



NPN SILICON HIGH FREQUENCY TRANSISTOR

UPA814T

FEATURES

- **SMALL PACKAGE STYLE:**
2 NE688 Die in a 2 mm x 1.25 mm package
- **LOW NOISE FIGURE:**
NF = 1.5 dB TYP at 2 GHz
- **HIGH GAIN BANDWIDTH:** $f_T = 9$ GHz
- **HIGH COLLECTOR CURRENT:** 100 mA

DESCRIPTION

NEC's UPA814T 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 RATINGS¹ ($T_A = 25^\circ\text{C}$)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V _{CBO}	Collector to Base Voltage	V	9
V _{CEO}	Collector to Emitter Voltage	V	6
V _{EBO}	Emitter to Base Voltage	V	2
I _C	Collector Current	mA	100
P _T	Total Power Dissipation 1 Die 2 Die	mW mW	110 200
T _J	Junction Temperature	°C	150
T _{STG}	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			UPA814T S06		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I _{CBO}	Collector Cutoff Current at V _{CB} = 5V, I _E = 0	μA			0.1
I _{EBO}	Emitter Cutoff Current at V _{EB} = 1V, I _C = 0	μA			0.1
h _{FE} ¹	Forward Current Gain at V _{CE} = 1V, I _C = 3mA		80	110	160
f _T	Gain Bandwidth at V _{CE} = 3V, I _C = 20mA, f = 2GHz	GHz		9.0	
C _{re} ²	Feedback Capacitance at V _{CB} = 1V, I _E = 0, f = 1MHz	pF		0.75	0.85
S ₂₁ ²	Insertion Power Gain at V _{CE} = 3V, I _C = 20mA, f = 2GHz	dB		6.5	
NF	Noise Figure at V _{CE} = 3V, I _C = 7mA, f = 2GHz	dB		1.5	
h _{FE1} /h _{FE2}	h _{FE} Ratio: h _{FE1} = Smaller Value of Q ₁ , or Q ₂ h _{FE2} = Larger Value of Q ₁ or Q ₂		0.85		

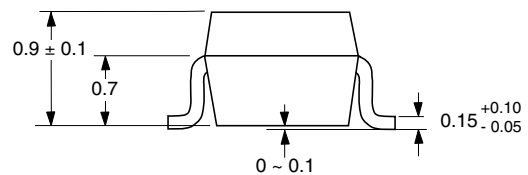
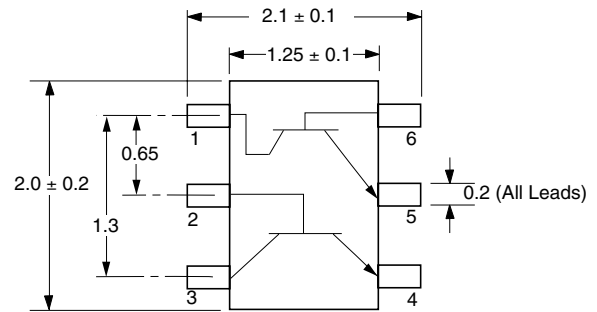
Notes: 1. Pulsed measurement, pulse width ≤ 350 μs, duty cycle ≤ 2 %.

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 UPA814T-T1, 3K per reel.

OUTLINE DIMENSIONS (Units in mm)

PACKAGE OUTLINE S06



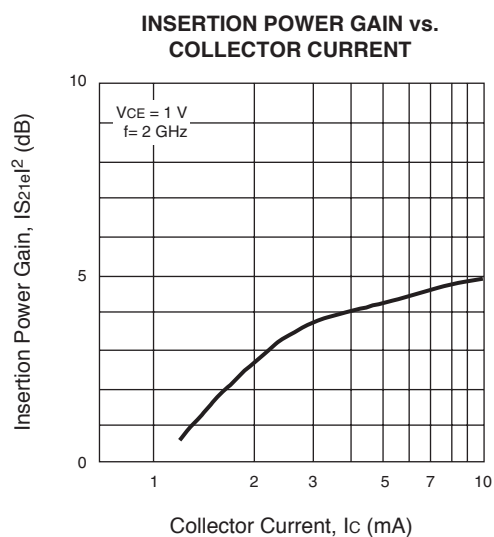
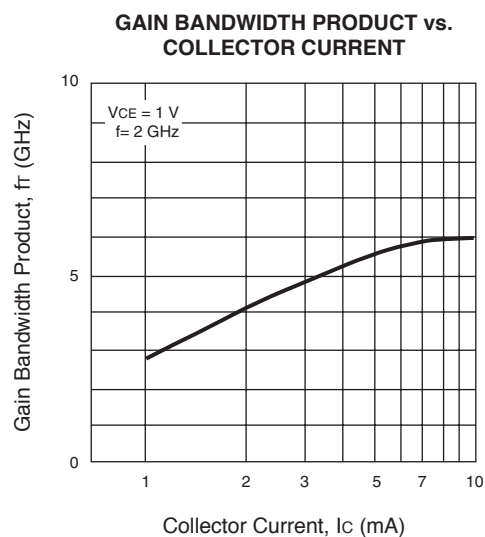
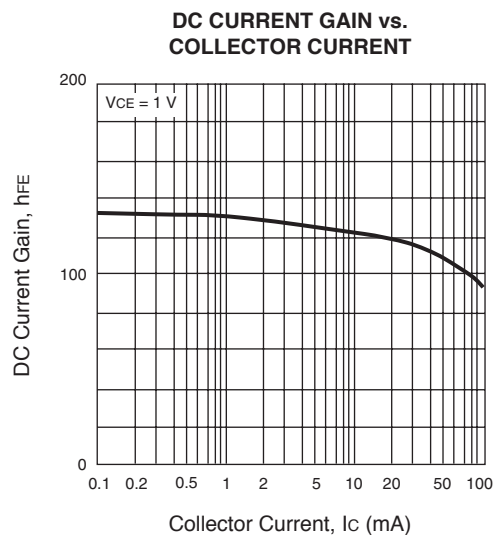
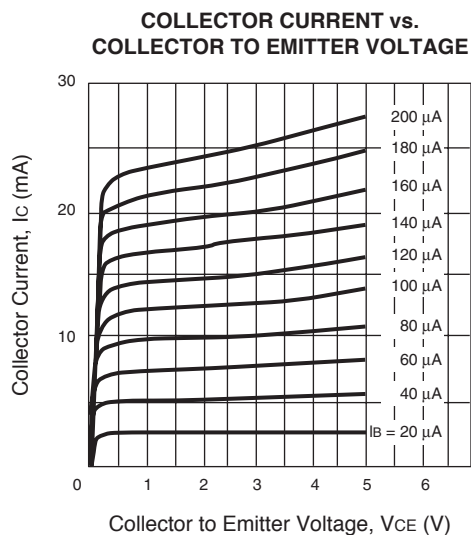
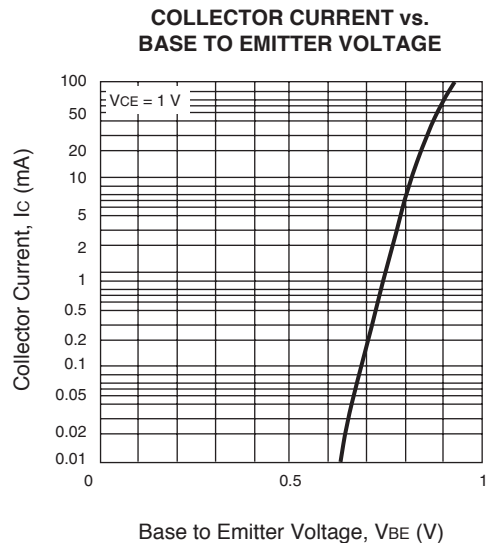
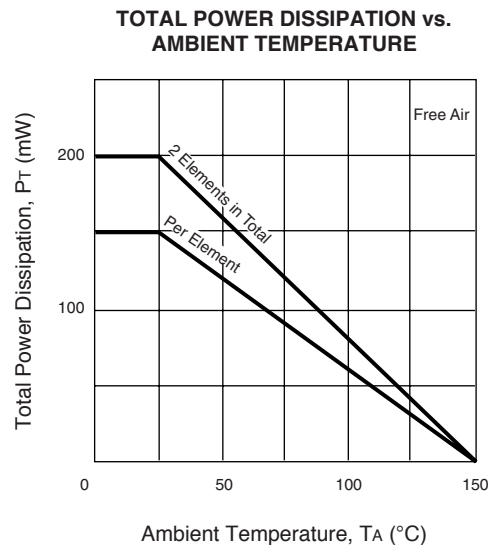
PIN OUT

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:

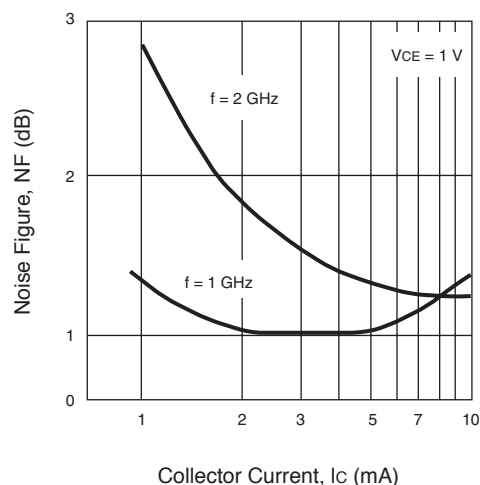
Pin 3 is identified with a circle on the bottom of the package.

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

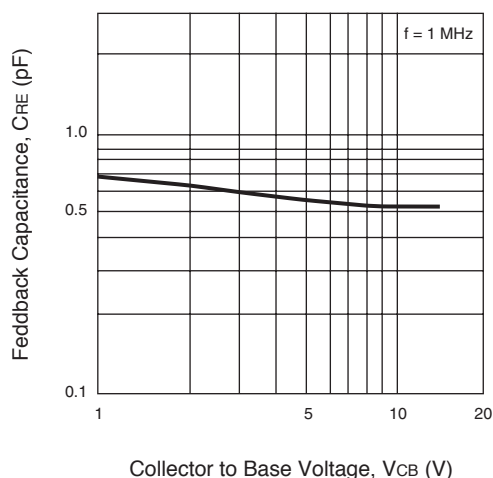


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

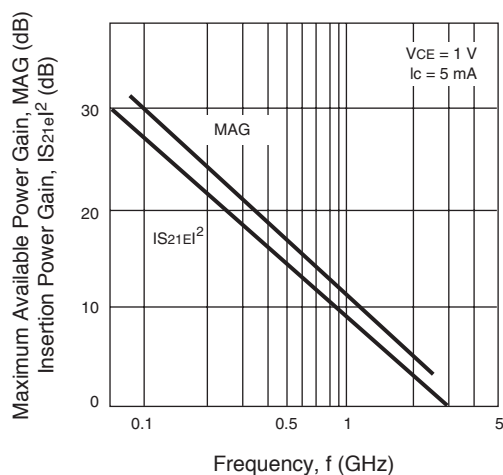
**NOISE FIGURE vs.
COLLECTOR CURRENT**



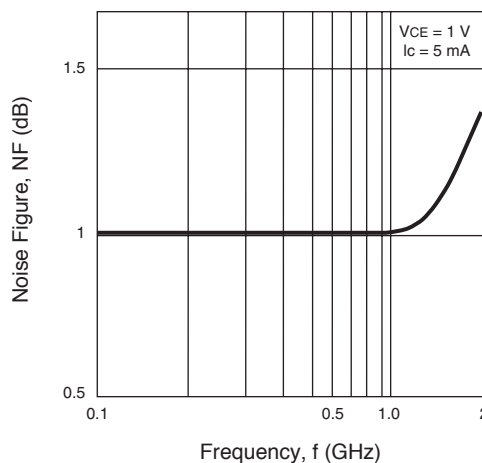
**FEEDBACK CAPACITANCE vs.
COLLECTOR TO BASE VOLTAGE**



**MAXIMUM AVAILABLE GAIN/INSERTION
POWER GAIN vs. FREQUENCY**



**NOISE FIGURE vs.
FREQUENCY**



ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKAGING
UPA814T-T1-A	3000	Tape & Reel

Life Support Applications

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CEL CALIFORNIA EASTERN LABORATORIES • Headquarters • 4590 Patrick Henry Drive • Santa Clara, CA 95054-1817 • (408) 988-3500 • Telex 34-6393 • FAX (408) 988-0279
24-Hour Fax-On-Demand: 800-390-3232 (U.S. and Canada only) • Internet: <http://WWW.CEL.COM>

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CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

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Restricted Substance per RoHS	Concentration Limit per RoHS (values are not yet fixed)	Concentration contained in CEL devices	
		-A	-AZ
Lead (Pb)	< 1000 PPM	Not Detected	(*)
Mercury	< 1000 PPM	Not Detected	
Cadmium	< 100 PPM	Not Detected	
Hexavalent Chromium	< 1000 PPM	Not Detected	
PBB	< 1000 PPM	Not Detected	
PBDE	< 1000 PPM	Not Detected	

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