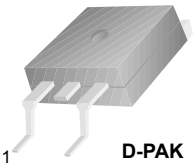
FAIRCHILD SEMICONDUCTOR®

July 2010

# FJD5304D
# High Voltage Fast Switching Transistor

## Features

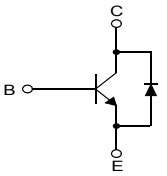
- Built-in Free Wheeling Diode
- Wide Safe Operating Area
- Small Variance in Storage Time
- Suitable for Electronic Ballast Application




**D-PAK**

1. Base 2. Collector 3. Emitter

Equivalent Circuit




## Absolute Maximum Ratings $T_a$ = 25°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°C<br>$T_a$ = 25°C | 30<br>1.25 | W<br>W |
| $T_J$ | Junction Temperature | 150 | °C |
| $T_{STG}$ | Storage Temperature | -55 to 150 | °C |

* Pulse Test: PW = 300μs, Duty Cycle = 2% Pulsed

## Thermal Characteristics $T_a$ = 25°C unless otherwise noted

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $R_{\theta ja}$ | Thermal Resistance Junction-Ambient ** | 99 | °C/W |

** Device mounted on minimum pad size.

## Package Marking and Ordering Information

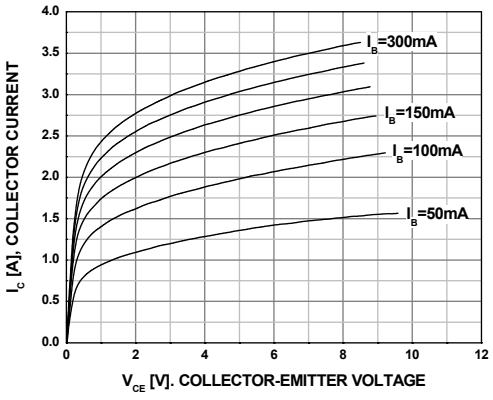
| Device Marking | Device | Package | Reel Size | Tape Width | Quantity |
|---|---|---|---|---|---|
| J5304D | FJD5304DTM | D-PAK | 13” Dia | - | 2500 |
| J5304D | FJD5304DTF | D-PAK | 13” Dia | - | 2000 |

## Electrical Characteristics $T_a$ = 25°C unless otherwise noted

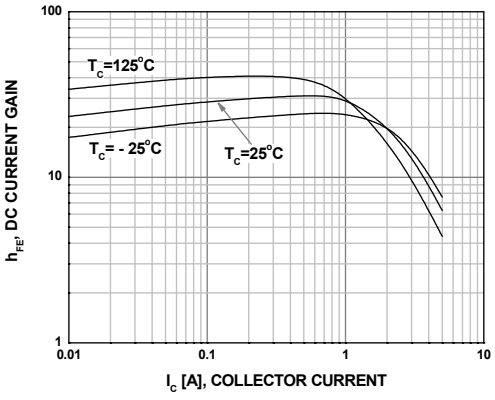
| Symbol | Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|---|
| $BV_{CBO}$ | Collector-Base Breakdown Voltage | $I_C$ = 1mA, $I_E$ = 0 | 700 | | | V |
| $BV_{CEO}$ | Collector-Emitter Breakdown Voltage | $I_C$ = 5mA, $I_B$ = 0 | 400 | | | V |
| $BV_{EBO}$ | Emitter-Base Breakdown Voltage | $I_E$ = 1mA, $I_C$ = 0 | 12 | | | V |
| $I_{CES}$ | Collector Cut-off Current | $V_{CB}$ = 700V, $I_E$ = 0 | | | 100 | μA |
| $I_{CEO}$ | Collector Cut-off Current | $V_{CB}$ = 400V, $I_B$ = 0 | | | 250 | μA |
| $I_{EBO}$ | Emitter Cut-off Current | $V_{EB}$ = 12V, $I_C$ = 0 | | | 1 | mA |
| $h_{FE}$ | DC Current Gain | $V_{CE}$ = 5V, $I_C$ = 10mA<br>$V_{CE}$ = 5V, $I_C$ = 2.0A | 10<br>8 | | <br>40 | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C$ = 0.5A, $I_B$ = 0.1A | | | 0.7 | V |
| | | $I_C$ = 1.0A, $I_B$ = 0.2A | | | 1.0 | V |
| | | $I_C$ = 2.5A, $I_B$ = 0.5A | | | 1.5 | V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage | $I_C$ = 0.5A, $I_B$ = 0.1A | | | 1.1 | V |
| | | $I_C$ = 1.0A, $I_B$ = 0.2A | | | 1.2 | V |
| | | $I_C$ = 2.5A, $I_B$ = 0.5A | | | 1.3 | V |
| $t_{STG}$ | Storage Time | $V_{CLAMP}$=200V, $I_C$=2.0A, $I_{B1}$=0.4A, $V_{BE}$(off)=-5V, L=200μH | | 0.6 | | μs |
| $t_F$ | Fall Time | | | 0.1 | | μs |
| $t_{STG}$ | Storage Time | $V_{CC}$=250V, $I_C$=2.0A, $I_{B1}$=0.4A, $I_{B2}$=-0.4A, $T_P$=30μs | | | 2.9 | μs |
| $t_F$ | Fall Time | | | 0.2 | | μs |
| $V_F$ | Diode Forward Voltage | $I_F$ = 2A | | | 2.5 | V |

## Typical Performance Characteristics

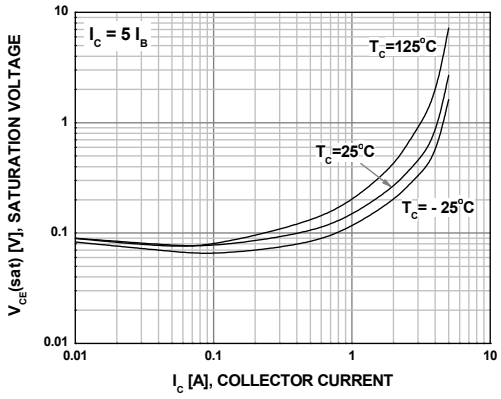
### Figure 1. Static Characteristic



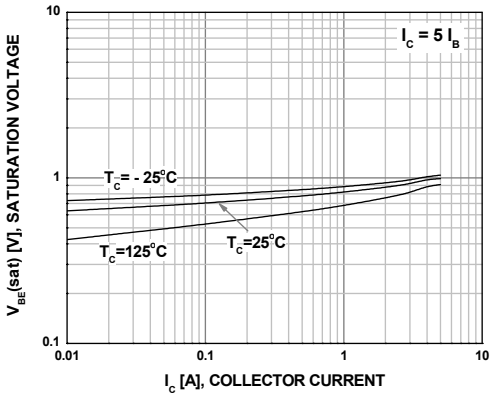

### Figure 2. DC Current Gain



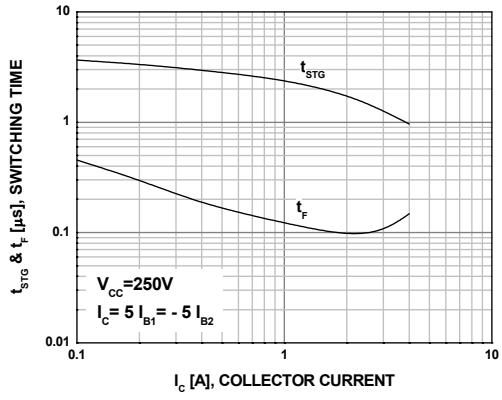

### Figure 3. Collector-Emitter Saturation Voltage



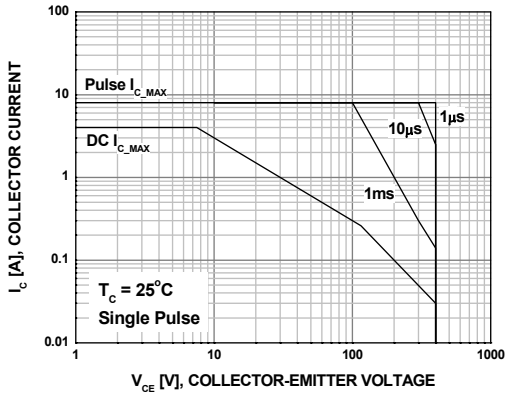

### Figure 4. Base-Emitter Saturation Voltage




### Figure 5. Resistive Load Switching Time




### Figure 6. Forward Biased Safe Operating Area



## Typical Performance Characteristics (Continued)

**Figure 7. Reverse Biased Safe Operating Area**

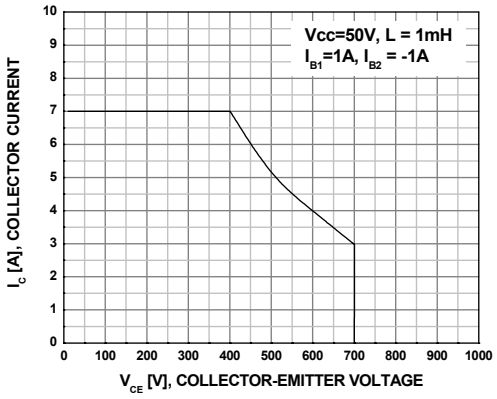
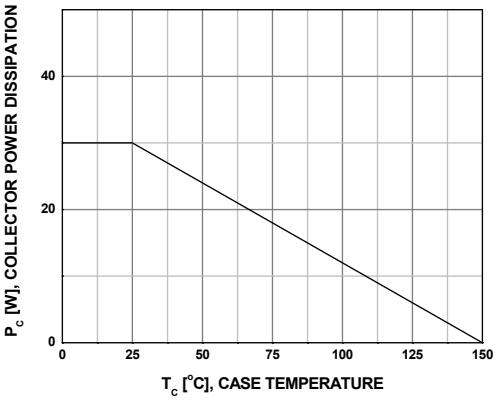
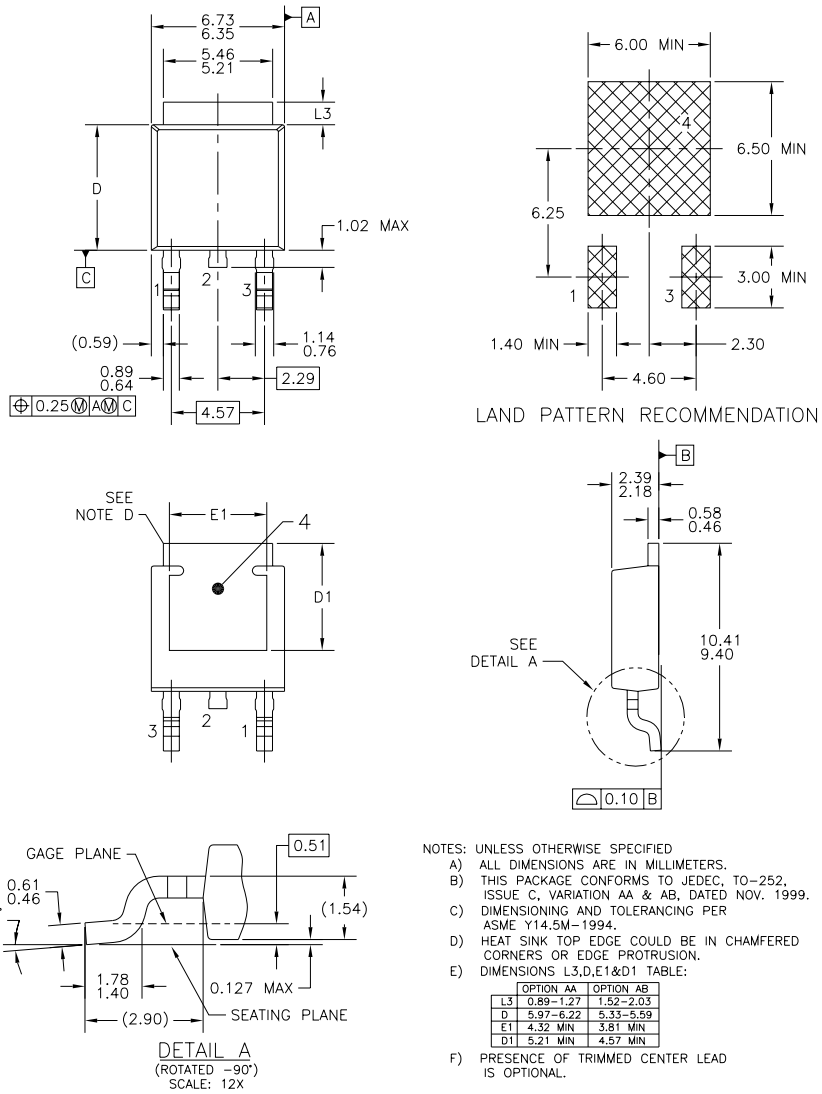



**Figure 8. Power Derating Curve**



## Mechanical Dimensions

# D-PAK




NOTES: UNLESS OTHERWISE SPECIFIED

A) ALL DIMENSIONS ARE IN MILLIMETERS.

B) THIS PACKAGE CONFORMS TO JEDEC, TO−252, ISSUE C, VARIATION AA & AB, DATED NOV. 1999.

C) DIMENSIONING AND TOLERANCING PER ASME Y14.5M−1994.

D) HEAT SINK TOP EDGE COULD BE IN CHAMFERED CORNERS OR EDGE PROTRUSION.

E) DIMENSIONS L3,D,E1&D1 TABLE:

| | OPTION AA | OPTION AB |
|---|---|---|
| L3 | 0.89−1.27 | 1.52−2.03 |
| D | 5.97−6.22 | 5.33−5.59 |
| E1 | 4.32 MIN | 3.81 MIN |
| D1 | 5.21 MIN | 4.57 MIN |

F) PRESENCE OF TRIMMED CENTER LEAD IS OPTIONAL.

Dimensions in Millimeters

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