



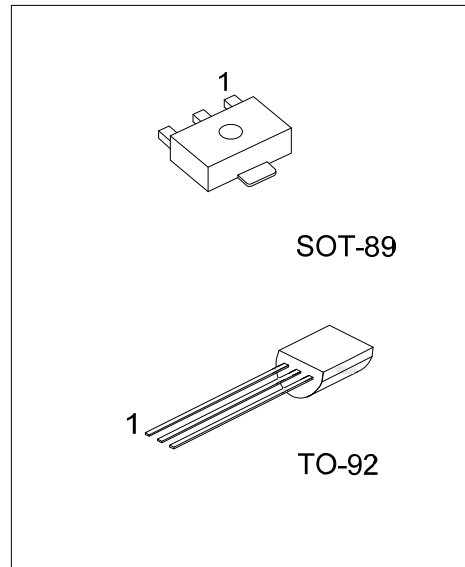
PN2222A

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 |
|-----------------|-------------------|----------------|---------|----------------|---|---|-----------|
| Normal | Lead Free Plating | Halogen Free | | 1 | 2 | 3 | |
| PN2222A-AB3-R | PN2222AL-AB3-R | PN2222AG-AB3-R | SOT-89 | B | C | E | Tape Reel |
| PN2222A-T92-B | PN2222AL-T92-B | PN2222AG-T92-B | TO-92 | E | B | C | Tape Box |
| PN2222A-T92-K | PN2222AL-T92-K | PN2222AG-T92-K | TO-92 | E | B | C | Bulk |

| | |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>PN2222AL-AB3-R</p> <p>(1) Packing Type</p> <p>(2) Package Type</p> <p>(3) Lead Plating</p> | <p>(1) B: Tape Box, K: Bulk, R: Tape Reel</p> <p>(2) AB3: SOT-89, T92: TO-92</p> <p>(3) G: Halogen Free, L: Lead Free Plating, Blank: Pb/Sn</p> |
|-----------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|

■ ABSOLUTE MAXIMUM RATING (T_A=25°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 | 1.2 | W |
| | TO-92 | 0.6 | |
| Junction Temperature | T _J | +150 | °C |
| Storage Temperature | T _{STG} | -55 ~ +150 | °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°C, unless otherwise noted)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|--------|---------|------|
| Junction to Ambient | SOT-89 | 104 | °C/W |
| | TO-92 | 200 | |

■ 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 | | | |
| | | I _C =150mA, V _{CE} =1.0V (Note) | 50 | | 300 | |
| | | 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 |

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified)

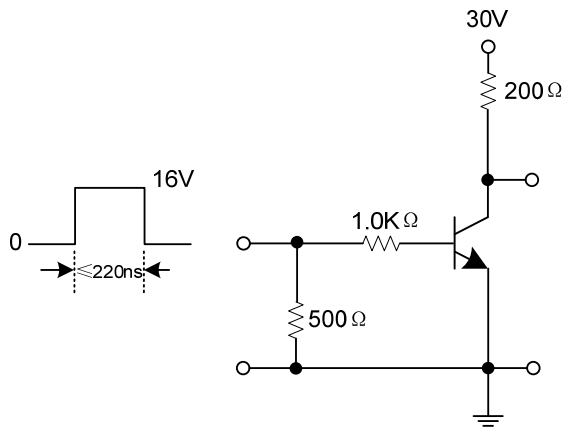
| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---------------------------|--------|-------------------------------------------------|-----|-----|-----|------|
| SWITCHING CHARACTERISTICS | | | | | | |
| Delay time | t_D | $V_{CC}=30\text{V}$, $V_{BE(OFF)}=0.5\text{V}$ | | | 10 | ns |
| Rise time | t_R | $I_C=150\text{mA}$, $I_{B1}=15\text{mA}$ | | | 25 | ns |
| Storage time | t_S | $V_{CC}=30\text{V}$, $I_C=150\text{mA}$ | | | 225 | ns |
| Fall time | t_F | $I_{B1}=I_{B2}=15\text{mA}$ | | | 60 | ns |

Note: Pulse test: Pulse Width $\leq 300\mu\text{s}$, Duty Cycle $\leq 2.0\%$

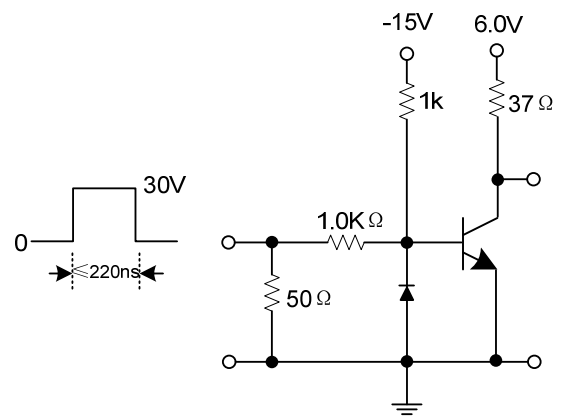
PN2222A

NPN SILICON TRANSISTOR

■ TEST CIRCUIT

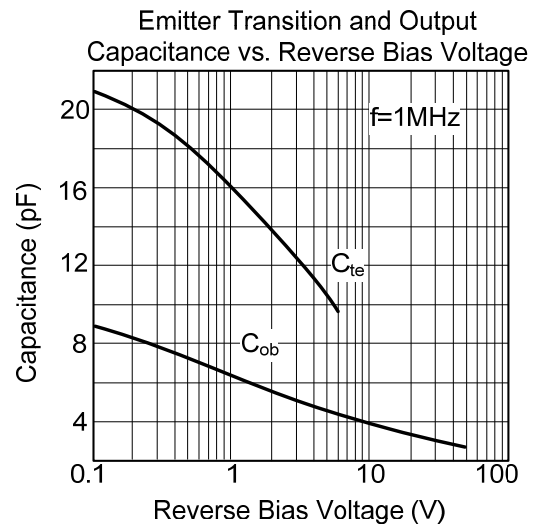
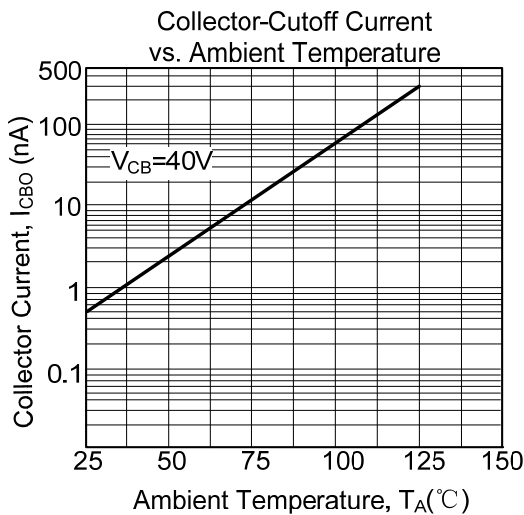
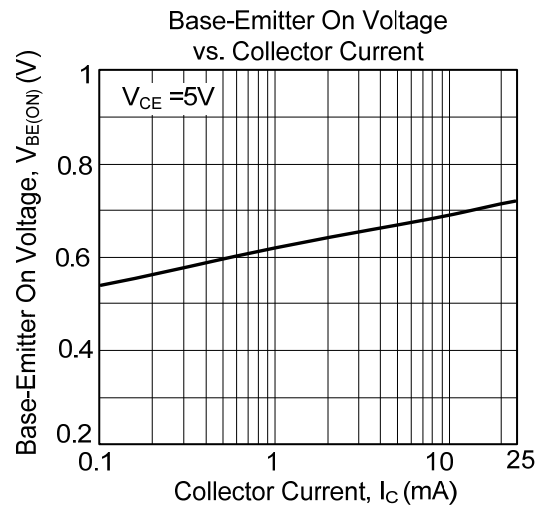
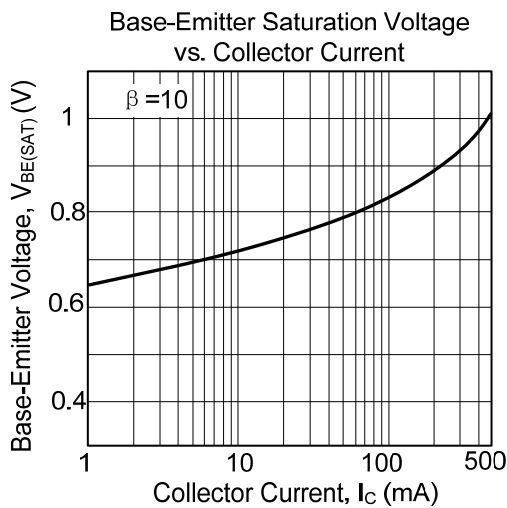
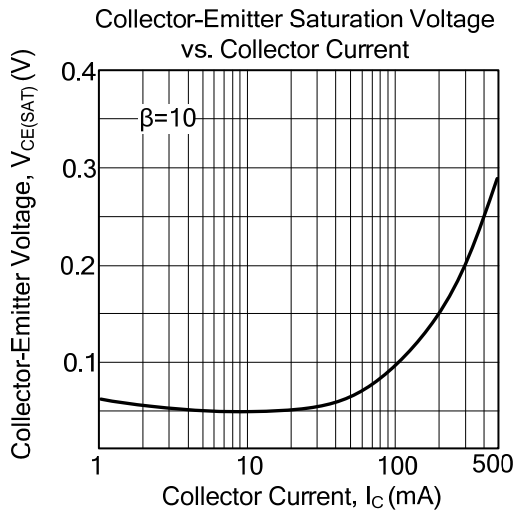
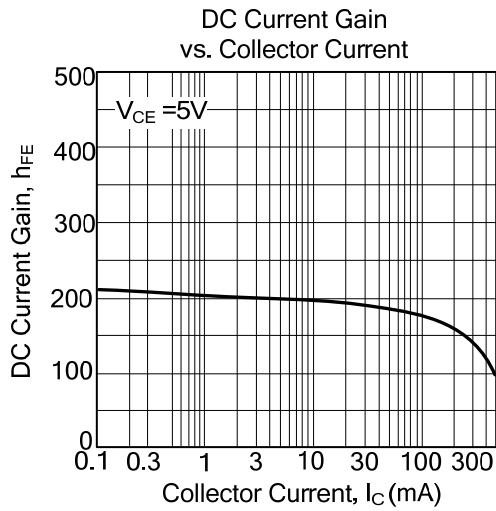


Saturated Turn-On Switching Time

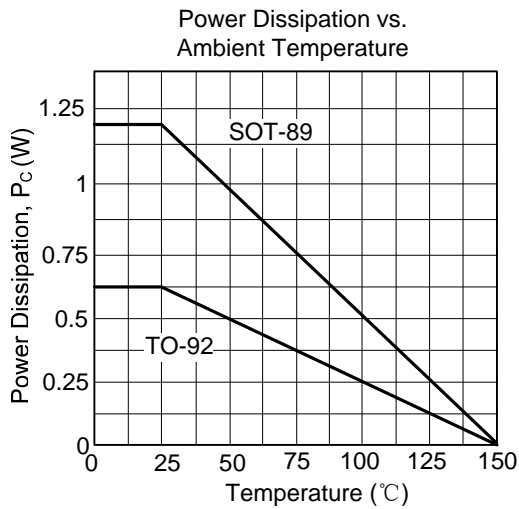
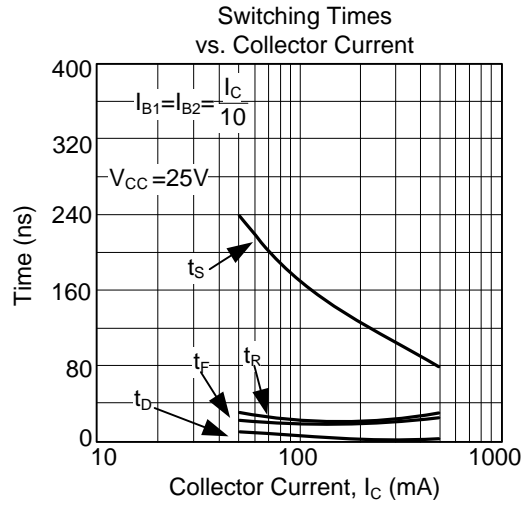
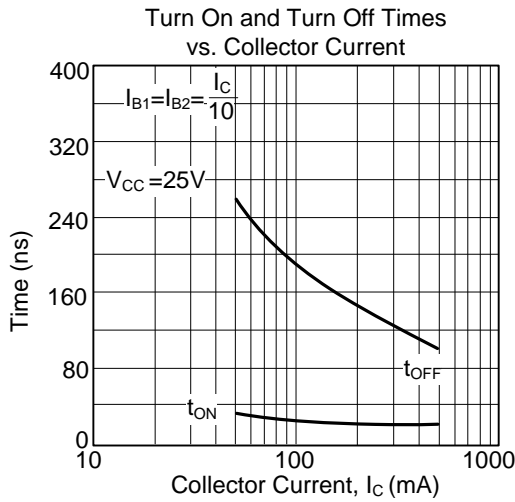


Saturated Turn-Off Switching Time

■ TYPICAL CHARACTERISTICS



■ TYPICAL CHARACTERISTICS(Cont.)



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