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E-Compact
*Less energy. More power.*

# HP-BB Series - EX8001

## High Efficiency UHF Broadband Transmitters

## ISDB-T Digital TV: 680 to 8400 Watts RMS

Hitachi Kokusai Linear

## HP-BB Series

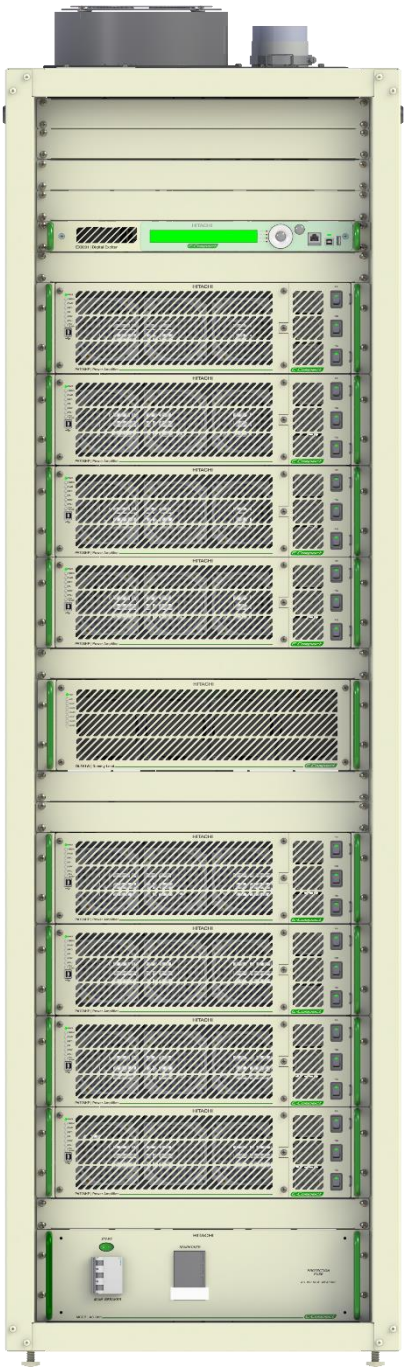
**E-Compact Family of High Power Broadband UHF Digital TV Transmitters features fully solid-state drivers, air-cooled and is structured on standard 19" cabinets.**

**Its compact design combines high power density per amplifier module and efficient energy consumption, embedded with Real Time A-DPD pre-correction technology that allows to recover MER values in an imperceptible way if there are changes in the equipment output power.**

**It features the option of Dual Exciter drivers, providing automatic redundancy to the equipment without the need for management by a separate control module.**

**Based upon Doherty topology Broadband Power Drawer delivers High performance with efficiency up to 41%, with three power supplies as standard thus assuring high reliability against power failures.**

## Highlights



- **ISDB-T EX8001-V4 Exciter.**
- **Full Equipment control, including Power Drawers, performed by the Exciter Driver, dispensing the need for external control units.**
- **Broadband Power Drawers with high efficiency Doherty topology, operating with up to 1000 W RMS @ ISDB-T.**
- **Real Time A-DPD function automatic 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[5], CONAX[5], BISS, VERIMATRIX[5] and NAGRAVISION[5] license options.**
- **Automatic fan speed control, resulting in low noise levels, energy savings and longer device life.**
- **High reliability against failures. Three power supplies for each Power Drawer. Balanced distribution of electrical network in a three-phase system.**
- **"Easy Maintenance" concept offering, among others, Plug-In connection for Power Supplies and Power Drawers.**
- **Insulated RF[2] combiners enabling Hot Swap[1].**
- **MCCB (Molded Case Circuit Breaker)[2], AC distribution module with SPD protection circuit – Surge Protection Devices (optional).**

## Available resources

| | |
|---|---|
| **MCCB (Molded Case Circuit Breaker)[2]**<br>AC distribution module with load capacity from 8kW to 30kW consisting of circuit breakers, In-Rush limiting system, phase loss protection, mains overvoltage protection, under voltage protection (<180VAC), auxiliary +50VDC, +15VDC and +8VDC power supplies and safety interlock input for equipment power cut off. | AVAILABLE |
| **Easy Maintenance concept**<br>Power Supplies and Power Drawers with plug-in connection, does not require the use of cables and wiring, allowing quick and safe replacement. | AVAILABLE |
| **Embedded WEB Server**<br>Remote access[3] of the settings and management of the transmitter through the Ethernet[4] port is possible, using a PC or Smartphone browser, without the need to install drivers or applications. | AVAILABLE |
| **Real Time A-DPD Linear and Nonlinear Pre-Correction**<br>Imperceptible Automatic pre-correction applied due to changes in transmitter output power to recover MER values and intermodulation. | AVAILABLE |
| **BTS Decompression**<br>Parameterizable BTS decompressor, embedded in the Transmitter, eliminating the use of auxiliary devices in the system, thus permitting interoperability with other brands. | AVAILABLE |
| **Embedded Remux**<br>PID filtering, insertion of PSI/SI static tables, Virtual Channel configuration and TMCC parameterization. | AVAILABLE |
| **Exciters Inputs / Outputs**<br>*Inputs:* BTS/TS over IP, 2x ASI/310M, 1PPS, 10MHz e ANTENA GPS.<br>*Outputs*: 2x ASI/310M, 1PPS, 10MHz, 2x USB 2.0 Type B, USB 2.0 Type A and Ethernet[4] RJ45.<br>*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.* | AVAILABLE |
| **Passive Elements**<br>Critical Mask Filter (50dB), Low Pass Filter, RF probe before mask filter[2], RF probe after mask filter. | AVAILABLE |
| **Insulated RF[2] combiners enabling Hot Swap[1].** | AVAILABLE |
| **1200W Power Supply**<br>Three 1200 Watt power supplies per power drawer. Operation with power redundancy.<br>Power Supplies with plug-in type connection ("Easy Maintenance" concept), eliminates the use of cables and wiring, for quick and safe replacement. | AVAILABLE |
| **Digital manuals in English.** | AVAILABLE |
| **Dual Exciter**<br>Backup driver, which allows automatic redundancy, without the need for management by a separate control module. | OPTIONAL |
| **SPD (Surge Protection Devices)[2]**<br>Extra protection against power grid overvoltage surges. | OPTIONAL |
| **Ethernet[4] Switch standard cabinet 19”**<br>Standard with the Double Excitement option. | OPTIONAL |
| **Instrumental through Software**<br>Pre-correction tool, MER reading, constellation and spectral density (GUI8001). | OPTIONAL |
| **GPS time base**<br>High precision time base sync via GPS. High performance running on SFN (Single Frequency Network). Features an external GPS antenna and surge protector. | OPTIONAL |
| **UHF Tuner (Terrestrial Reception)**<br>ISDB-T 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)**<br>L-Band DVB-S/S2 receiver compatible with C-band and Ku-band LNBs. Electric surge protector included. | OPTIONAL |
| **CAS Tuner (Satellite Reception with Conditional Access)**<br>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. Electric surge protector included. | OPTIONAL |
| **Decryption Licenses for CAS Tuner: IRDETO[5], CONAX[5], BISS-1, NAGRAVISION[5] and VERIMATRIX[5]**<br>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**<br>Transmitter remote monitoring using the GPRS cell phone network. | OPTIONAL |
| **Manuals printed in English.** | OPTIONAL |

## General features

- Mounting in standard 19” Rack cabinet;
- Fully solid state;
- 900 Watt RMS Doherty Power Drawers with LDMOS Transistors;
- Air cooled;
- Automatic restart in case of power failure;
- Operates on SFN (Single Frequency Network) and MFN (Multiple Frequency Network);
- 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[3] via Ethernet[4] (WEB server or SNMP);
- Alarm signaling LEDs present on the front panel of the Exciter and Power Drawer;
- Access the list of current or occurred alarms via display interface on the front panel of the Exciter or remotely[3] 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;
- Transistor AGING compensation adjustment via Exciter front panel display;
- USB communication drivers;
- 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.
- RF interconnections between equipment parts with rigid line.

## Models and their specific characteristics (EX8001 - ISDB-T)

| | EC701HP-BB* Available with EX9001 | EC702HP-BB* Available with EX9001 | EC703HP-BB | EC704HP-BB | EC706HP-BB | EC708HP-BB | EC712HP-BB |
|---|---|---|---|---|---|---|---|
| **Output power after filter** | 680 W | 1400 W | 2100 W | 2800 W | 4200 W | 5600 W | 8400 W |
| **Output power before filter** | 850 W | 1720 W | 2560 W | 3420 W | 5120 W | 6830 W | 10000 W |
| **AC consumption [6]** | 2340 W | 4620 W | 6900 W | 9180 W | 13740 W | 18300 W | 27420 W |
| **Thermal dissipation [6]** | 5664 BTU/h | 10987 BTU/h | 16378 BTU/h | 21769 BTU/h | 32552 BTU/h | 43334 BTU/h | 64899 BTU/h |
| **Efficiency after filter [6]** | 29,1 % | 30,3 % | 30,4 % | 30,5 % | 30,6 % | 30,6 % | 30,6 % |
| **Efficiency before filter [6]** | 36,3 % | 37,2 % | 37,1 % | 37,2 % | 37,3 % | 37,3 % | 36,5 % |
| **Power Drawers** | 1 | 2 | 3 | 4 | 6 | 8 | 12 |
| **Number of Cabinets** | 1 | | | | | | 2 |
| **Rack Units (19”)** | 8 RU | 25 RU | | | 40 RU | | |
| **Width** | 570 mm<br>22 7/16 in | | | | | | 1140 mm<br>44 7/8 in |
| **Length** | 900 mm<br>35 7/16 in | 1100 mm<br>43 5/16 in | | | | | |
| **Weight** | 70 Kg<br>154,32 lb | 170 Kg<br>374,79 lb | 210 Kg<br>462,97 lb | 250 Kg<br>551,16 lb | 350 Kg<br>771,62 lb | 420 Kg<br>925,94 lb | 700 Kg<br>1543,24 lb |

*Equipment also available with EX9001 exciter (consult specific catalogue).

## Transmission Spectrum Mask (Intermodulation)

| Critical mask | |
|---|---|
| **±3,15MHz @ BW = 6MHz** | ≥50 dB |
| **±4,50MHz @ BW = 6MHz** | ≥67 dB |
| **±9,00MHz @ BW = 6MHz** | ≥97 dB |
| **±15,00MHz @ BW = 6MHz** | ≥97 dB |

## Technical Characteristics

| RF | |
|---|---|
| **Standard** | ISDB-T |
| **Operation frequency** | 470 MHz to 608 MHz (Chanel 14 to Chanel 36)<br>608 MHz to 698 MHz (Chanel 37 to Chanel 51) |
| **Bandwidth** | 6 MHz / 8 MHz |
| **Minimum operating power** | 10 % of rated power |
| **Pré-correction** | A-DPD – Non linear<br>Pré-correction Linear |
| **Typical MER** | 35 dB minimum<br>38 dB typical<br>(depends on channel, power and transmitter efficiency) |
| **Out-of-channel spurs and harmonic distortions** | Better than -60 dBc |
| **Transmission Mask (Intermodulation)** | Critical mask |
| **Power stability** | ±2 % |
| **RF output impedance** | 50Ω |
| **Output Connections [7]** | EIA 1-5/8" @EC701HP-BB, EC702HP-BB, EC703HP-BB and EC704HP-BB<br>EIA 3-1/8" @EC706HP-BB, E708HP-BB and EC712HP-BB |

| 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 |

| UHF tuner input (optional) | |
|---|---|
| **Reception band** | UHF |
| **Standard** | ISDB-T |
| **Connectors** | SMA Female (Exciter)<br>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)<br>F Female (connection w/ LNB) |
| **Impedance** | 75 Ω |
| **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)<br>F Female (connection w/ LNB) |
| **Impedance** | 75 Ω |
| **Optional decryption licenses[5]** | IRDETO<br>CONAX<br>NAGRAVISION<br>VERIMATRIX<br>BISS-1 |
| **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** | -5 to +5 dBm |

| Local oscillator | |
|---|---|
| **Oscillator** | Synthesized by PLL |
| **Frequency stability** | ±1 Hz (with Internal GPS)<br>±35 Hz (without Internal GPS) |
| **Phase noise** | ≤-95 dBc/Hz @ 1 kHz |

| ISDB-T Modulation | |
|---|---|
| **Mode OFDM** | Mode 1: 2K (2048/3,96 KHz)<br>Mode 2: 4K (4096/1,98 KHz)<br>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 (Factory Configured)** | Single-phase 220VAC (M220)[8]<br>Biphasic 220 VAC (B220)[8]<br>Three-phase 220 VAC (T220)<br>Three-phase 380 VAC (T380) |
| **AC input voltage** | 180~254 VAC |
| **AC frequency** | 43~63 Hz |
| **Quantity of sources per Power Drawer** | 03 PSU |
| **PFC** | 0.95 (typical), 0.9 (minimum) |

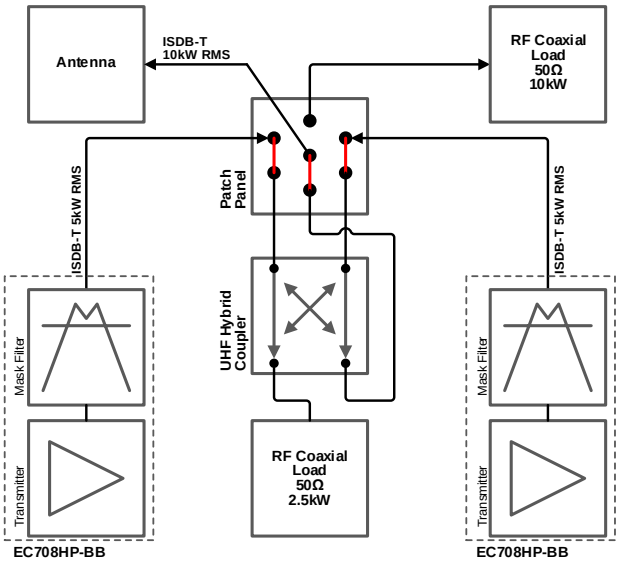
| Interfaces | |
|---|---|
| **Equipment local control interface** | Display LCD 2x40<br>An keyboard |
| **Signaling leds** | Alarm LEDs on the exciter and power drawers |
| **USB** | USB 2.0 type B (rear panel)<br>USB 2.0 type A (front panel)<br>USB 2.0 type B (front panel) |
| **Remote access** | Connector RJ45 (front panel)<br>Format IEEE802,3u 10 Base-T /100Base TX |
| **Communication interfaces** | Ethernet[4] WEB server<br>SNMP<br>Interface GUI8001 |

| Environment Features | |
|---|---|
| **Operating altitude** | Up to 2500 meters [9] (8200 ft) [9] above sea level |
| **Environment temperature range** | 0°C (32°F) to + 45°C (113°F)<br>+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 |

## Combined Assembly

### EC708HP-BB (EX8001) COMBINED: ISDB-T TV Digital 10kW RMS

**Transmitter system with combined output power after filter 5kW RMS in single mode or 10kW RMS in combined mode. It has an integrated redundant control system that enables individual or integrated operation of the transmitters even in case of main control failure.**




## Combined System Characteristics

**Two E-Compact Transmitters model EC708HP-BB with critical mask filter combined with Independent operation;**

**7-way EIA 3-1/8" Coaxial Patch Panel for switching between antenna, coaxial load, Transmitter A, Transmitter B or Transmitter A + Transmitter B with rigid line RF interconnections;**

**50Ω coaxial load of 10kW RMS coupled to the Patch Panel output for use in eventual system maintenance;**

**Hybrid Combiner and 2.5 kW unbalance load present in the combination system.**

**Control and protection module of the combined system present in both transmitters working as Main and Redundant;**

**Control and adjustment of the total system or individual output power level of each transmitter executed through the front panel of each transmitter or remotely via the WEB interface.**

**Manual switching operation in Patch Panel that allows the following settings:**
**Transmitter A + B connected to antenna.**
**Transmitter A + B connected to coaxial load.**
**Transmitter A connected to Antenna / Transmitter B connected to coaxial load.**
**Transmitter B connected to Antenna / Transmitter A connected to coaxial load.**

| System Performance | |
|---|---|
| **Output power after filter (Combined)** | 10000 W |
| **AC consumption [6]** | 39600 W |
| **Thermal dissipation [6]** | 101060 BTU/h |
| **Efficiency after filter [6]** | ≥25,2 % |
| **Typical MER (Combined)** | ≥38 dB |

| System Dimensions | |
|---|---|
| **Height** | 2160 mm<br>85 3/64 in |
| **Width** | 2000 mm<br>78 3/4 in |
| **Length** | 1925 mm<br>75 25/32 in |

**Notes:**

*[1] The Power Drawers can be removed or inserted with the Transmitter in operation, however the Power Drawer to be removed or inserted must have the AC switches on its front panel in the OFF position.*

*[2] Except EC701HP-BB model.*

*[3] Consult factory to use transmitter Web Interface access on the same network with multicast stream.*

*[4] Ethernet is a trademark of Xerox Corporation.*

*[5] Module with PCMCIA CAM slot (Irdeto, Conax, Nagravision and Verimatrix systems), SMARTCARD and CAM not included.*

*[6] Considering optimized channel and environmental conditions. It may vary according to channel frequency and operating conditions.*

*[7] Consult factory for other types of output connections.*

*[8] AC Power On Request for EC706HP-BB, EC708HP-BB and EC712HP-BB models.*

*[9] Rated power up to 2500 meters (8200 ft). Above 2500 meters (8200 ft), consult factory.*

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