Data Sheet

VIAVI
Signal Workshop
Configurable Modular Platform

VIAVI Solutions

Introduction/Overview

Signal Workshop is a fully integrated waveform creation, generation, signal capture, and post-capture analysis software suite designed to assist in finding and/or solving the toughest RF communications signal quality, spectral monitoring, interference, and environmental RF issues. Used in combination with the VIAVI CMP system components, it becomes a full-featured general purpose RF tool that combines live and off-line signal simulation and analysis capabilities to address multiple test applications, including:

- Communications – SigInt, Satellite
- Pulse – Radar, EW
- OTA testing
- Electromagnetic environment (EME)

Features

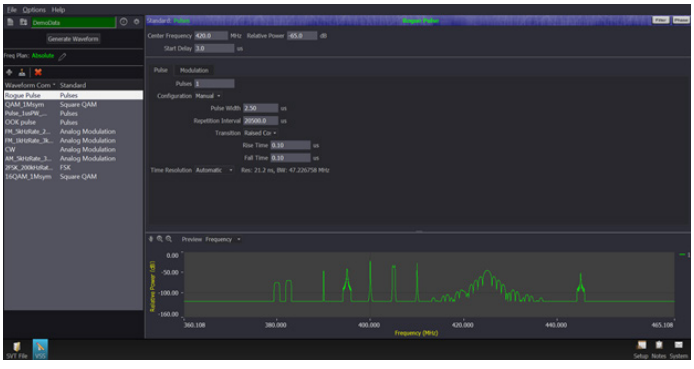
- Live monitoring and post-analysis display and processing
- Interactive spectrum/spectrogram/time plots
- Results strip charting and data logging
- Modulation domain analysis function with simple modulation classification (AM, FM, CW, pulse, other)
- GPS; latitude, longitude, time stamp
- Time trim and resampling engine features to assist in capture file size management
- AM / FM / PM analysis functions
- ASK / FSK / PSK / QAM analysis functions
- ASK Burst / FSK Burst / PSK Burst analysis functions
- Pulse analysis
- Signal notepad for recording plots and data
- Channel Power and Adjacent Channel Power Ratio (ACPR) analysis functions
- Spectrum Allocation Table (SAT)
- Environmental Signal Parameterization identifies and measures parameters for signals in the environment
- Remote API control

Signal Workshop consists of our waveform creation tool, Vector Signal Simulator (VSS), capable of creating a single waveform or reproducing an entire spectral environment. Waveforms can then be played on the VIAVI AXIe-based CMP hardware using Vector Signal Player (VSP). Conversely, Signal Vector Toolkit (SVT) captures live spectral environments when used in combination with CMP hardware, whereas SVT File provides post-capture analysis.

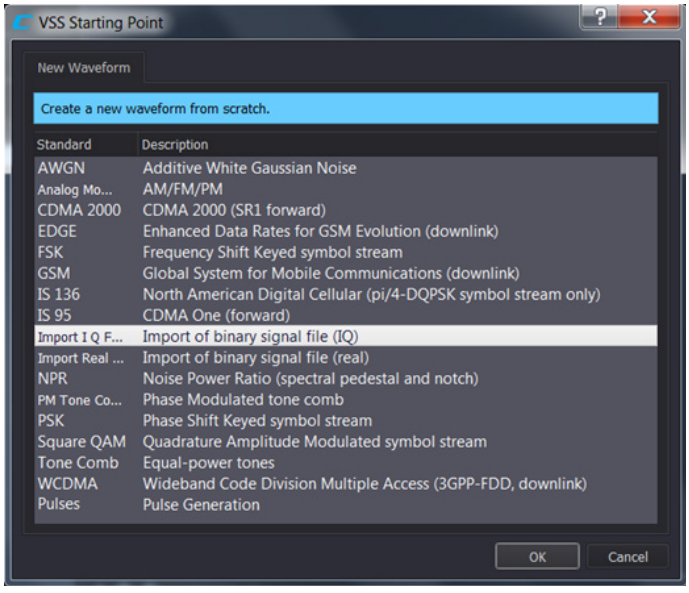
The VIAVI CMP hardware is AXIe-based, providing generation and capture with up to 200 MHz instantaneous bandwidth at up to 6 GHz carrier frequency in the mA-6806, which has onboard capture of up to 500 M samples, or can stream live data to the mA-3A01 RAID memory card with up to 9.6 TB of storage (over 2.5 hours of continuous recording or playback at full bandwidth).

Waveform Creation: Vector Signal Simulator (VSS)

VSS signal generation software can create communication waveforms and even entire broadband environments, including mixed signals, realistic impairments, and additive recorded signals. An intuitive graphics interface creates signals in single and multiple carrier formats with full control of RF parameters and embedded data. VSS computes the RF spectrum and Complementary Cumulative Distribution Function (CCDF), which are plotted to provide a means to visually validate created signals and are stored along with primary file data. Signal files are created and stored as Signal Workshop files, consisting of a paired .txt text file and .dat data file.



VSS provides a wide variety of data generation functions including Analog FM / PM / AM (including SSB and Suppressed Carrier) generation, additive white Gaussian noise (AWGN), Noise Power Ratio (NPR), cellular emulation for CDMA2000, WCDMA, GSM, IS136, IS95, generic digital modulation creation for PSK, FSK, QAM, tone combs, pulse generation, and more. Moreover, files can be imported as I/Q or Real. Impairments and signal modifications can be applied to existing waveforms, including user-defined filtering, phase, and hopping. Moreover, whole signal environments can be built using Signal Workshop's built-in resampling engine, which allows not only multi-carrier aggregation but also facilitates multi-standard signal aggregation.



Signal Generation: Vector Signal Player (VSP)

VSP provides the hardware interface for waveform playback. While waveforms may be created at a certain frequency, VSP provides the added flexibility of playing signals back at any frequency within the hardware's range at playback time. VSP also provides level control.

Signal Capture and Post-Capture Analysis: Signal Vector Toolkit (SVT/SVT File)

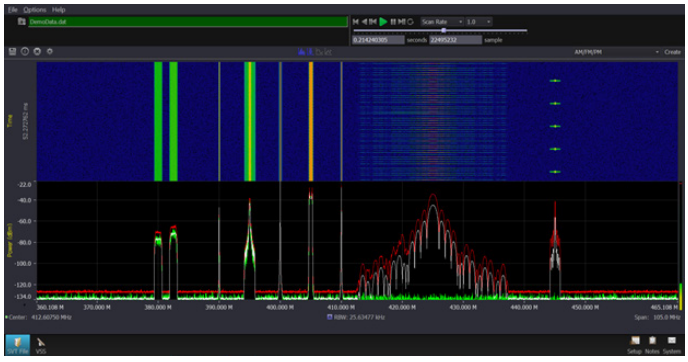
SVT is the live capture tool, whereas, SVT File provides post-capture analysis of captured/saved files. Both have the same analysis features; however, analysis features

in SVT function on a shared-resource basis in monitor mode (alternating between capture and analysis).

One key concern when capturing waveforms that are potentially massive in size is the ability to trim captured waveforms before saving to optimize file size. SVT conveniently provides the ability to trim time by picking start and stop times (specified in time or samples), as well as resampling engine that allows the user to specify custom bandwidths. The user can literally pick any frequency or bandwidth within the current capture to narrow the saved results, reducing file size. All the features will aid the professional in cataloging his work and managing capture file sizes.

Spectrum / Spectrogram / Time Plot

This provides the primary top-level interactive display set in SVT / SVT File by which to visualize the spectrum, spectrogram (waterfall), and time domain plots for the whole file, providing a multi-dimensional tool for initially viewing data to begin the process of narrowing collected information to find and classify valuable signals of interest.

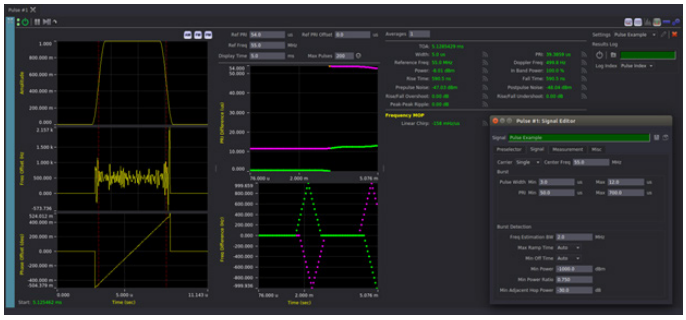


Modulation Domain

Modulation Domain is one of the most useful post-analysis functions in SVT / SVT File, highly recommended as a place to start the drill-down process of signal classification for most applications. It assists in estimating the basic modulation type of plotting and coherently measuring parameters on the AM, FM, and PM demodulated waveforms, which can be turned to specific frequencies and bandwidths within the capture spectrum.

Pulse Analysis

The pulse analysis function is used for pulse tasks such as commercial, automotive, and military radar applications, as well as avionics applications such as DME. It measures and plots pulse parameters, including carrier frequency, power, pulse width, PRI, and modulation characteristics (chirp, Barker, etc.), rise and fall times, Doppler, TOA, time rate of change over time, frequency rate of change over time, and more.



Strip Chart

As various analysis functions calculate numeric values (carrier frequency, power, etc.), any numeric values from the analysis functions can be selected and sent to the strip chart to display the value over time, as well as logging selected values to a .CSV file, if desired.

Signal Notepad

Any spectrum trace can be stored and viewed with the signal notepad. This allows different traces to be overlaid for easy comparison. The traces can be stored to disk in ASCII format.

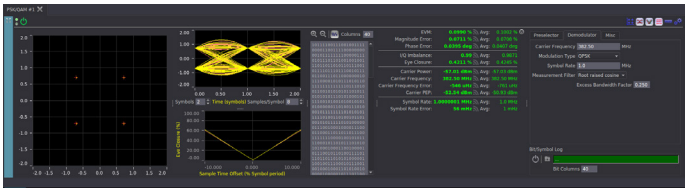
Analog Demodulation

The analog demodulation function, labeled AM / FM / PM, performs AM, FM, and PM demodulation within the captured spectrum. Tune into specific signals using pre-selector settings, select demodulation types, as well as post detection filtering - all features built into

this analysis tool. Pre and post detection spectrums can be simultaneously displayed and analyzed, as well as writing the demodulated baseband waveforms to an audio (.wav) or raw binary file.

Digital Demodulation Analysis Functions

The ASK, FSK, PSK, QAM, and LTE Downlink analysis functions demodulate, plot, and characterize signals, providing eye diagrams, constellations, spectrum and timing data, as well as demodulating signals to generate, display, and log message symbols. The PSK / QAM Estimate function will estimate the PSK / QAM signal type, order, and its fundamental parameters.

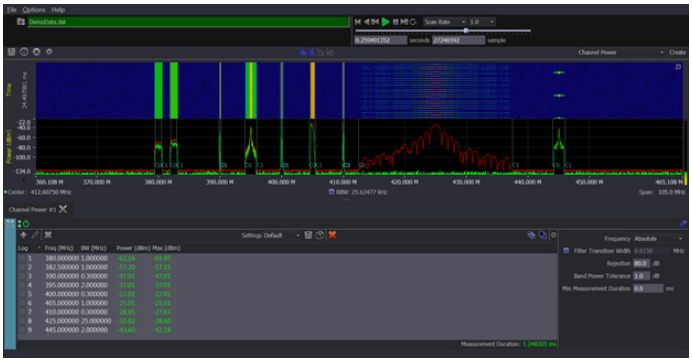


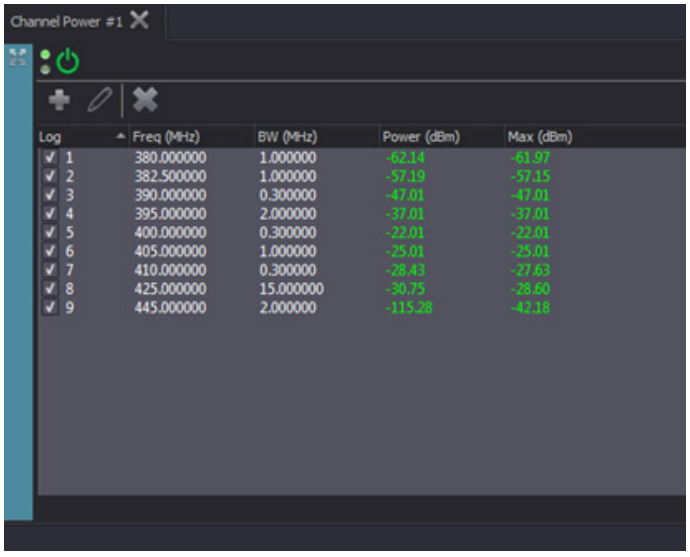
Burst / Agile Signal Analysis

ASK, FSK, and PSK Burst functions use the same core analysis functions, except they provide the ability to process burst signals, such as frequency hoppers and evaluate pulse width, PRI, and carrier frequency for every burst.

Channel Power

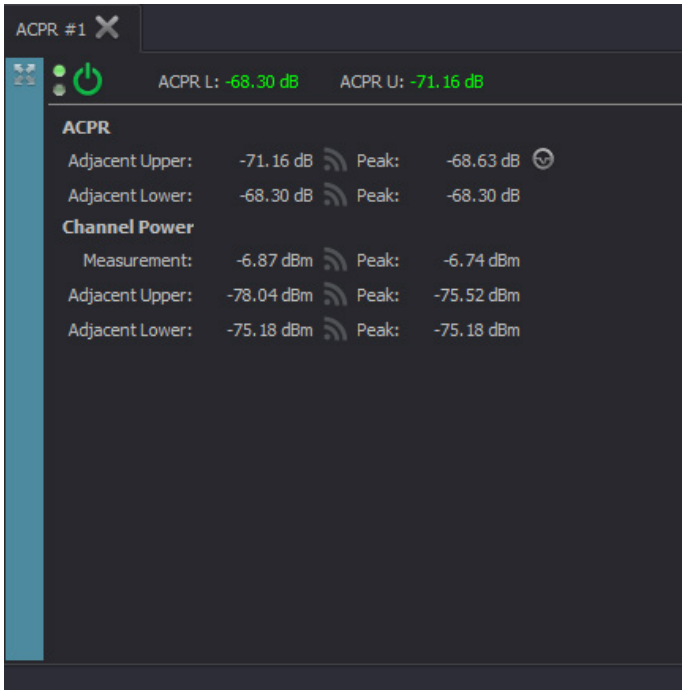
Measures the power in user-definable frequency bands, which has many useful applications.

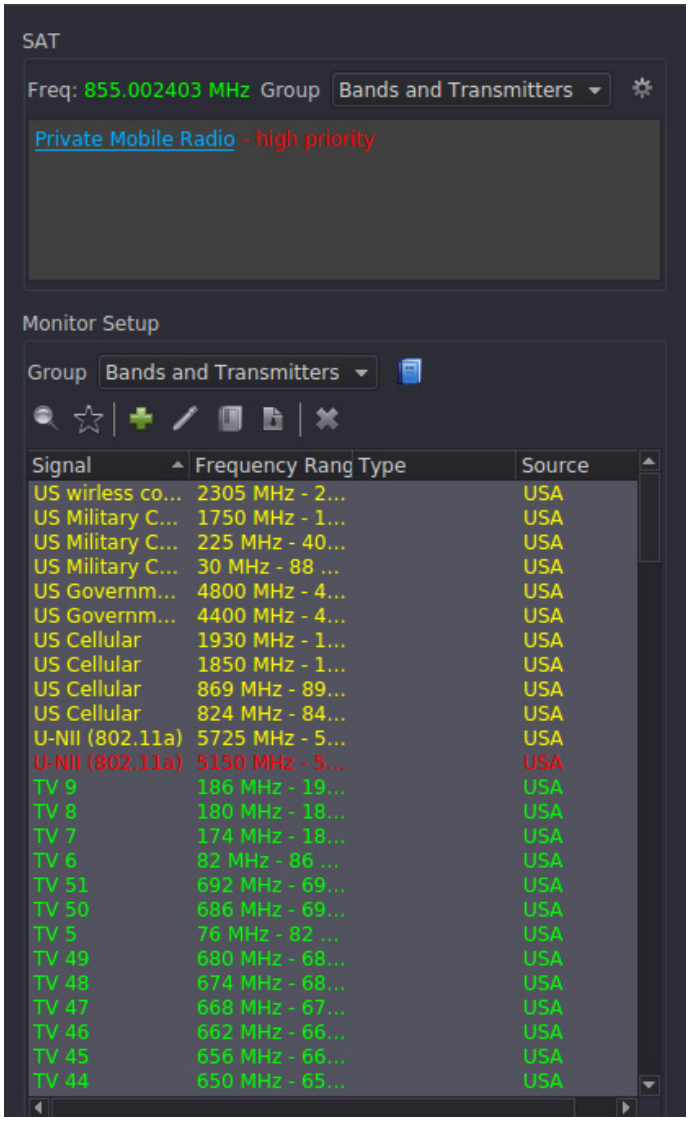




ACPR

The Adjacent Channel Power Ratio instrument measures the power and ratio of the powers in a main frequency band and bands on either side of this band. This can also be used to estimate the SNR of signals for many applications.





ESP

Environmental (Signal) Parameterization detects all signals in a band and measures the signal frequency, power, bandwidth, and on-time statistics. This function is used in spectrum monitoring and EME characterization applications.

Spectrum Allocation Table (SAT)

The Spectrum Allocation Table (SAT) displays text associated with the spectrum marker frequency. This tool is useful for signal search applications such as spectrum management and EME analysis, but it could be creatively used by all applications.

Waveform Creation / Generation (VSS / VSP)

Analog Modulation	
Modulation Types	AM AM suppressed carrier AM signal-sideband - Upper / lower, with definable sideband bandwidth FM PM
Baseband	Up to 2 analog modulation tones, or .wav import
Digital Modulation	
Cell Technologies	WCDMA CDMA2000 GSM IS95
Generic Digital Modulation	FSK - BPSK to 512 FSK PSK - up to 256 PSK QAM - up to 1024 (Modulation types include square nQAM (4 - 1024), nPSK (2 - 256), OQPSK, and Pi/r DQPSK) ASK
Pulse	
Number of Pulses	User-definable
Pulse Configuration	User-definable
Manual	Pulse width, Pulse interval, Transition (Step / Interval / Raised Cosine), Rise Time, Fall Time
File	Pulse descriptor file for irregular pulse configurations
Pulse Modulation Type	
Modulation On Pulse (MOP)	Barker, Bits, Symbols (BPSK, BFSK, OOK)
Frequency	Linear FM (chirp)
Additive White Gaussian Noise (AWGN)	
Features include Bandwidth, Noise Seed, Duration	
Noise Power Ratio (NPR)	
Pedestal Width	Frequency Accuracy Phase Seed User-definable Notches
Tone Comb	Standard Phase Modulated
All waveforms types have these editable fields	
Carrier Frequency	User-definable, Carrier Plan: Absolute or Relative (Note that actual carrier frequency may be redefined at time of playback in VSP)
Start delay	User-definable
Impairments	Filter - superimposes user defined filter on complete waveform Phase - user defined phase impairments
Multi-carrier / RF environment	VSS includes a remixing engine that automatically re-samples the composite mix, allowing multi-standard signal mixing
Hop	Frequency Start / Stop / Spacing Dwell Time Hop Sequence - random / file / sweep Assignable frequency gaps
Import	
I/Q	Interleaved binary, twos complement, signed integer with either one or two bytes per sample. It two-byte samples are used, endian format must be known.
Real	Binary, twos complement, signed integer with either one or two bytes per sample. If two-byte samples are used, endian format must be known.

Signal Capture (SVT)

Monitor Mode	Alternates between capture and post-capture analysis features (results may not be contiguous)
Capture Mode	(Provides uninterrupted (contiguous) capture by analysis is provided on an as-available basis is similar to monitor function)
Controls	Center Frequency Capture Bandwidth Capture Mode - Normal (offset), or Zero IF Input Level Port IP Address Play, Stop, Rewind, Step Forward, Step Reverse Scan Rate - playback can be sped up or slowed down, or movement may be measured in time or samples.

Signal Analysis (SVT and SVT File)

Main Displays
FTT
Time
Spectrogram (Waterfall)
Strip Chart

Analysis / Demodulation Features	
Analog Demodulation (AM / FM / PM)	Includes AM USB, LSB, and suppressed carrier
Digital Demodulation Types	
LTE Downlink	
ASK	BASK, OOK, 4ASK, Bit level demodulation
ASK Burst	
FSK	MSK, BFSK, 4FSK, Bit leve demodulation
FSK Burst	
PSK / QAM	BPSK, OQPSK, pi/4, DQPSK, (8, 16, 32, 64, 128, 256) PSK, (4, 16, 32, 64, 128, 256, 512, 1024) QAM. Rectangular or Root Raised Cosine mesaurement filter. Includes eye plot and eye closure measurements, as well as bit level demodulation.
PSK / QAM Burst	
PSK / QAM Est	PSK / QAM Estimator
PSK / QAM Gain / Phase	Gain / Phase / Group Delay
Adjacent Channel Power Ratio (ACPR)	
Channel Power	User-definable list
Environmental Parameterization	Modulation estimation tool
High Resolution Spectrum Analyzer	Tunable for focused analysis within capture band
Pulse	Carrier, Frequency, power, pulse width, PRI and modulation characteristics (chirp, Barker, etc.), rise and fall times, Doppler, TOA, time rate of change over time, and more.
Signal Allocation Table (SAT)	Provides a pre-definable table of frequency defination, useful for monitoring / quickly identifying frequencies of interest.
Import	
I/Q	Interleaved binary, twos complement, signed integer with either one or two bytes per sample. It two-byte samples are used, endian format must be known.
Real	Binary, twos complement, signed integer with either one or two bytes per sample. If two-byte samples are used, endian format must be known.
Multi-Channel	Interleaved binary, twos complement, signed integer with either one or two bytes per sample. If two-byte samples are used, endian format must be known.

Features are described below are virtual UI limitations, actual limitations are dependent on hardware.

VIAVI Solutions

Contact Us **+1 316 522 4981**
AvComm.Sales@viavisolutions.com

To reach the VIAVI office nearest you, visit
viavisolutions.com/contact

Signal_Workshop-ds-cmp-nse-ae
30187480 900 1218