

NPN - MJ15022, MJ15024*

*MJ15024 is a Preferred Device

Silicon Power Transistors

The MJ15022 and MJ15024 are PowerBase power transistors designed for high power audio, disk head positioners and other linear applications.

Features

- High Safe Operating Area (100% Tested) – 2 A @ 80 V
- High DC Current Gain – $h_{FE} = 15$ (Min) @ $I_C = 8$ Adc
- Pb-Free Packages are Available*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|--|----------------|-------------|--------------------------|
| Collector-Emitter Voltage MJ15022 MJ15024 | V_{CEO} | 200 250 | Vdc |
| Collector-Base Voltage MJ15022 MJ15024 | V_{CBO} | 350 400 | Vdc |
| Emitter-Base Voltage | V_{EBO} | 5 | Vdc |
| Collector-Emitter Voltage | V_{CEX} | 400 | Vdc |
| Collector Current – Continuous – Peak (Note 1) | I_C | 16 30 | Adc |
| Base Current – Continuous | I_B | 5 | Adc |
| Total Device Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 250 1.43 | W W/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +200 | $^\circ\text{C}$ |

THERMAL CHARACTERISTICS

| Characteristics | Symbol | Max | Unit |
|--------------------------------------|-----------------|------|---------------------------|
| Thermal Resistance, Junction-to-Case | $R_{\theta JC}$ | 0.70 | $^\circ\text{C}/\text{W}$ |

Maximum ratings are those values beyond which device damage can occur. Maximum ratings applied to the device are individual stress limit values (not normal operating conditions) and are not valid simultaneously. If these limits are exceeded, device functional operation is not implied, damage may occur and reliability may be affected.

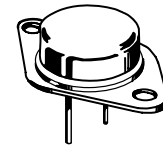
1. Pulse Test: Pulse Width = 5 ms, Duty Cycle $\leq 10\%$.



ON Semiconductor®

<http://onsemi.com>

**16 AMPERES
SILICON POWER TRANSISTORS
200 – 250 VOLTS, 250 WATTS**



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

MARKING DIAGRAM



MJ1502x = Device Code
x = 2 or 4
G = Pb-Free Package
A = Assembly Location
Y = Year
WW = Work Week
MEX = Country of Origin

ORDERING INFORMATION

| Device | Package | Shipping |
|----------|---------------------|------------------|
| MJ15022 | TO-204 | 100 Units / Tray |
| MJ15022G | TO-204 (Pb-Free) | 100 Units / Tray |
| MJ15024 | TO-204 | 100 Units / Tray |
| MJ15024G | TO-204 (Pb-Free) | 100 Units / Tray |

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

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

| Characteristic | Symbol | Min | Max | Unit |
|--|--------------------|-----------------------|------------|------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Sustaining Voltage (Note 2) (I _C = 100 mA _{dc} , I _B = 0) | MJ15022 MJ15024 | V _{CEO(sus)} | 200 250 | – |
| Collector Cutoff Current (V _{CE} = 200 V _{dc} , V _{BE(off)} = 1.5 V _{dc}) (V _{CE} = 250 V _{dc} , V _{BE(off)} = 1.5 V _{dc}) | MJ15022 MJ15024 | I _{CEX} | – – | 250 250 |
| Collector Cutoff Current (V _{CE} = 150 V _{dc} , I _B = 0) (V _{CE} = 200 V _{dc} , I _B = 0) | MJ15022 MJ15024 | I _{CEO} | – – | 500 500 |
| Emitter Cutoff Current (V _{CE} = 5 V _{dc} , I _B = 0) | | I _{EBO} | – | 500 |
| SECOND BREAKDOWN | | | | |
| Second Breakdown Collector Current with Base Forward Biased (V _{CE} = 50 V _{dc} , t = 0.5 s (non–repetitive)) (V _{CE} = 80 V _{dc} , t = 0.5 s (non–repetitive)) | | I _{S/b} | 5 2 | – – |
| ON CHARACTERISTICS | | | | |
| DC Current Gain (I _C = 8 A _{dc} , V _{CE} = 4 V _{dc}) (I _C = 16 A _{dc} , V _{CE} = 4 V _{dc}) | | h _{FE} | 15 5 | 60 – |
| Collector–Emitter Saturation Voltage (I _C = 8 A _{dc} , I _B = 0.8 A _{dc}) (I _C = 16 A _{dc} , I _B = 3.2 A _{dc}) | | V _{CE(sat)} | – – | 1.4 4.0 |
| Base–Emitter On Voltage (I _C = 8 A _{dc} , V _{CE} = 4 V _{dc}) | | V _{BE(on)} | – | 2.2 |
| DYNAMIC CHARACTERISTICS | | | | |
| Current–Gain – Bandwidth Product (I _C = 1 A _{dc} , V _{CE} = 10 V _{dc} , f _{test} = 1 MHz) | | f _T | 4 | – |
| Output Capacitance (V _{CB} = 10 V _{dc} , I _E = 0, f _{test} = 1 MHz) | | C _{ob} | – | 500 |

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

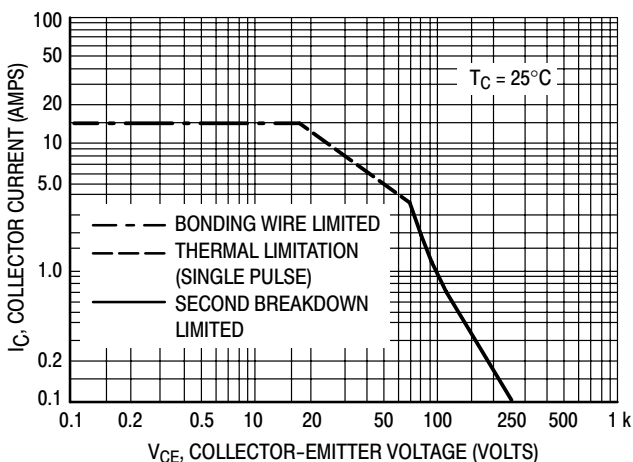


Figure 1. Active–Region Safe Operating Area

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 I_{on} than the limitations imposed by second breakdown.

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TYPICAL CHARACTERISTICS

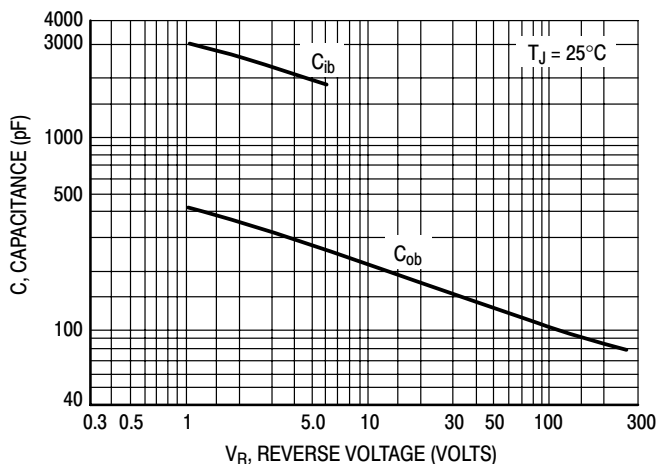


Figure 2. Capacitances

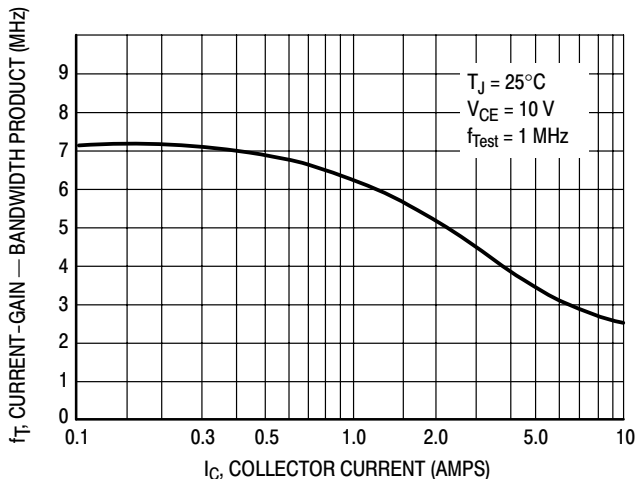


Figure 3. Current-Gain — Bandwidth Product

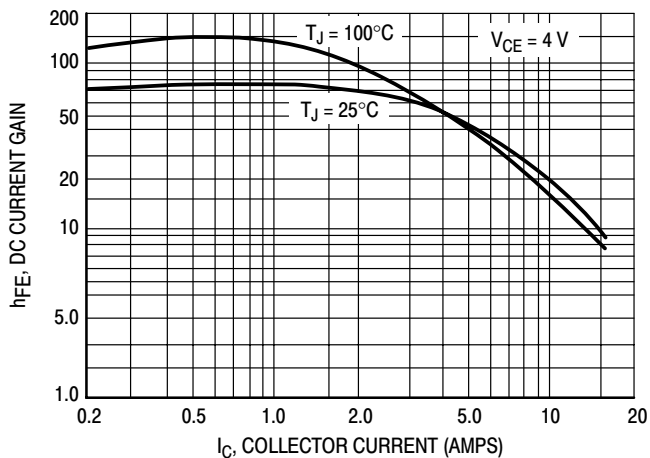


Figure 4. DC Current Gain

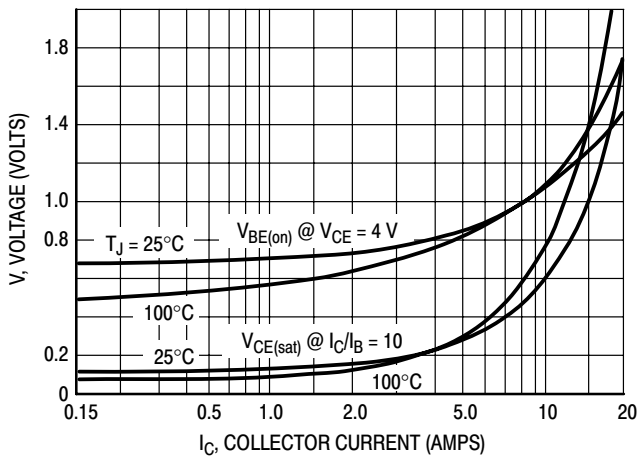


Figure 5. "On" Voltage

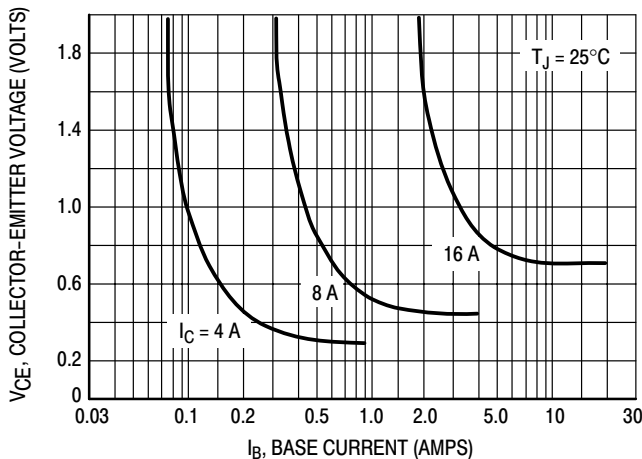
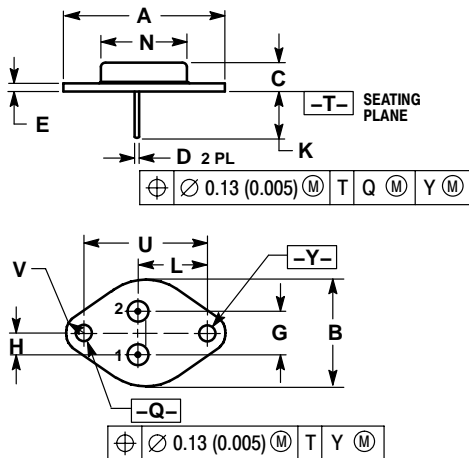


Figure 6. Collector Saturation Region

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PACKAGE DIMENSIONS

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



- 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

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