



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: April 28, 2020

Cert No. 551220083587385

Customer:

WATERS PACIFIC PTE LTD

1 SCIENCE PARK ROAD, #02-08 THE CAPRICORN
SINGAPORE SCIENCE PARK II
SINGAPORE 117528

Work Order #: SG-11014134

MPC Control #: C012641
Asset ID: 93246
Gage Type: DIGITAL PHOSPHOR OSCILLOSCOPE
Manufacturer: TEKTRONIX
Model Number: TDS3054C
Size: N/A
Temp/RH: 22°C / 50 %
Location: Calibration performed at MPC facility

Serial Number: C012641
Department: N/A
Performed By: DIVIEERNRAJ CHANDRAN
Received Condition: IN TOLERANCE
Returned Condition: IN TOLERANCE
Cal. Date: April 28, 2020
Cal. Interval: 12 MONTHS
Cal. Due Date: April 28, 2021

Calibration Notes:

Performance test passed. See attached data (3 Pages).

Calibration performed for PT Surya Teknologi.

Standards Used to Calibrate Equipment

I.D.	Description.	Model	Serial	Manufacturer	Cal. Due Date	Traceability #
CT2147	SIGNAL GENERATOR	SMA 100A-B103-B22	103536	ROHDE & SCHWARZ	Mar 8, 2021	551220083546510
DH3876	MULTI-FUNCTION CALIBRATOR	5700A/NAF	6020913	FLUKE	Apr 9, 2021	551220083583661
CA8197	80 MHZ FUNCTION / ARBITRARY WAVEFORM GENERATOR	33250A	MY40022550	AGILENT	Apr 20, 2021	551220083577497

Procedures Used in this Event

Procedure Name	Description
TEKTRONIX TDS3000C	Digital Phosphor Oscilloscopes, Tektronix TDS3000C Series, Sep-01-2009

Calibrating Technician:

DIVIEERNRAJ CHANDRAN

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/NCCL Z540.3-2006 and in case without guard banded the probability of false-accept depending on test uncertainty ratio.

THE CALIBRATION REPORT STATUS:

PASS- Term used when compliance statement is given, and the measurement result is PASS.

PASS? - Term used when compliance statement is given, and the measurement result is conditional passed or PASS?

FAIL- Term used when compliance statement is given, and the measurement result is FAIL.

FAIL? - Term used when compliance statement is given, and the measurement result is conditional failed or FAIL?

REPORT OF VALUE - Term used when reported measurement is not requiring compliance statement in report.

ADJUSTED- When adjustments are made to an instrument which changes the value of measurement from what was measured as found to new value as left.

LIMITED - When an instrument fails calibration but is still functional in a limited manner.

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/NCCL Z540.3. 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.



Calibration Report of Tektronix TDS3054C Digital Phosphor Oscilloscope

MPC Control #: _____	C012641	Serial Number: _____	C012641
Asset ID: _____	93246	Calibration Date: _____	April 28, 2020

DC Voltage Measurement Accuracy

Channel 1

Function Tested	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
1 mV/div	100.0 mV	99.3 mV	100.1 mV	100.1 mV	100.8 mV	PASS	0.0010 mV
2 mV/div	-7.000 mV	-7.540 mV	-7.105 mV	-7.105 mV	-6.460 mV	PASS	0.000071 mV
5 mV/div	-100.0 mV	-101.8 mV	-100.0 mV	-100.0 mV	-98.2 mV	PASS	0.0010 mV
50 mV/div	1000.0 mV	982.4 mV	999.6 mV	999.6 mV	1017.6 mV	PASS	0.0060 mV
50 mV/div	650.0 mV	632.4 mV	649.8 mV	649.8 mV	667.6 mV	PASS	0.0039 mV
50 mV/div delta	350.0 mV	340.5 mV	349.8 mV	349.8 mV	359.5 mV	PASS	0.0021 mV
90 mV/div	-315.0 mV	-339.3 mV	-316.4 mV	-316.4 mV	-290.7 mV	PASS	0.0019 mV
200 mV/div	10.000 V	9.900 V	10.000 V	10.000 V	10.100 V	PASS	0.000043 V
1 V/div	-10.000 V	-10.302 V	-9.976 V	-9.976 V	-9.698 V	PASS	0.000043 V

Channel 2

Function Tested	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
1 mV/div	100.0 mV	99.25 mV	99.82 mV	99.82 mV	100.75 mV	PASS	0.0010 mV
2 mV/div	-7.000 mV	-7.540 mV	-7.157 mV	-7.157 mV	-6.460 mV	PASS	0.000071 mV
5 mV/div	-100.0 mV	-101.8 mV	-100.0 mV	-100.0 mV	-98.2 mV	PASS	0.0010 mV
50 mV/div	1000.0 mV	982.4 mV	997.2 mV	997.2 mV	1017.6 mV	PASS	0.0060 mV
50 mV/div	650.0 mV	632.4 mV	647.7 mV	647.7 mV	667.6 mV	PASS	0.0039 mV
50 mV/div delta	350.0 mV	340.5 mV	349.5 mV	349.5 mV	359.5 mV	PASS	0.0021 mV
90 mV/div	-315.0 mV	-339.3 mV	-318.8 mV	-318.8 mV	-290.7 mV	PASS	0.0019 mV
200 mV/div	10.000 V	9.900 V	9.980 V	9.980 V	10.100 V	PASS	0.000043 V
1 V/div	-10.000 V	-10.302 V	-10.070 V	-10.070 V	-9.698 V	PASS	0.000043 V

Channel 3

Function Tested	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
1 mV/div	100.0 mV	99.3 mV	100.2 mV	100.2 mV	100.8 mV	PASS	0.0010 mV
2 mV/div	-7.000 mV	-7.540 mV	-7.124 mV	-7.124 mV	-6.460 mV	PASS	0.000071 mV
5 mV/div	-100.0 mV	-101.8 mV	-100.3 mV	-100.3 mV	-98.2 mV	PASS	0.0010 mV
50 mV/div	1000.0 mV	982.4 mV	1001.0 mV	1001.0 mV	1017.6 mV	PASS	0.0060 mV
50 mV/div	650.0 mV	632.4 mV	649.7 mV	649.7 mV	667.6 mV	PASS	0.0039 mV
50 mV/div delta	350.0 mV	340.5 mV	351.3 mV	351.3 mV	359.5 mV	PASS	0.0021 mV
90 mV/div	-315.0 mV	-339.3 mV	-316.3 mV	-316.3 mV	-290.7 mV	PASS	0.0019 mV
200 mV/div	10.000 V	9.900 V	10.010 V	10.010 V	10.100 V	PASS	0.000043 V
1 V/div	-10.000 V	-10.302 V	-10.040 V	-10.040 V	-9.698 V	PASS	0.000043 V



Calibration Report of Tektronix TDS3054C Digital Phosphor Oscilloscope

MPC Control #: _____	C012641	Serial Number: _____	C012641
Asset ID: _____	93246	Calibration Date: _____	April 28, 2020

Channel 4

Function Tested	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
1 mV/div	100.0 mV	99.3 mV	100.0 mV	100.0 mV	100.8 mV	PASS	0.0010 mV
2 mV/div	-7.000 mV	-7.540 mV	-7.096 mV	-7.096 mV	-6.460 mV	PASS	0.000071 mV
5 mV/div	-100.0 mV	-101.8 mV	-99.9 mV	-99.9 mV	-98.2 mV	PASS	0.0010 mV
50 mV/div	1000.0 mV	982.4 mV	999.4 mV	999.4 mV	1017.6 mV	PASS	0.0060 mV
50 mV/div	650.0 mV	632.4 mV	649.6 mV	649.6 mV	667.6 mV	PASS	0.0039 mV
50 mV/div delta	350.0 mV	340.5 mV	349.8 mV	349.8 mV	359.5 mV	PASS	0.0021 mV
90 mV/div	-315.0 mV	-339.3 mV	-313.6 mV	-313.6 mV	-290.7 mV	PASS	0.0019 mV
200 mV/div	10.000 V	9.900 V	10.000 V	10.000 V	10.100 V	PASS	0.000043 V
1 V/div	-10.000 V	-10.302 V	-10.000 V	-10.000 V	-9.698 V	PASS	0.000043 V

Check Bandwidth Accuracy @ 500 MHz

Function Tested	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
Channel 1	> 150.000 mV	150 mV	157 mV	157 mV	NA	PASS	4.5 mV
Channel 2	> 150.000 mV	150 mV	151 mV	151 mV	NA	PASS	4.5 mV
Channel 3	> 150.000 mV	150 mV	156 mV	156 mV	NA	PASS	4.5 mV
Channel 4	> 150.000 mV	150 mV	158 mV	158 mV	NA	PASS	4.5 mV

Channel Edge - Trigger Sensitivity

@ 500 MHz

Function Tested	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty (±)
Channel 1 / Rising Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 1 / Falling Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 2 / Rising Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 2 / Falling Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 3 / Rising Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 3 / Falling Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 4 / Rising Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 4 / Falling Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA



Calibration Report of Tektronix TDS3054C Digital Phosphor Oscilloscope

MPC Control #:	C012641	Serial Number:	C012641
Asset ID:	93246	Calibration Date:	April 28, 2020

@ 50 MHz

Function Tested	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty ($\pm$)
Channel 1 / Rising Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 1 / Falling Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 2 / Rising Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 2 / Falling Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 3 / Rising Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 3 / Falling Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 4 / Rising Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA
Channel 4 / Falling Slope	Stable Trigger	NA	Stable Trigger	Stable Trigger	NA	PASS	NA

Sample Rate and Delay Time Accuracy

Function Tested	Nominal	Lower Limit	As Found	As Left	Upper Limit	Result	Uncertainty ($\pm$)
100 ms / 1 Vpk-pk	0.00 div	-2.00 div	0.80 div	0.80 div	2.00 div	PASS	0.0057 div

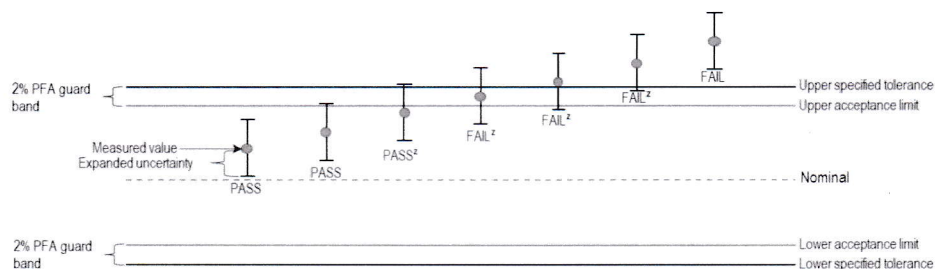
Statements of Pass or Fail Conformance

The uncertainty of measurement has been taken into account when determining compliance with specification, as per LAC-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.



Acceptance limits for $\leq 2\%$ probability of false accept (PFA) guard band

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.

- End of Calibration Report -