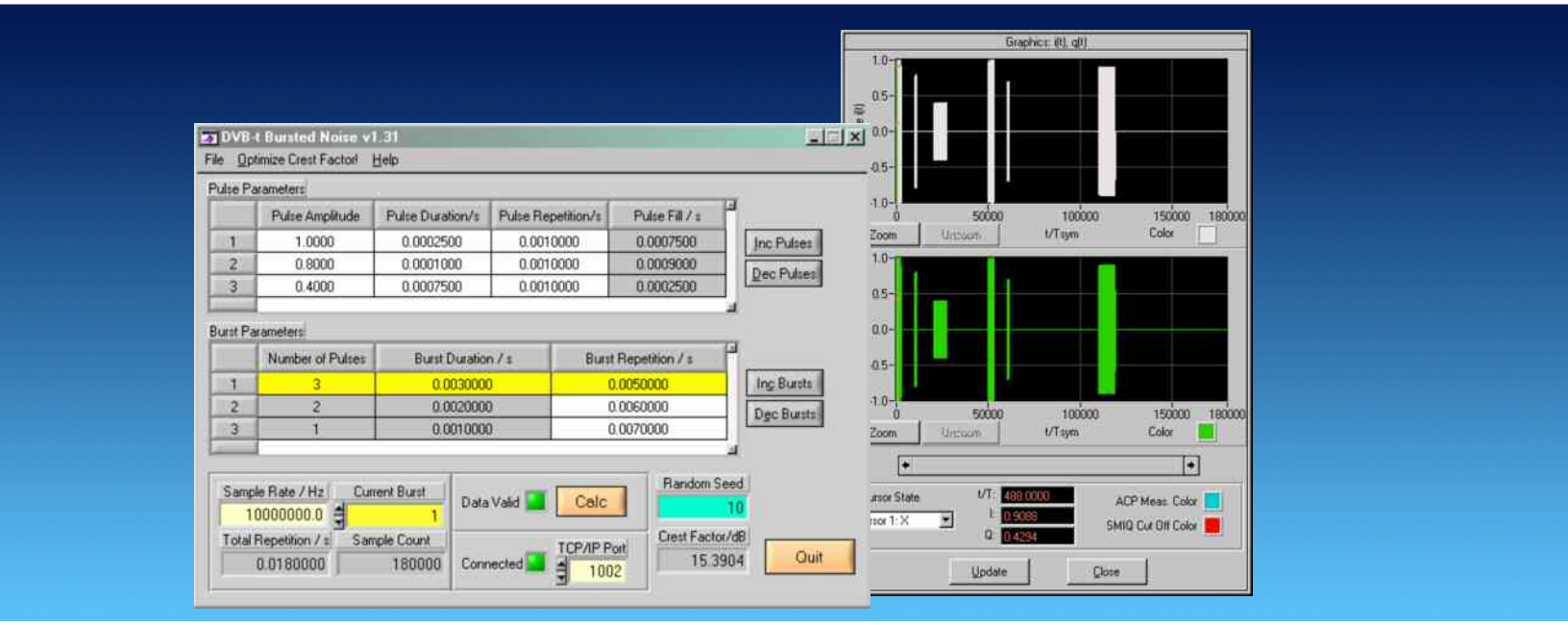

Products: R&S®AFQ100A, R&S®AFQ100B, R&S®SMU, R&S®FSL, R&S®FSP, R&S®FSQ, R&S®FSU, R&S®FSV, R&S®AMU

DVB-T
Bursted Noise
Signal Generation

Application Note

DVB-T Bursted Noise is a tool for generation of DVB-T compatible noise signals. The IQ data can be transferred to WinIQSIM / WinIQSIM2™ for further processing and transmission to an R&S®AMU, R&S®AFQ or R&S®SMU.

ROHDE&SCHWARZ

Contents

The following abbreviations are used in this Application Note for Rohde & Schwarz test equipment:

- The IQ Modulation Generators R&S®AFQ100A and R&S®AFQ100B are referred to as AFQ.
- The Baseband Signal Generator R&S®AMU is referred to as AMU.
- The IQ Modulation Generator R&S®AMIQ is referred to as AMIQ.
- The Vector Signal Generator R&S®SMU200A is referred to as SMU.
- The Vector Signal Generator R&S®SMIQ is referred to as SMIQ.
- The Spectrum Analyzer R&S®FSL is referred to as FSL.
- The Spectrum Analyzer R&S®FSP is referred to as FSP.
- The Spectrum Analyzer R&S®FSQ is referred to as FSQ.
- The Spectrum Analyzer R&S®FSU is referred to as FSU.
- The Spectrum Analyzer R&S®FSV is referred to as FSV.
- The Spectrum Analyzer R&S®FSIQ is referred to as FSIQ.

1 Overview

DVB-T Bursted Noise is a tool for generating DVB-T (Terrestic Digital Video Broadcasting) compatible noise signals. The IQ data can tranferred to WinIQSIM for further processing and transmission to an SMU, AMU, AFQ and AMIQ.

2 Software Features

The software offers:

- TCP/IP interface to WinIQSIM / WinIQSIM2™ using one or two separate computers
- load and save program and device configuration

3 Hardware and Software Requirements

Hardware Requirements

The software runs on a PC with

- CPU: Pentium 500 MHz or better
- RAM: 128 MBytes or more
- Monitor: VGA color monitor

Software Requirements

- ***Windows 2000/XP/Vista***
- optional **WINIQSIM V4.40** and **WINIQSIM2™ 2.X** (or higher) installed. This software tool is capable of receiving IQ data via TCP/IP software interface and calculating and transferring it to an SMU Vector Signal Generator or AMU, AFQ, AMIQ I/Q modulation generator. **DVBTBN** and **WINIQSIM** must run simultaneously to enable data transfer. Download latest **WINIQSIM / WINIQSIM2™** version from http://www.rohde-schwarz.com.

4 Connecting the Computer and Instrument

Connecting the instruments

Connect the computer running **DVB-T BURSTED NOISE** to an AFQ, AMU, AMIQ, SMU, SMIQ and optionally an FSQ, FSP, FSU, FSV or FSIQ spectrum analyzer.

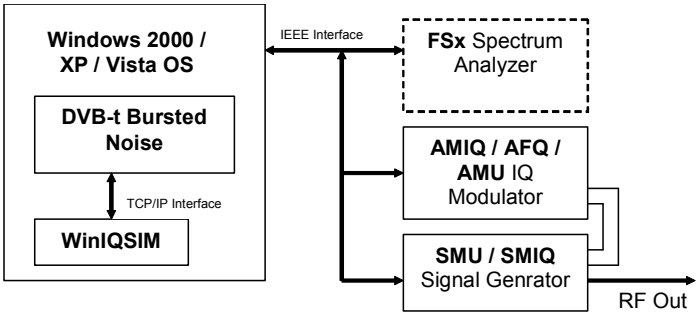

Fig. 1 Instrument Connection

5 Installing DVB-T Bursted Noise Software

Execute **DVBTBN_1.X.X.EXE** and select the installation directory. A new menu item **R&S DVB-T BURSTED NOISE** will be created in **START -> PROGRAM FILES**. The installation directory will contain the files named below:

DVBTBN.EXE	DVB-T Bursted Noise executable
DVBTBN.CFG	DVB-T Bursted Noise configuration file
DVBTBN.PDF	This file
DVBTBN.IQS	WinIQSIM configuration file

6 Basics

The bursted noise signals have following structure.

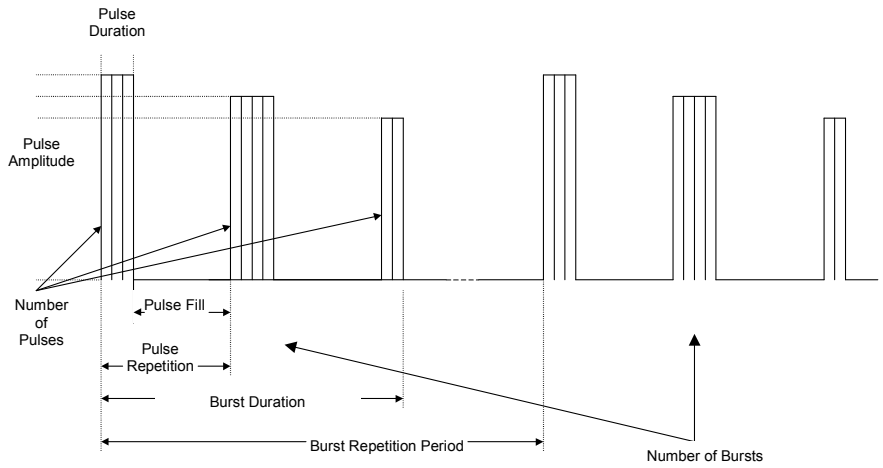

Fig 2 Basics

The variation of these parameters allows to simulate reproductable DVB-T signal interferences in order to test receiver capabilities.

7 Starting the Software / Measurement

Execute **DVBTBN.EXE** first. Then start WinIQSIM and load the **DVBTBN.IQS** configuration file. The program will come up with following or similar (depending on **DVBTBN.CFG** configuration file) start window.

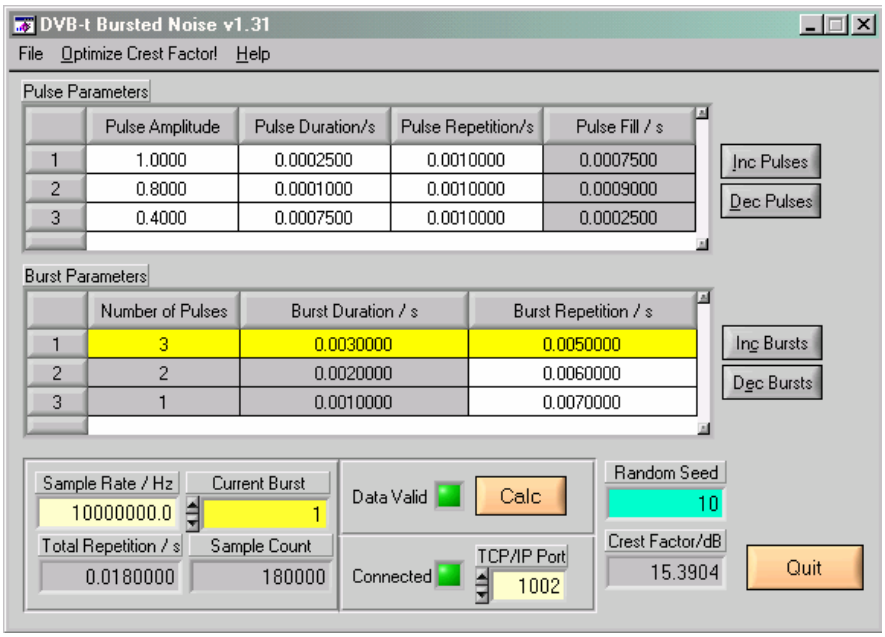

Fig. 3 Main Window

- **BURST PARAMETERS**
  - **Number of Pulses** – Indicator only (grey) for pulse count of specified burst. This value is affected by **INC PULSES** and **DEC PULSES**. Range: 1 to +inf.
  - **BURST DURATION** – Indicator only (grey) for sum of **PULSE REPETITIONS**.
  - **BURST REPETITION** – User control for time period between two consecutive bursts. Minimal value **BURST DURATION**. Upper limit restricted by AMIQ memory size.
  - **INC/DEC BURSTS** – Increments / decrements number of bursts. Minimal value: 1.

- **PULSE PARAMETERS**
  - **PULSE AMPLITUDE** – Range: 0.0 to 1.0.
  - **PULSE DURATION** – Effective pulse width. Range: 0.0 to upper limit restricted by AMIQ memory size.
  - **PULSE REPETITION** – Total time between current and consecutive pulse. Range: **PULSE DURATION** to upper limit restricted by AMIQ memory size.
  - **PULSE FILL** – Indicator only for time span between end of current pulse and start of next pulse. It is calculated as follows:

    PULSE FILL = PULSE REPETITION – PULSE DURATION
  - **INC/DEC PULSES** – Add/delete pulse to/from end of list. Minimal value: 1
- **SAMPLE RATE** – Specifies the sampling rate of the AMIQ. Valid range: 10 kHz to 105 MHz.
- **CURRENT BURST** – Active burst. Pulse parameters are updated accordingly. Range: 1 to **NUMBER OF BURSTS**.
- **TOTAL REPETITION** – Indicator only for total time span of bursted noise signal. Is calculated as:

  $\text{TOTAL REPETITION} = \text{BURST REPETITION}_1 + ... + \text{BURST REPETITION}_N$
- **SAMPLE COUNT** – Indicator only for number of samples. Is calculated as:

  SAMPLE COUNT = SAMPLE RATE * TOTAL REPETITION

  If SAMPLE COUNT exceeds maximum AMIQ memory size (16000000 samples for AMIQ-04) a red frame appears around it, indicating an AMIQ memory overrun.
- **CONNECTED** – indicator LED turns green when TCP/IP link to WinIQSIM is active.
- **CALC** – calculates two time domain arrays (I and Q data) for further processing with WinIQSIM.
- **DATA VALID** – indicator LED turns green when valid IQ data has been generated by pressing CALC.

Note: The maximum SAMPLE COUNT corresponds to the AMIQ-04. In case you have an AMIQ-03 or less, WinIQSIM will display a warning. The greyed table elements cannot be manipulated by the user.

See '*DVB-T Bursted Noise Measurement Example*' for a description of setting up *WinIQSIM*.

Menu

File

All program and device specific data may can be loaded / saved from / to a configuration file.

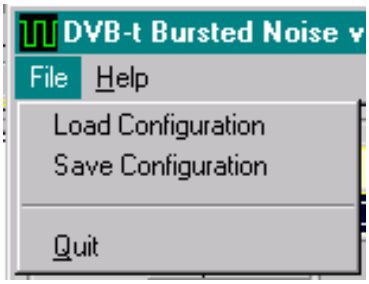

Fig. 4 Menu Items

- **LOAD CONFIGURATION** - the default file extension is **.cfg*.
- **SAVE CONFIGURATION** - the default file extension is **.cfg*. Similar file dialog as *Load Configuration*.

Optimize Crest Factor

This menu item enables calculating IQ data with varying start seeds. The min/max indexes and values are displayed so the user can choose the desires start seed on the main window.

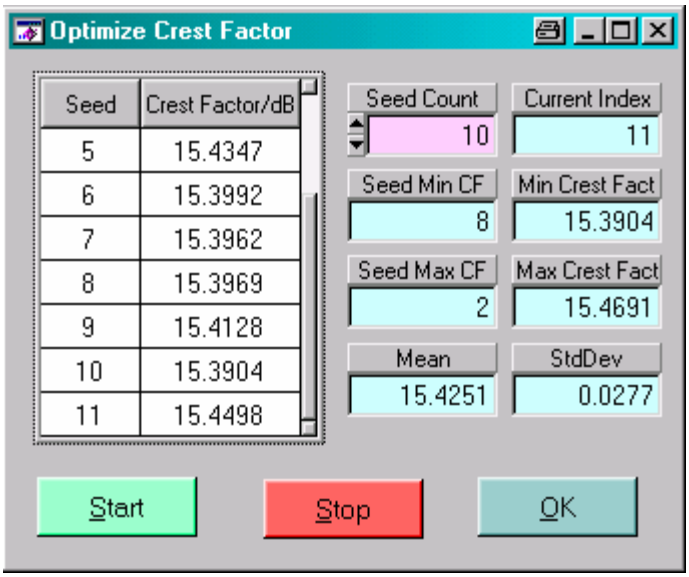

Fig. 5 Optimize Crest Factor

Note: Since two different randons arrays are generated and the I-array always starts with seed=1 the seed of the Q-array begins with 2.

Help

- **HELP** – Online help file
- **ABOUT** – displays revision and copyright information.

8 DVB-T Bursted Noise Measurement Example

- Start **DVBTBN** and **WinIQSIM** as described above. The DvbtBN example configuration **DVBTBN.CFG** is automatically loaded at startup. Setup the signal / modulation generator analyzer as required and load the WinIQSIM configuration file **DVBTBN.IQS**.
- Make sure you have a valid TCP/IP connection and press **CALC** in **DVBTBN**.
- Transfer the data by pressing the graphics button in WinIQSIM.

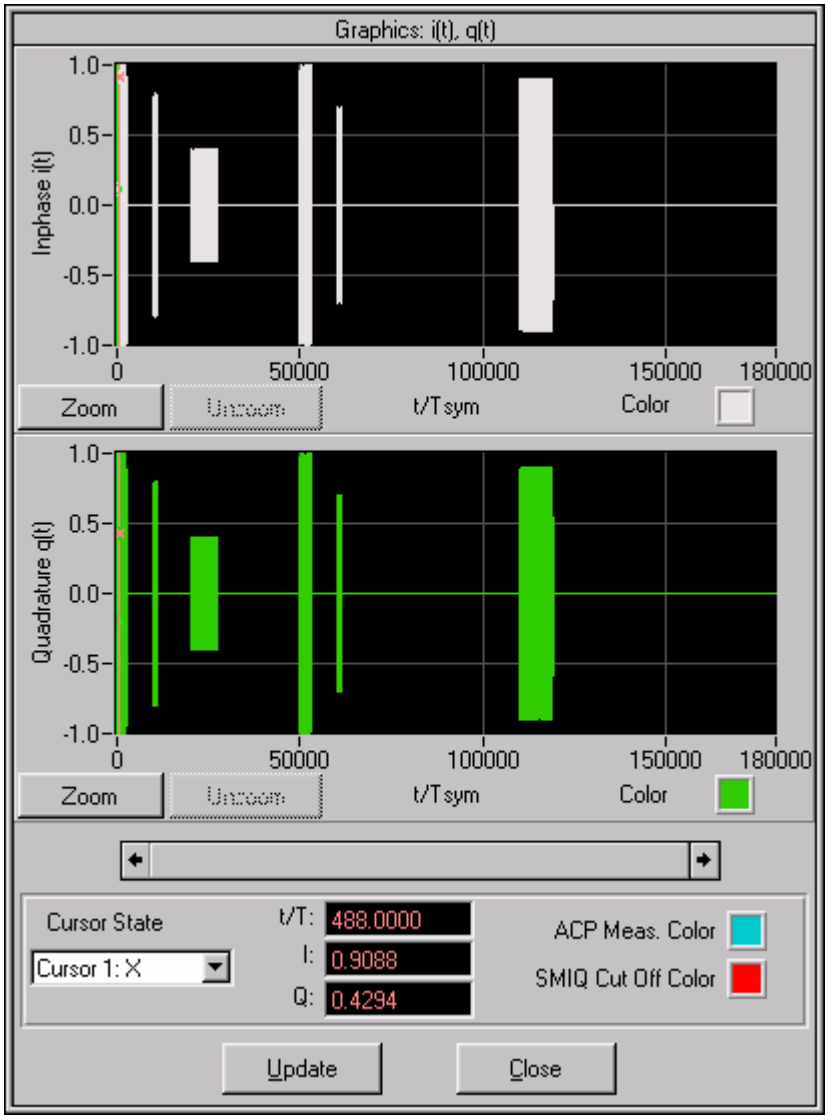

Fig. 6 WinIQSIM Graphics

- Then press the ***AMIQ Transmission -> Transmit*** button to transmit the data to the AMIQ. Be sure to check *Compensate Ouput Signal for sin(x)/x Distortion*.

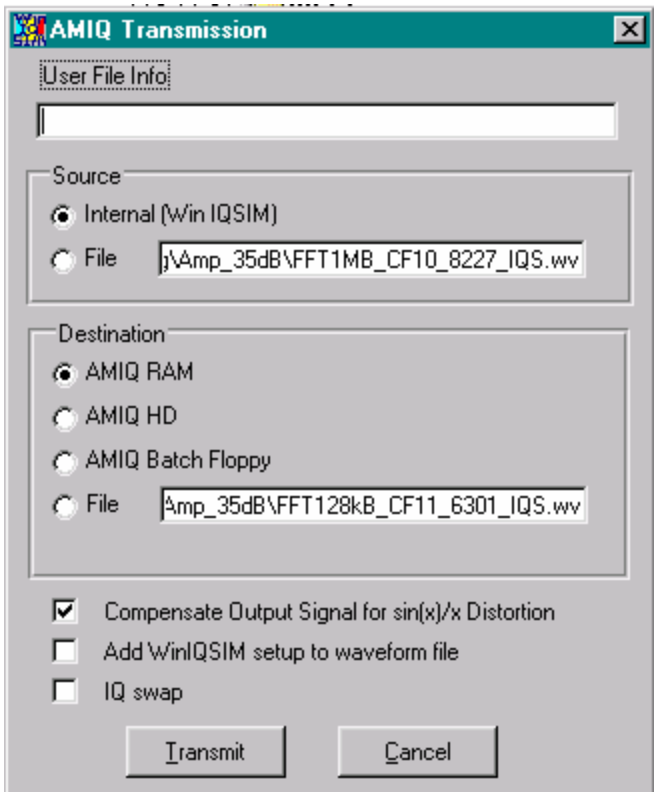

Fig. 7 AMIQ Transmission

9 Additional Information

Please contact **TM-APPLICATIONS@ROHDE-SCHWARZ.COM** for comments and further suggestions.

10 Ordering information

IQ Modulator		
R&S®AFQ100A	IQ Mod. Generator (200MHz)	1401.3003.02
R&S®AFQ100B	IQ Mod. Generator (528MHz)	1410.9000.02
R&S®AMU200A	Baseband Signal Generator	1402.4090.02
Vector Signal Generator		
R&S®SMU200A		1141.2005.02
Spectrum Analyzer		
R&S®FSPx	(9 kHz to 30 GHz)	1093.4495.xx
R&S®FSUxx	(20 Hz to 67 GHz)	1166.1660.xx
R&S®FSQxx	(20 Hz to 40 GHz)	1155.5001.xx
R&S®FSLxx	(9 kHz to 18 GHz)	1300.2502.xx
R&S®FSVxx	(9 kHz to 40 GHz)	1307.9002.xx

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