

NTS4101P

MOSFET – Power, Single, P-Channel, SC-70

-20 V, -1.37 A

Features

- Leading -20 V Trench for Low $R_{DS(on)}$
- -2.5 V Rated for Low Voltage Gate Drive
- SC-70 Surface Mount for Small Footprint (2x2 mm)
- Pb-Free Package is Available

Applications

- High Side Load Switch
- Charging Circuit
- Single Cell Battery Applications such as: Cell Phones, Digital Cameras, PDAs

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

Parameter			Symbol	Value	Units
Drain-to-Source Voltage			V_{DSS}	-20	V
Gate-to-Source Voltage			V_{GS}	± 8	V
Continuous Drain Current (Note 1)	Steady State	$T_A = 25^{\circ}\text{C}$	I_D	-1.37	A
		$T_A = 70^{\circ}\text{C}$		-0.62	
Power Dissipation (Note 1)	Steady State	$T_A = 25^{\circ}\text{C}$	P_D	0.329	W
Pulsed Drain Current	$t_p = 10\text{ }\mu\text{s}$		I_{DM}	-4.0	A
Operating Junction and Storage Temperature			T_J , T_{STG}	-55 to 150	$^{\circ}\text{C}$
Source Current (Body Diode), Continuous			I_S	-0.5	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	$^{\circ}\text{C}$

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction-to-Ambient – Steady State (Note 1)	$R_{\theta JA}$	380	$^\circ\text{C/W}$

Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.

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

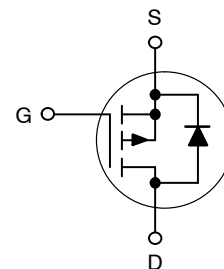


ON Semiconductor®

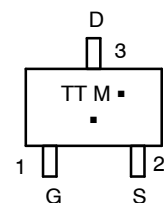
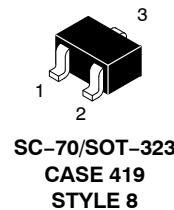
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$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
-20 V	83 m Ω @ -4.5 V	-1.37 A
	88 m Ω @ -3.6 V	
	104 m Ω @ -2.5 V	

P-Channel MOSFET



MARKING DIAGRAM & PIN ASSIGNMENT



TT = Device Code
M = Date Code*
■ = Pb-Free Package

(Note: Microdot may be in either location)

*Date Code orientation may vary depending upon manufacturing location.

ORDERING INFORMATION

Device	Package	Shipping†
NTS4101PT1	SOT-323	3000/Tape & Reel
NTS4101PT1G	SOT-323 (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.

NTS4101P

ELECTRICAL CHARACTERISTICS (T_J=25°C unless otherwise stated)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Drain-to-Source Breakdown Voltage	V _{(BR)DSS}	V _{GS} = 0 V, I _D = -250 μA	-20	-24.5		V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			-13.7		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = -16 V	T _J = 25°C		-1.0	μA
			T _J = 70°C		-5.0	
Gate-to-Source Leakage Current	I _{GSS}	V _{DS} = 0 V, V _{GS} = ±8 V			±100	nA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = -250 μA	-0.45	-0.64	-1.5	V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			2.7		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = -4.5 V, I _D = -1.0 A		83	120	mΩ
		V _{GS} = -3.6 V, I _D = -0.7 A		88	130	
		V _{GS} = -2.5 V, I _D = -0.3 A		104	160	
Forward Transconductance	G _{FS}	V _{DS} = -5.0 V, I _D = -1.3 A		5.2		S

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = -20 V		603	840	pF
Output Capacitance	C _{OSS}			90	125	
Reverse Transfer Capacitance	C _{RSS}			62	85	
Total Gate Charge	Q _{G(TOT)}	V _{GS} = -4.5 V, V _{DS} = -4.5 V, I _D = -1.0 A		6.4	9.0	nC
Threshold Gate Charge	Q _{G(TH)}			0.7		
Gate-to-Source Charge	Q _{GS}			1.0		
Gate-to-Drain Charge	Q _{GD}			1.5		

SWITCHING CHARACTERISTICS (Note 3)

Turn-On Delay Time	t _{d(ON)}	V _{GS} = -4.5 V, V _{DD} = -4.0 V, I _D = -1.0 A, R _G = 6.2 Ω		6.2	12	ns
Rise Time	t _r			14.9	25	
Turn-Off Delay Time	t _{d(OFF)}			26	40	
Fall Time	t _f			18	30	

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = -0.3 A	T _J = 25°C		-0.61	-1.2	V
			T _J = 125°C		-0.5		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _{SD} /dt = 100 A/μs, I _S = -1.0 A		10.9	20	ns	
Charge Time	T _a			7.1			
Discharge Time	T _b			3.8			
Reverse Recovery Charge	Q _{RR}			4.25			nC

2. Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.

3. Switching characteristics are independent of operating junction temperatures.

TYPICAL CHARACTERISTICS

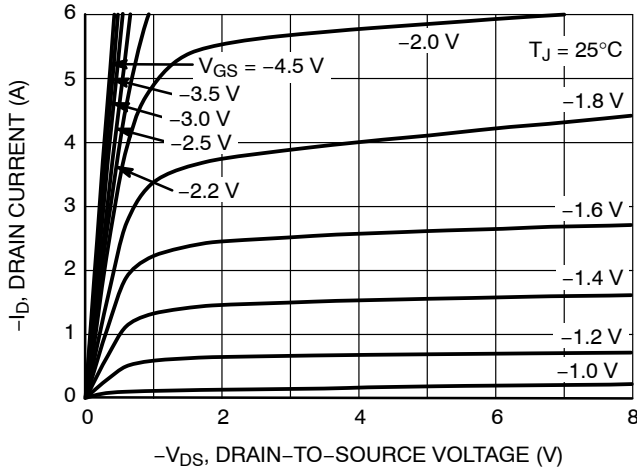


Figure 1. On-Region Characteristics

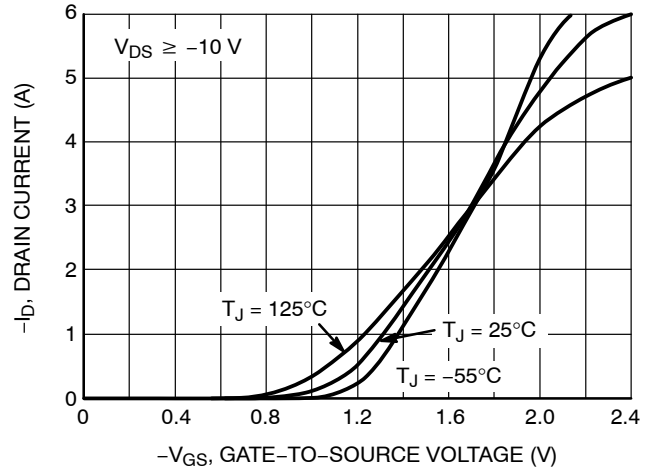


Figure 2. Transfer Characteristics

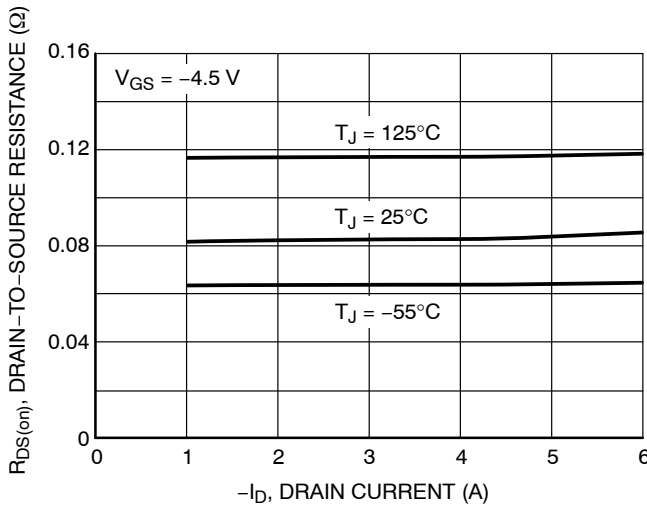


Figure 3. On-Resistance versus Drain Current and Temperature

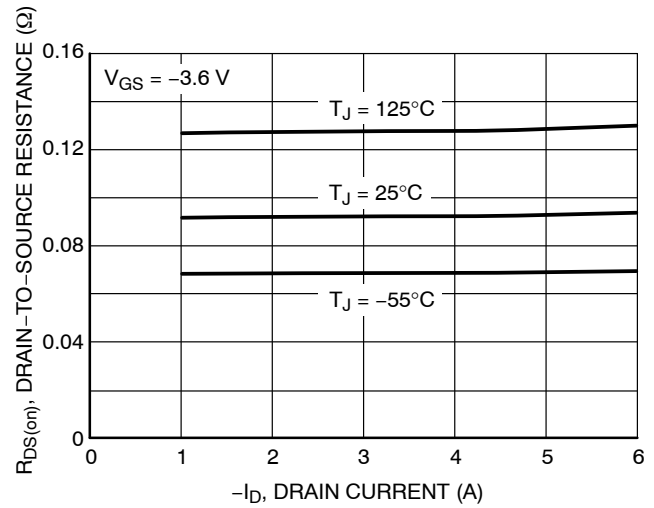


Figure 4. On-Resistance versus Drain Current and Temperature

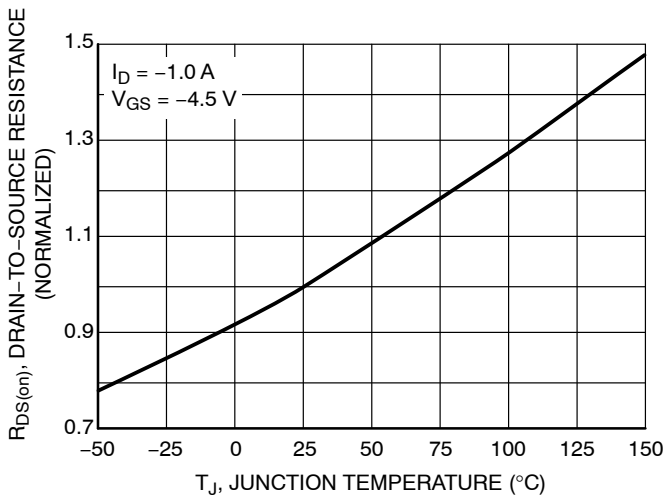


Figure 5. On-Resistance Variation with Temperature

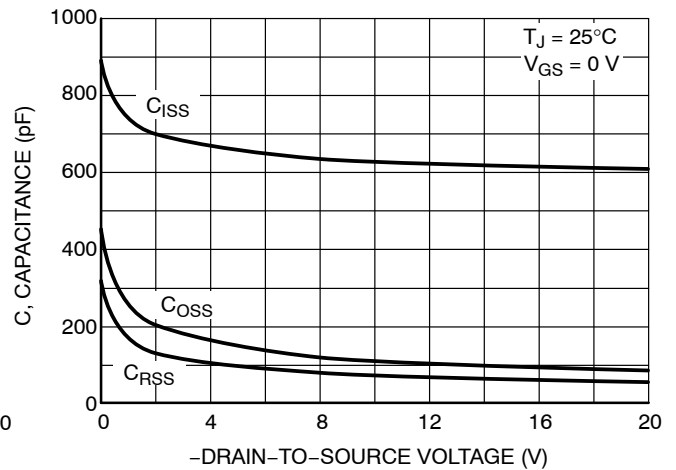


Figure 6. Capacitance Variation

TYPICAL CHARACTERISTICS

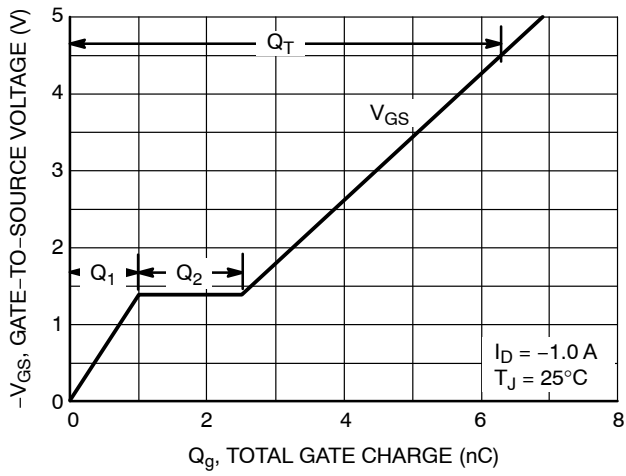


Figure 7. Gate-to-Source and Drain-to-Source Voltage versus Total Charge

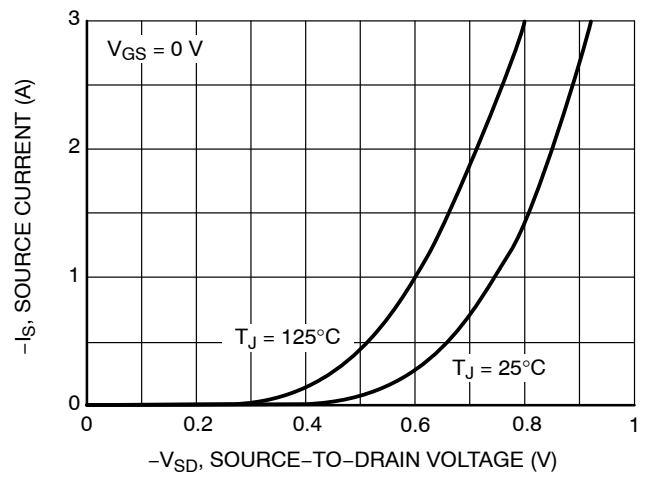
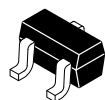


Figure 8. Diode Forward Voltage versus Current

MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS



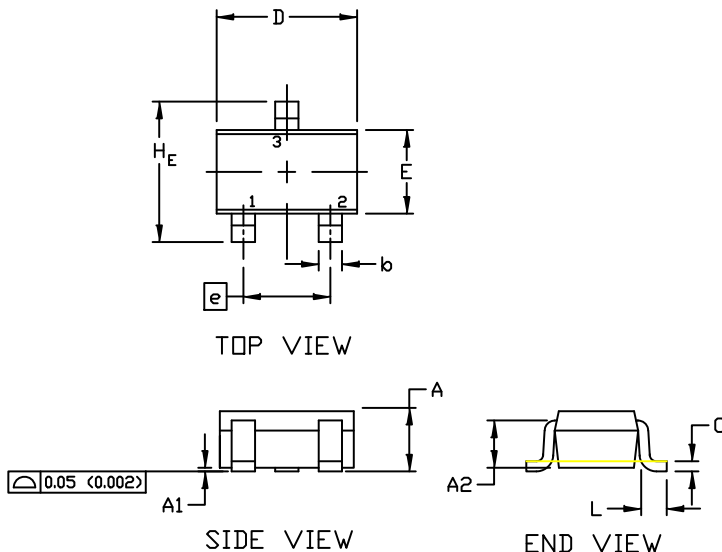
SCALE 4:1

SC-70 (SOT-323) CASE 419 ISSUE P

DATE 07 OCT 2021

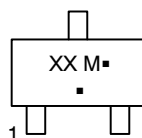
NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH



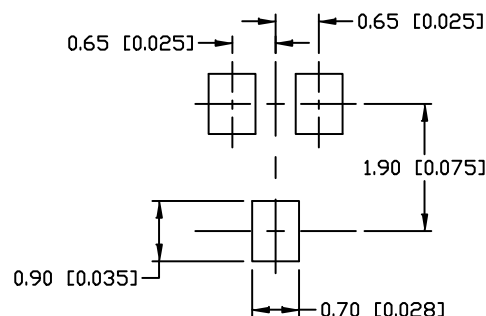
DIM	MILLIMETERS			INCHES		
	MIN.	NOM.	MAX.	MIN.	NOM.	MAX.
A	0.80	0.90	1.00	0.032	0.035	0.040
A1	0.00	0.05	0.10	0.000	0.002	0.004
A2	0.70 REF			0.028 BSC		
b	0.30	0.35	0.40	0.012	0.014	0.016
c	0.10	0.18	0.25	0.004	0.007	0.010
D	1.80	2.10	2.20	0.071	0.083	0.087
E	1.15	1.24	1.35	0.045	0.049	0.053
e	1.20	1.30	1.40	0.047	0.051	0.055
e1	0.65 BSC			0.026 BSC		
L	0.20	0.38	0.56	0.008	0.015	0.022
H _E	2.00	2.10	2.40	0.079	0.083	0.095

GENERIC MARKING DIAGRAM



XX = 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 ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

SOLDERING FOOTPRINT

STYLE 1:
CANCELLED

STYLE 2:
PIN 1. ANODE
2. N.C.
3. CATHODE

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

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. ANODE

STYLE 5:
PIN 1. ANODE
2. ANODE
3. CATHODE

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

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

STYLE 8:
PIN 1. GATE
2. SOURCE
3. DRAIN

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

STYLE 10:
PIN 1. CATHODE
2. ANODE
3. ANODE-CATHODE

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

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