GRANITE SERIES
PRODUCT CATALOG

MEDIUM HIGH POWER
AIR COOLED SOLID STATE
UHF TV TRANSMITTER

BROADBAND
REDUNDANT
POWER
SUPPLIES
AIR COOLED
11.2 KW IN A
SINGLE
CABINET

The Granite Series – Like a rock
Introduction

The Anywave GRANITE series of Air Cooled UHF TV transmitters provides the broadcaster with the latest state-of-the-art digital transmitter design. The GRANITE series delivers the highest levels of performance and reliability without costing you extra. The power capability of these forced air cooled Solid State (50V LDMOS technology) transmitters range from (all before filter) 1.4kW ATSC (1.2kW OFDM) to 11.2kW ATSC (9.6kW OFDM). They operate across all modulation standards including DVB-T/H, DVB-T, DVB-T2, ATSC, ATSC3.0, ISDB-T and DTMB. The GRANITE 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
- 8 x BLF888E (ultra high efficiency, Broadband) transistors provide power densities of 1.3kW (ATSC) per amplifier
- Modular for better reliability and ease of maintenance
- Optitune™ technology automatically optimizes performance and efficiency at any power level
- Redundant hot swappable Power Supply Units
- Simple and Efficient Front-to-Back Air Cooling with fan speed control and Graphene Enhanced Thermal Management technologies
- LCD Touch Screen Control System
- Remote monitoring and control via Web Browser and SNMP
General Overview

The MHPTV transmitter is easily configured to operate as a standard transmitter or as an RF translator. 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.

Independent feedback for adaptive SWR optimization function maximizes emission signal quality after the transmitter band-pass filter (BPF). The system level AGC (Automatic Gain Control) function includes both RF and DC AGC feedback obtaining a stable output power and performance.

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

The front panel of the transmitter includes a user friendly graphical display for control and status monitoring including a real time measurement and display of the shoulder levels and SNR of the transmitted signal. This control interface provides a quick guide to the operation of the entire transmitter including a real-time temperature display, an over temperature alarm, and the individual voltage and current readings of all the amplifier transistors.
ANYWAVE
COMMUNICATION TECHNOLOGIES

1,400W ATSC
1,200W OFDM

2,800W ATSC
2,400W OFDM

Granite is a coarse-grained, quartz and feldspar-bearing igneous rock that is made up entirely of crystals. It forms from the slow crystallization of Magma* below the Earth's surface.

The Granite Series, - built to last.

* Magma is Anywave’s new series of liquid cooled transmitters

The Granite Series – Like a rock

4,200W ATSC
3,600W OFDM

5,600W ATSC
4,800W OFDM

7,000W ATSC
6,000W OFDM
The Granite Series has the highest power density for any high power air cooled transmitter today. Up to 11.2 kW ATSC output with unparalleled performance in a single cabinet, provides a true alternative to a liquid cooled system.

8,400W ATSC
7,200W OFDM

11,200W ATSC
9,600W OFDM

The Granite Series
– Like a rock
ANYWAVE COMMUNICATION TECHNOLOGIES

Transmitter Block Diagram

- RF, ASI or IP INPUT
- DIGITAL EXCITER
- DIGITAL EXCITER (opt)
- CONTROLLER AND PRE-AMP
- MULTI-WAY SPLITTER
- 1 to 8 PA's
- MULTI-WAY COMBINER
- FILTER
- RF POWER AMPLIFIER
- dB φ
- DUAL INTEGRATED HOT PLUGGABLE AC/DC POWER SUPPLY

Highest Power Density

- 8 x BLF888E (ultra high efficiency, Broadband) transistors per PA delivers highest power density available today
- 8 PAs in a single rack provides 11.2 kW air cooled TX with smallest footprint available today
Superior PA Design

- Dual hot-swappable, easily replaceable high-capacity power supplies
- Individual variable speed control for each fan to user configurable target temperature
- Oversized single-piece heat-sink provides even heat distribution and enhanced heat transfer
- Eliminates critical hot-spots...designed to last

Less wasted heat equals lower operating costs
Graphene Enhanced Thermal Management Technology

Graphene’s heat conductivity is 4 times better than copper and 8 times better than aluminum.

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 8 amplifier modules per rack)

- 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
Easy installation and service

Installing or replacing a liquid cooled television transmitter often requires substantial construction work and expertise. In most cases it is necessary to install pipe work, flow meters, gate valves, heat exchangers, pumps, tanks, additional electrical conduit and electrical breakers. In comparison, the installation of an air cooled transmitter is far simpler. Once the RF system and electrical connections are in place, the air cooled system is typically ready to operate in a matter of hours rather than weeks. The initial cost of equipment and installation of a liquid cooled transmitter is higher than that of an air cooled system; in most situations 30% more.

Although liquid cooling has a marginally lower operating cost, the amount of time to pay-back the initial investment difference in most cases could be as much as 12 years. An Air cooled transmitter also has lower spares, replacement and maintenance costs. The new Granite Series air cooled transmitter from Anywave makes it possible to maintain with lesser qualified staff, achieve space savings and most importantly - significantly reduce initial capital expenses.
ANYWAVE
COMMUNICATION TECHNOLOGIES

Exciter Specifications

**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

**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

**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

**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: 10 LBS (net) / 15 LBS (gross)
## Power Requirements / Dimensions

<table>
<thead>
<tr>
<th>MHPTV Series - UHF</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>8</th>
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<tbody>
<tr>
<td>Number of Amplifiers</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<tr>
<td>Output Power (RMS) ATSC [1]</td>
<td>1400</td>
<td>2800</td>
<td>4200</td>
<td>5600</td>
<td>7000</td>
<td>8400</td>
<td>11200</td>
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<tr>
<td>Output Power (RMS) COFDM [1]</td>
<td>1200</td>
<td>2400</td>
<td>3600</td>
<td>4800</td>
<td>6000</td>
<td>7200</td>
<td>9600</td>
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<tr>
<td>Output Connector</td>
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<tr>
<td>Height (inches/mm)</td>
<td>53.5/1358</td>
<td>70.6/1794</td>
<td>81.2/2063</td>
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<tr>
<td>Width (inches/mm)</td>
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<td>28.5/725</td>
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<td>Depth (inches/mm)</td>
<td>33.5/850</td>
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<td>43.5/1100</td>
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<tr>
<td>Weight(LBS/Kg)</td>
<td>400/182</td>
<td>520/236</td>
<td>700/318</td>
<td>810/367</td>
<td>920/418</td>
<td>1060/480</td>
<td>1280/580</td>
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<td>AC input frequency</td>
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<td></td>
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<td>50/60 Hz</td>
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<tr>
<td>Consumption - Max - kW</td>
<td>3.2</td>
<td>6.3</td>
<td>9.3</td>
<td>12.2</td>
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<td>18.2</td>
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<tr>
<td>Current rating per φ - Max - A [2]</td>
<td>13.3/8.9</td>
<td>26.3/17.5</td>
<td>38.8/25.8</td>
<td>33.9</td>
<td>42.2</td>
<td>50.6</td>
<td>66.6</td>
</tr>
</tbody>
</table>

[1] Power measured before band pass filter

[2] 1,2,3 PA - Current rating is for 240 VAC Single φ/208 VAC Three φ; 4,5,6,8 PA - Current rating is for 208 VAC Three φ
Cost Effective 100%
Reliable 100%
Scalable 100%
Dependable 100%

www.anywavecom.net

Anywave Communication Technologies
Email: sales_us@anywavecom.com
Phone: +1 (847) 415 2258
Fax: +1 (847) 415 2112
Address: 300 Knightsbridge Parkway, Suite 150, Lincolnshire, IL 60069-3655
Website: www.anywavecom.net

Specification details subject to change without notice