

NTJD1155L

Power MOSFET

8 V, ±1.3 A, High Side Load Switch with Level-Shift, P-Channel SC-88

The NTJD1155L integrates a P and N-Channel MOSFET in a single package. This device is particularly suited for portable electronic equipment where low control signals, low battery voltages and high load currents are needed. The P-Channel device is specifically designed as a load switch using ON Semiconductor state-of-the-art trench technology. The N-Channel, with an external resistor (R1), functions as a level-shift to drive the P-Channel. The N-Channel MOSFET has internal ESD protection and can be driven by logic signals as low as 1.5 V. The NTJD1155L operates on supply lines from 1.8 to 8.0 V and can drive loads up to 1.3 A with 8.0 V applied to both V_{IN} and $V_{ON/OFF}$.

Features

- Extremely Low $R_{DS(on)}$ P-Channel Load Switch MOSFET
- Level Shift MOSFET is ESD Protected
- Low Profile, Small Footprint Package
- V_{IN} Range 1.8 to 8.0 V
- ON/OFF Range 1.5 to 8.0 V
- ESD Rating of 3000 V
- Pb-Free Package is Available

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

Rating		Symbol	Value	Unit
Input Voltage (V_{DSS} , P-Ch)		V_{IN}	8.0	V
ON/OFF Voltage (V_{GS} , N-Ch)		$V_{ON/OFF}$	8.0	V
Continuous Load Current (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	± 1.3	A
		$T_A = 85^\circ\text{C}$	± 0.9	
Power Dissipation (Note 1)	Steady State	$T_A = 25^\circ\text{C}$	0.40	W
		$T_A = 85^\circ\text{C}$	0.20	
Pulsed Load Current	$t_p = 10 \mu\text{s}$	I_{LM}	± 3.9	A
Operating Junction and Storage Temperature		T_J , T_{STG}	-55 to 150	$^\circ\text{C}$
Source Current (Body Diode)		I_S	-0.4	A
ESD Rating, MIL-STD-883D HBM (100 pF, 1.5 k Ω)		ESD	3.0	kV
Lead Temperature for Soldering Purposes (1/8" from case for 10 s)		T_L	260	$^\circ\text{C}$

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.

THERMAL RESISTANCE RATINGS

Rating	Symbol	Max	Unit
Junction-to-Ambient - Steady State (Note 1)	$R_{\theta JA}$	320	$^\circ\text{C}/\text{W}$
Junction-to-Foot - Steady State (Note 1)	$R_{\theta JF}$	220	

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

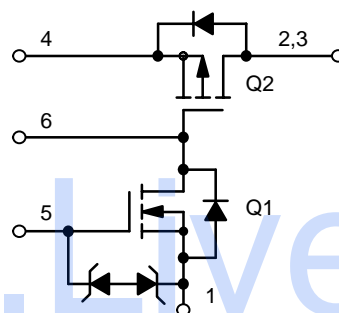


ON Semiconductor®

<http://onsemi.com>

$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
8.0 V	130 m Ω @ -4.5 V	± 1.3 A
	170 m Ω @ -2.5 V	
	260 m Ω @ -1.8 V	

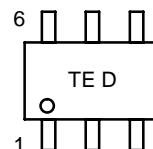
SIMPLIFIED SCHEMATIC



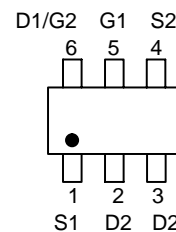
SC-88
(SOT-363)
CASE 419B
STYLE 27

TE = Device Code
D = Date Code

MARKING DIAGRAM



PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping†
NTJD1155LT1	SC-88	3000/Tape & Reel
NTJD1155LT1G	SC-88 (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.

NTJD1155L

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

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit	
OFF CHARACTERISTICS							
Q2 Drain-to-Source Breakdown Voltage	V _{IN}	V _{GS2} = 0 V, I _{D2} = 250 μA	-8.0			V	
Forward Leakage Current	I _{FL}	V _{GS1} = 0 V, V _{DS2} = -8.0 V	T _J = 25°C		1.0	μA	
			T _J = 125°C		10		
Q1 Gate-to-Source Leakage Current	I _{GSS}	V _{DS1} = 0 V, V _{GS1} = ±8.0 V			±100	nA	
Q1 Diode Forward On-Voltage	V _{SD}	I _S = -0.4 A, V _{GS1} = 0 V		-0.8	-1.1	V	
ON CHARACTERISTICS							
ON/OFF Voltage	V _{ON/OFF}		1.5		8.0	V	
Q1 Gate Threshold Voltage	V _{GS1(th)}	V _{GS1} = V _{DS1} , I _D = 250 μA	0.4		1.0	V	
Input Voltage	V _{IN}	V _{GS1} = V _{DS1} , I _D = 250 μA	1.8		8.0	V	
Q2 Drain-to-Source On Resistance	R _{DSON}	V _{ON/OFF} = 1.5 V	V _{IN} = 4.5 V I _L = 1.2 A		130	175	mΩ
			V _{IN} = 2.5 V I _L = 1.0 A		170	220	
			V _{IN} = 1.8 V I _L = 0.7 A		260	320	
Load Current	I _L	V _{DROP} ≤ 0.2 V, V _{IN} = 5.0 V, V _{ON/OFF} = 1.5 V	1.0			A	
		V _{DROP} ≤ 0.3 V, V _{IN} = 2.5 V, V _{ON/OFF} = 1.5 V	1.0				

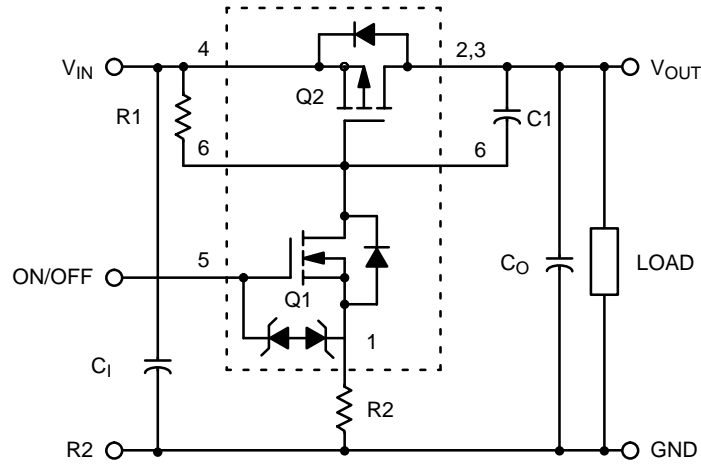


Figure 1. Load Switch Application

Components	Description	Values
R1	Pullup Resistor	Typical 10 kΩ to 1.0 Ω*
R2	Optional Slew-Rate Control	Typical 0 to 100 kΩ*
C _O , C _I	Output Capacitance	Usually < 1.0 μF
C1	Optional In-Rush Current Control	Typical ≤ 1000 pF

*Minimum R1 value should be at least 10 x R2 to ensure Q1 turn-on.

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TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

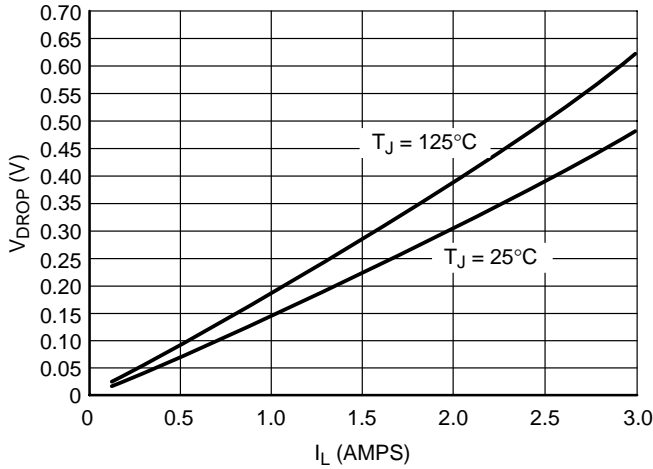


Figure 2. V_{drop} vs. I_L @ $V_{\text{in}} = 2.5 \text{ V}$

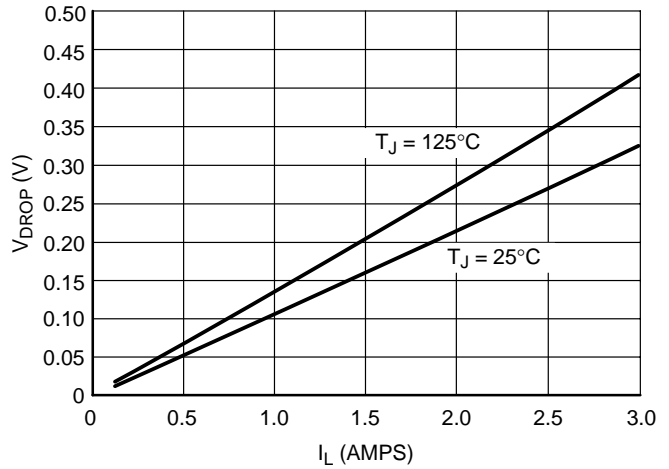


Figure 3. V_{drop} vs. I_L @ $V_{\text{in}} = 4.5 \text{ V}$

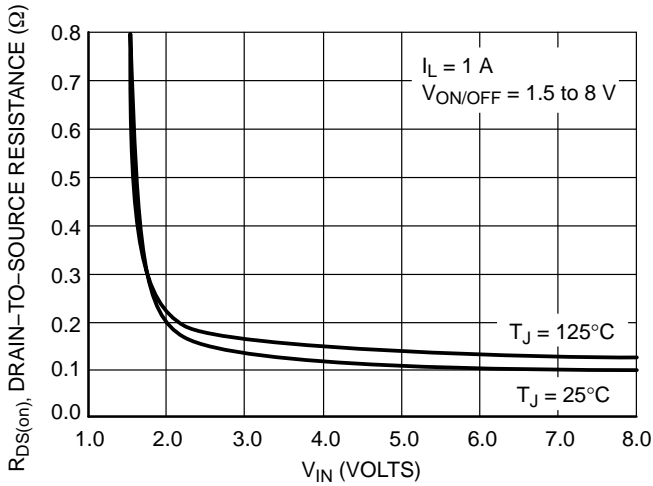


Figure 4. On-Resistance vs. Input Voltage

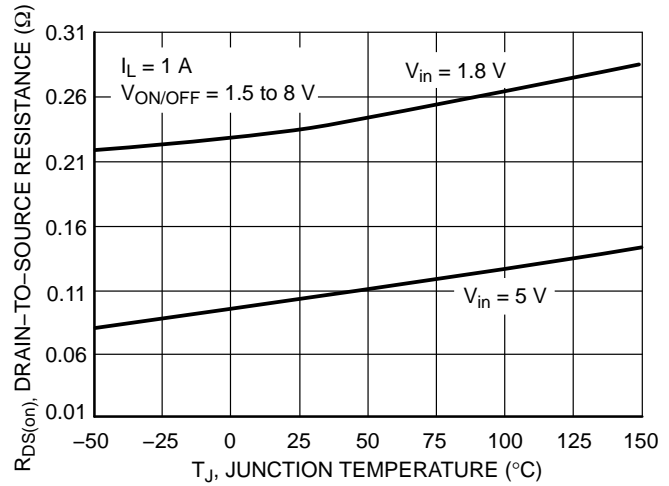


Figure 5. On-Resistance Variation with Temperature

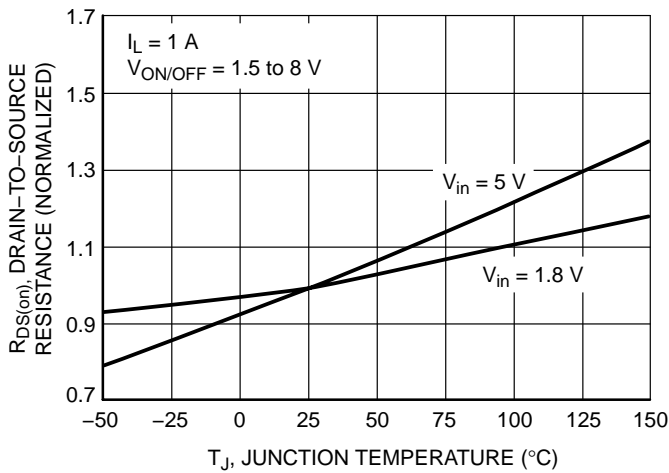


Figure 6. Normalized On-Resistance Variation with Temperature

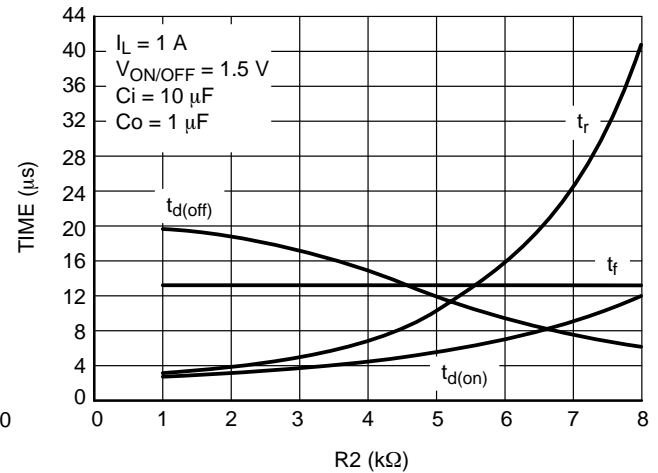


Figure 7. Switching Variation R_2 @ $V_{\text{in}} = 4.5 \text{ V}$, $R_1 = 20 \text{ k}\Omega$

NTJD1155L

TYPICAL PERFORMANCE CURVES ($T_J = 25^\circ\text{C}$ unless otherwise noted)

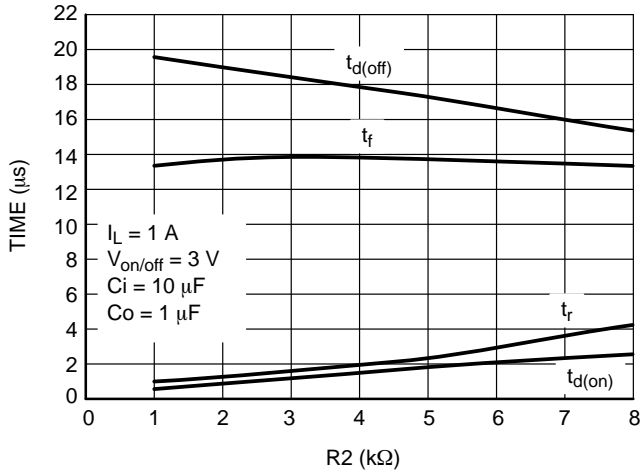


Figure 8. Switching Variation
R2 @ $V_{in} = 4.5\text{ V}$, $R1 = 20\ \text{k}\Omega$

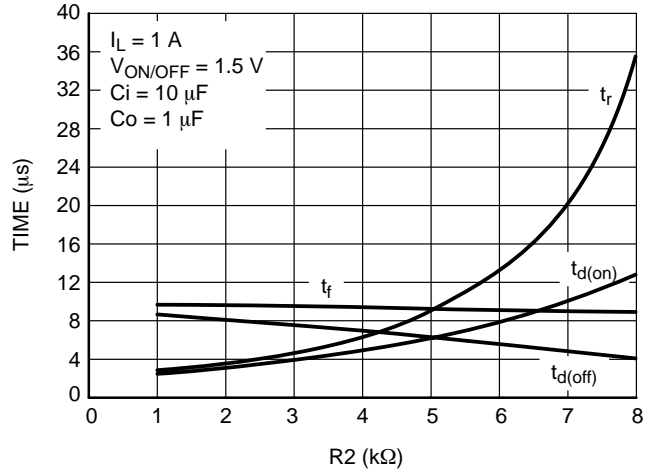


Figure 9. Switching Variation
R2 @ $V_{in} = 2.5\text{ V}$, $R1 = 20\ \text{k}\Omega$

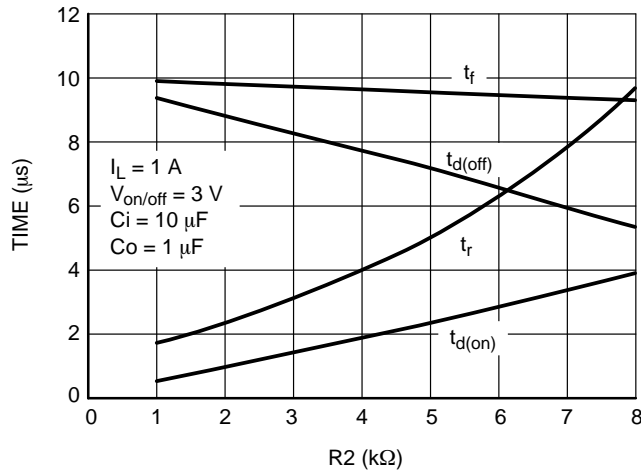


Figure 10. Switching Variation
R2 @ $V_{in} = 2.5\text{ V}$, $R1 = 20\ \text{k}\Omega$

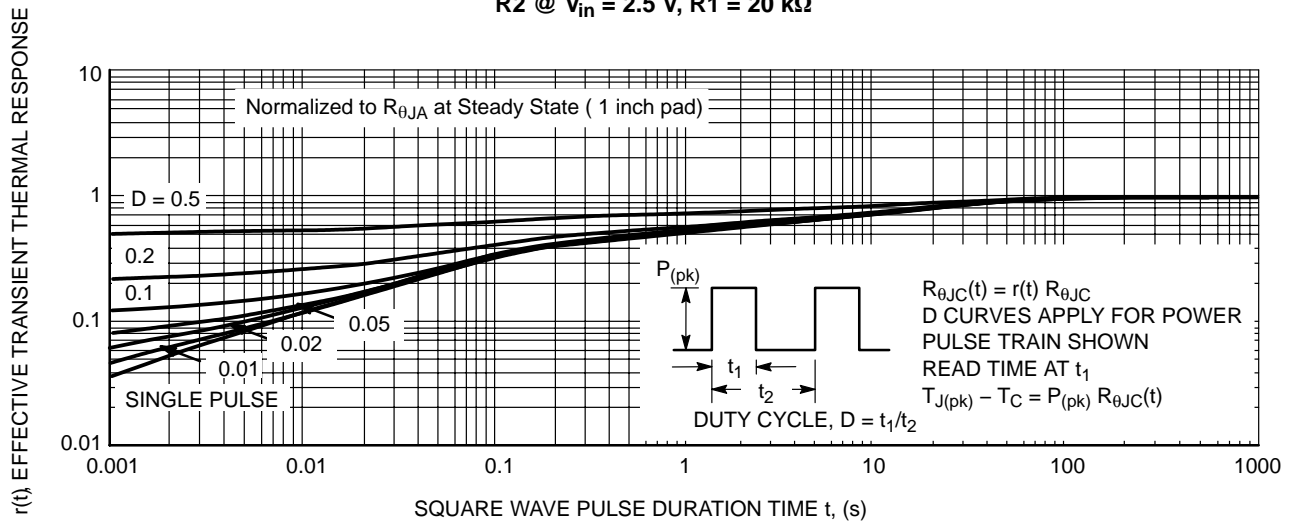
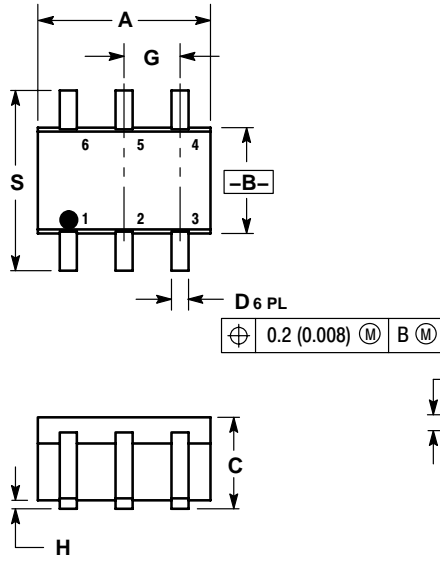


Figure 11. FET Thermal Response

NTJD1155L

PACKAGE DIMENSIONS

SC-88 (SOT-363)
CASE 419B-02
ISSUE U



NOTES:

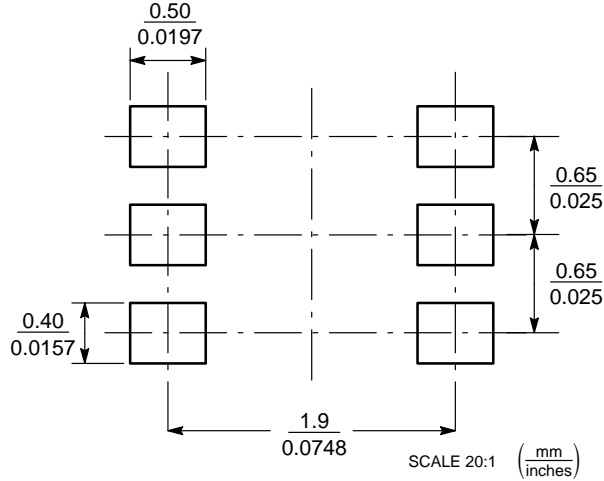
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. 419B-01 OBSOLETE, NEW STANDARD 419B-02.

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	0.031	0.043	0.80	1.10
D	0.004	0.012	0.10	0.30
G	0.026 BSC		0.65 BSC	
H	---	0.004	---	0.10
J	0.004	0.010	0.10	0.25
K	0.004	0.012	0.10	0.30
N	0.008 REF		0.20 REF	
S	0.079	0.087	2.00	2.20

STYLE 27:

- PIN 1. BASE 2
- BASE 1
- COLLECTOR 1
- EMITTER 1
- EMITTER 2
- COLLECTOR 2

SOLDERING FOOTPRINT*



SC-88/SC70-6/SOT363

*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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