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Ellipse® 3000
Contribution Encoders

HIGHLIGHTS

- MPEG-2 and MPEG-4 AVC SD/HD 4:2:0/4:2:2 8/10-bit encoding
- Dual independent encoding from a single source
- Broad SD/HD format support
- Audio encoding of up to eight stereo or 16 mono channels
- Low-delay mode
- Integrated modulator supporting DVB-S and DVB-S2 with roll-off factor up to 5%
- Simultaneous L-band, IP and DVB-ASI outputs
- User-friendly front-panel controls or web-based management
- BISS scrambling
- 1:1 stand-alone redundancy
- ASI cascading
- Fast boot time

Ellipse® 3000 contribution encoders leverage Harmonic's industry-leading compression expertise and a flexible system architecture to bring new levels of video quality and workflow efficiency to broadcast contribution applications. Multiformat, multi-codec versatility, low latency and an optional integrated modulator make this all-new compression platform ideal for both digital satellite newsgathering (DSNG) and fixed contribution. A compact footprint and plug-and-play deployment deliver the additional benefit of low cost of ownership.

Ellipse 3000 encoders support all SD and HD MPEG-2 and MPEG-4 AVC codecs at 4:2:0 or 4:2:2 chroma subsampling and 8 or 10 bits. Fully firmware upgradeable, the encoders offer a smooth and cost-effective migration path from MPEG-2 SD 4:2:0 8-bit to AVC HD 4:2:2 10-bit compression schemes, making them among the most versatile contribution encoders available. Options for remultiplexing and cascading allow the devices to operate on a stand-alone basis with no need for external multiplexers or PSI generators.

At just 1 RU, compact and rugged Ellipse 3000 encoders are a perfect fit for DSNG vehicles, teleports and flyaway packages operating on the C, Ku or Ka bands. Two models are available, assuring the deployment of systems precisely tailored to a user's application:

- **Ellipse 3100**
  For fixed contribution over IP networks; featuring simultaneous IP and DVB-ASI outputs
- **Ellipse 3200**
  For DSNG applications; adds an integrated DVB-S/S2/DSNG modulator with simultaneous L-band, IF and DVB-ASI output

BUSINESS BENEFITS

Pristine Video Quality
The use of AVC HD 4:2:2 10-bit encoding enables the transmission of exceptionally vivid video, augmenting your ability to offer customers the highest video quality available.

"Pay-As-You-Grow" Scalability
Video codecs and formats are easily added in Ellipse 3000 encoders via firmware upgrade, enabling a scalable migration path that provides operational flexibility and business continuity and extends the system's value.

Low CAPEX and OPEX
The integrated modulator in the Ellipse 3200 eliminates the need to purchase costly external stand-alone devices for satellite uplink. DVB-S2 technology improves spectral efficiency by utilizing advanced coding techniques, delivering bandwidth savings up to 30% compared to DVB-S. The small system footprint and low power consumption inherent to both Ellipse 3000 encoders further reduce operating expenses.

Integrated Redundant Path Support
Simultaneous L-band, IF and DVB-ASI outputs on Ellipse 3000 encoders provide alternate distribution channels in the event of link failure.

Integrated Multiplexing
A single "master" Ellipse 3000 encoder can aggregate up to 50 Mbps of content from "slave" encoders into one MPTS output, eliminating the need for external multiplexers.

End-to-End Contribution Solution
Ellipse 3000 encoders are the perfect complement to Harmonic's ProView™ 7100 integrated receiver-decoder. Compress AVC HD 4:2:2 10-bit video with the Ellipse 3000, then use the ProView 7100 for decompression at the same sampling and bitrate, and the result is a contribution workflow with nearly lossless video quality.

Content Protection
Ellipse 3000 encoders help prevent signal interception with industry-standard BISS (Basic Interoperability Scrambling System) mode 1 and BISS-E encryption.

TECHNICAL BENEFITS

Video Encoding
Utilizing the industry's most advanced silicon and ASIC compression technologies, Ellipse 3000 encoders offer superior-quality compression at data rates up to 80 Mbps with CABAC (context-adaptive binary arithmetic coding). Dual independent encoding allows a single source to be encoded to two different codecs; for instance, HD AVC 4:2:2 and SD MPEG-2.

Audio Encoding
Ellipse 3000 encoders support four AES/EBU embedded stereo pairs, two analog stereo pairs or four mono channels as standard. The addition of an optional audio expansion module increases support to eight digital or analog stereo pairs, or 16 mono channels. A range of sampling rates, an internal sample rate convertor (SRC) and an advanced coding scheme ensure reliable and high-quality audio encoding.

Low Delay
Low latency on Ellipse 3000 encoders helps eliminate awkward pauses during handoffs between field and studio talent, and is available for all encoding modes.

Ease of Use
Controlled by a front-panel operating menu or web GUI, the simple Ellipse 3000 menu structure is specifically tailored for contribution applications, with frequently used, operation-critical controls available via hot keys.

Plug and Play
Fast boot times prepare Ellipse 3000 encoders for action right out of the box, and configuration presets allow multiple user settings to be saved and quickly recalled, increasing the ability to get on air fast. Switching between 4:2:2 low-delay and 4:2:0 modes, for instance, is easily accomplished on the GUI, eliminating the need to manually change settings for different production setups.

Resilience Against Packet Loss
In video-over-IP applications, Ellipse 3000 encoders employ the SMPTE 2022 protocol to minimize packet loss by inserting forward error correction (FEC) packets in the transport stream. These packets are used by the reception device to detect lost packets and automatically recover from losses when they occur.

Efficient Multicast of Multiple Services
Ellipse 3000 encoders support the creation of multiple single-program transport streams, which can be multicast to 16 different ports or IP addresses. A separate PSI is generated for each SPTS. Users may choose optional BISS scrambling with a separate scrambling key for each SPTS.

High-Speed Data Transmission over Satellite
The Ellipse 3200 encoder supports data transmission of up to 20 Mbps via ETSI EN301 192 DVB MPE encoding, which enables IP packet transmission via satellite using an MPEG-2 transport stream.

Modulated Outputs
The on-board modulator on the Ellipse 3200 offers DVB-S/S2/DSNG transmission modes with QPSK, 8PSK, 16QAM and 16APSK constellations. The encoder supports IF or L-Band outputs, which can directly feed the up converter, providing a very compact uplink package. The integrated modulator supports standard and extended roll-off factors of 15%, 10% and 5%, enabling highly efficient utilization of transponder bandwidth.

L-Band Monitoring
The Ellipse 3200 encoder's L-band monitoring output provides real-time, on-the-spot monitoring of modulated information as it is transmitted.

Compact Footprint
Ellipse 3000 encoders occupy just 1 RU without the need for ventilation space above or below, saving real estate and reducing power consumption.

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Ellipse 3200 back panel

VIDEO

Video Compression	MPEG-2 SD 4:2:0 MPEG-2 SD 4:2:2 MPEG-2 HD 4:2:0 MPEG-2 HD 4:2:2 MPEG-4 AVC 4:2:0 SD MPEG-4 AVC 4:2:2 SD 8/10 bits MPEG-4 AVC 4:2:0 HD MPEG-4 AVC 4:2:2 HD 8/10 bits
Profiles and Levels	MPEG-2 MP@ML MPEG-2 M@HL MPEG-4 AVC MP@L4.0 MPEG-4 AVC HP@L4.0 Hi422P@L4.1
Video Formats	PAL NTSC

Resolutions

480 (NTSC)	Auto, 720x480, 704x480, 640x480, 544x480, 528x480, 480x480, 368x480, 352x480, 352x240
576 (PAL)	Auto, 720x576, 704x576, 640x576, 544x576, 528x576, 480x576, 368x576, 352x576, 352x288
720p	Auto, 1280x720, 960x720, 640x720
1080i	Auto, 1920x1080, 1440x1080, 1280x1080, 960x1080
MPEG-2, MPEG-4 Pre-Processing	Scene cut detection Analog/digital time base corrector (TBC) to handle raw VTR outputs Automatic frame resizing Motion compensated temporal filter Noise reduction filters Low pass filter
MPEG-4 AVC Video In-Loop Processing	Deblocking filter

AUDIO

Number of Channels

Standard	Four AES/EBU stereo pairs, embedded; or two analog stereo pairs; or four mono channels
Optional (via audio expansion module)	Eight AES/EBU stereo pairs, embedded; or eight analog stereo pairs; or 16 mono channels

Audio Formats

Standard	MPEG-1 Layer 2 Dolby® Digital (AC-3) 5.1 passthrough
Optional	AC-3 2.0 MPEG-2 AAC LC MPEG-4 HE-AAC v1, v2 Linear audio passthrough Dolby-E passthrough
Operating Modes	Joint stereo, single channel, dual channel
Sampling Frequencies	32, 44.1, 48 kHz Integrated sample rate converter (SRC)

VIDEO AND AUDIO INPUT

Video	Composite (PAL/NTSC) SD-SDI (SMPTE-259M) with EDH HD-SDI (SMPTE-292M) Video loop-through (SDI only)
Audio	Four balanced XLR inputs Eight terminal block inputs (optional)
DVB-ASI	Built-in multiplexer for encoder cascading Passive loop-through for cascading
Sync Lock	Black burst with loop-through capability
Data	Asynchronous RS-232 up to 115 Kbaud MPE (Multi Protocol Encapsulation) Up to 20 Mbps

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VIDEO AND AUDIO OUTPUT

DVB-ASI

Output Rate	350 Kbps-120 Mbps
Number of Connectors	Three for Ellipse 3100
	One for Ellipse 3200
DVB Scrambling (optional)	BISS mode 1, BISS-E
IP Output	Dual GbE IP output, RJ-45, auto-negotiation
	Auto MDI/MDIX crossover
	UDP/RTP
	TOS, TTL configurable values
	SMPTE-2022 FEC (optional)
	M-SPTS support (optional)

SATELLITE MODULATOR OUTPUT (ELLIPSE 3200 ONLY)

L-Band

DVB-S EN 300-421	QPSK
DVB-DSNG EN 210 301 (optional)	QPSK, 8PSK, 16QAM
DVB-S2 EN 302 307 (optional)	QPSK, 8PSK, 16APSK
Frequency	950-1750 MHz (50 Hz steps)
Symbol Rate	50 ksps -15 Msps
Roll-Off Factor	15%, 10% and 5%
Output Power	-50 dBm to -7 dBm (0.5 dB steps)
Spurious Level	-65 dBc @ -10 dBm
Monitoring Output Power	-45 dBm
Monitoring Output Frequency	Transmit frequency
Features	Constant code rate modulation (CCM)
	16 Kb and 64 Kb FEC block support
	Pilot mode
	External block up converter (BUC) support
	DC Feed for BUC up to 24 VDC 400 mA
	Selectable 10 MHz reference clock (in-band or external)

IF

DVB-S EN 300-421	QPSK
DVB-DSNG EN 210 301 (optional)	QPSK, 8PSK, 16QAM
DVB-S2 EN 302 307 (optional)	QPSK, 8PSK, 16APSK
Frequency	50-180 MHz (1 kHz steps)
Output Power	-30 dBm to 5 dBm (0.5 dB steps)
Spurious Level	-65 dBc @ -10 dBm
Selectable Output Impendence	50 Ω/75 Ω
L-Band Monitoring Output Power	- 45 dBm
L-Band Monitoring Output Frequency	1080 MHz

SYSTEM MANAGEMENT

Remote	Web-based management, SNMP
Local	Graphical front panel with quick access keys and alphanumeric keypad
Software Upgrades	Via FTP
Dry Contact Alarms (GPI)	One output for various status and faults
Presets	Up to 60 different configurations

POWER

Input Voltage Range	90-260 VAC
	-48 DC (optional)
Consumption	Up to 88 W
	Up to 100 W (with DC power feed for BUC)

PHYSICAL

Dimensions (W x H x D)	17.1 in x 1.75 in x 19.1 in (1 RU)
	43.9 cm x 4.4 cm x 48.9 cm
Weight	10 lbs/6 kg

ENVIRONMENTAL

Operating Temperature Range	+32º to +122º F
	0º to +50º C
Storage Temperature Range	-4º to +158º F
	-20º to +70º C
Operating Humidity	85% non-condensing
Electromagnetic Compliance	FCC part 15
	EN 55022, EN 55024
Safety	EN 60950
	RoHS directive 2002/95/EC

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