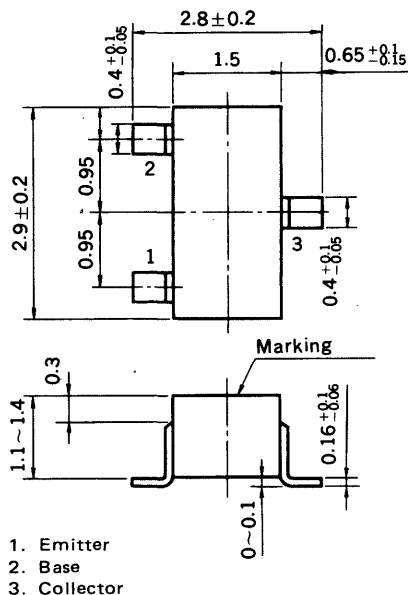


**HIGH FREQUENCY AMPLIFIER**  
**NPN SILICON EPITAXIAL TRANSISTOR**  
**MINI MOLD**

**PACKAGE DIMENSIONS**  
in millimeters



**FEATURES**

- High Speed:  $t_{stg} < 200$  ns
- Complementary to 2SA1461

**ABSOLUTE MAXIMUM RATINGS**

Maximum Voltages and Current ( $T_a = 25^\circ\text{C}$ )

|                              |           |     |    |
|------------------------------|-----------|-----|----|
| Collector to Base Voltage    | $V_{CBO}$ | 60  | V  |
| Collector to Emitter Voltage | $V_{CEO}$ | 40  | V  |
| Emitter to Base Voltage      | $V_{EBO}$ | 6   | V  |
| Collector Current (DC)       | $I_C$     | 200 | mA |

Maximum Power Dissipation

|                                                                      |       |     |    |
|----------------------------------------------------------------------|-------|-----|----|
| Total Power Dissipation<br>at $25^\circ\text{C}$ Ambient Temperature | $P_T$ | 200 | mW |
|----------------------------------------------------------------------|-------|-----|----|

Maximum Temperatures

|                           |           |             |                  |
|---------------------------|-----------|-------------|------------------|
| Junction Temperature      | $T_j$     | 150         | $^\circ\text{C}$ |
| Storage Temperature Range | $T_{stg}$ | -55 to +150 | $^\circ\text{C}$ |

**ELECTRICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )**

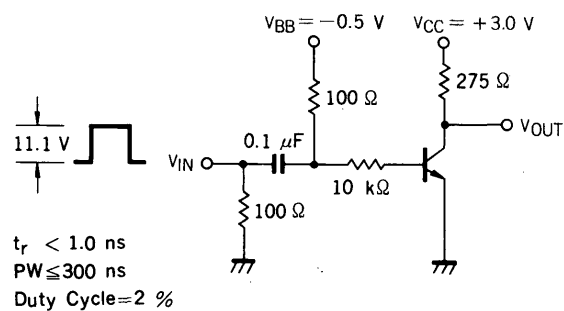
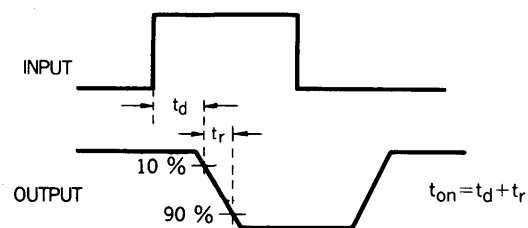
| CHARACTERISTIC               | SYMBOL          | MIN. | TYP. | MAX. | UNIT | TEST CONDITIONS                             |
|------------------------------|-----------------|------|------|------|------|---------------------------------------------|
| Collector Cutoff Current     | $I_{CBO}$       |      |      | 100  | nA   | $V_{CB} = 30$ V, $I_E = 0$                  |
| Emitter Cutoff Current       | $I_{EBO}$       |      |      | 100  | nA   | $V_{EB} = 3.0$ V, $I_C = 0$                 |
| DC Current Gain              | $h_{FE1}^*$     | 75   | 200  | 300  |      | $V_{CE} = 1.0$ V, $I_C = 10$ mA             |
| DC Current Gain              | $h_{FE2}^*$     | 25   | 80   |      |      | $V_{CE} = 1.0$ V, $I_C = 100$ mA            |
| Collector Saturation Voltage | $V_{CE(sat)}^*$ |      | 0.12 | 0.3  | V    | $I_C = 50$ mA, $I_B = 5.0$ mA               |
| Base Saturation Voltage      | $V_{BE(sat)}^*$ |      | 0.80 | 0.95 | V    | $I_C = 50$ mA, $I_B = 5.0$ mA               |
| Gain Bandwidth Product       | $f_T$           | 300  | 510  |      | MHz  | $V_{CE} = 20$ V, $I_E = -10$ mA             |
| Output Capacitance           | $C_{ob}$        |      | 3.0  | 4.0  | pF   | $V_{CB} = 5.0$ V, $I_E = 0$ , $f = 1.0$ MHz |
| Turn-on Time                 | $t_{on}$        |      |      | 70   | ns   | $V_{CC} = 3.0$ V                            |
| Storage Time                 | $t_{stg}$       |      | 100  | 200  | ns   | $I_C = 10$ mA                               |
| Turn-off Time                | $t_{off}$       |      |      | 250  | ns   | $I_{B1} = -I_{B2} = 1.0$ mA                 |

\* Pulsed:  $PW \leq 350$   $\mu$ s, Duty Cycle  $\leq 2\%$

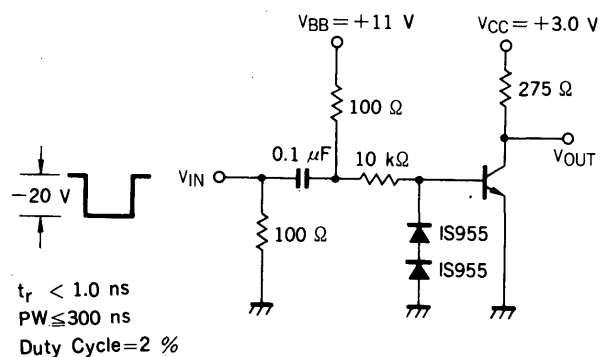
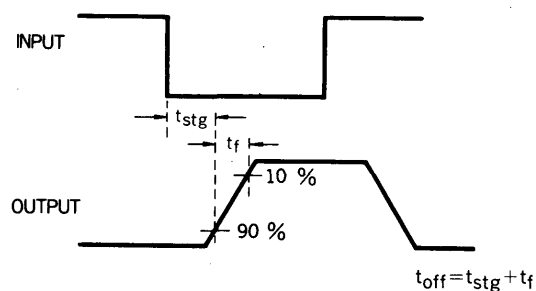
**$h_{FE}$  Classification**

| Marking   | B22       | B23        | B24        |
|-----------|-----------|------------|------------|
| $h_{FE1}$ | 75 to 150 | 100 to 200 | 150 to 300 |

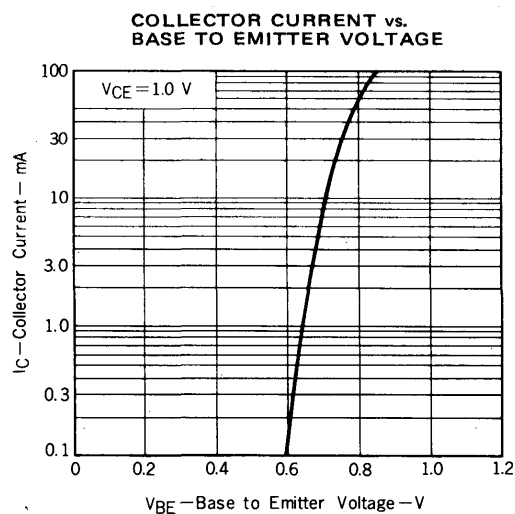
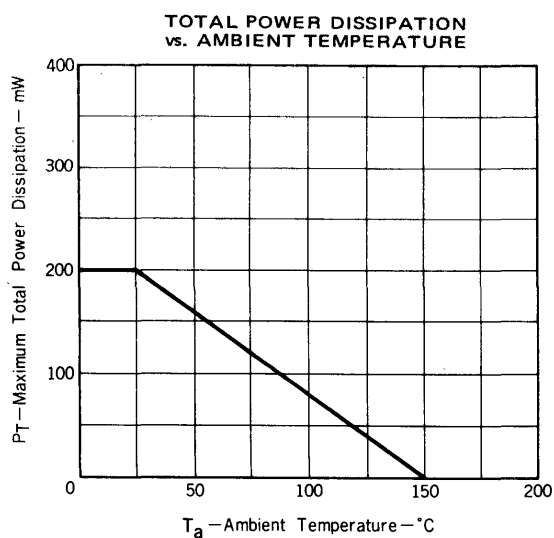
## SWITCHING TIME TEST CIRCUIT

 $t_{on}$  SWITCHING

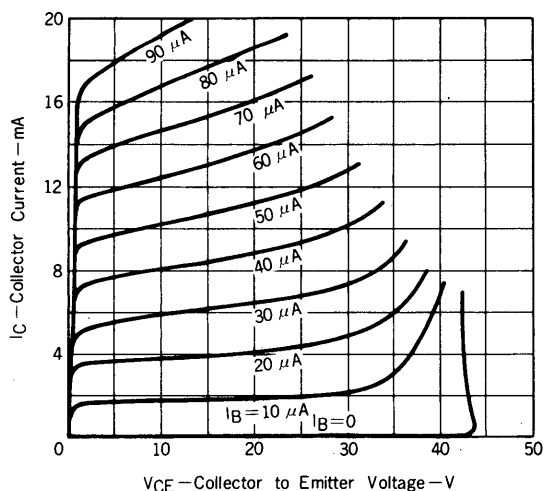
VOLTAGE WAVEFORMS

 $t_{off}$  SWITCHING

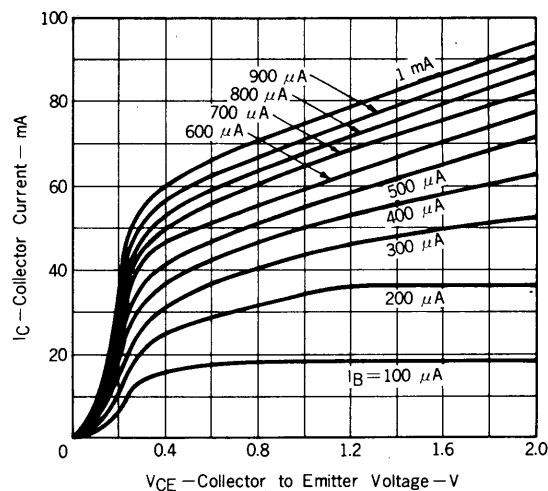
VOLTAGE WAVEFORMS

TYPICAL CHARACTERISTICS ( $T_a = 25^\circ\text{C}$ )

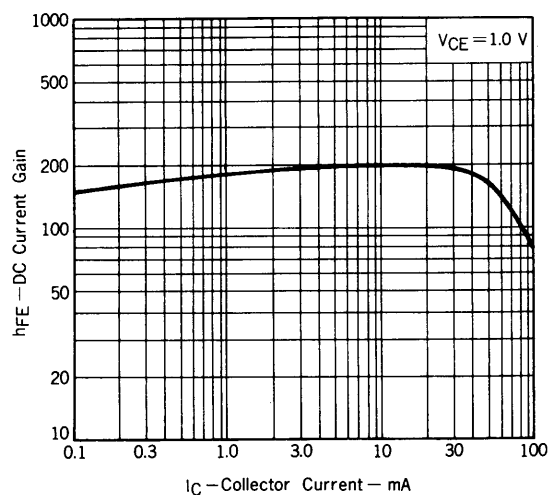
COLLECTOR CURRENT vs.  
COLLECTOR TO EMITTER VOLTAGE



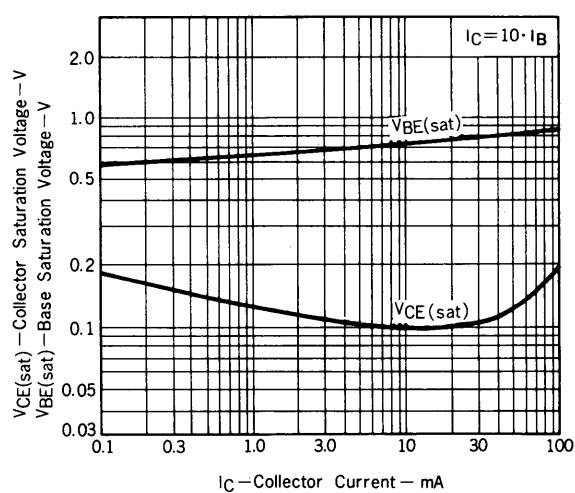
COLLECTOR CURRENT vs.  
COLLECTOR TO EMITTER VOLTAGE



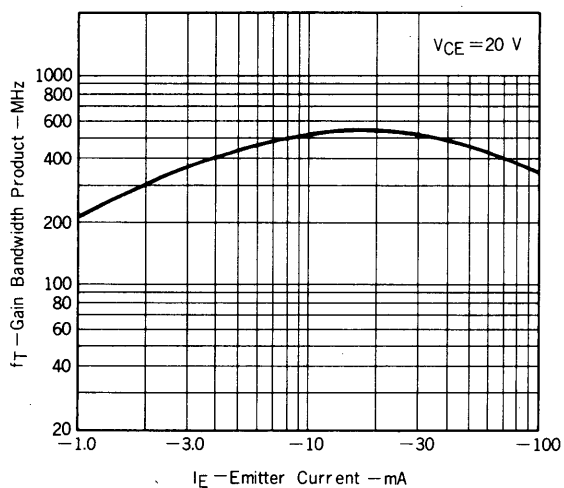
DC CURRENT GAIN vs.  
COLLECTOR CURRENT



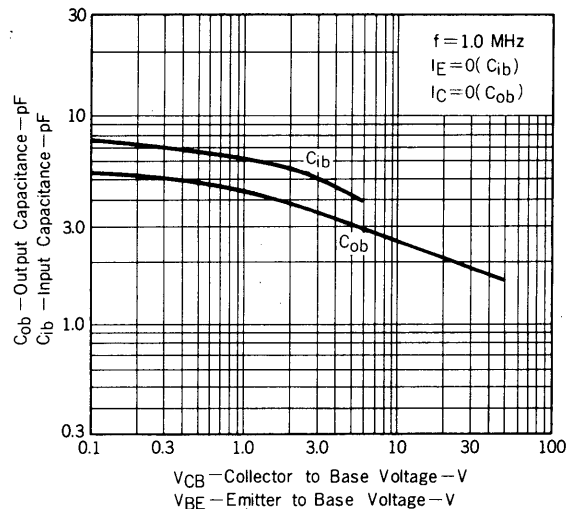
BASE AND COLLECTOR SATURATION  
VOLTAGE vs. COLLECTOR CURRENT



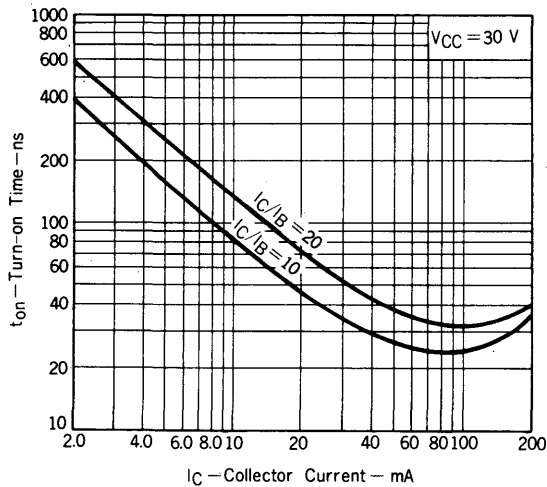
GAIN BANDWIDTH PRODUCT vs.  
EMITTER CURRENT



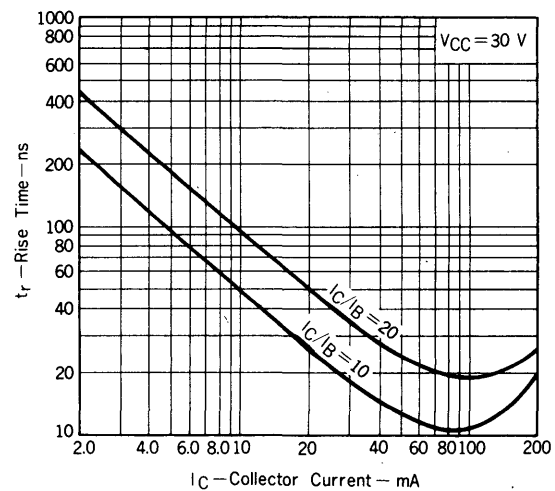
INPUT AND OUTPUT CAPACITANCE  
vs. REVERSE VOLTAGE



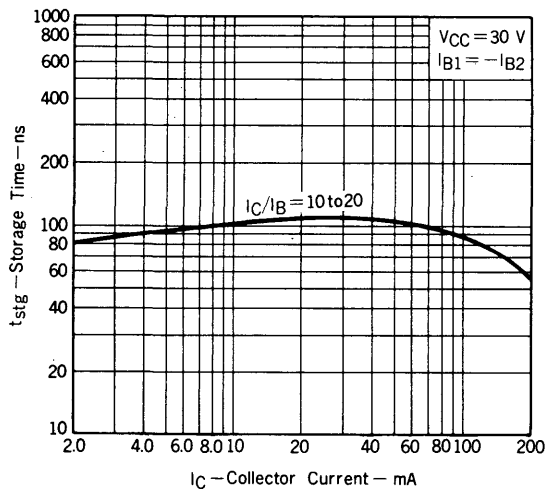
TURN-ON TIME vs. COLLECTOR CURRENT



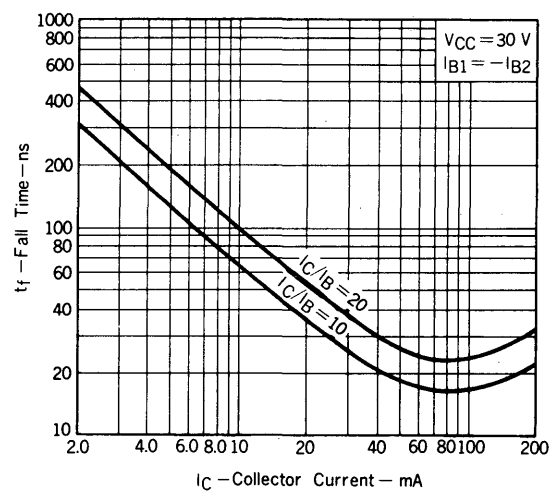
RISE TIME vs. COLLECTOR CURRENT



STORAGE TIME vs. COLLECTOR CURRENT



FALL TIME vs. COLLECTOR CURRENT



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