**Preferred Device** 

# **High Current Bias Resistor Transistor**

#### **PNP Silicon**

- Collector –Emitter Sustaining Voltage  $V_{CEO(sus)} = 30 \text{ Vdc (Min)} @ I_C = 10 \text{ mAdc}$
- High DC Current Gain -

$$\begin{array}{l} h_{FE} \ = 125 \ (Min) \ @ \ I_{C} = 0.8 \ Adc \\ = 90 \ (Min) \ @ \ I_{C} = 3.0 \ Adc \end{array}$$

• Low Collector –Emitter Saturation Voltage –

$$V_{CE(sat)} = 0.275 \text{ Vdc (Max)} @ I_C = 1.2 \text{ Adc}$$
  
= 0.55 Vdc (Max) @  $I_C = 3.0 \text{ Adc}$ 

- SOT-223 Surface Mount Packaging
- ESD Rating Human Body Model: Class 1B
  - Machine Model: Class B

#### **MAXIMUM RATINGS** ( $T_C = 25^{\circ}C$ unless otherwise noted)

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V <sub>CEO</sub>	30	Vdc
Collector-Base Voltage	V <sub>CB</sub>	45	Vdc
Emitter-Base Voltage	V <sub>EB</sub>	±6.0	Vdc
Base Current – Continuous	I <sub>B</sub>	1.0	Adc
Collector Current – Continuous – Peak	I <sub>C</sub>	3.0 5.0	Adc
Total Power Dissipation @ $T_C = 25^{\circ}C$ Derate above $25^{\circ}C$ Total $P_D$ @ $T_A = 25^{\circ}C$ mounted on 1" sq. (645 sq. mm) Collector pad on FR-4 bd material Total $P_D$ @ $T_A = 25^{\circ}C$ mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 bd material	P <sub>D</sub>	3.0 24 1.56	Watts mW/°C Watts
Operating and Storage Junction Temperature Range	T <sub>J</sub> , T <sub>stg</sub>	-55 to +150	°C

#### THERMAL CHARACTERISTICS

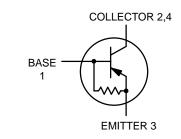
Characteristic	Symbol	Max	Unit
Thermal Resistance – Junction to Case  – Junction to Ambient on 1" sq. (645 sq. mm) Collector pad on FR-4 board material  – Junction to Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR-4 board material	R <sub>θJC</sub> R <sub>θJA</sub> R <sub>θJA</sub>	42 80 174	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T <sub>L</sub>	260	°C



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POWER BJT  $I_C = 3.0$  AMPERES  $BV_{CEO} = 30$  VOLTS  $V_{CE(sat)} = 0.275$  VOLTS





SOT-223 CASE 318E STYLE 1

#### **MARKING DIAGRAM**



9435R = Device Code

#### ORDERING INFORMATION

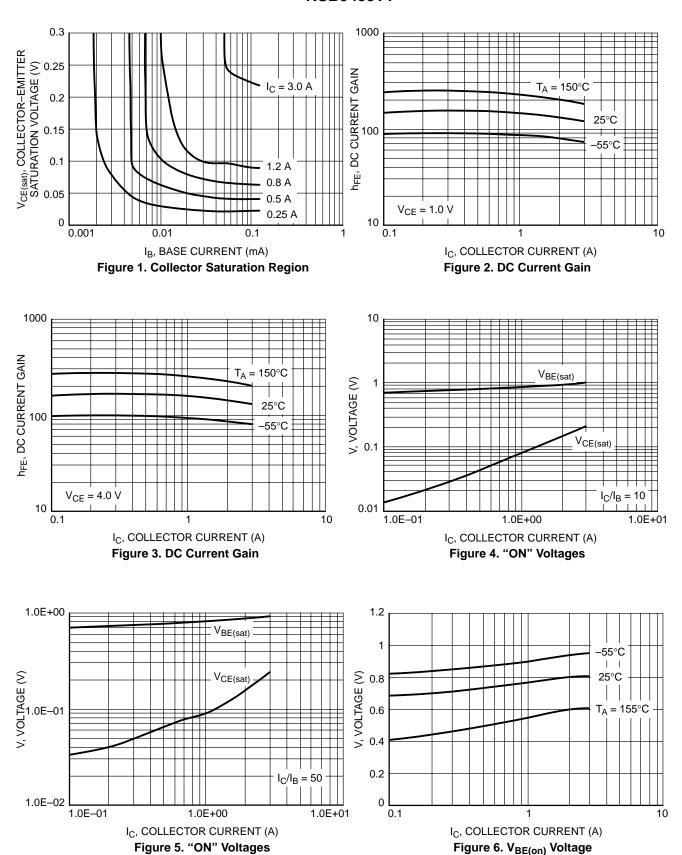
Device	Package	Shipping
NSB9435T1	SOT-223	1000/Tape & Reel

**Preferred** devices are recommended choices for future use and best overall value.

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

Characteristics	Symbol	Min	Тур	Max	Unit
OFF CHARACTERISTICS			•	•	•
Collector–Emitter Sustaining Voltage (I <sub>C</sub> = 10 mAdc, I <sub>B</sub> = 0 Adc)	V <sub>CEO(sus)</sub>	30	-	-	Vdc
Emitter–Base Voltage (I <sub>E</sub> = 50 μAdc, I <sub>C</sub> = 0 Adc)	V <sub>EBO</sub>	6.0	-	-	Vdc
Collector Cutoff Current (V <sub>CE</sub> = 25 Vdc) (V <sub>CE</sub> = 25 Vdc, T <sub>J</sub> = 125°C)	I <sub>CER</sub>	- -	_ _	20 200	μAdc
Emitter Cutoff Current (V <sub>BE</sub> = 5.0 Vdc)	I <sub>EBO</sub>	_	-	700	μAdc
ON CHARACTERISTICS (Note 1)					•
Collector–Emitter Saturation Voltage ( $I_C = 0.8$ Adc, $I_B = 20$ mAdc) ( $I_C = 1.2$ Adc, $I_B = 20$ mAdc) ( $I_C = 3.0$ Adc, $I_B = 0.3$ Adc)	V <sub>CE(sat)</sub>	- - -	0.155 - -	0.210 0.275 0.550	Vdc
Base–Emitter Saturation Voltage (I <sub>C</sub> = 3.0 Adc, I <sub>B</sub> = 0.3 Adc)	V <sub>BE(sat)</sub>	-	-	1.25	Vdc
Base–Emitter On Voltage (I <sub>C</sub> = 1.2 Adc, V <sub>CE</sub> = 4.0 Vdc)	V <sub>BE(on)</sub>	-	-	1.10	Vdc
DC Current Gain $(I_C = 0.8 \text{ Adc}, V_{CE} = 1.0 \text{ Vdc})$ $(I_C = 1.2 \text{ Adc}, V_{CE} = 1.0 \text{ Vdc})$ $(I_C = 3.0 \text{ Adc}, V_{CE} = 1.0 \text{ Vdc})$	h <sub>FE</sub>	125 110 90	220 _ _	- - -	-
Resistor	R1	7.5	10	12.5	kΩ
DYNAMIC CHARACTERISTICS			•	•	•
Output Capacitance (V <sub>CB</sub> = 10 Vdc, I <sub>E</sub> = 0 Adc, f = 1.0 MHz)	C <sub>ob</sub>	-	100	150	pF
Input Capacitance (V <sub>EB</sub> = 8.0 Vdc)	C <sub>ib</sub>	-	135	-	pF
Current–Gain – Bandwidth Product (Note 2) (I <sub>C</sub> = 500 mA, V <sub>CE</sub> = 10 V, F <sub>test</sub> = 1.0 MHz)	f <sub>T</sub>	_	110	_	MHz

Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
 f<sub>T</sub> = |h<sub>FE</sub>| • f<sub>test</sub>



10

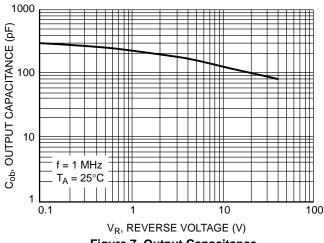
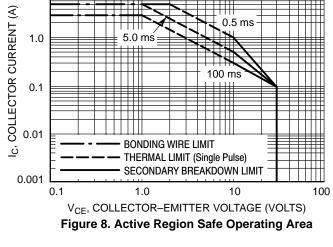


Figure 7. Output Capacitance



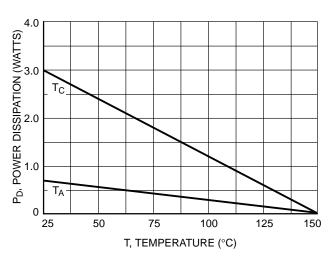


Figure 9. Power Derating

There are two limitations on the power handling ability of a transistor: average junction temperature and secondary breakdown. Safe operating area curves indicate I<sub>C</sub> - V<sub>CE</sub> limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 8 is based on  $T_{J(pk)} = 150$ °C;  $T_C$  is variable depending on conditions. Secondary breakdown pulse limits are valid for duty cycles to 10% provided T<sub>J(pk)</sub>  $\leq 150^{\circ}$ C.  $T_{J(pk)}$  may be calculated from the data in Figure 10. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by secondary breakdown.

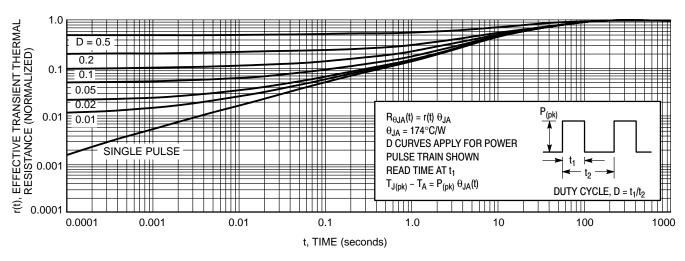
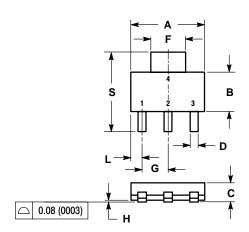
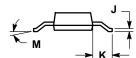


Figure 10. Thermal Response

#### **PACKAGE DIMENSIONS**

SOT-223 (TO-261) PLASTIC PACKAGE CASE 318E-04 ISSUE K





- NOTES:
  1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.

	INCHES		MILLIN	IETERS
DIM	MIN	MAX	MIN	MAX
Α	0.249	0.263	6.30	6.70
В	0.130	0.145	3.30	3.70
C	0.060	0.068	1.50	1.75
D	0.024	0.035	0.60	0.89
F	0.115	0.126	2.90	3.20
G	0.087	0.094	2.20	2.40
Н	0.0008	0.0040	0.020	0.100
J	0.009	0.014	0.24	0.35
K	0.060	0.078	1.50	2.00
L	0.033	0.041	0.85	1.05
M	0°	10 °	0 °	10 °
S	0.264	0.287	6.70	7.30

- STYLE 1:
  PIN 1. BASE
  2. COLLECTOR
  3. EMITTER
  4. COLLECTOR

# **Notes**

# **Notes**

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