FCC Test Report

FCC ID	:	**2AU82-E-BSCV1-3B**
Equipment	:	**Biometric Smart Card**
Brand Name	:	**Ethernom**
Model Name	:	**E-BSC-V1.3B**
Applicant	:	**Ethernom, INC. 3129 Tiger Run Court Suite 113 Carlsbad, CA 92010, United States**
Manufacturer	:	**SUNFLEX TECH. CO., LTD. No. 522, Nan-Shang Rd., Kueisan Dist., Taoyuan City, Taiwan, R.O.C.**
Standard	:	**47 CFR FCC Part 15.247**

The product was received on Oct. 01, 2019, and testing was started from Oct. 17, 2019 and completed on Nov. 29, 2019. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Allen Lin

Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)

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PHOTOGRAPHS OF EUT V01

History of this test report

Report No.	Version	Description	Issued Date
FR9O0209AL	01	Initial issue of report	Dec. 23, 2019

Summary of Test Result

Report Clause	Ref.Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	15.203	Antenna Requirement	PASS	-
3.1	15.207	AC Power-line Conducted Emissions	PASS	-
3.2	15.247(a)	DTS Bandwidth	PASS	-
3.3	15.247(b)	Maximum Conducted Output Power	PASS	-
3.4	15.247(e)	Power Spectral Density	PASS	-
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	PASS	-
3.6	15.247(d)	Emissions in Restricted Frequency Bands	PASS	-

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and explanations:
None

Reviewed by: Sam Tsai

Report Producer: Debby Hung

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)	1.0	1TX

Note:
- Bluetooth LE uses a GFSK (1Mbps) modulation for DSSS.
- BWch is the nominal channel bandwidth.

1.1.2 Antenna Information

Ant.	Brand	Model Name	Antenna Type	Connector	Part number	Gain (dBi)
1	Ethernom	-	Printed Antenna	-	BSC-V1.3C-3_ANT1	3.18

1.1.3 EUT Information

Operational Condition				
EUT Power Type	From Battery / Host system			
EUT Function	☒	Point-to-multipoint	☐	Point-to-point
Type of EUT				
☒	Stand-alone			
☐	Combined (EUT where the radio part is fully integrated within another device)			
	Combined Equipment - Brand Name / Model No.:	…		
☐	Plug-in radio (EUT intended for a variety of host systems)			
	Host System - Brand Name / Model No.:	…		
☐	Other:			

1.1.4 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
BT-LE(1Mbps)	0.634	1.98	396.25u	3k

Note. If DC < 0.98, the DCF was added while measuring Output power and PSD.

1.2 Testing Applied Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- KDB 558074 D01 v05r02
- KDB 414788 D01 v01r01

1.3 Testing Location Information

Testing Location					
☒	HWA YA	ADD :	No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)		
		TEL :	886-3-327-3456	FAX :	886-3-327-0973
Test site Designation No. TW1190 with FCC.					
☐	JHUBEI	ADD :	No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.)		
		TEL :	886-3-656-9065	FAX :	886-3-656-9085
Test site Designation No. TW0006 with FCC.					

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO04-HY	Edward	21.3~23.6°C / 62~66%	27/Nov/2019
RF Conducted	TH01-HY	Raven	23.1~25.5°C / 63.5~66.5%	29/Nov/2019
Radiated	03CH03-HY	Andy	22.6~21.2°C / 55.2~60.2%	17/Oct/2019~26/Nov/2019

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
Conducted Emission (150kHz ~ 30MHz)	3.54 dB	Confidence levels of 95%
Radiated Emission (9kHz ~ 30MHz)	1.6 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	4.3 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.9 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%
Temperature	0.7 °C	Confidence levels of 95%
Humidity	4 %	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Condition

RF Conducted	Abbreviation	Remark
TnomVnom	Tnom	20°C
-	Vnom	120V

2.2 Test Channel Mode

Test Software	CMD

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

2.3 The Worst Case Measurement Configuration

The Worst Case Mode for Following Conformance Tests	
Tests Item	AC power-line conducted emissions
Condition	AC power-line conducted measurement for line and neutral
Operating Mode	CTX
1	USB mode

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

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition	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.		
Operating Mode < 1GHz	CTX		
1	Adapter mode		
Operating Mode > 1GHz	CTX		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
Worst Planes of EUT		V	

2.4 Accessories and Support Equipment

Accessories				
Battery	Brand Name	Prologium	Model Name	FLCB-027038A
	Power Rating	3.7 Vdc, 15 mAh	Type	Li-ion, Y
USB Cable	Brand Name	Ethernom	Model Name	E-USB-CBL-V1
	Signal Line	0.3 meter, shielded cable, w/o ferrite core		
USB Dock	Brand Name	Ethernom	Model Name	E-USB-CHG-V1

Reminder: Regarding to more detail and other information, please refer to user manual.

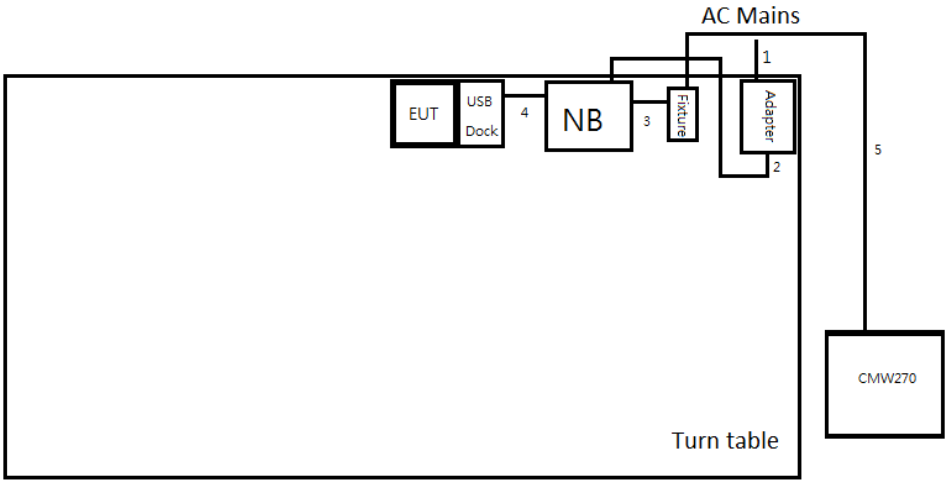
Support Equipment – AC Conduction				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	AC Power Cable	-	-	-
2	USB Cable	Ethernom	E-USB-CBL-V1	-
3	USB Dock	Ethernom	E-USB-CHG-V1	-
4	Adapter For NB	DELL	AA90PM111	-
5	Notebook	DELL	PP13S	-
6	Fixture	-	-	Client provided

Support Equipment – RF Conducted				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E5410	R33002 / DOC
2	Adapter for NB	DELL	HA65NM130	R35737 / DOC
3	DC Power Supply	GW	GPS-3030DD	-
4	Fixture	-	-	Client provided
5	Wireless Connectivity Tester	RS	CMW270	-
6	USB Dock	Ethernom	E-USB-CHG-V1	-

Support Equipment – Radiated Emission				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E5410	-
2	Adapter for NB	DELL	HA65NM130	-
3	Fixture	-	-	Client provided
4	USB Dock	Ethernom	E-USB-CHG-V1	-

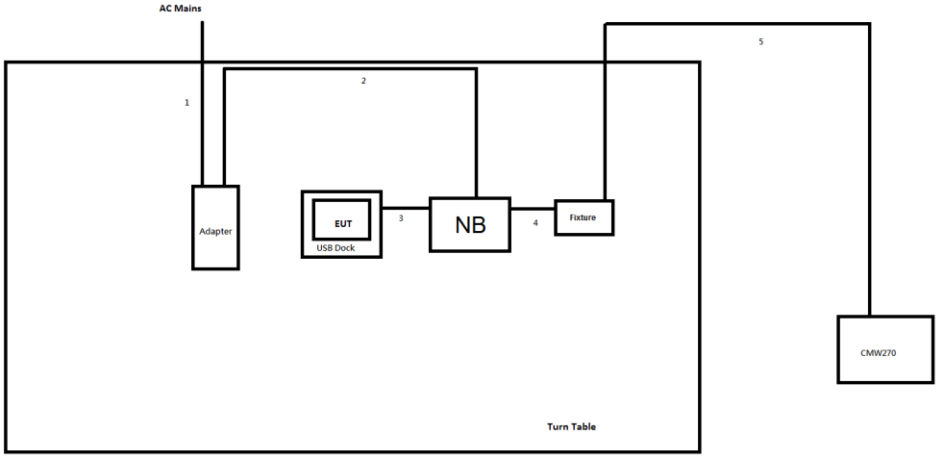
2.5 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)	Remark
1	AC Power Cable	No	1	-
2	DC Power Cable	No	1.8	-
3	USB Cable	No	0.3	-
4	USB Cable	No	0.3	-
5	USB Cable	No	10	-

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)	Remark
1	Power Cable	No	1.8	-
2	DC Power line	No	1.5	-
3	USB Cable	No	0.3	-
4	USB Cable	No	0.3	-
5	USB Cable	No	10	-

3 Transmitter Test Result

3.1 AC Power-line Conducted Emissions

3.1.1 AC Power-line Conducted Emissions Limit

AC Power-line Conducted Emissions Limit		
Frequency Emission (MHz)	**Quasi-Peak**	**Average**
0.15-0.5	66 - 56 *	56 - 46 *
0.5-5	56	46
5-30	60	50
Note 1: * Decreases with the logarithm of the frequency.		

3.1.2 Measuring Instruments

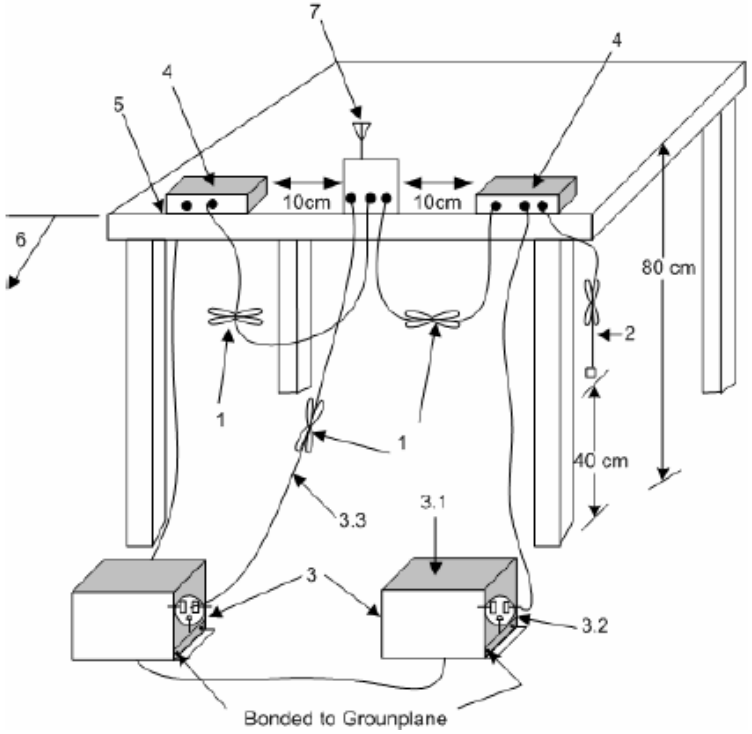
Refer a test equipment and calibration data table in this test report.

3.1.3 Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013, clause 6.2 foray power-line conducted emissions.

3.1.4 Test Setup

AC Power-line Conducted Emissions



1—Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 cm to 40 cm long.
2—The I/O cables that are not connected to an accessory shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.
3—EUT connected to one LISN. Unused LISN measuring port connectors shall be terminated in 50Ω loads. LISN may be placed on top of, or immediately beneath, reference ground plane.
3.1—All other equipment powered from additional LISN(s).
3.2—A multiple-outlet strip may be used for multiple power cords of non-EUT equipment.
3.3—LISN at least 80 cm from nearest part of EUT chassis.
4—Non-EUT components of EUT system being tested.
5—Rear of EUT, including peripherals, shall all be aligned and flush with edge of tabletop.
6—Edge of tabletop shall be 40 cm removed from a vertical conducting plane that is bonded to the ground plane.
7—Antenna can be integral or detachable. If detachable, then the antenna shall be attached for this test.

3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
▪ 6 dB bandwidth ≥ 500 kHz.

3.2.2 Measuring Instruments

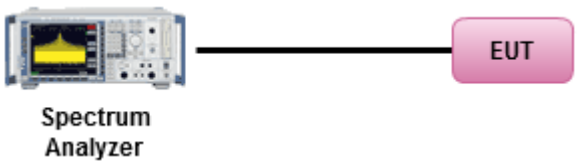
Refer a test equipment and calibration data table in this test report.

3.2.3 Test Procedures

Test Method	
▪ For the emission bandwidth shall be measured using one of the options below:	
	☒ Refer as KDB 558074, clause 8.2 (11.8 of ANSI C63.10) DTS bandwidth measurement.
	☐ Refer as RSS-Gen, clause 6.7 for for occupied bandwidth testing.
	☐ Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup

Emission Bandwidth



3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

Maximum Conducted Output Power Limit			
	▪ If $G_{TX} \leq 6$ dBi, then $P_{Out} \leq 30$ dBm (1 W)		
	▪ Point-to-multipoint systems (P2M): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)$ dBm		
	▪ Point-to-point systems (P2P): If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm		
	▪ Smart antenna system (SAS):		
		- Single beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm	
		- Overlap beam: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3$ dBm	
		- Aggregate power on all beams: If $G_{TX} > 6$ dBi, then $P_{Out} = 30 – (G_{TX} – 6)/3 + 8$dB dBm	
e.i.r.p. Power Limit:			
▪ 2400-2483.5 MHz Band			
	▪ Point-to-multipoint systems (P2M): $P_{eirp} \leq 36$ dBm (4 W)		
	▪ Point-to-point systems (P2P): $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX}])$ dBm		
	▪ Smart antenna system (SAS)		
		- Single beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm	
		- Overlap beam: $P_{eirp} \leq MAX(36, P_{Out} + G_{TX})$ dBm	
		- Aggregate power on all beams: $P_{eirp} \leq MAX(36, [P_{Out} + G_{TX} + 8])$ dBm	
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, **G_{TX}** = the maximum transmitting antenna directional gain in dBi.			

3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
▪ Maximum Peak Conducted Output Power	
	☐ Refer as KDB 558074, clause 8.3.1.1 (11.9.1.1 of ANSI C63.10) RBW ≥ EBW method.
	☐ Refer as KDB 558074, clause 8.3.1.2 (11.9.1.2 of ANSI C63.10) integrated band power method.
	☐ Refer as KDB 558074, clause 8.3.1.3 (11.9.1.3 of ANSI C63.10) peak power meter.
▪ Maximum Average Conducted Output Power	
	☐ Refer as KDB 558074, clause 8.3.2.2 (11.9.2.2 of ANSI C63.10) using a spectrum analyzer.
	☒ Refer as KDB 558074, clause 8.3.2.3 (11.9.2.3 of ANSI C63.10) using a power meter.
▪ For conducted measurement.	
	▪ If the EUT supports multiple transmit chains using options given below: Refer as 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.
	▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

Maximum Conducted Output Power (Power Meter)

3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

Power Spectral Density Limit
▪ Power Spectral Density (PSD)≤8 dBm/3kHz

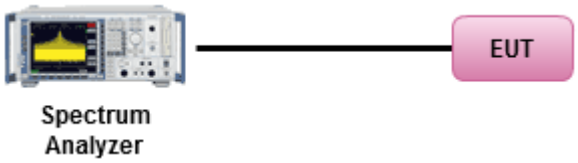
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method		
▪ 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).		
	☒ Refer as KDB 558074, clause 8.4 (11.10 of ANSI C63.10) Method PKPSD.	
▪ For conducted measurement.		
	▪ If The EUT supports multiple transmit chains using options given below:	
		▪ Measure and sum the spectra across the outputs. Refer as 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.

3.4.4 Test Setup

Power Spectral Density


3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dB)**
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 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 level.	

3.5.2 Measuring Instruments

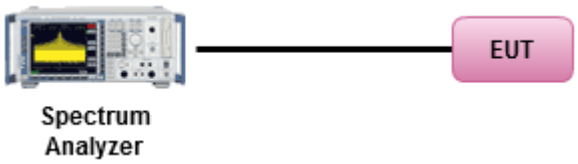
Refer a test equipment and calibration data table in this test report.

3.5.3 Test Procedures

Test Method
▪ Refer as KDB 558074, clause 8.5 (11.11 of ANSI C63.10) for non-restricted frequency bands.

3.5.4 Test Setup

Emissions in Non-restricted Frequency Bands



3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 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 below30 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.

3.6.2 Measuring Instruments

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

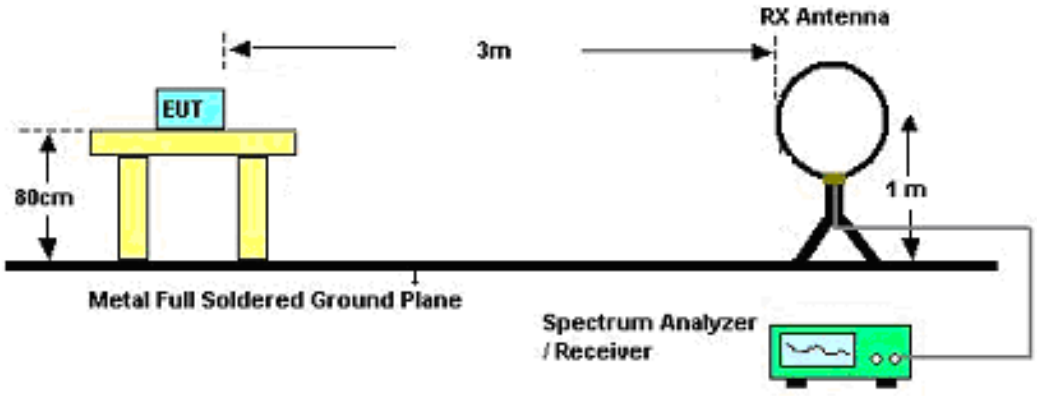
3.6.3 Test Procedures

Test Method	
▪ The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
▪ 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.	
▪ For the transmitter unwanted emissions shall be measured using following options below:	
	▪ Refer as KDB 558074, clause 8.6 (11.12 of ANSI C63.10) for restricted frequency bands.
▪ For the transmitter band-edge emissions shall be measured using following options below:	
	▪ Refer as KDB 558074 clause 8.7.1, 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.
	▪ Refer as KDB 558074, clause 8.7.2 (6.10.6 of ANSI C63.10) for marker-delta method for band-edge measurements.
	▪ Refer as KDB 558074, clause 8.7.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels.
▪ Use the following spectrum analyzer settings:	
	▪ Set RBW=100 kHz for f < 1 GHz; VBW=3 * RBW; Sweep = auto; Detector function = peak; Trace = max hold.
	▪ Set RBW = 1 MHz, VBW= 3MHz for f ≥ 1 GHz for peak measurement. For average measurement, refer as 1.1.4.
▪ KDB 414788 Open-Field Test Sites and Chamber Correlation Justification.	
	▪ Based on FCC 15.31 (f) (2): measurements may be performed at a distance closer than that specified in regulations; however, an attempt should be made to avoid making measurements in the near field.
	▪ Open-field site and chamber correlation testing had been performed and chamber measured test result is the worst case test result.

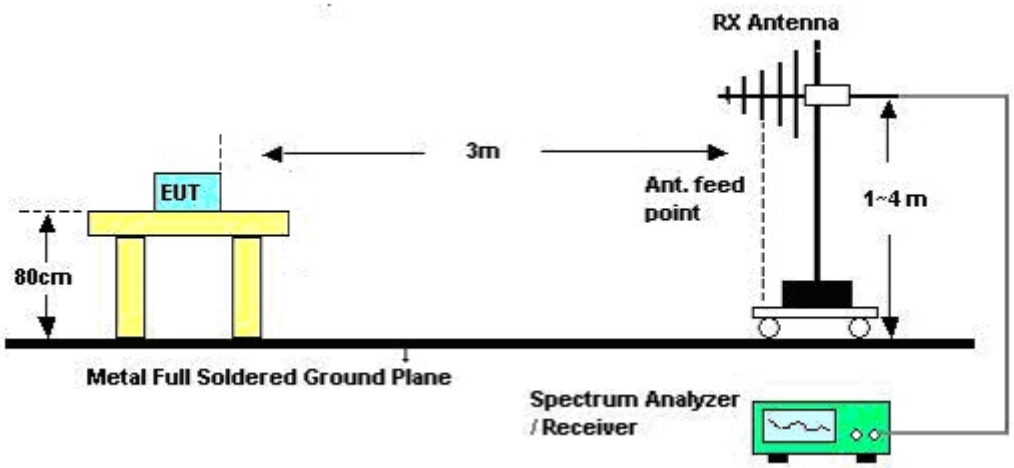
3.6.4 Test Setup

Emissions in Restricted Frequency Bands

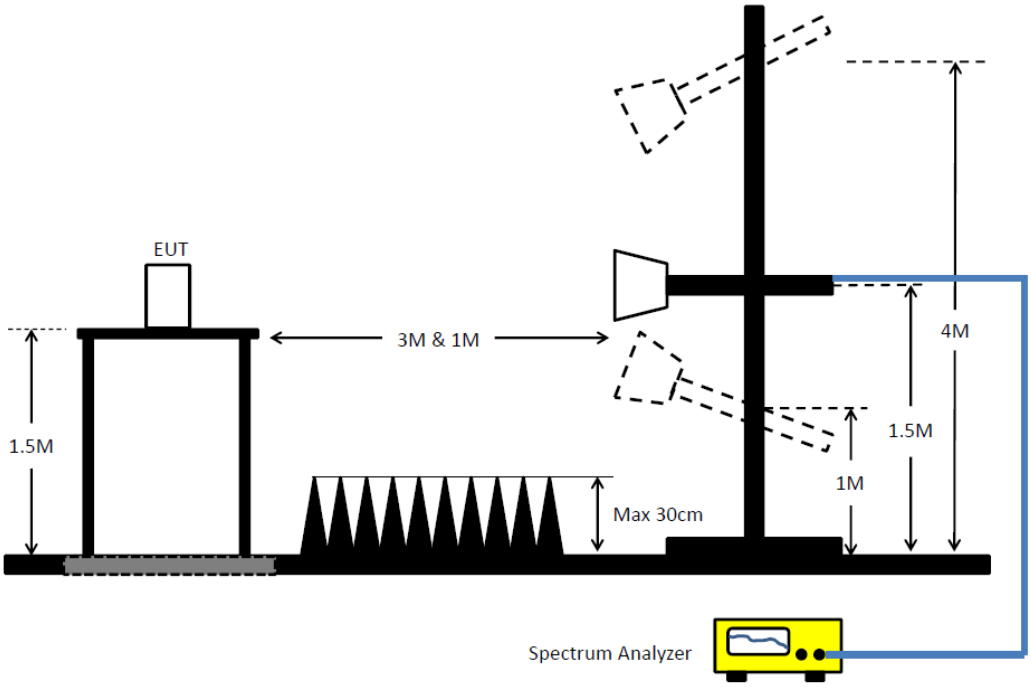
9kHz ~30MHz



30MHz~1GHz



Above 1GHz



3.6.5 Test Result of Emissions in Restricted Frequency Bands (Below 30MHz)

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

3.6.6 Test Result of Emissions in Restricted Frequency Bands

Refer as Appendix F

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	09/Apr/2019	08/Apr/2020
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	04/Nov/2019	05/Nov/2020
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	12/Sep/2019	11/Sep/2020
AC POWER	APC	AFC-11005G	F310050055	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Puls e Limiter	SCHWARZBEC K	VTSD 9561-F	9561-F041	9 kHz ~ 30 MHz	24/Sep/2019	23/Sep/2020

NCR : Non-Calibration Require

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	10Hz~40GHz	13/Mar/2019	12/Mar/2020
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	19/Feb/2019	18/Feb/2020
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	19/Feb/2019	18/Feb/2020
Cable 0.2m	HUBER	MY10710/4	RF Cable - 01	30MHz ~18G	10/Jan/2019	09/Jan/2020
Cable 0.2m	HUBER	MY10711/4	RF Cable - 02	30MHz ~18G	10/Jan/2019	09/Jan/2020
Cable 0.5m	HUBER	MY39470/4	RF Cable - 29	30MHz ~18G	10/Jan/2019	09/Jan/2020
SMB100A Signal Generator	R&S	SMB100A03	181147	100kHz~40GHz	12/Nov/2018	10/Nov/2020

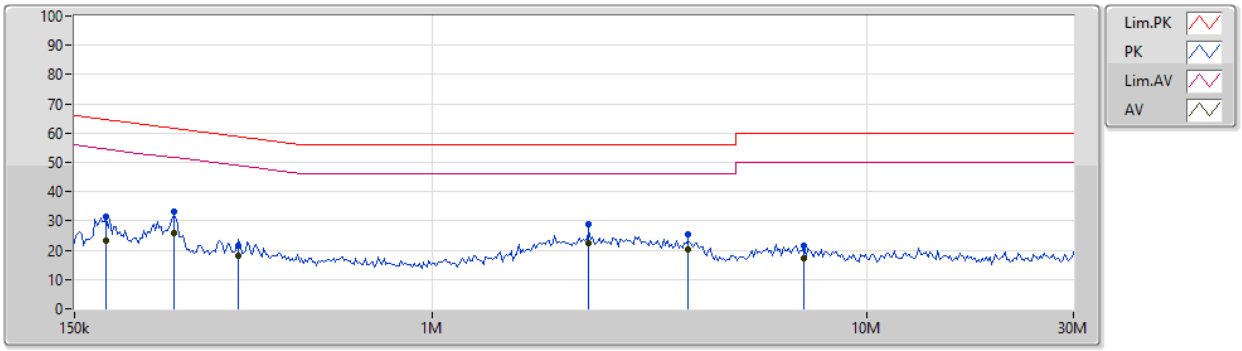
Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30MHz ~ 1GHz 3m	30/Aug/2019	29/Aug/2020
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	1GHz ~ 18GHz 3m	30/Aug/2019	29/Aug/2020
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	22/Apr/2019	21/Apr/2020
EMI Test Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	09/Apr/2019	08/Apr/2020
Bilog Antenna & 5dB Attenuator	SCHAFFNER / MTJ	CBL 6112B / MTJ6102-05	2723 / 2	30MHz ~ 1GHz	11/Oct/2019	10/Oct//2020
Microwave System Preamplifier	KEYSIGHT	83017A	MY53270196	1GHz ~ 26.5GHz	09/Sep/2019	08/Sep/2020
Signal Analyzer	R&S	FSP40	100305	9 kHz ~ 40 GHz;-140-+30dBm	10/Jun/2019	09/Jun/2020
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	22/Mar/2019	21/Mar/2020
RF CABLE 6m	HUBER+SUHNER	SUOFLEX 104	SN 805801/4	1GHz ~ 40GHz	21/Mar/2019	20/Mar/2020
RF CABLE	HUBER+SUHNER	SUOFLEX 104	802378/4	1 GHz ~ 18 GHz	04/Jul/2019	03/Jul/2020
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1531	1GHz ~ 18GHz	09/Mar/ 2019	08/Mar/2020
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	15/Mar/2019	14/Mar/2020

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	USB Mode		

AC Conduction_Mode 1

27/11/2019

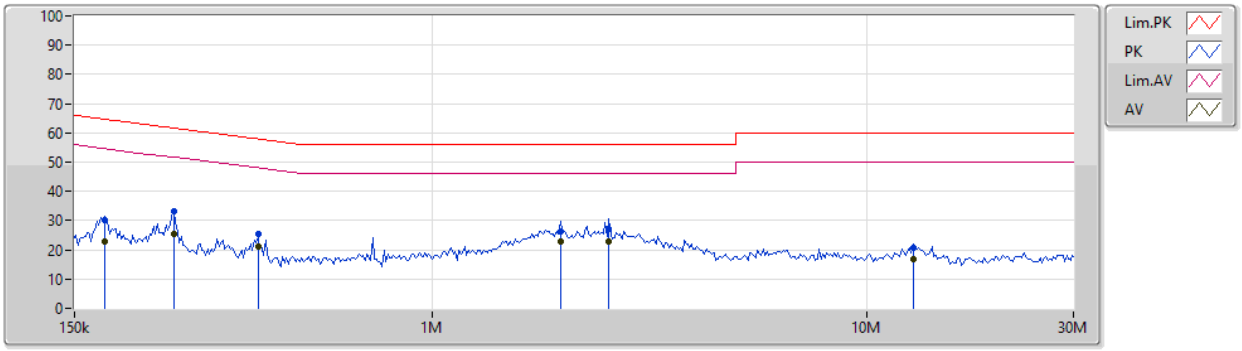


Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	177.646k	31.38	64.59	-33.21	19.47	Neutral	-	11.91	9.59	0.01	9.87
AV	177.646k	23.36	54.59	-31.23	19.47	Neutral	-	3.89	9.59	0.01	9.87
QP	254.17k	33.37	61.62	-28.25	19.47	Neutral	-	13.90	9.59	0.01	9.87
AV	254.17k	25.92	51.62	-25.70	19.47	Neutral	-	6.45	9.59	0.01	9.87
QP	356.493k	21.72	58.81	-37.09	19.48	Neutral	-	2.24	9.59	0.01	9.88
AV	356.493k	17.95	48.81	-30.86	19.48	Neutral	-	-1.53	9.59	0.01	9.88
QP	2.292M	28.75	56.00	-27.25	19.54	Neutral	-	9.21	9.61	0.04	9.89
AV	2.292M	22.57	46.00	-23.43	19.54	Neutral	"Worst"	3.03	9.61	0.04	9.89
QP	3.883M	25.42	56.00	-30.58	19.55	Neutral	-	5.87	9.61	0.05	9.89
AV	3.883M	20.41	46.00	-25.59	19.55	Neutral	-	0.86	9.61	0.05	9.89
QP	7.196M	21.53	60.00	-38.47	19.60	Neutral	-	1.93	9.65	0.06	9.89
AV	7.196M	17.13	50.00	-32.87	19.60	Neutral	-	-2.47	9.65	0.06	9.89

AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Line
Operating Function	USB Mode		

AC Conduction_Mode 1

27/11/2019



Type	Freq	Level	Limit	Margin	Factor	Condition	Comment	Raw	LISN	CL	AT
	(Hz)	(dBuV)	(dBuV)	(dB)	(dB)			(dBuV)	(dB)	(dB)	(dB)
QP	175.887k	30.27	64.68	-34.41	19.48	Line	-	10.79	9.60	0.01	9.87
AV	175.887k	22.86	54.68	-31.82	19.48	Line	-	3.38	9.60	0.01	9.87
QP	254.17k	33.25	61.62	-28.37	19.48	Line	-	13.77	9.60	0.01	9.87
AV	254.17k	25.39	51.62	-26.23	19.48	Line	-	5.91	9.60	0.01	9.87
QP	397.728k	25.64	57.89	-32.25	19.48	Line	-	6.16	9.59	0.01	9.88
AV	397.728k	21.27	47.89	-26.62	19.48	Line	-	1.79	9.59	0.01	9.88
QP	1.974M	26.50	56.00	-29.50	19.54	Line	-	6.96	9.62	0.03	9.89
AV	1.974M	22.78	46.00	-23.22	19.54	Line	-	3.24	9.62	0.03	9.89
QP	2.557M	27.16	56.00	-28.84	19.55	Line	-	7.61	9.62	0.04	9.89
AV	2.557M	23.05	46.00	-22.95	19.55	Line	"Worst"	3.50	9.62	0.04	9.89
QP	12.816M	20.81	60.00	-39.19	19.63	Line	-	1.18	9.65	0.08	9.90
AV	12.816M	16.81	50.00	-33.19	19.63	Line	-	-2.82	9.65	0.08	9.90

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)	726.25k	1.049M	1M05F1D	710k	1.043M

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

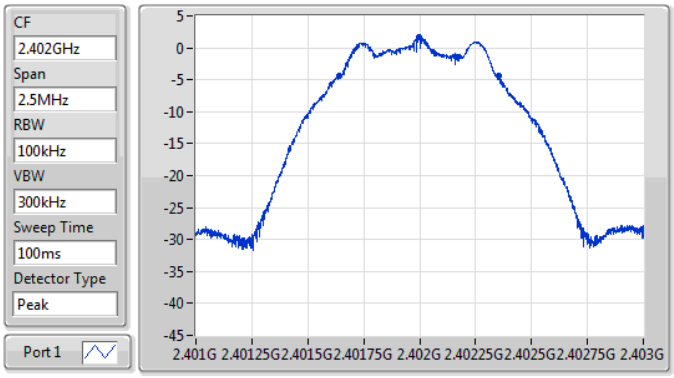
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	500k	711.25k	1.043M
2440MHz	Pass	500k	726.25k	1.046M
2480MHz	Pass	500k	710k	1.049M

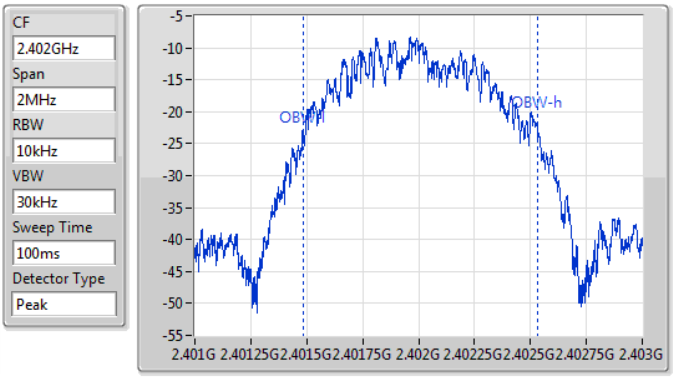
Port X-N dB = Port **X** 6dB down bandwidth; **Port X-OBW** = Port **X** 99% occupied bandwidth;

BT-LE(1Mbps) EBW

2402MHz

29/11/2019



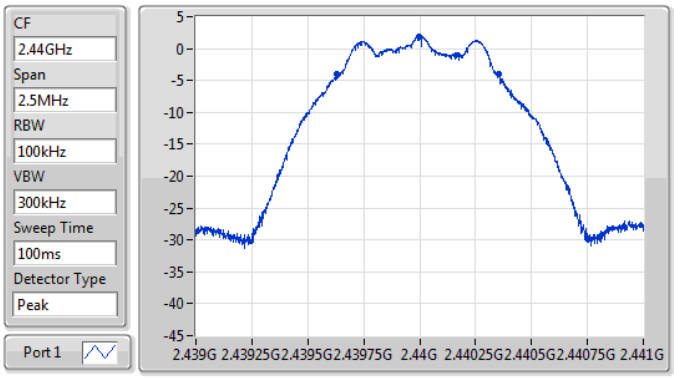


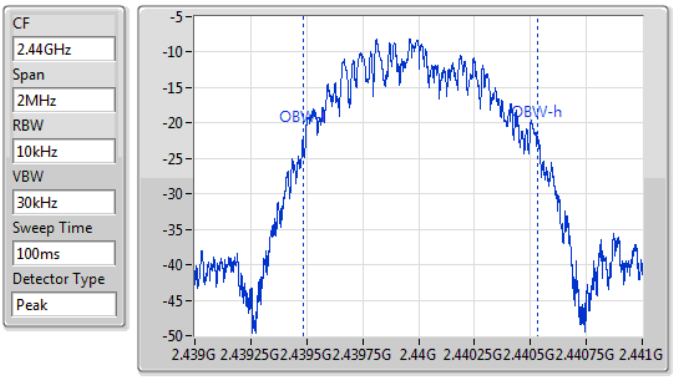
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
711.25k	2.40164G	2.402351G	1.043M	2.401487G	2.402531G	500k	1

BT-LE(1Mbps) EBW

2440MHz

29/11/2019



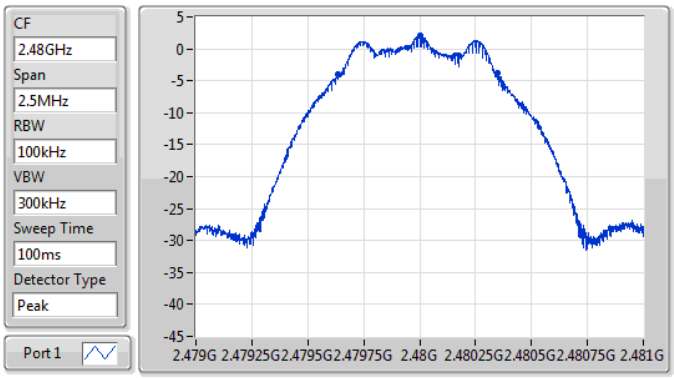


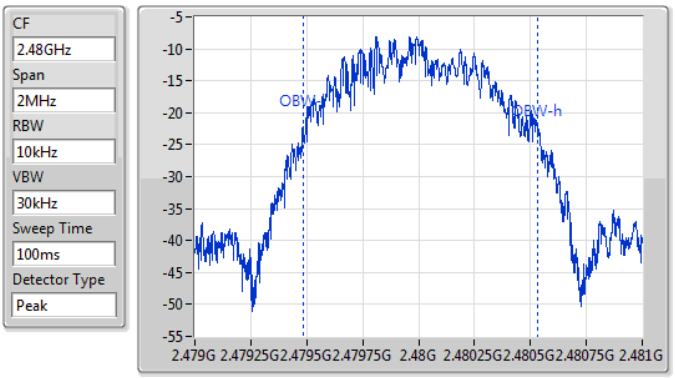
6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
726.25k	2.43963G	2.440356G	1.046M	2.439485G	2.440532G	500k	1

BT-LE(1Mbps) **EBW**

2480MHz

29/11/2019





6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
710k	2.479638G	2.480348G	1.049M	2.479483G	2.480533G	500k	1

Summary

Mode	Power (dBm)	Power (W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	-1.23	0.00075

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.18	-1.52	30.00
2440MHz	Pass	3.18	-1.23	30.00
2480MHz	Pass	3.18	-1.24	30.00

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

Summary

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	-13.85

RBW=3 kHz.

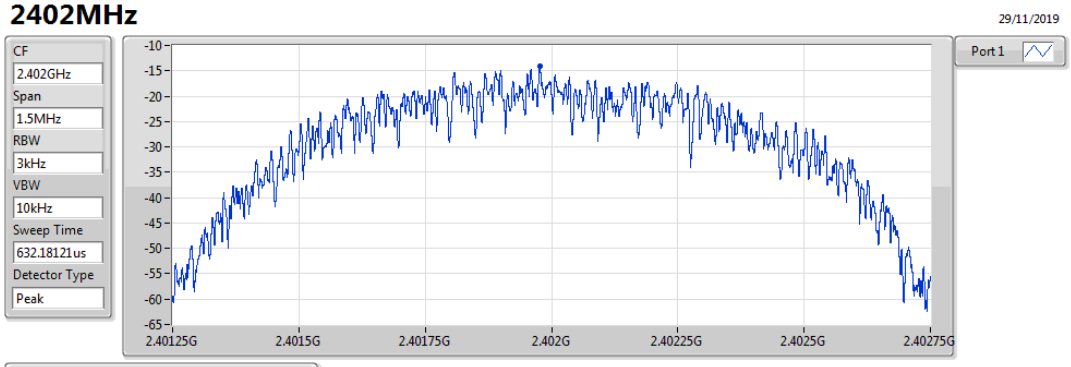
Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.18	-14.10	8.00
2440MHz	Pass	3.18	-13.85	8.00
2480MHz	Pass	3.18	-13.93	8.00

DG = Directional Gain; RBW=3 kHz;
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**

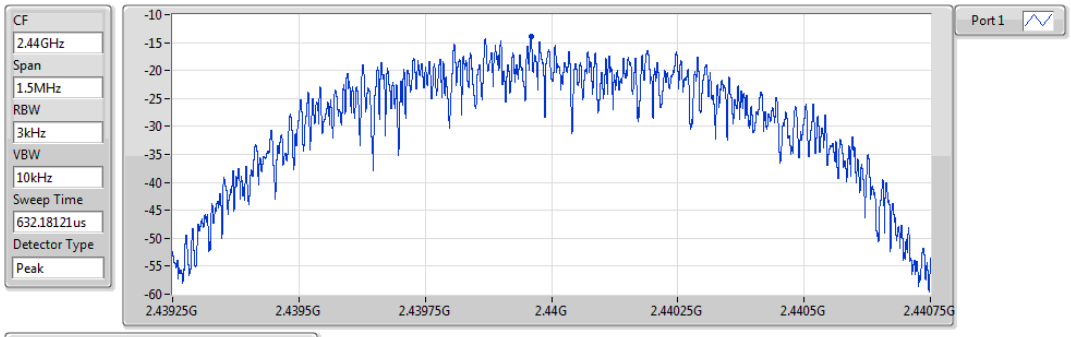
2402MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-14.10	-14.10	-14.10

BT-LE(1Mbps) **PSD**

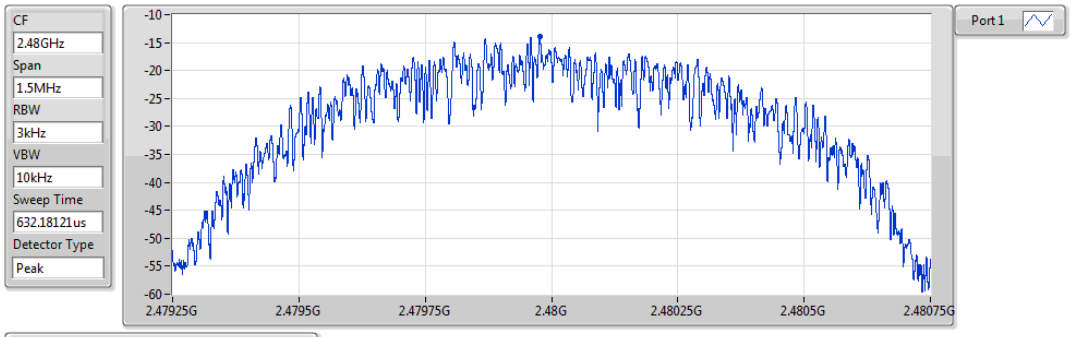
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-13.85	-13.85	-13.85

BT-LE(1Mbps) **PSD**

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-13.93	-13.93	-13.93

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	2.44G	1.95	-28.05	932.99M	-52.47	2.39997G	-46.69	2.4G	-46.73	2.48363G	-49.40	24.57538G	-39.80	1

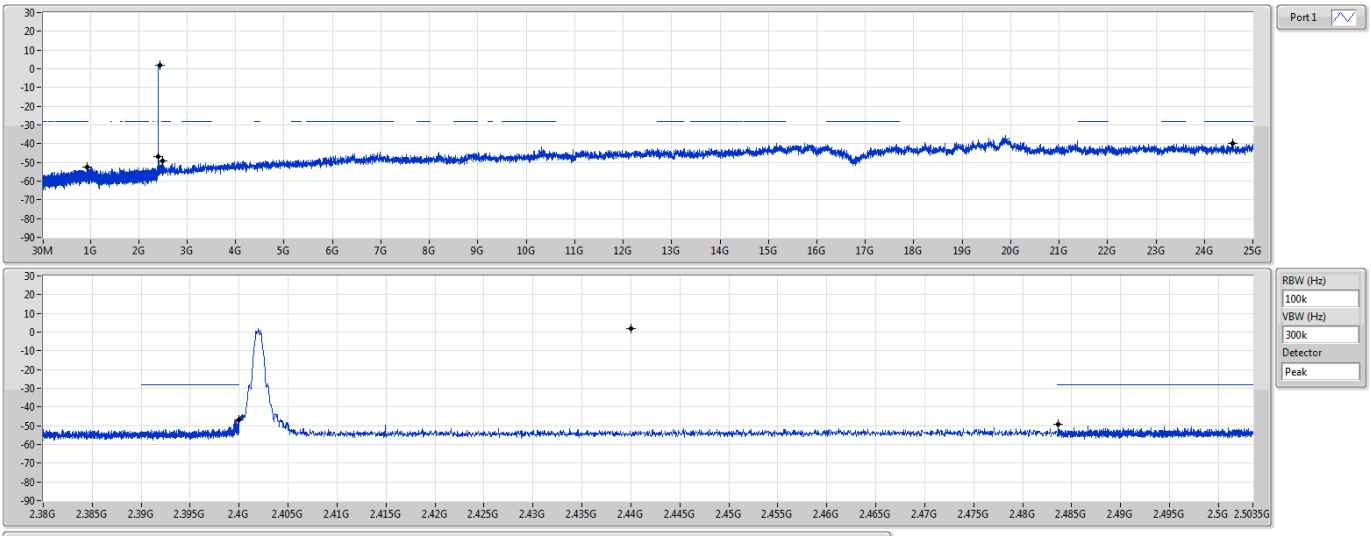
Result

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	2.44G	1.95	-28.05	932.99M	-52.47	2.39997G	-46.69	2.4G	-46.73	2.48363G	-49.40	24.57538G	-39.80	1
2440MHz	Pass	2.44G	1.95	-28.05	2.07773G	-52.98	2.39757G	-51.43	2.4835G	-53.39	2.49354G	-50.61	23.30995G	-38.72	1
2480MHz	Pass	2.44G	1.95	-28.05	1.99225G	-52.65	2.39916G	-51.01	2.4835G	-49.83	2.48356G	-49.29	24.65412G	-39.15	1

BT-LE(1Mbps) **CSE NdB**

2402MHz

29/11/2019

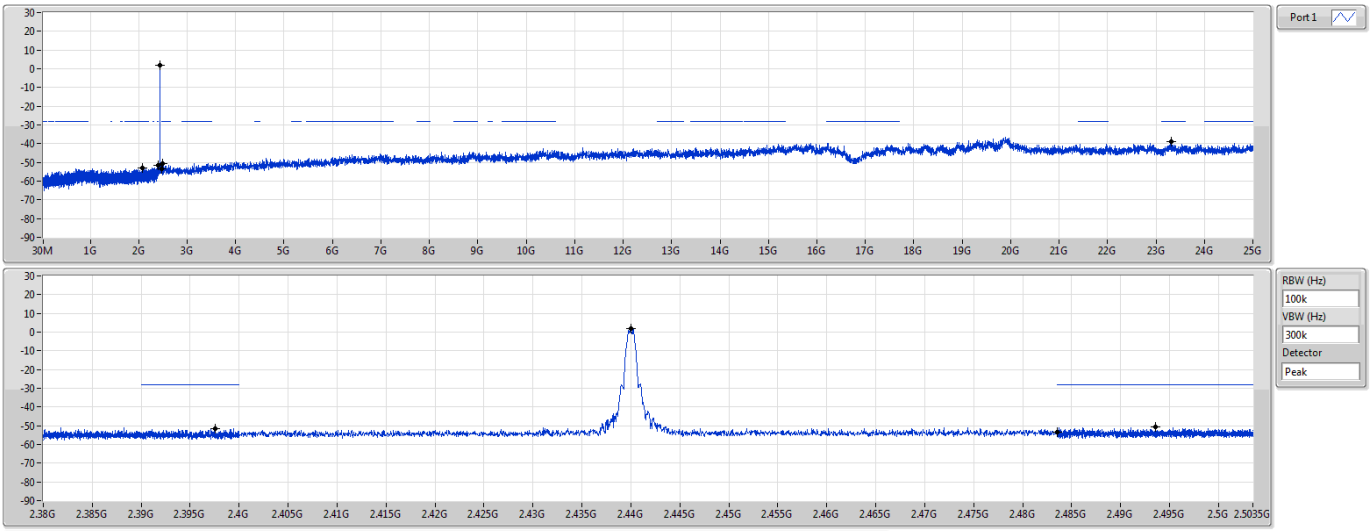


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.44G	1.95	-28.05	932.99M	-52.47	2.39997G	-46.69	2.4G	-46.73	2.48363G	-49.40	24.57538G	-39.80	1

BT-LE(1Mbps) **CSE NdB**

2440MHz

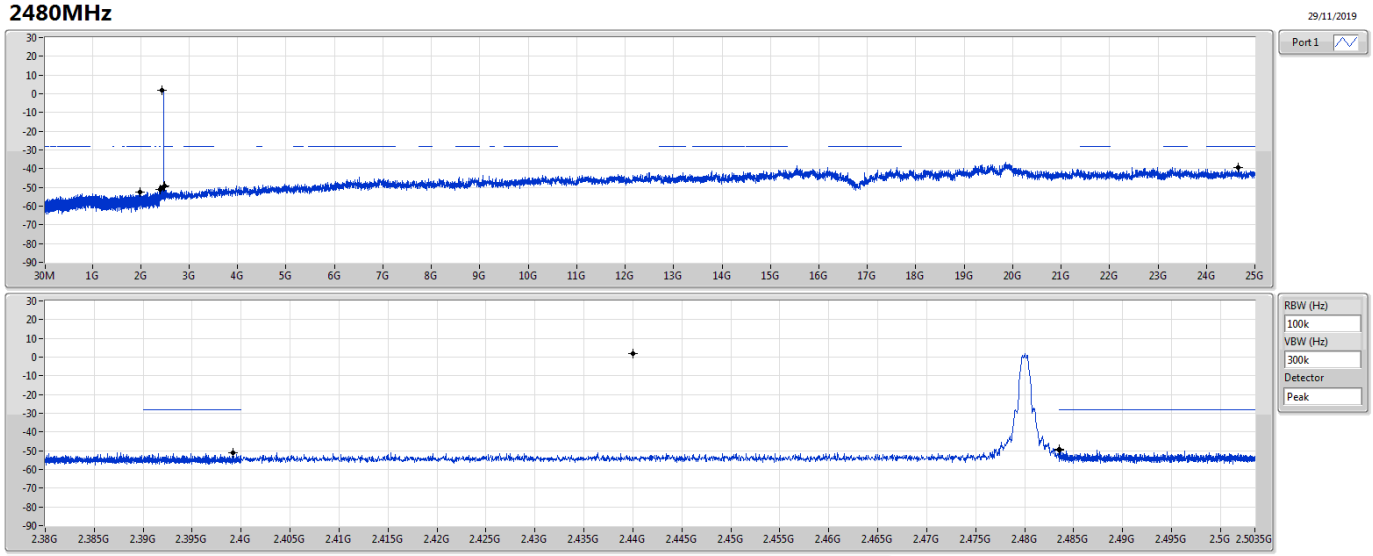
29/11/2019



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
2.44G	1.95	-28.05	2.07773G	-52.98	2.39757G	-51.43	2.4835G	-53.39	2.49354G	-50.61	23.30995G	-38.72	1

BT-LE(1Mbps) **CSE NdB**

2480MHz



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
2.44G	1.95	-28.05	1.99225G	-52.65	2.39916G	-51.01	2.4835G	-49.83	2.48356G	-49.29	24.65412G	-39.15	1

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	PK	179.05M	38.81	43.50	-4.69	3	Horizontal	0	1.00	-

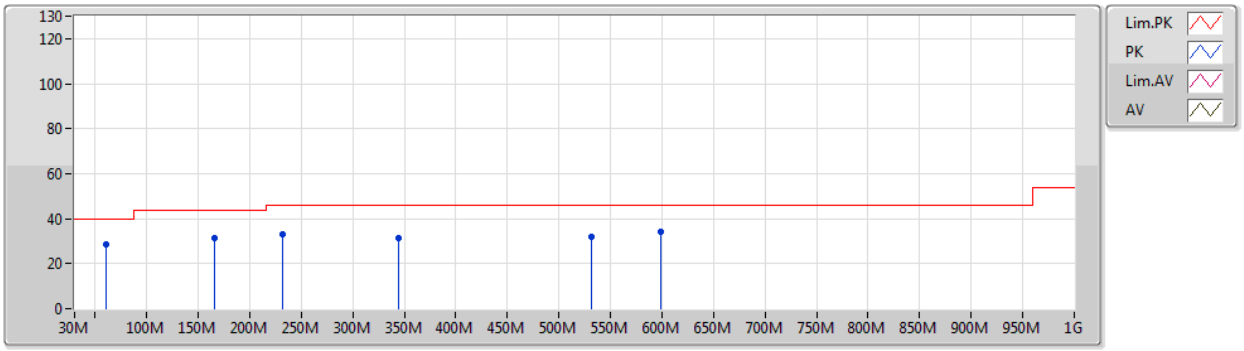
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	60.1M	28.78	40.00	-11.22	3	Vertical	360	1.00	-
2440MHz	Pass	PK	165.4M	31.31	43.50	-12.19	3	Vertical	360	1.00	-
2440MHz	Pass	PK	231.7M	33.29	46.00	-12.71	3	Vertical	360	1.00	-
2440MHz	Pass	PK	344.8M	31.47	46.00	-14.53	3	Vertical	360	1.00	-
2440MHz	Pass	PK	532M	32.05	46.00	-13.95	3	Vertical	360	1.00	-
2440MHz	Pass	PK	598.3M	34.00	46.00	-12.00	3	Vertical	360	1.00	-
2440MHz	Pass	PK	38.65M	28.85	40.00	-11.15	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	179.05M	38.81	43.50	-4.69	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	231.7M	37.75	46.00	-8.25	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	383.8M	32.62	46.00	-13.38	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	541.75M	33.26	46.00	-12.74	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	717.25M	33.50	46.00	-12.50	3	Horizontal	0	1.00	-

BT-LE(1Mbps)

2440MHz_USB

26/11/2019

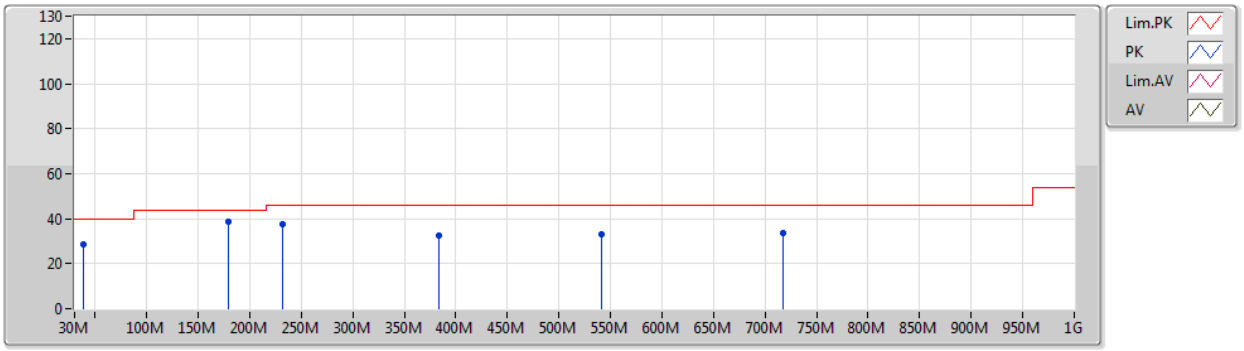


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	60.1M	28.78	40.00	-11.22	-14.86	3	Vertical	360	1.00	-	43.64	11.47	1.16	27.49
PK	165.4M	31.31	43.50	-12.19	-10.17	3	Vertical	360	1.00	-	41.48	14.95	1.99	27.11
PK	231.7M	33.29	46.00	-12.71	-8.98	3	Vertical	360	1.00	-	42.27	15.45	2.38	26.81
PK	344.8M	31.47	46.00	-14.53	-4.78	3	Vertical	360	1.00	-	36.25	19.22	2.95	26.95
PK	532M	32.05	46.00	-13.95	-1.30	3	Vertical	360	1.00	-	33.35	22.95	3.72	27.97
PK	598.3M	34.00	46.00	-12.00	-0.28	3	Vertical	360	1.00	-	34.28	23.70	4.07	28.05

BT-LE(1Mbps)

2440MHz_USB

26/11/2019



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
PK	38.65M	28.85	40.00	-11.15	-8.79	3	Horizontal	0	1.00	-	37.64	17.83	0.92	27.54
PK	179.05M	38.81	43.50	-4.69	-10.54	3	Horizontal	0	1.00	-	49.35	14.41	2.09	27.04
PK	231.7M	37.75	46.00	-8.25	-8.98	3	Horizontal	0	1.00	-	46.73	15.45	2.38	26.81
PK	383.8M	32.62	46.00	-13.38	-3.94	3	Horizontal	0	1.00	-	36.56	20.13	3.12	27.19
PK	541.75M	33.26	46.00	-12.74	-0.70	3	Horizontal	0	1.00	-	33.96	23.56	3.75	28.01
PK	717.25M	33.50	46.00	-12.50	0.55	3	Horizontal	0	1.00	-	32.95	24.18	4.41	28.04

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	2.496G	48.85	54.00	-5.15	3	Vertical	305	1.04	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-
2402MHz	Pass	AV	2.3796G	48.57	54.00	-5.43	3	Vertical	309	1.05	-
2402MHz	Pass	AV	2.402G	82.73	Inf	-Inf	3	Vertical	309	1.05	-
2402MHz	Pass	PK	2.3628G	60.19	74.00	-13.81	3	Vertical	309	1.05	-
2402MHz	Pass	PK	2.4022G	83.95	Inf	-Inf	3	Vertical	309	1.05	-
2402MHz	Pass	AV	2.402G	80.79	Inf	-Inf	3	Horizontal	359	1.08	-
2402MHz	Pass	PK	2.4022G	82.09	Inf	-Inf	3	Horizontal	359	1.08	-
2402MHz	Pass	AV	2.373G	48.67	54.00	-5.33	3	Horizontal	359	1.08	-
2402MHz	Pass	PK	2.3768G	59.87	74.00	-14.13	3	Horizontal	359	1.08	-
2402MHz	Pass	AV	4.80361G	37.01	54.00	-16.99	3	Vertical	34	2.99	-
2402MHz	Pass	PK	4.8034G	49.27	74.00	-24.73	3	Vertical	34	2.99	-
2402MHz	Pass	AV	4.80307G	36.87	54.00	-17.13	3	Horizontal	194	1.25	-
2402MHz	Pass	PK	4.80447G	49.73	74.00	-24.27	3	Horizontal	194	1.25	-
2440MHz	Pass	AV	2.34G	48.49	54.00	-5.51	3	Vertical	306	1.42	-
2440MHz	Pass	AV	2.44G	80.94	Inf	-Inf	3	Vertical	306	1.42	-
2440MHz	Pass	AV	2.4976G	48.61	54.00	-5.39	3	Vertical	306	1.42	-
2440MHz	Pass	PK	2.3736G	60.26	74.00	-13.74	3	Vertical	306	1.42	-
2440MHz	Pass	PK	2.4396G	82.20	Inf	-Inf	3	Vertical	306	1.42	-
2440MHz	Pass	PK	2.4896G	60.44	74.00	-13.56	3	Vertical	306	1.42	-
2440MHz	Pass	AV	2.3484G	48.34	54.00	-5.66	3	Horizontal	358	1.00	-
2440MHz	Pass	AV	2.44G	79.37	Inf	-Inf	3	Horizontal	358	1.00	-
2440MHz	Pass	AV	2.492G	48.53	54.00	-5.47	3	Horizontal	358	1.00	-
2440MHz	Pass	PK	2.3684G	60.66	74.00	-13.34	3	Horizontal	358	1.00	-
2440MHz	Pass	PK	2.44G	80.68	Inf	-Inf	3	Horizontal	358	1.00	-
2440MHz	Pass	PK	2.4992G	59.64	74.00	-14.36	3	Horizontal	358	1.00	-
2440MHz	Pass	AV	4.87954G	37.14	54.00	-16.86	3	Vertical	48	1.50	-
2440MHz	Pass	AV	7.3192G	42.95	54.00	-11.05	3	Vertical	149	1.50	-
2440MHz	Pass	PK	4.87984G	49.16	74.00	-24.84	3	Vertical	48	1.50	-
2440MHz	Pass	PK	7.31959G	55.43	74.00	-18.57	3	Vertical	149	1.50	-
2440MHz	Pass	AV	4.88002G	36.72	54.00	-17.28	3	Horizontal	301	2.94	-
2440MHz	Pass	AV	7.31947G	43.79	54.00	-10.21	3	Horizontal	324	1.02	-
2440MHz	Pass	PK	4.87988G	48.61	74.00	-25.39	3	Horizontal	301	2.94	-
2440MHz	Pass	PK	7.32073G	55.59	74.00	-18.41	3	Horizontal	324	1.02	-
2480MHz	Pass	AV	2.48G	79.66	Inf	-Inf	3	Vertical	305	1.04	-
2480MHz	Pass	AV	2.496G	48.85	54.00	-5.15	3	Vertical	305	1.04	-
2480MHz	Pass	PK	2.4802G	81.03	Inf	-Inf	3	Vertical	305	1.04	-
2480MHz	Pass	PK	2.49G	60.65	74.00	-13.35	3	Vertical	305	1.04	-
2480MHz	Pass	AV	2.48G	78.08	Inf	-Inf	3	Horizontal	0	1.00	-
2480MHz	Pass	AV	2.4858G	48.76	54.00	-5.24	3	Horizontal	0	1.00	-
2480MHz	Pass	PK	2.4798G	79.48	Inf	-Inf	3	Horizontal	0	1.00	-
2480MHz	Pass	PK	2.486G	60.45	74.00	-13.55	3	Horizontal	0	1.00	-
2480MHz	Pass	AV	4.95932G	37.17	54.00	-16.83	3	Vertical	317	2.69	-
2480MHz	Pass	AV	7.43941G	42.91	54.00	-11.09	3	Vertical	183	1.12	-
2480MHz	Pass	PK	4.95908G	50.48	74.00	-23.52	3	Vertical	317	2.69	-
2480MHz	Pass	PK	7.43974G	55.17	74.00	-18.83	3	Vertical	183	1.12	-
2480MHz	Pass	AV	4.96048G	36.83	54.00	-17.17	3	Horizontal	180	2.11	-
2480MHz	Pass	AV	7.44055G	43.44	54.00	-10.56	3	Horizontal	144	2.13	-
2480MHz	Pass	PK	4.95906G	48.98	74.00	-25.02	3	Horizontal	180	2.11	-

Remark :

Level (dBuV/m) = Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

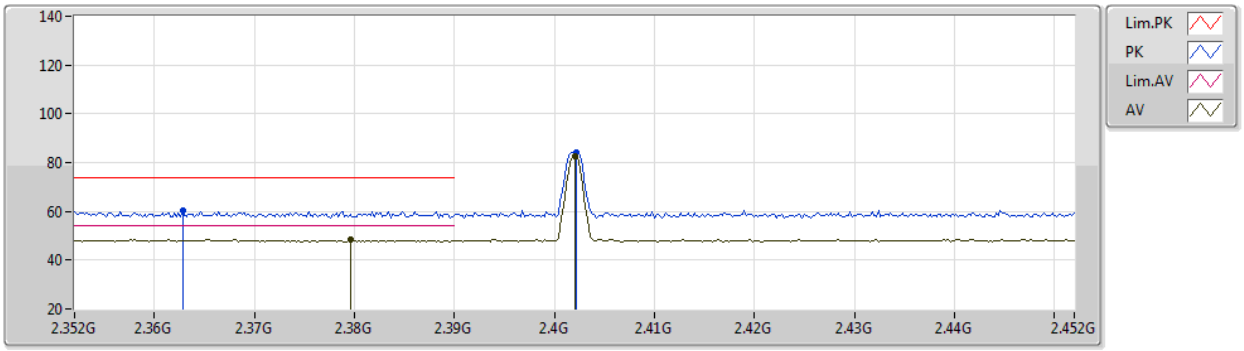
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2480MHz	Pass	PK	7.44094G	55.36	74.00	-18.64	3	Horizontal	144	2.13	-

Level (dBuV/m) = Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

BT-LE(1Mbps)

2402MHz_TX

17/10/2019

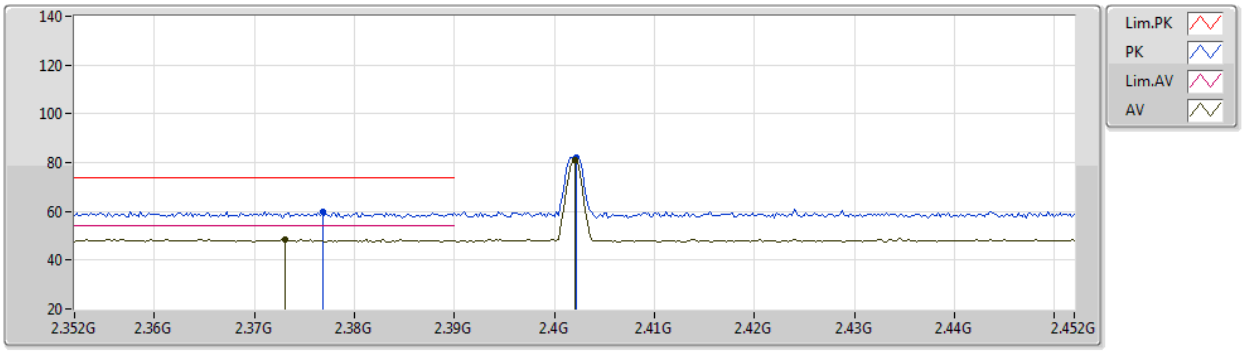


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3796G	48.57	54.00	-5.43	35.01	3	Vertical	309	1.05	-	13.56	27.68	7.33	-
AV	2.402G	82.73	Inf	-Inf	34.93	3	Vertical	309	1.05	-	47.80	27.60	7.33	-
PK	2.3628G	60.19	74.00	-13.81	35.09	3	Vertical	309	1.05	-	25.10	27.75	7.34	-
PK	2.4022G	83.95	Inf	-Inf	34.93	3	Vertical	309	1.05	-	49.02	27.60	7.33	-

BT-LE(1Mbps)

2402MHz_TX

17/10/2019

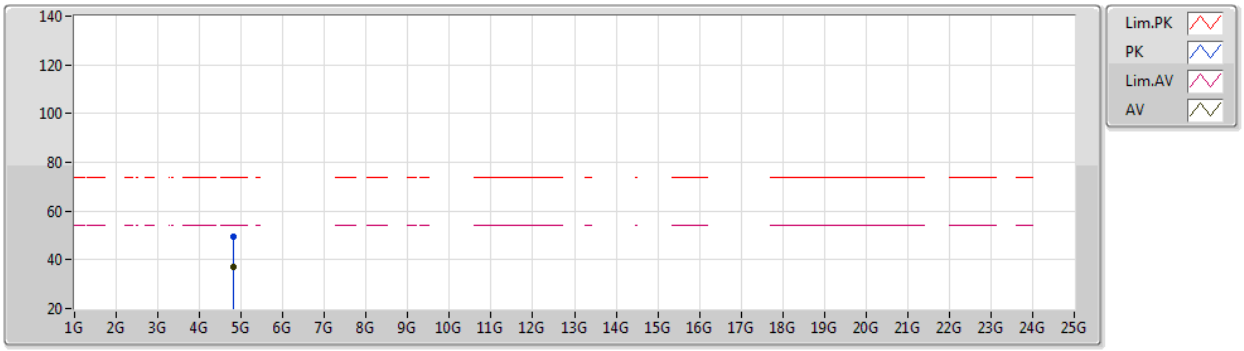


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.402G	80.79	Inf	-Inf	34.93	3	Horizontal	359	1.08	-	45.86	27.60	7.33	-
PK	2.4022G	82.09	Inf	-Inf	34.93	3	Horizontal	359	1.08	-	47.16	27.60	7.33	-
AV	2.373G	48.67	54.00	-5.33	35.05	3	Horizontal	359	1.08	-	13.62	27.71	7.34	-
PK	2.3768G	59.87	74.00	-14.13	35.03	3	Horizontal	359	1.08	-	24.84	27.69	7.34	-

BT-LE(1Mbps)

2402MHz_TX

17/10/2019



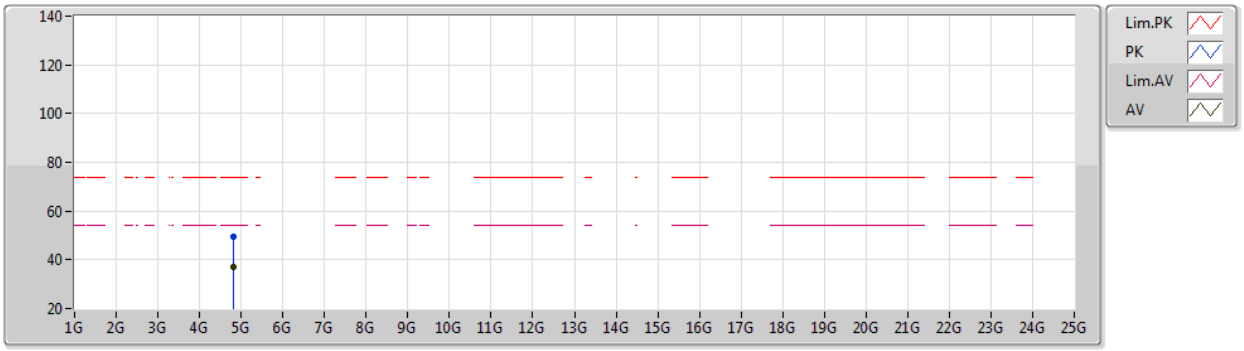
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.80361G	37.01	54.00	-16.99	6.97	3	Vertical	34	2.99	-	30.04	31.10	9.92	34.05
PK	4.8034G	49.27	74.00	-24.73	6.97	3	Vertical	34	2.99	-	42.30	31.10	9.92	34.05

Level (dBuV/m) = Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

BT-LE(1Mbps)

2402MHz_TX

17/10/2019



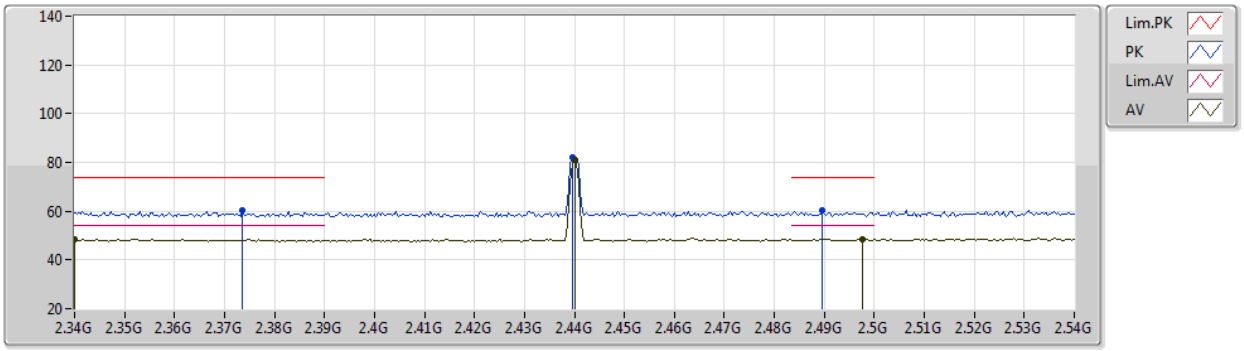
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.80307G	36.87	54.00	-17.13	6.97	3	Horizontal	194	1.25	-	29.90	31.10	9.92	34.05
PK	4.80447G	49.73	74.00	-24.27	6.97	3	Horizontal	194	1.25	-	42.76	31.10	9.92	34.05

Level (dBuV/m) = Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

BT-LE(1Mbps)

2440MHz_TX

17/10/2019

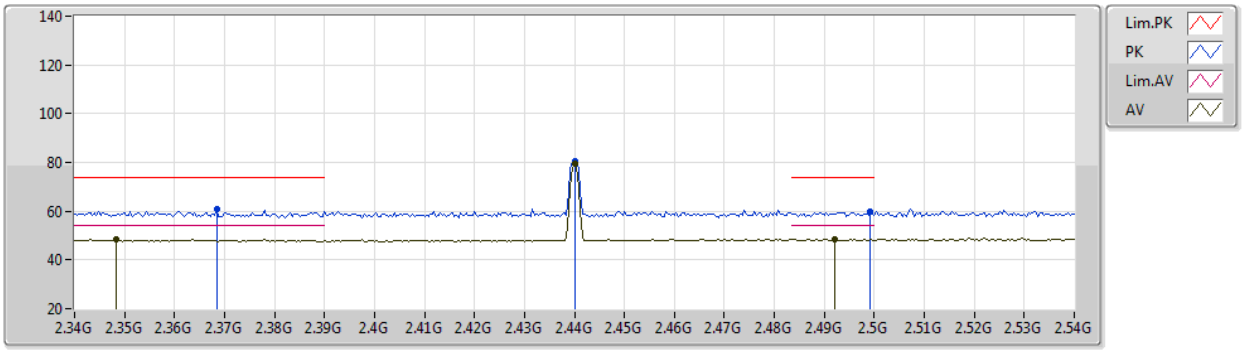


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.34G	48.49	54.00	-5.51	35.18	3	Vertical	306	1.42	-	13.31	27.84	7.34	-
AV	2.44G	80.94	Inf	-Inf	34.91	3	Vertical	306	1.42	-	46.03	27.56	7.35	-
AV	2.4976G	48.61	54.00	-5.39	34.87	3	Vertical	306	1.42	-	13.74	27.50	7.37	-
PK	2.3736G	60.26	74.00	-13.74	35.05	3	Vertical	306	1.42	-	25.21	27.71	7.34	-
PK	2.4396G	82.20	Inf	-Inf	34.91	3	Vertical	306	1.42	-	47.29	27.56	7.35	-
PK	2.4896G	60.44	74.00	-13.56	34.88	3	Vertical	306	1.42	-	25.56	27.51	7.37	-

BT-LE(1Mbps)

2440MHz_TX

17/10/2019

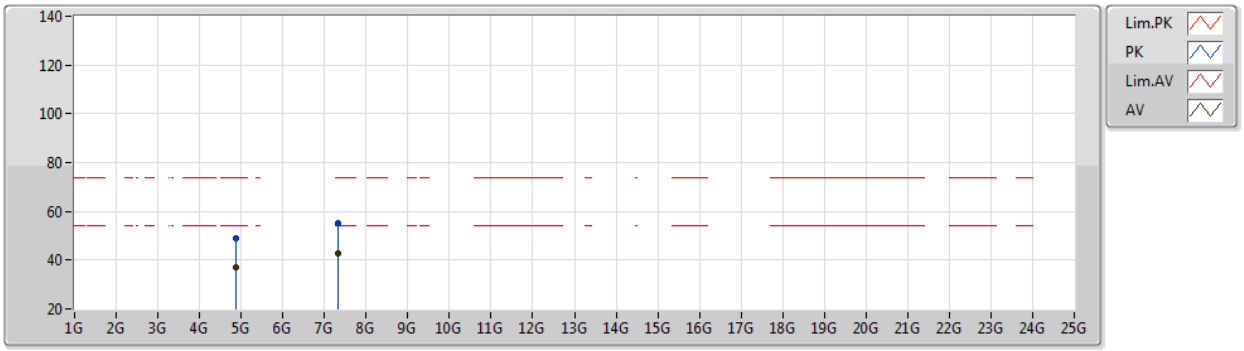


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.3484G	48.34	54.00	-5.66	35.15	3	Horizontal	358	1.00	-	13.19	27.81	7.34	-
AV	2.44G	79.37	Inf	-Inf	34.91	3	Horizontal	358	1.00	-	44.46	27.56	7.35	-
AV	2.492G	48.53	54.00	-5.47	34.88	3	Horizontal	358	1.00	-	13.65	27.51	7.37	-
PK	2.3684G	60.66	74.00	-13.34	35.07	3	Horizontal	358	1.00	-	25.59	27.73	7.34	-
PK	2.44G	80.68	Inf	-Inf	34.91	3	Horizontal	358	1.00	-	45.77	27.56	7.35	-
PK	2.4992G	59.64	74.00	-14.36	34.87	3	Horizontal	358	1.00	-	24.77	27.50	7.37	-

BT-LE(1Mbps)

2440MHz_TX

17/10/2019

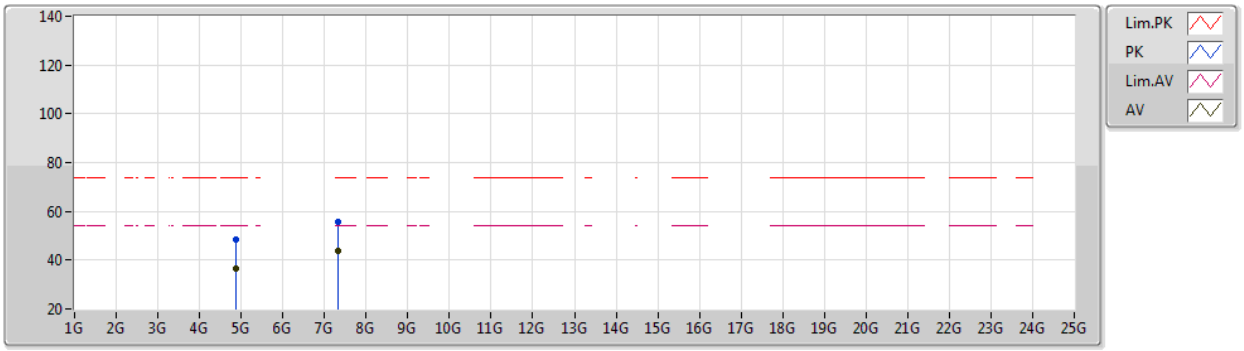


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.87954G	37.14	54.00	-16.86	7.03	3	Vertical	48	1.50	-	30.11	31.10	9.98	34.05
AV	7.3192G	42.95	54.00	-11.05	13.31	3	Vertical	149	1.50	-	29.64	36.28	11.30	34.27
PK	4.87984G	49.16	74.00	-24.84	7.03	3	Vertical	48	1.50	-	42.13	31.10	9.98	34.05
PK	7.31959G	55.43	74.00	-18.57	13.31	3	Vertical	149	1.50	-	42.12	36.28	11.30	34.27

BT-LE(1Mbps)

2440MHz_TX

17/10/2019



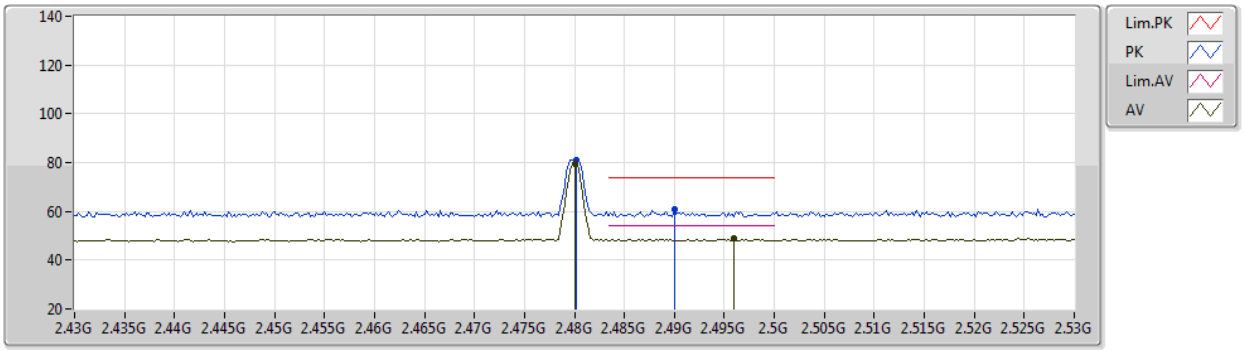
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.88002G	36.72	54.00	-17.28	7.03	3	Horizontal	301	2.94	-	29.69	31.10	9.98	34.05
AV	7.31947G	43.79	54.00	-10.21	13.31	3	Horizontal	324	1.02	-	30.48	36.28	11.30	34.27
PK	4.87988G	48.61	74.00	-25.39	7.03	3	Horizontal	301	2.94	-	41.58	31.10	9.98	34.05
PK	7.32073G	55.59	74.00	-18.41	13.31	3	Horizontal	324	1.02	-	42.28	36.28	11.30	34.27

Level (dBuV/m) = Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

BT-LE(1Mbps)

2480MHz_TX

17/10/2019



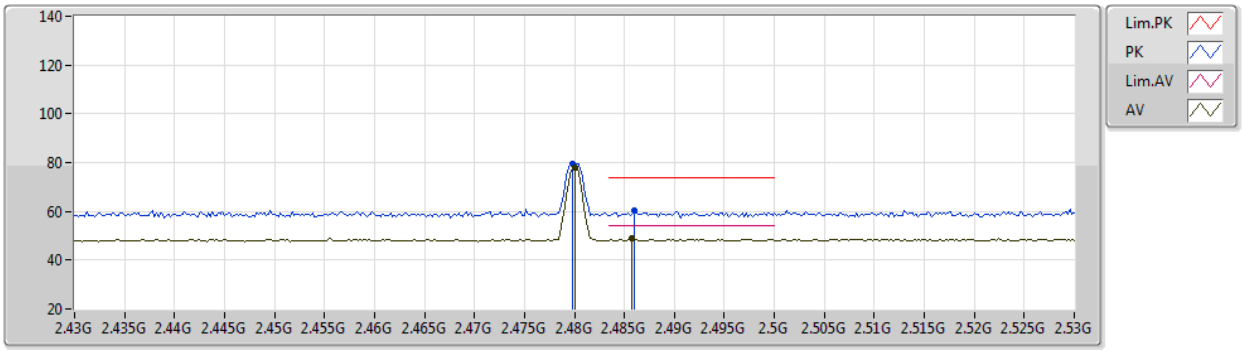
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	79.66	Inf	-Inf	34.89	3	Vertical	305	1.04	-	44.77	27.52	7.37	-
AV	2.496G	48.85	54.00	-5.15	34.87	3	Vertical	305	1.04	-	13.98	27.50	7.37	-
PK	2.4802G	81.03	Inf	-Inf	34.89	3	Vertical	305	1.04	-	46.14	27.52	7.37	-
PK	2.49G	60.65	74.00	-13.35	34.88	3	Vertical	305	1.04	-	25.77	27.51	7.37	-

Level (dBuV/m) = Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

BT-LE(1Mbps)

2480MHz_TX

17/10/2019

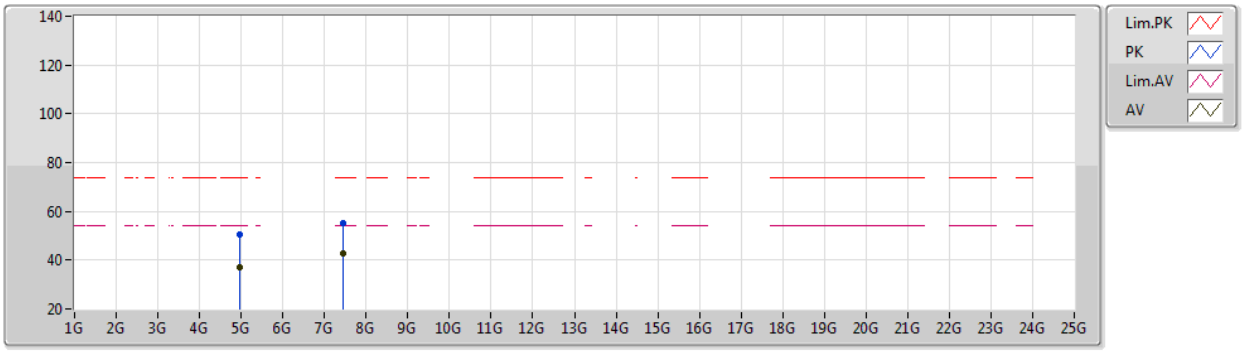


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	2.48G	78.08	Inf	-Inf	34.89	3	Horizontal	0	1.00	-	43.19	27.52	7.37	-
AV	2.4858G	48.76	54.00	-5.24	34.88	3	Horizontal	0	1.00	-	13.88	27.51	7.37	-
PK	2.4798G	79.48	Inf	-Inf	34.88	3	Horizontal	0	1.00	-	44.60	27.52	7.36	-
PK	2.486G	60.45	74.00	-13.55	34.88	3	Horizontal	0	1.00	-	25.57	27.51	7.37	-

BT-LE(1Mbps)

2480MHz_TX

17/10/2019



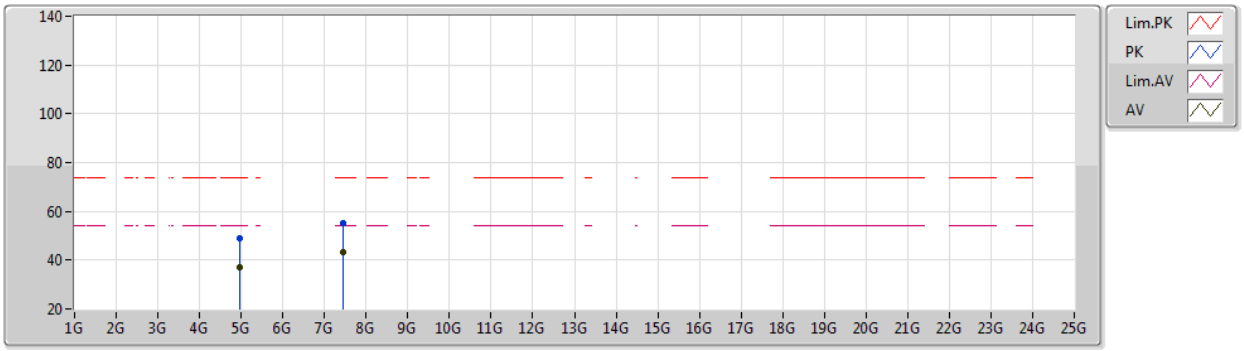
Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.95932G	37.17	54.00	-16.83	7.35	3	Vertical	317	2.69	-	29.82	31.34	10.05	34.04
AV	7.43941G	42.91	54.00	-11.09	13.41	3	Vertical	183	1.12	-	29.50	36.32	11.38	34.29
PK	4.95908G	50.48	74.00	-23.52	7.35	3	Vertical	317	2.69	-	43.13	31.34	10.05	34.04
PK	7.43974G	55.17	74.00	-18.83	13.41	3	Vertical	183	1.12	-	41.76	36.32	11.38	34.29

Level (dBuV/m) = Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)

BT-LE(1Mbps)

2480MHz_TX

17/10/2019



Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comment	Raw	AF	CL	PA
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)		(dBuV)	(dB)	(dB)	(dB)
AV	4.96048G	36.83	54.00	-17.17	7.35	3	Horizontal	180	2.11	-	29.48	31.34	10.05	34.04
AV	7.44055G	43.44	54.00	-10.56	13.41	3	Horizontal	144	2.13	-	30.03	36.32	11.38	34.29
PK	4.95906G	48.98	74.00	-25.02	7.35	3	Horizontal	180	2.11	-	41.63	31.34	10.05	34.04
PK	7.44094G	55.36	74.00	-18.64	13.41	3	Horizontal	144	2.13	-	41.95	36.32	11.38	34.29

Level (dBuV/m) = Raw(Read Level) + AF(Antenna Factor) + CL(Cable Loss) - PA(Preamp Factor)