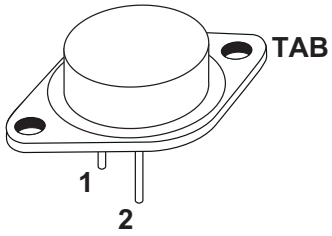
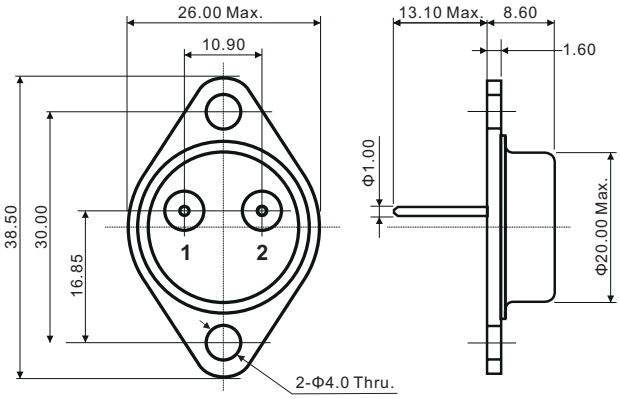
Complementary Silicon power transistors
(20A / 140V / 250W)



TO-3



All dimensions in millimeters

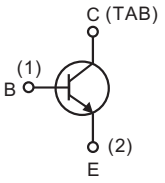
FEATURES

- Designed for general-purpose switching and amplifier applications.
- DC current gain-h_{FE} = 25 (Min) @ I_C = 5 Adc
- High safe operation area (100% tested) 250W @ 50V
- For low distortion complementary designs

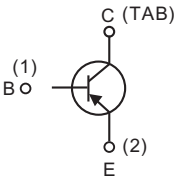
DESCRIPTION

The **MJ15003** is a silicon epitaxial-base planar NPN transistor mounted in JEDEC TO-3 metal case.
It is designed for high power audio, disk head positioners and other linear applications.
The complementary PNP type is **MJ15004**.

INTERNAL SCHEMATIC DIAGRAM



MJ15003(NPN)



MJ15004(PNP)

ABSOLUTE MAXIMUM RATINGS (T_C = 25°C unless otherwise specified)				
SYMBOL	PARAMETER		VALUE	UNIT
V_{CBO}	Collector to base voltage (I_E = 0)		140	V_{dc}
V_{CEO}	Collector to emitter voltage (I_B = 0)		140	
V_{EBO}	Emitter to base voltage		5	
I_C	Collector current - continuous		20	A_{dc}
I_B	Base current - continuous		5	
I_E	Emitter current - continuous		25	
P_D	Total power dissipation	T_C= 25°C	250	W
	Derate above 25ºC		1.43	W/ºC
T_j	Junction temperature		200	ºC
T_{stg}	Storage temperature		-65 to 200	
T_L	Maximum lead temperature for soldering purposes : 1/16" from case for ≤ 10 seconds		265	ºC

*For PNP types voltage and current values are negative.

THERMAL CHARACTERISTICS (T_C = 25°C unless otherwise specified)			
SYMBOL	PARAMETER	VALUE	UNIT
$R_{th(j-c)}$	Thermal resistance, junction to case	0.7	°C/W

ELECTRICAL CHARACTERISTICS (T_C = 25°C unless otherwise specified)					
SYMBOL	**PARAMETER**	**CONDITIONS**	**MIN**	**MAX**	**UNIT**
I_{CEX}	Collector cutoff current	V_{CE} = 140V, $V_{BE(off)}$ = 1.5V		100	μA
		V_{CE} = 140V, $V_{BE(off)}$ = 1.5V, T_C = 150°C		2.0	mA
I_{CEO}	Collector cutoff current	V_{CE} = 140V, I_B = 0		250	μA
I_{EBO}	Emitter cutoff current	V_{EBO} = 5V, I_C = 0		100	
$V_{CEO(SUS)}$*	Collector to emitter sustaining voltage	I_C = 200mA, I_B = 0	140		V
V_{CBO}	Collector to base voltage	I_E = 0	140		
V_{EBO}	Emitter to base voltage	I_C = 0	5		
h_{FE}	Forward current transfer ratio (DC current gain)	I_C = 5A, V_{CE} = 2V	25	150	
$V_{CE(sat)}$*	Collector to emitter saturation voltage	I_C = 5A, I_B = 0.5A		1.0	V
$V_{BE(on)}$*	Base to emitter on voltage	I_C = 5A, V_{CE} = 2V		2.0	
f_T	Transition frequency (current gain - bandwidth product)	I_C = 0.5A, V_{CE} = 10V, f_{test} = 0.5MHz	2.0		MHz
C_{ob}	Output capacitance	V_{CB} = 10V, I_E = 0, f_{test} = 1MHz		1000	pF
$I_{s/b}$*	Second breakdown collector current with base forward baised	V_{CE} = 50V, t = 1s, non-repetitive	5		A
		V_{CE} = 100V, t = 1s, non-repetitive	1		

*Pulsed : Pulse duration = 300 μs, duty cycle 2%.
*For PNP types voltage and current values are negative.

Fig.1 Power derating

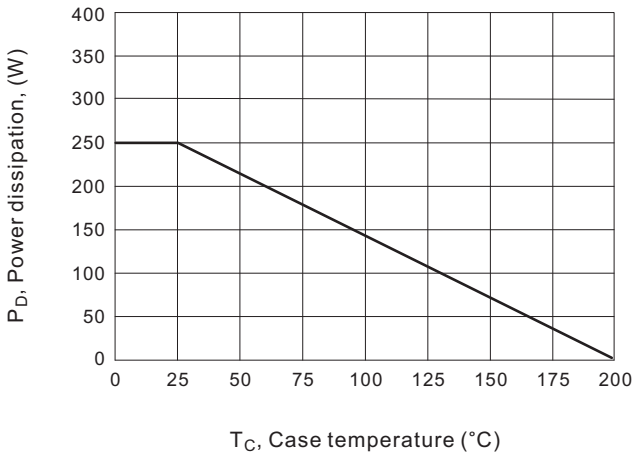
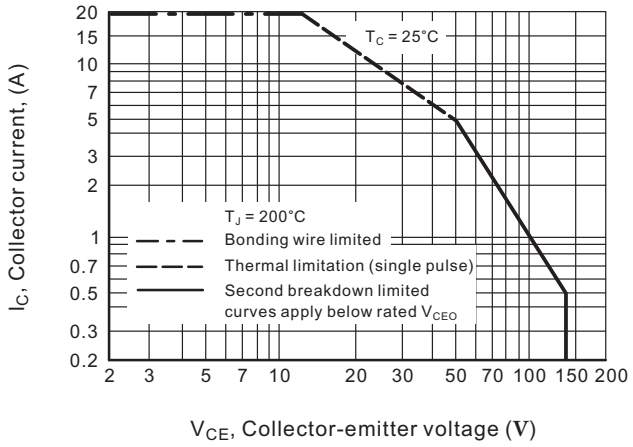


Fig.2 Active region safe operating area

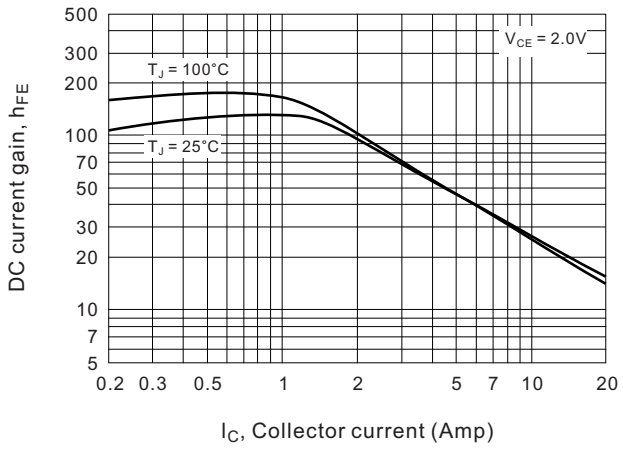


There are two limitations on the power handling ability of a transistor: average junction temperature and second breakdown. Safe operating area curves indicate I_C-V_{CE} limits of the transistor that must be observed for reliable operation; i.e., the transistor must not be subjected to greater dissipation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

The data of fig.2 is based on $T_{J(pk)}$ = 200°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.

Fig.3 DC Current gain

MJ15003(NPN)



MJ15004(PNP)

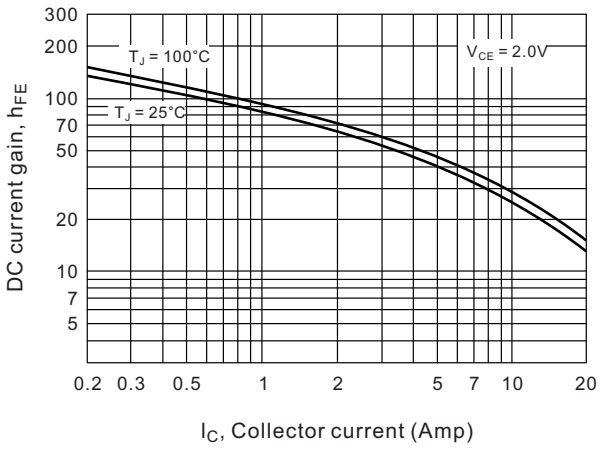
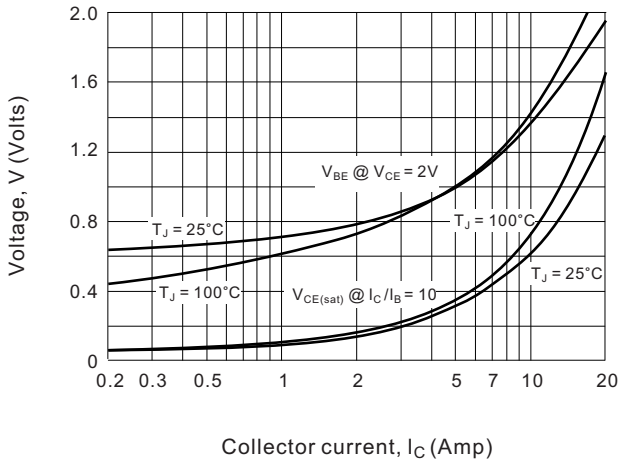


Fig.4 "ON" Characteristics

MJ15003(NPN)



MJ15004(PNP)

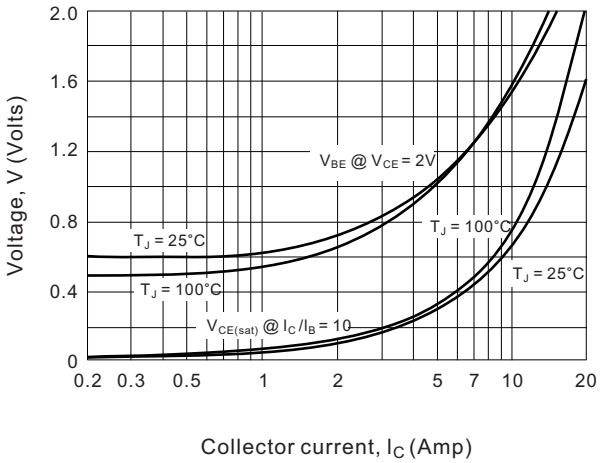


Fig.5 Capacitances

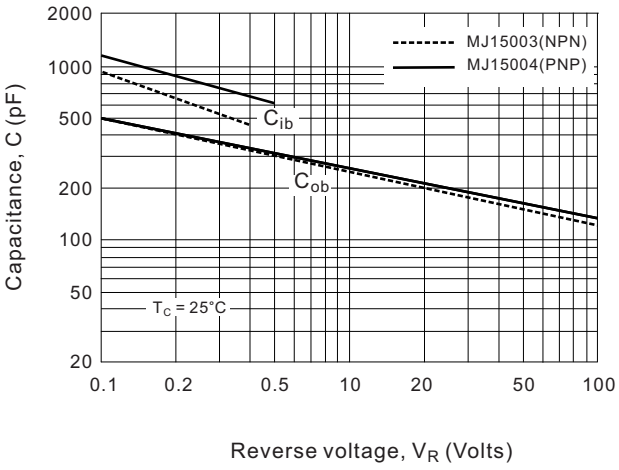


Fig.6 Transiton frequency (Current Gain-Bandwidth product)