

Broadcasting Technologies

Hitachi Kokusai Showcases New Camera Systems, DTV Transmitters

WITH CONTINUOUS EVOLUTION OF ITS CAMERA TECHNOLOGIES, HITACHI KOKUSAI EXPANDS HDTV OPTIONS FOR INDUSTRY PROFESSIONALS IN SEARCH FOR THE MOST OPTIMAL BROADCASTING SOLUTION.

Hitachi Kokusai Electric Inc. continues to make key technology innovations practical and cost effective for broadcasters and production professionals by evolving support for emerging technologies in its latest HDTV camera systems.

Powerful New CCU Features

The CU-HD550 camera control unit (CCU) (Photo 1) and its accessory, CA-HF550 camera adapter, collectively lower the cost of entry for 1080p60 video production. Also compatible with interlaced Z and SK-Series Hitachi HDTV cameras, the full possibilities of these latest accessories are unleashed when combined with 1080p60-native Hitachi camera heads to form robust acquisition systems with completely progressive signal paths, further bolstering benefits for progressive workflows.

When used with a high dynamic range (HDR)-capable Hitachi camera, the new dual-workflow functionality in CU-HD550 enables parallel HDR/SDR acquisition with a single camera by providing separate video shading adjustments for HDR and standard dynamic range (SDR) outputs. This allows producers to fine-tune each output path for optimal results, helping them create superior-quality content for distribution to both modern and legacy display platforms without the significant cost and operational burden of separate cameras.

Meanwhile, a new CU-HD550 configuration helps smooth producers'

transition from HD to ultra HD by transforming natively acquired 1080p video to 4K resolution and outputting the result over single-link 12G-SDI. The 4K output functionality supports high dynamic range when used with an HDR-enabled camera, while the color matrix of the 12Gbps SDI output can be switched between ITU-Rec.709 and BT.2020 color spaces.

CU-HD550 and CA-HF550 can be used in conjunction with the SK-HD1800 studio and field production camera. The feature-packed, 1080p SK-HD1800 combines the advanced, global shutter CMOS imaging technology first implemented in the company's popular Z-HD5500 camera with a motorized, remote filter wheel to deliver impeccable image quality for mobile and event-based productions even in venues with challenging LED lighting and large LED displays.

SMPTE ST 2110, Global Shutter Imager Advantages

Hitachi Kokusai cameras support the SMPTE ST-2110 suite of standards including the NMOS extensions. Hitachi Kokusai has now full multi-media over IP (MoIP) functionality with its new 1300-series digital, hybrid fiber cable transmission system. Due to Hitachi's 2-piece camera designs, the cable adapter model



Photo 2: CMOS imaging technology has been implemented in its Z-HD5500 and SK-HD1800 HDTV camera models.

CA-HF1300 and CCU model CU-HD1300 can be used with all progressive camera heads presently offered.

CMOS imaging technology has been implemented in its Z-HD5500 and SK-HD1800 HDTV camera models (Photo 2).

As a benchmark for performance, Hitachi used its successful line of CCD imager broadcast and professional cameras to establish design and performance goals for its new global shutter CMOS imager models. Existing resolution, sensitivity and signal-to-noise (S/N) specifications have all been surpassed over CCD imager ones due to the adaptation of CMOS imagers. CMOS imager technology presently surpasses that of CCD imagers' and is expected to keep improving camera performance and functionality. This design principle extends all the way from 2K (HDTV) cameras to HITACHI's UHD-2 (8K) camera designs.

Global shutter, CMOS imager technology, albeit more expensive to manufacture, will be the norm in broadcast and professional cameras due to the requirements to capture asynchronous, emissive light sources like giant LED displays and LED-illuminated scenery or objects.



Photo 1: CU-HD550 camera control unit



Photo 3: SK-UHD8060B 8K camera

8K Camera Advancements, Adoption

Hitachi Kokusai Electric has been the forefront of 8K (UHD-2) camera technology manufacturing. The existing 8K camera model SK-UHD8060B (Photo 3) represents HITACHI’s most advanced 8K camera model.

SK-UHD8060B is the 3rd generation of cameras using SUPER-35 imagers that have been updated to OPF-type sensors. These new sensors provide the benefits of increased sensitivity, dynamic range and signal to noise improvements. Furthermore, the dynamic range has been vastly improved, whereas HDR and wide-color-gamut functions can fully exploited by content producers like never before. SK-UHD8060B is designed as a field production camera that can be configured as a relay system, field recording/acquisition, hybrid-fiber cable tethered field production, and future wireless production.

Full Product Portfolio of DTV Transmitters

In a separate development, Hitachi Kokusai Electric Comark LLC (hereinafter Comark) will be releasing a full product portfolio for the low-power digital TV (DTV) transmitter market in the United States. There are three distinct series of the E-Compact air cooled, high-efficient UHF LPTV transmitters, including the low-power EC700LP-AT1, the medium-power EC700MP-BB3, and the high-power EC700HP-BB3. This product portfolio covers power levels from 50W through 13.2kW to meet all market needs. The E-Compact family is summarized in Table 1.

Earlier versions of the E-Compact transmitter family have been on the

Table 1: E-Compact family

Series	Model #	Power Level*
Low Power	EC705LP-AT1	50W
Low Power	EC720LP-AT1	125W
Medium Power	EC702MP-BB3	250W
Medium Power	EC704MP-BB3	500W
High Power	EC701HP-BB3	1.1kW
High Power	EC702HP-BB3	2.2kW
High Power	EC703HP-BB3	3.3kW
High Power	EC704HP-BB3	4.4kW
High Power	EC706HP-BB3	6.6kW
High Power	EC708HP-BB3	8.8kW
High Power	EC7012HP-BB3	13.2kW

market and serving many customers with high efficiency and reliability. E-Compact transmitters are fully optimized for the U.S. low power repack requirements, including the incorporation of broadband amplifier technology to cover the post-repack UHF channels of 14 to 36 without any need to re-tune amplifiers for frequency or performance. Each of the series are reviewed below.

EC700LP-AT1 low Power (50W/125W)

For low power requirements, Comark introduces the E-Compact EC705LP-AT1 (50W) (Photo 4) and EC720LP-AT1 (125W) (Photo 5) high-efficiency air-cooled solid-state UHF DTV transmitters. These two new models incorporate the ATSC exciter, driver, and final PA into a single rack-mountable chassis. EC720LP-AT1 includes a slot that can accommodate a second, optional backup power supply for 100 percent redundancy. The power supplies utilize a front panel plug-in connection for quick service. The air-cooled PA design includes automatic cooling fan speed control that provides lower acoustic noise levels during operation and saves electrical energy while increasing the life span of the fans. Customers can either mount the transmitter in their existing equipment rack cabinet or in an optional 10RU rack supplied by Comark.

The EC700LP-AT1 series of transmitters feature System-on-Chip (SoC) technology. SoC integrates multiple system elements into a compact architecture utilizing high processing power and superior reliability. SoC embeds powerful software such as MER measurements, IMD measurements, and linear and non-linear automatic digital pre-correction. The transmitters include front panel controls, comprehensive web-GUI, and SNMP for remote control and monitoring. An optional off-air receiver is available so that these units can be operated as a translator.



Photo 4: E-Compact LP series EC705LP-AT1



Photo 5: E-Compact LP series EC720LP-AT1

EC700MP-BB3 Medium Power (250W/500W)

For medium power requirements, Comark introduces the E-Compact EC702MP-BB3 (250W) (Photo 6) and EC704MP-BB3 (500W) high-efficiency air-cooled solid-state UHF DTV transmitters. These two new models, EC702MP-BB3 and EC704MP-BB3, now feature the latest asymmetric broadband Doherty LDMOS amplifiers (the same device as the award-winning **PARAJIAX** series liquid-cooled UHF transmitters) that allow for power efficiency of up to 44 percent. In addition, these “BB3” models both utilize dual, commercial off-the-shelf AC to DC rectifiers for their power supply system, which utilize a front panel plug-in connection for quick service. Customers can either mount the transmitter in their existing equipment rack cabinet or in an optional 10RU rack supplied by Comark.

The air-cooled PA design includes automatic cooling fan speed control that provides lower acoustic noise levels during operation. The transmitters include a built-in web-GUI and SNMP for remote control and monitoring. The E-Compact also features EXACT-V2 IP Optimized DTV excitors with “DualCast” technology and is easily upgraded from ATSC 1.0 to NextGen TV, protecting customer’s investment today for use tomorrow.

EC700HP-BB3 High Power (1.1kW - 13.2kW)

For high power requirements, Comark introduces the newly improved E-Compact EC700HP-BB3 series high-efficiency air-cooled solid-state UHF DTV transmitters. The E-Compact HP series was originally introduced at NAB 2016 and the “BB3” version is the third generation in the high-powered product line, supporting the U.S. post-repack channels 14 to 36. The EC700HP-BB3 (Photo 7) product line is available with a single final power amplifier or up to 12 × PA’s in parallel, producing from 1.1kW to up to 13.2kW, respectively after the mask filter. Improvements to the “BB3” series include: 1) Dual commercial off-the-shelf GE AC to DC rectifiers in the power supply of each PA; 2) Hot-swappable rectifiers accessible from the front panel of the PA chassis; 3) Newly im-



**Photo 6: E-Compact MP series
EC702MP-BB3**

proved system controller with a simpler user interface GUI; 4) Optional front panel touch screen for easier user access to the control/monitoring GUI, and 5) Optional outdoor cabinet for sites lacking adequate space in equipment shelter.

E-Compact “BB3” production and transmitter testing will be performed in the company’s Southwick, Massachusetts facility to enhance product line flexibility and reduce product lead times. The “BB3” continues to feature the latest asymmetric broadband Doherty LDMOS amplifiers that allow for power efficiency of up to 44 percent. The air-cooled PA design includes automatic cooling fan speed control that provides lower acoustic noise levels during operation. The transmitters include a built-in web-GUI and SNMP for remote control and monitoring.

DTV transmitters from Comark feature the next generation of DTV excitors, the EXACT-V2. These excitors deliver an ATSC compliant, on-channel RF output and perform RF precorrection of both linear and non-linear distortion with the company’s industry-leading Digital Adaptive Precorrection (DAP) technology. DAP automatically corrects both the linear and non-linear system distortions inherent to all DTV systems. The use of DAP provides the lowest cost of operation with the highest system efficiency and RF SNR performance.

EXACT-V2 is an “IP Optimized” platform that features seven Gigabit Ethernet ports. The exciter complies with the STL interface (A/324) and is available with an optionally built-in ALP encap-



**Photo 7: E-Compact HP series
EC702HP-BB3**

sulation feature. It also features “Dual-Cast” technology, which easily upgrades from ATSC 1.0 to NextGen TV.

Comark Digital Services – NextGen TV Demo

With all that being stated about their exciting transmitter product lines, Comark is more than just a DTV transmitter manufacturer. They are also heavily involved in technologies associated with NextGen TV. Comark Digital Services (CDS) was re-established in 2018 as an in-house integration, test, and deployment arm of the company that has already helped broadcasters with end-to-end solutions. Comark Digital Services is focused on integrating technology and software solutions to meet the upcoming demands of NextGen TV with a team of industry experts.

The E-Compact family is compact and rugged, perfectly suited for broadcast.

PARAJIAX is a registered trademark of Hitachi Kokusai Electric Comark LLC.

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