



THE AMERICAN ASSOCIATION FOR  
LABORATORY ACCREDITATION

## ACCREDITED LABORATORY

A2LA has accredited

**TECHMASTER ELECTRONICS INC.**  
**El Paso, TX**

for technical competence in the field of

### **Calibration**

This laboratory is accredited in accordance with the recognized International Standard ISO/IEC 17025:2005 *General Requirements for the Competence of Testing and Calibration Laboratories*. This laboratory also meets the requirements of ANSI/NCSL Z540-1-1994 and any additional program requirements in the field of calibration. This accreditation demonstrates technical competence for a defined scope and the operation of a laboratory quality management system (*refer to joint ISO-ILAC-IAF Communiqué dated 18 June 2005*).

Presented this 16<sup>th</sup> day of September 2008.

A handwritten signature in cursive script, reading "Peter Abney", positioned above a horizontal line.

President  
For the Accreditation Council  
Certificate Number 2729.02  
Valid to October 31, 2010



For the calibrations to which this accreditation applies, please refer to the laboratory's Calibration Scope of Accreditation.

SCOPE OF ACCREDITATION TO ISO/IEC 17025:2005  
& ANSI/NCSL Z540-1-1994

TECHMASTER ELECTRONICS INC.  
 10737 Gateway West Suite 108  
 El Paso, TX 79935  
 Robert Tyler Phone: 760 536 0227 x12

CALIBRATION

Valid To: October 31, 2010

Certificate Number: 2729.02

In recognition of the successful completion of the A2LA evaluation process, accreditation is granted to this laboratory to perform the following calibrations<sup>1</sup>:

I. Electrical – DC & Low Frequency

| Parameter/Range                                      | Frequency                      | Best Uncertainty <sup>2,3,5</sup> (±) | Comments                       |
|------------------------------------------------------|--------------------------------|---------------------------------------|--------------------------------|
| Oscilloscopes –                                      |                                |                                       |                                |
| Square Wave Signal                                   |                                |                                       |                                |
| 10 Hz to 10 kHz                                      |                                |                                       |                                |
| 50 Ω                                                 | 1 mV to 6.6 V <sub>pk-pk</sub> | 0.25 % + 40 μV                        | Wavetek 9100<br>option 100/600 |
| 1 MΩ                                                 | 1 mV to 130 V <sub>pk-pk</sub> | 0.25 % + 40 μV                        |                                |
| Level Sine Wave                                      | 5 mV to 5.5 V                  | 2 % + 300 μV                          |                                |
| Amplitude                                            | 50 kHz to 100 MHz              | 3.5 % + 300 μV                        |                                |
|                                                      | (100 to 300) MHz               | 4 % + 300 μV                          |                                |
|                                                      | (300 to 600) MHz               | 6 % + 300 μV                          |                                |
| Flatness referenced to<br>50 kHz reference           | 50 kHz to 100 MHz              | 1.5 % + 100 μV                        |                                |
|                                                      | (100 to 300) MHz               | 2 % + 100 μV                          |                                |
|                                                      | (300 to 600) MHz               | 4 % + 100 μV                          |                                |
| Time Markers<br>(5-2-1 sequence)<br>into a 50 Ω load | 5 s to 50 ms                   | 25 μHz/Hz + 15 mHz                    |                                |
|                                                      | 20 ms to 100 ns                | 2.5 μHz/Hz                            |                                |
|                                                      | 50 ns to 20 ns                 | 2.5 μHz/Hz                            |                                |
|                                                      | 10 ns                          | 2.5 μHz/Hz                            |                                |
|                                                      | 5 ns to 2 ns                   | 2.5 μHz/Hz                            |                                |
| Rise Time                                            | ≤ 300 ps                       | + 0 ps / - 100 ps                     |                                |

## II. Dimensional

| Parameter/Equipment                   | Range  | Best Uncertainty <sup>2,3,4</sup> ( $\pm$ ) | Comments                   |
|---------------------------------------|--------|---------------------------------------------|----------------------------|
| Master Ring Gage for Lab Master Setup | 6 in   | 100 $\mu$ in                                | VTG 0.500"                 |
| Thread Plug Gage – External Diameter  | 2 in   | 2 $\mu$ in + 0.5L                           | Pratt & Whitney Lab Master |
| Thread Ring Gage – Internal Diameter  | 1.5 in | 2 $\mu$ in + 0.5L                           | Pratt & Whitney Lab Master |

## III. Mechanical

| Parameter/Equipment                                                              | Range                                                                                         | Best Uncertainty <sup>2,5</sup> ( $\pm$ )                                                         | Comments                         |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|----------------------------------|
| Torque – Measure                                                                 | (10 to 100) in/lbs<br>(60 to 600) ft/lbs                                                      | 0.5 % + 1 count<br>0.5 % + 1 count                                                                | CDI 1001-I-ETT<br>CDI 6004-F-ETT |
| Mass –<br><br>Fixed Points                                                       | 10 g<br>20 g<br>25 g<br>50 g<br>100 g<br>200 g<br><br>100 g<br>200 g<br>500 g<br>1 kg<br>2 kg | 2 mg<br>3 mg<br>3 mg<br>7 mg<br>10 mg<br>20 mg<br><br>10 mg<br>20 mg<br>50 mg<br>100 mg<br>200 mg | Ohaus                            |
| Direct Verification of Durometers –<br><br>Scale Accuracy<br><br>Type A, B, C, D | (0 to 100) duros                                                                              | 2 duro points                                                                                     | Rex TB-1                         |

| Parameter/Equipment                                             | Range                          | Best Uncertainty <sup>2</sup> (±) | Comments                           |
|-----------------------------------------------------------------|--------------------------------|-----------------------------------|------------------------------------|
| Indirect Verification of Rockwell Hardness Testers <sup>3</sup> | HRB:<br>Low<br>Middle<br>High  | 1 HRB                             | Indirect verification per ASTM E18 |
|                                                                 | HRC<br>Low<br>Middle<br>High   | 1 HRC                             |                                    |
|                                                                 | HR30T<br>Low<br>Middle<br>High | 1 HR30T                           |                                    |

#### IV. Thermodynamics

| Parameter/Equipment            | Range           | Best Uncertainty <sup>2</sup> (±) | Comments   |
|--------------------------------|-----------------|-----------------------------------|------------|
| Relative Humidity –            | (20 to 70) % RH | 4 % RH                            | Fluke 1620 |
| Temperature – Infrared Devices | (115 to 350) °C | 5 °C                              | Hart 9103  |
| Temperature – Measure          | (15 to 35) °C   | 1 °C                              | Fluke 525A |

#### V. Time and Frequency

| Parameter/Equipment  | Range              | Best Uncertainty <sup>2,5</sup> (±) | Comments            |
|----------------------|--------------------|-------------------------------------|---------------------|
| Frequency – Generate | 20 Hz to 100 kHz   | 0.3 %                               | HP 8903B            |
|                      | 100 kHz to 3.2 GHz | 0.3 %                               | HP 8648C            |
| Fixed Point          | 10 MHz             | 1 part in 10 <sup>8</sup>           | Datum GPS 8902A     |
| Frequency – Measure  | 10 Hz to 26.5 GHz  | 2 parts in 10 <sup>6</sup>          | HP 5343A option 001 |

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<sup>1</sup> This laboratory offers commercial calibration service and field calibration service.

<sup>2</sup> “Best Uncertainty” is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of  $k = 2$ . The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer’s device and to influences from the circumstances of the specific calibration.

<sup>3</sup> Field calibration service is available for this calibration and this laboratory meets A2LA *R104 – General Requirements: Accreditation of Field Testing and Field Calibration Laboratories* for these calibrations. Please note the uncertainties achievable on a customer's site can normally be expected to be larger than the Best Measurement Capabilities (BMC) that the accredited laboratory has been assigned as Best Uncertainty on the A2LA Scope. Allowance must be made for aspects such as the environment at the place of calibration and for other possible adverse effects such as those caused by transportation of the calibration equipment. The usual allowance for the uncertainty introduced by the item being calibrated, (e.g. resolution) must also be considered and this, on its own, could result in the calibration uncertainty being larger than the BMC.

<sup>4</sup> In the statement of best uncertainty,  $L$  is the numerical value of the nominal length of the device measured in inches.

<sup>5</sup> In the statement of best uncertainty, percentages are percentages of reading, unless otherwise indicated.