

## Advance Information

# Complementary Silicon Power Transistors

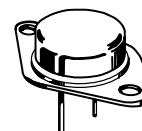
The MJ15011 and MJ15012 are PowerBase power transistors designed for high-power audio, disk head positioners, and other linear applications. These devices can also be used in power switching circuits such as relay or solenoid drivers, dc-to-dc converters or inverters.

- 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

**NPN**  
**MJ15011\***  
**PNP**  
**MJ15012\***

\*Motorola Preferred Device

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



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

## 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	$I_C$	10	Adc
— Peak (1)	$I_{CM}$	15	
Base Current — Continuous	$I_B$	2	Adc
— Peak (1)	$I_{BM}$	5	
Emitter Current — Continuous	$I_E$	12	Adc
— Peak (1)	$I_{EM}$	20	
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above $25^\circ\text{C}$	$P_D$	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	$^\circ\text{C}$

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

This document contains information on a new product. Specifications and information herein are subject to change without notice.

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

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
Collector–Emitter Breakdown Voltage (1) ( $I_C = 100\text{ mA}$ )	$V_{(BR)CEO}$	250	—	Vdc
Collector Cutoff Current ( $V_{CE} = 200\text{ Vdc}$ )	$I_{CEO}$	—	1	mAdc
Collector Cutoff Current ( $V_{CE} = 250\text{ Vdc}$ , $V_{BE(off)} = 15\text{ Vdc}$ )	$I_{CEX}$	—	500	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{BE} = 5\text{ Vdc}$ )	$I_{EBO}$	—	500	$\mu\text{Adc}$

**ON CHARACTERISTICS (1)**

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 5	100 —	—
Collector–Emitter Saturation Voltage ( $I_C = 2\text{ Adc}$ , $I_B = 0.2\text{ Adc}$ ) ( $I_C = 4\text{ Adc}$ , $I_B = 0.4\text{ Adc}$ )	$V_{CE(sat)}$	— —	0.8 2.5	Vdc
Base–Emitter On Voltage ( $I_C = 4\text{ Adc}$ , $V_{CE} = 2\text{ Vdc}$ )	$V_{BE(on)}$	—	2	Vdc

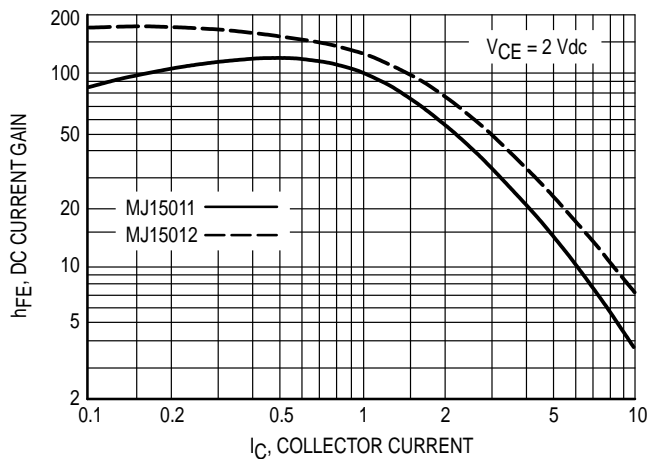
**DYNAMIC CHARACTERISTICS**

Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $f = 1\text{ MHz}$ )	$C_{ob}$	—	750	pF
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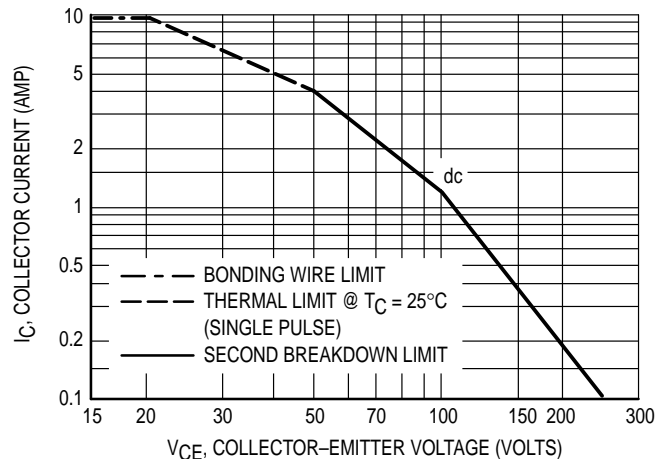
**SECOND BREAKDOWN**

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

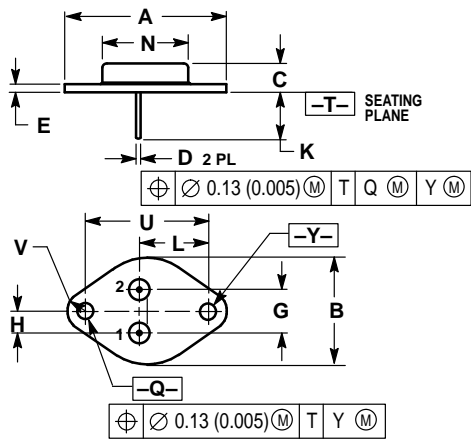


**Figure 1. DC Current Gain**



**Figure 2. Active Region Safe Operating Area**

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	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
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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**MOTOROLA****MJ15011/D**