

## NPN SILICON HIGH FREQUENCY TRANSISTOR

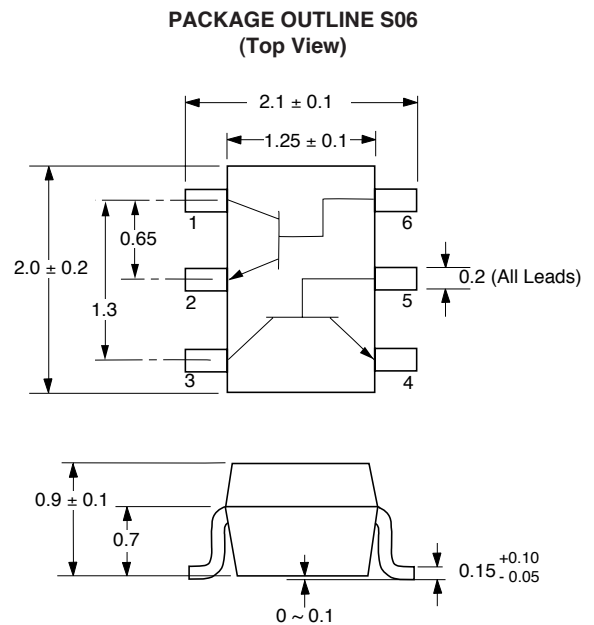
### FEATURES

- **SMALL PACKAGE STYLE:**  
2 NE680 Die in a 2 mm x 1.25 mm package
- **LOW NOISE FIGURE:**  
NF = 1.9 dB TYP at 2 GHz
- **HIGH GAIN:**  
 $IS_{21E}I^2 = 7.5$  dB TYP at 2 GHz
- **EXCELLENT LOW VOLTAGE, LOW CURRENT PERFORMANCE**

### DESCRIPTION

The UPA800T 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 ideally suited for pager and other hand-held wireless applications.

### 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.

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

PART NUMBER PACKAGE OUTLINE			UPA800T S06		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
$I_{CBO}$	Collector Cutoff Current at $V_{CB} = 10$ V, $I_E = 0$	$\mu\text{A}$			1.0
$I_{EBO}$	Emitter Cutoff Current at $V_{EB} = 1$ V, $I_C = 0$	$\mu\text{A}$			1.0
$h_{FE}^1$	Forward Current Gain at $V_{CE} = 3$ V, $I_C = 5$ mA		80	120	200
$f_T$	Gain Bandwidth at $V_{CE} = 3$ V, $I_C = 5$ mA	GHz	5.5	8.0	
$C_{re}^2$	Feedback Capacitance at $V_{CB} = 3$ V, $I_E = 0$ , $f = 1$ MHz	pF		0.3	0.7
$IS_{21E}I^2$	Insertion Power Gain at $V_{CE} = 3$ V, $I_C = 5$ mA, $f = 2$ GHz	dB	5.5	7.5	
NF	Noise Figure at $V_{CE} = 3$ V, $I_C = 5$ mA, $f = 2$ GHz	dB		1.9	3.2

Notes: 1. Pulsed measurement, pulse width  $\leq 350$   $\mu\text{s}$ , 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 UPA800T-T1, 3K per reel..

# UPA800T

## ABSOLUTE MAXIMUM RATINGS<sup>1</sup> (T<sub>A</sub> = 25°C)

SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CB0</sub>	Collector to Base Voltage	V	20
V <sub>CE0</sub>	Collector to Emitter Voltage	V	10
V <sub>EB0</sub>	Emitter to Base Voltage	V	1.5
I <sub>C</sub>	Collector Current	mA	35
P <sub>T</sub>	Total Power Dissipation	1 Die	mW
		2 Die	mW
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.

## ORDERING INFORMATION

PART NUMBER	QUANTITY	PACKAGING
UPA800T-T1-A	3000	Tape & Reel

## TYPICAL SCATTERING PARAMETERS

### UPA800T (Q1)

V<sub>CE</sub> = .5V, I<sub>C</sub> = .5mA, CE; h<sub>FE</sub> = 112

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.250	0.966	-16.00	1.722	162.10	0.055	77.50	0.983	-9.10	0.147	14.957
0.400	0.943	-25.30	1.702	152.50	0.085	70.70	0.965	-14.20	0.214	13.015
0.600	0.906	-36.90	1.659	140.90	0.120	62.90	0.934	-20.50	0.286	11.407
0.800	0.859	-48.20	1.611	129.70	0.150	55.50	0.900	-26.50	0.359	10.310
1.000	0.810	-58.80	1.544	119.40	0.175	48.70	0.864	-31.90	0.432	9.456
1.500	0.662	-83.70	1.423	95.40	0.216	34.40	0.778	-44.40	0.622	8.188
2.000	0.514	-109.60	1.288	74.30	0.234	23.10	0.710	-55.20	0.806	7.407
2.500	0.394	-143.00	1.163	55.10	0.232	14.10	0.663	-63.70	0.985	7.001
3.000	0.348	176.20	1.034	38.80	0.220	8.80	0.634	-70.20	1.153	4.345
3.500	0.384	141.10	0.905	25.30	0.204	7.90	0.621	-75.10	1.310	3.131
4.000	0.442	119.70	0.805	15.20	0.197	11.70	0.607	-80.30	1.420	2.262
4.500	0.484	108.00	0.735	7.60	0.206	17.70	0.586	-87.50	1.453	1.531
5.000	0.503	101.60	0.701	1.60	0.238	22.60	0.550	-98.00	1.386	0.989

### UPA800T (Q2)

V<sub>CE</sub> = .5V, I<sub>C</sub> = .5mA, CE; h<sub>FE</sub> = 107

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.250	0.967	-16.40	1.707	162.30	0.049	77.30	0.983	-8.60	0.144	15.420
0.400	0.947	-26.00	1.688	152.80	0.076	70.30	0.967	-13.50	0.208	13.466
0.600	0.913	-37.80	1.646	141.30	0.107	62.40	0.940	-19.60	0.276	11.870
0.800	0.871	-49.30	1.599	130.20	0.135	54.70	0.908	-25.30	0.350	10.735
1.000	0.828	-60.10	1.533	120.00	0.157	47.80	0.875	-30.60	0.418	9.896
1.500	0.695	-85.20	1.420	96.00	0.195	32.90	0.794	-42.80	0.609	8.623
2.000	0.560	-111.10	1.292	74.50	0.213	20.40	0.727	-53.80	0.798	7.829
2.500	0.448	-142.50	1.174	54.50	0.213	10.30	0.675	-63.50	0.991	7.413
3.000	0.394	-179.10	1.049	37.20	0.202	3.60	0.644	-71.30	1.181	4.580
3.500	0.409	147.80	0.923	22.50	0.185	1.50	0.629	-77.90	1.380	3.305
4.000	0.451	125.20	0.823	10.90	0.175	4.70	0.613	-84.40	1.548	2.362
4.500	0.483	111.60	0.751	1.90	0.181	11.10	0.590	-92.70	1.623	1.554
5.000	0.498	103.20	0.715	-5.60	0.211	16.80	0.549	-104.30	1.549	0.934

Note:

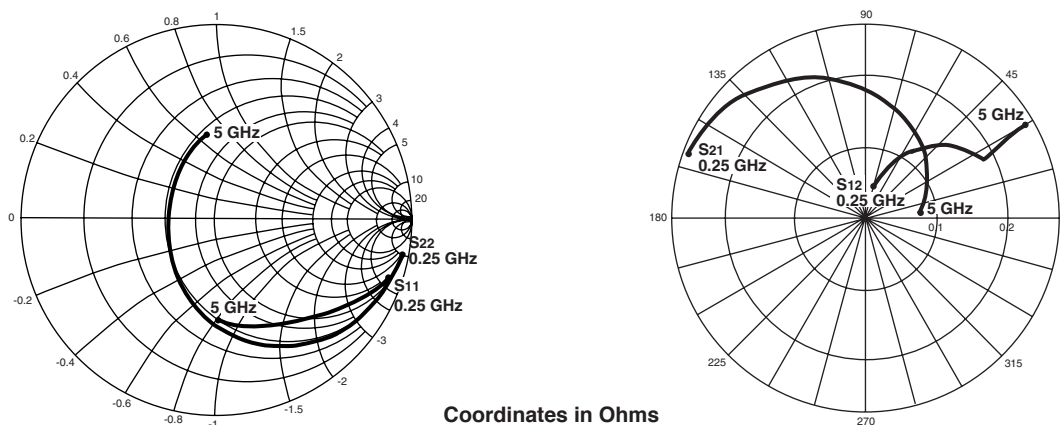
1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1}). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } MSG = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

TYPICAL SCATTERING PARAMETERS



Coordinates in Ohms  
 Frequency in GHz  
 V<sub>CE</sub> = 1 V, I<sub>c</sub> = 1 mA,  
 h<sub>FE</sub> = 112

UPA800T (Q1)

V<sub>CE</sub> = 1V, I<sub>c</sub> = 1mA, CE; h<sub>FE</sub> = 112

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.250	0.940	-18.90	3.202	160.10	0.045	76.20	0.972	-10.30	0.166	18.522
0.400	0.905	-29.70	3.115	149.80	0.069	69.30	0.943	-15.90	0.233	16.546
0.600	0.846	-43.00	2.960	137.70	0.095	61.40	0.897	-22.30	0.313	14.936
0.800	0.778	-55.50	2.793	126.30	0.117	54.60	0.849	-28.00	0.396	13.779
1.000	0.710	-66.90	2.604	116.10	0.133	48.80	0.804	-32.90	0.479	12.918
1.500	0.532	-92.30	2.215	93.30	0.160	38.60	0.711	-43.30	0.694	11.413
2.000	0.378	-119.10	1.881	74.00	0.174	32.00	0.653	-52.30	0.883	10.338
2.500	0.267	-156.40	1.621	57.00	0.181	28.00	0.614	-59.70	1.048	8.180
3.000	0.251	157.60	1.398	42.50	0.186	26.20	0.595	-65.60	1.157	6.359
3.500	0.309	125.10	1.211	30.30	0.192	26.60	0.583	-70.20	1.220	5.167
4.000	0.372	108.20	1.073	20.60	0.206	28.10	0.569	-74.60	1.224	4.311
4.500	0.413	99.90	0.981	12.70	0.229	29.60	0.547	-80.40	1.198	3.630
5.000	0.430	96.20	0.932	5.80	0.265	30.10	0.513	-88.50	1.145	3.151

UPA800T (Q2)

V<sub>CE</sub> = 1V, I<sub>c</sub> = 1mA, CE; h<sub>FE</sub> = 107

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.250	0.941	-19.30	3.214	160.40	0.039	76.10	0.975	-9.60	0.159	19.160
0.400	0.908	-30.30	3.130	150.20	0.060	68.90	0.949	-14.80	0.227	17.174
0.600	0.856	-43.80	2.979	138.20	0.083	60.80	0.907	-20.90	0.305	15.550
0.800	0.795	-56.60	2.816	126.90	0.102	53.80	0.863	-26.20	0.385	14.410
1.000	0.734	-68.20	2.634	116.80	0.116	47.80	0.822	-31.00	0.463	13.562
1.500	0.571	-94.10	2.259	93.80	0.140	36.80	0.734	-41.10	0.680	12.078
2.000	0.428	-120.60	1.934	74.00	0.152	29.30	0.673	-50.20	0.886	11.046
2.500	0.323	-154.40	1.678	56.20	0.158	24.60	0.633	-58.40	1.063	8.727
3.000	0.292	165.70	1.453	40.60	0.161	22.40	0.610	-65.50	1.203	6.834
3.500	0.326	133.50	1.262	27.20	0.166	22.70	0.599	-71.50	1.282	5.623
4.000	0.376	114.20	1.118	16.20	0.178	24.40	0.585	-77.20	1.299	4.700
4.500	0.409	103.50	1.018	7.10	0.200	26.10	0.564	-83.80	1.272	3.933
5.000	0.423	97.70	0.965	-1.00	0.236	26.50	0.528	-92.90	1.205	3.380

Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1}). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } MSG = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

# UPA800T

## TYPICAL SCATTERING PARAMETERS

### UPA800T (Q1)

V<sub>CE</sub> = 2 V, I<sub>c</sub> = 5 mA, CE; h<sub>FE</sub> = 112

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.250	0.734	-38.60	11.103	143.00	0.033	68.60	0.868	-18.50	0.353	25.269
0.400	0.611	-56.60	9.478	127.60	0.046	62.70	0.770	-24.10	0.668	23.140
0.600	0.480	-74.00	7.583	112.90	0.059	59.30	0.677	-27.60	0.795	21.090
0.800	0.381	-87.20	6.193	102.00	0.070	58.20	0.620	-29.60	0.892	19.468
1.000	0.308	-98.10	5.198	93.50	0.080	57.80	0.584	-31.30	1.027	18.127
1.500	0.177	-123.80	3.692	76.80	0.107	56.90	0.540	-36.50	1.082	14.369
2.000	0.097	-171.70	2.863	63.00	0.135	54.40	0.521	-43.70	1.092	11.519
2.500	0.123	122.90	2.329	50.70	0.162	51.20	0.516	-51.60	1.092	9.731
3.000	0.200	96.70	1.952	40.00	0.187	47.60	0.512	-58.50	1.086	8.396
3.500	0.271	86.10	1.677	30.50	0.211	44.10	0.505	-64.00	1.069	7.399
4.000	0.317	81.70	1.485	22.30	0.236	41.00	0.489	-68.30	1.052	6.596
4.500	0.339	81.10	1.358	15.00	0.266	37.90	0.466	-72.40	1.026	6.084
5.000	0.343	82.90	1.284	8.10	0.303	34.60	0.434	-77.60	0.997	6.271

### UPA800T (Q2)

V<sub>CE</sub> = 2 V, I<sub>c</sub> = 5 mA, CE; h<sub>FE</sub> = 107

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.250	0.742	-38.90	11.219	143.90	0.029	69.20	0.885	-16.50	0.330	25.876
0.400	0.629	-57.50	9.662	128.60	0.039	62.00	0.797	-21.60	0.484	23.940
0.600	0.506	-75.80	7.801	113.70	0.050	58.00	0.712	-25.00	0.650	21.932
0.800	0.412	-89.80	6.409	102.60	0.059	56.50	0.659	-27.00	0.782	20.359
1.000	0.343	-101.40	5.400	93.80	0.067	56.10	0.624	-28.70	0.888	19.063
1.500	0.220	-127.00	3.859	76.50	0.089	55.30	0.580	-33.80	1.042	15.116
2.000	0.142	-164.20	3.007	62.00	0.112	53.40	0.559	-40.90	1.107	12.295
2.500	0.139	143.40	2.457	48.80	0.135	50.20	0.547	-48.90	1.126	10.443
3.000	0.197	110.70	2.063	36.90	0.158	46.30	0.541	-56.60	1.113	9.115
3.500	0.259	94.90	1.773	26.30	0.180	42.60	0.535	-63.10	1.092	8.082
4.000	0.304	87.30	1.565	16.90	0.204	39.10	0.523	-68.30	1.065	7.288
4.500	0.326	84.10	1.423	8.60	0.233	35.70	0.506	-73.40	1.031	6.779
5.000	0.332	83.90	1.338	0.80	0.270	31.90	0.477	-79.60	0.993	6.951

Note:

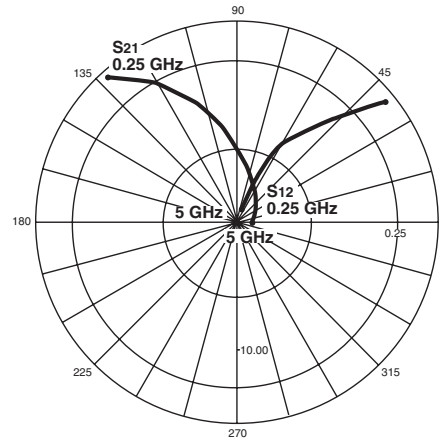
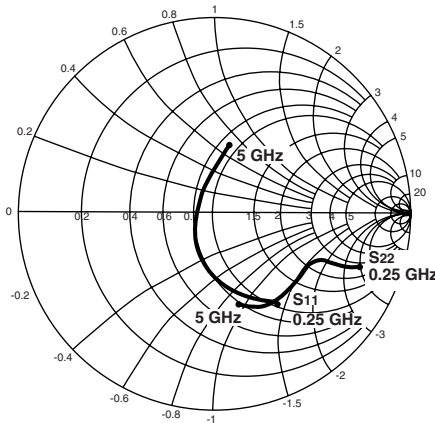
1. Gain Calculations:

$$\text{MAG} = \frac{|S_{21}|}{|S_{12}|} \left( K \pm \sqrt{K^2 - 1} \right). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } \text{MSG} = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

TYPICAL SCATTERING PARAMETERS



Coordinates in Ohms  
Frequency in GHz  
V<sub>CE</sub> = 3 V, I<sub>c</sub> = 10 mA  
h<sub>FE</sub> = 112

UPA800T (Q1)

V<sub>CE</sub> = 3V, I<sub>c</sub> = 10 mA, CE; h<sub>FE</sub> = 112

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.250	0.550	-54.70	15.326	131.00	0.026	66.80	0.787	-20.00	0.513	27.705
0.400	0.414	-74.40	11.717	115.40	0.036	64.10	0.687	-22.50	0.698	25.125
0.600	0.308	-91.40	8.623	102.50	0.047	64.40	0.619	-23.20	0.853	22.636
0.800	0.237	-104.90	6.763	93.60	0.057	65.10	0.586	-23.90	0.955	20.743
1.000	0.188	-116.80	5.553	86.40	0.068	65.30	0.567	-25.20	1.013	18.430
1.500	0.105	-152.20	3.844	72.00	0.097	64.30	0.547	-30.70	1.072	14.338
2.000	0.091	142.00	2.950	59.60	0.126	61.00	0.541	-38.50	1.082	11.944
2.500	0.154	102.90	2.383	48.20	0.154	56.90	0.540	-46.90	1.071	10.265
3.000	0.230	87.40	1.988	38.10	0.179	52.70	0.539	-54.10	1.055	9.016
3.500	0.294	80.20	1.703	29.10	0.204	48.80	0.534	-59.80	1.029	8.168
4.000	0.334	77.20	1.504	21.30	0.229	45.40	0.521	-64.30	1.009	7.588
4.500	0.352	77.10	1.374	14.30	0.260	42.20	0.501	-68.70	0.979	7.230
5.000	0.351	79.20	1.298	7.70	0.297	38.70	0.474	-73.90	0.949	6.405

UPA800T (Q2)

V<sub>CE</sub> = 3V, I<sub>c</sub> = 10 mA, CE; h<sub>FE</sub> = 107

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.250	0.563	-55.80	15.579	131.90	0.022	66.50	0.816	-17.60	0.490	28.501
0.400	0.436	-76.70	12.036	116.20	0.030	62.70	0.725	-20.00	0.682	26.034
0.600	0.336	-95.10	8.920	103.00	0.039	62.90	0.664	-20.80	0.841	23.593
0.800	0.268	-109.20	7.018	93.70	0.047	63.60	0.633	-21.70	0.955	21.741
1.000	0.223	-121.00	5.776	86.40	0.056	64.10	0.615	-23.10	1.018	19.312
1.500	0.145	-151.60	4.016	71.40	0.079	63.70	0.595	-28.50	1.094	15.193
2.000	0.117	161.50	3.095	58.20	0.104	60.90	0.585	-36.10	1.101	12.803
2.500	0.155	119.60	2.510	46.00	0.128	56.70	0.579	-44.50	1.091	11.088
3.000	0.221	98.40	2.100	34.70	0.151	52.30	0.576	-52.40	1.065	9.879
3.500	0.280	87.40	1.798	24.60	0.174	48.10	0.572	-59.20	1.033	9.027
4.000	0.320	81.50	1.583	15.70	0.198	44.30	0.563	-64.70	1.003	8.670
4.500	0.338	79.30	1.438	7.60	0.228	40.50	0.549	-70.00	0.963	7.998
5.000	0.340	79.60	1.351	0.10	0.265	36.70	0.526	-76.30	0.923	7.074

Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1})$$

When  $K \leq 1$ , MAG is undefined and MSG values are used.  $MSG = \frac{|S_{21}|}{|S_{12}|}$ ,  $K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}$ ,  $\Delta = S_{11} S_{22} - S_{21} S_{12}$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

TYPICAL SCATTERING PARAMETERS

UPA800T (Q1)

V<sub>CE</sub> = 5 V, I<sub>c</sub> = 10 mA, CE; h<sub>FE</sub> = 112

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.25	0.574	-51.50	15.447	132.20	0.025	68.00	0.807	-18.40	0.495	27.909
0.40	0.434	-70.10	11.889	116.50	0.034	64.40	0.712	-20.90	0.687	25.437
0.60	0.321	-86.20	8.790	103.50	0.044	64.90	0.648	-21.70	0.843	23.005
0.80	0.245	-98.30	6.904	94.50	0.054	65.50	0.616	-22.60	0.940	21.067
1.00	0.192	-108.70	5.675	87.30	0.065	65.90	0.598	-23.90	0.992	19.411
1.50	0.097	-139.40	3.933	73.00	0.092	65.00	0.579	-29.30	1.057	14.846
2.00	0.069	145.20	3.019	60.50	0.119	62.00	0.572	-36.90	1.073	12.390
2.50	0.135	99.90	2.438	49.20	0.146	58.10	0.571	-44.90	1.060	10.726
3.00	0.213	85.30	2.035	39.10	0.170	54.10	0.571	-51.90	1.042	9.532
3.50	0.277	78.80	1.743	30.10	0.194	50.50	0.567	-57.50	1.015	8.779
4.00	0.318	76.30	1.537	22.30	0.218	47.30	0.556	-61.90	0.993	8.482
4.50	0.335	76.40	1.403	15.40	0.248	44.30	0.539	-66.20	0.962	7.526
5.00	0.334	78.80	1.325	8.80	0.285	41.10	0.515	-71.40	0.926	6.674

UPA800T2 (Q2)

V<sub>CE</sub> = 5V, I<sub>c</sub> = 10 mA, CE; h<sub>FE</sub> = 107

Frequency GHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	MAG <sup>1</sup> (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
0.25	0.586	-52.30	15.769	133.30	0.020	67.00	0.836	-16.00	0.483	28.968
0.40	0.455	-72.20	12.274	117.50	0.028	63.70	0.753	-18.50	0.660	26.418
0.60	0.346	-89.60	9.139	104.20	0.036	63.60	0.694	-19.40	0.830	24.046
0.80	0.273	-102.80	7.204	94.80	0.044	64.30	0.664	-20.50	0.936	22.141
1.00	0.224	-113.70	5.935	87.40	0.052	64.90	0.648	-21.90	1.002	20.276
1.50	0.136	-141.60	4.130	72.40	0.074	64.70	0.629	-27.20	1.073	15.817
2.00	0.096	168.00	3.184	59.30	0.097	62.30	0.620	-34.60	1.084	13.398
2.50	0.132	119.10	2.584	47.10	0.119	58.50	0.615	-42.70	1.076	11.682
3.00	0.199	97.00	2.161	35.90	0.142	54.40	0.613	-50.40	1.042	10.568
3.50	0.260	86.30	1.851	25.80	0.164	50.30	0.610	-57.00	1.008	9.994
4.00	0.300	80.80	1.628	16.90	0.187	46.80	0.604	-62.50	0.974	9.398
4.50	0.318	78.70	1.477	8.90	0.216	43.40	0.592	-67.80	0.933	8.349
5.00	0.319	79.50	1.388	1.50	0.252	39.80	0.573	-74.10	0.889	7.410

Note:

1. Gain Calculations:

$$MAG = \frac{|S_{21}|}{|S_{12}|} (K \pm \sqrt{K^2 - 1}). \text{ When } K \leq 1, \text{ MAG is undefined and MSG values are used. } MSG = \frac{|S_{21}|}{|S_{12}|}, K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2 |S_{12} S_{21}|}, \Delta = S_{11} S_{22} - S_{21} S_{12}$$

MAG = Maximum Available Gain

MSG = Maximum Stable Gain

**UPA800T NONLINEAR MODEL**

**BJT NONLINEAR MODEL PARAMETERS(1)**

Parameters	Q1, Q2	Parameters	Q1, Q2
IS	3.84e-16	MJC	0.5
BF	124.9	XCJC	0
NF	1.04	CJS	0
VAF	11.87	VJS	0.75
IKF	0.027	MJS	0
ISE	1e-14	FC	0.5
NE	2.17	TF	10e-12
BR	1.0	XTF	18.0
NR	1.05	VTF	19.12
VAR	Infinity	ITF	0.082
IKR	Infinity	PTF	0
ISC	0	TR	0.635e-9
NC	2.0	EG	1.11
RE	0.6	XTB	0
RB	17.88	XTI	3
RBM	1.02	KF	0
IRB	4.01e-4	AF	1
RC	10.46		
CJE	0.358e-12		
VJE	0.711		
MJE	0.5		
CJC	0.21e-12		
VJC	0.791		

(1) Gummel-Poon Model

**UNITS**

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

**MODEL RANGE**

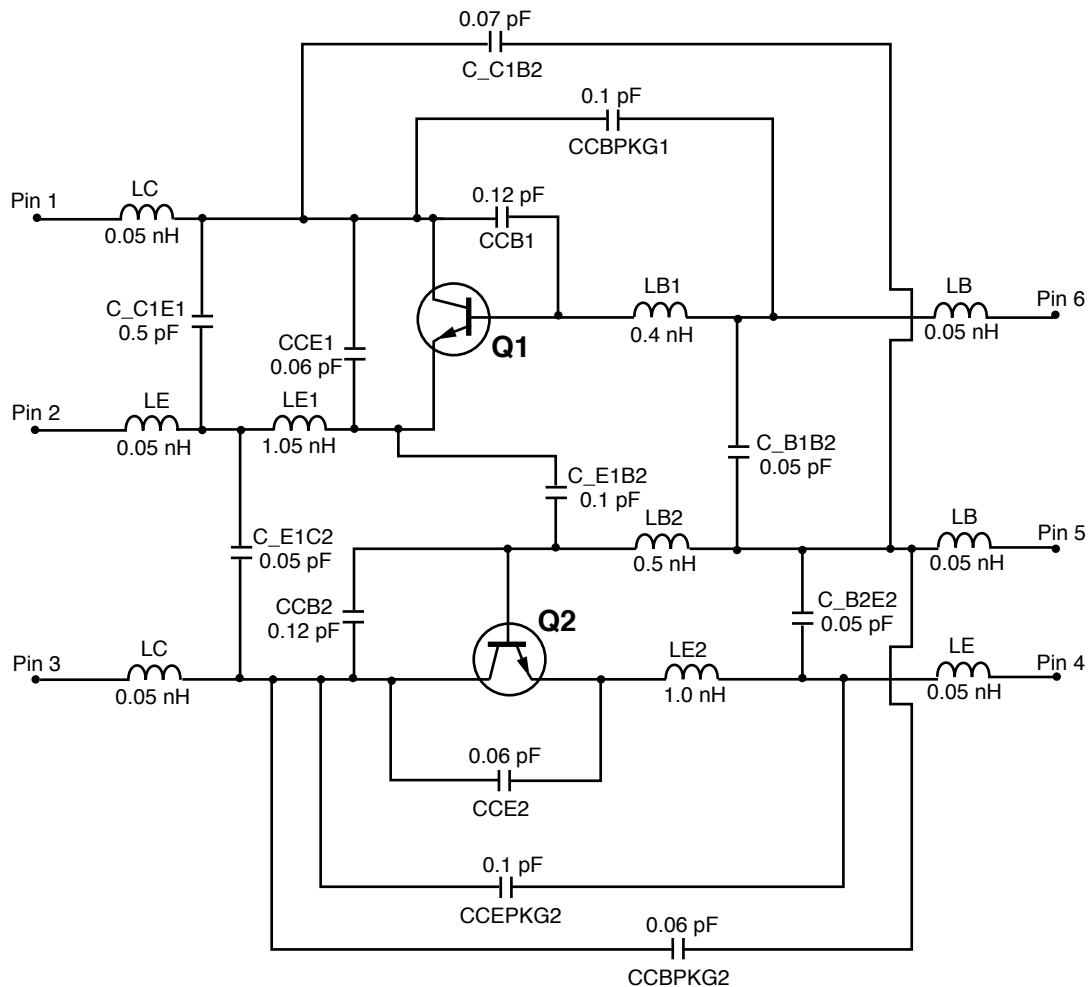
Frequency: 0.1 to 3.0 GHz

Bias:  $V_{CE} = 0.5 \text{ V to } 5 \text{ V}$ ,  $I_C = 0.5 \text{ mA to } 10 \text{ mA}$

Date: 10/98

## UPA800T NONLINEAR MODEL

## SCHEMATIC



## MODEL RANGE

Frequency: 0.1 to 3.0 GHz

Bias:  $V_{CE} = 0.5$  V to 5 V,  $I_C = 0.5$  mA to 10 mA

Date: 10/98

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