

# 2SA1020

## One Watt High Current PNP Transistor

### Features

- This is a Pb-Free Device\*

### 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 @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	900 5.0	mW mW/ $^\circ\text{C}$
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	1.5 12	W mW/ $^\circ\text{C}$
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-Ambient	$R_{\theta JA}$	125	$^\circ\text{C}/\text{W}$
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	83.3	$^\circ\text{C}/\text{W}$

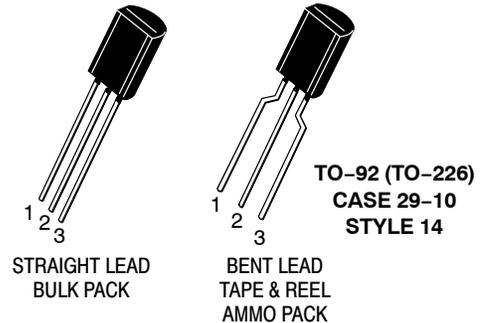
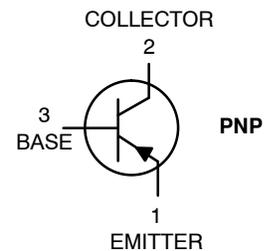
Stresses exceeding Maximum Ratings may damage the device. Maximum Ratings are stress ratings only. Functional operation above the Recommended Operating Conditions is not implied. Extended exposure to stresses above the Recommended Operating Conditions may affect device reliability.



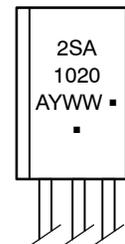
ON Semiconductor®

<http://onsemi.com>

### VOLTAGE AND CURRENT ARE NEGATIVE FOR PNP TRANSISTORS



### 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.

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

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### 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) ( $I_C = 10 \text{ mA}$ , $I_B = 0$ )	$V_{(BR)CEO}$	50	–	Vdc
Collector Cutoff Current ( $V_{CB} = 50 \text{ Vdc}$ , $I_E = 0$ )	$I_{CBO}$	–	1.0	$\mu\text{A}$ dc
Emitter Cutoff Current ( $V_{EB} = 5.0 \text{ V}$ , $I_C = 0$ )	$I_{EBO}$	–	1.0	$\mu\text{A}$ dc
<b>ON CHARACTERISTICS (Note 2)</b>				
DC Current Gain ( $I_C = 500 \text{ mA}$ , $V_{CE} = 2.0 \text{ V}$ ) ( $I_C = 1.5 \text{ A}$ , $V_{CE} = 2.0 \text{ V}$ )	$h_{FE}$	70 40	240 –	–
Collector – Emitter Saturation Voltage ( $I_C = 1.0 \text{ A}$ , $I_B = 50 \text{ mA}$ )	$V_{CE(sat)}$	–	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) ( $I_C = 500 \text{ mA}$ , $V_{CE} = 2.0 \text{ Vdc}$ , $f = 100 \text{ MHz}$ )	$f_T$	100	–	MHz

1. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , Duty Cycle = 2.0%.
2. Pulse Test: Pulse Width  $\leq 300 \mu\text{s}$ , 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>
2SA1020RLRAG	TO-92 (Pb-Free)	2000 / 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 Specifications Brochure, BRD8011/D.

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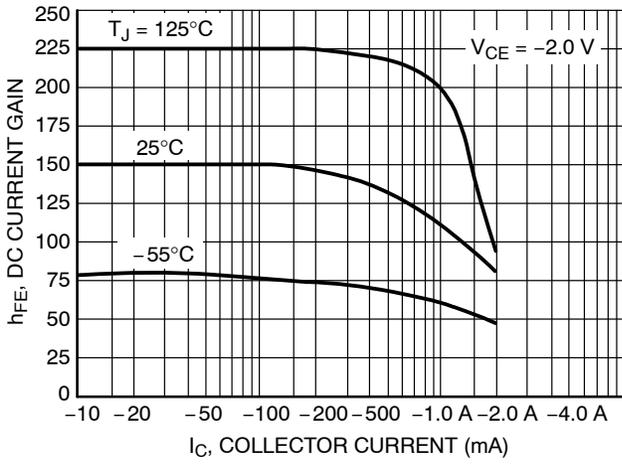


Figure 1. Typical DC Current Gain

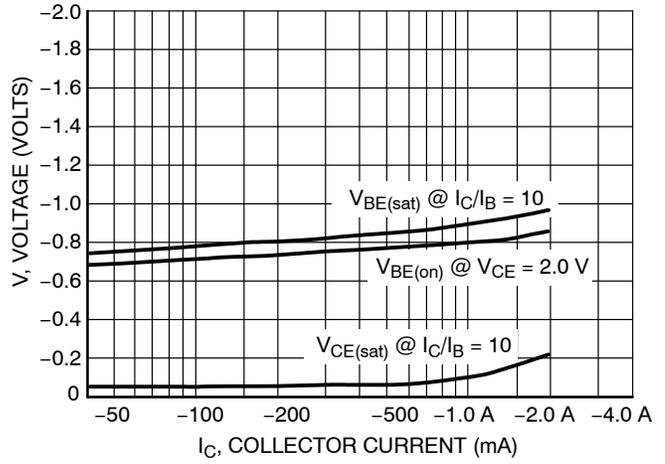


Figure 2. On Voltages

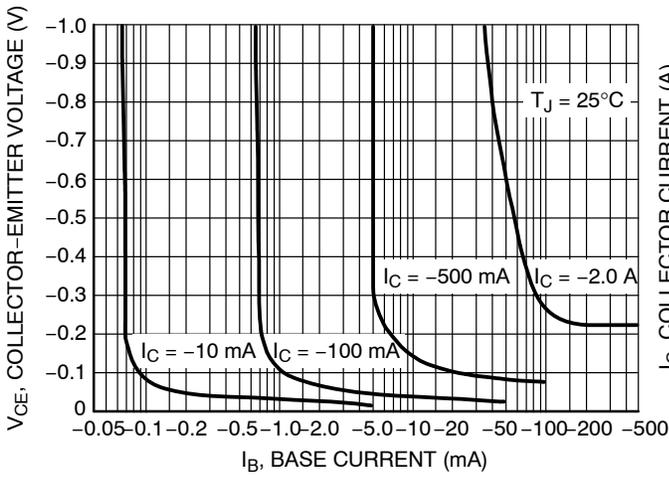


Figure 3. Collector Saturation Region

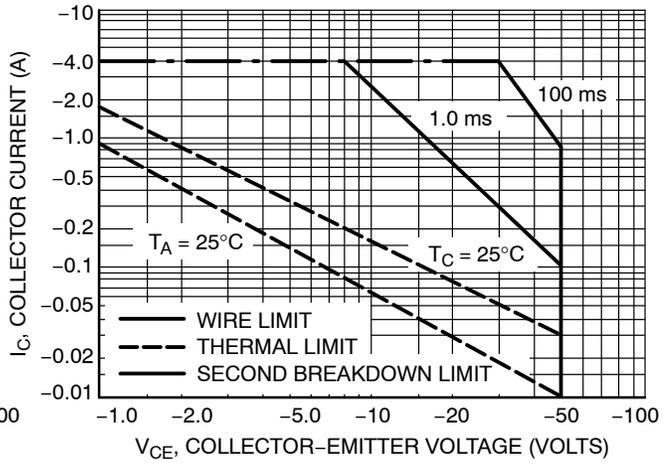
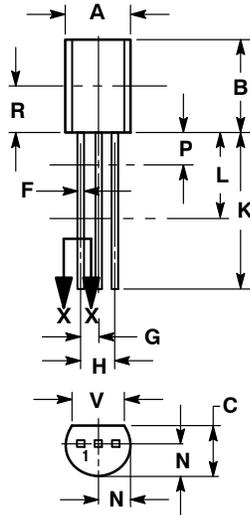


Figure 4. Safe Operating Area

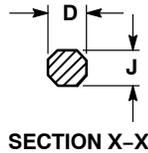
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## PACKAGE DIMENSIONS

TO-92 (TO-226) 1 WATT  
CASE 29-10  
ISSUE O



STRAIGHT LEAD  
BULK PACK



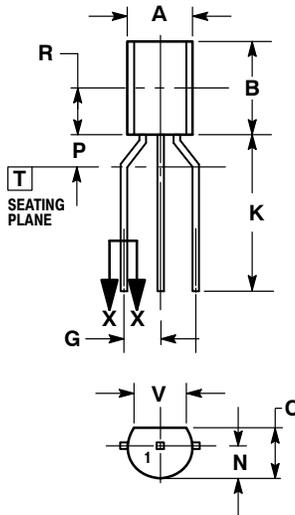
SECTION X-X

NOTES:

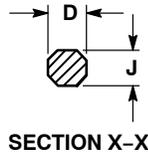
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN DIMENSIONS P AND L. DIMENSIONS D AND J APPLY BETWEEN DIMENSIONS L AND K MINIMUM. THE LEAD DIMENSIONS ARE UNCONTROLLED IN DIMENSION 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	0.46	0.53
F	0.016	0.019	0.41	0.48
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	---
V	0.135	---	3.43	---

STYLE 14:  
PIN 1. EMITTER  
2. COLLECTOR  
3. BASE



BENT LEAD  
TAPE & REEL  
AMMO PACK



SECTION X-X

NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: INCHES.
3. CONTOUR OF PACKAGE BEYOND DIMENSION R IS UNCONTROLLED.
4. DIMENSION F APPLIES BETWEEN DIMENSIONS P AND L. DIMENSIONS D AND J APPLY BETWEEN DIMENSIONS L AND K MINIMUM. THE LEAD DIMENSIONS ARE UNCONTROLLED IN DIMENSION P AND BEYOND DIMENSION K MINIMUM.

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B	0.290	0.310	7.37	7.87
C	0.125	0.165	3.18	4.19
D	0.018	0.021	0.46	0.53
G	0.094	0.102	2.40	2.80
J	0.018	0.024	0.46	0.61
K	0.500	---	12.70	---
N	0.080	0.105	2.04	2.66
P	---	0.100	---	2.54
R	0.135	---	3.43	---
V	0.135	---	3.43	---

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