

# NSVT1418L

## Bipolar Transistor -160 V, -1 A, Low $V_{CE(sat)}$ , PNP Single

This device is bipolar junction transistor featuring high current, low saturation voltage, and high speed switching.

Suitable for automotive applications. AEC-Q101 qualified and PPAP capable.

### Features

- Large Current Capacitance
- Low Collector to Emitter Saturation Voltage
- High Speed Switching
- High Allowable Power Dissipation
- AEC-Q101 Qualified and PPAP Capable
- Pb-Free, Halogen Free and RoHS Compliant
- Ultra Small Package Facilitates Miniaturization in End Products

### Typical Applications

- High Side Switch
- Lighting, Infotainment

### ABSOLUTE MAXIMUM RATINGS at $T_A = 25^\circ\text{C}$

| Parameter                      | Symbol    | Value       | Unit             |
|--------------------------------|-----------|-------------|------------------|
| Collector to Base Voltage      | $V_{CBO}$ | -180        | V                |
| Collector to Emitter Voltage   | $V_{CEO}$ | -160        | V                |
| Emitter to Base Voltage        | $V_{EBO}$ | -6          | V                |
| Collector Current              | $I_C$     | -1          | A                |
| Collector Current (Pulse)      | $I_{CP}$  | -2          | A                |
| Collector Dissipation (Note 1) | $P_C$     | 0.42        | W                |
| Junction Temperature           | $T_j$     | 150         | $^\circ\text{C}$ |
| Storage Temperature Range      | $T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |

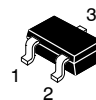
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Surface mounted on ceramic substrate. (250 mm<sup>2</sup> x 0.8 mm)



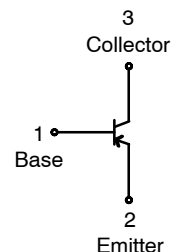
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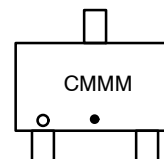


SOT-23  
CASE 318-08

### ELECTRICAL CONNECTION



### MARKING DIAGRAM



CMM = Specific Device Code  
M = Single Digit Date Code

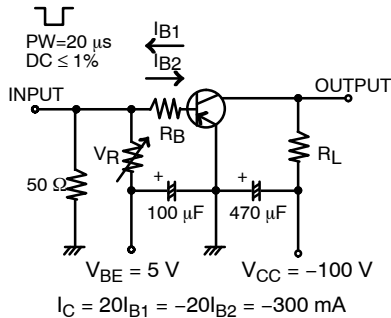
### ORDERING INFORMATION

See detailed ordering and shipping information on page 5 of this data sheet.

**ELECTRICAL CHARACTERISTICS** ( $T_A = 25^\circ\text{C}$  unless otherwise noted)

| Parameter                               | Symbol         | Conditions                                       | Value |       |       | Unit          |
|---|----------------|--|-------|-------|-------|---------------|
|   |                |  | Min   | Typ   | Max   |               |
| Collector Cutoff Current                | $I_{CBO}$      | $V_{CB} = -120\text{ V}, I_E = 0\text{ A}$       |       |       | -0.1  | $\mu\text{A}$ |
| Emitter Cutoff Current                  | $I_{EBO}$      | $V_{EB} = -4\text{ V}, I_C = 0\text{ A}$         |       |       | -0.1  | $\mu\text{A}$ |
| DC Current Gain                         | $h_{FE1}$      | $V_{CE} = -5\text{ V}, I_C = -100\text{ mA}$     | 100   |       | 400   |               |
|   | $h_{FE2}$      | $V_{CE} = -5\text{ V}, I_C = -10\text{ mA}$      | 90    |       |       |               |
| Gain-Bandwidth Product                  | $f_T$          | $V_{CE} = -10\text{ V}, I_C = -50\text{ mA}$     |       | 120   |       | MHz           |
| Output Capacitance                      | $C_{ob}$       | $V_{CB} = -10\text{ V}, f = 1\text{ MHz}$        |       | 11    |       | pF            |
| Collector to Emitter Saturation Voltage | $V_{CE(sat)1}$ | $I_C = -250\text{ mA}, I_B = -25\text{ mA}$      |       | -0.1  | -0.5  | V             |
|   | $V_{CE(sat)2}$ | $I_C = -250\text{ mA}, I_B = -50\text{ mA}$      |       | -0.08 | -0.13 | V             |
| Base to Emitter Saturation Voltage      | $V_{BE(sat)}$  | $I_C = -250\text{ mA}, I_B = -25\text{ mA}$      |       | -0.8  | -1.2  | V             |
| Collector to Base Breakdown Voltage     | $V_{(BR)CBO}$  | $I_C = -10\text{ }\mu\text{A}, I_E = 0\text{ A}$ | -180  |       |       | V             |
| Collector to Emitter Breakdown Voltage  | $V_{(BR)CEO}$  | $I_C = -1\text{ mA}, R_{BE} = \infty$            | -160  |       |       | V             |
| Emitter to Base Breakdown Voltage       | $V_{(BR)EBO}$  | $I_E = -10\text{ }\mu\text{A}, I_C = 0\text{ A}$ | -6    |       |       | V             |
| Turn-On Time                            | $t_{on}$       | See Figure 1                                     |       | 90    |       | ns            |
| Storage Time                            | $t_{stg}$      |  |       | 1000  |       | ns            |
| Fall Time                               | $t_f$          |  |       | 70    |       | ns            |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.



**Figure 1. Switching Time Test Circuit**

TYPICAL CHARACTERISTICS

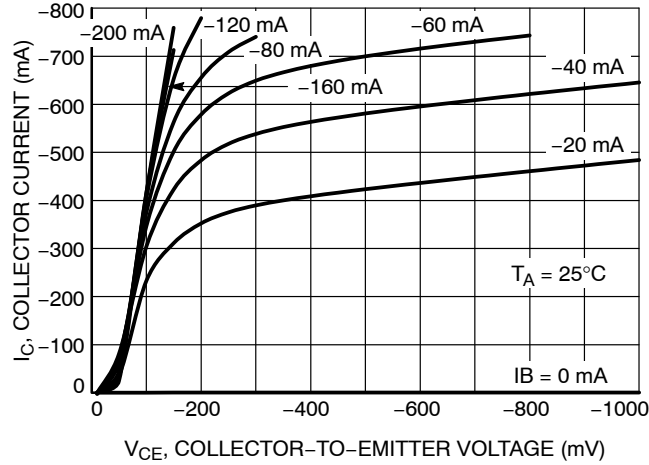


Figure 2.  $I_C$  vs.  $V_{CE}$

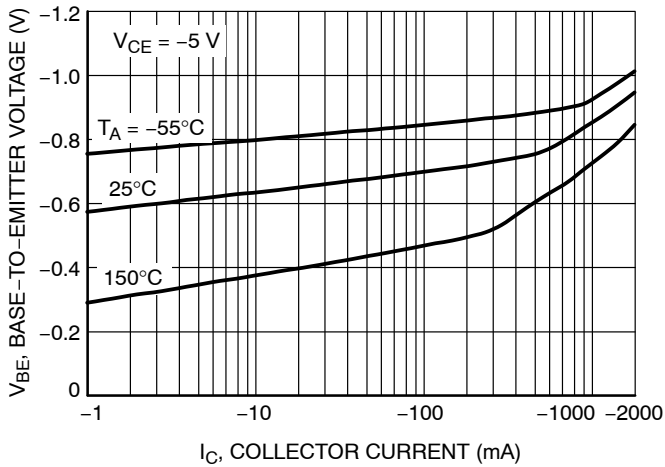


Figure 3.  $V_{BE}$  vs.  $I_C$

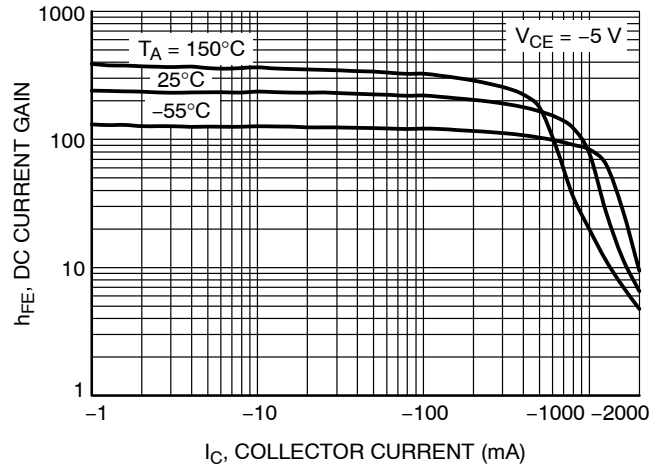


Figure 4.  $h_{FE}$  vs.  $I_C$

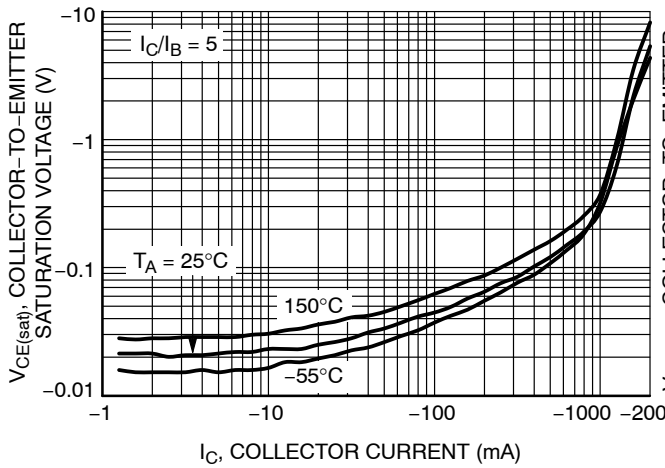


Figure 5.  $V_{CE(sat)}$  vs.  $I_C$

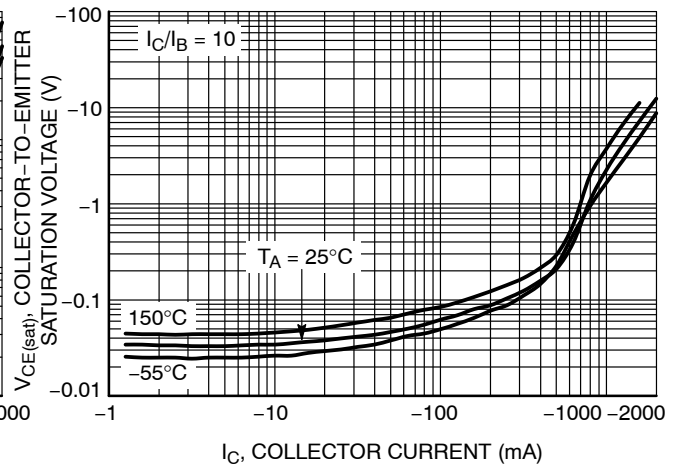


Figure 6.  $V_{CE(sat)}$  vs.  $I_C$

TYPICAL CHARACTERISTICS

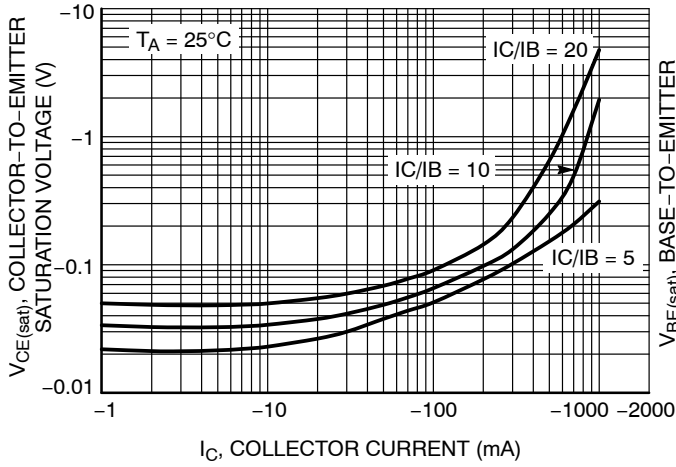


Figure 7.  $V_{CE(sat)}$  vs.  $I_C$

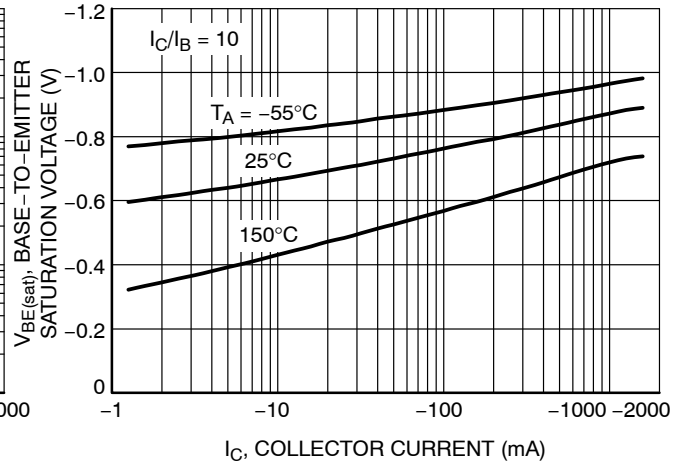


Figure 8.  $V_{BE(sat)}$  vs.  $I_C$

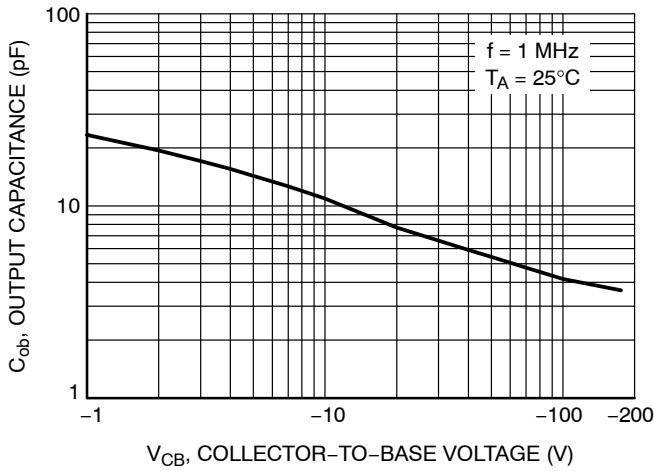


Figure 9.  $C_{ob}$  vs.  $V_{CB}$

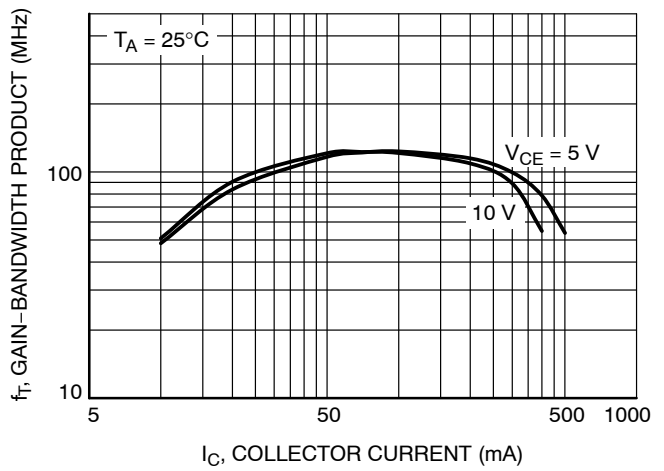


Figure 10.  $f_T$  vs.  $I_C$

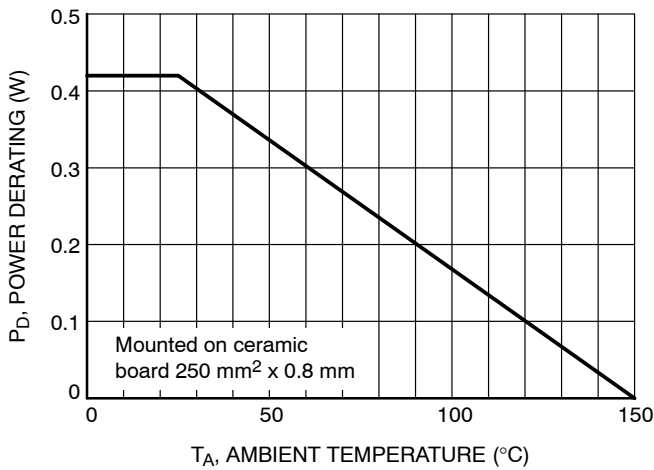


Figure 11. Power Derating

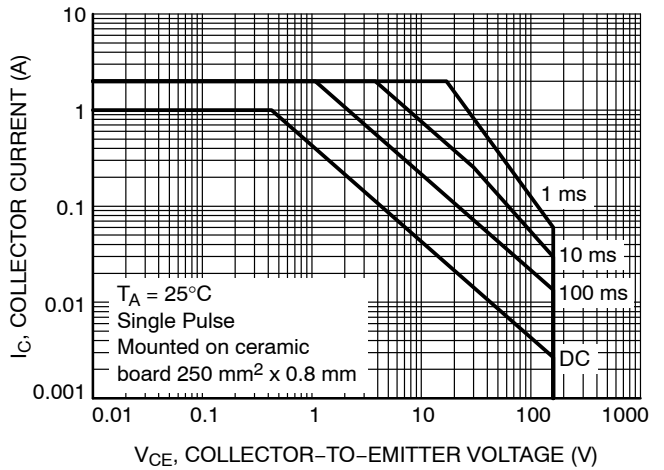


Figure 12. Safe Operating Area

## NSVT1418L

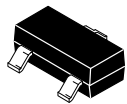
### ORDERING INFORMATION

| Device       | Marking | Package                            | Shipping (Qty / Packing) † |
|--------------|---------|------------------------------------|----------------------------|
| NSVT1418LT1G | CMM     | SOT-23<br>(Pb-Free / Halogen Free) | 3,000 / 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.

# MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

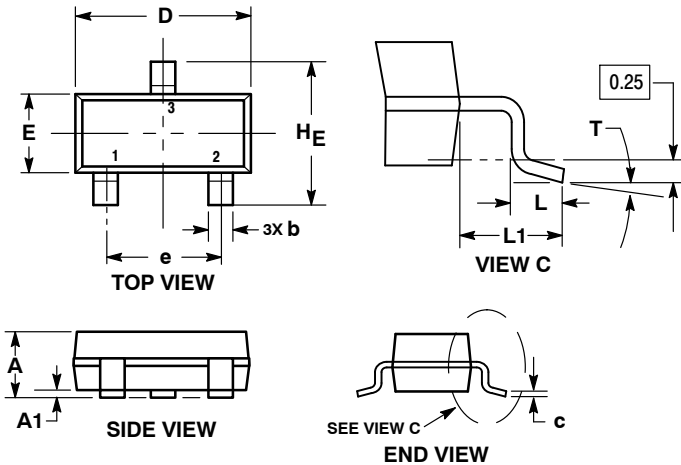
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## SOT-23 (TO-236) CASE 318-08 ISSUE AS

DATE 30 JAN 2018

SCALE 4:1

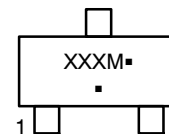


### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

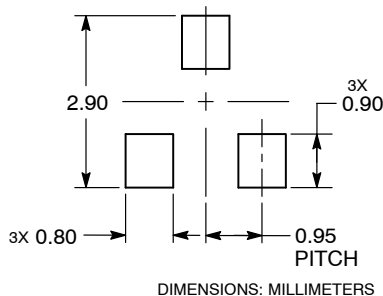
| DIM | MILLIMETERS |      |      | INCHES |       |       |
|-----|-------------|------|------|--------|-------|-------|
|     | MIN         | NOM  | MAX  | MIN    | NOM   | MAX   |
| A   | 0.89        | 1.00 | 1.11 | 0.035  | 0.039 | 0.044 |
| A1  | 0.01        | 0.06 | 0.10 | 0.000  | 0.002 | 0.004 |
| b   | 0.37        | 0.44 | 0.50 | 0.015  | 0.017 | 0.020 |
| c   | 0.08        | 0.14 | 0.20 | 0.003  | 0.006 | 0.008 |
| D   | 2.80        | 2.90 | 3.04 | 0.110  | 0.114 | 0.120 |
| E   | 1.20        | 1.30 | 1.40 | 0.047  | 0.051 | 0.055 |
| e   | 1.78        | 1.90 | 2.04 | 0.070  | 0.075 | 0.080 |
| L   | 0.30        | 0.43 | 0.55 | 0.012  | 0.017 | 0.022 |
| L1  | 0.35        | 0.54 | 0.69 | 0.014  | 0.021 | 0.027 |
| HE  | 2.10        | 2.40 | 2.64 | 0.083  | 0.094 | 0.104 |
| T   | 0°          | ---  | 10°  | 0°     | ---   | 10°   |

### GENERIC MARKING DIAGRAM\*



XXX = Specific Device Code  
M = Date Code  
▪ = Pb-Free Package

### RECOMMENDED SOLDERING FOOTPRINT



\*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.

STYLE 1 THRU 5:  
CANCELLED

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

STYLE 7:  
PIN 1. EMITTER  
2. BASE  
3. COLLECTOR

STYLE 8:  
PIN 1. ANODE  
2. NO CONNECTION  
3. CATHODE

STYLE 9:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 10:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE

STYLE 11:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE-ANODE

STYLE 12:  
PIN 1. CATHODE  
2. CATHODE  
3. ANODE

STYLE 13:  
PIN 1. SOURCE  
2. DRAIN  
3. GATE

STYLE 14:  
PIN 1. CATHODE  
2. GATE  
3. ANODE

STYLE 15:  
PIN 1. GATE  
2. CATHODE  
3. ANODE

STYLE 16:  
PIN 1. ANODE  
2. CATHODE  
3. CATHODE

STYLE 17:  
PIN 1. NO CONNECTION  
2. ANODE  
3. CATHODE

STYLE 18:  
PIN 1. NO CONNECTION  
2. CATHODE  
3. ANODE

STYLE 19:  
PIN 1. CATHODE  
2. ANODE  
3. CATHODE-ANODE

STYLE 20:  
PIN 1. CATHODE  
2. ANODE  
3. GATE

STYLE 21:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN

STYLE 22:  
PIN 1. RETURN  
2. OUTPUT  
3. INPUT

STYLE 23:  
PIN 1. ANODE  
2. ANODE  
3. CATHODE

STYLE 24:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE

STYLE 25:  
PIN 1. ANODE  
2. CATHODE  
3. GATE

STYLE 26:  
PIN 1. CATHODE  
2. ANODE  
3. NO CONNECTION

STYLE 27:  
PIN 1. CATHODE  
2. CATHODE  
3. CATHODE

STYLE 28:  
PIN 1. ANODE  
2. ANODE  
3. ANODE

|                         |                        |  |
|-------------------------|------------------------|--|
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