

MJ15003 (NPN), MJ15004 (PNP)

Preferred Device

Complementary Silicon Power Transistors

The MJ15003 and MJ15004 are PowerBase™ power transistors designed for high power audio, disk head positioners and other linear applications.

- High Safe Operating Area (100% Tested) – 5.0 A @ 50 V
- For Low Distortion Complementary Designs
- High DC Current Gain –
 $h_{FE} = 25$ (Min) @ $I_C = 5$ 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	20	Adc
Base Current – Continuous	I_B	5	Adc
Emitter Current – Continuous	I_E	25	Adc
Total Power Dissipation @ $T_C = 25^\circ\text{C}$ Derate above 25°C	P_D	250 1.43	Watts $\text{W}/^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	-65 to +200	$^\circ\text{C}$

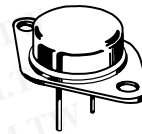
THERMAL CHARACTERISTICS

Characteristic	Symbol	Max	Unit
Thermal Resistance, Junction–to–Case	$R_{\theta JC}$	0.70	$^\circ\text{C}/\text{W}$
Maximum Lead Temperature for Soldering Purposes: 1/16" from Case for ≤ 10 seconds	T_L	265	$^\circ\text{C}$



ON Semiconductor®

20 AMPERE POWER TRANSISTORS COMPLEMENTARY SILICON 140 V 250 W



TO-204AA (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
MJ15003	TO-204AA (TO-3)	100 Foams
MJ15004	TO-204AA (TO-3)	100 Foams

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

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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) ($I_C = 200\text{ mAdc}$, $I_B = 0$)	$V_{CEO(sus)}$	140	–	Vdc
Collector Cutoff Current ($V_{CE} = 140\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$) ($V_{CE} = 140\text{ Vdc}$, $V_{BE(off)} = 1.5\text{ Vdc}$, $T_C = 150^\circ\text{C}$)	I_{CEX}	–	100 2	μAdc mAdc
Collector Cutoff Current ($V_{CE} = 140\text{ Vdc}$, $I_B = 0$)	I_{CEO}	–	250	μAdc
Emitter Cutoff Current ($V_{EB} = 5\text{ Vdc}$, $I_C = 0$)	I_{EBO}	–	100	μAdc

SECOND BREAKDOWN

Second Breakdown Collector Current with Base Forward Biased ($V_{CE} = 50\text{ Vdc}$, $t = 1\text{ s}$ (non repetitive)) ($V_{CE} = 100\text{ Vdc}$, $t = 1\text{ s}$ (non repetitive))	$I_{S/b}$	5.0 1.0	– –	Adc
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ON CHARACTERISTICS

DC Current Gain ($I_C = 5\text{ Adc}$, $V_{CE} = 2\text{ Vdc}$)	h_{FE}	25	150	
Collector Emitter Saturation Voltage ($I_C = 5\text{ Adc}$, $I_B = 0.5\text{ Adc}$)	$V_{CE(sat)}$	–	1.0	Vdc
Base Emitter On Voltage ($I_C = 5\text{ Adc}$, $V_{CE} = 2\text{ Vdc}$)	$V_{BE(on)}$	–	2.0	Vdc

DYNAMIC CHARACTERISTICS

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

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

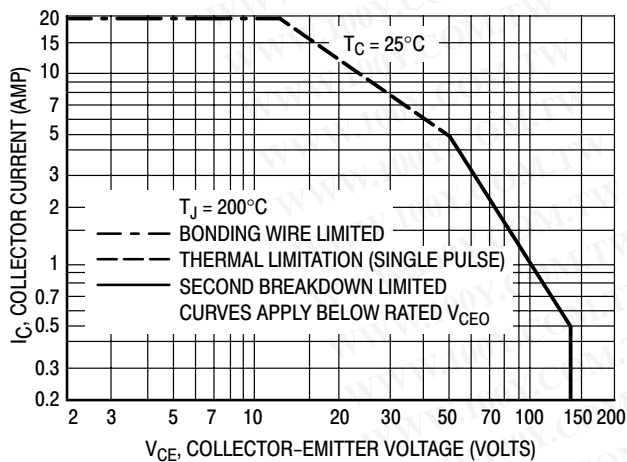


Figure 1. Active-Region Safe Operating Area

There are two limitations on the 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.

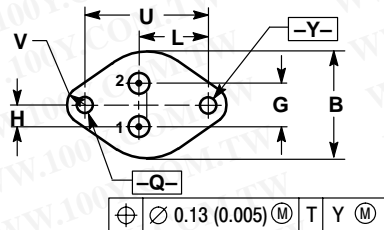
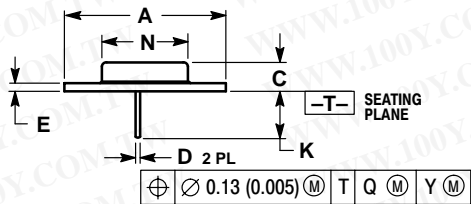
The data of Figure 1 is based on $T_{J(pk)} = 200^\circ\text{C}$; T_C is variable depending on conditions. At high case temperatures, thermal limitations will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

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PACKAGE DIMENSIONS

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



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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:

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