

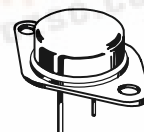
## Complementary Silicon Power Transistors

The MJ15001 and MJ15002 are EpiBase power transistors designed for high power audio, disk head positioners and other linear applications.

- High Safe Operating Area (100% Tested) —  
200 W @ 40 V  
50 W @ 100 V
- For Low Distortion Complementary Designs
- High DC Current Gain —  
 $h_{FE} = 25$  (Min) @  $I_C = 4$  Adc

**NPN**  
**MJ15001**  
**PNP**  
**MJ15002**

**15 AMPERE**  
**POWER TRANSISTORS**  
**COMPLEMENTARY**  
**SILICON**  
**140 VOLTS**  
**200 WATTS**



**CASE 1-07**  
**TO-204AA**  
**(TO-3)**

### MAXIMUM RATINGS

| Rating                                                                                | Symbol         | Value       | Unit                         |
|---------------------------------------------------------------------------------------|----------------|-------------|------------------------------|
| Collector-Emitter Voltage                                                             | $V_{CEO}$      | 140         | Vdc                          |
| Collector-Base Voltage                                                                | $V_{CBO}$      | 140         | Vdc                          |
| Emitter-Base Voltage                                                                  | $V_{EBO}$      | 5           | Vdc                          |
| Collector Current — Continuous                                                        | $I_C$          | 15          | Adc                          |
| Base Current — Continuous                                                             | $I_B$          | 5           | Adc                          |
| Emitter Current — Continuous                                                          | $I_E$          | 20          | Adc                          |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 200<br>1.14 | Watts<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range                                      | $T_J, T_{stg}$ | -65 to +200 | $^\circ\text{C}$             |

### THERMAL CHARACTERISTICS

| Characteristic                                                                            | Symbol          | Max   | Unit               |
|-------------------------------------------------------------------------------------------|-----------------|-------|--------------------|
| Thermal Resistance, Junction to Case                                                      | $R_{\theta JC}$ | 0.875 | $^\circ\text{C/W}$ |
| Maximum Lead Temperature for Soldering Purposes:<br>1/16" from Case for $\leq 10$ seconds | $T_L$           | 265   | $^\circ\text{C}$   |

## MJ15001 MJ15002

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

| Characteristic                                                                                                                                                                           | Symbol         | Min    | Max      | Unit                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|--------|----------|-------------------------|
| <b>OFF CHARACTERISTICS</b>                                                                                                                                                               |                |        |          |                         |
| Collector–Emitter Sustaining Voltage (1)<br>( $I_C = 200\text{ mAdc}$ , $I_B = 0$ )                                                                                                      | $V_{CEO(sus)}$ | 140    | —        | Vdc                     |
| Collector Cutoff Current<br>( $V_{CE} = 140\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ )<br>( $V_{CE} = 140\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ , $T_C = 150^\circ\text{C}$ ) | $I_{CEX}$      | —<br>— | 100<br>2 | $\mu\text{Adc}$<br>mAdc |
| Collector Cutoff Current<br>( $V_{CE} = 140\text{ Vdc}$ , $I_B = 0$ )                                                                                                                    | $I_{CEO}$      | —      | 250      | $\mu\text{Adc}$         |
| Emitter Cutoff Current<br>( $V_{EB} = 5\text{ Vdc}$ , $I_C = 0$ )                                                                                                                        | $I_{EBO}$      | —      | 100      | $\mu\text{Adc}$         |

### SECOND BREAKDOWN

|                                                                                                                                                                                                    |           |          |        |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|--------|-----|
| Second Breakdown Collector Current with Base Forward Biased<br>( $V_{CE} = 40\text{ Vdc}$ , $t = 1\text{ s}$ (non-repetitive))<br>( $V_{CE} = 100\text{ Vdc}$ , $t = 1\text{ s}$ (non-repetitive)) | $I_{S/b}$ | 5<br>0.5 | —<br>— | Adc |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------|----------|--------|-----|

### ON CHARACTERISTICS

|                                                                                           |               |    |     |     |
|-------------------------------------------------------------------------------------------|---------------|----|-----|-----|
| DC Current Gain<br>( $I_C = 4\text{ Adc}$ , $V_{CE} = 2\text{ Vdc}$ )                     | $h_{FE}$      | 25 | 150 | —   |
| Collector–Emitter Saturation Voltage<br>( $I_C = 4\text{ Adc}$ , $I_B = 0.4\text{ Adc}$ ) | $V_{CE(sat)}$ | —  | 1   | Vdc |
| Base–Emitter On Voltage<br>( $I_C = 4\text{ Adc}$ , $V_{CE} = 2\text{ Vdc}$ )             | $V_{BE(on)}$  | —  | 2   | Vdc |

### DYNAMIC CHARACTERISTICS

|                                                                                                                         |          |   |      |     |
|-------------------------------------------------------------------------------------------------------------------------|----------|---|------|-----|
| Current–Gain — Bandwidth Product<br>( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 10\text{ Vdc}$ , $f_{test} = 0.5\text{ MHz}$ ) | $f_T$    | 2 | —    | MHz |
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f_{test} = 1\text{ MHz}$ )                              | $C_{ob}$ | — | 1000 | pF  |

(1) Pulse Test: Pulse Width = 300  $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

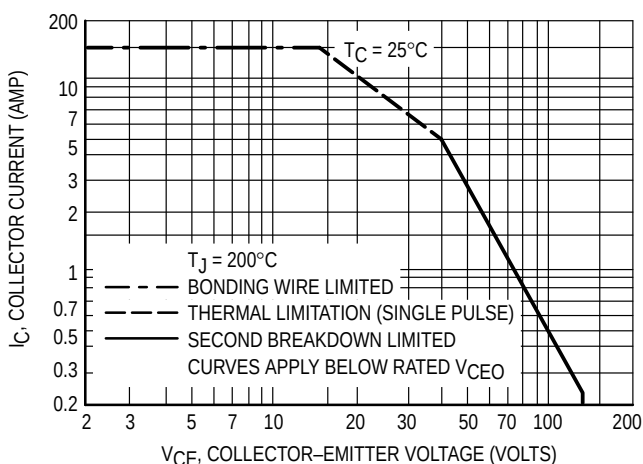


Figure 1. Active-Region Safe Operating Area

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 1 is based on  $T_J(\text{pk}) = 200^\circ\text{C}$ ;  $T_C$  is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

TYPICAL CHARACTERISTICS

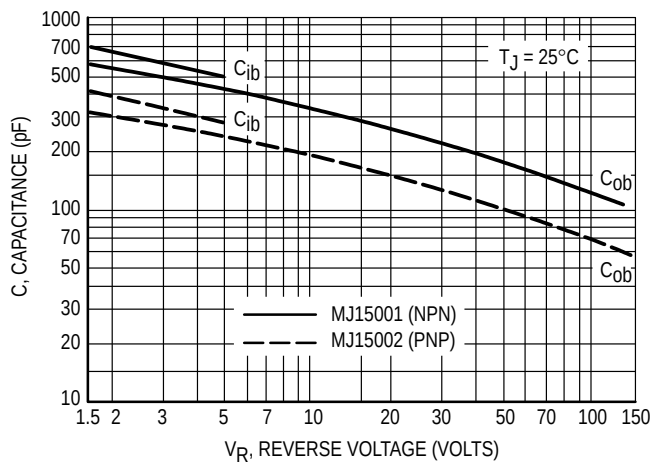


Figure 2. Capacitances

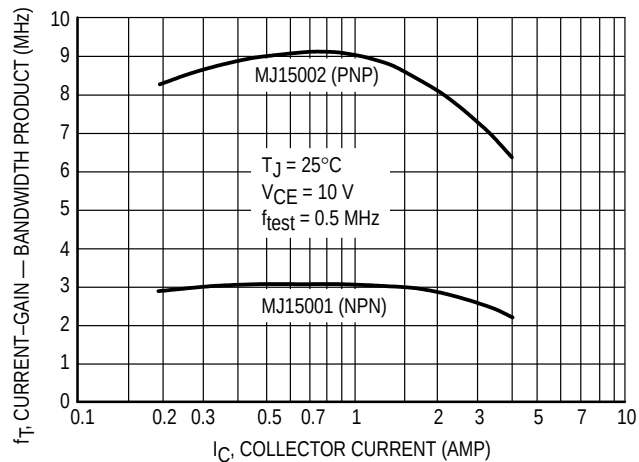


Figure 3. Current-Gain — Bandwidth Product

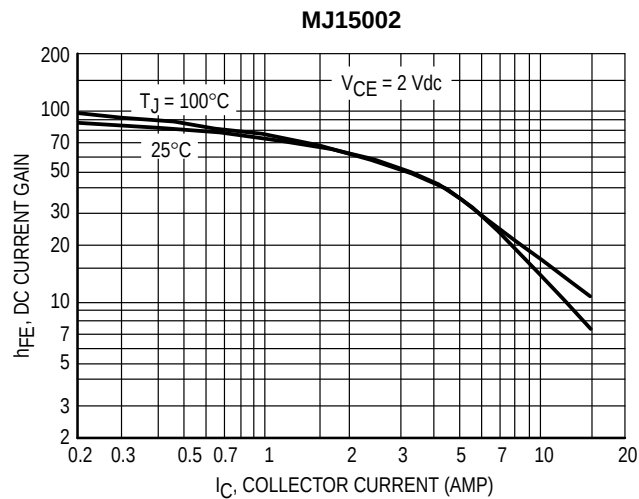
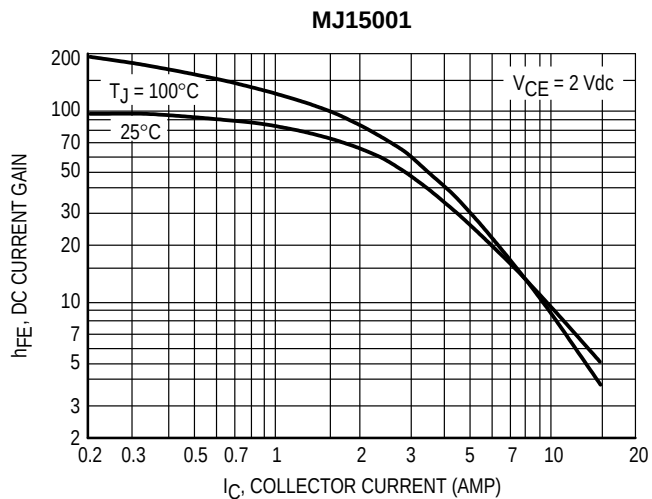


Figure 4. DC Current Gain

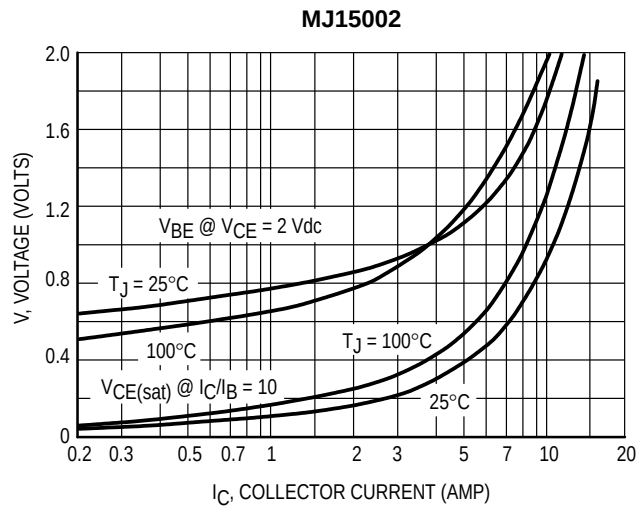
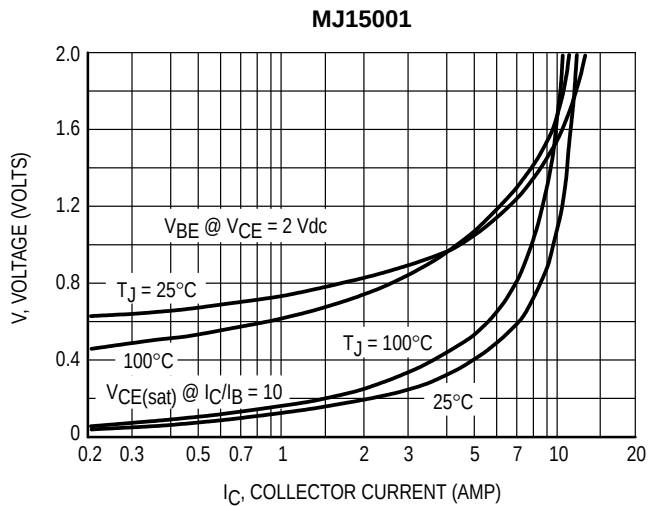
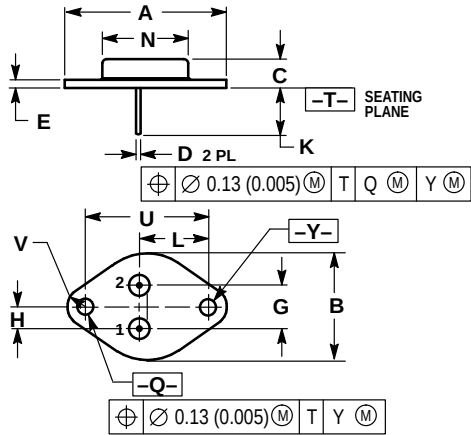


Figure 5. "On" Voltages

PACKAGE DIMENSIONS



- NOTES:
1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M, 1982.
  2. CONTROLLING DIMENSION: INCH.
  3. ALL RULES AND NOTES ASSOCIATED WITH REFERENCED TO-204AA OUTLINE SHALL APPLY.

| DIM | INCHES    |       | MILLIMETERS |       |
|-----|-----------|-------|-------------|-------|
|     | MIN       | MAX   | MIN         | MAX   |
| A   | 1.550 REF |       | 39.37 REF   |       |
| B   |           | 1.050 |             | 26.67 |
| C   | 0.250     | 0.335 | 6.35        | 8.51  |
| D   | 0.038     | 0.043 | 0.97        | 1.09  |
| E   | 0.055     | 0.070 | 1.40        | 1.77  |
| G   | 0.430 BSC |       | 10.92 BSC   |       |
| H   | 0.215 BSC |       | 5.46 BSC    |       |
| K   | 0.440     | 0.480 | 11.18       | 12.19 |
| L   | 0.665 BSC |       | 16.89 BSC   |       |
| N   |           | 0.830 |             | 21.08 |
| Q   | 0.151     | 0.165 | 3.84        | 4.19  |
| U   | 1.187 BSC |       | 30.15 BSC   |       |
| V   | 0.131     | 0.188 | 3.33        | 4.77  |

STYLE 1:  
PIN 1. BASE  
2. EMITTER  
CASE: COLLECTOR

CASE 1-07  
TO-204AA (TO-3)  
ISSUE Z

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How to reach us:  
USA / EUROPE: Motorola Literature Distribution;  
P.O. Box 20912; Phoenix, Arizona 85036. 1-800-441-2447

MFAX: RMFAX0@email.sps.mot.com - TOUCHTONE (602) 244-6609  
INTERNET: <http://Design-NET.com>

JAPAN: Nippon Motorola Ltd.; Tatsumi-SPD-JLDC, Toshikatsu Otsuki,  
6F Seibu-Butsuryu-Center, 3-14-2 Tatsumi Koto-Ku, Tokyo 135, Japan. 03-3521-8315

HONG KONG: Motorola Semiconductors H.K. Ltd.; 8B Tai Ping Industrial Park,  
51 Ting Kok Road, Tai Po, N.T., Hong Kong. 852-26629298