Unique Broadband Systems Ltd.

DAB 3000 Modulator

Model: DAB-Mod-3000

Product Features

- *ETS 300 401, 300 799 and EU147 compliant*
- *Supports T1 and E1 input rates*
- *Digital IQ (ETS 300 798), IF and RF outputs*
- *Transmission Modes: I, II, III, IV*
- *Programmable Static Delay up to 1.6 seconds*
- *Outstanding linear and non-linear digital pre-correction*
- *Instinctive Front Panel Control*
- *Web Browser and SNMP(optional) Remote Control*
- *Dynamic Reconfiguration*
- *Auto SFN Setup*
- *Downloadable Software Upgrades*



Description and Application

Overview

UBS's sleek and slender state-of-the-art DAB Modulator is setting new standards for DAB equipment. No longer does the broadcaster have to waste large areas of rack space deploying new solutions. The UBS solution occupies a mere 1U of rack space making it truly unique. This innovative product is the result of extensive consultation with many of the world's premier DAB broadcasters. It has been designed exclusively to satisfy the needs of the professional broadcaster, addressing the revolution now taking place in Radio throughout the world. The robust and efficient COFDM RF modulation technology provides superior coverage in non-line of sight situations. It is resistant to multipath interference even in a mobile environment.

DAB Modulator Features

Inputs

Dual NA inputs which can automatically and seamlessly switch between the two network feeds, having corrected for any differential network delay of up to 1 Second. Dual NI Inputs with Auto Switching between inputs.

Processing

Acting on the ETI header inserted by the ensemble multiplexer, the DAB-Modulator can perform dynamic multiplex management, allowing all modes of operation (Mode I, II, III and IV).
Static delay can be incrementally adjusted in service, up to 1.6 seconds, offering the flexibility required when implementing a single frequency network architecture.
Under the control of either NA or LI timestamps inserted in the ETI by the ensemble Multiplexer, the modulator can automatically manage network delays up to 1.6 seconds.

IF Output

The DAB Modulator uses all-digital synthesis and quadrature modulation. A digital IF Section converts the complex I/Q signal to an IF signal, using direct modulation. The output is an IF frequency of 44 MHz (or 36 MHz, optional).

Control

Local modulator control is performed via an easy to use front panel, by means of navigation keys and an illuminated LCD display, allowing the intuitive menu structure to be accessed.
Local control is also available through the RS232 serial port, using a CLI (command line interface) protocol.

Indications

Front Panel LED's indicate the status of all major unit functions i.e. inputs, GPS, Delay, RF Output, System, Control and Power. In addition, minimum 2 (up to an optional maximum of 10) user configurable Alarm relays contacts, open circuit for a valid alarm or power loss, are available on the rear panel.

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Product Features (Contd.)

Digital Precorrection

The DAB modulator features both digital Linear and digital Non Linear precorrection.

- The Non Linear precorrector is able to reduce, in both phase and amplitude, the intermodulation products resulting from the nonlinear characteristics of the high power amplifier. The value of third and fifth order products are adjustable, thereby reducing both in-band and out-of-band intermodulation products.
- The Linear precorrection compensates for the frequency and group delay response of the RF path in the system prior to transmission. This distortion is mainly caused in the combiner and mask filter sections of the overall transmission system.

Adjustments can be made to the Band Tilt, Band Sag, S Curve and overall group delay.
The above advanced features allow power amplifiers to be operated at higher output levels while maintaining very low out-of-band emissions.

Optional Features

RF Output – Band III or L-band

The DAB Modulator includes a high quality programmable up-converter, specifically developed for COFDM applications, which performs the frequency conversion The output frequency is flexible and can be set anywhere in Band III or L Band, using a channelized raster, while displaying the appropriate frequency. (Other frequency bands are available on request).

Dual Band (Band III and L band)

Dual Band output option is also available for this product.

Direct Frequency Select option

Allows setting the RF output frequency to any value in Band III or L-band.

Internal GPS option

This version of DAB Modulator includes an internal GPS unit, used for synchronizing the output signal and setting the delays, when operating in SFN Mode. The GPS output signals are also available on the rear panel, for connection to other equipment.

WEB Interface Remote Control option

Remote control is offered via the remote Ethernet Interface using the optional Web server solution. The WEB pages are designed as a complete Graphical User Interface (GUI), for monitoring the status and setting the parameters of the DAB Modulator.

SNMP Remote Control Option

Simple Network Management Protocol (SNMP) is supported via the Ethernet interface. The MIBs are available from UBS for customers wishing the flexibility of integrating this product into their existing control solution.

RS485/RS232 machine-machine option

The command protocols are available from UBS, for customers interested in controlling the RF Transmitter from the DAB Modulator unit.

Ordering Information

Basic Model

DAB-Mod-3000	with IF Output

Options

DAB-OPT-S-331	DAB 3000 Band III
DAB-OPT-S-332	DAB 3000 L-Band
DAB-OPT-S-338	DAB 3000 Dual Band (L, III)
DAB-OPT-GPS	DAB 3000 Internal GPS
DAB-OPT-S-333	DAB 3000 WEB Interface
DAB-OPT-S-334	DAB 3000 RS485 M-M interface
DAB-OPT-S-335	DAB 3000 RS232 M-M interface
DAB-OPT-S-336	DAB 3000 SNMP interface
DAB-OPT-S-337	DAB 3000 Direct Frequency select

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DAB 3000 Modulator

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Product Specifications (specifications are subject to change without notice)

Signal Processing

DAB Transmission modes	I, II, III, IV Transmission mode automatically selected from the ETI stream
Delay compensation	Up to 1.6 seconds in steps of 488 ns
MNSC Control	Transmitter Offset Delay Transmitter Identification Information (TII)

Signal Input

Number of inputs	2
Input impedance	High impedance, optional: terminated in 75 ohms
Connector type	BNC unbalanced
Input Type	ETI(NI) 2.048 MHz short haul or ETI(NA) protocols with support for either T1 or E1 interface in compliance with ETS 300 799
Input Selection	1) Dual NA with seamless switchover, 2) NI or NA, with automatic detection of input type and source 3) Manual lock to input 1 or 2 (auto detect of NA or NI)
Input Error Condition	Input CRC violations. (User-selectable parameters to define if and when the IF output should mute)

Clock Reference Input

Frequency	10 MHz
Level	TTL or sine wave: 100mV – 3Vpp
Connector	50 Ohm BNC

Time Reference Input

Frequency	1 pps
Level	TTL
Connector type	50 ohm BNC

Digital Output

Output type	Digital IQ 8 bit interleaved at 4 MHz
Connector	DB 25 (F) ETS 300 798
Signal Level	ECL-10k

IF Output

Modulation	Directly applied digitally at IF
Number of bits	15 bits using 64 MHz samples
Frequency	44 MHz (optional 36 MHz)
Output level	-15dBm ± 4dBm, adjustable; Step size: 0.1 dBm
Connector	50 ohm N-Type

RF Output

Band III	Channel 5A to 13 F (174.928 to 239.200 MHz)
L-band	Channel LA to LW (1452.960 to 1490.624 MHz) Channel L1 to L23 (1452.816 to 1491.184 MHz)
Output level	Adjustable, -10 to +1.5 dBm
Connector	50 Ohm N-type
Output Spectrum Mask	Meets ETS 300 401
Out of Band spurious	-50 dBm
Shoulder level	typical -45 dBc
Output Phase noise	< -80 dBc/Hz @ 100 Hz offset < -80 dBc/Hz @ 1 kHz offset < -95 dBc/Hz @ 10 kHz offset < -120 dBc/Hz @ 100 kHz offset
RF Stability MFN	Mode 1: +/- 10 Hz Mode 2: +/- 40 Hz Mode 3: +/- 80 Hz Mode 4: +/- 20 Hz Drift over a 3 months period: 1 Hz
RF Stability SFN	Mode 1: < 10 Hz Mode 2: < 40 Hz Mode 3: < 80 Hz Mode 4: < 20 Hz Drift over a 3 months period: 1 Hz

IF Monitor Output

Level	-20 dB below the IF output
Connector	50 ohm BNC

RF Monitor Output

Level	-25 dB below the RF output
Connector	50 ohm BNC

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Output Stream Timing

Processing Delay	Mode I	111000 µs
	Mode II	39000 µs
	Mode III	39000 µs
	Mode IV	63000 µs
Transmitter Delay	Mode I	111000 µs to 1.6 sec in 488 ns steps
	Mode II	39000 µs to 1.6 sec in 488 ns steps
	Mode III	39000 µs to 1.6 sec in 488 ns steps
	Mode IV	63000 µs to 1.6 sec in 488 ns steps
Transmitter Offset Delay		0 to 2047 microseconds in 488 ns steps
Network Padding Delay		0 to 2.5 sec

Digital Precorrection

Linear Precorrection	
Tilt	+/- 3 dB
Sag	+/- 3 dB
S-Curve	+/- 2 dB
Group Delay	+/- 1 µseconds
Non Linear Precorrection	
3rd order amplitude	Range: 0 to 99.99%
3rd order phase	Range: -240 to +240 degrees
5th order amplitude	Range: 0 to 99.99%
5th order phase	Range: -240 to +240 degrees
Peak clipping adjustment	
Range of backoff	6 - 12 dB
Differential delay between carriers (any carrier)	Less than 2.5 µseconds

Test Modes

- **DAB Mode I, II, III, IV** (full DAB signal with empty FIBs)
- **Impulse**
- **Two-tone**
- **48-tone comb**
- **64-tone comb**

Internal GPS option

GPS antenna connection	F Type, 75 ohm for Bullet III Thunderbolt antenna
Timing Signals present	Within 1 µsec of GPS UTC. (+/- 50 nsec)
Frequency Accuracy	$1.16x10^{-12}$ after 1 day (three sigma)
Holdover spec	Timing: +/- 1 µsec over 2 hours Less than +/- 100µsec over 24 hours Frequency accuracy: +/- 1.7e-9 over 15 degrees in 24 hours

Control Interface

Front Panel	LCD display and cursor/ execute keys
RS232 interface	Connector: 9-pin SUB-D Male Command protocol: CLI (Command Line Interf) Machine-machine (optional)
RS485 Interface	Connector: 9-pin SUB-D Male Command protocol: machine-machine (optional)
Web Interface (optional)	Internet Explorer 5.0+ Connector: RJ45 10/100 Base T
SNMP Control Interface (optional)	Ethernet 10/100 Base T Connector: RJ45

Alarm interface

Connector	25-pin SUB-D Male
Output	Two user programmable alarms via separate floating relay contacts, contact rating 30V/1A 10 contacts (optional)

Power

Voltage	90-264VAC
Frequency	47-63Hz
Consumption	Max. 45VA
Harmonic Correction	EN61000-3-2

Environmental

Operating Temperature	5°C to +40°C (+40°F to +105°F)
Humidity operating/storage	max 90% RH
Cooling	Temperature controlled fan to assist natural convection

Mechanical

Width	483 mm (19")
Height	44 mm (1.75")
Depth	559 mm (22")
Weight	7 kg (15 lbs)

Compliance

EMC	EN 55022, EN 55024
Safety	EN60950

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