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°C unless otherwise noted)

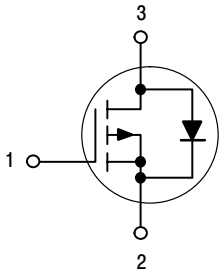
Rating	Symbol	Value	Unit
Drain−to−Source Voltage	V_{DSS}	20	Vdc
Gate−to−Source Voltage − Continuous	V_{GS}	12	Vdc
Drain Current − Continuous @ T_A = 25°C − Pulsed Drain Current ($t_p \le 10$ μs)	 I_D I_{DM}	 1.3 4.0	 A A
Total Power Dissipation @ T_A = 25°C	P_D	400	mW
Operating and Storage Temperature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

ON Semiconductor®

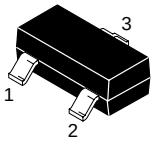
http://onsemi.com

1.3 AMPS
20 VOLTS
$R_{DS(on)}$ = 160 mΩ

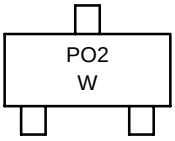
P−Channel



MARKING DIAGRAM

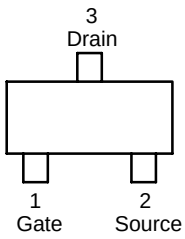


SOT−23
CASE 318
STYLE 21



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.

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

Characteristic		Symbol	Min	Typ	Max	Unit
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.

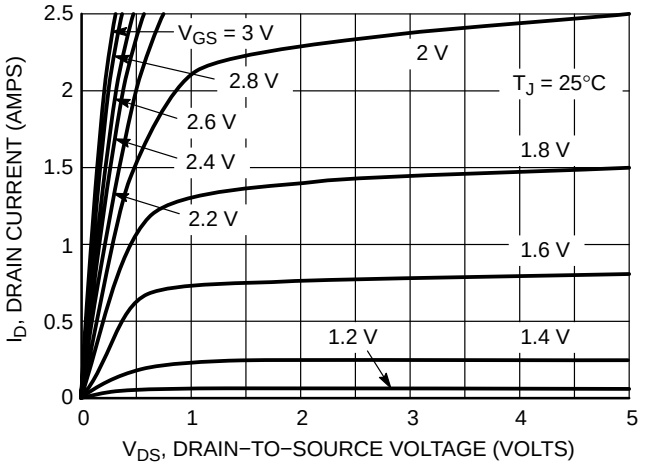


Figure 1. On−Region Characteristics

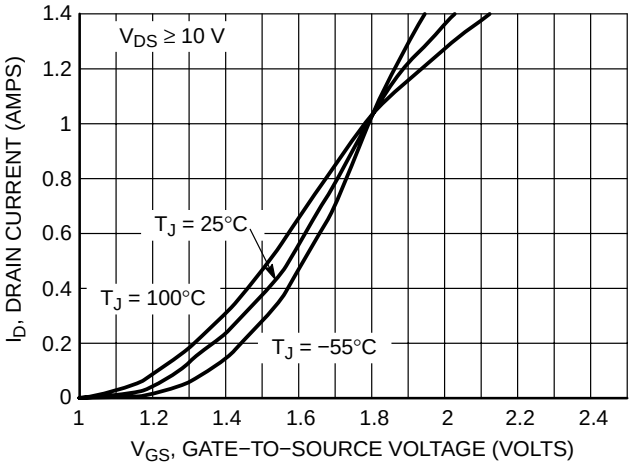


Figure 2. Transfer Characteristics

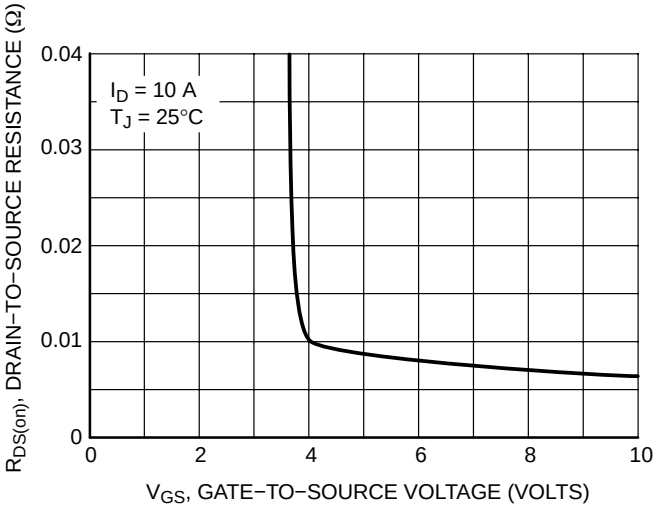


Figure 3. On−Resistance versus Gate−to−Source Voltage

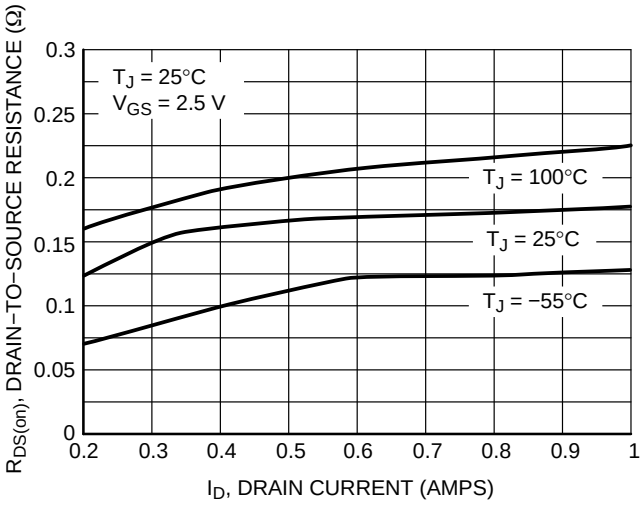


Figure 4. On−Resistance versus Drain Current and Gate Voltage

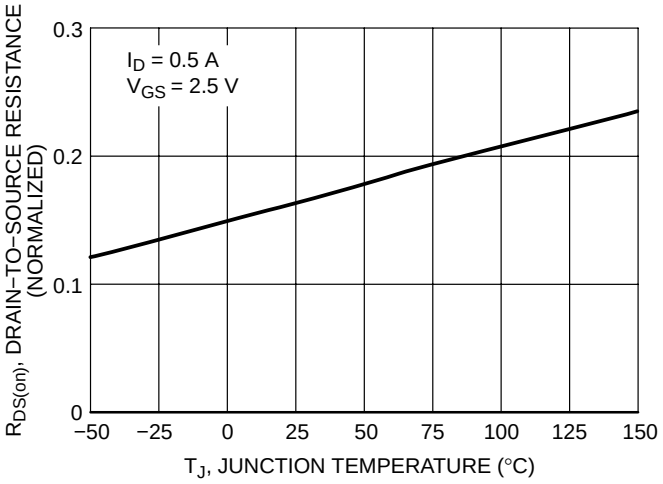


Figure 5. On−Resistance Variation with Temperature

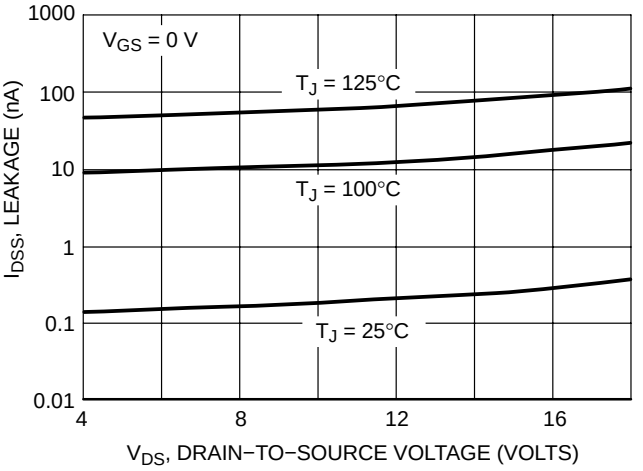


Figure 6. Drain−to−Source Leakage Current versus Voltage

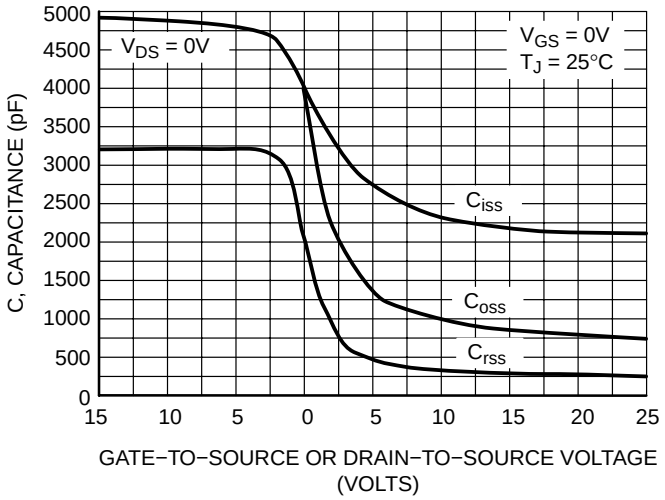


Figure 7. Capacitance Variation

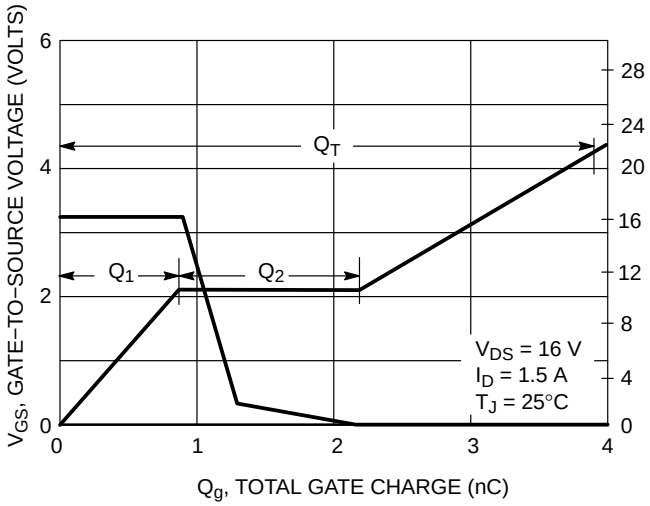


Figure 8. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

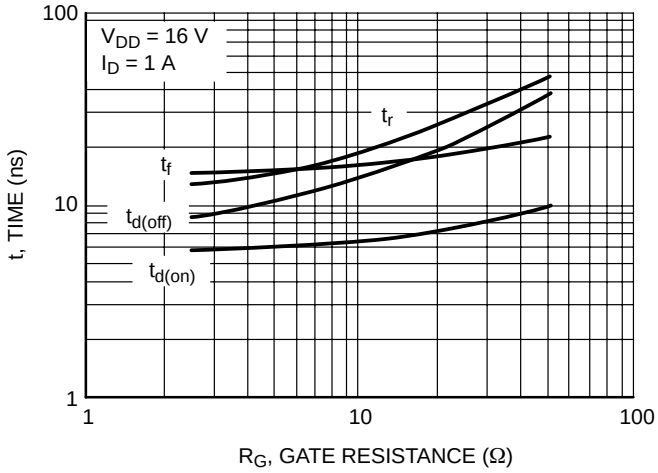


Figure 9. Resistive Switching Time Variation versus Gate Resistance

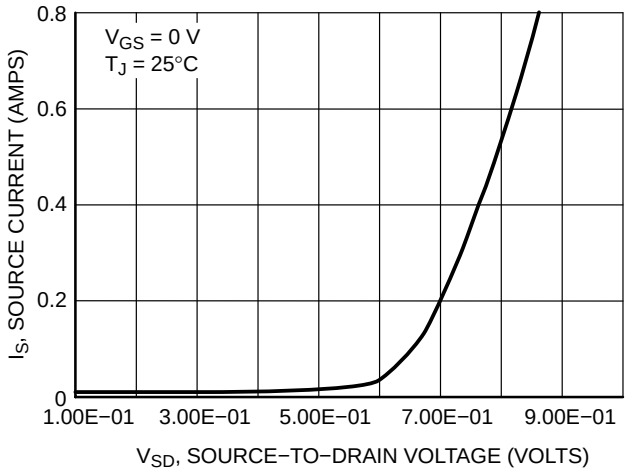
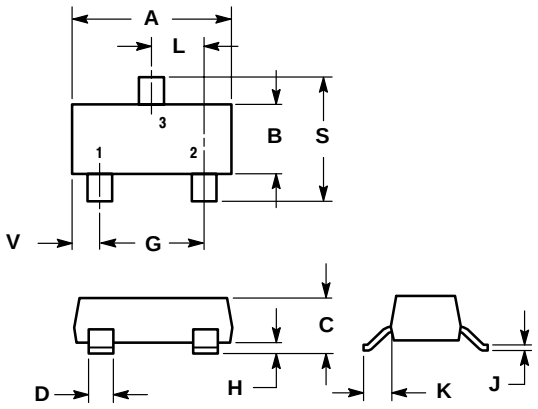


Figure 10. Diode Forward Voltage versus Current

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. MAXIUMUM 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.

	INCHES		MILLIMETERS	
DIM	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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
Literature Distribution Center for ON Semiconductor
P.O. Box 5163, Denver, Colorado 80217 USA
Phone: 303−675−2175 or 800−344−3860 Toll Free USA/Canada
Fax: 303−675−2176 or 800−344−3867 Toll Free USA/Canada
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