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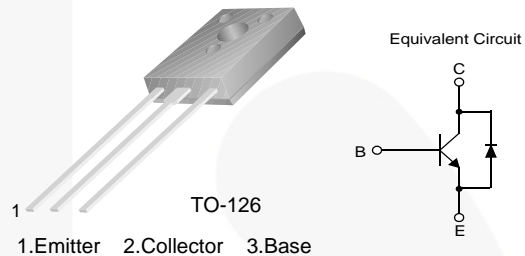


June 2014

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) ⁽¹⁾ | 8 | A |
| I_B | Base Current (DC) | 2 | A |
| I_{BP} | Base Current (Pulse) ⁽¹⁾ | 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⁽²⁾

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 | μA |
| I_{CEO} | Collector Cut-Off Current | $V_{CE} = 400 \text{ V}, I_B = 0$ | | | 250 | μA |
| I_{EBO} | Emitter Cut-Off Current | $V_{EB} = 12 \text{ V}, I_C = 0$ | | | 100 | μA |
| 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 |
| Inductive Load Switching ($V_{CC} = 200 \text{ V}$) | | | | | | |
| 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 | | μs |
| t_f | Fall Time | | | 0.1 | | μs |
| Resistive Load Switching ($V_{CC} = 250 \text{ V}$) | | | | | | |
| 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 | μs |
| t_f | Fall Time | | | 0.2 | | μs |

Note:

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

Typical Performance Characteristics

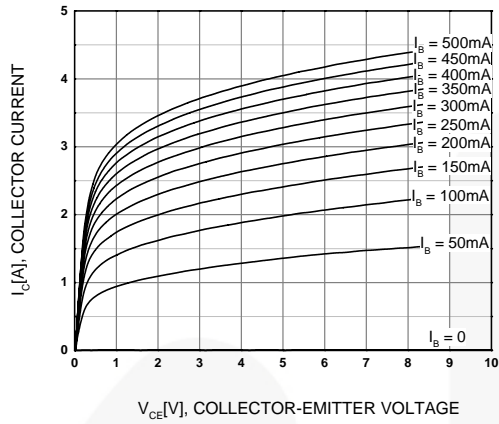


Figure 1. Static Characteristic

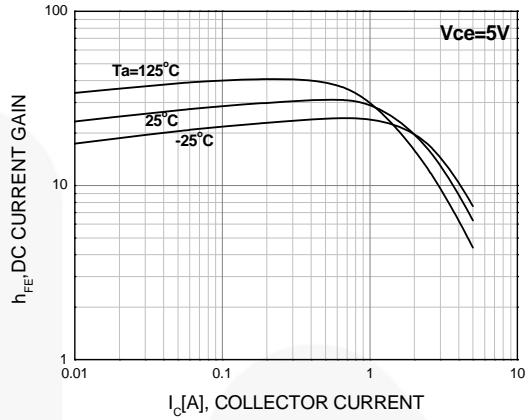


Figure 2. DC Current Gain

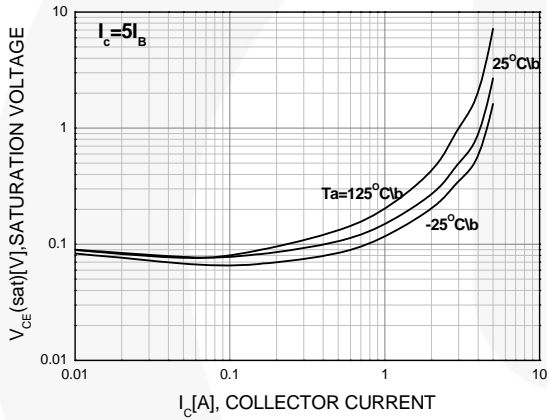


Figure 3. Collector-Emitter Saturation Voltage

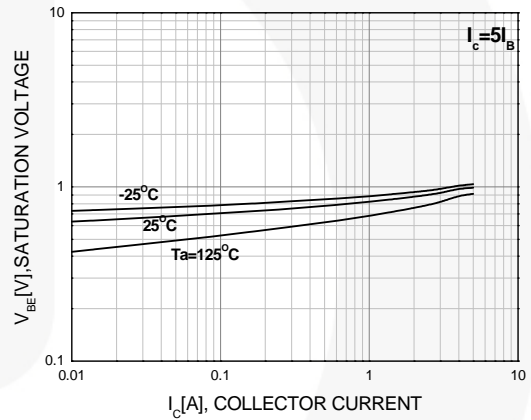


Figure 4. Base-Emitter Saturation Voltage

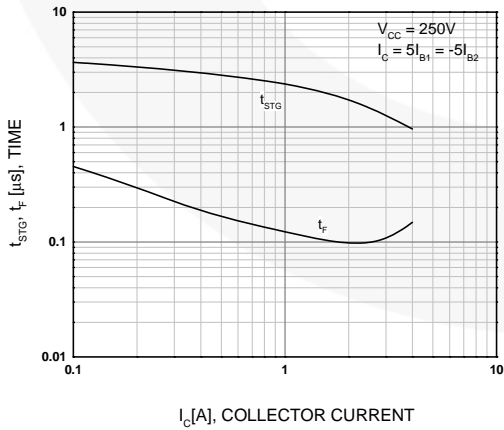


Figure 5. Resistive Load Switching Time

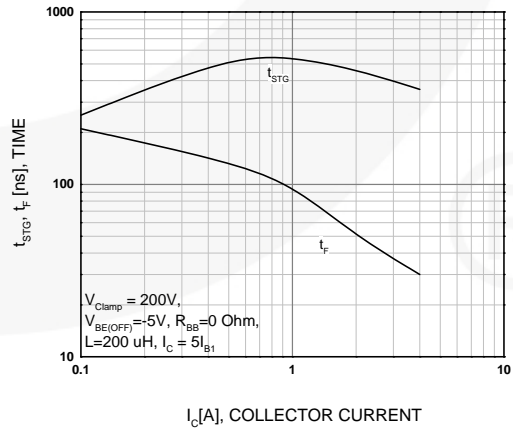


Figure 6. Inductive Load Switching Time

Typical Performance Characteristics (Continued)

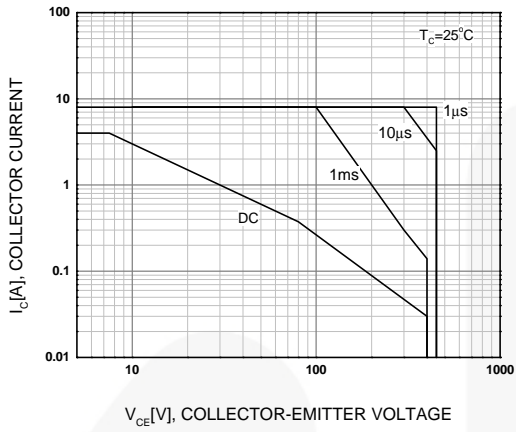


Figure 7. Forward Bias Safe Operating Area

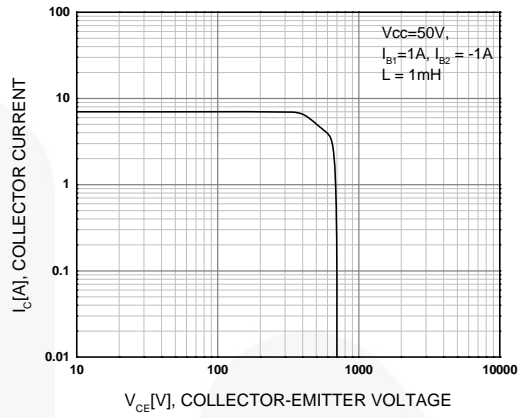


Figure 8. Reverse Bias Safe Operating Area

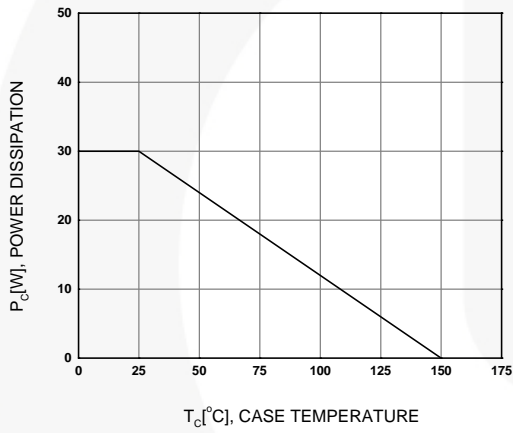


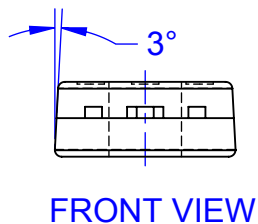
Figure 9. Power Derating



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 |

NOTES:

- 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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