

**Silicon NPN Power Transistors**

**2SC4004**

**DESCRIPTION**

- With TO-220Fa package
- Satisfactory linearity of forward current transfer ratio  $h_{FE}$
- Wide area of safe operation (ASO)
- High-speed switching
- High collector to base voltage  $V_{CBO}$

**APPLICATIONS**

- For high breakdown voltage high-speed switching

**PINNING**

PIN	DESCRIPTION
1	Base
2	Collector
3	Emitter

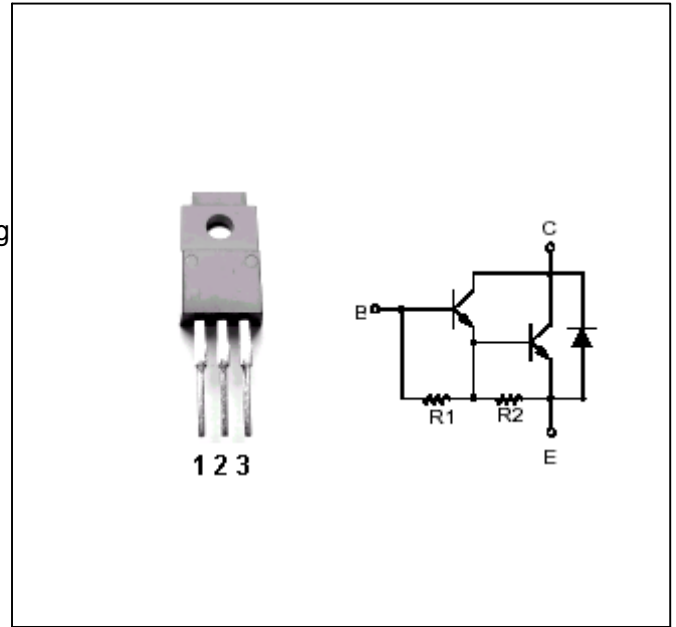


Fig.1 simplified outline (TO-220Fa) and symbol

**ABSOLUTE MAXIMUM RATINGS AT  $T_c=25$**

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$V_{CBO}$	Collector-base voltage	Open emitter	900	V
$V_{CEO}$	Collector-emitter voltage	Open base	900	V
$V_{CES}$			800	V
$V_{EBO}$	Emitter-base voltage	Open collector	7	V
$I_C$	Collector current (DC)		1	A
$I_{CM}$	Collector current-Peak		2	A
$I_B$	Base current		0.3	A
$P_C$	Collector power dissipation	$T_c=25$	30	W
		$T_a=25$	2	W
$T_j$	Junction temperature		150	
$T_{stg}$	Storage temperature		-55-150	

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**CHARACTERISTICS**

T<sub>j</sub>=25

unless

otherwise

specified

Symbol	Conditions	min	typ	max	Unit
I <sub>CBO</sub>	V <sub>CB</sub> = 900V, I <sub>E</sub> = 0			50	μA
I <sub>EBO</sub>	V <sub>EB</sub> = 7V, I <sub>C</sub> = 0			50	μA
V <sub>CEO</sub>	I <sub>C</sub> = 1mA, I <sub>B</sub> = 0	800			V
h <sub>FE1</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 0.05A	6			
h <sub>FE2</sub>	V <sub>CE</sub> = 5V, I <sub>C</sub> = 0.5A	3			
V <sub>CE(sat)</sub>	I <sub>C</sub> = 0.2A, I <sub>B</sub> = 0.04A			1.5	V
V <sub>BE(sat)</sub>	I <sub>C</sub> = 0.2A, I <sub>B</sub> = 0.04A			1.0	V
f <sub>T</sub>	V <sub>CE</sub> = 10V, I <sub>C</sub> = 0.05A, f = 1MHz		4		MHz
t <sub>on</sub>	I <sub>C</sub> = 0.2A, I <sub>B1</sub> = 0.04A, I <sub>B2</sub> = -0.04A, V <sub>CC</sub> = 250V			1.0	μs
t <sub>stg</sub>				3.0	μs
t <sub>f</sub>				1.0	μs

SYMBOL	PARAMETER	CONDITIONS	MIN	TYP.	MAX	UNIT
V <sub>CEO</sub>	Collector-emitter breakdown voltage	I <sub>C</sub> =1mA, I <sub>B</sub> =0	800			V
V <sub>CEsat</sub>	Collector-emitter saturation voltage	I <sub>C</sub> =0.2A I <sub>B</sub> =0.04A			1.5	V
V <sub>BEsat</sub>	Base-emitter saturation voltage	I <sub>C</sub> =0.2A I <sub>B</sub> =0.04A			1.0	V
I <sub>CBO</sub>	Collector cut-off current	V <sub>CB</sub> =900V I <sub>E</sub> =0			50	μA
I <sub>EBO</sub>	Emitter cut-off current	V <sub>EB</sub> =7V; I <sub>C</sub> =0			50	μA
h <sub>FE-1</sub>	DC current gain	I <sub>C</sub> =0.05A; V <sub>CE</sub> =5V	6			
h <sub>FE-2</sub>	DC current gain	I <sub>C</sub> =0.5A; V <sub>CE</sub> =5V	3			
f <sub>T</sub>	Transition frequency	I <sub>C</sub> =0.05A; V <sub>CE</sub> =10V;f=1MHz		4		MHz

Switching times

t <sub>on</sub>	Turn-on time	I <sub>C</sub> =0.2A; I <sub>B1</sub> =0.04A I <sub>B2</sub> =-0.04A; V <sub>CC</sub> =250V			1.0	μs
t <sub>s</sub>	Storage time				3.0	μs
t <sub>f</sub>	Fall time				1.0	μs

PACKAGE OUTLINE

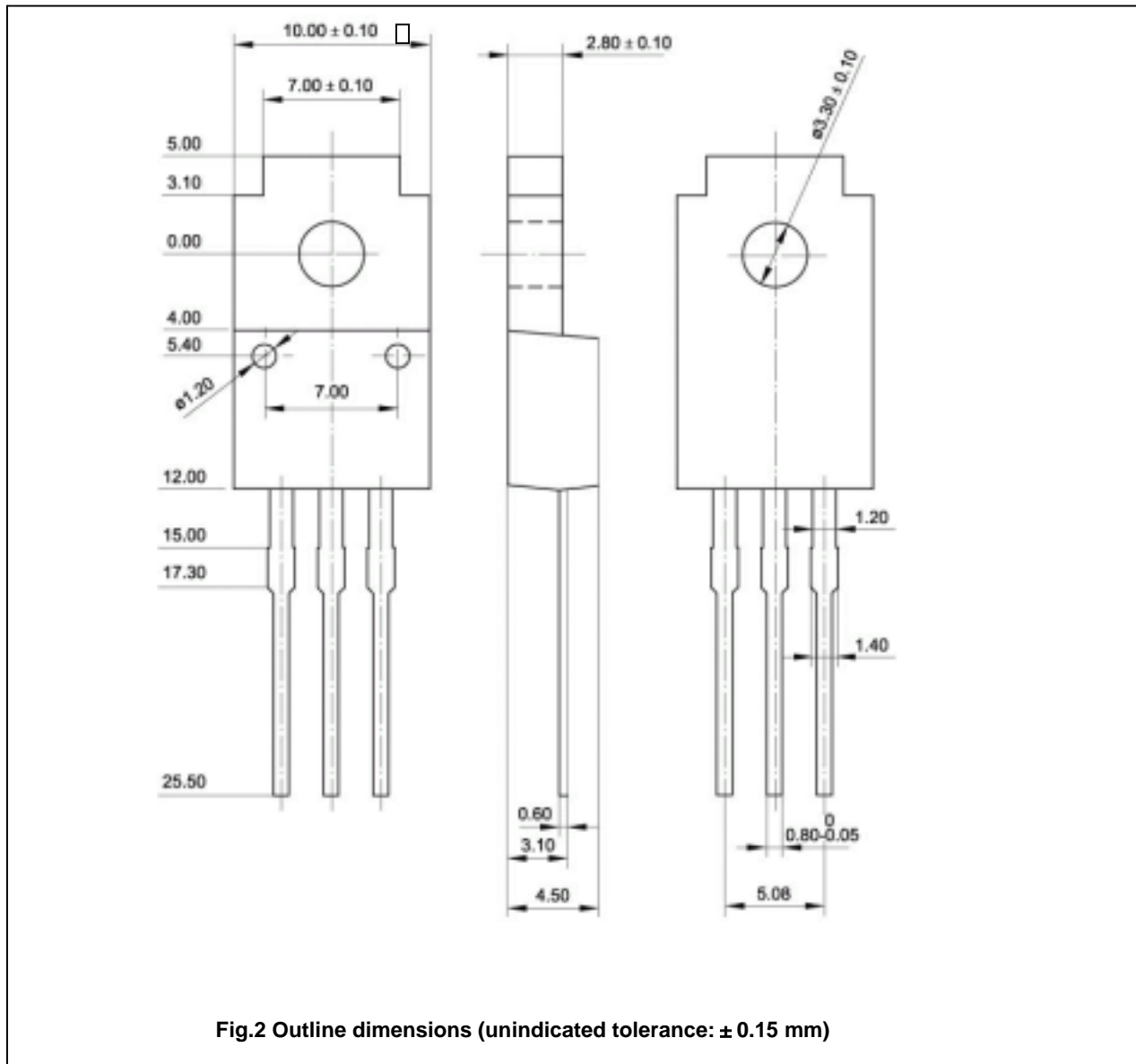


Fig.2 Outline dimensions (unindicated tolerance:  $\pm 0.15$  mm)