

MJ15011 (NPN), MJ15012 (PNP)

Preferred Devices

Complementary Silicon Power Transistors

The MJ15011 and MJ15012 are PowerBase power transistors designed for high-power audio, disk head positioners, and other linear applications. These devices can also be used in power switching circuits such as relay or solenoid drivers, dc-to-dc converters or inverters.

- High Safe Operating Area (100% Tested)
1.2 A @ 100 V
- Completely Characterized for Linear Operation
- High DC Current Gain and Low Saturation Voltage
 $h_{FE} = 20$ (Min) @ 2 A, 2 V
 $V_{CE(sat)} = 2.5$ V (Max) @ $I_C = 4$ A, $I_B = 0.4$ A
- For Low Distortion Complementary Designs
- Pb-Free Packages are Available*

MAXIMUM RATINGS

| Rating | Symbol | Value | Unit |
|---|-------------------|----------------|------------------------------|
| Collector-Emitter Voltage | V_{CEO} | 250 | Vdc |
| Collector-Emitter Voltage | V_{CEX} | 250 | Vdc |
| Emitter-Base Voltage | V_{EB} | 5 | Vdc |
| Collector Current – Continuous – Peak (Note 1) | I_C I_{CM} | 10 15 | Adc |
| Base Current – Continuous – Peak (Note 1) | I_B I_{BM} | 2 5 | Adc |
| Emitter Current – Continuous – Peak (Note 1) | I_E I_{EM} | 12 20 | Adc |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 200 1.14 | Watts 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 | T_L | 265 | $^\circ\text{C}$ |

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 $\leq 10\%$.

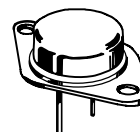
*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

<http://onsemi.com>

**10 AMPERE
COMPLEMENTARY
POWER TRANSISTORS
250 VOLTS
200 WATTS**



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

MARKING DIAGRAM



MJ1501x = Device Code
x = 1 or 2
G = Pb-Free Package
A = Location Code
YY = Year
WW = Work Week
MEX = Country of Origin

ORDERING INFORMATION

| Device | Package | Shipping |
|----------|-----------------------|----------------|
| MJ15011 | TO-204AA | 100 Units/Tray |
| MJ15011G | TO-204AA (Pb-Free) | 100 Units/Tray |
| MJ15012 | TO-204AA | 100 Units/Tray |
| MJ15012G | TO-204AA (Pb-Free) | 100 Units/Tray |

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

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

| Characteristic | Symbol | Min | Max | Unit |
|--|---------------|----------|------------|-----------------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Breakdown Voltage (Note 2) ($I_C = 100\text{ mA}$) | $V_{(BR)CEO}$ | 250 | – | Vdc |
| Collector Cutoff Current ($V_{CE} = 200\text{ Vdc}$) | I_{CEO} | – | 1 | mAdc |
| Collector Cutoff Current ($V_{CE} = 250\text{ Vdc}$, $V_{BE(off)} = 15\text{ Vdc}$) | I_{CEX} | – | 100 | μAdc |
| Emitter Cutoff Current ($V_{BE} = 5\text{ Vdc}$) | I_{EBO} | – | 10 | μAdc |
| ON CHARACTERISTICS (Note 2) | | | | |
| DC Current Gain ($I_C = 2\text{ Adc}$, $V_{CE} = 2\text{ Vdc}$) ($I_C = 4\text{ Adc}$, $V_{CE} = 2\text{ Vdc}$) | h_{FE} | 20 15 | 120 – | – |
| Collector–Emitter Saturation Voltage ($I_C = 2\text{ Adc}$, $I_B = 0.2\text{ Adc}$) ($I_C = 4\text{ Adc}$, $I_B = 0.4\text{ Adc}$) | $V_{CE(sat)}$ | – – | 0.6 1.0 | Vdc |
| Base–Emitter On Voltage ($I_C = 4\text{ Adc}$, $V_{CE} = 2\text{ Vdc}$) | $V_{BE(on)}$ | – | 1.8 | Vdc |
| DYNAMIC CHARACTERISTICS | | | | |
| Output Capacitance ($V_{CB} = 10\text{ Vdc}$, $f = 1\text{ MHz}$) | C_{ob} | – | 750 | pF |
| SECOND BREAKDOWN | | | | |
| Second Breakdown Collector Current with Base Forward Biased ($V_{CE} = 40\text{ Vdc}$, $t = 0.5\text{ s}$) ($V_{CE} = 100\text{ Vdc}$, $t = 0.5\text{ s}$) | $I_{S/b}$ | 5 1.4 | – – | Adc |

2. Pulse Test: Pulse Width = 300 μs , Duty Cycle $\leq 2\%$.

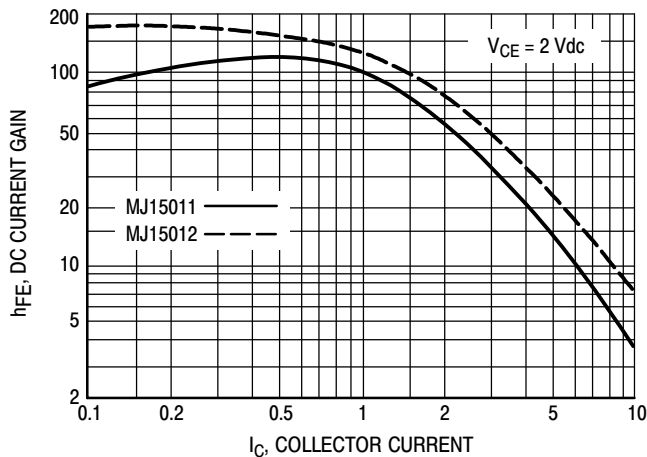


Figure 1. DC Current Gain

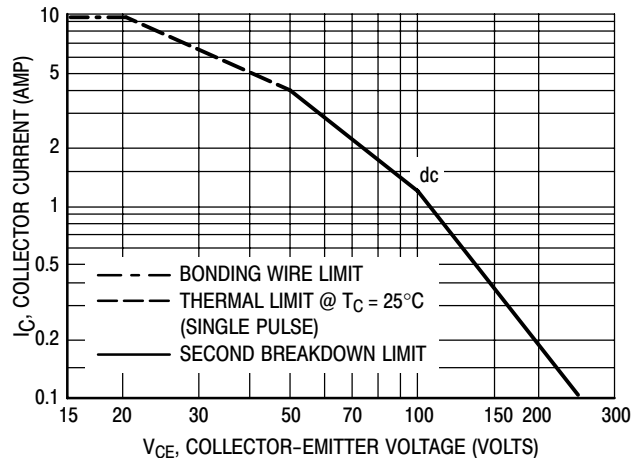
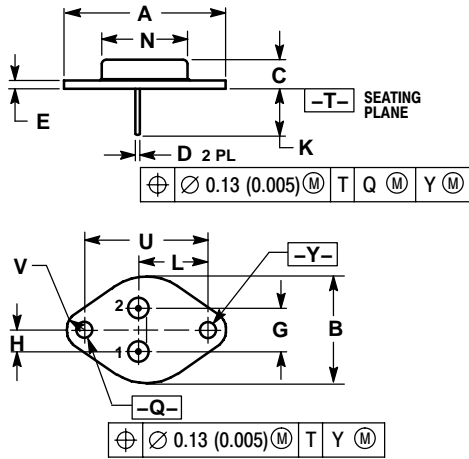


Figure 2. Active Region Safe Operating Area

MJ15011 (NPN), MJ15012 (PNP)

PACKAGE DIMENSIONS

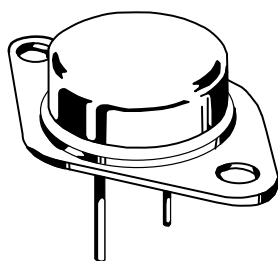
TO-204 (TO-3)
CASE 1-07
ISSUE Z



- 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 |

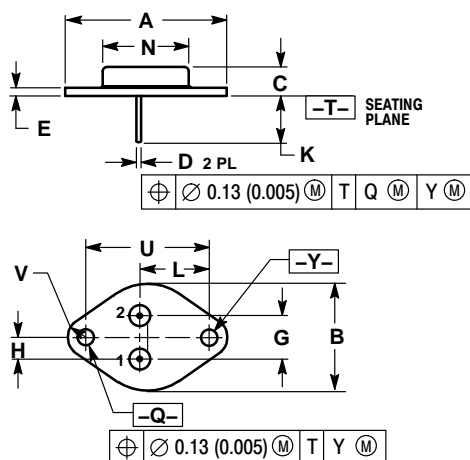
STYLE 1:
PIN 1. BASE
2. EMITTER
CASE: COLLECTOR



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

DATE 05/18/1988

SCALE 1:1



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

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

STYLE 3:
PIN 1. GATE
2. SOURCE
CASE: DRAIN

STYLE 4:
PIN 1. GROUND
2. INPUT
CASE: OUTPUT


STYLE 5:
PIN 1. CATHODE
2. EXTERNAL TRIP/DELAY
CASE: ANODE

STYLE 6:
PIN 1. GATE
2. EMITTER
CASE: COLLECTOR

STYLE 7:
PIN 1. ANODE
2. OPEN
CASE: CATHODE

STYLE 8:
PIN 1. CATHODE #1
2. CATHODE #2
CASE: ANODE

STYLE 9:
PIN 1. ANODE #1
2. ANODE #2
CASE: CATHODE

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