A-Series AT-61-RF14
Satellite Modulator with direct RF output

WORK MICROWAVE

The A-Series is a family of next generation satellite modem platforms built on versatile FPGA- and software-based architecture. The AX-60 product line supports the full range of DVB-S2X/S2/S standards. Exceptional analog and digital engineering provides teleport-grade devices with future-proof expandability.

Beyond DVB waveforms, A-Series devices can be extended to customized signal and data processing. Through an all-IP structure, the platform supports both native network operation as well as data streaming over IP. Built-in encapsulators provide support for a wide range of formats plus specialized streaming like transparent baseband data, raw IQ information, space data formats and more.

The **AT-61 Satellite Modulator** provides DVB uplinks for streams over IP and ASI interfaces, with TV signals being the main application. A dedicated feature set serves the specific requirements of distribution and DTH networks. Real-time monitoring and control together with common alarm and reference connectors allows seemless integration into professional teleport infrastructures.

Key Features

- DVB-S2X - ETSI EN 302 307-2
- DVB-S2 - ETSI EN 302 307-1
- DVB-S2X modulations:
  QPSK to 256APSK normal, short, linear
- DVB-S2 modulations:
  QPSK to 32APSK; normal, short
- Symbol rates from 100 ksps to 75 Msps
- Data rate up to 360 Mbit/s integrated
- Roll-Off: 35%, 25%, 20%, 15%, 10%, 5%
- Exceptionally clean signal output and internal processing
- Predistortion for automatic group delay and nonlinearity compensation

- Operates as layer 3 bridge or layer 3 router including traffic shaping / QoS functionality
- ACM controller open to various ACM systems
- GSE and MPE encapsulation integrated
- Customizable processing infrastructure for easy integration into large communication systems
- Flexible software architecture for easy extension and future virtualization of functionality
- **3 years warranty**

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TX Signal Specifications

Signal output Ku-band:	Frequency:	12.75...14.5 GHz	
	Connector:	N female	
	Impedance:	50 Ohm	
	Return loss:	> 16 dB	
	Output power:	-30...0 dBm	
		0.1 dB steps, ±0.5 dB accuracy	
	Output power muted:	< -70 dBm	
	Phase noise:	-45 dBc/Hz @ 10 Hz	
		-70 dBc/Hz @ 100 Hz	
		-80 dBc/Hz @ 1 kHz	
		-85 dBc/Hz @ 10 kHz	
		-95 dBc/Hz @ 100 kHz	
		-105 dBc/Hz @ 1 MHz	
	Signal related spurs:	< -67 dBc, unmodulated carrier, Δf > 2 MHz	
		< -60 dBc, unmodulated carrier, Δf < 2 MHz	
	L-band monitor output:	-30 dBm @ 2000 MHz, SMA female	
Clock stability:	Standard:	±2 x 10^-7 after warm up, aging: ±2 x 10^-8 per day, ±1 x 10^-6 per year	
	Extended:	±2 x 10^-8 after warm up, aging: ±1 x 10^-9 per day, ±1 x 10^-7 per year ***w/ options EXT or RI***	
Symbol rate:	Range:	100 ksps ... 75 Msps ***depending on license TXS****	
	Step size:	1 sps	
DVB-S2X Modulation / Coding:	ModCods: (normal FEC frame)	QPSK	13/45, 9/20, 11/20
		8PSK	23/36, 25/36, 13/18
		16APSK	26/45, 3/5, 28/45, 23/36, 25/36, 13/18, 7/9, 77/90
		32APSK	32/45, 11/15, 7/9
		64APSK	11/15, 7/9, 4/5, 5/6
		128PSK	3/4, 7/9
		256PSK	32/45, 3/4
	ModCods: (short FEC frame)	QPSK	11/45, 4/15, 14/45, 7/15, 8/15, 32/45
		8PSK	2/15, 8/15, 26/45, 32/45
		16APSK	7/15, 8/15, 26/45, 3/5, 32/45
		32APSK	2/3, 32/45
	ModCods linear: (normal FEC frame)	16APSK	1/2-L, 8/15-L, 5/9-L, 3/5-L, 2/3-L
		32APSK	2/3-L
		64APSK	32/45-L
		256PSK	29/45-L, 2/3-L, 31/45-L, 11/15-L
		all according to ETSI EN 302307-2	
DVB-S2 Modulation / Coding:	ModCods: (normal and short FEC frame; 9/10 normal FEC frame only)	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
	Pilot insertion:	on / off	
	Physical layer scrambling:	N = 0...262141	
		all according to ETSI EN 302307-1	
DVB-S Modulation / Coding:	ModCods:	QPSK	1/2, 2/3, 3/4, 5/6, 7/8
		8PSK	2/3, 5/6, 8/9
		16QAM	3/4, 7/8
		all according to ETSI EN 300421	
		only streaming functionality, no network operation	
Carrier ID:	DVB-CID according to ETSI TS 103129		
Signal spectrum mask:	α = 0.35, 0.25, 0.20, 0.15, 0.10, 0.05 according to ETSI EN 302307		
Predistortion:	***Contact factory for details.***		

Specifications are subject to change

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Data Processing and Device Specifications

Device connectors:	Data network:	2x Ethernet RJ-45, 10/100/1000Base-T auto sensing
	M&C network:	1x Ethernet RJ-45, 10/100/1000Base-T auto sensing
	10 MHz reference input:	BNC female, 50 Ohm *w/ option RI*
	Alarm:	DSUB-9 female
	Transport stream input:	2x BNC female, 75 Ohm
Network operation: *w/ licenses DAE and DAD*	IP network connectivity:	Layer 3 Bridge or Router for IPv4 packet transmission, IPv6 on request 256 IP/subnet routes towards satellite 64 baseband channels with independent DVB-S2X and encapsulation settings ACM MODCOD range and Es/N0 sensitivity independent per channel *Contact factory for customized IP-to-baseband data handling.* *Contact factory for customized ACM messaging formats.*
	IP traffic shaping/QoS:	255 independent rules Guaranteed and limited bandwidths Fixed or dynamically integrated into ACM by binding to MODCOD Match criteria: source/destination IP subnet, source MAC, UDP/TCP port ranges, TOS/DS field, packet size
	Baseband traffic shaping/QoS:	configurable baseband channel limits based on symbol rate guaranteed and limited bandwidth individually configurable
	Data encapsulation:	Generic Stream Encapsulation (GSE) according to ETSI TS 102606 Multiprotocol Encapsulation (MPE) according to ETSI EN 301192 *Contact factory for other encapsulation formats.*
	IP data rate limits:	360 Mbps or 80000 pps rx+tx processing, subject to prevailing modem limits maximum rates can vary in combination with complex internal processing
Stream inputs:	Interfaces:	RTP/UDP/IP over Ethernet according to IETF RFC 2250 2 streams per data interface Multicast and IGMPv3 support 2x ASI, for transport stream only
	Baseband data:	2 streams for direct input of baseband frames individually assignable to baseband channels configurable UDP/IP-based flow control *w/ license BBI*
	Transport stream:	1 stream selectable from the inputs, manually or automatic automatic redundancy based on timeouts or SMPTE 2022-7 seamless reconstruction jitter compensation up to 500ms PCR correction, null packet deletion and insertion *w/ license TSI* for IP input
Frontpanel interface:	LCD-Display 2x40 characters, 4 cursor keys, 4 function keys	
Remote monitoring and control:	Protocol:	SNMP
	Connection:	UDP/IP over Ethernet/RJ-45
	Protocol:	HTTP web browser interface
	Connection:	TCP/IP over Ethernet/RJ-45
Temperature range:	Operating:	0°C...50°C
	Storage:	-30°C...80°C
	Relative humidity:	< 95% non condensing
Mains power:	Input:	100...240 V AC nominal, 90...264 V AC max, 50...60 Hz
	Consumption:	80 VA / 60 W typical
	Connector:	IEC C14
	Fuse:	2x 3.15 A time-lag fuse
Dimension and weight:	483 x 44 x 505 mm³ (WxHxD), 1 RU 19" up to approx. 10 kg depending on device type	

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Order information:

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Hardware options:

Hardware options have to be defined with the order and are not field-upgradable. Not all device types may support all combinations. Contact factory with specific requests.

RI   external 10 MHz reference input

License based throughput:

License based throughput performance is field-upgradable by uploading a license file to the device. Either a symbol rate or a data rate based license has to be selected. License model can be changed in field.

TXSxx   symbol rate based transmission license for xx Msps
select from: **TXS15, TXS30, TXS45, TXS60, TXSmax**
TXSmax supports full throughput according to specification or device limits

TXDxx   data rate based transmission license for xx Mbps
select from: **TXD10** (default), **TXD30, TXD100, TXD160, TXDmax**
TXDmax supports full throughput according to specification or device limits

License based functions:

License based functions are field-upgradable by uploading a license file to the device.

BBI   direct baseband frame input streaming over IP
TSI   transport stream over IP input
DAE   MPE and GSE data encapsulation and network operation
DAD   MPE and GSE data decapsulation and network operation
TAB   DVB table insertion for MPE encapsulation