Frequency converter FC1002V/01

Application Note

Development of a 60 GHz communication link using the Sivers IMA 60 GHz converter FC1002V/01

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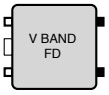
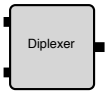
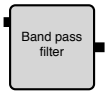
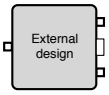
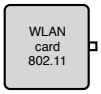
Abstract

R&D in the mm-wave area is, to say the least, a costly and potentially risky task. Cost and time to-market are often underestimated and too optimistic.
Cost is not only represented by monetary investments in a top of the line laboratory, but also by time to locate and attract very special and talented people. The most time consuming part is the creation a well thought out core design that will continue to serve market demands for many years.
The tricky (and often the most expensive part) of the design is the RF head including both the PA and the LNA interface to the antenna. Traditionally this has been a plumber's workshop using waveguide hardware. Tuning the RF head in manufacturing often demanded very skilled personnel and costly instrumentation. It would be attractive to have the RF head designed in a generic unit that could easily be tailored to customers' application.

The Sivers IMA FC1002V/01 converter platform and associated modules are a commodity product that can be used as building blocks for various 60 GHz products. Applications can include high capacity links for data, video, or any other digital information at speeds up to several gigabit per second. The converter is a low cost product in a high cost market segment.

Symbol	Description	Part number
	V-band FD (V-band converter Full Duplex), this converter platform is a broadband and versatile building block for V-band, (57-63 GHz) applications	FC1002V/01
	The diplexer unit will frequency multiplex the transmit and receive channels for use with a single antenna	DI1000V/nn
	Bandpass filters must be used when the separate antennas for transmit and receive are utilized.	FI1000V/nn
	External design module converts source signals to conform with Frequency Converter interface	
	Commercially available WLAN card	
	The antenna is connected to the Diplexer or the Bandpass filter with WR-15, waveguide connector	AN1101V/nn
	WR-15, waveguide connector, (integrated in modules, not a separate part)	
	SMA connector, (integrated in modules, not a separate part)	
	Molex connector for power, frequency settings and control parameters (integrated in modules, not a separate part)	

The logical design and technical data are covered in our DOC.SPLT 6145C 001.

In order to visualize the building blocks and how they interconnect, symbols have been used throughout this paper.

Sivers IMA AB
Box 1274
S-164 29 KISTA
Sweden

Phone: +46 (0)8 703 68 00
Fax: +46 (0)8 751 92 71
sales@siversima.com
www.siversima.com

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A full duplex microwave link with the V band converter could either use a diplexer with a single antenna, fig 1, or individual bandpass filters for the transmit and receive channel with separate antennas, fig 2. Interfaces are standardized, the user only needs to bolt the units together.

fig 1

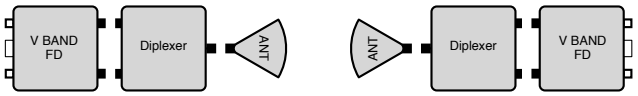
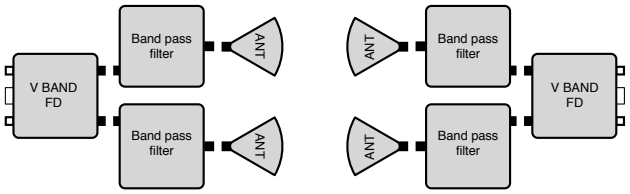


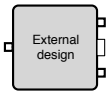
fig 2



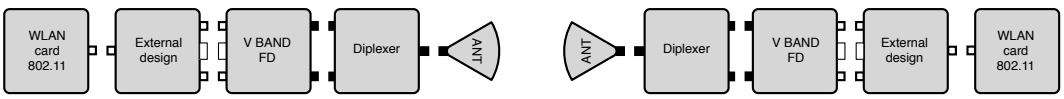
The next step towards an information carrying 60 GHz communication link would be to interface between the source and the V-band converter.

An external design would adopt any information from the source into a suitable format for the V-band converter. The converter is logically one transmit part and one receive part, totally separated from each other and thus both FDM and TDM techniques could be used. Independent selection of the LO frequencies makes the system very flexible in terms of modulation and choice of duplex concept (see our data sheet DOC.SPLT 6145C).

Consider an external design that adopts information from any of the inputs to data conforming to the flexible input of the v-band converter. The input signal to the converter can either be a modulated IF signal from 0.1 GHz to 6.2 GHz , or baseband IQ signals.

Source	External design	Note
Video		External design module converts source signals to conform with Frequency Converter interface
Data		
WiFi		
Telemetric		
FSO		
Sensor		

Consequently a link based on commercial available WLAN cards could look like this:



What remains is to provide a casing for outdoor use and a suitable Power arrangement, e.g. PoE (Power over thernet).

For assistance with the creation of a complete link and the external design interface, we can provide that service together with our partner Trebax AB www.trebax.se

Sivers IMA AB
Box 1274
S-164 29 KISTA
Sweden

Phone: +46 (0)8 703 68 00
Fax: +46 (0)8 751 92 71
sales@siversima.com
www.siversima.com