

# MJL0281A (NPN) MJL0302A (PNP)

Preferred Devices

## Complementary NPN-PNP Power Bipolar Transistors

These complementary devices are lower power versions of the popular MJL3281A and MJL1302A audio output transistors. With superior gain linearity and safe operating area performance, these transistors are ideal for high fidelity audio amplifier output stages and other linear applications.

### Features

- Exceptional Safe Operating Area
- NPN/PNP Gain Matching within 10% from 50 mA to 3.0 A
- Excellent Gain Linearity
- High BVCEO
- High Frequency
- Pb-Free Packages are Available\*

### 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

| Rating                                              | Symbol         | Value       | Unit             |
|-----------------------------------------------------|----------------|-------------|------------------|
| Collector-Emitter Voltage                           | $V_{CEO}$      | 260         | Vdc              |
| Collector-Base Voltage                              | $V_{CBO}$      | 260         | Vdc              |
| Emitter-Base Voltage                                | $V_{EBO}$      | 5.0         | Vdc              |
| Collector-Emitter Voltage – 1.5 V                   | $V_{CEX}$      | 260         | Vdc              |
| Collector Current – Continuous<br>– Peak (Note 1)   | $I_C$          | 15<br>30    | Adc              |
| Base Current – Continuous                           | $I_B$          | 1.5         | Adc              |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$  | $P_D$          | 180         | Watts            |
| Operating and Storage Junction<br>Temperature Range | $T_J, T_{stg}$ | -65 to +150 | $^\circ\text{C}$ |

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 = 5.0 ms, Duty Cycle < 10%.

\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.

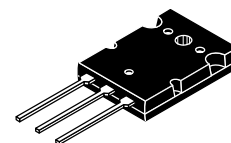


ON Semiconductor®

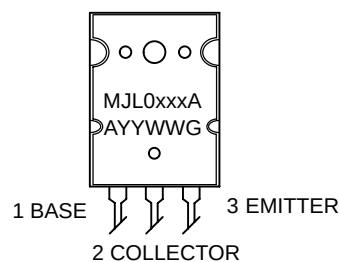
<http://onsemi.com>

## 15 AMPERES COMPLEMENTARY SILICON POWER TRANSISTORS 260 VOLTS – 180 WATTS

TO-264  
CASE 340G  
STYLE 2



### MARKING DIAGRAM



MJL0xxxA = Device Code  
xxx = 281 or 302  
A = Location Code  
YY = Year  
WW = Work Week  
G = Pb-Free Package

### ORDERING INFORMATION

| Device    | Package             | Shipping      |
|-----------|---------------------|---------------|
| MJL0281A  | TO-264              | 25 Units/Rail |
| MJL0281AG | TO-264<br>(Pb-Free) | 25 Units/Rail |
| MJL0302A  | TO-264              | 25 Units/Rail |
| MJL0302AG | TO-264<br>(Pb-Free) | 25 Units/Rail |

Preferred devices are recommended choices for future use and best overall value.

# MJL0281A (NPN) MJL0302A (PNP)

## THERMAL CHARACTERISTICS

| Characteristic                       | Symbol          | Value | Unit                 |
|--------------------------------------|-----------------|-------|----------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.69  | $^{\circ}\text{C/W}$ |

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

| Characteristic | Symbol | Min | Max | Unit |
|----------------|--------|-----|-----|------|
|----------------|--------|-----|-----|------|

### OFF CHARACTERISTICS

|                                                                              |               |     |     |               |
|------------------------------------------------------------------------------|---------------|-----|-----|---------------|
| Collector-Emitter Sustaining Voltage<br>( $I_C = 30\text{ mA}$ , $I_B = 0$ ) | $V_{CE(sus)}$ | 260 | –   | V             |
| Collector Cutoff Current<br>( $V_{CB} = 260\text{ V}$ , $I_E = 0$ )          | $I_{CBO}$     | –   | 10  | $\mu\text{A}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 5.0\text{ V}$ , $I_C = 0$ )            | $I_{EBO}$     | –   | 5.0 | $\mu\text{A}$ |

### ON CHARACTERISTICS

|                                                                                                                                                                                   |               |                |                   |   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------|----------------|-------------------|---|
| DC Current Gain<br>( $I_C = 0.5\text{ A}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ )<br>( $I_C = 3.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ ) | $h_{FE}$      | 75<br>75<br>75 | 150<br>150<br>150 | – |
| Collector-Emitter Saturation Voltage<br>( $I_C = 5.0\text{ A}$ , $I_B = 0.5\text{ A}$ )                                                                                           | $V_{CE(sat)}$ | –              | 1.0               | V |
| Base-Emitter On Voltage<br>( $I_C = 5.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ )                                                                                                     | $V_{BE(on)}$  | –              | 1.2               | V |

### DYNAMIC CHARACTERISTICS

|                                                                                                                      |          |    |     |     |
|----------------------------------------------------------------------------------------------------------------------|----------|----|-----|-----|
| Current-Gain – Bandwidth Product<br>( $I_C = 1.0\text{ A}$ , $V_{CE} = 5.0\text{ V}$ , $f_{test} = 1.0\text{ MHz}$ ) | $f_T$    | 30 | –   | MHz |
| Output Capacitance<br>( $V_{CB} = 10\text{ V}$ , $I_E = 0$ , $f_{test} = 1.0\text{ MHz}$ )                           | $C_{ob}$ | –  | 400 | pF  |

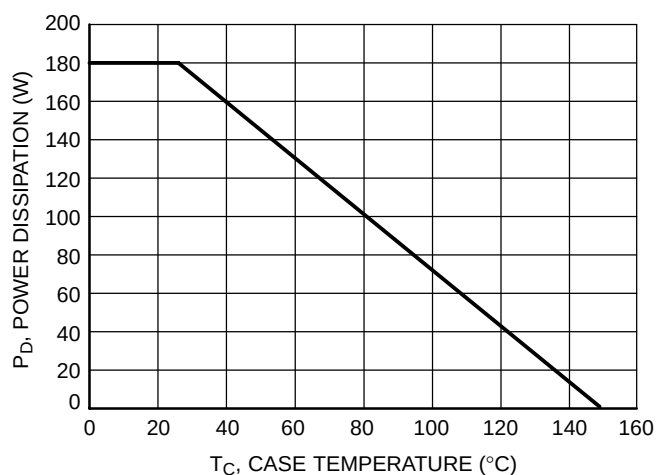


Figure 1. Power Derating

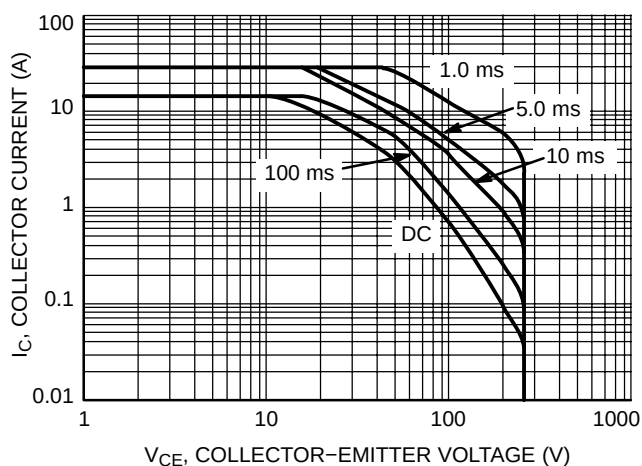


Figure 2. Safe Operating Area

# MJL0281A (NPN) MJL0302A (PNP)

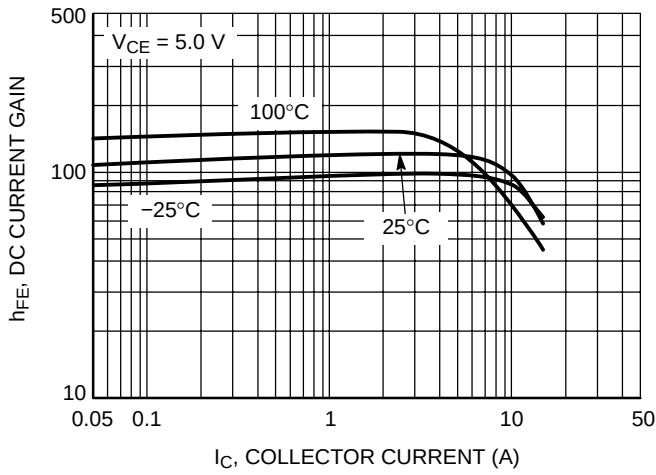


Figure 3. MJL0281A DC Current Gain

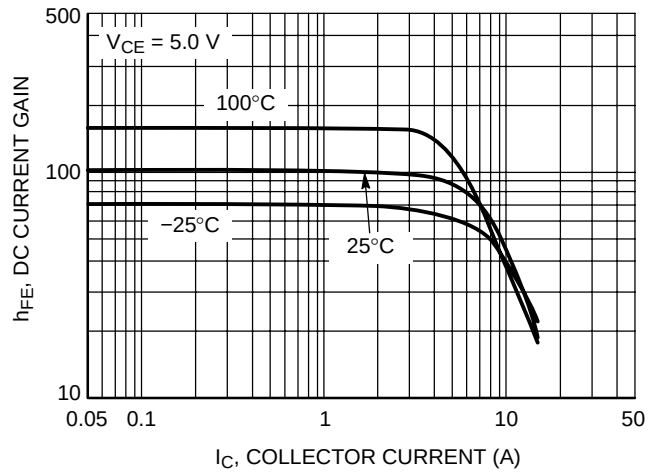


Figure 4. MJL0302A DC Current Gain

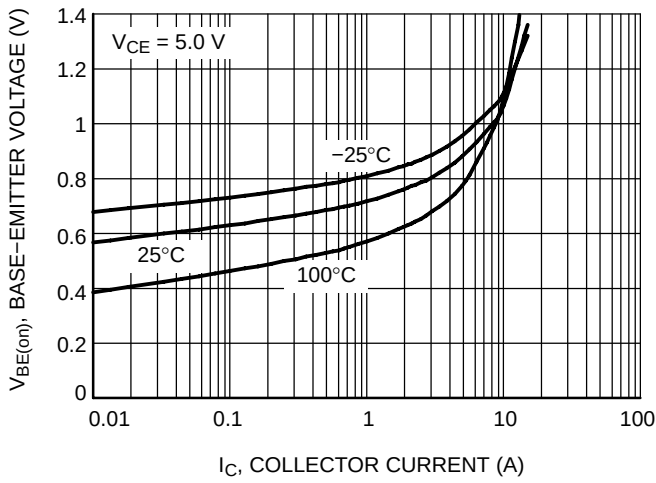


Figure 5. MJL0281A Base-Emitter Voltage

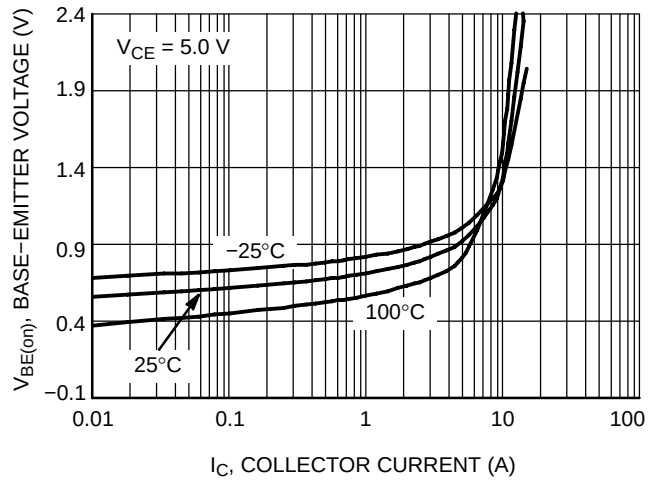


Figure 6. MJL0302A Base-Emitter Voltage

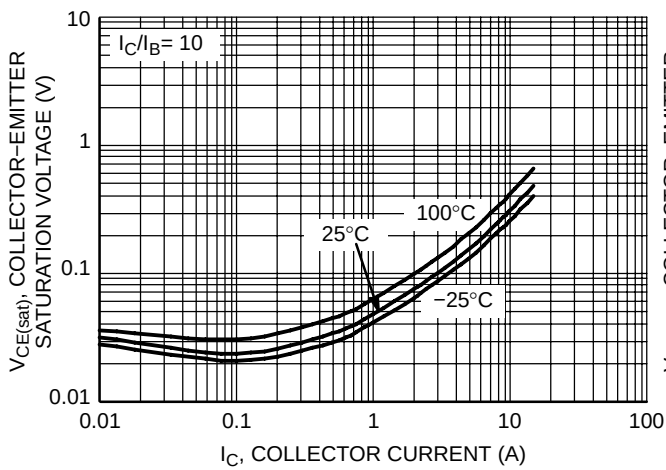


Figure 7. MJL0281A Saturation Voltage

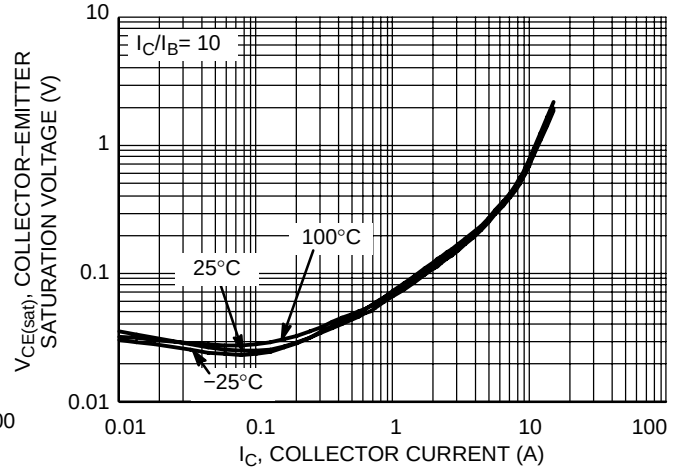


Figure 8. MJL0302A Saturation Voltage

MJL0281A (NPN) MJL0302A (PNP)

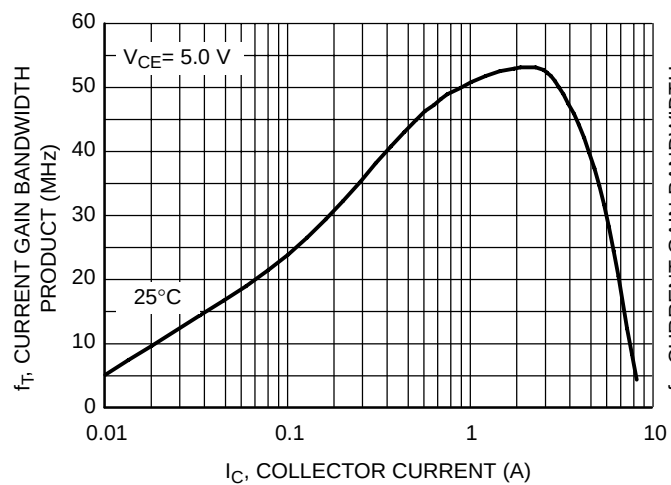


Figure 9. MJL0281A Current Gain Bandwidth Product

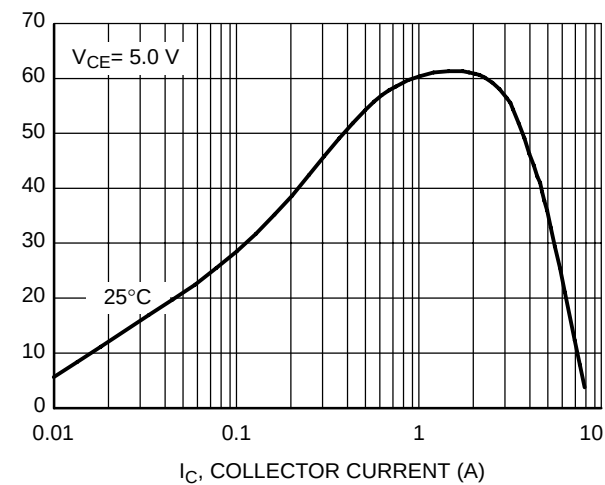
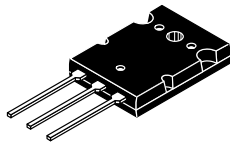


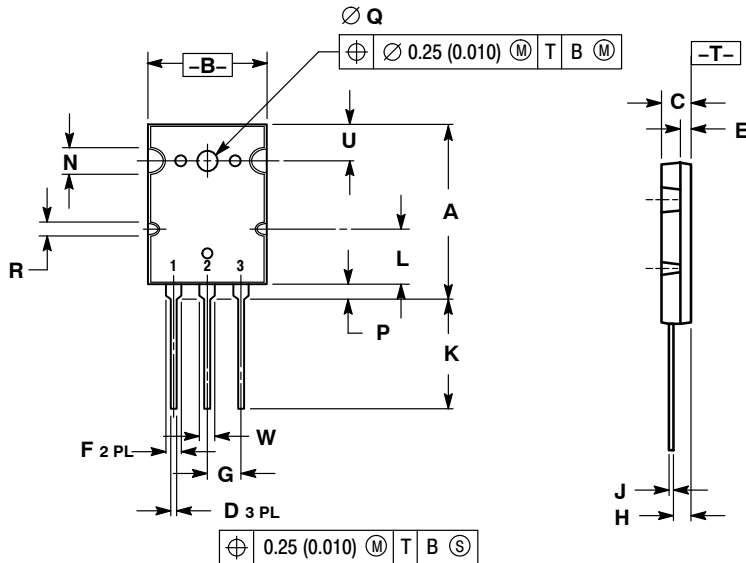
Figure 10. MJL0302A Current Gain Bandwidth Product



TO-3BPL (TO-264)  
CASE 340G-02  
ISSUE J

DATE 17 DEC 2004

SCALE 1:2



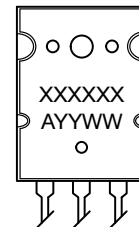
NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: MILLIMETER.

| DIM | MIN      | MAX  | MIN       | MAX   |
|-----|----------|------|-----------|-------|
| A   | 28.0     | 29.0 | 1.102     | 1.142 |
| B   | 19.3     | 20.3 | 0.760     | 0.800 |
| C   | 4.7      | 5.3  | 0.185     | 0.209 |
| D   | 0.93     | 1.48 | 0.037     | 0.058 |
| E   | 1.9      | 2.1  | 0.075     | 0.083 |
| F   | 2.2      | 2.4  | 0.087     | 0.102 |
| G   | 5.45 BSC |      | 0.215 BSC |       |
| H   | 2.6      | 3.0  | 0.102     | 0.118 |
| J   | 0.43     | 0.78 | 0.017     | 0.031 |
| K   | 17.6     | 18.8 | 0.693     | 0.740 |
| L   | 11.2 REF |      | 0.411 REF |       |
| N   | 4.35 REF |      | 0.172 REF |       |
| P   | 2.2      | 2.6  | 0.087     | 0.102 |
| Q   | 3.1      | 3.5  | 0.122     | 0.137 |
| R   | 2.25 REF |      | 0.089 REF |       |
| U   | 6.3 REF  |      | 0.248 REF |       |
| W   | 2.8      | 3.2  | 0.110     | 0.125 |

GENERIC  
MARKING DIAGRAM\*

- STYLE 1:  
PIN 1. GATE  
2. DRAIN  
3. SOURCE
- STYLE 2:  
PIN 1. BASE  
2. COLLECTOR  
3. EMITTER
- STYLE 3:  
PIN 1. GATE  
2. SOURCE  
3. DRAIN
- STYLE 4:  
PIN 1. DRAIN  
2. SOURCE  
3. GATE
- STYLE 5:  
PIN 1. GATE  
2. COLLECTOR  
3. EMITTER



XXXXXX = Specific Device Code  
A = Location Code  
YY = Year  
WW = Work Week

\*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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| DESCRIPTION:     | TO-3BPL (TO-264) | PAGE 1 OF 1                                                                                                                                                                      |

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