

PT3160 ATSC OEM Modulator



The PT3160 ATSC OEM ProTelevision Technologies Software defined modulator provides maximum integration flexibility for transmitter manufacturers.

The remarkable performance and robustness of the PT3160, makes it the perfect choice for your VHF and UHF ATSC transmitters.

- ◆ SW upgradable to **ATSC 3.0**.
- ◆ Optional support for **ATSC MH** (A/153).
- ◆ Optional support for **ATSC SFN** (A/110:B and A/110:2011).
- ◆ High performance digital adaptive **linear and nonlinear precorrection** for maximum transmitter performance (Option PT3754).
- ◆ **OPTIPOWER®** – market leading enhanced adaptive precorrection and PAPR clipping technology for maximum optimization of transmitter power efficiency and/or transmitter MER performance (Option PT3756).
- ◆ 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 **TSoIP** (Option PT3720/00).
- ◆ 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 according to the needs of the system: 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).



PT3160 ATSC OEM Modulator:

220 x 100 mm open PCB for seamless integration into an exciter/transmitter solution. OEM Platform compatible with ATSC 3.0.

For a 19" Rack Solution, please check the product PT3060 on ProTelevision's Website.

Application

The **PT3160 ATSC 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 main application of the OEM PT3160 ATSC modulator is to provide a versatile, robust and unsurpassed performance to integrate and manufacture high quality ATSC Transmitters.

The integration of the OEM PT3160 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 modulator standard of the board to another terrestrial broadcasting format. This makes the PT3160 ATSC modulator **fully SW upgradable to ATSC 3.0** by simply loading an alternative firmware image and licencing key.

The board is prepared for future implementation of an OFDM based solution as eventually ATSC 3.0.

The PT3160 ATSC modulators accept input in SMPTE310M and ASI format subject to the particular configuration. The PT3160 ATSC modulators have four Ethernet **Gigabit** ports with different MAC addresses. Either one or two

of these ethernet ports are available for **TSoIP** (PT3720/00).

The PT3160 ATSC modulator is designed in accordance with the ATSC standard A/53 with respect to ATSC channel coding and modulation.

Support for **ATSC M/H** transmission in accordance with the A/153 standard and support for SFN transmission in accordance with the A/110:Band A/110:2011 revisions of the **SFN** standard are available as optional features.

The M/H and the SFN support are based simply on software licenses installation (no need for hardware updates).

When the A/153 M/H option is installed, the PT3160 modulator will offer a free choice between manual selection of either A/53 or A/153 mode and, if preferred, automatic toggling between A/53 and A/153 mode.

The automatic toggling between A/53 and A/153 mode is controlled by the content of the applied input stream (A/153 mode activated whenever the input stream contains the M/H PID that is characteristic of M/H transmission).

The automatic selection of mode facilitates trouble free configuration of the transmitters based on the content of the input stream. The automatic mode selection is ideal for the typical scenario where day-time transmissions carry legacy as well as M/H content while the night/prime time transmissions reserve all bandwidth for legacy content only.



OPTI POWER®

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.



SUPPORTED MODULATOR MODES

A/53 ATSC
A/153 ATSC M/H (option PT3713)
A/110:B and A/110:2011 SFN mode (option PT 3714)
Test modes: Single carrier, 8VSB spectrum driven by null-packet input (PRBS mode)

ELECTRICAL SPECIFICATIONS

Inputs

ASI/SMPTE-310M inputs

No. of inputs:	2
Input mode:	SMPTE-310M or ASI, user selectable
Connector:	Coax contact in DIN41612M_60_4 main PCB connector
Input impedance:	75 ohm
Return loss:	> 13 dB
Redundancy:	User selectable switching policy between "Primary" and "Secondary" source

Ethernet ports (1Gbit/sec)

No. of Ethernet ports:	4 (2 of them optimized for PT3720/00 TSolP)
Connector:	RJ45 quadruple PCB connector

GNSS Receiver Input (Option PT3711)

Connector:	Coax contact in DIN41612M_60_4 main PCB connector
Frequency:	1.575 GHz (GPS) / 1.598-1.606 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 (± 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 connector
Frequency:	10 MHz
Level:	100 mV-3 Vpp
Impedance:	50 ohm/ > 1 k ohm, user selectable
Coupling:	AC

Time reference (SFN timing)

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

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 PT3160 card is 250 l/minute.

OUTPUT

RF-output

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

Spectrum outside band (for RF Output 0 dBm @ 6 MHz)

Harmonics and spurious:	< -50 dBc
-------------------------	-----------

Shoulders:	< -50 dB (typically -55 dB)
MER:	> 45 dB (typically 50 dBc)

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)

POWER SUPPLY

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

CONTROL INTERFACE

Ethernet interface

Connector:	RF45 quadruple PCB connector
------------	------------------------------

RS232/RS485 interface

Connector:	Routed via DIN41612M_60_4 main PCB connector
------------	--

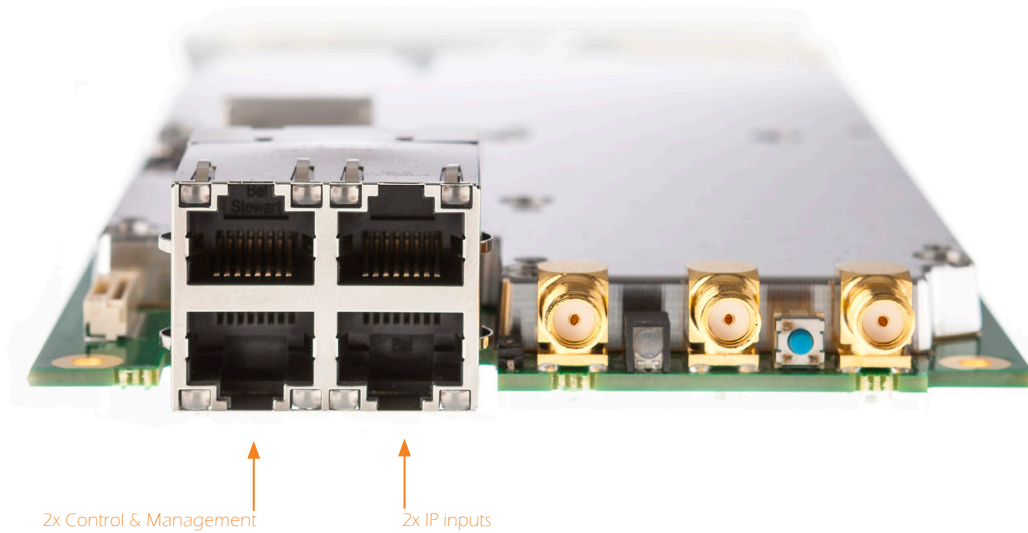
HW interface

Connector:	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, user programmable activation: ground closure or open

ENVIRONMENTAL SPECIFICATION

Note: The environmental specifications for a solution based on the PT3160 OEM card will depend on the specific chassis solution chosen in each individual case. The values shown are for ProTelevision own rack integration solution (PT3060).

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



2x Control & Management

2x IP inputs

Ordering codes:

OEM Modulator

PT3160 ATSC OEM modulator card

Options, software

PT3713 A/153 ATSC M/H mode*
 PT3714 A/110:B and A/110:2011 SFN timing*
 PT3720/00 2x TSoIP interface (Gigabit)
 PT3754 Adaptive digital Pre-corrector
 PT3756 OPTIPOWER®:
 Enhanced precorrection and adaptive PAPR clipper
 PT3770/00 Automatic Level Control
 PT3263 ATSC 3.0 License

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

*For transmission to air of these transmission modes/features, it is required a license from the patent owner.

Please check: <http://atsc.org/policies/patent-statements/>

[3160ver2] Data subject to alteration without notice.
 Copyright © 2016 ProTelevision Technologies
 Printed in Denmark