Product Overview

The S4000 Series Spectrum Analyzer Frequency Extension Module is a newly developed product by Siyi Technology designed to extend the frequency range of signal and spectrum analyzers. It offers a maximum frequency coverage of up to 500 GHz (customizable) and can be interconnected with a signal/spectrum analyzer to establish a complete millimeter-wave signal and spectrum analysis system. Once connected to the main spectrum analyzer unit via a USB cable, the extension module is automatically recognized, and parameters—such as frequency bands and conversion loss—are automatically configured. This series of frequency extension modules boasts several key advantages, including low conversion loss, high sensitivity, a high input 1 dB compression point, and excellent compatibility with host units, all of which significantly enhance testing efficiency. Furthermore, the module features a compact form factor and incorporates a " recessed" input port design, allowing for flexible adaptation to a wide variety of testing scenarios, including on-wafer testing.

The S82407 Series Spectrum Analyzer Frequency Extension Modules serve as millimeter-wave and terahertz frequency extension units for signal and spectrum analyzers, offering a maximum frequency coverage extending up to 1100 GHz (customizable). These modules enable a wide range of applications, including millimeter-wave and terahertz signal spectrum measurement, signal analysis, and electromagnetic environment monitoring. Furthermore, this series of extension modules can function as front-end units for millimeter-wave and terahertz signal transmitters and receivers. The input interface of the spectrum analyzer extension module utilizes standard rectangular waveguides appropriate for the corresponding frequency band, while both the Local Oscillator (LO) input and Intermediate Frequency (IF) output employ 3.5mm female connectors.

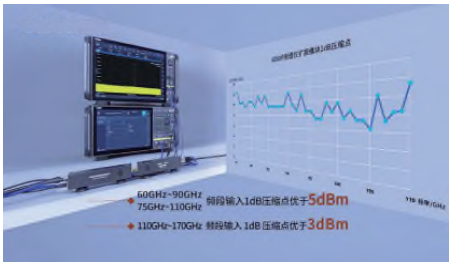
Spectrum Analyzer Frequency Extension Module Product

Product Type	High-End Standard Model	Mid-range Economy
Product Series	S4000	S82407
Picture		
Frequency Range	60GHz to 500GHz	50GHz to 1100GHz
Frequency Conversion Loss	≤14dB@170GHz	≤14dB@170GHz
Display Average Noise Level	≤-160dBm/Hz@170GHz	≤-150dBm/Hz@170GHz
1 dB Compression Point	≥3dBm@170GHz	--
RF Input Power Limit	10dBm	10dBm
Local Oscillator Interface	3.5mm(f)	
IF Interface	3.5mm(f)	
Power Input	Dedicated Adapter	12V Adapter
Power Consumption	≤35 (W)	≤30 (W)
Dimensions (W × H × D)	(85.0±0.8)mm×(44.5±0.8)mm×(240.0±1.2)mm (Excluding handles, feet, connectors, etc.) (88.0±2.5)mm×(58.0±2.5)mm×(253.8±2.5)mm (Including handles, feet, and connectors)	(120.0±0.8) mm×(85.0±0.8)mm×(240.0±1.2)mm (Excluding handles, feet, connectors, etc.) (138±2.5) mm×(140.0±2.5)mm×(255.5±2.5)mm (Including handles, feet, and connectors)
Weight (kg)	≤5.0 (kg)	

S4000 Series Spectrum Analyzer Extender

Key Features

- Frequency Range: 60GHz to 500GHz
- Uses an intelligent USB interface to connect with the host, enabling automatic recognition of the spread spectrum module, automatic configuration of frequency bands, and frequency conversion loss information.
- Low frequency conversion loss
- Low displayed average noise level
- High 1 dB compression point
- Compact design: small form factor, lightweight, and low power consumption
- Input waveguide port with 'recessed' design, radial fan cooling on both sides, flexibly adaptable to on-wafer testing and fixture testing scenarios



High Input Compression Point

The input 1 dB compression points for the S4000N and S4000P models are better than +5 dBm, while that of the S4000Q is better than +3 dBm, significantly expanding the amplitude range of the input signals that can be tested.

High Sensitivity

With the Low Noise Amplifier option configured, the spread spectrum module of the S4000 Series spectrum analyzer achieves a displayed average noise level of less than -160 dBm/Hz.

Main Specifications

Product Series	S4000N	S4000P	S4000Q
Frequency Range	60GHz to 90GHz	75GHz to 110GHz	110GHz to 170GHz
Frequency conversion factor	6	9	12
Frequency Conversion Loss	≤12dB	≤12dB	≤14dB
DANL	≤-150dBm/Hz	≤-150dBm/Hz	≤-150dBm/Hz
1 dB Compression Point	≥5dBm	≥5dBm	≥3dBm
RF Input Power Limit	10dBm	10dBm	10dBm
Local Oscillator Power Range	5dBm to 15dBm	5dBm to 15dBm	5dBm to 15dBm
Local Oscillator Interface	3.5mm(f)		
IF Interface	3.5mm(f)		
Input Waveguide Interface	WR12	WR10	WR6.5
Power Input Type	Dedicated Adapter		
Power Consumption	≤35(W)		
Dimensions (W × H × D)	(85.0±0.8)mm×(44.5±0.8)mm×(240.0±1.2)mm(Excluding handles, feet, connectors, etc.); (88.0±2.5)mm×(58.0±2.5)mm×(253.8±2.5)mm(Including handles, feet, connectors, etc.)		
Weight (kg)	≤5.0(kg)		

Product Series	S4000R	S4000SA	S4000S	S4000T
Frequency Range	140GHz to 220GHz	170GHz to 260GHz	220GHz to 330GHz	330GHz to 500GHz
Frequency conversion factor	12	18	24	36
Frequency Conversion Loss	≤14dB	≤16dB	≤18dB	≤27dB
DANL	≤-150dBm/Hz	≤-150dBm/Hz	≤-150dBm/Hz	≤-140dBm/Hz
1 dB Compression Point	——	——	——	——
RF Input Power Limit	10dBm	10dBm	10dBm	5dBm
Local Oscillator Power Range	5dBm to 15dBm	5dBm to 15dBm	5dBm to 15dBm	5dBm to 15dBm
Local Oscillator Interface	3.5mm(f)			
IF Interface	3.5mm(f)			
Input Waveguide Interface	WR5.1	WR4.3	WR3.4	WR2.2
Power Input Type	Dedicated Adapter			
Power Consumption	≤35(W)			
Dimensions (W × H × D)	(85.0±0.8)mm×(44.5±0.8)mm×(240.0±1.2)mm(Excluding handles, feet, connectors, etc.); (88.0±2.5)mm×(58.0±2.5)mm×(253.8±2.5)mm(Including handles, feet, connectors, etc.)			
Weight (kg)	≤5.0(kg)			

Ordering Information

NO.	Frequency Range	Model	Qty.	Remark
1	60GHz to 90GHz	S4000N	1	
2	75GHz to 110GHz	S4000P	1	
3	110GHz to 170GHz	S4000Q	1	
4	140GHz to 220GHz	S4000R	1	
5	170GHz to 260GHz	S4000SA	1	
6	220GHz to 330GHz	S4000S	1	
7	330GHz to 500GHz	S4000T	1	
Standard Configuration				
8	Power Cord		1	Standard 3-Core Power Cord
9	User Manual		1	1 printed copy or 1 electronic file
10	USB Cable		1	Used for information exchange between the host and the spectrum analyzer spread spectrum module
11	Product Certificate of Conformity		1	Factory Certificate of Conformity
12	Power Adapter		1	Dedicated Adapter
13	Adapter Cable		1	18-Pin Adapter Power Cable
14	Packing Box		1	Modular Briefcase
Options				
15	Low-Noise Preamplifier	S4000-H01-90	1	Provides low-noise amplification capability from 60GHz to 90GHz, optimizing the spread spectrum module's receive sensitivity to -160dBm/Hz. The S4000N spectrum analyzer spread spectrum module is optional. With this option configured, the module's input 1dB compression point depends on the low-noise amplifier's input 1dB compression point, typically -20dBm。
16	Low-Noise Preamplifier	S4000-H01-110	1	Provides low-noise amplification capability from 75GHz to 110GHz, optimizing the spread spectrum module's receiving sensitivity to -160dBm/Hz. The S4000P spectrum analyzer's spread spectrum module is optional. After configuring this option, the module's input 1dB compression point depends on the low-noise amplifier's input 1dB compression point, with a typical value of -20dBm.
17	Low-Noise Preamplifier	S4000-H01-170	1	Provides low-noise amplification capability from 110GHz to 170GHz, optimizing the spread spectrum module's receiving sensitivity to -160dBm/Hz. The S4000Q spectrum analyzer's spread spectrum module is optional. After configuring this option, the module's input 1dB compression point depends on the low-noise amplifier's input 1dB compression point, with a typical value of -20dBm.
18	Local Oscillator Frequency Extension	S4000-H02	1	Reduces the Local Oscillator (LO) input frequency requirements for the spread spectrum module. The spread spectrum module for the S4000N Spectrum Analyzer is available as an optional accessory.
19	2.4/3.5-JJ Cable Assembly	S4000-H04	1	Spectrum Analyzer External Spread Spectrum Connection Cable
20	SMA/SMA-JJ Cable Assembly	S4000-H05	1	Spectrum Analyzer External Spread Spectrum Connection Cable

S82407 Series Spectrum Analyzer Extender Module

Key Features

· Frequency coverage: 50 GHz to 1100 GHz
· Displayed Average Noise Level (DANL) as low as -150 dBm/Hz
· Features signal identification capabilities to accurately reconstruct the true test signal
· Utilizes an intelligent USB interface for interconnection with the host unit, enabling functions such as automatic recognition of the frequency extension module, automatic band configuration, and automatic retrieval of frequency conversion loss information

Typical Applications

Connects to the S4051/4052/4082 series spectrum analyzer mainframes to enable spectrum measurement capabilities in the millimeter-wave band.

Main Specifications

Product Series	S82407NA	S82407NC	S82407PA	S82407QA
Frequency Range	50GHz to 75GHz	60GHz to 90GHz	75GHz to 110GHz	90GHz to 140GHz
Frequency conversion factor	6	6	9	9
Frequency Conversion Loss	≤12dB	≤12dB	≤12dB	≤14dB
DANL	≤-150dBm/Hz	≤-150dBm/Hz	≤-150dBm/Hz	≤-150dBm/Hz
1 dB Compression Point	——	——	——	——
RF Input Power Limit	10dBm	10dBm	10dBm	10dBm
Local Oscillator Power Range	8dBm to 12dBm	8dBm to 12dBm	8dBm to 12dBm	8dBm to 12dBm
Local Oscillator Interface	3.5mm(f)			
IF Interface	3.5mm(f)			
Waveguide Interface	WR15	WR12	WR10	WR8.0
Power Input Type	12V Adapter			
Power Consumption	≤30(W)			
Dimensions (W × H × D)	(120.0±0.8)mm×(85.0±0.8)mm×(240.0±1.2)(excluding handles, base feet, connectors, etc.) (138±2.5)mm×(140.0±2.5)mm×(255.5±2.5)(Including handles, feet, connectors, etc.)			
Weight (kg)	≤5.0(kg)			
Product Series	**S82407QB**	**S82407RA**	**S82407SA**	**S82407S**
Frequency Range	110GHz to 170GHz	140GHz to 220GHz	170GHz to 260GHz	220GHz to 325GHz
Frequency conversion factor	12	18	18	24
Frequency Conversion Loss	≤14dB	≤16dB	≤18dB	≤20dB
DANL	≤-150dBm/Hz	≤-150dBm/Hz	≤-150dBm/Hz	≤-150dBm/Hz
1 dB Compression Point	——	——	——	——
RF Input Power Limit	10dBm	10dBm	10dBm	10dBm
Local Oscillator Power Range	8dBm to 12dBm	8dBm to 12dBm	8dBm to 12dBm	8dBm to 12dBm
Local Oscillator Interface	3.5mm(f)			
IF Interface	3.5mm(f)			
Waveguide Interface	WR6.5	WR5.1	WR4.3	WR3.4
Power Input Type	12V Adapter			
Power Consumption	≤30(W)			
Dimensions (W × H × D)	(120.0±0.8)mm×(85.0±0.8)mm×(240.0±1.2)(excluding handles, base feet, connectors, etc.) (138±2.5)mm×(140.0±2.5)mm×(255.5±2.5)(Including handles, feet, connectors, etc.)			
Weight (kg)	≤5.0(kg)			

Product Series	S82407TA	S82407R	S82407U	S82407V
Frequency Range	260GHz to 400GHz	325GHz to 500GHz	500GHz to 750GHz	750GHz to 1100GHz
Frequency conversion factor	24	36	48	72
Frequency Conversion Loss	≤20dB	≤30dB	≤30dB	≤45dB
DANL	≤-150dBm/Hz	≤-140dBm/Hz	≤-135dBm/Hz	≤-120dBm/Hz
1 dB Compression Point	——	——	——	——
RF Input Power Limit	10dBm	5dBm	5dBm	5dBm
Local Oscillator Power Range	8dBm to 12dBm	8dBm to 12dBm	8dBm to 12dBm	8dBm to 12dBm
Local Oscillator Interface	3.5mm(f)			
IF Interface	3.5mm(f)			
Waveguide Interface	WR2.8	WR2.2	WR1.5	WR1.0
Power Input Type	12V Adapter			
Power Consumption	≤30(W)			
Dimensions (W × H × D)	(120.0±0.8)mm×(85.0±0.8)mm×(240.0±1.2)(excluding handles, base feet, connectors, etc.) (138±2.5)mm×(140.0±2.5)mm×(255.5±2.5)(Including handles, feet, connectors, etc.)			
Weight (kg)	≤5.0(kg)			

● Ordering Information

No.	Frequency Range	Model	Qty.	Remark
1	50GHz to 75GHz	S82407NA	1	
2	60GHz to 90GHz	S82407NC	1	
3	75GHz to 110GHz	S82407PA	1	
4	90GHz to 140GHz	S82407QA	1	
5	110GHz to 170GHz	S82407QB	1	
6	140GHz to 220GHz	S82407RA	1	
7	170GHz to 260GHz	S82407SA	1	
8	220GHz to 325GHz	S82407S	1	
9	260GHz to 400GHz	S82407TA	1	
10	325GHz to 500GHz	S82407R	1	
11	500GHz to 750GHz	S82407U	1	
12	750GHz to 1100GHz	S82407V	1	
Standard Configuration				
13	Power Cord		1	Standard 3-Core Power Cord
14	User Manual		1	1 printed copy or 1 electronic file
15	USB Cable		1	Used for information exchange between the host and the spectrum analyzer's spread-spectrum module.
16	Certificate of Conformity		1	Factory Certificate of Conformity
17	Power Adapter		1	12V DC Output
18	Aluminum Alloy Case		1	Modular Briefcase
Options				
19	2.4/3.5-JJ Cable Assembly	S82407-H04	1	Spectrum Analyzer External Spread Spectrum Connection Cable
20	SMA/SMA-JJ Cable Assembly	S82407-H05	1	Spectrum Analyzer External Spread Spectrum Connection Cable