NTJD1155L

MOSFET – Power, P-Channel, High Side Load Switch with Level-Shift, SC-88

8 V, ±1.3 A

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
- These Devices are Pb−Free and are RoHS Compliant

MAXIMUM RATINGS (T_J = 25°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°C	I_L	±1.3	A
		T_A = 85°C		±0.9	
Power Dissipation (Note 1)	Steady State	T_A = 25°C	P_D	0.40	W
		T_A = 85°C		0.20	
Pulsed Load Current	t_p = 10 μs		I_{LM}	±3.9	A
Operating Junction and Storage Temperature			T_J, T_{STG}	−55 to 150	°C
Source Current (Body Diode)			I_S	−0.4	A
Lead Temperature for Soldering Purposes (1/8″ from case for 10 s)			T_L	260	°C

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Junction−to−Ambient – Steady State (Note 1)	$R_{\theta JA}$	320	°C/W
Junction−to−Foot – Steady State (Note 1)	$R_{\theta JF}$	220	

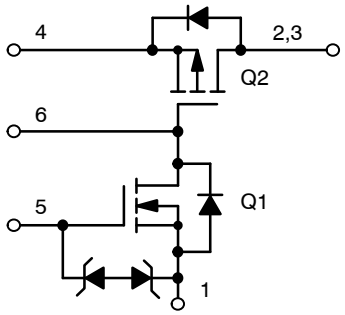
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

ON Semiconductor®

www.onsemi.com

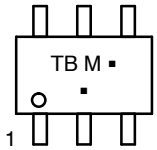
$V_{(BR)DSS}$	$R_{DS(on)}$ TYP	I_D MAX
8.0 V	130 mΩ @ −4.5 V	±1.3 A
	170 mΩ @ −2.5 V	
	260 mΩ @ −1.8 V	

SIMPLIFIED SCHEMATIC



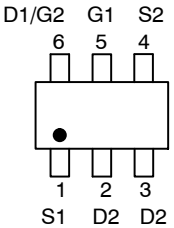
SC−88
(SOT−363)
CASE 419B
STYLE 30

MARKING DIAGRAM



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

PIN ASSIGNMENT



ORDERING INFORMATION

Device	Package	Shipping†
NTJD1155LT1G, NTJD1155LT2G	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.

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

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	$R_{DS(on)}$	$V_{ON/OFF}$ = 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			

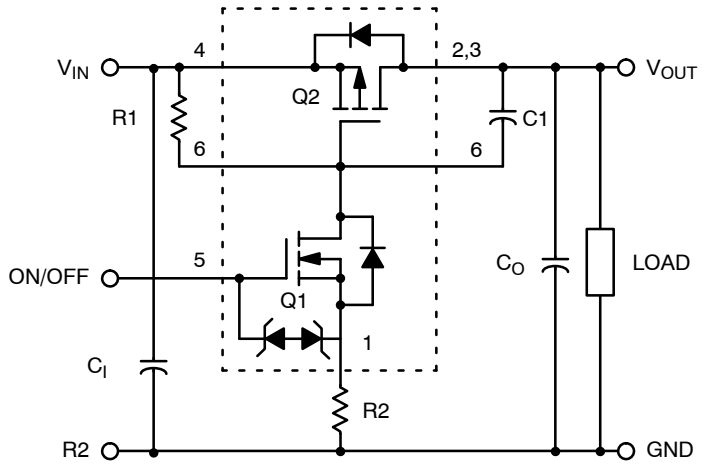


Figure 1. Load Switch Application

Components	Description	Values
R1	Pullup Resistor	Typical 10 kΩ to 1.0 MΩ*
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.

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

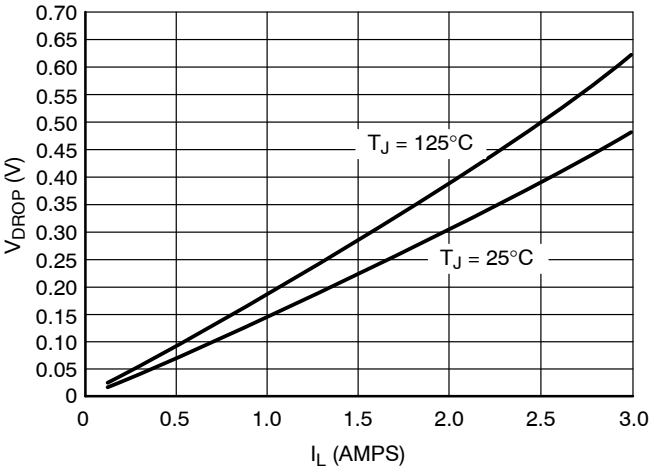


Figure 2. V_{drop} vs. I_L @ V_{in} = 2.5 V

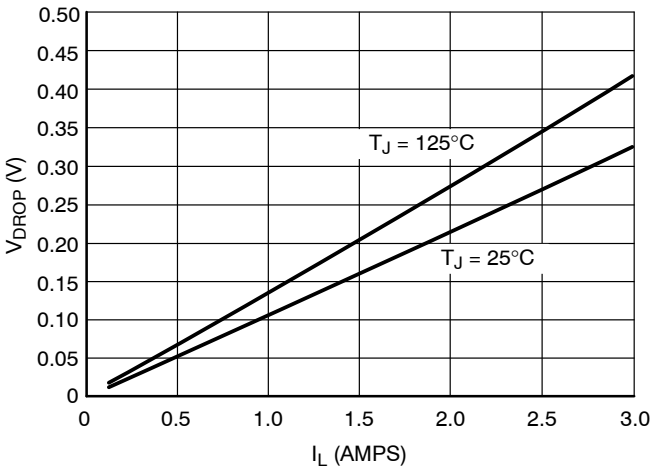


Figure 3. V_{drop} vs. I_L @ V_{in} = 4.5 V

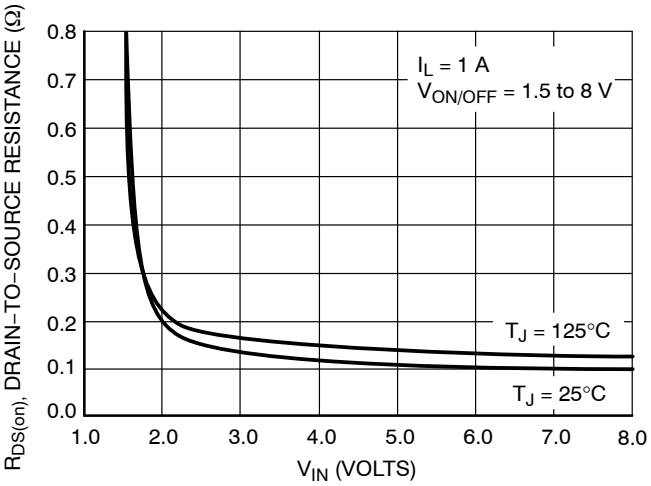


Figure 4. On−Resistance vs. Input Voltage

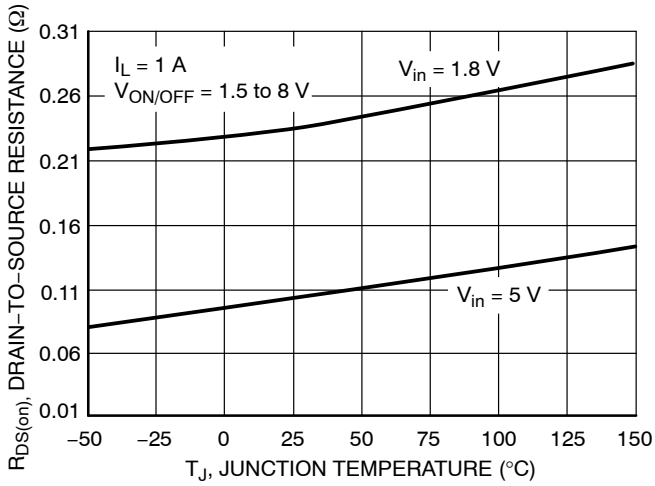


Figure 5. On−Resistance Variation with Temperature

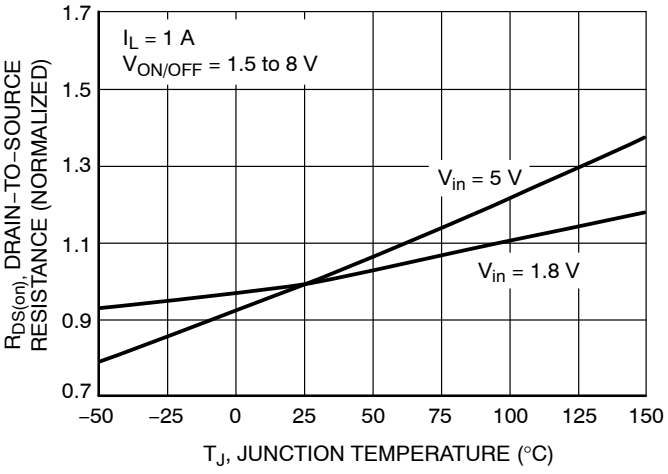


Figure 6. Normalized On−Resistance Variation with Temperature

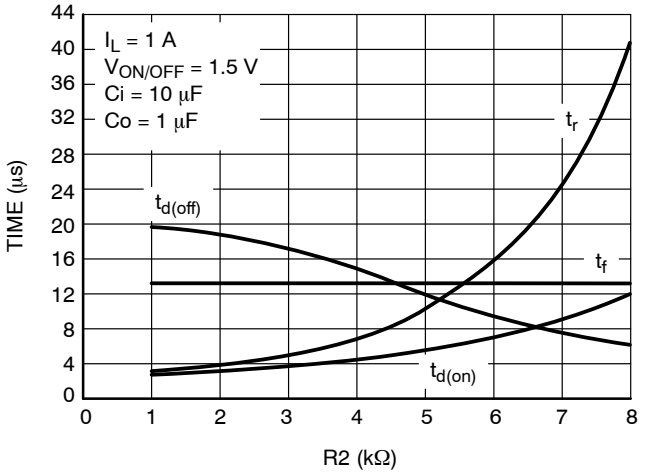


Figure 7. Switching Variation R2 @ V_{in} = 4.5 V, R1 = 20 kΩ

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

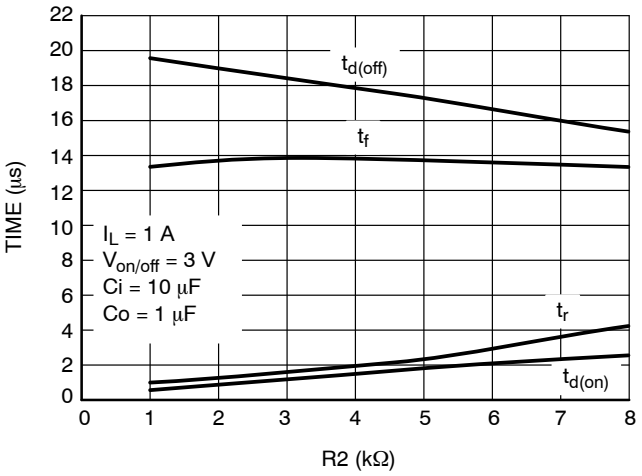


Figure 8. Switching Variation
R2 @ V_{in} = 4.5 V, R1 = 20 kΩ

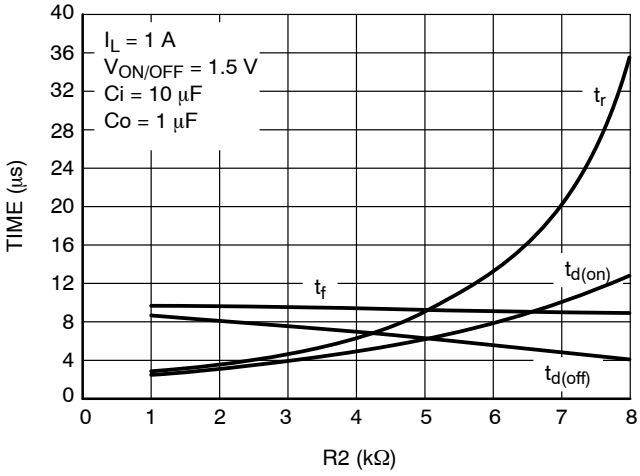


Figure 9. Switching Variation
R2 @ V_{in} = 2.5 V, R1 = 20 kΩ

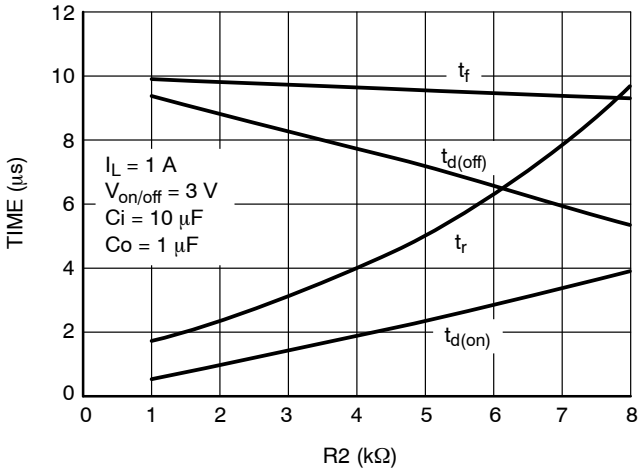


Figure 10. Switching Variation
R2 @ V_{in} = 2.5 V, R1 = 20 kΩ

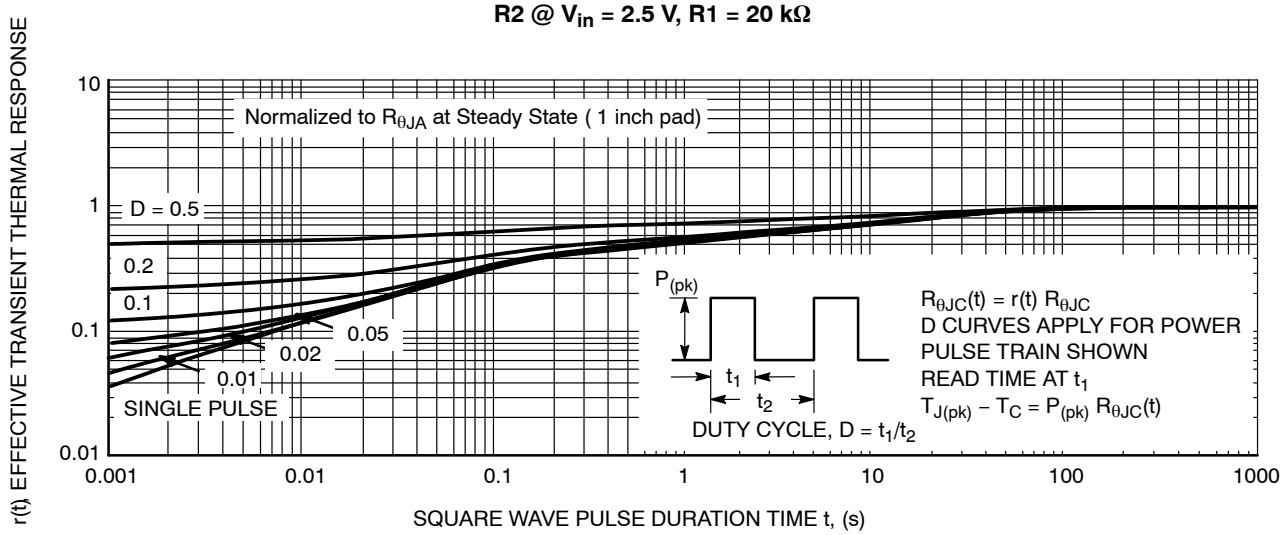
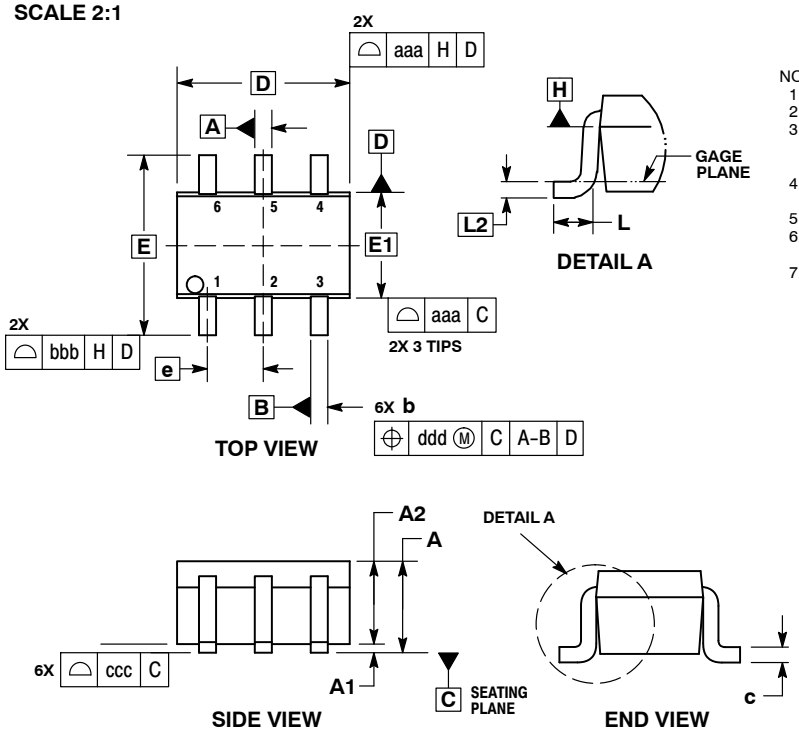


Figure 11. FET Thermal Response

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

DATE 11 DEC 2012

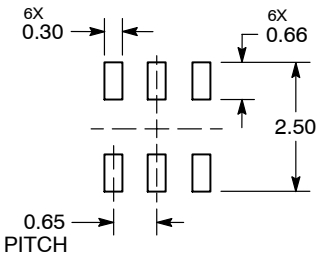
1
SCALE 2:1



NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE PLASTIC BODY AND DATUM H.
5. DATUMS A AND B ARE DETERMINED AT DATUM H.
6. DIMENSIONS b AND c APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.08 AND 0.15 FROM THE TIP.
7. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. ALLOWABLE DAMBAR PROTRUSION SHALL BE 0.08 TOTAL IN EXCESS OF DIMENSION b AT MAXIMUM MATERIAL CONDITION. THE DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OF THE FOOT.

	MILLIMETERS			INCHES		
DIM	**MIN**	**NOM**	**MAX**	**MIN**	**NOM**	**MAX**
A	−−−	−−−	1.10	−−−	−−−	0.043
A1	0.00	−−−	0.10	0.000	−−−	0.004
A2	0.70	0.90	1.00	0.027	0.035	0.039
b	0.15	0.20	0.25	0.006	0.008	0.010
C	0.08	0.15	0.22	0.003	0.006	0.009
D	1.80	2.00	2.20	0.070	0.078	0.086
E	2.00	2.10	2.20	0.078	0.082	0.086
E1	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC			0.026 BSC		
L	0.26	0.36	0.46	0.010	0.014	0.018
L2	0.15 BSC			0.006 BSC		
aaa	0.15			0.006		
bbb	0.30			0.012		
ccc	0.10			0.004		
ddd	0.10			0.004		

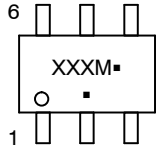
RECOMMENDED SOLDERING FOOTPRINT*



DIMENSIONS: MILLIMETERS

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

GENERIC MARKING DIAGRAM*



XXX = Specific Device Code
M = Date Code*
▪ = Pb−Free Package

(Note: Microdot may be in either location)

*Date Code orientation and/or position may vary depending upon manufacturing location.

*This information is generic. Please refer to device data sheet for actual part marking. Pb−Free indicator, "▪", may or may not be present. Some products may not follow the Generic Marking.

STYLES ON PAGE 2

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

DATE 11 DEC 2012

STYLE 1:
PIN 1. EMITTER 2
2. BASE 2
3. COLLECTOR 1
4. EMITTER 1
5. BASE 1
6. COLLECTOR 2

STYLE 2:
CANCELLED

STYLE 3:
CANCELLED

STYLE 4:
PIN 1. CATHODE
2. CATHODE
3. COLLECTOR
4. EMITTER
5. BASE
6. ANODE

STYLE 5:
PIN 1. ANODE
2. ANODE
3. COLLECTOR
4. EMITTER
5. BASE
6. CATHODE

STYLE 6:
PIN 1. ANODE 2
2. N/C
3. CATHODE 1
4. ANODE 1
5. N/C
6. CATHODE 2

STYLE 7:
PIN 1. SOURCE 2
2. DRAIN 2
3. GATE 1
4. SOURCE 1
5. DRAIN 1
6. GATE 2

STYLE 8:
CANCELLED

STYLE 9:
PIN 1. EMITTER 2
2. EMITTER 1
3. COLLECTOR 1
4. BASE 1
5. BASE 2
6. COLLECTOR 2

STYLE 10:
PIN 1. SOURCE 2
2. SOURCE 1
3. GATE 1
4. DRAIN 1
5. DRAIN 2
6. GATE 2

STYLE 11:
PIN 1. CATHODE 2
2. CATHODE 2
3. ANODE 1
4. CATHODE 1
5. CATHODE 1
6. ANODE 2

STYLE 12:
PIN 1. ANODE 2
2. ANODE 2
3. CATHODE 1
4. ANODE 1
5. ANODE 1
6. CATHODE 2

STYLE 13:
PIN 1. ANODE
2. N/C
3. COLLECTOR
4. EMITTER
5. BASE
6. CATHODE

STYLE 14:
PIN 1. VREF
2. GND
3. GND
4. IOUT
5. VEN
6. VCC

STYLE 15:
PIN 1. ANODE 1
2. ANODE 2
3. ANODE 3
4. CATHODE 3
5. CATHODE 2
6. CATHODE 1

STYLE 16:
PIN 1. BASE 1
2. EMITTER 2
3. COLLECTOR 2
4. BASE 2
5. EMITTER 1
6. COLLECTOR 1

STYLE 17:
PIN 1. BASE 1
2. EMITTER 1
3. COLLECTOR 2
4. BASE 2
5. EMITTER 2
6. COLLECTOR 1

STYLE 18:
PIN 1. VIN1
2. VCC
3. VOUT2
4. VIN2
5. GND
6. VOUT1

STYLE 19:
PIN 1. I OUT
2. GND
3. GND
4. V CC
5. V EN
6. V REF

STYLE 20:
PIN 1. COLLECTOR
2. COLLECTOR
3. BASE
4. EMITTER
5. COLLECTOR
6. COLLECTOR

STYLE 21:
PIN 1. ANODE 1
2. N/C
3. ANODE 2
4. CATHODE 2
5. N/C
6. CATHODE 1

STYLE 22:
PIN 1. D1 (i)
2. GND
3. D2 (i)
4. D2 (c)
5. VBUS
6. D1 (c)

STYLE 23:
PIN 1. Vn
2. CH1
3. Vp
4. N/C
5. CH2
6. N/C

STYLE 24:
PIN 1. CATHODE
2. ANODE
3. CATHODE
4. CATHODE
5. CATHODE
6. CATHODE

STYLE 25:
PIN 1. BASE 1
2. CATHODE
3. COLLECTOR 2
4. BASE 2
5. EMITTER
6. COLLECTOR 1

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

STYLE 27:
PIN 1. BASE 2
2. BASE 1
3. COLLECTOR 1
4. EMITTER 1
5. EMITTER 2
6. COLLECTOR 2

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

STYLE 29:
PIN 1. ANODE
2. ANODE
3. COLLECTOR
4. EMITTER
5. BASE/ANODE
6. CATHODE

STYLE 30:
PIN 1. SOURCE 1
2. DRAIN 2
3. DRAIN 2
4. SOURCE 2
5. GATE 1
6. DRAIN 1

Note: Please refer to datasheet for style callout. If style type is not called out in the datasheet refer to the device datasheet pinout or pin assignment.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:
Technical Library: www.onsemi.com/design/resources/technical−documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support
For additional information, please contact your local Sales Representative at www.onsemi.com/support/sales