

## Silicon Power Transistors

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

- High Safe Operating Area (100% Tested) —  
2 A @ 80 V
- High DC Current Gain —  
 $h_{FE} = 15$  (Min) @  $I_C = 8$  Adc

### MAXIMUM RATINGS

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

### THERMAL CHARACTERISTICS

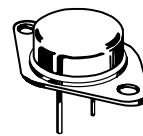
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.70	$^\circ\text{C}/\text{W}$

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

**NPN**  
**MJ15022**  
**MJ15024 \***

\*ON Semiconductor Preferred Device

**16 AMPERE**  
**SILICON**  
**POWER TRANSISTORS**  
**200 AND 250 VOLTS**  
**250 WATTS**



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

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

# MJ15022 MJ15024

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

Characteristic	Symbol	Min	Max	Unit
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### OFF CHARACTERISTICS

Collector–Emitter Sustaining Voltage (1) ( $I_C = 100\text{ mA}$ , $I_B = 0$ )	MJ15022 MJ15024	$V_{CEO(sus)}$	200 250	— —	
Collector Cutoff Current ( $V_{CE} = 200\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ ) ( $V_{CE} = 250\text{ Vdc}$ , $V_{BE(off)} = 1.5\text{ Vdc}$ )	MJ15022 MJ15024	$I_{CEX}$	— —	250 250	$\mu\text{A}$
Collector Cutoff Current ( $V_{CE} = 150\text{ Vdc}$ , $I_B = 0$ ) ( $V_{CE} = 200\text{ vdc}$ , $I_B = 0$ )	MJ15022 MJ15024	$I_{CEO}$	— —	500 500	$\mu\text{A}$
Emitter Cutoff Current ( $V_{CE} = 5\text{ Vdc}$ , $I_B = 0$ )		$I_{EBO}$	—	500	$\mu\text{A}$

### SECOND BREAKDOWN

Second Breakdown Collector Current with Base Forward Biased ( $V_{CE} = 50\text{ Vdc}$ , $t = 0.5\text{ s}$ (non-repetitive)) ( $V_{CE} = 80\text{ Vdc}$ , $t = 0.5\text{ s}$ (non-repetitive))		$I_{S/b}$	5 2	— —	$\text{A}$
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### ON CHARACTERISTICS

DC Current Gain ( $I_C = 8\text{ A}$ , $V_{CE} = 4\text{ Vdc}$ ) ( $I_C = 16\text{ A}$ , $V_{CE} = 4\text{ Vdc}$ )		$h_{FE}$	15 5	60 —	—
Collector–Emitter Saturation Voltage ( $I_C = 8\text{ A}$ , $I_B = 0.8\text{ A}$ ) ( $I_C = 16\text{ A}$ , $I_B = 3.2\text{ A}$ )		$V_{CE(sat)}$	— —	1.4 4.0	$\text{Vdc}$
Base–Emitter On Voltage ( $I_C = 8\text{ A}$ , $V_{CE} = 4\text{ Vdc}$ )		$V_{BE(on)}$	—	2.2	$\text{Vdc}$

### DYNAMIC CHARACTERISTICS

Current–Gain — Bandwidth Product ( $I_C = 1\text{ A}$ , $V_{CE} = 10\text{ Vdc}$ , $f_{test} = 1\text{ MHz}$ )		$f_T$	4	—	$\text{MHz}$
Output Capacitance ( $V_{CB} = 10\text{ Vdc}$ , $I_E = 0$ , $f_{test} = 1\text{ MHz}$ )		$C_{ob}$	—	500	$\text{pF}$

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

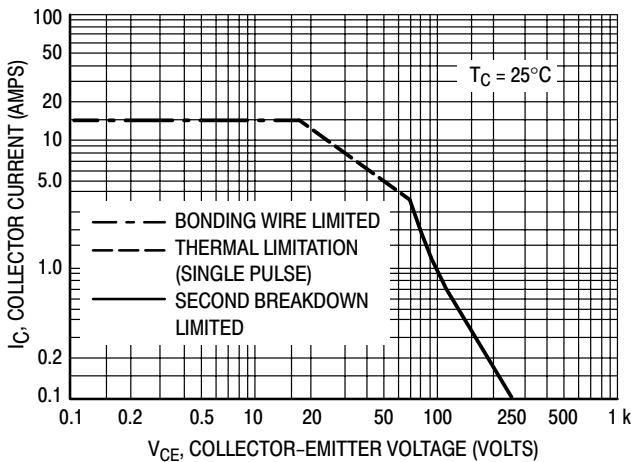


Figure 1. Active–Region Safe Operating Area

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  $T_{J(pk)} = 200^\circ\text{C}$ ;  $T_C$  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.

TYPICAL CHARACTERISTICS

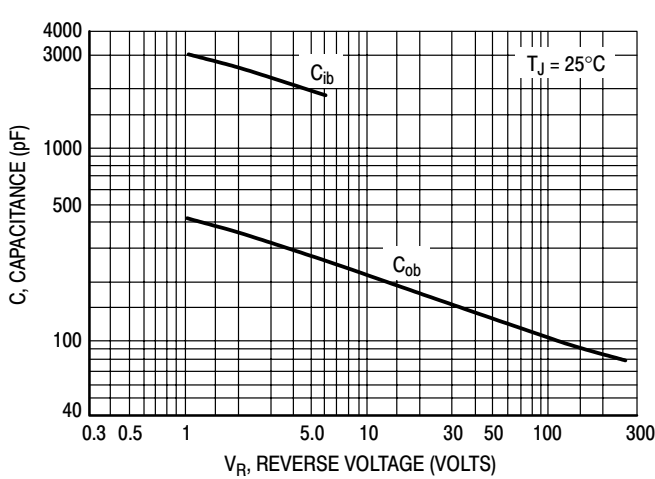


Figure 2. Capacitances

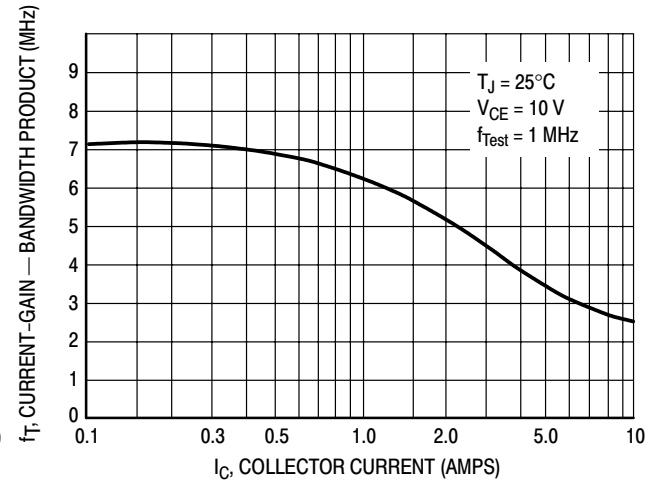


Figure 3. Current-Gain — Bandwidth Product

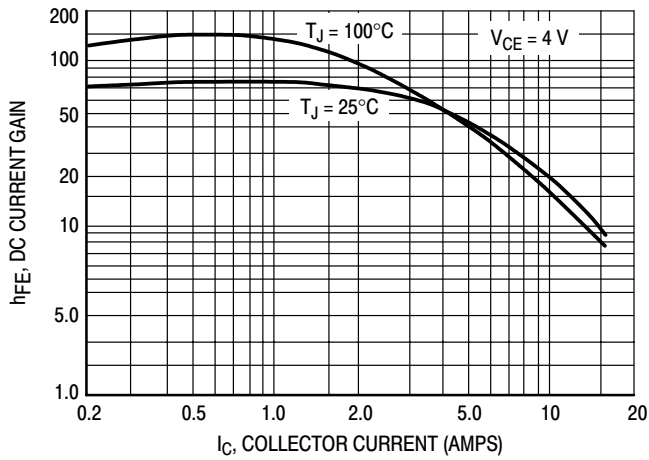


Figure 4. DC Current Gain

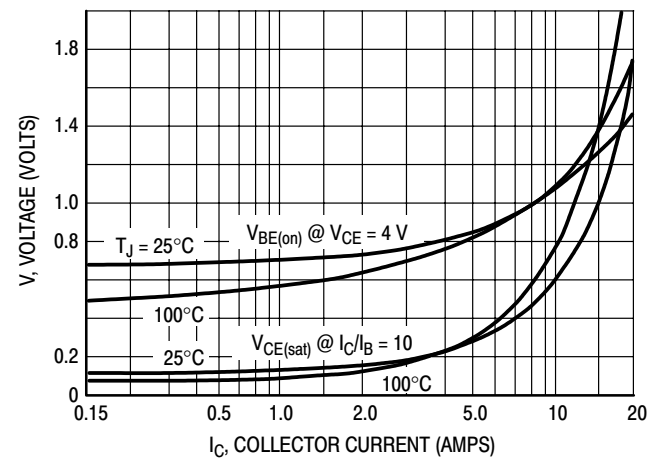


Figure 5. "On" Voltage

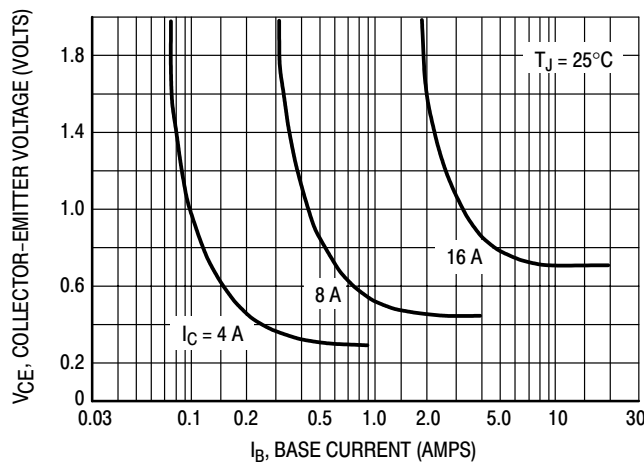
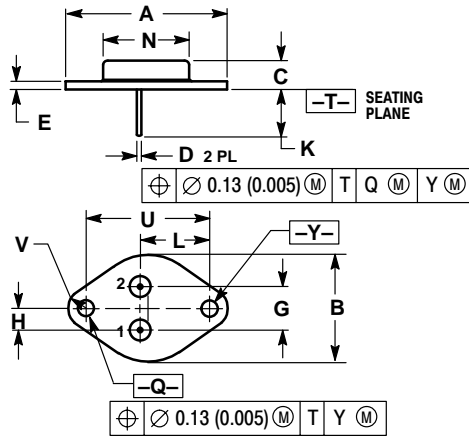


Figure 6. Collector Saturation Region

# MJ15022 MJ15024

## 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	---	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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