

BCW32LT1G

General Purpose Transistors

NPN Silicon

Features

- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--------------------------------|-----------|-------|------|
| Collector-Emitter Voltage | V_{CEO} | 32 | Vdc |
| Collector-Base Voltage | V_{CBO} | 32 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 5.0 | Vdc |
| Collector Current – Continuous | I_C | 100 | mAdc |

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.

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Value | Unit |
|---|-----------------|-------------|---------------------------|
| Total Device Dissipation FR-5 Board ⁽¹⁾ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 225 | mW |
| | | 1.8 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 556 | $^\circ\text{C}/\text{W}$ |
| Total Device Dissipation Alumina Substrate, ⁽²⁾ $T_A = 25^\circ\text{C}$ Derate above 25°C | P_D | 300 | mW |
| | | 2.4 | mW/ $^\circ\text{C}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 417 | $^\circ\text{C}/\text{W}$ |
| Junction and Storage Temperature | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

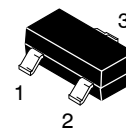
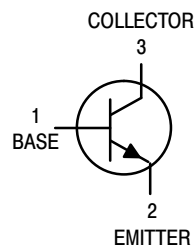
1. FR-5 = $1.0 \times 0.75 \times 0.062$ in.

2. Alumina = $0.4 \times 0.3 \times 0.024$ in. 99.5% alumina.



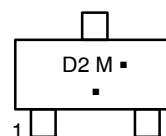
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SOT-23 (TO-236AB)
CASE 318
STYLE 6

MARKING DIAGRAM



D2 = Device Code
M = Date Code*
■ = Pb-Free Package

(Note: Microdot may be in either location)

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

ORDERING INFORMATION

| Device | Package | Shipping† |
|-----------|---------------------|--------------------|
| BCW32LT1G | SOT-23 (Pb-Free) | 3000 / 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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ELECTRICAL CHARACTERISTICS (T_A = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|--|----------------------|--------|--------|-----------|--------------------------------------|
| OFF CHARACTERISTICS | | | | | |
| Collector – Emitter Breakdown Voltage (I _C = 2.0 mA _{dc} , V _{EB} = 0) | V _{(BR)CEO} | 32 | – | – | V _{dc} |
| Collector – Base Breakdown Voltage (I _C = 10 μA _{dc} , I _E = 0) | V _{(BR)CBO} | 32 | – | – | V _{dc} |
| Emitter – Base Breakdown Voltage (I _E = 10 μA _{dc} , I _C = 0) | V _{(BR)EBO} | 5.0 | – | – | V _{dc} |
| Collector Cutoff Current (V _{CB} = 32 V _{dc} , I _E = 0) (V _{CB} = 32 V _{dc} , I _E = 0, T _A = 100°C) | I _{CBO} | – – | – – | 100 10 | nA _{dc} μA _{dc} |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (I _C = 2.0 mA _{dc} , V _{CE} = 5.0 V _{dc}) | h _{FE} | 200 | – | 450 | – |
| Collector – Emitter Saturation Voltage (I _C = 10 mA _{dc} , I _B = 0.5 mA _{dc}) | V _{CE(sat)} | – | – | 0.25 | V _{dc} |
| Base – Emitter On Voltage (I _C = 2.0 mA _{dc} , V _{CE} = 5.0 V _{dc}) | V _{BE(on)} | 0.55 | – | 0.70 | V _{dc} |
| SMALL-SIGNAL CHARACTERISTICS | | | | | |
| Output Capacitance (I _E = 0, V _{CB} = 10 V _{dc} , f = 1.0 MHz) | C _{obo} | – | – | 4.0 | pF |
| Noise Figure (I _C = 0.2 mA _{dc} , V _{CE} = 5.0 V _{dc} , R _S = 2.0 kΩ, f = 1.0 kHz, BW = 200 Hz) | NF | – | – | 10 | dB |

TYPICAL NOISE CHARACTERISTICS

(V_{CE} = 5.0 V_{dc}, T_A = 25°C)

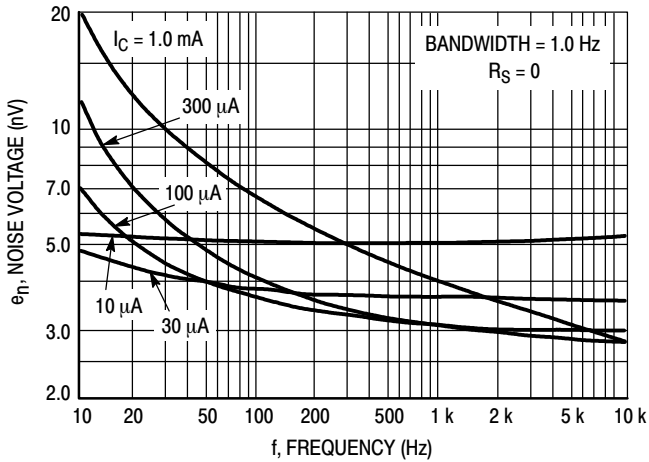


Figure 1. Noise Voltage

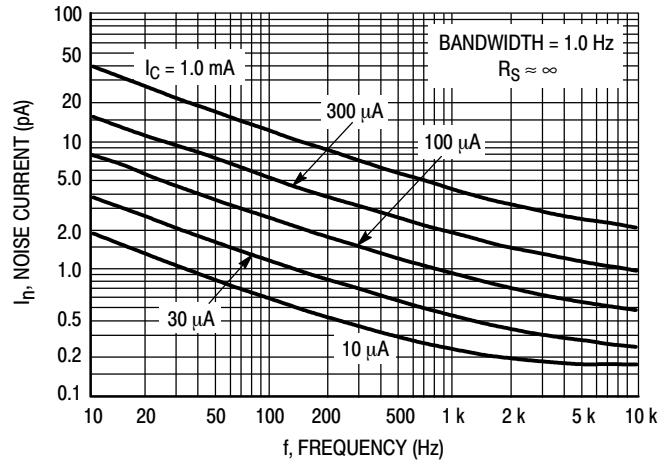


Figure 2. Noise Current

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NOISE FIGURE CONTOURS

($V_{CE} = 5.0 \text{ Vdc}$, $T_A = 25^\circ\text{C}$)

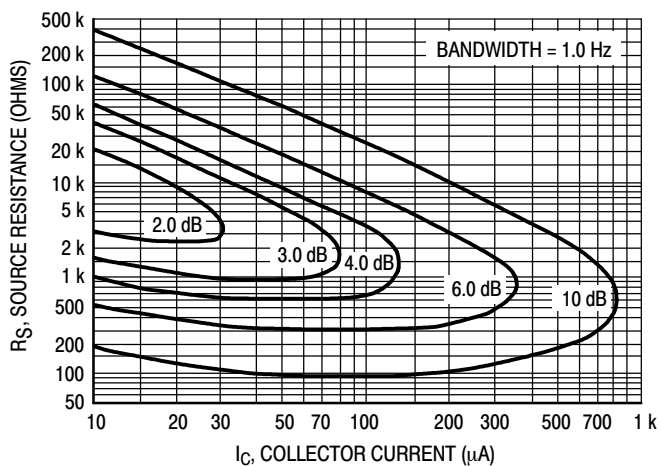


Figure 3. Narrow Band, 100 Hz

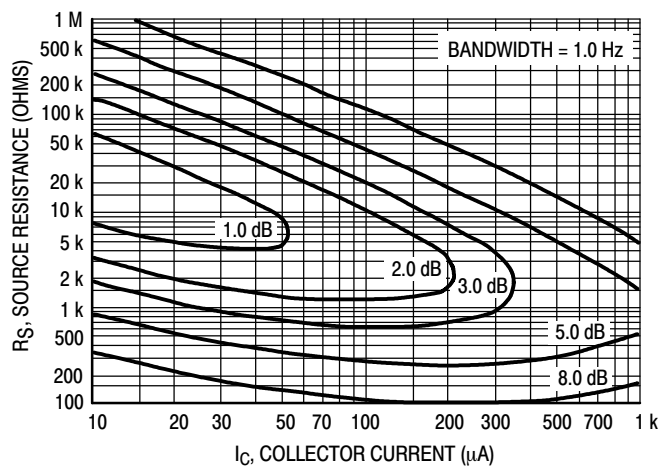


Figure 4. Narrow Band, 1.0 kHz

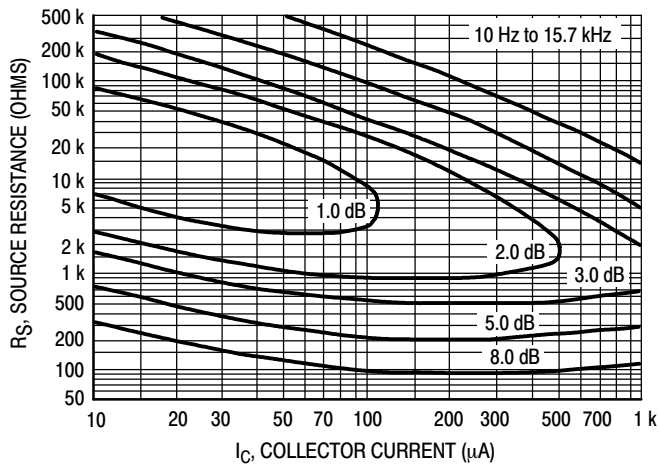


Figure 5. Wideband

Noise Figure is defined as:

$$NF = 20 \log_{10} \left(\frac{e_n^2 + 4KTR_S + I_n^2 R_S^2}{4KTR_S} \right)^{1/2}$$

- e_n = Noise Voltage of the Transistor referred to the input. (Figure 3)
- I_n = Noise Current of the Transistor referred to the input. (Figure 4)
- K = Boltzman's Constant ($1.38 \times 10^{-23} \text{ J/}^\circ\text{K}$)
- T = Temperature of the Source Resistance ($^\circ\text{K}$)
- R_S = Source Resistance (Ω)

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TYPICAL STATIC CHARACTERISTICS

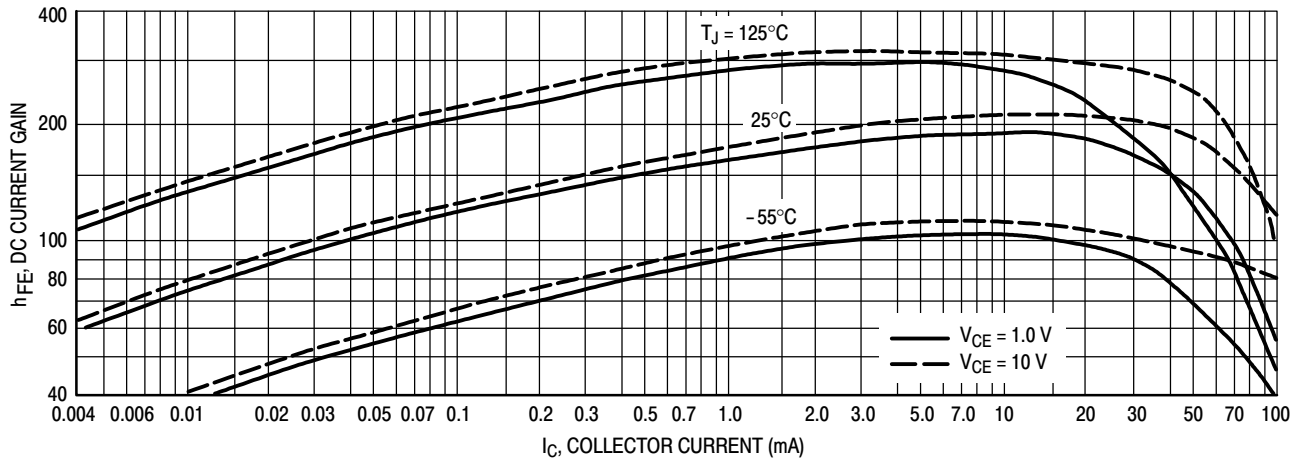


Figure 6. DC Current Gain

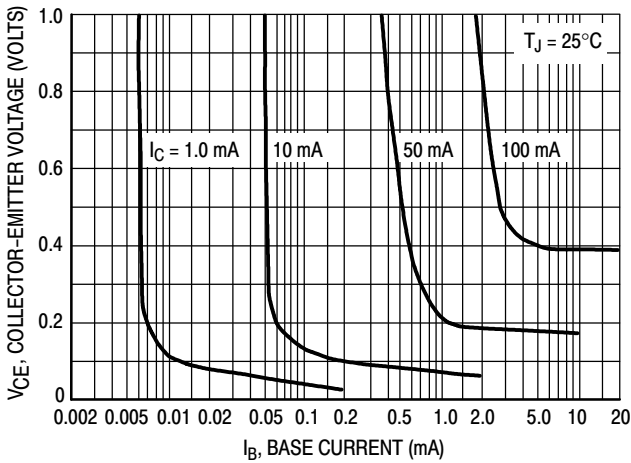


Figure 7. Collector Saturation Region

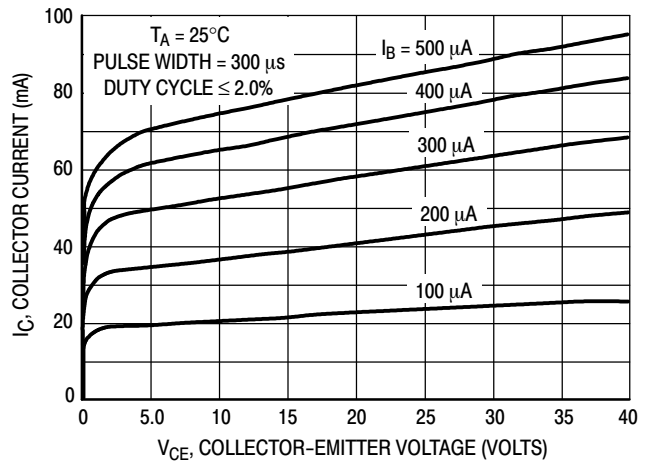


Figure 8. Collector Characteristics

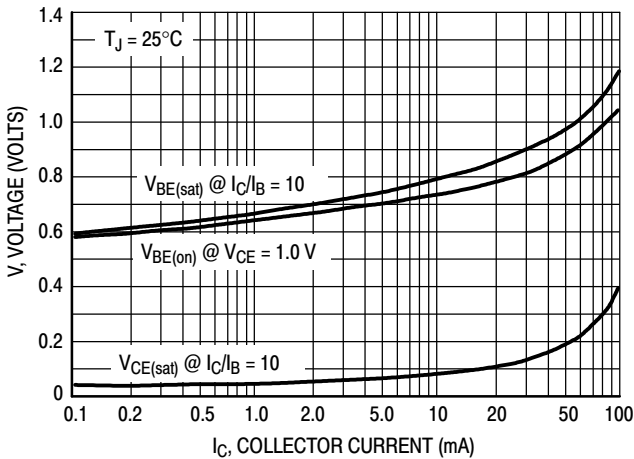


Figure 9. "On" Voltages

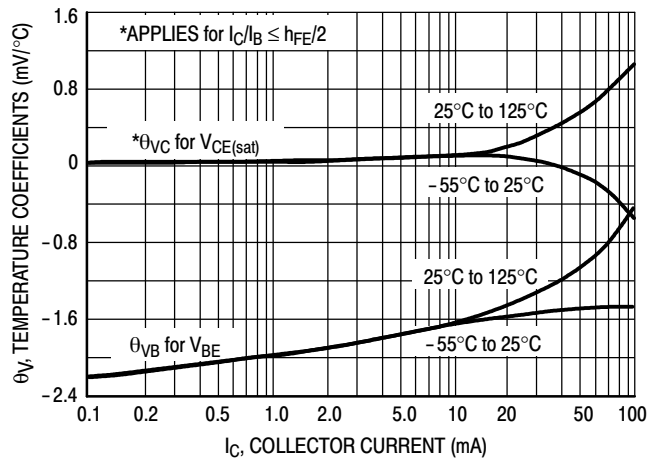


Figure 10. Temperature Coefficients

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TYPICAL DYNAMIC CHARACTERISTICS

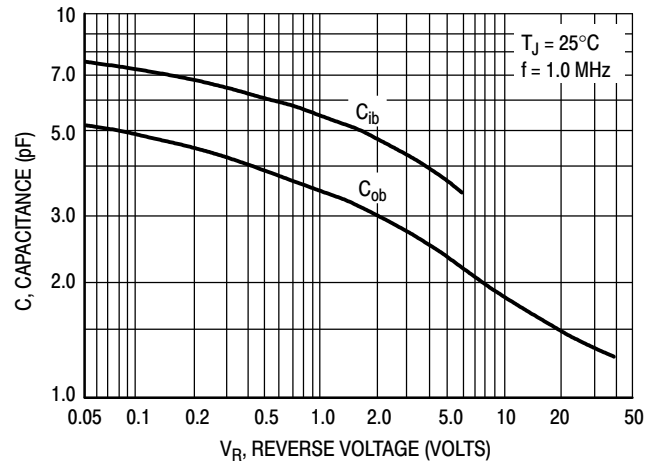
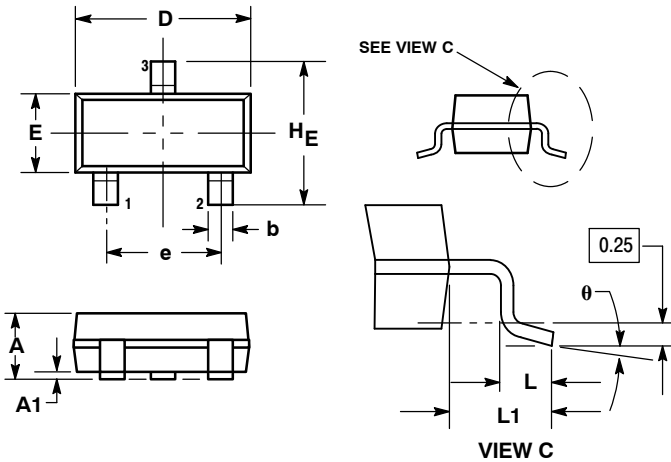


Figure 11. Capacitance

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PACKAGE DIMENSIONS

SOT-23 (TO-236)
CASE 318-08
ISSUE AN



NOTES:

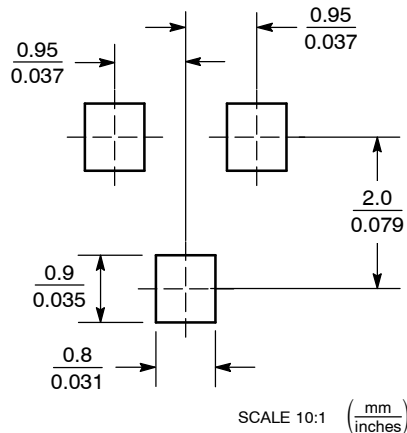
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. MAXIMUM LEAD THICKNESS INCLUDES LEAD FINISH THICKNESS. MINIMUM LEAD THICKNESS IS THE MINIMUM THICKNESS OF BASE MATERIAL.
4. 318-01 THRU -07 AND -09 OBSOLETE, NEW STANDARD 318-08.

| DIM | MILLIMETERS | | | INCHES | | |
|-----|-------------|------|------|--------|-------|-------|
| | MIN | NOM | MAX | MIN | NOM | MAX |
| A | 0.89 | 1.00 | 1.11 | 0.035 | 0.040 | 0.044 |
| A1 | 0.01 | 0.06 | 0.10 | 0.001 | 0.002 | 0.004 |
| b | 0.37 | 0.44 | 0.50 | 0.015 | 0.018 | 0.020 |
| c | 0.09 | 0.13 | 0.18 | 0.003 | 0.005 | 0.007 |
| D | 2.80 | 2.90 | 3.04 | 0.110 | 0.114 | 0.120 |
| E | 1.20 | 1.30 | 1.40 | 0.047 | 0.051 | 0.055 |
| e | 1.78 | 1.90 | 2.04 | 0.070 | 0.075 | 0.081 |
| L | 0.10 | 0.20 | 0.30 | 0.004 | 0.008 | 0.012 |
| L1 | 0.35 | 0.54 | 0.69 | 0.014 | 0.021 | 0.029 |
| HE | 2.10 | 2.40 | 2.64 | 0.083 | 0.094 | 0.104 |

STYLE 6:

1. BASE
2. EMITTER
3. COLLECTOR

SOLDERING FOOTPRINT*



*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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