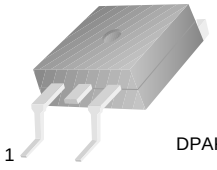
FAIRCHILD SEMICONDUCTOR®

April 2009

# FJD3305H1
# NPN Silicon Transistor

## High Voltage Switch Mode Application

- Fast Speed Switching
- Wide Safe Operating Area
- Suitable for Electronic Ballast Application




DPAK

1. Base 2. Collector 3. Emitter

## Absolute Maximum Ratings * $T_C$=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 | 9 | V |
| $I_C$ | Collector Current (DC) | 4 | A |
| $I_{CP}$ | Collector Current (Pulse) | 8 | A |
| $I_B$ | Base Current | 2 | A |
| $P_C$ | Collector Dissipation, $T_a$ = 25°C<br>$T_c$ = 25°C | 1.1<br>50 | W<br>W |
| $T_J$ | Junction Temperature | 150 | °C |
| $T_{STG}$ | Storage Temperature | -65 ~ 150 | °C |



* These ratings are limiting values above which the serviceability of any semiconductor device may be impaired.

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

| Symbol | Parameter | Value | Units |
|---|---|---|---|
| $R_{\theta JA}$ | Thermal Resistance, Junction to Ambient | 110 | °C/W |
| $R_{\theta JC}$ | Thermal Resistance, Junction to Case | 2.0 | °C/W |

* Device mounted on minimum pad size

## Ordering Information

| Part Number | Marking | Package | Packing Method | Remarks |
|---|---|---|---|---|
| FJD3305H1TM | J3305H1 | D-PAK | Tape & Reel | |

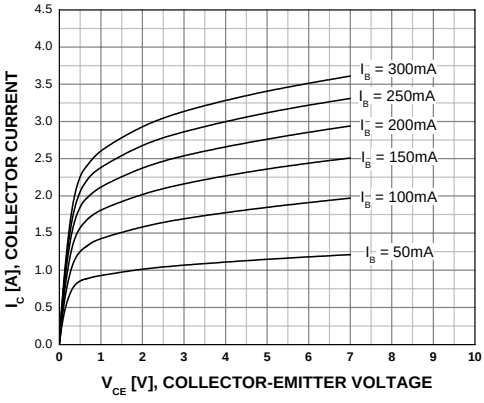
## Electrical Characteristics * $T_C$=25°C unless otherwise noted

| Symbol | Parameter | Conditions | Min. | Typ. | Max | Units |
|---|---|---|---|---|---|---|
| $BV_{CBO}$ | Collector-Base Breakdwon Voltage | $I_C$ = 500μA, $I_E$ = 0 | 700 | | | V |
| $BV_{CEO}$ | Collector-Emitter Breakdown Voltage | $I_C$ = 5mA, $I_B$ = 0 | 400 | | | V |
| $BV_{EBO}$ | Emitter-Base Breakdown Voltage | $I_E$ = 500μA, $I_C$ = 0 | 9 | | | V |
| $I_{CBO}$ | Collector Cut-off Current | $V_{CB}$ = 700V, $I_E$ = 0 | | | 1 | μA |
| $I_{EBO}$ | Emitter Cut-off Current | $V_{EB}$ = 9V, $I_C$ = 0 | | | 1 | μA |
| $h_{FE1}$<br>$h_{FE2}$ | DC Current Gain * | $V_{CE}$ = 5V, $I_C$ = 1A<br>$V_{CE}$ = 5V, $I_C$ = 2A | 19<br>8 | | 28<br>40 | |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C$ = 1A, $I_B$ = 0.2A<br>$I_C$ = 2A, $I_B$ = 0.5A<br>$I_C$ = 4A, $I_B$ = 1A | | | 0.5<br>0.6<br>1.0 | V<br>V<br>V |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage | $I_C$ = 1A, $I_B$ = 0.2A<br>$I_C$ = 2A, $I_B$ = 0.5A | | | 1.2<br>1.6 | V<br>V |
| $f_T$ | Current Gain Bandwidth Product | $V_{CE}$ = 10V, $I_C$ = 0.5A | 4 | | | MHz |
| $C_{ob}$ | Output Capacitance | $V_{CB}$ = 10V, f = 1MHz | | 65 | | pF |
| $t_{ON}$ | Turn On Time | $V_{CC}$ = 125V, $I_C$ = 2A<br>$I_{B1}$ = -$I_{B2}$ = 0.4A<br>$R_L$ = 62.5Ω | | | 0.8 | μs |
| $t_{STG}$ | Storage Time | | | | 4.0 | μs |
| $t_F$ | Fall Time | | | | 0.9 | μs |

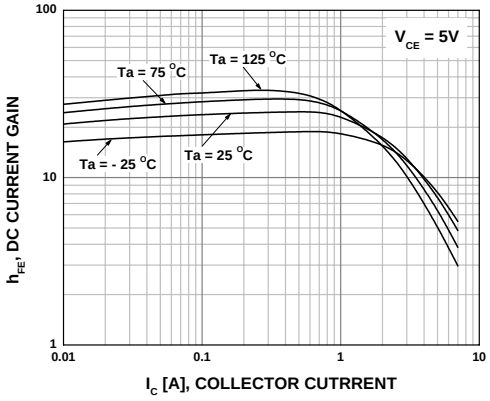
* Pulse Test: Pulse Width≤300μs, Duty Cycle≤2%

## Typical Performance Characteristics

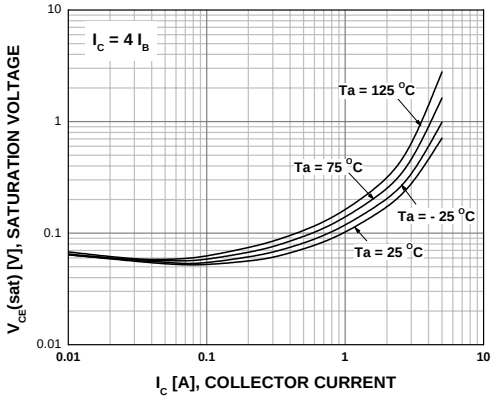
### Figure 1. Static Characteristic



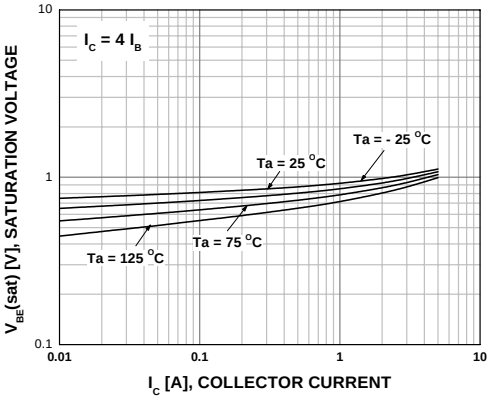

### Figure 2. DC Current Gain




### Figure 3. Collector- Emitter Saturation Voltage

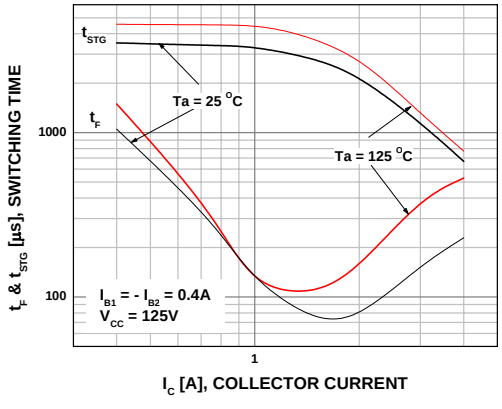



### Figure 4. Base - EmitterSaturation Voltage






### Figure 5. Switching Time




### Figure 6. Capacitance

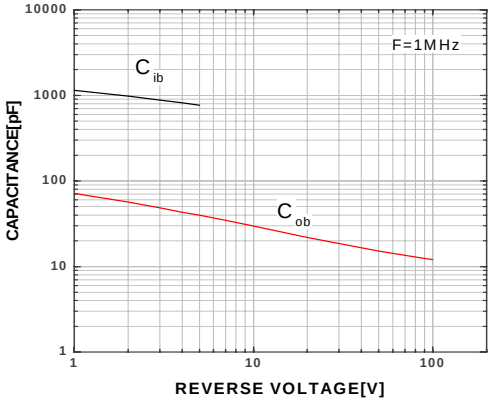


**Figure 7. Reverse Biased Safe Operating Area**

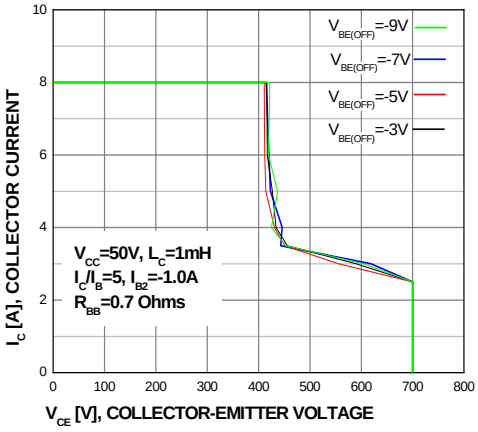



**Figure 8. RBSOA Collector- Emitter Saturation Voltage**

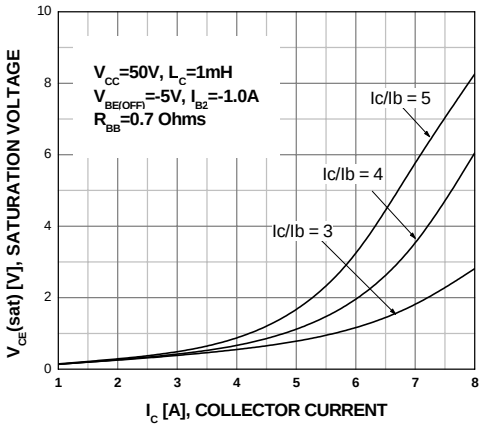



**Figure 9. RBSOA Turn-on Pulse Width vs Collector Current**

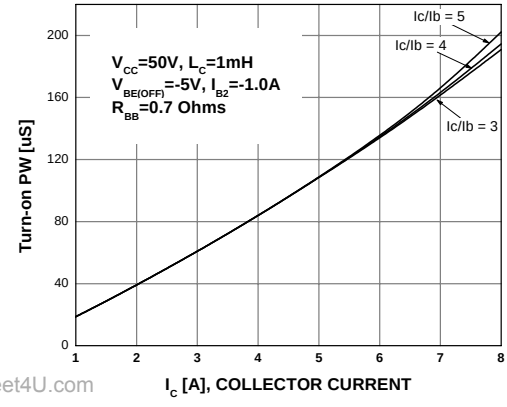



**Figure 10. Power Derating**

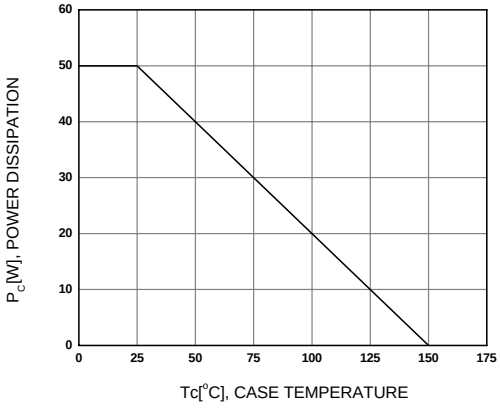
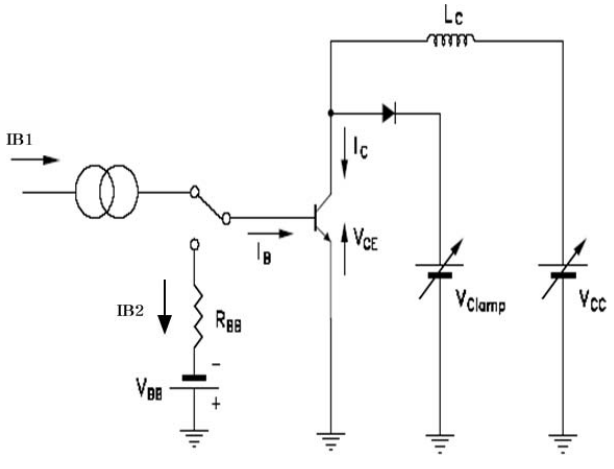


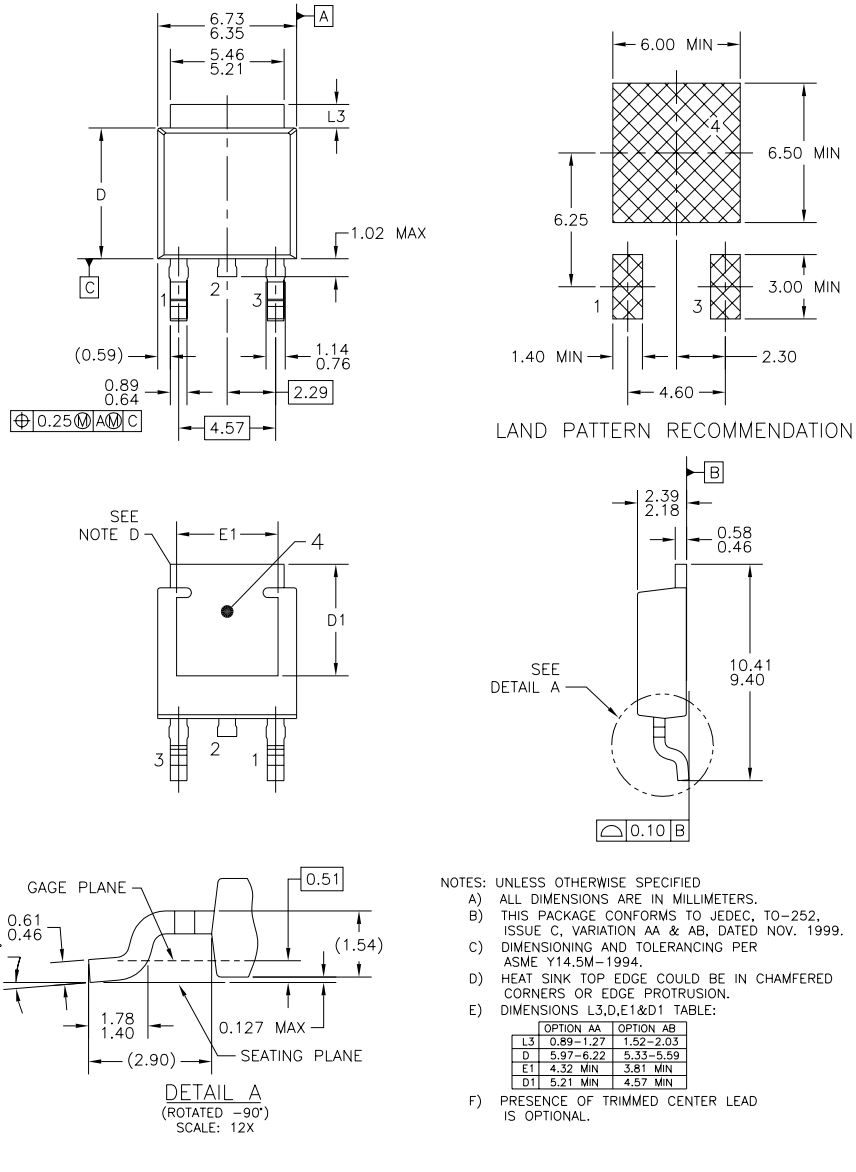



**Figure 11. RBSOA Test Circuit**



## 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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