

High Current Bias Resistor Transistor

PNP Silicon

NSB9435T1G, NSV9435T1G

Features

- 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
- 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*

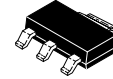
MAXIMUM RATINGS ($T_C = 25^\circ\text{C}$ unless otherwise noted)

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

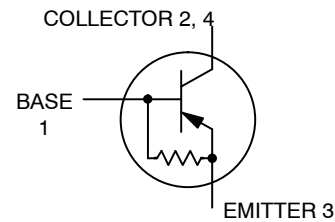
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

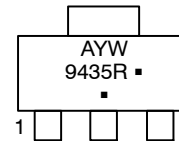
POWER BJT
 $I_C = 3.0 \text{ AMPERES}$
 $BV_{CEO} = 30 \text{ VOLTS}$
 $V_{CE(sat)} = 0.275 \text{ VOLTS}$



SOT-223
CASE 318E
STYLE 1



MARKING DIAGRAM



A = Assembly Location
Y = Year
W = Work Week
9435R = Device Code
▪ = Pb-Free Package

(Note: Microdot may be in either location)

ORDERING INFORMATION

Device	Package	Shipping [†]
NSB9435T1G	SOT-223 (Pb-Free)	1,000/Tape & Reel
NSV9435T1G	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.

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THERMAL CHARACTERISTICS

Characteristic	Symbol	Value	Unit
Thermal Resistance			°C/W
Junction-to-Case	$R_{\theta JC}$	42	
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 s	T_L	260	°C

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 ($I_C = 10 \text{ mAdc}$, $I_B = 0 \text{ Adc}$)	$V_{CE(sus)}$	30	-	-	Vdc
Emitter-Base Voltage ($I_E = 50 \mu\text{Adc}$, $I_C = 0 \text{ Adc}$)	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	μAdc
Emitter Cutoff Current ($V_{BE} = 5.0 \text{ Vdc}$)	I_{EBO}	-	-	700	μAdc

ON CHARACTERISTICS (Note 1)

Collector-Emitter Saturation Voltage ($I_C = 0.8 \text{ Adc}$, $I_B = 20 \text{ mAdc}$) ($I_C = 1.2 \text{ Adc}$, $I_B = 20 \text{ mAdc}$) ($I_C = 3.0 \text{ Adc}$, $I_B = 0.3 \text{ Adc}$)	$V_{CE(sat)}$	-	0.155	0.210 0.275 0.550	Vdc
Base-Emitter Saturation Voltage ($I_C = 3.0 \text{ Adc}$, $I_B = 0.3 \text{ Adc}$)	$V_{BE(sat)}$	-	-	1.25	Vdc
Base-Emitter On Voltage ($I_C = 1.2 \text{ Adc}$, $V_{CE} = 4.0 \text{ Vdc}$)	$V_{BE(on)}$	-	-	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_{FE}	125 110 90	220 - -	- - -	-
Resistor	R1	7.5	10	12.5	k Ω

DYNAMIC CHARACTERISTICS

Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0 \text{ Adc}$, $f = 1.0 \text{ MHz}$)	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

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.

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

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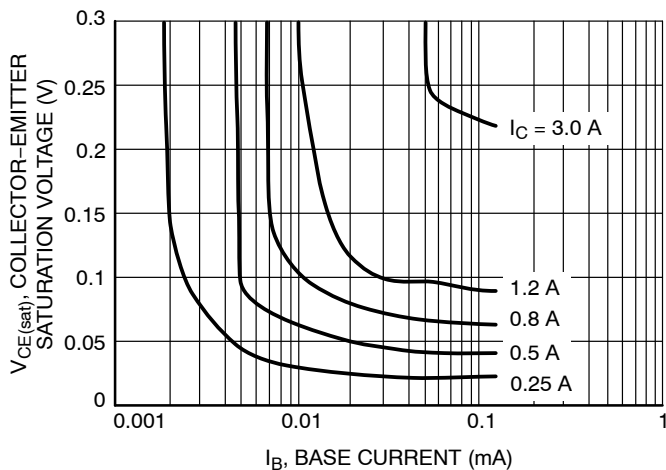


Figure 1. Collector Saturation Region

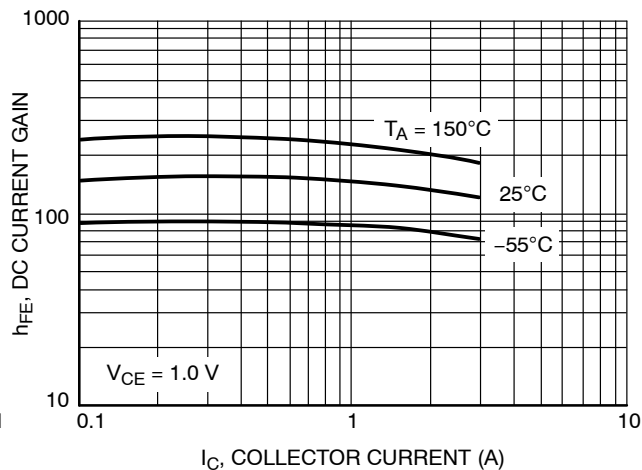


Figure 2. DC Current Gain

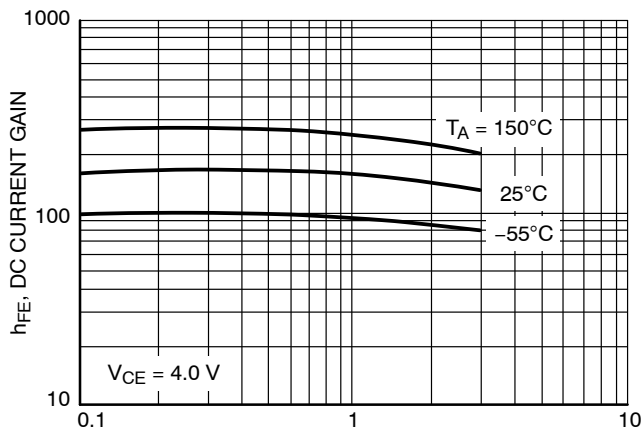


Figure 3. DC Current Gain

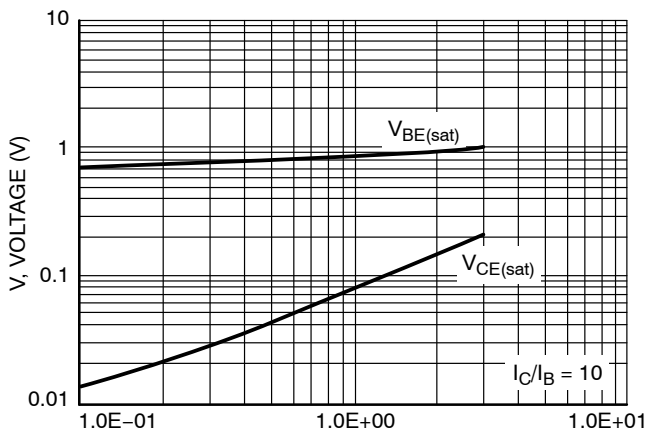


Figure 4. "ON" Voltages

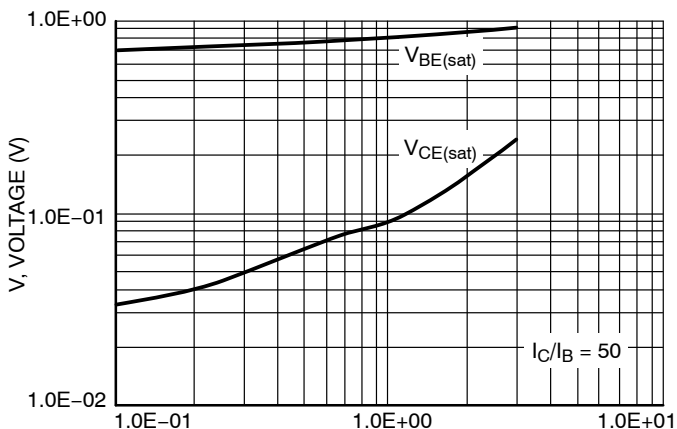


Figure 5. "ON" Voltages

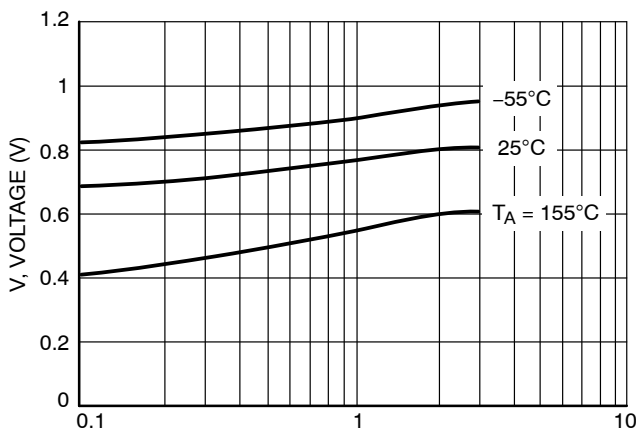


Figure 6. V_{BE(on)} Voltage

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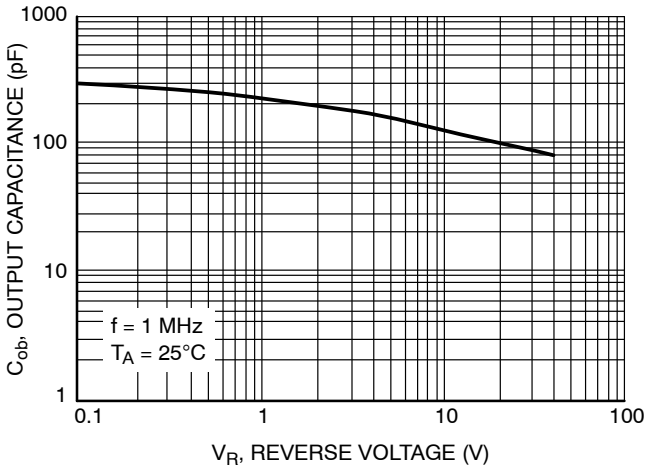


Figure 7. Output Capacitance

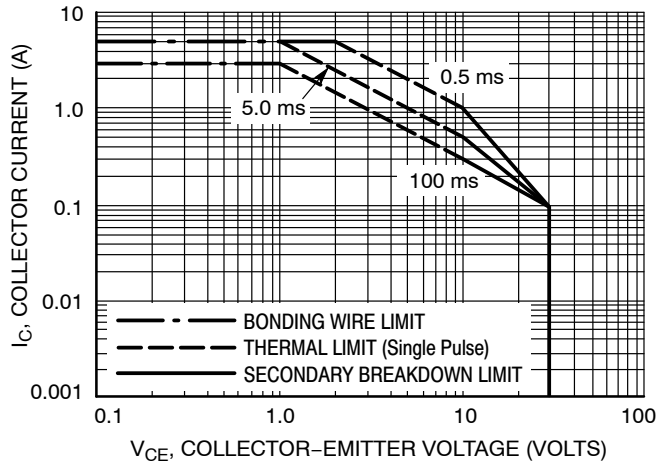


Figure 8. Active Region Safe Operating Area

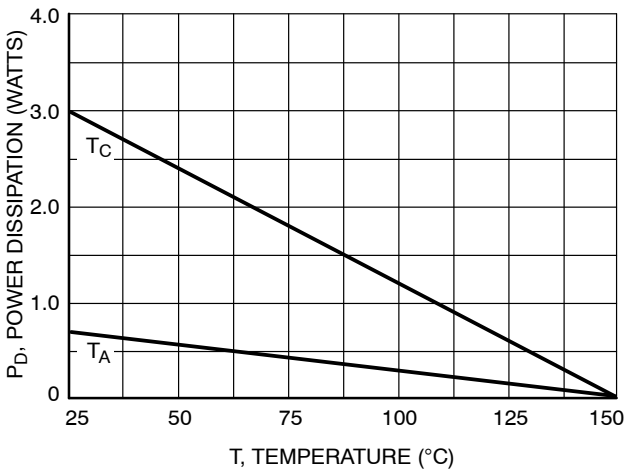


Figure 9. Power Derating

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.

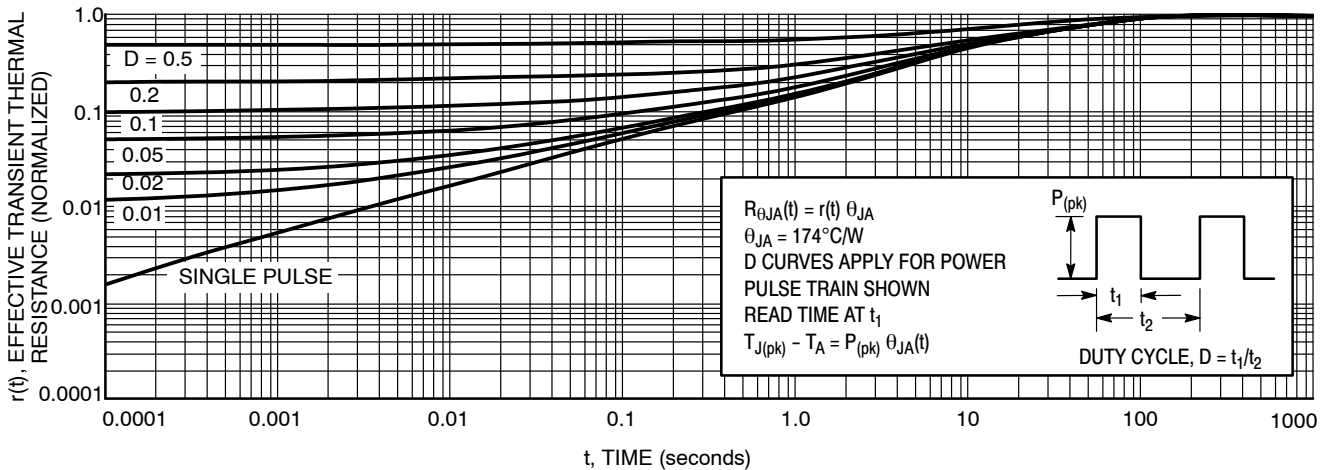


Figure 10. Thermal Response

MECHANICAL CASE OUTLINE

PACKAGE DIMENSIONS

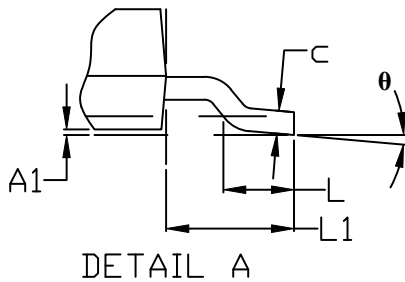
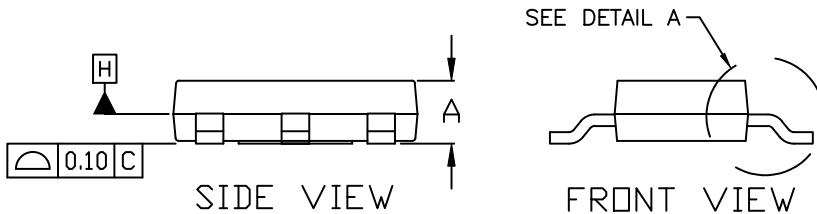
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SCALE 1:1

SOT-223 (TO-261)
CASE 318E-04
ISSUE R

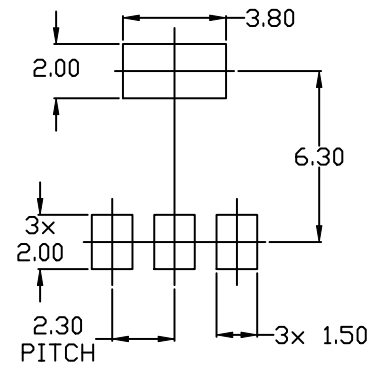
DATE 02 OCT 2018



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS D & E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS. MOLD FLASH, PROTRUSIONS OR GATE BURRS SHALL NOT EXCEED 0.200MM PER SIDE.
4. DATUMS A AND B ARE DETERMINED AT DATUM H.
5. A1 IS DEFINED AS THE VERTICAL DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.
6. POSITIONAL TOLERANCE APPLIES TO DIMENSIONS b AND b1.

MILLIMETERS			
DIM	MIN.	NOM.	MAX.
A	1.50	1.63	1.75
A1	0.02	0.06	0.10
b	0.60	0.75	0.89
b1	2.90	3.06	3.20
c	0.24	0.29	0.35
D	6.30	6.50	6.70
E	3.30	3.50	3.70
e	2.30 BSC		
L	0.20	---	---
L1	1.50	1.75	2.00
He	6.70	7.00	7.30
θ	0°	---	10°



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SOT-223 (TO-261)
CASE 318E-04
ISSUE R

DATE 02 OCT 2018

- | | | | | |
|--|---|---|---|---|
| STYLE 1:
PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR | STYLE 2:
PIN 1. ANODE
2. CATHODE
3. NC
4. CATHODE | STYLE 3:
PIN 1. GATE
2. DRAIN
3. SOURCE
4. DRAIN | STYLE 4:
PIN 1. SOURCE
2. DRAIN
3. GATE
4. DRAIN | STYLE 5:
PIN 1. DRAIN
2. GATE
3. SOURCE
4. GATE |
| STYLE 6:
PIN 1. RETURN
2. INPUT
3. OUTPUT
4. INPUT | STYLE 7:
PIN 1. ANODE 1
2. CATHODE
3. ANODE 2
4. CATHODE | STYLE 8:
CANCELLED | STYLE 9:
PIN 1. INPUT
2. GROUND
3. LOGIC
4. GROUND | STYLE 10:
PIN 1. CATHODE
2. ANODE
3. GATE
4. ANODE |
| STYLE 11:
PIN 1. MT 1
2. MT 2
3. GATE
4. MT 2 | STYLE 12:
PIN 1. INPUT
2. OUTPUT
3. NC
4. OUTPUT | STYLE 13:
PIN 1. GATE
2. COLLECTOR
3. EMITTER
4. COLLECTOR | | |

**GENERIC
 MARKING DIAGRAM***



- A = Assembly Location
- Y = Year
- W = Work Week
- XXXXX = Specific Device Code
- = Pb-Free Package

(Note: Microdot may be in either location)

*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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