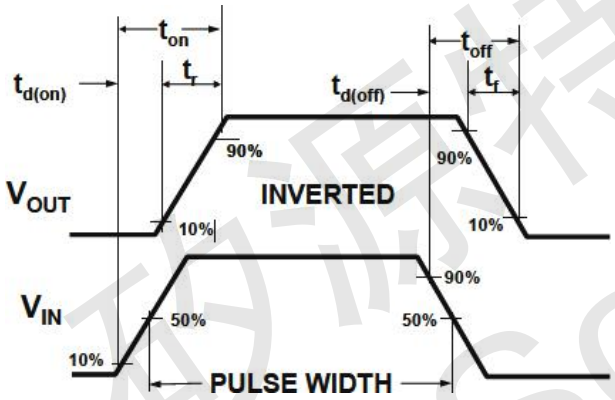
TEST CIRCUIT

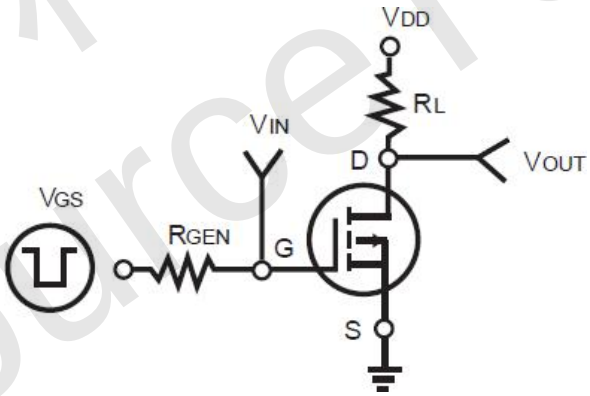
1、Gate Charge Test Circuit





2、Switch Time Test Circuit and Switching Waveforms





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Power Dissipation

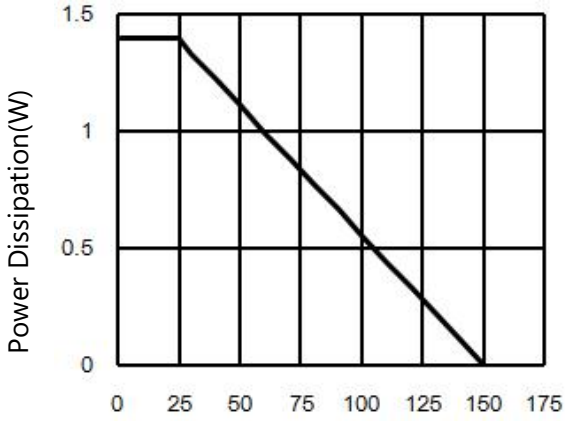


Figure 2. Drain Current

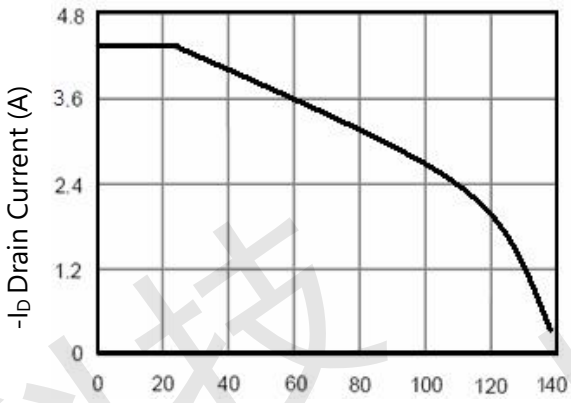


Figure 3. Output Characteristics

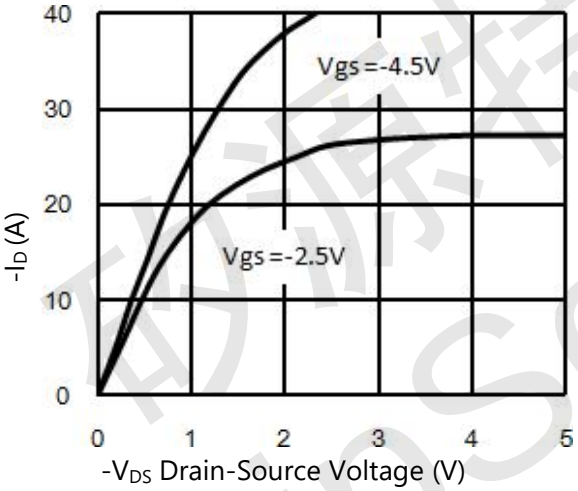


Figure 4. Transfer Characteristics

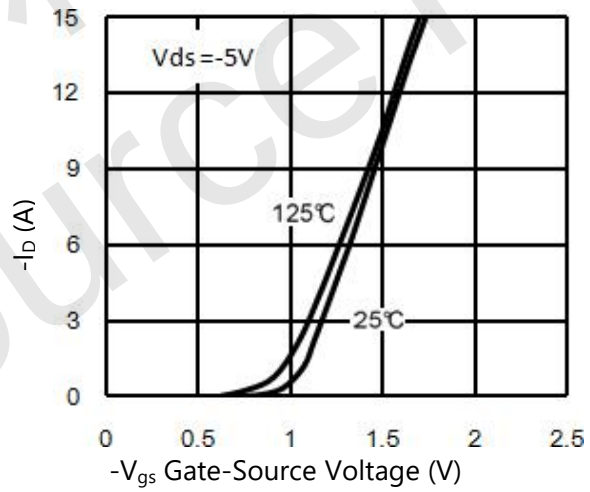


Figure 5. $V_{GS(th)}$ vs Junction Temperature

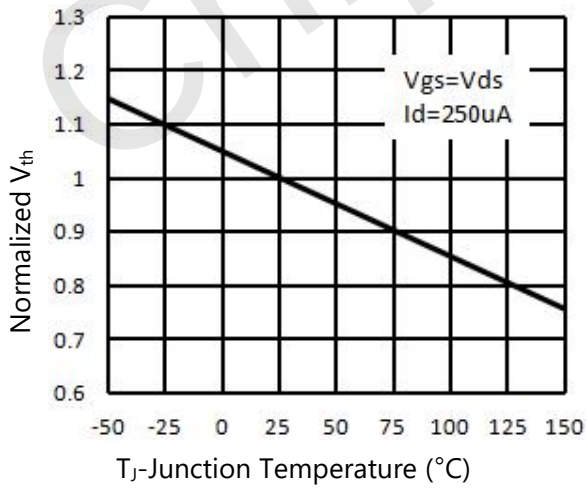
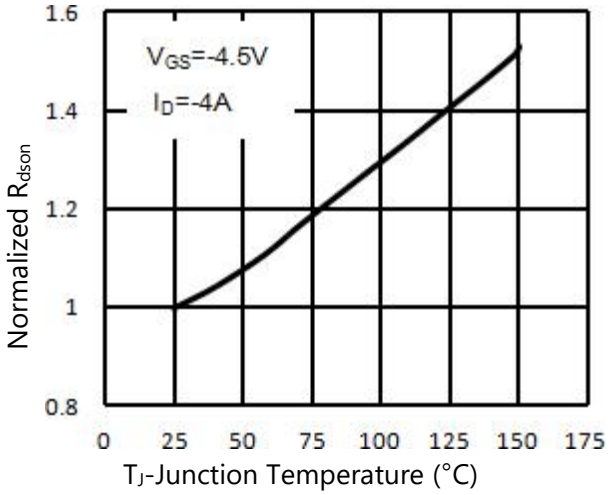


Figure 6. $R_{DS(ON)}$ vs Junction Temperature



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. Gate Charge Waveforms

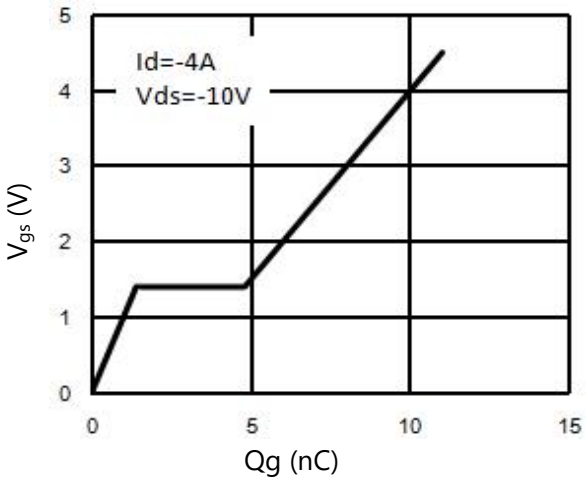


Figure 8. Capacitance

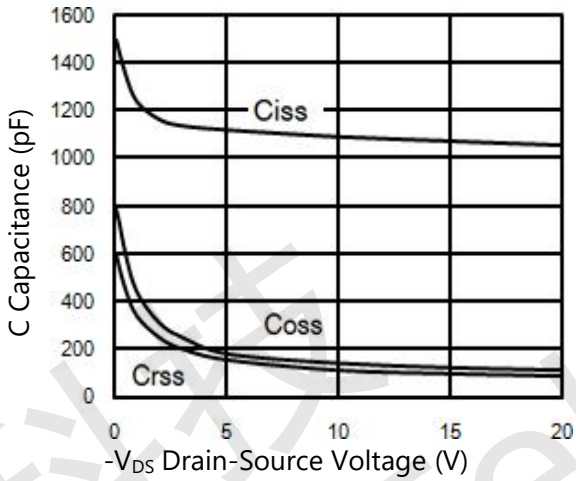


Figure 9. Body-Diode Characteristics

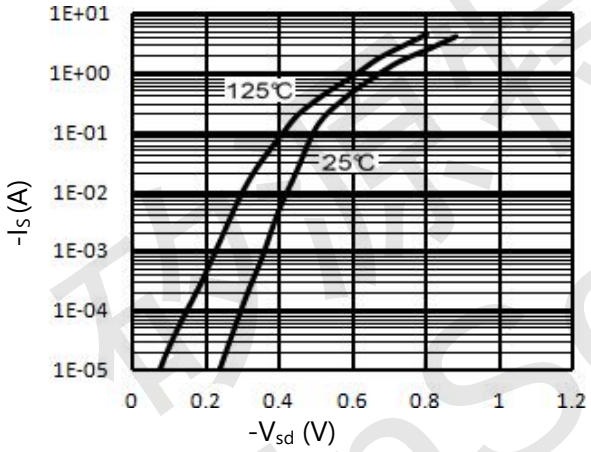
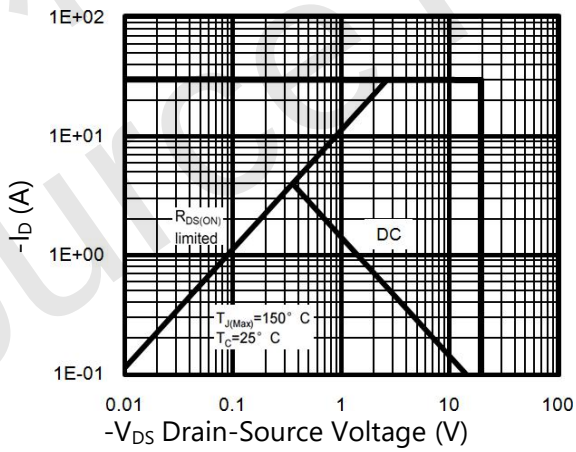
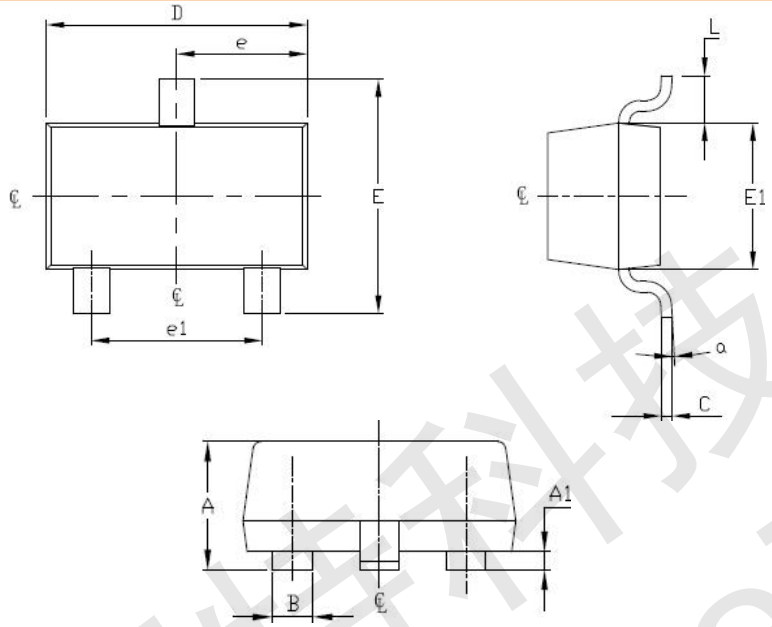


Figure 10. Maximum Safe Operating Area



PACKAGE INFORMATION

SOT-23



Symbol	Dimensions InMillimeters		
	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°