

Description

The DM9300 is a 3 channel BB-IF to RF Up-converter in a 3U form factor. The input may be

- Baseband IQ complex signal, so to allow direct conversion to RF (Option Q) or
- IF Single component for intermediate frequencies up to 150MHz (Baseline).

The output RF frequency is in the range of 1150MHz to 1600 Mhz .Other Frequencies available upon request.

Each Up-converting chain presents

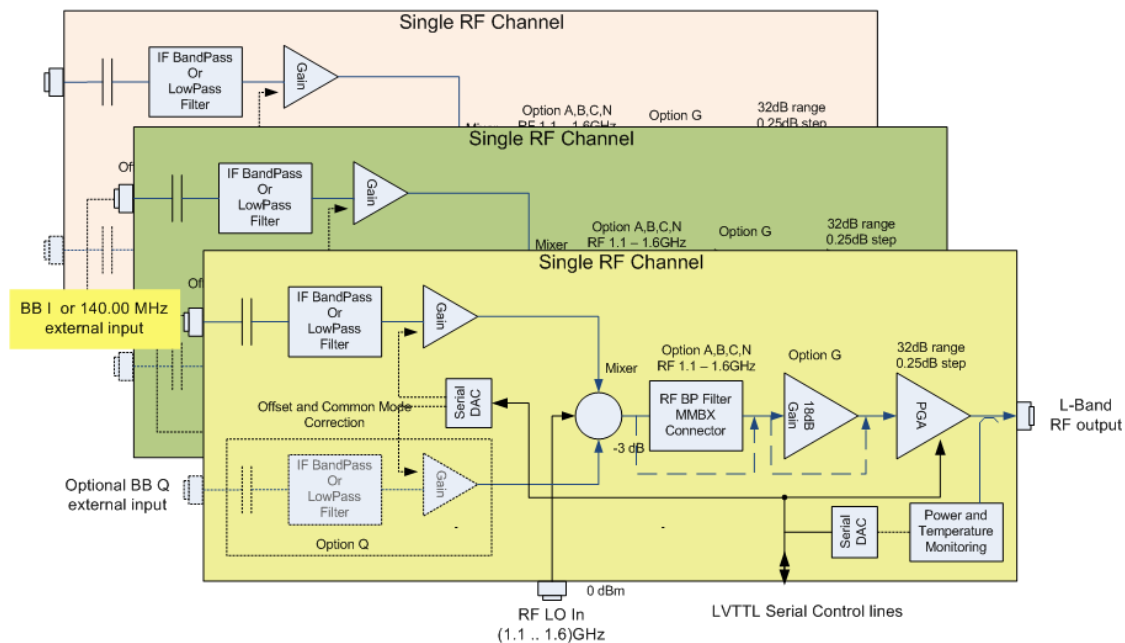
- An input by-passable filter that allows to reject unwanted frequencies
- Single ended to differential wideband amplifier
- Direct Quadrature Modulator
- Output low noise Gain Amplifier (Optional).
- On Board by-passable RF Filter
- On Board RF Power and temperature monitoring

Internal Microcontroller and USB connector allow to DM9300 to be configured via a PC based GUI. Optionally the board may be mounted in backplane applications.

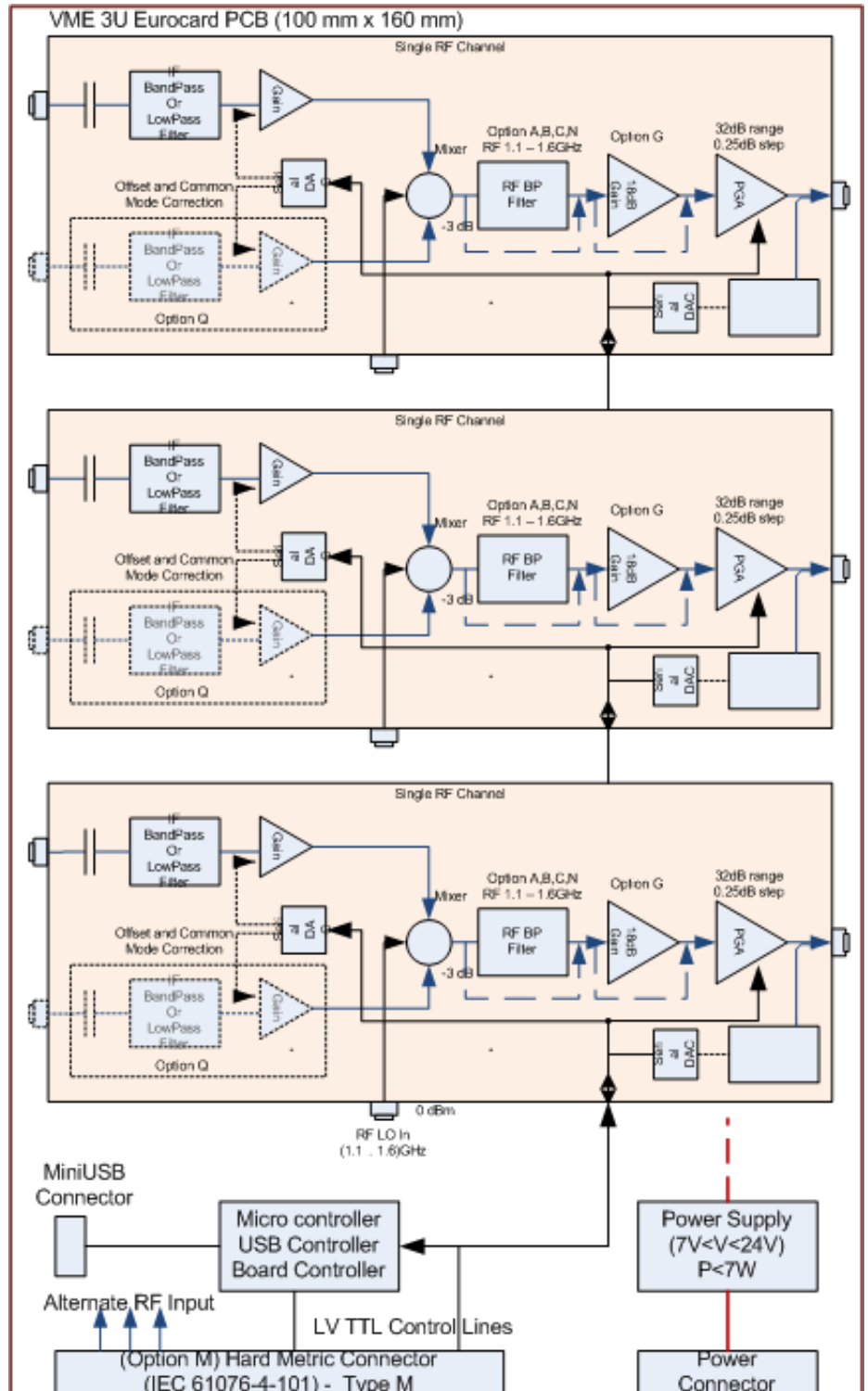
Features

- ❖ **L Band RF Up converter to cover all GPS and Galileo Navigation services**
- ❖ 3 channels in a single board (any frequency configuration allowed)
- ❖ Ultra wideband: Up to 200MHz bandwidth (Option Q) or 100MHz IF centered (Baseline)
- ❖ 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 (Baseline) or DC Coupled (Option Q)
- ❖ Optional Input Filter
- ❖ Optional Output RF Image rejection Filter (Option A,B,C,N)
- ❖ Output Level : up to -20 dBm ;
- ❖ Gain: -24 dB (AC coupled Load, -40 dBm option L)
- ❖ Power Consumption (7V<V<20V): 7W total
- ❖ Form Factor : 3U
- ❖ Optional Hard Metric Connector (IEC 61076-4-101) - Type M (Option M)

Block Diagram



Top Level Board Layout





DM9300

1.1- 1.6GHz Triple RF Up Converter

Detailed Description

The DM9300 is a 3 channel BB-IF to RF Up-converter in a 3U form factor (highest worldwide integration) suitable for L-Band applications and covering in particular all the frequencies and bandwidth (L1,L2, L5, E5, E6) of the actual and forthcoming second generation navigation systems (GPS, Glonass, Galileo....).

Each channel's top level diagram and board level diagram are shown in page 1 and 2 of this datasheet.

The board has no RF carrier synthesis thus allowing the DM9300 to be used in navigation system test equipments, where the synthesis section is usually much more accurate than commercial up-converters. Each Up-converting chain presents

- An input filter that allows to reject unwanted frequencies.
- Modulator
- Output RF Filter. Ordering option A,B,C select E5, E6 or L1 center frequencies and bandwidth. Option N has to be used when no internal filtering is required (and filter has to be provided by customer otherwise image will not be suppressed). Customized filters may also be delivered on customer requirements;
- Output low noise Amplifier (Option G).
- Output power control (32 dB range in 0.25 dB steps)
- Output power detector (to monitor output power)
- Temperature sensor.

Each section is provided with its own BB/IF input, LO and output SMA connectors. For Commercial backplane applications, is possible to feed BB/IF inputs and LO via a dedicated Hard Metric Connector Type M (IEC 61076-4-101) (Option M) (Not mounted in photographs). Please note that BB/IF and LO signal paths from type M Connectors to each section are not equalized, so for high accuracy, channel synchronous and low noise applications (typical of Test Equipment) is suggested to order the baseline SMA connectorized version.

The presence of an onboard microcontroller and mini USB port allow, using the delivered SW GUI, to easily configure via internal LVTTTL serial lines all the features and to monitor power and temperature. When Option M is selected, the control lines are also echoed to the backplane Type M Connector.

The maximum IF input level are is 4dBm and the gain chain is -24dB (-4 dB when the internal LNA is used – option G).

Ordering Information

The Complete Part Number of DM9300 is:

DM9300 - X1 X2 X3 - Y1 Y2 Y3 - Z1 Z2 Z3 - W

Where

X1,2,3 = **A** (E5 100MHz Bandwidth filter), **B** (E6 60MHz Bandwidth filter), **C** (L1 60MHz Bandwidth filter), **N** (No Filter, A filter or a short via MMBX connectors has to be necessarily provided by customer since the gain section is actually unconnected), **S** (No Filter, an internal short is provided. Image Rejection has to be guaranteed by an external SMA filter).

Y1,2,3 = **G** (20 dB internal Amplifier is mounted – baseline, may be omitted), **L** (No Amplifier, specify which chain has no RF amplifier)

Z1,2,3 = **Q** (Quadrature DC Coupled Baseband Input), **I** (baseline, IF AC Coupled Input, may be omitted)

W = **M** (Type M Backplane connector mounted), Nothing (baseline, may be omitted)



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Ordering Information (cont. d)

Ordering Examples:

DM9300 - ABC : Baseline DM9300 with internal E5 filter on channel 1, E6 on Channel 2 and L1 on Channel 3, No backplane Connector;

DM9300 - ABC-LGG-QII : DM9300 with internal E5 filter on channel 1 having DC Coupled IQ Baseband Input, E6 on Channel 2 and L1 on Channel 3 having both IF AC coupled input , No backplane Connector;

Electrical Characteristics

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

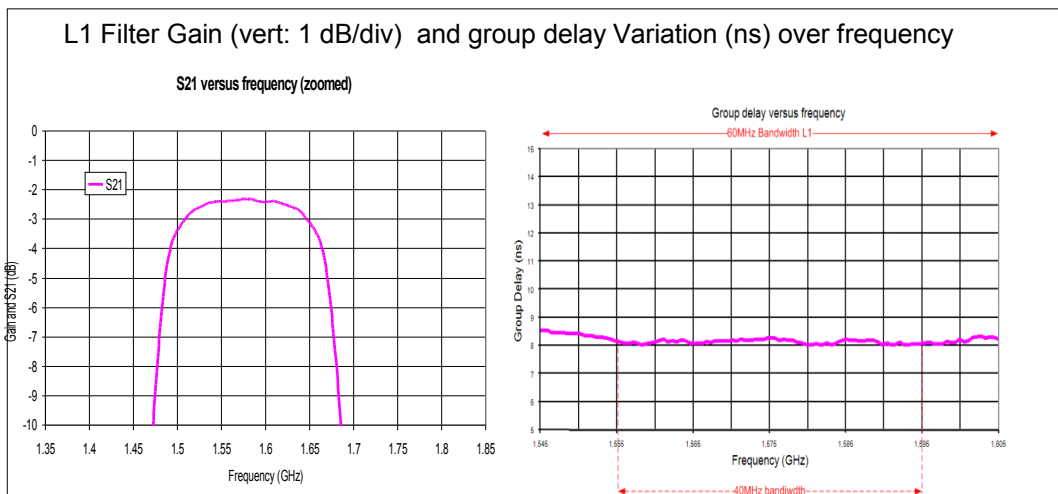
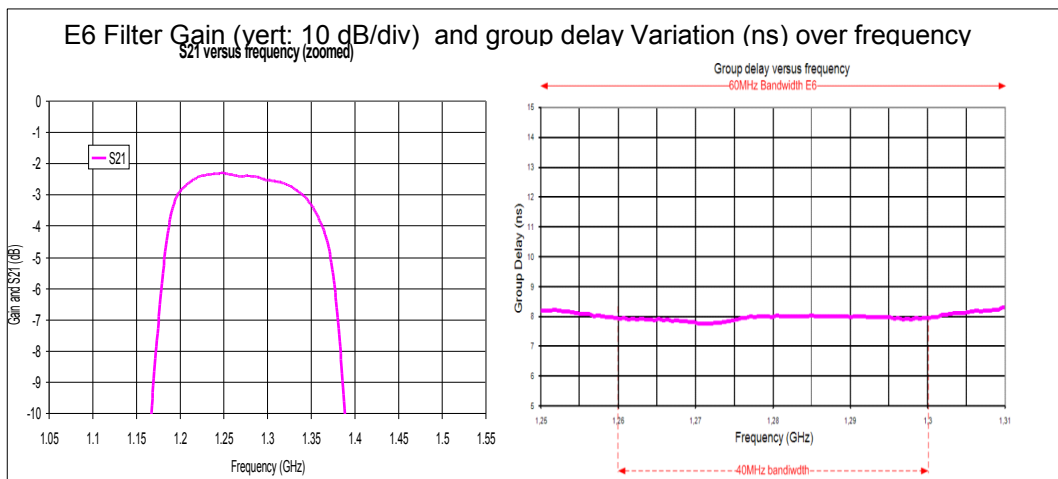
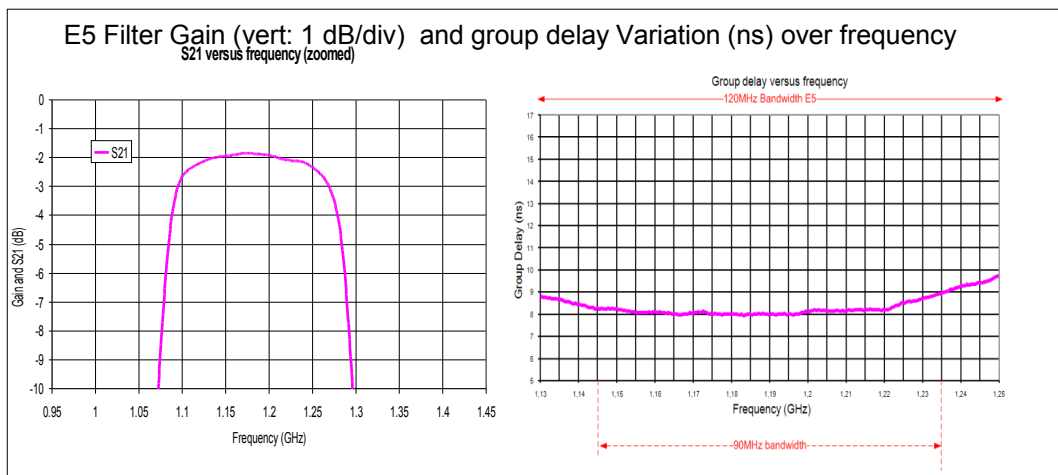
2. Input and output termination: 50 ohm AC Coupled.

3. Actual bandwidth are higher than those specified so to keep low Group delay variation

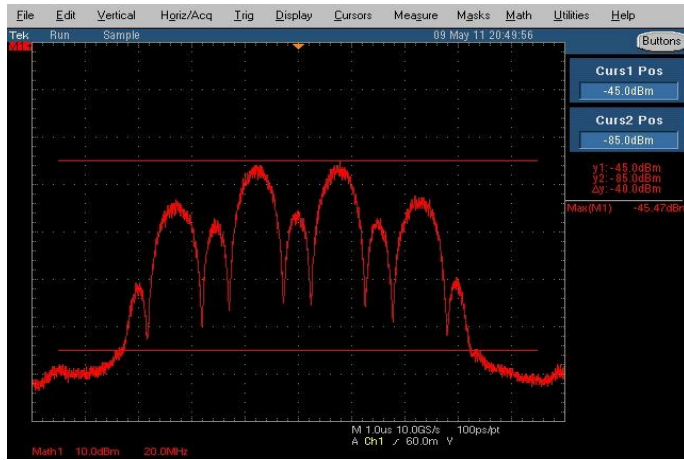
4. G option: gain -24dBm

Symbol	Parameters	Min	Typ	Max	Units
VDC	Power supply voltage	7	12	24.00	V
VLO	Input LO Drive Level		0		dBm
VIN	Data input Drive level (AC Coupled) ⁽²⁾		4		dBm
G	Gain ⁽⁴⁾		-24		dB
Gr	Gain Ripple Peak			0.25	dB
FIF	Input IF Frequency	135	143	150	MHz
FLO	Input LO Frequency	900	1500	2100	MHz
BW	E5 (Option A) RF Bandwidth ⁽³⁾ E6 (Option A) RF Bandwidth ⁽³⁾ L1 (Option A) RF Bandwidth ⁽³⁾	100 70 70			MHz
RLin	Minimum input return loss (up to 2 GHz)	15			dB
RLout	Minimum output return loss (up to 2 GHz)	15			dB
Gdel	Group delay Linear Group delay Parabolic Group delay Residual Peak to Peak Ripple			0.005 0.00044 0.2	ns/MHz ns/MHz ² ns
Pd	Power dissipation		1.0		W

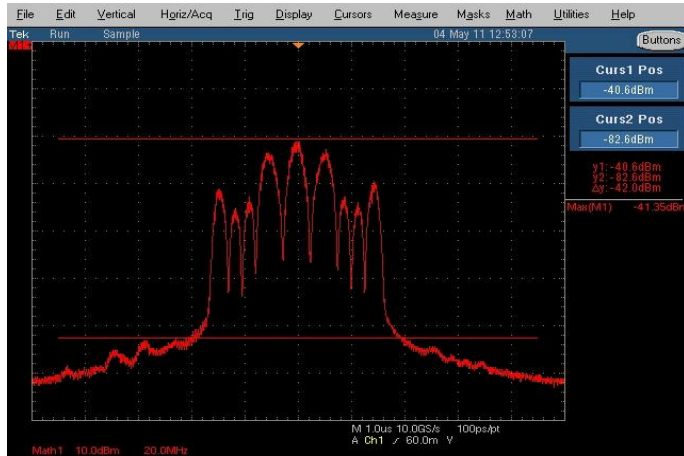
Option A,B,C (E5, E6, L1) Filter Measurements



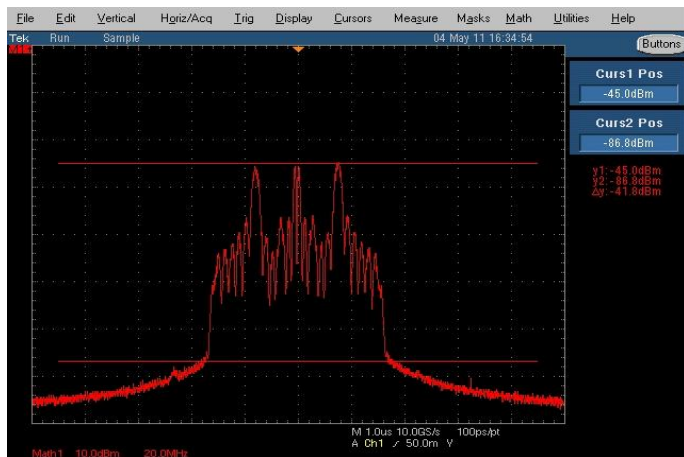
E5 Output Spectrum (option A)



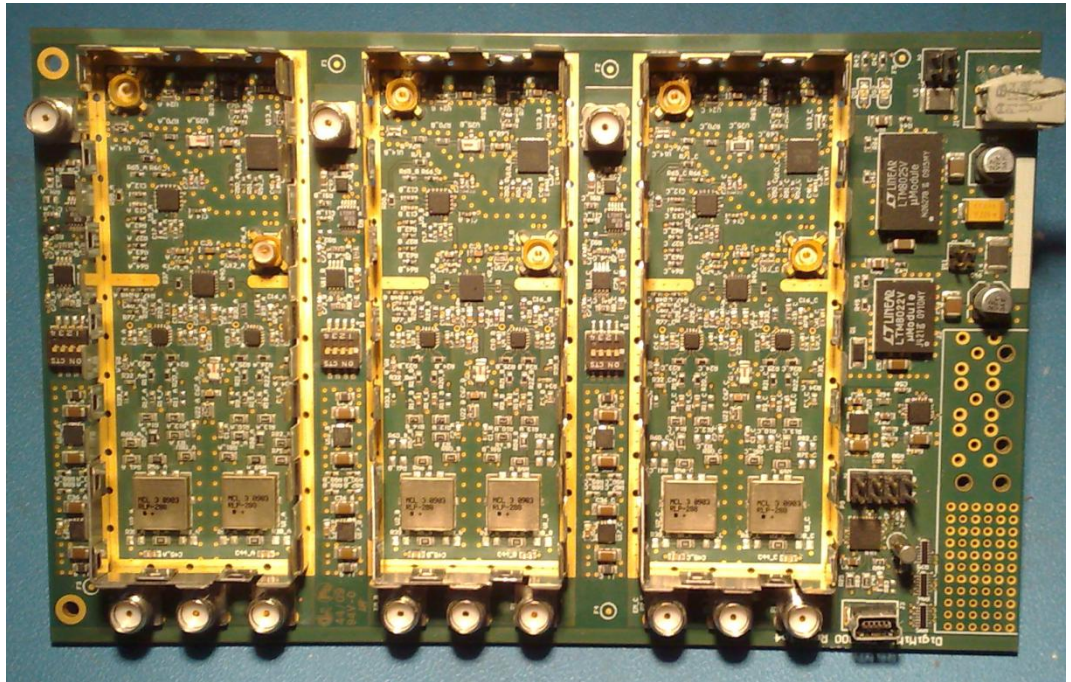
E6 Output Spectrum (option B)



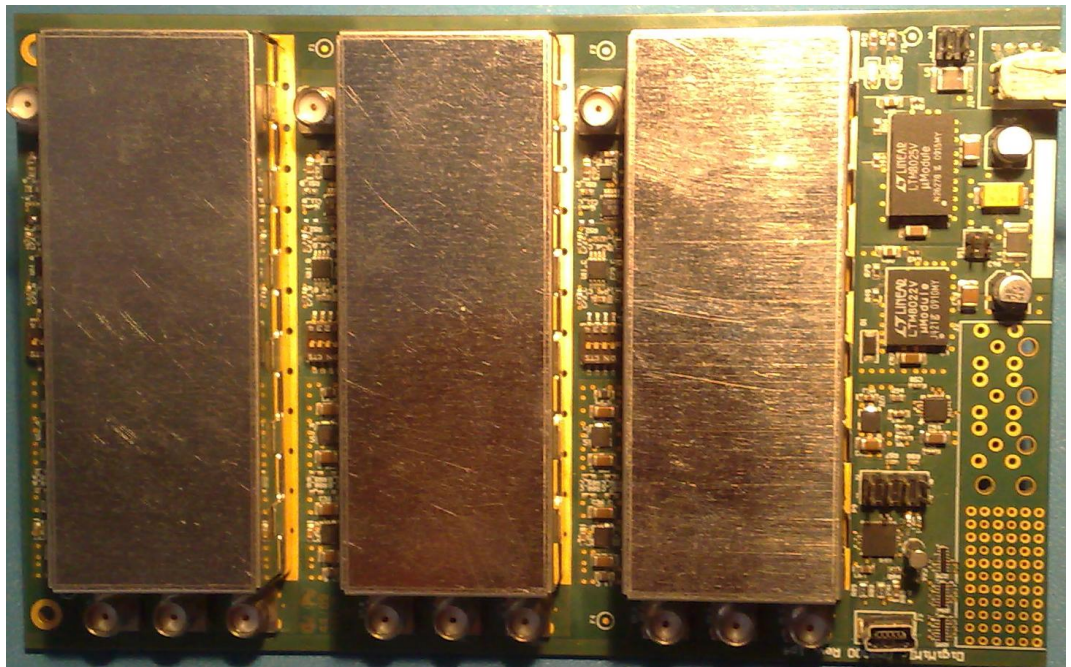
L1 Output Spectrum (option C)



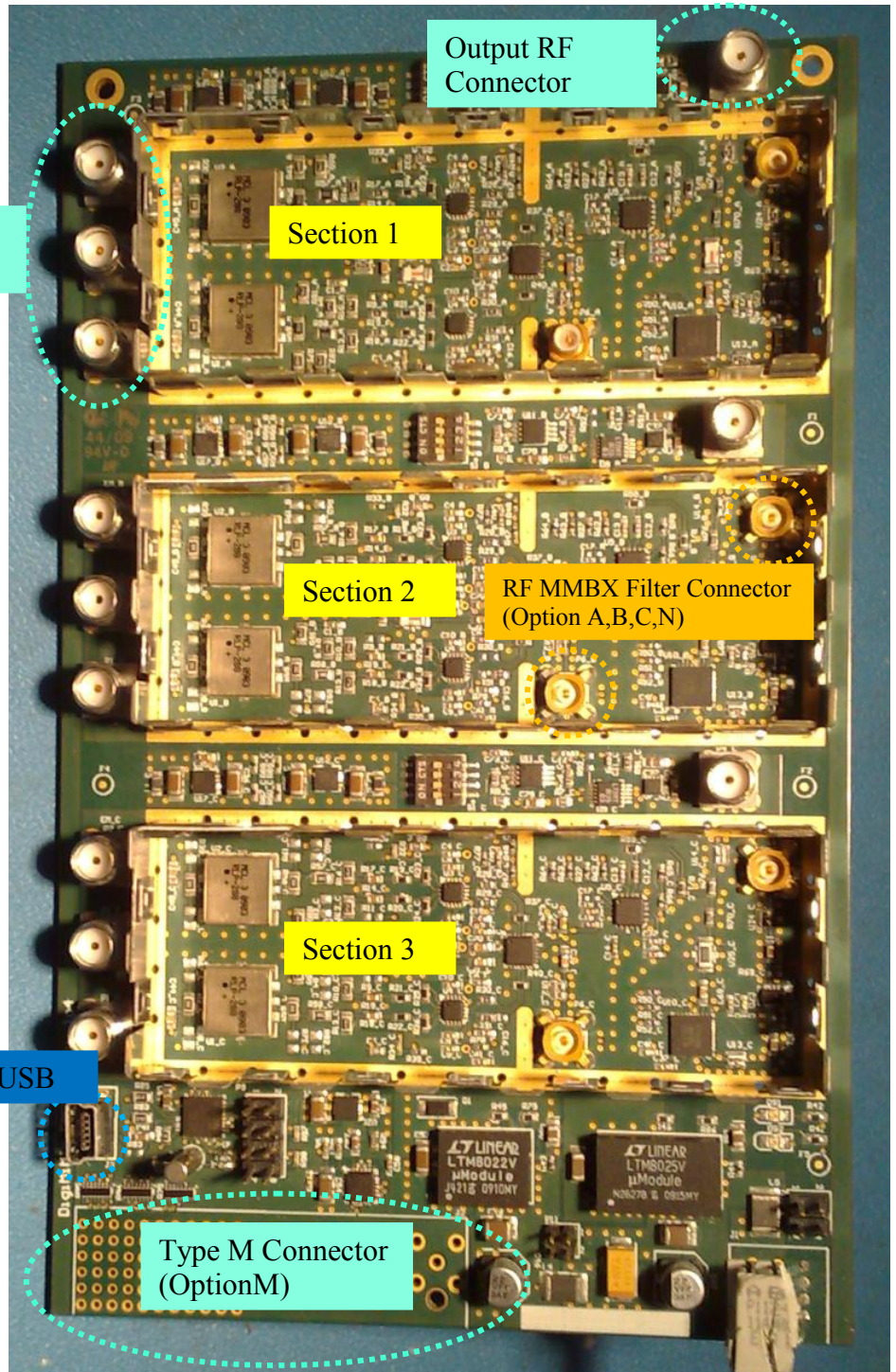
Board Picture
without RF
shields covers



Board Picture
with RF shields
covers



Board





DM9300 1.1- 1.6GHz Triple RF Up Converter

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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.
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