

# Complementary NPN-PNP Silicon Power Bipolar Transistors

## NJW3281G (NPN), NJW1302G (PNP)

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)

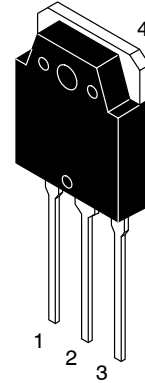
### MAXIMUM RATINGS (T<sub>J</sub> = 25 °C unless otherwise noted)

Symbol	Rating	Value	Unit
V <sub>CEO</sub>	Collector-Emitter Voltage	250	Vdc
V <sub>CB0</sub>	Collector-Base Voltage	250	Vdc
V <sub>EBO</sub>	Emitter-Base Voltage	5.0	Vdc
V <sub>CEX</sub>	Collector-Emitter Voltage – 1.5 V	250	Vdc
I <sub>C</sub>	Collector Current – Continuous	15	Adc
I <sub>CM</sub>	Collector Current – Peak (Note 1)	30	Adc
I <sub>B</sub>	Base Current – Continuous	1.6	Adc
P <sub>D</sub>	Total Power Dissipation @ T <sub>C</sub> = 25 °C Derate Above 25 °C	200 1.43	W W/°C
T <sub>J</sub> , T <sub>stg</sub>	Operating and Storage Junction Temperature Range	– 65 to +150	°C

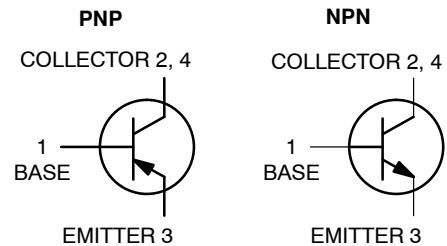
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

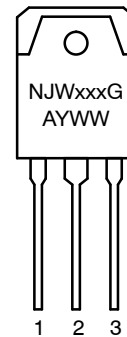
## 15 AMPERES COMPLEMENTARY SILICON POWER TRANSISTORS 250 VOLTS 200 WATTS



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



### MARKING DIAGRAM



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)

## THERMAL CHARACTERISTICS

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

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

Symbol	Characteristic	Min	Typ	Max	Unit
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### OFF CHARACTERISTICS

$V_{CEO(sus)}$	Collector-Emitter Sustaining Voltage ( $I_C = 100\text{ mAdc}$ , $I_B = 0$ )	250	–	–	Vdc
$I_{CBO}$	Collector Cutoff Current ( $V_{CB} = 250\text{ Vdc}$ , $I_E = 0$ )	–	–	50	$\mu\text{Adc}$
$I_{EBO}$	Emitter Cutoff Current ( $V_{EB} = 5\text{ Vdc}$ , $I_C = 0$ )	–	–	5	$\mu\text{Adc}$

### SECOND BREAKDOWN

$I_{S/b}$	Second Breakdown Collector with Base Forward Biased ( $V_{CE} = 50\text{ Vdc}$ , $t = 1\text{ s}$ (non-repetitive))	4	–	–	Adc
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### ON CHARACTERISTICS

$h_{FE}$	DC Current Gain ( $I_C = 100\text{ mAdc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 1\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 3\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 5\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ ) ( $I_C = 8\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ )	75 75 75 60 45	– – – – –	150 150 150 – –	–
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage ( $I_C = 8\text{ Adc}$ , $I_B = 0.8\text{ Adc}$ )	–	0.4	0.6	Vdc
$V_{BE(on)}$	Base-Emitter On Voltage ( $I_C = 8\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ )	–	–	1.5	Vdc

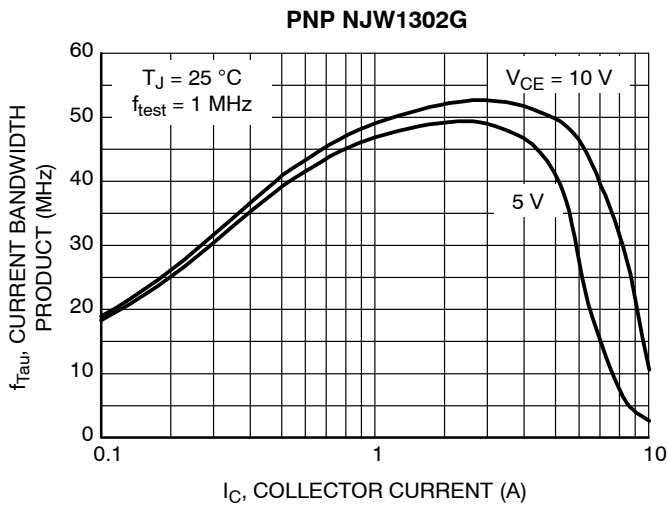
### DYNAMIC CHARACTERISTICS

$f_T$	Current-Gain – Bandwidth Product ( $I_C = 1\text{ Adc}$ , $V_{CE} = 5\text{ Vdc}$ , $f_{test} = 1\text{ MHz}$ )	–	30	–	MHz
$C_{ob}$	Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f_{test} = 1\text{ MHz}$ )	–	–	600	pF

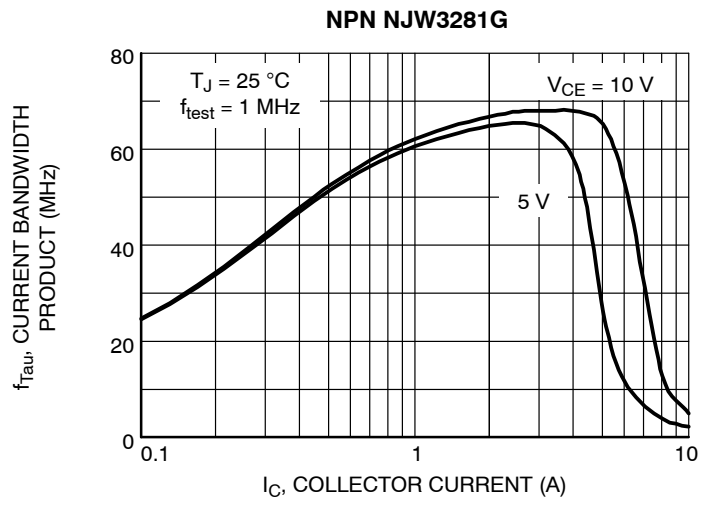
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

# NJW3281G (NPN), NJW1302G (PNP)

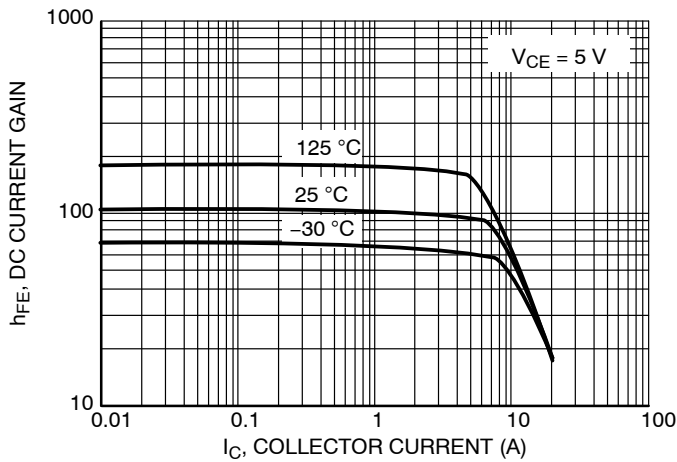
## TYPICAL CHARACTERISTICS



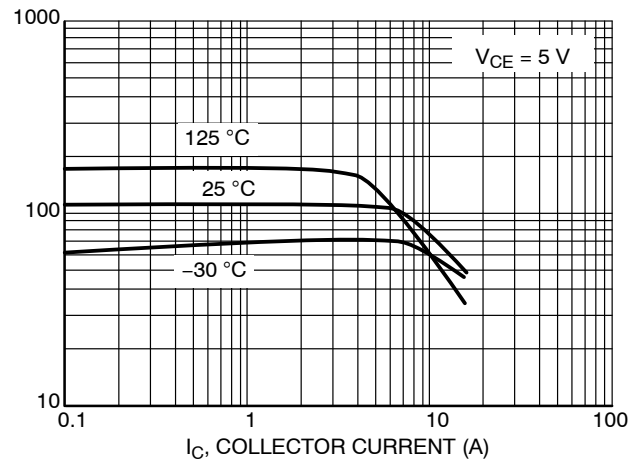
**Figure 1. Typical Current Gain Bandwidth Product**



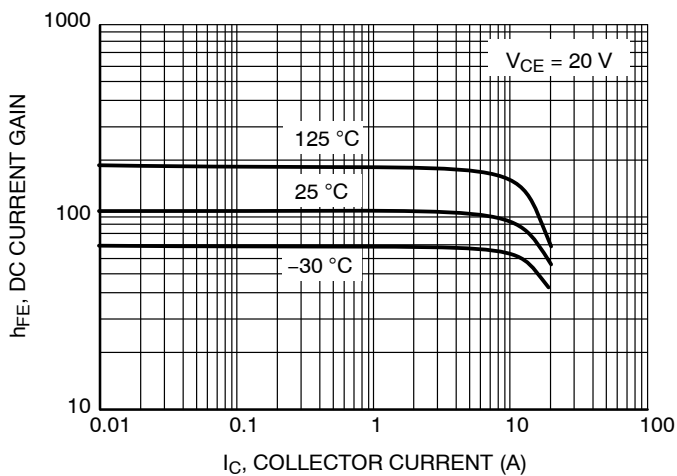
**Figure 2. Typical Current Gain Bandwidth Product**



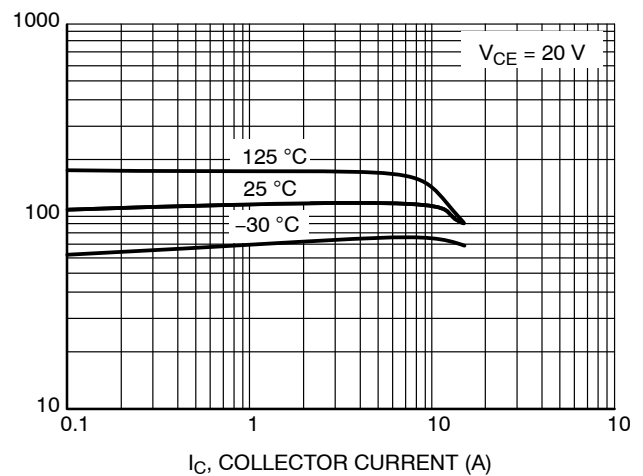
**Figure 3. DC Current Gain**



**Figure 4. DC Current Gain**



**Figure 5. DC Current Gain**



**Figure 6. DC Current Gain**

# NJW3281G (NPN), NJW1302G (PNP)

## TYPICAL CHARACTERISTICS (continued)

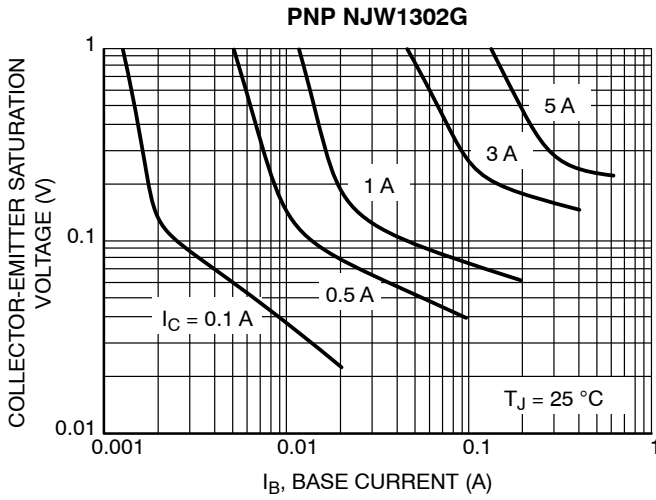


Figure 7. Saturation Region

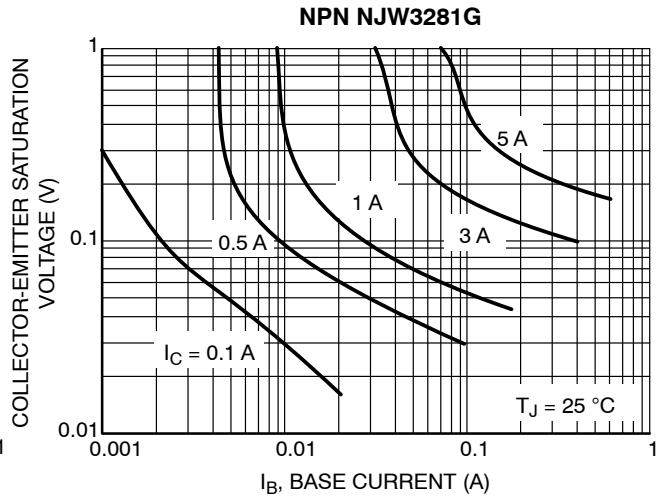


Figure 8. Saturation Region

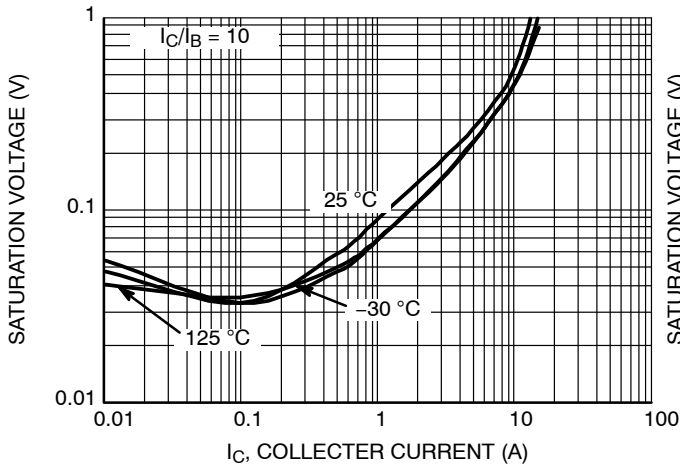


Figure 9.  $V_{CE(sat)}$ , Collector-Emitter Saturation Voltage

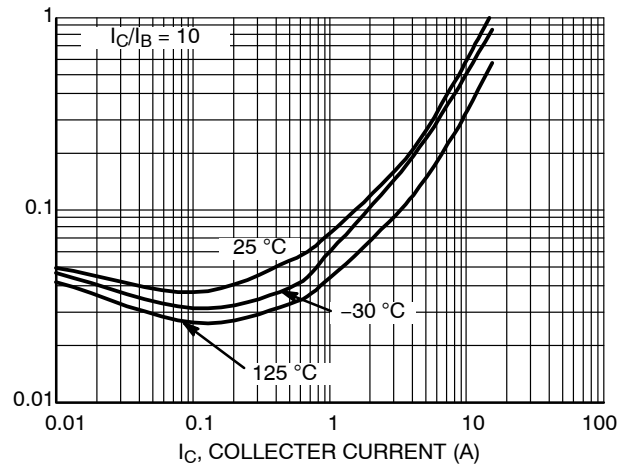


Figure 10.  $V_{CE(sat)}$ , Collector-Emitter Saturation Voltage

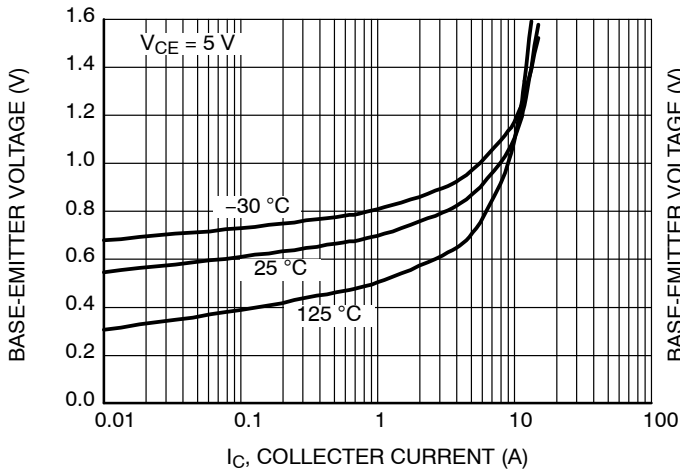


Figure 11.  $V_{BE(on)}$ , Base-Emitter Voltage

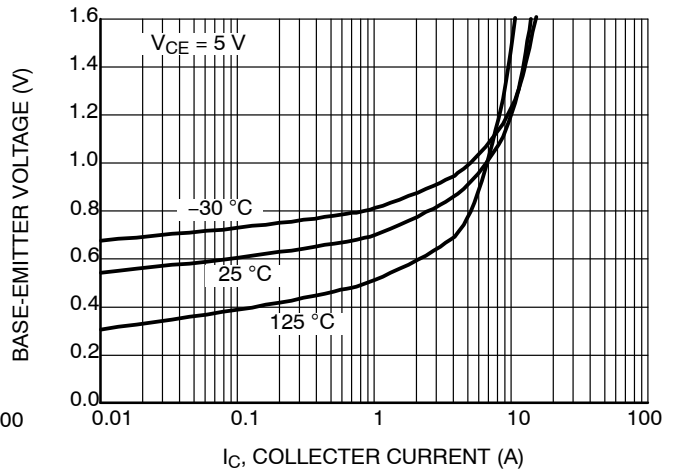
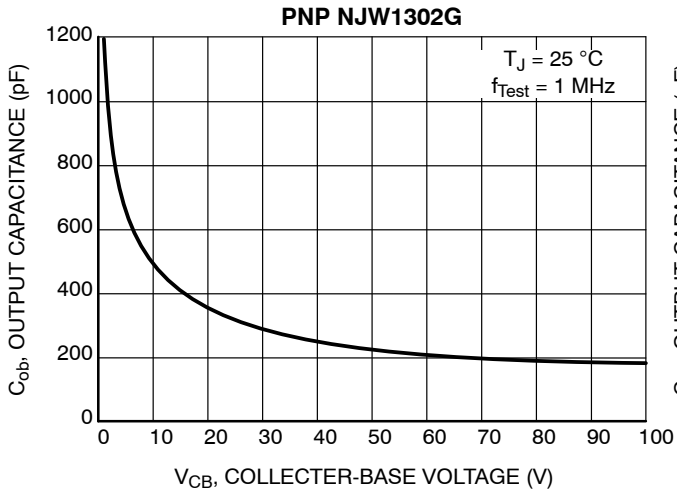


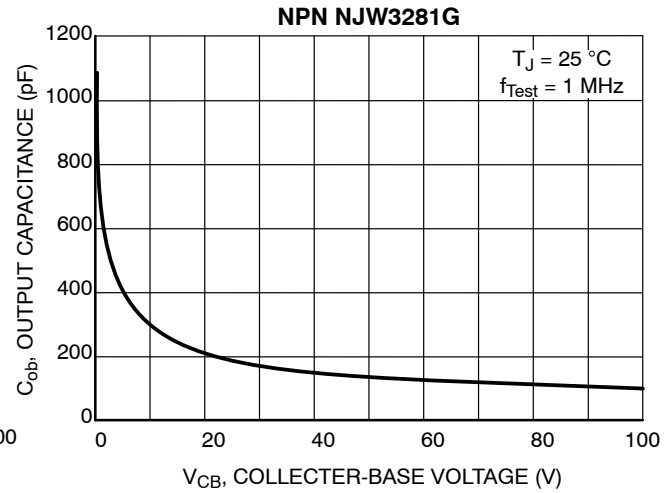
Figure 12.  $V_{BE(on)}$ , Base-Emitter Voltage

# NJW3281G (NPN), NJW1302G (PNP)

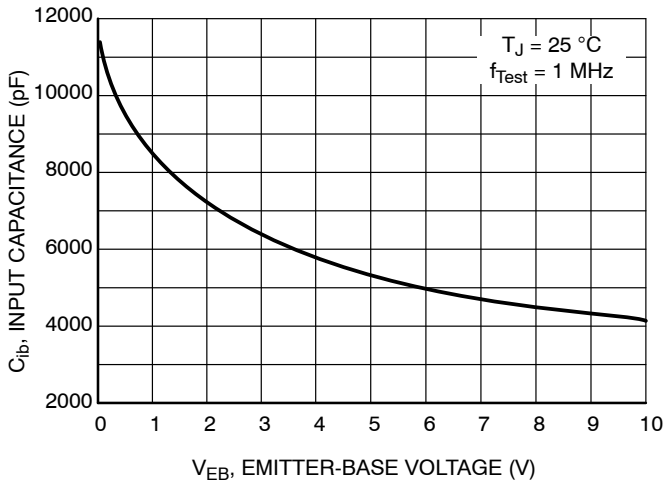
## TYPICAL CHARACTERISTICS (continued)



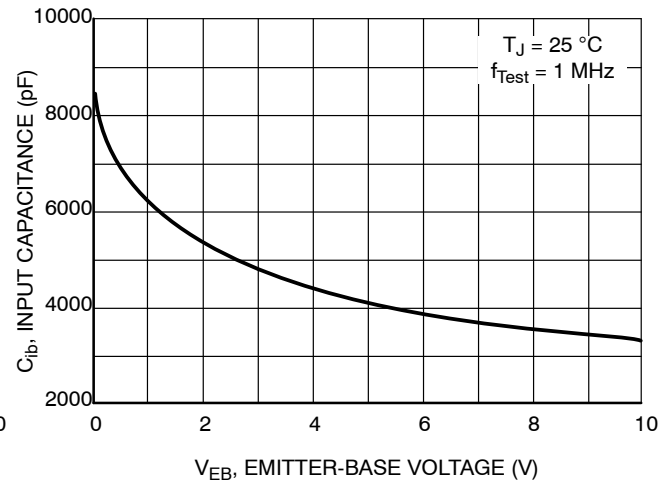
**Figure 13. Output Capacitance**



**Figure 14. Output Capacitance**



**Figure 15. Input Capacitance**



**Figure 16. Input Capacitance**

# NJW3281G (NPN), NJW1302G (PNP)

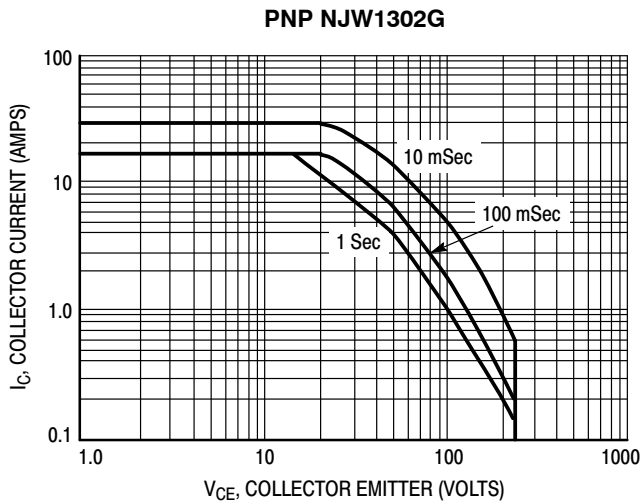


Figure 17. Active Region Safe Operating Area

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.

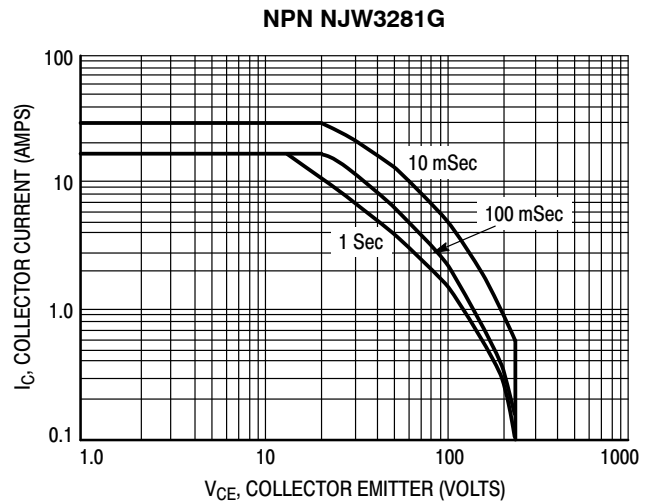


Figure 18. Active Region Safe Operating Area

The data of Figures 17 and 18 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  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.

# NJW3281G (NPN), NJW1302G (PNP)

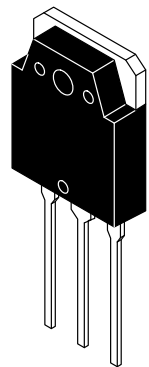
## REVISION HISTORY

Revision	Description of Changes	Date
2	Rebranded the Data Sheet to <b>onsemi</b> format.	7/7/2025

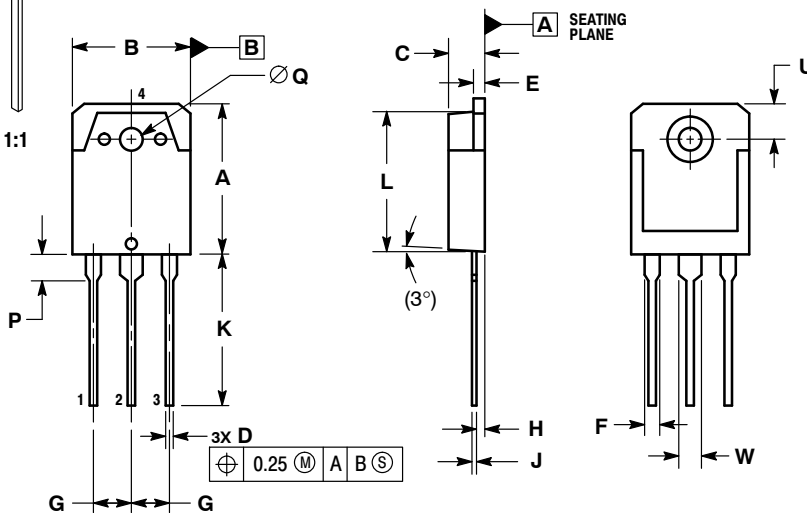
This document has undergone updates prior to the inclusion of this revision history table. The changes tracked here only reflect updates made on the noted approval dates.

TO-3P-3LD  
CASE 340AB  
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

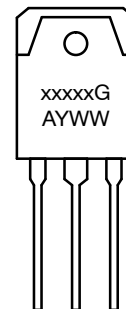
STYLE 2:

- 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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DESCRIPTION:	TO-3P-3LD	PAGE 1 OF 1

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