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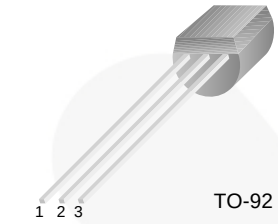
November 2014

# KSP2222A
# NPN General-Purpose Amplifier

## Features

- Collector-Emitter Voltage: $V_{CEO}$ = 40 V
- Available as PN2222A




TO-92

1. Emitter 2. Base 3. Collector

## Ordering Information

| Part Number | Marking | Package | Packing Method |
|---|---|---|---|
| KSP2222ABU | KSP2222A | TO-92 3L | Bulk |
| KSP2222ATA | KSP2222A | TO-92 3L | Ammo |
| KSP2222ATF | KSP2222A | TO-92 3L | 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 $T_A$ = 25°C unless otherwise noted.

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $V_{CBO}$ | Collector-Base Voltage | 75 | V |
| $V_{CEO}$ | Collector-Emitter Voltage | 40 | V |
| $V_{EBO}$ | Emitter-Base Voltage | 6.0 | V |
| $I_C$ | Collector Current | 600 | mA |
| $T_J$ | Junction Temperature | 150 | °C |
| $T_{STG}$ | Storage Temperature | -55 to +150 | °C |

## Thermal Characteristics[1]

Values are at $T_A$ = 25°C unless otherwise noted.

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $P_D$ | Power Dissipation by $R_{\theta JA}$ | 625 | mW |
| | Derate Above 25°C | 5 | mW/°C |
| $R_{\theta JC}$ | Thermal Resistance, Junction-to-Case | 83.3 | °C/W |
| $R_{\theta JA}$ | Thermal Resistance, Junction-to-Ambient | 200 | °C/W |

**Note:**

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.

## Electrical Characteristics

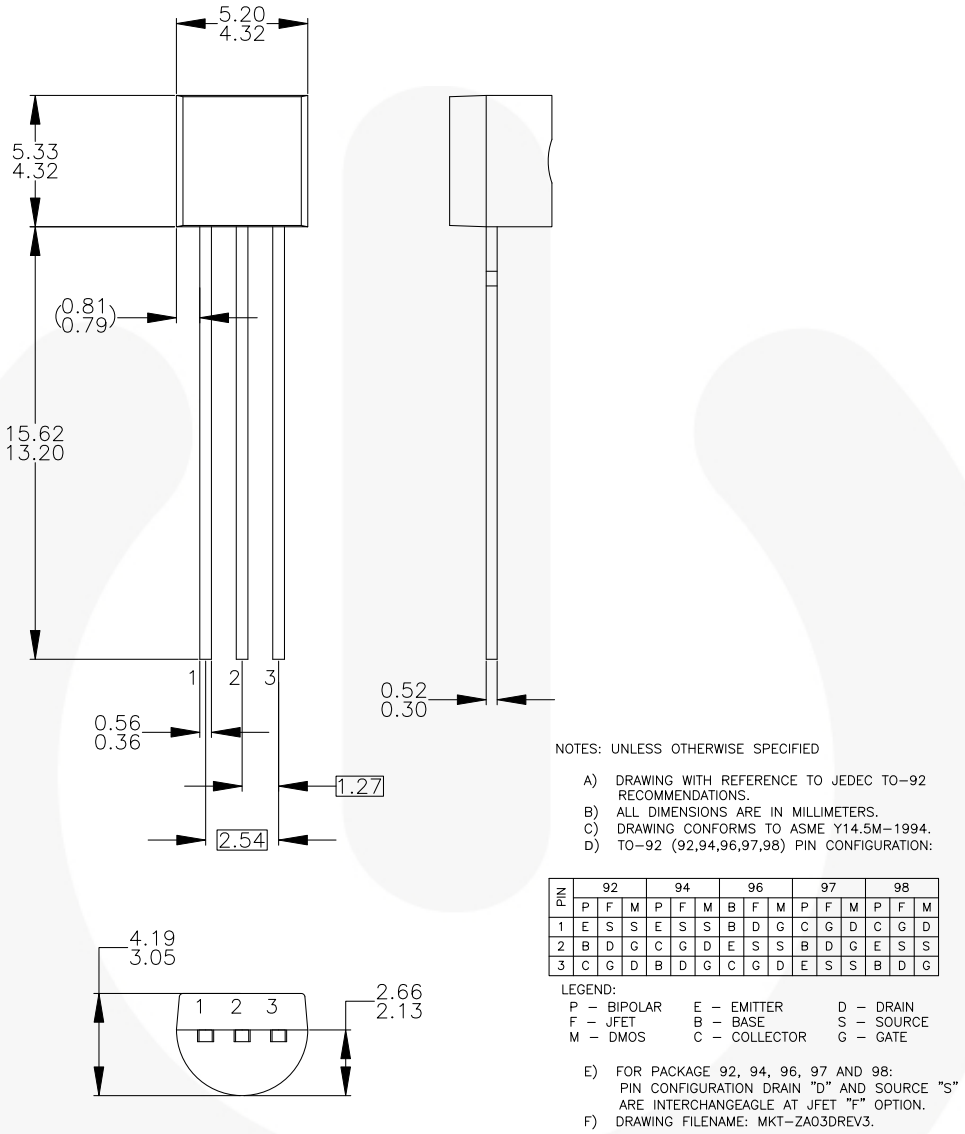
Values are at $T_A$ = 25°C unless otherwise noted.

| Symbol | Parameter | Conditions | Min. | Max. | Unit |
|---|---|---|---|---|---|
| $BV_{CBO}$ | Collector-Base Breakdown Voltage | $I_C$ = 10 μA, $I_E$ = 0 | 75 | | V |
| $BV_{CEO}$ | Collector-Emitter Breakdown Voltage | $I_C$ = 10 mA, $I_B$ = 0 | 40 | | V |
| $BV_{EBO}$ | Emitter-Base Breakdown Voltage | $I_E$ = 10 μA, $I_C$ = 0 | 6.0 | | V |
| $I_{CBO}$ | Collector Cut-Off Current | $V_{CB}$ = 60 V, $I_E$ = 0 | | 0.01 | μA |
| $I_{EBO}$ | Emitter Cut-Off Current | $V_{EB}$ = 3.0 V, $I_C$ = 0 | | 10 | nA |
| $h_{FE}$ | DC Current Gain | $V_{CE}$ = 10 V, $I_C$ = 0.1 mA | 35 | | |
| | | $V_{CE}$ = 10 V, $I_C$ = 1 mA | 50 | | |
| | | $V_{CE}$ = 10 V, $I_C$ = 10 mA | 75 | | |
| | | $V_{CE}$ = 10 V, $I_C$ = 150 mA[2] | 100 | 300 | |
| | | $V_{CE}$ = 10 V, $I_C$ = 500 mA[2] | 40 | | |
| $V_{CE}$(sat) | Collector-Emitter Saturation Voltage[2] | $I_C$ = 150 mA, $I_B$ = 15 mA | | 0.3 | V |
| | | $I_C$ = 500 mA, $I_B$ = 50 mA | | 1.0 | |
| $V_{BE}$(sat) | Base-Emitter Saturation Voltage[2] | $I_C$ = 150 mA, $I_B$ = 15 mA | 0.6 | 1.2 | V |
| | | $I_C$ = 500 mA, $I_B$ = 50 mA | | 2.0 | |
| $f_T$ | Current Gain Bandwidth Product | $I_C$ = 20 mA, $V_{CE}$ = 20 V, f = 100 MHz | 300 | | MHz |
| $C_{ob}$ | Output Capacitance | $V_{CB}$ = 10 V, $I_E$ = 0, f = 1.0 MHz | | 8 | pF |
| $t_{ON}$ | Turn-On Time | $V_{CC}$ = 30 V, $I_C$ = 150 mA, $I_{B1}$ = 15 mA, $V_{BE(off)}$ = 0.5 V | | 35 | ns |
| $t_{OFF}$ | Turn-Off Time | $V_{CC}$ = 30 V, $I_C$ = 150 mA, $I_{B1}$ = $I_{B2}$ = 15 mA | | 285 | ns |
| NF | Noise Figure | $I_C$ = 100 μA, $V_{CE}$ = 10 V, $R_S$ = 1 kΩ, f = 1.0 kHz | | 4 | dB |

**Note:**

2. Pulse test: Pulse width ≤ 300 μs, duty cycle ≤ 2%

## Physical Dimensions




| PIN | 92 | | | 94 | | | 96 | | | 97 | | | 98 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | P | F | M | P | F | M | B | F | M | P | F | M | P | F | M |
| 1 | E | S | S | E | S | S | B | D | G | C | G | D | C | G | D |
| 2 | B | D | G | C | G | D | E | S | S | B | D | G | E | S | S |
| 3 | C | G | D | B | D | G | C | G | D | E | S | S | B | D | G |

**Figure 1. 3-Lead, TO-92, JEDEC TO-92 Compliant Straight Lead Configuration, Bulk Type**

## Physical Dimensions (Continued)

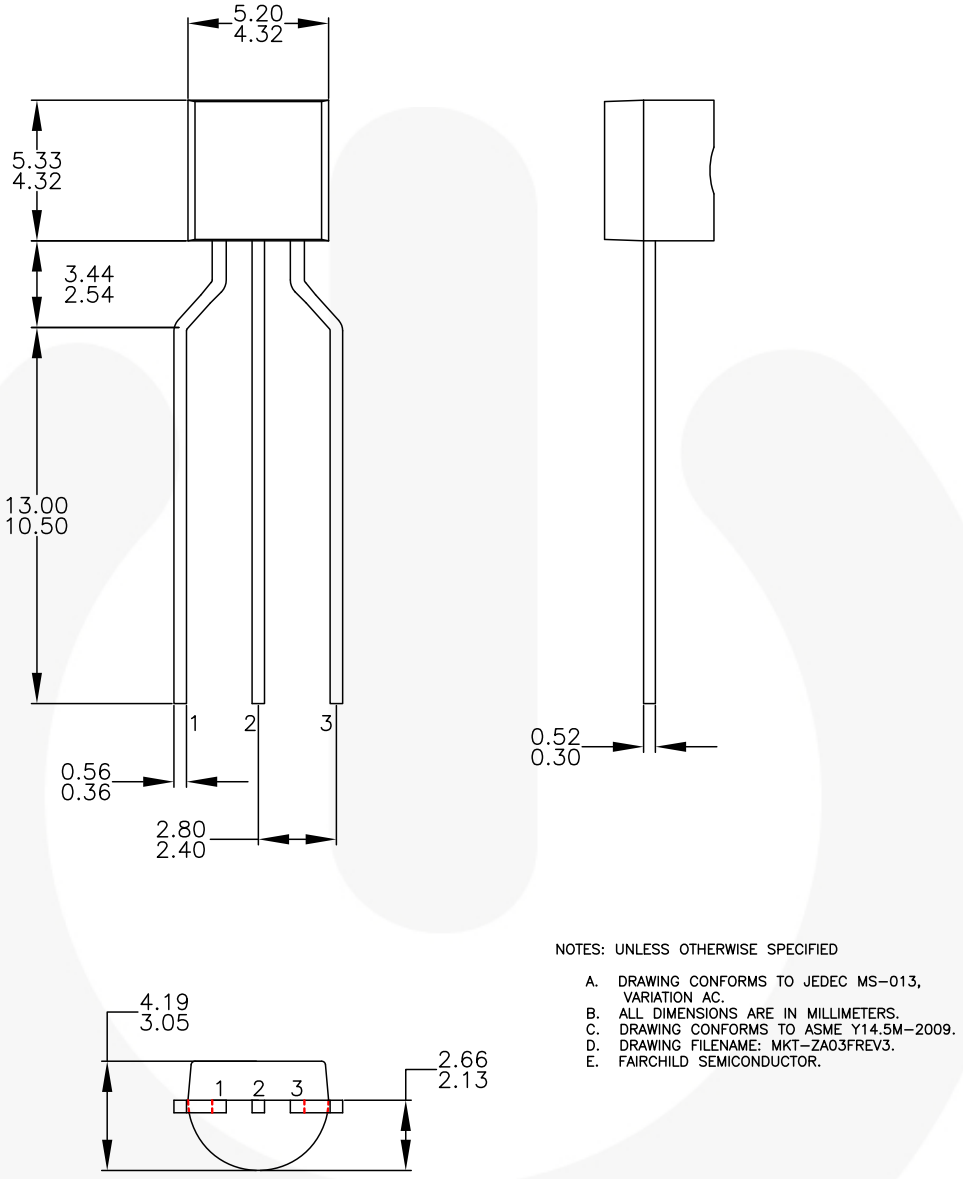



**Figure 2. 3-Lead, TO-92, Molded, 0.2 In Line Spacing Lead Form, Ammo, Tape and Reel Type**

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