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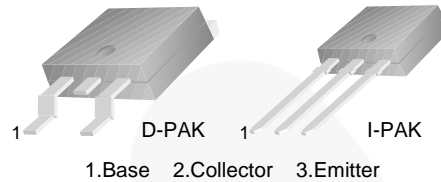
March 2014



# KSH47 / KSH50 NPN Epitaxial Silicon Transistor

## Features

- High-Voltage and High-Reliability
- D-PAK for Surface-Mount Applications
- Lead-Formed for Surface Mount Application (No Suffix)
- Straight Lead (I-PAK, “ - I ” Suffix)
- Electrically Similar to Popular TIP47 and TIP50



## Ordering Information

| Part Number | Top Mark | Package          | Packing Method |
|-------------|----------|------------------|----------------|
| KSH47TF     | KSH47    | TO-252 3L (DPAK) | Tape and Reel  |
| KSH50TF     | KSH50    | TO-252 3L (DPAK) | Tape and Reel  |

## 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    | KSH47 | 350         | V                |
|           |                           | KSH50 | 500         |                  |
| $V_{CEO}$ | Collector-Emitter Voltage | KSH47 | 250         | V                |
|           |                           | KSH50 | 400         |                  |
| $V_{EBO}$ | Emitter-Base Voltage      |       | 5           | V                |
| $I_C$     | Collector Current (DC)    |       | 1           | A                |
| $I_{CP}$  | Collector Current (Pulse) |       | 2           | A                |
| $I_B$     | Base Current              |       | 0.6         | A                |
| $T_J$     | Junction Temperature      |       | 150         | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature Range |       | - 65 to 150 | $^\circ\text{C}$ |

KSH47 / KSH50 — NPN Epitaxial Silicon Transistor

## Thermal Characteristics

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

| Symbol | Parameter  | Value | Unit |
|--------|--|-------|------|
| $P_C$  | Collector Dissipation ( $T_C = 25^\circ\text{C}$ ) | 15.0  | W    |
|        | Collector Dissipation ( $T_A = 25^\circ\text{C}$ ) | 1.56  |      |

## Electrical Characteristics

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

| Symbol         | Parameter   | Conditions                                 | Min.                                | Typ. | Max. | Unit |    |
|----------------|---|--|-------------------------------------|------|------|------|----|
| $V_{CE0(sus)}$ | Collector-Emitter Sustaining Voltage <sup>(1)</sup> | KSH47                                      | $I_C = 30\text{ mA}, I_B = 0$       | 250  |      |      | V  |
|                |   | KSH50                                      |                                     | 400  |      |      |    |
| $I_{CEO}$      | Collector Cut-Off Current                           | KSH47                                      | $V_{CE} = 150\text{ V}, I_B = 0$    |      |      | 0.2  | mA |
|                |   | KSH50                                      | $V_{CE} = 300\text{ V}, I_B = 0$    |      |      | 0.2  |    |
| $I_{CES}$      | Collector Cut-Off Current                           | KSH47                                      | $V_{CE} = 350\text{ V}, V_{EB} = 0$ |      |      | 0.1  | mA |
|                |   | KSH50                                      | $V_{CE} = 500\text{ V}, V_{EB} = 0$ |      |      | 0.1  |    |
| $I_{EBO}$      | Emitter Cut-Off Current                             | $V_{BE} = 5\text{ V}, I_C = 0$             |                                     |      | 1    | mA   |    |
| $h_{FE}$       | DC Current Gain <sup>(1)</sup>                      | $V_{CE} = 10\text{ V}, I_C = 0.3\text{ A}$ | 30                                  |      | 150  |      |    |
|                |   | $V_{CE} = 10\text{ V}, I_C = 1\text{ A}$   | 10                                  |      |      |      |    |
| $V_{CE(sat)}$  | Collector-Emitter Saturation Voltage <sup>(1)</sup> | $I_C = 1\text{ A}, I_B = 0.2\text{ A}$     |                                     |      | 1    | V    |    |
| $V_{BE(on)}$   | Base-Emitter On Voltage <sup>(1)</sup>              | $V_{CE} = 10\text{ V}, I_C = 1\text{ A}$   |                                     |      | 1.5  | V    |    |
| $f_T$          | Current Gain Bandwidth Product                      | $V_{CE} = 10\text{ V}, I_C = 0.2\text{ A}$ | 10                                  |      |      | MHz  |    |

### Note:

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

## Typical Performance Characteristics

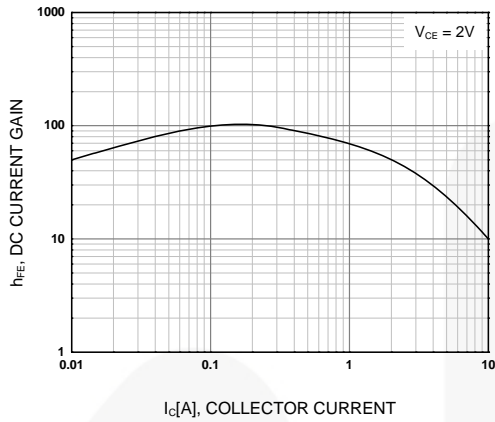


Figure 1. DC Current Gain

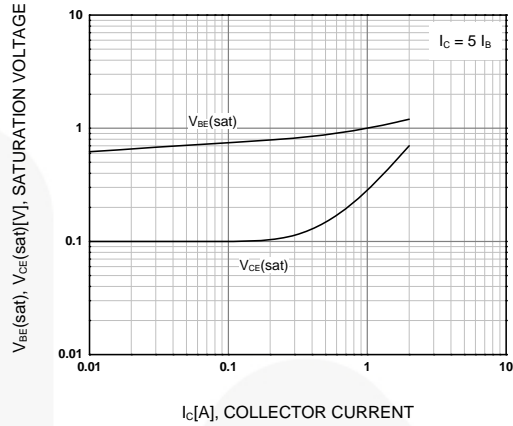


Figure 2. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

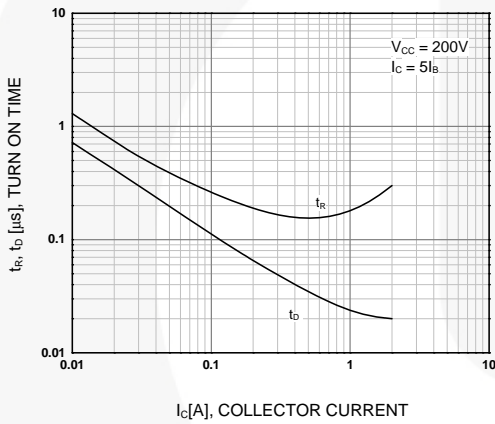


Figure 3. Turn-On Time

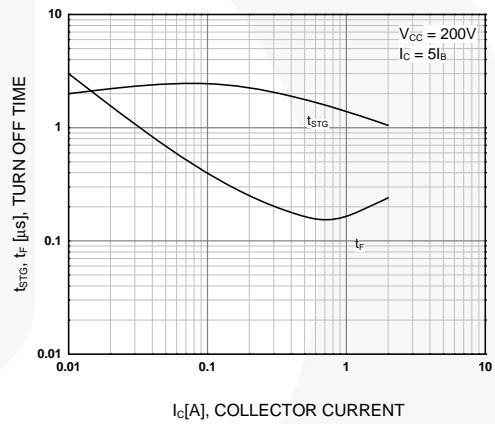


Figure 4. Turn-Off Time

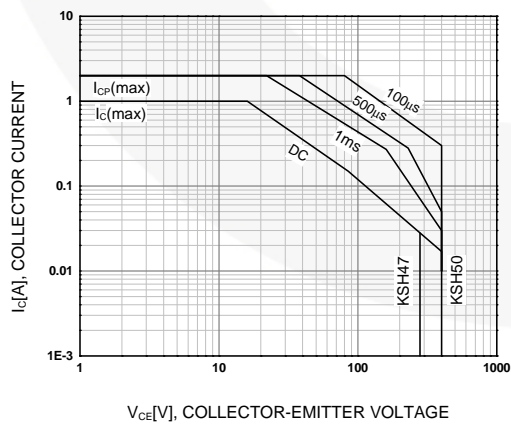


Figure 5. Safe Operating Area

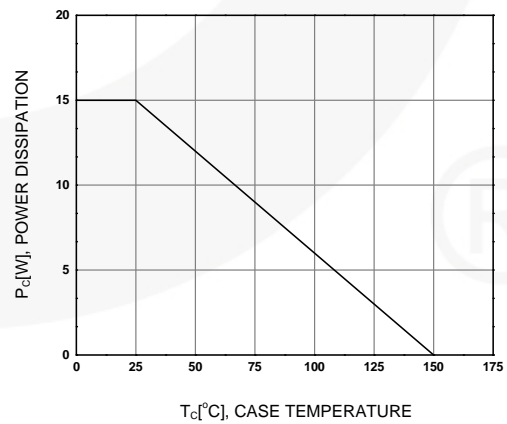
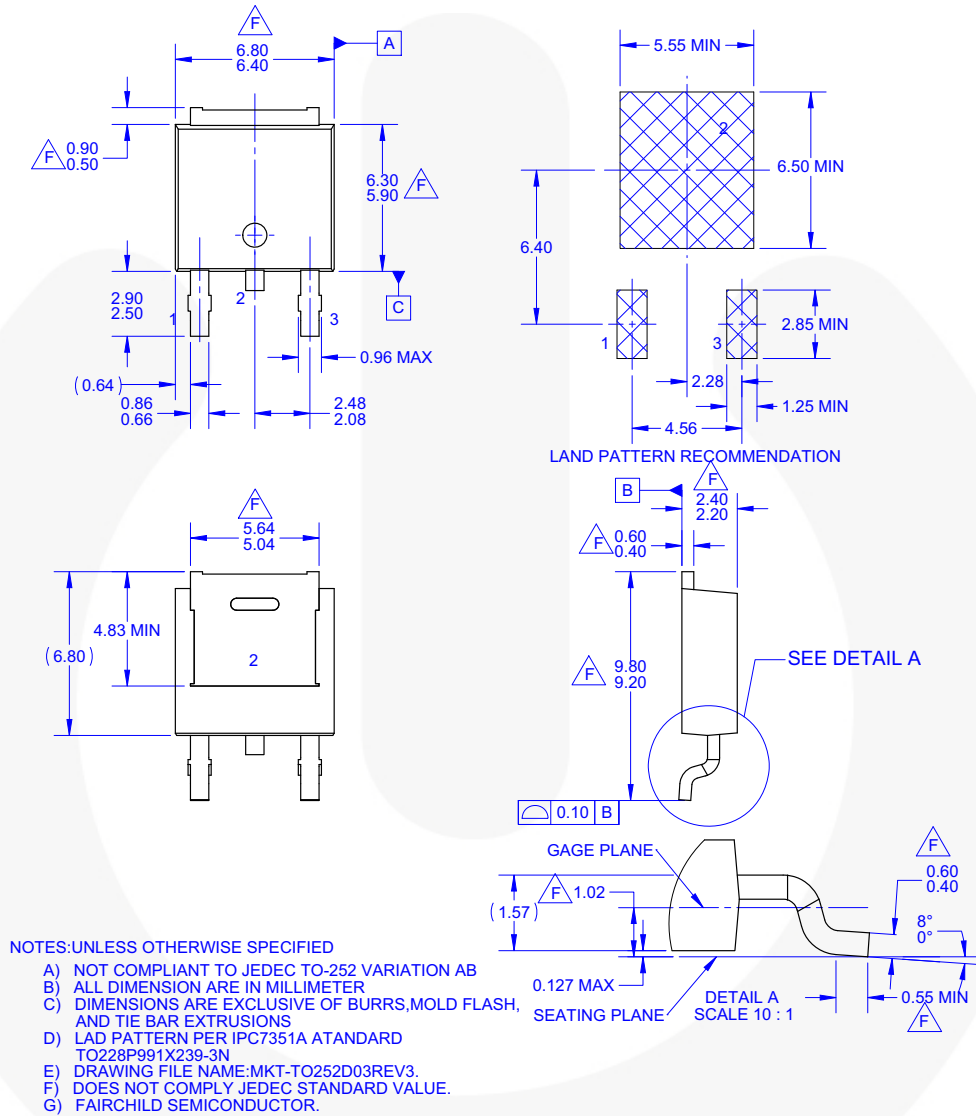


Figure 6. Power Derating

**Physical Dimensions**

**TO-252 3L**



**Figure 7. 3-LEAD, TO-252, JEDEC TO-252 VAR. AB, SURFACE MOUNT (DPAK) (ACTIVE)**

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