ANYWAVE

MAGMA SERIES
PRODUCT BROCHURE

HIGH POWER LIQUID COOLED SOLID STATE UHF TV TRANSMITTER

BROADBAND

REDUNDANT HOT SWAPPABLE POWER SUPPLIES

25KW IN A SINGLE CABINET

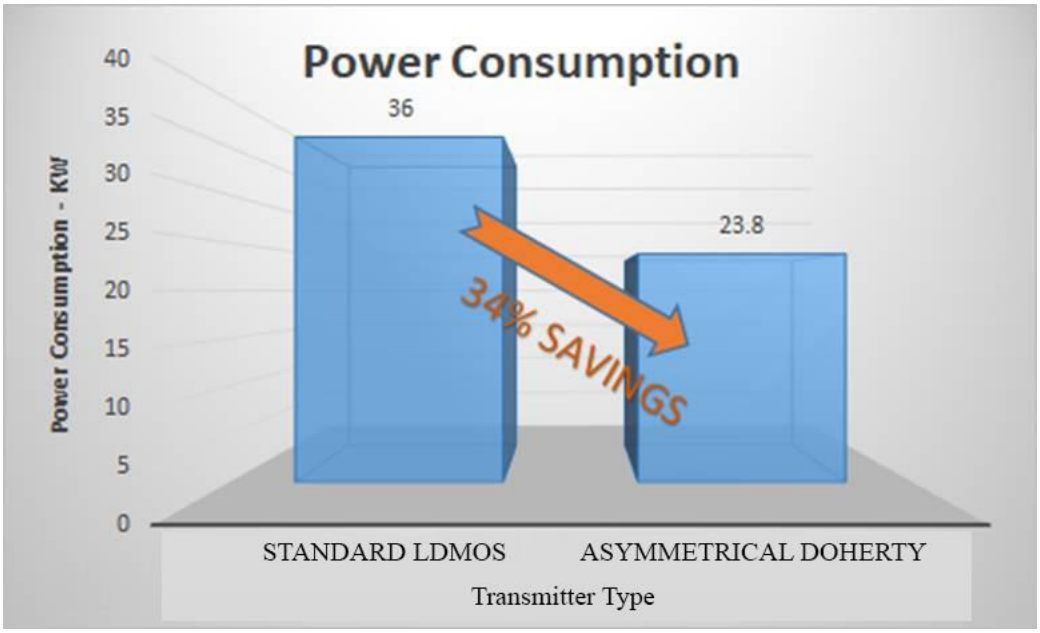
The **Magma Series –** Forging a New Path

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 UHF solution (CH14 – CH36) with peak levels of performance and reliability. These Solid State transmitters range in output power from 2.5KW ATSC/OFDM to 150KW ATSC/OFDM, with up to 25KW ATSC output from a single rack. They operate across all digital TV standards including DVB-T, DVB-T2, ATSC, ATSC3.0, ISDB-T and DTMB. The ***MAGMA*** series incorporates the powerful correction capabilities of the Anywave digital exciter platforms.

Key Facts

- ✓ Multi-standard capability: DVB-T, DVB-T2, ATSC, ATSC3.0, ISDB-T, DTMB, NTSC, and PAL
- ✓ Implements latest state-of-the-art Asymmetrical Broadband Doherty Technology with Transmitter efficiency up to 40% (UHF)
- ✓ Modular for better reliability and ease of maintenance
- ✓ Superior Liquid Cooling system incorporates Friction Stir Welded Enhanced Thermal Management and an all stainless steel design
- ✓ Optitune™ technology automatically optimizes performance and efficiency at any power level
- ✓ Redundant hot swappable Power Supply Units
- ✓ Built-in AVQ performance monitoring optional
- ✓ Remote monitoring and control via Web Browser and SNMP



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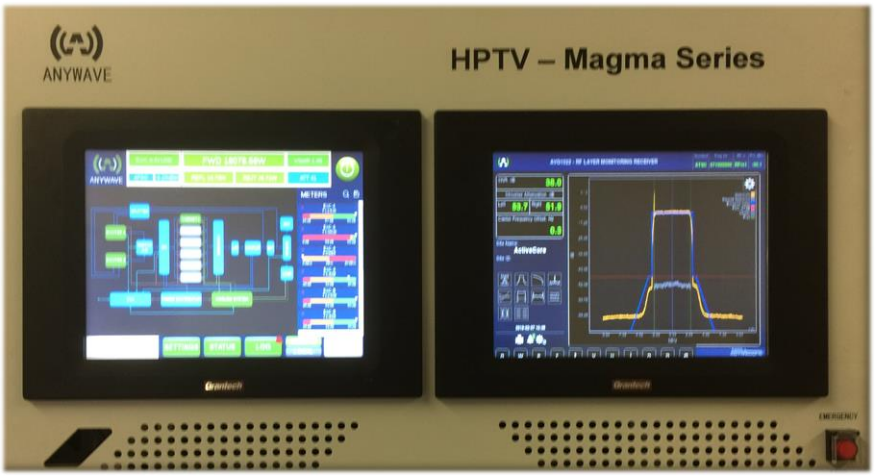
General Overview

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*** 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 5.0 kW OFDM	7.5 kW ATSC 7.5 kW OFDM	10.0 kW ATSC 10.0 kW OFDM	12.5 kW ATSC 12.5 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 15.0 kW OFDM	20.0 kW ATSC 20.0 kW OFDM	25.0 kW ATSC 25.0 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
50.0 kW OFDM

150.0 kW ATSC
150.0 kW OFDM

Highest Power Density

- 16 x ultra high efficiency broadband power 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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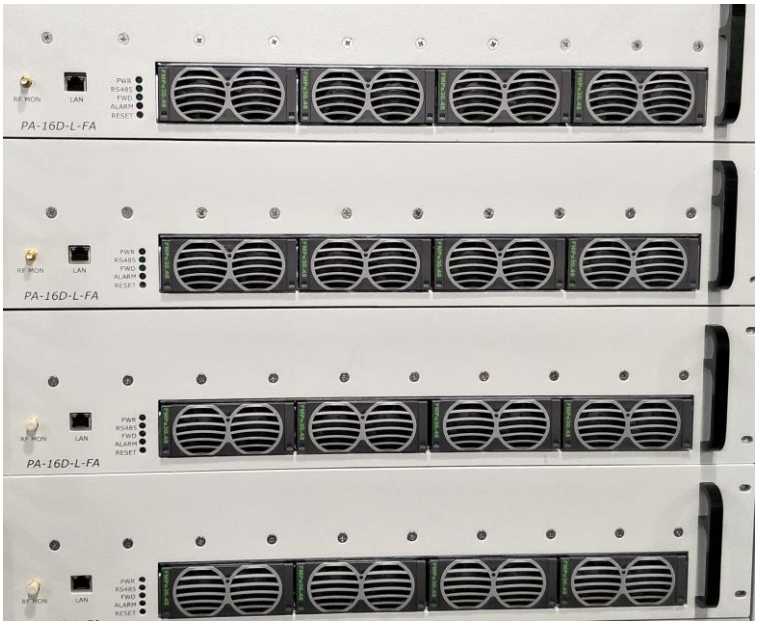
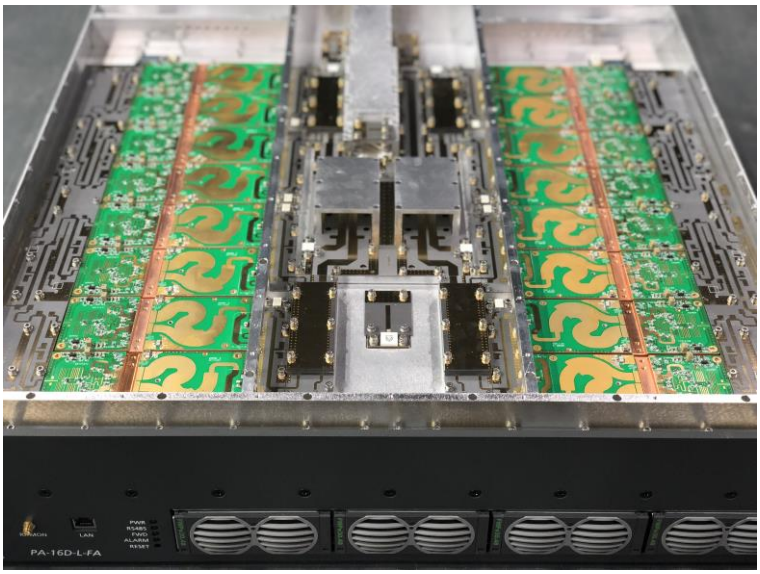
Intelligent System Design





Intelligent Self-monitoring System = Easy to operate

- 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.)
- Friction Stir Welding provides best thermal performance - one piece, same material, lower pressure drop - long life, more reliable operation with balanced parallel cooling

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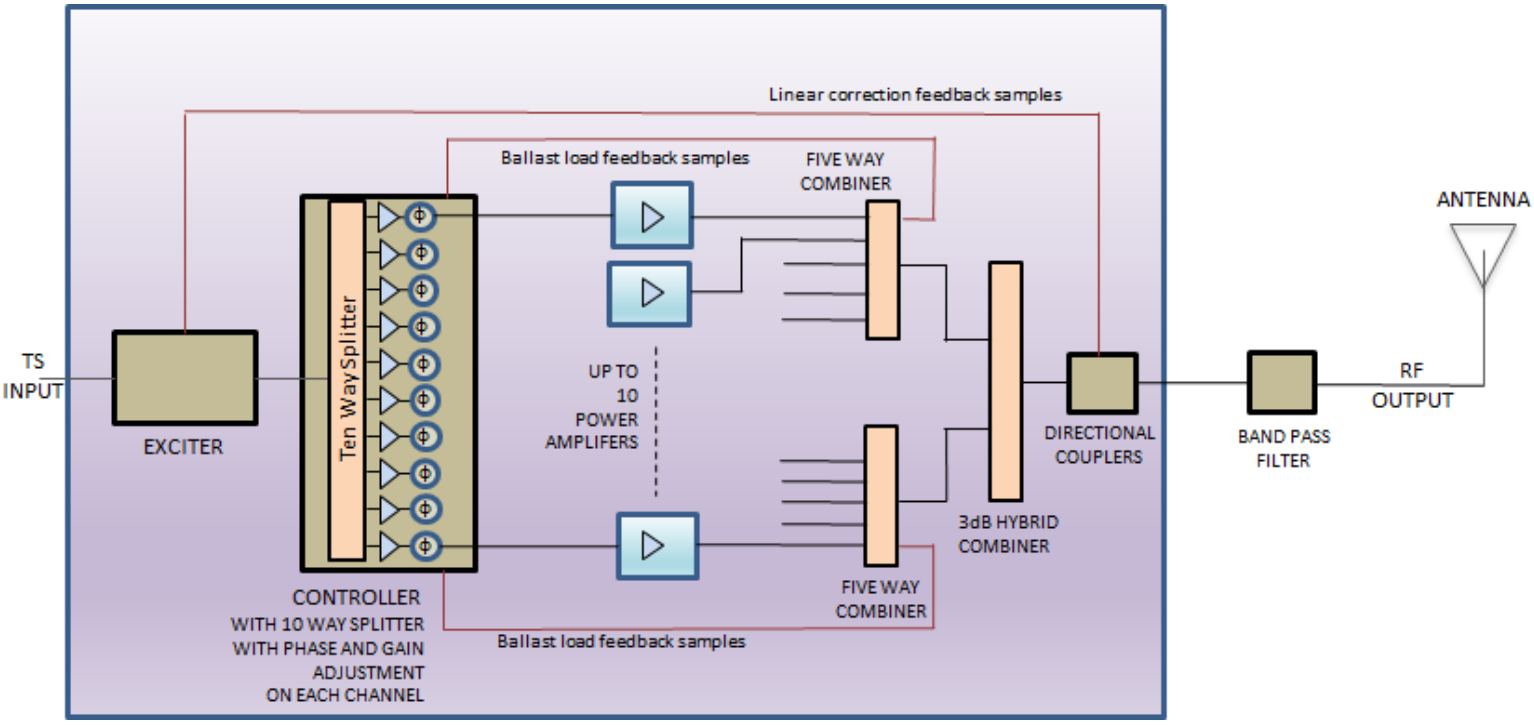
Optitune™ Technology



- 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)

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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

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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 (ATSC A/53 operation)
  Equalization Range (-1 μs ~ 0 μs): ≤ -2 dB
  Equalization Range (0 μs ~ 17 μs): ≤ -3 dB
  Adjacent Channel Rejection (N ± 1): > 30 dB

Signal Processing
- Bandwidth: 6, 7, or 8 MHz
- Supported Modes: ATSC, ATSC 3.0, DVB-T/T2, ISDB-T, DTMB
- Network Mode: MFN, SFN

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: < ± 0.1 dB
- Frequency Stability: < 0.5 x 10^{-7} (with onboard 10MHz REF), or in accordance with the Ext. GPS accuracy
- Symbol Rate: 10.762238 MHz (ATSC)
- MER: > 40dB
- Amplitude Flatness: < ± 0.5 dB
- IMD Shoulder Level (± 500 kHz): < -60 dB
- Out of Band Spurious: < -60 dB
- Pilot Amplitude Error: < ± 0.1 dB (ATSC)
- Return Loss: > 15 dB
- Phase Noise (@20 kHz): < -107 dBc/Hz

Reference Clock
Internal 10MHz
- Frequency Stability: < ± 0.05 ppm
- Aging: < ± 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: < ± 0.5 dB

Other
- Power Supply: 88 ~ 264 VAC, 50/60Hz
- Operating Temperature: 0° C ~ 50° C (+32°F~+122°F)
- Operating Humidity: ≤ 95%
- Size: 1 RU, 19” Wide
- Weight: 15 LBS

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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

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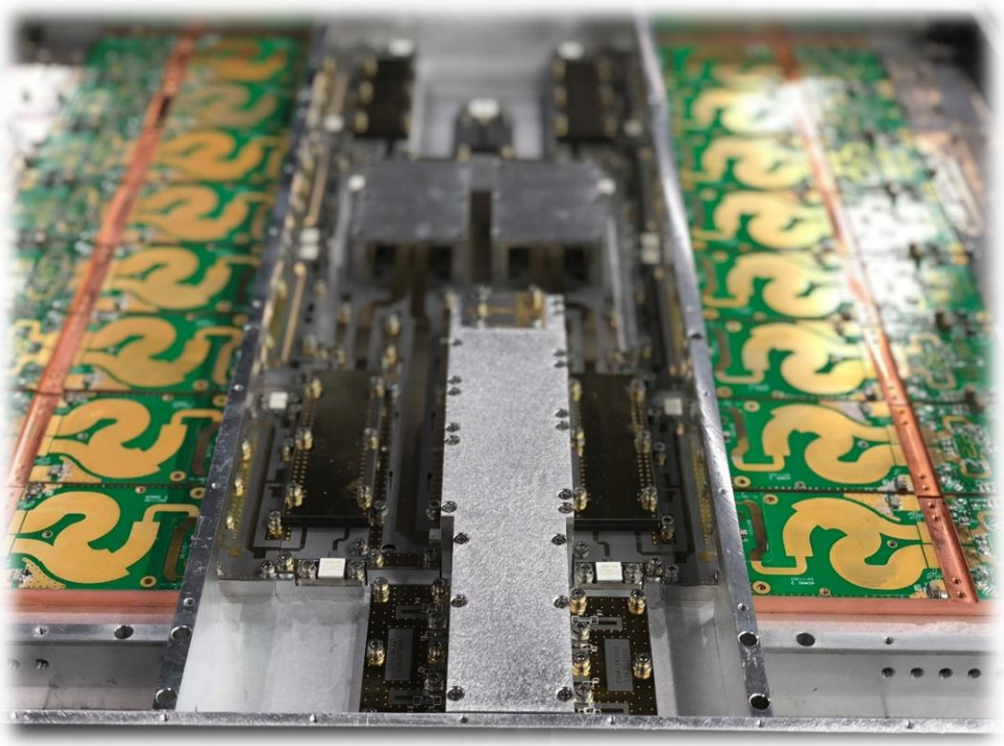
Power Requirements / Dimensions

HPTV Series - UHF [1]								
Standard	All [2]							
Number of Amplifiers / rack	1	2	3	4	5	6	8	10
Output Power (RMS) ATSC	2,500	5,000	7,500	10,000	12,500	15,000	20,000	25,000
Output Power (RMS) COFDM	2,500	5,000	7,500	10,000	12,500	15,000	20,000	25,000
Output Power (Peak) Analog	5,750	11,500	17,250	20,000	N/A	32,000	N/A	N/A
Output Connector	1-5/8"		3-1/8"			4-1/16"		
Height (inches / mm)	77.2 / 1960							
Width (inches / mm)	30 / 760							
Depth (inches / mm)	47.3 / 1200							
AC Input Voltage	208 VAC, three phase							
AC Input Frequency	50 / 60 Hz							
Consumption - ATSC 1.0 - KW	6.25	12.5	18.8	25.0	31.3	37.5	50.0	62.5
Current Rating Per ϕ - ATSC 1.0 - A	17.3	34.7	52.1	69.5	86.8	104.2	139	173.7
Consumption - OFDM - KW	6.25	12.5	18.8	25.0	31.3	37.5	50.0	62.5
Current Rating Per ϕ - OFDM - A	17.3	34.7	52.1	69.5	86.8	104.2	139	173.7
Consumption - Analog (Peak) - KW	10	20.0	30.0	37.1	N/A	59.4	N/A	N/A
Current rating per ϕ - Analog - A	27.8	55.6	83.4	103.1	N/A	165.1	N/A	N/A

(1) Power measured before Band Pass Filter

(2) Standards include ATSC, ATSC 3.0, DVB-T, DVB-T2, ISDB-T, CMMB, DTMB, NTSC, PAL



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General Specifications

Specifications		
Digital TV		
Standards		DVB-T, DVB-T2, ATSC, ATSC3.0, ISDB-T, DTMB
Channel bandwidth	DVB-T	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-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	470 MHz to 700 MHz
Supply voltage		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 - ref 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

Cost Effective 100%

Reliable 100%

Scalable 100%

Dependable 100%

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