

# Complementary Silicon Power Transistors

... designed for use as high frequency drivers in Audio Amplifiers.

- High Gain Complementary Silicon Power Transistors
- Safe Operating Area 100% Tested 50 V, 3.0 A, 1.0 Sec.
- Excellent Frequency Response —  
 $f_T = 20$  MHz min.

## MAXIMUM RATINGS

| Rating                                                                                | Symbol         | MJ15020<br>MJ15021 | Unit                         |
|---------------------------------------------------------------------------------------|----------------|--------------------|------------------------------|
| Collector–Emitter Voltage                                                             | $V_{CEO}$      | 250                | Vdc                          |
| Collector–Base Voltage                                                                | $V_{CBO}$      | 250                | Vdc                          |
| Emitter–Base Voltage                                                                  | $V_{EBO}$      | 7.0                | Vdc                          |
| Collector Current — Continuous                                                        | $I_C$          | 4.0                | Adc                          |
| Base Current — Continuous                                                             | $I_B$          | 2.0                | Adc                          |
| Emitter Current — Continuous                                                          | $I_E$          | 6.0                | Adc                          |
| Total Power Dissipation @ $T_C = 25^\circ\text{C}$<br>Derate above $25^\circ\text{C}$ | $P_D$          | 150<br>0.86        | Watts<br>W/ $^\circ\text{C}$ |
| Operating and Storage Junction<br>Temperature Range                                   | $T_J, T_{stg}$ | –65 to +200        | $^\circ\text{C}$             |

## THERMAL CHARACTERISTICS

| Characteristic                       | Symbol          | Max  | Unit               |
|--------------------------------------|-----------------|------|--------------------|
| Thermal Resistance, Junction to Case | $R_{\theta JC}$ | 1.17 | $^\circ\text{C/W}$ |

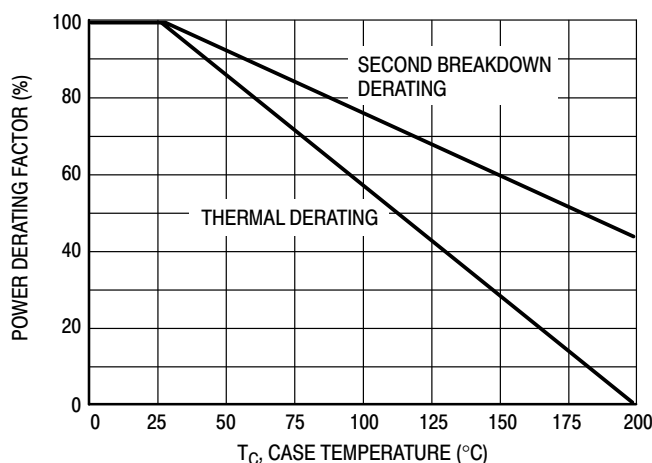
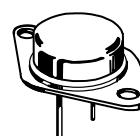


Figure 1. Power Derating

**NPN**  
**MJ15020** \*  
**PNP**  
**MJ15021** \*

\*ON Semiconductor Preferred Device

**4.0 AMPERES  
COMPLEMENTARY  
SILICON  
POWER TRANSISTORS  
200 AND 250 VOLTS  
150 WATTS**



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

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

# MJ15020 MJ15021

## 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>( $I_C = 100\text{ mAdc}$ , $I_B = 0$ )                                              | $V_{CEO(sus)}$ | 250      | —      | Vdc             |
| Collector Cutoff Current<br>( $V_{CE} = 200\text{ Vdc}$ , $I_B = 0$ )                                                            | $I_{CEO}$      | —        | 500    | $\mu\text{Adc}$ |
| Emitter Cutoff Current<br>( $V_{EB} = 7.0\text{ Vdc}$ , $I_C = 0$ )                                                              | $I_{EBO}$      | —        | 500    | $\mu\text{Adc}$ |
| <b>SECOND BREAKDOWN</b>                                                                                                          |                |          |        |                 |
| Second Breakdown Collector Current with Base Forward–Biased<br>( $V_{CE} = 50\text{ Vdc}$ , $t = 0.5\text{ s}$ (non–repetitive)) | $I_{S/b}$      | 3.0      | —      | Adc             |
| <b>ON CHARACTERISTICS (1)</b>                                                                                                    |                |          |        |                 |
| DC Current Gain<br>( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 4.0\text{ V}$ )<br>( $I_C = 3.0\text{ Adc}$ , $V_{CE} = 4.0\text{ V}$ )  | $h_{FE}$       | 30<br>10 | —<br>— |                 |
| Collector–Emitter Saturation Voltage<br>( $I_C = 1.0\text{ Adc}$ , $I_B = 0.1\text{ Adc}$ )                                      | $V_{CE(sat)}$  | —        | 1.0    | Vdc             |
| Base–Emitter on Voltage<br>( $I_C = 1.0\text{ Adc}$ , $V_{CE} = 4.0\text{ Vdc}$ )                                                | $V_{BE(on)}$   | —        | 2.0    | Vdc             |
| <b>DYNAMIC CHARACTERISTICS</b>                                                                                                   |                |          |        |                 |
| Current–Gain — Bandwidth Product<br>( $I_C = 0.5\text{ Adc}$ , $V_{CE} = 10\text{ Vdc}$ , $f_{test} = 1.0\text{ MHz}$ )          | $f_T$          | 20       | —      | MHz             |
| Output Capacitance<br>( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $F_{test} = 1.0\text{ MHz}$ )                                     | $C_{ob}$       | —        | 500    | pF              |

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

## TYPICAL DYNAMIC CHARACTERISTICS

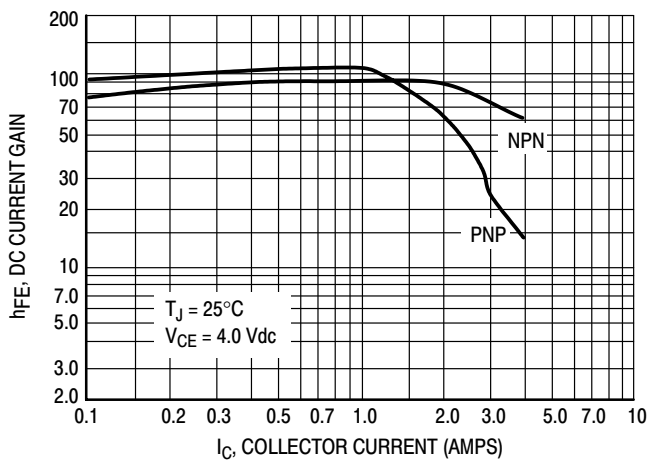


Figure 2. DC Current Gain

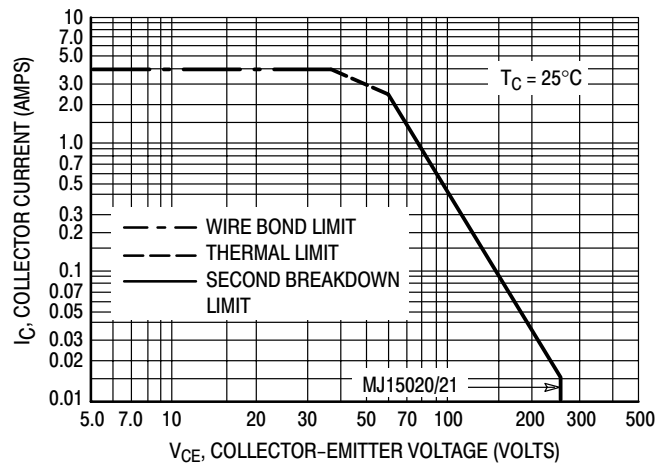
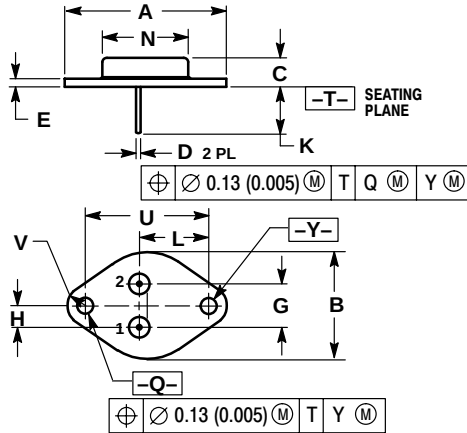


Figure 3. Maximum Rated Forward Biased Safe Operating Area

# MJ15020 MJ15021

## PACKAGE DIMENSIONS

### CASE 1-07 TO-204AA (TO-3) 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   | 0.250     | 0.335 | 6.35        | 8.51  |
| C   | 0.038     | 0.043 | 0.97        | 1.09  |
| D   | 0.055     | 0.070 | 1.40        | 1.77  |
| E   | 0.430 BSC |       | 10.92 BSC   |       |
| G   | 0.215 BSC |       | 5.46 BSC    |       |
| H   | 0.440     | 0.480 | 11.18       | 12.19 |
| K   | 0.665 BSC |       | 16.89 BSC   |       |
| L   | 0.830     |       | 21.08       |       |
| N   | 0.151     | 0.165 | 3.84        | 4.19  |
| 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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