

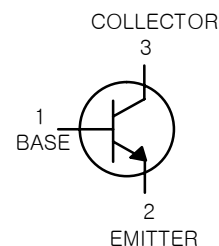
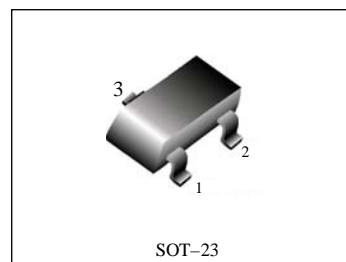
General Purpose Transistor

NPN Silicon

- We declare that the material of product compliance with RoHS requirements.

ORDERING INFORMATION

| Device | Maring | Shipping |
|----------|--------|--------------------|
| 2N2222AS | 1P | 3000 / Tape & Reel |



MAXIMUM RATINGS ($T_A = 25^\circ\text{C}$)

| Rating | Symbol | Max | Unit |
|--------------------------------|-----------|-----|------|
| Collector–Emitter Voltage | V_{CEO} | 40 | Vdc |
| Collector–Base Voltage | V_{CBO} | 75 | Vdc |
| Emitter–Base Voltage | V_{EBO} | 6.0 | Vdc |
| Collector Current – Continuous | I_C | 600 | mAdc |

THERMAL CHARACTERISTICS

| Characteristic | Symbol | Max | Unit |
|---|-----------------|-------------|--------------------|
| Total Device Dissipation (Note 1) $T_A = 25^\circ\text{C}$ | P_D | 350 | mW |
| Thermal Resistance, (Note 1) Junction–to–Ambient | $R_{\theta JA}$ | 357 | $^\circ\text{C/W}$ |
| Operating and Storage Junction Temperature Range | T_J, T_{stg} | -55 to +150 | $^\circ\text{C}$ |

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

| Characteristic | Symbol | Min | Max | Unit |
|---|---------------|-----|-----|------|
| OFF CHARACTERISTICS | | | | |
| Collector–Emitter Breakdown Voltage (Note 1) ($I_C = 1.0 \text{ mAdc}, I_B = 0$) | $V_{(BR)CEO}$ | 40 | – | Vdc |
| Collector–Base Breakdown Voltage ($I_C = 10 \mu\text{Adc}, I_E = 0$) | $V_{(BR)CBO}$ | 75 | – | Vdc |
| Emitter–Base Breakdown Voltage ($I_E = 10 \mu\text{Adc}, I_C = 0$) | $V_{(BR)EBO}$ | 6.0 | – | Vdc |
| Base Cutoff Current ($V_{CE} = 60 \text{ Vdc}, V_{EB} = 3.0 \text{ Vdc}$) | I_{BL} | – | 20 | nAdc |
| Collector Cutoff Current ($V_{CE} = 60 \text{ Vdc}, V_{EB} = 3.0 \text{ Vdc}$) | I_{CEX} | – | 10 | nAdc |



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ON CHARACTERISTICS (Note 2)

| | | | | |
|--|---------------|-----------------------------|-------------------------|-----|
| DC Current Gain ($I_C = 0.1 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 1.0 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 10 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 150 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$) ($I_C = 500 \text{ mAdc}$, $V_{CE} = 10 \text{ Vdc}$) | H_{FE} | 35 50 75 100 40 | - - - 300 - | - |
| Collector-Emitter Saturation Voltage ($I_C = 150 \text{ mAdc}$, $I_B = 15 \text{ mAdc}$) ($I_C = 500 \text{ mAdc}$, $I_B = 50 \text{ mAdc}$) | $V_{CE(sat)}$ | - - | 0.3 1.0 | Vdc |
| Base-Emitter Saturation Voltage ($I_C = 150 \text{ mAdc}$, $I_B = 15 \text{ mAdc}$) ($I_C = 500 \text{ mAdc}$, $I_B = 50 \text{ mAdc}$) | $V_{BE(sat)}$ | 0.6 - | 1.2 2.0 | Vdc |

SMALL-SIGNAL CHARACTERISTICS

| | | | | |
|--|-----------|------|------|------------------|
| Current-Gain - Bandwidth Product ($I_C = 20 \text{ mAdc}$, $V_{CE} = 20 \text{ Vdc}$, $f = 100 \text{ MHz}$) | f_T | 300 | - | MHz |
| Output Capacitance ($V_{CB} = 10 \text{ Vdc}$, $I_E = 0$, $f = 1.0 \text{ MHz}$) | C_{obo} | - | 8.0 | pF |
| Input Capacitance ($V_{EB} = 0.5 \text{ Vdc}$, $I_C = 0$, $f = 1.0 \text{ MHz}$) | C_{ibo} | - | 25 | pF |
| Input Impedance ($V_{CE} = 10 \text{ Vdc}$, $I_C = 10 \text{ mAdc}$, $f = 1.0 \text{ kHz}$) | h_{ie} | 0.25 | 1.25 | k Ω |
| Voltage Feedback Ratio ($V_{CE} = 10 \text{ Vdc}$, $I_C = 10 \text{ mAdc}$, $f = 1.0 \text{ kHz}$) | h_{re} | - | 4.0 | $\times 10^{-4}$ |
| Small-Signal Current Gain ($V_{CE} = 10 \text{ Vdc}$, $I_C = 10 \text{ mAdc}$, $f = 1.0 \text{ kHz}$) | h_{fe} | 75 | 375 | - |
| Output Admittance ($V_{CE} = 10 \text{ Vdc}$, $I_C = 10 \text{ mAdc}$, $f = 1.0 \text{ kHz}$) | h_{oe} | 25 | 200 | μmhos |
| Noise Figure ($V_{CE} = 10 \text{ Vdc}$, $I_C = 100 \mu\text{Adc}$, $R_S = 1.0 \text{ k ohms}$, $f = 1.0 \text{ kHz}$) | NF | - | 4.0 | dB |

SWITCHING CHARACTERISTICS

| | | | | | |
|--------------|--|-------|---|-----|----|
| Delay Time | ($V_{CC} = 30 \text{ Vdc}$, $V_{BE} = -0.5 \text{ Vdc}$, $I_C = 150 \text{ mAdc}$, $I_{B1} = 15 \text{ mAdc}$) | t_d | - | 10 | ns |
| Rise Time | | t_r | - | 25 | |
| Storage Time | ($V_{CC} = 30 \text{ Vdc}$, $I_C = 150 \text{ mAdc}$, $I_{B1} = I_{B2} = 15 \text{ mAdc}$) | t_s | - | 225 | ns |
| Fall Time | | t_f | - | 60 | |

1. Device mounted on FR-4 PCB 16*16*0.6mm or on 99.5% alumina 10*8*0.6mm
2. Pulse Test: Pulse Width $\leq 300 \mu\text{s}$, Duty Cycle $\leq 2.0\%$.

SWITCHING TIME EQUIVALENT TEST CIRCUITS

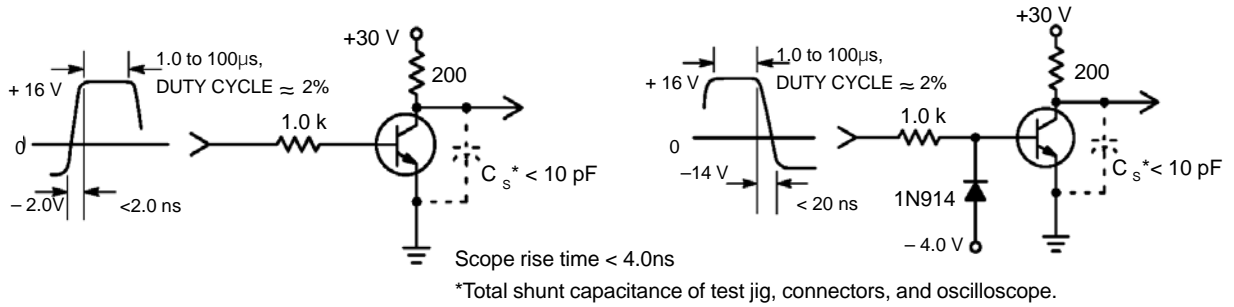


Figure 1. Turn-On Time

Figure 2. Turn-Off Time

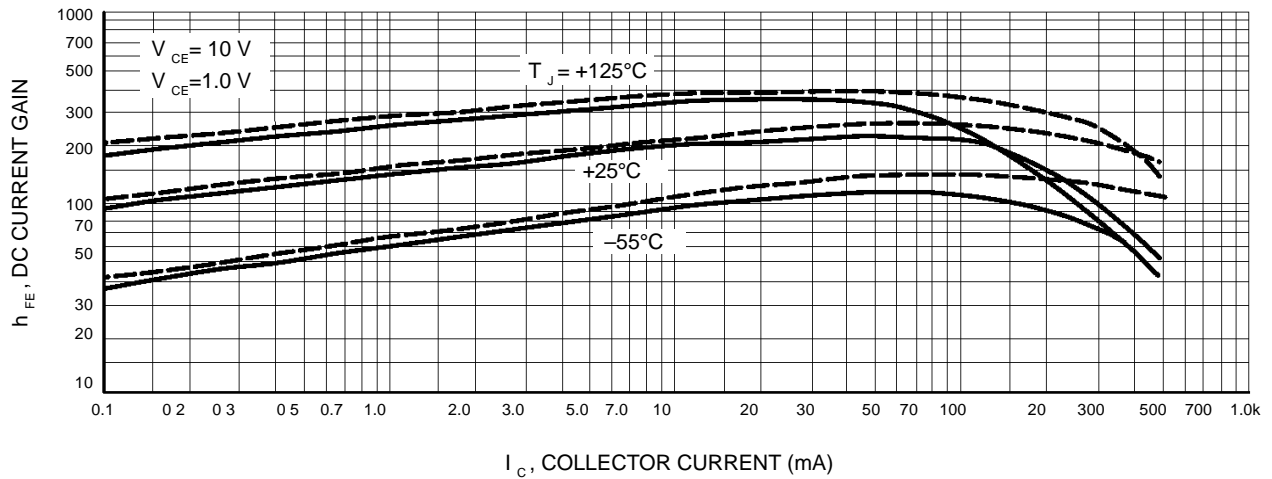


Figure 3. DC Current Gain

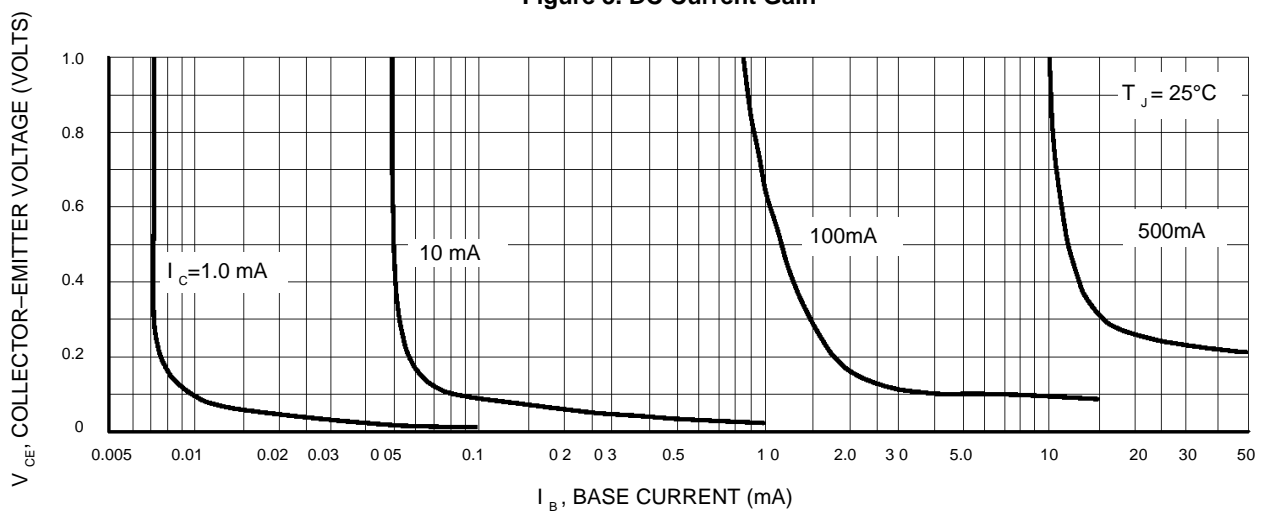


Figure 4. Collector Saturation Region

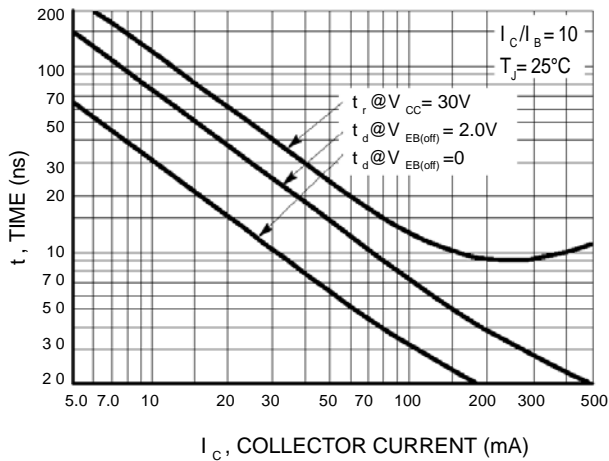


Figure 5. Turn-On Time

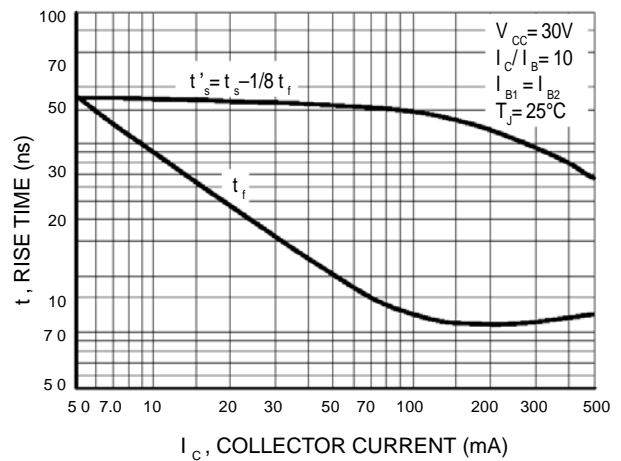


Figure 6. Turn - Off Time

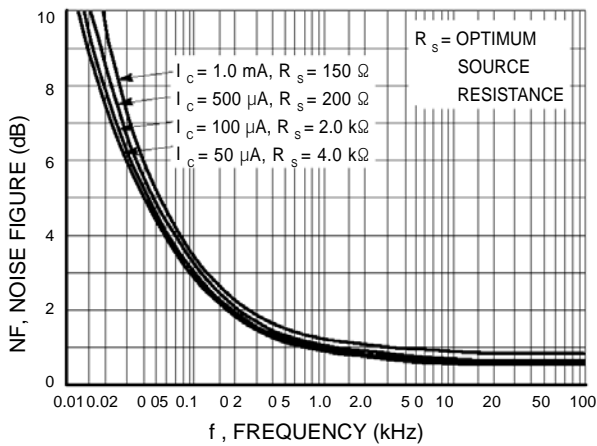


Figure 7. Frequency Effects

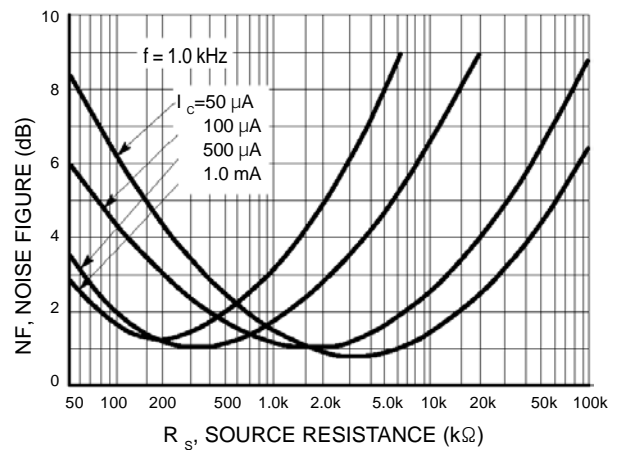


Figure 8. Source Resistance Effects

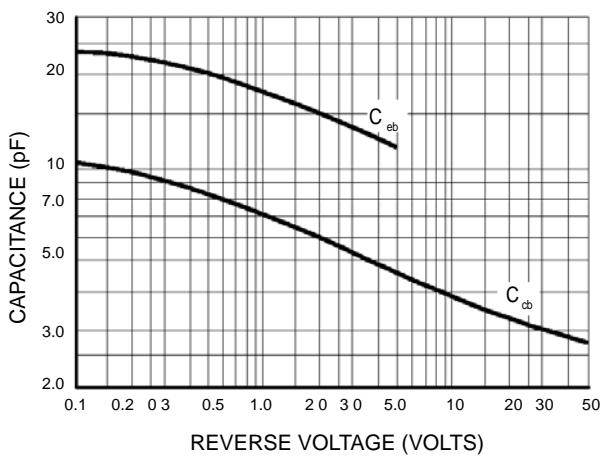


Figure 9. Capacitance

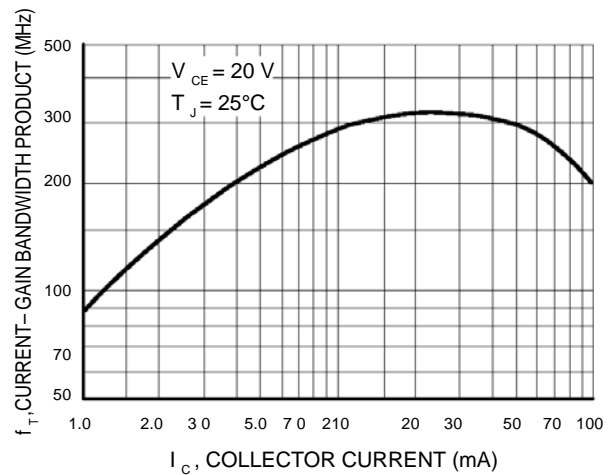


Figure 10. Current-Gain Bandwidth Product



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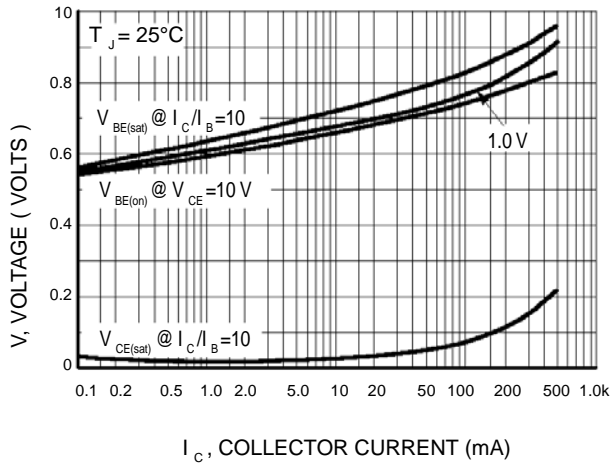


Figure 11. "On" Voltages

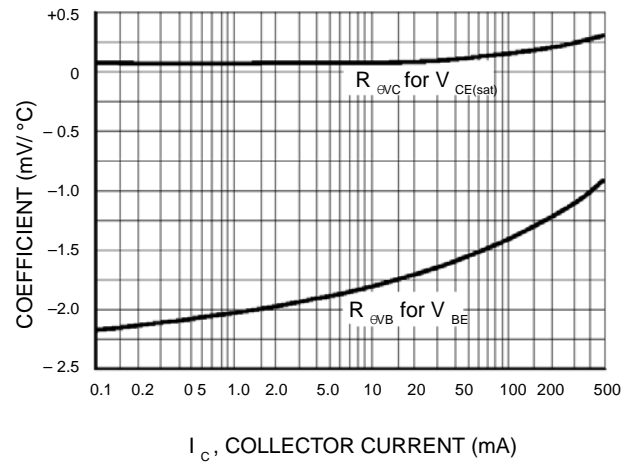


Figure 12. Temperature Coefficients

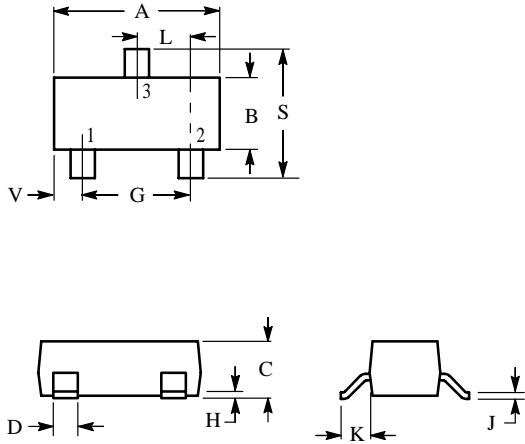


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SOT-23

NOTES:

1. DIMENSIONING AND TOLERANCING PER ANSI Y14.5M,1982
2. CONTROLLING DIMENSION: INCH.



| DIM | INCHES | | MILLIMETERS | |
|-----|--------|--------|-------------|-------|
| | MIN | MAX | MIN | MAX |
| A | 0.1102 | 0.1197 | 2.80 | 3.04 |
| B | 0.0472 | 0.0551 | 1.20 | 1.40 |
| C | 0.0350 | 0.0440 | 0.89 | 1.11 |
| D | 0.0150 | 0.0200 | 0.37 | 0.50 |
| G | 0.0701 | 0.0807 | 1.78 | 2.04 |
| H | 0.0005 | 0.0040 | 0.013 | 0.100 |
| J | 0.0034 | 0.0070 | 0.085 | 0.177 |
| K | 0.0140 | 0.0285 | 0.35 | 0.69 |
| L | 0.0350 | 0.0401 | 0.89 | 1.02 |
| S | 0.0830 | 0.1039 | 2.10 | 2.64 |
| V | 0.0177 | 0.0236 | 0.45 | 0.60 |

PIN 1 BASE
 2 EMITTER
 3 COLLECTOR

