

# 2SA1020

Preferred Device

## One Watt High Current PNP Transistor

### Features

- Pb-Free Packages are Available\*

### MAXIMUM RATINGS

| Rating  | Symbol         | Value          | Unit                       |
|---|----------------|----------------|----------------------------|
| Collector – Emitter Voltage   | $V_{CE}$       | 50             | Vdc                        |
| Collector – Base Voltage  | $V_{CB}$       | 50             | Vdc                        |
| Emitter – Base Voltage  | $V_{EB}$       | 5.0            | Vdc                        |
| Collector Current – Continuous  | $I_C$          | 2.0            | Adc                        |
| Total Power Dissipation @ $T_A = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 900<br>5.0     | mW<br>mW/ $^\circ\text{C}$ |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 1.5<br>12      | W<br>mW/ $^\circ\text{C}$  |
| Operating and Storage Junction Temperature Range                                      | $T_J, T_{stg}$ | -55 to<br>+150 | $^\circ\text{C}$           |

### THERMAL CHARACTERISTICS

| Characteristic                          | Symbol          | Max  | Unit               |
|---|-----------------|------|--------------------|
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 125  | $^\circ\text{C/W}$ |
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 83.3 | $^\circ\text{C/W}$ |

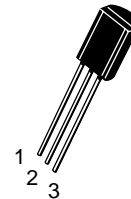
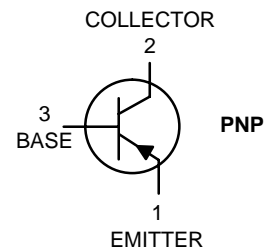
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



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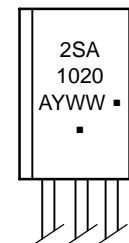
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### VOLTAGE AND CURRENT ARE NEGATIVE FOR PNP TRANSISTORS



TO-92 (TO-226)  
CASE 29-10  
STYLE 14

### MARKING DIAGRAM



A = Assembly Location  
Y = Year  
WW = Work Week  
▪ = Pb-Free Package

(Note: Microdot may be in either location)

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 2 of this data sheet.

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

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

## 2SA1020

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

| Characteristic  | Symbol        | Min      | Max      | Unit            |
|---|---------------|----------|----------|-----------------|
| <b>OFF CHARACTERISTICS</b>  |               |          |          |                 |
| Collector – Emitter Breakdown Voltage (Note 1)<br>( $I_C = 10\text{ mAdc}$ , $I_B = 0$ )                                      | $V_{(BR)CEO}$ | 50       | –        | Vdc             |
| Collector Cutoff Current<br>( $V_{CB} = 50\text{ Vdc}$ , $I_E = 0$ )  | $I_{CBO}$     | –        | 1.0      | $\mu\text{Adc}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )   | $I_{EBO}$     | –        | 1.0      | $\mu\text{Adc}$ |
| <b>ON CHARACTERISTICS (Note 2)</b>  |               |          |          |                 |
| DC Current Gain<br>( $I_C = 500\text{ mA}$ , $V_{CE} = 2.0\text{ V}$ )<br>( $I_C = 1.5\text{ A}$ , $V_{CE} = 2.0\text{ V}$ )  | $h_{FE}$      | 70<br>40 | 240<br>– | –               |
| Collector – Emitter Saturation Voltage<br>( $I_C = 1.0\text{ A}$ , $I_B = 50\text{ mA}$ )                                     | $V_{CE(sat)}$ | –        | 0.5      | Vdc             |
| Base – Emitter Saturation Voltage ( $I_C = 1.0\text{ A}$ , $I_B = 50\text{ mA}$ )   | $V_{BE(sat)}$ | –        | 1.2      | Vdc             |
| <b>SMALL – SIGNAL CHARACTERISTICS</b>   |               |          |          |                 |
| Current – Gain – Bandwidth Product (Note 3)<br>( $I_C = 500\text{ mAdc}$ , $V_{CE} = 2.0\text{ Vdc}$ , $f = 100\text{ MHz}$ ) | $f_T$         | 100      | –        | MHz             |

1. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle = 2.0%.
2. Pulse Test: Pulse Width  $\leq 300\text{ }\mu\text{s}$ , Duty Cycle = 2.0%.
3.  $f_T$  is defined as the frequency at which  $|h_{fe}|$  extrapolates to unity.

### ORDERING INFORMATION

| Device       | Package            | Shipping <sup>†</sup> |
|--------------|--------------------|-----------------------|
| 2SA1020      | TO-92              | 5000 Units / Box      |
| 2SA1020G     | TO-92<br>(Pb-Free) |                       |
| 2SA1020RLRA  | TO-92              | 2000 / Tape & Reel    |
| 2SA1020RLRAG | TO-92<br>(Pb-Free) |                       |

<sup>†</sup>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.

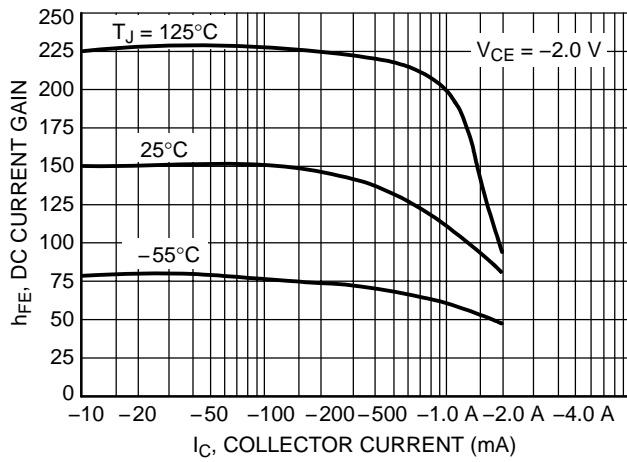


Figure 1. Typical DC Current Gain

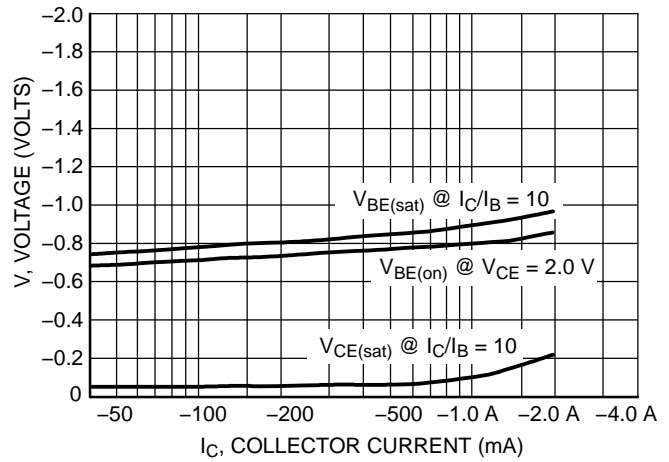


Figure 2. On Voltages

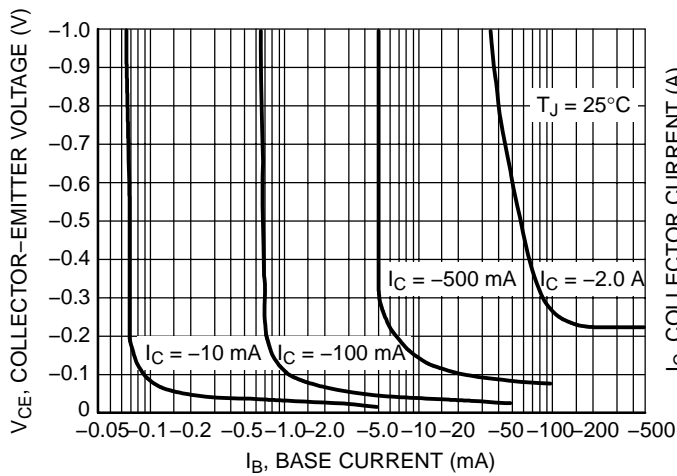


Figure 3. Collector Saturation Region

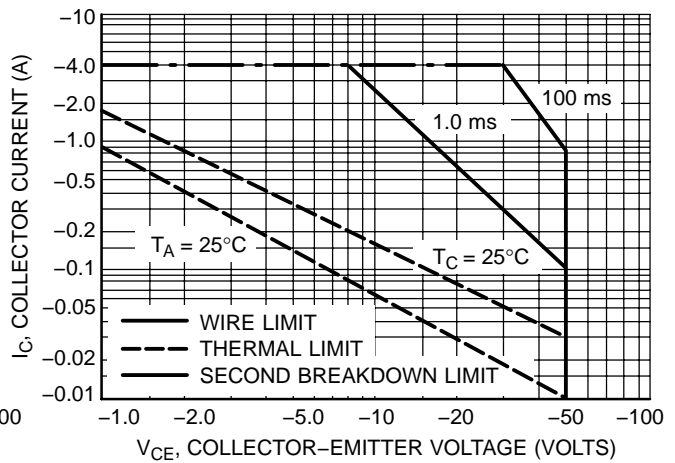
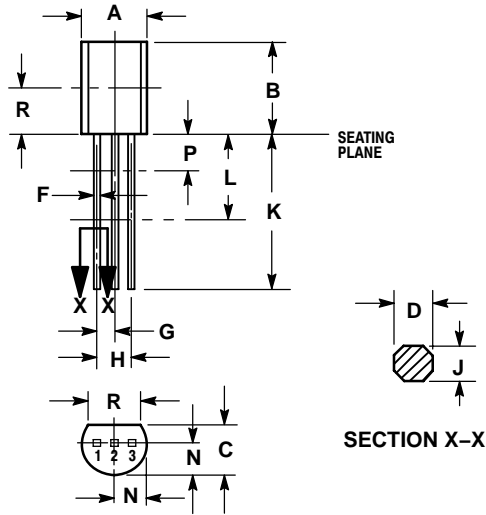


Figure 4. Safe Operating Area

# 2SA1020

## PACKAGE DIMENSIONS

TO-92 (TO-226)  
CASE 29-10  
ISSUE AL




### NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN P AND L. DIMENSIONS D AND J APPLY BETWEEN L AND K MINIMUM. LEAD DIMENSION IS UNCONTROLLED IN P AND BEYOND DIMENSION K MINIMUM.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.175  | 0.205 | 4.44        | 5.21  |
| B   | 0.290  | 0.310 | 7.37        | 7.87  |
| C   | 0.125  | 0.165 | 3.18        | 4.19  |
| D   | 0.018  | 0.021 | 0.457       | 0.533 |
| F   | 0.016  | 0.019 | 0.407       | 0.482 |
| G   | 0.045  | 0.055 | 1.15        | 1.39  |
| H   | 0.095  | 0.105 | 2.42        | 2.66  |
| J   | 0.018  | 0.024 | 0.46        | 0.61  |
| K   | 0.500  | ---   | 12.70       | ---   |
| L   | 0.250  | ---   | 6.35        | ---   |
| N   | 0.080  | 0.105 | 2.04        | 2.66  |
| P   | ---    | 0.100 | ---         | 2.54  |
| R   | 0.135  | ---   | 3.43        | ---   |

### STYLE 14:

1. EMITTER
2. COLLECTOR
3. BASE

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