NTS4101P

Power MOSFET

−20 V, −1.37 A, Single P−Channel, SC−70

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°C unless otherwise stated)

Parameter			Symbol	Value	Units
Drain−to−Source Voltage			V_{DSS}	−20	V
Gate−to−Source Voltage			V_{GS}	±12	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25°C	I_D	−1.28	A
		T_A = 70°C		−1.00	
	t ≤ 5 s	T_A = 25°C		−1.37	A
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	0.29	W
	t ≤ 5 s			0.33	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	−4.0	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°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	°C

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Units
Junction−to−Ambient – Steady State (Note 1)	$R_{\theta JA}$	430	°C/W
Junction−to−Ambient − t ≤ 5 s (Note 1)	$R_{\theta JA}$	375	

1. Surface−mounted on FR4 board using 1″ 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 (Cu area = TBD in sq).

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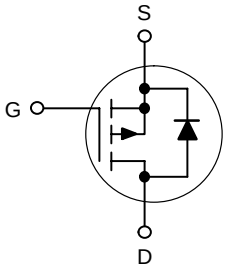
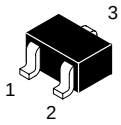
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
−20 V	83 mΩ @ −4.5 V	−1.37 A
	88 mΩ @ −3.6 V	
	104 mΩ @ −2.5 V	

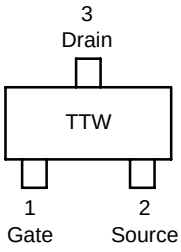
P−Channel MOSFET



MARKING DIAGRAM & PIN ASSIGNMENT



SC−70/SOT−323
CASE 419
STYLE 8



TT = Device Code
W = Work Week

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.

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

Parameter	Symbol	Test Condition		Min	Typ	Max	Unit
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} = −20 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} = ±12 V				±100	nA
ON CHARACTERISTICS (Note 3)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = −250 μA		−0.45	−0.64		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	
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = −20 V			603		pF
Output Capacitance	C_{OSS}				90		
Reverse Transfer Capacitance	C_{RSS}				62		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = −4.5 V, V_{DS} = −4.5 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 4)							
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				14.9		
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		−0.61	−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		ns
Charge Time	T_a				7.1		
Discharge Time	T_b				3.8		
Reverse Recovery Charge	Q_{RR}				4.25		nC

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

TYPICAL CHARACTERISTICS

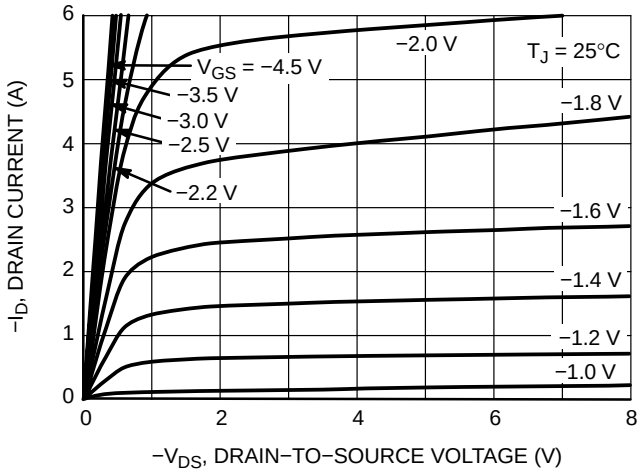


Figure 1. On−Region Characteristics

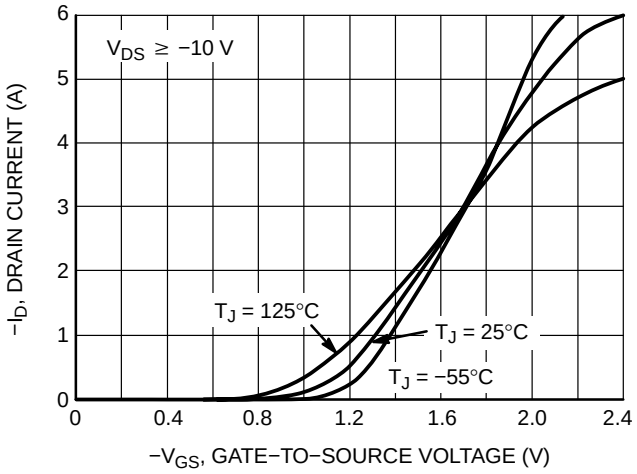


Figure 2. Transfer Characteristics

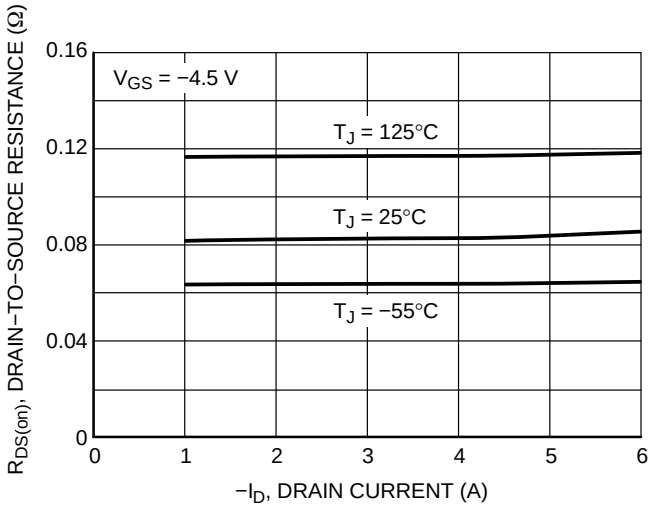


Figure 3. On−Resistance versus Drain Current and Temperature

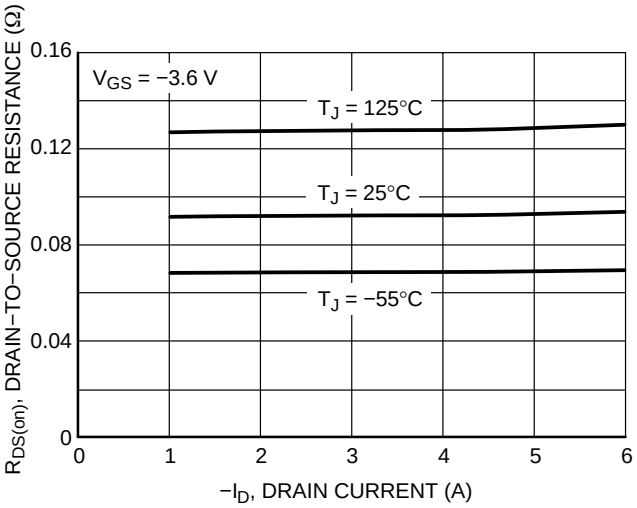


Figure 4. On−Resistance versus Drain Current and Temperature

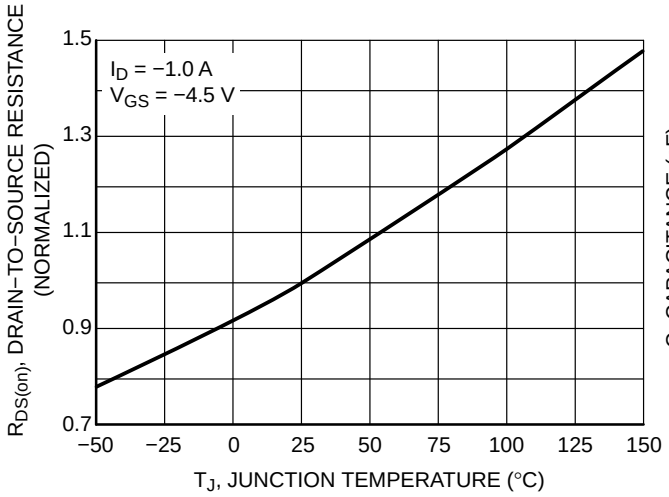


Figure 5. On−Resistance Variation with Temperature

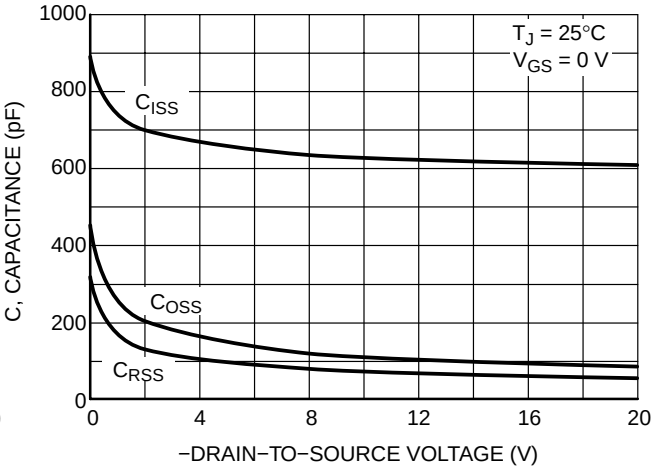


Figure 6. Capacitance Variation

TYPICAL CHARACTERISTICS

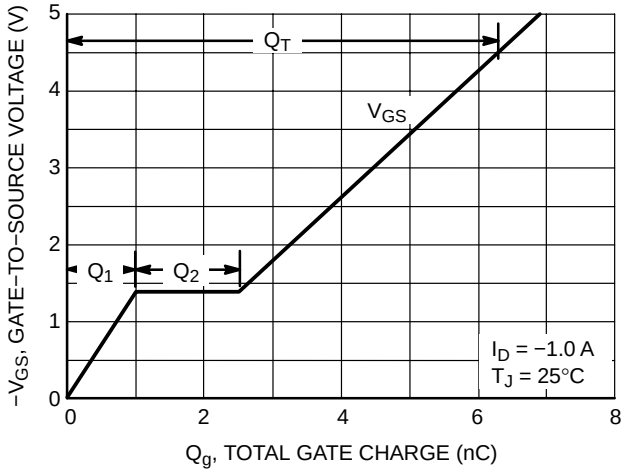


Figure 7. Gate−to−Source and Drain−to−Source Voltage versus Total Charge

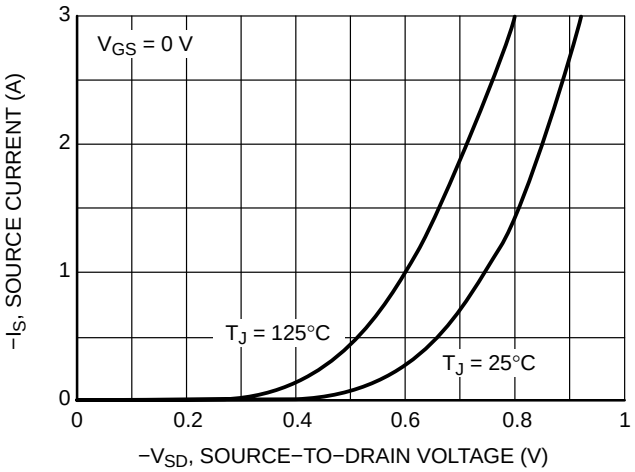
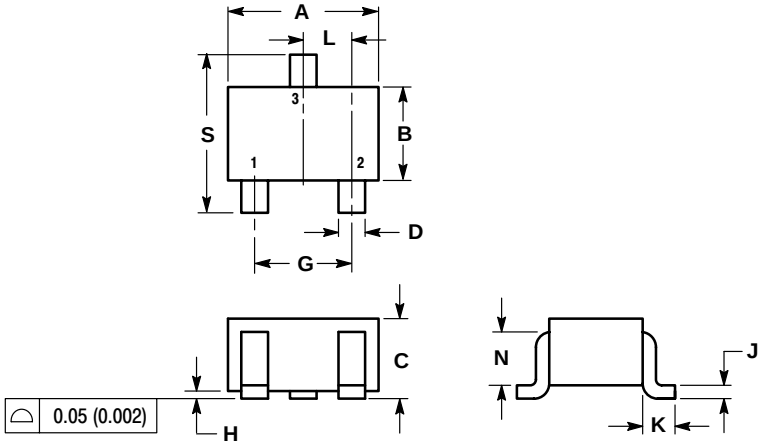


Figure 8. Diode Forward Voltage versus Current

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.

	INCHES		MILLIMETERS	
DIM	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

PUBLICATION ORDERING INFORMATION

LITERATURE FULFILLMENT:
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