# Amplifiers

## Model 447

**Features:**

- 150 kW Pulsed min 150 - 900 MHz
- 120 kW Pulsed min 900 – 1000 MHz
- Class AB design
- Full VSWR tolerant
- Built-in fault monitoring, logging and protection
- Touch screen display
- Forward and reverse power monitoring
- VSWR monitor with user settable limit
- User settable ALC
- Remote control: Ethernet, USB, GPIB, fiber-optic serial, RS-232
- Modular design for easy maintenance and service
- CE & RoHS Compliant
- High Efficiency

**Applications:**

- EMC Test applications
- RADAR simulation
- Science

**To view our full amplifier portfolio visit: www.arworld.us**

AR RF/Microwave Instrumentation
160 Schoolhouse Rd
Souderton, PA 18964
215.723.8181
ISO 9001:2015 Certified
ISO 17025 :2017 Accredited

The Model 447 is a solid-state, Class AB, self-contained, air-cooled broadband power amplifier designed for pulse applications with low duty cycles, where wide bandwidth and high gain are essential. It delivers a minimum of 150 kW within its operating range of 150 - 900 MHz and 120 kW 900 – 1000 MHz.

This model comes with a Digital Control Panel (DCP), allowing both local and remote operation. The DCP features a color LCD touch screen and a single rotary knob, providing detailed status updates and control options. Users can view Forward Power, Reflected Power, and amplifier status on the display. Additional features include gain adjustment and protection for the RF output level.

The amplifier is protected against various failure scenarios, such as overheating or power supply problems. An indicator on the front panel shows both operational status and any detected faults. All amplifier controls and status indicators can also be accessed remotely via GPIB/IEEE-488, RS-232 serial, or Ethernet connections. The interface connector is located on the rear panel, while a keylock on the front assures secure switching between local and remote control.

For export purposes, this equipment is classified as EAR99. It is subject to U.S. Export Administration Regulations, and diversion from authorized destinations is forbidden by law.

## Electrical Specifications

| Parameter | Symbol | Minimum | Typical | Maximum | Unit |
|---|---|---|---|---|---|
| **Rated Power Output (150 – 900 MHz)** | Psat | 150 | 160 | 165 | kW |
| **Rated Power Output (900 – 1000 MHz)** | | 120 | 130 | 140 | kW |
| **Input for Rated Output** | Pin | | | 1 | mW |
| | | | | 0 | dBm |
| **Operating Frequency** | BW | 150 | | 1000 | MHz |
| **Gain (Small Signal)** | | 82 | 84 | 86 | dB |
| **Gain Reduction Adjustment** (when below compression) | | 20 | | | dB |
| **Flatness (@ rated power)** | ΔGP | | ±1 | ±2 | dB |
| **Input Impedance** | Z in | | 50 | | Ohm |
| | | | 1.5:1 | ≤2.0:1 | VSWR |
| **Output Impedance** | Z out | | 50 | | Ohm |
| **Noise Figure** | NF | 6 | 7 | ≤8 | dB |
| **Harmonic Distortion** | H2, H3 | -30 | -20 | -18 | dBc |
| **Spurious** | | | | ≤-60 | dBc |
| **Power Consumption at max duty cycle** | PD | 22 | 22.5 | 38 | kW |
| **Modulation** | AM, FM or Pulse | | | | |

## Pulse Capability

| Parameter | Value |
|---|---|
| **Pulse Width** | 125 µs Maximum |
| **Pulse Droop - 125 µs pulse @ 150kW** | <1.0 dB |
| **Pulse Rate (PRF)** | 2000 Hz maximum |
| **Duty Cycle** | 2% maximum |
| **RF Rise and Fall** | 30 ns maximum (10 - 90 %) (Internal RF switch) |
| **Delay/Trigg** | 12 µs from pulse input to RF 90% |
| **Pulse Width Distortion** | ±25 ns maximum (difference between Pulse input gate and RF pulse) |
| **Pulse Off Isolation** | 60 dB minimum |
| **Pulse Trigger** | +5 V nominal / 50 ohms internal termination |

## Absolute Maximum Rating

**Exceeding any of the limits listed here may result in permanent damage to the device.**

| Parameter | Minimum | Typical | Maximum | Unit |
|---|---|---|---|---|
| **RF Drive** | | 0 | +13 | dBm |
| **RF Load**<br>Withstand any VSWR from short to open circuit, with a feedback loop above 38 kW reflected. | | 1:1 | 3:1 | VSWR |
| **RF Load Reflected**<br>Will operate without damage or oscillation when connected to any load impedance without the aid of foldback circuitry up to 38 kW reflected. Alarm and protection above 38 kW reflected power (VSWR ≥3:1) | | | 25 | % |
| **AC Power (Three Phase, Wye 5-wire)** | 200 | 208 | 240 | |
| **AC Power** | 47 | 60 | 63 | Hz |
| **Ambient Operating Temperature** | +5 | +25 | +40 | °C |
| **Storage Temperature** | -20 | | +50 | °C |
| **Altitude** | | | 1000 | M |
| **Shock/Vibration** | MIL-STD-810G Method 514 and 516 | | | |

## Mechanical Specifications

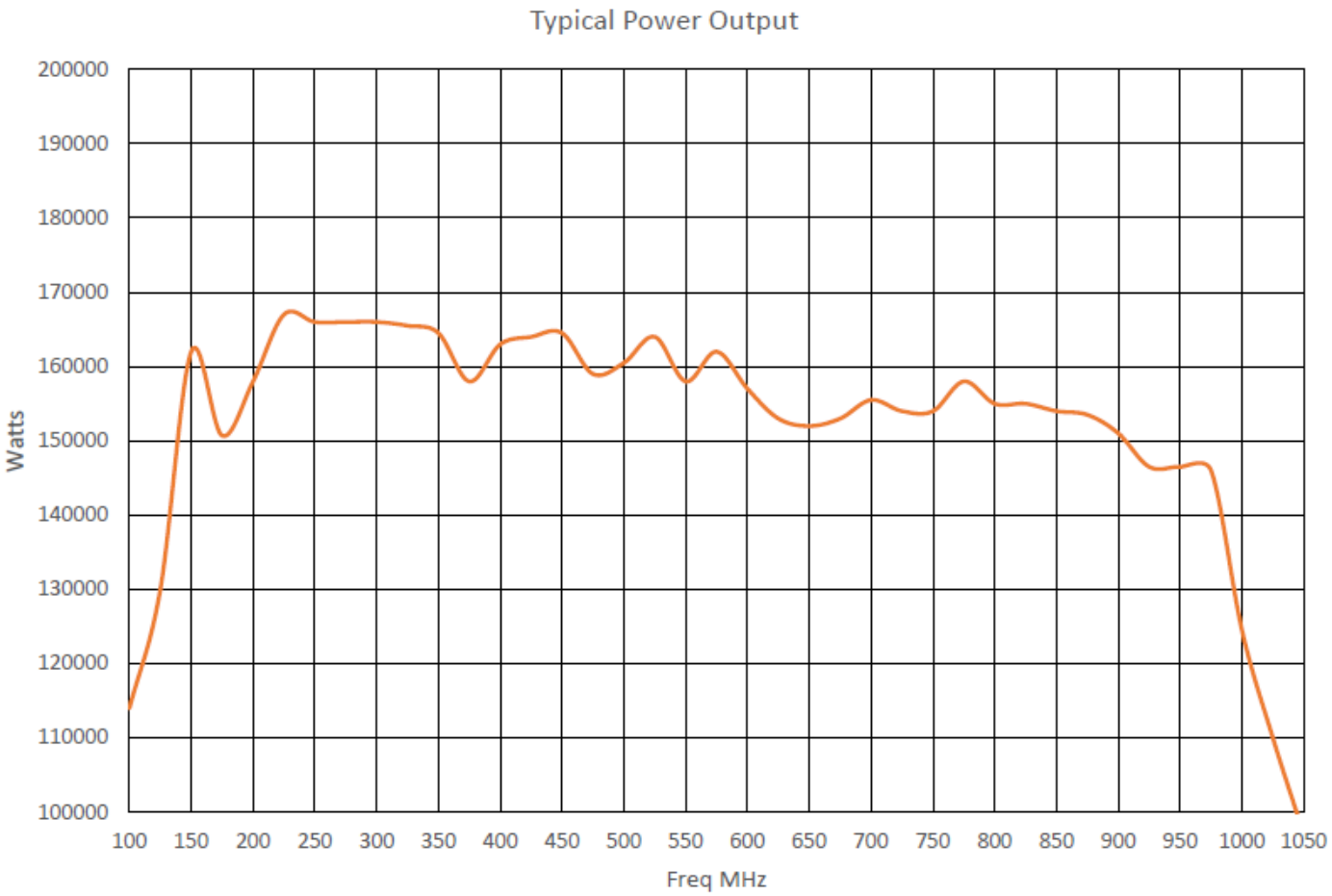
| Parameters | Typical | Unit |
|---|---|---|
| **Dimensions (W x H x D), 7 x 45U Racks** | 404.20 x 236.14 x 103 | cm |
| | 159.13 x 92.97 x 40.6 | in |
| **Weight** | 5684 | kg |
| | 12530 | lb |
| **Cooling** | Forced air (self-contained fans)<br>Air flow 380 liters per second<br>Δt = +15°C (typical) | |
| **Acoustic Noise Measured @ 1 Meter** | 74 | dBA |

## Connector Interfaces

| Function | Type |
|---|---|
| **RF Input** | Rear Panel, N-Female, (50 Ω) |
| **RF Output** | Front Panel 3-1/8 EIA, (50 Ω) |
| **RF Sample** | Rear Panel N-Female, (50 Ω) (80dB typical) |
| **Pulse Input** | BNC, rear |
| **IEEE-488** | 24-pin |
| **RS-232** | 9 pin subminiature D |
| **Ethernet** | RJ-45 |
| **RS-232 (fiber optic)** | ST |
| **USB 2.0 Type B** | Type B |
| **Interlock** | 15-pin subminiature D |
| **AC Power** | 3 Phase Screw Terminal Block with Protective Cover and cable Management |

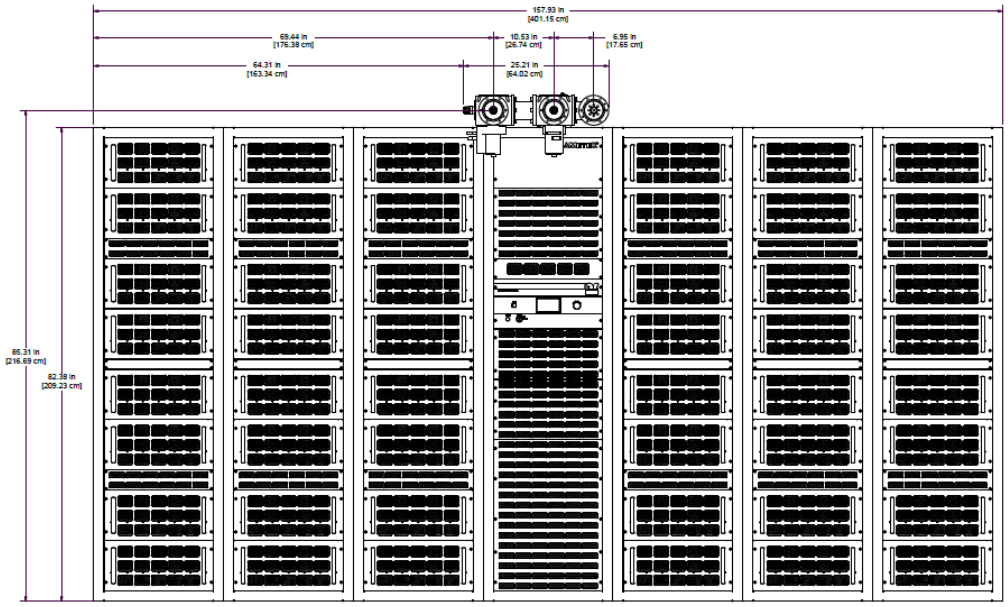
| Regulatory Compliance | |
|---|---|
| **Type** | **Standard** |
| **EMC** | EN 61326-1 |
| **Safety** | UL 61010-1 |
| | CAN/CSA C22.2 #61010-1 |
| | CENELEC EN 61010-1 |
| **RoHS** | Directive 2011/65/EU |
| **Export** | 3A999.d |

## Power Graph

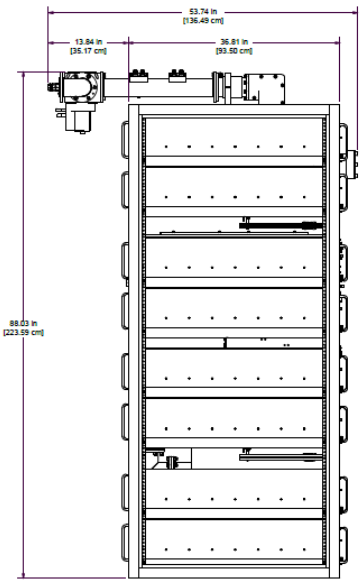


Model 447

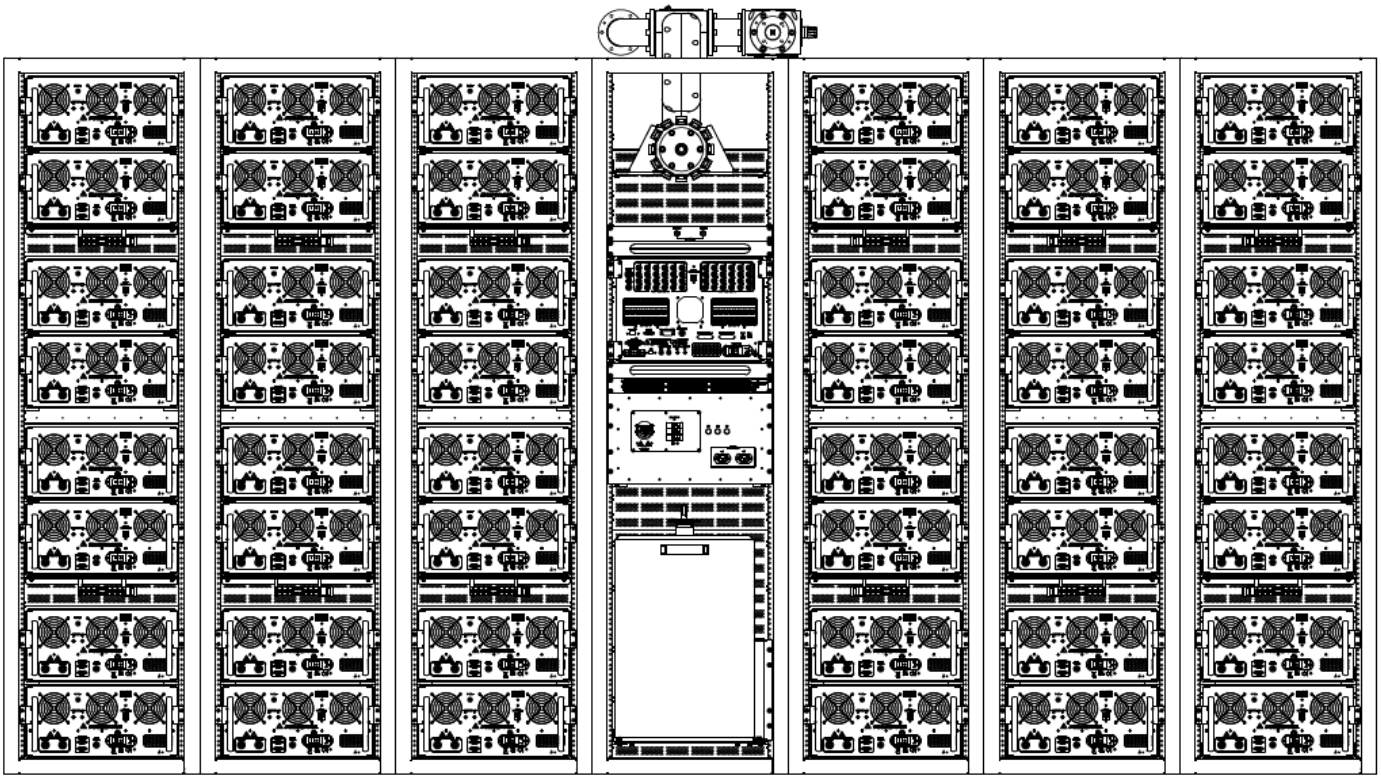
- 150 kW, 150 – 900 MHz
- 120 kW, 900 – 1000 MHz




FRONT VIEW
SCALE 1/8




RIGHT SIDE VIEW
SCALE 1/8



REAR VIEW
SCALE 5/32