

NTS2101P

Power MOSFET

–8.0 V, –1.4 A, Single P–Channel, SC–70

Features

- Leading Trench Technology for Low $R_{DS(on)}$ Extending Battery Life
- –1.8 V Rated for Low Voltage Gate Drive
- SC–70 Surface Mount for Small Footprint (2 x 2 mm)
- Pb–Free Package is Available

Applications

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

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

Parameter			Symbol	Value	Units
Drain-to–Source Voltage			V _{DSS}	–8.0	V
Gate-to–Source Voltage			V _{GS}	±8.0	V
Continuous Drain Current (Note 1)	Steady State	T _A = 25°C	I _D	–1.4	A
		T _A = 70°C		–1.1	
	t ≤ 5 s	T _A = 25°C		–1.5	A
Power Dissipation (Note 1)	Steady State	T _A = 25°C	P _D	0.29	W
				t ≤ 5 s	0.33
Pulsed Drain Current	tp = 10 μs		I _{DM}	–3.0	A
Operating Junction and Storage Temperature			T _J , T _{STG}	–55 to 150	°C
Source Current (Body Diode), Continuous			I _S	–0.46	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T _L	260	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction-to–Ambient – Steady State (Note 1)	$R_{\theta JA}$	430	$^\circ\text{C/W}$
Junction-to–Ambient – $t \leq 5\text{ s}$ (Note 1)	$R_{\theta JA}$	375	

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

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

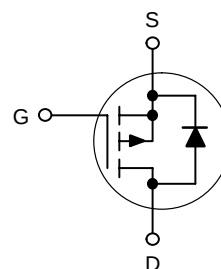


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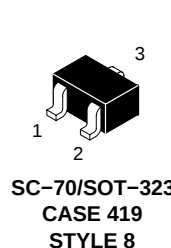
<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
–8.0 V	65 m Ω @ –4.5 V	–1.4 A
	78 m Ω @ –2.5 V	
	117 m Ω @ –1.8 V	

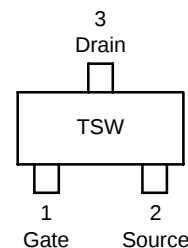
P–Channel MOSFET



MARKING DIAGRAM & PIN ASSIGNMENT



SC-70/SOT-323
CASE 419
STYLE 8



TS = Device Code
W = Work Week

ORDERING INFORMATION

Device	Package	Shipping [†]
NTS2101PT1	SOT-323	3000/Tape & Reel
NTS2101PT1G	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.

NTS2101P

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	-8.0	-20		V
Drain-to-Source Breakdown Voltage Temperature Coefficient	V _{(BR)DSS} /T _J			-10		mV/°C
Zero Gate Voltage Drain Current	I _{DSS}	V _{GS} = 0 V, V _{DS} = -6.4 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} = ±8.0 V			±100	nA

ON CHARACTERISTICS (Note 2)

Gate Threshold Voltage	V _{GS(TH)}	V _{GS} = V _{DS} , I _D = -250 μA	-0.45	-0.7		V
Negative Threshold Temperature Coefficient	V _{GS(TH)} /T _J			2.6		mV/°C
Drain-to-Source On Resistance	R _{DS(on)}	V _{GS} = -4.5 V, I _D = -1.0 A		65	100	mΩ
		V _{GS} = -2.5 V, I _D = -0.5 A		78	140	
		V _{GS} = -1.8 V, I _D = -0.3 A		117	210	

CHARGES AND CAPACITANCES

Input Capacitance	C _{ISS}	V _{GS} = 0 V, f = 1.0 MHz, V _{DS} = -8.0 V		640		pF
Output Capacitance	C _{OSS}			120		
Reverse Transfer Capacitance	C _{RSS}			82		
Total Gate Charge	Q _{G(TOT)}	V _{GS} = -5.0 V, V _{DD} = -5.0 V, I _D = -1.0 A		6.4		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		ns
Rise Time	t _r			15		
Turn-Off Delay Time	t _{d(OFF)}			26		
Fall Time	t _f			18		

DRAIN-SOURCE DIODE CHARACTERISTICS

Forward Diode Voltage	V _{SD}	V _{GS} = 0 V, I _S = -0.3 A	T _J = 25°C		-0.62	-1.2	V
			T _J = 125°C		-0.51		
Reverse Recovery Time	t _{RR}	V _{GS} = 0 V, dI _{SD} /dt = 100 A/μs, I _S = -1.0 A		23.4			ns
Charge Time	T _a			7.7			
Discharge Time	T _b			15.7			
Reverse Recovery Charge	Q _{RR}			9.5			nC

- Pulse Test: pulse width ≤ 300 μs, duty cycle ≤ 2%.
- Switching characteristics are independent of operating junction temperatures.

TYPICAL ELECTRICAL CHARACTERISTICS

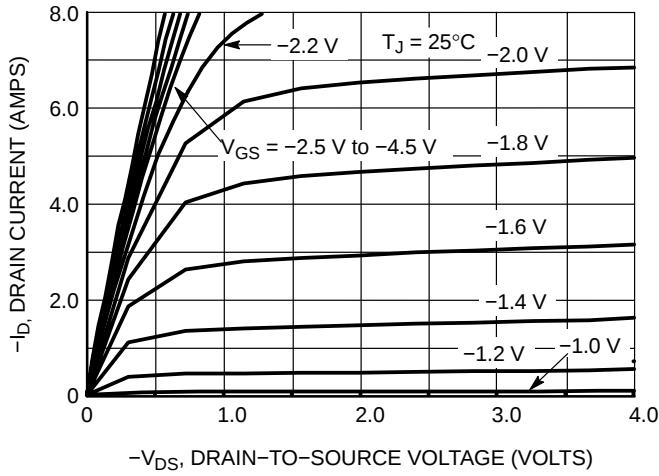


Figure 1. On-Region Characteristics

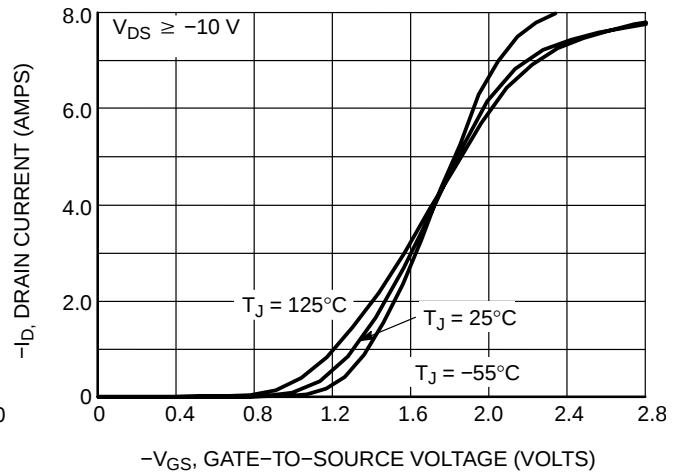


Figure 2. Transfer Characteristics

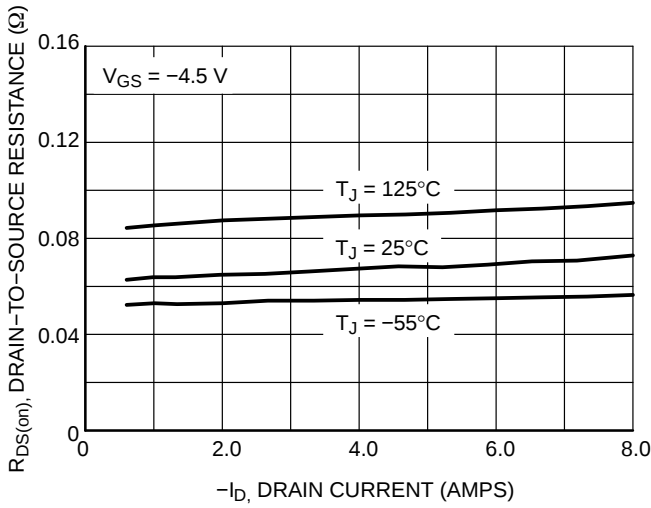


Figure 3. On-Resistance vs. Drain Current and Temperature

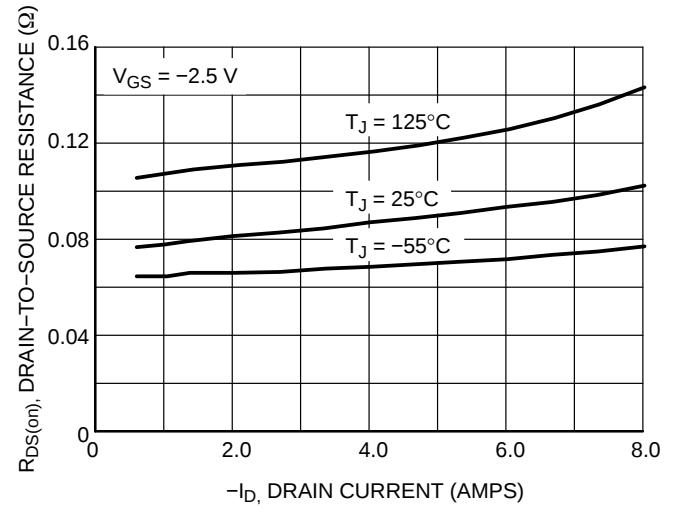


Figure 4. On-Resistance vs. Drain Current and Temperature

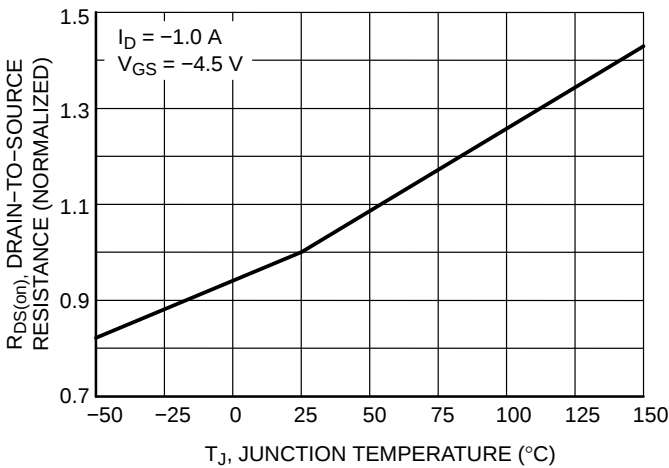


Figure 5. On-Resistance Variation with Temperature

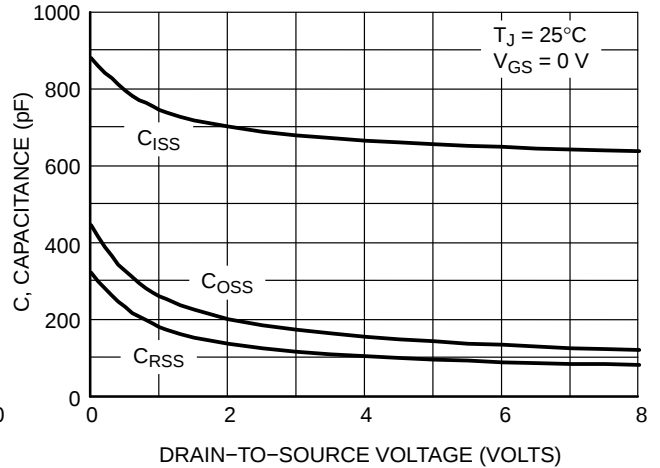


Figure 6. Capacitance Variation

TYPICAL ELECTRICAL CHARACTERISTICS

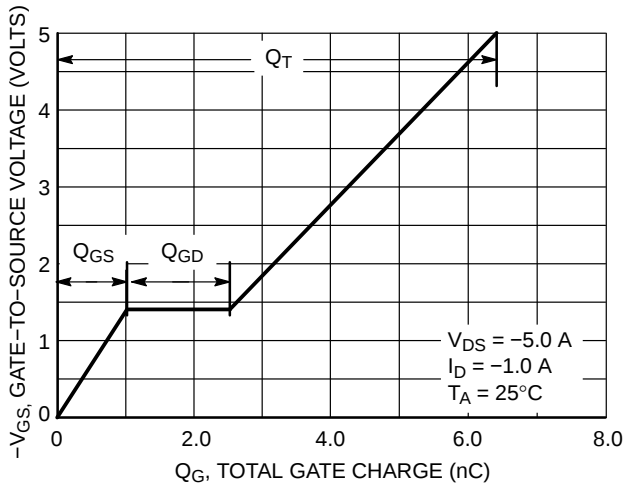


Figure 7. Gate-to-Source and Drain-to-Source Voltage vs. Total Gate Charge

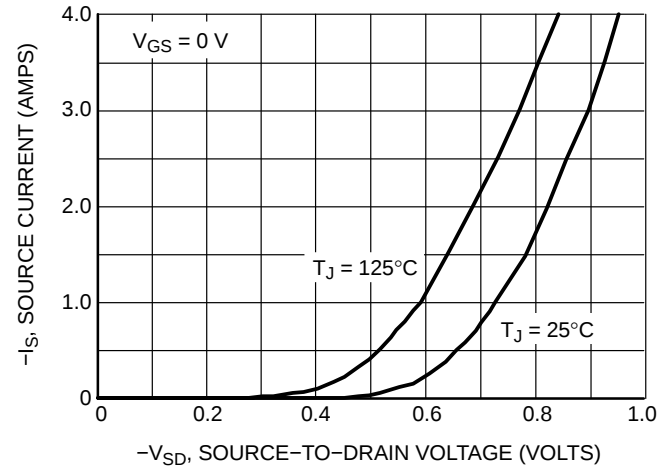
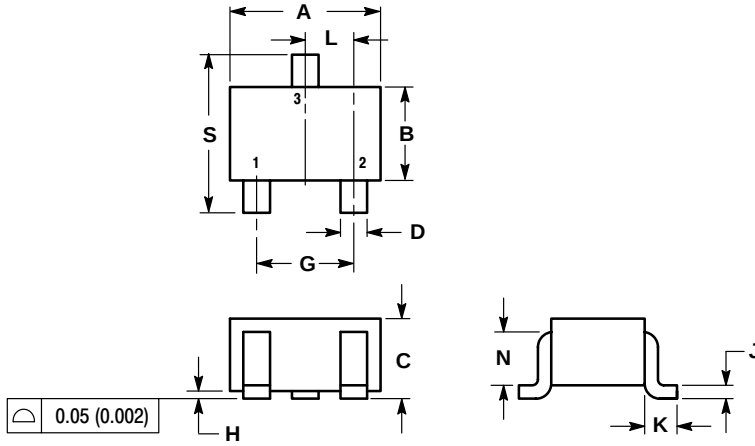


Figure 8. Diode Forward Voltage vs. Current

NTS2101P

PACKAGE DIMENSIONS

SC-70 (SOT-323)
CASE 419-04
ISSUE L

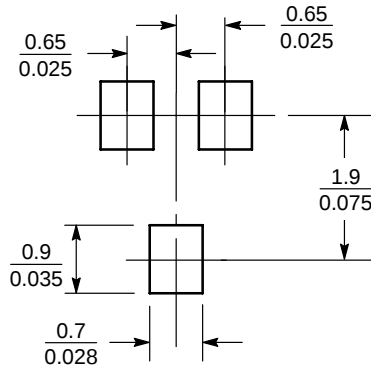


- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
 2. CONTROLLING DIMENSION: INCH.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.071	0.087	1.80	2.20
B	0.045	0.053	1.15	1.35
C	0.032	0.040	0.80	1.00
D	0.012	0.016	0.30	0.40
G	0.047	0.055	1.20	1.40
H	0.000	0.004	0.00	0.10
J	0.004	0.010	0.10	0.25
K	0.017 REF		0.425 REF	
L	0.026 BSC		0.650 BSC	
N	0.028 REF		0.700 REF	
S	0.079	0.095	2.00	2.40

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

SOLDERING FOOTPRINT*



*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

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