



GaAs INTEGRATED CIRCUIT

UPG2311T5F

GaAs MMIC LOW NOISE AMPLIFIER FOR GPS

DESCRIPTION

The μ PG2311T5F is a GaAs MMIC LNA for Car Navigation Systems and Handy GPS. This IC consists of two stage amplifiers and has high gain performance.

FEATURES

- High gain : $G_P = 37$ dB TYP.
- Low noise : $NF = 1.2$ dB TYP.
- 12-pin plastic QFN package (3.0 × 3.0 × 0.75 mm)

APPLICATION

- Car Navigation System
- Handy GPS

★ ORDERING INFORMATION (Pb-Free)

| Part Number | Order Number | Package | Marking | Supplying Form |
|----------------------|----------------------|---------------------------------|---------|---|
| μ PG2311T5F-E2-A | μ PG2311T5F-E2-A | 12-pin plastic QFN (Pb-Free) | 2311 | <ul style="list-style-type: none">• Embossed tape 8 mm wide• Pin 1 indicates roll-in direction of tape• Qty 3 kpcs/reel |

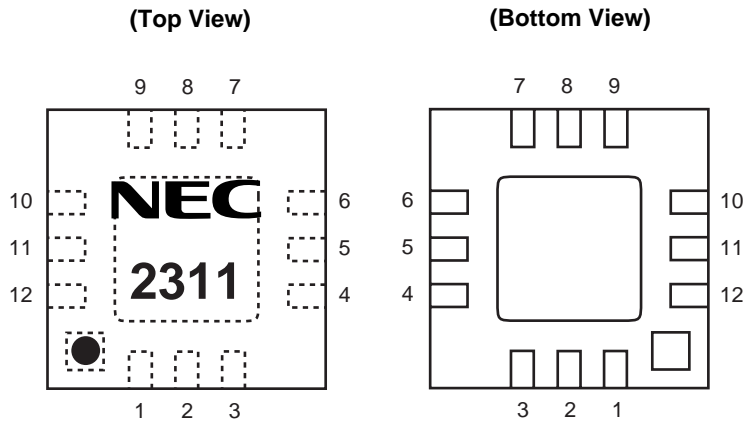
Remark To order evaluation samples, contact your nearby sales office.

Part number for sample order: UPG2311T5F-A

Caution Observe precautions when handling because these devices are sensitive to electrostatic discharge.

The information in this document is subject to change without notice. Before using this document, please confirm that this is the latest version.

★ PIN CONNECTIONS



| Pin No. | Pin Name |
|-------------|-------------------|
| 1 | OUT2 |
| 2 | GND |
| 3 | V _{cc} 2 |
| 4 | V _{cc} 1 |
| 5 | GND |
| 6 | IN1 |
| 7 | GND |
| 8 | OUT1 |
| 9 | GND |
| 10 | IN2 |
| 11 | GND |
| 12 | GND |
| EXPOSED PAD | GND |

ABSOLUTE MAXIMUM RATINGS (T_A = +25°C, unless otherwise specified)

| Parameter | Symbol | Ratings | Unit |
|-------------------------------|--------------------------------------|----------------------|------|
| Supply Voltage | V _{cc} 1, V _{cc} 2 | +5.0 | V |
| Input Power | P _{in} | -25 | dBm |
| Total Power Dissipation | P _{tot} | 0.25 ^{Note} | W |
| Operating Ambient Temperature | T _A | -45 to +85 | °C |
| Storage Temperature | T _{stg} | -55 to +150 | °C |

Note Mounted on double-sided copper-clad 50 × 50 × 1.6 mm epoxy glass PWB, T_A = +85°C

RECOMMENDED OPERATING RANGE

| Parameter | Symbol | MIN. | TYP. | MAX. | Unit |
|---------------------|--------------------------------------|------|-------|------|------|
| Operating Frequency | f _{opt} | – | 1.575 | – | GHz |
| Supply Voltage | V _{cc} 1, V _{cc} 2 | +2.7 | +3.0 | +3.3 | V |

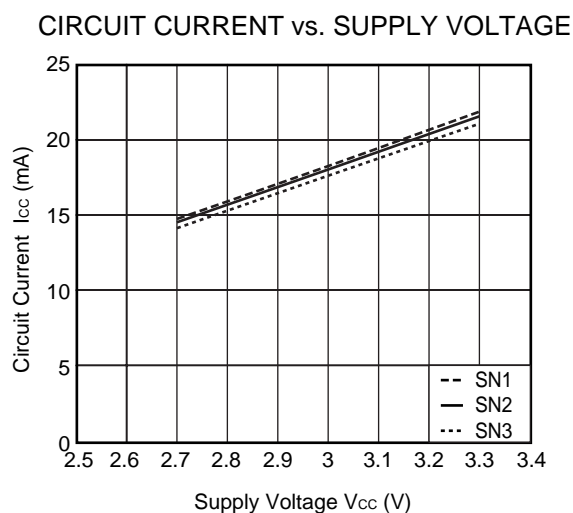
ELECTRICAL CHARACTERISTICS ($T_A = +25^\circ\text{C}$, $V_{CC1} = V_{CC2} = +3.0\text{ V}$, $Z_o = 50\ \Omega$, unless otherwise specified)

| Parameter | Symbol | Test Conditions | MIN. | TYP. | MAX. | Unit |
|------------------------------------|---------------------|---------------------------------|------|------|------|------|
| Power Gain ^{Note 1} | G_P | $f = 1.575\text{ GHz}$ | 34 | 37 | – | dB |
| Noise Figure ^{Note 2} | NF | $f = 1.575\text{ GHz}$ | – | 1.2 | 1.5 | dB |
| Input Return Loss | RL_{in} | $f = 1.575\text{ GHz}$ | – | 5 | – | dB |
| ★ Output Return Loss | RL_{out} | $f = 1.575\text{ GHz}$ | – | 20 | – | dB |
| 1 dB Gain Compression Output Power | $P_O (1\text{ dB})$ | $f = 1.575\text{ GHz}$ | – | +5 | – | dBm |
| Circuit Current ^{Note 3} | I_{CC} | $f = 1.575\text{ GHz}$, Non-RF | – | 17 | 20 | mA |

Notes 1. Total gain of 1st stage and 2nd stage amplifiers (not include filter loss).

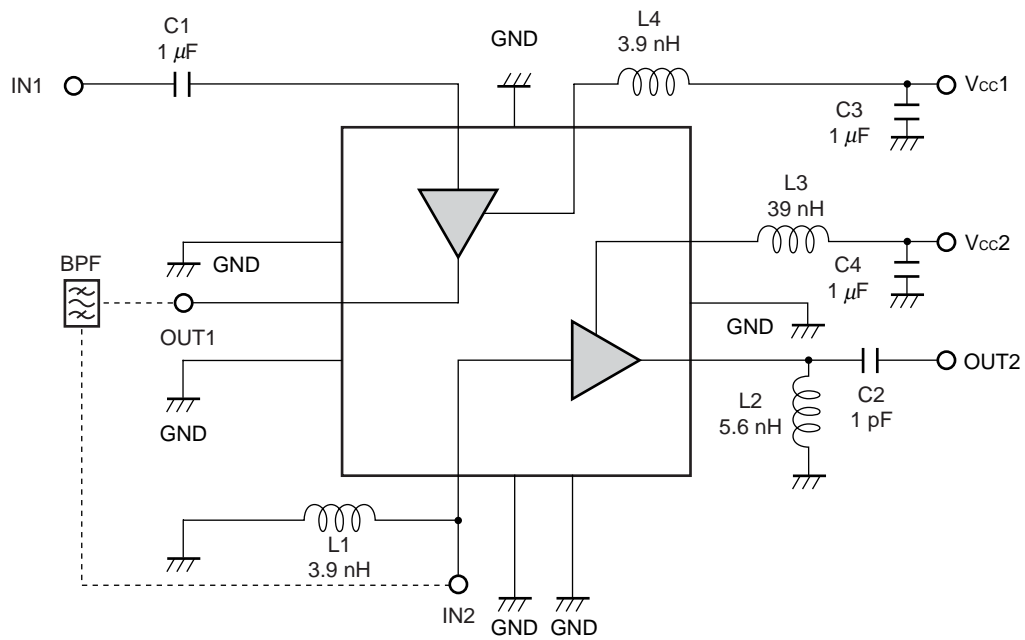
2. NF of 1st stage amplifier.

3. Please refer to following chart.



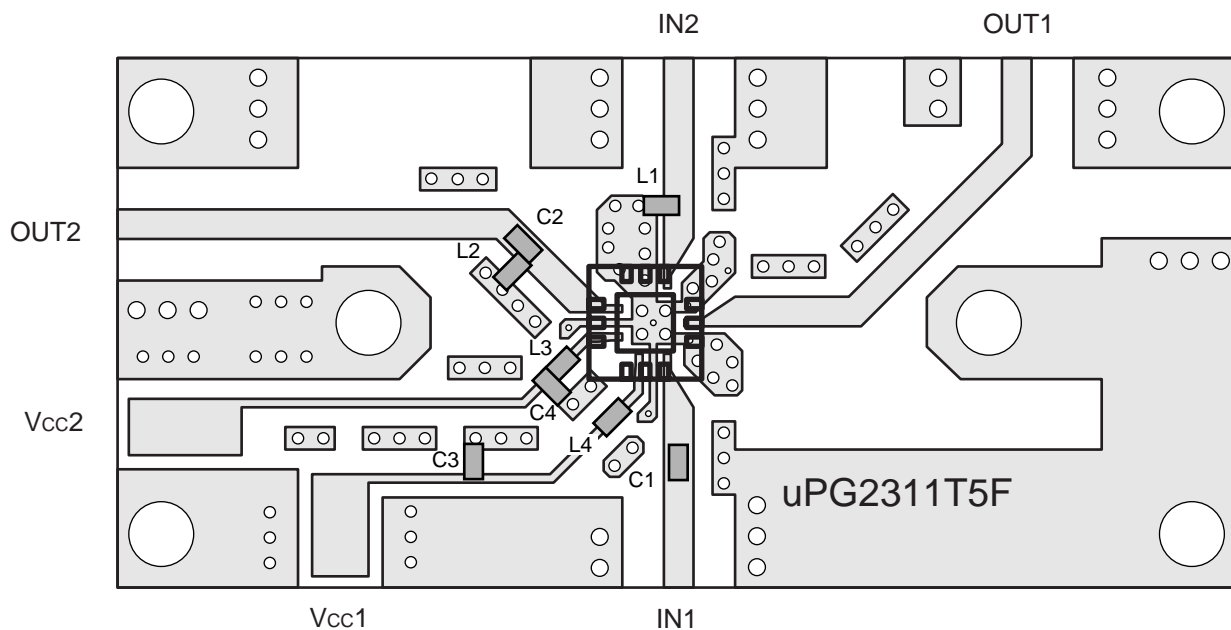
Remark The graph indicates nominal characteristics.

★ TEST CIRCUIT



The application circuits and their parameters are for reference only and are not intended for use in actual design-ins.

★ ILLUSTRATION OF THE TEST CIRCUIT ASSEMBLED ON EVALUATION BOARD

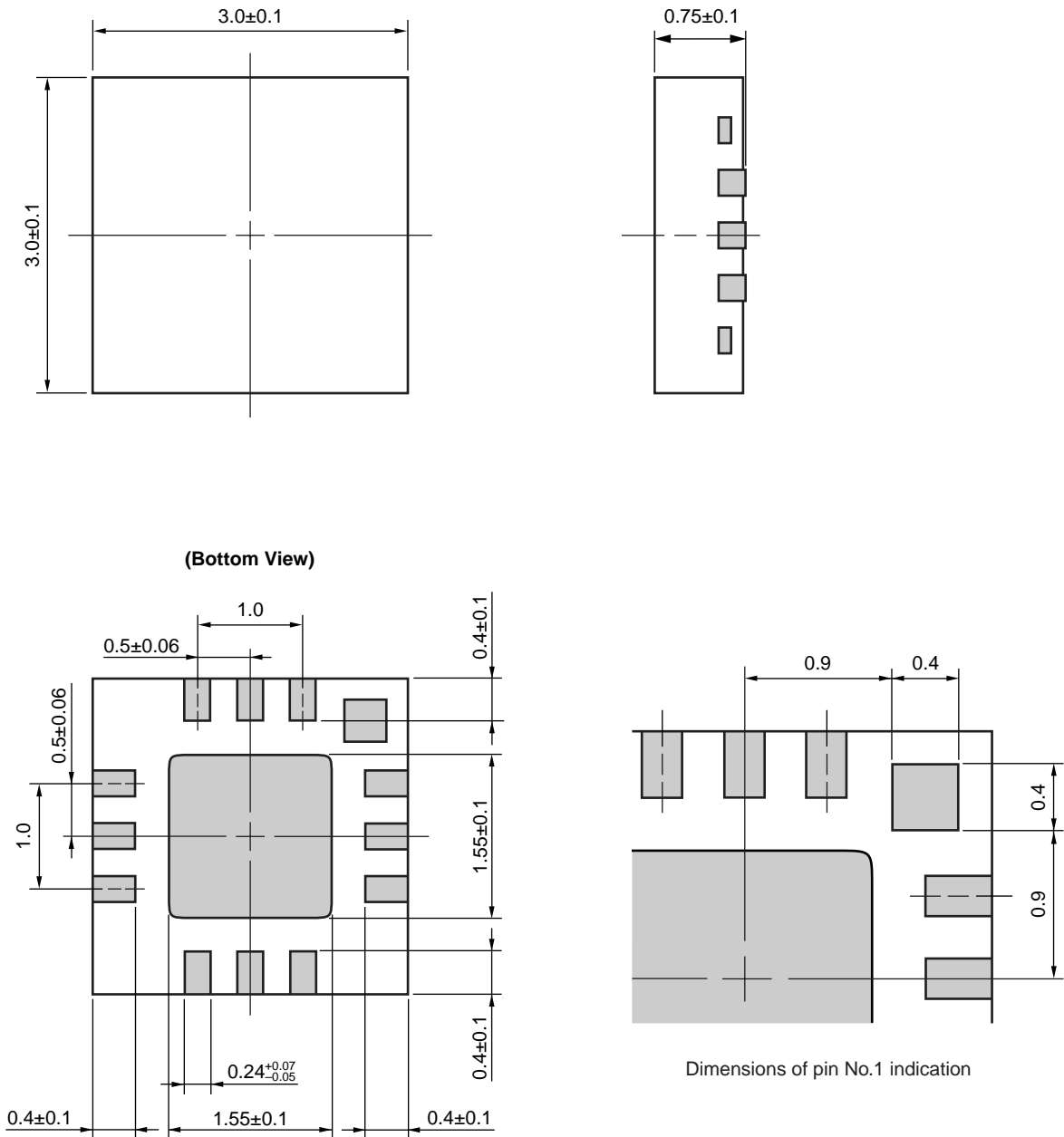


★ USING THE NEC EVALUATION BOARD

| Symbol | Rating | Size | Symbol | Rating | Size |
|--------|-----------|------|--------|--------|------|
| C1 | 1 μ F | 1608 | L1 | 3.9 nH | 1005 |
| C2 | 1 pF | 1005 | L2 | 5.6 nH | 1005 |
| C3 | 1 μ F | 1608 | L3 | 39 nH | 1005 |
| C4 | 1 μ F | 1608 | L4 | 3.9 nH | 1005 |

★ **PACKAGE DIMENSIONS**

12-PIN PLASTIC QFN (UNIT: mm)



RECOMMENDED SOLDERING CONDITIONS

This product should be soldered and mounted under the following recommended conditions. For soldering methods and conditions other than those recommended below, contact your nearby sales office.

| Soldering Method | Soldering Conditions | Condition Symbol |
|------------------|---|------------------|
| Infrared Reflow | Peak temperature (package surface temperature) : 260°C or below Time at peak temperature : 10 seconds or less Time at temperature of 220°C or higher : 60 seconds or less Preheating time at 120 to 180°C : 120±30 seconds Maximum number of reflow processes : 3 times Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | IR260 |
| Wave Soldering | Peak temperature (molten solder temperature) : 260°C or below Time at peak temperature : 10 seconds or less Preheating temperature (package surface temperature) : 120°C or below Maximum number of flow processes : 1 time Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | WS260 |
| Partial Heating | Peak temperature (terminal temperature) : 350°C or below Soldering time (per side of device) : 3 seconds or less Maximum chlorine content of rosin flux (% mass) : 0.2%(Wt.) or below | HS350 |

Caution Do not use different soldering methods together (except for partial heating).

Subject: Compliance with EU Directives

CEL certifies, to its knowledge, that semiconductor and laser products detailed below are compliant with the requirements of European Union (EU) Directive 2002/95/EC Restriction on Use of Hazardous Substances in electrical and electronic equipment (RoHS) and the requirements of EU Directive 2003/11/EC Restriction on Penta and Octa BDE.

CEL Pb-free products have the same base part number with a suffix added. The suffix –A indicates that the device is Pb-free. The –AZ suffix is used to designate devices containing Pb which are exempted from the requirement of RoHS directive (*). In all cases the devices have Pb-free terminals. All devices with these suffixes meet the requirements of the RoHS directive.

This status is based on CEL's understanding of the EU Directives and knowledge of the materials that go into its products as of the date of disclosure of this information.

| Restricted Substance per RoHS | Concentration Limit per RoHS (values are not yet fixed) | Concentration contained in CEL devices | |
|-------------------------------|---|--|-----|
| | | -A | -AZ |
| Lead (Pb) | < 1000 PPM | Not Detected | (*) |
| Mercury | < 1000 PPM | Not Detected | |
| Cadmium | < 100 PPM | Not Detected | |
| Hexavalent Chromium | < 1000 PPM | Not Detected | |
| PBB | < 1000 PPM | Not Detected | |
| PBDE | < 1000 PPM | Not Detected | |

If you should have any additional questions regarding our devices and compliance to environmental standards, please do not hesitate to contact your local representative.

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