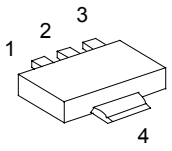
# UTC PZT2222A NPN EPITAXIAL SILICON TRANSISTOR

## NPN GENERAL PURPOSE AMPLIFIER

### FEATURES

*This device is for use as a medium power amplifier and switch requiring collector currents up to 500mA. Sourced from Process 19.




SOT-223

1:EMITTER 2,4:COLLECTOR 3:BASE

### ABSOLUTE MAXIMUM RATINGS (Ta=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | RATING | UNIT |
|---|---|---|---|
| Collector-base voltage | $V_{CBO}$ | 75 | V |
| Collector-emitter voltage | $V_{CEO}$ | 40 | V |
| Emitter-base voltage | $V_{EBO}$ | 6 | V |
| Collector current | Ic | 1 | A |
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature | $T_{STG}$ | -55 ~ +150 | °C |

Note: These are steady state limits. The factory should be consulted on applications involving pulsed or low duty cycle operations.

### ELECTRICAL CHARACTERISTICS (Ta=25°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **OFF CHARACTERISTICS** | | | | | | |
| Collector-base breakdown voltage | $V_{(BR)CBO}$ | $I_C$=10μA, $I_E$=0 | 75 | | | V |
| Collector-emitter breakdown voltage | $V_{(BR)CEO}$ | $I_C$=10mA, $I_B$=0 | 40 | | | V |
| Emitter-base breakdown voltage | $V_{(BR)EBO}$ | $I_E$=10μA, $I_C$=0 | 6 | | | V |
| Collector cutoff current | $I_{CEX}$ | $V_{CE}$=60V,$V_{EB(OFF)}$=3.0V | | | 10 | nA |
| Collector cutoff current | $I_{CBO}$ | $V_{CB}$=60V,$I_E$=0 | | | 0.01 | μA |
| | | $V_{CB}$=60V,$I_E$=0, $T_A$=150°C | | | 10 | μA |
| Emitter cutoff current | $I_{EBO}$ | $V_{EB}$=3.0V,$I_C$=0 | | | 10 | nA |
| Base cutoff current | $I_{BL}$ | $V_{CE}$=60V, $V_{EB(OFF)}$=3.0V | | | 20 | nA |

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|---|---|---|---|---|---|
| **ON CHARACTERISTICS** | | | | | | |
| DC current gain | $h_{FE}$ | $I_C$=0.1mA, $V_{CE}$=10V | 35 | | | |
| | | $I_C$=1.0mA, $V_{CE}$=10V | 50 | | | |
| | | $I_C$=10mA, $V_{CE}$=10V | 75 | | | |
| | | $I_C$=10mA, $V_{CE}$=10V, $T_A$=-55°C | 35 | | | |
| | | $I_C$=150mA, $V_{CE}$=10V* | 100 | | 300 | |
| | | $I_C$=150mA, $V_{CE}$=1.0V* | 50 | | | |
| | | $I_C$=500mA, $V_{CE}$=10V* | 40 | | | |
| Collector-emitter saturation voltage* | $V_{CE}$(sat) | $I_C$=150mA, $I_B$=15mA | | | 0.3 | V |
| | | $I_C$=500mA, $I_B$=50mA | | | 1.0 | V |
| Base-emitter saturation voltage* | $V_{BE}$(sat) | $I_C$=150mA, $I_B$=15mA | 0.6 | | 1.2 | V |
| | | $I_C$=500mA, $I_B$=50mA | | | 2.0 | V |
| **SMALL SIGNAL CHARACTERISTICS** | | | | | | |
| Current gain-Bandwidth product | $f_T$ | $I_C$=20mA, $V_{CE}$=20V, f=100MHz | 300 | | | MHz |
| Output capacitance | Cobo | $V_{CB}$=10V, $I_E$=0, f=100kHz | | | 8.0 | pF |
| Input capacitance | Cibo | $V_{EB}$=0.5V, $I_C$=0, f=100kHz | | | 25 | pF |
| Collector base time constant | rb'Cc | $I_C$=20mA, $V_{CB}$=20V, f=31.8MHz | | | 150 | pS |
| Noise figure | NF | $I_C$=100μA, $V_{CE}$=10V, Rs=1.0kΩ, f=1.0kHz | | | 4.0 | dB |
| Real part of common-emitter high frequency input impedance | Re(hje) | $I_C$=20mA, $V_{CB}$=20V, f=300MHz | | | 60 | Ω |
| **SWITCHING CHARACTERISTICS** | | | | | | |
| Delay time | td | Vcc=30V, $V_{BE(OFF)}$=0.5V, | | | 10 | ns |
| Rise time | tr | $I_C$=150mA, $I_{B1}$=15mA | | | 25 | ns |
| Storage time | ts | Vcc=30V, $I_C$=150mA, | | | 225 | ns |
| Fall time | tf | $I_{B1}$= $I_{B2}$=15mA | | | 60 | ns |
| **THERMAL CHARACTERISTICS (TA=25°C, unless otherwise noted)** | | | | | | |
| Total Device Dissipation | $P_D$ | | | | 1000 | mW |
| Derate above 25°C | | | | | 8.0 | mW/°C |
| Thermal resistance, junction to Ambient | $R_{\theta JA}$ | | | | 125 | °C/W |

*Pulse test: Pulse Width ≤ 300μs, Duty Cycle ≤ 2.0%

## TEST CIRCUITS

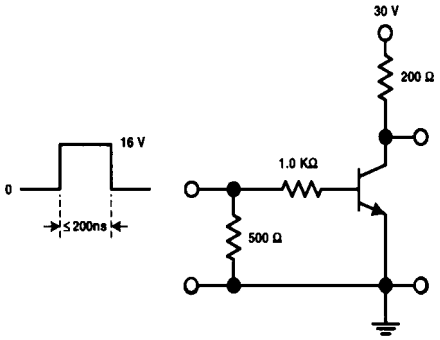



FIG.1 Saturated Turn-On Switching Time

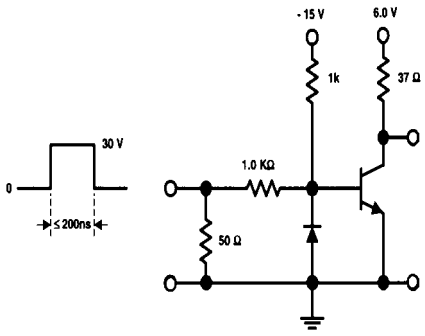
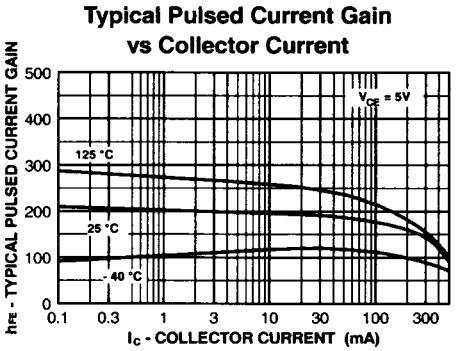
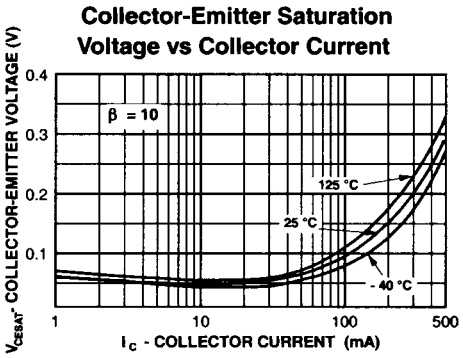
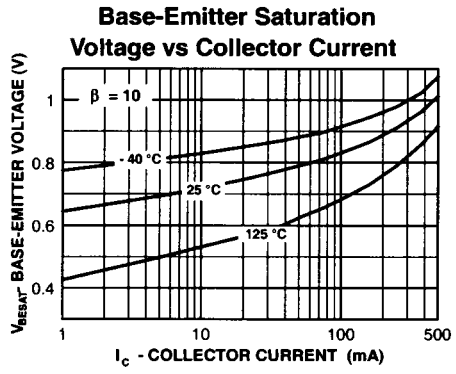


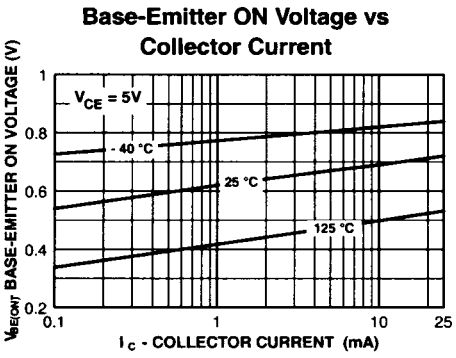

FIG.2 Saturated Turn-Off Switching Time

## TYPICAL CHARACTERISTICS

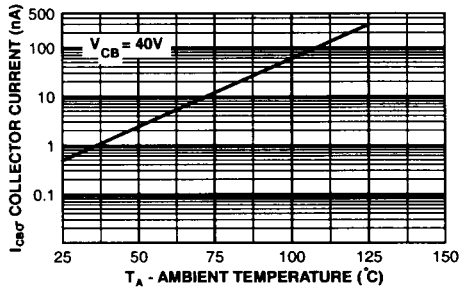


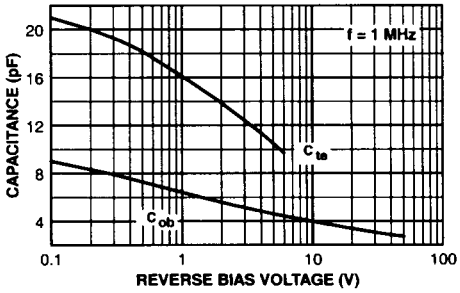



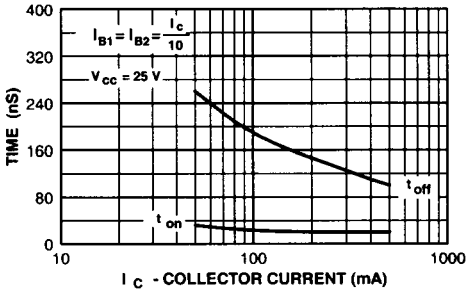
**Collector-Cutoff Current vs Ambient Temperature**



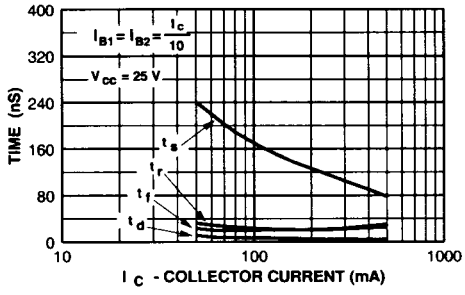

**Emitter Transition and Output Capacitance vs Reverse Bias Voltage**




**Turn On and Turn Off Times vs Collector Current**




**Switching Times vs Collector Current**




**Power Dissipation vs Ambient Temperature**