

NCC Test Report

Equipment : 無線網路基地台
Brand Name : UBIQUITI
Model Name : UDM
Applicant : 香港商優比快科技有限公司台灣分公司
臺北市信義區松仁路 107 號 12 樓
Manufacturer : Ubiquiti Networks, Inc.
685 Third Avenue, 27th Floor New York,
New York 10017 USA
Standard : LP0002 Section 3.10 (2018-01-10)

The product was received on Jul. 16, 2018, and testing was started from Jul. 16, 2018 and completed on Jul. 08, 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.



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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History of this test report

[illegible]

Summary of Test Result

Report Clause	Ref. Std. Clause	Test Items	Result (PASS/FAIL)	Remark
1.1.2	3.10.1.4	Antenna Requirement	PASS	LP0002-2.2
3.1	2.3	AC Power-line Conducted Emissions	PASS	LP0002-2.3
3.2	3.10.1.6	DTS Bandwidth	PASS	≥500kHz
3.3	3.10.1.2	Maximum Conducted Output Power	PASS	Power [dBm]:30
3.4	3.10.1.6	Power Spectral Density	PASS	PSD [dBm/3kHz]:8
3.5	3.10.1.5	Emissions in Non-restricted Frequency Bands	PASS	Non-Restricted Bands: >30 dBc
3.6	3.10.1.5	Emissions in Restricted Frequency Bands	PASS	Restricted Bands: LP0002-2.8
3.7	2.11	Receiver Radiated Unwanted Emissions	PASS	Restricted Bands: LP0002-2.8

Note : From Sporton Project No.:FR870420-01AL.

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: Jenny Yang

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
1	-	-	internal antenna	I-Pex
2	-	-	internal antenna	I-Pex
3	-	-	internal antenna	I-Pex
4	-	-	internal antenna	I-Pex
5	-	-	internal antenna	I-Pex

Ant.	2.4G		5G			BT	
	Port	Gain (dBi)	Port	Non-Beamforming Gain (dBi)	Beamforming Gain (dBi)	Port	Gain (dBi)
1	1	3	4	4.5	6.02	-	-
2	2	3	3	4.5	6.02	-	-
3	-	-	2	4.5	6.02	-	-
4	-	-	1	4.5	6.02	-	-
5	-	-	-	-		1	2

Note 1: The EUT has five antennas.

For 2.4GHz function:

For IEEE 802.11 b/g/n mode (2TX/2RX)

Ant. 1 (port 1) and Ant. 2 (port 2) could transmit/receive simultaneously.

For 5GHz function:

For IEEE 802.11 a/an/ac mode (4TX/4RX)

Ant. 1 (port 4), Ant. 2 (port 3), Ant. 3 (port 2) and Ant. 4 (port 1) could transmit/receive simultaneously.

For BT function:

For Bluetooth mode (1TX/1RX)

Ant. 5 (port 1) could transmit/receive simultaneously.

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From AC mains
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)	0.625	2.041	405u	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:

- ♦ LP0002 (2018-01-10)
- ♦ ANSI C63.10-2013
- ♦ KDB 558074 D01 v05r02
- ♦ ANSI C63.4-2014

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
☐	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 Condition	Test Site No.	Test Engineer	Test Environment	Test Date	Remark
AC Conduction	CO04-HY	Andy	24.8°C / 56.5%	06/Oct/2018	for TX
	CO01-HY	Jeff	24.5°C / 54.3%	05/Jun/2019	for RX
RF Conducted	TH06-HY	Tim	24.5°C / 52.3%	16/Jul/2018~ 18/Jul/2018	-
Radiated	03CH02-HY	Jeff	23.9°C / 55%	06/Nov/2018	for TX
	03CH02-HY	Edward	26.2~27.5°C / 55.8~57.3%	17/May/2019~ 08/Jul/2019	for RX

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	Putty
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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/CRX
1	AC mains 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 Receiver Radiated Unwanted Emissions		
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/CRX		
1	AC mains mode		
Operating Mode > 1GHz	CTX/CRX		
Orthogonal Planes of EUT	X Plane	Y Plane	Z Plane
			
Worst Planes of EUT		V	

2.4 Accessories and Support Equipment

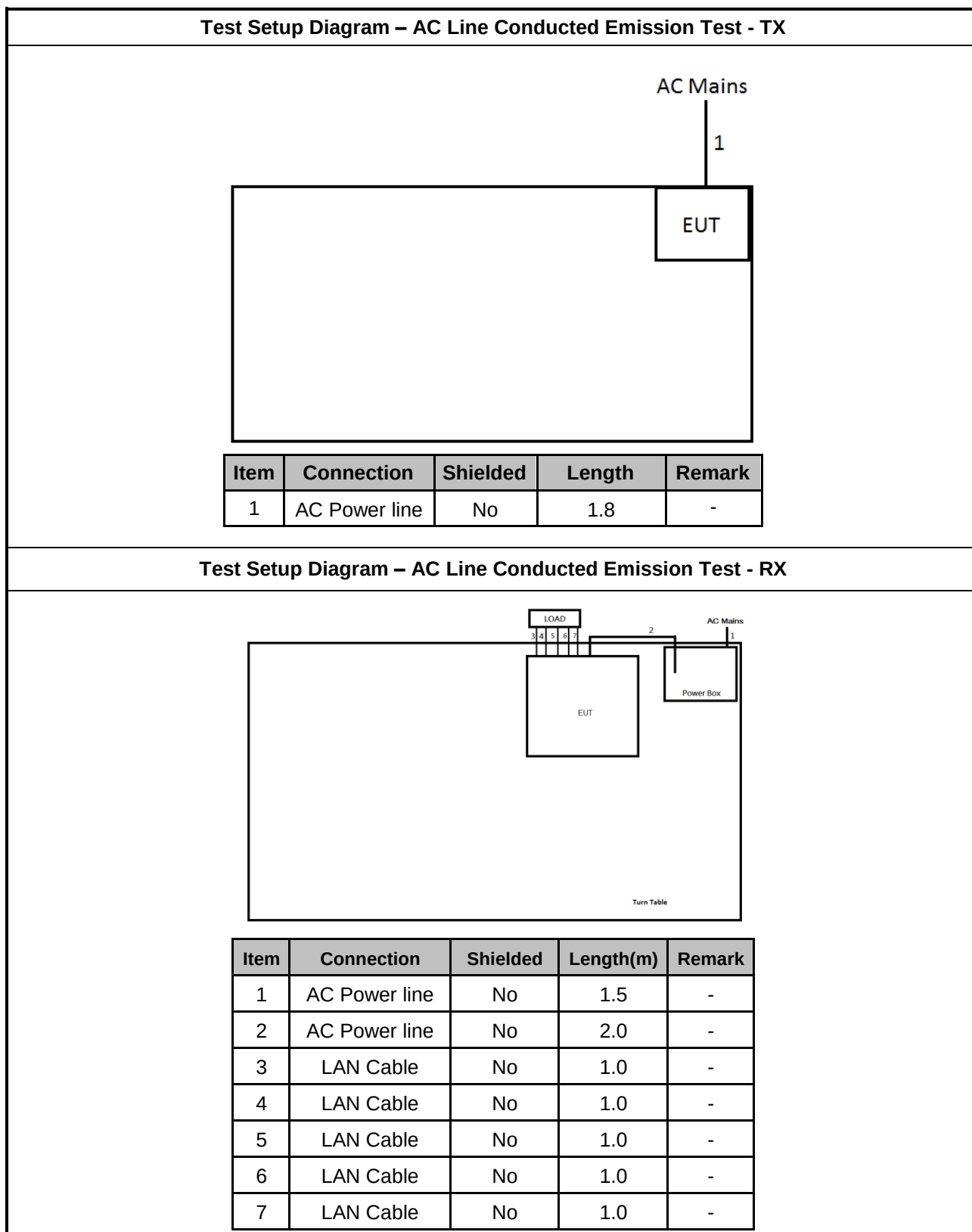
Accessories				
Power Cord (FCC/CE Plug)	Brand Name	ASAP (Luxshare)	Model Name	A1F-0147-AC2 + A1F-0145-AC2
	Category	-	In/Out door	Indoor
	Cable	2 meter, Non-Shielded cable		

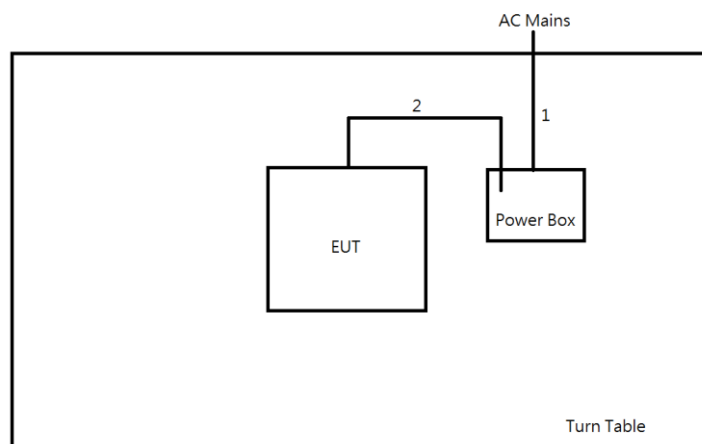
Reminder: Regarding to more detail and other information, please refer to user manual.

Support Equipment – RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DoC
2	Adapter for Notebook	DELL	HA65NM130	DoC
3	AC Power Line	N/A	N/A	N/A

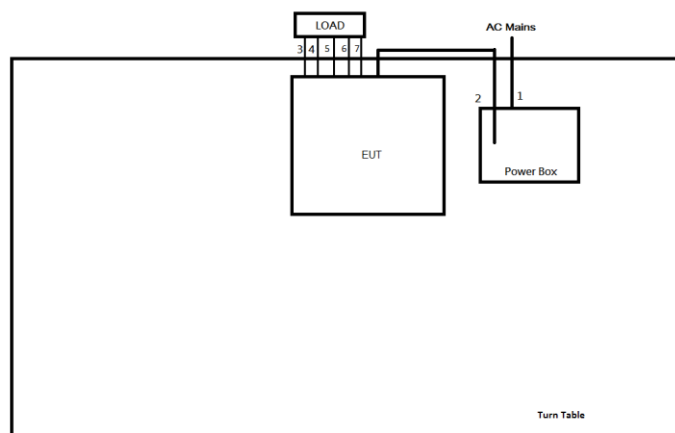
Support Equipment – Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Load (RX mode)	SPORTON	-	-

2.5 Test Setup Diagram



Test Setup Diagram - Radiated Test - TX


Item	Connection	Shielded	Length	Remark
1	AC Power line	No	1.5	-
2	AC Power line	No	1.5	-

Test Setup Diagram - Radiated Test - RX


Item	Connection	Shielded	Length(m)	Remark
1	AC Power line	No	1.5	-
2	AC Power line	No	2.0	-
3	LAN Cable	No	1.0	-
4	LAN Cable	No	1.0	-
5	LAN Cable	No	1.0	-
6	LAN Cable	No	1.0	-
7	LAN Cable	No	1.0	-

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.

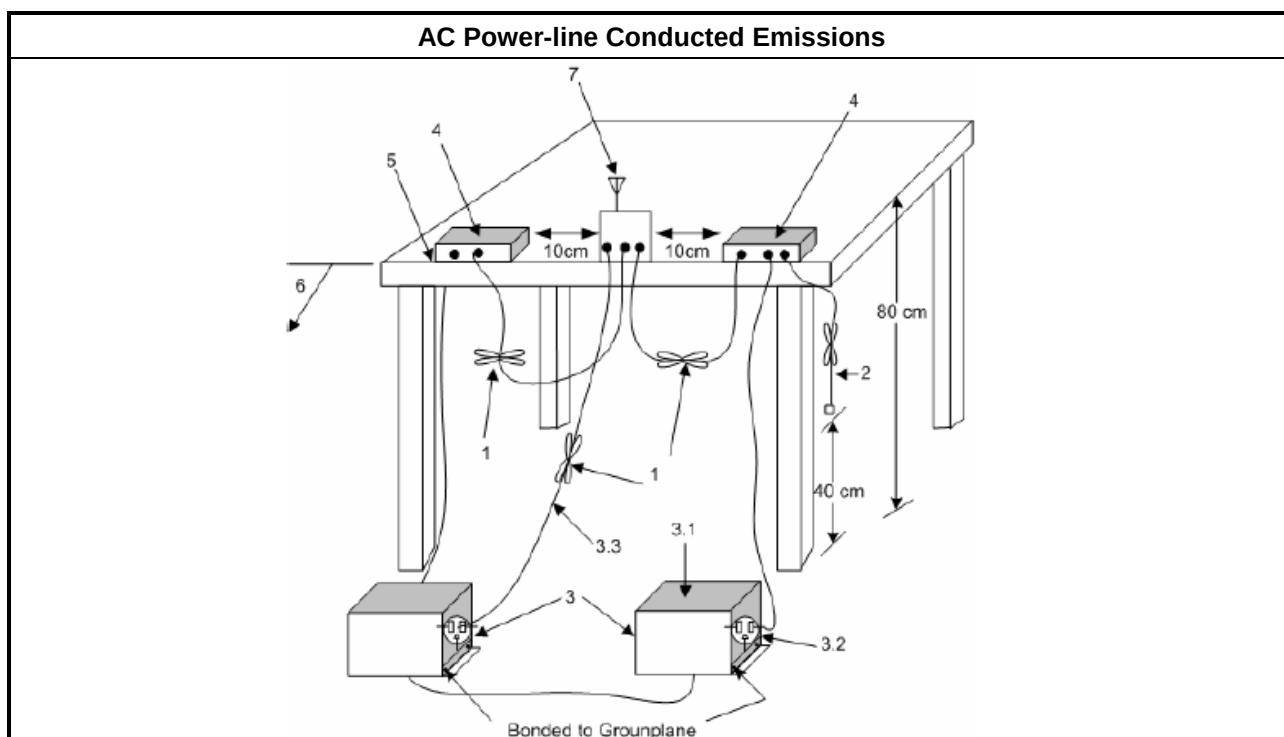
3.1.2 Measuring Instruments

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 for AC power-line conducted emissions.

3.1.4 Test Setup



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 $\geq$ 500 kHz.

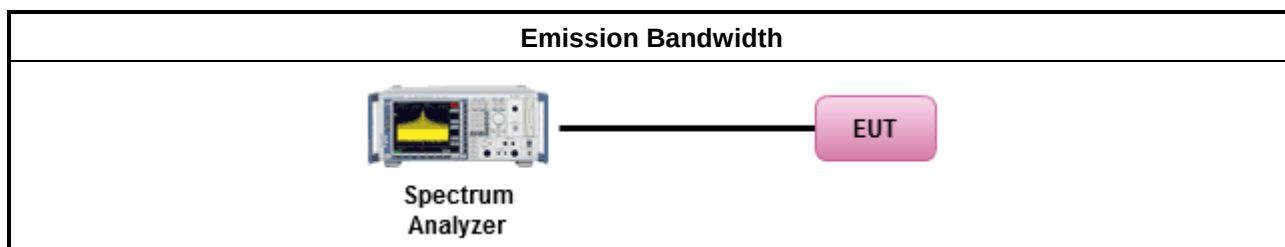
3.2.2 Measuring Instruments

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 occupied bandwidth testing.
☐	Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup



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): $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])$ dBm
	Smart antenna system (SAS)
	- Single beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	- Overlap beam: $P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})$ dBm
	- Aggregate power on all beams: $P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])$ 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.	

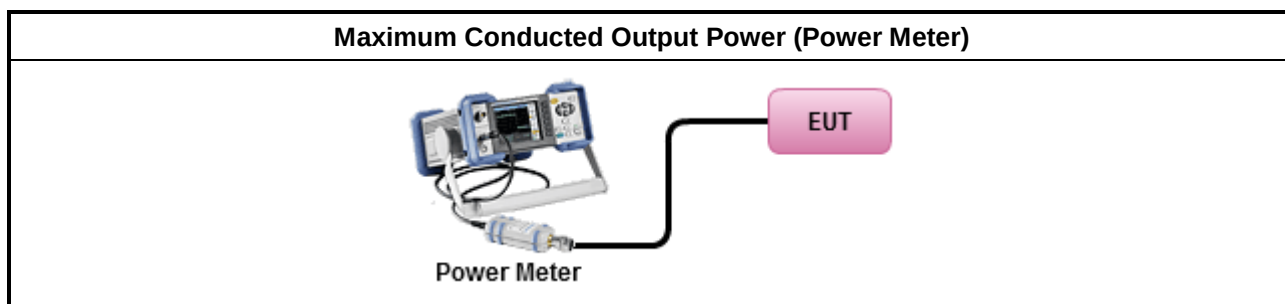
3.3.2 Measuring Instruments

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: $P_{total} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$	

3.3.4 Test Setup



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

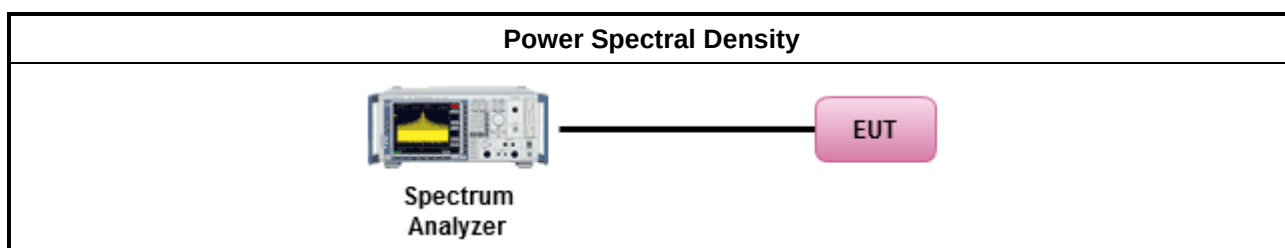
3.4.2 Measuring Instruments

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



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.	

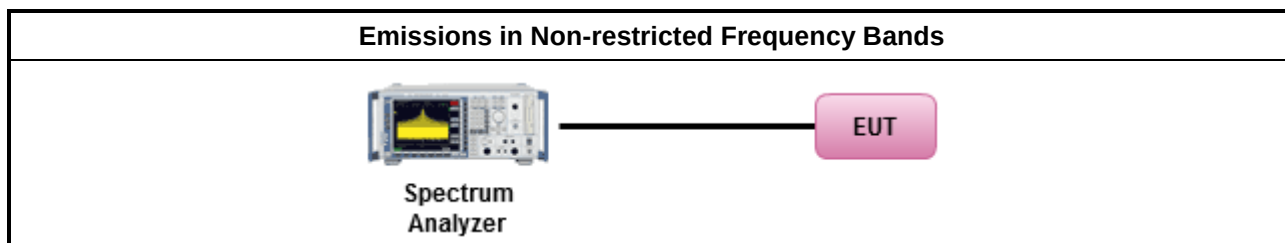
3.5.2 Measuring Instruments

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



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 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.

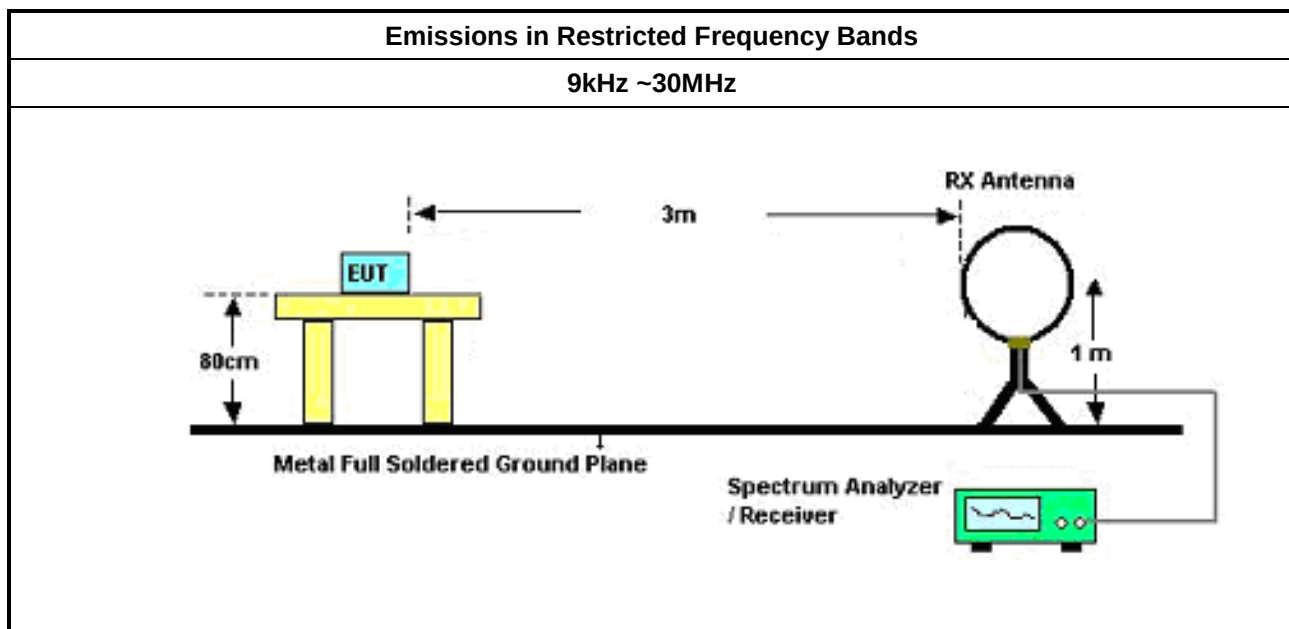
3.6.2 Measuring Instruments

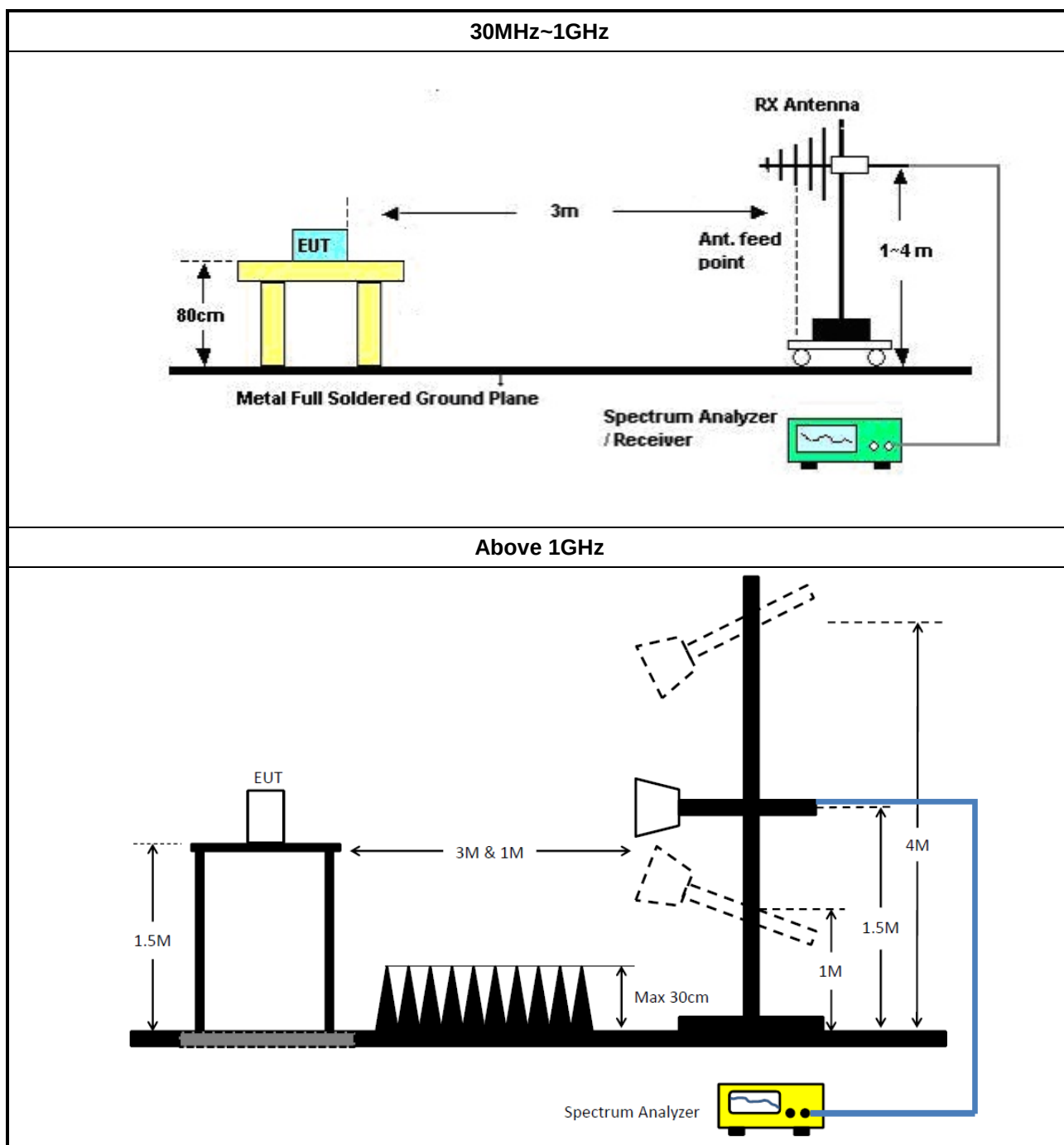
Refer a test equipment and calibration data table in this test report.

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 $f \geq 1$ GHz for peak measurement. For average measurement, refer as 1.1.4.

3.6.4 Test Setup





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

3.7 Receiver Radiated Spurious Emissions

3.7.1 Receiver in Radiated Spurious Emissions Limit

Restricted Spurious 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.

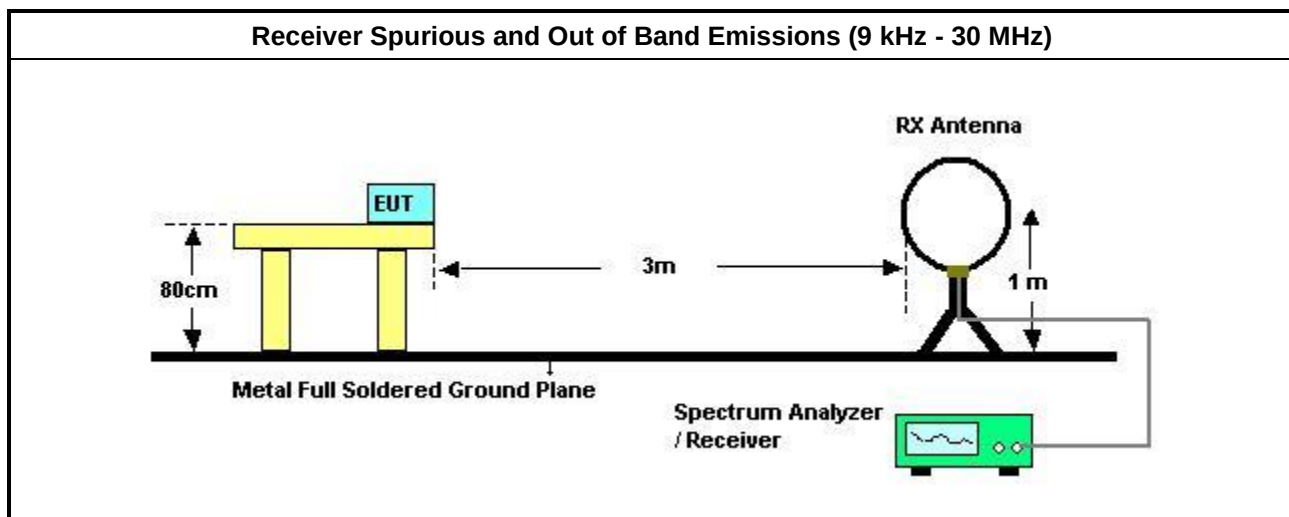
3.7.2 Measuring Instruments

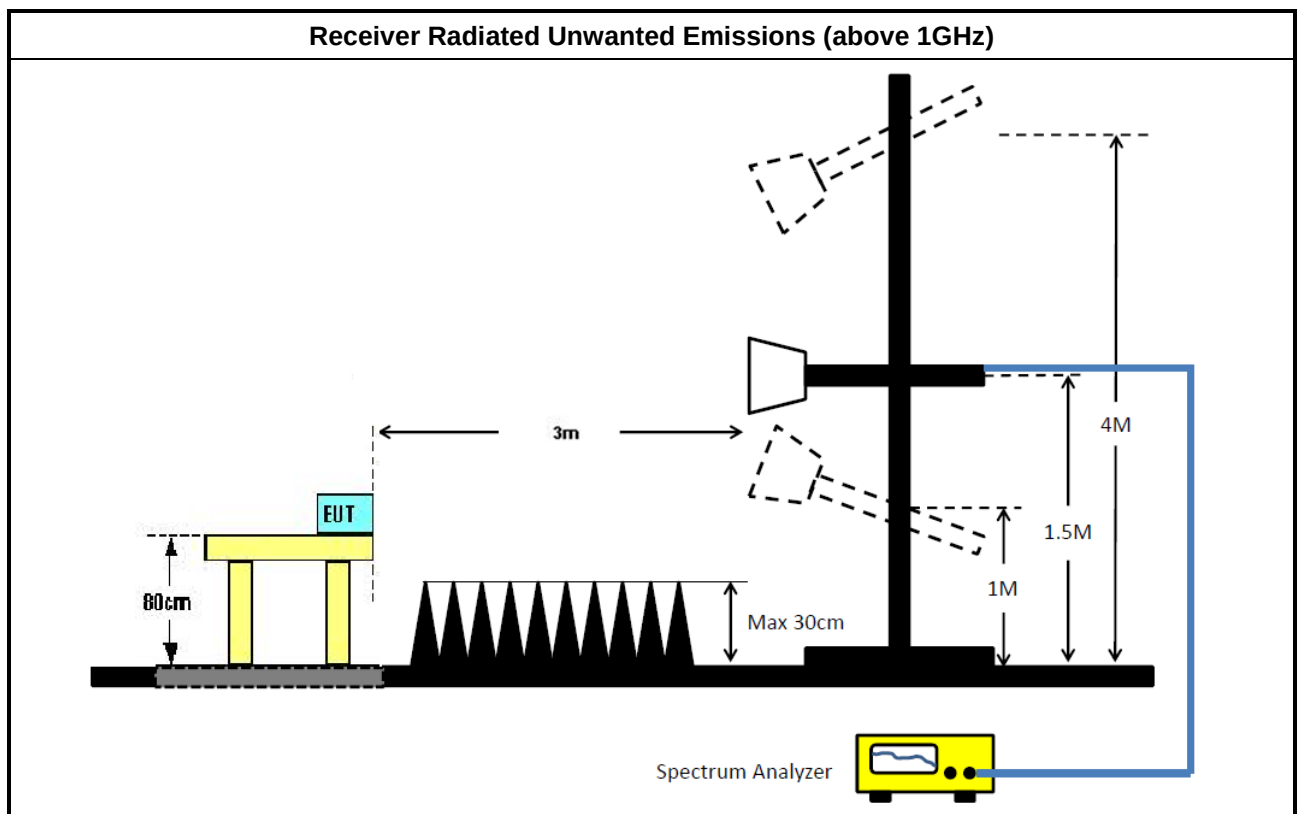
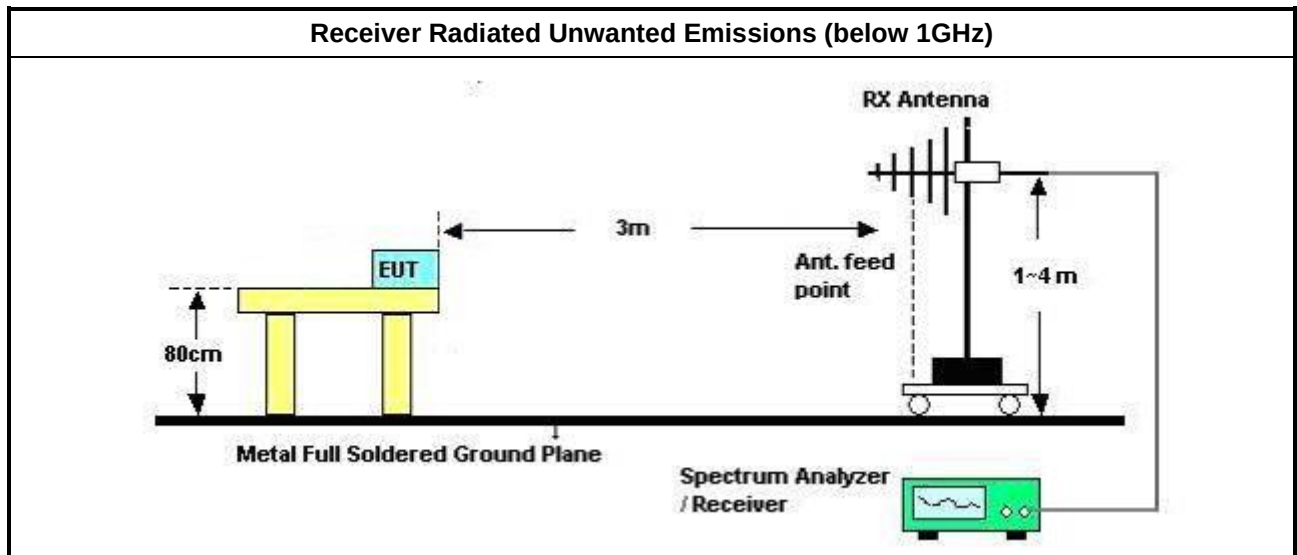
Refer a test equipment and calibration data table in this test report.

3.7.3 Test Procedures

Test Method	
☒	The search for spurious emissions shall be from the lowest frequency internally generated or used in the receiver (e.g. local oscillator, intermediate or carrier frequency), or 30 MHz, whichever is higher, to at least 3 times the highest tuneable or local oscillator frequency, whichever is higher, without exceeding 40 GHz.
☒	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).
☒	For radiated measurement, refer as ANSI C63.4, clause 8.3.
☒	Refer as ANSI C63.4, clause 8.3.1.1 and 8.3.2.1 for radiated emissions from below 30 MHz.
☒	Refer as ANSI C63.4, clause 8.3.1.1 and 8.3.2.1 for radiated emissions from 30 MHz-1 GHz. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the QP-Limit so that the QP level does not need to be reported in addition.
☒	Refer as ANSI C63.4, clause 8.3.1.2 and 8.3.2.2 for radiated emissions from above 1 GHz. For the peak measurement is fully sufficient, as the max field strength as measured with the Peak-Detector meets the AV-Limit so that the AV level does not need to be reported in addition.
☒	All amplitude of spurious emissions that are attenuated by more than 30 dB below the permissible value has no need to be reported.

3.7.4 Test Setup





3.7.5 Receiver Radiated Unwanted Emissions (Below 30MHz)

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

3.7.6 Test Result of Receiver Radiated Unwanted Emissions

Refer as Appendix G

4 Test Equipment and Calibration Data

Instrument for AC Conduction - TX

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR	102051	9KHz ~ 3.6GHz	03/May/2018	02/May/2019
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	17/Nov/2017	16/Nov/2018
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	05/Oct/2018	04/Oct/2019
AC POWER	APC	AFC-11005G	F310050055	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561-F	9561-F041	9 kHz ~ 30 MHz	12/Oct/2017	11/Oct/2018

NCR : Non-Calibration Require

Instrument for AC Conduction - RX

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	ENV 216	101274	9kHz ~ 30MHz	12/Jun/2018	11/Jun/2019
RF Cable-CON	MTJ	RG142	CB001-CO	9kHz ~ 30MHz	17/Sep/2018	16/Sep/2019
AC POWER	APC	AFC-11003G	F308010045	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	SCHWARZBECK	VTSD 9561F	9495	9kHz ~ 30MHz	11/Oct/2018	10/Oct/2019

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	05/Feb/2018	04/Feb/2019
Signal Generator	Anritsu	MG3694C	163401	10MHz ~ 40GHz	15/Jan/2018	14/Jan/2019
Pulse Power Sensor	Anritsu	MA2411B	1027452	300MHz ~ 40GHz	27/Feb/2018	26/Feb/2019
Power Meter	Anritsu	ML2495A	1124009	300MHz ~ 40GHz	27/Feb/2018	26/Feb/2019
CABLE 0.2m	HUBER	MY37960/4	RF Cable - 17	1 to 18GHz	17/Jan/2018	16/Jan/2019
CABLE 0.2m	HUBER	MY37960/4	RF Cable - 17	30 to 1000MHz	17/Jan/2018	16/Jan/2019
CABLE 0.5m	HUBER	MY37963/4	RF Cable - 22	1 to 18GHz	17/Jan/2018	16/Jan/2019

Instrument for Radiated Test - TX

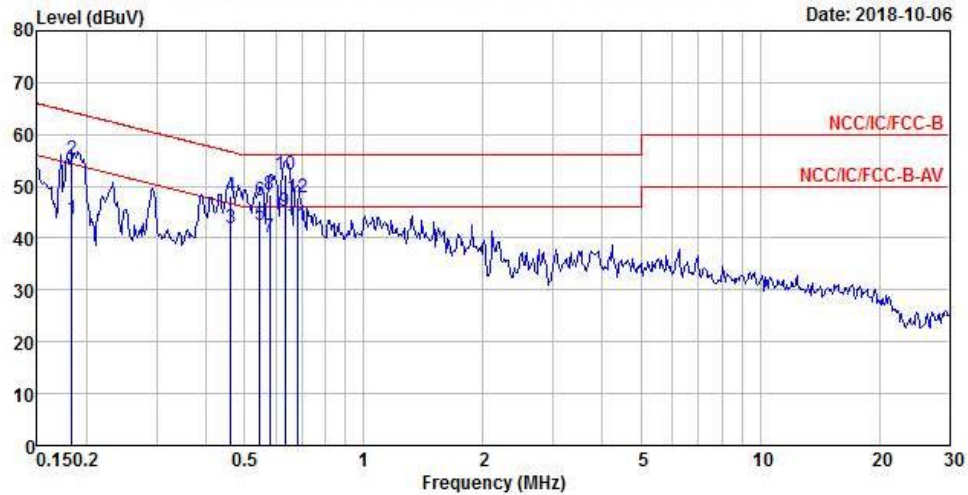
Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	27/Oct/2017	26/Oct/2018
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	17/Oct/2018	16/Oct/2019
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	27/Oct/2017	26/Oct/2018
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	17/Oct/2018	16/Oct/2019
Amplifier	Agilent	8447D	2944A11149	100kHz ~ 1.3GHz	27Jul/2018	02/Jul/2019
Amplifier	HP	8447D	2944A08033	10kHz ~ 1.3GHz	23/Apr/2018	19/Apr/2019
Microwave Preamplifier	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	28/Sep/2017	27/Sep/2018
Microwave System Preamplifier	KEYSIGHT	83017A	MY53270196	1GHz ~ 26.5GHz	05/Sep/2018	04/Sep/2019
Spectrum Analyzer	Rohde & Schwarz	FSP40	100593	9KHz - 40GHz	12/Dec/2017	11/Dec/2018
EMI Test Receiver	Rohde & Schwarz	ESCS 30	100354	9kHz ~ 2.75GHz	08/Dec/2017	07/Dec/2018
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	19/Jan/2018	18/Jan/2019
RF Cable-high	SUHNER	SUCOFLEX104	MY34918/4	1GHz ~ 40GHz	19/Jan/2018	18/Jan/2019
Bilog Antenna	SCHAFFNER	CBL 6112D	2678	30MHz ~ 1GHz	07/Jul/2018	06/Jul/2019
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170154	18GHz ~ 40GHz	06/Feb/2018	05/Feb/2019
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120D	BBHA 9120 D 1531	1GHz ~ 18GHz	18/Apr/2018	17/Apr/2019
Preamplifier	MITEQ	TTA1840-35-HG	1864481	18GHz ~ 40GHz	31/Aug/2017	30/Aug/2018
Preamplifier	MITEQ	TTA1840-35-HG	1864481	18GHz ~ 40GHz	24/Aug/2018	23/Aug/2019
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	29/Mar/2018	28/Mar/2019

Instrument for Radiated Test - RX

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz ~ 1GHz 3m	19/Oct/2018	18/Oct/2019
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz 3m	17/Oct/2018	16/Oct/2019
Amplifier	COM -POWER	PA-103	161046	1-1000MHz	13/Dec/2018	12/Dec/2019
Microwave Preamplifier	Agilent	8449B	3008A02373	1GHz ~ 26.5GHz	23/Oct/2018	22/Oct/2019
Signal Analyzer	R&S	FSV40	101500	10Hz ~ 40GHz	18/Jul/2018	17/Jul/2019
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	18/Jan/2019	17/Jan/2020
RF Cable-high	SUHNER	SUCOFLEX104	MY34918/4	1GHz ~ 40GHz	18/Jan/2019	17/Jan/2020
Bilog Antenna & 5dB Attenuator	SCHAFFNER / MTJ	CBL 6112B / MTJ6102-05	2723 / 2	30MHz ~ 1GHz	08/Sep/2018	07/Sep/2019
Preamplifier	MITEQ	TTA1840-35-HG	1864481	18GHz ~ 40GHz	24/Aug/2018	23/Aug/2019
EMI Test Receiver	R&S	ESR	102052	9kHz ~ 3.6GHz	09/Apr/2019	08/Apr/2020
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	15/Mar/2019	14/Mar/2020
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA 9170221	15GHz ~ 40GHz	22/Mar/2019	21/Mar/2020
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 01543	1GHz ~ 18GHz	03/Jun/2019	02/Jun/2020

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	AC mains mode - TX		

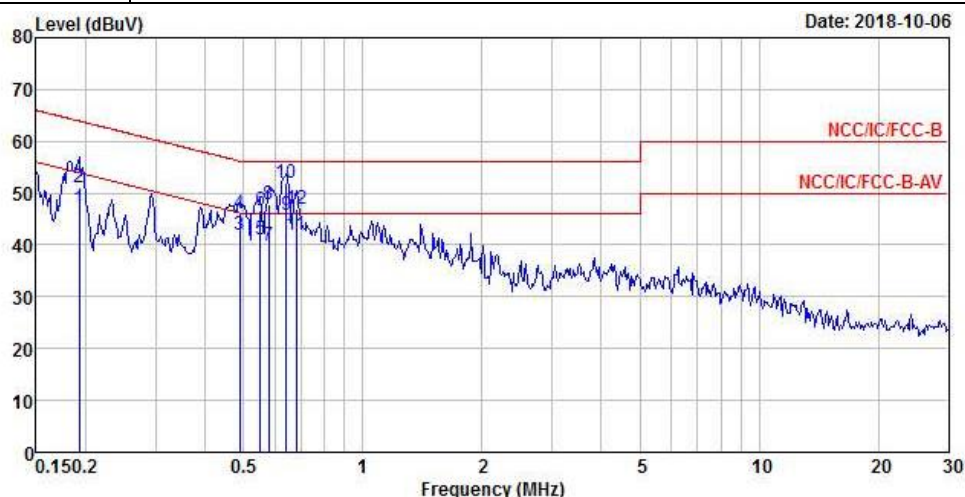


	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.18	43.75	-10.58	54.33	34.12	9.62	0.01	Average
2	0.18	55.07	-9.26	64.33	45.44	9.62	0.01	QP
3	0.46	41.80	-4.87	46.67	32.11	9.61	0.08	Average
4	0.46	48.06	-8.61	56.67	38.37	9.61	0.08	QP
5	0.55	42.51	-3.49	46.00	32.83	9.61	0.07	Average
6	0.55	47.35	-8.65	56.00	37.67	9.61	0.07	QP
7	0.58	40.23	-5.77	46.00	30.56	9.61	0.06	Average
8	0.58	48.31	-7.69	56.00	38.64	9.61	0.06	QP
9 MAX	0.63	45.14	-0.86	46.00	35.48	9.61	0.05	Average
10	0.63	52.32	-3.68	56.00	42.66	9.61	0.05	QP
11	0.68	42.42	-3.58	46.00	32.76	9.62	0.04	Average
12	0.68	47.82	-8.18	56.00	38.16	9.62	0.04	QP

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	AC mains mode - TX		



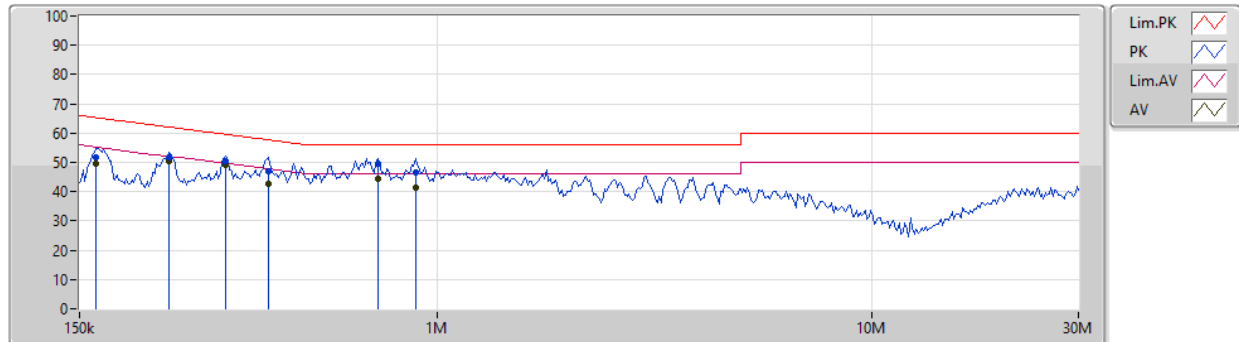
	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.19	47.00	-6.93	53.93	37.37	9.62	0.01	Average
2	0.19	51.05	-12.88	63.93	41.42	9.62	0.01	QP
3	0.49	41.91	-4.28	46.19	32.22	9.61	0.08	Average
4	0.49	46.04	-10.15	56.19	36.35	9.61	0.08	QP
5	0.55	40.93	-5.07	46.00	31.26	9.61	0.06	Average
6	0.55	46.71	-9.29	56.00	37.04	9.61	0.06	QP
7	0.58	39.73	-6.27	46.00	30.06	9.61	0.06	Average
8	0.58	47.78	-8.22	56.00	38.11	9.61	0.06	QP
9 MAX	0.64	45.78	-0.22	46.00	36.12	9.61	0.05	Average
10	0.64	51.85	-4.15	56.00	42.19	9.61	0.05	QP
11	0.68	41.83	-4.17	46.00	32.18	9.61	0.04	Average
12	0.68	46.98	-9.02	56.00	37.33	9.61	0.04	QP

Note 1: ">20dB" means emission levels that exceed the level of 20 dB below the applicable limit.
 Note 2: "N/F" means Nothing Found emissions (No emissions were detected.)

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	AC mains mode - RX		

05/06/2019

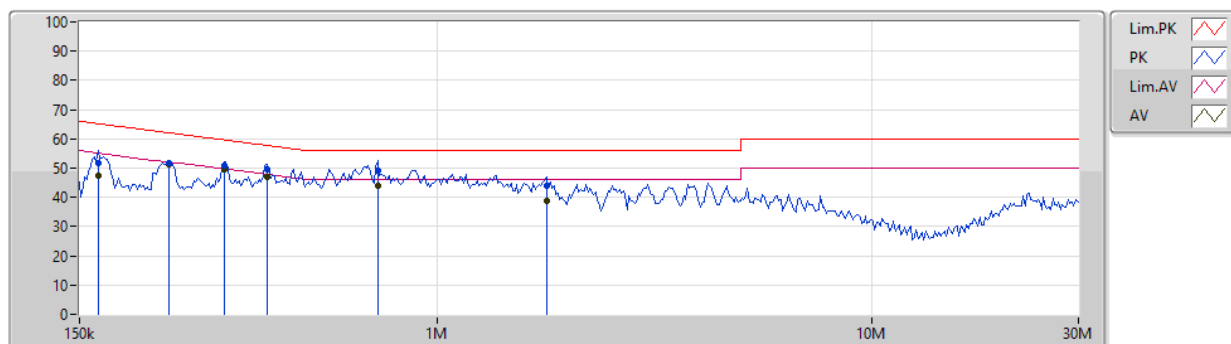


Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	164.053k	51.74	65.25	-13.51	19.52	Neutral	-	32.22	9.65	0.01	9.86			
AV	164.053k	49.77	55.25	-5.48	19.52	Neutral	-	30.25	9.65	0.01	9.86			
QP	241.834k	51.54	62.02	-10.48	19.51	Neutral	-	32.03	9.64	0.01	9.86			
AV	241.834k	50.54	52.02	-1.48	19.51	Neutral	-	31.03	9.64	0.01	9.86			
QP	325.956k	50.47	59.56	-9.09	19.51	Neutral	-	30.96	9.64	0.01	9.86			
AV	325.956k	49.22	49.56	-0.34	19.51	Neutral	"Worst"	29.71	9.64	0.01	9.86			
QP	409.779k	47.17	57.64	-10.47	19.51	Neutral	-	27.66	9.64	0.01	9.86			
AV	409.779k	42.55	47.64	-5.09	19.51	Neutral	-	23.04	9.64	0.01	9.86			
QP	729.776k	49.38	56.00	-6.62	19.52	Neutral	-	29.86	9.64	0.02	9.86			
AV	729.776k	44.19	46.00	-1.81	19.52	Neutral	-	24.67	9.64	0.02	9.86			
QP	890.466k	46.47	56.00	-9.53	19.52	Neutral	-	26.95	9.64	0.02	9.86			
AV	890.466k	41.32	46.00	-4.68	19.52	Neutral	-	21.80	9.64	0.02	9.86			

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	AC mains mode - RX		

05/06/2019



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	165.693k	51.66	65.18	-13.52	19.48	Line	-	32.18	9.61	0.01	9.86			
AV	165.693k	47.28	55.18	-7.90	19.48	Line	-	27.80	9.61	0.01	9.86			
QP	241.834k	51.73	62.02	-10.29	19.48	Line	-	32.25	9.61	0.01	9.86			
AV	241.834k	51.08	52.02	-0.94	19.48	Line	-	31.60	9.61	0.01	9.86			
QP	322.728k	50.78	59.63	-8.85	19.48	Line	-	31.30	9.61	0.01	9.86			
AV	322.728k	49.56	49.63	-0.07	19.48	Line	"Worst"	30.08	9.61	0.01	9.86			
QP	405.722k	49.44	57.74	-8.30	19.48	Line	-	29.96	9.61	0.01	9.86			
AV	405.722k	46.80	47.74	-0.94	19.48	Line	-	27.32	9.61	0.01	9.86			
QP	729.776k	49.33	56.00	-6.67	19.49	Line	-	29.84	9.61	0.02	9.86			
AV	729.776k	44.15	46.00	-1.85	19.49	Line	-	24.66	9.61	0.02	9.86			
QP	1.787M	43.97	56.00	-12.03	19.52	Line	-	24.45	9.62	0.03	9.87			
AV	1.787M	38.99	46.00	-7.01	19.52	Line	-	19.47	9.62	0.03	9.87			

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)	657.5k	1.011M	1M01F1D	643.75k	985.757k

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;

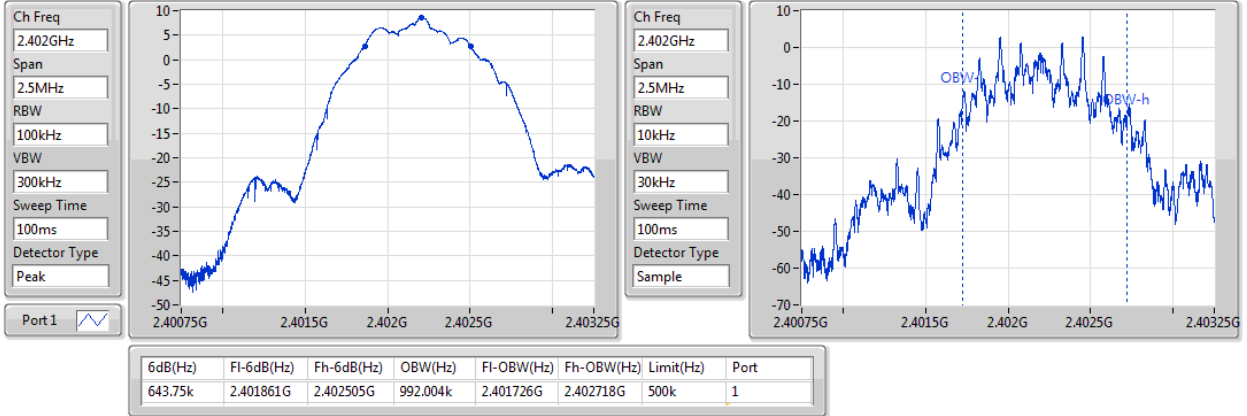
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	500k	643.75k	992.004k
2440MHz_TnomVnom	Pass	500k	657.5k	1.011M
2480MHz_TnomVnom	Pass	500k	645k	985.757k

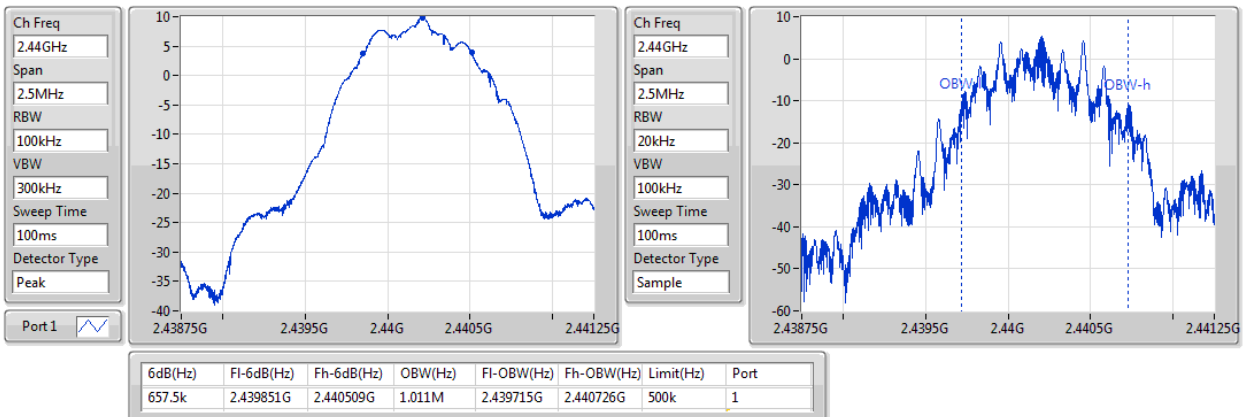
Port X-N dB = Port X 6dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;

BT-LE(1Mbps)
EBW
2402MHz

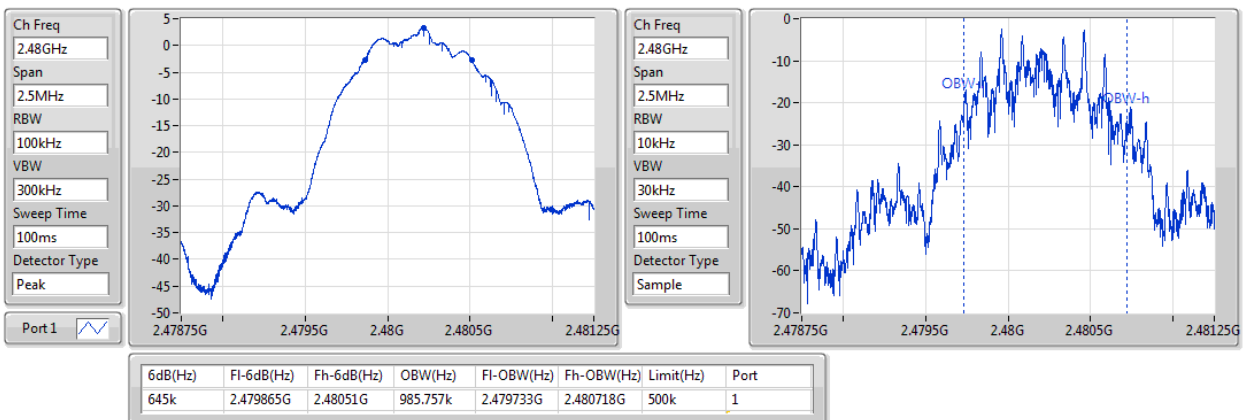
16/07/2018


BT-LE(1Mbps)
EBW
2440MHz

16/07/2018


BT-LE(1Mbps)
EBW
2480MHz

18/07/2018



**Summary**

Mode	Power	Power
	(dBm)	(W)
2.4-2.4835GHz	-	-
BT-LE(1Mbps)	9.36	0.00863

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	2.0	8.37	30.00
2440MHz_TnomVnom	Pass	2.0	9.36	30.00
2480MHz_TnomVnom	Pass	2.0	3.00	30.00

**Summary**

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
BT-LE(1Mbps)	3.46

RBW=3kHz.

Result

Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz_TnomVnom	Pass	2.0	1.89	8.00
2440MHz_TnomVnom	Pass	2.0	3.46	8.00
2480MHz_TnomVnom	Pass	2.0	-3.89	8.00

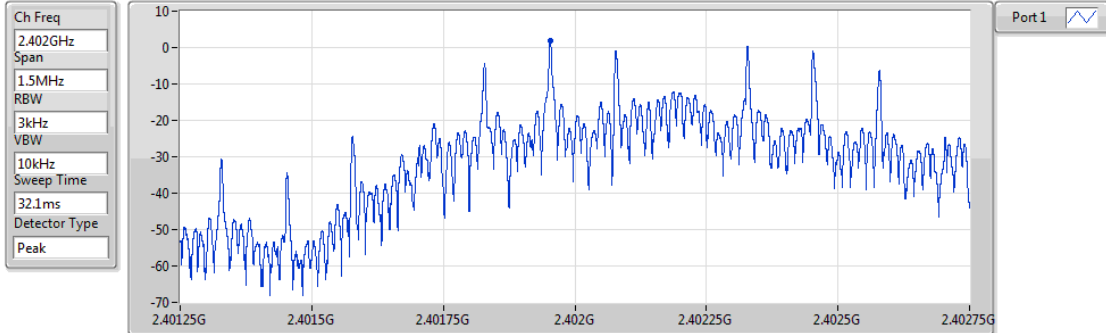
RBW=3kHz.

BT-LE(1Mbps)

PSD

2402MHz

16/07/2018



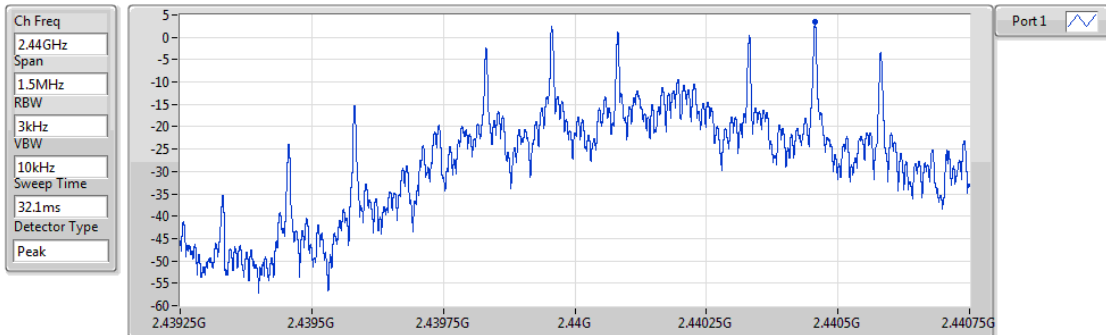
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
1.89	1.89	1.89

BT-LE(1Mbps)

PSD

2440MHz

16/07/2018



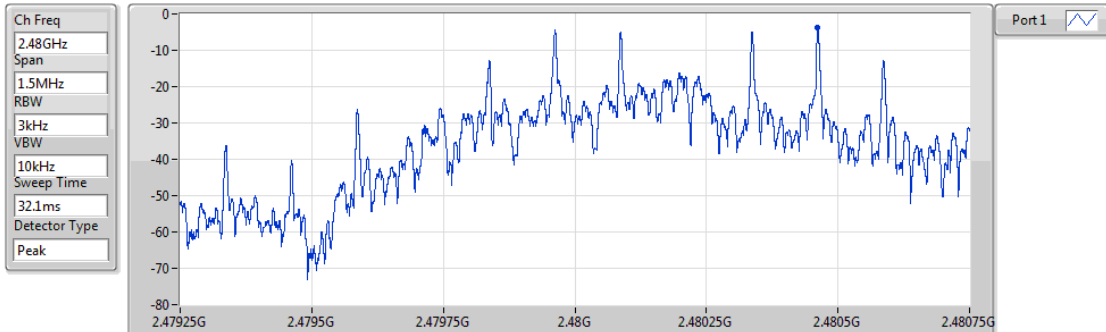
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
3.46	3.46	3.46

BT-LE(1Mbps)

PSD

2480MHz

18/07/2018



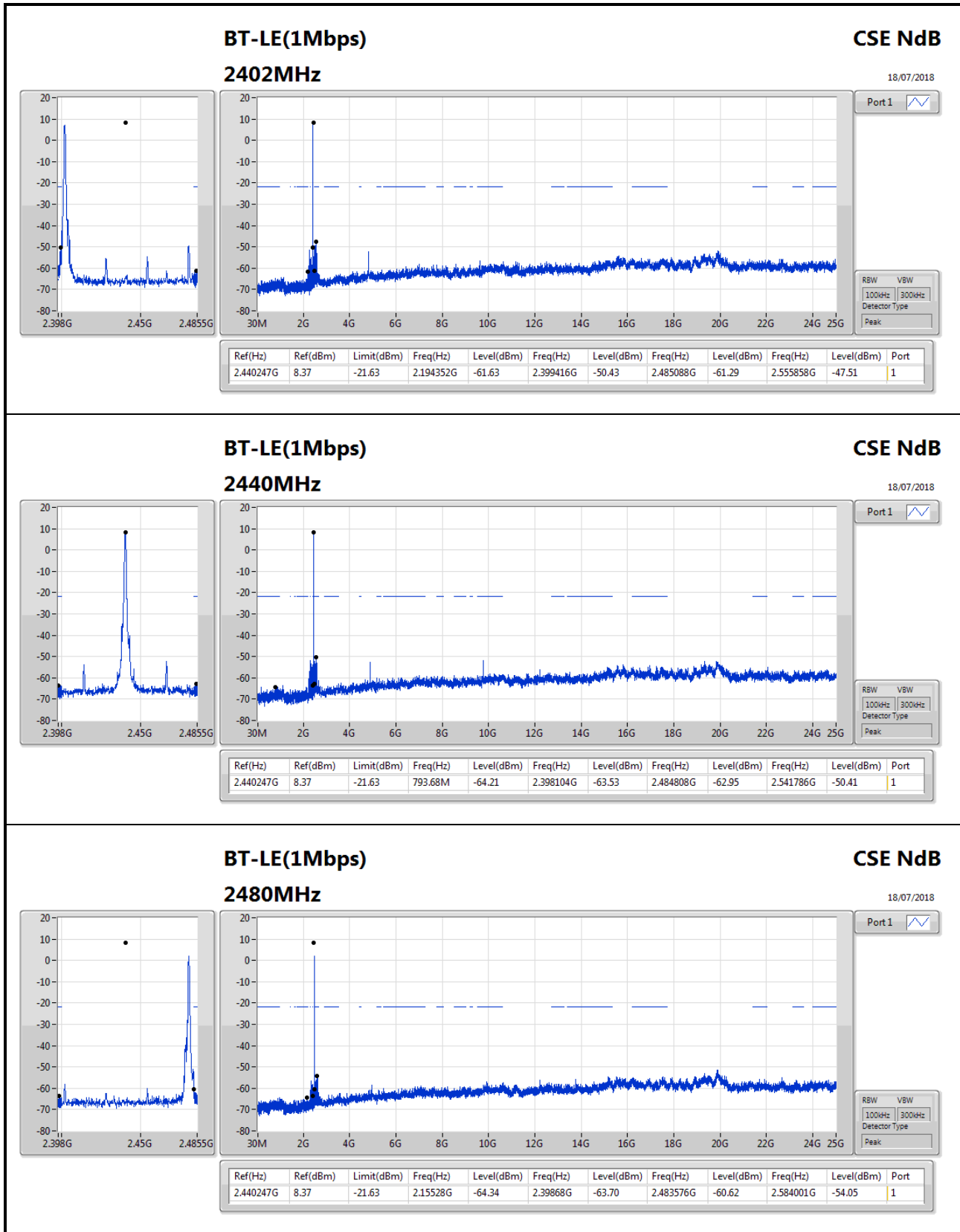
Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-3.89	-3.89	-3.89

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)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	2.440247G	8.37	-21.63	2.194352G	-61.63	2.399416G	-50.43	2.485088G	-61.29	2.555858G	-47.51	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)	Port
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TnomVnom	Pass	2.440247G	8.37	-21.63	2.194352G	-61.63	2.399416G	-50.43	2.485088G	-61.29	2.555858G	-47.51	1
2440MHz_TnomVnom	Pass	2.440247G	8.37	-21.63	793.68M	-64.21	2.398104G	-63.53	2.484808G	-62.95	2.541786G	-50.41	1
2480MHz_TnomVnom	Pass	2.440247G	8.37	-21.63	2.15528G	-64.34	2.39868G	-63.70	2.483576G	-60.62	2.584001G	-54.05	1





Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	PK	142.52M	39.37	43.50	-4.13	-9.77	3	Horizontal	0	2.00	-

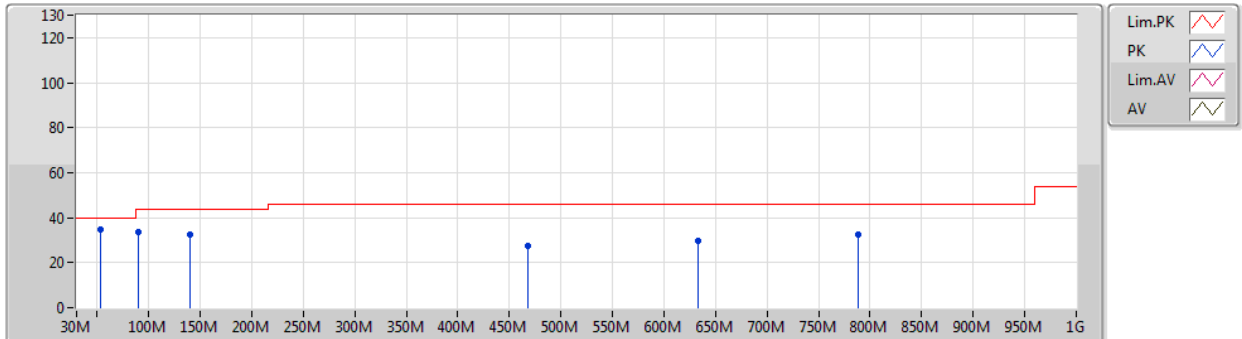
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz_Switching Power Supply	Pass	PK	53.28M	34.68	40.00	-5.32	-14.61	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	90.14M	33.62	43.50	-9.88	-12.37	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	140.58M	32.38	43.50	-11.12	-9.64	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	468.44M	27.38	46.00	-18.62	-2.38	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	633.34M	29.89	46.00	-16.11	-0.23	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	788.54M	32.42	46.00	-13.58	1.36	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	90.14M	32.58	43.50	-10.92	-12.37	3	Horizontal	0	2.00	-
2440MHz_Switching Power Supply	Pass	PK	142.52M	39.37	43.50	-4.13	-9.77	3	Horizontal	0	2.00	-
2440MHz_Switching Power Supply	Pass	PK	225.94M	28.18	46.00	-17.82	-9.81	3	Horizontal	0	2.00	-
2440MHz_Switching Power Supply	Pass	PK	464.56M	28.31	46.00	-17.69	-2.50	3	Horizontal	0	2.00	-
2440MHz_Switching Power Supply	Pass	PK	718.7M	31.34	46.00	-14.66	0.32	3	Horizontal	0	2.00	-
2440MHz_Switching Power Supply	Pass	PK	840.92M	33.43	46.00	-12.57	2.05	3	Horizontal	0	2.00	-

BT-LE(1Mbps)

2440MHz_ Switching Power Supply

11/06/2018

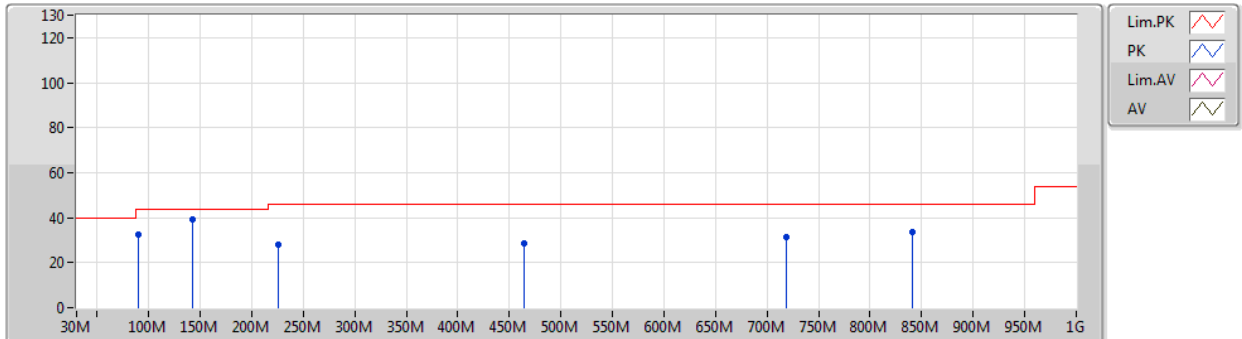


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
PK	53.28M	34.68	40.00	-5.32	-14.61	3	Vertical	360	1.00	-
PK	90.14M	33.62	43.50	-9.88	-12.37	3	Vertical	360	1.00	-
PK	140.58M	32.38	43.50	-11.12	-9.64	3	Vertical	360	1.00	-
PK	468.44M	27.38	46.00	-18.62	-2.38	3	Vertical	360	1.00	-
PK	633.34M	29.89	46.00	-16.11	-0.23	3	Vertical	360	1.00	-
PK	788.54M	32.42	46.00	-13.58	1.36	3	Vertical	360	1.00	-

BT-LE(1Mbps)

2440MHz_ Switching Power Supply

11/06/2018



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
PK	90.14M	32.58	43.50	-10.92	-12.37	3	Horizontal	0	2.00	-				
PK	142.52M	39.37	43.50	-4.13	-9.77	3	Horizontal	0	2.00	-				
PK	225.94M	28.18	46.00	-17.82	-9.81	3	Horizontal	0	2.00	-				
PK	464.56M	28.31	46.00	-17.69	-2.50	3	Horizontal	0	2.00	-				
PK	718.7M	31.34	46.00	-14.66	0.32	3	Horizontal	0	2.00	-				
PK	840.92M	33.43	46.00	-12.57	2.05	3	Horizontal	0	2.00	-				



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.483502G	50.99	54.00	-3.01	30.69	3	Horizontal	318	1.37	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2402MHz_TX	Pass	AV	2.375G	44.17	54.00	-9.83	30.33	3	Vertical	225	1.51	-
2402MHz_TX	Pass	AV	2.4022G	94.31	Inf	-Inf	30.42	3	Vertical	225	1.51	-
2402MHz_TX	Pass	PK	2.383G	55.25	74.00	-18.75	30.35	3	Vertical	225	1.51	-
2402MHz_TX	Pass	PK	2.4026G	96.35	Inf	-Inf	30.42	3	Vertical	225	1.51	-
2402MHz_TX	Pass	AV	2.38998G	44.08	54.00	-9.92	30.38	3	Horizontal	306	1.22	-
2402MHz_TX	Pass	AV	2.4022G	101.14	Inf	-Inf	30.42	3	Horizontal	306	1.22	-
2402MHz_TX	Pass	PK	2.3804G	54.56	74.00	-19.44	30.34	3	Horizontal	306	1.22	-
2402MHz_TX	Pass	PK	2.4026G	103.12	Inf	-Inf	30.42	3	Horizontal	306	1.22	-
2402MHz_TX	Pass	AV	4.8048G	34.24	54.00	-19.76	5.79	3	Vertical	53	2.71	-
2402MHz_TX	Pass	PK	4.80404G	47.21	74.00	-26.79	5.79	3	Vertical	53	2.71	-
2402MHz_TX	Pass	AV	4.80448G	34.76	54.00	-19.24	5.79	3	Horizontal	66	2.12	-
2402MHz_TX	Pass	PK	4.8046G	48.11	74.00	-25.89	5.79	3	Horizontal	66	2.12	-
2440MHz_TX	Pass	AV	2.375G	44.16	54.00	-9.84	30.33	3	Vertical	265	2.31	-
2440MHz_TX	Pass	AV	2.4402G	96.91	Inf	-Inf	30.55	3	Vertical	265	2.31	-
2440MHz_TX	Pass	AV	2.4998G	46.28	54.00	-7.72	30.75	3	Vertical	265	2.31	-
2440MHz_TX	Pass	PK	2.3806G	56.16	74.00	-17.84	30.34	3	Vertical	265	2.31	-
2440MHz_TX	Pass	PK	2.4398G	99.02	Inf	-Inf	30.55	3	Vertical	265	2.31	-
2440MHz_TX	Pass	PK	2.4998G	55.58	74.00	-18.42	30.75	3	Vertical	265	2.31	-
2440MHz_TX	Pass	AV	2.3622G	44.17	54.00	-9.83	30.29	3	Horizontal	303	1.00	-
2440MHz_TX	Pass	AV	2.4402G	101.89	Inf	-Inf	30.55	3	Horizontal	303	1.00	-
2440MHz_TX	Pass	AV	2.4926G	45.34	54.00	-8.66	30.72	3	Horizontal	303	1.00	-
2440MHz_TX	Pass	PK	2.3898G	54.91	74.00	-19.09	30.38	3	Horizontal	303	1.00	-
2440MHz_TX	Pass	PK	2.4398G	103.76	Inf	-Inf	30.55	3	Horizontal	303	1.00	-
2440MHz_TX	Pass	PK	2.4926G	55.61	74.00	-18.39	30.72	3	Horizontal	303	1.00	-
2440MHz_TX	Pass	AV	4.88752G	42.35	54.00	-11.65	5.96	3	Vertical	305	1.08	-
2440MHz_TX	Pass	AV	7.32144G	37.49	54.00	-16.51	11.15	3	Vertical	158	1.50	-
2440MHz_TX	Pass	PK	4.88756G	48.83	74.00	-25.17	5.96	3	Vertical	305	1.08	-
2440MHz_TX	Pass	PK	7.31996G	50.94	74.00	-23.06	11.15	3	Vertical	158	1.50	-
2440MHz_TX	Pass	AV	4.88752G	37.84	54.00	-16.16	5.96	3	Horizontal	212	1.32	-
2440MHz_TX	Pass	AV	7.32004G	38.30	54.00	-15.70	11.15	3	Horizontal	247	2.24	-
2440MHz_TX	Pass	PK	4.88764G	46.45	74.00	-27.55	5.96	3	Horizontal	212	1.32	-
2440MHz_TX	Pass	PK	7.32G	51.50	74.00	-22.50	11.15	3	Horizontal	247	2.24	-
2480MHz_TX	Pass	AV	2.4802G	92.27	Inf	-Inf	30.68	3	Vertical	267	2.49	-
2480MHz_TX	Pass	AV	2.483502G	47.75	54.00	-6.25	30.69	3	Vertical	267	2.49	-
2480MHz_TX	Pass	PK	2.48G	94.29	Inf	-Inf	30.68	3	Vertical	267	2.49	-
2480MHz_TX	Pass	PK	2.483502G	56.37	74.00	-17.63	30.69	3	Vertical	267	2.49	-
2480MHz_TX	Pass	AV	2.4802G	96.75	Inf	-Inf	30.68	3	Horizontal	318	1.37	-
2480MHz_TX	Pass	AV	2.483502G	50.99	54.00	-3.01	30.69	3	Horizontal	318	1.37	-
2480MHz_TX	Pass	PK	2.48G	98.72	Inf	-Inf	30.68	3	Horizontal	318	1.37	-
2480MHz_TX	Pass	PK	2.483502G	58.68	74.00	-15.32	30.69	3	Horizontal	318	1.37	-
2480MHz_TX	Pass	AV	4.96102G	31.42	54.00	-22.58	6.12	3	Vertical	341	2.84	-
2480MHz_TX	Pass	PK	4.94902G	44.47	74.00	-29.53	6.09	3	Vertical	341	2.84	-
2480MHz_TX	Pass	AV	7.43212G	37.37	54.00	-16.63	11.46	3	Vertical	27	1.49	-
2480MHz_TX	Pass	PK	7.44756G	51.04	74.00	-22.96	11.50	3	Vertical	27	1.49	-
2480MHz_TX	Pass	AV	7.43112G	37.48	54.00	-16.52	11.46	3	Horizontal	318	1.50	-
2480MHz_TX	Pass	PK	7.4334G	51.22	74.00	-22.78	11.47	3	Horizontal	318	1.50	-
2480MHz_TX	Pass	AV	4.96G	31.51	54.00	-22.49	6.11	3	Horizontal	83	1.91	-



RSE TX above 1GHz Result

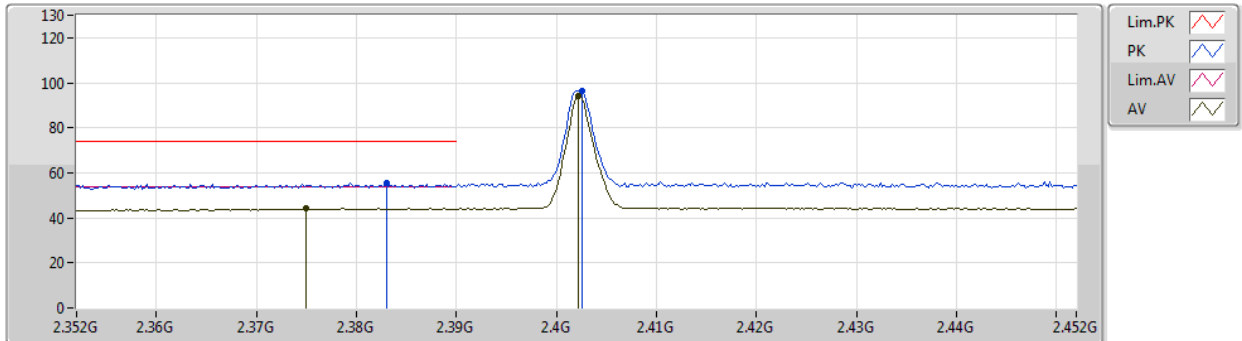
Appendix F.2

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2480MHz_TX	Pass	PK	4.96632G	45.35	74.00	-28.65	6.12	3	Horizontal	83	1.91	-

BT-LE(1Mbps)

2402MHz_TX

18/07/2018

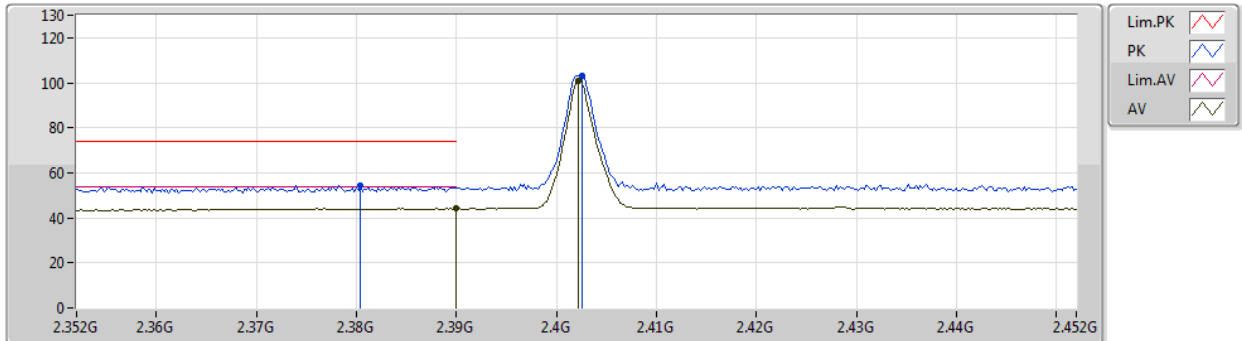


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
AV	2.375G	44.17	54.00	-9.83	30.33	3	Vertical	225	1.51	-				
AV	2.4022G	94.31	Inf	-Inf	30.42	3	Vertical	225	1.51	-				
PK	2.383G	55.25	74.00	-18.75	30.35	3	Vertical	225	1.51	-				
PK	2.4026G	96.35	Inf	-Inf	30.42	3	Vertical	225	1.51	-				

BT-LE(1Mbps)

2402MHz_TX

18/07/2018

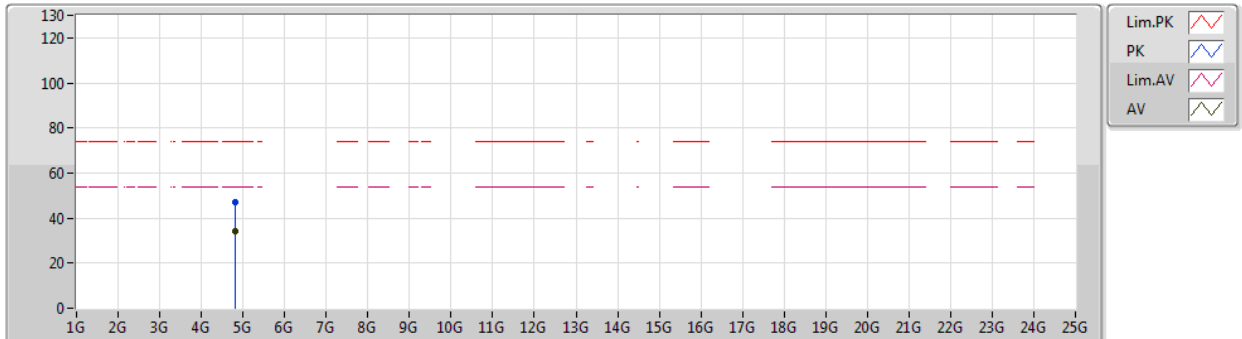


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
AV	2.389998G	44.08	54.00	-9.92	30.38	3	Horizontal	306	1.22	-				
AV	2.4022G	101.14	Inf	-Inf	30.42	3	Horizontal	306	1.22	-				
PK	2.3804G	54.56	74.00	-19.44	30.34	3	Horizontal	306	1.22	-				
PK	2.4026G	103.12	Inf	-Inf	30.42	3	Horizontal	306	1.22	-				

BT-LE(1Mbps)

2402MHz_TX

18/07/2018

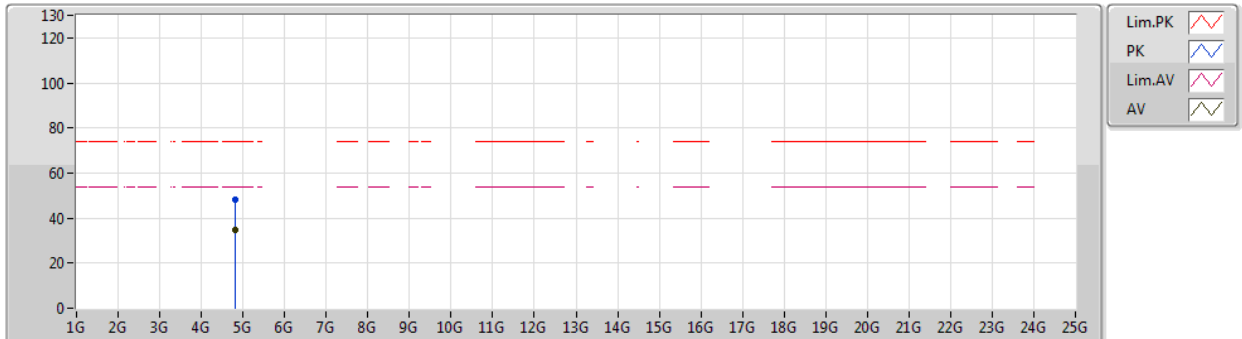


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.8048G	34.24	54.00	-19.76	5.79	3	Vertical	53	2.71	-
PK	4.80404G	47.21	74.00	-26.79	5.79	3	Vertical	53	2.71	-

BT-LE(1Mbps)

2402MHz_TX

18/07/2018

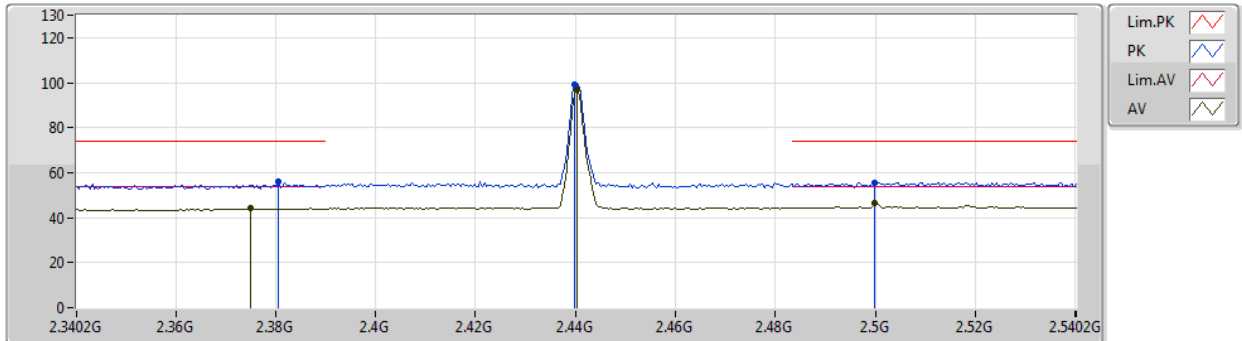


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	4.80448G	34.76	54.00	-19.24	5.79	3	Horizontal	66	2.12	-
PK	4.8046G	48.11	74.00	-25.89	5.79	3	Horizontal	66	2.12	-

BT-LE(1Mbps)

2440MHz_TX

18/07/2018

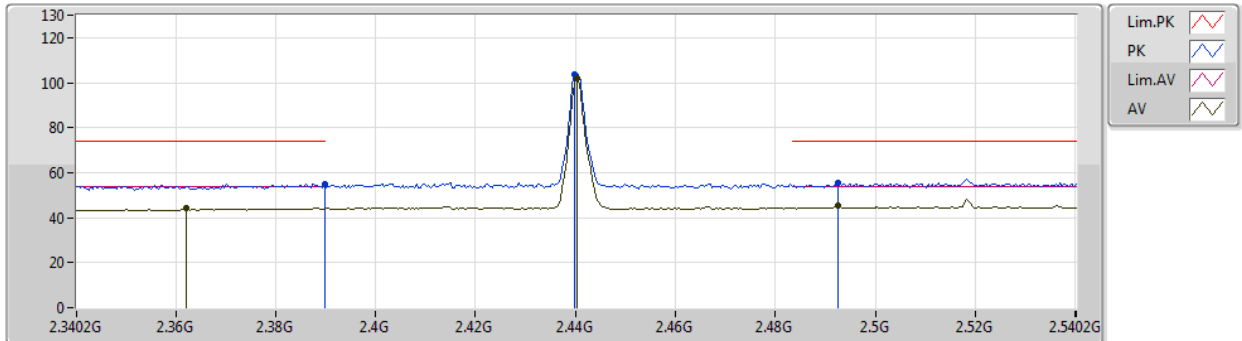


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
AV	2.375G	44.16	54.00	-9.84	30.33	3	Vertical	265	2.31	-				
AV	2.4402G	96.91	Inf	-Inf	30.55	3	Vertical	265	2.31	-				
AV	2.4998G	46.28	54.00	-7.72	30.75	3	Vertical	265	2.31	-				
PK	2.3806G	56.16	74.00	-17.84	30.34	3	Vertical	265	2.31	-				
PK	2.4398G	99.02	Inf	-Inf	30.55	3	Vertical	265	2.31	-				
PK	2.4998G	55.58	74.00	-18.42	30.75	3	Vertical	265	2.31	-				

BT-LE(1Mbps)

2440MHz_TX

18/07/2018

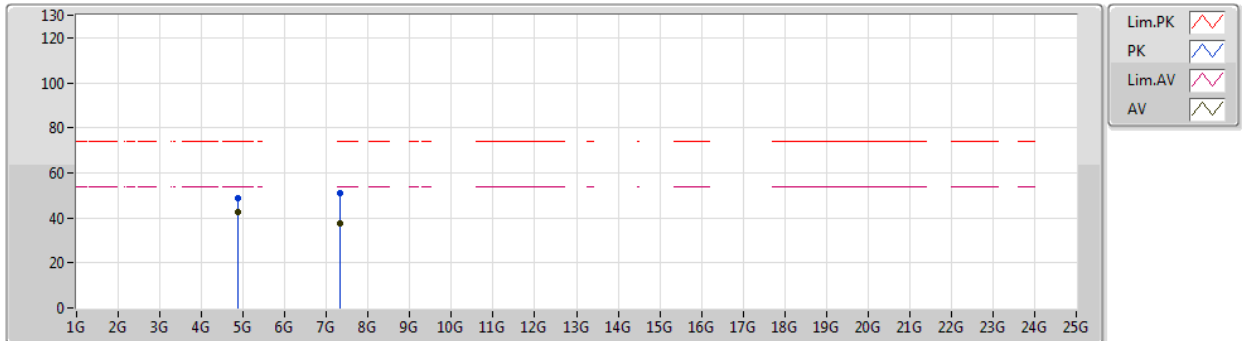


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
AV	2.3622G	44.17	54.00	-9.83	30.29	3	Horizontal	303	1.00	-				
AV	2.4402G	101.89	Inf	-Inf	30.55	3	Horizontal	303	1.00	-				
AV	2.4926G	45.34	54.00	-8.66	30.72	3	Horizontal	303	1.00	-				
PK	2.3898G	54.91	74.00	-19.09	30.38	3	Horizontal	303	1.00	-				
PK	2.4398G	103.76	Inf	-Inf	30.55	3	Horizontal	303	1.00	-				
PK	2.4926G	55.61	74.00	-18.39	30.72	3	Horizontal	303	1.00	-				

BT-LE(1Mbps)

2440MHz_TX

18/07/2018

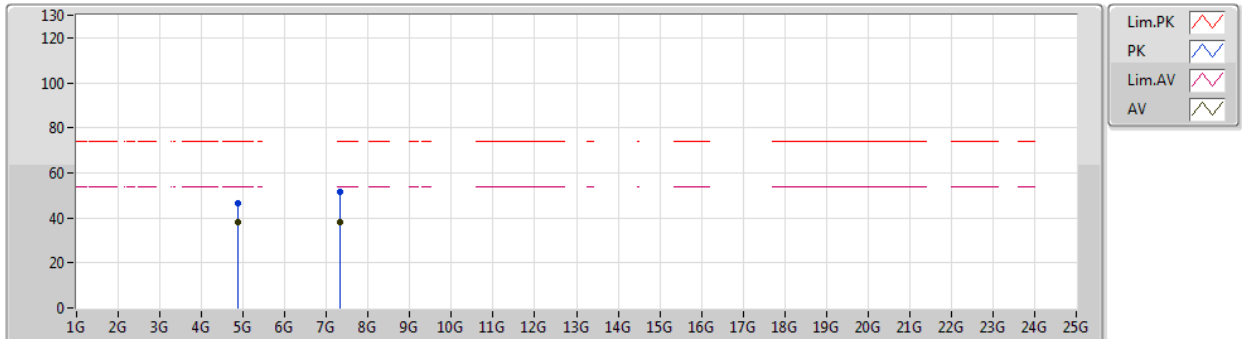


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
AV	4.88752G	42.35	54.00	-11.65	5.96	3	Vertical	305	1.08	-				
AV	7.32144G	37.49	54.00	-16.51	11.15	3	Vertical	158	1.50	-				
PK	4.88756G	48.83	74.00	-25.17	5.96	3	Vertical	305	1.08	-				
PK	7.31996G	50.94	74.00	-23.06	11.15	3	Vertical	158	1.50	-				

BT-LE(1Mbps)

2440MHz_TX

18/07/2018

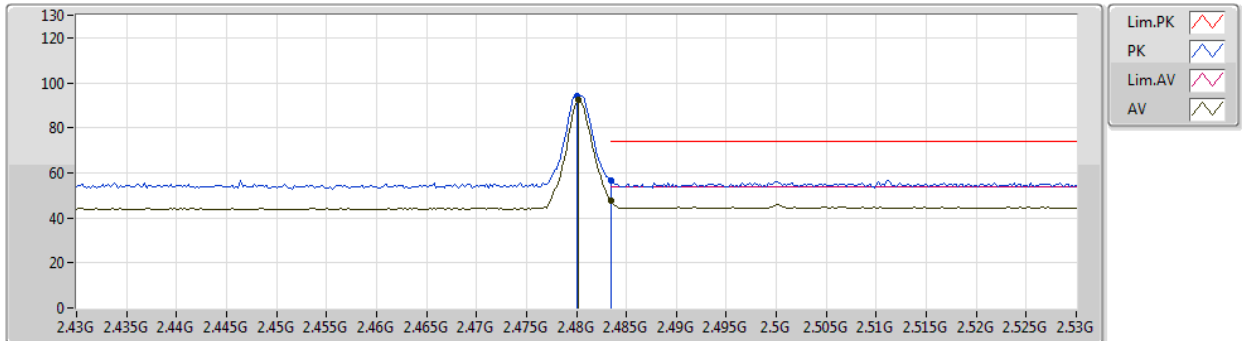


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
AV	4.88752G	37.84	54.00	-16.16	5.96	3	Horizontal	212	1.32	-				
AV	7.32004G	38.30	54.00	-15.70	11.15	3	Horizontal	247	2.24	-				
PK	4.88764G	46.45	74.00	-27.55	5.96	3	Horizontal	212	1.32	-				
PK	7.32G	51.50	74.00	-22.50	11.15	3	Horizontal	247	2.24	-				

BT-LE(1Mbps)

2480MHz_TX

18/07/2018

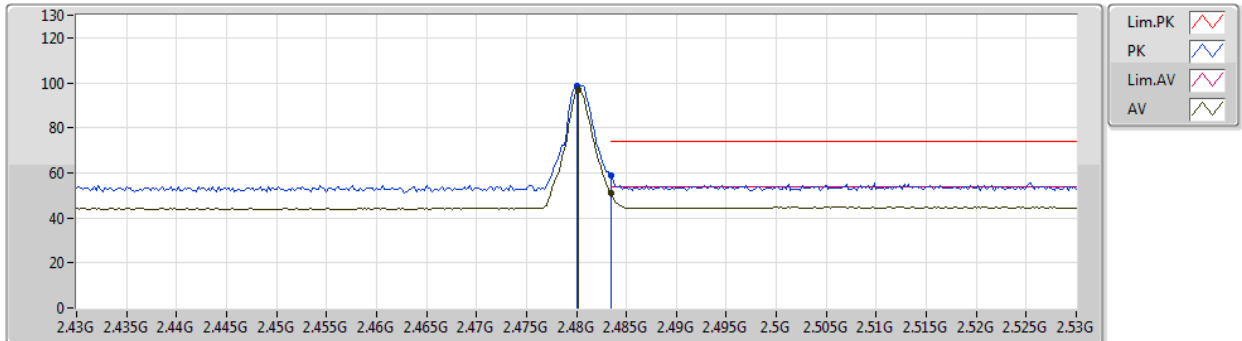


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.4802G	92.27	Inf	-Inf	30.68	3	Vertical	267	2.49	-
AV	2.483502G	47.75	54.00	-6.25	30.69	3	Vertical	267	2.49	-
PK	2.48G	94.29	Inf	-Inf	30.68	3	Vertical	267	2.49	-
PK	2.483502G	56.37	74.00	-17.63	30.69	3	Vertical	267	2.49	-

BT-LE(1Mbps)

2480MHz_TX

18/07/2018

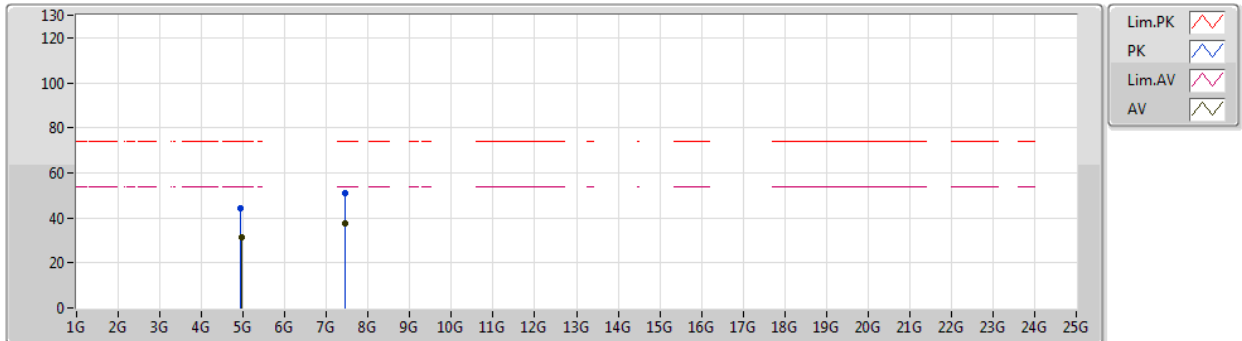


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
AV	2.4802G	96.75	Inf	-Inf	30.68	3	Horizontal	318	1.37	-				
AV	2.483502G	50.99	54.00	-3.01	30.69	3	Horizontal	318	1.37	-				
PK	2.48G	98.72	Inf	-Inf	30.68	3	Horizontal	318	1.37	-				
PK	2.483502G	58.68	74.00	-15.32	30.69	3	Horizontal	318	1.37	-				

BT-LE(1Mbps)

2480MHz_TX

18/07/2018

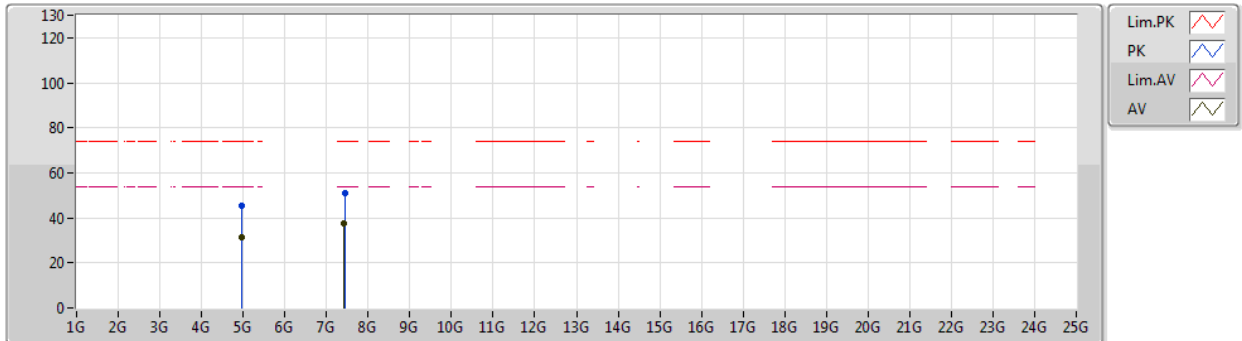


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
AV	4.96102G	31.42	54.00	-22.58	6.12	3	Vertical	341	2.84	-				
PK	4.94902G	44.47	74.00	-29.53	6.09	3	Vertical	341	2.84	-				
AV	7.43212G	37.37	54.00	-16.63	11.46	3	Vertical	27	1.49	-				
PK	7.44756G	51.04	74.00	-22.96	11.50	3	Vertical	27	1.49	-				

BT-LE(1Mbps)

2480MHz_TX

18/07/2018



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	7.43112G	37.48	54.00	-16.52	11.46	3	Horizontal	318	1.50	-
PK	7.4334G	51.22	74.00	-22.78	11.47	3	Horizontal	318	1.50	-
AV	4.96G	31.51	54.00	-22.49	6.11	3	Horizontal	83	1.91	-
PK	4.96632G	45.35	74.00	-28.65	6.12	3	Horizontal	83	1.91	-



RSE RX below 1GHz Result

Appendix G.1

Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	QP	35.82M	37.95	40.00	-2.05	-7.68	3	Vertical	179	1.00	-

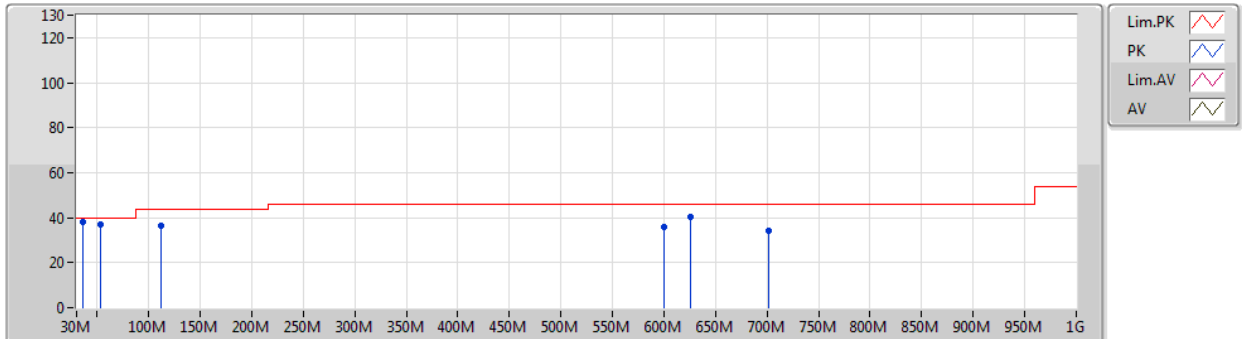
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz_Switching Power Supply	Pass	PK	53.28M	36.77	40.00	-3.23	-14.69	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	111.48M	36.61	43.50	-6.89	-9.17	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	600.36M	35.63	46.00	-10.37	-1.03	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	625.58M	40.31	46.00	-5.69	-0.43	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	PK	701.24M	34.45	46.00	-11.55	-0.16	3	Vertical	360	1.00	-
2440MHz_Switching Power Supply	Pass	QP	35.82M	37.95	40.00	-2.05	-7.68	3	Vertical	179	1.00	-
2440MHz_Switching Power Supply	Pass	PK	35.82M	32.71	40.00	-7.29	-7.68	3	Horizontal	0	1.00	-
2440MHz_Switching Power Supply	Pass	PK	198.78M	27.27	43.50	-16.23	-10.65	3	Horizontal	0	1.00	-
2440MHz_Switching Power Supply	Pass	PK	222.06M	30.51	46.00	-15.49	-10.32	3	Horizontal	0	1.00	-
2440MHz_Switching Power Supply	Pass	PK	375.32M	38.61	46.00	-7.39	-4.48	3	Horizontal	0	1.00	-
2440MHz_Switching Power Supply	Pass	PK	499.48M	34.10	46.00	-11.90	-2.38	3	Horizontal	0	1.00	-
2440MHz_Switching Power Supply	Pass	PK	875.84M	34.76	46.00	-11.24	2.15	3	Horizontal	0	1.00	-

BT-LE(1Mbps)RX

2440MHz_ Switching Power Supply

08/07/2019

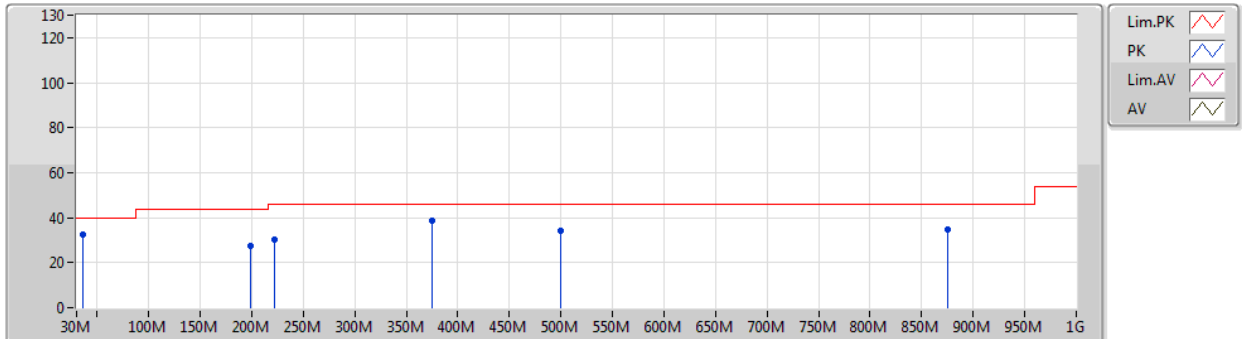


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
PK	53.28M	36.77	40.00	-3.23	-14.69	3	Vertical	360	1.00	-				
PK	111.48M	36.61	43.50	-6.89	-9.17	3	Vertical	360	1.00	-				
PK	600.36M	35.63	46.00	-10.37	-1.03	3	Vertical	360	1.00	-				
PK	625.58M	40.31	46.00	-5.69	-0.43	3	Vertical	360	1.00	-				
PK	701.24M	34.45	46.00	-11.55	-0.16	3	Vertical	360	1.00	-				
QP	35.82M	37.95	40.00	-2.05	-7.68	3	Vertical	179	1.00	-				

BT-LE(1Mbps)RX

2440MHz_ Switching Power Supply

08/07/2019



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment				
PK	35.82M	32.71	40.00	-7.29	-7.68	3	Horizontal	0	1.00	-				
PK	198.78M	27.27	43.50	-16.23	-10.65	3	Horizontal	0	1.00	-				
PK	222.06M	30.51	46.00	-15.49	-10.32	3	Horizontal	0	1.00	-				
PK	375.32M	38.61	46.00	-7.39	-4.48	3	Horizontal	0	1.00	-				
PK	499.48M	34.10	46.00	-11.90	-2.38	3	Horizontal	0	1.00	-				
PK	875.84M	34.76	46.00	-11.24	2.15	3	Horizontal	0	1.00	-				



Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-
BT-LE(1Mbps)	Pass	AV	2.124G	47.14	54.00	-6.86	-5.19	3	Horizontal	237	1.95	-

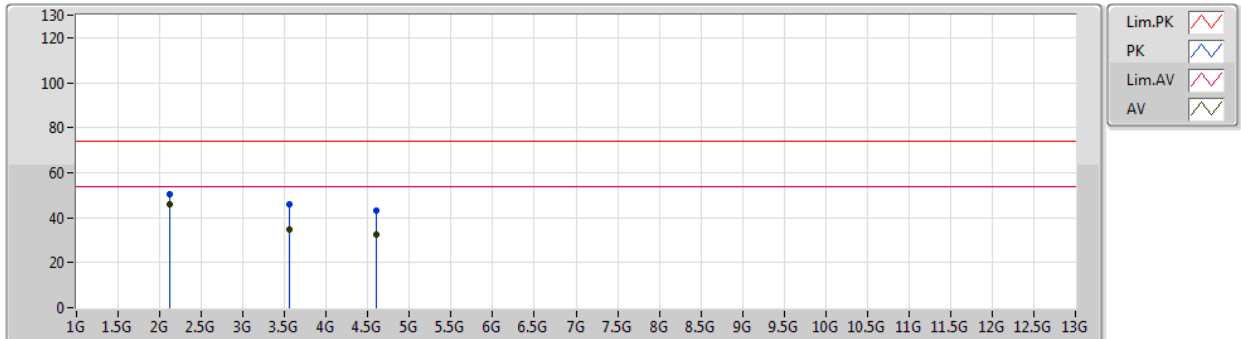
Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz_RX	Pass	AV	2.124G	46.14	54.00	-7.86	-5.19	3	Vertical	241	1.53	-
2440MHz_RX	Pass	AV	3.56G	34.82	54.00	-19.18	-1.33	3	Vertical	159	1.00	-
2440MHz_RX	Pass	AV	4.6G	32.32	54.00	-21.68	1.14	3	Vertical	220	1.00	-
2440MHz_RX	Pass	PK	2.124G	50.67	74.00	-23.33	-5.19	3	Vertical	241	1.53	-
2440MHz_RX	Pass	PK	3.56G	46.17	74.00	-27.83	-1.33	3	Vertical	159	1.00	-
2440MHz_RX	Pass	PK	4.6G	43.29	74.00	-30.71	1.14	3	Vertical	220	1.00	-
2440MHz_RX	Pass	AV	2.124G	47.14	54.00	-6.86	-5.19	3	Horizontal	237	1.95	-
2440MHz_RX	Pass	AV	3.568G	33.66	54.00	-20.34	-1.30	3	Horizontal	360	1.00	-
2440MHz_RX	Pass	AV	4.148G	35.46	54.00	-18.54	0.34	3	Horizontal	360	1.00	-
2440MHz_RX	Pass	PK	2.124G	50.67	74.00	-23.33	-5.19	3	Horizontal	237	1.95	-
2440MHz_RX	Pass	PK	3.568G	42.50	74.00	-31.50	-1.30	3	Horizontal	360	1.00	-
2440MHz_RX	Pass	PK	4.148G	42.79	74.00	-31.21	0.34	3	Horizontal	360	1.00	-

BT-LE(1Mbps)RX

2440MHz_RX

17/05/2019

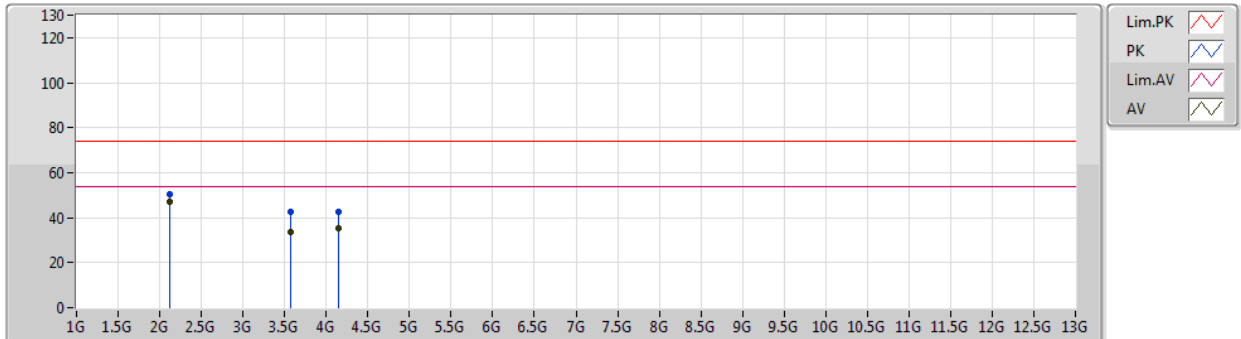


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.124G	46.14	54.00	-7.86	-5.19	3	Vertical	241	1.53	-
AV	3.56G	34.82	54.00	-19.18	-1.33	3	Vertical	159	1.00	-
AV	4.6G	32.32	54.00	-21.68	1.14	3	Vertical	220	1.00	-
PK	2.124G	50.67	74.00	-23.33	-5.19	3	Vertical	241	1.53	-
PK	3.56G	46.17	74.00	-27.83	-1.33	3	Vertical	159	1.00	-
PK	4.6G	43.29	74.00	-30.71	1.14	3	Vertical	220	1.00	-

BT-LE(1Mbps)RX

2440MHz_RX

17/05/2019



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comment
AV	2.124G	47.14	54.00	-6.86	-5.19	3	Horizontal	237	1.95	-
AV	3.568G	33.66	54.00	-20.34	-1.30	3	Horizontal	360	1.00	-
AV	4.148G	35.46	54.00	-18.54	0.34	3	Horizontal	360	1.00	-
PK	2.124G	50.67	74.00	-23.33	-5.19	3	Horizontal	237	1.95	-
PK	3.568G	42.50	74.00	-31.50	-1.30	3	Horizontal	360	1.00	-
PK	4.148G	42.79	74.00	-31.21	0.34	3	Horizontal	360	1.00	-