

MOSFET – Single, N-Channel, Small Signal, SOT-23

30 V, 0.56 A

NTR4003N, NVR4003N

Features

- Low Gate Voltage Threshold ($V_{GS(TH)}$) to Facilitate Drive Circuit Design
- Low Gate Charge for Fast Switching
- ESD Protected Gate
- SOT-23 Package Provides Excellent Thermal Performance
- Minimum Breakdown Voltage Rating of 30 V
- NVR 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

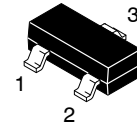
- Notebooks:
 - ◆ Level Shifters
 - ◆ Logic Switches
 - ◆ Low Side Load Switches
- Portable Applications

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

Symbol	Parameter			Value	Unit
V _{DSS}	Drain-to-Source Voltage			30	V
V _{GS}	Gate-to-Source Voltage			±20	V
I _D	Continuous Drain Current (Note 1)	Steady State	T _A = 25 °C	0.5	A
			T _A = 85 °C	0.37	
P _D	Power Dissipation (Note 1)	Steady State		0.69	W
I _D	Continuous Drain Current (Note 1)	t < 10 s	T _A = 25 °C	0.56	A
			T _A = 85 °C	0.40	
P _D	Power Dissipation (Note 1)	t < 5 s		0.83	W
I _{DM}	Pulsed Drain Current	t _p = 10 μs		1.7	A
T _J , T _{stg}	Operating Junction and Storage Temperature			–55 to 150	°C
I _S	Source Current (Body Diode)			1.0	A
T _L	Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			260	°C

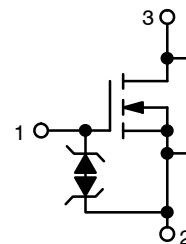
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
30 V	1.0 Ω @ 4.0 V	0.56 A
	1.5 Ω @ 2.5 V	

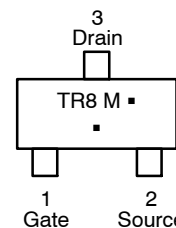


SOT-23
CASE 318
STYLE 21

N-Channel



MARKING DIAGRAM/ PIN ASSIGNMENT



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

(Note: Microdot may be in either location)

* Date Code orientation and overbar may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping [†]
NTR4003NT1G	SOT-23 (Pb-Free)	3,000 / Tape & Reel
NTR4003NT3G	SOT-23 (Pb-Free)	10,000 / Tape & Reel
NVR4003NT3G	SOT-23 (Pb-Free)	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 Specification Brochure, [BRD8011/D](#).

THERMAL RESISTANCE RATINGS

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

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

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
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OFF CHARACTERISTICS

$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	$V_{GS} = 0\text{ V}, I_D = 100\text{ }\mu\text{A}$	30	–	–	V
$V_{(BR)DSS}/T_J$	Drain-to-Source Breakdown Voltage Temperature Coefficient		–	40	–	mV/°C
I_{DSS}	Zero Gate Voltage Drain Current	$V_{GS} = 0\text{ V}, V_{DS} = 30\text{ V}$	–	–	1.0	μA
I_{GSS}	Gate-to-Source Leakage Current	$V_{DS} = 0\text{ V}, V_{GS} = \pm 10\text{ V}$	–	–	± 1.0	μA

ON CHARACTERISTICS (Note 3)

$V_{GS(TH)}$	Gate Threshold Voltage	$V_{GS} = V_{DS}, I_D = 250\text{ }\mu\text{A}$	0.8	–	1.4	V
$V_{GS(TH)}/T_J$	Negative Threshold Temperature Coefficient		–	3.4	–	mV/°C
$R_{DS(on)}$	Drain-to-Source On Resistance	$V_{GS} = 4.0\text{ V}, I_D = 10\text{ mA}$	–	1.0	1.5	Ω
		$V_{GS} = 2.5\text{ V}, I_D = 10\text{ mA}$	–	1.5	2.0	
g_{FS}	Forward Transconductance	$V_{DS} = 3.0\text{ V}, I_D = 10\text{ mA}$	–	0.33	–	S

CHARGES AND CAPACITANCES

C_{iss}	Input Capacitance	$V_{GS} = 0\text{ V}, f = 1.0\text{ MHz}, V_{DS} = 5.0\text{ V}$	–	21	42	pF
C_{oss}	Output Capacitance		–	19.7	40	
C_{rss}	Reverse Transfer Capacitance		–	8.1	16	
$Q_{G(TOT)}$	Total Gate Charge	$V_{GS} = 5.0\text{ V}, V_{DS} = 24\text{ V}, I_D = 0.1\text{ A}$	–	1.15	–	nC
$Q_{G(TH)}$	Threshold Gate Charge		–	0.15	–	
Q_{GS}	Gate-to-Source Gate Charge		–	0.32	–	
Q_{GD}	Gate-to-Drain Charge		–	0.23	–	

SWITCHING CHARACTERISTICS (Note 4)

$t_{d(on)}$	Turn-On Delay Time	$V_{GS} = 4.5\text{ V}, V_{DD} = 5.0\text{ V}, I_D = 0.1\text{ A}, R_G = 50\text{ }\Omega$	–	16.7	–	ns
t_r	Rise Time		–	47.9	–	
$t_{d(off)}$	Turn-Off Delay Time		–	65.1	–	
t_f	Fall Time		–	64.2	–	

SOURCE-DRAIN DIODE CHARACTERISTICS

V_{SD}	Forward Diode Voltage	$V_{GS} = 0\text{ V}, I_S = 10\text{ mA}$	$T_J = 25^\circ\text{C}$	–	0.65	0.7	V
			$T_J = 125^\circ\text{C}$	–	0.45	–	
t_{RR}	Reverse Recovery Time	$V_{GS} = 0\text{ V}, dI_S/dt = 8\text{ A}/\mu\text{s}, I_S = 10\text{ mA}$		–	14	–	ns

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.

3. Pulse Test: pulse width $\leq 300\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.
4. Switching characteristics are independent of operating junction temperatures.



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

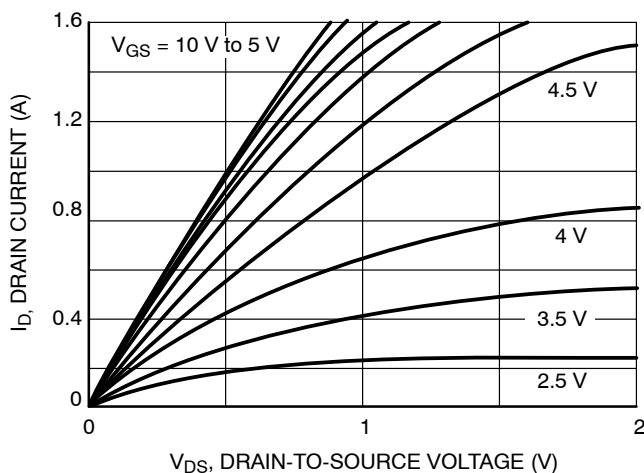


Figure 1. On-Region Characteristics

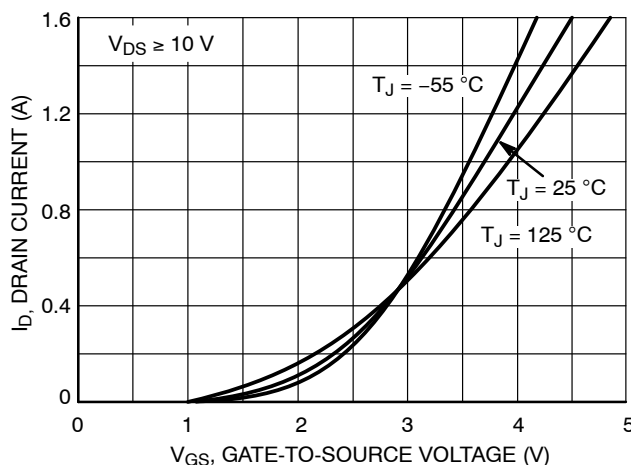


Figure 2. Transfer Characteristics

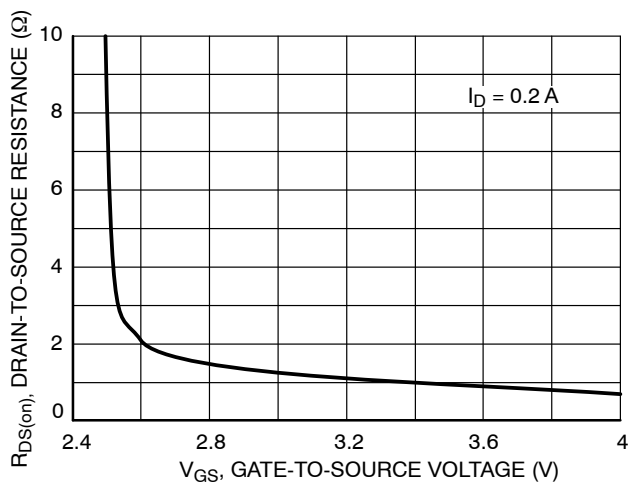


Figure 3. On-Resistance vs. Gate-to-Source Voltage

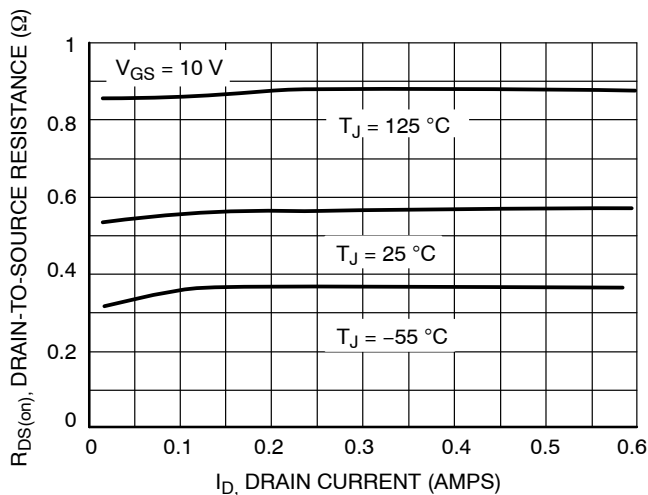


Figure 4. On-Resistance vs. Drain Current and Temperature

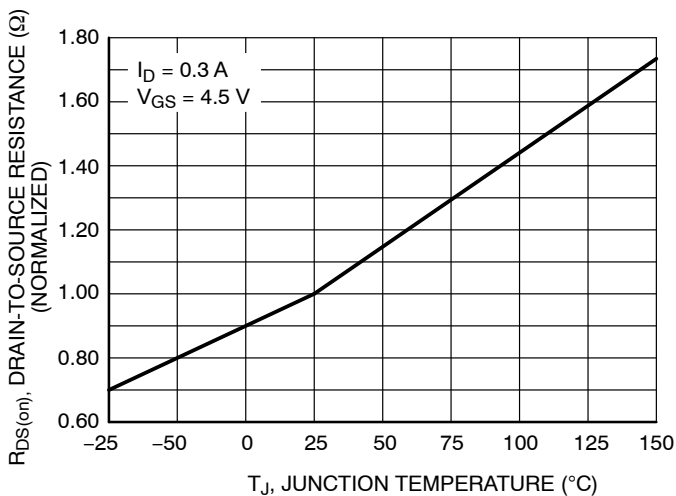


Figure 5. On-Resistance Variation with Temperature

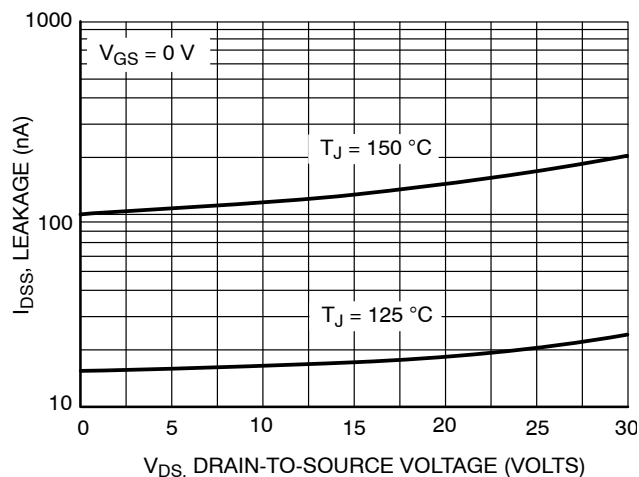


Figure 6. Drain-to-Source Leakage Current vs. Voltage

NTR4003N, NVR4003N

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

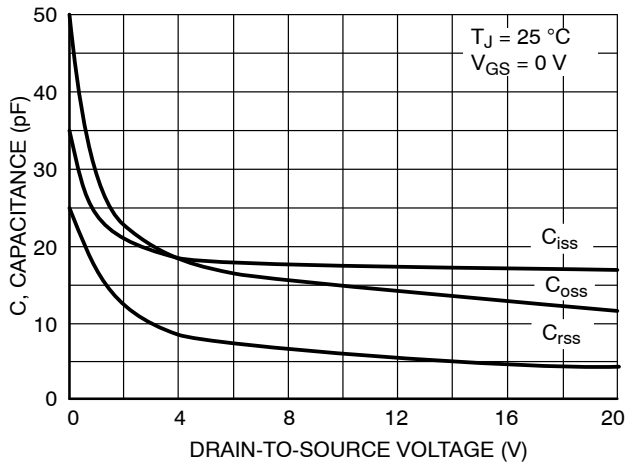


Figure 7. Capacitance Variation

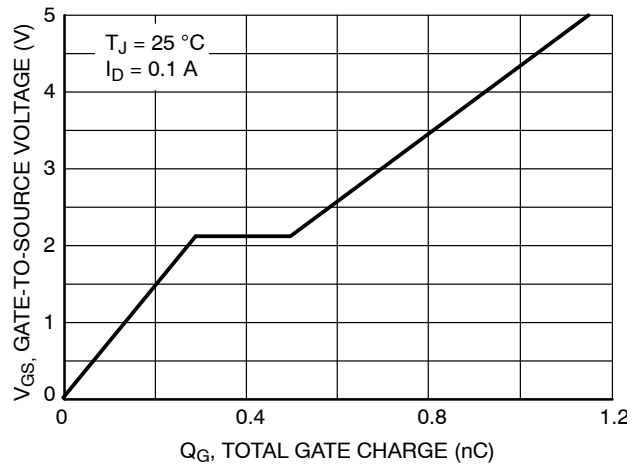


Figure 8. Gate-to-Source & Drain-to-Source Voltage vs. Total Charge

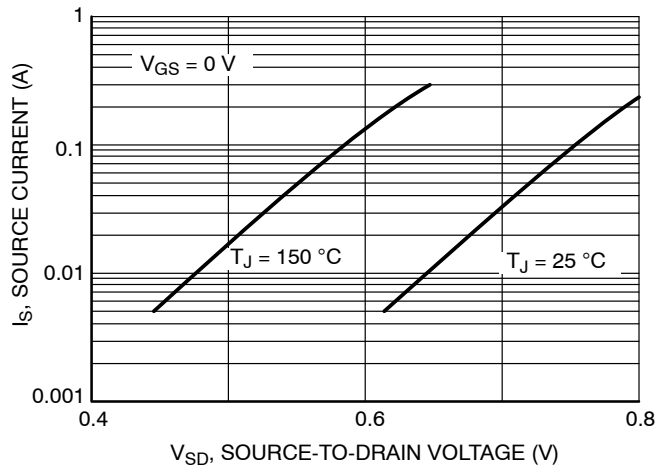


Figure 9. Diode Forward Voltage vs. Current

NTR4003N, NVR4003N

REVISION HISTORY

Revision	Description of Changes	Date
6	Rebranded the Data Sheet to onsemi format.	01/14/2026

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



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
HE	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

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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				

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