

A-Series AX-60 All-IP Platform



DVB-S2X DVB-GSE DVB-CID



The A-Series is a next generation FPGA-based family of satellite modem, modulator and demodulator platforms. The AX-60 product line is based on a powerful architecture that supports the new DVB-S2X standard, providing users with a future-proof solution. Advanced features and benefits include higher modulation schemes up to 256APSK, a finer granularity of ModCods and advanced filtering.

Beyond DVB-S2X, the AX-60 platform can be extended to customized waveforms and user-defined data processing. Through an all-IP structure, the platform supports both native network operation as well as data streaming over IP. Built-in encapsulators

and decapsulators provide support for the standard formats, such as GSE and MPE plus specialized streaming like transparent baseband data, raw IQ information, space data formats and more.

A-Series devices are based on a new processing architecture that offers signal based advancements, a flexible software platform and improved access from monitoring and control to the transmission parameters. This allows direct real-time monitoring and quick adaptation to specific customer requirements. Scalable hardware ensures that operators can serve all applications from very low up to extremely high throughput.

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 %
- Low spurious output
- Operates as Layer 3 Bridge or Layer 3 Router
- Predistortion ready for automatic group delay and nonlinearity compensation
- OptiACM controller (open for other ACM systems)
- Real-time M&C capabilities
- IP and baseband traffic shaping
- Generic Stream Encapsulation (GSE)
- Multiprotocol Encapsulation (MPE)
- CE compliant
- **3 years warranty**

A-Series AX-60 All-IP Platform

Modulator Parameters:		AX-60 / AT-60	
Signal Outputs:		1x L-band output 950 ... 2150 MHz	1x VHF-band output 50 ... 180 MHz (option V)
		VHF-band Output	L-band Output
IF-Output Frequency:		50 ... 180 MHz	950 ... 2150 MHz
Frequency Resolution:		1 Hz	1 Hz
Phase Noise:			
10 Hz		-70	-65
100 Hz		-80	-75
1 kHz		-88	-88
10 kHz		-90	-90
100 kHz		-100	-100
1 MHz		-115	-115
max. values in dBc/Hz			
IF-Output Characteristics:		Impedance: 50 Ω or 75 Ω Return Loss: > 18 dB Output Power: -25 dBm ... 5 dBm, 0.1 dB steps, ±0.5 dBm accuracy Output Power muted: < -85 dBm Connector: BNC female	Impedance: 50 Ω Return Loss: > 18 dB Output Power: -30 dBm ... 0 dBm, 0.1 dB steps, ±0.5 dBm accuracy Output Power muted: < -85 dBm Connector: N female 50 Ω 10 MHz reference output: 1.5 ±1.5 dBm (can be switched on/off)
Spurious Outputs:		Signal related: < -70 dBc, unmodulated carrier, 50 ... 90 MHz or 100 ... 180 MHz < -45 dBc, unmodulated carrier, out of band	Signal related: < -70 dBc, unmodulated carrier, 950 ... 1900 MHz < -55 dBc, unmodulated carrier, 1900 ... 2150 MHz < -45 dBc, unmodulated carrier, out of band
Frequency and Clock Stability:		±2 x 10 ⁻⁸ (-30 °C ... 60 °C, after warm up), aging: ±1 x 10 ⁻⁹ per day, ±1 x 10 ⁻⁷ per year	
Symbol Rate:		Max. Range: 100 ksps ... 75 Msps (depending on firmware option) 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 128APSK 3/4, 7/9 256APSK 32/45, 3/4 ModCods: (short FEC frame) QPSK 11/45, 4/15, 14/45, 7/15, 8/15, 32/45 8PSK 7/15, 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) 8PSK 5/9-L, 26/45-L 16APSK 1/2-L, 8/15-L, 5/9-L, 3/5-L, 2/3-L 32APSK 25/36-L 64APSK 32/45-L 256APSK 29/45, 2/3, 31/45, 11/15 all according to ETSI EN 302307-2	
DVB-S2 Modulation / Coding:		ModCods: (normal and short FEC frame; except 9/10 short 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 Pilots Insertion: on / off Physical Layer Scrambling: N = 0 ... 262141 all according to ETSI EN 302307-1	
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 ETSI EN 302307	

Specifications continued next page

A-Series AX-60 All-IP Platform

Demodulator Parameters:	AX-60 / AR-60	
Signal Inputs:	1x L-band input 950 ... 2150 MHz 1x VHF-band input 50 ... 180 MHz (option V)	
	VHF-band Input	L-band Input
IF-Input Frequency:	50 ... 180 MHz	950 ... 2150 MHz
IF-Input Characteristics:	Impedance: 50 Ω / 75 Ω switchable Return Loss: >18 dB Input Power: -60 dBm ... -15 dBm (total aggregate power) IF-Connector: BNC female 50 Ω	Impedance: 75 Ω Return Loss: >13 dB Input Power: -70 dBm ... -20 dBm (total aggregate power) IF-Connector: F female LNB DC-Feed: 13.5V or 18 VA (450mA) switchable, 22 kHz tone on/off, DISEqC 1.1 short circuit protected
Symbol Rate:	Max. Range: 100 ksps ... 75 Msps Step size: 1 sps	
DVB-S2X Demodulation / Decoding:	ModCods non-linear: (normal FEC frame)	QSPK 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 128APSK 3/4, 7/9 256APSK 32/45, 3/4
	ModCods non-linear: (short FEC frame)	QSPK 11/45, 4/15, 14/45, 7/15, 8/15, 32/45 8PSK 7/15, 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)	8PSK 5/9-L, 26/45-L 16APSK 1/2-L, 8/15-L, 5/9-L, 3/5-L, 2/3-L 32APSK 25/36-L 64APSK 32/45-L 256APSK 29/45, 2/3, 31/45, 11/15 all according to ETSI EN 302307-2
DVB-S2 Demodulation / Decoding:	ModCods: (normal and short FEC frame; except 9/10 short 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
	Demodulator auto detection: Physical Layer Scrambling:	Modulation- and FEC-type, pilots on/off are automatically detected N = 0 ... 262141 all according to ETSI EN 302307-1
Signal Spectrum Mask:	$\alpha = 0.35, 0.25, 0.20, 0.15, 0.10, 0.05$ according ETSI EN 302307-2	
Common Parameters:	AX-60 / AT-60 / AR-60	
Data Interfaces:	2x Ethernet RJ-45, 10/100/1000 Mbps auto sensing arbitrarily assignable for M&C and/or traffic operation	
Network Operation:	Layer 3 Bridge or Router for IPv4 and IPv6 packet transmission 256 IP/subnet routes towards satellite 64 baseband channels with independent DVB-S2X and encapsulation settings	
Data Encapsulation:	Generic Stream Encapsulation (GSE) according ETSI TS 102606 Multiprotocol Encapsulation (MPE) according to ETSI EN 301192	
IP Data Rate:	up to 360 Mbps or 80000 pps rx+tx processing data rates/packet rates can vary in combination with complex internal processing (i.e. traffic shaping)	
Traffic Shaper/QoS on BB level:	configurable baseband channel limits based on symbol rate guaranteed and limited bandwidth individually configurable	
Traffic Shaper/QoS on IP level:	(contact factory for options)	
OptiACM:	CCM / VCM / ACM functionality for point-to-point and point-to-multipoint links 64 ACM channels with separate MODCOD range and Es/N0 sensitivity	
Predistortion:	(contact factory for options)	
Monitoring and Control:	Protocol: SNMP Connection: UDP/IP over Ethernet/RJ-45 or in-band via satellite link	
	Protocol: HTTP (web browser interface) Connection: TCP/IP over Ethernet/RJ-45 or in-band via satellite link	
Internal Fan	FAN included	
Temperature Range:	0°C ... 50°C operating or -30°C ... 60°C operating (option EXT) -30°C ... 80°C storage	
Relative Humidity:	< 95% non condensing	
User Interface:	LCD-Display 2 x 40 characters, 4 cursor keys, 2/4 function keys VFD-Display 2 x 40 characters, 4 cursor keys, 2/4 function keys (option EXT)	
Mains Power Input:	100 ... 240 V AC nominal, 90 ... 264 V AC max, 50 ... 60 Hz	
Mains Power Consumption:	Typ.: 65 VA / 45 W	
Mains Power Input Connector:	IEC C14	
Mains Fuse:	2 x 3.15 A time-lag fuse	
Dimension and Weight:	483 x 44 x 505 mm ³ (WxHxD), 1 RU (19") up to approx. 8 kg depending on device type	

Specifications are subject to change

A-Series AX-60 All-IP Platform

Order Information:

AX-60	IP Modem
AT-60	IP Modulator
AR-60	IP Demodulator

Hardware options:

EXT	extended operating temperature range of -30°C ... +60°C
MOD	module version without 19" housing
V50	additional 50 Ω VHF-band output and 50 Ω/75 Ω switchable VHF-band input
V75	additional 75 Ω VHF-band output and 50 Ω/75 Ω switchable VHF-band input

Hardware options may only be available for certain device types and are not field-upgradable. Please contact factory with specific requests.

Software options:

BBO	baseband interface over IP
SRxx	modulator symbol rate limit of 15/30/45/60/75 Msps

Software options are field-upgradable by a code.



Trade Mark of the DVB Digital Video Broadcasting Project