



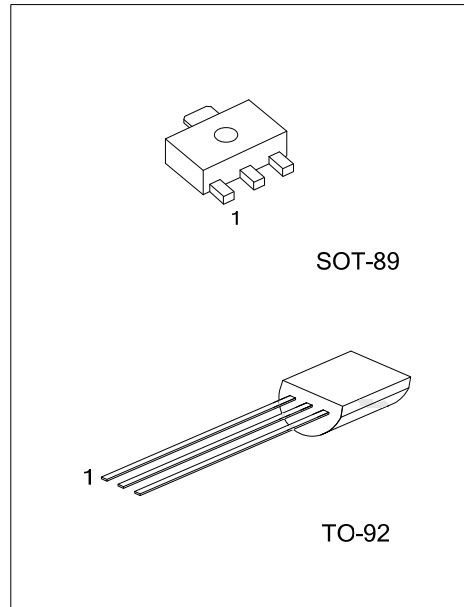
PN2222A

NPN 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.



■ ORDERING INFORMATION

| Ordering Number | | Package | Pin Assignment | | | Packing |
|-----------------|----------------|---------|----------------|---|---|-----------|
| Lead Free | Halogen Free | | 1 | 2 | 3 | |
| PN2222AL-AB3-R | PN2222AG-AB3-R | SOT-89 | B | C | E | Tape Reel |
| PN2222AL-T92-R | PN2222AG-T92-R | TO-92 | E | B | C | Tape Reel |
| PN2222AL-T92-B | PN2222AG-T92-B | TO-92 | E | B | C | Tape Box |
| PN2222AL-T92-K | PN2222AG-T92-K | TO-92 | E | B | C | Bulk |

| | |
|--|---|
| <p>PN2222AL-AB3-R</p> <p>(1)Packing Type (2)Package Type (3)Lead Plating</p> | <p>(1) R: Tape Reel, B: Tape Box, K: Bulk (2) AB3: SOT-89, T92: TO-92 (3) L: Lead Free, G: Halogen Free</p> |
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■ ABSOLUTE MAXIMUM RATING ($T_A=25^{\circ}\text{C}$, unless otherwise specified)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---------------------------|--------|-----------|------------|--------------------|
| Collector-Base Voltage | | V_{CBO} | 75 | V |
| Collector-Emitter Voltage | | V_{CEO} | 40 | V |
| Emitter-Base Voltage | | V_{EBO} | 6 | V |
| Collector Current | | I_C | 0.6 | A |
| Total Device Dissipation | SOT-89 | P_C | 1.2 | W |
| | TO-92 | | 0.6 | |
| Junction Temperature | | T_J | +150 | $^{\circ}\text{C}$ |
| Storage Temperature | | T_{STG} | -55 ~ +150 | $^{\circ}\text{C}$ |

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

■ THERMAL DATA ($T_A=25^{\circ}\text{C}$, unless otherwise noted)

| PARAMETER | | SYMBOL | RATINGS | UNIT |
|---------------------|--------|---------------|---------|-----------------------------|
| Junction to Ambient | SOT-89 | θ_{JA} | 104 | $^{\circ}\text{C}/\text{W}$ |
| | TO-92 | | 200 | |
| Junction to Case | SOT-89 | θ_{JC} | 38 | $^{\circ}\text{C}/\text{W}$ |
| | TO-92 | | 80 | |

■ ELECTRICAL CHARACTERISTICS (T_A=25°C, unless otherwise specified)

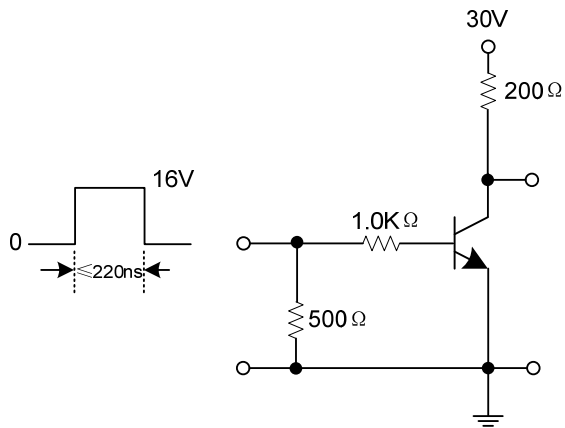
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|--|----------------------|--|-----|-----|------|------|
| OFF CHARACTERISTICS | | | | | | |
| Collector-Base Breakdown Voltage | BV _{CBO} | I _C =10μA, I _E =0 | 75 | | | V |
| Collector-Emitter Breakdown Voltage | BV _{CEO} | I _C =10mA, I _B =0 | 40 | | | V |
| Emitter-Base Breakdown Voltage | BV _{EBO} | I _E =10μA, I _C =0 | 6 | | | V |
| Collector Cut-off Current | I _{CEO} | V _{CE} =60V, V _{EB(OFF)} =3.0V | | | 10 | nA |
| Collector Cut-Off Current | I _{CBO} | V _{CB} =60V, I _E =0 | | | 0.01 | μA |
| Emitter Cut-Off Current | I _{EBO} | V _{EB} =3.0V, I _C =0 | | | 10 | nA |
| Base Cut-Off Current | I _{BL} | V _{CE} =60V, V _{EB(OFF)} =3.0V | | | 20 | nA |
| 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 =150mA, V _{CE} =10V (Note) | 100 | | 300 | |
| | | I _C =150mA, V _{CE} =1.0V (Note) | 50 | | | |
| | | I _C =500mA, V _{CE} =10V (Note) | 40 | | | |
| Collector-Emitter Saturation Voltage (Note) | V _{CE(SAT)} | I _C =150mA, I _B =15mA | | | 0.3 | V |
| | | I _C =500mA, I _B =50mA | | | 1.0 | |
| Base-Emitter Saturation Voltage (Note) | V _{BE(SAT)} | I _C =150mA, I _B =15mA | 0.6 | | 1.2 | V |
| | | I _C =500mA, I _B =50mA | | | 2.0 | |
| SMALL SIGNAL CHARACTERISTICS | | | | | | |
| Transition Frequency | f _T | I _C =20mA, V _{CE} =20V, f=100MHz | 300 | | | MHz |
| Output Capacitance | C _{obo} | V _{CB} =10V, I _E =0, f=100kHz | | | 8.0 | pF |
| Input Capacitance | C _{ibo} | V _{EB} =0.5V, I _C =0, f=100kHz | | | 25 | pF |
| Collector Base Time Constant | τ _{b'Cc} | I _C =20mA, V _{CB} =20V, f=31.8MHz | | | 150 | pS |
| Noise Figure | NF | I _C =100μA, V _{CE} =10V, R _S =1.0kΩ, f=1.0kHz | | | 4.0 | dB |
| Real Part of Common-Emitter High Frequency Input Impedance | Re(h _{je}) | I _C =20mA, V _{CB} =20V, f=300MHz | | | 60 | Ω |
| SWITCHING CHARACTERISTICS | | | | | | |
| Delay time | t _D | V _{CC} =30V, V _{BE(OFF)} =0.5V | | | 10 | ns |
| Rise time | t _R | I _C =150mA, I _{B1} =15mA | | | 25 | ns |
| Storage time | t _S | V _{CC} =30V, I _C =150mA | | | 225 | ns |
| Fall time | t _F | I _{B1} = I _{B2} =15mA | | | 60 | ns |

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

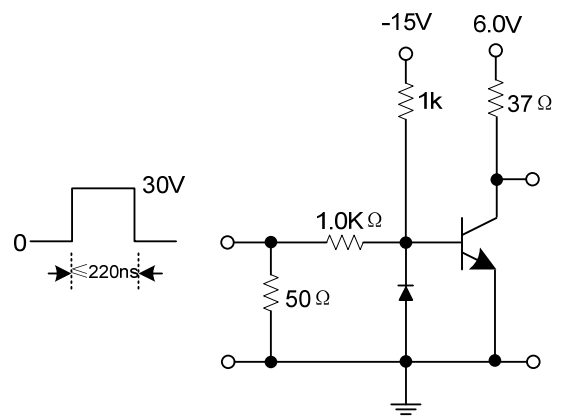
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■ TEST CIRCUIT

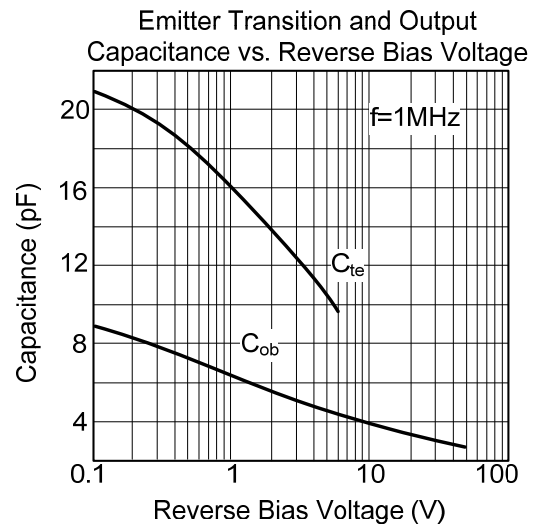
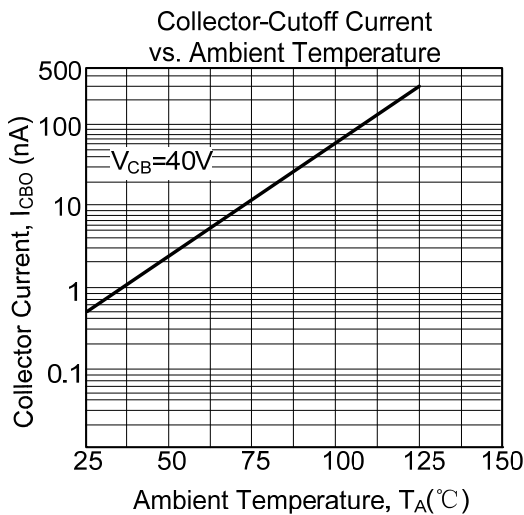
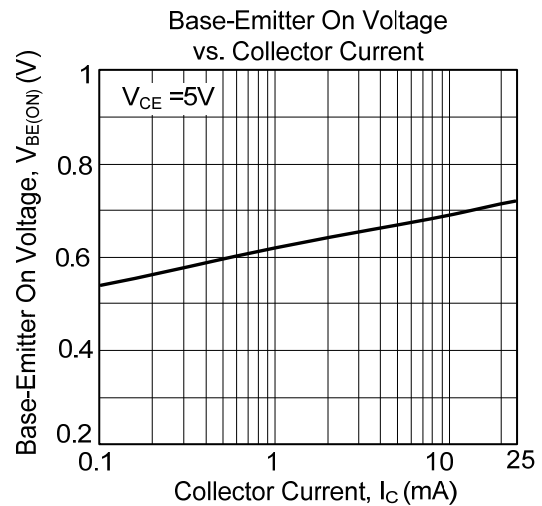
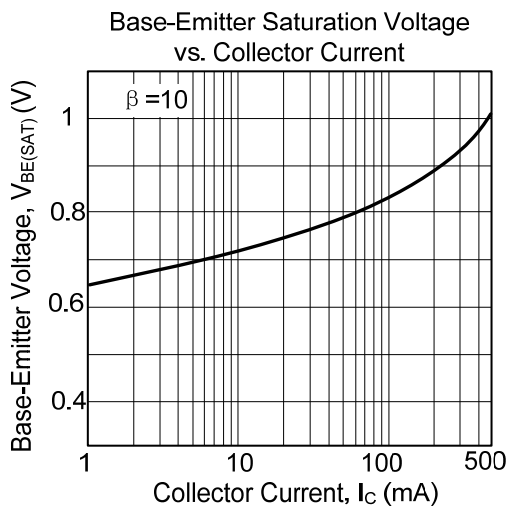
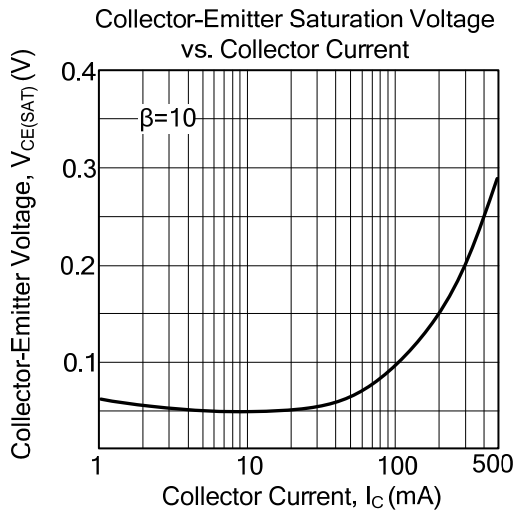
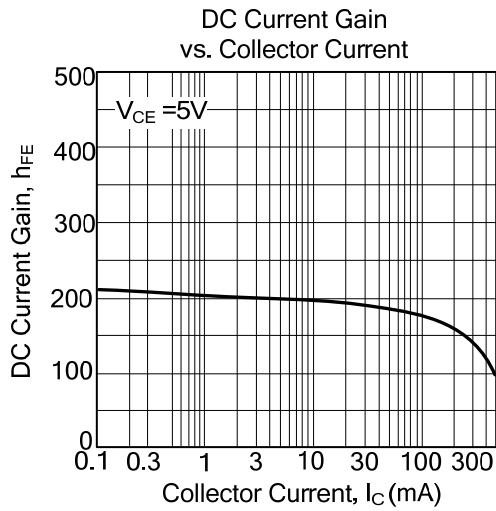


Saturated Turn-On Switching Time

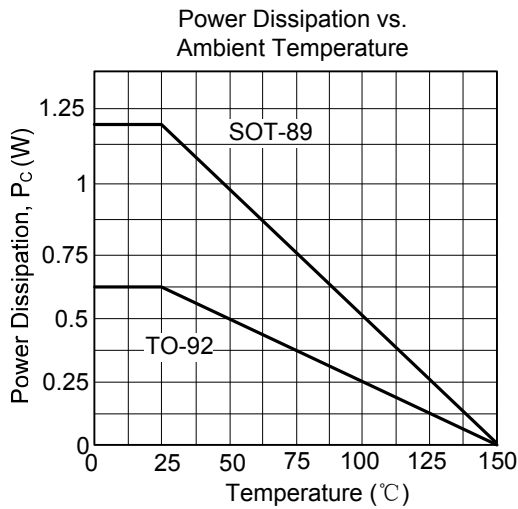
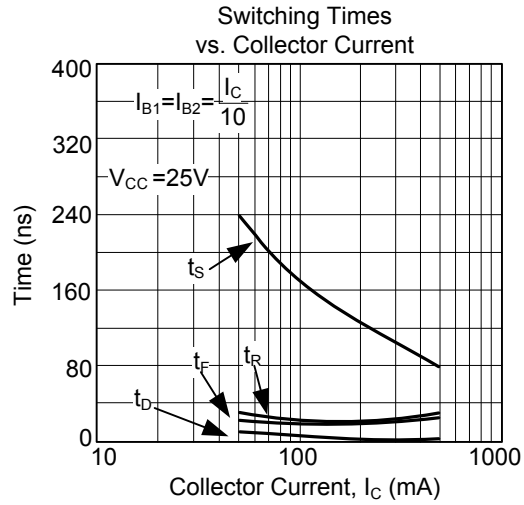
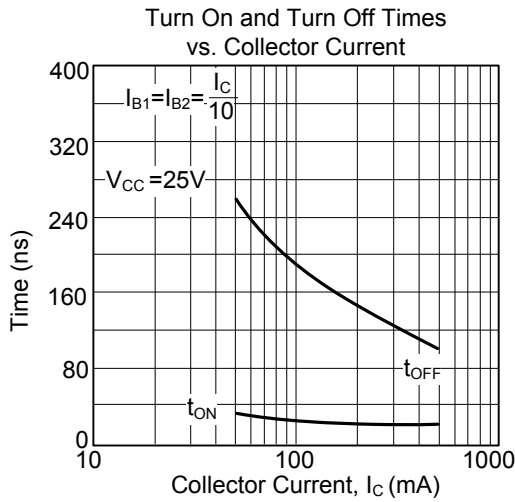


Saturated Turn-Off Switching Time

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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