



Products: R&S® SFU Broadcast Test System, R&S® SFE Broadcast Tester, R&S® SFE100 Test Transmitter

Converting MediaFLO™ Waveform Files to R&S® SFU / SFE / SFE100 ARB Format Using IQWIZARD/WinIQSIM™ for R&S® SFx-K35 ARB

Application Note

This application note introduces the methods to convert MediaFLO™ waveform files to ARB format to be used with R&S® Broadcast Signal Generators SFx-K35 ARB Generator. R&S® IQWIZARD and WinIQSIM™ software are used, providing a quick and simple file conversion method.



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1 Overview

With the recent exponential growth in wireless device capabilities, mobile TV is now getting a lot of attention in the industry. MediaFLO™ developed and standardized by QUALCOMM promises an efficient way to broadcast video and multimedia contents to vast numbers of wireless devices.

MediaFLO™ waveform files are available from the FloForum or directly from QUALCOMM (<http://www.floforum.org> / <http://www.qualcomm.com>). This application note introduces the methods to convert that kind of waveform files to ARB format to be used with R&S® Broadcast Signal Generators SFx-K35 ARB Generator. R&S® IQWIZARD and WinIQSIM™ software are used, providing a quick and simple file conversion method.

Trademarks: MediaFLO™ is trademark of QUALCOMM, Inc.

2 Hardware and Software Requirements

Hardware Requirements

Test Instrument

| | | |
|------------------|---------------------------|----------------------------|
| Main Unit | R&S® SFU / SFE / SFE100 | Broadcast Signal Generator |
| Software Options | R&S® SFx-K35 ¹ | ARB Generator |

The Software runs on a PC with

| | Minimum | Recommended |
|----------|---------------------|---------------------|
| CPU | CPU 1 GHz | CPU 2 GHz or higher |
| RAM | 128 Mbyte | 1 Gbyte or higher |
| Harddisk | 50 Mbyte free space | 1 Gbyte free space |

Software Requirements

| | | |
|-----------------|----------------------------|-------------------------|
| Windows 2000/XP | Microsoft Operating System | |
| R&S® IQWizard | Application Software | Version 4.5.8 or higher |
| R&S® WinIQSIM™ | Software Tool | Version 4.40 or higher |

¹ For R&S® SFE / SFE100, option R&S® SFE-K350 / SFE100-K350 is also required.

3 Hardware Set-up

Connecting the instruments

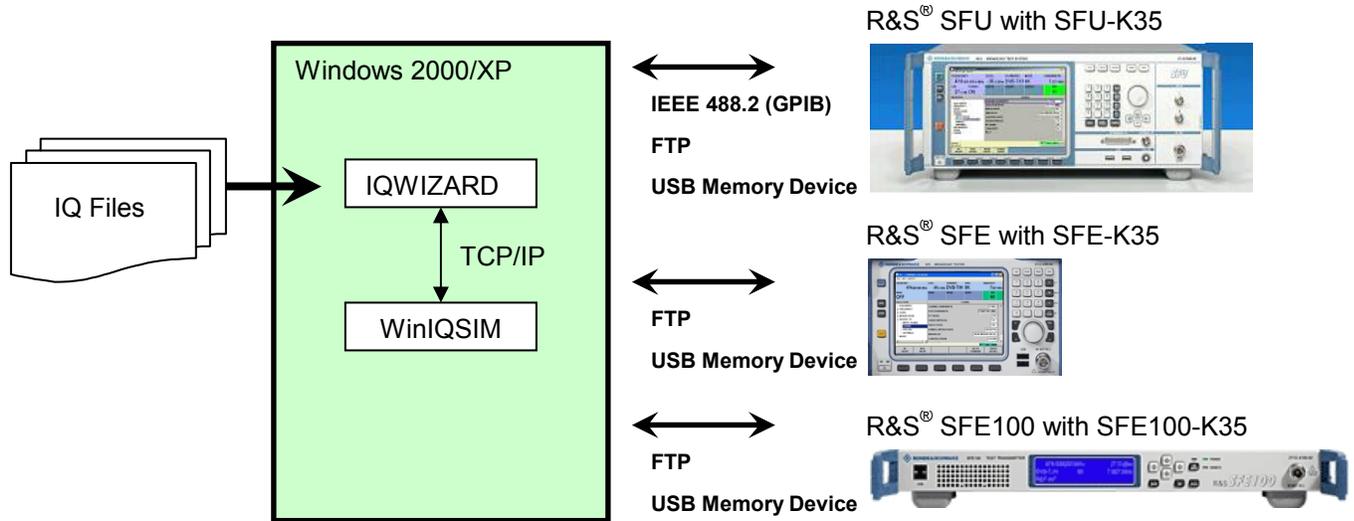


Figure 1, Setup and connections

Converted files can be transferred into R&S® SFU directly within WinIQSIM™ via IEEE 488.2 (GPIB) interface. It is also possible to transfer the files via FTP or an USB memory device. The IEEE 488.2 (GPIB) interface is not available for R&S® SFE / SFE100.

4 Software Installation

R&S® IQWIZARD

R&S® IQWizard [1] is a tool for loading IQ signal files in various formats and downloading IQ data from a R&S® FSx Spectrum Analyzer or R&S® ESx Receiver. The obtained IQ data in memory can be stored in various formats or be transmitted to an R&S® SFU / AMIQ / SMIQ / SMU with WinIQSIM™.

The installation file IQWIZARD_X.X.X.exe can be downloaded from <http://www.rohde-schwarz.com/appnote/1MA28.html>, whereas X.X.X stand for the latest version available. 4.5.8 or higher is recommended.

WinIQSIM™

WinIQSIM™ is a software tool capable of receiving IQ data via TCP/IP software interface and calculating and transferring it to an R&S® SFU / AMIQ IQ Modulation Generator. R&S® IQWizard and WinIQSim must run simultaneously to enable data transfer.

WinIQSIM™ installation file can be downloaded from the following links:

<http://www2.rohde-schwarz.com/product/winiqsim.html>

WinIQSIM™ version 4.40 or higher is recommended.

Install both softwares as guided by the installation wizard.

5 Converting MediaFLO™ Waveform Files to R&S® SFx ARB Format

IQ data in various formats, including MediaFLO™, can be loaded and converted to be used with R&S® SFx-K35 ARB Generator.

MediaFLO™ waveform file conversion can be accomplished with R&S® IQWIZARD and WinIQSIM™ software.

R&S® IQWIZARD allows IQ data from various formats to be loaded. It is also possible to capture IQ data directly from a R&S spectrum analyzer. WinIQSIM™ is then used to generate IQ data according to the respective standards to be used in R&S® SFU / SFE / SFE100.

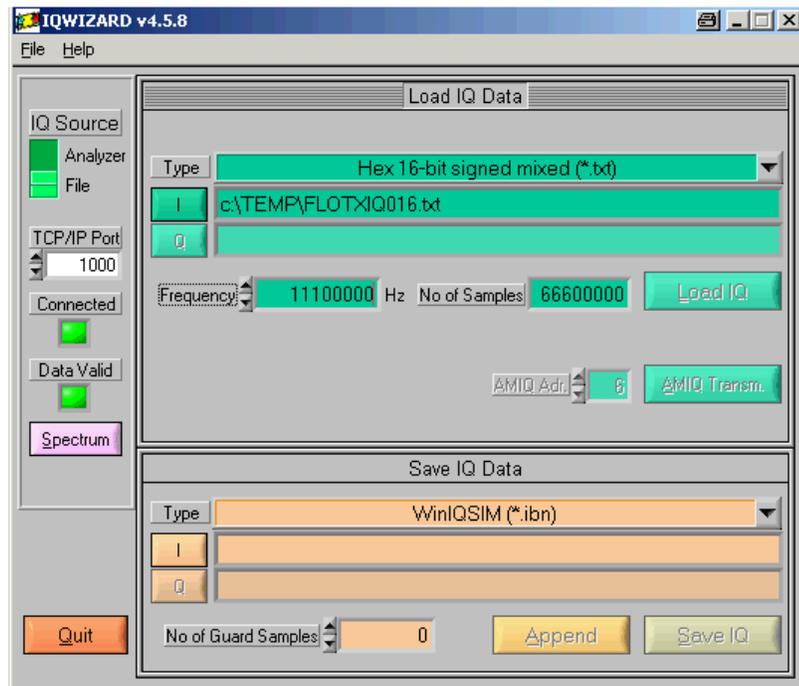


Figure 2, R&S® IQWIZARD Main Menu

1. To start converting waveform files, run R&S® IQWIZARD software. Beginning from **Load IQ Data** frame as shown in Figure 2, follow the steps below to load the IQ waveform file to be converted :
 - a. Click “**Type**” within the **Load IQ Data** frame and select “Hex 16-bit Signed Mixed (*.txt)”
 - b. Click “I” and select the desired file.
 - c. Set frequency according to the bandwidth:

| | | | | |
|-----------------|------|------|-------|------|
| Bandwidth [MHz] | 5 | 6 | 7 | 8 |
| Frequency [MHz] | 9.25 | 11.1 | 12.95 | 14.8 |
 - d. Click “Load IQ” to begin the file loading process. It will take a couple of minutes depending on the file size.
2. Next, run WinIQSIM™ software to continue with the conversion process. From “**System!**” Menu, select “**Import**” and the following screen is displayed:

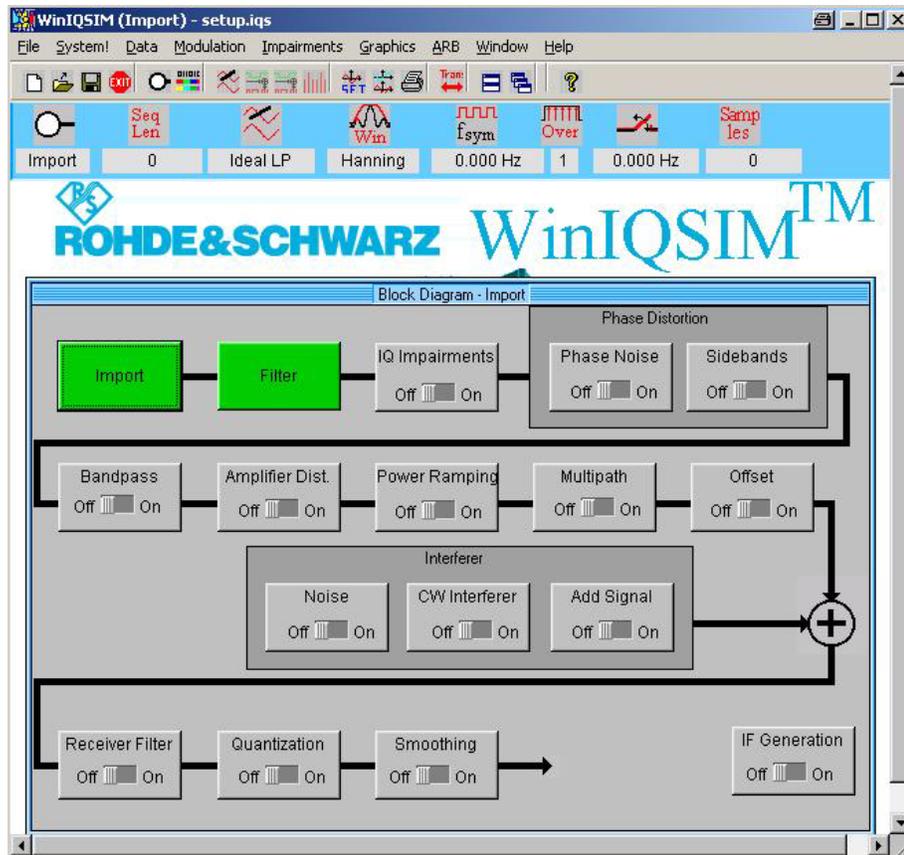


Figure 3, WinIQSIM™ with Import Block Diagram

- To begin importing IQ data from R&S® IQWIZARD, click the green “Import” button in WinIQSIM™ Block Diagram. This will bring up the **Import Info** dialog box as shown in Figure 4. Configure the parameters accordingly and click “Update Settings”.

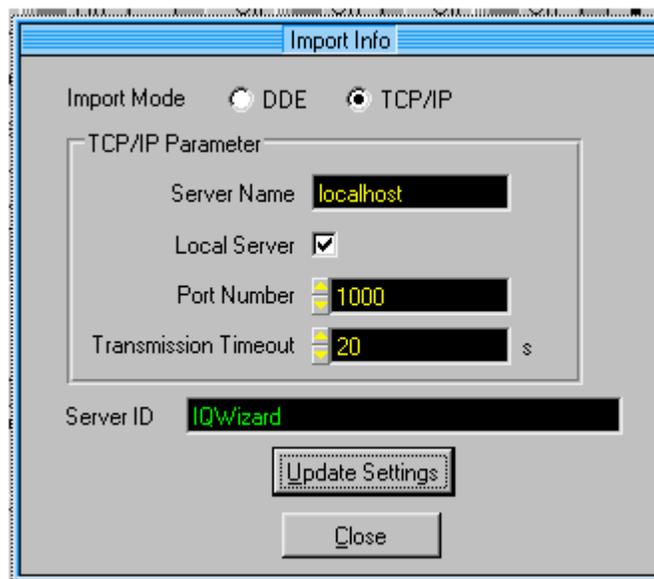
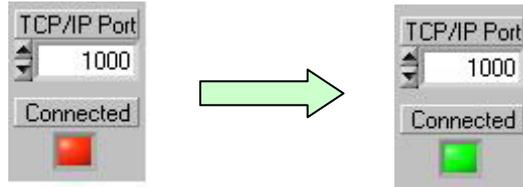


Figure 4, R&S® IQWIZARD Import Info Dialog Box

- In R&S® IQWIZARD software set TCP/IP port number to that configured in WinIQSIM™. A green LED indicates that the link is setup successfully.



- For this conversion process, no filtering is required. It can be turned Off from WinIQSIM™ green “Filter” button in the Block Diagram.
- In WINIQSIM™ “ARB” menu, select “Target ARB” to be SFU-K35.
- SFU Waveform Transmission** dialog box can now be selected with the following:

ARB --- > SFU(ARB)--- > Transmission

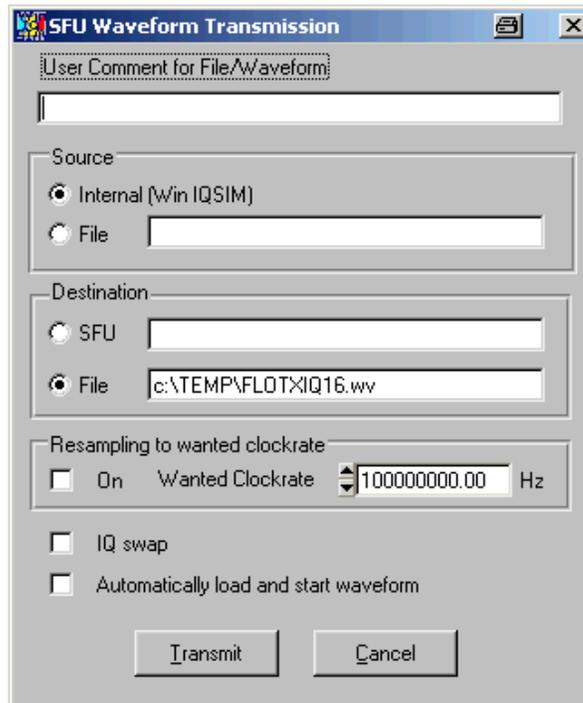
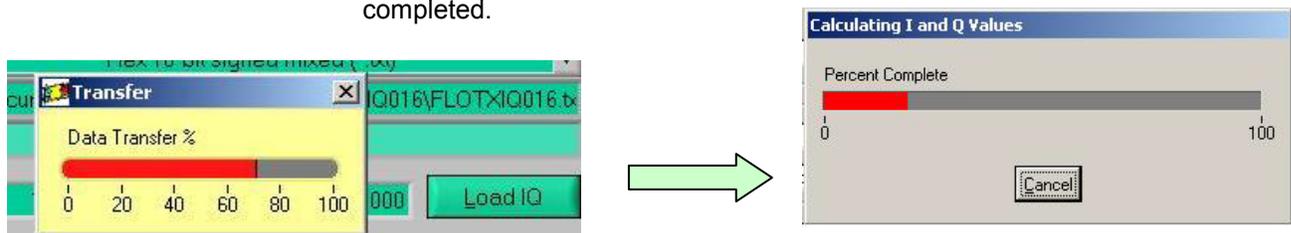


Figure 5, SFU Waveform Transmission dialog box.

- Select Source to “**Internal (WinIQSIM)**”. Specify a **Destination File** where the converted file will be saved. Once this is done, click “**Transmit**” to begin the file generation process. Typical time taken to convert a file of 1 Gbyte in size takes approximately 50 minutes on a PC with 3 GHz CPU and 2 Gbyte of RAM. A file with .wv extension will be created once the conversion is completed.



- Transfer the converted .wv file into R&S® SFU via IEEE 488.2 (GPIB), FTP or USB memory device. Refer to page 34 of Application Note 7BM57 [2] for further details. In case of R&S® SFE / SFE100 you have to use FTP or an USB memory device for the .wv file transfer.
- A sample of the MediaFLO™ signal generated with R&S® SFU is shown as below.

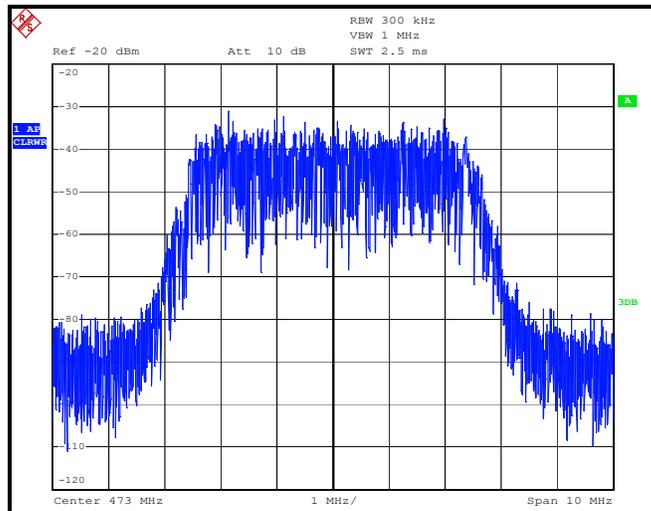


Figure 6, MediaFLO™ signal generated by R&S® SFU

6 Summary

With R&S® IQWIZARD and WinIQSIM™, MediaFLO™ waveform files can be converted to R&S® SFx ARB format allowing a wide range of signal simulation possibilities. Additional options allow comprehensive simulations of reproducible environment in laboratories. Interference and noise, including AWGN, phase noise and impulsive noise, could be easily added in this highly flexible platform. Refer to R&S® SFU / SFE / SFE100 product brochures for a complete range of functions possible.

7 Literature & References

- 1MA28, R&S® IQWizard IQ Signal Measurement and Conversion
- 7BM57, R&S® SFU & WinIQSIM™ Functions and uses of the Arbitrary Function Generator (ARB)
- FLO Technology Overview, QUALCOMM, Inc.
- R&S® SFU Broadcast Test System Product Brochures, SFU-bro_en.pdf

8 Additional Information

Our Application Notes are regularly revised and updated.
Check for any changes at <http://www.rohde-schwarz.com>.

Please send any comments or suggestions about this Application Note to Broadcasting-TM-Applications@rohde-schwarz.com.

9 Ordering Information

R&S® SFU

| Designation | Type | Order No. |
|---|--------------|-----------------|
| Broadcast Test System including power cable, hardcopy of quick start guide, CD-ROM (includes operating manuals and quick start guide) | R&S®SFU | 2110.2500.02 |
| Options | | |
| Basic configuration | | |
| Realtime Disabled (option available only at initial delivery) | R&S®SFU-K81 | 2110.7960.02 |
| Realtime Enabled (only if R&S®SFU-K81 is installed) | R&S®SFU-K82 | 2110.7976.02 |
| RF path | | |
| High Power | R&S®SFU-B90 | 2110.8008.03 |
| Digital modulation systems | | |
| DVB-T/H Coder | R&S®SFU-K1 | 2110.7301.02 |
| DVB-C/ISDB-C Coder | R&S®SFU-K2 | 2110.7324.02 |
| DVB-S/DVB-DSNG Coder | R&S®SFU-K3 | 2110.7330.02 |
| DVB-S2 Coder (requires an installed R&S®SFU-B1 or R&S®SFU-B10) | R&S®SFU-K8 | 2110.7399.02 |
| ATSC/ 8VSB Coder | R&S®SFU-K4 | 2110.7353.02 |
| ATSC/ A-VSB Coder | R&S®SFU-K14 | only on request |
| ATSC M/H ² Coder | R&S®SFU-K18 | only on request |
| J.83/B Coder | R&S®SFU-K5 | 2110.7360.02 |
| ISDB-T/ISDB-T _B /ISDB-T _{SB} Coder | R&S®SFU-K6 | 2110.7376.02 |
| MediaFLO™ Coder (requires an installed R&S®SFU-B10) | R&S®SFU-K10 | 2110.7524.02 |
| T-DMB/DAB Coder | R&S®SFU-K11 | 2110.7518.02 |
| DMB-T (TDS-OFDM) Coder (requires an installed R&S®SFU-B1 or R&S®SFU-B10) | R&S®SFU-K7 | only on request |
| DTMB/DMB-TH (TDS-OFDM) Coder (requires an installed R&S®SFU-B1 or R&S®SFU-B10) | R&S®SFU-K12 | 2110.7760.02 |
| Coder CMMB ²³ (requires an installed R&S®SFU-B1 or R&S®SFU-B10) | R&S®SFU-K15 | 2110.7818.02 |
| DIRECTV Legacy Modulation Coder (requires an installed R&S®SFU-B1 or R&S®SFU-B10) | R&S®SFU-K9 | 2110.7401.02 |
| AMC Coder (requires an installed R&S®SFU-K8 (DVB-S2) and an installed R&S®SFU-B1 or R&S®SFU-B10) | R&S®SFU-K108 | only on request |
| Coder Extension 1 | R&S®SFU-B1 | 2110.7424.02 |
| Coder Extension 10 | R&S®SFU-B10 | 2110.7747.02 |
| Analog modulation systems | | |
| Coder AM/FM RDS (requires an installed R&S®SFU-B2) | R&S®SFU-K170 | 2110.7830.02 |
| ATV Standard B/G Coder (requires an installed R&S®SFU-B2) | R&S®SFU-K190 | 2110.8050.02 |
| ATV Standard D/K Coder (requires an installed R&S®SFU-B2) | R&S®SFU-K191 | 2110.8037.02 |
| ATV Standard I Coder (requires an installed R&S®SFU-B2) | R&S®SFU-K192 | 2110.8043.02 |
| ATV Standard M/N Coder (requires an installed R&S®SFU-B2) | R&S®SFU-K193 | 2110.8066.02 |
| ATV Standard L Coder (requires an installed R&S®SFU-B2) | R&S®SFU-K194 | 2110.8072.02 |
| Multi ATV Predefined (requires an installed R&S®SFU-B3) | R&S®SFU-K199 | 2110.8089.02 |
| Coder Extension 2 preinstalled in R&S®SFU from serial no. 101000 | R&S®SFU-B2 | 2110.7430.02 |

² In preparation.

MediaFLO™ Waveform Files for R&S® SFx-K35 ARB

| Simulation | | |
|--|--------------|-----------------|
| Fading Simulator | R&S®SFU-B30 | 2110.7530.02 |
| Fading Simulator Extension to 40 Paths (requires an installed R&S®SFU-B30) | R&S®SFU-B31 | 2110.7547.02 |
| Enhanced Fading (requires an installed R&S®SFU-B30) | R&S®SFU-K30 | 2110.7560.02 |
| Gaussian Fading (requires an installed R&S®SFU-B30) (included in R&S®SFU-B30 option) | R&S®SFU-K32 | 2110.7630.02 |
| ARB Generator (requires an installed R&S®SFU-B3) | R&S®SFU-K35 | 2110.7601.02 |
| Memory Extension 1 preinstalled in R&S®SFU from serial no. 101000 | R&S®SFU-B3 | 2110.7447.02 |
| T-DMB/DAB Waveforms (can be used with R&S®SFU-K35) | R&S®SFU-K351 | 2110.4277.02 |
| DVB-H Waveforms (can be used with R&S®SFU-K35) | R&S®SFU-K352 | 2110.4425.02 |
| DRM Waveforms (can be used with R&S®SFU-K35) | R&S®SFU-K353 | 2110.4554.02 |
| DTV Interferers (can be used with R&S®SFU-K35) | R&S®SFU-K354 | 2110.4690.02 |
| MediaFLO™ Waveforms (can be used with R&S®SFU-K35) | R&S®SFU-K355 | 2110.2974.02 |
| Cable Interferers (can be used with R&S®SFU-K35) | R&S®SFU-K356 | 2110.3212.02 |
| HD Radio™ Waveforms (can be used with R&S®SFU-K35, Ibisquity license required) | R&S®SFU-K357 | only on request |
| CMMB Waveforms ³ (can be used with R&S®SFU-K35) | R&S®SFU-K358 | only on request |
| Interferer Management | R&S®SFU-K37 | 2110.7647.02 |
| AWGN Noise | R&S®SFU-K40 | 2110.7653.02 |
| Phase Noise | R&S®SFU-K41 | 2110.7660.02 |
| Impulsive Noise | R&S®SFU-K42 | 2110.7676.02 |
| Multinoise Use (requires at least one installed R&S®SFU-K40, R&S®SFU-K41, or R&S®SFU-K42) | R&S®SFU-K43 | 2110.7682.02 |
| Custom OFDM (generates customer-specific OFDM signals) | R&S®SMU-K15 | 1160.6402.02 |
| Baseband inputs/outputs | | |
| Extended I/Q | R&S®SFU-K80 | 2110.7953.02 |
| ETI Input/Output | R&S®SFU-B11 | 2110.7553.03 |
| Digital baseband | | |
| TS Generator including SDTV streams | R&S®SFU-K20 | 2110.7476.02 |
| DVB-H Stream Library (requires an installed R&S®SFU-K20) | R&S®DV-DVBH | 2085.8704.02 |
| Test Card M Streams (requires an installed R&S®SFU-K20) | R&S®DV-TCM | 2085.7708.02 |
| HDTV Sequences (requires an installed R&S®SFU-K20) | R&S®DV-HDTV | 2085.7650.02 |
| H.264 Stream Library (requires an installed R&S®SFU-K20) | R&S®DV-H264 | 2085.9052.02 |
| ISDB-T Stream Library (requires an installed R&S®SFU-K20) | R&S®DV-ISDBT | 2085.9146.02 |
| TRP Player (requires an installed R&S®SFU-B6 and an installed R&S®SFU-B4) | R&S®SFU-K22 | 2110.7499.02 |
| TS/ETI Recorder (requires an installed R&S®SFU-K22, R&S®SFU-B6, and R&S®SFU-B4) | R&S®SFU-K21 | 2110.7482.02 |
| Memory Extension 2 | R&S®SFU-B4 | 2110.7453.02 |

³ In preparation.

MediaFLO™ Waveform Files for R&S® SFx-K35 ARB

| | | |
|---|--------------|--------------|
| Additional Hard Disk for instruments with serial numbers <101000 | R&S®SFU-B6 | 2110.7501.02 |
| Additional Hard Disk for instruments with serial numbers >101000 | R&S®SFU-B6 | 2110.7501.03 |
| T-DMB/DAB Streams (requires an installed R&S®SFU-K22) | R&S®SFU-K221 | 2110.4348.02 |
| DAB+ Streams (requires an installed R&S®SFU-K22) | R&S®SFU-K223 | 2110.4760.02 |
| MediaFLO™ Streams (requires an installed R&S®SFU-K22) | R&S®SFU-K222 | 2110.2968.02 |
| ISDB-T Streams (requires an installed R&S®SFU-K22) | R&S®SFU-K224 | 2110.4777.02 |

| | | |
|--|---------------|--------------|
| Analog baseband | | |
| Video Generator (included in R&S®SFU-K190 to -K194) | R&S®SFU-K23 | 2110.7799.02 |
| ATV Video Signals (can be used with R&S®SFU-K190 to R&S®SFU-K194) | R&S®ATV Video | 2110.4831.02 |
| Impedance Matching Pad 75/50 Ohms (can be used with R&S®SFU-K190 to R&S®SFU-K194) | R&S®SFU-Z19 | 2110.7276.02 |
| Measurement and analysis functions | | |
| RF Power Measurements (can be used with R&S®NRP-Zxx power sensors) | R&S®SFU-K55 | 2110.7753.02 |
| BER Measurements (cannot be used at all or only to a limited extent for DVB-S2, DIRECTV, DTMB, DMB-TH, and MediaFLO™) | R&S®SFU-K60 | 2110.7782.02 |
| Other expansions | | |
| User I/O (additional input/output) (supported by R&S®SFU firmware versions <V1.70) | R&S®SFU-B5 | 2110.7460.02 |
| Upgrade Kit for R&S®SFU-K43 | R&S®SFU-U43 | 2110.7699.02 |

R&S® SFE

| Order designation | Type | Order No. |
|---|--------------------|---------------------|
| Broadcast Tester including power cable, Quick Start Guide, CD-ROM (includes operating manuals) | R&S®SFE | 2112.4300.02 |
| Options | | |
| Digital modulation systems | | |
| DVB-T/H Coder | R&S®SFE-K1 | 2113.4010.02 |
| DVB-C/ISDB-C Coder | R&S®SFE-K2 | 2113.4032.02 |
| DVB-S/DVB-DSNG Coder | R&S®SFE-K3 | 2113.4055.02 |
| DVB-S2 Coder | R&S®SFE-K8 | 2113.4132.02 |
| ATSC/8VSB Coder | R&S®SFE-K4 | 2113.4078.02 |
| J.83/B Coder | R&S®SFE-K5 | 2113.4090.02 |
| ISDB-T/ISDB-Tsb/ISDB-T _B Coder | R&S®SFE-K6 | 2113.4110.02 |
| MediaFLO™ Coder | R&S®SFE-K10 | 2113.4178.02 |
| T-DMB/DAB Coder | R&S®SFE-K11 | 2113.4190.02 |
| DTMB / DMB-TH Coder | R&S®SFE-K12 | 2113.4210.02 |
| DirectTV Legacy Modulation Coder | R&S®SFE-K9 | 2113.4155.02 |
| Analog modulation systems | | |
| AM/FM/RDS Coder | R&S®SFE-K170 | 2113.4432.02 |
| ATV Standard B/G Coder | R&S®SFE-K190 | 2113.4655.02 |
| ATV Standard D/K Coder | R&S®SFE-K191 | 2113.4678.02 |
| ATV Standard I Coder | R&S®SFE-K192 | 2113.4690.02 |
| ATV Standard M/N Coder | R&S®SFE-K193 | 2113.4710.02 |
| ATV Standard L Coder | R&S®SFE-K194 | 2113.4732.02 |
| ATV Multistandard | R&S®SFE-K195 | 2113.4755.02 |
| ARB/waveforms | | |
| ARB Waveform Generator requires an installed R&S®SFE-B3 option | R&S®SFE-K35 | 2113.4932.02 |
| Memory Expansion | R&S®SFE-B3 | 2112.4500.02 |
| R&S®WinIQSIM™ Support | R&S®SFE-K350 | 2113.4955.02 |
| T-DMB/DAB Waveforms can be used with the R&S®SFE-K35 option | R&S®SFU-K351 | 2110.4277.04 |
| DVB-H Waveforms can be used with the R&S®SFE-K35 option | R&S®SFU-K352 | 2110.4425.02 |
| DRM Waveforms can be used with the R&S®SFE-K35 option | R&S®SFU-K353 | 2110.4554.02 |
| DTV Waveforms can be used with the R&S®SFE-K35 option | R&S®SFU-K354 | 2110.4690.02 |
| MediaFLO™ Waveforms can be used with the R&S®SFE-K35 option | R&S®SFU-K355 | 2110.2974.02 |
| Cable Interferers can be used with the R&S®SFE-K35 option | R&S®SFU-K356 | 2110.3212.02 |
| Simulation | | |
| AWGN Generator | R&S®SFE-K40 | 2113.4910.02 |

MediaFLO™ Waveform Files for R&S® SFX-K35 ARB

| Baseband inputs/outputs | | |
|---|---------------|--------------|
| Extended I/Q Input | R&S®SFE-K80 | 2113.5251.02 |
| Digital baseband | | |
| TS Generator including SDTV streams | R&S®SFE-K20 | 2113.4878.02 |
| DVB-H Stream Library requires the R&S®SFE-K20 option | R&S®DV-DVBH | 2085.8704.02 |
| Test Card M Streams requires the R&S®SFE-K20 option | R&S®DV-TCM | 2085.7708.02 |
| HDTV Sequences requires the R&S®SFE-K20 option | R&S®DV-HDTV | 2085.7650.02 |
| H.264 Stream Library requires the R&S®SFE-K20 option | R&S®DV-H264 | 2085.9052.02 |
| ISDB-T Stream Library requires the R&S®SFE-K20 option | R&S®DV-ISDBT | 2085.9146.02 |
| TRP Player requires an installed R&S®SFE-B6 option | R&S®SFE-K22 | 2113.5274.02 |
| Second Hard Disk (Compact Flash) | R&S®SFE-B6 | 2112.4522.02 |
| T-DMB/DAB Streams requires the R&S®SFE-K22 option | R&S®SFU-K221 | 2113.4348.02 |
| MediaFLO™ Streams requires the R&S®SFE-K22 option | R&S®SFU-K222 | 2110.2968.02 |
| Analog baseband | | |
| Video Generator | R&S®SFE-K23 | 2113.4890.02 |
| ATV Video Signals | R&S®ATV Video | 2110.4831.02 |
| Measurement and analysis | | |
| BER Measurement possible for DVB-S2, DirecTV, DTMB, and MediaFLO™ to a limited extent or not possible at all | R&S®SFE-K60 | 2113.5151.02 |

R&S® SFE100

| Order designation | Type | Order No. |
|--|-------------|--------------|
| Test Transmitter For digital standards or ARB generator, including power cable, Quick Start Guide, CD-ROM (includes operating manuals) | R&S® SFE100 | 2112.4100.02 |
| Test Transmitter For analog standards, including power cable, Quick Start Guide, CD-ROM (includes operating manuals) | R&S® SFE100 | 2112.4100.03 |

| Options | | |
|---|------------------|--------------|
| Digital modulation systems | | |
| DVB-T/H Coder | R&S® SFE100-K1 | 2113.4003.02 |
| DVB-C/ISDB-C Coder | R&S® SFE100-K2 | 2113.4026.02 |
| DVB-S/DVB-DSNG Coder | R&S® SFE100-K3 | 2113.4049.02 |
| DVB-S2 Coder | R&S® SFE100-K8 | 2113.4126.02 |
| ATSC/8VSB Coder | R&S® SFE100-K4 | 2113.4061.02 |
| J.83/B Coder | R&S® SFE100-K5 | 2113.4084.02 |
| ISDB-T/ISDB-Tsb/ISDB-T _B Coder | R&S® SFE100-K6 | 2113.4103.02 |
| MediaFLO™ Coder | R&S® SFE100-K10 | 2113.4161.02 |
| T-DMB/DAB Coder | R&S® SFE100-K11 | 2113.4184.02 |
| DTMB Coder | R&S® SFE100-K12 | 2113.4203.02 |
| DirecTV Legacy Modulation Coder | R&S® SFE100-K9 | 2113.4149.02 |
| Analog modulation systems | | |
| ATV Standard B/G Coder | R&S® SFE100-K190 | 2113.4649.02 |
| ATV Standard D/K Coder | R&S® SFE100-K191 | 2113.4661.02 |
| ATV Standard I Coder | R&S® SFE100-K192 | 2113.4684.02 |
| ATV Standard M/N Coder | R&S® SFE100-K193 | 2113.4703.02 |
| ATV Standard L Coder | R&S® SFE100-K194 | 2113.4726.02 |
| ARB/waveforms | | |
| ARB Waveform Generator requires an installed R&S® SFE100-B3 option | R&S® SFE100-K35 | 2113.4926.02 |
| Memory Extension | R&S® SFE100-B3 | 2112.4400.02 |
| R&S® WinIQSIM™ Support | R&S® SFE100-K350 | 2113.4949.02 |
| T-DMB/DAB Waveforms can be used with the R&S® SFE100-K35 option | R&S® SFU-K351 | 2110.4277.04 |
| DVB-H Waveforms can be used with the R&S® SFE100-K35 option | R&S® SFU-K352 | 2110.4425.02 |
| DRM Waveforms can be used with the R&S® SFE100-K35 option | R&S® SFU-K353 | 2110.4554.02 |
| DTV Interferers can be used with the R&S® SFE100-K35 option | R&S® SFU-K354 | 2110.4690.02 |
| MediaFLO™ Waveforms can be used with the R&S® SFE100-K35 option | R&S® SFU-K355 | 2110.2974.02 |
| Cable Interferers can be used with the R&S® SFE100-K35 option | R&S® SFU-K356 | 2110.3212.02 |

MediaFLO™ Waveform Files for R&S® SFX-K35 ARB

| Baseband inputs/outputs | | |
|---|----------------|--------------|
| Extended I/Q Input | R&S®SFE100-K80 | 2113.5245.02 |
| Digital baseband | | |
| TS Generator including SDTV streams | R&S®SFE100-K20 | 2113.4861.02 |
| DVB-H Stream Library requires the R&S®SFE100-K20 option | R&S®DV-DVBH | 2085.8704.02 |
| Test Card M Streams requires the R&S®SFE100-K20 option | R&S®DV-TCM | 2085.7708.02 |
| HDTV Sequences requires the R&S®SFE100-K20 option | R&S®DV-HDTV | 2085.7650.02 |
| H.264 Stream Library requires the R&S®SFE100-K20 option | R&S®DV-H264 | 2085.9052.02 |
| ISDB-T Stream Library requires the R&S®SFE100-K20 option | R&S®DV-ISDBT | 2085.9146.02 |
| TRP Player requires an installed R&S®SFE100-B6 option | R&S®SFE100-K22 | 2113.5268.02 |
| Second Hard Disk | R&S®SFE100-B6 | 2112.4539.02 |
| T-DMB/DAB Streams requires the R&S®SFE100-K22 option | R&S®SFU-K221 | 2113.4348.02 |
| MediaFLO™ Streams requires the R&S®SFE100-K22 option | R&S®SFU-K222 | 2110.2968.02 |
| Analog baseband | | |
| Video Generator | R&S®SFE100-K23 | 2113.4884.02 |
| ATV Video Signals | R&S®ATV Video | 2110.4831.02 |
| Other extras | | |
| High Power | R&S®SFE100-B90 | 2112.4900.02 |



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