



TEGAM®

# TEGAM

PRODUCT CATALOG



When the measurement matters, be certain with TEGAM.

# Ohmmeters

Micro-ohmmeters, Milli-ohmmeters/Bond Meters,  
Mega-ohmmeters, 4-Wire Probes

# Low-Ohm Resistance Measurements

Bond testing is used to verify mechanical and electrical bonds for safety, conductivity, and integrity, for airframes, proper ground systems, shock hazard mitigation, and electrical circuit connectors and components. Industries where these measurements are critical include:

Aerospace | Alternative Energy | Electronics | Automotive | Electrical Systems



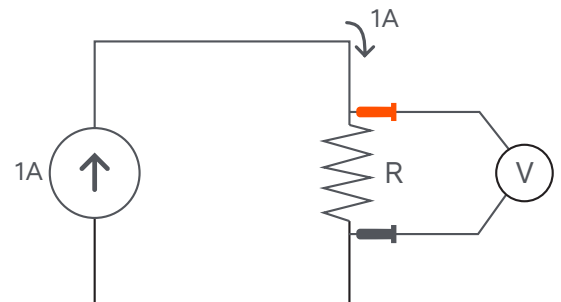
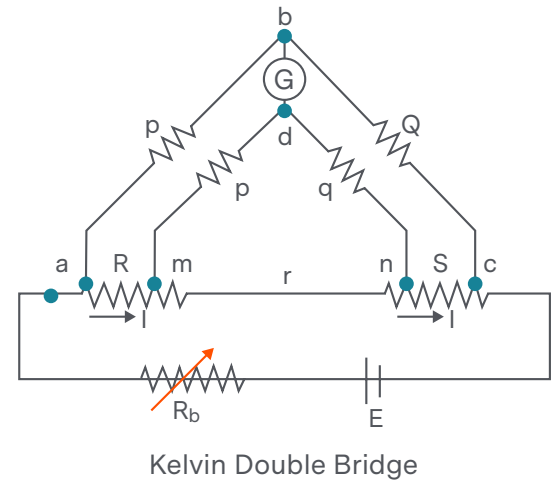
TEGAM uses the 4-wire (Kelvin sensing) method for all low-ohm resistance instruments.

- The purpose of this method is to eliminate the measurement error caused by the resistance of the probe leads.
- The Kelvin Double Bridge circuit integrates a second pair of ratio arms to proportionately divide the voltage drop.

## Kelvin Sensing

- A known current source is applied to the component being measured and the voltage drop is measured at the lead tips, negating any lead resistance present.
- All four measurement nodes are brought to the front of the instrument by the way of Kelvin clips or probes.
- The Drive side of the probe is the current source and the Sense side of the probe is where the voltage drop is measured.
  - The V+ (Sense) and I+ (Drive) are paired in one probe and the V- (Sense) and I- (Drive) are paired in the other.
  - When the probes are placed on either side of a component, an electric circuit is completed, and the resistance can be calculated, using Ohm's Law, as follows:

$$\text{Measured Voltage} \div \text{Known Amperage} = \text{Component Resistance}$$





## 700 Series | Bond Meters

### 730A | Wireless Datalogging

- Bluetooth LE connectivity
- Free iOS/Android app (TEGAMLink B)
- Seamless software integration
- Reduces data recording errors

### 720A | Intrinsically Safe

- Continuous use in the presence of flammable gases, vapors, and mists
- UL/CSA/ATEX/IECEX certified
- Also available as complete kit: 720A-BK-KIT

### 710A | Standard

- Also available as complete kit: 710A-BK-KIT

### COMMON FEATURES

- High accuracy:  $\pm(0.2\% \text{ rdg} + 0.02\% \text{ rng})$  Across the entire operating range
- 3 readings per second
- Ergonomic, one-hand operation
- Smooth contours, easy to clean
- Long battery life (3AA)
- Widest range of probe options



730A



720A



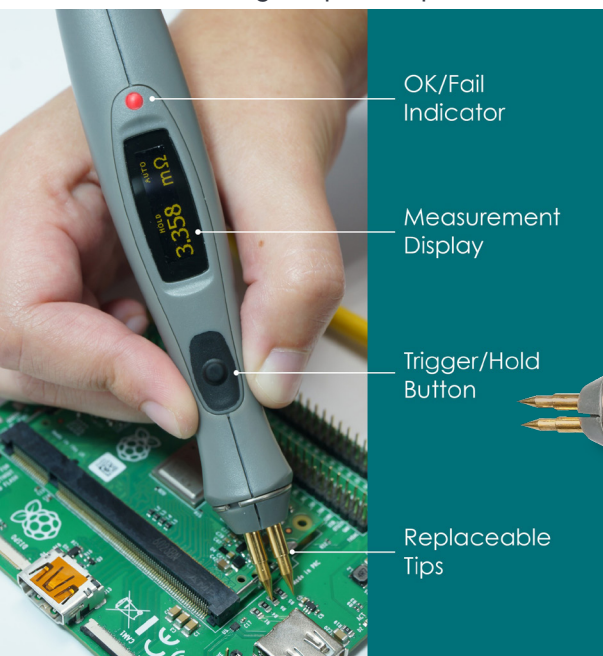
710A



720A-BK-KIT



710A-BK-KIT



OK/Fail Indicator

Measurement Display

Trigger/Hold Button

Replaceable Tips



Unique Display Probes



## R1L Series Milli-Ohmmeters & Bond Meters

### R1L-BIR Portable Milli-Ohmmeter

- Measures 2 m $\Omega$  to 20  $\Omega$
- Accuracy:  $\pm 0.25\%$  of reading
- Long, rechargeable battery life
- Rugged; meets MIL-PRG-28800F Class 3
- **R1L-BIR1** with 4-Wire Push-Pin & Alligator Clip Probes



### R1L-D1 Milli-Ohmmeter & RTD Meter

- Measures 200 m $\Omega$  to 2 k $\Omega$
- High accuracy:  $\pm 0.05\%$  of reading
- Measures 100 and 1000  $\Omega$  3-wire and 4-wire RTDs
- Long (140 hr) rechargeable battery life
- Rugged; meets MIL-PRF-28800F Class 3



### R1L-E2A Intrinsically Safe Milli-Ohmmeter

- UL/CSA/ATEX-certified
- Measures 2 m $\Omega$  to 20  $\Omega$
- Accuracy:  $\pm 0.1\%$  rdg + 2 cnt
- Long, rechargeable battery life
- Includes complete set of IS probes



### R1L-BI Bench Top Milli-Ohmmeter

- Measures 2 m $\Omega$  to 20  $\Omega$
- Accuracy:  $\pm 0.25\%$  of reading
- Long, rechargeable battery life
- Rugged; meets MIL-PRG-28800F Class 3
- Kelvin Test Leads included



## R1M Series Mega-Ohmmeters

For measuring high resistances  
(insulation testing)



### R1M-A Portable Mega-Ohmmeter

- Measures from 1 M $\Omega$  to 200 G $\Omega$
- Measurement accuracy  $\pm 5\%$
- 50, 100, 250, 500 V Test Voltages
- Rugged, weather resistant carry case



### R1M-B Handheld Mega-Ohmmeter





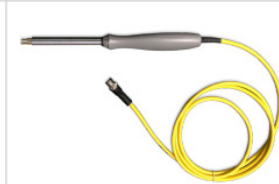




























- Designed to measure resistance in “live” circuits
- Measures from 1 M $\Omega$  to 200 M $\Omega$
- Accuracy  $\pm 3\%$
- Measures 3 to 600 VAC RMS

# 1750 High Speed Micro-ohmmeter

- Accuracy: 0.02%
- Measurement Speed: 10 ms
- Range 2 mΩ to 20 MΩ
- Resolution: 100 nΩ
- Programmable reference currents
- GPIB, RS-232C and RS-422 compatibility
- Kelvin Klips, Spade Lugs or Kelvin Probes available



## Probe Selection 4-wire Probes and Clips

PROBES (Choose either 1 Display + 1 Basic OR 2 Basic)																									
<b>MKP-M2 (BASIC) / MKDP-M2 (DISPLAY)</b>	<b>BKP-M2 (BASIC) / BKDP-M2 (DISPLAY)</b>	<b>BCP-M2 (BASIC) / BCDP-M2 (DISPLAY)</b>	<b>KC-M2, KC-M5 (BASIC)</b>	<b>BKEP (BASIC)</b>																					
																									
<div style="background-color: orange; color: white; padding: 10px;"> <h3>DISPLAY PROBE</h3> <p>Convenient "line of sight" readout</p> </div>  <ul style="list-style-type: none"> <li>OK/Fail Indicator</li> <li>Measurement Display</li> <li>Trigger/Hold Button</li> <li>Replaceable Tips</li> </ul>			<b>PINS (For MKP/MKDP or BKP/BKDP Style Probes)</b>																						
			<table border="1"> <thead> <tr> <th colspan="2">MKP/MKDP</th> <th colspan="2">BKP/BKDP</th> </tr> </thead> <tbody> <tr> <td></td> <td><math>\pm .036</math> (0.91) B</td> <td></td> <td><math>\pm .157</math> (4.00) J</td> </tr> <tr> <td></td> <td><math>\pm .080</math> (1.52) F</td> <td></td> <td><math>\pm .110</math> (2.79) B</td> </tr> <tr> <td></td> <td><math>\pm .060</math> (1.52) H</td> <td></td> <td><math>\pm .156</math> (3.96) F</td> </tr> <tr> <td></td> <td><math>\pm .036</math> (0.91) J</td> <td></td> <td><math>\pm .156</math> (3.96) H</td> </tr> <tr> <td></td> <td><math>\pm .060</math> (1.52) LM</td> <td></td> <td></td> </tr> </tbody> </table>	MKP/MKDP		BKP/BKDP			$\pm .036$ (0.91) B		$\pm .157$ (4.00) J		$\pm .080$ (1.52) F		$\pm .110$ (2.79) B		$\pm .060$ (1.52) H		$\pm .156$ (3.96) F		$\pm .036$ (0.91) J		$\pm .156$ (3.96) H		$\pm .060$ (1.52) LM
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# Thermometry

Digital Thermometers, Temperature Calibrators,  
Temperature Probes, Datalogging Thermometers,  
Thermocouple Thermometers, RTD Thermometers,  
Intrinsically Safe Thermometers, RTD Probes, Thermistor  
Probes, Thermocouple Probes



# 900 Series | Thermocouple Thermometers

## 931B/932B | Wireless Datalogging

- Bluetooth LE connectivity
- Free iOS/Android app (TEGAMLink T)
- Seamless software integration
- Reduces data recording errors
- Support 8 thermocouple types

## 921B/922B | Intrinsically Safe

- Continuous use in the presence of flammable gases, vapors, and mists
- UL/CSA/ATEX/IECEX certified
- Support 8 thermocouple types

## 911B/912B | Standard

- 2000-hour battery life
- Support 4 thermocouple types



931B/932B

921B/922B

911B/912B



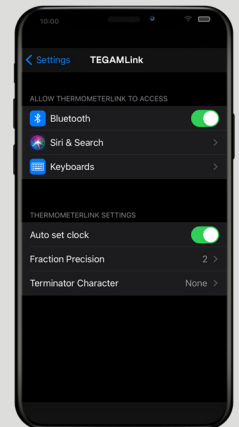
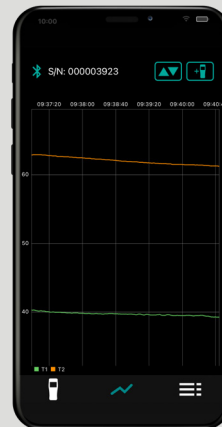
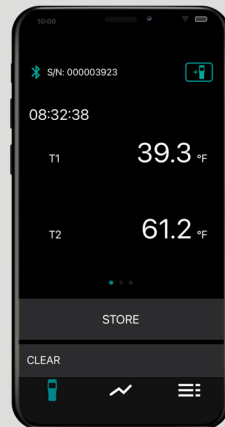
## COMMON FEATURES

- High accuracy:  $\pm(0.04\% \text{ rdg} + 0.3^\circ\text{C})$
- Temperature compensation
- Probe offset function
- Ergonomic, one-hand operation
- Smooth contours, easy to clean
- Long battery life (3AA)
- 2-year calibration cycle
- Single-channel and dual-channel models

## TEGAMLINK™

### TEGAMLINK T APP (shown)

Automates the capture of temperature, time and place data. Reduces chances for recording errors.



## 940 Series | Temperature Calibrators

### 948A | Wireless Datalogging

- Bluetooth LE connectivity
- Free iOS/Android app (TEGAMLink C)
- Seamless software integration
- Reduces data recording errors
- Supports 14 thermocouple types

### 947A | Intrinsically Safe

- Continuous use in the presence of flammable gases, vapors, and mists
- UL/CSA/ATEX/IECEX certified
- Supports 14 thermocouple types

### 945A/940A | Standard

- **945A:** Supports 14 thermocouple types
- **940A:** Supports 4 thermocouple types

### COMMON FEATURES

- Laboratory grade
  - High accuracy:  $\pm(0.005\% + 5\mu V)$
  - Resolution:  $0.01^\circ$
  - Environmental compensation
  - ISO 17025 calibration
- Long battery life (3AA)
- AMS2750 calibration option
- Easy one-hand operation

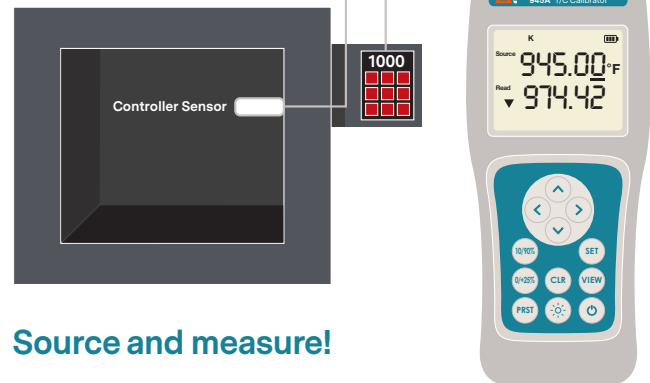


948A

947A

945A/940A

### Calibrating a Heat Treat Oven



Source and measure!



## 80XX Series Switch Box

TEGAM multiprobe switchboxes plug directly into any thermometer containing a miniature thermocouple connector, including single- and multiple-input units. TEGAM switchboxes can also interface multiple probes with a variety of thermocouple readout devices, including panel meters, process monitors, and analog meters. With an optional extension cable the switchbox becomes a bench unit, complete with rubber feet and built-in tilt feature. Connect two or more switchboxes together to further expand the number of temperature inputs.

### Model 8012 – Type K Thermocouple

### Model 8022 – Type J Thermocouple

### Model 8052 – Type T Thermocouple

- Enables thermometer to read six probes in any sequence
- Compatible with virtually any bench and handheld digital thermometer



Switch Box Attaches to Thermometer



Switch Box



# Thermistor Thermometer

Thermistor Thermometers by TEGAM – °C & °F Thermistor Thermometers

## 865 Thermistor Thermometer

- Accuracy:  $\pm 0.3\%$
- Range: -70 to 300 °F
- Resolution:  $0.1^\circ/1^\circ$
- Input Type : 2252  $\Omega$  Thermistor
- Ideal for cryogenic and high-temperature research or industrial monitoring
- One year warranty



## 866 Thermistor Thermometer

- Accuracy:  $\pm 0.3\%$
- Range: -55 to 150 °C
- Resolution:  $0.1^\circ/1^\circ$
- Input Type : 2252  $\Omega$  Thermistor
- Ideal for cryogenic and high-temperature research or industrial monitoring
- One year warranty



## 868 Platinum RTD Thermometer

- Accuracy:  $\pm 0.4^\circ\text{F}$
- Range: -360 to 1100 °F
- Resolution:  $0.1^\circ/1^\circ$
- Input Type: 100  $\Omega$  Platinum RTD
- Low battery indicator
- Big, easy to read LCD display
- One year warranty



## 869 Platinum RTD Thermometer

- Accuracy:  $\pm 0.3^\circ\text{C}$
- Range: -220 to 630 °C
- Resolution:  $0.1^\circ/1^\circ$
- Input Type: 100  $\Omega$  Platinum RTD
- Low battery indicator
- Big, easy to read LCD display
- One year warranty



# Temperature Probes



TEGAM offers a wide spectrum of temperature probes to meet most any thermal sensing application. Built to the highest standards, these probes include many types, styles, and configurations.

**PROBE SELECTION GUIDE**

CONNECTOR TYPES	HANDLE OPTIONS	CORDS	PROBE TIP STYLES
<b>MTC</b> <b>PHN</b> <b>TA4</b> <b>M12</b>	<p>No Handle (None) <b>0</b></p> <p>T Handle <b>1</b></p> <p>Tri Shape Handle <b>6</b></p>	 <p>All probes (except wire tip) come with a coiled cord (Retracted 1' Stretches to 5')</p>	<b>02</b> <b>03</b> <b>13</b> <b>04</b> <b>05</b> <b>06</b> <b>07</b>

Configure your probe with the following selections: Select from 2 probe families, 5 sensor types, 3 handle options, 7 tip styles, 4 connector types, and a custom probe length.

**OPTION DESCRIPTIONS:**

**Product Family** select from:

 **IS9** (Intrinsically Safe Probe)  
 **9** (Probe)

**Sensor Type** select from:

 **J** (TC - J)  
 **K** (TC - K)  
 **T** (TC - T)  
 **X** (Thermistor)  
 **Y** (RTD)

\*IS: Specify ONLY for Intrinsically Safe Model #s

**Handle** select from:

 **0** (None)  
 **1** (T Handle)  
 **6** (Tri Shape)

**Tip Style** select from:

 **02** (Wire)  
 **03** (Immersion, Non-Tapered)  
 **13** (Immersion, Tapered)  
 **04** (Penetration)  
 **05** (Surface)  
 **06** (Air/Gas)  
 **07** (Hypodermic)

**Connector Type** select from:

 **MTC** (Thermocouple)  
 **PHN** (Thermistor)  
 **TA4** (RTD)  
 **M12** (Thermocouple)

**Probe Length**

Please specify length from handle to tip in 1" increments:  
 \_\_\_ \_\_\_ **01" to 48"** (in 1" increments)

**SAMPLE CONFIGURATIONS:** **IS9K104MTC18**

**9K104MTC18** : Probe, Type K, T Handle, Penetration Tip, MTC Connector, 18" Probe Length

**9Y606TA408** : Probe, Type RTD, Tri Shape Handle, Air/Gas Tip, TA4 Connector, 8" Probe Length

**IS9T605MTC06** : Intrinsically Safe Probe, Type T, Tri Shape Handle, Surface Tip, MTC Connector, 6" Probe Length

## AVAILABLE TYPES include:

- Thermocouple Type J
- Thermocouple Type K
- Thermocouple Type T
- RTD
- Thermistor

## USAGE TYPES:

- Standard
- Intrinsically Safe

## CONFIGURATION OPTIONS include:

- Connector type
- Handle style
- Sheath type and length
- Cord tyle or wire length

**CUSTOM DESIGN OPTIONS**, available upon request.

# RF & Microwave Instruments

Power Meters, Power Sensor Calibration, Calorimeters, RF  
Standards & More



## RF Power Meters

TEGAM RF Power Meters, Bolometers and RF Accessories

### GEMINI 5540A Series RF Power Meter

- Accuracy:  $\pm 0.5\% + 0.5 \text{ W}$
- 0.2-200 MHz, at 3 to 5,000 W
- Read forward and reverse power, VSWR, and frequency
- Insertion loss < 0.05 dB



### 1820B RF Mount Temperature Controller

- Maintains calibration standards at operating temperature
- Improves calibration throughput
- Rack Mount Option
- 2 channels



### 1830A RF Thermistor Power Meter

- Compatible with thermistor power sensors from: TEGAM, Agilent (HP), Weinschel, Hughes, General Microwave, Millitech
- Power range: -30 to +14 dBm (0.001 mW to 25 mW)
- Frequency range: 6 kHz to 110 GHz (Sensor Dependent)
- Supports 100  $\Omega$  and 200  $\Omega$  thermistors
- Four digit calibration factor resolution



## RF Power Standards

TEGAM Power Standards, RF Transfer Standards, RF Terminating Power Standards

### 2818A RF Power Transfer Standard

- Calibrate RF Power sensors from 9 kHz to 18 GHz
- Fast reading settling time of < 2s
- 0.01 to 10 mW typical usable range (-20 to +10 dBm), expandable with attenuators
- Rack mount option available



### 1505A/2505A RF Power Standard

- Calibrate RF Power Sensors from 6 kHz to 18 GHz
- 0.01 to 10 mW power range
- Terminating design (1505A), feedthrough standard (2505A)
- Rack mount option available
- Compatible with the 1830A RF Thermistor Power Meter and 1806 Bridge



Model: 1505A



Model: 2505A

### 1510A/2510A RF Power Standard

- Calibrate RF Power Sensors from 10 MHz to 50 GHz
- 0.01 to 10 mW power range
- Terminating design (1510A), feedthrough standard (2510A)
- Rack mount option available
- Compatible with the 1830A RF Thermistor Power Meter and 1806 Bridge



Model: 1510A



Model: 2510A

# Power Sensor Calibration

TEGAM RF Power Sensor Calibration Systems, RF Accessories, RF Measurement, PS-Cal Software

## COMMON FEATURES

- Turn-key system
- Compact Benchtop Rack Cabinet (Appr. 22Wx23Hx24D)
- Includes Generator, VNA, and RF Power Standards



## PMX18-012 RF Power Sensor Calibration System

- System consists of: 1830A, 2505A, (1 Each) CA-21-15 & CA-14-2M
- Measurement range: 6 KHz to 18 GHz; -20 to +10 dBm
- Fast calibration method
- Low total uncertainty
- Repeatable thermistor RF power standards
- Low overall cost of ownership



## PMX50-002 RF Power Sensor Calibration System

- System consists of: 1830A, 2510A, (1 Each) CA-21-15 & CA-14-2M
- Measurement range: 10 MHz to 50 GHz; -20 to +10 dBm
- Fast calibration method
- Low total uncertainty
- Repeatable thermistor RF power standards
- Low overall cost of ownership



## PMX50-014 RF Power Sensor Calibration System

- System consists of: (2) 1830A, (1) F1130B, (1) 2510A, (1) CA-7-15, CA-11-15, CA-21-15 & (2) CA-14-2M
- Measurement range: 6 kHz to 50 GHz; -20 to +10 dBm
- Fast calibration method
- Low total uncertainty
- Repeatable thermistor RF power standards
- Low overall cost of ownership





# High Power Calibration

TEGAM High Power RF Calibration Systems, Calorimeters, Transfer Standards

## 1316A RF Calorimeter

- Unmatched Accuracy for Commercial Calorimeter
- 50 Hz to 500 MHz Frequency Range
- Measure up to 10,000 W input power
- National Lab Traceable through an AC Power Standard



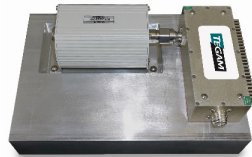
## 1314 RF Calorimeter with Chiller

- Calibrate High Power RF Sensing devices up to 250 W
- Working standards like the TEGAM 2601A and 2602A
- Through devices like a Bird Wattmeter
- 50 Hz to 3500 MHz Frequency Range
- National Lab Traceable through an AC Power Standard



## 2601A High Power RF Transfer Standard

- Calibrate High Power RF Sensing devices from 250 kHz to 1000 MHz
- 2.5 W to 250 W dynamic range (+34 to +54 dBm)
- TEGAM High Power RF Calibration System Compatible



## 2602A High Power RF Transfer Standard

- Calibrate High Power RF Sensing devices from 700 to 3500 MHz
- 2.5 W to 250 W dynamic range (+34 to +54 dBm)
- TEGAM High Power RF Calibration System Compatible



## HPC High Power RF Calibration System

- Calibrate High Power RF Sensing devices up to 100 W with uncertainty less than 1%
- Working standards like a TEGAM 2601A
- Through devices like a Bird Wattmeter
- High Power RF Power Sensors from 250 kHz to 3000 MHz Frequency Range
- National Lab Traceable through an AC Power Standard



## GEMINI 5540A Series RF Power Meter

- Accuracy:  $\pm 0.5\% + 0.5 \text{ W}$
- 0.2-200 MHz, at 3 to 5,000 W
- Read forward and reverse power, VSWR, and frequency
- Insertion loss < 0.05 dB



# More TEGAM

LCR Meters, Precision Power Amplifier and AC Ratio Standards

## LCR Meter & Amplifier

### 252 LCR Meter

- Basic Accuracy: 0.25%
- Measurement Speed: 250 ms
- Test Frequency: 1 kHz
- Automatic L, C, R, G and D measurements
- Shielded Kelvin Connections
- Calibration Certificate Included



### 2348 Precision High Current Power Amplifier

- Output Voltage: 50 Vp-p
- Output Current: 750 mA
- Bandwidth: DC to 2 MHz
- Slew Rate: >200 V/ $\mu$ s
- 1 Channel
- Compatible with most waveform generators



### 2340/2350 Precision High Voltage Power Amplifiers

- Output Voltage: 400 Vp-p ( $\pm 200$  V)
- Output Current: 40 mA
- Bandwidth: DC to 2 MHz
- Slew Rate: >250 V/ $\mu$ s
- Standard x50 gain (10-100 available)
- Single Channel (2340)
- Dual Channel (2350)



# Ratio Standards

## 1372 AC Ratio Transformer Calibrator

- Resolution 0.1 ppm
- Terminal linearity 0.9 ppm
- Bandwidth 50 Hz to 20 kHz
- Calibrate AC ratio transformer standards
- Ratio testing is performed at defined points between 0.0000000 and +1.0000000



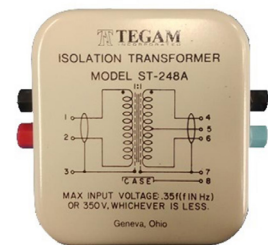
## DT72B AC Ratio Standard, 7 Decades

- Resolution 0.1 ppm
- Terminal linearity 0.9 ppm
- Bandwidth 50 Hz to 20 kHz
- Parallel switches reduce contact resistance
- Switch Resistors virtually eliminate switch transients
- Ratio range from -0.0111111 to +1.1111110



## ST-200A/ST-248A AC Ratio Standard

- Special Purpose Transformer
- 1:1 Turns Ratio
- Binding Post Termination
- Frequency Range 50-10,000 Hz
- Insulation 500V Test
- Open Circuit Ratio Accuracy at 400 Hz .005%
- Input Impedence (with secondary open circuit) at 400 Hz, Greater than 250,000 ohms
- Electrostatic Shields (ST-248A)
- Center Tapped Secondary







For international contact information,  
visit [advancedenergy.com](https://www.advancedenergy.com).

[powersales@aei.com](mailto:powersales@aei.com) (Sales Support)  
[productsupport.ep@aei.com](mailto:productsupport.ep@aei.com) (Technical Support)  
+1 888 412 7832

## ABOUT ADVANCED ENERGY

Advanced Energy (AE) has devoted more than four decades to perfecting power for its global customers. AE designs and manufactures highly engineered, precision power conversion, measurement and control solutions for mission-critical applications and processes.

Our products enable customer innovation in complex applications for a wide range of industries including semiconductor equipment, industrial, manufacturing, telecommunications, data center computing, and medical. With deep applications know-how and responsive service and support across the globe, we build collaborative partnerships to meet rapid technological developments, propel growth for our customers, and innovate the future of power.

PRECISION | POWER | PERFORMANCE | TRUST

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