

FEATURES

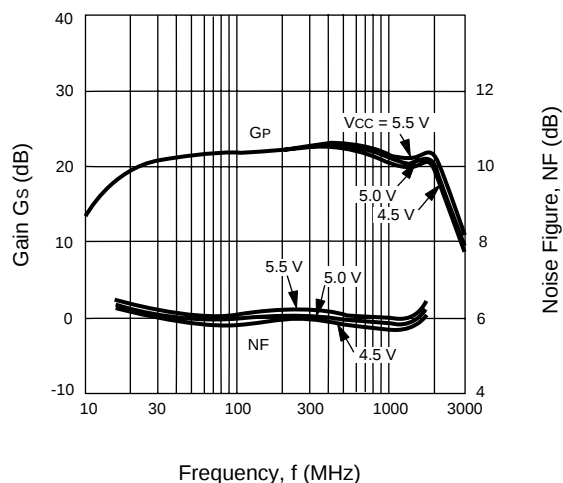
- **HIGH OUTPUT POWER:** +18 dBm PSAT
- **EXCELLENT FREQUENCY RESPONSE:**
2.0 GHz TYP at 3 dB Down
- **HIGH POWER GAIN:** 23 dB TYP at 500 MHz
- **SINGLE SUPPLY VOLTAGE:** 5 V
- **AVAILABLE IN TAPE AND REEL**

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.

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

NOISE FIGURE AND GAIN
vs. FREQUENCY AND VOLTAGE



ELECTRICAL CHARACTERISTICS (TA = 25°C, VCC = +5 V, f = 500 MHz, ZL = ZS = 50 Ω)

PART NUMBER PACKAGE OUTLINE			UPC1678G G08		
SYMBOLS	PARAMETERS AND CONDITIONS	UNITS	MIN	TYP	MAX
Icc	Circuit Current at No Input Signal	mA	40	49	60
Gs	Small Signal Gain	dB	21	23	25
f3dB	Upper Limit Operating Frequency at 3 dB down below the Gain at 100 MHz	MHz	1700	2000	
PSAT	Saturated Output Power	dBm	15.5	17.5	
NF	Noise Figure	dB		6	
RLIN	Input Return Loss	dB	11	14	
RLOUT	Output Return Loss	dB	1	4	
ISOL	Isolation	dB	30	35	

ABSOLUTE MAXIMUM RATINGS¹ (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	mW	330
T _{OP}	Operating Temperature	°C	-45 to +85
T _{STG}	Storage Temperature	°C	-55 to +150

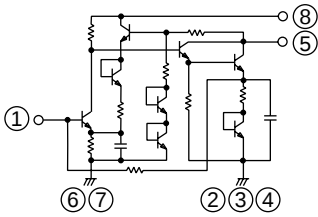
Notes:

- 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 glass epoxy PWB at T_A = +85°C.

RECOMMENDED OPERATING CONDITIONS

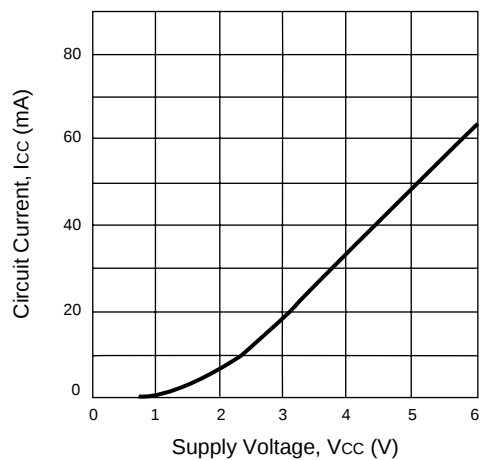
SYMBOLS	CHARACTERISTICS	UNITS	MIN	TYP	MAX
V _{CC}	Supply Voltage	V	4.5	5.0	5.5
T _{OP}	Operating Temperature	°C	-40	+25	+85

PIN DESCRIPTIONS

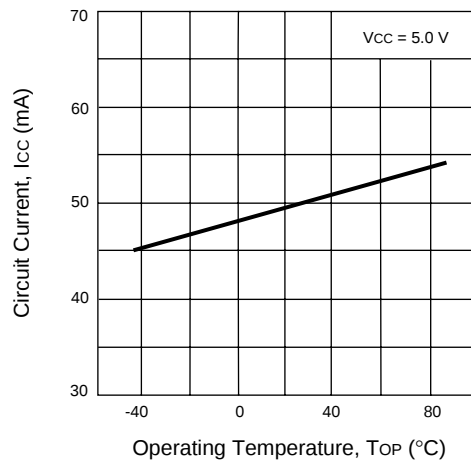
Pin No.	Pin Name	Applied Voltage (V)	Description	Internal Equivalent Circuit
1	Input	—	Signal input pin. An internal matching circuit, configured with resistors, enables 50 Ω connection over a wide bandwidth. A multi-feedback circuit is designed to cancel the deviations of h _{FE} and resistance. This pin must be coupled to the signal source with a blocking capacitor.	
5	Output	4.5 to 5.5	Signal output pin. Connect an inductor between this pin and V _{CC} to supply current to the internal output transistors.	
8	V _{CC}		Power supply pin. This pin should be externally equipped with a bypass capacitor to minimize ground impedance.	
2 3 4 6 7	GND	0	Ground pins. These pins should be connected to system ground with minimum inductance. Ground pattern on the board should be formed as wide as possible. All the ground pins must be connected together with wide ground pattern to minimize impedance difference.	

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

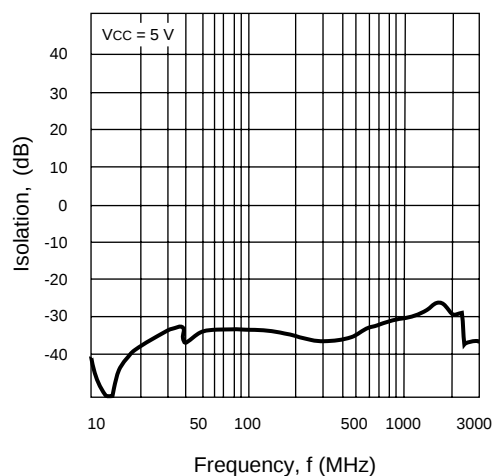
CIRCUIT CURRENT vs. SUPPLY VOLTAGE



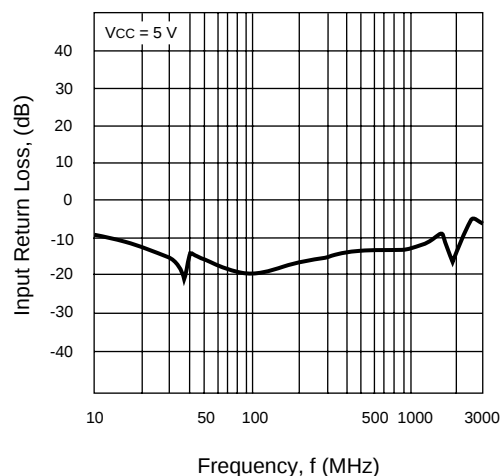
CIRCUIT CURRENT vs. OPERATING TEMPERATURE



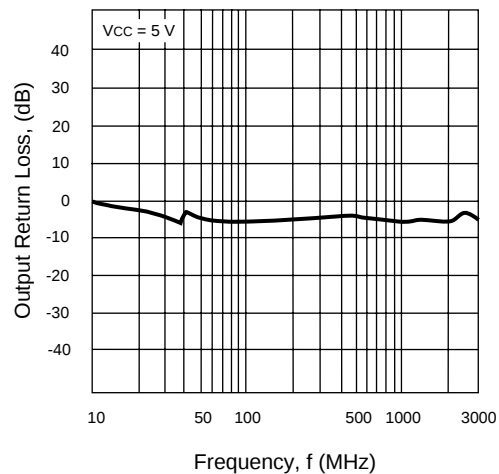
ISOLATION vs. FREQUENCY



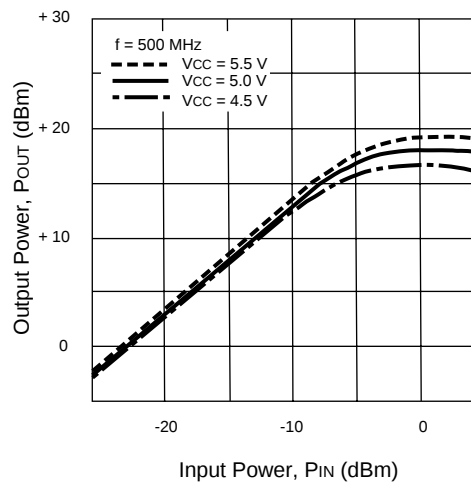
INPUT RETURN LOSS vs. FREQUENCY



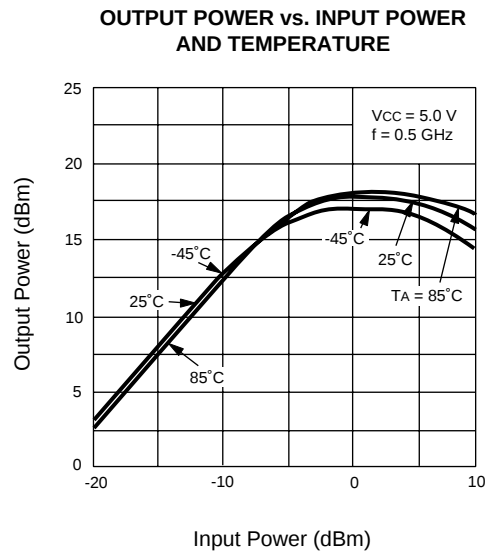
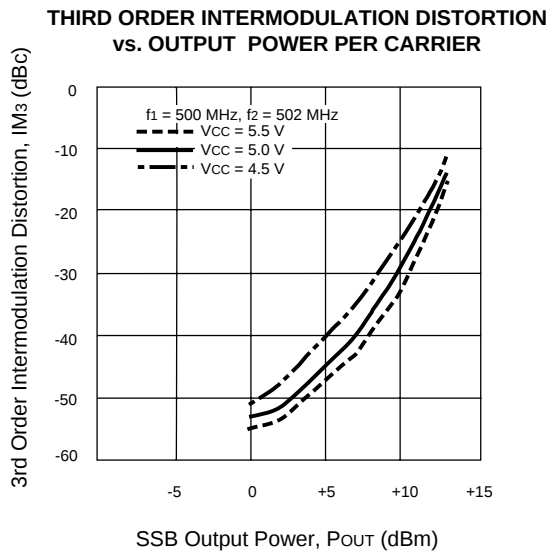
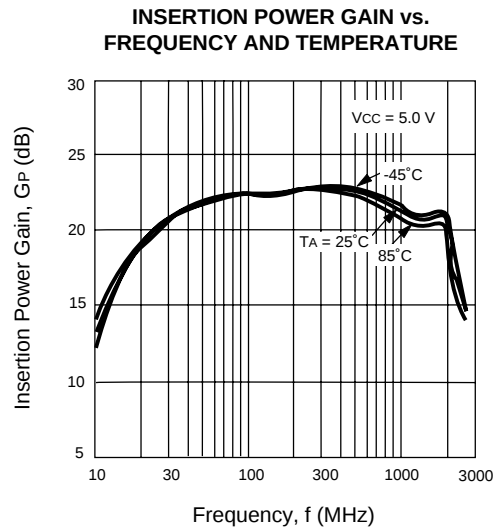
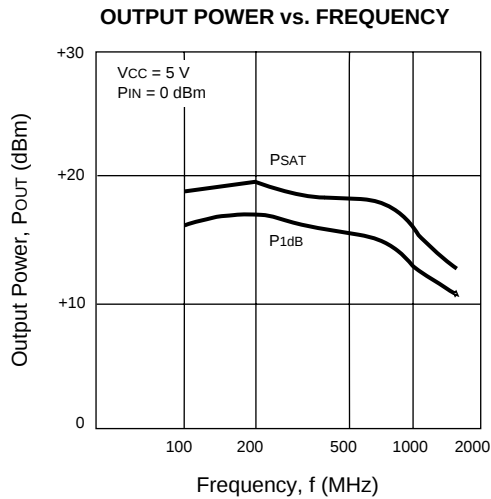
OUTPUT RETURN LOSS vs. FREQUENCY



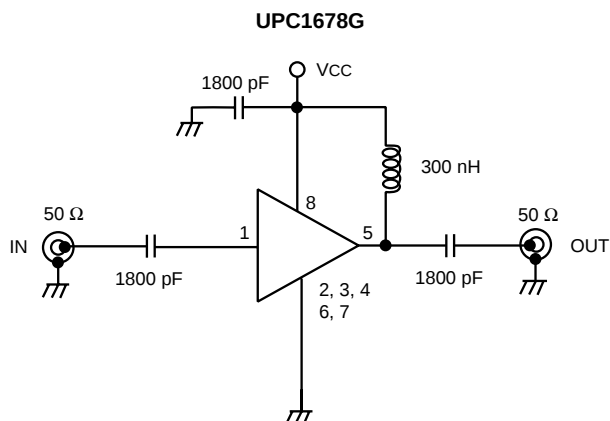
OUTPUT POWER vs. INPUT POWER



TYPICAL PERFORMANCE CURVES (T_A = 25°C)



TEST CIRCUIT



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

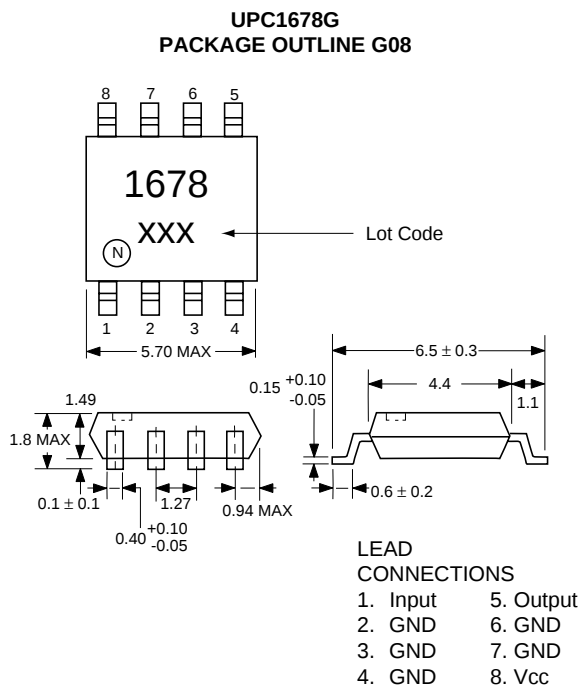
TYPICAL SCATTERING PARAMETERS (T_A = 25°C)

UPC1678G

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

FREQUENCY (GHz)	S ₁₁		S ₂₁		S ₁₂		S ₂₂		K	S ₂₁ (dB)
	MAG	ANG	MAG	ANG	MAG	ANG	MAG	ANG		
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

OUTLINE DIMENSIONS (Units in mm)



ORDERING INFORMATION

PART NUMBER	QTY
UPC1678G-E1	2500/REEL

Note: Embossed tape, 8 mm wide. Pin 1 is in tape pull-out direction.