



<http://www.lab-t.net>

2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu
Yongin-si, Gyeonggi-do 17036, Korea (Republic of)
Main: +82-31-322-6767, Fax: +82-31-322-6768

Test report No.:
TREFCC23-0012

FCC CERTIFICATION TEST REPORT

Test report No. : TREFCC23-0012
Applicant : RIFATRON CO.,LTD.
Address : #612, RIFATRON, 108, Gassan Digital 2-ro
Geumcheon-gu, Seoul, 08506, Korea
Manufacturer : RIFATRON CO.,LTD.
Address : #612, RIFATRON, 108, Gassan Digital 2-ro
Geumcheon-gu, Seoul, 08506, Korea
Type of equipment : DVR
Model name : HX20-504KRS4
FCC ID : 2A96M-504KRS4
Variant model name : Not applicable
Date of incoming : January 25, 2023
Date of test : January 30 ~ February 01, 2023
Date of issue : February 14, 2023
Test standards : ANSI C 63.4-2014
47 CFR Part 15 Subpart B
Type of device : Class A digital devices
Test Result : ☒ Complied ☐ Not Complied

Summary

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of Lab-T, Inc.

Prepared by

SeungHwan Lee / EMC test engineer

Approved by

Cheol-Ho, Lee / Technical manager

If this test report is required to confirmation of authenticity, please contact to info@lab-t.net
This test report is not related to KOLAS.

	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	--

- CONTENTS -

1. REVISION HISTORY	3
2. INFORMATION OF TEST LABORATORY	4
3. APPLICANT INFORMATION	5
4. DESCRIPTION OF EUT (EQUIPMENT UNDER TEST)	6
4.1 Product description	6
4.2 Product specification	6
4.3 EUT internal operating frequency	7
4.4 Information of additional model	7
4.5 Peripheral equipment	8
4.6 Connection cable	9
4.7 Test set-up configuration	10
4.8 EUT operating test mode(s)	11
4.9 EUT modification	11
5. TEST STANDARDS	12
5.1 Standards	12
6. EMISSION TEST RESULTS	13
6.1 Conducted emission	13
6.2 Radiated emission (30 MHz ~ 1 000 MHz)	18
6.3 Radiated emission (Above 1 GHz)	22

	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	--

1. Revision history

Issued report No.	Version	Issued date	Revision
TREFCC23-0012	Rev. 00	February 14 , 2023	Original

	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	--

2. Information of test laboratory

Corporate name	Lab-T, Inc.
Representative	Duke (Jongyoung) Kim
Address	2182-42, Baegok-daero, Mohyeon-eup, Cheoin-gu, Yongin-si
	Gyeonggi-do 17036, Korea (Republic of)
Telephone	+82-31-322-6767
Fax	+82-31-322-6768
E-mail	info@lab-t.net
Test Site	Building L, A, T
Address	2182-40, 2182-44, 2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu
	Yongin-si, Gyeonggi-do 17036, Korea (Republic of)

* Lab-T, Inc. has been accredited / filed / authorized by the agencies listed in the following table.

Certificate	Nation	Agency	Code	Mark
Accreditation	Korea	KOLAS	KT703	
Site filing	USA	FCC	KR0159	
	Japan	VCCI	R-14282, C-14764 T-12276, G-10886 G-10887	
	Canada	Industry Canada (IC)	22000	
Certification	Korea	KC	KR0159 (RRA) KC2019-1 (KATS)	
	EU	TUV SUD	CARAT 093449 0007	
	USA	UL	1706-E-197	

	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	--

3. Applicant information

Applicant	RIFATRON CO.,LTD.
Address	#612, RIFATRON, 108, Gassan Digital 2-ro Geumcheon-gu, Seoul, 08506, Korea

Manufacturer	RIFATRON CO.,LTD.
Address	#612, RIFATRON, 108, Gassan Digital 2-ro Geumcheon-gu, Seoul, 08506, Korea

	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	--

4. Description of EUT (Equipment under test)

4.1 Product description

Type of EUT	DVR
Model name	HX20-504KRS4

4.2 Product specification

Video Video	Input	4 BNC
	Input Resolution	4 K (8 MP), 5 MP, 4 MP, 3 MP, 2 MP, 960 H
	Output	1 HDMI, 1 VGA, 1 BNC
	Output Resolution	UHD, QHD, FHD, SXGA, XGA
Recording	Speed	2 MP : 30 fps/ch 3 MP, 4 MP : 15 fps/ch 5 MP : 10 fps/ch 4 K (8 MP) : 8 fps/ch
	Compression	H.265, H.264
	Resolution	4 K (8 MP), 5 MP, 4 MP, 3 MP, 2 MP, 960 H
Playback	Speed	2 MP : 104 fps 3 MP : 73 fps 4 MP : 58 fps 5 MP : 43 fps 4 K : 26 fps
	Resolution	4 K (8 MP), 5 MP, 4 MP, 3 MP, 2 MP, 960 H
Audio	Input	4 RCA
	Output	1 HDMI, 1 RCA
Interface	Sensor In / Out	4 / 1 - NC / NO
	USB	-
	PTZ / Keyboard	RS485 - Terminal Block
	ATM / POS	Ethernet POS
Network	Interface	Ethernet 10 / 100
	Compression	H.265, H.264
	Speed	8 fps (4 K), 10 fps (5 MP), 20 fps (2 MP)
	Resolution	Normal 2MP, REC Video Bypass Max. 4K

	<p>http://www.lab-t.net 2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	---

System	OS	Embedded Linux (Built-in Flash Memory)
	Pre / Post-Alarm	5 sec / 5 sec ~ 5 min
	Recording Mode	Continuous, Event, Schedule
	Data Search	Calendar, Multi Day / Time, Event, Go to Time
	Backup Interface	USB, Network
	Backup Type	Video(RMS, AVI), Capture(JPEG), Log List, Setup Data
	Alarm Action	Buzzer, PTZ Preset, E-mail , SPOT, Relay, Event Popup, Push
	User	15 Users (Admin, User 1 ~ User 14)
	Network Viewer	CMS, Web Viewer, App (iOS, Android), etc
	ONVIF	ONVIF Profile T
Storage	Primary	2 HDD
General	Size (W x H x D)	340 mm x 300 mm x 59 mm
	Weight (w/o HDD)	3 Kg
	Temp / Humidity	5 ~ 40 °C / 10 ~ 80 %
	Power Supply	12 V / 5 A
	Power Consumption	60 Watts

4.3 EUT internal operating frequency

Frequency	Description	Frequency	Description
1 200 MHz	-	-	-

4.4 Information of additional model

Division	Model name
-	-

	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	--

4.5 Peripheral equipment

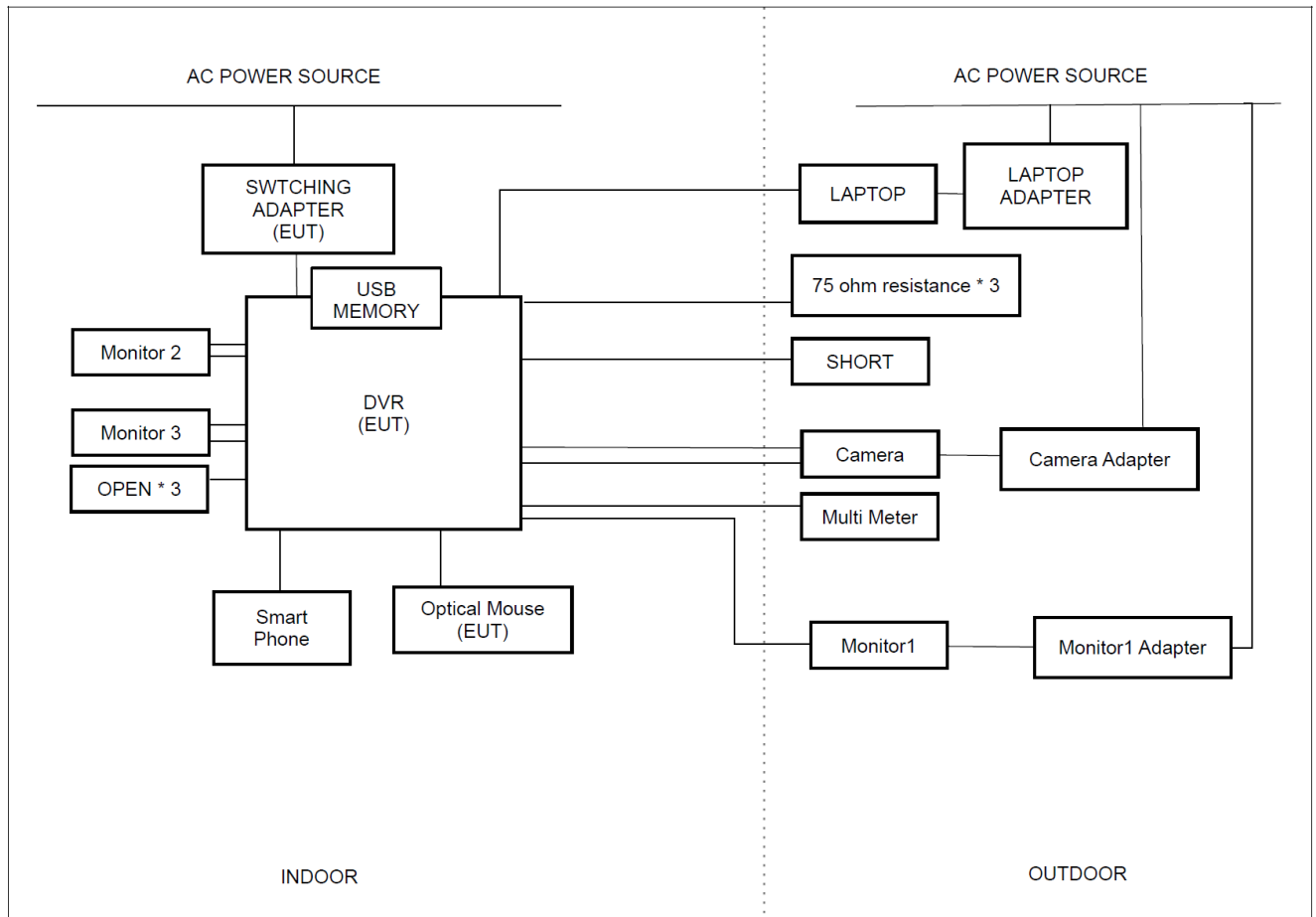
Product	Model name	Serial No.	Manufacturer
DVR (EUT)	HX20-504KRS4	-	RIFATRON CO.,LTD. / Korea
SWITCHING ADAPTER (EUT)	FH-SW20171205000	-	SHENZHEN FUJIA APPLIANCE CO., LTD. / -
Optical Mouse (EUT)	-	-	- / China
Monitor1	LVM-071W	-	Vidente / Korea
Monitor 1 Adapter	LSE0107A1240	-	Dongguang Lite Power 2nd Plant. / China
Monitor 2	-	-	AOC / China
Monitor 3	-	-	AOC / China
Camera	-	-	-
Camera Adapter	SW36-12003000-Z	-	Shenzhen Smart Power Technology Co.,Ltd / China
Smart Phone	LGM-V300S	-	LG Electronics / Korea
Multi meter	-	-	-
75 ohm resistance	-	-	-
LAPTOP	TP00067A	-	LCFC (HeFei) ElectronicsnTechnology Co., Ltd / Chaina
LAPTOP ADAPTER	ADLX65NLC3A	-	CHICONY POWER TECHNOLOGY(SUZHOU) CO., LTD / Chaina
USB MEMORY	SDCZ48-064G	-	SanDisk / Chaina

	<p style="text-align: center;">http://www.lab-t.net</p> <p style="text-align: center;">2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p style="text-align: center;">Test report No.: TREFCC23-0012</p>
---	---	--

4.6 Connection cable

Start-up device		Connected end device		Cable specification	
Name	I/O port	Name	I/O port	Length (m)	Spec.
DVR(EUT)	DC IN	SWITCHING ADAPTER (EUT)	DCOUT	1.4	Unshield
	USB	Optical Mouse (EUT)	USB	1.2	Unshield
	BNC(VIDEO IN)	Camera	BNC	3.0	Shield
	RS-485		RS-485	3.0	Unshield
	BNC(VIDEO OUT)	Monitor1	BNC	3.0	Shield
	HDMI	Monitor 2	HDMI	1.2	Shield
	RCA(AUDIO OUT)		AUX	1.2	Shield
	VGA	Monitor 3	VGA	1.2	Shield
	RCA(AUDIO IN)	Smart Phone	AUX(AUDIO)	1.2	Shield
	RCA(AUDIO)	OPEN * 3	-	1.0	Shield
	BNC(VIDEO)	75 ohm resistance * 3	-	3.0	Shield
	ALARM	Multi Meter	-	3.0	Unshield
	RJ-45(LAN)	LAPTOP	RJ-45(LAN)	3.0	Unshield
	SENSOR1-4	SHORT	-	3.0	Unshield
	USB	USB MEMORY	-	-	Direct
SWITCHING ADAPTER (EUT)	AC IN	AC POWER SOURCE	AC OUT	0.9	Unshield
Monitor1	DC IN	Monitor1 Adapter	DC OUT	1.4	Unshield
Camera	DC IN	Camera Adapter	DC OUT	1.4	Unshield
LAPTOP	DC IN	LAPTOP ADAPTER	DC OUT	1.8	Unshield
Monitor1 Adapter	AC IN	AC POWER SOURCE	AC OUT	1.2	Unshield
Camera Adapter	AC IN	AC POWER SOURCE	AC OUT	1.6	Unshield
LAPTOP ADAPTER	AC IN	AC POWER SOURCE	AC OUT	1.6	Unshield

4.7 Test set-up configuration



	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	--

4.8 EUT operating test mode(s)

- During the test, the peripheral devices (LAPTOP, LAPTOP ADAPTER, Camera, Camera Adapter, Multimeter, Monitor 1, Monitor 1 Adapter) are set to OUTDOOR and tested.
- After applying the image through the camera, monitor 1, monitor 2, monitor 3, and LAPTOP web viewer are monitored and tested.
- The equipment to be tested is tested by continuous ping test with LAPTOP.
- After inputting a 1 kHz sound source continuously played through a smartphone, the equipment to be tested checks the sound output operation through monitors 2 .
- The equipment to be tested checks RS-485 communication through PTZ operation.
- Check the buzzer after connecting the multimeter to the ALARM port.
- The equipment to be tested is checked through the system alarm after shorting to the SENSOR port.
- The equipment to be tested checks the recorded video after the test.
- The RCA (AUDIO) ports of the equipment to be tested were opened with the same port and tested.
- The BNC (VEDIO) port of the equipment to be tested was terminated and tested through 75 ohm resistance with the same port.

4.9 EUT modification

- Not modification.

	<p style="text-align: center;">http://www.lab-t.net</p> <p style="text-align: center;">2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p style="text-align: center;">Test report No.: TREFCC23-0012</p>
---	---	--

5. Test standards

5.1 Standards

Test item	Applied standard	Result
Conducted emission	47 CFR FCC Part 15 Subpart B §15.107 (Class A)	C
Radiated emission (30 MHz ~ 1 000 MHz)	47 CFR FCC Part 15 Subpart B §15.109 (Class A)	C
Radiated emission (Above 1 GHz)	47 CFR FCC Part 15 Subpart B §15.109 (Class A)	C
* C=Comply, N/A=Not applicable		

* Measurement uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC.

The factors contributing to uncertainties are test receiver, cable loss, antenna factor calibration, Antenna directivity, antenna factor variation with height, antenna phase center variation, antenna frequency interpolation, measurement distance variation, site imperfection, mismatch, and system repeatability. Based on CISPR 16-4-2, the measurement uncertainty level with a 95 % confidence level was applied.

Test item		Uncertainty	Confidence level of approximately
Conducted emission	150 kHz ~ 30 MHz	2.36 dB	Least about 95 %, k = 2
Radiated emission (30 MHz ~ 1 000 MHz)	30 MHz ~ 1 000 MHz	4.80 dB	Least about 95 %, k = 2
Radiated emission (Above 1 GHz)	1 000 MHz ~ 2 000 MHz	5.06 dB	Least about 95 %, k = 2

	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	---	--

6. Emission test results

6.1 Conducted emission

Test standard	47 CFR FCC Part 15 Subpart B §15.107
Test date	2023.01.30
Test facility	Building A Shielded room (#1)
Test voltage	AC 120 V, 60 Hz
Temperature	(19.3 ~ 19.7) °C
Relative humidity	(50.5 ~ 50.9) % R.H.
Test result	Complied

6.1.1 Measurement procedure

If the EUT is table top equipment, it was placed on a non-metal table with a height of 0.8 m above the reference ground plane and 0.4 m from the conducting wall of the shielded room.

Also if the EUT is floor-standing equipment, it was placed either directly on the reference ground plane or on insulating material as described in ANSI C 63.4 6.3.3.2. Connect the EUT's power source lines to the appropriate power mains / peripherals through the LISN. All the other peripherals are connected to the 2nd LISN & ISN, if any. Unused measuring port of the LISN & ISN was resistively terminated by 50 ohm terminator. The measuring port of the LISN for EUT was connected to spectrum analyzer. Using conducted emission test software, the emissions were scanned with peak detector mode. After scanning over the frequency range, suspected emissions were selected to perform final measurement. When performing final measurement, the receiver was used which has quasi-peak detector and CISPR average detector. By varying the configuration of the test sample and the cable routing it was attempted to maximize the emission.

	<p style="text-align: center;">http://www.lab-t.net</p> <p style="text-align: center;">2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p style="text-align: center;">Test report No.: TREFCC23-0012</p>
---	---	--

6.1.2 Test equipment used

Equipment	Model	Manufacturer	Serial number	Next cal. date
EMI Test Receiver	ESR7	R&S	102160	2023.06.14
PULSE LIMITER	TFL-007D	KYORITSU	12-19-121	2023.06.15
LISN	ENV216	R&S	101416	2023.06.14
LISN	NSLK 8127 RC	Schwarzbeck	05057	2023.06.14
LISN Control Unit	LISN Controller	TSJ	06660-1	-
LISN Control Unit	LISN Controller	TSJ	06660-2	-
8-WIRE ISN	ENY81	R&S	100359	2023.06.14
EMI CE Software	EMI-C	TSJ	-	-

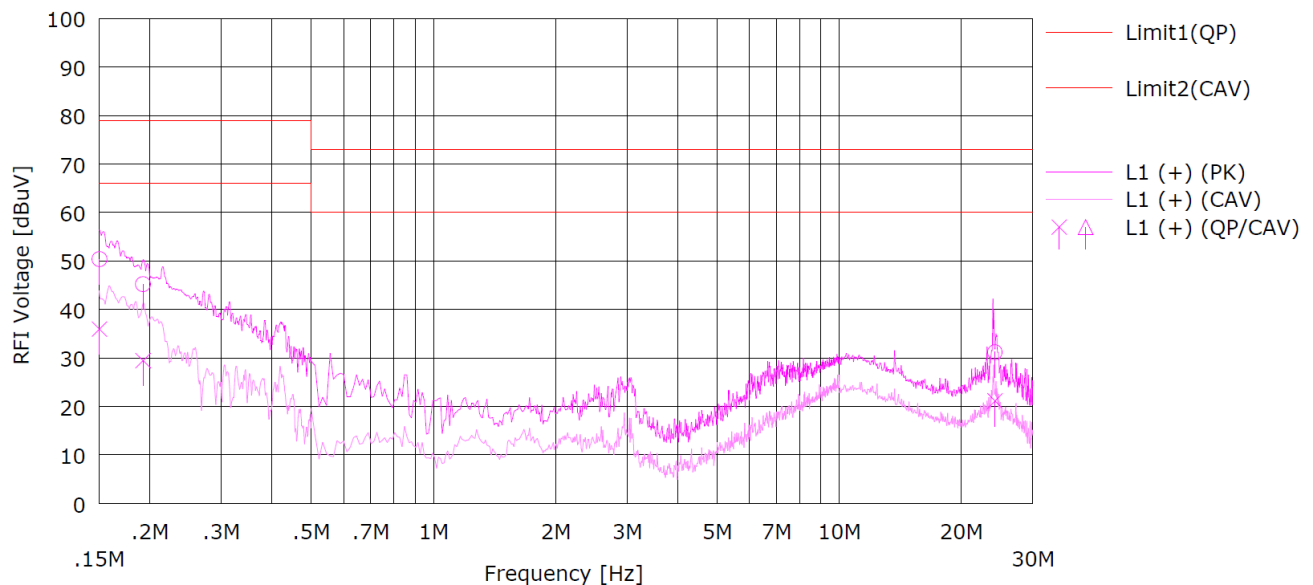
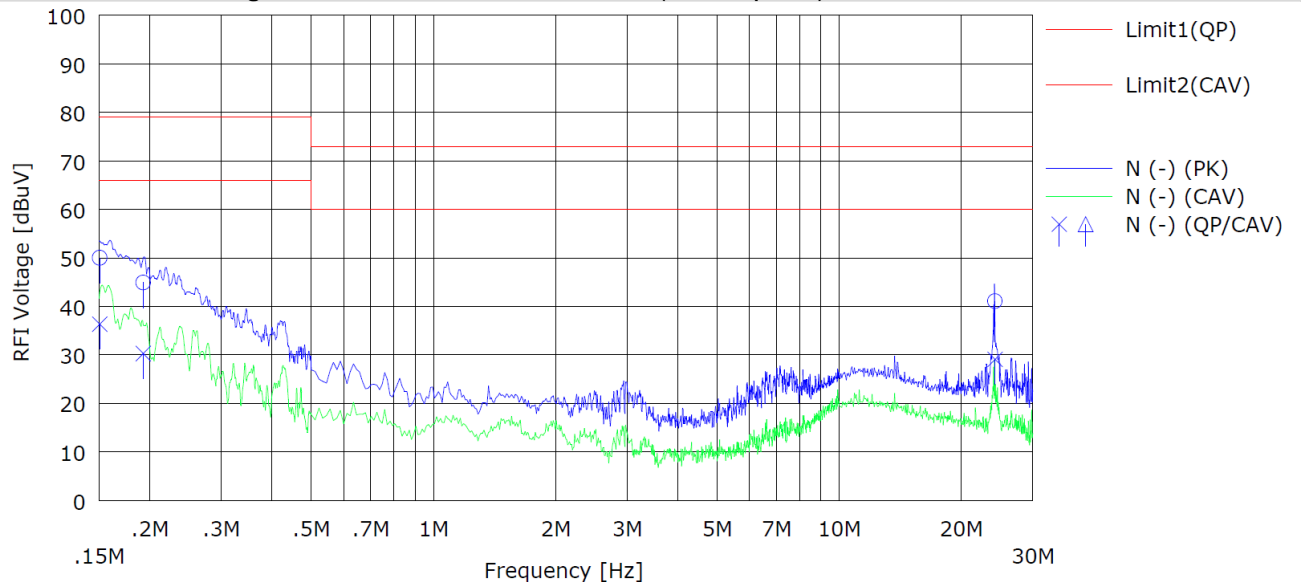
* All test equipment used is calibrated on a regular basis.

6.1.3 Conducted emission limits

Frequency (MHz)	Class A (dB(μV))		Class B (dB(μV))	
	Quasi-peak	Average	Quasi-peak	Average
0.15 to 0.5	79	66	66 ~ 56*	56 ~ 46*
0.5 to 5	73	60	56	46
5 to 30			60	50
Remark 1: (*) The limit decreases linearly with the logarithm of frequency.				

6.1.4 Conducted emission limits test data

* Minimum limit margin is 28.6 dB at 0.15037 MHz. (Quasi-peak)





<http://www.lab-t.net>

2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu
Yongin-si, Gyeonggi-do 17036, Korea (Republic of)
Main: +82-31-322-6767, Fax: +82-31-322-6768

Test report No.:
TREFCC23-0012

NO	FREQ [MHz]	READING		C.FACTOR [dB]	RESULT		LIMIT		MARGIN		PHASE
		QP [dBuV]	CAV [dBuV]		QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	QP [dBuV]	CAV [dBuV]	
1	0.15055	40.4	26.7	9.6	50.0	36.4	79.0	66.0	29.0	29.6	N (-)
2	0.19268	35.0	20.4	9.9	44.9	30.3	79.0	66.0	34.1	35.7	N (-)
3	24.21833	30.9	18.9	10.1	41.1	29.0	73.0	60.0	31.9	31.0	N (-)
4	0.15037	40.6	26.2	9.7	50.4	35.9	79.0	66.0	28.6	30.1	L1 (+)
5	0.19262	35.2	19.5	10.0	45.2	29.5	79.0	66.0	33.8	36.5	L1 (+)
6	24.21733	20.9	10.9	10.2	31.1	21.1	73.0	60.0	41.9	38.9	L1 (+)

* Remark: "L1": (Line), "N": (Neutral)

* Results [dB(μV)] = Reading [dB(μV)] + C.FACTOR [dB]

* C.FACTOR [dB] = LISN insertion Loss [dB] + Cable loss [dB] + Pulse limiter factor [dB]

* Margin [dB] = Limit [dB(μV)] - Result [dB(μV)]

* QP: Quasi-peak, CAV: CISPR Average

* ex) Measure Value[QP]

Frequency: 0.15055 MHz

Results [dB μV] = 50.0, Reading [dB μV] = 40.4, C.FACTOR [dB] = 9.6

50.0 dB μV = 40.4 dB μV + 9.6 dB

Margin [dB μV] = 29.0, Limit [dB μV] = 79.0, Result [dB μV] = 50.0

29.0 dB μV = 79.0 dB μV - 50.0 dB μV

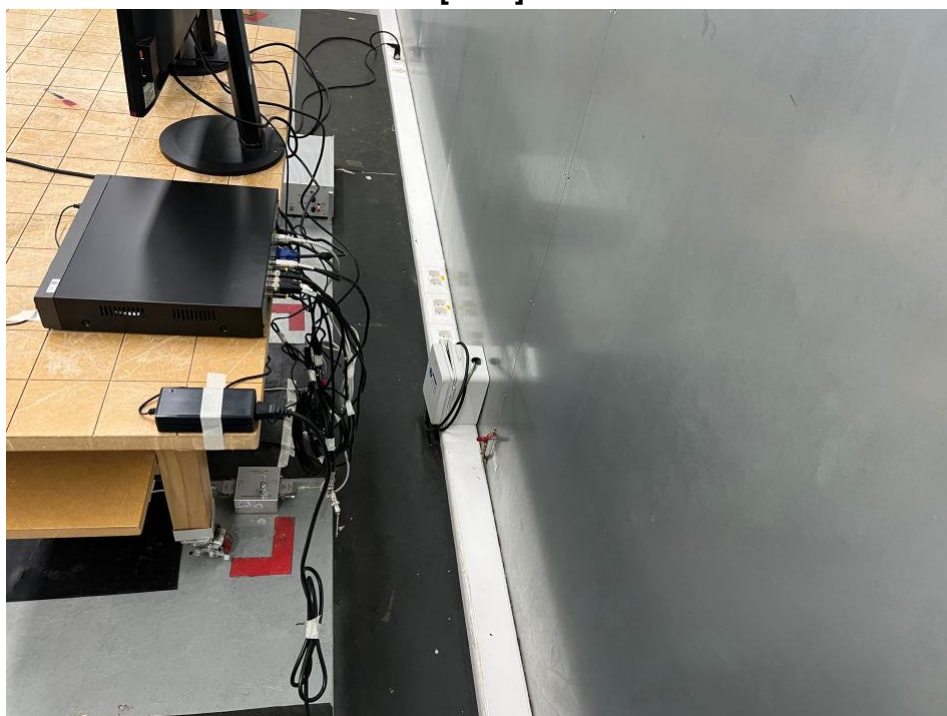
	<p>http://www.lab-t.net</p> <p>2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p>Test report No.: TREFCC23-0012</p>
---	--	--

6.1.5 Test setup photos

[Front]



[Rear]



	<p style="text-align: center;">http://www.lab-t.net</p> <p style="text-align: center;">2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p style="text-align: center;">Test report No.: TREFCC23-0012</p>
---	---	--

6.2 Radiated emission (30 MHz ~ 1 000 MHz)

Test standard	47 CFR FCC Part 15 Subpart B §15.109
Test date	2023.02.01
Test facility	Building A 10 m chamber
Test voltage	AC 120 V, 60 Hz
Temperature	(19.7 ~ 20.3) °C
Relative humidity	(50.2 ~ 50.8) % R.H.
Test result	Complied

6.2.1 Measurement procedure

If the EUT is tabletop equipment, it was placed on a non-metal table with a height of 0.8 m above the reference ground plane and 10 m away from the interference receiving antenna in the semi-anechoic chamber.

Also if the EUT is floor-standing equipment, it was placed either directly on the reference ground plane or on insulating material as described in ANSI C 63.4 6.3.3.2. Rotate the EUT from (0 - 360)° and position the receiving antenna at heights from (1 - 4) m above the reference ground plane continuously to determine associated with higher emission levels and record them.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report. For 30 MHz ~ 1 000 MHz frequency range, quasi-peak detector with 120 kHz RBW was used.

	<p style="text-align: center;">http://www.lab-t.net</p> <p style="text-align: center;">2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p style="text-align: center;">Test report No.: TREFCC23-0012</p>
---	---	--

6.2.2 Test equipment used

Equipment	Model	Manufacturer	Serial number	Next cal. date
EMI Test Receiver	ESW44	R&S	101839	2023.06.14
Low Noise Preamplifier	MLA-10k01-b01-14	TSJ	2060297	2023.06.14
Bi-Log Antenna	VULB9168	Schwarzbeck	00822	2023.03.31
Attenuator	50FPE-006N	JFW	6 dB-1	2023.04.14
Controller	C3000	Innco	45450119	-
Antenna Mast	MA4000-EP	Innco	-	-
Turn Table	-	-	-	-
EMI RE Software	EMI-R	TSJ	-	-

* All test equipment used is calibrated on a regular basis.

6.2.3 Radiated emission limits

- Limit for radiated emission below 1 000 MHz

Frequency range (MHz)	Class A Equipment (10 m distance)	Class B Equipment (3 m distance)
	Quasi-peak (dB(μV/m))	Quasi-peak (dB(μV/m))
30 to 88	39.1	40
88 to 216	43.5	43.5
216 to 960	46.4	46
960 to 1 000	49.5	54

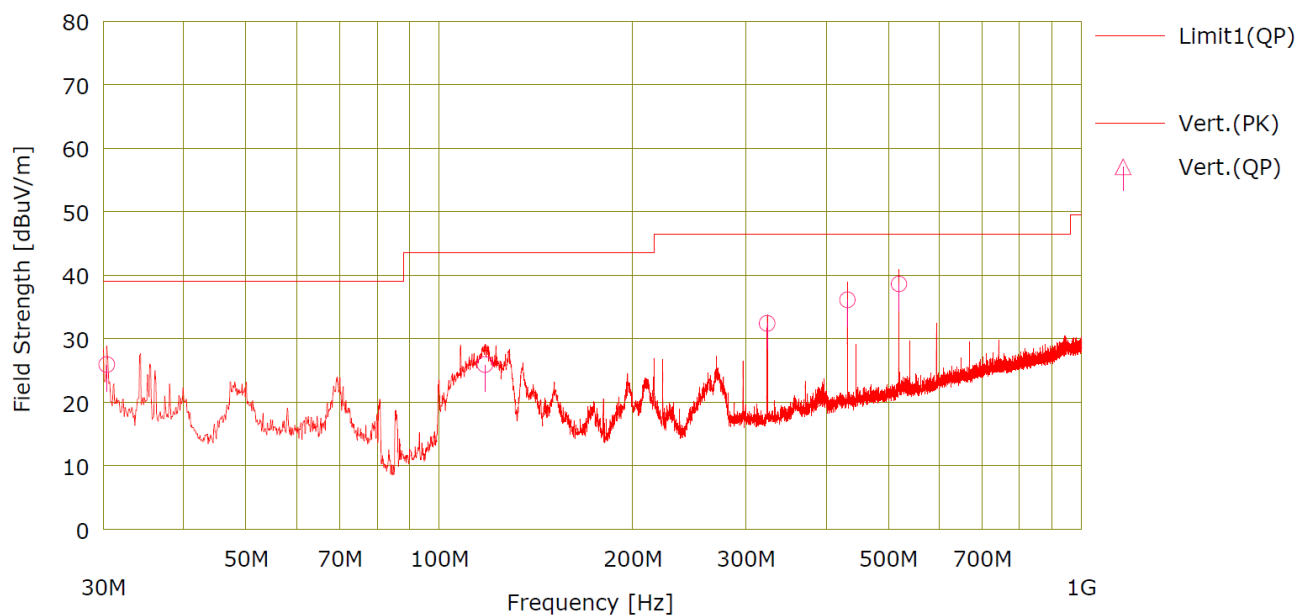
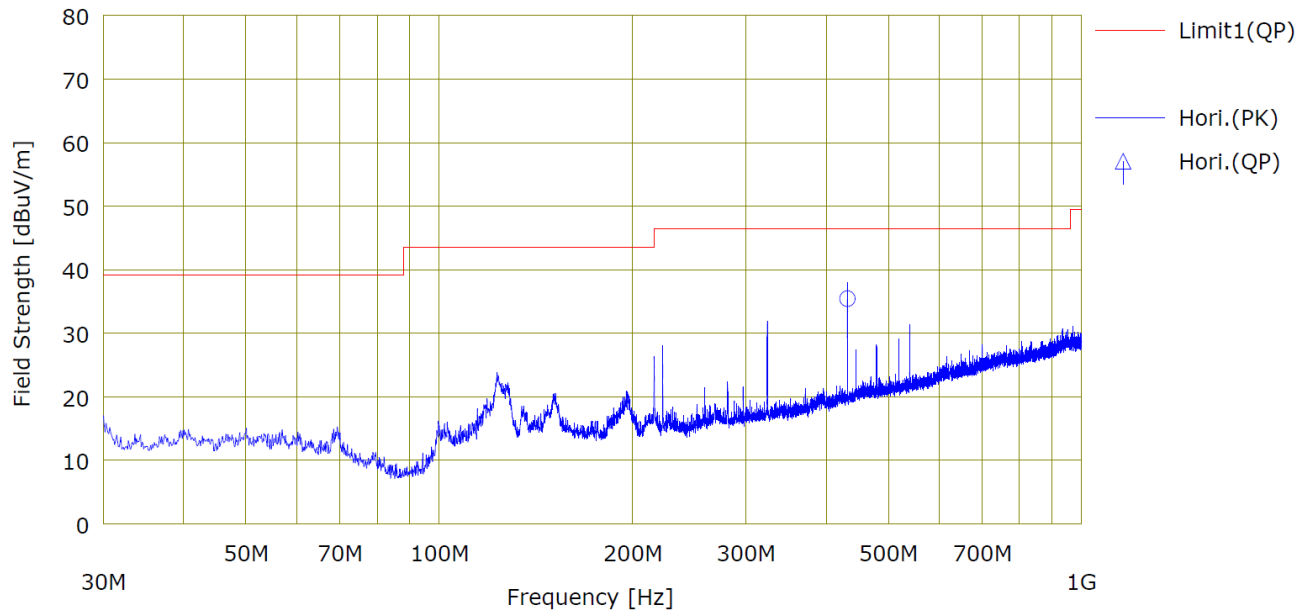
Note 1 The lower limit shall apply at the transition frequency.

Note 2 Additional provisions may be required for cases where interference occurs.

Note 3 According to 15.109(g), as an alternative to the radiated emission limit shown above, digital devices may be shown to comply with the standards(CISPR), Pub. 22 shown as below.

6.2.4 Radiated emission test data

* Minimum limit margin is 7.8 dB at 519.813 MHz. (Vertical)





<http://www.lab-t.net>

2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu
Yongin-si, Gyeonggi-do 17036, Korea (Republic of)
Main: +82-31-322-6767, Fax: +82-31-322-6768

Test report No.:
TREFCC23-0012

<< QP DATA >>

No.	Freq.	Reading	Ant.Fac	Loss	Gain	Result	Limit	Margin	Pola.	Height	Angle	Ant. Type
		<QP>				<QP>	<QP>	<QP>				
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	
1	432.076	54.4	22.6	-41.6	0.0	35.4	46.4	11.0	Hori.	200	263	VULB9
2	30.388	52.4	18.3	-44.8	0.0	25.9	39.1	13.2	Vert.	100	6	VULB9
3	117.790	53.6	16.5	-44.3	0.0	25.9	43.5	17.6	Vert.	100	52	VULB9
4	324.012	54.2	20.2	-42.0	0.0	32.4	46.4	14.0	Vert.	100	2	VULB9
5	431.974	55.1	22.6	-41.6	0.0	36.1	46.4	10.3	Vert.	100	166	VULB9
6	519.813	55.8	24.1	-41.3	0.0	38.6	46.4	7.8	Vert.	100	133	VULB9

* Results [dB(μ V/m)] = Reading [dB(μ V)] + Antenna factor [dB/m] - Loss

* Loss = Cable loss [dB] - Amp gain [dB]

* Margin [dB] = Limit [dB(μ V/m)] - Results [dB(μ V/m)]

* QP: Quasi-peak

* ex) Measure Value[QP]

Frequency: 432.076 MHz

Results [dB μ V/m] = 35.4, Reading [dB μ V/m] = 54.4, Antenna factor [dB/m] = 22.6, Loss [dB] = - 41.6, Amp gain [dB] = 0.0

35.4 dB μ V/m = 54.4 dB μ V/m + 22.6 dB/m - 41.6 dB - 0.0 dB

Margin [dB μ V/m] = 11.0, Limit [dB μ V/m] = 46.4, Result [dB μ V/m] = 35.4

11.0 dB μ V/m = 46.4 dB μ V/m - 35.4 dB μ V/m

	<p style="text-align: center;">http://www.lab-t.net</p> <p style="text-align: center;">2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p style="text-align: center;">Test report No.: TREFCC23-0012</p>
---	---	--

6.3 Radiated emission (Above 1 GHz)

Test standard	47 CFR FCC Part 15 Subpart B §15.109
Test date	2023.02.01
Test facility	Building A 10 m chamber
Test voltage	AC 120 V, 60 Hz
Temperature	(20.3 ~ 20.7) °C
Relative humidity	(50.8 ~ 51.2) % R.H.
Test result	Complied

6.3.1 Measurement procedure

If the EUT is tabletop equipment, it was placed on a non-metal table with a height of 0.8 m above the reference ground plane and 3 m away from the interference receiving antenna in the chamber. Also if the EUT is floor-standing equipment, it was placed either directly on the reference ground plane or on insulating material as described in ANSI C 63.4 6.3.3.2. Rotate the EUT from (0 - 360)° and position the receiving antenna at heights from (1 - 4) m above the reference ground plane continuously to determine associated with higher emission levels and record them.

The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report. For peak and average detector with 1 MHz RBW were used for above 1 GHz frequency range.

	<p style="text-align: center;">http://www.lab-t.net</p> <p style="text-align: center;">2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu Yongin-si, Gyeonggi-do 17036, Korea (Republic of) Main: +82-31-322-6767, Fax: +82-31-322-6768</p>	<p style="text-align: center;">Test report No.: TREFCC23-0012</p>
---	---	--

6.3.2 Test equipment used

Equipment	Model	Manufacturer	Serial number	Next cal. date
EMI Test Receiver	ESW44	R&S	101839	2023.06.14
Low Noise Preamplifier	MLA-0108-J02-39	TSJ	20755	2023.06.14
Horn Antenna	BBHA 9120 D	Schwarzbeck	02067	2023.06.02
Controller	C3000	Innco	45450119	-
Antenna Mast	MA4640-XP-ET	Innco	-	-
Turn Table	-	-	-	-
EMI RE Software	EMI-R	TSJ	-	-

* All test equipment used is calibrated on a regular basis

6.3.3 Radiated emission limits

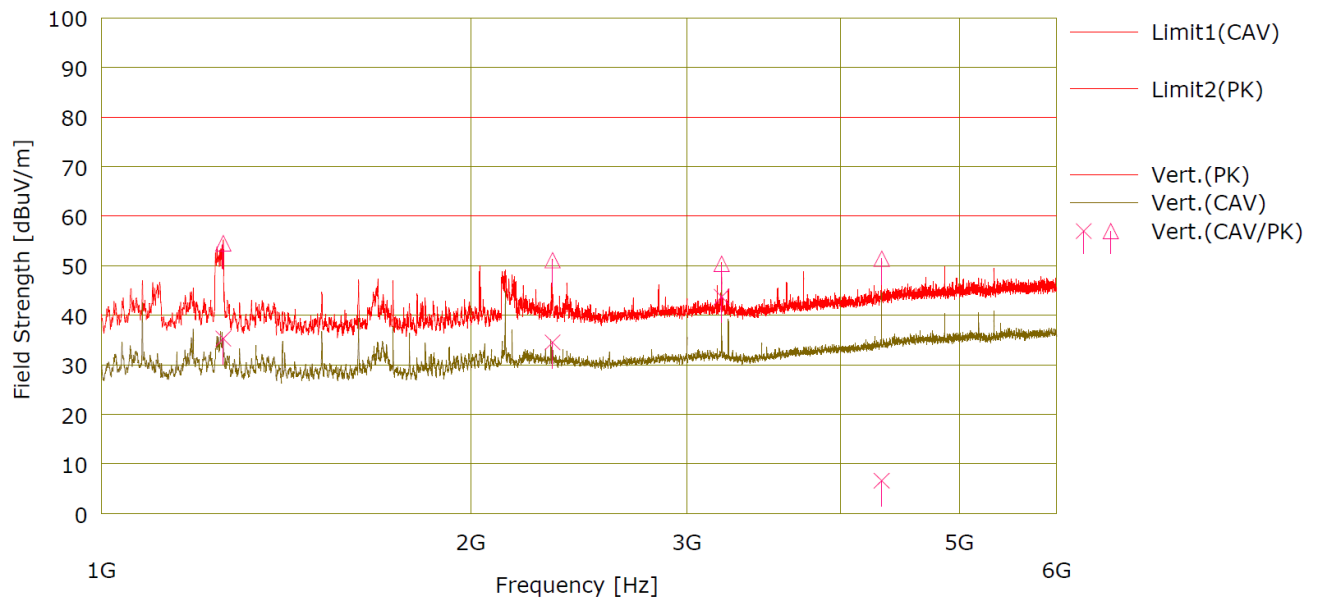
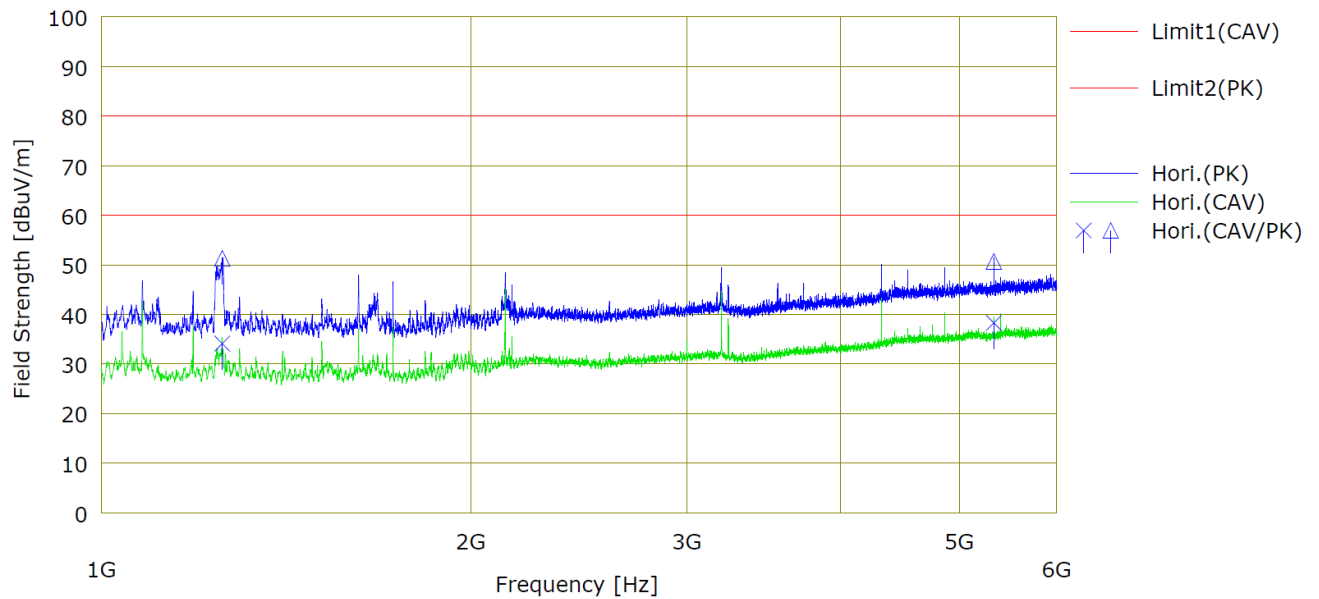
- The test frequency range of radiated disturbance measurements are listed below

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1 000
108 - 500	2 000
500 - 1 000	5 000
Above 1 000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

Frequency (GHz)	Class A equipment (3 m distance) (dB(μV/m))		Class B equipment (3 m distance) (dB(μV/m))	
	Peak	Average	Peak	Average
1 to 2	80	60	74	54

6.3.4 Radiated emission test data

* Minimum limit margin is 16.3 dB at 3199.995 MHz. (CISPR Average)





<http://www.lab-t.net>

2182-42 Baegok-daero, Mohyeon-eup, Cheoin-gu
Yongin-si, Gyeonggi-do 17036, Korea (Republic of)
Main: +82-31-322-6767, Fax: +82-31-322-6768

Test report No.:
TREFCC23-0012

<< CAV/PK DATA >>

No.	Freq.	Reading		Ant.Fac	Loss	Gain	S.Fac	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type
		<CAV>	<PK>					<CAV>	<PK>	<CAV>	<PK>	<CAV>	<PK>				
	[MHz]	[dBuV]	[dBuV]					[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]				
1	1254.505	40.8	58.0	25.8	-36.1	0.0	3.5	34.1	51.3	60.0	80.0	25.9	28.7	Hori.	100	61	3BHA9
2	5333.483	33.8	46.2	31.4	-30.4	0.0	3.5	38.3	50.7	60.0	80.0	21.7	29.3	Hori.	100	78	3BHA9
3	1256.986	42.0	61.2	25.8	-36.1	0.0	3.5	35.3	54.5	60.0	80.0	24.7	25.5	Vert.	200	0	3BHA9
4	2330.490	38.2	54.8	27.8	-35.0	0.0	3.5	34.5	51.1	60.0	80.0	25.5	28.9	Vert.	200	155	3BHA9
5	3199.995	45.2	51.9	28.8	-33.9	0.0	3.5	43.7	50.4	60.0	80.0	16.3	29.6	Vert.	400	221	3BHA9
6	4320.531	4.6	49.4	30.3	-31.8	0.0	3.5	6.6	51.4	60.0	80.0	53.4	28.6	Vert.	400	213	3BHA9

* Results [dB(μV/m)] = Reading [dB(μV)] + Antenna factor [dB/m] - Loss [dB]

* Loss = Cable loss [dB] - Amp gain [dB] + S.Fac

* Margin [dB] = Limit [dB(μV/m)] - Results [dB(μV/m)]

* QP: Quasi-peak , CAV: CISPR Average

* ex) Measure Value[CAV]

Frequency: 1254.505 MHz

Results [dB μ V/m] = 34.1, Reading [dB μ V/m] = 40.8, Antenna factor [dB/m] = 25.8, Loss [dB] = - 36.1

Amp gain [dB] = -0.0, S.Fac [dB] = 3.5

34.1 dB μ V/m = 40.8 dB μ V/m + 25.8 dB/m - 36.1 dB - 0.0 dB + 3.5 dB

Margin [dB] = 25.9, Limit [dB μ V/m] = 60.0, Result [dB μ V/m] = 34.1

25.9 dB = 60.0 dB μ V/m - 34.1 dB μ V/m