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July 2008

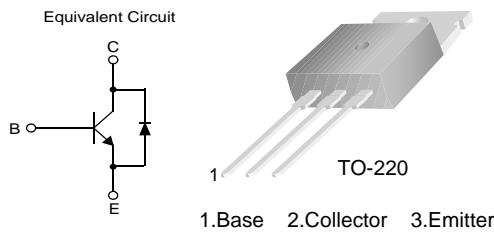
# FJP5304D NPN Silicon Transistor



FJP5304D — NPN Silicon Transistor

## High Voltage High Speed Power Switch Application

- Wide Safe Operating Area
- Built-in Free Wheeling diode Suitable for Electronic Ballast Application
- Suitable for Electronic Ballast Application
- Small Variance in Storage Time



## Absolute Maximum Ratings $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Value	Units
$V_{CBO}$	Collector-Base Voltage	700	V
$V_{CEO}$	Collector-Emitter Voltage	400	V
$V_{EBO}$	Emitter-Base Voltage	12	V
$I_C$	Collector Current (DC)	4	A
$I_{CP}$	* Collector Current (Pulse)	8	A
$I_B$	Base Current (DC)	2	A
$I_{BP}$	* Base Current (Pulse)	4	A
$P_C$	Collector Dissipation ( $T_C=25^\circ\text{C}$ )	70	W
$T_{STG}$	Storage Temperature	- 65 ~ 150	$^\circ\text{C}$

\* Pulse Test Pulse Width = 5ms, Duty Cycle  $\geq$  1.0%

## Electrical Characteristics $T_C=25^\circ\text{C}$ unless otherwise noted

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Units
$BV_{CBO}$	Collector-Base Breakdown Voltage	$I_C = 1\text{mA}, I_E = 0$	700			V
$BV_{CEO}$	Collector-Emitter Breakdown Voltage	$I_C = 5\text{mA}, I_B = 0$	400			V
$BV_{EBO}$	Emitter-Base Breakdown Voltage	$I_E = 1\text{mA}, I_C = 0$	12			V
$I_{CES}$	Collector Cut-off Current	$V_{CE} = 700\text{V}, V_{EB} = 0$			100	mA
$I_{CEO}$	Collector Cut-off Current	$V_{CE} = 400\text{V}, I_B = 0$			250	mA
$I_{EBO}$	Emitter Cut-off Current	$V_{EB} = 12\text{V}, I_C = 0$			100	mA

$h_{FE}$	DC Current Gain	$V_{CE} = 5V, I_C = 10mA$ $V_{CE} = 5V, I_C = 2A$	10 8		40	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 0.5A, I_B = 0.1A$ $I_C = 1A, I_B = 0.2A$ $I_C = 2.5A, I_B = 0.5A$			0.7 1.0 1.5	V
$V_{BE(sat)}$	Base-Emitter Saturation Voltage	$I_C = 0.5A, I_B = 0.1A$ $I_C = 1A, I_B = 0.2A$ $I_C = 2.5A, I_B = 0.5A$			1.1 1.2 1.3	V
$V_f$	Internal Diode Forward Voltage Drop	$I_F = 2A$			2.5	V
<b>Inductive Load Switching (<math>V_{CC} = 200V</math>)</b>						
$t_{stg}$	Storage Time	$I_C = 2A, I_{B1} = 0.4A$ $V_{BE(off)} = -5V, L = 200\mu H$		0.6		$\mu s$
$t_f$	Fall Time			0.1		
<b>Resistive Load Switching (<math>V_{CC} = 250V</math>)</b>						
$t_{stg}$	Storage Time	$I_C = 2A, I_{B1} = I_{B2} = 0.4A$ $T_P = 30\mu s$			2.9	$\mu s$
$t_f$	Fall Time			0.2		

\* Pulse test:  $PW \leq 300\mu s$ , Duty cycle  $\leq 2\%$

### Thermal Characteristics

Symbol	Parameter	Max.	Units
$R_{\theta JC}$	Thermal Resistance, Junction to Case	1.78	$^{\circ}C/W$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	62.5	$^{\circ}C/W$

# Typical Characteristics

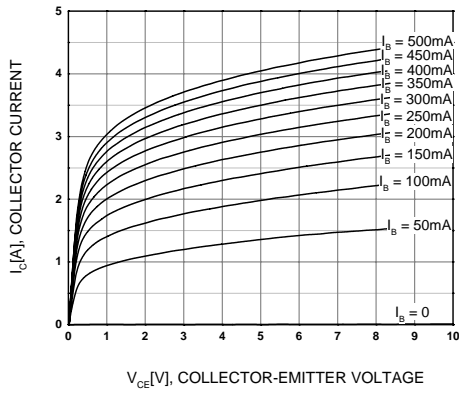


Figure 1. Static Characteristic

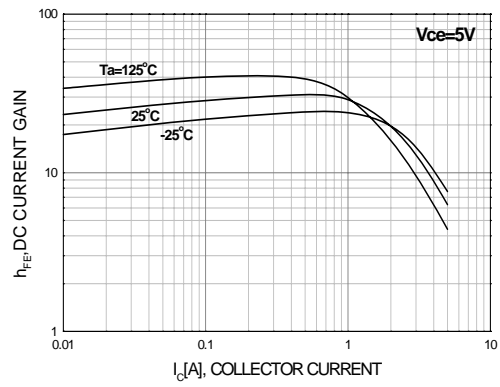


Figure 2. DC Current Gain

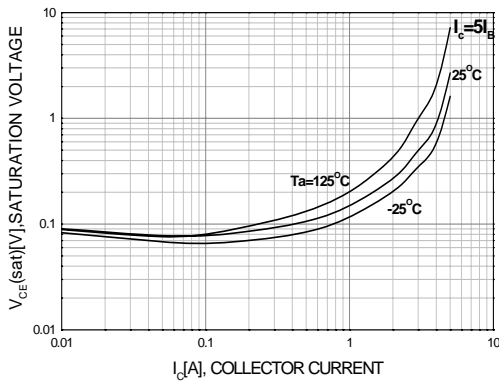


Figure 3. Collector-Emitter Saturation Voltage

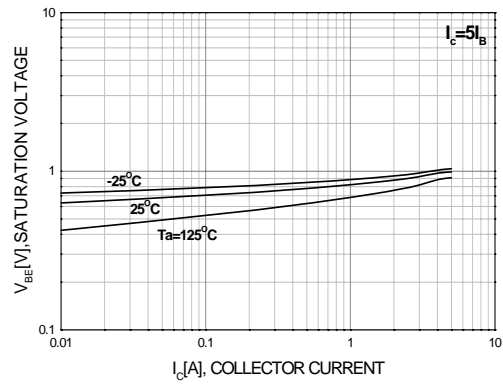


Figure 4. Base-Emitter Saturation Voltage

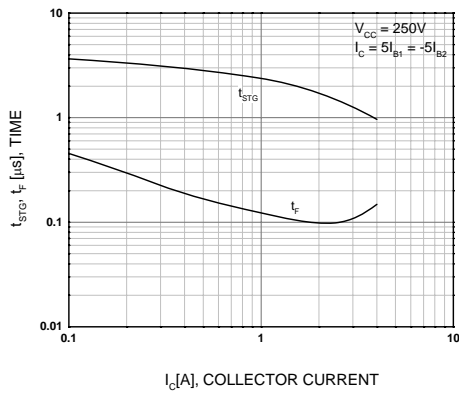


Figure 5. Resistive Load Switching Time

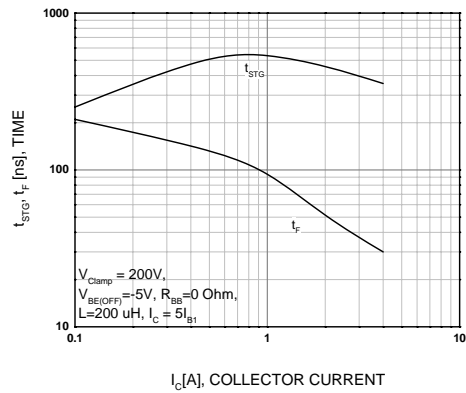


Figure 6. Inductive Load Switching Time

## Typical Characteristics (Continued)

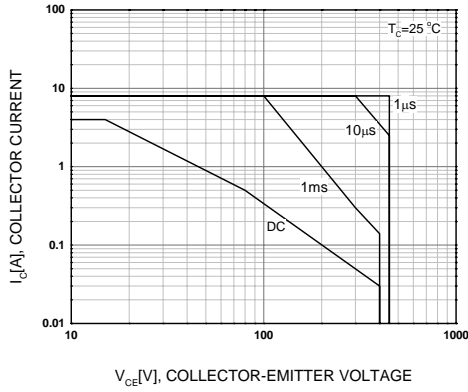


Figure 1. Forward Bias Safe Operating Area

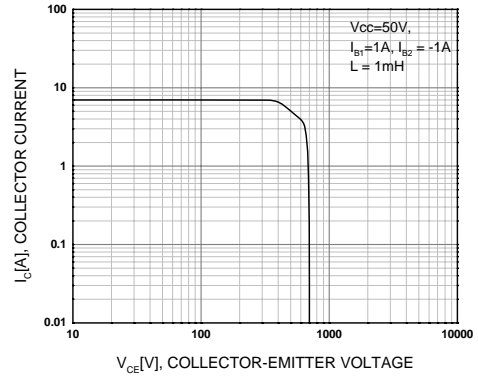


Figure 2. Reverse Bias Safe Operating Area

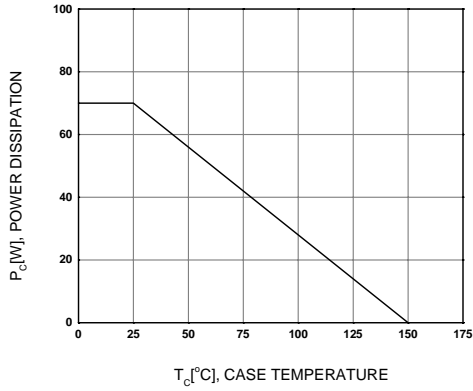


Figure 3. Power Derating



- NOTES:**
- A) REFERENCE JEDEC, TO-220, VARIATION AB
  - B) ALL DIMENSIONS ARE IN MILLIMETERS.
  - C) DIMENSIONS COMMON TO ALL PACKAGE SUPPLIERS EXCEPT WHERE NOTED [ ].
  - D) LOCATION OF MOLDED FEATURE MAY VARY (LOWER LEFT CORNER, LOWER CENTER AND CENTER OF THE PACKAGE)
  - E) DOES NOT COMPLY JEDEC STANDARD VALUE.
  - F) "A1" DIMENSIONS AS BELOW:  
 SINGLE GAUGE = 0.51 - 0.61  
 DUAL GAUGE = 1.10 - 1.45
  - G) DRAWING FILE NAME: TO220B03REV9
  - H) PRESENCE IS SUPPLIER DEPENDENT
  - I) SUPPLIER DEPENDENT MOLD LOCKING HOLES IN HEATSINK.

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