Magma Series
Product Catalog

High Power
Liquid Cooled Solid State
VHF Band I TV Transmitter

Broadband
10kW 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 VHF Band I Solid State transmitters range in output power from 10kW ATSC (8kW OFDM) to 40kW ATSC (32kW OFDM), with 10kW 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
✓ 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
ANYWAVE
COMMUNICATION TECHNOLOGIES

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.
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

10.0 kW ATSC
8.0 kW OFDM
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

- 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 (8 amplifier modules per cabinet, up to 4 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)
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 (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

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

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: < ± 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
- 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
- Return Loss: > 15 dB
- Phase Noise (@20 kHz): < -107 dBC/Hz

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: 10 LBS (net) / 15 LBS (gross)
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 - VHF Band I

<table>
<thead>
<tr>
<th>Number of amplifiers/rack</th>
<th>Number of racks</th>
<th>Output Power (RMS)(ATSC 1.0)</th>
<th>Output Power (RMS)(COFDM)</th>
<th>Output connector</th>
<th>Height (inches/mm)</th>
<th>Width (inches/mm)</th>
<th>Depth (inches/mm)</th>
<th>AC input voltage</th>
<th>AC input frequency</th>
<th>Consumption - typical - kW</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>1</td>
<td>10000</td>
<td>8000</td>
<td>3-1/8&quot;</td>
<td>78/2000</td>
<td>30/765</td>
<td>43.3/1100</td>
<td>380 VAC Wye, 3 phase, 5 wire</td>
<td>50/60 Hz</td>
<td>40,000</td>
</tr>
<tr>
<td>8</td>
<td>2</td>
<td>20000</td>
<td>16000</td>
<td></td>
<td></td>
<td>60/1530</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>3</td>
<td>30000</td>
<td>24000</td>
<td></td>
<td></td>
<td>90/2295</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>4</td>
<td>40000</td>
<td>32000</td>
<td></td>
<td></td>
<td>120/3060</td>
<td></td>
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</tr>
</tbody>
</table>

**AC input voltage:** 380 VAC Wye, 3 phase, 5 wire

**AC input frequency:** 50/60 Hz

**Consumption - typical - kW:**

- 40,000
- 80,000
- 120,000
- 160,000
## General Specifications

### Specifications

**Digital TV**

<table>
<thead>
<tr>
<th>Standards</th>
<th>DVB-T/H, DVB-T, DVB-T2, ISDB-T, ATSC, ATSC 3.0, DTMB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channel bandwidth</td>
<td>DVB-T, DVB-H 5/6/7/8 MHz</td>
</tr>
<tr>
<td></td>
<td>DVB-T2 1.7/5/6/7/8 MHz</td>
</tr>
<tr>
<td></td>
<td>ATSC 6 MHz</td>
</tr>
<tr>
<td></td>
<td>ISDB-T 6/8 MHz</td>
</tr>
<tr>
<td></td>
<td>DTMB 8 MHz</td>
</tr>
<tr>
<td>Inputs</td>
<td>2 x ASI (HP/LP), 75 Ω BNC, 2 x RJ-45</td>
</tr>
<tr>
<td></td>
<td>DVB-T, DVB-H, DVB-T2, DTMB</td>
</tr>
<tr>
<td></td>
<td>ATSC 2 x SMPTE310M or 2 x ASI, 75 Ω BNC, 2 x RJ-45</td>
</tr>
<tr>
<td></td>
<td>ISDB-T 2 x BTS, 75 Ω BNC, 2 x RJ-45</td>
</tr>
<tr>
<td></td>
<td>2 x ETI, BNC 75 Ω/high impedance, 2 x RJ-45</td>
</tr>
</tbody>
</table>

### General data

<table>
<thead>
<tr>
<th>Frequency range</th>
<th>VHF Band I 54-88 MHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>220 V, Single-phase, 3 wire (L1,L2,GND)</td>
</tr>
<tr>
<td></td>
<td>208 V, 3-phase, 4 wire (L1,L2,L3,GND)</td>
</tr>
<tr>
<td>Max. installation altitude</td>
<td>&gt; 2000m on request</td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>+1 °C to +45 °C</td>
</tr>
<tr>
<td>Relative humidity (max.)</td>
<td>95 %, non-condensing</td>
</tr>
<tr>
<td>Synchronization</td>
<td></td>
</tr>
<tr>
<td>Reference frequency</td>
<td>10 MHz, 0.3 V to 5 V (V_{pp}) or TTL, BNC</td>
</tr>
<tr>
<td>Reference pulse</td>
<td>1 Hz, TTL, BNC</td>
</tr>
</tbody>
</table>

**Operation**

- Display unit with touchscreen and LEDs: local operation and display
- Ethernet interface, RJ-45: local, remote, standard web browser
- Parallel remote interface: network management interface via SNMP
- Floating contacts for messages and commands
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