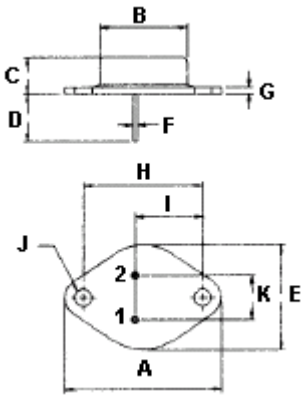
MJ15003, MJ15004

20A Complementary Power Transistors

The MJ15003 and MJ15004 are power base power transistors designed for high power audio, disk head positioners, linear amplifiers, switching regulators and other linear applications.

Features:

- High Power Dissipation
  P_D = 250W (T_C = 25°C)
- High DC current Gain and Low Saturation Voltage
  h_{FE} = 25 (Minimum) at I_C = 5.0A, V_{CE} = 2.0V.
- For Low Distortion Complementary designs.



Pin 1. Base
2. Emitter
Collector(Case)

Dimensions	Minimum	Maximum
A	38.75	39.96
B	19.28	22.23
C	7.96	9.28
D	11.18	12.19
E	25.20	26.67
F	0.92	1.09
G	1.38	1.62
H	29.90	30.40
I	16.64	17.30
J	3.88	4.36
K	10.67	11.18

Dimensions : Millimetres

NPN	PNP
MJ15003	MJ15004

20 Ampere
Complementary
Silicon Power
Transistors
140 Volts
250 Watts

TO-3

Maximum Ratings

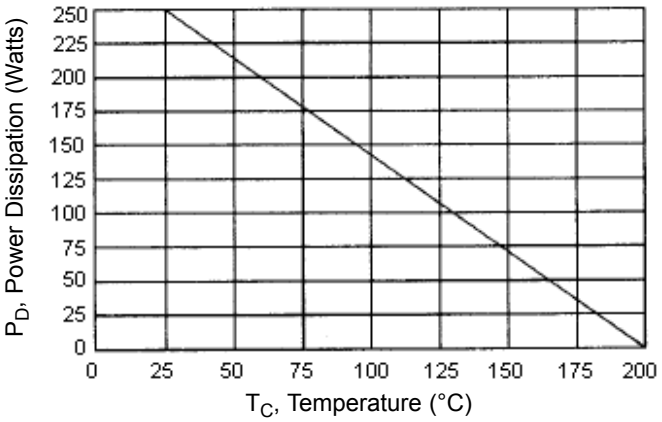
Characteristic	Symbol	Rating	Unit
Collector-Emitter Voltage	$V_{CEO(sus)}$	140	V
Collector-Base Voltage	V_{CBO}		
Emitter-Base Voltage	V_{EBO}	5.0	
Collector Current-Continuous -Peak (1)	I_C I_{CM}	20 30	A
Base Current-Continuous -Peak (1)	I_B I_{BM}	5.0 10	
Total Power Dissipation at T_C = 25°C Derate above 25°C	P_D	250 1.43	W W/°C
Operating and Storage Junction Temperature Range	T_J, T_{STG}	-65 to +200	°C

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

Thermal Characteristics

Characteristic	Symbol	Maximum	Unit
Thermal Resistance Junction to Case	Rθjc	0.70	°C/W

Figure - 1 Power Derating



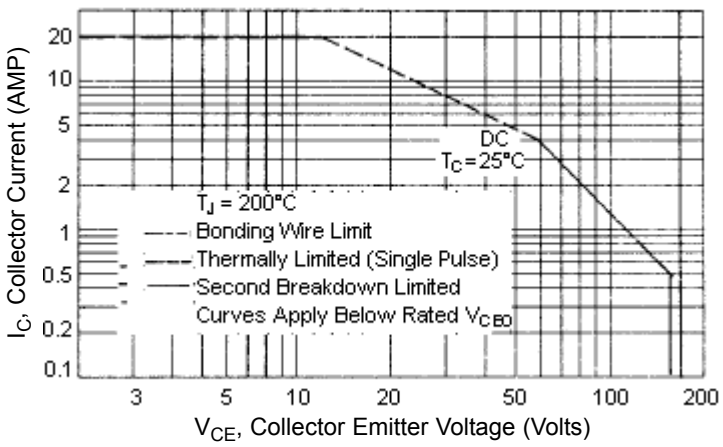
Electrical Characteristics (T_c = 25°C unless otherwise noted)

Characteristic	Symbol	Minimum	Maximum	Unit
OFF Characteristics				
Collector-Emitter Sustaining Voltage (2) (I_C = 200mA, I_B = 0)	$V_{CEO(sus)}$	140	-	V
Collector Cut off Current (V_{CE} = 140V, I_B = 0)	I_{CEO}	-	250	µA
Collector Cut off Current (V_{CE} = 140V, $V_{BE(off)}$ = 1.5V) (V_{CE} = 140V, $V_{BE(off)}$ = 1.5V, T_C = 150°C)	I_{CEX}	-	100 2.0	µA mA
Emitter Cut off Current (V_{EB} = 5.0V, I_C = 0)	I_{EBO}	-	100	µA
ON Characteristics (2)				
DC Current Gain (I_C = 5.0A, V_{CE} = 2.0V)	h_{FE}	25	150	-
Collector-Emitter Saturation Voltage (I_C = 5.0A, I_B = 500mA)	$V_{CE(sat)}$	-	1.0	V
Base-Emitter On Voltage (I_C = 5.0A, V_{CE} = 2.0A)	$V_{BE(on)}$	-	2.0	
Dynamic Characteristics				
Current Gain-Bandwidth Product (3) (I_C = 500mA, V_{CE} = 10V, f = 0.5MHz)	f_T	2.0	-	MHz
Output Capacitance (V_{CB} = 4.0V, I_E = 0, f = 1MHz)	C_{ob}	-	1000	pF

(2) Pulse Test : Pulse Width = 300µs, Duty Cycle ≤2.0%.

(3) $f_T = |h_{fe}| \bullet f_{test}$

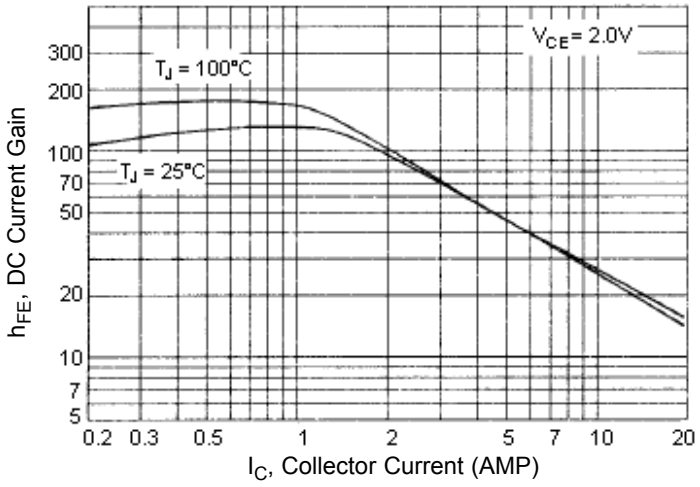
Figure - 2 Forward Base Safe Operating Area



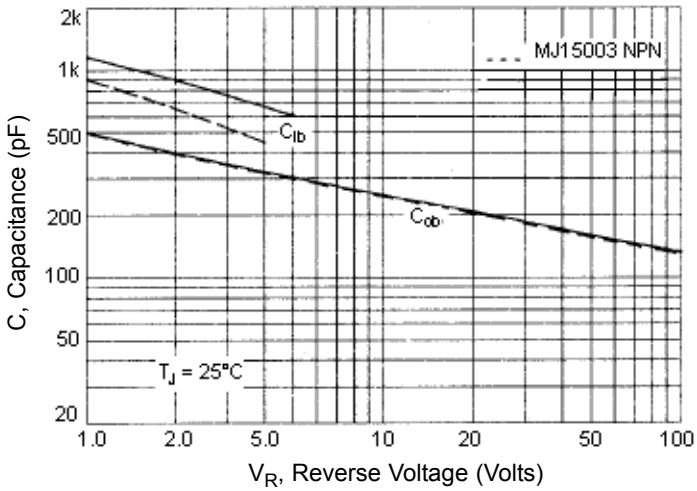
There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown safe operating area curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation i.e., the transistor must not be subjected to greater dissipation than the curves indicate.

The data of Figure - 2 is based on $T_{J(pk)}$ = 200°C; T_C is variable depending on conditions. At high case temperatures, thermal limitation will reduce the power that can be handled to values less than the limitations imposed by second breakdown.

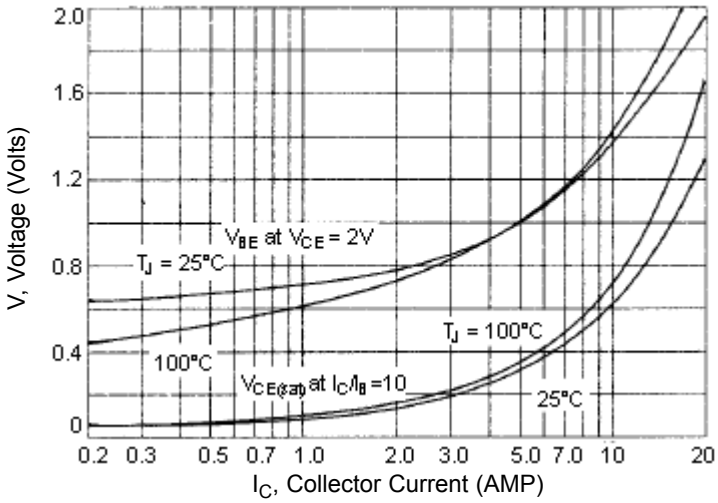
DC Current Gain



Capacitances



"ON" Voltage



Specifications

$I_{C(av)}$ maximum (V)	V_{CEO} maximum (V)	h_{FE} minimum at I_C = 5A	P_{tot} at 25°C (W)	Package	Type	Part Number
16	140	25	250	TO-3	NPN	MJ15003
20	250	15			PNP	MJ15004

Notes:

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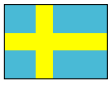

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