

# PNP Epitaxial Silicon Transistor

## KSA992

### Features

- Audio Frequency Low-Noise Amplifier
- Complement to KSC1845
- These are Pb-Free Devices

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

| Symbol    | Parameter                 | Value      | Unit             |
|-----------|---------------------------|------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage    | -120       | V                |
| $V_{CEO}$ | Collector-Emitter Voltage | -120       | V                |
| $V_{EBO}$ | Emitter-Base Voltage      | -5         | V                |
| $I_C$     | Collector Current         | -50        | mA               |
| $I_B$     | Base Current              | -10        | mA               |
| $T_J$     | Junction Temperature      | 150        | $^\circ\text{C}$ |
| $T_{STG}$ | Storage Temperature       | -55 to 150 | $^\circ\text{C}$ |

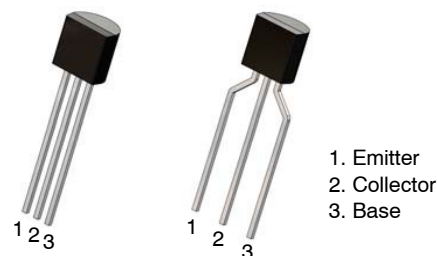
Stresses exceeding those listed in the Maximum Ratings table may damage the device. If any of these limits are exceeded, device functionality should not be assumed, damage may occur and reliability may be affected.

### THERMAL CHARACTERISTICS

(Values are at  $T_A = 25^\circ\text{C}$  unless otherwise noted.) (Note 1)

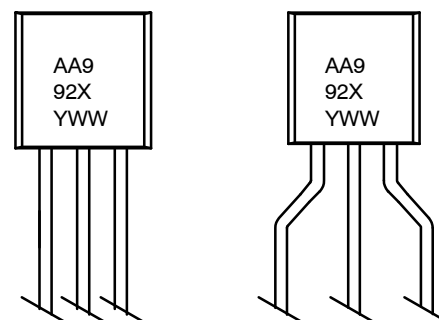
| Symbol          | Parameter                               | Value | Unit                      |
|-----------------|-----------------------------------------|-------|---------------------------|
| $P_D$           | Power Dissipation                       | 500   | mW                        |
|                 | Derate Above $25^\circ\text{C}$         | 4     | mW/ $^\circ\text{C}$      |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 250   | $^\circ\text{C}/\text{W}$ |

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.



TO-92 3 4.825x4.76 CASE 135AN  
TO-92 3 4.83x4.76 LEADFORMED CASE 135AR

### MARKING DIAGRAMS



A = Assembly Code  
A992 = Device Code  
X = F / FA / FB  
YWW = Date Code

### ORDERING INFORMATION

| Device     | Package              | Shipping               |
|------------|----------------------|------------------------|
| KSA992FBU  | TO-92 3 (Pb-Free)    | 10000 Units / Bulk Bag |
| KSA992FTA  | TO-92 3 LF (Pb-Free) | 2000 / Fan-Fold        |
| KSA992FATA | TO-92 3 LF (Pb-Free) | 2000 / Fan-Fold        |
| KSA992FBTA | TO-92 3 LF (Pb-Free) | 2000 / Fan-Fold        |

# KSA992

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

| Symbol        | Parameter                            | Conditions                                                                                           | Min   | Typ   | Max   | Unit          |
|---------------|--------------------------------------|------------------------------------------------------------------------------------------------------|-------|-------|-------|---------------|
| $I_{CBO}$     | Collector Cut-Off Current            | $V_{CB} = -120\text{ V}$ , $I_E = 0$                                                                 | –     | –     | –50   | nA            |
| $I_{CEO}$     | Collector Cut-Off Current            | $V_{CE} = -100\text{ V}$ , $I_B = 0$                                                                 | –     | –     | –1    | $\mu\text{A}$ |
| $I_{EBO}$     | Emitter Cut-Off Current              | $V_{EB} = -5\text{ V}$ , $I_C = 0$                                                                   | –     | –     | –50   | nA            |
| $h_{FE1}$     | DC Current Gain                      | $V_{CE} = -6\text{ V}$ , $I_C = -0.1\text{ mA}$                                                      | 150   | 500   | –     |               |
| $h_{FE2}$     |                                      | $V_{CE} = -6\text{ V}$ , $I_C = -1\text{ mA}$                                                        | 300   | 450   | 600   |               |
| $V_{BE(on)}$  | Base-Emitter On Voltage              | $V_{CE} = -6\text{ V}$ , $I_C = -1\text{ mA}$                                                        | –0.55 | –0.61 | –0.65 | V             |
| $V_{CE(sat)}$ | Collector-Emitter Saturation Voltage | $I_C = -10\text{ mA}$ , $I_B = -1\text{ mA}$                                                         | –     | –0.09 | –0.30 | V             |
| $f_T$         | Current Gain Bandwidth Product       | $V_{CE} = -6\text{ V}$ , $I_C = -1\text{ mA}$                                                        | 50    | 100   | –     | MHz           |
| $C_{ob}$      | Output Capacitance                   | $V_{CB} = -30\text{ V}$ , $I_E = 0$ , $f = 1\text{ MHz}$                                             | –     | 2     | 3     | pF            |
| NF            | Noise Figure                         | $V_{CE} = -5\text{ V}$ , $I_C = -1.0\text{ mA}$ ,<br>$R_S = 100\text{ k}\Omega$ , $f = 1\text{ kHz}$ | –     | 7     | –     | dB            |

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.

## $h_{FE}$ CLASSIFICATION

| Classification | F       | FA      | FB      |
|----------------|---------|---------|---------|
| $h_{FE2}$      | 300~600 | 300~470 | 430~600 |

## TYPICAL PERFORMANCE CHARACTERISTICS

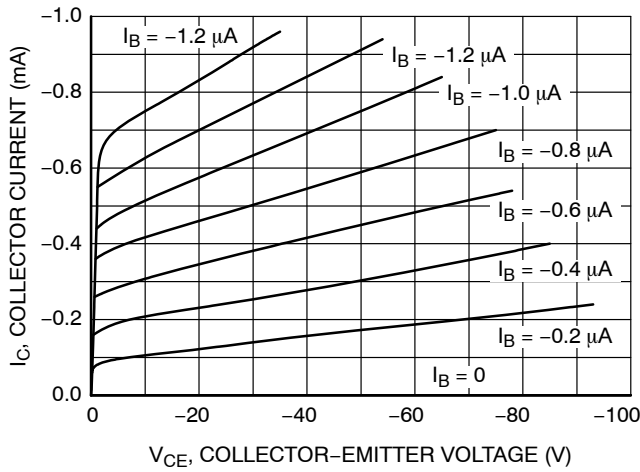


Figure 1. Static Characteristic

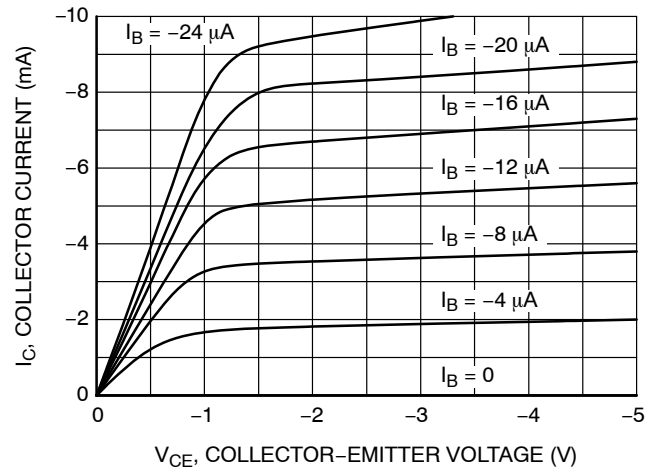


Figure 2. Static Characteristic

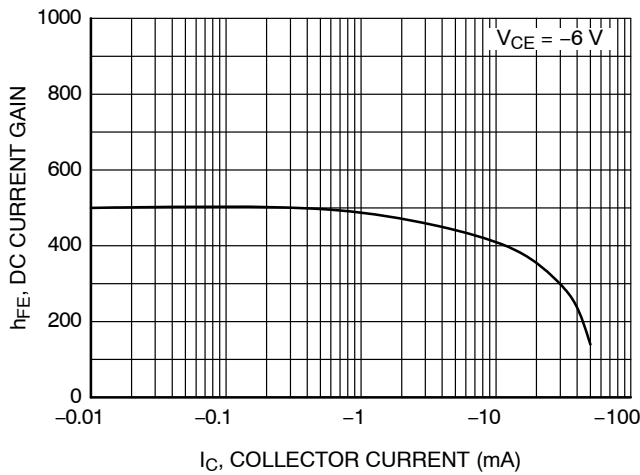


Figure 3. DC Current Gain

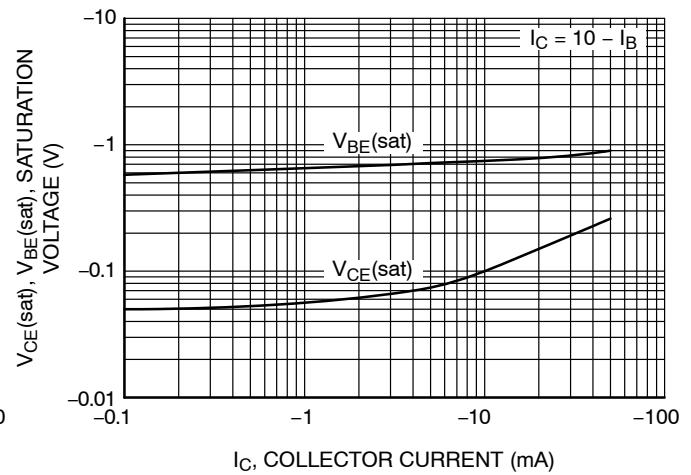


Figure 4. Base-Emitter Saturation Voltage and Collector-Emitter Saturation Voltage

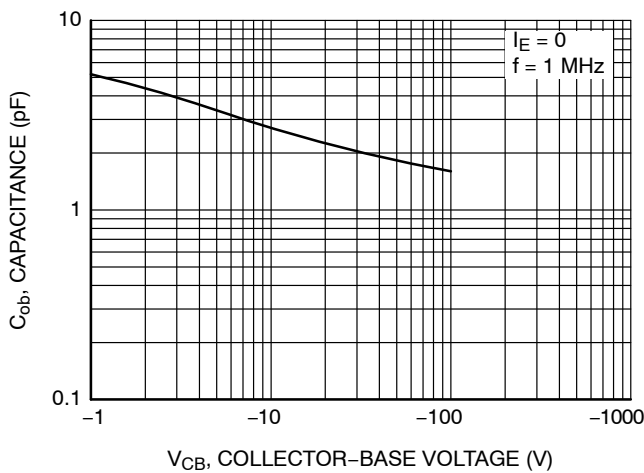


Figure 5. Collector Output Capacitance

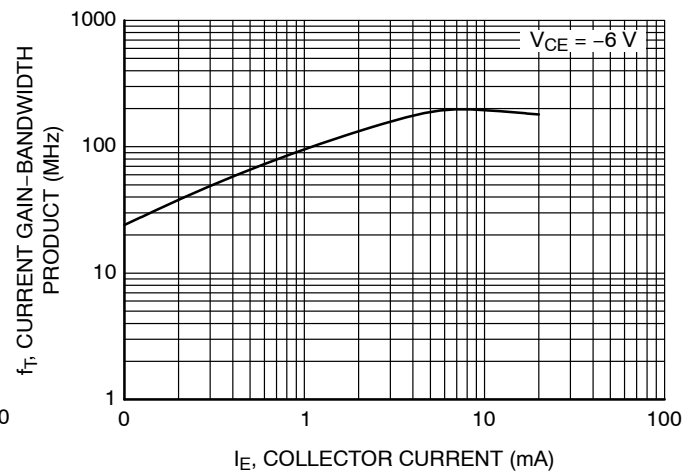
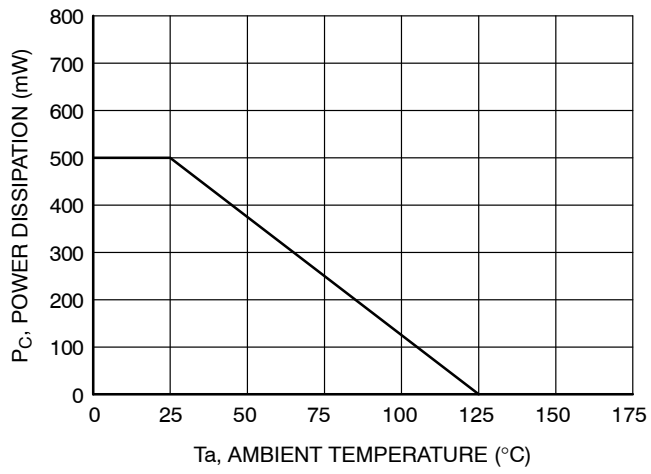


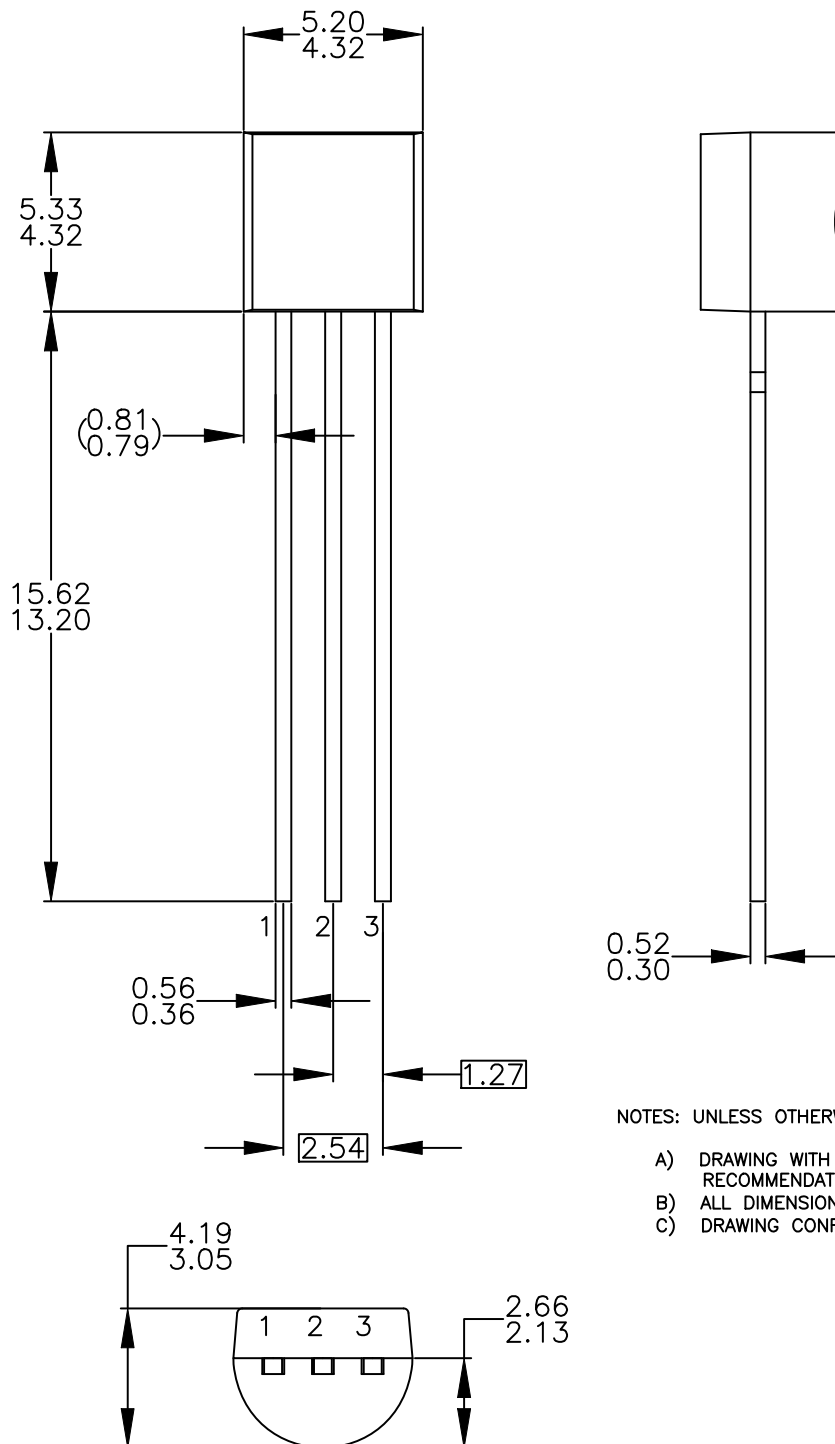
Figure 6. Current Gain Bandwidth Product

## TYPICAL PERFORMANCE CHARACTERISTICS (Continued)

**Figure 7. Power Derating**

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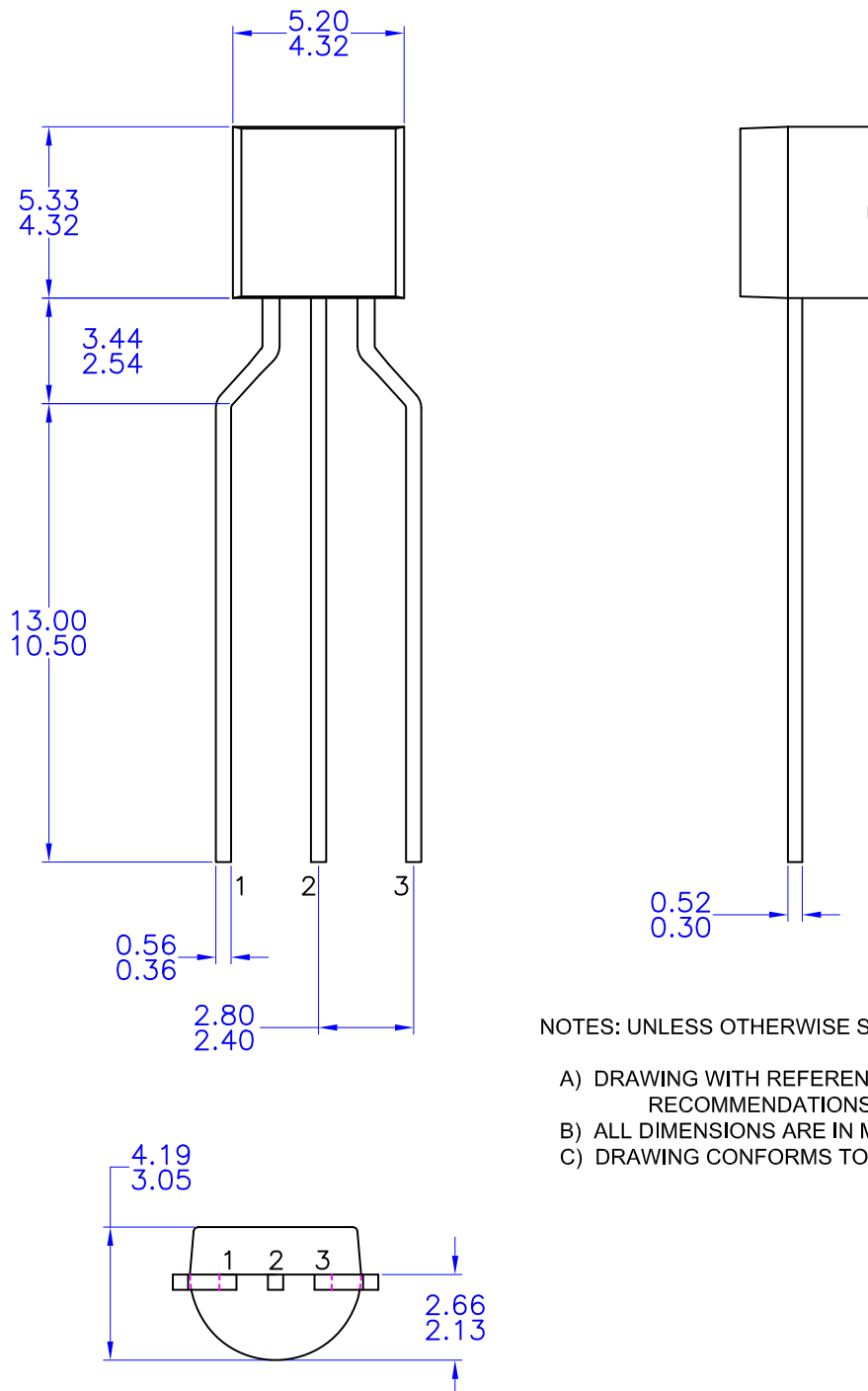
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