



## NPN SILICON HIGH FREQUENCY TRANSISTOR

### FEATURES

- **SMALL PACKAGE STYLE:**  
2 NE681 Die in a 2 mm x 1.25 mm package
- **LOW NOISE FIGURE:**  
NF = 1.4 dB TYP at 1 GHz
- **HIGH GAIN:**  
 $IS_{21EI}^2 = 12$  dB TYP at 1 GHz
- **HIGH GAIN BANDWIDTH:**  $f_T = 7$  GHz
- **LOW CURRENT OPERATION**

### DESCRIPTION

The UPA812T is two NPN high frequency silicon epitaxial transistors encapsulated in an ultra small 6 pin SMT package. Each transistor is independently mounted and easily configured for either dual transistor or cascode operation. The high  $f_T$ , low voltage bias and small size make this device suited for various hand-held wireless applications.

### ABSOLUTE MAXIMUM RATINGS<sup>1</sup> ( $T_A = 25^\circ\text{C}$ )

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CB0</sub>	Collector to Base Voltage	V	20
V <sub>CEO</sub>	Collector to Emitter Voltage	V	10
V <sub>EBO</sub>	Emitter to Base Voltage	V	1.5
I <sub>C</sub>	Collector Current	mA	65
P <sub>T</sub>	Total Power Dissipation		
	1 Die	mW	110
	2 Die	mW	200
T <sub>J</sub>	Junction Temperature	°C	150
T <sub>STG</sub>	Storage Temperature	°C	-65 to +150

Note: 1. Operation in excess of any one of these parameters may result in permanent damage.

### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ )

PART NUMBER PACKAGE OUTLINE			UPA812T S06		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I <sub>CB0</sub>	Collector Cutoff Current at V <sub>CB</sub> = 10 V, I <sub>E</sub> = 0	μA			0.8
I <sub>EBO</sub>	Emitter Cutoff Current at V <sub>EB</sub> = 1 V, I <sub>C</sub> = 0	μA			0.8
h <sub>FE</sub> <sup>1</sup>	Forward Current Gain at V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA		70	100	240
f <sub>T</sub>	Gain Bandwidth at V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz	GHz	4.5	7.0	
C <sub>re</sub> <sup>2</sup>	Feedback Capacitance at V <sub>CB</sub> = 3 V, I <sub>E</sub> = 0, f = 1 MHz	pF			0.9
IS <sub>21EI</sub> <sup>2</sup>	Insertion Power Gain at V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz	dB	10	12	
NF	Noise Figure at V <sub>CE</sub> = 3 V, I <sub>C</sub> = 7 mA, f = 1 GHz	dB		1.4	1.7
h <sub>FE1</sub> /h <sub>FE2</sub>	h <sub>FE</sub> Ratio: h <sub>FE1</sub> = Smaller Value of Q <sub>1</sub> , or Q <sub>2</sub> h <sub>FE2</sub> = Larger Value of Q <sub>1</sub> or Q <sub>2</sub>		0.85		

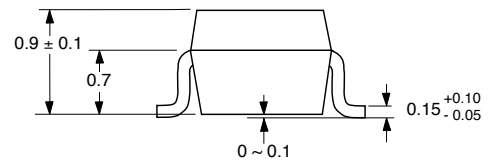
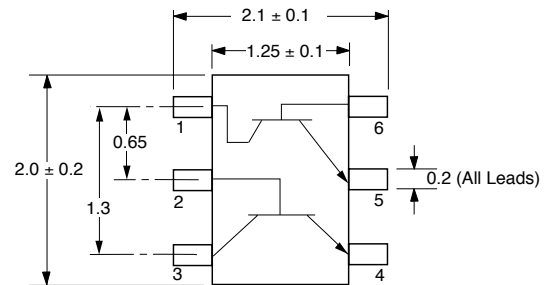
Notes: 1. Pulsed measurement, pulse width ≤ 350 μs, duty cycle ≤ 2 %.

2. The emitter terminal should be connected to the ground terminal of the 3 terminal capacitance bridge.

For Tape and Reel version use part number UPA812T-T1, 3K per reel.

### OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE S06  
(Top View)



#### PIN OUT

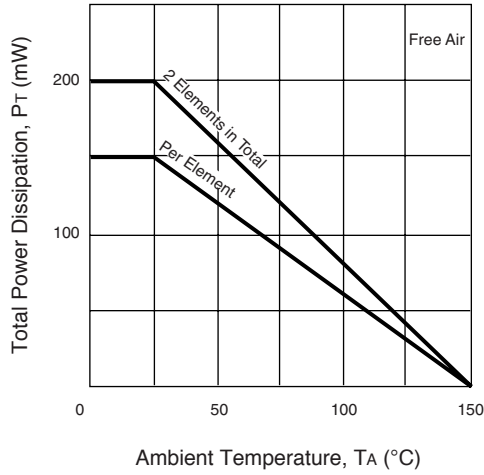
1. Collector Transistor 1
2. Base Transistor 2
3. Collector Transistor 2
4. Emitter Transistor 2
5. Emitter Transistor 1
6. Base Transistor 1

Note:

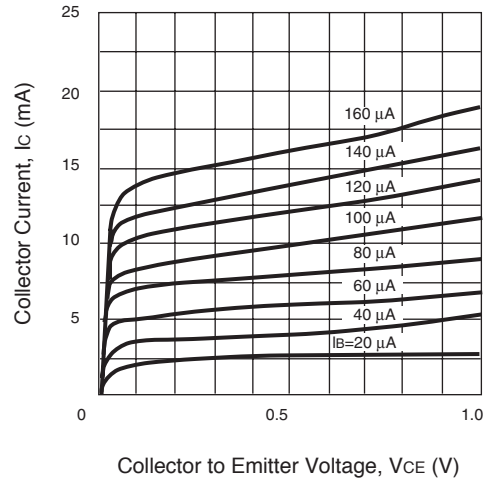
Pin 3 is identified with a circle on the bottom of the package.

**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )

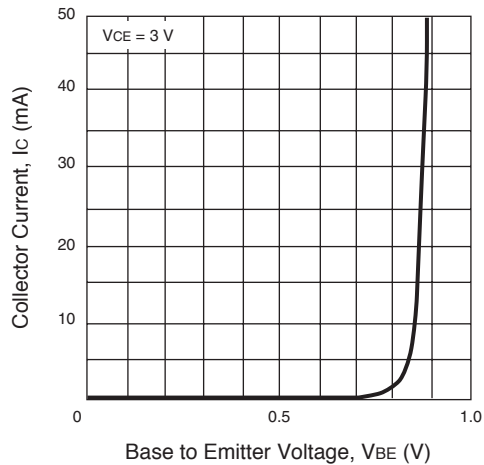
**TOTAL POWER DISSIPATION vs. AMBIENT TEMPERATURE**



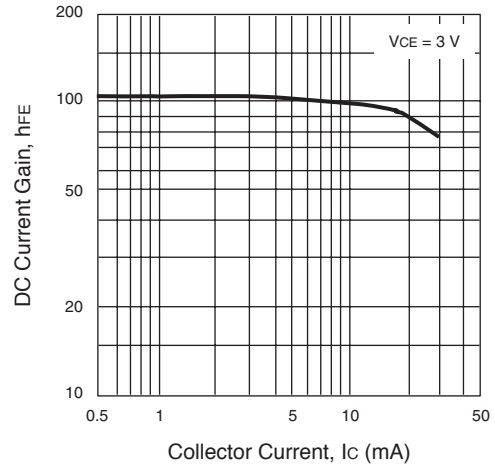
**COLLECTOR CURRENT vs. COLLECTOR TO EMITTER VOLTAGE**



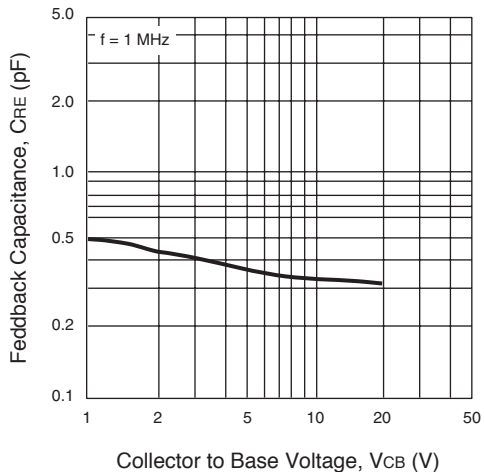
**COLLECTOR CURRENT vs. BASE TO EMITTER VOLTAGE**



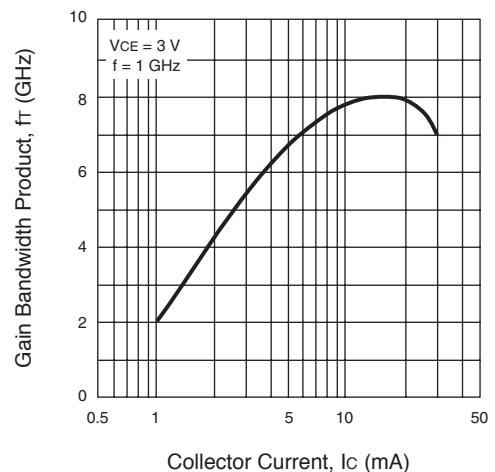
**DC CURRENT GAIN vs. COLLECTOR CURRENT**



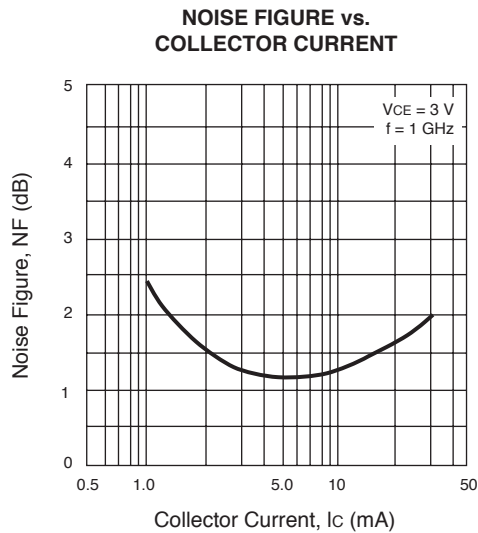
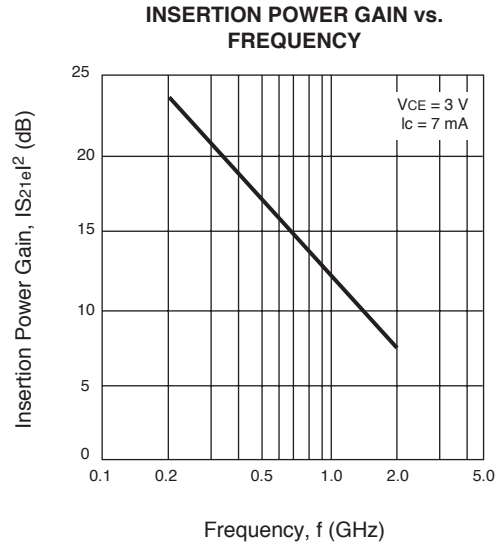
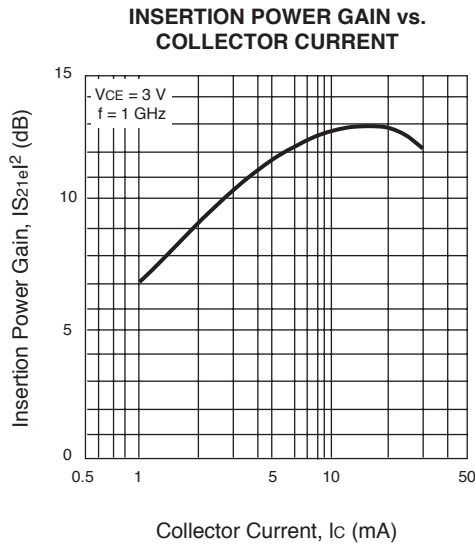
**FEEDBACK CAPACITANCE vs. COLLECTOR TO BASE VOLTAGE**



**GAIN BANDWIDTH PRODUCT vs. COLLECTOR CURRENT**



**TYPICAL PERFORMANCE CURVES** ( $T_A = 25^\circ\text{C}$ )



**ORDERING INFORMATION**

PART NUMBER	QUANTITY	PACKAGING
UPA812T-T1-A	3000	Tape & Reel

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