

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)

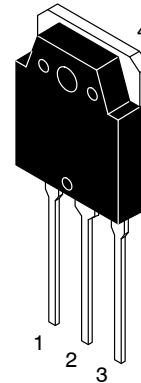
MAXIMUM RATINGS ($T_J = 25^\circ\text{C}$ unless otherwise noted)

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

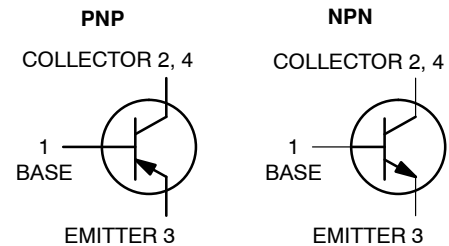
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

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

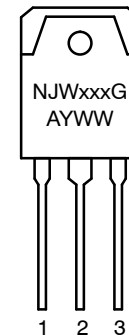
15 AMPERES COMPLEMENTARY SILICON POWER TRANSISTORS 250 VOLTS 200 WATTS



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	$^{\circ}\text{C}/\text{W}$
$R_{\theta JA}$	Thermal Resistance, Junction-to-Ambient	40	$^{\circ}\text{C}/\text{W}$

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

Symbol	Characteristic	Min	Typ	Max	Unit
--------	----------------	-----	-----	-----	------

OFF CHARACTERISTICS

$V_{CE(sus)}$	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	μAdc
I_{EBO}	Emitter Cutoff Current ($V_{EB} = 5\text{ Vdc}$, $I_C = 0$)	–	–	5	μAdc

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
-----------	--	---	---	---	-----

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

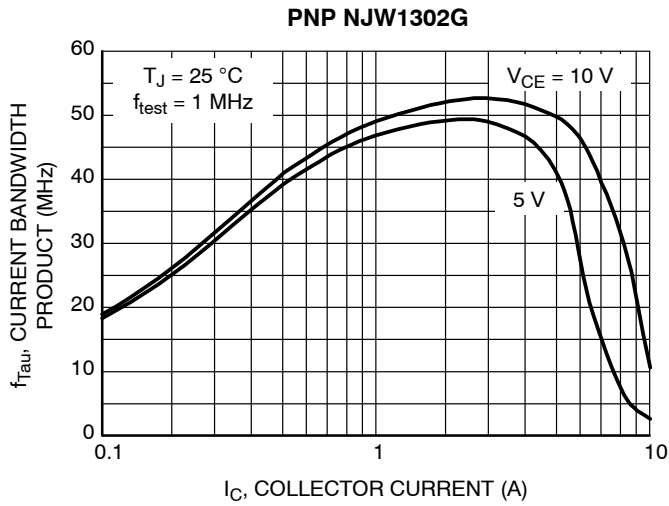


Figure 1. Typical Current Gain Bandwidth Product

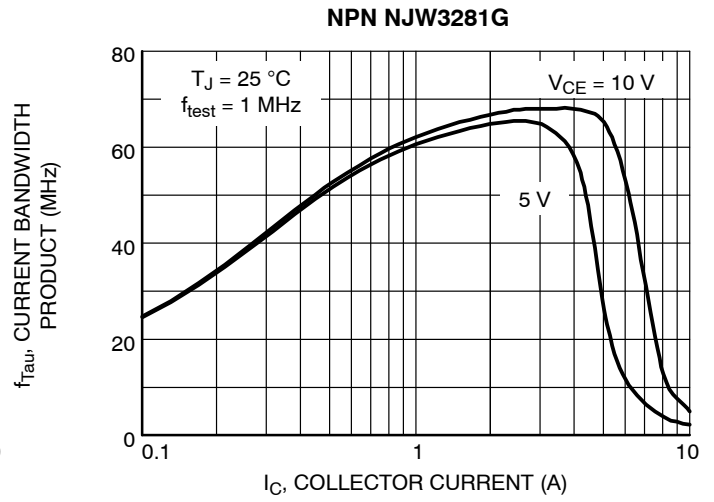


Figure 2. Typical Current Gain Bandwidth Product

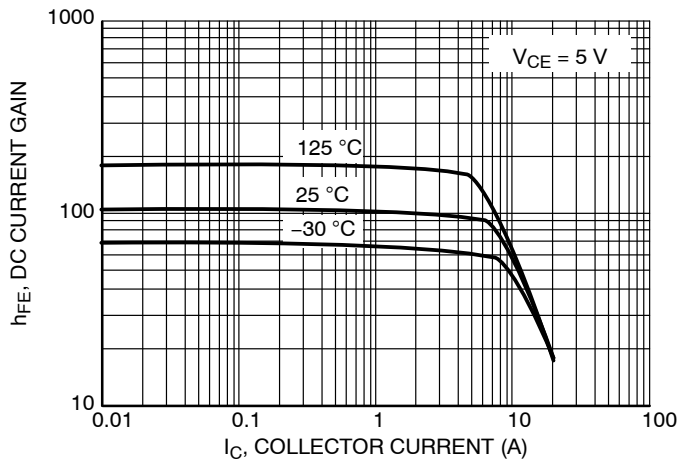


Figure 3. DC Current Gain

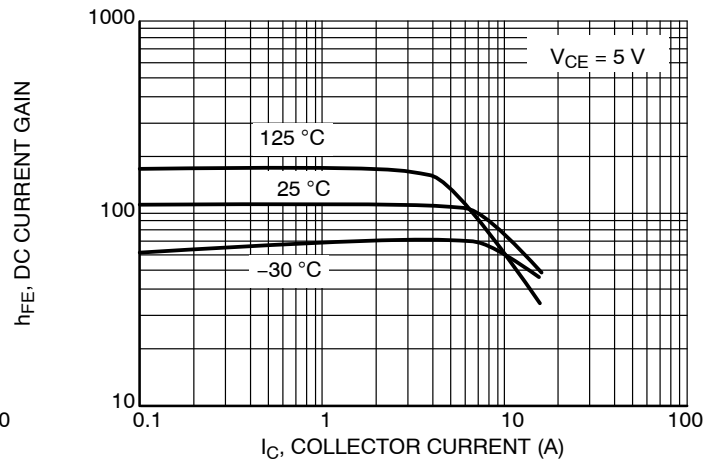


Figure 4. DC Current Gain

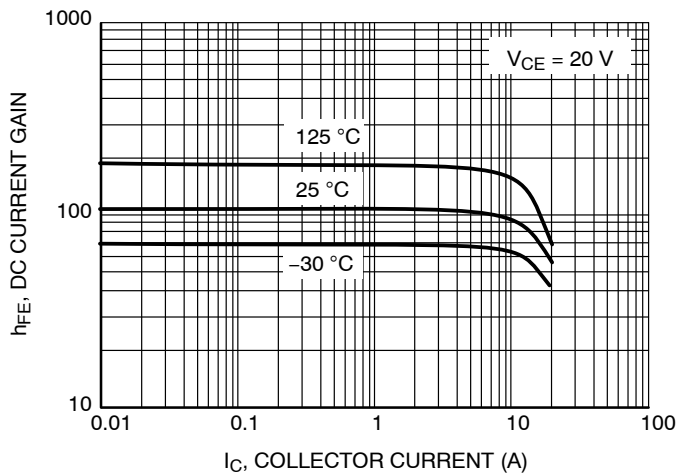


Figure 5. DC Current Gain

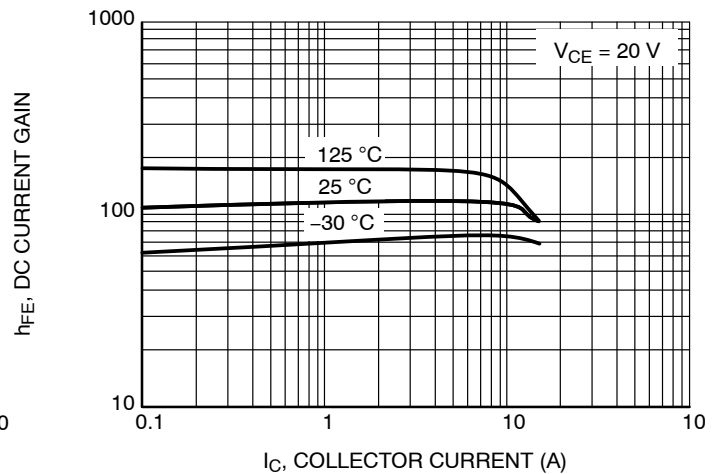


Figure 6. DC Current Gain

NJW3281G (NPN), NJW1302G (PNP)

TYPICAL CHARACTERISTICS (continued)

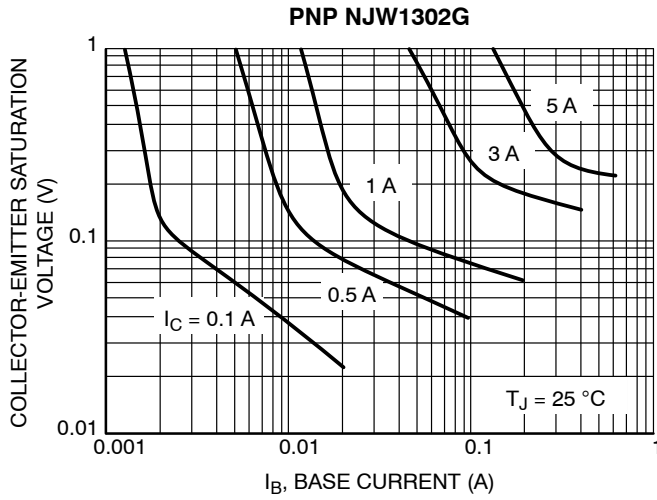


Figure 7. Saturation Region

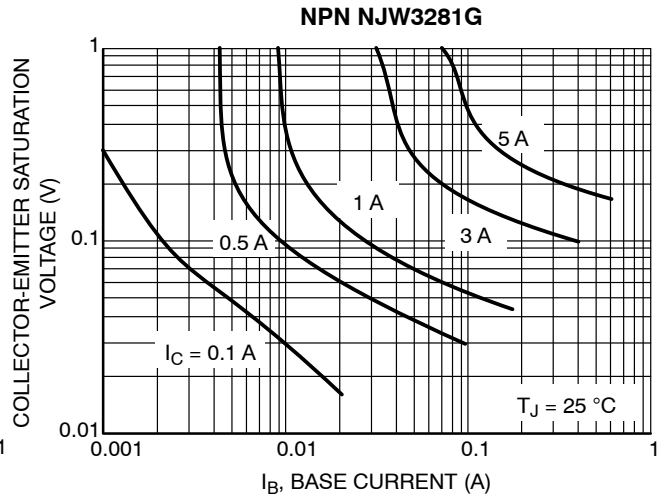


Figure 8. Saturation Region

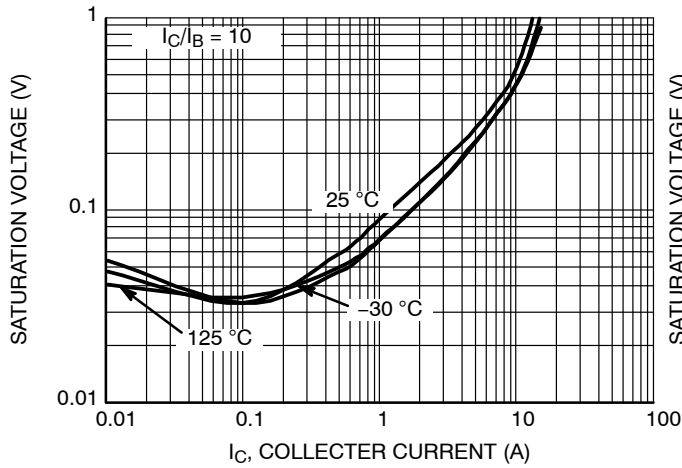


Figure 9. $V_{CE(sat)}$, Collector-Emitter Saturation Voltage

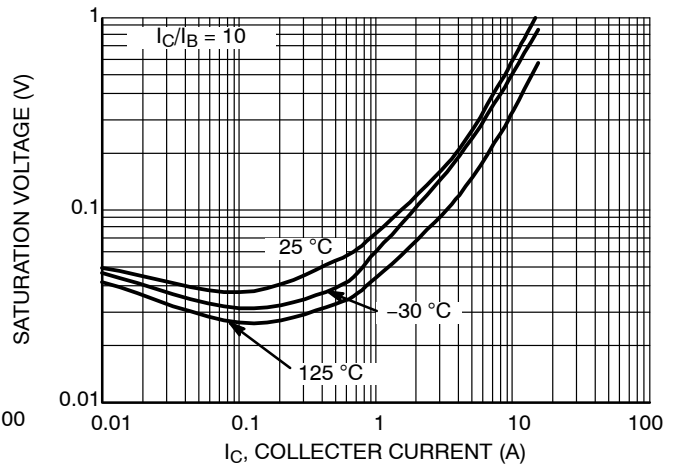


Figure 10. $V_{CE(sat)}$, Collector-Emitter Saturation Voltage

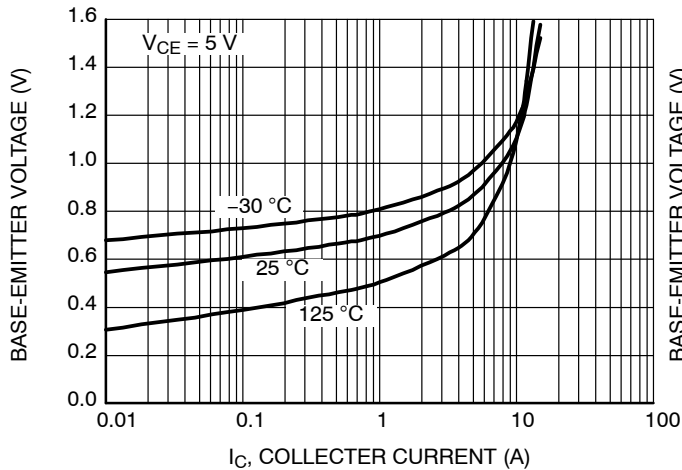


Figure 11. $V_{BE(on)}$, Base-Emitter Voltage

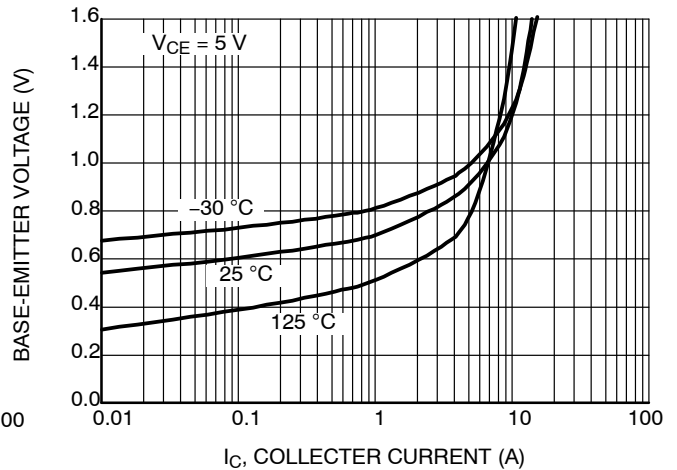


Figure 12. $V_{BE(on)}$, Base-Emitter Voltage

NJW3281G (NPN), NJW1302G (PNP)

TYPICAL CHARACTERISTICS (continued)

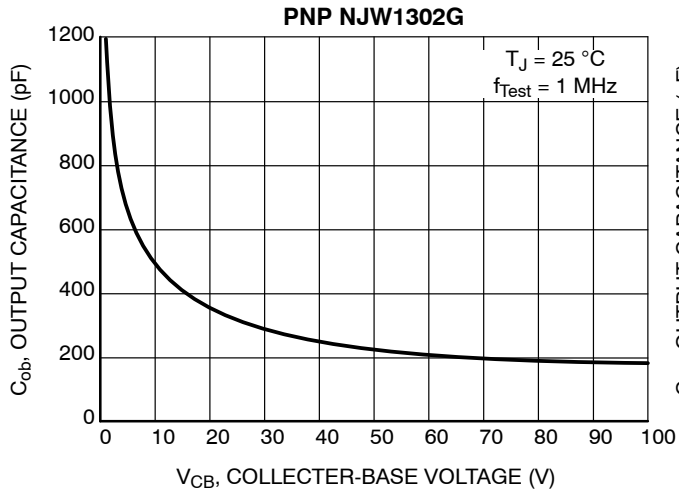


Figure 13. Output Capacitance

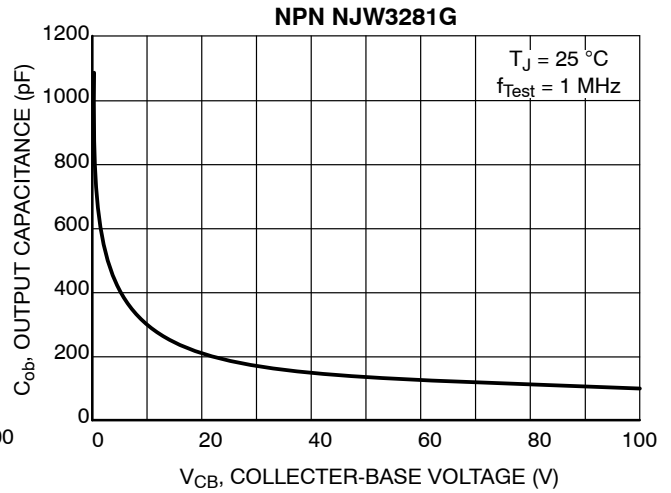


Figure 14. Output Capacitance

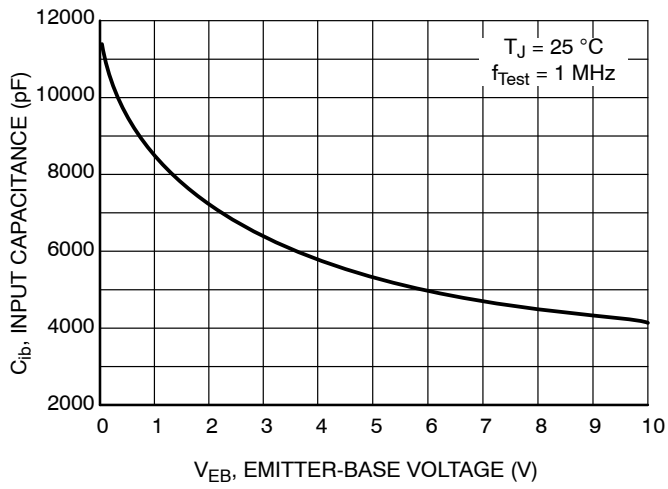


Figure 15. Input Capacitance

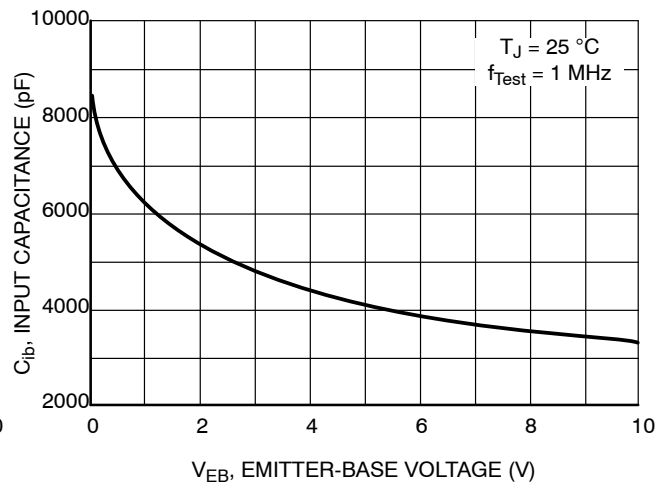


Figure 16. Input Capacitance

NJW3281G (NPN), NJW1302G (PNP)

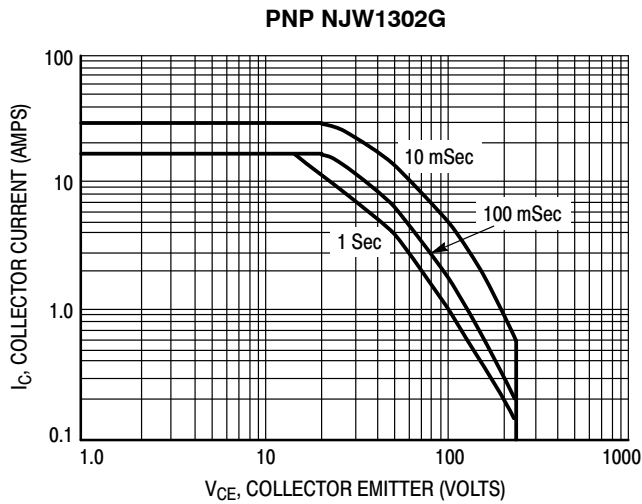


Figure 17. Active Region Safe Operating Area

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.

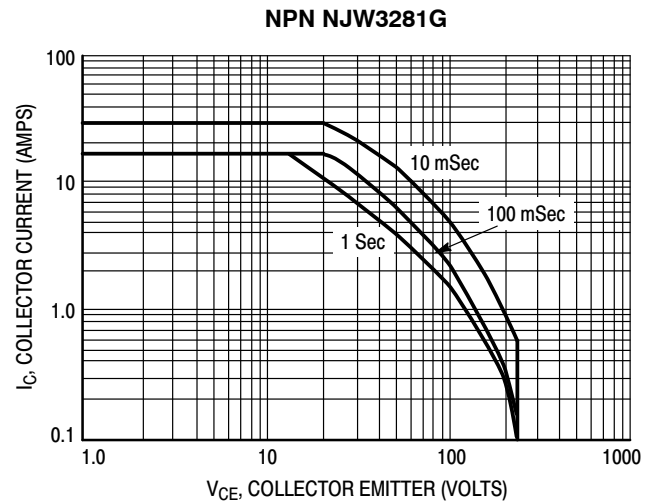


Figure 18. Active Region Safe Operating Area

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)

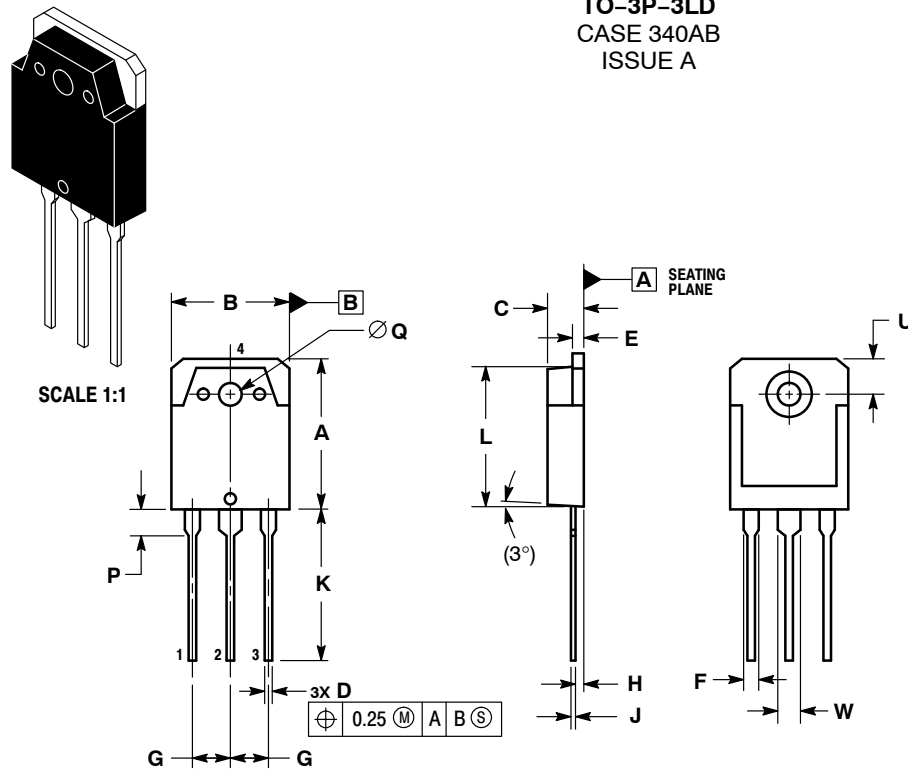
REVISION HISTORY

Revision	Description of Changes	Date
2	Rebranded the Data Sheet to onsemi 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

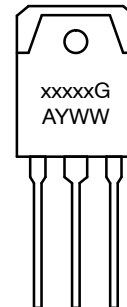


NOTES:

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

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.

DOCUMENT NUMBER:	98AON25095D	Electronic versions are uncontrolled except when accessed directly from the Document Repository. Printed versions are uncontrolled except when stamped "CONTROLLED COPY" in red.
DESCRIPTION:	TO-3P-3LD	PAGE 1 OF 1

onsemi and onsemi are trademarks of Semiconductor Components Industries, LLC dba onsemi or its subsidiaries in the United States and/or other countries. onsemi reserves the right to make changes without further notice to any products herein. onsemi makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does onsemi assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. onsemi does not convey any license under its patent rights nor the rights of others.

onsemi, **Onsemi**, and other names, marks, and brands are registered and/or common law trademarks of Semiconductor Components Industries, LLC dba "**onsemi**" or its affiliates and/or subsidiaries in the United States and/or other countries. **onsemi** owns the rights to a number of patents, trademarks, copyrights, trade secrets, and other intellectual property. A listing of **onsemi**'s product/patent coverage may be accessed at www.onsemi.com/site/pdf/Patent-Marking.pdf. **onsemi** reserves the right to make changes at any time to any products or information herein, without notice. The information herein is provided "as-is" and **onsemi** makes no warranty, representation or guarantee regarding the accuracy of the information, product features, availability, functionality, or suitability of its products for any particular purpose, nor does **onsemi** assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation special, consequential or incidental damages. Buyer is responsible for its products and applications using **onsemi** products, including compliance with all laws, regulations and safety requirements or standards, regardless of any support or applications information provided by **onsemi**. "Typical" parameters which may be provided in **onsemi** data sheets and/or specifications can and do vary in different applications and actual performance may vary over time. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts. **onsemi** does not convey any license under any of its intellectual property rights nor the rights of others. **onsemi** products are not designed, intended, or authorized for use as a critical component in life support systems or any FDA Class 3 medical devices or medical devices with a same or similar classification in a foreign jurisdiction or any devices intended for implantation in the human body. Should Buyer purchase or use **onsemi** products for any such unintended or unauthorized application, Buyer shall indemnify and hold **onsemi** and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that **onsemi** was negligent regarding the design or manufacture of the part. **onsemi** is an Equal Opportunity/Affirmative Action Employer. This literature is subject to all applicable copyright laws and is not for resale in any manner.

ADDITIONAL INFORMATION

TECHNICAL PUBLICATIONS:

Technical Library: www.onsemi.com/design/resources/technical-documentation
onsemi Website: www.onsemi.com

ONLINE SUPPORT: www.onsemi.com/support

For additional information, please contact your local Sales Representative at
www.onsemi.com/support/sales