

Complementary NPN-PNP Silicon Power Bipolar Transistors

MJL4281A (NPN) MJL4302A (PNP)

The MJL4281A and MJL4302A are power transistors for high power audio.

Features

- 350 V Collector-Emitter Sustaining Voltage
- Gain Complementary:
 - Gain Linearity from 100 mA to 5 A
 - High Gain – 80 to 240
 - $h_{FE} = 50$ (min) @ $I_C = 8$ A
- Low Harmonic Distortion
- High Safe Operation Area – 1.0 A/100 V @ 1 Second
- High f_T
- Pb-Free Packages are Available*

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

| Rating | Symbol | Value | Unit |
|---|----------------|-------------|-----------|
| Collector-Emitter Voltage | V_{CEO} | 350 | Vdc |
| Collector-Base Voltage | V_{CBO} | 350 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 5.0 | Vdc |
| Collector-Emitter Voltage – 1.5 V | V_{CEX} | 350 | Vdc |
| Collector Current – Continuous – Peak (Note 1) | I_C | 15 30 | Adc |
| Base Current – Continuous | I_B | 1.5 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate Above 25°C | P_D | 230 1.84 | W °C/W |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | –65 to +150 | °C |

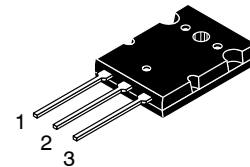
THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|--------------------------------------|-----------------|------|------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.54 | °C/W |

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.

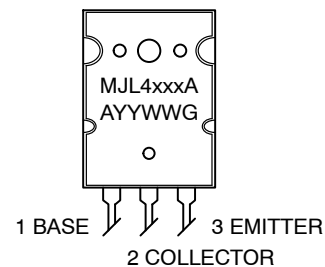
1. Pulse Test: Pulse Width = 5 ms, Duty Cycle < 10%.

15 AMPERES
COMPLEMENTARY SILICON
POWER TRANSISTORS
350 VOLTS, 230 WATTS



TO-264
CASE 340G
STYLE 2

MARKING DIAGRAM



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

ORDERING INFORMATION

| Device | Package | Shipping |
|-----------|---------------------|---------------|
| MJL4281A | TO-264 | 25 Units/Rail |
| MJL4281AG | TO-264 (Pb-Free) | 25 Units/Rail |
| MJL4302A | TO-264 | 25 Units/Rail |
| MJL4302AG | TO-264 (Pb-Free) | 25 Units/Rail |

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

MJL4281A (NPN) MJL4302A (PNP)

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

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

OFF CHARACTERISTICS

| | | | | |
|--|----------------------|-----|-----|------|
| Collector Emitter Sustaining Voltage (I _C = 50 mA, I _B = 0) | V _{CE(sus)} | 350 | | Vdc |
| Collector Cut-off Current (V _{CE} = 200 V, I _B = 0) | I _{CEO} | | 100 | μAdc |
| Collector Cutoff Current (V _{CB} = 350 Vdc, I _E = 0) | I _{CBO} | – | 50 | μAdc |
| Emitter Cutoff Current (V _{EB} = 5.0 Vdc, I _C = 0) | I _{EBO} | – | 5.0 | μAdc |

SECOND BREAKDOWN

| | | | | |
|--|------------------|------------|--------|-----|
| Second Breakdown Collector with Base Forward Biased (V _{CE} = 50 Vdc, t = 1.0 s (non-repetitive) (V _{CE} = 100 Vdc, t = 1.0 s (non-repetitive) | I _{S/b} | 4.5 1.0 | – – | Adc |
|--|------------------|------------|--------|-----|

ON CHARACTERISTICS

| | | | | |
|---|----------------------|----------------------------------|------------------------------------|-----|
| DC Current Gain (I _C = 100 mAdc, V _{CE} = 5.0 Vdc) (I _C = 1.0 Adc, V _{CE} = 5.0 Vdc) (I _C = 3.0 Adc, V _{CE} = 5.0 Vdc) (I _C = 5.0 Adc, V _{CE} = 5.0 Vdc) (I _C = 8.0 Adc, V _{CE} = 5.0 Vdc) (I _C = 15 Adc, V _{CE} = 5.0 Vdc) | h _{FE} | 80 80 80 80 50 10 | 250 250 250 250 – – | – |
| Collector–Emitter Saturation Voltage (I _C = 8.0 Adc, I _B = 0.8 Adc) | V _{CE(sat)} | – | 1.0 | Vdc |
| Emitter–Base Saturation Voltage (I _C = 8.0 Adc, I _B = 0.8 A) | V _{BE(sat)} | – | 1.4 | Vdc |
| Base–Emitter ON Voltage (I _C = 8.0 Adc, V _{CE} = 5.0 Vdc) | V _{BE(on)} | – | 1.5 | Vdc |

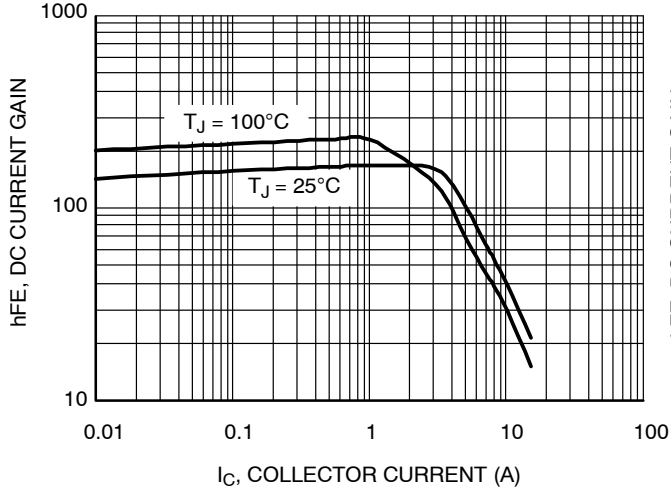
DYNAMIC CHARACTERISTICS

| | | | | |
|--|-----------------|----|-----|-----|
| Current–Gain – Bandwidth Product (I _C = 1.0 Adc, V _{CE} = 5.0 Vdc, f _{test} = 1.0 MHz) | f _T | 35 | – | MHz |
| Output Capacitance (V _{CB} = 10 Vdc, I _E = 0, f _{test} = 1.0 MHz) | C _{ob} | – | 600 | pF |

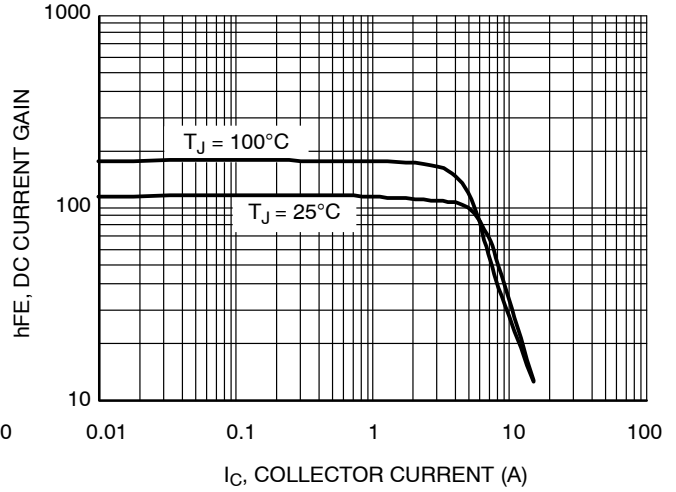
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

MJL4281A (NPN) MJL4302A (PNP)

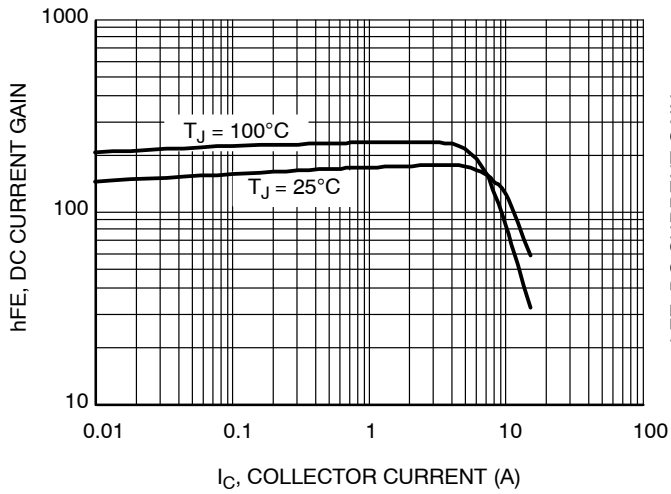
TYPICAL CHARACTERISTICS



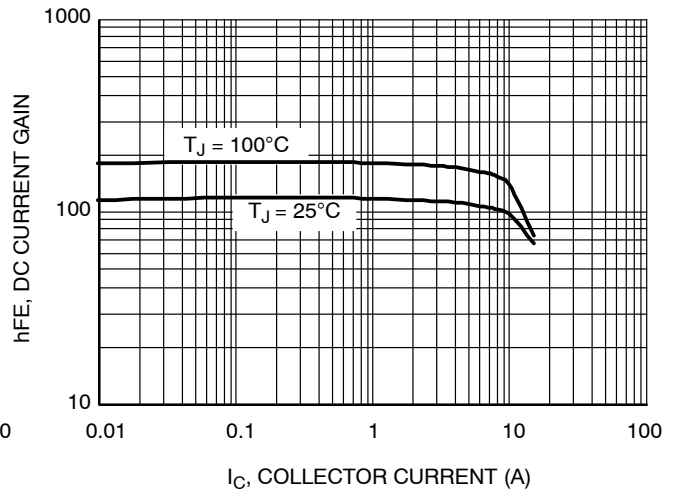
**Figure 1. DC Current Gain, $V_{CE} = 5$ V,
NPN MJL4281A**



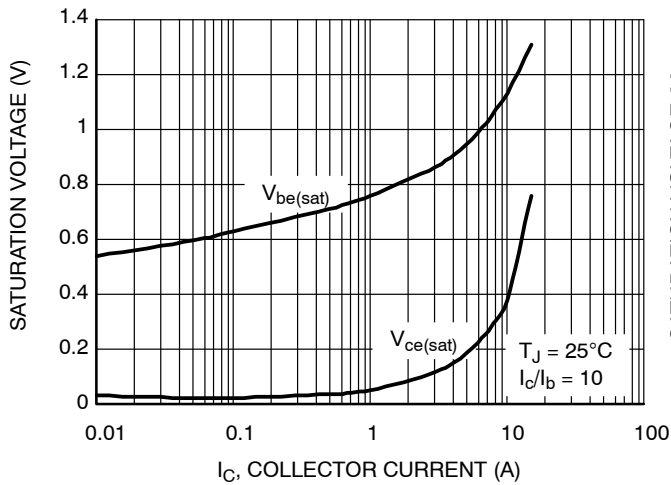
**Figure 2. DC Current Gain, $V_{CE} = 5$ V,
PNP MJL4302A**



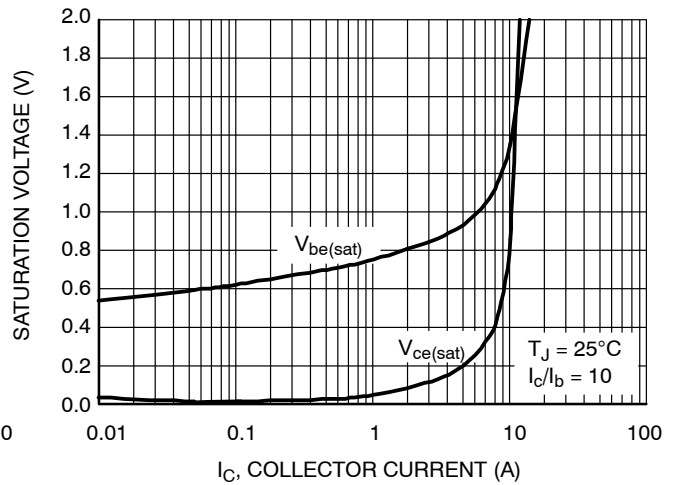
**Figure 3. DC Current Gain, $V_{CE} = 20$ V,
NPN MJL4281A**



**Figure 4. DC Current Gain, $V_{CE} = 20$ V,
PNP MJL4302A**



**Figure 5. Typical Saturation Voltage,
NPN MJL4281A**



**Figure 6. Typical Saturation Voltage,
PNP MJL4302A**

MJL4281A (NPN) MJL4302A (PNP)

TYPICAL CHARACTERISTICS

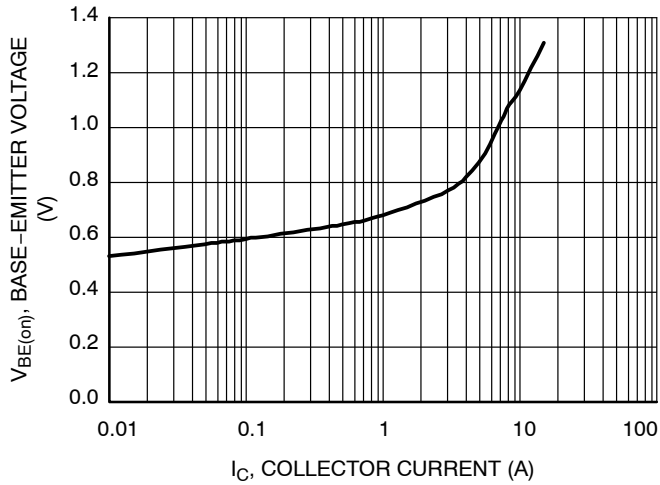


Figure 7. Typical Base-Emitter Voltages, NPN MJL4281A

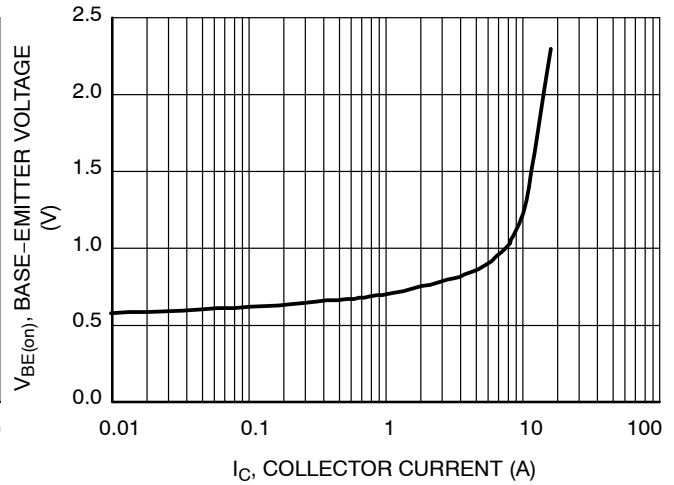


Figure 8. Typical Base-Emitter Voltages, PNP MJL4302A

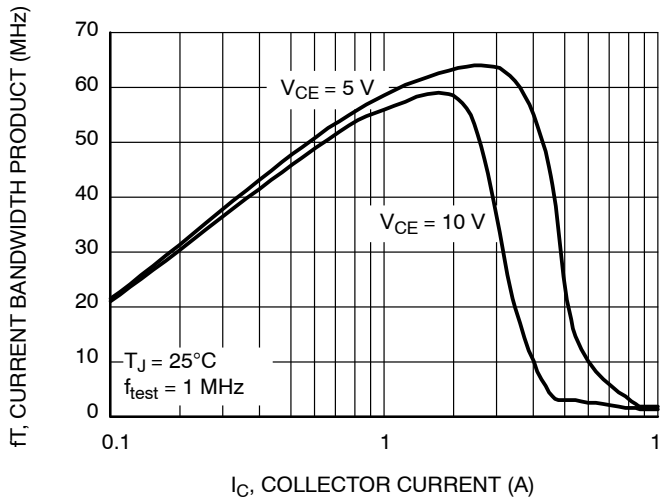


Figure 9. Typical Current Gain Bandwidth Product, NPN MJL4281A

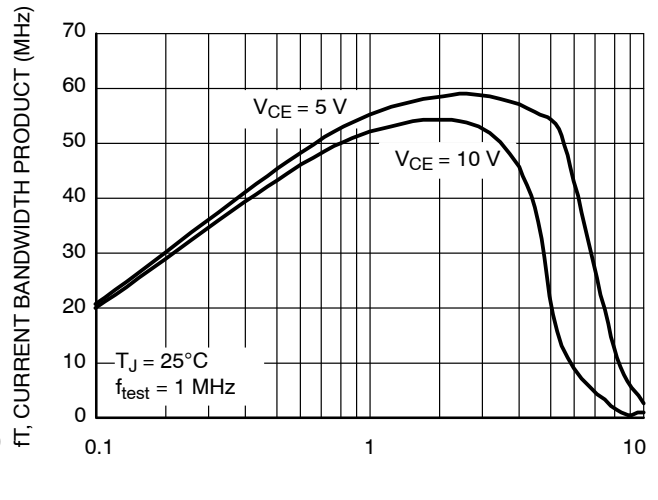


Figure 10. Typical Current Gain Bandwidth Product, PNP MJL4302A

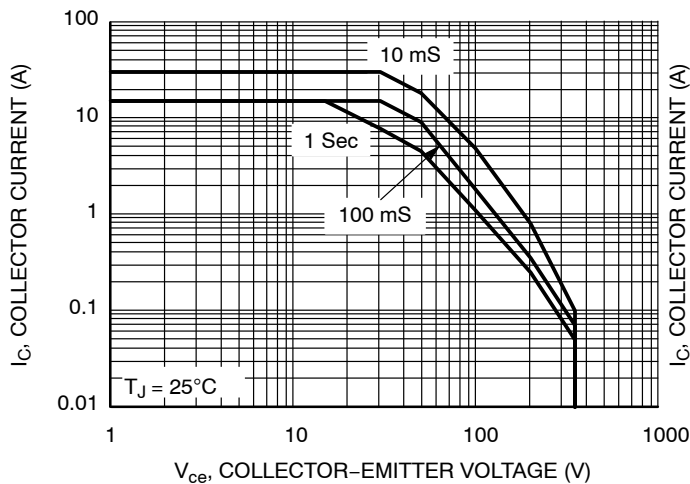


Figure 11. Active Region Safe Operating Area, NPN MJL4281A

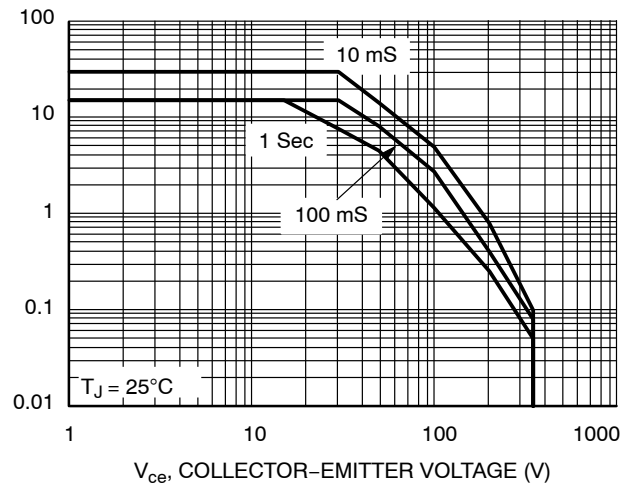
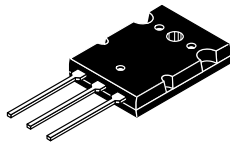


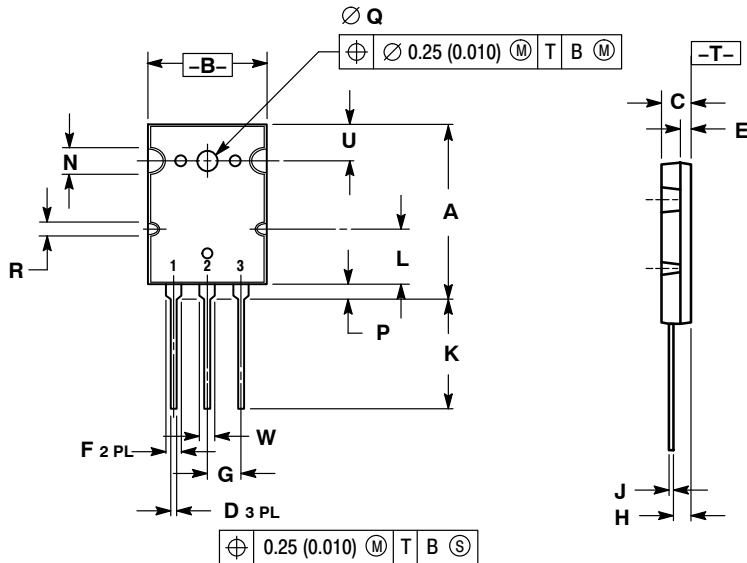
Figure 12. Active Region Safe Operating Area, PNP MJL4302A



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

DATE 17 DEC 2004

SCALE 1:2



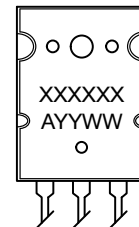
NOTES:

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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