

# PNP Silicon General Purpose Amplifier Transistor

## NS2029M3

This PNP transistor is designed for general purpose amplifier applications. This device is housed in the SOT-723 package which is designed for low power surface mount applications, where board space is at a premium.

### Features

- Reduces Board Space
- High  $h_{FE}$ , 210–460 (Typical)
- Low  $V_{CE(sat)}$ , < 0.5 V
- ESD Performance: Human Body Model; > 2000 V, Machine Model; > 200 V
- Available in 8000 Unit Tape & Reel with 2 mm Pitch
- NSV Prefix for Automotive and Other Applications Requiring Unique Site and Control Change Requirements; AEC-Q101 Qualified and PPAP Capable
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### MAXIMUM RATINGS ( $T_A = 25^\circ\text{C}$ )

| Rating                         | Symbol        | Value | Unit |
|--------------------------------|---------------|-------|------|
| Collector–Base Voltage         | $V_{(BR)CBO}$ | –60   | Vdc  |
| Collector–Emitter Voltage      | $V_{(BR)CEO}$ | –50   | Vdc  |
| Emitter–Base Voltage           | $V_{(BR)EBO}$ | –6.0  | Vdc  |
| Collector Current – Continuous | $I_C$         | –150  | mAdc |

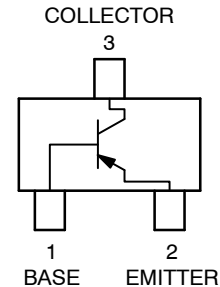
### THERMAL CHARACTERISTICS

| Rating                     | Symbol    | Max        | Unit             |
|----------------------------|-----------|------------|------------------|
| Power Dissipation (Note 1) | $P_D$     | 265        | mW               |
| Junction Temperature       | $T_J$     | 150        | $^\circ\text{C}$ |
| Storage Temperature Range  | $T_{stg}$ | –55 ~ +150 | $^\circ\text{C}$ |

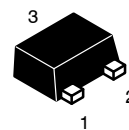
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

1. Device mounted on a FR-4 glass epoxy printed circuit board using the minimum recommended footprint.

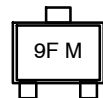
## PNP GENERAL PURPOSE AMPLIFIER TRANSISTORS SURFACE MOUNT



### MARKING DIAGRAM



SOT-723  
CASE 631AA



9F = Specific Device Code  
M = Date Code\*

\*Date Code orientation and/or position may vary depending upon manufacturing location.

### ORDERING INFORMATION

| Device       | Package           | Shipping <sup>†</sup> |
|--------------|-------------------|-----------------------|
| NS2029M3T5G  | SOT-723 (Pb-Free) | 8000/Tape & Reel      |
| NSV2029M3T5G | SOT-723 (Pb-Free) | 8000/Tape & Reel      |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specification Brochure, BRD8011/D.

# NS2029M3

## ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

| Characteristic                                                                                            | Symbol        | Min  | Typ | Max  | Unit          |
|-----------------------------------------------------------------------------------------------------------|---------------|------|-----|------|---------------|
| Collector-Base Breakdown Voltage ( $I_C = -50\ \mu\text{Adc}$ , $I_E = 0$ )                               | $V_{(BR)CBO}$ | -60  | -   | -    | Vdc           |
| Collector-Emitter Breakdown Voltage ( $I_C = -1.0\ \text{mAdc}$ , $I_B = 0$ )                             | $V_{(BR)CEO}$ | -50  | -   | -    | Vdc           |
| Emitter-Base Breakdown Voltage ( $I_E = -50\ \mu\text{Adc}$ , $I_C = 0$ )                                 | $V_{(BR)EBO}$ | -6.0 | -   | -    | Vdc           |
| Collector-Base Cutoff Current ( $V_{CB} = -30\ \text{Vdc}$ , $I_E = 0$ )                                  | $I_{CBO}$     | -    | -   | -0.5 | nA            |
| Emitter-Base Cutoff Current ( $V_{EB} = -7.0\ \text{Vdc}$ , $I_B = 0$ )                                   | $I_{EBO}$     | -    | -   | -0.1 | $\mu\text{A}$ |
| Collector-Emitter Saturation Voltage (Note 2)<br>( $I_C = -50\ \text{mAdc}$ , $I_B = -5.0\ \text{mAdc}$ ) | $V_{CE(sat)}$ | -    | -   | -0.5 | Vdc           |
| DC Current Gain (Note 2)<br>( $V_{CE} = -6.0\ \text{Vdc}$ , $I_C = -1.0\ \text{mAdc}$ )                   | $h_{FE}$      | 120  | -   | 560  | -             |
| Transition Frequency<br>( $V_{CE} = -12\ \text{Vdc}$ , $I_C = -2.0\ \text{mAdc}$ , $f = 30\ \text{MHz}$ ) | $f_T$         | -    | 140 | -    | MHz           |
| Output Capacitance ( $V_{CB} = -12\ \text{Vdc}$ , $I_E = 0\ \text{Adc}$ , $f = 1.0\ \text{MHz}$ )         | $C_{OB}$      | -    | 3.5 | -    | pF            |

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  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

TYPICAL ELECTRICAL CHARACTERISTICS

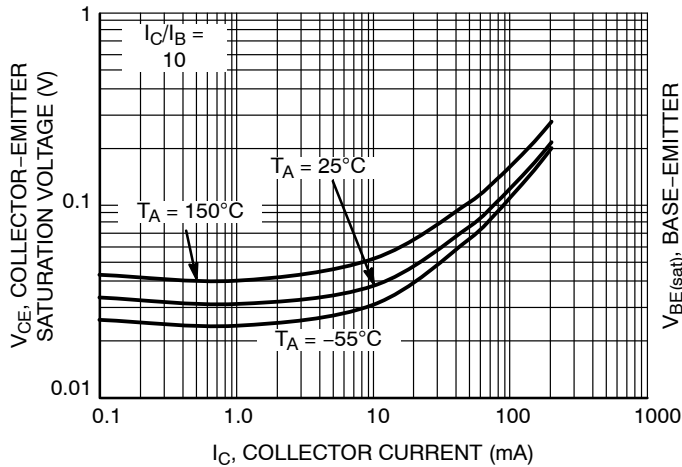


Figure 1. Collector-Emitter Saturation Voltage vs. Collector Current

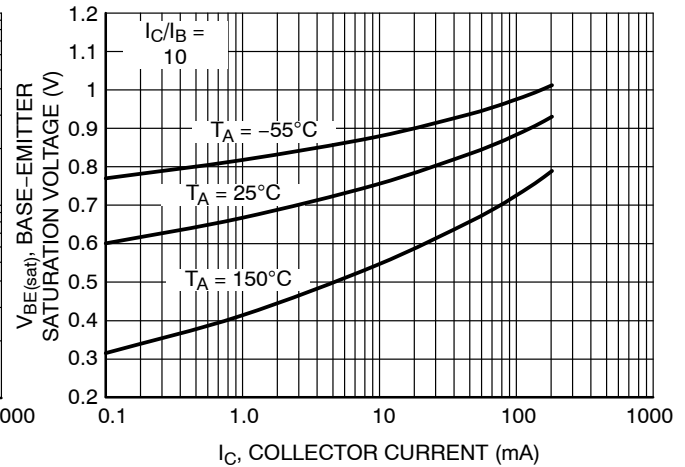


Figure 2. Base-Emitter Saturation Voltage vs. Collector Current

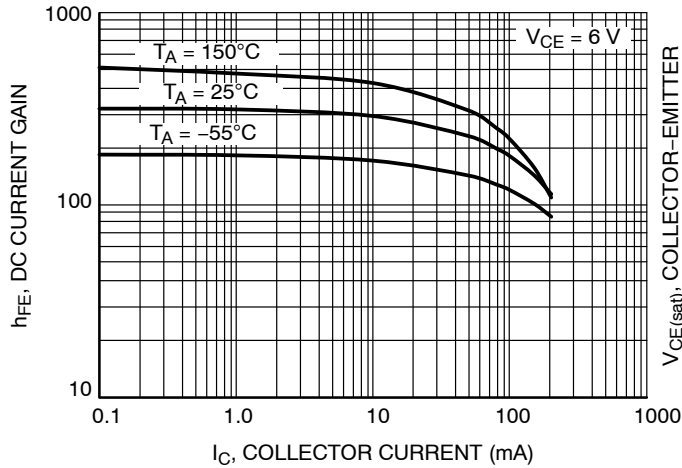


Figure 3. DC Current Gain vs. Collector Current

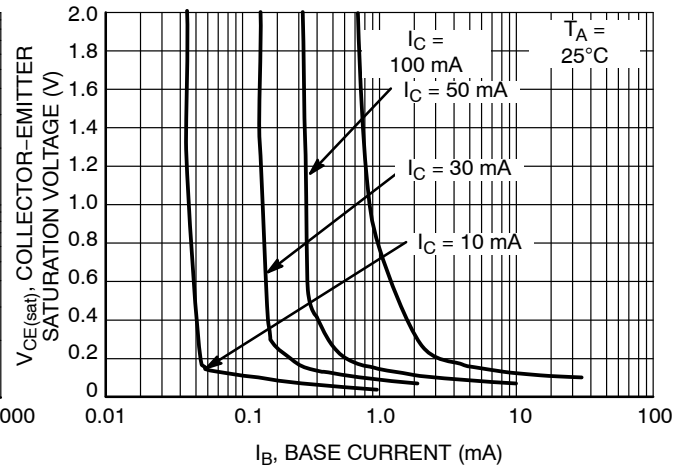


Figure 4. Saturation Region

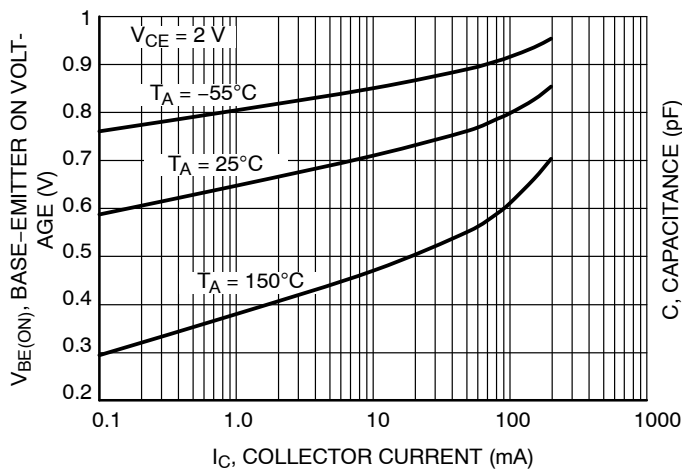


Figure 5. Base-Emitter Turn-ON Voltage vs. Collector Current

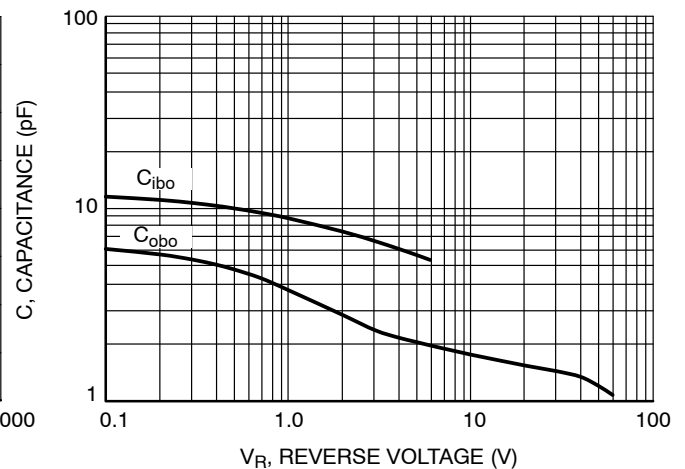


Figure 6. Capacitance

TYPICAL ELECTRICAL CHARACTERISTICS

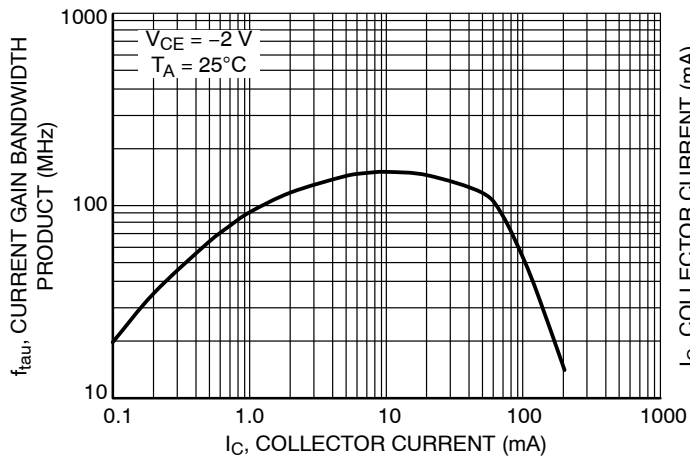


Figure 7. Current Gain Bandwidth Product vs. Collector Current

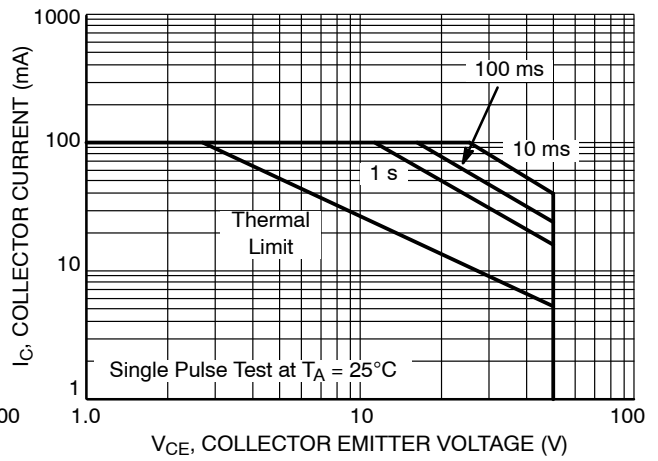


Figure 8. Safe Operating Area

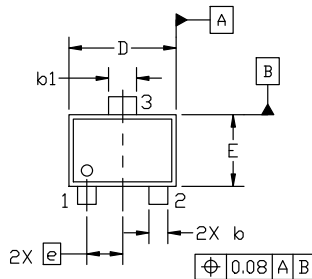


**SOT-723 1.20x0.80x0.50, 0.40P**  
**CASE 631AA**  
**ISSUE E**

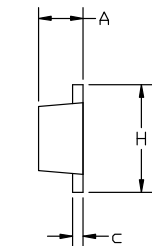
DATE 24 JAN 2024

NOTES:

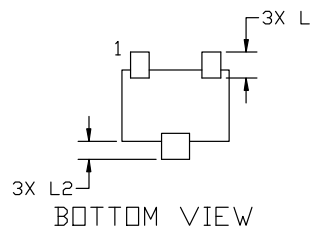
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2018.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. DIMENSIONS D AND E DO NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.



TOP VIEW



SIDE VIEW



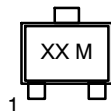
BOTTOM VIEW

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 0.45        | 0.50 | 0.55 |
| b   | 0.15        | 0.21 | 0.27 |
| b1  | 0.25        | 0.31 | 0.37 |
| c   | 0.07        | 0.12 | 0.17 |
| D   | 1.15        | 1.20 | 1.25 |
| E   | 0.75        | 0.80 | 0.85 |
| e   | 0.40 BSC    |      |      |
| H   | 1.15        | 1.20 | 1.25 |
| L   | 0.29 REF    |      |      |
| L2  | 0.15        | 0.20 | 0.25 |



RECOMMENDED MOUNTING  
FOOTPRINT

**GENERIC  
MARKING DIAGRAM\***



XX = Specific Device Code  
M = Date Code

\*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.

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

|                                                       |                                                  |                                                    |                                                      |                                                  |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|
| STYLE 1:<br>PIN 1. BASE<br>2. EMITTER<br>3. COLLECTOR | STYLE 2:<br>PIN 1. ANODE<br>2. N/C<br>3. CATHODE | STYLE 3:<br>PIN 1. ANODE<br>2. ANODE<br>3. CATHODE | STYLE 4:<br>PIN 1. CATHODE<br>2. CATHODE<br>3. ANODE | STYLE 5:<br>PIN 1. GATE<br>2. SOURCE<br>3. DRAIN |
|-------------------------------------------------------|--------------------------------------------------|----------------------------------------------------|------------------------------------------------------|--------------------------------------------------|

|                         |                                      |                                                                                                                                                                                  |
|-------------------------|--------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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| <b>DESCRIPTION:</b>     | <b>SOT-723 1.20x0.80x0.50, 0.40P</b> | <b>PAGE 1 OF 1</b>                                                                                                                                                               |

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