Maxiva™ ULX

Liquid-Cooled UHF Multimedia TV Transmitter

PowerSmart®

The Maxiva™ ULX UHF liquid-cooled, solid-state transmitter provides today's multimedia broadcaster with one transmitter platform capable of multiple modulation schemes. Featuring the proven Apex M2X™ multimedia exciter at its core, the Maxiva ULX transmitter is an ideal solution for digital applications, as well as any analog broadcaster planning a future transition to DVB-T/H, DVB-T2, ATSC, ATSC-MDTV, ISDB-Tb, CMMB, CTTB, and other digital standards.w

Maxiva ULX transmitters incorporate Harris® PowerSmart® technology, enabling best-in-class power-density and efficiency. With digital power levels up to 28.1 kW COFDM and 44.6 kW ATSC and analog power levels up to 75 kW, the Maxiva ULX transmitter offers the best footprint-to-power ratio in the industry — allowing for simplified installation, easier maintenance and reduced total cost of ownership over the life of the transmitter.

FEATURES

- PowerSmart technology, for best-in-class power efficiency and lowest operating costs
- Apex M2X exciter technology, allowing easy migration from analog to digital or between different standards
- Rugged, reliable design and construction
- Analog power levels up to 75 kW, digital power levels up to 44.6 kW ATSC, 28.1 kW COFDM
- All-digital, real-time adaptive linear and nonlinear precorrection
- Fully broadband power amplifier (PA) modules — 470 to 862 MHz with no adjustment
- 1:1 RF device to power supply ratio for ultimate redundancy
- Hot-pluggable liquid-cooled linear RF amplifier modules
- Automatic restart after AC mains interruption; returns to previous operational mode
- Modular central control system, for straightforward monitoring and in-depth diagnostics
- Web-enabled remote graphical user interface (GUI)
- Energy-efficient cooling system adapts pump and fan speeds to varying environmental conditions

PRODUCT DETAILS

Best-in-Class Efficiency

Featuring Harris PowerSmart technology in its transmitter architecture, the Maxiva ULX line offers unmatched efficiency that makes it ideal for all high-power UHF applications. New 50-volt LDMOS device technology delivers a dramatic increase in power density, lower operating costs, and reduced cost of ownership over the life of the transmitter.

Powerful, Straightforward Monitoring and Control

The Maxiva ULX transmitter features a modular central control system within the main transmitter cabinet. It is housed in a rackmounted 3RU chassis featuring convection cooling and integrated, low-voltage control power supply with redundancy. The main controller communicates with the transmitter modules and the exciters, as well as the cabinet level controllers located in additional cabinets. Individual cabinet controllers provide for maximum redundancy and independent operation in times of service or fault, while still providing full protection.

For maximum functionality, all Maxiva ULX systems include a Transmitter Control Unit (TCU). The TCU includes two parallel levels of operational support: a main microprocessor based controller and a back-up, or "life-support" controller. The main controller provides a front-panel, color touch-screen display, SNMP communications support and IP connectivity via the built-in Web GUI. Ideal for network operations, the control system can be accessed from anywhere in the world via TCP/IP over a telecom or network connection. The back-up controller provides minimal control and monitoring of the transmitter platform, using a small number of parallel signals, simple interface controls and front-panel controls and indicators.

Easy Migration from Analog to Digital

The Apex M2X multimedia exciter supports a broad range of analog, digital, and mobile standards and allows for a smooth conversion from analog to digital operation. This flexibility, coupled with Real-Time Adaptive Correction (RTAC™), provides superior performance.

Simple Serviceability and Maintainability

Distributed control architecture provides for outstanding reliability and soft failure operation. The modular-designed PAs enable simple sub-module replacement, rather than the entire amplifier module. On-air servicing has been simplified, and costly service interruptions are virtually eliminated with the hot-pluggable, redundant power amplifier/power supply modules.

Reduced Service Costs

Lightweight, universal PA pallets and power supply modules facilitate overnight/same-day shipment from a centralized depot for simple and cost-effective spares holding. Lightweight subassemblies eliminate two-person lift requirements for maintenance and troubleshooting, resulting in labor-related cost savings.

Enhanced Redundancy

The Maxiva ULX transmitter supports a range of backup options. In dual-drive systems, the integrated control system monitors exciters and switches control and RF feeds. The control system also supports options for 1+1 and full N+1 installation — monitoring and controlling each transmitter system, input stream and RF switching.

Compact Footprint

As the world's most compact liquid-cooled UHF transmitter, the Maxiva ULX is ideally suited for crowded, shared transmitter sites.

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SPECIFICATIONS

Specifications are subject to change without notice.

General

Frequency Range	470 to 862 MHz
Channel Bandwidth	6, 7 or 8 MHz
RF Load Impedance	50 ohms, 1.1:1 VSWR over any single TV channel
RF Output Connector	1-5/8 in. (4 mm), 3-1/8 in. (8 mm), 4-1/16 in. (10 mm), EIA (dependent upon power level)

AC Mains

AC Mains Requirement:	
AC Line Voltage	3-phase 50/60 Hz, 380 to 415 V, or 208 to 240 V (specify when ordering)
AC Line Variation	10% to -15%
Power Factor	>0.90

Environmental

Altitude	Up to 13,123 ft (4,000 m) elevation above mean sea level
Ambient Temperature	32º to 113º F (0º to 45º C) at sea level (upper limit derated 3.6º F (2º C) per 984 ft (300 m) elevation AMSL)
Humidity	Up to 95%, non-condensing
Cooling Method	Liquid (50% mixture of water and ethylene glycol or propylene glycol)
Acoustic Noise	<65 dBA (measured 3.3 ft (1 m) in front of cabinet, not including pump module)

Analog

Analog Television Systems	CCIR G, I, K, K1, M, N
Color Systems	PAL, NTSC, SECAM
Sound Systems	Monaural, BTSC, IRT, NICAM G
Power Output (vision peak of sync)	2.5 to 75 kW available (higher powers on request)

Analog Video Performance

Video Input	2 inputs, 75 ohms, 0.7 to 1.4 V, 75 ohms, 34 dB return loss
Regulation of Output Power[1]	±3%
Variation of Output Power[2]	±2%
Vision Sideband Response[3]	PAL system G shown (other systems available)
-1.25 MHz and below	-20 dB or less
-4.43 MHz	-30 dB or less
-0.75 MHz to -1.25 MHz	+0.5 dB or less
-0.5 to +4.5 MHz	+0.5 to -0.5 dB
+5.0 MHz	+0.5 to -2.5 dB
+5.75 MHz and above	-35 dB or less
Frequency Stability[4]	±150 Hz/month
Differential Gain[5]	3%
Differential Phase[5]	3°
Low Frequency Linearity[6]	10%
Incidental Carrier Phase Modulation[5]	±2°
Signal-to-Noise Ratio	>60 dB (weighted)
K Factor	2% or less with 2T sin² pulse
20T Equivalent Gain and Delay	3% total baseline distortion
Spurious (inter-modulation) and Harmonic Radiation	-60 dB or better
In-Channel Intermodulation	-58 dB, or better (-60 dB typical)

Analog Sound Performance

Frequency Stability	±150 Hz/month
Modulation Capability	±120 kHz peak deviation
Monaural Input	Adjustable 0 to +12 dBm, 600 ohms, balanced, >30 dB return loss
Pre-emphasis	Selectable 75 or 50 µS
Frequency Response	±0.5 dB, 40 Hz to 15 kHz
Harmonic Distortion	0.5%, 30 Hz to 15 kHz
FM Noise	60 dB RMS with de-emphasis
AM Noise	50 dB RMS from 30 Hz to 15 kHz
Synchronous AM Noise	40 dB RMS at 400 Hz with ±25 kHz deviation
IRT Sound	Available on request
NICAM Sound	Available on request

DVB-T, DVB-T2, ISDB-TB, CMMB, CTTB

Power Output (average)	1.1 to 28.1 kW models available; measured before optional mask filter
Systems	DVB-T, standard ETS 300744, DVB-T2, standard EN302755; ISDB-TB (Brazil standard)
ASI Inputs	4 type BNC female; 75 ohms acc. to EN 50083-9 (2 main, 2 hierarchical); 2 main inputs may be used as T2MI for DVB-T2 applications
Output Power Reduction	0 to -6 dB
Crest Factor	Maximum 13 dB
Shoulder Level	<-37 dB (before mask filter)
END	≤0.7 dB
MER	>33 dB
Harmonics (before filter)	<-40 dB
Central Carrier Suppression	>75 dB
Frequency Stability (without external reference)	±150 Hz/month
Frequency Offsets	1 Hz resolution

ATSC

Power Output (average)	1.5 to 1.4 to 44.6 kW models available; measured at output of optional mask filter
System	ATSC A-53, 8-VSB DTV standard; ATSC Mobile DTV
Data Input	19.39 Mb/s
Impedance	75 ohms, unbalanced
Standard	SMPTE 310M
Connector	2 BNC female, isolated
External Precise Frequency Input	10 MHz, sinusoidal
Impedance	50 ohms, unbalanced
Level	0 to 10 dBm
Connector	BNC 50 ohms, female
Signal to Noise (EVM)	27 dB or better (4% or less)
Phase Noise	<104 dBc/Hz @ 20 kHz offset (ATSC A/64)
Pilot Frequency Stability	Less than ±150 Hz/month Less than ±3 Hz with internal or external PFC
Harmonic Radiation and Spurious	Meets mask requirements specified in FCC 5th and 6th report and order
Sideband Performance	Compliant with FCC radiation mask, when measured at the output of Harris-supplied output filter

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Remote Control

Parallel Remote . . . . . DB-37, female
Relay Contacts. . . . . 25 mA @ 24 VDC
Digital Inputs (TTL level) . . . . . Pulse duration ≥100 ms or permanent signal
Ethernet/SNMP (optional) . . . . . RJ-45, twisted pair

Compliance

- RoHS 2002/95/EC
- R&TTE 1999/5/EC
- Safety: EN 60215
- EMC: EN 301-489-1
- FCC Part 73

[1] Variation of peak output power with a change in average picture level from black to white (0% to 100%).

[2] Peak-to-peak variation of peak sync voltage during one field using field test signal per EIA-508.

[3] Response specified for transmitter operating into a resistive load of 1.05:1 VSWR.

[4] After initial aging of 60 days.

[5] Measured using 20% peak-to-peak amplitude swept video modulation with pedestal set at 10%, 50% and 90% APL. All percentages relative to a blanking to white transition.

[6] Measured using a 5-step staircase signal. Test signal #3, CCIR REC. #421-3 Derate maximum temperature by 3.6º F (2° C) per 1000 ft (305 m) above mean sea level.

Maxiva ULX Series Power Levels

Number of Cabinets	Number of PA Modules	Power Output (Watts)							
		ATSC		COFDM				Analog	
		Pre-Filter 470-698 MHz	Pre-Filter >698 MHz	Pre-Filter 470-494 MHz	Pre-Filter 495-630 MHz	Pre-Filter 631-670 MHz	Pre-Filter >670 MHz	Pre-Filter	Post-Filter
1	2	2,000	1,700	1,200	1,200	1,200	1,100	3,600	3,200
1	3	3,000	2,600	1,800	1,900	1,800	1,700	5,200	5,000
1	4	4,000	3,400	2,400	2,500	2,400	2,300	7,100	6,800
1	6	6,000	5,200	3,600	3,800	3,600	3,400	10,500	10,000
1	8	8,000	6,900	4,800	5,000	4,800	4,400	13,800	13,000
1	10	9,600	8,300	5,700	6,100	5,700	5,500	17,000	16,500
1	12	11,500	10,000	6,900	7,300	6,900	6,500	20,900	20,000
1	16	15,400	13,300	9,200	9,700	9,200	8,700	26,200	25,000
2	18	16,900	14,700	10,400	11,000	10,400	9,800	31,400	30,000
2	24	22,200	19,300	13,300	14,100	13,300	12,600	41,400	40,000
2	32	29,800	25,700	17,800	18,700	17,800	16,800	51,800	50,000
3	36	33,300	29,000	20,000	21,200	20,000	18,800	62,100	60,000
3	48	44,600	38,500	26,700	28,100	26,700	25,200	77,600	75,000

IMAGES/DIAGRAMS

Configuration