

CAN6107 GNSS LNA

Product Description

Rev 1.2 July, 2018

This datasheet is intended for customer's evaluation and application of the CAN6107 device. Under no circumstances it should be circulated outside the customer's company. CanaanTek reserves the right to modify and to improve the data.

PRODUCT DESCRIPTION

CAN6107 is a high-gain, low-noise amplifier (LNA) designed for GPS, Galileo, Glonass and Beidou GNSS applications. The LNA achieves 17dB gain and 0.85dB noise figure. CAN6107 forms the optimal RF front-end for the reception of GNSS satellites. Packaged in a 6-pin μ DFN package, the CAN6107 sits on a small form factor PCB space. It can operate from a 1.7V to 3.6V single supply and draws only 3.6mA DC current. The shutdown leakage current is only 1uA.

FEATURES

- Ultra-low-noise figure of 0.85dB
- High-power gain of 17dB
- Low-power of 3.6mA operated from a single 1.7V to 3.6V voltage
- Small footprint of 1.1mmx0.7mm
- Thin profile of 0.45mm
- Lead-free and RoHS-compliant package
- High integration with few off-chip BOM and low cost
- Temperature from -40°C to 85°C range

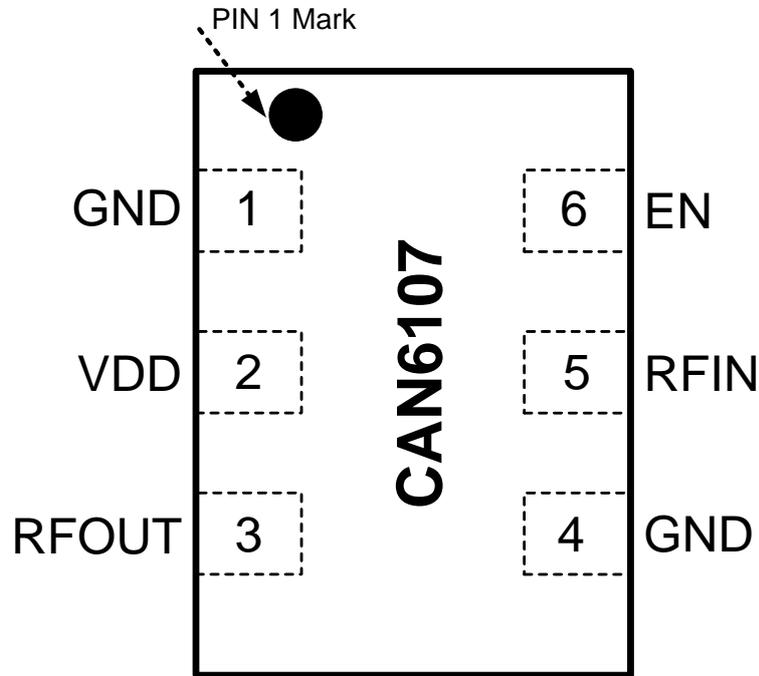
APPLICATIONS

- Smartphone with GPS capability
- PNDs (Personal Navigation Devices)
- PMPs (Personal Media Players)
- Automobile Navigation Systems
- GNSS tracking systems
- GNSS industrial applications
- Software GPS
- iPad like Mobile PCs

PACKAGE

- Device in a small 1.1mmx0.7mm 6-pin μ DFN RoHS-compliant package

PIN ASSIGNMENT



(Top View)

PIN CONNECTIONS AND INTERNAL BLOCK DIAGRAM

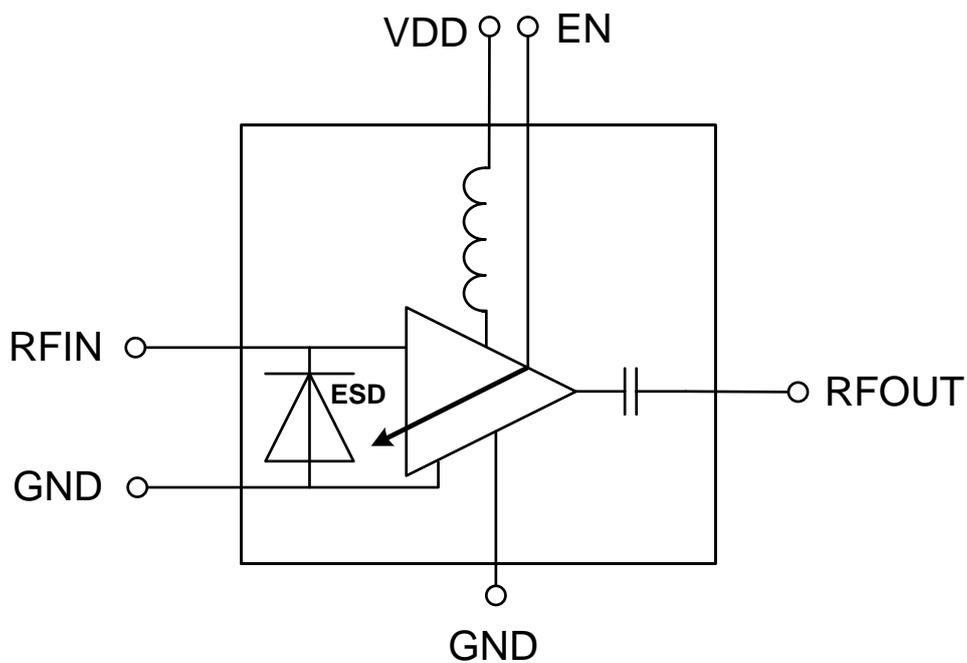


Figure 1 Block Diagram for CAN6107

Pin Out Description

| Pin No. | Name | Description | Connection |
|---------|-------|----------------------|-----------------------------------------------------------------------------------------------|
| 1 | GND | Ground connection | Connect to PCB ground plane |
| 2 | VDD | power supply for LNA | Supply Voltage |
| 3 | RFOUT | RF Output | RF output. Connect either direct to saw filter input, or to match component using an inductor |
| 4 | GND | Ground connection | Connect to PCB ground plane |
| 5 | RFIN | RF Input | Requires a DC-blocking capacitor and external matching components |
| 6 | EN | Shut down input | A logic-low disables the device |

ABSOLUTE MAXIMUM RATINGS

| Parameter | Symbol | Test Conditions | Min. | Max. | Unit |
|---------------------------|--------------------|-----------------|------|------|------|
| Supply Voltage | VDD | TA=+25°C | | 3.6 | V |
| Power down Voltage | V _{PD_EN} | TA=+25°C | | 3.6 | V |
| LNA Max RF Input Power | P _{in} | | | 0 | dBm |
| ESD:HBM, 150pF/1.5KOhm | - | | 2 | | kV |
| Storage Temperature | T _{STG} | | -40 | +150 | °C |
| Solder Reflow Temperature | T _{SLDR} | | | +260 | °C |

Note1: This device should be handled with care within the above stress ratings. This IC has ESD protection circuits within but must be handled and assembled according to the industry practice and at the ESD protected work platforms.

RECOMMENDED OPERATING CONDITIONS

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|-------------------------------|--------------------|------|------|------|------|
| Ambient Operating Temperature | T _A | -40 | +25 | +85 | °C |
| Supply Voltage | VDD | 1.7 | 3.0 | 3.6 | V |
| Power Down Turn-on Voltage | V _{PDOn} | 1.7 | 3.0 | 3.6 | V |
| Power Down Turn-off Voltage | V _{PDoff} | 0 | | 0.45 | V |

ELECTRICAL CHARACTERISTICS

(TA = +25°C, VDD = EN = 2.5V, f_{in} = 1575.42MHz, unless otherwise specified)

| Parameter | Symbol | Test Conditions | Min. | Typ. | Max. | Unit |
|--------------------|-------------------|----------------------|------|------|------|------|
| Circuit current | I _{cc} | VDD=1.8V | | 3.6 | | mA |
| | | VDD=2.5V | | 3.9 | | mA |
| Power Gain | G _P | VDD=1.8V, Pin=-40dBm | | 16.7 | | dB |
| | | VDD=2.5V, Pin=-40dBm | | 17.2 | | dB |
| Noise Figure | NF | VDD=1.8V or 2.5V | | 0.85 | | dB |
| Input Return Loss | RL _{in} | VDD=2.5V | | -6 | | dB |
| Output Return Loss | RL _{out} | VDD=2.5V | | -12 | | dB |

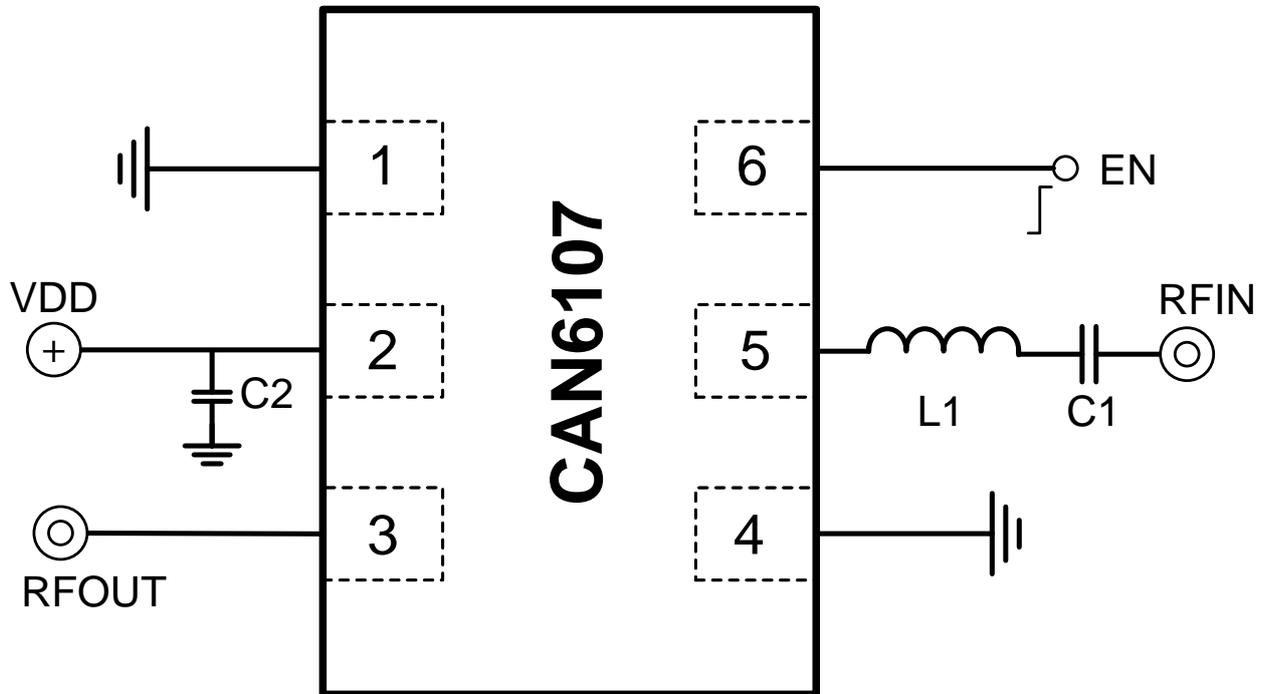
STANDARD CHARACTERISTICS FOR REFERENCE

(TA = +25°C, VDD = EN = 2.5V, f_{in} = 1575.42MHz, unless otherwise specified)

| Parameter | Symbol | Test Conditions | Reference | Unit |
|--------------------------------------------------------|----------------------|-----------------|-----------|------|
| Isolation | ISL | | 26 | dB |
| Input 3 rd Order Distortion intercept Point | IIP ₃ | (Note 1) | -10 | dBm |
| Gain 1 dB Compression Input Power | P _{in(1dB)} | | -16 | dBm |

Note1: Measured with the two tones located at 5MHz and 10MHz offset from the center of the GPS band with -40dBm/tone.

Typical Application Diagram



BOM LIST

| BOM Descriptions | Symbol | Size | Value | Unit |
|------------------|--------|------|-------|------|
| Chip Capacitor | C1 | 0402 | 100 | pF |
| Chip Capacitor | C2 | 0402 | 10 | nF |
| Chip inductor | L1 | 0402 | 9 | nH |

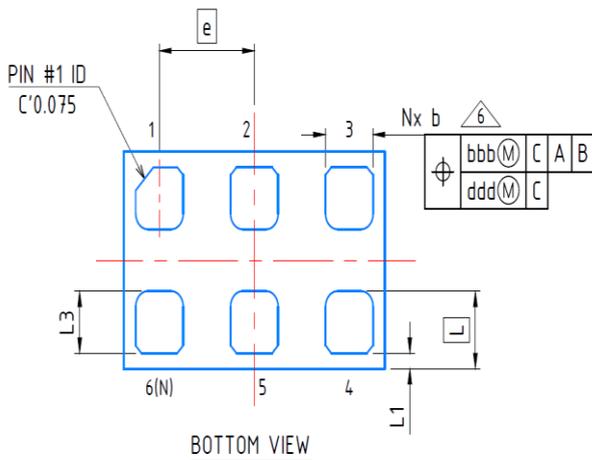
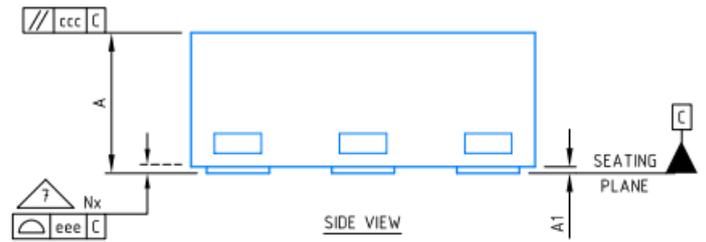
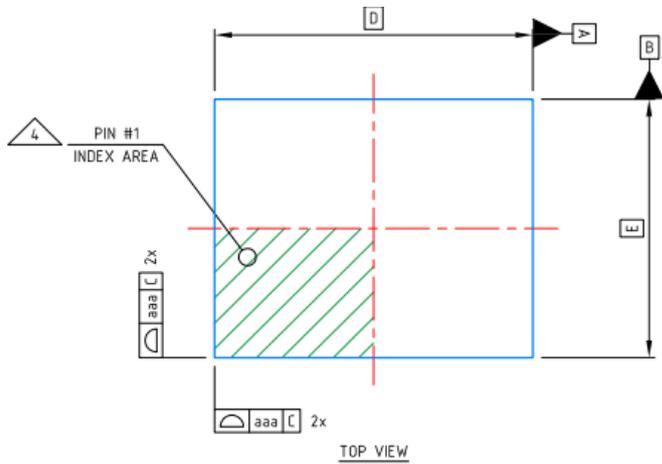
Notes:

1. These component values are for reference only and are subject to change with customer specific PCB layout design.
2. The input matching inductor L1 is recommended for high Q off-chip inductor, the accuracy of which is within 5% to 10%.



PACKAGE DIMENSIONS

6-PIN PLASTIC TSON (UNIT: mm)

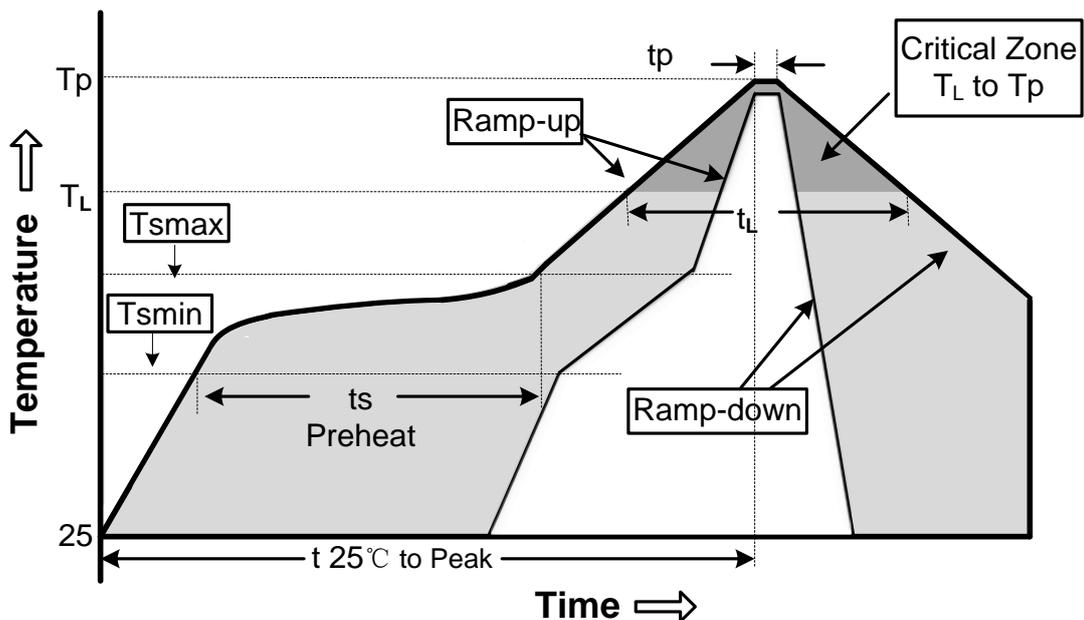


| | MILLMETER | | |
|--------|-----------|-----------|------|
| SYMBOL | MIN | NOR | MAX |
| A | 0.41 | 0.45 | 0.5 |
| A1 | 0 | 0.02 | 0.05 |
| A3 | --- | 0.127 Ref | --- |
| b | 0.15 | 0.2 | 0.25 |
| D | 1.10 BSC | | |
| E | 0.70 BSC | | |
| e | 0.40 BSC | | |
| L | 0.25 BSC | | |
| L1 | 0.00 | 0.05 | 0.10 |
| L3 | 0.15 | 0.20 | 0.25 |
| aaa | 0.05 | | |
| bbb | 0.07 | | |
| ccc | 0.10 | | |
| ddd | 0.05 | | |
| eee | 0.08 | | |
| N | 6 | | |

Recommended Reflow Temperature Profile

| Profile Feature | SnPb Eutectic Assembly | Lead (Pb) Free Assembly |
|-----------------------------------------|------------------------|-------------------------|
| Average Ramp-up Rate (T_L to T_p) | 3°C/s (max) | 3°C/s (max) |
| Preheat | | |
| Temperature Min. (T_{smin}) | 100°C | 150°C |
| Temperature Max. (T_{smax}) | 150°C | 200°C |
| Time (Min. to Max.) (t_s) | 60 – 120s | 60 – 80s |
| Ramp Up | | |
| T_{smax} to t_L | - | 3°C/s (max) |
| Time 25°C to Peak Temperature | 6 mins.(max) | 8 mins.(max) |
| Reflow | | |
| Temperature (t_L) | 183°C | 217°C |
| Time maintained above t_L | 60 – 150s | 60 – 150s |
| Peak Temperature (t_p) | 240 ± 5°C | 260 + 0/-5°C |
| Time Within 5°C of Actual Peak | 10 - 30s | 20 - 40s |
| Temperature (t_p) | | |
| Ramp-Down | | |
| Ramp-Down Rate | 6°C/s (max) | 6°C/s (max) |

Reflow Profile (Reference JEDDC J-STD-020)





Revision History

| Revision | Release Date | Description |
|----------|--------------|------------------------------------|
| Rev1.0 | 2017.11 | First Version. |
| Rev1.1 | 2018.04 | Update electrical characteristics. |
| Rev1.2 | 2018.07 | Update VDD=1.8V spec. |
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