

MJ15001 (NPN), MJ15002 (PNP)

Complementary Silicon Power Transistors

The MJ15001 and MJ15002 are EpiBase power transistors designed for high power audio, disk head positioners and other linear applications.

- High Safe Operating Area (100% Tested) –
5.0 A @ 40 V
0.5 A @ 100 V
- For Low Distortion Complementary Designs
- High DC Current Gain –
 $h_{FE} = 25$ (Min) @ $I_C = 4$ Adc

MAXIMUM RATINGS

Rating	Symbol	Value	Unit
Collector-Emitter Voltage	V_{CEO}	140	Vdc
Collector-Base Voltage	V_{CBO}	140	Vdc
Emitter-Base Voltage	V_{EBO}	5	Vdc
Collector Current – Continuous	I_C	15	Adc
Base Current – Continuous	I_B	5	Adc
Emitter Current – Continuous	I_E	20	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°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

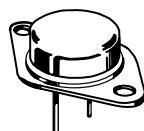
Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction-to-Case	$R_{\theta JC}$	0.875	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes: 1/16" from Case for ≤ 10 seconds	T_L	265	$^\circ\text{C}$



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20 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 140 V 250 W



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

MARKING DIAGRAM



xx = Specific Device Code
A = Assembly Location
WL, L = Wafer Lot
YY, Y = Year
WW, W = Work Week

ORDERING INFORMATION

Device	Package	Shipping
MJ15001	TO-204AA (TO-3)	100 Foams
MJ15002	TO-204AA (TO-3)	100 Foams

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

Characteristic	Symbol	Min	Max	Unit
OFF CHARACTERISTICS				
Collector-Emitter Sustaining Voltage (Note 1) ($I_C = 200 \text{ mA}$, $I_B = 0$)	$V_{CEO(\text{sus})}$	140	—	Vdc
Collector Cutoff Current ($V_{CE} = 140 \text{ Vdc}$, $V_{BE(\text{off})} = 1.5 \text{ Vdc}$) ($V_{CE} = 140 \text{ Vdc}$, $V_{BE(\text{off})} = 1.5 \text{ Vdc}$, $T_C = 150^\circ\text{C}$)	I_{CEX}	— —	100 2.0	μA mA
Collector Cutoff Current ($V_{CE} = 140 \text{ Vdc}$, $I_B = 0$)	I_{CEO}	—	250	μA
Emitter Cutoff Current ($V_{EB} = 5 \text{ Vdc}$, $I_C = 0$)	I_{EBO}	—	100	μA

SECOND BREAKDOWN

Second Breakdown Collector Current with Base Forward Biased ($V_{CE} = 40 \text{ Vdc}$, $t = 1 \text{ s}$ (non-repetitive)) ($V_{CE} = 100 \text{ Vdc}$, $t = 1 \text{ s}$ (non-repetitive))	$I_{S/b}$	5.0 0.5	— —	Adc
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ON CHARACTERISTICS

DC Current Gain ($I_C = 4 \text{ Adc}$, $V_{CE} = 2 \text{ Vdc}$)	h_{FE}	25	150	—
Collector-Emitter Saturation Voltage ($I_C = 4 \text{ Adc}$, $I_B = 0.4 \text{ Adc}$)	$V_{CE(\text{sat})}$	—	1.0	Vdc
Base-Emitter On Voltage ($I_C = 4 \text{ Adc}$, $V_{CE} = 2 \text{ Vdc}$)	$V_{BE(\text{on})}$	—	2.0	Vdc

DYNAMIC CHARACTERISTICS

Current-Gain — Bandwidth Product ($I_C = 0.5 \text{ Adc}$, $V_{CE} = 10 \text{ Vdc}$, $f_{\text{test}} = 0.5 \text{ MHz}$)	f_T	2.0	—	MHz
Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f_{\text{test}} = 1 \text{ MHz}$)	C_{ob}	—	1000	pF

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

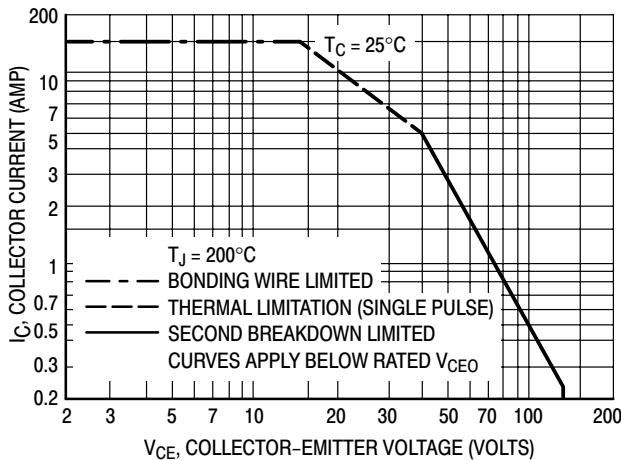


Figure 1. Active-Region Safe Operating Area

There are two limitations on the power handling 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 $T_J(\text{pk}) = 200^\circ\text{C}$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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TYPICAL CHARACTERISTICS

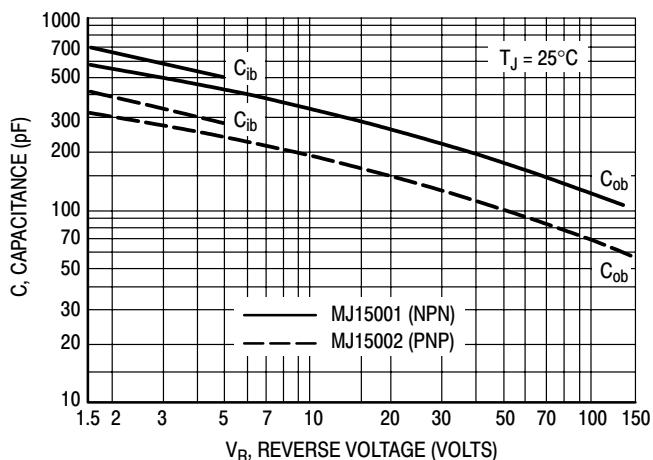


Figure 2. Capacitances

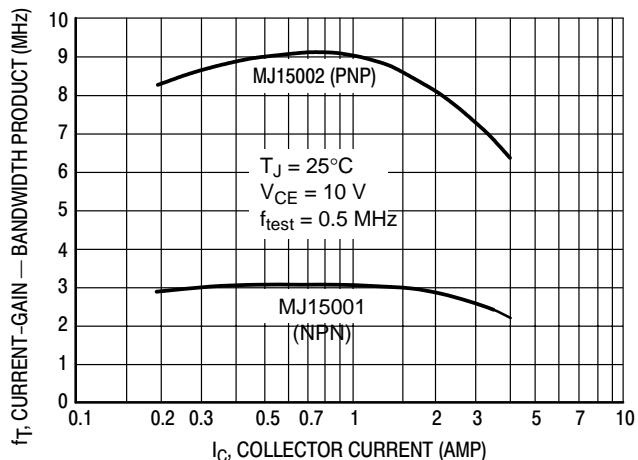


Figure 3. Current-Gain — Bandwidth Product

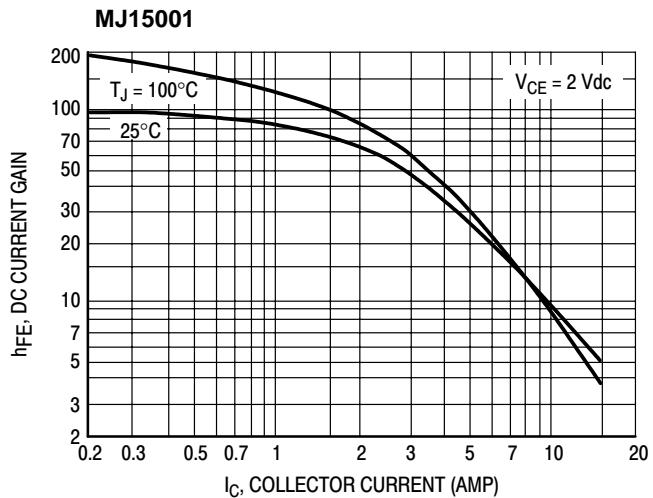


Figure 4. DC Current Gain

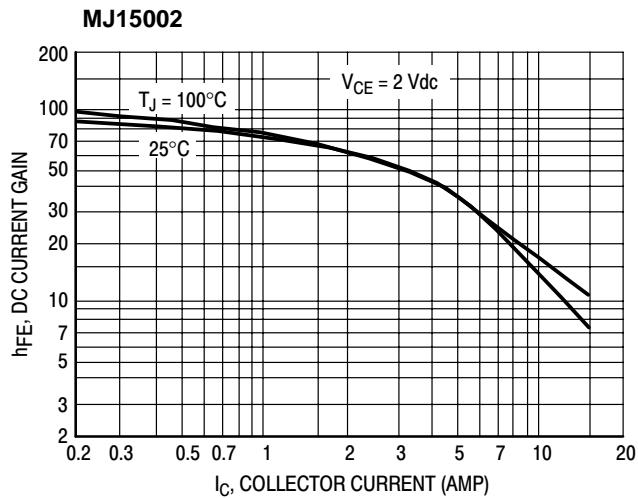


Figure 4. DC Current Gain

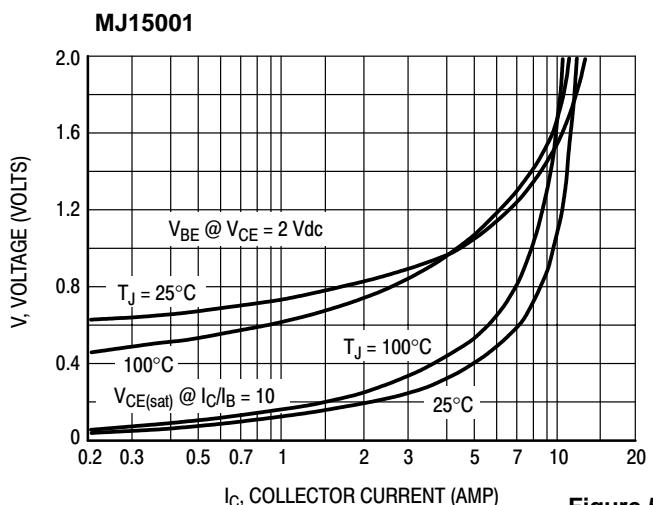
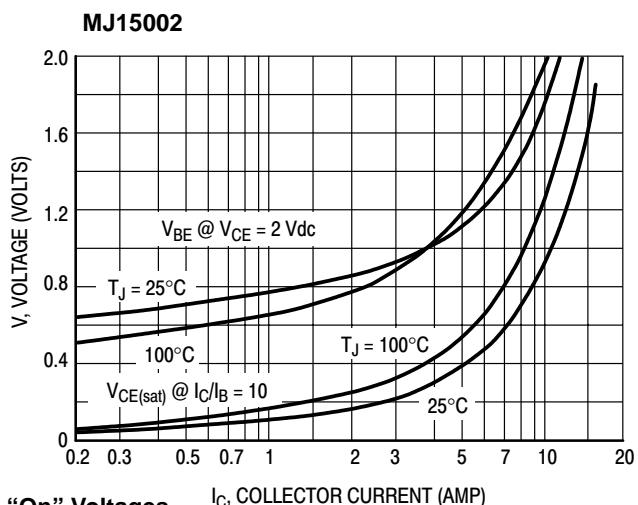


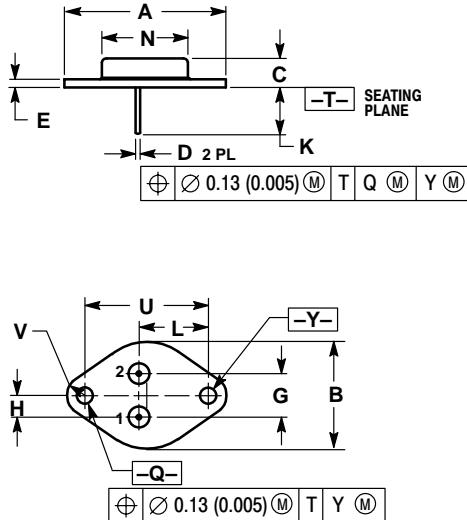
Figure 5. "On" Voltages



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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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