# harmonic

Ellipse™ 2000

HIGHLIGHTS

- **Versatile modulation schemes: DVB-S, DVB-DSNG and DVB-S2**

- **QPSK/8PSK/16QAM/16APSK constellations**

- **Broadcast grade IF or L-band outputs with secondary L-band monitoring outputs**

- **External or modulated 10MHz reference clock**

- **High contrast LCD display**

- **Easy front panel controls or Web-based management with up to 60 configuration presets**

- **MPEG-4 AVC SD and MPEG-2 SD simulcast outputs**

- **Upgradeable to MPEG-4 AVC HD**

- **4:2:2/4:2:0 encoding profiles (4:2:2 – MPEG-2 only)**

- **Low latency mode**

- **Audio and video test patterns**

- **Logo insertion**

- **BISS mode 1 & BISS E scrambling**

- **Simultaneous outputs via IP, DVB-ASI and modulated interfaces**

- **Cascading via DVB-ASI input with passive loop-through support**

The Ellipse 2000 Compact DSNG Encoder is a fully integrated MPEG-2 Standard Definition 4:2:2/4:2:0 and MPEG-4 AVC Standard Definition and High Definition 4:2:0 encoder/modulator in a 1-RU unit. Designed for digital satellite contribution applications, the Ellipse 2000 features a professional broadcast quality encoder and a built-in DVB-S, DVB-S2 and DVB-DSNG modulator with L-Band and IF outputs.

The rugged and easy-to-use Ellipse 2000 is a perfect fit for teleports, satellite newsgathering vehicles and flyaway packages operating on either the C, Ku, or Ka-bands.
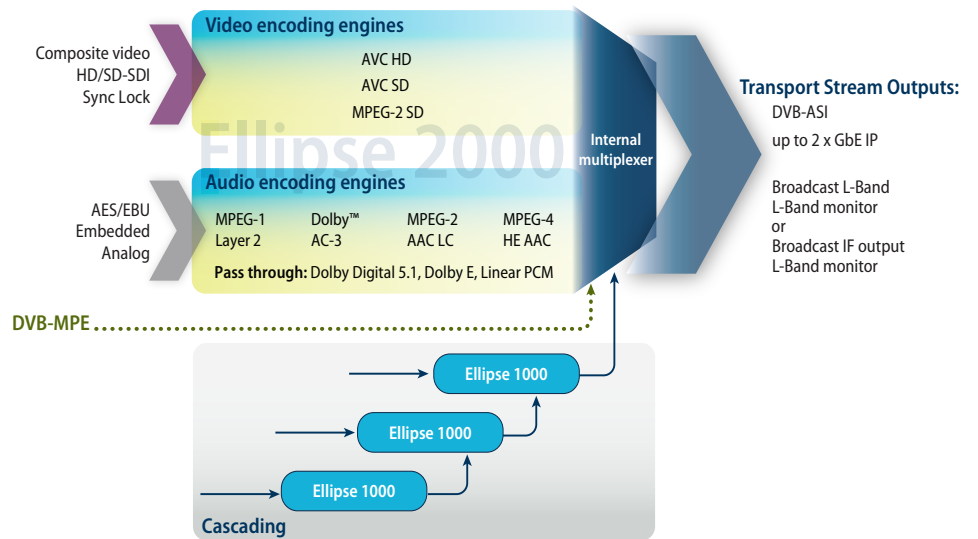
Ellipse 2000/2000H block diagram

BUSINESS BENEFITS

- **Low OPEX** - DVB-S2 technology improves spectral efficiency by utilizing advanced coding techniques, for savings of up to 30% on bandwidth. In addition, the Ellipse 2000's small system footprint and low power consumption further reduces operating expenses.

- **Low CAPEX** - Integrated modulator eliminates the need to purchase costly external standalone devices.

- **Multi-format video encode**r - Versatile design offers firmware migration path across video codecs and formats providing operational flexibility, business continuity and reduced CAPEX.

- **Modular pay-as-you-need licensing** - Flexible DSNG encoding platform enables customers to invest only in the features they need. Additional features can be added on the same hardware platform through firmware licenses.

- **Built-in redundant path support** - Simultaneous L-band, IP and DVB-ASI outputs provide alternate distribution channels in the event of link failure.

- **Integrated multiplexing** - A single "master" Ellipse 2000 encoder can aggregate up to 50 Mbps of content from "Slave" encoders into a single MPTS output, eliminating the need for external multiplexers.

- **Content protection** - Prevent signal interception with industry standard BISS (Basic Interoperability Scrambling System) scrambling.

TECHNICAL BENEFITS

- **Compact, with low power footprint**: The Ellipse 2000 only occupies 1-RU without the need for ventilation space above or below.

- **Video encoding** - The Ellipse 2000 offers quality video encoding at data rates of up to 50 Mbps utilizing advanced MPEG-2 and MPEG-4 AVC ASIC technologies, which offer broadcast video quality. The Ellipse 2000 supports simultaneous content encoding in MPEG-2 and MPEG-4 AVC formats in a variety of standard video resolutions.

- **Audio encoding** - The Ellipse 2000 encoder supports up to four quality stereo audio channels (or up to 8 mono channels) as either embedded/AES or as two analog stereo channel inputs. A range of sampling rates, internal SRC (Sample Rate Convertor) and an advanced coding scheme insure reliable and high quality audio encoding.

- **Modulated outputs** - The versatile on-board modulator offers DVB-S/DSNG and DVB-S2 transmission mode with QPSK, 8PSK, 16QAM and 16APSK constellations. The Ellipse 2000 supports IF or L-Band outputs which can directly feed the up-converter, providing a very compact uplink package.

- **L-Band monitoring** - The Ellipse 2000 DSNG encoder's L-band monitoring outputs provide real-time, on-the-spot monitoring of modulated information as it is transmitted.

- **Low latency** - In low-delay mode, the Ellipse 2000 enables interaction without awkward pauses. Available for MPEG-2 4:2:0 or 4:2:2 encoding, as well as for the MPEG-4 AVC SD/HD.

- **Front panel control** - The Ellipse 2000's front panel operating menu is specifically tailored for DSNG, with frequently used operation-critical controls such as 'carrier on/off' and 'modulation on/off' available via hot keys on the front panel touch pad keyboard.

- **Resilience against packet loss** - SMPTE 2022 (formerly Pro-MPEG CoP 3) FEC enhances link robustness 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 recover from losses when they occur

- **Efficient multicast of multiple services** - For IP output, the Ellipse 2000 supports creation of multiple SPTS which can be multicast to 16 different ports or IP addresses. A separate PSI is generated for each SPTS. User may choose optional BISS scrambling with a separate scrambling key for each SPTS.

- **High speed IP data transmission over satellite** - Data transmission of up to 20 Mbps is supported by utilizing DVB-MPE EN301 192, enabling IP packet transmission via satellite using an MPEG-2 transport stream.

harmonic

VIDEO SPECIFICATIONS

Video Compression and Bit-Rates	MPEG-2 4:2:0 MP@ML 100Kbps - 15Mbps MPEG-2 4:2:2 P@ML 4Mbps - 50Mbps SD MPEG-4 AVC MP@L3 0.3 Mbps to 15 Mbps HD MPEG-4 AVC HP@L4 or MP@L4 1 Mbps to 29 Mbps
HD Resolutions	1080i x 1920, 1440, 1280, 960 pixels 720p x 1280, 960 pixels
Formats	1080i-25Hz, 29.97Hz; 720p-50Hz, 59.97Hz
Standard Definition Horizontal Resolution Vertical Resolution	720,704, 640,544, 528, 480, 368, 352 pixels NTSC-480, 240 lines ; PAL-576, 288 lines
Pre-Processing MPEG-2/MPEG-4 Scene cut detection Analog/digital TBC (Time Base Corrector) to handle raw VTR outputs Automatic frame re-sizing Motion compensated temporal filter (MPEG-4 AVC SD only)	
Ancillary Data and VBI	WSS, Teletext (WST), VPS, AMOL,TV Guide
Closed Captioning	CEA 608 from Line 21 (MPEG-2) CEA 708/608 VANC extraction per SMPTE 334M CEA 708/608 external caption server per SMPT 333M
MPEG-4 AVC Video in-loop Processing	De-blocking filter

AUDIO SPECIFICATIONS

Number of Channels	Up to 4 digital stereo channels AES/EBU, embedded or 2 analog channels Option to support up to 8 digital channels AES/EBU, embedded or 8 analog channels
Audio Formats	MPEG-1 Layer 2 Dolby Digital™ 2.0 (AC-3) (optional) MPEG-2 AAC LC (optional) MPEG-4 HE-AAC v1, v2 (optional) Dolby Digital 5.1 pass-through Linear audio pass-through (optional) Dolby-E pass-through (optional)
Operating Modes	Joint stereo, single channel, dual channel
Sampling Frequencies	32 kHz, 44.1 kHz, 48 kHz

INPUTS AND OUTPUTS

Video Inputs	HD-SDI (SMPTE-292M) SDI (SMPTE-259M) Composite (PAL/NTSC)
Audio Inputs	Four balanced XLR inputs Eight terminal block inputs (optional) Integrated sample rate converter (SRC)
DVB-ASI Input	Built-in multiplexer for encoder cascading Passive loop-through for cascading
Sync Lock	Black burst with Loop-through capability
Data	Asynchronous RS232 up to 115Kbaud MPE (Multi Protocol Encapsulation) up to 20Mbps

VIDEO AND AUDIO OUTPUTS

DVB-ASI Output Rate	350Kbps – 70Mbps
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) Supports M-SPTS (optional)

L-BAND Output	
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 (50Hz steps)
Symbol Rate	50ksps -15Msps
Roll-of	20%, 25%, and 35%
Output Power	-50 dBm to -7 dBm (0.5 dB steps)
Spurious Level	-65dBc@-10dBm
L-Band Monitoring Output Power	-45dBm
L-Band Monitoring Output Frequency	Transmit frequency
Constant Code rate Modulation (CCM)	
Supports 16Kb and 64Kb FEC blocks	
Supports pilot mode	
External Block Up-Converter (BUC) support	
DC Feed for BUC	up to 24VDC 400mA
Selectable 10MHz reference clock (In-Band or external)	

IF Output	
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 - 180MHz (1 kHz steps)
Output Power	-30dBm to 5dBm (0.5 dB steps)
Spurious Level	-65dBc@ -10dBm
Selectable Output Impendence	50Ω / 75Ω
L-Band Monitoring Output Power	- 45dBm
L-Band Monitoring Output Frequency	1080 MHz

SYSTEM MANAGEMENT

|	
Remote	Web-based management, SNMP
Local	Graphical easy-to-use front panel with quick access keys and alphanumeric keypad
Software Upgrade	Easy to use FTP (File Transfer Protocol)
Dry contact alarms (GPI)	1 output for various status and faults
Presets	Up to 60 different configurations

harmonic

POWER

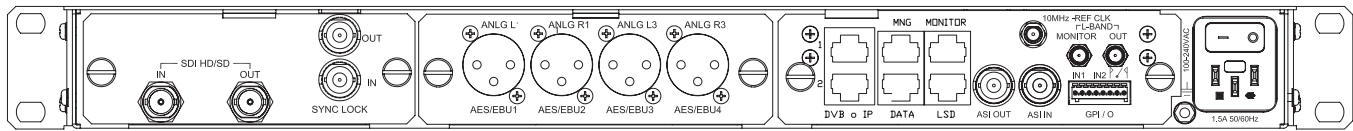|	
Input Voltage Range	90-260VAC, -48 DC (optional)
Power Consumption	Up to 88W Up to 100W (with DC power feed for BUC)

PHYSICAL

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

ENVIRONMENTAL

Operating Temperature Range	0°C to +50°C
Storage Temperature Range	-20°C to +70°C
Operating Humidity	85% non-condensing
Electromagnetic Compliance	FCC part 15, EN55022, EN55024
Safety	EN60950
RoHS	Directive 2002/95/EC
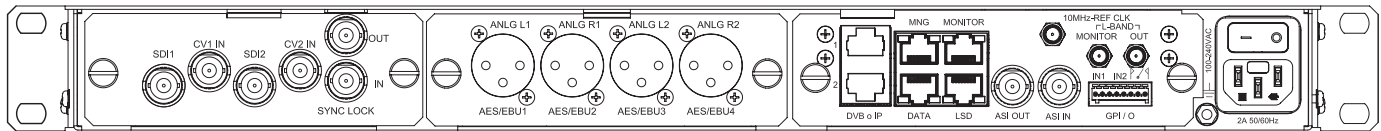
Ellipse 2000

Ellipse 2000H

harmonic