SCS02 Series Ultra-wideband Channel Simulator

Datasheet

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Overview

SCS02 series ultra-wideband channel simulator is a high-performance channel simulator for simulation of ultra-large bandwidth, ultra-long delay and ultra-high speed mobile channels. The product supports classical path loss and size scale fading models, and has dynamic Doppler code deviation, rotor occlusion and weather attenuation simulation functions, which can well support the key technology research and equipment development in the field of satellite communication, battlefield wireless communication and cellular mobile communication.

Key features

- RF real-time bandwidth up to 2GHz
- The maximum path delay is 1 second
- Maximum Doppler shift ±2MHz
- Dynamic Doppler frequency shift and code offset simulation
- Classical road damage and scale fading simulation

Applications

- Wireless communication equipment research and development
- Communication network performance testing
- Research on key technologies of communication signals
- Cyber confrontation exercises

Technical specifications

Parameters	Product specifications
Qty. of physical channels	1/2
Frequency range	2GHz ~ 4GHz, supports up to 67G customization
Real-time analog bandwidth	2GHz
Maximum number of paths in a single channel	3
Internal interference generator (optional support)	Single-tone interference, multi-tone interference, narrowband interference, broadband interference, partial band, comb, pulse interference, etc
Doppler shift	Max ±2 MHz, step by 1Hz
Doppler shift change rate	≥±60kHz/s, step by 1Hz/s
Path delay	30us to 1s, step by 1us
Path delay change rate	≥2ms/s, step 0.2ns/s
In-band flatness	≤±2dB (2GHz), ≤±1dB (500MHz)
Doppler code deviation	Normalized code bias maximum 3*10e-5, step 1Hz, accuracy 1Hz
Third order intermodulation	＜-30dBc

RF performance

RF performance	Product specifications
Input-output port VSWR	≤1.4
Input-output impedance	50Ω
Input-output port	N-type panel connector
Input signal power	-40dBm~+10dBm
Receive channel gain	-10～40dB
Output signal power	Range:-70dBm~-5dBm
Output power adjustment step	0.1dB
In-band frequency conversion clutter:	Signal correlation: (0dBm output)≤-60dBc Signal indifference: ≤-60dBm
In-band harmonic suppression	≤-50dBc
Phase noise	≤-75dBc/Hz@100Hz ≤-95dBc/Hz@1KHz ≤-106dBc/Hz@10KHz ≤-106dBc/Hz@100KHz ≤-115dBc/Hz@1MHz

Channel model

Path loss and shadow fading

Free space (Friis), Log-normal, Okumura/Ha-ta, IEEE 802.16d, breakpoint model, custom model

Small-scale fading

Constant, Rayleigh, Rice, Nakagami, Suzuki, Pure Doppler, Flat, circular, Gauss, Jakes, Butterworth, user-defined models, and more

Time delay

Constant, sinusoidal sliding delay, linear sliding delay, 3GPP increase and decrease, 3GPP sliding delay group, user-defined

Meteorological attenuation model

Atmospheric attenuation, rainfall attenuation, cloud attenuation, tropospheric scintillation attenuation model and supporting parameters of input frequency band

Doppler frequency shift model

Sawtooth, trigonometry, sine, cosine, custom, etc

Rotor occlusion model

Rotor occlusion cycle range: 30ms~100ms, step 0.1ms
Rotor occlusion occlusion ratio range: 20%~40%, step 0.1%

Memory function

After the device is powered off and restarted, keep the latest Settings before the power failure

Remote control function

Supports remote control and configuration commands

Options support interference models

Single tone, multi-tone, narrowband, broadband, partial band, comb, pulse interference, etc

Options support ray-tracing models

Options supports playback of measured wireless channel data

Options support dynamic scenario simulation, including dynamic continuous simulation of measured scenarios

Software display interface

Channel model test diagram

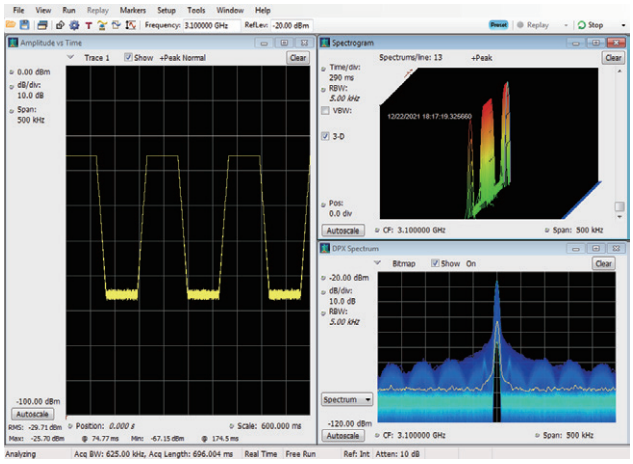

Figure 1 Test results of rotor occlusion (no attenuation, change period 200ms)

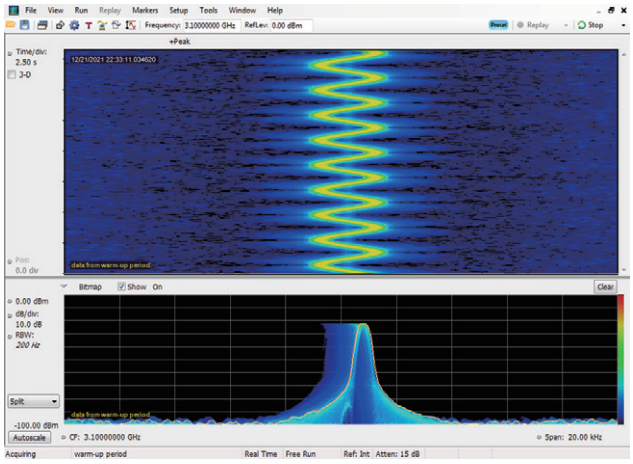

Figure 2 Doppler frequency shift (sinusoidal model waterfall, frequency offset 1kHz)

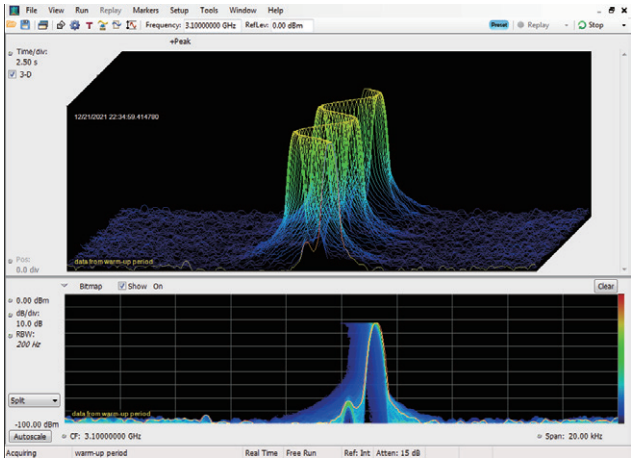

Figure 3 Doppler shift (3D diagram of sinusoidal model, frequency offset 1kHz)

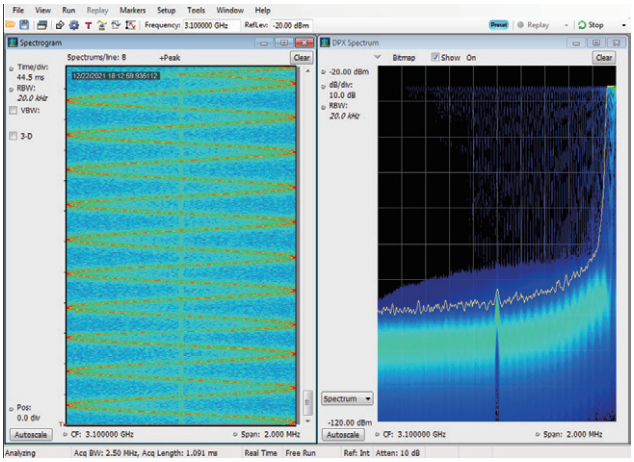

Figure 4 Doppler shift (sinusoidal model waterfall, frequency offset 1MHz)

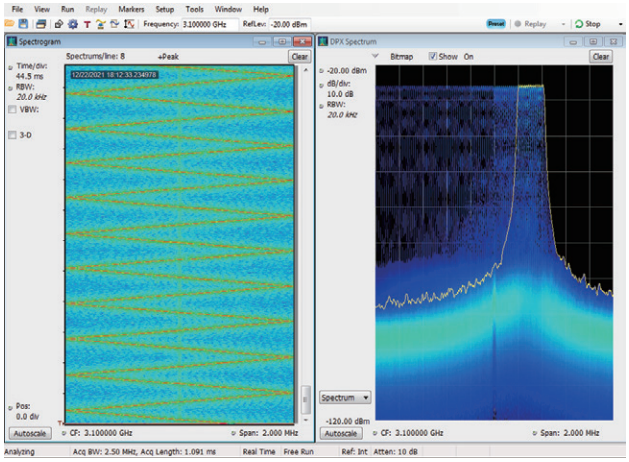

Figure 5 Doppler frequency shift (triangle model waterfall, frequency offset 1MHz)

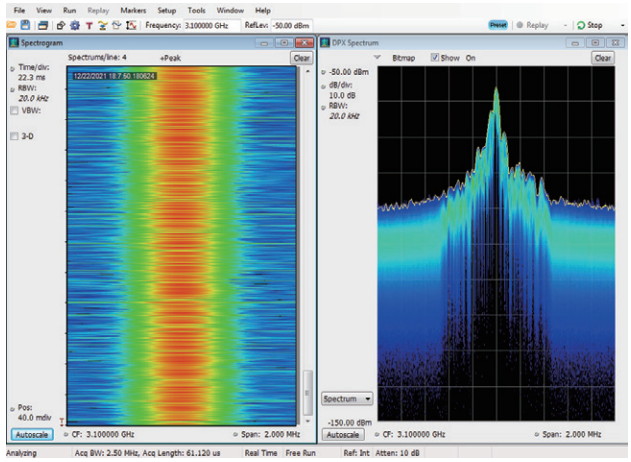

Figure 6 Butterworth (Max Doppler expansion 1MHz)

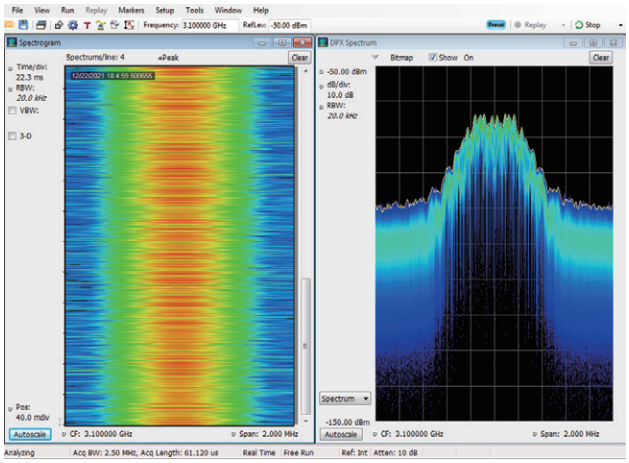

Figure 7 Test results of Gaussian distribution (maximum Doppler expansion 1MHz)

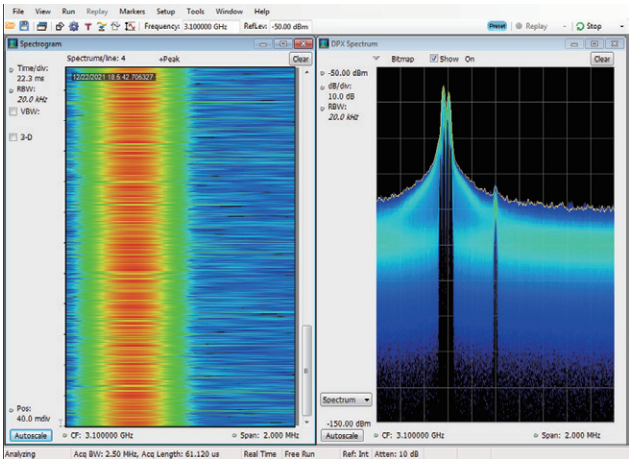

Figure 8 Test results from the upper distribution(Max. Doppler spread 1MHz)

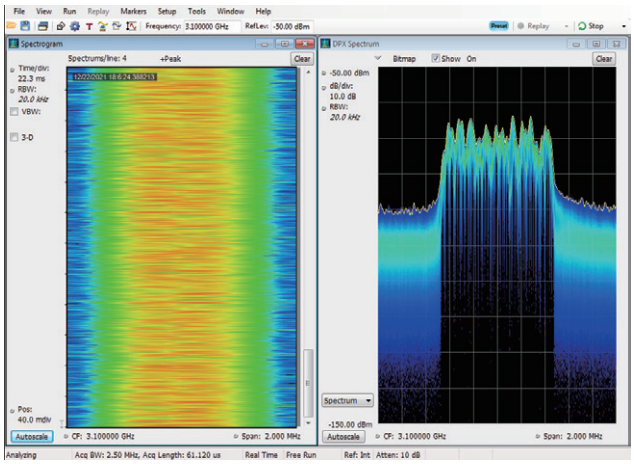

Figure 9 Flat spectral distribution test results (maximum Doppler expansion 1MHz)

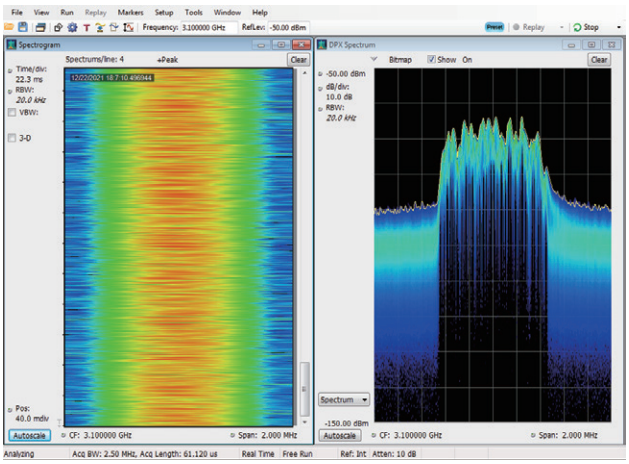

Figure 10 Test results of circular spectrum distribution (maximum Doppler extension 1MHz)

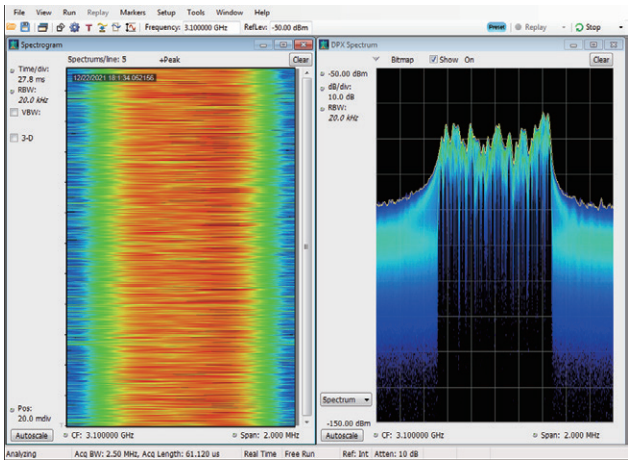

Figure 11 Test results of Rayleigh distribution (maximum Doppler expansion 1MHz)

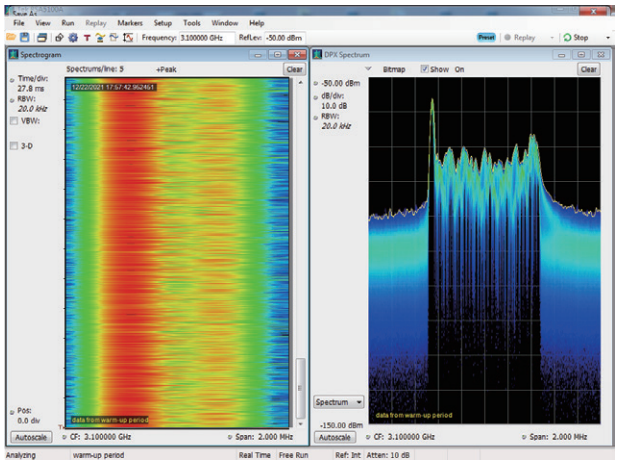

Figure 12 Rice distribution test results (Max. 1MHz Doppler extension)

Figure 13 Delay test results (delay 1S)