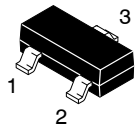
MOSFET – Single, N-Channel, Small Signal, SOT-23

30 V, 0.56 A

NTR4003N, NVR4003N

$V_{(BR)DSS}$	$R_{DS(on)}$ 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

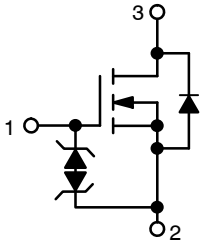
Features

- 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

N-Channel

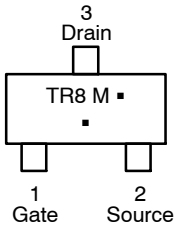


MAXIMUM RATINGS (T_J = 25 °C unless otherwise noted)

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, Tstg	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.

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.

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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 °C unless otherwise specified)

Symbol	Parameter	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS						
$V_{(BR)DSS}$	Drain-to-Source Breakdown Voltage	V_{GS} = 0 V, I_D = 100 μA	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 V, V_{DS} = 30 V, T_J = 25 °C	–	–	1.0	μA
I_{GSS}	Gate-to-Source Leakage Current	V_{DS} = 0 V, V_{GS} = ±10 V	–	–	±1.0	μA
ON CHARACTERISTICS (Note 3)						
$V_{GS(TH)}$	Gate Threshold Voltage	V_{GS} = V_{DS}, I_D = 250 μA	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 V, I_D = 10 mA	–	1.0	1.5	Ω
		V_{GS} = 2.5 V, I_D = 10 mA	–	1.5	2.0	
g_{FS}	Forward Transconductance	V_{DS} = 3.0 V, I_D = 10 mA	–	0.33	–	S
CHARGES AND CAPACITANCES						
C_{iss}	Input Capacitance	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 5.0 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 V, V_{DS} = 24 V, I_D = 0.1 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 V, V_{DD} = 5.0 V, I_D = 0.1 A, R_G = 50 Ω	–	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 V, I_S = 10 mA, T_J = 25 °C	–	0.65	0.7	V
		T_J = 125 °C	–	0.45	–	
t_{RR}	Reverse Recovery Time	V_{GS} = 0 V, dI_S/dt = 8A/μs, I_S = 10 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 ≤ 300 μs, duty cycle ≤ 2%.
4. Switching characteristics are independent of operating junction temperatures.

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TYPICAL PERFORMANCE CURVES (T_J = 25 °C unless otherwise noted)

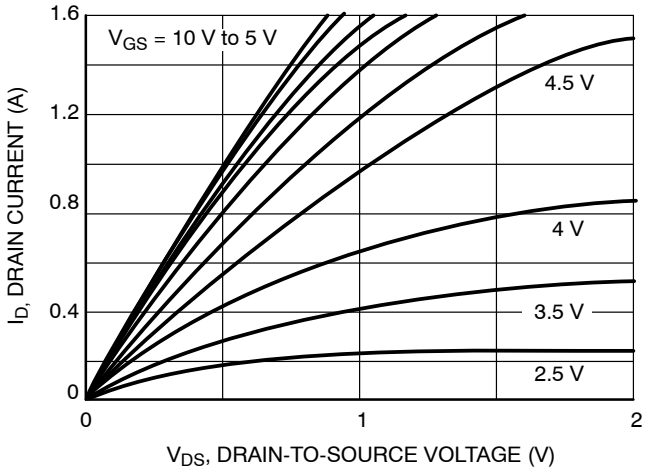


Figure 1. On-Region Characteristics

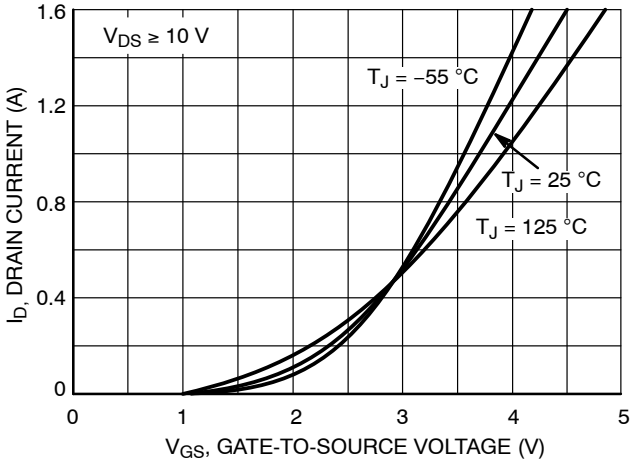


Figure 2. Transfer Characteristics

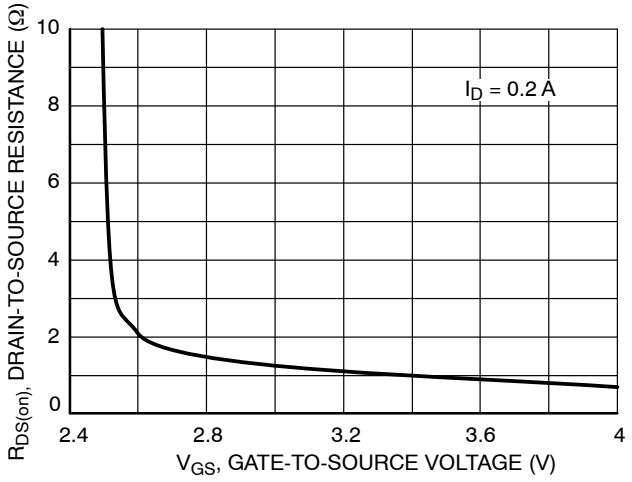


Figure 3. On-Resistance vs. Gate-to-Source Voltage

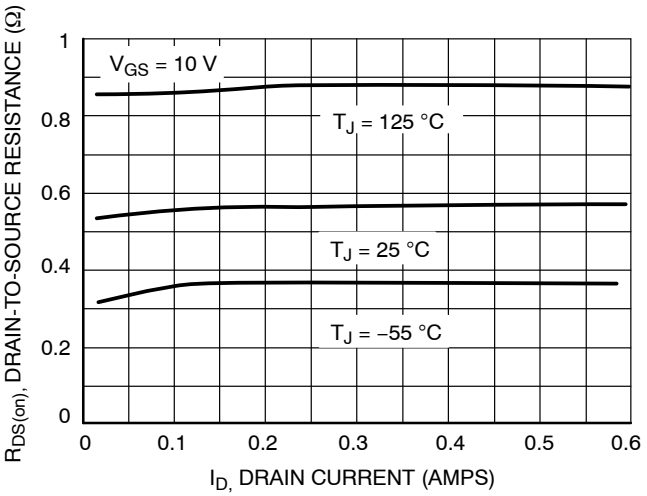


Figure 4. On-Resistance vs. Drain Current and Temperature

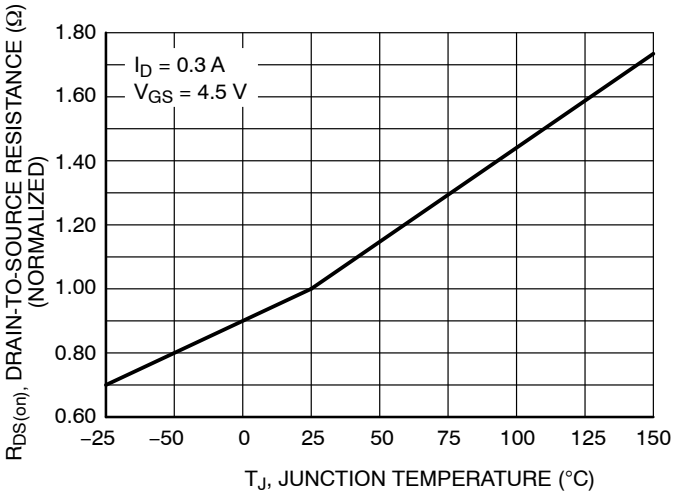


Figure 5. On-Resistance Variation with Temperature

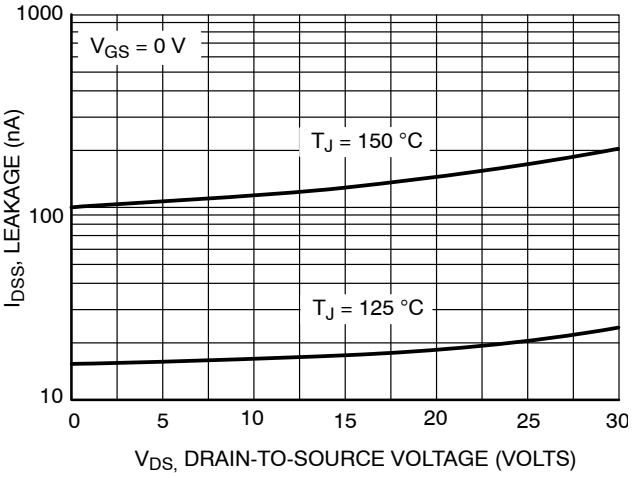


Figure 6. Drain-to-Source Leakage Current vs. Voltage

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TYPICAL PERFORMANCE CURVES (T_J = 25 °C unless otherwise noted) (continued)

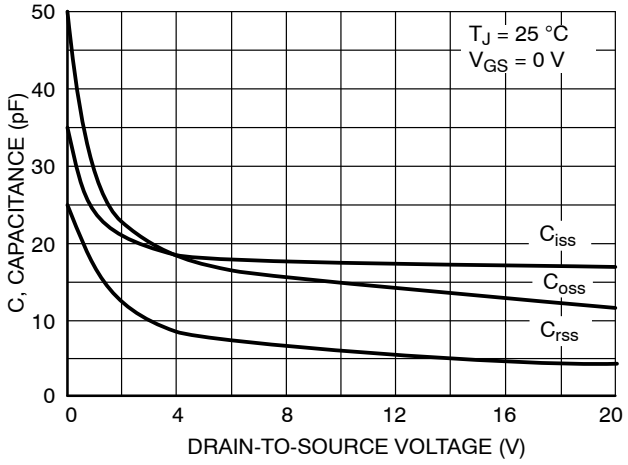


Figure 7. Capacitance Variation

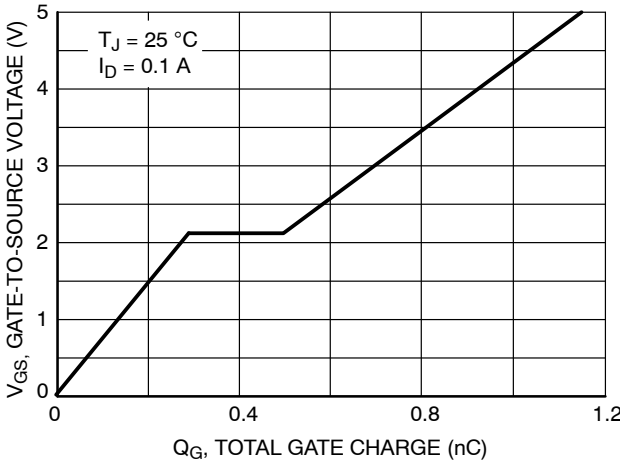


Figure 8. Gate-to-Source & Drain-to-Source Voltage vs. Total Charge

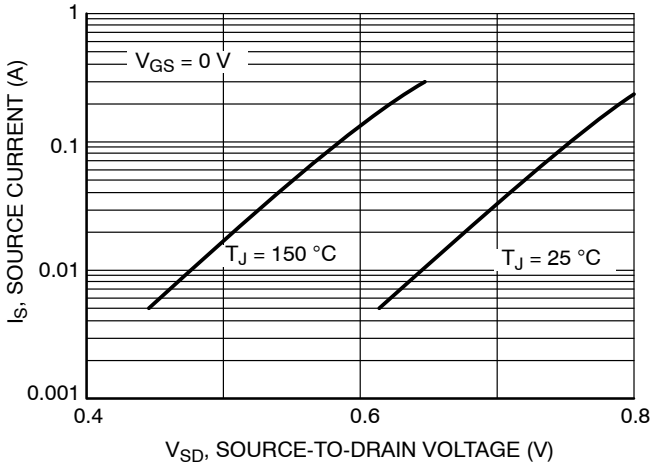


Figure 9. Diode Forward Voltage vs. Current

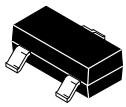
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REVISION HISTORY

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.

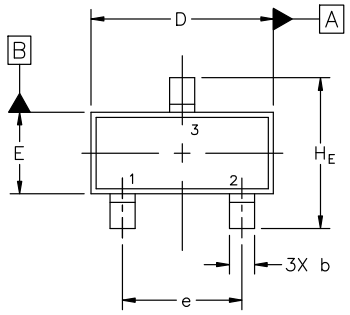
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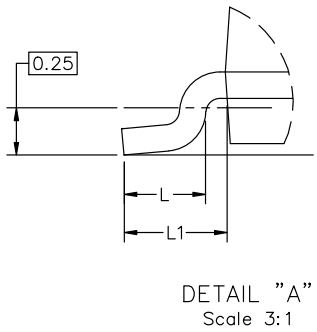
SCALE 4:1

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

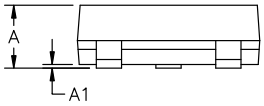
DATE 14 AUG 2024



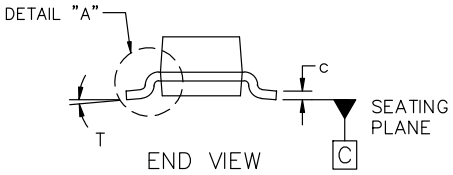
TOP VIEW



DETAIL "A"
Scale 3:1



SIDE VIEW

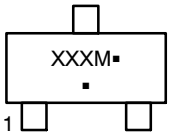


END VIEW

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°

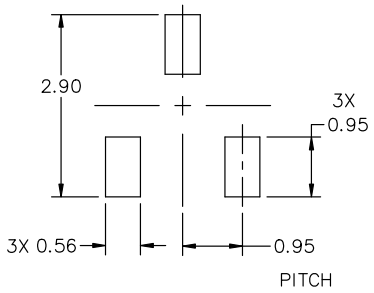
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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

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DESCRIPTION:	**SOT−23 (TO−236) 2.90x1.30x1.00 1.90P**		**PAGE 1 OF 2**

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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

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