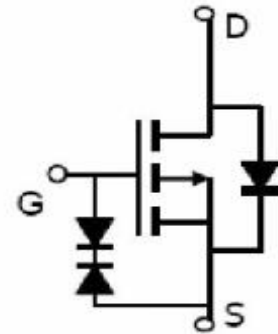




P-Channel Enhancement Mode Power MOSFET

Description

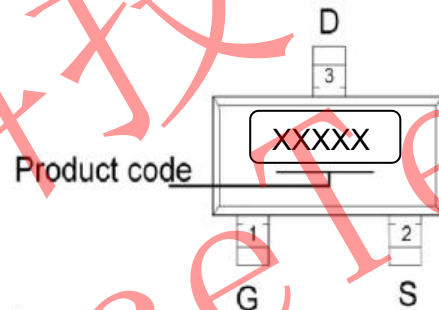
The MX3415 uses advanced trench technology to provide excellent $R_{DS(ON)}$, low gate charge and operation with gate voltages as low as 1.8V. This device is suitable for use as a load switch or in PWM applications. It is ESD protected.



General Features

- $V_{DS} = -20V$, $I_D = -4.5A$
- $R_{DS(ON)}(Typ.) < 33m\Omega$ @ $V_{GS} = -4.5V$
- $R_{DS(ON)}(Typ.) < 44m\Omega$ @ $V_{GS} = -2.5V$
- ESD Rating: 2500V HBM
- High Power and current handling capability
- Lead free product is acquired
- Surface mount package

Schematic diagram



Application

- ◆ PWM applications
- ◆ Load switch

Marking and pin assignment SOT-23-3 (TOP VIEW)

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-Continuous	I_D	-4.5	A
Drain Current-Pulsed (Note 1)	I_{DM}	-30	A
Maximum Power Dissipation	P_D	1.4	W
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 To 150	$^\circ C$

Thermal Characteristic

Thermal Resistance, Junction-to-Ambient (Note 2)	$R_{\theta JA}$	89.3	$^\circ C/W$
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Electrical Characteristics (TA=25°C unless otherwise noted)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
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
On Characteristics (Note 3)						
Gate Threshold Voltage	V _{GS(th)}	V _{DS} =V _{GS} , I _D =-250μA	-0.4	-0.65	-1.0	V
Drain-Source On-State Resistance	R _{DS(ON)}	V _{GS} =-4.5V, I _D =-4A	-	33	47	mΩ
		V _{GS} =-2.5V, I _D =-4A	-	44	60	mΩ
Forward Transconductance	g _{FS}	V _{DS} =-5V, I _D =-4A	8	-	-	S
Dynamic Characteristics (Note4)						
Input Capacitance	C _{iss}	V _{DS} =-10V, V _{GS} =0V, F=1.0MHz	-	950	-	PF
Output Capacitance	C _{oss}		-	165	-	PF
Reverse Transfer Capacitance	C _{rss}		-	120	-	PF
Switching Characteristics (Note 4)						
Turn-on Delay Time	t _{d(on)}	V _{DD} =-10V, R _L =2. 5Ω V _{GS} =-4.5V, R _{GEN} =3Ω	-	12		nS
Turn-on Rise Time	t _r		-	10		nS
Turn-Off Delay Time	t _{d(off)}		-	19		nS
Turn-Off Fall Time	t _f		-	25		nS
Total Gate Charge	Q _g	V _{DS} =-10V, I _D =-4A, V _{GS} =-4.5V	-	12		nC
Gate-Source Charge	Q _{gs}		-	1.4	-	nC
Gate-Drain Charge	Q _{gd}		-	3.6	-	nC
Drain-Source Diode Characteristics						
Diode Forward Voltage (Note 3)	V _{SD}	V _{GS} =0V, I _s =-1A	-	-	-1.2	V
Diode Forward Current (Note 2)	I _s		-	-	-2.2	A

Notes:

- 1.Repetitive Rating: Pulse width limited by maximum junction temperature.
- 2.Surface Mounted on FR4 Board, t ≤ 10 sec.
- 3.Pulse Test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2%.
- 4.Guaranteed by design, not subject to production



Typical Performance Characteristics

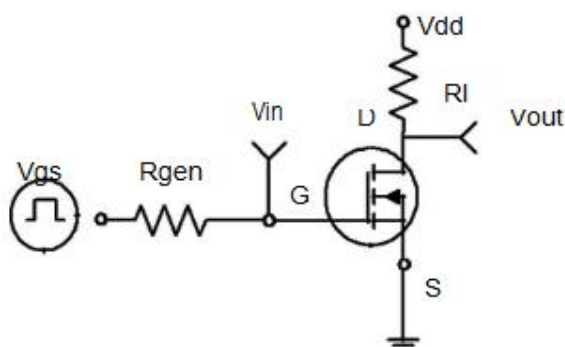


Figure 1: Switching Test Circuit

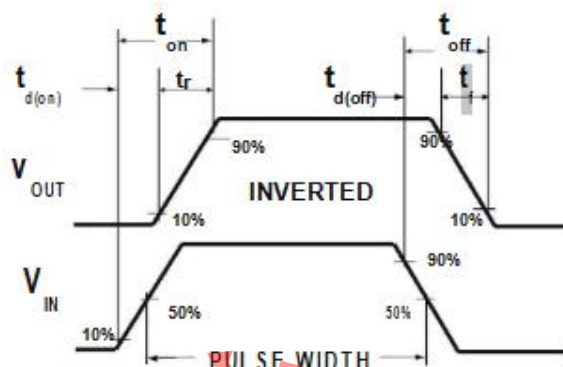
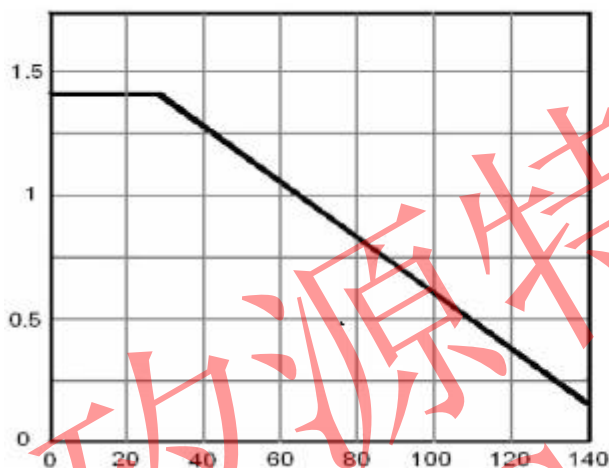
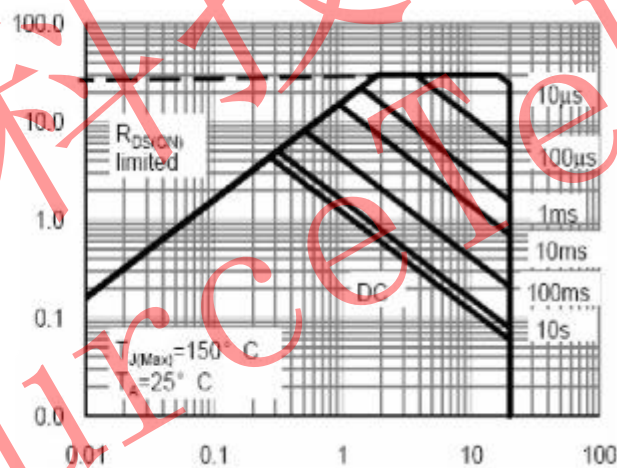


Figure 2: Switching Waveforms



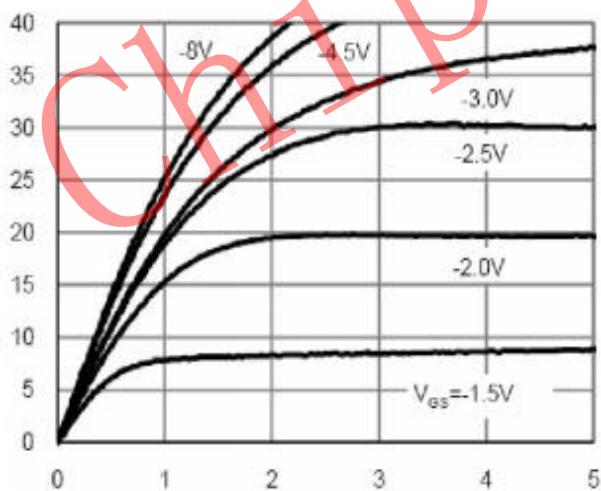
T_J-Junction Temperature(°C)

Figure 3 Power Dissipation



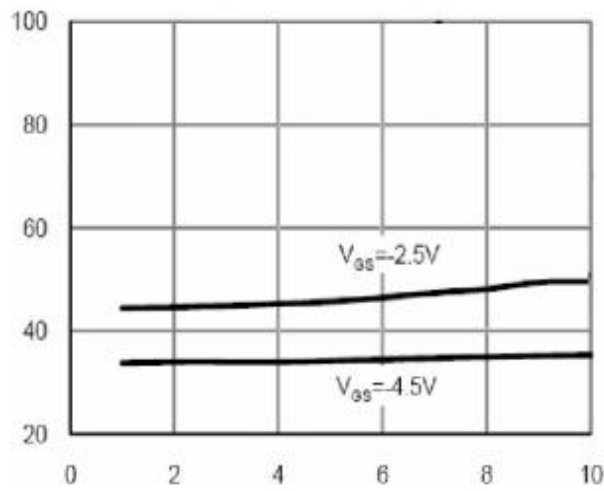
V_{ds} Drain-Source Voltage (V)

Figure 4 Safe Operation Area



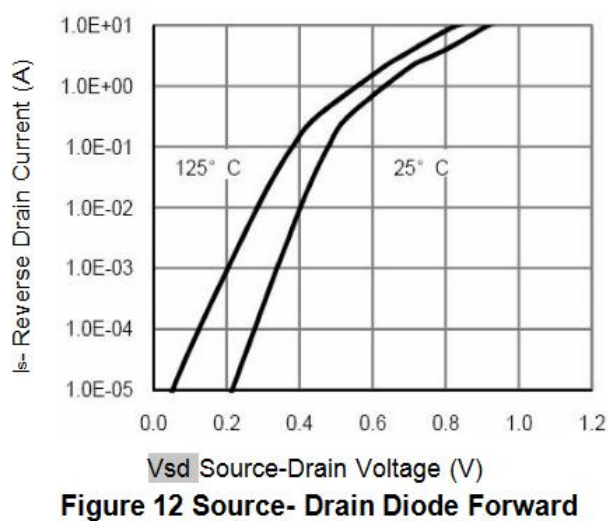
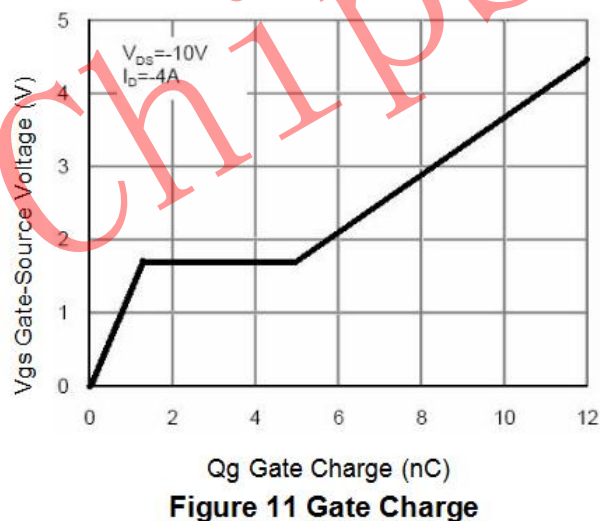
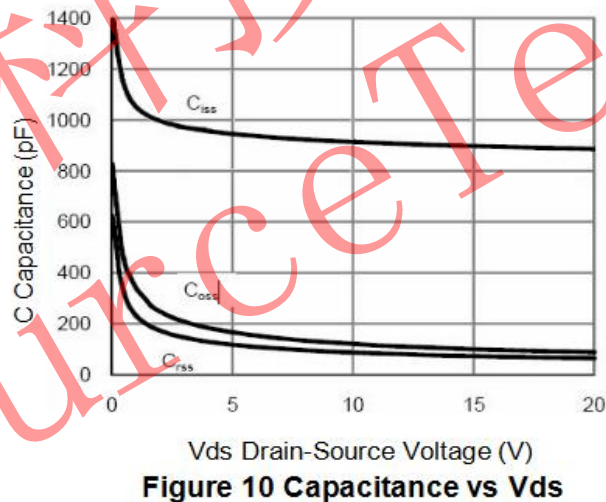
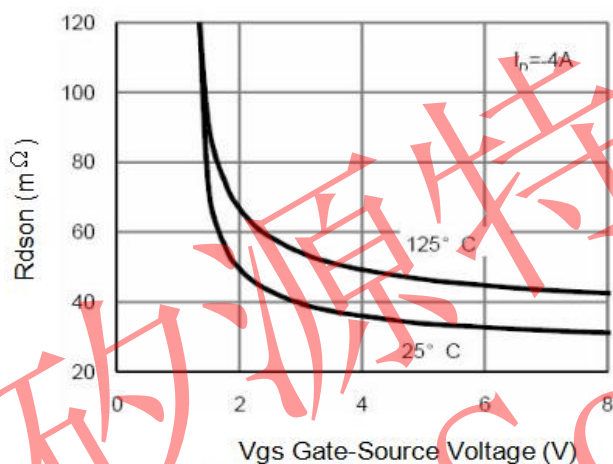
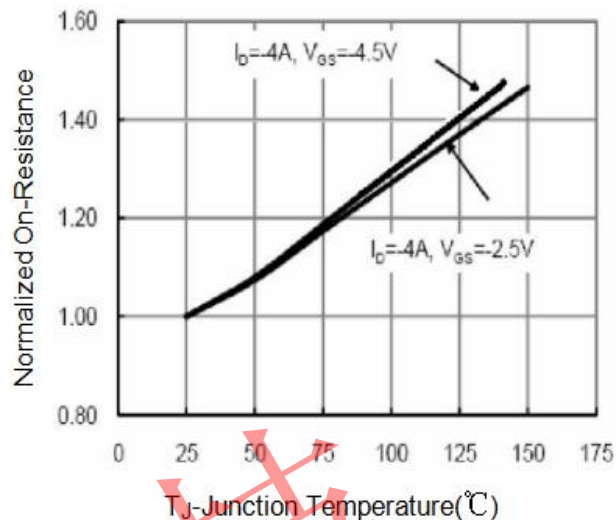
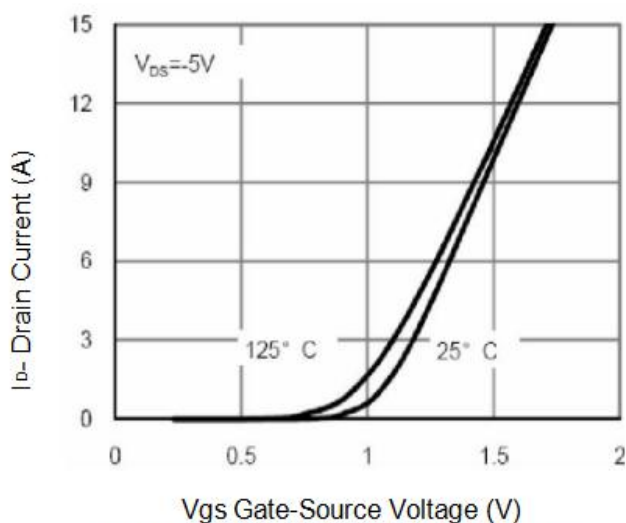
V_{ds} Drain-Source Voltage (V)

Figure 5 Output CHARACTERISTICS



I_D- Drain Current (A)

Figure 6 Drain-Source On-Resistance



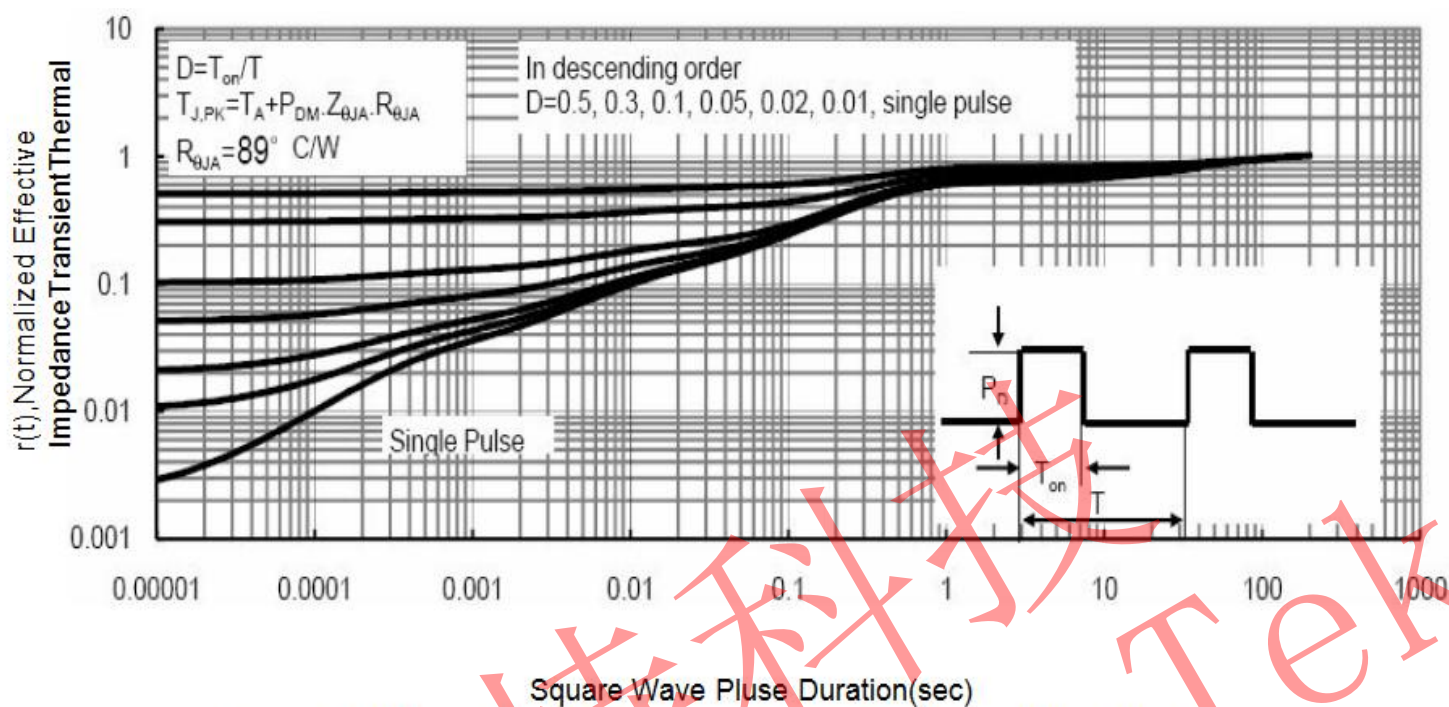
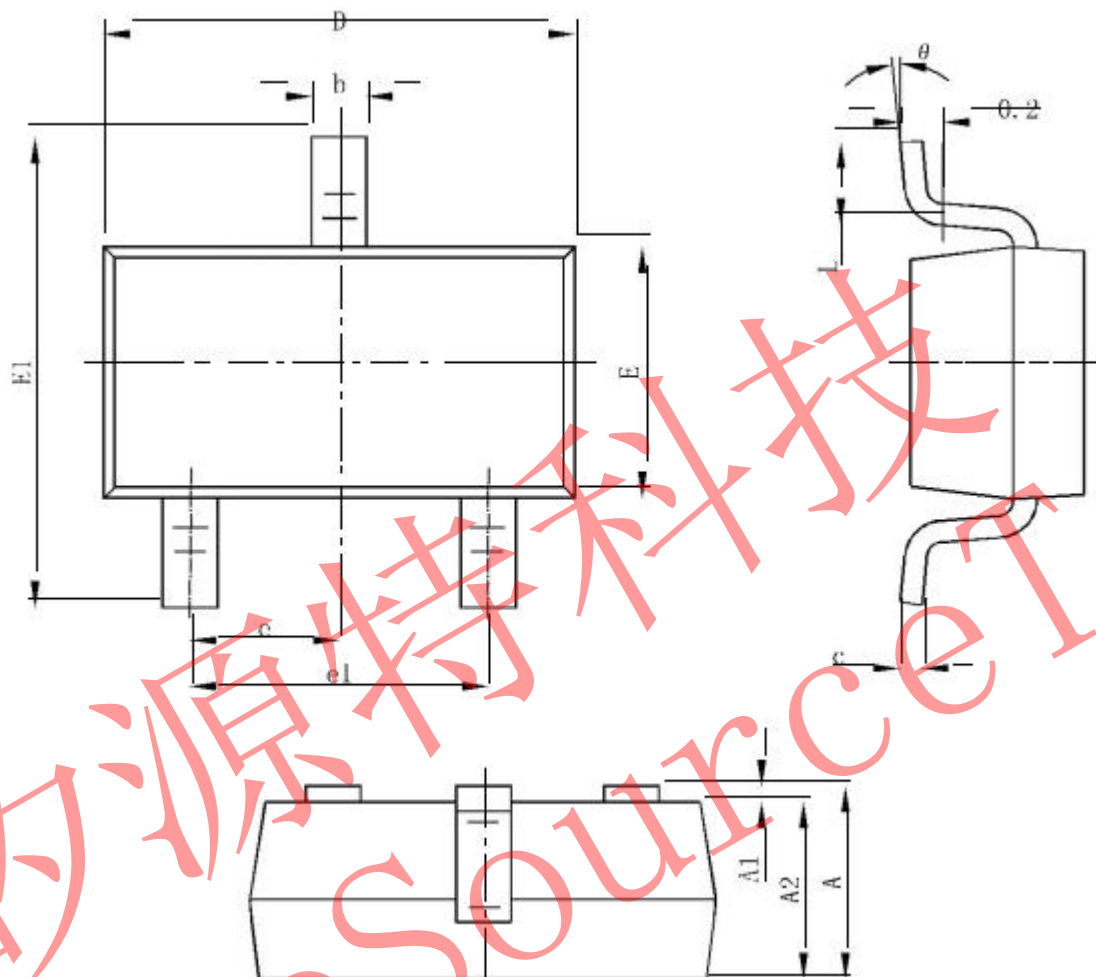


Figure 13 Normalized Maximum Transient Thermal Impedance



SOT23-3 PACKAGE INFOR



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°