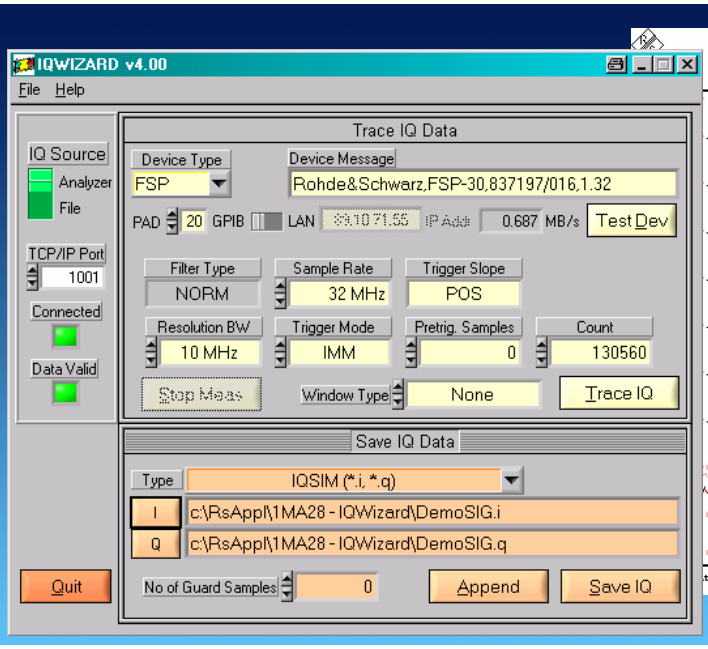

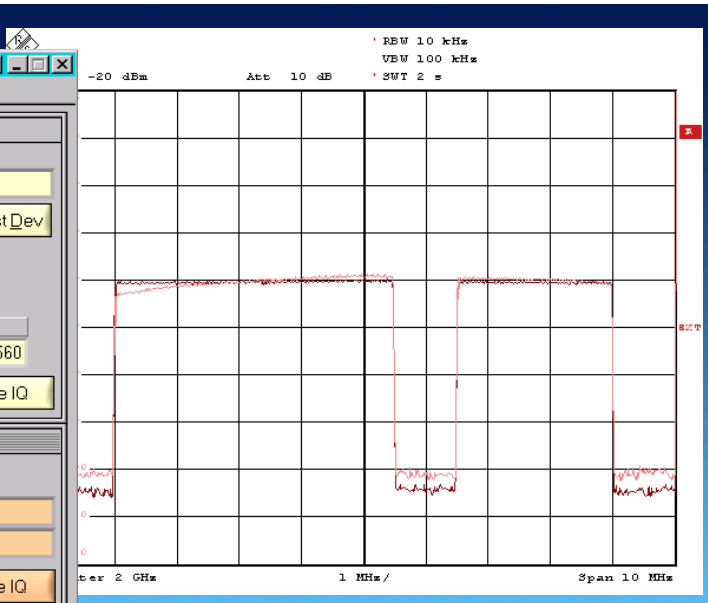

Products: SMU200A, SMJ100A, SMIQ, AMIQ, FSIQ, FSP, FSU, FSQ, FSL, FSG, ESPI, ESU, ESCI, FSMR, FSUP, ETL

IQWizard
IQ-Signal Measurement & Conversion

Application Note

IQWizard is a tool for loading IQ signal files in various formats and measuring IQ signals with a R&S® FSx spectrum analyzer or R&S® ESx test receiver. The obtained IQ data in memory can be stored in various formats or be transmitted to a R&S® SMU200A / SMJ100A with WinIQSIM™ or WinIQSIM 2™.

ROHDE&SCHWARZ

Contents

1 Overview

IQWIZARD is a software tool for loading IQ data files in various formats or measuring IQ signals with a R&S® **FSIQ** (with B70 option), **FSP** , **FSU**, **FSQ**, **FSL** or **ESPI** analyzer. The IQ data may be stored various file formats for further processing with signal analysis, simulation and generation tools such as **MATHCAD**, **MATLAB** and **ADS**. IQWizard also offers a TCP/IP interface for transmission of the IQ data to **WINIQSIM**, which can manipulate the data and upload it to an AMIQ.

The following abbreviations are used in the following text for R&S® test equipment:

- The R&S® FSIQ, R&S® FSP, R&S® FSU, R&S® FSQ, R&S® FSL and R&S® FSG spectrum analyzers are referred to as FSIQ, FSP, FSU, FSQ, FSL and FSG.
- The R&S® FSUP signal source analyzer is referred to as FSUP.
- The R&S® ESPI, R&S® ESU, R&S® ESCI and R&S® FSMR test receivers are referred to as ESPI, ESU and FSMR.
- The R&S® AMIQ I/Q Modulation Generator is referred to as AMIQ.
- The R&S® Vector Signal Generator SMIQ is referred to as SMIQ.
- The R&S® Vector Signal Generators SMU200A is referred to as SMU.
- The R&S® Vector Signal Generators SMJ100A is referred to as SMJ.
- R&S® means Rohde & Schwarz GmbH und Co KG

2 Software Features

The software offers:

- IQ trace with FSIQ (with FSIQ-B70), FSx spectrum analyzer, FSUP signal source analyzer and ESx test receivers.
- TCP/IP interface to WinIQSIM using one or two separate computers
- load and save program and device configuration
- load IQ data in various file formats
- save IQ data in various file formats
- I/Q data up to 5.6 GBytes

3 Hardware and Software Requirements

Hardware Requirements

The software runs on a PC with

CPU	Pentium 333MHz or better
RAM	128 MBytes or more
MONITOR	VGA color monitor
IEC/IEEE BUS	National Instruments **PCI-GPIB** or **GPIB-PCMCIA** card
Optional	
LAN INTERFACE	installed with TCP/IP protocol

It supports following R&S® instruments named below:

- ***FSIQ*** *(**B70** option),* ***FSP****,* ***FSU****,* ***FSQ****,* ***FSL****,* ***FSG*** *spectrum analyzers,* ***ESPI****,* ***ESU****,* ***ESCI****,* ***FSMR*** *test receivers and* ***FSUP*** *phase noise test system.*

Software Requirements

WINDOWS XP / VISTA™	Microsoft operating system
NI-488.2 V3.0 (or above)	IEC/IEEE – bus driver from National Instruments. See http://www.natinst.com for latest revision.
NI-VISA V4.1 (or above)	VISA driver from National Instruments. See http://www.natinst.com for latest revision.
Or	
AGILENT I/O LIBRARY M14 (OR ABOVE)	GPIB + VISA driver from Agilent
RSIB-PASSPORT V1.4	Application note 1EF47 for VISA control of R&S device via LAN interface. Only required for devices without MS Windows XP™.
WINIQSIM V4.00 (or above) optionally	This is a software tool capable of receiving IQ data via TCP/IP software interface and calculating and transferring it to an AMIQ I/Q modulation generator. IQWizard and WinIQSim must run simultaneously to enable data transfer. Download latest WinIQSim version from http://www.rohde-schwarz.com.

Note: *If only the NI-488.2 GPIB driver is installed but no VISA driver, the program will react as if there were no device connected to the GPIB bus.*

4 Connecting the Computer and Instrument

Connecting the Instruments

Connect the computer running *IQWizard* to the analyzer FSIQ (with B70 option), FSP, FSU, FSQ, FSL, FSG, ESPI, ESU, ESCI or FSMR and and optionally a signal generator SMU, SMJ or SMIQ.

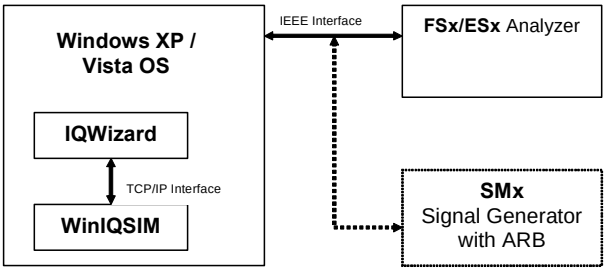

Fig. 1 Connecting Instruments

5 Installing IQWizard

The installation file **IQWIZARD_X.XX.EXE** can be downloaded from http://www.rohde-schwarz.com/appnote/1MA28.html. The installer uninstalls previous IQWizard versions if present.

6 Starting the Software / Measurement

After executing **IQWIZARD.EXE** the program will come up with following or similar (depending on **IQWIZARD.CFG** configuration file) start window.

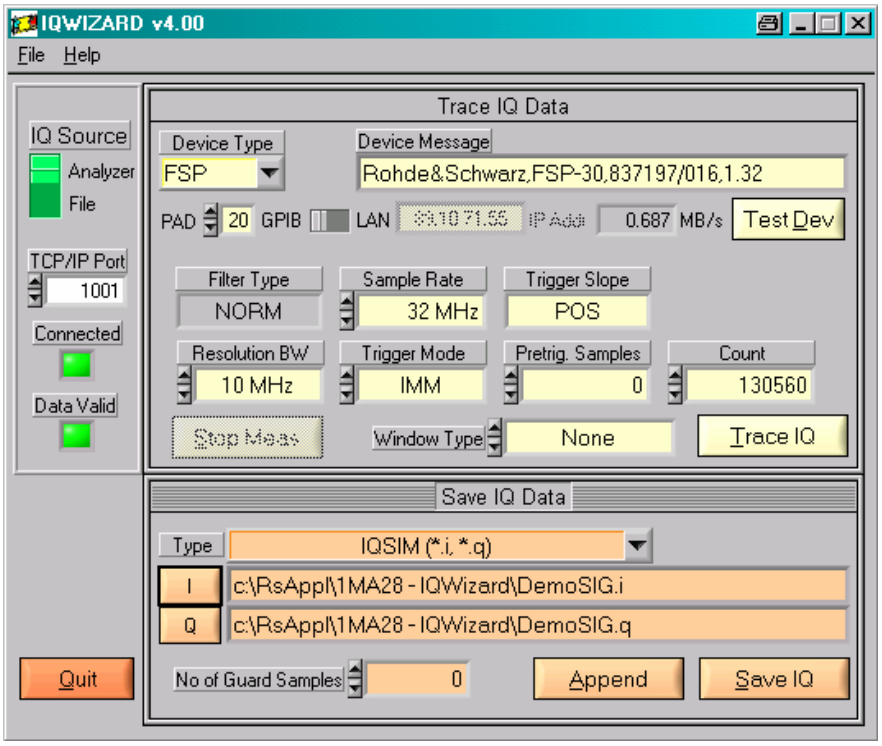

Fig. 2 Main Window

- **IQ SOURCE** – Data can be recorded with a spectrum a**nalyzer** (FSx) or test r**eceiver** (ESx) or can be loaded from a **FILE** with various formats.
- **TCP/IP PORT** – specifies the port number for connecting to WinIQSIM via TCP/IP transfer.
- **CONNECTED** – indicator LED turns green when link to WinIQSIM is active.
- **DATA VALID** – indicator LED turns green when valid IQ data traced from an analyzer or read from a file is stored in memory.

See '*IQWizard 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. 3 File Menu

- **LOAD CONFIGURATION** – the default file extension is **.cfg*.

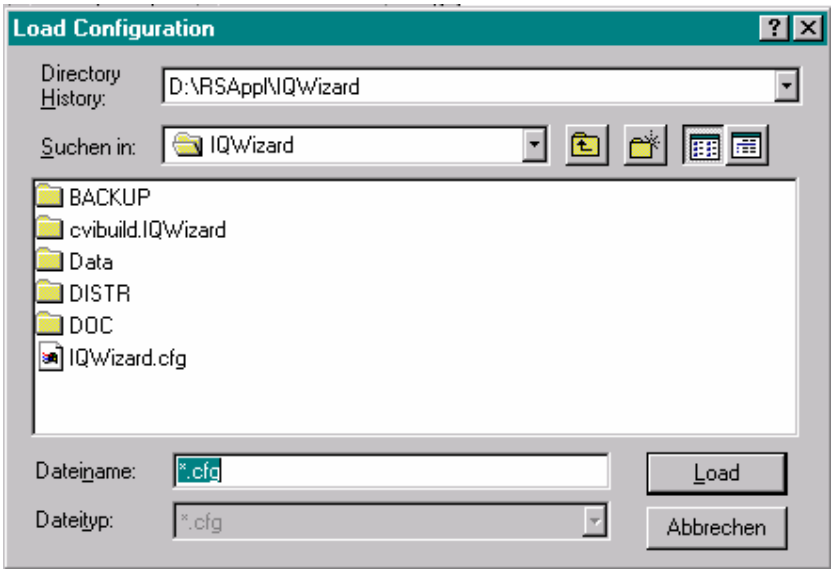

Fig. 4 Load Configuration

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

Help

- **HELP** – opens help ducument.
- **ABOUT** – displays revision and copyright information.

Load IQ Data

This windows allows to read IQ data from various input file formats into memory and turns active when *IQ Source* is set to *File*.

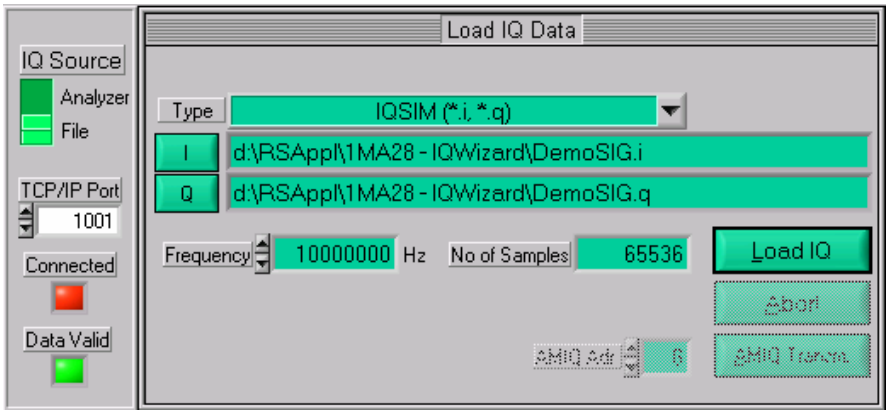

Fig. 5 Load IQ Data

- **TYPE** – specifies file type to load IQ data from. Possible selections see picture below.

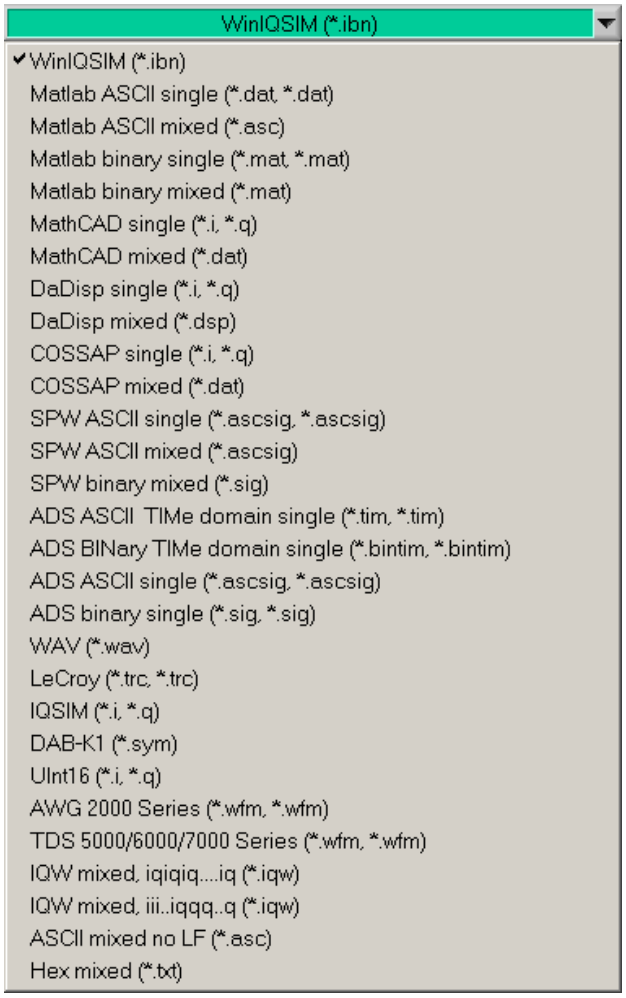

Fig. 6 Load IQ File Type

- **WINIQSIM** (*.ibn) – This is a mixed (I & Q Data) binary file format. *.ibn files generated with WinIQSIM cannot be loaded into IQWizard because the data is scrambled.

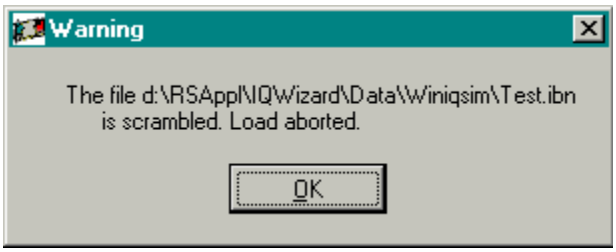

Fig. 7 Scrambled Warning

- **MATLAB SINGLE / IQSIM** (*.i, *.q) – these files have following format:

```
1.000000
2.000000
3.000000
....
```

- **MATLAB MIXED** (*.mat) – binary file format. The file should contain 2 differently named arrays (i.e. “I” and “Q”). Following C - example code shows how to generate the *.mat file correctly:

```
MATFile *fp;
double Iarr[1024], Qarr[1024];
mxArray *p;

// fill IArr and Qarr with iq data
........

fp = matOpen (d.INam, "w");
p = mxCreateDoubleMatrix (1, 1024, mxREAL);

memcpy (mxGetPr (p), IArr, 1024 * sizeof (double));
mxSetName (p, "I");
matPutArray (fp, p);

memcpy (mxGetPr (p), QArr, 1024 * sizeof (double));
mxSetName (p, "Q");
matPutArray (fp, p);

mxFree (p);
free (IArr);
free (Qarr);
matClose (fp);
```

- **MATHCAD / COSSAP SINGLE** (*.i, *.q) – have a dynamic format; integer, float and exponential format; up to 199 characters per line; comment starts with %.

```
1.0 2 3.0 4e0 5e0 6.00000 % Yeah Yeah 1.3
7.0 8 9.0 1e1 1.10e1 12.00000 % No No 1.7
.....
```

- **MATHCAD / COSSAP MIXED** (*.dat) – same as single, only that consecutive values are an i- and q- pair so the value count must always be even.

- **DADISP SINGLE** (*.i, *.q)

```
DATASET i
VERSION NEXT
NUM SIGS 1
STORAGE MODE INTERLACED
SIGNAL i
DATE 11-29-2000
TIME 14:49:26
INTERVAL 1.000000E+02
VERT_UNITS volt
HORZ_UNITS sec
COMMENT
DATA
 1.0000000
 2.0000000
 3.0000000
 4.0000000
.....
```

- **DADISP MIXED** (*.dsp)

```
DATASET i_q
VERSION NEXT
NUM SIGS 2
STORAGE MODE INTERLACED
SIGNAL i, q
DATE 12-27-2000
TIME 14:23:59
INTERVAL 1.000000E-06
VERT_UNITS volt
HORZ_UNITS sec
COMMENT
DATA
0.000000e+00 0.000000e+00
6.278100e-02 0.000000e+00
1.253130e-01 0.000000e+00
1.873750e-01 0.000000e+00
.....
```

- **SPW ASCII SINGLE** (*.ascsig, *.ascsig) – uses the extension *.ascsig for i- and q- data files. It is convenient to place this information in the file name, i.e. circle_i.ascsig.

```
$SIGNAL_FILE 9
$USER_COMMENT

$COMMON_INFO
SPW Version          = 4.70
System Type          = solaris2
Sampling Frequency = 65536000.0
Starting Time        = 0.0
$DATA_INFO
Number of points     = 20480
Signal Type          = Double
$DATA
0.00427246
0.00476074
0.00299072
.....
```

- **SPW ASCII MIXED** (*.ascsig)

```
$SIGNAL_FILE 9
$USER_COMMENT

$COMMON_INFO
SPW Version          = 4.70
System Type          = solaris2
Sampling Frequency = 65536000.0
Starting Time        = 0
$DATA_INFO
Number of points     = 20480
Signal Type          = Double
Complex Format       = Real_Imag
$DATA
0.00427246+j0.06279034
0.00476074-j0.24868988
0.00299072+j0.53582679
.....
```

- **SPW BINARY MIXED** (*.sig)

```
$SIGNAL_FILE 9
$USER_COMMENT

$COMMON_INFO
SPW Version          = 4.70
System Type          = solaris2
Sampling Frequency = 65536000.0
Starting Time        = 0
$DATA_INFO
Number of points     = 20480
Signal Type          = Double
Complex Format       = Real_Imag
$DATA
```

<I0 64-bit REAL><Q0 64-bit REAL><I1 64-bit REAL> <Q1 64-bit REAL><I2 64-bit REAL><Q2 64-bit REAL><I3 64-bit REAL> <Q3 64-bit REAL>.....

- **ADS ASCII TIME DOMAIN SINGLE** (*.tim, *.tim)

```
BEGIN TIMEDATA
#       T       ( SEC V R xx)
%       t       v
<data line>
…
<data line>
END
```

- **ADS BINARY TIME DOMAIN SINGLE** (*.bintim, *.bintim)

```
NUMBER OF DATA XX1
BEGIN TIMEDATA
# T ( SEC V R XX)
% T V
<binar data block>
```

- **ADS ASCII SINGLE** (*.ascsig, *.ascsig) – see SPW ASCII single
- **ADS BINARY SINGLE** (*.sig, *.sig) – same as SPW binary mixed, except that instead of <I0><Q0><I1><Q1>…<In><Qn> the data is stored as <I0><I1>…<In> or <Q0><Q1>…<Qn>.
- **WAV** Files (*.wav) – binary audio file format. Can be used to store IQ data. IQWizard only accepts **8-** and **16-BIT STEREO** format.
- **LECROY** (*.trc) – binary 8 or 16-bit format containing 2 channels generated with LeCroy's general oscilloscope controlling software **SCOPE EXPLORER**™ available at http://www.lecroy.com.

- **DAB-K1** (*.sym) – binary file format. DAB-K1 is a software for generation of various DAB and DVB signals for spectrum evaluation. DAB-K1 is available at http://www.rohde-schwarz.com.
- **UINT16** (*.i, *.q) – 16-Bit format ranging from 1 to 65535 (0 is internally converted to 1). This format especially supports the AMIQ's digital IQ output (option **AMIQ-B3**). Transmitting this format to an AMIQ requires following WinIQSIM configuration (**DEMO16BIT.IQS**):

IMPORT FILTER FUNCTION	**None**
AMIQ -> SIGNAL STAT.AND QUANT	Use Peak Value: **OFF**
	Level: **32767.0000**
	Resolution: **16 Bit**
AMIQ TRANSMISSION	Comp.Output Signal for sin(x)/x Dist.: **OFF**

- **AWG 2000** (*.wmf, *.wmf) – format for Tektronix AWG2000 series arbitrary waveform generators containing frequency and amplitude information in the header. The 12 bit I- and Q-values (0...4095) are normalized to ± amplitude. Wmf demo files are available at http://www.tektronix.com.
- **TDS 5000 / 6000 / 7000** – Tektronix TDS 5000 / 6000 / 7000 series digital sampling oscilloscopes WFM file format.
- **IQW** (*.iqw) – 4-byte binary float format with alternating I- and Q-values.

  N = NUMBER OF ELEMENTS = FILESIZE / 4 (FLOAT) / 2 (I & Q)

  $I1,Q1,I2,Q2,\ldots,I_N,Q_N$
- **IQW BLOCK DATA** (*.iqw) – Same as IQW but with I and Q data blocks.

  $I_1,I_2,\ldots,I_N,Q_1,Q_2,\ldots,Q_N$
- **ASCII NO LF** – Alternating I- and Q- ASCII values separated by spaces.
- **HEX 16-BIT SIGNED MIXED** – Alternating I- and Q- 16-Bit Hexadecimal values separated by spaces or tabs. The values range from 0 to 0x7FFF → 0.0 to +1.0 and 0x8000 to 0xFFFF → -1.0 to 0.0.

  0x0000 0xFFFF
  0x7FFF 0x8000
  0x4000 0xC000
  …. ….

  is converted and normalized to

  +0.00000 -0.00000
  +1.00000 -1.00000
  +0.50000 -0.50000
  …. ….

When a mixed file type (contains I and Q values) is selected the Q selection button and file name line are dimmed.

- **I** – starts file load popup with predefined extension (see picture below).

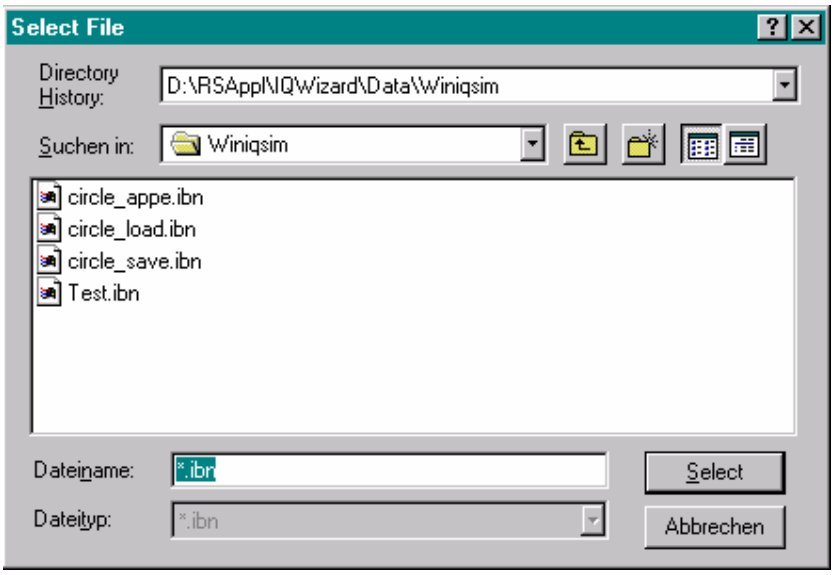

Fig. 8 Select File

- **Q** – same as I.
- **LOAD IQ** – after necessary files have been selected this button is un-dimmed and by pressing it the IQ data is loaded from file into memory. When sucessfull, the *Data Valid* indicator LED turns green.

  Note: To avoid an endless loop in case of an incorrect input format for WinIQSIM, SPW and ADS both the Status and Load window allow to abort the load operation with the Abort key, <Alt>A or ESC.

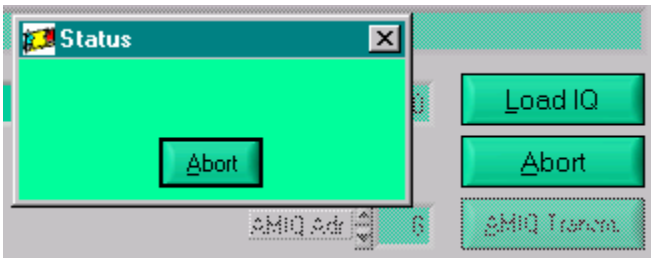

Fig. 9 Abort Load

- **AMIQ ADR**. – AMIQ GPIB address (default 6).
- **AMIQ TRANSMISSION** – transmits 16-bit values to directly to an AMIQs digital output and sets sample frequency. All other other settings (I/Q output level, filters etc.) can be set with **WINIQSIM**.

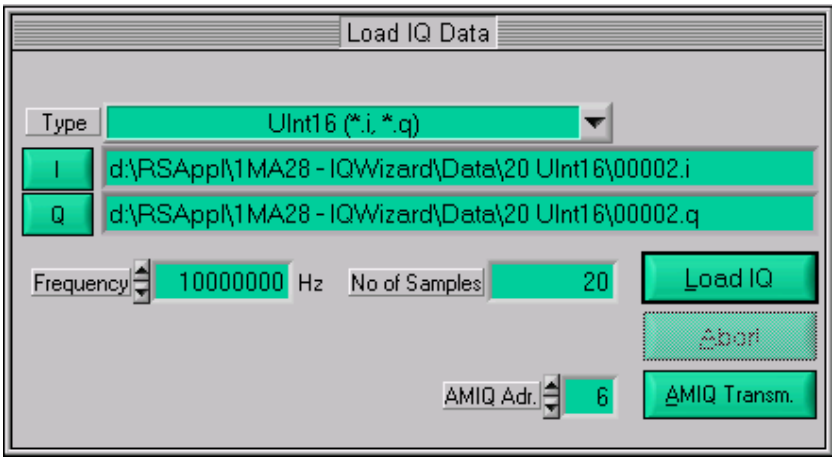

Fig.10 AMIQ Transmission

Note: *AMIQ Adr. and AMIQ Transmission controls are only active (not dimmed) in case the Uint16 (16-bit) format is selected.*

Trace IQ Data

IQWizard converts the absolute IQ data provided by the analyzer into relative IQ values corresponding to the analyzer's grid maximum ($U_{IQpeak} \triangleq 1.00$ at reference level). WinIQSim displays 0dB when the IQ value is equal to the reference level (1.00). Following conversion must be performed manually obtain the absolute level P/dBm.

$$P/dBm = reflevel + 20 * \log\left(\frac{Uiqpeak}{1V}\right)$$

Example:

RefLevel = -10dBm
U_{IQpeak} = 100mV

$$P = -10dBm + 20 * \log\left(\frac{0.1V}{1V}\right) = -30dBm$$

FSIQ

The picture below shows the control window for tracing IQ data with an FSIQ with FSIQ-B70 option. It pops up when **IQ SOURCE** is set to **ANALYZER** and **DEVICE TYPE** is set to **FSIQ**.

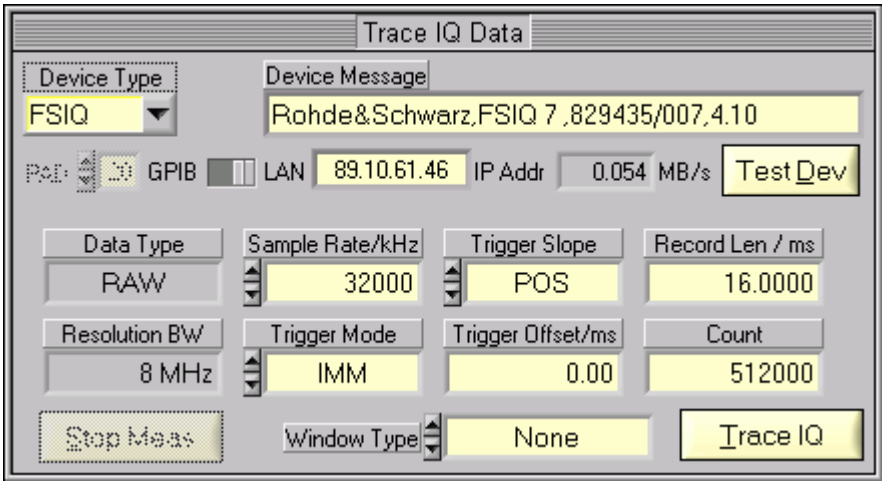

Fig. 11 Trace IQ Data FSIQ

- **DEVICE TYPE** – specifies the analyzer used. Possible selections: FSIQ, FSP, FSU, FSQ, FSG, FSL, ESU, ESPI, ESCI, FSMR and FSUP.
- **GPIB/LAN** – sets interface type.
- **PAD** – GPIB primary address. Range: 1 to 31.
- **IP ADDR** – LAN TCP/IP address. R&S analyzer default: **89.10.xx.xx** (see operating manual for LAN configuration details).
- **TEST DEVICE** – Resets device and displays device ID in the Device Message box.
- **DATA TYPE** – constantly set to RAW.
- **RESOLUTION BW** – constantly set to 8MHz.

- **SAMPLE RATE** – specifies the rate in which IQ data is sampled simultaneously. Range: 40 kHz to 32 MHz.
- **TRIGGER MODE** – selects trigger source to initiate an IQ trace. Possible selections: IMMediate, EXTernal, VIDeo.
- **TRIGGER SLOPE** – selects trigger signal slope of EXTernal and VIDeo trigger. Possible selections: POSitive, NEGative.
- **TRIGGER OFFSET** – delay between trigger and start of measurement. A negative value means that the first couple of IQ samples have been taken before the trigger event. Range: -590 µs to 2.5ms.
- **RECORD LENGTH** – time period of data trace. Range: 1µs to 20.4ms.
- **COUNT** – is limited to 524200 and in case it is exceed a foldback of the *Record Length* takes place. It is calculated as follows:

  Count = Sample Rate * Record Length
- **WINDOW TYPE** – a window is used for turning non-periodic signals into periodic ones by setting the beginning and end to zero. See picture below for possible choices.

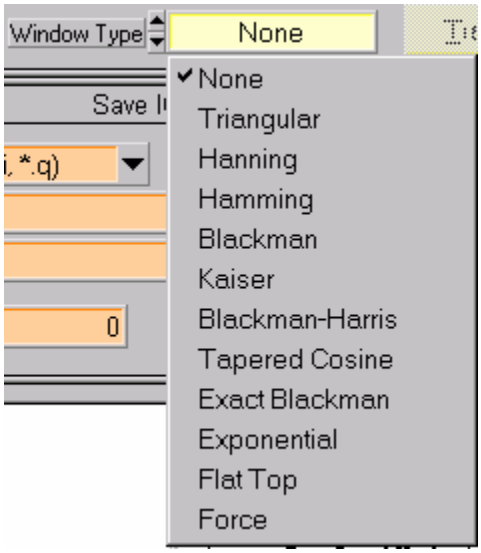

Fig. 12 Window Type

- **TRACE IQ** – starts measurement.

FSP / FSU / ESPI / ESCI / FSMR

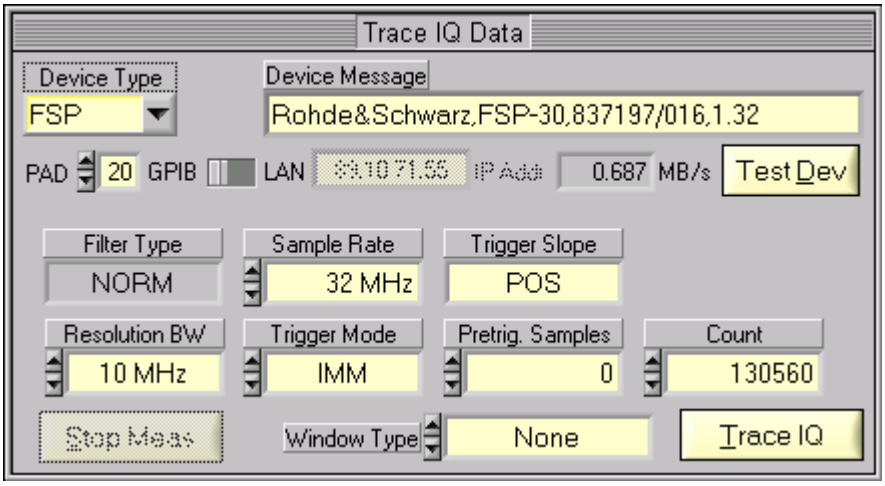

Fig. 13 Trace IQ Data FSP/FSU/FSQ

- **DEVICE TYPE, GPIB/LAN, PAD, IP ADDR, TEST DEVICE, WINDOW TYP, TRACE IQ** see *FSIQ*.
- **FILTER TYPE** – constantly set to NORM
- **RESOLUTION BANDWIDTH** – Possible selections are 300 kHz, 1 MHz, 3 MHz or 10 MHz for FSP and additionally 20 MHz and 50 MHz for the *FSU*, *ESPI* , *ESCI* and *FSMR*.

  Note: In this particular case the Resolution Bandwidth is the maximum traceable bandwidth and not the smallest frequency resolution.
- **SAMPLE RATE** – possible selections are 15.625 kHz, 31.25 kHz, 62.5 kHz, 125 kHz, 250 kHz, 500 kHz, 1 MHz, 2 MHz, 4 MHz, 8 MHz, 16 MHz or 32 MHz for *FSP*, *FSU* and *ESPI*. 10 kHz for the *ESCI* and *FSMR*.
- **TRIGGER MODE** – possible selections are IMMediate or EXTernal.
- **TRIGGER SLOPE** – constantly set to POSitive.
- **PRETRIG. SAMPLES** – number of samples taken before trigger event. Range 0 to 65023.
- **COUNT** – maximum sample count. Range 1 to 130560 (2^{17} – 512) for the *FSP* and *ESPI*, 1 to 523776 (2^{19} – 512) for the *FSU*, *ESCI* and *FSMR*.

FSQ / ESU / FSG / FSUP

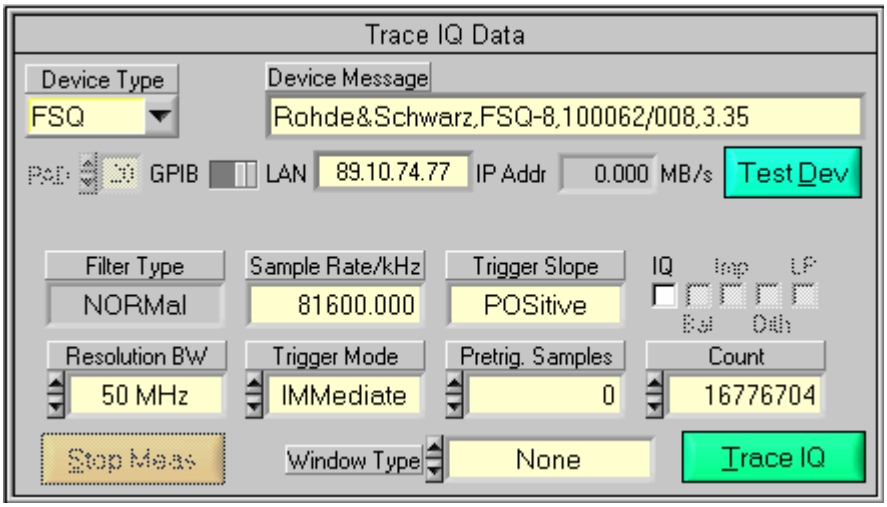

Fig. 14 Trace IQ Data FSQ

- **DEVICE TYPE, GPIB/LAN, PAD, IP ADDR, TEST DEVICE, WINDOW TYP, TRACE IQ** see FSIQ.
- **FILTER TYPE** – constantly set to NORM
- **RESOLUTION BANDWIDTH** – Possible selections are 300 kHz / 1 MHz / 3 MHz / 10 MHz / 20 MHz / 50 MHz.

  Note: In this particular case the Resolution Bandwidth is the maximum traceable bandwidth and not the smallest frequency resolution.
- **SAMPLE RATE** – Range 10 kHz to 81.6 MHz. The FSQ can sample up to 326.4 MHz with the FSQ-B72 bandwidth extension.
- **TRIGGER MODE, TRIGGER SLOPE, PRETRIG. SAMPLES** – -16776see FSP/FSU/ESPI/ESU/.
- **COUNT** – maximum sample count. Range 1 to 16776704 (2^{24} – 512), 1 to 704642560 (704643072 – 512) with FSQ-B100 + FSQ-B102.

  Note: If **DEVICE TYPE** is FSQ and **COUNT** ≥ 125.000.000 Samples the raw IQ data is stored in the binary file **IQ.MEM** (I_1 4 byte float, Q1 4 byte float, ...I_n, …Q_n). With a TCPIP 100 Mbit/s LAN connection it takes approximately 13½ minutes to trace 705 MSamples (= 5.6 GB) from the FSQ.
- **IQ** – Turns IQ baseband inputs ON/OFF (only FSQ with FSQ-B71 option).
- **BAL** – Baseband input balanced = ON, unbalanced = OFF (only FSQ with FSQ-B71 option).
- **IMP** – Input impedance of baseband inputs. OFF = impedance 50 Ohm, ON = impedance high Z (only FSQ with FSQ-B71 option).
- **DITH** – Dithering ON/OFF (only FSQ with FSQ-B71 option).
- **LP** – Baseband input antialiasing low pass ON/OFF (only FSQ with FSQ-B71 option).

FSL / ETL

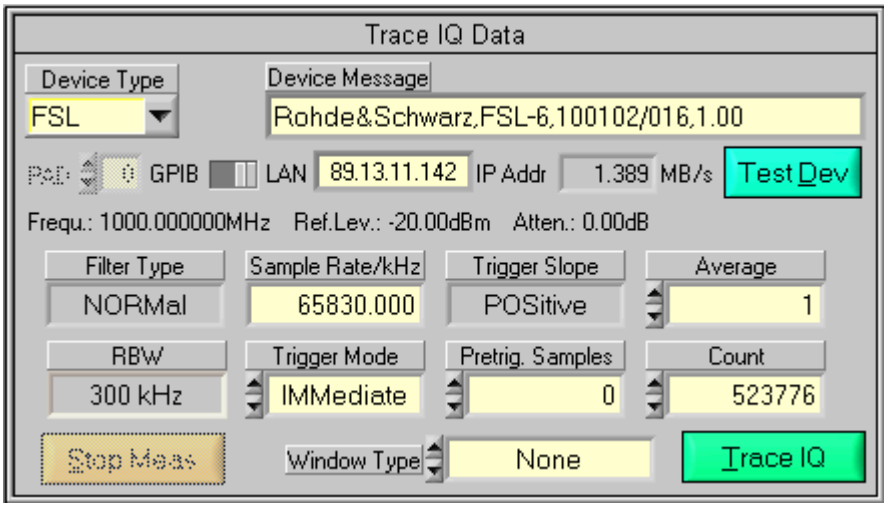

Fig. 15 Trace IQ FSL

- **DEVICE TYPE, GPIB/LAN, PAD, IP ADDR, TEST DEVICE, WINDOW TYP, TRACE IQ** see FSIQ.
- **FILTER TYPE** – constantly set to NORM
- **RESOLUTION BANDWIDTH** – Indicator for FSL RBW (10Hz to 10 MHz).

  Note: In this particular case the Resolution Bandwidth is the maximum traceable bandwidth and not the smallest frequency resolution.
- **SAMPLE RATE** – Range 10 kHz to 65.83 MHz.
- **TRIGGER MODE** – possible selections are IMMediate, EXTernal or IF-Power.
- **TRIGGER SLOPE** – constantly set to POSitive.
- **PRETRIG. SAMPLES** – number of samples taken before trigger event. Range : -16253439 to 523775. Negative values correspond to a trigger delay.
- **AVERAGE** – Performs averaging of IQ Data. Range 0 to 32767. Averaging is turned OFF by the program for values ≤ 1.
- **COUNT** – maximum sample count. Range 1 to 523776 (2^{19} – 512).

Save IQ Data

This control windows allows to store IQ data in various file formats.

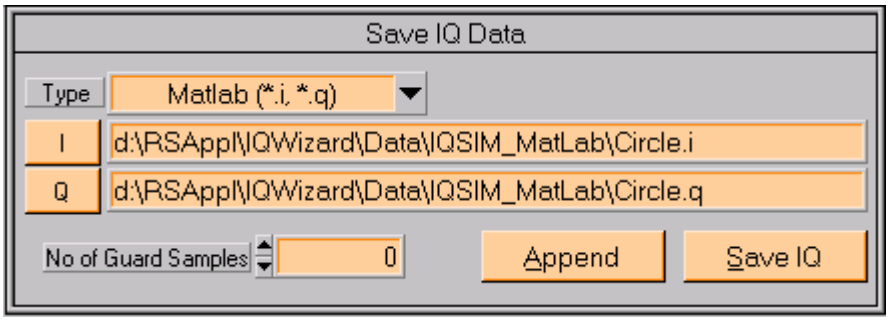

Fig. 16 Save IQ Data

- **TYPE** – selects file type from pull down menu (see section **LOAD IQ DATA**, p.8 for details on file formats).

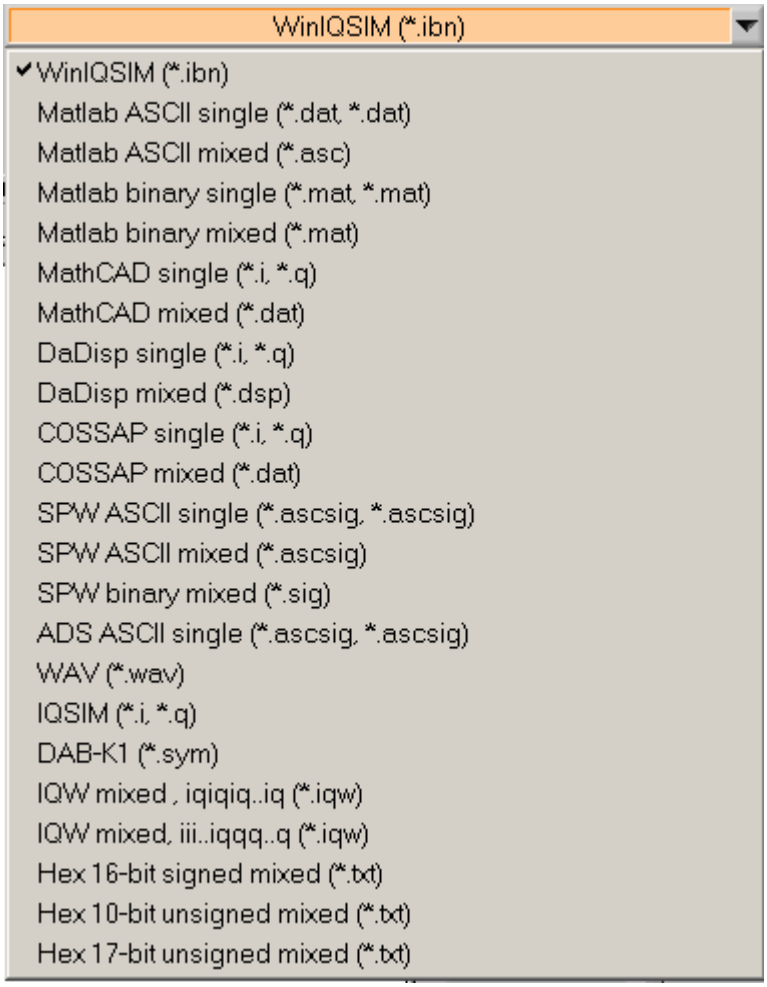

Fig. 17 Save IQ File Type

HEX 10-BIT UNSIGNED MIX – Scales an input array i/q min to i/q max to 0 … 3FF.

HEX 17-BIT UNSIGNED MIX – Scales an input array i/q min to i/q max to 0 … 1FFFF.

- **I** – select I-, or IQ- (containing both I and Q values) file name.
- **Q** – select Q file name. This control and indicator are dimmed when IQ-file format is selected.
- **SAVE IQ** – save data in memory to specified file.
- **APPEND** – append data in memory to data already in the specified file.
- **NO OF GUARD SAMPLES** – number of samples added before data in memory is appended. The last samples are appended in regular order (see picture).

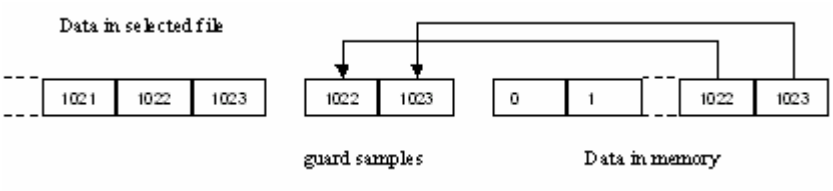

Fig. 18 Guard Samples

IQWizard Measurement Example

The demo configuration should be set up as follows.

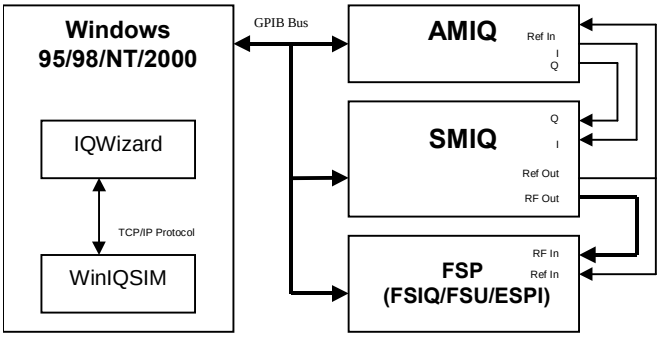

Fig. 19 Demo Hardware Configuration

This example demonstrates how an IQ signal file (**DEMOSIGNAL.I**, **DEMOSIGNAL.Q**) can be loaded with *IQWizard*, transferred to *WinIQSIM* and uploaded to an *AMIQ*. The signal from the AMIQ is modulated by an SMIQ. The SMIQ output is directly connected to an FSP analyzer. WinIQSIM is set up with the configuration file **DEMOWIQ.IQS** and the analyzer is configured by IQWizard directly using **DEMOIQW.CFG**. Data is recorded with the FSP *Trace IQ* function. Transfer the data to WinIQSIM again in order to check the traced signal quality.

1. Start **IQWIZARD.EXE** (**IQWIZARD.CFG** is automatically loaded)
2. Load **DEMOSIG.I** and **DEMOSIG.Q**

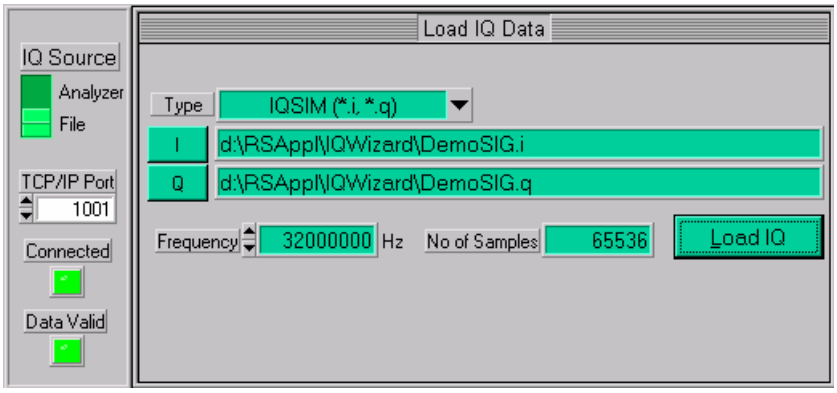

Fig. 20 Demo Load IQ Data

3. Start **WINIQSIM.EXE** and load **DEMOWIQ.IQS** configuration file to set up *Import*, *Filter* and *Graphics* parameters If the IQWizard *Connected LED* does not turn green simply move mouse cursor in WinIQSIM to the Import button, click once and change the TCP/IP port number, if necessary.

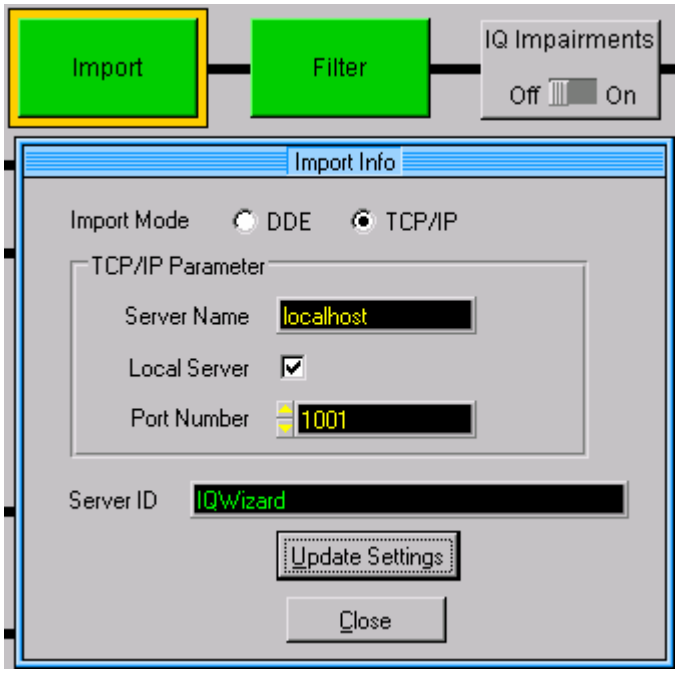

Fig. 21 WinIQSIM Import

4. The Import Filter is set up as follows.

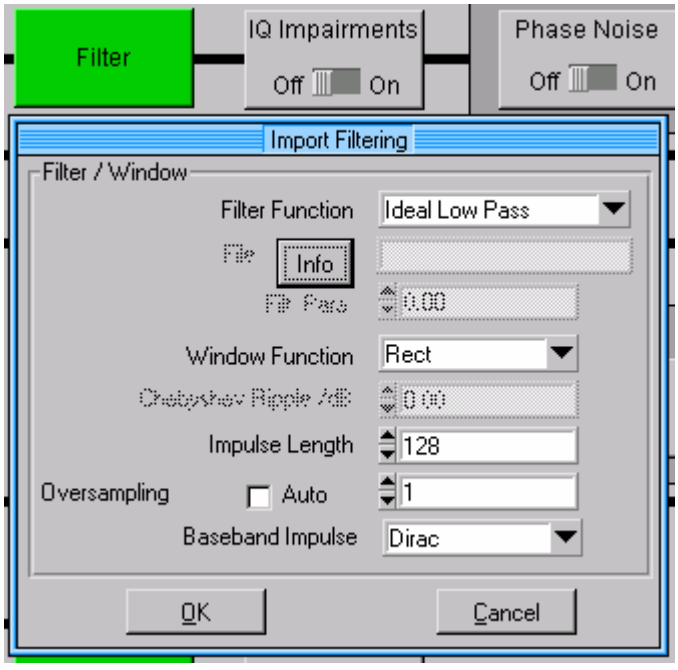

Fig. 22 WinIQSIM Import Filter

5. Now click on the WinIQSIM *Graphics* icon to load the IQ data from IQWizard via TCP/IP.

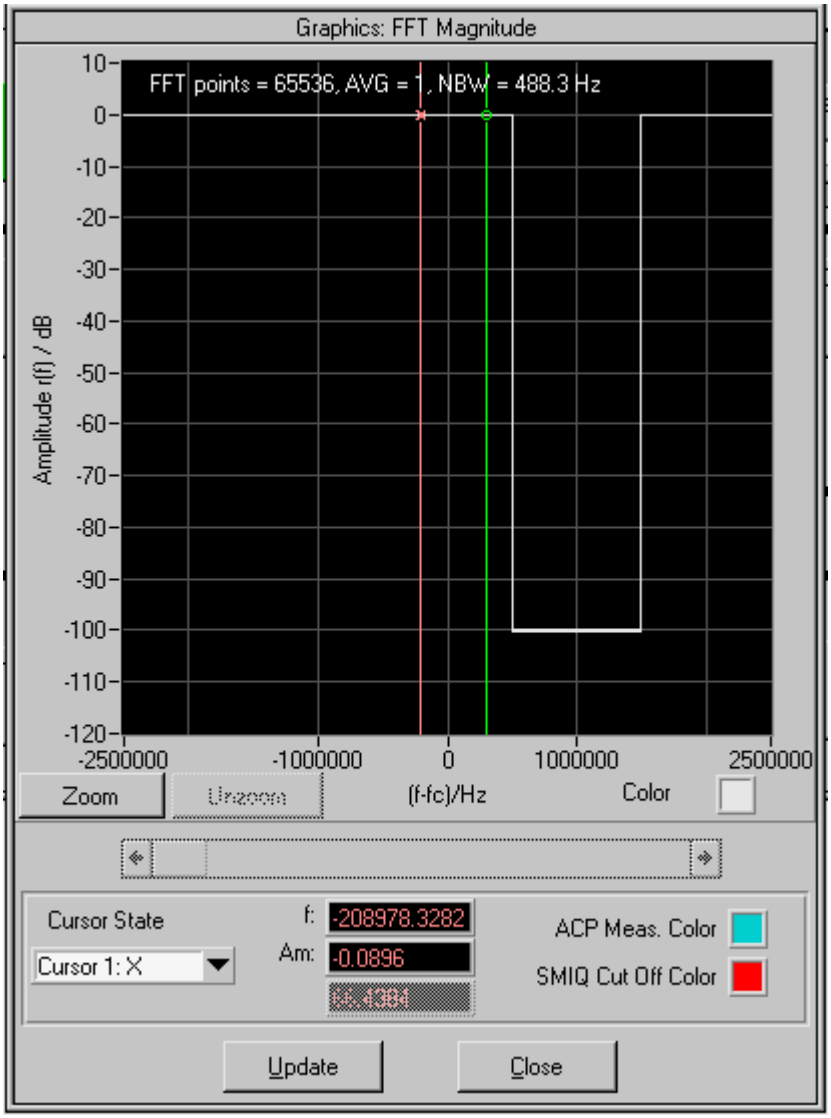

Fig. 23 WinIQSIM Original Signal

6. 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**.

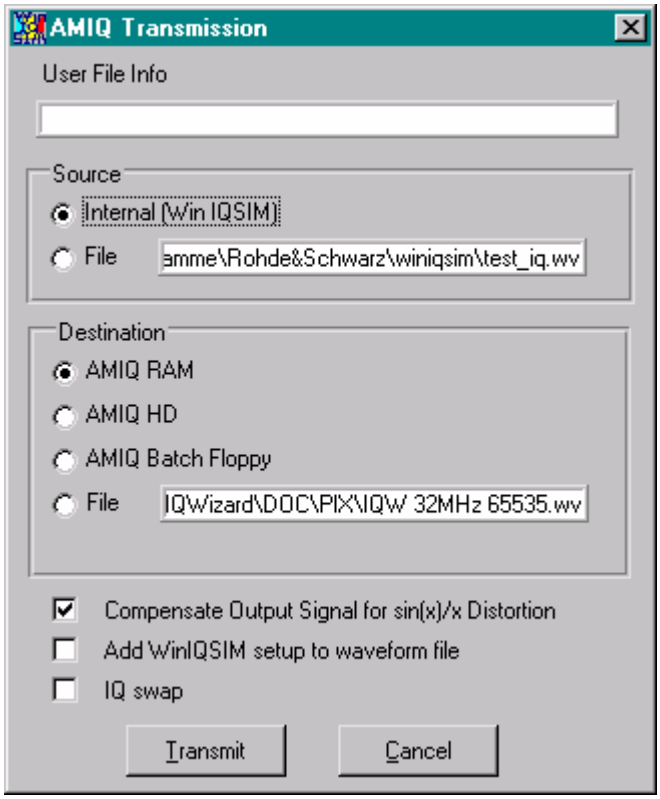

Fig. 24 WinIQSIM AMIQ Transmission

7. *Reset* the **SMIQ** and set following parameters manually.

FREQUENCY	2 GHz
OUTPUT LEVEL	-20 dBm
VECTOR MODULATION	ON

8. Reset the **FSP** and set following parameters manually. If you wish to store the analyzer trace for further examination press

   TRACE -> COPY TRACE -> 2 -> ENTER

CENTER FREQUENCY	2 GHz
OUTPUT LEVEL	-20 dBm
RESOLUTION BANDWIDTH	10 kHz
VIDEO BANDWIDTH	AUTO
SWEEPTIME	2s
DETECTOR	RMS

9. Change the **IQ SOURCE** in IQWIZARD to **ANALYZER**, press the **TRACE IQ** button and wait until the **DATA VALID** indicator turns *green*.

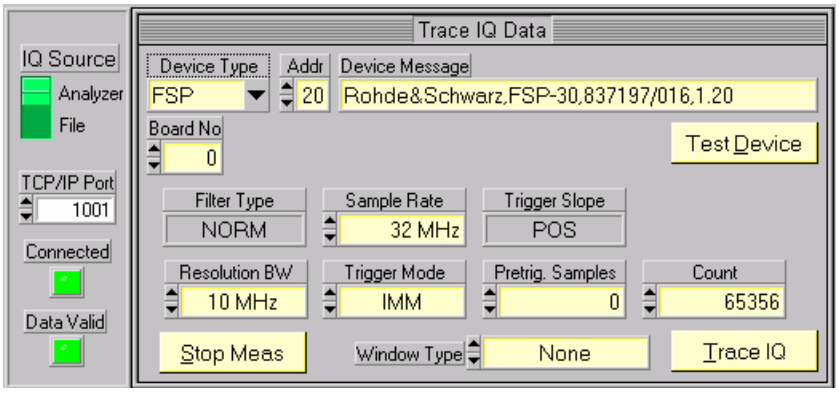

Fig. 25 IQWizard Demo Trace

10. Transfer the IQ data from IQWIZARD to by pressing WinIQSIM's **GRAPHICS** menu **UPDATE** button.

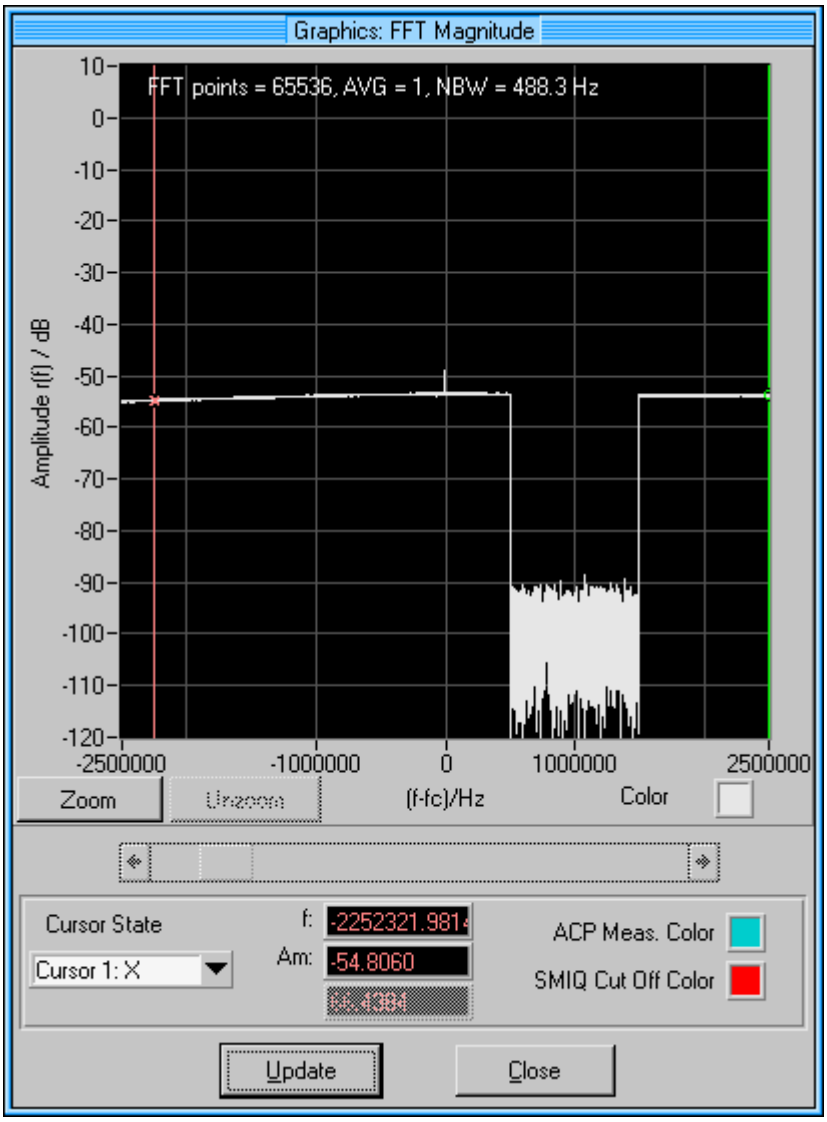

Fig. 26 WinIQSIM Demo Trace

11. Transmit the IQ signal to the AMIQ as described above and you will obtain the following display on the analyzer.

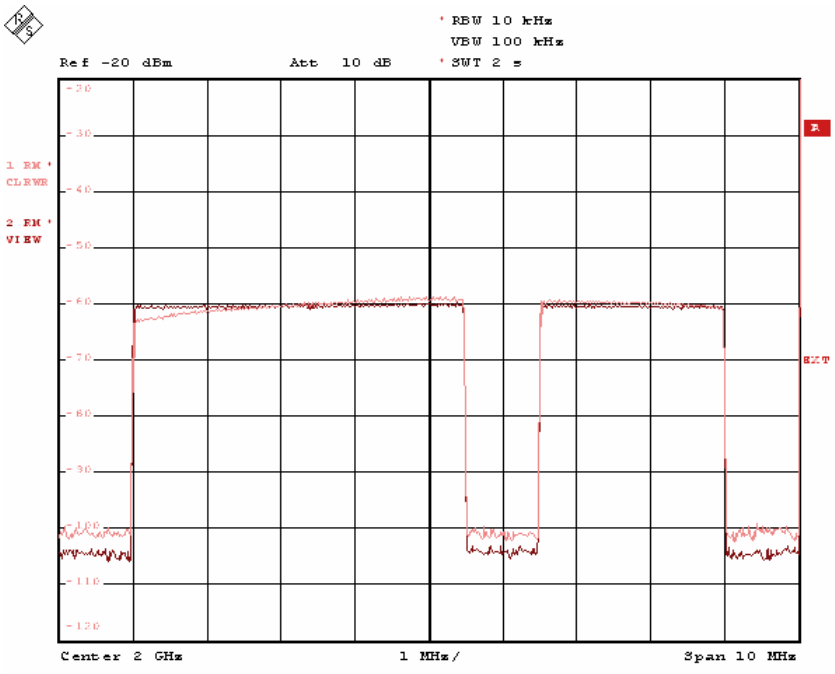

Fig. 27 FSP Demo Trace

7 Additional Information

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

8 Ordering information

Vector Signal Generator		
R&S® SMU200A	Vector Signal Generator	1141.2005.02
R&S® SMU-B10	Baseband Generator 64MS	1141.7007.02
R&S® SMU-B11	Baseband Generator 16MS	1159.8411.02
R&S® SMU-B13	Baseband Main Module	1141.8003.02
R&S® SMJ100A	Vector Signal Generator	1403.4507.02
R&S® SMJ-B10	Baseband Generator 64 MS	1403.8902.02
R&S® SMJ-B11	Baseband Generator 16 MS	1403.9009.02
R&S® SMJ-B13	Baseband Main Module	1403.9109.02
Spectrum Analyzer		
R&S® FSPxx	(9 kHz to 30 GHz)	1093.4495.xx
R&S® FSUxx	(20 Hz to 26.5 GHz)	1129.9003.xx
R&S® FSQxx	(20 HZ to 40 GHz)	1155.5001.xx
R&S® FSQ-B71	Analog Baseband Inputs	1157.0113.02
R&S® FSQ-B72	Bandwidth Extension	1157.0336.02
R&S® FSQ-B100	IQ Memory Extension 235 MS	1162.5204.02
R&S® FSQ-B102	IQ Memory Extension to 705 MS (FSQ-B100 required)	1162.5204.04
R&S® FSLx	(9 kHz to 6 GHz)	1300.2502.xx
R&S® FSGxx	(9 kHz to 13.6 GHz)	1309.0002.xx
Test Receiver		
R&S® ESPIx	(9 kHz to 7 GHz)	1142.8007.xx
R&S® ESU	(20 Hz to 40 GHz)	1302.6005.xx
R&S® ESCI	(9 kHz to 3 GHz)	1166.5950.03
R&S® FSMR	(20 Hz to 50 GHz)	1166.3311.xx
TV Analyzer		
R&S® ETL	(500 kHz to 3 GHz)	2112.0004.13
Signal Source Analyzer for Phase Noise		
R&S® FSUPxx	(1 MHz – 50 GHz)	1166.3505.xx

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