

# 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 $25^\circ\text{C}$	$P_D$	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	$^\circ\text{C}$

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  $\leq 10\%$ .

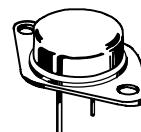
\*For additional information on our Pb-Free strategy and soldering details, please download the ON Semiconductor Soldering and Mounting Techniques Reference Manual, SOLDERRM/D.



ON Semiconductor®

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**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.

# MJ15011 (NPN), MJ15012 (PNP)

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

Characteristic	Symbol	Min	Max	Unit
<b>OFF CHARACTERISTICS</b>				
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	$\mu\text{Adc}$
Emitter Cutoff Current ( $V_{BE} = 5\text{ Vdc}$ )	$I_{EBO}$	–	10	$\mu\text{Adc}$
<b>ON CHARACTERISTICS (Note 2)</b>				
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
<b>DYNAMIC CHARACTERISTICS</b>				
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $f = 1\text{ MHz}$ )	$C_{ob}$	–	750	pF
<b>SECOND BREAKDOWN</b>				
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  $\mu\text{s}$ , Duty Cycle  $\leq 2\%$ .

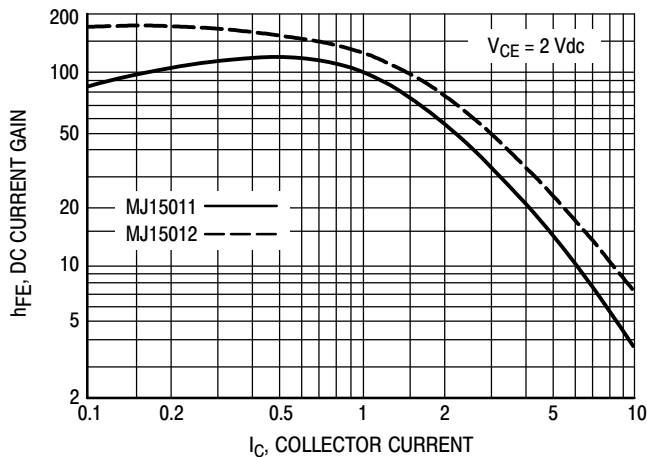


Figure 1. DC Current Gain

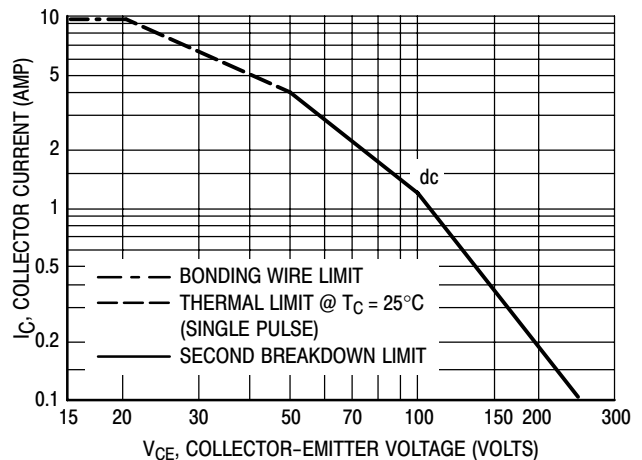
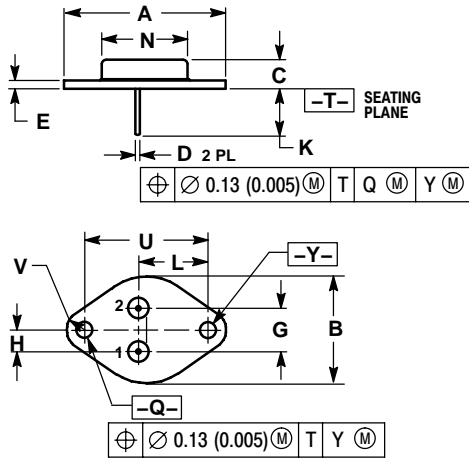


Figure 2. Active Region Safe Operating Area

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## PACKAGE DIMENSIONS

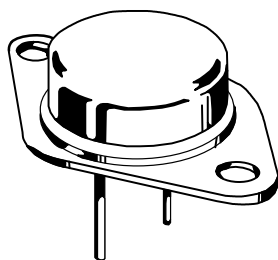
TO-204 (TO-3)  
CASE 1-07  
ISSUE Z



- 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

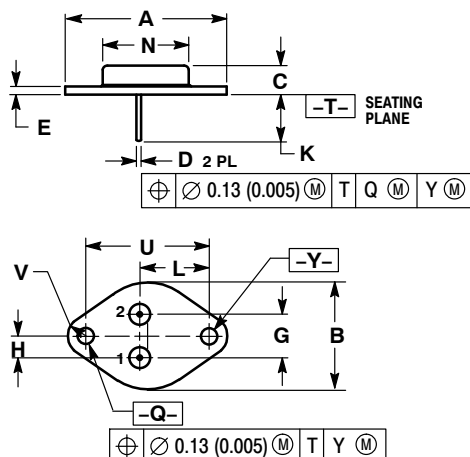
STYLE 1:  
PIN 1. BASE  
2. EMITTER  
CASE: COLLECTOR



TO-204 (TO-3)  
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ISSUE Z

DATE 10 MAR 2000

SCALE 1:1



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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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