## ELECTRICAL CHARACTERISTICS ($T_A$ = +25°C)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|---|---|---|---|---|---|---|
| DC Characteristics | | | | | | |
| Collector Cut-off Current | $I_{CBO}$ | $V_{CB}$ = 5 V, $I_E$ = 0 mA | – | – | 100 | nA |
| Emitter Cut-off Current | $I_{EBO}$ | $V_{EB}$ = 1 V, $I_C$ = 0 mA | – | – | 100 | nA |
| DC Current Gain | $h_{FE}$ Note 1 | $V_{CE}$ = 2 V, $I_C$ = 5 mA | 130 | 190 | 260 | – |
| RF Characteristics | | | | | | |
| Gain Bandwidth Product | $f_T$ | $V_{CE}$ = 3 V, $I_C$ = 20 mA, f = 2 GHz | 20 | 25 | – | GHz |
| Insertion Power Gain | $\|S_{21e}\|^2$ | $V_{CE}$ = 3 V, $I_C$ = 20 mA, f = 2 GHz | 16.0 | 18.0 | – | dB |
| Noise Figure (1) | NF | $V_{CE}$ = 2 V, $I_C$ = 5 mA, f = 2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$ | – | 0.8 | 1.1 | dB |
| Noise Figure (2) | NF | $V_{CE}$ = 2 V, $I_C$ = 5 mA, f = 5.2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$ | – | 1.3 | – | dB |
| Associated Gain (1) | $G_a$ | $V_{CE}$ = 2 V, $I_C$ = 5 mA, f = 2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$ | 15.0 | 17.0 | – | dB |
| Associated Gain (2) | $G_a$ | $V_{CE}$ = 2 V, $I_C$ = 5 mA, f = 5.2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$ | – | 10.0 | – | dB |
| Reverse Transfer Capacitance | $C_{re}$ Note 2 | $V_{CB}$ = 2 V, $I_E$ = 0 mA, f = 1 MHz | – | 0.15 | 0.25 | pF |
| Maximum Stable Power Gain | MSG Note 3 | $V_{CE}$ = 3 V, $I_C$ = 20 mA, f = 2 GHz | 19.0 | 21.5 | – | dB |
| Gain 1 dB Compression Output Power | $P_{O(1\ dB)}$ | $V_{CE}$ = 3 V, $I_C$ = 20 mA, f = 2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$ | – | 13 | – | dBm |
| 3rd Order Intermodulation Distortion Output Intercept Point | $OIP_3$ | $V_{CE}$ = 3 V, $I_C$ = 20 mA, f = 2 GHz, $Z_S = Z_{Sopt}$, $Z_L = Z_{Lopt}$ | – | 23 | – | dBm |

**Notes 1.** Pulse measurement: PW ≤ 350 μs, Duty Cycle ≤ 2%

**2.** Collector to base capacitance when the emitter grounded

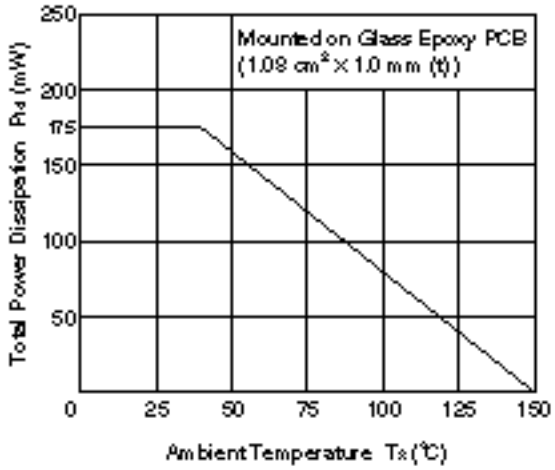
**3.** $MSG = \left| \frac{S_{21}}{S_{12}} \right|$

## $h_{FE}$ CLASSIFICATION

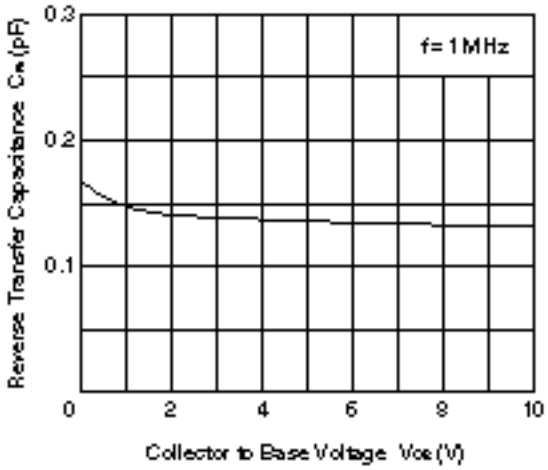
| Rank | FB |
|---|---|
| Marking | T1H |
| $h_{FE}$ Value | 130 to 260 |

## TYPICAL CHARACTERISTICS ($T_A$ = +25°C, unless otherwise specified)

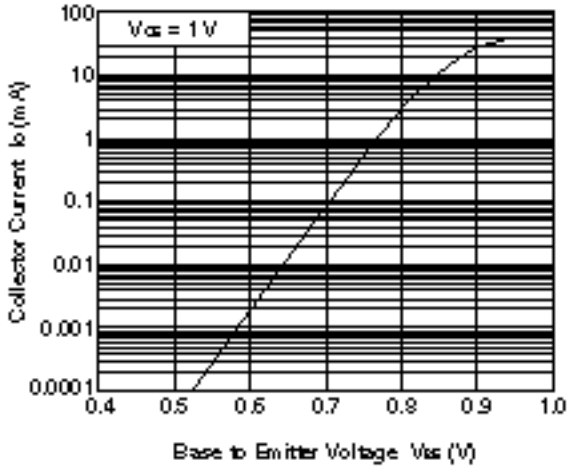
TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE



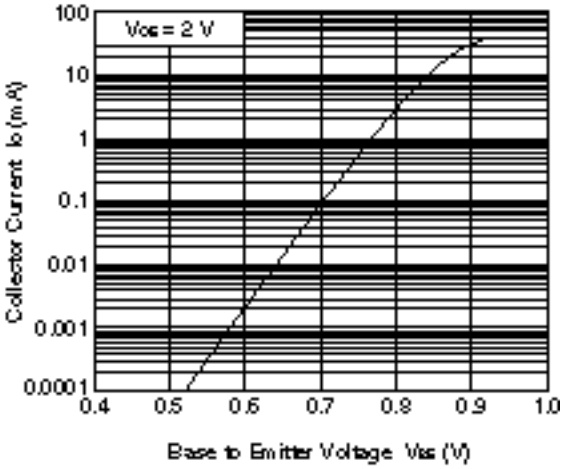

REVERSE TRANSFER CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE



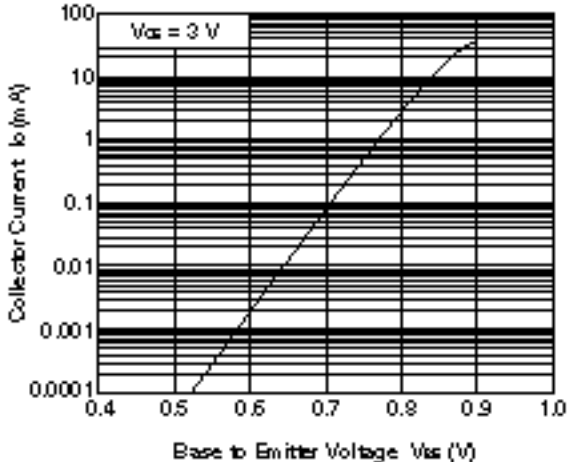

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



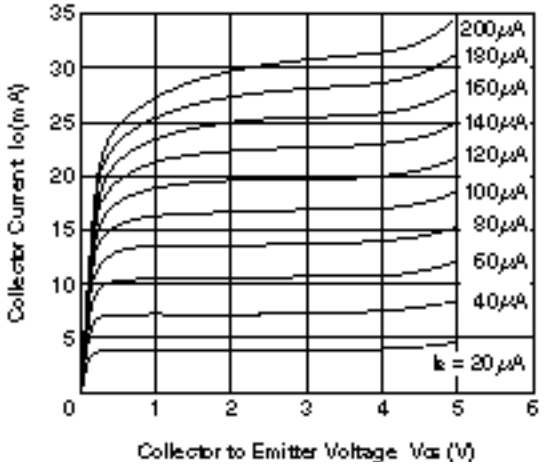

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



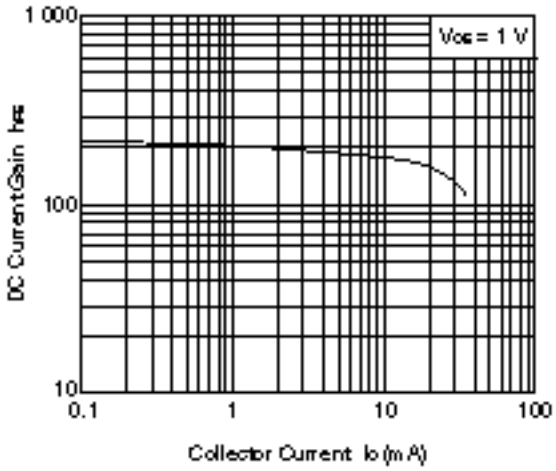

COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE



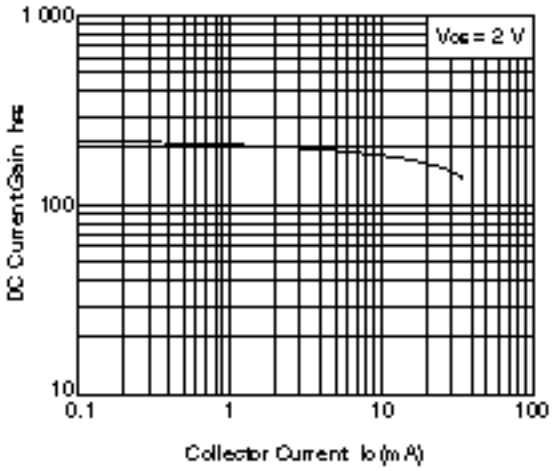

COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE



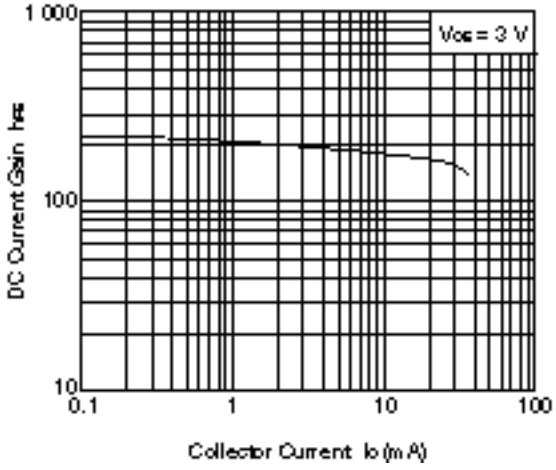
DC CURRENT GAIN vs.
COLLECTOR CURRENT



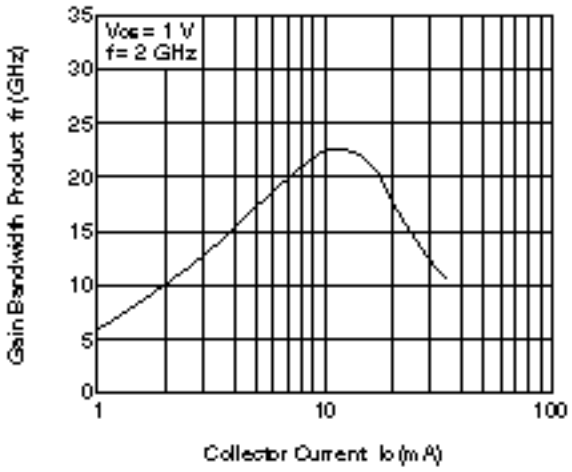

DC CURRENT GAIN vs.
COLLECTOR CURRENT



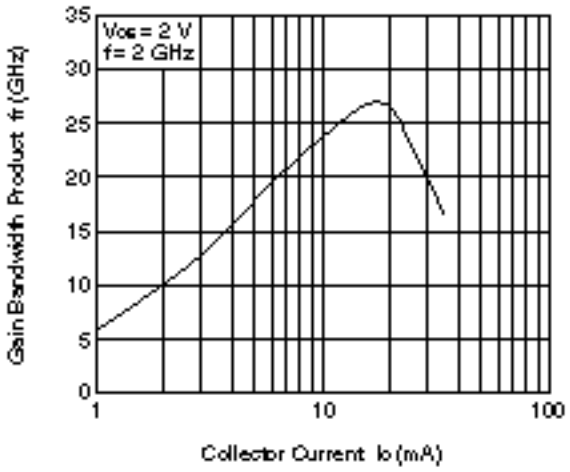

DC CURRENT GAIN vs.
COLLECTOR CURRENT



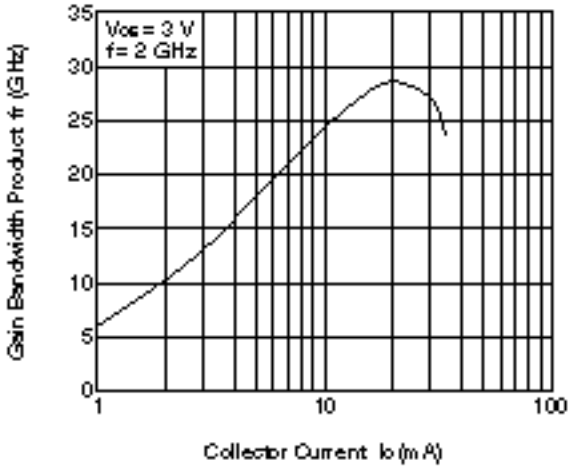
GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



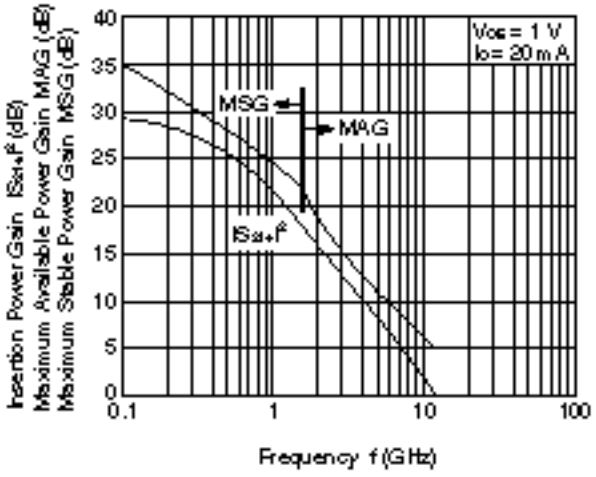

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



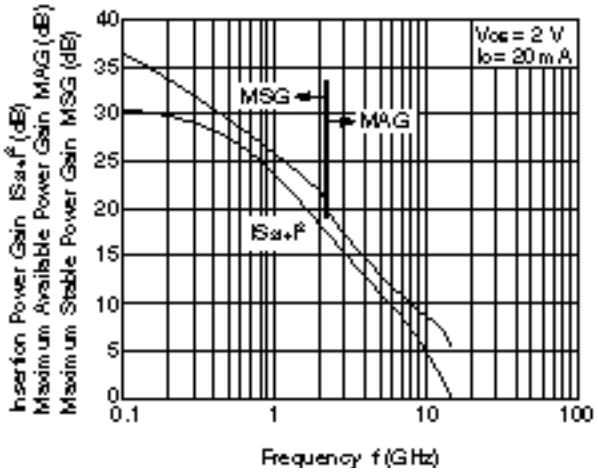

GAIN BANDWIDTH PRODUCT
vs. COLLECTOR CURRENT



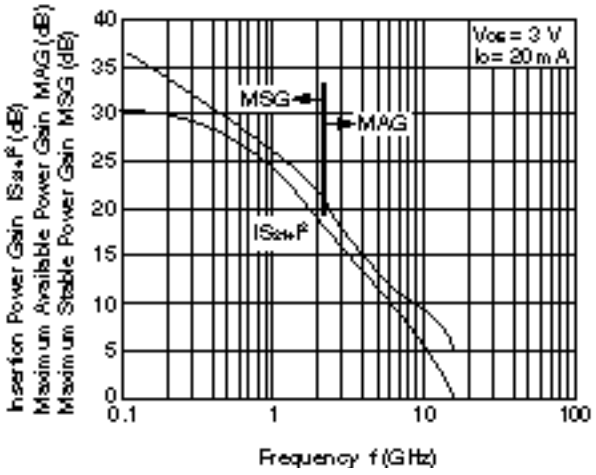

INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



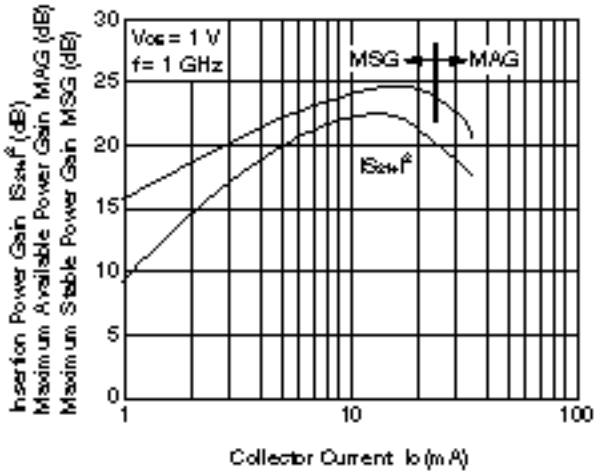

INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



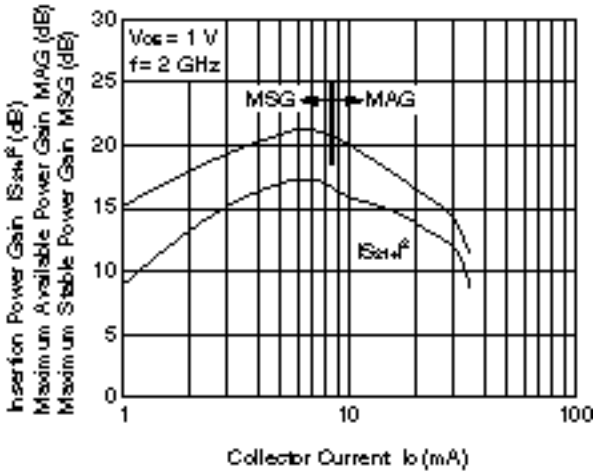

INSERTION POWER GAIN,
MAG, MSG vs. FREQUENCY



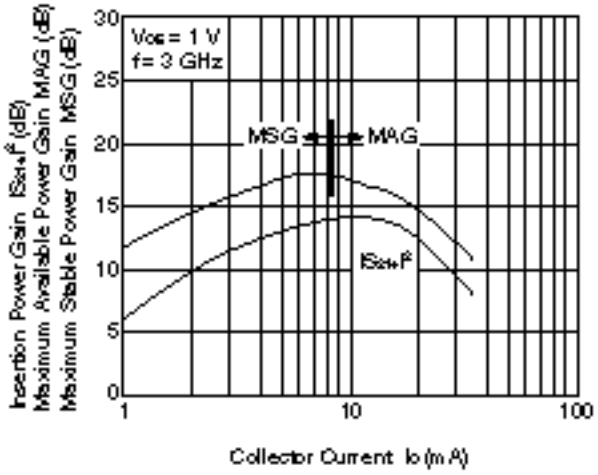
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



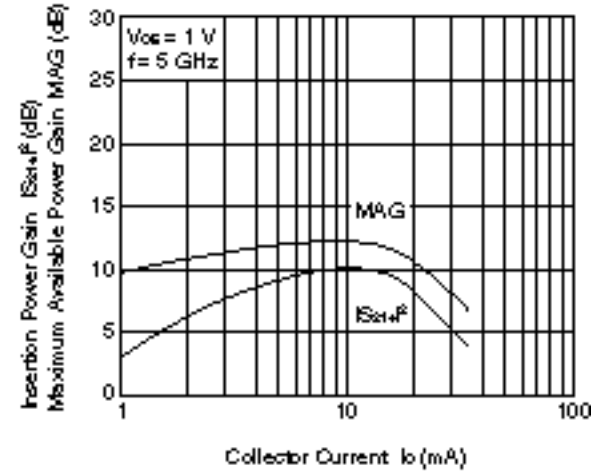

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



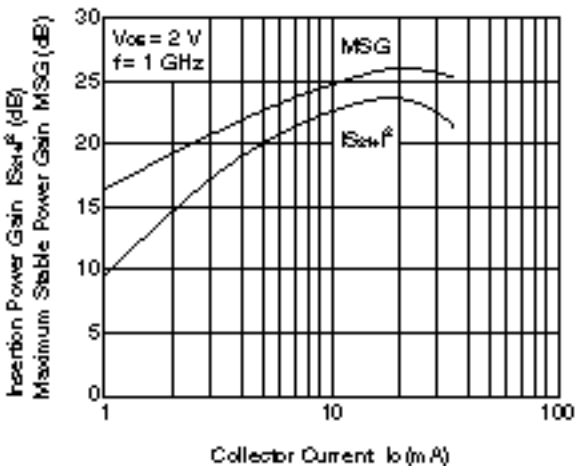

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



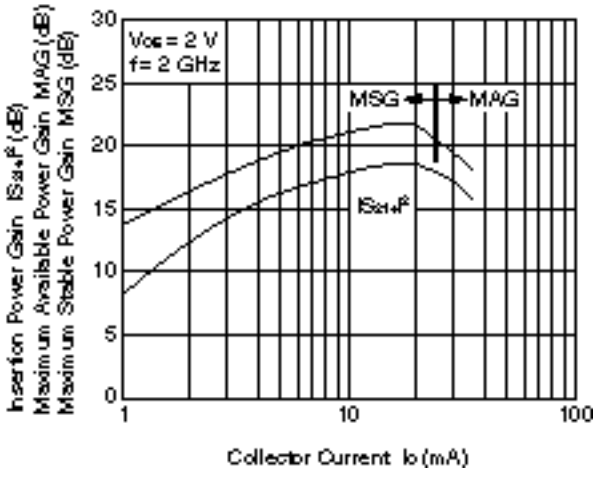

INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



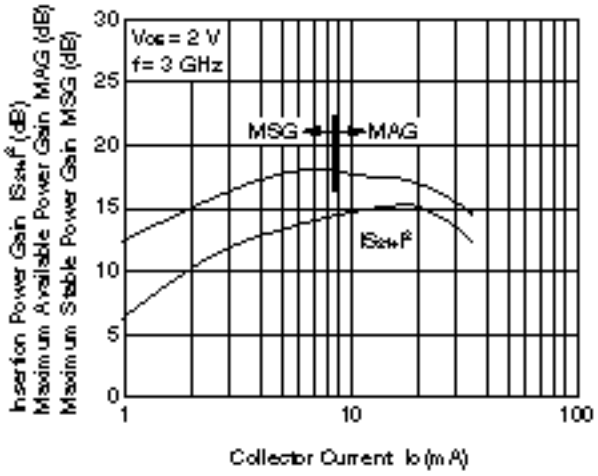

INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



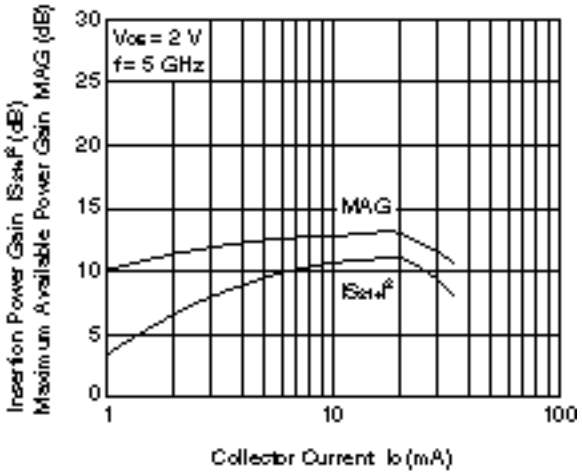

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



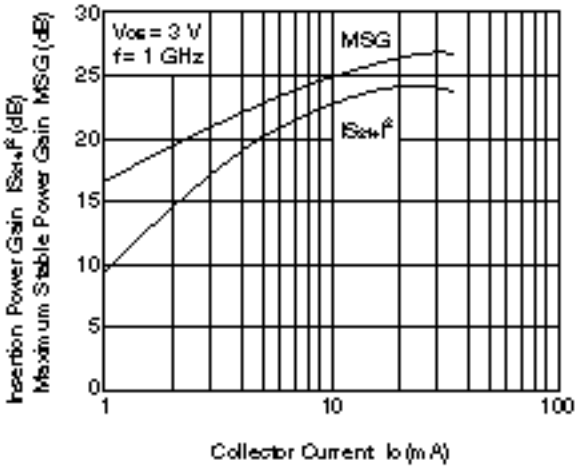
INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



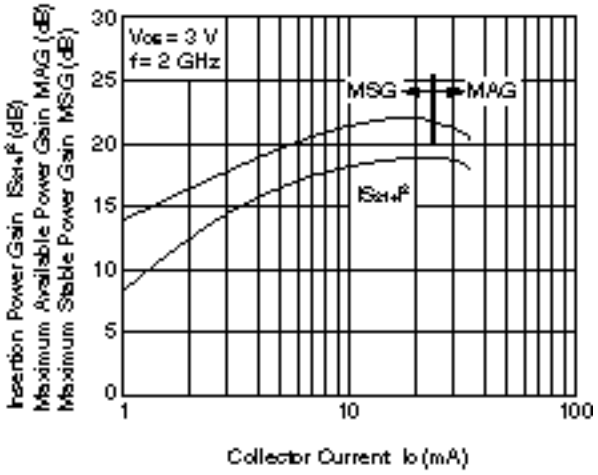

INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



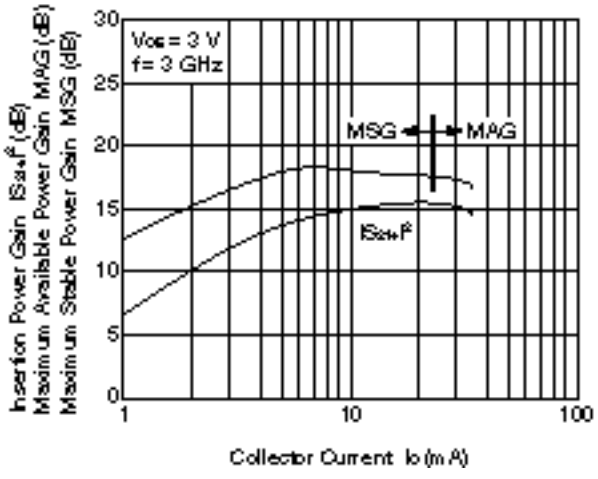

INSERTION POWER GAIN, MSG
vs. COLLECTOR CURRENT



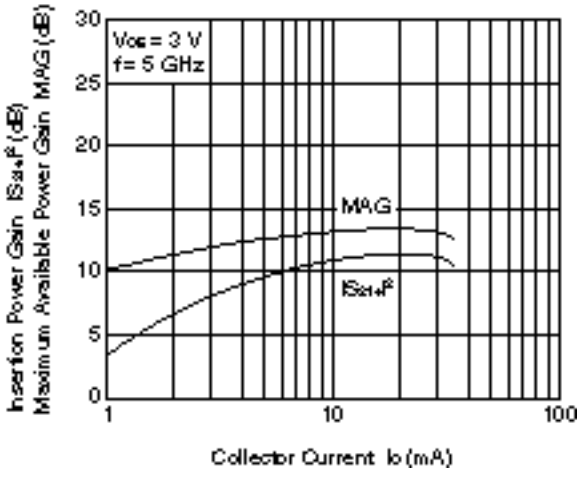

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



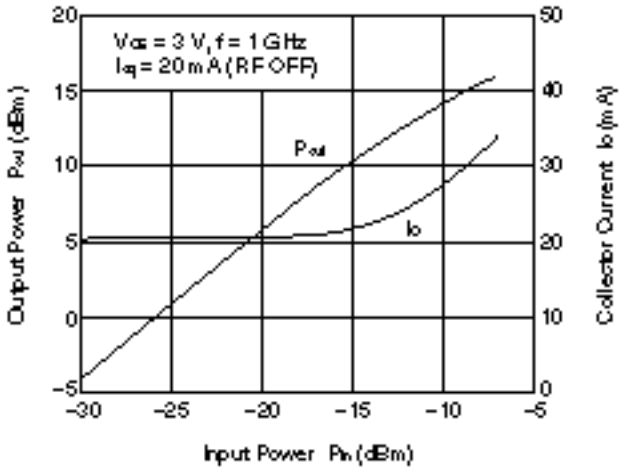

INSERTION POWER GAIN, MAG, MSG
vs. COLLECTOR CURRENT



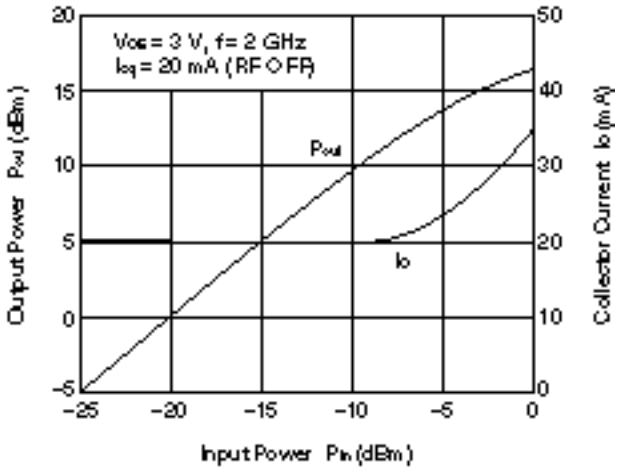

INSERTION POWER GAIN, MAG
vs. COLLECTOR CURRENT



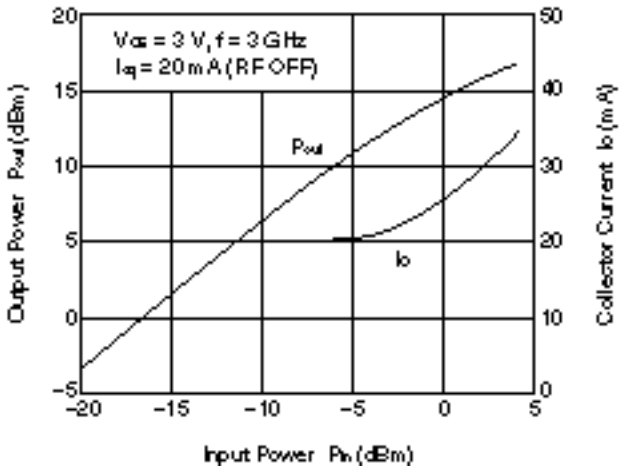
OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



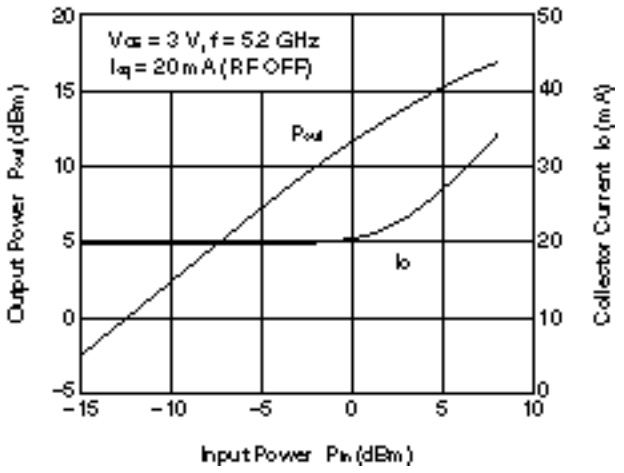

OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



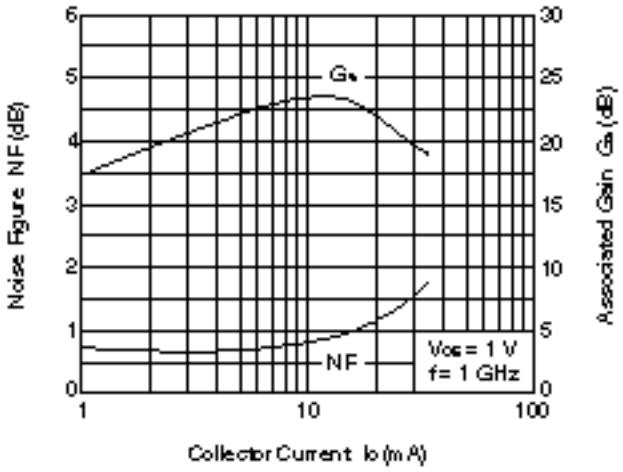

OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



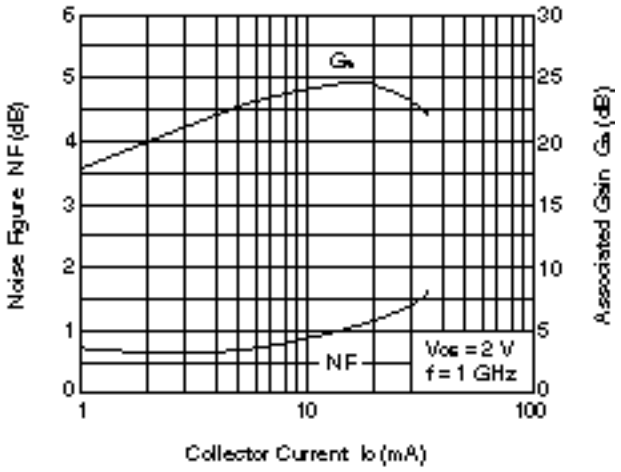

OUTPUT POWER, COLLECTOR CURRENT vs. INPUT POWER



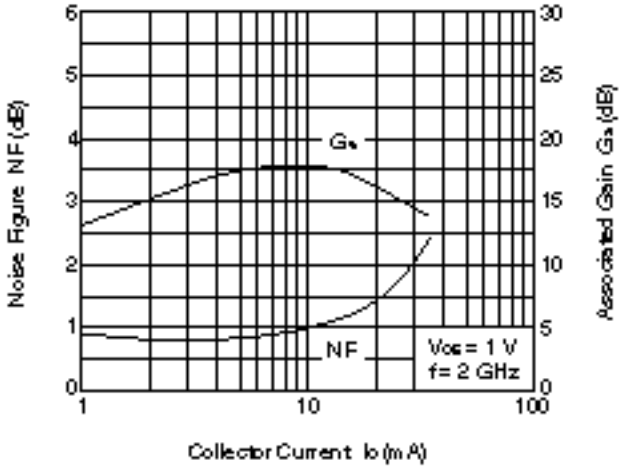
NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



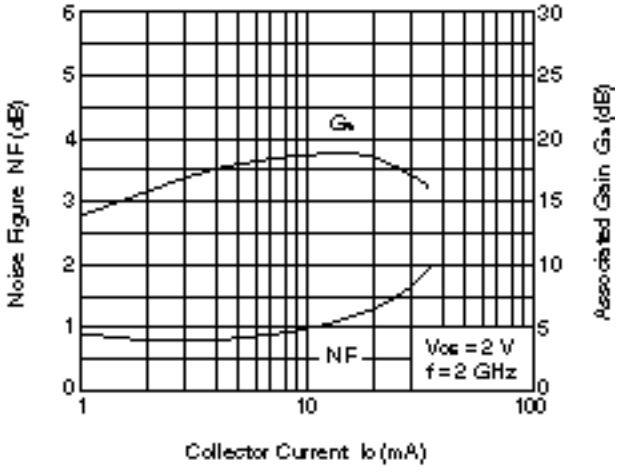

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



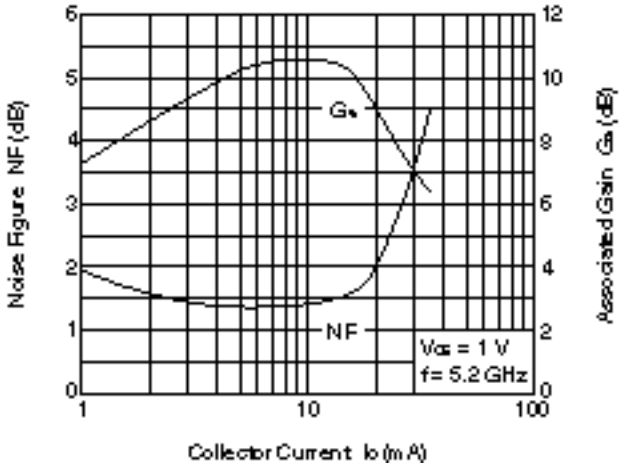

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



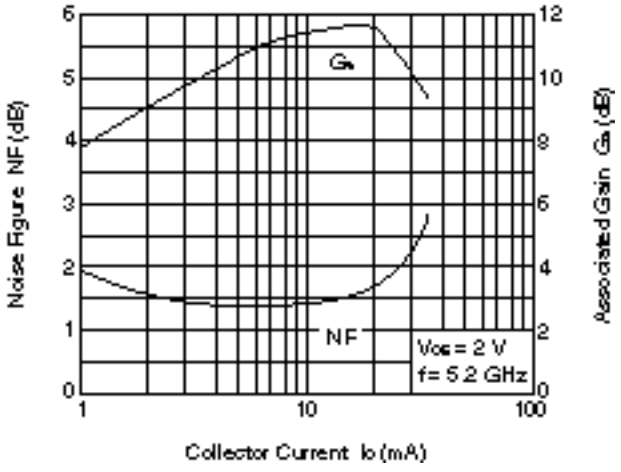

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



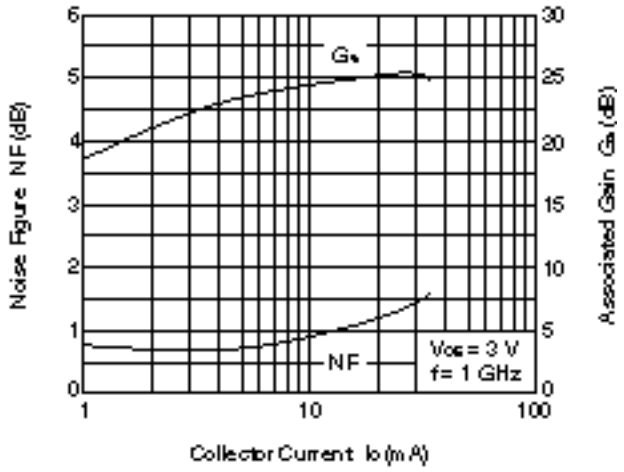

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



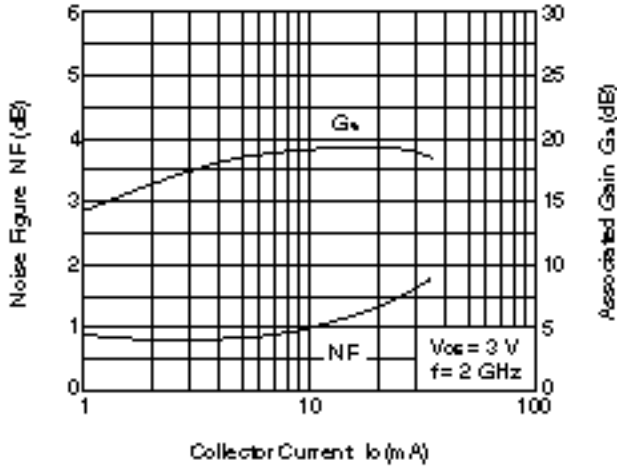

NOISE FIGURE, ASSOCIATED GAIN vs. COLLECTOR CURRENT



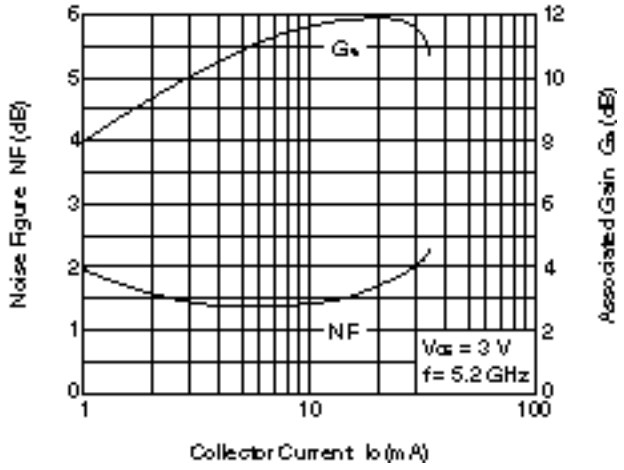
NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT




NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT




NOISE FIGURE, ASSOCIATED GAIN
vs. COLLECTOR CURRENT



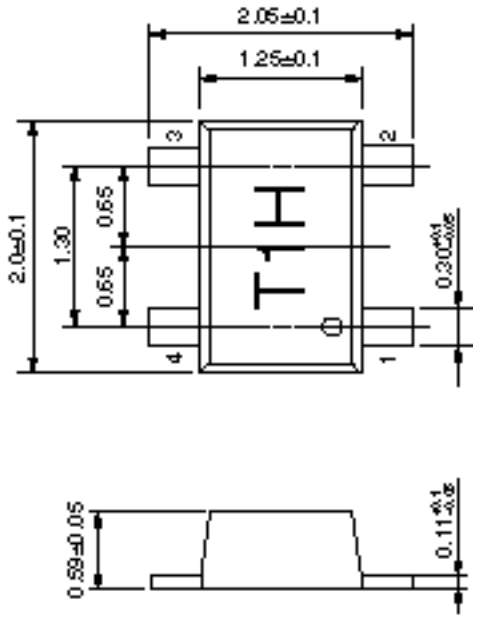

**Remark** The graphs indicate nominal characteristics.

## S-PARAMETERS

- S-parameters and noise parameters are provided on our Web site in a format (S2P) that enables the direct import of the parameters to microwave circuit simulators without the need for keyboard inputs.
- Click here to download S-parameters.
- [RF and Microwave] ® [Device Parameters]
- URL http://www.necel.com/microwave/en/

**PACKAGE DIMENSIONS**

**FLAT-LEAD 4-PIN THIN-TYPE SUPER MINIMOLD (M05) (UNIT: mm)**




PIN CONNECTIONS

1. Base
2. Emitter
3. Collector
4. Emitter