

Spirent HBTE Semi-Anechoic RF Chamber and Accessories

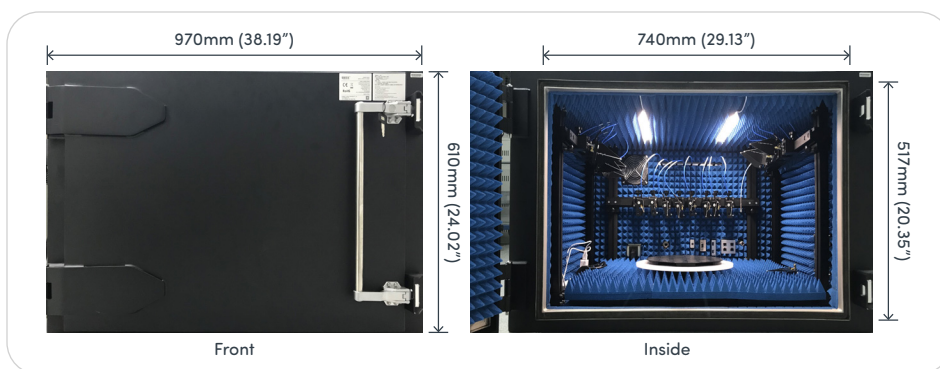
Wi-Fi 6/6E and Wireless Test Solutions

Solution Overview

Spirent HBTE RF isolation chambers and a selection of the latest state of the art in-lab wireless testbed accessories are available to support testing Wi-Fi 6/6E, 5G, CBRS, UWB, Bluetooth, and IoT applications. The RF chambers with a semi-anechoic design create a stable and isolated RF environment. This prevents unwanted radio frequency signals from entering the test environment to allow for accurate functional and performance verification of wireless devices in a controlled and repeatable fashion. The high-quality semi-anechoic RF chambers built with lightweight aluminum magnesium alloy can cover up to 8GHz frequency spectrum and support easy to test, cost saving, and operational efficiency in conjunction with the use of other wireless testing gears.

RF chambers serve as the main component for wireless testbeds and can be used in a completely RF cabled conductive setting, with RF cables connecting from the inside SMA connectors directly to a Device Under Test (DUT).

The filtered communication interfaces provide the maximum usability to easily connect Ethernet, USB, optical cables to the inside appliance. In addition, it includes up to 24 configurable antennas that have a logarithmic cycle single-polarized design for over-the-air (OTA) testing while the DUT has its antenna attached. The turntable supports two-dimension orientation testing with accurately controlled angle movement to examine the angle-based antenna performance. There are also accessories such as different SMA to SMA RF length cables, RF combiner/splitter, 4-channel or 8-channel programmable attenuators offered as an end-to-end testbed solution. The multiple chambers are stackable for more sophisticated mesh testbeds to simultaneously test multiple devices. The dimensions of the RF chamber are shown in the photographs.



- Conductive or OTA testing
- Eliminate undesired noise and interference
- Controllable testing and repeatable measurements
- Wireless applications such as Wi-Fi, CBRS, 5G, UWB, IoT
- Wi-Fi functional and performance testbed
- OFDMA and MU-MIMO testing
- Wi-Fi mesh testbed
- Multi-AP roaming testing
- Fronthaul and backhaul concurrent testing
- RFC2544 and BBF TR-398 testbed
- RF and Layer 2-7 performance testing
- Stability testing
- Wi-Fi Dynamic Frequency Selection (DFS) testing
- Easy rate vs range testing
- Integration with Spirent test solutions
- End-to-end lab automation

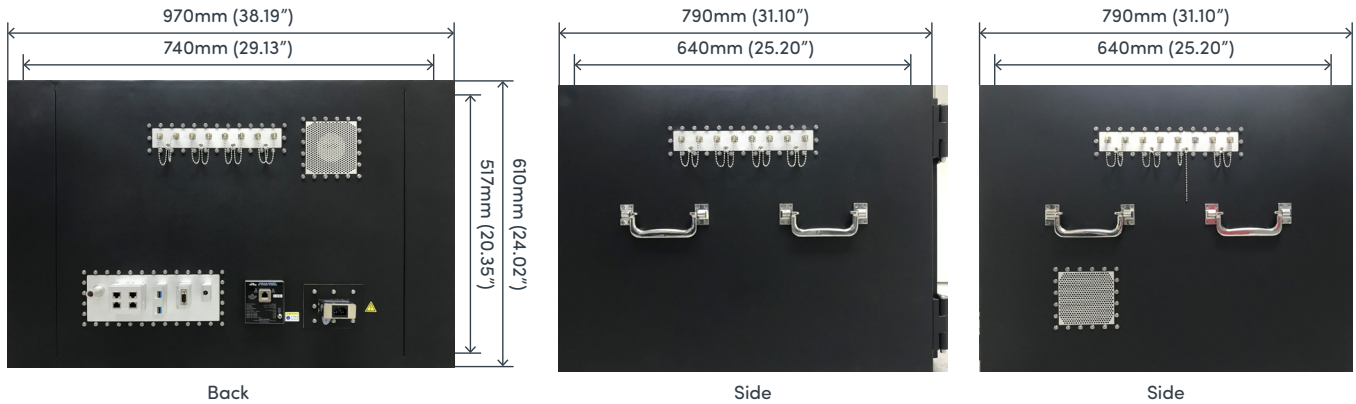


Figure 1: Spirent HTBE Semi-Anechoic RF Chamber

Features and Benefits

Semi-Anechoic RF Chamber

- Support wireless applications such as Wi-Fi 6/6E, 5G, CBRS, Bluetooth, and IoT
- Featured RF chambers for Wi-Fi single or mesh testbed
- Lightweight aluminum magnesium alloy materials
- Semi-anechoic chamber with double absorber design for the best far-field performance
- Support up to 8GHz frequency spectrum
- Integration with Spirent's Wi-Fi 6/6E testing gears
- Support new Wi-Fi 6E 6GHz spectrum
- Rich filtered interface set supported
- Up to 24 internal mounted high gain antennas on three sides of the chamber
- Fully adjustable height of each antenna mounting track on each side
- Support one filtered 10Gbe Base-T copper interface along with 4 filtered 1Gbe interfaces
- Ethernet controlled turntable with 360° rotation
- Inside chamber lighting fixture
- Various and flexible interface selections and configurations

Logarithmic Cycle Single-Polarized Antenna

- Antenna can be manually moved along the antenna brackets
- Antenna can be rotated at any angle from 0° to 360° on the fixed frame
- Antenna fixator can be moved on the sideslip to a suitable position and then locked
- Horizontal slide rail can be moved to the appropriate position on the vertical slide rail and then locked

Coaxial RF Cable

- Cable can support DC to 8GHz
- Made with super soft braided shielding wire and high quality SMA connectors
- Superior RF performance with wide band support, low insertion loss, low VSWR, bending resistance

4-Way Power Divider

- Divide one RF signal from 2GHz to 8GHz into 4-way equal or non-equal energy
- In reverse, combine multiple signals into one
- Applications in antenna array, mixer, and balance amplifier

4-Ch and 8-Ch Programmable Attenuators

- Bi-directional and non-blocking matrix system integrated in 2U factor
- Solid state components with consistent, repeatable, and reliable performance
- Attenuation range of 0-127dB and step size of 1dB step
- High power handling of 30dBm
- Telnet and TCP/IP interface support
- Support multiple control mode including local LED control, PC GUI, and automation scripting with API
- Single Ethernet interface for remote access, firmware update, debug, and reboot

Technical Specifications

Semi-Anechoic Chamber

Basic Specification

Frequency (GHz)	2-8GHz
Insertion loss (dB)	<1dB
Isolation (dB)	>90
RF ports	24
RF port type	24 x SMA (Female) – SMA (Female)
Filtered connections	2 x USB3.0 1 x RJ45 Ethernet Base-T 10Gbe 4 x RJ45 Ethernet 10/100/1000Mbe 1 x DC5/9/12V 2A 1 x AC220V 10A 1 x DB9
Unfiltered connections	1 x Fiber Optic Waveguide
Internal absorbing material	Pyramidal absorber and plate absorber
Cooling fan	2
LED lighting	2
Ventilation	Active

Turntable Specification

Azimuth axis	360° rotating range, 0.1° rotation precision, fast start, rotation, and stop
Maximum load	5 kg
Remote control	Yes, through a 1Gbe Ethernet interface
Script automation	Yes, API provided

Mechanical Specification

Cooling	80mm square axial fan Filtered over inlet and outlet for isolation
Operation mode	Manual
Security locking latch	No
Exterior dimensions (mm)	970L x 790W x 610H
Interior dimensions (mm)	740L x 640W x 517H
Exterior dimensions (inches)	38.19" L x 31.10" W x 24.02" H
Interior dimensions (inches)	29.13" L x 25.20" W x 20.35" H
Weight (kg)	90kg
Shell material	Aluminum magnesium alloy
Surface treatment	Spray
Exterior Color	Black

Other Specifications

AC Power Entry Module	IEC-320 C14 inlet connector 120/240VAC 50/60Hz with 6A 5x20mm fuse
Power supply	1 x AC 220V/10A~30A 1 x DC12V/5A
Power distribution	1x5 way socket
Working temperature (°C)	-15~55
Storage temperature (°C)	-20~+70
Humidity range	< 93%@40°C
Altitude range (m)	< 4600

Technical Specifications (cont'd)

Logarithmic Cycle Single-Polarized Antenna

Electrical Specification

Type	Logarithmic cycle single-polarized
Frequency (GHz)	2-8
Gain (dBi)	5dBi
Polarization	Linear polarization
Cross polarization (dB)	25
Half power angle	70deg@phi=0@2GHz, 70deg@phi=0@4GHz, 66deg@phi=0@6GHz, 55deg@phi=0@8GHz
VSWR	<2
Impedance	50 ohm
Power capacity (W)	50@SMA-male

Mechanical Specifications

Exterior dimensions (mm)	100mm x 60mm x 2mm
Exterior dimensions (inches)	3.94" L x 2.36" W x 0.08" H
Weight (kg)	0.1
Port type	SMA-Female
Operating Temperature (°C)	-30~ +65
Storage Temperature (°C)	-40~ +80



Figure 2: Chamber internal mounted logarithmic cycle single-polarized antenna

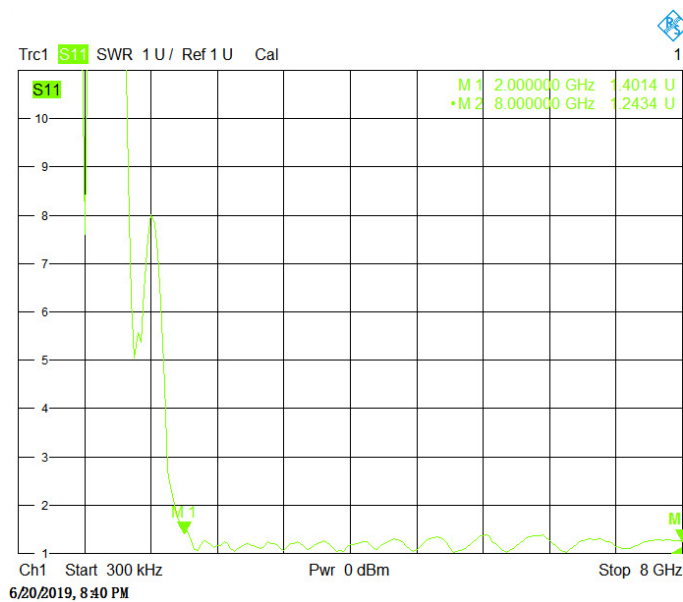


Figure 3: Voltage Standing Wave Ratio (VSWR)

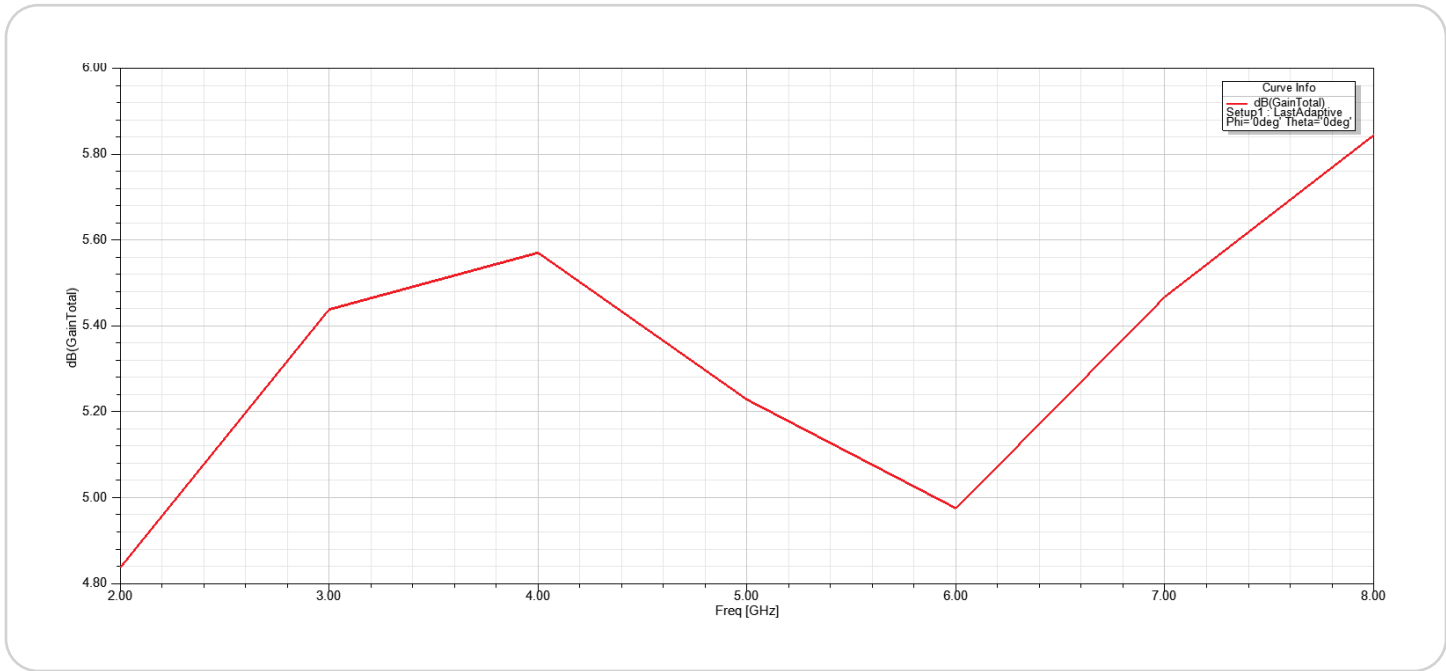


Figure 4: Antennas gain plot

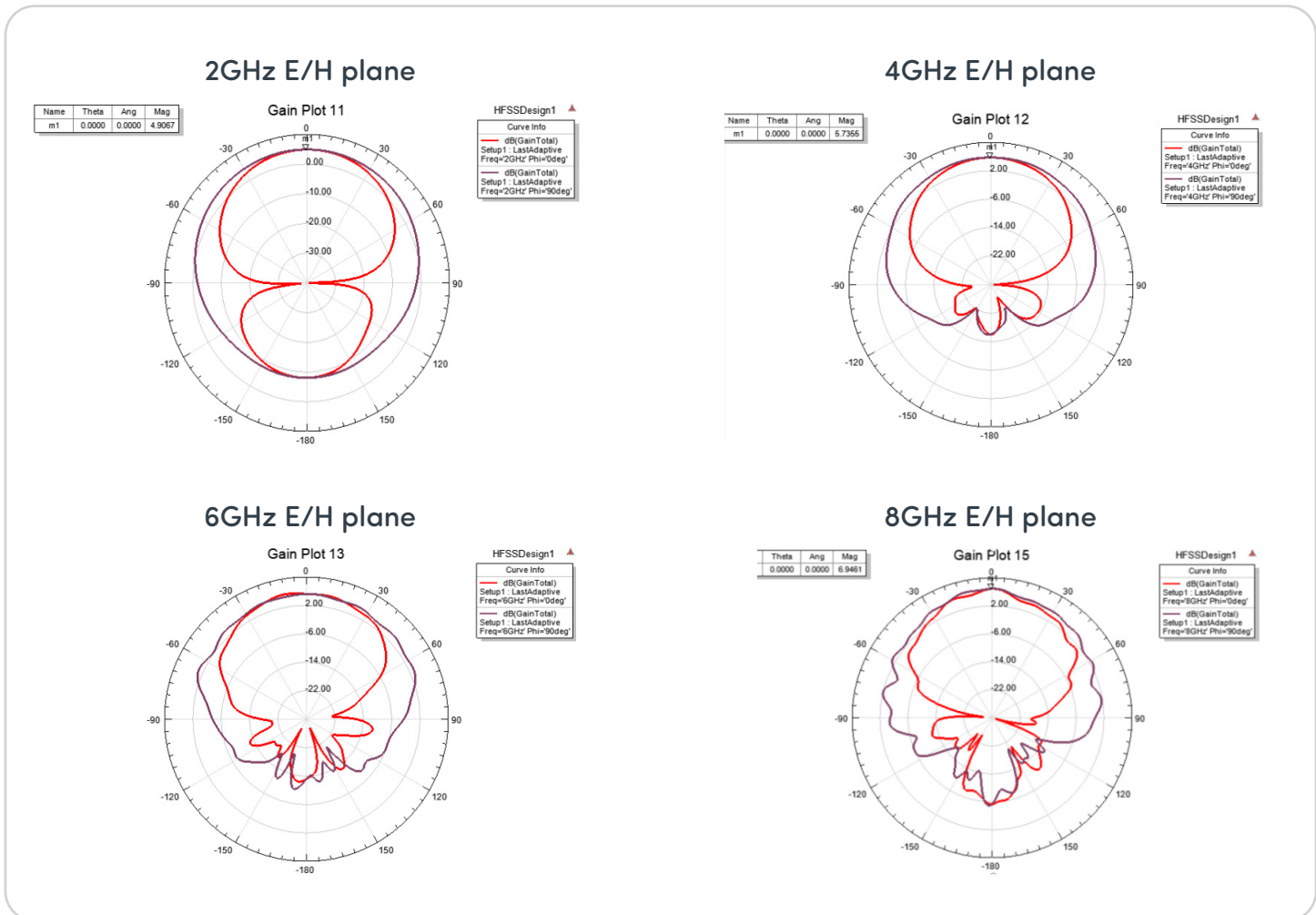


Figure 5: Radiation Patterns for 2GHz, 4GHz, 6GHz, and 8Ghz

Technical Specifications (cont'd)

Coaxial RF Cable

Electrical Specification

Frequency range	DC-8000MHz
Port connector	SMA (Male) – SMA (Male)
Insertion loss	≤1.31dB/m @ 8GHz
Connector Insertion Loss	≤0.1dB
VSWR	≤1.2
Connector Working Life	>500
Power Input Max (W)	78W @8GHz
Isolation (dB)	>90dB
Impedance (ohm)	50 ohm
Working Temperature (°C)	-55 ~ 100

4-Way Power Divider (RF Combiner/Splitter)

Electrical Specifications

Frequency range	2000-8000MHz
Port connector	SMA (Female)
Insertion loss	≤1.2dB Max over the split loss
VSWR	≤1.45:1
Isolation	≥18dB
Amplitude Balance	≤±0.5dB
Phase Balance	≤±5 deg
Power handling	10 W (Forward); 2W (Reverse)
Impedance (ohm)	50 ohm

4-Ch Programmable Attenuator Matrix

Device Function

RF Function	<ul style="list-style-type: none"> • Support 2000-8000MHz frequency band • Channel attenuations range from 0 to 127dB with 0.25dB step size • Simultaneous multiple-to-multiple channels signaling • Bi-directional transmission with non-differential signal
Control and Software Function	<ul style="list-style-type: none"> • Graphical control UI • Equipment operation statistics display and control • Network configuration settings • Remote reboot • Resource and log management • Device security management • Python script support • API
Interface and Protocol	<ul style="list-style-type: none"> • 1Gbe Ethernet interface • Support telnet, socket, and other protocols • Remote firmware upgrade via Ethernet port • Fully automated script operation
Local Display and Function	<ul style="list-style-type: none"> • Support local on device LED display with a 4.3 inch color touch screen • Network settings • Channel control • Local settings • Attenuation value

Technical Specifications (cont'd)

RF Specification	
Ports	4-Input/4-Output or 8-Input/8-Output
Frequency	0.7-8GHz
Attenuation Range	0-127dB
Step (dB)	1dB (with support for 0.25dB)
Attenuation Accuracy (dB)	+/- 0.5dB 0.25-16dB
	+/- 1.0dB 16-31.5dB
	+/- 1.5dB 31.5-47.5dB
	+/- 2.0dB 47.5-63dB
	+/- 2.5dB 63-90dB
+/- 3.0dB 90-127dB	
Impedance (ohm)	50
Maximum Input Power (dBm)	30
VSWR	≤ 1.8
Insertion Loss (dB)	≤16
Connector Type	SMA(F)/8

Mechanical Specification		
Front Panel	Display Screen, Power Switch	
Rear Panel	<ul style="list-style-type: none"> • AC power socket • Ground socket • RJ45 network port • Status LED • RF signal connectors SMA(F) 	
	Size (mm)	482mm (L) x 350mm (W) x 87mm (H)
	Weight (kg)	4.5kg for 4-CH; 6.5kg for 8-CH
	Shell Material	Magnesium alloy
	Surface Treatment	Conductive oxide and spray

Electrical Specification	
Power	100-240V AC/50-60 Hz
Power Consumption (W)	5
Network Interface	RJ45, Ethernet
Power Switch Speed (ms)	1

Others	
Working temperature (°C)	0~55
Storage temperature (°C)	-20~+70
Humidity range	< 93%@40°C
Altitude Range (m)	< 4,600
Compliance	EU EMC Directive 2004/108/EC, IEC/EN61326-1/IEC/EN61326-2-1

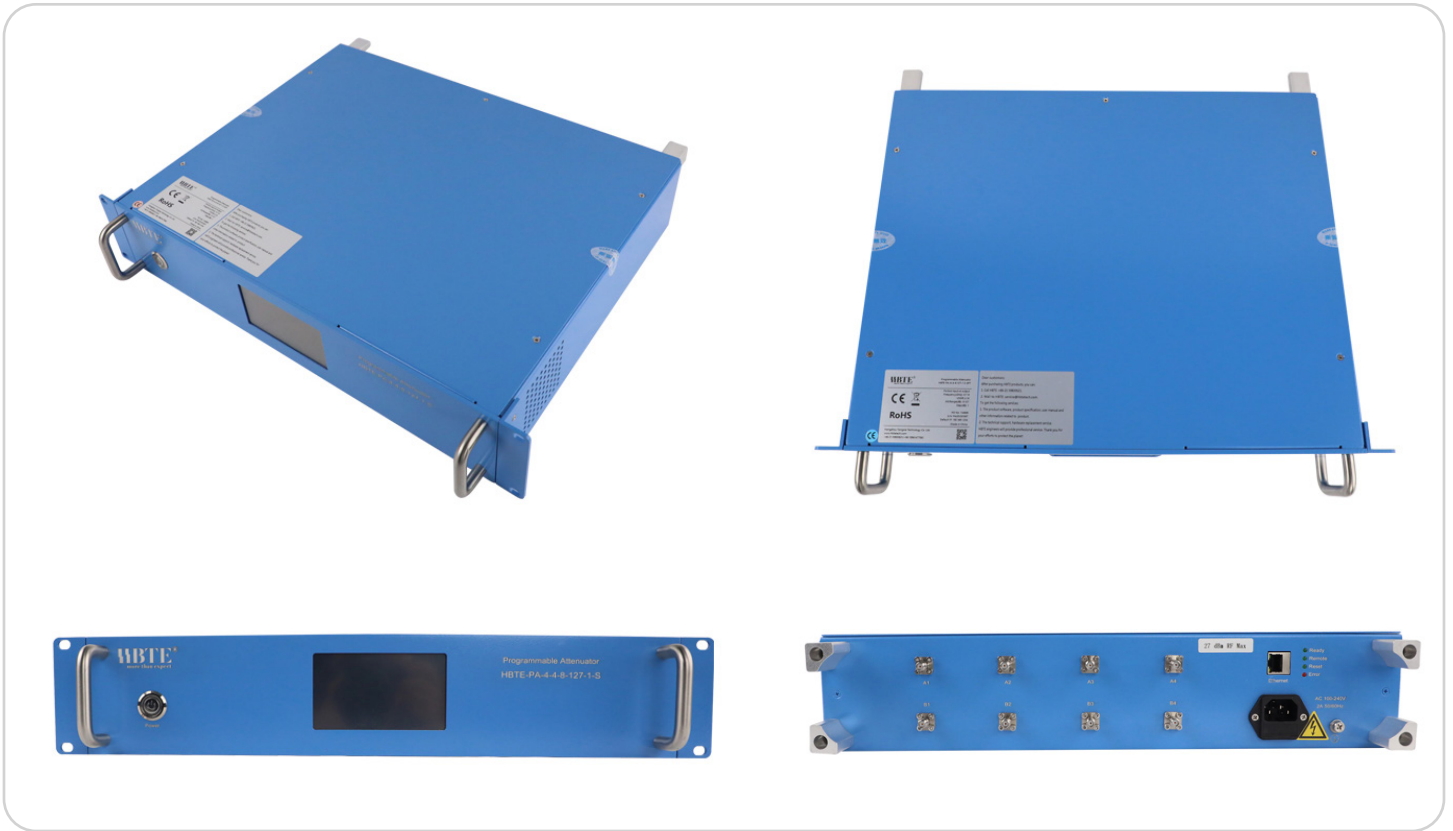








Figure 6: 4-Channel Programmable RF Attenuator Matrix

Ordering Information

Product Number	Description
ACC-5110 	4 to 1 RF power combiner/splitter with SMA female connector; 50 ohm; <= 1.2dB insertion loss, isolation >= 18dB
ACC-5111 	Super soft braided and double shielded RF cable with precision SMA male connectors, 2 meters (24 inches), 50 ohm, Straight SMA to SMA <i>Note:</i> ACC-5121 for 3 meters (36 inches) ACC-5122 for 4 meters (48 inches)
ACC-5113 	Logarithmic cycle single-polarized, high gain and high-performance antenna for Chamber, 2.4 to 8GHz
ACC-5114 	SMA fixed attenuator, 50 ohm, 10 dB, 2-8GHz <i>Note:</i> ACC-5115 for 20dB ACC-5116 for 30dB
ACC-5119 	Semi-anechoic RF Chamber, 2-8GHz, 24 SMA, 90dB isolation, Turntable, 1x 10Gbe Base-T Ethernet, 4x 1Gbe Ethernet, Exterior dimension: 970mm (L) x 790mm (W) x 610mm (H), Interior dimension: 740mm (L) x 640mm (W) x 517mm (H) <i>Note:</i> ACC-5118 for the same chamber without turntable and 10Gbe interface
ACC-5119 	Bi-directional 4-Ch (4-input and 4-output) programmable attenuator, 2-8GHz, up to 127dB, 0.25dB step size, compact 2U chassis <i>Note:</i> ACC-5120 for 8-channel programmable attenuator

About Spirent Communications

Spirent Communications (LSE: SPT) is a global leader with deep expertise and decades of experience in testing, assurance, analytics and security, serving developers, service providers, and enterprise networks. We help bring clarity to increasingly complex technological and business challenges. Spirent's customers have made a promise to their customers to deliver superior performance. Spirent assures that those promises are fulfilled. For more information visit: www.spirent.com

Americas 1-800-SPIRENT

+1-800-774-7368 | sales@spirent.com

Europe and the Middle East

+44 (0) 1293 767979 | emeainfo@spirent.com

Asia and the Pacific

+86-10-8518-2539 | salesasia@spirent.com