DM9510
L-band Beamforming UpConverter

(preliminary data-sheet)

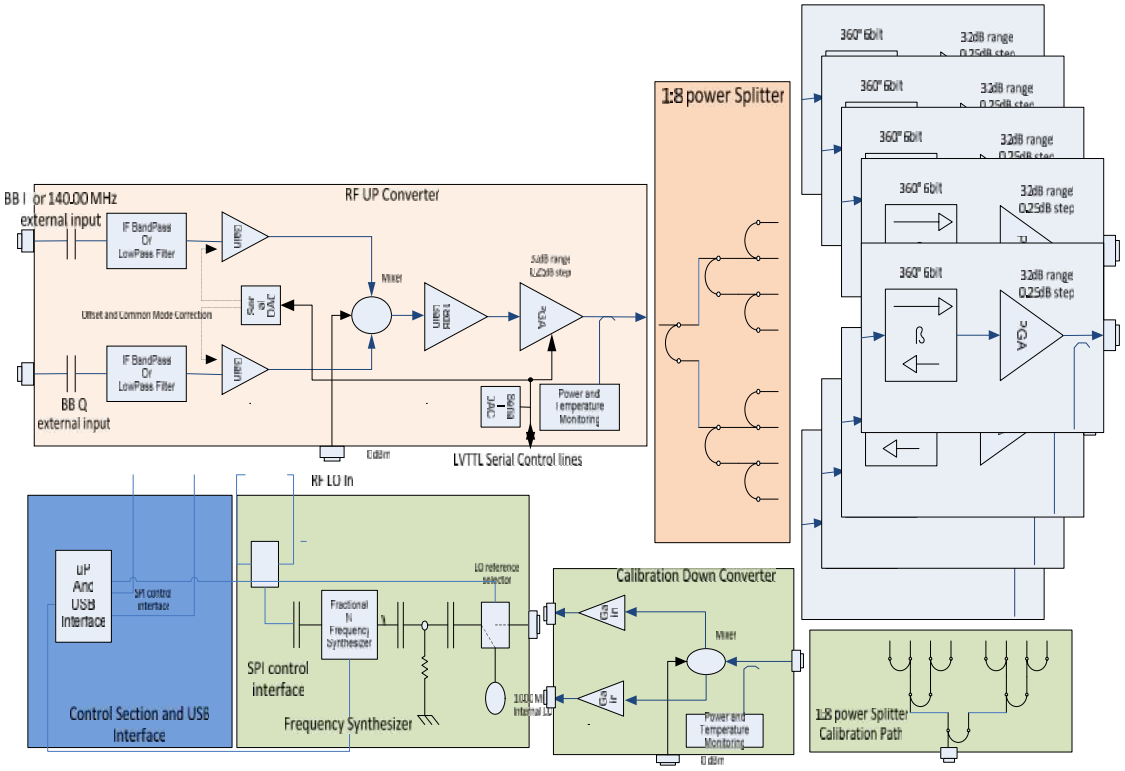
Description

The DM9510 is a BB-IF to RF Up-converter and 8 Nodes Beam-Former in a 3U from factor.
The input may be either Base-Band IQ complex signal, so to allow direct conversion to RF or IF Single component for intermediate frequencies up to 150MHz.
The output RF allowed frequency is in the range of 1450MHz to 2400 MHz.
The Maximum allowed analog bandwidth is 500 MHz when used as a direct IQ modulator, or 200 MHz when the input is centered at 140 MHz.
DM9510 Features an Up-Converter modulator, followed by 8 Beam Forming Nodes (BFN). Each BFN allow to control phase (360°, 6 bits) and gain (31.75dB control range in 0.25 dB attenuation steps). Part of DM9510 is the calibration return path, consisting of an internal demodulator coupled to each of the 8BFN transmitting nodes. A synthesis section to generate LO signals is also present.

Features

- 1 RF UP Converter
- 8 Beam-Forming Nodes
  - 360° , 6 bits phase control;
  - 31.75 dB, 0.25 dB steps attenuation Control;
- Ultra wideband: Up to 500MHz bandwidth (IQ baseband complex) or 200MHz IF centered;
- Maximum output power: -8 dBm from each node;
- Input BB/IF and LO Carrier SMA Connectors
- Input Level up to 0 dBm (maximum BB/IF, nominal LO)
- BB/IF Input impedance 50 ohm Se AC (IF Input) or DC Coupled (IQ Modulator)
- Output Frequency range 1450MHz to 2400 MHz
  - RF center frequency 1700MHz to 2100 MHz @ 500 MHz bandwidth;
  - RF center frequency 1525MHz to 2325 MHz @ 125 MHz bandwidth;
- On Board Complete Calibration Path Internally coupled with internal DownConverter;
- On Board LO Synthesis Section, either from external 10 MHz or internal;
- Completely controllable from USB;
- Form Factor : 3U

Complete Block Diagram



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Detailed description

The DM9510 is a 8 BFN Nodes BB-IF to RF Up-converter in a 3U form factor (highest worldwide integration) suitable for L-Band applications and covering in particular the GPS frequencies with huge bandwidth (up to 500 MHz). It can be used either in instrumentation or in L1 bandwidth of actual and forthcoming second generation navigation systems (GPS, Glonass, Galileo….).
DM9510 top level diagram and board level diagram are shown in page 1 of this datasheet.
The board may be used either with external LO (for higher performances test equipment) or with internal Synthesis section (externally 10MHz locked or free running).
DM9510 features:
-Up converter Section
-8 Beam-Forming Nodes

- 360° , 6 bits phase control;
- 31.75 dB, 0.25 dB steps attenuation Control;
- Ultra wideband: Up to 500MHz bandwidth (IQ baseband complex) or 200MHz IF centered;
- Output Frequency range 1450MHz to 2400 MHz
  - RF center frequency 1700MHz to 2150 MHz @ 500 MHz bandwidth;
  - RF center frequency 1525MHz to 2325 MHz @ 125 MHz bandwidth;
- Maximum output power: -8 dBm from each node;

-Input BB/IF and LO Carrier SMA Connectors
-Input Level up to 0 dBm (maximum BB/IF, nominal LO)
-BB/IF Input impedance 50 ohm Se AC (IF Input) or DC Coupled (IQ Modulator)
-On Board Complete Calibration Path Internally coupled with internal Down-Converter;
-The calibration path may also be used in a real time environment to continuously monitor the output power of each one of the 8 BFN nodes separately.
-On Board LO Synthesis Section, either from external 10 MHz or internal;
-Completely controllable from USB;
The presence of an onboard microcontroller and mini USB port allows, using the delivered SW GUI, to easily configure via internal LVTTL serial lines all the features and to monitor power and temperature. maximum IF input level are is 4dBm and the gain chain is -14dB

Electrical Characteristics

Symbol	Parameters	Min	Typ	Max	Units
VDC	Power supply voltage	7	12	24.00	V
VLO	Input LO Drive Level		0		dBm
Gr	Gain Control Range Common		31.75		dB
Gstep_C	Gain Control Accuracy Common		0.25		dB
Fi	Phase Control Accuracy on each Node		5.625		degrees
Gstep	Gain Control Accuracy on each Node		0.25		dB
Gr	Gain Control Range Each Node		31.75		dB
FRF	Output RF Frequency	1450	1900	2400	MHz
BW	Maximum		500		MHz
RLin	Minimum Output return loss	10			dB
IMREJ	Image Rejection With no RF Filter	25	40		dB
MaxPow	Maximum Output Power From each Node		-8		dBm
Pd	Power dissipation		15		W

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 +/-0.5dB flatness. Actual bandwidth are higher than those specified so to keep low Group delay variation

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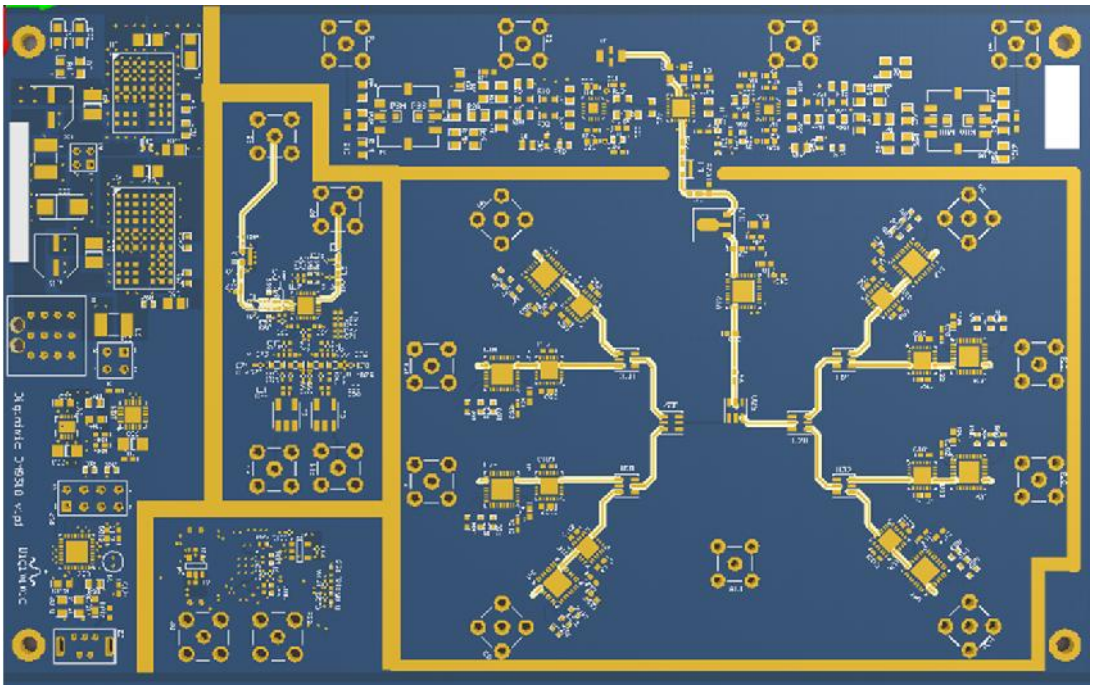
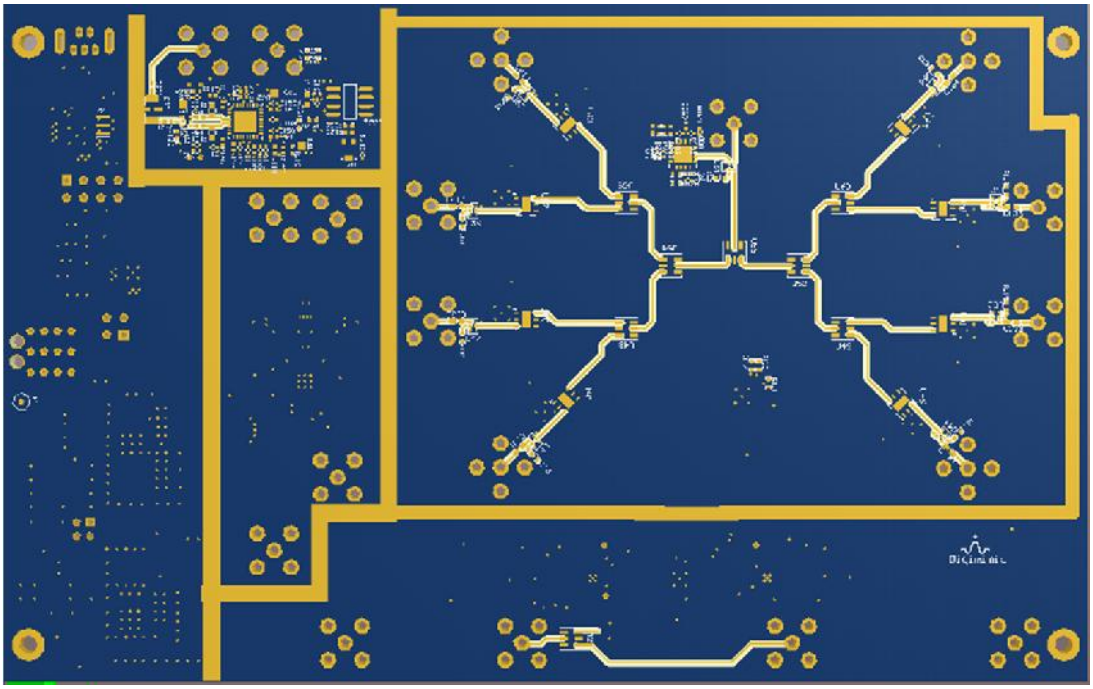
PCB Layout (Top: Main Sections)



PCB Layout (Bottom: Calibration Path)



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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.

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