

E-Compact*Less energy. More power.*

LP Series - EX9001

High Efficiency VHF-BIII Transmitters

ISDB-T TV Digital: 50 Watts RMS

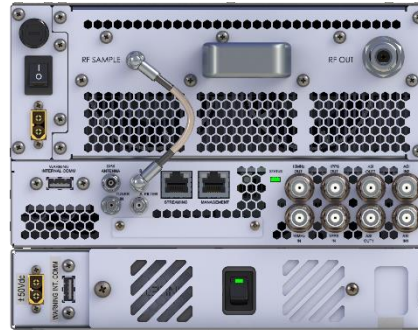
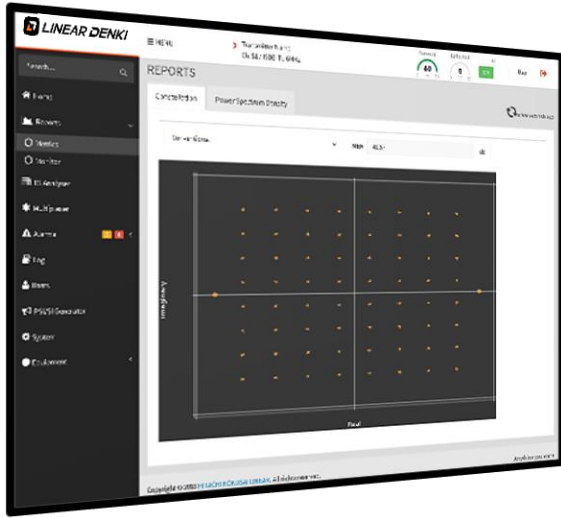
**KOKUSAI DENKI Electric Linear S/A**

LP Series

E-Compact Family of Low Power Broadband VHF-BIII Digital TV Transmitters features fully solid-state drivers, air-cooled and compatible in standard 19" cabinets.

Its compact design combines high power density per amplifier module and efficient energy consumption, embedded with adaptive non-linear pre-correction technology that allows to recover MER typical values if there are changes in the equipment output power.

Highlights



- SoC (System on Chip) technology.
- Measurement tools through the WEB interface. In a graphical environment, it offers the visualization of measurements such as Intermodulation and MER, eliminating the need for high-cost measurement equipment.
- Real Time adaptive non-linear pre-correction and linear pre-correction.
- Built-in parameterizable BTS decompressor, compatible with other brands.
- Embedded remux, allows the signal adjustment according to the need for transmission.
- Onboard satellite receiver, with Free to Air, IRDETO¹, CONAX¹, BISS, VERIMATRIX¹ and NAGRAVISION¹ license options.
- Automatic fan speed control, resulting in low noise levels, energy savings and longer device life.
- "Easy Maintenance" concept offering, among others, Plug-In connection for Power Supplies and Power Modules.
- Up to two power supplies per transmitter, operating in "Share" mode, allows for different levels of power redundancy.

Available resources

SoC (System on Chip) Technology The Hardware SoC integrates several elements of the system in a single chip, allowing software to be loaded with high processing power. This makes it a compact system with great processing power and high reliability.	STANDARD
Measurement tools MER measurements, Intermodulation, Power, Temperature and many others. In the WEB interface, the visualization takes place in a graphical environment, allows the visualization of the constellation diagram and spectral density, among others, eliminating the use of high-cost measuring equipment.	STANDARD
Remote software update It is possible to update the equipment software remotely, through the WEB interface.	STANDARD
Easy Maintenance concept Power Supplies and Power Modules with plug-in connection, does not require the use of cables and wiring, allowing quick and safe replacement.	STANDARD
Embedded WEB Server Remote access of the settings and management of the transmitter through the Ethernet ² port is possible, using a PC or Smartphone browser, without the need to install drivers or applications.	STANDARD
Adaptive non-linear pre-correction and linear pre-correction Imperceptible Automatic pre-correction applied due to changes in transmitter output power to recover MER values and intermodulation.	STANDARD
BTS Decompression Parameterizable BTS decompressor, embedded in the Transmitter, eliminating the use of auxiliary devices in the system, thus permitting interoperability with other brands.	STANDARD
Embedded Remux PID filtering, insertion of PSI/SI static tables, Virtual Channel configuration and TMCC parameterization.	STANDARD
Exciters Inputs / Outputs <i>Inputs:</i> BTS/TS over IP, 2x ASI/310M, 1PPS, 10MHz e ANTENA GPS. <i>Outputs:</i> 2x ASI/310M, 1PPS, 10MHz and Ethernet ² RJ45. <i>The BTS/TS over IP input can be converted to ASI and made available on the ASI/310M outputs without interfering with the modulating signal.</i>	STANDARD
Passive Elements Mask Filter, RF Probe after Mask Filter.	STANDARD
1200 W Power Supply Power Supplies with plug-in type connection ("Easy Maintenance" concept), eliminates the use of cables and wiring and allows for quick and safe replacement. 01 power supply present in each transmitter.	STANDARD
Digital manuals in English.	STANDARD
ASI to IP convert Bidirectional Ethernet ² port for TSolP (input/output) streaming. The BTS/TS signal inserted into the ASI or TUNER inputs (SAT or UHF) can be made available on the Streaming port (TSolP), without interfering with the currently modulated signal. This functionality is optional, enabled through a software license.	OPTIONAL
TS Analyzer Allows you to check TS information such as PIDs, Continuity Package Error, Program Name, Bit Rate, among others.	OPTIONAL
DC power The Transmitters can have as an option Power Supplies with $\pm 48\text{VDC}$ input, ideal for shared power systems in telecom shelters or solar energy backup systems.	OPTIONAL
GPS time base High precision time base sync via GPS. High performance running on SFN (Single Frequency Network). Features an external GPS antenna and surge protector.	OPTIONAL
VHF-BIII / UHF Tuner (Terrestrial Reception) ¹¹ ISDB-T VHF-BIII / UHF receiver and demodulator for terrestrial signal retransmission. It comes with a 5 or 7 pole mechanical tuning filter, depending on the conditions of the adjacent channels.	OPTIONAL
SAT Tuner (Satellite Reception) L-Band DVB-S/S2 receiver compatible with C-band and Ku-band LNBs.	OPTIONAL
CAS Tuner (Satellite Reception with Conditional Access) L-Band DVB-S/S2 receiver compatible with C-band and Ku-band LNB. It performs the decryption of up to 08 services simultaneously and visualization of up to 08 services on the display.	OPTIONAL
Electric Surge Protector for Sat Tuner and CAS Tuner GTD (Gas Discharge Tube) Protector. Increased security for the equipment against electrical surges in the satellite signal reception line.	OPTIONAL
Decryption Licenses for CAS Tuner: IRDETO¹, CONAX¹, NAGRAVISION¹ and VERIMATRIX¹, BISS-1 and BISS-E Decryption licenses can be purchased individually or together, for new transmitters or for transmitters that are already in field operation. In some cases it is possible to enable licenses remotely.	OPTIONAL
Remote telemetry over GPRS Transmitter remote monitoring using the GPRS cell phone network.	OPTIONAL
Redundant Power Supply Each Transmitter has a compartment to accommodate up to 02 Power Supplies of 1,200W each, operates in "Share" mode when the 02 Supplies are present.	OPTIONAL
Manuals printed in English.	OPTIONAL

General features

- Compatible in standard in 19" Rack;
- Fully solid state;
- Exciter and power amplifier integrated in the same equipment.
- Air cooled;
- Automatic restart in case of power failure;
- Operates on SFN (Single Frequency Network) and MFN (Multiple Frequency Network);
- Positively shifted center frequency of OFDM carriers of 1/7 MHz.
- All equipment controlled and managed by firmware;
- Access to settings and management of parameters via display interface on the front panel of the Exciter or remote via Ethernet² (WEB server or SNMP);
- Alarm signaling LEDs present on the front panel;
- Access the list of current or occurred alarms via display interface on the front panel of the Exciter or remotely via WEB interface;
- VSWR and Overpower protection via hardware and software, with automatic power reduction;
- Software protection against module temperature increase, with alarm signaling and power reduction;
- Automatic fan rotation speed control;
- Automatic quiescent bias current compensation of power transistors as a function of temperature;
- Automatic and programmable input switching in hold on and hold off modes;
- Power supply with PFC (Power Factor Correction) and soft starter with In-Rush limitation.

Models and their specific characteristics (ISDB-T)

	EC610LP	EC610LP-MTX	EC610LP-VI
Output power after filter	50 W		
Output power before filter	76 W		
Typical MER	≥40 dB		
AC consumption ³	478 W		
Thermal dissipation ³	1459 BTU/h		
Efficiency after filter ³	10,5 %		
Efficiency before filter ³	15,9 %		
Rack Units (19")	2 RU	4 RU	
Width	482 mm	222 mm	
Length	633 mm	470 mm	
Weight	15,6 Kg	9,6 Kg	

The dimensions and weight described above refer to the SoC drawer (Integrated drawer: Exciter and Power Module). These values for the complete equipment vary according to the type of assembly and the number of options. For further information, consult our Sales department.

Transmission Spectrum Mask (Intermodulation) ⁴

	Critical Mask	Sub-Critical Mask	Non-Critical Mask
±3,15 MHz @ BW = 6 MHz	≥50 dB	≥43 dB	≥36 dB
±4,50 MHz @ BW = 6 MHz	≥67 dB	≥60 dB	≥53 dB
±9,00 MHz @ BW = 6 MHz	≥97 dB	≥90 dB	≥83 dB
±15,00 MHz @ BW = 6 MHz	≥97 dB	≥90 dB	≥83 dB

Transmission spectrum mask according to ABNT NBR 15601:2007

Technical Characteristics

RF	
Standard	ISDB-T
Operation frequency	174 MHz à 216 MHz (Canal 7 ao Canal 13)
Bandwidth	6 MHz / 8 MHz
Minimum operating power	10 % of rated power (0,5 Watts)
Pre-correction	Adaptive non-linear Linear
Typical MER	≥40 dB
Out-of-channel spurs and harmonic distortions	Better than -60 dBc
Transmission Mask (Intermodulation) ⁴	Critical Subcritical Non-Critical
Power stability	±2 %
RF output impedance	50Ω
Output Connections	N-Female

ASI Inputs / Outputs	
Quantity	02 inputs, 02 Outputs
Standard	DVB-ASI 188 /204 BYTES
Connectors	BNC Female
Impedance	75 Ω

Input TSoIP	
Standard	IEEE802.3u 10 Base-T /100Base TX
Connector	RJ45
Encapsulation	UDP/RTP
IP assignment	Static
Multicast	IGMP v2

GPS antenna input (optional)	
Connectors	SMA Female
Impedance	50 Ω
Accessories	External antenna, cable and surge protector

VHF-BIII / UHF tuner input (optional)	
Reception band ¹¹	VHF-BIII: CH07 ~ CH13 UHF: CH14 ~ CH 51
Standard	ISDB-T
Connectors	SMA Female (Exciter) N Female (input UHF filter)
Impedance	50 Ω

Satellite tuner input (optional)	
Reception band	L band
Polarization	Vertical / Horizontal
LNB voltage	+13 V, +18 V
Standard	DVB-S / DVB-S2
Connectors	SMA Female (Exciter) F Female (connection w/ LNB)
Impedance	75 Ω
Optional Accessories	surge protector

CAS tuner input (optional)	
Reception band	L band
Polarization	Vertical / Horizontal
LNB voltage	+13 V, +18 V
Standard	DVB-S / DVB-S2
Connectors	SMA Female (Exciter) F Female (connection w/ LNB)
Impedance	75 Ω
Optional decryption licenses¹	IRDETO CONAX NAGRAVISION VERIMATRIX BISS-1 BISS-E
Optional Accessories	surge protector

10MHz external references - Input / output	
Quantity	01 input, 01 output
Connector	BNC Female
Impedance	50 Ω
Input level	0 a +10dBm
Output Level	+10 dBm

1PPS external references - Input / output	
Quantity	01 input, 01 output
Connector	BNC Female
Impedance	1 kΩ
Input level	3V3 LVTTTL
Output Level	3V3 LVTTTL

Linearization inputs. After Filter / Before Filter.	
After Filter Input	Linear pre-correction
Before Filter Input	Nonlinear pre-correction
Connector	SMA Female
Impedance	50 Ω
Input level	-10 to +5 dBm

Local oscillator

Oscillator	Synthesized by PLL
Frequency stability	±1 Hz (with Internal GPS) ±35 Hz (without Internal GPS)
Phase noise	≤-95 dBc/Hz @ 1 kHz

ISDB-T Modulation

Mode OFDM	Mode 1: 2K (2048/3,96 KHz) Mode 2: 4K (4096/1,98 KHz) Mode 3: 8K (8192/0,99 KHz)
Guard interval	1/4, 1/8, 1/16, 1/32
Partial reception	Single segment for mobile devices (1-Sec)
Hierarchical Transmission	Support for 3 layers (A, B and C)
Segments	1 to 13
Modulation	QPSK, DQPSK, 16QAM, 64QAM
FEC	1/2, 2/3, 3/4, 5/6, 7/8
Time Interleaving	0, 1, 2, 4

Electrical Characteristics

Mains	Single-phase 110VAC (M110) Single-phase 220VAC (M220) Biphasic 220 VAC (B220)
AC input voltage	100 ~254 VAC
AC frequency	43~63 Hz
Number of power supplies	01 default 02 optional
PFC	0.95 (typical), 0.9 (minimum)
DC input voltage (optional DC power)	±50 VDC (48 ~ 52 VDC)

Interfaces

Equipment local control interface ⁷	256X64 pixels graphic display cursor navigation keys
Signaling Leds	Alarm LEDs on front panel
Remote access	Connector RJ45 (front panel) Format IEEE802,3u 10 Base-T /100Base TX
Communication interfaces	Ethernet ² WEB server SNMP

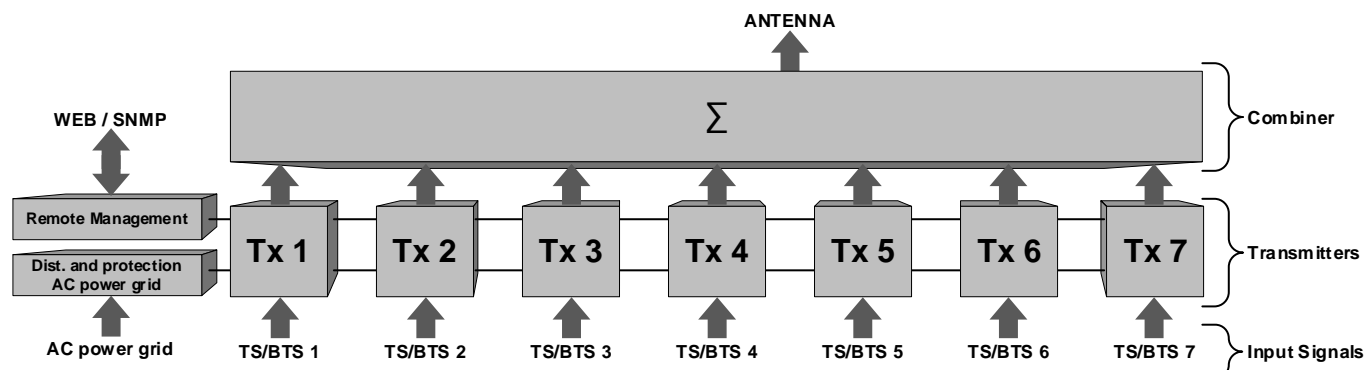
Environment Features

Operating altitude	Up to 2500 meters ⁵ (8200 ft) ⁵ above sea level
Environment temperature range	0°C (32°F) to + 45°C (113°F) +25°C (77°F) recommended
Environment humidity range	0 to 95 % non-condensing
Power amplifier cooling	Forced ambient air, front-to-rear flow through high-volume integral fans

Multichannel Mount Option

The E-Compact Multichannel System is designed for ISDB-T Digital TV broadcast sharing. This system allows several stations to operate on different channels, sharing the same structure of the radiating system and electrical energy.

The Multichannel system consists of low power E-Compact family transmitters of up to 50 Watts after the combiner.





Manifold Combiner

Compact system, offers a better optimization of the physical space.

Front signal connection interfaces

All signal input and output interfaces are located on the equipment's front panel, for easier installation access.

"Easy Maintenance" Concept

Power Supplies and Amplifier Module with plug-in connection, removable through the equipment front panel.

Air flow direction options for refrigeration:

Front-Rear
Rear-Front

Technical Characteristics of the Combined System (ISDB-T)

	EC610LP						
	MTX 1	MTX 2	MTX 3	MTX 4	MTX 5	MTX 6	MTX 7
Output power after the combiner	50 W	100 W	150 W	200 W	250 W	300 W	350 W
AC consumption ³	478 W	935 W	1433 W	1911 W	2389 W	2866 W	3344 W
Thermal dissipation ³	1460 BTU/h	2920 BTU/h	4380 BTU/h	5840 BTU/h	7300 BTU/h	8760 BTU/h	10220 BTU/h
Efficiency before filter ³	15,9 %						

VI Mount Option

The EC610LP-VI (Value Innovation) offers an affordable digital broadcasting solution, combining reliable performance and cost-effective design to meet the needs of modern broadcasters.



General Characteristics

Available for model EC610LP (50 W);

Compatible with 19" rack standardization.

It occupies 4 RU per unit. Its compact design allows the installation of two units side by side in the same space, optimizing physical use and facilitating organization in professional broadcast systems.

Front signal connection interfaces

All signal input and output interfaces are located on the front panel of the equipment, for easier access during installation.

"Easy Maintenance" Concept

Power Supplies and Amplifier Module with plug-in connection, removable through the equipment's front panel.

Notes:

¹ Module with PCMCIA CAM slot (Irdeto, Conax, Nagravision and Verimatrix systems), SMARTCARD and CAM not included.

² Ethernet is a trademark of Xerox Corporation.

³ Measurements in channel and optimized environment, may vary according to operating frequency and MER.

⁴ Critical Mask is the standard for E-Compact transmitters. For Multichannel mounting type, the mask will depend on the filter or combination system.

⁵ Rated power up to 2500 meters (8200 ft). Above 2500 meters (8200 ft), consult factory.

⁷ Not available for Multi-Channel Mounting option.

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