FCC Test Report

Equipment	:	**Internet of Things Gateway**
Brand Name	:	**DELL**
Model No.	:	**N03G**
FCC ID	:	**E2K-N03G**
Standard	:	**47 CFR FCC Part 15.247**
Operating Band	:	**2400 MHz – 2483.5 MHz**
Function	:	**☒ Point-to-multipoint; ☐ Point-to-point**
Applicant / Manufacturer	:	**Dell Inc. One Dell Way, Round Rock, Texas 78682, USA**

The product sample received on Jan. 26, 2017 and completely tested on Mar. 22, 2017. 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.

Phoenix Chen
SPORTON INTERNATIONAL INC.

Testing Laboratory
1190

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Summary of Test Result

Conformance Test Specifications				
Report Clause	**Ref. Std. Clause**	**Description**	**Limit**	**Result**
1.1.2	15.203	Antenna Requirement	FCC 15.203	Complied
3.1	15.207	AC Power-line Conducted Emissions	FCC 15.207	Complied
3.2	15.247(a)	DTS Bandwidth	≥500kHz	Complied
3.3	15.247(b)	Maximum Conducted Output Power	Power [dBm]:30	Complied
3.4	15.247(e)	Power Spectral Density	PSD [dBm/3kHz]:8	Complied
3.5	15.247(d)	Emissions in Non-restricted Frequency Bands	Non-Restricted Bands: > 20 dBc	Complied
3.6	15.247(d)	Emissions in Restricted Frequency Bands	Restricted Bands: FCC 15.209	Complied

Revision History

Report No.	Version	Description	Issued Date
FR712529AZ	Rev. 01	Initial issue of report	May 11, 2017

1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std.	Ch. Frequency (MHz)	Channel Number
2.4-2.4835GHz	802.15.4	2405-2480	11-26 [16]

Band	Mode	BWch (MHz)	Nant
2.4-2.4835GHz	Zigbee	5	1TX

Note:.
- Zigbee uses a O-QPSK (250kbps) 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	2	taoglas	GW.15.1113	Monopole	SMA	0.1

1.1.3 EUT Information

Identify EUT		
SW / HW	N/A	
Operational Condition		
EUT Power Type	From AC Adapter	
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
Zigbee	1	0	0	10

1.2 Testing Applied Standards

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

- 47 CFR FCC Part 15
- ANSI C63.10-2013
- KDB 558074 D01 v03r05

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. 553509 with FCC.			
☐	JHUBEI	ADD : No.8, Ln. 724, Bo'ai St., Zhubei City, Hsinchu County, Taiwan (R.O.C.) TEL : 886-3-656-9065 FAX : 886-3-656-9085	
Test site Designation No. TW0006 with FCC.			

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
RF Conducted	TH01-HY	Gary	21.5°C / 62%	06/Mar/2017
Radiated	03CH02-HY	Jeff	22.2°C / 51.8%	18/Mar/2017
AC Conduction	CO04-HY	Bear	20°C / 67%	22/Mar/2017

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

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

2.2 Test Channel Mode

Test Software	Dos

Mode	Power Setting
Zigbee	-
2405MHz	8
2440MHz	8
2480MHz	0

2.3 The Worst Case Measurement Configuration

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

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

The Worst Case Mode for Following Conformance Tests			
Tests Item	Emissions in Restricted Frequency Bands		
Test Condition	Radiated measurement If EUT consist of multiple antenna assembly (multiple antenna are used in EUT regardless of spatial multiplexing MIMO configuration), the radiated test should be performed with highest antenna gain of each antenna type.		
Operating Mode < 1GHz	CTX		
1	Adapter mode		
Orthogonal Planes of EUT	**X Plane**	**Y Plane**	**Z Plane**
			
Worst Planes of EUT			V

The Worst Case Mode for Following Conformance Tests	
Tests Item	Simultaneous Transmission Analysis
Operating Mode	CTX
1	Zigbee+BT
2	Zigbee+WiFi
Refer to Sporton Test Report No.: FA712529 for Co-location RF Exposure Evaluation.	

2.4 Accessories

Accessories				
AC Adapter 1 (US Plug)	Brand Name	DELL	Model Name	DA65NM130
	Manufacturer	DELTA		
	Power Rating	I/P: 100- 240 Vac, 1.7 A, O/P: 19.5 Vdc, 3.34 A		
	Power Cord	0.9 meter, non-shielded cable, w/o ferrite core 1.8 meter, non-shielded cable, w/o ferrite core(DC output cable) 0.12 meter, non-shielded cable, w/o ferrite core(DC to DC cable)		

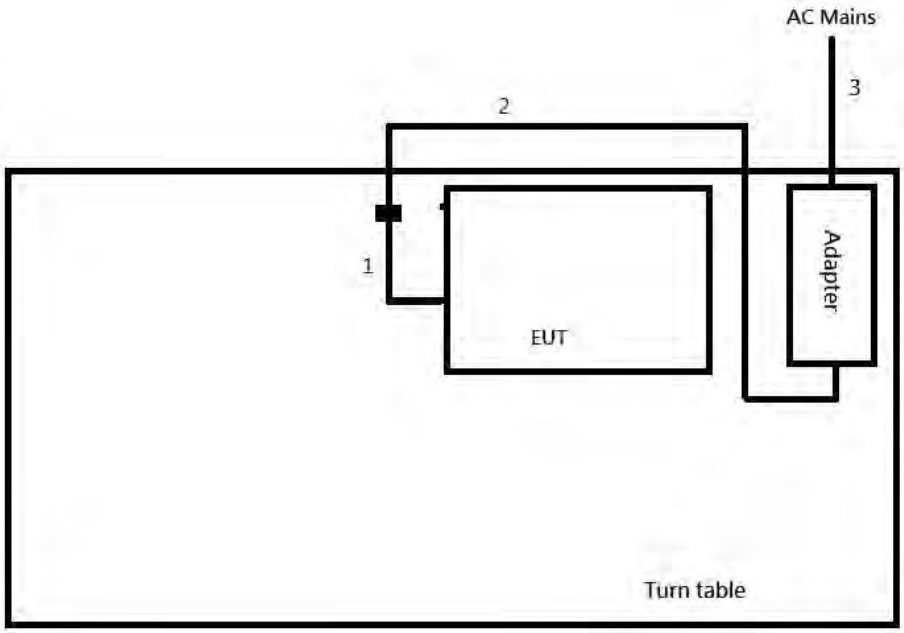
Reminder: Regarding to more detail and other information, please refer to user manual.

2.5 Support Equipment

Support Equipment – RF Conducted				
No.	**Equipment**	**Brand Name**	**Model Name**	**FCC ID**
1	Notebook	DELL	E5410	R33002 / DOC
2	Adapter for NB	DELL	HA65NM130	R35737 / DOC

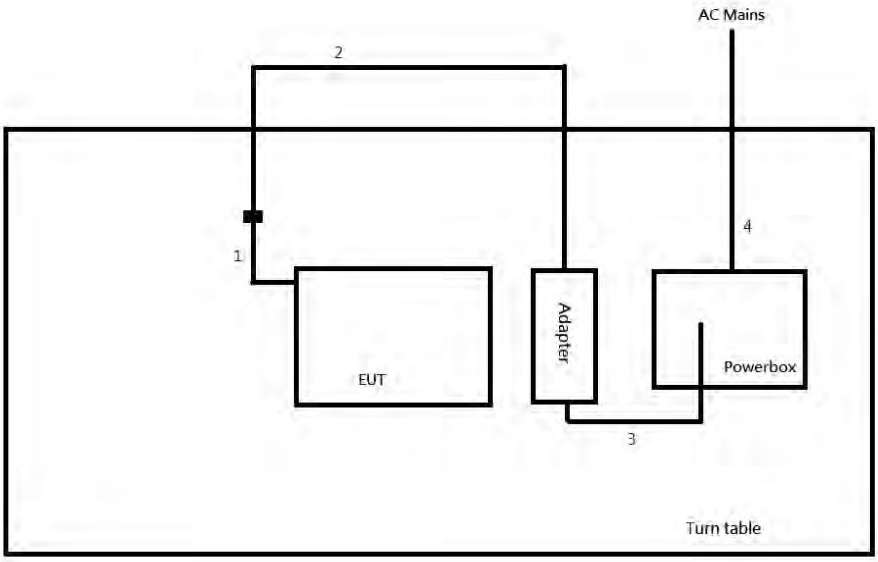
2.6 Test Setup Diagram

Test Setup Diagram – AC Line Conducted Emission Test



Item	Connection	Shielded	Length(m)	Remark
1	DC to DC cable	No	0.12m	-
2	DC output cable	No	1.8m	-
3	AC power cable	No	0.9m	-

Test Setup Diagram - Radiated Test



Item	Connection	Shielded	Length(m)	Remark
1	DC to DC cable	No	0.12m	-
2	DC output cable	No	1.8m	-
3	AC power cable	No	0.9m	-
4	AC power cable	No	1.8m	-

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

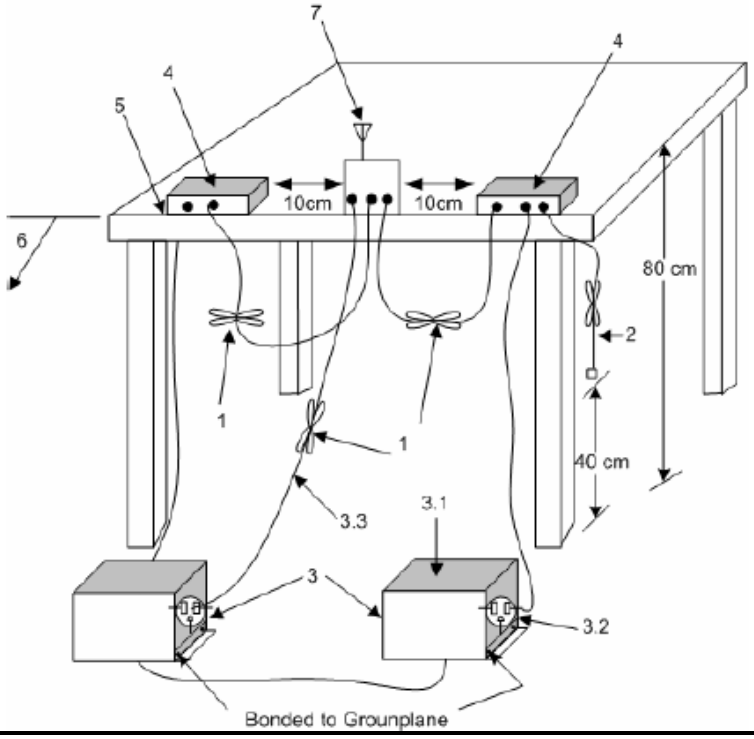
Refer a test equipment and calibration data table in this test report.

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

AC Power-line Conducted Emissions



3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

3.2 DTS Bandwidth

3.2.1 6dB Bandwidth Limit

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

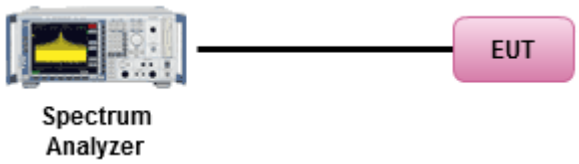
3.2.2 Measuring Instruments

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

3.2.3 Test Procedures

Test Method	
▪ For the emission bandwidth shall be measured using one of the options below:	
	☒ Refer as KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.
	☐ Refer as KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.
	☐ Refer as ANSI C63.10, clause 6.9.3 for occupied bandwidth testing.

3.2.4 Test Setup

Emission Bandwidth


3.2.5 Test Result of Emission Bandwidth

Refer as Appendix B

3.3 Maximum Conducted Output Power

3.3.1 Maximum Conducted Output Power Limit

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

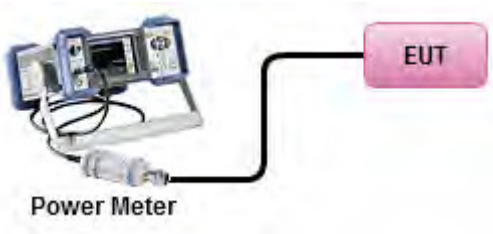
3.3.2 Measuring Instruments

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

3.3.3 Test Procedures

Test Method	
▪ Maximum Peak Conducted Output Power	
	☐ Refer as KDB 558074, clause 9.1.1 Option 1 (RBW ≥ EBW method).
	☒ Refer as KDB 558074, clause 9.1.2 Option 2 (peak power meter for VBW ≥ DTS BW)
▪ Maximum Average Conducted Output Power	
	Duty cycle ≥ 98%
	☐ Refer as KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
	Duty cycle < 98%
	☐ Refer as KDB 558074, clause 9.2.2.5 Method AVGSA-2 Alt. (slow sweep speed)
	RF power meter and average over on/off periods with duty factor or gated trigger
	☒ Refer as KDB 558074, clause 9.2.3.1 Method AVGPM (using an RF average power meter).
▪ For conducted measurement.	
	▪ If the EUT supports multiple transmit chains using options given below: Refer as KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.
	▪ If multiple transmit chains, EIRP calculation could be following as methods: $P_{total} = P_1 + P_2 + \ldots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $EIRP_{total} = P_{total} + DG$

3.3.4 Test Setup

Maximum Conducted Output Power (Power Meter)


3.3.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

3.4 Power Spectral Density

3.4.1 Power Spectral Density Limit

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

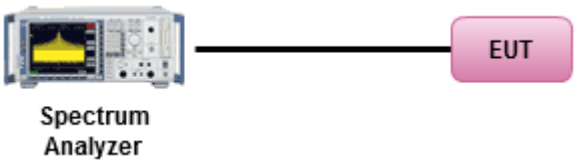
3.4.2 Measuring Instruments

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

3.4.3 Test Procedures

Test Method			
▪ Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).			
	☒ Refer as KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz; Detector=peak).		
▪ For conducted measurement.			
	▪ If The EUT supports multiple transmit chains using options given below:		
		☐	Measure and sum the spectra across the outputs. Refer as KDB 662911, In-band power spectral density (PSD). Sample all transmit ports simultaneously using a spectrum analyzer for each transmit port. Where the trace bin-by-bin of each transmit port summing can be performed. (i.e., in the first spectral bin of output 1 is summed with that in the first spectral bin of output 2 and that from the first spectral bin of output 3, and so on up to the NTX output to obtain the value for the first frequency bin of the summed spectrum.). Add up the amplitude (power) values for the different transmit chains and use this as the new data trace.

3.4.4 Test Setup

Power Spectral Density


3.4.5 Test Result of Power Spectral Density

Refer as Appendix D

3.5 Emissions in Non-restricted Frequency Bands

3.5.1 Emissions in Non-restricted Frequency Bands Limit

Un-restricted Band Emissions Limit	
RF output power procedure	**Limit (dB)**
Peak output power procedure	20
Average output power procedure	30
Note 1: If the peak output power procedure is used to measure the fundamental emission power to demonstrate compliance to requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum measured in-band peak 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.	

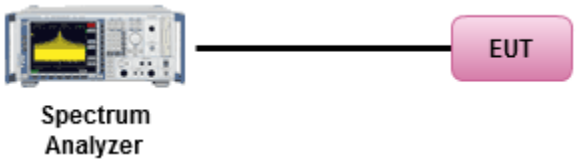
3.5.2 Measuring Instruments

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

3.5.3 Test Procedures

Test Method
▪ Refer as KDB 558074, clause 11 for unwanted emissions into non-restricted bands.

3.5.4 Test Setup

Emissions in Non-restricted Frequency Bands


3.5.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

3.6 Emissions in Restricted Frequency Bands

3.6.1 Emissions in Restricted Frequency Bands Limit

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

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

Note 2: Test distance for frequencies at below 30 MHz, measurements may be performed at a distance closer than the EUT limit distance; however, an attempt should be made to avoid making measurements in the near field. When performing measurements 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.

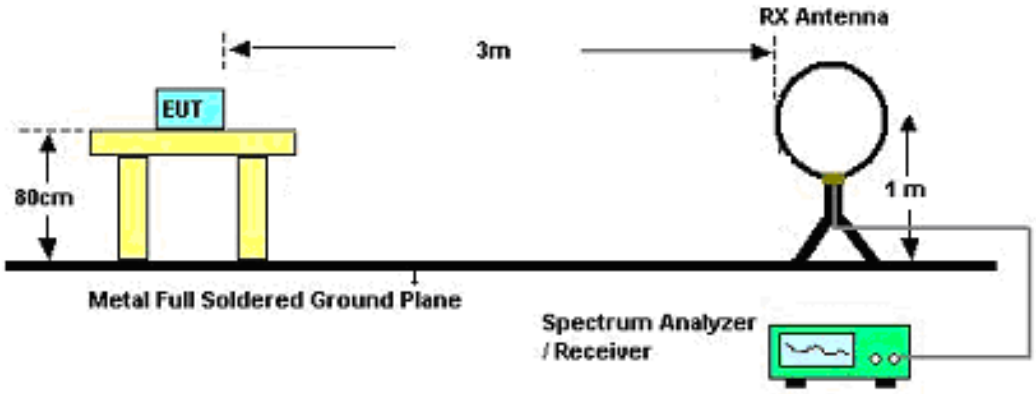
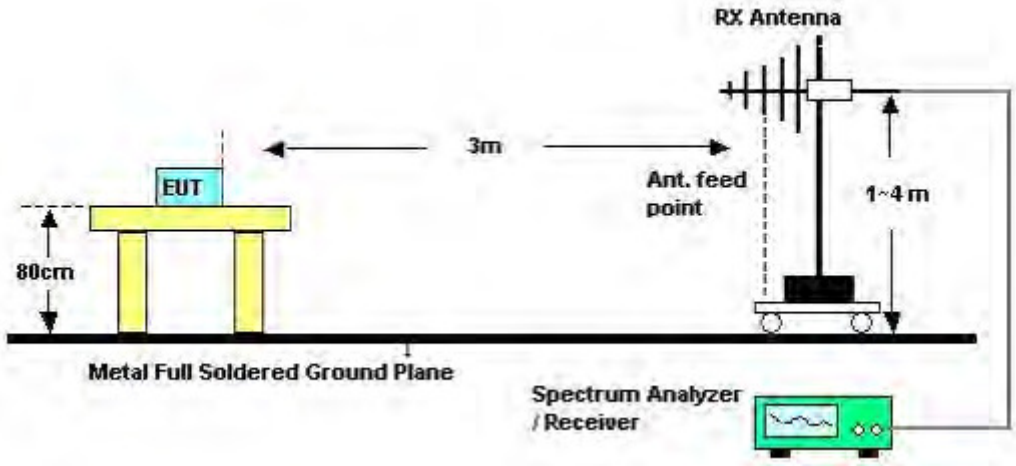
3.6.2 Measuring Instruments

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

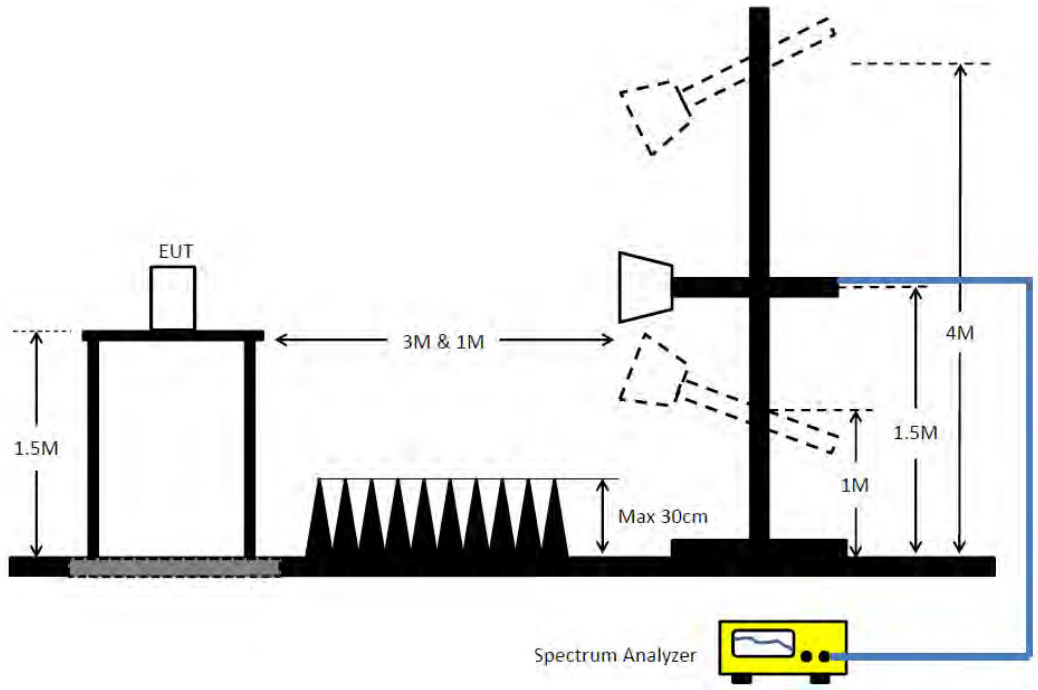
3.6.3 Test Procedures

Test Method
▪ The average emission levels shall be measured in [duty cycle ≥ 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 12 for unwanted emissions into restricted bands.
☒ Refer as KDB 558074, clause 12.2.5.3 (ANSI C63.10, clause 4.1.4.2.3), Reduced VBW≥1/T.
☒ Refer as KDB 558074, clause 12.2.4 measurement procedure peak limit.
▪ For the transmitter band-edge emissions shall be measured using following options below:
▪ Refer as KDB 558074 clause 13.1, When the performing peak or average radiated measurements, emissions within 2 MHz of the authorized band edge may be measured using the marker-delta method described below.
▪ Refer as KDB 558074, clause 13.2 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.
▪ Refer as KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).
▪ For conducted and cabinet radiation measurement, refer as KDB 558074, clause 12.2.2.
▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB
▪ For KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.

3.6.4 Test Setup

Emissions in Restricted Frequency Bands
9kHz ~30MHz

30MHz~1GHz


Above 1GHz



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

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

4 Test Equipment and Calibration Data

Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR3	102051	9KHz ~ 3.6GHz	15/Apr/2016	14/Apr/2017
LISN	R&S	ENV216	101295	9kHz ~ 30MHz	15/Nov/2016	14/Nov/2017
RF Cable-CON	HUBER+SUHNER	RG213/U	07611832020001	9kHz ~ 30MHz	24/Oct/2016	23/Oct/2017

NCR : Non-Calibration Require

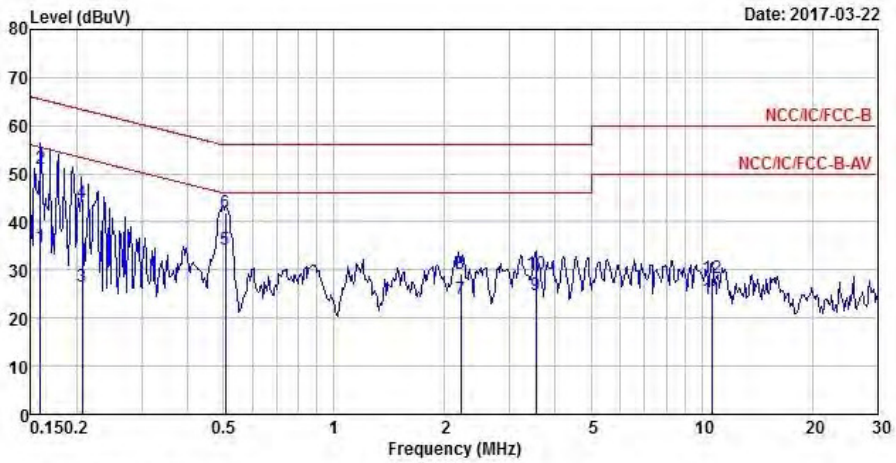
Instrument for Radiated Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSP40	100593	9KHz - 40GHz	26/Oct/2016	25/Oct/2017
3m Semi Anechoic	SIDT FRANKONIA	SAC-3M	03CH02-HY	30MHz-1GHz	03/Jun/2016	02/Jun/2017
3m Semi Anechoic	SIDT FRANKONIA	SAC-3M	03CH02-HY	1GHz ~ 18GHz	12/Dec/2016	11/Dec/2017
Amplifier	Agilent	8447D	2944A11149	100KHz-1.3GHz	01/Jul/2016	30/Jun/2017
Amplifier	Agilent	8449B	3008A02373	1GHz-26.5GHz	02/Sep/2016	01/Sep/2017
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA9120D 01543	1GHz-18GHz	22/Apr/2016	21/Apr/2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170339	15GHz-40GHz	10/Mar/2016	09/Mar/2018
Bilog Antenna	SCHAFFNER	CBL6112B	2723	30MHz-1GHz	01/Oct/2016	30/Sep/2017
Loop Antenna	TESEQ	HLA 6120	31244	9KHz-30MHz	02/Mar/2017	01/Mar/2018
RF Cable-high	SUHNER	SUCOFLEX104	MY34918/4	1GHz ~ 40GHz	26/Jan/2017	25/Jan/2018
RF Cable-R03m	Jye Bao	RG142	CB017	9kHz ~ 1GHz	26/Jan/2017	25/Jan/2018

Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101500	9kHz~40GHz	12/May/2016	11/May/ 2017
Power Sensor	Anritsu	MA2411B	0917017	300MHz ~ 40GHz	10/Feb/2017	09/Feb/2018
Power Meter	Anritsu	ML2495A	0949003	300MHz ~ 40GHz	10/Feb/2017	09/Feb/2018
Signal Generator	R&S	SMR40	100116	10MHz ~ 40GHz	21/Jul/2016	20/Jul/2017
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10709/4	30MHz ~ 26.5GHz	02/Oct/2016	01/Oct/2017
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10710/4	30MHz ~ 26.5GHz	02/Oct/2016	01/Oct/2017
RF Cable-0.5m	HUBER+SUHNER	SUCOFLEX_104	MY10713/4	30MHz ~ 26.5GHz	02/Oct/2016	01/Oct/2017

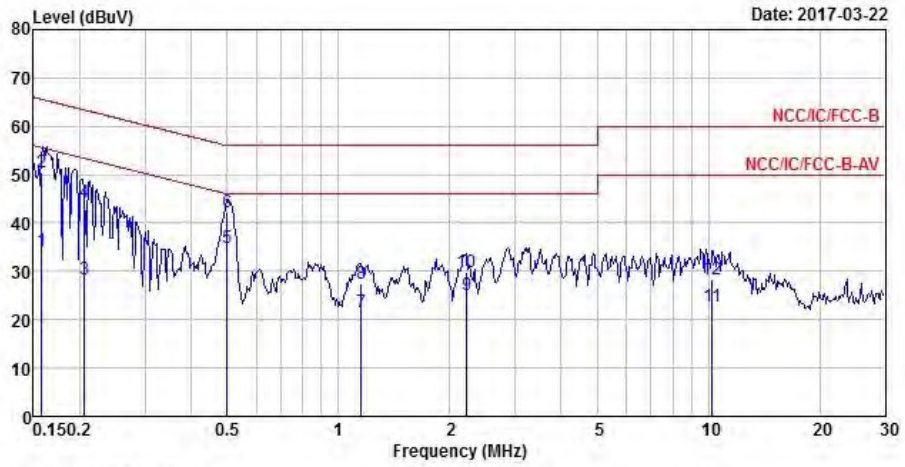
AC Power-line Conducted Emissions Result			
Operating Mode	1	**Power Phase**	Neutral
Operating Function	Adapter mode		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.16	34.76	-20.75	55.51	24.92	9.61	0.23	Average
2	0.16	51.22	-14.29	65.51	41.38	9.61	0.23	QP
3	0.21	26.66	-26.69	53.35	16.70	9.67	0.29	Average
4	0.21	43.94	-19.41	63.35	33.98	9.67	0.29	QP
5 MAX	0.51	34.19	-11.81	46.00	24.47	9.62	0.10	Average
6	0.51	41.94	-14.06	56.00	32.22	9.62	0.10	QP
7	2.21	23.97	-22.03	46.00	14.04	9.66	0.27	Average
8	2.21	29.16	-26.84	56.00	19.23	9.66	0.27	QP
9	3.55	24.74	-21.26	46.00	14.91	9.70	0.13	Average
10	3.55	29.15	-26.85	56.00	19.32	9.70	0.13	QP
11	10.64	23.86	-26.14	50.00	13.91	9.75	0.20	Average
12	10.64	28.26	-31.74	60.00	18.31	9.75	0.20	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	Adapter mode		



	Freq	Level	Over Limit	Limit Line	Read Level	LISN Factor	Cable Loss	Remark
	MHz	dBuV	dB	dBuV	dBuV	dB	dB	
1	0.16	34.24	-21.33	55.57	24.35	9.66	0.23	Average
2	0.16	50.46	-15.11	65.57	40.57	9.66	0.23	QP
3	0.21	28.38	-25.00	53.38	18.44	9.65	0.29	Average
4	0.21	44.21	-19.17	63.38	34.27	9.65	0.29	QP
5 MAX	0.50	34.87	-11.13	46.00	25.10	9.67	0.10	Average
6	0.50	42.18	-13.82	56.00	32.41	9.67	0.10	QP
7	1.15	21.53	-24.47	46.00	11.73	9.66	0.14	Average
8	1.15	27.57	-28.43	56.00	17.77	9.66	0.14	QP
9	2.23	25.00	-21.00	46.00	14.94	9.79	0.27	Average
10	2.23	29.79	-26.21	56.00	19.73	9.79	0.27	QP
11	10.25	22.83	-27.17	50.00	12.88	9.75	0.20	Average
12	10.25	28.30	-31.70	60.00	18.35	9.75	0.20	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.)

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
Zigbee	-	-	-	-	-
2.4-2.4835GHz	1.575M	2.43M	2M43G1D	1.55M	2.386M

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;

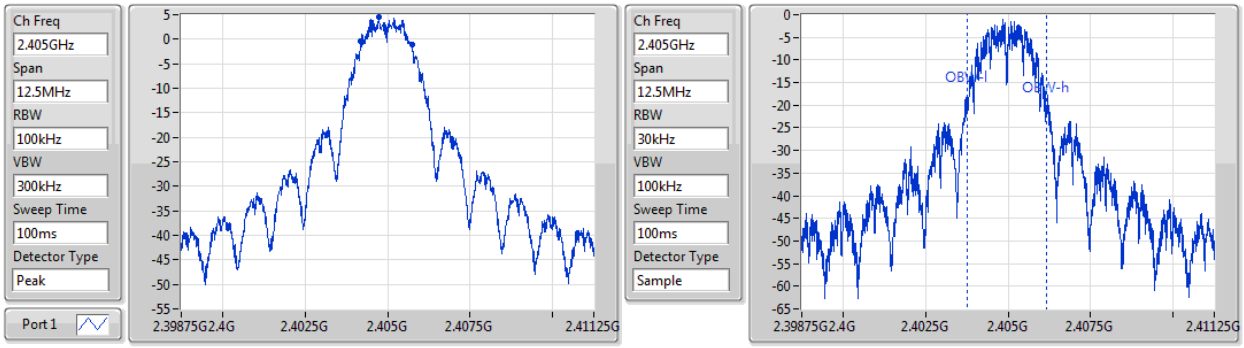
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
Zigbee	-	-	-	-
2405MHz	Pass	500k	1.55M	2.386M
2440MHz	Pass	500k	1.575M	2.405M
2480MHz	Pass	500k	1.569M	2.43M

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

Zigbee **EBW**

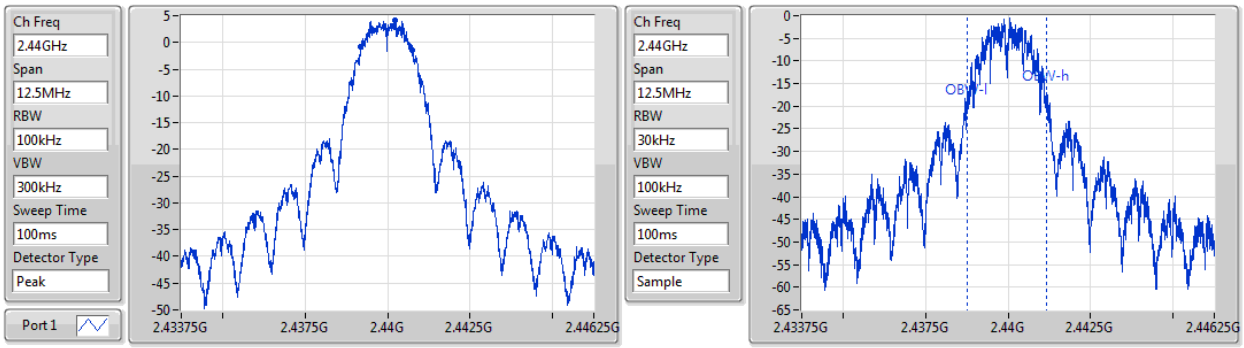
2405MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.55M	2.404194G	2.405744G	2.386M	2.403763G	2.406149G	500k	1

Zigbee **EBW**

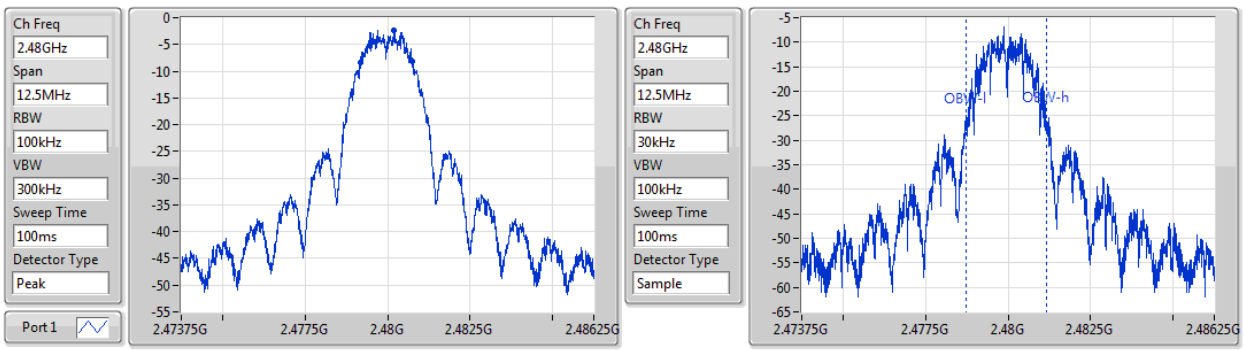
2440MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.575M	2.439181G	2.440756G	2.405M	2.438769G	2.441174G	500k	1

Zigbee **EBW**

2480MHz



6dB(Hz)	Fl-6dB(Hz)	Fh-6dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
1.569M	2.479181G	2.48075G	2.43M	2.478744G	2.481174G	500k	1

Summary

Mode	Total Power (dBm)	Total Power (W)
Zigbee	-	-
2.4-2.4835GHz	7.92	0.00619

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	0.10	7.88	7.88	30.00
2440MHz	Pass	0.10	7.92	7.92	30.00
2480MHz	Pass	0.10	2.47	2.47	30.00

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

Summary

Mode	Total Power (dBm)	Total Power (W)
Zigbee	-	-
2.4-2.4835GHz	7.88	0.00614

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	0.10	7.84	7.84	30.00
2440MHz	Pass	0.10	7.88	7.88	30.00
2480MHz	Pass	0.10	2.40	2.40	30.00

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

Summary

Mode	PD (dBm/RBW)
Zigbee	-
2.4-2.4835GHz	-8.14

RBW=3kHz.

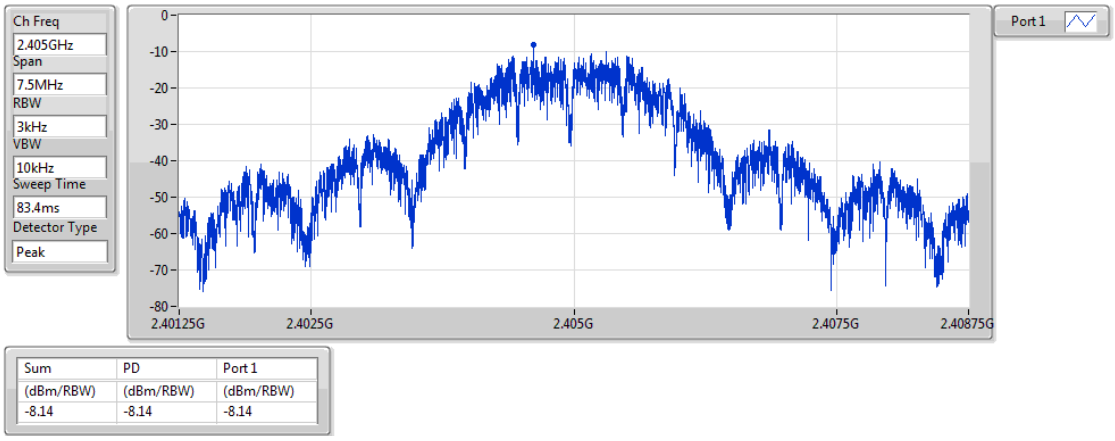
Result

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
Zigbee	-	-	-	-	-
2405MHz	Pass	0.00	-8.14	-8.14	8.00
2440MHz	Pass	0.00	-10.08	-10.08	8.00
2480MHz	Pass	0.10	-16.44	-16.44	8.00

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

Zigbee **PSD**

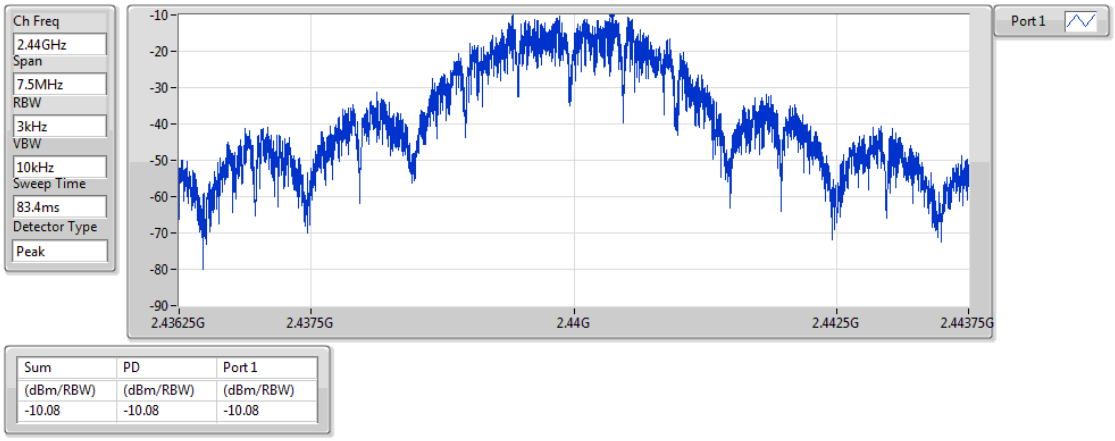
2405MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-8.14	-8.14	-8.14

Zigbee **PSD**

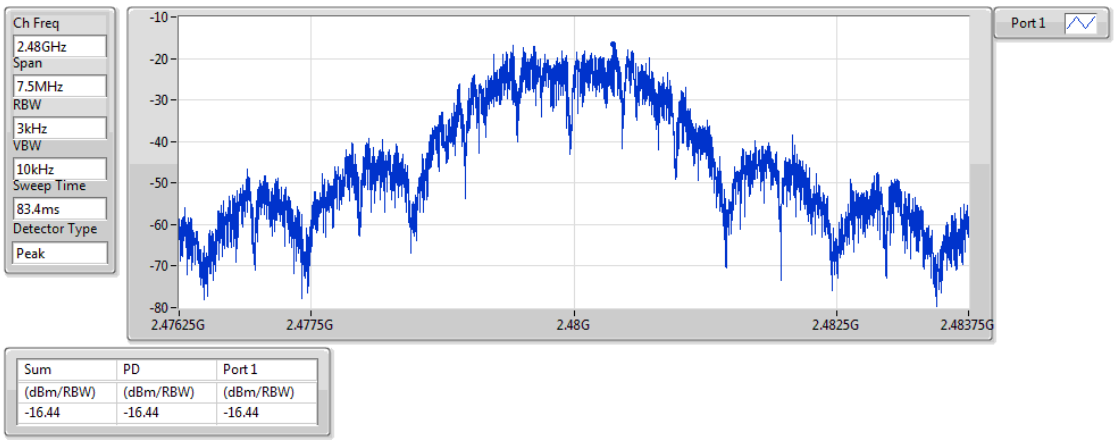
2440MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-10.08	-10.08	-10.08

Zigbee **PSD**

2480MHz



Sum	PD	Port 1
(dBm/RBW)	(dBm/RBW)	(dBm/RBW)
-16.44	-16.44	-16.44

Summary

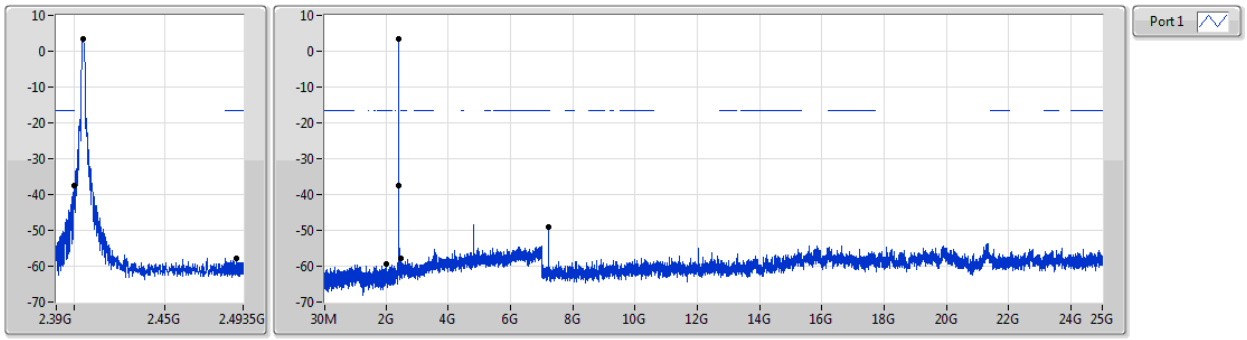
Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
Zigbee	-	-	-	-	-	-	-	-	-	-	-	-	-
2.4-2.4835GHz	Pass	2.479993G	-3.64	-23.64	694.34M	-59.02	2.39542G	-58.62	2.48392G	-38.86	6.719095G	-53.56	1

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
Zigbee	-	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	2.404676G	3.38	-16.62	1.99234G	-59.34	2.39996G	-37.38	2.49008G	-57.75	7.214238G	-49.06	1
2440MHz	Pass	2.439913G	3.79	-16.21	802.9M	-59.29	2.39504G	-57.09	2.48488G	-57.34	6.826001G	-53.66	1
2480MHz	Pass	2.479993G	-3.64	-23.64	694.34M	-59.02	2.39542G	-58.62	2.48392G	-38.86	6.719095G	-53.56	1

Zigbee **CSE NdB**

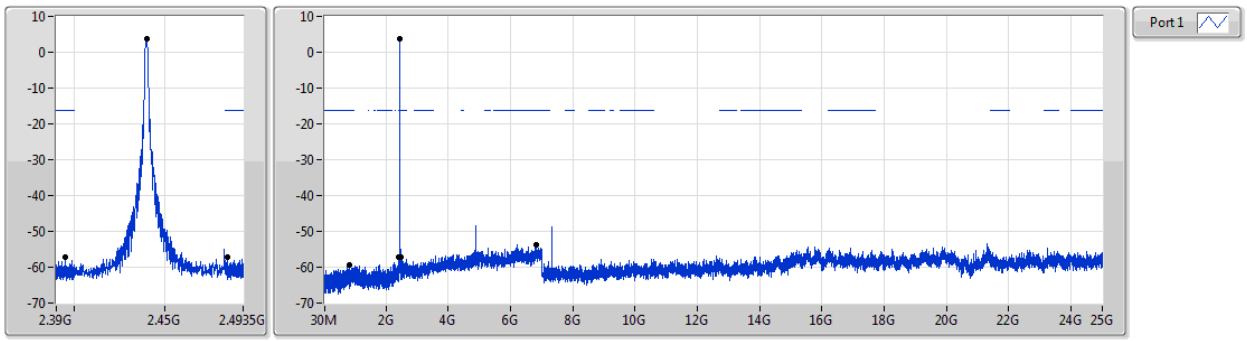
2405MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.404676G	3.38	-16.62	1.99234G	-59.34	2.39996G	-37.38	2.49008G	-57.75	7.214238G	-49.06	1

Zigbee **CSE NdB**

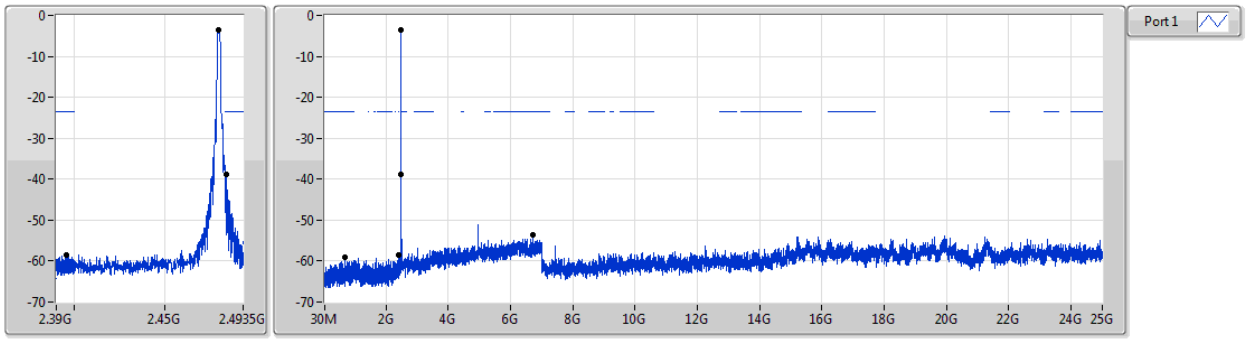
2440MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.439913G	3.79	-16.21	802.9M	-59.29	2.39504G	-57.09	2.48488G	-57.34	6.826001G	-53.66	1

Zigbee **CSE NdB**

2480MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
2.479993G	-3.64	-23.64	694.34M	-59.02	2.39542G	-58.62	2.48392G	-38.86	6.719095G	-53.56	1

Summary

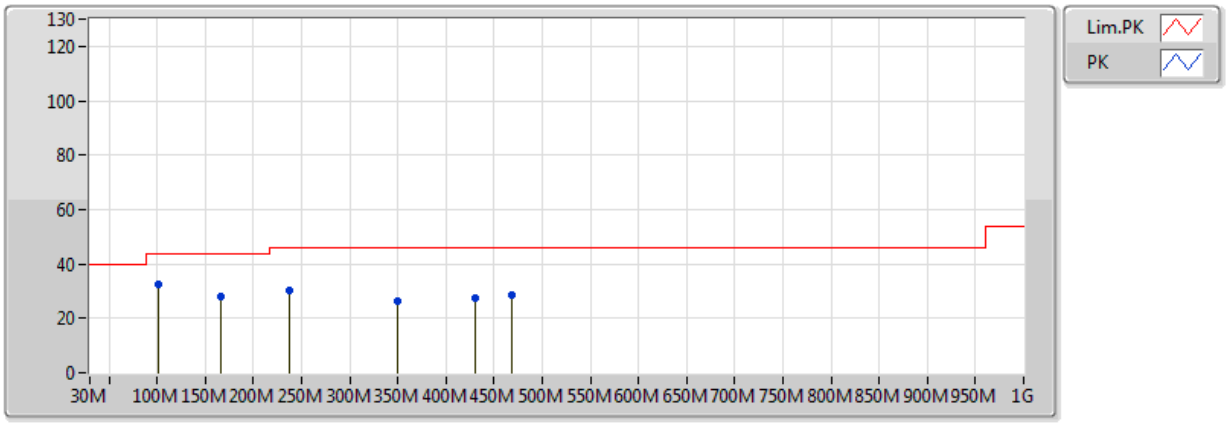
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
Zibee_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
2.4-2.4835GHz	Pass	PK	101.78M	32.55	43.50	-10.95	-10.28	3	V	360	1.00	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
Zibee_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	144.46M	26.35	43.50	-17.15	-10.06	3	H	275	1.00	-
2440MHz	Pass	PK	167.74M	30.54	43.50	-12.96	-10.70	3	H	275	1.00	-
2440MHz	Pass	PK	237.58M	33.96	46.00	-12.04	-8.84	3	H	275	1.00	-
2440MHz	Pass	PK	291.9M	28.34	46.00	-17.66	-6.60	3	H	275	1.00	-
2440MHz	Pass	PK	342.34M	31.12	46.00	-14.88	-5.69	3	H	275	1.00	-
2440MHz	Pass	PK	441.28M	27.81	46.00	-18.19	-3.20	3	H	275	1.00	-
2440MHz	Pass	PK	101.78M	32.55	43.50	-10.95	-10.28	3	V	360	1.00	-
2440MHz	Pass	PK	165.8M	27.80	43.50	-15.70	-10.64	3	V	360	1.00	-
2440MHz	Pass	PK	237.58M	30.13	46.00	-15.87	-8.84	3	V	360	1.00	-
2440MHz	Pass	PK	350.1M	26.59	46.00	-19.41	-5.39	3	V	360	1.00	-
2440MHz	Pass	PK	429.64M	27.68	46.00	-18.32	-3.42	3	V	360	1.00	-
2440MHz	Pass	PK	468.44M	28.62	46.00	-17.38	-2.85	3	V	360	1.00	-

Zibee_Nss1_1TX

2440MHz_Adapter

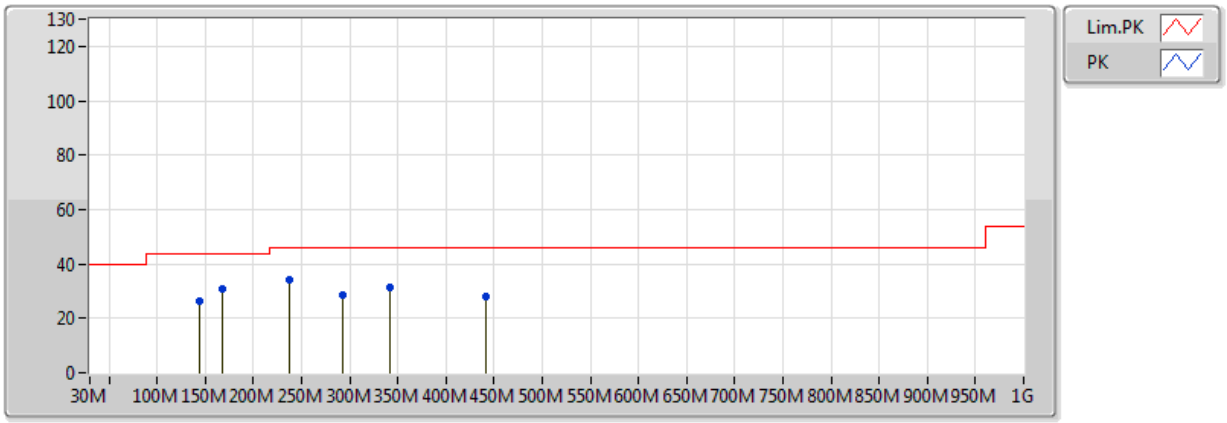


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
PK	101.78M	32.55	43.50	-10.95	-10.28	3	V	360	1.00	-
PK	165.8M	27.80	43.50	-15.70	-10.64	3	V	360	1.00	-
PK	237.58M	30.13	46.00	-15.87	-8.84	3	V	360	1.00	-
PK	350.1M	26.59	46.00	-19.41	-5.39	3	V	360	1.00	-
PK	429.64M	27.68	46.00	-18.32	-3.42	3	V	360	1.00	-
PK	468.44M	28.62	46.00	-17.38	-2.85	3	V	360	1.00	-

Zibee_Nss1_1TX

2440MHz_Adapter



EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
PK	144.46M	26.35	43.50	-17.15	-10.06	3	H	275	1.00	-
PK	167.74M	30.54	43.50	-12.96	-10.70	3	H	275	1.00	-
PK	237.58M	33.96	46.00	-12.04	-8.84	3	H	275	1.00	-
PK	291.9M	28.34	46.00	-17.66	-6.60	3	H	275	1.00	-
PK	342.34M	31.12	46.00	-14.88	-5.69	3	H	275	1.00	-
PK	441.28M	27.81	46.00	-18.19	-3.20	3	H	275	1.00	-

Summary

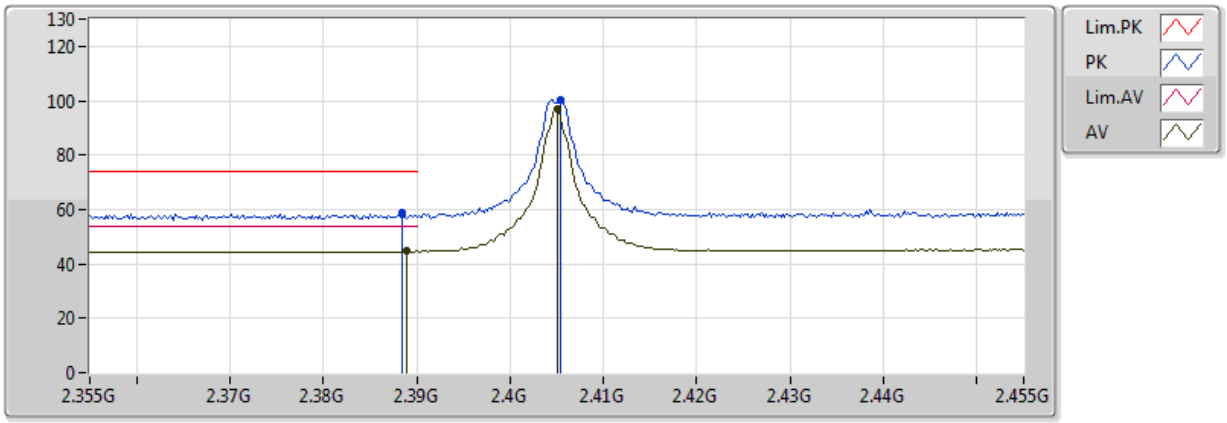
Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
Zibee_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
2.4-2.4835GHz	Pass	AV	2.483502G	53.69	54.00	-0.31	31.07	3	V	78	2.87	-

Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
Zibee_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	AV	4.81G	42.19	54.00	-11.81	2.00	3	H	123	2.28	-
2405MHz	Pass	PK	4.81G	52.26	74.00	-21.74	2.00	3	H	123	2.28	-
2405MHz	Pass	AV	2.389G	44.56	54.00	-9.44	30.75	3	V	99	3.46	-
2405MHz	Pass	AV	2.405G	96.70	Inf	-Inf	30.81	3	V	99	3.46	-
2405MHz	Pass	AV	4.81G	44.72	54.00	-9.28	2.00	3	V	188	1.19	-
2405MHz	Pass	PK	2.3884G	58.66	74.00	-15.34	30.75	3	V	99	3.46	-
2405MHz	Pass	PK	2.4054G	100.14	Inf	-Inf	30.81	3	V	99	3.46	-
2405MHz	Pass	PK	4.81G	53.81	74.00	-20.19	2.00	3	V	188	1.19	-
2440MHz	Pass	AV	2.3404G	44.43	54.00	-9.57	30.59	3	V	104	3.32	-
2440MHz	Pass	AV	2.44G	98.15	Inf	-Inf	30.93	3	V	104	3.32	-
2440MHz	Pass	AV	2.498G	45.46	54.00	-8.54	31.12	3	V	104	3.32	-
2440MHz	Pass	PK	2.3432G	58.79	74.00	-15.21	30.60	3	V	104	3.32	-
2440MHz	Pass	PK	2.4396G	101.95	Inf	-Inf	30.92	3	V	104	3.32	-
2440MHz	Pass	PK	2.4936G	58.74	74.00	-15.26	31.11	3	V	104	3.32	-
2440MHz	Pass	AV	7.32G	43.15	54.00	-10.85	7.70	3	H	132	2.32	-
2440MHz	Pass	PK	7.32G	55.15	74.00	-18.85	7.70	3	H	132	2.32	-
2440MHz	Pass	AV	7.32G	46.00	54.00	-8.00	7.70	3	V	296	1.25	-
2440MHz	Pass	PK	7.32G	57.31	74.00	-16.69	7.70	3	V	296	1.25	-
2480MHz	Pass	AV	2.48G	90.43	Inf	-Inf	31.06	3	V	78	2.87	-
2480MHz	Pass	AV	2.483502G	53.69	54.00	-0.31	31.07	3	V	78	2.87	-
2480MHz	Pass	PK	2.4794G	96.39	Inf	-Inf	31.06	3	V	78	2.87	-
2480MHz	Pass	PK	2.483502G	66.00	74.00	-8.00	31.07	3	V	78	2.87	-
2480MHz	Pass	AV	4.96G	36.98	54.00	-17.02	2.41	3	V	160	1.13	-
2480MHz	Pass	PK	4.96G	48.59	74.00	-25.41	2.41	3	V	160	1.13	-

Zibee_Nss1_1TX

2405MHz_TX

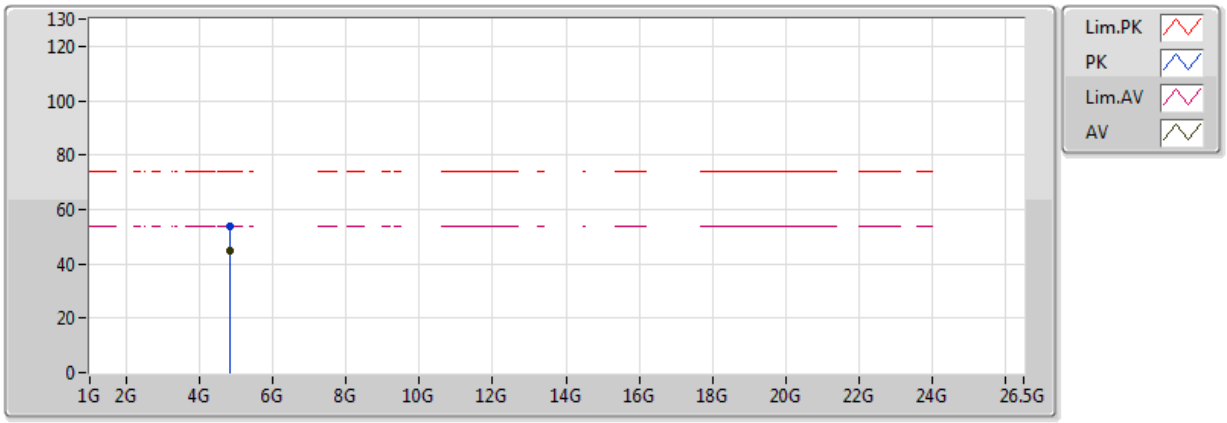


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.389G	44.56	54.00	-9.44	30.75	3	V	99	3.46	-
AV	2.405G	96.70	Inf	-Inf	30.81	3	V	99	3.46	-
PK	2.3884G	58.66	74.00	-15.34	30.75	3	V	99	3.46	-
PK	2.4054G	100.14	Inf	-Inf	30.81	3	V	99	3.46	-

Zibee_Nss1_1TX

2405MHz_TX

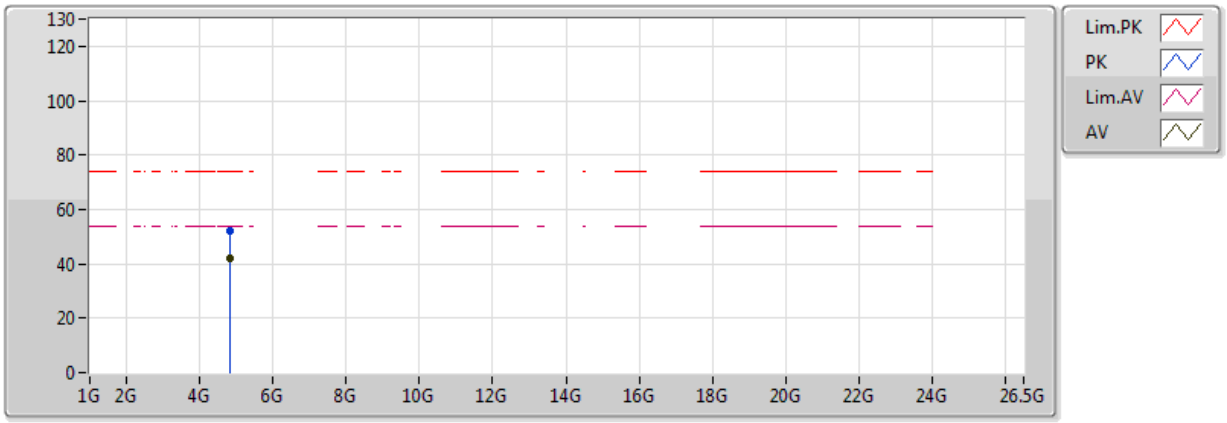


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.81G	44.72	54.00	-9.28	2.00	3	V	188	1.19	-
PK	4.81G	53.81	74.00	-20.19	2.00	3	V	188	1.19	-

Zibee_Nss1_1TX

2405MHz_TX

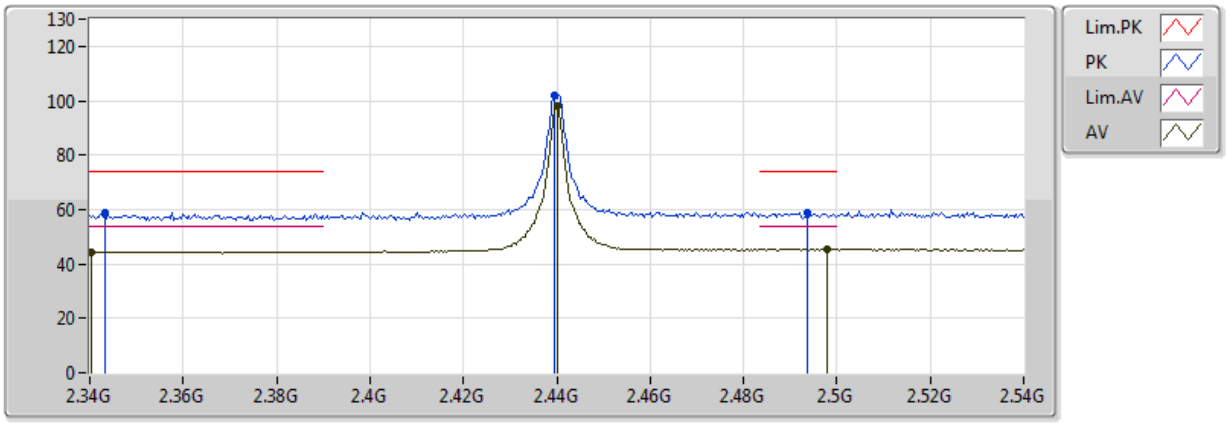


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.81G	42.19	54.00	-11.81	2.00	3	H	123	2.28	-
PK	4.81G	52.26	74.00	-21.74	2.00	3	H	123	2.28	-

Zibee_Nss1_1TX

2440MHz_TX

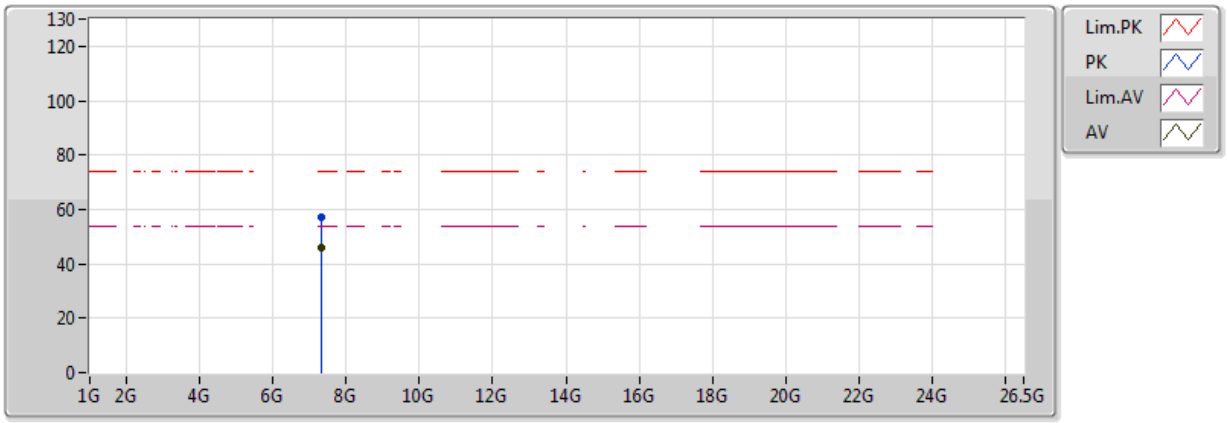


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.3404G	44.43	54.00	-9.57	30.59	3	V	104	3.32	-
AV	2.44G	98.15	Inf	-Inf	30.93	3	V	104	3.32	-
AV	2.498G	45.46	54.00	-8.54	31.12	3	V	104	3.32	-
PK	2.3432G	58.79	74.00	-15.21	30.60	3	V	104	3.32	-
PK	2.4396G	101.95	Inf	-Inf	30.92	3	V	104	3.32	-
PK	2.4936G	58.74	74.00	-15.26	31.11	3	V	104	3.32	-

Zibee_Nss1_1TX

2440MHz_TX

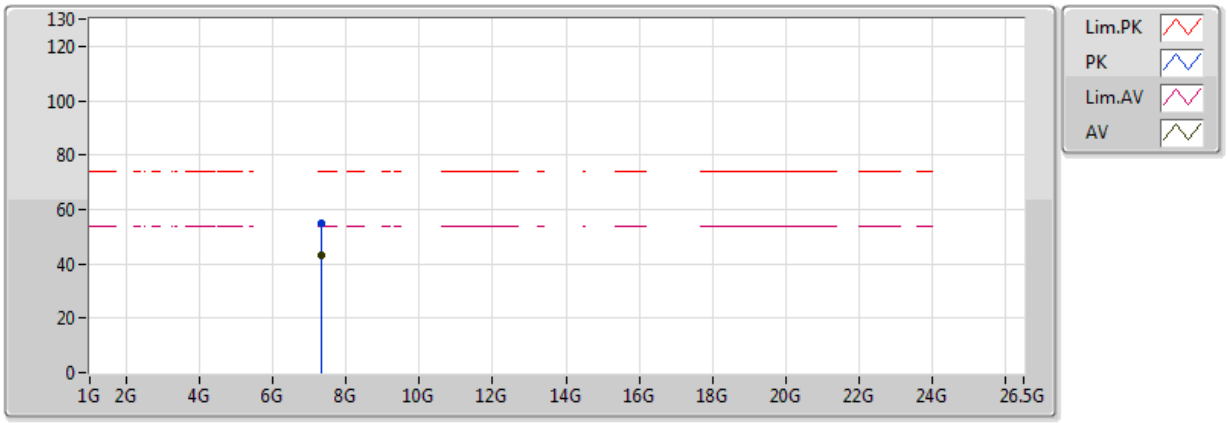


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	7.32G	46.00	54.00	-8.00	7.70	3	V	296	1.25	-
PK	7.32G	57.31	74.00	-16.69	7.70	3	V	296	1.25	-

Zibee_Nss1_1TX

2440MHz_TX

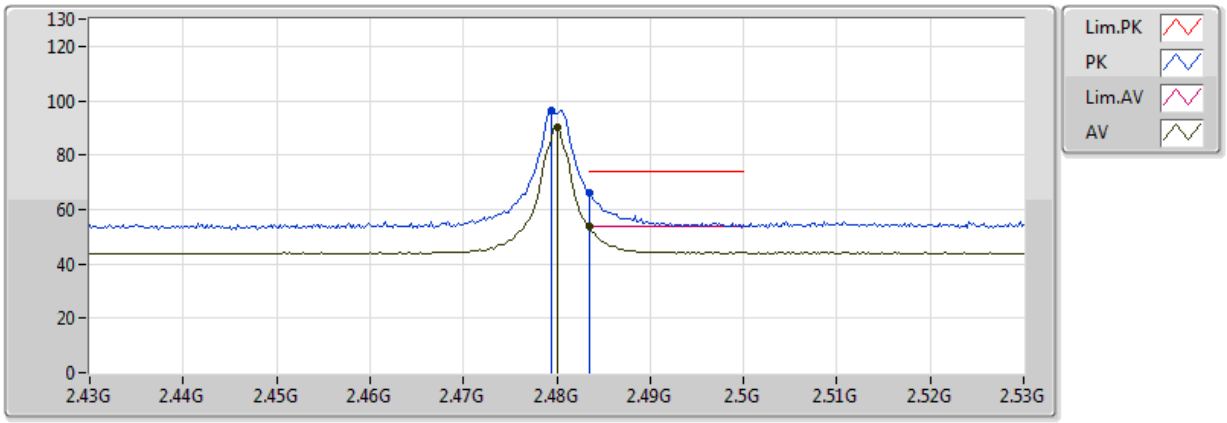


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	7.32G	43.15	54.00	-10.85	7.70	3	H	132	2.32	-
PK	7.32G	55.15	74.00	-18.85	7.70	3	H	132	2.32	-

Zibee_Nss1_1TX

2480MHz_TX

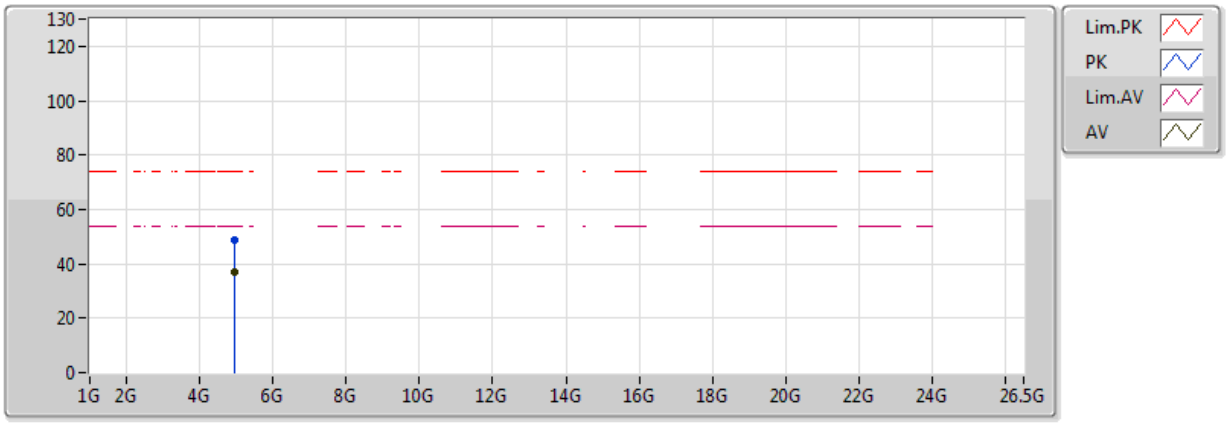


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.48G	90.43	Inf	-Inf	31.06	3	V	78	2.87	-
AV	2.483502G	53.69	54.00	-0.31	31.07	3	V	78	2.87	-
PK	2.4794G	96.39	Inf	-Inf	31.06	3	V	78	2.87	-
PK	2.483502G	66.00	74.00	-8.00	31.07	3	V	78	2.87	-

Zibee_Nss1_1TX

2480MHz_TX

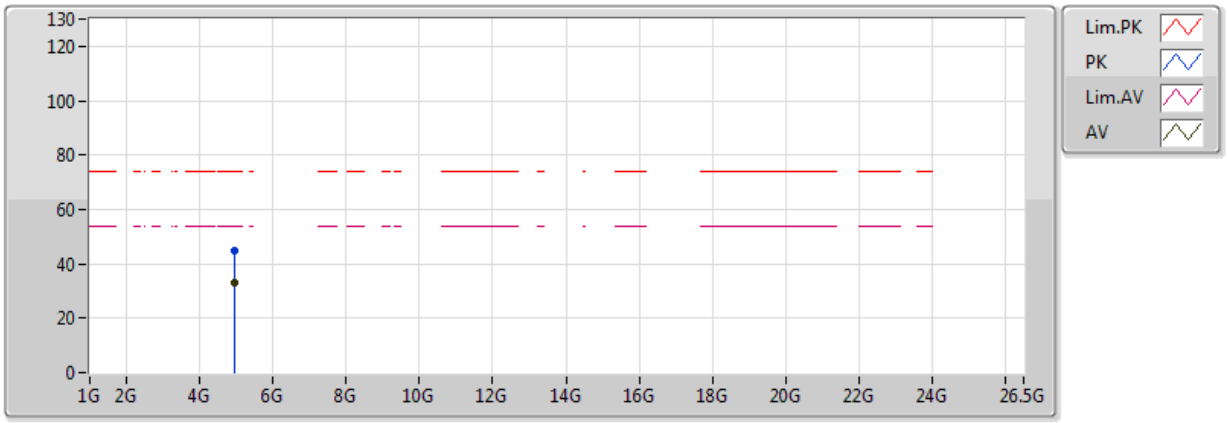


EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.96G	36.98	54.00	-17.02	2.41	3	V	160	1.13	-
PK	4.96G	48.59	74.00	-25.41	2.41	3	V	160	1.13	-

Zibee_Nss1_1TX

2480MHz_TX



EUT= Z

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	4.96G	33.01	54.00	-20.99	2.41	3	H	118	2.43	-
PK	4.96G	44.91	74.00	-29.09	2.41	3	H	118	2.43	-