

2N2222A

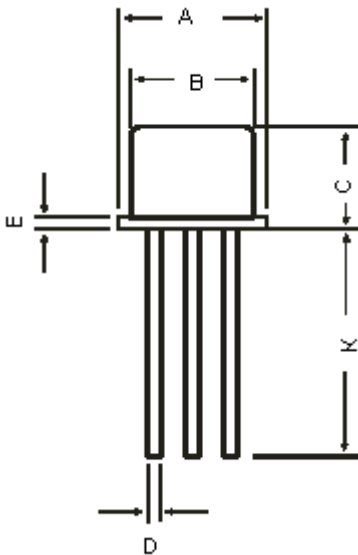
High Speed Switching Transistor



Features:

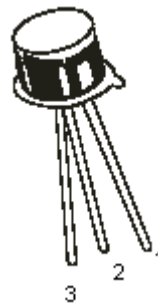
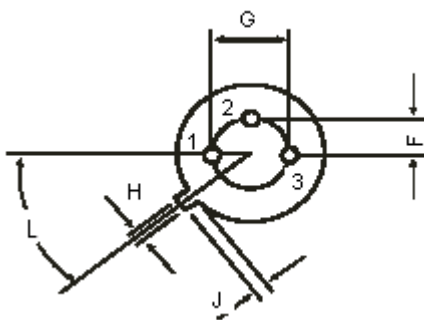
- NPN Silicon Planar Switching Transistor.
- Fast switching devices exhibiting short turn-off and low saturation voltage characteristics.
- Switching and Linear application DC and VHF Amplifier applications.

TO-18 Metal Can Package



| Dimensions | Minimum | Maximum |
|------------|---------|---------|
| A | 5.24 | 5.84 |
| B | 4.52 | 4.97 |
| C | 4.31 | 5.33 |
| D | 0.4 | 0.53 |
| E | — | 0.76 |
| F | — | 1.27 |
| G | — | 2.97 |
| H | 0.91 | 1.17 |
| J | 0.71 | 1.21 |
| K | 12.7 | — |
| L | 45° | |

Dimensions : Millimetres



Pin Configuration:

1. Emitter
2. Base
3. Collector



Absolute Maximum Ratings

| Parameter | Symbol | Rating | Unit |
|--|----------------|-------------|----------------------------|
| Collector-Emitter Voltage | V_{CEO} | 40 | V |
| Collector-Base Voltage | V_{CBO} | 75 | |
| Emitter-Base Voltage | V_{EBO} | 6.0 | |
| Collector Current Continuous | I_C | 800 | mA |
| Power Dissipation at $T_a = 25^\circ\text{C}$ Derate above 25°C | P_D | 500 2.28 | mW mW/ $^\circ\text{C}$ |
| Power Dissipation at $T_C = 25^\circ\text{C}$ Derate above 25°C | P_D | 1.2 6.85 | W mW/ $^\circ\text{C}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -65 to +200 | $^\circ\text{C}$ |

Electrical Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Condition | Value | | |
|--------------------------------------|----------------|--|---------|----------|---------------------|
| | | | Minimum | Maximum | Unit |
| Collector-Emitter Voltage | V_{CEO} | $I_C = 10\text{mA}, I_B = 0$ | 40 | - | V |
| Collector-Base Voltage | V_{CBO} | $I_C = 10\mu\text{A}, I_E = 0$ | 75 | - | |
| Emitter-Base Voltage | V_{EBO} | $I_E = 10\mu\text{A}, I_C = 0$ | 6.0 | - | |
| Collector-Cut off Current | I_{CBO} | $V_{CB} = 60\text{V}, I_E = 0$ | - | 10 | nA |
| | I_{CEX} | $T_a = 150^\circ\text{C}$ $V_{CB} = 60\text{V}, I_E = 0$ $V_{CE} = 60\text{V}, V_{EB} = 3\text{V}$ | - | 10 10 | μA nA |
| Emitter-Cut off Current | I_{EBO} | $V_{EB} = 3\text{V}, I_C = 0$ | - | 10 | nA |
| Base-Cut off Current | I_{BL} | $V_{CE} = 60\text{V}, V_{EB} = 3\text{V}$ | - | 20 | |
| Collector Emitter Saturation Voltage | $*V_{CE(Sat)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$ | - | 0.3 | V |
| | | $I_C = 500\text{mA}, I_B = 50\text{mA}$ | - | 1.0 | |
| Base Emitter Saturation Voltage | $*V_{BE(Sat)}$ | $I_C = 150\text{mA}, I_B = 15\text{mA}$ | - | 0.6-1.2 | |
| | | $I_C = 500\text{mA}, I_B = 50\text{mA}$ | - | 2.0 | |

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Electrical Characteristics ($T_a = 25^\circ\text{C}$ unless otherwise specified)

| Parameter | Symbol | Test Condition | Rating | Unit |
|---|--------------|---|----------------------|-------------------|
| DC Current Gain | h_{FE} | $I_C = 0.1\text{mA}, V_{CE} = 10\text{V}$ | >35 | - |
| | | $I_C = 1\text{mA}, V_{CE} = 10\text{V}$ | >50 | |
| | | $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ | >75 | |
| | | $T_a = 55^\circ\text{C}$ | | |
| | | $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ | >35 | |
| | | $I_C = 150\text{mA}, V_{CE} = 10\text{V}$ | 100-300 | |
| | | $I_C = 150\text{mA}, V_{CE} = 1\text{V}$ | >50 | |
| | | $I_C = 500\text{mA}, V_{CE} = 10\text{V}$ | >40 | |
| Dynamic Characteristics | | | | |
| | | ALL F = 1kHz | | |
| Small Signal Current Gain | h_{fe} | $I_C = 1\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ | 50 - 300 75 - 375 | - |
| Input Impedance | h_{ie} | $I_C = 1\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ | 2.0-8.0 0.25-1.25 | k Ω |
| Voltage Feedback Ratio | h_{re} | $I_C = 1\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ | <8.0 <4.0 | x10 ⁻⁴ |
| Output Admittance | h_{oe} | $I_C = 1\text{mA}, V_{CE} = 10\text{V}$ $I_C = 10\text{mA}, V_{CE} = 10\text{V}$ | 5.0-35 25-200 | umhos |
| Collector Base Time Constant | $r_b'C_c$ | $I_E = 20\text{mA}, V_{CB} = 20\text{V}$ $f = 31.8\text{MHz}$ | <150 | ps |
| Real Part Common-Emitter High Frequency | $Re_{(hie)}$ | $I_C = 20\text{mA}, V_{CE} = 20\text{V}$ | <60 | Ω |
| Input Impedance | - | $f = 300\text{MHz}$ | - | - |
| Noise Figure | N_F | $I_C = 100\mu\text{A}, V_{CE} = 10\text{V}$ $R_s = 1\text{kohms}, f = 1\text{kHz}$ | <4.0 | dB |
| Dynamic Characteristics | | | | |
| Transistors Frequency | f_t | $I_C = 20\text{mA}, V_{CE} = 20\text{V}$ $f = 100\text{MHz}$ | >300 | MHz |
| Output Capacitance | C_{ob} | $V_{CB} = 10\text{V}, I_E = 0$ $f = 100\text{kHz}$ | <8.0 | pF |
| Input Capacitance | C_{ib} | $V_{EB} = 0.5\text{V}, I_C = 0$ $f = 100\text{kHz}$ | <25 | |
| Switching Time | | | | |
| Delay Time | t_d | $I_C = 150\text{mA}, I_{B1} = 15\text{mA}$ | <10 | ns |
| Rise Time | t_r | $V_{CC} = 30\text{V}, V_{BE} = 0.5\text{V}$ | <25 | |
| Storage Time | t_s | $I_C = 150\text{mA}, I_{B1} =$ | <225 | |
| Fall Time | t_f | $I_{B2} = 15\text{mA}, V_{CC} = 30\text{V}$ | <60 | |

*Pulse Condition: Pulse Width = 300 μs , Duty Cycle = 2%



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Specifications

| V_{CEO} maximum (V) | I_C maximum (A) | $V_{CE(sat)}$ maximum (V) at $I_C = 150mA$ | t_{off} maximum (ns) at $I_C = 150mA$ | h_{FE} minimum at $I_C = 150mA$ | P_{tot} at 25°C (mW) | Package and Pin Out | Part Number |
|-----------------------------|-------------------------|---|--|---|------------------------------|---------------------------|-------------|
| 40 | 0.8 | 0.3 | 60 | 100 | 500 | TO-18 | 2N2222A |

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Notes:

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