Test report No.: 2331058R-RFUSV10S-A

TEST REPORT

Product Name	Smart Sensor
Trademark	VIVOTEK
Model and /or type reference	AH-41610
FCC ID	O5P-AH-41610
Applicant´s name / address	VIVOTEK INC. 6F, No.192, Lien-Cheng Rd., Chung-Ho, New Taipei City, Taiwan, R.O.C.
Manufacturer´s name	VIVOTEK INC.
Test method requested, standard	FCC CFR Title 47 Part 15 Subpart C ANSI C63.4: 2014, ANSI C63.10: 2013
Verdict Summary	IN COMPLIANCE
Documented By (Senior Project Specialist / Ida Tung)	Ida Tung
Tested By (Senior Engineer / Ivan Chuang)	Ivan Chuang
Approved By (Senior Engineer / Alan Chen)	Alan Chen
Date of Receipt	2023/03/31
Date of Issue	2023/08/31
Report Version	V2.0

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Competences and Guarantees

DEKRA is a testing laboratory competent to carry out the tests described in this report.

In order to assure the traceability to other national and international laboratories, DEKRA has a calibration and maintenance program for its measurement equipment.

DEKRA guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated in the report and it is based on the knowledge and technical facilities available at DEKRA at the time of performance of the test.

DEKRA is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

General conditions

1. The test results relate only to the samples tested.
2. The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.
3. This report must not be used to claim product endorsement by TAF or any agency of the government.
4. The test report shall not be reproduced without the written approval of DEKRA Testing and Certification Co., Ltd.
5. Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Revision History

Report No.	Version	Description	Issued Date
2331058R-RFUSV10S-A	V1.0	Initial issue of report.	2023/07/25
2331058R-RFUSV10S-A	V2.0	Correction antenna gain and E.I.R.P	2023/08/31

1. General Information

1.1. EUT Description

Product Name	Smart Sensor
Trademark	VIVOTEK
Model and /or type reference	AH-41610
EUT Rated Voltage	PoE or DC 12V(by Power Adapter)
EUT Test Voltage	AC 120V/60Hz
Frequency Range	61 - 64 GHz
Channel Number	1
Type of Modulation	FMCW
Channel Control	Auto
Contain Module	FCC ID: 2AC7Z-ESP32WROVERE

Antenna List

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	TEXAS INSTRUMENTS	IWR6843AOPEVM	Antenna-on-Package (AOP)	5.2 dBi for 62600 MHz

Note: The antenna of EUT is conform to FCC 15.203.

Center Frequency of Each Channel:

Channel	Frequency (GHz)
01	62.6

Note:

1. The EUT is a Smart Sensor with a built-in 62.6 GHz wireless transceiver.
2. These tests are conducted on a sample of the equipment for the purpose of demonstrating compliance of transmitter with Part 15 Subpart C Paragraph 15.255(a)(2), (c)(3) For fixed field disturbance sensors.

Test Mode	Mode 1	Transmit

1.2. Tested System Datails

The types for all equipment, plus descriptions of all cables used in the tested system (including inserted cards) are:

For PoE

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	PoE	ELJINTEK, INC.	GPSU70A-8	N/A	N/A
2	Test Fixture	N/A	N/A	N/A	N/A
3	Notebook PC	DELL	Latitude 5501	9V4JL13	N/A

Cable Type		Cable Description
A	Power Cable	Non-shielded, 1.9m
B	LAN Cable	Non-shielded, 2.8m
C	LAN Cable	Non-shielded, 3m

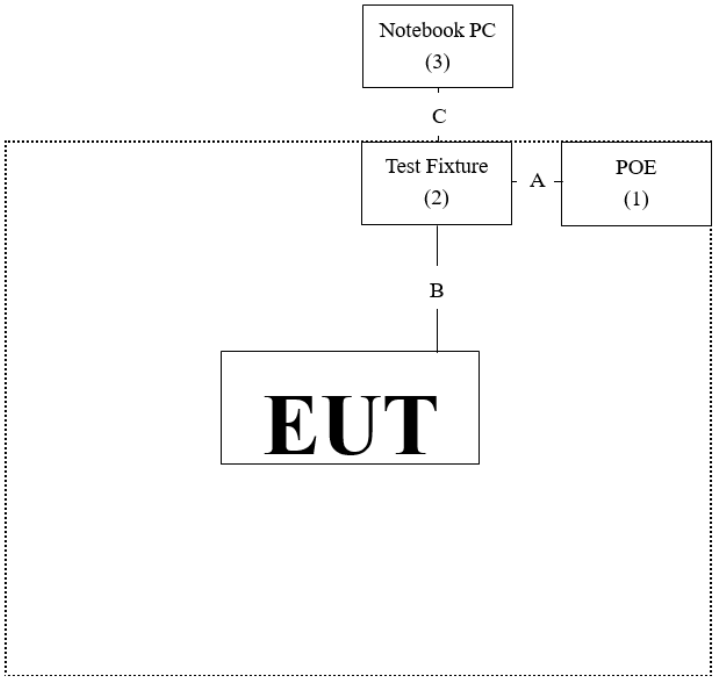
For Adapter

Product		Manufacturer	Model No.	Serial No.	Power Cord
1	Adapter	OEM	ADS0248T-W120150	N/A	N/A
2	Notebook PC	DELL	Latitude 5501	9V4JL13	N/A

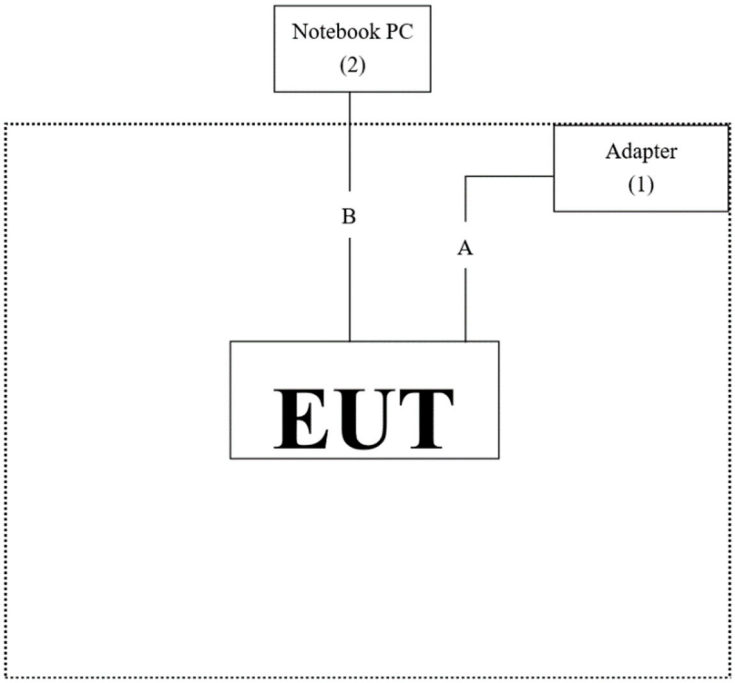
Cable Type		Cable Description
A	Power Cable	Non-shielded, 3m
B	LAN Cable	Non-shielded, 3m

1.3. Configuration of Test System

For PoE



For Power Adapter



1.4. EUT Exercise Software

(1) Setup the EUT as shown in Section 1.3.

(2) Execute "cmd Version 10.0.19045.2965" on the Notebook PC.

(3) Configure the test mode and the test channel.

(4) Start the continuous transmit.

(5) Verify that the EUT works properly.

1.5. Test Facility

Ambient conditions in the laboratory:

Performed Item	Items	Required	Actual
Conducted Emission	Temperature (°C)	10~40 ℃	26.5℃
	Humidity (%RH)	10~90 %	58.3%
Radiated Emission	Temperature (°C)	10~40 ℃	24.5 ℃
	Humidity (%RH)	10~90 %	61.3 %
Conductive	Temperature (°C)	10~40 ℃	23.5℃
	Humidity (%RH)	10~90 %	58.1%

Site Description	Accredited by TAF
	Accredited Number: 3023

Test Laboratory	DEKRA Testing and Certification Co., Ltd.
	Linkou Laboratory
Address	No.5-22, Ruishukeng Linkou District, New Taipei City, 24451, Taiwan, R.O.C.
Performed Location	No. 26, Huaya 1st Rd., Guishan Dist.,Taoyuan City 333411, Taiwan, R.O.C.
Phone Number	+886-3-275-7255
Fax Number	+886-3-327-8031

1.6. List of Test Equipment

For Conduction Measurements / HY-SR01

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	EMI Test Receiver	R&S	ESR7	101601	2022/06/23	2023/06/22
V	Two-Line V-Network	R&S	ENV216	101306	2023/03/16	2024/03/15
V	Two-Line V-Network	R&S	ENV216	101307	2022/07/04	2023/07/03
V	Coaxial Cable	SUHNER	RG400_BNC	RF001	2022/05/24	2023/05/23

Note:

1. All equipments are calibrated every one year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software Version: e3 230303 dekra V9.

For Test Site number: HY-SR03

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Temperature Chamber	KSON	THS-D4T-100	A0606	2022/08/23	2023/08/22
V	DC Power Supply	GW Instek	SPD-3606	GEQ820915	2022/07/05	2023/07/04
V	Spectrum Analyzer	Keysight	N9030B	MY56320509	2022/08/02	2023/08/01
V	Horn Antenna	VDI	RCH015 (50-75GHz)	N/A	2020/11/02	2023/11/01

Note:

1. The mm-Wave VDI equipment (above 50 GHz) is calibrated every three years, the other equipments are calibrated every one year.
2. The test instruments marked with “V” are used to measure the final test results.

For Radiated Measurements / HY-CB02

	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
V	Signal Analyzer	R&S	FSV3044	101113	2023/02/04	2024/02/03
V	Spectrum Analyzer	Keysight	N9030B	MY56320509	2022/08/02	2023/08/01
V	Oscilloscope	R&S	RTO 2022	330016	2023/07/10	2024/07/09
V	Horn Antenna	Millitech	SGH-15-RP000	447	2020/11/02	2023/11/01
V	RF Detector	Millitech	DET-15-RPFW0	081	2020/11/02	2023/11/01
V	Horn Antenna	VDI	RCH015RL (50-75GHz)	--	2022/03/10	2025/03/09
V	Horn Antenna	VDI	RCH012RL(60-90GHz)	--	2022/03/10	2025/03/09
V	Horn Antenna	VDI	RCH08RL(90-140GHz)	--	2022/03/10	2025/03/09
V	Horn Antenna	VDI	RCH05RL(140-220GHz)	--	2022/03/10	2025/03/09
	Horn Antenna	VDI	2-43/2-44(220-330GHz)	--	2022/03/10	2025/03/09
V	Down Convertor(SAX405)	VDI	N9029AV15(AT0-55847)	US54250164	2022/03/10	2025/03/09
V	Down Convertor(SAX404)	VDI	N9029AV12(AT0-59570)	US54250170	2022/03/10	2025/03/09
V	Down Convertor(SAX403)	VDI	N9029AV08(AT0-59571)	US53250012	2022/03/10	2025/03/09
V	Down Convertor(SAX402)	VDI	N9029AV05(AT0-60029)	US53250019	2022/03/10	2025/03/09
	Down Convertor(SAX401)	VDI	N9029AV03(AT0-57775)	US53250021	2022/03/10	2025/03/09
V	Loop Antenna	AMETEK	HLA6121	49611	2023/02/21	2024/02/20
V	Bi-Log Antenna	SCHWARZBECK	VULB9168	9168-0657	2021/08/11	2023/08/10
V	Horn Antenna	RF SPIN	DRH18-E	210802A18ES	2022/06/08	2023/06/07
V	Horn Antenna	Com-Power	AH-840	101101	2021/11/30	2023/11/29
V	Pre-Amplifier	SGH	EM330	60736	2023/01/10	2024/01/09
V	Pre-Amplifier	EMCI	EMC051835SE	980312	2022/07/28	2023/07/27
V	Pre-Amplifier	EMCI	EMC05820SE	980361	2022/07/28	2023/07/27
V	Pre-Amplifier	EMCI	EMC184045SE	980369	2023/01/10	2024/01/09
	Coaxial Cable	EMCI	EMC102-KM-KM-600	1160314		
	Coaxial Cable	EMCI	EMC102-KM-KM-7000	170242		
V	EMI Test Receiver	R&S	ESR7	101604	2022/06/23	2023/06/22
V	Coaxial Cable	SGH	HA800	GD20110223-2	2023/01/10	2024/01/09
		SGH	HA800	GD20110222-4		
		SGH	SGH18	2021005-2		
		SGH	SGH18	202108-5		

Note:

1. Bi-Log Antenna and Horn Antenna(AH-840) is calibrated every two years, VDI and Millitech equipments is calibrated every three years, the other equipments are calibrated every one year.
2. The test instruments marked with “V” are used to measure the final test results.
3. Test Software version: e3 230303 dekra V9.

1.7. Uncertainty

Uncertainties have been calculated according to the DEKRA internal document.

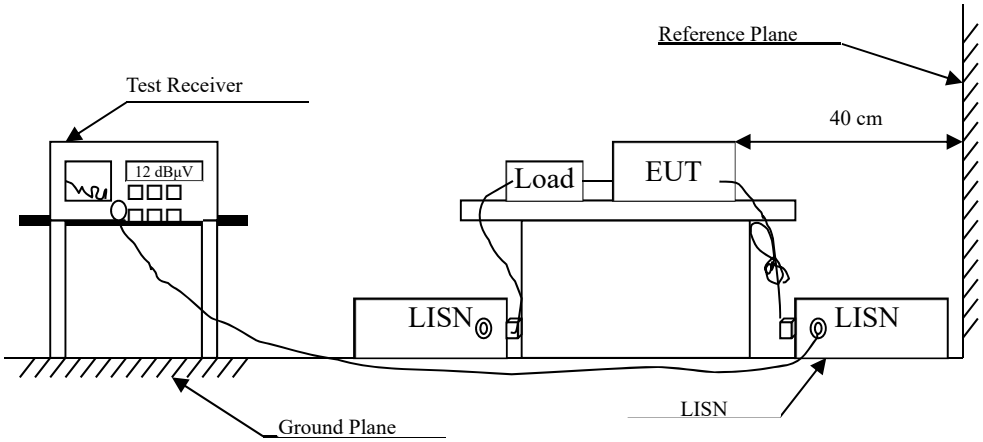
The reported expanded uncertainties are based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Test Item	**Uncertainty**
Conducted Emission	±3.50 dB
Radiated Emission	30 MHz~1 GHz: ±4.42 dB 1 GHz~18 GHz: ±4.28 dB 18 GHz~40 GHz: ±3.90 dB 40GHz~50GHz: ±5.06dB 50GHz~75GHz: ±4.07dB 75GHz~110GHz: ±4.02dB 90GHz~140GHz: ±4.24dB 140GHz~220GHz: ±4.75dB 220GHz~325GHz: ±5.71dB
Duty Cycle	±0.53 %

2. Conducted Emission

2.1. Test Setup



2.2. Limits

FCC Part 15 Subpart C Paragraph 15.207 (dBµV) Limit		
Frequency MHz	Limits	
	QP	AV
0.15 - 0.50	66-56	56-46
0.50 - 5.0	56	46
5.0 - 30	60	50

Remarks: In the above table, the tighter limit applies at the band edges.

2.3. Test Procedure

The EUT and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50 ohm /50 µH coupling impedance for the measuring equipment.

The peripheral devices are also connected to the main power through a LISN that provides a 50 ohm / 50 µH coupling impedance with 50 ohm termination. (Please refers to the block diagram of the test setup and photographs.)

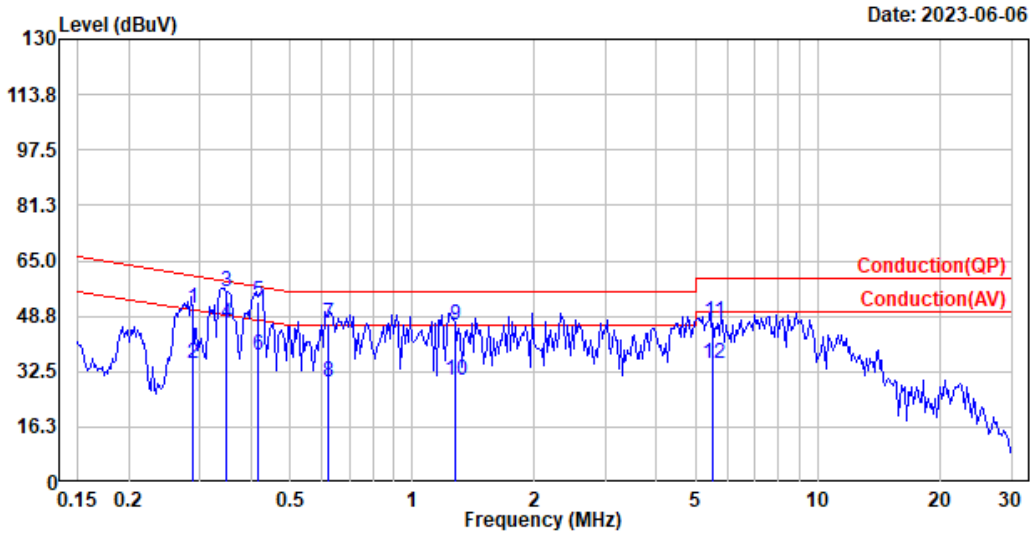
Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4: 2014 on conducted measurement.

Conducted emissions were invested over the frequency range from 0.15 MHz to 30 MHz using a receiver bandwidth of 9 kHz.

2.4. Test Result of Conducted Emission

Transmit Mode:

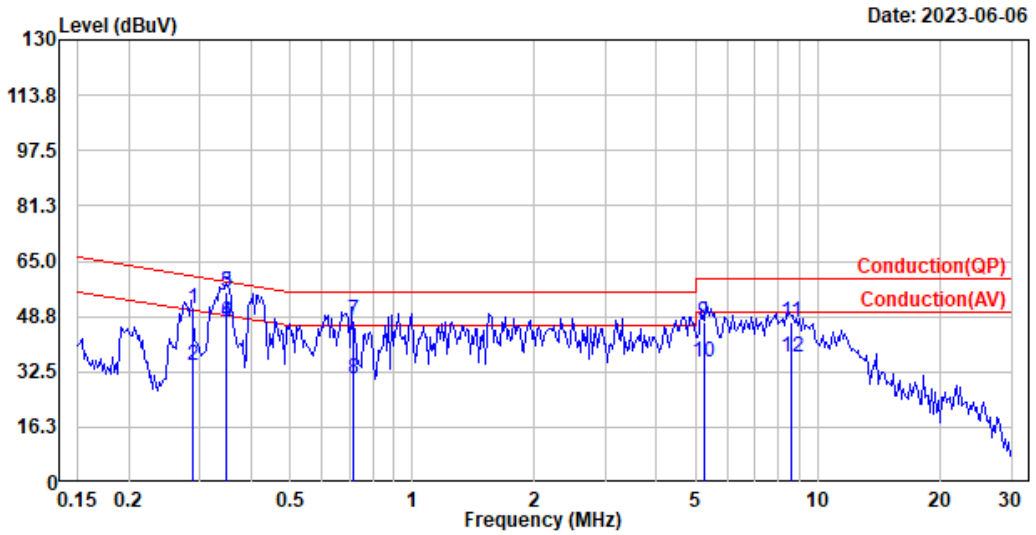
Site :HY-SR01
Condition :Line
Mode :60G+POE
test by :Kevin



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	0.289	51.09	60.56	-9.47	41.42	9.67	QP
2	0.289	34.69	50.56	-15.87	25.02	9.67	Average
3	0.348	55.96	59.01	-3.05	46.28	9.68	QP
4	0.348	46.76	49.01	-2.25	37.08	9.68	Average
5	0.419	53.02	57.47	-4.45	43.34	9.68	QP
6	0.419	37.52	47.47	-9.95	27.84	9.68	Average
7	0.620	46.50	56.00	-9.50	36.81	9.69	QP
8	0.620	29.57	46.00	-16.43	19.88	9.69	Average
9	1.274	46.32	56.00	-9.68	36.58	9.74	QP
10	1.274	30.14	46.00	-15.86	20.40	9.74	Average
11	5.512	47.24	60.00	-12.76	36.41	10.83	QP
12	5.512	35.07	50.00	-14.93	24.24	10.83	Average

Note:
1. Level = Read Level + Factor
2. Factor = LISN insertion loss + Cable loss
3. Over Limit = Level - Limit Line

Site :HY-SR01
Condition :Neutral
Mode :60G+POE
test by :Kevin

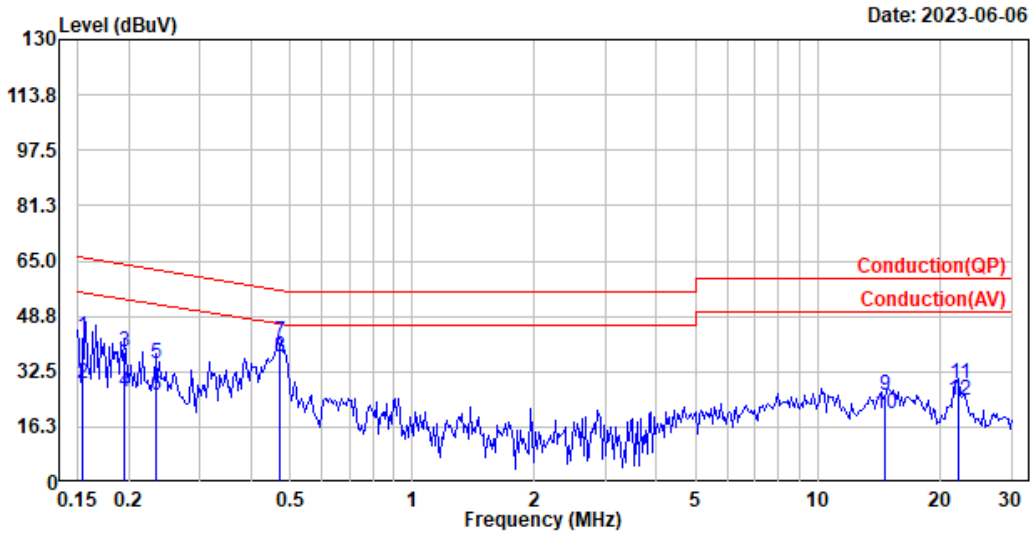


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	0.289	50.82	60.56	-9.74	41.17	9.65	QP
2	0.289	34.41	50.56	-16.15	24.76	9.65	Average
3	0.349	55.84	58.99	-3.15	46.18	9.66	QP
4	0.349	46.86	48.99	-2.13	37.20	9.66	Average
5	0.349	55.89	58.98	-3.09	46.23	9.66	QP
6	0.349	46.99	48.98	-1.99	37.33	9.66	Average
7	0.715	47.82	56.00	-8.18	38.14	9.68	QP
8	0.715	30.33	46.00	-15.67	20.65	9.68	Average
9	5.223	47.16	60.00	-12.84	36.34	10.82	QP
10	5.223	35.34	50.00	-14.66	24.52	10.82	Average
11	8.582	47.18	60.00	-12.82	36.38	10.80	QP
12	8.582	36.85	50.00	-13.15	26.05	10.80	Average

Note:
1. Level = Read Level + Factor
2. Factor = LISN insertion loss + Cable loss
3. Over Limit = Level - Limit Line

Adapter Mode:

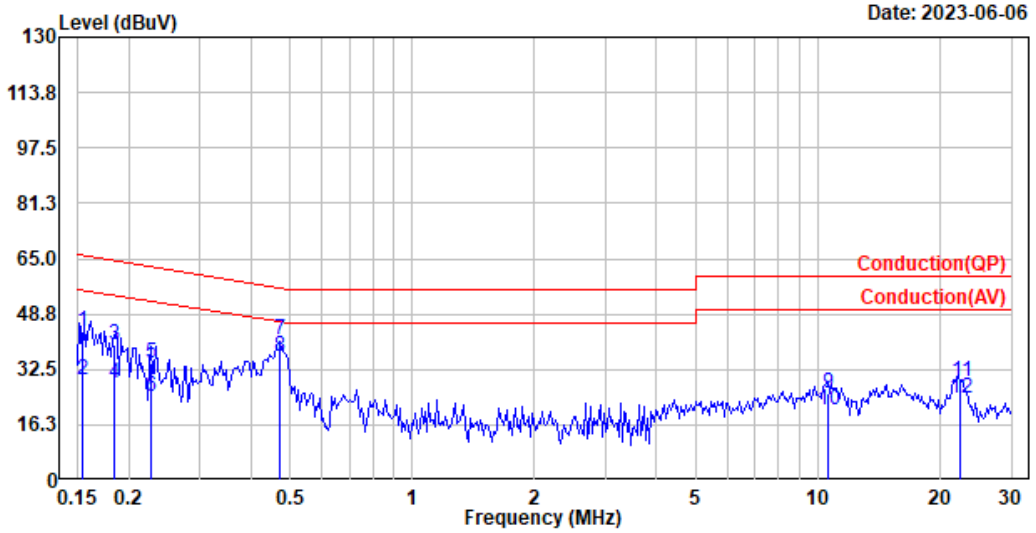
Site :HY-SR01
Condition :Line
Mode :60G+ADP
test by :Kevin



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	0.154	42.84	65.76	-22.92	33.16	9.68	QP
2	0.154	29.04	55.76	-26.72	19.36	9.68	Average
3	0.196	38.06	63.78	-25.72	28.38	9.68	QP
4	0.196	26.64	53.78	-27.14	16.96	9.68	Average
5	0.233	35.06	62.35	-27.29	25.38	9.68	QP
6	0.233	25.74	52.35	-26.61	16.06	9.68	Average
7	0.470	41.21	56.51	-15.30	31.53	9.68	QP
8	0.470	36.91	46.51	-9.60	27.23	9.68	Average
9	14.620	25.31	60.00	-34.69	14.52	10.79	QP
10	14.620	20.03	50.00	-29.97	9.24	10.79	Average
11	22.241	29.09	60.00	-30.91	18.47	10.62	QP
12	22.241	24.26	50.00	-25.74	13.64	10.62	Average

Note:
1. Level = Read Level + Factor
2. Factor = LISN insertion loss + Cable loss
3. Over Limit = Level - Limit Line

Site :HY-SR01
Condition :Neutral
Mode :60G+ADP
test by :Kevin

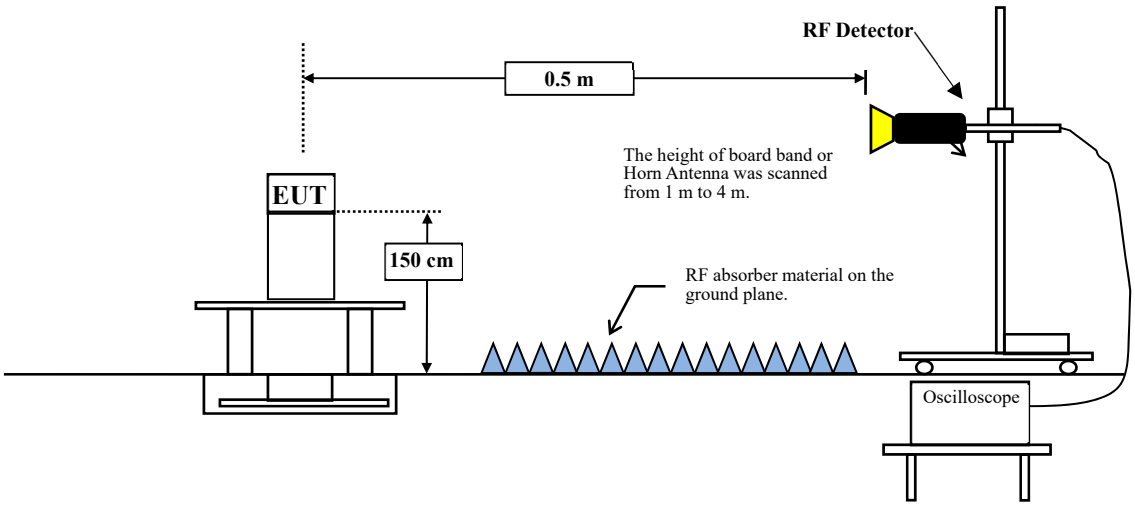


No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	0.154	43.64	65.81	-22.17	33.98	9.66	QP
2	0.154	29.45	55.81	-26.36	19.79	9.66	Average
3	0.184	39.78	64.30	-24.52	30.12	9.66	QP
4	0.184	28.65	54.30	-25.65	18.99	9.66	Average
5	0.227	34.33	62.54	-28.21	24.67	9.66	QP
6	0.227	24.59	52.54	-27.95	14.93	9.66	Average
7	0.472	41.02	56.48	-15.46	31.36	9.66	QP
8	0.472	36.25	46.48	-10.23	26.59	9.66	Average
9	10.625	25.68	60.00	-34.32	14.89	10.79	QP
10	10.625	20.74	50.00	-29.26	9.95	10.79	Average
11	22.434	29.01	60.00	-30.99	18.28	10.73	QP
12	22.434	24.13	50.00	-25.87	13.40	10.73	Average

Note:
1. Level = Read Level + Factor
2. Factor = LISN insertion loss + Cable loss
3. Over Limit = Level - Limit Line

3. Equivalent Isotropically Radiated Power

3.1. Test Setup



3.2. Limits

FCC 15.255(c)(3): Within the 57-71 GHz band, emission levels shall not exceed the following equivalent isotropically radiated power:

For fixed field disturbance sensors other than those operating under the provisions of paragraph (c)(2) of this section, and short-range devices for interactive motion sensing, the peak transmitter conducted output power shall not exceed −10 dBm and the peak EIRP level shall not exceed 10 dBm.

3.3. Test Procedure

Placing EUT on the non-conductive surface which is 150 cm high(place floor-standing product on the ground) and the surface can be rotated 360 degrees. The distance between EUT and receiving antenna should be 0.5 m for measuring the maximum radiated electric field strength of EUT. The vertical and horizontal polarization should be tested severally once under the EUT normal operation.

The RF detector connecting with oscilloscope could reveal the power reading value, the equation below would be adopted to calculate E.I.R.P.

The EIRP obtained on the section 3.4 would be adopted to calculate the peak output power.

The measurement method refers to ANSI C63.10, 2013 and FCC KDB200443.

$E = 126.8 - 20\log(\lambda) + P - G$

where

E is the field strength of the emission at the measurement distance, in dBμV/m.

λ is the wavelength of the emission under investigation [300/fMHz], in m.

G is the gain of the test antenna, in dBi.

$EIRP = E + 20\log(dmeas) - 104.7$

where

EIRP is the equivalent isotropically radiated power, in dBm.

Emeas is the field strength of the emission at the measurement distance, in dBμV/m.

dMeas is the measurement distance, in m.

3.4. Test Result of Equivalent Isotropically Radiated Power

Product : Smart Sensor
Test Item : Equivalent Isotropically Radiated Power
Test Mode : Transmit

Peak E.I.R.P

Test Frequency (MHz)	DSO (mV)	Power Measured (dBm)	E_{meas} (dBuV/m)	Peak E.I.R.P (dBm)	Limit (dBm)	Result
62600	1.27	-47.92	105.21	-5.52	10	Pass

Conducted output power

Frequency (MHz)	Peak E.I.R.P (dBm)	GEUT (dBi)	Pcond (dBm)	Limit (dBm)	Result
62600	-5.52	5.20	-10.72	-10	Pass

Note:

E = 126.8 − 20log(λ) + P –G

where

E is the field strength of the emission at the measurement distance, in dBµV/m
λ is the wavelength of the emission under investigation [300/fMHz], in m
G is the gain of the test antenna, in dBi

EIRP = E + 20log (dmeas) −104.7

where

EIRP is the equivalent isotropically radiated power, in dBm
EMeas is the field strength of the emission at the measurement distance, in dBµV/m
dMeas is the measurement distance, in m

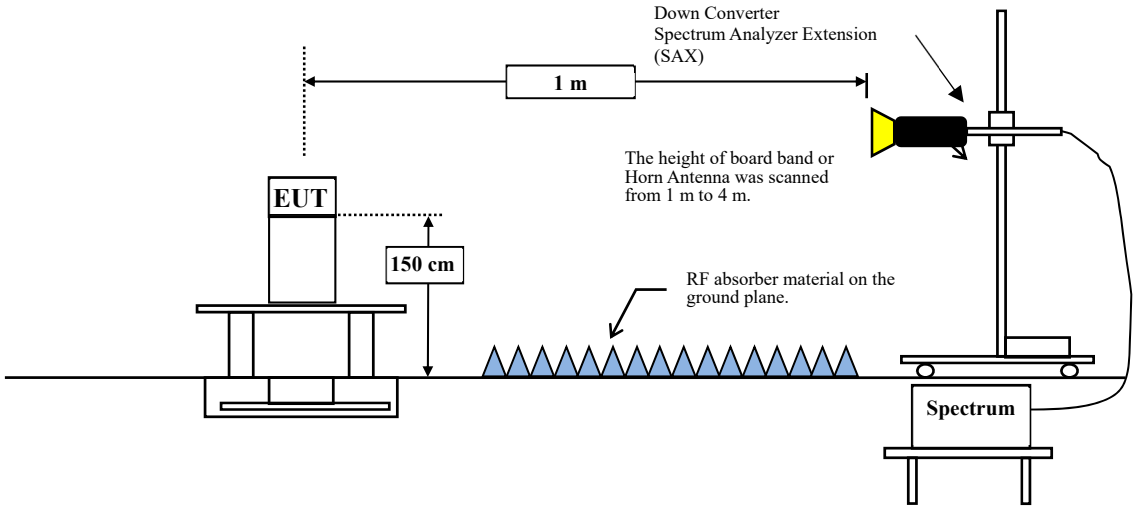
Average E.I.R.P

Test Frequency (MHz)	Peak E.I.R.P (dBm)	Duty Cycle Factor (dB)	Average E.I.R.P (dBm)
62600	-5.52	-3.904	-9.424

Note: Duty Cycle Factor Refer to Section 7.

4. Occupied Bandwidth

4.1. Test Setup



4.2. Limits

N/A

4.3. Test Procedure

For measuring the 20dB emission bandwidth of EUT, the peak hold function should be employed.

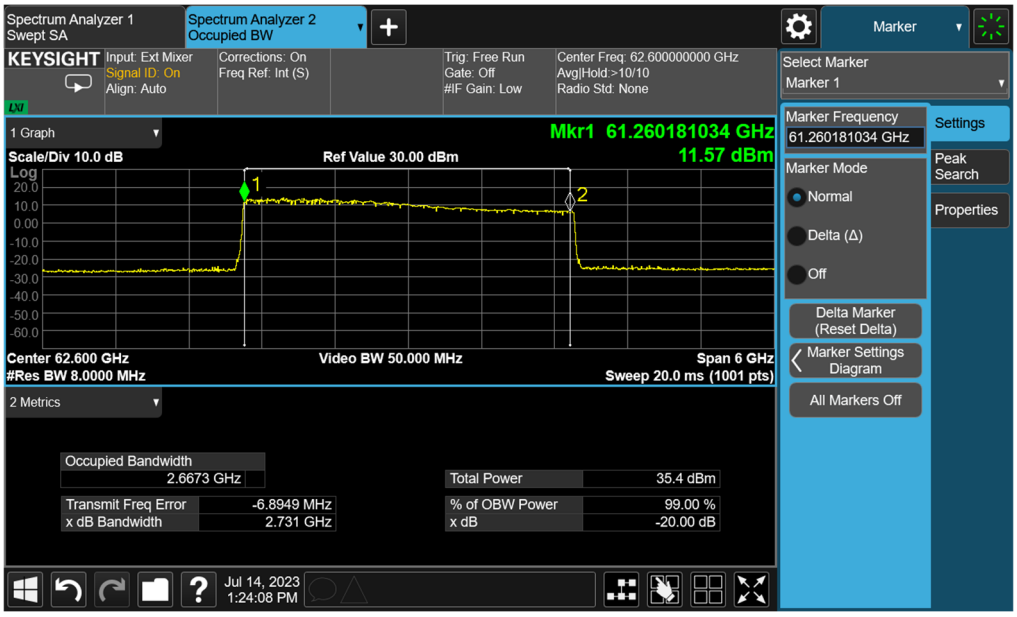
The measurement method refers to ANSI C63.10, 2013 and FCC KDB200443.

4.4. Test Result of Occupied Bandwidth

Product : Smart Sensor
Test Item : 20 dB Occupied Bandwidth
Test Site : No.3 OATS
Test Mode : Transmit

20 dB Occupied Bandwidth

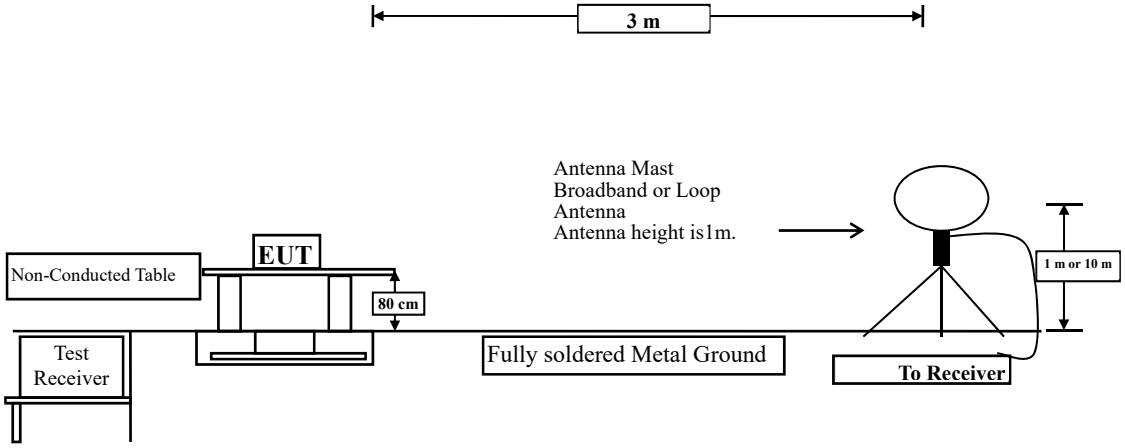
Frequency (MHz)	Measurement Bandwidth (MHz)
62600	2731



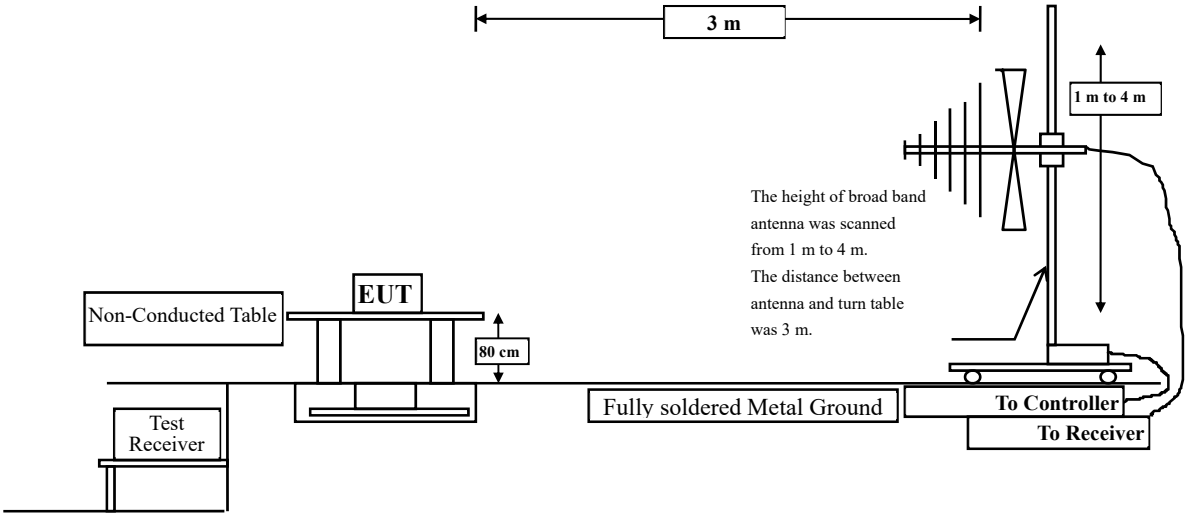
5. Radiated Emission

5.1. Test Setup

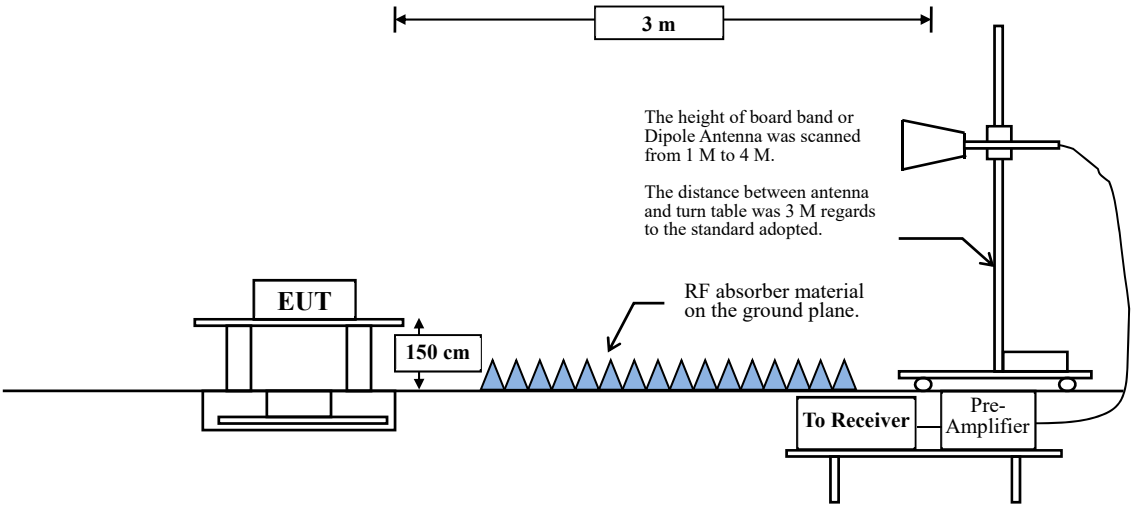
Radiated Emission Under 30 MHz



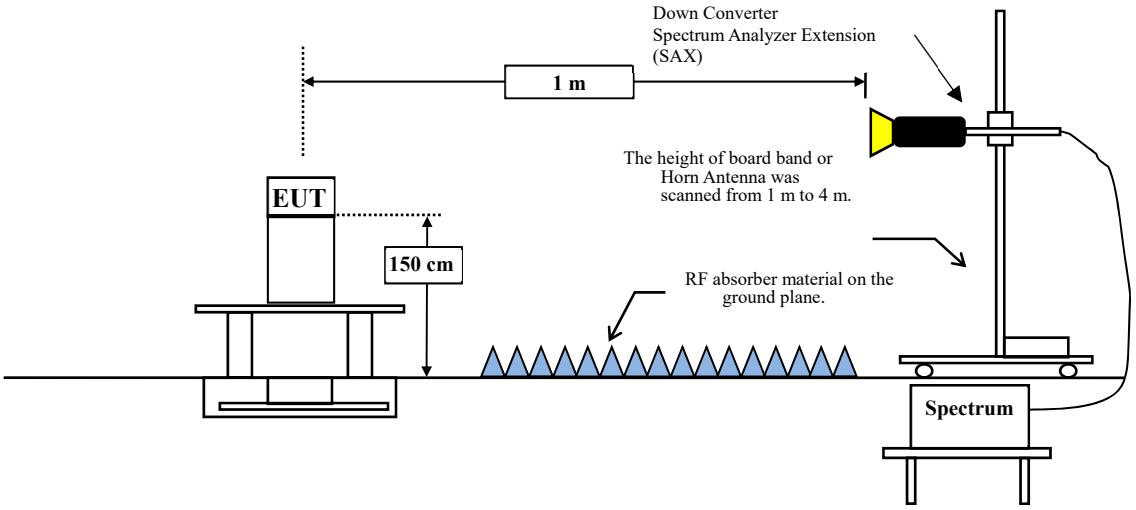
Radiated Emission Below 1 GHz



Radiated Emission Above 1 GHz



Above 1 GHz (50 GHz-200 GHz)



5.2. Limits

➢ **General Radiated Emission Limits**

Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in paragraph 15.209.

15.255(d)(3) Between 40 GHz and 200 GHz, the level of these emissions shall not exceed 90 pW/cm^2 at a distance of 3 meters.

whichever is the lesser attenuation.

FCC Part 15 Subpart C Paragraph 15.209(a) Limits		
Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meter)
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

Remarks: E field strength (dBμV /m) = 20 log E field strength (μV/m).

5.3. Test Procedure

The EUT was setup according to ANSI C63.10, 2013 and tested compliance to FCC 47CFR 15.255 requirements.

For 30 MHz to 40 GHz(from 30 MHz to 40 GHz)

Measuring the frequency range below 1 GHz, the EUT is placed on a turn table which is 0.8 meter above ground,when measuring the frequency range above 1 GHz, the EUT is placed on a turn table which is 1.5 meter above ground.

The turn table is rotated 360 degrees to determine the position of the maximum emission level.

The EUT was positioned such that the distance from antenna to the EUT was 3 meters.

The antenna is scanned between 1 meter and 4 meters to find out the maximum emission level. This is repeated for both horizontal and vertical polarization of the antenna. In order to find the maximum emission, all of the interface cables were manipulated according to ANSI C63.10: 2013 on radiated measurement.

For 40 GHz to 200 GHz(from 40 GHz to 200 GHz)

Placing EUT on the non-conductive surface which is 80 cm high(place floor-standing product on the ground) and the surface can be rotated 360 degrees. The distance between EUT and receiving antenna should be 1 m for measuring the maximum radiated electric field strength of EUT.

The resolution bandwidth below 30 MHz setting on the field strength meter is 9kHz and 30 MHz~1 GHz is 120 kHz and above 1 GHz is 1 MHz.

Radiated emission measurements below 30 MHz are made using Loop Antenna and 30 MHz~1 GHz are made using broadband Bilog antenna and above 1 GHz are made using Horn Antennas.

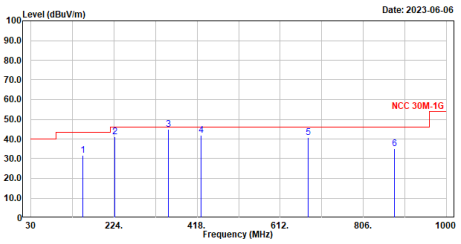
The measurement is divided into the Preliminary Measurement and the Final Measurement.

The suspected frequencies are searched for in Preliminary Measurement with the measurement antenna kept pointed at the source of the emission both in azimuth and elevation, with the polarization of the antenna oriented for maximum response. The antenna is pointed at an angle towards the source of the emission, and the EUT is rotated in both height and polarization to maximize the measured emission. The emission is kept within the illumination area of the 3 dB bandwidth of the antenna.

The measurement frequency range form 9 kHz - 10th Harmonic of fundamental was investigated.

5.4. Test Result of Radiated Emission

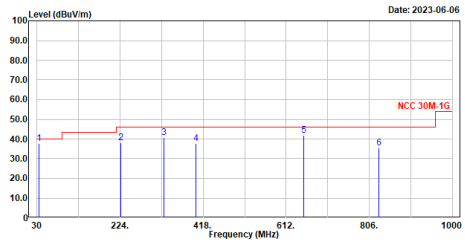
Site :HY-CB02
Condition :3m ,HORIZONTAL
Mode :TX
TEST BY :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	150.523	31.77	43.50	-11.73	50.72	-18.95	QP
2	226.061	41.01	46.00	-4.99	62.44	-21.43	QP
3	351.676	44.88	46.00	-1.12	62.25	-17.37	QP
4	426.851	41.82	46.00	-4.18	57.17	-15.35	QP
5	678.203	40.84	46.00	-5.16	51.33	-10.49	QP
6	879.235	35.27	46.00	-10.73	43.14	-7.87	QP

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.

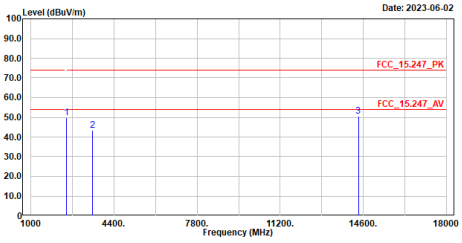
Site :HY-CB02
Condition :3m ,VERTICAL
Mode :TX
TEST BY :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	34.486	37.59	40.00	-2.41	57.29	-19.70	QP
2	226.061	38.08	46.00	-7.92	59.51	-21.43	QP
3	326.456	40.89	46.00	-5.11	58.52	-17.63	QP
4	401.874	37.66	46.00	-8.34	53.64	-15.98	QP
5	653.104	41.85	46.00	-4.15	52.33	-10.48	QP
6	829.038	35.29	46.00	-10.71	43.62	-8.33	QP

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.

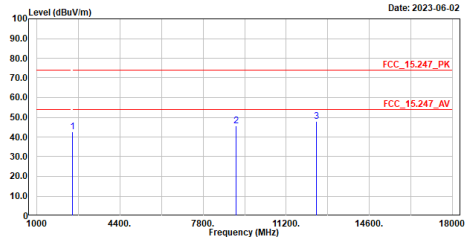
Site :HY-CB02
Condition :3m ,HORIZONTAL
Mode :TX
TEST BY :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2457.750	49.97	77.00	-27.03	69.94	-19.97	Peak
2	3516.000	43.42	74.00	-30.58	60.14	-16.72	Peak
3	14400.250	50.38	74.00	-23.62	48.27	2.11	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.

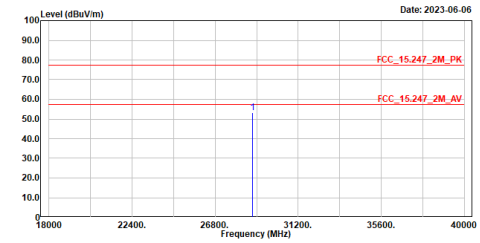
Site :HY-CB02
Condition :3m ,VERTICAL
Mode :TX
TEST BY :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	2455.625	42.48	77.00	-34.52	62.45	-19.97	Peak
2	9164.250	45.48	74.00	-28.52	50.09	-4.61	Peak
3	12434.630	48.02	74.00	-25.98	48.18	-0.16	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.

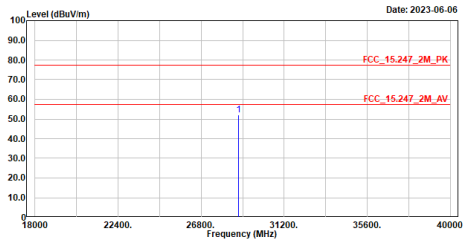
Site :HY-CB02
Condition :2m ,Horizontal
Mode :18-40G_TX
TEST BY :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	28800.000	53.32	77.52	-24.20	46.98	6.34	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.

Site :HY-CB02
Condition :2m ,Vertical
Mode :18-40G_TX
TEST BY :Peter



No.	Frequency	Level	Limit Line	Over Limit	Read Level	Factor	Remark
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	
1	28800.000	52.03	77.52	-25.49	45.69	6.34	Peak

Note:
1. Level = Read Level + Factor
2. Factor = Antenna Factor + Cable Loss - Preamp Factor
3. Over Limit = Level - Limit Line
4. The emission under 30MHz was not included since the emission levels are very low against the limit.

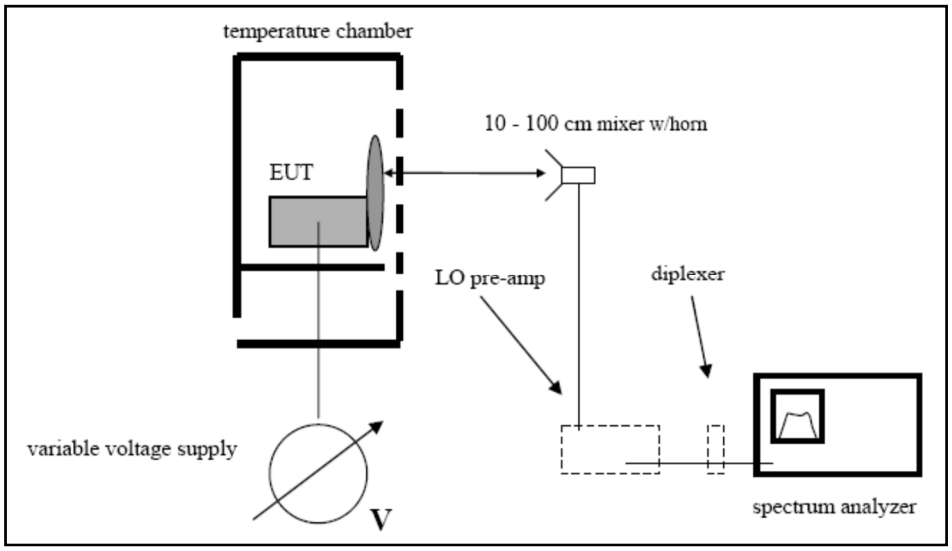
Product : Smart Sensor
Test Item : Radiated Emission
Test Mode : Transmit

62.60 GHz

Frequency (GHz)	**Measurement Distance (m)**	**Peak output Power (dBm)**	**RX Antenna Gain (dBi)**	**EIRP (dBm)**
140.78	0.5	-75.37	19.53	-25.39
EIRP (W)	**Specification Distance (m)**	**Power Density (W / m^2)**	**Power Density (pW / cm^2)**	**Limit (pW / cm^2)**
0.000003	3	2.5559E-08	2.56	90

6. Frequency Stability

6.1. Test Setup



6.2. Limits

FCC15.255(f) Fundamental emissions must be contained within the frequency bands specified in this section during all conditions of operation. Equipment is presumed to operate over the temperature range -20 to +50 degrees Celsius with an input voltage variation of 85 % to 115 % of rated input voltage, unless justification is presented to demonstrate otherwise.

6.3. Test Procedure

a） As the EUT and test equipment setup shown below, a environmental test chamber with a window or other opening allows receiving antenna to be placed outdoor.

b） The EUT frequency offset revealed on spectrum analyzer should be recorded while EUT is under the specified temperature(about 25°C) and the voltage source is equal to the EUT nominal operating voltage (100 %).

c） Change the EUT nominal operating voltage from 85 % to 115 % and record the results.

d） Return the EUT nominal operating voltage to 100 % and enhance the operation temperature to 50°C, record the results.

e） Repeat step d, record results each 10°C until -20°C.

The measurement method refers to ANSI C63.10, 2013 and FCC KDB200443.

Product : Smart Sensor
Test Item : Frequency Stability
Test Mode : Transmit

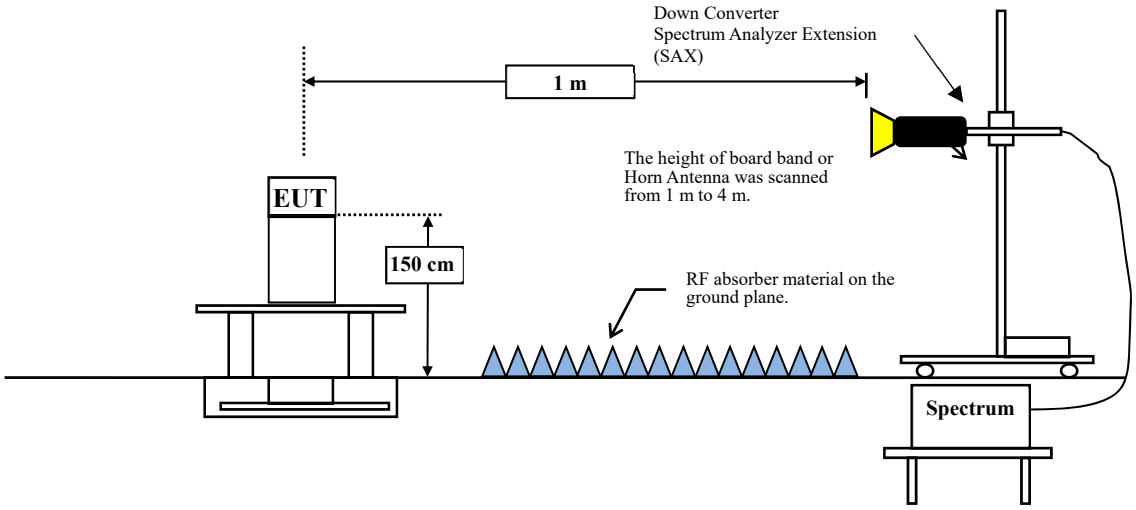
62.60 GHz

Voltage (V)	Temperature (℃)	Observe Time	Measurement Frequency (MHz)	Limit
AC 120 V	50	start	62594.00	Within band
		2 mins	62594.00	Within band
		5 mins	62594.00	Within band
		10 mins	62594.00	Within band
	40	start	62588.00	Within band
		2 mins	62588.00	Within band
		5 mins	62588.00	Within band
		10 mins	62588.00	Within band
	30	start	62600.00	Within band
		2 mins	62600.00	Within band
		5 mins	62600.00	Within band
		10 mins	62600.00	Within band
	20	start	62594.00	Within band
		2 mins	62594.00	Within band
		5 mins	62594.00	Within band
		10 mins	62594.00	Within band
	10	start	62591.00	Within band
		2 mins	62591.00	Within band
		5 mins	62591.00	Within band
		10 mins	62591.00	Within band
	0	start	62600.00	Within band
		2 mins	62600.00	Within band
		5 mins	62600.00	Within band
		10 mins	62600.00	Within band
	-10	start	62600.00	Within band
		2 mins	62600.00	Within band
		5 mins	62600.00	Within band
		10 mins	62600.00	Within band
	-20	start	62597.00	Within band
		2 mins	62597.00	Within band
		5 mins	62597.00	Within band
		10 mins	62597.00	Within band

Temperature (℃)	Voltage (V)	Measurement Frequency (MHz)	Limit
20 ℃	AC 138 V	62594.00	Within band
	AC 120 V	62594.00	Within band
	AC 102 V	62594.00	Within band

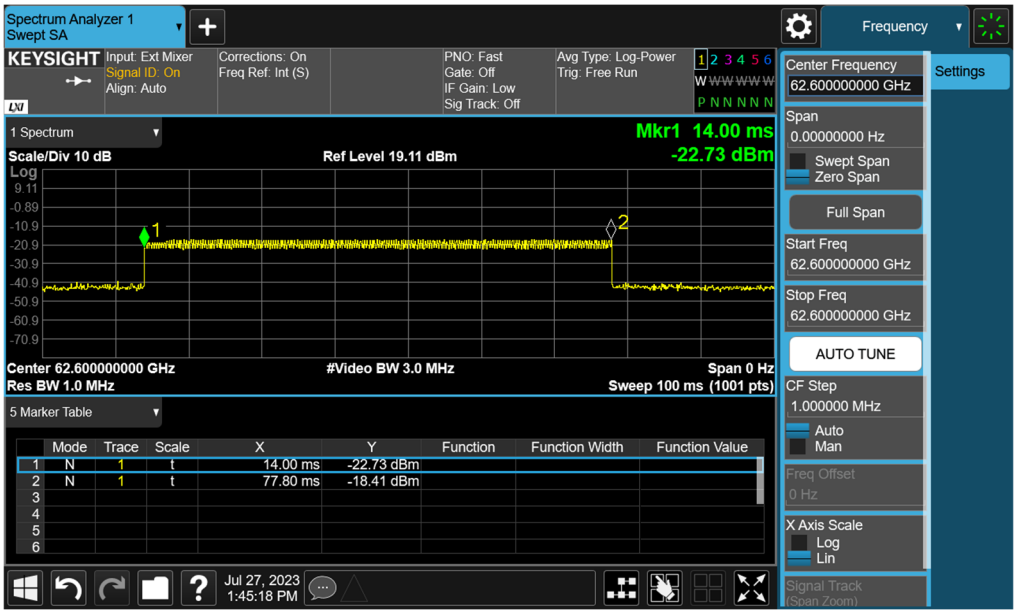
7. Duty Cycle

7.1. Test Setup



7.2. Test Result of Duty Cycle

Product : Smart Sensor
Test Item : Duty Cycle Data
Test Mode : Transmit



Time on of 100 ms = 63.80 ms
Duty Cycle = 63.80 ms / 100ms = 0.638
Duty Cycle correction factor = 20 LOG 0.638 = -3.904 dB

Duty Cycle correction factor: -3.904 dB

8. FCC15.255(a)(h)-Operation restriction and group installation

Applicable Standard

15.255(a) Operation under the provisions of this section is not permitted for the following products:

(1) Equipment used on satellites.

(2) Field disturbance sensors, including vehicle radar systems, unless the field disturbance sensors are employed for fixed operation or used as short-range devices for interactive motion sensing. For the purposes of this section, the reference to fixed operation includes field disturbance sensors installed in fixed equipment, even if the sensor itself moves within the equipment.

15.255(h) Any transmitter that has received the necessary FCC equipment authorization under the rules of this chapter may be mounted in a group installation for simultaneous operation with one or more other transmitter(s) that have received the necessary FCC equipment authorization, without any additional equipment authorization. However, no transmitter operating under the provisions of this section may be equipped with external phase-locking inputs that permit beam-forming arrays to be realized.

Result of Operation Restriction

The manufacturer declared that the EUT will not be advertised or sold for use on aircraft or satellites.

Result of Group Installations

The frequency amplitude and phase of the transmit sign are set within the EUT. There are no external phase-locking inputs or any other means of combining two or more units together to realize a beam-forming arrays.

9. EMI Reduction Method During Compliance Testing

No modification was made during testing.