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 multi-path 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.
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
# 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 (automatic detection 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)
  - 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


**Product Specifications** (specifications are subject to change without notice)

**Output Stream Timing**

<table>
<thead>
<tr>
<th>Processing Delay</th>
<th>Mode I</th>
<th>111000 μs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mode II</td>
<td>39000 μs</td>
</tr>
<tr>
<td></td>
<td>Mode III</td>
<td>39000 μs</td>
</tr>
<tr>
<td></td>
<td>Mode IV</td>
<td>63000 μs</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transmitter Delay</th>
<th>Mode I</th>
<th>111000 μs to 1.6 sec in 488 ns steps</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mode II</td>
<td>39000 μs to 1.6 sec in 488 ns steps</td>
</tr>
<tr>
<td></td>
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</tr>
<tr>
<td></td>
<td>Mode IV</td>
<td>63000 μs to 1.6 sec in 488 ns steps</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transmitter Offset Delay</th>
<th>0 to 2047 microseconds in 488 ns steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Network Padding Delay</td>
<td>0 to 2.5 sec</td>
</tr>
</tbody>
</table>

**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
- 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 Interface)
  - 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