**CPRI test done brilliantly and affordably.**

SC2820 **|** SIQMA **|** CPRI Analyzer

Summary

SIQMA is the highest performing, lowest cost CPRI analyzer on the market. Unlike any other CPRI instruments, SIQMA not only captures every frame to deliver 100% detection of interference problems, it offers simultaneous antenna support without sacrificing performance. By focusing on one application – CPRI analysis – we have brilliantly designed the market's highest performing instrument at half the price.
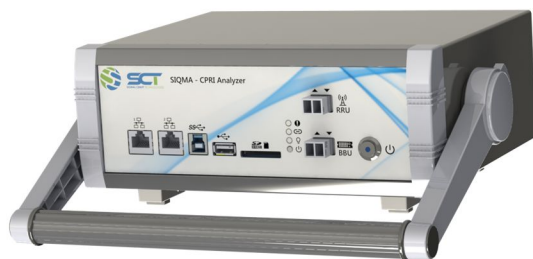
SIQMA - The latest in CPRI analysis tools

Description

CPRI is an optical communications protocol used by the baseband unit (BBU) and remote radio unit (RRU) in modern base stations to exchange control, timing, and payload data. The SC2820 SIQMA provides site technicians with a stand-alone tool for analyzing CPRI signals, conveniently accessed at the BBU.

When connected, the integral low-loss optical splitter is inserted in series with the existing RRU-to-BBU (UL) optical cable, resulting in minimal disruption to operation on live systems. Interacting with the intuitive GUI, digitized radio data is presented to the user in the frequency domain, just like a spectrum analyzer, the traditional RAN engineers' tool of choice. Data can also be collected, stored, and viewed in real time onsite or offsite within an intuitive Windows GUI.

The SC2820 incorporates high-performance signal processing hardware and has been designed specifically for CPRI applications. Unlike other solutions that have been retrofitted to support CPRI, SIQMA provides significantly higher operating speeds and longer lasting battery than competitive products.

Common Applications

- Interference detection and hunting
- Passive intermodulation detection (PIM)
- Distributed antenna system (DAS) optimization
- Fiber to the antenna (FTTA) troubleshooting and identifying misconnects with antenna sectors

Interference Hunting

RAN engineers are constantly working to optimize system throughput. A critical aspect of network optimization involves the detection and identification of in-band interference. As spectrum occupancy increases, the presence of interferers has a direct impact on network capacity and customer quality of service. Interferers may be narrow carriers or wideband modulated signals: single-shot, bursting, or continuous in nature. The ability to measure and quantify each of these characteristics is imperative when identifying and locating interference sources. The SC2820 SIQMA features that enable this characterization include:

- Fast sweep rates that can detect and trigger on very short interference bursts
- Contiguous data capture and display to identify periodic or swept frequency sources
- Long duration, continuous streaming of live data to permanent storage for future replay and analysis
- Affordable cost that enables teams to deploy and park multiple instruments across multiple sites until issues are resolved
- Remote access and control, which allows off-site domain experts to provide supplementary technical support and guidance to field personnel
- Floating (versus fixed) trigger levels for peak delta detection in systems where average network traffic varies significantly over time
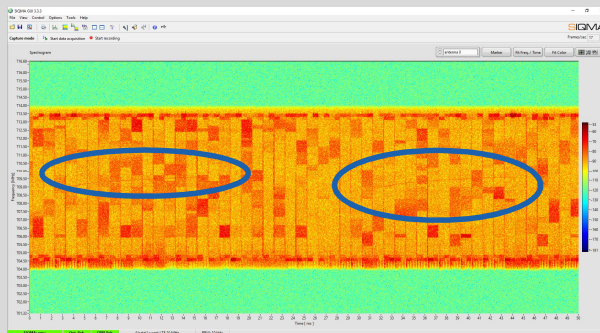
50mS Spectrogram showing 2 repeat occurrences of a very narrow sweep frequency interferer

## Passive Intermodulation (PIM) Detection

Intermodulation products are a type of distortion created when two or more signals pass through non-linear systems, including passive ones. Typical base station PIM sources include saturated RRU amplifiers or corroded RF connectors. As fundamental Tx power levels and/or the non-linear properties increase, the intermodulation distortion levels worsen. When these distortion products fall within the RRU UL channel (receive or Rx band), system performance is degraded. PIM products can be self-generated or produced by adjacent equipment, whether related or not to the system in question.
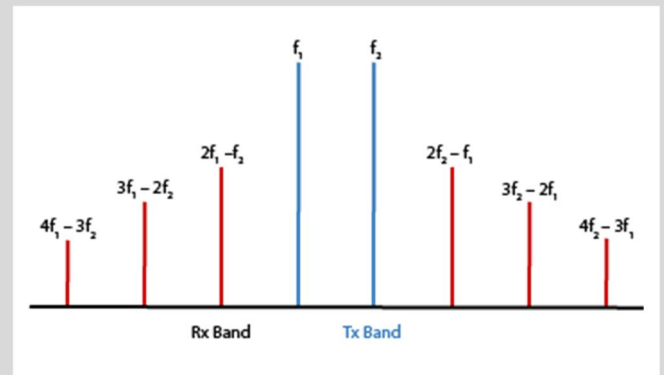
Graphical example showing second and third order inter-mod products of Tx carriers f1 and f2 falling within the Rx Band

Despite claims to the contrary, no automated equipment features exist today that can replace the know-how of an experienced RAN engineer armed with the right tool. Equipment reporting false positives is problematic and can lead to wasted time. The SC2820 SIQMA capabilities that can help facilitate PIM detection include:

- Continuous 'average' and 'minimum' trace hold capabilities
- Overlay of multiple antennas data to compare site background noise levels on each antenna; discrepancies in a single RRU can be an indication of an installation problem
- Wide dynamic range (high S/N performance)
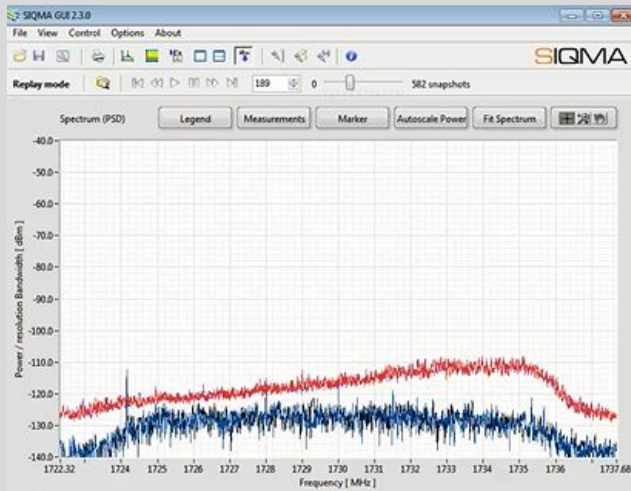
Red trace (peak hold function of blue trace)
clearly depicts the presence of in-band PIM product

Distributed Antenna System (DAS) Optimization

DAS systems are commonly found in dense mobile environments such as airports and stadiums. Deployment and optimization in theses environments is challenging as overlapping coverage between adjacent antennas makes power balance critical to proper operation of the overall system. Typically, RRU gains are set to transmit at the minimum signal-to-noise levels possible. The SC2820 SIQMA makes a powerful DAS optimization tool by providing users with the following features:

- The ability to overlay multiple antennas with minimum trace hold functions, which is critical to determining minimum hold function to establish ambient noise floors
- Remote access to the device, critical to DAS optimization activities when RRU and DAS radios are located in different areas

FTTA Troubleshooting

When new sites are commissioned, RAN engineers need to verify correct mapping of the CPRI links before a site is commissioned. Problems such as wrong SFP and incorrect antenna connections can be detected before final launch of the site. The SC2820 SIQMA helps with FTTA troubleshooting with the following features:

- The ability to measure optical power level
- The ability to quickly lock onto and report and confirm CPRI line rates
- The ability to verify CPRI antenna container data and connectivity status
- Overlay of multiple antenna traces, which allows the user to compare ambient noise levels to ensure the system is balanced and the antenna connections are correct

Feature Overview

Ease of Use
- Cost-effective, stand-alone solution
- Intuitive GUI
- Built-in optical splitter, which minimizes external parts
- Remote access

Simplifies RRU Maintenance and Operation
- Simultaneous collection of data from multiple antennas
- Interference analysis
- PIM detection
- Data storage mode for post/remote data analysis

Compatible with Existing Tools and Equipment
- Windows-based GUI for laptop configuration, operation, and analysis
- Optional API available to 3rd party integrators

CPRI Data Analysis
- Supports all vendor CPRI interfaces
- Performs basic conformance and acceptance testing
- Troubleshoots live cells without interruption

Specifications

BBU Support
- CPRI Line Rate 1 to Line Rate 7
- Compatible with all W-CDMA and LTE (5, 10, 15, and 20MHz) systems

Dimensions and Weight
- Size: 22.8 x 19.1 x 8.9cm (excluding handle)
- Weight: 3.2kg

Power Requirements
- Line powered (120-240VAC, 50-60Hz)
- 12Vdc external and battery (8hr) option available

Environmental/Regulatory
- Enclosure is UL94-5VA-compliant
- Battery pack is UN38.3 certified for marine/air travel
- EMC ICES-003, issue 6
- FCC part 15.109, subpart B
- FCC part 15.107, subpart B
- Operating temperature: 10 to 40°C
- Storage temperature: -20 to +65°C
- Operating/storage humidity: 5% to 85%, non-condensing

Interfaces
1. 10/100/1000BaseT Ethernet port provides access for remote connectivity
2. USB3.0 primary interface for local PC connectivity
3. External storage via SD card for stand-alone operation
4. Quick view status indicators (power/low battery, storage active, link detect/sync, system error)
5. RRU connector, UL port to BBU UL port via internal optical coupler (3.6dB Insertion Loss), DL to BBU DL port via direct shunt
6. BBU connector
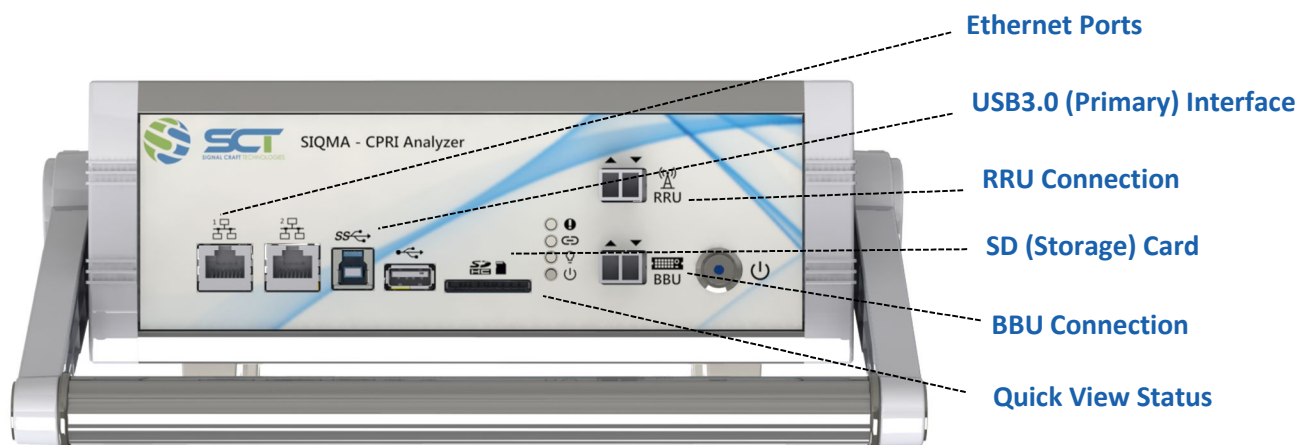
User Interface

Measurement Settings

- Center frequency
- Amplitude: reference level, scale, and offset
- Resolution bandwidth: 1, 3, 10, 15, and 180 kHz
- Measurement mode: spectrum, spectrogram, continuous waterfall
- CPRI mode: auto detect
- Sweep: continuous, single, and triggered
- Trace display mode: current, peak hold, minimum hold, and averaging
- Trigger mode: threshold detect
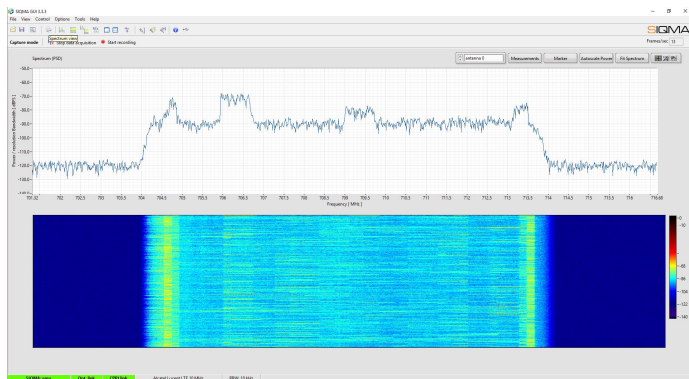
Split display showing current trace and scrolling waterfall below; this screen configuration can be very useful format when trying to detect sporadic interference

Storage Capability

- 17.476 seconds of contiguous I/Q or 8.738 sec of FFT (spectral) data
- Unlimited running display storage (limited by PC storage capacity)

Multiple Traces

- Simultaneous display of up to 4 CPRI antenna streams
- 16 trace combinations including normal, average, peak, and min hold on each of the 4 active antenna traces
- Triggering (fixed and floating)

Markers

- 4 independent markers can be applied to any antenna trace
- Reference marker and delta functions
- Marker table clearly lists frequency, amplitude, and delta information
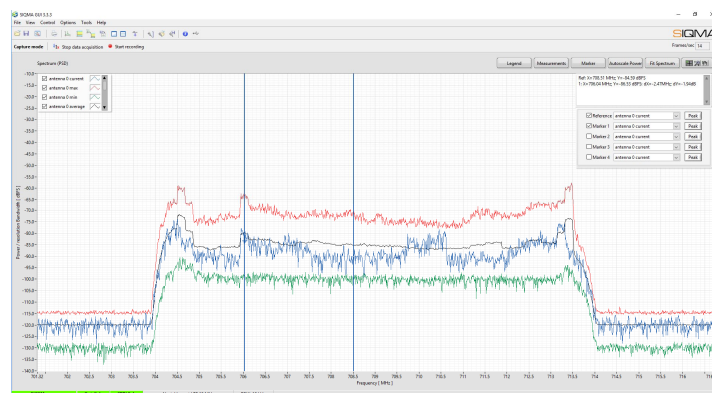
Single antenna display showing minimum, maximum, average, and current traces

GUI Requirements

- Windows 7, 8, and 10
- Recommended minimum 4GB RAM

Optional Features

Option 01 – Standard model
Includes support for 120-240Vac, 50-60Hz external power.

Option 02 – Add external 12V$_{DC}$ input and battery
Provides inputs for both 120Vac and 12Vdc power input. Internal battery pack supports remote operation for up to 8 hours.

Option 21 – Extended warranty
Extends the standard software maintenance and warranty from 12 to 24 months.

Support
Technical support is available through our website, www.signalcraft.com/support, or by contacting us at support@signalcraft.com.

Warranty
Full one-year parts and labor when used under normal installation and operation conditions. Repair services are available for products no longer covered under warranty.

Ordering Information
Send inquiries to info@signalcraft.com.

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