

PT3163 ATSC 3.0 OEM Modulator



The PT3163 ATSC 3.0 OEM ProTelevision Technologies' Software defined modulator, provides maximum integration flexibility for transmitter manufacturers.

The remarkable performance and robustness of the PT3163, makes it the perfect choice for your VHF and UHF ATSC 3.0 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).
- ◆ 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).
- ◆ **OPTIPOWER®** – market leading enhanced adaptive precorrection and PAPR clipping technology for maximum optimization of transmitter power efficiency and/or transmitter MER performance (Option PT3756).
- ◆ SCPI control over RS232/RS485 and over IP.
- ◆ 4x Ethernet Gigabit interfaces for control and data transport.
- ◆ 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.**
- ◆ **SNMP** client Get/Set/Trap.

ATSC 3.0

OPTIPOWER®

Available in different versions:

PT3163 ATSC 3.0 OEM Modulator
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 PT3063 on ProTelevision's Website.

Application

The **PT3163 ATSC 3.0 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 PT3163 ATSC 3.0 modulator is to provide a versatile, robust and unsurpassed performance to integrate and manufacture high quality ATSC 3.0 Transmitters.

The integration of the OEM PT3163 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.

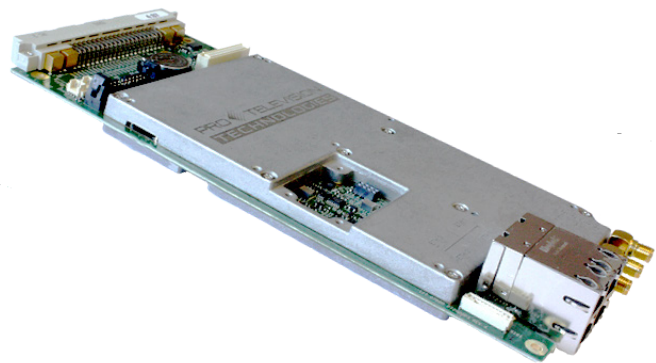
The PT3163 ATSC 3.0 modulators have four Ethernet **Gigabit** ports with different MAC addresses.

The PT3163 ATSC 3.0 modulators are fully ready for IP networks. The quadruple Ethernet Gigabit ports consist of 2 optimized ports for IP data input and 2 ports available for control and management.

The PT3163 modulator is designed according to the ATSC 3.0 standard and supports all the approved modes including **Layer Division Multiplex (LDM)**. (Option PT3730)

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 (for example ATSC 1.0), by simply loading an alternative firmware image and licencing key.

ATSC 3.0



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.



SIGNAL PROCESSING ATSC 3.0

System bandwidth:	6 MHz, 7 MHz and 8 MHz
Multiple PLP:	64 PLP
PLP modulation:	QPSK, 16QAM, 64QAM, 256QAM, 1024QAM, 4096QAM
PLP LDPC code rate:	2/15, 3/15, 4/15, 5/15, 6/15, 7/15, 8/15, 9/15, 10/15, 11/15, 12/15, 13/15
FFT Size:	8K, 16K, 32K
Guard intervals (samples):	192, 384, 512, 768, 1024, 1536, 2048, 2432, 3072, 3648, 4096 and 4864
Pilot pattern:	SP3_2, SP3_4, SP4_2, SP4_4, SP6_2, SP6_4, SP8_2, SP8_4, SP12_2, SP12_4, SP16_2, SP16_4, SP24_2, SP24_4, SP32_2, SP32_4
Signalling FEC Type	Modes 1 to 7 for LI-Basic and LI- Detail
Network modes:	MFN & SFN
Test modes:	Single carrier, PRBS, NULL-Bootstrap and OFDM PAPR 3

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:	< -55 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	OCVXO 0.25 ppm (optional)
PT3710/20	OCVXO 0.01 ppm (optional)

CONTROL INTERFACE

Ethernet interface	RF45 quadruple 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, user programmable activation: ground closure or open

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 PT3163 card is 250 l/minute.

ELECTRICAL SPECIFICATIONS

Inputs

No. of inputs:	2
Input mode:	Ethernet RJ45 (IP Gigabit)
Redundancy:	User selectable switching policy between "Primary" and "Secondary" source

Ethernet ports (1Gbit/sec)

No. of Ethernet ports:	4 (2 of them optimized for IP input)
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

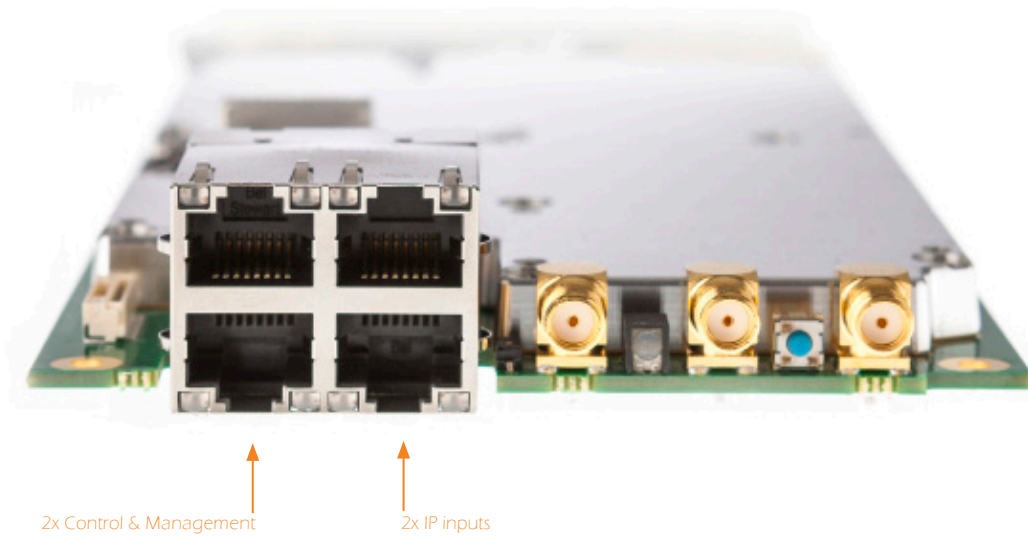
POWER SUPPLY

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

ENVIRONMENTAL SPECIFICATION

Note: The environmental specifications for a solution based on the PT3163 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



Ordering codes:

OEM Modulator

PT3163 ATSC 3.0 OEM modulator board

Options, software

PT3754 Adaptive digital Pre-corrector
 PT3756 OPTIPOWER®:
 Enhanced precorrection and adaptive PAPR clipper
 PT3770/00 Automatic Level Control
 PT3730/00 Layered Division Multiplexing (LDM)
 PT3786 Scheduler Mode
 PT3787 ATSC 3.0 Seamless Switching (STL)

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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