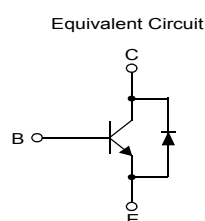
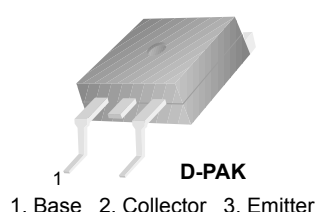


# FJD5304D

## 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



### Absolute Maximum Ratings $T_a = 25^\circ\text{C}$ 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       | $T_c = 25^\circ\text{C}$ | 30 W             |
|           |                             | $T_a = 25^\circ\text{C}$ | 1.25 W           |
| $T_J$     | Junction Temperature        | 150                      | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature         | -55 to 150               | $^\circ\text{C}$ |

\* Pulse Test:  $PW = 300\mu\text{s}$ , Duty Cycle = 2% Pulsed

### Thermal Characteristics $T_a = 25^\circ\text{C}$ unless otherwise noted

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

\*\* 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 $T_a = 25^\circ\text{C}$ unless otherwise noted

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

## Typical Performance Characteristics

Figure 1. Static Characteristic

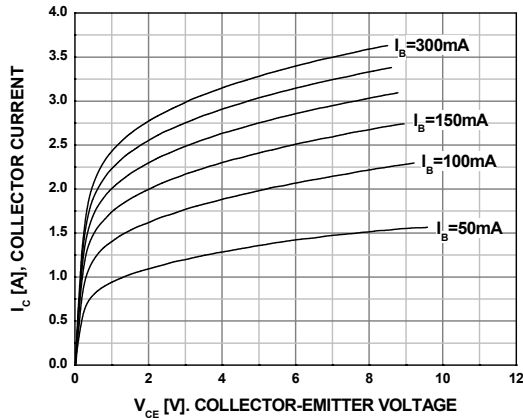


Figure 2. DC Current Gain

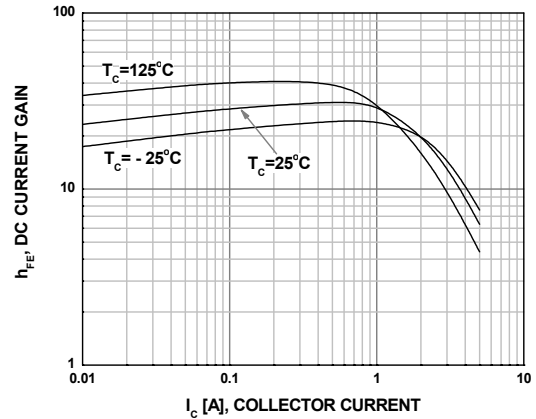


Figure 3. Collector-Emitter Saturation Voltage

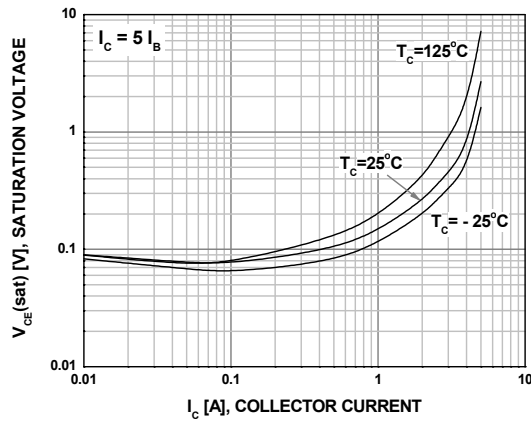


Figure 4. Base-Emitter Saturation Voltage

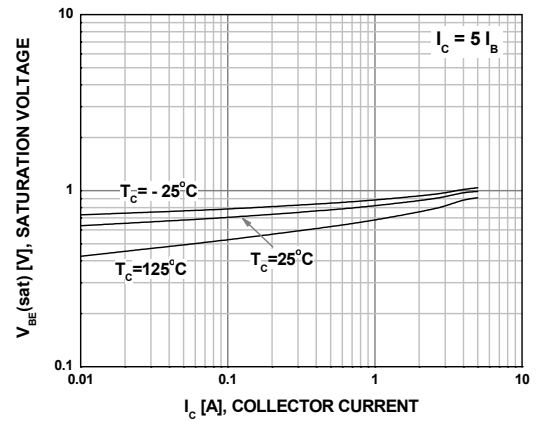


Figure 5. Resistive Load Switching Time

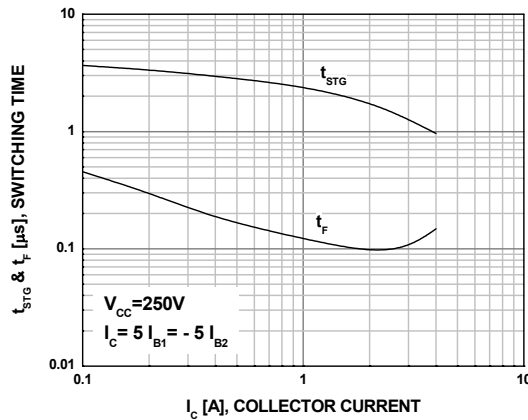
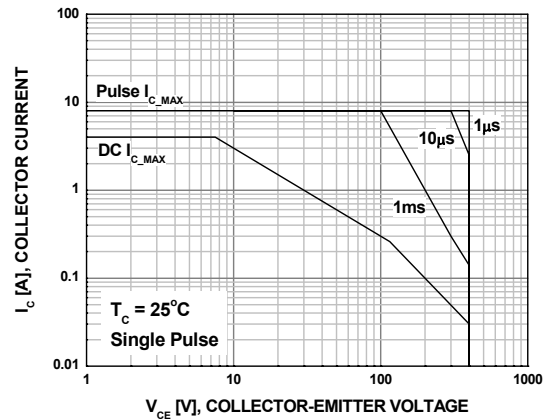


Figure 6. Forward Biased Safe Operating Area



## Typical Performance Characteristics (Continued)

Figure 7. Reverse Biased Safe Operating Area

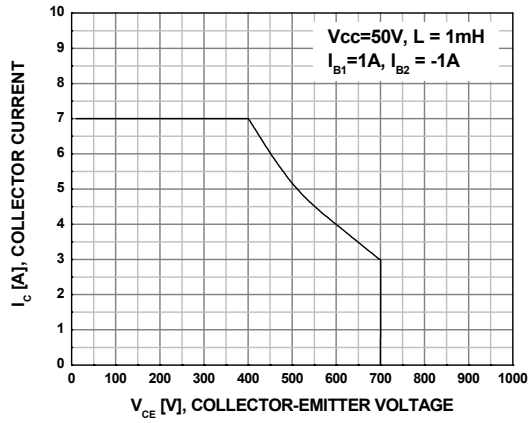
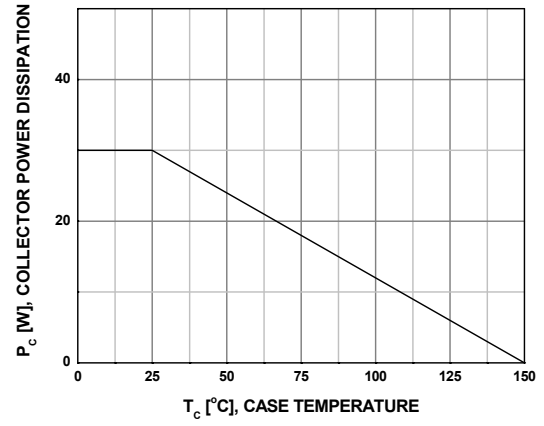
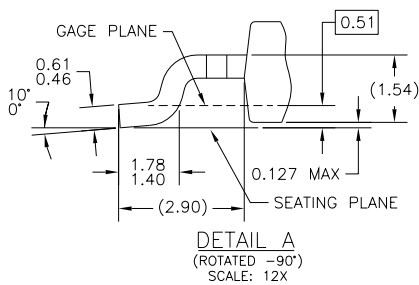
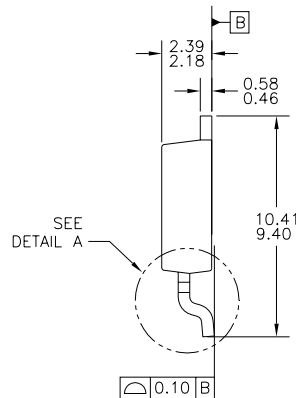
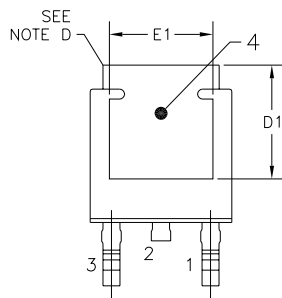
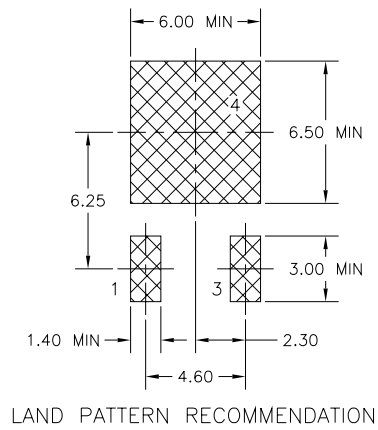
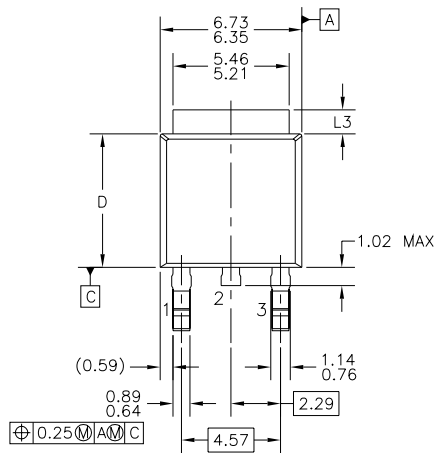


Figure 8. Power Derating Curve



## 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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| EfficientMax™            | MicroFET™              | TM                         | TinyPower™           |
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| FETBench™                | ®                      | TM                         | Ultra FRFET™         |
| FlashWriter®*            | PDP SPM™               | TM                         | UniFET™              |
| FPS™                     |                        | TM                         | VCX™                 |
|                          |                        | TM                         | VisualMax™           |
|                          |                        | TM                         | XS™                  |

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