

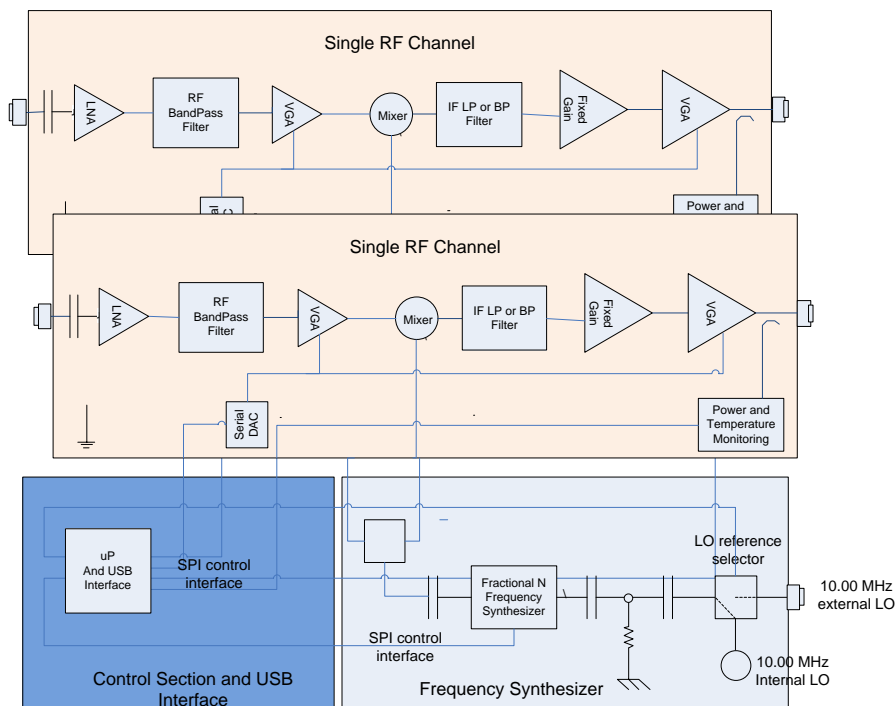
Description

The DM9100 is a 3U form factor RF Board aimed for interfacing a standard wideband or narrowband Navigation Antennas. The down conversion **gain** from L-band to IF (430 MHz default, 140 or 70 MHz upon request) is programmable up to **95 dB** so to allow **direct interfacing with** a passive or an active **GNSS antenna**. The DM9100 RF central frequency spans from 1.1 to 1.7 GHz. The RF Board is equipped with two down conversion data paths, and a synthesizer section aimed to generate the RF LO starting from an internal 10.00MHz oscillator or alternatively from an external reference up to 26MHz. The RF LO synthesizer is implemented through an integrated fractional/integer-N synthesizer and voltage controlled oscillator (VCO). RF LO synthesizer center frequency can be tuned in the range of 700..2200 MHz using a standard SPI three wires interface or via the on board USB connector. The Down converter selectivity is dictated by RF and IF filters. RF filters are pluggable so to easily configure the down converter for any signal bandwidth up to 100 MHz. A proprietary Topology Image rejection Mixer allows to improve filtering of out of band Interferences. DM9100 can also be configured as a **wideband 500 MHz receiver** so to allow the down-conversion of the whole GNSS bandwidth (including E5/L5, E6, L1, Glonass etc.). The combination of LO and RF frequency range allows the down conversion of any present and future GNSS Signal in L Band. The Overall **Noise Figure** is below **1.5 dB** at maximum gain.

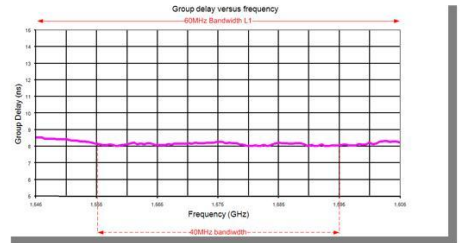
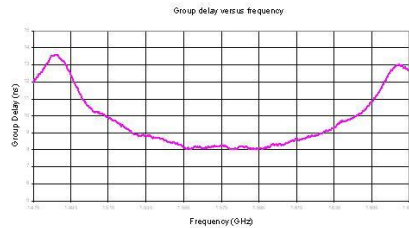
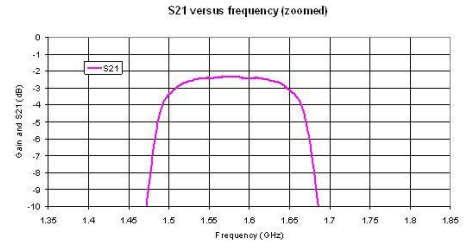
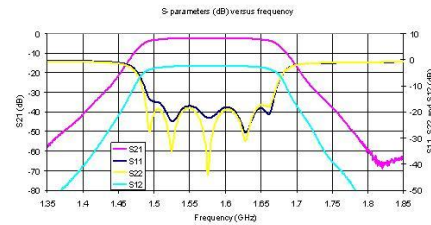
Features

- ❖ Down-converter from RF 1.1..1.7 GHz to IF 420 or 140MHz. Antenna Ready.
- ❖ Down-converter IF output maximum power level 0 dBm (50Ohm S.E. AC coupled)
- ❖ Proprietary Image Rejection Mixer
- ❖ Internal RF and IF DC blocks
- ❖ Down-converter Noise Figure : 1.2 dB
- ❖ RF Filter bandwidth (-3dB) : Pluggable Filters
- ❖ IF Filter bandwidth (-3dB) : 100MHz Pass-band or 500MHz Low Pass (Wideband GNSS)
- ❖ Single Power Supply : +6.5V to +24V
- ❖ Down-converter Dual VGA gain control range : greater than 70 dB
- ❖ Maximum Gain: 95dB

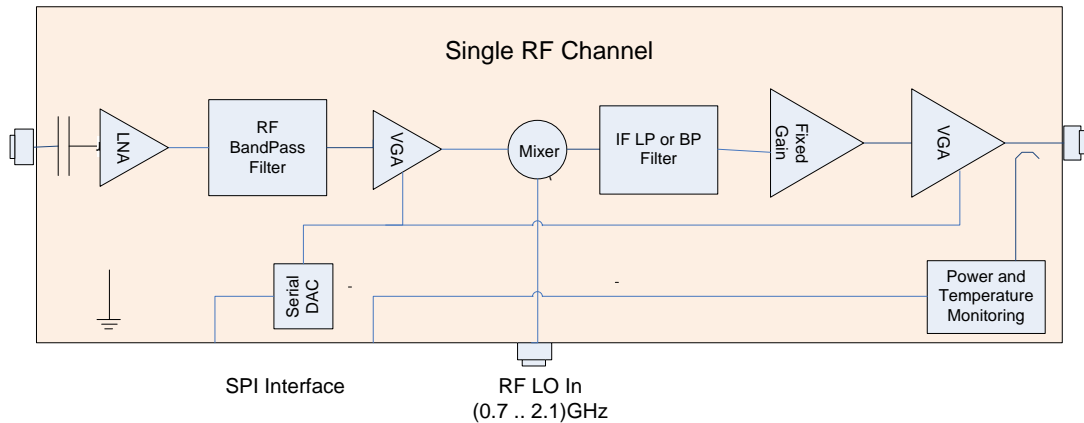
Complete Block Diagram



RF Filters Shaping L1 Examples



Down-converter section block diagram



Detailed description

The DM9100 is a 3U form factor RF Board aimed for interfacing a standard wideband or narrowband Navigation Antennas. The down conversion gain from L-band to IF. The IF default center frequency is 420 to 440 MHz which allows to handle signal bandwidth greater than 100MHz with minimum group delay degradation. Depending on customers requests the board may be customized to work at different IF center frequencies: 140 +/- 10MHz or 70 +/- 10MHz.

The gain is programmable from 35 up to 95 dB. Two SPI controlled VGAs, one at RF and the second at IF are present for each down-converter chain so to allow the customers to select the desired working point, and/or to make possible the usage of any kind Passive or active antenna.

The DM9100 RF central frequency spans from 1.1 to 1.7 GHz. The down-converter section adopts a proprietary topology Image rejection Mixer which allows to improve filtering of out of band Interferences and typically guarantees 25-30 dB image rejection on the 100 MHz signal bandwidth.

The RF section Noise figure performances are dominated by a first 30dB LNA which allows the down converter to have very low noise figure below 1.3dB at maximum gain including all filter and connector losses.

This extremely low noise figure allows the usage of an external, SMA connectorized, lossless input filter, while still keeping noise figure below 2.5dB.



DM9100 Dual Carrier GNSS RF Front End

(preliminary data-sheet)

Detailed description cont.d

Even though the RF LO frequency may be provided through a dedicated SMA connector, the DM9100 hosts a dual synthesizer section aimed to generate the RF LO starting from an internal 10.00MHz oscillator or alternatively from an external reference up to 26MHz.

The Down converter selectivity is dictated by RF and IF filters. RF filters are pluggable so to easily configure the down converter for any signal bandwidth up to 100 MHz. The combination of LO and RF frequency range allows the down conversion of any present and future GNSS Signal in L Band. The DM9100 can be also configured as a wideband 500 MHz receiver so to allow downconversion of all the GNSS services.

Electrical Characteristics

1. Electrical characteristics at ambient temperature. Working Temperature range is 0 to 65 °C.

2. Input and output termination: 50 ohm AC Coupled.

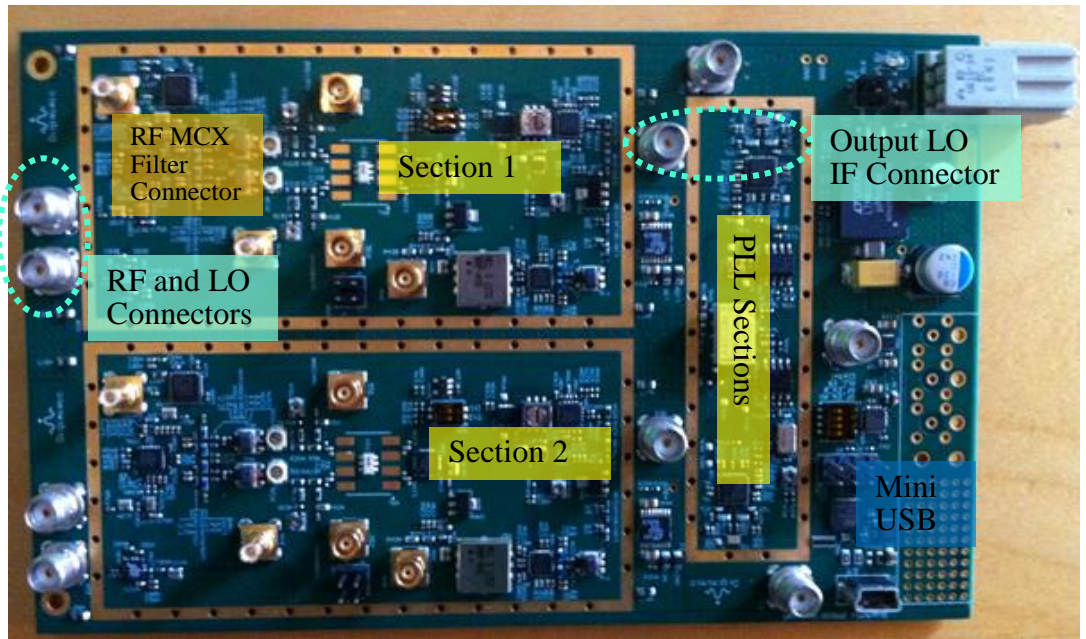
3. Specified Bandwidth for +/-0.15dB flatness. Actual bandwidth are higher than those specified so to keep low Group delay variation

4. Specified Bandwidths:
-E5:92MHz;
-L1: 41MHz
-E6:41 MHz

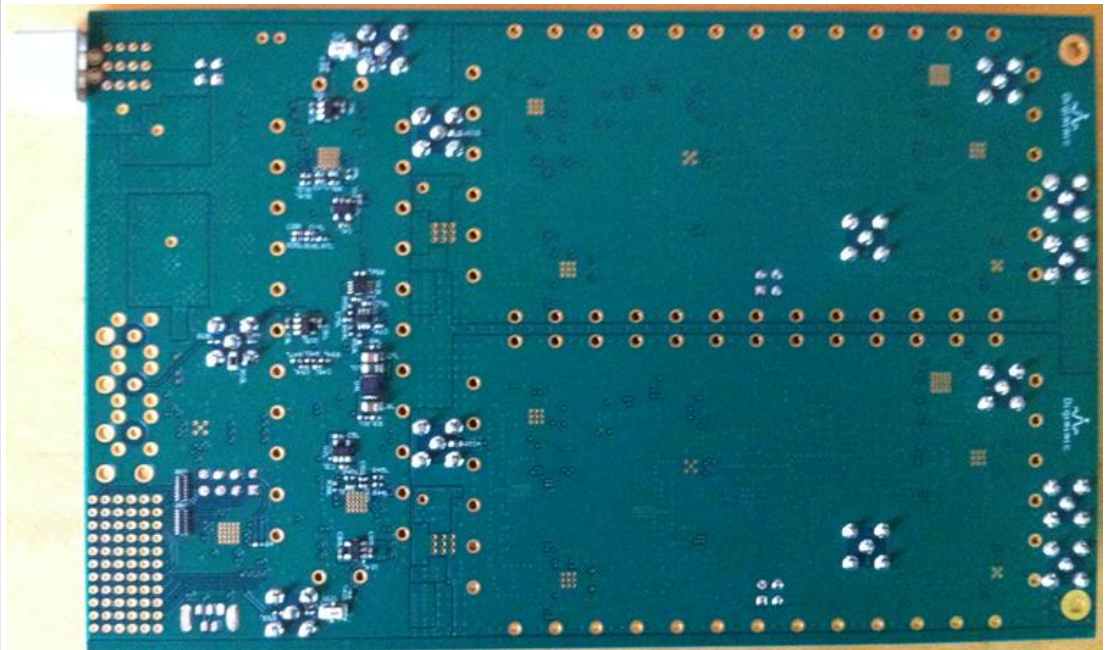
Symbol	Parameters	Min	Typ	Max	Units
VDC	Power supply voltage	7	12	24.00	V
VLO	Input LO Drive Level		0		dBm
MG	Maximum Gain		95		dB
Gr	Gain Control Range	65	70		dB
FIF	Output Frequency	420	430	440	MHz
FRF	Input RF Frequency	900	1500	2100	MHz
BW	E5 RF Bandwidth ⁽³⁾ E6 RF Bandwidth ⁽³⁾ L1 RF Bandwidth ⁽³⁾	95 60 60			MHz
RLin	Minimum input return loss	15			dB
RLout	Minimum output return loss (up to 0.6 GHz)	15			dB
NF	Noise Figure Maximum Gain Maximum Gain -10dB Maximum Gain -20dB Maximum Gain -30dB Maximum Gain -40dB		1.1 1.1 1.15 1.25 2.4		dB
IMREJ	Image Rejection With no RF Filter plugged	25	30		dB
IMREJ	Image Rejection With Plugged RF Filter E5 RF Bandwidth ⁽³⁾ E6 RF Bandwidth ⁽³⁾ L1 RF Bandwidth ⁽³⁾	85 85 85			dB
Gdel	Group delay variation (Wide quasi-low Pass IF) E5 RF Bandwidth ⁽⁴⁾ E6 RF Bandwidth ⁽⁴⁾ L1 RF Bandwidth ⁽⁴⁾			0.95 0.30 0.30	ns
Gdel	Group delay variation (Selective Band Pass IF for E6 ed L1) E6 RF Bandwidth ⁽⁴⁾ L1 RF Bandwidth ⁽⁴⁾			1.2 1.2	ns
Pd	Power dissipation		15		W

Assembled
Board

Top



Bottom





DM9100 Dual Carrier GNSS RF Front End

(preliminary data-sheet)

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Application Information

CAUTION: THIS IS AN ESD SENSITIVE DEVICE

Manage with care. Please avoid stresses above absolute maximum operating ratings.

Product Status Definitions

Datasheet Identification	Product Status	Definition
Advanced Information	Formative or or In Design	This datasheet contains the design specifications for product development. Specifications may change in any manner without notice.
Preliminary	First Production	This datasheet contains preliminary data, and supplementary data will be published at a later date. DIGIMIMIC reserves the right to make changes at any time without notice in order to improve design.
No Identification Needed	Full Production	This datasheet contains final specifications. DIGIMIMIC reserves the right to make changes at any time without notice in order to improve design.
Obsolete	Not in Production	This datasheet contains specifications on a product that has been discontinued by DIGIMIMIC. The datasheet is printed for reference information only.