

# NSL12AW

## High Current Surface Mount PNP Silicon Low $V_{CE(sat)}$ Transistor for Battery Operated Applications

### Features

- High Current Capability (3 A)
- High Power Handling (Up to 650 mW)
- Low  $V_{CE(s)}$  (170 mV Typical @ 1 A)
- Small Size
- Pb-Free Package is Available

### Benefits

- High Specific Current and Power Capability Reduces Required PCB Area
- Reduced Parasitic Losses Increases Battery Life

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

Rating	Symbol	Max	Unit
Collector-Emitter Voltage	$V_{CEO}$	-12	Vdc
Collector-Base Voltage	$V_{CBO}$	-12	Vdc
Emitter-Base Voltage	$V_{EBO}$	-5.0	Vdc
Collector Current – Continuous	$I_C$	-2.0	Adc
– Peak	$I_{CM}$	-3.0	
Electrostatic Discharge	ESD	HBM Class 3 MM Class 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 CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$ (Note 1)	450	mW
		3.6	mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$ (Note 1)	275	$^\circ\text{C}/\text{W}$
Total Device Dissipation $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$ (Note 2)	650	mW
		5.2	mW/ $^\circ\text{C}$
Thermal Resistance, Junction-to-Ambient	$R_{\theta JA}$ (Note 2)	192	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Lead 6	$R_{\theta JL}$	105	$^\circ\text{C}/\text{W}$
Total Device Dissipation (Single Pulse < 10 sec.)	$P_D$ Single	1.4	W
Junction and Storage Temperature Range	$T_J, T_{stg}$	-55 to +150	$^\circ\text{C}$

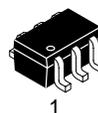
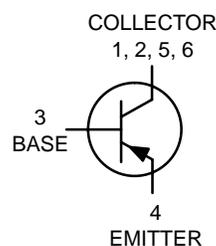
1. FR-4, Minimum Pad, 1 oz Coverage
2. FR-4, 1" Pad, 1 oz Coverage



ON Semiconductor®

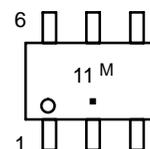
<http://onsemi.com>

**12 VOLTS**  
**3.0 AMPS**  
**PNP TRANSISTOR**



**CASE 419B**  
**SC-88/SOT-363**  
**STYLE 20**

### MARKING DIAGRAM



M = Date Code  
■ = Pb-Free Package

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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## ELECTRICAL CHARACTERISTICS (T<sub>J</sub> = 25°C unless otherwise noted)

Characteristic	Symbol	Min	Typ	Max	Unit
<b>OFF CHARACTERISTICS</b>					
Collector–Emitter Breakdown Voltage, (I <sub>C</sub> = -10 mAdc, I <sub>B</sub> = 0)	V <sub>(BR)CEO</sub>	-12	-15	-	Vdc
Collector–Base Breakdown Voltage, (I <sub>C</sub> = -0.1 mAdc, I <sub>E</sub> = 0)	V <sub>(BR)CBO</sub>	-12	-25	-	Vdc
Emitter–Base Breakdown Voltage, (I <sub>E</sub> = -0.1 mAdc, I <sub>C</sub> = 0)	V <sub>(BR)EBO</sub>	-5.0	-7.0	-	Vdc
Collector Cutoff Current, (V <sub>CB</sub> = -12 Vdc, I <sub>E</sub> = 0)	I <sub>CBO</sub>	-	-0.02	-0.1	μAdc
Collector–Emitter Cutoff Current, (V <sub>CES</sub> = -12 Vdc, I <sub>E</sub> = 0)	I <sub>CES</sub>	-	-0.03	-0.1	μAdc
Emitter Cutoff Current, (V <sub>CES</sub> = -5.0 Vdc, I <sub>E</sub> = 0)	I <sub>EBO</sub>	-	-0.03	-0.1	μAdc

## ON CHARACTERISTICS

DC Current Gain (Note 3) (I <sub>C</sub> = -0.5 A, V <sub>CE</sub> = -1.5 V) (I <sub>C</sub> = -0.8 A, V <sub>CE</sub> = -1.5 V) (I <sub>C</sub> = -1.0 A, V <sub>CE</sub> = -1.5 V)	h <sub>FE</sub>	100 100 100	180 165 160	- 300 -	
Collector–Emitter Saturation Voltage (Note 3) (I <sub>C</sub> = -0.5 A, I <sub>B</sub> = -10 mA) (I <sub>C</sub> = -0.8 A, I <sub>B</sub> = -16 mA) (I <sub>C</sub> = -1.0 A, I <sub>B</sub> = -20 mA)	V <sub>CE(sat)</sub>	-	-0.10 -0.14 -0.17	-0.160 -0.235 -0.290	V
Base–Emitter Saturation Voltage (Note 3) (I <sub>C</sub> = -1.0 A, I <sub>B</sub> = -20 mA)	V <sub>BE(sat)</sub>	-	-0.84	-0.95	V
Base–Emitter Turn–on Voltage (Note 3) (I <sub>C</sub> = -1.0 A, V <sub>CE</sub> = -1.5 V)	V <sub>BE(on)</sub>	-	-0.81	-0.95	V
Cutoff Frequency (I <sub>C</sub> = -100 mA, V <sub>CE</sub> = -5.0 V, f = 100 MHz)	f <sub>T</sub>	-	100	-	MHz
Output Capacitance (V <sub>CB</sub> = -1.5 V, f = 1.0 MHz)	C <sub>obo</sub>	-	50	65	pF

3. Pulsed Condition: Pulse Width < 300 μsec, Duty Cycle < 2%

## ORDERING INFORMATION

Device	Package	Shipping†
NSL12AWT1	SOT-363	3000 Tape & Reel
NSL12AWT1G	SOT-363 (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 Specifications Brochure, BRD8011/D.

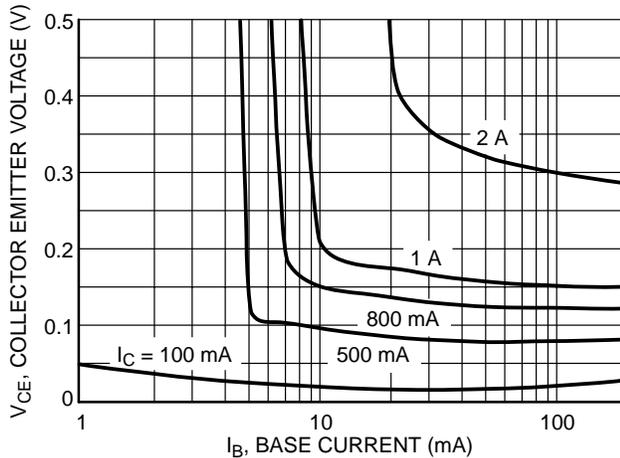


Figure 1. Collector Emitter Voltage vs Base Current

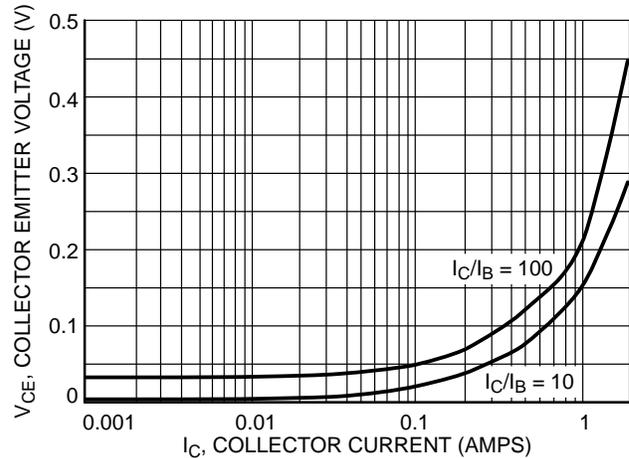
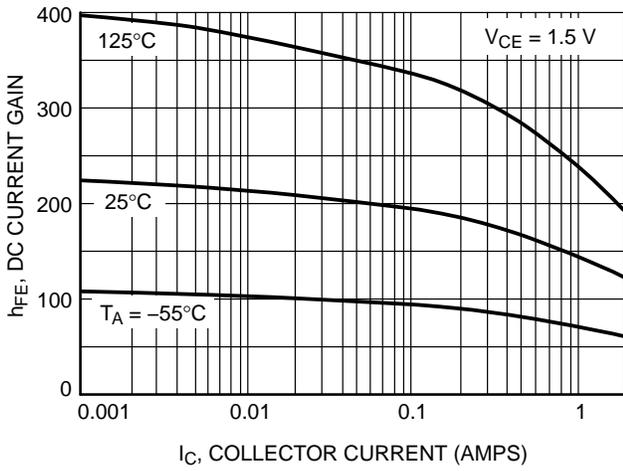
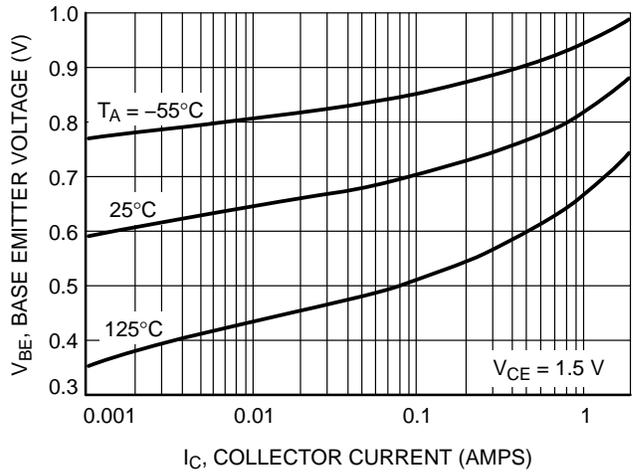


Figure 2. Collector Emitter Voltage vs Collector Current

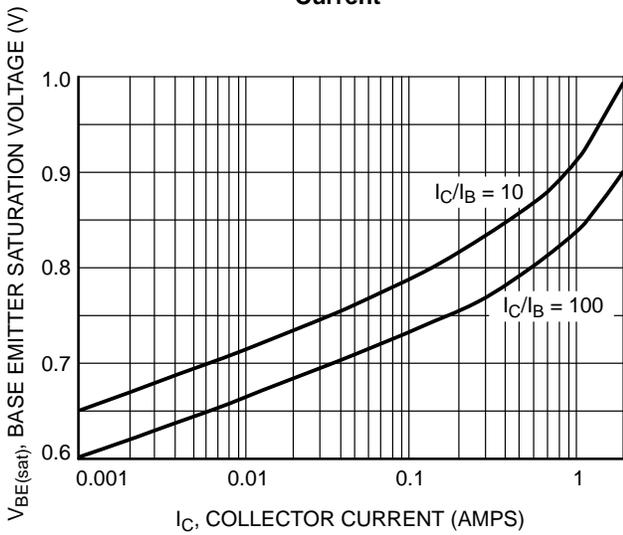
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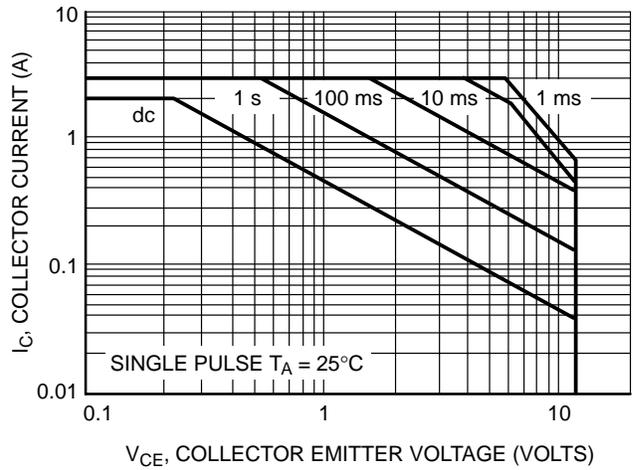
**Figure 3. DC Current Gain versus Collector Current**



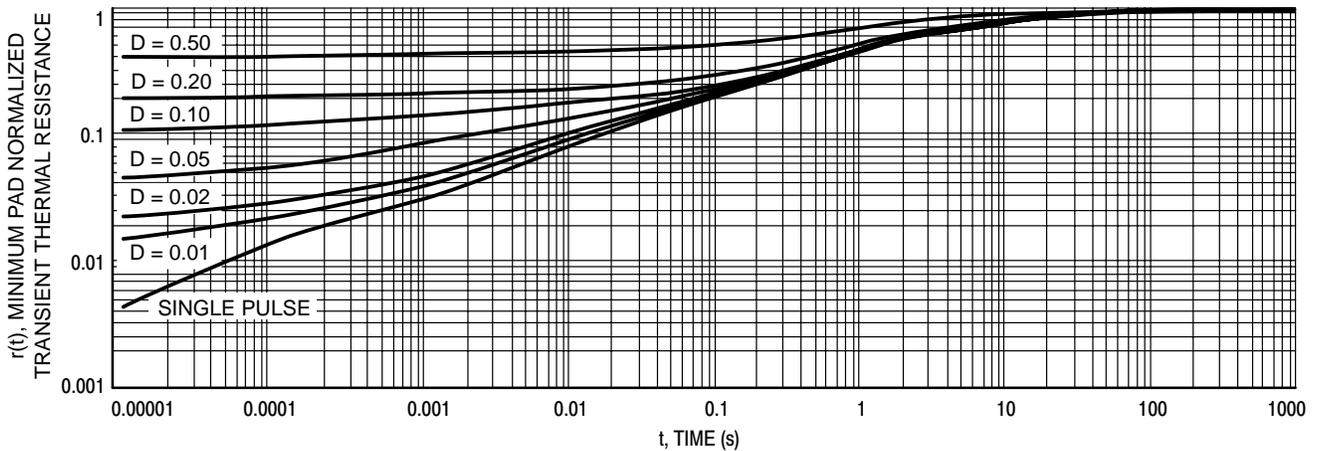
**Figure 4. Base Emitter Voltage versus Collector Current**



**Figure 5. Base Emitter Saturation Voltage versus Base Current**



**Figure 6. Safe Operating Area**

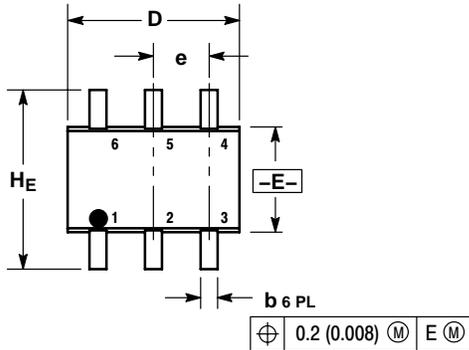


**Figure 7. Normalized Thermal Response**

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## PACKAGE DIMENSIONS

SC-88/SC70-6/SOT-363  
CASE 419B-02  
ISSUE V



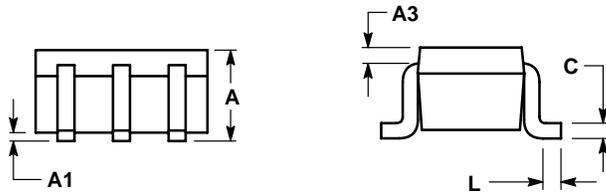
NOTES:

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

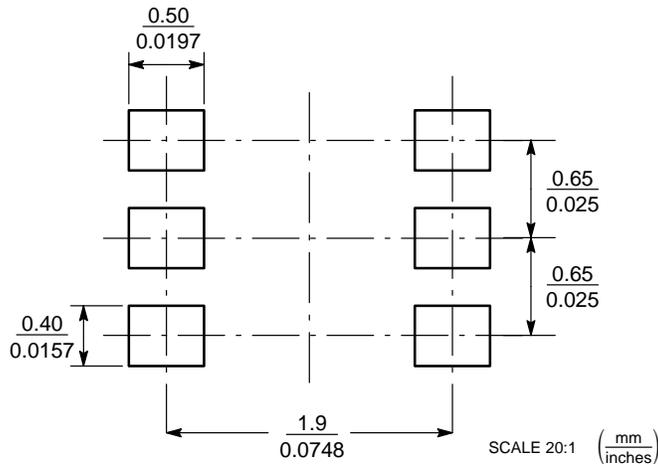
DIM	MILLIMETERS			INCHES		
	MIN	NOM	MAX	MIN	NOM	MAX
A	0.80	0.95	1.10	0.031	0.037	0.043
A1	0.00	0.05	0.10	0.000	0.002	0.004
A3	0.20 REF			0.008 REF		
b	0.10	0.21	0.30	0.004	0.008	0.012
C	0.10	0.14	0.25	0.004	0.005	0.010
D	1.80	2.00	2.20	0.070	0.078	0.086
E	1.15	1.25	1.35	0.045	0.049	0.053
e	0.65 BSC	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

STYLE 20:

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



### 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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