

# NSS1C200L, NSV1C200L

## 100 V, 2.0 A, Low $V_{CE(sat)}$ PNP Transistor

ON Semiconductor's e<sup>2</sup>PowerEdge family of low  $V_{CE(sat)}$  transistors are miniature surface mount devices featuring ultra low saturation voltage ( $V_{CE(sat)}$ ) and high current gain capability. These are designed for use in low voltage, high speed switching applications where affordable efficient energy control is important.

Typical applications are DC-DC converters and power management in portable and battery powered products such as cellular and cordless phones, PDAs, computers, printers, digital cameras and MP3 players. Other applications are low voltage motor controls in mass storage products such as disc drives and tape drives. In the automotive industry they can be used in air bag deployment and in the instrument cluster. The high current gain allows e<sup>2</sup>PowerEdge devices to be driven directly from PMU's control outputs, and the Linear Gain (Beta) makes them ideal components in analog amplifiers.

### Features

- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

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

| Rating                         | Symbol    | Max  | Unit |
|--------------------------------|-----------|------|------|
| Collector-Emitter Voltage      | $V_{CEO}$ | -100 | Vdc  |
| Collector-Base Voltage         | $V_{CBO}$ | -140 | Vdc  |
| Emitter-Base Voltage           | $V_{EBO}$ | -7.0 | Vdc  |
| Collector Current - Continuous | $I_C$     | -2.0 | A    |
| Collector Current - Peak       | $I_{CM}$  | -3.0 | A    |

### THERMAL CHARACTERISTICS

| Characteristic  | Symbol                   | Max            | Unit                      |
|---|--------------------------|----------------|---------------------------|
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$ (Note 1)           | 490            | mW                        |
| Thermal Resistance,<br>Junction-to-Ambient  | $R_{\theta JA}$ (Note 1) | 255            | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$ (Note 2)           | 710            | mW                        |
| Thermal Resistance,<br>Junction-to-Ambient  | $R_{\theta JA}$ (Note 2) | 176            | $^\circ\text{C}/\text{W}$ |
| Junction and Storage<br>Temperature Range   | $T_J, T_{stg}$           | -55 to<br>+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.

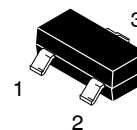
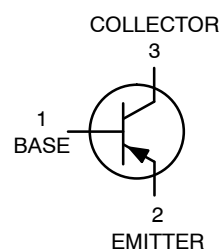
1. FR-4 @ 100 mm<sup>2</sup>, 1 oz. copper traces.
2. FR-4 @ 500 mm<sup>2</sup>, 1 oz. copper traces.



ON Semiconductor®

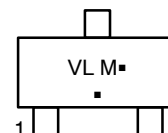
[www.onsemi.com](http://www.onsemi.com)

## -100 VOLTS, 2.0 AMPS PNP LOW $V_{CE(sat)}$ TRANSISTOR



SOT-23 (TO-236)  
CASE 318  
STYLE 6

### MARKING DIAGRAM



VL = Specific Device Code  
M = Date Code\*  
■ = Pb-Free Package

(Note: Microdot may be in either location)

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

### ORDERING INFORMATION

| Device                        | Package             | Shipping†        |
|-------------------------------|---------------------|------------------|
| NSS1C200LT1G,<br>NSV1C200LT1G | SOT-23<br>(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.

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

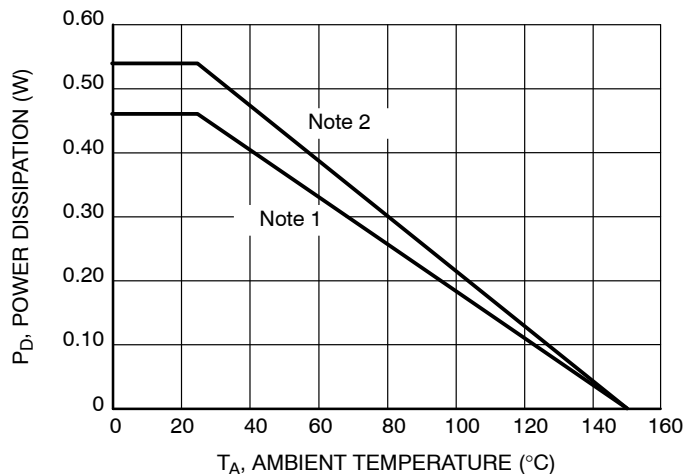
| Characteristic   | Symbol        | Min  | Typ | Max  | Unit |
|--|---------------|------|-----|------|------|
| <b>OFF CHARACTERISTICS</b>   |               |      |     |      |      |
| Collector – Emitter Breakdown Voltage<br>( $I_C = -10\text{ mA}$ , $I_B = 0$ ) | $V_{(BR)CEO}$ | -100 |     |      | Vdc  |
| Collector – Base Breakdown Voltage<br>( $I_C = -0.1\text{ mA}$ , $I_E = 0$ )   | $V_{(BR)CBO}$ | -140 |     |      | Vdc  |
| Emitter – Base Breakdown Voltage<br>( $I_E = -0.1\text{ mA}$ , $I_C = 0$ )     | $V_{(BR)EBO}$ | -7.0 |     |      | Vdc  |
| Collector Cutoff Current<br>( $V_{CB} = -140\text{ Vdc}$ , $I_E = 0$ )         | $I_{CBO}$     |      |     | -100 | nAdc |
| Emitter Cutoff Current<br>( $V_{EB} = -6.0\text{ Vdc}$ )                       | $I_{EBO}$     |      |     | -50  | nAdc |

## ON CHARACTERISTICS

|   |               |                        |     |                                      |     |
|---|---------------|------------------------|-----|--------------------------------------|-----|
| DC Current Gain (Note 3)<br>( $I_C = -10\text{ mA}$ , $V_{CE} = -2.0\text{ V}$ )<br>( $I_C = -500\text{ mA}$ , $V_{CE} = -2.0\text{ V}$ )<br>( $I_C = -1.0\text{ A}$ , $V_{CE} = -2.0\text{ V}$ )<br>( $I_C = -2.0\text{ A}$ , $V_{CE} = -2.0\text{ V}$ )                 | $h_{FE}$      | 150<br>120<br>80<br>50 | 240 | 360                                  |     |
| Collector – Emitter Saturation Voltage (Note 3)<br>( $I_C = -0.1\text{ A}$ , $I_B = -0.01\text{ A}$ )<br>( $I_C = -0.5\text{ A}$ , $I_B = -0.05\text{ A}$ )<br>( $I_C = -1.0\text{ A}$ , $I_B = -0.100\text{ A}$ )<br>( $I_C = -2.0\text{ A}$ , $I_B = -0.200\text{ A}$ ) | $V_{CE(sat)}$ |                        |     | -0.040<br>-0.080<br>-0.115<br>-0.250 | V   |
| Base – Emitter Saturation Voltage (Note 3)<br>( $I_C = -1.0\text{ A}$ , $I_B = -0.100\text{ A}$ )   | $V_{BE(sat)}$ |                        |     | -0.950                               | V   |
| Base – Emitter Turn-on Voltage (Note 3)<br>( $I_C = -1.0\text{ A}$ , $V_{CE} = -2.0\text{ V}$ )   | $V_{BE(on)}$  |                        |     | -0.850                               | V   |
| Cutoff Frequency<br>( $I_C = -100\text{ mA}$ , $V_{CE} = -5.0\text{ V}$ , $f = 100\text{ MHz}$ )  | $f_T$         |                        | 120 |                                      | MHz |
| Input Capacitance ( $V_{EB} = 2.0\text{ V}$ , $f = 1.0\text{ MHz}$ )  | $C_{ibo}$     |                        | 200 |                                      | pF  |
| Output Capacitance ( $V_{CB} = 10\text{ V}$ , $f = 1.0\text{ MHz}$ )  | $C_{obo}$     |                        | 22  |                                      | pF  |

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.

3. Pulsed Condition: Pulse Width = 300 msec, Duty Cycle  $\leq 2\%$ .



**Figure 1. Power Derating**

# NSS1C200L, NSV1C200L

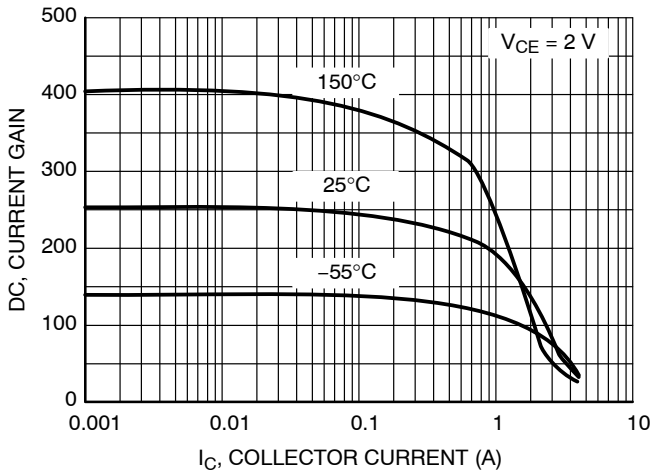


Figure 2. DC Current Gain

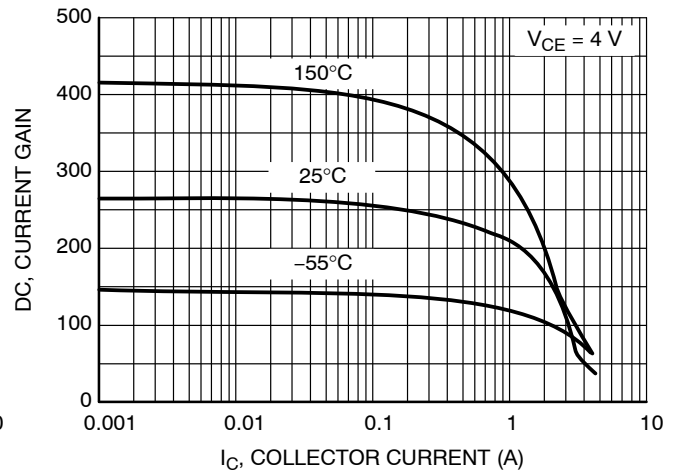


Figure 3. DC Current Gain

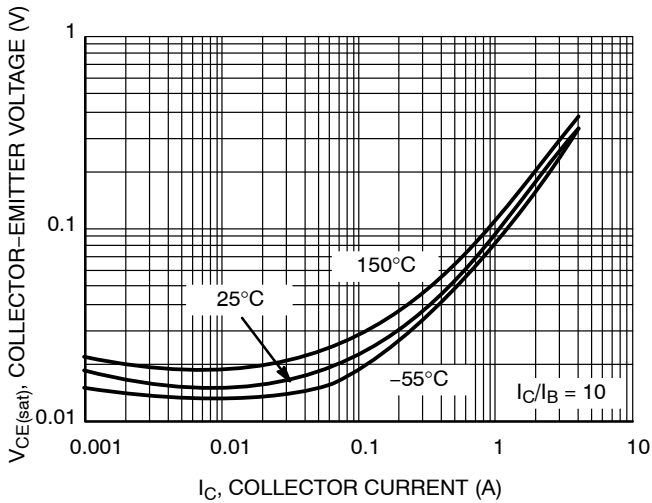


Figure 4. Collector-Emitter Saturation Voltage

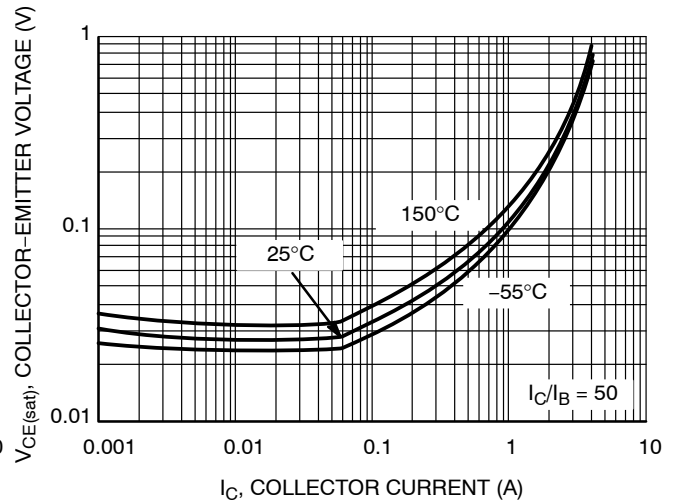


Figure 5. Collector-Emitter Saturation Voltage

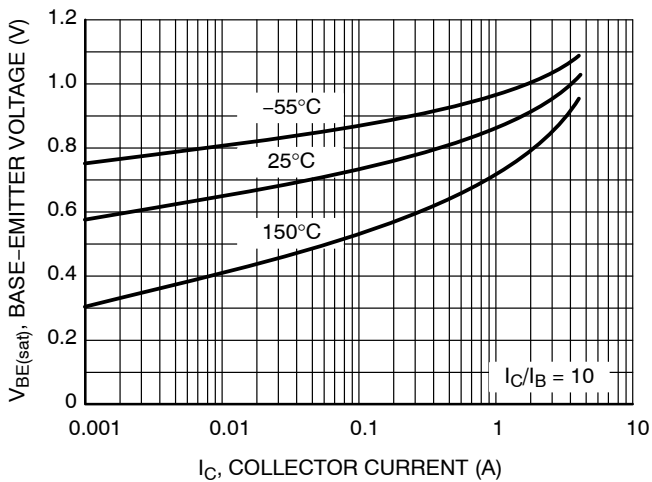


Figure 6. Base-Emitter Saturation Voltage

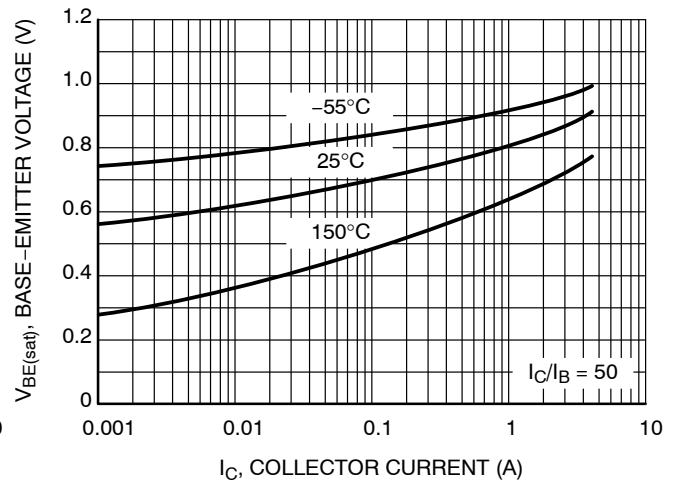
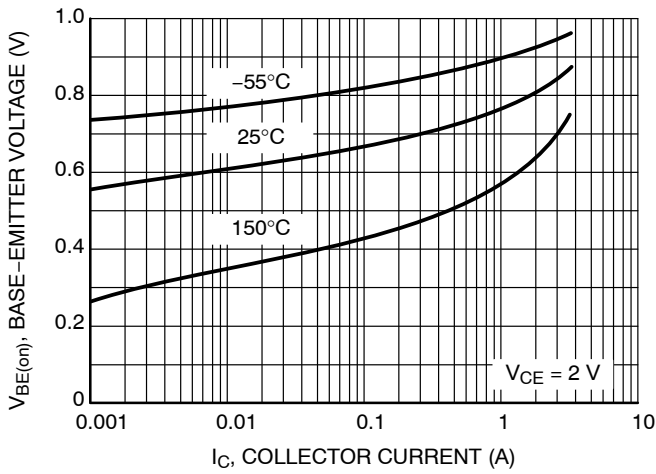
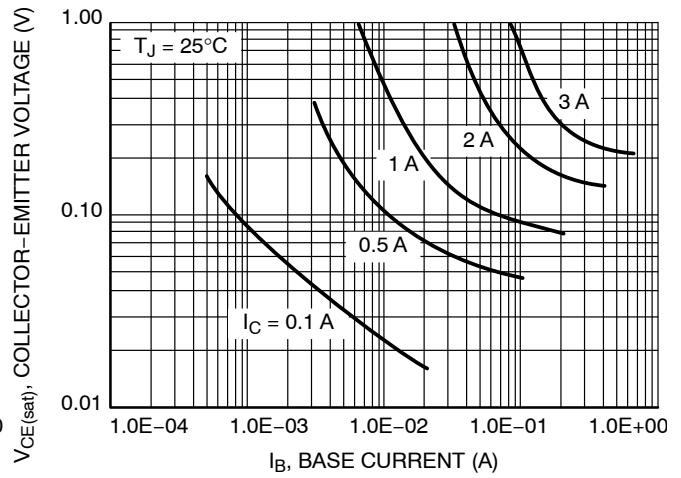


Figure 7. Base-Emitter Saturation Voltage

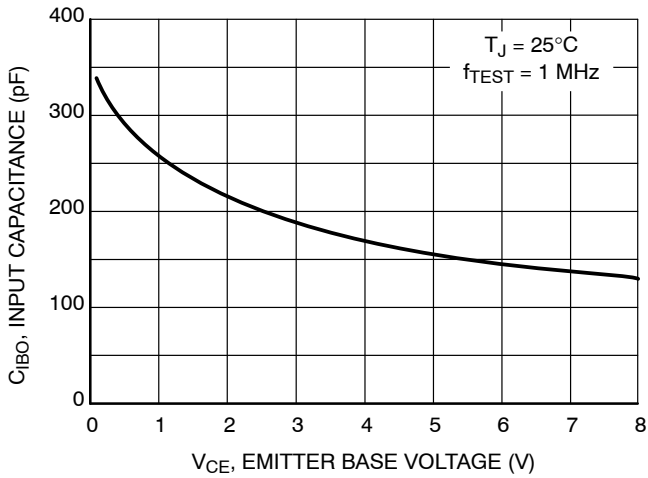
# NSS1C200L, NSV1C200L



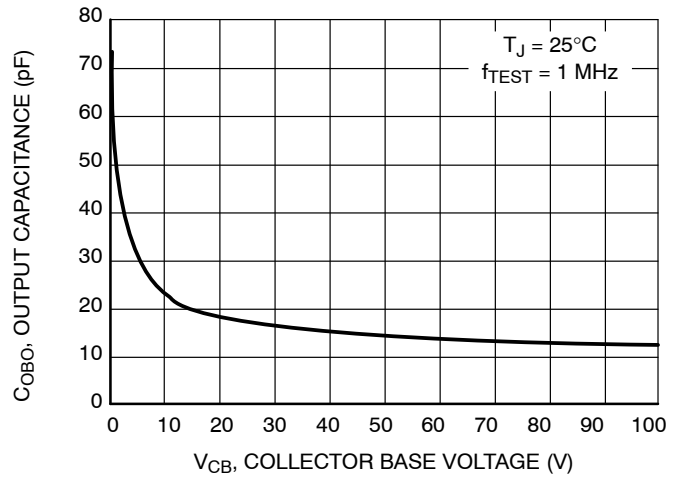
**Figure 8. Base-Emitter Saturation Voltage**



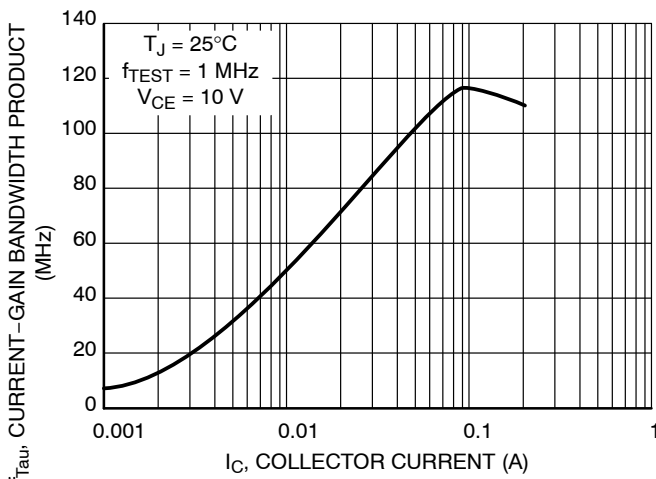
**Figure 9. Collector Saturation Region**



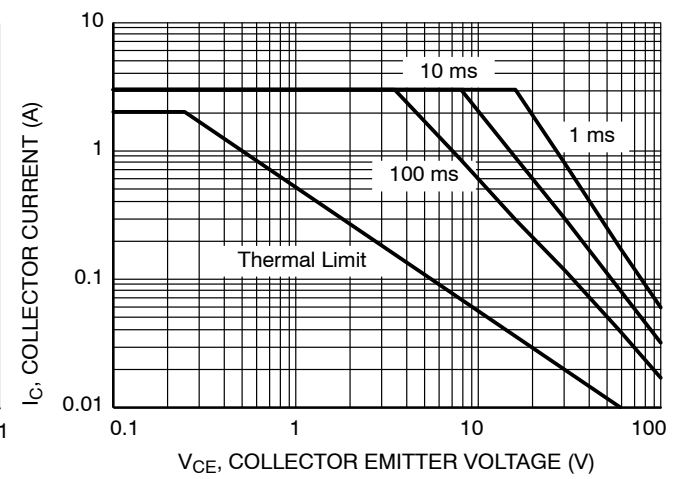
**Figure 10. Input Capacitance**



**Figure 11. Output Capacitance**



**Figure 12. Current-Gain Bandwidth Product**



**Figure 13.**

# NSS1C200L, NSV1C200L

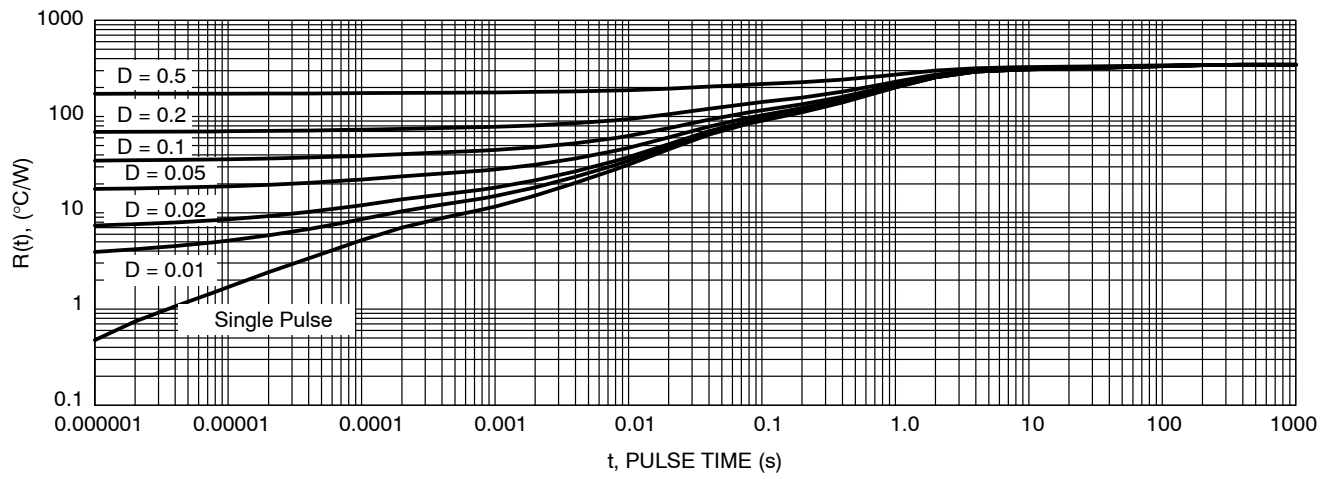
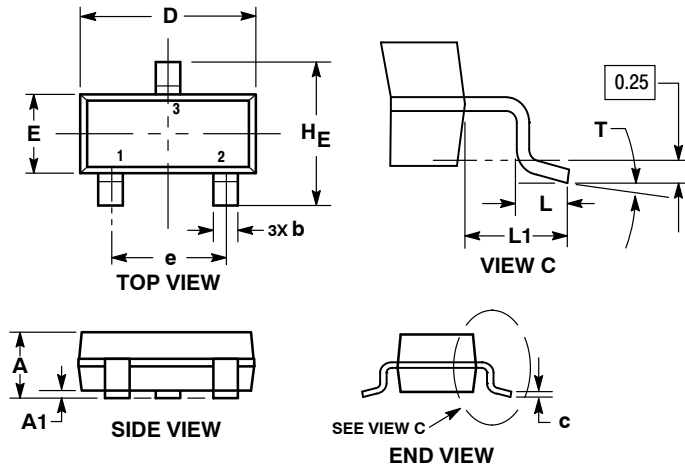


Figure 14. Transient Thermal Resistance

# NSS1C200L, NSV1C200L

## PACKAGE DIMENSIONS

SOT-23 (TO-236)  
CASE 318-08  
ISSUE AR



**NOTES:**

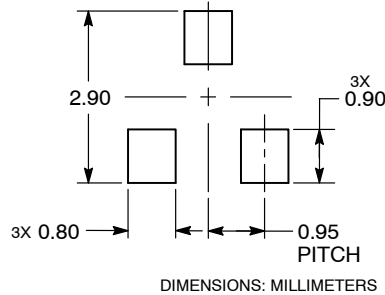
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF THE BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| 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°   |

**STYLE 6:**

1. BASE
2. EMITTER
3. COLLECTOR

### RECOMMENDED 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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