

## 1.2 GHz BANDWIDTH LOW NOISE SILICON MMIC AMPLIFIER

**UPC1676B  
UPC1676G  
UPC1676P**

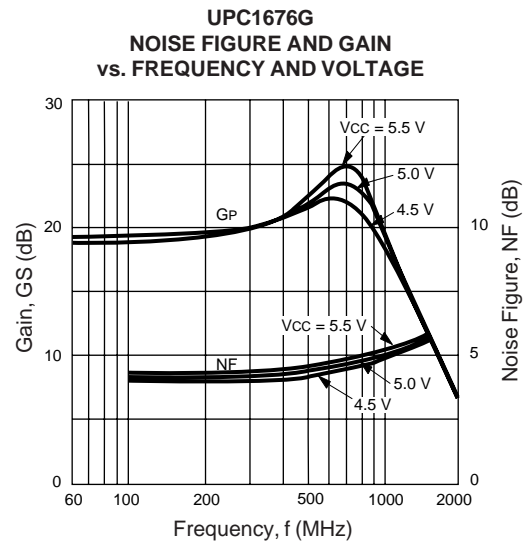
### FEATURES

- **WIDE BANDWIDTH:**  
1200 MHz at 3 dB Point for UPC1676G  
1300 MHz at 3 dB Point for UPC1676B, UPC1676P
- **HIGH POWER GAIN:** 22 dB TYP AT  $f = 500$  MHz
- **HIGH ISOLATION**
- **SINGLE POWER SUPPLY:**  $V_{CC} = 5$  V
- **INPUT/OUTPUT MATCHED TO  $50 \Omega$**
- **AVAILABLE IN TAPE AND REEL (UPC1676G)**

### DESCRIPTION

The UPC1676 is a silicon monolithic integrated circuit designed for wide-band amplifiers covering the VHF to UHF bands. The series is available in two package styles: a surface mount package (UPC1676G), and an 8 lead ceramic flat package (UPC1676B). Also available in chip form (UPC1676P).

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



### ELECTRICAL CHARACTERISTICS ( $T_A = 25^\circ\text{C}$ , $V_{CC} = 5$ V, $f = 500$ MHz)

PART NUMBER PACKAGE OUTLINE			UPC1676B <sup>1</sup> B08			UPC1676G 39			UPC1676P CHIP		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX	MIN	TYP	MAX	MIN	TYP	MAX
$I_{CC}$	Supply Current	mA	14	19	24	14	19	24	14	19	24
$G_s$	Small Signal Gain	dB	18	20	22	19	22	24	19	22	24
$P_{SAT}$	Saturated Output Power	dBm	3.5	5.5		3	5		3	5	
BW	Bandwidth 3 dB down from gain at 100 MHz	MHz	1000	1300		1000	1200		1000	1300	
NF	Noise Figure	dB		4.5	6		4.5	6		4.5	6
$R_{LIN}$	Input Return Loss	dB	18	21		9	12			21	
$R_{LOUT}$	Output Return Loss	dB	10	13		6	9			13	
ISOL	Isolation	dB	24	28		24	28		24	28	
$R_{TH(J-C)}$	Thermal Resistance (Junction to Case)	$^\circ\text{C/W}$			50						

Note:

1. Case must be connected to GND for stable RF operation and optimum thermal dissipation.

# UPC1676B, UPC1676G, UPC1676P

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

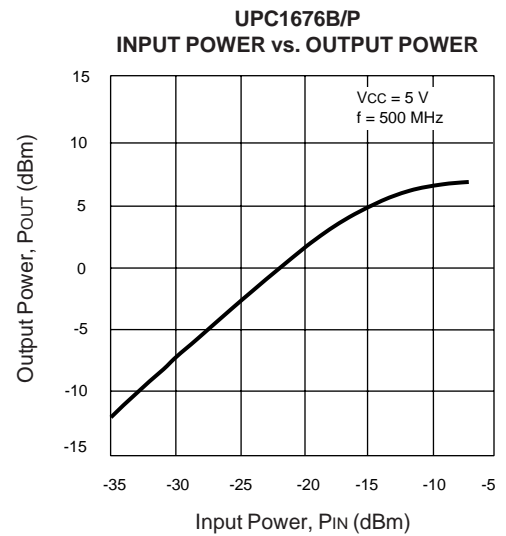
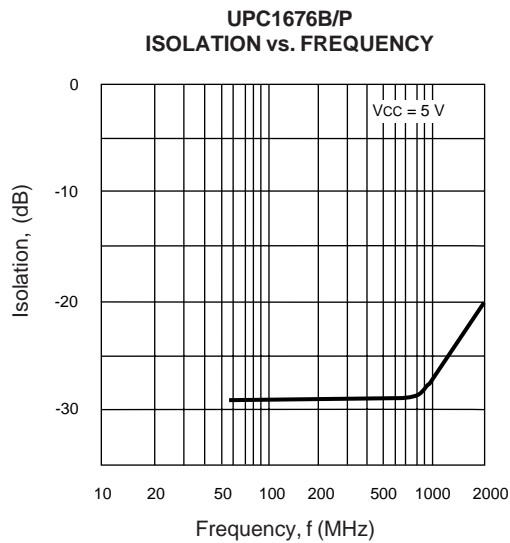
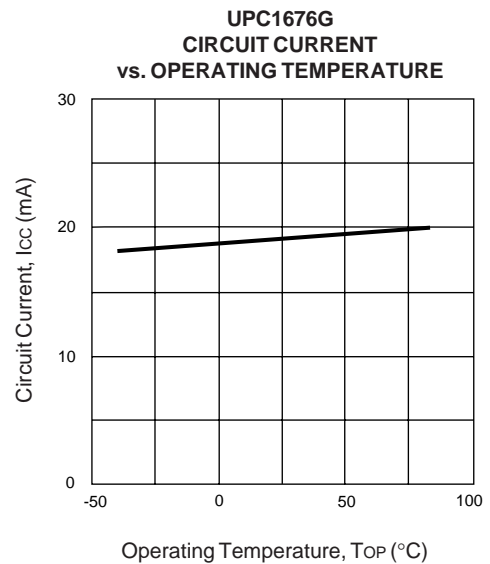
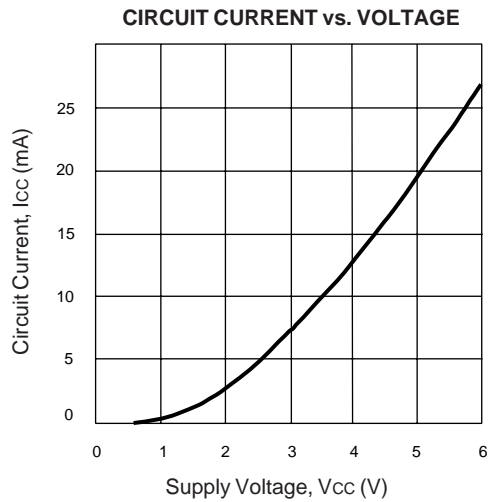
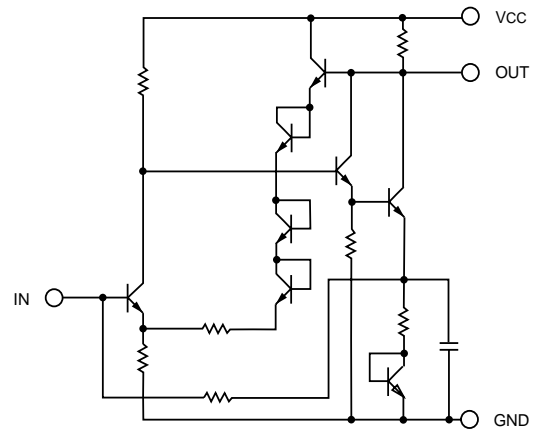
SYMBOLS	PARAMETERS	UNITS	RATINGS
V <sub>CC</sub>	Power Supply Voltage	V	6
P <sub>T</sub>	Total Power Dissipation UPC1676B/P UPC1676G	W mW	1.5 (T <sub>c</sub> = +125°C) 200 (T <sub>A</sub> = +85°C)
T <sub>OP</sub>	Operating Temperature UPC1676B/P UPC1676G	°C °C	-55 to +125 -40 to +85
T <sub>STG</sub>	Storage Temperature UPC1676B/P UPC1676G	°C °C	-65 to +200 -55 to +150

Note:

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

## TYPICAL PERFORMANCE CURVES (T<sub>A</sub> = 25°C)

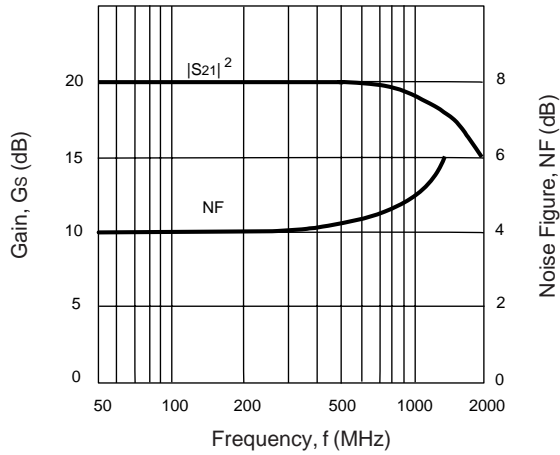
## EQUIVALENT CIRCUIT



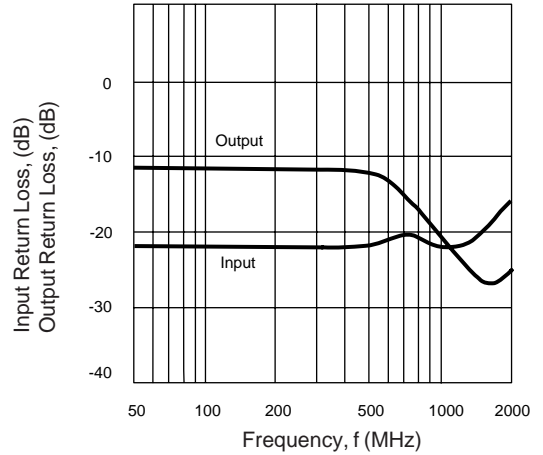
# UPC1676B, UPC1676G, UPC1676P

## TYPICAL PERFORMANCE CURVES (TA = 25°C)

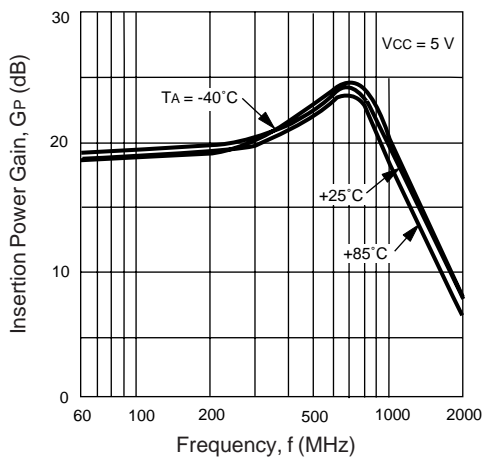
**UPC1676B/P**  
**NOISE FIGURE AND**  
**GAIN vs. FREQUENCY**



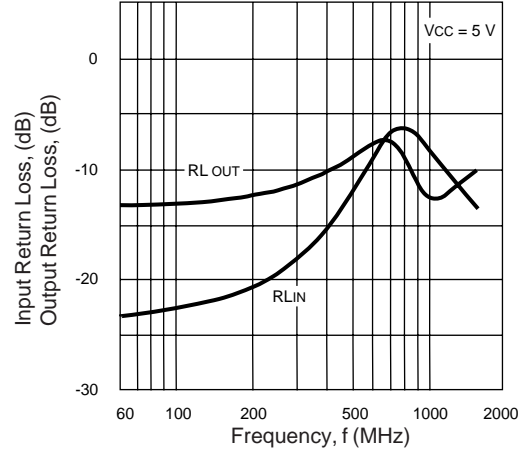
**UPC1676B/P**  
**INPUT AND OUTPUT**  
**RETURN LOSS vs. FREQUENCY**



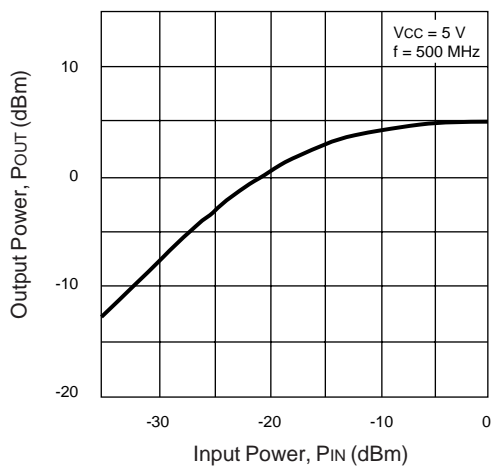
**UPC1676G**  
**INSERTION POWER GAIN**  
**vs. FREQUENCY AND TEMPERATURE**



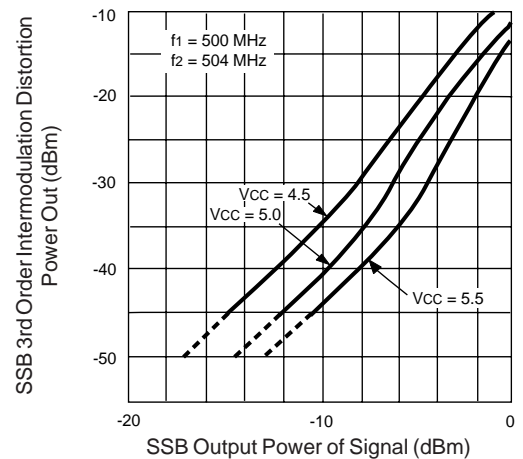
**UPC1676G**  
**INPUT AND OUTPUT**  
**RETURN LOSS vs. FREQUENCY**



**UPC1676G**  
**OUTPUT POWER vs. INPUT POWER**



**UPC1676G**  
**THIRD ORDER INTERMODULATION DISTORTION**  
**vs. OUTPUT POWER AND VOLTAGE**



# UPC1676B, UPC1676G, UPC1676P

## TYPICAL SCATTERING PARAMETERS (TA = 25°C)

### UPC1676B

VCC = 5 V, ICC = 19 mA

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	S <sub>21</sub> dB
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
50	0.064	-11	10.153	-4	0.040	0	0.216	175	1.39	20.1
100	0.064	-18	10.131	-10	0.039	-3	0.219	165	1.41	20.1
200	0.074	-40	10.209	-23	0.038	-3	0.213	147	1.43	20.2
400	0.095	-86	10.646	-49	0.037	-7	0.211	107	1.39	20.5
600	0.100	-130	11.076	-78	0.036	-11	0.210	60	1.37	20.9
800	0.105	-174	11.035	-110	0.035	-13	0.209	9	1.40	20.9
1000	0.069	148	10.053	-145	0.031	-16	0.209	-46	1.69	20.0
1200	0.030	98	8.525	-176	0.027	-12	0.198	-95	2.21	18.6
1400	0.017	-80	6.795	157	0.030	-6	0.169	-137	2.48	16.6
1600	0.045	-121	5.407	134	0.032	2	0.135	-176	2.91	14.7
1800	0.072	-153	4.372	113	0.035	2	0.107	143	3.29	12.8
2000	0.081	-175	3.566	94	0.041	1	0.088	98	3.45	11.0
2200	0.087	158	2.984	77	0.047	-1	0.096	52	3.58	9.5
2400	0.083	129	2.537	60	0.051	-4	0.111	16	3.86	8.1

### UPC1676G

VCC = 5 V, ICC = 19 mA

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	S <sub>21</sub> dB
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
100	0.110	-52.7	9.91	-12.0	0.039	0.3	0.218	172.0	1.43	19.9
200	0.128	-82.7	10.22	-28.0	0.040	-2.7	0.226	154.1	1.35	20.2
400	0.250	-141.3	11.61	-60.7	0.045	-7.7	0.286	111.3	1.03	21.3
600	0.484	160.9	14.84	-101.1	0.057	-20.7	0.392	63.6	0.62	23.4
800	0.813	87.1	17.69	-162.9	0.061	-50.3	0.483	-8.0	0.51	25.0
1000	0.728	15.2	12.19	134.2	0.039	-69.4	0.299	-86.6	0.85	21.7
1200	0.530	-32.1	7.34	93.6	0.032	-58.0	0.151	-152.2	1.68	17.3
1400	0.400	-66.8	4.91	64.2	0.036	-54.3	0.101	133.5	2.42	13.8
1600	0.319	-94.6	3.59	38.8	0.043	-57.6	0.110	69.4	2.92	11.1
1800	0.254	-124.5	2.79	15.1	0.051	-67.0	0.132	25.0	3.28	8.9
2000	0.200	-150.3	2.28	-8.2	0.057	-77.7	0.157	-9.5	3.65	7.2
2200	0.156	-174.9	1.95	-30.5	0.065	-87.3	0.178	-40.7	3.79	5.8
2400	0.112	164.1	1.70	-52.6	0.073	-98.7	0.199	-69.1	3.89	4.6

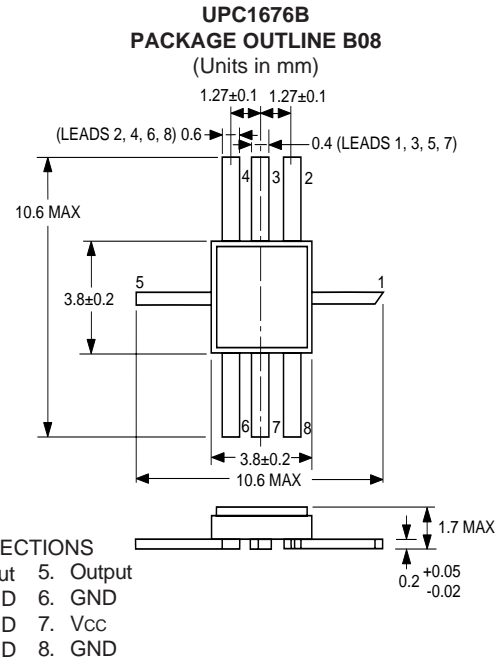
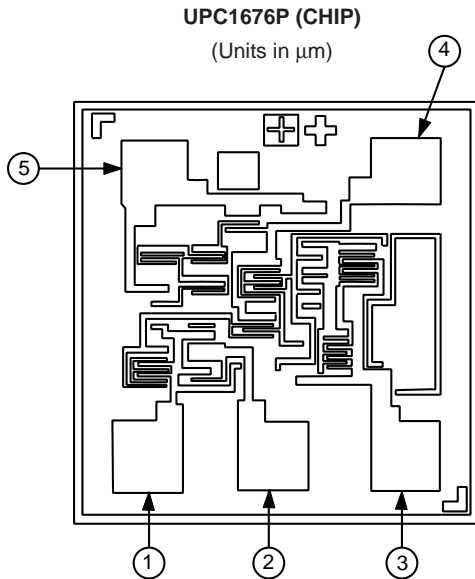
### UPC1676P

VCC = 5 V, ICC = 19 mA

FREQUENCY MHz	S <sub>11</sub>		S <sub>21</sub>		S <sub>12</sub>		S <sub>22</sub>		K	S <sub>21</sub> dB
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
50	0.116	-11.5	9.90	-4.0	0.046	-1.0	0.240	174.0	1.28	19.9
100	0.105	-19.5	9.77	-9.0	0.045	-2.0	0.229	168.0	1.31	19.8
200	0.122	-23.0	10.00	-19.0	0.046	4.5	0.242	154.5	1.26	20.0
400	0.131	-48.5	10.27	-39.5	0.046	9.5	0.246	128.0	1.22	20.2
600	0.146	-74.0	10.44	-61.5	0.046	13.5	0.244	98.5	1.19	20.4
800	0.152	-97.8	10.35	-85.5	0.049	16.5	0.233	65.9	1.14	20.3
1000	0.167	-120.4	9.82	-111.5	0.051	13.0	0.231	27.4	1.13	19.8
1200	0.140	-134.8	8.65	-136.0	0.049	19.5	0.182	-10.5	1.31	18.7
1400	0.136	-141.6	7.33	-158.0	0.052	23.5	0.152	-44.5	1.44	17.3
1600	0.149	-139.8	6.12	-176.0	0.060	31.6	0.092	-64.8	1.50	15.7
1800	0.166	-149.8	5.20	167.5	0.068	29.5	0.097	-62.7	1.53	14.3
2000	0.161	-156.3	4.29	151.0	0.069	25.0	0.127	-93.2	1.76	12.6
2200	0.182	-158.4	3.66	137.5	0.075	27.5	0.101	-104.5	1.87	11.3
2400	0.196	-165.4	3.10	124.5	0.080	25.0	0.111	-110.4	2.03	9.8

# UPC1676B, UPC1676G, UPC1676P

## OUTLINE DIMENSIONS



### CHIP FEATURES

- **Die Size:** 0.60 mm x 0.65 mm
- **Thickness:** 170  $\pm$  30  $\mu\text{m}$
- **Pad Size:** 100  $\mu\text{m}$  x 100  $\mu\text{m}$
- **Ti/Pt/Au Metallization**

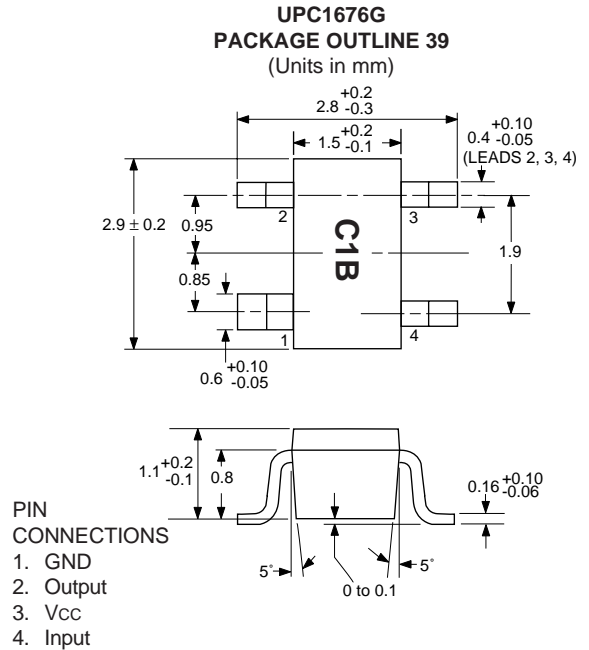
### BONDING INFORMATION

BONDING PAD NO.	BONDING PAD (mm)		PAD CONNECTION
	X AXIS	Y AXIS	
1	-185	210	INPUT
2	-5	-210	GND
3	+185	-210	GND
4	+185	-210	OUTPUT
5	-175	+210	Vcc

Note:  
All dimensions are typical unless otherwise specified.

### ORDERING INFORMATION

PART NUMBER	QTY
UPC1676G-T1	3000 / Reel



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