

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

The UPA809T 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_{CB0}	Collector to Base Voltage	V	9
V_{CE0}	Collector to Emitter Voltage	V	6
V_{EB0}	Emitter to Base Voltage	V	2
I_C	Collector Current	mA	100
PT	Total Power Dissipation		
	1 Die	mW	110
	2 Die	mW	200
T_J	Junction Temperature	$^\circ\text{C}$	150
T_{STG}	Storage Temperature	$^\circ\text{C}$	-65 to +150

Note:

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

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

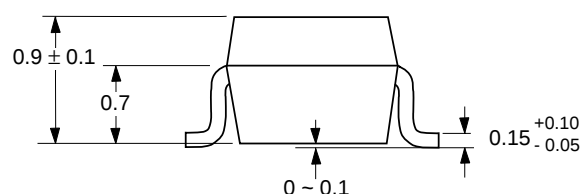
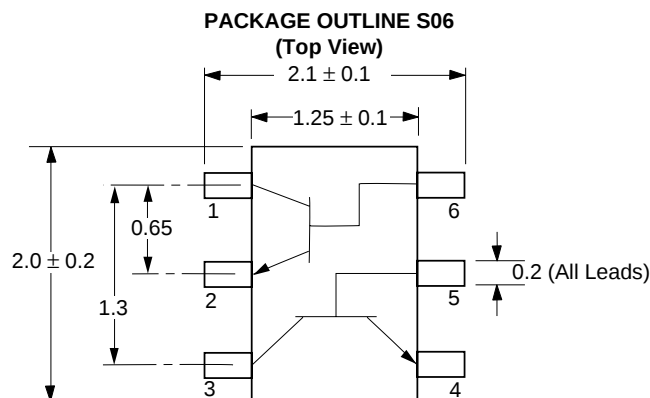
PART NUMBER PACKAGE OUTLINE			UPA809T S06		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
I_{CBO}	Collector Cutoff Current at $V_{CB} = 5\text{ V}$, $I_E = 0$	μA			0.1
I_{EBO}	Emitter Cutoff Current at $V_{EB} = 1\text{ V}$, $I_C = 0$	μA			0.1
h_{FE}^1	Forward Current Gain at $V_{CE} = 1\text{ V}$, $I_C = 3\text{ mA}$		80	110	160
f_T	Gain Bandwidth at $V_{CE} = 3\text{ V}$, $I_C = 20\text{ mA}$, $f = 2\text{ GHz}$	GHz		9.0	
C_{re}^2	Feedback Capacitance at $V_{CB} = 1\text{ V}$, $I_E = 0$, $f = 1\text{ MHz}$	pF		0.75	0.85
$ S_{21E} ^2$	Insertion Power Gain at $V_{CE} = 3\text{ V}$, $I_C = 20\text{ mA}$, $f = 2\text{ GHz}$	dB		6.5	
NF	Noise Figure at $V_{CE} = 3\text{ V}$, $I_C = 7\text{ mA}$, $f = 2\text{ GHz}$	dB		1.5	
h_{FE1}/h_{FE2}	h_{FE} Ratio: $h_{FE1} = \text{Smaller Value of } Q_1, \text{ or } Q_2$ $h_{FE2} = \text{Larger Value of } Q_1 \text{ or } Q_2$		0.85		

Notes: 1. Pulsed measurement, pulse width $\leq 350\text{ }\mu\text{s}$, duty cycle $\leq 2\%$.

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 UPA809T-T1, 3K per reel.

OUTLINE DIMENSIONS (Units in mm)

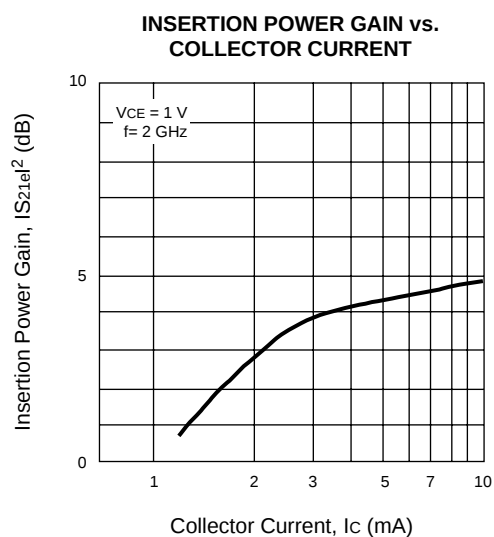
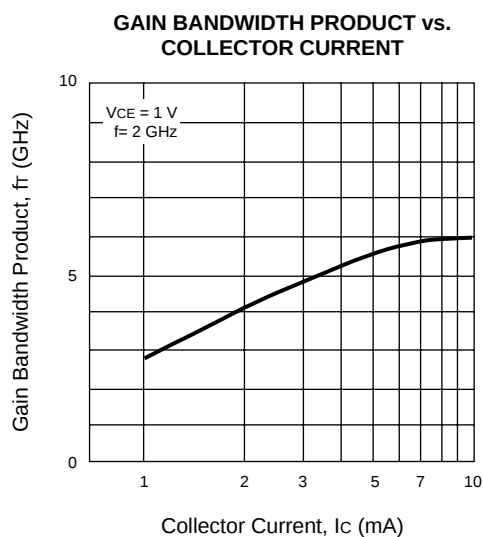
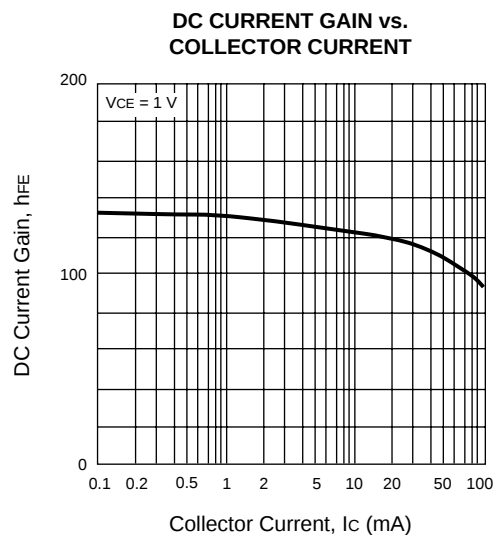
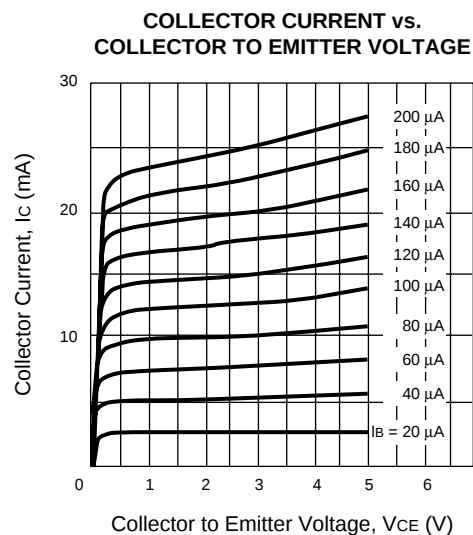
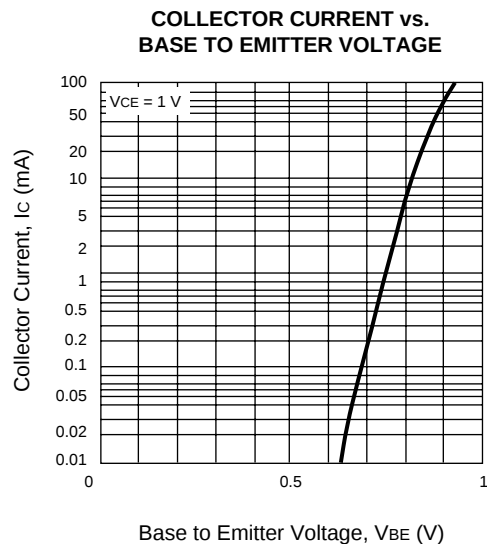
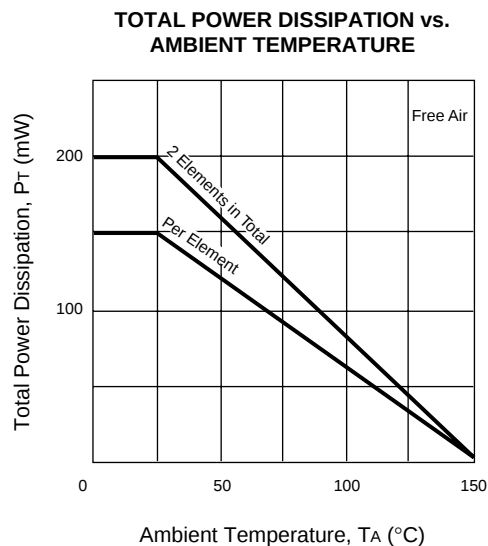


PIN OUT

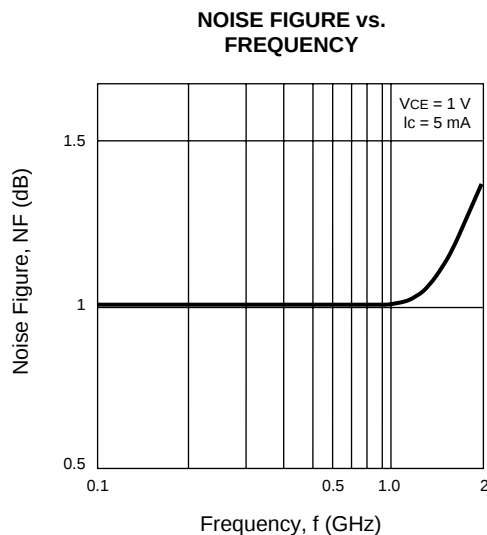
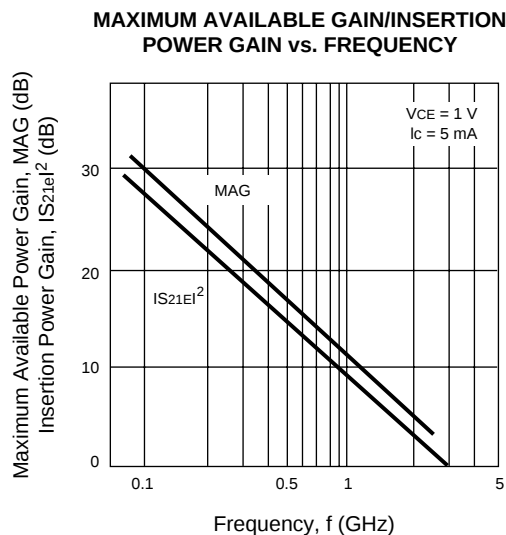
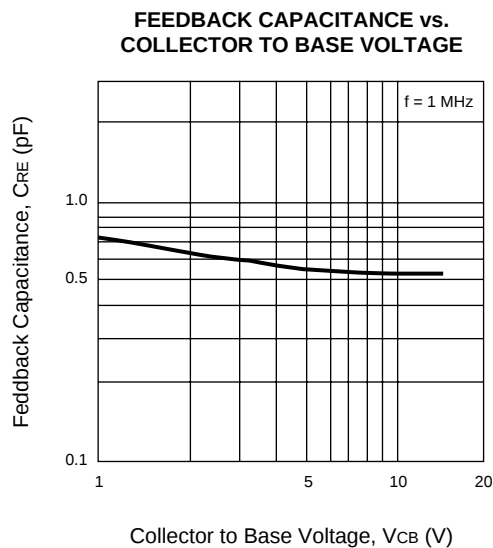
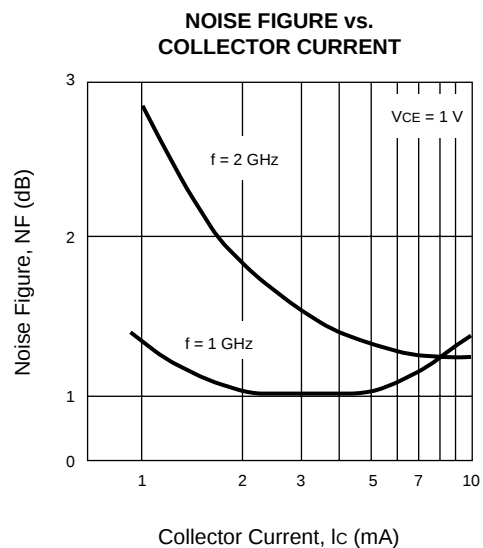
1. Collector Transistor 1
2. Emitter Transistor 1
3. Collector Transistor 2
4. Emitter Transistor 2
5. Base Transistor 2
6. Base Transistor 1

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



ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKAGING
UPA809T-T1	3000	Tape & Reel

BJT NONLINEAR MODEL PARAMETERS (1)

Parameters	Q1, Q2	Parameters	Q1, Q2
IS	3.8e-16	MJC	0.48
BF	135.7	XCJC	0.56
NF	1	CJS	0
VAF	28	VJS	0.75
IKF	0.6	MJS	0
ISE	3.8e-15	FC	0.75
NE	1.49	TF	9e-12
BR	12.3	XTF	0.36
NR	1.1	VTF	0.65
VAR	3.5	ITF	0.61
IKR	0.06	PTF	50
ISC	3.5e-16	TR	32e-12
NC	1.62	EG	1.11
RE	0.4	XTB	0
RB	6.14	XTI	3
RBM	3.5	KF	0
IRB	0.001	AF	1
RC	4.2		
CJE	0.796e-12		
VJE	0.71		
MJE	0.38		
CJC	0.45e-12		
VJC	0.65		

(1) Gummel-Poon Model

Note:

This nonlinear model utilized the latest data available.

See our Design Parameter Library at www.cel.com for this data.

UNITS

Parameter	Units
time	seconds
capacitance	farads
inductance	henries
resistance	ohms
voltage	volts
current	amps

MODEL RANGE

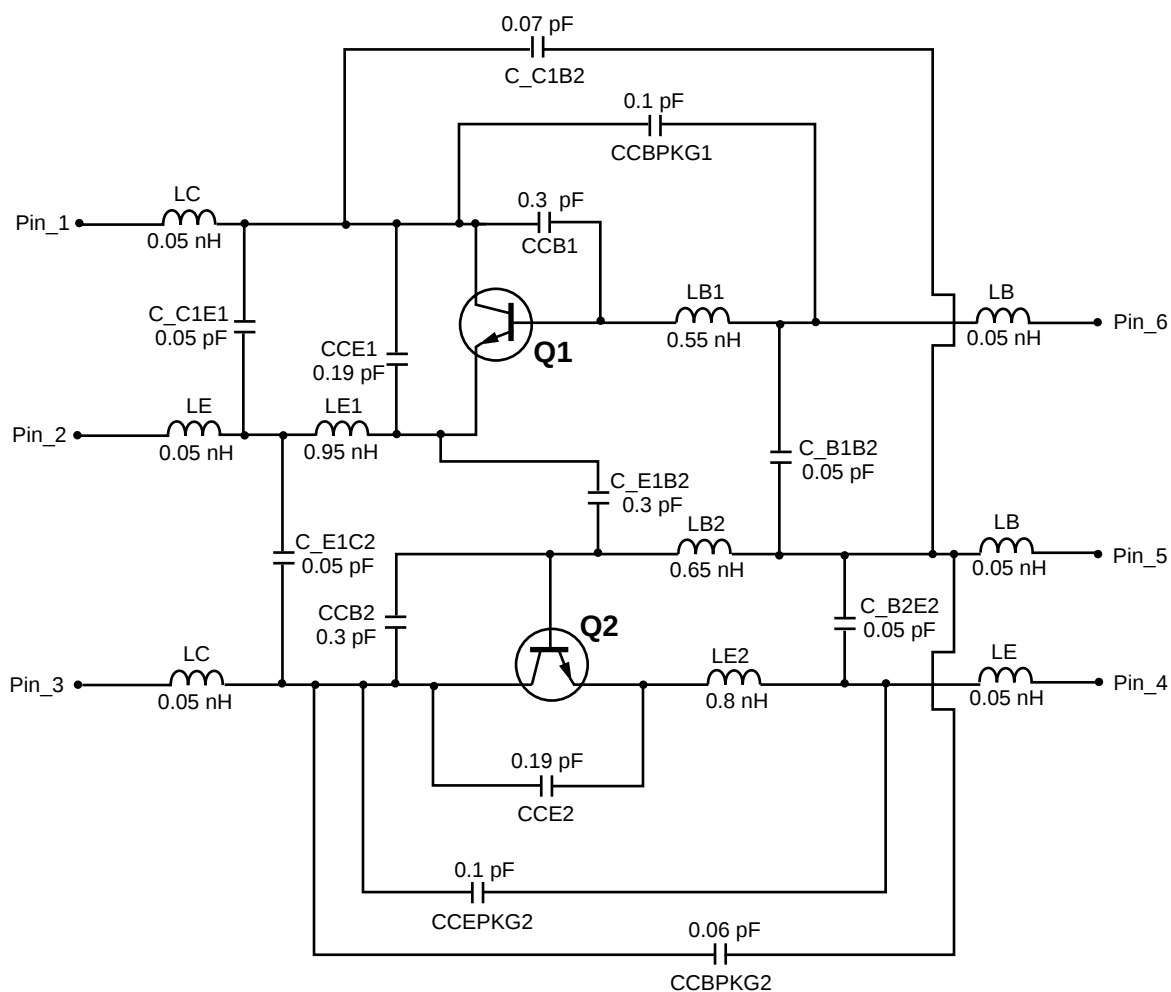
Frequency: 0.1 to 3.0 GHz

Bias: $V_{CE} = 1\text{ V to }5\text{ V}$, $I_C = 1\text{ mA to }10\text{ mA}$

Date: 11/98

NONLINEAR MODEL

SCHEMATIC



MODEL RANGE

Frequency: 0.1 to 3.0 GHz

Bias: $V_{CE} = 1\text{ V to }5\text{ V}$, $I_C = 1\text{ mA to }10\text{ mA}$

Date: 11/98