

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) —
250 W @ 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 W/ $^\circ\text{C}$
Operating and Storage Junction Temperature Range	T_J, T_{stg}	–65 to +200	$^\circ\text{C}$

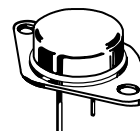
THERMAL CHARACTERISTICS

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

NPN
MJ15003 *
PNP
MJ15004 *

*ON Semiconductor Preferred Device

20 AMPERE
POWER TRANSISTORS
COMPLEMENTARY
SILICON
140 VOLTS
250 WATTS



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

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

MJ15003 MJ15004

*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) ($I_C = 200 \text{ mAdc}$, $I_B = 0$)	$V_{CEO(sus)}$	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 1	— —	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	Vdc
Base Emitter On Voltage ($I_C = 5 \text{ Adc}$, $V_{CE} = 2 \text{ Vdc}$)	$V_{BE(on)}$	—	2	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	—	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 $\leq 2\%$.

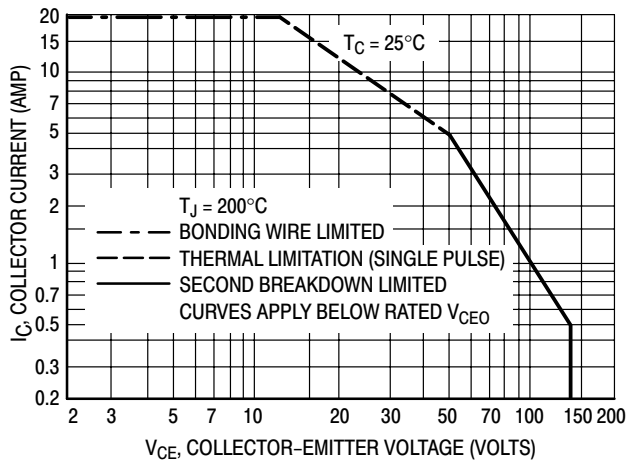


Figure 1. Active-Region Safe Operating Area

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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