ELECTROMAGNETIC COMPATIBILITY TEST REPORT

Test Report No.		RAPA23-O-021
Applicant	Name	Comfile Technology Inc.
	Address	11-9, Gamasan-ro 27-gil, Guro-gu, Seoul, Republic of Korea
Manufacturer	Name	Comfile Technology Inc.
	Address	11-9, Gamasan-ro 27-gil, Guro-gu, Seoul, Republic of Korea
Type of Equipment		Touch Display Controller for Industrial
Model Name		CPi-S101WR
Multi Model Name		N/A
Serial number		N/A
Total page of Report		57pages (including this page)
Test period		May 3, 2023 to June 1, 2023
Issuing date of report		June 5, 2023

SUMMARY

The equipment complies with the standards; EN 55032:2015/A11:2020, EN 55035:2017/A11:2020
EN IEC 61000-3-2:2019/A1:2021+A1:2021 and EN 61000-3-3:2013/A2:2021

This test report contains only the result of a single test of the sample supplied for the examination.
It is not a general valid assessment of the features of the respective products of the mass-production.

Prepared by : ______________________
SeungSoo Kim / Assistant Manager
TCL of RAPA.

Reviewed by : ______________________
SeungSik Kim / Manager
TCL of RAPA.

ISSUANCE OF TEST REPORT

Issuance date	test report number	purpose
June 5, 2023	RAPA23-O-021	Initial issuance
-	-	-

CONTENTS

1. APPLICANT AND MANUFACTURER INFORMATION

Applicant	Name	Comfile Technology Inc.
	Address	11-9, Gamasan-ro 27-gil, Guro-gu, Seoul, Republic of Korea
Manufacturer	Name	Comfile Technology Inc.
	Address	11-9, Gamasan-ro 27-gil, Guro-gu, Seoul, Republic of Korea
Contact name		Hyung-Tae Park / Senior
E-mail address		ted@comfile.co.kr
Telephone No.		+82-2-711-2593
Fax No.		+82-2-856-2611

2. TEST SUMMARY

2.1 Test standards and results

STANDARDS		RESULTS
EN 55032:2015/A11:2020	Main Terminal Continuous Disturbance Voltage	See Note 1
	Conducted common mode disturbance at TEL ports	PASS
	Radiated Emission (Below 1 GHz)	PASS
	Radiated Emission (Above 1 GHz)	PASS
EN IEC 61000-3-2:2019/A1:2021	Harmonic Current Emission	See Note 1
EN 61000-3-3: 2013/A1:2021	Voltage Change, Voltage fluctuations and Flicker	See Note 1
EN 55035:2017/A11:2020	Electrostatic discharge immunity	PASS
	Radio frequency electromagnetic fields	PASS
	Electrical fast transient/burst immunity	PASS
	Surge immunity	See Note 2
	Conducted disturbance induced by RF fields immunity	PASS
	Power frequency magnetic field immunity	See Note 3
	Voltage Dips and Short interruptions	See Note 1

NOTE 1: The equipment under test was DC mains power ports, so this test was not executed.
NOTE 2: The equipment under test was excluded from the test item because EUT doesn’t have ports that can be connected directly to outdoor cable and cable longer than 3 m in length according to the manufacturer's specifications.
NOTE 3: The equipment under test was not susceptible to magnetic fields, so this test was not executed.

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standards.

2.3 Purpose of the test

To determine whether the equipment under test fulfills the EMC requirements of the standards stated in section 2.1.

2.4 Test facilities

- Place of test : Head office

101 & B104, Anyang Megavalley, 268, Hagui-ro, Dongan-gu, Anyang-si, Gyeonggi-do, Korea
Open Area Test Site

103, Anseok-dong, 138beon-gil, Hwaseong-si, Gyeonggi-do, Korea

(FCC OATS Registration Number : 931589)
(FCC Conformity Assessment Body, Registration Number : 608365)
(IC Company address code : 9355B)
(RRA Designation Number : KR0027)

2.5 Criterion description

Criterion	Descriptions
A	The equipment shall continue to operate as intended without operator intervention. No degradation of performance, loss of function or change of operating state is allowed below a performance level specified by the manufacturer when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level or the permissible performance loss is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
B	During the application of the disturbance, degradation of performance is allowed. However, no unintended change of actual operating state or stored data is allowed to persist after the test. After the test, the equipment shall continue to operate as intended without operator intervention; no degradation of performance or loss of function is allowed, below a performance level specified by the manufacturer, when the equipment is used as intended. The performance level may be replaced by a permissible loss of performance. If the minimum performance level (or the permissible performance loss), or recovery time, is not specified by the manufacturer, then either of these may be derived from the product description and documentation, and by what the user may reasonably expect from the equipment if used as intended.
C	Loss of function is allowed, provided the function is self-recoverable, or can be restored by the operation of the controls by the user in accordance with the manufacturer's instructions. A reboot or re-start operation is allowed Information stored in non-volatile memory, or protected by a battery backup, shall not be lost.

3. EUT (Equipment Under Test)

3.1 Identification of the EUT

- Equipment : Touch Display Controller for Industrial
- Model name : CPi-S101WR
- Multi model name : N/A
- Brand name : Comfile Technology Inc.
- Serial number : N/A
- Manufacturer : Comfile Technology Inc.

3.2 Additional information about the EUT

The model CPi-S101WR (referred to as the EUT in this report) of ILOGICS INC.is Touch Display Controller for Industrial specification described herein was obtained from product data sheet or user’s manual.

HMI	
MCU	1.5 GHz 64-Bit Quad-Core ARM Cortex-A72 processor
GPU	Broadcom VideoCore IV
RAM	1 GB
Storage	1 microSD Slot (Default: 8 GB)
LCD	10.1 Inch (1024 x 600)
Aspect Ratio	16:9
Colors	162 K
Contrast Ratio	600:1
Brightness	250 cd/m2
Touchscreen	Pressure-sensitive (Resistive Film Type)
Housing	Flame retardant ABS IP65 Water-Resistant Front Panel
Ethernet	100 Base-T (1 Port)
Audio	Stereo audio output (ø3.5 Audio Jack)
USB	USB 2.0 x 3 Port
Serial	COM0 (RS232C)/COM1 (RS485)
I2C	1 Port
RTC	DS3231 (Battery rated for 5 years)
GPIO	22 Port (includes ESD protection circuit) / 40-Pin Header socket
Input Power	DC 12 V ~ DC 24 V
Power Consumption	<10 W (0.8 A @12 V)
Dimension	264(H)x170(V)x53(D) mm
Weight	0.92 kg
Operating Temperature	0 ℃ ~ 60 ℃
Storage Temperature	-20 ℃ ~ 80 ℃

3.3 Peripheral equipment

It is defined as peripheral equipment needed for correct operation of the EUT but not considered as tested.

Model	Manufacturer	Description	Serial No.
CPi-S101WR	Comfile Technology Inc.	Touch Display Controller for Industrial (EUT)	N/A
HP 8570P B8Z36PA	HP	Laptop	N/A
SeriesPPP012L-E	LITE-ON TECHNOLOGY (CHANGZHOU) CO., LTD.	Laptop Adapter	WBGTK0A1RZ9200
GP-4303DU	EZ Digital Co., Ltd.	DC Power Supply	2100198
N/A	N/A	Earphone	N/A
32 GB	Sandisk	Micro SD card	N/A
32 GB	Sandisk	USB memory 1	N/A
32 GB	Sandisk	USB memory 2	N/A
32 GB	Sandisk	USB memory 3	N/A

3.4 Mode of operation during the test

By the applicant request, The EUT has maintained normal operation and full loaded traffic mode during the test. EUT Input power is DC 12, 24 V

3.5 Alternative type(s)/model(s); also covered by this test report

The followings are added model names and their differences.

Model Name	Differences	Tested
None	None	☐

NOTE1: Applicant asks only basic model to test. Therefore, testing laboratories just guarantee the unit which has been tested.

3.6 EUT cable description

Ports name		Shielded	Ferrite bead	Length (m)	Connected to
CPi-S101WR (EUT)	DC IN	NO	NO	1.2	DC Power Supply
	COM0 RS232	NO	NO	1.5	Laptop
	COM1 RS485	NO	NO	1.2	Laptop
	I2C	NO	NO	0.2	EUT
	USB 3 Port	-	NO	direct	EUT
	ETHERNET	NO	NO	3.0	Laptop
	µSD Card	-	NO	direct	EUT
	Audio Out	NO	NO	1.0	EUT
Laptop	DC IN	NO	NO	1.8	Laptop Adapter
	Serial 9 Pin	NO	NO	1.2	EUT
	RJ-45	NO	NO	3.0	EUT
	USB	NO	NO	1.5	EUT
DC Power Supply	AC IN	NO	NO	1.5	AC MAIN
	DC OUT	NO	NO	1.5	EUT

4. EUT MODIFICATIONS

- None

5. EMISSION TESTS

5.1 Mains terminal continuous disturbance voltage

5.1.1 Operating environment

- Temperature: -
- Humidity : -

5.1.2 Test set-up

The EUT was placed on a wooden table with 0.8 m height above the floor. The EUT was connected to AC power supply and the input power was supplied through a 50 Ω/ 50 μH ± 5 Ω Artificial Mains Network (AMN). The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

The test set-up photos are included in appendix I.

5.1.3 Measurement uncertainty

- Conducted emission, Quasi-peak detection: ± 3.46 dB
- Conducted emission, CISPR-Average detection: ± 3.14 dB

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95.45 % with the coverage factor, *k* = 2.

5.1.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☐	ESCI7	Rohde & Schwarz	EMI Test Receiver	100938	Dec. 26, 2022
☐	ESH3-Z2	Rohde & Schwarz	Pulse Limiter	101631	Dec. 26, 2022
☐	ENV216	Rohde & Schwarz	LISN	101264	Jul. 04, 2022
☐	3825/2	EMCO	LISN	9004-1635	Jul. 04, 2022
☐	ES-SCAN	R&S	EMI Software	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

5.1.5 Test data

- Test date : -
- Resolution bandwidth : 9 kHz
- Frequency range : 150 KHz ~ 30 MHz

Frequency (MHz)	Line	Quasi-peak			CISPR-Average		
		Emission level(dBμV)	Limits (dBμV)	Margin (dB)	Emission level(dBμV)	Limits (dBμV)	Margin (dB)
Not Applicable							

- **Plots**

- This test was excepted because EUT uses DC power.

SeungSoo Kim / Assistant Manager

5.2 Conducted common mode disturbance at telecommunication ports

5.2.1 Operating environment

- Temperature: 16.0 °C
- Humidity : 54.5 % R.H.

5.2.2 Test set-up

The EUT and other support equipment were placed on a wooden table, 0.8 m height above the floor. Telecommunication line for the EUT connected to the associated equipment through an Impedance Stabilization Network (ISN) which has a common mode termination impedance of 150 Ω to the telecommunication port under test. The ground plane was electrically bonded to the reference ground system and all power lines were filtered from ambient.

The test set-up photos are included in appendix II.

5.2.3 Measurement uncertainty

- Conducted emission, Quasi-peak detection: ± 3.46 dB
- Conducted emission, CISPR-Average detection: ± 3.14 dB

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, *k* = 2.

5.2.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☒	ESCI7	Rohde & Schwarz	EMI Test Receiver	100938	Dec. 26, 2022
☒	ESH3-Z2	Rohde & Schwarz	Pulse Limiter	101631	Dec. 26, 2022
☒	ENV216	Rohde & Schwarz	LISN	101264	Jul. 04, 2022
☒	3825/2	EMCO	LISN	9004-1635	Jul. 04, 2022
☒	CAT3 8158	SCHWARZBECK	ISN	8158-0031	Dec. 23, 2022
☒	CAT5 8158	SCHWARZBECK	ISN	8158-0047	Dec. 23, 2022
☐	CVP 9222 C	SCHWARZBECK	Capacitive Voltage Probe	00045	Jan. 06, 2023
☒	ES-SCAN	Rohde & Schwarz	EMI Software	N/A	N/A

Remark: All test equipment used is calibrated on a regular basis.

5.2.5 Test data

- Test date : May 31, 2023
- Resolution bandwidth : 9 kHz
- Frequency range : 0.15 MHz ~ 30 MHz

- **Test mode: 10 Mbps (DC 12 V)**

Frequency (MHz)	Port	Quasi-peak			CISPR-Average		
		Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)
0.17	RJ-45	41.69	95.96	54.27	39.64	82.96	43.32
0.48	RJ-45	46.62	87.37	40.75	43.46	74.37	30.91
1.02	RJ-45	50.96	87.00	36.04	48.16	74.00	25.84
6.70	RJ-45	57.59	87.00	29.41	52.44	74.00	21.56
18.24	RJ-45	68.64	87.00	18.36	65.26	74.00	8.74
23.13.	RJ-45	68.02	87.00	18.98	64.39	74.00	9.61

- **Test mode: 100 Mbps (DC 12 V)**

Frequency (MHz)	Port	Quasi-peak			CISPR-Average		
		Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)
0.48	RJ-45	48.60	87.37	38.77	46.12	74.37	28.25
1.43	RJ-45	46.94	87.00	40.96	43.96	74.00	30.04
2.39	RJ-45	47.57	87.00	39.43	43.64	74.00	30.36
6.39	RJ-45	55.41	87.00	31.59	46.91	74.00	27.09
8.92	RJ-45	58.25	87.00	28.75	53.04	74.00	20.9
23.13	RJ-45	59.05	87.00	27.95	54.61	74.00	19.39

- **Test mode: 10 Mbps (DC 24 V)**

Frequency (MHz)	Port	Quasi-peak			CISPR-Average		
		Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)
0.20	RJ-45	46.88	94.69	47.81	44.79	81.69	36.90
0.35	RJ-45	46.27	89.87	43.60	45.01	76.87	31.86
1.02	RJ-45	51.28	87.00	35.72	48.56	74.00	25.44
5.91	RJ-45	57.42	87.00	29.58	52.60	74.00	21.40
16.23	RJ-45	68.33	87.00	18.67	65.08	74.00	8.92
23.13	RJ-45	68.69	87.00	18.31	65.56	74.00	8.44

- **Test mode: 100 Mbps (DC 24 V)**

Frequency (MHz)	Port	Quasi-peak			CISPR-Average		
		Emission Level (dBμV)	Limits (dBμV)	Margin (dB)	Emission Level (dBμV)	Limits (dBμV)	Margin (dB)
0.48	RJ-45	48.31	87.37	39.06	45.88	74.37	28.49
1.43	RJ-45	45.80	87.00	41.20	43.50	74.00	30.50
2.39	RJ-45	48.32	87.00	38.68	44.73	74.00	29.27
8.82	RJ-45	58.03	87.00	28.97	52.88	74.00	21.12
12.20	RJ-45	59.06	87.00	27.94	54.17	74.00	19.83
23.13	RJ-45	58.84	87.00	28.16	54.03	74.00	19.97

The equipment doesn’t have wired network port, so this test was not executed

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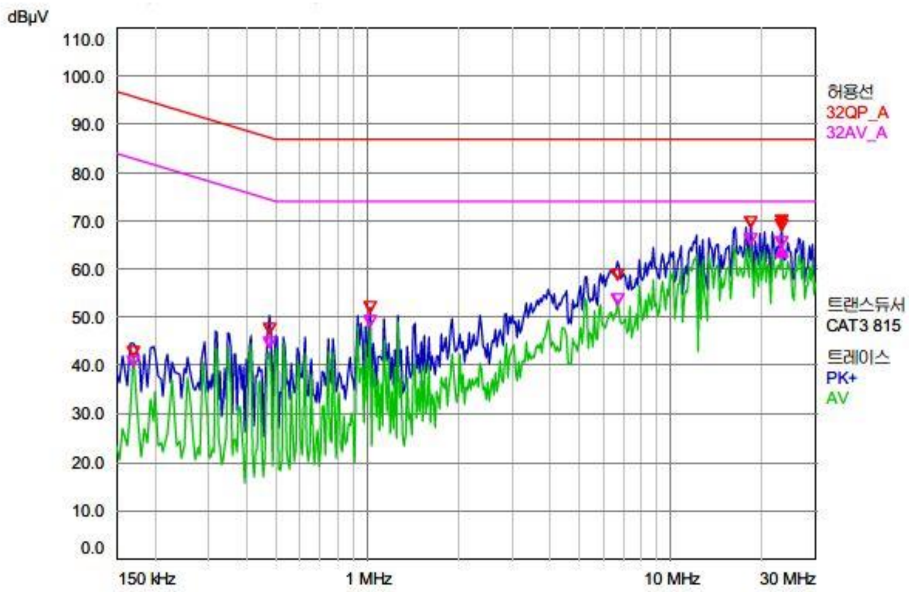
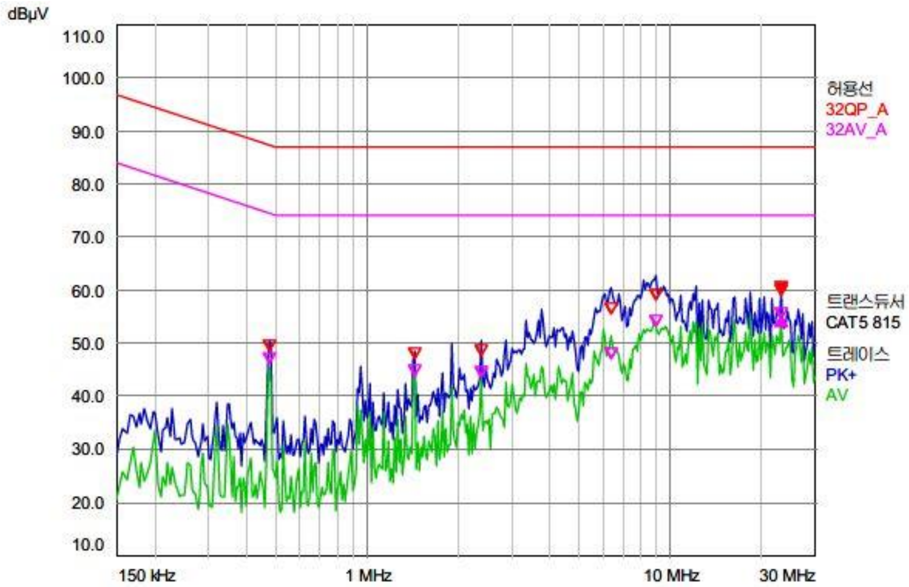
▪ **Test mode: DC 12 V**

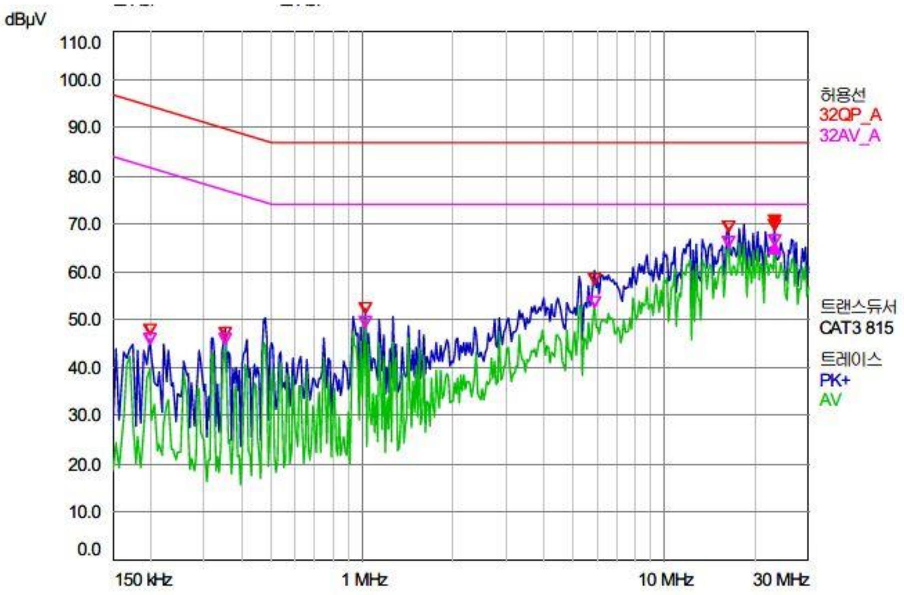


10 Mbps

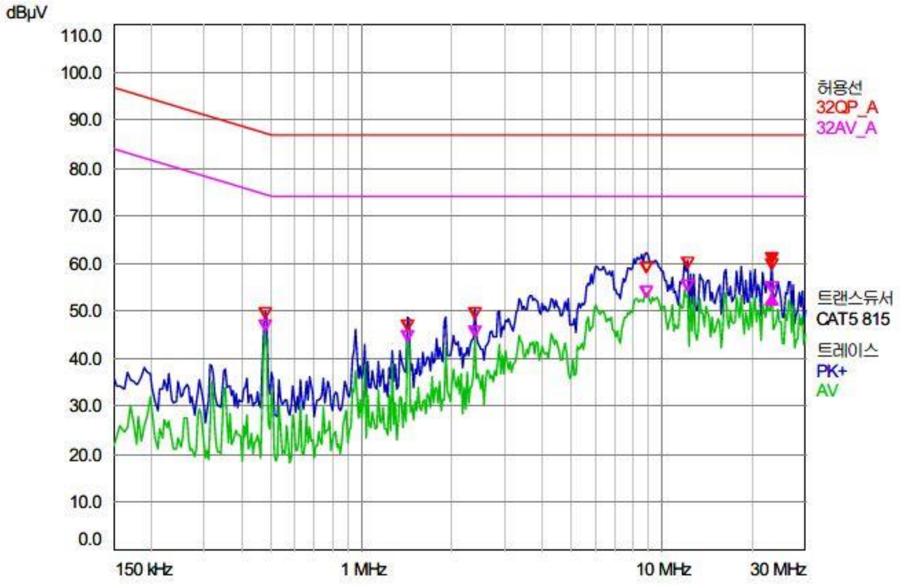


100 Mbps

▪ **Test mode: DC 24 V**



10 Mbps



100 Mbps

5.3 Radiated electromagnetic field (Below 1 GHz)

5.3.1 Operating environment

▪ Temperature: 23.7 °C
▪ Humidity : 52.1 % R.H.

5.3.2 Test set-up

The radiated emissions were measured at the 10 m Open Area Test Site. The EUT was placed on a wooden table with 0.8 meters height above the ground plane.

The frequency spectrum from 30 MHz to 1 000 MHz was scanned and maximum emission levels at each frequency recorded. The table was rotated 360° and the antenna was varied in height between 1.0 m and 4.0 m in order to detect the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

The test set-up photos are included in appendix III.

5.3.3 Measurement uncertainty

▪ Radiated emission electric field intensity in the range of 30 MHz ~ 1 000 MHz, Quasi-peak detection: ± 4.36 dB

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, *k* = 2.

5.3.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☒	ESS	R&S	EMI Test Receiver	833776/011	Jul. 04, 2022
☒	DS 1500 S-1t-O	Innco GmbH	Turn Table	N/A	N/A
☒	MA4000-O	Innco GmbH	Antenna Mast	N/A	N/A
☒	CO 2000	Innco GmbH	Controller	N/A	N/A
☒	VULB 9168	SCHWARZBECK	Trilog-Broadband Antenna	9168-735	Nov. 17, 2021
☒	AMP 20-1000	INFINITECH	BROADBAND PRE-AMP	2013 05 0003	Dec. 22, 2022
☐	CMAD 1614	SCHWARZBECK	CMAD	00318	Jan. 05, 2023

Remark: All test equipment used is calibrated on the regular basis.

5.3.5 Test data

- Test date : May 22, 2023
- Resolution bandwidth : 120 kHz
- Frequency range : 30 MHz ~ 1 000 MHz
- Measurement distance : 10 m

- Test Mode: DC 12 V Mode

Frequency (MHz)	Reading (dBμV)	ANT Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss +Amp (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
130.00	48.10	V	2.80	110.00	11.90	-33.57	26.43	40.00	-13.57
260.00	60.80	H	4.00	250.00	12.14	-32.31	40.63	47.00	-6.37
325.01	52.10	V	2.70	390.00	13.90	-32.39	33.61	47.00	-13.39
390.01	58.10	H	1.50	170.00	15.36	-32.75	40.71	47.00	-6.29
455.01	50.10	H	2.00	300.00	17.06	-32.47	34.69	47.00	-12.31
500.00	49.10	H	3.30	250.00	17.60	-32.09	34.61	47.00	-12.39

- Test Mode: DC 24 V Mode

Frequency (MHz)	Reading (dBμV)	ANT Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss +Amp (dB)	Emission Level (dBμV/m)	Limits (dBμV/m)	Margin (dB)
130.00	48.20	V	2.80	110.00	11.90	-33.57	26.53	40.00	-13.47
260.01	62.20	H	4.00	240.00	12.14	-32.31	42.03	47.00	-4.97
390.01	52.50	H	1.50	170.00	15.36	-32.75	35.11	47.00	-11.89
455.01	57.40	H	2.00	310.00	17.06	-32.47	41.99	47.00	-5.01
500.01	49.40	H	3.30	250.00	17.60	-32.09	34.91	47.00	-12.09
550.01	35.40	V	1.80	80.00	18.40	-31.75	22.05	47.00	-24.95

Tabulated test data for Radiated Electromagnetic Field

Here, H = Horizontal, V = Vertical

SeungSoo Kim / Assistant Manager

5.4 Radiated electromagnetic field (Above 1 GHz)

5.4.1 Operating environment

▪ Temperature: 20.2 °C
▪ Humidity : 44.4 % R.H.

5.4.2 Test set-up

The radiated emissions were measured at the 3 m Anechoic Chamber. The EUT was placed on a wooden table with 0.8 meters height above the ground plane.

The frequency spectrum from 1 000 MHz to 6 000 MHz was scanned and maximum emission levels at each frequency recorded. The table was rotated 360° and the antenna was varied in height between 1.0 m and 2.0 m in order to detect the maximum emission levels. This procedure was performed for both horizontal and vertical polarization of the receiving antenna.

The test set-up photos are included in appendix IV.

5.4.3 Measurement uncertainty

▪ Radiated emission electric field intensity in the range of 1 000 MHz ~ 6 000 MHz, peak detection: ±4.80 dB
▪ Radiated emission electric field intensity in the range of 1 000 MHz ~ 6 000 MHz, CISPR-average: ± 4.72 dB

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, *k* = 2.

5.4.4 Test equipment used

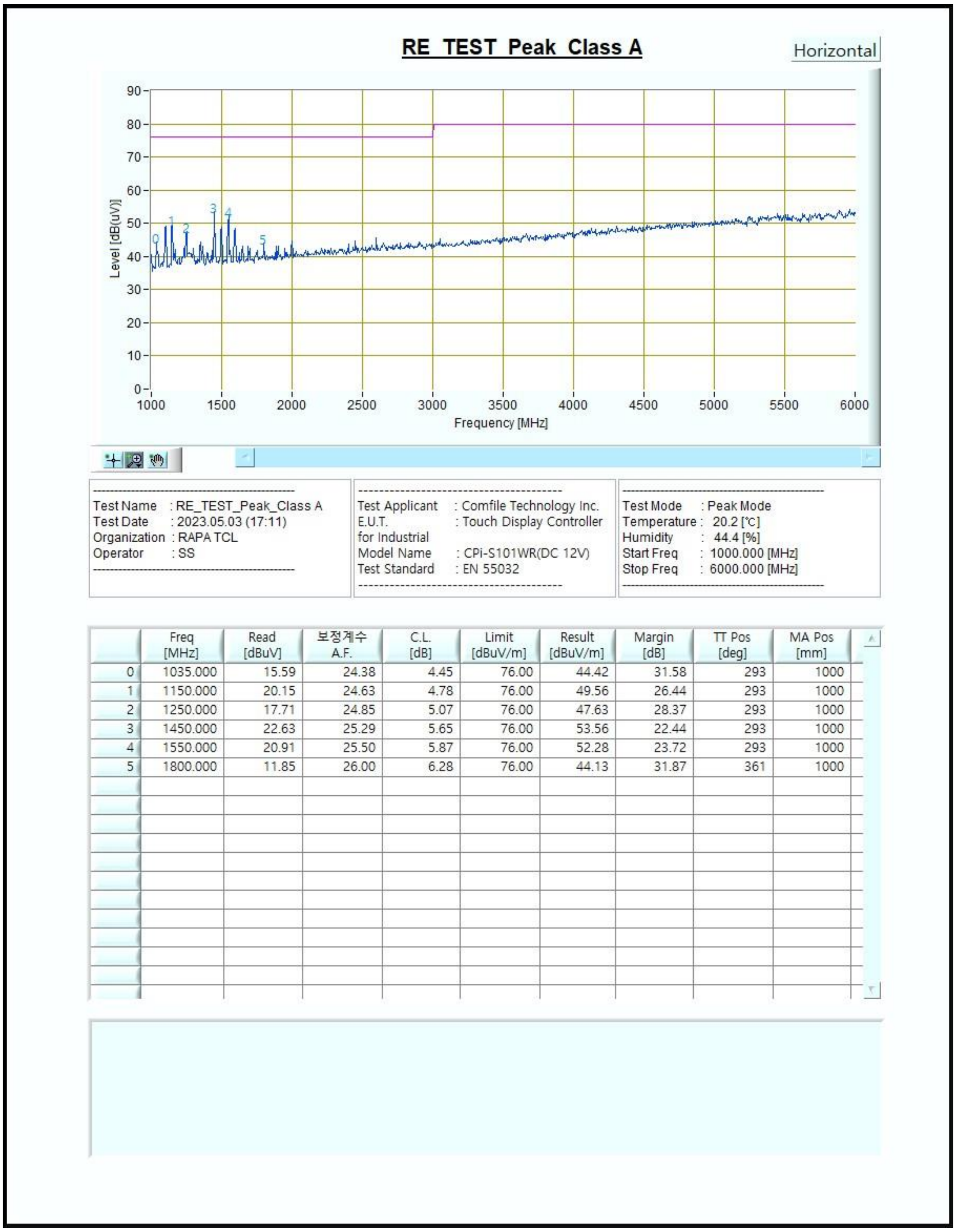
Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☒	FSV30	Rohde & Schwarz	Spectrum Analyze	101673	Dec. 21, 2022
☒	ALL1.5TT	Airlink Lab.	N/A	N/A	N/A
☒	ALL2.2MA	Airlink Lab.	N/A	N/A	N/A
☒	ALL-TMC-2X-PG	Airlink Lab.	N/A	N/A	N/A
☒	Broadband Pre-AMP	Infinitech	Broadband Pre-AMP	2013 05 00002/1	Dec. 22, 2022
☒	BBHA-9120D	Schwarzbeck	Horn Antenna	395	Jun. 04, 2021
☒	RE32_V1_5	Airlink Lab.	RE Test System	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

5.4.5 Test data

- Test date : May 3, 2023
- Resolution bandwidth : 1 MHz
- Frequency range : 1 000 MHz ~ 6 000 MHz
- Measurement distance : 3 m

▪ Test mode: Peak_Horizontal (DC 12 V Mode)



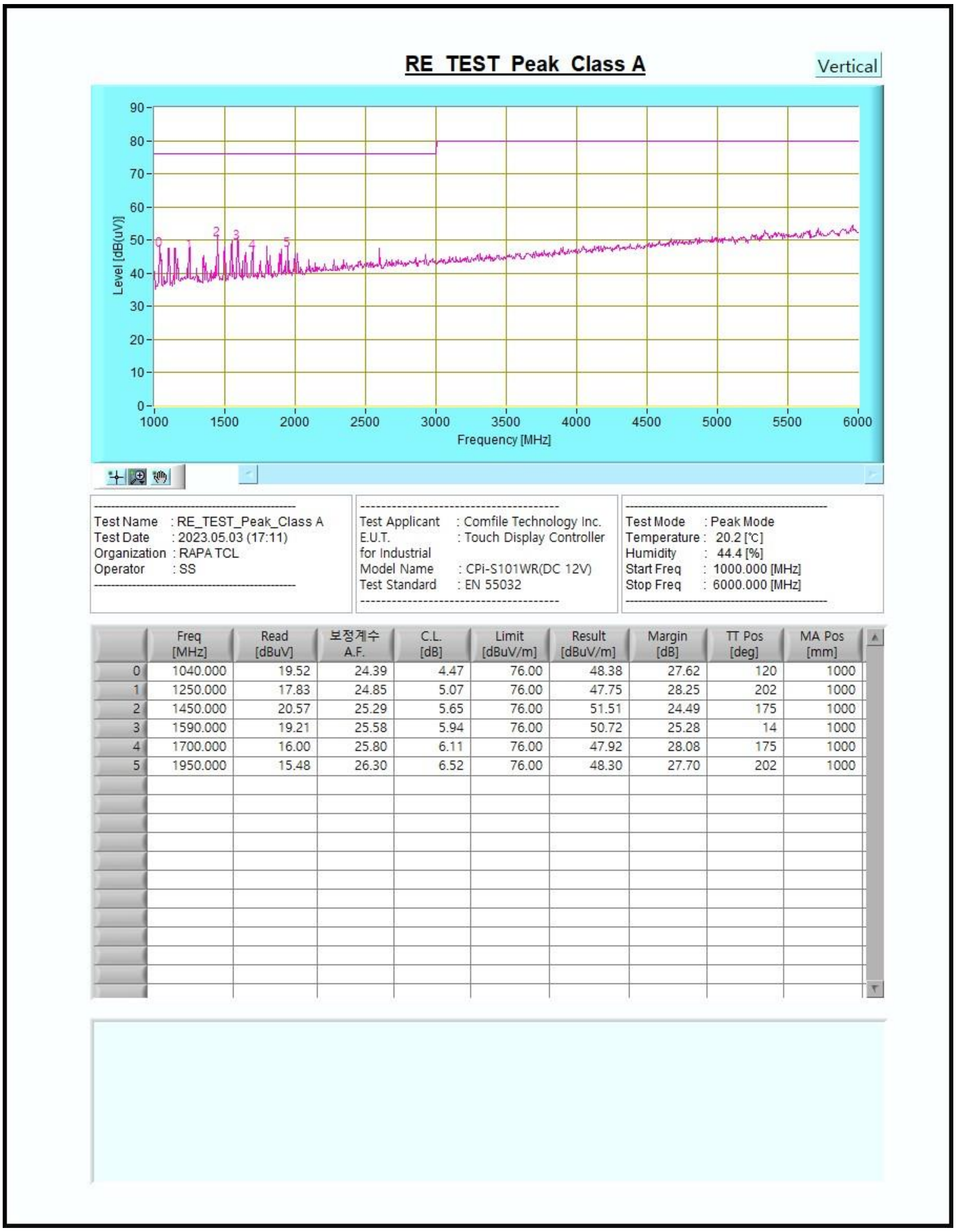
Test Name : RE_TEST_Peak_Class A
Test Date : 2023.05.03 (17:11)
Organization : RAPA TCL
Operator : SS

Test Applicant : Comfile Technology Inc.
E.U.T. : Touch Display Controller for Industrial
Model Name : CPi-S101WR(DC 12V)
Test Standard : EN 55032

Test Mode : Peak Mode
Temperature : 20.2 [℃]
Humidity : 44.4 [%]
Start Freq : 1000.000 [MHz]
Stop Freq : 6000.000 [MHz]

	Freq [MHz]	Read [dBuV]	보정계수 A.F.	C.L. [dB]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]	TT Pos [deg]	MA Pos [mm]
0	1035.000	15.59	24.38	4.45	76.00	44.42	31.58	293	1000
1	1150.000	20.15	24.63	4.78	76.00	49.56	26.44	293	1000
2	1250.000	17.71	24.85	5.07	76.00	47.63	28.37	293	1000
3	1450.000	22.63	25.29	5.65	76.00	53.56	22.44	293	1000
4	1550.000	20.91	25.50	5.87	76.00	52.28	23.72	293	1000
5	1800.000	11.85	26.00	6.28	76.00	44.13	31.87	361	1000

▪ **Test mode: Peak_Vertical (DC 12 V Mode)**



Test Name : RE_TEST_Peak_Class A
Test Date : 2023.05.03 (17:11)
Organization : RAPA TCL
Operator : SS

Test Applicant : Comfile Technology Inc.
E.U.T. : Touch Display Controller for Industrial
Model Name : CPi-S101WR(DC 12V)
Test Standard : EN 55032

Test Mode : Peak Mode
Temperature : 20.2 [℃]
Humidity : 44.4 [%]
Start Freq : 1000.000 [MHz]
Stop Freq : 6000.000 [MHz]

	Freq [MHz]	Read [dBuV]	보정계수 A.F.	C.L. [dB]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]	TT Pos [deg]	MA Pos [mm]
0	1040.000	19.52	24.39	4.47	76.00	48.38	27.62	120	1000
1	1250.000	17.83	24.85	5.07	76.00	47.75	28.25	202	1000
2	1450.000	20.57	25.29	5.65	76.00	51.51	24.49	175	1000
3	1590.000	19.21	25.58	5.94	76.00	50.72	25.28	14	1000
4	1700.000	16.00	25.80	6.11	76.00	47.92	28.08	175	1000
5	1950.000	15.48	26.30	6.52	76.00	48.30	27.70	202	1000

▪ Test mode: Average_Horizontal (DC 12 V Mode)

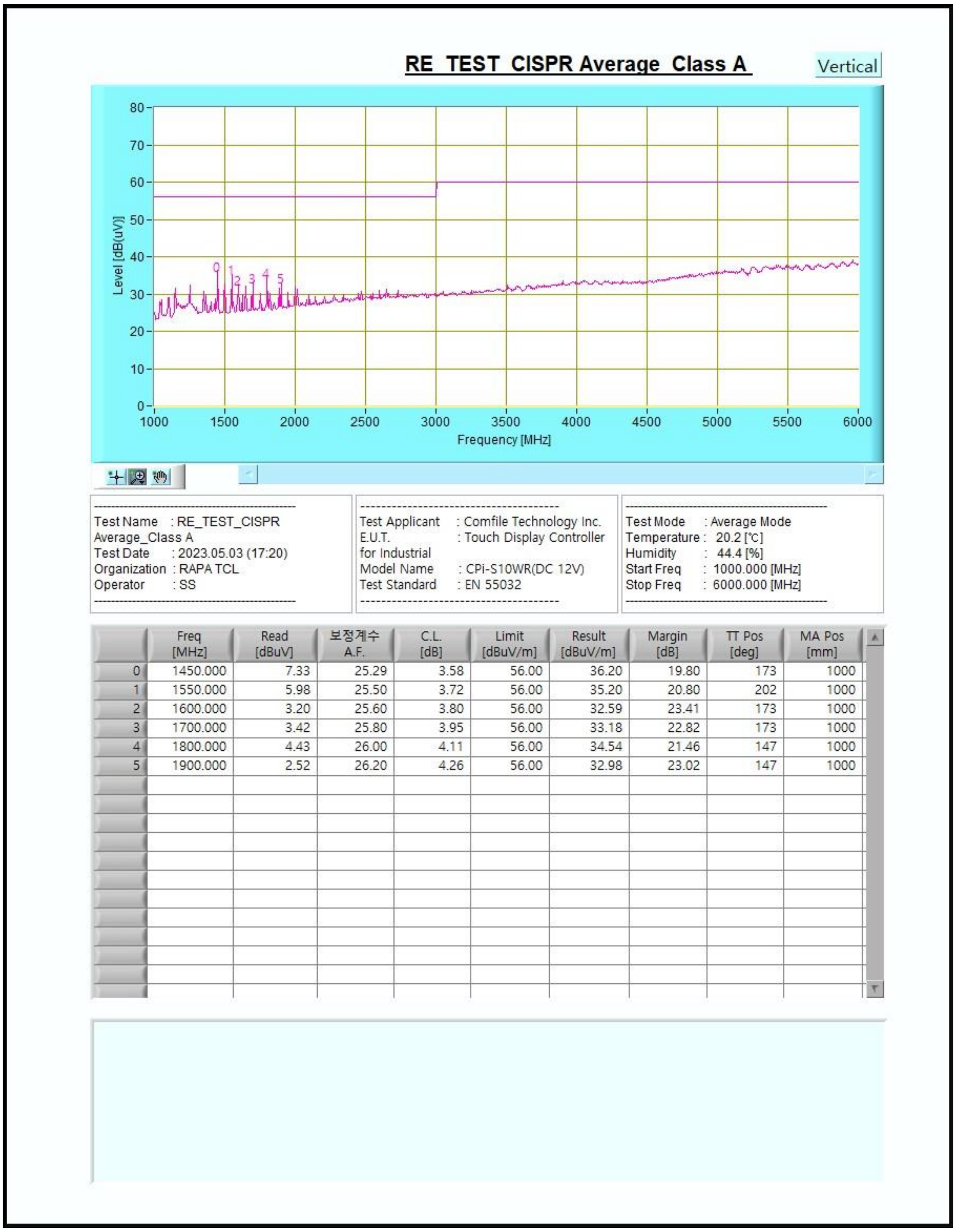
Test Name : RE_TEST_CISPR Average_Class A
Test Date : 2023.05.03 (17:20)
Organization : RAPA TCL
Operator : SS

Test Applicant : Comfile Technology Inc.
E.U.T. : Touch Display Controller for Industrial
Model Name : CPi-S10WR(DC 12V)
Test Standard : EN 55032

Test Mode : Average Mode
Temperature : 20.2 [℃]
Humidity : 44.4 [%]
Start Freq : 1000.000 [MHz]
Stop Freq : 6000.000 [MHz]

	Freq [MHz]	Read [dBuV]	보정계수 A.F.	C.L. [dB]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]	TT Pos [deg]	MA Pos [mm]
0	1150.000	6.10	24.63	3.22	56.00	33.95	22.05	296	1000
1	1250.000	5.18	24.85	3.34	56.00	33.37	22.63	296	1000
2	1450.000	9.20	25.29	3.58	56.00	38.07	17.93	296	1000
3	1500.000	4.99	25.40	3.64	56.00	34.03	21.97	296	1000
4	1550.000	7.56	25.50	3.72	56.00	36.78	19.22	296	1000
5	2600.000	-0.53	28.00	5.03	56.00	32.50	23.50	215	1000

▪ **Test mode: Average_Vertical (DC 12 V Mode)**



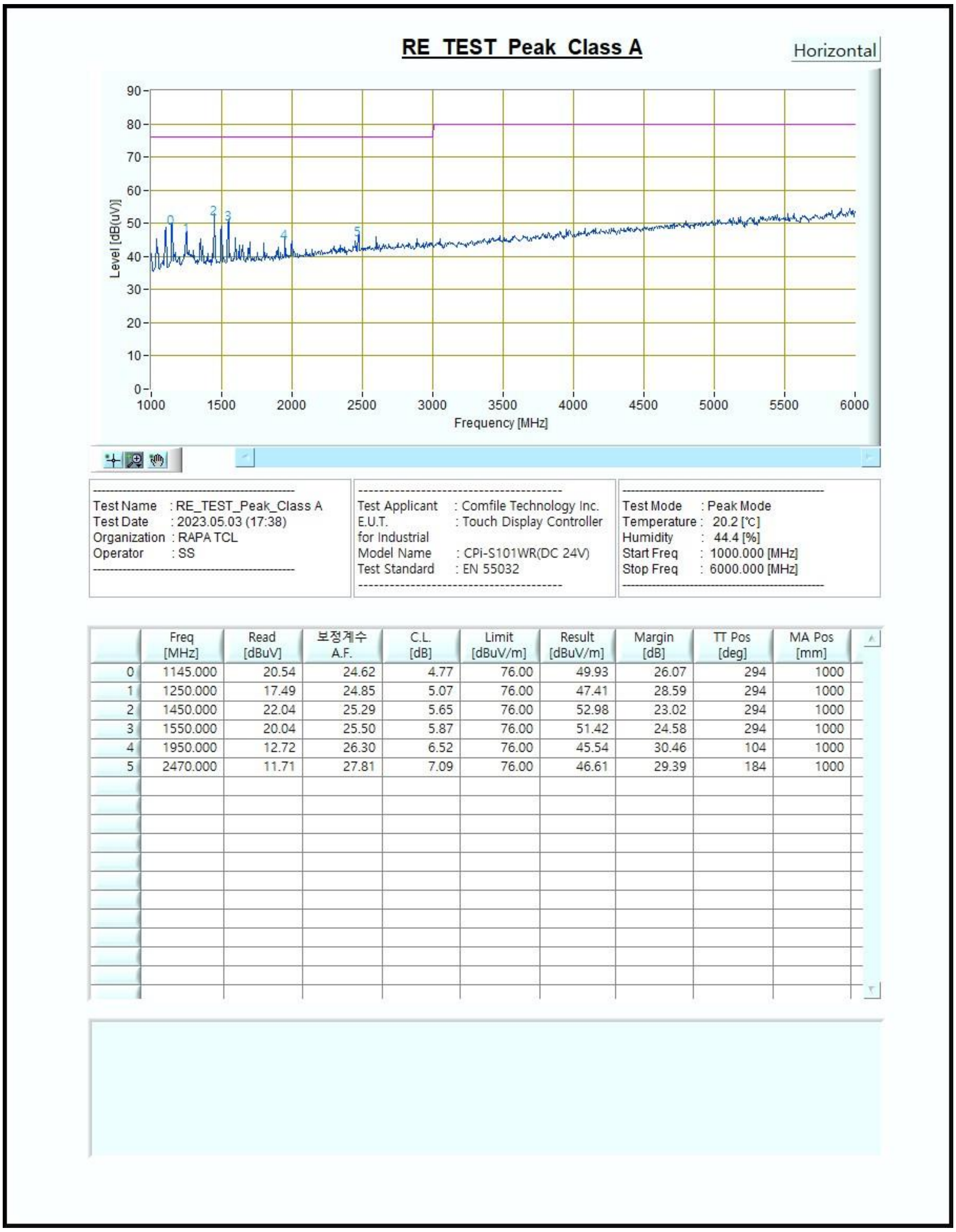
Test Name : RE_TEST_CISPR Average_Class A
Test Date : 2023.05.03 (17:20)
Organization : RAPA TCL
Operator : SS

Test Applicant : Comfile Technology Inc.
E.U.T. : Touch Display Controller for Industrial
Model Name : CPi-S10WR(DC 12V)
Test Standard : EN 55032

Test Mode : Average Mode
Temperature : 20.2 [℃]
Humidity : 44.4 [%]
Start Freq : 1000.000 [MHz]
Stop Freq : 6000.000 [MHz]

	Freq [MHz]	Read [dBuV]	보정계수 A.F.	C.L. [dB]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]	TT Pos [deg]	MA Pos [mm]
0	1450.000	7.33	25.29	3.58	56.00	36.20	19.80	173	1000
1	1550.000	5.98	25.50	3.72	56.00	35.20	20.80	202	1000
2	1600.000	3.20	25.60	3.80	56.00	32.59	23.41	173	1000
3	1700.000	3.42	25.80	3.95	56.00	33.18	22.82	173	1000
4	1800.000	4.43	26.00	4.11	56.00	34.54	21.46	147	1000
5	1900.000	2.52	26.20	4.26	56.00	32.98	23.02	147	1000

▪ **Test mode: Peak_Horizontal (DC 24 V Mode)**



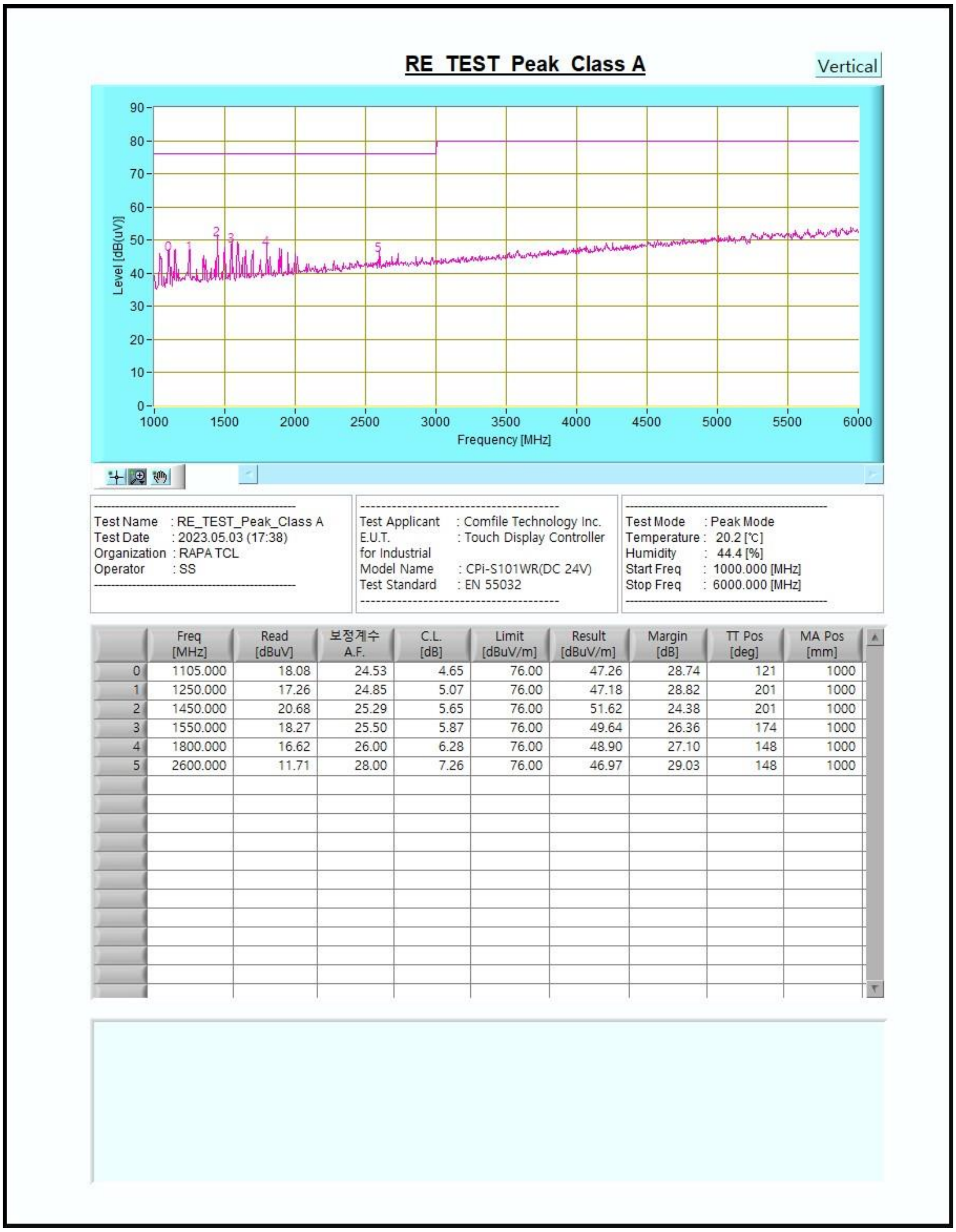
Test Name : RE_TEST_Peak_Class A
Test Date : 2023.05.03 (17:38)
Organization : RAPA TCL
Operator : SS

Test Applicant : Comfile Technology Inc.
E.U.T. : Touch Display Controller for Industrial
Model Name : CPi-S101WR(DC 24V)
Test Standard : EN 55032

Test Mode : Peak Mode
Temperature : 20.2 [℃]
Humidity : 44.4 [%]
Start Freq : 1000.000 [MHz]
Stop Freq : 6000.000 [MHz]

	Freq [MHz]	Read [dBuV]	보정계수 A.F.	C.L. [dB]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]	TT Pos [deg]	MA Pos [mm]
0	1145.000	20.54	24.62	4.77	76.00	49.93	26.07	294	1000
1	1250.000	17.49	24.85	5.07	76.00	47.41	28.59	294	1000
2	1450.000	22.04	25.29	5.65	76.00	52.98	23.02	294	1000
3	1550.000	20.04	25.50	5.87	76.00	51.42	24.58	294	1000
4	1950.000	12.72	26.30	6.52	76.00	45.54	30.46	104	1000
5	2470.000	11.71	27.81	7.09	76.00	46.61	29.39	184	1000

▪ Test mode: Peak_Vertical (DC 24 V Mode)



Test Name : RE_TEST_Peak_Class A
Test Date : 2023.05.03 (17:38)
Organization : RAPA TCL
Operator : SS

Test Applicant : Comfile Technology Inc.
E.U.T. : Touch Display Controller for Industrial
Model Name : CPi-S101WR(DC 24V)
Test Standard : EN 55032

Test Mode : Peak Mode
Temperature : 20.2 [℃]
Humidity : 44.4 [%]
Start Freq : 1000.000 [MHz]
Stop Freq : 6000.000 [MHz]

	Freq [MHz]	Read [dBuV]	보정계수 A.F.	C.L. [dB]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]	TT Pos [deg]	MA Pos [mm]
0	1105.000	18.08	24.53	4.65	76.00	47.26	28.74	121	1000
1	1250.000	17.26	24.85	5.07	76.00	47.18	28.82	201	1000
2	1450.000	20.68	25.29	5.65	76.00	51.62	24.38	201	1000
3	1550.000	18.27	25.50	5.87	76.00	49.64	26.36	174	1000
4	1800.000	16.62	26.00	6.28	76.00	48.90	27.10	148	1000
5	2600.000	11.71	28.00	7.26	76.00	46.97	29.03	148	1000

▪ Test mode: Average_Horizontal (DC 24 V Mode)

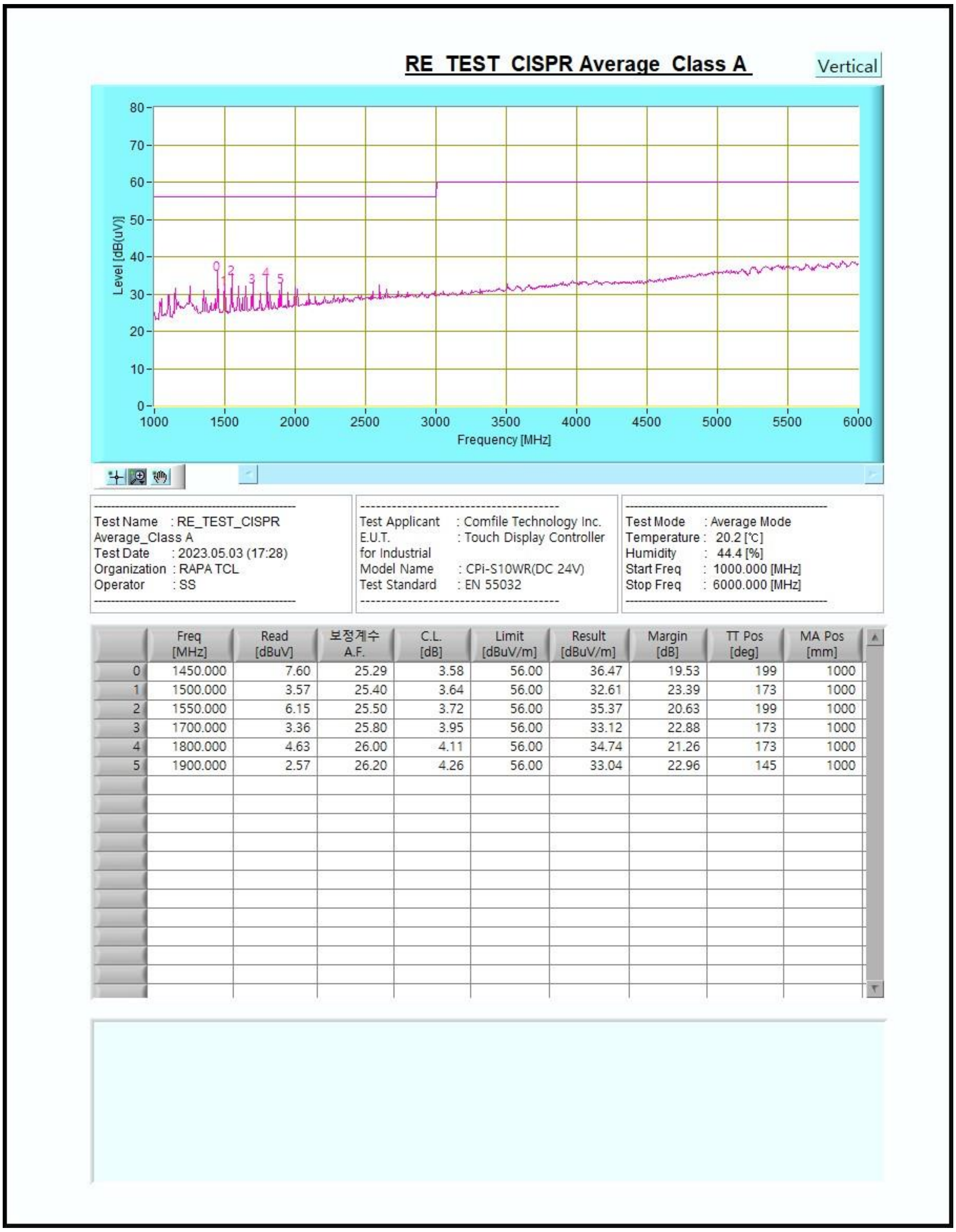
Test Name : RE_TEST_CISPR
Average_Class A
Test Date : 2023.05.03 (17:28)
Organization : RAPA TCL
Operator : SS

Test Applicant : Comfile Technology Inc.
E.U.T. : Touch Display Controller
for Industrial
Model Name : CPi-S10WR(DC 24V)
Test Standard : EN 55032

Test Mode : Average Mode
Temperature : 20.2 [℃]
Humidity : 44.4 [%]
Start Freq : 1000.000 [MHz]
Stop Freq : 6000.000 [MHz]

	Freq [MHz]	Read [dBuV]	보정계수 A.F.	C.L. [dB]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]	TT Pos [deg]	MA Pos [mm]
0	1150.000	6.14	24.63	3.22	56.00	33.99	22.01	0	1000
1	1250.000	5.12	24.85	3.34	56.00	33.31	22.69	0	1000
2	1450.000	8.69	25.29	3.58	56.00	37.56	18.44	0	1000
3	1500.000	5.34	25.40	3.64	56.00	34.38	21.62	0	1000
4	1550.000	7.42	25.50	3.72	56.00	36.64	19.36	0	1000
5	1800.000	-0.28	26.00	4.11	56.00	34.74	21.26	295	1000

▪ Test mode: Average_Vertical (DC 24 V Mode)



Test Name : RE_TEST_CISPR Average_Class A
Test Date : 2023.05.03 (17:28)
Organization : RAPA TCL
Operator : SS

Test Applicant : Comfile Technology Inc.
E.U.T. : Touch Display Controller for Industrial
Model Name : CPi-S10WR(DC 24V)
Test Standard : EN 55032

Test Mode : Average Mode
Temperature : 20.2 [℃]
Humidity : 44.4 [%]
Start Freq : 1000.000 [MHz]
Stop Freq : 6000.000 [MHz]

	Freq [MHz]	Read [dBuV]	보정계수 A.F.	C.L. [dB]	Limit [dBuV/m]	Result [dBuV/m]	Margin [dB]	TT Pos [deg]	MA Pos [mm]
0	1450.000	7.60	25.29	3.58	56.00	36.47	19.53	199	1000
1	1500.000	3.57	25.40	3.64	56.00	32.61	23.39	173	1000
2	1550.000	6.15	25.50	3.72	56.00	35.37	20.63	199	1000
3	1700.000	3.36	25.80	3.95	56.00	33.12	22.88	173	1000
4	1800.000	4.63	26.00	4.11	56.00	34.74	21.26	173	1000
5	1900.000	2.57	26.20	4.26	56.00	33.04	22.96	145	1000

5.5 Harmonic Current Emissions

5.5.1 Operating environment

- Temperature: -
- Humidity : -

5.5.2 Test set-up

Harmonics of the fundamental current were measured up to 2 kHz using a universal power analyzer. The measurements were carried out under steady conditions and identical test conditions.
Before taking measurements, it is necessary for the EUT to decide which class the EUT fulfills into; A, B, C or D.

The test set-up photo is included in appendix V.

5.5.3 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☐	DPA500N1	EM Test	Digital Power Analyzer	V0937105136	Dec. 27, 2022
☐	ACS500N3	EM Test	Universal Power Analyzer	V0937105137	N/A
☐	dpa.control	EM Test	The measurement and analysis software for Harmonics & Flicker	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

.5.4 Test data

- Test date : -
- Class : -
- Test result : -

- This test was excepted because EUT uses DC power

SeungSoo Kim / Assistant Manager

5.6 Voltage changes, Voltage fluctuations and Flicker

5.6.1 Operating environment

- Temperature: -
- Humidity : -

5.6.2 Test set-up

The voltage changes at the supply terminals were measured across the complex reference impedance Z = (0.4 + j0.25) Ω. The short-term flicker values are measured during a time interval of 10 min. D_c (relative voltage change between two steady states) and D_{max}(maximum single voltage change) are measured over the reference impedance.

The test set-up photo is included in appendix V.

5.6.3 Measurement uncertainty

- The uncertainty of our equipment for flicker measurement: ± 5 %.

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, *k* = 2.

5.6.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☐	DPA500N1	EM Test	Digital Power Analyzer	V0937105136	Dec. 27, 2022
☐	ACS500N3	EM Test	Universal Power Analyzer	V0937105137	N/A
☐	dpa.control	EM Test	The measurement and analysis software for Harmonics & Flicker	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

5.6.5 Test data

- Test date : -
- Class : -
- Test result : -

- This test was excepted because EUT uses DC power

SeungSoo Kim / Assistant Manager

6. IMMUNITY TESTS

6.1 Electrostatic discharge immunity test

The measurement of the Immunity against Electrostatic Discharge was performed in a shield room.

- Test Location : Shielded Room (S121)
- Date : June 1, 2023

Here, S121 = Shield room number

6.1.1 Operating environment

Item	Measured	Recommended
Ambient temperature	15.5 ºC	15 ºC ~ 35 ºC
Relative humidity	58.0 % R.H.	30 % R.H ~ 60 % R.H
Atmospheric pressure	101.2 kPa	86.0 kPa ~ 106.0 kPa

6.1.2 Test set-up

The EUT and all peripheral equipment were placed on non-metallic support with 0.8 m height above a reference ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix VI.

6.1.3 Measurement uncertainty

It has been demonstrated that the ESD generator meets the specified requirements in the standard with at least 95 % confidence.

6.1.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☒	ESS-2000	NOISEKEN	ESD Simulator	ESS0308043	Dec. 20, 2022
☒	TC-815P	NOISEKEN	ESD Gun	ESS0120522	Dec. 20, 2022

Remark: All test equipment used is calibrated on the regular basis.

6.1.5 Test data

▪ Test levels	: Contact discharge 2 kV / 4 kV, Air discharge 2 kV / 4 kV / 8 kV
▪ Number of discharges	: 25 each pol. at each point for contact discharge, 10 each pol. at each point for air discharge
▪ Polarity	: Positive / Negative
▪ The EUT Position	: Table Top
▪ Required performance criterion	: B
▪ Test result	: A
▪ Monitoring of the EUT	: The EUT was operated with all operating mode continuously during the test
▪ Test mode	: DC 12 V Mode, DC 24 V Mode

The test points of the EUT are each location on the surface touchable by hand (see test point in next page) and four sides of the EUT (through VCP and HCP).

The results of selected test points of the EUT are listed in the below table.

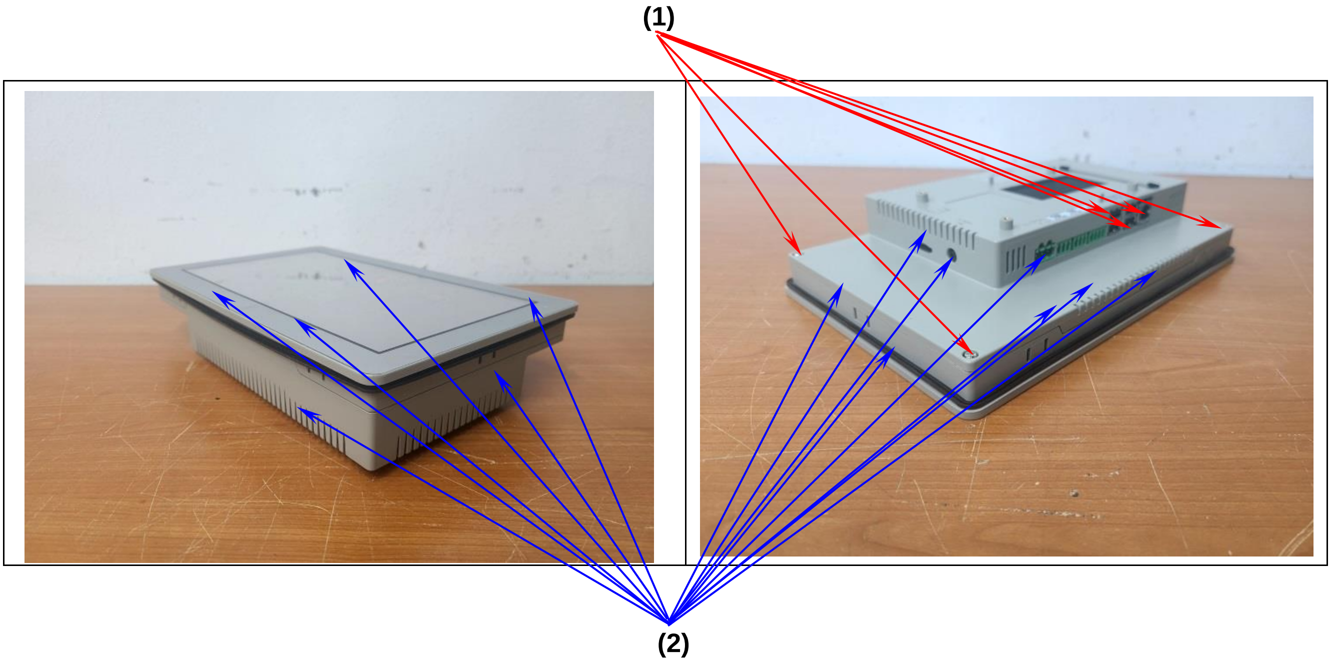
Point		Test level [± kV]	Pass / Fail	Description
(1)	Screw, Ethernet Port	2 / 4 (Contact)	Pass	There was no deviation from normal operation condition.
(1)	USB Port	2 / 4 (Contact)	Pass	
(2)	Frame (Non-Metal)	2 / 4 / 8 (Air)	Pass	
(2)	Port (Power, RS232, RS485)	2 / 4 / 8 (Air)	Pass	
(2)	I2C, GPIO Port	2 / 4 / 8 (Air)	Pass	
HCP / VCP		4 (Contact)	Pass	

- The static electricity discharges applied only front frame and display panel because back of product is only accessible under maintenance.

SeungSoo Kim / Assistant Manager

6.1.6 ESD Test point table

ESD Point		Discharge voltage [± kV]	Results
(1)	Screw, Ethernet Port	2 / 4 (Contact)	Criterion A
(1)	USB Port	2 / 4 (Contact)	Criterion A
(2)	Frame (Non-Metal)	2 / 4 / 8 (Air)	Criterion A
(2)	Power, RS232, RS485, I2C, GPIO Port	2 / 4 / 8 (Air)	Criterion A
HCP / VCP		4 (Contact)	Criterion A



6.2 Radiated RF-electromagnetic field immunity test

The measurement of the Immunity against Radiated RF-Electromagnetic Field was performed in an anechoic chamber.

- Test location : Anechoic Chamber (S111)
- Date : May 13, 2023

Here, S111 = Anechoic Chamber number

6.2.1 Operating environment

- Ambient temperature : (21.6 ± 1.0) °C
- Humidity : (51.1 ± 2.0) % R.H.

6.2.2 Test set-up

The EUT and all peripheral equipment were placed on a non-metallic support 0.8 m above a reference ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix VII.

6.2.3 Measurement uncertainty

- The measurement uncertainty: 2.22 V/m for 1 V/m, 3 V/m, 10 V/m.

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95%.

6.2.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☒	SMBV100A	R&S	Signal Generator	263455	N/A
☒	E4419B	Agilent	EPM Series Power Meter	GB38410335	Dec 23, 2022
☒	E9300A	Agilent	Power Sensor	MY41497581	Dec 23, 2022
☒	E9300A	Agilent	Power Sensor	MY41497836	Dec 23, 2022
☒	ITRS-086KM2	Infinitech	Wide Band High Power Amplifier	2012 10 00001	Jul 05, 2022
☒	K9128	Airlink Lab	RS Antenna	N/A	-
☒	BBHA-9120D	Schwarzbeck	Horn Antenna	395	Jun 04, 2021
☒	TST-1000	TESTEK	Sound Acoustic Tester	150043	Jul 06, 2022
☒	CA111	BSWA TECH	Calibrator for Microphone	520042	Jul 07, 2022
☒	MPA261	BSWA TECH	Microphones	530025	Jul 07, 2022
☐	TIB-R1	TESTEK	Impedance Box	150030	Jul. 05, 2022
☒	IMS	KTI	EMS	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

6.2.5 Test data

- Test level : 3 V/m (AM 80 %, 1 kHz)
- Frequency range : 80 MHz ~ 1 000 MHz, 1.8 GHz, 2.6 GHz, 3.5 GHz, 5.0 GHz
- Frequency step : 1 %
- Dwell time at each frequency : 3 s
- Exposed side : Front / Rear / Left / Right
- Polarization of antenna : Horizontal / Vertical
- The EUT position : Table Top
- Distance from antenna to EUT : 3 m
- Required performance criterion : A
- Test result : Met criterion A
- Monitoring of the EUT : The EUT was operated with all operating mode continuously during the test
- Test mode : DC 12 V Mode, DC 24 V Mode

The results of test are listed in below table.

Freq. Range [MHz]	Ant. Pol.	Exposed side	Pass / Fail	Description
80 ~ 1 000	V	Left / Right / Front / Rear	Pass	There was no deviation from normal operation condition.
80 ~ 1 000	H	Left / Right / Front / Rear	Pass	
1 800, 2 600, 3 500, 5 000	V	Left / Right / Front / Rear	Pass	
1 800, 2 600, 3 500, 5 000	H	Left / Right / Front / Rear	Pass	

Here, H = Horizontal, V = Vertical

SeungSoo Kim / Assistant Manager

6.3 Electrical fast transient/burst immunity test

The measurement of the Immunity Fast Transient/Burst was performed in a shield room.

- Test location : Shielded Room (S121).
- Date : May 30, 2023

6.3.1 Operating environment

- Ambient temperature : 16.0 ºC
- Humidity : 55.0 % R.H.

6.3.2 Test set-up

The EUT was placed on non-metallic support with 0.1 m height above a reference ground plane (RGP) and was put into operation according to the specified operating mode. If the manufacturer provides a non-detachable supply cable more than 0.5 m long with the equipment, the excess length of this cable shall be folded to avoid a flat coil and situated at a distance of 0.1 m above the ground reference plane.

The test set-up photo is included in appendix VIII.

6.3.3 Measurement uncertainty

It has been demonstrated that the burst generator met the specified requirements in the standard with at least 95 % confidence.

6.3.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☒	UCS 500N7	EM Test	Ultra Compact Generator	V937105138	Jul. 05, 2022
☒	HFK	EM Test	Capacitive Coupling Clamp	0709-26	Dec. 21, 2022
☒	iec.control	EM Test	Software for industrial and telecom testing	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

6.3.5 Test data

▪ Test level	: 1 kV (AC power port), 0.5 kV (DC power port)
▪ Burst frequency	: 5 kHz
▪ Polarity	: Positive / Negative
▪ Coupling methods	: Signal line – Capacitive Coupling Clamp (CCC)
▪ Lines for test	: Analogue/digital data ports for EUT
▪ Type of line & length	: Unshielded above 3.0 m (RJ-45)
▪ The EUT-position	: Table Top
▪ Required performance criterion	: B
▪ Test result	: Met criterion A
▪ Monitoring of the EUT	: The EUT was operated with all operating mode continuously during the test
▪ Test mode	: DC 12 V Mode, DC 24 V Mode

The results of test are listed in below table.

Line for test	Coupling Method	Test level [± kV]	Pass / Fail	Description
Signal Cable RJ-45 (Ethernet)	CCC	0.5	Pass	There was no deviation from normal operation condition.

Here, for the AC mains, L = Hot, N = Neutral, PE = Protective Earth, for the DC-mains, L = Positive, N = Negative.

The equipment under test was excluded from the test item because EUT power cable less than 3 m in length according to the manufacturer's specifications

SeungSoo Kim / Assistant Manager

6.4 Surge immunity test

The measurement of the Surge Transients immunity was performed in a shield room.

- Test location : Shielded Room (S121).
- Date : -

6.4.1 Operating environment

- Ambient temperature : -
- Humidity : -
- Atmospheric pressure : -

6.4.2 Test set-up

The EUT and all peripheral equipment were placed on a non-metallic support with 0.8 m height above a reference ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix IX.

6.4.3 Measurement uncertainty

It has been demonstrated that the surge generator meets the specified requirements in the standard with at least 95 % confidence.

6.4.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☐	UCS 500N7	EM Test	Ultra Compact Generator	V0937105138	Jul. 05, 2022
☐	SP02	EM TEST	HV contacts	N/A	N/A
☐	iec.control	EM Test	Software for industrial and telecom testing	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

6.4.5 Test data

- Test level : 1.0 kV (Line-Line)
- Number of surge : 5 surges / polarity
- Polarity : Positive / Negative
- Angle : 90° / 270°
- Repetition rate : 60 s
- Coupling methods : -
- Lines for test : -
- Type of line and length : Unshielded 0.5 m AC mains
- The EUT-position : Table Top
- Required performance criterion : B
- Test result : -
- Monitoring of the EUT : The EUT was operated with all operating mode continuously during the test
- Test mode : -

The results of test are listed in below table.

Line for test	Coupling Method	Test level [± kV]	Pass/ Fail	Description
-	-	-	-	There was no deviation from normal operating condition.

- DC power port can’t be connected directly to outdoor cables so this test excepted.

SeungSoo Kim / Assistant Manager

6.5 Conducted disturbance induced by RF fields immunity

The measurement of the Immunity against Injection Current was performed in the Shield Room.

- Test Location : Shielded Room (S121).
- Date : May 30, 2023

6.5.1 Operating environment

- Ambient temperature : (16.0 ± 1.0) °C
- Humidity : (55.0 ± 2.0) % R.H.

6.5.2 Test set-up

The EUT and all peripheral equipment were placed on a non-metallic support with 0.1 m height above a reference ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix X.

6.5.3 Measurement uncertainty▪ The measurement uncertainty: ± 0.17 V for 1.8 V, ± 0.50 V for 5.4 V and ± 1.70 V for 18 V.

Measurement uncertainty is calculated in accordance with WECC 19-1990. The measurement uncertainty is given with a confidence of 95 %.

6.5.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☒	CWS 500N1	EM Test	Continuous Wave Simulator	V0937105141	Jul. 05, 2022
☒	5906 N-50-1	Huber + Suhner	Attenuator 6dB/75W	253452201	Dec. 22, 2022
☒	FCC-801-M2/M3-16A	FCC	CDN	091759	Jul. 04, 2022
☐	FCC-801-T2-RJ45	FCC	CDN	091757	Jul. 04, 2022
☒	FCC-801-T4-RJ45	FCC	CDN	091757	Jul. 04, 2022
☐	EM101	Liithi	EM Clamp	35941	Dec. 20, 2022
☒	M016	Schaffner	CDN	16678	Jul. 04, 2022
☒	TST-1000	TESTEK	Sound Acoustic Tester	150043	Jul 06, 2022
☒	CA111	BSWA TECH	Calibrator for Microphone	520042	Jul 07, 2022
☒	MPA261	BSWA TECH	Microphones	530025	Jul 07, 2022
☐	TIB-R1	TESTEK	Impedance Box	150030	Jul. 05, 2022
☒	icd.control	EM Test	Software for conducted immunity from DC to 1 GHZ	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

6.5.5 Test data

▪ Test level	: 3 V, 3 to 1 V, 1 V (AM 80 %, 1 kHz)
▪ Frequency range	: 0.15~10 MHz, 10~30 MHz, 30~80 MHz
▪ Frequency step	: 1 %
▪ Dwell time at each frequency	: 3 s
▪ Coupling methods	: Signal line – Capacitive Coupling Clamp (CDN),
▪ Lines for test	: Analogue/digital data ports for EUT
▪ Type of line & length	: Unshielded above 3.0 m (RJ-45)
▪ EUT-position	: Table Top
▪ Required performance criterion	: A
▪ Test result	: Met criterion A
▪ Monitoring of the EUT	: The EUT was operated with all operating mode continuously during the test
▪ Test mode	: DC 12 V Mode, DC 24 V Mode

The results of test are listed in below table.

Freq. Range [MHz]	**Coupling Method**	**Line for test**	**Test level [V]**	**Pass/ Fail**	**Description**
0.15~10 10~30 30~80	CDN(T4)	Signal line (RJ45 port)	3 3 to 1 1	Pass	There was no deviation from normal operation condition.

The equipment under test was excluded from the test item because EUT power cable less than 3 m in length according to the manufacturer's specifications

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6.6 Main supply voltage Dips and Short interruptions immunity test

The measurement of the Voltage Dips and Interruptions Immunity was performed in a shield room.

- Test location : Shielded Room (S101).
- Date : -

6.6.1 Operating environment

- Ambient temperature : -
- Humidity : -
- Atmospheric pressure : -

6.6.2 Test set-up

The EUT and all local support equipment were placed on a non-metallic support with 0.8 m height above a reference ground plane (RGP) and were put into operation according to the specified operating mode.

The test set-up photo is included in appendix XI.

6.6.3 Measurement uncertainty

It has been demonstrated that the voltage dips and interruptions generator meets the specified requirements in the standard with at least 95 % confidence.

6.6.4 Test equipment used

Use	Model Number	Manufacturer	Description	Serial Number	Last Calibration
☐	UCS 500 N	EM Test	Ultra Compact Generator	V0937105138	Jul. 05, 2022
☐	MV2616	EM Test	Motorized VARIAC	V0937105140	N/A
☐	iec.control	EM Test	Software for industrial and telecom testing	N/A	N/A

Remark: All test equipment used is calibrated on the regular basis.

6.6.5 Test data

- Nominal Mains Voltage (V_{NOM}) : 230 Vac
- Level of Reduction (dip) : 200 ms at 30 % of V_{NOM}
- Level of Interruptions : 10 ms at 100 % of V_{NOM}
- No. of dips/interruption : 3
- Interval : 10 s
- Type of line & length : Unshielded 0.5 m AC mains of the EUT
- The EUT-position : Table Top
- Required performance criterion : B and C
- Test result : -
- Monitoring of the EUT : -
- Test mode : -

The results of test are listed in below table.

Test	Reduction (% of V_{NOM})	Duration In time (period)	Pass / Fail	Performance Criterion		Notes
				Criteria	Result	
Voltage dips	> 95	0.5	Pass	B	-	3 interrupts with 10 sec interval between each test
	30	25		C		
Voltage Interruptions	> 95	250	Pass	C	-	

Performance Criterion Results

Here,
A = Normal performance within the specification limits.
B = Temporary degradation or loss of function or performance which is self-recoverable.
C = Temporary degradation or loss of function of performance which requires operator intervention or system reset.

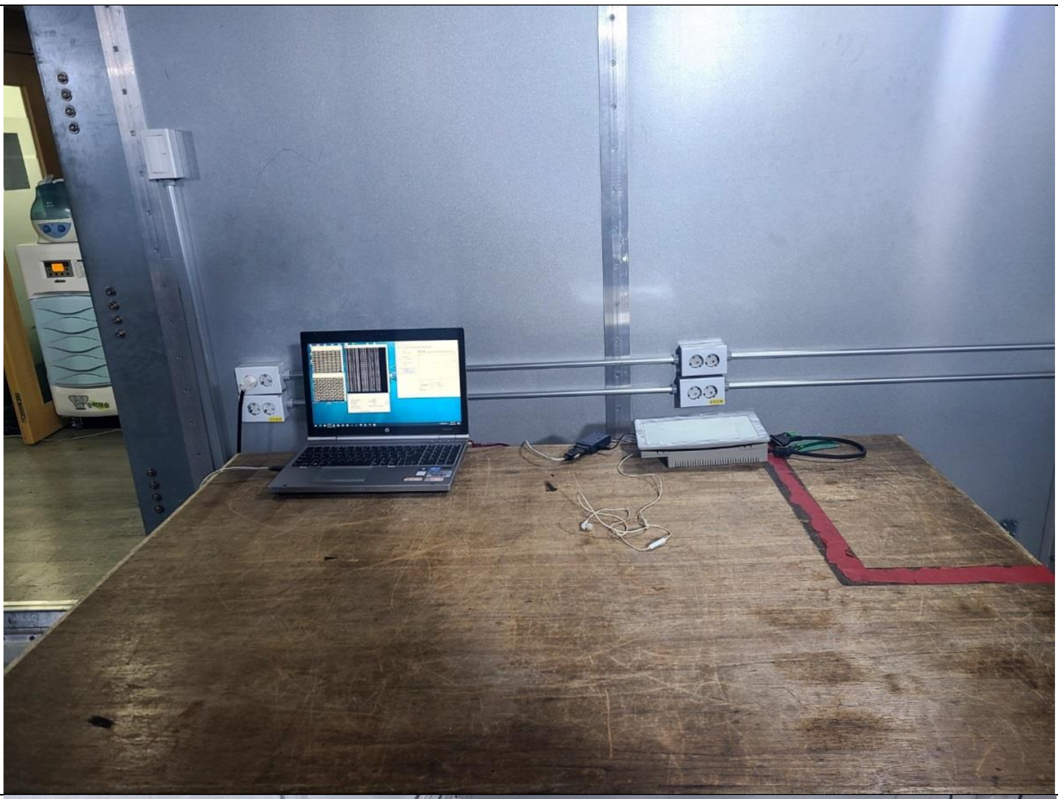
- This test was excepted because EUT uses DC power.

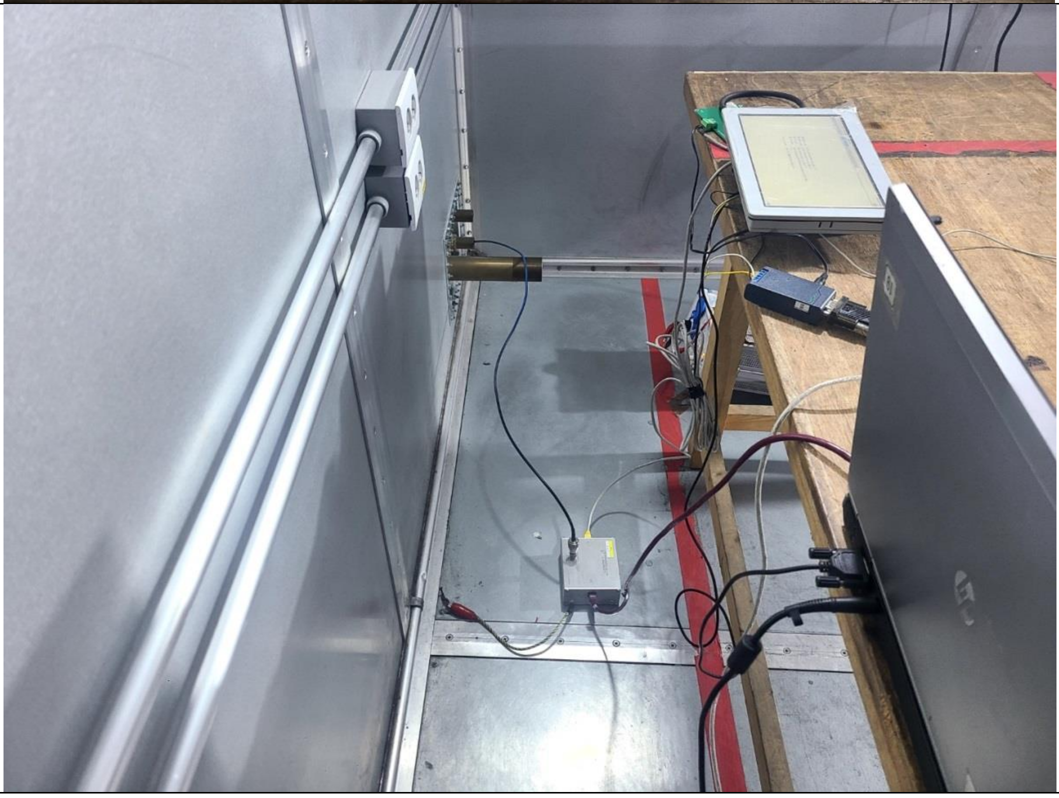
SeungSoo Kim / Assistant Manager

APPENDIX I - TEST SET-UP PHOTOS: Mains terminal disturbance voltage

Not Applicable
Not Applicable

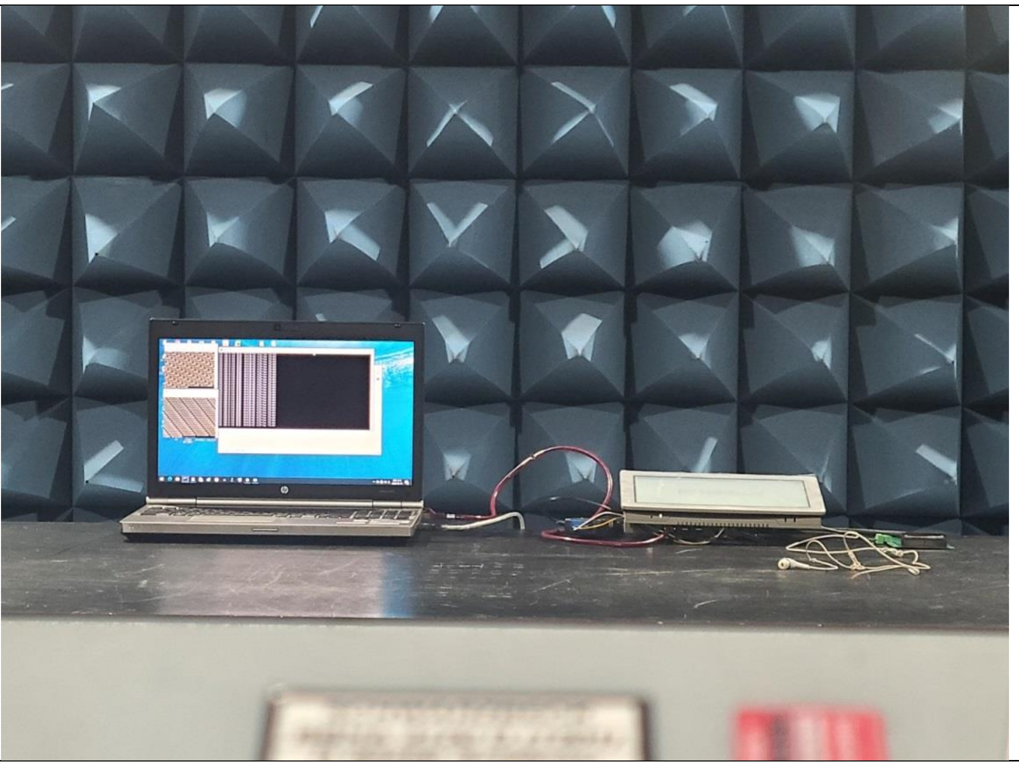
APPENDIX II - TEST SET-UP PHOTOS: Conducted common mode disturbance at TEL ports





APPENDIX III - TEST SET-UP PHOTOS: Radiated electromagnetic field (Below 1 GHz)

APPENDIX IV - TEST SET-UP PHOTOS: Radiated electromagnetic field (Above 1 GHz)



APPENDIX V - TEST SET-UP PHOTO: Harmonics & voltage fluctuations on AC mains

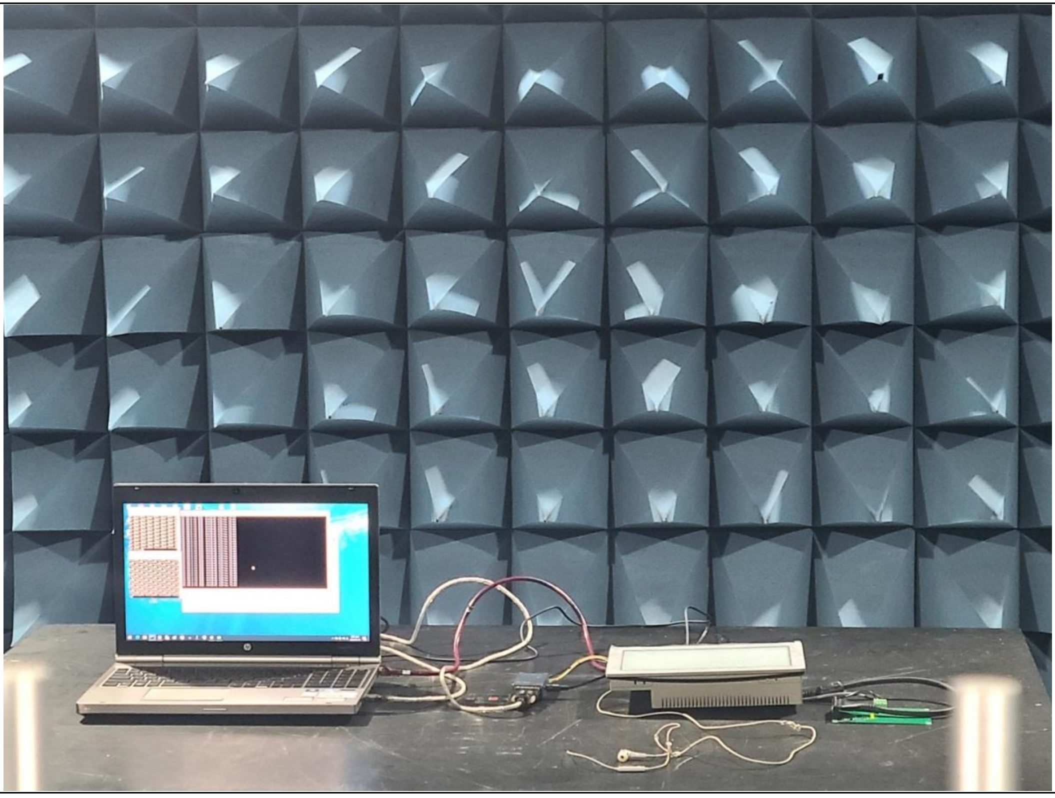
Not Applicable

APPENDIX V - TEST SET-UP PHOTO: Voltage changes, Voltage fluctuations and Flicker

Not Applicable

APPENDIX VI - TEST SET-UP PHOTO: Electrostatic discharge immunity

APPENDIX VII - TEST SET-UP PHOTO: Radiated frequency electromagnetic field



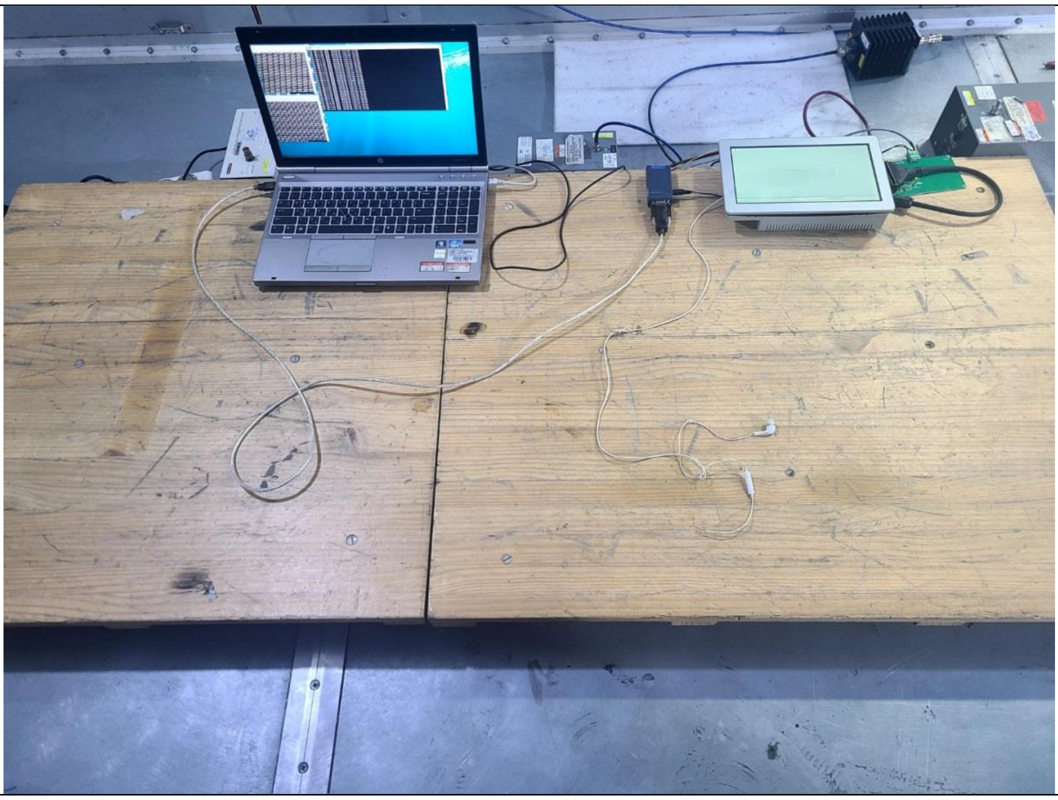
-

APPENDIX VIII - TEST SET-UP PHOTO: Electrical fast transient/burst immunity

APPENDIX IX - TEST SET-UP PHOTO: Surge immunity

Not Applicable

APPENDIX X - TEST SET-UP PHOTO: Conducted disturbance induced by RF fields Immunity

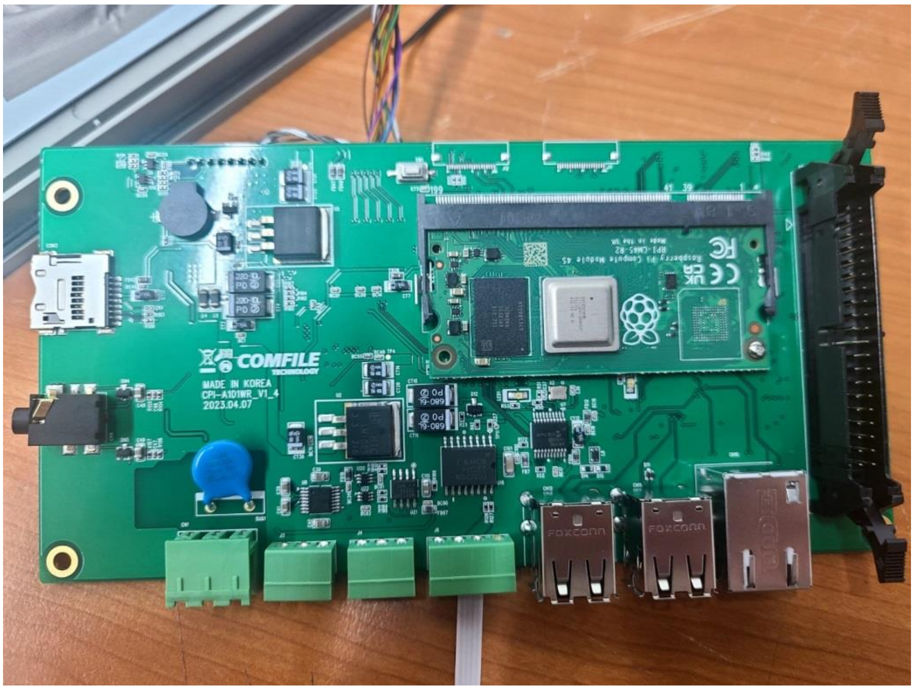


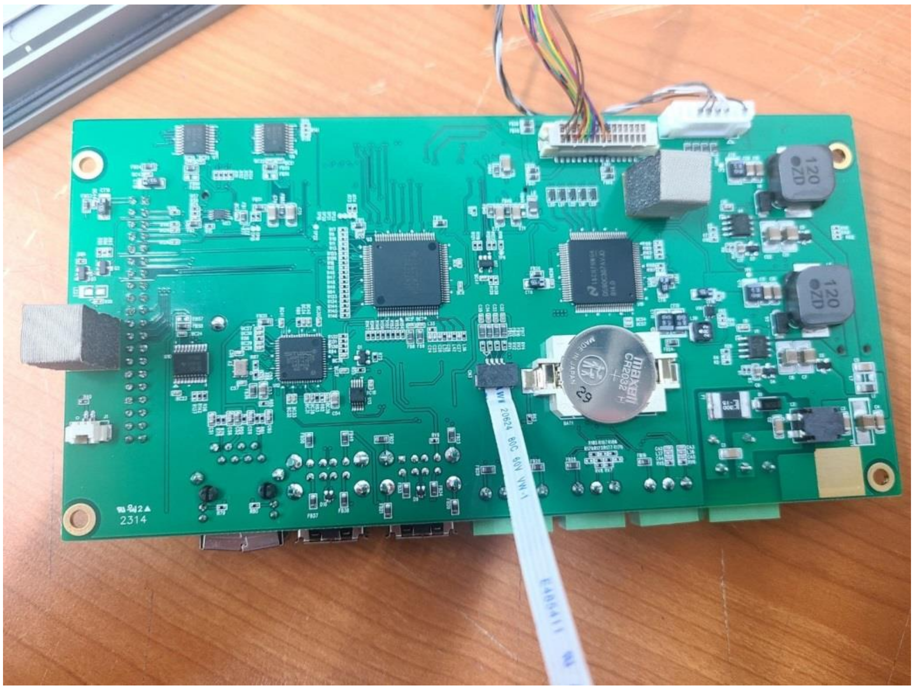
APPENDIX XI - TEST SET-UP PHOTO: Voltage Dips and Short interruptions

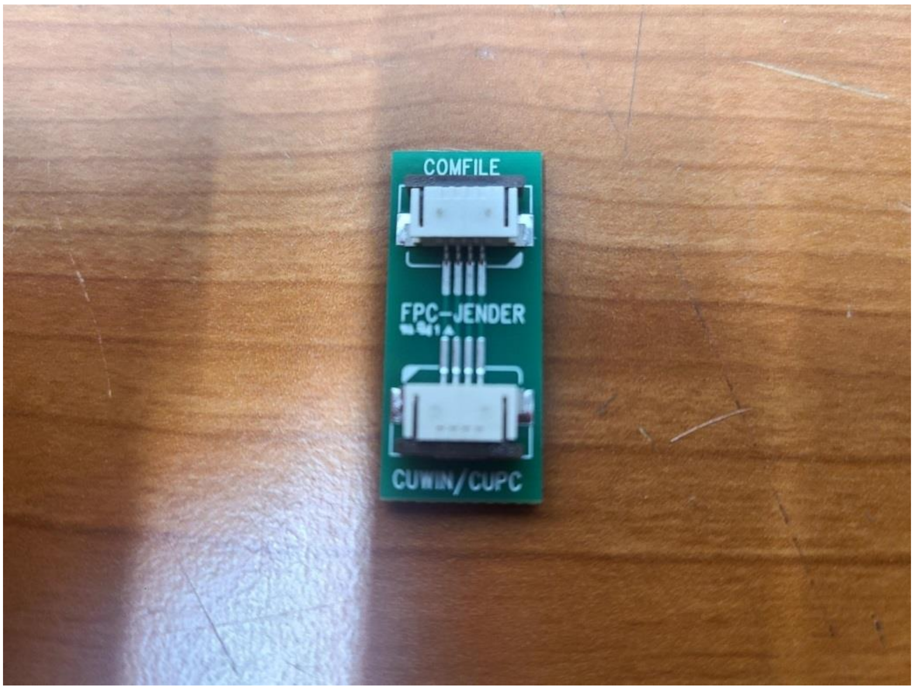
Not Applicable

APPENDIX XII – PHOTOGRAPHS: Internal and External appearances

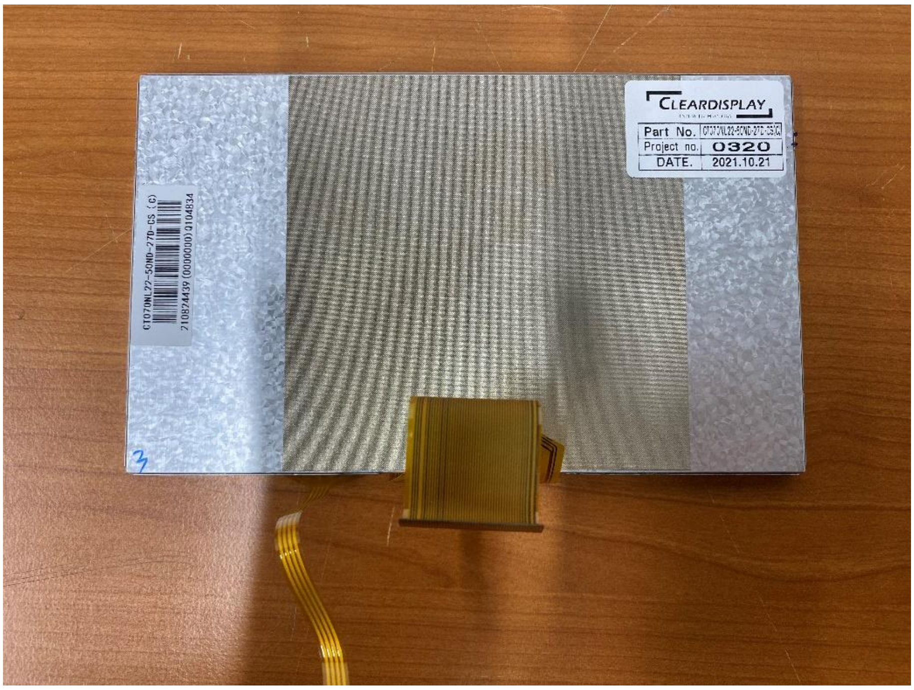

-S101WR
DC 12-24V
RS232C
COM0
TX RX GND
RS485
COM1
D- D+ GND
I2C1
5V SDA SCL GND
USB DEVICE
USB HOST
USB HOST
USB HOST
ETHERNET

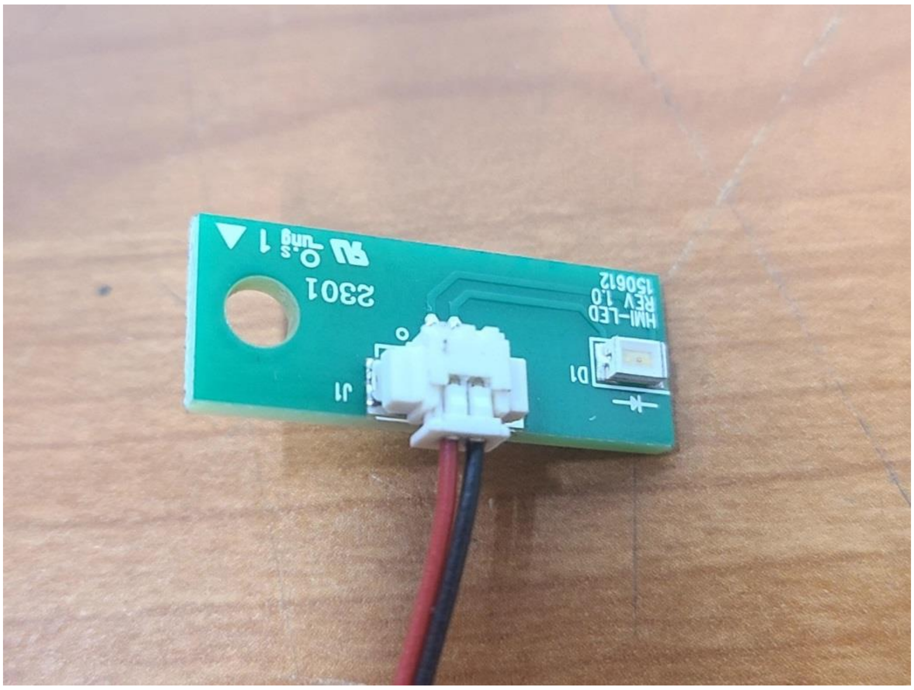





COMFILE
FPC-JENDER
CUWIN/CUPC


32556290


CLEARDISPLAY
Part No.
Project no. 0320
DATE. 2021.10.21
3


1
2301
HMI-LED
REV 1.0
150612
J1
D1