

NTR1P02LT1

Power MOSFET 1.3 A, 20 V

P-Channel SOT-23

These miniature surface mount MOSFETs low $R_{DS(on)}$ assure minimal power loss and conserve energy, making these devices ideal for use in space sensitive power management circuitry. Typical applications are dc-dc converters and power management in portable and battery-powered products such as computers, printers, PCMCIA cards, cellular and cordless telephones.

- Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
- Miniature SOT-23 Surface Mount Package Saves Board Space

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DS}	20	Vdc
Gate-to-Source Voltage – Continuous	V_{GS}	12	Vdc
Drain Current	I_D	1.3	A
– Continuous @ $T_A = 25^\circ\text{C}$			
– Pulsed Drain Current ($t_p \leq 10 \mu\text{s}$)	I_{DM}	4.0	A
Total Power Dissipation @ $T_A = 25^\circ\text{C}$	P_D	400	mW
Operating and Storage Temperature Range	T_J, T_{stg}	– 55 to 150	$^\circ\text{C}$
Thermal Resistance – Junction-to-Ambient	$R_{\theta JA}$	300	$^\circ\text{C/W}$
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 10 seconds	T_L	260	$^\circ\text{C}$



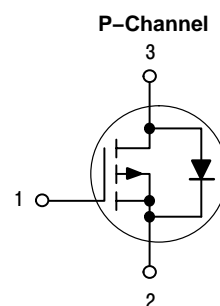
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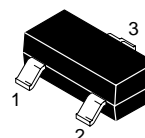
1.3 AMPS

20 VOLTS

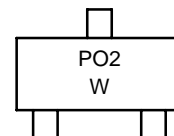
$R_{DS(on)} = 160 \text{ m}\Omega$



MARKING DIAGRAM

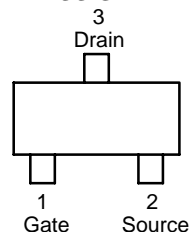


SOT-23
CASE 318
STYLE 21



PO2 = Device Code
W = Work Week

PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping†
NTR1P02LT1	SOT-23	3000 Tape & Reel
NTR1P02LT3	SOT-23	10,000 Tape & Reel

†For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

NTR1P02LT1

ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage (V _{GS} = 0 Vdc, I _D = 10 μAdc)	V _{(BR)DSS}	20	–	–	Vdc
Zero Gate Voltage Drain Current (V _{DS} = 16 Vdc, V _{GS} = 0 Vdc) (V _{DS} = 16 Vdc, V _{GS} = 0 Vdc, T _J = 125°C)	I _{DSS}	–	–	1.0 10	μAdc
Gate-Body Leakage Current (V _{GS} = ± 12 Vdc, V _{DS} = 0 Vdc)	I _{GSS}	–	–	±100	nAdc

ON CHARACTERISTICS (Note 1)

Gate Threshold Voltage (V _{DS} = V _{GS} , I _D = 250 μAdc)	V _{GS(th)}	0.7	1.0	1.25	Vdc
Static Drain-to-Source On-Resistance (V _{GS} = 4.5 Vdc, I _D = 0.75 Adc) (V _{GS} = 2.5 Vdc, I _D = 0.5 Adc)	r _{DS(on)}	–	0.135 0.190	0.16 0.25	Ω

DYNAMIC CHARACTERISTICS

Input Capacitance	(V _{DS} = 5.0 Vdc)	C _{iss}	–	225	–	pF
Output Capacitance	(V _{DS} = 5.0 Vdc)	C _{oss}	–	130	–	
Transfer Capacitance	(V _{DG} = 5.0 Vdc)	C _{rss}	–	55	–	

SWITCHING CHARACTERISTICS (Note 2)

Turn-On Delay Time	(V _{DD} = 5.0 Vdc, I _D = 1.0 Adc, R _L = 5.0 Ω, R _G = 6.0 Ω)	t _{d(on)}	–	7.0	–	ns
Rise Time		t _r	–	15	–	
Turn-Off Delay Time		t _{d(off)}	–	18	–	
Fall Time		t _f	–	20	–	
Total Gate Charge	(V _{DS} = 16 Vdc, I _D = 1.5 Adc, V _{GS} = 4.0 Vdc)	Q _T	–	5500	–	pC

SOURCE-DRAIN DIODE CHARACTERISTICS

Continuous Current	I _S	–	–	0.6	A
Pulsed Current	I _{SM}	–	–	0.75	
Forward Voltage (Note 2) (V _{GS} = 0 Vdc, I _S = 0.6 Adc)	V _{SD}	–	–	1.0	V
Reverse Recovery Time	(I _S = 1.0 Adc, V _{GS} = 0 Vdc, dI _S /dt = 100 A/μs)	t _{rr}	–	16	ns
		t _a	–	11	
		t _b	–	5.5	
Reverse Recovery Stored Charge	Q _{RR}	–	0.0085	–	μC

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
2. Switching characteristics are independent of operating junction temperature.

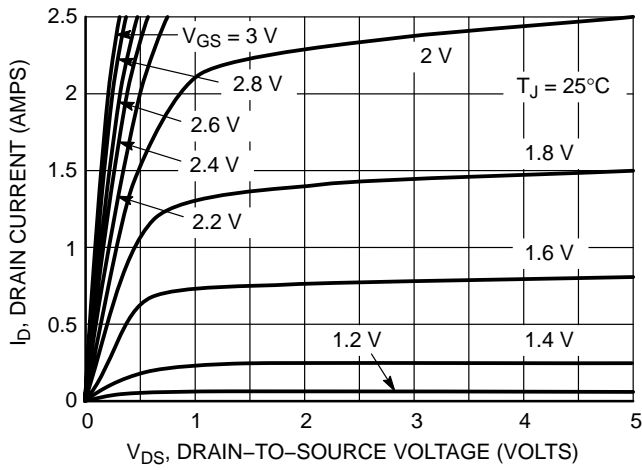


Figure 1. On-Region Characteristics

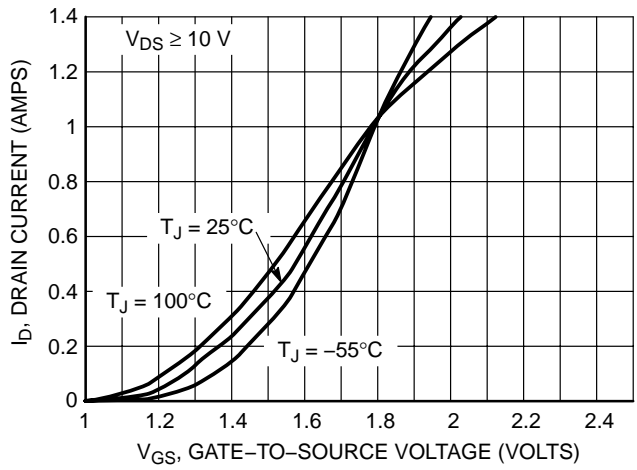


Figure 2. Transfer Characteristics

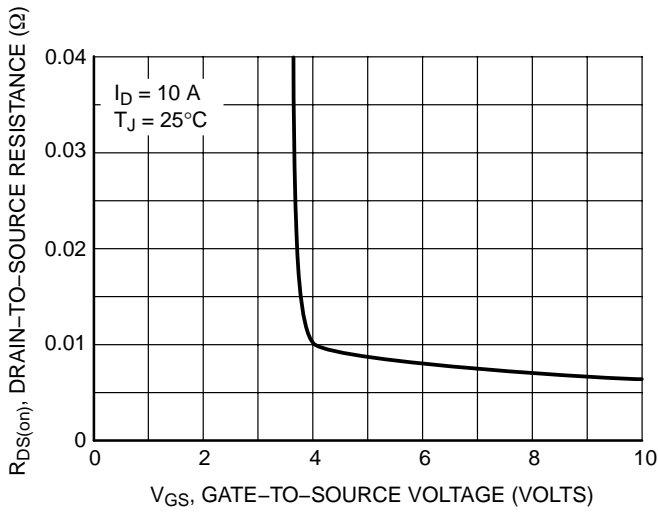


Figure 3. On-Resistance versus Gate-to-Source Voltage

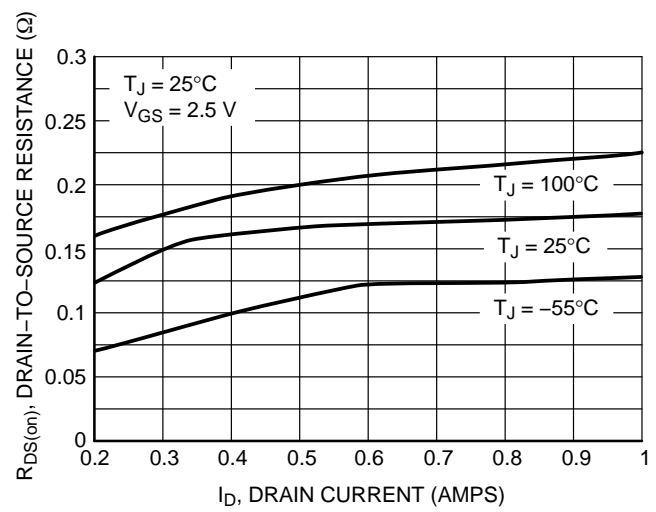


Figure 4. On-Resistance versus Drain Current and Gate Voltage

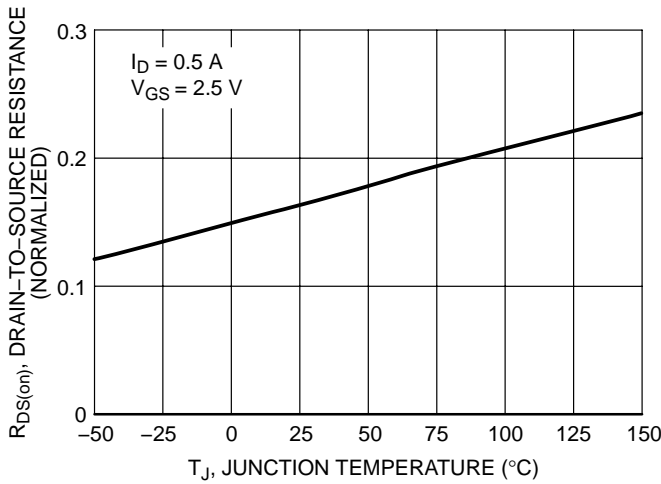


Figure 5. On-Resistance Variation with Temperature

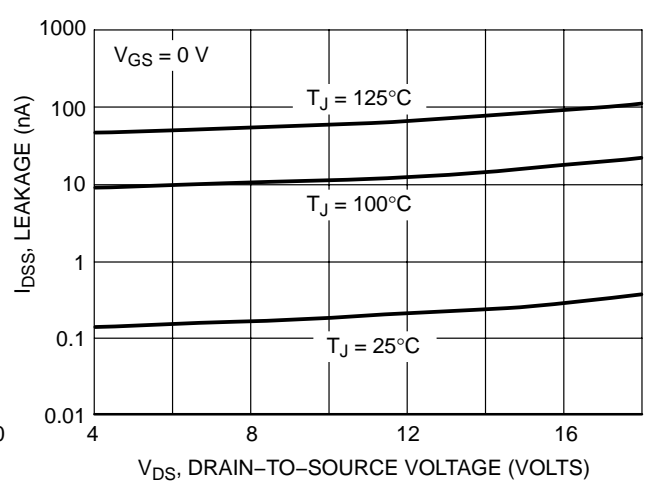


Figure 6. Drain-to-Source Leakage Current versus Voltage

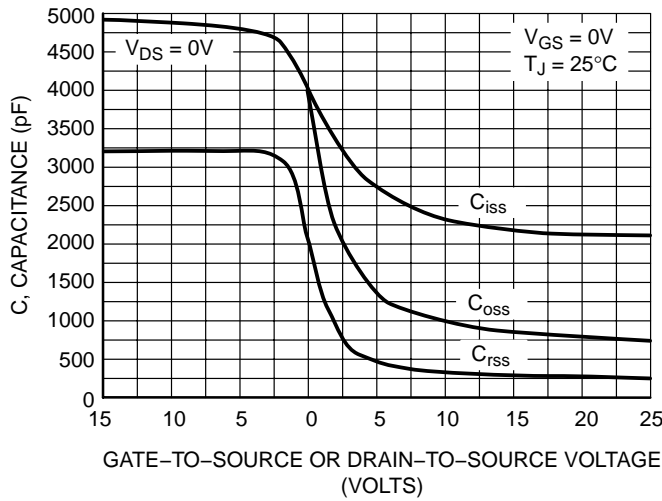


Figure 7. Capacitance Variation

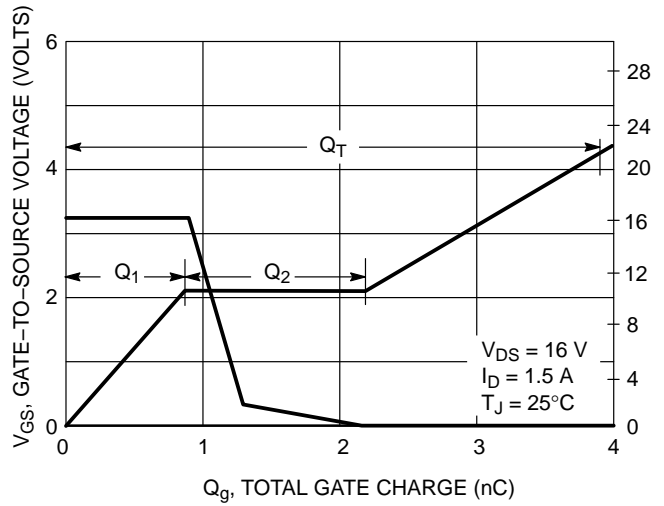


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

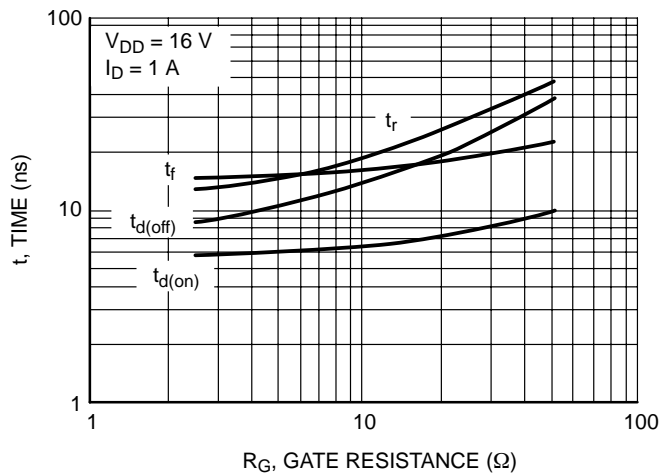


Figure 9. Resistive Switching Time Variation versus Gate Resistance

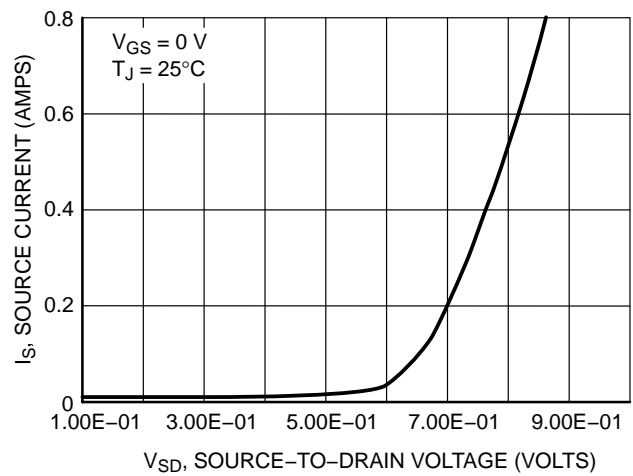
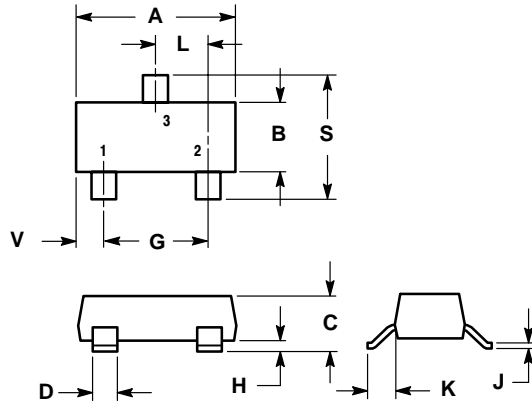


Figure 10. Diode Forward Voltage versus Current

NTR1P02LT1

PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-09
ISSUE AH



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01, -02, AND -06 OBSOLETE, NEW STANDARD 318-09.

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	0.0385	0.0498	0.99	1.26
D	0.0140	0.0200	0.36	0.50
G	0.0670	0.0826	1.70	2.10
H	0.0040	0.0098	0.10	0.25
J	0.0034	0.0070	0.085	0.177
K	0.0180	0.0236	0.45	0.60
L	0.0350	0.0401	0.89	1.02
S	0.0830	0.0984	2.10	2.50
V	0.0177	0.0236	0.45	0.60

STYLE 21:

- PIN 1. GATE
2. SOURCE
3. DRAIN

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