

# Spirent Vertex® High Frequency Converter

## Enabling Channel Emulation for 5G Applications

The Vertex® High Frequency Converter (HFC) was developed to bring advanced channel emulation test capabilities to 5G applications by extending the Vertex channel emulator frequency range from Radio Frequency (RF) bands to higher mmWave frequency bands. Depending on the model, the Vertex HFC converts RF ranges between 0.75GHz and 6GHz to mmWave (mmW) ranges between 5.9GHz and 40.5GHz and vice versa, allowing channel characteristic simulation in millimeter band scenarios required for 5G implementation. It can also be customized to support other mmW frequencies.

### Key Features

- Supports basic 2x2 MIMO or massive MIMO applications at mmW bands
- Five models to accommodate different conversion ranges and capacities
- Supports internal or external local oscillator (LO)

### Available in Two Configurations

The Vertex HFC is available in two options to best suit the application; for smaller capacity implementations, the streamlined instrument accommodates up to 4 channels while the high capacity version accommodates up to 20.



- 4-channel unit addresses entry level (2x2 bidirectional) tests in multiple models to accommodate different frequency ranges
- 20-channel unit has an internal combiner for multi-Vertex instrument applications: stackable from 16x4 bi-directional (2 Vertex + 1 HFC) to 64x4 bidirectional (8 Vertex + 4 HFC)

### Typical Application Scenarios

The Vertex HFC can be used to inject RF channel emulation between a mmW band eNodeB (eNB) and mmW band device (Figure 1). Other scenarios include upconverting from an RF band network emulator or eNB to a mmW band device (Figure 2).

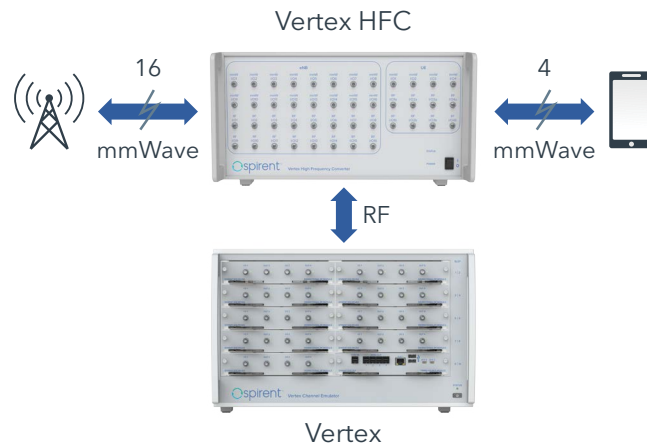


Figure 1

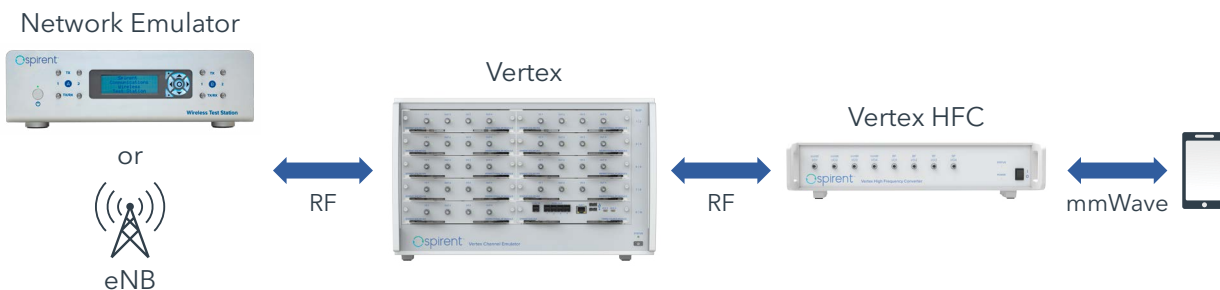


Figure 2

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Frequency range	27.5 GHz to 28.5GHz	24.25 to 29.5GHz	37 to 40.5GHz	9-13GHz	5.9-10GHz
	20-channel unit		4-channel unit		
Model Number	VCE6-HFC-20C-28GHZ	VCE6-HFC-4C-27GHZ	VCE6-HFC-4C-39GHZ	VCE6-HFC-4C-11GHZ	VCE6-HFC-4C-7GHZ
LO	25.5GHz Internal	23.5GHz	35GHz	14.5GHz	11.75GHz
External LO level	10dBm	4dBm	4dBm	4dBm	4dBm
Internal RF filter	DC-3GHz	DC-6GHz	DC-6GHz	DC-6GHz	DC-6GHz
Internal mmW filter	27.5GHz to 28.5GHz	24.25 to 29.5GHz	37 to 40.5GHz	9-13GHz	5.9-10GHz
Input frequency	2GHz to 3GHz	0.75 to 6GHz	2 to 5.5GHz	1.5 to 5.5GHz	1.75 to 5.85GHz
Maximum input power level to any RF/mmWave port	<27.5dBm	<27.5dBm	<27.5dBm	<27.55dBm	<27.5dBm
Nominal RF input power level for 5G NR, 100MHz	-2dBm	-2dBm	-2dBm	0dBm	0dBm
Nominal mmWave power level for 5G NR, 100MHz	-2dBm	-2dBm	-2dBm	0dBm	0dBm
Conversion loss	eNB Ports <22dB; device Ports <26dB	<22dB	<24dB	<22dB	<22dB
10MHz reference	External	External	External	External	External
In-band spurious emission	-40dBc	-40dBc	-40dBc	-40dBc	-40dBc
Impedance	50 ohms	50 ohms	50 ohms	50 ohms	50 ohms
Input VSWR	<1.5	<1.5	<1.5	<1.5	<1.5
Typical phase noise of LO	-110dBc/Hz (@100kHz)	-115dBc/Hz (@100kHz)	-105dBc/Hz (@100kHz)	-125dBc/Hz (@100kHz)	-128dBc/Hz (@100kHz)

Note: Multiple HFCs can be used in a system to increase channel capacity; if doing so, please be sure their external clocks are all connected to the same qualified 10MHz clock source.

**Contact Us**

For more information, call your Spirent sales representative or visit us on the web at [www.spirent.com/ContactSpirent](http://www.spirent.com/ContactSpirent).

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