

Small Signal MOSFET

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

Features

- Low Gate Voltage Threshold($V_{GS(th)}$)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.

Applications

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

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ 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	$T_A = 25^\circ\text{C}$	0.5
		$T_A = 85^\circ\text{C}$	0.37
Power Dissipation (Note 1)	Steady State	P_D	0.69
Continuous Drain Current (Note 1)	$t < 10\text{ s}$	$T_A = 25^\circ\text{C}$	0.56
		$T_A = 85^\circ\text{C}$	0.40
Power Dissipation (Note 1)	$t < 5\text{ s}$	P_D	0.83
Pulsed Drain Current	$t_p = 10\ \mu\text{s}$	I_{DM}	1.7
Operating Junction and Storage Temperature	T_J, T_{stg}	-55 to 150	$^\circ\text{C}$
Source Current (Body Diode)	I_S	1.0	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	$^\circ\text{C}$

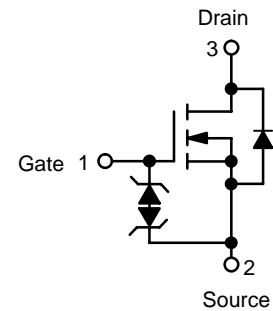
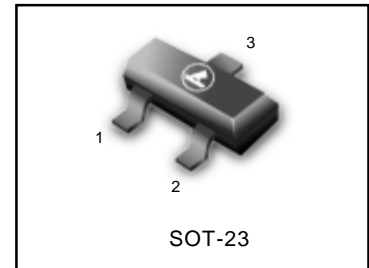
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

THERMAL RESISTANCE RATINGS

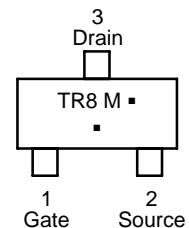
Parameter	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	180	$^\circ\text{C/W}$
Junction-to-Ambient – $t < 10\text{ s}$ (Note 1)	$R_{\theta JA}$	150	
Junction-to-Ambient – Steady State (Note 2)	$R_{\theta JA}$	300	

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.

LNTR4003NLT1G



MARKING DIAGRAM



- TR8 = Specific Device Code
- M = Date Code
- = Pb-Free Package

ORDERING INFORMATION

Device	Package	Shipping
LNTR4003NT1G	SOT-23	3000/Tape & Reel
LNTR4003NT3G	SOT-23	10,000/Tape & Reel

LNTR4003NLT1G
ELECTRICAL CHARACTERISTICS ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 100\ \mu\text{A}$	30			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			40		mV/ $^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V}, V_{DS} = 30\text{ V}, T_J = 25^\circ\text{C}$			1.0	μA
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$			± 1.0	μA

ON CHARACTERISTICS (Note 3)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	0.8		1.6	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			3.4		mV/ $^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 4.0\text{ V}, I_D = 10\text{ mA}$		1.0	1.5	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 10\text{ mA}$		1.5	2.0	
Forward Transconductance	g_{FS}	$V_{DS} = 3.0\text{ V}, I_D = 10\text{ mA}$		0.33		S

CHARGES AND CAPACITANCES

Input Capacitance	C_{iss}	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 5.0\text{ V}$		21		pF
Output Capacitance	C_{oss}			19.7		
Reverse Transfer Capacitance	C_{rss}			8.1		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 5.0\text{ V}, V_{DS} = 24\text{ V}, I_D = 0.1\text{ A}$		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	$t_{d(on)}$	$V_{GS} = 4.5\text{ V}, V_{DD} = 5.0\text{ V}, I_D = 0.1\text{ A}, R_G = 50\ \Omega$		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}	$V_{GS} = 0\text{ V}, I_S = 10\text{ mA}$	$T_J = 25^\circ\text{C}$		0.65	0.7	V
			$T_J = 125^\circ\text{C}$		0.45		
Reverse Recovery Time	t_{RR}	$V_{GS} = 0\text{ V}, di_S/dt = 8\text{ A}/\mu\text{s}, I_S = 10\text{ mA}$		14		ns	

 3. Pulse Test: pulse width $\leq 300\ \mu\text{s}$, duty cycle $\leq 2\%$.

4. Switching characteristics are independent of operating junction temperatures.

LNTR4003NLT1G

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

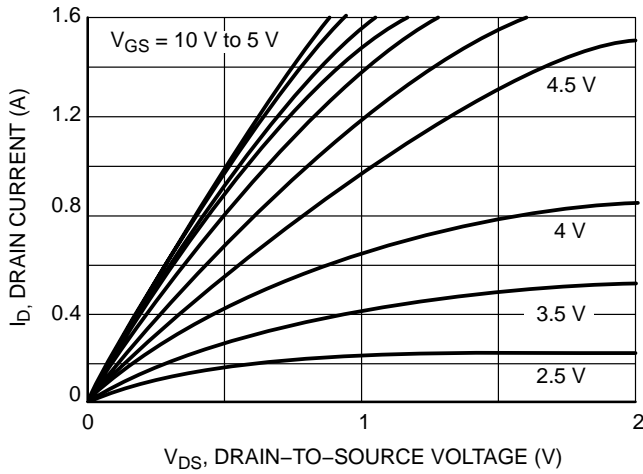


Figure 1. On-Region Characteristics

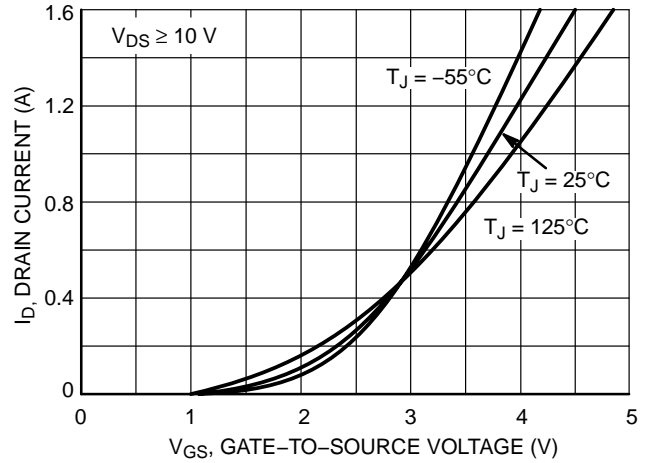


Figure 2. Transfer Characteristics

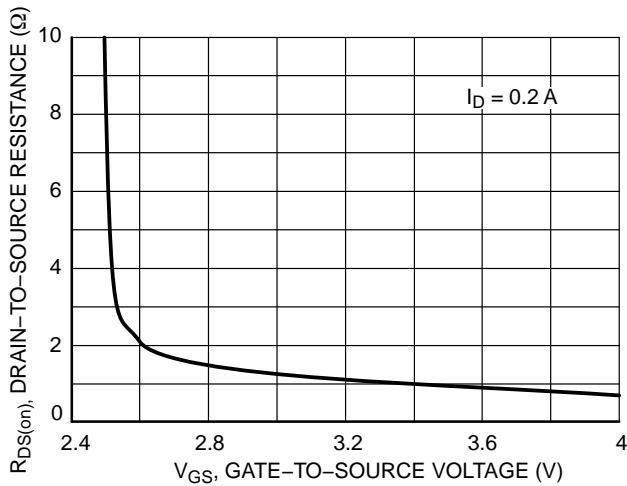


Figure 3. On-Resistance vs. Gate-to-Source Voltage

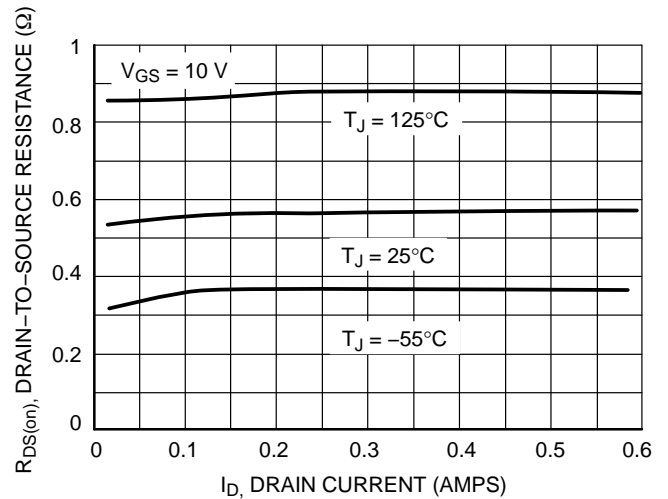


Figure 4. On-Resistance vs. Drain Current and Temperature

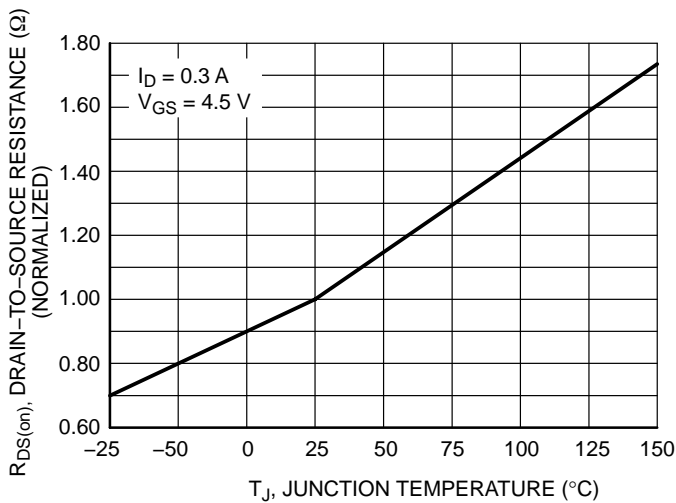


Figure 5. On-Resistance Variation with Temperature

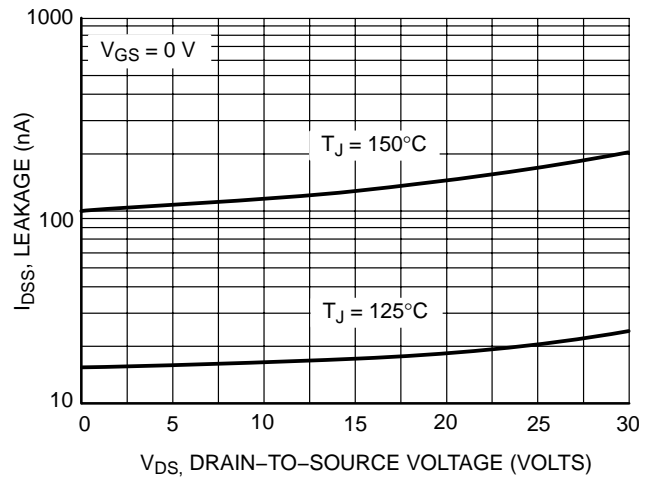


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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

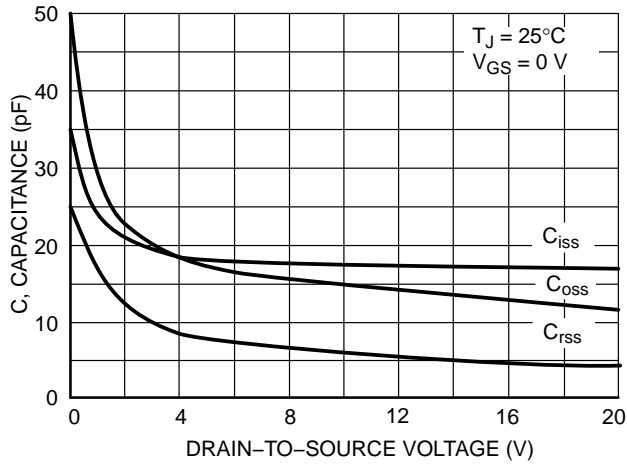


Figure 7. Capacitance Variation

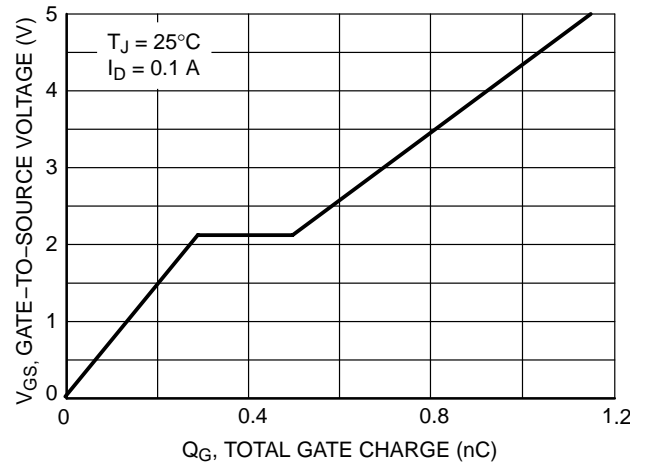


Figure 8. Gate-to-Source & Drain-to-Source Voltage vs. Total Charge

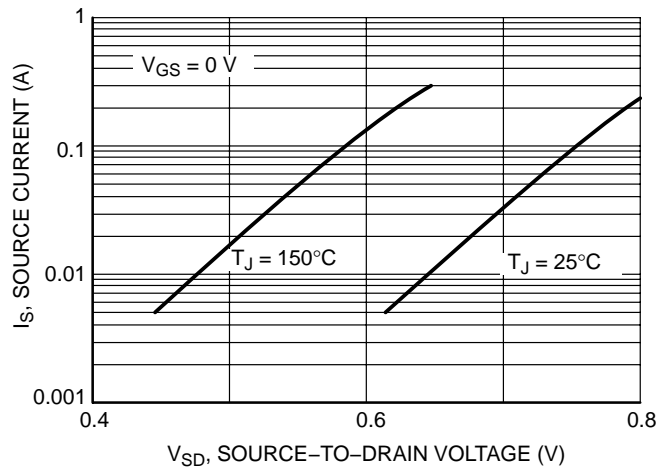


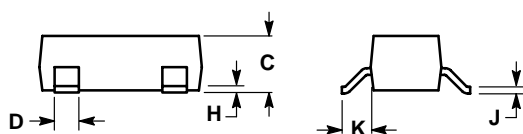
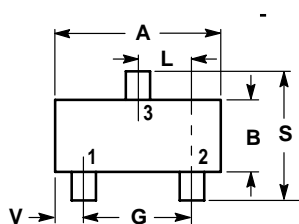
Figure 9. Diode Forward Voltage vs. Current

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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

