NTJS4160N

Power MOSFET

30 V, 3.2 A, Single N−Channel, SC−88

Features

- Offers an Low $R_{DS(on)}$ Solution in the SC−88 Package
- Low Profile (< 1.1 mm) Allows it to fit Easily into Extremely Thin Environments such as Portable Electronics
- Operates at Standard Logic Level Gate Drive
- Low Gate Charge
- This is a Pb−Free Device

Applications

- DC−DC Converters (Buck and Boost Circuit)
- Optimized for Battery Powered Portable Equipment such as, Cell Phones, PDAs, Media Players, etc.
- Load Management
- Battery Charging and OV IC Protection Circuits

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

Parameter			Symbol	Value	Unit
Drain−to−Source Voltage			V_{DSS}	30	V
Gate−to−Source Voltage			V_{GS}	±20	V
Continuous Drain Current (Note 1)	Steady State	T_A = 25 °C	I_D	2.6	A
		T_A = 85 °C		1.9	
	t ≤ 1 s	T_A = 25 °C		3.2	
Power Dissipation (Note 1)	Steady State	T_A = 25 °C	P_D	0.62	W
	t ≤ 1 s			0.95	
Continuous Drain Current (Note 2)	Steady State	T_A = 25 °C	I_D	1.8	A
		T_A = 85 °C		1.3	
Power Dissipation (Note 2)		T_A = 25 °C	P_D	0.3	W
Pulsed Drain Current	t_p = 10 μs		I_{DM}	10	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode)			I_S	1.3	A
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)			T_L	260	°C

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 [2 oz] including traces).
2. Surface mounted on FR4 board using the minimum recommended pad size.

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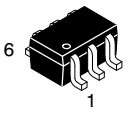
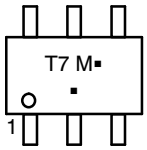
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D Max
30 V	45 mΩ @ 10 V	3.2 A
	65 mΩ @ 4.5 V	



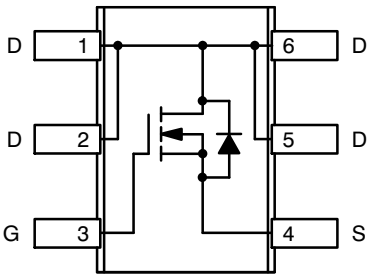
SC−88 (SOT 363)
CASE 419B
STYLE 28

MARKING DIAGRAM



T7 = Device Code
M = Date Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

SC−88
(SOT−363)



Top View

ORDERING INFORMATION

Device	Package	Shipping†
NTJS4160NT1G	SC−88 (Pb−Free)	3000 Units/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.

THERMAL RESISTANCE RATINGS

Parameter	Symbol	Max	Unit
Junction−to−Ambient − Steady State (Note 3)	$R_{\theta JA}$	200	°C/W
Junction−to−Ambient − t ≤ 1 s (Note 3)	$R_{\theta JA}$	132	
Junction−to−Ambient − Steady State (Note 4)	$R_{\theta JA}$	420	

3. Surface mounted on FR4 board using 1 in sq pad size (Cu area = 1.127 in sq [2 oz] including traces).
4. Surface mounted on FR4 board using the minimum recommended pad size.

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		30			V
Drain−to−Source Breakdown Voltage Temperature Coefficient	$V_{(BR)DSS}/T_J$	I_D = 250 μA, ref to 25°C			20		mV/°C
Zero Gate Voltage Drain Current	I_{DSS}	V_{GS} = 0 V, V_{DS} = 24 V	T_J = 25°C			1.0	μA
			T_J = 125°C			10	
Gate−to−Source Leakage Current	I_{GSS}	V_{DS} = 0 V, V_{GS} = +20 V				100	nA
		V_{DS} = 0 V, V_{GS} = −20 V				−200	
ON CHARACTERISTICS (Note 5)							
Gate Threshold Voltage	$V_{GS(TH)}$	V_{GS} = V_{DS}, I_D = 250 μA		0.8		2.4	V
Gate Threshold Temperature Coefficient	$V_{GS(TH)}/T_J$				−5.0		mV/°C
Drain−to−Source On Resistance	$R_{DS(on)}$	V_{GS} = 10 V, I_D = 2.6 A			45	60	mΩ
		V_{GS} = 4.5 V, I_D = 2.2 A			65	85	
Forward Transconductance	g_{FS}	V_{GS} = 5.0 V, I_D = 3.0 A			4.2		S
CHARGES AND CAPACITANCES							
Input Capacitance	C_{ISS}	V_{GS} = 0 V, f = 1.0 MHz, V_{DS} = 10 V			230		pF
Output Capacitance	C_{OSS}				62		
Reverse Transfer Capacitance	C_{RSS}				39		
Total Gate Charge	$Q_{G(TOT)}$	V_{GS} = 4.5 V, V_{DS} = 15 V, I_D = 2.6 A			2.75		nC
Threshold Gate Charge	$Q_{G(TH)}$				0.37		
Gate−to−Source Charge	Q_{GS}				0.87		
Gate−to−Drain Charge	Q_{GD}				1.1		
SWITCHING CHARACTERISTICS (Note 6)							
Turn−On Delay Time	$t_{d(ON)}$	V_{GS} = 4.5 V, V_{DD} = 15 V, I_D = 1.0 A, R_G = 6.0 Ω			8.7	15	ns
Rise Time	t_r				7.2	13	
Turn−Off Delay Time	$t_{d(OFF)}$				10.9	19	
Fall Time	t_f				1.9	4.0	
DRAIN−SOURCE DIODE CHARACTERISTICS							
Forward Diode Voltage	V_{SD}	V_{GS} = 0 V, I_S = 1.3 A	T_J = 25°C		0.79	1.2	V
			T_J = 125°C		0.67		
Reverse Recovery Time	t_{RR}	V_{GS} = 0 V, dI_S/dt = 100 A/μs, I_S = 1.3 A			10.3		ns
Charge Time	T_a				7.2		
Discharge Time	T_b				3.1		
Reverse Recovery Charge	Q_{RR}				4.0		nC

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

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

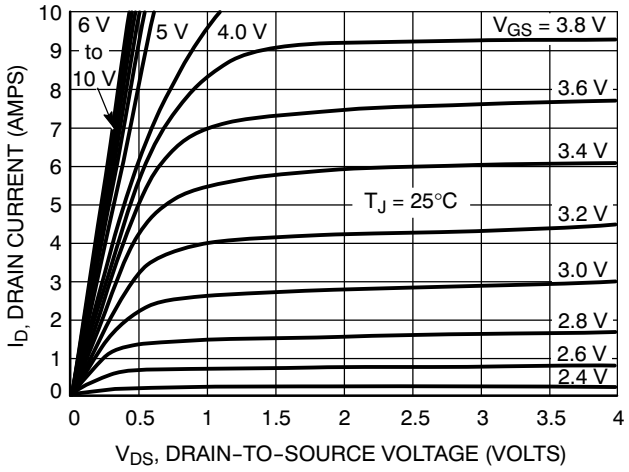


Figure 1. On−Region Characteristics

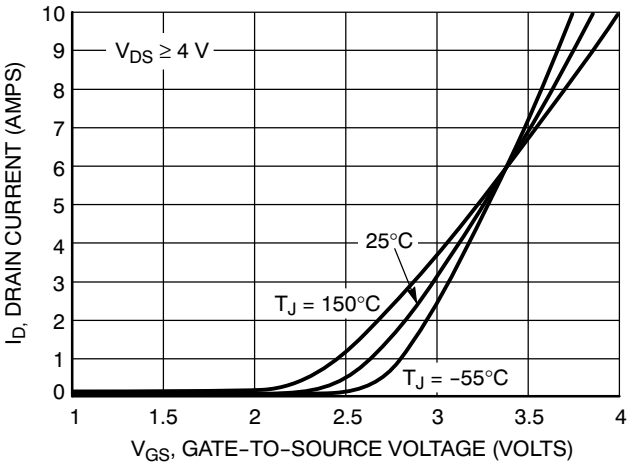


Figure 2. Transfer Characteristics

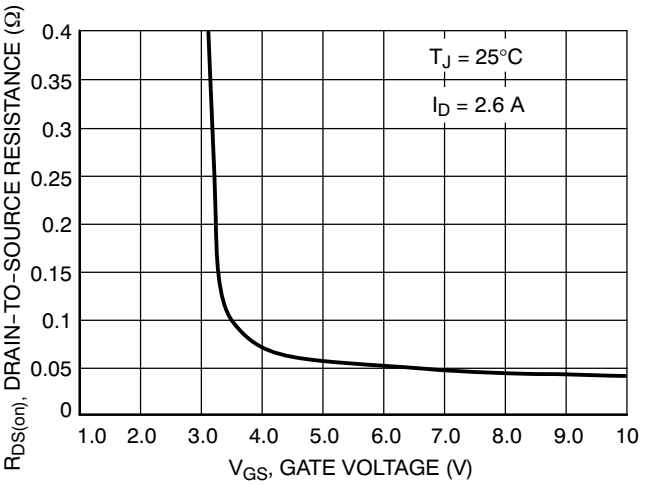


Figure 3. On−Resistance vs. Gate Voltage

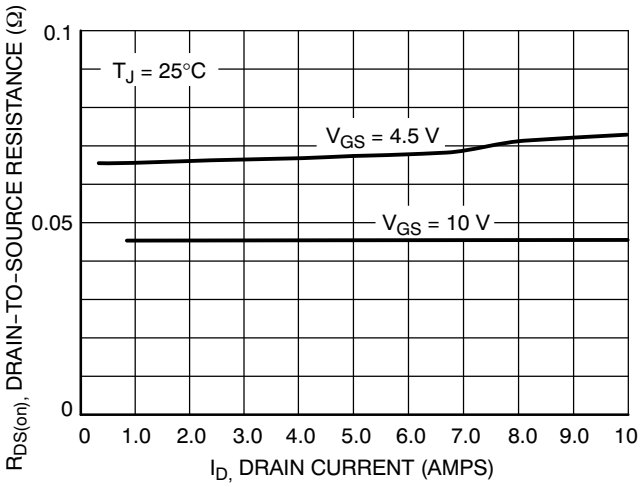


Figure 4. On−Resistance vs. Drain Current and Gate Voltage

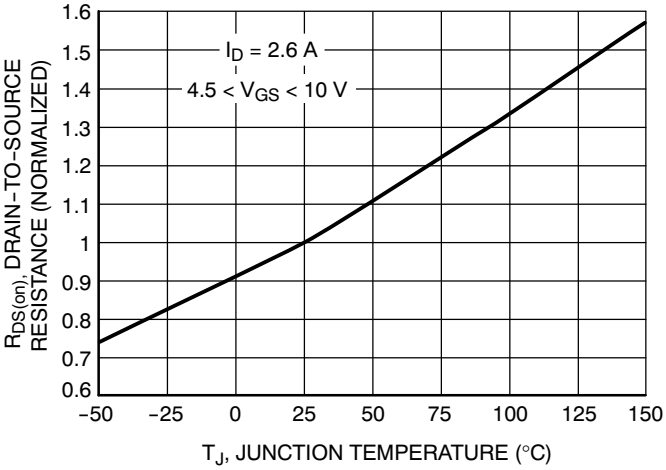


Figure 5. On−Resistance Variation with Temperature

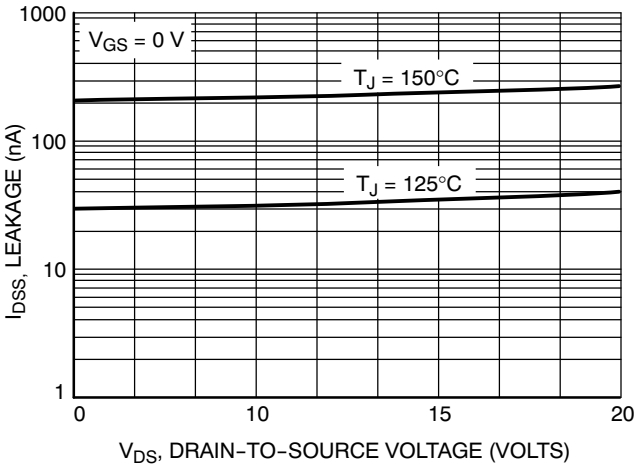


Figure 6. Drain−to−Source Leakage Current vs. Voltage

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

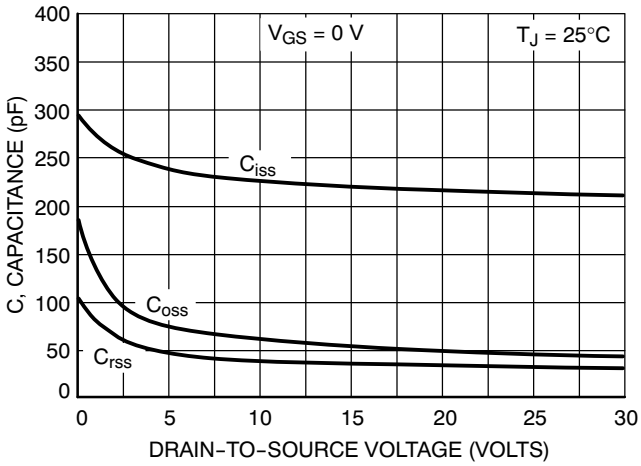


Figure 7. Capacitance Variation

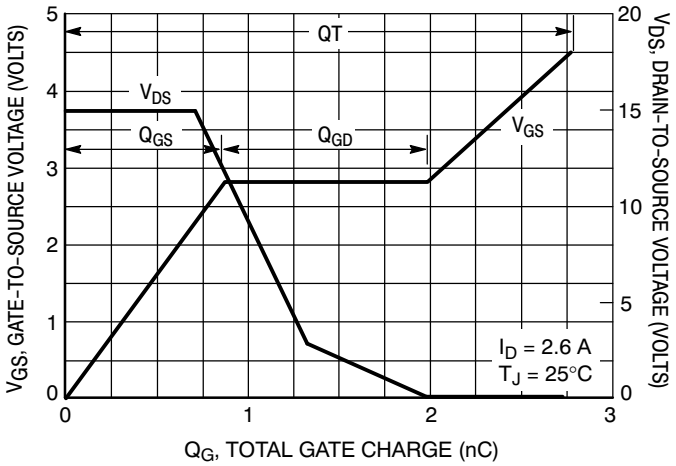


Figure 8. Gate−to−Source and Drain−to−Source Voltage vs. Total Charge

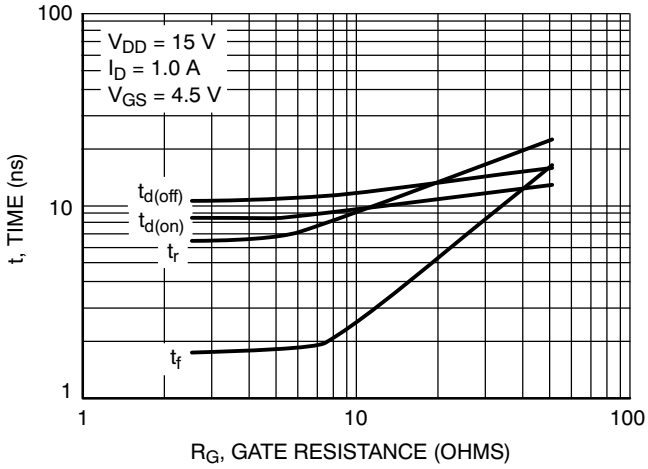


Figure 9. Resistive Switching Time Variation vs. Gate Resistance

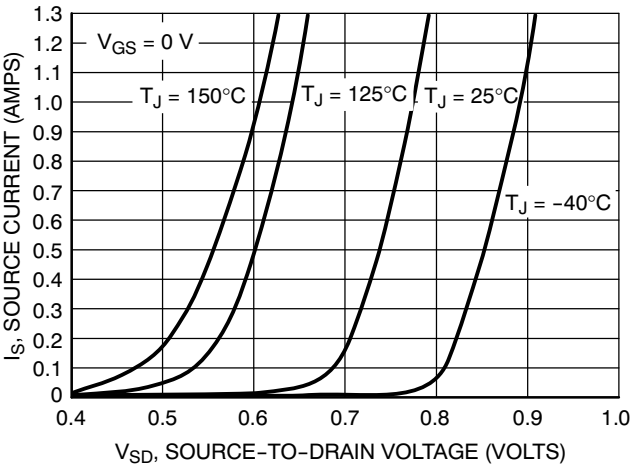
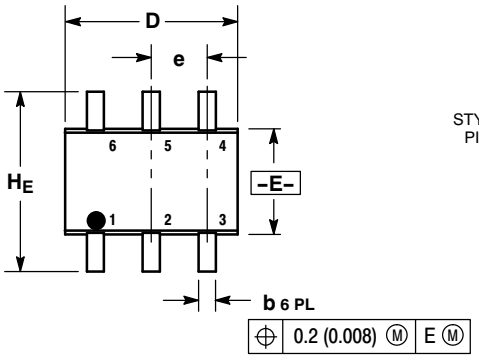


Figure 10. Diode Forward Voltage vs. Current

NTJS4160N

PACKAGE DIMENSIONS

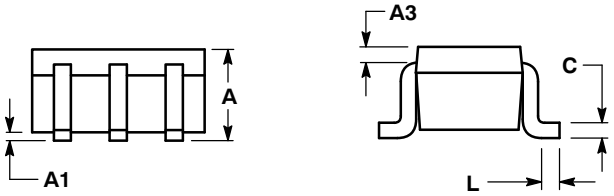
SC−88 (SOT−363)
CASE 419B−02
ISSUE W



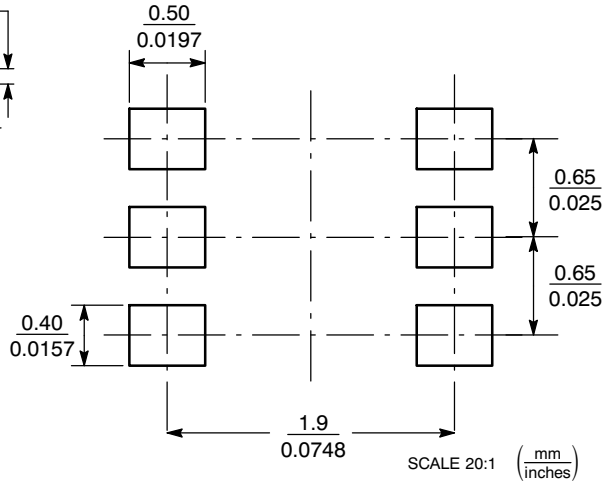
STYLE 28:
PIN 1. DRAIN
2. DRAIN
3. GATE
4. SOURCE
5. DRAIN
6. DRAIN

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



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.

PUBLICATION ORDERING INFORMATION

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