

NJL0281D (NPN) NJL0302D (PNP)

Complementary ThermalTrak™ Transistors

The ThermalTrak family of devices has been designed to eliminate thermal equilibrium lag time and bias trimming in audio amplifier applications. They can also be used in other applications as transistor die protection devices.

Features

- Thermally Matched Bias Diode
- Instant Thermal Bias Tracking
- Absolute Thermal Integrity
- High Safe Operating Area
- Pb-Free Packages are Available*

Benefits

- Eliminates Thermal Equilibrium Lag Time and Bias Trimming
- Superior Sound Quality Through Improved Dynamic Temperature Response
- Significantly Improved Bias Stability
- Simplified Assembly
 - ◆ Reduced Labor Costs
 - ◆ Reduced Component Count
- High Reliability

Applications

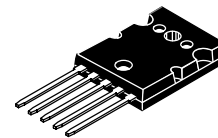
- High-End Consumer Audio Products
 - ◆ Home Amplifiers
 - ◆ Home Receivers
- Professional Audio Amplifiers
 - ◆ Theater and Stadium Sound Systems
 - ◆ Public Address Systems (PAs)



ON Semiconductor®

<http://onsemi.com>

**BIPOLAR POWER
TRANSISTORS**
15 AMP, 260 VOLT, 180 WATT

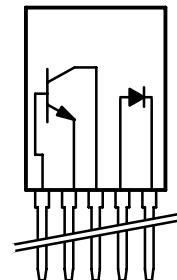


TO-264, 5 LEAD
CASE 340AA
STYLE 1

MARKING DIAGRAM



SCHEMATIC



NJL0xxxD = Device Code
 xxx = 281 or 302
 G = Pb-Free Package
 A = Assembly Location
 YY = Year
 WW = Work Week

ORDERING INFORMATION

Device	Package	Shipping
NJL0281D	TO-264	25 Units / Rail
NJL0281DG	TO-264 (Pb-Free)	25 Units / Rail
NJL0302D	TO-264	25 Units / Rail
NJL0302DG	TO-264 (Pb-Free)	25 Units / Rail

*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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MAXIMUM RATINGS (T_J = 25°C unless otherwise noted)

Rating	Symbol	Value	Unit
Collector–Emitter Voltage	V _{CEO}	260	Vdc
Collector–Base Voltage	V _{CBO}	260	Vdc
Emitter–Base Voltage	V _{EBO}	5	Vdc
Collector–Emitter Voltage – 1.5 V	V _{CEX}	260	Vdc
Collector Current – Continuous – Peak (Note 1)	I _C	15 25	Adc
Base Current – Continuous	I _B	1.5	Adc
Total Power Dissipation @ T _C = 25°C Derate Above 25°C	P _D	180 1.43	W W/°C
Operating and Storage Junction Temperature Range	T _J , T _{stg}	– 65 to +150	°C
DC Blocking Voltage	V _R	200	V
Average Rectified Forward Current	I _{F(AV)}	1.0	A

THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	R _{θJC}	0.694	°C/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%.

ATTRIBUTES

Characteristic	Value
ESD Protection Human Body Model Machine Model	>8000 V > 400 V
Flammability Rating	UL 94 V–0 @ 0.125 in

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage ($I_C = 100\text{ mAdc}$, $I_B = 0$)	$V_{CE(sus)}$	260	-	Vdc
Collector Cutoff Current ($V_{CB} = 260\text{ Vdc}$, $I_E = 0$)	I_{CBO}	-	10	μAdc
Emitter Cutoff Current ($V_{EB} = 5\text{ Vdc}$, $I_C = 0$)	I_{EBO}	-	5	μAdc
ON CHARACTERISTICS				
DC Current Gain ($I_C = 500\text{ mAdc}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 1\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$) ($I_C = 3\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	h_{FE}	75 75 75	150 150 150	
Collector-Emitter Saturation Voltage ($I_C = 5\text{ Adc}$, $I_B = 0.5\text{ Adc}$)	$V_{CE(sat)}$	-	1.0	Vdc
Base-Emitter On Voltage ($I_C = 5\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$)	$V_{CE(on)}$	-	1.2	Vdc
DYNAMIC CHARACTERISTICS				
Current-Gain - Bandwidth Product ($I_C = 1\text{ Adc}$, $V_{CE} = 5\text{ Vdc}$, $f_{test} = 1\text{ MHz}$)	f_T	30	-	MHz
Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $I_E = 0$, $f_{test} = 1\text{ MHz}$)	C_{ob}	-	400	pF
Maximum Instantaneous Forward Voltage (Note 2) ($i_F = 1.0\text{ A}$, $T_J = 25^\circ\text{C}$) ($i_F = 1.0\text{ A}$, $T_J = 150^\circ\text{C}$)	V_F	1.1 0.93		V
Maximum Instantaneous Reverse Current (Note 2) (Rated dc Voltage, $T_J = 25^\circ\text{C}$) (Rated dc Voltage, $T_J = 150^\circ\text{C}$)	i_R	10 100		μA
Maximum Reverse Recovery Time ($i_F = 1.0\text{ A}$, $di/dt = 50\text{ A}/\mu\text{s}$)	t_{rr}	100		ns

2. Diode Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2.0\%$.

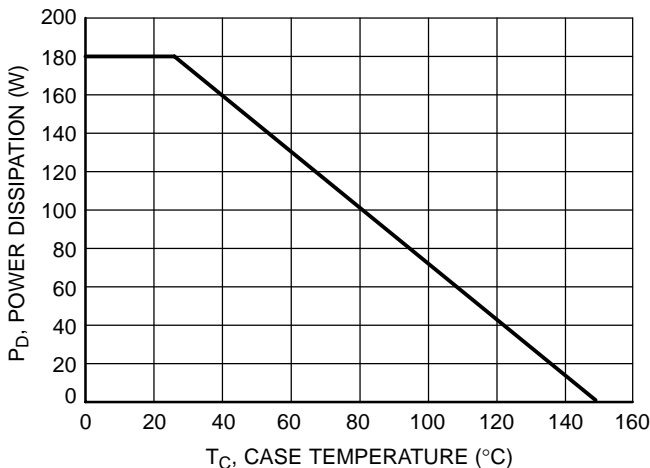


Figure 1. Power Derating

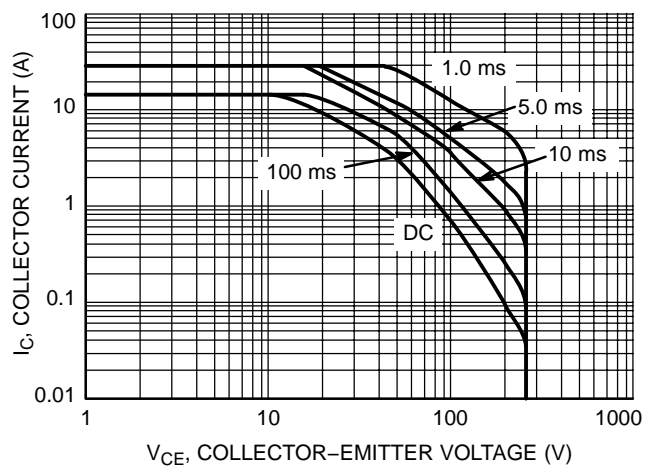


Figure 2. Safe Operating Area

NJL0281D (NPN) NJL0302D (PNP)

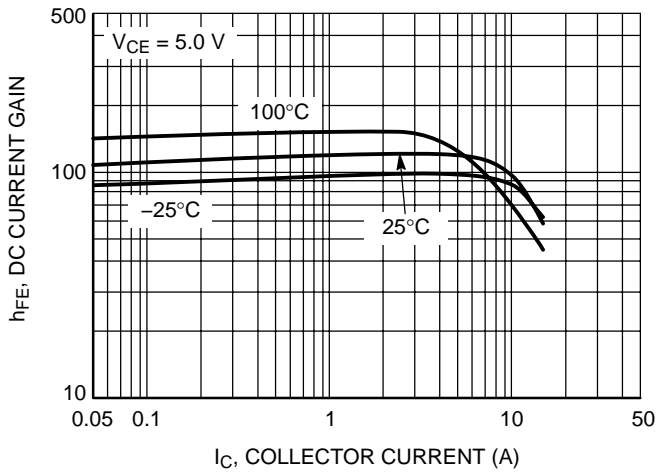


Figure 3. NJL0281A DC Current Gain

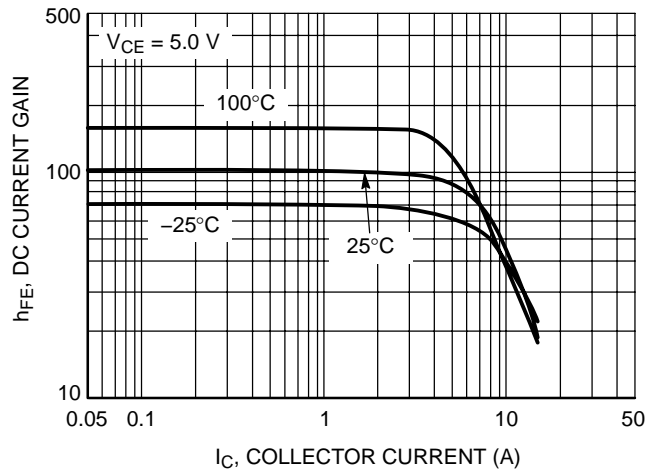


Figure 4. NJL0302A DC Current Gain

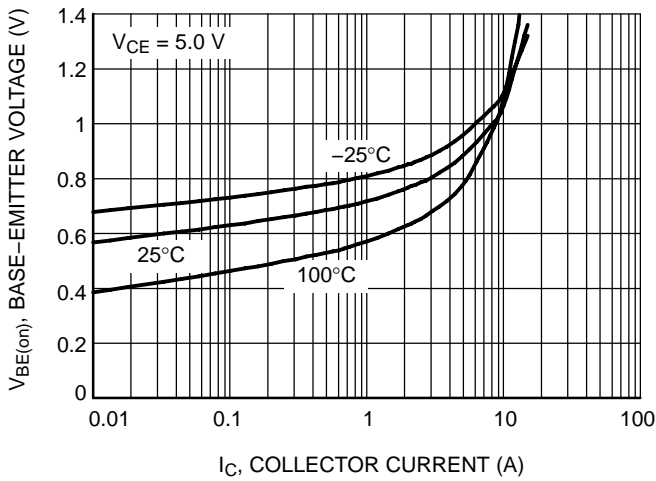


Figure 5. NJL0281A Base-Emitter Voltage

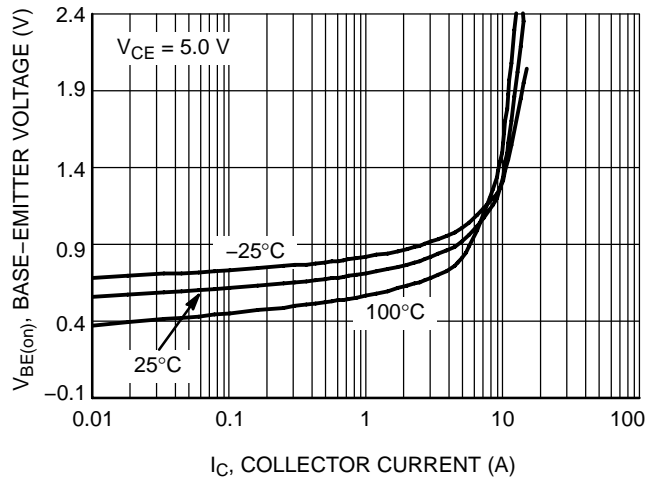


Figure 6. NJL0302A Base-Emitter Voltage

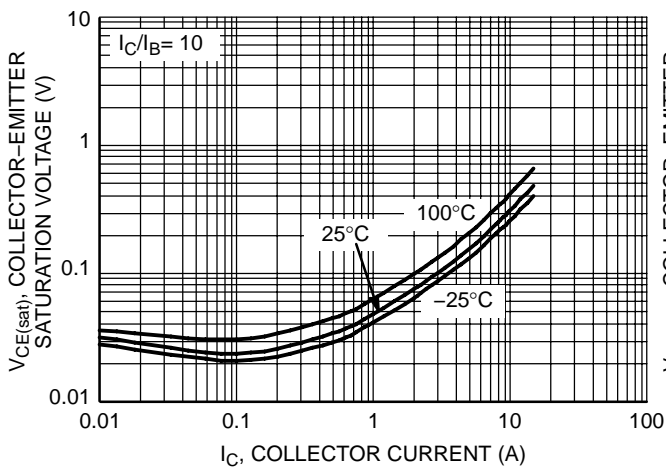


Figure 7. NJL0281A Saturation Voltage

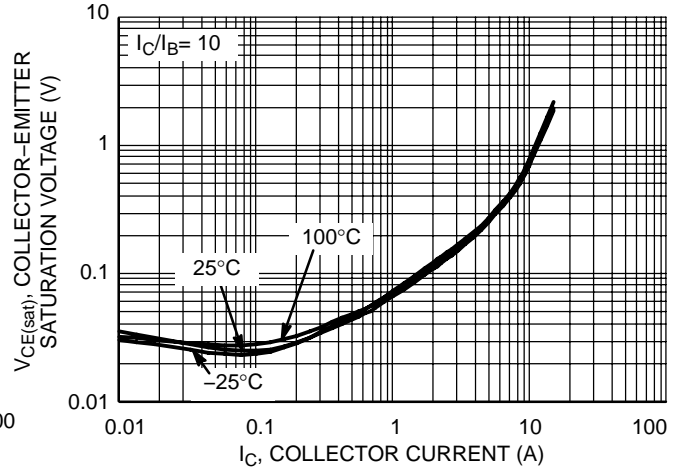


Figure 8. NJL0302A Saturation Voltage

NJL0281D (NPN) NJL0302D (PNP)

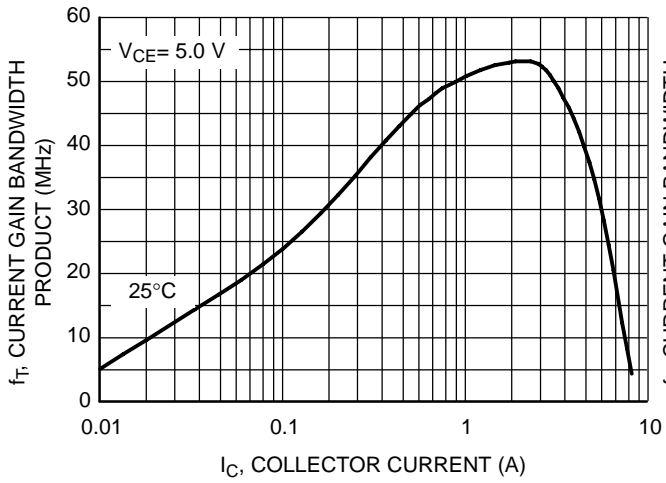


Figure 9. NJL0281A Current Gain Bandwidth Product

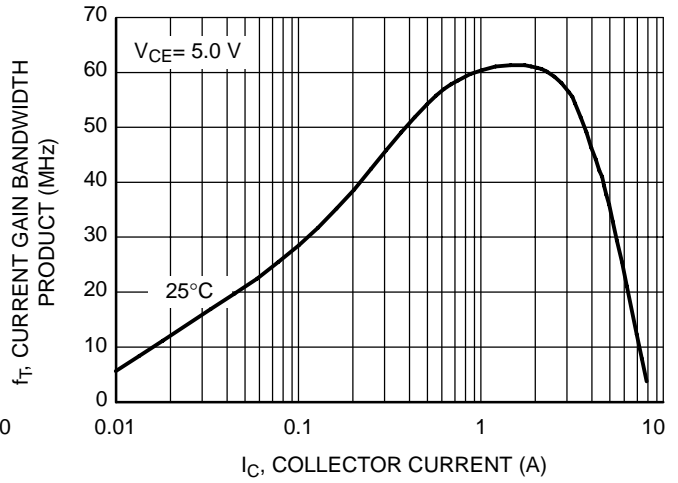


Figure 10. NJL0302A Current Gain Bandwidth Product

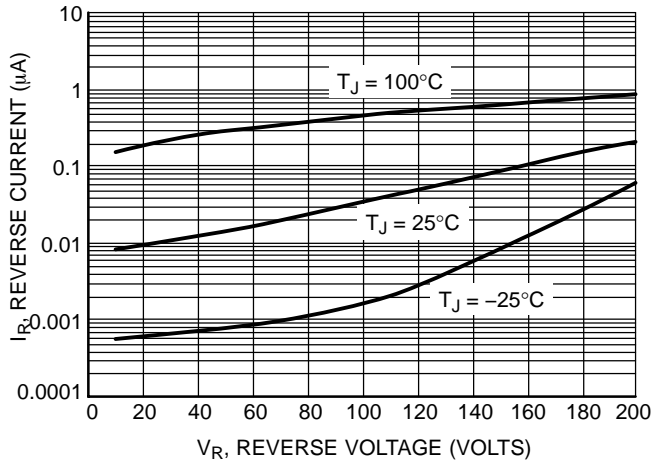


Figure 11. Typical Reverse Current

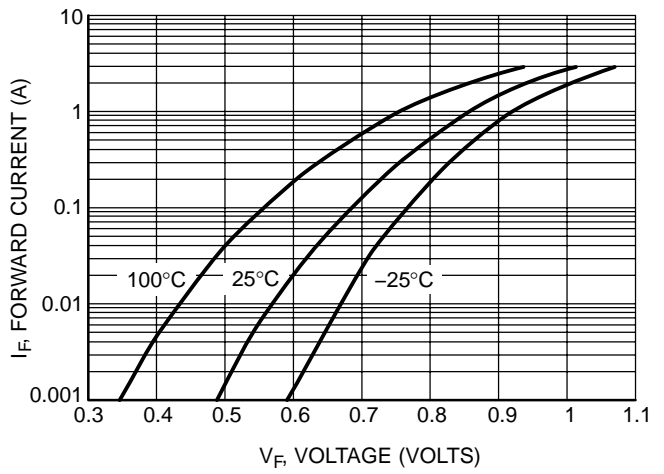
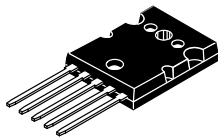


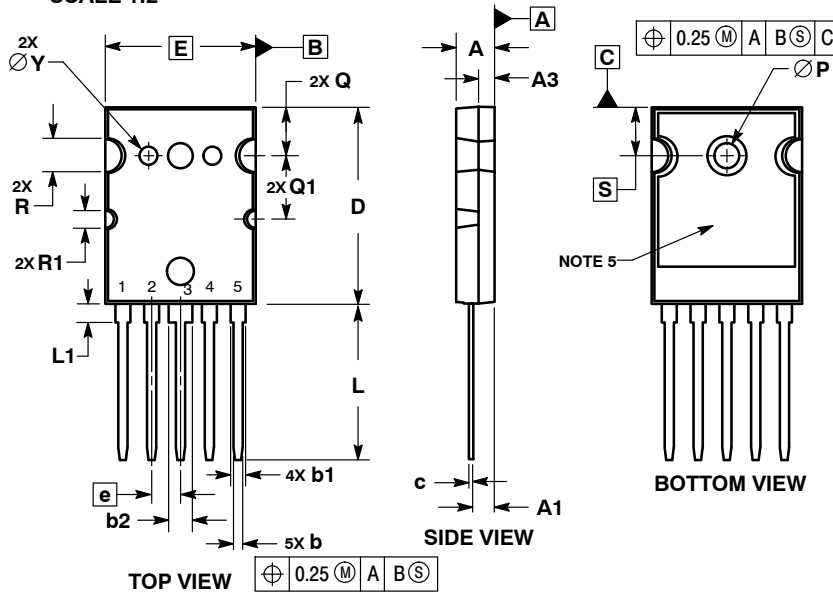
Figure 12. Typical Forward Voltage



TO-264, 5-LEAD
CASE 340AA
ISSUE A

DATE 04 FEB 2013

SCALE 1:2



NOTES:

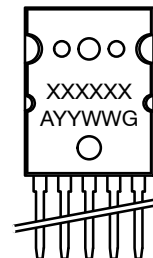
1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 1994.
2. CONTROLLING DIMENSION: MILLIMETERS.
3. DIMENSION b APPLIES BETWEEN 2.50 AND 3.81 FROM THE LEAD TIP.
4. DIMENSION S APPLIES TO THE MOUNTING HOLE (∅P). DIMENSION Q APPLIES TO THE NOTCHES (2X R).
5. THERMAL PAD SIZE AND SHAPE MAY VARY WITHIN THE AREA DEFINED BY DIMENSIONS D AND E.

DIM	MILLIMETERS	
	MIN	MAX
A	4.70	5.31
A1	2.50	3.10
A3	2.00 REF	
b	1.10	1.50
b1	2.00 REF	
b2	3.00 REF	
c	0.43	0.74
D	25.58	26.59
E	19.30	20.29
e	3.81 BSC	
L	19.79	21.39
L1	2.10	2.30
P	3.00	3.51
Q	5.80	6.20
Q1	8.80	9.20
R	4.00 REF	
R1	2.00 REF	
S	9.00 BSC	
Y	1.80 REF	

STYLE 1:

- PIN 1. BASE
- 2. EMITTER
- 3. COLLECTOR
- 4. ANODE
- 5. CATHODE

GENERIC
MARKING DIAGRAM*



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

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

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