**PNP**
# MJ15023
# MJ15025*

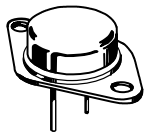
*Motorola Preferred Device

# Silicon Power Transistors

The MJ15023 and MJ15025 are PowerBase power transistors designed for high power audio, disk head positioners and other linear applications.

- High Safe Operating Area (100% Tested) — 2 A @ 80 V
- High DC Current Gain — $h_{FE}$ = 15 (Min) @ $I_C$ = 8 Adc

**16 AMPERE**
**SILICON**
**POWER TRANSISTORS**
**200 AND 250 VOLTS**
**250 WATTS**



**CASE 1–07**
**TO–204AA**
**(TO–3)**

**MAXIMUM RATINGS**

| Rating | Symbol | MJ15023 | MJ15025 | Unit |
|---|---|---|---|---|
| Collector–Emitter Voltage | $V_{CEO}$ | 200 | 250 | Vdc |
| Collector–Base Voltage | $V_{CBO}$ | 350 | 400 | Vdc |
| Emitter–Base Voltage | $V_{EBO}$ | 5 | | Vdc |
| Collector–Emitter Voltage | $V_{CEX}$ | 400 | | Vdc |
| Collector Current — Continuous<br>Peak (1) | $I_C$ | 16<br>30 | | Adc |
| Base Current — Continuous | $I_B$ | 5 | | Adc |
| Total Power Dissipation @ $T_C$ = 25°C<br>Derate above 25°C | $P_D$ | 250<br>1.43 | | Watts<br>W/°C |
| Operating and Storage Junction Temperature Range | $T_J$, $T_{stg}$ | –65 to +200 | | °C |

**THERMAL CHARACTERISTICS**

| Characteristic | Symbol | Max | Unit |
|---|---|---|---|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 0.70 | °C/W |

(1) Pulse Test: Pulse Width = 5 ms, Duty Cycle ≤ 10%.

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

**REV 7**

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

| Characteristic | | Symbol | Min | Max | Unit |
|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | |
| Collector–Emitter Sustaining Voltage (1) ($I_C$ = 100 mAdc, $I_B$ = 0) | MJ15023<br>MJ15025 | $V_{CEO(sus)}$ | <br>200<br>250 | <br>—<br>— | |
| Collector Cutoff Current ($V_{CE}$ = 200 Vdc, $V_{BE(off)}$ = 1.5 Vdc)<br>($V_{CE}$ = 250 Vdc, $V_{BE(off)}$ = 1.5 Vdc) | MJ15023<br>MJ15025 | $I_{CEX}$ | <br>—<br>— | <br>250<br>250 | μAdc |
| Collector Cutoff Current ($V_{CE}$ = 150 Vdc, $I_B$ = 0)<br>($V_{CE}$ = 200 Vdc, $I_B$ = 0) | MJ15023<br>MJ15025 | $I_{CEO}$ | <br>—<br>— | <br>500<br>500 | μAdc |
| Emitter Cutoff Current ($V_{CE}$ = 5 Vdc, $I_B$ = 0) | Both | $I_{EBO}$ | — | 500 | μAdc |
| **SECOND BREAKDOWN** | | | | | |
| Second Breakdown Collector Current with Base Forward Biased ($V_{CE}$ = 50 Vdc, t = 0.5 s (non–repetitive))<br>($V_{CE}$ = 80 Vdc, t = 0.5 s (non–repetitive)) | | $I_{S/b}$ | <br>5<br>2 | <br>—<br>— | Adc |
| **ON CHARACTERISTICS** | | | | | |
| DC Current Gain ($I_C$ = 8 Adc, $V_{CE}$ = 4 Vdc)<br>($I_C$ = 16 Adc, $V_{CE}$ = 4 Vdc) | | $h_{FE}$ | <br>15<br>5 | <br>60<br>— | — |
| Collector–Emitter Saturation Voltage ($I_C$ = 8 Adc, $I_B$ = 0.8 Adc)<br>($I_C$ = 16 Adc, $I_B$ = 3.2 Adc) | | $V_{CE(sat)}$ | <br>— | <br>1.4<br>4.0 | Vdc |
| Base–Emitter On Voltage ($I_C$ = 8 Adc, $V_{CE}$ = 4 Vdc) | | $V_{BE(on)}$ | — | 2.2 | Vdc |
| **DYNAMIC CHARACTERISTICS** | | | | | |
| Current–Gain — Bandwidth Product ($I_C$ = 1 Adc, $V_{CE}$ = 10 Vdc, $f_{test}$ = 1 MHz) | | $f_T$ | 4 | — | MHz |
| Output Capacitance ($V_{CB}$ = 10 Vdc, $I_E$ = 0, $f_{test}$ = 1 MHz) | | $C_{ob}$ | — | 600 | pF |

(1) Pulse Test: Pulse Width = 300 μs, Duty Cycle ≤ 2%.

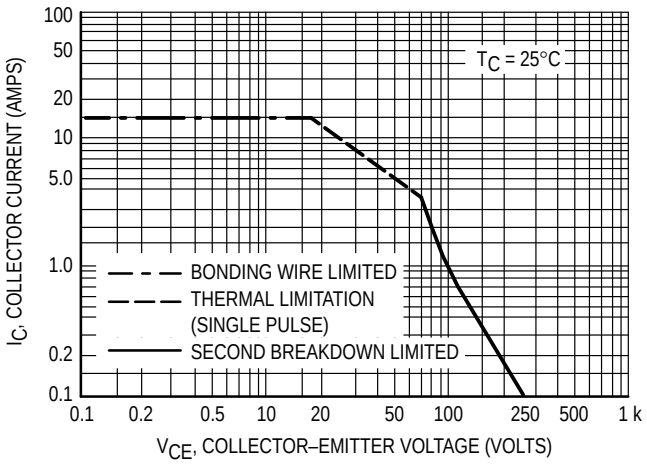



**Figure 1. Active–Region Safe Operating Area**

There are two limitations on the powerhandling 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 $T_{J(pk)}$ = 200°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

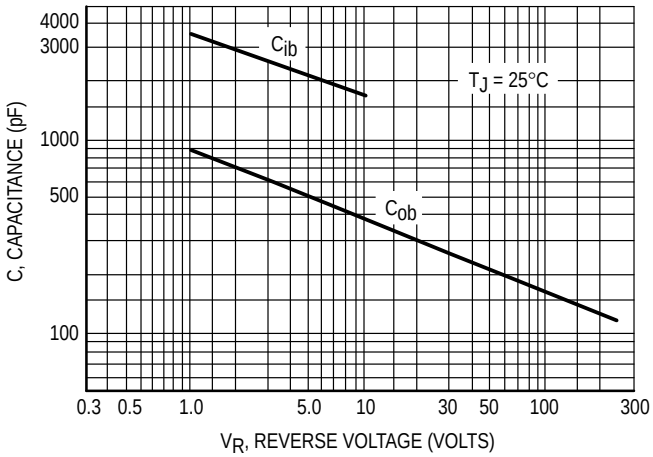



**Figure 2. Capacitances**

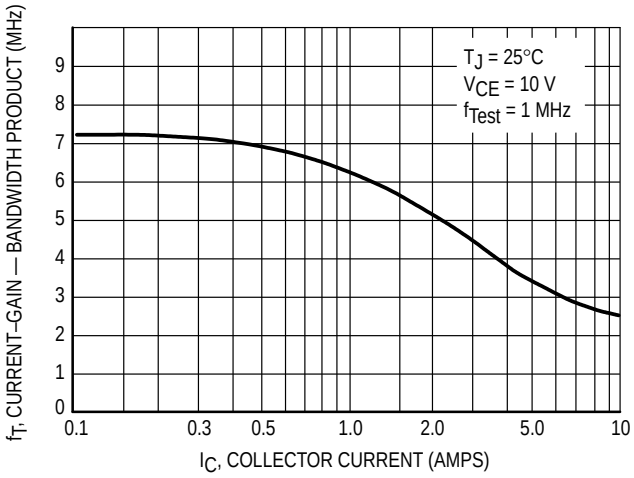



**Figure 3. Current–Gain — Bandwidth Product**

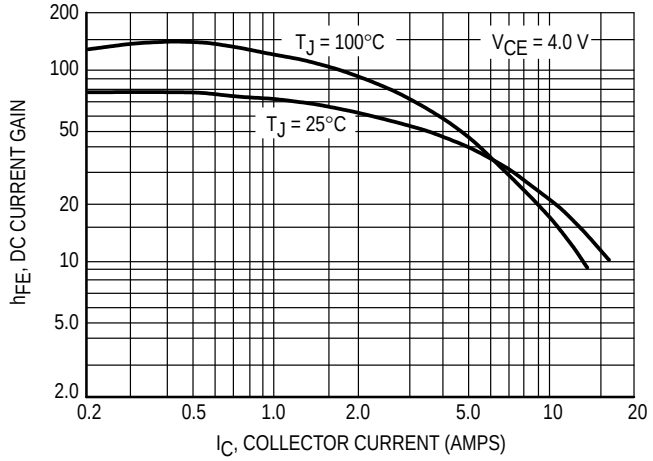



**Figure 4. DC Current Gain**

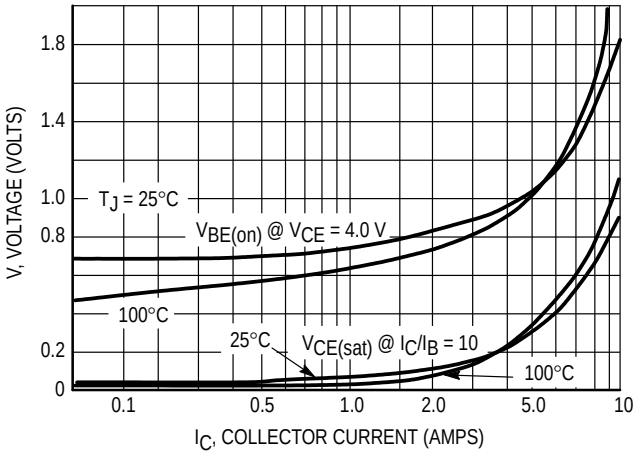
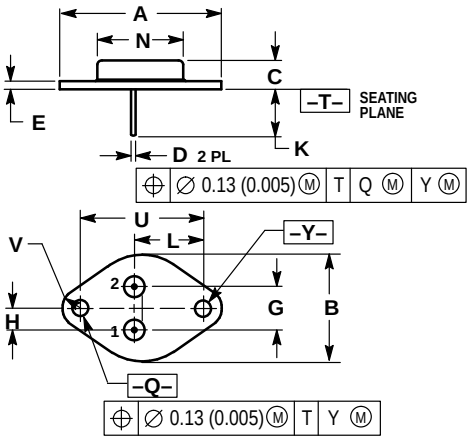



**Figure 5. “On” Voltages**

## 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.

| | INCHES | | MILLIMETERS | |
|---|---|---|---|---|
| DIM | 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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