



Pete Ricketts, Governor

BEST AND FINAL OFFER LETTER

July 11, 2019

Hitachi Kokusai Electric Comark LLC
Michael Roosa
104 Feeding Hills Road
Southwick, MA 01077
Fax: 413-998-1194
E-Mail: mroosa@comarktv.com

RE: Request for Best and Final Offer for ITB Number 6079 OF, NET Displaced TV Translator (3 Transmitters)

The State of Nebraska, Educational Telecommunications Commission, has completed its evaluation of the Bidders' submitted bids in response to ITB # 6079 OF, NET Displaced TV Translator (3 Transmitters). At this time, the State requests your overall Best and Final Offer (BAFO) which will require that a new cost proposal be submitted.

Bidders are requested to resubmit a new cost proposal that includes:

1. Best and Final Offer (Cost Sheet)
2. Bidder's Detailed Itemized Sheet

Submission Information

A response to this request for a Best and Final Offer shall include a cost proposal, including, The State's Best and Final Offer (Cost Sheet) which is included in this request for a BAFO.

Failure to submit a Best and Final Offer that conforms to this request may result in the rejection of the bidder's cost proposal and thereby disqualify the bidder's entire proposal from further consideration.

Please submit your response with one (1) original copy in a sealed envelope by 2:00 PM Central Time July 30, 2019.

Sealed responses shall be submitted to the following address:

Julie Dabydeen, Buyer
State Purchasing Bureau
1526 K Street, Suite 130
Lincoln, NE 68508

BAFO Written Questions and Answers

Bidders should present, as questions, any assumptions upon which the Bidder's BAFO might be developed. BAFO's will be evaluated without consideration of any known or unknown assumptions of a bidder. The contract will not incorporate any known or unknown assumptions of a bidder.

Doug Carlson, Materiel Administrator

Department of Administrative Services | MATERIEL DIVISION

1526 K Street, Ste. 130
Lincoln, Nebraska 68508

OFFICE 402-471-6500
FAX 402-471-2089

das.nebraska.org

Any explanation desired by a bidder regarding the BAFO must be submitted in writing to the State Purchasing Bureau and clearly marked "ITB Number 6079 OF, NET Displaced TV Translator (3 Transmitters). It is preferred that questions be sent via e-mail to as.materielpurchasing@nebraska.gov. Questions may also be sent by facsimile to 402-471-2089, but must include a cover sheet clearly indicating that the transmission is to the attention of Julie Dabydeen, showing the total number of pages transmitted, and clearly marked "ITB Number 6079 OF; NET Displaced TV Translator (3 Transmitters). The last day to submit written questions is July 21, 2019.

Written answers will be provided on July 23, 2019 through an addendum to be posted on the State Purchasing Bureau website at <http://das.nebraska.gov/materiel/purchasing.html>.

The sealed responses will be publicly opened on July 30, 2019, at 2:00 PM Central Time at the following address:

State Purchasing Bureau
1526 K Street, Suite 130
Lincoln, NE 68508

For your convenience, responses will be available for viewing after the response opening.



Additional System Discount

Line #	NET TV TRANSLATORS			Unit Price
	Description	Qty	UOM	
1	Total 6078	1	EA	\$ 167,625.00
2	Total 6079	1	EA	\$ 84,275.00
	Grand Total			\$ 251,900.00
	NETV Discount for both 6078 & 6079			\$ (10,000.00)
	Net Total to NETV			\$ 241,900.00



Bidder Signature

19-Jul-19

Date

Hitachi Kokusai Electric Comark LLC

Company Name

6079 OF
NETV
BEST AND FINAL OFFER
COST SHEET

Line #	NET Displaced TV Translators (3 Transmitters)			OPTIONS	
	Description	Qty	UOM	Unit Price	
1	50W UHF TRANSMITTER CHANNEL 27 - Make and Model Bidding: <u>Comark EC702MP 225 watts 1.0, 200 watts 3.0</u>	1	EA	\$ 16,925.00	
2	MASK FILTER, CHANNEL 27 - Make and Model Bidding: <u>BPF-6-U-250 filter 6 pole UHF</u>	1	EA	\$ 1,150.00	
3	600W UHF TRANSMITTER CHANNEL 31 - Make and Model Bidding: <u>Comark EC710MP 1300 watts 1.0, 1300 watts 3.0</u>	1	EA	\$ 23,700.00	
4	MASK FILTER, CHANNEL 31 - Make and Model Bidding: <u>BPF-6-U-1500 filter 6 pole UHF</u>	1	EA	\$ 2,500.00	Note: We were uncertain if 1300 watts would be sufficient for this channel, so we have offered the next size transmitter up as an option.
5	1400W UHF TRANSMITTER CHANNEL 21 - Make and Model Bidding: <u>Comark EC701HP-BB2 1300 watts 1.0, 1100 watts 3.0</u>	1	EA	\$ 27,000.00	1400W UHF TRANSMITTER CHANNEL 21 - Make and Model Bidding: <u>Comark EC702HP-BB2 2600 watts 1.0, 2200 watts 3.0</u> \$ 39,000.00
6	MASK FILTER, CHANNEL 21 - Make and Model Bidding: <u>BPF-6-U-1500 filter 6 pole UHF</u>	1	EA	\$ 2,800.00	
7	DUAL EXCITER CONFIGURATION CHANNEL 21 - Make and Model Bidding: <u>Comark Exact V2 Exciter</u>	1	EA	\$ 9,000.00	Comark has two options available for amplifier spares. One is a Pallet Module used in the base bid, the 2nd is the below optional complete amplifier drawer - both can be used on all channels.
8	SHELF SPARE PA MODULE OPTION CHANNEL 21 Make and Model Bidding: <u>Comark MOD40160 Pallet Module</u>	1	EA	\$ 1,200.00	SHELF SPARE PA MODULE OPTION CHANNEL 33 - Make and Model Bidding: <u>Pallet PN MOD 40160; works on all ch</u> \$ 10,000.00
TOTAL COST OF LINES 1-8				\$ 84,275.00	Total with Options \$ 106,275.00

Please Attach Separate Itemized Price Sheet for Each Line Item Listed Above



Bidder Signature

19-Jul-19

Date

Hitachi Kokusai Electric Comark LLC

Company Name



Hitachi Kokusai Electric Comark LLC Proposal
P#3756R1-NET 6079-190722

For
Best and Final Offer for NET TV Transmitters Bid 6079

Prepared for:
Julie Dabydeen, Buyer
State Purchasing Bureau
402 471 6500
julie.dabydeen@nebraska.gov

COMARK
Communications



PROPOSAL REFERENCE #:
P#3756R1-NET 6079-190722

Hitachi Kokusai Electric Comark LLC
 104 Feeding Hills Road
 Southwick, MA 01077
 TEL: (413) 998-1100
 FAX: (413) 998-1194

Westfield Bank
 141 Elm Street
 Westfield, MA 01086
 ABA#211871604
 Account #1001323052
 Swift Code: WFLDUS33

FEIN#27-4660540

Subject: Best and Final Offer for NET TV Transmitters Bid 6079
Call Letters/ID: NET TV

Attn: Julie Dabydeen, Buyer
Group Owner State Purchasing Bureau
Phone: 402 471 6500
Email: julie.dabydeen@nebraska.gov

Contact: Michael Roosa
Phone: (413) 998-1529
Email: mroosa@comarktv.com
Proposal Date: 07/22/19
Validity: 60 days

Item	Model #	Description	Qty	Unit Price USD	Sell Total USD
1	EC702MP-BB	225W UHF Air Cooled Digital Transmitter (Wideband Doherty High Efficiency)	1	\$18,075.00	\$18,075.00
2	EC710MP-BB	1000W UHF Air Cooled Digital Transmitter (Wideband Doherty High Efficiency)	1	\$26,200.00	\$26,200.00
3	EC701HP-BB2	1300W UHF Air Cooled Digital Transmitter (Wideband Doherty High Efficiency)	1	\$29,800.00	\$29,800.00
4	EXACT-V2	Spare Exciter	1	\$9,000.00	\$9,000.00
5	MOD 40160	E Compact Pallet, BLF-888E	1	\$1,200.00	\$1,200.00
5a	MOD 40159A	OPTION - E Compact Power Amplifier Unit, BLF-888E	0	\$10,000.00	\$0.00
Net Price:					\$84,275.00

Payment and Delivery:

Payment Terms: Per 6078 Terms and Conditions
Incoterm 2010: Shipped to site
Delivery: As required per Bid 6078



PROPOSAL REFERENCE #:
P#3756R1-NET 6079-190722

Hitachi Kokusai Electric Comark LLC

104 Feeding Hills Road
Southwick, MA 01077
TEL: (413) 998-1100
FAX: (413) 998-1194

Westfield Bank
141 Elm Street
Westfield, MA 01086
ABA#211871604
Account #1001323052
Swift Code: WFLDUS33

FEIN#27-4660540

General Conditions:

This quotation contains proprietary information and it may not to be divulged to any third party without the expressed written consent of Hitachi Kokusai Electric Comark LLC

This Proposal and all sales hereunder shall be subject to the attached Sales Terms and Conditions. Although the customer may include or reference its standard forms for orders or other notices hereunder, such standard forms will be superseded by the terms and conditions of this proposal including the attached Sales Terms and Conditions and any term or condition in such standard forms that is inconsistent with or in addition to the terms and conditions of this Proposal shall this Proposal shall have no force or effect.

If this proposal is acceptable, please sign below and fax a copy to Hitachi Kokusai Electric Comark LLC (413) 998-1178.
Please attach a copy of a tax exempt certificate (if applicable). Please reference this Proposal Number on all Purchase Orders.

Special Conditions:

None.

Purchaser's Acceptance

Proposal # P#3756R1-NET 6079-190722

Bill To:

Purchaser's Name: State Purchasing Bureau

Signature:

Title:

Ship To:

Date:



Hitachi Kokusai Electric Comark Proposal
 P#3756R1-NET 6079-190722
 Equipment & Services

All Prices In US Dollars

ITEM	QTY	PART NO.	DESCRIPTION	Unit Price	Extended Price
			Family - EC700MP Model - EC702MP DTV Standard ATSC 1.0 / 8VSB DTV Channel - 14, 20 & 24 System Output ATSC1.0 225W; ATSC 3.0 200W (at TX Output) Amplifier Type LDMOS Doherty Input Voltage/Frequency 220 VAC / 60 Hz		
1	1	EC702MP-BB	EC702MP 225W UHF Air cooled Digital TV Transmitter Inclusive features of the entire EC700MP product line are: > Fully Solid State, 50VDC LDMOS devices > Digital Precorrector > Doherty High Efficiency UHF Power Amplifiers	\$16,925.00	\$16,925.00
1.1	1		Transmitter System Includes:	Included	
1.1.1	1	EXACT-V2	Exciter/Control/Amplifier containing: UHF TV DTV Exciter containing: > Digital Adaptive Precorrection DAP™ > Remote Interface	Included	
1.1.2	1	CC8001	System controller / user interface (1 required per exciter)	Included	
1.2	1		Power Amplifier with: -- 225 Watts RMS per amplifier chassis -- Standard Input Voltage: 220V single phase -- Internal chassis cooling fans variable speed -- 2RU Rack-Mount Chassis	Included	
1.3	1		Table Top mounting frame (customer supplied rack cabinet)	Included	
1.4	1		RF Output Filter and Accessories (FCC Mask Compliant) > Reflective 6 Pole RF Mask Filter, 600W > Voltage probes for DAP Samples > RF Interconnect Coax Cables (lot)	1,150.00	\$1,150.00
1.5	1		Instruction Book Set on USB Memory Stick	Included	
1.6	1	S25	Standard Warranty COMARK's standard warranty three (3) year from date of delivery. All other terms, conditions, and limitations shall apply.	Included	

Total Transmitter Price Shipped to Site

\$18,075.00



Hitachi Kokusai Electric Comark Proposal
 P#3756R1-NET 6079-190722
 Equipment & Services

All Prices In US Dollars

ITEM	QTY	PART NO.	DESCRIPTION	Unit Price	Extended Price
Family - <i>EC700MP</i> Model - <i>EC710MP-BB</i> DTV Standard ATSC 1.0 / 8VSB & ATSC 3.0/OFDM DTV Channel - 31 System Output 1000W at ATSC 1.0 & ATSC 3.0 (at TX Output) Amplifier Type LDMOS Doherty Input Voltage/Frequency 220 VAC / 60 Hz					
1	1	EC710MP-BB	EC710MP 1000W UHF Air cooled Digital TV Transmitter Inclusive features of the entire <i>EC700MP</i> product line are: > Fully Solid State, 50VDC LDMOS devices > Digital Precorrector > Doherty High Efficiency UHF Power Amplifiers	\$23,700.00	\$23,700.00
1.1	1		Transmitter System Includes:		
1.1.1	1	EXACT-V2	Exciter/Control/Amplifier containing: UHF TV DTV Exciter containing: > Digital Adaptive Precorrection DAP™ > Remote Interface		
1.1.2	1	CC8001	System controller / user interface (1 required per exciter)		
1.2	1		Power Amplifier with: -- 1000 Watts RMS per amplifier chassis -- Standard Input Voltage: 220V single phase -- Internal chassis cooling fans variable speed -- 2RU Rack-Mount Chassis		
1.3	1		Table Top mounting frame (customer supplied rack cabinet)		
1.4	1		RF Output Filter and Accessories (FCC Mask Compliant) > Reflective 6 Pole RF Mask Filter, 1500W > Voltage probes for DAP Samples > RF Interconnect Coax Cables (lot)	\$2,500.00	\$2,500.00
1.5	1		Instruction Book Set on USB Memory Stick		
1.6	1	S25	Standard Warranty COMARK's standard warranty three (3) year from date of delivery. All other terms, conditions, and limitations shall apply.		

Total Transmitter Price Shipped to Site

\$26,200.00



Hitachi Kokusai Electric Comark Proposal
 P#3756R1-NET 6079-190722
 Equipment & Services

All Prices In US Dollars

ITEM	QTY	PART NO.	DESCRIPTION	UNIT PRICE	EXTN'D PRICE
			Family - <i>EC700HP-BB2 Series</i> Model - EC701HP-BB2 DTV Standard ATSC – 8 VSB DTV Channel - 23 & 33 System Output ATSC1.0 1300W; ATSC 3.0 1100W (at TX Output) Amplifier Type LDMOS Doherty Input Voltage/Frequency 220 VAC / 60 Hz		
1	2	EC701HP-BB2	EC701HP-BB2 1300W UHF Air cooled Digital TV Transmitter Inclusive features of the entire <i>EC700HP-BB2 Series</i> product line are: > Fully Solid State, 50VDC LDMOS devices > Digital Precorrector > Broadband Doherty High Efficiency UHF Power Amplifiers	\$27,000.00	\$54,000.00
1.1.	2		<u>Transmitter System Includes:</u> Exciter/Control/Amplifier containing:		
1.1.1	2	EXACT-ATSC	UHF TV 8VSB Exciter containing: > Reed Solomon Error Correction Coding > Data Randomization > Data Interleaving and Trellis coding > Side Band Correction > Digital Adaptive Precorrection DAP™ > ATSC 1.0, upgradeable to ATSC 3.0 > Remote Interface		
1.1.2	2	CM8001	System controller / user interface (1 required per exciter)		
1.1.3	2		Power Amplifier with: -- 1300 Watts RMS per amplifier chassis -- Standard Input Voltage: 220V single phase -- Internal chassis cooling fans variable speed -- 3RU Rack-Mount Chassis		
1.2	2		RF Output Filter (FCC Mask Compliant)	\$2,800.00	\$5,600.00
1.2.1	2	BPF-6-U-1500	> Reflective 6 Pole RF Mask Filter		
1.3	2	OPT-ACC-1000	Accessory Kit for LPTV-8000-1000U		
1.4	2		Instruction Book Set on USB Memory Stick		
1.5	2	S25	Standard Warranty COMARK's standard warranty three (3) year from date of delivery. All other terms, conditions, and limitations shall apply.		
Total Transmitter Price Shipped to Site					\$59,600.00
2			<u>OPTIONS</u>		
2.1	1	EXACT-V2	Dual Exciter Option for EC701-HP-BB2 Transmitter in Dual Drive configuration	\$9,000.00	\$9,000.00
2.2	1	MOD 40160	E Compact Pallet, BLF-888E	\$1,200.00	\$1,200.00
2.3	1	MOD 40159A	OPTION - E Compact Power Amplifier Unit, BLF-888E	\$10,000.00	\$10,000.00

EC710MP-BB UHF Digital TV Transmitters

HITACHI

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E-Compact TV • High Efficiency • UHF Broadband • Air Cooled • Doherty Technology

ATSC 3.0
ATSC 1.0
1000 WATTS RMS



Highlights:

- 1300 Watts RMS ATSC 1.0 / ATSC 3.0 (Before Filter);
- Power Amplifier Drawer efficiency up to 36%;
- Broadband: 470 to 608MHz;
- Compact structure, 19" EIA chassis, optional 8RU or 25RU cabinet mounting;
- Single 3RU Compact Power Amplifier chassis with ten Doherty Technology Transistors;
- Single 1RU Power Supply chassis with four Plug-in 1200W Power Sources (25% Equipment Power Redundancy);
- Easy assembly and maintenance, Powers Sources featuring Plug-in connection, no wiring or cables required;
- Automatic Fan Speed Control providing low noise level and increased lifespan;
- Highly versatile, compatible with ATSC 1.0 / ATSC 3.0. Excellent signal quality with adaptive signal pre-correction. High performance in either SFN or MFN transmission systems;
- AC Mains Protection Unit, composed of Surge Protection Devices (SPD) and Circuit Breakers that limit possible overvoltages of the AC mains, protecting the Equipment;

Included:

- Main Control Software, WEB Server and SNMP;
- USB Communications Drive;
- EIA 1-5/8" RF Low Pass Filter;
- Sample probe before RF Mask Filter inside Power Amplifier Drawer;
- EIA 1-5/8" RF Output Line with Sample Probe to monitor the RF Output signal after the RF Mask Filter;
- 1RU 19" Ethernet¹ Switch;
- 1RU EXACT-V2 DTV exciter with GPS receiver;
- 1RU system controller chassis;

Optional:

- Telesupervision Module, Telemetry though GPRS;
- 8RU or 25RU equipment cabinet mounting;
- Dual Drive with two DTV exciters and two system controllers (Main and Backup) for redundancy. Only available in 25RU Cabinet mounting;
- 6-pole RF Mask Filter with coax interconnect kit;
- 8-pole RF Mask Filter with coax interconnect kit;



E-Compact
Less energy. More power.

Empresa Certificada
ISO 9001
10 anos de certificação

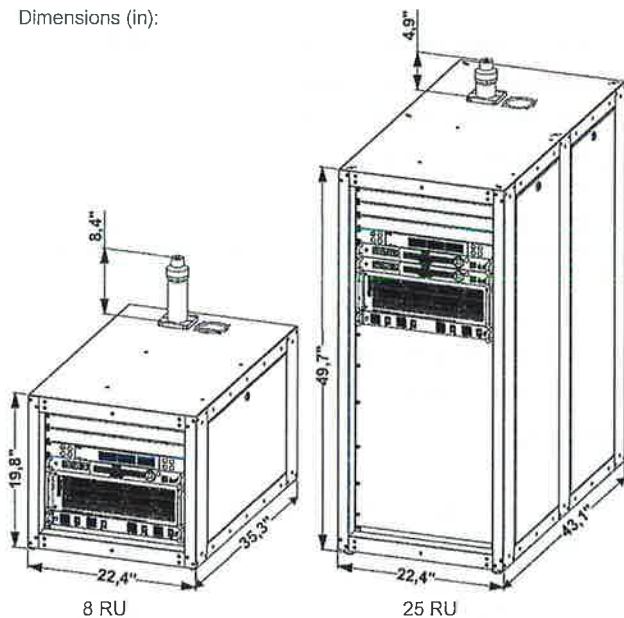
General Specifications

- ASI or SMPTE-310 TS input for ATSC 1.0, redundant A/B switching;
- A/324 Gigabit Ethernet IP inputs for ATSC 3.0
- Control Module present;
- Switch Module present;
- 1.3kW Power Amplifier Drawer ATSC 1.0 / ATSC 3.0;
- High efficiency with asymmetric Doherty LDMOS technology;
- Air cooled PA and PSU;
- Automatic Fan Speed Control providing low noise levels, energy savings and increased lifespan;
- Power supplies featuring Power Factor Correction better than 0.95;
- Measures and alarms through front display and keypad or remotely.
- VSWR and Overdrive protection via hardware with power reduction;
- Software oriented overheating protection for internal modules;
- Adaptive Digital Pre-correction (Linear and Non-Linear);
- Main Control Software, WEB Server and SNMP;
- USB communication Drivers;
- Passive elements: Low-pass filter, before and after-filter probes;
- Rack 19" standard mount.
- Optional 8RU or 25RU cabinet (dual drive only in 25RU);
- Telemetry: WEB Server/SNMP, for local or remote management (Optional);

Mechanical Features

Equipment Weight	8 RU	150lbs / 67Kg
	25 RU	247lbs / 112Kg
Equipment Color	Beige	
Transmitter Service/Access	Top and Front	

Dimensions (in):



RF Performance

Modulation Standard	ATSC 3.0 A/300 ATSC 1.0 A/53	
Output Power (After Filter)	ATSC 3.0 ATSC 1.0	1000 Watts
Output Power (Before Filter)	ATSC 3.0 ATSC 1.0	1300 Watts
RF Output Regulation	≤± 0.1 dB	
Operation Frequency	470MHz to 608MHz (UHF) Channel 14 to Channel 36	
Bandwidth	6 MHz	
RF Input Level	0dBm	
ATSC 3.0 MER Performance	Typical 35dB	
ATSC 1.0 MER Performance	Typical 36dB	
Harmonics/Spurious	better than -60dBc	
Output Impedance / Connector	50Ω / 1-5/8" EIA	

Electrical Features

Power Requirement	2-Phases B208: 180~240VAC Between Both Phases. 3-Phases T208: 180~240VAC Between three Phases. Single Phase M208*: 180~240VAC Between Phase and Neutral. 3-Phases T380*: 180~240VAC Between each Phases to Neutral.		
Frequency AC mains	50Hz / 60 Hz		
Power Factor Correction	Typical 0.95, minimum 0.9		
Typical Efficiency (varies per channel)	ATSC 1.0: >36.5% Before Filter ATSC 3.0: >34.5% Before Filter		
Typical Consumption (Single Drive, ATSC 1.0) 6 poles Filter	TPO 1.0 kW	DC 2.93 kW	AC 3.18 kVA
Typical Consumption (Single Drive, ATSC 3.0) 6 poles Filter	TPO 1.0 kW	DC 3.11 kW	AC 3.38 kVA
Typical Consumption (Single Drive, ATSC 3.0) 8 poles Filter	TPO 1.0 kW	DC 3.29 kW	AC 3.58 kVA
Typical Heat Dissipation	ATSC 1.0 – 6 Poles Filter ATSC 3.0 – 6 Poles Filter ATSC 3.0 – 8 Poles Filter		
	7500 BTU/h	8200 BTU/h	9000 BTU/h

Environment Features

Operation altitude	up to 5000ft ² AMSL ³
Environment temperature range	+11°F to +113°F (-10°C to +15°C)
Environment humidity range	0 to 95% (non-condensing)
Power Amplifier Cooling	Forced ambient air, front to back flow using integral high volume fans

Interfaces

Monitor / Control Interface	Web GUI and SNMP: Ethernet ¹ via RJ-45
Communication Interfaces	USB / Ethernet ¹ / SNMP
Format	Ethernet ¹ (IEEE 802.3u) 10Base-T/100Base-TX

Notes:

¹Ethernet is a trademark of Xerox Corporation.

²Above 5000ft on request.

³AMSL: Above Mean Sea Level.

⁴Electric grid on request

©Copyright 2019 Hitachi Kokusai Linear all rights reserved. The products hereby presented are a trademark of Hitachi Linear Kokusai Equipamentos Eletrônicos S/A.

The product specifications are subject to change without previous notice. The image hereby presented has solely illustrative purposes.

Hitachi Kokusai Linear

Solutions in Broadcasting, Video and Communication from Brazil to the World.

Hitachi Kokusai Linear Equipamentos Eletrônicos S/A.

Rodovia BR 459, nº 121-A, Km 121 – Bairro Córrego Raso, 37540-000, Santa Rita do Sapucaí, MG, Brazil.

Phone: +55(35) 3473-3473 Fax: +55(35) 3473-2425

www.hitachi-linear.com.br

Hitachi Kokusai Electric Comark LLC

104 Feeding Hills Rd.

Southwick, MA 01077 USA

Phone: 413-998-1100 Fax: 413-998-1194

www.comarktv.com

E-Compact HP-BB2 Series UHF Digital TV Transmitters

HITACHI

Inspire the Next

E-Compact TV • High Efficiency • UHF Broadband • Air Cooled • Doherty Technology

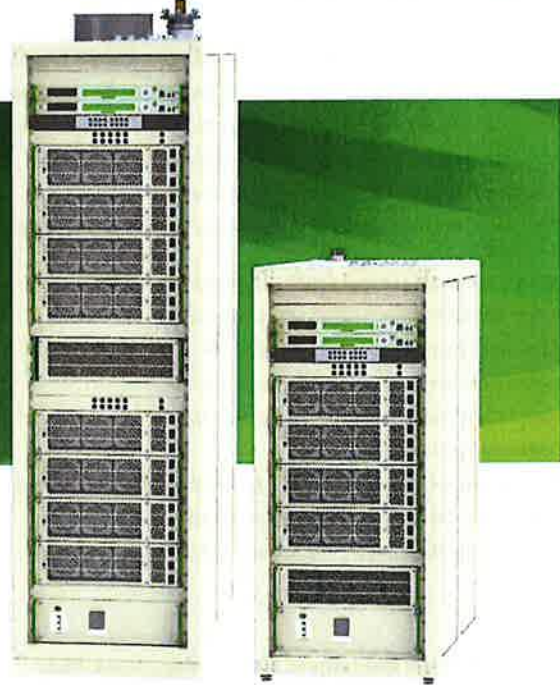
ATSC 3.0
950 to 11200 Watts RMS

ATSC 1.0
1100 to 13200 Watts RMS

Hitachi's E-Compact transmitter Series offers optimal broadcasting features with power efficiency up to 44%.

The simplicity of its configuration and operation allows a fast startup and its high robustness ensures a smooth and safe operation.

The E-Compact HP-BB2 Series is comprised of air-cooled transmitters with output powers of 950W up to 11.2kW in ATSC 3.0 standard, and of 1.1kW up to 13.2kW in ATSC 1.0.



Highlights:

- Devices assembled on a single rack¹. Its compact design results in a smaller installation footprint;
- Excellent power density on PA module. 3U Compact Power Amplifier Drawer transmitting up to 1.3kWrms;
- Developed with Doherty Technology, it provides high efficiency and consumption cost reduction of up to 60% when compared to conventional transmitters;
- The E-Compact line astonishes with its transmission versatility, allowing upgrade from ATSC1.0 to 3.0 through software update;
- Broadband: 470 to 608MHz;
- Easy assembly and maintenance, Powers Sources featuring Plug-In connection, no wiring or cables required;
- Features three power supplies per PA Drawers, operate in shared mode, ensuring redundancy and perfect phase distribution in three-phase systems.
- Automatic Fan Speed Control providing low noise level and increased lifespan;
- High versatility. Compatible with ATSC 1.0 / ATSC 3.0 Exciters. Excellent response to any pre-adaptive signal correction and high performance in SFN network transmission or MFN retransmission;

- AC Mains Protection Unit, composed of Surge Protection Devices (SPD) and Circuit Breakers that limit possible overvoltages of the AC mains, protecting the Equipment;

Included:

- Main Control Software, WEB Server and SNMP;
- USB Communications Drive;
- EIA RF Output Line with Sample Probe to monitor the RF Output signal after the RF Mask Filter;
- RF Low Pass Filter;
- Sample probe before RF Mask Filter;
- 19" Ethernet[®] Switch;
- Control Module Drawer;
- Washable air filters
- Mains AC Power distribution drawer²
- RF hybrid combiner with Unbalance Load Module²

Optional:

- Telesupervision Module, Telemetry though GPRS;
- Double Exciter. Two Control Module (Main and Backup) for Exciter Redundancy.



E-Compact
Less energy. More power.

Empresa Certificada
ISO 9001
10 anos de certificação

Hitachi Kokusai Linear

Solutions In Broadcasting, Video and Communication from Brazil to the World.

General Specifications

- IP Input;
- Control Module present;
- Switch Module present;
- Power Amplifier Drawer ATSC 1.0 / ATSC 3.0;
- High efficiency with Doherty technology;
- Air cooled;
- Automatic Fan Speed Control providing low noise levels, energy saving and increased lifespan;
- Power supplies featuring Power Factor Correction better than 0,95;
- Measures and alarms through front display and keypad or remotely;
- VSWR and Overdrive protection via hardware with power reduction;
- Software oriented overheating protection for internal modules;
- Adaptive Digital Pre-correction (Linear and Non-Linear);
- Telemetry: WEB Server/SNMP, for local or remote management (Optional);
- AGING transistor compensation via exciter's front panel;
- Automatic GM compensation with temperature;
- Gain and Phase adjustments per drawer;
- Isolated combiner, enabling Hot Swapwap³
- Main Control Software, WEB Server and SNMP;
- USB communication Drivers;
- Passive elements: Low-pass filter, before and after-filter probes;
- Transmitter Service/Access at top and front
- Rack 19" standard mount, beige equipment color;

General RF Performance

Modulation Standard	ATSC 3.0 A/300 / ATSC 1.0 A/53
RF Output Regulation	± 0.1 dB
UHF Operation Frequency	470MHz to 608MHz / Ch14 to Ch36
Bandwidth	6 MHz
RF Input Level	0dBm
ATSC 3.0 MER Performance	>33dB
ATSC 1.0 MER Performance	>36dB
Harmonics/Spurious	better than -60dBc

General Electrical Features

Power Requirement	Single Phase 240Vac: 180~240VAC Between Both wire. Wye Three-Phase 208Vac: 180~240VAC Between three Phases. Delta Three-Phase 240Vac: 180~240VAC Between three Phases. Single Phase 208Vac Wild Leg ⁹ : 180~240VAC Between Phases to Neutral (using Delta Three Phase 240Vac). Wye Three-Phase 380Vac ⁹ : 180~240VAC Between three Phases and Neutral.
Frequency AC mains	43 to 63Hz
Power Factor Correction	Typical 0.95, minimum 0.9

Interfaces

Communication Interfaces	USB / Ethernet ⁵ / SNMP
Format	Ethernet ⁵ (IEEE 802.3u) 10Base-T/100Base-TX

Environment Features

Operation altitude	up to 5000ft AMSL ⁶
Environment temperature range	+32°F to +113°F (0°C to +45°C)
Environment humidity range	0 to 95% (non-condensing)
Power Amplifier Cooling	Forced ambient air, front to back flow using integral high volume fans

Technical Table – Equipment with 6-poles mask filter

Model:	EC701HP-BB2		EC702HP-BB2		EC703HP-BB2		EC704HP-BB2		EC706HP-BB2		EC708HP-BB2		EC712HP-BB2	
Output power (W) ⁷	B.F. ⁸	A.F. ⁸	B.F. ⁸	A.F. ⁸	B.F. ⁸	A.F. ⁸	B.F. ⁸	A.F. ⁸	B.F. ⁸	A.F. ⁸	B.F. ⁸	A.F. ⁸	B.F. ⁸	A.F. ⁸
ATSC 3.0	1100	950	2200	1860	3300	2850	4400	3800	6500	5700	8800	7600	12200	11200
ATSC 1.0	1300	1100	2800	2200	3800	3300	5000	4400	7500	6600	10000	8800	14600	13200
50Ω Output connector	EIA 1-5/8"						EIA 3-1/8"							
Power modules	1 module		2 modules		3 modules		4 modules		6 modules		8 modules		12 modules	
AC mains	Single Phase 240Vac		Single Phase 240Vac		Single Phase 240Vac		Single Phase 240Vac		Single Phase 240Vac / Wye Three-Phase 208Vac / Delta Three-Phase 240Vac		Single Phase 240Vac		Single Phase 208Vac Wild Leg ⁹ / Wye Three-Phase 380Vac ⁹	
AC typical consumption (kW) ⁷	ATSC 3.0		ATSC 3.0		ATSC 3.0		ATSC 3.0		ATSC 3.0		ATSC 3.0		ATSC 3.0	
	2.90		5.70		8.50		11.30		16.90		22.50		33.70	
	ATSC 1.0		ATSC 1.0		ATSC 1.0		ATSC 1.0		ATSC 1.0		ATSC 1.0		ATSC 1.0	
	3.15		6.15		9.17		12.20		18.25		24.30		36.38	
Typical heat dissipation (BTU/h) ⁷	ATSC 3.0		ATSC 3.0		ATSC 3.0		ATSC 3.0		ATSC 3.0		ATSC 3.0		ATSC 3.0	
	6620		12820		19220		25510		37690		50140		76030	
	ATSC 1.0		ATSC 1.0		ATSC 1.0		ATSC 1.0		ATSC 1.0		ATSC 1.0		ATSC 1.0	
	6790		13150		19740		26210		38660		51430		78150	
Rack dimensions (RU)	8		25		25		25		40		40		40	
Numbers of racks	1		1		1		1		1		1		2	
Width (in)	22.44		22.44		22.44		22.44		22.44		22.44		44.88	
Depth (in)	35.43		43.31		43.31		43.31		43.31		43.31		43.31	
Weight (pound)	154		375		463		551		772		926		1543	

Notes:

¹Except EC712HP.

²Except EC701HP.

³The PA modules can be removed / inserted with the transmitter in operation, although the PA being removed / inserted must be switched off.

⁴Contact Hitachi Kokusai Linear for optional availability in each standard.

⁵ Ethernet is a trademark of Xerox Corporation.

⁶ Above 5000ft on request; AMSL: Above Mean Sea Level

⁷ May change depending on MER value, channel and output power.

⁸ B.F.: Before Filter / A.F.: After Filter

⁹Electric grid on request

Hitachi Kokusai Linear Equipamentos Eletrônicos S/A.

Headquarters

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www.hitachi-linear.com.br

Comercial Office – São Paulo

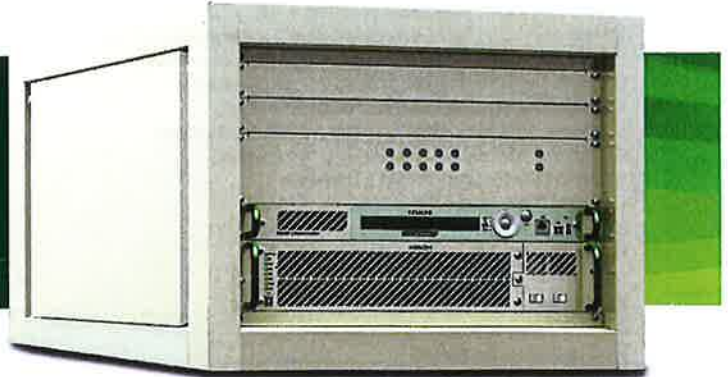
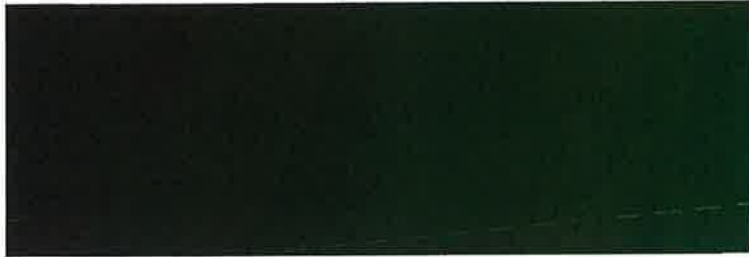
Alameda Santos, 745, Conj 92, Cerqueira César, 01419-001,
São Paulo, SP, Brazil
Phone: +55(11) 3541-3244

Hitachi Kokusai Linear

Solutions In Broadcasting, Video and Communication from Brazil to the World.

UHF Digital TV Transmitters

E-Compact TV • High Efficiency • Air Cooling • Medium Power



Hitachi's E-Compact Transmitter Series offers optimal broadcasting features with power efficiency up to 38%. The simplicity of its configuration and operation allows a fast startup and its high robustness ensures a smooth and safe operation. Its Medium Power sub-family is comprised of air cooled transmitters with output powers (before filter) of 200W and 400W in ISDB-Tb / DVB-T2 standards, and 225W and 450W in the ATSC standard.

The E-compact Medium Power Series can be assembled in three versions: rack, structural frame or table top. A compact design offers a small installation footprint. The 19", 2RU PA offers excellent power density, transmitting up to 450Wrms.

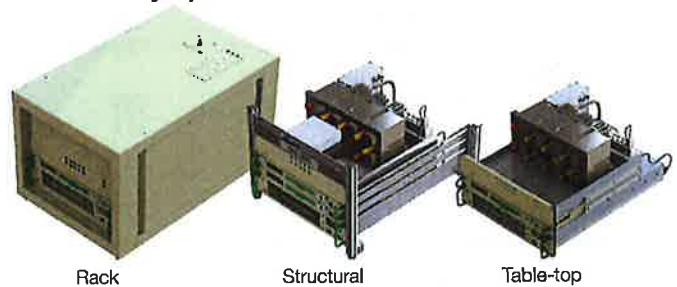
Developed with Doherty Technology, it provides high efficiency and consumption cost reduction of up to 50% when compared to conventional transmitters.

The E-Compact line astonishes with its transmission versatility, either operating in SFN or in MFN retransmissions. The retransmission signal can be received through Satellite or Terrestrial tuners and through Ethernet² and ASI inputs. The EX8001 exciter features pre-correction, BTS decompression, and conditional access module, dispensing the need for other external devices.

Medium Power E-Compact Highlights:

- Doherty Amplification Technology.
- Energy Saving.
- Power supply redundancy (up to 100%).
- Quick-plug for Power Supplies, through front panel, hot-swappable.
- Automatic Fan Speed Control providing low noise levels and increased lifespan.
- Easy access Fan bank and washable air filters;
- Real time A-DPD: A resource that applies, automatically, the device's pre-correction on every output power fluctuations related to user adjustments and/or failure. Taking less than two seconds to recover MER values,
- it's the fastest tool in the market.

Assembly Options:



Hitachi Kokusai Linear Equipamentos Eletrônicos S/A.

Solutions for Broadcast, Video and Communication from Brazil to the world.

UHF Digital TV Transmitters

E-Compact TV - High Efficiency - Air Cooling - Medium Power

GENERAL SPECIFICATIONS

- IP Input;
- Modular power amplifiers;
- High efficiency with Doherty Technology;
- Air Cooling;
- Redundant & Hot swappable³ Power supplies;
- Automatic Fan Speed Control: low noise levels, energy saving and increased lifespan;
- Power Supply with Power Factor Correction ≥ 0.9 ;
- Measurements and Alarms through front display and keyboard or via web;
- VSWR and Overdrive protection via hardware with power reduction;
- Software oriented overheating protection for internal modules;
- Automatic Digital Pre-correction (Linear and Non-Linear);
- Telemetry: WEB Server/SNMP, for local or remote management;
- AGING transistor compensation via exciter's front panel;
- Automatic GM compensation with temperature;
- Gain and Phase adjustments per drawer;
- SFN Operation;
- BTS decompression;

INCLUDED

- General Control Software, WEB Server and SNMP;
- USB communication Drivers;
- PT-BR, US-EN or ESP manuals (digital formats).
- Passive elements kit: Low-pass filter, before and after-filter probes.

OPTIONALS³

- Telemetry through GPRS interface;
- Double Exciter;
- Instrumental embedded via software;
- GPS time base (exciter's internal module);
- Terrestrial reception for UHF retransmission (N-Female Connector);
- Satellite reception (DVB-S/S2) for UHF retransmission (N-Female Connector);
- Conditional Access Module with up to four simultaneous services, and display of up to eight services;
- 8-pole Output filter for critical mask (50dB) OU 6-pole Output filter for sub-critical mask(43dB);
- Input 7-pole filter for UHF receiver;
- RF Output connectors: DIN 7/16" female (standard), EIA 7/8" flanged, EIA 7/8" unflanged or N-Female;
- Assembly: 8RU Rack, Structural or Table-top;
- Redundant Power Supply;

Model	EC702MP		EC704MP		
	B.F. ⁶	A.F. ⁶	B.F. ⁶	A.F. ⁶	
Output power (W) ⁷	ISDB-T / DVB-T2	200	150	400	300
	ATSC	225	170	450	350
AC mains (43 to 63Hz)	M220		M220		
	B220		B220		
Output connector ⁹	N Female		N Female		
Typical AC consumption (W) ⁷	ISDB-T / DVB-T2	600	1,200		
	ATSC	750	1,500		
Typical heat dissipation (BTU/h) ⁷	ISDB-T / DVB-T2	1,400	2,800		
	ATSC	1,750	3,500		
Optional rack dimensions (RU)	8		8		
Rack total width (mm)	570		570		
Rack total depth (mm)	900		900		
Transmitter weight with rack (kg)	64		65		

Communication Interfaces	USB / Ethernet ¹ / SNMP
Frequency Stability	± 1 Hz (Internal GPS)
Oscillator	PLL synthesized
Power Factor	Better than 0.9
Operation Altitude	up to 2,500m a.s.l. ⁵
Environment temperature range	from 0°C to +45°C
Environmental Humidity range	from 0 to 95% (non-condensing)

BTS, TS or IP INPUTS

Formats	DVB-ASI 188 / 204 bytes Ethernet ¹ (IEEE 802.3u) 10Base-T/100Base-TX
Connector	BNC-Female RJ45
Impedance	75 Ω

OUTPUT

Operation Frequency	470MHz to 806MHz (UHF)
Bandwidth	6 / 7 / 8 MHz
Power	up to 550Wrms after filter
TV Standard	ISDB-T, ATSC and DVB-T2
Intermodulation	-43dB @ $\pm 3,15$ MHz (BW=6MHz) -50dB @ $\pm 3,15$ MHz (BW=6MHz) -50dB @ $\pm 4,2$ MHz (BW=8MHz)
Harmonics / spurious	better than -80dBc
MER ⁶	35dB up to 38dB

POWER PROGRAMMING TABLE (AFTER FILTER)⁷

Model	Standard TV	Rated Power	Minimum Operation Power	Power Step
EC702MP	ISDB-T / DVB-T2	150 W	10 W	10 W
	ATSC	170 W	20 W	10 W
EC704MP	ISDB-T / DVB-T2	300 W	30 W	10 W
	ATSC	350 W	40 W	10 W

Remarks / Notes

¹ Ethernet is a registered trademark of Xerox Corporation.

² Default for the EC704MP.
Optional for the EC702MP.
Removing/inserting of the power supply can be done while the equipment is in operation, but as long as the frontal AC switch on the power supply being removed / inserted is off.

³ Contact Hitachi Kokusai Linear for optionals availability in each standard.

⁴ DVB-CA Standard (conditional access)
- DVB Common-Interface (DVB-CI)
Module with PCMCIA CAM slot (Irdato, Conex descramblers) - SMARTCARD and CAM not included.

⁵ Altitudes above 2,500m under consultation.
a.s.l.: above sea level.

⁶ May change depending on MER value, channel and filter.

⁷ B.F.: Before Filter | A.F.: After Filter.

Hitachi Kokusai Linear Equipamentos Eletrônicos S/A.

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EXACT-V2

DualCast ATSC 1.0 / 3.0 Digital TV Exciter

The EXACT-V2 is the next generation, compact and powerful exciter platform that delivers an ATSC compliant, on-channel output as well as performs adaptive RF precorrection for the best possible broadcast signal.



Hitachi-Comark provides high performance and award winning television transmitters that are backed by more than 40 years of leadership in both inductive output tube (IOT) and solid-state broadcast technologies.

The next generation EXACT-V2 Digital TV Exciter was developed for the ATSC broadcast market. It uses the compact 1RU exciter hardware platform in conjunction with ATSC compatible firmware and software. The EXACT-V2 exciter is designed to work either in a stand-alone mode with OEM DTV transmitters or fully integrated in Hitachi-Comark digital TV transmitters.

Flexibility by Design

The EXACT-V2 exciter's core modulation and correction functions are processed by firmware that resides on internal Field Programmable Gate Arrays (FPGA).

This architecture provides flexibility so as digital TV standards evolve and change, the processing can be upgraded and adapted to meet these new requirements, simply by loading new firmware.

Beyond the FPGA technology, the exciter platform incorporates a microcontroller for user interface to the monitor and control functions. Custom software running in the exciter provides user access through various Man-Machine Interfaces (MMI) provided from the EXACT-V2.

DAP Technology Streamlines Performance

The EXACT-V2 exciter integrates Digital Adaptive Precorrection (DAP) technology, which provides superior performance that is unattainable using any other correction technique.

This technology allows for simple and easy setup and maintenance of a high performance transmitter system.

DAP technology provides unsurpassed digital correction of all distortions created by a DTV transmitter system. These distortions include nonlinear distortions created by active amplifier devices, such as amplitude and phase distortions along with correction for memory effect. Additionally DAP corrects linear distortions created by the transmitter's high-power passive RF system, such as group delay and frequency response distortions maximizing the SNR performance.

Advanced Monitoring & Control

The EXACT-V2 exciter incorporates local control and monitoring using an enhanced user interface front panel with backlit LCD display, LED's, and menu driven push buttons. Local access includes menus for initial setup, configuration status, and control functions. The front panel displays the forward & reflected power levels, output RF shoulders as well as the SNR performance.

KEY FEATURES

- ▶ Unique *DualCast* ATSC 1.0 to 3.0 upgradeable, protects investment*
- ▶ New IP optimized platform (7xGbe ports) specifically for ATSC 3.0
- ▶ Optional built-in ALP encapsulation for "gateway-free" operation
- ▶ User friendly but advanced WEB GUI local or remote control
- ▶ *Industry Leading* Digital Adaptive Precorrection (DAP)
- ▶ Dual TS inputs (SMPTE-310M or ASI), provides seamless A/B input redundancy
- ▶ Compact 1RU platform
- ▶ Embedded forward and reflected RF power measurements
- ▶ SNR, shoulders, and FWD / RFL power monitoring via front panel
- ▶ Optional SNMP client, activated via software license

The EXACT-V2 exciter can also be remotely controlled using the Web GUI interface with nothing more than a PC running a standard web browser. The Web GUI allows users to retrieve information such as SNR, lower and upper RF shoulder measurements, user configuration, and alarms.

ATSC Now and the Future

The EXACT-V2 is fully compliant with the ATSC 1.0 A/53 DTV standard. EXACT-V2 includes powerful processing and the required can also be field upgraded* with new firmware/software to support ATSC 3.0, preserving your investment.

Seamless TS Input Switching

The EXACT-V2 features two independent sets of dual (A & B) transport stream (TS) inputs. The dual TS inputs allow signal path diversity (i.e. one ASI TS feed via a fiber link and a second ASI TS feed via a STL microwave). The A & B TS switching can be set for automatic or manual depending on the user's preference.



Monitor/Control:

- ✓ The EXACT-V2 includes a built-in Web based user monitor and control interface
- ✓ Pertinent information is displayed in a user friendly and very intuitive layout
- ✓ The exciter can be setup in minutes with dedicated menus for operation and control

SPECIFICATIONS

Operating Frequency:

- VHF Band 1; 54-88MHz
- VHF Band 3; 174-216MHz
- UHF Bands 4 & 5; 470-862 MHz

Modulation / Standard:

- ATSC 1.0 8VSB ~ ATSC A/53
- ATSC 3.0 ready ~ ATSC A/300*

ASI Interfaces (ATSC 1.0):

- 2 inputs, 1 output; DVB-ASI (or SMPTE-310M input)
- ASI = BNC female connector, 75Ω
- Auto switching between ASI ports

Gbe Interfaces (ATSC 3.0):

- 4 x Gigabit Ethernet; RJ45 ports
- Protocols: UDP, IP, IGMP (V2&V3)
- STL Interface (A/324)
- Built-in ALP Encapsulation (opt.)

RF Output:

- 0dBm output power (rms), Optional +20dBm output (rms)
- N female connector, 50Ω
- Low level rear panel RF monitor port, SMA 50Ω @ -20dBm
- 6 MHz RF channel bandwidth
- > 37dB global MER

Clock and Synchronization:

- 1PPS in/out, BNC female 50Ω,
- 10MHz in/out, BNC female 50Ω

Ancillary Inputs:

- ALE / NLC RF correction inputs, -15 to -5dBm level, SMA female
- FWD/RFL power monitoring inputs, 5dBm max level, SMA

Monitor/Control:

- Web: 2 x Gigabit Ethernet, RJ45
- SNMP: Gigabit Ethernet, RJ45 (opt.)
- General Purpose IO, DB-9 x2
- GPS input, BNC 50Ω (external antenna optional)

Environmental & Safety:

- 0° to 50° C Temp range
- ≤ 95% non-condensing relative humidity

General Electrical & Mechanical:

- 19" W x 1.75" H x 10" D
- 90 ~ 240 VAC, 50/60 Hz
- < 1.5A current draw
- 4.5 kg (net) / 10 lbs.
- > 0.9 power factor
- Air cooled, right to left air flow



EXACT-V2 Rear Panel

* Depending on standard final approval

ORDERING INFORMATION

Please contact your authorized Hitachi-Comark representative.
 US Sales 1-800-288-8364 or 413-998-1100
 Hitachi Kokusai Electric Comark LLC
 104 Feeding Hills Road
 Southwick, MA 01077

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www.comarktv.com

- EXACT-SNMP → Optional SNMP License
- EXACT-20DB → Optional +20dBm Output
- EXACT-A3UP → Upgrade ATSC 3.0 License (single PLP)
- EXACT-ALP3 → Upgrade ATSC 3.0 ALP Encapsulation

LPTV-5000-V1

VHF Band 1 DTV Transmitters

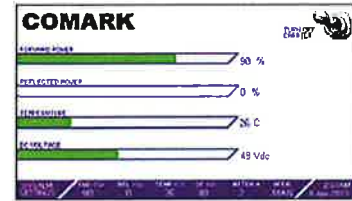
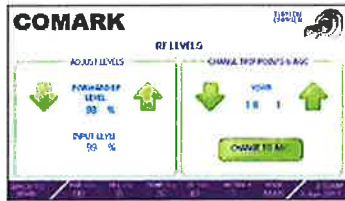
The LPTV-5000-V1 is compact low power VHF digital transmitter providing an extremely cost effective solution.



Hitachi-Comark provides high performance and award winning television transmitters that are backed by more than 40 years of leadership in broadcast technologies.

The LPTV-5000-V1 is a compact platform that is available in 250 – 5000 watts average output power. The transmitter uses an external RF mask filter for ATSC systems.

The transmitter features a full color touch screen display user interface. Remote monitoring and control is via Ethernet / SNMP and/or a dedicated rear-panel parallel port using a DB-25 interface.



Touch screen User Interface

SPECIFICATIONS

Input:

- MPEG-2 transport stream
- DVB-ASI, BNC 75 Ω impedance
- 19.39Mbps max input data rate

RF Output:

- Type N or 7-16 DIN female connector power level dependent
- 50 Ω impedance

RF Performance:

- 250W through 5kW output power, with 10-100% adjustability
- 6MHz RF channel bandwidth
- VHF B1 (54-88 MHz)
- >36 dB typical MER
- >104 dB phase jitter
- > -50 dB typical RF shoulders

Environmental & Mechanical:

- 0° to 45° C Temp range
- <90% relative humidity, (non-condensing)
- Air cooled, front to back air flow
- 19" W x 25" D, consult factory on vertical height / power level
- 110/220VAC +/-10%, 60 Hz

KEY FEATURES

- ▶ Automatic adaptive pre-correction for highest possible SNR
- ▶ 250W-5kW models available
- ▶ Repeater (RF input) optional
- ▶ Full color touch screen display
- ▶ 2 stage amplification with Class A/AB operation
- ▶ Designed for adjacent operation
- ▶ Ultra efficient switching PSU
- ▶ Air cooled for high reliability and long service life
- ▶ ATSC A/53 8VSB compliant

ORDERING INFORMATION

Please contact your authorized Hitachi-Comark representative.
US Sales 1-800-288-8364 or 413-998-1100
Hitachi Kokusai Electric Comark LLC
104 Feeding Hills Road
Southwick, MA 01077

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LPTV-5000-V3

VHF Band 3 DTV Transmitters

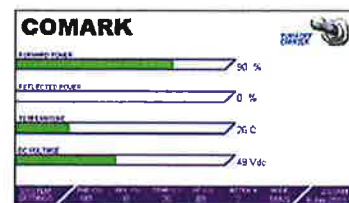
The LPTV-5000-V3 is compact low power VHF digital transmitter providing an extremely cost effective solution.



Hitachi-Comark provides high performance and award winning television transmitters that are backed by more than 40 years of leadership in broadcast technologies.

The LPTV-5000-V3 is a compact platform that is available in 250 – 5000 watts average output power. The transmitter uses an external RF mask filter for ATSC systems.

The transmitter features a full color touch screen display user interface. Remote monitoring and control is via Ethernet / SNMP and/or a dedicated rear-panel parallel port using a DB-25 interface.



Touch screen User Interface

SPECIFICATIONS

Input:

- MPEG-2 transport stream
- DVB-ASI, BNC 75 Ω impedance
- 19.39Mbps max input data rate

RF Output:

- Type N or 7-16 DIN female connector power level dependent
- 50 Ω impedance

RF Performance:

- 250W through 5kW output power, with 10-100% adjustability
- 6MHz RF channel bandwidth
- VHF B3 (174-216 MHz)
- >36 dB typical MER
- >104 dB phase jitter
- > -50 dB typical RF shoulders

Environmental & Mechanical:

- 0° to 45° C Temp range
- <90% relative humidity, (non-condensing)
- Air cooled, front to back air flow
- 19" W x 25" D, consult factory on vertical height / power level
- 110/220VAC +/-10%, 60 Hz

KEY FEATURES

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