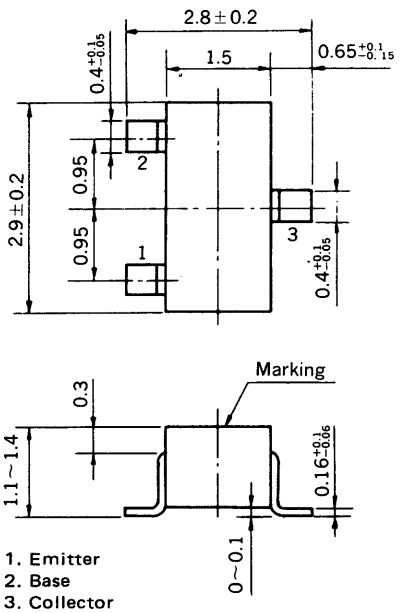
NEC
ELECTRON DEVICE

# SILICON TRANSISTOR

# 2SA1461

## HIGH FREQUENCY AMPLIFIER AND SWITCHING
## PNP SILICON EPITAXIAL TRANSISTOR
## MINI MOLD

### PACKAGE DIMENSIONS
in millimeters




1. Emitter
2. Base
3. Collector

### FEATURES

- High Speed Switching: $t_{stg}$ = 110 ns
- High Gain Bandwidth Product : $f_T$ = 510 MHz
- Complementary to 2SC3734

### ABSOLUTE MAXIMUM RATINGS

| | | | |
|---|---|---|---|
| Maximum Voltages and Current ($T_a$ = 25 °C) | | | |
| Collector to Base Voltage | $V_{CBO}$ | −40 | V |
| Collector to Emitter Voltage | $V_{CEO}$ | −40 | V |
| Emitter to Base Voltage | $V_{EBO}$ | −5 | V |
| Collector Current (DC) | $I_C$ | −200 | mA |
| Maximum Power Dissipation | | | |
| Total Power Dissipation at 25 °C Ambient Temperature | $P_T$ | 200 | mW |
| Maximum Temperatures | | | |
| Junction Temperature | $T_j$ | 150 | °C |
| Storage Temperature Range | $T_{stg}$ | −55 to +150 | °C |

### ELECTRICAL CHARACTERISTICS ($T_a$ = 25 °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 | 180 | 300 | | $V_{CE}$ = −1.0 V, $I_C$ = −10 mA |
| DC Current Gain | $h_{FE2}$* | 25 | 100 | | | $V_{CE}$ = −10 V, $I_C$ = −100 mA |
| Collector Saturation Voltage | $V_{CE(sat)}$* | | −0.1 | −0.4 | V | $I_C$ = −50 mA, $I_B$ = −5.0 mA |
| Base Saturation Voltage | $V_{BE(sat)}$* | | −0.8 | −0.95 | V | $I_C$ = −50 mA, $I_B$ = −5.0 mA |
| Gain Bandwidth Product | $f_T$ | 200 | 510 | | MHz | $V_{CE}$ = −20 V, $I_E$ = 10 mA |
| Output Capacitance | $C_{ob}$ | | 2.5 | 4.5 | 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 | $t_{stg}$ | | 110 | 225 | ns | $I_C$ = −10 mA |
| Turn-off Time | $t_{off}$ | | | 300 | ns | $I_{B1}$ = −$I_{B2}$ = −1.0 mA |

* Pulsed: PW ≦ 350 μs, Duty Cycle ≦ 2 %

$h_{FE}$ Classification

| MARKING | Y22 | Y23 | Y24 |
|---|---|---|---|
| $h_{FE1}$ | 75 to 150 | 100 to 200 | 150 to 300 |



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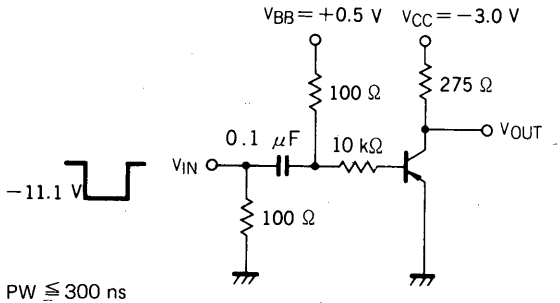
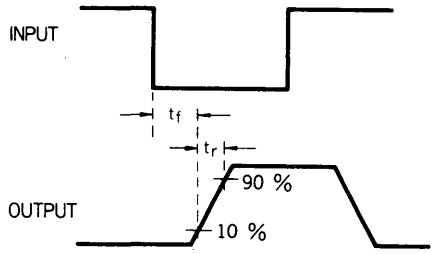
## SWITCHING TIME TEST CIRCUIT

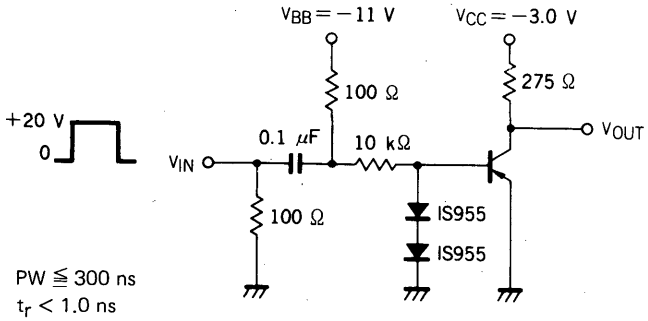



PW ≦ 300 ns
$t_r$ < 1.0 ns
$Z_{IN}$ = 50 Ω
Duty Cycle = 2 %

**$t_{on}$ SWITCHING**

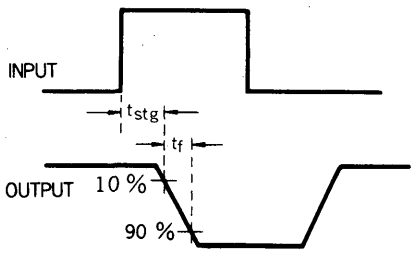



**VOLTAGE WAVEFORMS**




PW ≦ 300 ns
$t_r$ < 1.0 ns
Duty Cycle = 2 %

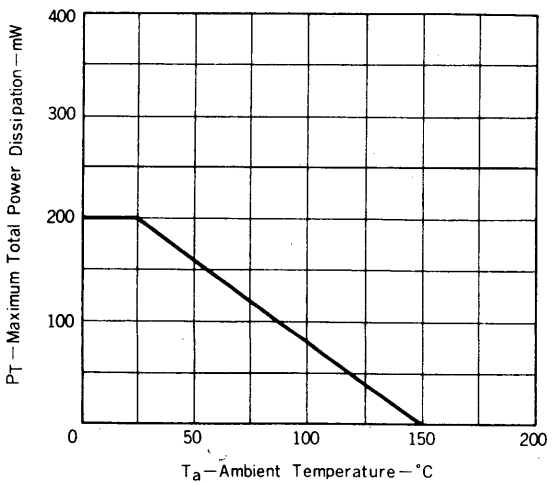
**$t_{off}$ SWITCHING**



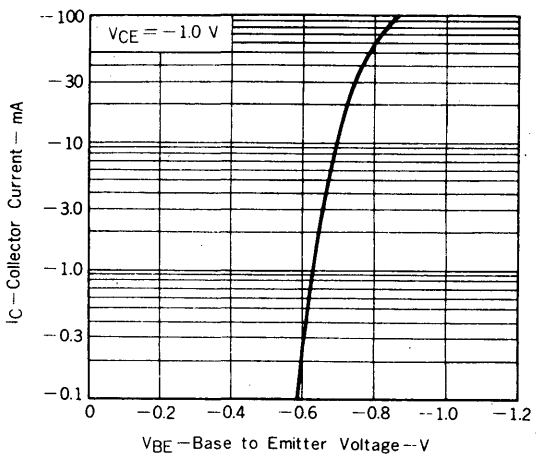

**VOLTAGE WAVEFORMS**

## TYPICAL CHARACTERISTICS ($T_a$ = 25 °C)

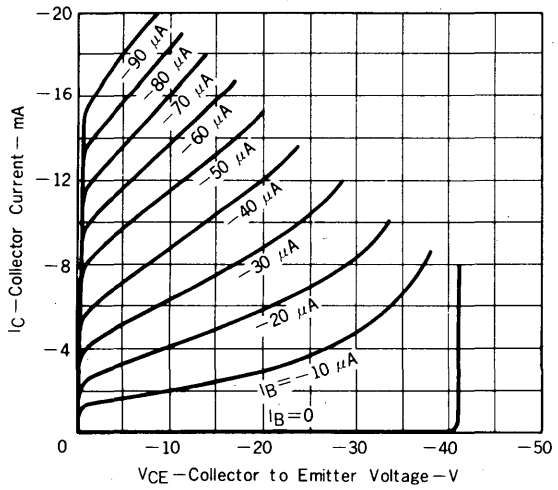
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



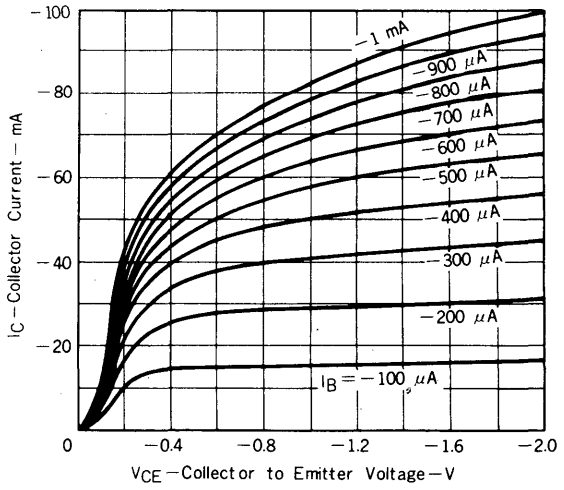

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



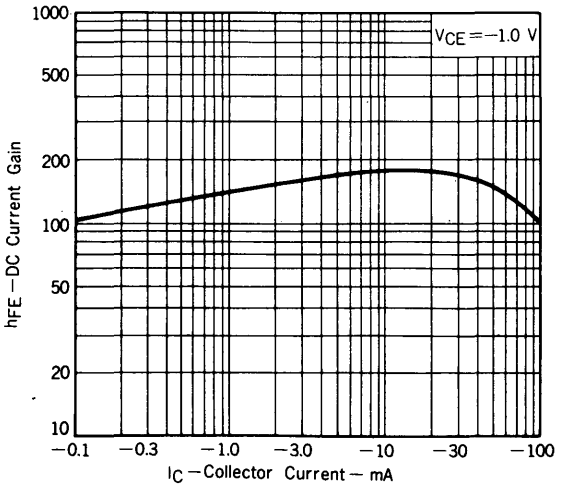
COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



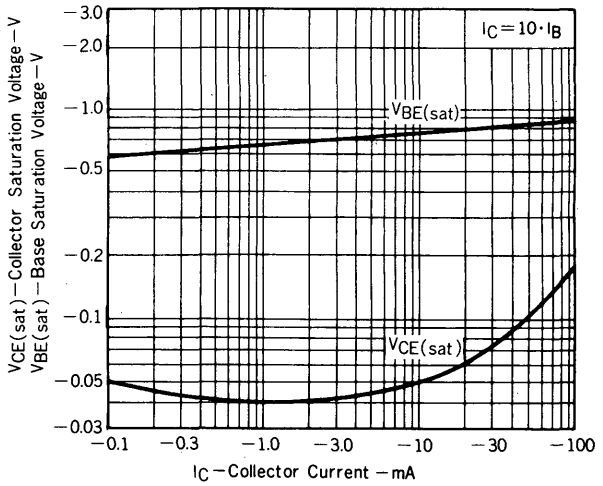

COLLECTOR CURRENT vs.
COLLECTOR TO EMITTER VOLTAGE



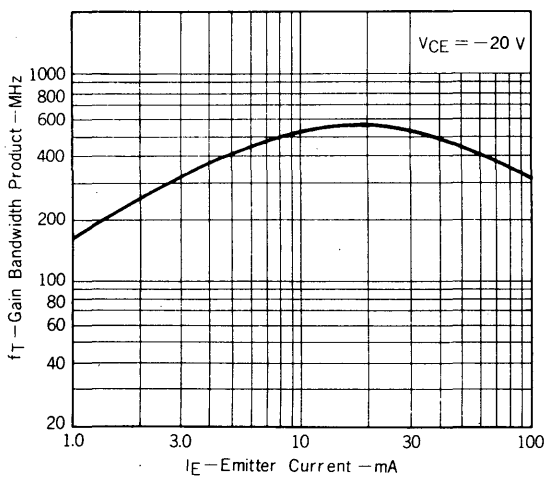

DC CURRENT GAIN vs.
COLLECTOR CURRENT



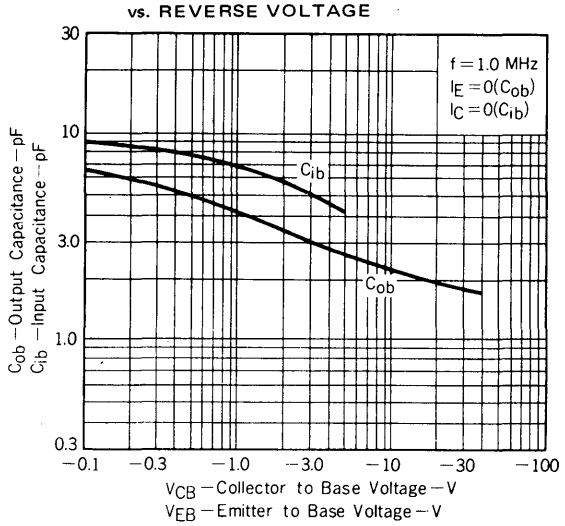

BASE AND COLLECTOR SATURATION VOLTAGE
vs. COLLECTOR CURRENT



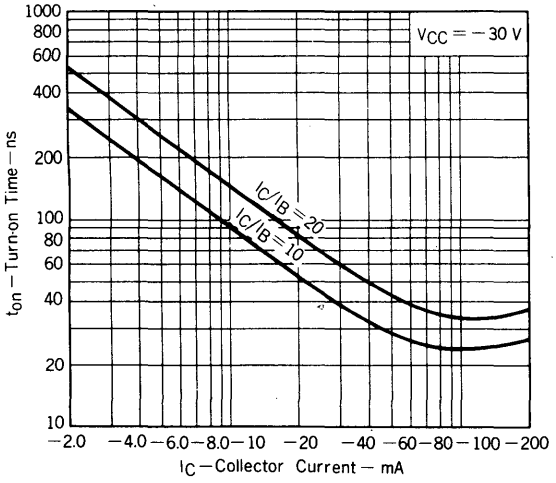

GAIN BANDWIDTH PRODUCT
vs. EMITTER CURRENT



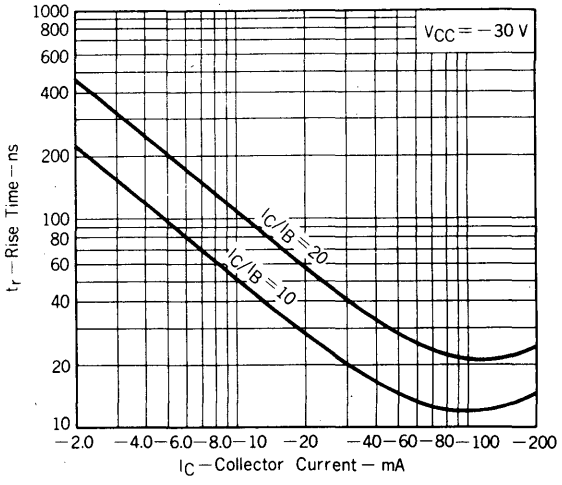

INPUT AND OUTPUT CAPACITANCE
vs. REVERSE VOLTAGE



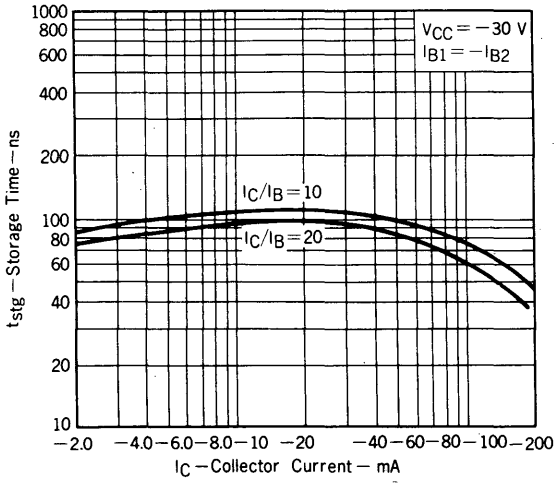
TURN-ON TIME vs.
COLLECTOR CURRENT



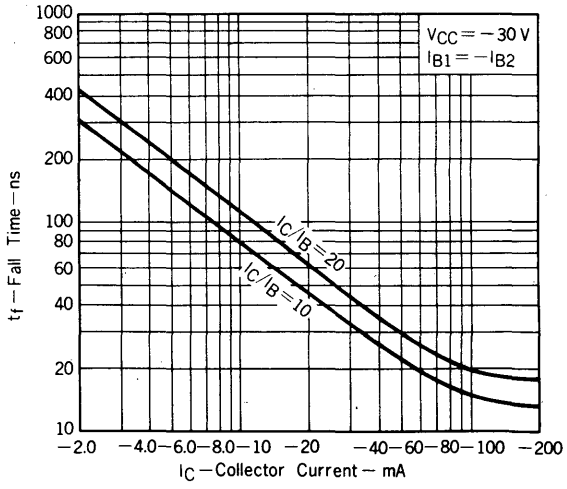

RISE TIME vs.
COLLECTOR CURRENT




STORAGE TIME vs.
COLLECTOR CURRENT




FALL TIME vs.
COLLECTOR CURRENT





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