

# 2N4920G

## Medium-Power Plastic PNP Silicon Transistors

These medium-power, high-performance plastic devices are designed for driver circuits, switching, and amplifier applications.

### Features

- Low Saturation Voltage
- Excellent Power Dissipation Due to Thermopad™ Construction
- Excellent Safe Operating Area
- Complement to NPN 2N4921G, 2N4922G, 2N4923G
- This Device is Pb-Free and is RoHS Compliant\*

### MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector – Emitter Voltage	$V_{CEO}$	80	Vdc
Collector – Base Voltage	$V_{CBO}$	80	Vdc
Emitter – Base Voltage	$V_{EBO}$	5.0	Vdc
Collector Current – Continuous (Note 1)	$I_C$	1.0	Adc
Collector Current – Peak	$I_{CM}$	3.0	Adc
Base Current	$I_B$	1.0	Adc
Total Power Dissipation @ $T_A = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	30 0.24	W W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	$T_J, T_{stg}$	-65 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.

1. The 1.0 A max  $I_C$  value is based upon JEDEC current gain requirements. The 3.0 A max value is based upon actual current-handling capability of the device (See Figure 5).

### THERMAL CHARACTERISTICS (Note 2)

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	4.16	$^\circ\text{C/W}$

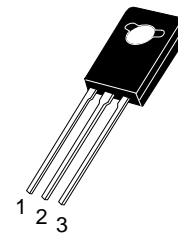
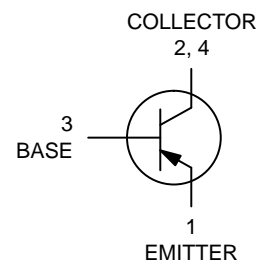
2. Recommend use of thermal compound for lowest thermal resistance.



ON Semiconductor®

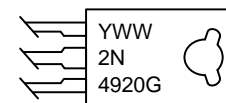
<http://onsemi.com>

## 3.0 A, 40–80 V, 30 W GENERAL PURPOSE POWER TRANSISTORS



TO-225  
CASE 77-09  
STYLE 1

### MARKING DIAGRAM



Y = Year  
WW = Work Week  
2N4920 = Specific Device Code  
G = Pb-Free Package

### ORDERING INFORMATION

Device	Package	Shipping
2N4920G	TO-225 (Pb-Free)	500 Unit / Bulk

\*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 Sustaining Voltage (Note 3) ( $I_C = 0.1\text{ Adc}$ , $I_B = 0$ )	$V_{CE(sus)}$	80	–	Vdc
Collector Cutoff Current ( $V_{CE} = 40\text{ Vdc}$ , $I_B = 0$ )	$I_{CEO}$	–	0.5	mAdc
Collector Cutoff Current ( $V_{CE} = \text{Rated } V_{CEO}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = \text{Rated } V_{CEO}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ , $T_C = 125^\circ\text{C}$ )	$I_{CEX}$	– –	0.1 0.5	mAdc
Collector Cutoff Current ( $V_{CB} = \text{Rated } V_{CB}$ , $I_E = 0$ )	$I_{CBO}$	–	0.1	mAdc
Emitter Cutoff Current ( $V_{BE} = 5.0\text{ Vdc}$ , $I_C = 0$ )	$I_{EBO}$	–	1.0	mAdc
<b>ON CHARACTERISTICS</b>				
DC Current Gain (Note 3) ( $I_C = 50\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 500\text{ mAdc}$ , $V_{CE} = 1.0\text{ Vdc}$ ) ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$h_{FE}$	40 30 10	– 150 –	–
Collector–Emitter Saturation Voltage (Note 3) ( $I_C = 1.0\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )	$V_{CE(sat)}$	–	0.6	Vdc
Base–Emitter Saturation Voltage (Note 3) ( $I_C = 1.0\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )	$V_{BE(sat)}$	–	1.3	Vdc
Base–Emitter On Voltage (Note 3) ( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 1.0\text{ Vdc}$ )	$V_{BE(on)}$	–	1.3	Vdc
<b>SMALL–SIGNAL CHARACTERISTICS</b>				
Current–Gain – Bandwidth Product ( $I_C = 250\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ MHz}$ )	$f_T$	3.0	–	MHz
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f = 100\text{ kHz}$ )	$C_{ob}$	–	100	pF
Small–Signal Current Gain ( $I_C = 250\text{ mAdc}$ , $V_{CE} = 10\text{ Vdc}$ , $f = 1.0\text{ kHz}$ )	$h_{fe}$	25	–	–

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.

3. Pulse Test:  $PW \approx 300\ \mu\text{s}$ , Duty Cycle  $\approx 2.0\%$

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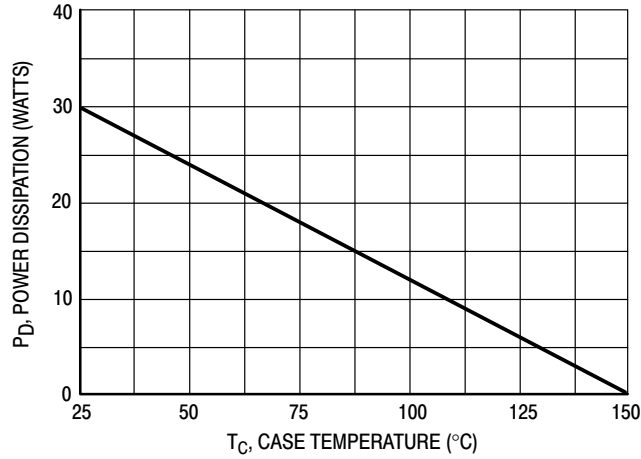


Figure 1. Power Derating

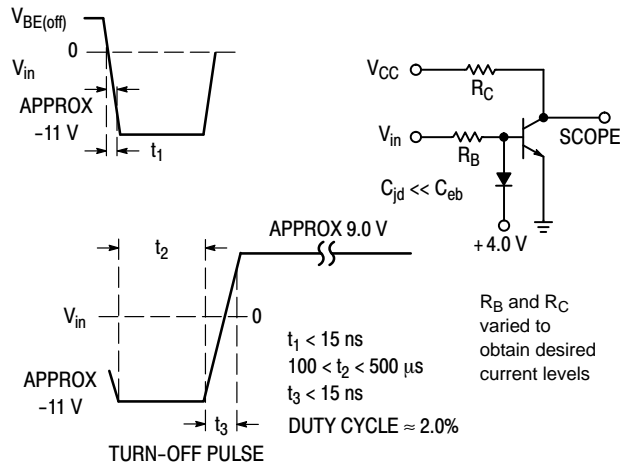


Figure 2. Switching Time Equivalent Test Circuit

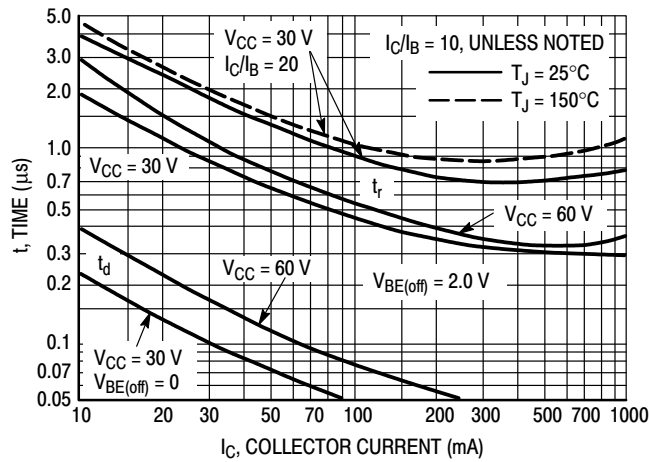


Figure 3. Turn-On Time

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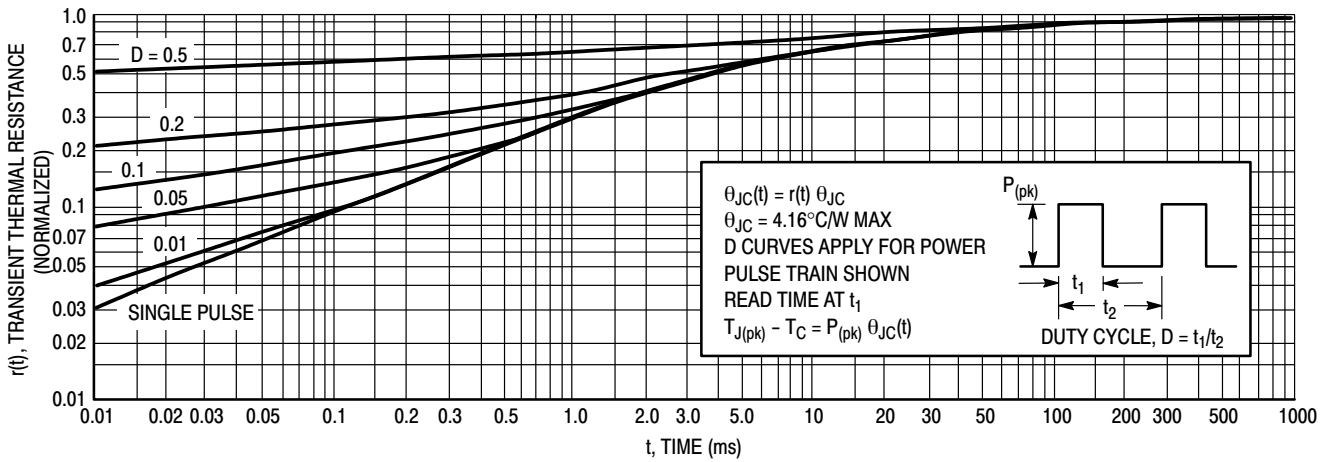


Figure 4. Thermal Response

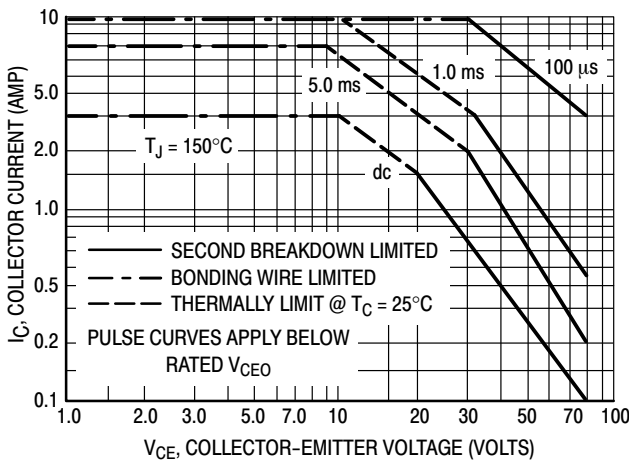


Figure 5. Active-Region Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate  $I_C - V_{CE}$  operation i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure 5 is based on  $T_{J(pk)} = 150^{\circ}\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^{\circ}\text{C}$ . At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

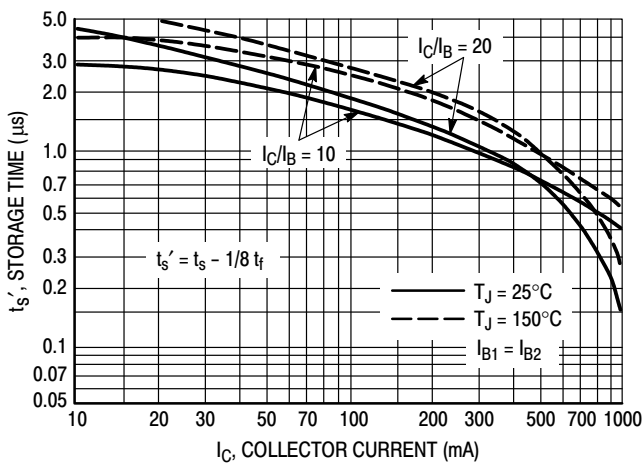


Figure 6. Storage Time

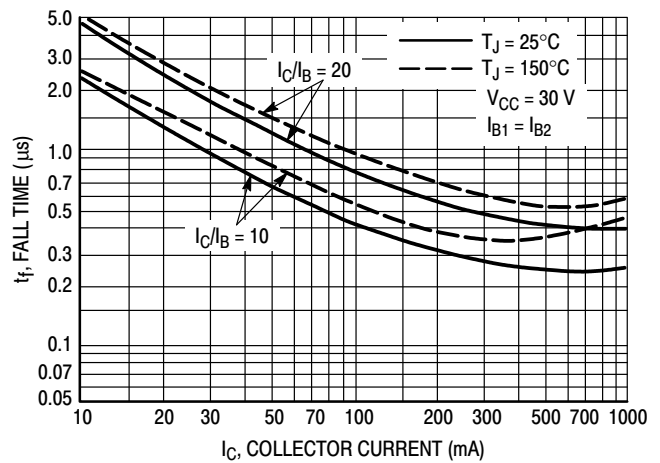


Figure 7. Fall Time

TYPICAL DC CHARACTERISTICS

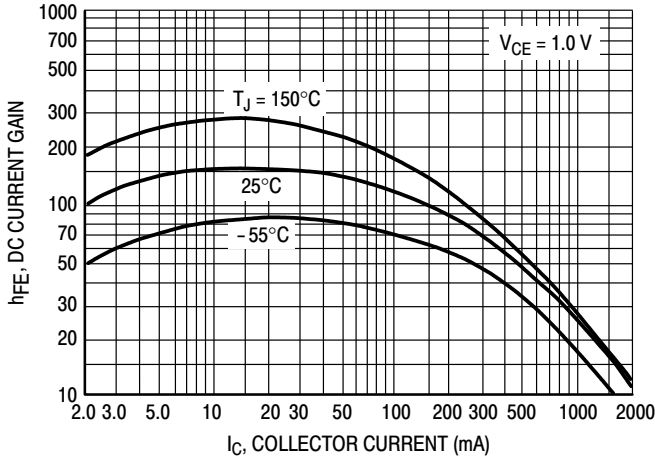


Figure 8. Current Gain

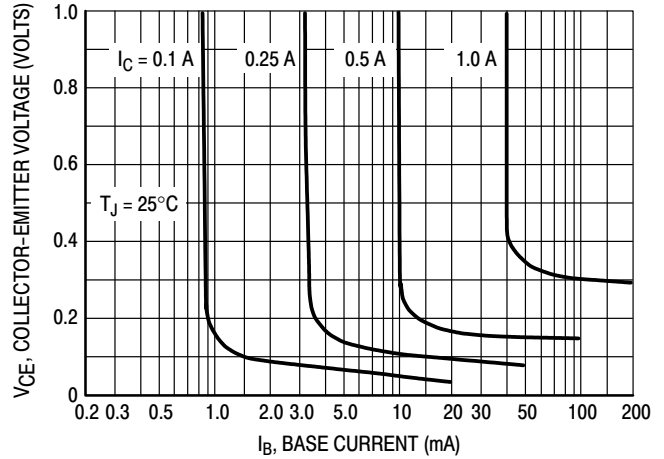


Figure 9. Collector Saturation Region

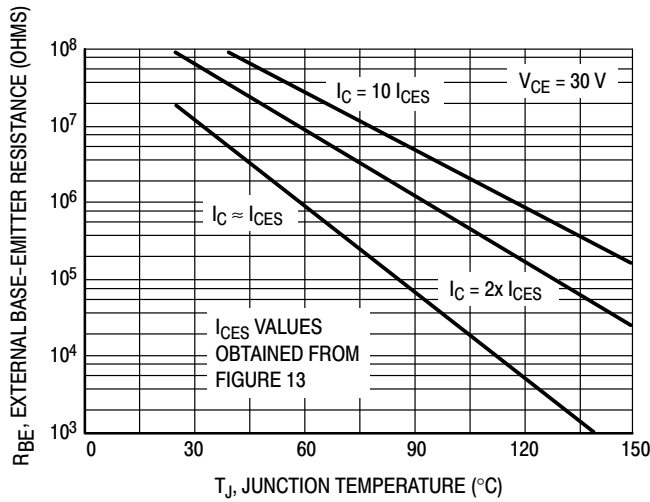


Figure 10. Effects of Base-Emitter Resistance

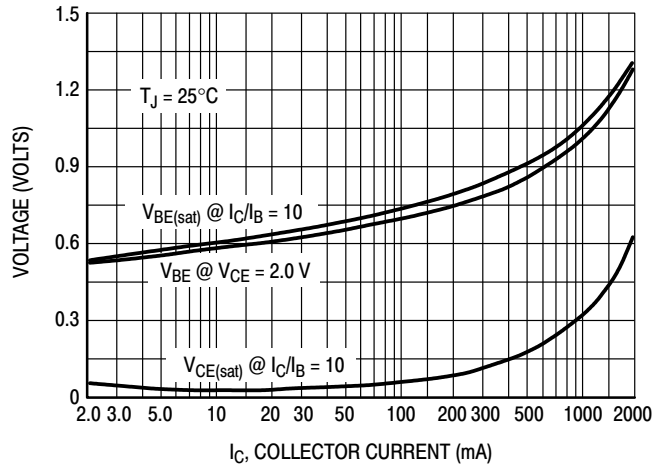


Figure 11. "On" Voltage

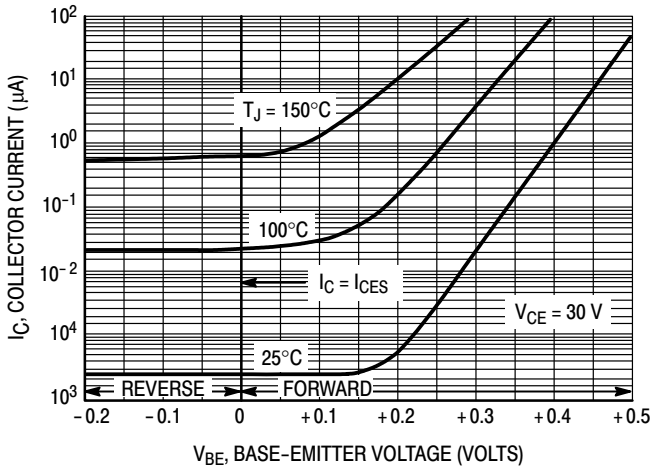


Figure 12. Collector Cut-Off Region

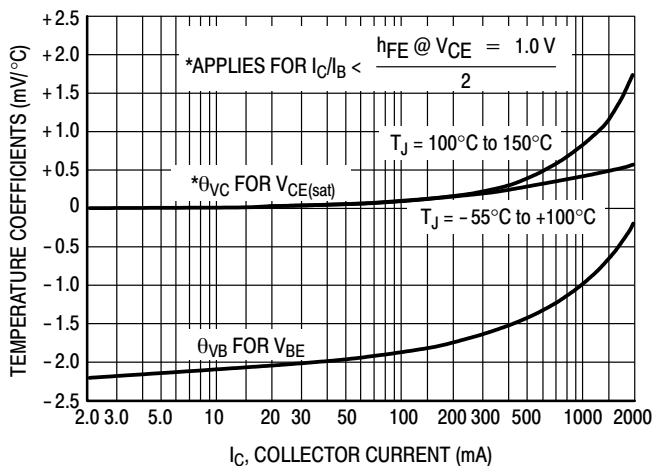
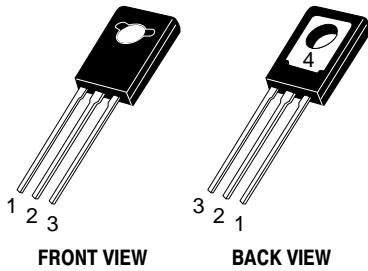


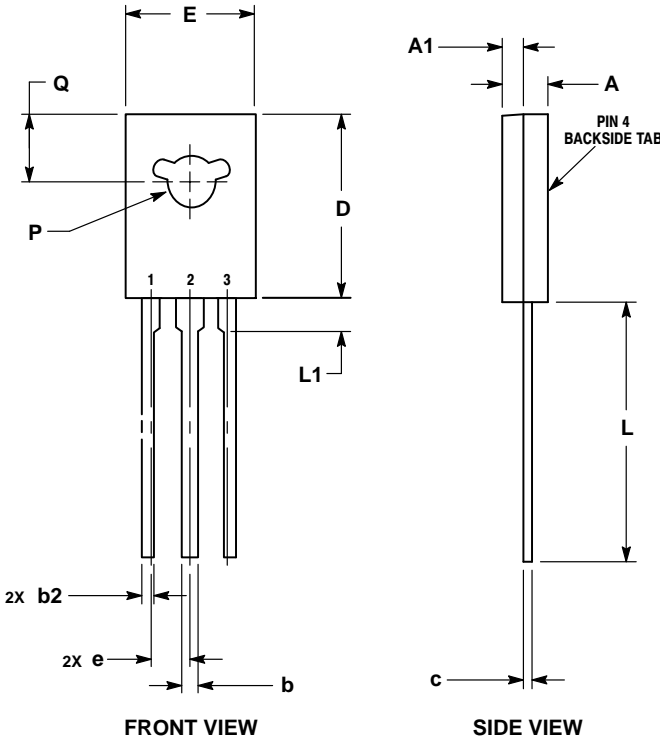
Figure 13. Temperature Coefficients

# 2N4920G

## PACKAGE DIMENSIONS



TO-225  
CASE 77-09  
ISSUE AC



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
  2. CONTROLLING DIMENSION: MILLIMETERS.
  3. NUMBER AND SHAPE OF LUGS OPTIONAL.

DIM	MILLIMETERS	
	MIN	MAX
A	2.40	3.00
A1	1.00	1.50
b	0.60	0.90
b2	0.51	0.88
c	0.39	0.63
D	10.60	11.10
E	7.40	7.80
e	2.04	2.54
L	14.50	16.63
L1	1.27	2.54
P	2.90	3.30
Q	3.80	4.20

- STYLE 1:  
PIN 1. EMITTER  
2, 4. COLLECTOR  
3. BASE

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