

NJW3281G (NPN) NJW1302G (PNP)

Complementary NPN-PNP Silicon Power Bipolar Transistors

The NJW3281G and NJW1302G are power transistors for high power audio, disk head positioners and other linear applications.

Features

- Exceptional Safe Operating Area
- NPN/PNP Gain Matching within 10% from 50 mA to 5 A
- Excellent Gain Linearity
- High BVCEO
- High Frequency
- These Devices are Pb-Free and are RoHS Compliant

Benefits

- Reliable Performance at Higher Powers
- Symmetrical Characteristics in Complementary Configurations
- Accurate Reproduction of Input Signal
- Greater Dynamic Range
- High Amplifier Bandwidth

Applications

- High-End Consumer Audio Products
 - ◆ Home Amplifiers
 - ◆ Home Receivers
- Professional Audio Amplifiers
 - ◆ Theater and Stadium Sound Systems
 - ◆ Public Address Systems (PAs)

MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

| Rating | Symbol | Value | Unit |
|---|----------------|-------------|--------------------------|
| Collector-Emitter Voltage | V_{CEO} | 250 | Vdc |
| Collector-Base Voltage | V_{CBO} | 250 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 5.0 | Vdc |
| Collector-Emitter Voltage - 1.5 V | V_{CEX} | 250 | Vdc |
| Collector Current - Continuous | I_C | 15 | Adc |
| Collector Current - Peak (Note 1) | I_{CM} | 30 | Adc |
| Base Current - Continuous | I_B | 1.6 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C | P_D | 200 1.43 | W W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +150 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------|---------------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.625 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 40 | $^\circ\text{C}/\text{W}$ |

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.

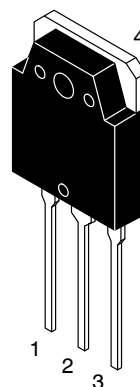
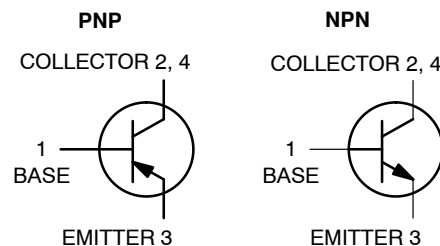
1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.



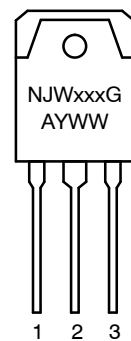
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15 AMPERES COMPLEMENTARY SILICON POWER TRANSISTORS 250 VOLTS 200 WATTS



MARKING DIAGRAM



TO-3P CASE 340AB STYLES 1,2,3

xxxx = 0281 or 0302
G = Pb-Free Package
A = Assembly Location
Y = Year
WW = Work Week

ORDERING INFORMATION

| Device | Package | Shipping |
|----------|--------------------|---------------|
| NJW3281G | TO-3P (Pb-Free) | 30 Units/Rail |
| NJW1302G | TO-3P (Pb-Free) | 30 Units/Rail |

NJW3281G (NPN) NJW1302G (PNP)

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise noted)

| Characteristic | Symbol | Min | Typ | Max | Unit |
|---|-----------------------|----------------------------|-----------------------|-----------------------------|------|
| OFF CHARACTERISTICS | | | | | |
| Collector–Emitter Sustaining Voltage (I _C = 100 mAdc, I _B = 0) | V _{CEO(sus)} | 250 | – | – | Vdc |
| Collector Cutoff Current (V _{CB} = 250 Vdc, I _E = 0) | I _{CBO} | – | – | 50 | μAdc |
| Emitter Cutoff Current (V _{EB} = 5 Vdc, I _C = 0) | I _{EBO} | – | – | 5 | μAdc |
| SECOND BREAKDOWN | | | | | |
| Second Breakdown Collector with Base Forward Biased (V _{CE} = 50 Vdc, t = 1 s (non-repetitive)) | I _{S/b} | 4 | – | – | Adc |
| ON CHARACTERISTICS | | | | | |
| DC Current Gain (I _C = 100 mAdc, V _{CE} = 5 Vdc) (I _C = 1 Adc, V _{CE} = 5 Vdc) (I _C = 3 Adc, V _{CE} = 5 Vdc) (I _C = 5 Adc, V _{CE} = 5 Vdc) (I _C = 8 Adc, V _{CE} = 5 Vdc) | h _{FE} | 75 75 75 60 45 | – – – – – | 150 150 150 – – | – |
| Collector–Emitter Saturation Voltage (I _C = 8 Adc, I _B = 0.8 Adc) | V _{CE(sat)} | – | 0.4 | 0.6 | Vdc |
| Base–Emitter On Voltage (I _C = 8 Adc, V _{CE} = 5 Vdc) | V _{BE(on)} | – | – | 1.5 | Vdc |
| DYNAMIC CHARACTERISTICS | | | | | |
| Current–Gain – Bandwidth Product (I _C = 1 Adc, V _{CE} = 5 Vdc, f _{test} = 1 MHz) | f _T | – | 30 | – | MHz |
| Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f _{test} = 1 MHz) | C _{ob} | – | – | 600 | pF |

NJW3281G (NPN) NJW1302G (PNP)

TYPICAL CHARACTERISTICS

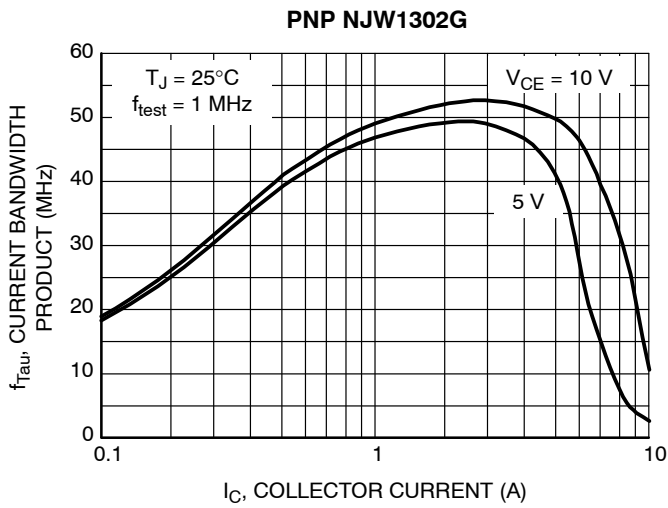


Figure 1. Typical Current Gain Bandwidth Product

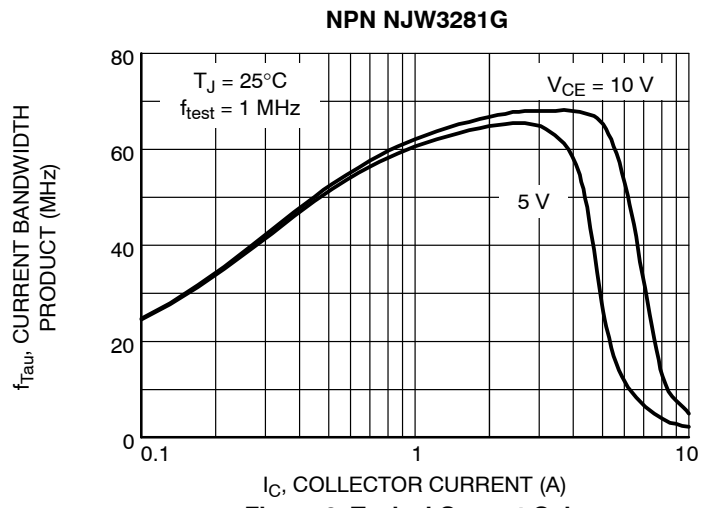


Figure 2. Typical Current Gain Bandwidth Product

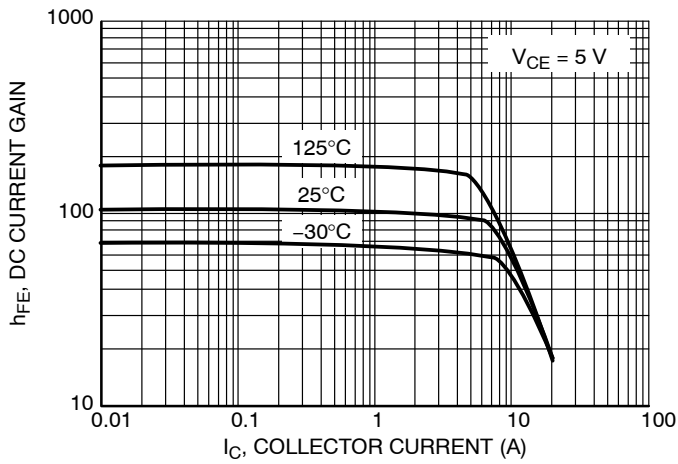


Figure 3. DC Current Gain

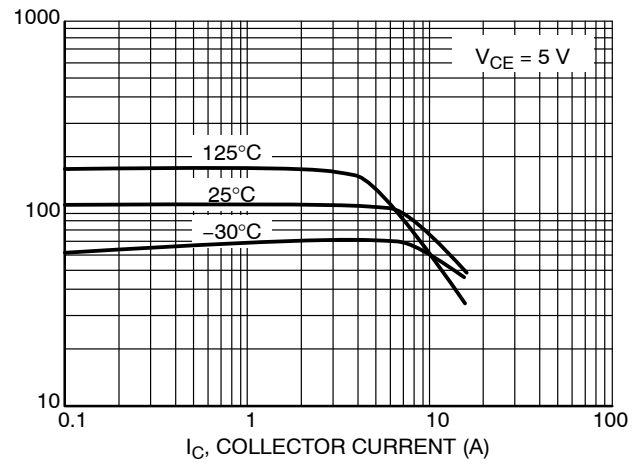


Figure 4. DC Current Gain

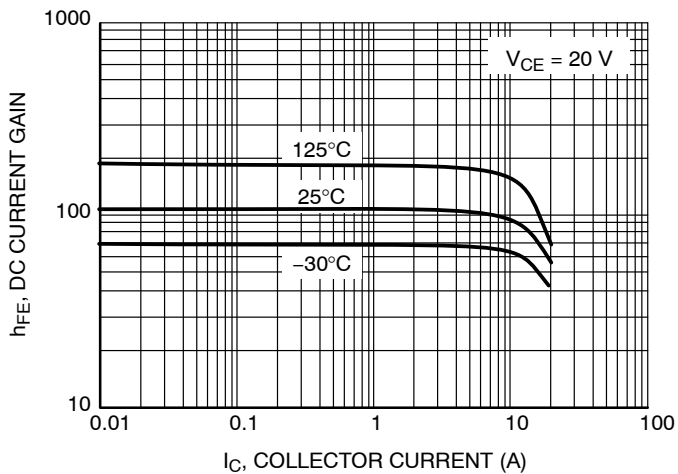


Figure 5. DC Current Gain

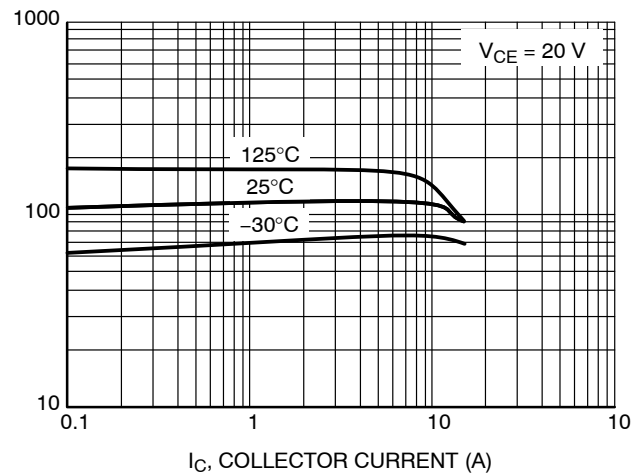


Figure 6. DC Current Gain

TYPICAL CHARACTERISTICS

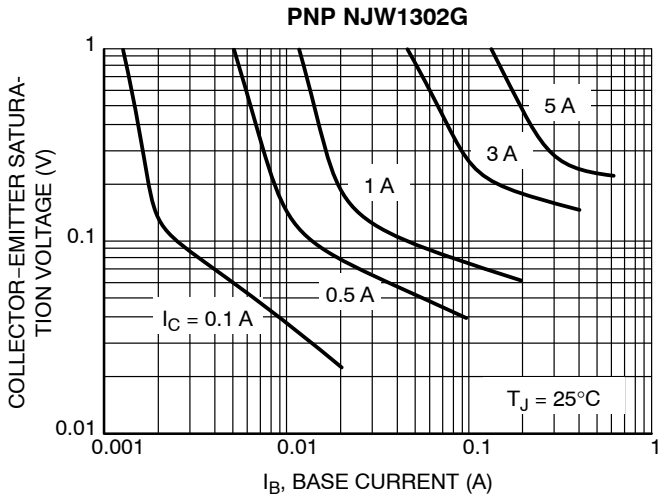


Figure 7. Saturation Region

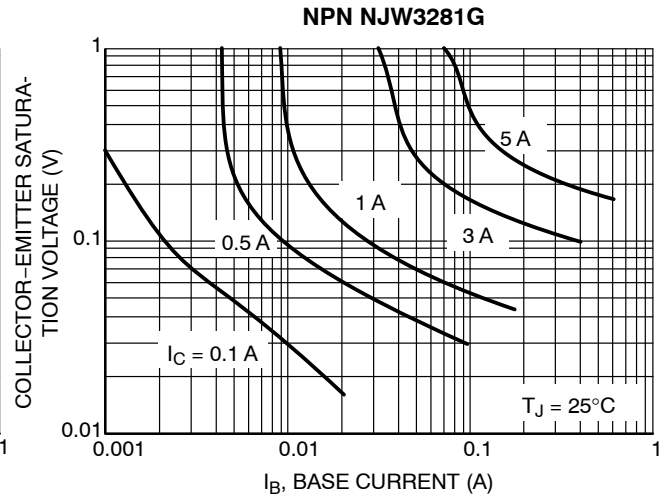


Figure 8. Saturation Region

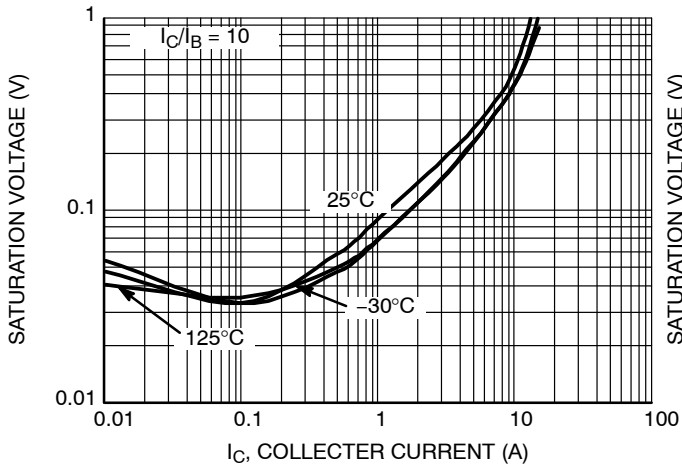


Figure 9. $V_{CE(sat)}$, Collector-Emitter Saturation Voltage

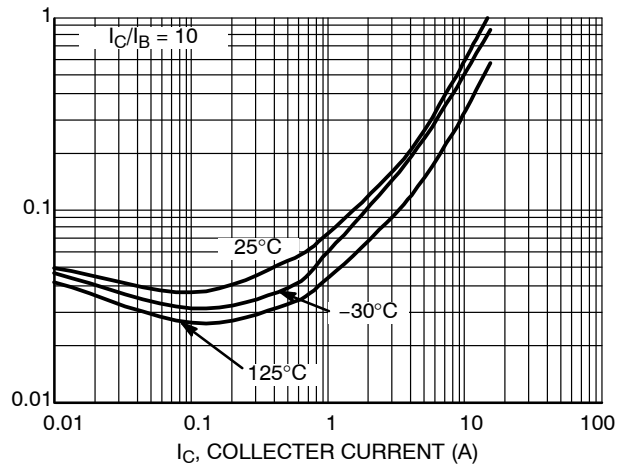


Figure 10. $V_{CE(sat)}$, Collector-Emitter Saturation Voltage

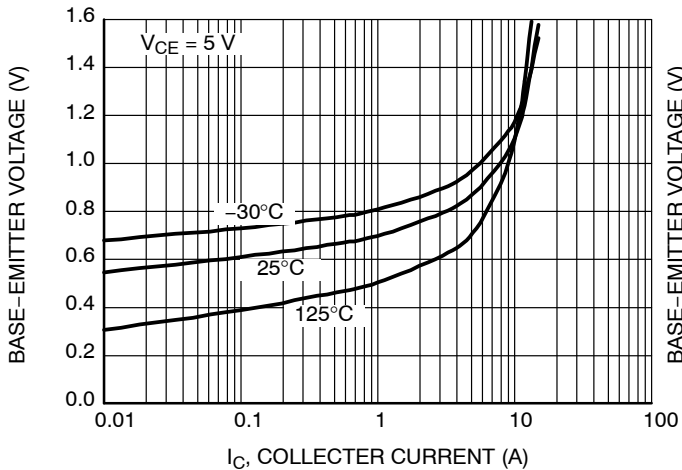


Figure 11. $V_{BE(on)}$, Base-Emitter Voltage

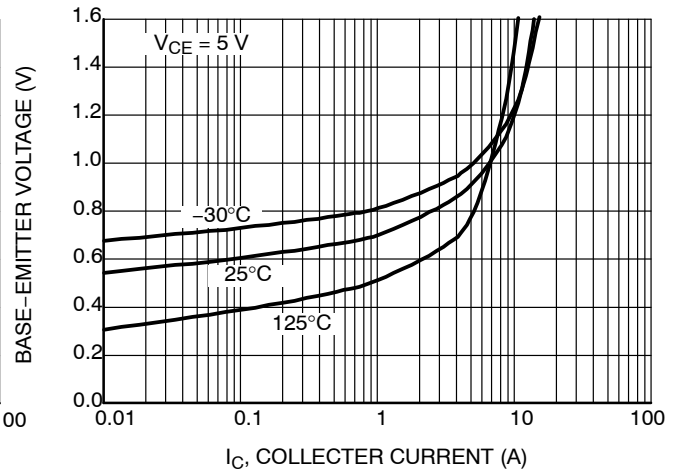


Figure 12. $V_{BE(on)}$, Base-Emitter Voltage

NJW3281G (NPN) NJW1302G (PNP)

TYPICAL CHARACTERISTICS

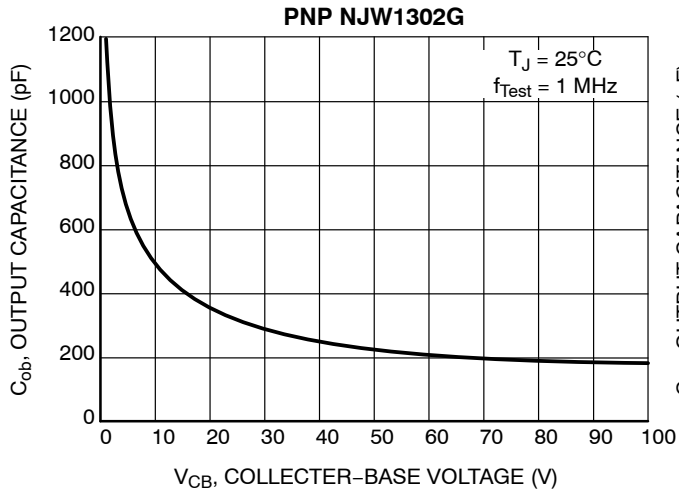


Figure 13. Output Capacitance

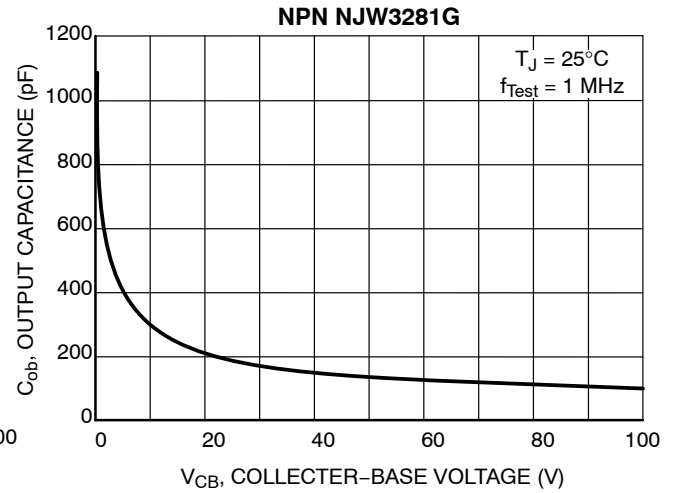


Figure 14. Output Capacitance

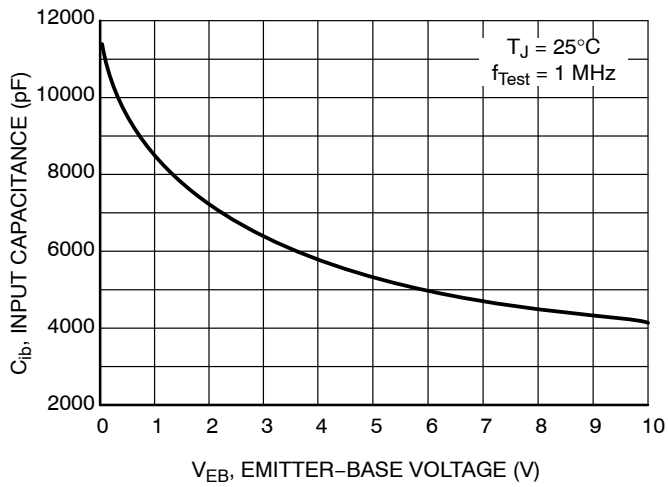


Figure 15. Input Capacitance

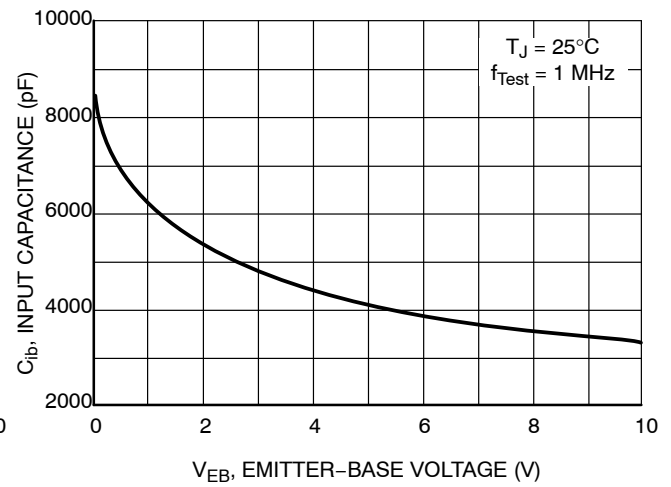


Figure 16. Input Capacitance

NJW3281G (NPN) NJW1302G (PNP)

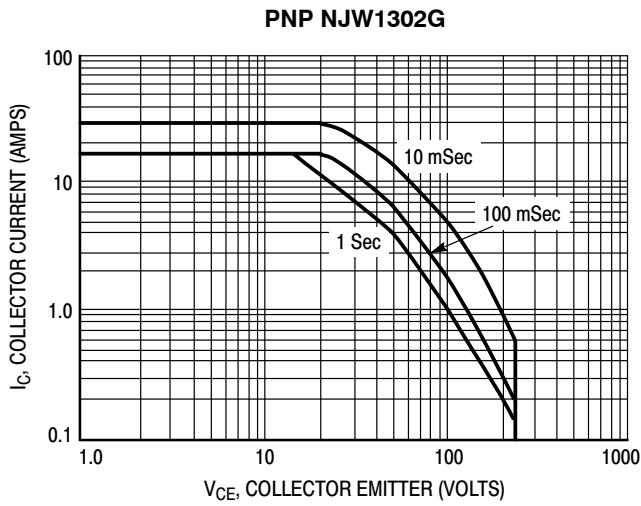


Figure 17. Active Region Safe Operating Area

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

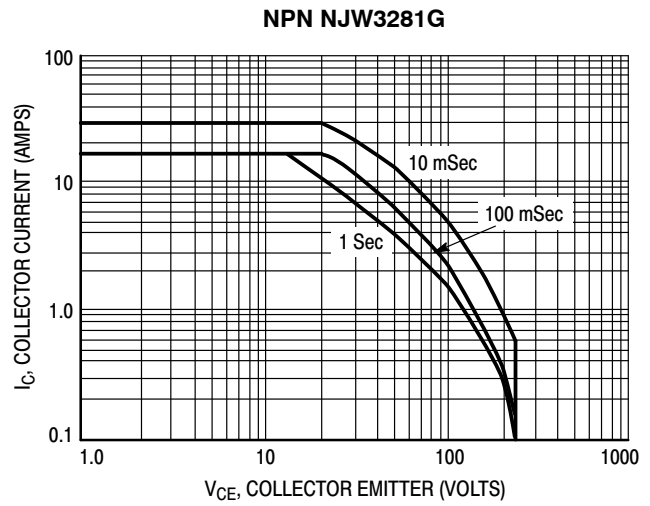


Figure 18. Active Region Safe Operating Area

The data of Figures 17 and 18 is based on $T_{J(pk)} = 150^{\circ}C$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power than can be handled to values less than the limitations imposed by second breakdown.

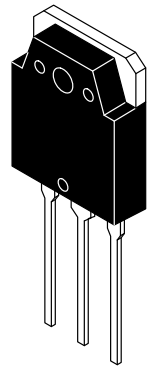
MECHANICAL CASE OUTLINE PACKAGE DIMENSIONS

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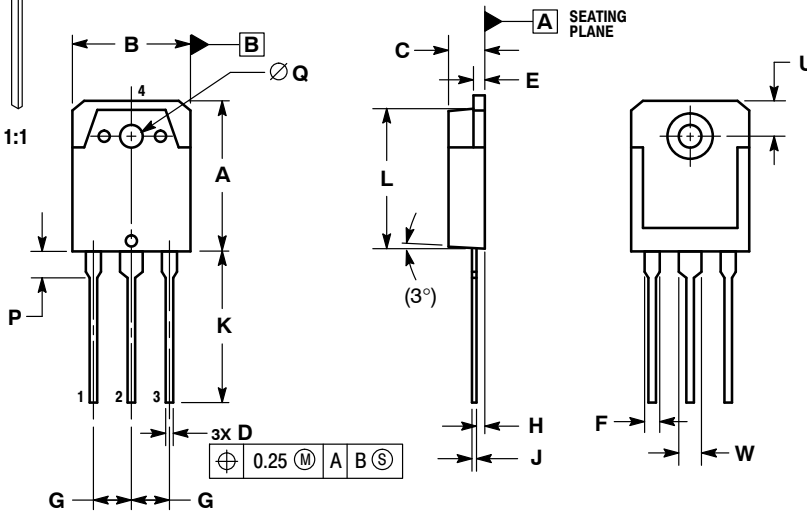


TO-3P-3LD CASE 340AB-01 ISSUE A

DATE 30 OCT 2007



SCALE 1:1



NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSION b APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30mm FROM THE TERMINAL TIP.
4. DIMENSION A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

| DIM | MILLIMETERS | | |
|-----|-------------|-------|-------|
| | MIN | NOM | MAX |
| A | 19.70 | 19.90 | 20.10 |
| B | 15.40 | 15.60 | 15.80 |
| C | 4.60 | 4.80 | 5.00 |
| D | 0.80 | 1.00 | 1.20 |
| E | 1.45 | 1.50 | 1.65 |
| F | 1.80 | 2.00 | 2.20 |
| G | 5.45 BSC | | |
| H | 1.20 | 1.40 | 1.60 |
| J | 0.55 | 0.60 | 0.75 |
| K | 19.80 | 20.00 | 20.20 |
| L | 18.50 | 18.70 | 18.90 |
| P | 3.30 | 3.50 | 3.70 |
| Q | 3.10 | 3.20 | 3.50 |
| U | 5.00 REF | | |
| W | 2.80 | 3.00 | 3.20 |

STYLE 1:

- PIN 1. BASE
- 2. COLLECTOR
- 3. EMITTER
- 4. COLLECTOR

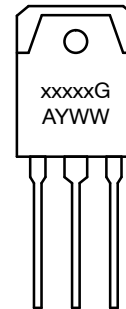
STYLE 2:

- PIN 1. ANODE
- 2. CATHODE
- 3. ANODE
- 4. CATHODE

STYLE 3:

- PIN 1. GATE
- 2. DRAIN
- 3. SOURCE
- 4. DRAIN

GENERIC MARKING DIAGRAM*



- xxxxx = Specific Device Code
- G = Pb-Free Package
- A = Assembly Location
- Y = Year
- WW = Work Week

*This information is generic. Please refer to device data sheet for actual part marking. Pb-Free indicator, "G", may or not be present.

| | | |
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