



MICRO PRECISION CALIBRATION PTE LTD
BLOCK 5008 ANG MO KIO AVENUE 5 #07-02/03
TECHPLACE II SINGAPORE 569874
65 67484384



Certificate of Calibration

Date: November 28, 2019

Cert No. 551220083350911

Customer:

FLEXTRONICS MANUFACTURING (SINGAPORE) PTE. LTD.
NO.1 KALLANG PLACE SINGAPORE 339211

Work Order #: SG-11012782

MPC Control #: 6069766
Asset ID: 0360
Gage Type: ELECTRICAL SAFETY ANALYZER
Manufacturer: QUADTECH
Model Number: GUARDIAN 6000
Size: REFER DATA
Temp/RH: 22°C / 52 %
Location: Calibration performed at MPC facility

Serial Number: 6069766
Department: N/A
Performed By: SENGTHYE CHEW
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: November 28, 2019
Cal. Interval: 12 MONTHS
Cal. Due Date: November 28, 2020

Calibration Notes:

Performance Test Passed. See attached data. (3 pages).

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CA8201	225MHZ UNIVERSAL COUNTER	53132A	MY40004745	AGILENT	May 4, 2020	551220082996309
CA8106	CALIBRATOR FOR W.TESTER	TOS1200	VL002591	KIKUSUI ELECTRONICS CORP.	Mar 22, 2020	551220082881479
CA8105	HIGH VOLTAGE DIGITALMETER	149-10A	VM002242	KIKUSUI ELECTRONICS CORP.	Mar 22, 2020	551220082881472
CT2147	SIGNAL GENERATOR	SMA 100A-B103-B22	103536	ROHDE & SCHWARZ	Mar 8, 2020	551220082852034
CA8198	PRECISION DECADE DC RESISTANCE BOX	SB2015-3	CA8198	CEPREI	Apr 12, 2020	17002776-0001
CA8284	MULTIMETER	3458A	2823A20603	HP	Jun 12, 2020	551220083087113
CA8100	DECADE RESISTANCE BOX	2793	00060U	YOKOGAWA	Jun 1, 2020	551220083053241
CH2324	CURRENT SHUNT	34330A	0804	AGILENT	Sep 7, 2020	551220083200927

Calibrating Technician:

SENGTHYE CHEW

QC Approval:

JUN CALIMAG

Statements of Pass or Fail Conformance: The uncertainty of measurement has been taken into account when determining compliance with specification, as per ILAC-G8:03/2009. All measurements and test results guard banded to ensure the probability of false-accept does not exceed 2% in compliance with ANSI/NCSL Z540.3-2006.

The status of compliance with the acceptance criteria is reported as:

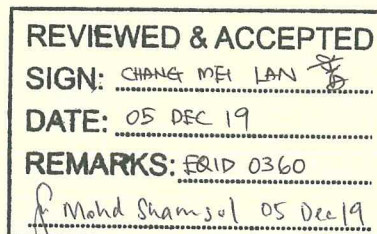
PASS - Compliant with specification.

FAIL - Not compliant with specification.

FAIL² - The measured value is not within the acceptance limits. However, a portion of the expanded uncertainty of measurement at 95% is within the specified tolerance.

PASS² - The measured value is within acceptance limits. However, a portion of the expanded uncertainty of measurement at 95% exceeds the specified tolerance.

The expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor $k=2$, which for a normal distribution corresponds to a coverage probability of approximately 95%, unless otherwise stated. This calibration report complies with ISO/IEC 17025:2017 and ANSI/NCSL Z540.3 Method 6-Guard Bands based on Test Uncertainty Ratio. Calibration cycles and resulting due dates were submitted/approved by the customer. Any number of factors may cause an instrument to drift out of tolerance before the next scheduled calibration. Recalibration cycles should be based on frequency of use, environmental conditions and customer's established systematic accuracy. All standards are traceable to SI through the National Institute of Standards and Technology (NIST) and/or recognized national or international standards laboratories. Services rendered include proper manufacturer's service instruction and are warranted for no less than thirty (30) days. The information on this report pertains only to the instrument identified, this may not be reproduced in part or in a whole without the prior written approval of the issuing MP Calibration Laboratory.





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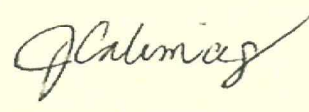
Procedures Used in this Event

Procedure Name	Description
QUADTECH 6000 PLUS Rev. A6	Electrical Safety Analyzer Instruction Manual, Form 150798

Calibrating Technician:


SENGTHYE CHEW

QC Approval:


JUN CALIMAG

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Quadtech Guardian 6000 Electrical Safety Analyzer

Procedure: **QUADTECH 6000 PLUS**

ID Number: **6069766**

Asset Number: **0360**

Order Number: **SG-11012782**

Serial Number: **6069766**

Calibration Date: **November 28, 2019**

AC Voltage Accuracy (@60 Hz)

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
0.5 to 5 kV	1.000 kV	0.985 kV	1.002 kV	1.002 kV	1.015 kV	PASS	0.0012 kV
0.5 to 5 kV	1.350 kV	1.332 kV	1.353 kV	1.353 kV	1.369 kV	PASS	0.0012 kV
0.5 to 5 kV	2.000 kV	1.975 kV	2.003 kV	2.003 kV	2.025 kV	PASS	0.00060 kV
0.5 to 5 kV	2.400 kV	2.371 kV	2.402 kV	2.402 kV	2.429 kV	PASS	0.00060 kV
0.5 to 5 kV	3.000 kV	2.965 kV	3.001 kV	3.001 kV	3.035 kV	PASS	0.00060 kV
0.5 to 5 kV	4.000 kV	3.955 kV	4.006 kV	4.006 kV	4.045 kV	PASS	0.00060 kV
0.5 to 5 kV	5.000 kV	4.945 kV	5.006 kV	5.006 kV	5.055 kV	PASS	0.00060 kV

DC Voltage Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
0.5 to 6 kV	1.000 kV	0.985 kV	0.997 kV	0.997 kV	1.015 kV	PASS	0.0025 kV
0.5 to 5 kV	1.900 kV	1.876 kV	1.892 kV	1.892 kV	1.924 kV	PASS	0.0046 kV
0.5 to 6 kV	2.000 kV	1.975 kV	1.993 kV	1.993 kV	2.025 kV	PASS	0.0048 kV
0.5 to 5 kV	2.400 kV	2.371 kV	2.392 kV	2.392 kV	2.429 kV	PASS	0.0058 kV
0.5 to 6 kV	3.000 kV	2.965 kV	2.987 kV	2.987 kV	3.035 kV	PASS	0.0072 kV
0.5 to 6 kV	4.000 kV	3.955 kV	3.983 kV	3.983 kV	4.045 kV	PASS	0.010 kV
0.5 to 6 kV	5.000 kV	4.945 kV	4.977 kV	4.977 kV	5.055 kV	PASS	0.012 kV
0.5 to 6 kV	6.000 kV	5.935 kV	5.973 kV	5.973 kV	6.065 kV	PASS	0.014 kV

AC Current Accuracy (@60 Hz)

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
1 µA to 40 mA	0.250 mA	0.243 mA	0.252 mA	0.252 mA	0.258 mA	PASS	0.00058 mA
1 µA to 40 mA	0.500 mA	0.490 mA	0.503 mA	0.503 mA	0.510 mA	PASS	0.00059 mA
1 µA to 40 mA	1.000 mA	0.985 mA	1.004 mA	1.004 mA	1.015 mA	PASS	0.00063 mA
1 µA to 40 mA	2.000 mA	1.975 mA	2.005 mA	2.005 mA	2.025 mA	PASS	0.00074 mA
1 µA to 40 mA	5.000 mA	4.945 mA	5.004 mA	5.004 mA	5.055 mA	PASS	0.0017 mA
1 µA to 40 mA	10.000 mA	9.895 mA	10.015 mA	10.015 mA	10.105 mA	PASS	0.0027 mA
1 µA to 40 mA	20.00 mA	19.75 mA	20.02 mA	20.02 mA	20.25 mA	PASS	0.0074 mA
1 µA to 40 mA	35.00 mA	34.60 mA	35.03 mA	35.03 mA	35.40 mA	PASS	0.014 mA
1 µA to 40 mA	38.00 mA	37.57 mA	38.05 mA	38.05 mA	38.43 mA	PASS	0.015 mA

DC Current Accuracy

Range	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
0.1 µA to 12 mA	0.250 mA	0.243 mA	0.249 mA	0.249 mA	0.258 mA	PASS	0.00057 mA
0.1 µA to 12 mA	0.200 mA	0.193 mA	0.199 mA	0.199 mA	0.207 mA	PASS	0.00057 mA
0.1 µA to 12 mA	0.500 mA	0.490 mA	0.499 mA	0.499 mA	0.510 mA	PASS	0.00057 mA
0.1 µA to 12 mA	1.000 mA	0.985 mA	0.997 mA	0.997 mA	1.015 mA	PASS	0.00057 mA
0.1 µA to 12 mA	2.000 mA	1.975 mA	1.992 mA	1.992 mA	2.025 mA	PASS	0.00058 mA
0.1 µA to 12 mA	5.000 mA	4.945 mA	4.973 mA	4.973 mA	5.055 mA	PASS	0.00065 mA
0.1 µA to 12 mA	10.000 mA	9.895 mA	9.950 mA	9.950 mA	10.105 mA	PASS	0.00082 mA
0.1 µA to 12 mA	12.00 mA	11.83 mA	11.97 mA	11.97 mA	12.17 mA	PASS	0.0057 mA

Insulation DC Voltage Accuracy

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
0.050 kV	0.050 kV	0.045 kV	0.048 kV	0.048 kV	0.056 kV	PASS	0.0006 kV
0.500 kV	0.500 kV	0.490 kV	0.499 kV	0.499 kV	0.510 kV	PASS	0.0013 kV
1.000 kV	1.000 kV	0.985 kV	0.999 kV	0.999 kV	1.015 kV	PASS	0.0025 kV

Insulation Resistance Accuracy

Voltage Setting	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
100 V	0.100 MΩ	0.085 MΩ	0.090 MΩ	0.090 MΩ	0.115 MΩ	PASS	0.00057 MΩ
500 V	1.00 MΩ	0.85 MΩ	1.01 MΩ	1.01 MΩ	1.15 MΩ	PASS	0.0057 MΩ
500 V	10.0 MΩ	9.0 MΩ	10.09 MΩ	10.09 MΩ	11.0 MΩ	PASS	0.057 MΩ
500 V	100 MΩ	90 MΩ	99 MΩ	99 MΩ	110 MΩ	PASS	0.57 MΩ
500 V	1.00 GΩ	0.90 GΩ	0.97 GΩ	0.97 GΩ	1.10 GΩ	PASS	0.0058 GΩ
500 V	10.0 GΩ	8.5 GΩ	9.2 GΩ	9.2 GΩ	11.5 GΩ	PASS	0.058 GΩ
1000 V	1.00 MΩ	0.85 MΩ	0.98 MΩ	0.98 MΩ	1.15 MΩ	PASS	0.0057 MΩ
1000 V	10.0 MΩ	9.0 MΩ	10.03 MΩ	10.0 MΩ	11.0 MΩ	PASS	0.057 MΩ
1000 V	100 MΩ	90 MΩ	100.0 MΩ	100.0 MΩ	110 MΩ	PASS	0.57 MΩ
1000 V	1.00 GΩ	0.90 GΩ	0.97 GΩ	0.97 GΩ	1.10 GΩ	PASS	0.0058 GΩ
1000 V	10.0 GΩ	8.5 GΩ	9.3 GΩ	9.3 GΩ	11.5 GΩ	PASS	0.058 GΩ

Ground Bond AC Current Accuracy

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
5.000 A	5.000 A	4.947 A	4.991 A	4.991 A	5.053 A	PASS	0.0073 A
10.000 A	10.000 A	9.897 A	9.997 A	9.997 A	10.103 A	PASS	0.014 A
15.00 A	15.00 A	14.82 A	14.99 A	14.99 A	15.18 A	PASS	0.022 A
20.00 A	20.00 A	19.77 A	19.98 A	19.98 A	20.23 A	PASS	0.029 A
25.00 A	25.00 A	24.72 A	24.99 A	24.99 A	25.28 A	PASS	0.036 A
30.00 A	30.00 A	29.67 A	29.99 A	29.99 A	30.33 A	PASS	0.043 A

Resistance Accuracy

Function Tested	Nominal Value	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
@ 10 A	300.0 mΩ	296.7 mΩ	301.8 mΩ	301.8 mΩ	303.3 mΩ	PASS	0.15 mΩ
@ 10 A	500.0 mΩ	494.7 mΩ	502.7 mΩ	502.7 mΩ	505.3 mΩ	PASS	0.15 mΩ
@ 25 A	100.0 mΩ	98.7 mΩ	100.6 mΩ	100.6 mΩ	101.3 mΩ	PASS	0.15 mΩ

Timer Accuracy Check

Nominal Value	As Found	As Left	Uncertainty ($\pm$)
2.00 s	2.00 s	2.00 s	0.14 s
5.00 s	5.01 s	5.01 s	0.14 s
10.00 s	10.01 s	10.01 s	0.14 s