

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°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

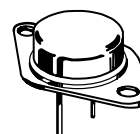
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction to Case	$R_{\theta JC}$	0.70	$^\circ\text{C/W}$

(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) ($I_C = 100\text{ mAdc}$, $I_B = 0$)	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	μAdc
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	μAdc
Emitter Cutoff Current ($V_{CE} = 5\text{ Vdc}$, $I_B = 0$)		I_{EBO}	—	500	μAdc

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	— —	Adc
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ON CHARACTERISTICS

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

DYNAMIC CHARACTERISTICS

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

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

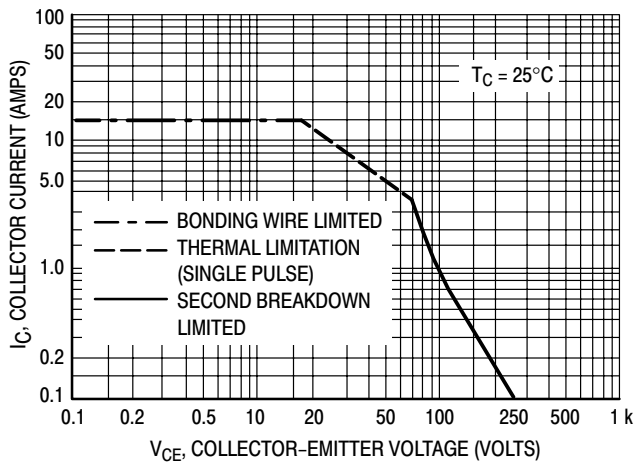


Figure 1. Active–Region Safe Operating Area

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

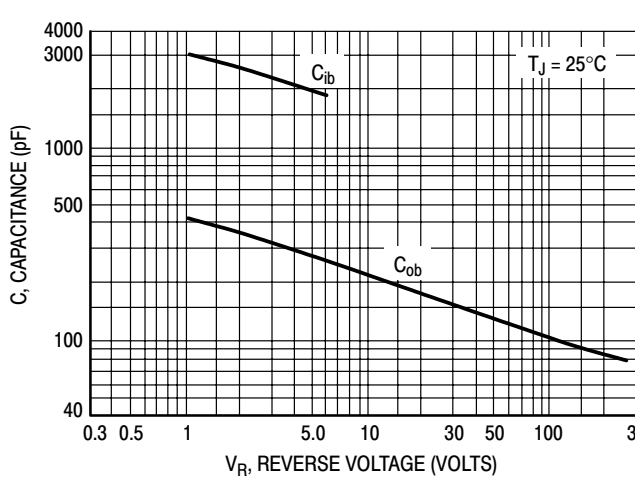


Figure 2. Capacitances

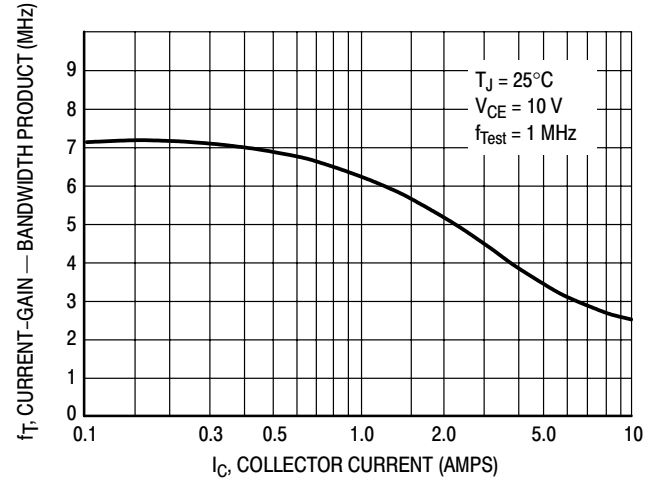


Figure 3. Current-Gain — Bandwidth Product

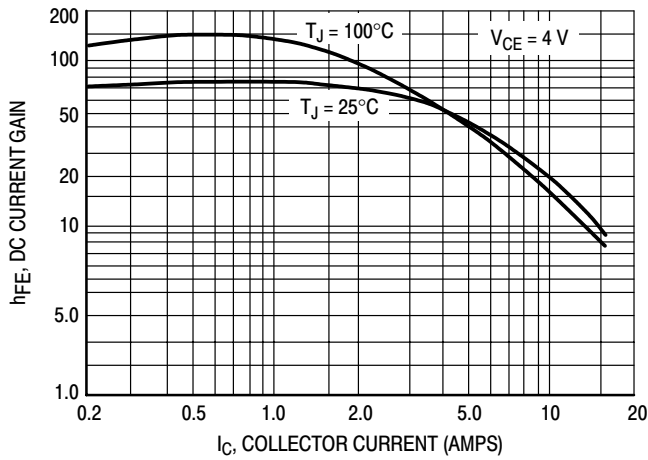


Figure 4. DC Current Gain

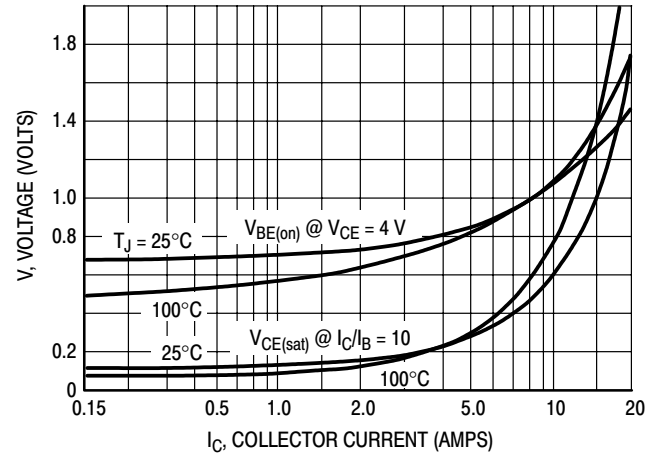


Figure 5. "On" Voltage

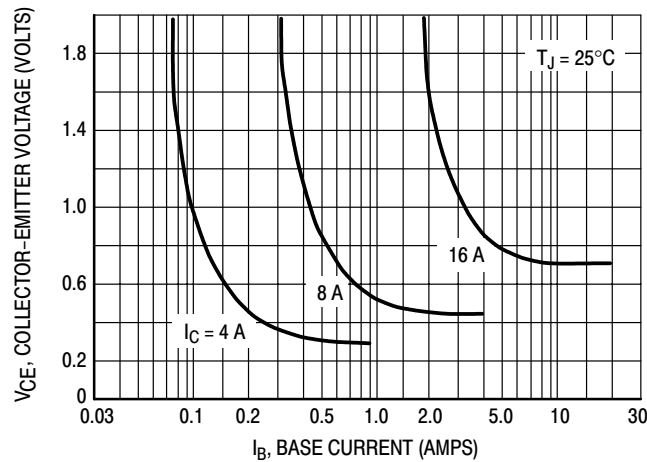
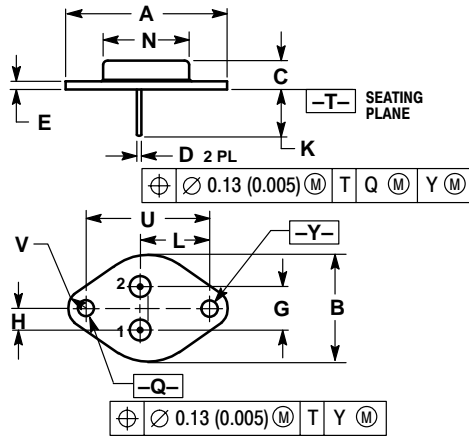


Figure 6. Collector Saturation Region

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
 - EMITTER
- CASE: COLLECTOR

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