

NCC Test Report

Equipment : Security Controller
Brand Name : Tesla
Model No. : 1089774
Applicant : 台灣特斯拉汽車有限公司
臺北市內湖區民權東路 6 段 11 巷 6 號
Manufacturer : TESLA INC
45500 FREMONT BLVD FREMONT CA 94538-6326
Standard : LP0002 Section 3.10 (2018-01-10)

The product sample received on May 03, 2017 and completely tested on Mar. 30, 2019. We, SPORTON, would like to declare that the tested sample has been evaluated in accordance with the procedures given in ANSI C63.10-2013 and shown compliance with the applicable technical standards.

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



Approved by: Allen Lin

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

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Table of Contents

1	GENERAL DESCRIPTION	5
1.1	Information.....	5
1.2	Testing Applied Standards	6
1.3	Testing Location Information	6
1.4	Measurement Uncertainty	6
2	TEST CONFIGURATION OF EUT.....	7
2.1	Test Condition	7
2.2	Test Channel Mode	7
2.3	The Worst Case Measurement Configuration.....	8
2.4	Support Equipment.....	9
2.5	Test Setup Diagram	10
3	TRANSMITTER TEST RESULT	13
3.1	AC Power-line Conducted Emissions	13
3.2	DTS Bandwidth.....	14
3.3	Maximum Conducted Output Power	15
3.4	Power Spectral Density	17
3.5	Emissions in Non-restricted Frequency Bands	18
3.6	Emissions in Restricted Frequency Bands.....	19
3.7	Receiver Radiated Spurious Emissions	23
4	TEST EQUIPMENT AND CALIBRATION DATA	26
APPENDIX A. TEST RESULTS OF AC POWER-LINE CONDUCTED EMISSIONS		
APPENDIX B. TEST RESULTS OF DTS BANDWIDTH		
APPENDIX C. TEST RESULTS OF MAXIMUM CONDUCTED OUTPUT POWER		
APPENDIX D. TEST RESULTS OF POWER SPECTRAL DENSITY		
APPENDIX E. TEST RESULTS OF EMISSIONS IN NON-RESTRICTED FREQUENCY BANDS		
APPENDIX F. TEST RESULTS OF EMISSIONS IN RESTRICTED FREQUENCY BANDS		
APPENDIX G. TEST RESULTS OF RECEIVER RADIATED UNWANTED EMISSIONS		
APPENDIX H. TEST PHOTOS		
PHOTOGRAPHS OF EUT V01		

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



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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	1TX

Note:

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

1.1.2 Antenna Information

Ant.	Port	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	1	-	-	PCB	fixed on board	3.94

1.1.3 EUT Information

Operational Condition	
EUT Power Type	From DC Power Source
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) $\geq 1/T$
BT-LE(1Mbps)	1	0	n/a (DC $\geq$ 0.98)	n/a (DC $\geq$ 0.98)

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 v05r01
- ♦ 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
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. TW1190 with FCC.			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH06-HY	Ryan	24.5°C / 65%	06/Jun/2017
Radiated - TX	03CH09-HY	Ryan	22.5~24.4°C / 55~60%	07/Jun/2017~12/Jun/2017
Radiated - RX	03CH09-HY	Ryan	23.2~23.6°C / 57~61%	25/Mar/2019
AC Conduction	CO04-HY	Lego	22.2~25.1°C / 56.4~58.6%	26/Mar/2019~30/Mar/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)	3.6 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	2.1 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	2.6 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	2.9 dB	Confidence levels of 95%
Conducted Emission	1.3 dB	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Condition

RF Conducted	Abbreviation	Remark
TnomVnom	Tnom	20°C
-	Vnom	12V

2.2 Test Channel Mode

Test Software Version	BTool v1.40.15
-----------------------	----------------

Mode	Power Setting
BT-LE(1Mbps)	-
2402MHz	0xC
2440MHz	0xC
2480MHz	0xC

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	DC Power Supply 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	DC Power Supply mode	
Operating Mode > 1GHz	CTX/CRX	
Orthogonal Planes of EUT	Y Plane	Z Plane
		
Worst Planes of EUT		V

2.4 Support Equipment

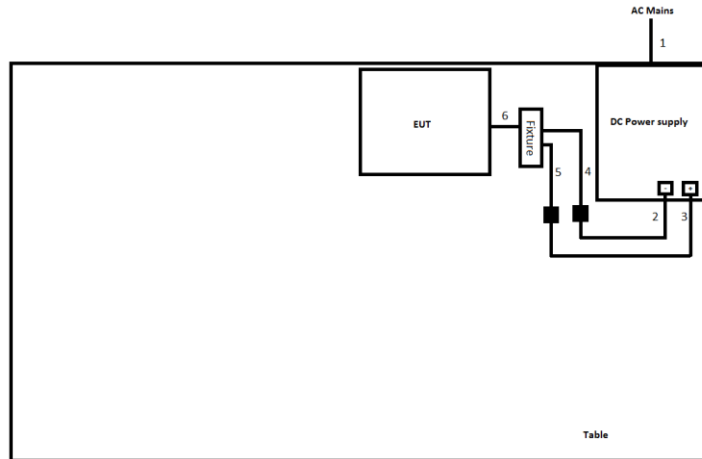
Support Equipment – RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	DC Power Supply	G.W.	GPC-6030D	-

Support Equipment – Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	DC Power Supply	G.W.	GPC-6030D	-

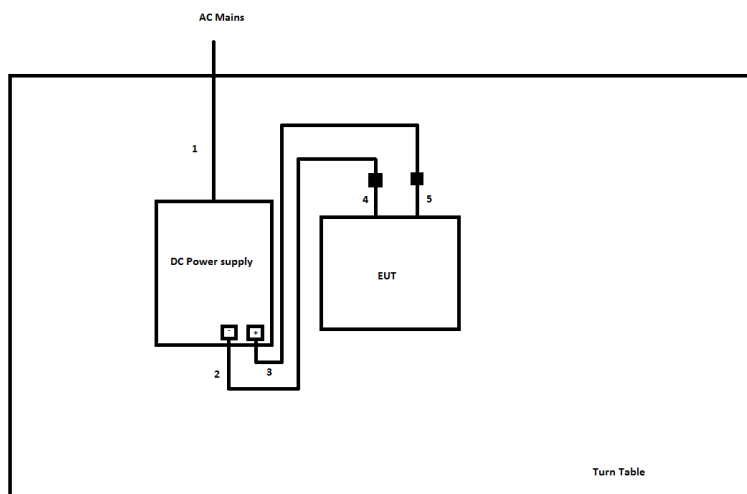
Support Equipment – AC Conduction				
No.	Equipment	Brand Name	Model Name	FCC ID
1	DC Power Supply	G.W.	GPC-6030D	-

2.5 Test Setup Diagram

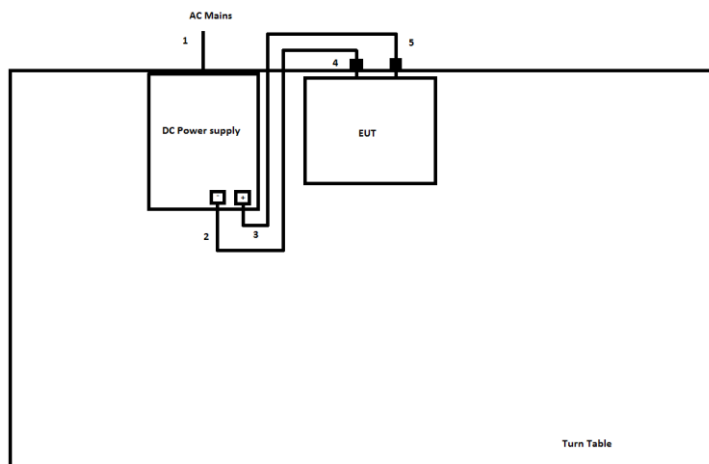
Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)	Remark
1	AC Power line	No	1.5	-
2	DC Power line	No	1.0	-
3	DC Power line	No	1.0	-
4	DC Power line	No	0.2	-
5	DC Power line	No	0.2	-
6	Fixture cable	No	2.35	-

Test Setup Diagram - Radiated Test - TX


Item	Connection	Shielded	Length(m)	Remark
1	AC Power line	No	1.5	-
2	DC Power line	No	1.0	-
3	DC Power line	No	1.0	-
4	DC Power line	No	0.2	-
5	DC Power line	No	0.2	-

Test Setup Diagram - Radiated Test - RX


Item	Connection	Shielded	Length(m)	Remark
1	AC Power line	No	1.5	-
2	DC Power line	No	1.0	-
3	DC Power line	No	1.0	-
4	DC Power line	No	0.2	-
5	DC Power line	No	0.2	-

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.

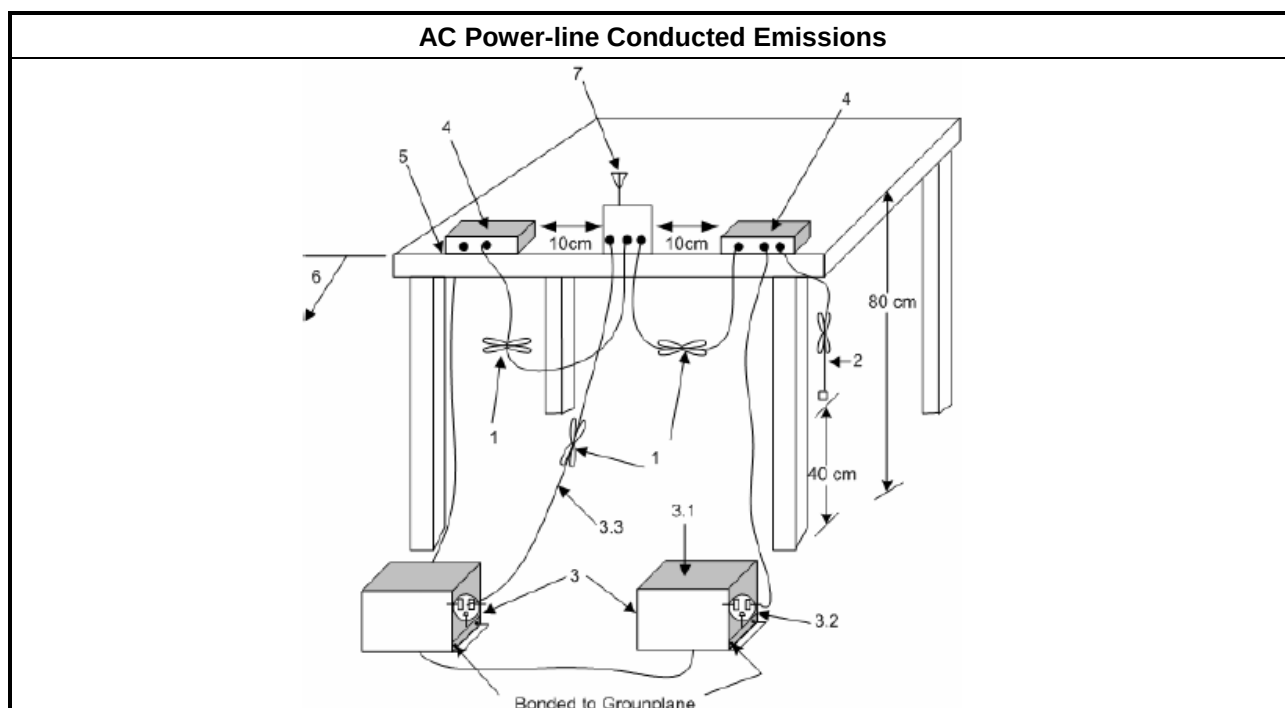
3.1.2 Measuring Instruments

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



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.

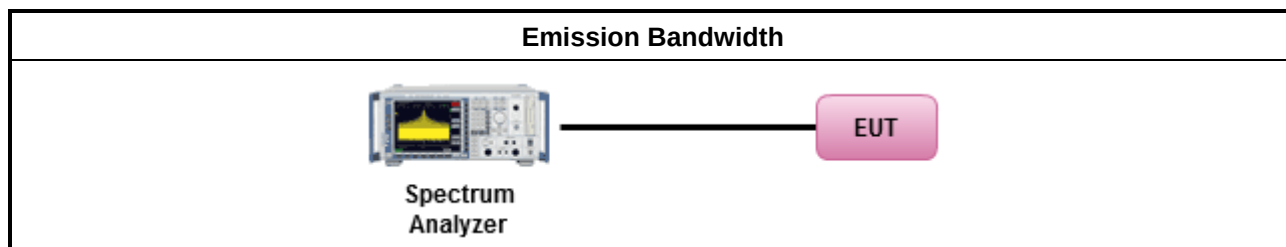
3.2.2 Measuring Instruments

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.		

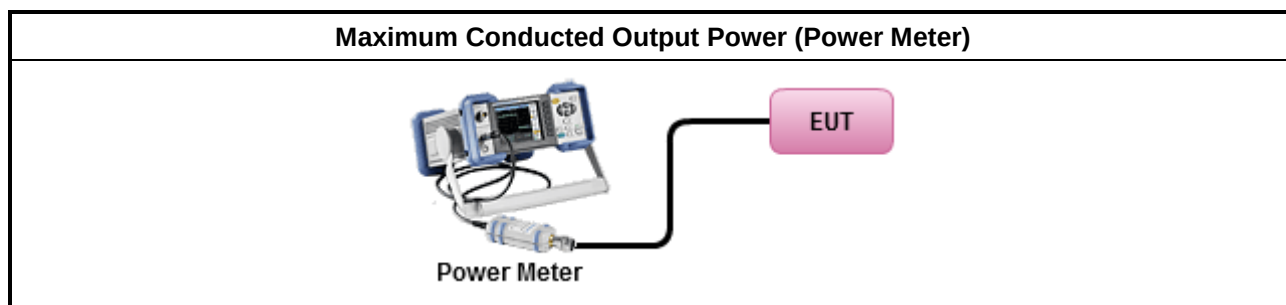
3.3.2 Measuring Instruments

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

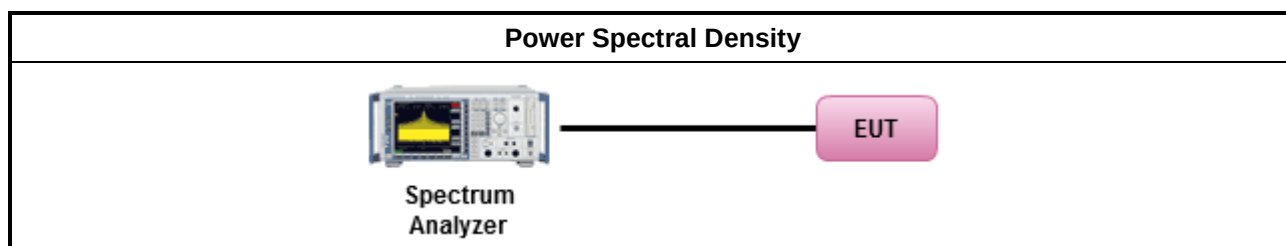
3.4.2 Measuring Instruments

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

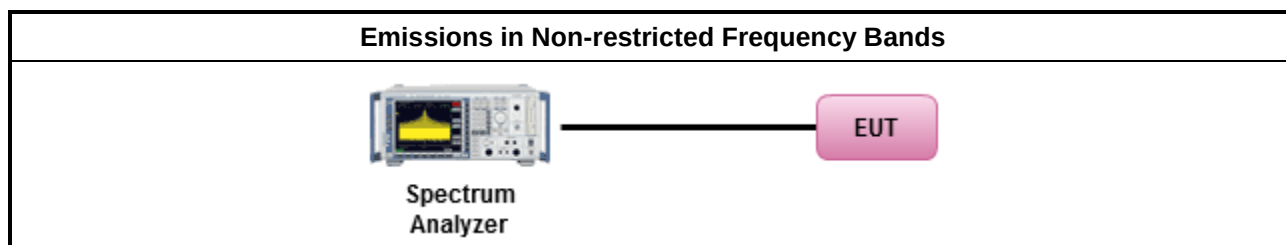
3.5.2 Measuring Instruments

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.

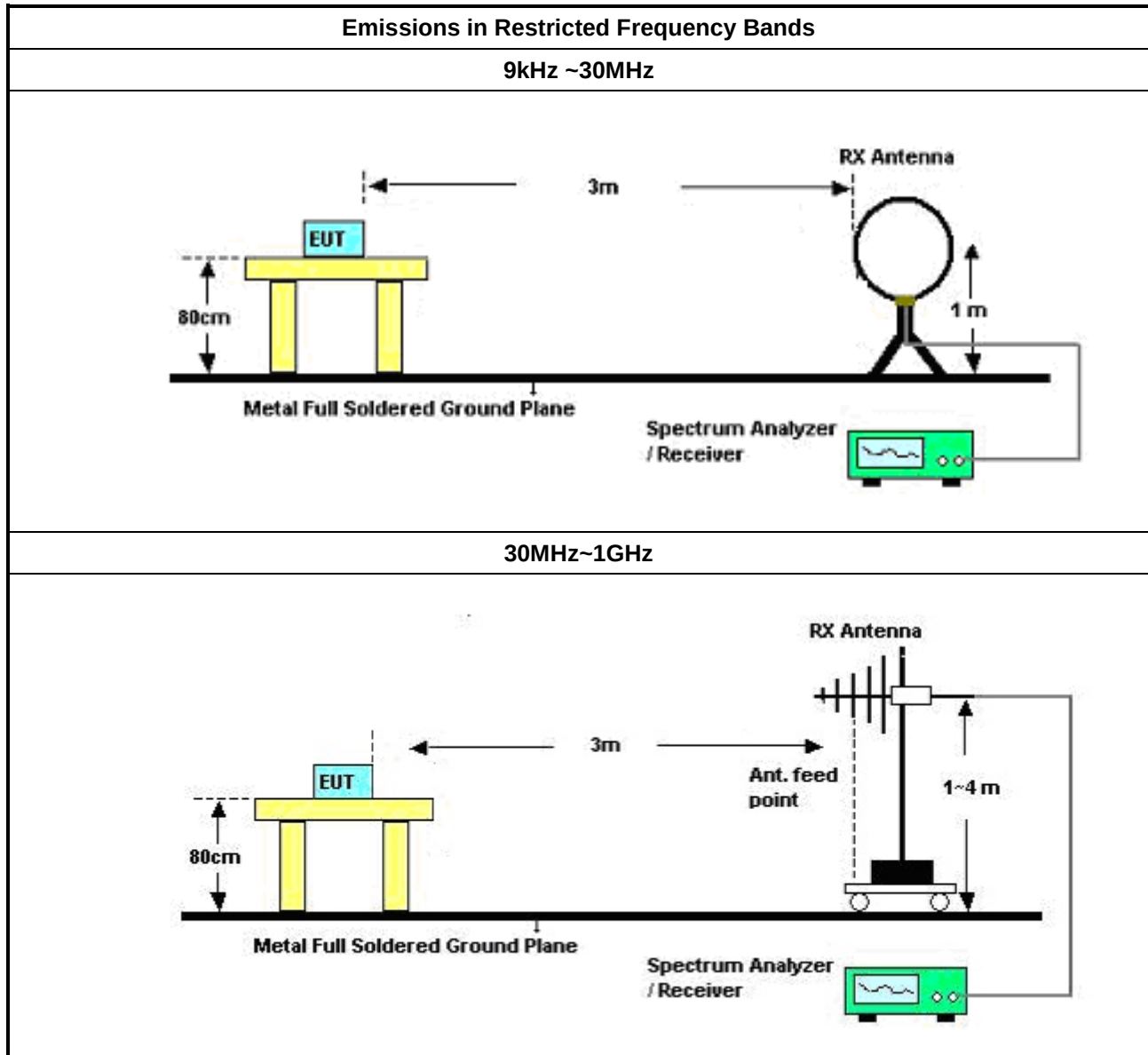
3.6.2 Measuring Instruments

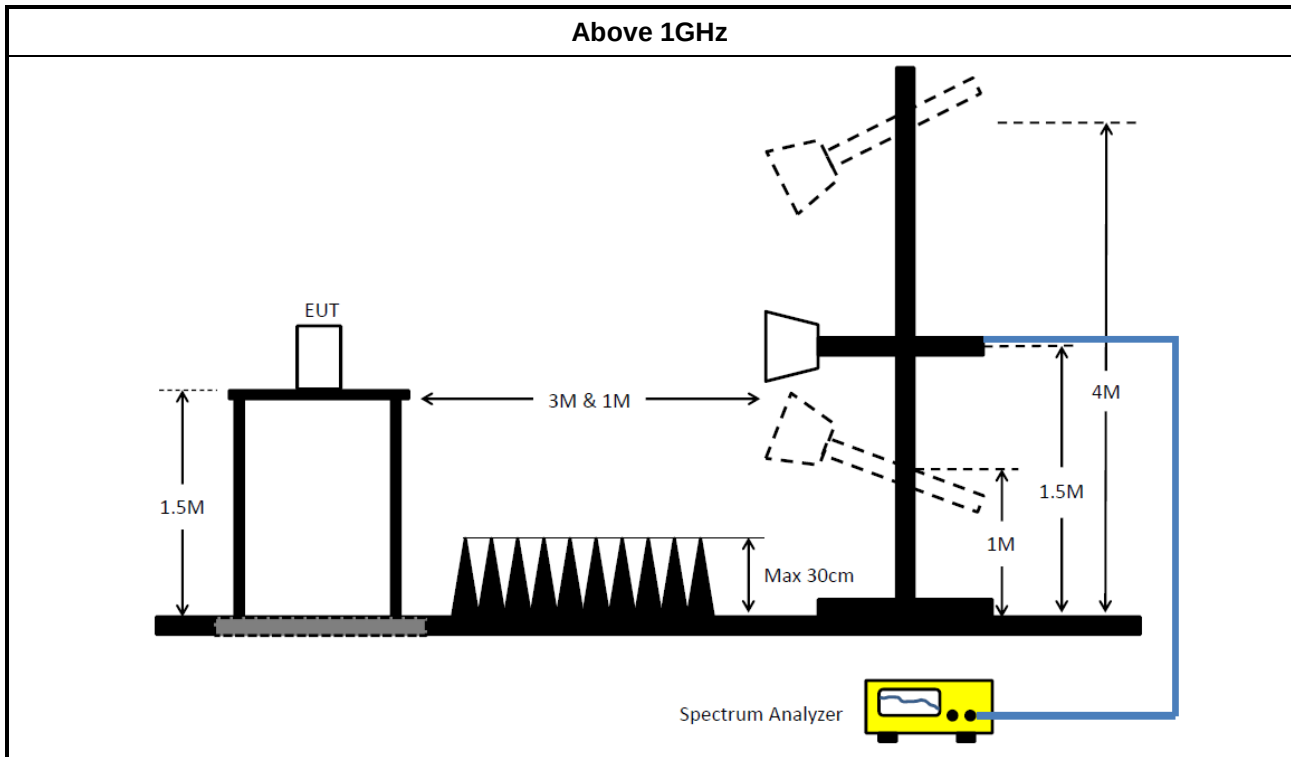
Refer a test equipment and calibration data table in this test report.

3.6.3 Test Procedures

Test Method	
The average emission levels shall be measured in [duty cycle $\geq$ 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 (i.e., 1 MHz).
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. All amplitude of spurious emissions that are attenuated by more than 20 dB 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.

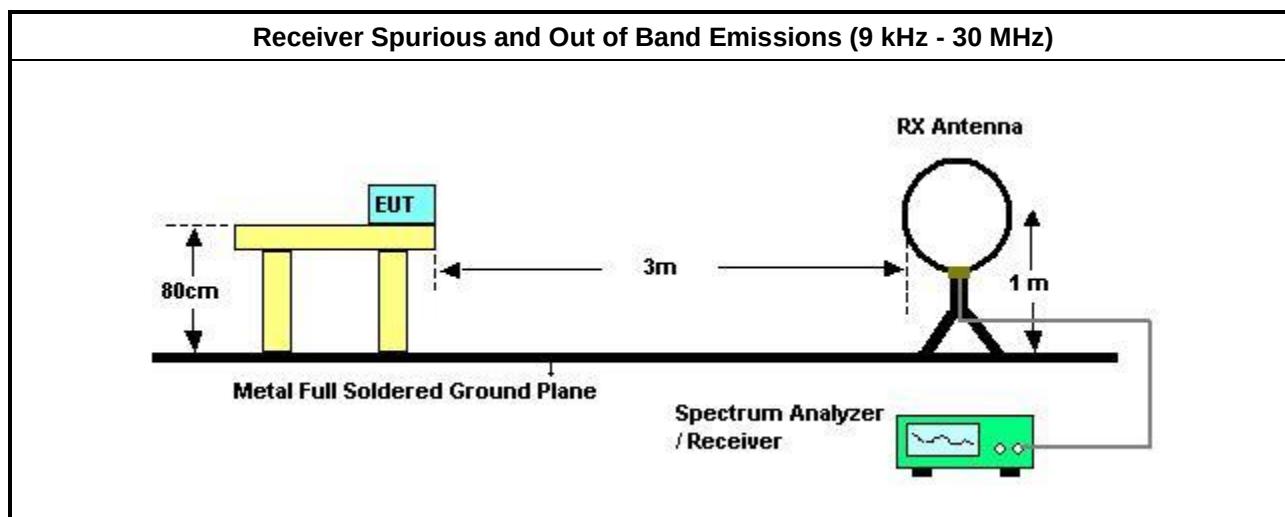
3.7.2 Measuring Instruments

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

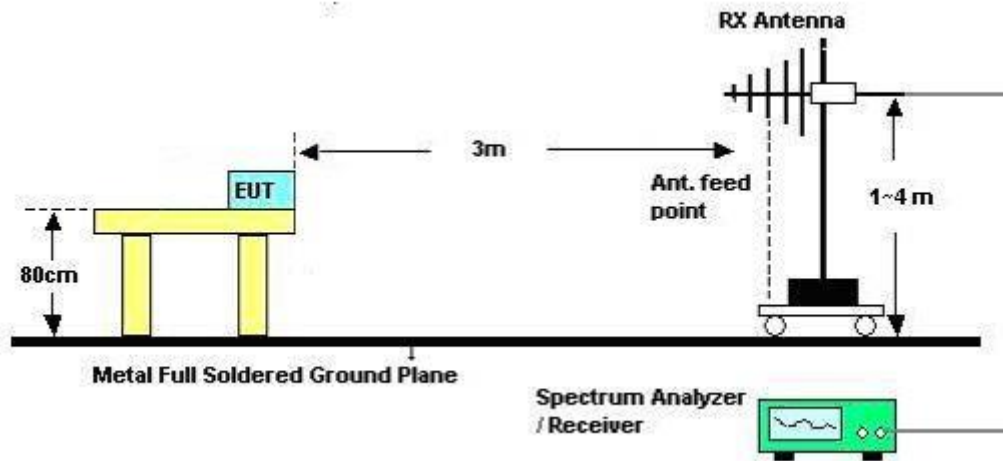
3.7.3 Test Procedures

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.

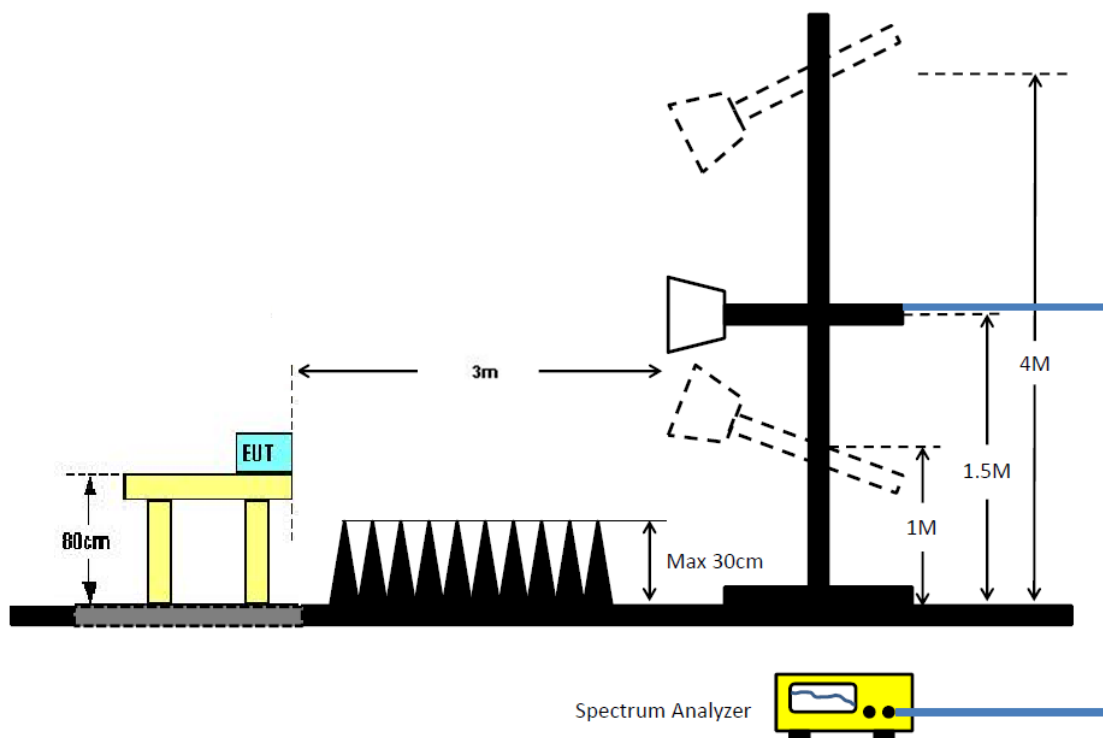
3.7.4 Test Setup



Receiver Radiated Unwanted Emissions (below 1GHz)



Receiver Radiated Unwanted Emissions (above 1GHz)



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 Radiated Test - TX

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	30MHz ~ 1GHz	25/Apr/2017	24/Apr/2018
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	1GHz ~ 18GHz	21/Jun/2016	20/Jun/2017
Amplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	25/Apr/2017	24/Apr/2018
Amplifier	EMC	EMC9135	980232	9KHz~1GHz	25/Apr/2017	24/Apr/2018
Spectrum Analyzer	KEYSIGHT	N9010A	MY54200885	10Hz ~ 44GHz	04/Jul/2016	03/Jul/2017
Bilog Antenna	TESEQ	CBL 6111D	35418	30MHz~1GHz	01/Oct/2016	30/Sep/2017
Horn Antenna	SCHWARZBECK	BBHA 9120D	BBHA9120D 1534	1GHz~18GHz	28/Apr/2017	27/Apr/2018
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170614	18GHz ~ 40GHz	06/Feb/2017	05/Feb/2018
Amplifier	MITEQ	JS44-18004000-33-8P	1840917	18GHz ~ 40GHz	06/Feb/2017	05/Feb/2018
Loop Antenna	R&S	HFH2-Z2	100330	9 kHz~30 MHz	02/Mar/2017	01/Mar/2018
RF Cable-R03m	Jye Bao	RG142	CB021	9kHz ~ 1GHz	23/Jul/2016	22/Jul/2017
RF Cable-high	Jye Bao	RG142	03CH09-HY	1GHz ~ 40GHz	23/Jul/2016	22/Jul/2017
Receiver	R&S	ESR3	102052	9KHz ~ 3.6GHz	29/Apr/2017	28/Apr/2018

Instrument for Radiated Test - RX

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	30MHz ~ 1GHz	23/Apr/2018	22/Apr/2019
3m Semi Anechoic Chamber	TDK	SAC-3M	03CH09-HY	1GHz ~ 18GHz	14/Jun/2018	13/Jun/2019
Microwave Preamplifier	Agilent	8449B	3008A02096	1GHz ~ 26.5GHz	10/May/2018	09/May/2019
Amplifier	EMC	EMC9135	980232	9KHz~1GHz	27/Apr/2018	26/Apr/2019
EMI Test Receiver	R&S	ESR3	102052	9kHz ~ 3.6GHz	10/Apr/2018	09/Apr/2019
EXA Signal Analyzer	KEYSIGHT	N9010A	MY54200885	10Hz ~ 44GHz	31/Jul/2018	30/Jul/2019
Bilog Antenna & 5dB Attenuator	TESEQ & MTJ	CBL6111D & MTJ6102-05	35418 / 3	30MHz~1GHz	02/Oct/2018	03/Oct/2019
Double Ridged Guide Horn Antenna	SCHWARZBECK	BBHA 9120 D	BBHA9120 D 1534	1GHz~18GHz	30/Apr/2018	29/Apr/2019
Broadband Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170339	18GHz ~ 40GHz	11/Apr/2018	10/Apr/2019
Loop Antenna	TESEQ	HLA 6120	31244	9k-30MHz	29/Mar/2018	28/Mar/2019
LF-CABLE-2019 0218	Jye Bao	RG142	CB028	9kHz ~ 1GHz	18/Feb/2019	17/Feb/2020
RF Cable-high	HUBER+SUHNER	SUCOFLEX104	SN 556626/4 + 556627	1GHz ~ 40GHz	14/Mar/2019	13/Mar/2020

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	30/Dec/2016	29/Dec/2017
Power Sensor	Anritsu	MA2411B	1027452	300MHz~40GHz	24/Feb/2017	23/Feb/2018
Power Meter	Anritsu	ML2495A	1124009	300MHz~40GHz	24/Feb/2017	23/Feb/2018
Signal Generator	R&S	SMR40	100116	10MHz~40GHz	21/Jul/2016	20/Jul/2017
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY677/3	30MHz~26.5GHz	02/Oct/2016	01/Oct/2017
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY678/3	30MHz~26.5GHz	02/Oct/2016	01/Oct/2017
RF Cable-0.5m	HUBER+SUHNER	SUCOFLEX_104	MY10717/4	30MHz~26.5GHz	02/Oct/2016	01/Oct/2017

Instrument for AC Conduction

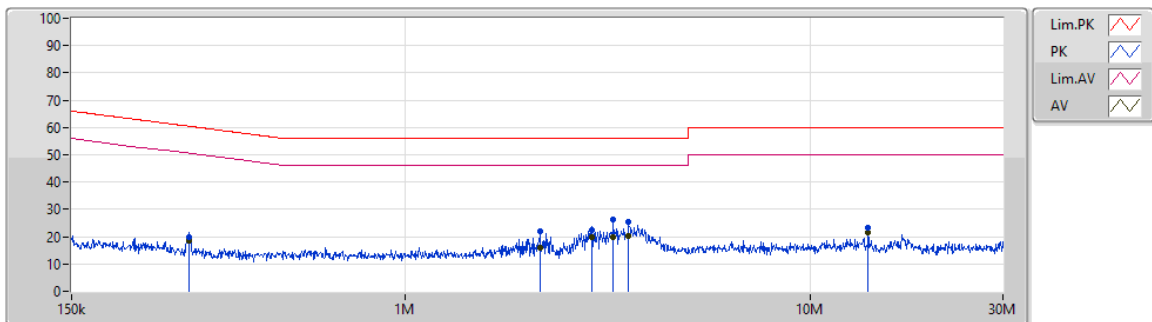
Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR	102051	9KHz ~ 3.6GHz	03/May/2018	02/May/2019
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	08/Nov/2018	07/Nov/2019
RF Cable-CON	MTJ	RG142	CB002-CO	9kHz ~ 200MHz	17/Sep/2018	16/Sep/2019
AC POWER	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/2018	11/Oct/2019

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	DC Power Supply mode_TX		

AC Conduction

27/03/2019



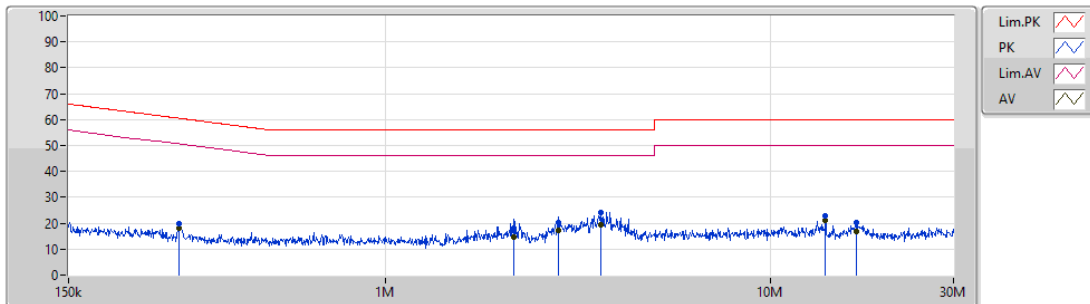
Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	293.329k	19.89	60.44	-40.55	19.48	Neutral	-	0.41	9.59	0.01	9.88			
AV	293.329k	18.47	50.44	-31.97	19.48	Neutral	-	-1.01	9.59	0.01	9.88			
QP	2.15M	22.01	56.00	-33.99	19.53	Neutral	-	2.48	9.61	0.03	9.89			
AV	2.15M	16.14	46.00	-29.86	19.53	Neutral	-	-3.39	9.61	0.03	9.89			
QP	2.889M	22.50	56.00	-33.50	19.54	Neutral	-	2.96	9.61	0.04	9.89			
AV	2.889M	19.63	46.00	-26.37	19.54	Neutral	-	0.09	9.61	0.04	9.89			
QP	3.27M	26.44	56.00	-29.56	19.54	Neutral	-	6.90	9.61	0.04	9.89			
AV	3.27M	19.87	46.00	-26.13	19.54	Neutral	-	0.33	9.61	0.04	9.89			
QP	3.57M	25.46	56.00	-30.54	19.54	Neutral	-	5.92	9.61	0.04	9.89			
AV	3.57M	20.08	46.00	-25.92	19.54	Neutral	"Worst"	0.54	9.61	0.04	9.89			
QP	13.927M	23.27	60.00	-36.73	19.66	Neutral	-	3.61	9.67	0.09	9.90			
AV	13.927M	21.68	50.00	-28.32	19.66	Neutral	-	2.02	9.67	0.09	9.90			

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	DC Power Supply mode_TX		

AC Conduction

27/03/2019



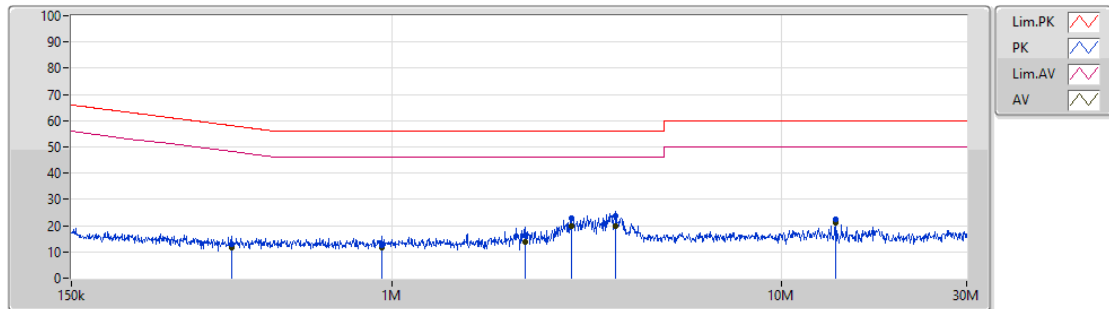
Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	290.996k	19.69	60.49	-40.80	19.48	Line	-	0.21	9.59	0.01	9.88			
AV	290.996k	18.27	50.49	-32.22	19.48	Line	-	-1.21	9.59	0.01	9.88			
QP	2.15M	18.25	56.00	-37.75	19.54	Line	-	-1.29	9.62	0.03	9.89			
AV	2.15M	14.61	46.00	-31.39	19.54	Line	-	-4.93	9.62	0.03	9.89			
QP	2.81M	20.38	56.00	-35.62	19.55	Line	-	0.83	9.62	0.04	9.89			
AV	2.81M	17.43	46.00	-28.57	19.55	Line	-	-2.12	9.62	0.04	9.89			
QP	3.642M	24.03	56.00	-31.97	19.56	Line	-	4.47	9.63	0.04	9.89			
AV	3.642M	19.39	46.00	-26.61	19.56	Line	"Worst"	-0.17	9.63	0.04	9.89			
QP	13.927M	22.77	60.00	-37.23	19.64	Line	-	3.13	9.65	0.09	9.90			
AV	13.927M	20.99	50.00	-29.01	19.64	Line	-	1.35	9.65	0.09	9.90			
QP	16.734M	20.08	60.00	-39.92	19.64	Line	-	0.44	9.64	0.10	9.90			
AV	16.734M	16.70	50.00	-33.30	19.64	Line	-	-2.94	9.64	0.10	9.90			

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Neutral
Operating Function	DC Power Supply mode_RX		

AC Conduction

26/03/2019



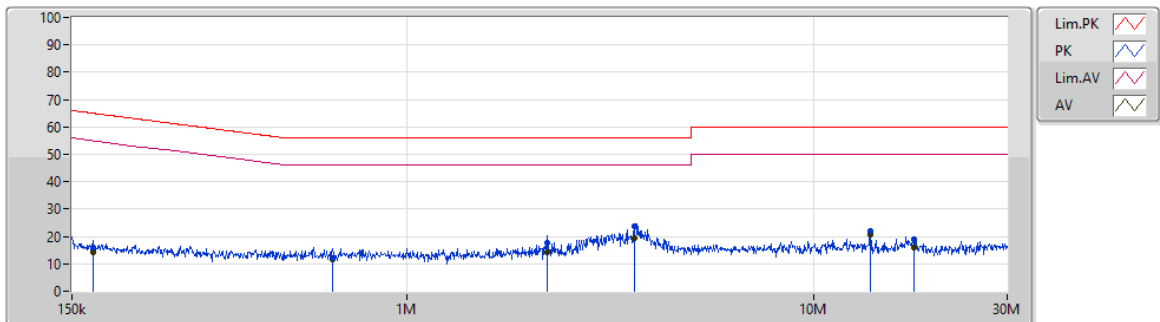
Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	386.35k	12.76	58.14	-45.38	19.48	Neutral	-	-6.72	9.59	0.01	9.88			
AV	386.35k	11.80	48.14	-36.34	19.48	Neutral	-	-7.68	9.59	0.01	9.88			
QP	941.021k	12.63	56.00	-43.37	19.49	Neutral	-	-6.86	9.59	0.02	9.88			
AV	941.021k	11.50	46.00	-34.50	19.49	Neutral	-	-7.99	9.59	0.02	9.88			
QP	2.194M	16.46	56.00	-39.54	19.53	Neutral	-	-3.07	9.61	0.03	9.89			
AV	2.194M	13.83	46.00	-32.17	19.53	Neutral	-	-5.70	9.61	0.03	9.89			
QP	2.889M	22.71	56.00	-33.29	19.54	Neutral	-	3.17	9.61	0.04	9.89			
AV	2.889M	19.80	46.00	-26.20	19.54	Neutral	-	0.26	9.61	0.04	9.89			
QP	3.745M	23.56	56.00	-32.44	19.54	Neutral	-	4.02	9.61	0.04	9.89			
AV	3.745M	19.95	46.00	-26.05	19.54	Neutral	"Worst"	0.41	9.61	0.04	9.89			
QP	13.816M	22.37	60.00	-37.63	19.66	Neutral	-	2.71	9.67	0.09	9.90			
AV	13.816M	20.96	50.00	-29.04	19.66	Neutral	-	1.30	9.67	0.09	9.90			

AC Power-line Conducted Emissions Result

Operating Mode	1	Power Phase	Line
Operating Function	DC Power Supply mode_RX		

AC Conduction

26/03/2019



Type	Freq (Hz)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Factor (dB)	Condition	Comment	Raw (dBuV)	LISN (dB)	CL (dB)	AT (dB)			
QP	169.084k	15.81	65.01	-49.20	19.48	Line	-	-3.67	9.60	0.01	9.87			
AV	169.084k	14.31	55.01	-40.70	19.48	Line	-	-5.17	9.60	0.01	9.87			
QP	656.999k	11.99	56.00	-44.01	19.49	Line	-	-7.50	9.60	0.01	9.88			
AV	656.999k	11.49	46.00	-34.51	19.49	Line	-	-8.00	9.60	0.01	9.88			
QP	2.211M	17.58	56.00	-38.42	19.54	Line	-	-1.96	9.62	0.03	9.89			
AV	2.211M	14.18	46.00	-31.82	19.54	Line	-	-5.36	9.62	0.03	9.89			
QP	3.642M	23.54	56.00	-32.46	19.56	Line	-	3.98	9.63	0.04	9.89			
AV	3.642M	19.26	46.00	-26.74	19.56	Line	"Worst"	-0.30	9.63	0.04	9.89			
QP	13.816M	22.17	60.00	-37.83	19.64	Line	-	2.53	9.65	0.09	9.90			
AV	13.816M	20.58	50.00	-29.42	19.64	Line	-	0.94	9.65	0.09	9.90			
QP	17.696M	19.02	60.00	-40.98	19.64	Line	-	-0.62	9.64	0.10	9.90			
AV	17.696M	16.16	50.00	-33.84	19.64	Line	-	-3.48	9.64	0.10	9.90			

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
BT-LE(1Mbps)	-	-	-	-	-
2.4-2.4835GHz	718.75k	1.071M	1M07F1D	695k	1.053M

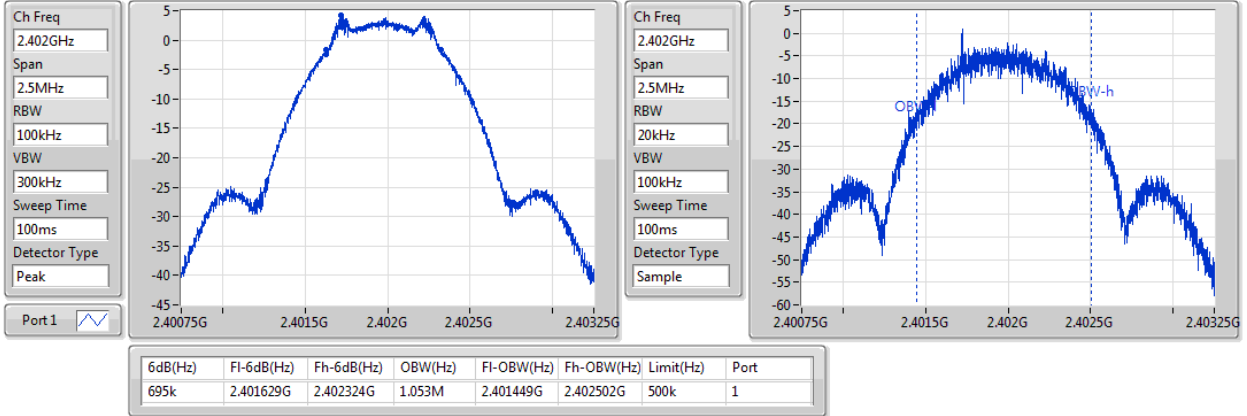
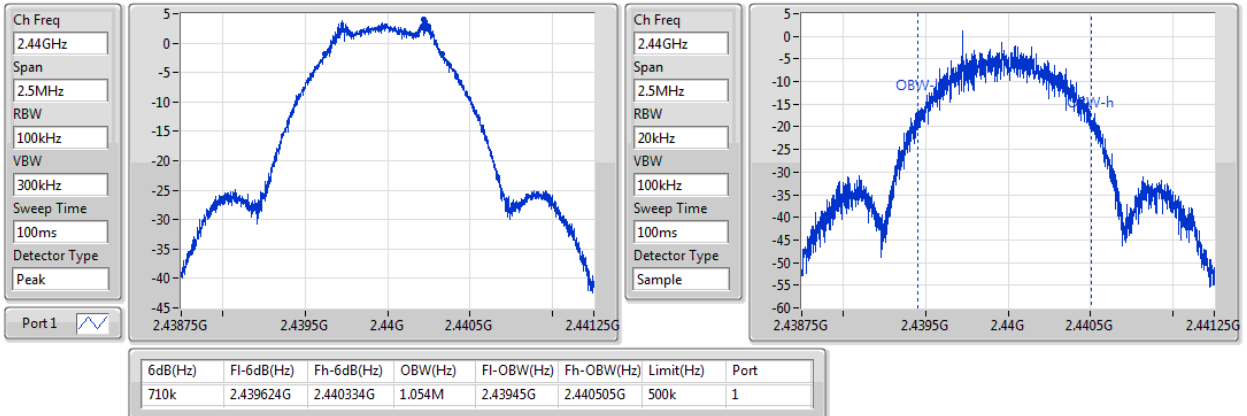
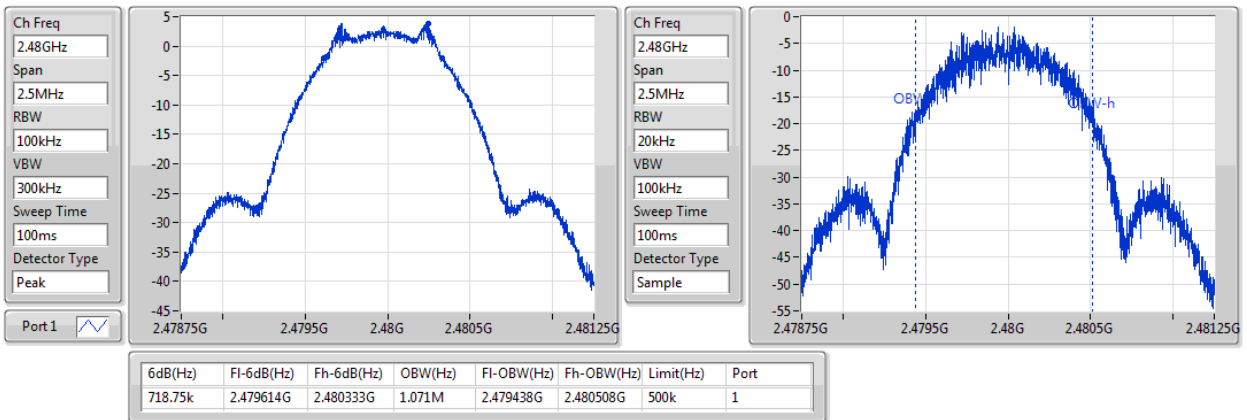
Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;

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	695k	1.053M
2440MHz	Pass	500k	710k	1.054M
2480MHz	Pass	500k	718.75k	1.071M

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

BT-LE(1Mbps)
EBW
2402MHz

BT-LE(1Mbps)
EBW
2440MHz

BT-LE(1Mbps)
EBW
2480MHz


Summary

Mode	Power	Power
	(dBm)	(W)
BT-LE(1Mbps)	-	-
2.4-2.4835GHz	4.93	0.00311

Result

Mode	Result	Gain (dBi)	Power (dBm)	Power Limit (dBm)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.94	4.93	30.00
2440MHz	Pass	3.94	4.68	30.00
2480MHz	Pass	3.94	4.45	30.00

Summary

Mode	PD (dBm/RBW)
BT-LE(1Mbps)	-
2.4-2.4835GHz	-7.45

RBW=3kHz.

Result

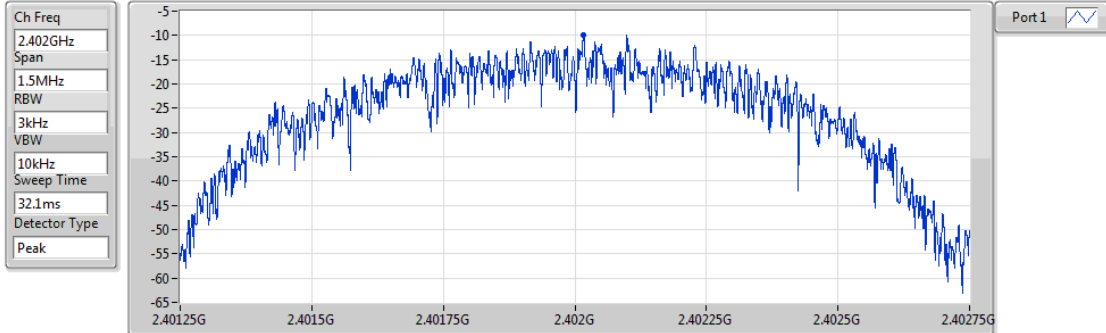
Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
BT-LE(1Mbps)	-	-	-	-
2402MHz	Pass	3.94	-9.91	8.00
2440MHz	Pass	3.94	-7.45	8.00
2480MHz	Pass	3.94	-9.71	8.00

RBW=3kHz.

BT-LE(1Mbps)

PSD

2402MHz

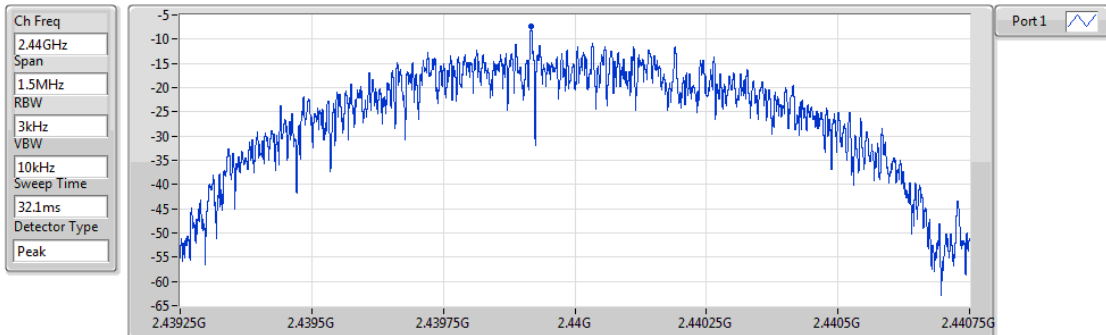


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-9.91	-9.91	-9.91

BT-LE(1Mbps)

PSD

2440MHz

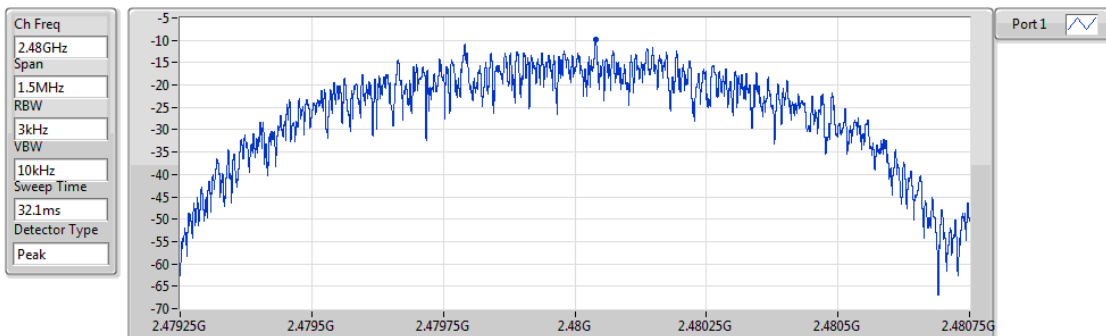


Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-7.45	-7.45	-7.45

BT-LE(1Mbps)

PSD

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-9.71	-9.71	-9.71

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
BT-LE(1Mbps)	-	-	-	-	-	-	-	-	-	-	-	-	-
2.4-2.4835GHz	Pass	2.401837G	3.24	-26.76	2.398G	-57.25	2.399992G	-45.19	2.484476G	-56.78	6.960257G	-52.82	1

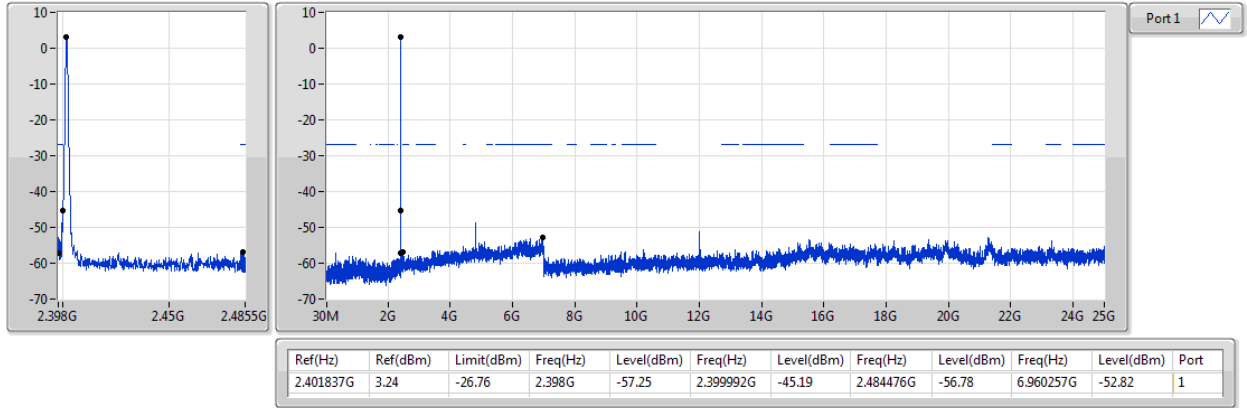
Result

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	Pass	2.401837G	3.24	-26.76	2.398G	-57.25	2.399992G	-45.19	2.484476G	-56.78	6.960257G	-52.82	1
2440MHz	Pass	2.401837G	3.24	-26.76	304.688M	-55.65	2.39824G	-57.36	2.485144G	-56.70	6.751998G	-52.36	1
2480MHz	Pass	2.401837G	3.24	-26.76	309.424M	-55.84	2.399296G	-57.91	2.483608G	-54.52	6.915228G	-52.90	1

BT-LE(1Mbps)

CSE NdB

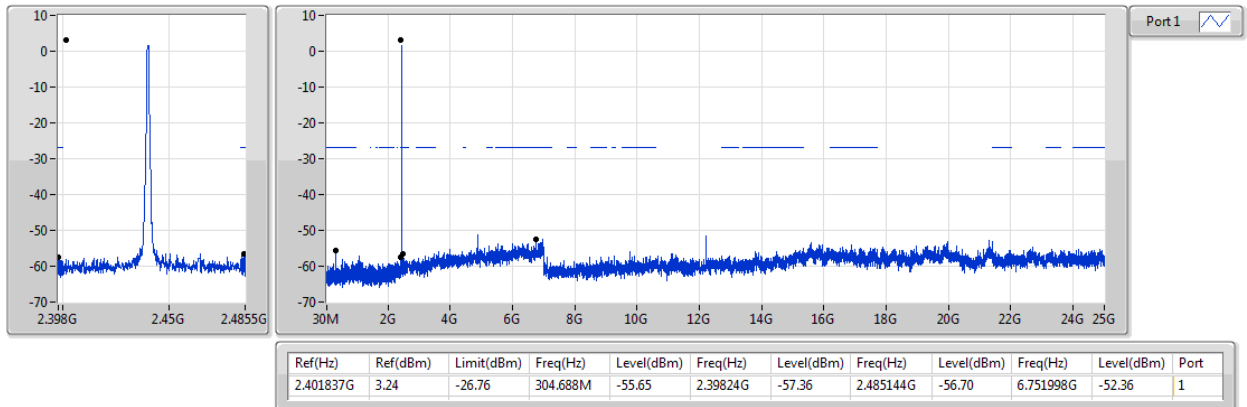
2402MHz



BT-LE(1Mbps)

CSE NdB

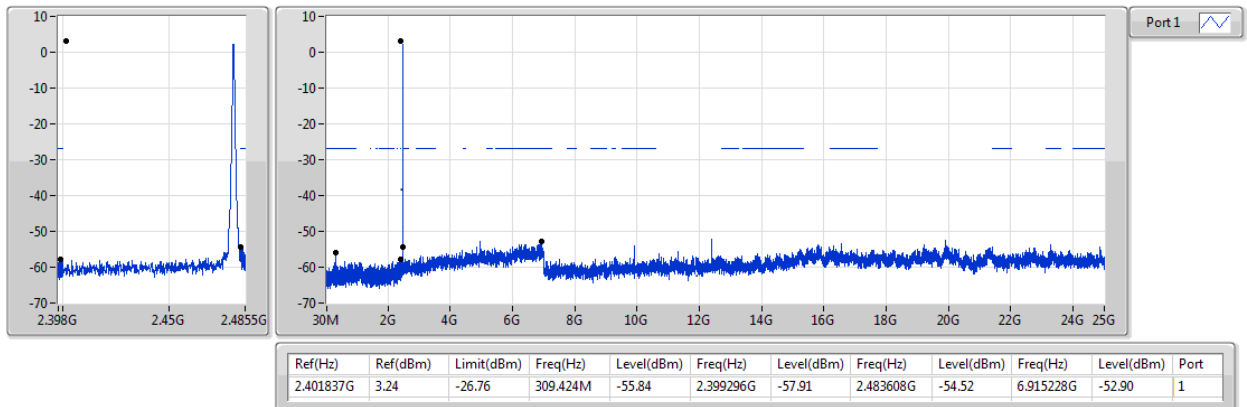
2440MHz



BT-LE(1Mbps)

CSE NdB

2480MHz





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	39.7M	25.98	40.00	-14.02	-7.95	3	Horizontal	360	1.00	-

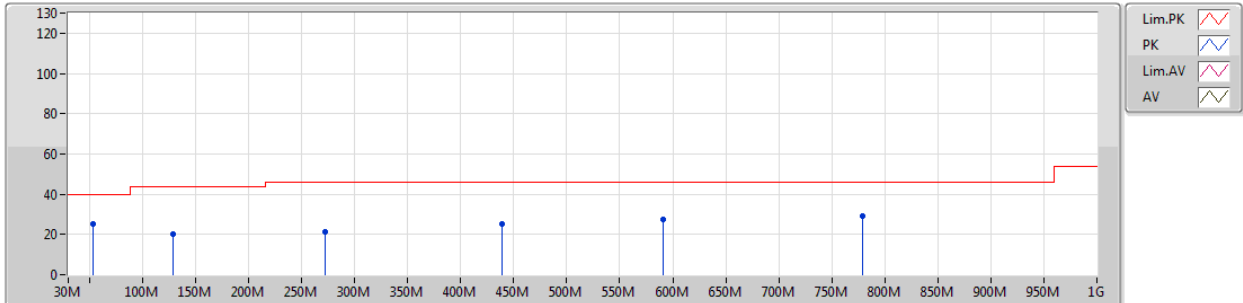
Result

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	Pass	PK	53.28M	25.45	40.00	-14.55	-13.22	3	Vertical	0	1.00	-
2440MHz	Pass	PK	128.94M	20.31	43.50	-23.19	-7.88	3	Vertical	0	1.00	-
2440MHz	Pass	PK	272.5M	21.54	46.00	-24.46	-6.25	3	Vertical	0	1.00	-
2440MHz	Pass	PK	439.34M	25.06	46.00	-20.94	-2.51	3	Vertical	0	1.00	-
2440MHz	Pass	PK	590.66M	27.65	46.00	-18.35	-0.56	3	Vertical	0	1.00	-
2440MHz	Pass	PK	778.84M	29.18	46.00	-16.82	1.56	3	Vertical	0	1.00	-
2440MHz	Pass	PK	39.7M	25.98	40.00	-14.02	-7.95	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	123.12M	20.68	43.50	-22.82	-7.91	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	206.54M	26.83	43.50	-16.67	-10.13	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	433.52M	26.76	46.00	-19.24	-2.64	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	610.06M	28.63	46.00	-17.37	-0.44	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	747.8M	29.55	46.00	-16.45	1.22	3	Horizontal	360	1.00	-

BT-LE(1Mbps)

2440MHz_DC Power Supply

12/06/2017

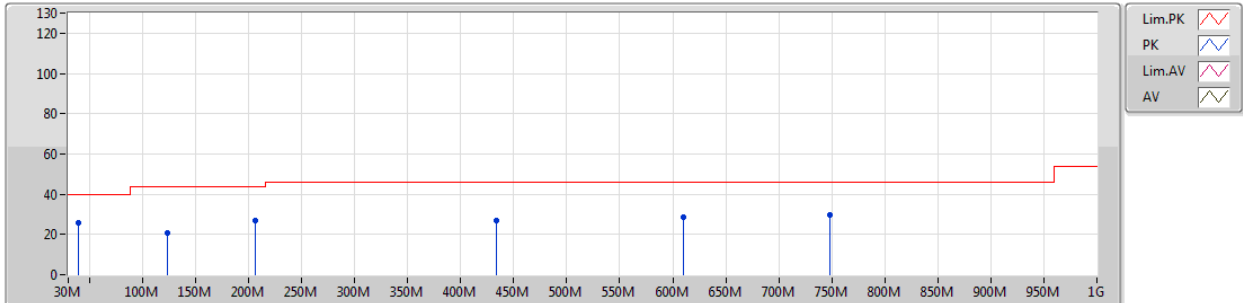


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	53.28M	25.45	40.00	-14.55	-13.22	3	Vertical	0	1.00	-
PK	128.94M	20.31	43.50	-23.19	-7.88	3	Vertical	0	1.00	-
PK	272.5M	21.54	46.00	-24.46	-6.25	3	Vertical	0	1.00	-
PK	439.34M	25.06	46.00	-20.94	-2.51	3	Vertical	0	1.00	-
PK	590.66M	27.65	46.00	-18.35	-0.56	3	Vertical	0	1.00	-
PK	778.84M	29.18	46.00	-16.82	1.56	3	Vertical	0	1.00	-

BT-LE(1Mbps)

2440MHz_DC Power Supply

12/06/2017



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	39.7M	25.98	40.00	-14.02	-7.95	3	Horizontal	360	1.00	-
PK	123.12M	20.68	43.50	-22.82	-7.91	3	Horizontal	360	1.00	-
PK	206.54M	26.83	43.50	-16.67	-10.13	3	Horizontal	360	1.00	-
PK	433.52M	26.76	46.00	-19.24	-2.64	3	Horizontal	360	1.00	-
PK	610.06M	28.63	46.00	-17.37	-0.44	3	Horizontal	360	1.00	-
PK	747.8M	29.55	46.00	-16.45	1.22	3	Horizontal	360	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	2.4838G	48.25	54.00	-5.75	31.78	3	Horizontal	320	1.17	-

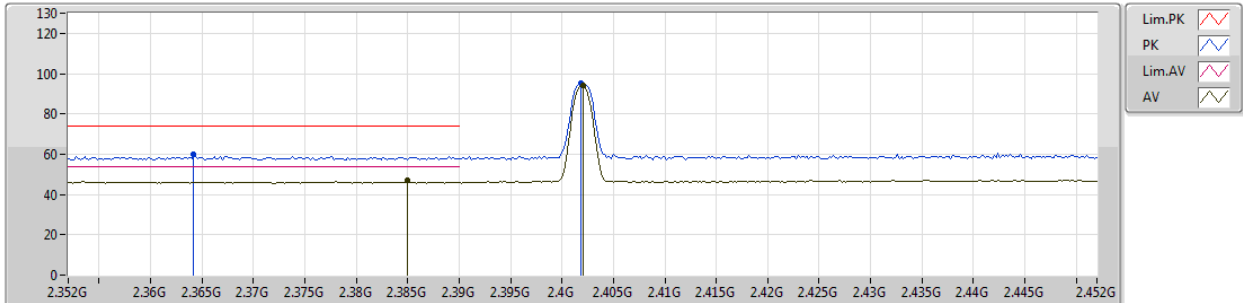
Result

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	Pass	AV	2.385G	47.22	54.00	-6.78	31.43	3	Vertical	176	1.36	-
2402MHz	Pass	AV	2.402G	94.37	Inf	-Inf	31.49	3	Vertical	176	1.36	-
2402MHz	Pass	PK	2.3642G	59.78	74.00	-14.22	31.35	3	Vertical	176	1.36	-
2402MHz	Pass	PK	2.4018G	95.23	Inf	-Inf	31.49	3	Vertical	176	1.36	-
2402MHz	Pass	AV	2.359G	46.97	54.00	-7.03	31.34	3	Horizontal	320	1.31	-
2402MHz	Pass	AV	2.402G	102.90	Inf	-Inf	31.49	3	Horizontal	320	1.31	-
2402MHz	Pass	PK	2.3608G	59.36	74.00	-14.64	31.34	3	Horizontal	320	1.31	-
2402MHz	Pass	PK	2.4022G	103.69	Inf	-Inf	31.49	3	Horizontal	320	1.31	-
2402MHz	Pass	AV	4.804G	37.43	54.00	-16.57	6.43	3	Vertical	322	2.24	-
2402MHz	Pass	PK	4.804G	48.43	74.00	-25.57	6.43	3	Vertical	322	2.24	-
2402MHz	Pass	AV	4.804G	46.43	54.00	-7.57	6.43	3	Horizontal	302	1.00	-
2402MHz	Pass	PK	4.804G	53.43	74.00	-20.57	6.43	3	Horizontal	302	1.00	-
2440MHz	Pass	AV	2.3496G	47.09	54.00	-6.91	31.30	3	Vertical	175	1.50	-
2440MHz	Pass	AV	2.44G	94.45	Inf	-Inf	31.62	3	Vertical	175	1.50	-
2440MHz	Pass	AV	2.5G	47.91	54.00	-6.09	31.84	3	Vertical	175	1.50	-
2440MHz	Pass	PK	2.364G	59.43	74.00	-14.57	31.35	3	Vertical	175	1.50	-
2440MHz	Pass	PK	2.4396G	95.35	Inf	-Inf	31.62	3	Vertical	175	1.50	-
2440MHz	Pass	PK	2.4948G	60.19	74.00	-13.81	31.82	3	Vertical	175	1.50	-
2440MHz	Pass	AV	2.3508G	47.00	54.00	-7.00	31.31	3	Horizontal	320	1.05	-
2440MHz	Pass	AV	2.44G	102.90	Inf	-Inf	31.62	3	Horizontal	320	1.05	-
2440MHz	Pass	AV	2.484G	47.98	54.00	-6.02	31.78	3	Horizontal	320	1.05	-
2440MHz	Pass	PK	2.3716G	59.32	74.00	-14.68	31.38	3	Horizontal	320	1.05	-
2440MHz	Pass	PK	2.4396G	103.78	Inf	-Inf	31.62	3	Horizontal	320	1.05	-
2440MHz	Pass	PK	2.498G	60.53	74.00	-13.47	31.83	3	Horizontal	320	1.05	-
2440MHz	Pass	AV	4.88G	37.62	54.00	-16.38	6.62	3	Vertical	54	1.97	-
2440MHz	Pass	PK	4.88G	48.62	74.00	-25.38	6.62	3	Vertical	54	1.97	-
2440MHz	Pass	AV	4.88G	45.62	54.00	-8.38	6.62	3	Horizontal	303	1.01	-
2440MHz	Pass	PK	4.88G	52.62	74.00	-21.38	6.62	3	Horizontal	303	1.01	-
2480MHz	Pass	AV	2.48G	98.11	Inf	-Inf	31.77	3	Vertical	283	3.69	-
2480MHz	Pass	AV	2.4902G	48.20	54.00	-5.80	31.80	3	Vertical	283	3.69	-
2480MHz	Pass	PK	2.4802G	98.93	Inf	-Inf	31.77	3	Vertical	283	3.69	-
2480MHz	Pass	PK	2.4968G	60.33	74.00	-13.67	31.83	3	Vertical	283	3.69	-
2480MHz	Pass	AV	2.48G	103.28	Inf	-Inf	31.77	3	Horizontal	320	1.17	-
2480MHz	Pass	AV	2.4838G	48.25	54.00	-5.75	31.78	3	Horizontal	320	1.17	-
2480MHz	Pass	PK	2.4798G	104.12	Inf	-Inf	31.77	3	Horizontal	320	1.17	-
2480MHz	Pass	PK	2.4908G	60.82	74.00	-13.18	31.81	3	Horizontal	320	1.17	-
2480MHz	Pass	AV	4.96G	37.45	54.00	-16.55	6.82	3	Vertical	145	1.47	-
2480MHz	Pass	PK	4.96G	49.49	74.00	-24.51	6.82	3	Vertical	145	1.47	-
2480MHz	Pass	AV	4.96G	39.23	54.00	-14.77	6.82	3	Horizontal	307	1.02	-
2480MHz	Pass	PK	4.96G	50.29	74.00	-23.71	6.82	3	Horizontal	307	1.02	-

BT-LE(1Mbps)

2402MHz_TX

12/06/2017

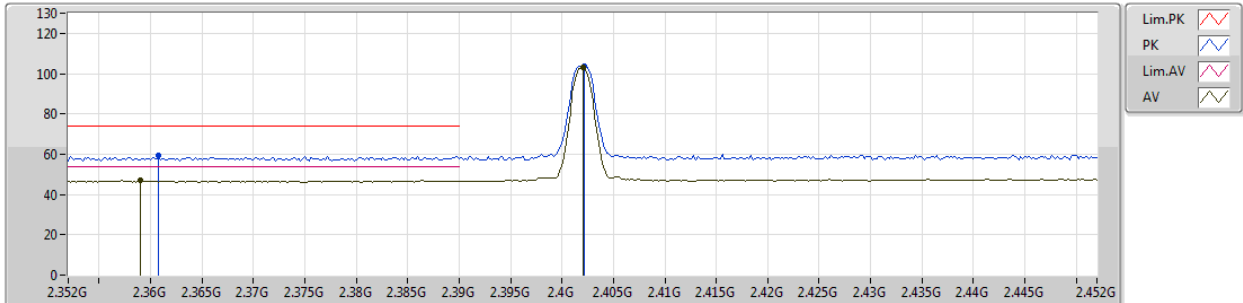


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.385G	47.22	54.00	-6.78	31.43	3	Vertical	176	1.36	-
AV	2.402G	94.37	Inf	-Inf	31.49	3	Vertical	176	1.36	-
PK	2.3642G	59.78	74.00	-14.22	31.35	3	Vertical	176	1.36	-
PK	2.4018G	95.23	Inf	-Inf	31.49	3	Vertical	176	1.36	-

BT-LE(1Mbps)

2402MHz_TX

12/06/2017

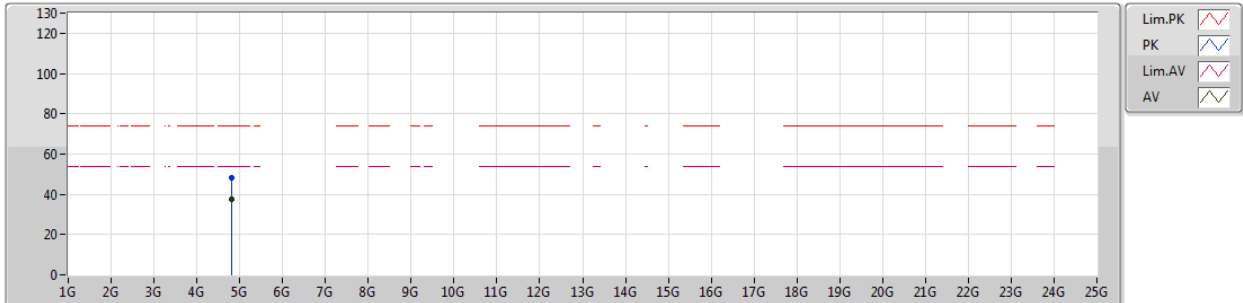


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.359G	46.97	54.00	-7.03	31.34	3	Horizontal	320	1.31	-
AV	2.402G	102.90	Inf	-Inf	31.49	3	Horizontal	320	1.31	-
PK	2.3608G	59.36	74.00	-14.64	31.34	3	Horizontal	320	1.31	-
PK	2.4022G	103.69	Inf	-Inf	31.49	3	Horizontal	320	1.31	-

BT-LE(1Mbps)

2402MHz_TX

12/06/2017

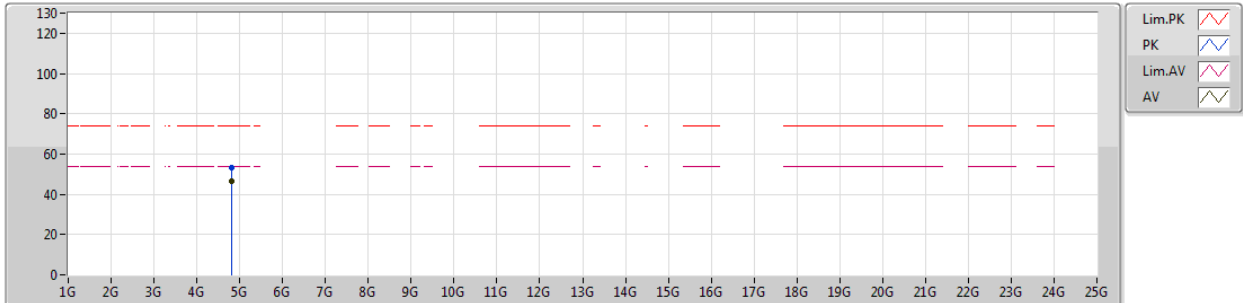


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments							
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)								
AV	4.804G	37.43	54.00	-16.57	6.43	3	Vertical	322	2.24	-							
PK	4.804G	48.43	74.00	-25.57	6.43	3	Vertical	322	2.24	-							

BT-LE(1Mbps)

2402MHz_TX

12/06/2017

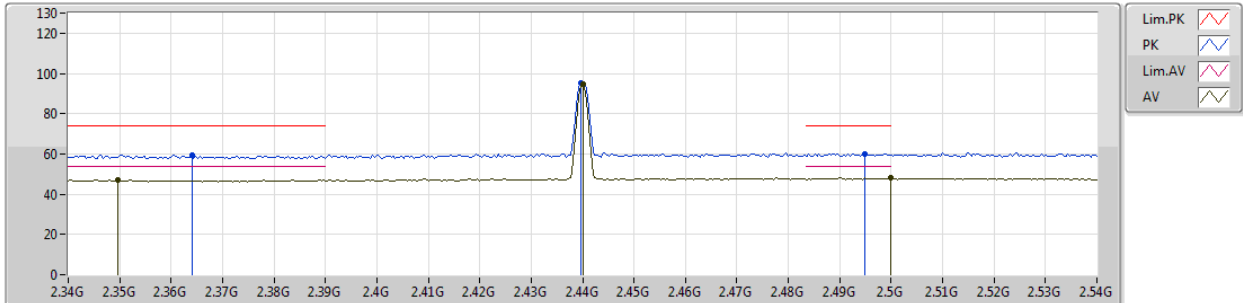


Type	Freq	Level	Limit	Margin	Factor	Dist	Condition	Azimuth	Height	Comments							
	(Hz)	(dBuV/m)	(dBuV/m)	(dB)	(dB)	(m)		(°)	(m)								
AV	4.804G	46.43	54.00	-7.57	6.43	3	Horizontal	302	1.00	-							
PK	4.804G	53.43	74.00	-20.57	6.43	3	Horizontal	302	1.00	-							

BT-LE(1Mbps)

2440MHz_TX

12/06/2017

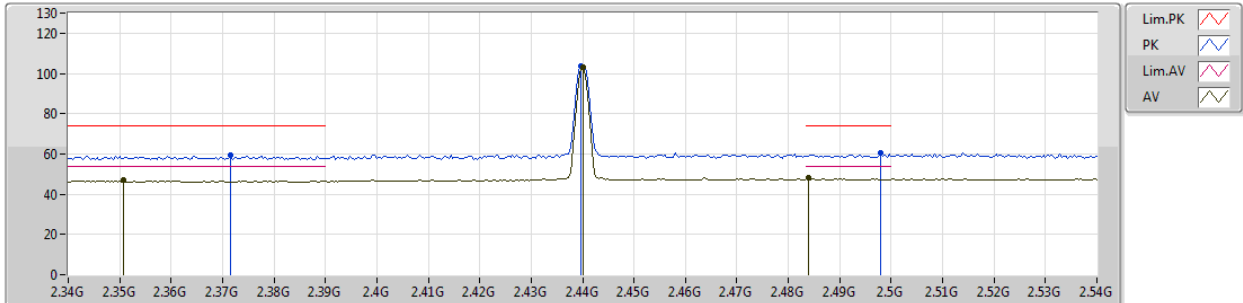


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3496G	47.09	54.00	-6.91	31.30	3	Vertical	175	1.50	-
AV	2.44G	94.45	Inf	-Inf	31.62	3	Vertical	175	1.50	-
AV	2.5G	47.91	54.00	-6.09	31.84	3	Vertical	175	1.50	-
PK	2.364G	59.43	74.00	-14.57	31.35	3	Vertical	175	1.50	-
PK	2.4396G	95.35	Inf	-Inf	31.62	3	Vertical	175	1.50	-
PK	2.4948G	60.19	74.00	-13.81	31.82	3	Vertical	175	1.50	-

BT-LE(1Mbps)

2440MHz_TX

12/06/2017

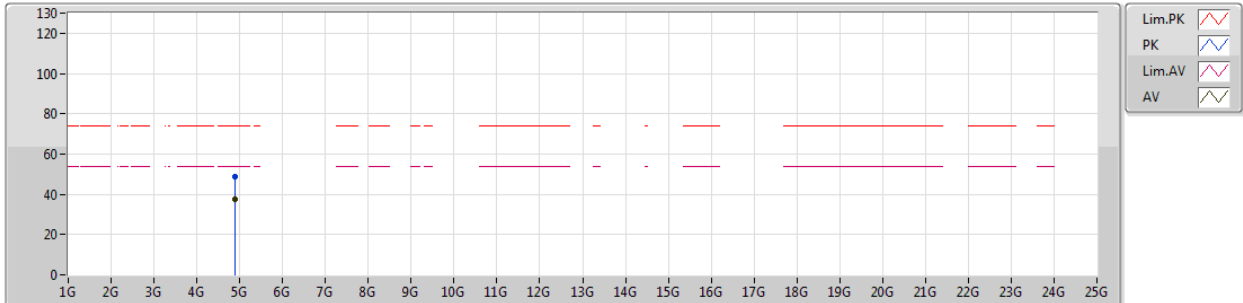


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.3508G	47.00	54.00	-7.00	31.31	3	Horizontal	320	1.05	-
AV	2.44G	102.90	Inf	-Inf	31.62	3	Horizontal	320	1.05	-
AV	2.484G	47.98	54.00	-6.02	31.78	3	Horizontal	320	1.05	-
PK	2.3716G	59.32	74.00	-14.68	31.38	3	Horizontal	320	1.05	-
PK	2.4396G	103.78	Inf	-Inf	31.62	3	Horizontal	320	1.05	-
PK	2.498G	60.53	74.00	-13.47	31.83	3	Horizontal	320	1.05	-

BT-LE(1Mbps)

2440MHz_TX

12/06/2017

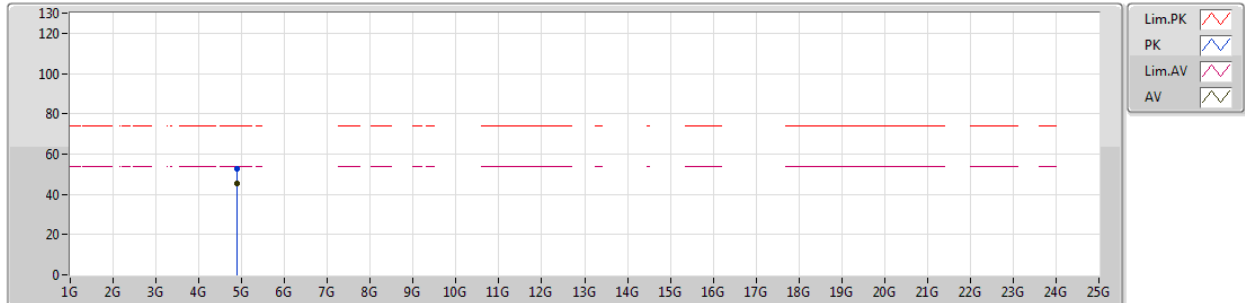


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.88G	37.62	54.00	-16.38	6.62	3	Vertical	54	1.97	-
PK	4.88G	48.62	74.00	-25.38	6.62	3	Vertical	54	1.97	-

BT-LE(1Mbps)

2440MHz_TX

12/06/2017

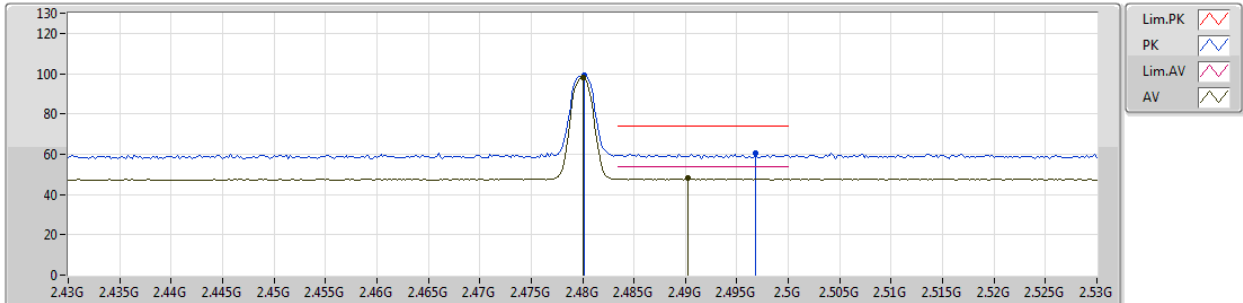


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments							
AV	4.88G	45.62	54.00	-8.38	6.62	3	Horizontal	303	1.01	-							
PK	4.88G	52.62	74.00	-21.38	6.62	3	Horizontal	303	1.01	-							

BT-LE(1Mbps)

2480MHz_TX

07/06/2017

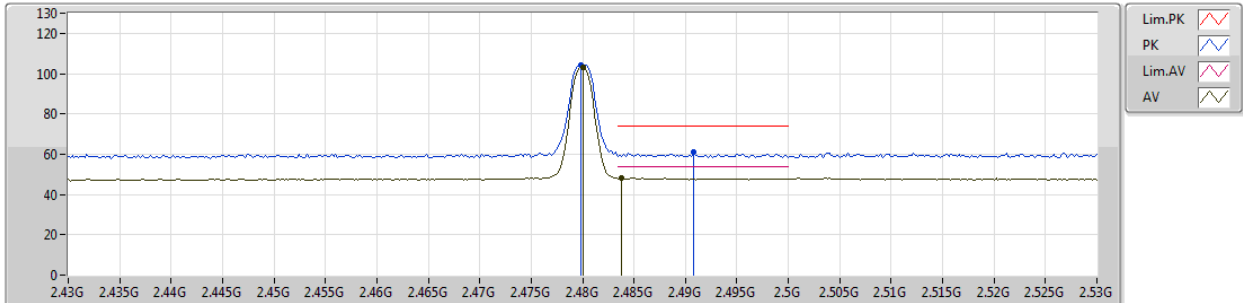


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.48G	98.11	Inf	-Inf	31.77	3	Vertical	283	3.69	-
AV	2.4902G	48.20	54.00	-5.80	31.80	3	Vertical	283	3.69	-
PK	2.4802G	98.93	Inf	-Inf	31.77	3	Vertical	283	3.69	-
PK	2.4968G	60.33	74.00	-13.67	31.83	3	Vertical	283	3.69	-

BT-LE(1Mbps)

2480MHz_TX

07/06/2017

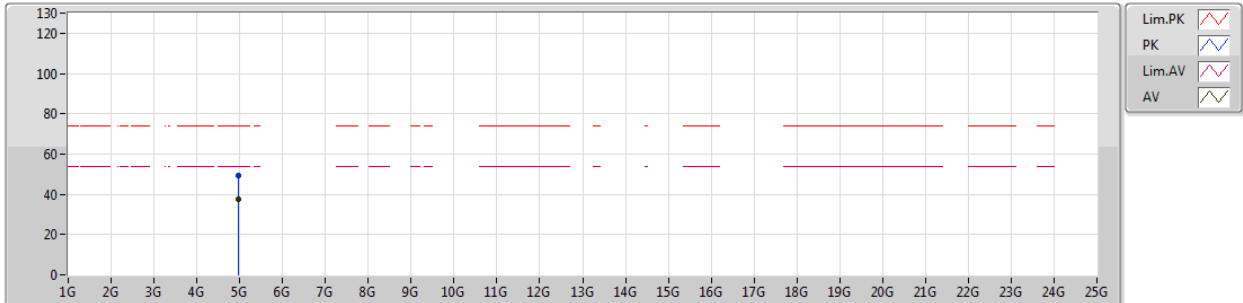


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	2.48G	103.28	Inf	-Inf	31.77	3	Horizontal	320	1.17	-
AV	2.4838G	48.25	54.00	-5.75	31.78	3	Horizontal	320	1.17	-
PK	2.4798G	104.12	Inf	-Inf	31.77	3	Horizontal	320	1.17	-
PK	2.4908G	60.82	74.00	-13.18	31.81	3	Horizontal	320	1.17	-

BT-LE(1Mbps)

2480MHz_TX

07/06/2017

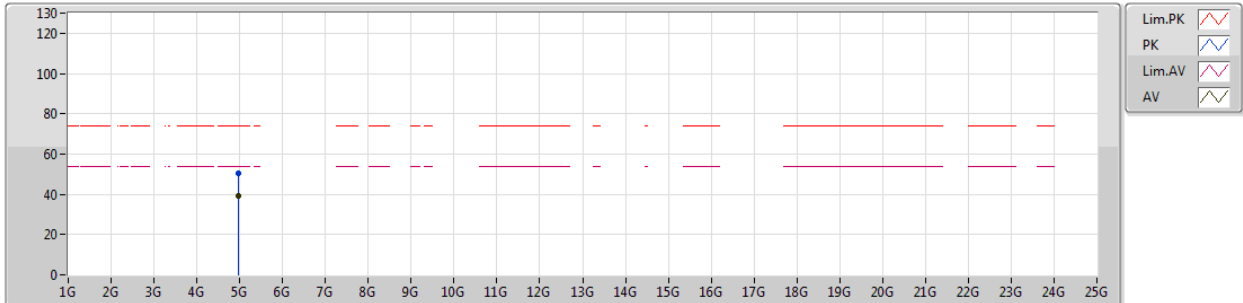


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.96G	37.45	54.00	-16.55	6.82	3	Vertical	145	1.47	-
PK	4.96G	49.49	74.00	-24.51	6.82	3	Vertical	145	1.47	-

BT-LE(1Mbps)

2480MHz_TX

07/06/2017



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	4.96G	39.23	54.00	-14.77	6.82	3	Horizontal	307	1.02	-
PK	4.96G	50.29	74.00	-23.71	6.82	3	Horizontal	307	1.02	-



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	PK	41.64M	34.10	40.00	-5.90	-19.06	3	Vertical	360	1.00	-

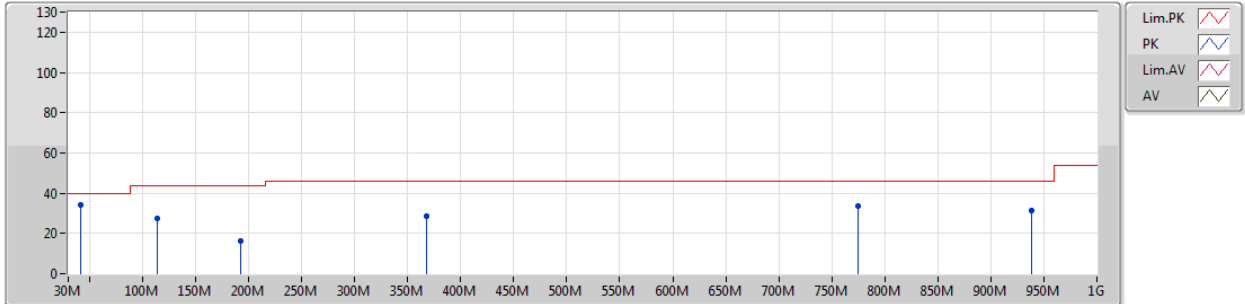
Result

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	Pass	PK	41.64M	34.10	40.00	-5.90	-19.06	3	Vertical	360	1.00	-
2440MHz	Pass	PK	113.42M	27.72	43.50	-15.78	-19.52	3	Vertical	360	1.00	-
2440MHz	Pass	PK	192.96M	16.33	43.50	-27.17	-21.21	3	Vertical	360	1.00	-
2440MHz	Pass	PK	367.56M	28.43	46.00	-17.57	-14.92	3	Vertical	360	1.00	-
2440MHz	Pass	PK	774.96M	33.82	46.00	-12.18	-7.72	3	Vertical	360	1.00	-
2440MHz	Pass	PK	937.92M	31.15	46.00	-14.85	-5.01	3	Vertical	360	1.00	-
2440MHz	Pass	PK	55.22M	14.13	40.00	-25.87	-25.00	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	113.42M	16.02	43.50	-27.48	-19.52	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	192.96M	16.57	43.50	-26.93	-21.21	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	251.16M	17.47	46.00	-28.53	-16.94	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	555.74M	24.10	46.00	-21.90	-10.25	3	Horizontal	0	1.00	-
2440MHz	Pass	PK	885.54M	31.74	46.00	-14.26	-6.62	3	Horizontal	0	1.00	-

BT-LE(1Mbps)RX

2440MHz_DC Power Supply

25/03/2019

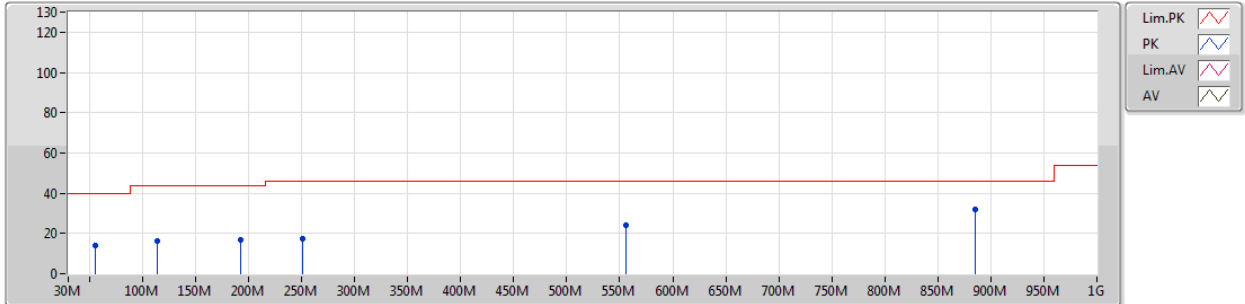


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	41.64M	34.10	40.00	-5.90	-19.06	3	Vertical	360	1.00	-
PK	113.42M	27.72	43.50	-15.78	-19.52	3	Vertical	360	1.00	-
PK	192.96M	16.33	43.50	-27.17	-21.21	3	Vertical	360	1.00	-
PK	367.56M	28.43	46.00	-17.57	-14.92	3	Vertical	360	1.00	-
PK	774.96M	33.82	46.00	-12.18	-7.72	3	Vertical	360	1.00	-
PK	937.92M	31.15	46.00	-14.85	-5.01	3	Vertical	360	1.00	-

BT-LE(1Mbps)RX

2440MHz_DC Power Supply

25/03/2019



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
PK	55.22M	14.13	40.00	-25.87	-25.00	3	Horizontal	0	1.00	-
PK	113.42M	16.02	43.50	-27.48	-19.52	3	Horizontal	0	1.00	-
PK	192.96M	16.57	43.50	-26.93	-21.21	3	Horizontal	0	1.00	-
PK	251.16M	17.47	46.00	-28.53	-16.94	3	Horizontal	0	1.00	-
PK	555.74M	24.10	46.00	-21.90	-10.25	3	Horizontal	0	1.00	-
PK	885.54M	31.74	46.00	-14.26	-6.62	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	5.87379G	44.19	54.00	-9.81	5.25	3	Horizontal	360	1.00	-

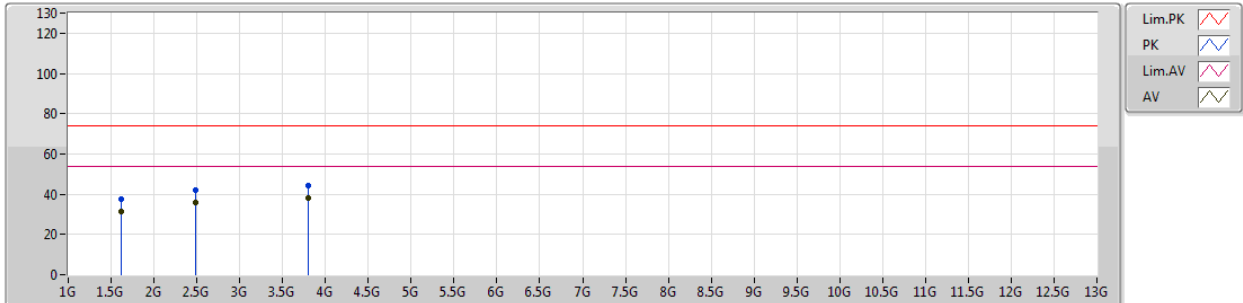
Result

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	Pass	AV	1.61434G	31.43	54.00	-22.57	-5.91	3	Vertical	0	1.00	-
2440MHz	Pass	AV	2.48595G	35.83	54.00	-18.17	-2.93	3	Vertical	0	1.00	-
2440MHz	Pass	AV	3.79579G	38.32	54.00	-15.68	0.45	3	Vertical	0	1.00	-
2440MHz	Pass	PK	1.616G	37.72	74.00	-36.28	-5.91	3	Vertical	0	1.00	-
2440MHz	Pass	PK	2.484G	41.96	74.00	-32.04	-2.93	3	Vertical	0	1.00	-
2440MHz	Pass	PK	3.798G	44.48	74.00	-29.52	0.46	3	Vertical	0	1.00	-
2440MHz	Pass	AV	1.84289G	31.10	54.00	-22.90	-5.29	3	Horizontal	360	1.00	-
2440MHz	Pass	AV	2.75766G	36.84	54.00	-17.16	-2.06	3	Horizontal	360	1.00	-
2440MHz	Pass	AV	5.87379G	44.19	54.00	-9.81	5.25	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	1.844G	41.11	74.00	-32.89	-5.29	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	2.756G	46.51	74.00	-27.49	-2.07	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	5.874G	53.73	74.00	-20.27	5.25	3	Horizontal	360	1.00	-

BT-LE(1Mbps)RX

25/03/2019

2440MHz_RX

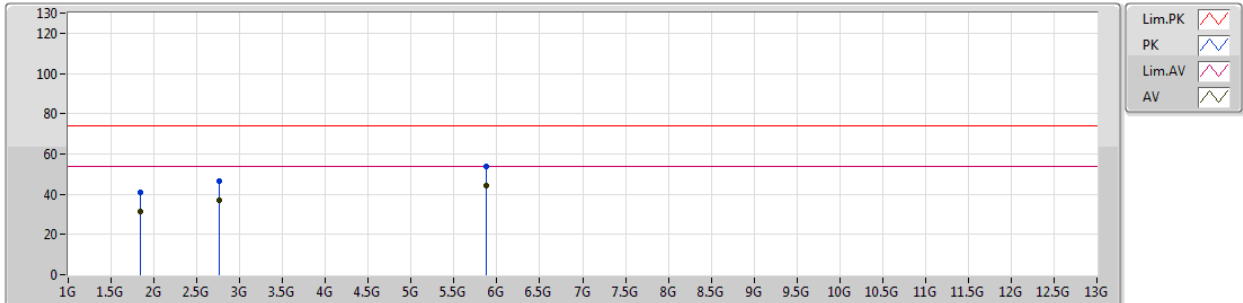


Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	1.61434G	31.43	54.00	-22.57	-5.91	3	Vertical	0	1.00	-
AV	2.48595G	35.83	54.00	-18.17	-2.93	3	Vertical	0	1.00	-
AV	3.79579G	38.32	54.00	-15.68	0.45	3	Vertical	0	1.00	-
PK	1.616G	37.72	74.00	-36.28	-5.91	3	Vertical	0	1.00	-
PK	2.484G	41.96	74.00	-32.04	-2.93	3	Vertical	0	1.00	-
PK	3.798G	44.48	74.00	-29.52	0.46	3	Vertical	0	1.00	-

BT-LE(1Mbps)RX

2440MHz_RX

25/03/2019



Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
AV	1.84289G	31.10	54.00	-22.90	-5.29	3	Horizontal	360	1.00	-
AV	2.75766G	36.84	54.00	-17.16	-2.06	3	Horizontal	360	1.00	-
AV	5.87379G	44.19	54.00	-9.81	5.25	3	Horizontal	360	1.00	-
PK	1.844G	41.11	74.00	-32.89	-5.29	3	Horizontal	360	1.00	-
PK	2.756G	46.51	74.00	-27.49	-2.07	3	Horizontal	360	1.00	-
PK	5.874G	53.73	74.00	-20.27	5.25	3	Horizontal	360	1.00	-