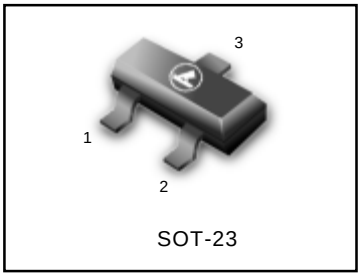
Small Signal MOSFET

30 V, 0.56 A, Single, N−Channel, Gate ESD Protection, SOT-23

LNTR4003NLT1G
S-LNTR4003NLT1G



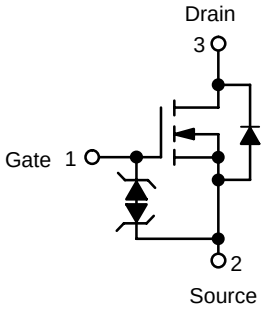
SOT-23

Features

- Low Gate Voltage Threshold(Vgs(th))to Facilitate Drive Circuit Design
- Low Gate Charge for Fast Switching
- ESD Protected Gate
- Minimum Breakdown Voltage Rating of 30 V
- We declare that the material of product is ROHS compliant and halogen free.
- S- Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable.

Applications

- Level Shifters
- Level Switches
- Low Side Load Switches
- Portable Applications



MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	0.5	A
		T_A = 85°C		0.37	
Power Dissipation (Note 1)	Steady State		P_D	0.69	W
Continuous Drain Current (Note 1)	t < 10 s	T_A = 25°C	I_D	0.56	A
		T_A = 85°C		0.40	
Power Dissipation (Note 1)	t < 5 s		P_D	0.83	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	1.7	A
Operating Junction and Storage Temperature			T_J, Tstg	−55 to 150	°C
Source Current (Body Diode)			I_S	1.0	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

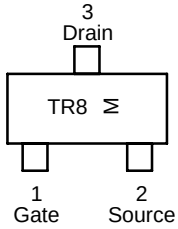
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 1)	$R_{\theta JA}$	180	°C/W
Junction−to−Ambient − t < 10 s (Note 1)	$R_{\theta JA}$	150	
Junction−to−Ambient − Steady State (Note 2)	$R_{\theta JA}$	300	

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

MARKING DIAGRAM



TR8 = Specific Device Code
M = Month Code

ORDERING INFORMATION

Device	Package	Shipping
LNTR4003NLT1G S-LNTR4003NLT1G	SOT−23	3000/Tape & Reel
LNTR4003NLT3G S-LNTR4003NLT3G	SOT−23	10,000/Tape & Reel

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ELECTRICAL CHARACTERISTICS (T_J = 25°C unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain−to−Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 100 μA	30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			40		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 30 V, T_J = 25°C			1.0	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±10 V			±1.0	μA
ON CHARACTERISTICS (Note 3)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA	0.8		1.6	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.4		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.0 V, I_D = 10 mA		1.0	1.5	Ω
		V_{GS} = 2.5 V, I_D = 10 mA		1.5	2.0	
Forward Transconductance	g_{FS}	V_{DS} = 3.0 V, I_D = 10 mA		0.33		S
CHARGES AND CAPACITANCES						
Input Capacitance	C_{iss}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 5.0 V		21		pF
Output Capacitance	C_{oss}			19.7		
Reverse Transfer Capacitance	C_{rss}			8.1		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 5.0 V, V_{DS} = 24 V, I_D = 0.1 A		1.15		nC
Threshold Gate Charge	$Q_{G(TH)}$			0.15		
Gate−to−Source Gate Charge	Q_{GS}			0.32		
Gate−to−Drain Charge	Q_{GD}			0.23		
SWITCHING CHARACTERISTICS (Note 4)						
Turn−On Delay Time	$t_{d(on)}$	V_{GS} = 4.5 V, V_{DD} = 5.0 V, I_D = 0.1 A, R_G = 50 Ω		16.7		ns
Rise Time	t_r			47.9		
Turn−Off Delay Time	$t_{d(off)}$			65.1		
Fall Time	t_f			64.2		
SOURCE−DRAIN DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 10 mA, T_J = 25°C		0.65	0.7	V
		T_J = 125°C		0.45		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 8A/μs, I_S = 10 mA		14		ns

3. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

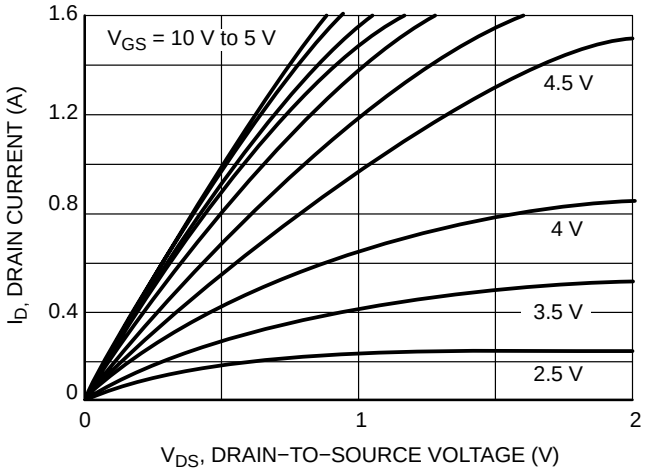

Figure 1. On−Region Characteristics

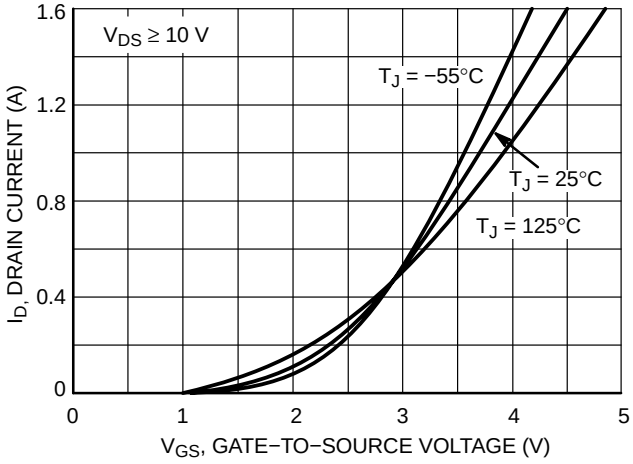

Figure 2. Transfer Characteristics

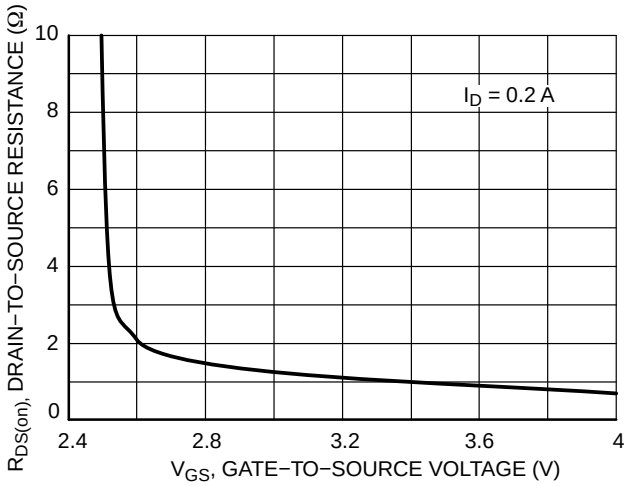

Figure 3. On−Resistance vs. Gate−to−Source Voltage

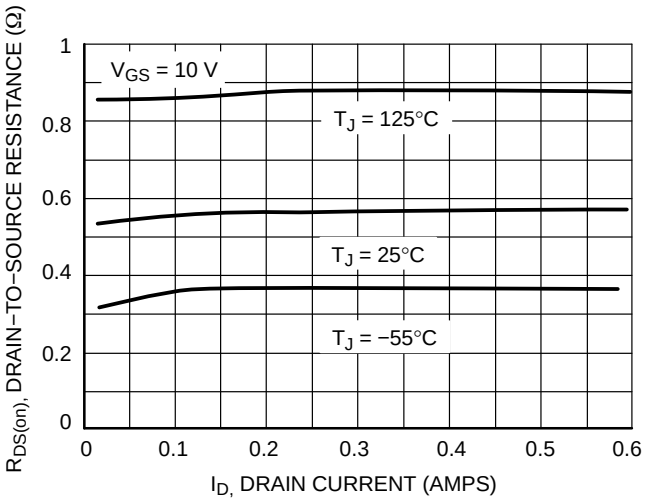

Figure 4. On−Resistance vs. Drain Current and Temperature

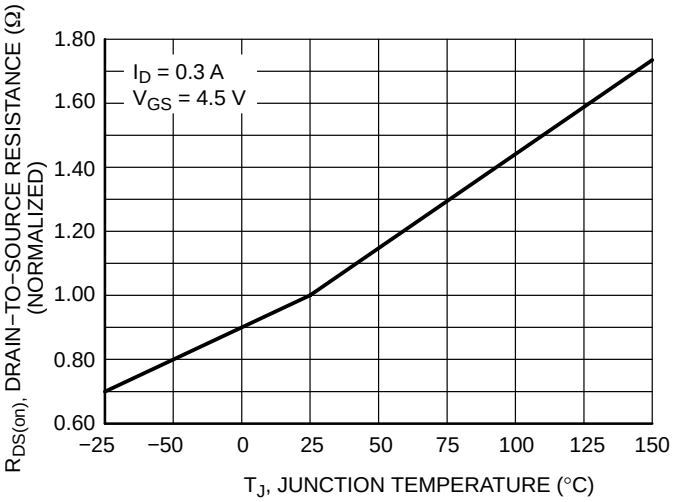

Figure 5. On−Resistance Variation with Temperature

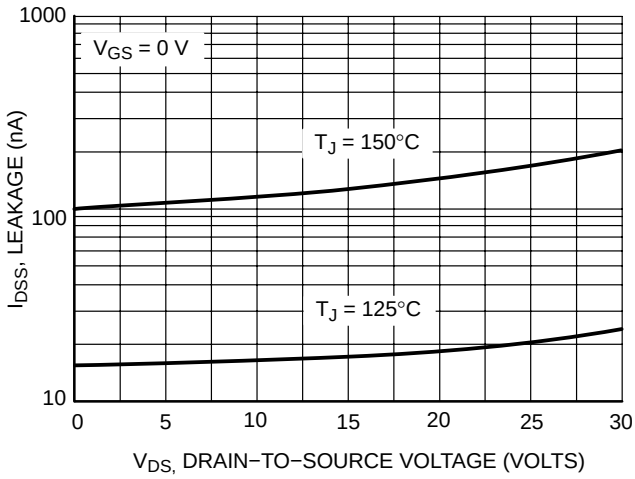

Figure 6. Drain−to−Source Leakage Current vs. Voltage

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TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

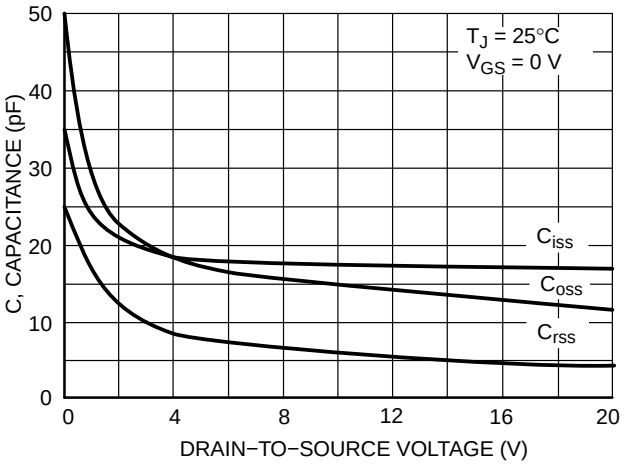

Figure 7. Capacitance Variation

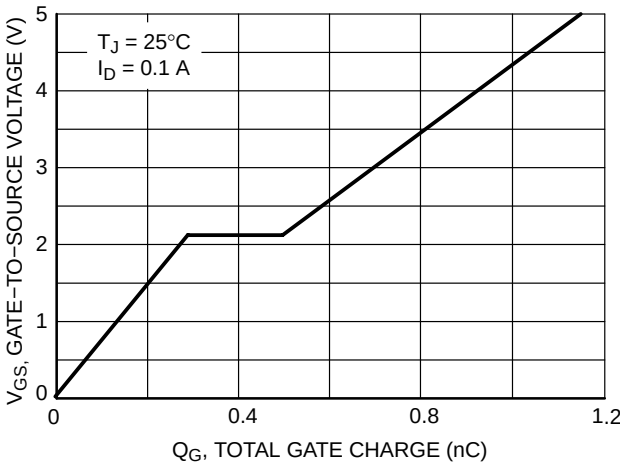

Figure 8. Gate−to−Source & Drain−to−Source Voltage vs. Total Charge

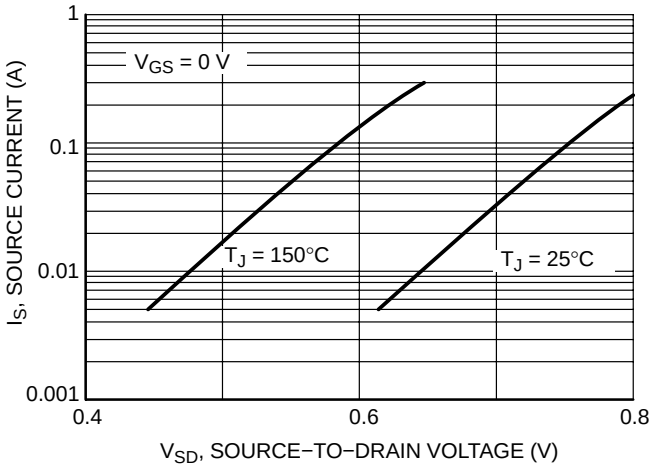

Figure 9. Diode Forward Voltage vs. Current

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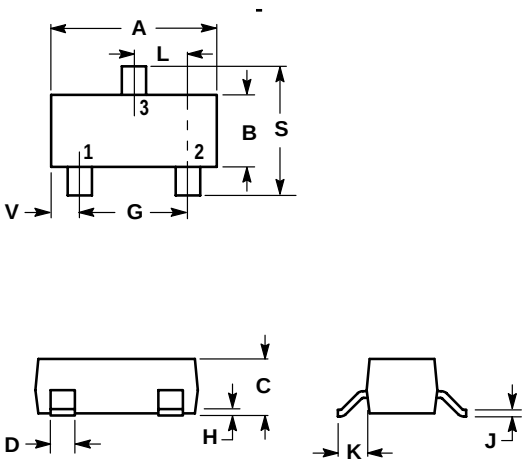

NOTES:

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

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.1102	0.1197	2.80	3.04
B	0.0472	0.0551	1.20	1.40
C	0.0350	0.0440	0.89	1.11
D	0.0150	0.0200	0.37	0.50
G	0.0701	0.0807	1.78	2.04
H	0.0005	0.0040	0.013	0.100
J	0.0034	0.0070	0.085	0.177
K	0.0140	0.0285	0.35	0.69
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.1039	2.10	2.64
V	0.0177	0.0236	0.45	0.60