

NSB9435T1

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 –
 $h_{FE} = 125 \text{ (Min) @ } I_C = 0.8 \text{ Adc}$
 $= 90 \text{ (Min) @ } I_C = 3.0 \text{ Adc}$
- Low Collector–Emitter Saturation Voltage –
 $V_{CE(sat)} = 0.275 \text{ Vdc (Max) @ } I_C = 1.2 \text{ Adc}$
 $= 0.55 \text{ Vdc (Max) @ } I_C = 3.0 \text{ Adc}$
- SOT–223 Surface Mount Packaging
- ESD Rating – Human Body Model: Class 1B
 – Machine Model: Class B

MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ 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 @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	3.0 24	Watts mW/ $^\circ\text{C}$
Total P_D @ $T_A = 25^\circ\text{C}$ mounted on 1" sq. (645 sq. mm) Collector pad on FR–4 bd material		1.56	Watts
Total P_D @ $T_A = 25^\circ\text{C}$ mounted on 0.012" sq. (7.6 sq. mm) Collector pad on FR–4 bd material		0.72	Watts
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–55 to +150	$^\circ\text{C}$

THERMAL CHARACTERISTICS

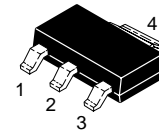
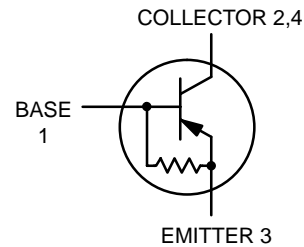
Characteristic	Symbol	Max	Unit
Thermal Resistance – Junction to Case	$R_{\theta JC}$	42	$^\circ\text{C/W}$
– Junction to Ambient on 1" sq. (645 sq. mm) Collector pad on FR–4 board material	$R_{\theta JA}$	80	
– Junction to Ambient on 0.012" sq. (7.6 sq. mm) Collector pad on FR–4 board material	$R_{\theta JA}$	174	
Maximum Lead Temperature for Soldering Purposes, 1/8" from case for 5 seconds	T_L	260	$^\circ\text{C}$



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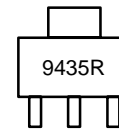
<http://onsemi.com>

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



**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.

NSB9435T1

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

Characteristics	Symbol	Min	Typ	Max	Unit
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OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage ($I_C = 10\text{ mA}$, $I_B = 0\text{ A}$)	$V_{CE(sus)}$	30	–	–	Vdc
Emitter–Base Voltage ($I_E = 50\text{ }\mu\text{A}$, $I_C = 0\text{ A}$)	V_{EBO}	6.0	–	–	Vdc
Collector Cutoff Current ($V_{CE} = 25\text{ Vdc}$) ($V_{CE} = 25\text{ Vdc}$, $T_J = 125^\circ\text{C}$)	I_{CER}	–	–	20 200	μA
Emitter Cutoff Current ($V_{BE} = 5.0\text{ Vdc}$)	I_{EBO}	–	–	700	μA

ON CHARACTERISTICS (Note 1)

Collector–Emitter Saturation Voltage ($I_C = 0.8\text{ A}$, $I_B = 20\text{ mA}$) ($I_C = 1.2\text{ A}$, $I_B = 20\text{ mA}$) ($I_C = 3.0\text{ A}$, $I_B = 0.3\text{ A}$)	$V_{CE(sat)}$	–	0.155	0.210 0.275 0.550	Vdc
Base–Emitter Saturation Voltage ($I_C = 3.0\text{ A}$, $I_B = 0.3\text{ A}$)	$V_{BE(sat)}$	–	–	1.25	Vdc
Base–Emitter On Voltage ($I_C = 1.2\text{ A}$, $V_{CE} = 4.0\text{ Vdc}$)	$V_{BE(on)}$	–	–	1.10	Vdc
DC Current Gain ($I_C = 0.8\text{ A}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 1.2\text{ A}$, $V_{CE} = 1.0\text{ Vdc}$) ($I_C = 3.0\text{ A}$, $V_{CE} = 1.0\text{ Vdc}$)	h_{FE}	125 110 90	220 – –	– – –	–
Resistor	R1	7.5	10	12.5	k Ω

DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0\text{ A}$, $f = 1.0\text{ MHz}$)	C_{ob}	–	100	150	pF
Input Capacitance ($V_{EB} = 8.0\text{ Vdc}$)	C_{ib}	–	135	–	pF
Current–Gain – Bandwidth Product (Note 2) ($I_C = 500\text{ mA}$, $V_{CE} = 10\text{ V}$, $f_{test} = 1.0\text{ MHz}$)	f_T	–	110	–	MHz

1. Pulse Test: Pulse Width $\leq 300\text{ }\mu\text{s}$, Duty Cycle $\leq 2\%$.
2. $f_T = |h_{FE}| \cdot f_{test}$

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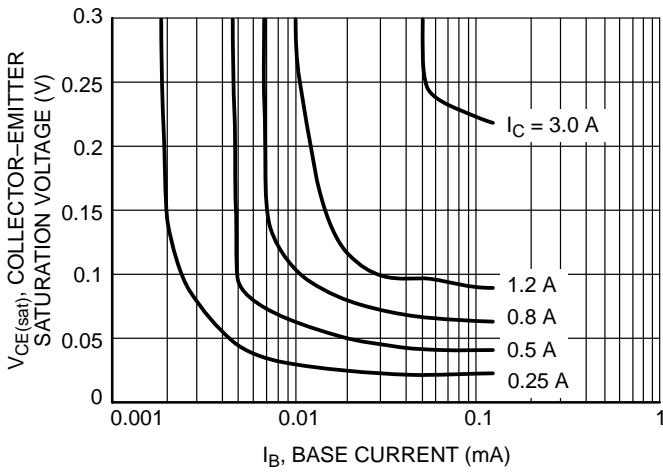


Figure 1. Collector Saturation Region

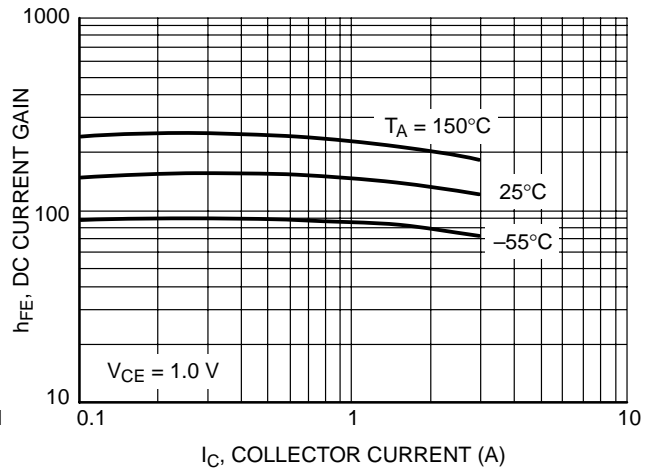


Figure 2. DC Current Gain

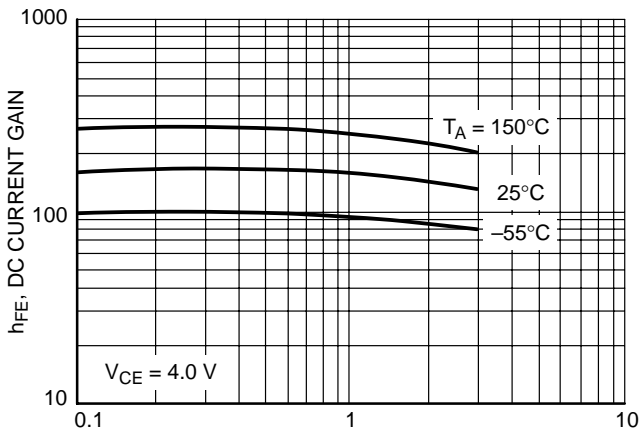


Figure 3. DC Current Gain

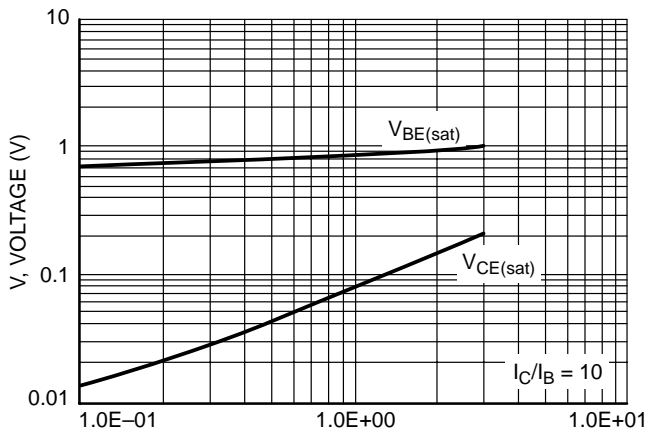


Figure 4. "ON" Voltages

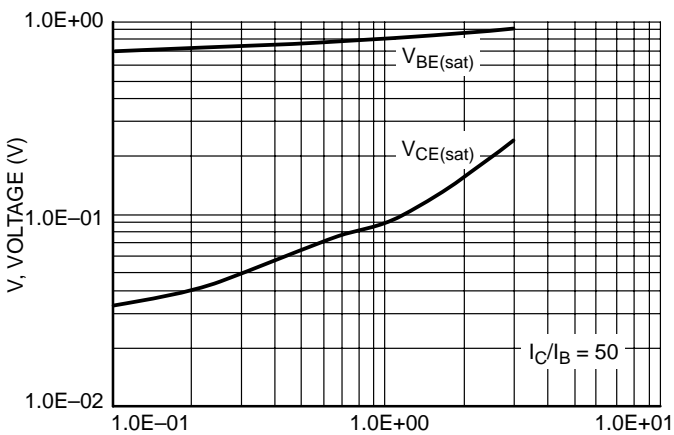


Figure 5. "ON" Voltages

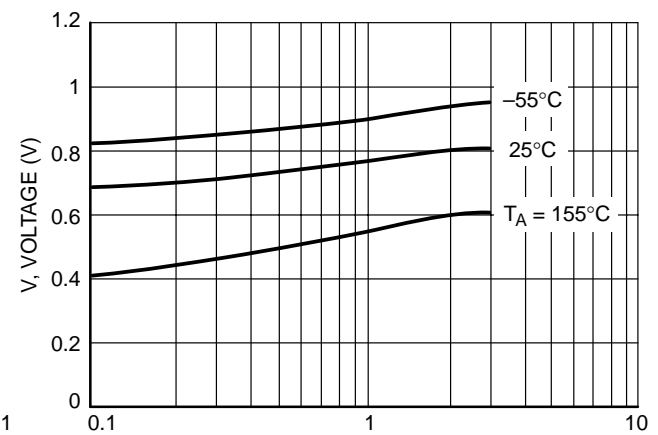


Figure 6. V_{BE(on)} Voltage

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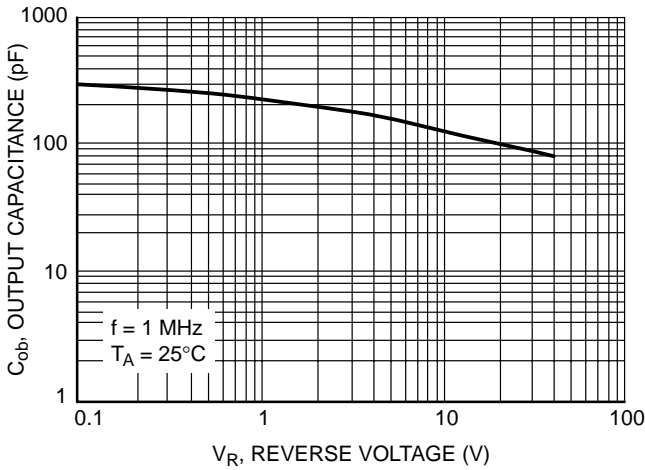


Figure 7. Output Capacitance

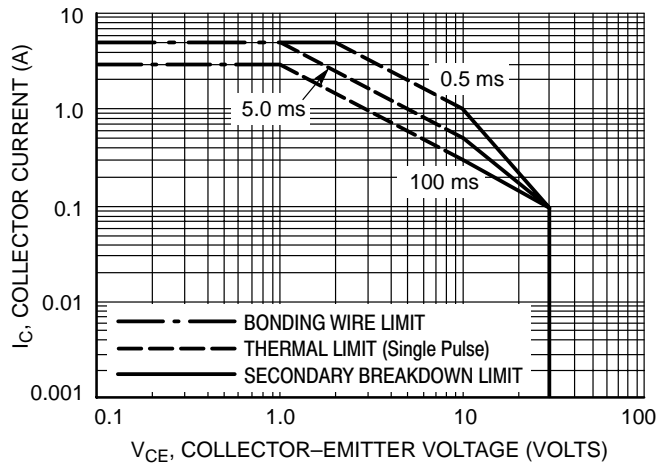


Figure 8. Active Region Safe Operating Area

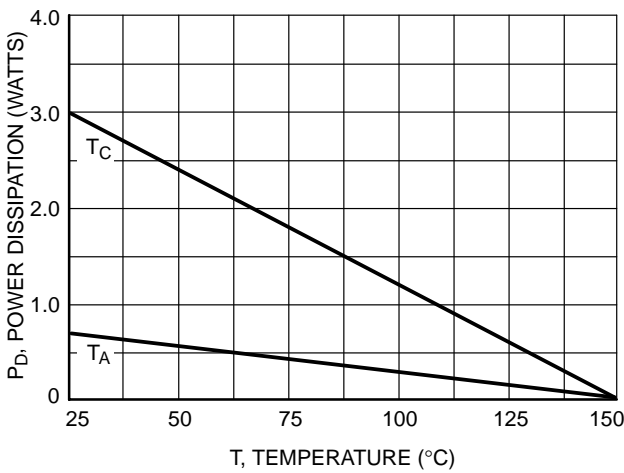


Figure 9. Power Derating

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 $T_{J(pk)} = 150^\circ\text{C}$; T_C is variable depending on conditions. Secondary breakdown pulse limits are valid for duty cycles to 10% provided $T_{J(pk)} \leq 150^\circ\text{C}$. $T_{J(pk)}$ 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.

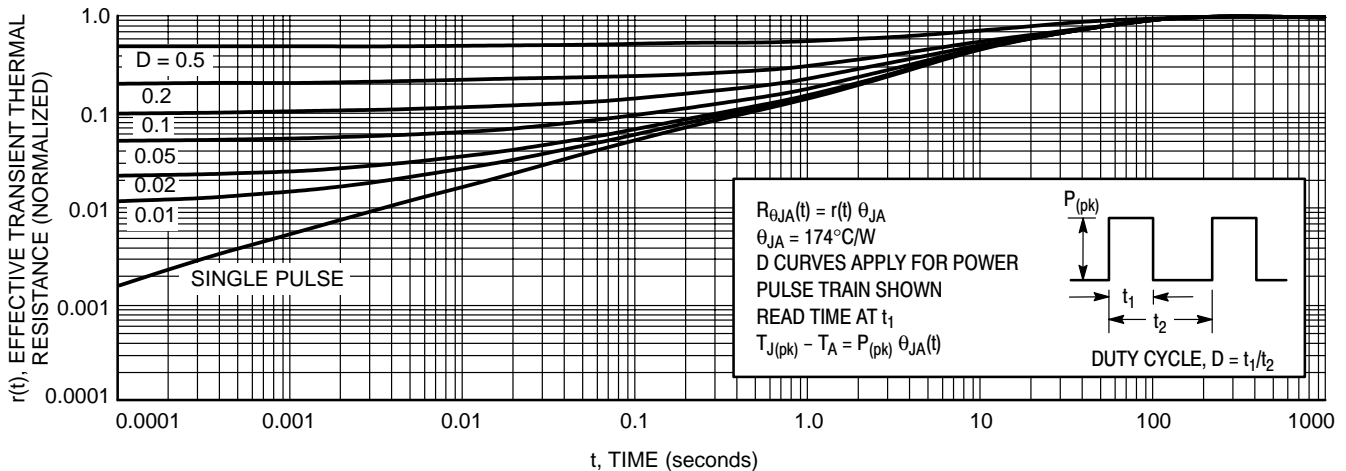
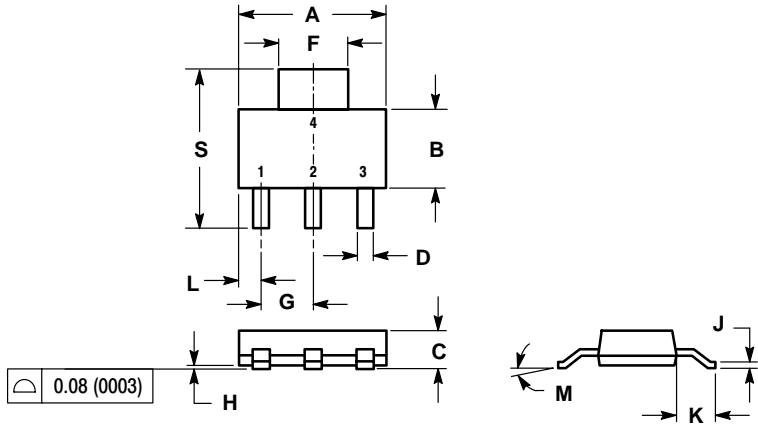


Figure 10. Thermal Response

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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.

DIM	INCHES		MILLIMETERS	
	MIN	MAX	MIN	MAX
A	0.249	0.263	6.30	6.70
B	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
H	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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