

# NSS12100XV6T1G

## Low $V_{CE(sat)}$ Transistor, PNP, 12 V, 1.0 A, SOT-563 Package

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 application 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

- High Current Capability (1 A)
- High Power Handling (Up to 650 mW)
- Low  $V_{CE(s)}$  (150 mV Typical @ 500 mA)
- Small Size
- This is a Pb-Free Device

### 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<br>– Peak | $I_C$<br>$I_{CM}$ | -1.0<br>-2.0              | Adc  |
| Electrostatic Discharge                  | ESD               | HBM Class 3<br>MM Class C |      |

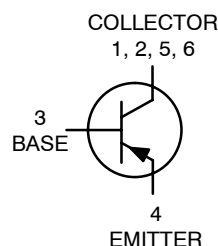
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



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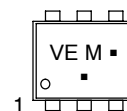
12 VOLTS, 1.0 AMPS  
PNP LOW  $V_{CE(sat)}$  TRANSISTOR  
EQUIVALENT  $R_{DS(on)}$  300 m $\Omega$



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SOT-563  
CASE 463A  
STYLE 4

### DEVICE MARKING



VE = Specific Device Code

M = Month Code

▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

| Device         | Package              | Shipping†        |
|----------------|----------------------|------------------|
| NSS12100XV6T1G | SOT-563<br>(Pb-Free) | 4000/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.

# NSS12100XV6T1G

## 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)           | 500         | mW                        |
|   |                          | 4.0         | mW/ $^\circ\text{C}$      |
| Thermal Resistance,<br>Junction-to-Ambient  | $R_{\theta JA}$ (Note 1) | 250         | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation<br>$T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$ (Note 2)           | 650         | mW                        |
|   |                          | 5.2         | mW/ $^\circ\text{C}$      |
| Thermal Resistance,<br>Junction-to-Ambient  | $R_{\theta JA}$ (Note 2) | 192         | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance,<br>Junction-to-Lead 6   | $R_{\theta JL}$          | 105         | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation<br>(Single Pulse < 10 sec.)                                    | $P_D$ Single             | 1.0         | W                         |
| Junction and Storage<br>Temperature Range   | $T_J, T_{stg}$           | -55 to +150 | $^\circ\text{C}$          |

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

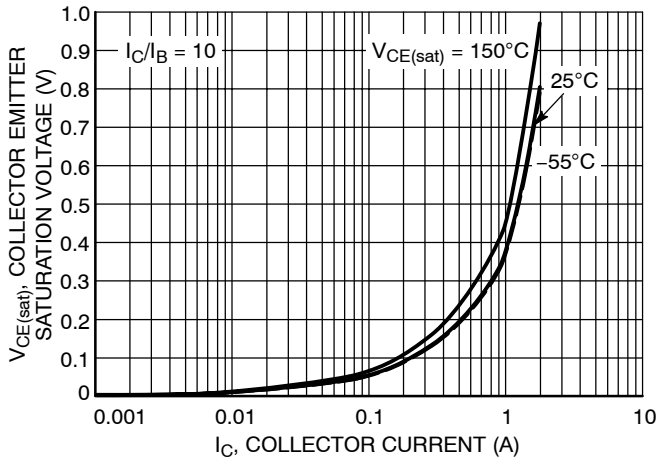
| Characteristic   | Symbol        | Min  | Typ   | Max  | Unit            |
|--|---------------|------|-------|------|-----------------|
| <b>OFF CHARACTERISTICS</b>   |               |      |       |      |                 |
| Collector-Emmitter Breakdown Voltage, ( $I_C = -10\text{ mAdc}, I_B = 0$ ) | $V_{(BR)CEO}$ | -12  | -     | -    | Vdc             |
| Collector-Base Breakdown Voltage, ( $I_C = -0.1\text{ mAdc}, I_E = 0$ )    | $V_{(BR)CBO}$ | -12  | -     | -    | Vdc             |
| Emmitter-Base Breakdown Voltage, ( $I_E = -0.1\text{ mAdc}, I_C = 0$ )     | $V_{(BR)EBO}$ | -5.0 | -     | -    | Vdc             |
| Collector Cutoff Current, ( $V_{CB} = -12\text{ Vdc}, I_E = 0$ )           | $I_{CBO}$     | -    | -0.02 | -0.1 | $\mu\text{Adc}$ |
| Emmitter Cutoff Current, ( $V_{CES} = -5.0\text{ Vdc}, I_E = 0$ )          | $I_{EBO}$     | -    | -0.03 | -0.1 | $\mu\text{Adc}$ |

## ON CHARACTERISTICS

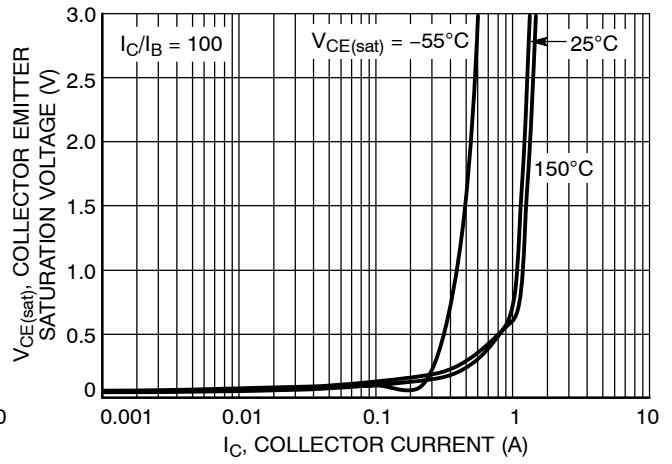
|  |               |                  |  |  |    |
|--|---------------|------------------|--|--|----|
| DC Current Gain (Note 3)<br>( $I_C = -10\text{ mA}, V_{CE} = -2.0\text{ V}$ )<br>( $I_C = -500\text{ mA}, V_{CE} = -2.0\text{ V}$ )<br>( $I_C = -1.0\text{ A}, V_{CE} = -2.0\text{ V}$ )   | $h_{FE}$      | 200<br>100<br>90 | -  | -  |    |
| Collector-Emmitter Saturation Voltage (Note 3)<br>( $I_C = -0.05\text{ A}, I_B = -0.005\text{ A}$ ) (Note 4)<br>( $I_C = -0.1\text{ A}, I_B = -0.002\text{ A}$ )<br>( $I_C = -0.1\text{ A}, I_B = -0.010\text{ A}$ )<br>( $I_C = -0.5\text{ A}, I_B = -0.050\text{ A}$ )<br>( $I_C = -1.0\text{ A}, I_B = -0.100\text{ A}$ ) | $V_{CE(sat)}$ | -                | -0.030<br>-0.080<br>-0.050<br>-0.200<br>-0.400 | -0.040<br>-0.100<br>-0.060<br>-0.225<br>-0.440 | V  |
| Base-Emmitter Saturation Voltage (Note 3)<br>( $I_C = -1.0\text{ A}, I_B = -0.01\text{ A}$ )   | $V_{BE(sat)}$ | -                | 0.95   | -1.15  | V  |
| Base-Emmitter Turn-on Voltage (Note 3)<br>( $I_C = -2.0\text{ A}, V_{CE} = -3.0\text{ V}$ )  | $V_{BE(on)}$  | -                | -1.05  | -1.15  | V  |
| Input Capacitance ( $V_{EB} = -0.5\text{ V}, f = 1.0\text{ MHz}$ )   | $C_{ibo}$     | -                |  | 50   | pF |
| Output Capacitance ( $V_{CB} = -3.0\text{ V}, f = 1.0\text{ MHz}$ )  | $C_{obo}$     | -                |  | 20   | pF |

1. FR-4 @ 100 mm<sup>2</sup>, 1 oz copper traces.
2. FR-4 @ 500 mm<sup>2</sup>, 1 oz copper traces.
3. Pulsed Condition: Pulse Width = 300  $\mu\text{sec}$ , Duty Cycle  $\leq 2\%$ .
4. Guaranteed by design but not tested.

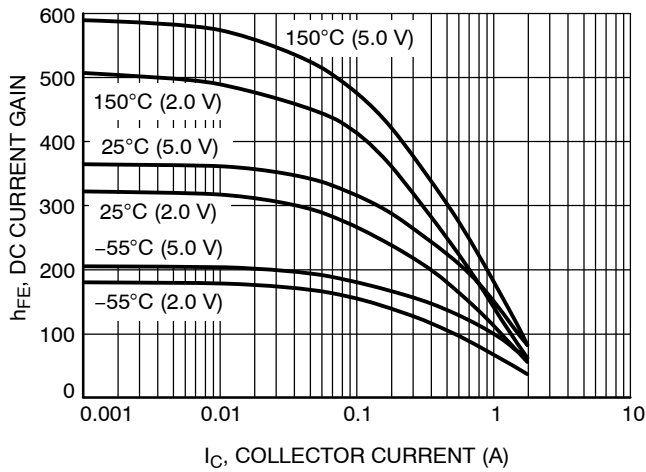
# NSS12100XV6T1G



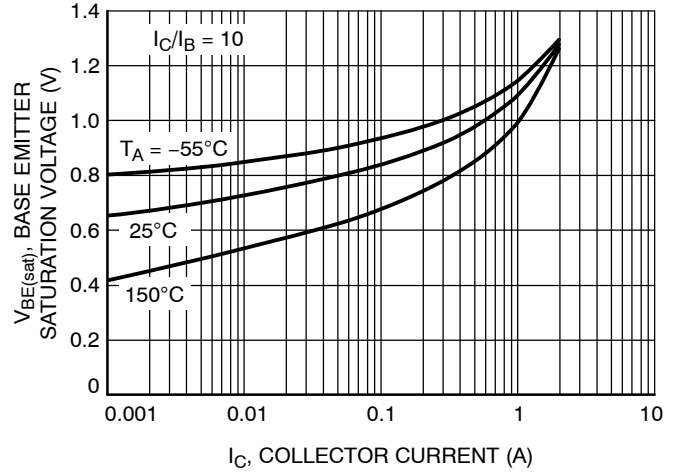
**Figure 1. Collector Emitter Saturation Voltage vs. Collector Current**



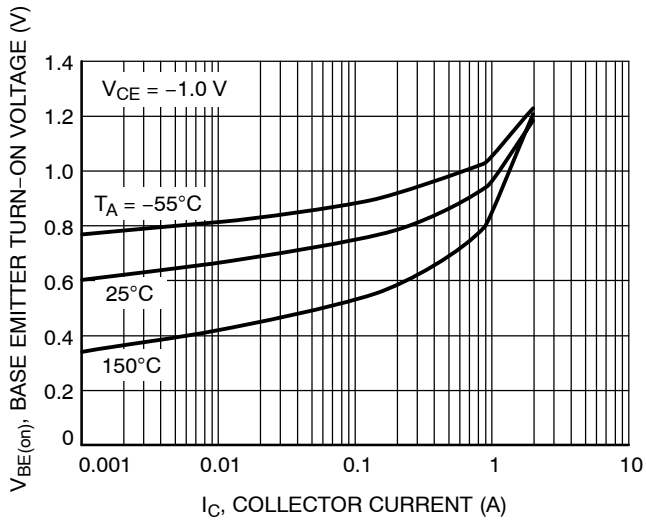
**Figure 2. Collector Emitter Saturation Voltage vs. Collector Current**



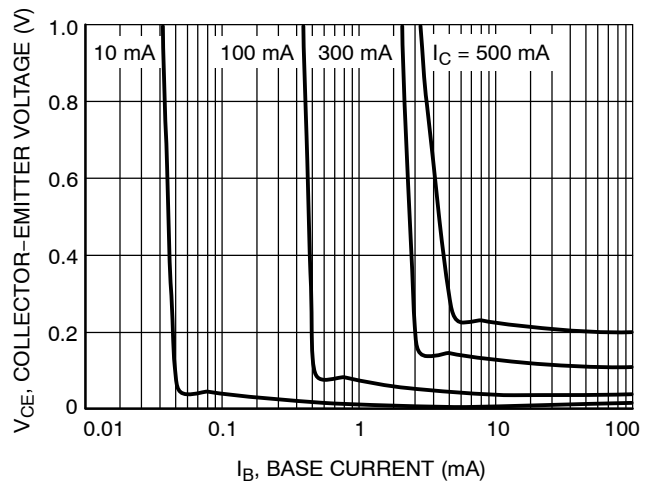
**Figure 3. DC Current Gain vs. Collector Current**



**Figure 4. Base Emitter Saturation Voltage vs. Collector Current**

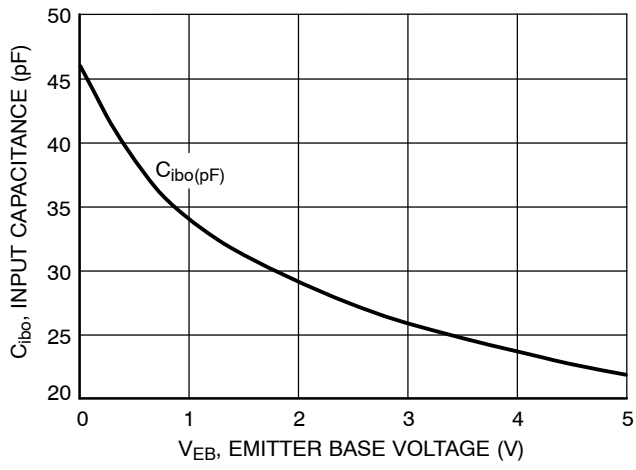


**Figure 5. Base Emitter Turn-On Voltage vs. Collector Current**

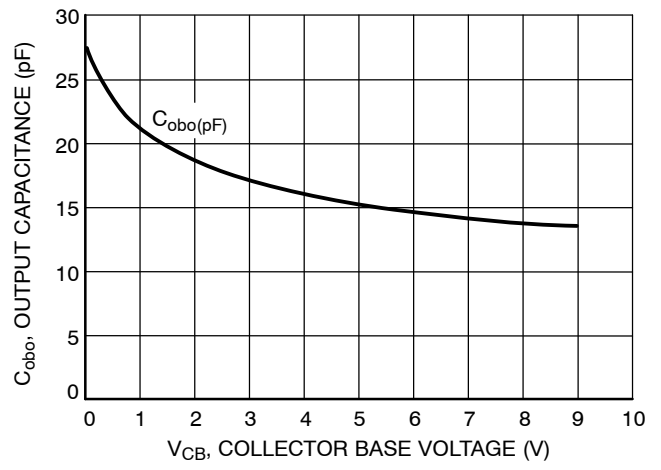


**Figure 6. Saturation Region**

# NSS12100XV6T1G



**Figure 7. Input Capacitance**



**Figure 8. Output Capacitance**

# MECHANICAL CASE OUTLINE

## PACKAGE DIMENSIONS

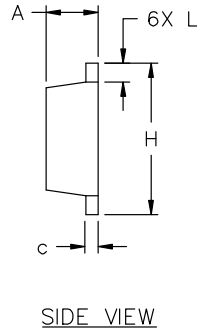
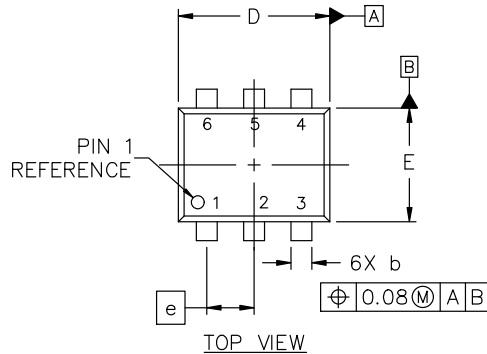


**SOT-563-6 1.60x1.20x0.55, 0.50P**  
**CASE 463A**  
**ISSUE J**

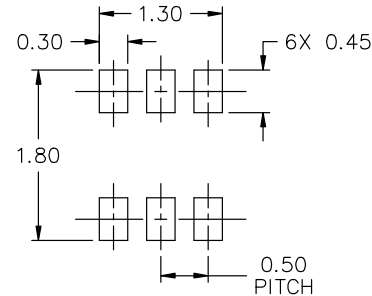
DATE 15 FEB 2024

**NOTES:**

1. DIMENSIONING AND TOLERANCING CONFORM TO ASME Y14.5-2018.
2. ALL DIMENSION ARE IN MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.



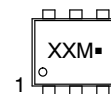
| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.50        | 0.55 | 0.60 |
| b   | 0.17        | 0.22 | 0.27 |
| c   | 0.08        | 0.13 | 0.18 |
| D   | 1.50        | 1.60 | 1.70 |
| E   | 1.10        | 1.20 | 1.30 |
| e   | 0.50 BSC    |      |      |
| H   | 1.50        | 1.60 | 1.70 |
| L   | 0.10        | 0.20 | 0.30 |



- |  |   |  |
|--|---|--|
| <p><b>STYLE 1:</b><br/>                 PIN 1. EMITTER 1<br/>                 2. BASE 1<br/>                 3. COLLECTOR 2<br/>                 4. EMITTER 2<br/>                 5. BASE 2<br/>                 6. COLLECTOR 1</p> | <p><b>STYLE 2:</b><br/>                 PIN 1. EMITTER 1<br/>                 2. EMITTER 2<br/>                 3. BASE 2<br/>                 4. COLLECTOR 2<br/>                 5. BASE 1<br/>                 6. COLLECTOR 1</p>  | <p><b>STYLE 3:</b><br/>                 PIN 1. CATHODE 1<br/>                 2. CATHODE 1<br/>                 3. ANODE/ANODE 2<br/>                 4. CATHODE 2<br/>                 5. CATHODE 2<br/>                 6. ANODE/ANODE 1</p> |
| <p><b>STYLE 4:</b><br/>                 PIN 1. COLLECTOR<br/>                 2. COLLECTOR<br/>                 3. BASE<br/>                 4. EMITTER<br/>                 5. COLLECTOR<br/>                 6. COLLECTOR</p>      | <p><b>STYLE 5:</b><br/>                 PIN 1. CATHODE<br/>                 2. CATHODE<br/>                 3. ANODE<br/>                 4. ANODE<br/>                 5. CATHODE<br/>                 6. CATHODE</p>                | <p><b>STYLE 6:</b><br/>                 PIN 1. CATHODE<br/>                 2. ANODE<br/>                 3. CATHODE<br/>                 4. CATHODE<br/>                 5. CATHODE<br/>                 6. CATHODE</p>                       |
| <p><b>STYLE 7:</b><br/>                 PIN 1. CATHODE<br/>                 2. ANODE<br/>                 3. CATHODE<br/>                 4. CATHODE<br/>                 5. ANODE<br/>                 6. CATHODE</p>               | <p><b>STYLE 8:</b><br/>                 PIN 1. DRAIN<br/>                 2. DRAIN<br/>                 3. GATE<br/>                 4. SOURCE<br/>                 5. DRAIN<br/>                 6. DRAIN</p>                        | <p><b>STYLE 9:</b><br/>                 PIN 1. SOURCE 1<br/>                 2. GATE 1<br/>                 3. DRAIN 2<br/>                 4. SOURCE 2<br/>                 5. GATE 2<br/>                 6. DRAIN 1</p>                     |
| <p><b>STYLE 10:</b><br/>                 PIN 1. CATHODE 1<br/>                 2. N/C<br/>                 3. CATHODE 2<br/>                 4. ANODE 2<br/>                 5. N/C<br/>                 6. ANODE 1</p>              | <p><b>STYLE 11:</b><br/>                 PIN 1. EMITTER 2<br/>                 2. BASE 2<br/>                 3. COLLECTOR 1<br/>                 4. EMITTER 1<br/>                 5. BASE 1<br/>                 6. COLLECTOR 2</p> |  |

\* 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\***



- XX = Specific Device Code
- M = Month Code
- = Pb-Free Package

\*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.

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