

# PT3182 DVB-T/T2

## PT3180 DVB-T/H

### OEM Modulator



The PT3182 DVB-T2 OEM ProTelevision Technologies' Software defined modulator, provides maximum integration flexibility for transmitter manufacturers.

The remarkable performance and robustness of the PT3182, makes it the perfect choice for your VHF and UHF DVB-T/T2 transmitters.

- ◆ Future proof technology based on a fully reconfigurable, **software defined** modulator platform, that allows upgrading of the board to other DTT standards (ISDB-T/Tb, DVB-T/T2 or ATSC 1.0).
- ◆ Interface B input mode for support of MFN, SFN (**MISO and SISO**), single PLP and Multiple PLP DVB-T2 transmission based on T2-MI
- ◆ Optional **Interface A** input mode for stand-alone support of DVB-T2 in MFN single PLP mode with legacy MPEG-2 TS input.
- ◆ High performance **digital adaptive linear and nonlinear precorrection** for maximum transmitter performance (Option PT3754).
- ◆ User friendly intuitive **WEB GUI** control for use with standard Web Browser (Internet Explorer, Mozilla Firefox, Google Chrome and Opera compatible).
- ◆ **SNMP** client Get/Set/Trap.
- ◆ SCPI control over RS232/RS485 and over IP.
- ◆ 4x Ethernet Gigabit interfaces for control and data transport. Two of them optimized for **TSolP** Input (Option PT3720/00).
- ◆ **OPTIPOWER®** – market leading enhanced adaptive precorrection and PAPR clipping technology for maximum optimization of transmitter power efficiency and/or transmitter MER performance (Option PT3756).
- ◆ Integrated Multi Standard Global Navigation Satellite System (GNSS) receiver for time and frequency reference based on **GPS and GLONASS** systems (Option PT3711).
- ◆ **VHF and UHF** (selectable frequency from 30MHz to 860 MHz in steps of 1Hz).
- ◆ Power Supply acceptance range: from **5V to 52V**. That allows the usage of existing power supply mounted in the system.
- ◆ Three choices of internal precision (Local Oscillator) according to the network requirements 2ppm, 0.25ppm or 0.01ppm.
- ◆ Power Output selectable from **-10dBm to +10dBm** in steps of 0.1dB.
- ◆ Available SW based **Automatic Level Control** to regulate any third party power amplifier output. (Option PT3770/00).
- ◆ **Seamless switching** between any of the **ASI** and/or **IP** inputs.

# DVB<sup>®</sup> T2

## OPTIPOWER<sup>®</sup>

#### Available in different versions:

PT3180 DVB-T/H OEM Modulator  
PT3182 DVB-T2 OEM Modulator

And by installing the license "PT3726 DVB-T & DVB-T2 Support" to any of the above products, we get a DVB-T/T2 configuration holding both DTT standards on one board.

The Hw is 220 x 100 mm open PCB for seamless integration into an exciter/transmitter solution.

For a 19" Rack Solution, please check the product PT3082 on ProTelevision's Website.

## Application

The **PT3182 DVB-T2** modulator is characterized by a high RF and MER performance and by its unique ability to optimize the performance of any third party power amplifier being utilized together with the modulator.

The PT3182 OEM DVB-T2 modulator provides a versatile, robust and unsurpassed performance solution for integration and manufacturing of high quality DVB-T/T2 transmitters.

The integration of the OEM PT3182 into any transmitter system, is an easy process. ProTelevision Technologies will provide full support during this process which will only be necessary to do once in life, since ProTelevision's OEM hardware platforms are always backwards compatible with previous versions.

In addition, only one electrical and mechanical integration will automatically multiply the range of products, due to the feasibility of reconfiguring the modulation standard of the board to another terrestrial broadcasting format (for example ATSC or ISDB-T/Tb), by simply loading an alternative firmware image and licensing key.

The board is prepared for implementation of any future OFDM based solution.

The PT3182 DVB-T2 modulators accept input in ASI format and in TSolP format subject to the particular configuration; The PT3182 DVB-T2 modulators have four Ethernet Gigabit ports

with different MAC addresses. Either one or two of these ports are optimized for TSolP (PT3720/00).

When operating in the Interface A input mode (ref. TS 102 733 paragraph 4.2, system architecture) the modulator accepts input of legacy MPEG-2 transport stream over the ASI and TSolP interfaces.

When operating in the Interface B input mode (ref. TS 102 773 paragraph 4.2, system architecture) the modulator accepts input of T2-MI over the ASI and TSolP interfaces (T2-MI encapsulated in MPEG-2 TS). The PT3182 Modulator, is transparent to any compression format carried by the MPEG-2 TS (MPEG-2, MPEG-4, H.264, HEVC or any future format).

The PT3182 **DVB-T2** modulator is designed in accordance with the ETSI standards TS 102 773 (T2-MI) and EN 302 755 (DVB-T2 channel coding and modulation).

If DVB-T/H is the standard of choice. The type code for the modulator is changed to PT3180. The PT3180 DVB-T/H can be upgraded to DVB-T2 by loading a different software licence key or alternatively be delivered with a Dual SW image. (option PT3726)

Please refer to Signal Processing DVB-T/H (PT3180) description in the specification section.

**Seamless switching** between any combination of inputs (**ASI and/or IP**) is fully supported for both **DVB-T and DVB-T2** in SFN mode.



Optipower is a ProTelevision Technologies' proprietary solution developed to provide an increase of quality (MER) and efficiency to new or existing TV transmitters.



**Optipower consists of:**

- 1) Enhanced Nonlinear Precorrection algorithm with **DEEP MEMORY EFFECTS** based on the Volterra polynomial series.
- 2) **Adaptive PAPR clipper**.

These two adaptive mechanisms, allow achieving the maximum MER value on any transmitter system (VHF, UHF, Class AB, Doherty, etc...) compared with other precorrection solutions on the market.

This MER extra increase, can be used to **enhance the overall efficiency of the transmitter system**.

In addition, ProTelevision Optipower (Option PT3756) will provide **live measurements** on the WEB Graphical User Interface: Shoulders, MER, PAPR, MER vs Carrier and a Spectrum graphic on the channel transmitted (see picture).

Main specifications for (Optipower) precorrection and feedback signals: Connectors: SMA 50 ohm // Level: -10dBm to +10dBm // Return Loss > 20dB // Frequency: 30MHz to 860MHz.

## SIGNAL PROCESSING DVB-T2 (PT3182)

### Supported Interface modes:

Interface A:	Input of 'legacy' MPEG-2 TS for MFN single PLP transmission (requires option PT3784)
Interface B:	Input of T2-MI from external T2 gateway (Single and multi PLP, MFN and SFN)

### System main characteristics

(note: all listed system main characteristics are for Interface B mode subject to the modes supported by the T2 gateway used):

Supported T2 versions and profiles:	1.1.1/Main, 1.2.1/Main, 1.3.1/Main and Lite and 1.4.1/Main and Lite
System bandwidth:	1.7 MHz, 5 MHz, 6 MHz, 7 MHz and 8 MHz

### PLP configuration

(note: all listed PLP configurations are for Interface B mode subject to the modes supported by the T2 gateway used):

Number of PLPs:

Interface A mode:	Single PLP only
Interface B mode:	Single PLP and Multiple PLP mode up to 255 PLPs equal to the maximum given by the T2 standard.

(In practice the number of PLPs will be limited by the T2 gateway that supplies T2-MI input to the modulator).

PLP payload type:

Interface A mode:	TS
Interface B mode:	TS, GSE, GCS, GFPS
PLP mode:	Normal and High Efficiency
PLP modulation:	QPSK, 16-QAM, 64-QAM, 256-QAM (rotated and none-rotated)
PLP FEC:	32K LDPC, 64K LDPC
PLP LDPC code rate:	1/2, 3/5, 2/3, 3/4, 4/5, 5/6 and 1/3, 2/5
PLP time interleaving type:	None, One T2Frame, SeveralT2Frames
PLP time maximum interleaving length:	1-255 blocks by One T2-frame, 2 - 255 frames by Several T2 frames
PLP ISSY:	ON / OFF
PLP NPD:	ON / OFF

### T2 frame configuration

(note: all listed T2 frame configurations are for Interface B mode subject to the modes supported by the T2 gateway used):

IFFT:	1K, 2K, 4K, 8K, 16K, 32K (including extended carrier modes)
Guard intervals:	1/4, 19/256, 1/8, 19/128, 1/16, 1/32, 1/128
Pilot pattern:	PP1, PP2, PP3, PP4, PP5, PP6, PP7, PP8
PAPR control:	L1-ACE / P2-TR with T2 version 1.2.1 and 1.3.1 (HW and FW prepared for L1-ACE and ACE only, L1-ACE and TR only, L1-ACE ACE and TR)
L1 Modulation:	DPSK, QPSK, 16-QAM
Network modes:	MFN & SFN (relative & absolute timestamp, MISO/SISO)
Test modes:	Single carrier, PRBS, NULL-PI

## SIGNAL PROCESSING DVB-T/H (PT3180)

Supported modes IFFT:	2K, 4K and 8K
Interleaver:	Native as well as in-depth and native (DVB-H mod)
Guard intervals:	1/4, 1/8, 1/16, 1/32
Code rates:	1/2, 2/3, 3/4, 5/6, 7/8
Constellations:	QPSK, 16-QAM, 64-QAM
Hierarchical modes :	16-QAM and 64-QAM in alpha-1, alpha-2 and alpha-4
Network mode:	MFN and SFN
Bandwidth:	8 MHz, 7 MHz, 6 MHz and 5 MHz

## ELECTRICAL SPECIFICATIONS

### Inputs

ASI inputs

No. of ASI inputs:	2
Connector:	Coax contact in DIN41612M_60_4 main PCB con.
Input impedance:	75 ohm
Return loss:	> 13 dB
Redundancy:	User selectable switching policy between "Primary" and "Secondary" ASI source

Ethernet ports (1Gbit/sec)

No. of ethernet ports:	4
Connector:	Quadruple RJ45 mounted on the board

GNSS Receiver Input (option PT3711)

Connector:	Coax contact in DIN41612M_60_4 main PCB con.
Frequency:	1.575 GHz (GPS) / 1.602-1.603 GHz (GLONASS)
Antenna net gain range:	0 to +32 dB
Antenna:	Passive or active antenna (not included)
Antenna DC supply:	OFF, 3 Vdc or 5 Vdc ( $\pm 0.5$ V), user selectable
Antenna DC current:	max 50 mA

External Clock reference (carrier frequency and SFN timing)

Connector:	Routed via DIN41612M_60_4 main PCB con.
Frequency:	10 MHz
Level:	100 mV-3 Vpp
Impedance:	50 ohm/ > 1 kohm, user selectable

Time reference (SFN timing)

Connector:	Routed via DIN41612M_60_4 main PCB con.
Frequency:	1 PPS
Level:	0-5 V, user selectable trigger point 1V or 1.6V
Trigger:	Rising or falling edge, user selectable
Impedance:	50 ohm/ > 1 kohm, user selectable

## OUTPUT

### RF-output

Connector:	SMA female, 50 ohm
Centre frequency:	Adjustable 30-860 MHz in steps of 1 Hz
Frequency stability:	Intern ref 2 ppm-0.01 ppm or in accordance with external ref. accuracy
Spectrum polarity:	Inverted and non-inverted, user selectable
Level:	Adjustable [-10, +10] dBm
Stability:	$\pm 0.5$ dB
Return loss:	> 16 dB

Spectrum outside band

+/-3,8 MHz:	0 dB
+/-4,25 MHz (shoulders):	< -50 dB (typically -55 dB)
Harmonics and spurious:	< -55 dBc
MER:	> 45 dB (typically 50 dB)

Internal frequency reference

Selectable Local Oscillator for customer's specific requirements.

PT3710/00	TCXO 2 ppm (default)
PT3710/10	OCVCXO 0.25 ppm (optional)
PT3710/20	OCVCXO 0.01 ppm (optional)

## CONTROL INTERFACE

Ethernet interface	Quadruple RJ45 PCB connector
RS232/RS485 interface	Routed via DIN41612M_60_4 main PCB connector
HW interface	Routed via DIN41612M_60_4 main PCB connector
Alarm output:	Two user programmable open collector alarm lines
Input:	Separate Reset control and Output muting control

## ENVIRONMENTAL SPECIFICATIONS

The environmental specifications for a solution based on the PT3182 OEM card will depend on the specific chassis solution chosen in each individual case. The values shown are for ProTelevision own rack integration solution (PT3082).

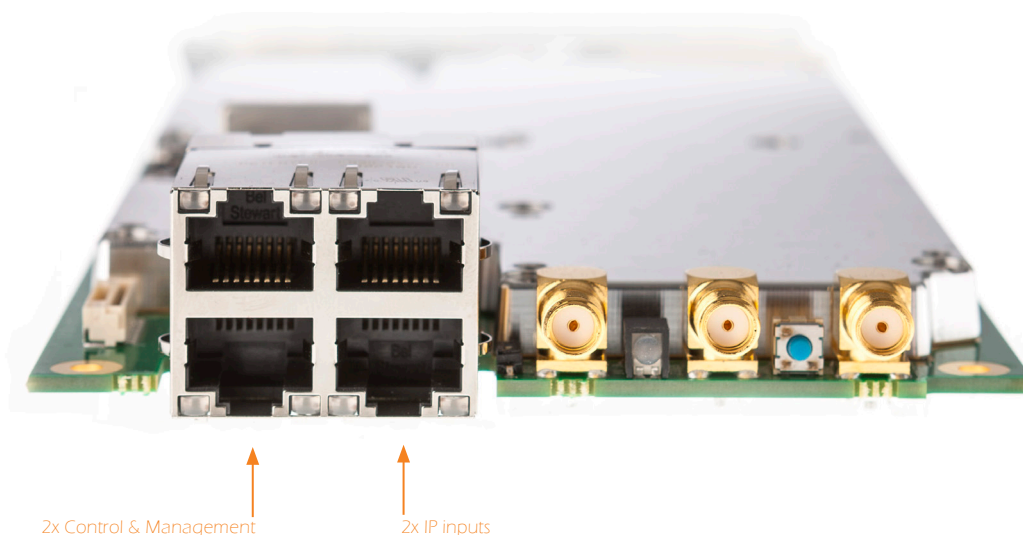
Climatic Temperature range operating:	-5°C to +50°C (+23 F to +122 F)
Temperature range within specs:	+5°C to +45°C (+41 F to +113 F)
Temperature range storage:	-30°C to +70°C (-22 F to +158 F)
Humidity operating:	max 90% RH
Humidity storage:	max 90% RH
EMC	Compliant to EN55022 (emission) and EN55024 (immunity)
Safety	Compliant to EN60950-1
RoHS	Compliant with directive 2011/65/EU

## POWER SUPPLY

Voltage:	Accepts all the DC range from 5V to 52V
Power Consumption:	Max. 18 W (Typical 16W)

## MECHANICAL SPECIFICATION

Open PCB:	EURO module size
Width:	100mm
Depth:	220 mm (PCB footprint excluding connectors), 240 mm end-to-end including SMA and DIN connector
Build height:	Approximately 30 mm including allowance for recommended clearance of 7 mm between PCB underside and chassis. 3D step file available
Weight:	0.5 kg
Cooling:	Designed for air-cooling. Recommended airflow along the PT3182 card is 250 l/minute



## Ordering codes:

### OEM Modulator

PT3180 DVB-T/H OEM modulator  
PT3182 DVB-T2 OEM modulator

### Options, software

PT3720/00 2x TSolP interface (Gigabit)  
PT3754 Adaptive digital Pre-corrector  
PT3756 OPTIPOWER®: Enhanced precorrection and adaptive PAPR clipper  
PT3784 Interface-A input option  
PT3783 DVB-T2 Lite Support (FEF transmission mode)  
PT3770 Automatic Level Control  
PT3726 DVB-T & DVB-T2 Dualcast Support

### Options, hardware

PT3711 GNSS module (GPS and GLONASS support)  
PT3710/10 Medium Precision Oscillator OCVCXO 0.25 ppm  
PT3710/20 High Precision Oscillator OCVCXO 0.01 ppm

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