



**THE DATASHEET OF  
MJE5731AG**



# MJE5730, MJE5731, MJE5731A

## High Voltage PNP Silicon Plastic Power Transistors

These devices are designed for line operated audio output amplifier, switch-mode power supply drivers and other switching applications.

### Features

- Popular TO-220 Plastic Package
- PNP Complements to the TIP47 thru TIP50 Series
- These Devices are Pb-Free and are RoHS Compliant\*

### MAXIMUM RATINGS

| Rating  | Symbol         | Value             | Unit                     |
|---|----------------|-------------------|--------------------------|
| Collector-Emitter Voltage<br>MJE5730<br>MJE5731<br>MJE5731A                               | $V_{CEO}$      | 300<br>350<br>375 | Vdc                      |
| Collector-Base Voltage<br>MJE5730<br>MJE5731<br>MJE5731A                                  | $V_{CB}$       | 300<br>350<br>375 | Vdc                      |
| Emitter-Base Voltage  | $V_{EB}$       | 5.0               | Vdc                      |
| Collector Current – Continuous  | $I_C$          | 1.0               | Adc                      |
| Collector Current – Peak  | $I_{CM}$       | 3.0               | Adc                      |
| Base Current  | $I_B$          | 1.0               | Adc                      |
| Total Device Dissipation<br>@ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 40<br>0.32        | W<br>W/ $^\circ\text{C}$ |
| Total Device Dissipation<br>@ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 2.0<br>0.016      | W<br>W/ $^\circ\text{C}$ |
| Unclamped Inducting Load Energy<br>(See Figure 10)  | E              | 20                | mJ                       |
| Operating and Storage Junction<br>Temperature Range                                       | $T_J, T_{stg}$ | -65 to +150       | $^\circ\text{C}$         |

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.

### THERMAL CHARACTERISTICS

| Characteristics                         | Symbol          | Max   | Unit                      |
|---|-----------------|-------|---------------------------|
| Thermal Resistance, Junction-to-Case    | $R_{\theta JC}$ | 3.125 | $^\circ\text{C}/\text{W}$ |
| Thermal Resistance, Junction-to-Ambient | $R_{\theta JA}$ | 62.5  | $^\circ\text{C}/\text{W}$ |

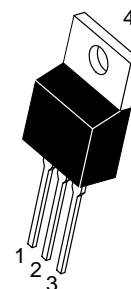
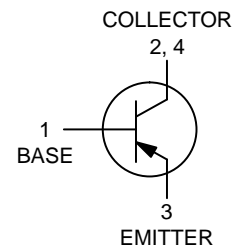
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



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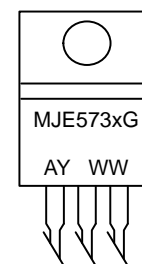
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**1.0 AMPERE  
POWER TRANSISTORS  
PCP SILICON  
300-350-400 VOLTS  
50 WATTS**



TO-220  
CASE 221A-09  
STYLE 1

### MARKING DIAGRAM



MJE573x = Device Code  
x = 0, 1, or 1A  
G = Pb-Free Package  
A = Assembly Location  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

See detailed ordering and shipping information in the package dimensions section on page 5 of this data sheet.

# MJE5730, MJE5731, MJE5731A

## ELECTRICAL CHARACTERISTICS (T<sub>C</sub> = 25°C unless otherwise noted)

| Characteristic   | Symbol                | Min               | Max               | Unit |
|--|-----------------------|-------------------|-------------------|------|
| <b>OFF CHARACTERISTICS</b>   |                       |                   |                   |      |
| Collector–Emitter Sustaining Voltage (Note 1)<br>(I <sub>C</sub> = 30 mAdc, I <sub>B</sub> = 0)<br>MJE5730<br>MJE5731<br>MJE5731A  | V <sub>CEO(sus)</sub> | 300<br>350<br>375 | –<br>–<br>–       | Vdc  |
| Collector Cutoff Current<br>(V <sub>CE</sub> = 200 Vdc, I <sub>B</sub> = 0)<br>MJE5730<br>(V <sub>CE</sub> = 250 Vdc, I <sub>B</sub> = 0)<br>MJE5731<br>(V <sub>CE</sub> = 300 Vdc, I <sub>B</sub> = 0)<br>MJE5731A    | I <sub>CEO</sub>      | –<br>–<br>–       | 1.0<br>1.0<br>1.0 | mAdc |
| Collector Cutoff Current<br>(V <sub>CE</sub> = 300 Vdc, V <sub>BE</sub> = 0)<br>MJE5730<br>(V <sub>CE</sub> = 350 Vdc, V <sub>BE</sub> = 0)<br>MJE5731<br>(V <sub>CE</sub> = 400 Vdc, V <sub>BE</sub> = 0)<br>MJE5731A | I <sub>CES</sub>      | –<br>–<br>–       | 1.0<br>1.0<br>1.0 | mAdc |
| Emitter Cutoff Current<br>(V <sub>BE</sub> = 5.0 Vdc, I <sub>C</sub> = 0)  | I <sub>EBO</sub>      | –                 | 1.0               | mAdc |
| <b>ON CHARACTERISTICS (Note 1)</b>   |                       |                   |                   |      |
| DC Current Gain<br>(I <sub>C</sub> = 0.3 Adc, V <sub>CE</sub> = 10 Vdc)<br>(I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 10 Vdc)  | h <sub>FE</sub>       | 30<br>10          | 150<br>–          | –    |
| Collector–Emitter Saturation Voltage<br>(I <sub>C</sub> = 1.0 Adc, I <sub>B</sub> = 0.2 Adc)   | V <sub>CE(sat)</sub>  | –                 | 1.0               | Vdc  |
| Base–Emitter On Voltage<br>(I <sub>C</sub> = 1.0 Adc, V <sub>CE</sub> = 10 Vdc)  | V <sub>BE(on)</sub>   | –                 | 1.5               | Vdc  |
| <b>DYNAMIC CHARACTERISTICS</b>   |                       |                   |                   |      |
| Current Gain – Bandwidth Product<br>(I <sub>C</sub> = 0.2 Adc, V <sub>CE</sub> = 10 Vdc, f = 2.0 MHz)  | f <sub>T</sub>        | 10                | –                 | MHz  |
| Small–Signal Current Gain<br>(I <sub>C</sub> = 0.2 Adc, V <sub>CE</sub> = 10 Vdc, f = 1.0 kHz)   | h <sub>fe</sub>       | 25                | –                 | –    |

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.

1. Pulse Test: Pulse Width ≤ 300 μs, Duty Cycle ≤ 2.0%.

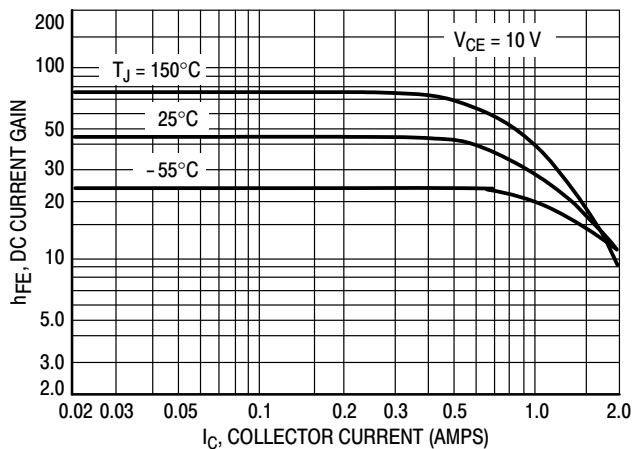


Figure 1. DC Current Gain

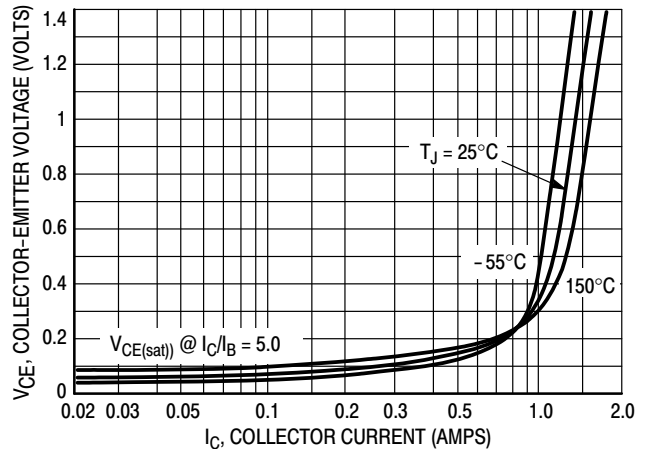


Figure 2. Collector–Emitter Saturation Voltage

# MJE5730, MJE5731, MJE5731A

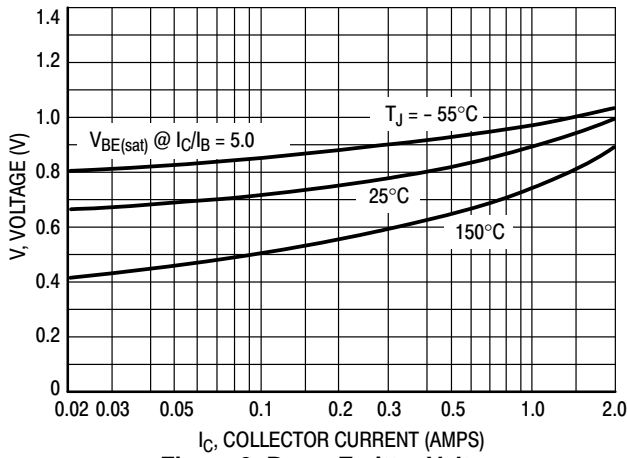


Figure 3. Base-Emitter Voltage

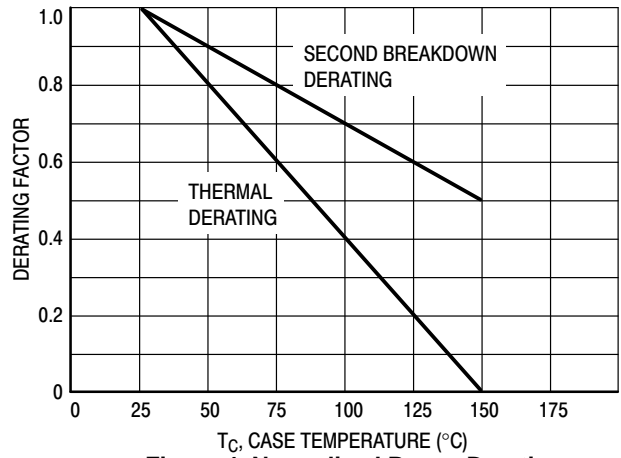


Figure 4. Normalized Power Derating

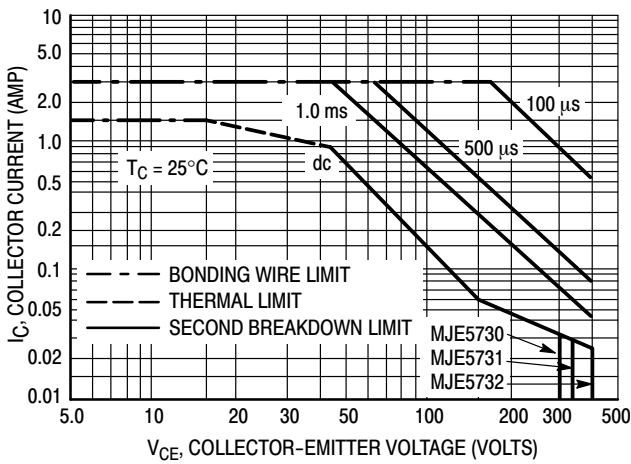


Figure 5. Forward Bias Safe Operating Area

There are two limitations on the power handling ability of a transistor: average junction temperature and second 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.

The data of Figure 5 is based on  $T_{J(pk)} = 150^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. Second breakdown pulse limits are valid for duty cycles to 10% provided  $T_{J(pk)} \leq 150^\circ\text{C}$ .  $T_{J(pk)}$  may be calculated from the data in Figure 6. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

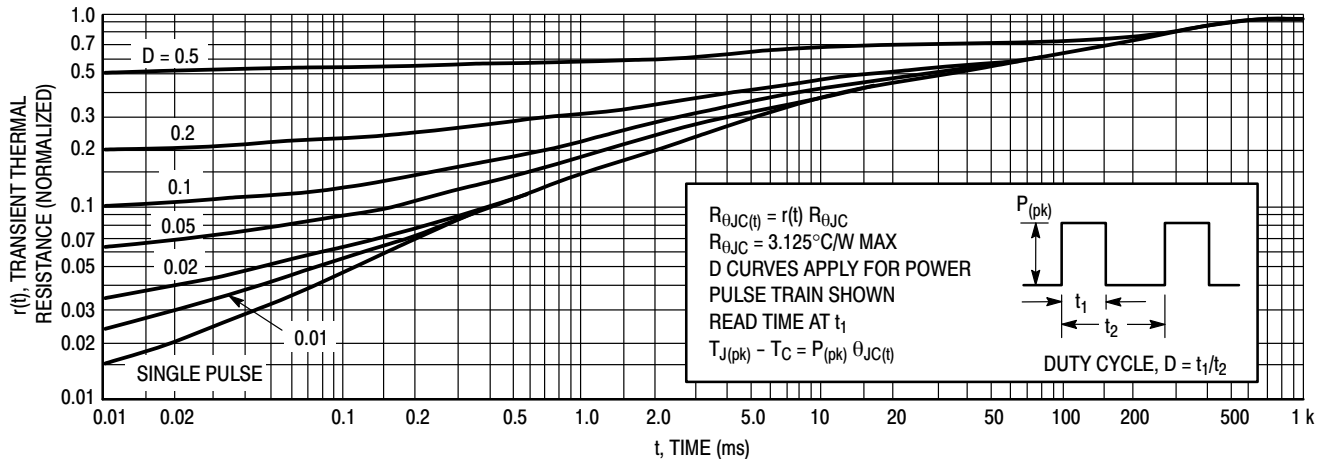


Figure 6. Thermal Response



# MJE5730, MJE5731, MJE5731A

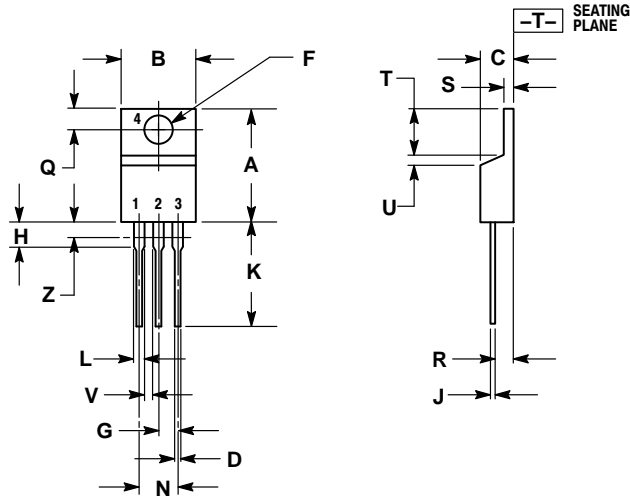
## ORDERING INFORMATION

| Device    | Package             | Shipping        |
|-----------|---------------------|-----------------|
| MJE5730G  | TO-220<br>(Pb-Free) | 50 Units / Rail |
| MJE5731G  | TO-220<br>(Pb-Free) | 50 Units / Rail |
| MJE5731AG | TO-220<br>(Pb-Free) | 50 Units / Rail |

# MJE5730, MJE5731, MJE5731A

## PACKAGE DIMENSIONS

TO-220  
CASE 221A-09  
ISSUE AH



NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
2. CONTROLLING DIMENSION: INCH.
3. DIMENSION Z DEFINES A ZONE WHERE ALL BODY AND LEAD IRREGULARITIES ARE ALLOWED.

| DIM | INCHES |       | MILLIMETERS |       |
|-----|--------|-------|-------------|-------|
|     | MIN    | MAX   | MIN         | MAX   |
| A   | 0.570  | 0.620 | 14.48       | 15.75 |
| B   | 0.380  | 0.415 | 9.66        | 10.53 |
| C   | 0.160  | 0.190 | 4.07        | 4.83  |
| D   | 0.025  | 0.038 | 0.64        | 0.96  |
| F   | 0.142  | 0.161 | 3.61        | 4.09  |
| G   | 0.095  | 0.105 | 2.42        | 2.66  |
| H   | 0.110  | 0.161 | 2.80        | 4.10  |
| J   | 0.014  | 0.024 | 0.36        | 0.61  |
| K   | 0.500  | 0.562 | 12.70       | 14.27 |
| L   | 0.045  | 0.060 | 1.15        | 1.52  |
| N   | 0.190  | 0.210 | 4.83        | 5.33  |
| Q   | 0.100  | 0.120 | 2.54        | 3.04  |
| R   | 0.080  | 0.110 | 2.04        | 2.79  |
| S   | 0.045  | 0.055 | 1.15        | 1.39  |
| T   | 0.235  | 0.255 | 5.97        | 6.47  |
| U   | 0.000  | 0.050 | 0.00        | 1.27  |
| V   | 0.045  | ---   | 1.15        | ---   |
| Z   | ---    | 0.080 | ---         | 2.04  |

STYLE 1:

- PIN 1. BASE
2. COLLECTOR
3. EMITTER
4. COLLECTOR

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