

# NPN Epitaxial Silicon Darlington Transistor

## KSP13

### Features

- Collector–Emitter Voltage:  $V_{CES}=30\text{ V}$
- Collector Power Dissipation:  $P_C(\text{max})=625\text{ mW}$
- These are Pb–Free Devices

### ABSOLUTE MAXIMUM RATINGS

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

| Symbol    | Parameter                   | Value      | Unit             |
|-----------|-----------------------------|------------|------------------|
| $V_{CBO}$ | Collector–Base Voltage      | 30         | V                |
| $V_{CES}$ | Collector–Emitter Voltage   | 30         | V                |
| $V_{EBO}$ | Emitter–Base Voltage        | 10         | V                |
| $I_C$     | Collector Current           | 500        | mA               |
| $P_C$     | Collector Power Dissipation | 625        | mW               |
| $T_J$     | Junction Temperature        | 150        | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature         | –55 to 150 | $^\circ\text{C}$ |

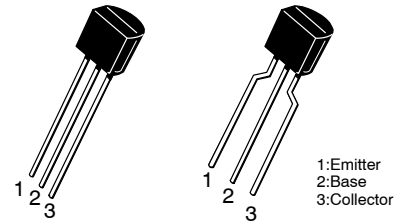
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### ELECTRICAL CHARACTERISTICS ( $T_C = 25^\circ\text{C}$ unless otherwise noted.)

| Symbol               | Parameter                            | Test Condition  | Min | Max | Unit |
|----------------------|--------------------------------------|---|-----|-----|------|
| $BV_{CES}$           | Collector–Emitter Breakdown Voltage  | $I_C = 100\ \mu\text{A}, I_B = 0$                                 | 30  | –   | V    |
| $I_{CBO}$            | Collector Cut–off Current            | $V_{CB} = 30\text{ V}, I_E = 0$                                   | –   | 100 | nA   |
| $I_{EBO}$            | Emitter Cut–off Current              | $V_{EB} = 10\text{ V}, I_C = 0$                                   | –   | 100 | nA   |
| $h_{FE}$             | DC Current Gain (Note 1)             | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$                         | 5k  | –   |      |
|                      |                                      | $V_{CE} = 5\text{ V}, I_C = 100\text{ mA}$                        | 10k | –   |      |
| $V_{CE(\text{sat})}$ | Collector–Emitter Saturation Voltage | $I_C = 100\text{ mA}, I_B = 0.1\text{ mA}$                        | –   | 1.5 | V    |
| $V_{BE(\text{on})}$  | Base–Emitter On Voltage              | $V_{CE} = 5\text{ V}, I_C = 100\text{ mA}$                        | –   | 2.0 | V    |
| $f_T$                | Current Gain Bandwidth Product       | $V_{CE} = 5\text{ V}, I_C = 10\text{ mA}$<br>$f = 100\text{ MHz}$ | 125 | –   | MHz  |

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.

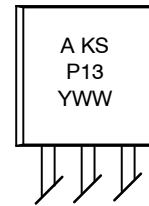
1. Pulse Test: Pulse Width  $\leq 300\ \mu\text{s}$ , Duty Cycle  $\leq 2\%$ .



TO–92 3  
CASE 135AN

TO–92 3 LF  
CASE 135AR

### MARKING DIAGRAM



A = Assembly Code  
KSP13 = Device Code  
Y = Year  
WW = Work Week

### ORDERING INFORMATION

| Device  | Package                 | Shipping            |
|---------|-------------------------|---------------------|
| KSP13BU | TO–92 3<br>(Pb–Free)    | 10000 /<br>Bulk Bag |
| KSP13TA | TO–92 3 LF<br>(Pb–Free) | 2000 /<br>Fan–Fold  |

TYPICAL CHARACTERISTICS

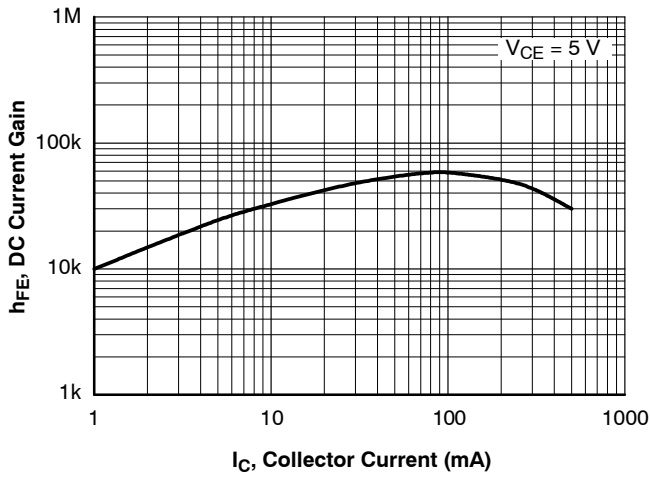


Figure 1. DC Current Gain

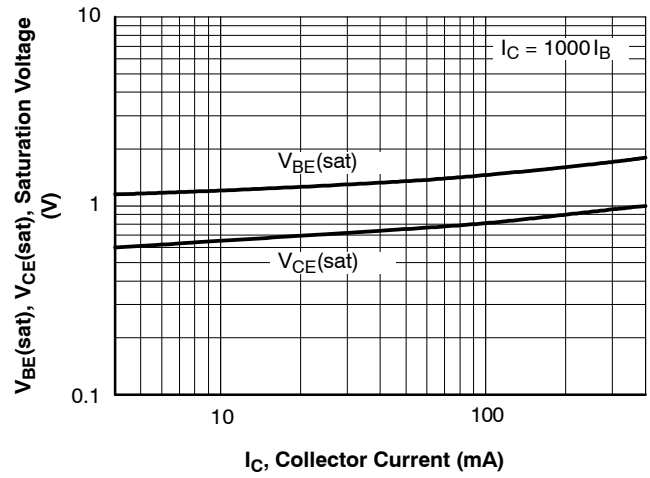


Figure 2. Base-Emitter Saturation Voltage  
Collector-Emitter Saturation Voltage

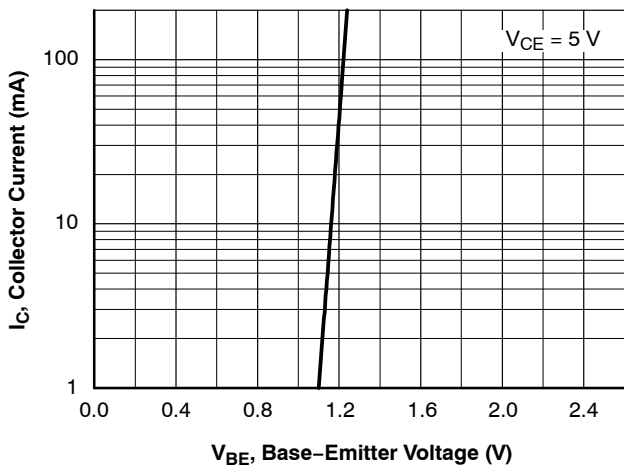


Figure 3. Base-Emitter On Voltage

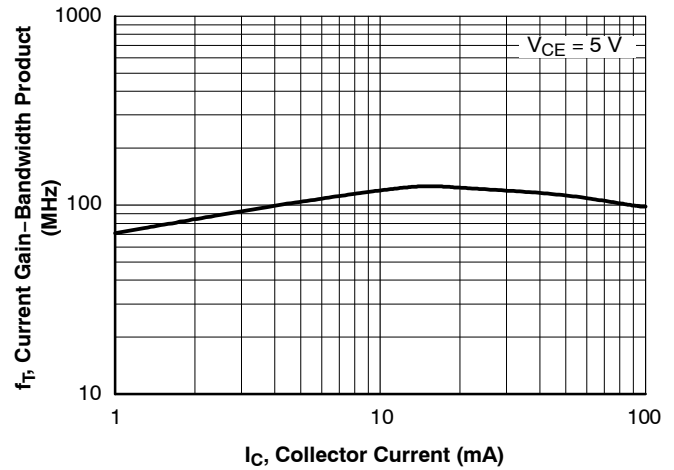
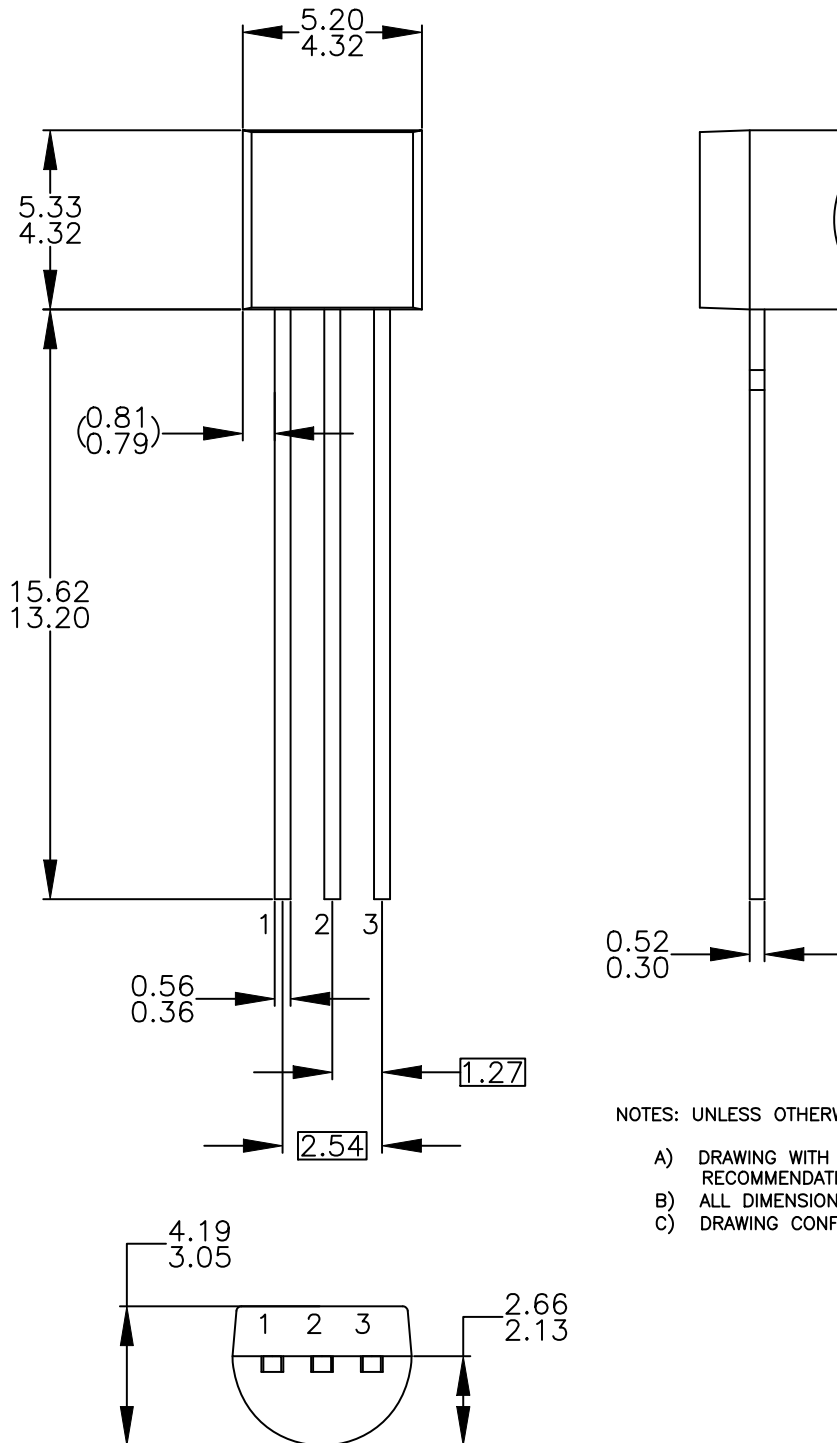


Figure 4. Current Gain Bandwidth Product

**MECHANICAL CASE OUTLINE**  
**PACKAGE DIMENSIONS**

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

DATE 31 JUL 2016



NOTES: UNLESS OTHERWISE SPECIFIED

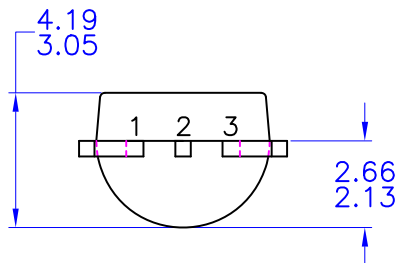
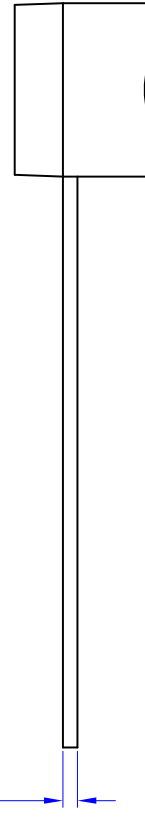
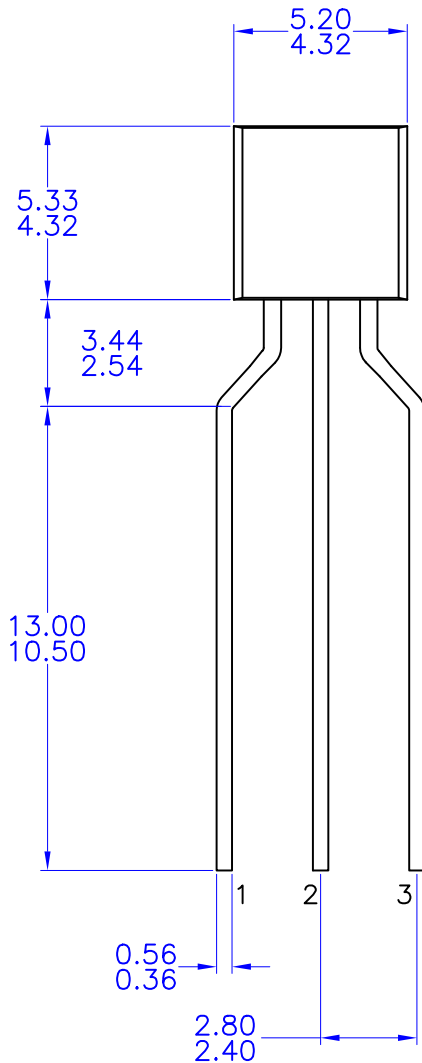
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**TO-92 3 4.83x4.76 LEADFORMED**  
**CASE 135AR**  
**ISSUE O**


DATE 30 SEP 2016



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