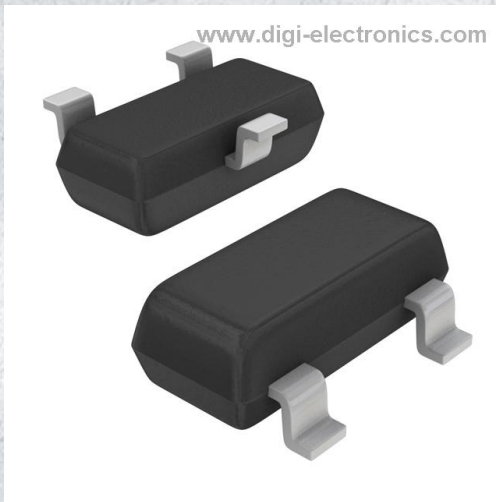


NTR5103NT1G Datasheet



<https://www.DiGi-Electronics.com>

DiGi Electronics Part Number	NTR5103NT1G-DG
Manufacturer	onsemi
Manufacturer Product Number	NTR5103NT1G
Description	MOSFET N-CH 60V 260MA SOT23-3
Detailed Description	N-Channel 60 V 260mA (Ta) 300mW (Ta) Surface Mount SOT-23-3 (TO-236)



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.

Purchase and inquiry

Manufacturer Product Number:

NTR5103NT1G

Series:

-

FET Type:

N-Channel

Drain to Source Voltage (Vdss):

60 V

Drive Voltage (Max Rds On, Min Rds On):

4.5V, 10V

Vgs(th) (Max) @ Id:

2.6V @ 250 μ A

Vgs (Max):

\pm 30V

FET Feature:

-

Operating Temperature:

-55°C ~ 150°C (Tj)

Supplier Device Package:

SOT-23-3 (TO-236)

Base Product Number:

NTR5103

Manufacturer:

onsemi

Product Status:

Active

Technology:

MOSFET (Metal Oxide)

Current - Continuous Drain (Id) @ 25°C:

260mA (Ta)

Rds On (Max) @ Id, Vgs:

2.5Ohm @ 240mA, 10V

Gate Charge (Qg) (Max) @ Vgs:

0.81 nC @ 5 V

Input Capacitance (Ciss) (Max) @ Vds:

40 pF @ 25 V

Power Dissipation (Max):

300mW (Ta)

Mounting Type:

Surface Mount

Package / Case:

TO-236-3, SC-59, SOT-23-3

Environmental & Export classification

RoHS Status:

ROHS3 Compliant

REACH Status:

REACH Unaffected

HTSUS:

8541.21.0095

Moisture Sensitivity Level (MSL):

1 (Unlimited)

ECCN:

EAR99

NTR5103N

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

60 V, 310 mA



ON Semiconductor®

<http://onsemi.com>

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.

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ 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	I_D	$T_A = 25^\circ\text{C}$	260
		$T_A = 85^\circ\text{C}$	190
$t < 5$ s	I_D	$T_A = 25^\circ\text{C}$	310
		$T_A = 85^\circ\text{C}$	220
Power Dissipation (Note 1) Steady State $t < 5$ s	P_D	300	mW
		420	
Pulsed Drain Current ($t_p = 10 \mu\text{s}$)	I_{DM}	1.2	A
Operating Junction and Storage Temperature Range	T_J, T_{STG}	-55 to +150	$^\circ\text{C}$
Source Current (Body Diode)	I_S	300	mA
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)	T_L	260	$^\circ\text{C}$

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.

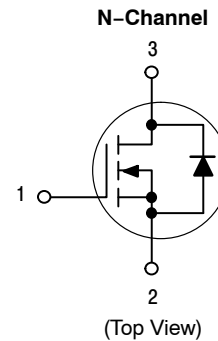
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	417	$^\circ\text{C}/\text{W}$
Junction-to-Ambient – $t \leq 5$ s (Note 1)	$R_{\theta JA}$	300	

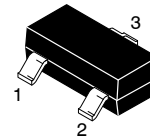
1. Surface-mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [1 oz] including traces)

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

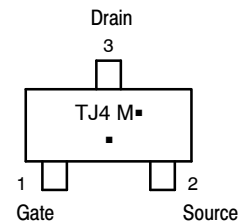
Simplified Schematic



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)

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 Specifications Brochure, BRD8011/D.

NTR5103N**ELECTRICAL CHARACTERISTICS** ($T_J = 25^\circ\text{C}$ unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Units
OFF CHARACTERISTICS						
Drain-to-Source Breakdown Voltage	$V_{(BR)DSS}$	$V_{GS} = 0\text{ V}, I_D = 250\ \mu\text{A}$	60			V
Drain-to-Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			75		$\text{mV}/^\circ\text{C}$
Zero Gate Voltage Drain Current	I_{DSS}	$V_{GS} = 0\text{ V},$ $V_{DS} = 60\text{ V}$	$T_J = 25^\circ\text{C}$		1	μA
			$T_J = 125^\circ\text{C}$		500	
Gate-to-Source Leakage Current	I_{GSS}	$V_{DS} = 0\text{ V}, V_{GS} = \pm 30\text{ V}$			200	nA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	$V_{GS(TH)}$	$V_{GS} = V_{DS}, I_D = 250\ \mu\text{A}$	1.9		2.6	V
Negative Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			4.4		$\text{mV}/^\circ\text{C}$
Drain-to-Source On Resistance	$R_{DS(on)}$	$V_{GS} = 10\text{ V}, I_D = 240\text{ mA}$		1.0	2.5	Ω
		$V_{GS} = 4.5\text{ V}, I_D = 50\text{ mA}$		1.4	3.0	
Forward Transconductance	g_{FS}	$V_{DS} = 5\text{ V}, I_D = 200\text{ mA}$		530		mS

CHARGES AND CAPACITANCES

Input Capacitance	C_{ISS}	$V_{GS} = 0\text{ V}, f = 1\text{ MHz},$ $V_{DS} = 25\text{ V}$		26.7	40	pF
Output Capacitance	C_{OSS}			4.6		
Reverse Transfer Capacitance	C_{RSS}			2.9		
Total Gate Charge	$Q_{G(TOT)}$	$V_{GS} = 5\text{ V}, V_{DS} = 10\text{ V};$ $I_D = 240\text{ mA}$		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	$t_{d(ON)}$	$V_{GS} = 10\text{ V}, V_{DD} = 30\text{ V},$ $I_D = 200\text{ mA}, R_G = 10\ \Omega$		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}	$V_{GS} = 0\text{ V},$ $I_S = 200\text{ mA}$	$T_J = 25^\circ\text{C}$		0.79	1.2	V
			$T_J = 85^\circ\text{C}$		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.

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

NTR5103N

TYPICAL CHARACTERISTICS

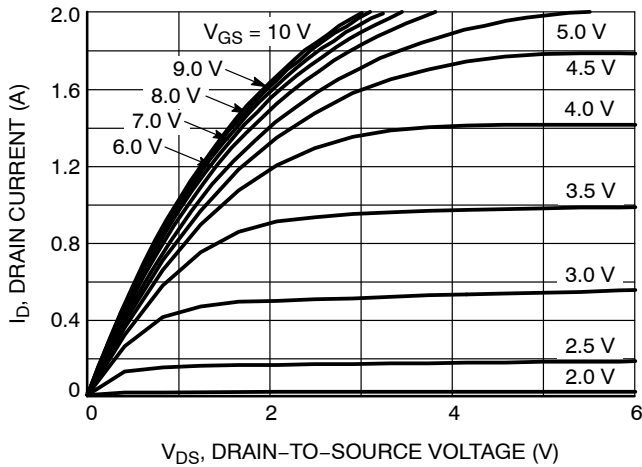


Figure 1. On-Region Characteristics

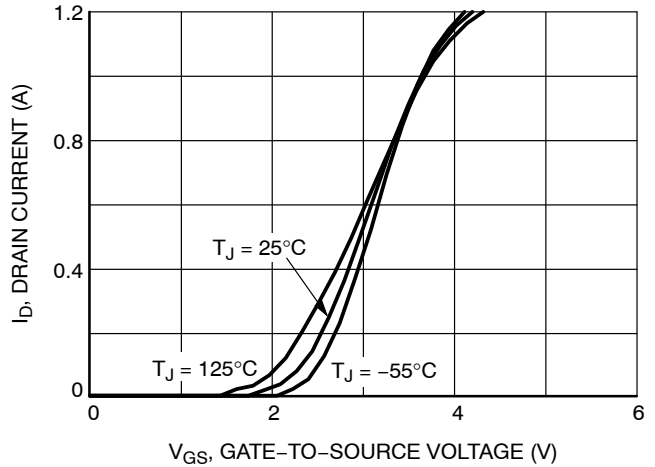


Figure 2. Transfer Characteristics

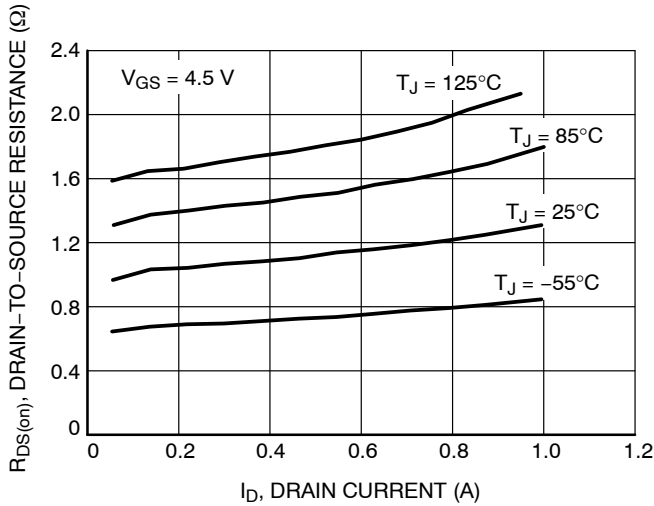


Figure 3. On-Resistance vs. Drain Current and Temperature

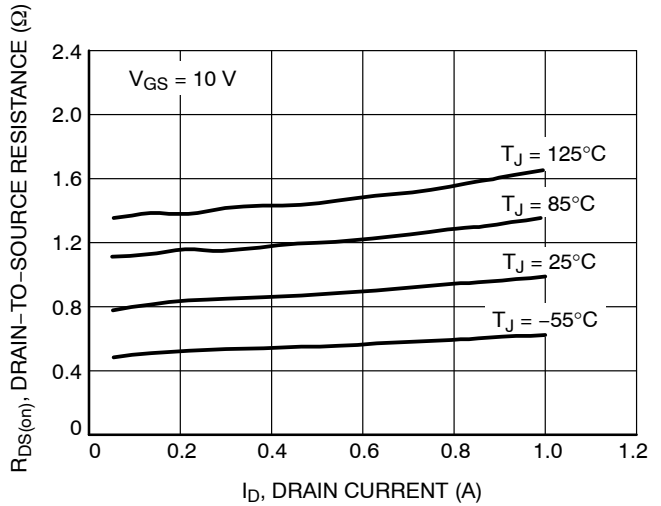


Figure 4. On-Resistance vs. Drain Current and Temperature

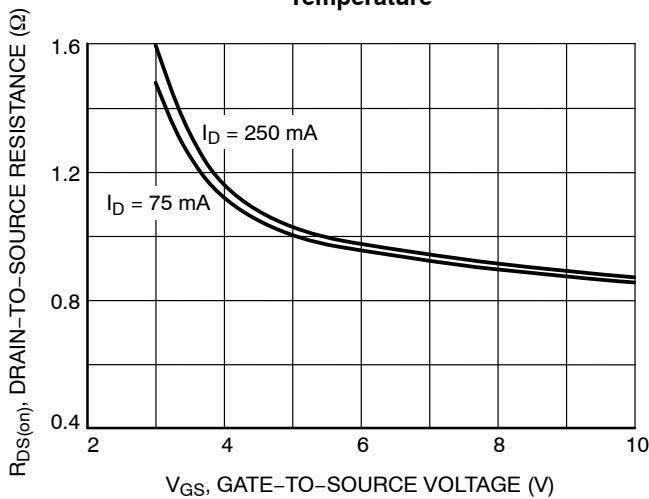


Figure 5. On-Resistance vs. Gate-to-Source Voltage

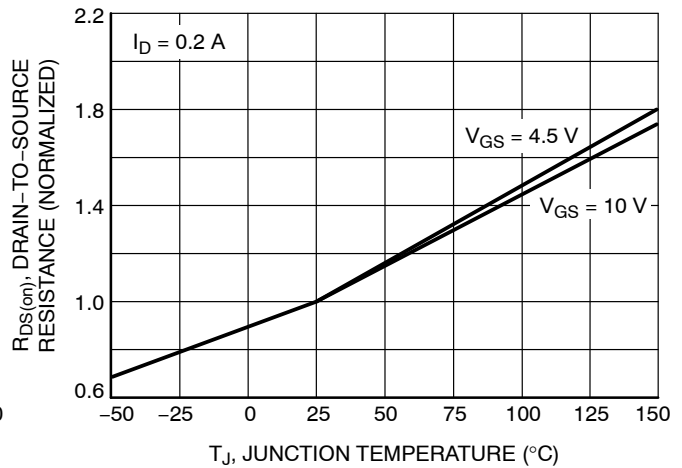


Figure 6. On-Resistance Variation with Temperature

NTR5103N

TYPICAL CHARACTERISTICS

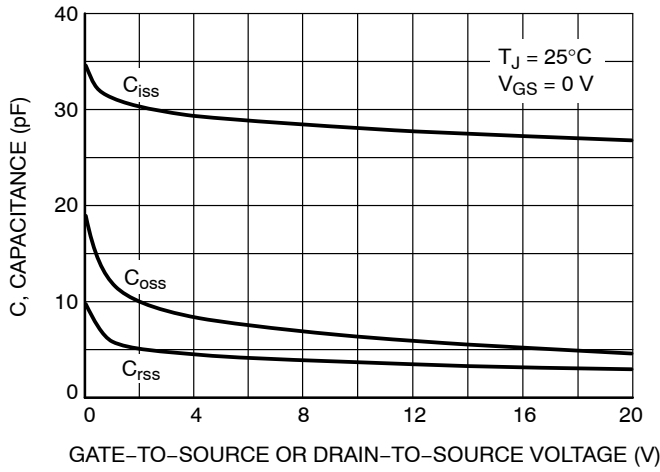


Figure 7. Capacitance Variation

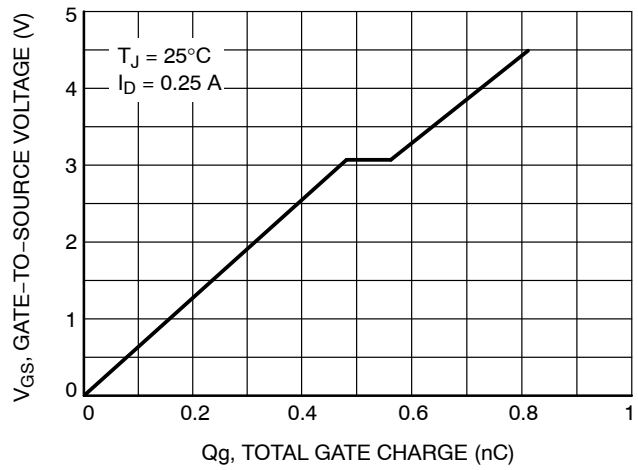


Figure 8. Gate-to-Source and Drain-to-Source Voltage vs. Total Charge

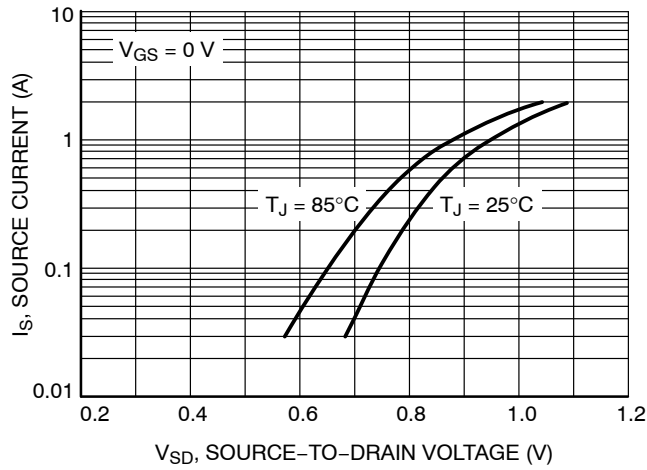
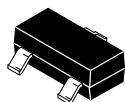


Figure 9. Diode Forward Voltage vs. Current



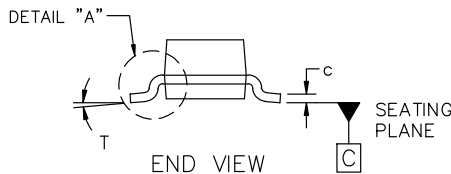
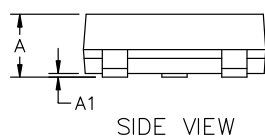
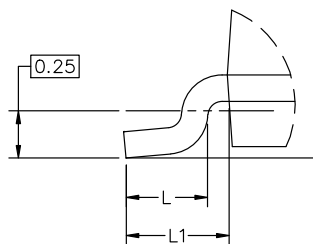
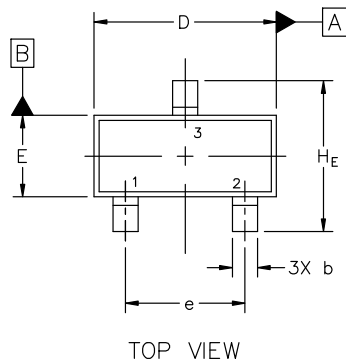
**MECHANICAL CASE OUTLINE
PACKAGE DIMENSIONS**



SCALE 4:1

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

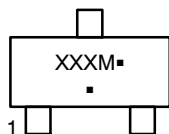
DATE 14 AUG 2024



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°

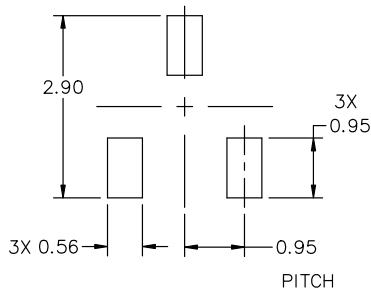
- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
 2. CONTROLLING DIMENSIONS: MILLIMETERS.
 3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
 4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

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.



* 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

DOCUMENT NUMBER:	98ASB42226B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOT-23 (TO-236) 2.90x1.30x1.00 1.90P	PAGE 1 OF 2

onsemi and ONSEMI are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

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

DOCUMENT NUMBER:	98ASB42226B	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	SOT-23 (TO-236) 2.90x1.30x1.00 1.90P	PAGE 2 OF 2

onsemi and **ONSEMI** are trademarks of Semiconductor Components Industries, LLC dba **onsemi** or its subsidiaries in the United States and/or other countries. **onsemi** reserves the right to make changes without further notice to any products herein. **onsemi** makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. **onsemi** does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

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

OUR CERTIFICATE

DiGi provide top-quality products and perfect service for customer worldwide through standardization, technological innovation and continuous improvement. DiGi through third-party certification, we strictly control the quality of products and services. Welcome your RFQ to

Email: Info@DiGi-Electronics.com



Tel: +00 852-30501935

RFQ Email: Info@DiGi-Electronics.com

DiGi is a global authorized distributor of electronic components.