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## 2N5232A

### Silicon NPN Transistor

### Low Noise, High Gain Amplifier

### TO-92 Type Package

**Description:**

The 2N5232A is a silicon NPN transistor in a TO-92 type package designed especially for low noise preamplifier and small signal industrial amplifier applications. This device features low collector saturation voltage, tight beta control, and excellent low noise characteristics.

**Absolute Maximum Ratings:** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

|  |                                     |
|--|-------------------------------------|
| Collector-Emitter Voltage, $V_{CEO}$ .....                                   | 50V                                 |
| Collector-Base Voltage, $V_{CBO}$ .....                                      | 70V                                 |
| Emitter-Base Voltage, $V_{EBO}$ .....  | 5V                                  |
| Collector Current, $I_C$ .....   | 100mA                               |
| Power Dissipation ( $T_A = +25^\circ\text{C}$ ), $P_T$ .....                 | 360mW                               |
| Derate Above $+25^\circ\text{C}$ .....                                       | 3.6mW/ $^\circ\text{C}$             |
| Operating Junction Temperature, $T_J$ .....                                  | $+125^\circ\text{C}$                |
| Storage Temperature Range, $T_{stg}$ .....                                   | $-55^\circ$ to $+150^\circ\text{C}$ |
| Lead Temperature (During Soldering, 1/16" from case, 10sec max), $T_L$ ..... | $+260^\circ\text{C}$                |

**Electrical Characteristics:** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

| Parameter                     | Symbol    | Test Conditions  | Min | Typ | Max | Unit          |
|-------------------------------|-----------|--|-----|-----|-----|---------------|
| <b>Static Characteristics</b> |           |  |     |     |     |               |
| Collector Cutoff Current      | $I_{CBO}$ | $V_{CB} = 50\text{V}, I_E = 0$                           | -   | -   | 30  | nA            |
|                               |           | $V_{CB} = 50\text{V}, I_E = 0, T_A = +100^\circ\text{C}$ | -   | -   | 10  | $\mu\text{A}$ |
| Collector Cutoff Current      | $I_{CES}$ | $V_{CB} = 50\text{V}, V_{BE} = 0$                        | -   | -   | 30  | nA            |
| Emitter Cutoff Current        | $I_{EBO}$ | $V_{EB} = 5\text{V}, I_C = 0$                            | -   | -   | 50  | nA            |

**Electrical Characteristics (Cont'd):** ( $T_A = +25^\circ\text{C}$  unless otherwise specified)

| Parameter                                 | Symbol        | Test Conditions   | Min | Typ | Max   | Unit |
|---|---------------|---|-----|-----|-------|------|
| <b>Static Characteristics (Cont'd)</b>    |               |   |     |     |       |      |
| DC Current Gain                           | $h_{FE}$      | $V_{CE} = 5\text{V}, I_C = 0.1\text{mA}$ , Note 2   | -   | 170 | -     |      |
|   |               | $V_{CE} = 5\text{V}, I_C = 2\text{mA}$  | 250 | -   | 500   |      |
| Breakdown Voltage<br>Collector-to-Emitter | $V_{(BR)CEO}$ | $I_C = 10\text{mA}, I_B = 0$  | 50  | -   | -     | V    |
| Breakdown Voltage<br>Collector-to-Base    | $V_{(BR)CBO}$ | $I_C = 10\mu\text{A}, I_E = 0$  | 70  | -   | -     | V    |
| Breakdown Voltage<br>Emitter-to-Base      | $V_{(BR)EBO}$ | $I_E = 10\mu\text{A}, I_C = 0$  | 5   | -   | -     | V    |
| Collector Saturation Voltage              | $V_{CE(sat)}$ | $I_C = 10\text{mA}, I_B = 1\text{mA}$ , Note 3  | -   | -   | 0.125 | V    |
| Base Saturation Voltage                   | $V_{BE(sat)}$ | $I_C = 10\text{mA}, I_B = 1\text{mA}$ , Note 3  | -   | -   | 0.78  | V    |
| Base Emitter ON Voltage                   | $V_{BE(on)}$  | $V_{CE} = 10\text{V}, I_C = 2\text{mA}$   | 0.5 | -   | 0.9   | V    |
| <b>Dynamic Characteristics</b>            |               |   |     |     |       |      |
| Forward Current Transfer Ratio            | $h_{fe}$      | $V_{CE} = 5\text{V}, I_C = 2\text{mA}, f = 1\text{kHz}$   | 250 | -   | 750   |      |
| Output Capacitance                        | $C_{ob}$      | $V_{CB} = 10\text{V}, I_E = 0, f = 1\text{MHz}$   | -   | -   | 4     | pF   |
| Noise Figure                              | NF            | $I_C = 100\mu\text{A}, V_{CE} = 5\text{V},$<br>$R_s = 5\text{k}\Omega, f = 1\text{kHz},$<br>$BW = 15.7\text{kHz}$ | -   | -   | 5     | dB   |

Note 2. Typically, a minimum of 95% of the distribution is above this value.

Note 3. Pulse Test: Pulse Width  $\leq 300\mu\text{s}$ , Duty Cycle  $\leq 2\%$

