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Test report No.:
TREFCC24-0063

FCC SUPPLIER'S DECLARATION OF CONFORMITY TEST REPORT

Test report No.	:	TREFCC24-0063
Applicant	:	DAS Co., Ltd
Address	:	61, Jipyeongseonsandan 3-gil, Gimje-si, Jeollabuk-do, Korea
Manufacturer	:	DAS Co., Ltd
Address	:	61, Jipyeongseonsandan 3-gil, Gimje-si, Jeollabuk-do, Korea
Type of equipment	:	IRON-MD Transmitter
Model name	:	IRON-MD-TD
Variant model name	:	Not applicable
Date of incoming	:	June 14, 2024
Date of test	:	July 29, 2024
Date of issue	:	August 14, 2024
Test standards	:	ANSI C 63.4-2014 47 CFR Part 15 Subpart B
Type of device	:	All other 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	**Approved by**
Jae Hee Song / EMC test engineer	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.

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1. Revision history

Issued report No.	Version	Issued date	Revision
TREFCC24-0063	Rev. 00	August 14, 2024	Original

2. Information of test laboratory

Corporate name	Lab-T, Inc.
Representative	Duke (Jongyoung) Kim
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	Gyeonggi-do 17036, Korea (Republic of)
Telephone	+82-31-322-6767
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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 0009	
	USA	UL	1706-E-197	

3. Applicant information

Applicant	DAS Co., Ltd
Address	61, Jipyeongseonsandan 3-gil, Gimje-si, Jeollabuk-do, Korea

Manufacturer	DAS Co., Ltd
Address	61, Jipyeongseonsandan 3-gil, Gimje-si, Jeollabuk-do, Korea
Country of origin	Korea

4. Description of EUT (Equipment under test)

4.1 Product description

Name of EUT	IRON-MD Transmitter
Model name	IRON-MD-TD

4.2 Product specification

Classification	**Specifications**
Display	GRAPHICS LCD 128*128 (OPTION)
T(Transmission)/R(Receiving) Radio Frequency	433 MHz / 2.4 GHz(Bluetooth)
Used Battery	Li-ion 18650 3.7 V / 3 A
Battery Charging Time	5 hours
Usage Time After One Charge	More than 40 hours
Operating Temp.	- 20 °C to + 70 °C
Storage Temp.	- 40 °C to + 85 °C
Waterproof Rating	IP65
Weight	1.1 kg

4.3 EUT internal operating frequency

Frequency	Description	Frequency	Description
433 MHz	-	2 480 MHz	Bluetooth (BLE)

4.4 Information of additional model

Product	Model name	Difference
-	-	-

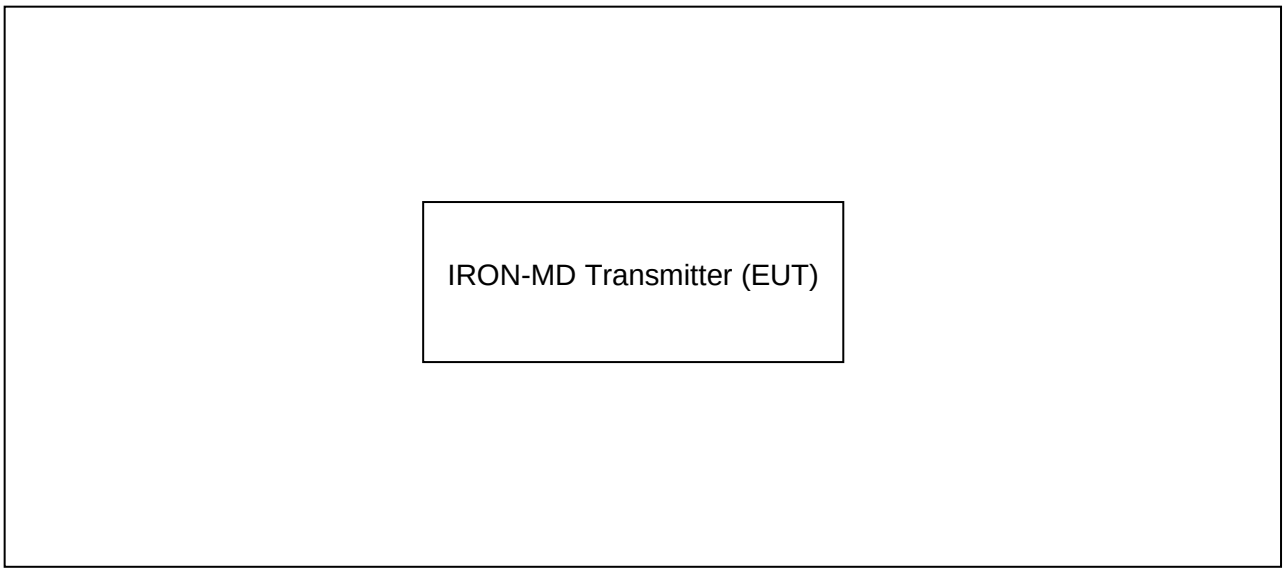
4.5 Peripheral equipment

Product	Model name	Serial No.	Manufacturer
IRON-MD Transmitter (EUT)	IRON-MD-TD	-	DAS Co., Ltd / Korea

4.6 Connection cable

Start-up device		Connected end device		Cable specification	
Name	**I/O port**	**Name**	**I/O port**	**Length(m)**	**Spec.**
-	-	-	-	-	-

4.7 Test set-up configuration



4.8 EUT operating test mode(s)

- The test was conducted with the battery power turned on and in transmit/receive standby mode.

4.9 EUT modification

- Not modification.

5. Test standards

5.1 Standards

Test item	Applied standard	Result
Conducted emission	47 CFR FCC Part 15 Subpart B §15.107 (Class A)	N/A (*Note 1)
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 * Note 1: The test excluded as EUT is using Battery Power.		

* **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
Radiated emission (30 MHz ~ 1 000 MHz)	30 ㎒ ~ 1 000 ㎒	4.80 ㏈	Least about 95 %, k = 2
Radiated emission (Above 1 GHz)	Above 1 GHz	5.06 ㏈	Least about 95 %, k = 2

6. Emission test results

6.1 Conducted emission

Test standard	**47 CFR FCC Part 15 Subpart B §15.107**
Test date	-
Test facility	-
Test voltage	-
Temperature	-
Relative humidity	-
Test result	Not applicable

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.

6.1.2 Test equipment used

Equipment	Model	Manufacturer	Serial number	Next cal. date
-	-	-	-	-

* 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	CISPR Average	Quasi-peak	CISPR 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

N/A

6.1.5 Test setup photos

N/A

6.2 Radiated emission (30 MHz ~ 1 000 MHz)

Test standard	**47 CFR FCC Part 15 Subpart B §15.109**
Test date	2024.07.29
Test facility	Building A 10 m chamber
Test voltage	DC 3.7 V (Battery)
Temperature	(18.9 ~ 19.2) °C
Relative humidity	(49.1 ~ 49.4) % 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.

6.2.2 Test equipment used

Equipment	Model	Manufacturer	Serial number	Next cal. date
EMI Test Receiver	ESW44	R&S	101839	2025.05.30
Low Noise Preamplifier	MLA-10k01-b01-14	TSJ	2060297	2025.05.31
Bi-Log Antenna	VULB9168	Schwarzbeck	00822	2025.03.09
Attenuator	50FPE-006N	JFW	6 dB-1	2025.03.09
Controller	CO3000	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

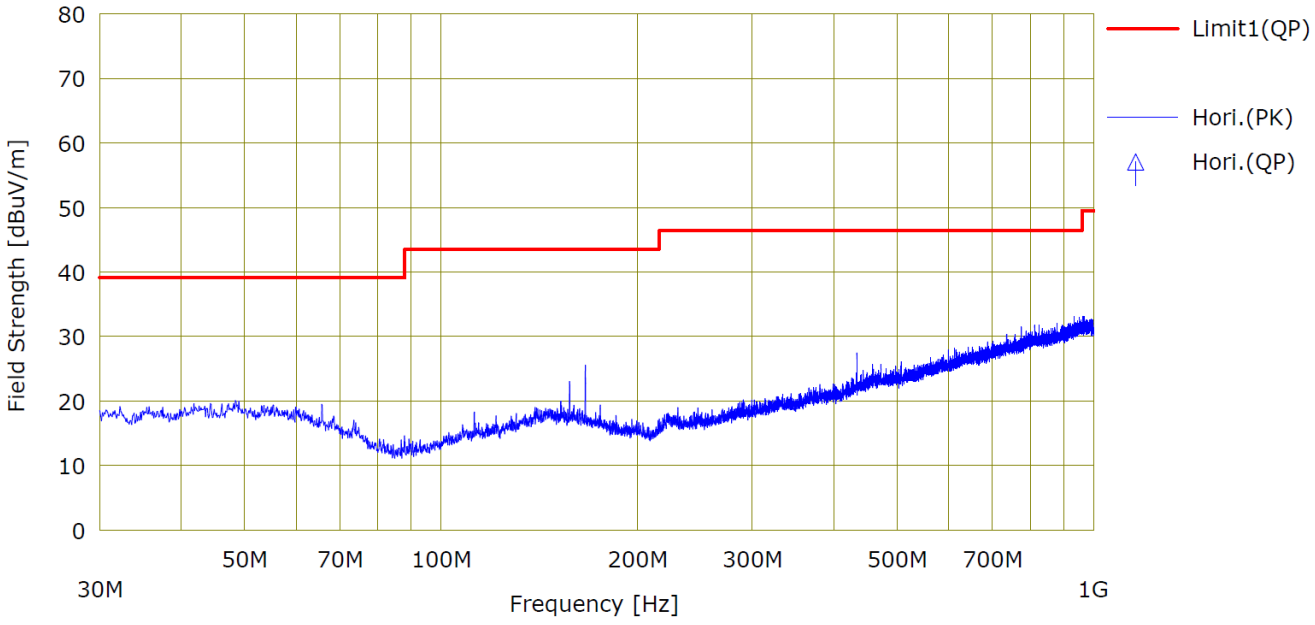
- Limit for radiated emission below 1 000 MHz

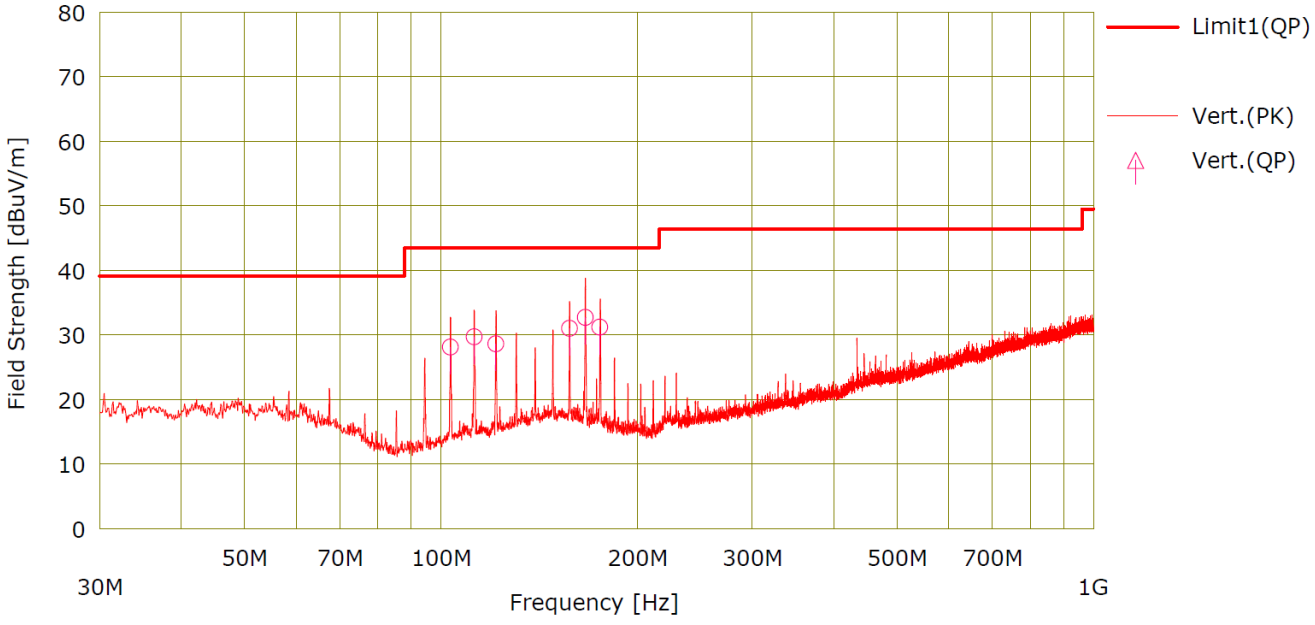
Frequency range (MHz)	Class A Equipment (10 m distance)	Class B Equipment (3 m distance)
	Quasi-peak (dB(μV/m))	Quasi-peak (dB(μV/m))
30 to 88	39.1	40
88 to 216	43.5	43.5
216 to 960	46.4	46
960 to 1 000	49.5	54

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 10.8 dB at 166.514 MHz. (Vertical)





<< QP DATA >>

No.	Freq.	Reading <QP>	Ant.Fac	Loss	Gain	Result <QP>	Limit <QP>	Margin <QP>	Pola.	Height	Angle	Ant. Type
	[MHz]	[dBuV]	[dB/m]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[H/V]	[cm]	[deg]	
1	103.448	50.7	15.7	-38.3	0.0	28.1	43.5	15.4	Vert.	100	348	VULB9
2	112.514	51.4	16.5	-38.2	0.0	29.7	43.5	13.8	Vert.	100	299	VULB9
3	121.455	49.8	16.9	-38.1	0.0	28.6	43.5	14.9	Vert.	100	0	VULB9
4	157.487	50.1	18.9	-37.9	0.0	31.0	43.5	12.5	Vert.	100	130	VULB9
5	166.514	52.2	18.4	-37.9	0.0	32.7	43.5	10.8	Vert.	100	83	VULB9
6	175.225	51.0	18.0	-37.8	0.0	31.2	43.5	12.3	Vert.	100	22	VULB9

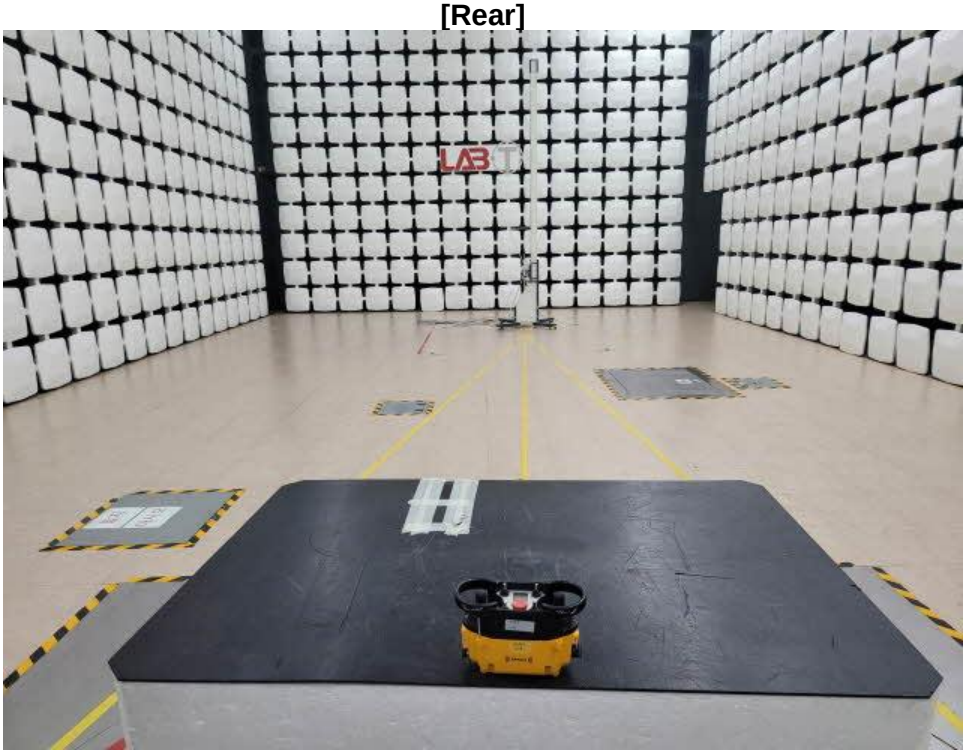
* Results [dB(μV/m)] = Reading [dB(μV)] + Antenna factor [dB/m] - Loss
* Loss = Cable loss [dB] - Amp gain [dB]
* Margin [dB] = Limit [dB(μV/m)] - Results [dB(μV/m)]
* QP: Quasi-peak

* ex) Measure Value[QP]
Frequency: 103.448 MHz
Results [dB μ V/m] = 28.1, Reading [dB μ V/m] = 50.7, Antenna factor [dB/m] = 15.7, Loss [dB] = - 38.3, Amp gain [dB] = 0.0
28.1 dB μ V/m = 50.7 dB μ V/m + 15.7 dB/m – 38.3 dB – 0.0 dB
Margin [dB μ V/m] = 15.4, Limit [dB μ V/m] = 43.5, Result [dB μ V/m] = 28.1
15.4 dB μ V/m = 43.5 dB μ V/m – 28.1 dB μ V/m

6.2.5 Test setup photos

[Front]

[Rear]



6.3 Radiated emission (Above 1 GHz)

Test standard	**47 CFR FCC Part 15 Subpart B §15.109**
Test date	2024.07.29
Test facility	Building A 10 m chamber
Test voltage	DC 3.7 V (Battery)
Temperature	(20.2 ~ 20.6) °C
Relative humidity	(50.1 ~ 50.5) % 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.

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6.3.2 Test equipment used

Equipment	Model	Manufacturer	Serial number	Next cal. date
EMI Test Receiver	ESW44	R&S	101839	2025.05.30
Horn Antenna	BBHA 9120 D	Schwarzbeck	01735	2025.04.03
Low Noise amplifier	TK-PA18H	TESTEK	170004-L	2025.04.01
Controller	CO3000	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

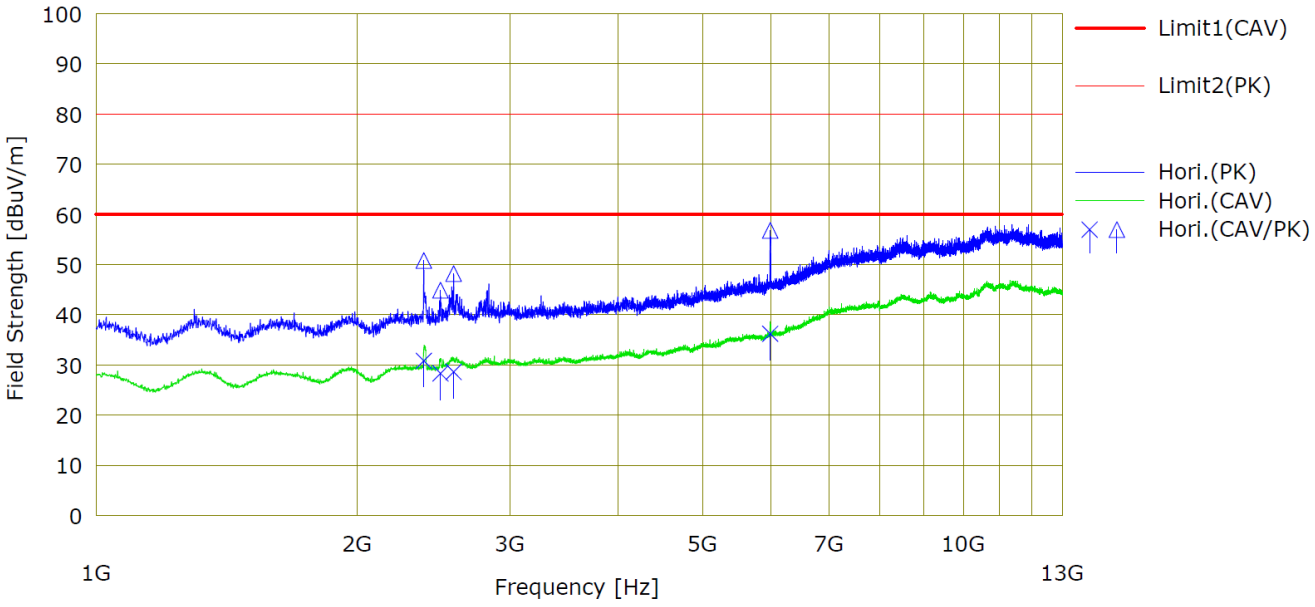
Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 108	1 000
108 - 500	2 000
500 - 1 000	5 000
Above 1 000	5th harmonic of the highest frequency or 40 GHz, whichever is lower

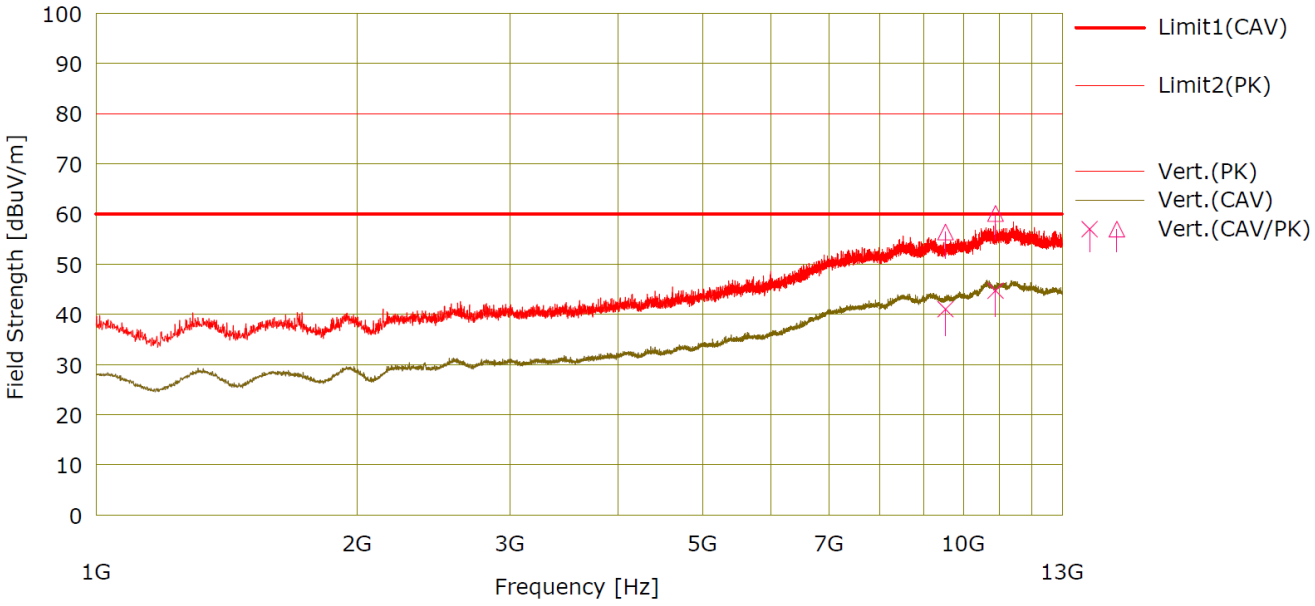
Frequency (GHz)	Class A equipment (3 m distance) (dB(μV/m))		Class B equipment (3 m distance) (dB(μV/m))	
1 to 18	Peak	CISPR Average	Peak	CISPR Average
	80	60	74	54

Frequency (GHz)	Class A equipment (1 m distance) (dB(μV/m))		Class B equipment (1 m distance) (dB(μV/m))	
18 to 40	Peak	CISPR Average	Peak	CISPR Average
	89.4	69.4	83.4	63.4

6.3.4 Radiated emission test data

* Minimum limit margin is 15.3 dB at 10893.680 MHz. (Vertical)





<< CAV/PK DATA >>

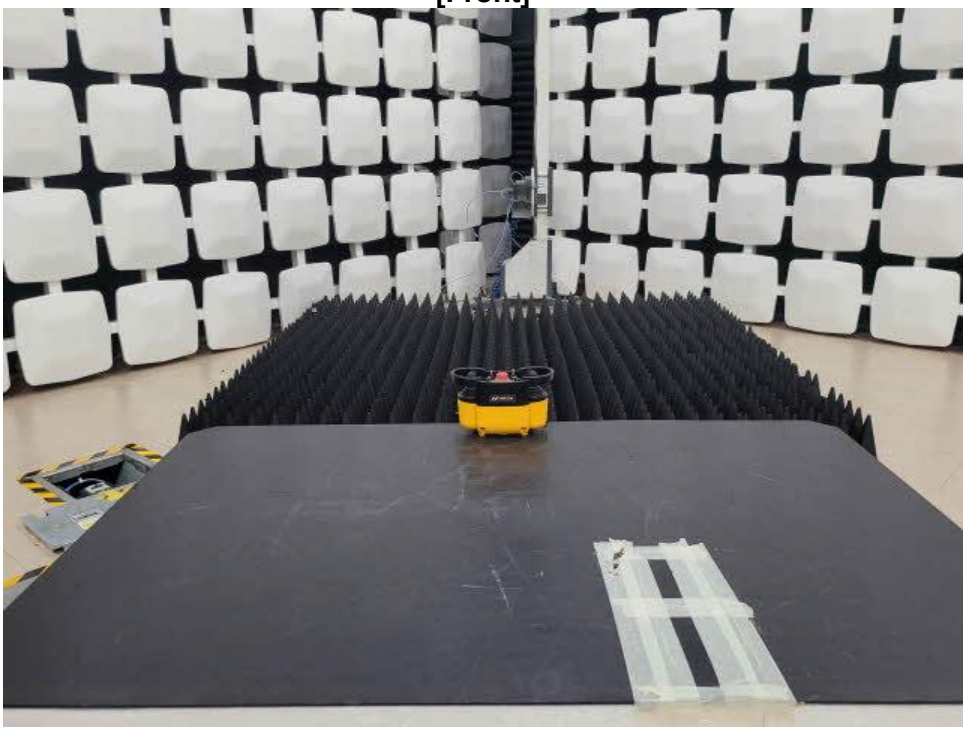
No.	Freq.	Reading		Ant.Fac	Loss	Gain	S.Fac	Result		Limit		Margin		Pola.	Height	Angle	Ant. Type
		<CAV>	<PK>					<CAV>	<PK>	<CAV>	<PK>	<CAV>	<PK>				
	[MHz]	[dBuV]	[dBuV]	[dB/m]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dBuV/m]	[dB]	[dB]	[H/V]	[cm]	[deg]	
1	2386.783	35.8	55.8	27.1	9.3	44.9	3.5	30.8	50.8	60.0	80.0	29.2	29.2	Hori.	101	132	HORN_
2	2494.839	32.7	49.3	27.4	9.4	44.7	3.5	28.3	44.9	60.0	80.0	31.7	35.1	Hori.	101	360	HORN_
3	2583.994	32.6	52.2	27.6	9.6	44.7	3.5	28.6	48.2	60.0	80.0	31.4	31.8	Hori.	101	223	HORN_
4	5987.589	27.8	48.4	32.4	15.6	43.1	3.5	36.2	56.8	60.0	80.0	23.8	23.2	Hori.	101	204	HORN_
5	9537.985	22.0	37.4	38.4	20.0	42.9	3.5	41.0	56.4	60.0	80.0	19.0	23.6	Vert.	101	0	HORN_
6	10893.680	22.1	37.5	40.2	21.4	42.5	3.5	44.7	60.1	60.0	80.0	15.3	19.9	Vert.	101	232	HORN_

* Results [dB(μV/m)] = Reading [dB(μV)] + Antenna factor [dB/m] - Loss [dB] + S.Fac
* Loss = Cable loss [dB] - Amp gain [dB]
* Margin [dB] = Limit [dB(μV/m)] - Results [dB(μV/ m)]
* PK = Peak, CAV = CISPR Average

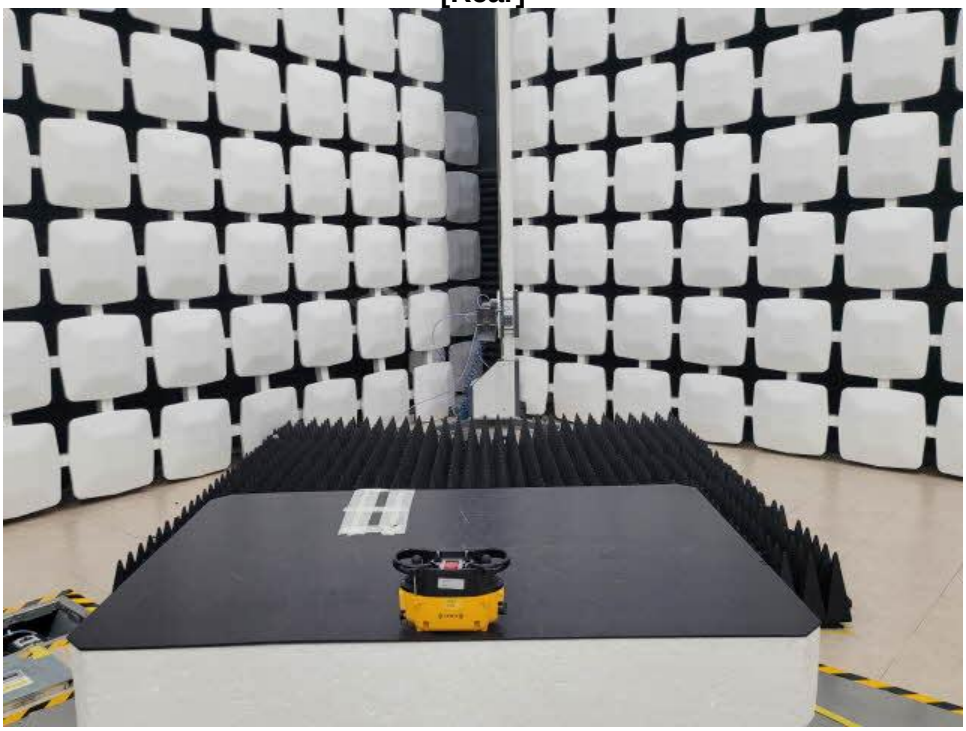
* ex) Measure Value[CAV]
Frequency: 2386.783 MHz
Results [dB μ V/m] = 30.8, Reading [dB μ V/m] = 35.8, Antenna factor [dB/m] = 27.1, S.Fac [dB] = 3.5,
Loss [dB] = - 9.3, Amp gain [dB] = 44.9
30.8 dB μ V/m = 35.8 dB μ V/m + 27.1 dB/m + 3.5 – 9.3 dB – 44.9 dB
Margin [dB μ V/m] = 29.2, Limit [dB μ V/m] = 60.0, Result [dB μ V/m] = 30.8
29.2 dB μ V/m = 60.0 dB μ V/m – 30.8 dB μ V/m

6.3.5 Test setup photos

[Front]



[Rear]



7. Photographs of the product

[Front]

[Rear]

[Left]

[Right]

[Top]

[Bottom]

8. Compliance information and information to user requirements summaries.

8.1 Compliance Information

This device labeling requirement is in addition to the SDoC compliance information statement and label requirements of Sections 2.1074 and 2.1077; however, placing the Part 15 compliance information will also satisfy the requirements for Sections 2.1074 and 2.1077. When the device is so small, or for such use that it is impracticable to label it with the compliance statement specified in a font that is four-point or larger, and the device does not have a display that can show electronic labeling,18 then the information required shall be placed in the instruction manual, and on the device packaging or on a removable label attached to the device. In cases where the instruction manual with the compliance information is a printed document provided along with the device, the arrangement is acceptable for compliance with the Part 2 and 15 rules for information to the user. Where the instruction manual is not a printed document, a paper slip printed with the Part 15 compliance information and included with the device will also meet the requirement of the rules.

Sections 2.1077

(a) If a product must be tested and authorized under Supplier's Declaration of Conformity, a compliance information statement shall be supplied with the product at the time of marketing or importation, containing the following information:

(1) Identification of the product, e.g., name and model number;
(2) A compliance statement as applicable, e.g., for devices subject to part 15 of this chapter as specified in §15.19(a)(3) of this chapter, that the product complies with the rules; and
(3) The identification, by name, address and telephone number or Internet contact information, of the responsible party, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

(b) If a product is assembled from modular components (e.g., enclosures, power supplies and CPU boards) that, by themselves, are authorized under a Supplier's Declaration of Conformity and/or a grant of certification, and the assembled product is also subject to authorization under Supplier's Declaration of Conformity but, in accordance with the applicable regulations, does not require additional testing, the product shall be supplied, at the time of marketing or importation, with a compliance information statement containing the following information:

(1) Identification of the assembled product, e.g., name and model number.
(2) Identification of the modular components used in the assembly. A modular component authorized under Supplier's Declaration of Conformity shall be identified as specified in

paragraph (a)(1) of this section. A modular component authorized under a grant of certification shall be identified by name and model number (if applicable) along with the FCC Identifier number.

(3) A statement that the product complies with part 15 of this chapter.

(4) The identification, by name, address and telephone number or Internet contact information, of the responsible party who assembled the product from modular components, as defined in §2.909. The responsible party for Supplier's Declaration of Conformity must be located within the United States.

(5) Copies of the compliance information statements for each modular component used in the system that is authorized under Supplier's Declaration of Conformity.

(c) The compliance information statement shall be included in the user's manual or as a separate sheet. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the Internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form. The information may be provided electronically as permitted in §2.935.

8.2 Labeling requirements (Section 15.19)

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or Supplier's Declaration of Conformity shall be labeled as follows:

(1) Receivers associated with the operation of a licensed radio service, e.g., FM broadcast under part 73 of this chapter, land mobile operation under part 90 of this chapter, etc., shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the condition that this device does not cause harmful interference.

(2) A stand-alone cable input selector switch, shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules for use with cable television service.

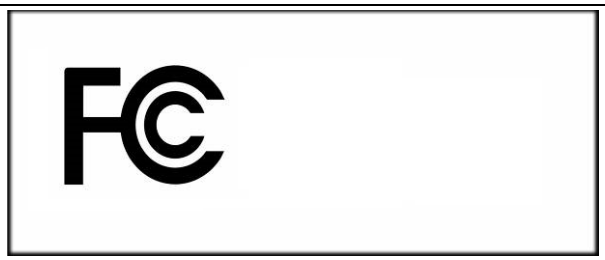
(3) All other devices shall bear the following statement in a conspicuous location on the device:
This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

(4) Where a device is constructed in two or more sections connected by wires and marketed together, the statement specified under paragraph (a) of this section is required to be affixed only to the main control unit.

(5) When the device is so small or for such use that it is impracticable to label it with the statement specified under paragraph (a) of this section in a font that is four-point or larger, and the device does not have a display that can show electronic labeling, then the information required by this paragraph shall be placed in the user manual and must also either be placed on the device packaging or on a removable label attached to the device.

(b)-(c) [Reserved]

(d) Consumer electronics TV receiving devices, including TV receivers, videocassette recorders, and similar devices, that incorporate features intended to be used with cable television service, but do not fully comply with the technical standards for cable ready equipment set forth in §15.118, shall not be marketed with terminology that describes the device as “cable ready” or “cable compatible,” or that otherwise conveys the impression that the device is fully compatible with cable service. Factual statements about the various features of a device that are intended for use with cable service or the quality of such features are acceptable so long as such statements do not imply that the device is fully compatible with cable service. Statements relating to product features are generally acceptable where they are limited to one or more specific features of a device, rather than the device as a whole. This requirement applies to consumer TV receivers, videocassette recorders and similar devices manufactured or imported for sale in this country on or after October 31, 1994.



8.3 Information to the user

8.3.1. For devices approved under Part 15, the user's manual or instruction manual for an intentional or unintentional radiator shall caution the user about changes or modifications to the device (Section 15.21).

8.3.2. For Class A and Class B digital devices, information to the user is required to include the following statements (Section 15.105):

For a Class A digital device or peripheral, the instructions furnished to the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For a Class B digital device or peripheral, the instructions furnished to the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

NOTE: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:
—Reorient or relocate the receiving antenna.
—Increase the separation between the equipment and receiver.
—Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
—Consult the dealer or an experienced radio/TV technician for help.

[Label location of EUT]

- END -

