NEC

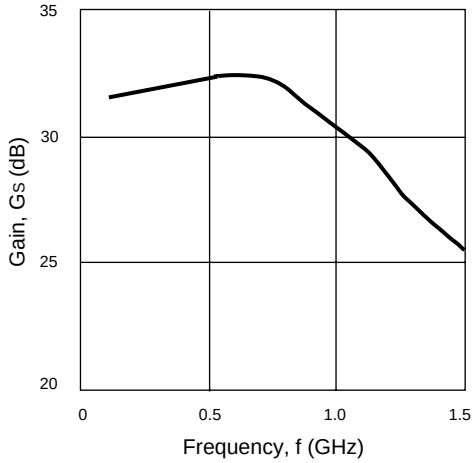
1.5 GHz SILICON MMIC WIDE-BAND AMPLIFIER

UPC2710T

FEATURES

- **FREQUENCY RESPONSE:** 1.5 GHz
- **HIGH GAIN:** 33 dB
- **SATURATED OUTPUT POWER:** +13.5
- **INTERNAL CURRENT REGULATION MINIMIZES GAIN CHANGE OVER TEMPERATURE**
- **5 V SINGLE SUPPLY VOLTAGE**
- **SUPER SMALL PACKAGE**
- **TAPE AND REEL PACKAGING OPTION AVAILABLE**

GAIN vs. FREQUENCY



DESCRIPTION

The UPC2710T is a Silicon Monolithic integrated circuit manufactured using the NESAT III process. This device is suitable for applications which require high gain and wide-band operation. It is designed for low cost gain stages in cellular radios, GPS receivers, DBS tuners, PCN, and test/measurement equipment.

NEC's stringent quality assurance and test procedures ensure the highest reliability and performance.

ELECTRICAL CHARACTERISTICS (T_A = 25 °C, f = 0.5 GHz, V_{CC} = 5 V)

PART NUMBER PACKAGE OUTLINE			UPC2710T T06		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**
I_{CC}	Circuit Current (no signal)	mA	16	22	29
G_S	Small Signal Gain	dB	30	33	36.5
f_U	Upper Limit Operating Frequency (The gain at f_U is 3 dB down from the gain at 0.1 GHz)	GHz	0.7	1.0	
ΔG_S	Gain Flatness, f = 0.1 ~ 0.6 GHz f = 0.1~ 0.8 GHz	dB		±0.8	
P_{SAT}	Saturated Output Power	dBm	11	13.5	
P_{1dB}	Output Power at 1dB Compression Point	dBm		7.5	
NF	Noise Figure	dB		3.5	5
RL_{IN}	Input Return Loss	dB	3	6	
RL_{OUT}	Output Return Loss	dB	9	12	
ISOL	Isolation	dB	34	39	
ΔG_T	Gain -Temperature Coefficient	dB/°C		-0.006	
R_{TH}	Thermal Resistance (Junction to Ambient)	°C/W			200

ABSOLUTE MAXIMUM RATINGS[1] (T_A = 25°C)

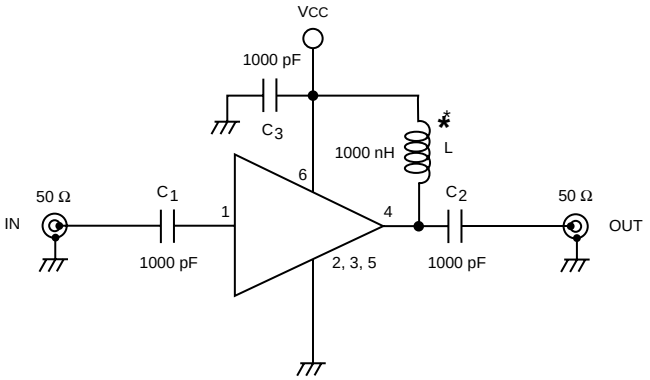
SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CC}	Supply Voltage	V	6
P_{IN}	Input Power	dBm	+10
P_T	Power Dissipation	mW	280[2]
T_{OP}	Operating Temperature	°C	-40 to +85
T_{STG}	Storage Temperature	°C	-55 to +150

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. Mounted on 50 x 50 x 1.6 mm epoxy glass PWB (T_A = +85°C).

RECOMMENDED OPERATING CONDITIONS

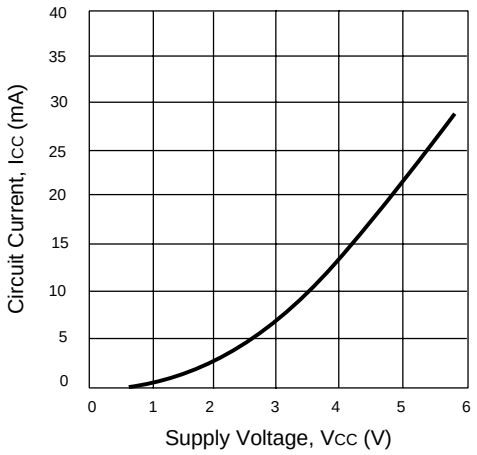
SYMBOL	PARAMETER	UNITS	MIN	TYP	MAX
V_{CC}	Supply Voltage	V	4.5	5.0	5.5

TEST CIRCUIT

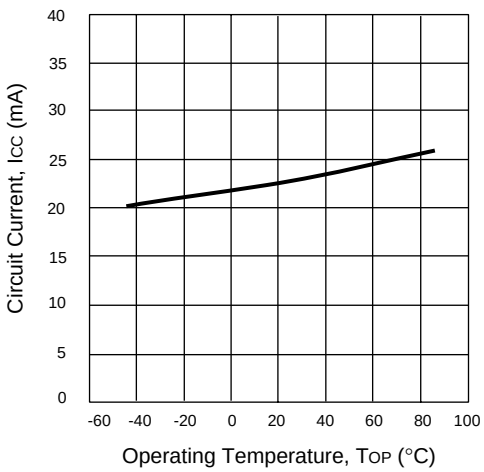


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

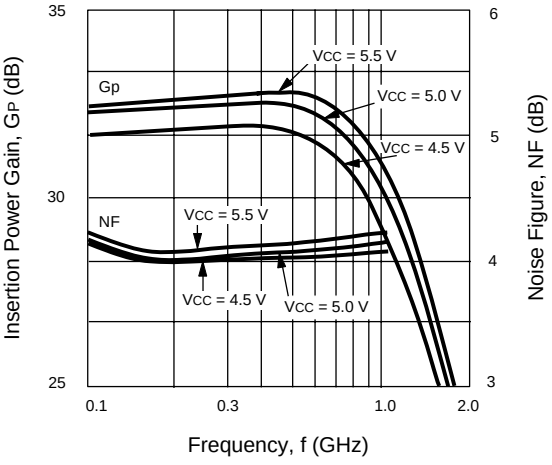
CIRCUIT CURRENT vs. VOLTAGE



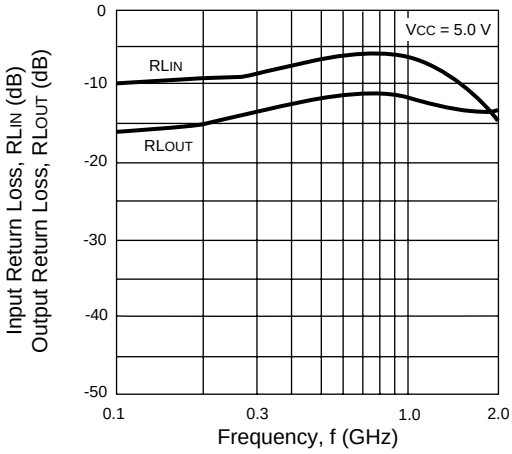
CIRCUIT CURRENT vs. TEMPERATURE



NOISE FIGURE AND INSERTION GAIN vs. FREQUENCY

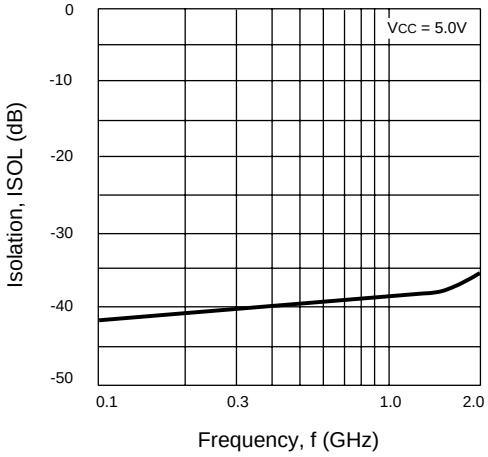


RETURN LOSS vs. FREQUENCY

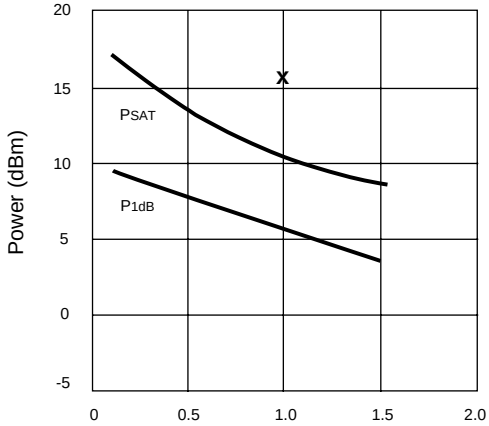


TYPICAL PERFORMANCE CURVES (T_A = 25° C)

ISOLATION vs. FREQUENCY

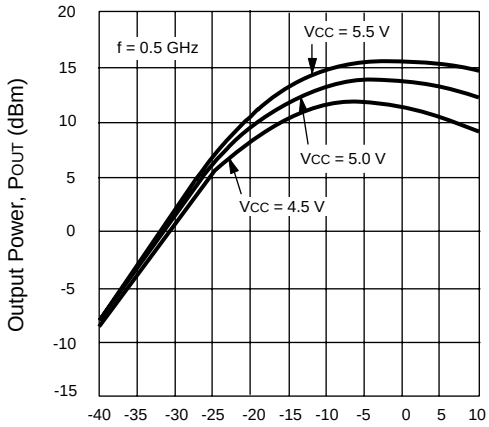


POWER vs. FREQUENCY

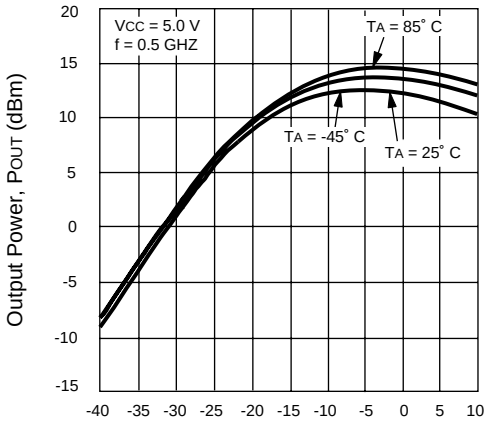


X: Typical SSB Third Order Intercept Point

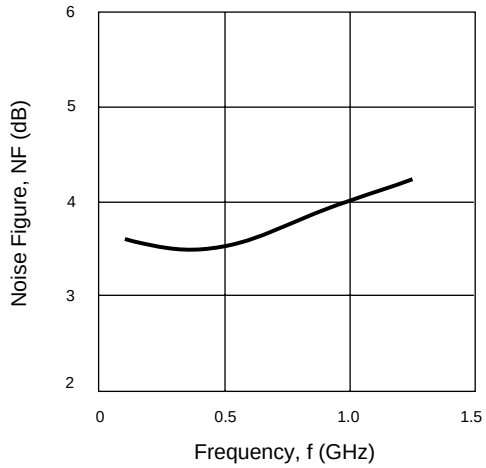
OUTPUT POWER vs. INPUT POWER AND VOLTAGE



OUTPUT POWER vs. INPUT POWER AND TEMPERATURE



NOISE FIGURE vs. FREQUENCY



TYPICAL SCATTERING PARAMETERS (T_A = 25° C)

UPC2710T

V_{CC} = 5 V, I_{CC} = 22 mA

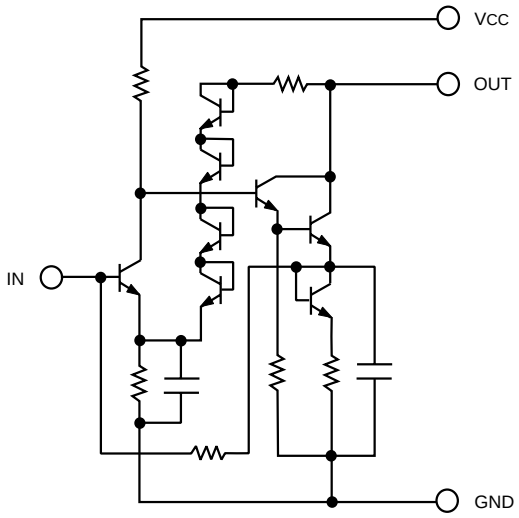
FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K^1	S_{21}
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)
0.10	0.322	-0.3	37.7	-5.9	0.013	17.1	0.200	-11.7	1.06	31.5
0.20	0.346	3.3	38.8	-17.0	0.012	19.8	0.208	-15.4	1.07	31.8
0.30	0.383	2.1	40.2	-28.0	0.009	22.5	0.231	-23.5	1.21	32.1
0.40	0.429	-1.7	41.6	-40.4	0.009	25.1	0.258	-34.2	1.10	32.4
0.50	0.465	-9.4	42.1	-54.1	0.012	27.8	0.273	-47.2	0.86	32.5
0.60	0.486	-17.8	42.3	-68.3	0.013	30.5	0.305	-60.9	0.79	32.5
0.70	0.487	-27.2	41.1	-83.2	0.013	33.1	0.319	-77.8	0.82	32.3
0.80	0.468	-36.5	39.1	-97.9	0.013	35.8	0.320	-96.2	0.89	31.9
0.90	0.423	-44.5	35.4	-111.7	0.013	38.5	0.297	-115.4	1.04	31.0
1.00	0.392	-50.3	32.9	-123.4	0.014	41.2	0.260	-128.2	1.10	30.4
1.10	0.349	-56.6	30.0	-135.5	0.014	43.9	0.240	-142.2	1.22	29.6
1.20	0.301	-61.0	26.8	-146.8	0.015	46.6	0.216	-156.3	1.31	28.6
1.30	0.257	-63.2	23.8	-156.8	0.016	49.2	0.192	-169.7	1.40	27.5
1.40	0.217	-63.5	21.1	-165.9	0.016	51.6	0.173	176.0	1.56	26.5
1.50	0.184	-59.9	18.8	-174.2	0.017	54.5	0.155	162.3	1.65	25.5

Note:

1. K factor calculations:

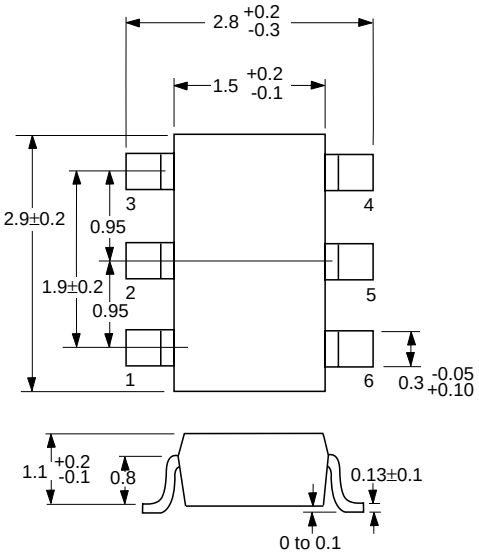
$$K = \frac{1 + |\Delta|^2 - |S_{11}|^2 - |S_{22}|^2}{2\,|S_{12}\,S_{21}|}, \quad \Delta = S_{11}\,S_{22} - S_{21}\,S_{12}$$

EQUIVALENT CIRCUIT



PACKAGE OUTLINE (Units in mm)

PACKAGE OUTLINE T06

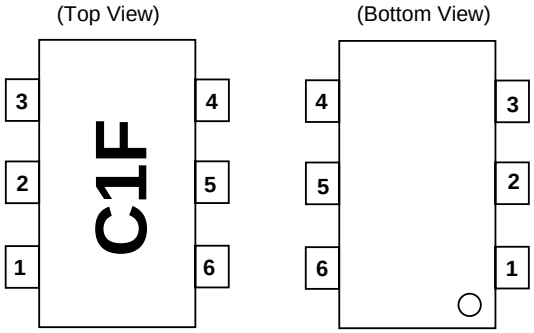


Note:
All dimensions are typical unless otherwise noted.

ORDERING INFORMATION

PART NUMBER	QTY
UPC2710T-E3	3K/Reel

LEAD CONNECTIONS



1. INPUT
2. GND
3. GND
4. OUTPUT
5. GND
6. VCC

RECOMMENDED P.C.B. LAYOUT (Units in mm)