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DATA SHEET
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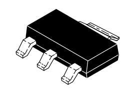
High Current Bias Resistor Transistor

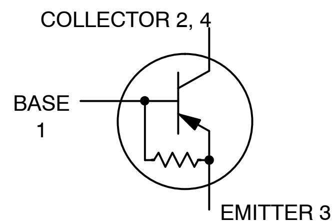
PNP Silicon

NSB9435T1G, NSV9435T1G

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



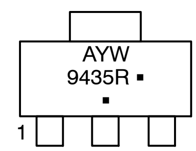
SOT−223
CASE 318E
STYLE 1



Features

- Collector −Emitter Sustaining Voltage −
  $V_{CEO(sus)}$ = 30 Vdc (Min) @ I_C = 10 mAdc
- High DC Current Gain −
  h_{FE} = 125 (Min) @ I_C = 0.8 Adc
  = 90 (Min) @ I_C = 3.0 Adc
- Low Collector −Emitter Saturation Voltage −
  $V_{CE(sat)}$ = 0.275 Vdc (Max) @ I_C = 1.2 Adc
  = 0.55 Vdc (Max) @ I_C = 3.0 Adc
- SOT−223 Surface Mount Packaging
- ESD Rating − Human Body Model: Class 1B
  − Machine Model: Class B
- AEC−Q101 Qualified and PPAP Capable
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements
- These Devices are Pb−Free, Halogen Free/BFR Free and are RoHS Compliant*

MARKING DIAGRAM



A = Assembly Location
Y = Year
W = Work Week
9435R = Device Code
▪ = Pb−Free Package
(Note: Microdot may be in either location)

MAXIMUM RATINGS (T_C = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector−Emitter Voltage	V_{CEO}	30	Vdc
Collector−Base Voltage	V_{CB}	45	Vdc
Emitter−Base Voltage	V_{EB}	±6.0	Vdc
Base Current − Continuous	I_B	1.0	Adc
Collector Current Continuous Peak	I_C	 3.0 5.0	Adc
Total Power Dissipation @ T_C = 25°C Derate above 25°C Total P_D @ T_A = 25°C mounted on 1″ sq. (645 sq. mm) Collector pad on FR−4 bd material Total P_D @ T_A = 25°C mounted on 0.012″ sq. (7.6 sq. mm) Collector pad on FR−4 bd material	P_D	 3.0 24 1.56 0.72	W mW/°C W W
Operating and Storage Junction Temperature Range	T_J, T_{stg}	−55 to +150	°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.

*For additional information on our Pb−Free strategy and soldering details, please download the **onsemi** Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

ORDERING INFORMATION

Device	Package	Shipping†
NSV9435T1G	SOT−223 (Pb−Free)	1,000/Tape & Reel

DISCONTINUED (Note 1)

Device	Package	Shipping†
NSB9435T1G	SOT−223 (Pb−Free)	1,000/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.

1. **DISCONTINUED:** This device is not recommended for new design. Please contact your **onsemi** representative for information. The most current information on this device may be available on www.onsemi.com.

July, 2024 − Rev. 9

Publication Order Number:
NSB9435T1/D

THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	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	 $R_{\theta JC}$ $R_{\theta JA}$ $R_{\theta JA}$	 42 80 174	°C/W
Maximum Lead Temperature for Soldering Purposes, 1/8″ from case for 5 s	T_L	260	°C

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

Characteristics	Symbol	Min	Typ	Max	Unit
OFF CHARACTERISTICS					
Collector−Emitter Sustaining Voltage (I_C = 10 mAdc, I_B = 0 Adc)	$V_{CEO(sus)}$	30	–	–	Vdc
Emitter−Base Voltage (I_E = 50 μAdc, I_C = 0 Adc)	V_{EBO}	6.0	–	–	Vdc
Collector Cutoff Current (V_{CE} = 25 Vdc) (V_{CE} = 25 Vdc, T_J = 125°C)	I_{CER}	 – –	 – –	 20 200	μAdc
Emitter Cutoff Current (V_{BE} = 5.0 Vdc)	I_{EBO}	–	–	700	μAdc
ON CHARACTERISTICS (Note 2)					
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)	$V_{CE(sat)}$	 – – –	 0.155 – –	 0.210 0.275 0.550	Vdc
Base−Emitter Saturation Voltage (I_C = 3.0 Adc, I_B = 0.3 Adc)	$V_{BE(sat)}$	–	–	1.25	Vdc
Base−Emitter On Voltage (I_C = 1.2 Adc, V_{CE} = 4.0 Vdc)	$V_{BE(on)}$	–	–	1.10	Vdc
DC Current Gain (I_C = 0.8 Adc, V_{CE} = 1.0 Vdc) (I_C = 1.2 Adc, V_{CE} = 1.0 Vdc) (I_C = 3.0 Adc, V_{CE} = 1.0 Vdc)	h_{FE}	 125 110 90	 220 – –	 – – –	–
Resistor	R1	7.5	10	12.5	kΩ
DYNAMIC CHARACTERISTICS					
Output Capacitance (V_{CB} = 10 Vdc, I_E = 0 Adc, f = 1.0 MHz)	C_{ob}	–	100	150	pF
Input Capacitance (V_{EB} = 8.0 Vdc)	C_{ib}	–	135	–	pF
Current−Gain – Bandwidth Product (Note 3) (I_C = 500 mA, V_{CE} = 10 V, F_{test} = 1.0 MHz)	f_T	–	110	–	MHz

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.

2. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2%.
3. $f_T = |h_{FE}| \bullet f_{test}$

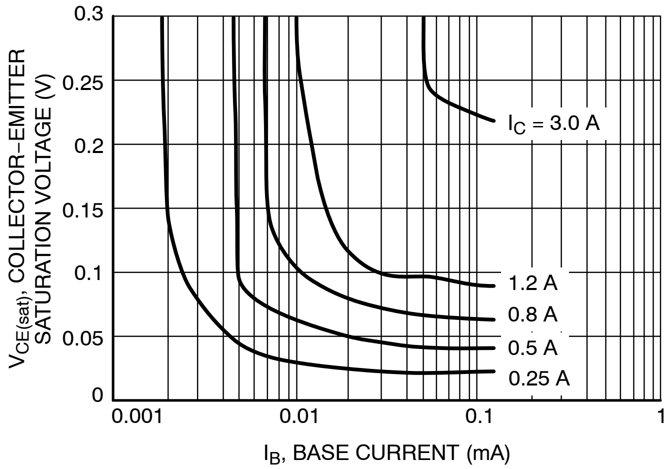


Figure 1. Collector Saturation Region

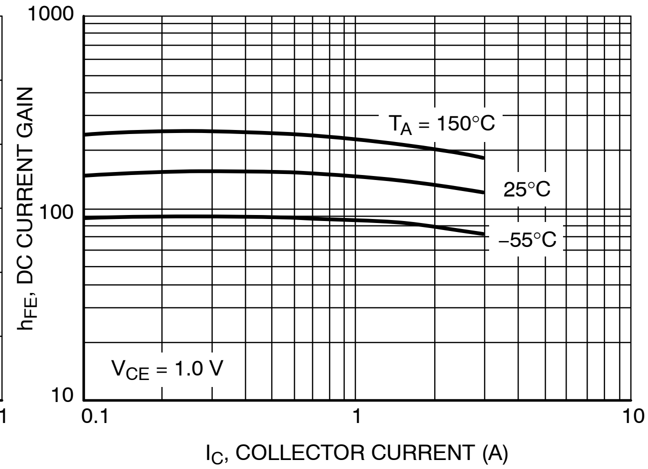


Figure 2. DC Current Gain

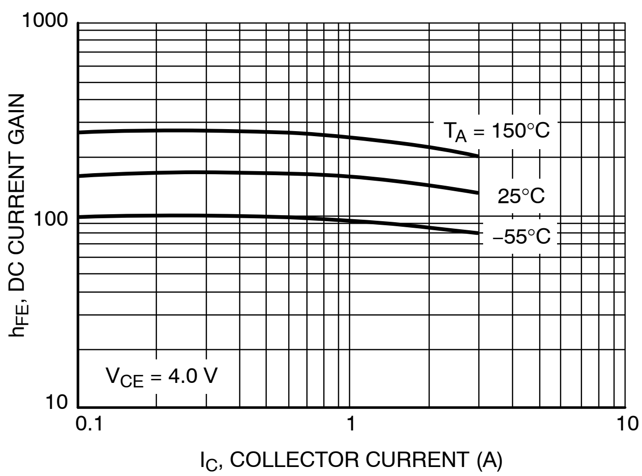


Figure 3. DC Current Gain

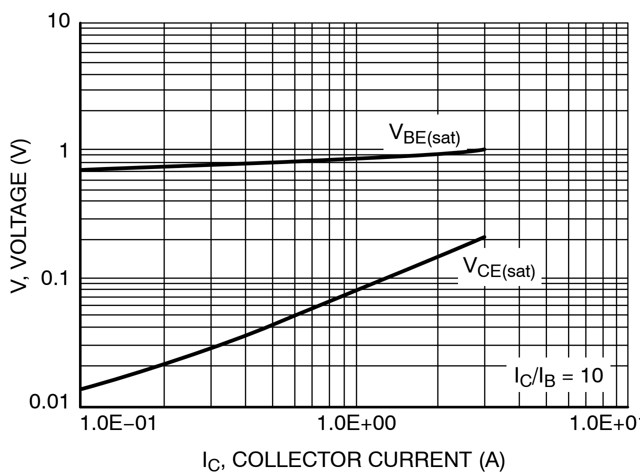


Figure 4. "ON" Voltages

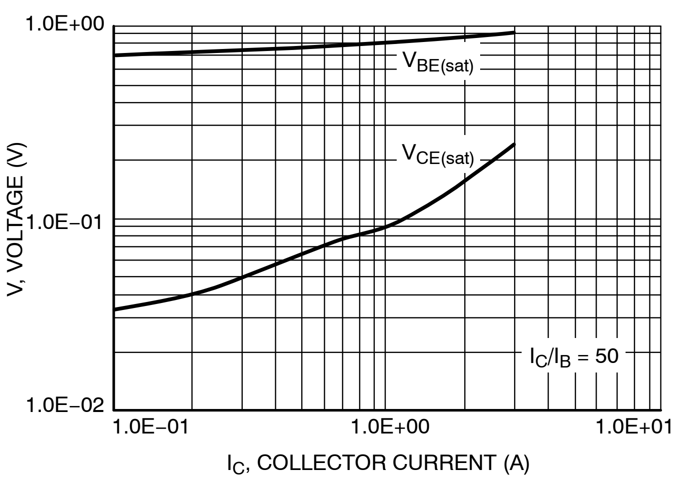


Figure 5. "ON" Voltages

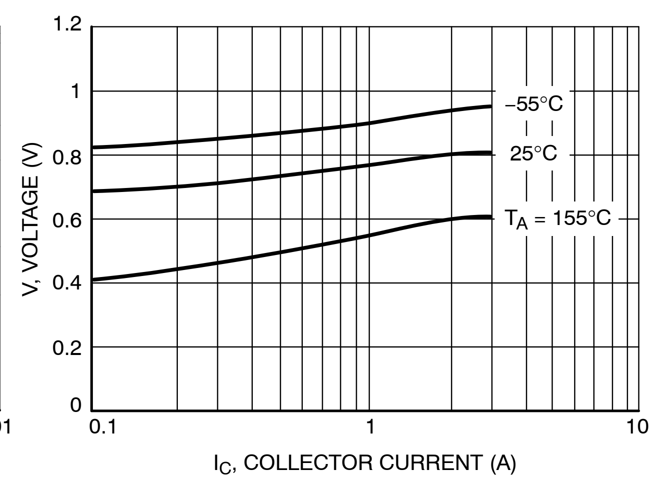


Figure 6. $V_{BE(on)}$ Voltage

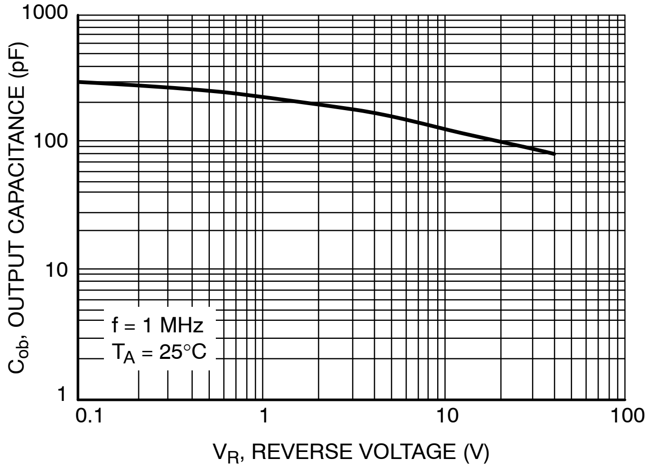


Figure 7. Output Capacitance

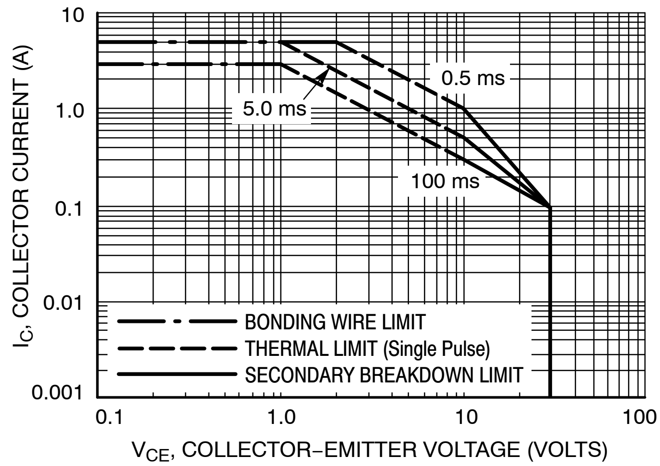


Figure 8. Active Region Safe Operating Area

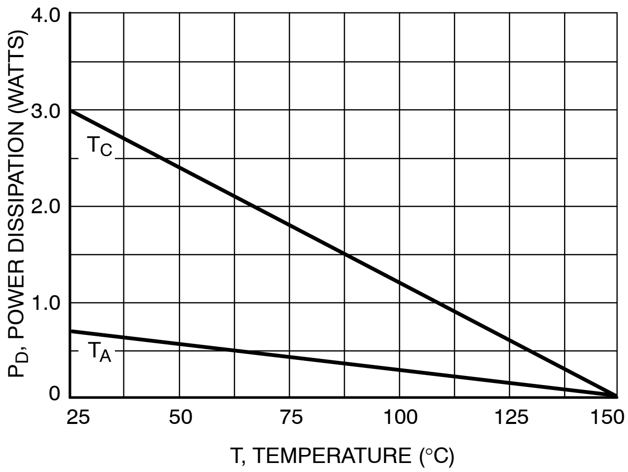


Figure 9. Power Derating

There are two limitations on the power handling ability of a transistor: average junction temperature and secondary breakdown. Safe operating area curves indicate $I_C - V_{CE}$ 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 $T_{J(pk)} \leq 150°C$. $T_{J(pk)}$ 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.

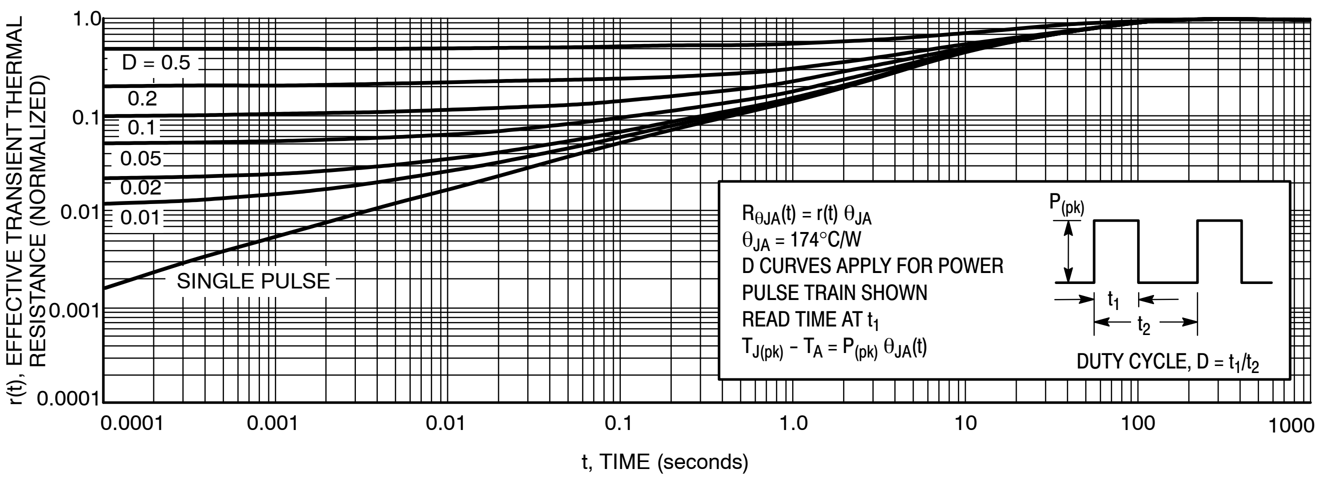


Figure 10. Thermal Response

ADDITIONAL INFORMATION

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