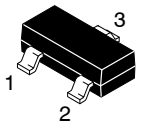
MOSFET – Power, P-Channel, SOT-23

-20 V, -400 mA

NTR0202PL, NVTR0202PL

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D MAX
−20 V	550 mΩ @ −10 V	−400 mA



SOT-23
CASE 318
STYLE 21

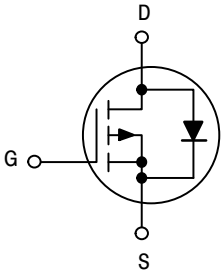
Features

- Low $R_{DS(on)}$ Provides Higher Efficiency and Extends Battery Life
  R_{DSon} = 0.80 Ω, V_{GS} = −10 V
  R_{DSon} = 1.10 Ω, V_{GS} = −4.5 V
- Miniature SOT-23 Surface Mount Package Saves Board Space
- NVT Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free and are RoHS Compliant

Applications

- DC-DC Converters
- Computers
- Printers
- PCMCIA Cards
- Cellular and Cordless Telephones

P-Channel



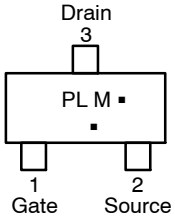
MAXIMUM RATINGS (T_J = 25 °C unless otherwise noted)

Symbol	Rating	Value	Unit
V_{DSS}	Drain-to-Source Voltage	−20	V
V_{GS}	Gate-to-Source Voltage - Continuous	±20	V
I_D I_{DM}	Continuous Drain Current @ T_A = 25 °C Pulsed Drain Current ($t_p \le 10$ μs)	−0.4 −1.0	A
P_D	Total Power Dissipation @ T_A = 25 °C (Note 1)	225	mW
T_J, T_{stg}	Operating and Storage Temperature Range	− 55 to 150	°C
$R_{\theta JA}$	Thermal Resistance - Junction-to-Ambient	556	°C/W
I_S	Source Current (Body Diode)	0.4	A
T_L	Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 10 s	260	°C

Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.

MARKING DIAGRAM & PIN ASSIGNMENT



PL = Specific Device Code
M = Date Code*
▪ = Pb-Free Package

(Note: Microdot may be in either location)

* For additional marking information, refer to Application Note AND8002/D.

See detailed ordering, marking and shipping information in the package dimensions section on page 4 of this data sheet.

NOTE: Some of the devices on this data sheet have been **DISCONTINUED**. Please refer to the table on page 4.

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

Symbol	Characteristic		Min	Typ	Max	Unit
OFF CHARACTERISTICS						
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage (V_{GS} = 0 V, I_D = −10 μA) (Positive Temperature Coefficient)		−20	 33		V mV/°C
I_{DSS}	Zero Gate Voltage Drain Current (V_{DS} = −20 V, V_{GS} = 0 V, T_J = 25 °C) (V_{DS} = −20 V, V_{GS} = 0 V, T_J = 150 °C)				 −1.0 −10	μA
I_{GSS}	Gate-Body Leakage Current (V_{GS} = ± 20 V, V_{DS} = 0 V)				±100	nA
ON CHARACTERISTICS (Note 2)						
$V_{GS(th)}$	Gate Threshold Voltage (V_{DS} = V_{GS}, I_D = −250 μA) (Negative Temperature Coefficient)		−1.1	−1.9 3.0	−2.3	V mV/°C
$R_{DS(on)}$	Static Drain-to-Source On-Resistance (V_{GS} = −10 V, I_D = −200 mA) (V_{GS} = −4.5 V, I_D = −50 mA)			 0.55 0.80	 0.80 1.10	Ω
g_{fs}	Forward Transconductance (V_{DS} = −10 V, I_D = −200 mA)			0.5		Mhos
DYNAMIC CHARACTERISTICS						
C_{iss}	Input Capacitance	(V_{DS} = −5.0 V, V_{GS} = 0 V, F = 1.0 MHz)		70		pF
C_{oss}	Output Capacitance			74		
C_{rss}	Reverse Transfer Capacitance			26		
SWITCHING CHARACTERISTICS (Note 3)						
$t_{d(on)}$	Turn-On Delay Time	(V_{DD} = −15 V, I_D = −200 mA, V_{GS} = −10 V, R_G = 6.0 Ω)		3.0		ns
t_r	Rise Time			6.0		
$t_{d(off)}$	Turn-Off Delay Time			18		
t_f	Fall Time			4		
Q_{TOT}	Total Gate Charge	(V_{DS} = −15 V, I_D = −200 mA, V_{GS} = −10 V)		2.18		nC
Q_{GS}	Gate-Source Charge			0.41		
Q_{GD}	Gate-Drain Charge			0.40		
BODY−DRAIN DIODE CHARACTERISTICS (Note 2)						
V_{SD}	Diode Forward Voltage (Note 2) (I_S = −400 mA, V_{GS} = 0 V) (I_S = −400 mA, V_{GS} = 0 V, T_J = 150 °C)			 −0.8 −0.65	−1.0	V
t_{rr}	Reverse Recovery Time	(I_S = −1.0 A, V_{GS} = 0 V, dI_S/dt = 100 A/μs)		11.8		ns
t_a				9		
t_b				3		
Q_{RR}	Reverse Recovery Stored Charge	(I_S = −1.0 A, V_{GS} = 0 V, dI_S/dt = 100 A/μs)		0.007		μC

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

TYPICAL CHARACTERISTICS

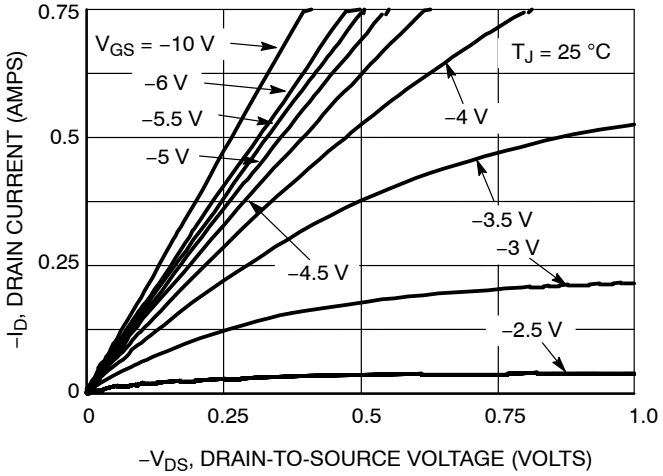


Figure 1. On-Region Characteristics

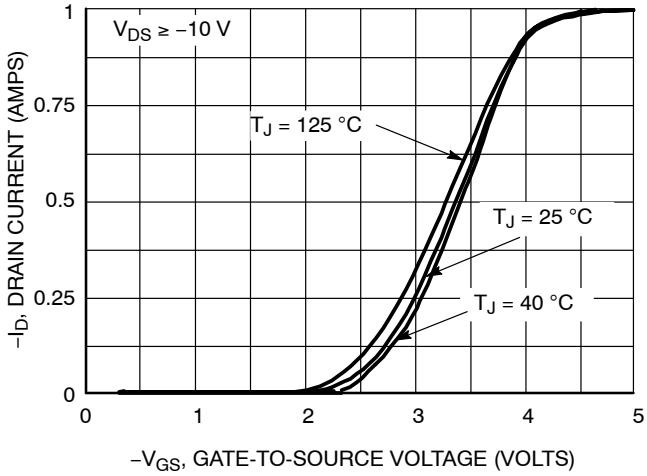


Figure 2. Transfer Characteristics

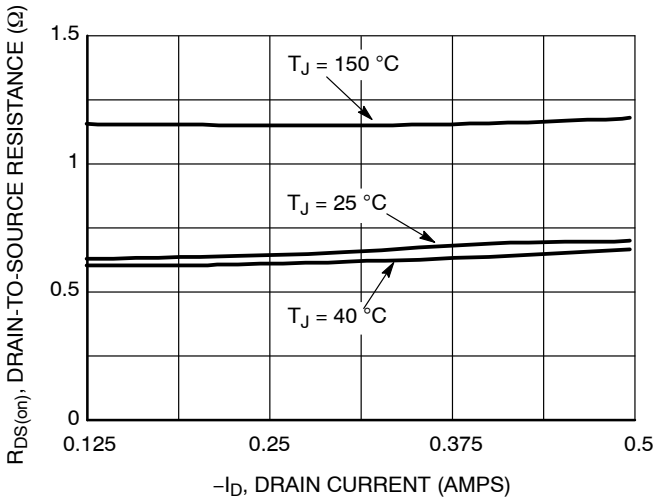


Figure 3. On-Resistance versus Drain Current

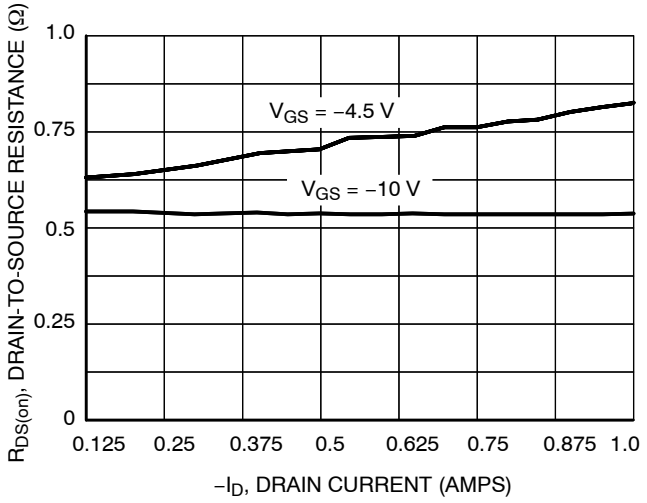


Figure 4. On-Resistance versus Drain Current and Gate Voltage

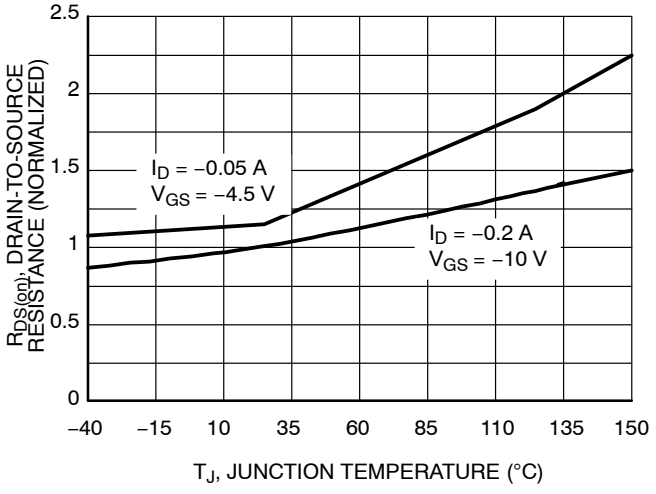


Figure 5. On-Resistance Variation with Temperature

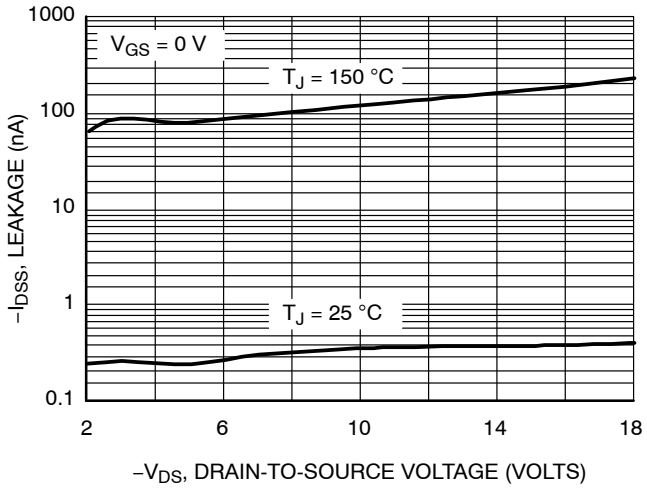


Figure 6. Drain-to-Source Leakage Current versus Voltage

TYPICAL CHARACTERISTICS (continued)

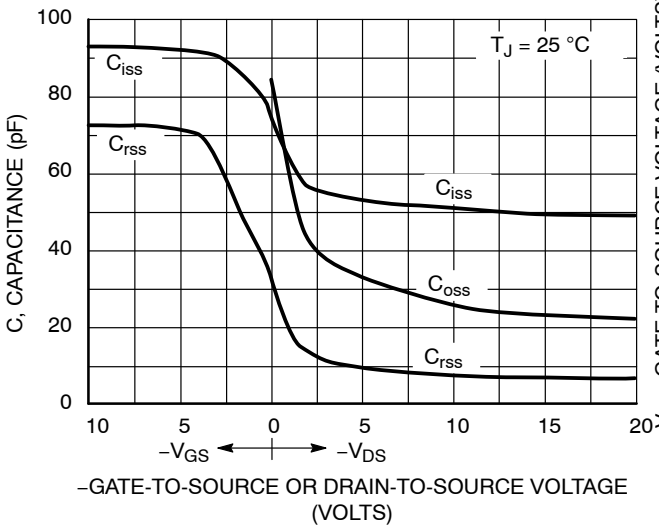


Figure 7. Capacitance Variation

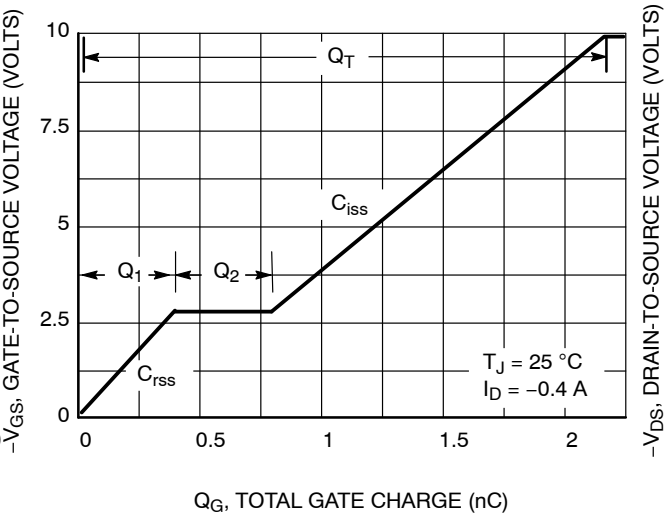


Figure 8. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

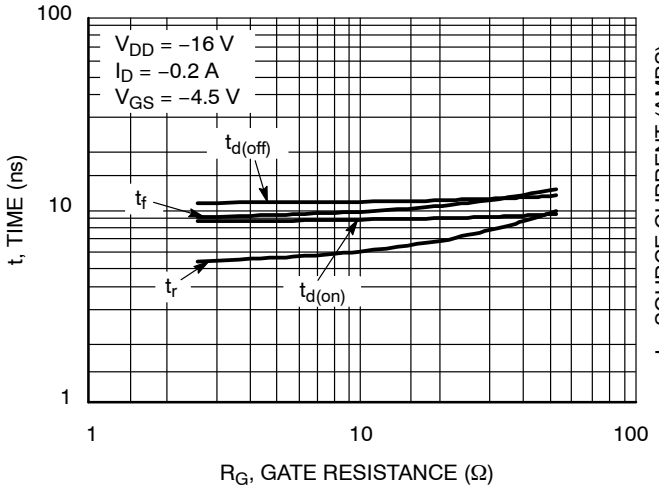


Figure 9. Resistive Switching Time Variation versus Gate Resistance

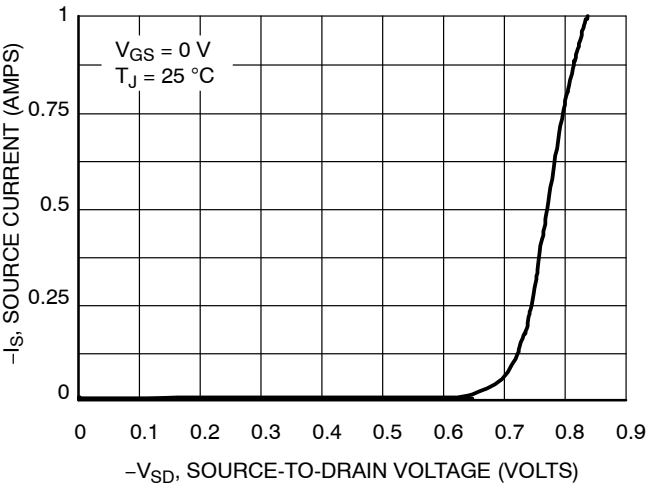


Figure 10. Diode Forward Voltage versus Current

DEVICE ORDERING INFORMATION

Device	Package	Shipping†
NTR0202PLT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel

DISCONTINUED (Note 4)

NTR0202PLT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
NVTR0202PLT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel

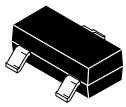
† For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

4. **DISCONTINUED:** This device is not available. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

REVISION HISTORY

Revision	Description of Changes	Date
8	NVTR0202PLT1G OPN Marked as Discontinued.	7/15/2025

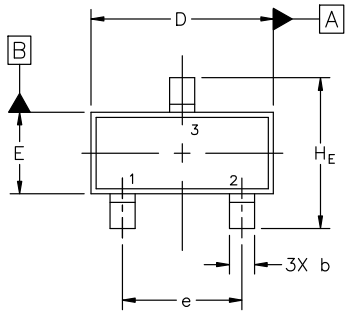
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.



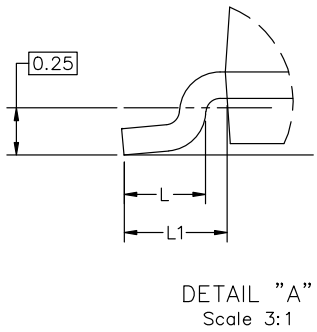
SCALE 4:1

SOT−23 (TO−236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

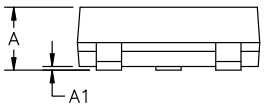
DATE 14 AUG 2024



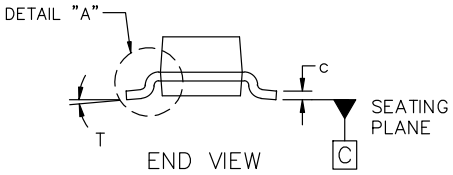
TOP VIEW



DETAIL "A"
Scale 3:1



SIDE VIEW

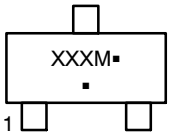


END VIEW

MILLIMETERS			
DIM	MIN	NOM	MAX
A	0.89	1.00	1.11
A1	0.01	0.06	0.10
b	0.37	0.44	0.50
c	0.08	0.14	0.20
D	2.80	2.90	3.04
E	1.20	1.30	1.40
e	1.78	1.90	2.04
L	0.30	0.43	0.55
L1	0.35	0.54	0.69
H_E	2.10	2.40	2.64
T	0°	−−−	10°

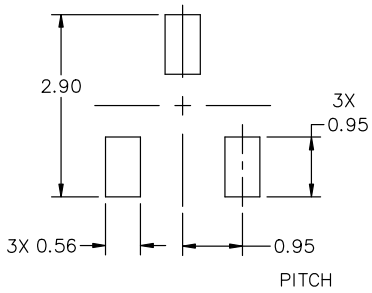
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

GENERIC
MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code
▪ = Pb−Free Package

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "G" or microdot "▪", may or may not be present. Some products may not follow the Generic Marking.



RECOMMENDED
MOUNTING FOOTPRINT

* For additional information on our Pb−Free strategy and soldering details, please download the onsemi Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

STYLES ON PAGE 2

SOT−23 (TO−236) 2.90x1.30x1.00 1.90P
CASE 318
ISSUE AU

DATE 14 AUG 2024

STYLE 1 THRU 5:
CANCELLED

STYLE 6:
PIN 1. BASE
2. EMITTER
3. COLLECTOR

STYLE 7:
PIN 1. EMITTER
2. BASE
3. COLLECTOR

STYLE 8:
PIN 1. ANODE
2. NO CONNECTION
3. CATHODE

STYLE 9:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 10:
PIN 1. DRAIN
2. SOURCE
3. GATE

STYLE 11:
PIN 1. ANODE
2. CATHODE
3. CATHODE−ANODE

STYLE 12:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 13:
PIN 1. SOURCE
2. DRAIN
3. GATE

STYLE 14:
PIN 1. CATHODE
2. GATE
3. ANODE

STYLE 15:
PIN 1. GATE
2. CATHODE
3. ANODE

STYLE 16:
PIN 1. ANODE
2. CATHODE
3. CATHODE

STYLE 17:
PIN 1. NO CONNECTION
2. ANODE
3. CATHODE

STYLE 18:
PIN 1. NO CONNECTION
2. CATHODE
3. ANODE

STYLE 19:
PIN 1. CATHODE
2. ANODE
3. CATHODE−ANODE

STYLE 20:
PIN 1. CATHODE
2. ANODE
3. GATE

STYLE 21:
PIN 1. GATE
2. SOURCE
3. DRAIN

STYLE 22:
PIN 1. RETURN
2. OUTPUT
3. INPUT

STYLE 23:
PIN 1. ANODE
2. ANODE
3. CATHODE

STYLE 24:
PIN 1. GATE
2. DRAIN
3. SOURCE

STYLE 25:
PIN 1. ANODE
2. CATHODE
3. GATE

STYLE 26:
PIN 1. CATHODE
2. ANODE
3. NO CONNECTION

STYLE 27:
PIN 1. CATHODE
2. CATHODE
3. CATHODE

STYLE 28:
PIN 1. ANODE
2. ANODE
3. ANODE

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales