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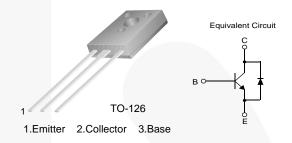


June 2014

# FJE5304D NPN Triple Diffused Planar Silicon Transistor

#### **Features**

- High-Voltage, High-Speed Power Switch Applications
- · Wide Safe Operating Area
- Built-in Free-Wheeling diode
- Suitable for Electronic Ballast Applications
- · Small Variance in Storage Time



#### **Ordering Information**

Part Number	Top Mark	Package	Packing Method
FJE5304D	J5304D	TO-126 3L	Bulk
FJE5304DTU	J5304D	TO-126 3L	Rail

#### **Absolute Maximum Ratings**

Stresses exceeding the absolute maximum ratings may damage the device. The device may not function or be operable above the recommended operating conditions and stressing the parts to these levels is not recommended. In addition, extended exposure to stresses above the recommended operating conditions may affect device reliability. The absolute maximum ratings are stress ratings only. Values are at  $T_C = 25^{\circ}C$  unless otherwise noted.

Symbol	Parameter	Value	Unit
V <sub>CBO</sub>	Collector-Base Voltage	700	V
V <sub>CEO</sub>	Collector-Emitter Voltage	400	V
V <sub>EBO</sub>	Emitter-Base Voltage	12	V
I <sub>C</sub>	Collector Current (DC)	4	Α
I <sub>CP</sub>	Collector Current (Pulse) <sup>(1)</sup>	8	Α
I <sub>B</sub>	Base Current (DC)	2	Α
I <sub>BP</sub>	Base Current (Pulse) <sup>(1)</sup>	4	Α
T <sub>STG</sub>	Storage Temperature Range	-65 to 150	°C

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#### Note

1. Pulse test: pulse width  $\leq$  300  $\mu$ s, duty cycle  $\leq$  2%.

### **Thermal Characteristics**

Values are at  $T_C = 25$ °C unless otherwise noted.

Symbol	Parameter	Max.	Unit
P <sub>C</sub>	Collector Dissipation (T <sub>C</sub> = 25°C)	30	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4.17	°C/W
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	83.3	°C/W

### Electrical Characteristics(2)

Values are at  $T_C = 25$ °C unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Тур.	Max.	Unit
BV <sub>CBO</sub>	Collector-Base Breakdown Voltage	$I_C = 1 \text{ mA}, I_E = 0$	700			V
BV <sub>CEO</sub>	Collector-Emitter Breakdown Voltage	$I_C = 5 \text{ mA}, I_B = 0$	400			V
BV <sub>EBO</sub>	Emitter-Base Breakdown Voltage	$I_E = 1 \text{ mA}, I_C = 0$	12			V
I <sub>CES</sub>	Collector Cut-Off Current	$V_{CE} = 700 \text{ V}, V_{EB} = 0$			100	μΑ
I <sub>CEO</sub>	Collector Cut-Off Current	$V_{CE} = 400 \text{ V}, I_{B} = 0$			250	μΑ
I <sub>EBO</sub>	Emitter Cut-Off Current	$V_{EB} = 12 \text{ V}, I_{C} = 0$			100	μΑ
h <sub>FE</sub>	DC Current Gain	$V_{CE} = 5 \text{ V}, I_{C} = 10 \text{ mA}$	10			
	DC Current Gain	$V_{CE} = 5 \text{ V}, I_{C} = 2 \text{ A}$	8		40	
	Collector-Emitter Saturation Voltage	$I_C = 0.5 \text{ A}, I_B = 0.1 \text{ A}$			0.7	V
V <sub>CE</sub> (sat)		I <sub>C</sub> = 1 A, I <sub>B</sub> = 0.2 A			1.0	
		$I_C = 2.5 \text{ A}, I_B = 0.5 \text{ A}$			1.5	
V <sub>BE</sub> (sat)	Collector-Base Saturation Voltage	$I_C = 0.5 \text{ A}, I_B = 0.1 \text{ A}$			1.1	V
		I <sub>C</sub> = 1 A, I <sub>B</sub> = 0.2 A			1.2	
		$I_C = 2.5 \text{ A}, I_B = 0.5 \text{ A}$			1.3	
V <sub>f</sub>	Internal Diode Forward Voltage Drop	I <sub>F</sub> = 2 A			2.5	V
Inductive L	_oad Switching (V <sub>CC</sub> = 200 V)					
t <sub>stg</sub>	Storage Time	$I_C = 2 \text{ A}, I_{B1} = 0.4 \text{ A},$ $V_{BE}(\text{off}) = -5 \text{ V},$ $L = 200 \mu\text{H}$		0.6		μs
t <sub>f</sub>	Fall Time			0.1		μs
Resistive L	oad Switching (V <sub>CC</sub> = 250 V)					
t <sub>stg</sub>	Storage Time	$I_C = 2 A,$ $I_{B1} = I_{B2} = 0.4 A,$ $T_P = 30 \mu s$			2.9	μs
t <sub>f</sub>	Fall Time			0.2		μs

#### Note:

2. Pulse test: pulse width  $\leq 300~\mu s,$  duty cycle  $\leq 2\%.$ 

### **Typical Performance Characteristics**

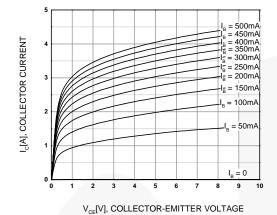


Figure 1. Static Characteristic

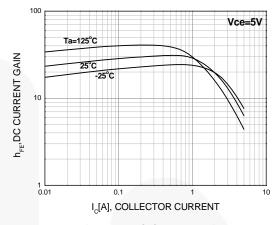


Figure 2. DC Current Gain

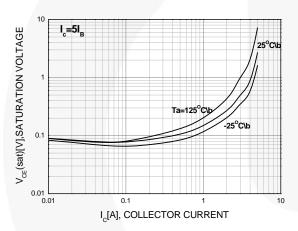


Figure 3. Collector-Emitter Saturation Voltage

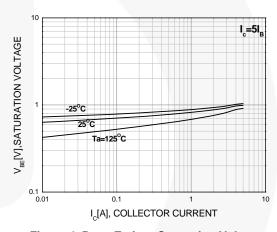


Figure 4. Base-Emitter Saturation Voltage

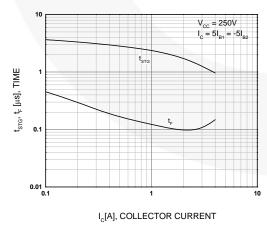


Figure 5. Resistive Load Switching Time

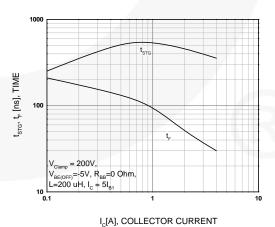


Figure 6. Inductive Load Switching Time

## **Typical Performance Characteristics** (Continued)

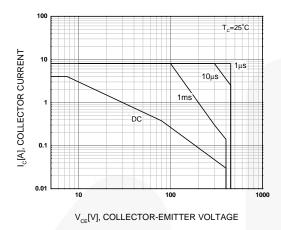


Figure 7. Forward Bias Safe Operating Area

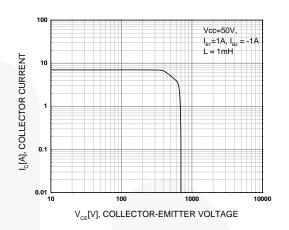


Figure 8. Reverse Bias Safe Operating Area

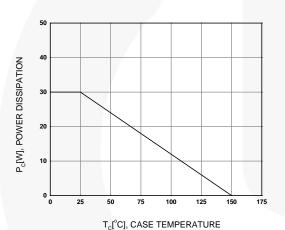
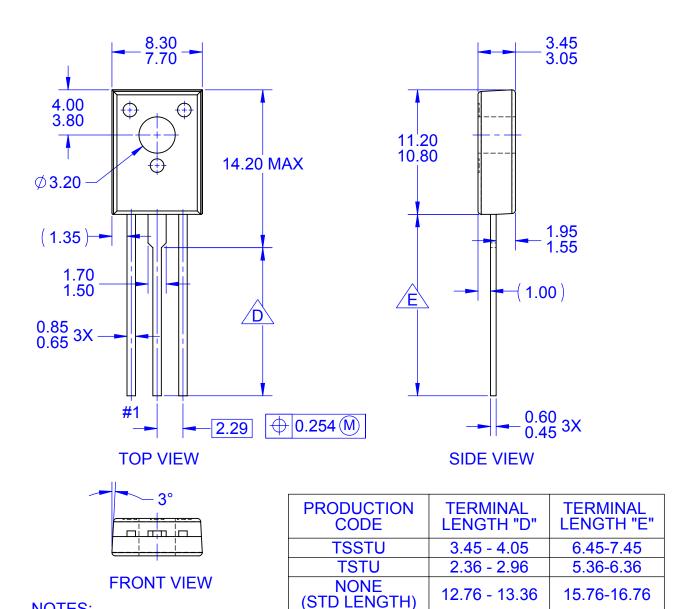


Figure 9. Power Derating



#### **NOTES:**

- Α. NO INDUSTRY STANDARD APPLIES TO THIS **PACKAGE**
- ALL DIMENSIONS ARE IN MILLIMETERS B.
- C. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, AND TIE BAR PROTRUSIONS







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