

# NPN Epitaxial Silicon Transistor

## KSP44, KSP45

### Features

- High-Voltage Transistor
- Collector-Emitter Voltage:
  - ♦ KSP44:  $V_{CEO} = 400\text{ V}$
  - ♦ KSP45:  $V_{CEO} = 350\text{ V}$
- These Devices are Pb-Free, Halogen Free/BFR Free and are RoHS Compliant

### ABSOLUTE MAXIMUM RATINGS

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

| Symbol    | Parameter                 |       | Value      | Unit             |
|-----------|---------------------------|-------|------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage    | KSP44 | 500        | V                |
|           |                           | KSP45 | 400        |                  |
| $V_{CEO}$ | Collector-Emitter Voltage | KSP44 | 400        | V                |
|           |                           | KSP45 | 350        |                  |
| $V_{EBO}$ | Emitter-Base Voltage      |       | 6          | V                |
| $I_C$     | Collector Current         |       | 300        | mA               |
| $T_J$     | Junction Temperature      |       | 150        | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature       |       | -55 to 150 | $^\circ\text{C}$ |

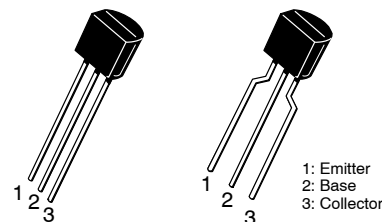
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS (Note 1)

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

| Symbol          | Parameter                               |                          | Value | Unit               |
|-----------------|-----------------------------------------|--------------------------|-------|--------------------|
| $P_D$           | Power Dissipation                       | $T_A = 25^\circ\text{C}$ | 625   | mW                 |
|                 |                                         | $T_C = 25^\circ\text{C}$ | 1.5   | W                  |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case    |                          | 83.3  | $^\circ\text{C/W}$ |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient |                          | 200   | $^\circ\text{C/W}$ |

1. PCB size: FR-4, 76 mm x 114 mm x 1.57 mm (3.0 inch x 4.5 inch x 0.062 inch) with minimum land pattern size.



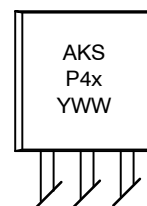
STRAIGHT LEAD  
BULK PACK

TO-92-3  
CASE 135AN

BENT LEAD  
TAPE & REEL  
AMMO PACK

TO-92 LF  
CASE 135AR

### MARKING DIAGRAM



A = Assembly Code  
 KSP4x = Device Code (x = 4 or 5)  
 Y = Year  
 WW = Work Week

### ORDERING INFORMATION

See detailed ordering and shipping information on page 2 of this data sheet.

# KSP44, KSP45

## ORDERING INFORMATION

| Part Number | Top Mark | Package                       | Shipping <sup>†</sup>     |
|-------------|----------|-------------------------------|---------------------------|
| KSP44BU     | KSP44    | TO-92-3 (Pb-Free), case 135AN | 10,000 units / Bulk Bag   |
| KSP44TA     | KSP44    | TO-92-3 (Pb-Free), case 135AR | 2,000 units / Fan-Fold    |
| KSP44TF     | KSP44    | TO-92-3 (Pb-Free), case 135AR | 2,000 units / Tape & Reel |
| KSP45TA     | KSP45    | TO-92-3 (Pb-Free), case 135AR | 2,000 units / Fan-Fold    |

<sup>†</sup>For information on tape and reel specifications, including part orientation and tape sizes, please refer to our Tape and Reel Packaging Specifications Brochure, BRD8011/D.

## ELECTRICAL CHARACTERISTICS

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

| Symbol        | Parameter                                     |       | Conditions                                                | Min. | Max. | Unit          |
|---------------|-----------------------------------------------|-------|-----------------------------------------------------------|------|------|---------------|
| $BV_{CBO}$    | Collector-Base Breakdown Voltage              | KSP44 | $I_C = 100\ \mu\text{A}$ , $I_E = 0$                      | 500  |      | V             |
|               |                                               | KSP45 |                                                           | 400  |      |               |
| $BV_{CEO}$    | Collector-Emitter Breakdown Voltage (Note 2)  | KSP44 | $I_C = 1\ \text{mA}$ , $I_B = 0$                          | 400  |      | V             |
|               |                                               | KSP45 |                                                           | 350  |      |               |
| $BV_{EBO}$    | Emitter-Base Breakdown Voltage                |       | $I_E = 100\ \mu\text{A}$ , $I_C = 0$                      | 6    |      | V             |
| $I_{CBO}$     | Collector Cut-Off Current                     | KSP44 | $V_{CB} = 400\ \text{V}$ , $I_E = 0$                      |      | 0.1  | $\mu\text{A}$ |
|               |                                               | KSP45 | $V_{CB} = 320\ \text{V}$ , $I_E = 0$                      |      | 0.1  |               |
| $I_{CES}$     | Collector Cut-Off Current                     | KSP44 | $V_{CE} = 400\ \text{V}$ , $I_E = 0$                      |      | 0.5  | $\mu\text{A}$ |
|               |                                               | KSP45 | $V_{CE} = 320\ \text{V}$ , $I_E = 0$                      |      | 0.5  |               |
| $I_{EBO}$     | Emitter Cut-Off Current                       |       | $V_{EB} = 4\ \text{V}$ , $I_C = 0$                        |      | 0.1  | $\mu\text{A}$ |
| $h_{FE}$      | DC Current Gain (Note 2)                      |       | $V_{CE} = 10\ \text{V}$ , $I_C = 1\ \text{mA}$            | 40   |      |               |
|               |                                               |       | $V_{CE} = 10\ \text{V}$ , $I_C = 10\ \text{mA}$           | 50   | 200  |               |
|               |                                               |       | $V_{CE} = 10\ \text{V}$ , $I_C = 50\ \text{mA}$           | 45   |      |               |
|               |                                               |       | $V_{CE} = 10\ \text{V}$ , $I_C = 100\ \text{mA}$          | 40   |      |               |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage (Note 2) |       | $I_C = 1\ \text{mA}$ , $I_B = 0.1\ \text{mA}$             |      | 0.40 | V             |
|               |                                               |       | $I_C = 10\ \text{mA}$ , $I_B = 1\ \text{mA}$              |      | 0.50 |               |
|               |                                               |       | $I_C = 50\ \text{mA}$ , $I_B = 5\ \text{mA}$              |      | 0.75 |               |
| $V_{BE(sat)}$ | Base-Emitter Saturation Voltage (Note 2)      |       | $I_C = 10\ \text{mA}$ , $I_B = 1\ \text{mA}$              |      | 0.75 | V             |
| $C_{ob}$      | Output Capacitance                            |       | $V_{CB} = 20\ \text{V}$ , $I_E = 0$ , $f = 1\ \text{MHz}$ |      | 7    | pF            |

Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

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

TYPICAL PERFORMANCE CHARACTERISTICS

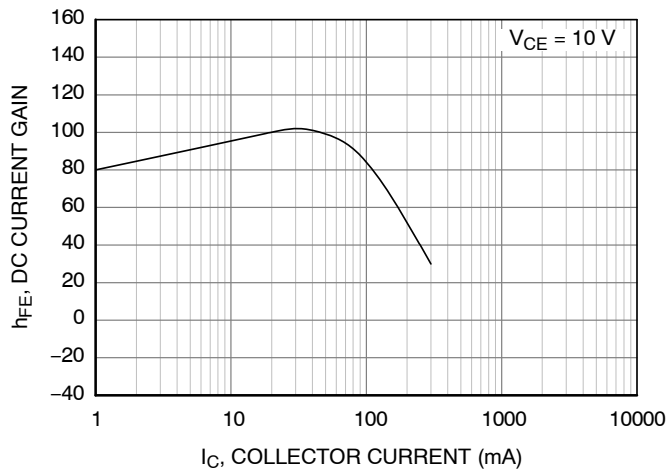


Figure 1. DC Current Gain

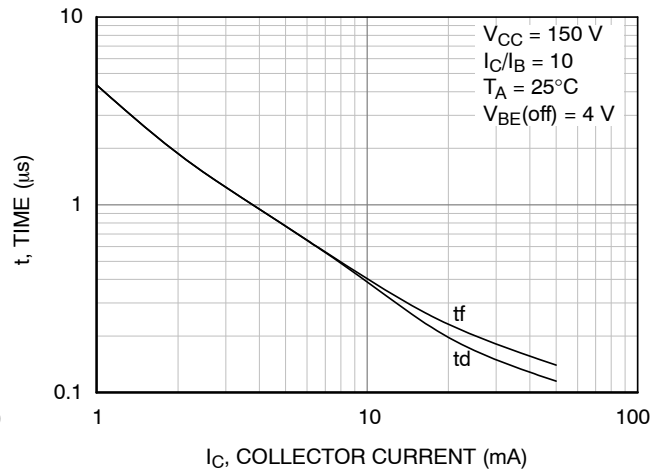


Figure 2. Turn-On Switching Times

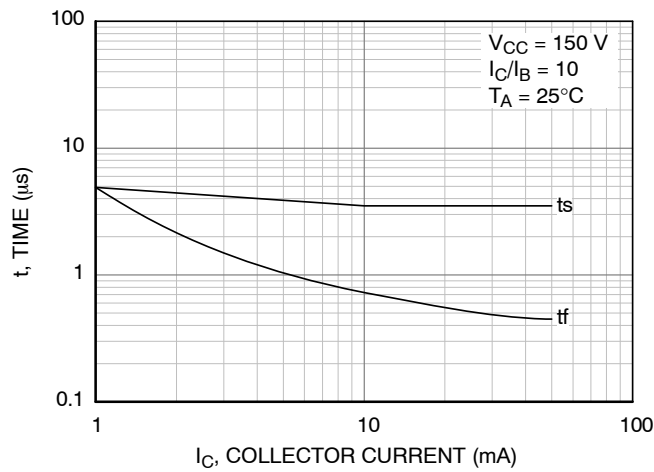


Figure 3. Turn-Off Switching Times

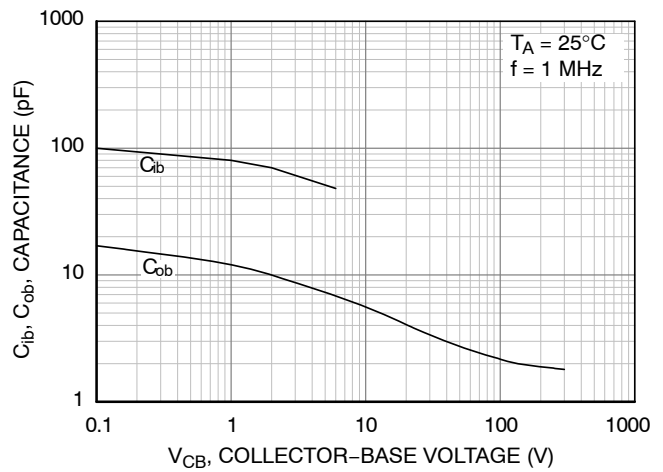


Figure 4. Capacitance

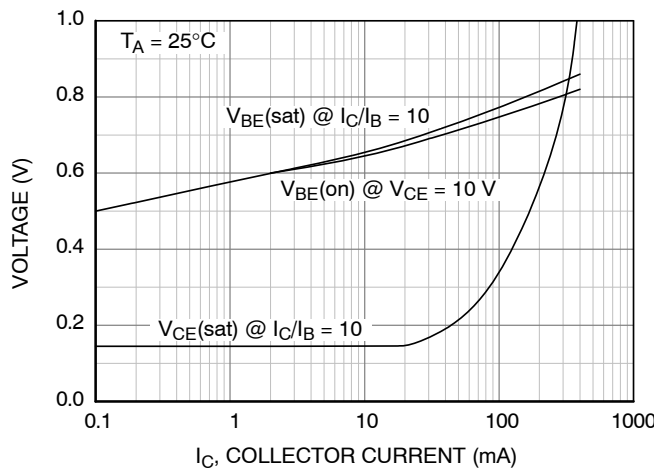


Figure 5. On Voltage

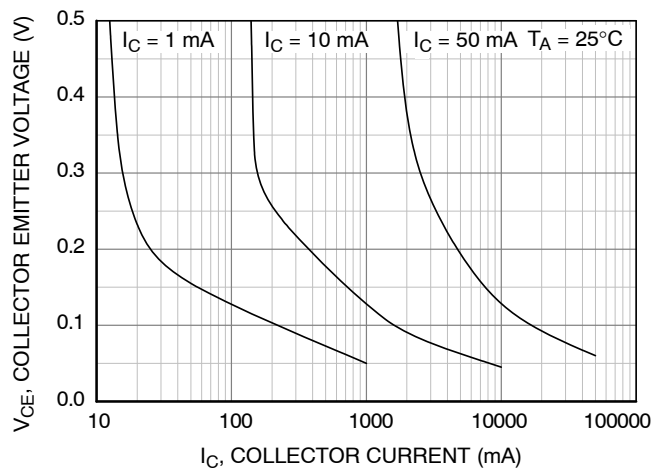
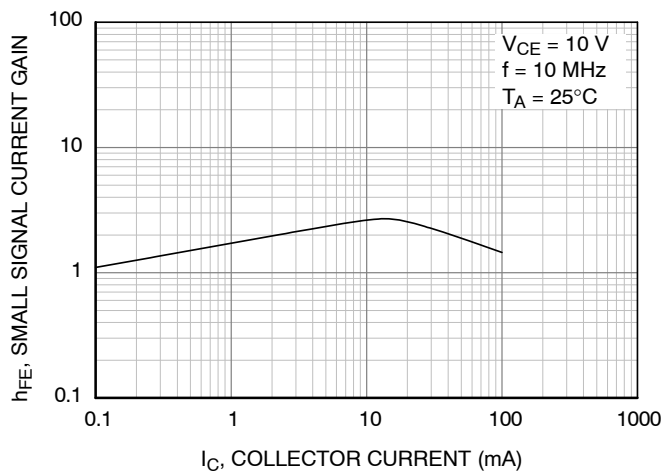


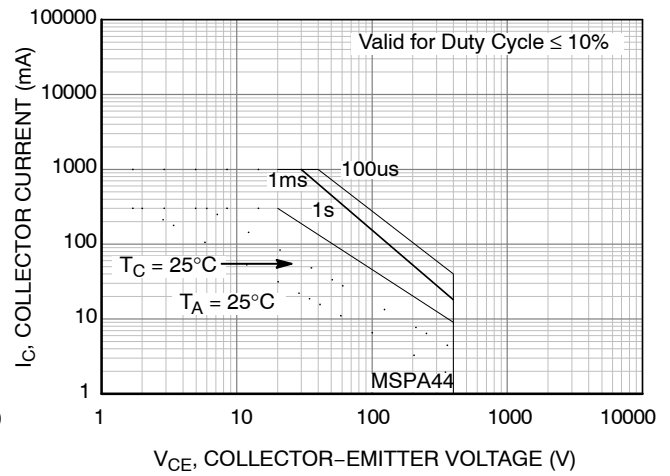
Figure 6. Collector Saturation Region

# KSP44, KSP45

## TYPICAL PERFORMANCE CHARACTERISTICS (continued)



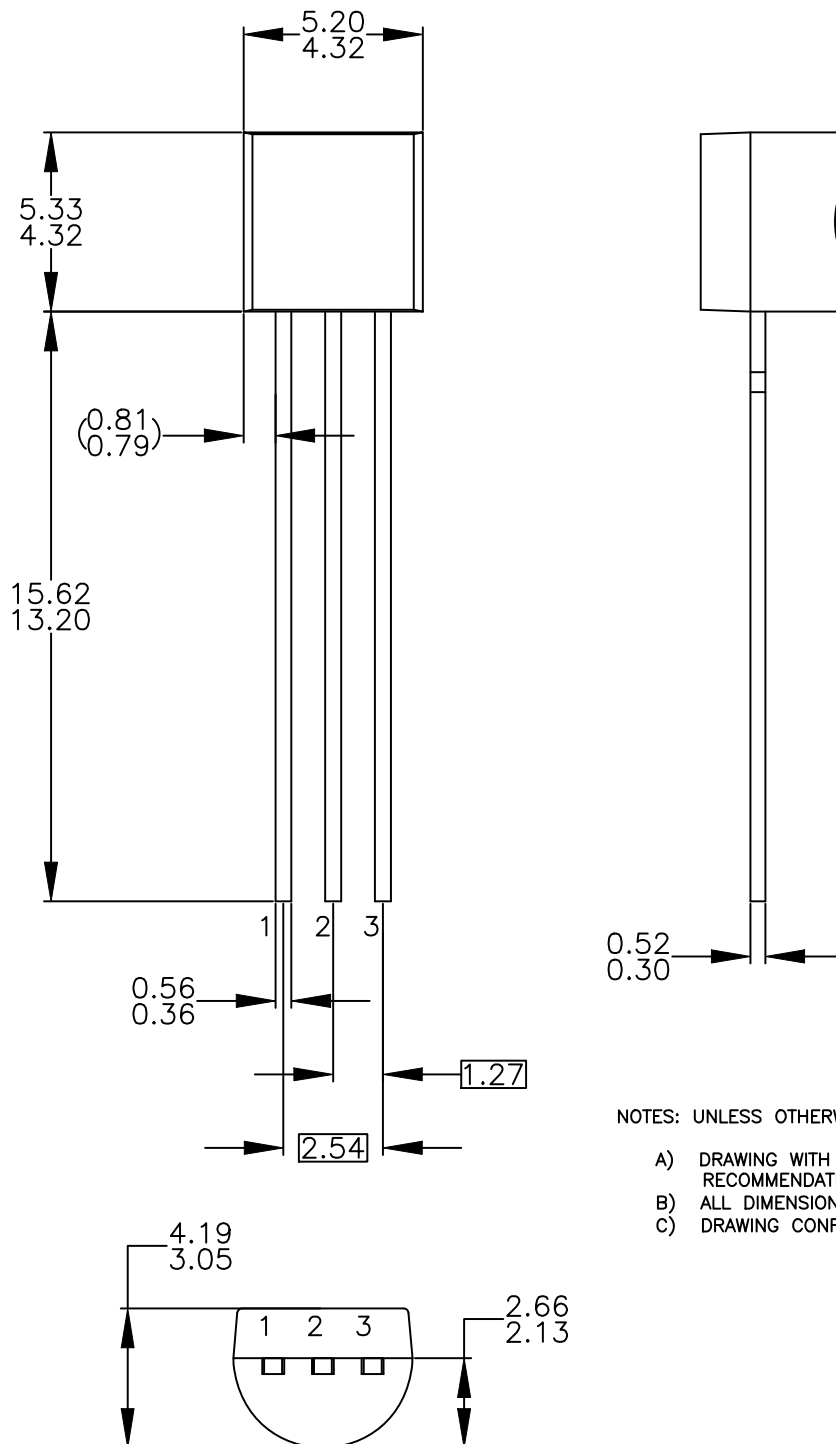
**Figure 7. High-Frequency Current Gain**



**Figure 8. Safe Operating Area**

**TO-92 3 4.825x4.76**  
**CASE 135AN**  
**ISSUE O**

DATE 31 JUL 2016



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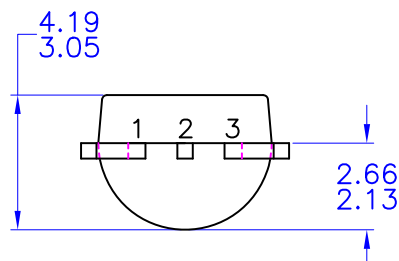
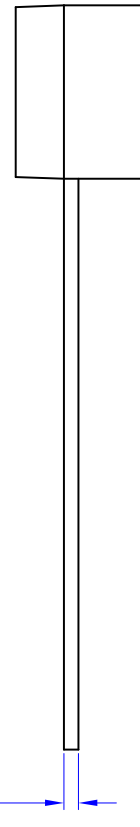
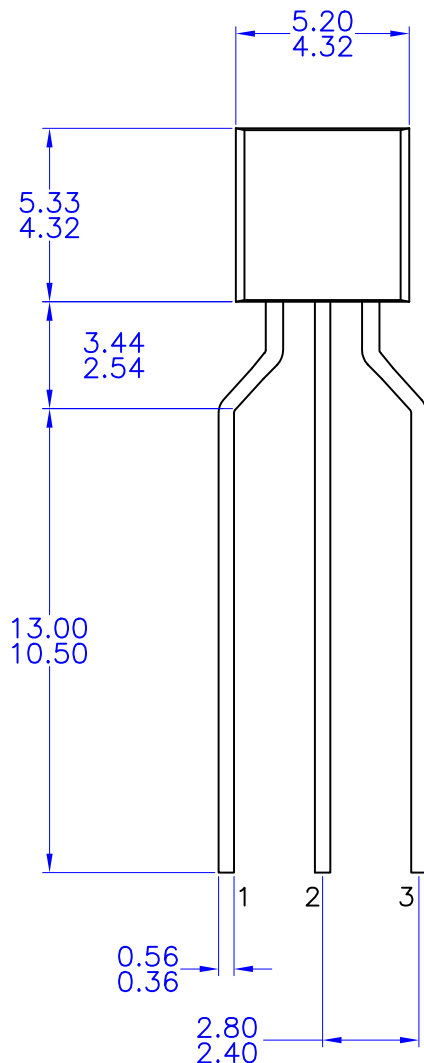
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- B) ALL DIMENSIONS ARE IN MILLIMETERS.
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**TO-92 3 4.83x4.76 LEADFORMED**  
CASE 135AR  
ISSUE O

DATE 30 SEP 2016



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