NTJD4401N

Small Signal MOSFET
20 V, Dual N−Channel, SC−88 ESD Protection

Features

- Small Footprint (2 x 2 mm)
- Low Gate Charge N−Channel Device
- ESD Protected Gate
- Same Package as SC−70 (6 Leads)
- Pb−Free Packages are Available

Applications

- Load Power switching
- Li−Ion Battery Supplied Devices
- Cell Phones, Media Players, Digital Cameras, PDAs
- DC−DC Conversion

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	20	V
Gate−to−Source Voltage			V_{GS}	±12	V
Continuous Drain Current (Based on $R_{\theta JA}$)	Steady State	T_A = 25°C	I_D	0.63	A
		T_A = 85°C		0.46	
Power Dissipation (Based on $R_{\theta JA}$)	Steady State	T_A = 25°C	P_D	0.27	W
		T_A = 85°C		0.14	
Continuous Drain Current (Based on $R_{\theta JL}$)	Steady State	T_A = 25°C	I_D	0.91	A
		T_A = 85°C		0.65	
Power Dissipation (Based on $R_{\theta JL}$)	Steady State	T_A = 25°C	P_D	0.55	W
		T_A = 85°C		0.29	
Pulsed Drain Current		t ≤10 μs	I_{DM}	±1.2	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Continuous Source Current (Body Diode)			I_S	0.63	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

THERMAL RESISTANCE RATINGS (Note 1)

Parameter	Symbol	Typ	Max	Units
Junction−to−Ambient – Steady State	$R_{\theta JA}$	400	460	°C/W
Junction−to−Lead (Drain) – Steady State	$R_{\theta JL}$	194	226	

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.

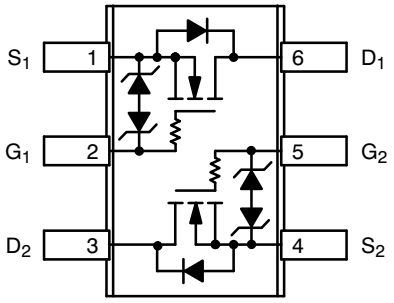
1. Surface mounted on FR4 board using 1 oz Cu area = 0.9523 in sq.

ON Semiconductor®

http://onsemi.com

$V_{(BR)DSS}$	$R_{DS(on)}$ Typ	I_D Max
20 V	0.22 Ω @ 4.5 V	0.775 A
	0.32 Ω @ 2.5 V	
	0.51 Ω @ 1.8 V	

SC−88 (SOT−363)



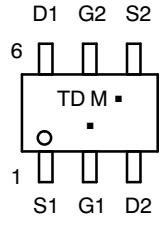
Top View

MARKING DIAGRAM & PIN ASSIGNMENT



1

SC−88/SOT−363
CASE 419B
STYLE 28



TD = Device Code
M = Date Code
▪ = Pb−Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 4 of this data sheet.

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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	27		V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$			22		mV/ °C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 16 V			1.0	μA
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = ±12 V			10	μA
ON CHARACTERISTICS (Note 2)						
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA	0.6	0.92	1.5	V
Gate Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$			−2.1		mV/ °C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 4.5 V, I_D = 0.63 A		0.29	0.375	Ω
		V_{GS} = 2.5 V, I_D = 0.40 A		0.36	0.445	
Forward Transconductance	g_{FS}	V_{DS} = 4.0 V, I_D = 0.63 A		2.0		S
CHARGES AND CAPACITANCES						
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 20 V		33	46	pF
Output Capacitance	C_{OSS}			13	22	
Reverse Transfer Capacitance	C_{RSS}			2.8	5.0	
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 10 V, I_D = 0.63 A		1.3	3.0	nC
Threshold Gate Charge	$Q_{G(TH)}$			0.1		
Gate−to−Source Charge	Q_{GS}			0.2		
Gate−to−Drain Charge	Q_{GD}			0.4		
SWITCHING CHARACTERISTICS (Note 3)						
Turn−On Delay Time	$td_{(ON)}$	V_{GS} = 4.5 V, V_{DD} = 10 V, I_D = 0.5 A, R_G = 20 Ω		0.083		μs
Rise Time	tr			0.227		
Turn−Off Delay Time	$td_{(OFF)}$			0.786		
Fall Time	tf			0.506		
DRAIN−SOURCE DIODE CHARACTERISTICS						
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S =0.23 A, T_J = 25°C		0.76	1.1	V
		V_{GS} = 0 V, I_S =0.23 A, T_J = 125°C		0.63		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 0.63 A		0.410		μs

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

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

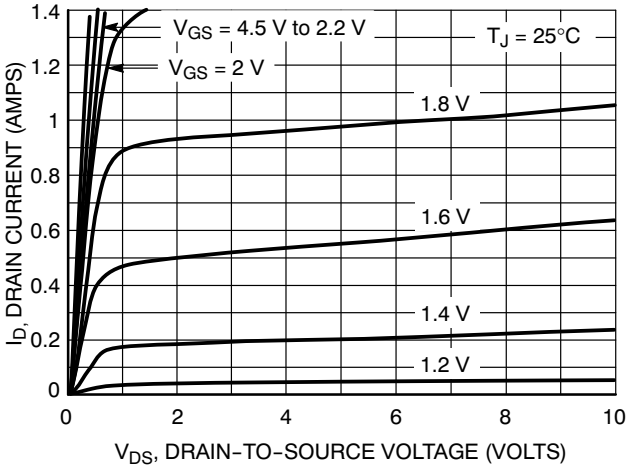


Figure 1. On−Region Characteristics

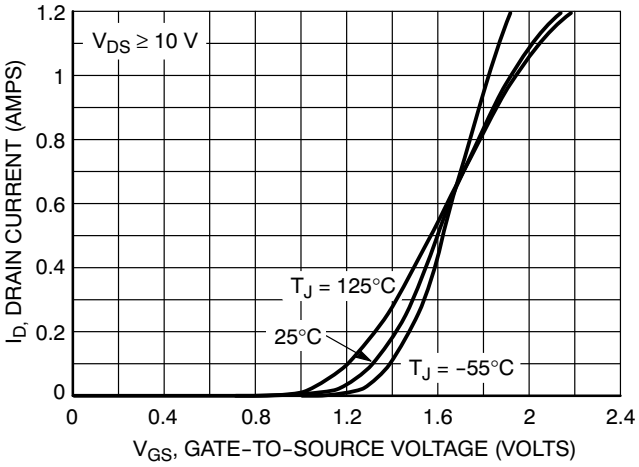


Figure 2. Transfer Characteristics

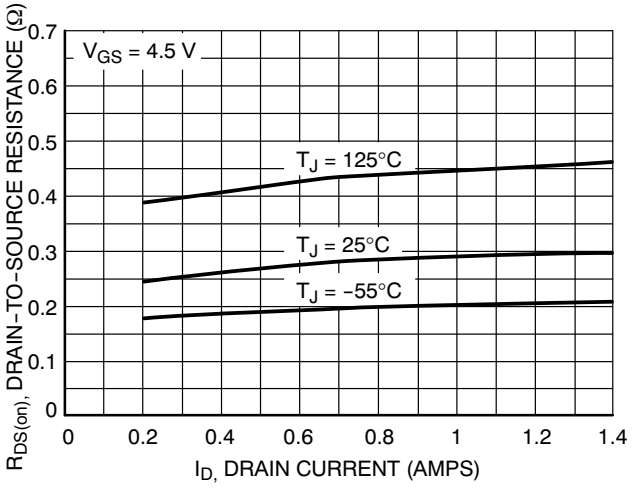


Figure 3. On−Resistance vs. Drain Current and Temperature

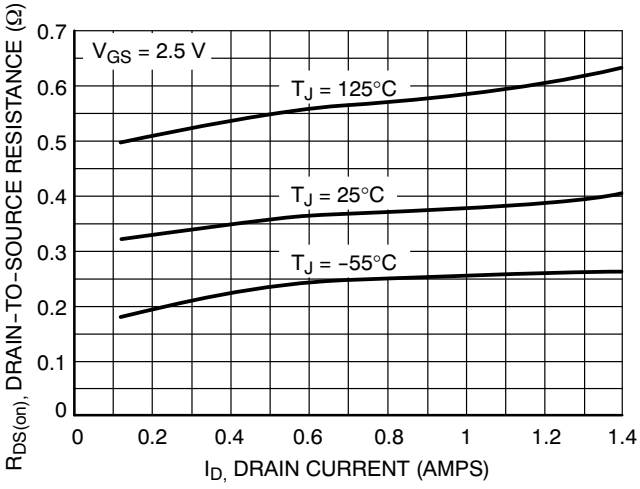


Figure 4. On−Resistance vs. Drain Current and Temperature

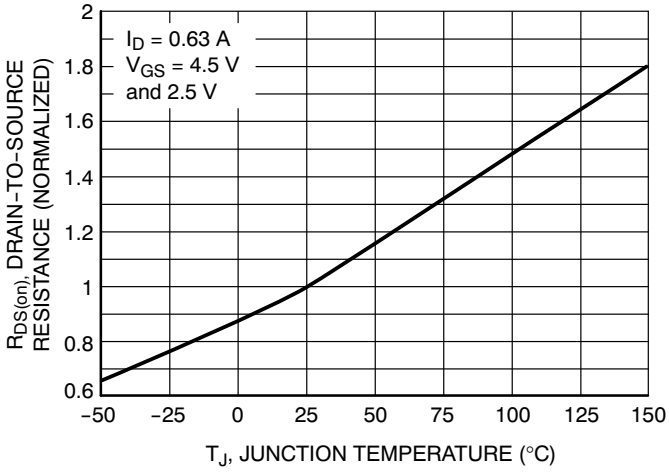


Figure 5. On−Resistance Variation with Temperature

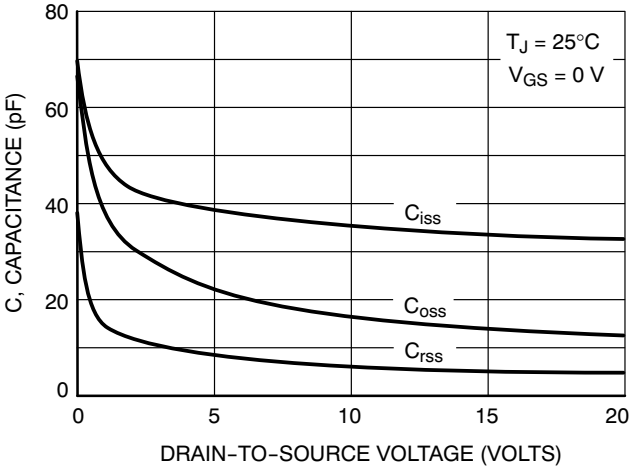


Figure 6. Capacitance Variation

TYPICAL PERFORMANCE CURVES (T_J = 25°C unless otherwise noted)

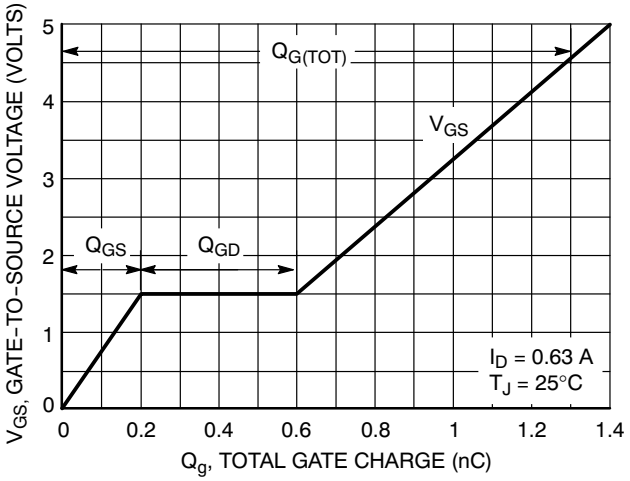


Figure 7. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

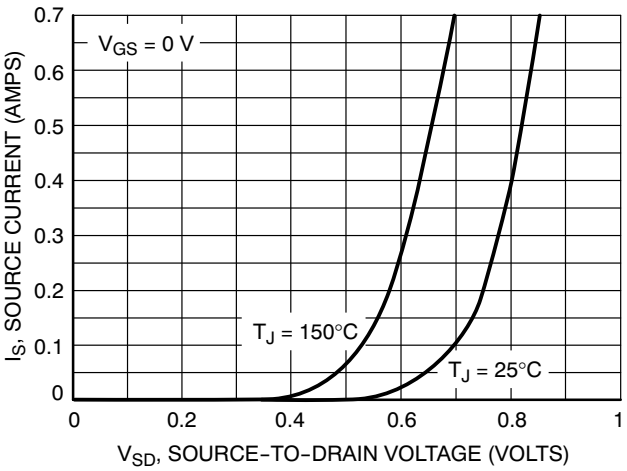


Figure 8. Diode Forward Voltage vs. Current

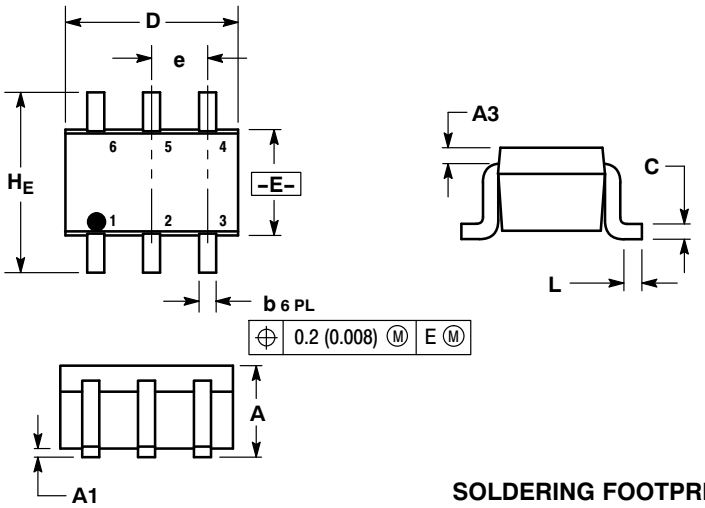
ORDERING INFORMATION

Device	Package	Shipping†
NTJD4401NT1	SC−88	3000 / Tape & Reel
NTJD4401NT1G	SC−88 (Pb−Free)	3000 / Tape & Reel
NTJD4401NT2	SC−88	3000 / Tape & Reel
NTJD4401NT2G	SC−88 (Pb−Free)	3000 / Tape & Reel
NTJD4401NT4	SC−88	10,000 / Tape & Reel
NTJD4401NT4G	SC−88 (Pb−Free)	10,000 / 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.

PACKAGE DIMENSIONS

SC−88/SC70−6/SOT−363
CASE 419B−02
ISSUE W

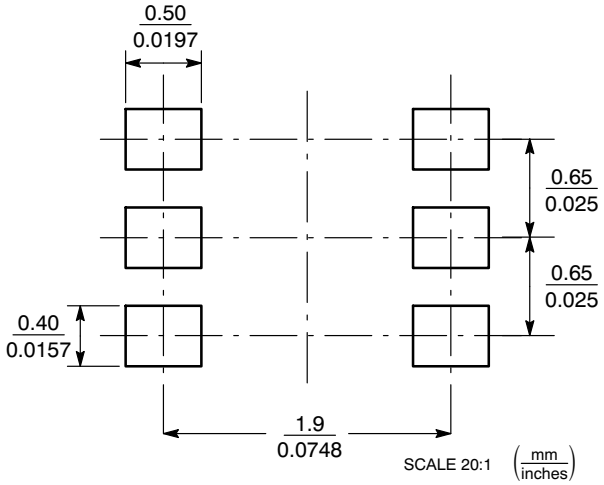


NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B−01 OBSOLETE, NEW STANDARD 419B−02.

	MILLIMETERS			INCHES		
DIM	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.10	0.20	0.30	0.004	0.008	0.012
H_E	2.00	2.10	2.20	0.078	0.082	0.086

STYLE 26:
PIN 1. SOURCE 1
2. GATE 1
3. DRAIN 2
4. SOURCE 2
5. GATE 2
6. DRAIN 1

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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