RF Front Ends for GNSS Receivers
NT1065 is a 4-channel RF front end for a simultaneous reception of GPS/GLONASS/Galileo/BeiDou/IRNSS/QZSS Global Navigation Satellite System signals (GNSS) of various frequency bands L1/L2/L3/L5/E1/E5a/E5b/E6/B1/B1-C/B1-2/B2/B3. Each setting, including output signal frequency bandwidth, AGC options, mirror channel suppression option, etc., can be set for every channel individually. NT1065 includes two fully independent frequency synthesizers. Channel#1 and channel#2 are supplied with LO signal generated in PLL “A” while PLL “B” is assigned for channels #3 and #4. For specific applications there is an option to feed all four channels with single LO source from PLL “A”. This powerful toolkit is accompanied with very simple and easy-to-use register map. All the functionality allows application of NT1065 in high precision GNSS based positioning, goniometry, driverless car systems and related branches.

IC is fabricated on AMS 0.35µm SiGe BiCMOS technology.

**FEATURES**

- Single conversion super heterodyne receiver
- 4 independently fully configurable channels, each includes LNA, image rejection mixer, IF filter, IFA, 2-bit ADC
- Signal bandwidth up to 25MHz supports GNSS high precision codes such as P-code in GPS
- Dual adoptable AGC system (RF + IF) or programmable gain
- Superior dynamic range with 1dB compression point at -29dBm
- Analog differential output with two options of voltage swing 0.2/0.48Vp-p and 0.44/1.03Vp-p (sine wave/noise) or 2-bit ADC digital output data
- Two independent fully integrated synthesizers with flexible LO and CLK frequencies selection (“A” and “B”)
- Embedded temperature sensor
- SPI interface with easy-to-use register map
- Individual status indicators of main subsystems (available in SPI registers) and cumulative status indicator (AOK, available both as a separate pin and in SPI registers)
- 10x10mm QFN88 package

**OPERATING CHARACTERISTICS**

- **Input frequency range:**
  - GLONASS: L1/L2/L3/L5
  - GPS: L1/L2/L5
  - Galileo: E1/E5a/E5b/E6
  - IRNSS: L5
  - QZSS: L1/L2/L5
- **Noise figure:** 3.5dB
- **1dB compression point:** -29dBm
- **Channel isolation:** 42dB
- **Power consumption:** 69.5mW/channel
NT1065 "Nomada"
4-Channel
GPS/GLONASS/Galileo/Beidou/IRNSS/QZSS
L1/L2/L3/L5 band RF Front End

LDOs
Voltage & current reference source
Temperature sensor

Clock output
CLK_OUT1
CLK_OUT2

2-bit ADC
sampling frequency

Reference frequency input
REF_IN

Channel #1 input
RF1_IN

Channel #2 input
RF2_IN

Channel #3 input
RF3_IN

Channel #4 input
LNA4_IN

Input supply voltage
+3V_VCC

REF_CUR

AOK
MISO
MOSI
SCLK
CSN
IC Control IO

NTLab
Version NT1065 BlockDiagram v0.08
05.11.2015

www.ntlab.com
OVERVIEW

NT1051 is a two-channel RF front end for reception, down conversion, filtration and amplification of GPS/Galileo/GLONASS/BeiDou/IRNSS/QZSS signals as well as augmentation signals like SBAS in GPS for further digital processing. IC includes two individual channels with one common LO synthesizer for simultaneous signal reception in the bands (by the first and the second channel respectively in the following combinations):

- GLONASS L1OF, L1OC, SDKM L1OC, GPS L1 C/A, SBAS L1 C/A/Galileo E1, BeiDou B1-C, B1-2 and QZSS L1
- GLONASS L2OF, L2OC, GPS L2C and QZSS L2
- L3OC, SDKM L3OC, E5b, B2 and L5 (I5+Q5), E5a.

The front end has 2 operation modes: “Low Power Consumption” and “High Blocking Interference Immunity” with high linearity for stable reception under heavy interferences. IC is fabricated on TSMC 0.18µm SiGe BiCMOS technology.

FEATURES

- Single conversion super heterodyne receiver
- Embedded LNA in each channel
- Integrated mixer preamplifier with programmable operating current in each channel
- Analog differential output or 2-bit ADC digital output data
- Integrated asynchronous or clocked by rising/falling edge 2-bit ADC with programmable thresholds
- LO frequency programmable synthesizer including fully integrated VCO with automatic subband adjustment system
- Programmable reference frequency divider
- Programmable clock frequency
- PLL lock indicator
- Status monitoring, mode configuration and parameter adjustment via 3-wire SPI
- «Stand-by» mode with minimum current consumption
- 7x7mm QFN48 package
- 64-pin ceramic package 5143.64-1

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Input frequency range:</th>
<th>GLONASS L1/L2/L3/L5</th>
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</thead>
<tbody>
<tr>
<td>GLONASS</td>
<td>L1/L2/L3/L5</td>
</tr>
<tr>
<td>GPS</td>
<td>L1/L2/L5</td>
</tr>
<tr>
<td>Galileo</td>
<td>E1/E5a/E5b</td>
</tr>
<tr>
<td>BeiDou</td>
<td>B1-C/B2/L5</td>
</tr>
<tr>
<td>IRNSS</td>
<td>L5</td>
</tr>
<tr>
<td>QZSS</td>
<td>L1/L2/L5</td>
</tr>
<tr>
<td>Noise figure</td>
<td>2.6dB</td>
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<tr>
<td>1dB compression point</td>
<td>-42dBm</td>
</tr>
<tr>
<td>Power consumption</td>
<td>49mW/channel</td>
</tr>
</tbody>
</table>
NT1052
2-Channel GPS/Galileo/GLONASS/BeiDou/IRNSS/QZSS Multiband RF Front End

OVERVIEW

NT1052 is a 2-channel RF front end for reception, conversion, filtration and amplification of GNSS GPS/Galileo/GLONASS/BeiDou/IRNSS/QZSS signals of various frequency bands L1/L2/L3/L5/E1/E5a/E5b/B1-C/B1-2/B2. IC is fabricated on AMS 0.35µm SiGe BiCMOS technology.

FEATURES

- Double conversion super heterodyne receiver
- Thyristor effect prevention unit
- Embedded LNA in each channel
- Integrated mixer preamplifier with programmable operating current in each channel
- Analog differential output or 2-bit ADC digital output data
- Integrated asynchronous or clocked by rising/falling edge 2-bit ADC with programmable thresholds
- Selectable front end modes: “Two fully independent channels” or “Two channels with common input”
- LO frequency programmable synthesizer including fully integrated VCO with automatic subband adjustment system
- First LO frequency programmable divider for second down conversion
- Programmable reference frequency divider
- Programmable clock frequency
- PLL lock indicator
- Status monitoring, mode configuration and parameter adjustment via 3-wire SPI
- «Stand-by» mode with minimum current consumption
- 9x9mm QFN64 package
- 64-pin ceramic package 5143.64-1

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Input frequency range:</th>
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</thead>
<tbody>
<tr>
<td>GLONASS</td>
<td>L1/L2/L3/L5</td>
</tr>
<tr>
<td>GPS</td>
<td>L1/L2/L5</td>
</tr>
<tr>
<td>Galileo</td>
<td>E1/E5a/E5b</td>
</tr>
<tr>
<td>BeiDou</td>
<td>B1-C/B1-2/B2/L5</td>
</tr>
<tr>
<td>IRNSS</td>
<td>L5</td>
</tr>
<tr>
<td>QZSS</td>
<td>L1/L2/L5</td>
</tr>
<tr>
<td>Noise figure</td>
<td>2.2dB</td>
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<tr>
<td>1dB compression point</td>
<td>-50dBm</td>
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<tr>
<td>Power consumption</td>
<td>202.5mW/channel</td>
</tr>
</tbody>
</table>
NT2024
Multiaimed GPS/Galileo/GLONASS/BeiDou/IRNSS/QZSS & Digital TV & FM multiband RF Front End

OVERVIEW

NT2024 is a 4-channel RF front end designed to perform a simultaneous reception, conversion, filtering and amplifying of:
- radio broadcasting signals of FM (65...110MHz) and VHF (130...220MHz) bands,
- digital television signals of DVB-T/T2/H/C, DAB/DAB+/DMB/T-DMB, RAVIS, CMIMC standards transmitted at FM (65...110MHz), VHF (160...240MHz), UHF (470...862MHz) bands, L-band (1430...1720MHz) and S-band (2170...2400MHz).

IC is fabricated on TSMC 0.18 µm SiGe BiCMOS technology.

FEATURES

- 4 independent channels: L1, L2 (or L3, or L5), FM, TV
- Selectable modes “TV tuner”, “Navigation L1”, “Navigation L2 (L3, L5)” and “FM receiver” or any combination
- 12x12mm QFN108 package

GPS/Galileo/GLONASS/BeiDou, IRNSS/QZSS receiver
- Single conversion super heterodyne receiver
- Active antenna detector
- Integrated 50Ω output matched LNA
- Integrated IF filters with automatic passband adjustment
- Selectable output data interface: analog differential output or 2-bit ADC digital output with programmable thresholds and output logic high level
- Fully integrated frequency synthesizer with internal PLL filter and clock driver for correlator

TV tuner
- Direct conversion receiver
- Easy-to-use register map: user just should specify carrier frequency in kHz and logic control unit automatically calculates all the necessary settings
- Individual antenna inputs for UHF/VHF/FM and L/S bands with integrated Low Noise Diplexers matched to 50Ω
- Integrated tunable bandwidth IF channel filters (1.5...5MHz)
- Gain control options (RF & IF):
  - dual AGC system
  - voltage controlled gain via external pins
  - programmable gain via I2C
  - any combination of above-listed
- Fully integrated fractional-N frequency synthesizer
- Low IF super heterodyne receiver
- Integrated 75Ω output matched LNA
- Analog image rejection
- Embedded delta-sigma ADC
- Digital stream from the ADC (external DSP usage purpose)
- Compatibility with RAVIS system
- Fully integrated fractional-N frequency synthesizer
- PLL lock indicator

FM receiver
- 20mW power consumption in DVB-H mode with 10:1 time slicing
OPERATING CHARACTERISTICS

Input frequency range:
- GLONASS L1/L2/L3/L5
- GPS L1/L2/L5
- Galileo E1/E5a/E5b/E6
- BeiDou B1-C/B1-2/B2/B3/L5
- IRNSS L5
- QZSS L1/L2/L5
- TV tuner FM/VHF/UHF/L/S
- Radio broadcasting FM/VHF

Noise figure GNSS/TV/FM 1.65/4.4/3.1dB
1dB compression point GNSS/TV/FM -50/+14/+10dBm
Power consumption GNSS/TV/FM 45/221/33mW/channel
OVERVIEW

NT1036 is a 4-channel RF front end designed for a simultaneous reception of GPS/Galileo/GLONASS/BeiDou/IRNSS/QZSS signals of various frequency bands L1/L2/L3/L5/E1/E5a/E5b/E6/B1-C/B1-2/B2/B3. The front end is equipped with two fully independent frequency synthesizers. Channel#1 and channel#2 are supplied with LO signal generated in PLL “A” while PLL “B” is assigned for channels #3 and #4. IC is fabricated on AMS 0.35µm SiGe BiCMOS technology.

FEATURES

- Single conversion super heterodyne receiver
- 4 independent configurable channels, each includes preamplifier, image rejection mixer, IF filter, IFA, 2-bit ADC
- Single LO source for all 4 channels option
- IFA AGC system in each channel
- Integrated IF filters with automatic passband adjustment
- Fixed gain in channels can be optionally set via 4-wire SPI
- Analog differential output or 2-bit ADC digital output data
- Integrated 2-bit asynchronous or clocked by rising/falling edge ADC with programmable thresholds and output logic high level
- LO frequency programmable synthesizer including fully integrated VCO with automatic subband adjustment system
- Programmable reference frequency divider
- PLL lock indicator
- 4-channel quadrature signal former with individual phase control for each channel
- Embedded temperature sensor
- Status monitoring, mode configuration and parameter adjustment via 4-wire SPI
- «Stand-by» mode with minimum current consumption
- 9x9mm QFN64 package

OPERATING CHARACTERISTICS

Input frequency range:

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>GLONASS</td>
<td>L1/L2/L3/L5</td>
</tr>
<tr>
<td>GPS</td>
<td>L1/L2/L5</td>
</tr>
<tr>
<td>Galileo</td>
<td>E1/E5a/E5b/E6</td>
</tr>
<tr>
<td>BeiDou</td>
<td>B1-C/B1-2/B2/B3/L5</td>
</tr>
<tr>
<td>IRNSS</td>
<td>L5</td>
</tr>
<tr>
<td>QZSS</td>
<td>L1/L2/L5</td>
</tr>
</tbody>
</table>

Noise figure 3.7dB
1dB compression point -43dBm
Channel isolation 30dB
Power consumption 74.25mW/channel
NT1032
Single-channel GLONASS Noise-immune Dual-band RF Front End

OVERVIEW

NT1032 is a single-channel RF front end designed for amplifying and conversion of L1/L2-band GLONASS signals (1590…1606, 1237…1259MHz respectively) to the intermediate frequency used for the further digital processing after multibit analog-to-digital conversion (61.5…82.2MHz).
IC is fabricated on iHP 0.25µm SiGe BiCMOS technology.

FEATURES

- Single conversion super heterodyne receiver
- Few external components
- Superior linearity (-18dBm of 1dB compression point)
- Fully integrated frequency synthesizer with internal PLL filter and clock driver for correlator, LO signal output option
- External LO signal input option
- PLL lock indicator
- High accuracy temperature sensor (±5ºC)
- 4-wire SPI for status monitoring, mode configuration and parameter adjustment
- 7x7mm QFN48 package
- 9x9mm VBKP QFN64 ceramic package

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Input frequency range:</th>
<th>L1/L2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Noise figure</td>
<td>2.7dB</td>
</tr>
<tr>
<td>1dB compression point</td>
<td>-18dBm</td>
</tr>
<tr>
<td>Power consumption</td>
<td>344mW/channel</td>
</tr>
</tbody>
</table>
OVERVIEW

NT2022 is a RF front end designed for simultaneous reception, conversion, filtering and amplifying of both digital TV and GPS/Galileo/GLONASS/BeiDou/QZSS L1/E1/B1-C/B1-2-band signals. The front end supports DVB-H, DVB-T, DVB-T2, DAB/DAB+/DMB/T-DMB, FM, RAVIS, CMMB standards and covers FM (65...110MHz), VHF (160...240 MHz), UHF (470...862MHz) bands, L-band (1430...1720 MHz) and S-band (2170...2200 MHz).
IC is fabricated on TSMC 0.18μm SiGe BiCMOS technology.

FEATURES

- “TV only” and “Navigation only” modes
- Few external components
- Selectable type of serial interface: individual I²C for TV and 3-wire SPI for GPS/Galileo/GLONASS/BeiDou or I²C for both
- 9x9mm QFN64 package

GPS/Galileo/GLONASS/BeiDou/QZSS receiver

- Single conversion super heterodyne receiver
- Active antenna detector
- Selectable front end modes: GPS/Galileo/GLONASS/BeiDou/QZSS IQ, GPS/Galileo/BeiDou/QZSS IQ, GLONASS IQ, GPS/Galileo/BeiDou/QZSS and GLONASS with image rejection
- Integrated 50Ω output matched LNA
- Integrated IF filters with automatic passband adjustment
- Analog differential output or 2-bit ADC digital output data with programmable thresholds and output logic high level
- Fully integrated frequency synthesizer with internal tunable PLL filter and clock driver for correlator

TV tuner

- Direct conversion super heterodyne receiver
- Easy-to-use register map: user just should specify carrier frequency in kHz and logic control unit automatically calculates all the necessary settings
- Antenna input for UHF/VHF/FM bands with integrated Low Noise Diplexer matched to 50Ω
- Antenna input for L/S bands with integrated Low Noise Diplexer matched to 50Ω
- Bandpass tracking filters
- Integrated tunable bandwidth channel filters (1.5...5 MHz)
- Gain control options (RF & IF):
  - dual AGC system
  - voltage controlled gain via external pins
  - programmable gain via I²C
  - any combination of above-listed
  - Fully integrated fractional-N frequency synthesizer
  - PLL lock indicator
  - 20mW power consumption in DVB-H mode with 10:1 time slicing

OPERATING CHARACTERISTICS

Input frequency range:
- GLONASS L1
- GPS L1
- Galileo E1
- BeiDou B1/B1-C/B1-2
- QZSS L1
- TV tuner FM/VHF/UHF/L/S

Noise figure GNSS/TV 1.65/4.4dB
1dB compression point GNSS/TV -50/+14dBm
Power consumption GNSS/TV 44.7/221mW/channel
NT1026
2-Channel GPS/Galileo/GLONASS/QZSS Single-band RF Front End

OVERVIEW

NT1026 is a 2-channel RF front end designed to perform a simultaneous reception, conversion, filtering and amplifying of GLONASS/GPS/Galileo/QZSS L1/E1 – band signals. IC is fabricated on SMIC 0.18µm CMOS technology.

FEATURES

- Single conversion super heterodyne receiver
- Optimized for SiP implementation
- Few external components
- Fully independent GPS/Galileo/QZSS and GLONASS channels with image rejection
- 2-input (LNA/active antenna) integrated multiplexer-amplifier
- Integrated antenna detector with output current limiting and short circuit detection options
- Integrated LDOs with configurable output voltage for external units: LNA, active antenna and TCXO
- Embedded LDOs for internal units
- Integrated mixer preamplifier with programmable operating current
- Individual image-rejection IQ mixers for each channel
- Integrated IF filters with automatic passband adjustment
- Analog differential output or 2-bit ADC digital output data with programmable thresholds
- IFA AGC for both analog and digital output signals
- Fully integrated frequency synthesizer with adjustable PLL filter
- Programmable clock frequency for correlator
- Fully integrated VCO with automatic subband adjustment system
- PLL lock indicator
- 4-wire SPI for status monitoring, mode configuration and parameter adjustment
- Individual status indicators of main subsystems (available in SPI registers) and cumulative status indicator (AOK, available both as a separate pin and in SPI registers)
- «Stand-by» mode with minimum current consumption
- 7x7mm QFN48 package
- 26 die-to-pin outputs in SiP implementation

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Input frequency range:</th>
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<tbody>
<tr>
<td>GLONASS L1</td>
</tr>
<tr>
<td>GPS L1</td>
</tr>
<tr>
<td>Galileo E1</td>
</tr>
<tr>
<td>QZSS L1</td>
</tr>
<tr>
<td>Noise Figure 9dB</td>
</tr>
<tr>
<td>1dB compression point -45dBm</td>
</tr>
<tr>
<td>Power Consumption 32.8mW/channel</td>
</tr>
</tbody>
</table>
NT1028
2-Channel GPS/Galileo/GLONASS/QZSS Multiband RF Front End

OVERVIEW
NT1028 is a 2-channel multiband RF front end intended for reception, conversion, filtering and amplifying of GPS/Galileo/GLONASS/QZSS L1/E1-band and L2/E6-band signals with extended dynamic range and enhanced noise immunity. The front end is based on double conversion super heterodyne architecture and has 2 fully independent receiving channels. First intermediate frequency filters are external meanwhile second intermediate frequency active filters are embedded. Fully integrated programmable synthesizer provides LO signals for both channels. IC is fabricated on AMS 0.35µm SiGe BiCMOS technology.

FEATURES
- Double conversion super heterodyne receiver
- 2 fully independent receiving channels, each includes LNA, first mixer, first IF amplifier, second mixer, second IF active filter, second IF amplifier, output buffer and 1.5-bit ADC
- No external components are required for LNA output matching
- Dual AGC system in each channel: RF AGC covers LNA, first mixer and second mixer preamplifier; IF AGC controls second IF amplifier
- AGC can be switched to manual mode where gain is set via integrated DAC
- Analog differential output or 1.5-bit ADC digital output data
- Programmable thresholds of embedded 1.5-bit asynchronous or clocked by rising/falling edge ADC
- LO frequency programmable synthesizer including fully integrated VCO with automatic subband adjustment system
- First LO frequency programmable divider for second down conversion
- Programmable reference frequency divider
- Programmable clock frequency
- PLL lock indicator
- Status monitoring, mode configuration and parameter adjustment via 3-wire SPI
- «Stand-by» mode with minimum current consumption
- 9x9mm QFN64 package

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Input frequency range:</th>
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<tbody>
<tr>
<td>GLONASS</td>
<td>L1/L2</td>
</tr>
<tr>
<td>GPS</td>
<td>L1/L2</td>
</tr>
<tr>
<td>Galileo</td>
<td>E1/E6</td>
</tr>
<tr>
<td>QZSS</td>
<td>L1/L2</td>
</tr>
<tr>
<td>Noise Figure</td>
<td>3.2dB</td>
</tr>
<tr>
<td>1dB compression point</td>
<td>-18dBm</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>202.5mW/channel</td>
</tr>
</tbody>
</table>
NT1021
2-Channel GPS/Galileo/GLONASS/BeiDou/QZSS Single-band RF Front End

OVERVIEW
NT1021 is a 4-system 2-channel RF front end designed for simultaneous reception, conversion, filtering and amplifying of GLONASS/GPS/Galileo/BeiDou/QZSS signals of various frequency bands L1/E1/B1-C/B1-2. IC is fabricated on SMIC 0.18µm CMOS technology.

FEATURES
- Single conversion super heterodyne receiver
- Optimized for SiP implementation
- Few external components
- Independent GPS/Galileo/GLONASS/BeiDou/QZSS channels with image rejection
- 2-input (LNA/active antenna) integrated multiplexer-amplifier
- Integrated antenna detector with output current limiting and short circuit detection options
- Integrated LDOs with configurable output voltage for external units: LNA, active antenna and TCXO
- Embedded LDOs for internal units
- Integrated mixer preamplifier with programmable operating current
- Image rejection IQ mixer
- Integrated IF filters with automatic passband adjustment
- Analog differential output or 2-bit ADC digital output data with programmable thresholds
- IFA AGC for both analog and digital output signals
- Fully integrated frequency synthesizer with adjustable PLL filter
- Programmable clock frequency for correlator
- Fully integrated VCO with automatic subband adjustment system
- PLL lock indicator
- Individual status indicators of main subsystems (available in SPI registers) and cumulative status indicator (AOK, available both as a separate pin and in SPI registers)
- «Stand-by» mode with minimum current consumption
- 4-wire SPI for status monitoring, mode configuration and parameter adjustment
- 5x5mm QFN32 package
- 6x6mm QFN40 package

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Input frequency range:</th>
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<tbody>
<tr>
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<td>GPS</td>
<td>L1</td>
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<tr>
<td>Galileo</td>
<td>E1</td>
</tr>
<tr>
<td>BeiDou</td>
<td>B1-C/B1-2</td>
</tr>
<tr>
<td>QZSS</td>
<td>L1</td>
</tr>
</tbody>
</table>

| Noise figure          | 9.0dB |
| 1dB compression point | -45dBm |
| Power consumption     | 24mW/channel |
NT1020
GPS/Galileo/GLONASS/QZSS Single-band RF Front End

OVERVIEW
NT1020 is a 3-system RF front end designed for a simultaneous reception, conversion, filtering and amplifying of GPS/Galileo/GLONASS/QZSS L1/E1-band signals. IC is fabricated on TSMC 0.18µm SiGe BiCMOS technology.

FEATURES
- Single conversion super heterodyne receiver
- Active antenna detector
- Selectable front end modes: GPS/Galileo/GLONASS/QZSS IQ, GPS/Galileo/QZSS IQ, GLONASS IQ, GPS/Galileo/GLONASS/QZSS with image rejection
- Integrated 50Ω output matched LNA
- Integrated mixer preamplifier with programmable operating current
- Image rejection mixers
- Integrated IF filters with automatic passband adjustment
- Analog differential output or 2-bit ADC digital output data with programmable output logic high level
- Fully integrated frequency synthesizer with adjustable internal PLL filter and clock driver for correlator
- Fully integrated VCO with automatic operating subband adjustment
- PLL lock indicator
- 3-wire SPI for status monitoring, mode configuration and parameter adjustment
- «Stand-by» mode with minimum current consumption
- 5x5mm QFN32 package

OPERATING CHARACTERISTICS
Input frequency range:
- GLONASS L1
- GPS L1
- Galileo E1
- QZSS L1
Noise figure 1.75dB
1dB compression point -62dBm
Power consumption 49mW/channel
NT1019
GPS/Galileo/GLONASS/QZSS Single-band RF Front End

OVERVIEW
NT1019 is a 3-system RF front end designed for simultaneous reception, conversion, filtering and amplifying of GPS/Galileo/GLONASS/QZSS L1/E1-band signals. IC is fabricated on SMIC 0.18µm CMOS technology.

FEATURES
- Single conversion super heterodyne receiver
- Selectable front end modes: GPS/Galileo/GLONASS/QZSS IQ, GPS/Galileo/QZSS IQ, GLONASS IQ, GPS/Galileo/GLONASS/QZSS with image rejection
- Integrated mixer preamplifier with programmable operating current
- Image rejection mixers
- Integrated IF filters with automatic passband adjustment
- External IF filters option (for 48-pin package)
- Independent AGC for each channel, time constant can be set by external capacitor value
- Integrated 2-bit ADC with programmable output logic high level
- Fully integrated frequency synthesizer with internal adjustable PLL filter
- Clock driver for correlator
- Fully integrated VCO with automatic operating subband adjustment
- PLL lock indicator
- 3-wire SPI for status monitoring, mode configuration and parameter adjustment
- «Stand-by» mode with minimum current consumption
- 7x7mm QFN48 package
- 6x6mm QFN40 package

OPERATING CHARACTERISTICS
Input frequency range:
- GLONASS L1
- GPS L1
- Galileo E1
- QZSS L1
Noise figure 3.3dB
1dB compression point -62dBm
Power consumption 49.3mW/channel
OVERVIEW

NT1017 is a 3-system RF front end designed for a simultaneous reception, conversion, filtering and amplifying of GPS/Galileo/GLONASS/QZSS L1/E1-band signals. IC is fabricated on AMS 0.35µm SiGe BiCMOS technology.

FEATURES

- Single conversion super heterodyne receiver
- IQ differential output data
- Integrated LNA with programmable operating current
- Integrated mixer preamplifier with programmable operating current
- Integrated IF filters with automatic passband adjustment
- External IF filters option (for 48-pin package)
- Independent AGC for each channel, time constant can be set by external capacitor value
- Fully integrated frequency synthesizer with internal adjustable PLL filter
- Clock driver for correlator
- Fully integrated VCO with automatic operating subband adjustment
- PLL lock indicator
- 3-wire SPI for status monitoring, mode configuration and parameter adjustment
- «Stand-by» mode with minimum current consumption
- 7x7mm QFN48 package
- 6x6mm QFN40 package
- 5x5mm QFN32 package

OPERATING CHARACTERISTICS

Input frequency range:
- GLONASS L1
- GPS L1
- Galileo E1
- QZSS L1

Noise figure 2.6dB
1dB compression point -68dBm
Power consumption 34.65mW/channel
NT1006 is a RF front end designed to perform reception, amplifying of GPS/GLONASS/Galileo/IRNSS/QZSS L1/L2/L3/L5/E1/E5a/E5b/E6-band signals as well as down conversion to intermediate frequency for further digital processing. IC is fabricated on AMS 0.35µm SiGe BiCMOS technology.

**OVERVIEW**

**FEATURES**

- Double conversion super heterodyne receiver
- Integrated LNA
- Integrated mixer preamplifier with programmable operating current
- Analog differential output or 1.5-bit ADC digital output data
- Asynchronous or clocked by rising/falling edge ADC
- First LO frequency programmable synthesizer including fully integrated VCO with automatic subband adjustment system
- First LO frequency programmable divider for second down conversion
- Programmable clock frequency
- Programmable reference frequency divider
- PLL lock indicator
- Status monitoring, mode configuration and parameter adjustment via 3-wire SPI
- «Stand-by» mode with minimum current consumption
- 9x9mm QFN64 package

**OPERATING CHARACTERISTICS**

<table>
<thead>
<tr>
<th>Input frequency range:</th>
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<tbody>
<tr>
<td>GLONASS</td>
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<tr>
<td>GPS</td>
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<tr>
<td>Galileo</td>
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<tr>
<td>IRNSS</td>
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<tr>
<td>QZSS</td>
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</tbody>
</table>

- Noise figure: 3.5dB
- 1dB compression point: -65dBm
- Power consumption: 70.9mW/channel
NT1012
2-Channel GPS/Galileo/GLONASS/IRNSS/QZSS Multiband RF Front End

OVERVIEW
NT1012 is a 2-channel RF front end designed for GPS/Galileo/GLONASS/IRNSS/QZSS receivers. IC is fabricated on XFAB 0.6µm BiCMOS technology.

FEATURES
- Two channels with common input
- Fully integrated LNA, LO frequency programmable synthesizer
- Integrated mixer preamplifier with programmable operating current
- First LO frequency programmable divider for second down conversion
- Programmable clock frequency
- Programmable reference frequency divider
- PLL lock indicator
- Status monitoring, mode configuration and parameter adjustment via 3-wire SPI
- 9x9mm QFN64 package

OPERATING CHARACTERISTICS
Input frequency range:
- GLONASS L1/L2/L3/L5
- GPS L1/L2/L5
- Galileo E1/E5a/E5b/E6
- IRNSS L5
- QZSS L1/L2/L5

Noise figure 4.5dB
1dB compression point -60dBm
Power consumption 90mW/channel
NT1002
GPS/GLONASS multiband 2-channel RF Front End

OVERVIEW
NT1002 is a RF front end designed for reception and amplifying of GPS/GLONASS L1/L2-band signals. IC is fabricated on XFAB 0.6µm BiCMOS technology.

FEATURES
- Double conversion super heterodyne receiver
- Fully integrated LNA, LO frequency synthesizer
- Integrated mixer preamplifier with programmable operating current
- First LO frequency programmable divider for second down conversion
- Programmable clock frequency
- Programmable reference frequency divider
- PLL lock indicator
- Status monitoring, mode configuration and parameter adjustment via 3-wire SPI
- 9x9mm QFN64 package

OPERATING CHARACTERISTICS

<table>
<thead>
<tr>
<th>Input frequency range:</th>
<th></th>
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<tbody>
<tr>
<td>GLONASS</td>
<td>L1/L2</td>
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<tr>
<td>GPS</td>
<td>L1/L2</td>
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<tr>
<td>Noise figure</td>
<td>4.5dB</td>
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<tr>
<td>1dB compression point</td>
<td>-60dBm</td>
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<tr>
<td>Power consumption</td>
<td>90.75mW/channel</td>
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