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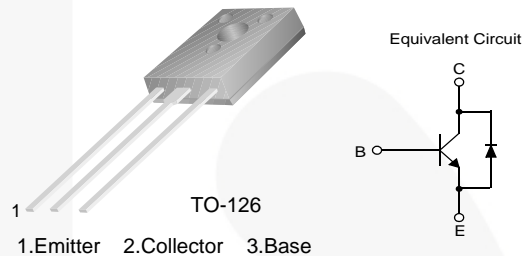


June 2014

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

Symbol	Parameter	Value	Unit
$V_{CBO}$	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) <sup>(1)</sup>	8	A
$I_B$	Base Current (DC)	2	A
$I_{BP}$	Base Current (Pulse) <sup>(1)</sup>	4	A
$T_{STG}$	Storage Temperature Range	-65 to 150	$^\circ\text{C}$

### Note:

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

## Thermal Characteristics

Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Max.	Unit
$P_C$	Collector Dissipation ( $T_C = 25^\circ\text{C}$ )	30	W
$R_{\theta JC}$	Thermal Resistance, Junction to Case	4.17	$^\circ\text{C/W}$
$R_{\theta JA}$	Thermal Resistance, Junction to Ambient	83.3	$^\circ\text{C/W}$

## Electrical Characteristics<sup>(2)</sup>

Values are at  $T_C = 25^\circ\text{C}$  unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
$BV_{CBO}$	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	$\mu\text{A}$
$I_{CEO}$	Collector Cut-Off Current	$V_{CE} = 400 \text{ V}, I_B = 0$			250	$\mu\text{A}$
$I_{EBO}$	Emitter Cut-Off Current	$V_{EB} = 12 \text{ V}, I_C = 0$			100	$\mu\text{A}$
$h_{FE}$	DC Current Gain	$V_{CE} = 5 \text{ V}, I_C = 10 \text{ mA}$	10			
		$V_{CE} = 5 \text{ V}, I_C = 2 \text{ A}$	8		40	
$V_{CE(sat)}$	Collector-Emitter Saturation Voltage	$I_C = 0.5 \text{ A}, I_B = 0.1 \text{ A}$			0.7	V
		$I_C = 1 \text{ A}, I_B = 0.2 \text{ A}$			1.0	
		$I_C = 2.5 \text{ A}, I_B = 0.5 \text{ A}$			1.5	
$V_{BE(sat)}$	Collector-Base Saturation Voltage	$I_C = 0.5 \text{ A}, I_B = 0.1 \text{ A}$			1.1	V
		$I_C = 1 \text{ A}, I_B = 0.2 \text{ A}$			1.2	
		$I_C = 2.5 \text{ A}, I_B = 0.5 \text{ A}$			1.3	
$V_f$	Internal Diode Forward Voltage Drop	$I_F = 2 \text{ A}$			2.5	V
<b>Inductive Load Switching (<math>V_{CC} = 200 \text{ V}</math>)</b>						
$t_{stg}$	Storage Time	$I_C = 2 \text{ A}, I_{B1} = 0.4 \text{ A},$ $V_{BE(off)} = -5 \text{ V},$ $L = 200 \mu\text{H}$		0.6		$\mu\text{s}$
$t_f$	Fall Time			0.1		$\mu\text{s}$
<b>Resistive Load Switching (<math>V_{CC} = 250 \text{ V}</math>)</b>						
$t_{stg}$	Storage Time	$I_C = 2 \text{ A},$ $I_{B1} = I_{B2} = 0.4 \text{ A},$ $T_P = 30 \mu\text{s}$			2.9	$\mu\text{s}$
$t_f$	Fall Time			0.2		$\mu\text{s}$

### Note:

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

## Typical Performance Characteristics

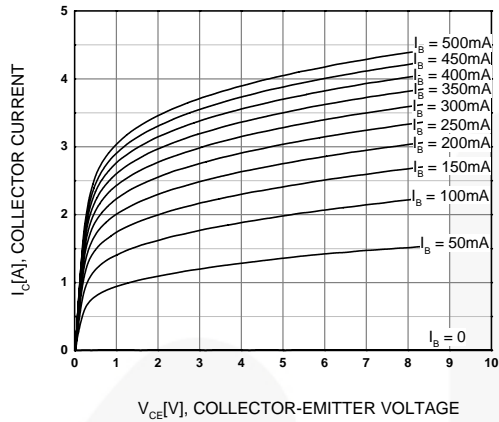


Figure 1. Static Characteristic

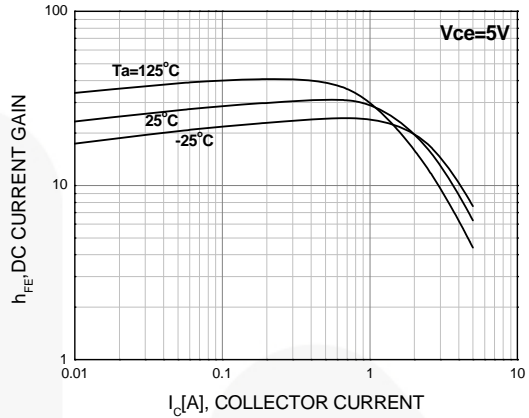


Figure 2. DC Current Gain

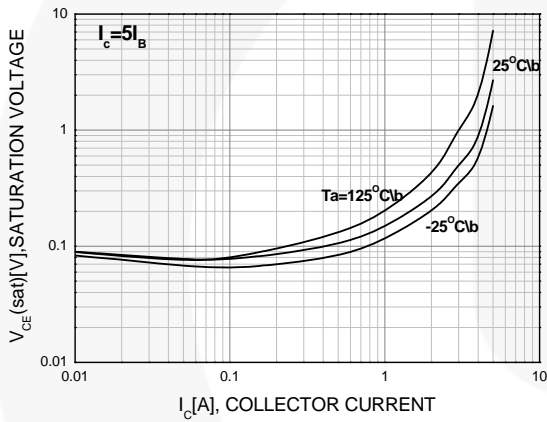


Figure 3. Collector-Emitter Saturation Voltage

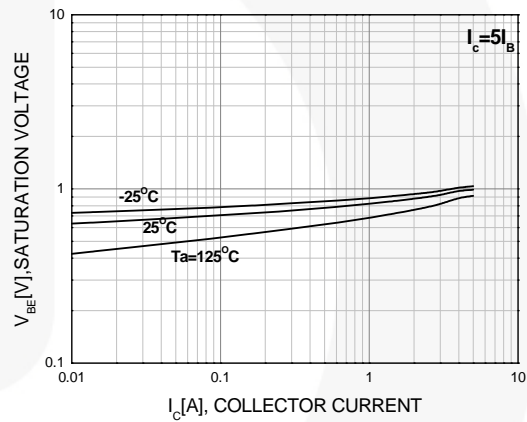


Figure 4. Base-Emitter Saturation Voltage

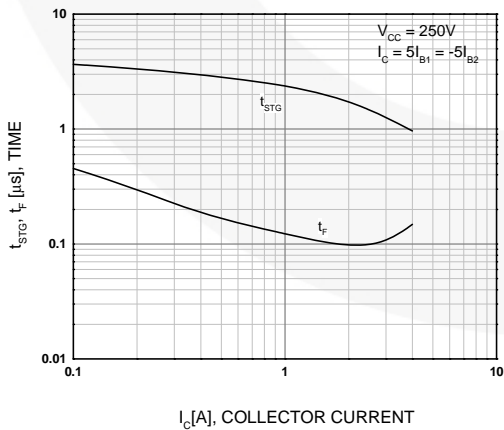


Figure 5. Resistive Load Switching Time

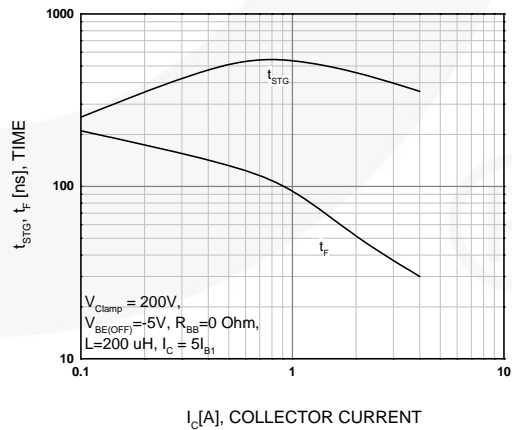
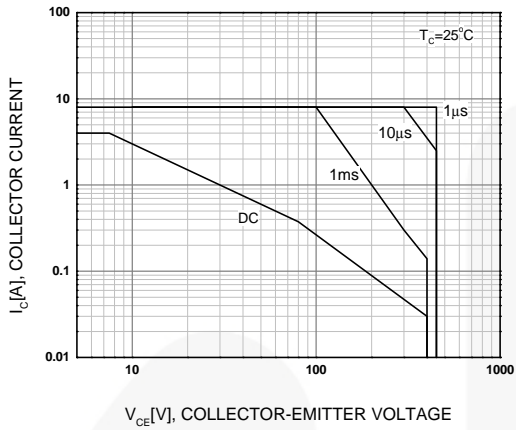
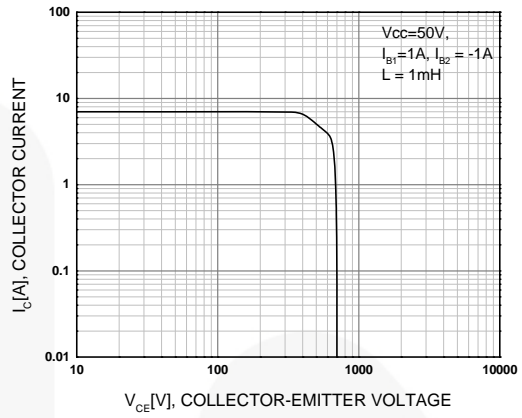


Figure 6. Inductive Load Switching Time

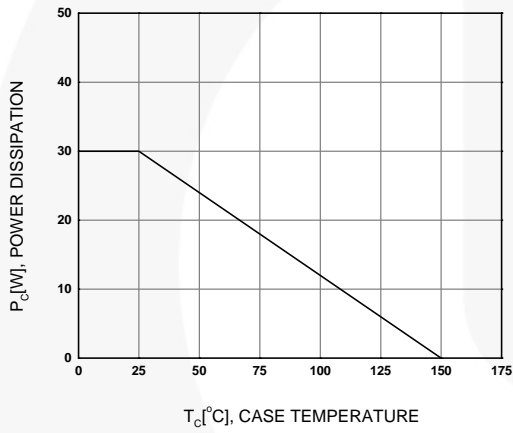
**Typical Performance Characteristics** (Continued)



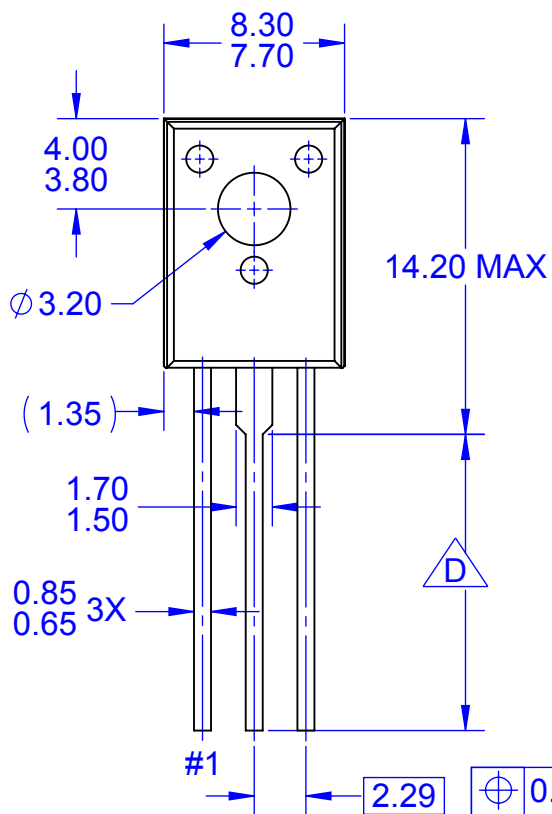
**Figure 7. Forward Bias Safe Operating Area**



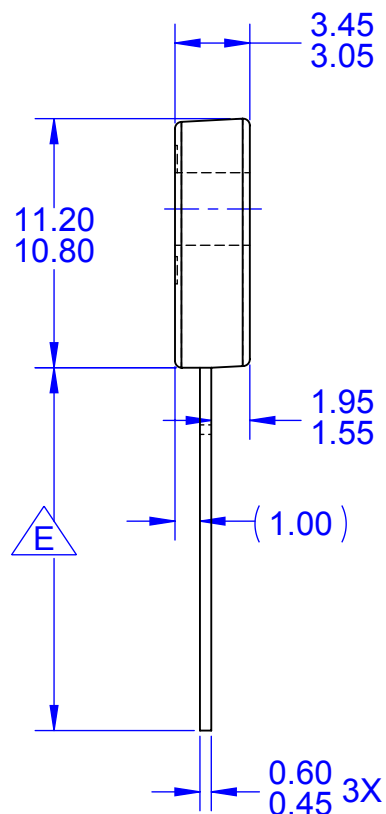
**Figure 8. Reverse Bias Safe Operating Area**



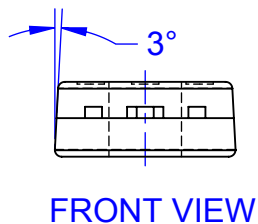
**Figure 9. Power Derating**



TOP VIEW



SIDE VIEW



FRONT VIEW

PRODUCTION CODE	TERMINAL LENGTH "D"	TERMINAL LENGTH "E"
TSSTU	3.45 - 4.05	6.45-7.45
TSTU	2.36 - 2.96	5.36-6.36
NONE (STD LENGTH)	12.76 - 13.36	15.76-16.76

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

 FOR TERMINAL LENGTH "D", REFER TO TABLE

 FOR TERMINAL LENGTH "E", REFER TO TABLE

F. DRAWING FILENAME: MKT-TO126AArev2



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