

BIPOLAR ANALOG INTEGRATED CIRCUIT

μ PC1688G

5 V, 1.1 GHz WIDE BAND AND FLAT GAIN AMPLIFIER SILICON MMIC

DESCRIPTION

The μ PC1688G is a silicon monolithic integrated circuit especially designed as a flat gain and wide band amplifier covering HF through UHF band.

FEATURES

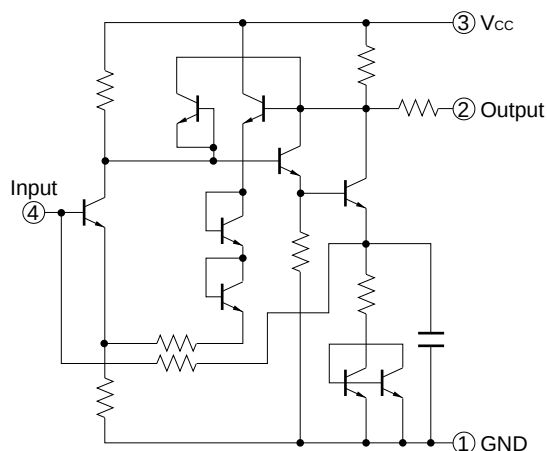
- Flat gain: $\Delta G_P = \pm 1 \text{ dB}_{\text{TYP.}}$ @ $f = 0.1 \text{ to } 0.7 \text{ GHz}$
- Frequency response : $1.1 \text{ GHz}_{\text{TYP.}}$ @ 3dB band width
- Power gain : $21 \text{ dB}_{\text{TYP.}}$ @ 0.5 GHz
- Supply voltage : $5 \text{ V} \pm 0.5 \text{ V}$
- 4 pin mini mold package

ORDERING INFORMATION

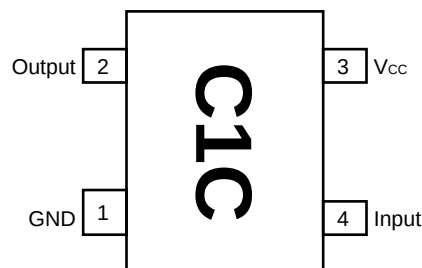
Order Number	Package	Marking	Supplying Form	
μ PC1688G	4 pin mini mold	C1C	Plastic magazine case	
μ PC1688G-T1			• Embossed tape 8 mm wide.	Tape perforation side faces pin3, 4.
μ PC1688G-T2			• QTY 3 kpcs/Reel.	Tape perforation side faces pin1, 2.

Remarks To order evaluation samples, please contact your local NEC sales office.

INTERNAL EQUIVALENT CIRCUIT



PIN CONNECTIONS (Top View)



Caution Electro-static sensitive devices

ABSOLUTE MAXIMUM RATINGS ($T_A = +25\text{ }^\circ\text{C}$)

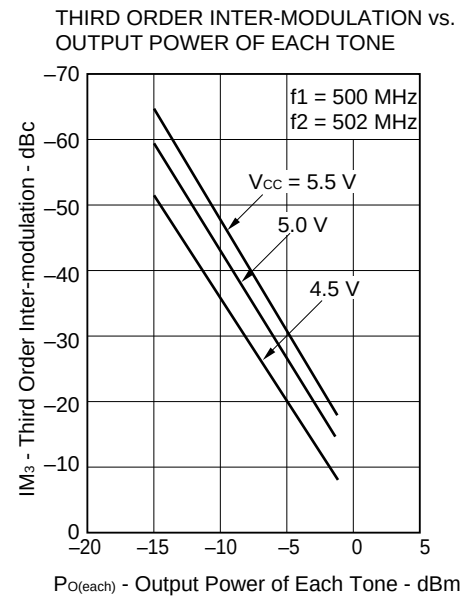
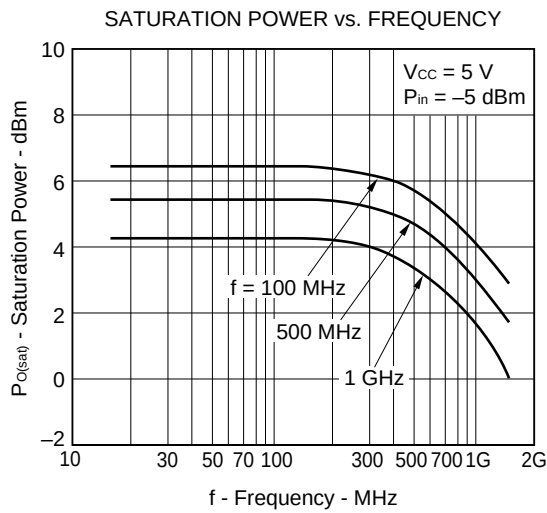
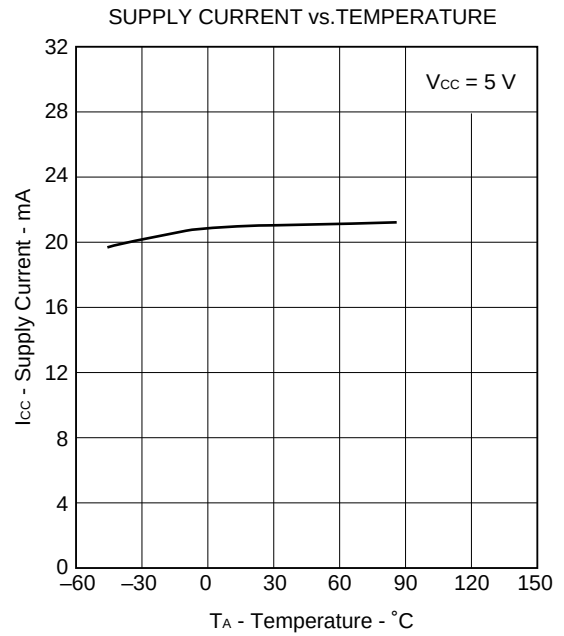
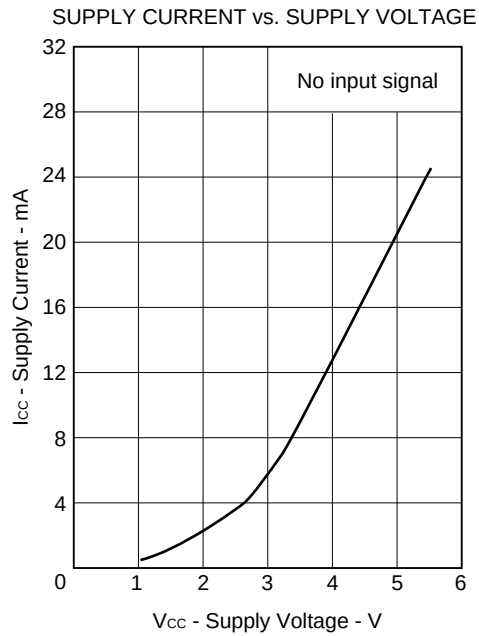
Supply Voltage	V_{CC}	6	V
Input Power	P_{in}	+10	dBm
Total Power Dissipation	P_T	200	mW
Operating Temperature	T_{opt}	-40 to +85	$^\circ\text{C}$
Storage Temperature	T_{stg}	-55 to +150	$^\circ\text{C}$

ELECTRICAL CHARACTERISTICS ($T_A = +25\text{ }^\circ\text{C}$, $V_{CC} = 5\text{ V}$, $Z_s = Z_L = 50\text{ }\Omega$)

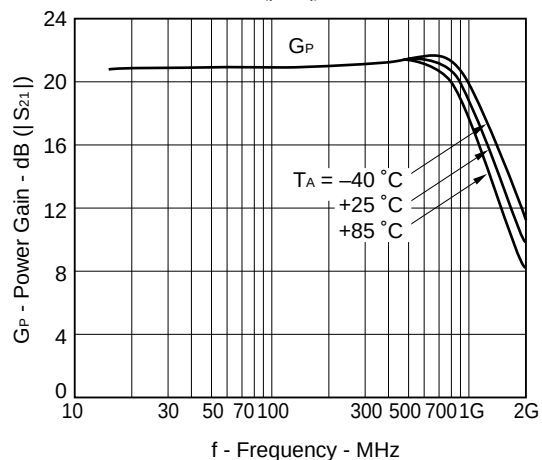
Characteristic	Symbol	MIN.	TYP.	MAX.	Unit	Test Conditions
Circuit current	I_{CC}	14	19	24	mA	No input signal
Power gain	G_P	18	21	23	dB	$f = 0.5\text{ GHz}$ ($G_P = S_{21} $)
Noise figure	NF	—	4.0	5.5	dB	$f = 0.5\text{ GHz}$
Upper limit operating frequency	f_u	0.9	1.1	—	GHz	3 dB down below 0.1 GHz gain
Isolation	ISL	23	27	—	dB	$f = 0.5\text{ GHz}$ ($ISL = S_{12} $)
Input return loss	RL_{in}	10	13	—	dB	$f = 0.5\text{ GHz}$ ($RL_{in} = S_{11} $)
Output return loss	RL_{out}	10	13	—	dB	$f = 0.5\text{ GHz}$ ($RL_{out} = S_{22} $)
Maximum output level	$P_{O(sat)}$	2	4	—	dBm	$f = 0.5\text{ GHz}$, $P_{in} = -5\text{ dBm}$

As for test circuit and application circuit, please refer to Application note (Document No. 10964EJ2V0AN00).

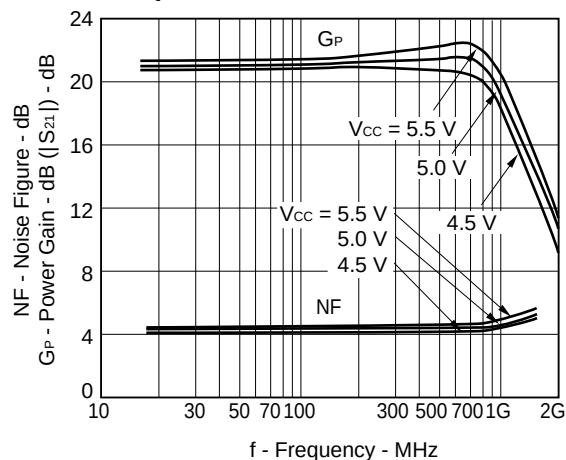
TYPICAL CHARACTERISTICS ($T_A = 25^\circ\text{C}$, Unless otherwise specified)



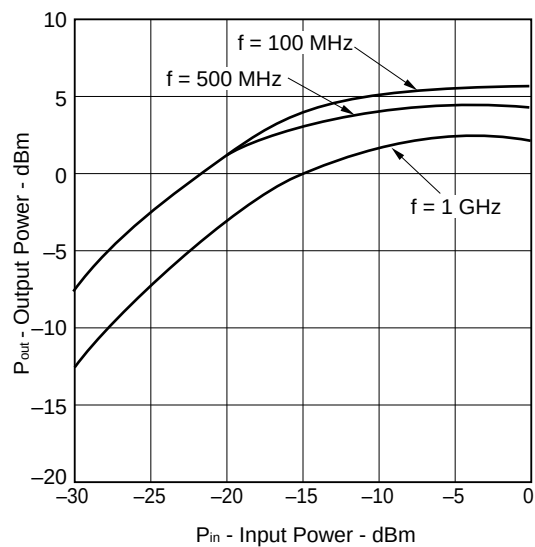
POWER GAIN ($|S_{21}|$) vs. FREQUENCY



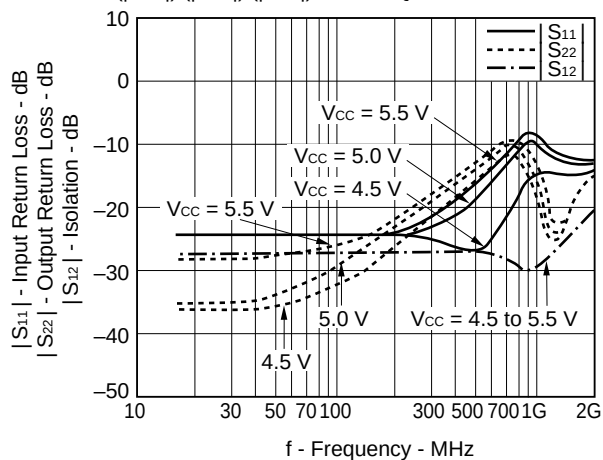
NOISE FIGURE AND POWER GAIN ($|S_{21}|$) vs. FREQUENCY



INPUT POWER vs. OUTPUT POWER



INPUT AND OUTPUT RETURN LOSS, ISOLATION ($|S_{11}|$) ($|S_{22}|$) ($|S_{12}|$) vs. FREQUENCY



Technical drawing of a mechanical part, showing two views: a front view (top) and a side view (bottom). The drawing includes dimensions and tolerances.

Front View Dimensions:

- Overall width: 2.9 ± 0.2
- Overall height: $2.8^{+0.2}_{-0.3}$
- Top flange width: $1.5^{+0.2}_{-0.1}$
- Top flange thickness: $0.4^{+0.1}_{-0.05}$
- Bottom flange width: 1.9
- Bottom flange thickness: $0.4^{+0.1}_{-0.05}$
- Internal width: 0.85
- Internal height: 0.95
- Internal width (left): $0.6^{+0.1}_{-0.05}$
- Internal width (right): $0.6^{+0.1}_{-0.05}$

Side View Dimensions:

- Overall width: $1.1^{+0.2}_{-0.1}$
- Overall height: 0.8
- Top flange width: $0.16^{+0.1}_{-0.05}$
- Top flange thickness: 0.1
- Internal width: 0 to 0.1
- Internal height: 0.1
- Internal width (left): $0.6^{+0.1}_{-0.05}$
- Internal width (right): $0.6^{+0.1}_{-0.05}$

Angles:

- Top flange chamfer angle: 5°
- Bottom flange chamfer angle: 5°
- Internal chamfer angle: 5°

NOTE ON CORRECT USE

- (1) Observe precautions for handling because of electro-static sensitive devices.
- (2) Form a ground pattern as wide as possible to minimize ground impedance (to prevent undesired oscillation).
- (3) Keep the track length of the ground pins as short as possible.
- (4) The bypass capacitor should be attached to the V_{CC} pin.
- (5) The DC cut capacitor must be each attached to the input and output pins.

RECOMMENDED SOLDERING CONDITIONS

This product should be soldered in the following recommended conditions. Other soldering methods and conditions than the recommended conditions are to be consulted with our sales representatives.

 μ PC1688G

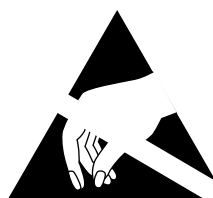
Soldering Method	Soldering Conditions	Recommended Condition Symbol
Infrared ray reflow	Package peak temperature: 235 °C, Hour: within 30 s. (more than 210 °C), Time: 3 times, Limited days: no. ^{Note}	IR35-00-3
VPS	Package peak temperature: 215 °C, Hour: within 40 s. (more than 200 °C), Time: 3 times, Limited days: no. ^{Note}	VP15-00-3
Wave soldering	Soldering tub temperature: less than 260 °C, Hour: within 10 s. Time: Limited days: no. ^{Note}	WS60-00-1
Pin part heating	Pin area temperature: less than 300 °C, Hour: within 3 s/pin. Limited days: no. ^{Note}	

Note It is the storage days after opening a dry pack, the storage conditions are 25 °C, less than 65 % RH.

Caution The combined use of soldering method is to be avoided (However, except the pin area heating method).

For details of recommended soldering conditions for surface mounting, refer to information document **SEMICONDUCTOR DEVICE MOUNTING TECHNOLOGY MANUAL (C10535EJ7V0IF00)**.

[MEMO]



ATTENTION

OBSERVE PRECAUTIONS
FOR HANDLING
ELECTROSTATIC
SENSITIVE
DEVICES

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Specific: Aircrafts, aerospace equipment, submersible repeaters, nuclear reactor control systems, life support systems or medical equipment for life support, etc.

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Anti-radioactive design is not implemented in this product.