NSL12AWT1G

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

ON Semiconductor®

http://onsemi.com

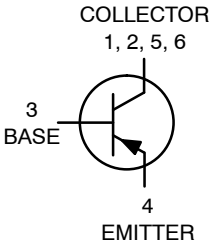
12 VOLTS
3.0 AMPS
PNP TRANSISTOR

Features

- High Current Capability (3 A)
- High Power Handling (Up to 650 mW)
- Low $V_{CE(s)}$ (170 mV Typical @ 1 A)
- Small Size
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant

Benefits

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



MAXIMUM RATINGS (T_A = 25°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 − Peak	I_C I_{CM}	−2.0 −3.0	Adc
Electrostatic Discharge	ESD	HBM Class 3 MM Class 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.

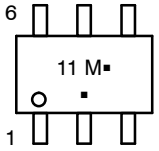
SC−88/SOT−363
CASE 419B
STYLE 20

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 1)	450 3.6	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 1)	275	°C/W
Total Device Dissipation T_A = 25°C Derate above 25°C	P_D (Note 2)	650 5.2	mW mW/°C
Thermal Resistance, Junction−to−Ambient	$R_{\theta JA}$ (Note 2)	192	°C/W
Thermal Resistance, Junction−to−Lead 6	$R_{\theta JL}$	105	°C/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	°C

1. FR−4, Minimum Pad, 1 oz Coverage
2. FR−4, 1″ Pad, 1 oz Coverage

MARKING DIAGRAM



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 2 of this data sheet.

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

Characteristic	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Breakdown Voltage, (I_C = −10 mAdc, I_B = 0)	$V_{(BR)CEO}$	−12	−15	–	Vdc
Collector−Base Breakdown Voltage, (I_C = −0.1 mAdc, I_E = 0)	$V_{(BR)CBO}$	−12	−25	–	Vdc
Emitter−Base Breakdown Voltage, (I_E = −0.1 mAdc, I_C = 0)	$V_{(BR)EBO}$	−5.0	−7.0	–	Vdc
Collector Cutoff Current, (V_{CB} = −12 Vdc, I_E = 0)	I_{CBO}	–	−0.02	−0.1	μAdc
Collector−Emitter Cutoff Current, (V_{CES} = −12 Vdc, I_E = 0)	I_{CES}	–	−0.03	−0.1	μAdc
Emitter Cutoff Current, (V_{CES} = −5.0 Vdc, I_E = 0)	I_{EBO}	–	−0.03	−0.1	μAdc
ON CHARACTERISTICS					
DC Current Gain (Note 3) (I_C = −0.5 A, V_{CE} = −1.5 V) (I_C = −0.8 A, V_{CE} = −1.5 V) (I_C = −1.0 A, V_{CE} = −1.5 V)	h_{FE}	 100 100 100	 180 165 160	 – 300 –	
Collector−Emitter Saturation Voltage (Note 3) (I_C = −0.5 A, I_B = −10 mA) (I_C = −0.8 A, I_B = −16 mA) (I_C = −1.0 A, I_B = −20 mA)	$V_{CE(sat)}$	 – – –	 −0.10 −0.14 −0.17	 −0.160 −0.235 −0.290	V
Base−Emitter Saturation Voltage (Note 3) (I_C = −1.0 A, I_B = −20 mA)	$V_{BE(sat)}$	 –	 −0.84	 −0.95	V
Base−Emitter Turn−on Voltage (Note 3) (I_C = −1.0 A, V_{CE} = −1.5 V)	$V_{BE(on)}$	 –	 −0.81	 −0.95	V
Cutoff Frequency (I_C = −100 mA, V_{CE} = −5.0 V, f = 100 MHz)	f_T	 –	 100	 –	MHz
Output Capacitance (V_{CB} = −1.5 V, f = 1.0 MHz)	C_{obo}	 –	 50	 65	pF

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

ORDERING INFORMATION

Device	Package	Shipping†
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.

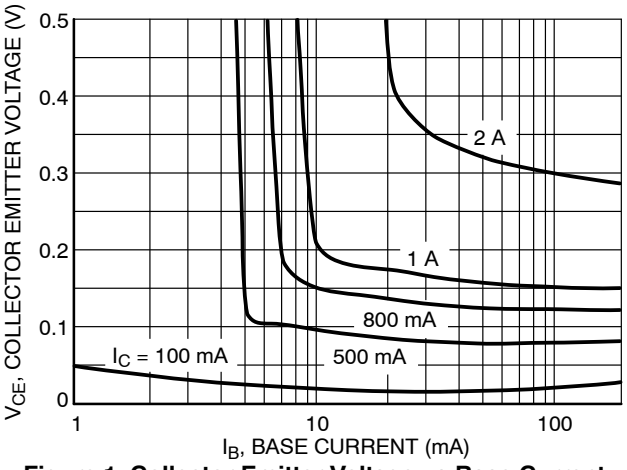

Figure 1. Collector Emitter Voltage vs Base Current

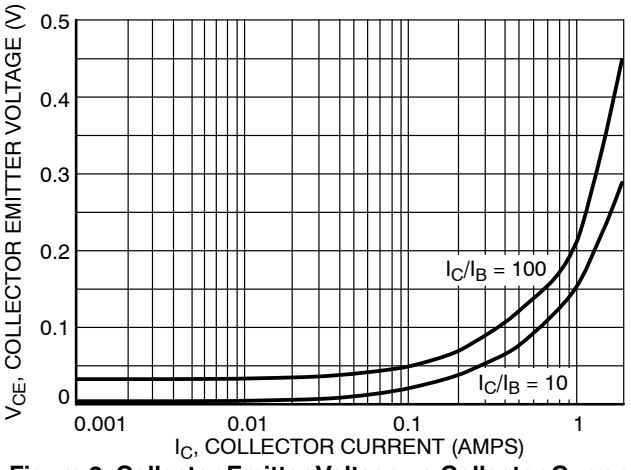

Figure 2. Collector Emitter Voltage vs Collector Current

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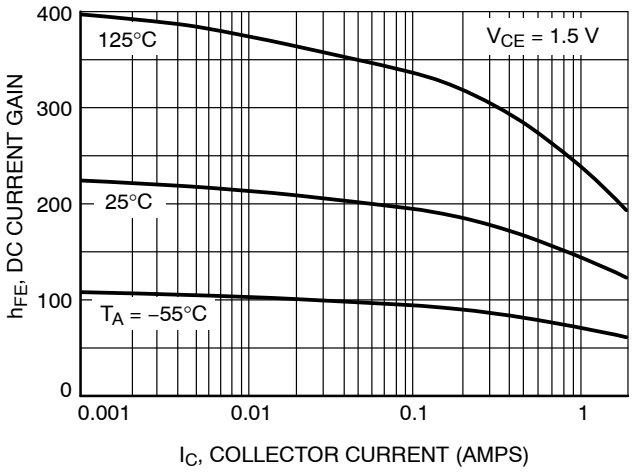

Figure 3. DC Current Gain versus Collector Current

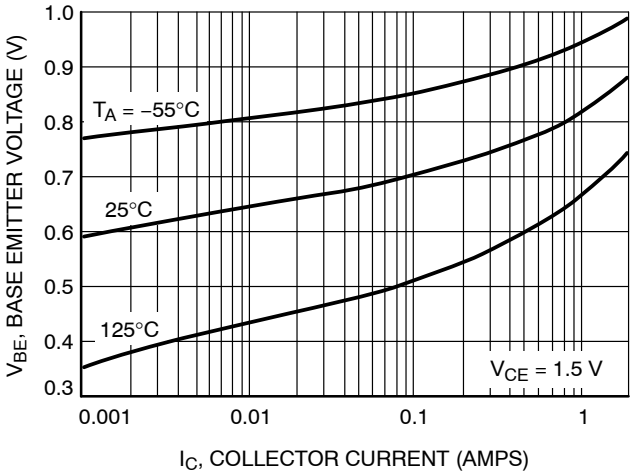

Figure 4. Base Emitter Voltage versus Collector Current

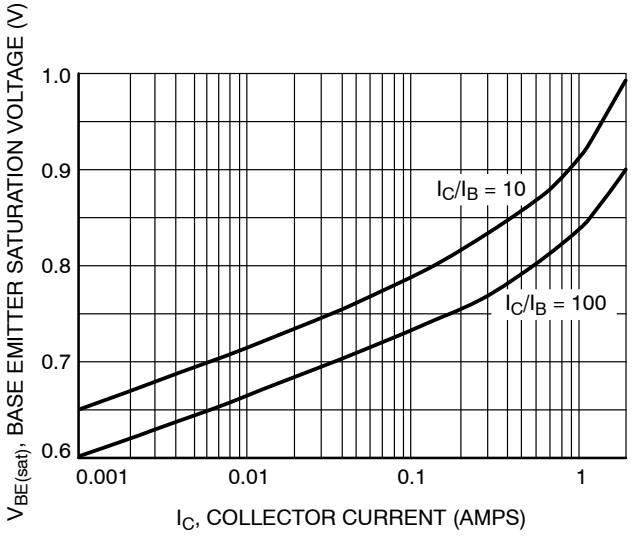

Figure 5. Base Emitter Saturation Voltage versus Base Current

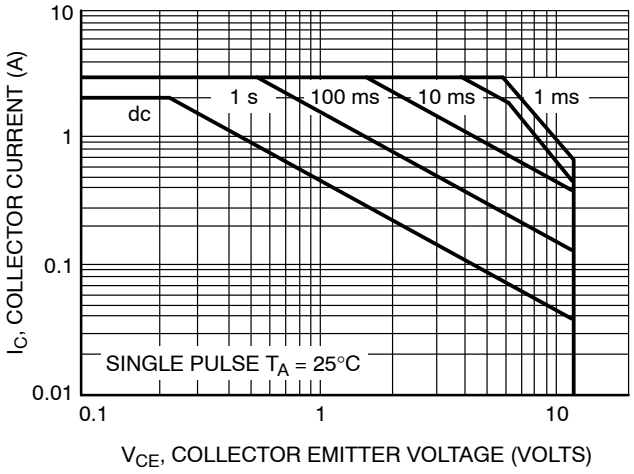

Figure 6. Safe Operating Area

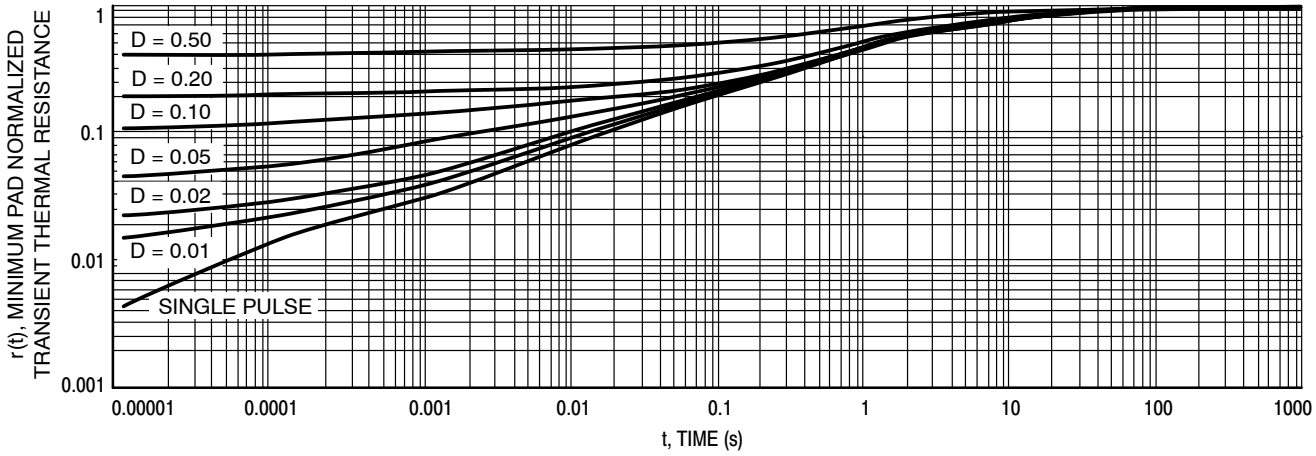

Figure 7. Normalized Thermal Response

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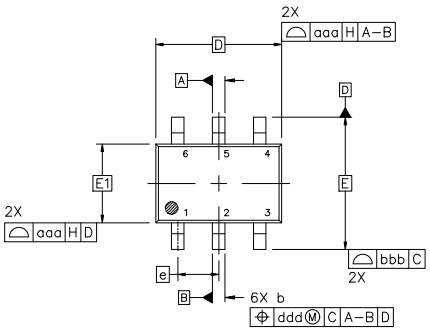
CASE 419B−02
ISSUE Z

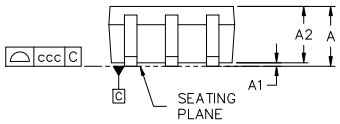
DATE 18 APR 2024



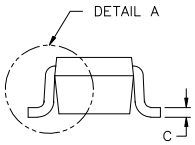
TOP VIEW

NOTES:

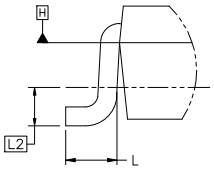
1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5−2018.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. DIMENSIONS D AND E1 DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS. MOLD FLASH, PROTRUSIONS, OR GATE BURRS SHALL NOT EXCEED 0.20 PER END.
4. DIMENSIONS D AND E1 AT THE OUTERMOST EXTREMES OF THE 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.



SIDE VIEW

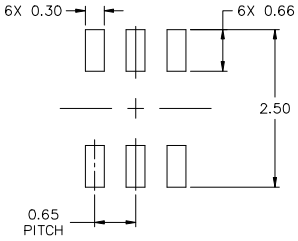


END VIEW



DETAIL A
SCALE 2:1

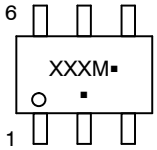
DIM	MILLIMETERS		
	MIN.	NOM.	MAX.
A	−−−	−−−	1.10
A1	0.00	−−−	0.10
A2	0.70	0.90	1.00
b	0.15	0.20	0.25
c	0.08	0.15	0.22
D	2.00 BSC		
E	2.10 BSC		
E1	1.25 BSC		
e	0.65 BSC		
L	0.26	0.36	0.46
L2	0.15 BSC		
aaa	0.15		
bbb	0.30		
ccc	0.10		
ddd	0.10		



RECOMMENDED MOUNTING FOPTPRINT*

* FOR ADDITIONAL INFORMATION ON OUR Pb−FREE STRATEGY AND SOLDERING DETAILS, PLEASE DOWNLOAD THE ONSEMI 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, “G” or microdot “▪”, may or may not be present. Some products may not follow the Generic Marking.

STYLES ON PAGE 2

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CASE 419B−02
ISSUE Z

DATE 18 APR 2024

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.

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