

DekTec DTU-215 Gold Edition

- Professional modulator for nearly every digital 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



The Gold Modulator

One Modulator for Every Terrestrial Digital TV Standard

Digital TV has a number of different standards. Most of the terrestrial receivers that we have introduced to you here in the pages of TELE-satellite receive signals in the DVB standard, for example, DVB-T (most often used for TV transmissions in standard definition) and the newer DVB-T2 (mostly used for high resolution signals). For those receivers used with cable TV networks, it's mostly DVB-C while receivers in the ISDB-T standard are used in South America.

TELE-satellite test reports can be found all over the world and therefore have direct access to their corresponding signal standards. But the same can't be said for receiver manufacturers: a receiver production line simply can't be moved from one location to another for the purpose of receiving live TV signals in other standards.

Obviously, it would be far better to bring the necessary signals to the manu-

facturer. DekTec, a company located in Holland, has developed a multi-standard modulator just for this type of application. It's ideally suited to test terrestrial receivers in different TV standards and to take these digital TV signals and make them available in the VHF/UHF range.

All of the DekTec's modulator hardware is enclosed in an unremarkable, silver-gray aluminum box that is 123 x 62 x 22mm in size. It comes with a single USB 2.0 connector as well as the RF signal output on both ends of the box.

If you're all scratching your heads now trying to figure out where the input signal comes from and how the box gets its power, DekTec has found a rather interesting solution: the DekTec DTU-215 is designed to be used with any standard PC and thus gets its power from the PC via the USB 2.0 interface.

The little modulator box doesn't place too much of a 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 of DVB-T2, a more powerful processor would be needed, for example, an Intel Core 2 Duo.

All of the required drivers and the necessary software are supplied by DekTec on a USB stick. This USB stick not only contains the software for the DTU-215, but it also has DekTec's entire software palette. This means the user has to search through all the files on the USB stick to find the matching software for the DTU-215.

Overall, the workmanship and packaging of the modulator left us with a very good impression; clearly, this is a high-end product for use by professionals.

We referred to the instal-

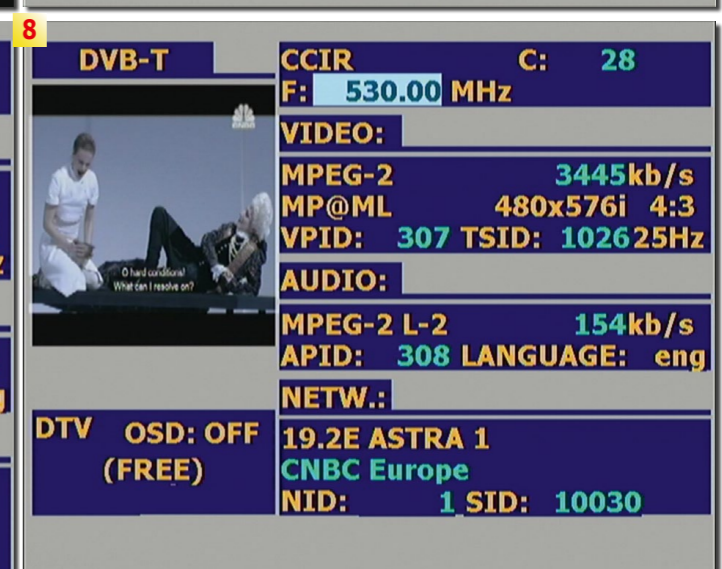
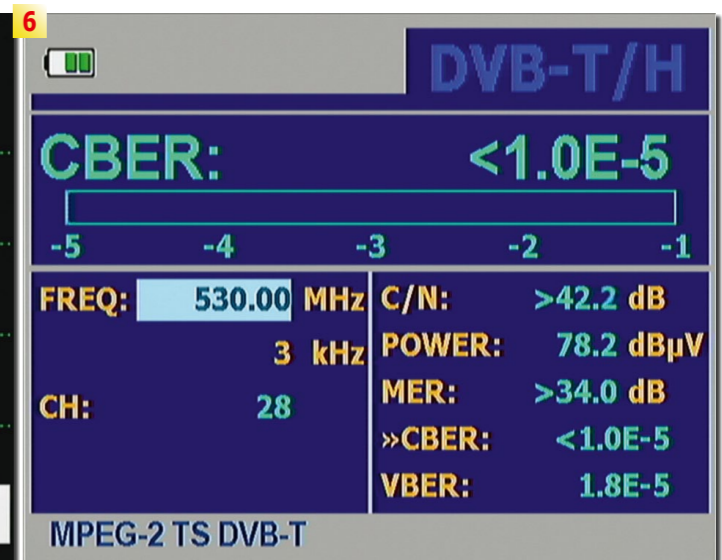
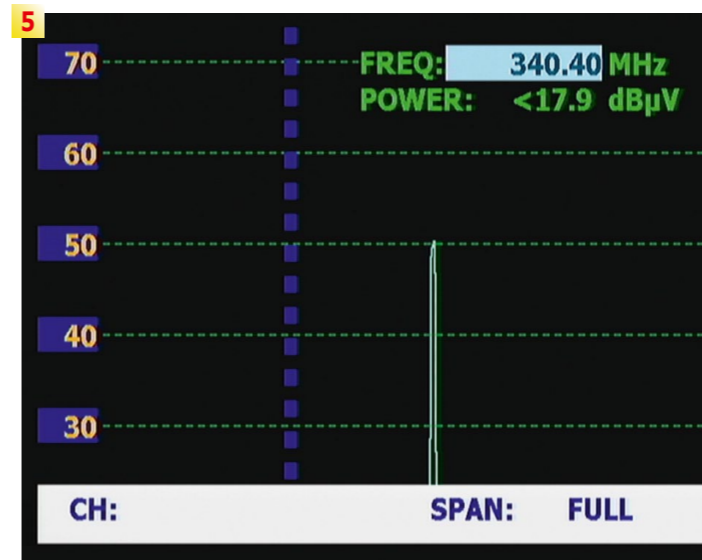
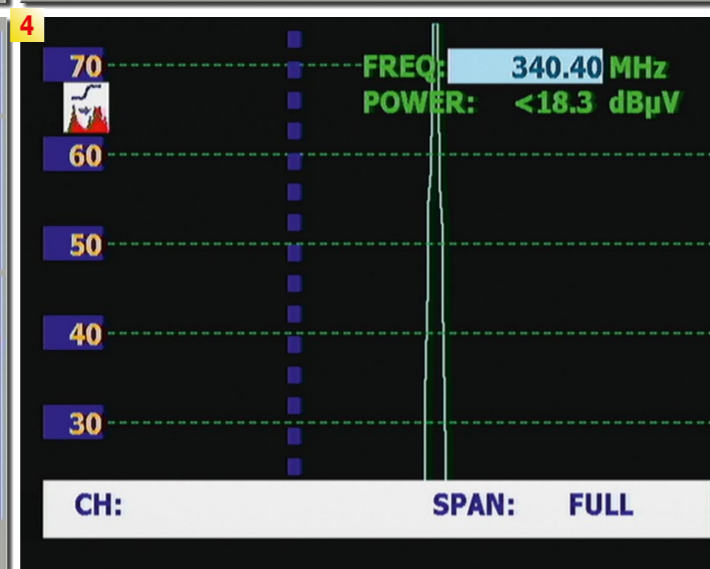
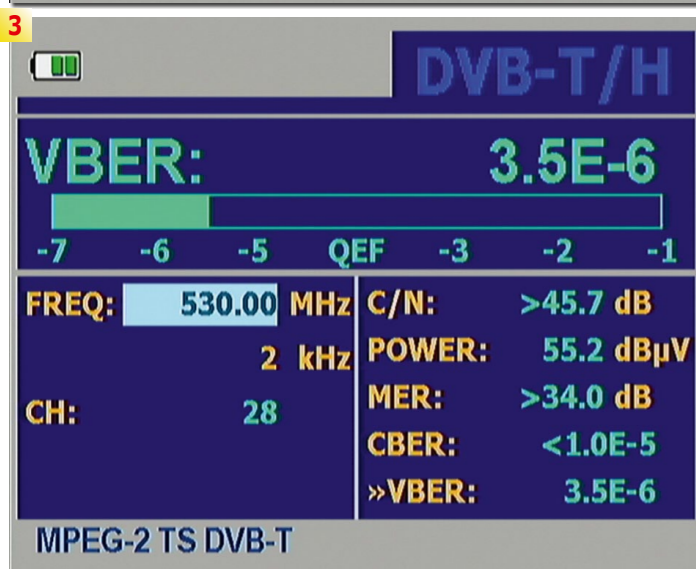
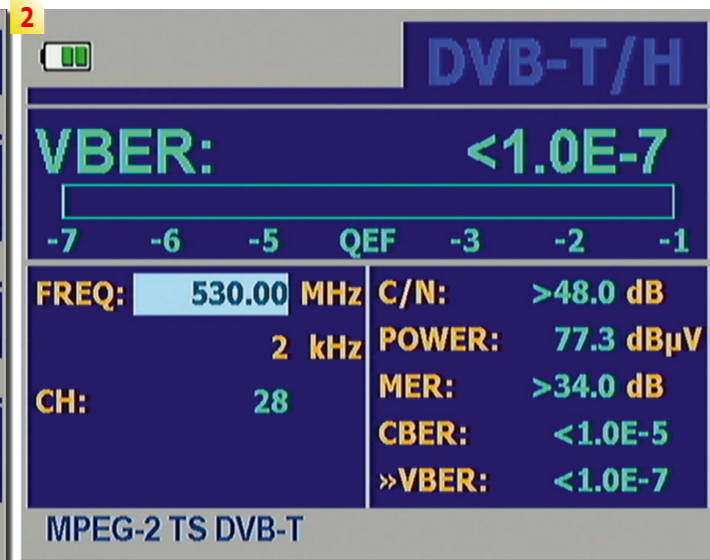
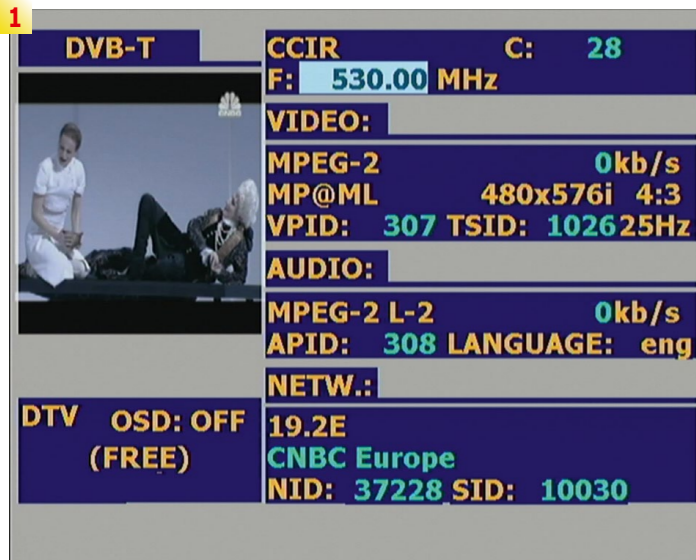
lation manual included by the manufacturer regarding the integration of the required drivers in the operating system (Windows XP/2003/Vista/2008 and Windows 7 are supported). This all functioned very easily with a double-click on the installation assistant. The Stream Player Software, the modulator's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

Once all of the software needs were taken care of, we connected the modulator to our PC via the USB 2.0 port. Windows instantly recognized the new hardware and set it up in just a few seconds.

Before we can start testing this modulator, a few basic settings have to be taken care of first. This includes the modulation mode as well as the desired output frequency. The modulations are listed in Table 1.

The user can select an output frequency between 47 and 1000 MHz in the VHF and UHF bands with a bandwidth from 2.7 to 8 MHz. The modulators signal output level for QAM is between -46 and -15 dBm; with OFDM it lies between -49 and -18 dBm. The modulator draws roughly 500mA at 5V; this can be obtained from a USB 2.0 interface so





that an external power supply is not necessary.

All of the popular transport streams can be used. Since the box modulates the stream 1:1 and passes it on to the attached receiver, raw MPEG, AVI or even DivX content is not suitable. The DTU-215 does not modify the stream, rather, it passes it along with all its information in the preselected

modulation mode (for example, MPEG-2 or MPEG-4). The more complete the stream is, the better the result at the modulator's RF output.

How do you recognize a complete stream and where do you get it from? You should direct yourself to a stream from a satellite operator that is known for its proper streams (Tip: larger

worldwide satellite operators are more likely to deal with correct streams than are smaller national operators).

In addition to a complete PMT, you should look for numerous other features of the individual channels in the stream of the transponder such as EPG, Subtitle, teletext, multiple audio tracks or even encryption.

To record such a stream you can use a standard DVB-S/S2 card for a PC (you can find suitable cards in this issue of TELE-satellite on the overview pages of the award winning HDTV PC card).

This PC card communicates with the PC through the PCI-e port so that there won't be any problems recording large data rates like

those from a DVB-S2 transponder with multiple HD channels.

Streams stored in this 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-

sented with three large text fields that contain information on the transponder stream, which channels it contains, the PIDs that are in use and the data rate that was used to send it.

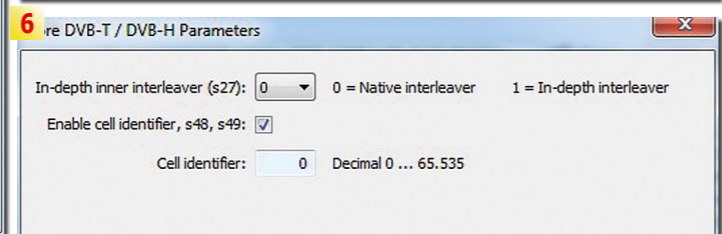
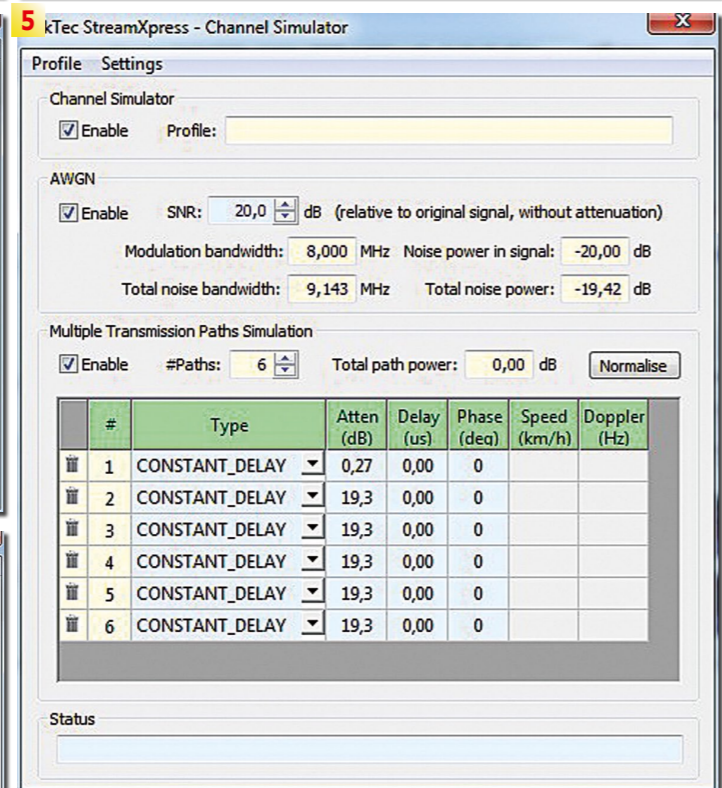
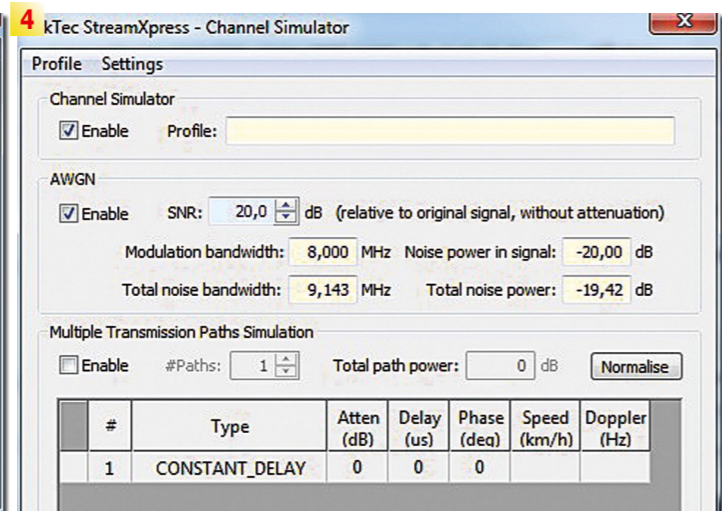
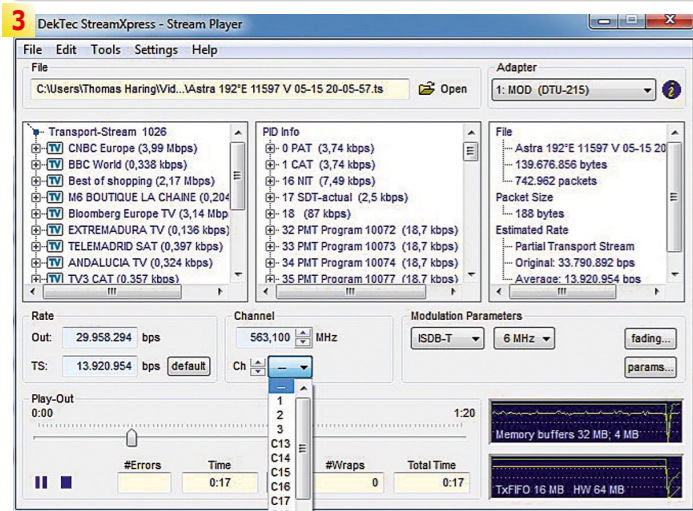
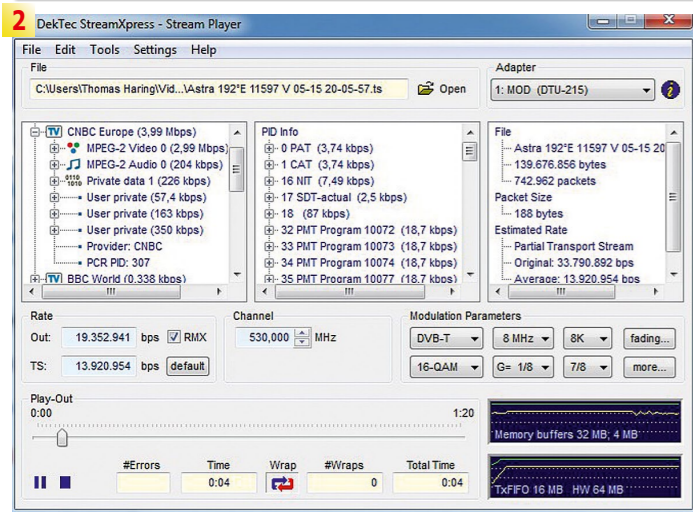
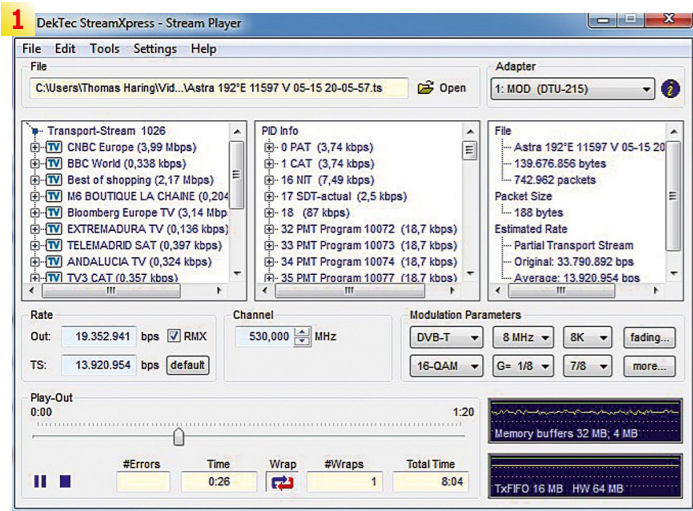
Since the DekTec DTU-215 cannot receive a live input signal and instead relies on a stream that is already available, the Stream Player

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



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
CMMB	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)



Software can play it back in an endless line; even individual portions of the stream can be replayed.

As a professional unit, the DTU-215 can also modify the transport stream in ways that a user with normal TV reception would never want: it can artificially introduce errors. In this way the Stream Player

Software can simulate the loss of data packets, bit errors as well as entire byte errors in amounts and frequencies that are user-selectable.

This is an outstanding feature in that it allows you to thoroughly test the input sensitivity and error correction capability of a receiver.

The DTU-215 also lets you adjust the signal level between -46 and -15 dBm with QAM and between -49 and -18 dBm with OFDM. By looking at the screenshots that came with this test report, you can clearly see how the signal curve changes in the spectrum of our signal analyzer.

Even the simulation of a

1. The Stream Player's main window
2. Detailed information can be displayed for every PID in the transponder stream
3. Frequency selection in ISDB-T Mode
4. Using the Channel Simulator function an AWGN signal can be created; even the transmission of the signal can be simulated over multiple stations
5. Through a total of six stations the signal can be individually adjusted for attenuation and delay
6. Various additional options in DVB-T/H mode

7. Individual portions of the data stream can easily be marked for playback

8. The modulator can introduce missing data packets into the output data stream

9. The modulator can introduce bit errors into the output data stream

10. The modulator can introduce byte errors into the output data stream

11. In Loop mode you can customize the time information in the data stream

12. In addition to a transponder stream, a test signal can also be generated, if desired, in any of the supported modulation standards

13. Customizing the output level

14. Information on the hardware in use

15. Even modulation of HD content is possible without any problems

16. Detailed information on an HD channel

17. Thanks to Plug&Play, the DTU-215 is easily recognized in the Windows Device Manager

complex signal distribution and transmission system is possible with the DTU-215. You can use the box to introduce signal attenuation (in dB) at multiple transmission points as well as transmission delays (in μ s).

You can even generate

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 be processed without any 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

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

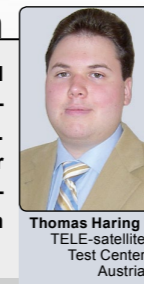
the DekTec drivers.

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 attached hardware through

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.

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

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)	-46 .. -15dBm (+/-2 dB)
Level (OFDM)	-49 .. -18dBm (+/-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

