

# AZ110

## Broadcast Satellite Modulator

### Azimuth Product Family

# AZIMUTH

SERIES

#### Description

The AZ110 is a state-of-the-art satellite modulator designed for broadcast contribution, DSNG and distribution applications over satellite in full compliance with the DVB standards. Depending on the applications and the activated features, the AZ110 can be used in conjunction with set-top boxes, professional IRDs or satellite demodulators such as the AZ910.

In its default configuration, the AZ110 is capable of transmitting one MPEG transport stream in DVB-S, DVB-DSNG or DVB-S2 mode. The AZ110 allows automatic or manual selection between two ASI inputs and has dual ASI monitoring outputs. Optionally, an optical ASI interface can be added. BISS scrambling options can be activated to scramble a single stream or Multiple program streams (BISSM).

To simplify the migration towards IP, the AZ110 is also available with DualFlow (combined ASI+Ethernet interface), providing broadcasters the following capabilities:

- The ability to transmit two transport streams simultaneously in DVB-S2 Multistream mode (via a second ASI input).
- The ability to interface (via a GbE input) with equipment or networks that carry transport streams over IP with the RTP or UDP protocols. The IP layer is removed by the modulator before transmission.
- The ability to transmit IP services (file transfers, VoIP, TCP services...) and transport stream(s) simultaneously. In this case the modulator performs the encapsulation of the IP data in XPE mode
- The ability to transmit IP services or transport stream(s) alternatively. In this case the modulator performs the encapsulation of the IP data in XPE or MPE mode.
- The ability to configure Quality of Service (QoS) of the IP traffic, while keeping absolute priority to the ASI streams

When several transport streams and/or IP services are transmitted simultaneously, the Variable Coding and Modulation (VCM) option allows each QoS or stream to be modulated with its own parameters.

At the output of the modulator, the signal is available on an L-band interface. IF- and RF-band as well as BUC power supply and reference frequency are available as configuration options, providing a compact and cost effective solution.

This modulator provides exceptional performance and bandwidth efficiency. When activated, the unique linear and non-linear predistortion option Equalink™ provides an additional link margin improvement of up to 2,5dB, truly unleashing the full efficiency of higher modulation schemes such as 16 and 32 APSK.

#### Key features

- DVB-S2 and DVB-DSNG/S compliant
- QPSK, 8PSK, 16APSK and 32APSK
- Data rates up to 216 Mbit/s
- ASI or optical ASI transport stream interfaces

- L-band monitoring output
- Programmable amplitude slope equalizer
- Optional DualFlow: combined ASI+GbE interface with integrated IP encapsulator and Configurable Quality of Service (QoS)
- Optional BISS scrambling
- Optional Multistream and/or VCM operation
- Optional integrated RF upconverter
- Optional 10 MHz reference input/output
- Optional Linear and non-linear predistortion (Equalink™)
- Featured-based pricing and software upgradability

#### Main advantages

- Lower operational costs thanks to highest bandwidth efficiency
- Guaranteed interoperability with DVB receivers
- High versatility and flexibility
- Future-proof design combining video and IP technologies
- High compactness

#### Applications

- Contribution
- Primary distribution
- Direct-to-home
- DSNG combined with IP services
- Data broadcast
- Distance learning, Business TV

#### Related products

AZ410 Broadcast Satellite Modem  
AZ910 DSNG and Contribution Demodulator

AZ7x0 Frequency converters  
AZ210 1+1 Modulator Redundancy Switch  
AZ200 Universal Switching System

#### Related Documents

White paper Equalink™

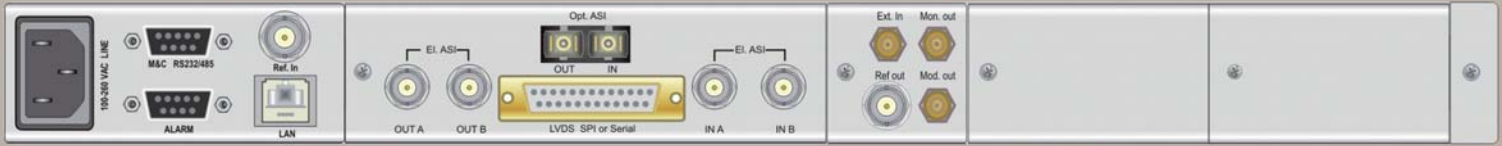


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# Specifications – AZ110(R6)



## Input interface

### ASI/SPI interface (default):

- 2x ASI input on BNC (F) - 75 ohms (coax)
- 2x ASI output (loop through) on BNC (F) - 75 ohms (coax)
- SPI on 25 pin sub-D connector
- Optical ASI on ST (optional)
- 188 or 204 byte mode
- Encryption (optional)
  - BISS (single program): mode 0,1, E
  - BISSM (multiple program): mode 0,1,E
- Rate adapter

### DualFlow: Combined ASI+Ethernet (optional)

- 2 x ASI on BNC (F) - 75 ohms (coax)
- 2x ASI output (loop through) on BNC (F) - 75 ohms (coax)
- 188 byte mode
- Auto switching 10/100/1000 Base-T Ethernet interface:
  - transport stream on IP interface (UDP/RTP)
  - Ethernet/IP QoS:
    - 4 Queue priorities
    - 8 traffic classification rules
    - Configurable queue size
  - Layer 2 bridge mode – Ethernet frames over satellite (data pipng)
  - Layer 3 bridge or router mode: IP packets over satellite using Multi Protocol (MPE) or Extended Performance (XPE) Encapsulation
  - Maximum 16 routes/destinations addresses
  - Processing of up to 40 000 IP packets per second – maximum 50 Mbit/s
- DVB-S2 Multistream support
- VCM support (optional)
- Base-Band frame (BBF) input support (optional)

## Modulation

### Supported modulation schemes and FEC

- DVB-S/DSNG:
  - Outer/Inner FEC: Reed Solomon / Viterbi
  - MODCODs:
    - QPSK: 1/2, 2/3, 3/4, 5/6, 7/8
    - 8PSK: 2/3, 5/6, 8/9
    - 16QAM: 3/4, 7/8
- DVB-S2:
  - Outer/Inner FEC: BCH/ LDPC
  - MODCODs:
    - QPSK: 1/4, 1/3, 2/5, 1/2, 3/5, 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
    - 8PSK: 3/5, 2/3, 3/4, 5/6, 8/9, 9/10
    - 16APSK: 2/3, 3/4, 4/5, 5/6, 8/9, 9/10
    - 32APSK: 3/4, 4/5, 5/6, 8/9, 9/10

### Baud rate range

- DVB-S2 0,05 – 45 Mbaud
- DVB-S/DSNG 0,05 – 45 Mbaud

### Frame length

- DVB-S/DSNG 188 bytes
- DVB-S2 Short Frames 16200 bits
- DVB-S2 Normal Frames 64800 bits

### Roll-off factor

- 20 % - 25% -35%

## Output interfaces

### L-band output (default):

- Connector SMA (F), 50 ohms
- Return loss > 10 dB
- Level -50/-7 dBm (+/- 2dB)
- Frequency 950 - 1750 MHz (50 Hz steps)

### IF-band (optional):

- Connector BNC (F) - 75 ohms
- Return loss 50 ohms : > 14 dB  
75 ohms : > 20 dB (intermateable with 50 ohms)
- Level -30/+5 dBm (± 3 dB)
- Frequency 50 - 180 MHz (50 Hz steps)

### L-band+IF (optional)

- L-band: same as above
- IF: fixed 70 or 140 MHz frequency  
-34/+1 dBm (+/- 3 dB) output level

### RF band (optional)

- Connector SMA (F), 50 ohms
- Return loss > 12 dB
- Frequencies 5.85-6.65 GHz  
12.75-13.25 GHz  
13.75-14.5 GHz
- Level -50/-7 dBm (+/- 3dB)
- Frequencies 17.30-18.10 GHz  
17.60-18.40 GHz
- Level -40/+3 dBm (+/- 3dB)

### L-band monitoring output (default)

- Connector SMA (F), 50 ohms
- Return loss > 7 dB
- Level -45 dBm
- Frequency default: identical to L-band output, with options AA-02 / AA-06: 1080 MHz

### BUC power and reference frequency (optional)

- max. current 1,5 A
- voltage 24V
- frequency 10MHz
- stability ±5x10-8 over 0°C to 65°C

### Spurious performance

- better than - 65 dBc @ -10 dBm output level

### 10 MHz reference input / output interface (optional)

- Connector BNC (F) – 50 ohms
- Input level -3dbm up to 7dBm
- Output level +7dBm

## Internal Reference frequency

- High Stability (optional)
  - Stability ±5x10<sup>-8</sup> over 0°C to 70°C
  - Ageing: ± 15 ppb/day  
± 300 ppb/year
- Very High Stability (optional)
  - Stability ±2x10<sup>-9</sup> over 0°C to 65°C
  - Ageing: ± 0.5 ppb/day  
± 500 ppb/10 year

## Generic

### Monitor and control interfaces

- Web based GUI
- Diagnostics report, alarm log
- RMCP over TCP-IP/UDP and RS232/RS485
- SNMP v2c

### Alarm interface

- Electrical dual contact closure alarm contacts
- Connector 9-pin sub-D (F)
- Logical interface and general device alarm

## Physical

- 1RU, width: 19", depth 51 cm, 6 kg
- Power supply: 90-130 & 180-260 Vac, 105 VA, 47-63 Hz
- Temperature
  - Operational: 0°C to 40°C
  - Storage: -40 to +70°C
- Humidity: 5% to 85% non-condensing
- CE label

## Ordering information

AZ 110 Broadcast Satellite Modulator		Order n°
<b>Default Configuration</b>		
DVB Modulator, SNMP Modulation & Baud rate: DVB-S 5Mbaud Input interface: ASI interface + Rate adaptor Output interface : L-band (950-1750 MHz)		AZ110
<b>Configuration options</b>		
Category		Max. 1 option per category
Input Interface	ASI	Default
	ASI+ Optical ASI	AG-02
	DualFlow: Ethernet + ASI (CCM)	AG-03
	DualFlow: Ethernet + ASI (CCM +VCM)*	AG-04
Output Interface	L-band (950-1750 MHz)	Default
	IF (50-180 MHz)	AA-02
	L-band + 10MHz for BUC	AA-03
	L-band + 10MHz + 24Vdc for BUC	AA-04
	IF+ L-band	AA-06
	L+ C-band (5,85-6,65 GHz)	AA-07
	L+ Ku-band (12,75-13,25 GHz)	AA-08
	L+ Ku-band (13,75-14,50 GHz)	AA-09
	L+ DBS-band (17,30-18,10 GHz)	AA-10
	L+ DBS-band (17,60-18,40 GHz)	AA-11
	Modulation & Baud rate	DVB-S Q/8PSK, 16QAM 5Mbaud
DVB-S Q/8PSK, 16QAM 15Mbaud*		AB-02
DVB-S Q/8PSK, 16QAM 30Mbaud*		AB-03
DVB-S Q/8PSK, 16QAM 45Mbaud*		AB-04
DVB-S/S2 QPSK 5Mbaud*		AB-25
DVB-S/S2 QPSK 15Mbaud*		AB-26
DVB-S/S2 QPSK 30Mbaud*		AB-27
DVB-S/S2 QPSK 45Mbaud*		AB-28
DVB-S/S2 Q/8PSK 5Mbaud*		AB-05
DVB-S/S2 Q/8PSK 15Mbaud*		AB-06
DVB-S/S2 Q/8PSK 30Mbaud*		AB-07
DVB-S/S2 Q/8PSK 45Mbaud*		AB-08
DVB-S/S2 Q/8PSK, 16QAM, 16APSK 5Mbaud*		AB-09
DVB-S/S2 Q/8PSK, 16QAM, 16APSK 15Mbaud*		AB-10
DVB-S/S2 Q/8PSK, 16QAM, 16APSK 30Mbaud*		AB-11
DVB-S/S2 Q/8PSK, 16QAM, 16APSK 45Mbaud*		AB-12
DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 5Mbaud*	AB-13	
DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 15Mbaud*	AB-14	
DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 30Mbaud*	AB-15	
DVB-S/S2 Q/8PSK, 16QAM, 16/32APSK 45Mbaud*	AB-16	
<b>Additional options</b>		
Category		Max. 1 option per category
10MHz reference In/Out	High stability	GR-01
	Very high stability	GR-02
Predistortion	Equalink *	AC-01
Encryption	BISS scrambling ( only with ASI interface)	AD-01
	BISSM scrambling ( only with ASI interface)	AD-02
Input frame	Base-Band frame (only with Ethernet interface)	AV-01

(\* upgradeable via license key

Other configurations and options such as RF-band amplifiers or 68 Mbaud rate are available on request.

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