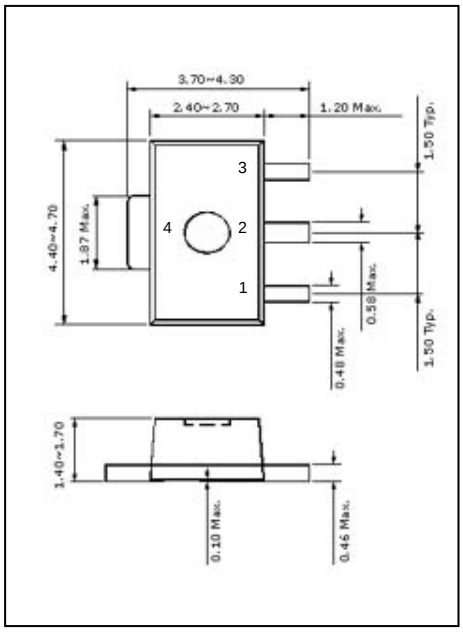
AUK Semiconductor

# THN5702F

**SiGe NPN Transistor**

**SOT-89** **Unit in mm**




## ☐ *Applications*

- VHF and UHF wide band amplifier

## ☐ *Features*

- Medium power(800mW, 1W) application
- Power gain

$G_P$ = 14 dB at $V_{CE}$ = 3.6 V, f = 460 MHz, $P_{IN}$ = 0 dBm

$G_P$ = 15 dB at $V_{CE}$ = 4.5 V, f = 460 MHz, $P_{IN}$ = 0 dBm

$G_P$ = 15 dB at $V_{CE}$ = 6.0 V, f = 460 MHz, $P_{IN}$ = 0 dBm

$G_P$ = 16 dB at $V_{CE}$ = 3.0 V, f = 434 MHz, $P_{IN}$ = 0 dBm

- Output power

$P_{OUT}$ = 29 dBm at $V_{CE}$ = 3.6 V, $I_{CQ}$ = 30 mA, f = 460 MHz

$P_{OUT}$ = 30 dBm at $V_{CE}$ = 4.5 V, $I_{CQ}$ = 50 mA, f = 460 MHz

$P_{OUT}$ = 31 dBm at $V_{CE}$ = 6.0 V, $I_{CQ}$ = 30 mA, f = 460 MHz

$P_{OUT}$ = 25 dBm at $V_{CE}$ = 3.0 V, $I_{CQ}$ = 50 mA, f = 434 MHz

### Pin Configuration

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

## ☐ *Absolute Maximum Ratings* ($T_A$ = 25 ℃)

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Collector to Base Breakdown Voltage | $BV_{CBO}$ | 15 | V |
| Collector to Emitter Breakdown Voltage | $BV_{CEO}$ | 10 | V |
| Emitter to Base Breakdown Voltage | $BV_{EBO}$ | 1.5 | V |
| Collector Current | $I_C$ | 800 | mA |
| Total Power Dissipation | $P_{tot}$ | 1.5 | W |
| Junction Temperature | $T_j$ | 150 | ℃ |
| Storage Temperature | $T_{stg}$ | -65 ~ 150 | ℃ |

## ☐ *Thermal Characteristics*

| Symbol | Parameter | Value | Unit |
|---|---|---|---|
| $R_{th\ j\text{-}a}$ | Thermal Resistance from Junction to Ambient | 80 | K/W |

## ☐ *Electrical Characteristics* ($T_A$ = 25 ℃)

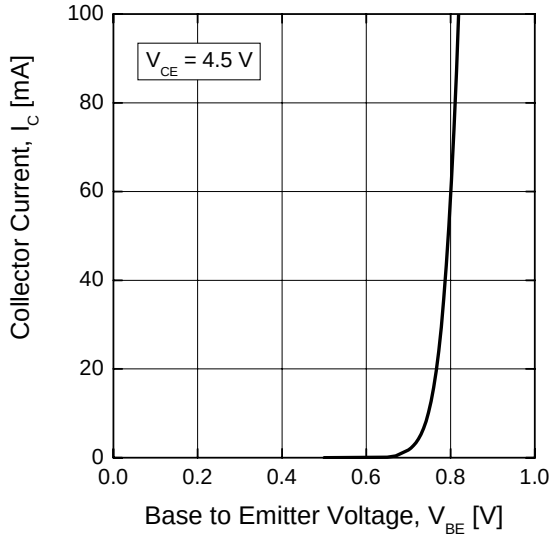
| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Collector Cut-off Current | $I_{CBO}$ | $V_{CB}$ = 13 V, $I_E$ = 0 mA | - | - | 2.5 | ㎂ |
| | $I_{CEO}$ | $V_{CE}$ = 7 V, $I_B$ = 0 mA | - | - | 1.5 | ㎂ |
| Emitter Cut-off Current | $I_{EBO}$ | $V_{EB}$ = 1.0 V, $I_C$ = 0 mA | - | - | 1.5 | ㎂ |
| DC Current Gain | $h_{FE}$ | $V_{CE}$ = 4.5 V, $I_C$ = 150 mA | 40 | | 300 | |
| Power Gain | $G_P$ | $V_{CE}$ = 3.6 V, $I_C$ = 30 mA(RF off), f = 460 MHz, $P_{IN}$=0dBm | 12 | 14 | - | dB |
| | | $V_{CE}$ = 4.5 V, $I_C$ = 50 mA(RF off), f = 460 MHz, $P_{IN}$=0dBm | 13 | 15 | - | dB |
| | | $V_{CE}$ = 6.0 V, $I_C$ = 30 mA(RF off), f = 460 MHz, $P_{IN}$=0dBm | 13 | 15 | - | dB |
| | | $V_{CE}$ = 3.0 V, $I_C$ = 50 mA(RF off), f = 434 MHz, $P_{IN}$=0dBm | 14 | 16 | - | dB |
| Output Power | $P_{OUT}$ | $V_{CE}$ = 3.6 V, $I_C$ = 30 mA(RF off), f = 460 MHz, $P_{IN}$=15dBm | 27 | 29 | - | dBm |
| | | $V_{CE}$ = 4.5 V, $I_C$ = 50 mA(RF off), f = 460 MHz, $P_{IN}$=15dBm | 28 | 30 | - | dBm |
| | | $V_{CE}$ = 6.0 V, $I_C$ = 30 mA(RF off), f = 460 MHz, $P_{IN}$=15dBm | 29 | 31 | - | dBm |
| | | $V_{CE}$ = 3.0 V, $I_C$ = 50 mA(RF off), f = 434 MHz, $P_{IN}$=10dBm | 23 | 25 | - | dBm |
| Reverse Transfer Capacitance | $C_{re}$ | $V_{CB}$ = 4.5 V, $I_E$ = 0 mA, f = 1 MHz | - | 6.5 | 8.0 | pF |

## ☐ *$h_{FE}$ Classification*

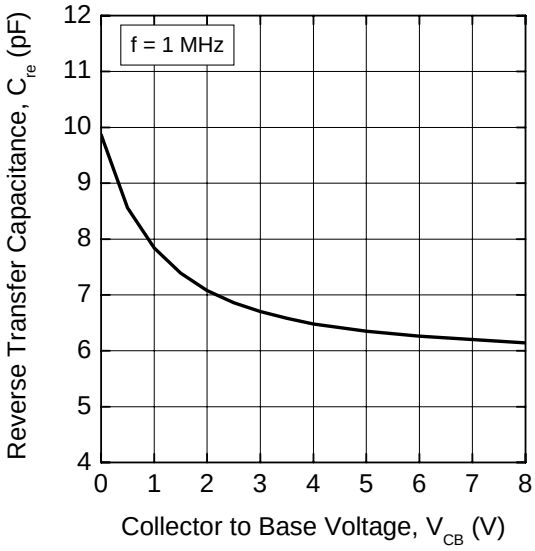
| Marking | PC1 | PC2 |
|---|---|---|
| $h_{FE}$ Value | 40 - 200 | 170 - 300 |

## □ *Typical Characteristics ( $T_A$ = 25 ℃, unless otherwise specified)*

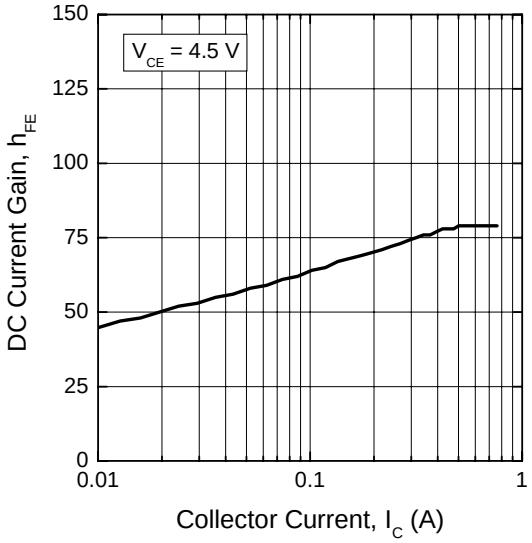
**Collector Current**
**vs. Base to Emitter Voltage**



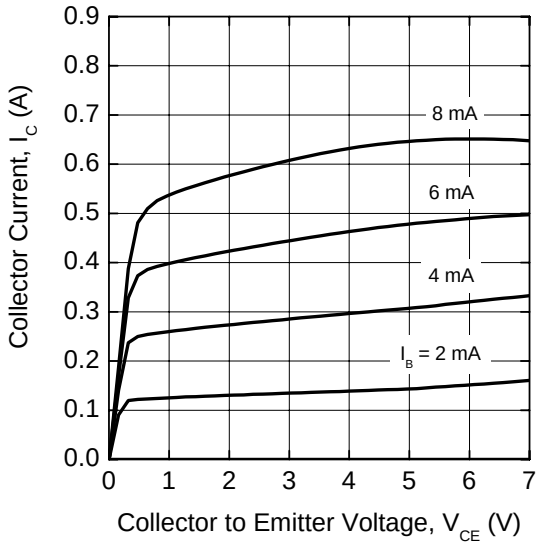

**Reverse Transfer Capacitance**
**vs. Collector to Base Voltage**




**DC Current Gain**
**vs. Collector Current**



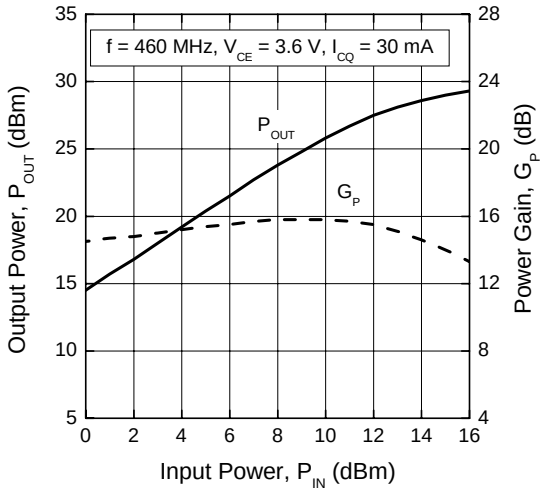

**Collector Current**
**vs. Collector to Emitter Voltage**



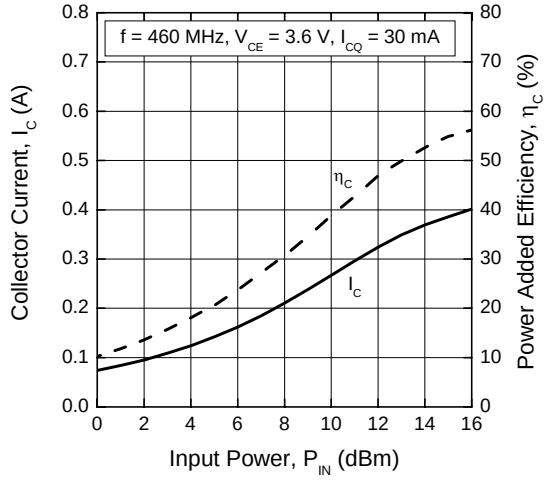
## ☐ *Application Information ( at f = 460 MHz )*

| Operation Mode | f (MHz) | $V_{CE}$ (V) | $P_{OUT}$ (dBm) | $G_P$ (dB) | $\eta_C$ (%) |
|---|---|---|---|---|---|
| CW, class-AB | 460 | 3.6 | 29.0 | 14.0 | 54.9 |

**Output Power or Power Gain vs. Input Power**

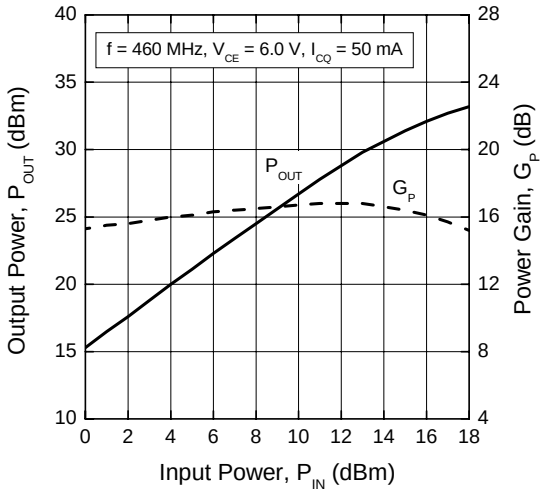



**Collector Current or Power Added Efficiency vs. Input Power**

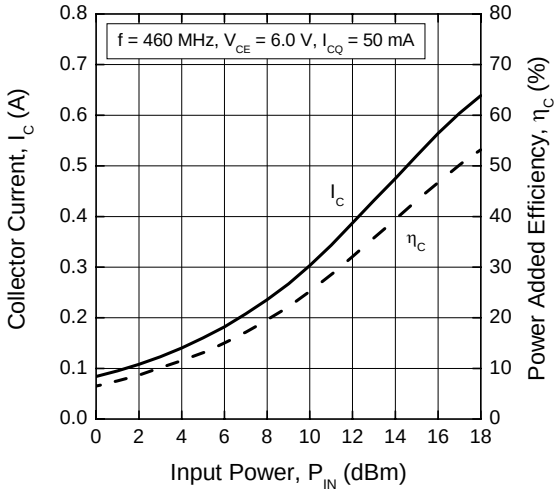



| Operation Mode | f (MHz) | $V_{CE}$ (V) | $P_{OUT}$ (dBm) | $G_P$ (dB) | $\eta_C$ (%) |
|---|---|---|---|---|---|
| CW, class-AB | 460 | 6.0 | 31.4 | 16.4 | 43.2 |

**Output Power or Power Gain vs. Input Power**



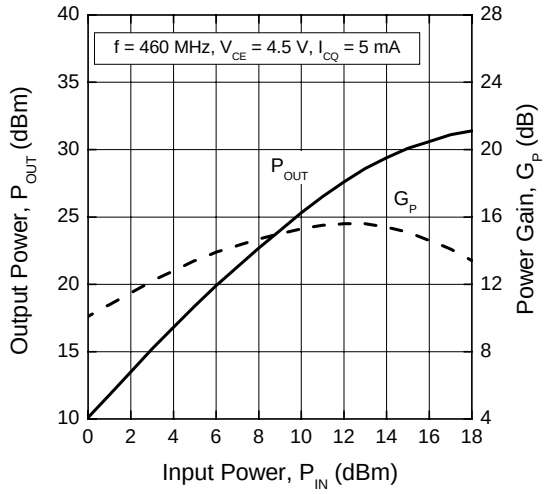

**Collector Current or Power Added Efficiency vs. Input Power**



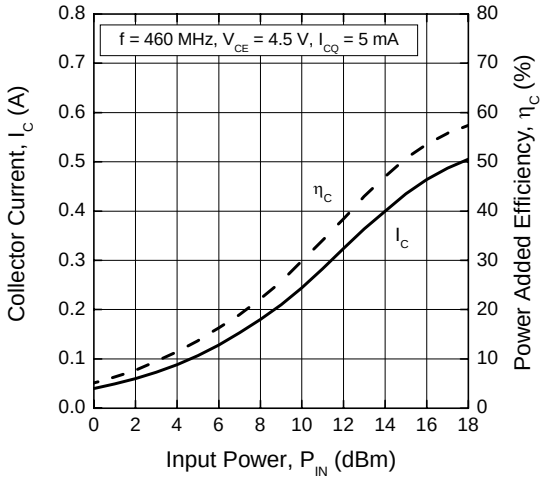
## ☐ *Application Information ( at f = 460 MHz )*

| Operation Mode | f (MHz) | $V_{CE}$ (V) | $P_{OUT}$ (dBm) | $G_P$ (dB) | $\eta_C$ (%) |
|---|---|---|---|---|---|
| CW, class-AB | 460 | 4.5 | 30.0 | 15.0 | 50.8 |

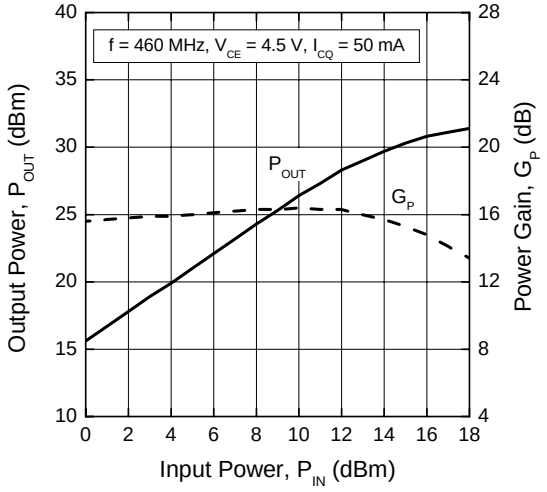
**Output Power or Power Gain vs. Input Power**



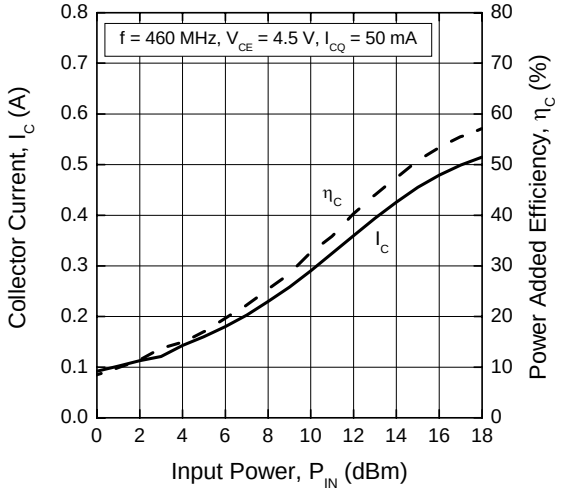

**Collector Current or Power Added Efficiency vs. Input Power**




**Output Power or Power Gain vs. Input Power**



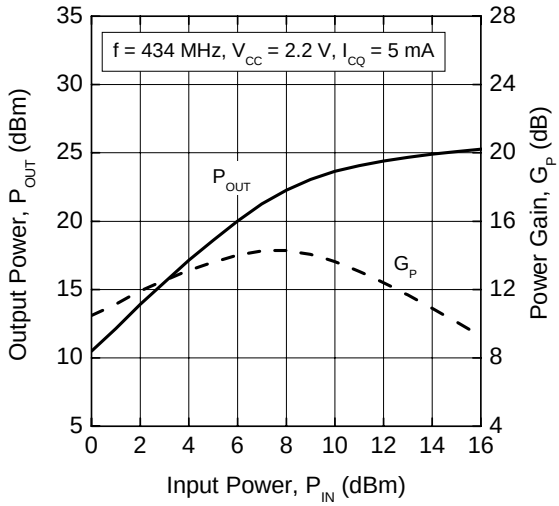

**Collector Current or Power Added Efficiency vs. Input Power**



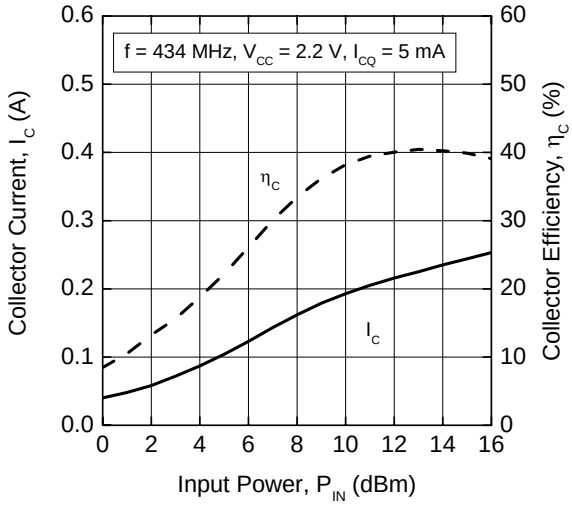
## ☐ *Application Information ( f = 434 MHz )*

| Operation Mode | f (MHz) | $V_{CE}$ (V) | $P_{OUT}$ (dBm) | $G_P$ (dB) | $\eta_C$ (%) |
|---|---|---|---|---|---|
| CW, class-AB | 434 | 2.2 | 24 | 14 | 38 |

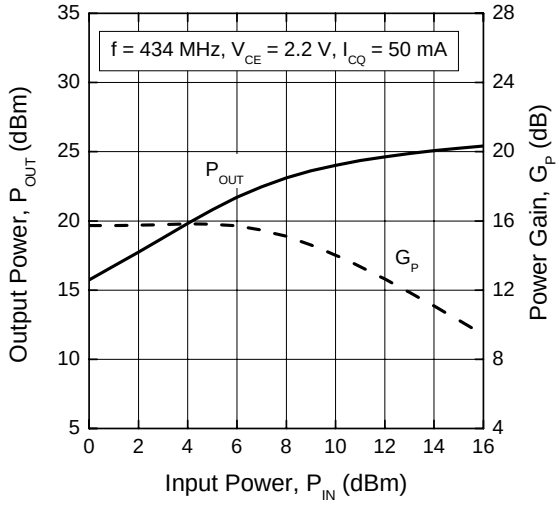
**Output Power or Power Gain vs. Input Power**



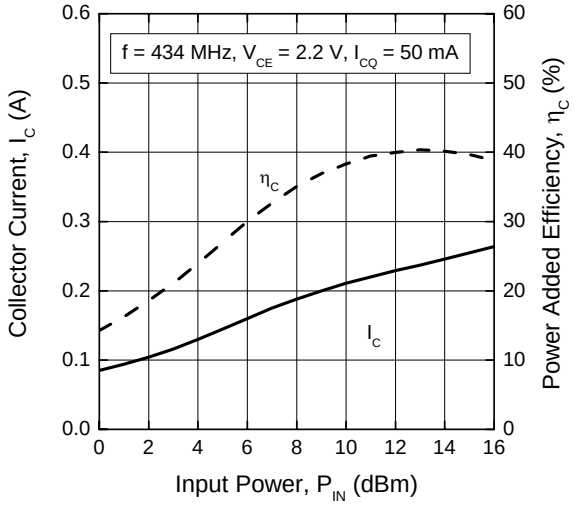

**Collector Current or Power Added Efficiency vs. Input Power**




**Output Power or Power Gain vs. Input Power**



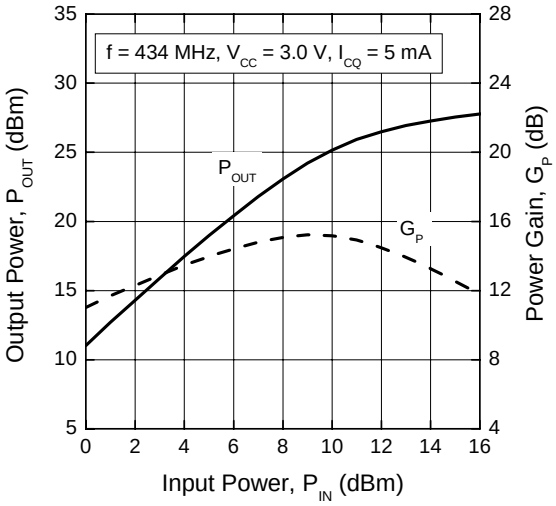

**Collector Current or Power Added Efficiency vs. Input Power**



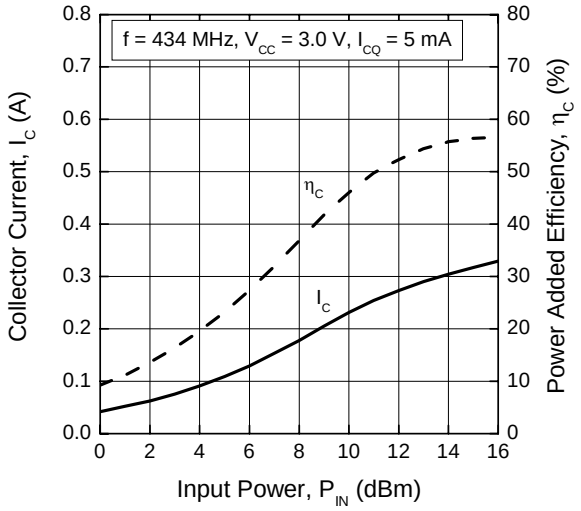
## ☐ *Application Information ( f = 434 MHz )*

| Operation Mode | f (MHz) | $V_{CE}$ (V) | $P_{OUT}$ (dBm) | $G_P$ (dB) | $\eta_C$ (%) |
|---|---|---|---|---|---|
| CW, class-AB | 434 | 3.0 | 25 | 15 | 47 |

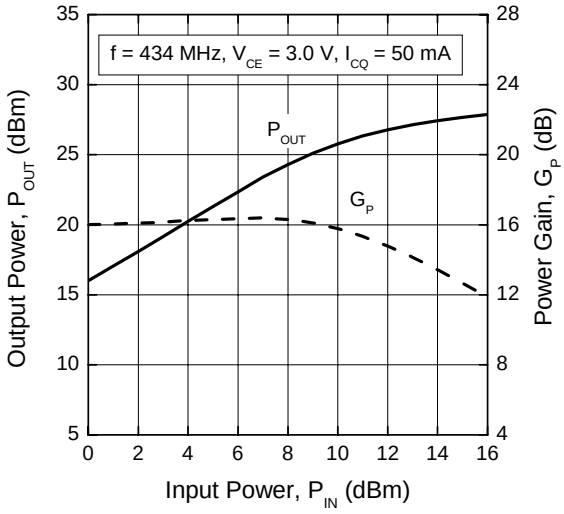
**Output Power or Power Gain vs. Input Power**



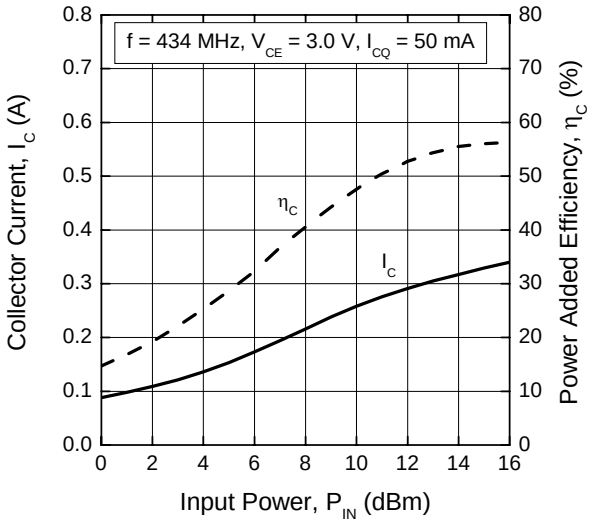

**Collector Current or Power Added Efficiency vs. Input Power**



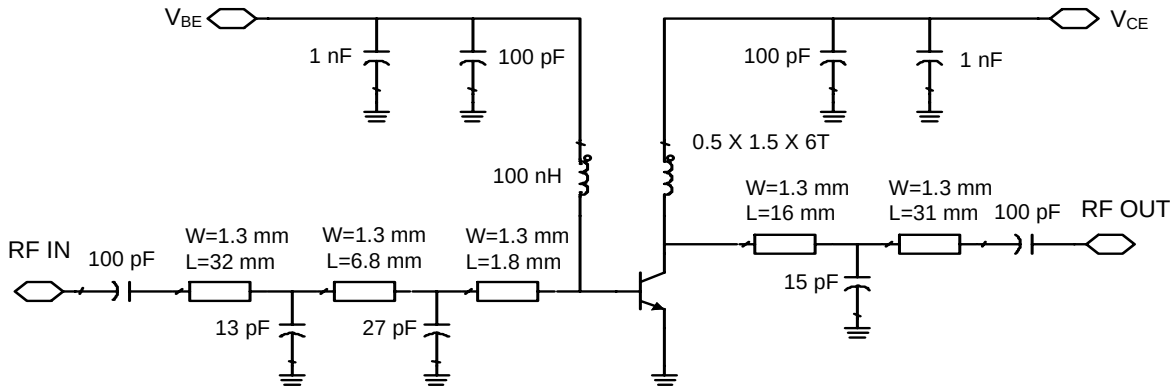

**Output Power or Power Gain vs. Input Power**



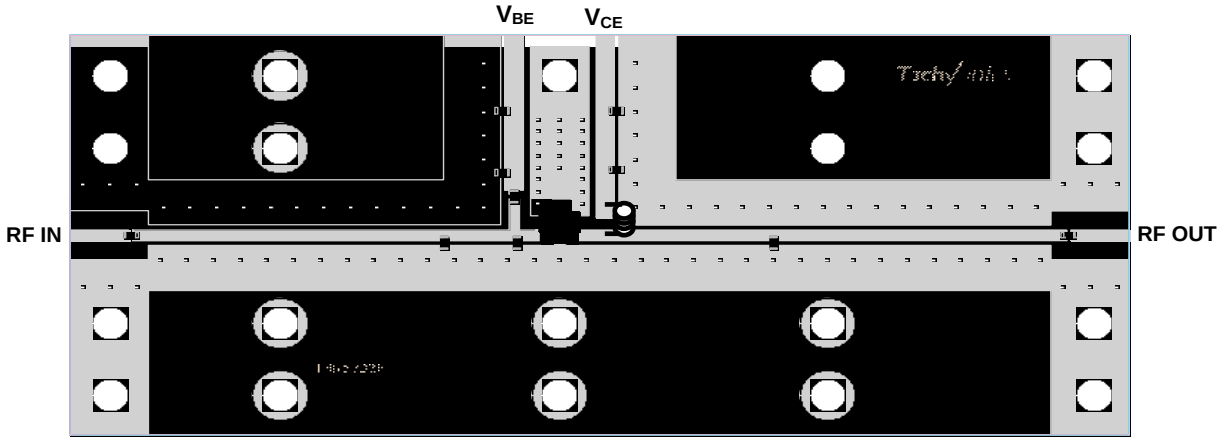

**Collector Current or Power Added Efficiency vs. Input Power**



## ☐ *Test Circuit Schematic Diagram ( f = 460 MHz, 434MHz )*




## ☐ *Evaluation Board ( f = 460 MHz, 434 MHz )*




**Notes**

1. FR4 glass epoxy: dielectric constant = 4.5, thickness = 0.8 mm
2. Evaluation board dimension = 119 x 50 $mm^2$