



Ruggedized Low Latency 1080p60 HD H.264 Encoder

Designed for Airborne & Mobile ISR Makito™ Air combines the unrivaled low latency and performance of Haivision's commercial Makito HD H.264 encoder in a completely ruggedized DO-160 compliant form-factor with full KLV/CoT metadata support. The Makito Air addresses the most demanding intelligence, surveillance, and reconnaissance (ISR) video challenges by delivering H.264 video up to 1080p60 with metadata, encoding latency as low as 55 milliseconds, and end-to-end latency as low as 70 milliseconds when coupled with a Makito decoder. The Makito Air encoder can support constrained data links found in the most challenging operating environments by reducing the spatial resolution of the video without affecting image aspect ratios. Additionally, two different bitrate (resolution/framerate) H.264 streams can be produced simultaneously from the same source. The Makito Air allows for scaling and frame rate settings to be adjusted on-the-fly, should controls be established from data rate sensing systems.

KLV Metadata Makito Air supports industry standard MISP-compliant Key-Length-Value (KLV) metadata transport within the MPEG-2 transport stream. Metadata is captured via serial port, Ethernet or the SDI-VANC embedded input stream. Synchronous transport of the metadata with the associated image frames is guaranteed through Presentation Time Stamp (PTS). Additionally, Makito Air supports Cursor-on-Target (CoT) metadata. CoT is converted into standard KLV format prior to being multiplexed in the MPEG-2 transport stream.

In the Air or on the Ground Makito Air is ideal for installations on-board manned and unmanned aerial platforms used for ISR applications; where video and metadata are transmitted over microwave (LOS) or satellite (BLOS) networks to operations and exploitation centers. The Makito Air is also suitable for ISR applications on ground-based platforms, equipped with wireless transmitters. For emergency aid and disaster recovery efforts, Makito Air is ideal for streaming live video from sensor-equipped platforms to first-responders and news outlets.

JITC Certification As the industry's first and only JITC certified H.264 1080p60 HD encoders for both airborne and ground-based applications, Makito Air and Makito guarantee interoperability of field systems and ensures compliance with the U.S. Department of Defense (DoD) standards for encoding Full Motion Video (FMV) for ISR.

Product Features

Product Benefits

Commercial-Off-The-Shelf (COTS)	Continuous product evolution and improvement with powerful feature sets
Ruggedized DO-160 design	Designed for airborne and ground-based vehicles
Low latency - 70ms end-to-end	Support mission-critical communication challenges
JITC Certified H.264 1080p60 HD encoder	Guaranteed interoperability & compliance with DoD and ISR
Performance in a compact form-factor	Three encoders can be mounted in a single rack unit, each encoder weighing under 3 lbs.
Multi-bitrate (MBR) streaming	Multiple stream output from a single source

Makito Air (S-290E-AIR, S-290E-AIR-COT)

Video (Inputs):

Composite	NTSC/PAL
SD-SDI	SMPTE 259M-C
HD-SDI	SMPTE 292M
	SMPTE 274M
	SMPTE 296M
3G-SDI	SMPTE 424M
	SMPTE 425M

Video Resolutions:

1920x1080p 60/59.94/50/30/24/23.98/29.97/25 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 (Input):

Balanced Stereo Analog Audio
 Unbalanced Stereo Analog Audio
 Embedded Audio
 SD-SDI SMPTE 272M
 HD-SDI SMPTE 299M

ADVANCED FEATURES

Multi-bitrate (MBR) streaming
 SD de-interlacing
 Built-in downscaling
 Deblocking filter
 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
 Logo overlay
 Selective Mute
 SD aspect ratio configuration
 SD AFD and WSS (x-290E-HDSDI)

VIDEO ENCODING

Compression Standard:

H.264 (MPEG-4 AVC part 10)
 ISO/IEC 14496-10
 Level 4.2 and lower Intermediate Levels
 I, IP framing
 Configurable Group of Picture (GOP) size
 Configurable frame rate

Bit Rates:

SD/HD from 150 kbps to 15 Mbps

Rate Control:

Traffic Shaping

Latency (encode only):

Less than 55ms

AUDIO ENCODING

Compression Standard:

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

Audio Channels:

2 per video channel

Bit Rates:

From 32 to 448 kbps per audio pair

Frequency Response:

From 20 Hz to 22 kHz

IP NETWORK INTERFACES

Standard:

Ethernet 10/100/1000 Base-T, auto-detect, Half/Full-duplex

Networking Protocols:

Unicast Streaming
 Multicast Streaming (IGMP v3)
 Multiple Unicast Streaming
 MPEG Transport Stream over UDP / RTP
 Direct RTP - H.264 over RTP (RFC 3984)
 RTP / RTCP (RFC 3550)
 RTMP
 QuickTime RTSP (RFC 3640) (Progressive resolutions only)
 SAP (RFC 2974)

MANAGEMENT INTERFACES

Standard:

RS-232 or Ethernet

Management:

HTTPS (web browser)
 Command line over Telnet/RS-232/SSH
 FTP/TFTP
 Furnace Portal Server (VF Pilot)
 SNMPv3
 Common Criteria: NDPP 1.1 support

KLV METADATA

MISB Compliant, considering:

IETF RFC 2250
 Video over IP using MPEG-2 systems (TS mode)
 MISB 0601.3 compliant
 UAS Datalink Local Metadata Set, Section 5
 MISB 0604.2 compliant
 Time Stamping Compressed Motion Imagery
 SMPTE 336M-2007 Data Encoding Protocol
 Using Key-Length-Value

Makito Air (S-290E-AIR-x)

Dimensions:

41mm H x 143mm W x 216mm D
 (1.6"H x 5.6"W x 8.5"D)

Weight:

3.6 lbs.

Power:

28VDC, 17W
 MIL-STD connector

Temperature:

Operating: -55° to 50°C
 Non-operating: -65° to 85°C

Compliances/Certifications:

Designed for specific sections of:
 RTCA-DO-160F
 MIL-STD-810F
 MIL-STD-704F
 IEC60529:2001-02
 JITC MISP 5.5



Makito Air

Makito Air Product Portfolio & Ordering Information **

Makito Air
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S-290E-AIR
 S-290E-AIR-COT

Makito AIR ruggedized HD H.264 Encoder with KLV, MIL-STD connectors optional
 Makito AIR ruggedized HD H.264 Encoder with KLV and CoT, MIL-STD connectors optional. For US Federal use only

** For complete pricing and ordering, contact us at sales@haivision.com or your certified Haivision reseller.