IP Head-end Technology

Where to find what?

Made in Germany

Carrier Class Technology - the U series

The U series head-end components were designed and developed for professional applications in largest cable networks. All devices of this series are built in 19“ technology and some are equipped with redundant power supply units or can be updated with redundant power supply optionally.

Carrier Class Edge Technology

The U 100 series is a modular designed IP head-end concept. The base unit can house up to three modules that can optionally be operated with redundant power supply. Hardware and software both offer all mechanisms, that contribute to ensure the best operational signal availability.

Combining

For combining of head-end signals ASTRO offers active and passive components. The U 960 can be equipped with splitters according to customers needs. The redundant power supply is achieved either via separate power supply units or by remote feeding via RF jack.

Active SAT splitters

The U 9xx SAT distribution field can be ordered in different variations. 1 x 1 in 16 or 2 x 1 in 8, in 75 Ω or 50 Ω implementation – anything is possible. Furthermore these units can be integrated into the ASTRO bus system making it possible to do a remote configuration of attenuation and slope. It is as well possible to supervise the LNC current consumption.

FAQ

What does „Direct Digital“ mean?

Direct Digital by ASTRO

Direct Digital features the completely digital modulation of output signals. In addition the new technology on an FPGA basis leads to outstanding signal parameters, independent of temperature and aging. The modulator is realized as software solution with many positive effects. Changing the standard of an output signal is done by programming the module via Web GUI. No tuning of hardware is required.

Why are RTP and FEC recommended?

RTP (Real-time Transport Protocol) is important to evaluate the quality of the link between signal source and receiver. Every transmitted Ethernet frame gets an increment number according RTP. As a result the receiver is able to recognize missing or reordered frames. Any packet loss is only recognized but not repaired. To fix the packet loss FEC (Forward Error Correction) is mandatory. The FEC assorts the arriving Ethernet frames to a matrix and calculates column and line sum. The size of the matrix can be determined in the web GUI and is decisive for the additional overhead of the FEC packets. The “weakest” FEC is able to correct up to 5 missing or corrupt frames in series and produces an overhead of 11% including RTP. RTP is mandatory to set-up an FEC, so both features belong together. In ASTRO IP receiving and transmitting devices RTP and FEC is included without additional license fees.

Base units and modules at a glance

Type	Description	Page
Carrier Class Edge Technology		
U 100-230	Base unit for mounting up to 3 modules of the U 1xx series Input voltage 230 V AC in connection with the U 100-SNT power supply unit	18
U 100-48	Base unit for mounting up to 3 modules of the U 1xx series Input voltage - 48 V DC	18
U 100-C	Management-system for U 100 base units and signal converters	19
U 144-X	DVB-S2 to IP streamer 4-way converter, 4 standard DVB-S2 input signals via 4 input jacks into 4 IP multicast groups with 4 CI slots	20
U 148-X	DVB-S2 in IP streamer 8-way converter, 8 standard DVB-S2 input signals via 4 input jacks into 8 IP multicast groups	22
U 164-X	DVB-C, DVB-T or DVB-T2 to IP streamer 4-way converter, 4 standard DVB-C, DVB-T or DVB-T2 input signals via 4 input jacks into 4 IP multicast groups with 4 CI slots	24
U 168-X	DVB-C, DVB-T or DVB-T2 to IP streamer 8-way converter, 8 standard DVB-C, DVB-T or DVB-T2 input signals via 4 input jacks into 8 IP multicast groups, FTA	26
U 116	IP to PAL converter with MPEG 4 support (H.264/AVC Level 4.1 HP), HD to SD downscaling, optional AC-3 4-way converter, 4 IP multicast groups to 4 standard PAL programmes	28
U 118	IP to PAL converter with MPEG 4 support (H.264/AVC Level 4.1 HP), HD to SD downscaling, optional AC-3 8-way converter, 8 IP multicast groups to 8 standard PAL programmes	28
U 118-x	IP to PAL converter with MPEG 4 support (H.264/AVC Level 4.1 HP), HD to SD downscaling 8-way converter, 8 IP multicast groups to 8 standard PAL programmes	28
U 224-230	IP to PAL converter with MPEG 4 support (H.264/AVC Level 4.1 HP), HD to SD downscaling 24-way converter, 24 IP multicast groups to 3 x 2 x 4 standard PAL programmes, input voltage 230 V AC	30
U 224-48	IP to PAL converter with MPEG 4 support (H.264/AVC Level 4.1 HP), HD to SD downscaling 24-way converter, 24 IP multicast groups to 3 x 2 x 4 standard PAL programmes, input voltage - 48 V DC	30
U 124	IP to FM converter 16-way converter, 4 IP multicast groups to 2 x 8 standard FM programmes	32
U 125	IP to FM converter 40-way converter, 16 IP multicast groups to 2 x 20 standard FM programmes	32
U 158	IP to QAM converter 8-way converter, 8 IP multicast groups to 8 standard QAM channels	34
U 159	IP to QAM converter 64-way converter, 64 IP multicast groups to 64 QAM channels	36
U 160	IP to DVB-C converter 24-way converter, 24 IP multicast groups to 2 DVB-C2 systems	38
U 174	IP to COFDM converter 4-way converter, 4 IP multicast groups to 4 standard COFDM channels	40
U 194	IP to IP descrambler 4-way descrambler, 4 transport streams, multi-service-descrambling, 4 CI slots	42
Active and passive combining		
U 960	Passive combining network distribution of input signals in the frequency range 5 to 1000 MHz	44
Professional SAT distribution		
U 911 - 946	Active SAT splitters 2 SAT-inputs into 8 outputs at a time or 1 SAT-input into 16 outputs	45

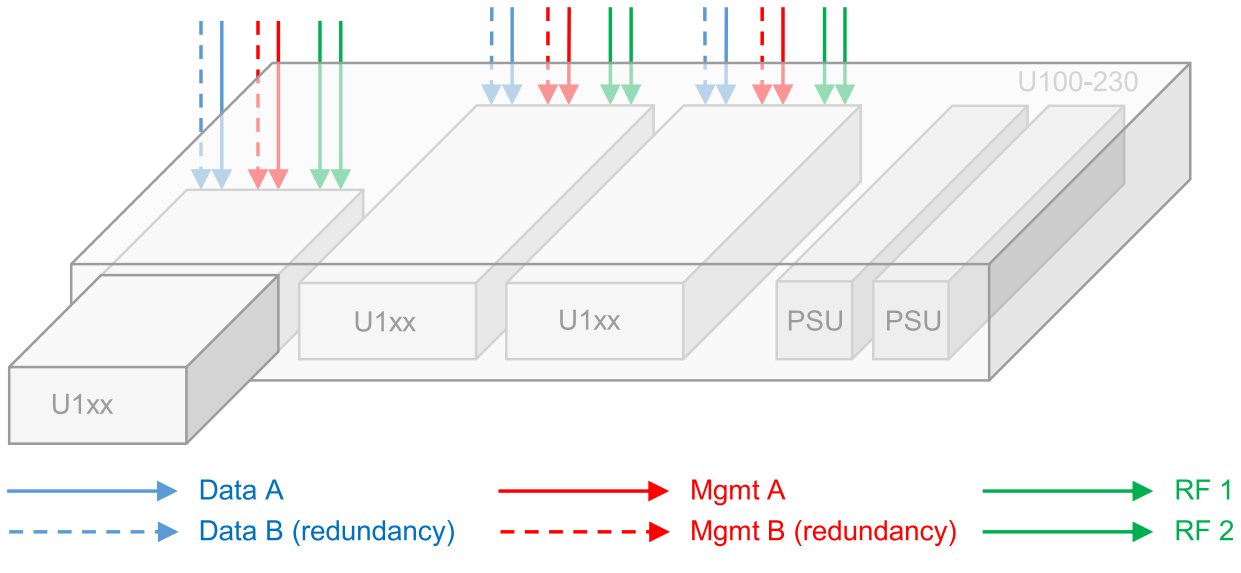
Why choose the U 100 series?

A modular built IP head-end concept for any demand

The U 100 Edge series has been developed on the basis of many years of experience gained from the operation of IP head-ends for processing CATV signals from IP data streams.

The series is based on a hardware model which is completely new from the ground up. The experience, gained in major IP content over IP projects, enabled ASTRO to consider operating conditions in large IP backbone networks.

Thus, in addition to outstanding transmission parameters, the U 100 series also offers sophisticated redundancy and replacement switching mechanisms to reach the greatest possible signal performance availability.



Easy configuration / operation

- user friendly configuration via web browser - no proprietary software needed for managing the system
- consistant menu structure of configuration interface for each module
- LEDs indicate operation and errors on each module

High end performance

- three plug-in modules per 19 inch height provide high signal density
- signal converters offer outstanding signal parameters by Direct Digital ®
- low power consumption per channel

Easy installation

- easy mounting of the base unit in 19 inch cabinets
- passive backplane enables a quick exchange of the signal converters
- all active components integrated into the signal converters
- wiring remains unaffected, even if different types of converters will be used

Maximum reliability

- redundant power supply
- short down-time in case of malfunction: every module has redundant network interfaces for network management and data connection
- effective redundancy switching options in case of link failure, source failure or device failure
- 2 data ports per signal converter
- IGMPv3, RTP and FEC without additional license fees

Easy service handling

- HOT SWAP service
- compact design allows easy spare part handling
- Log file output via web interface
- Remote access to your U 100 head-end by ASTRO support team

FAQ

Are there any features with additional license costs?

All major features of the ASTRO U 100 series are included. Features like UDP/RTP and FEC at the IP receiving side are included as well as programmable time-sharing of output channels and information ticker for PAL programs. These are some examples. The only feature with additional costs is the transport stream analyzer.

How do updates work and what are the costs for updates?

In general, updates are available on the ASTRO firmware server. These updates can be downloaded to a local computer and then an update can be started. The update file might also be stored on the U 100-C management module and the firmware will be uploaded directly or time-controlled to the module. The third possibility is the download via FTP server directly to the module. Standard firmware updates are free-of-charge. Those standard updates include bug fixes or general improvements of the firmware.

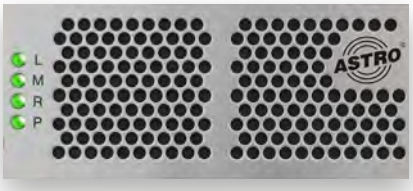
U 100 base units

The U 100 base unit serves as the chassis for the various signal converters, providing space for three signal converters and two power supply units within a single rack unit. Each slot is equipped with a temperature-controlled fan and the replaceable rear panel offers two management and two data ports as well as the output of the CATV signals via two F sockets.

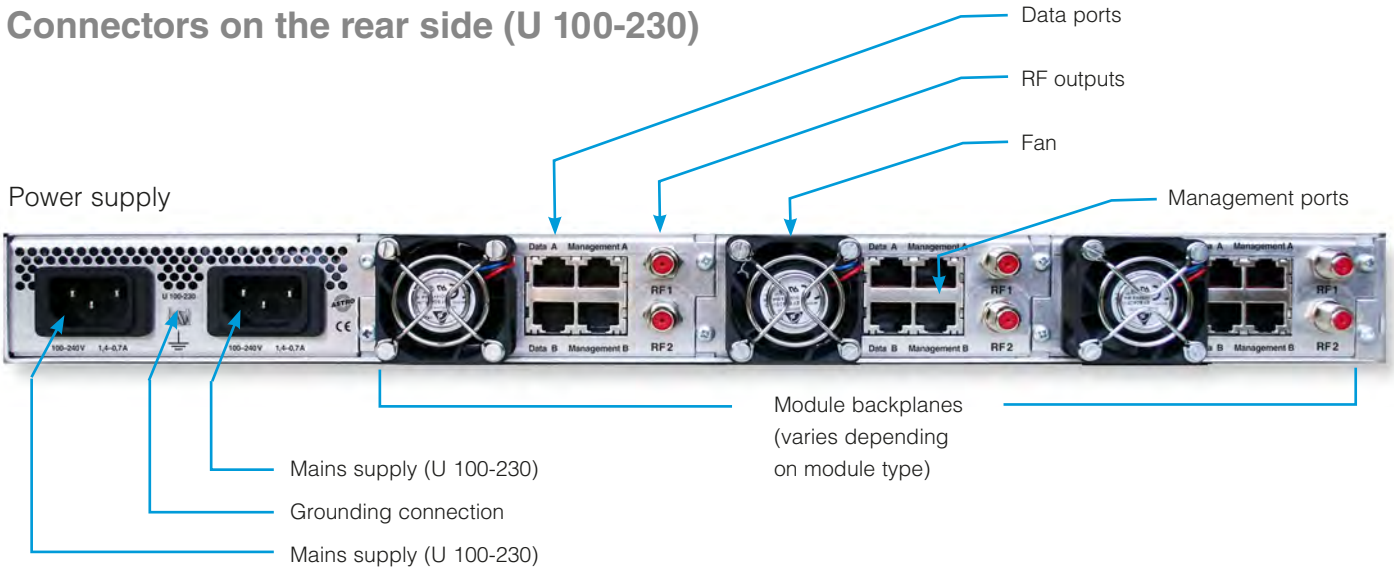
Order no.: 380 101 (for U 100-230)

Status display for slots

L = left
M = middle
R = right
P = power supply



Connectors on the rear side (U 100-230)



The U 100-SNT ECO power supply unit

The U 100-SNT power supply is required to operate the U 100-230 base unit. Minimum one power supply is needed, while two U 100-SNT enable a redundant supply of the base unit and are recommended to avoid signal loss due to mains power failures.

Order no.: 380 109

Base unit for 48 V power supply

The U 100 base unit is also available for -48 V DC power supply. In this case the redundant power supply can be provided by a battery system or any other 48 V power supply unit and no further power supply units are needed inside the U 100-48 base unit.

Order no.: 380 100 (for U 100-48)

U 960 combining network

For distribution of input signals ASTRO offers a 19 inch rack device with individual mounting subject to customer request. It is available with 16 or 28 inputs and can be assembled with 2-way, 3-way, 4-way or 8-way splitter.

Order no.: 380 179 (16 inputs); 380 198 (28 inputs)

Modules of the U 100 series

The ASTRO IP head-end modules handle all output signals distributed in standard CATV networks: QAM, PAL, COFDM and FM. Based on the proven Direct Digital ® system, all the signal converters provide outstanding parameters. For generating IP signals, different types of IP streamers are available. These are equipped with DVB-S2 or DVB-C/T2 frontends and offer high signal density.

IP front end included

One special feature of the signal converters is the inclusion of the IP frontend in each slide-in module. Consequently, each module has its own independent IP receiver unit and operates separately from the other modules inside the base unit. In this way, it is possible to limit any failure of an IP frontend to only a single module, meaning that the effects of an error are far less serious compared to a system which has only a single IP interface shared by all the signal converters.

Configuration kept safe on SD card

System parameters are stored on SD card. If the signal converter must be replaced, the SD card plugged into the old module can now be inserted in the new module, allowing the previous configuration to be automatically migrated. Thanks to this feature, the spare equipment can be set in operation quickly on site without any need for service staff to reconfigure the system.

Easy front panel operation

Control and data wheel, menu switch

Display of management IP addresses, data IP addresses, status messages, etc.

FAQ

What is the output alignment in the different converters with CATV output?

There are different alignments of output signals depending on the type of modulator. The U 116 IP to PAL and U 174 IP to COFDM converters offer 4 output channels transmitted in 2 pairs via 2 F-female outputs. The difference between start and stop frequency in one pair of output channels can be 32 MHz, or with other words: 2 channels can be left unused between two output channels. The U 118 IP to PAL and U 158 IP to QAM converter offer 8 output channels transmitted in 2 quartets via 2 F-female outputs. Those 4 channels per output have to be adjacent channels. An independent processing of the output channels is possible with the U 124 IP to FM converter but via 2 F-female outputs.

What is the field of application for the output channel filter?

Any modulator causes broadband noise, no matter how sophisticated the hard- and software is designed. Especially if a huge number of output channels shall be combined, this broadband noise accumulates at the combined output. To cut off this noise, the optional output channel filter can be installed to the signal converter. This leads to a significant improvement of the S/N at the combined output. The ASTRO modulators have one separate signal path to lead the signal via the channel output filter. This means that the modulator stays fully frequency agile.

Why are there so many IP interfaces for each signal converter?

The ASTRO U 100 series offers several physical interfaces to enable all possible redundancy mechanisms and to configure different receive paths. To reduce the impact of a lost input signal to a minimum, redundant data interfaces are mandatory. For different concepts of remote access it is also necessary to provide redundant management interfaces. These interfaces can be used, but they don't have to be used. The disadvantage of a slightly more time-consuming cabling effort can be neglected, compared to the benefit of high signal stability and different remote access options.

Can I use different types of signal converters in one base unit?

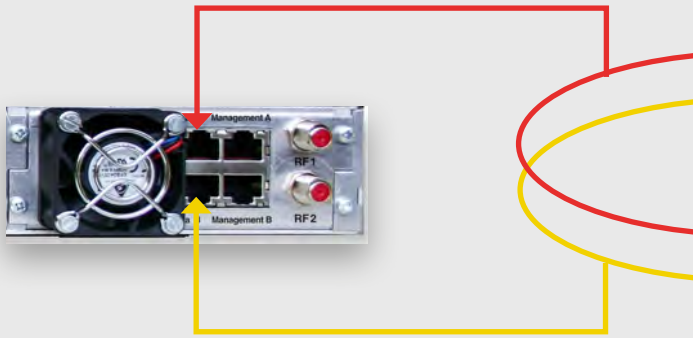
Any type of U 100 series signal converter can be used in the U 100-230 or U 100-48 base unit. They can be operated in any mixture without limitations. The only thing to be considered is the type of backplane which is installed to the corresponding slot. The backplane is part of the delivery of any signal converter.

The U 100 redundancy concept

The U 100 series offers **all possible redundancy options** like link redundancy, source redundancy and device redundancy. Want maximum reliability? - Choose the U 100 series and you'll get it!

Link redundancy

- Requirement for real link redundancy are **two independent data interfaces**.
- If one signal feed fails, the redundant data interface must take over the operation.
- ASTRO U 100 series devices offer fully redundant data interfaces, independently configurable.
- Switching between interfaces can be done manually or automatically with configurable priorities.
- The redundant signals can be configured in hot stand-by or cold stand-by.
- Thanks to the link redundancy concept every device and link in-between the master head-end and the regional head-end is covered.
- In case of hot stand-by, the redundant link and source is monitored permanently to ensure an error-free operation after switching over.

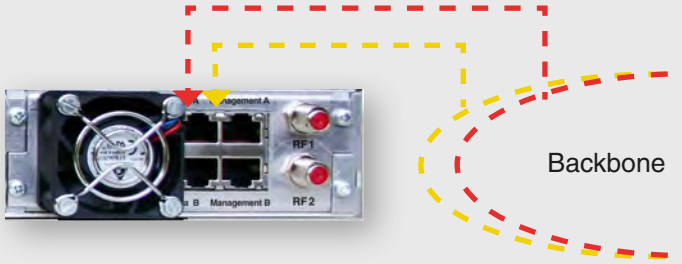


IP RX1 Channel Settings

Property	Data A (eth2) 1G						
Primary Receive IP:Port	232	20	100	71	10000	Priority	12 Highest/Hot
Primary Source Select	0	0	0	0			
Secondary Receive IP:Port	0	0	0	0	0	Priority	0 Off
Secondary Source Select	0	0	0	0			
Tertiary Receive IP:Port	0	0	0	0	0	Priority	0 Off
Tertiary Source Select	0	0	0	0			

Source redundancy

- Requirement for source redundancy are **at least two independently configurable IP receivers per data interface.**
- If the primary signal source fails, the IP receiver must listen immediately to the secondary source.
- ASTRO U 100 series devices even offer **three (!) configurable IP receivers per data interface.**
- This enables the operator to have two sources feeding the backbone and one local source for emergencies.
- The redundant signal sources can be configured in hot stand-by or cold stand-by.
- In case of hot-stand-by, the redundant link and source is monitored permanently to ensure an error-free operation after switching over.



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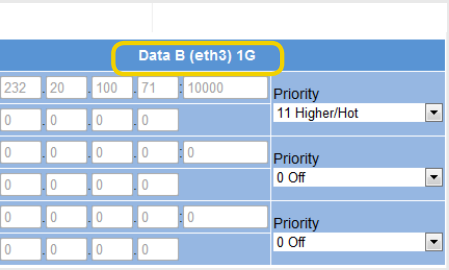
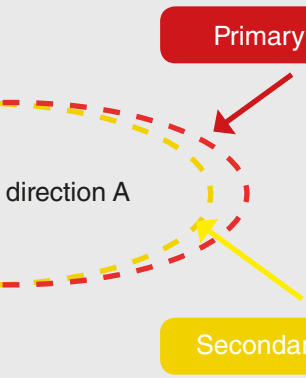
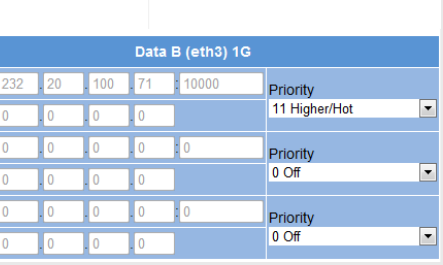
Tertiary Receive IP:Port	0	0	0	0	0	Priority	0 Off
Tertiary Source Select	0	0	0	0			



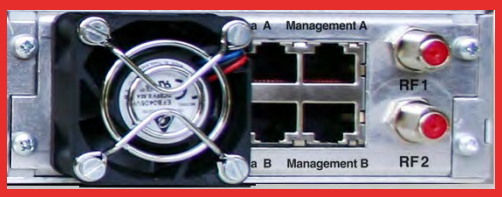




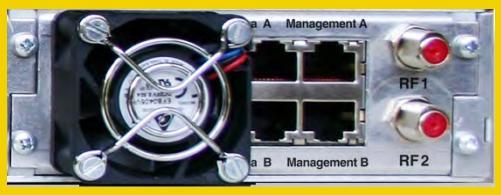
Device redundancy

- Requirement for device redundancy is **spare equipment inside the working head-end** and the U 100-C controller.
- This spare equipment must be connected to the same signal sources like the working equipment.
- A device is considered as spare equipment by the controller if the RF ports are switched off.
- The switching-over to the spare equipment can be made manually or automatically in case of certain events.

working U 100 module



redundant U 100 module



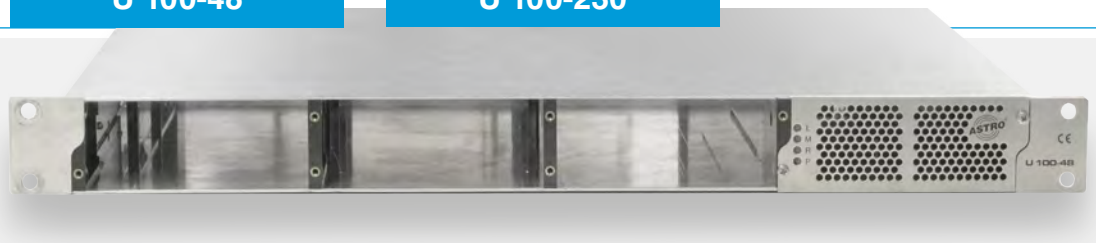
Replace

Base	Slot	Module	Status	Message	Monitoring	Replace Options
⊞ 1	1	U174	ok	lock is logged in	ok	
⊞ 1	2	U114	ok	lock is logged in	ok	Base 2 / Slot 3
⊞ 1	3	U100-C	warning	Supply13V: 0V,Supply1V2: 0V,Supply2V5: 0V,Supply3V3: 0V	warning status	
⊞ 2	1	U124	ok	lock is logged in	ok	
⊞ 2	2	U158	ok	lock is logged in	ok	
⊞ 2	3	U114	off	lock is logged in	ok	

Base units

FOR MOUNTING U 100 MODULES

U 100-48 **U 100-230**



Backside of U 100, 230 V version:

Backside of U 100, 48 V version:

- power and signal supply for modules of the U 100 series
- can carry up to 3 modules of the U 100 series
- output signals are separately led out via F-jacks
- optional redundant power supply available
- status indication for signal converters and power supply units
- horizontal air flow allows compact installation

It is mandatory to use guide rails in the 19 inch rack. As these guide rails are different for each 19 inch rack supplier, they are not in the scope of delivery of U 100 base units.

The power supply units for the U 100-230 base unit are not included in the scope of delivery and must be ordered separately.

Type		U 100 - 48	U 100 - 230
Order number		380 100	380 101
EAN-Code		4026187611064	4026187611149
Common data			
Voltage supply	[V]	- 48	110…240
Voltage supply tolerance	[%]	10	
Supply frequency		DC	50 - 60
Effective power consumption	[W]	depends on number of modules assembled (see operating manual, chapter: "Calculation of effective and apparent power consumption at mains")	
Apparent power consumption	[VA]		
Maximum permissible current draw at mains	[A]	3	1,6
complete current of all converter modules at the internal intermediate voltage	[A]	3	3
Internal intermediate voltage (I48)		Input voltage - 2.4	47
Dimensions		19" / 1 RU	
Ambient temperature	[°C]	0…+45	

Management controller module

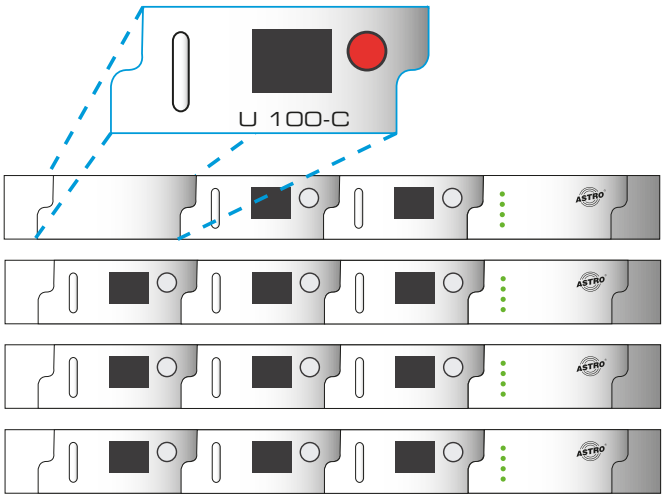
SYSTEM MANAGEMENT FOR U 100 SIGNAL PROCESSORS

U 100-C

Backplane:

- umbrella management system for the complete U 100 head-end
- management via **one** IP address
- required for switched N + 1 device redundancy
- provides many functions for configuring and servicing the U 100 series
- comfortable rack view with status display of all installed U 1xx components
- scheduled updates
- user friendly configuration via web browser interface
- monitored fan

The U 100-C is an overall management system for the U 100 series with many interesting features for network operators. It features a comfortable rack view of the complete system, time controlled updates and it can initiate automatic redundancy switching in case of malfunctions.



Type		U 100-C
Order number		380 103
EAN-Code		4026187131739
Network interfaces (passive routing to U 1xx)		
Protocol		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3
Common data		
Power consumption	[W]	27
Dimensions		19´´, 1 HE
Ambient temperature	[°C]	0...+45

Streamer modules

SIGNAL PROCESSING: DVB-S2 → IP

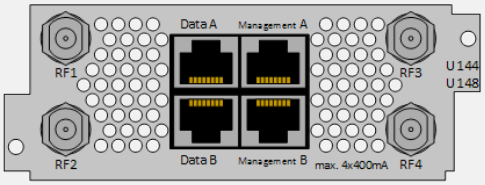
U 144-X

4 x DVB-S2 to IP, up to 4 DVB-S2 transponders

now with **Multiplexing**

without front cover:

Backplane:

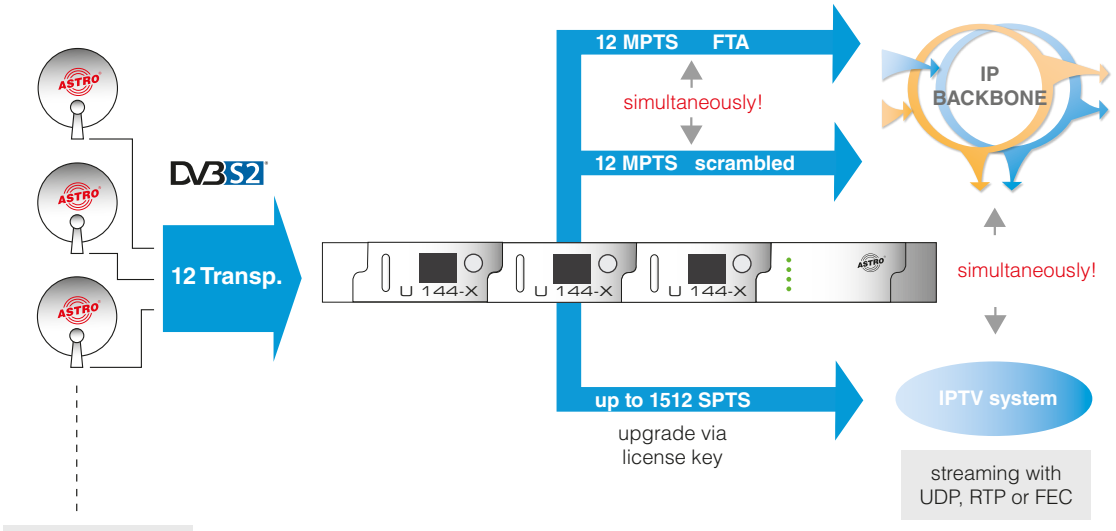


- plug-in module for U 100 base unit
- 4 physical signal input jacks
- for processing of 4 DVB-S2 signals into IP multicast groups (4 MPTS, 504 SPTS)
- up to 4 DVB-S2 transponders
- up to 12 streams per rack unit
- multiplexing of four input transponders to four output streams (license afforded)
- support for Multistream Transponders
- 4 cascadable CI slots with multi channel decryption
- APSK support
- tuners with DiSEqC control
- monitored fan

Direct Digital DD by ASTRO

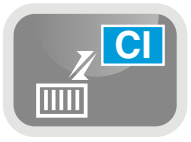
APPLICATION EXAMPLE

Ultra-dense streaming of DVB-S2 in IP with descrambling



up to 12 different polarisations

Each module can be upgraded with multiplex function (license key) 1 x 4 in 4 mux.



Type		U 144-X
Order number		380 138
EAN-Code		4026187194475
Number of DVB-S2 input signals		4
Number of DVB-S2 transponders		4
Number of IP output streams		8 (4 FTA and SCR each) MPTS, 504 SPTS (SPTS license afforded)
Interfaces		
Management		2 x 100 Base-T Ethernet (RJ 45)
Data		2 x 1000 Base-T Ethernet (RJ 45)
Protocols		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3
Transportstream Encapsulation		
Protocols		UDP, UDP / RTP, 1-7 packets, FEC
Packet length	[Bytes]	188 / 204
DVB-S demodulator		
DVB-S modulation		QPSK; 8PSK; 16APSK; 32APSK
Input frequency range	[MHz]	950 - 2150
Input level	[dBµV]	40 - 80
SAT-IF input	[Ω]	75, F-jack
Reflection loss	[dB]	≥ 10
Input symbol rate	[MS/s]	max. 45,0 (depends on DVB-S2 Modulation)
DVB-S Roll-off-factors		0,20 ;0,25; 0,35
DVB-S LDPC		1/2; 1/3; ¼; 2/3; 2/5; 3/5; 4/5; 5/6; 8/9; 9/10 (depends on DVB-S2 Modulation)
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8; automatically / manually
DiSEqC Control		☑
CI interfaces		
CI slots		4 x (front access)
Supported modules	excerpt (others on request)	Alphacrypt, Aston Conax, Dreamcrypt, Entavio CAM, GkWare BISS CAM, Homecast CAM, ICECrypt, Ideto Access, Kid CAM, Mascom Cryptoworks, Matrix CAM, Mediaguard Canal Digitaal, Nagravision, Oasis CAM, PCMCIA CAM, Premiere, Worldcam, TechniCam Beta2, Technicrypt, TPS, Reality CAM, SMiT, Universal CAM, Viaccess, Videoguard CAM
Connectors		4 x PCMCIA
RF inputs		
Connectors	[Ω]	75, 4 x F-jack
Common data		
Current consumption at 48 V	[mA]	530
Power consumption at 36 - 60 V	[W]	25
Input voltage	[V]	36 - 60
Dimensions		1 HU, 19 inch
Ambient temperature	[°C]	0 ... +45

Streamer modules

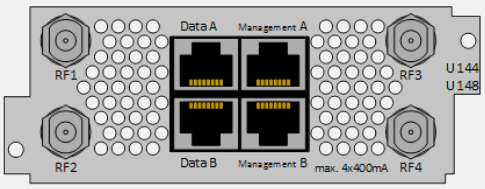
SIGNAL PROCESSING: DVB-S2 → IP

U 148-X

4 x DVB-S2 to IP; up to 8 DVB-S2 transponders

- plug-in modules for U 100 base unit
- 4 physical signal input jacks
- for processing of 8 DVB-S2 signals into IP multicast groups (8 MPTS, 504 SPTS)
- up to 24 streams per rack unit
- multiplexing of four input transponders to four output streams (license afforded)
- support for Multistream Transponders
- APSK support
- tuners with DiSEqC control
- monitored fan

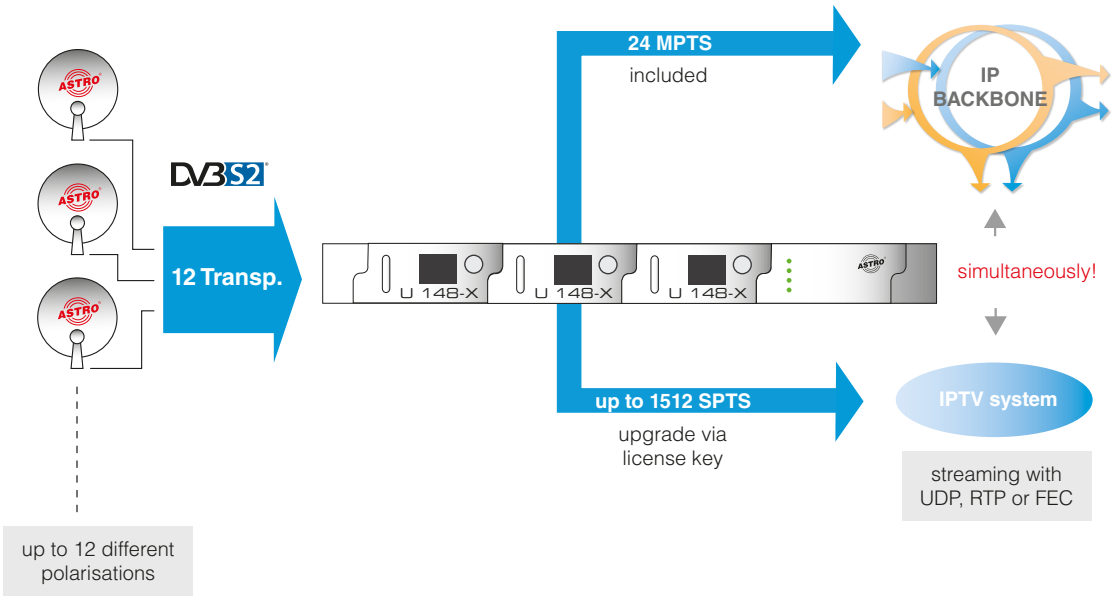
Backplane:



Direct Digital DD by ASTRO

APPLICATION EXAMPLE

Ultra-dense streaming of DVB-S2 in IP



Type		U 148-X
Order number		380 139
EAN-Code		4026187194482
Number of DVB-S2 input signals		4
Number of DVB-S2 transponders		8
Number of IP output streams		8 MPTS, 504 SPTS (SPTS license afforded)
Interfaces		
Management		2 x 100 Base-T Ethernet (RJ 45)
Data		2 x 1000 Base-T Ethernet (RJ 45)
Protocols		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3
Transportstream Encapsulation		
Protocols		UDP, UDP / RTP, 1-7 packets, FEC
Packet length	[Bytes]	188 / 204
DVB-S demodulator		
DVB-S modulation		QPSK; 8PSK; 16APSK; 32APSK
Input frequency range	[MHz]	950 - 2150
Input level	[dBµV]	40 - 80
SAT-IF input	[Ω]	75, F-jack
Reflection loss	[dB]	≥ 10
Input symbol rate	[MS/s]	max. 45,0 (depends on DVB-S2 Modulation)
DVB-S Roll-off-factors		0,20; 0,25; 0,35
DVB-S LDPC		1/2; 1/3; ¼; 2/3; 2/5; 3/5; 4/5; 5/6; 8/9; 9/10 (depends on DVB-S2 Modulation)
Viterbi decoding (according DVB standard)		1/2; 2/3; 3/4; 5/6; 7/8; automatically / manually
DiSEqC Control		☑
RF inputs		
Connectors	[Ω]	75, 4 x F-jack
Common data		
Current consumption at 48 V	[mA]	580
Power consumption at 36 - 60 V	[W]	28 per module
Input voltage	[V]	36 - 60
Dimensions		1 HU, 19 inch
Ambient temperature	[°C]	0 ... +45

Streamer modules

SIGNAL PROCESSING: DVB-C / DVB-T / DVB-T2 → IP

U 164-X

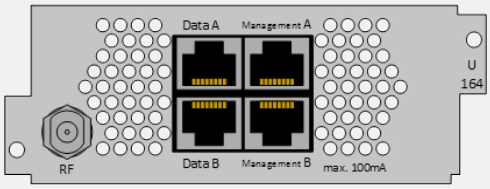
4 x DVB-C, DVB-T or DVB-T2 to IP

now with **Multiplexing**

without front cover:

- plug-in module for U 100 base unit
- one physical signal input jacks
- for processing of 4 DVB-CT2 signals into IP multicast groups (8 MPTS, 504 SPTS)
- up to 12 streams per rack unit
- multiplexing of four input transponders to four output streams (license afforded)
- 4 cascadable CI slots with multi channel decryption
- monitored fan

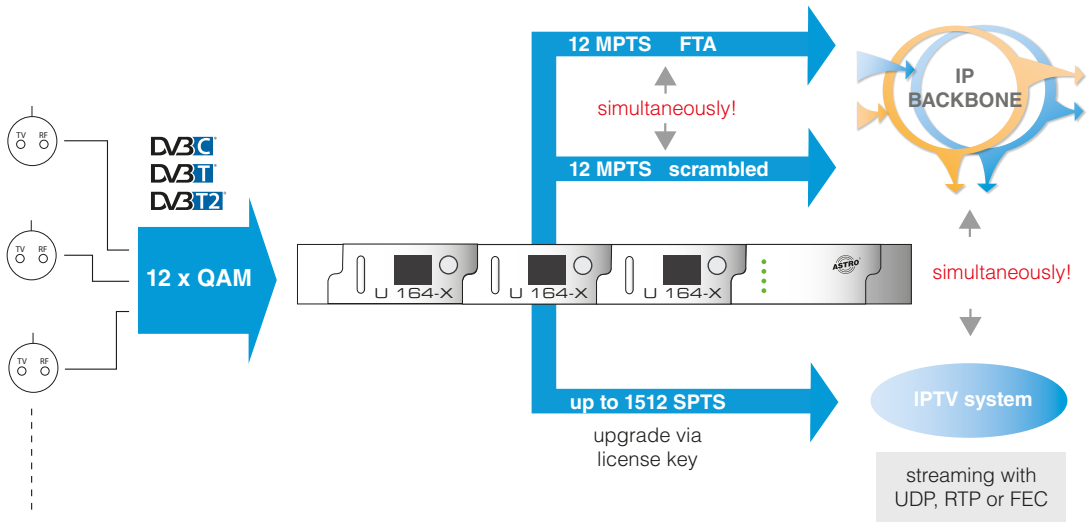
Backplane:



Direct Digital DD by ASTRO

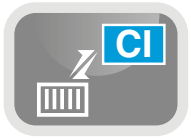
APPLICATION EXAMPLE

Ultra-dense streaming of DVB-T/T2 and DVB-C in IP with descrambling



up to 12 QAM channels allocated via up to 3 F-connectors

Each module can be upgraded with multiplex function (license key) 1 x 1 in 4 mux.



Type		U 164-X
Order number		380 167
EAN-Code		4026187194499
Number of DVB-CT2 input signals		4
Number of DVB-CT2 tuners		8
Number of IP output streams		8 MPTS (4 FTA and SCR each), 504 SPTS
Interfaces		
Management		2 x 100 Base-T Ethernet (RJ 45)
Data		2 x 1000 Base-T Ethernet (RJ 45)
Protocols		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3
Transportstream Encapsulation		
Protocols		UDP, UDP / RTP, 1-7 packets, FEC
Packet length	[Bytes]	188 / 204
DVB-C demodulator		
Frequency range	[MHz]	47 - 862
Input data rate	[Mbaud]	0,5 - 7
Modulation modes (accord. DVB-standard)		QPSK, QAM16, QAM32, QAM64, QAM128, QAM256
Input symbol rate	[MS/s]	1,8 - 7,2
DVB-T demodulator / DVB-T2 demodulator (Scrambling of L1 post signalling; conforms to ETSI EN 302-755 v1.31)		
Frequency range	[MHz]	47 - 862
Modulation		DVB-T: 4-, 16-, 64-QAM; DVB-T2: 4-, 16-, 64-, 256-QAM DVB-T2 scrambling of L1 post signalling
Guardinterval		DVB-T: 1/4; 1/8; 1/16; 1/32; DVB-T2: 1/4; 5/32; 1/8; 5/64; 1/16; 1/32; 1/64; 1/128
FEC		DVB-T: 1/2; 2/3; 3/4; 5/6; 7/8; DVB-T2: 1/2; 3/5; 2/3; 3/4; 4/5; 5/6
FFT-Mode		DVB-T: 2k, 8k; DVB-T2: 1k, 2k, 4k, 8k, 16k, 32k
Bandwidth	[MHz]	DVB-T: 6; 7; 8; DVB-T2: 5; 6; 7; 8
Remote voltage supply		5V, typical, 100mA, switchable
Input symbol rate	[MS/s]	DVB-T: 6, 7, 8; DVB-T2: 5, 6, 7, 8
CI interfaces		
CI slots		4 x (front access)
Supported modules	excerpt (others on request)	Alphacrypt, Aston Conax, Dreamcrypt, Entavio CAM, GkWare BISS CAM, Homecast CAM, ICECrypt, Ideto Access, Kid CAM, Mascom Cryptoworks, Matrix CAM, Mediaguard Canal Digitaal, Nagravision, Oasis CAM, PCMCIA CAM, Premiere, Worldcam, TechniCam Beta2, Technicrypt, TPS, Reality CAM, SMiT, Universal CAM, Viaccess, Videoguard CAM
Connectors		4 x PCMCIA
RF inputs		
Connectors	[Ω]	75, 4 x F-jack
Common data		
Current consumption at 48 V	[mA]	590
Power consumption at 36 - 60 V	[W]	28,5 per module
Input voltage	[V]	36 - 60
Dimensions		1 HU, 19 inch
Ambient temperature	[°C]	0 ... +45

Streamer modules

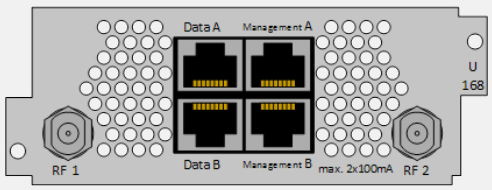
SIGNAL PROCESSING: DVB-C / DVB-T / DVB-T2 → IP

U 168-X

8 x DVB-C, DVB-T or DVB-T2 to 8 x IP

- plug-in module for U 100 base unit
- 2 physical signal input jacks
- for processing of 8 DVB-CT2 signals into IP multicast groups (8 MPTS, 504 SPTS)
- up to 24 streams per rack unit
- multiplexing of four input transponders to four output streams (license afforded)
- monitored fan

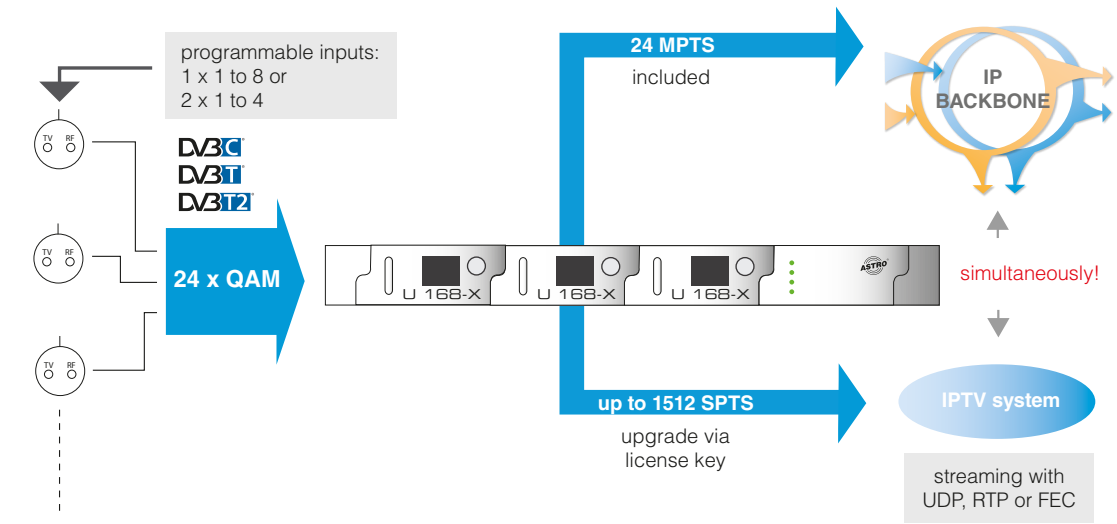
Backplane:



Direct Digital DD by ASTRO

APPLICATION EXAMPLE

Ultra-dense streaming of DVB-T/T2 and DVB-C in IP



up to 24 QAM channels allocated via up to 6 F-connectors

Each module can be upgraded with multiplex function (license key) 2 x 1 in 4 mux.

Type		U 168-X
Order number		380 172
EAN-Code		4026187194505
Number of DVB-CT2 input signals		4
Number of DVB-CT2 tuners		8
Number of IP output streams		8 MPTS, 504 SPTS
Interfaces		
Management		2 x 100 Base-T Ethernet (RJ 45)
Data		2 x 1000 Base-T Ethernet (RJ 45)
Protocols		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3
Transportstream Encapsulation		
Protocols		UDP, UDP / RTP, 1-7 packets, FEC
Packet length	[Bytes]	188 / 204
DVB-C demodulator		
Frequency range	[MHz]	47 - 862
Input data rate	[Mbaud]	0,5 - 7
Modulation modes (accord. DVB-standard)		QPSK, QAM16, QAM32, QAM64, QAM128, QAM256
Input symbol rate	[MS/s]	1,8 - 7,2
DVB-T demodulator / DVB-T2 demodulator (Scrambling of L1 post signalling; conforms to ETSI EN 302-755 v1.31)		
Frequency range	[MHz]	47 - 862
Modulation		DVB-T: 4-, 16-, 64-QAM; DVB-T2: 4-, 16-, 64-, 256-QAM DVB-T2 scrambling of L1 post signalling
Guardinterval		DVB-T: 1/4; 1/8; 1/16; 1/32; DVB-T2: 1/4; 5/32; 1/8; 5/64; 1/16; 1/32; 1/64; 1/128
FEC		DVB-T: 1/2; 2/3; 3/4; 5/6; 7/8; DVB-T2: 1/2; 3/5; 2/3; 3/4; 4/5; 5/6
FFT-Mode		DVB-T: 2k, 8k; DVB-T2: 1k, 2k, 4k, 8k, 16k, 32k
Bandwidth	[MHz]	DVB-T: 6; 7; 8; DVB-T2: 5; 6; 7; 8
Remote voltage supply		5V, typical, 100mA, switchable
Input symbol rate	[MS/s]	DVB-T: 6, 7, 8; DVB-T2: 5, 6, 7, 8
RF inputs		
Connectors	[Ω]	75, 2 x F-jack
Common data		
Current consumption at 48 V	[mA]	710
Power consumption at 36 - 60 V	[W]	34 per module
Input voltage	[V]	36 - 60
Dimensions		1 HU, 19 inch
Ambient temperature	[°C]	0 ... +45

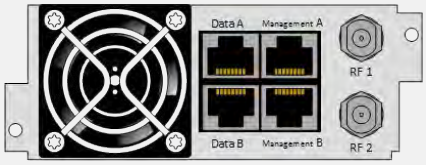
Signal converters with IP front end

SIGNAL PROCESSING: IP → PAL / NTSC / SECAM

U 116

4 x IP to 4 x PAL / SECAM / NTSC with MPEG 4 support (H.264/AVC Level 4.1 HP)

Backplane:



- plug-in module for U 100 base unit
- U 118: for processing of up to 8 IP multicast groups of a Gigabit Ethernet MPEG TS in 8 standard PAL programmes
- U 116: for processing of up to 4 IP multicast groups of a Gigabit Ethernet MPEG TS in 4 standard PAL programmes
- PAL programmes are led through as two pairs of adjacent channels
- outstanding signal parameters by Direct Digital technology (Video-S/N: typ. 66 dB; residual carrier accuracy: 1 %)
- optionally available output channel filters (U-KF) allow for maintaining the high signal quality even after combining
- user friendly configuration via web browser
- monitored fan

Direct Digital DD by ASTRO

U 118

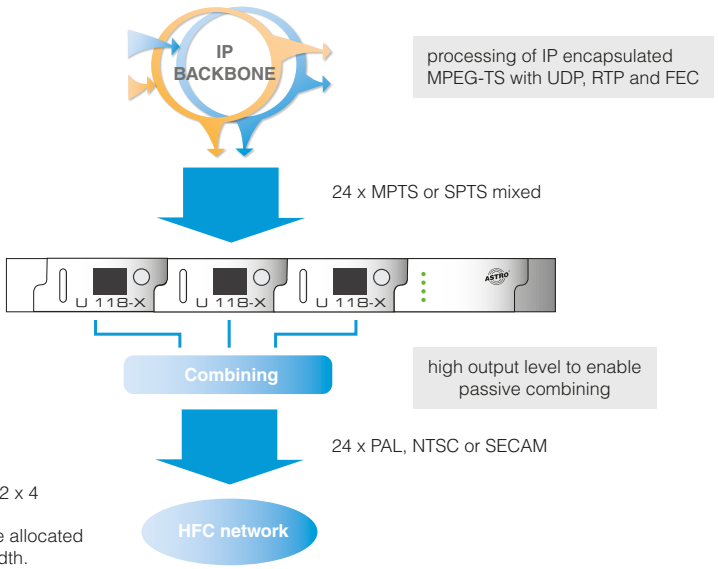
8 x IP to 8 x PAL / SECAM / NTSC with MPEG 4 support (H.264/AVC Level 4.1 HP)

U 118-x

as U 118 but PAL modulator with 2 x 4 channels on 80 MHz bandwidth

APPLICATION EXAMPLE

IP to analogue



Each module delivers 2 x 4 output channels.
The 4 channels can be allocated within 80 MHz bandwidth.

Type		U 116	U 118	U 118-X
Order number		380 117	380 122	380 127
EAN-Code		4026187141059	4026187191955	4026187192815
Maximum number of IP input signals		4	8	8
Maximum number of PAL output signals		4	8	8
Network interfaces (passive routing to U 1xx)				
Management		2 x 100 Base-T Ethernet (RJ 45)		
Data		2 x 1000 Base-T Ethernet (RJ 45)		
Protocol		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3		
Transport stream editing				
TS Decapsulation		UDP, UDP / RTP, 1-7 packets, FEC		
Packet length	[Bytes]	188 / 204		
Decoding				
Video		H.264/AVC Level 4.1 HP, MPEG-2 MP@HL		
Audio		MPEG-1/2 Layer 1/2, (HE-)AAC, AC-3* / Dolby Digital (Plus) optional		
Data		Teletext, VPS, WSS, Teletext subtitles, DVB Subtitling		
PAL modulator				
Connectors	[Ω]	75, 2 x F-jack		
Frequency range	[MHz]	47 - 862, digital modulation		47 - 862, digital modulation, 2 x 4 channels on 80 MHz bandwidth
Output level	[dBµV]	118	112	
Return loss	[dB]	≥ 14		
Spurious frequency dist.	[dB]	≥ 60		
Stereo cross talk	[dB]	> 55		
Residual carrier accuracy	[%]	1		
TV standard		PAL B/G, D/K, M, N, SECAM, SECAM L, A2/NICAM, NTSC mono		
Video-signal to noise ratio	[dB]	typ. 65	typ. 63	
Common data				
Current consumption at 48 V	[mA]	660	890	850
Power consumption at 48 V	[W]	32 per module	40 per module	
Input voltage	[V]	48		
Dimensions		1 HU, 19 inch		
Ambient temperature	[°C]	0 ... +45		

*) AC-3 only supported by U 116 (AC-3), order number: 380 118; U 118 (AC-3), order number 380 123 and U 118-x (AC-3), order number 380 128

Signal converters with IP front end

SIGNAL PROCESSING: IP → PAL / NTSC / SECAM

U 224-230 **U 224-48**

Direct Digital by ASTRO

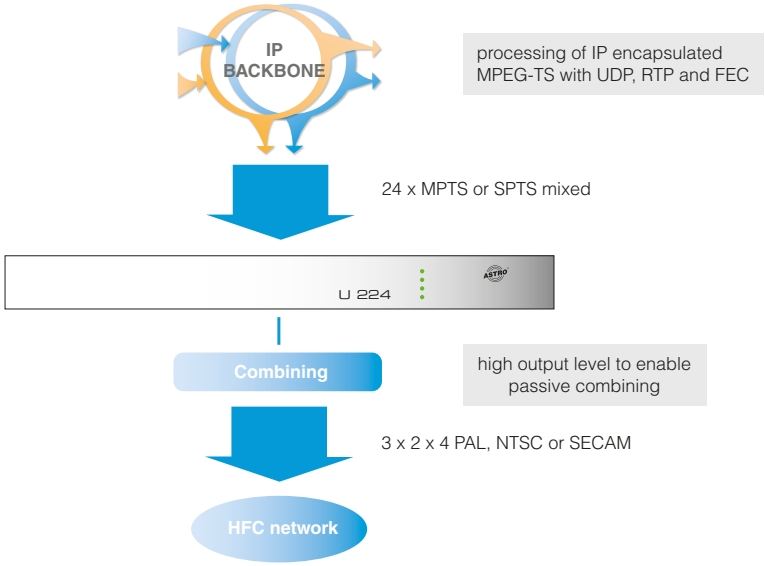
- fully integrated device for the conversion of IP signals to PAL / NTSC TV programmes
- for the conversion of up to 24 IP Gigabit Ethernet multicast groups to 3 x 2 x 4 standard PAL programmes
- each four analogue programmes can be played out in a range of 80 MHz
- WSS, Teletext, VPS, ticker insertion, RTP, FEC, IGMPv3, MPEG4 H.264/AVC level 4.1, HD in SD downscaling
- versions with AC-3 audio decoding available (see data sheet)
- outstanding parameters thanks to Direct Digital technology
- power supplies have to be ordered **seperately** (one for operation, two for redundant voltage supply)
- user-friendly configuration via web interface
- fans integrated to the management

Backside of U 224-230:

Backside of U 224-48:

APPLICATION EXAMPLE

IP to analogue



Type		U 224-230	U 224-48
Order number		380 227	380 228
EAN-Code		4026187194635	4026187194727
Network interfaces (passive routing to U 1xx)			
Management		3 x 100 Base-T Ethernet (RJ 45)	
Data		3 x 1000 Base-T Ethernet (RJ 45)	
Protocol		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3	
Transport stream editing			
TS Decapsulation		UDP, UDP / RTP, 1-7 packets, FEC, SPTS, MPTS	
Packet length	[Bytes]	188 / 204	
Decoding			
Video		H.264/AVC Level 4.1 HP, MPEG-2 MP@HL	
Audio		MPEG-1/2 Layer 1/2, (HE-)AAC, AC-3*	
Data		Teletext, VPS, WSS, Teletext subtitles, DVB Subtitling	
PAL modulator			
Number of channels		up to 24	
Connectors	[Ω]	75, F-jack	
Frequency range	[MHz]	47 - 862, digital modulation	
Output level	[dBµV]	maximum 104	
Return loss	[dB]	≥ 14	
Spurious frequency dist.	[dB]	≥ 60	
Stereo cross talk	[dB]	> 55	
Residual carrier accuracy	[%]	1	
TV standard		PAL B/G, D/K, M, N, SECAM, SECAM L, A2/NICAM, NTSC mono	
Audio standard		A 2, A 2+, A 2-, Nicam	
Video-signal to noise ratio	[dB]	≥ 60	
Common data			
Input voltage	[V]	100 - 240 (50 / 60 Hz)	
Input power consumption	[W / VA]	130 (@ 2 redundant power supply units)	
Dimensions		1 HU, 19 inch	
Ambient temperature	[°C]	0 ... +45	

*) AC-3 is only supported by U 224-230 AC-3 (Order number 380 230) and U 224-48 AC-3 (Order number 380 229)

Signal converters with IP front end

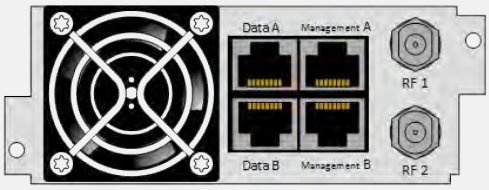
SIGNAL PROCESSING: IP → FM

U 125

4 x IP to 2 x 20 FM programmes

- plug-in module for U 100 base unit
- U 124: for processing of up to 4 IP multicast groups of a Gigabit Ethernet MPEG TS into 2 x 8 standard FM programmes
- U 125: for processing of up to 16 IP multicast groups of a Gigabit Ethernet MPEG TS into 2 x 20 standard FM programmes
- FM programmes are led through as two groups consisting of 8 programmes
- outstanding signal parameters by Direct Digital technology
- static and dynamic RDS are supported (radiotext, PTY, PS and CT)
- user friendly configuration via web browser
- monitored fan

Backplane:



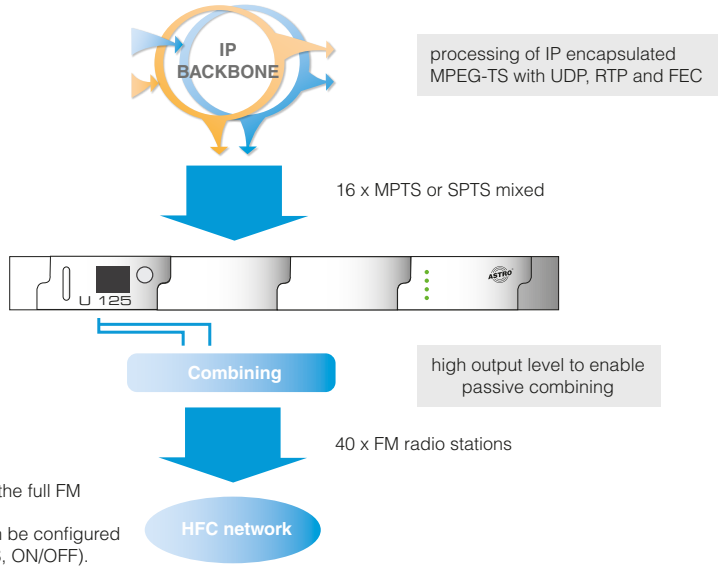
Direct Digital DD by ASTRO

U 124

4 x IP to 2 x 8 FM programmes

APPLICATION EXAMPLE

IP to FM radio



One module to cover the full FM radio band.
Every programme can be configured separately (level, RDS, ON/OFF).

Type		U 124	U 125
Order number		380 124	380 125
EAN-Code		4026187611118	4026187191337
Network interfaces (passive routing to U 1xx)			
Management		2 x 100 Base-T Ethernet (RJ 45)	
Data		2 x 1000 Base-T Ethernet (RJ 45)	
Protocol		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3	IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMP, SSL, RADIUS
Transport stream editing			
Decapsulation		UDP, UDP / RTP, 1-7 packets, FEC	
Packet length	[Bytes]	transparent (188 or 204 packets)	
Decoding			
Input signal		4 x MPEG-2 TS	16 x MPEG-2 TS
Audio		MPEG 1 Layer 2, Stereo	
FM modulator			
Connectors		2 x F-jack	
Output signal		2 x 8 FM stereo channels with RDS	2 x 20 FM stereo channels with RDS
Output frequency	[MHz]	87,5 - 108, digital modulated, 10 kHz steps	
static dynamic		TP / PI / PS 8 x 8 signs Pi / Radiotext / PTY / PS / CT / MS	
Output level	[dBµV]	114	
Intermodulation distance	[dBc]	> 60	60 @ 114 dbµV; 65 @ 112 dbµV
Return loss	[dB]	> 14	> 18
Signal to noise ratio	[dB]	> 64	> 65
Unweighted signal to noise ratio	[dB]	> 70	
Preemphasis	[µs]	50	
Stereo cross talk attenuation	[dB]	60	
Harmonic factor	[%]	< 0,05	
Frequency range	[dB]	< 1	
Common data			
Current consumption at 48 V	[mA]	680	920
Power consumption at 36 - 60 V	[W]	25,5 per module	39 per module
Input voltage	[V]	36 - 60	
Dimensions		1 HU, 19 inch	
Ambient temperature	[°C]	0 ... +45	

Signal converters with IP front end

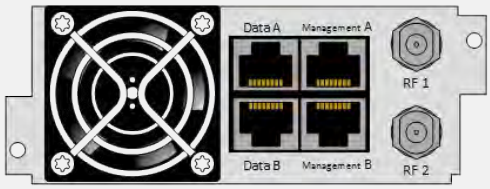
SIGNAL PROCESSING: IP → QAM

U 158

8 x IP to 8 x QAM

- plug-in module for U 100 base unit
- for processing of up to 8 IP multicast groups of a Gigabit Ethernet MPEG TS in 8 standard QAM channels
- QAM channels programmes are led through as four adjacent channels
- outstanding signal parameters by Direct Digital technology
- NIT and LCN processing integrated
- optionally available output channel filters (U-KF) allow for maintaining the high signal quality even after combining
- user friendly configuration via web browser
- monitored fan

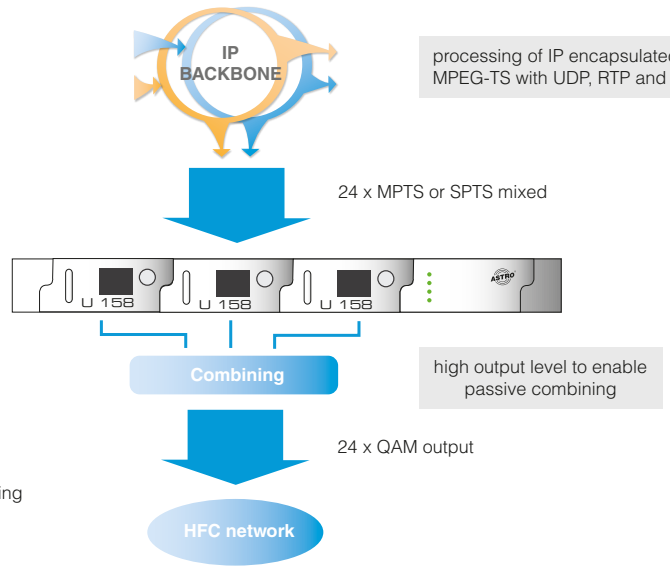
Backplane:



Direct Digital DD by ASTRO

APPLICATION EXAMPLE

IP to QAM



dynamic NIT processing
NIT out of IP
NIT out of PID
LCN processing

Type		U 158
Order number		380 158
EAN-Code		4026187131852
Network interfaces (passive routing to U 1xx)		
Management		2 x 100 Base-T Ethernet (RJ 45)
Data		2 x 1000 Base-T Ethernet (RJ 45)
Protocol		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3
Transport stream editing		
TS capsulation		UDP, UDP / RTP, 1-7 packets, FEC
Packet length	[Bytes]	188 / 204
QAM modulator		
Modulation		16-, 32-, 64-, 128-, 256-QAM
Signal processing		according DVB standard
Spectrum shape (cos-roll-off)	[%]	15
FEC		Reed-Solomon (204, 188)
Data rate adjustment		☑
PCR-correction		☑
NIT-handling, PID-remapping		☑
Output symbol rate	[Msymb/s]	3,45 - 7,5 (for 2 adjacent channels)
Bandwidth	[MHz]	4 - 8 depending on output symbol rate
Gross data rate	[Mbit/s]	55,2
MER (Equalizer)	[dB]	≥ 44
RF modulator		
Connectors	[Ω]	75, 2 x F-jack
Frequency range	[MHz]	47 - 862, digital modulation
Output level	[dBµV]	114
Return loss	[dB]	> 14
Spurious frequency distance	[dB]	> 60
Common data		
Current consumption at 48 V	[mA]	680
Power consumption at 36 - 60 V	[W]	28 per module
Input voltage	[V]	36 - 60
Dimensions		1 HU, 19 inch
Ambient temperature	[°C]	0 ... +45

Signal converters with IP front end

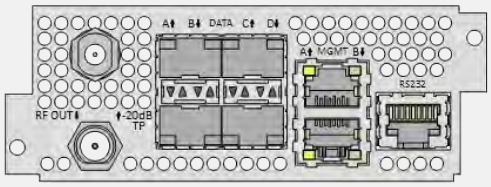
SIGNAL PROCESSING: IP → QAM

U 159

64 x IP to QAM

- plug-in module for U 100 base unit
- for processing of up to 64 IP multicast groups of a Gigabit Ethernet MPEG TS into 64 QAM channels
- 192 QAM channels in one 19 inch RU
- QAM Annex A & B, RTP, FEC, IGMP, SNMP
- each QAM channel frequency independent
- Multiplexing - Generation of QAM channels out of different input signals
- outstanding signal parameters by Direct Digital technology
- user friendly configuration via web browser
- monitored fan

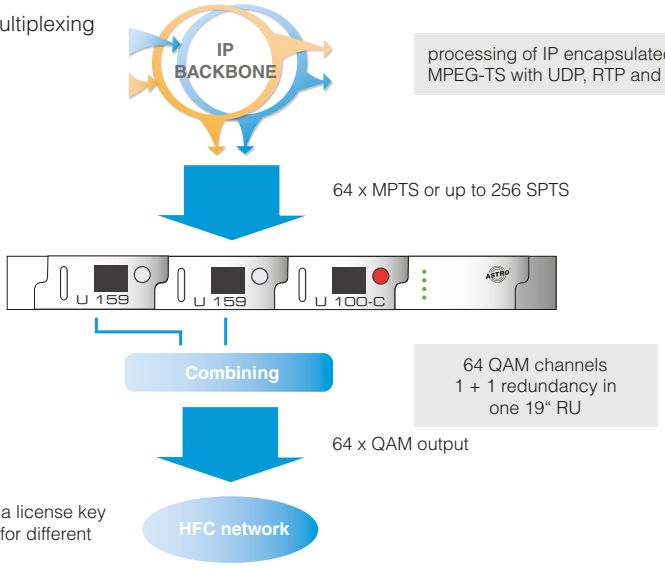
Backplane:



Direct Digital DD by ASTRO

APPLICATION EXAMPLE

Ultra-dense IP to QAM with multiplexing



IP feed via SFP
multiplexer upgrade via license key
flexible license model for different applications

Type		U 159
Order Number		380 159
EAN-Code		4026187193270
Network interfaces (passive routing to U 1xx)		
Management		2 x 1000 Base-T Ethernet (RJ 45)
Data		4 x SFP (1000 Base-X or SGMII)
Input Bitrate per Data Port	[Mbit/s]	1000/1000/900/750 @1/2/3/4 Ports
Protocol		Ethernet, ARP, IPv4, IPv6, UDP, RTP, TCP, HTTP(S), SNTP, SNMP v2c/v3, Syslog, IGMP v2/v3, MLD v1/v2
Serial		1x RJ 45, 115200 kbit/s, 8N1
Transport Stream Processing		
TS Decapsulation		UDP, UDP/RTP, 1-7 packets, FEC (SMPTE 2022-1, -2)
Packet Length	[Bytes]	188
Data rate adjustment		☑
PCR-Correction (< 500 ns acc. DVB)		☑
NIT Handling		static, NIT from PID, dynamic
QAM-Modulator		
Modulation		16-, 32-, 64-, 128-, 256-QAM
Signal processing		DVB EN 300 429, ITU J.83 Annex A/C
Spectrum shape cos-roll-off	[%]	12, 13, 15, 18
FEC		Reed-Solomon (204, 188) Code
Symbol rate	[Msymb/s]	1 - 7,14
Channel Bandwidth	[MHz]	1,12 - 8 (depends on symbol rate)
Maximum number of channels		64
Maximum bitrate per output channel	[Mbit/s]	52,64
Phase error dynamic	[°]	0,3
MER (Equalizer)	[dB]	≥ 44
Shoulder attenuation	[dB]	> 56
RF-Modulator		
Connectors	[Ω]	75, 2 x F-jack (1 x RF, 1 x Test point -20 dB)
Frequency range	[MHz]	47 - 1006, digital modulation
Frequency drift	[kHz]	< 10
Output level	[dBµV]	114/111/108 @16/32/64 Channels
Intermodulation distance	[dB]	> 60
Return loss	[dB]	> 14
Spurious frequency distance	[dB]	> 60
Intercarrier Signal-to-Noise ratio	[dB]	> 60
Common data		
Current consumption at 48 VDC	[mA]	830
Power consumption	[W]	45
Input voltage	[V]	36 - 60 VDC or 230 VAC
Dimensions		1 RU, 19 inch
Ambient temperature	[°C]	0...+45

Signal converters with IP front end

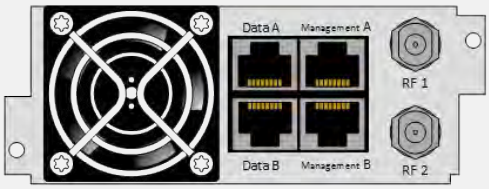
SIGNAL PROCESSING: IP → DVB-C2

U 160

2 x IP to 2 x DVB-C2

- plug-in module for U 100 base unit
- for processing of up to 24 IP multicast groups of a Gigabit Ethernet MPEG TS into 2 DVB-C2 systems
- multiple transportstream
- multiplexing of data slices
- FEC: LDPC and BCH
- OFDM modulation
- 2 x 8 MHz / 1 data slice or 2 x 16 MHz / 3 data slices
- RTP, IGMPv3
- broadband notch placing
- user friendly configuration via web browser
- monitored fan

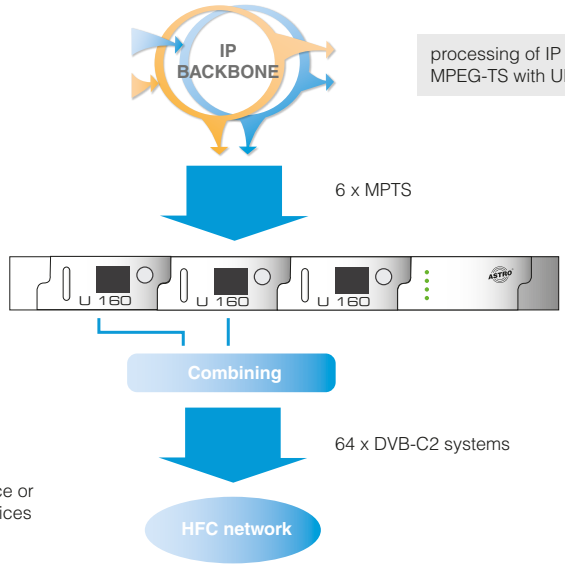
Backplane:



Direct Digital DD by ASTRO

APPLICATION EXAMPLE

IP to DVB-C2



2 x 8 MHz / 1 data slice or
2 x 16 MHz / 3 data slices
modulation schemes:
16 QAM to 4096 QAM

Type		U 160
Order number		380 160
EAN-Code		4026187161088
Interfaces		
Management		2 x 100 Base-T Ethernet (RJ 45)
Data		2 x 1000 Base-T Ethernet (RJ 45)
Protocols		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3
Transportstream Encapsulation		
Protocols		UDP, UDP / RTP, 1-7 packets, FEC
Packet length	[Bytes]	188 / 204
DVB-C2 demodulator		
Input interface		Transportstream
Coding Modes		static
FEC		LDPC, BCH
Interleaving		Bit, time and frequency
Modulation		OFDM
Bandwidth	[MHz]	16
Guard interval		1/64 or 1/128
Modulation schemes		16 QAM to 4096 QAM
FEC Frame		64 800 bits or 16 200 bits
Data Slices		1-3
Physical Layer Pipes		Single PLP per Data Slice
Narrowband Notches		☑
Broadband Notches		☑
RF modulator		
Connectors	[Ω]	75, 2 x F-jack
Frequency range	[MHz]	47 - 862
RF output level	[dBµV]	114
Return loss	[dB]	> 14
Spurious frequency distance	[dB]	> 60
Common data		
Current consumption at 48 V	[mA]	680
Power consumption at 36 - 60 V	[W]	28 per module
Input voltage	[V]	36 - 60
Dimensions		1 HU, 19 inch
Ambient temperature	[°C]	0 ... +45

Signal converters with IP front end

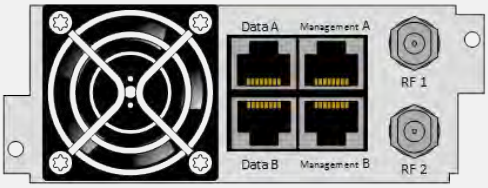
SIGNAL PROCESSING: IP → COFDM / ISDB-T

4 x IP to 4 x COFDM

U 174

- plug-in module for U 100 base unit
- for processing of up to 4 IP multicast groups of a Gigabit Ethernet MPEG TS into 4 standard COFDM channels
- COFDM channels are led through as two adjacent channels
- outstanding signal parameters by Direct Digital technology (MER: ≥ 43 dB; shoulder attenuation: ≥ 56 dB)
- RTP, FEC, IGMPv3
- optionally available output channel filters (U-KF) allow for maintaining the high signal quality even after combining
- user friendly configuration via web browser
- monitored fan

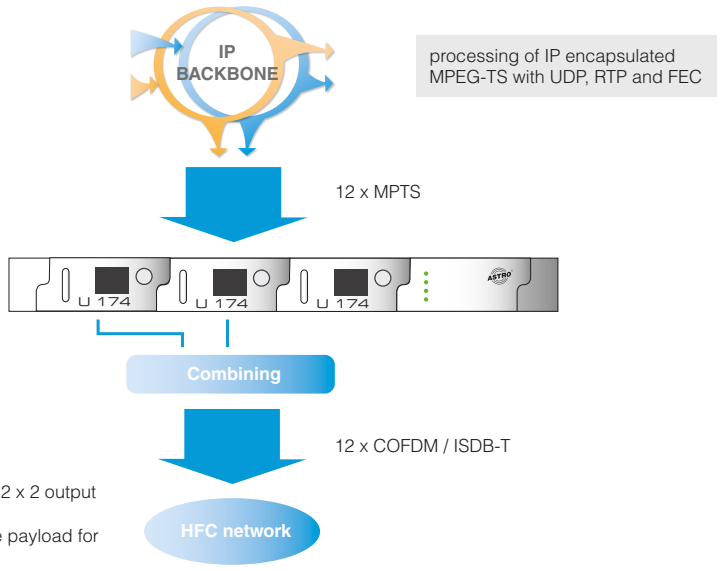
Backplane:



Direct Digital DD by ASTRO

APPLICATION EXAMPLE

IP to COFDM / ISDB-T



each module delivers 2 x 2 output channels
PID filter to reduce the payload for output channels

Type		U 174	
Order number		380 174	
EAN-Code		4026187611026	
Network interfaces (passive routing to U 1xx)			
Management		2 x 100 Base-T Ethernet (RJ 45)	
Data		2 x 1000 Base-T Ethernet (RJ 45)	
Protocol		IEEE802.3 Ethernet, RTP, ARP, IPv4, TCP/UDP, HTTP, SNTP, IGMPv3	
Transportstream editing			
TS capsulation		UDP, UDP / RTP, 1-7 packets, FEC	
Packet length	[Bytes]	188 / 204	
COFDM modulator		**ISDB-T**	**DVB**
COFDM Mode		2k, 4k, 8k	2k, 8k
Carrier modulation		QPSK, DQPSK, 16-, 64-QAM	QPSK, 16-, 64-QAM
Bandwidth	[MHz]	6, 7, 8	6, 7, 8
Maximum gross data rate	[Mbit/s]	30,980	31,668
Signal processing		accord. ARIB STD-B31 Ver. 2.2-E1 ("Time Interleaver", "Hierarchical transmission" und "Auxiliary channel" are not supported)	accord. DVB standard
FEC		Reed-Solomon (204, 188) code, convolutional code	Reed-Solomon (204, 188) code, convolutional code
Coding rates		1/2, 2/3, 3/4, 5/6, 7/8	1/2, 2/3, 3/4, 5/6, 7/8
Guard intervals		1/4, 1/8, 1/16, 1/32	1/4, 1/8, 1/16, 1/32
Data rate adjustment		☑	
PCR-correction (< 500 ns accord. DVB)		☑	
NIT-Handling (static)		☑	
PID Remapping		☑	
PID Filtering		Drop or Pass PID-Filter	
MER (Equalizer)	[dB]	≥ 43	
Shoulder attenuation	[dB]	> 56 (< 700 MHz); > 54 (≥ 700 MHz)	
HF modulator			
Connectors	[Ω]	75, 2 x F-jack	
Frequency range	[MHz]	47 - 862, digitally modulated	
Frequency deviation	[kHz]	< 10	
Output level	[dBµV]	114	
Intermodulation distance	[dB]	> 60	
Return loss	[dB]	> 14	
Spurious frequency distance	[dB]	> 60	
Common data			
Current consumption at 48 V	[mA]	680	
Power consumption at 36 - 60 V	[W]	28 per module	
Input voltage	[V]	36 - 60	
Dimensions		1 HU, 19 inch	
Ambient temperature	[°C]	0 … +45	

Descrambler

SIGNAL PROCESSING: IP → IP

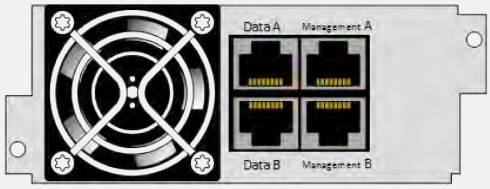
4 x IP to 4 x IP

U 194

- plug-in module for U 100 base unit
- 4 CI-slots; independent / cascadable
- 4 transport streams
- Multi-Service-Descrambling
- decryption level: service based, PID based
- RTP, FEC, IGMPv3
- user friendly configuration via web browser
- monitored fan

without front cover

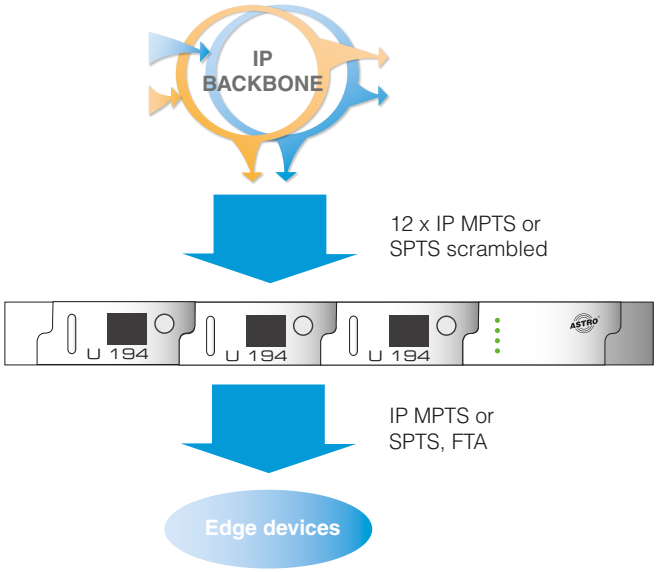
Backplane:

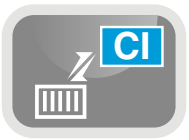


Direct Digital DD by ASTRO

APPLICATION EXAMPLE

IP to IP descrambler



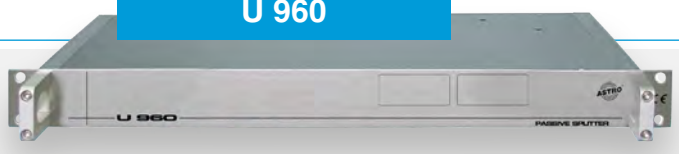


Type		U 194
Order number		380 161
EAN-Code		4026187161095
Network data interfaces		
Interface type		100FD/1000Base-T Ethernet IEEE 802.3
Protocol		IP v4, ARP, UDP, RTP, ICMP, IGMPv2
Connector		2 x 8p8C "RJ-45" (redundant)
TS Receiver		4 x (unicast / multicast)
TS Transmitter		4 x (unicast / multicast)
CI interfaces		
CI slots		4 x (front access)
Supported modules	excerpt (others on request)	Alphacrypt, Aston Conax, Dreamcrypt, Entavio CAM, GkWare BISS CAM, Homecast CAM, ICECrypt, Ideto Access, Kid CAM, Mascom Cryptoworks, Matrix CAM, Mediaguard Canal Digitaal, Nagravision, Oasis CAM, PCMCIA CAM, Premiere, Worldcam, TechniCam Beta2, Technicrypt, TPS, Reality CAM, SMiT, Universal CAM, Viaccess, Videoguard CAM
Connectors		4 x PCMCIA
Transportstream		
TS encapsulation		UDP/IP, RTP/UDP/IP, FEC
TS type		MPTS
TS functionality		Receiver, decode, and transmit up to 4 MPTS via IP
Control and Management		
Interface type		100FD/1000Base-T Ethernet IEEE 802.3
Features		Element control via HTTP/Web-GUI, SNMP traps for integration with network management systems (NMS), software update via FTP or TFTP
Protocol		IP v4, ARP, UDP, TCP, ICMP, HTTP, SNMP v2c, FTP, TFTP, DNS, DHCP, SNTP
Connectors		2 x 8P8C "RJ-45" (redundant)
Common data		
Current consumption at 48 V	[mA]	605
Power consumption at 36 - 60 V	[W]	24,3 per module
Input voltage	[V]	36 - 60
Dimensions		1 HU, 19 inch
Ambient temperature	[°C]	0 ... +45

Passive Combining

PASSIVE COMBINING NETWORK

U 960



- for distribution of input signals in the frequency range 5 - 1000 MHz
- individual mounting subject to customer request

Type		U 960
Order number		380 195
EAN-Code		4026187680152
Impedance	[Ω]	75
Frequency range	[MHz]	5 - 1000
Screening	[dB]	> 100
Connectors	[dB]	F-jacks
can be assembled with:		
2-way splitter		
Through loss	[dB]	3,8 ± 0,5
Isolation	[dB]	> 24
Return loss	[dB]	> 21
3-way splitter		
Through loss	[dB]	6,5 ± 0,5
Isolation	[dB]	> 24
Return loss	[dB]	> 22
4-way splitter		
Through loss	[dB]	7,5 ± 0,5
Isolation	[dB]	> 23
Return loss	[dB]	> 23
8-way splitter		
Through loss	[dB]	11,2 ± 0,5
Isolation	[dB]	> 29
Return loss	[dB]	> 21
Common data		
Housing		19", 1 HE
Ambient temperature	[°C]	0...+50

Active SAT splitters

FOR DISTRIBUTION OF SAT POLARISATIONS

U 911 - U 946

- 19-inch rack-version
  attenuation and slope adjustable via HE programming software, completely remote maintenance, transmission of system-error indication

Type		U 911	U 912	U 914	U 915
Order number		380 192	380 212	380 214	380 215
EAN-Code 4026187...		...651435	...002749	...651909	002763
Connectors	[Ω]	In- and outputs: F-jacks, 75			

Type		U 921	U 922	U 924	U 925
Order number		380 221	380 222	380 224	380 225
EAN-Code 4026187...		...735180	...002787	...735173	002800
Connectors	[Ω]	In- and outputs: SMA-connectors, 50			

Type		U 931	U 932	U 934	U 935
Order number		380 231	380 232	380 234	380 235
EAN-Code 4026187...		...002824	...002831	...002855	...002862
Connectors	[Ω]	Inputs: SMA-connectors, 50 & Outputs: F-jacks, 75			

Type		U 941	U 942	U 944	U 945
Order number		380 241	380 242	380 244	380 245
EAN- Code 4026187...		...002886	...002893	...002916	...002923
Connectors	[Ω]	Inputs: F-jacks, 75 & Outputs: SMA-connectors, 50			

Common data					
Inputs / Outputs		2 x 1 in 8		1 x 1 in 16	
Num. of power suppl. 230 V / 28VA		2	1	2	1
Remote current	[ma]	350	350	350	350
LNB voltage	[V]	16	16	16	16
Input frequency range	[MHz]	950 - 2150			
Input level value	[dBµV]	85			
Through loss	[dB]	0 ± 2			
Isolation	[dB]	> 40			
Level control (0,5 dB steps)	[dB]	0...-15			
Equalizer	[dB]	0 / 7 ± 1			
Frequency range insertion loss in 36 MHz bandwidth in nominal frequency range	 [dBss] [dBss]	 < 1 < 2			
Return loss Inputs / Outputs	 [dB]	 ≥ 12 / ≥ 14			
Output isolation	[dB]	> 20			
Testpoints (1 per polarization) Value output isolation Return loss	 [dB] [dB]	 10 12			

* maximum 1,5 A, depending on power supply and internal securing