



MAGMA SERIES
PRODUCT CATALOG
HIGH POWER
LIQUID COOLED SOLID STATE
UHF TV TRANSMITTER

BROADBAND

**25KW IN A
SINGLE
CABINET**



**REDUNDANT
HOT
SWAPPABLE
POWER
SUPPLIES**



The Magma Series – Forging a New Path

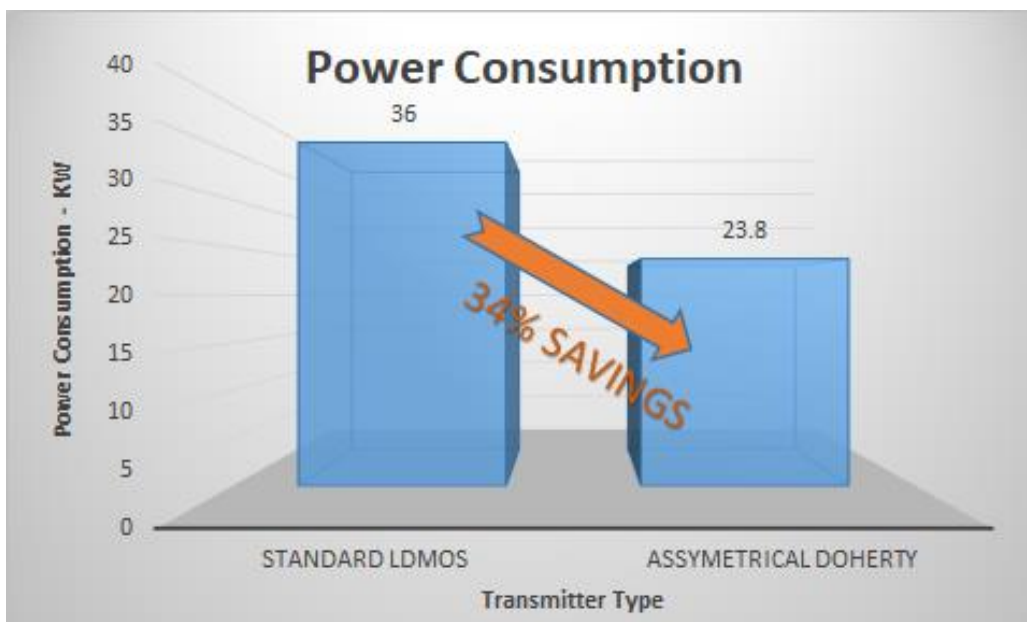
Introduction

The Anywave **MAGMA** series of Liquid Cooled TV transmitters provides the broadcaster with the greatest power density and highest operating efficiencies in digital transmitters today. The **MAGMA** series delivers a broadband solution with peak levels of performance and reliability. These Solid State transmitters range in output power from 5kW ATSC (4kW OFDM) to 150kW ATSC (120kW OFDM), with 25kW ATSC output from a single rack. They operate across all modulation standards including DVB-T/H, DVB-T, DVB-T2, ATSC, ATSC3.0, ISDB-T and DTMB. The **MAGMA** series incorporates the powerful correction capabilities of the ACT 5X+ or 9X digital exciter platforms.



Key Facts

- ✓ Multi-standard capability: DVB-T/H, DVB-T, DVB-T2, ATSC, ATSC3.0, ISDB-T and DTMB
- ✓ Transmitter efficiency up to 45% (amplifier efficiency > 50%)
- ✓ Implements latest state-of-the-art Asymmetrical Broadband Doherty Technology
- ✓ 16 x BLF888E (ultra high efficiency, Broadband) transistors provide power densities of 2.8kW (ATSC) per amplifier
- ✓ Modular for better reliability and ease of maintenance
- ✓ Superior Liquid Cooling system incorporates Friction Stir Welded and Graphene Enhanced Thermal Management technologies
- ✓ Optitune™ technology automatically optimizes performance and efficiency at any power level
- ✓ Redundant hot swappable Power Supply Units
- ✓ Built-in AVQ performance monitoring
- ✓ Remote monitoring and control via Web Browser and SNMP



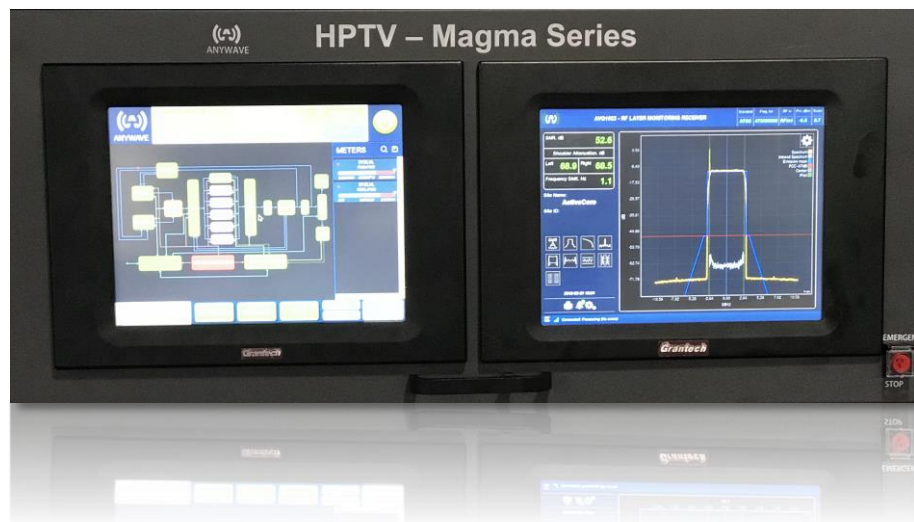
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General Overview

The Anywave **MAGMA** series implements the latest state of the art devices and technologies, forging a new path in high efficiency, high power, liquid cooled transmitter design. Dual front panel touchscreen monitors provide easy navigation and control as well as detailed operation and performance monitoring of the entire system. With over 450 self-monitoring sensors, the **MAGMA** LDAS preventive monitoring system side-steps problems before they occur - providing greater peace of mind.



Innovative DDRF™ (Direct Digital RF) broadband automatic balancing technology achieves near perfect RF performance with shoulder levels exceeding -60 dB and out of band spurious also greater than -60 dB, all based on an ultra low noise floor.

The transmitter includes a digital ultra-wideband phase noise processing technology that automatically detects and compensates phase noise to achieve unparalleled performance.



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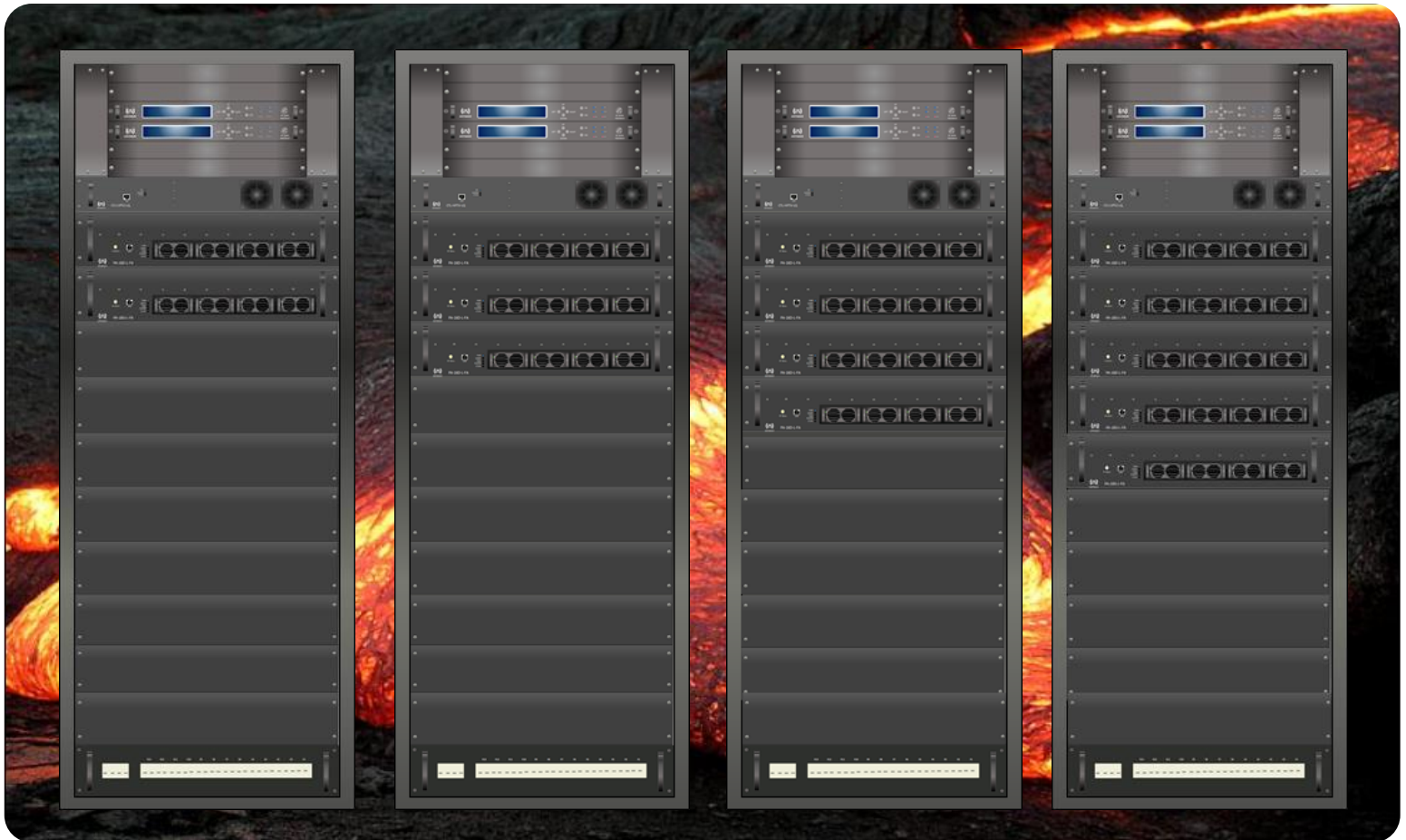


5.0 kW ATSC
4.0 kW OFDM

7.5 kW ATSC
6.0 kW OFDM

10.0 kW ATSC
8.0 kW OFDM

12.5 kW ATSC
10.0 kW OFDM



“Magma ... a hot fluid or semifluid material below or within the earth's crust from which lava and other igneous rock is formed by cooling...”

The Magma Series

- forging a new path



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The Anywave **MAGMA SERIES** of Liquid Cooled TV transmitters provides the broadcaster with the greatest power density and highest operating efficiencies in digital transmitters today. Up to 25kW ATSC output with unparalleled performance in a single cabinet.

15.0 kW ATSC
12.0 kW OFDM

20.0 kW ATSC
16.0 kW OFDM

25.0 kW ATSC
20.0 kW OFDM



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The Anywave **MAGMA SERIES** - Combine 2 to 6 cabinets to produce up to 150 kW ATSC output power.

50.0 kW ATSC
40.0 kW OFDM

150.0 kW ATSC
120.0 kW OFDM



Highest Power Density

- 16 x BLF888E (ultra high efficiency, Broadband) transistors per 3RU Amplifier delivers highest power density available today
- 10 PAs in a single rack provides 25kW liquid cooled TX with smallest footprint available today
- Combining up to 6 cabinets produces 150 kW ATSC output power



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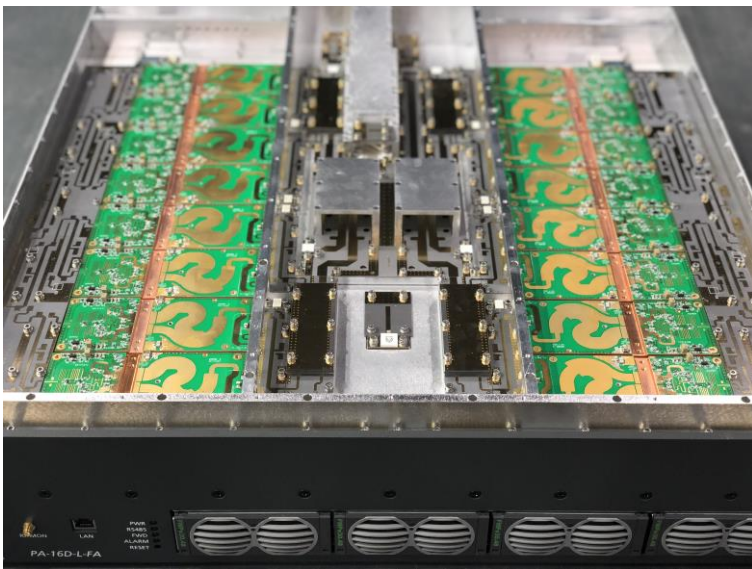
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Intelligent System Design



- 4 x 3000W (100% redundant) hot-swappable high-capacity power supplies per PA
- Telco grade AC/DC PSU, self current balancing with variable speed controlled fans



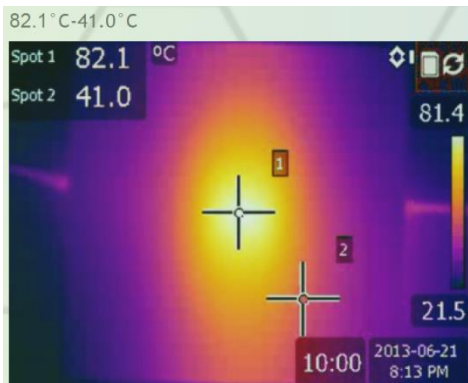
- Redundant & Smart Pumps, Blowers, and Fans operate at reduced optimal levels, even with a failed AC mains phase
- Over 450 self-monitoring system sensors (power levels, voltages, currents, temps, pressures, flows, equipment status, etc.)

Intelligent Self-monitoring System = Easy to operate

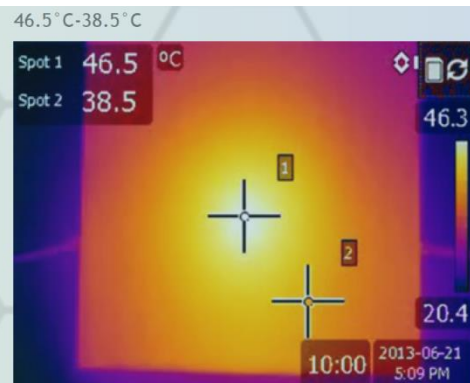




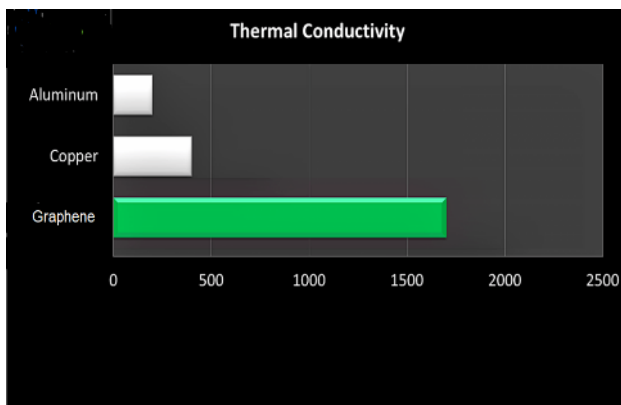
Friction Stir Welding and Graphene Enhanced Thermal Management Technology



Without Graphene



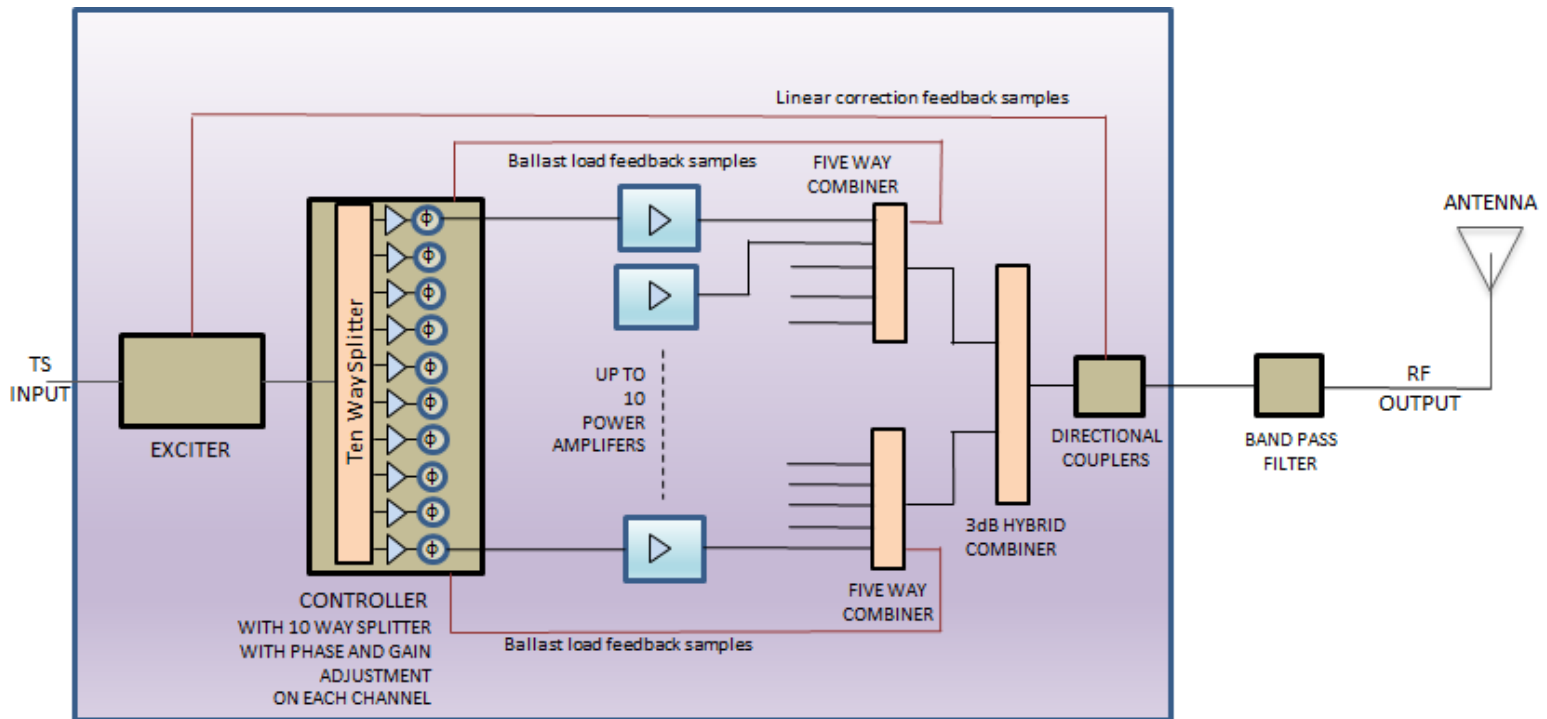
With Graphene



- Graphene's heat conductivity is 4 times better than copper and 8 times better than aluminum
- Friction Stir Welding provides best thermal performance - one piece, same material, lower pressure drop - long life, more reliable operation with balanced parallel cooling
- Cooler operation means better performance, higher reliability, and longer life



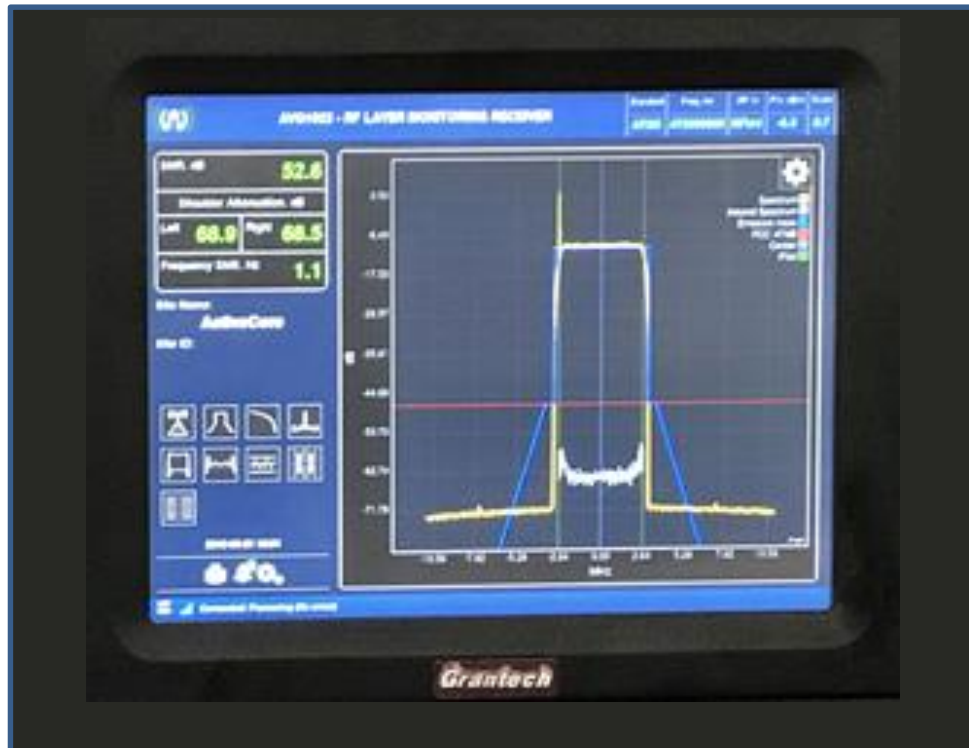
Optitune™ Technology



- Self-calibrating, automatic, adaptive phase and gain matching of all PA modules (up to 10 amplifier modules per cabinet, up to 6 cabinets)
- Automatically balances entire system in gain and phase within 10 minutes to achieve maximum output power (minimizes combiner losses) and optimal operating efficiency (minimizes operating costs)



AVQ Monitoring



- Real time signal quality monitoring including spectrum, shoulders, constellation diagram, eye diagram, MER, frequency response, impulse response, group delay, CCDF, etc.
- Built-in performance monitoring eliminates the need for costly test equipment
- Upgradable to ATSC3.0



Exciter Specifications



Signal Inputs

- TS Inputs: 2 Transport Stream with loop out, DVB-ASI only
Connector: BNC female 75 Ω
- RF Input: Frequency: VHF or UHF
Bandwidth: 6 MHz
Connector: BNC female 50 Ω
Level: -85 dBm ~ -15 dBm
AWGN TOV: ≤ 16 dB (A/53 operation)
Equalization Range (-1 μ s ~ 0 μ s): ≤ -2 dB
Equalization Range (0 μ s ~ 17 μ s): ≤ -3 dB
Adjacent Channel Rejection ($N \pm 1$): > 30 dB

Signal Processing

- Bandwidth: 6 MHz
- Supported Mode: ATSC
- Network Mode: MFN

RF Output

- Connector (RF Out): N-Type female 50 Ω
- Frequency: VHF/UHF in steps of 1 Hz, spectrum shifting up to ± 50 KHz
- Level: -25 dBm ~ +5 dBm in steps of 0.05 dB
- Level Stability: $< \pm 0.1$ dB
- Frequency Stability: $< 0.5 \times 10^{-7}$ (with onboard 10MHz REF), or in accordance with the Ext. GPS accuracy
- Symbol Rate: 10.762238 MHz
- MER: > 40 dB
- Amplitude Flatness: $< \pm 0.5$ dB
- IMD Shoulder Level (± 500 kHz): < -60 dB
- Out of Band Spurious: < -60 dB
- Pilot Amplitude Error: $< \pm 0.1$ dB
- Return Loss: > 15 dB
- Phase Noise (@20 kHz): < -107 dBc/Hz

Reference Clock

Internal 10MHz

- Frequency Stability: $< \pm 0.05$ ppm
- Aging: $< \pm 0.05$ ppm/year
- Output level: 0 dBm ± 3 dB

External 10MHz

- Input Level: AC coupled V (p-p) > 300 mV
- Input Connector: BNC female 50 Ω

External 1PPS

- Input Level: TTL
- Input Connector: BNC female 50 Ω

Linear and Non-linear ADPC™

- Dual Feedback Signal: BNC female 50 Ω
- Feedback level: -35 dBm ~ 0 dBm (suggested value: -15 dBm ~ -5 dBm)
- Correction is Adaptive and Automatic: No additional instruments or manual operations needed
- Continuous measurement and display of SNR and IMD
- Correction of amplitude, phase and group delay
- Up to 10 dB of MER improvement
- Up to 15 dB of shoulder improvement
- In-band flatness: $< \pm 0.5$ dB

Other

- Power Supply: 88 ~ 264 VAC, 50/60Hz
- Operating Temperature: 0° C ~ 50° C (+32°F~+122°F)
- Operating Humidity: $\leq 95\%$
- Size: 1 RU, 19" Wide
- Weight: 10 LBS (net) / 15 LBS (gross)

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Cooling System



- Cooling system implements 100% redundant, most efficient pumps on the market with all stainless steel pipes
- 100% redundant heat exchanger blowers with individual temp and speed control
- Automatically analyzes system parameters, finds optimum settings and continuously adjusts operation to changes in demand – optimized performance with minimum energy consumption
- Cooling system can be integrated into the same rack for single transmitter with up to five PAs

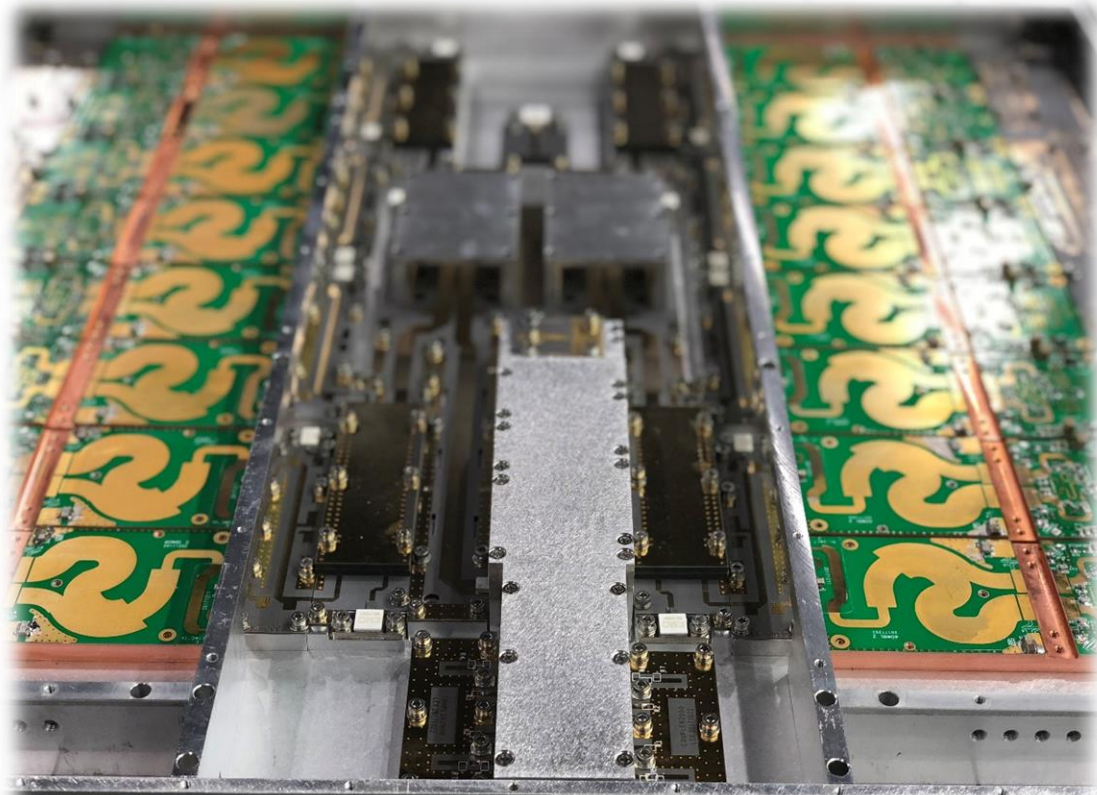


Power Requirements / Dimensions

HPTV Series - UHF							
Number of Amplifiers / rack	2	3	4	5	6	8	10
Output Power (RMS) ATSC ⁽¹⁾	5,900	8,890	11,900	14,200	17,000	22,650	28,300
Output Power (rms) ATSC ⁽²⁾	5,000	7,500	10,000	12,500	15,000	20,000	25,000
Output Power (RMS) COFDM ⁽¹⁾	4,700	7,100	9,500	11,400	13,600	18,100	22,600
Output Power (rms) COFDM ⁽²⁾	4,000	6,000	8,000	10,000	12,000	16,000	20,000
Output Connector	3 1/8"						
Height (inches / mm)	78 / 2000						
Width (inches / mm)	30 / 765						
Depth (inches / mm)	43.3 / 1100						
AC Input Voltage ⁽³⁾	208VAC or 277/480VAC Three ϕ						
AC Input Frequency	50 / 60 Hz						
Consumption - Max. - KW	14.0	21.2	28.3	33.8	40.5	53.9	67.4
Consumption - Typical - KW	12.8	19.3	25.9	30.9	37.0	49.2	61.5
Current Rating Per ϕ - Max. (A)	58.3	88.3	117.9	140.8	168.8	224.6	280.8

⁽¹⁾ Power measured before Band Pass Filter

⁽²⁾ Power measured after Band Pass Filter





General Specifications

Specifications		
Digital TV		
Standards		DVB-T/H, DVB-T, DVB-T2, ISDB-T, ATSC, ATSC 3.0, DTMB
Channel bandwidth	DVB-T, DVB-H	5 / 6 / 7 / 8 MHz
	DVB-T2	1.7 / 5 / 6 / 7 / 8 MHz
	ATSC	6 MHz
	ISDB-T	6/8 MHz
	DTMB	8 MHz
Inputs	DVB-T, DVB-H, DVB-T2, DTMB	2 × ASI (HP/LP), 75 Ω BNC, 2 × RJ-45
	ATSC	2 × SMPTE310M or 2 × ASI, 75 Ω BNC, 2 × RJ-45
	ISDB-T	2 × BTS, 75 Ω BNC, 2 × RJ-45
		2 x ETI, BNC 75 Ω/high impedance, 2 x RJ-45
General data		
Frequency range	UHF bands IV/V	470 MHz to 862 MHz
Supply voltage		220 V; Single-phase, 3 wire (L1,L2,GND)
		208 V; 3-phase, 4 wire (L1,L2,L3,GND)
Max. installation altitude	> 2000m on request	2000 m above sea level
Operating temperature range		+1 °C to +45 °C
Relative humidity (max.)		95 %, non-condensing
Synchronization		
Reference frequency		10 MHz, 0.3 V to 5 V (V_{pp}) or TTL, BNC
Reference pulse		1 Hz, TTL, BNC
Operation		
Display unit with touchscreen and LEDs		local operation and display
Ethernet interface, RJ-45		local, remote, standard web browser
		network management interface via SNMP
Parallel remote interface		floating contacts for messages and commands

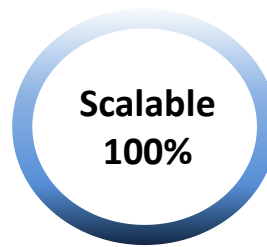


Ordering Information

ORDERING INFORMATION			
MODEL	PART NUMBER	DESCRIPTION	TPO (W) *
UHF HPTV - Magma Series Transmitters - ATSC			
TRN-5X+U-216D-L	103305.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (2) Hi-Eff PA	5,000
TRN-5X+U-316D-L	103306.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (3) Hi-Eff PA	7,500
TRN-5X+U-416D-L	103307.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (4) Hi-Eff PA	10,000
TRN-5X+U-516D-L	103308.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (5) Hi-Eff PA	12,500
TRN-5X+U-616D-L	103309.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (6) Hi-Eff PA	15,000
TRN-5X+U-716D-L	103310.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (7) Hi-Eff PA	17,500
TRN-5X+U-816D-L	103311.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (8) Hi-Eff PA	20,000
TRN-5X+U-916D-L	103312.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (9) Hi-Eff PA	22,500
TRN-5X+U-1016D-L	103313.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (10) Hi-Eff PA	25,000
TRN-5X+U-21016D-L	103325.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (20) Hi-Eff PA	50,000
TRN-5X+U-31016D-L	103326.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (30) Hi-Eff PA	75,000
TRN-5X+U-41016D-L	103327.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (40) Hi-Eff PA	100,000
UHF HPTV - Magma Series Transmitters - OFDM			
TRN-9X-U-216D-L	103316.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (2) Hi-Eff PA	4,000
TRN-9X-U-316D-L	103317.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (3) Hi-Eff PA	6,000
TRN-9X-U-416D-L	103318.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (4) Hi-Eff PA	8,000
TRN-9X-U-516D-L	103319.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (5) Hi-Eff PA	10,000
TRN-9X-U-616D-L	103320.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (6) Hi-Eff PA	12,000
TRN-9X-U-716D-L	103321.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (7) Hi-Eff PA	14,000
TRN-9X-U-816D-L	103322.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (8) Hi-Eff PA	16,000
TRN-9X-U-916D-L	103323.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (9) Hi-Eff PA	18,000
TRN-9X-U-1016D-L	103324.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (10) Hi-Eff PA	20,000
TRN-9X-U-21016D-L	103330.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (10) Hi-Eff PA	40,000
TRN-9X-U-31016D-L	103331.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (30) Hi-Eff PA	60,000
TRN-9X-U-41016D-L	103332.01	Transmitter UHF, Liq Cooled w/ (2) Exciters & (40) Hi-Eff PA	80,000
EXCITER			
EXC-INC-DVB	100032.01	Modulation Standard DVB/DVBT2	
EXC-INC-ATSC	100032.02	Modulation Standard ATSC A/65	
EXC-INC-ISDB	100032.03	Modulation Standard ISDBT	
EXC-OPT-PSIP	100033.01	PSIP and TSID Edit	
EXC-OPT-SFN	100033.02	SFN	
EXC-OPT-GPS	100033.03	GPS	
EXC-OPT-TSIP	100033.04	Transport Stream over IP Input	
EXC-OPT-PQM	100033.06	Performance Quality Monitoring System Software	
EXC-OPT-ANA	100033.07	Analog option for 9X	
EXC-OPT-SPF	100034.08	Still Picture Feature, Full TS gen. 10 programs	
EXC-OPT-RFASI	100034.09	ASI loop thru' from RF Input, RF demodulator to ASI	
EXC-OPT-EASIPS	100037.10	EAS IP/ASI Switch with PSIP Insertion and PID remapping	
EXC-OPT-DIGUP	100035.10	Digital Upgrade of Analog 9X Series Exciter to any standard	
OTHER			
IP-ENP-5	100038.01	IP Encapsulator with ASI input IP-RJ45 Output	
RF-PM-UTV	200820.01	RF Power Meter, UHF input includes FWD, RFL and Temp meas.	
RF-PM-VTV	200821.01	RF Power Meter, VHF input includes FWD, RFL and Temp meas.	
RF-PM-RM	200823.01	RF Power Meter, 19" Rack mount Hardware	
TE-RX-19RU-B	200700.01	RF Monitoring Receiver, Rack Mount - Basic	
TE-RX-19RU-E	200701.01	RF Test Receiver, Rack Mount - Enhanced	
TE-RX-PORT-B	200702.01	RF Monitoring Receiver, Portable - Basic	
TE-RX-PORT-E	200703.01	RF Test Receiver Portable, - Enhanced	
TE-RX-19-B-3.0UPG	200704.01	RF Monitoring Receiver ATSC3.0 SW Upgrade	
TE-RX-19-E-3.0UPG	200705.01	RF Test Receiver ATSC3.0 SW Upgrade	
TE-RX-SW-UPG	200706.01	Additional standards licenses: DVB-T/T2, ISDB-T, DAB, HDR	

* Power After BPF





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