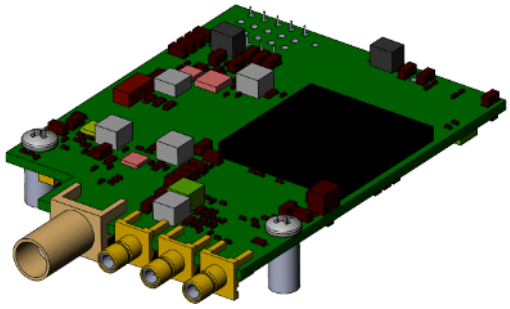
L-Band Tuner/Base Band Down Converter

Overview

- Single-site L-Band tuner module with integrated preselector, switched LNA, and high-resolution A/D converter

Features

- Input Frequency Range: 800 to 2300 MHz (Contact factory for extended range options)
- Selectable Bandwidth: 10 to 110 MHz
- Input Power Range: -104 to 0 dBm
- Adjustable Gain Range: 0 to 70 dB
- Integrated Switched LNA (+15 dBm/2.7 dB NF)
- Integrated three-stage preselector
- Internal or External 10 MHz reference
- Precision time-tagged data (External 1 PPS input)
- Integrated input power meter
- Multi-module synchronization via Digital I/O port
- Single-site module for use with ICE-PIC6/7/8 DSP cards



Applications

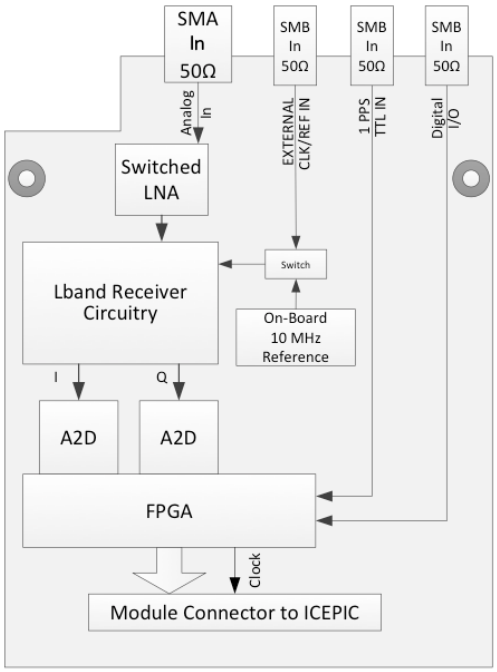
- LNB IF processing
- L-Band tuning and signal reception
- RF-to-Digital conversion
- Communications
- Instrumentation

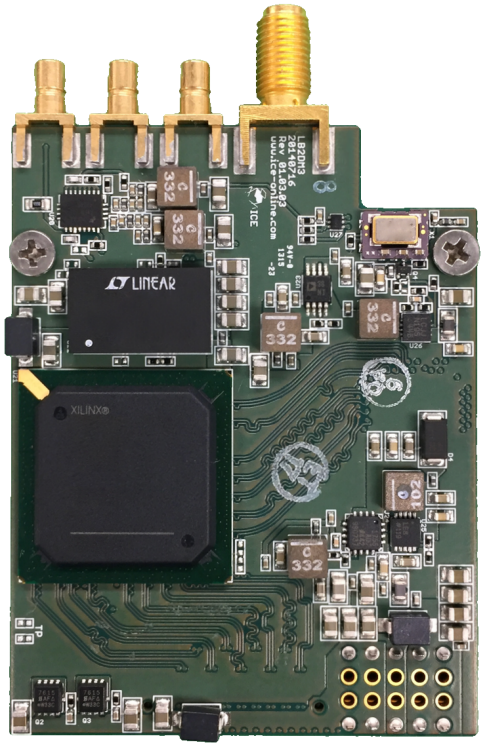
Description

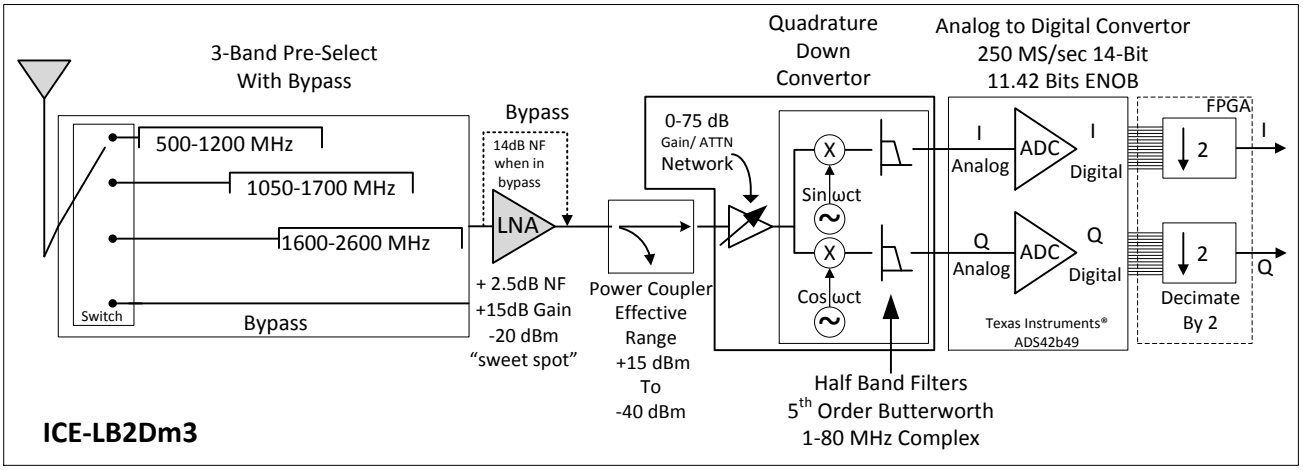
The L-Band Tuner is a single-site module that accepts an input frequency range from 800 to 2300 MHz with input signal power ranging from -106 to +0 dBm. The software interface provided displays amplitude vs. time (oscilloscope), amplitude vs. frequency (spectrum), and frequency vs. time (falling raster). Control of the L-Band tuner is available via the software interface. The receive bandwidth is software-selectable from 1 to 110 MHz. Two ICE-LB2D-M3 modules can be placed on a single ICE-PIC card for dual-channel applications. A single 8-lane PCI-Express slot is required.

An internal 10 MHz reference can be used by selecting the onboard 10 MHz reference, or an external 10 MHz reference can be provided via an SMB connector. An SMB connector for external 1 PPS input is available. The external 1 PPS input can be stored in bit 0 of a 16-bit word that is 14-bit Data MSB aligned. When used for the ICE-PIC7 DSP Card, an IRIG-B002 (DC IRIG-B) stream can be received via an SMB connector on the ICE-PIC card for accurate time tagging reference.

Functional Block Diagram / Actual Module



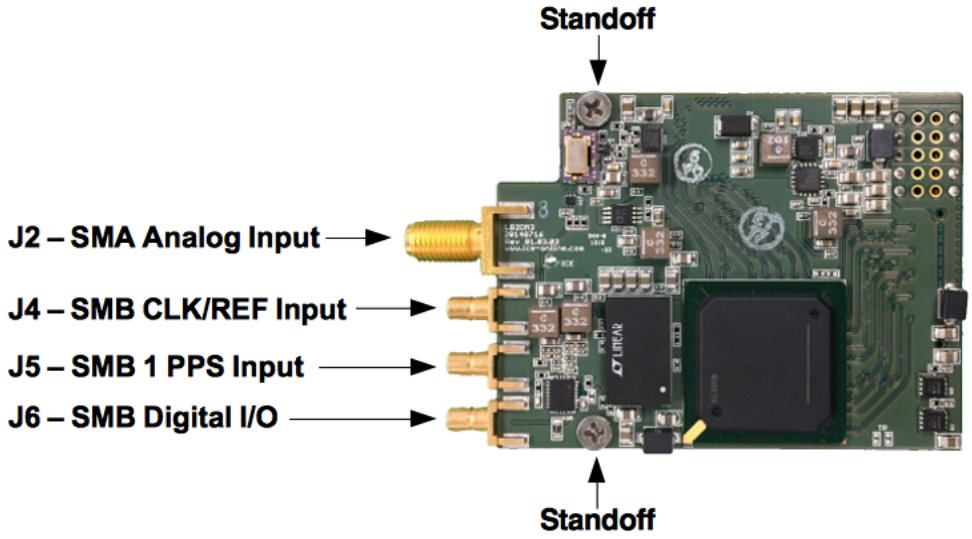




Specifications

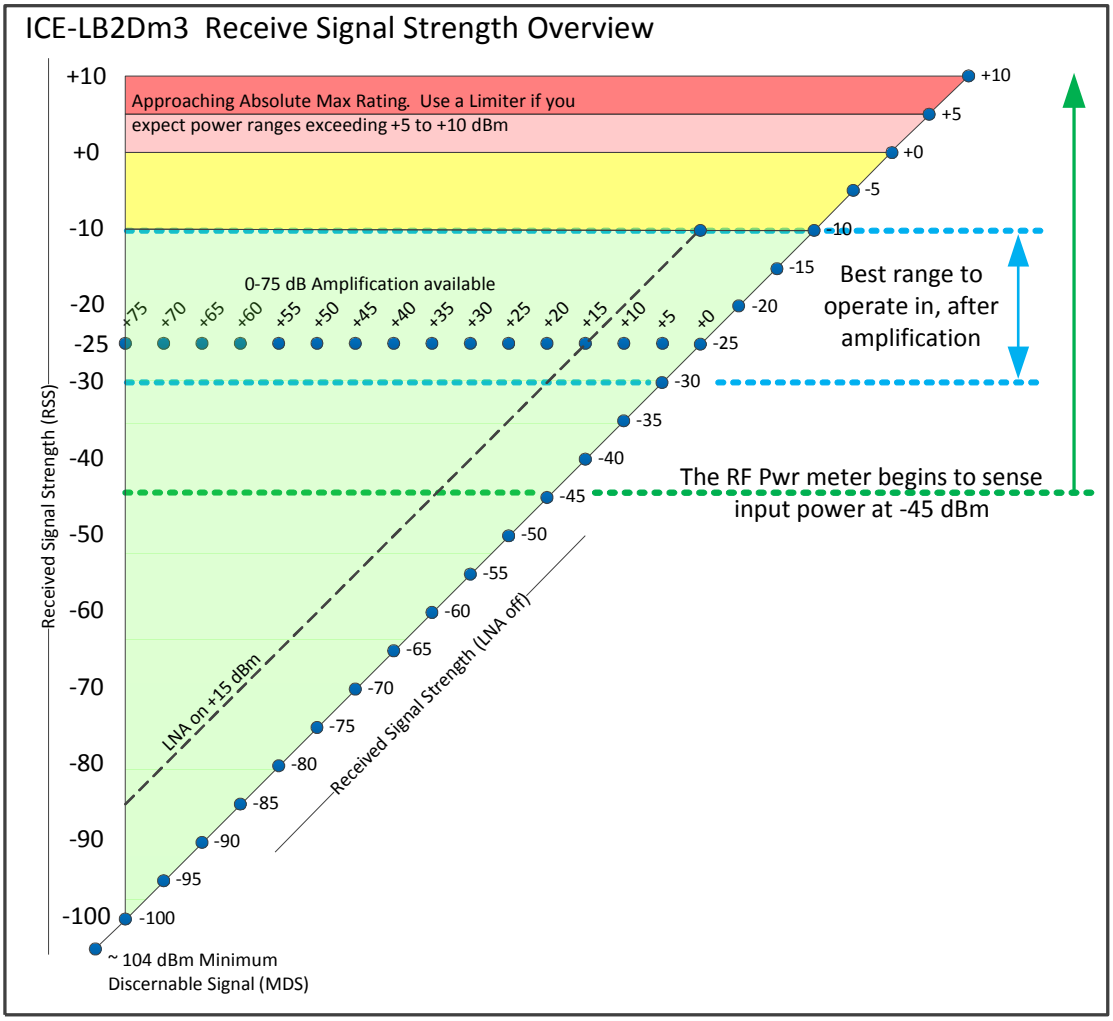
Functional

Connector	Manufacturer	Part Number	Description	J-Number
Signal Connections				
Analog Input	Emerson	142-0701-871	Edge launch SMA	J2
Reference Input	Amphenol	903-518J-51P	Edge launch SMB	J4
PPS/Trigger Input	Amphenol	903-518J-51P	Edge launch SMB	J5
Digital I/O	Amphenol	903-518J-51P	Edge launch SMB	J6
Board Connection				
Data Connection	Samtec	QTE-020-03-F-D-A	40-pin header	J3
Power Connection	Global	BG190-10-A-3-N-D	2-pin header	J1
Physical Connection				
Standoff (2 each)				
Mating Connectors				
SMB	AMP	414946-1		J4, J5, J6
	Huber Suhner	11_SMB-50-2-40		
Data	Samtec	QTE-020-03-F-D-A		J3



Electrical

Parameter	Impedance	Minimum	Typical	Maximum	Unit
SMA Analog Input	50 ohm	-104	-40 to -10	+5	dBm
SMB External Reference (AC-coupled)	50 ohm	+/- 0.5	+/- 1.0	+/- 2.0	V_{p-p}
SMB External 1 PPS / Trigger (DC-coupled LVTTL)	50 ohm	+/- 0.5	+/- 1.0	+/- 2.0	V_{p-p}
SMB Digital I/O (LVTTL)	50 ohm	0.5	3.3	3.6	V_{p-p}



Front-end Design Recommendations

If an external front-end LNB is in line prior to the input of the L-Band Tuner, then this external LNB will set the Noise Figure for the system. Most LNBs output a nominal -20 dBm signal strength. This external front-end LNB's -20 dBm signal output, injected into the L-Band Tuner, does not need the additional +15 dBm that the integrated LNA provides. In this use case the integration LNA should be turned off and the LNB will be used to establish the front-end Noise Figure. If an external LNB is not used, then the Noise Figure for the integrated LNA of the L-Band Tuner is 2.5 dB.

LNA Use Recommendations

- It is recommended that the LNA be OFF for a received signal strength greater than -10 dBm.
- It is recommended that the LNA be ON for a received signal strength less than -30 dBm.
- For received signal strengths between -30 and -10 dBm the LNA may be on or off depending on signal characteristics and linearity requirements.

Mechanical

Width	2.0 in
Length	2.6 in
Height	The edge-launch low profile module, installed on the ICE-PIC card complies with PCI slot width specifications

Absolute Maximum Ratings

Parameter	Value	Units	Conditions
Electrical			
AV_{CC}	3.3	VDC	
DV_{CC}	3.3	VDC	
PPS Input LVTTL	3.6	V_{P-P}	
External Reference Input LVTTL	3.6	V_{P-P}	
Analog Input Power	+10	dBm	50 ohm
Environmental			
Operating Temperature	-10 to +65	°C	Airflow required[1]
Storage Temperature	-40 to +85	°C	

Warning: Operation of this module beyond any of these parameters may cause permanent damage to the module and any ICE-PIC cards on which it is installed. Exposure to absolute maximum ratings for extended periods may affect reliability. Operation of the module beyond the absolute maximum rating parameters voids the factory warranty.

Notes

- The headers and components on the board are static sensitive: Do not handle the board without observing proper procedures for the handling of ESD sensitive materials.
- Make sure all connectors are properly oriented before installation

[1] Airflow: Our new ICE-BLOCK and ICE-COOLER products offer the requisite sustained airflow of 150-180 CFM in a convenient 1U package.

Revisions

Revision No.	Date	Description
1.0.1	22 June 2017	