



# RADIO TEST REPORT

FCC ID : 2ADKMI2100601  
Equipment : Pet Digital Scale  
Brand Name : Brook Zoo  
Model Name : ZBZ\_PDS-001  
Applicant : Zeroplus Technology Corporation  
3F, No. 121, Jian 8th Rd., Chung Ho District, New Taipei City 235, Taiwan  
Manufacturer : ZHONGSHAN KANGNUO ELECTRONIC CO.,LTD.  
NO.9 DONGCHENG NORTH ROAD,DONGSHENG,ZHONGSHAN,GUANGDONG, CHINA  
Standard : 47 CFR FCC Part 15.247

The product was received on Mar. 31, 2022, and testing was started from Nov. 21, 2022 and completed on Dec. 15, 2022. We, Sporton International Inc. Hsinchu Laboratory, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of Sporton International Inc. Hsinchu Laboratory, the test report shall not be reproduced except in full.

Approved by: Sam Chen

**Sporton International Inc. Hsinchu Laboratory**

No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)



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**Photographs of EUT v01**





## Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
-	15.207	AC Power-line Conducted Emissions	N/A	Note
3.1	15.247(a)	DTS Bandwidth	PASS	-
3.2	15.247(b)	Maximum Conducted Output Power	PASS	-
3.3	15.247(e)	Power Spectral Density	PASS	-
3.4	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.5	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Note: It was supplied power by battery for EUT; it's not necessary to apply to AC Power Port Conducted Emission test.

**Declaration of Conformity:**

1. The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers. It's means measurement values may risk exceeding the limit of regulation standards, if measurement uncertainty is include in test results.
2. The measurement uncertainty please refer to report "Measurement Uncertainty".

**Comments and Explanations:**

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

**Reviewed by: Sam Chen****Report Producer: Penny Kao**



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

Frequency Range (MHz)	Bluetooth Mode	Ch. Frequency (MHz)	Channel Number
2400-2483.5	LE	2402-2480	0-39 [40]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	BT-LE(1Mbps)	1	1

Note:

- Bluetooth LE uses a GFSK modulation.
- BWch is the nominal channel bandwidth.

### 1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	Elink	BM16	PCB Antenna	N/A	-1.08

Note1: The above information was declared by manufacturer.

Note2: The EUT has one antenna.

#### Bluetooth function (1TX/1RX):

Port 1 can be used as transmitting/receiving antenna.

Port 1 could transmit/receive simultaneously.

### 1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-LE(1Mbps)	0.285	5.45	295.625u	10k

Note:

- DC is Duty Cycle.
- DCF is Duty Cycle Factor.

### 1.1.4 EUT Operational Condition

EUT Power Type	From battery*2 (AAA 1.5V)		
Function	<input checked="" type="checkbox"/> Point-to-multipoint	<input type="checkbox"/> Point-to-point	
Test Software Version	BK3256 RF Test -v1.5 en		
Support Mode	<input checked="" type="checkbox"/> LE 1M PHY: 1 Mb/s		
	<input type="checkbox"/> LE Coded PHY (S=2): 500 Kb/s		
	<input type="checkbox"/> LE Coded PHY (S=8): 125 Kb/s		
	<input type="checkbox"/> LE 2M PHY: 2 Mb/s		

Note: The above information was declared by manufacturer.



## 1.2 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ◆ 47 CFR FCC Part 15.247
- ◆ ANSI C63.10-2013

The following reference test guidance is not within the scope of accreditation of TAF.

- ◆ FCC KDB 558074 D01 v05r02
- ◆ FCC KDB 414788 D01 v01r01

## 1.3 Testing Location Information

<b>Testing Location Information</b>	
Test Lab. : Sporton International Inc. Hsinchu Laboratory	
Hsinchu	ADD: No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County 302010, Taiwan (R.O.C.)
(TAF: 3787)	TEL: 886-3-656-9065      FAX: 886-3-656-9085
Test site Designation No. TW3787 with FCC.	
Conformity Assessment Body Identifier (CABID) TW3787 with ISED.	

Test Condition	Test Site No.	Test Engineer	Test Environment (°C / %)	Test Date
RF Conducted	TH03-CB	Eason Chen	23.4-25.1 / 52-64	Dec. 08, 2022~ Dec. 15, 2022
Radiated < 1GHz	03CH05-CB	Black Lu	24.4-25.5 / 55-58	Nov. 23, 2022
Radiated > 1GHz	03CH06-CB	Richard Pai	23.7-24.8 / 56-59	Nov. 21, 2022~ Nov. 22, 2022

## 1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2))

Test Items	Uncertainty	Remark
Radiated Emission (9kHz ~ 30MHz)	3.4 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	5.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	5.2 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	4.7 dB	Confidence levels of 95%
Conducted Emission	3.2 dB	Confidence levels of 95%
Output Power Measurement	0.8 dB	Confidence levels of 95%
Power Density Measurement	3.2 dB	Confidence levels of 95%
Bandwidth Measurement	2.0 %	Confidence levels of 95%



## 2 Test Configuration of EUT

### 2.1 Test Channel Mode

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	3
2440MHz	2
2480MHz	2



## 2.2 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density Emissions in Non-restricted Frequency Bands
<b>Test Condition</b>	Conducted measurement at transmit chains

The Worst Case Mode for Following Conformance Tests	
<b>Tests Item</b>	Emissions in Restricted Frequency Bands Test Voltage: 120Vac / 60Hz
<b>Test Condition</b>	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.
<b>Operating Mode &lt; 1GHz</b>	Normal Link
	After evaluating, the worst case was found at X axis, thus the measurement will follow this same test configuration.
1	EUT in X axis + battery
<b>Operating Mode &gt; 1GHz</b>	CTX
	After evaluating, the worst case was found at Y axis, thus the measurement will follow this same test configuration.
1	EUT in Y axis

Note: The battery is for measurement only, would not be marketed.

The battery information as below:

Support Unit	Brand	Model Name	FCC ID
Battery	Toshiba	LR03	N/A

## 2.3 EUT Operation during Test

For CTX Mode:

The EUT was programmed to be in continuously transmitting mode.

For Normal Link Mode:

During the test, the EUT operation to normal function.





## 2.4 Accessories

N/A

## 2.5 Support Equipment

For Radiated (below 1GHz):

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	iPad mini 2	Apple	ME279TA	N/A
B	Battery*2	Toshiba	LR03	N/A

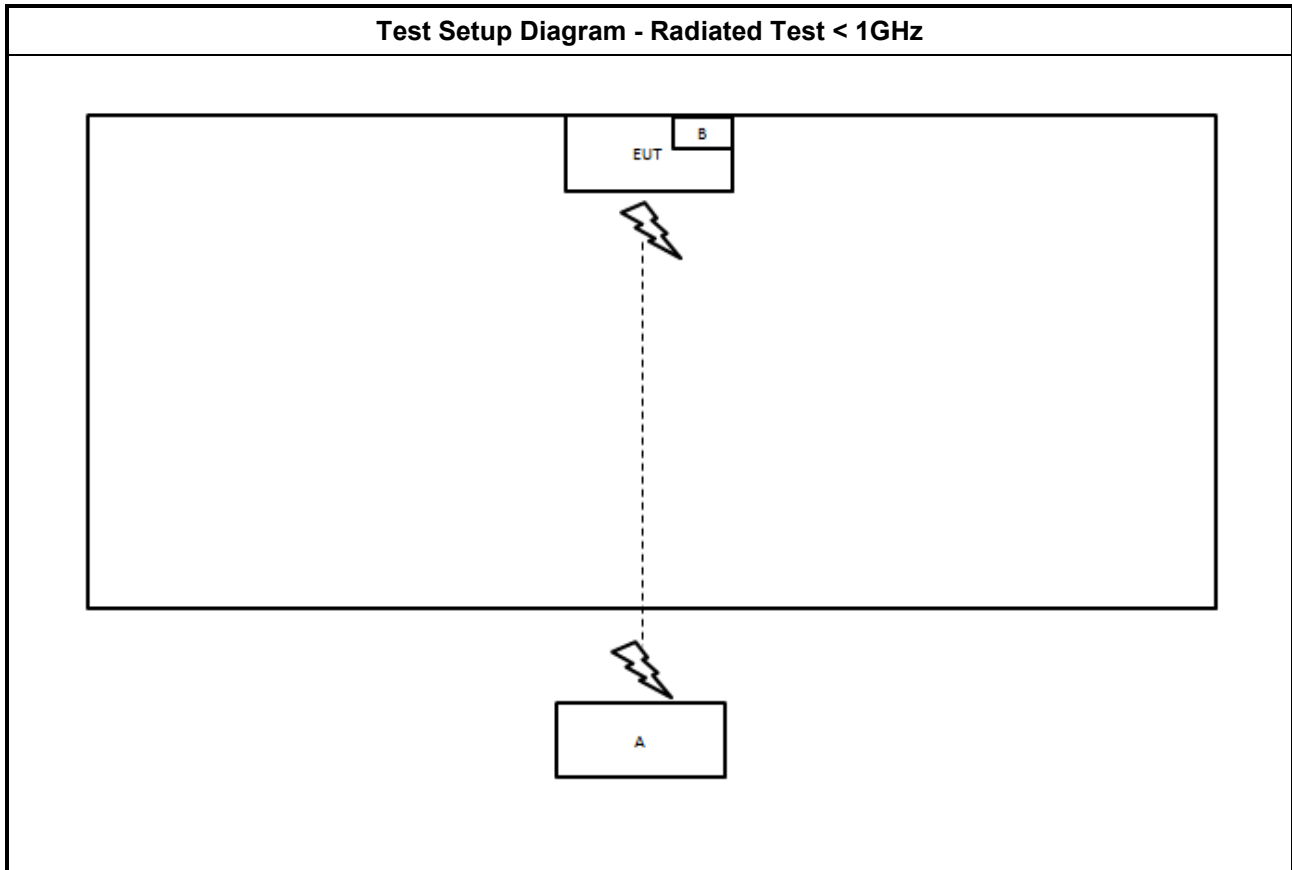
For Radiated (above 1GHz):

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	Notebook	DELL	E4300	N/A

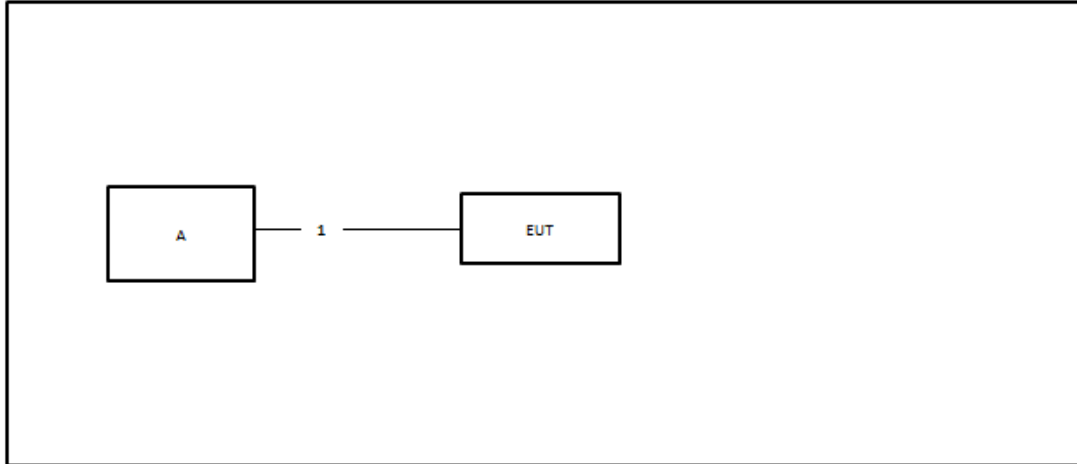
For RF Conducted:

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
A	Notebook	DELL	E4300	N/A
B	Test Fixture	Cilicon Lab	CP2102	N/A

## 2.6 Test Setup Diagram



**Test Setup Diagram - Radiated Test > 1GHz**



Item	Connection	Shielded	Length
1	Console Cable	No	0.2m

### 3 Transmitter Test Result

#### 3.1 DTS Bandwidth

##### 3.1.1 6dB Bandwidth Limit

6dB Bandwidth Limit
<b>Systems using digital modulation techniques:</b>
<ul style="list-style-type: none"> <li>▪ 6 dB bandwidth <math>\geq</math> 500 kHz.</li> </ul>

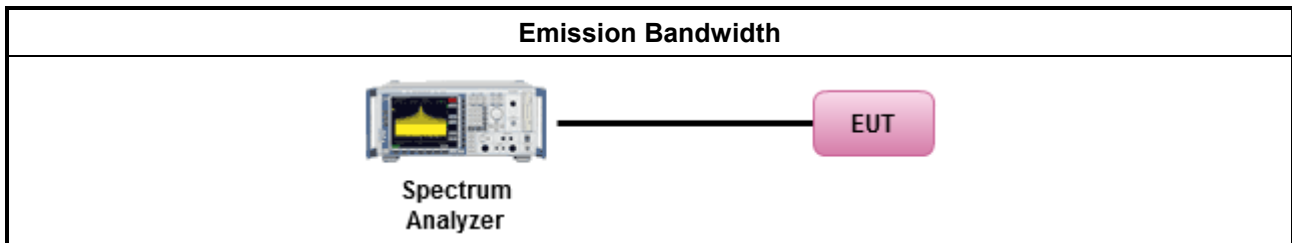
##### 3.1.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

##### 3.1.3 Test Procedures

Test Method
<ul style="list-style-type: none"> <li>▪ For the emission bandwidth shall be measured using one of the options below:</li> </ul>
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.1 Option 1 for 6 dB bandwidth measurement.
<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.2 & C63.10 clause 11.8.2 Option 2 for 6 dB bandwidth measurement.
<input type="checkbox"/> Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of Emission Bandwidth

Refer as Appendix A



### 3.2 Maximum Conducted Output Power

#### 3.2.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit	
	<ul style="list-style-type: none"> <li>▪ If <math>G_{TX} \leq 6</math> dBi, then <math>P_{Out} \leq 30</math> dBm (1 W)</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Point-to-multipoint systems (P2M): If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)</math> dBm</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Point-to-point systems (P2P): If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)/3</math> dBm</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Smart antenna system (SAS):</li> </ul>
	<ul style="list-style-type: none"> <li>- Single beam: If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)/3</math> dBm</li> </ul>
	<ul style="list-style-type: none"> <li>- Overlap beam: If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)/3</math> dBm</li> </ul>
	<ul style="list-style-type: none"> <li>- Aggregate power on all beams: If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)/3 + 8</math> dB dBm</li> </ul>
$P_{Out}$ = maximum peak conducted output power or maximum conducted output power in dBm, $G_{TX}$ = the maximum transmitting antenna directional gain in dBi.	

#### 3.2.2 Measuring Instruments

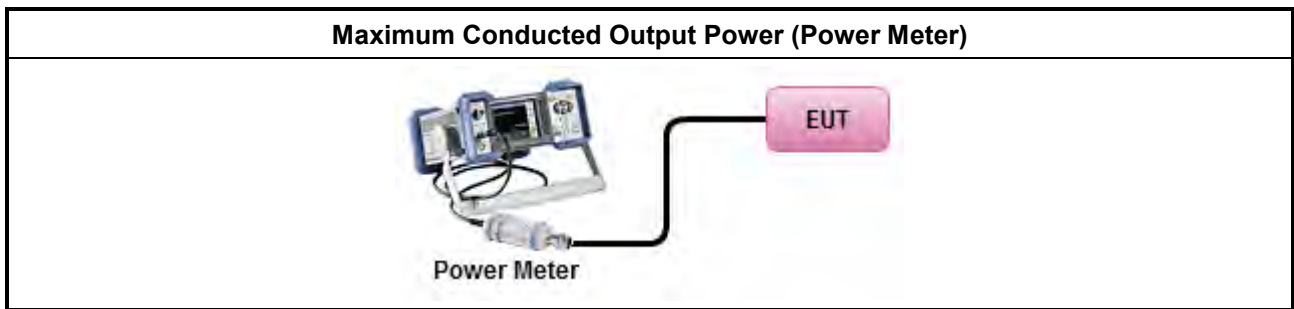
Refer a test equipment and calibration data table in this test report.

#### 3.2.3 Test Procedures

Test Method	
	<ul style="list-style-type: none"> <li>▪ Maximum Peak Conducted Output Power</li> </ul>
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.1.1 & C63.10 clause 11.9.1.1 (RBW $\geq$ EBW method).
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.1.3 & C63.10 clause 11.9.1.3 (peak power meter).
	<ul style="list-style-type: none"> <li>▪ Maximum Conducted Output Power</li> </ul>
	[duty cycle $\geq$ 98% or external video / power trigger]
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.2 Method AVGSA-1.
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.3 Method AVGSA-1A. (alternative)
	duty cycle < 98% and average over on/off periods with duty factor
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.4 Method AVGSA-2.
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.5 Method AVGSA-2A (alternative)
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.6 Method AVGSA-3
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.2.2 & C63.10 clause 11.9.2.2.7 Method AVGSA-3A (alternative)
	Measurement using a power meter (PM)
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.1 Method AVGPM (using an RF average power meter).
	<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 8.3.2.3 & C63.10 clause 11.9.2.3.2 Method AVGPM-G (using

	an gate RF average power meter).
	<ul style="list-style-type: none"> <li>▪ For conducted measurement.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ If the EUT supports multiple transmit chains using options given below: Refer as FCC KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ If multiple transmit chains, EIRP calculation could be following as methods:  <math>P_{total} = P_1 + P_2 + \dots + P_n</math>                      (calculated in linear unit [mW] and transfer to log unit [dBm])  <math>EIRP_{total} = P_{total} + DG</math> </li> </ul>

**3.2.4 Test Setup**



**3.2.5 Test Result of Maximum Conducted Output Power**

Refer as Appendix B



### 3.3 Power Spectral Density

#### 3.3.1 Power Spectral Density Limit

Power Spectral Density Limit
<ul style="list-style-type: none"> <li>Power Spectral Density (PSD) ≤ 8 dBm/3kHz</li> </ul>

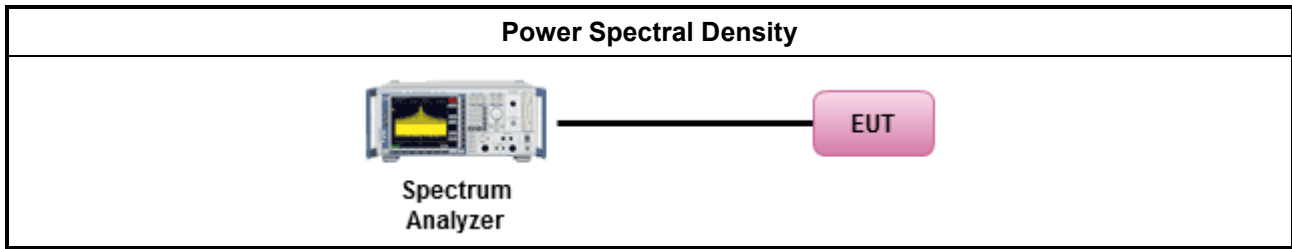
#### 3.3.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.3.3 Test Procedures

Test Method
<ul style="list-style-type: none"> <li>Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).</li> </ul>
<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 8.4 & C63.10 clause 11.10 Method Max. PSD. [duty cycle ≥ 98% or external video / power trigger]
<ul style="list-style-type: none"> <li>For conducted measurement.</li> </ul>
<ul style="list-style-type: none"> <li>If The EUT supports multiple transmit chains using options given below: <ul style="list-style-type: none"> <li><input type="checkbox"/> Option 1: Measure and sum the spectra across the outputs. Refer as FCC KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.</li> <li><input type="checkbox"/> Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,</li> <li><input type="checkbox"/> Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.</li> </ul> </li> </ul>

### 3.3.4 Test Setup



### 3.3.5 Test Result of Power Spectral Density

Refer as Appendix C



### 3.4 Emissions in Non-restricted Frequency Bands

#### 3.4.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	Limit (dBc)
Peak output power procedure	20
Average output power procedure	30

Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak PSD level.

Note 2: If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in-band average PSD level.

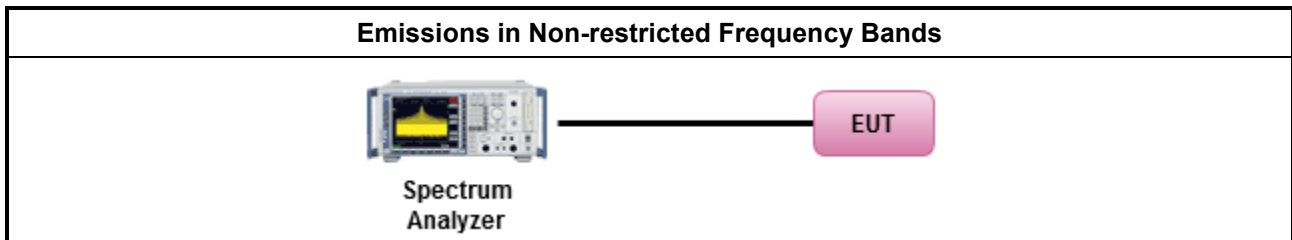
#### 3.4.2 Measuring Instruments

Refer a test equipment and calibration data table in this test report.

#### 3.4.3 Test Procedures

Test Method
<ul style="list-style-type: none"> <li>Refer as FCC KDB 558074, clause 8.5 for unwanted emissions into non-restricted bands.</li> </ul>

#### 3.4.4 Test Setup



#### 3.4.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix D



### 3.5 Emissions in Restricted Frequency Bands

#### 3.5.1 Emissions in Restricted Frequency Bands Limit

Restricted Band Emissions Limit			
Frequency Range (MHz)	Field Strength (uV/m)	Field Strength (dBuV/m)	Measure Distance (m)
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1: Test distance for frequencies at or above 30 MHz, measurements may be performed at a distance other than the limit distance provided they are not performed in the near field and the emissions to be measured can be detected by the measurement equipment. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor of 20 dB/decade (inverse of linear distance for field-strength measurements, inverse of linear distance-squared for power-density measurements).

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements below 30 MHz at a closer distance than the limit distance, the results shall be extrapolated to the specified distance by either making measurements at a minimum of two or more distances on at least one radial to determine the proper extrapolation factor or by using the square of an inverse linear distance extrapolation factor (40 dB / decade). The test report shall specify the extrapolation method used to determine compliance of the EUT.

Note 3: Using the distance of 1m during the test for above 18 GHz, and the test value to correct for the distance factor at 3m.

#### 3.5.2 Measuring Instruments

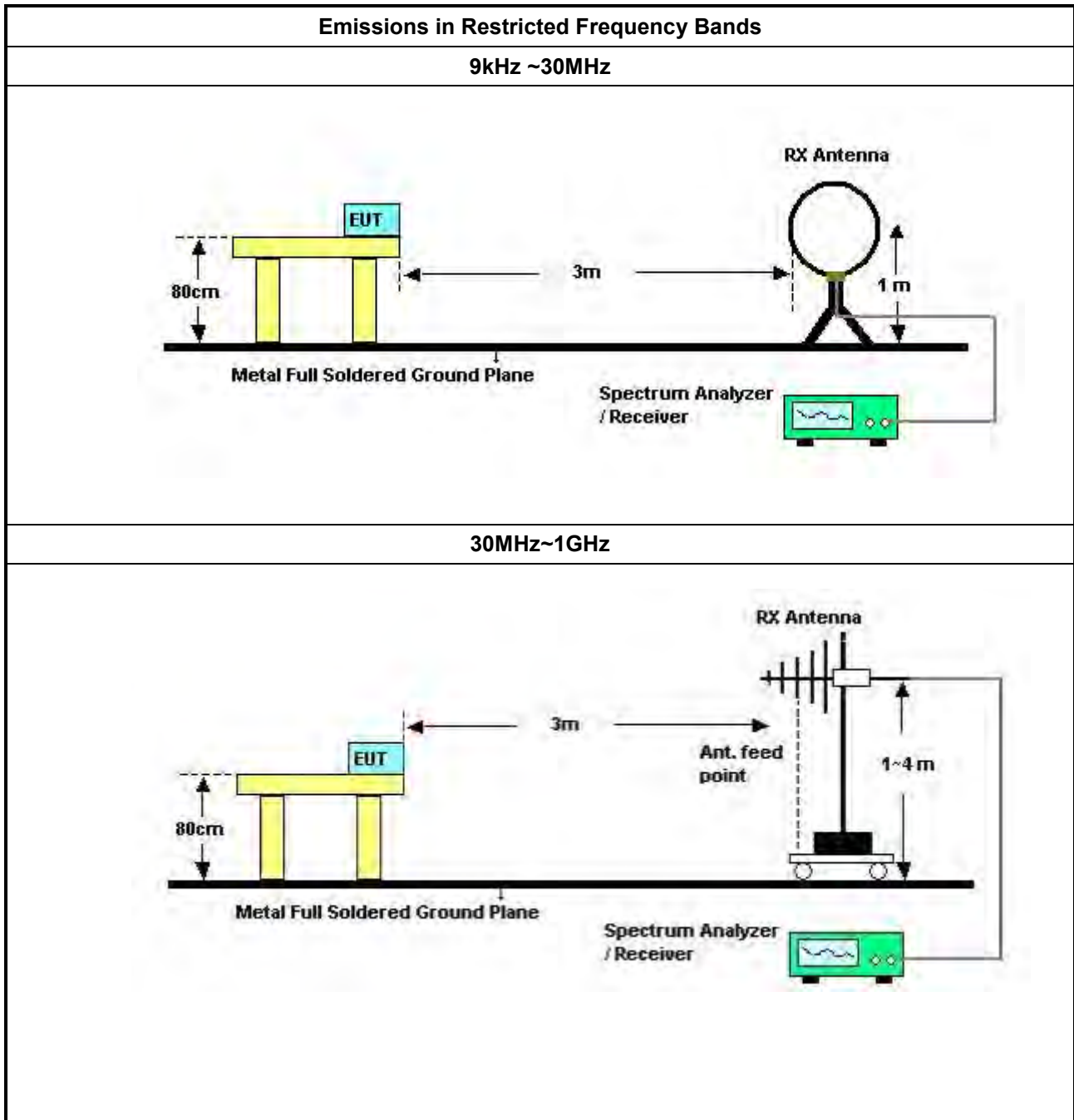
Refer a test equipment and calibration data table in this test report.

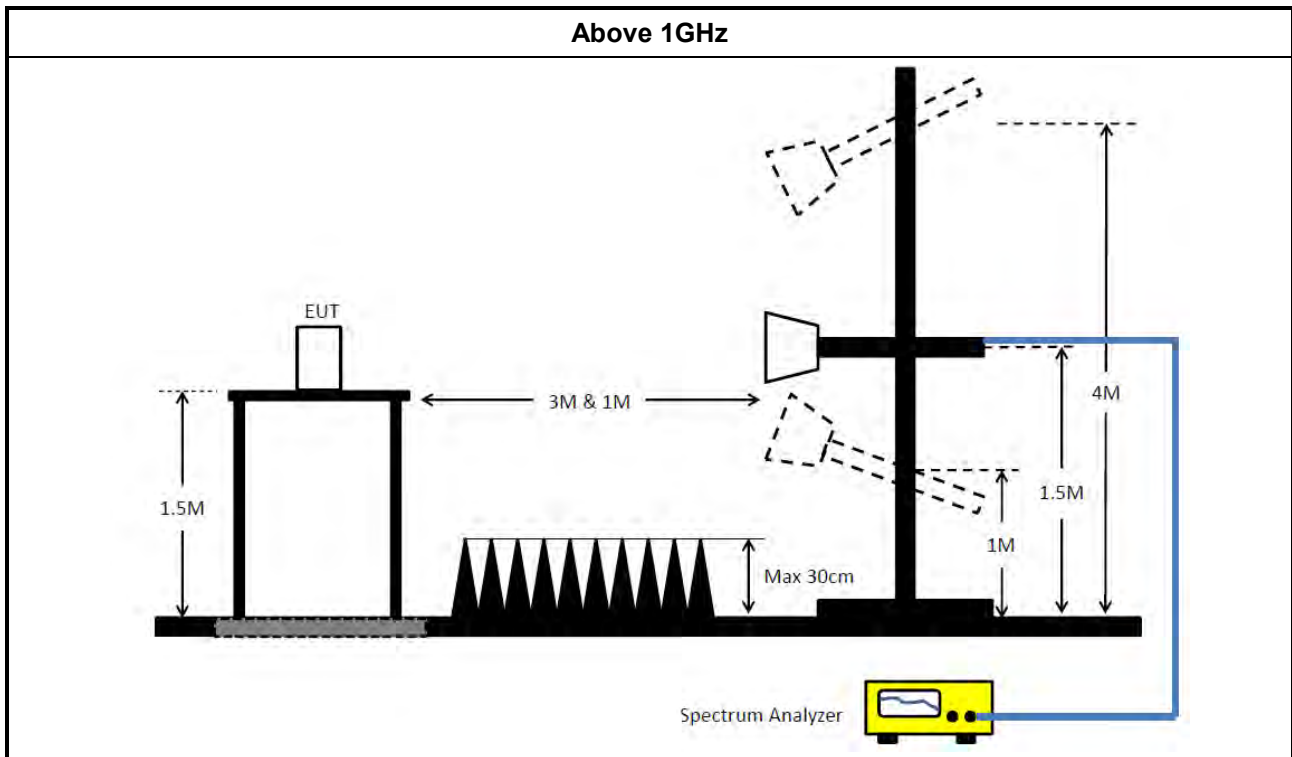


**3.5.3 Test Procedures**

<b>Test Method</b>	
<ul style="list-style-type: none"> <li>▪ The average emission levels shall be measured in [duty cycle <math>\geq</math> 98 or duty factor].</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ For the transmitter unwanted emissions shall be measured using following options below:</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 558074, clause 8.6 for unwanted emissions into restricted bands.</li> </ul>
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.1(trace averaging for duty cycle $\geq$ 98%).
	<input type="checkbox"/> Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.2(trace averaging + duty factor).
	<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.5.3(Reduced VBW $\geq$ 1/T).
	<input type="checkbox"/> Refer as ANSI C63.10, clause 11.12.2.5.3 (Reduced VBW). VBW $\geq$ 1/T, where T is pulse time.
	<input type="checkbox"/> Refer as ANSI C63.10, clause 7.5 average value of pulsed emissions.
	<input checked="" type="checkbox"/> Refer as FCC KDB 558074, clause 8.6 & C63.10 clause 11.12.2.4 measurement procedure peak limit.
<ul style="list-style-type: none"> <li>▪ For the transmitter band-edge emissions shall be measured using following options below:</li> </ul>	
	<ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 558074 clause 8.7 &amp; c63.10 clause 11.13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 558074, clause 8.7 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Refer as FCC KDB 558074, clause 8.7 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).</li> </ul>
	<ul style="list-style-type: none"> <li>▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below:                (1) Measure and sum the spectra across the outputs or                (2) Measure and add 10 log(N) dB             </li> </ul>
	<ul style="list-style-type: none"> <li>▪ For FCC KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.</li> </ul>

**3.5.4 Test Setup**





### 3.5.5 Measurement Results Calculation

The measured Level is calculated using:

Corrected Reading: Antenna factor (AF) + Cable loss (CL) + Read level (Raw) - Preamp factor (PA)(if applicable) = Level.

### 3.5.6 Emissions in Restricted Frequency Bands (Below 30MHz)

There is a comparison data of both open-field test site and alternative test site - semi-Anechoic chamber according to KDB414788 Radiated Test Site, and the result came out very similar.

All amplitude of spurious emissions that are attenuated by more than 20 dB below the permissible value has no need to be reported.

The radiated emissions were investigated from 9 kHz or the lowest frequency generated within the device, up to the 10th harmonic or 40 GHz, whichever is appropriate.

### 3.5.7 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix E



## 4 Test Equipment and Calibration Data

Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	May 14, 2022	May 13, 2023	Radiation (03CH05-CB)
3m Semi Anechoic Chamber NSA	TDK	SAC-3M	03CH05-CB	30 MHz ~ 1 GHz	Aug. 03, 2022	Aug. 02, 2023	Radiation (03CH05-CB)
Bilog Antenna with 6dB Attenuator	TESEQ & EMCI	CBL 6112D & N-6-06	35236 & AT-N0610	30MHz ~ 2GHz	Mar. 25, 2022	Mar. 24, 2023	Radiation (03CH05-CB)
Pre-Amplifier	EMCI	EMC330N	980331	20MHz ~ 3GHz	Apr. 26, 2022	Apr. 25, 2023	Radiation (03CH05-CB)
Spectrum Analyzer	R&S	FSP40	100304	9kHz ~ 40GHz	Mar. 14, 2022	Mar. 13, 2023	Radiation (03CH05-CB)
EMI Test Receiver	R&S	ESCS	826547/017	9kHz ~ 2.75GHz	Jun. 17, 2022	Jun. 16, 2023	Radiation (03CH05-CB)
RF Cable-low	Woken	RG402	Low Cable-04+23	30MHz~1GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH05-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH05-CB)
3m Semi Anechoic Chamber VSWR	TDK	SAC-3M	03CH06-CB	1GHz ~18GHz 3m	Sep. 30, 2022	Sep. 29, 2023	Radiation (03CH06-CB)
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA 9120D-1292	1GHz~18GHz	Aug. 09, 2022	Aug. 08, 2023	Radiation (03CH06-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Aug. 22, 2022	Aug. 21, 2023	Radiation (03CH06-CB)
Pre-Amplifier	Agilent	83017A	MY53270064	0.5GHz ~ 26.5GHz	Aug 02, 2022	Aug 01, 2023	Radiation (03CH06-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 20, 2022	Jul. 19, 2023	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSP40	100080	9kHz~40GHz	Dec. 24, 2021	Dec. 23, 2022	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-67	1GHz~18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH06-CB)
RF Cable-high	Woken	RG402	High Cable-05+67	1GHz~18GHz	Oct. 03, 2022	Oct. 02, 2023	Radiation (03CH06-CB)
High Cable	Woken	WCA0929M	40G#5+7	1GHz ~ 40 GHz	Dec. 14, 2021	Dec. 13, 2022	Radiation (03CH06-CB)
High Cable	Woken	WCA0929M	40G#5	1GHz ~ 40 GHz	Dec. 08, 2021	Dec. 07, 2022	Radiation (03CH06-CB)
High Cable	Woken	WCA0929M	40G#7	1GHz ~ 40 GHz	Dec. 14, 2021	Dec. 13, 2022	Radiation (03CH06-CB)



Instrument	Brand	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Radiation (03CH06-CB)
Spectrum analyzer	R&S	FSV40	101028	9kHz~40GHz	Jan. 07, 2022	Jan. 06, 2023	Conducted (TH03-CB)
Power Sensor	Anritsu	MA2411B	1531344	300MHz~40GHz	Jul. 31, 2022	Jul. 30, 2023	Conducted (TH03-CB)
Power Meter	Anritsu	ML2495A	1728002	300MHz~40GHz	Jul. 31, 2022	Jul. 30, 2023	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-11	1 GHz –18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-12	1 GHz –18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-13	1 GHz –18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-14	1 GHz –18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH03-CB)
RF Cable-high	Woken	RG402	High Cable-15	1 GHz –18 GHz	Oct. 03, 2022	Oct. 02, 2023	Conducted (TH03-CB)
RF Power Divider	STI	2 Way	DV-2 way-01	1GHz ~ 8GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH03-CB)
RF Power Divider	STI	2 Way	DV-2 way-02	1GHz ~ 8GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH03-CB)
RF Power Divider	STI	2 Way	DV-2 way-03	1GHz ~ 8GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH03-CB)
RF Power Divider	STI	2 Way	DV-2 way-04	1GHz ~ 8GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH03-CB)
Switch	SPTCB	SP-SWI	SWI-03	1 GHz –26.5 GHz	Oct. 04, 2022	Oct. 03, 2023	Conducted (TH03-CB)
Test Software	SPORTON	SENSE	V5.10	-	N.C.R.	N.C.R.	Conducted (TH03-CB)

Note: Calibration Interval of instruments listed above is one year.

NCR means Non-Calibration required.



**Summary**

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
2.4-2.4835GHz	-	-	-	-	-
BT-LE(1Mbps)	797.5k	1.322M	1M32F1D	783.75k	1.184M

Max-N dB = Maximum 6dB down bandwidth; Max-OBW = Maximum 99% occupied bandwidth;  
Min-N dB = Minimum 6dB down bandwidth; Min-OBW = Minimum 99% occupied bandwidth

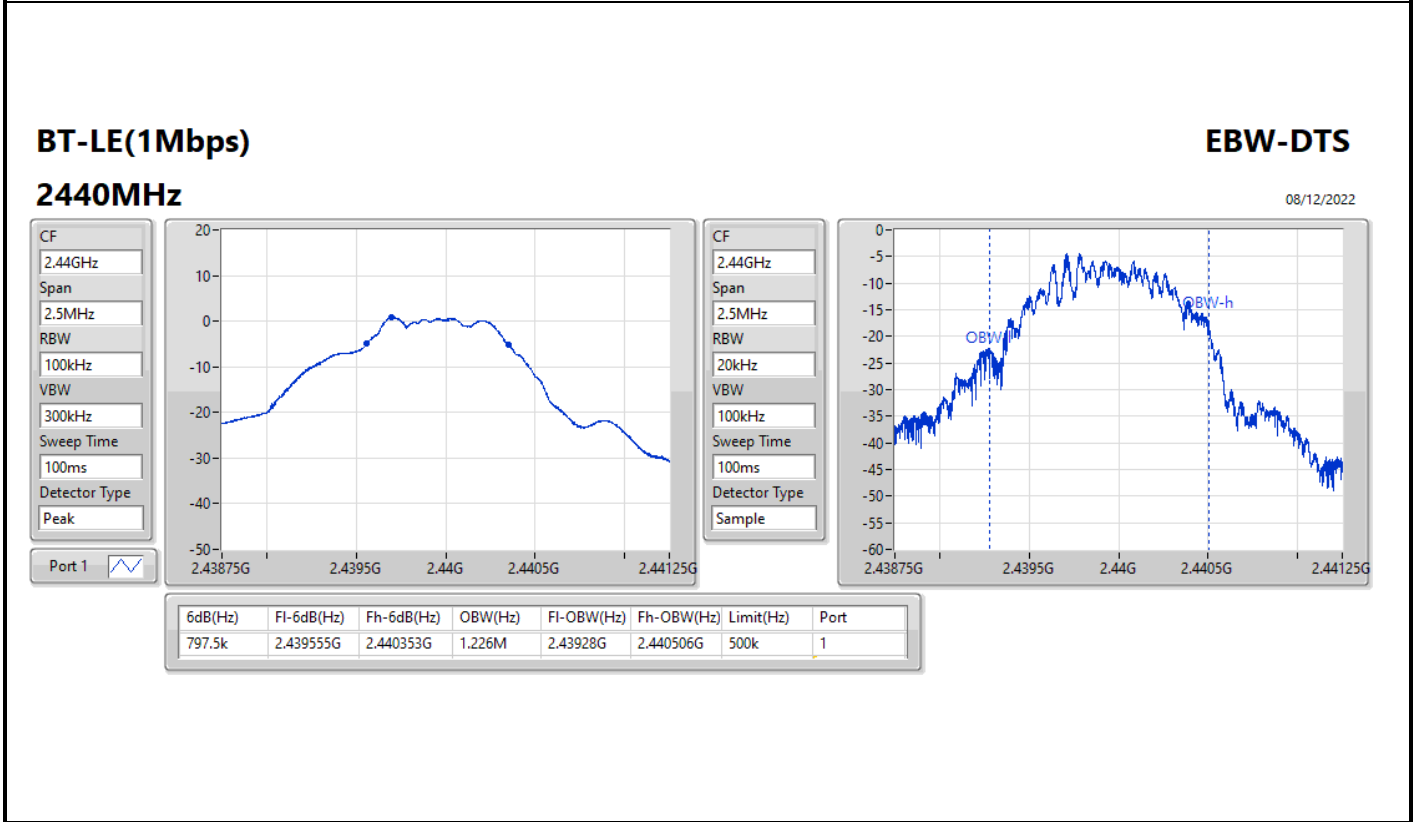
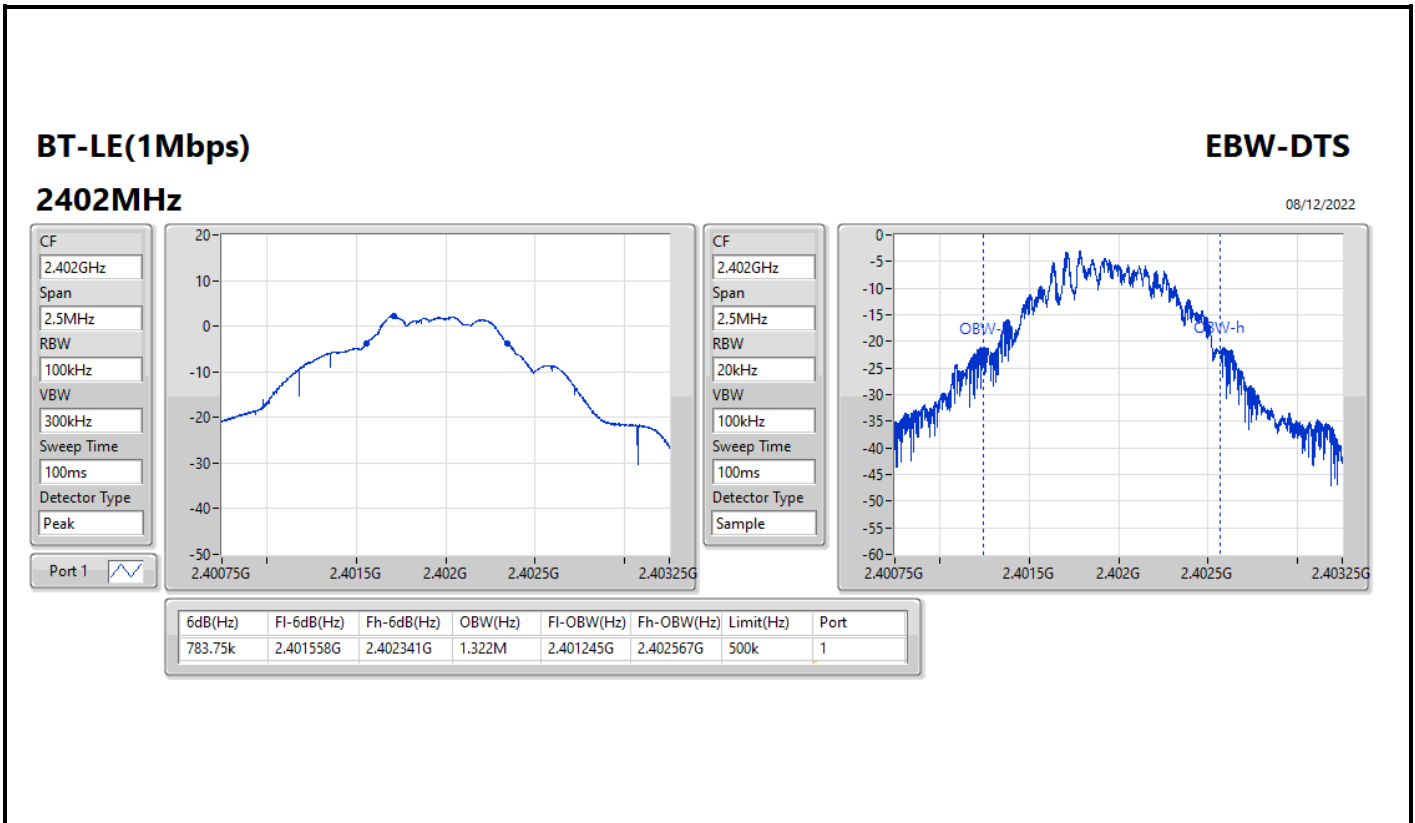


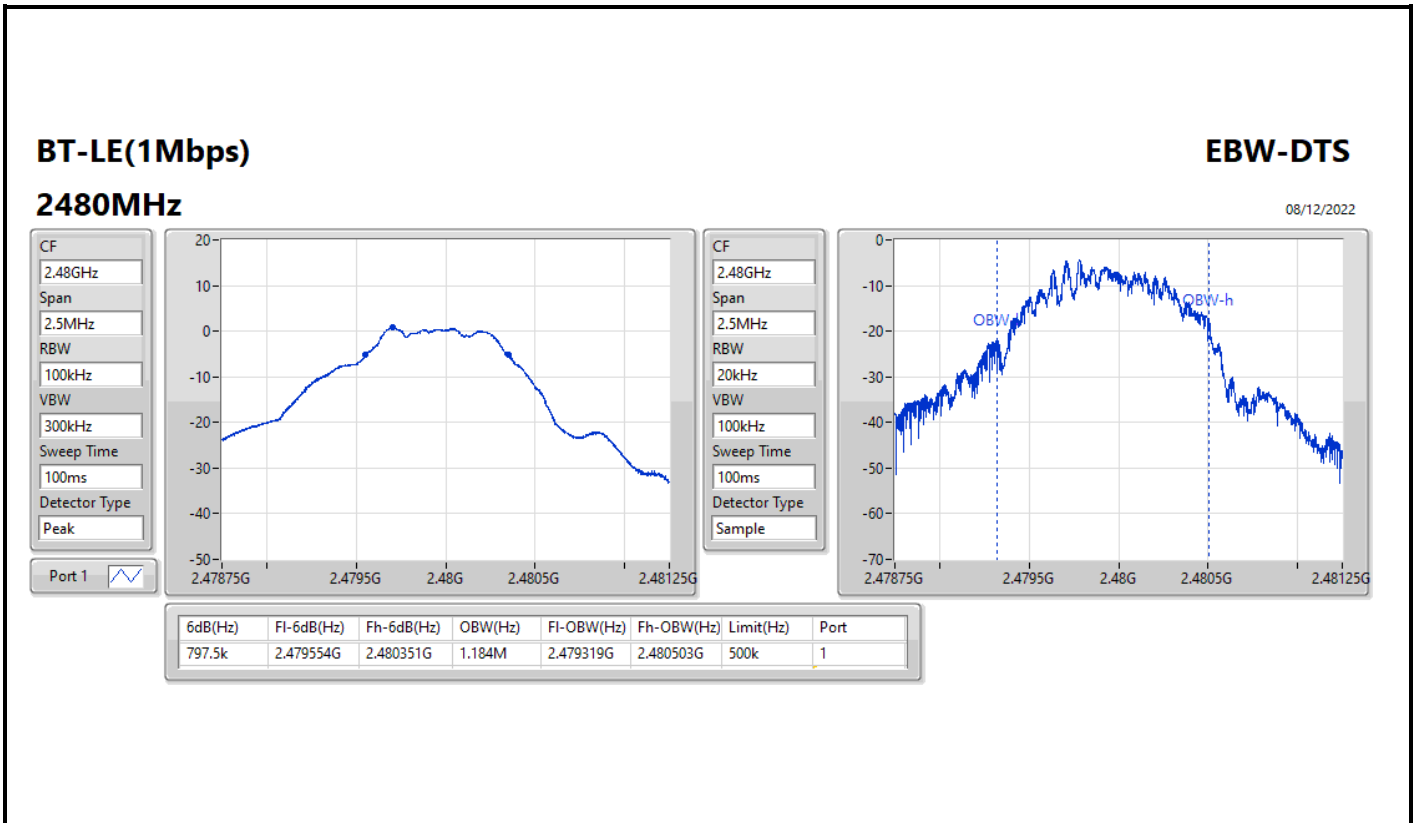


Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	783.75k	1.322M
2440MHz	Pass	500k	797.5k	1.226M
2480MHz	Pass	500k	797.5k	1.184M

Port X-N dB = Port X 6dB down bandwidth;  
Port X-OBW = Port X 99% occupied bandwidth







**Summary**

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	3.35	0.00216



**Result**

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	-1.08	3.35	30.00
2440MHz	Pass	-1.08	1.91	30.00
2480MHz	Pass	-1.08	1.96	30.00

DG = Directional Gain; Port X = Port X output power



**Summary**

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-14.23

RBW = 3kHz;



Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	-1.08	-14.23	8.00
2440MHz	Pass	-1.08	-15.60	8.00
2480MHz	Pass	-1.08	-14.65	8.00

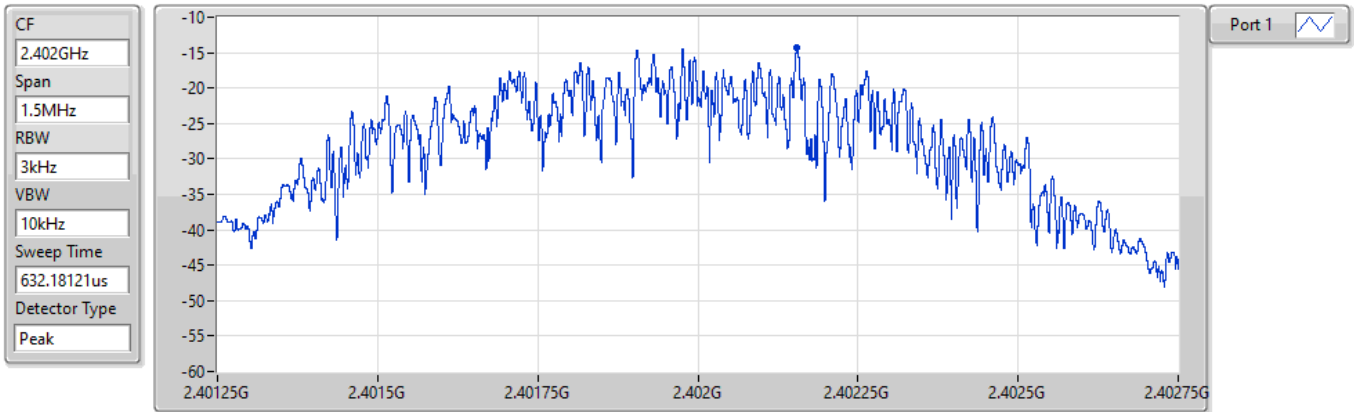
DG = Directional Gain; RBW = 3kHz;  
PD = trace bin-by-bin of each transmits port summing can be performed maximum power density; Port X = Port X Power Density;

### BT-LE(1Mbps)

### PSD

#### 2402MHz

08/12/2022



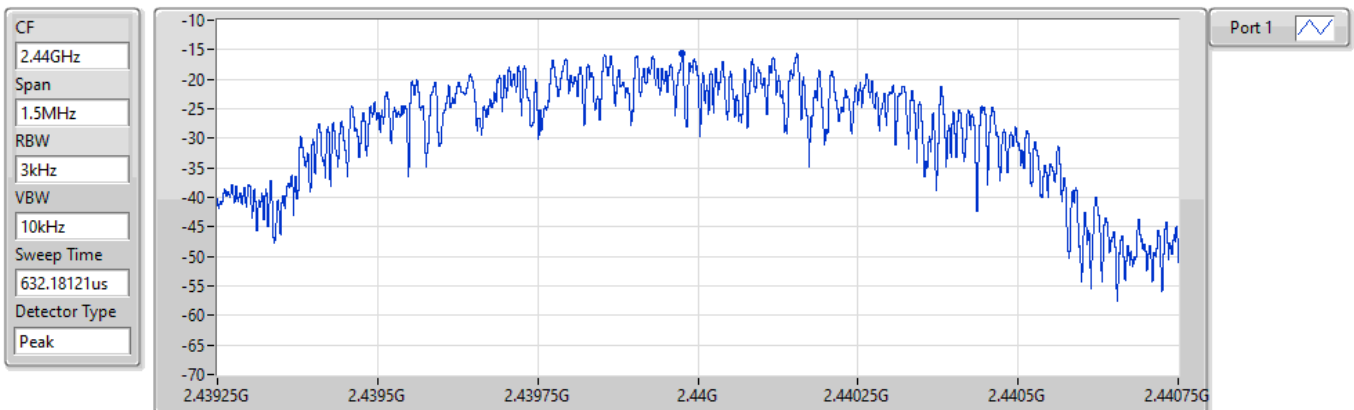
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-14.23	-14.23	-14.23

### BT-LE(1Mbps)

### PSD

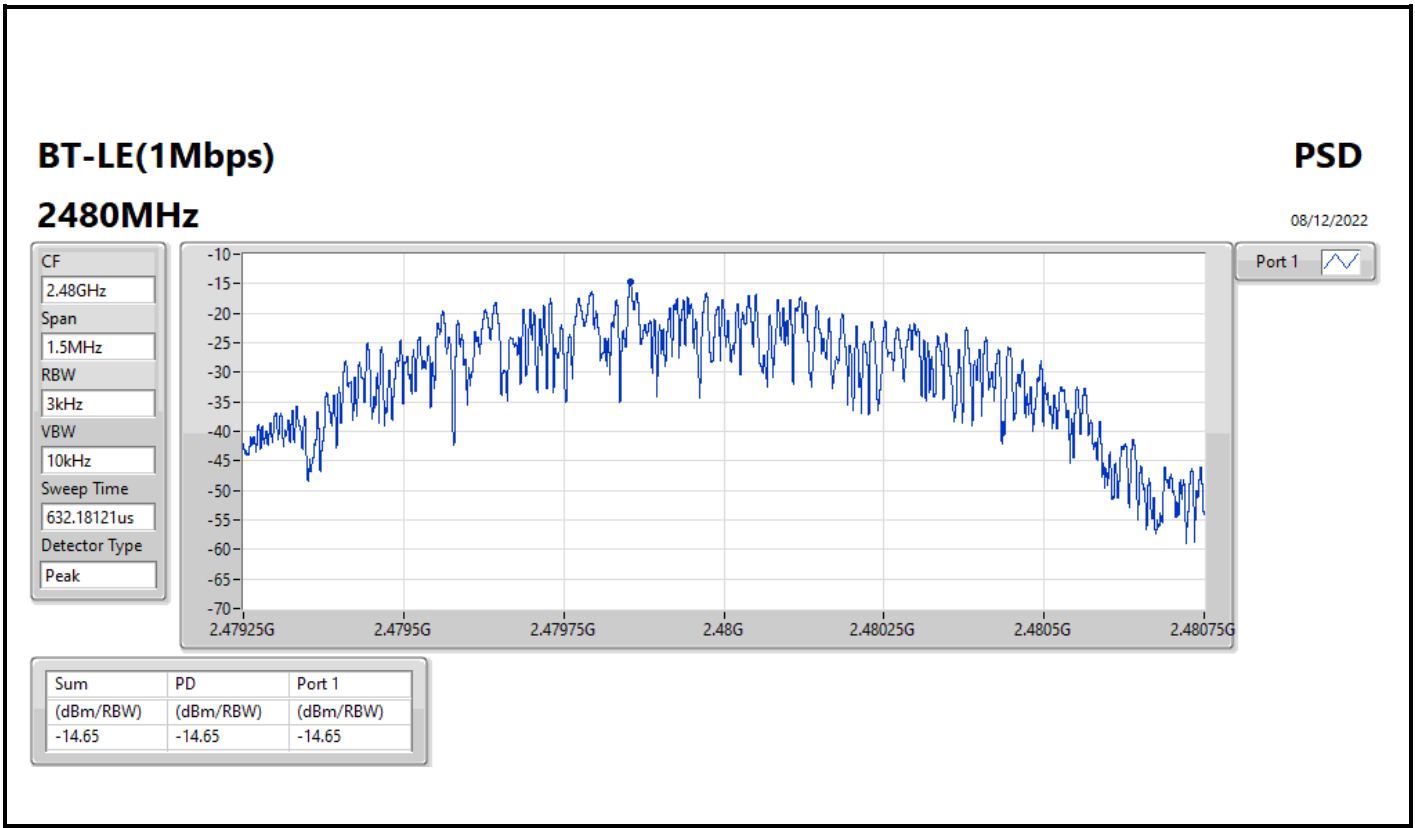
#### 2440MHz

08/12/2022



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-15.60	-15.60	-15.60







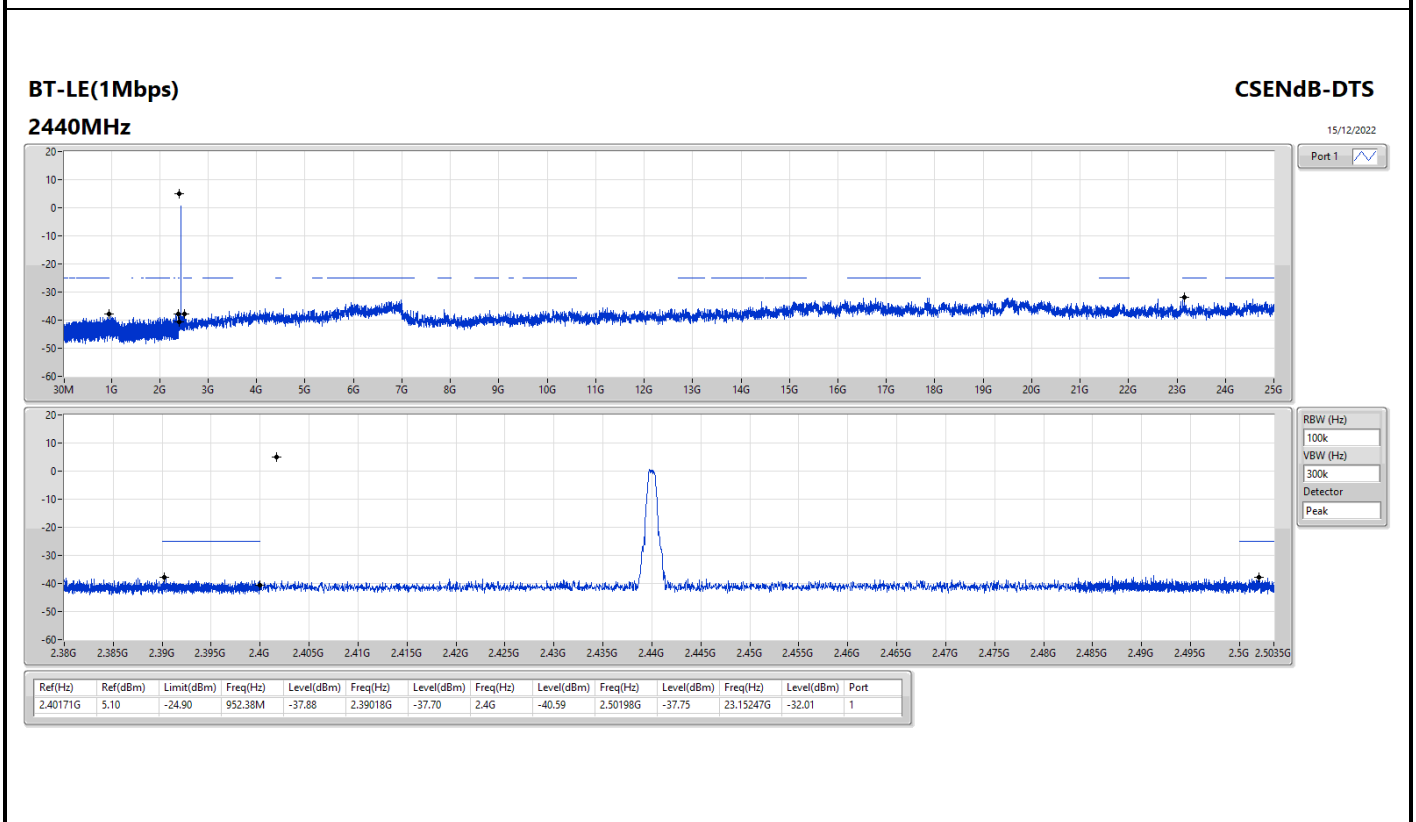
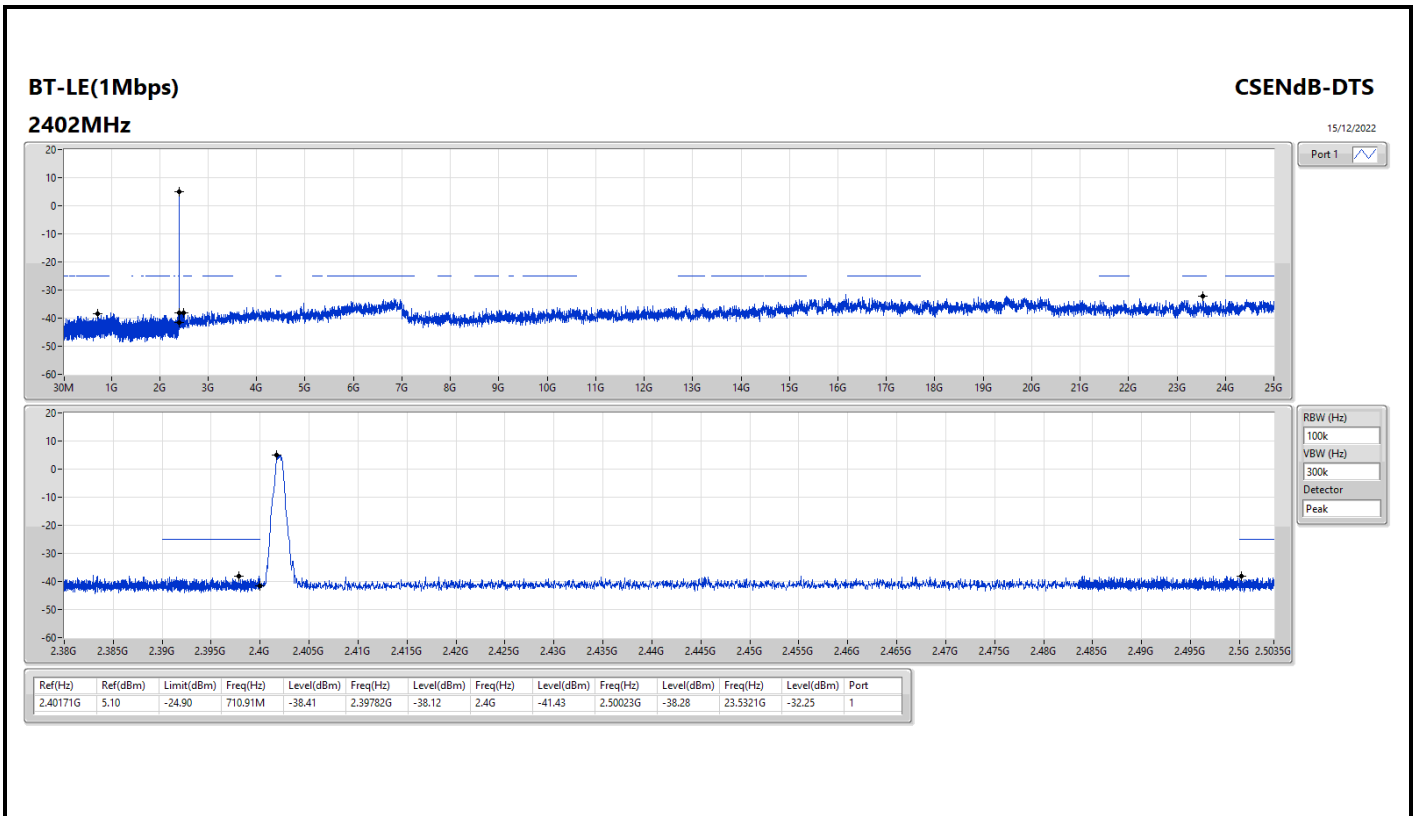
Summary

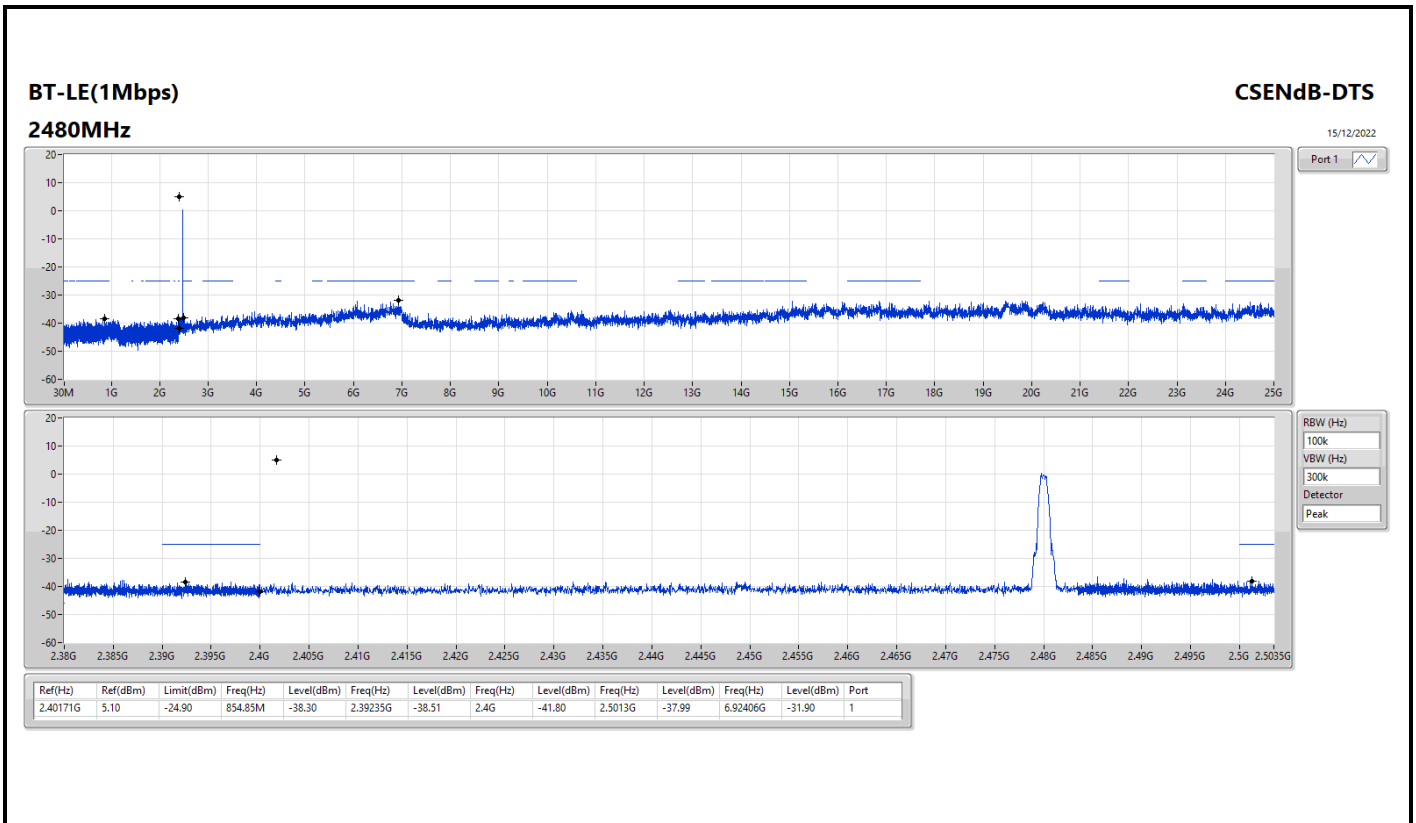
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.40171G	5.10	-24.90	952.38M	-37.88	2.39018G	-37.70	2.4G	-40.59	2.50198G	-37.75	23.15247G	-32.01	1



Result

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	2.40171G	5.10	-24.90	710.91M	-38.41	2.39782G	-38.12	2.4G	-41.43	2.50023G	-38.28	23.5321G	-32.25	1
2440MHz	Pass	2.40171G	5.10	-24.90	952.38M	-37.88	2.39018G	-37.70	2.4G	-40.59	2.50198G	-37.75	23.15247G	-32.01	1
2480MHz	Pass	2.40171G	5.10	-24.90	854.85M	-38.30	2.39235G	-38.51	2.4G	-41.80	2.5013G	-37.99	6.92406G	-31.90	1



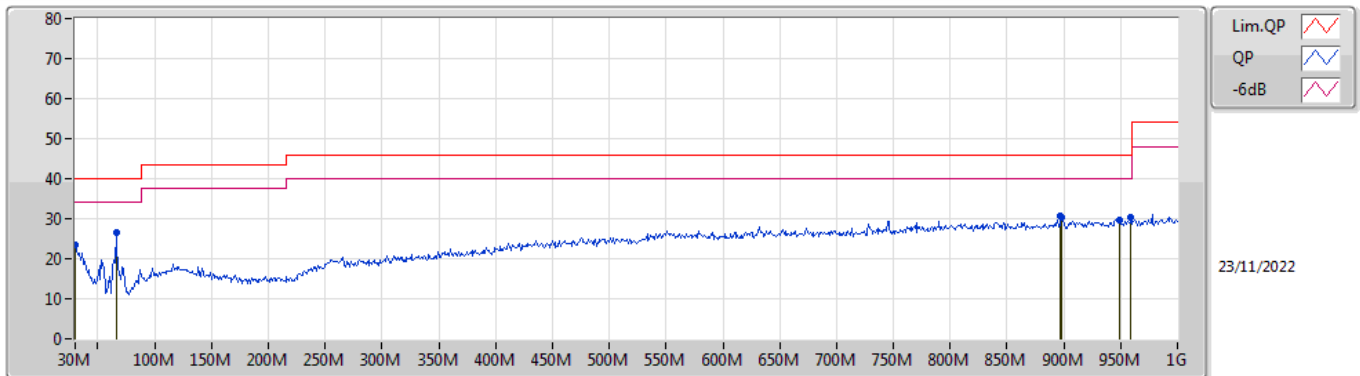




**Summary**

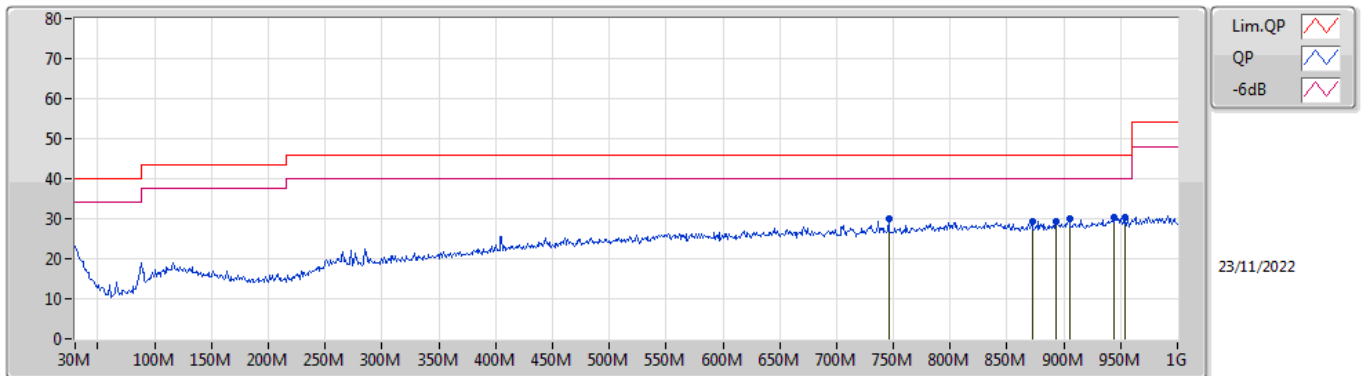
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Condition
Mode 1	Pass	PK	65.89M	26.41	40.00	-13.59	Vertical

Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)
PK	30M	23.38	40.00	-16.62	-7.12	3	Vertical	207	1.00	-	30.50	23.99	0.44	31.55
PK	65.89M	26.41	40.00	-13.59	-18.95	3	Vertical	359	2.00	"Worst"	45.36	12.16	0.83	31.94
PK	897.18M	30.69	46.00	-15.31	-2.14	3	Vertical	329	1.50	-	32.83	26.20	4.15	32.49
PK	898.15M	30.35	46.00	-15.65	-2.13	3	Vertical	329	1.50	-	32.48	26.20	4.16	32.49
PK	948.59M	29.81	46.00	-16.19	-1.70	3	Vertical	15	2.00	-	31.51	26.46	4.32	32.48
PK	959.26M	30.32	46.00	-15.68	-1.50	3	Vertical	68	1.00	-	31.82	26.62	4.33	32.45

Mode 1



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB/m)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	Raw (dBuV/m)	AF (dB/m)	CL (dB)	PA (dB)
PK	745.86M	29.88	46.00	-16.12	-3.63	3	Horizontal	2	1.25	-	33.51	25.22	3.76	32.61
PK	871.96M	29.42	46.00	-16.58	-2.38	3	Horizontal	360	1.25	-	31.80	26.02	4.09	32.49
PK	893.3M	29.47	46.00	-16.53	-2.18	3	Horizontal	256	1.50	-	31.65	26.17	4.14	32.49
PK	904.94M	29.84	46.00	-16.16	-2.11	3	Horizontal	360	1.00	-	31.95	26.20	4.18	32.49
PK	944.71M	30.36	46.00	-15.64	-1.76	3	Horizontal	360	1.50	-	32.12	26.42	4.30	32.48
PK	953.44M	30.45	46.00	-15.55	-1.60	3	Horizontal	359	1.00	"Worst"	32.05	26.55	4.32	32.47



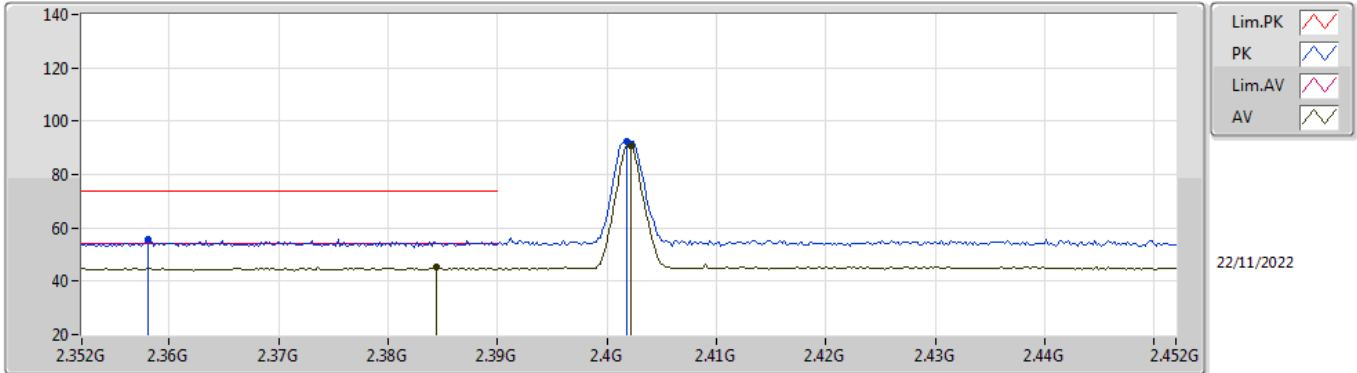


Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	7.31924G	53.35	54.00	-0.65	3	Horizontal	260	2.94	-

### BT-LE(1Mbps)

### 2402MHz\_TX

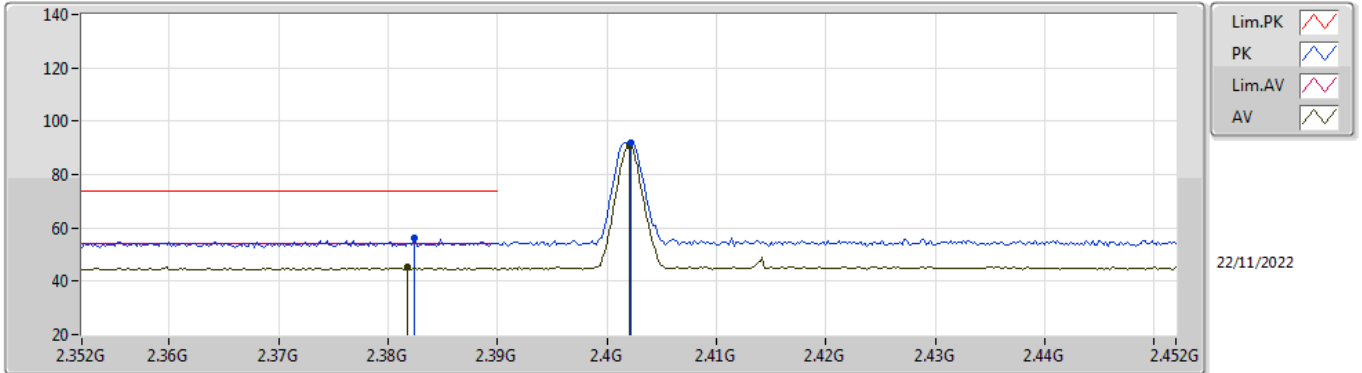


EUT Y\_1TX  
Setting 3  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	2.358G	55.51	74.00	-18.49	23.90	3	Vertical	251	2.26	-	27.77	3.84	-
AV	2.3844G	45.42	54.00	-8.58	13.88	3	Vertical	251	2.26	-	27.66	3.88	-
PK	2.4018G	92.27	Inf	-Inf	60.77	3	Vertical	251	2.26	-	27.60	3.90	-
AV	2.4022G	91.09	Inf	-Inf	59.59	3	Vertical	251	2.26	-	27.60	3.90	-

### BT-LE(1Mbps)

### 2402MHz\_TX

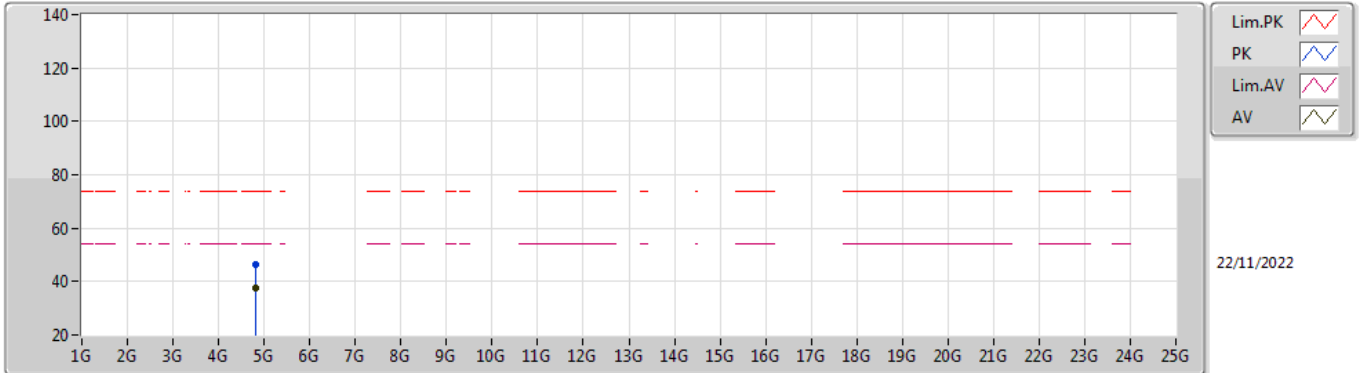


EUT\_V\_1TX  
Setting 3  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	2.3824G	56.07	74.00	-17.93	24.53	3	Horizontal	174	1.76	-	27.67	3.87	-
AV	2.3818G	45.25	54.00	-8.75	13.71	3	Horizontal	174	1.76	-	27.67	3.87	-
PK	2.4022G	91.89	Inf	-Inf	60.39	3	Horizontal	174	1.76	-	27.60	3.90	-
AV	2.402G	90.72	Inf	-Inf	59.22	3	Horizontal	174	1.76	-	27.60	3.90	-

### BT-LE(1Mbps)

### 2402MHz\_TX

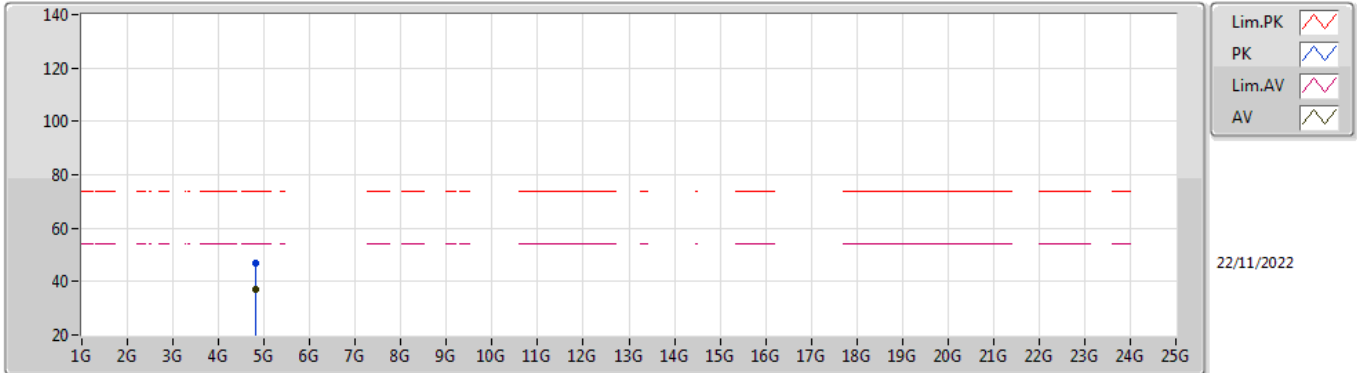


EUT Y\_1TX  
Setting 3  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	4.80412G	46.16	74.00	-27.84	41.98	3	Vertical	360	2.77	-	31.31	5.40	32.53
AV	4.80364G	37.44	54.00	-16.56	33.26	3	Vertical	360	2.77	-	31.31	5.40	32.53

### BT-LE(1Mbps)

### 2402MHz\_TX

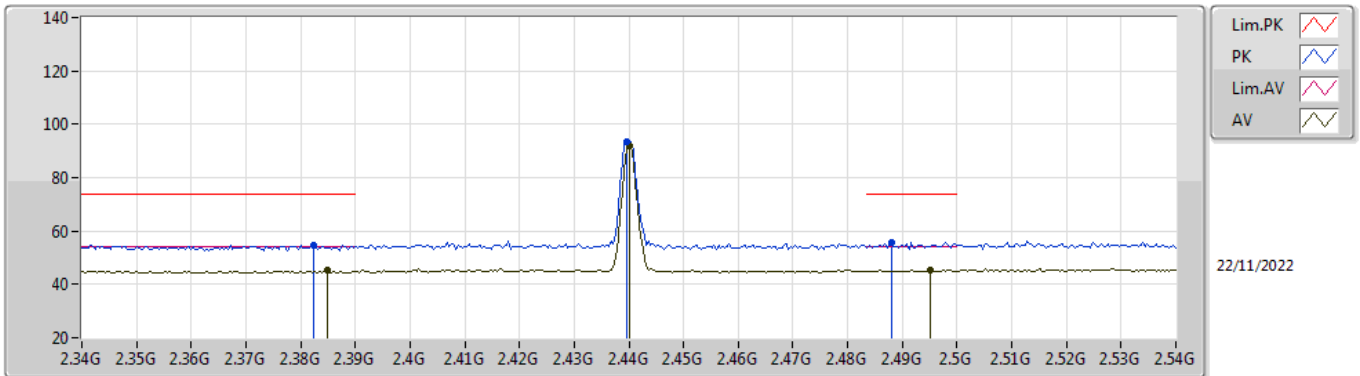


EUT Y\_1TX  
Setting 3  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	4.80416G	47.02	74.00	-26.98	42.84	3	Horizontal	273	1.80	-	31.31	5.40	32.53
AV	4.80348G	37.23	54.00	-16.77	33.05	3	Horizontal	273	1.80	-	31.31	5.40	32.53

### BT-LE(1Mbps)

### 2440MHz\_TX

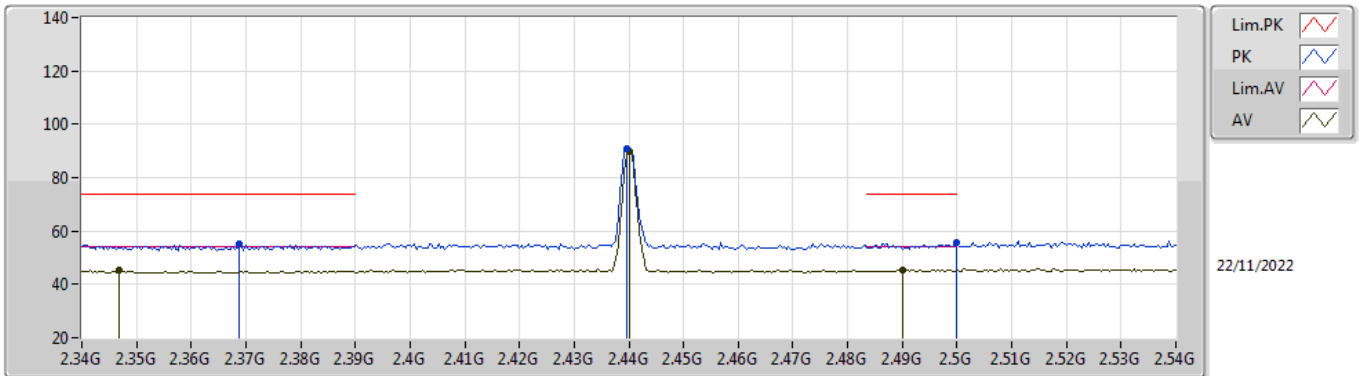


EUT\_V\_1TX  
Setting 2  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	2.3824G	54.65	74.00	-19.35	23.11	3	Vertical	253	2.84	-	27.67	3.87	-
AV	2.3848G	45.20	54.00	-8.80	13.66	3	Vertical	253	2.84	-	27.66	3.88	-
PK	2.4396G	93.28	Inf	-Inf	61.74	3	Vertical	253	2.84	-	27.60	3.94	-
AV	2.44G	92.04	Inf	-Inf	60.50	3	Vertical	253	2.84	-	27.60	3.94	-
PK	2.488G	55.67	74.00	-18.33	24.08	3	Vertical	253	2.84	-	27.60	3.99	-
AV	2.4952G	45.40	54.00	-8.60	13.80	3	Vertical	253	2.84	-	27.60	4.00	-

**BT-LE(1Mbps)**

**2440MHz\_TX**

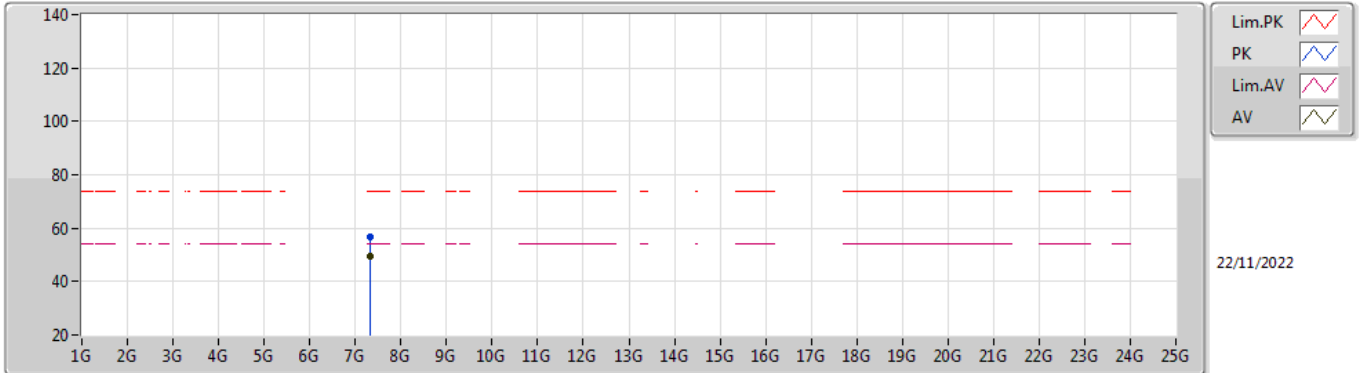


EUT\_V\_1TX  
Setting 2  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	2.3688G	55.39	74.00	-18.61	23.82	3	Horizontal	189	2.07	-	27.72	3.85	-
AV	2.3468G	45.19	54.00	-8.81	13.55	3	Horizontal	189	2.07	-	27.82	3.82	-
PK	2.4396G	90.99	Inf	-Inf	59.45	3	Horizontal	189	2.07	-	27.60	3.94	-
AV	2.44G	89.68	Inf	-Inf	58.14	3	Horizontal	189	2.07	-	27.60	3.94	-
PK	2.5G	55.73	74.00	-18.27	24.13	3	Horizontal	189	2.07	-	27.60	4.00	-
AV	2.49G	45.58	54.00	-8.42	13.99	3	Horizontal	189	2.07	-	27.60	3.99	-

### BT-LE(1Mbps)

### 2440MHz\_TX



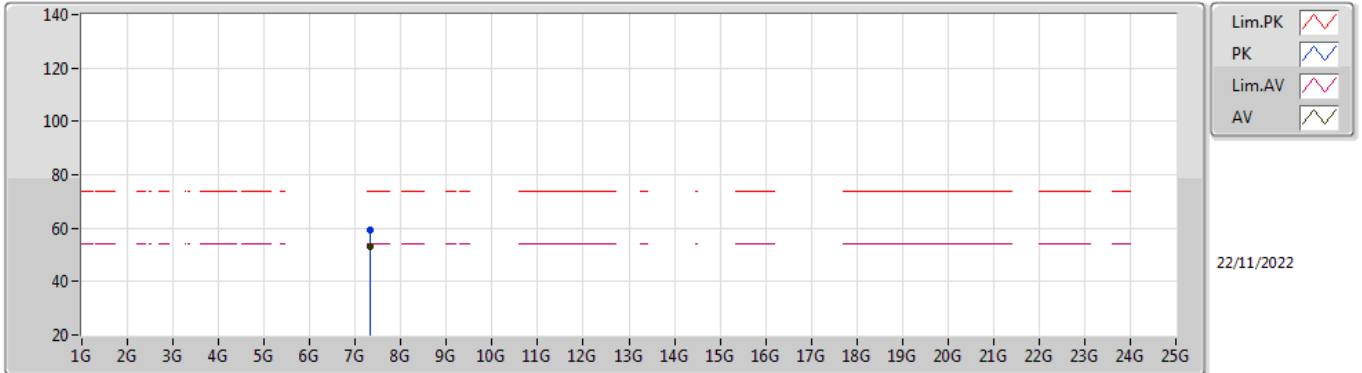
EUT Y\_1TX  
Setting 2  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	7.32086G	56.78	74.00	-17.22	46.73	3	Vertical	310	1.00	-	36.70	6.80	33.45
AV	7.31934G	49.34	54.00	-4.66	39.29	3	Vertical	310	1.00	-	36.70	6.80	33.45



### BT-LE(1Mbps)

### 2440MHz\_TX

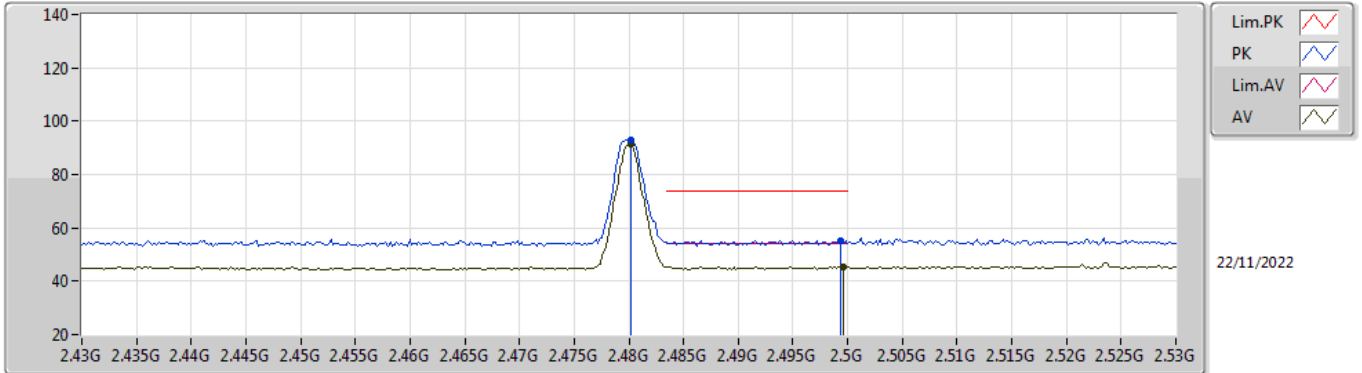


EUT Y\_1TX  
Setting 2  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
AV	7.31924G	53.35	54.00	-0.65	43.30	3	Horizontal	260	2.94	-	36.70	6.80	33.45
PK	7.32082G	59.44	74.00	-14.56	49.39	3	Horizontal	260	2.94	-	36.70	6.80	33.45

**BT-LE(1Mbps)**

**2480MHz\_TX**

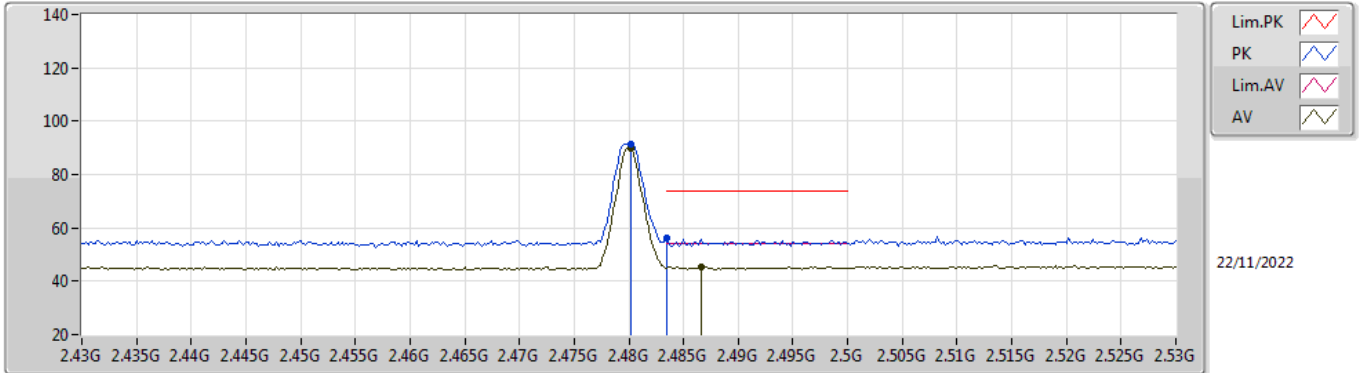


EUT Y\_1TX  
Setting 2  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	2.4802G	92.88	Inf	-Inf	61.30	3	Vertical	253	1.00	-	27.60	3.98	-
AV	2.4802G	91.49	Inf	-Inf	59.91	3	Vertical	253	1.00	-	27.60	3.98	-
PK	2.4994G	55.38	74.00	-18.62	23.78	3	Vertical	253	1.00	-	27.60	4.00	-
AV	2.4996G	45.51	54.00	-8.49	13.91	3	Vertical	253	1.00	-	27.60	4.00	-

**BT-LE(1Mbps)**

**2480MHz\_TX**

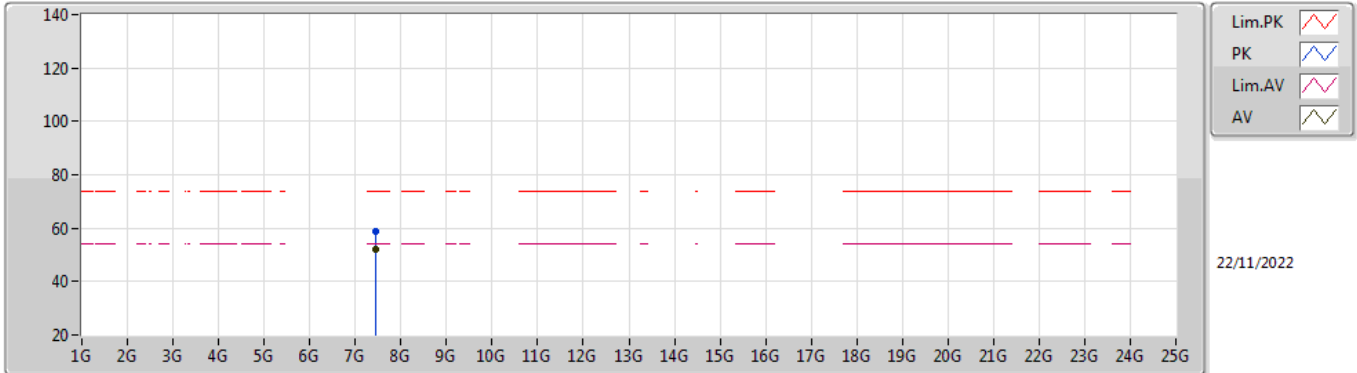


EUT Y\_1TX  
Setting 2  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	2.4802G	91.20	Inf	-Inf	59.62	3	Horizontal	270	1.41	-	27.60	3.98	-
AV	2.4802G	90.04	Inf	-Inf	58.46	3	Horizontal	270	1.41	-	27.60	3.98	-
PK	2.4835G	55.95	74.00	-18.05	24.37	3	Horizontal	270	1.41	-	27.60	3.98	-
AV	2.4866G	45.51	54.00	-8.49	13.92	3	Horizontal	270	1.41	-	27.60	3.99	-

### BT-LE(1Mbps)

### 2480MHz\_TX

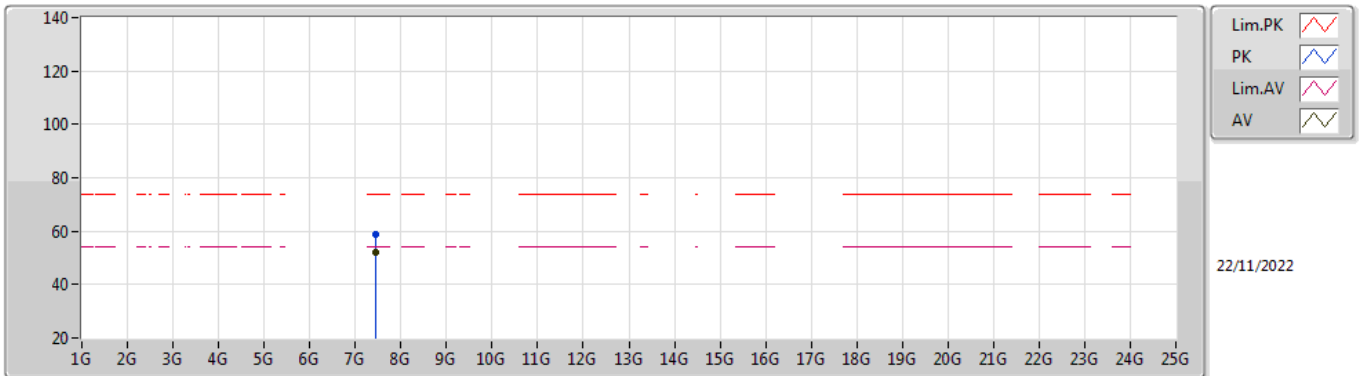


EUT Y\_1TX  
Setting 2  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	7.4392G	58.62	74.00	-15.38	48.68	3	Vertical	337	2.73	-	36.70	6.84	33.60
AV	7.43924G	52.28	54.00	-1.72	42.34	3	Vertical	337	2.73	-	36.70	6.84	33.60

### BT-LE(1Mbps)

### 2480MHz\_TX



EUT Y\_1TX  
Setting 2  
01-E-P-5

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Raw (dBuV)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment	AF (dB)	CL (dB)	PA (dB)
PK	7.44076G	58.58	74.00	-15.42	48.64	3	Horizontal	98	1.01	-	36.70	6.84	33.60
AV	7.43934G	52.16	54.00	-1.84	42.22	3	Horizontal	98	1.01	-	36.70	6.84	33.60