

Silicon Power Transistors

NJW21193G (PNP) NJW21194G (NPN)

The NJW21193G and NJW21194G utilize Perforated Emitter technology and are specifically designed for high power audio output, disk head positioners and linear applications.

Features

- Total Harmonic Distortion Characterized
- High DC Current Gain
- Excellent Gain Linearity
- High SOA
- These Devices are Pb-Free and are RoHS Compliant

MAXIMUM RATINGS

Symbol	Rating	Value	Unit
V _{CEO}	Collector-Emitter Voltage	250	Vdc
V_{CBO}	Collector-Base Voltage	400	Vdc
V_{EBO}	Emitter-Base Voltage	5.0	Vdc
V_{CEX}	Collector-Emitter Voltage – 1.5 V	400	Vdc
I _C	Collector Current - Continuous	16	Adc
I _{CM}	Collector Current - Peak (Note 1)	30	Adc
Ι _Β	Base Current - Continuous	5.0	Adc
P _D	Total Power Dissipation @ T _C = 25 °C Derate Above 25 °C	200 1.6	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.

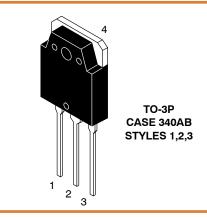
1. Pulse Test: Pulse Width = 5 μs, Duty Cycle ≤ 10%.

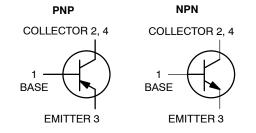
THERMAL CHARACTERISTICS

Symbol	Symbol Characteristic		Unit
$R_{ heta JC}$	Thermal Resistance, Junction-to-Case	0.625	°C/W
$R_{ heta JA}$	Thermal Resistance, Junction-to-Ambient	40	°C/W

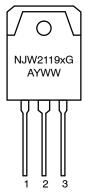
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16 AMPERES COMPLEMENTARY SILICON POWER TRANSISTORS 250 VOLTS, 200 WATTS





MARKING DIAGRAM



NJW2119= Specific Device Code

x = 3 or 4

G = Pb-Free Package A = Assembly Location

Y = Year WW = Work Week

ORDERING INFORMATION

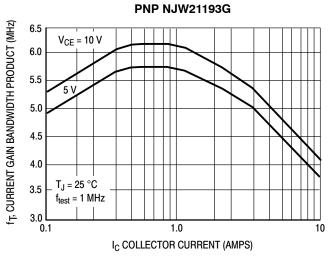
Device	Package	Shipping
NJW21193G	TO-3P (Pb-Free)	30 Units/Rail
NJW21194G	TO-3P (Pb-Free)	30 Units/Rail

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

Symbol	Characteristic		Min	Тур	Max	Unit
FF CHARA	CTERISTICS		•	•	•	•
V _{CEO(sus)}	Collector-Emitter Sustaining Voltage $(I_C = 100 \text{ mAdc}, I_B = 0)$		250	-	_	Vdc
I _{CEO}	Collector Cutoff Current (V _{CE} = 200 Vdc, I _B = 0)		-	-	100	μAdc
I _{EBO}	Emitter Cutoff Current (V _{CE} = 5 Vdc, I _C = 0)		-	-	100	μAdc
I _{CEX}	Collector Cutoff Current (V _{CE} = 250 Vdc, V _{BE(off)} = 1.5 Vdc)		-	-	100	μAdc
ECOND BF	REAKDOWN					
I _{S/b}	Second Breakdown Collector Current with Base Forward Biased (V _{CE} = 50 Vdc, t = 1 s (non-repetitive) (V _{CE} = 80 Vdc, t = 1 s (non-repetitive)		4.0 2.25		- -	Adc
N CHARAC	CTERISTICS		<u>.</u>	<u>I</u>		<u></u>
h _{FE}	DC Current Gain ($I_C = 8$ Adc, $V_{CE} = 5$ Vdc) ($I_C = 16$ Adc, $I_B = 5$ Adc)		20 8	- -	80 -	
V _{BE(on)}	Base-Emitter On Voltage (I _C = 8 Adc, V _{CE} = 5 Vdc)		-	-	2.2	Vdc
V _{CE(sat)}	Collector-Emitter Saturation Voltage ($I_C = 8$ Adc, $I_B = 0.8$ Adc) ($I_C = 16$ Adc, $I_B = 3.2$ Adc)			- -	1.4 4	Vdc
YNAMIC C	HARACTERISTICS					
T _{HD}	Total Harmonic Distortion at the Output V _{RMS} = 28.3 V, f = 1 kHz, P _{LOAD} = 100 W _{RMS}	h _{FE} unmatched	_	0.8	_	%
	(Matched pair h _{FE} = 50 @ 5 A/5 V)	h _{FE} matched	_	0.08	-	
f _T	Current Gain Bandwidth Product $(I_C = 1 \text{ Adc}, V_{CE} = 10 \text{ Vdc}, f_{test} = 1 \text{ MHz})$		4	-	_	MHz
C _{ob}	Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f _{test} = 1 MHz)		-	-	500	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.

TYPICAL CHARACTERISTICS

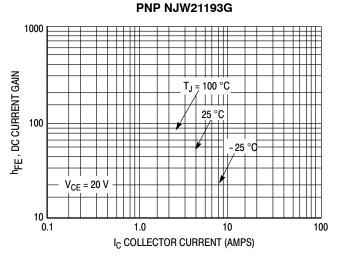


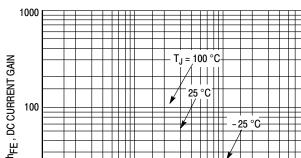
NPN NJW21194G f_{T} , CURRENT GAIN BANDWIDTH PRODUCT (MHz) 8.0 7.0 10 V 6.0 5.0 $V_{CE} = 5 V$ 4.0 3.0 2.0 $T_J = 25$ °C 1.0 $f_{test} = 1 \text{ MHz}$ 0 1.0 0.1 10 IC COLLECTOR CURRENT (AMPS)

Figure 1. Typical Current Gain Bandwidth Product

Figure 2. Typical Current Gain Bandwidth Product

NPN NJW21194G





1.0

V_{CE} = 20 V

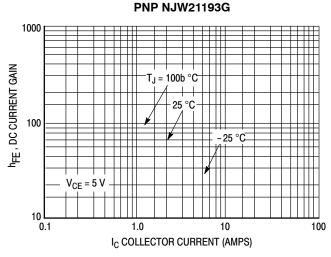
10 L 0.1

Figure 3. DC Current Gain, V_{CE} = 20 V

 I_{C} COLLECTOR CURRENT (AMPS) Figure 4. DC Current Gain, $V_{CE} = 20 \text{ V}$

10

100





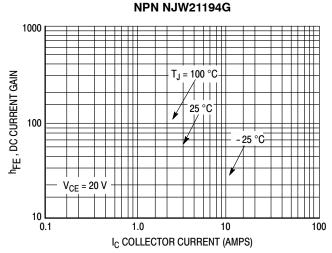


Figure 6. DC Current Gain, V_{CE} = 5 V

TYPICAL CHARACTERISTICS

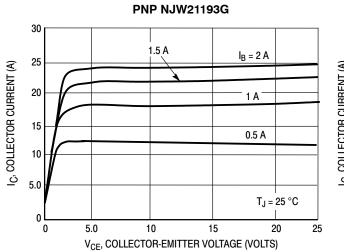


Figure 7. Typical Output Characteristics

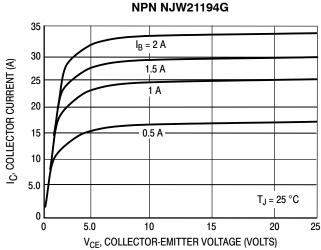


Figure 8. Typical Output Characteristics

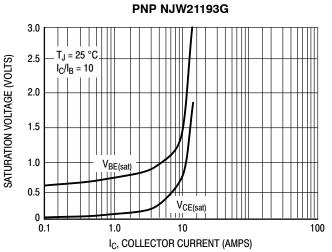


Figure 9. Typical Saturation Voltages

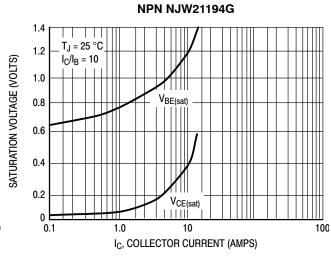


Figure 10. Typical Saturation Voltages

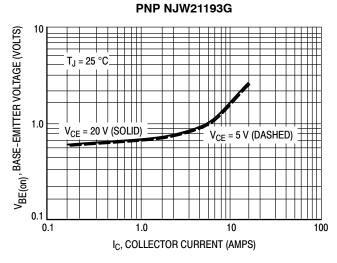


Figure 11. Typical Base-Emitter Voltage

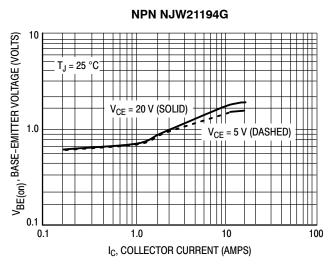


Figure 12. Typical Base-Emitter Voltage

PNP NJW21193G 100 100 100 mSec 100 mSec

Figure 13. 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.

NPN NJW21194G 100 10 mSec 100 mSec 100

V_{CE}, COLLECTOR EMITTER (VOLTS)

Figure 14. Active Region Safe Operating Area

The data of Figure 13 is based on $T_{J(pk)} = 150$ °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.

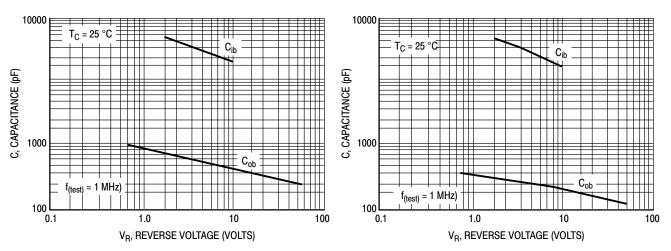


Figure 15. NJW21193G Typical Capacitance

Figure 16. NJW21194G Typical Capacitance

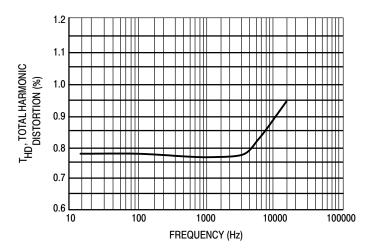


Figure 17. Typical Total Harmonic Distortion

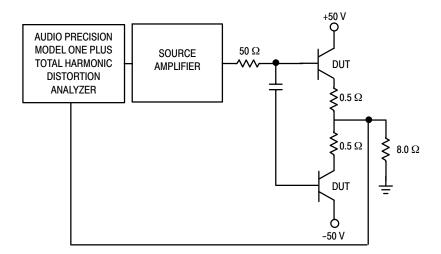


Figure 18. Total Harmonic Distortion Test Circuit

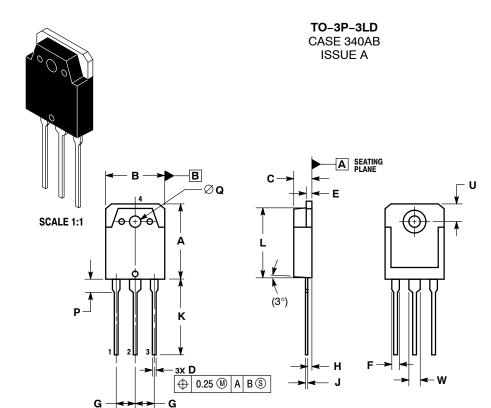
REVISION HISTORY

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.

DATE 30 OCT 2007

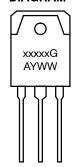




- DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
- CONTROLLING DIMENSION: MILLIMETERS
 DIMENSION & APPLIES TO PLATED TERMINAL AND IS MEASURED BETWEEN 0.15 AND 0.30mm FROM THE TERMINAL TIP.
- DIMENSION A AND B DO NOT INCLUDE MOLD FLASH, PROTRUSIONS, OR GATE BURRS.

	MILLIMETERS		
DIM	MIN	NOM	MAX
Α	19.70	19.90	20.10
В	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		
Н	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 = Pb-Free Package G = Assembly Location Α Υ = 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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STYLE 1: PIN 1. BASE 2. COLLECTOR

- EMITTER
- COLLECTOR

STYLE 2: ANODE CATHODE PIN 1. 2.

ANODE CATHODE

PIN 1. GATE 2. DRAIN SOURCE DRAIN

STYLE 3:

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