Haivision

Makito
X Series

High Quality, High Density, High Profile H.264 Encoder & Decoder

Extreme Encoding The Makito™ X family of H.264 encoders and decoders delivers a complete end-to-end field-proven video solution offering confidence, security, and reliability with a mature feature set. A complete product family, Makito X solves the most demanding encoding and video distribution challenges. Available as single appliances or mini-blades within rack mountable chassis, the Makito X encoders achieve remarkable density supporting up to 12 1080p60 inputs or outputs within a single rack unit.

Highest Quality To maximize video quality over your network, the Makito X supports High Profile H.264 encoding. Tuned to excel in low bandwidth environments, the Makito X gives you twice the quality or uses half the bandwidth compared to other enterprise encoders. Matched with the Makito X Decoder to provide end-to-end latency as low as 70 milliseconds, the Makito X delivers pristine quality at sub-2 Mbps bitrates. The Makito X is ideal for video distribution within a facility, to connect facilities or support remote video contribution, to deliver performance video over satellite connections and across the Internet.

Powerful Features With up to 2 inputs and 4 encoding engines per blade, the Makito X carries forward the strong heritage of the Makito family with features designed to address the most rigorous video applications. The excellent picture quality at low bandwidth and the lowest end-to-end latency of the industry makes the Makito X platform ideal for internal broadcast applications. Combining KLV and CoT metadata support makes the Makito X ideal for Full Motion Video (FMV) applications in government and military. Moreover, integrated features such as snapshots, logo insertion, Selective Mute™, talkback, and powerful control interfaces enable advanced video network management in medical applications. Multi-bitrate (MBR) encoding to unicast, multicast, and RTMP enables administrators to direct many unique streams groomed to specific desktop and mobile viewers, set-top boxes, recorders, and Internet destinations.

Integrated Solutions Haivision has designed specific integrated technology supporting end-to-end video applications. The Makito X includes Haivision's Secure Reliable Transport (SRT) technology enabling video distribution over low cost public Internet connection, AES encryption and Forward Error Correction (FEC) for controlled media distribution throughout facilities with the Furnace IPTV and CoolSign digital signage systems.

The Makito X family includes single HD-SDI, dual HD-SDI, and DVI/Component encoders and the Makito X dual HD-SDI decoders.

Product **Features** — Product **Benefits**

Product Features	Product Benefits
70 millisecond end-to-end latency	Supports mission-critical distribution and interactive communication challenge
4 HD encoding engines	Deliver up to 4 HD streams from 1 or 2 sources for multi-bitrate (MBR) streaming
Multiple destinations per stream	Target different systems, networks, users, and platforms individually
Highly efficient encoding	Up to twice the quality or half of the bandwidth, using High Profile H.264
12 HD 1080p60 channels in 1RU	Highest density available reducing cost, footprint, and energy consumption
AES 256 bit encryption	Secure unicast or multicast end-to-end video distribution
Metadata support	Insert synchronized KLV into the MPEG stream from IP, embedded, or serial data sources
SRT and FEC	Maintain video quality over unqualified networks and low cost public internet connections
Integrated with Furnace, InStream and CoolSign	Complete end-to-end video solution

MAKITO X SPECIFICATIONS

MAKITO X (SDI ENCODERS & DECODER)

Video Inputs (single or dual input encoder only)
Composite	NTSC/PAL/PAL-M
SD-SDI	SMPTE 259M-C
HD-SDI	SMPTE 292M
	SMPTE 274M
	SMPTE 296M
3G-SDI	SMPTE 424M
	SMPTE 425M

Video Outputs (decoder only - dual SDI):
HDMI
SD-SDI / SMPTE 259M-C
HD-SDI / SMPTE 292M & 296M
3G-SDI / SMPTE 274M & 424M &425M

Video Resolutions:
1920x1080p 60/59.94/50/30/29.97/25/24/23.98 Hz
1920x1080i 60/59.94/50 Hz
1280x720p 60/59.94/50/30/29.97/25 Hz
720x480/576i 60/59.94/50 Hz
(interlaced shown in fields per second)

Audio Inputs/Outputs:
Available through a locking mini-DIN-8 connector:
   Balanced stereo analog audio
   Unbalanced stereo analog audio
Embedded Audio
   SD-SDI SMPTE 272M
   HD-SDI SMPTE 299M
   HDMI (Decoder only)

MAKITO X (DVI ENCODER)

Video Inputs:
Y, Pb, Pr / RGBHV component analog
Y, Cb, Cr / DVI component digital

Video Resolutions:
1920x1080p 60/59.94/50/30/29.97/25/24/23.98 Hz
1920x1080i 60/59.94/50 Hz
1280x720p 60/59.94/50/30/29.97/25 Hz
720x480/576i 60/59.94/50 Hz
720x480/576p 60/59.54/50 Hz
(interlaced shown in fields per second)

Computer Resolutions:
1920x1200 60 Hz	1680x1050 60 Hz
1600x1200 60 Hz	1600x900 60 Hz
1440x900 75/60 Hz	1400x1050 75/60 Hz
1360x768 60 Hz	1280x1024 75/60 Hz
1280x800 85/75/60 Hz	1280x768 85/75/60 Hz
1152x864 75 Hz	1024x768 85/75/60 Hz
800x600 85/75/60 Hz	640x480 85/75/60 Hz

Audio Inputs:
Available through a locking mini-DIN-8 connector:
   Balanced stereo analog audio
   Unbalanced stereo analog audio
Embedded DVI Audio

VIDEO ENCODING/DECODING

Compression Standard:
H.264 (MPEG-4 AVC part 10)
ISO/IEC 14496-10
Baseline, Main, and High Profiles
Up to Level 4.2 and lower intermediate levels
I, IP, IBP, IBBP framing
Configurable Group of Picture (GOP) size
Configurable frame rate
Deblocking filter

Bit Rates:
SD/HD from 32 kbps to 25 Mbps

Rate Control:
CBR/VBR

Latency (encode only):
Less than 55ms

AUDIO ENCODING/DECODING

Compression Standard:
MPEG-2 AAC-LC ISO/IEC 13818-7
MPEG-4 AAC-LC ISO/IEC 14496-3

Audio Channels:
2 analog audio per blade
16 embedded audio per blade (SDI)
2 embedded audio per blade (DVI)

Bit Rates:
From 56 to 320 kbps per audio pair

Frequency Response:
From 20 Hz to 22 kHz

METADATA (OPTIONAL)

CoT to KLV conversion
KLV or CoT over serial RS-232/422
KLV or CoT over UDP
KLV over SDI
SMPTE 336M compliant
MISB 0601.5 compliant
MISB 0604.2 compliant
Asynchronous & synchronous modes as per MISB 0604.2
High precision timecode insertion as per MISB 0604.2

IP NETWORK INTERFACES

Standard:
 Ethernet 10/100/1000 Base-T, auto-detect, Half/Full-duplex
Static IP/DHCP

Connector:
RJ45

Networking Protocols:
Unicast streaming
Multicast streaming (IGMP v3)
Multiple unicast streaming
MPEG transport stream over UDP / RTP
RTMP
SAP (RFC 2974)
Direct RTP - H.264 over RTP (RFC 3984)

MANAGEMENT INTERFACES

Standard:
RS-232
RJ45 to RS-232 (DB-9 Management Cable Req'd.)
Ethernet

Management:
HTTPS (web browser)
Command line over SSH/Telnet/RS-232
SFTP/TFTP/SCP
SNMP v3
Furnace Server

SINGLE BLADE APPLIANCE

Dimensions:
24mm H x 149mm W x 202mm D (0.92"H x 5.85"W x 8.0"D)

Weight:
2.5 lbs.

Power:
12VDC, 20W (each blade),
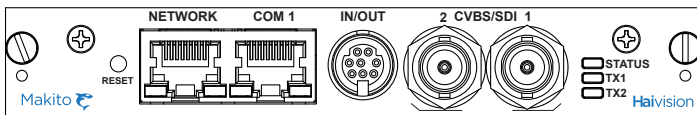100-240VAC 30W external locking power supply

Temperature:
Operating: -20º to 40ºC (-4º to 104ºF)
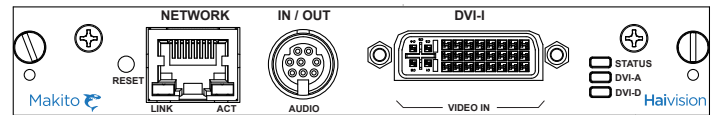Non-operating: -40º to 50ºC (-40º to 122ºF)

ADVANCED FEATURES

Multi-bitrate (MBR) streaming
HD/SD de-interlacing
Built-in downscaling
EIA-608-B/NTSC Line 21 closed captioning
EIA-708-B/SDI closed captioning
Forward Error Correction (FEC)
AES encryption 128-bit or 256-bit with Furnace
Aspect ratio configuration
Active Format Description (AFD)
Wide Screen Signaling (WSS)
Logo overlay
Selective Mute
Talkback (encode only)
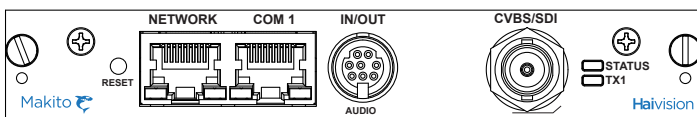Color Space Conversion (DVI only)

CHASSIS OPTIONS

6 blade chassis (F-MB6X-RAC, F-MB6X-DC, F-MB6X-MED)
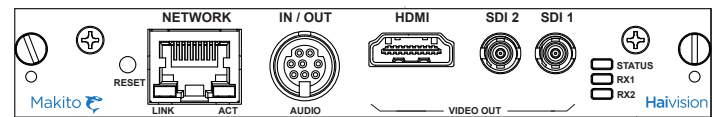21 blade chassis (F-MB21B-R)
See Datasheet for specification details

Makito X (Dual SDI)

Makito X (DVI)

Makito X (Single SDI)

Makito X Decoder

Makito Product Portfolio & Ordering Information **

Makito X Single SDI	S/B-292E-HDSDI1	Makito X Encoder Appliance (S) or Blade (B) HD H.264 IP video encoder supporting a single 3G/HD/SD-SDI and Composite
Makito X Dual SDI	S/B-292E-HDSDI2	Makito X Encoder Appliance (S) or Blade (B) HD H.264 IP video encoder supporting dual 3G/HD/SD-SDI and Composite
Makito X DVI	S/B-292E-DVI	Makito X Encoder Appliance (S) or Blade (B) HD H.264 IP video encoder supporting a single DVI-I and Component
Makito X Decoder	S/B-292D-HD2	Makito X Decoder Appliance (S) or Blade (B) HD H.264 IP Video decoder supporting dual 3G/HD/SD-SDI and HDMI