

# PNP Epitaxial Silicon Transistor

## KSA1013

### Features

- Color TV Audio Output
- Color TV Vertical Deflection Output

### ABSOLUTE MAXIMUM RATINGS

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

| Symbol    | Parameter                 | Ratings     | Unit             |
|-----------|---------------------------|-------------|------------------|
| $V_{CBO}$ | Collector-Base Voltage    | -160        | V                |
| $V_{CEO}$ | Collector-Emitter Voltage | -160        | V                |
| $V_{EBO}$ | Emitter-Base Voltage      | -6          | V                |
| $I_C$     | Collector Current         | -1          | A                |
| $I_B$     | Base Current              | -0.5        | A                |
| $T_J$     | 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)

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

| Symbol          | Parameter                               | Value | Unit                      |
|-----------------|-----------------------------------------|-------|---------------------------|
| $P_D$           | Power Dissipation                       | 900   | mW                        |
|                 | Derate Above $T_A = 25^\circ\text{C}$   | 7.2   | mW/ $^\circ\text{C}$      |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 139   | $^\circ\text{C}/\text{W}$ |

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

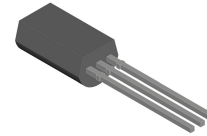
### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ unless otherwise noted.)

| Symbol               | Parameter                            | Conditions                                               | Min   | Typ | Max   | Unit          |
|----------------------|--------------------------------------|----------------------------------------------------------|-------|-----|-------|---------------|
| $I_{CBO}$            | Collector Cut-off Current            | $V_{CB} = -150\text{ V}$ , $I_E = 0$                     | -     | -   | -1    | $\mu\text{A}$ |
| $I_{EBO}$            | Emitter Cut-off Current              | $V_{BE} = -6\text{ V}$ , $I_C = 0$                       | -     | -   | -1    | $\mu\text{A}$ |
| $BV_{CEO}$           | Collector-Emitter Breakdown Voltage  | $I_C = -10\text{ mA}$ , $I_B = 0$                        | -160  | -   | -     | V             |
| $h_{FE}$             | DC Current Gain                      | $V_{CE} = -5\text{ V}$ , $I_C = -200\text{ mA}$          | 60    | -   | 320   |               |
| $V_{CE}(\text{sat})$ | Collector-Emitter Saturation Voltage | $I_C = -500\text{ mA}$ , $I_B = -50\text{ mA}$           | -     | -   | -1.5  | V             |
| $V_{BE}(\text{on})$  | Base-Emitter On Voltage              | $V_{CE} = -5\text{ V}$ , $I_C = -5\text{ mA}$            | -0.45 | -   | -0.75 | V             |
| $f_T$                | Current Gain Bandwidth Product       | $V_{CE} = -5\text{ V}$ , $I_C = -200\text{ mA}$          | 15    | 50  | -     | MHz           |
| $C_{ob}$             | Output Capacitance                   | $V_{CB} = -10\text{ V}$ , $I_E = 0$ , $f = 1\text{ MHz}$ | -     | -   | 35    | pF            |

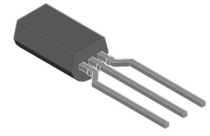
Product parametric performance is indicated in the Electrical Characteristics for the listed test conditions, unless otherwise noted. Product performance may not be indicated by the Electrical Characteristics if operated under different conditions.

### $h_{FE}$ Classification

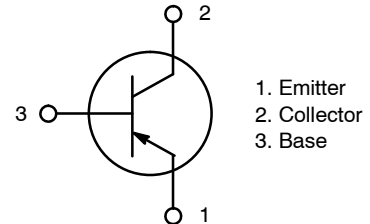
| Classification | R        | O         | Y         |
|----------------|----------|-----------|-----------|
| $h_{FE}$       | 60 ~ 120 | 100 ~ 200 | 160 ~ 320 |



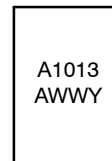
TO-92 3  
CASE 135AP



TO-92 3 LF  
CASE 135AM



### MARKING DIAGRAM



A1013 = Specific Device Code  
A = Assembly Site  
WW = Work Week  
Y = Year of Production

### ORDERING INFORMATION

| Device     | Package              | Shipping          |
|------------|----------------------|-------------------|
| KSA1013YBU | TO-92 3 (Pb-Free)    | 6000 Units / Bulk |
| KSA1013YTA | TO-92 3 LF (Pb-Free) | 2000 Units / Ammo |

## TYPICAL PERFORMANCE CHARACTERISTICS

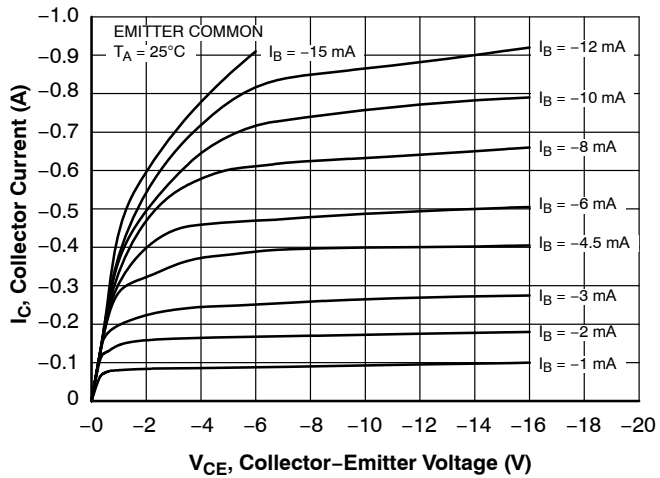


Figure 1. Static Characteristic

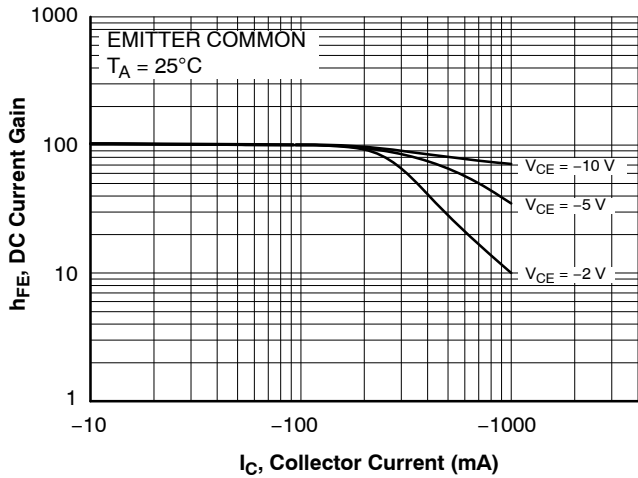


Figure 2. DC Current Gain

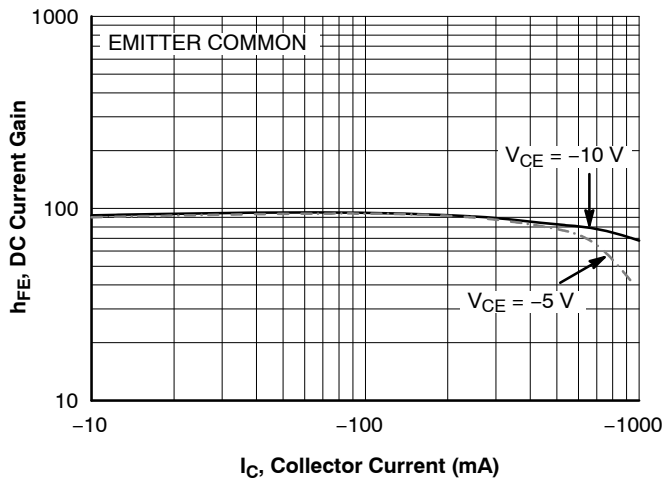


Figure 3. DC Current Gain

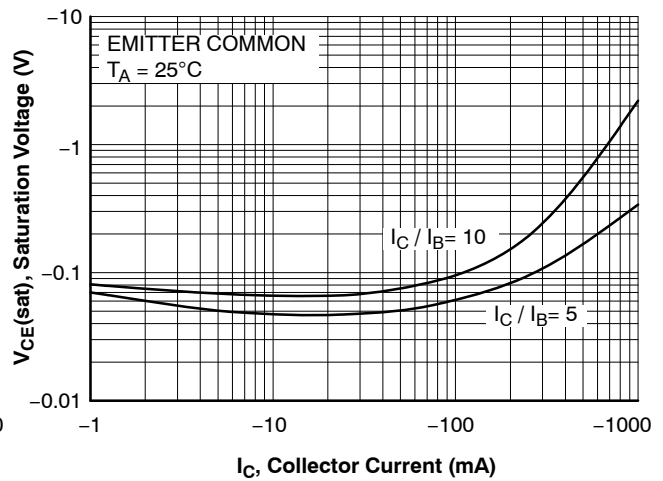


Figure 4. Collector-Emitter Saturation Voltage

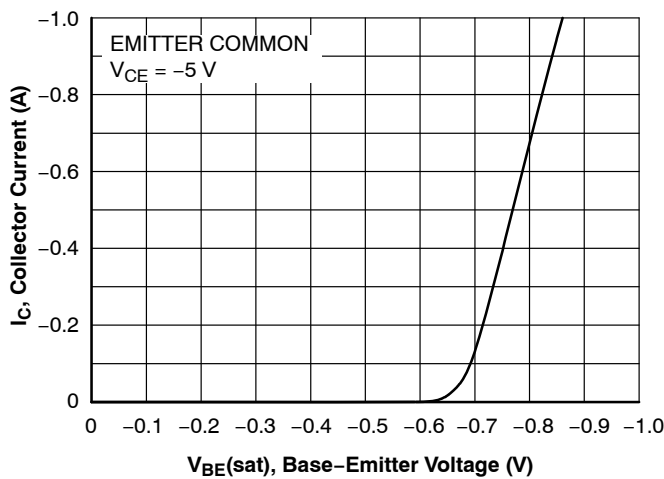


Figure 5. Base-Emitter On Voltage

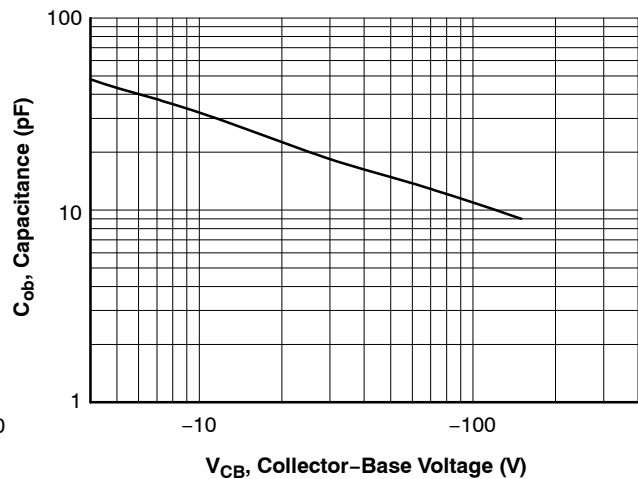


Figure 6. Collector Output Capacitance

## TYPICAL PERFORMANCE CHARACTERISTICS (CONTINUED)

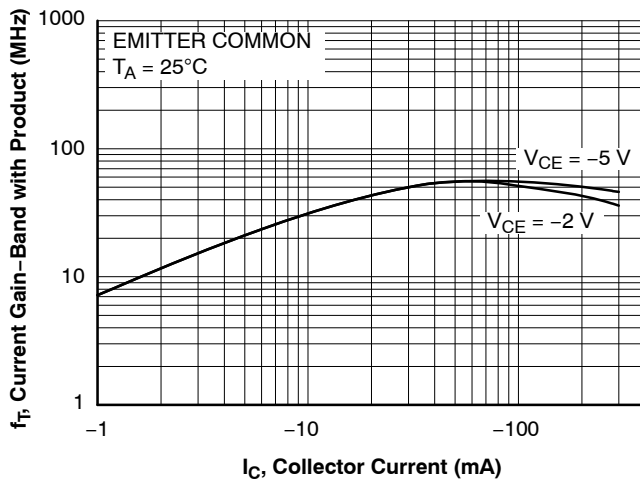


Figure 7. Current Gain Bandwidth Product

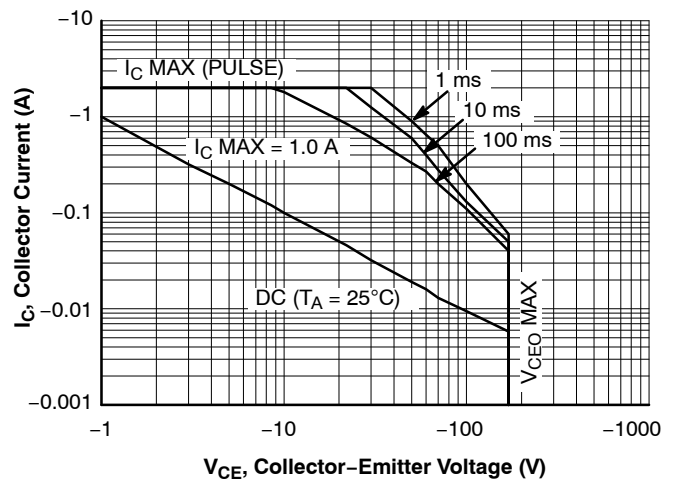
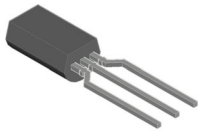
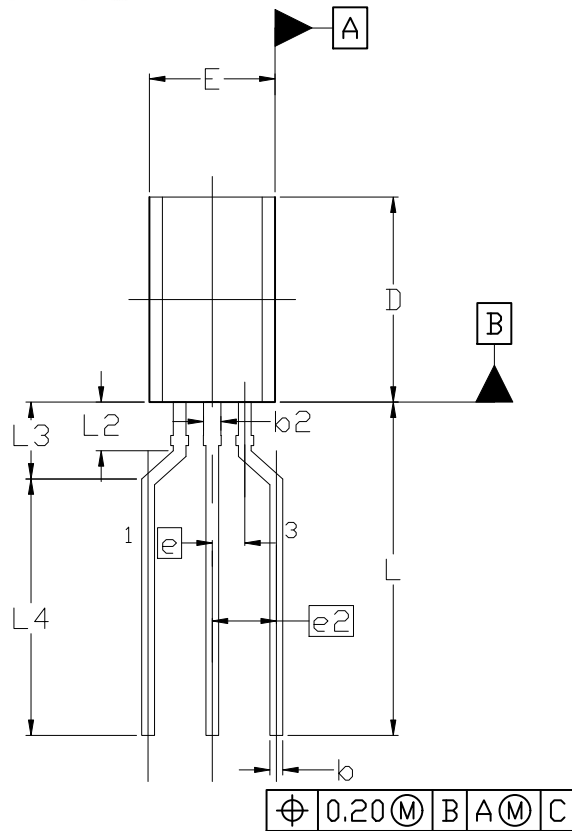


Figure 8. Safe Operating Area

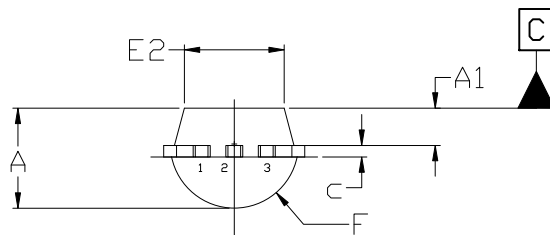


**TO-92 3 8.0x4.9 (LEADFORMED)**  
CASE 135AM  
ISSUE B

DATE 14 JAN 2021



TOP VIEW



END VIEW

**NOTES:**

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, GATE REMAINS AND TIE BAR PROTRUSIONS.
4. DIMENSION b AND b2 DOES NOT INCLUDE DAMBAR PROTRUSION. DIMENSION b2 LOCATED ABOVE THE DAMBAR PORTION OF MIDDLE LEAD.

| DIM | MILLIMETERS |      |      |
|-----|-------------|------|------|
|     | MIN.        | NOM. | MAX. |
| A   | 3.70        | 3.90 | 4.10 |
| A1  | 1.25        | 1.45 | 1.65 |
| b   | 0.35        | 0.50 | 0.60 |
| b2  | 0.62        | ---  | 0.78 |
| c   | 0.35        | 0.45 | 0.55 |
| D   | 7.80        | 8.00 | 8.20 |
| E   | 4.70        | 4.90 | 5.10 |
| E2  | 3.70        | 3.90 | 4.10 |
| e   | 1.27 BSC    |      |      |
| e2  | 2.50 BSC    |      |      |
| F   | 2.45 REF    |      |      |
| L   | 13.00 REF   |      |      |
| L2  | 1.50        | ---  | 1.90 |
| L3  | 2.60        | ---  | 3.40 |
| L4  | 10.40 REF   |      |      |

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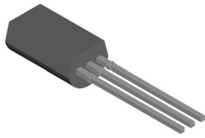
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# MECHANICAL CASE OUTLINE

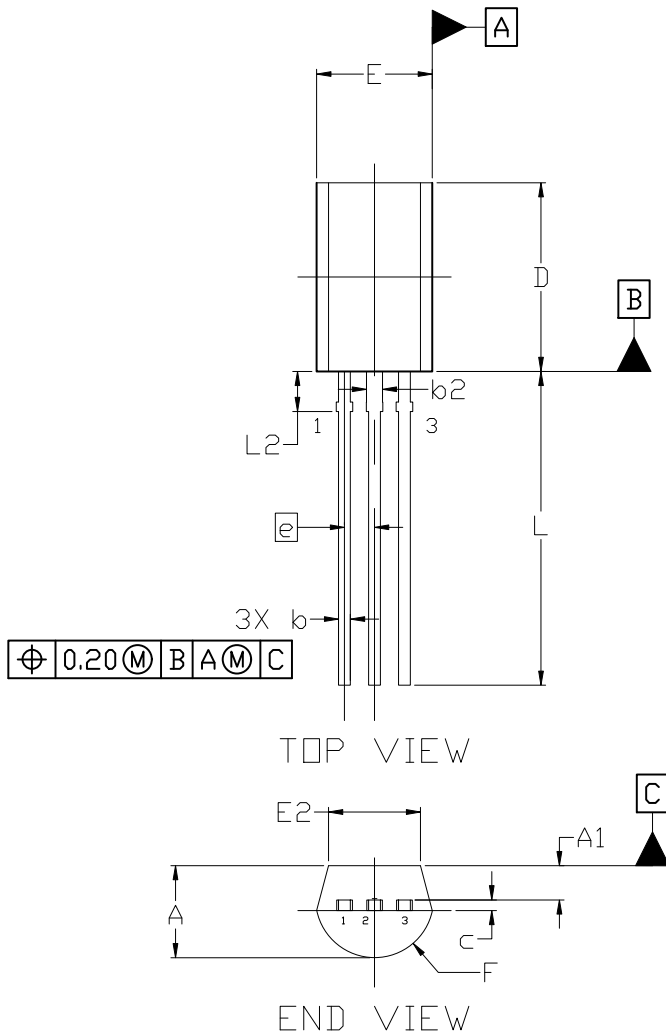
## PACKAGE DIMENSIONS

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**TO-92 3 8.0x4.9**  
CASE 135AP  
ISSUE A

DATE 13 JAN 2021



### NOTES:

1. DIMENSIONING AND TOLERANCING PER ASME Y14.5M, 2009.
2. CONTROLLING DIMENSION: MILLIMETERS
3. DIMENSIONS ARE EXCLUSIVE OF BURRS, MOLD FLASH, GATE REMAINS AND TIE BAR PROTRUSIONS.
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| DIM | MILLIMETERS |      |       |
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| A   | 3.70        | 3.90 | 4.10  |
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| b2  | 0.62        | ---  | 0.78  |
| c   | 0.35        | 0.45 | 0.55  |
| D   | 7.80        | 8.00 | 8.20  |
| E   | 4.70        | 4.90 | 5.10  |
| E2  | 3.70        | 3.90 | 4.10  |
| e   | 1.27 BSC    |      |       |
| F   | 2.45 REF    |      |       |
| L   | 13.30       | ---  | 14.20 |
| L2  | 1.70 REF    |      |       |

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