TECHNOLOGY PROMOTION ASSOCIATION (THAILAND-JAPAN)
CORPORATE SERVICES 3: EQUIPMENT CALIBRATION AND TESTING SERVICES
534/4 PATTANAKARN ROAD SOI 18, SUANLUANG, SUANLUANG, BANGKOK 10250
TEL. 0-2717-3000-24 FAX. 0-2719-9484

NSC-TISI-TIS17025
CALIBRATION 0008

Certificate of Calibration

Certificate No. : 23E1910
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Equipment :	Digital Storage Oscilloscope
Manufacturer:	Rigol
Model :	DS 5102CA
Serial No.:	DS510200070185
ID No.:	OSCI002
Condition As-Received:	Used Item
Received Date:	06 June 2023
Calibration Date:	07 June 2023

Reference:	2306-0124WSC
Ambient Temperature:	(23 ± 2) °C
Relative Humidity:	(50 ± 10) %

Submitted by: National Healthcare Systems Co.,Ltd.
2301/2 New Petchburi Soi 47 (Soonvijai),
Bangkapi, Huaykwang, Bangkok 10310

Procedure used: Calibration were conducted using in-house calibration Procedure CP-E12 According to direct measurement method with Multi-Product Calibrator.

Condition of this result of calibration

1.Reference standards instruments :

Instrument	Model	Serial No.	Certificate No.	Due Date
1) Multi-Product Calibrator	5500A	6440007	EE-0084-22	23 Oct 2023

2.This result of calibration was made on requested at the point specified by customer.

3.The certificate is valid only to the item calibrated on date and place of calibration.

4.This Certification is traceable to the International System of Unit maintained through:-

-National Institute of Metrology Thailand (NIMT)

Calibrated by : Wutchareeporn Wongchutikrane
Issue Date : 09 June 2023

Approved Signatory : _____

[ ] Phalinee Prabpaipal
[✓] Nuntawat Khamchai
[ ] Pornthippa Tameyakul

B 0317003

Result of calibration :- (*) Without adjustment ( ) After adjustment

Channel : 1 Vertical Deflection Error Test

Volts / Div Setting	Deflection Error	Uncertainty
(V)	(%)	±
2.00 mV	0.0	0.16 mV
5.00 mV	0.0	0.22 mV
10.00 mV	0.0	0.32 mV
20.00 mV	0.0	0.52 mV
50.00 mV	0.0	1.2 mV
100.0 mV	0.0	2.2 mV
200.0 mV	0.0	4.3 mV
500.0 mV	0.0	11 mV
1.000 V	0.0	21 mV
2.000 V	0.0	42 mV
5.000 V	0.0	0.11 V

Channel : 2 Vertical Deflection Error Test

Volts / Div Setting	Deflection Error	Uncertainty
(V)	(%)	±
2.00 mV	0.0	0.16 mV
5.00 mV	0.0	0.22 mV
10.00 mV	0.0	0.32 mV
20.00 mV	0.0	0.52 mV
50.00 mV	0.0	1.2 mV
100.0 mV	0.0	2.2 mV
200.0 mV	0.0	4.3 mV
500.0 mV	0.0	11 mV
1.000 V	0.0	21 mV
2.000 V	0.0	42 mV
5.000 V	0.0	0.11 V

Result of calibration :- (*) Without adjustment ( ) After adjustment

Channel : 1

Horizontal Deflection error Test.: Sweep Rate

Time / Div Setting (Time)	Error (%)	Uncertainty ±	Time / Div Setting (Time)	Error (%)	Uncertainty ±
5.000 ns	0.0	0.058 ns	200.0 µs	0.0	2.6 µs
10.00 ns	0.0	0.12 ns	500.0 µs	0.0	5.8 µs
20.00 ns	0.0	0.24 ns	1.000 ms	0.0	12 µs
50.00 ns	0.0	0.58 ns	2.000 ms	0.0	24 µs
100.0 ns	0.0	1.2 ns	5.000 ms	0.0	58 µs
200.0 ns	0.0	2.4 ns	10.00 ms	0.0	0.12 ms
500.0 ns	0.0	5.8 ns	20.00 ms	0.0	0.24 ms
1.000 µs	0.0	12 ns	50.00 ms	0.0	0.58 ms
2.000 µs	0.0	24 ns	100.0 ms	0.0	1.7 ms
5.000 µs	0.0	58 ns	200.0 ms	0.0	2.3 ms
10.00 µs	0.0	0.12 µs	500.0 ms	0.0	5.8 ms
20.00 µs	0.0	0.24 µs	1.000 s	0.0	12 ms
50.00 µs	0.0	0.58 µs	2.000 s	0.0	24 ms
100.0 µs	0.0	1.7 µs	5.000 s	0.0	58 ms

Result of calibration :- (*) Without adjustment ( ) After adjustment

Channel : 1

Volt / Div Setting at 0.5 V

Standard Input Signal : Sine Wave / 3.0 V Peak-to-Peak

Bandwidth Testing : -3 dB Attenuation at 150.00 MHz

Standard Frequency (MHz)	Amplitude Attenuation (dB)
0.05	0
5.00	0
10.00	0
50.00	0
100.00	0
150.00	-3

Channel : 2

Volt / Div Setting at 0.5 V

Standard Input Signal : Sine Wave / 3.0 V Peak-to-Peak

Bandwidth Testing : -3 dB Attenuation at 175.00 MHz

Standard Frequency (MHz)	Amplitude Attenuation (dB)
0.05	0
5.00	0
10.00	0
50.00	0
100.00	0
175.00	-3

Channel : 1

Display Waveform Measurement

Input Frequency : 100 MHz

Standard Frequency	Displayed Waveform of Oscilloscope
Sinusoidal Wave	Sinusoidal Wave

Channel : 2

Display Waveform Measurement

Input Frequency : 100 MHz

Standard Frequency	Displayed Waveform of Oscilloscope
Sinusoidal Wave	Sinusoidal Wave

The uncertainty of leveled sine wave amplitude measurement was ± 0.40 dB

The reported uncertainty of measurement was based on a standard uncertainty multiplied by a coverage factor k = 2, providing level of confidence of of approximately 95 %

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