Broadcasting DTV

LINEAR DENKI

E-Compact

Less energy. More power.

LP Series - EX9001

High Efficiency UHF Broadband Transmitters

ISDB-T TV Digital: 15 to 100 Watts RMS

English

ISDB-T Digital TV Standard | High Efficiency | Redundant Power Supply | Smart Fan Control | SoC Technology | Adaptive Linearization | Embedded WEB Sever | Remote Access | SFN | BTS Decomp | Remux | [*****] Conditional Access | Surge Protector

KOKUSAI DENKI Electric Linear S/A

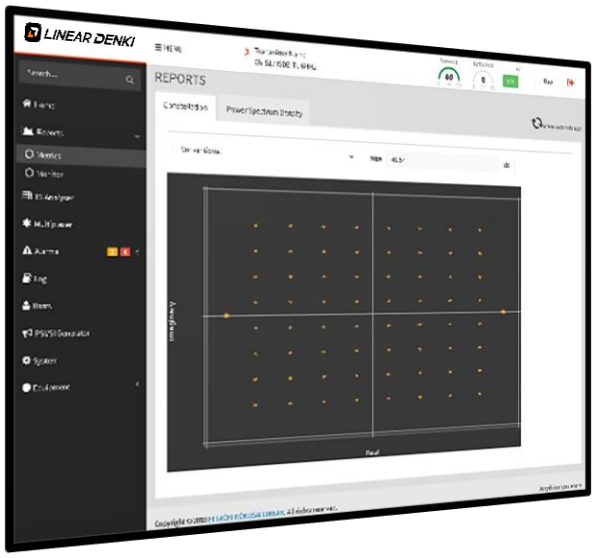
LP Series

E-Compact Family of Low Power Broadband UHF Digital TV Transmitters features fully solid-state drivers, air-cooled and is structured on 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.

The 50 and 100 Watt models have high-performance Doherty technology power modules with efficiency up to 29%.

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, IRDETO[1], CONAX[1], BISS, VERIMATRIX[1] and NAGRAVISION[1] 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.**
- **For the 50 and 100 Watts models, 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 *Inputs:* BTS/TS over IP, 2x ASI/310M, 1PPS, 10MHz e ANTENA GPS. *Outputs*: 2x ASI/310M, 1PPS, 10MHz and Ethernet[2] RJ45. *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.*	**STANDARD**
Passive Elements Mask Filter, RF Probe after Mask Filter.	**STANDARD**
500 W (EC703LP / EC705LP) and 1.200 W (EC710LP and EC720LP) 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 TSoIP (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 (TSoIP), 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 ±48VDC 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 04 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: IRDETO[1], CONAX[1], NAGRAVISION[1], VERIMATRIX[1], 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 (EC710LP and EC720LP) 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

- **Standard 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 Ethernet[2] (WEB server or SNMP);**
- **Alarm signaling LEDs [3] 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)

	EC703LP	EC705LP	EC710LP	EC720LP
Output power after filter	15 W	25 W	50 W	100 W
Output power before filter	21 W	34 W	80 W	142 W
Typical MER	≥42 dB	≥42 dB	≥40 dB	≥39 dB
AC consumption [4]	214 W	250 W	388 W	484 W
Thermal dissipation [4]	679 BTU/h	768 BTU/h	1.153 BTU/h	1.310 BTU/h
Efficiency after filter [4]	7,0 %	10,0 %	12,9 %	20,7 %
Efficiency before filter [4]	9,8 %	13,6 %	20,6 %	29,3 %
Rack Units (19”)	1 RU		2 RU	
Width	482 mm (19 in)			
Length	600 mm (23 5/8 in)		633 mm (24 7/8 in)	
Weight	10,8 Kg (23,8 lb)		15,6 Kg (34,4 lb)	

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. Depends on the mask filter type and the combination system type.

Technical Characteristics

RF	
Standard	ISDB-T
Operation frequency	470 MHz to 698 MHz (Chanel 14 to Chanel 51)
Bandwidth	6 MHz / 8 MHz
Minimum operating power	10 % of rated power
Pre-correction	Adaptive non-linear Linear
Typical MER	≥40 dB
Out-of-channel spurs and harmonic distortions	Better than -60 dBc
Transmission Mask (Intermodulation) [5]	Critical Subcritical (Multichannel) Non-Critical (Multichannel)
Power stability	±2 %
RF output impedance	50Ω
Output Connections	N-Female DIN 7/16" Female EIA 7/8"

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 licenses	IRDETO[1] CONAX [1] NAGRAVISION[1] VERIMATRIX[1] 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 LVTTL
Output Level	3V3 LVTTL

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 @EC710LP (optional) 02 @EC720LP (optional)
PFC	0.95 (typical), 0.9 (minimum)
DC input voltage (optional DC power)	±50 VDC (48 ~ 52 VDC)

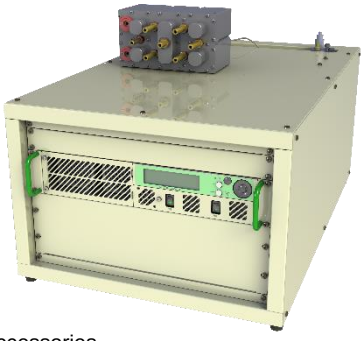
Interfaces	
Equipment local control interface [6]	256X64 pixels graphic display cursor navigation keys
Signaling Leds [3]	Alarm LEDs on front panel
Remote access	Connector RJ45 (front panel) Format IEEE802,3u 10 Base-T /100Base TX
Communication interfaces	Ethernet[2] WEB server SNMP

Environment Features	
Operating altitude	Up to 2500 meters [7] (8200 ft) [7] 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

Indoor Mount Options

Rack Plus

Standard 19” rack in 8U size aluminum with reinforced frame;
Connection interfaces available on the top panel of the Rack;
Filter attached to independent rack support
Removable coin-beam rack side and rear panels: easy access and organization of internal devices;
AC power protection circuit;
Six to Seven slots vacant to accommodate options or other standard 19” rack equipment;
Available for EC703LP, EC705LP, EC710LP and EC720LP.



Rack

Standard 19” rack in 6U carbon steel with open back and sides fixed with screws;
Access the equipment interfaces through the opening in the top and rear panel;
Four to five slots vacant to accommodate options or other standard 19” rack equipment;
Available for EC703LP, EC705LP, EC710LP and EC720LP.

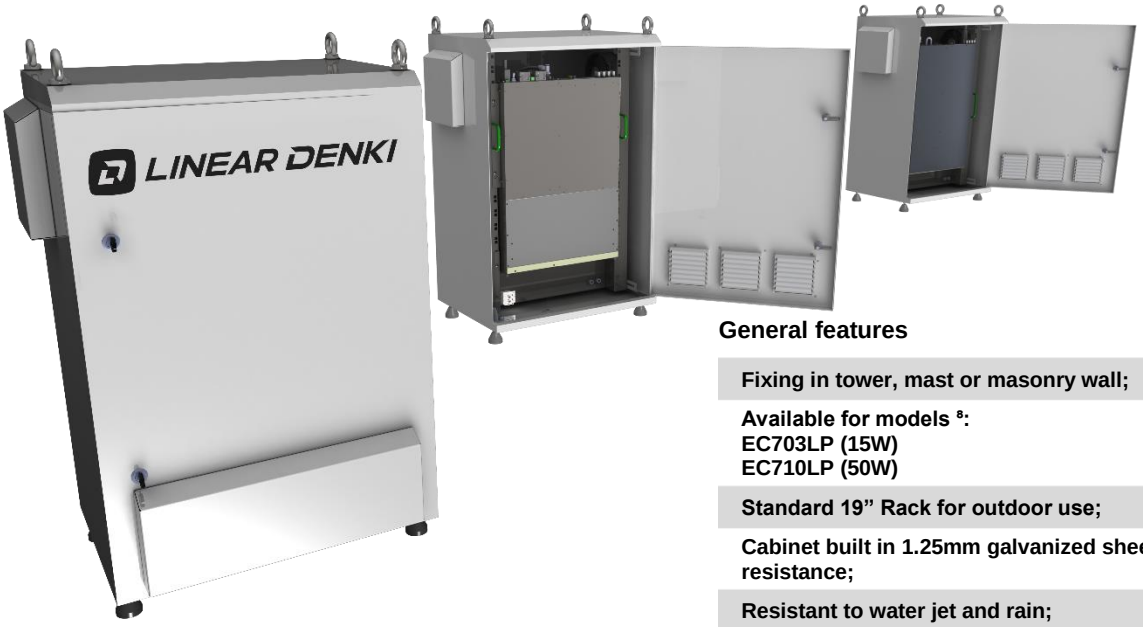
Desktop Plus

Equipment mounted on a mechanical support for fixing all peripherals and accessories to the transmitter, including the optional ones;
Transmitter and its peripherals/fixed accessories, forming a single set;
Support compatible with fixation on 19” Racks;
Filter attached directly to the mechanical support;
Available for EC703LP, EC705LP, EC710LP and EC720LP.

Desktop

Transmitter and accessories supplied without a rack or mechanical mounting bracket.
Flexibility for mounting in 19” cabinets;
Supplied cables and connectors: AC 10A cable (only for EC703LP and EC705LP), AC 3-pin connector (only for EC710LP and EC720LP), RF out cable – filter, RF sample cable – b. filter, RF sample cable – A. filter;
Available for EC703LP, EC705LP, EC710LP and EC720LP.

Outdoor Mount Options



Dimensões

	EC703LP-TW	EC710LP-TW
Height [10]	905 mm	
Width [10]	610 mm	
Length [10]	440 mm	
Weight [10]	57 Kg (125,7 lb)	60 Kg (132,3 lb)

General features

Fixing in tower, mast or masonry wall;

Available for models [8]:
EC703LP (15W)
EC710LP (50W)

Standard 19” Rack for outdoor use;

Cabinet built in 1.25mm galvanized sheet of high mechanical resistance;

Resistant to water jet and rain;

Air filtration and humidity control

Polyester electrostatic painting;

Hinged front door with lock;

Front door air inlets with easy-to-replace filters;

Unidirectional air vents on the upper sides;

AC powered exhaust fans;

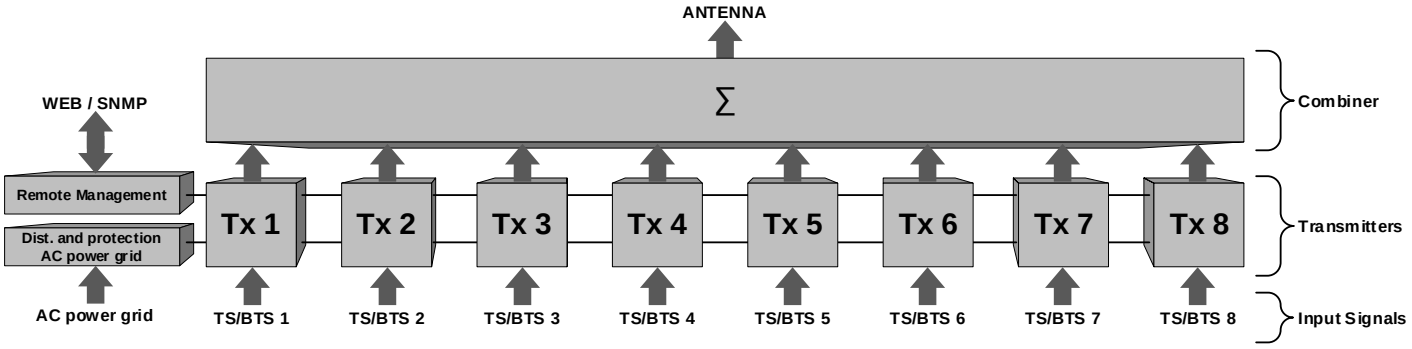
Eyelets for lifting;

Flex support, adaptable for attachment to towers and masts (BAP clamps) or masonry walls (using parabold);

Multichannel Mount Option

The E-Compact Low Power 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.



Channels Combiner

There are 02 options for the combination system: Manifold or CIF (Constant Impedance). Both do not use coaxial cables in their construction, which reduces the number of connections, losses and defect occurrences (higher MTBF), in addition to offering an ease for changing the channel. The filters are manufactured in-house and allow the combination of up to 08 transmitters. Consult us for combination of more than 08 transmitters.

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

Combiner Options

Manifold Combiner Compact system, offers a better optimization of the physical space.	**OPCIONAL**
CIF Combiner (Constant Impedance) Compact system, offers greater ease for future expansions where the channels have not yet been defined.	**OPCIONAL**

Technical Characteristics of the Combined System (ISDB-T)

	EC710LP-MTX							
	MTX 1	MTX 2	MTX 3	MTX 4	MTX 5	MTX 6	MTX 7	MTX 8
Output power after the combiner	50 W	100 W	150 W	200 W	250 W	300 W	350 W	400 W
AC consumption [4]	386 W	757 W	1.123 W	1.482 W	1.834 W	2.177 W	2.540 W	2.903 W
Thermal dissipation [4]	1.146 BTU/h	2.239 BTU/h	3.319 BTU/h	4.372 BTU/h	5.400 BTU/h	6.401 BTU/h	7.467 BTU/h	8.534 BTU/h
Efficiency before filter [4]	20,7 %	21,1 %	21,4 %	21,6 %	21,8 %	22,0 %	22,0 %	22,0 %

VI Mount Option

The EC710LP-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 [8] EC710LP (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] Not available for Outdoor Mount option
[4] Measurements in channel and optimized environment, may vary according to operating frequency and MER.
[5] Critical Mask is the standard for E-Compact transmitters. For Multichannel mounting type, the mask will depend on the filter or combination system.
[6] Not available for Outdoor and Multichannel Mount option.
[7] Rated power up to 2.500 meters (8.200 ft). Above 2.500 meters (8.200 ft), consult factory.
[8] Consult factory for other models.
[9] Dimensions of Transmitter and Power Supply, not considering Rack and Combiner.
[10] Minimum dimensions. Subject to change depending on customer design.
[11] For VHF-BIII tuners, consult the factory for the applicable mounting models.

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