

Small Signal MOSFET

25 V, 0.75 A, Single, N-Channel,
ESD Protection, SC-70/SOT-323

Features

- Advance Planar Technology for Fast Switching, Low $R_{DS(on)}$
- Higher Efficiency Extending Battery Life
- This is a Pb-Free Device
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

Applications

- Boost and Buck Converter
- Load Switch
- Battery Protection

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

Rating		Symbol	Value	Unit
Drain-to-Source Voltage		V_{DSS}	25	V
Gate-to-Source Voltage		V_{GS}	± 8.0	V
Drain Current	$t < 5\text{ s}$	I_D	0.75	A
Continuous Drain Current (Note 1)	Steady State		$T_A = 25^\circ\text{C}$	0.7
		$T_A = 75^\circ\text{C}$	0.6	A
Power Dissipation (Note 1)	Steady State	P_D	0.28	W
Power Dissipation (Note 1)	$t \leq 5\text{ s}$	P_D	0.33	W
Pulsed Drain Current	$t_p = 10\ \mu\text{s}$	I_{DM}	3.0	A
Operating Junction and Storage Temperature		T_J, T_{STG}	-55 to +150	$^\circ\text{C}$
Source Current (Body Diode) (Note 1)		I_S	0.3	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$
ESD Rating – Machine Model			250	V

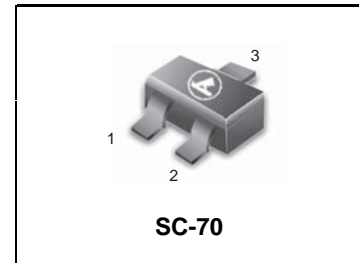
THERMAL RESISTANCE RATINGS

Rating	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	450	$^\circ\text{C/W}$
Junction-to-Ambient – $t \leq 5\text{ s}$ (Note 1)	$R_{\theta JA}$	375	$^\circ\text{C/W}$

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

1. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces).

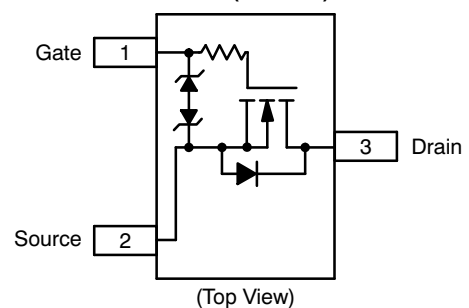
LNTS4409NWT1G
S-LNTS4409NWT1G



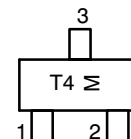
$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
25 V	249 m Ω @ 4.5 V	0.75 A
	299 m Ω @ 2.7 V	

PIN CONNECTIONS

SC-70 (3-Leads)



MARKING DIAGRAM



T4 = Specific Device Code
M = Month Code

Device	Package	Shipping
LNTS4409NWT1G S-LNTS4409NWT1G	SC-70 (Pb-Free)	3000/Tape & Reel

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

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	25			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			30		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 20\text{ V}$	$T_J = 25^\circ\text{C}$		0.5	μA
			$T_J = 70^\circ\text{C}$		2.0	
			$T_J = 125^\circ\text{C}$		5.0	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = 8.0\text{ V}$			3	μA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	0.5		1.5	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			-2.0		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 4.5\text{ V}, I_D = 0.6\text{ A}$		249	350	m Ω
		$V_{GS} = 2.7\text{ V}, I_D = 0.2\text{ A}$		299	400	
		$V_{GS} = 4.5\text{ V}, I_D = 1.2\text{ A}$		260		
Forward Transconductance	g_{FS}	$V_{DS} = 5.0\text{ V}, I_D = 0.5\text{ A}$		0.5		S

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 10\text{ V}$		49	60	pF
Output Capacitance	C_{OSS}			22.4	30	
Reverse Transfer Capacitance	C_{RSS}			8.0	12	
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 0.8\text{ A}$		1.2	1.5	nC
Threshold Gate Charge	$Q_{G(TH)}$			0.2		
Gate-to-Source Charge	Q_{GS}			0.28	0.50	
Gate-to-Drain Charge	Q_{GD}			0.3	0.40	

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	$t_{d(ON)}$	$V_{GS} = 4.5\text{ V}, V_{DS} = 15\text{ V}, I_D = 0.7\text{ A}, R_G = 51\ \Omega$		5.0	12	ns
Rise Time	t_r			8.2	8.0	
Turn-Off Delay Time	$t_{d(OFF)}$			23	35	
Fall Time	t_f			41	60	

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V_{SD}	$V_{GS} = 0\text{ V}, I_S = 0.6\text{ A}$	$T_J = 25^\circ\text{C}$		0.82	1.20	V
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- Pulse Test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.
- Switching characteristics are independent of operating junction temperatures.

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

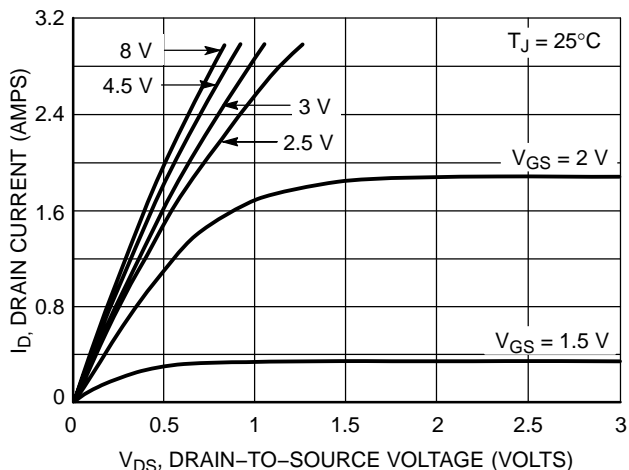


Figure 1. On-Region Characteristics

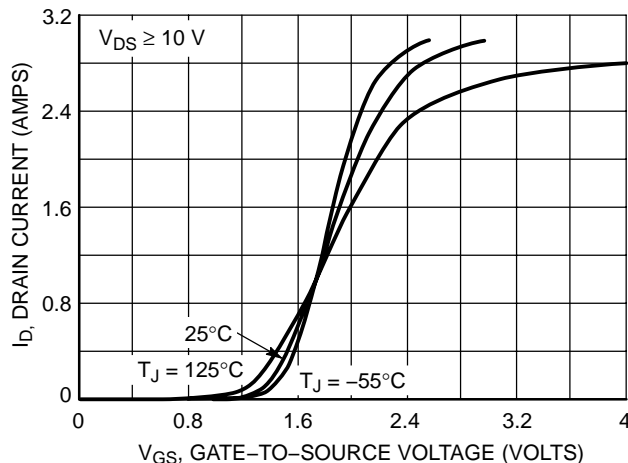


Figure 2. Transfer Characteristics

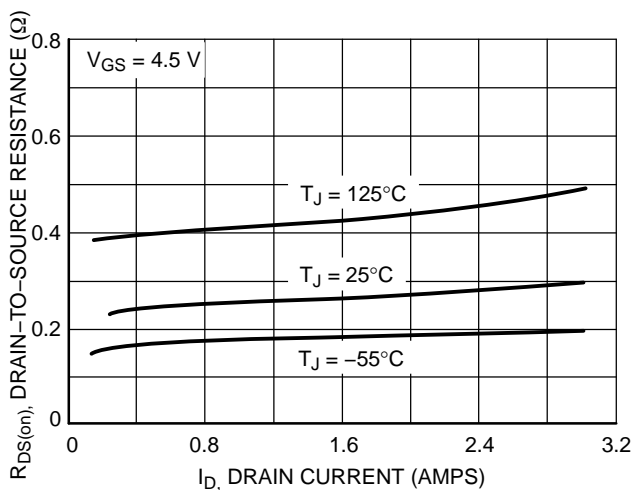


Figure 3. On-Resistance vs. Drain Current and Temperature

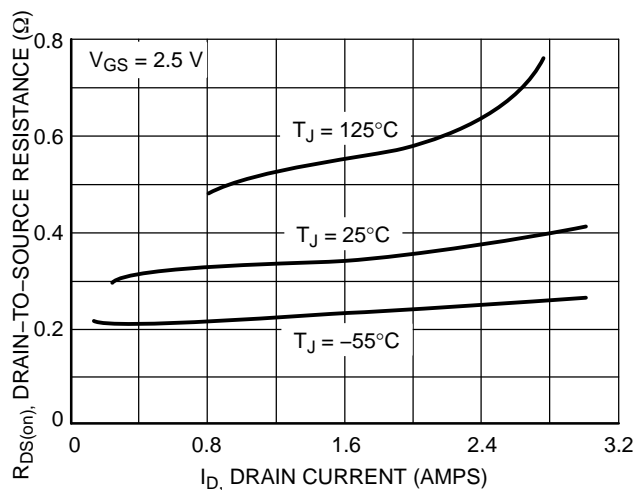


Figure 4. On-Resistance vs. Drain Current and Gate Voltage

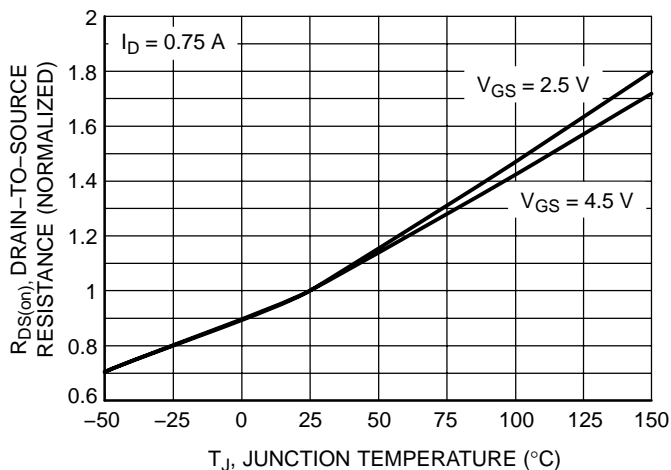


Figure 5. On-Resistance Variation with Temperature

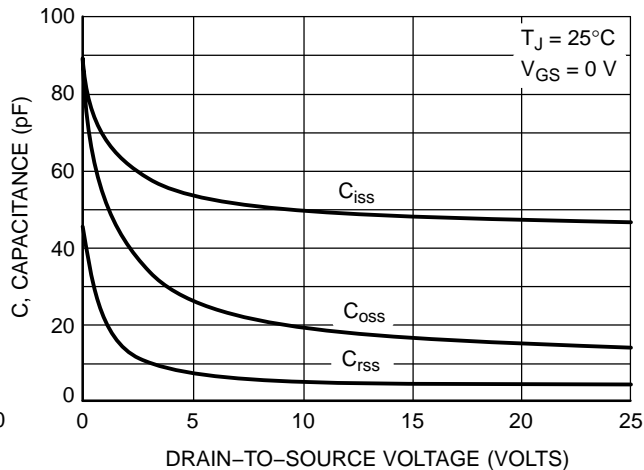


Figure 6. Capacitance Variation

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

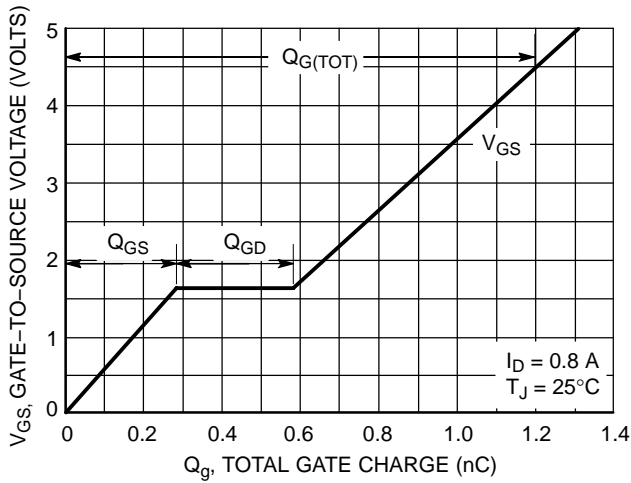


Figure 7. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

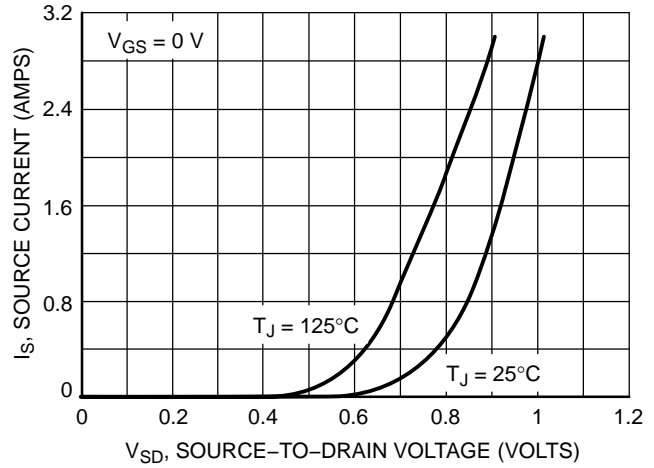
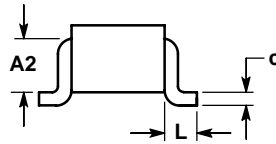
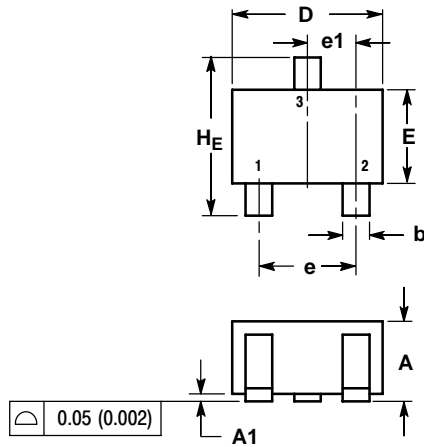


Figure 8. Diode Forward Voltage vs. Current

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PACKAGE DIMENSIONS

SC-70 (SOT-323)



- NOTES:
 1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.7 REF			0.028 REF		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.425 REF			0.017 REF		
HE	2.00	2.10	2.40	0.079	0.083	0.095

- STYLE 8:
 PIN 1. GATE
 2. SOURCE
 3. DRAIN

SOLDERING FOOTPRINT*

