1 x HDMI to DVB-T (COFDM) "DUAL" modulator

DHM-2056

Operation Manual

1. IMPORTANT SAFETY PRECAUTIONS INFORMATION

READ THE FOLLOWING WARNINGS BEFORE YOU USE YOUR DEVICE

WARNING

The following safety precautions must be observed to prevent fire or electric shock hazard. Safety precautions include but are not restricted to the following:

Power supply / Mains cord
- Operate the unit only within the voltage range defined as appropriate by the manufacturer.
- Occasionally check the power connector and remove dirt or dust that may have accumulated.
- Use only the mains cord that comes with your unit.
- Do not operate the unit or plug in the mains cord if it is broken, split, or damaged in any way.
- Do not place the mains cord next to heating devices. Do not pull it, place heavy objects on it or damage it in any way. Keep it out of reach of children.
- Ensure that the device is plugged in a properly grounded socket. Insufficient grounding may cause electrocution.
- Always carefully disconnect all plugs by pulling on the plug and not on the cord. Make sure the unit's power switch is turned off before removing the cord from an outlet.
- Disconnect the mains cord when the unit is not in use for long periods of time or during storms.
- Do not connect the unit to a multiple-outlet to avoid plug overheating.

Disassembling
- This unit contains parts that cannot be repaired by the user. Do not disassemble or try to repair it as this will void all warranties. Please contact the manufacturer if you experience any problems with your unit.

Water/humidity
- Do not keep the unit in a humid place or near water.
- Do not plug/unplug the unit with wet hands.

Fire
- Never place a candle or another source of fire on the unit as it may fall and start a fire.
- If the mains cord or the power connector is damaged or destroyed, or if there is a sudden loss of picture during operation, or if you notice a strange smell or there is smoke, immediately switch the unit off, disconnect the mains cord and contact the manufacturer's technical support department.

Installation / Storage

- This unit contains high precision pieces of electronics. To ensure optimal performance and avoid damage, do not store it in any location where it may collect dirt, duct, lint, etc. Do not expose it to extreme heat or cold (e.g. in direct sunlight, near a heater or in the car during the day). Place the unit in a secure place to avoid falls.
- Before moving the unit, always unplug all cords first.
- When installing the unit, make sure that an outlet is within easy reach. In case of malfunction, switch the unit off and unplug the power cord. When the unit is not in use for a long period of time, make sure that the mains cord is disconnected.

Connectivity

- Before connecting the unit to other electronic devices, always switch off and unplug all devices.

Maintenance

- Do not spill liquids on the unit. Do not use any diluents or volatile liquid to clean the unit. Instead, use a soft slightly damp cloth and allow the unit to dry completely before using again.

Handling

- Do not poke your finger into the openings on your unit.
- Never put paper, metal parts or other objects into the openings of your unit. If you suspect that there are foreign parts in your unit, switch it off and unplug the mains cord. Contact the manufacturer's technical support department.
- Do not step on or place heavy objects on top of the unit. To avoid hardware damage, handle all buttons, connectors and switches gently.

2. INTRO

Congratulations on purchasing the DHM-2056. You now own a high quality, "DUAL" DVB-T HD modulator. To get the most out of your purchase, please take the time to carefully read through this manual.

3. INSTRUCTIONS

3.1 DESCRIPTION

The DHM-2056 is a high quality DVB-T "DUAL" modulator which accepts one HDMI and one analog Stereo Audio / CVBS signal and converts it into one RF DVB-T channel on its output. The excellent picture (Full HD 1920*1080-30p) and modulation quality (MER~35dB) renders the DHM-2056 the ideal solution for distributing HD or analog TV signals coming from e.g. a DVD player, STB or camera in a CATV network using the DVB-T technology.

The user has the ability to control the device by either using the onboard SSD (**S**even **S**egment **D**isplay) interface and keypad for quick installation or by using the USB interface with the appropriate software accompanying the DHM-2056 for advance programming.
Finally, the DHM-2056's metal case provides excellent electromagnetic shielding as well as great temperature dissipation and rigidness.

3.2 FEATURES

- High quality and performance
- CVBS and HDMI input (with redundant source mode)
- Very clean RF spectrum
- MER value ~ 35dB
- RF output frequencies 174...862MHz
- H.264 HD encoder bitrate 1-19Mbps
- HDCP support
- Very friendly user interface for quick installation
- USB interface for advanced programming
- External power supply

3.2.1 Auto-reset functions and watchdog

During the normal operation of the DHM-2056, the main CPU monitors all the internal parts in order to ensure that the device works normally. In case of an internal error or module failure, the DHM-2056 immediately initiates the recovery procedure by resetting the appropriate module or the device. Finally, watchdog timers ensure that the device will be reset in case of CPU failure.

3.2.2 Buttons lock-mechanism

The DHM-2056 will lock the functionality of its buttons after one-minute idle time to avoid of being pushed accidentally. Two red dots on the SSD notify the user that the button interface is locked. To unlock it, the user must press simultaneously the UP + DOWN buttons for 5 seconds.

3.2.3 Input redundant source mode

When the DHM-2056 detects a valid input source coming (eg. from the HDMI input), it will "mark" this source as its primary source. In case of a failure of the primary source, the DHM-2056 will automatically switch to secondary source which in our case the CVBS input.

3.2.4 USB interface for advance programming

The DHM-2056 provides a USB interface with the appropriate software for advanced programming. For more information, please read Appendix A.

3.3 BLOCK DIAGRAM
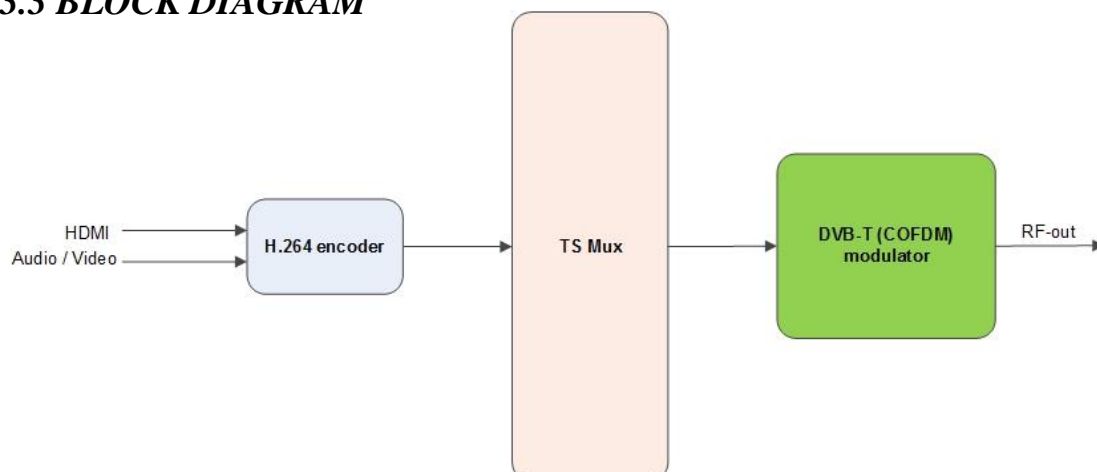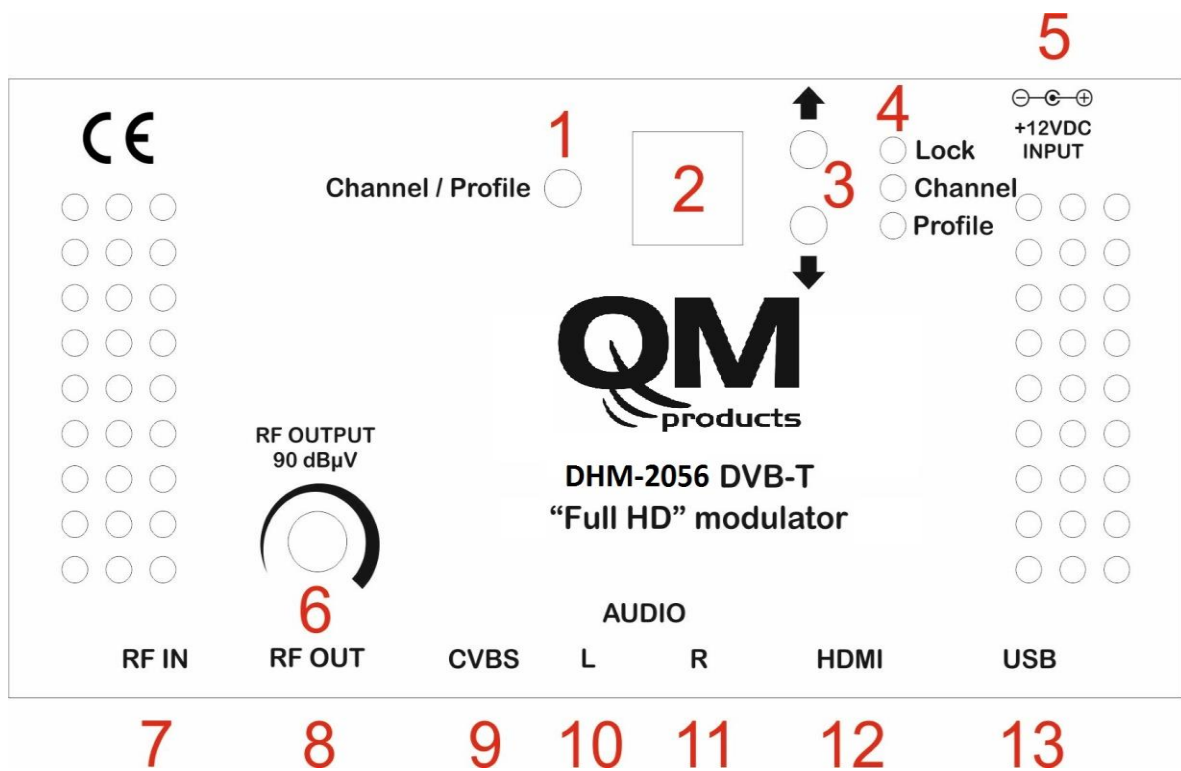
3.4 FRONT PANEL

<div align="right">Figure No.1</div>

1. Channel or Profile selection button
2. Seven Segment Display
3. UP / DOWN buttons
4. LED indicators
5. +12V/2A VDC input
6. 20dB RF output attenuator
7. RF-IN loop-through
8. RF-OUT main output
9. CVBS input
10. Left audio channel input
11. Right audio channel input
12. HDMI input
13. USB input

3.3 INSTALLATION

The DHM-2056 can be programmed with one of the following ways:

- From the front panel display
- From the USB interface

3.3.1 Installation using the Front panel display

The user is able to install very quick and easy multiple MHD-2056's using the SSD + Button interface of the front panel of the device, following the steps below:

1st Step
Power up the MHD-2056 by adding the external power supply. The MHD-2056 will need 20-30secs to initialize itself. The SSD (Seven Segment Display – No2 / Figure No.1) depicts the initialization status.

2nd Step
Choose "*Chanel mode*" by pressing the Channel/Profile button (No 1 / Figure No.1) and the "Channel LED" will lit.

3rd Step
Adjust the output power using the output 20dB attenuator.

4th Step
Choose "*Profile* mode" by pressing the Channel/Profile button (No 1 / Figure No.1) and the "Profile LED" will lit.

How Profiles works

In an installation all the modulators (or Mux in general) need to have different values of the following fields to avoid conflicts in the automated scan of the TV sets:

Program Name   Service ID   TS ID

For that reason, the user must always select a different Profile number in every modulator starting from Number #1.

Eg. Let's say we want to install three modulators in a CATV network. In step No 4 we will choose:

- Profile No 1 for the **1st** modulator
    - meaning: Program Name = DTV **1**
    - meaning: Service ID = 1
    - meaning: TS ID = 224**0**

- Profile No 2 for the **2nd** modulator
    - meaning: Program Name = DTV **2**
    - meaning: Service ID = 2
    - meaning: TS ID = 2241

- Profile No 3 for the **3rd** modulator
  - meaning: Program Name = DTV **3**
  - meaning: Service ID = 3
  - meaning: TS ID = 224**2**

As a result, all the above modulators have different values in the above fields.

<u>Caution!!!</u>

- Every time we choose a different Profile number the DHM-2056 will apply a full reset to itself that will last for 20-30 seconds.

- Using the USB interface, someone has the ability to add custom values to the above fields.

- The "HDMI LED" indicates the lock status of the HDMI input.

3.3.2 Installation using the USB interface

The DHM-2056 provides a USB interface with the appropriate software for advanced programming. For more information, please read Appendix A.
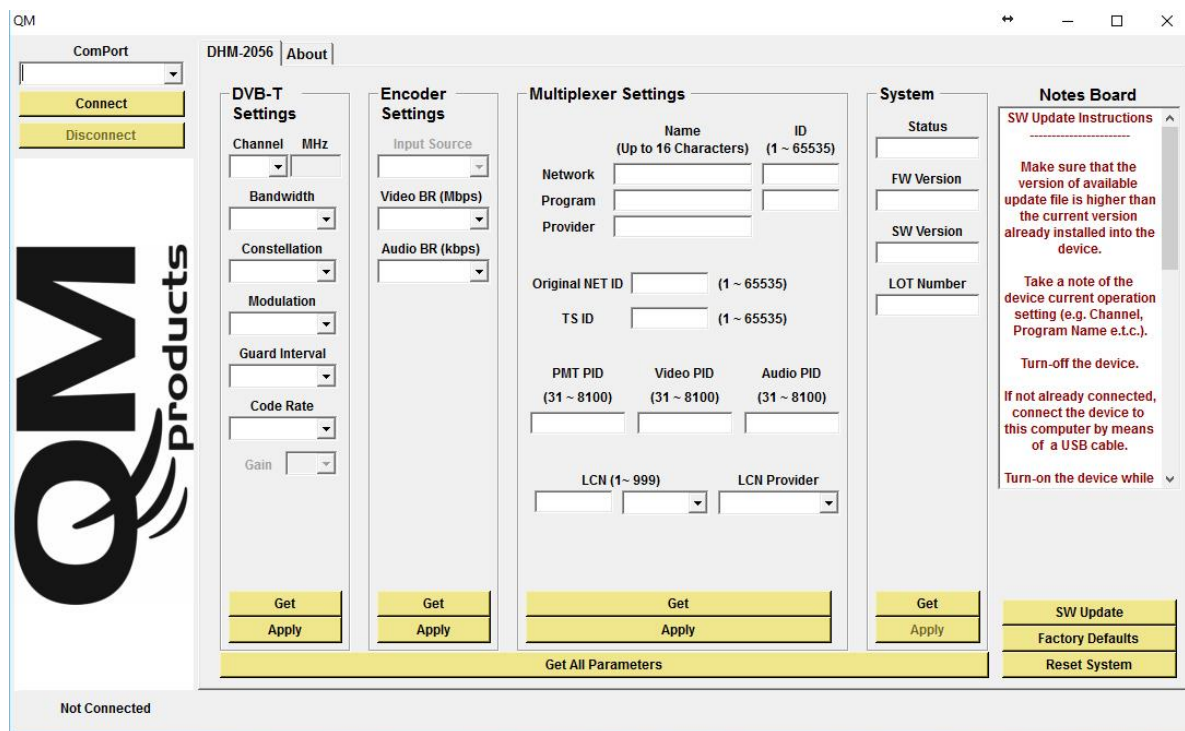
4. TECHNICAL SPECIFICATIONS

Input
Type: 1 x HDMI & 1 x CVBS
Connector: 1 x HDMI & 1 x RCA – Female
                                   (White, Red, Yellow)
Video coding: MPEG-4 AVC/H.264
Profile: High profile 4.0
Resolution: 1920x1080-30p for HDMI
                                   PAL 720x576@25fps
HDCP support: Yes
Audio: HDMI & Mono/Stereo
Standard: MPEG-1 Layer II
Audio Bit Rate: 64, 96, 128, 192, 256, 320, 384 kbps
Level: 0.5Vpp to 1.0Vpp adjustable

H.264 Encoder
Standard: MPEG-4 AVC/H.264
Bit Rate: 1 – 19 Mb/s adjustable

Configurable Parameters: Service Name, Service ID, Video PID,
                                   Audio PID, PMT PID

Transport Stream Processing
Automatic Regeneration: NIT, PAT, CAT, SDT, PMTs,
                                   EITs tables
Configurable Parameters: TS ID, Original Network ID,
                                   Network ID, Provider Name
LCN support: Yes
LCN Providers: Nordin, ITC/UK, EICTA/Europe,
                                   New Zealand

DVB-T Output
Standard: EN 300 744
Bandwidth: 5,6,7,8 MHz
Mode: 2K,8K
Constellation: QPSK,16QAM, 64QAM
Guard Interval: 1/4, 1/8, 1/16, 1/32
Code Rate: 1/2, 2/3, 3/4, 5/6, 7/8

RF Output
Type: RF DVB-T (COFDM)
Output Frequencies: 174…862MHz
Output Level: 90dbμV max.
Connector: 75Ω - F, female
Output Attenuator: 0…20dB
MER: 35dB (Typical)
Shoulder Attenuation: >45dBc
Output loop-through loss: <1dB
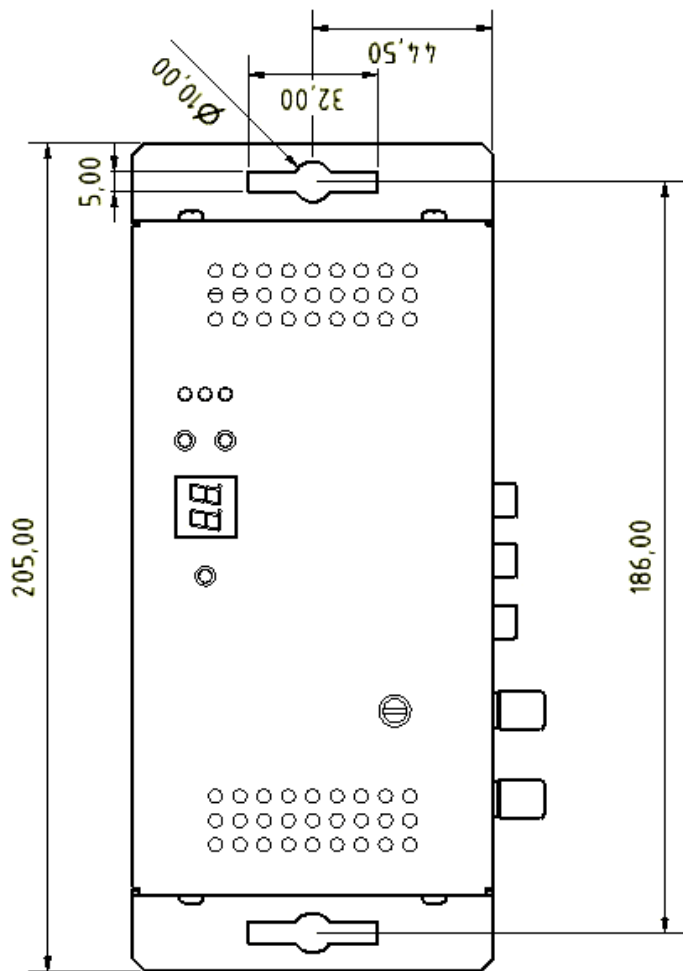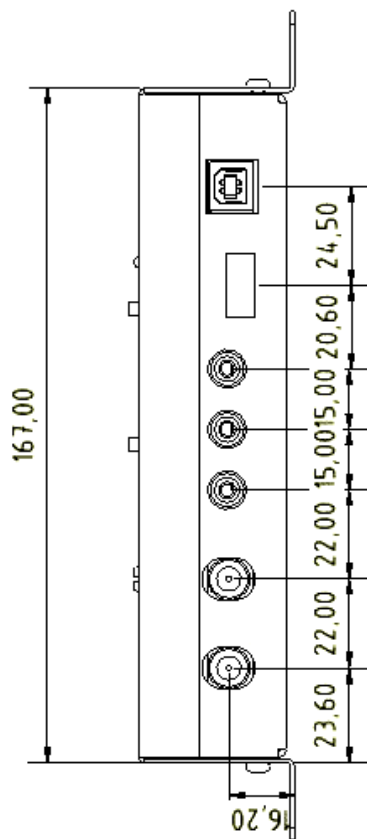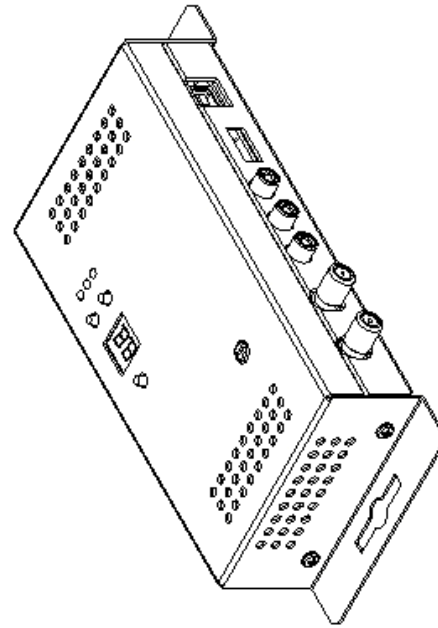Connectors: 2 x F - female

Programming Interface   SSD Display + keypad
                                       USB interface

General
Power Supply: +12VDC
Power supply consumption: 400 mA max.
Operating Temperature: 0 ℃ to 50 ℃
Storage Temperature: -10 ℃ to +70 ℃
Humidity: Up to 90%
Dimensions: 205 x 101,80 x 41mm
Weight: 0.3Kg

5. DIMENSIONS
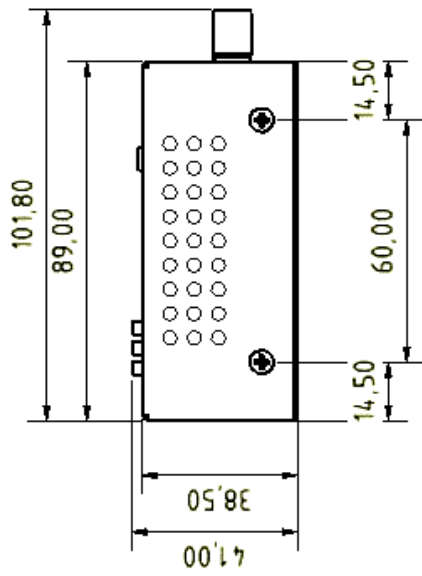
*dimensions in mm

6. QM PRODUCTS LIMITED WARRANTY

This QM Products unit is guaranteed against defects in workmanship and materials for a period of five (5) years beginning on the date of purchase of the product. During the applicable warranty period, QM Products will repair or replace at our sole option, without charge, any defective component part of the purchased unit. The unit is to be delivered packed in adequate packing AFTER an authorization for return has been received.

The owner's responsibilities are to use the instrument in accordance with its written instructions, to provide transport to and from our facilities in the event service is required, and to provide proof of purchase if requested.

Our warranty does not cover any problem resulting from:

(a) accident; abuse; neglect; shock; electrostatic discharge; heat or humidity beyond product specifications; improper installation, operation, maintenance or modification

(b) any misuse contrary to the instructions in the user manual

(c) malfunctions caused by other equipment.

<u>WARNING!!</u>

Our limited warranty is considered void if a product is returned with removed, damaged or tampered labels or any alterations (including removal of any component or external cover) carried out by unauthorized personnel.

OUT OF WARRANTY SERVICING

We repair and service units of our production even once the warranty has expired, if this is economically the best solution to the customer.

The mechanical and electronic spare parts are replaceable for a five-year period after production when the circuits are assembled with discrete components. When integrated circuits are used, the supply of spare parts is guaranteed up to the depletion of our stock and, depending on the possibility of procuring them on the worldwide market.

To avoid any unnecessary loss of time, it is very important that the instrument be returned to our premises accompanied by a proper delivery note, duly completed with all the required information, as per the legal dispositions currently enforced.

7. WARNINGS

Content warning

This document contains preliminary information about a product of QM Products. QM Products reserves the right to make any changes or modifications at any time without prior notice.

APPENDIX A

The DHM-2056 offers a USB interface with the appropriate software (DVProbe.exe) for advance programming. The software can be found in the CD that accompanies the DHM-2056.

System requirements
- Windows XP (SP1 or higher)
- Windows Vista
- Windows 7 (32 & 64bit)
- Windows 8 (32 & 64bit)

Device connection via software

1. Insert the supplied software CD into your CD-ROM drive.
2. Connect the DHM-2056 via the USB cable (A-male to B-male type)
3. In case Windows cannot install the USB drivers automatically, when prompt, insert the correct path of the CD folder named "USB drivers", which contains the DHM-2056 USB drivers.

4. Once Windows have successfully installed the USB drivers of the DHM-2056, a pop-up message appears to verify this process.

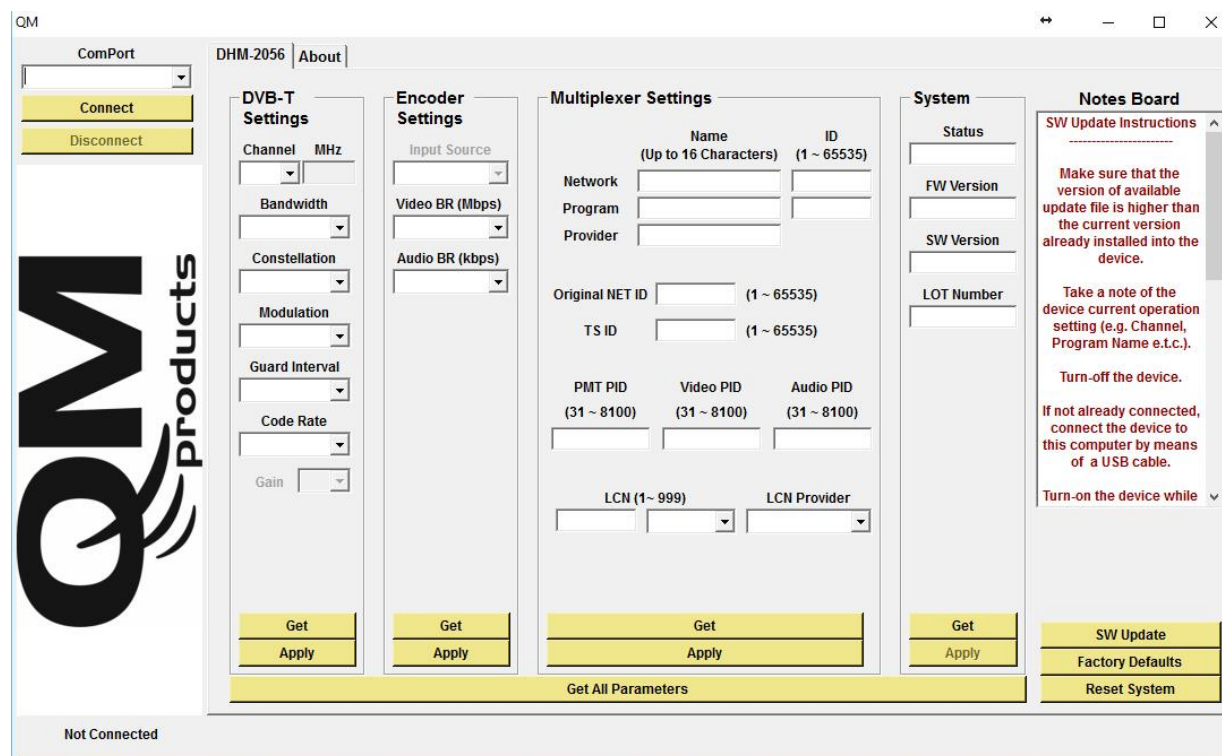5. Run the DVProbe.exe file and the main screen will appear (Figure No 2):

Figure No.2

Software guidelines

1. From the "ComPort" combo box select the correct USB port, that connects the DHM-2056, and press "Connect".
2. Once the software has successfully connected with the device, it will automatically download all the settings of the DHM-2056.
3. The DV Probe consists of four sub-categories as described below:

   - DVB-T Settings – Parameters regarding the modulator part
   - Encoder Settings – Parameters regarding the H.264 encoder
   - Multiplexer Settings – Parameters regarding the multiplex part
   - System Settings – Parameters regarding system information

1. DVB-T Settings

In this category the user is able to adjust several parameters of the modulator RF output part, as described below:

1.1	**Channel** - Output **channel** selection (VHF:5-12 & UHF:21-69)
1.2	**Bandwidth** - Bandwidth selection
1.3	**Constellation** - Constellation selection
1.4	**Modulation** - Modulation selection
1.5	**Guard Interval** - Guard Interval selection
1.6	**Code rate** - Code rate selection

2.Encoder Settings

In this category the user is able to adjust parameters of the H.264 encoder, as described below:

2.1	**Input source** – Select the primary input source
2.2	**Video BR (Mbps)** – Set the video bitrate
2.3	**Audio BR (Kbps)** – Set the audio bitrate

3.Multiplexer Settings

In this category the user is able to adjust parameters of the DHM-2056 multiplexer, as described below:

3.1	**Network Name** + ID – Enter the Network name + ID*
3.2	**Program Name** + ID – Enter the Program name + ID
3.3	**Provider Name** - Enter the Provider name
3.4	**Original Net ID -** Set the Net ID (0-65535) *
3.5	**TS ID** - Set the Transport Stream ID (0-65535) *
3.6	**PMT PID** – Set the PID value
3.7	**Video PID** – Set the Video PID value
3.8	**Audio PID** – Set the Audio PID value
3.9	**LCN No –** Set the LCN No (1-999) (must be enabled first)
3.10	**LCN Provider -** Set the LCN provider

* TS ID must always be different between DVB-T modulators in the same network.

<u>Caution:</u>

- Modulation settings must be applied with care and in order to have adequate output bitrate. The output bitrate (which can be calculated from the tables in Appendix B) must be equal or greater than the total sum of the bitrate of the encoders.

Example: Assuming we select the following modulation settings:

Modulation:	8K
Constellation:	16-QAM
Code Rate:	5/6
Guard Interval:	1/32
Bandwidth:	8MHz

We have an output bitrate of **20.107 Mbps** according to Appendix B.

This means that encoder's bitrate must be adjusted in such a way that the total bitrate of the encoder does not exceed the 20.107MBps limit, otherwise artifacts may occur.

For example, one valid selection in case of four encoders would be to set each encoder bitrate to 5Mbps since: 4 x 5Mbps = 20Mbps < 20.107MBps

4.System Settings
This category depicts information about the system's settings as follows:

- **4.1** **Status** - Depicts the status of the modulator (Idle or Running)
- **4.2** **FW Version** – Depicts the firmware version of the up
- **4.3** **SW Version** – Depicts the software version of the DV Probe
- **4.4** **HW Version** – Depicts the hardware version of the DHM-2056
- **4.5** **Serial number** – Depicts the serial number of the device

Buttons
- By pressing the "Get" button in any sub-category, all the settings of this category are downloaded from the modulator.

- By pressing the "Apply" button in any sub-category, all the settings of this category are uploaded to the modulator.

- The "Factory Defaults" button sets the modulator's setting to factory default.

- The "Reset System" button applies a reset to the modulator.

APPENDIX B

DVB-T bitrates(Mbit/s) for **8 MHz** bandwidth (non-hierarchical systems)

Modulation	Coding Rate	Guard Interval			
		1/4	1/8	1/16	1/32
QPSK	½	4.976	5.529	5.855	6.032
	2/3	6.635	7.373	7.806	8.043
	¾	7.465	8.294	8.782	9.048
	5/6	8.294	9.216	9.758	10.053
	7/8	8.709	9.676	10.246	10.556
16-QAM	½	9.953	11.059	11.709	12.064
	2/3	13.271	14.745	15.612	16.086
	¾	14.929	16.588	17.564	18.096
	5/6	16.588	18.431	19.516	20.107
	7/8	17.418	19.353	20.491	21.112
64-QAM	½	14.929	16.588	17.564	18.096
	2/3	19.906	22.118	23.419	24.128
	¾	22.394	24.882	26.346	27.144
	5/6	24.882	27.647	29.273	30.160
	7/8	26.126	29.029	30.737	31.668

DVB-T bitrates(Mbit/s) for **7 MHz** bandwidth (non-hierarchical systems)

Modulation	Coding Rate	Guard Interval			
		1/4	1/8	1/16	1/32
QPSK	½	4.354	4.838	5.123	5.278
	2/3	5.806	6.451	6.830	7.037
	¾	6.532	7.257	7.684	7.917
	5/6	7.257	8.064	8.538	8.797
	7/8	7.620	8.467	8.965	9.237
16-QAM	½	8.709	9.676	10.246	10.556
	2/3	11.612	12.902	13.661	14.075
	¾	13.063	14.515	15.369	15.834
	5/6	14.515	16.127	17.076	17.594
	7/8	15.240	16.934	17.930	18.473
64-QAM	½	13.063	14.515	15.369	15.834
	2/3	17.418	19.353	20.491	21.112
	¾	19.595	21.772	23.053	23.751
	5/6	21.772	24.191	25.614	26.390
	7/8	22.861	25.401	26.895	27.710

DVB-T bitrates(Mbit/s) for **6 MHz** bandwidth (non-hierarchical systems)

Modulation	Coding Rate	Guard Interval			
		1/4	1/8	1/16	1/32
QPSK	½	3.732	4.147	4.391	4.524
	2/3	4.976	5.529	5.855	6.032
	¾	5.599	6.221	6.587	6.786
	5/6	6.221	6.912	7.318	7.540
	7/8	6.532	7.257	7.684	7.917
16-QAM	½	7.465	8.294	8.782	9.048
	2/3	9.953	11.059	11.709	12.064
	¾	11.197	12.441	13.173	13.572
	5/6	12.441	13.824	14.637	15.080
	7/8	13.063	14.515	15.369	15.834
64-QAM	½	11.197	12.441	13.193	13.572
	2/3	14.929	16.588	17.564	18.096
	¾	16.796	18.662	19.760	20.358
	5/6	18.662	20.735	21.995	22.620
	7/8	19.595	21.772	23.053	23.751

8. NOTES

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DEALER INFORMATION