

Maxiva™ ULX

Liquid-Cooled UHF Television Transmitter
for Worldwide Analog and Digital Standards



PowerSmart™ 

Maxiva™ ULX

One Transmitter — Multiple Modulation Standards

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 any analog broadcaster planning a future transition to DVB-T, DVB-H, DVB-T2, ATSC, or other digital standards.

Maxiva ULX transmitters incorporate Harris® PowerSmart™ technology, enabling best-in-class power-density and efficiency. With digital power levels up to 18.9 kW COFDM and analog levels up to 62.8 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.

Harris® PowerSmart™ Technology Inside

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, making it possible for a single-cabinet unit to provide up to 8.7 kW DVB-T average power or 26.2 kW analog power.

PowerSmart™ 

Apex M2X™ — The Heart of Every Maxiva ULX Transmitter

The Apex M2X multimedia exciter enables analog broadcasters to transition to digital via a simple software update and DTV broadcasters to carry out multichannel broadcasting of HDTV, DTV and Mobile TV channels. This world-class exciter provides a flawless digital signal with complete technical and regulatory compliance for all digital and analog transmitters.

To ensure you're fully prepared for the future, this flexible exciter supports a wide range of global digital standards, including ATSC, ATSC mobile, DVB-T/H, ISDB-Tb, FLO, DMB-T/H, DAB, CMMB and a range of analog TV standards, including NTSC and PAL. And you can have confidence in your investment knowing that Harris digital exciters have logged more hours in "real-time" broadcast than all others combined.

FEATURES

- PowerSmart technology, for best-in-class power efficiency and lowest operating costs
- Apex M2X exciter, for easy migration from analog to digital or between different standards
- Rugged, reliable design and construction
- Analog power levels up to 62.8 kW, digital power levels up to 25.8 kW ATSC, 18.9 kW COFDM
- All-digital, real-time adaptive linear and nonlinear precorrection
- Fully broadband PA modules — 470 to 862 MHz with no adjustment
- 1:1 PA module to power supply 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
- Harris eCDi, Web-enabled remote GUI interface



The RTAC™ Advantage

For digital operations, the exclusive Real-Time Adaptive Correction (RTAC™) incorporated in the Apex M2X enables the exciter to more fully utilize the transmitter power amplifier, yet maintain spectral mask compliance of the digital signal. The only system with simultaneous, linear and nonlinear, adaptive, memoryful precorrection, RTAC provides the highest level of correction to all types of RF amplifiers.

With RTAC, the Apex M2X exciter continuously monitors transmitter output and any filter, while automatically adapting for system nonlinearities — keeping your station well within compliance and maximizing your coverage.

Global Monitoring and Control



The Maxiva ULX transmitter features a modular central control system within the main transmitter cabinet. It is housed in a rack-mounted, 3RU chassis, with 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 reliability, the transmitter control system includes two parallel levels of operational support: a basic mode and an enhanced mode. The basic mode provides minimal control of the transmitter platform using a small number of parallel signals, simple interface controls and front-panel indicators. This can be used during maintenance or as a backup to the main enhanced controller. The enhanced mode provides a front-panel, color touch-screen display, SNMP communications support and IP connectivity via the built-in eCDi™ Web GUI interface. Ideal for network operations, the control system can be accessed from anywhere in the world via TCP/IP over a telecom or network connection.

Make a safe investment

Because launching a new analog or digital service often requires a significant investment in new and unfamiliar technology, it also requires a partner with technical expertise and financial stability. Harris is uniquely positioned to provide both.

Harris has developed a solid core-competency backed by years of experience in maximizing digital performance, and has leveraged that expertise to provide transmission solutions for major digital transmission network rollouts and trials around the world. As a digital transmission leader, Harris offers field-proven systems and a range of support options from standard 24/7 telephone technical assistance and parts, to installations, training, full system design and field maintenance contracts.

Maxiva ULX Series Power Levels

Output Power Level (before filter)				
Number of Racks	Number of PA Modules	Power Output (Watts)		
		Analog	DVB-T	ATSC
1	2	3,600	1,100	1,600
	3	5,200	1,700	2,400
	4	7,100	2,300	3,200
	5	8,300	2,900	3,800
	6	10,500	3,400	4,700
	8	13,800	4,400	6,300
	10	17,000	5,500	7,600
	12	20,900	6,500	9,200
	16	26,200	8,700	12,300
2	18 (12+6)	31,400	9,500	13,400
2	24 (12+12)	41,900	12,600	17,800
3	36 (12+12+12)	62,800	18,900	25,800

Output Power Level (after filter)				
Number of Racks	Number of PA Modules	Power Output (Watts)		
		Analog	DVB-T	ATSC
1	2	3,200	1,000	1,400
	3	5,000	1,500	2,100
	4	6,800	2,000	2,800
	5	8,000	2,600	3,600
	6	10,000	3,000	4,500
	8	13,000	4,200	6,000
	10	16,500	5,200	7,400
	12	20,000	6,200	8,800
	16	25,000	8,300	11,700
2	18 (12+6)	30,000	9,000	12,800
2	24 (12+12)	40,000	12,000	17,000
3	36 (12+12+12)	60,000	18,000	24,600

Benefits

- **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 RTAC correction, provides superior performance.

- **Maximum Efficiency for Cost-Effective Operation**

Leveraging PowerSmart technology, the Maxiva ULX transmitter offers market-leading power efficiency, lower operating costs and reduced cost of ownership over the life of the transmitter.

- **Compact Footprint**

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

- **Highest Power Density**

Harris PowerSmart technology and the latest 50-volt LDMOS devices allow the Maxiva ULX transmitter to achieve market-leading power levels.

- **Powerful, Straightforward Monitoring and Control**

A color touch screen provides an overview of all operational parameters for maintenance procedures and performance checks. The control system supports SNMP communications and can be accessed from anywhere in the world via TCP/IP over a telecom or network connection for remote monitoring.

- **Simple Serviceability and Maintainability**

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

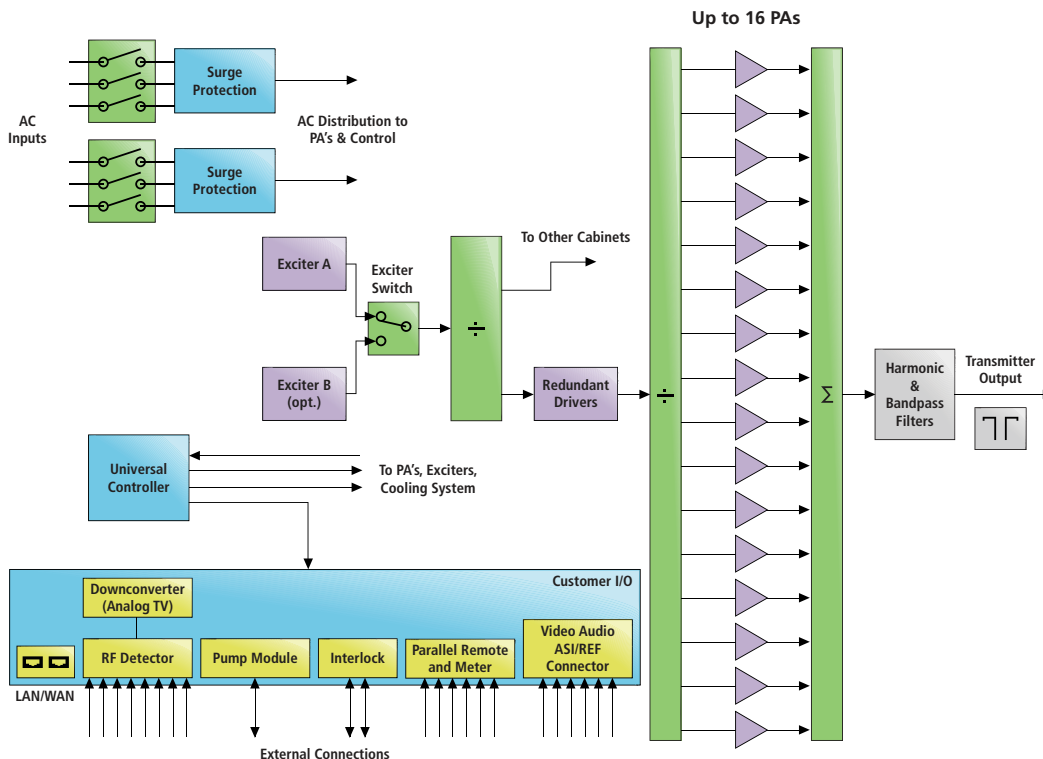
- **Reduced Service Costs**

Lightweight, universal power amplifier 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 installations — monitoring and controlling each transmitter system, input stream and RF switching.

Configuration



Features

RF Connection

Each Maxiva ULX transmitter has a main RF output located at the top of the cabinet and multiple samples for test use.

Apex M2X Exciters

Maxiva™ ULX supports dual Apex M2X multimedia exciters for maximum redundancy and performance.

Integrated Transmitter Control System

The transmitter control unit (TCU) provides front-panel display with color touch-screen GUI and control, as well as full system operation via remote TCP/IP connectivity.

Redundant Pre-Drivers

Hot-Pluggable Dual RF Driver Modules

RF Power Modules

Hot-pluggable RF power modules provide compact linear power for all analog, digital and mobile standards. Each module holds four field-replaceable RF pallet sub-assemblies for simple repair.

Power Supplies

Each RF module contains eight independent, fully regulated, DC power modules to provide power to each individual RF device.

Cooling System

(mounted away from transmitter and not shown)

The Maxiva ULX transmitter includes an efficient liquid cooling system with a remotely located pump module and heat exchanger system with connections to the RF modules. This removes the operational heat from the transmitter room.



Maxiva™ ULX

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., 3-1/8 in., 4-1/16 in., 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 Range	32° to 113° F (0° to 45° C) at sea level (upper limit derated 35.6° F (2° C) per 984 ft (300 m) elevation AMSL)
Humidity	95%, non-condensing
Cooling Method	Liquid (50% mixture of water and ethylene glycol or propylene glycol)
Acoustic Noise	< 65 dBA (measured 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 60 kW available (higher powers on request)
Analog Video Performance	
Video Input	2 inputs 75 ohms, 0.7 to 1.4 V, 75 ohm, 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 & Delay	3% total baseline distortion
Spurious (Inter-Modulation) & Harmonic Radiation	-60 dB or better
In-Channel Intermodulation Distortion	-60 dB or better
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 75µS or 50µS
Frequency Response	±0.5 dB, 40 Hz to 15 kHz
Harmonic Distortion	0.5%, 30 Hz to 15 kHz
FM Noise	60 dB r.m.s. with de-emphasis
AM Noise	50 dB r.m.s. from 30 Hz to 15 kHz
Synchronous AM Noise	40 dB r.m.s. at 400 Hz with ±25 kHz deviation
IRT Sound	Available on request
NICAM Sound	Available on request

DVB-T / ISDB-T_B Specifications

Power Output (Average)	1 to 18 kW models available; measured at output of optional mask filter
Systems	DVB-T, standard ETS 300744, ISDB-T _B – Brazil standard
ASI Inputs	4 type BNC female; 75 ohms acc. to EN 50083-9 (2 main /2 hierarchical)
Output power reduction	0 dB to -6 dB
Crest factor	Max. 13 dB
Shoulder Level	< -37 dB (before mask filter)
END	≤ 0.7 dB
MER	> 34 dB
Harmonics (before filter)	< -40 dB
Central carrier Suppression	> 75 dB
Frequency stability (without external reference)	± 150 Hz/month
Frequency Offsets	2 MHz resolution

ATSC Specifications

Power Output (Average)	1.5 to 24.6 kW models available; measured at output of optional mask filter
System	ATSC A-53, 8-VSB DTV standard
Data Input	Data 19.39 Mb/s Impedance 75 ohms, unbalanced Standard SMPTE 310M Connector 2 BNC female, isolated
External Precise Frequency Input	Frequency 10 MHz, sinusoidal Impedance 50 ohms, unbalanced Level 0 to +10 dBm Connector BNC 50 ohm, 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

Remote Control

Parallel REMOTE	DB-37, female
Relay Contacts	25 mA @ 24 V DC
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 35.6° F (2° C) per 1000 ft (305 m) above mean sea level.

ONE Company for Workflow Solutions Throughout the Media Chain

Harris is the ONE company delivering interoperable workflow solutions across the entire media delivery chain — providing today's broadcaster with a single, integrated approach to capitalize on the benefits of IT and mobile applications. By providing unparalleled interoperability across our product portfolio, Harris is able to offer customers integrated solutions that improve workflows, save money, enable new revenue streams and provide a migration path to emerging media business models. To meet the evolving needs of broadcast, distribution, government agencies and entertainment businesses, Harris is the ONE answer for change.

Service And Support

At Harris, we are committed to customer service excellence. It is our goal to provide the highest level of support by applying a simple rule: We take ownership of helping our customers succeed. Our support teams consist of innovative technical experts who support all situations regarding product performance, integration and operational processing. We are adept at providing proven solutions, making workflows better and ensuring reliability of the product and system. At Harris, our experienced and dedicated teams stand ready to help you meet your goals for premium product performance, 100% up-time and reduced maintenance investment.

Warranty

Because we want to assure you that Harris stands beside its products and system solutions, our products carry a standard set of warranty services, which are competitive with — and in some cases outperform — others in the industry.

Service Packages

We offer value-add services that allow you to customize the level of services you need in meeting mission-critical performance levels. Our service package options offer many ways to upgrade your standard warranty by choosing the All-Inclusive OnePak, or by selecting individual services from our extensive portfolio. Our service and support advisors can assist in the selection of the individual services that best suit your requirements.

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For more information, please visit www.broadcast.harris.com/maxiva.

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