DekTec **DTU-215 Gold Edition**

modulation standard

• Ideal for use as a test signal modulator, for example, for receiver manufacturers

• Capable of modulating transponder streams as well as test signals

• Fully compatible with all HD standards • Plug&Play for Windows PC



DTU-215 MODULATOR

DekTed

• Professional modulator for nearly every digital





The Gold Modulator **One Modulator for Every Terrestrial Digital TV Standard**

different standards. Most of pany located in Holland, has the terrestrial receivers that developed a multi-standard we have introduced to you modulator just for this type here in the pages of TELE- of application. It's ideally satellite receive signals in suited to test terrestrial the DVB standard, for ex- receivers in different TV ample, DVB-T (most often standards and to take these used for TV transmissions in digital TV signals and make standard definition) and the them available in the VHF/ newer DVB-T2 (mostly used UHF range. for high resolution signals). For those receivers used with cable TV networks, it's lator hardware is enclosed mostly DVB-C while receivers in the ISDB-T standard gray aluminum box that is are used in South America.

ers can be found all over the signal output on both ends world and therefore have direct access to their corresponding signal standards. But the same can't be said receiver production line sim- put signal comes from and signals in other standards.

better to bring the neces- power from thePC via the sary signals to the manu- USB 2.0 interface.

Digital TV has a number of facturer. DekTec, a com-

All of the DekTec's moduin an unremarkable, silver-TELE-satellite test report- connector as well as the RF of the box.

If you're all scratching your heads now trying to for receiver manufacturers: a figure out where the inply can't be moved from one how the box gets its power, location to another for the DekTec has found a rather purpose of receiving live TV interesting solution: the DekTec DTU-215 is designed to be used with any stan-Obviously, it would be far dard PC and thus gets its

doesn't place too much of a stick. demand on the PC: an Intel Pentium III processor with 1 GB of memory is enough for almost all of the modulator's functions; in the case tor to our PC via the USB 2.0 of DVB-T2, a more powerful processor would be needed, for example, an Intel Core 2 and set it up in just a few Duo.

All of the required drivers and the necessary software ing this modulator, a few are supplied by DekTec on basic settings have to be a USB stick. This USB stick taken care of first. This in-123 x 62 x 22mm in size. It not only contains the soft- cludes the modulation mode comes with a single USB 2.0 ware for the DTU-215, but as well as the desired output it also has DekTec's en- frequency. The modulations tire software palette. This are listed in Table 1. means the user has to search through all the files on the USB stick to find the output frequency between matching software for the 47 and 1000 MHZ in the DTU-215.

> and packaging of the modu- nal output level for QAM is lator left us with a very good between -46 and -15 dBm; impression; clearly, this is a with OFDM it lies between high-end product for use by -49 and -18 dBm. The modprofessionals.

required drivers in the operating system (Windows XP/2003/Vista/2008 and Windows 7 are supported). This all functioned very easilv with a double-click on the installation assistant. The Stream Player Software, the modulator's actual control center, was just as quickly installed and set up only after we found it hidden behind a DTC-300 labelled The little modulator box folder on the included USB Once all of the software

lation manual included by the manufacturer regarding the integration of the

needs were taken care of, we connected the modulaport. Windows instantly recognized the new hardware seconds.

Before we can start test-

The user can select an VHF and UHF bands with a bandwidth from 2.7 to 8 Overall, the workmanship MHz. The modulators sigulator draws roughly 500mA at 5V; this can be obtained We referred to the instal- from a USB 2.0 interface so



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Derlec

1 DVB-T CCIR C: 28 F: 530.00 MHz	DVB-T/H
VIDEO: MPEG-2 0kb/s MP@ML 480x576i 4:3	VBER: <1.0E-7
VPID: 307 TSID: 102625Hz AUDIO:	-7 -6 -5 QEF -3 -2 -1 FREQ: 530.00 MHz C/N: >48.0 dB
MPEG-2 L-2 Okb/s APID: 308 LANGUAGE: eng NETW.:	2 kHz POWER: 77.3 dBμV CH: 28 MER: >34.0 dB
DTV OSD: OFF 19.2E (FREE) CNBC Europe NID: 37228 SID: 10030	CBER: <1.0E-5 >VBER: <1.0E-7
	MPEG-2 TS DVB-T
DVB-T/H	4 70FREQ: 340.40 MHz POWER: <18.3 dBμV
VBER: 3.5E-6	60
-7 -6 -5 QEF -3 -2 -1	50
FREQ: 530.00 MHz C/N: >45.7 dB 2 kHz POWER: 55.2 dBμV	40
CH: 28 MER: >34.0 dB CBER: <1.0E-5	30
>VBER: 3.5E-6 MPEG-2 TS DVB-T	CH: SPAN: FULL

ply is not necessary.

Since the box modulates output. the stream 1:1 and passes it on to the attached receiver,

ample, MPEG-2 or MPEG- tors are more likely to deal All of the popular trans- stream is, the better the are smaller national opera- can find suitable cards in port streams can be used. result at the modulator's RF tors).

raw MPEG, AVI or even DivX complete stream and where numerous other features content is not suitable. The do you get it from? You of the individual channels DTU-215 does not modify should direct yourself to a in the stream of the tran- cates with the PC through the stream, rather, it pass- stream from a satellite op- sponder such as EPG, Sub- the PCI-e port so that there es it along with all its infor- erator that is known for its title, teletext, multiple audio won't be any problems remation in the preselected proper streams (Tip: larger tracks or even encryption.

that an external power sup- modulation mode (for ex- worldwide satellite opera-

In addition to a complete the award winning HDTV PC How do you recognize a PMT, you should look for card).

To record such a stream you can use a standard 4). The more complete the with correct streams than DVB-S/S2 card for a PC (you this issue of TELE-satellite on the overview pages of

> This PC card communicording large data rates like



5 70	FRE	Q:	<mark>340.40</mark> МН2 <17.9 dBµ
60			
50			
40			
30			
CH:		SPAN:	FULL

DVB-T	CCIR C: 28 F: 530.00 MHz
	VIDEO:
	MPEG-2 2267kb/s MP@ML 480x576i 4:3 VPID: 307 TSID: 102625Hz
	AUDIO:
	MPEG-2 L-2 151 kb/s APID: 308 LANGUAGE: eng
	NETW.:
DTV OSD: OFF (FREE)	19.2E ASTRA 1 CNBC Europe
	NID: 1 SID: 10030

sponder with multiple HD channels.

Streams stored in this contains, the PIDs that are manner find their way 1:1 in the Stream Player Software which are then completely read and modulated into the desired output data stream.

In the software's main

window the user is pre-

those from a DVB-S2 tran- sented with three large text fields that contain information on the transponder stream, which channels it in use and the data rate that was used to send it.

> Since the DekTec DTU-215 cannot receive a live input signal and instead relies on a stream that is already available, the Stream Player

Norm	SD	HD	Main Usage Areas	Transmission	Receiver
DVB-T	yes	no	Europe, Parts of Asia and Africa, Australia	Terrestrial	STB
DVB-T2	yes	yes	Parts of Europe and Africa	Terrestrial	STB
DVB-H	yes	no	Parts of Europe and Asia	Terrestrial	Smartphone*
DVB-C	yes	yes	Europe	Cable	STB
DVB-C2	yes	yes	Parts of Europe	Cable	STB
QAM	yes	no	Europe	Cable, MVDS	STB
ISDB-TB	yes	yes	South America	Terrestrial	STB
ATSC	yes	yes	North America	Terrestrial	STB
DMB-TH	yes	yes	China	Terrestrial	STB
СММВ	yes	no	China	Terrestrial	Smartphone*

Table 1: The most important modulation standards supported by the DTU-215 Gold Edition (*Note: If you are connecting to a SmartPhone without an antenna input jack, an external transmitter would be necessary)



6 (III)			DV	В-Т ,	/H
CBE	R:		<	1.0E	-5
-5	-4	-	3	-2	-1
FREQ:	530.00	MHz	C/N:	>42.2	dB
CH:	3 28	kHz	POWER: MER: »CBER: VBER:	>34.0 <1.0	
MPEG-2 TS DVB-T					
B DVB-	AL F	CIR : 53 IDEO	30.00 MHz	C: 2	8



1. The DekTec DTU-215 modulates a DVB-T signal from an original transponder stream via satellite 2. Signal measurement without artificially introduced errors

3. Signal measurement with artificially introduced errors through the modulator

4. The signal curve in the spectrum with high output level

5. The signal curve in the spectrum with low output signal

6. Signal measurement with artificially introduced errors through the modulator

7. Through the introduction of data containing errors, the display on our analyzer was significantly distorted

8. Clean image without any modulator introduced error

bits

Deklec

Adapter 1: MOD (DTU-215)	Profile Settings
1: MOD (DTU-215) 🔹 🧑	The second se
	Channel Simulator
File	Image: Constraint of the second state of the second sta
G= 1/8 V //8 V more	Enable #Paths: 1 - Total path power: 0 dB Normalise
Memory buffers 32 MB; 4 MB	# Type Atten (dB) Delay (us) Phase (deq) Speed (km/h) Doppler (Hz) 1 CONSTANT_DELAY 0 0 0 0
	5 kTec StreamXpress - Channel Simulator
Adapter	Profile Settings
1: MOD (DTU-215) -	Channel Simulator
→ Sile 152 € 11.57 V 0.0-13 20 → 138.678.65 bytes → 742.962 packets Packet Size → 188.678.82 bps → Parial Transport Stream → Original: 33.790.832 bps → Averace: 13.920.954 bos → ■ ● MiHz ● MiHz ■ ● 1/8 ▼ ● 1/8 ▼ ■ ● 1/8 ▼ ● 1/8 ▼ ● 1/8 ▼ ● 1/8 ▼ ● 1/8 ▼ ● 1/8 ▼ ● 1/8 ▼ ● 1/8 ▼ ● 1/8 ▼ ● 1/8 ● 1/8 ● 1/8 ● 1/8	AWGN Image: Enable SNR: 20,0 million dB (relative to original signal, without attenuation) Modulation bandwidth: 8,000 MHz Noise power in signal: -20,00 dB Total noise bandwidth: 9,143 MHz Total noise power: -19,42 dB Multiple Transmission Paths Simulation Image: Comparison of the simulation Total path power: 0,00 dB Normalise
Memory buffers 32 MB; 4 MB	# Type Atten Delay Phase Speed Doppler (dB) (us) (deg) (km/h) (Hz)
TxFIFO 16 MB HW 64 MB	Image:
	19,3 0,00 0
	19,3 0,00 0
	19,3 0,00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
1. 1100 (010-210)	
Pile Astra 192'E 11597 V 05-15 20 - Astra 192'E 11597 V 05-15 20 - 139,676.856 bytes - 742.962 packets Packet Size E Estimated Rate - Partial Transport Stream - Original 3.3706.982 bos - Mitz 6 MHz fading Memory buffers \$2 MB; 4 MB	Status 6 re DVB-T / DVB-H Parameters In-depth inner interleaver (\$27): 0 Notes and the interleaver of the interleave

Software can play it back Software can simulate the in an endless line; even loss of data packets, bit er- you adjust the signal level 2. Detailed information can be individual portions of the rors as well as entire byte between -46 and -15 dBm displayed for every PID in the transponder stream stream can be replayed.

As a professional unit, lectable. the DTU-215 can also modways that a user with nor- feature in that it allows you see how the signal curve multiple stations mal TV reception would to thoroughly test the input changes in the spectrum of 5. Through a total of six stations never want: it can artifi- sensitivity and error corcially introduce errors. In rection capability of a rethis way the Stream Player ceiver.

The DTU-215 also lets 1. The Stream Player's main window By looking at the screen-shots that came with this tect report you can clearly our signal analyzer.

Even the simulation of a DVB-T/H mode

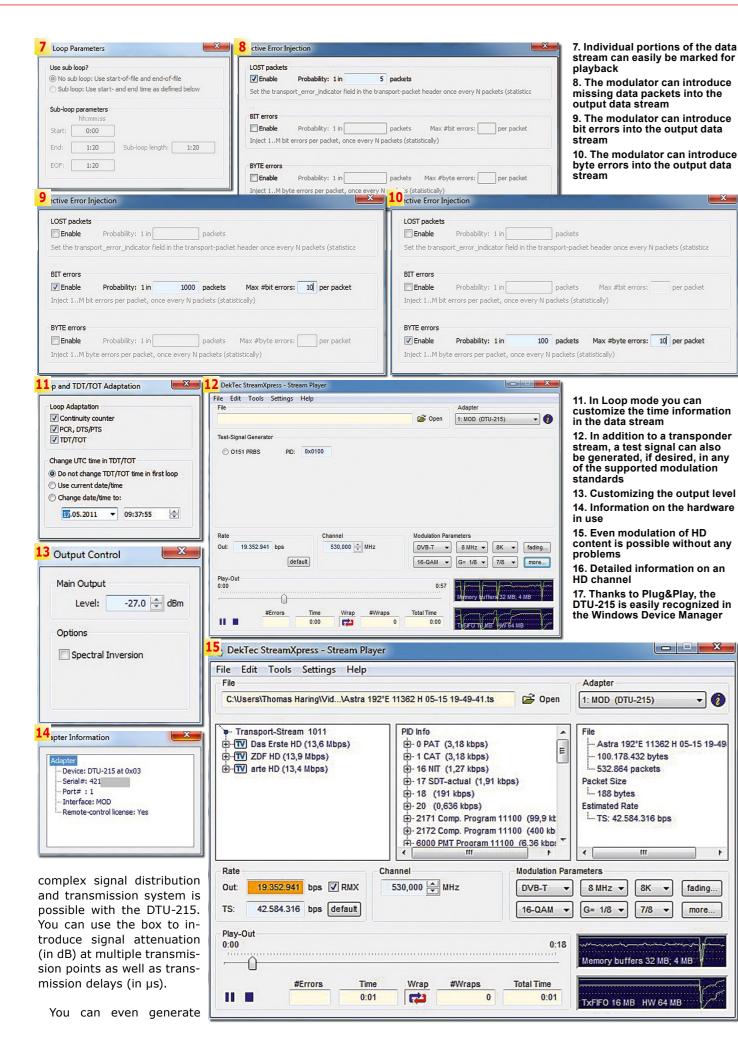
errors in amounts and fre-quencies that are user-se-and -18 dBm with OFDM. Transponder stream **3. Frequency selection in ISDB-T Mode**

ify the transport stream in This is an outstanding test report, you can clearly the signal can be simulated over

the signal can be individually adjusted for attenuation and delay

6. Various additional options in

Derec



16 DekTec StreamXpress - Stream Playe File Edit Tools Settings Help nas Harino/Vid. \Astra 192°E 11362 H 05-15 19-49-41.ts 1: MOD (DTU-215) 0 - Astra 192°E 11362 H 05-15 19-4 - J MPEG-1 Audio 2 (267 kbps) . 0 PAT (3,18 kbps) MPEG-1 Audio 4 (266 kbps) -1 CAT (3,18 kbps) - 100.178.432 bytes Otto Private data 1 (281 kbns) 16 NIT (1 27 kbns - 532.864 packets B-⁰¹¹⁰ B-⁰¹¹⁰ Private data 1 (300 kbps) B-⁰¹¹⁰ Private data (3,82 kbps) 17 SDT-actual (1,91 kbp Packet Size -18 (191 kbps) AVC/H.264 Video (12,3 Mbp: Private Sections (1,91 kbps) -20 (0,636 kbps) Estimated Rate - 2171 Comp. Program 11100 (99.9 kt -TS: 42.584.316 bps - 2172 Comp. Program 11100 (400 kb - 6000 PMT Program 11100 (6.36 kbp) Provider: ZDFvision PCR PID: 6210 9.352.941 bps 🔽 RMX Out: 530,000 🚔 MHz DVB-T 42.584.316 bps default TS: [16-QAM ▼] G= 1/8 ▼ 7/8 ▼ more... Play-Out 0:00 Time 0:06 Wrap 0:07

a test signal in any of the modulation standards as well as an AWGN (Additive White Gaussian Noise) signal. If you introduce this AWGN signal to the actual signal and manipulate its amplitude according to a Gauss curve, you can model what would happen to the original signal if it should get disturbed by white noise.

During our tests we were quite surprised at the high efficiency of the modulator and the relatively small load it placed on the PC. We were able to modulate a transport stream with five TV channels and multiple radio channels along with all of the additional services and display them on a TV via DVB-T.

(+)

It became interesting though when we tried to take an HDTV transponder with a total of three HD channels and modulate it in DVB-T2. It was easy to see that the USB 2.0 port was at the limits of its capabilities. But if you reduce the number of HD channels in the transport stream, it can problems.

The DekTec DTU-215 is available from the manufacturer in two versions: While the DTU-215 Gold Edition can handle every possible modulation including future versions and can simulate a complex signal distribution network plus generate an AWGN signal, these options are not available in the

Expert Opinion

The DekTec DTU-215 is a professional signal modulator for nearly every digital modulation standard via satellite, terrestrial or cable. Thanks to the multifaceted Stream Player Software, it makes an exceptional test instrument and can also be used for demonstration purposes.



No information is provided on which of the many drivers stored on the included USB stick are actually for use with the modulator

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ile Action View Help	
a TSI	
> 📲 Computer	
Disk drives	
Display adapters	
DVD/CD-ROM drives	
り 単調 Human Interface Devices	
Gamma IDE ATA/ATAPI controllers	
> The second sec	
Keyboards	
Mice and other pointing devices	
Monitors	
Network adapters	
Portable Devices	
Ports (COM & LPT)	
Processors	
a - professional audio/video interfaces	
DTU-215 USB-2 Multi-Standard Modulator/VHF+UHF Upconverter	
Sound, video and game controllers	
IF System devices	
Universal Serial Bus controllers	

DTU-215 SP nor are some of the modulations (ISDB-T, CMMB, DTMB).

If you have sufficient programming experience, you can develop your own software with the help of the C++ API available for download from the manufacturer that would access the atbe processed without any tached hardware through

the DekTec drivers.

This would seem to be a good time to point out that DekTec offers not only Windows drivers but Linux drivers as well although the matching modulator control software is not yet available for Linux; the user must develop it themselves using the C++ API.

TECHNICAL		
DATA		
Manufacturer	DekTec Digital Video B.V., Van Riebeeckweg 43A, 1212 EH Hilversum, The Netherlands	
Email sales	info@dektec.com	
Internet	www.dektec.com	
Model	DTU-215 Gold Edition	
Function	USB 2.0 digital VHF/UHF Modulator	
Frequency range	47 1000 MHz (+/- 1ppm)	
Bandwidth	2.7 8 MHz	
Modulations	ATSC VSB, ADTB-T/DTMB, CMMB, DVB-C, DVB-C2 DVB-T/DVB-H, DVB-T2, ISDB-T, QAM	
MER (OFDM)	> 42dB	
RF Connector	75 Ohm (F)	
Return loss	15dB (47 862 MHz)	
Level (QAM)	-4615dBm (+/-2 dB)	
Level (OFDM)	-4918dBm (+/-2 dB)	
Amplitude Step Size	0.5dB	
Adjacent Channel	-54dB (QAM), -52dB (OFDM)	
Phase Noise	< -95dBc @ 10kHz	
Spectral Purity	> 50dB (47 1000MHz)	
USB Port	USB 2.0	
Power (through USB 2.0)	5V, 500mA	
Dimensions	123 x 62 x 22 mm	