



2N4401

NPN GENERAL PURPOSE SWITCHING TRANSISTOR

VOLTAGE 40 Volts **POWER** 625 mWatts

FEATURES

- NPN epitaxial silicon, planar design
- Collector-emitter voltage $V_{CE} = 40V$
- Collector current $I_C = 600mA$
- Complimentary (PNP) device:2N4403
- Pb free product are available :99% Sn above can meet RoHS environment substance directive request

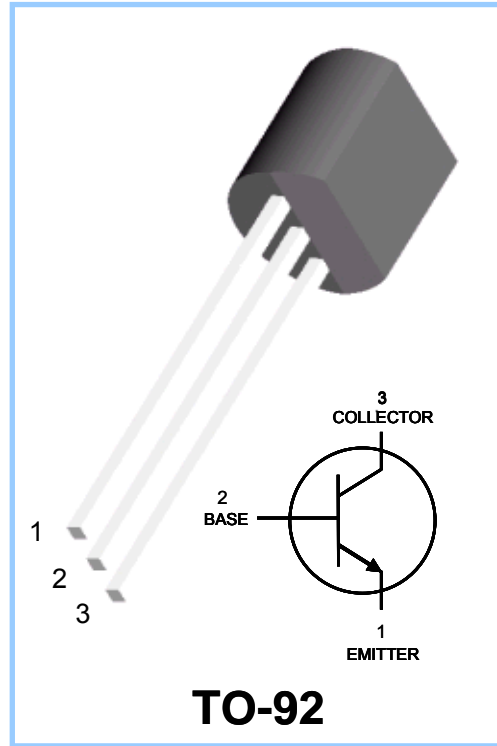
MECHANICAL DATA

Case: TO-92

Terminals: Solderable per MIL-STD-202, Method 208

Approx Weight : 0.02grams

Marking : 4401



ABSOLUTE MAXIMUM RATINGS

| PARAMETER | Symbol | Value | Units |
|--------------------------------|-----------|-------|-------|
| Collector - Emitter Voltage | V_{CEO} | 40 | V |
| Collector - Base Voltage | V_{CBO} | 60 | V |
| Emitter - Base Voltage | V_{EBO} | 6.0 | V |
| Collector Current - Continuous | I_C | 600 | mA |

THERMAL CHARACTERISTICS

| PARAMETER | Symbol | Value | Units |
|---|-----------------|------------|-------|
| Max Power Dissipation | P_{TOT} | 625 | mW |
| Storage Temperature | T_{STG} | -55 to 150 | °C |
| Junction Temperature | T_J | -55 to 150 | °C |
| Thermal Resistance, Junction to Ambient | $R_{\theta JA}$ | 200 | °C/W |



2N4401

ELECTRICAL CHARACTERISTICS ($T_J=25^{\circ}\text{C}$, unless otherwise noted)

| PARAMETER | Symbol | Test Condition | MIN. | TYP. | MAX. | Units |
|--|---------------|---|-----------|------|-------------|--------------|
| Collector - Emitter Breakdown Voltage | $V_{(BR)CEO}$ | $I_C=1.0\text{mA}$, $I_E=0$ | 40 | - | - | V |
| Collector - Base Breakdown Voltage | $V_{(BR)CBO}$ | $I_C=100\mu\text{A}$, $I_E=0$ | 60 | - | - | V |
| Emitter - Base Breakdown Voltage | $V_{(BR)EBO}$ | $I_E=100\mu\text{A}$, $I_C=0$ | 6.0 | - | - | V |
| Base Cutoff Current | I_{BEV} | $V_{CE}=35\text{V}$, $V_{EB}=0.4\text{V}$ | - | - | 100 | nA |
| Collector Cutoff Current | I_{CEX} | $V_{CE}=35\text{V}$, $V_{EB}=0.4\text{V}$ | - | - | 100 | nA |
| DC Current Gain | h_{FE} | $I_C=0.1\text{mA}$, $V_{CE}=1.0\text{V}$ | 20 | - | - | - |
| | | $I_C=1.0\text{mA}$, $V_{CE}=1.0\text{V}$ | 40 | - | - | |
| | | $I_C=10\text{mA}$, $V_{CE}=1.0\text{V}$ | 80 | - | - | |
| | | $I_C=150\text{mA}$, $V_{CE}=1.0\text{V}$ | 100 | - | 300 | |
| | | $I_C=500\text{mA}$, $V_{CE}=2.0\text{V}$ | 40 | - | - | |
| Collector - Emitter Saturation Voltage | $V_{CE(SAT)}$ | $I_C=150\text{mA}$, $I_B=15\text{mA}$ $I_C=500\text{mA}$, $I_B=50\text{mA}$ | - | - | 0.4 0.75 | V |
| Base - Emitter Saturation Voltage | $V_{BE(SAT)}$ | $I_C=150\text{mA}$, $I_B=15\text{mA}$ $I_C=500\text{mA}$, $I_B=50\text{mA}$ | 0.75 - | - | 0.95 1.2 | V |
| Current-Gain - Bandwidth Product | f_T | $I_C=200\text{mA}$, $V_{CE}=10\text{V}$ $f=100\text{MHz}$ | 250 | - | - | MHz |
| Collector-Base Capacitance | C_{CBO} | $V_{CB}=5.0\text{V}$, $I_E=0$, $f=1\text{MHz}$ | - | - | 6.5 | pF |
| Emitter - Base Capacitance | C_{EBO} | $V_{CB}=5.0\text{V}$, $I_E=0$, $f=1\text{MHz}$ | - | - | 30 | pF |
| Delay Time | t_d | $V_{CC}=30\text{V}$, $V_{BE}=2.0\text{V}$, $I_C=150\text{mA}$, $I_{B1}=15\text{mA}$ | - | - | 15 | ns |
| Rise Time | t_r | | - | - | 20 | ns |
| Storage Time | t_s | | - | - | 225 | ns |
| Fall Time | t_f | $V_{CC}=30\text{V}$, $I_C=150\text{mA}$ $I_{B1}=I_{B2}=15\text{mA}$ | - | - | 30 | ns |

SWITCHING TIME EQUIVALENT TEST CIRCUITS

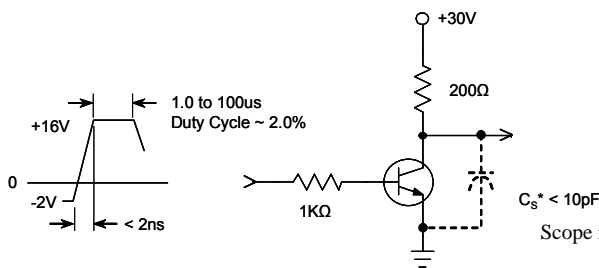


Fig. 1. Turn-On Time

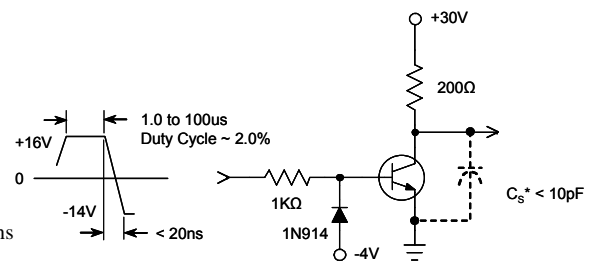


Fig. 2. Turn-Off Time

* Total shunt capacitance of test jig, connectors, and oscilloscope



ELECTRICAL CHARACTERISTICS CURVE

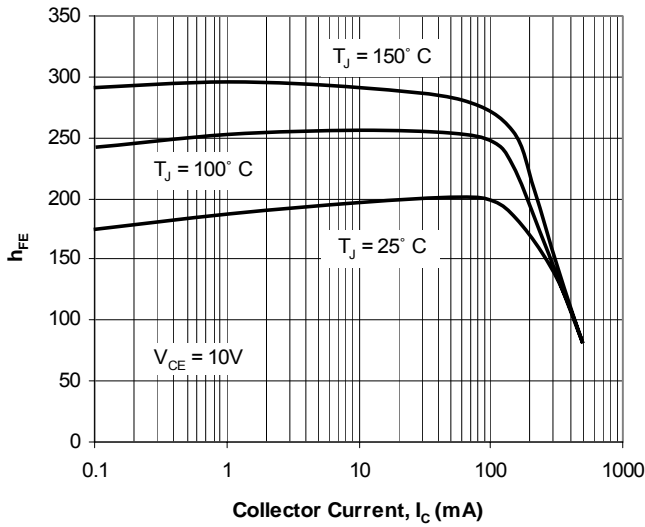


Fig. 3. Typical h_{FE} vs Collector Current

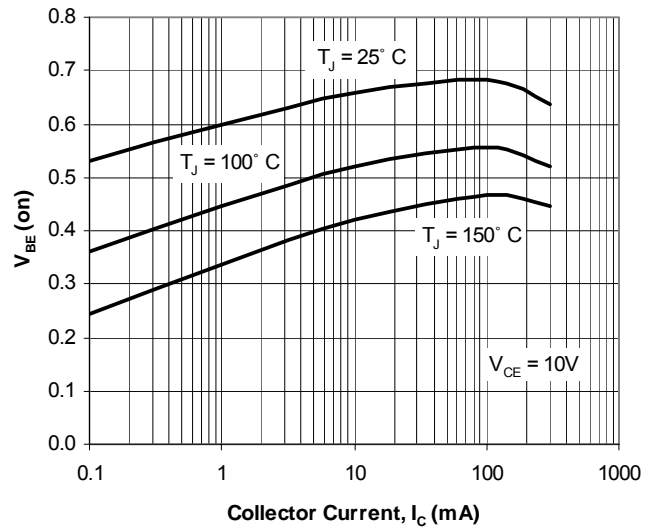


Fig. 4. Typical V_{BE} vs Collector Current

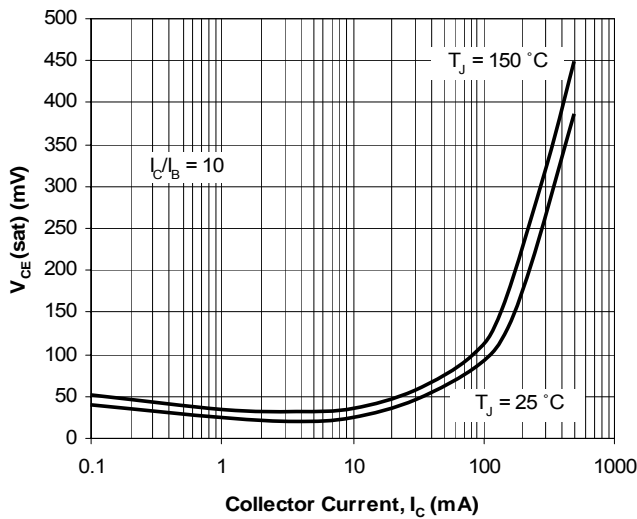


Fig. 5. Typical $V_{CE(sat)}$ vs Collector Current

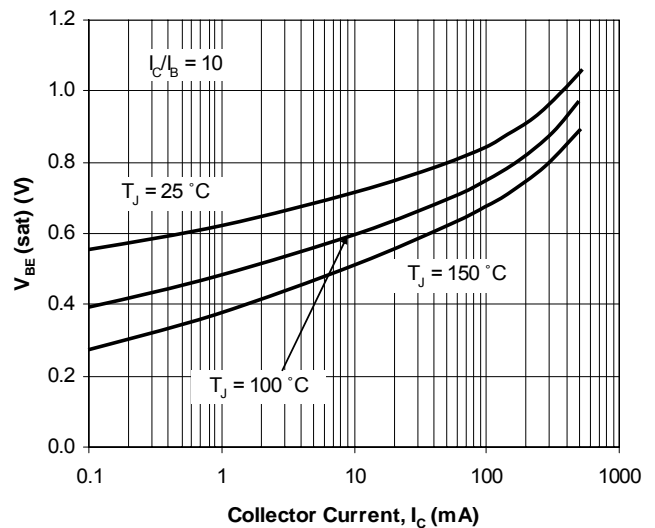


Fig. 6. Typical $V_{BE(sat)}$ vs Collector Current

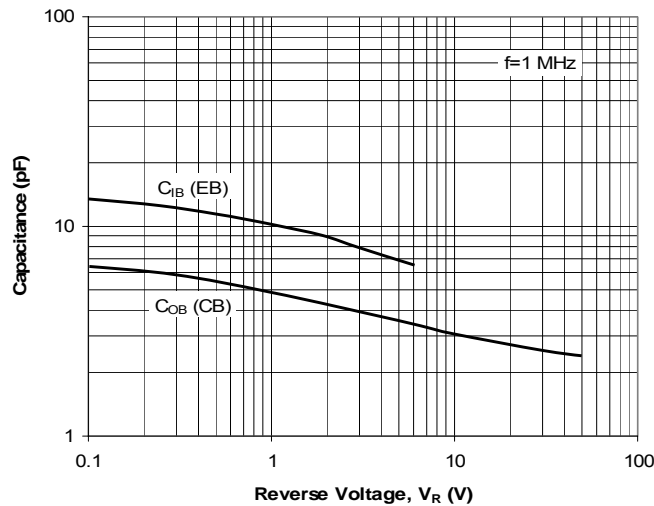


Fig. 7. Typical Capacitances vs Reverse Voltage

