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

60 V, 310 mA

NTR5103N

$V_{(BR)DSS}$	$R_{DS(on)}$ MAX	I_D MAX (Note 1)
60 V	3.0 Ω @ 4.5 V	310 mA
	2.5 Ω @ 10 V	

Features

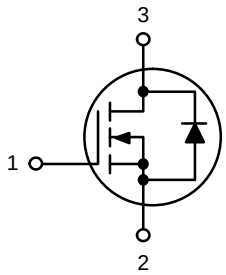
- Low $R_{DS(on)}$
- Small Footprint Surface Mount Package
- Trench Technology
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

Applications

- Low Side Load Switch
- Level Shift Circuits
- DC-DC Converter
- Portable Applications i.e. DSC, PDA, Cell Phone, etc.

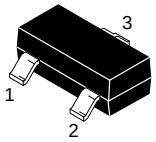
Simplified Schematic

N-Channel

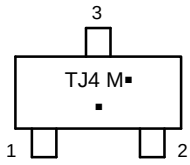


(Top View)

MARKING DIAGRAM & PIN ASSIGNMENT



SOT-23
CASE 318
STYLE 21



TJ4 = Device Code
M = Date Code
▪ = Pb-Free Package
(Note: Microdot may be in either location)

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

Rating	Symbol	Value	Unit
Drain-to-Source Voltage	V_{DSS}	60	V
Gate-to-Source Voltage	V_{GS}	±30	V
Drain Current (Note 1) Steady State T_A = 25 °C T_A = 85 °C t < 5 s T_A = 25 °C T_A = 85 °C	I_D	 260 190 310 220	mA
Power Dissipation (Note 1) Steady State t < 5 s	P_D	 300 420	mW
Pulsed Drain Current (t_p = 10 μs)	I_{DM}	1.2	A
Operating Junction and Storage Temperature Range	T_J, T_{STG}	−55 to +150	°C
Source Current (Body Diode)	I_S	300	mA
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)	T_L	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.

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Junction-to-Ambient − Steady State (Note 1)	$R_{\theta JA}$	417	°C/W
Junction-to-Ambient − t ≤ 5 s (Note 1)	$R_{\theta JA}$	300	

1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)

ORDERING INFORMATION

Device	Package	Shipping†
NTR5103NT1G	SOT-23 (Pb-Free)	3000 / 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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ELECTRICAL CHARACTERISTICS (T_J = 25 °C unless otherwise specified)

Parameter	Symbol	Test Condition		Min	Typ	Max	Units
OFF CHARACTERISTICS							
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	V_{GS} = 0 V, I_D = 250 μA		60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$				75		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 60 V	T_J = 25 °C			1	μA
			T_J = 125 °C			500	
Gate-to-Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±30 V				200	nA
ON CHARACTERISTICS (Note 2)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		1.9		2.6	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				4.4		mV/°C
Drain-to-Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 240 mA			1.0	2.5	Ω
		V_{GS} = 4.5 V, I_D = 50 mA			1.4	3.0	
Forward Transconductance	g_{FS}	V_{DS} = 5 V, I_D = 200 mA			530		mS
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1 MHz, V_{DS} = 25 V			26.7	40	pF
Output Capacitance	C_{OSS}				4.6		
Reverse Transfer Capacitance	C_{RSS}				2.9		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 5 V, V_{DS} = 10 V; I_D = 240 mA			0.81		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.31		
Gate-to-Source Charge	Q_{GS}				0.48		
Gate-to-Drain Charge	Q_{GD}				0.08		
SWITCHING CHARACTERISTICS, V_{GS} = V (Note 3)							
Turn-On Delay Time	$t_{d(ON)}$	V_{GS} = 10 V, V_{DD} = 30 V, I_D = 200 mA, R_G = 10 Ω			1.7		ns
Rise Time	t_r				1.2		
Turn-Off Delay Time	$t_{d(OFF)}$				4.8		
Fall Time	t_f				3.6		
DRAIN-SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 200 mA	T_J = 25 °C		0.79	1.2	V
			T_J = 85 °C		0.7		

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 temperatures

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TYPICAL CHARACTERISTICS

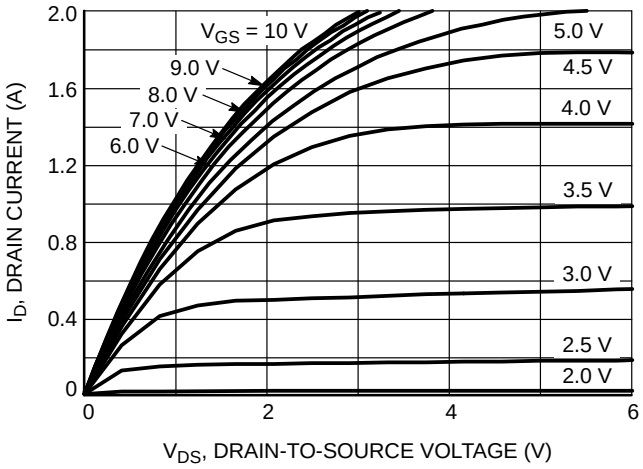

Figure 1. On-Region Characteristics

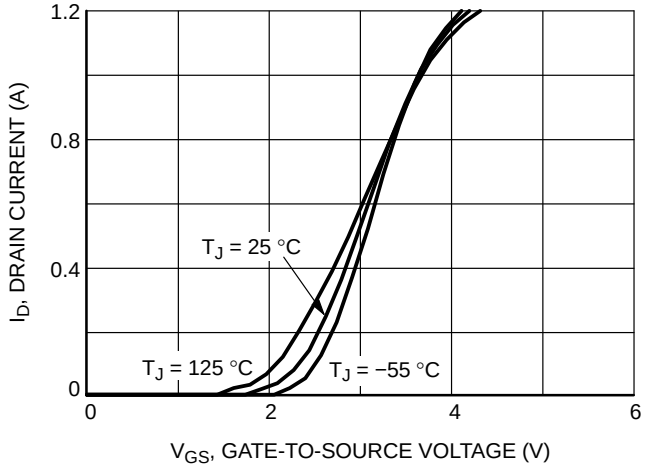

Figure 2. Transfer Characteristics

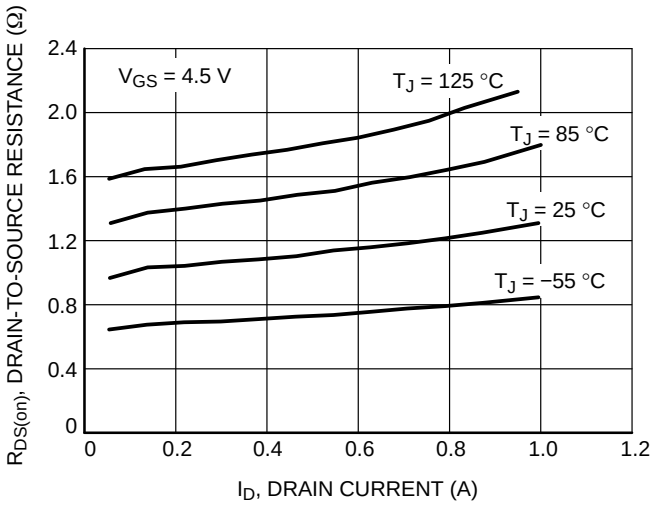

Figure 3. On-Resistance vs. Drain Current and Temperature

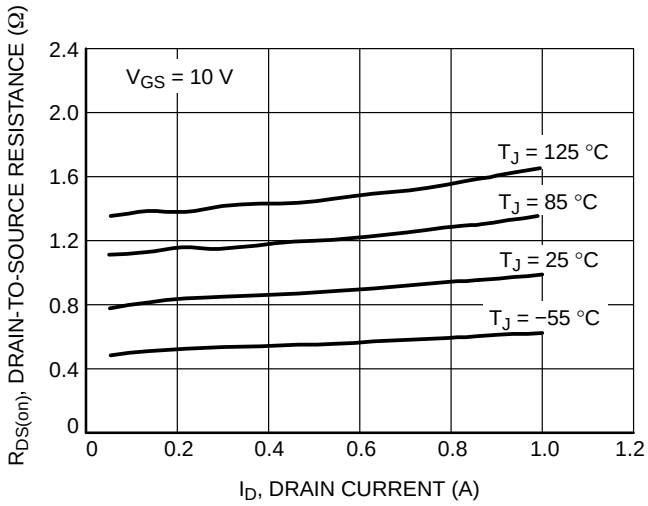

Figure 4. On-Resistance vs. Drain Current and Temperature

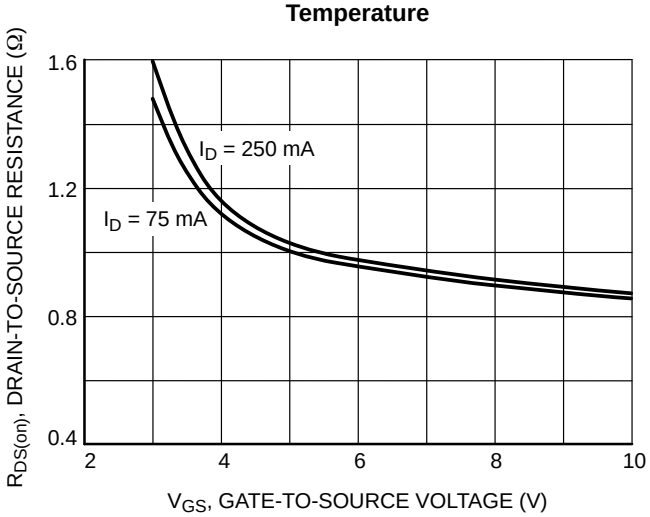

Figure 5. On-Resistance vs. Gate-to-Source Voltage

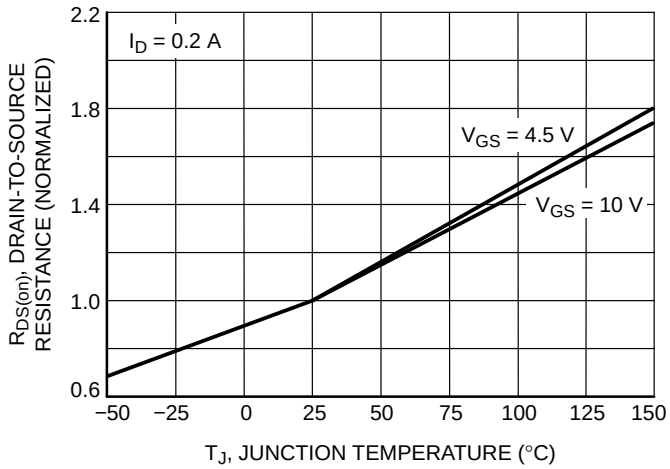

Figure 6. On-Resistance Variation with Temperature

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TYPICAL CHARACTERISTICS

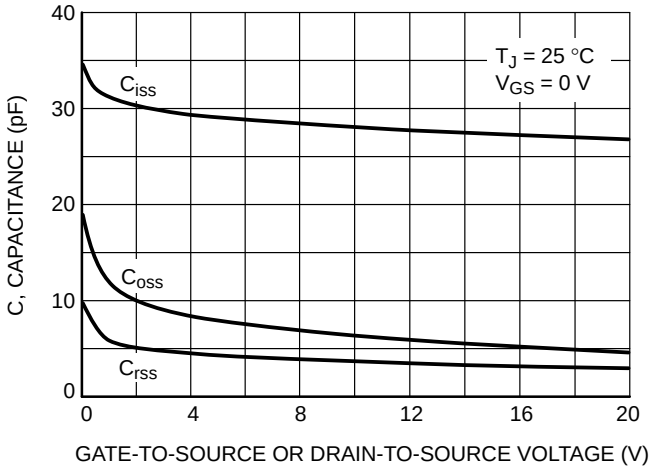

Figure 7. Capacitance Variation

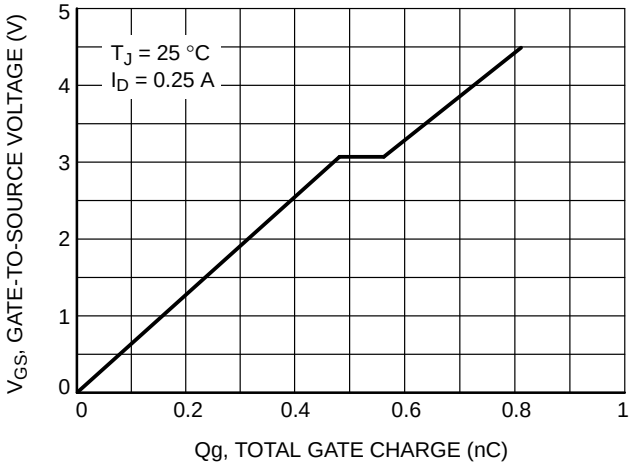

Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

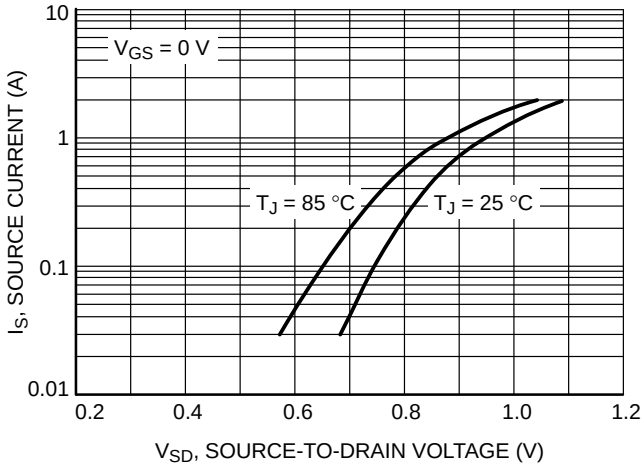

Figure 9. Diode Forward Voltage vs. Current

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REVISION HISTORY

Revision	Description of Changes	Date
2	Rebranded the Data Sheet to **onsemi** format.	10/24/2025

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.

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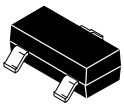
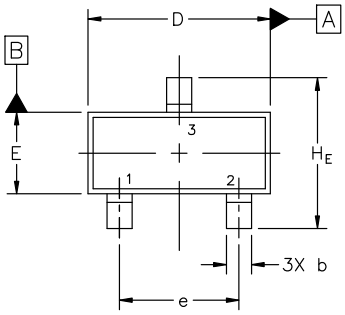


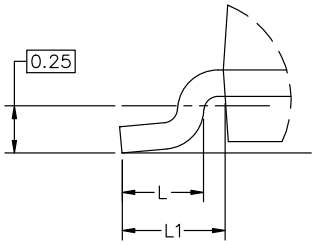
SCALE 4:1

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

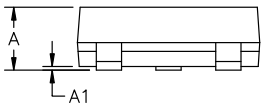
DATE 14 AUG 2024



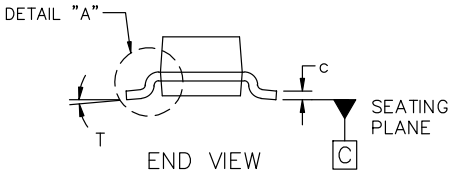
TOP VIEW



DETAIL "A"
Scale 3:1



SIDE VIEW

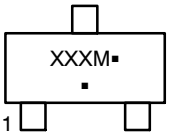


END VIEW

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°

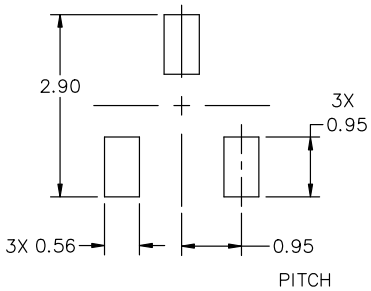
NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSIONS: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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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