JQA File No. : KL80230325
Issue Date : August 30, 2023

TEST REPORT

Applicant	:	A&D Company, Limited
Address	:	1-243, Asahi, Kitamoto-shi, Saitama 364-8585, Japan
Products	:	Digital Blood Pressure Monitor
Model No.	:	UA-6000BLEWM
Serial No.	:	--
Test Standard	:	CFR 47 FCC Rules and Regulations Part 15 Subpart C
FCC ID	:	KSN-UA662L
Test Results	:	**Passed**
Date of Receipt	:	August 1, 2023
Date of Test	:	August 10 ~ 25, 2023

ilac-MRA VLAC Lab Accreditation
VLAC-001-2

Kosei Shibata
Deputy Director
Japan Quality Assurance Organization
Kitakansai Testing Center
Saito EMC Branch
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

- The test results in this test report was made by using the measuring instruments which are traceable to national standards of measurement in accordance with ISO/IEC 17025.
- The applicable standard, testing condition and testing method which were used for the tests are based on the request of the applicant.
- The test results presented in this report relate only to the offered test sample.
- The contents for the equipment under test (EUT) such as identification information in clause 2 and 6 of this report were provided by the applicant. JQA is not responsible for the test results affected by the incorrect information.
- The contents of this test report cannot be used for the purposes, such as advertisement for consumers.
- This test report shall not be reproduced except in full without the written approval of JQA.
- VLAC does not approve, certify or warrant the product by this test report.

REVISION HISTORY

File No.	Contents	Issue Date
KL80230325	Initial Issue	August 30, 2023

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1 Summary of Test Results

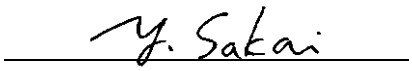
Applied Standard : CFR 47 FCC Rules and Regulations Part 15 – Radio Frequency Devices
Subpart C – Intentional Radiators

Item	FCC rules	Result	Note
Antenna Requirement	§15.203	Passed	1
99% Occupied Bandwidth	--	--	2
6 dB Emission Bandwidth	§15.247(a)(2)	Passed	
Power Spectral Density	§15.247(e)	Passed	
Maximum Conducted Output Power	§15.247(b)(3)	Passed	
Conducted Spurious Emission	§15.247(d)	Passed	
Radiated Spurious Emission	§15.205, §15.209 and §15.247(d)	Passed	
AC Powerline Conducted Emission	§15.207	Not Applicable	3
RF Exposure	§1.1310, §2.1091 and §15.247(i)	Passed	

1) The EUT is designed to ensure that no antenna other than that furnished by the manufacturer shall be used. Information for antenna type is described in clause 2.
2) Reporting purposes only
3) The EUT is not connected to the AC mains.

In the approval of test results,
- No deviations were employed from the applied standard.
- No modifications were conducted by JQA to achieve compliance to the limitations.

Reviewed by
Yasuhisa Sakai / Project Manager



Tested by
Yuji Shintaku / Assistant Manager

2 Description of Equipment Under Test (EUT)

2.1 General Information

Manufacturer	A&D ELECTRONICS (Shen Zhen) CO., LTD 1-5/F ,No.4 Building, Hengchangrong High Tech Ind. Park, Shangnan East Rd, China
Products	Digital Blood Pressure Monitor
Model No.	UA-6000BLEWM
Serial No.	--
Product Type	Pre-production
Date of Manufacture	--
Power Rating	6VDC (Batteries R6P, LR6 or AA ×4)
EUT Grounding	None
Modulation Technology	Digital transmission system (DTS)
Modulation Type	Bluetooth 5.1 +LE (GFSK)
Operating Frequency	2402.0 MHz (00CH) – 2480.0MHz (39CH)
Antenna Type	PC8099 Pattern Antenna
Antenna Gain	-2.2 dBi

2.2 Channel List

40 channels are provided for BLE.

Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	2402	20	2442
1	2404	⋮	⋮
2	2406	⋮	⋮
⋮	⋮	37	2476
18	2438	38	2478
19	2440	39	2480

3 Test Location

Japan Quality Assurance Organization (JQA)
Kitakansai Testing Center Saito EMC Branch
7-3-10, Saito-asagi, Ibaraki-shi, Osaka 567-0085, Japan

4 Accreditation of Test Laboratory

JQA Kitakansai Testing Center Saito EMC Branch is accredited under ISO/IEC 17025 by the following accreditation bodies and the test facility is registered by the following bodies.

VLAC Accreditation No. : VLAC-001-2 (Expiry date : April 30, 2024)
A2LA Accreditation No. : 5498.01 (Expiry date : November 30, 2023)

VCCI Registration No. : A-0002 (Expiry date : April 30, 2024)
FCC Registration No. : JP5008 (Expiry date : April 30, 2024)
ISED Registration No. : JP0014 (Expiry date : November 30, 2023)
BSMI Registration No. : SL2-IS-E-6006, SL2-IN-E-6006, SL2-R1/R2-E-6006, SL2-A1-E-6006 (Expiry date : September 14, 2025)

Accredited as conformity assessment body for Japan electrical appliances and material law by METI. (Expiry date : February 22, 2025)

5 Measurement Uncertainty

Item	Frequency	Uncertainty (*U*)
AC Powerline Conducted Emission	150 kHz – 30 MHz	± 2.6 dB
Emission Bandwidth	--	± 0.9 %
Peak Output Power	--	± 0.9 dB
Conducted Emission (Antenna Port)	9 kHz – 1 GHz	± 1.4 dB
	1 GHz – 18 GHz	± 1.7 dB
	18 GHz – 40 GHz	± 2.3 dB
Radiated Emission	9 kHz – 30 MHz	± 3.0 dB
	30 MHz – 200 MHz	± 3.6 dB
	200 MHz – 1000 MHz	± 5.2 dB
	1 GHz – 6 GHz	± 4.7 dB
	6 GHz – 18 GHz	± 4.6 dB
	18 GHz – 40 GHz	± 5.5 dB

Determining compliance with the limits in this test report was based on the results of the compliance measurement, not taking into account measurement instrumentation uncertainty (MIU).
The reported expanded uncertainty of measurement, *U* is described with using the coverage factor k = 2, to give a level of confidence of approximately 95 %.

6 Setup of EUT

6.1 Test Configuration

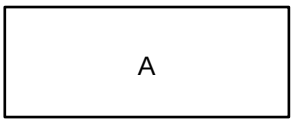
The equipment under test (EUT) consists of :

	Item	Manufacturer	Model No.	Serial No.
A	Digital Blood Pressure Monitor	A&D ELECTRONICS (Shen Zhen) CO., LTD	UA-6000BLEVM	--

The auxiliary equipment (AE) used for testing :
None

Type of Cable:
None

6.2 Test Arrangement (Drawings)



6VDC (LR6 ×4) (*)

*) A DC external power supply was used instead of batteries due to output the stable power.

6.3 Operating Condition

Test Mode

The EUT is set with the test mode, the specification of the test mode is as followings.

Bluetooth Low Energy Mode (Bluetooth 5.1 +LE):
Transmitting frequency : 2402 MHz (00CH) – 2480 MHz (39CH)
Receiver frequency : 2402 MHz (00CH) – 2480 MHz (39CH)

The tests were performed in the following worst condition.

Mode	Data Rate (Worst)	Channel
BLE 1 Mbps	1 Mbps	0, 19, 39
BLE 2 Mbps	2 Mbps	0, 19, 39

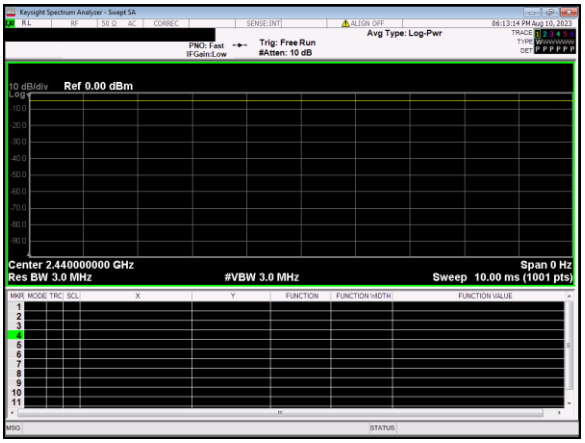
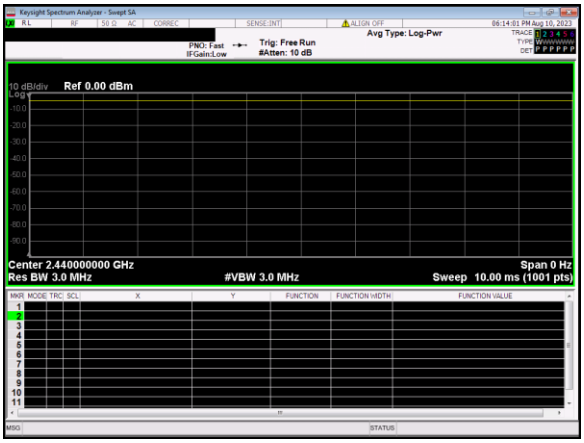
The EUT with temporary antenna port was used in conducted measurement.

The tests were performed using the following test program supplied by applicant;

- Software Name : Tera Term
- Software Version : Version 4.106 (SVN# 9298)
- Storage Location : Controller PC

6.4 Duty Cycle

Mode	On Time (msec.)	On+Off Time (msec.)	Duty Cycle (%)	Duty Factor (dB)	VBA [>1/T] (kHz)
BLE 1 Mbps	1.000	1.000	100.0	0.00	> 0.01
BLE 2 Mbps	1.000	1.000	100.0	0.00	> 0.01

BLE 1 Mbps	BLE 2 Mbps
	

7 Test Item

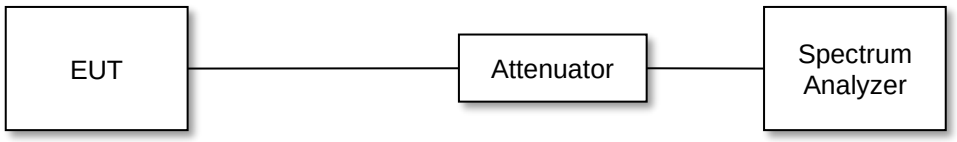
7.1 99% Occupied Bandwidth

7.1.1 Test Site and Instruments

Test Site : Shielded Room S3					
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Last Cal.**	**Cal. Due**
Spectrum Analyzer	N9010A	MY47191105	Agilent	2022/11/10	2023/11/09
Attenuator	54A-10	W5713 (D-29)	Weinschel	2022/10/17	2023/10/16
RF Cable	LU1-054-1000	1709001 (H-36)	Rosenberger	2023/05/26	2024/05/25
Thermo-Hygrometer	testo 608-H2	30050650 (F-71)	testo	2023/04/24	2024/04/23

7.1.2 Test Method and Test Setup (Diagrammatic illustration)

The EUT is connected to the measuring equipment via a suitable attenuator.
The test conditions and methods comply with the following test standards.
- ANSI C63.10-2013 clause 6.9.3



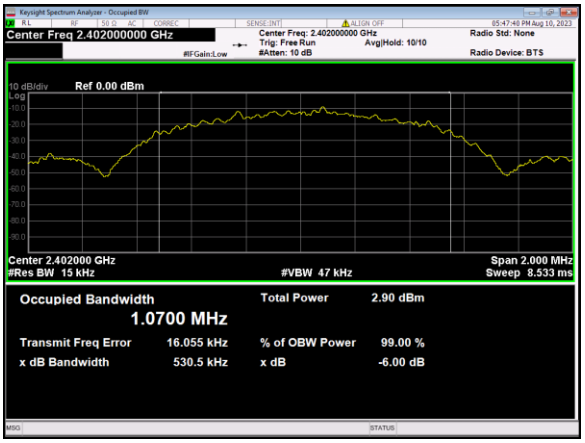
7.1.3 Test Data

Test Date: August 10, 2023
Temp.: 25 °C, RH: 59 %, Atm.: 1003 hPa

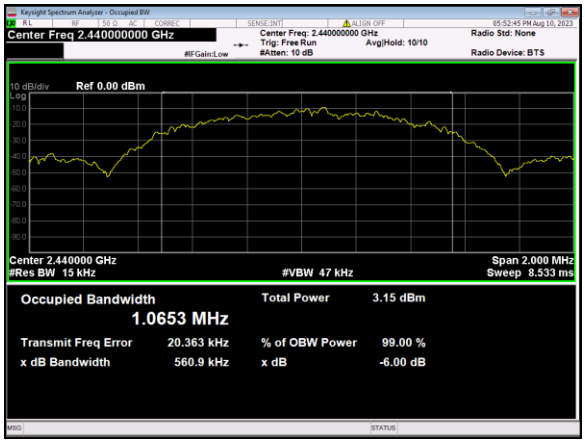
Mode	Channel	Frequency (MHz)	99% Occupied Bandwidth (MHz)	Limits (MHz)
BLE 1 Mbps	0	2402	1.070	--
	19	2440	1.065	--
	39	2480	1.070	--
BLE 2 Mbps	0	2402	2.101	--
	19	2440	2.097	--
	39	2480	2.088	--

BLE 1 Mbps

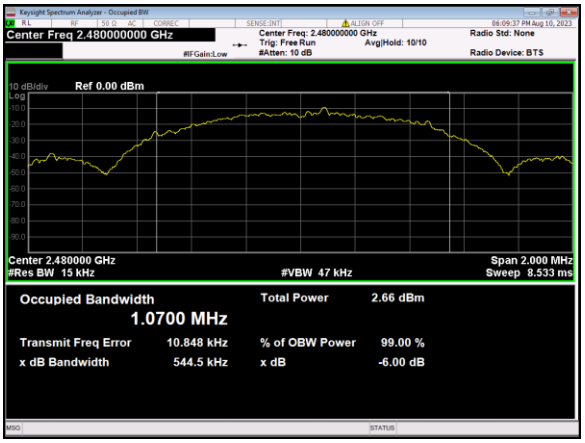
Channel 0 (2402 MHz)

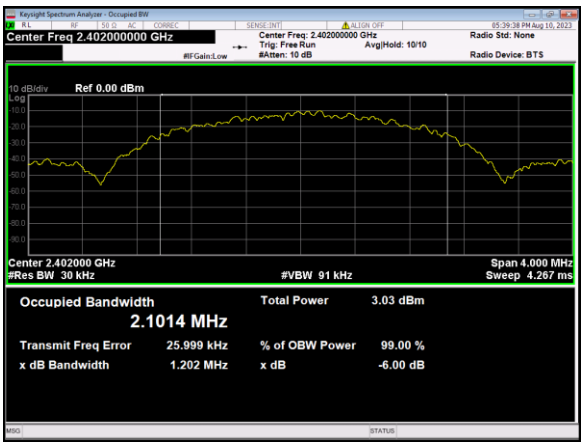
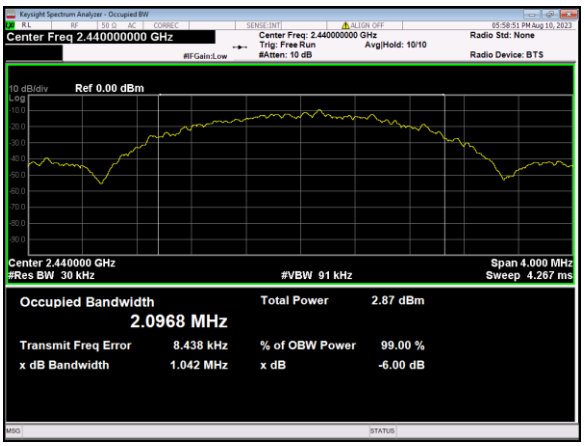
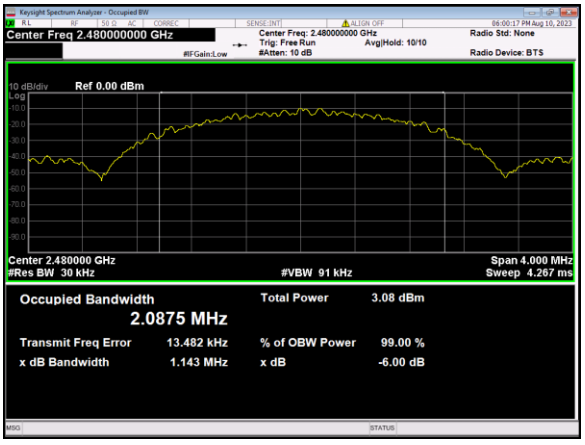


Channel 19 (2440 MHz)



Channel 39 (2480 MHz)



BLE 2 Mbps	
Channel 0 (2402 MHz)	Channel 19 (2440 MHz)
	
Channel 39 (2480 MHz)	
	

7.2 6 dB Emission Bandwidth

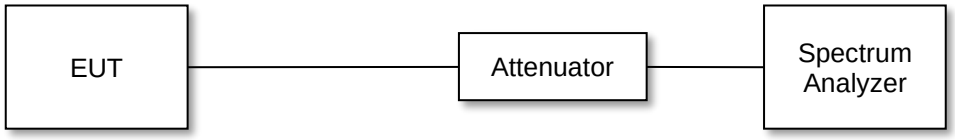
7.2.1 Test Site and Instruments

Test Site : Shielded Room S3					
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Last Cal.**	**Cal. Due**
Spectrum Analyzer	N9010A	MY47191105	Agilent	2022/11/10	2023/11/09
Attenuator	54A-10	W5713 (D-29)	Weinschel	2022/10/17	2023/10/16
RF Cable	LU1-054-1000	1709001 (H-36)	Rosenberger	2023/05/26	2024/05/25
Thermo-Hygrometer	testo 608-H2	30050650 (F-71)	testo	2023/04/24	2024/04/23

7.2.2 Test Method and Test Setup (Diagrammatic illustration)

The EUT is connected to the measuring equipment via a suitable attenuator.
The test conditions and methods comply with the following test standards.

- KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013 clause 11.8



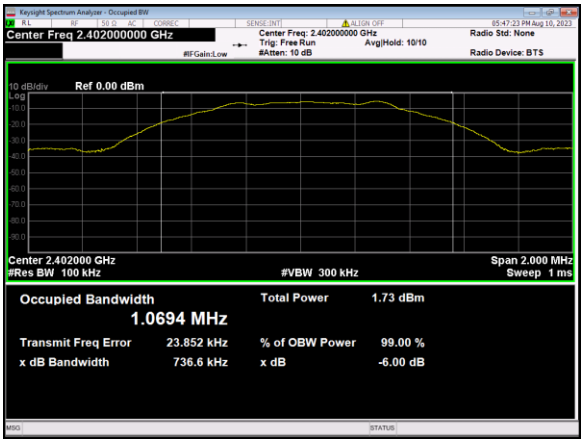
7.2.3 Test Data

Test Date: August 10, 2023
Temp.: 25 °C, RH: 59 %, Atm.: 1003 hPa

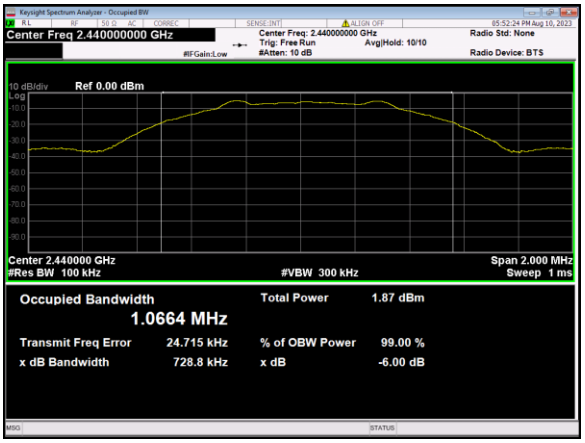
Mode	Channel	Frequency (MHz)	6dB Bandwidth (MHz)	Limits (MHz)
BLE 1 Mbps	0	2402	0.737	≥ 0.5
	19	2440	0.729	≥ 0.5
	39	2480	0.738	≥ 0.5
BLE 2 Mbps	0	2402	1.279	≥ 0.5
	19	2440	1.270	≥ 0.5
	39	2480	1.236	≥ 0.5

BLE 1 Mbps

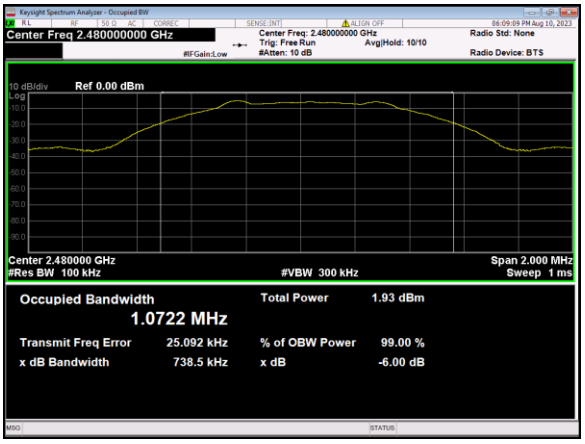
Channel 0 (2402 MHz)

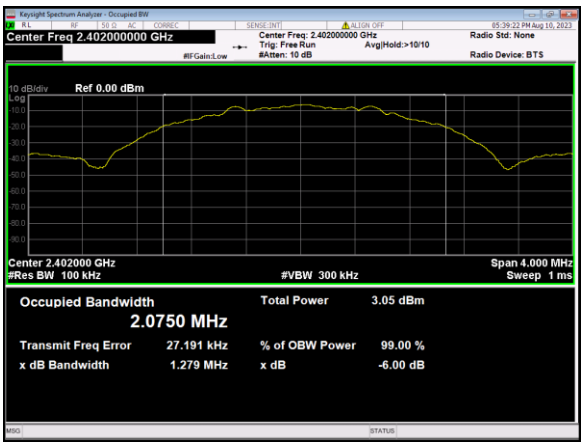
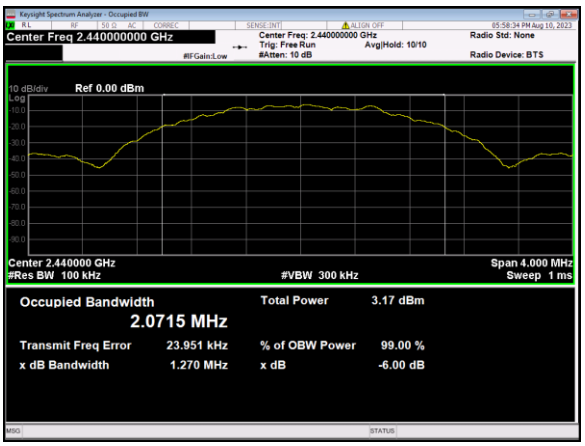
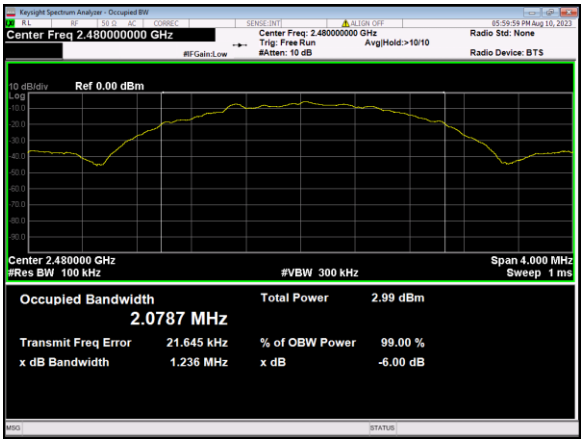


Channel 19 (2440 MHz)



Channel 39 (2480 MHz)



BLE 2 Mbps	
Channel 0 (2402 MHz)	Channel 19 (2440 MHz)
	
Channel 39 (2480 MHz)	
	

7.3 Power Spectral Density

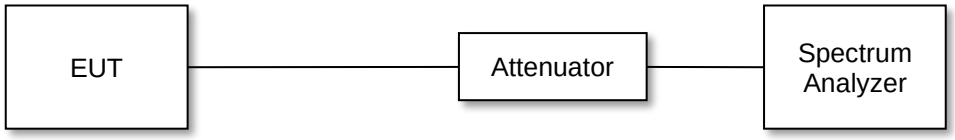
7.3.1 Test Site and Instruments

Test Site : Shielded Room S3					
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Last Cal.**	**Cal. Due**
Spectrum Analyzer	N9010A	MY47191105	Agilent	2022/11/10	2023/11/09
Attenuator	54A-10	W5713 (D-29)	Weinschel	2022/10/17	2023/10/16
RF Cable	LU1-054-1000	1709001 (H-36)	Rosenberger	2023/05/26	2024/05/25
Thermo-Hygrometer	testo 608-H2	30050650 (F-71)	testo	2023/04/24	2024/04/23

7.3.2 Test Method and Test Setup (Diagrammatic illustration)

The EUT is connected to the measuring equipment via a suitable attenuator.
The test conditions and methods comply with the following test standards.

- KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013 clause 11.10



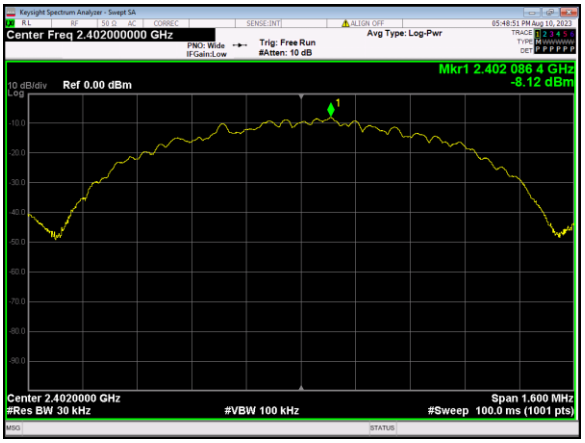
7.3.3 Test Data

Test Date: August 10, 2023
Temp.: 25 °C, RH: 59 %, Atm.: 1003 hPa

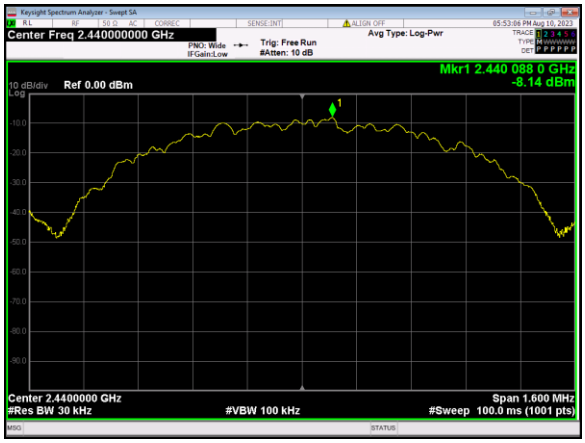
Mode	Channel	Frequency (MHz)	Power Spectral Density (dBm/30kHz)	Limits (dBm/3kHz)
BLE 1 Mbps	0	2402	-8.12	≤ 8.0
	19	2440	-8.14	≤ 8.0
	39	2480	-8.11	≤ 8.0
BLE 2 Mbps	0	2402	-10.53	≤ 8.0
	19	2440	-9.93	≤ 8.0
	39	2480	-10.20	≤ 8.0

BLE 1 Mbps

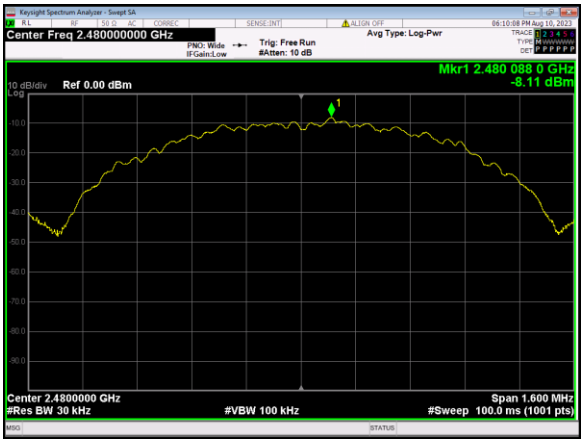
Channel 0 (2402 MHz)

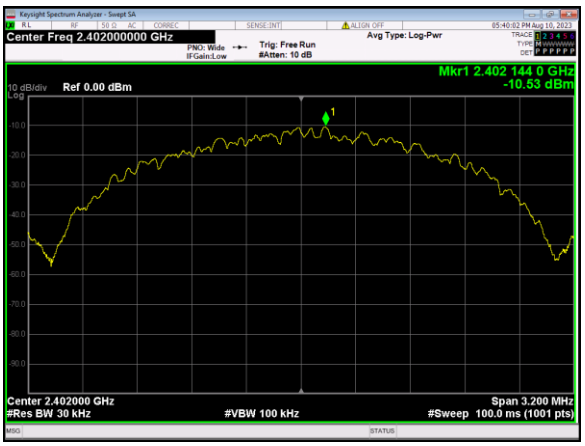
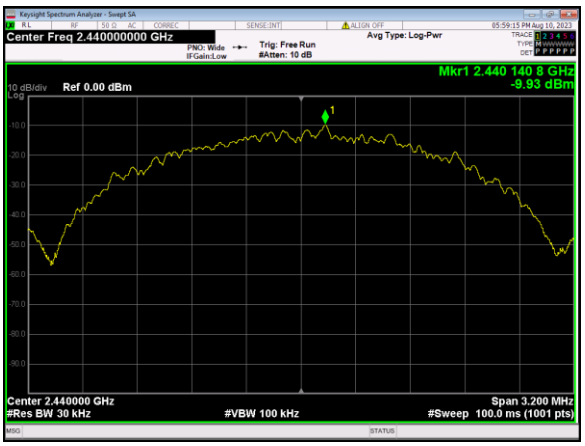
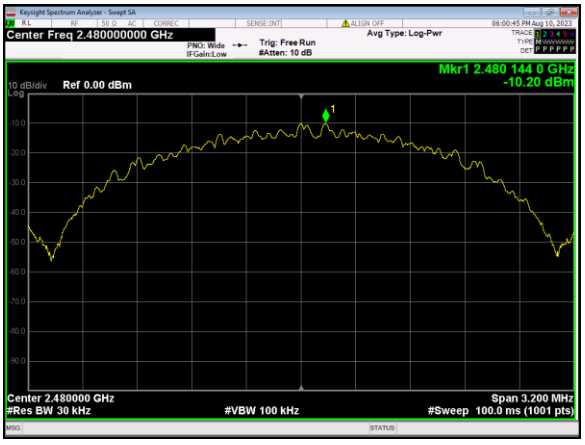


Channel 19 (2440 MHz)



Channel 39 (2480 MHz)



BLE 2 Mbps	
Channel 0 (2402 MHz)	Channel 19 (2440 MHz)
	
Channel 39 (2480 MHz)	
	

7.4 Maximum Conducted Output Power

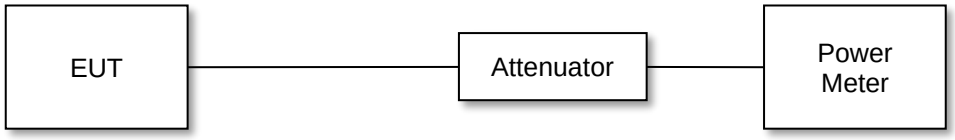
7.4.1 Test Site and Instruments

Test Site : Measurement Room M2					
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Last Cal.**	**Cal. Due**
Power Meter	ML2495A	1423001 (B-16)	Anritsu	2023/08/14	2024/08/13
Power Sensor	MA2411B	1339136 (B-18)	Anritsu	2023/08/14	2024/08/13
Attenuator	54A-10	W5732 (D-30)	Weinschel	2023/05/26	2024/05/25
Thermo-Hygrometer	testo 608-H2	30050646 (F-68)	testo	2023/06/09	2024/06/08

7.4.2 Test Method and Test Setup (Diagrammatic illustration)

The EUT is connected to the measuring equipment via a suitable attenuator.
The test conditions and methods comply with the following test standards.

- KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013 clause 11.9



7.4.3 Test Data

Test Date: August 17, 2023
Temp.: 23 °C, RH: 57 %, Atm.: 1012 hPa

Mode	Channel	Frequency (MHz)	Peak Output Power (dBm)	Limits (dBm)
BLE 1 Mbps	0	2402	-4.87	≤ 30.0
	19	2440	-4.97	≤ 30.0
	39	2480	-5.00	≤ 30.0
BLE 2 Mbps	0	2402	-4.85	≤ 30.0
	19	2440	-5.03	≤ 30.0
	39	2480	-5.08	≤ 30.0

Mode	Channel	Frequency (MHz)	Average Output Power (dBm)	Limits (dBm)
BLE 1 Mbps	0	2402	-5.58	--
	19	2440	-5.70	--
	39	2480	-5.68	--
BLE 2 Mbps	0	2402	-5.53	--
	19	2440	-5.67	--
	39	2480	-5.74	--

7.5 Conducted Spurious Emission

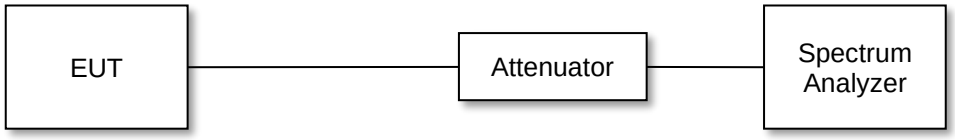
7.5.1 Test Site and Instruments

Test Site : Shielded Room S3					
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Last Cal.**	**Cal. Due**
Spectrum Analyzer	N9010A	MY47191105	Agilent	2022/11/10	2023/11/09
Attenuator	54A-10	W5713 (D-29)	Weinschel	2022/10/17	2023/10/16
RF Cable	LU1-054-1000	1709001 (H-36)	Rosenberger	2023/05/26	2024/05/25
Thermo-Hygrometer	testo 608-H2	30050650 (F-71)	testo	2023/04/24	2024/04/23

7.5.2 Test Method and Test Setup (Diagrammatic illustration)

The EUT is connected to the measuring equipment via a suitable attenuator.
The test conditions and methods comply with the following test standards.

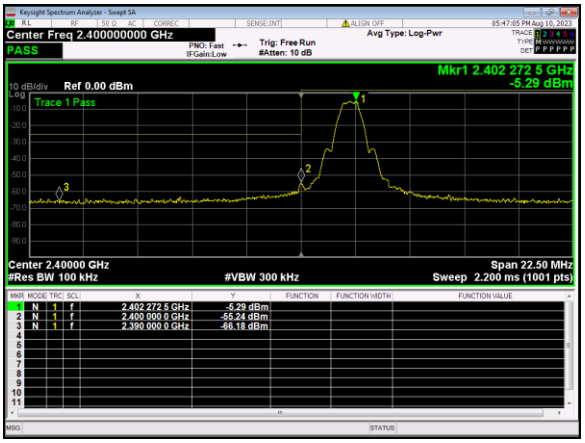
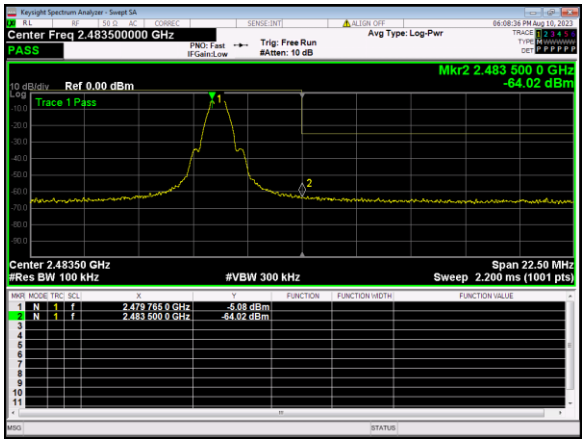
- KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013 clause 11.11

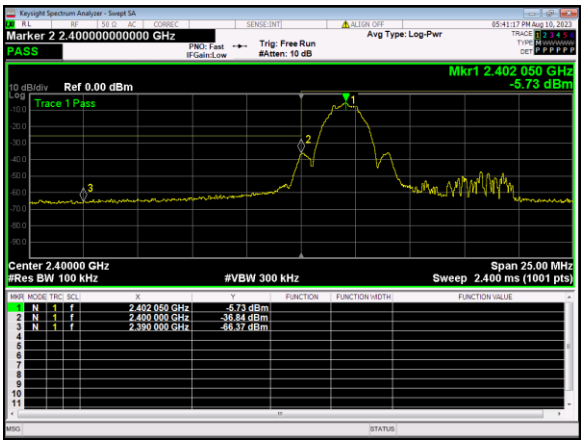
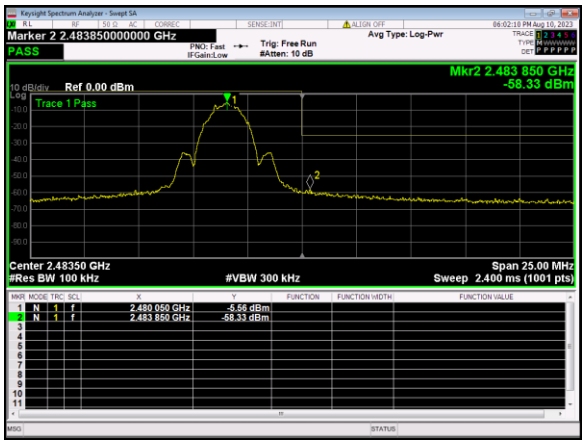


7.5.3 Test Data

7.5.3.1 Band-edge Emission

Test Date: August 10, 2023
Temp.: 25 °C, RH: 59 %, Atm.: 1003 hPa

BLE 1 Mbps	
Channel 0 (2402 MHz)	Channel 39 (2480 MHz)
	

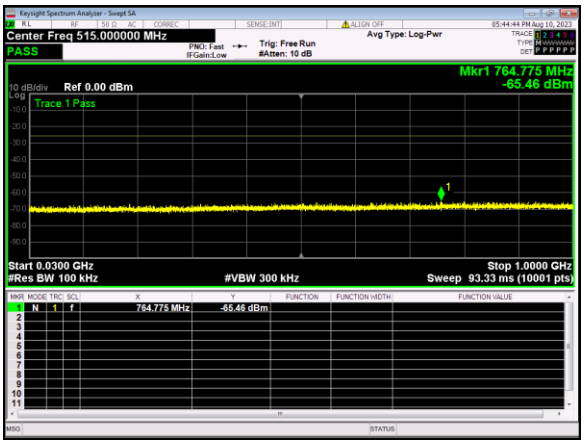
BLE 2 Mbps	
Channel 0 (2402 MHz)	Channel 39 (2480 MHz)
	

7.5.3.2 Conducted Spurious Emission

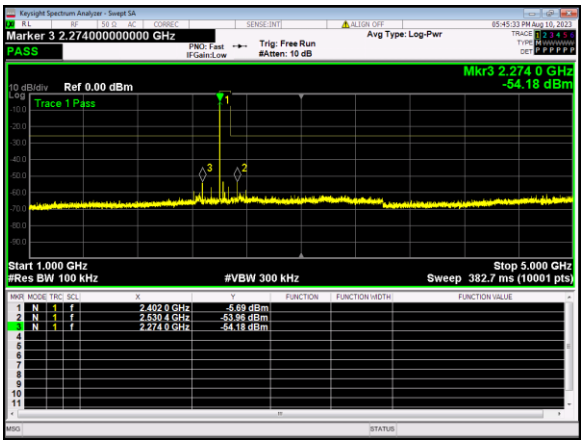
Test Date: August 10, 2023
Temp.: 25 °C, RH: 59 %, Atm.: 1003 hPa

BLE 1 Mbps – Channel 0 (2402 MHz)

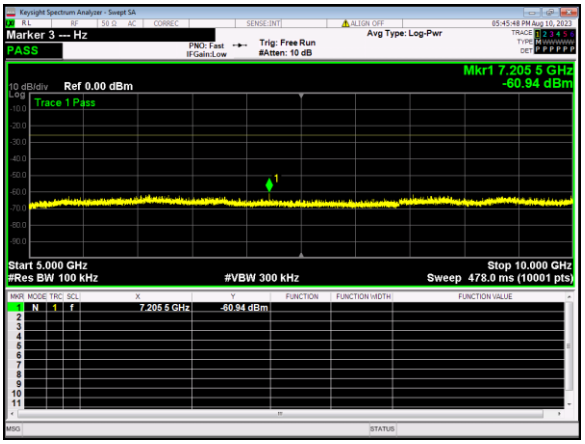
30 MHz – 1000 MHz



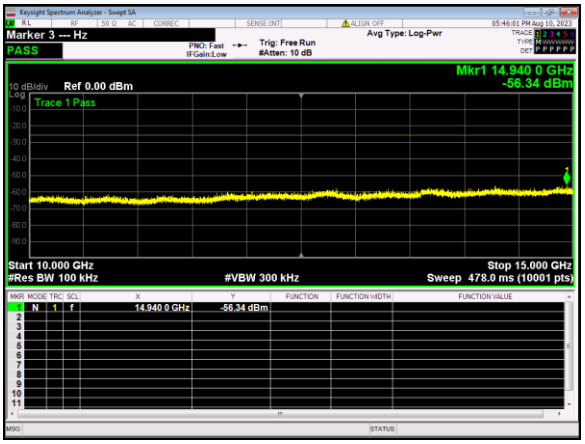
1 GHz – 5 GHz



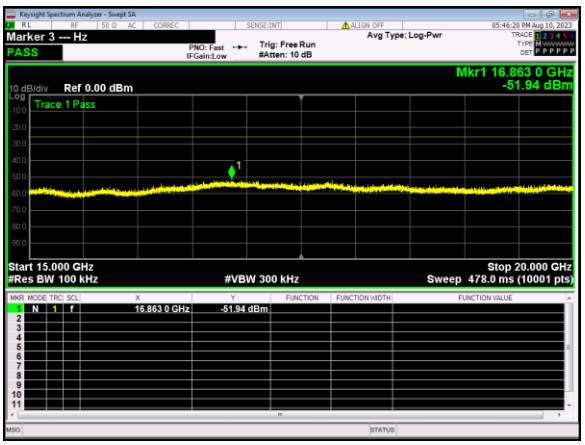
5 GHz – 10 GHz



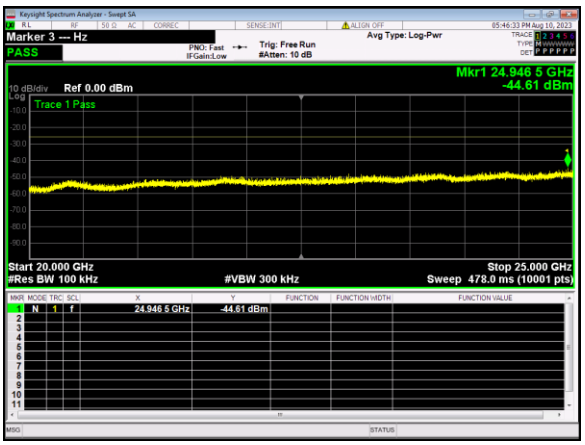
10 GHz – 15 GHz

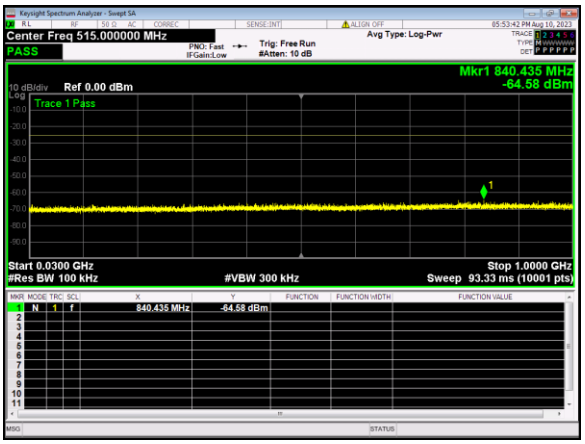
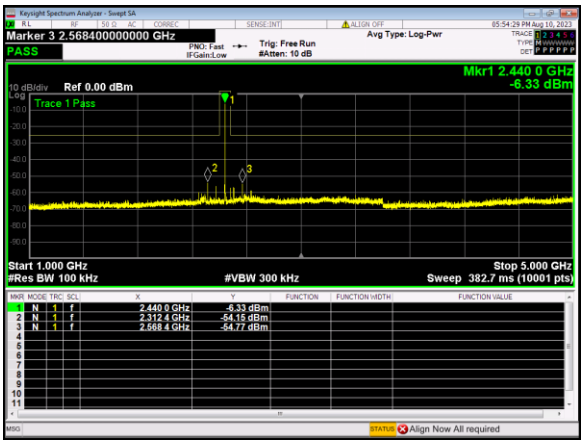
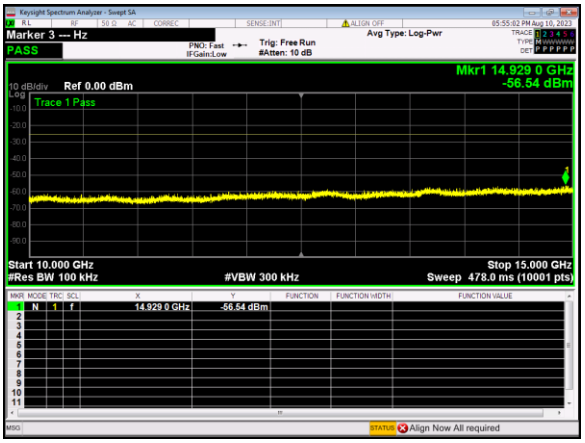
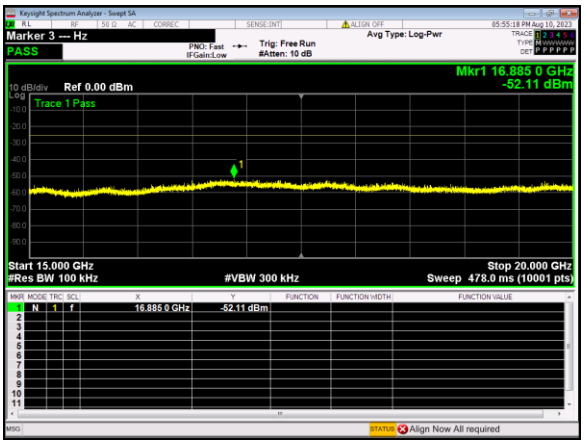
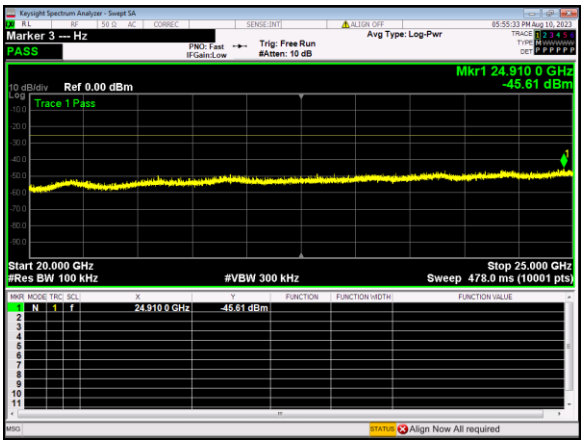


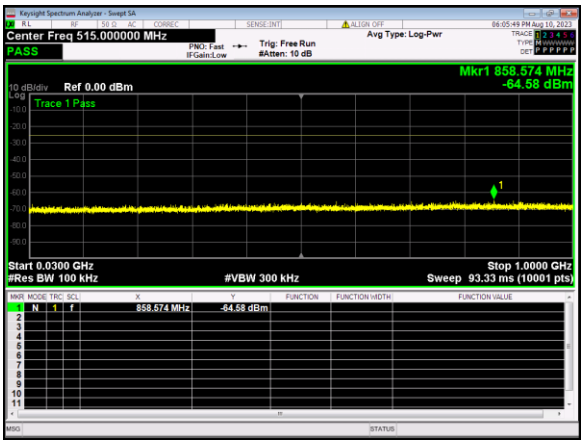
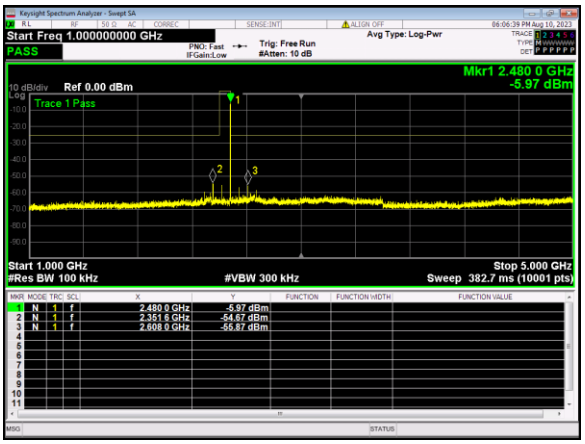
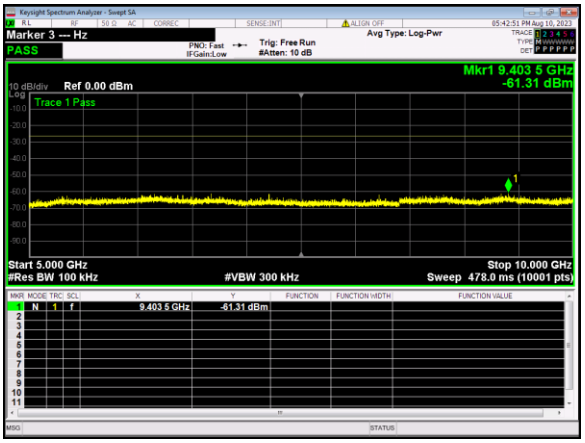
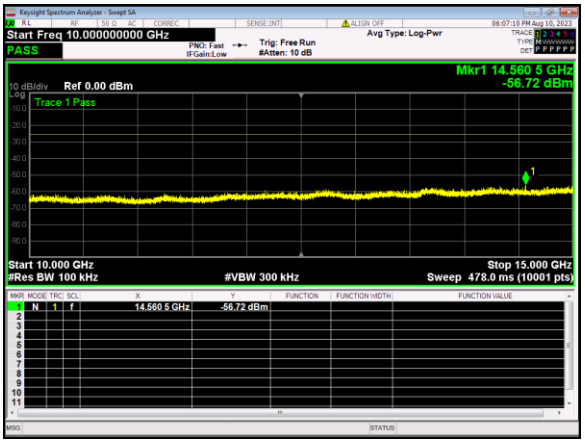
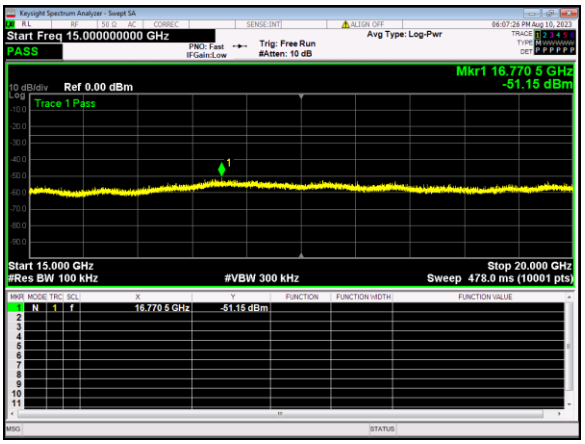
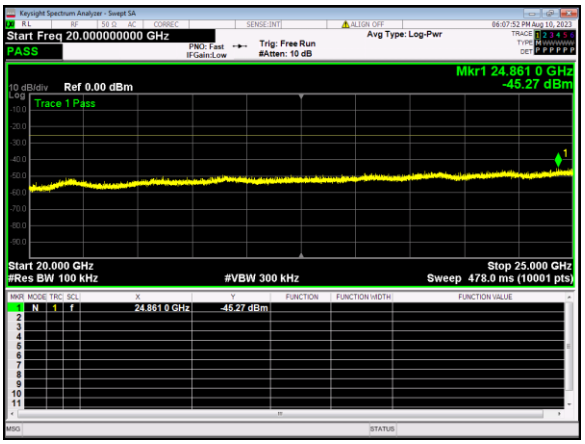
15 GHz – 20 GHz

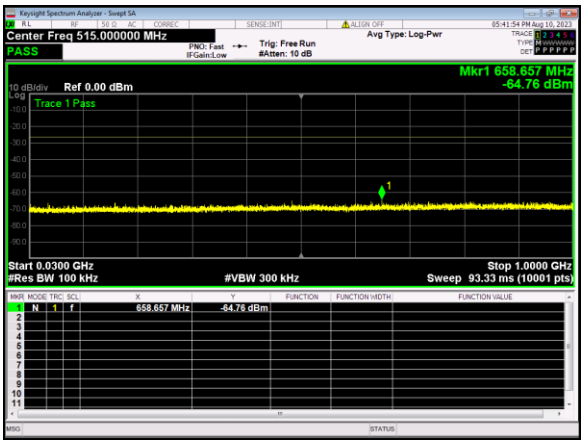
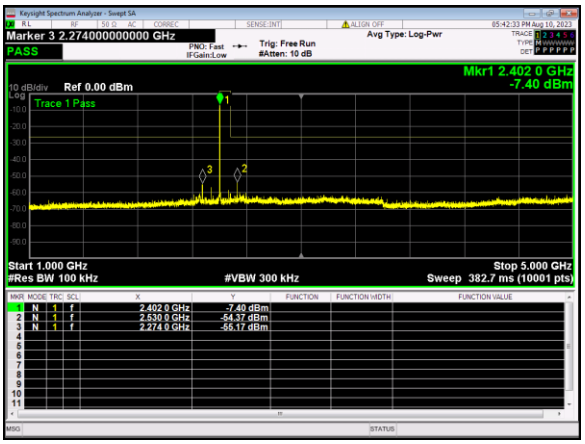
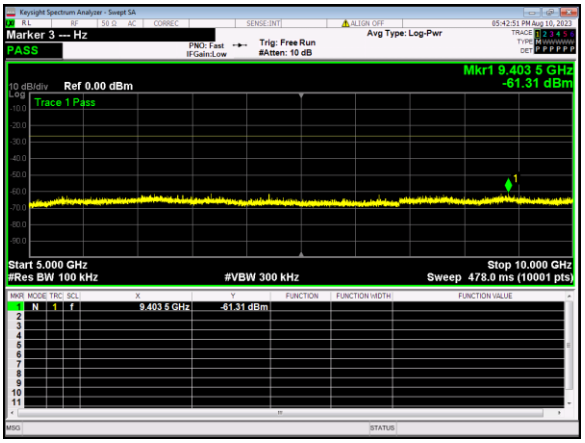
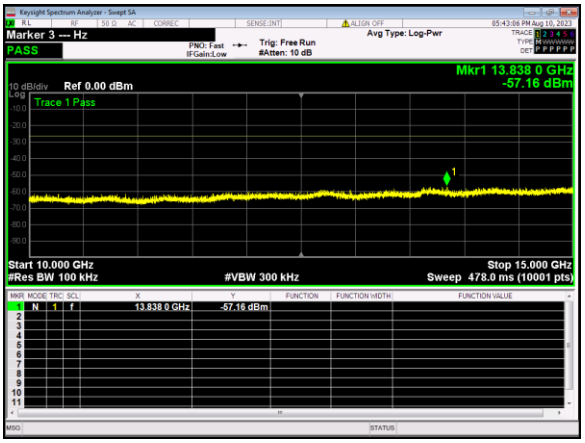
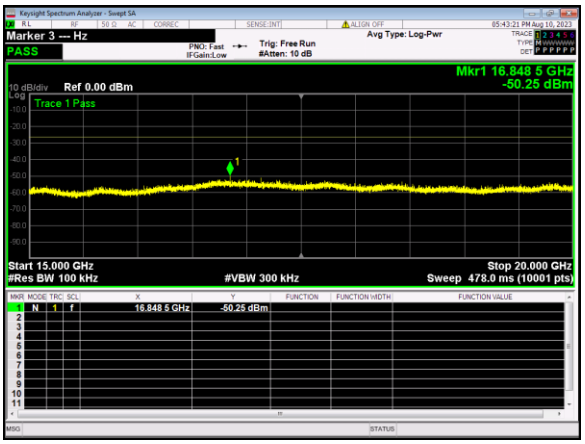
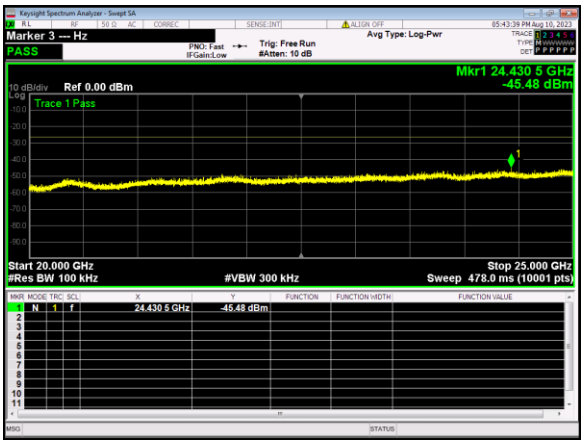


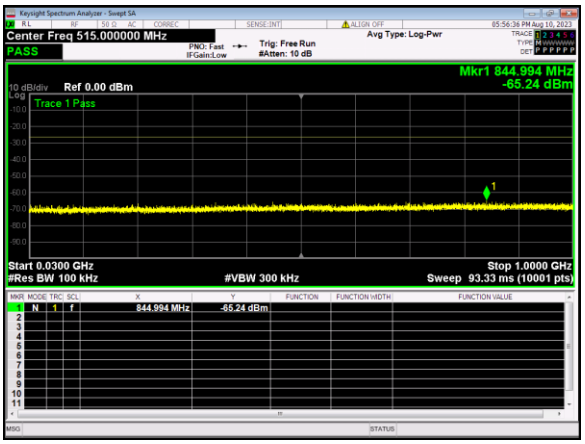
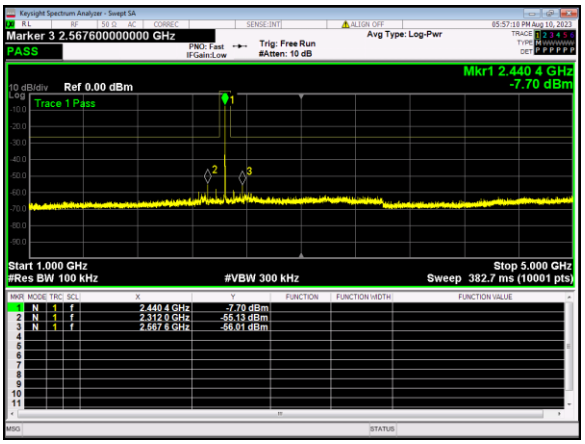
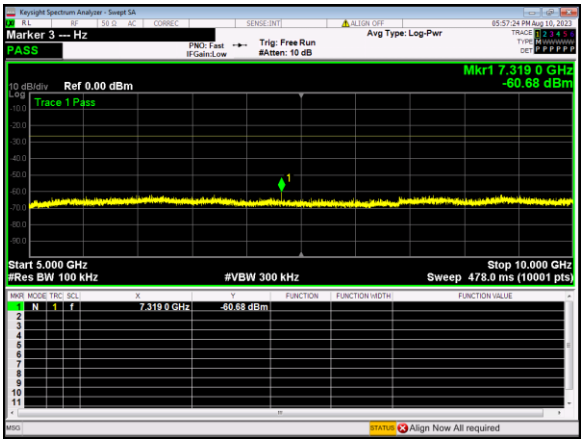
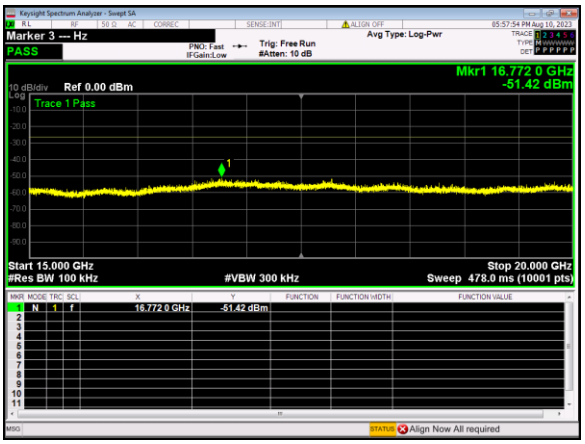
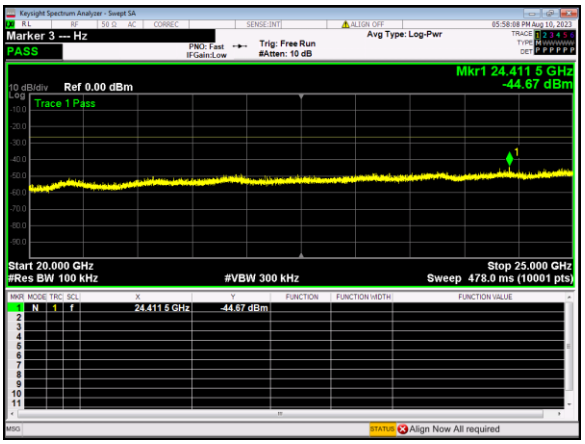
20 GHz – 25 GHz

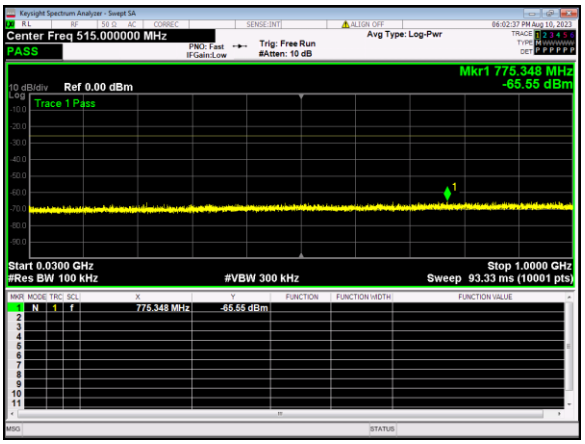
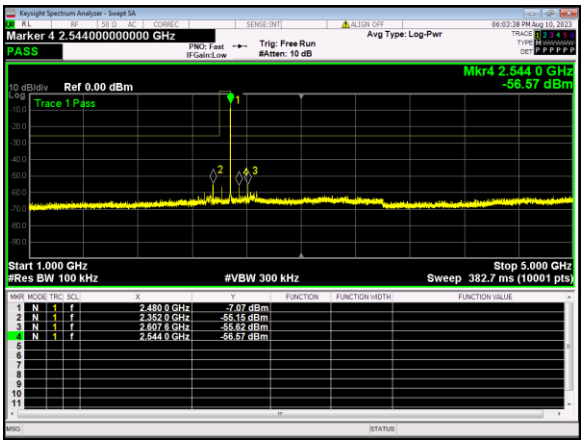
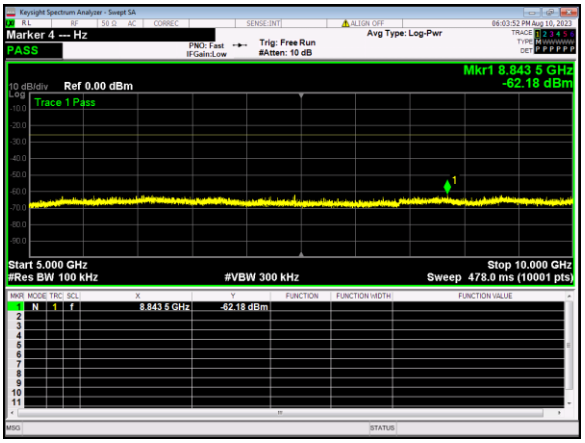
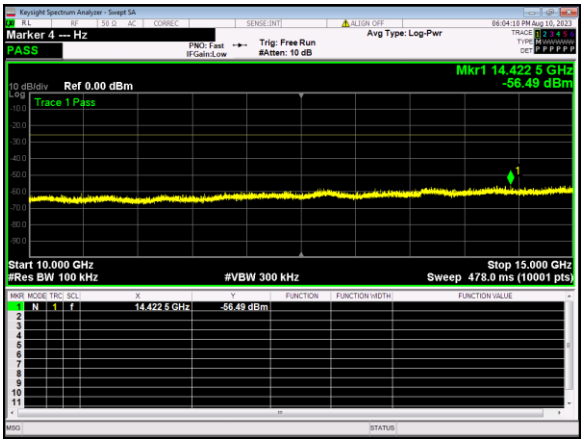
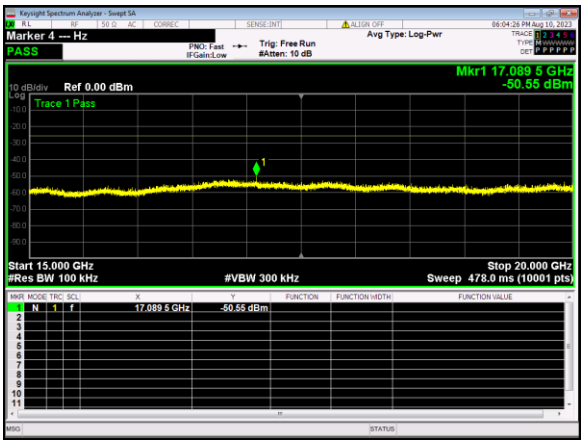
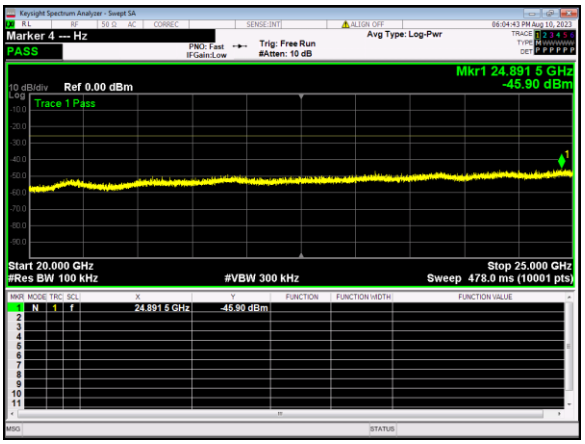


BLE 1 Mbps – Channel 19 (2440 MHz)	
30 MHz – 1000 MHz	1 GHz – 5 GHz
	
5 GHz – 10 GHz	10 GHz – 15 GHz
	
15 GHz – 20 GHz	20 GHz – 25 GHz
	

BLE 1 Mbps – Channel 39 (2480 MHz)	
30 MHz – 1000 MHz	1 GHz – 5 GHz
	
5 GHz – 10 GHz	10 GHz – 15 GHz
	
15 GHz – 20 GHz	20 GHz – 25 GHz
	

BLE 2 Mbps – Channel 0 (2402 MHz)	
30 MHz – 1000 MHz	1 GHz – 5 GHz
	
5 GHz – 10 GHz	10 GHz – 15 GHz
	
15 GHz – 20 GHz	20 GHz – 25 GHz
	

BLE 2 Mbps – Channel 19 (2440 MHz)	
30 MHz – 1000 MHz	1 GHz – 5 GHz
	
5 GHz – 10 GHz	10 GHz – 15 GHz
	
15 GHz – 20 GHz	20 GHz – 25 GHz
	

BLE 2 Mbps – Channel 39 (2480 MHz)	
30 MHz – 1000 MHz	1 GHz – 5 GHz
	
5 GHz – 10 GHz	10 GHz – 15 GHz
	
15 GHz – 20 GHz	20 GHz – 25 GHz
	

7.6 Radiated Spurious Emission

7.6.1 Test Site and Instruments

Test Site : Anechoic Chamber A1					
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Last Cal.**	**Cal. Due**
Test Receiver	ESCI 7	100811 (A-8)	Rohde & Schwarz	2022/10/31	2023/10/30
Loop Antenna	HFH2-Z2	872096/25 (C-2)	Rohde & Schwarz	2023/05/25	2024/05/24
RF Cable	S 10162 B-11 etc.	--- (H-3)	HUBER+SUHNER	2022/10/26	2023/10/25
RF Cable	RG213/U	--- (H-28)	HUBER+SUHNER	2023/05/25	2024/05/24
Thermo-Hygrometer	testo 608-H2	30050613 (F-67)	testo	2023/04/24	2024/04/23
EMC Software	EP5/RE	Ver.6.00.120	TOYO	--	--

Test Site : Anechoic Chamber A4					
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Last Cal.**	**Cal. Due**
Test Receiver	ESR 26	101690 (A-7)	Rohde & Schwarz	2022/09/27	2023/09/26
Biconical Antenna	VHBB9124/BBA9106	01314 (C-85)	Schwarzbeck	2022/11/08	2023/11/07
Log-periodic Antenna	VULP9118B	871 (C-39)	Schwarzbeck	2022/11/08	2023/11/07
Pre-Amplifier	APT4-00100600-1310-D6	118243 (A-61)	AmpliTech	2022/10/31	2023/10/30
Band Pass Filter	MBP301	193313 (D-123)	Microwave Factory	2022/12/16	2023/12/15
RF Cable	S 10162 B-11 etc.	--- (H-1)	HUBER+SUHNER	2022/10/31	2023/10/30
Thermo-Hygrometer	testo 608-H2	41488568 (F-78)	testo	2022/10/26	2023/10/25
EMC Software	EP5/RE	Ver.6.00.120	TOYO	--	--

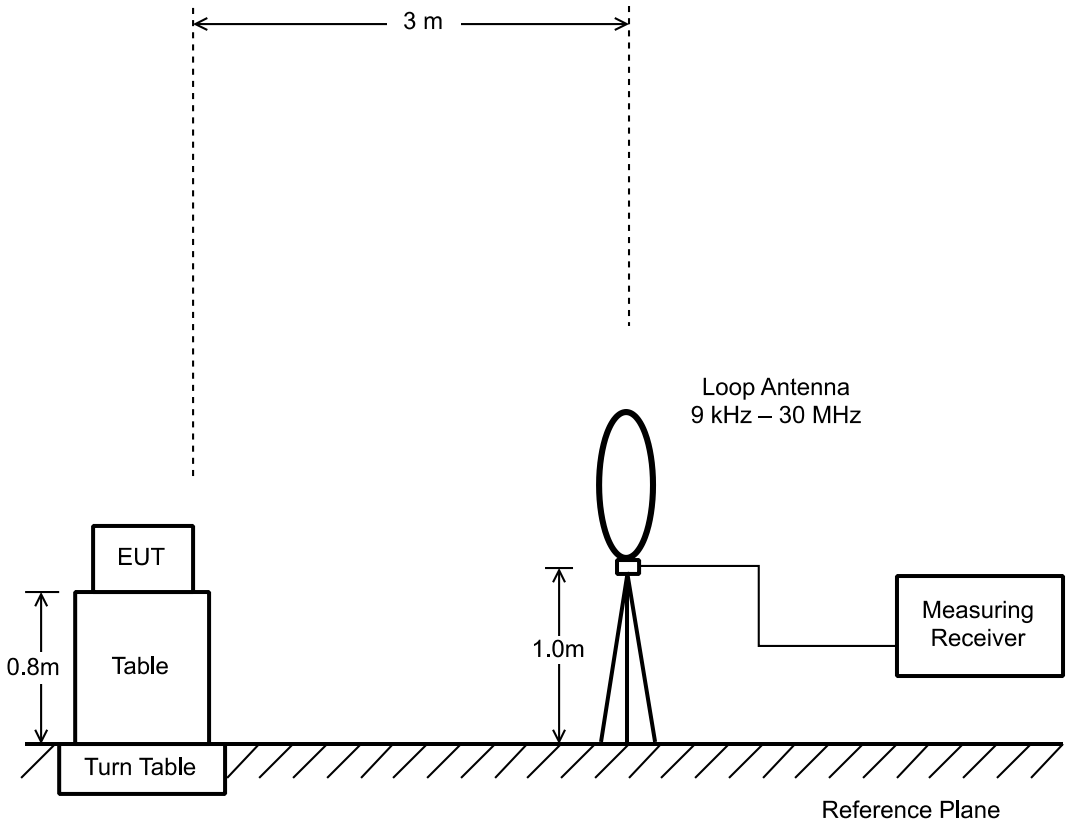
Test Site : Anechoic Chamber A2					
Type	**Model**	**Serial No. (ID)**	**Manufacturer**	**Last Cal.**	**Cal. Due**
Test Receiver	ESR26	101680 (A-76)	Rohde & Schwarz	2023/02/20	2024/02/19
Double-Ridge Guide Horn Antenna	TR17206	73370006 (C-29)	ADVANTEST	2023/05/22	2024/05/21
Horn Antenna	91889-2	568 (C-41-2)	EATON	2023/05/23	2024/05/22
Horn Antenna	3160-08	9904-1099 (C-59)	EMCO	2023/05/23	2024/05/22
Horn Antenna	3160-09	9808-1117 (C-48)	EMCO	2023/07/17	2024/07/16
Pre-Amplifier	BZR-01001800-201040-182323-HS	23804 (A-65)	B&Z	2023/02/03	2024/02/02
Pre-Amplifier	RP1826G-45H	RP140121-11 (A-53)	EMCS	2023/07/17	2024/07/16
RF Cable	SF104	267415/4 (C-68)	HUBER+SUHNER	2023/02/03	2024/02/02
RF Cable	SF126	MY4596/26 (C-78)	HUBER+SUHNER	2023/02/03	2024/02/02
RF Cable	SF102E	6683/2E (C-70)	HUBER+SUHNER	2023/04/03	2024/04/02
RF Cable	SF102E	10055/2E (C-75)	HUBER+SUHNER	2023/04/03	2024/04/02
RF Cable	SF102EA	3041/2EA (C-69)	HUBER+SUHNER	2023/04/03	2024/04/02
Band Rejection Filter	BRM50702	371 (D-121)	MICRO-TRONICS	2022/10/17	2023/10/16
Thermo-Hygrometer	testo 608-H2	30050646 (F-68)	testo	2023/06/09	2024/06/08

7.6.2 Test Method and Test Setup (Diagrammatic illustration)

The test conditions and methods comply with the following test standards.
- KDB 558074 D01 15.247 Meas Guidance v05r02
- ANSI C63.10-2013 clause 11.12

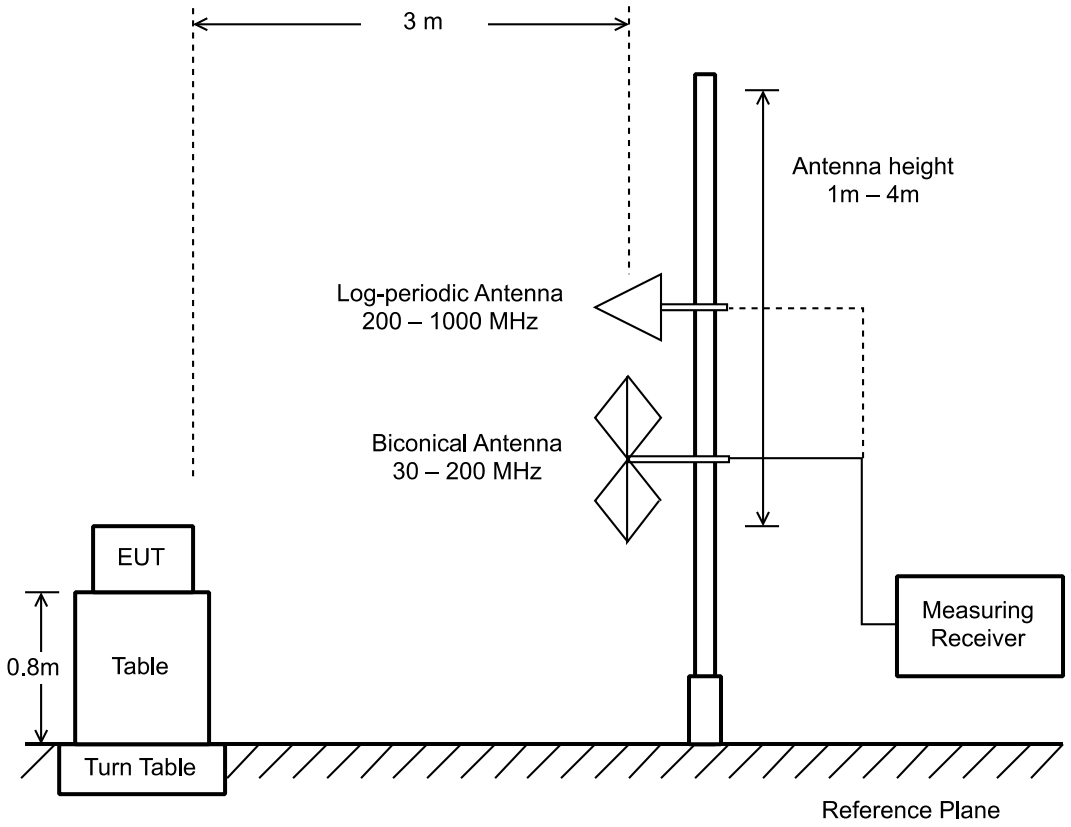
7.6.2.1 Radiated Spurious Emission 9 kHz – 30 MHz

The pre-scan measurements were performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT. The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.
The measurement were performed about three antenna orientations (parallel, perpendicular, and ground-parallel).
According to KDB 414788, a used anechoic chamber were equivalent to those on an open fields site based on comparison measurements.
This configurations was used for formal measurements.
(Reference divisional instruction No. G703649)



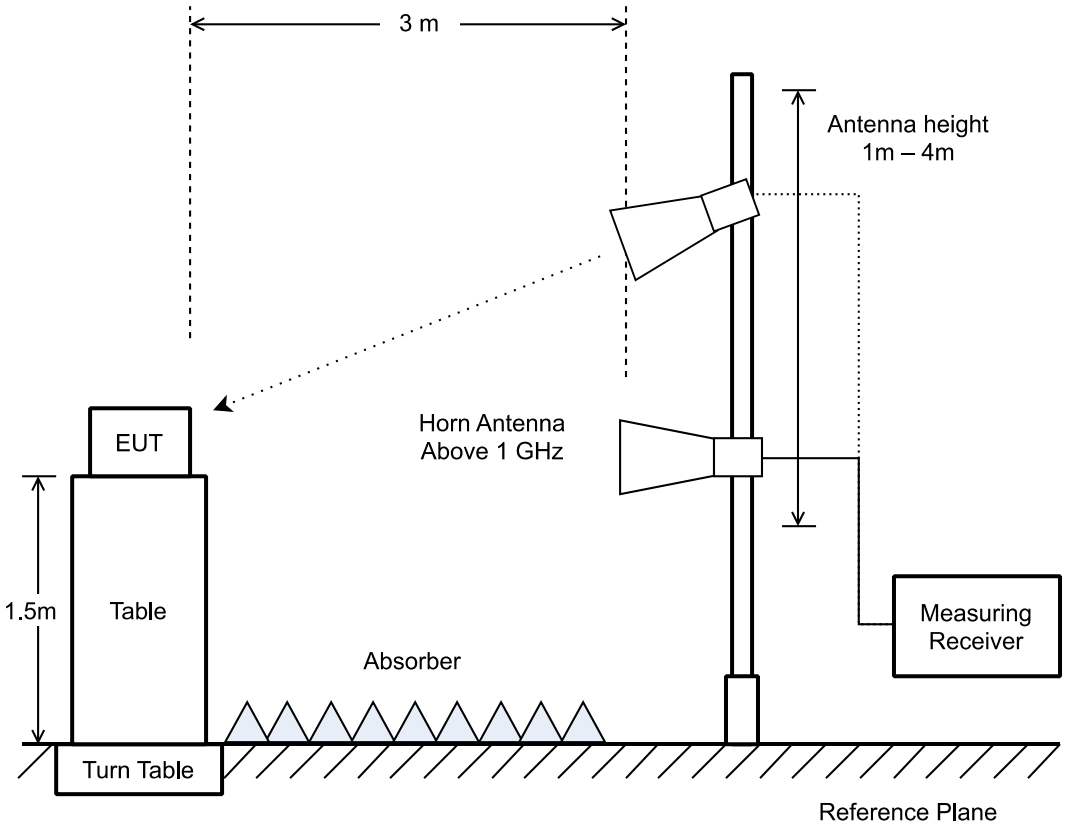
7.6.2.2 Radiated Spurious Emission 30 MHz – 1000 MHz

The pre-scan measurements were performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT. The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.
This configurations was used for formal measurements.
(Reference divisional instruction No. G703649)



7.6.2.3 Radiated Spurious Emission above 1 GHz

The pre-scan measurements were performed using the scan mode of test receiver or spectrum analyzer to observe the emissions characteristics of the EUT. The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions.
This configurations was used for formal measurements.
(Reference divisional instruction No. G703649)

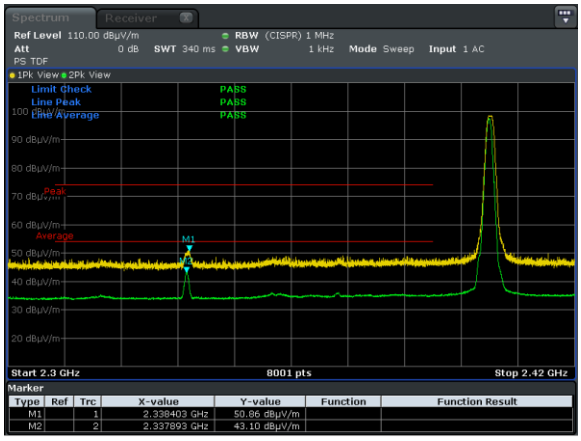
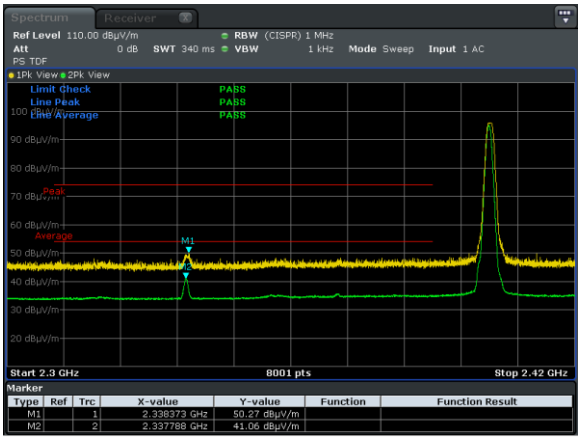


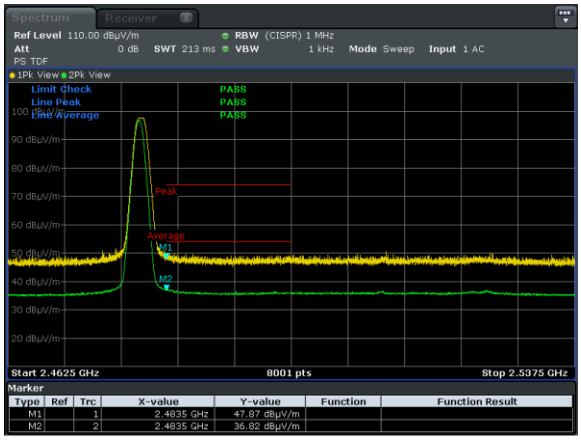
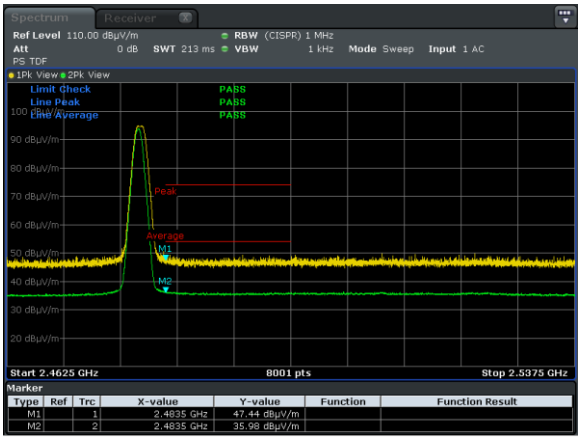
NOTE
When the EUT is manipulated through three different orientations (for example, X, Y and Z axis), the scan height upper range for the measurement antenna is limited to 2.5 m or 0.5 m above the top of the EUT.

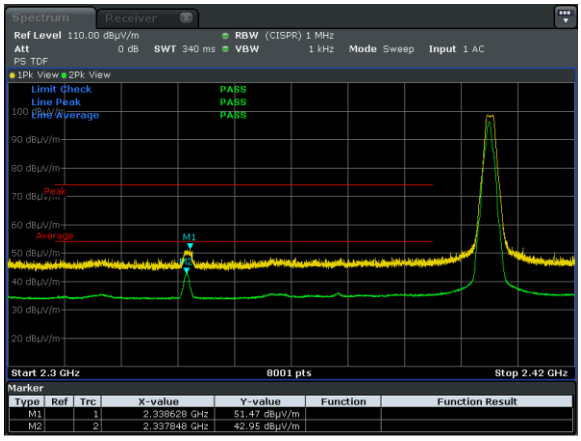
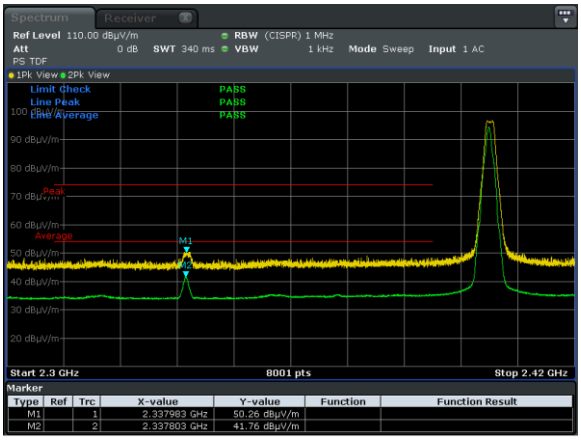
7.6.3 Test Data

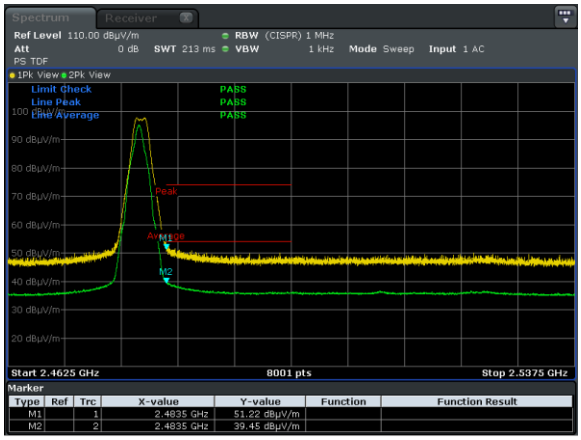
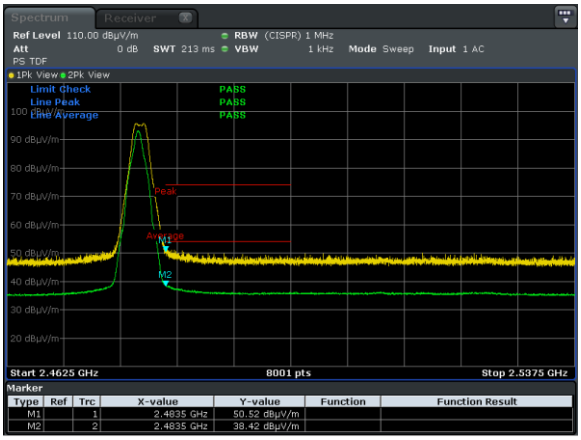
7.6.3.1 Band-edge Emission

Test Date: August 20, 2023
Temp.: 24 °C, RH: 58 %, Atm.: 1001 hPa

BLE 1 Mbps – Channel 0 (2402 MHz)	
Horizontal – Y axis	Vertical – Z axis
	
Peak Average	

BLE 1 Mbps – Channel 39 (2480 MHz)	
Horizontal – Y axis	Vertical – Z axis
	
Peak Average	

BLE 2 Mbps – Channel 0 (2402 MHz)	
Horizontal – Y axis	Vertical – Z axis
	

BLE 2 Mbps – Channel 39 (2480 MHz)	
Horizontal – Y axis	Vertical – Z axis
	

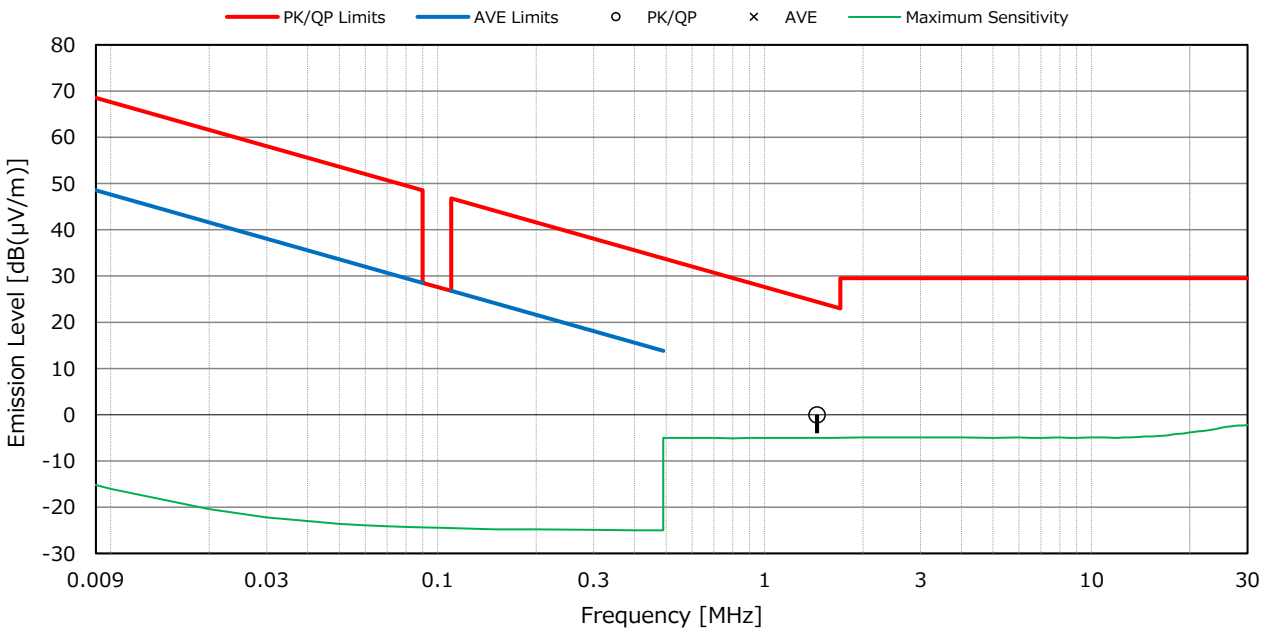
7.6.3.2 Radiated Spurious Emission 9 kHz – 30 MHz

Mode of EUT : All modes have been investigated and the worst case mode has been listed.
Loop antenna orientation : Parallel

Test voltage : 6VDC

Test Date: August 25, 2023
Temp.: 21 °C, RH: 51 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK/QP	AVE	PK/QP	AVE	PK/QP	AVE	PK/QP	AVE	
1.4470	-20.0	20.0	--	24.4	--	0.0	--	+ 24.4	--	-



NOTES
1) Measurement Distance : 3 m (Specified Distance : 30 m)
2) The spectrum was checked from 9 kHz to 30 MHz.
3) The factor includes the antenna factor, the cable loss and the distance conversion.
4) The symbol of "--" means "not applicable".
5) Calculated result as the worst point shown on underline :
Factor + Reading (PK/QP) = -20.0 + 20.0 = 0.0 dB(μV) at 1.4470 MHz
Turntable Rotation Position : 173 °
6) PK/QP : Quasi-Peak detector, AVE : Average detector
7) Bandwidth : 200 Hz (9 kHz - 150 kHz), 9 kHz (150 kHz - 30 MHz)

7.6.3.3 Radiated Spurious Emission 30 MHz – 1000 MHz

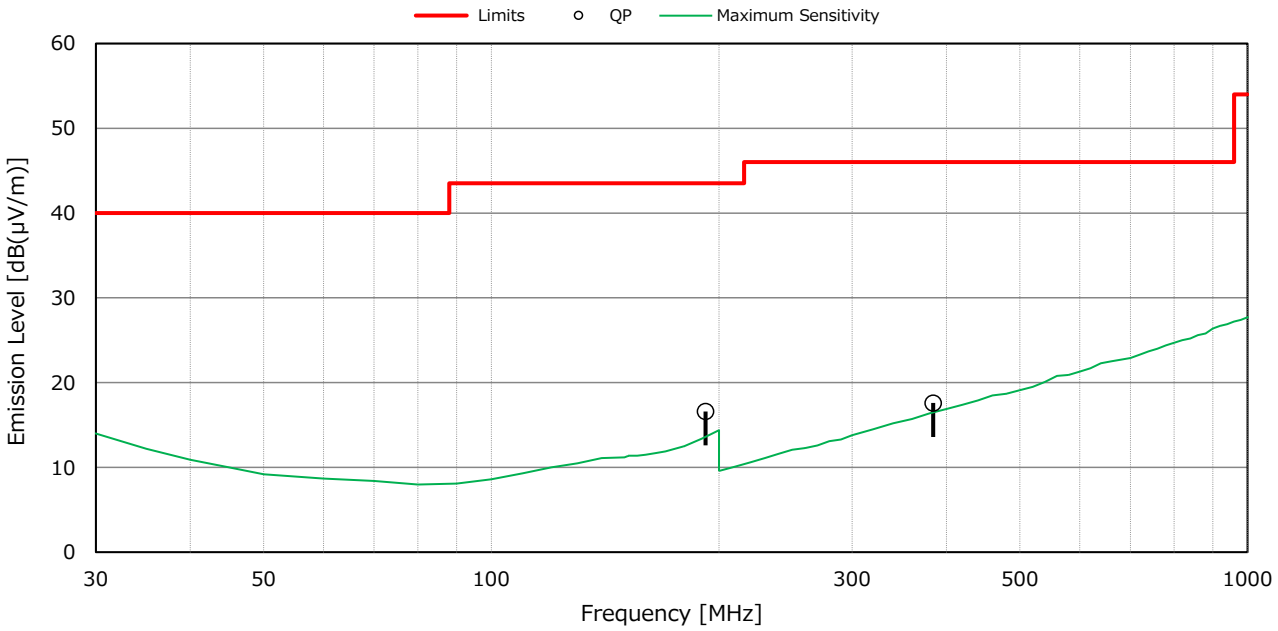
Mode of EUT : All modes have been investigated and the worst case mode has been listed.

Test voltage : 6VDC

Test Date: August 23, 2023
Temp.: 23 °C, RH: 51 %, Atm.: 1010 hPa

Antenna polarization : Horizontal

Frequency [MHz]	Factor [dB]	Readings [dB(μV)]	Limits [dB(μV/m)]	Results [dB(μV/m)]	Margin [dB]	Remarks
192.012	-26.4	43.0	43.5	16.6	+ 26.9	-
384.033	-23.5	41.1	46.0	17.6	+ 28.4	-

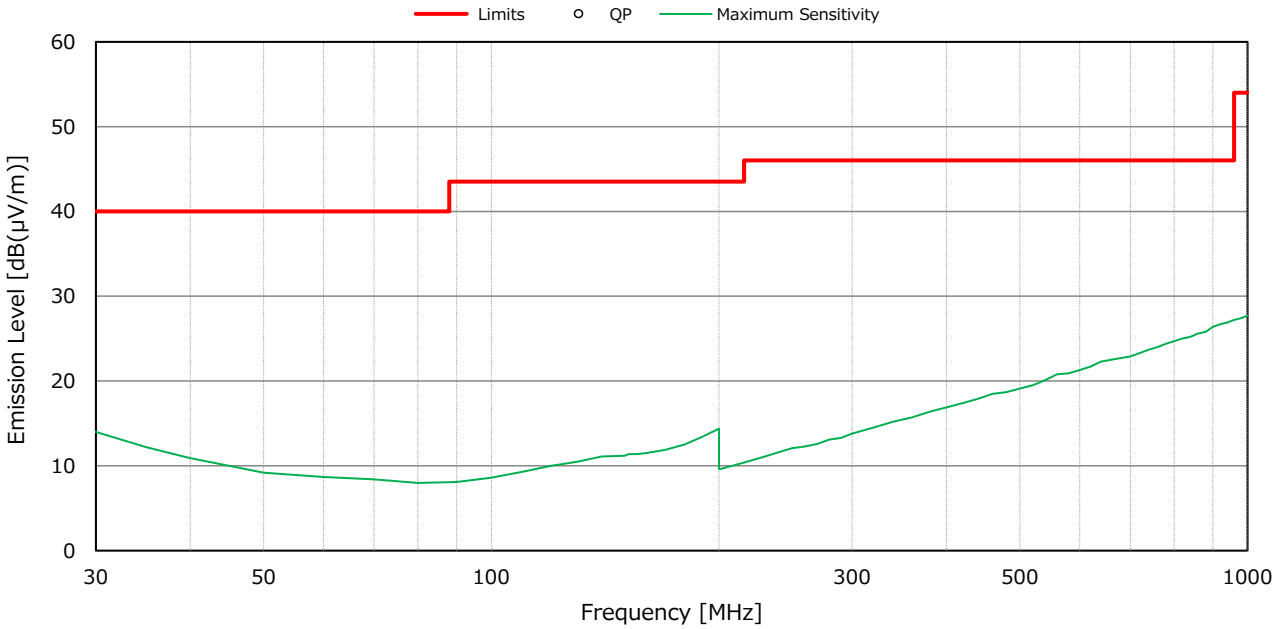


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 30 MHz to 1000 MHz.
3) The factor includes the antenna factor and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (QP) = -26.4 + 43.0 = 16.6 dB(μV) at 192.012 MHz
   Antenna Height : 188 cm, Turntable Rotation Position : 250 °
5) QP : Quasi-Peak detector
6) Bandwidth : 120 kHz (30 MHz - 1000 MHz)

Test voltage : 6VDC

Test Date: August 23, 2023
Temp.: 23 °C, RH: 51 %, Atm.: 1010 hPa

Antenna polarization : Vertical



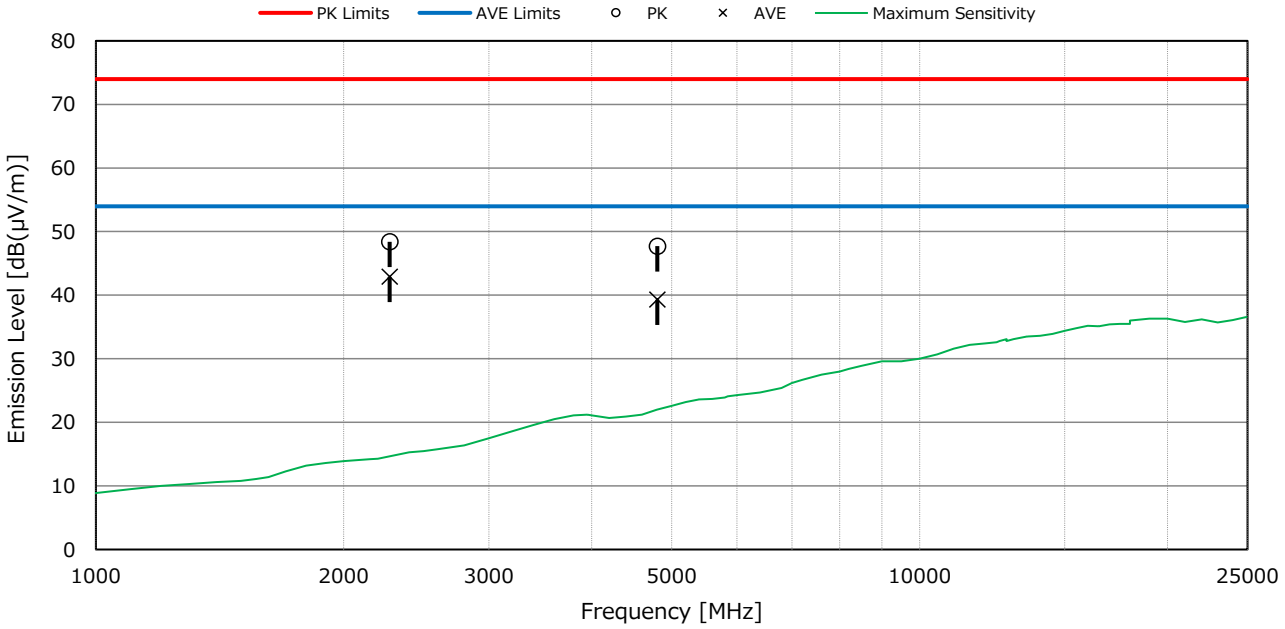
NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 30 MHz to 1000 MHz.
3) QP : Quasi-Peak detector
4) Bandwidth : 120 kHz (30 MHz - 1000 MHz)
5) All emission levels were below the noise floor, or more than 15 dB below the applied limits.

7.6.3.4 Radiated Spurious Emission above 1 GHz

Test voltage : 6VDC
Test condition : BLE 1 Mbps, 0 ch (2402 MHz)
Antenna polarization : Horizontal

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency [MHz]	Factor [dB]	Readings [dB(μV)] PK	Readings [dB(μV)] AVE	Limits [dB(μV/m)] PK	Limits [dB(μV/m)] AVE	Results [dB(μV/m)] PK	Results [dB(μV/m)] AVE	Margin [dB] PK	Margin [dB] AVE	Remarks
2274.02	-10.2	58.6	53.1	74.0	54.0	48.4	42.9	+ 25.6	+ 11.1	Y
4804.00	- 5.8	53.5	45.1	74.0	54.0	47.7	39.3	+ 26.3	+ 14.7	X

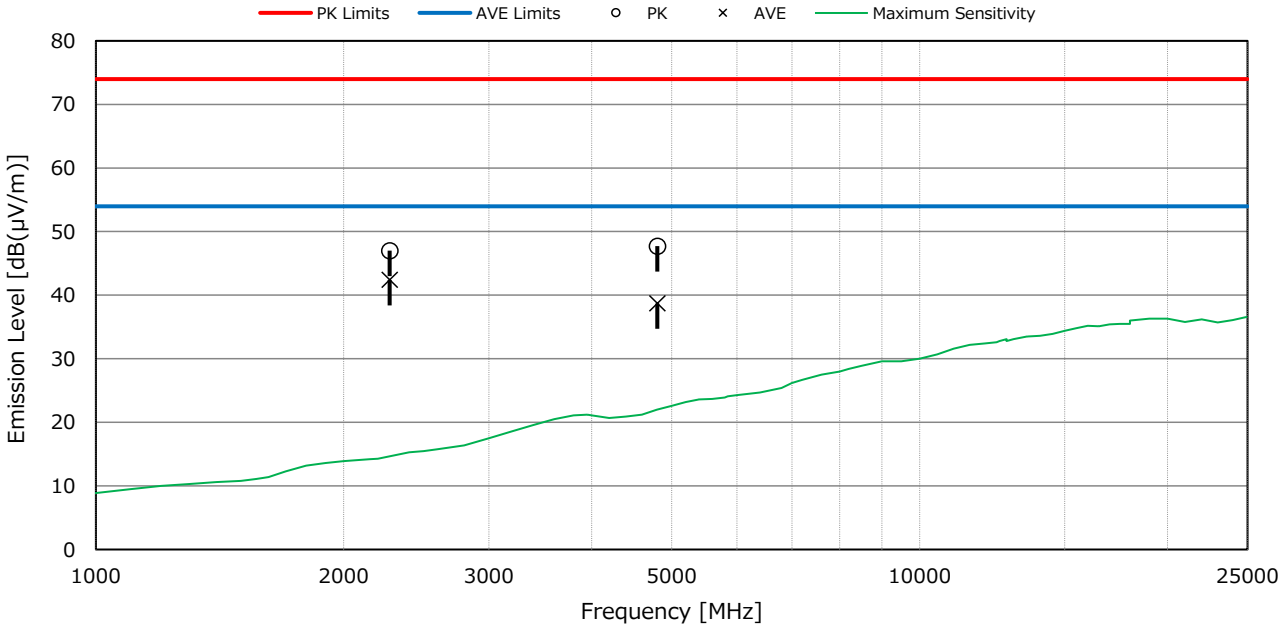


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -10.2 + 53.1 = 42.9 dB(μV) at 2274.02 MHz
   Antenna Height : 129 cm, Turntable Rotation Position : 197 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)

Test voltage : 6VDC
Test condition : BLE 1 Mbps, 0 ch (2402 MHz)
Antenna polarization : Vertical

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2274.02	-10.2	57.2	52.6	74.0	54.0	47.0	42.4	+ 27.0	+ 11.6	X
4804.00	- 5.8	53.5	44.5	74.0	54.0	47.7	38.7	+ 26.3	+ 15.3	Z

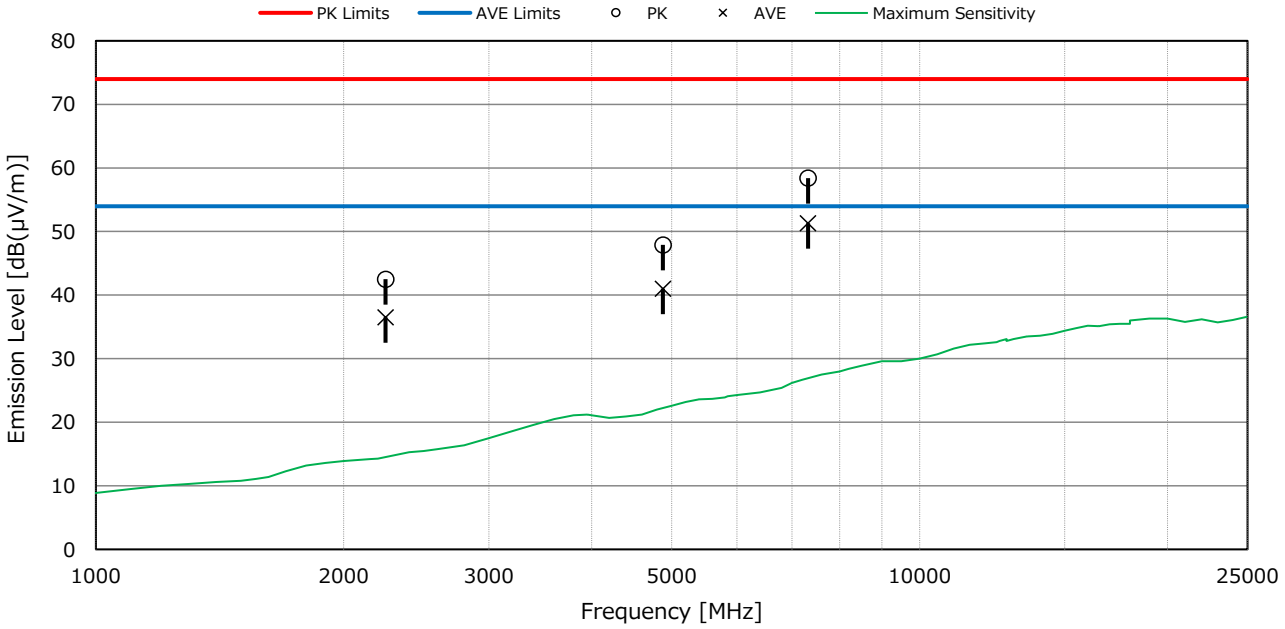


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -10.2 + 52.6 = 42.4 dB(μV) at 2274.02 MHz
   Antenna Height : 143 cm, Turntable Rotation Position : 51 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)

Test voltage : 6VDC
Test condition : BLE 1 Mbps, 19 ch (2440 MHz)
Antenna polarization : Horizontal

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2247.98	-11.3	53.8	47.8	74.0	54.0	42.5	36.5	+ 31.5	+ 17.5	Z
4880.00	- 5.6	53.5	46.6	74.0	54.0	47.9	41.0	+ 26.1	+ 13.0	X
7320.00	- 0.7	59.1	52.0	74.0	54.0	58.4	51.3	+ 15.6	+ 2.7	Y

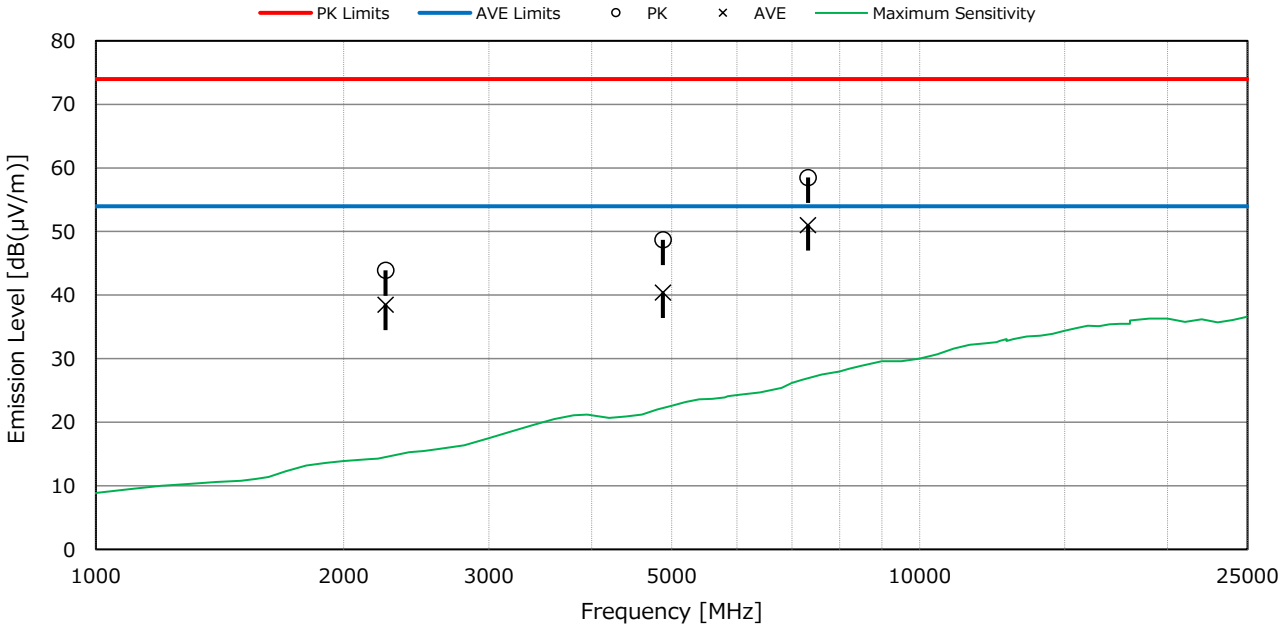


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -0.7 + 52.0 = 51.3 dB(μV) at 7320.00 MHz
   Antenna Height : 130 cm, Turntable Rotation Position : 124 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)
7) The measurement result (worst point) is within the range of measurement uncertainty.

Test voltage : 6VDC
Test condition : BLE 1 Mbps, 19 ch (2440 MHz)
Antenna polarization : Vertical

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2247.98	-11.3	55.2	49.8	74.0	54.0	43.9	38.5	+ 30.1	+ 15.5	X
4880.00	- 5.6	54.3	46.0	74.0	54.0	48.7	40.4	+ 25.3	+ 13.6	X
7320.00	- 0.7	59.2	51.7	74.0	54.0	58.5	51.0	+ 15.5	+ 3.0	X

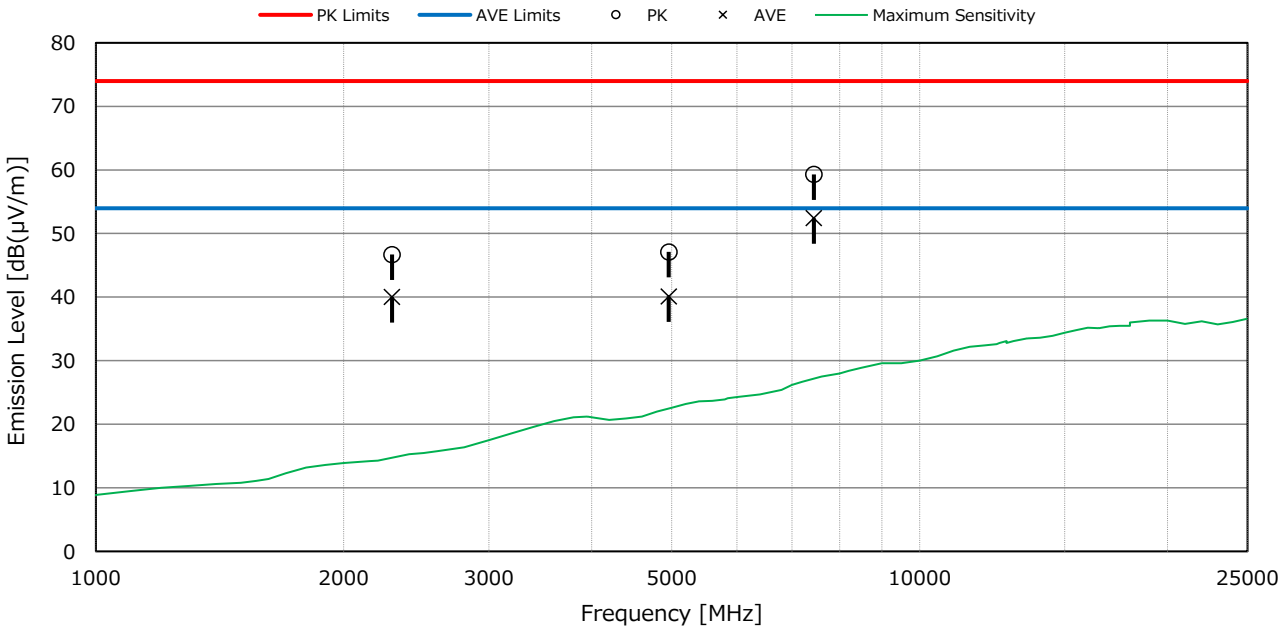


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -0.7 + 51.7 = 51.0 dB(μV) at 7320.00 MHz
   Antenna Height : 127 cm, Turntable Rotation Position : 305 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)
7) The measurement result (worst point) is within the range of measurement uncertainty.

Test voltage : 6VDC
Test condition : BLE 1 Mbps, 39 ch (2480 MHz)
Antenna polarization : Horizontal

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2288.14	- 8.8	55.5	48.8	74.0	54.0	46.7	40.0	+ 27.3	+ 14.0	Y
4960.00	- 5.3	52.4	45.4	74.0	54.0	47.1	40.1	+ 26.9	+ 13.9	Y
7440.00	- 0.4	59.7	52.8	74.0	54.0	59.3	52.4	+ 14.7	+ 1.6	X

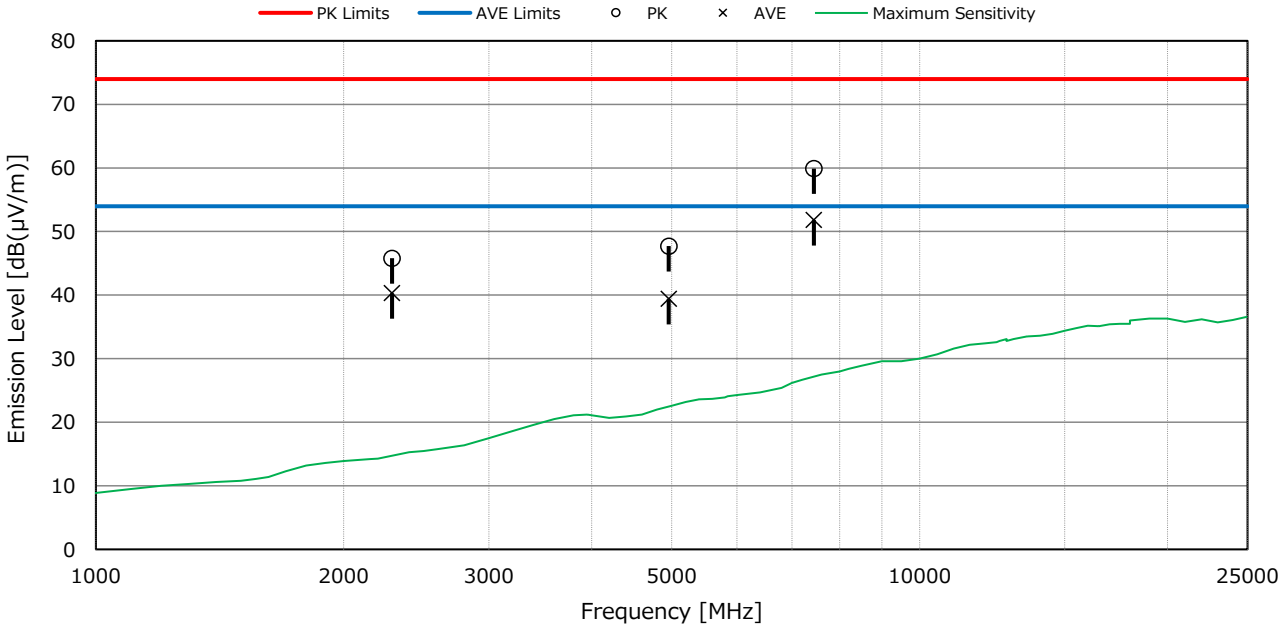


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -0.4 + 52.8 = 52.4 dB(μV) at 7440.00 MHz
   Antenna Height : 130 cm, Turntable Rotation Position : 310 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)
7) The measurement result (worst point) is within the range of measurement uncertainty.

Test voltage : 6VDC
Test condition : BLE 1 Mbps, 39 ch (2480 MHz)
Antenna polarization : Vertical

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2288.14	- 8.8	54.6	49.1	74.0	54.0	45.8	40.3	+ 28.2	+ 13.7	Z
4960.00	- 5.3	53.0	44.7	74.0	54.0	47.7	39.4	+ 26.3	+ 14.6	X
7440.00	- 0.4	60.3	52.2	74.0	54.0	59.9	51.8	+ 14.1	+ 2.2	Z

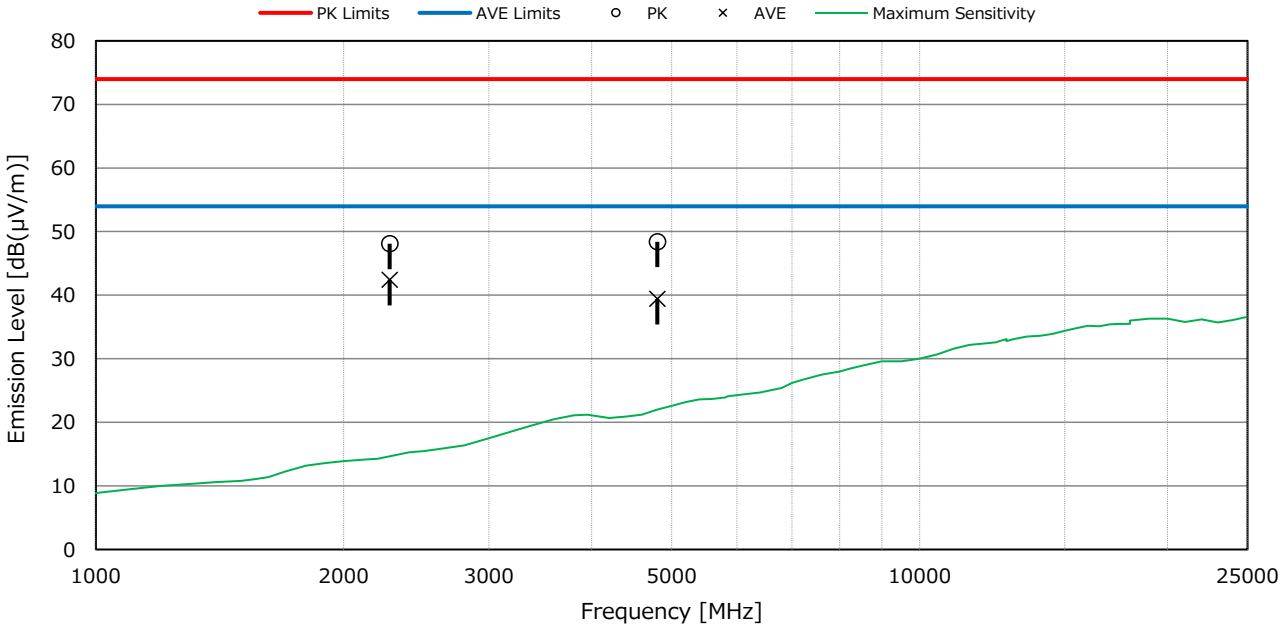


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -0.4 + 52.2 = 51.8 dB(μV) at 7440.00 MHz
   Antenna Height : 149 cm, Turntable Rotation Position : 279 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)
7) The measurement result (worst point) is within the range of measurement uncertainty.

Test voltage : 6VDC
Test condition : BLE 2 Mbps, 0 ch (2402 MHz)
Antenna polarization : Horizontal

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2274.05	-10.2	58.3	52.6	74.0	54.0	48.1	42.4	+ 25.9	+ 11.6	Y
4804.00	- 5.8	54.2	45.2	74.0	54.0	48.4	39.4	+ 25.6	+ 14.6	Y

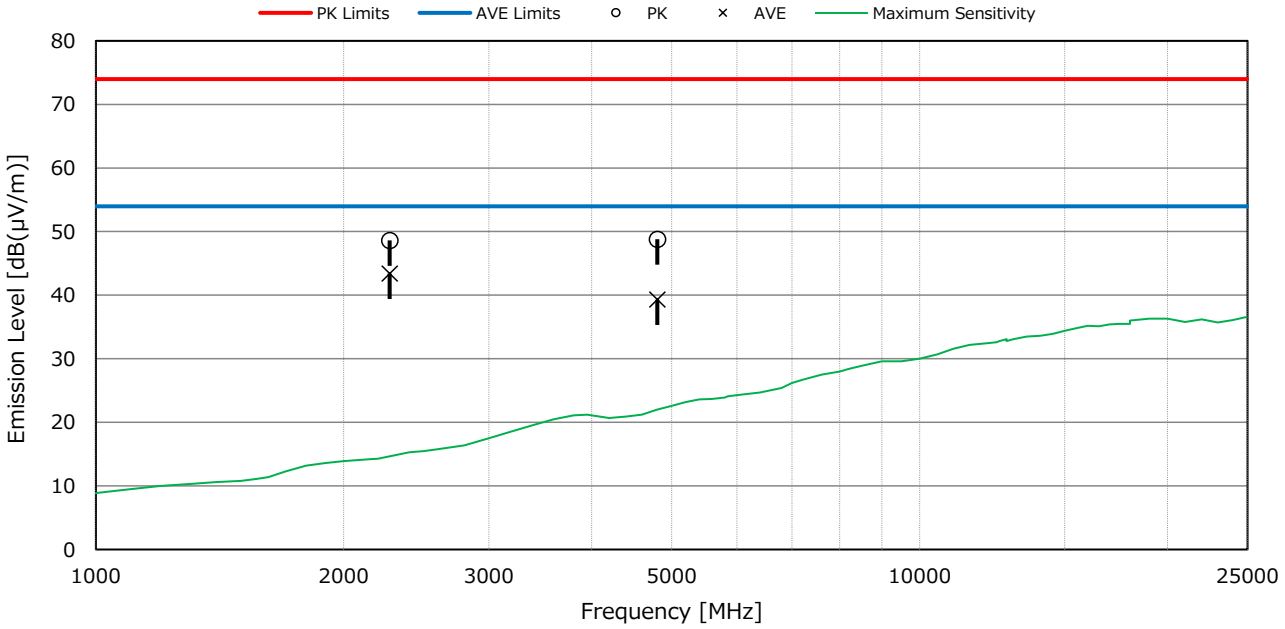


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -10.2 + 52.6 = 42.4 dB(μV) at 2274.05 MHz
   Antenna Height : 139 cm, Turntable Rotation Position : 281 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)

Test voltage : 6VDC
Test condition : BLE 2 Mbps, 0 ch (2402 MHz)
Antenna polarization : Vertical

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2274.05	-10.2	58.8	53.6	74.0	54.0	48.6	43.4	+ 25.4	+ 10.6	Z
4804.00	- 5.8	54.6	45.1	74.0	54.0	48.8	39.3	+ 25.2	+ 14.7	Z

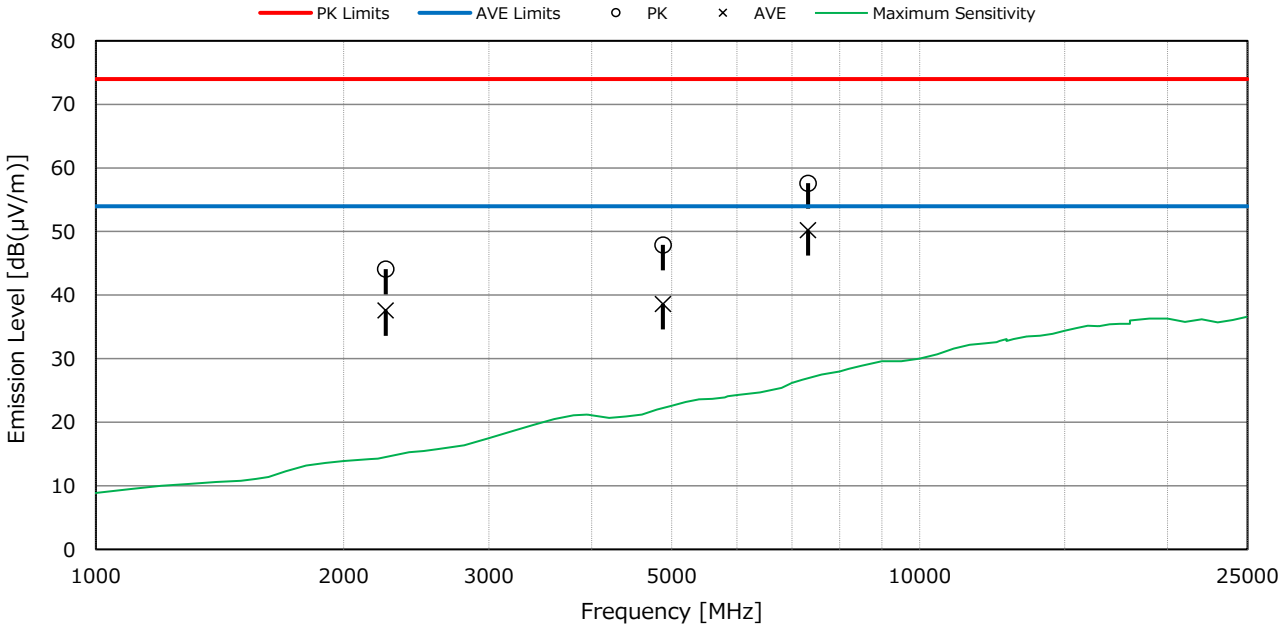


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -10.2 + 53.6 = 43.4 dB(μV) at 2274.05 MHz
   Antenna Height : 144 cm, Turntable Rotation Position : 98 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)

Test voltage : 6VDC
Test condition : BLE 2 Mbps, 19 ch (2440 MHz)
Antenna polarization : Horizontal

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2248.10	-11.3	55.4	48.9	74.0	54.0	44.1	37.6	+ 29.9	+ 16.4	Y
4880.00	- 5.6	53.5	44.2	74.0	54.0	47.9	38.6	+ 26.1	+ 15.4	Y
7320.00	- 0.7	58.3	50.9	74.0	54.0	57.6	50.2	+ 16.4	+ 3.8	X

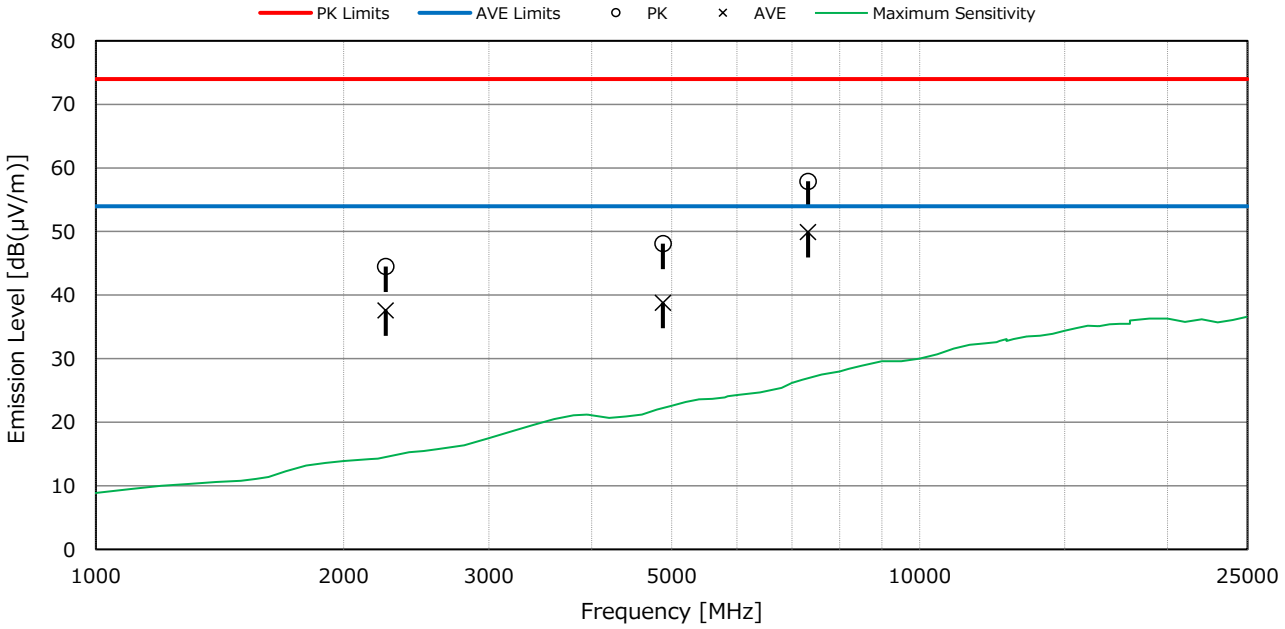


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -0.7 + 50.9 = 50.2 dB(μV) at 7320.00 MHz
   Antenna Height : 137 cm, Turntable Rotation Position : 297 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)
7) The measurement result (worst point) is within the range of measurement uncertainty.

Test voltage : 6VDC
Test condition : BLE 2 Mbps, 19 ch (2440 MHz)
Antenna polarization : Vertical

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2248.10	-11.3	55.8	48.9	74.0	54.0	44.5	37.6	+ 29.5	+ 16.4	X
4880.00	- 5.6	53.7	44.4	74.0	54.0	48.1	38.8	+ 25.9	+ 15.2	X
7320.00	- 0.7	58.6	50.6	74.0	54.0	57.9	49.9	+ 16.1	+ 4.1	Z

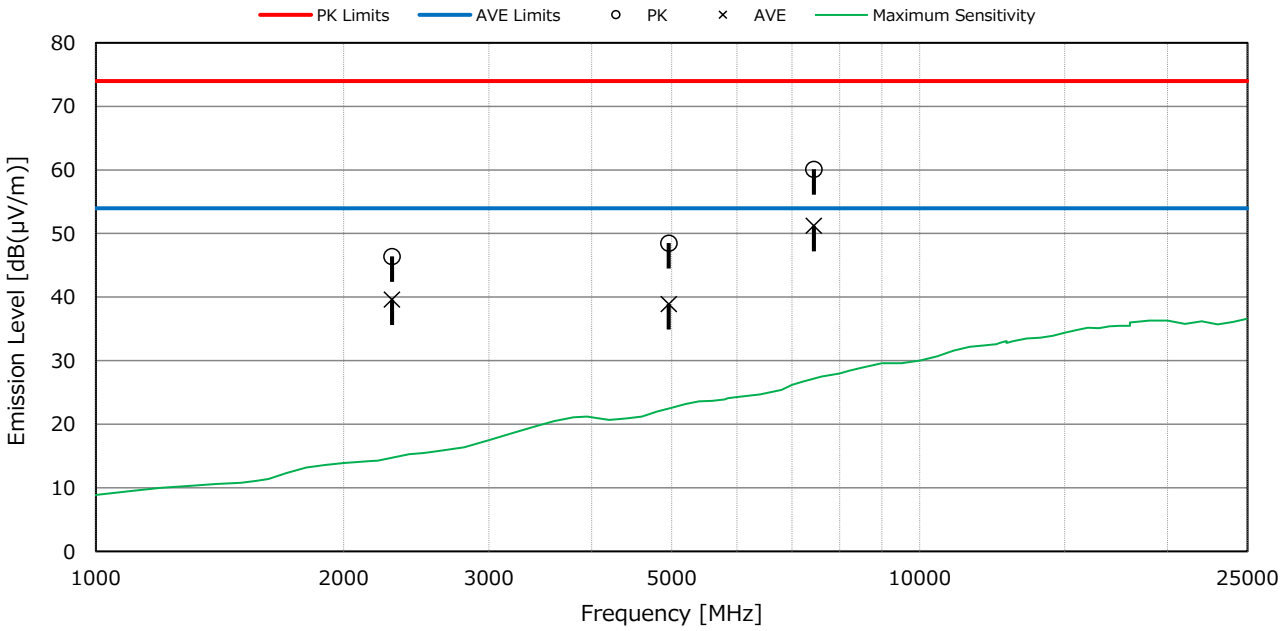


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -0.7 + 50.6 = 49.9 dB(μV) at 7320.00 MHz
   Antenna Height : 127 cm, Turntable Rotation Position : 306 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)
7) The measurement result (worst point) is within the range of measurement uncertainty.

Test voltage : 6VDC
Test condition : BLE 2 Mbps, 39 ch (2480 MHz)
Antenna polarization : Horizontal

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2288.13	- 8.8	55.2	48.4	74.0	54.0	46.4	39.6	+ 27.6	+ 14.4	X
4960.00	- 5.3	53.8	44.2	74.0	54.0	48.5	38.9	+ 25.5	+ 15.1	Y
7440.00	- 0.4	60.5	51.6	74.0	54.0	60.1	51.2	+ 13.9	+ 2.8	X

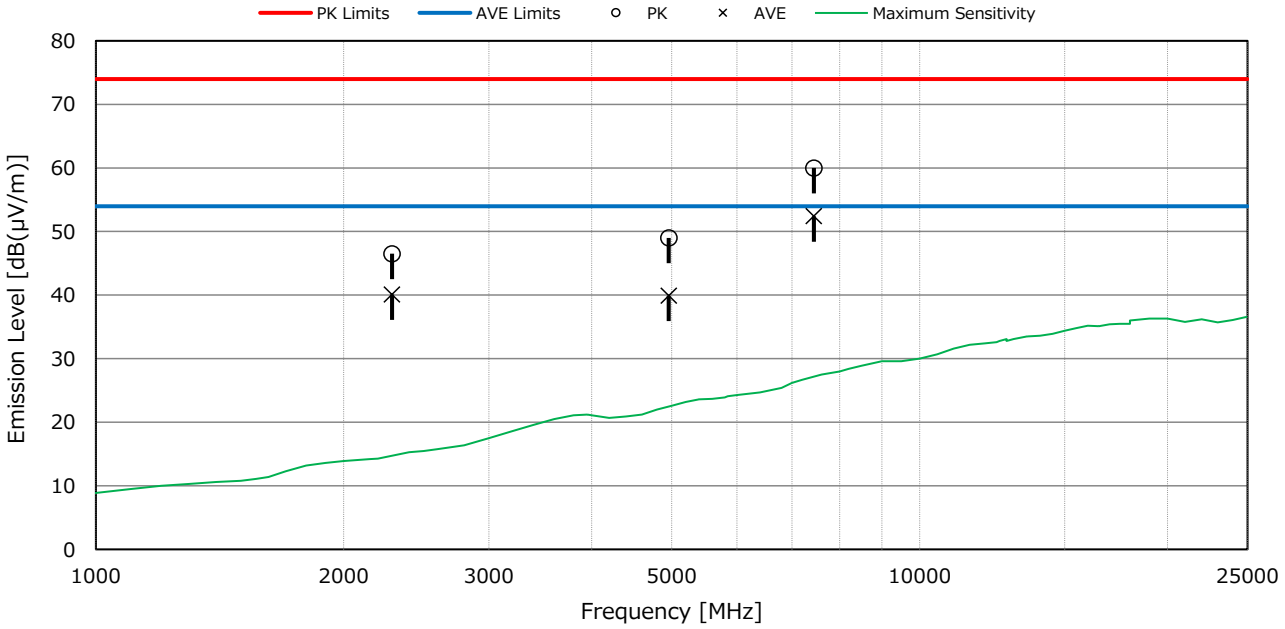


NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -0.4 + 51.6 = 51.2 dB(μV) at 7440.00 MHz
   Antenna Height : 118 cm, Turntable Rotation Position : 290 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)
7) The measurement result (worst point) is within the range of measurement uncertainty.

Test voltage : 6VDC
Test condition : BLE 2 Mbps, 39 ch (2480 MHz)
Antenna polarization : Vertical

Test Date: August 18, 2023
Temp.: 21 °C, RH: 50 %, Atm.: 1010 hPa

Frequency	Factor	Readings [dB(μV)]		Limits [dB(μV/m)]		Results [dB(μV/m)]		Margin [dB]		Remarks
[MHz]	[dB]	PK	AVE	PK	AVE	PK	AVE	PK	AVE	
2288.13	- 8.8	55.3	48.9	74.0	54.0	46.5	40.1	+ 27.5	+ 13.9	Z
4960.00	- 5.3	54.3	45.2	74.0	54.0	49.0	39.9	+ 25.0	+ 14.1	X
7440.00	- 0.4	60.4	52.8	74.0	54.0	60.0	52.4	+ 14.0	+ 1.6	Z



NOTES
1) Measurement Distance : 3 m
2) The spectrum was checked from 1 GHz to 25 GHz.
3) The factor includes the antenna factor, the pre-amplifier gain and the cable loss.
4) Calculated result as the worst point shown on underline :
   Factor + Reading (AVE) = -0.4 + 52.8 = 52.4 dB(μV) at 7440.00 MHz
   Antenna Height : 166 cm, Turntable Rotation Position : 279 °
5) PK : Peak detector, AVE : Average detector
6) Bandwidth : 1 MHz (1 GHz - 25 GHz)
7) The measurement result (worst point) is within the range of measurement uncertainty.