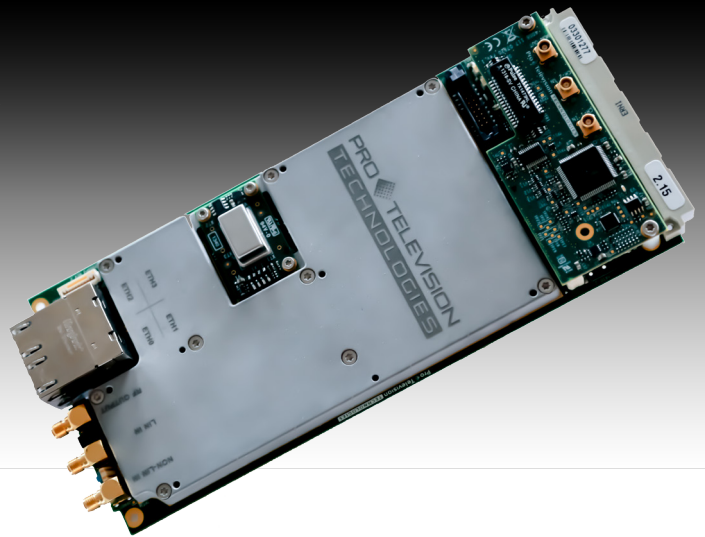# PT3170
DAB/DAB+/T-DMB
OEM Modulator

The PT3170 DAB/DAB+/T-DMB OEM ProTelevision Technologies Software defined modulator provides maximum integration flexibility for transmitter manufacturers.

The remarkable performance and robustness of the PT3170, makes it the perfect choice for your VHF Digital Radio transmitters.

- Future proof technology based on a fully reconfigurable, software defined modulator platform, that allows upgrading of the board to other TV standars (for example DVB-T/T2) or Radio T2 Lite over 1.7MHz.

- 2 x EDI 1Gb inputs (Option PT3720/10) and 3 x ETI interfaces (G.703, G.704): 2 inputs and 1 monitoring output).

- 4x Ethernet Gigabit interfaces for control and data transport. Two of them optimized for EDI Input (Option PT3720/10) and two of them for management and control.

- SFN and MFN.

- 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.

- OPTIPOWER® - market leading enhanced adaptive precorrection and PAPR clipping technology for maximum optimization of transmitter power efficiency and/or transmiter 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).

- 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 ETI and/or EDI inputs.

PT3170 DAB/DAB+/T-DMB OEM modulator:

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

DAB
Digital Audio Broadcasting

OPTI POWER®

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Application

ProTelevision Technologies, market leader in design and manufacture of best in class TV modulators, has given at step ahead into radio transmission with the PT3170 DAB/DAB+/T-DMB modulator dedicated to Digital Radio Networks but upgradable to other standards.

The ProTelevision DAB modulator is characterized by its high RF and MER performance and its unique ability to optimize the performance of any third power amplifier being utilized with the modulator.

ProTelevision Technologies highly advanced adaptive pre-correction technology, achieves substantial increase in transmitter power efficiency, reducing power consumption and consequently, a reduction in OPEX cost for the Digital Radio Broadcasters.

The DAB/DAB+/T-DMB modulation core has been developed by ProTelevision on the same world recognized hardware platform PT3000, utilized for digital TV standards. Therefore with a simple software upgrade the modulator can be reconfigured into any Digital TV standard as for example DVB-T/T2 or any digital radio standards developed by ProTelevision such as **T2 Lite radio over 1.7MHz.**

This software flexibility, also means that all the generic features developed for the TV standards, can be installed at the DAB/DAB+/T-DMB modulator, such as OptiPower, the most advanced state of the art non-linear signal processing technology capable of enhancing the overall efficiency of any DAB/DAB+/T-DMB transmitter..

The DAB/DAB+/T-DMB features redundant ETI (G703/G704) inputs, two **EDI Ethernet Gigabit IP ports** providing **seamless switching** of data inputs and two TCP/IP control ports.

Advanced monitoring ETI and EDI stream check, time stamp error and deviation, Support for SFN with absolute timestamps over EDI.

Integrated multi standard Global Navigation Satellite System (GNSS) receiver supporting both **GPS** and **GLONASS** satellites.

Seamless switching between any combination of inputs **(ETI and/or EDI)** is fully supported in SFN mode.
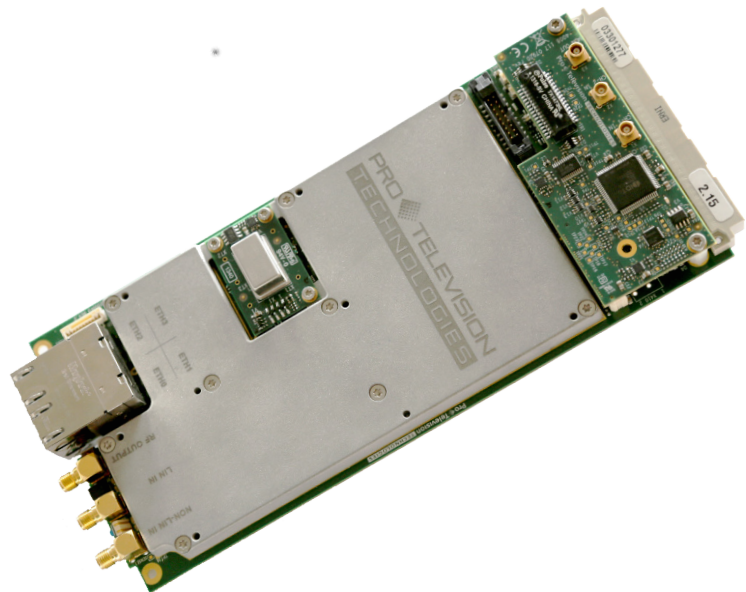
Optipower is a ProTelevision Technologies' proprietary solution developed to provide an increase of quality (MER) and efficiency to new or existing TV transmitters.

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.

DAB Signal Processing:

Modulation standards: DAB/DAB+/T-DMB
o DAB Transmission: EN 300 401 v1.4.1
o DMB Services: EN TS 102 428 v1.1.1

Transmission: SFN and MFN

Supported modes: DAB Mode I, II, III and IV

Test Modes: Single Carrier, PRBS.

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:	± 0.5 dB
Return loss:	> 12 dB (Standarized as >8dB)

ETI Monitor Output

No. of ETI Outputs:	1
Interface:	ETI (Channel Out)
Connector:	MCX Female, 75 ohm
Return loss:	> 12 dB

Spectrum Outside Band

Shoulders:	< -45 dB
Harmonics and spurious:	< -55 dBc
MER:	> 42 dB

Internal frequency reference
Selectable Local Oscillator for customer's specific request.

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

Control Interface

Ethernet interface
Connector:	Quadruple RJ45 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

Power supply

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

# Electrical specifications

Inputs
ETI inputs

No. of ETI inputs:	2
Standards:	ETS 300 799
Protocols:	(NI,G703), (NA,G704) 5376, (NA,G704)5592 and Jitter tolerance according to G.823
Connector:	MCX Female, 75 ohm
Return loss:	> 20 dB (Standarized as >18dB)
Capacity:	2 Mbps
Redundancy:	User selectable switching policy between "Primary" and "Secondary" ETI source

EDI Stream Inputs

No. of ETI inputs:	2, (out of the 4 IP interfaces available)
Standards:	ETSI TS 102 693
Protocols:	IP, RTP, UDP, IGMP (v2 & v3)
Connector:	RJ45
Capacity:	Gigabyte interfaces
Redundancy:	User selectable switching policy between "Primary" and "Secondary" EDI source

Ethernet ports (1Gbit/sec)

No. of ethernet ports:	4; 2 of them optimized for EDI (PT3720/10)
Connector:	Quadruple RJ45 mounted on the board

2x Control & Management   2x EDI inputs
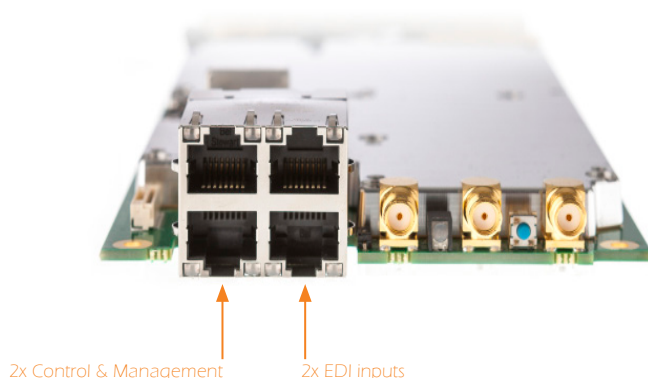
GNSS Receiver Input (option PT3711)

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 (±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 k ohm, user selectablePLP

ENVIRONMENTAL SPECIFICATION

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 (PT30XX).

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

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 PT3170 card is 200 l/minute.
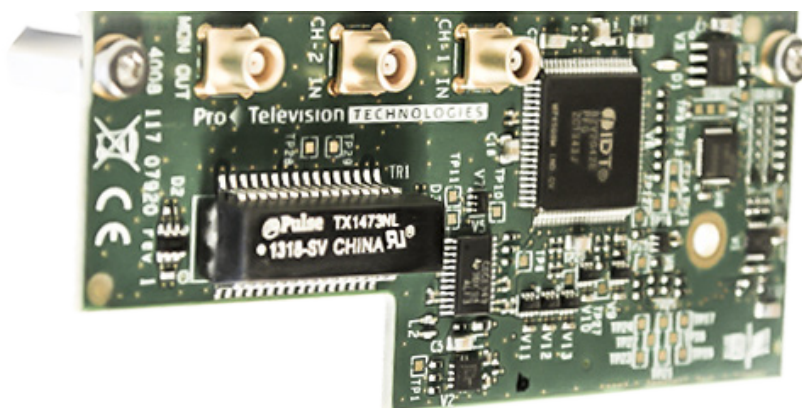
ETI PLUG-IN INTERFACE BOARD

Ordering codes:

OEM Modulator
PT3170   DAB/DAB+/T-DMB OEM modulator

Options, software
PT3720/10   2x EDI interface (Gigabit)
PT3754   Adaptive digital Pre-corrector
PT3756   OPTIPOWER®: Enhanced precorrection and adaptive PAPR clipper
PT3770/00   Automatic Level Control

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

PT3750   ETI PLUG-IN interface board (by default).

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