NEC

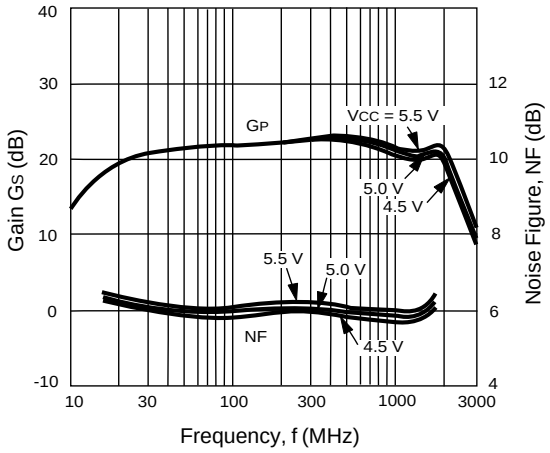
2 GHz MEDIUM POWER BROADBAND SILICON MMIC AMPLIFIER

UPC1678G UPC1678GV

FEATURES

- **HIGH OUTPUT POWER**: +18 dBm P_{SAT}
- **EXCELLENT FREQUENCY RESPONSE:** 2.0 GHz TYP at 3 dB Down
- **HIGH POWER GAIN:** 23 dB TYP at 500 MHz
- **SINGLE SUPPLY VOLTAGE:** 5 V
- **AVAILABLE IN TAPE AND REEL**

NOISE FIGURE AND GAIN vs. FREQUENCY AND VOLTAGE



DESCRIPTION

The UPC1678 is a silicon monolithic integrated circuit designed as a wide-band amplifier covering the HF to UHF bands. The device features high output power, 18 dBm TYP, high gain, 23 dB TYP and operates from a single 5 volt supply. The UPC1678 is available in two package styles: 8 pin SOP and SSOP packages.

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

ELECTRICAL CHARACTERISTICS (T_A = 25°C, V_{CC} = +5 V, f = 500 MHz)

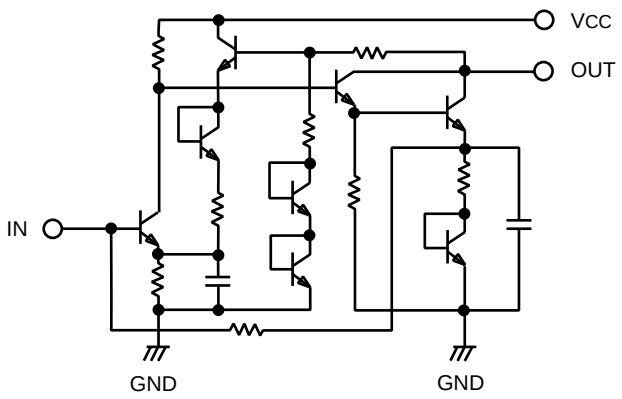
PART NUMBER PACKAGE OUTLINE			UPC1678G, GV G08, S08		
SYMBOLS	**PARAMETERS AND CONDITIONS**	**UNITS**	**MIN**	**TYP**	**MAX**
I_{CC}	Circuit Current at No Input Signal	mA	40	49	60
G_S	Small Signal Gain	dB	21	23	25
f_{3dB}	Upper Limit Operating Frequency at 3 dB down below the Gain at 100 MHz	MHz	1700	2000	
P_{SAT}	Saturated Output Power	dBm	15.5	17.5	
NF	Noise Figure	dB		6	
RL_{IN}	Input Return Loss	dB	11	14	
RL_{OUT}	Output Return Loss	dB	1	4	
ISOL	Isolation	dB	30	35	

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

SYMBOLS	PARAMETERS	UNITS	RATINGS
V_{CC}	Power Supply Voltage	V	-0.5 to 6.0
P_{IN}	Input Power	dBm	+10
P_T	Total Power Dissipation[2] UPC1678G, GV	mW	330
T_{OP}	Operating Temperature UPC1678G, GV	°C	-45 to +85
T_{STG}	Storage Temperature UPC1678G, GV	°C	-55 to +150

Notes:
1. Operation in excess of any one of these parameters may result in permanent damage.
2. Mounted on 5 cm x 5 cm x 1.6 mm glass epoxy PWB at T_A = maximum operating temperature..

EQUIVALENT CIRCUIT

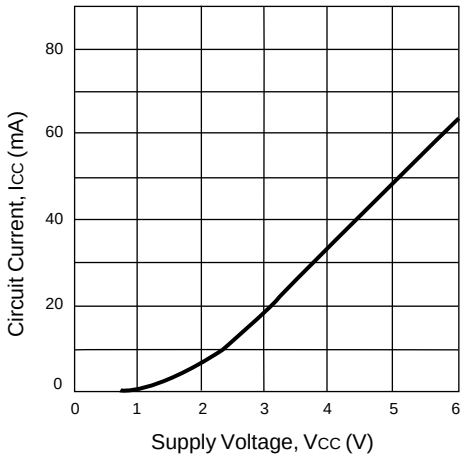


RECOMMENDED OPERATING CONDITIONS

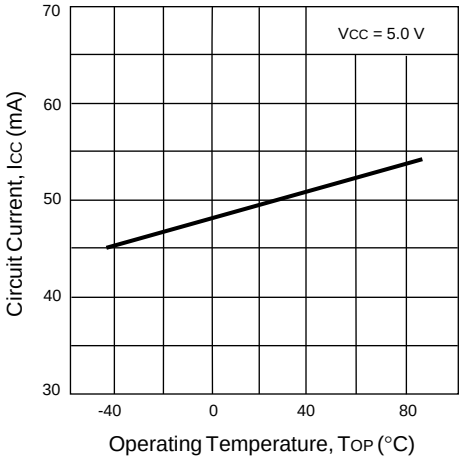
SYMBOLS	CHARACTERISTICS	UNITS	MIN	TYP	MAX
V_{CC}	Supply Voltage	V	4.5	5.0	5.5
T_{OP}	Operating Temperature	°C	-40	+25	+85

TYPICAL PERFORMANCE CURVES (T_A = 25°C)

CIRCUIT CURRENT vs. SUPPLY VOLTAGE

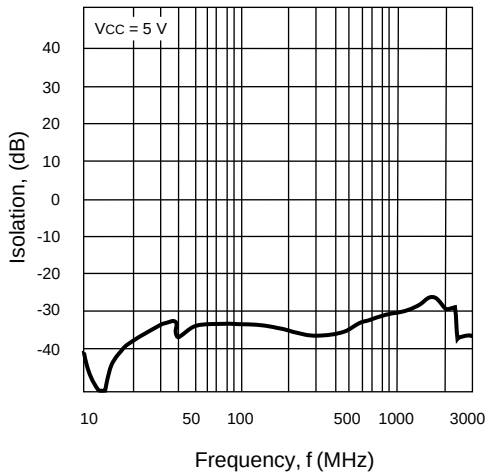


CIRCUIT CURRENT vs. OPERATING TEMPERATURE

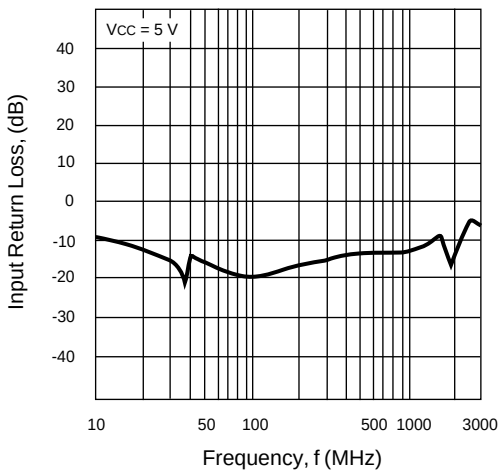


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

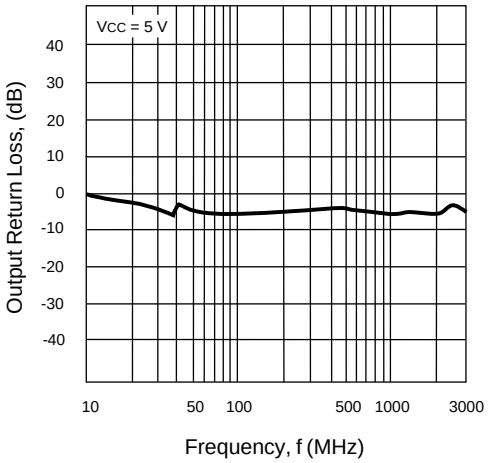
UPC1678G, GV
ISOLATION vs. FREQUENCY



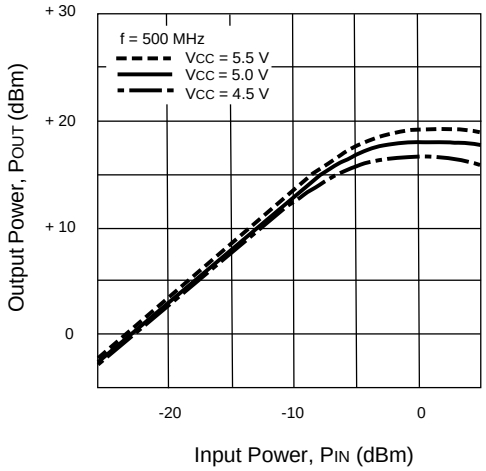
UPC1678G, GV
INPUT RETURN LOSS vs. FREQUENCY



UPC1678G, GV
OUTPUT RETURN LOSS vs. FREQUENCY

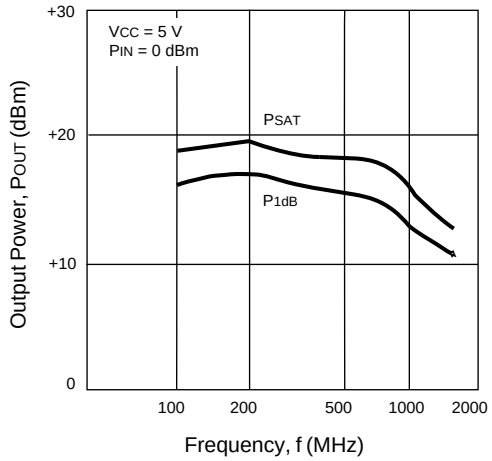


UPC1678G, GV
OUTPUT POWER vs. INPUT POWER

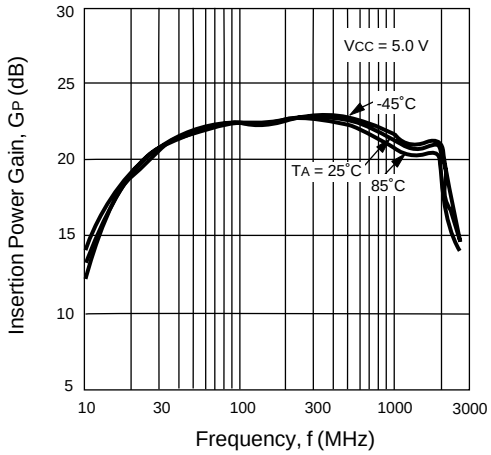


TYPICAL PERFORMANCE CURVES (T_A = 25°C)

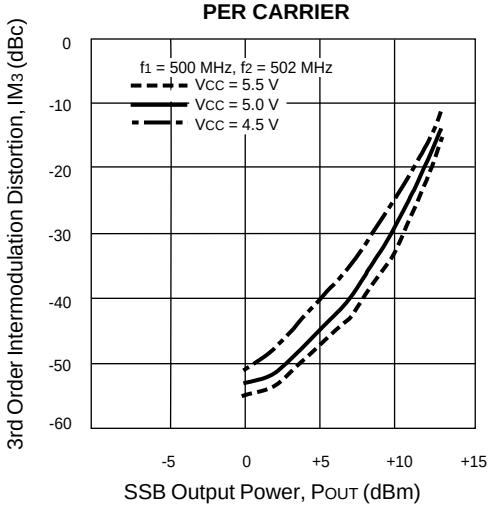
UPC1678G, GV
OUTPUT POWER vs. FREQUENCY



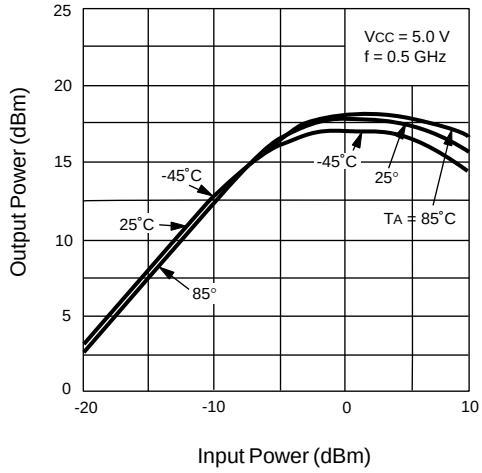
UPC1678G, GV
INSERTION POWER GAIN vs.
FREQUENCY AND TEMPERATURE



UPC1678G, GV
THIRD ORDER INTERMODULATION
DISTORTION vs. OUTPUT POWER
PER CARRIER

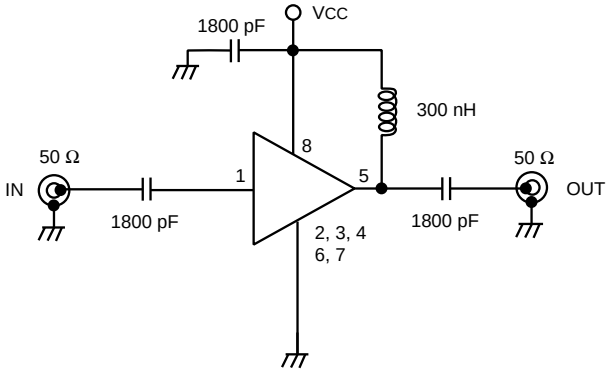


UPC1678G, GV
OUTPUT POWER vs. INPUT POWER
AND TEMPERATURE



TEST CIRCUIT

UPC1678G, GV



Precautions: 1) These devices are ESD sensitive. Use proper precautionary measures when handling and installing these devices.

TYPICAL SCATTERING PARAMETERS (T_A = 25°C)

UPC1678G

V_{CC} = 5 V, I_{CC} = 51 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	S_{21}
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)
0.05	0.193	143	9.9	31	0.018	26	0.746	91	1.45	23.5
0.10	0.126	151	12.6	6	0.020	10	0.610	44	1.43	24.1
0.20	0.138	136	13.6	-23	0.018	-13	0.618	6	1.47	24.8
0.40	0.208	88	14.4	-70	0.015	-7	0.691	-44	1.35	26.4
0.60	0.248	43	14.0	-111	0.022	-19	0.681	-85	0.97	28.1
0.80	0.256	2	13.1	-152	0.028	-38	0.635	-121	0.89	26.7
1.00	0.239	-35	12.5	170	0.034	-57	0.610	-155	0.83	25.6
1.20	0.190	-72	11.9	129	0.038	-87	0.646	167	0.77	24.9
1.40	0.152	-115	11.9	92	0.044	-109	0.634	136	0.75	24.4
1.60	0.093	-173	11.4	53	0.045	-136	0.669	98	0.73	24.0
1.80	0.042	81	10.0	8	0.043	-169	0.697	53	0.80	23.6
2.00	0.167	37	9.1	-30	0.041	171	0.626	9	0.98	23.4
2.20	0.214	-7	7.4	-70	0.034	145	0.579	-35	1.46	19.4
2.40	0.256	-38	6.1	-107	0.031	122	0.523	-77	1.99	17.2
2.50	0.292	-53	5.5	-127	0.028	116	0.469	-98	2.49	16.1

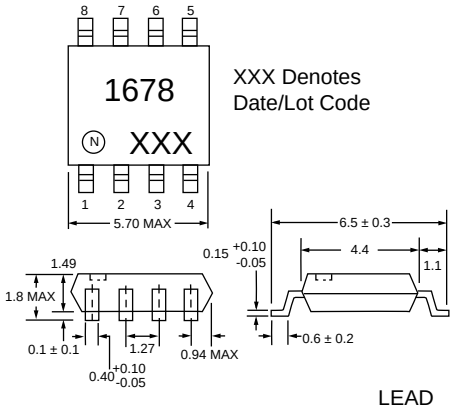
UPC1678GV

V_{CC} = 5 V, I_{CC} = 50 mA

FREQUENCY	S_{11}		S_{21}		S_{12}		S_{22}		K	S_{21}
(GHz)	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		(dB)
0.05	0.136	157	10.2	36	0.018	3	0.683	89	1.59	23.0
0.10	0.106	164	12.1	18	0.025	26	0.609	53	1.25	23.8
0.20	0.126	165	13.2	3	0.020	15	0.621	22	1.34	24.6
0.40	0.174	144	14.4	-17	0.017	50	0.673	-10	1.24	26.4
0.60	0.184	119	15.0	-35	0.024	71	0.657	-37	0.85	27.9
0.80	0.150	107	14.6	-52	0.033	75	0.619	-64	0.78	26.5
1.00	0.102	115	15.1	-70	0.038	77	0.599	-89	0.78	26.0
1.20	0.112	148	14.0	-88	0.040	83	0.585	-116	0.81	25.4
1.40	0.169	151	12.4	-114	0.046	92	0.542	-142	0.81	24.4
1.60	0.180	137	11.3	-131	0.054	99	0.449	-163	0.86	23.2
1.80	0.146	121	7.6	-144	0.063	101	0.335	-177	1.10	18.8
2.00	0.072	89	6.2	-159	0.073	102	0.224	-177	1.25	16.2
2.20	0.045	-37	4.6	-157	0.081	100	0.192	-163	1.49	13.4
2.40	0.137	-84	3.9	-164	0.085	97	0.206	-157	1.60	12.1
2.50	0.180	-95	3.9	-161	0.088	95	0.219	-158	1.54	12.2

OUTLINE DIMENSIONS (Units in mm)

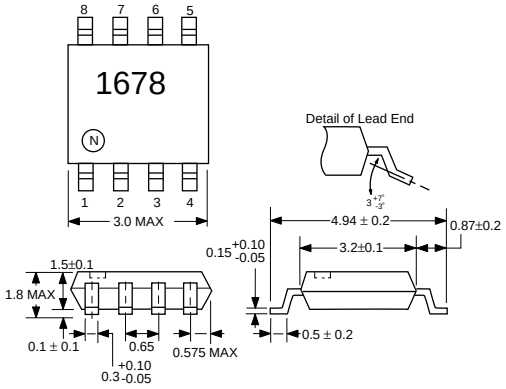
UPC1678G
PACKAGE OUTLINE G08



LEAD CONNECTIONS

1. Input	5. Output
2. GND	6. GND
3. GND	7. GND
4. GND	8. Vcc

UPC1678GV
PACKAGE OUTLINE S08



LEAD CONNECTIONS

1. Input	5. Output
2. GND	6. GND
3. GND	7. GND
4. GND	8. Vcc

ORDERING INFORMATION

PART NUMBER	QTY
UPC1678G-E1	2500/REEL
UPC1678GV-E1	1000/REEL