

DESCRIPTION

The MX3409 uses advanced trench technology to provide excellent $R_{DS(ON)}$, This device is suitable for use as a load switch or in PWM applications.

GENERAL FEATURES

- $V_{DS}=-30V$, $I_D=-4.3A$
 $R_{DS(ON)}(Typ.)=60m\Omega$ @ $V_{GS}=-4.5V$
 $R_{DS(ON)}(Typ.)=38m\Omega$ @ $V_{GS}=-10V$
- High Power and current handling capability
- Lead free product is acquired
- Surface Mount Package

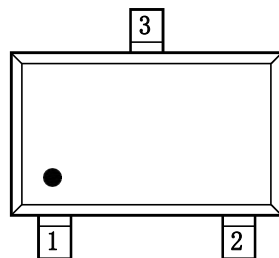
APPLICATION

- PWM applications
- Load switch
- Power management

PINOUT



Schematic diagram



Marking and Pin Assignment



SOT-23-3 top view

ORDERING INFORMATION

Part Number	Marking	Storage Temperature	Package	Devices Per Reel
MX3409		-55°C to 150°C	SOT-23-3	3000

ABSOLUTE MAXIMUM RATINGS ($T_A=25^\circ C$ unless otherwise noted)

Parameter	Symbol	Limit	Unit
Drain-Source Voltage	V_{DS}	-30	V
Gate-Source Voltage	V_{GS}	± 20	V
Drain Current-Continuous	I_D	-4.3	A
Drain Current-Pulsed ^(Note1)	I_{DM}	-20	A
Drain-Source Diode Forward Current	I_S	-1.25	A
Maximum Power Dissipation	P_D	1.5	W
Operating Junction Temperature Range	T_J	-55 to 150	°C

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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Off Characteristics

Drain-Source Breakdown Voltage	BV_{DSS}	$V_{GS}=0V, I_D=-250\mu A$	-30	-	-	V
Zero Gate Voltage Drain Current	I_{DSS}	$V_{DS}=-24V, V_{GS}=0V$	-	-	-1	μA
Gate-Body Leakage Current	I_{GSS}	$V_{GS}=\pm 20V, V_{DS}=0V$	-	-	± 100	nA

On Characteristics (Note3)

Gate Threshold Voltage	$V_{GS(th)}$	$V_{DS}=V_{GS}, I_D=-250\mu A$	-1.4	-1.6	-2.4	V
		$V_{GS}=-4.5V, I_D=-4A$	-	60	100	m Ω
		$V_{GS}=-10V, I_D=-4.3A$	-	38	50	m Ω
Forward Transconductance	g_{FS}	$V_{DS}=-5V, I_D=-4.1A$	5.5	-	-	S

Dynamic Characteristics (Note4)

Input Capacitance	C_{iss}	$V_{DS}=-15V, V_{GS}=0V, F=1.0MHz$	-	700	-	pF
Output Capacitance	C_{oss}		-	120	-	pF
Reverse Transfer Capacitance	C_{rss}		-	75	-	pF

Switching Characteristics (Note4)

Turn-on Delay Time	$t_{d(on)}$	$V_{DD}=-15V, R_L=3.6\Omega, V_{GS}=-10V, R_{GEN}=3\Omega$	-	9	-	nS
Turn-on Rise Time	t_r		-	5	-	nS
Turn-Off Delay Time	$t_{d(off)}$		-	28	-	nS
Turn-Off Fall Time	t_f		-	13.5	-	nS
Total Gate Charge	Q_g	$V_{DS}=-15V, I_D=-4.2A, V_{GS}=-4.5V$	-	14	-	nC
Gate-Source Charge	Q_{gs}		-	3.1	-	nC
Gate-Drain Charge	Q_{gd}		-	3	-	nC

Drain-Source Diode Characteristics

Diode Forward Voltage (Note3)	V_{SD}	$V_{GS}=0V, I_S=-4.2A$	-	-	-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 production

TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 1. Switching Test Circuit

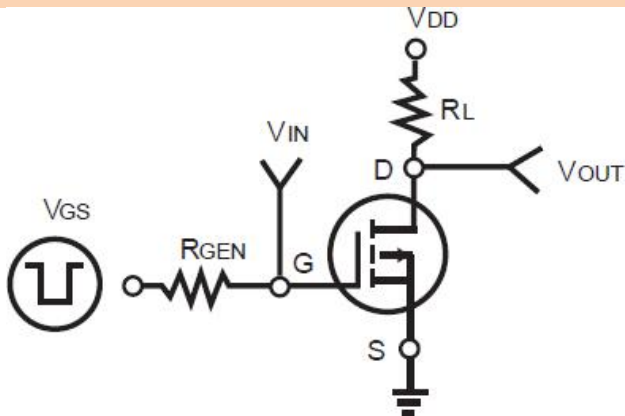


Figure 2. Switching Waveform

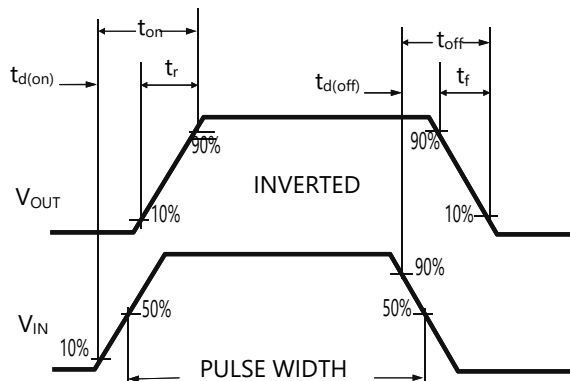


Figure 3. Power Dissipation

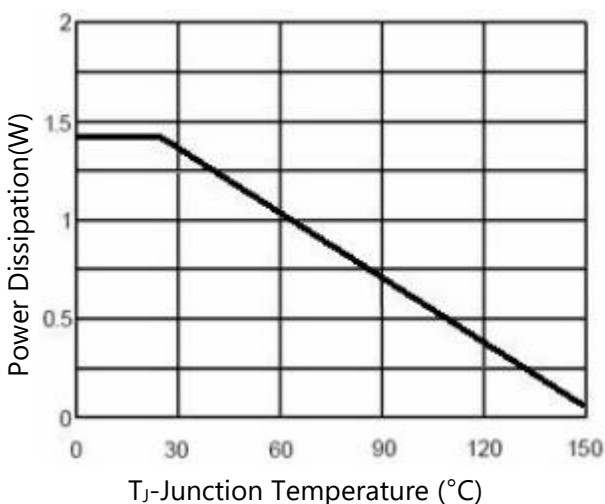


Figure 4. Drain Current

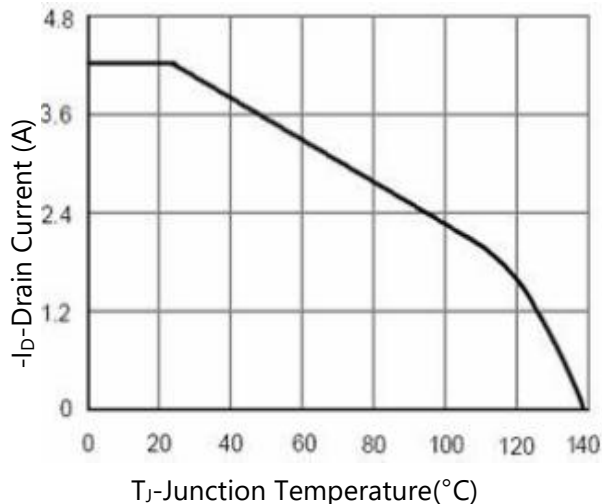


Figure 5. Output Characteristics

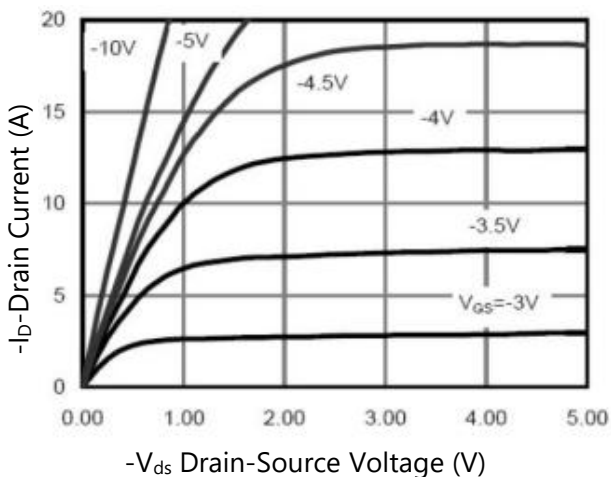
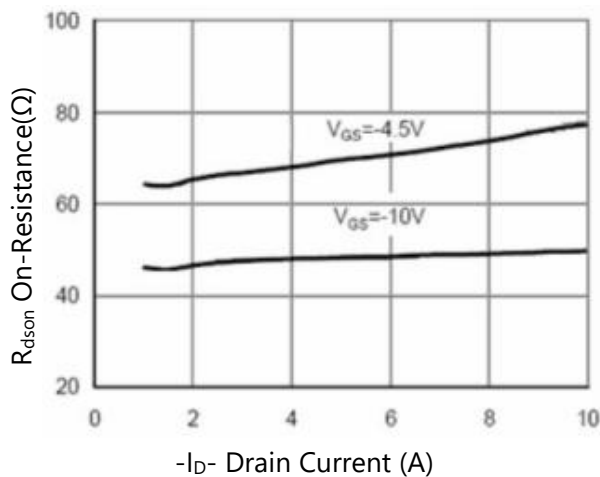


Figure 6. Drain-Source On-Resistance





TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 7. Transfer Characteristics

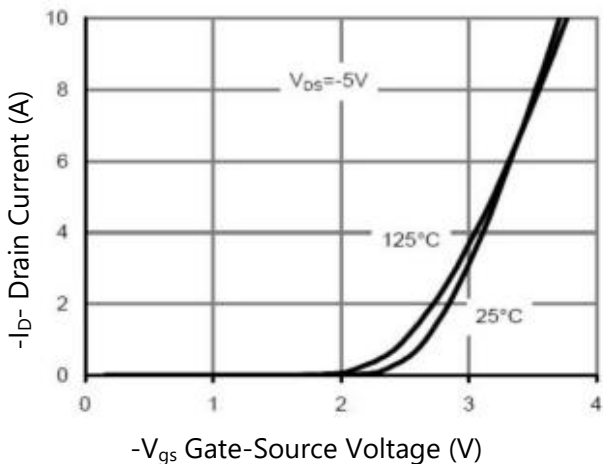


Figure 8. Drain-Source On-Resistance

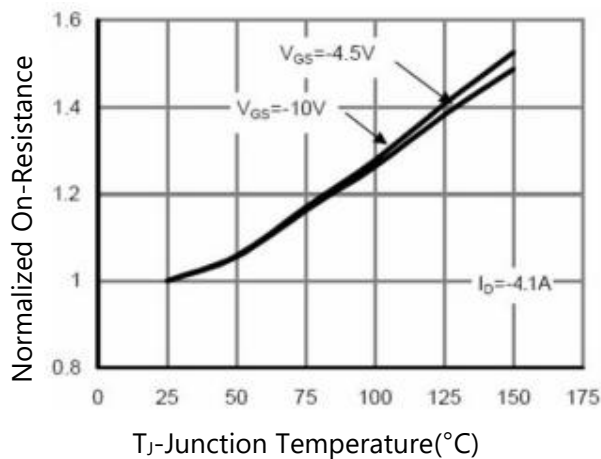


Figure 9. R_{ds(on)} vs V_{gs}

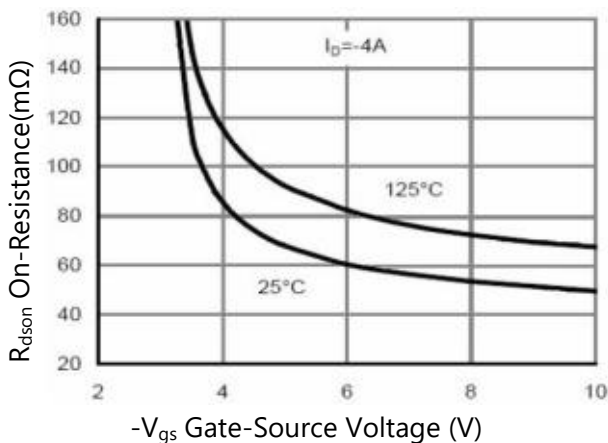


Figure 10. Capacitance vs V_{ds}

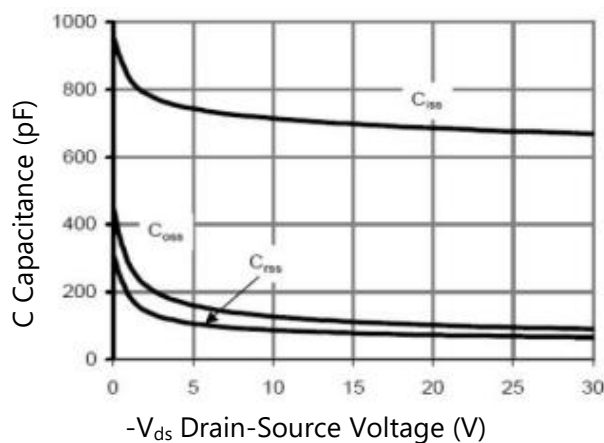


Figure 11. Gate Charge

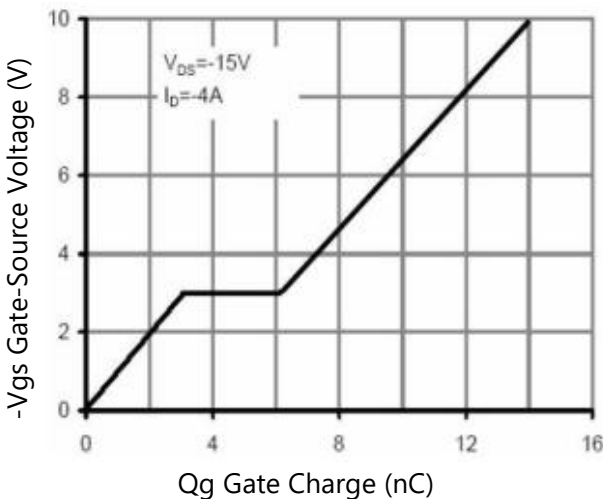
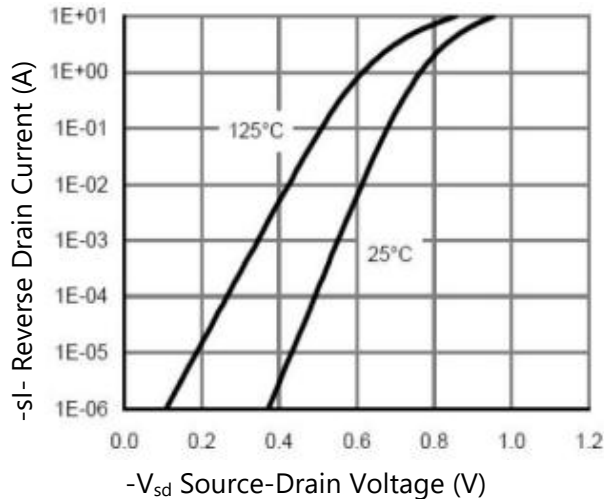


Figure 12. Source- Drain Diode Forward



TYPICAL ELECTRICAL AND THERMAL CHARACTERISTICS

Figure 11. Safe Operation Area

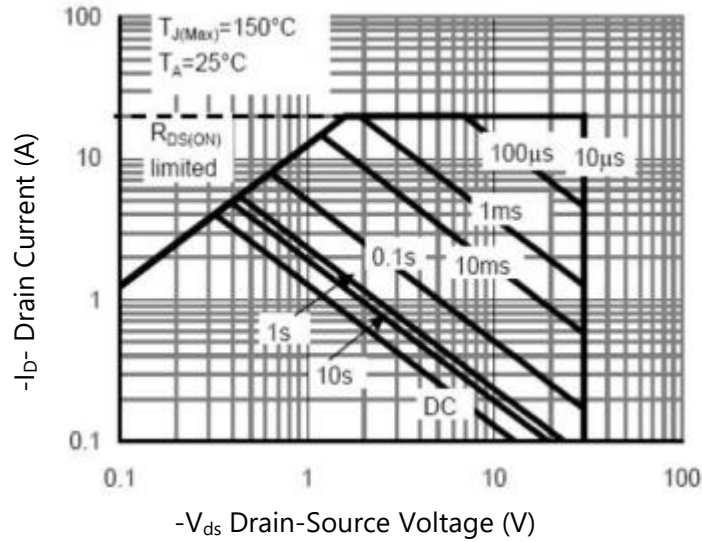
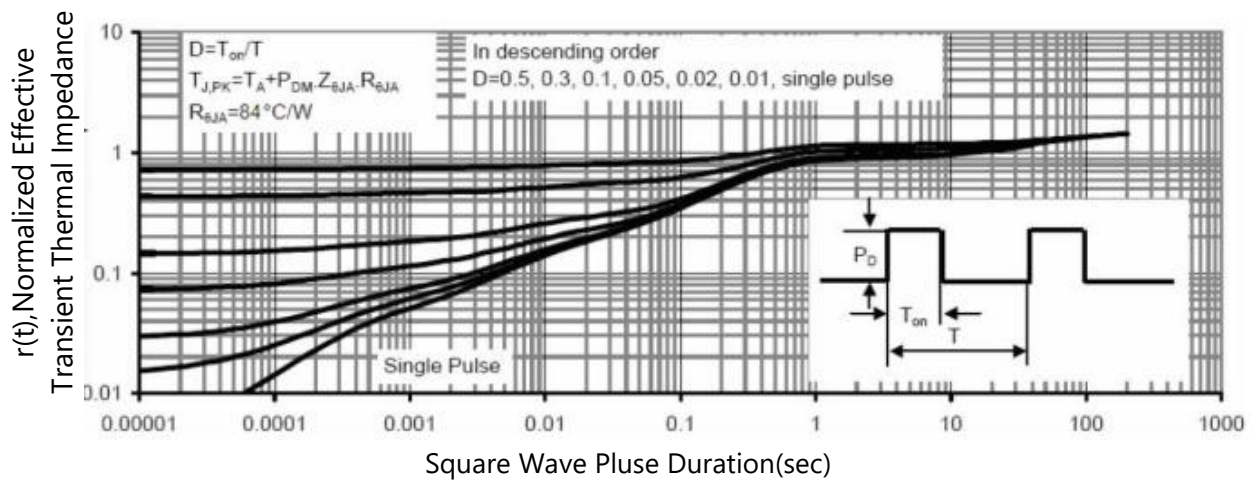
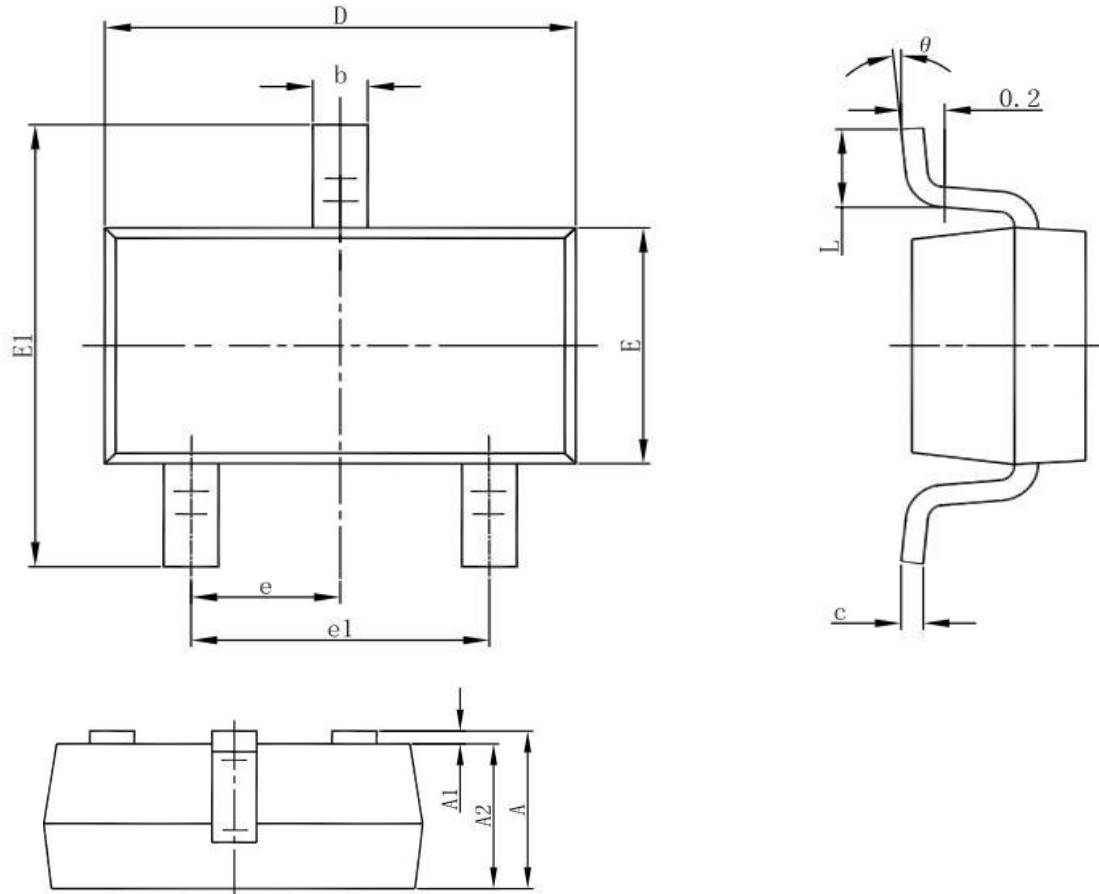


Figure 12. Normalized Maximum Transient Thermal Impedance



 **PACKAGE INFORMATION**

SOT23-3L



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°