

# FCC Test Report

**Equipment** : Wireless 802.11 a/ac+b/g/n PCBA module  
**Brand Name** : Extreme Networks  
**Model No.** : AP3917k/AP7662k  
**FCC ID** : QXO-AP3917K  
**Standard** : 47 CFR FCC Part 15.247  
**Operating Band** : 2400 MHz – 2483.5 MHz  
**Function** :  Point-to-multipoint;  Point-to-point  
**Applicant** : Extreme Networks, Inc.  
6480 Via Del Oro San Jose CA 95119 United States  
Of America  
**Manufacturer** : Senao Networks, Inc.  
3F, No. 529, Chung Cheng Rd. Hsintien Taipei Taiwan

The product sample received on Sep. 21, 2017 and completely tested on Oct. 11, 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 / Assistant Manager





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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: > 30 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
FR780809AZ	Rev. 01	Initial issue of report	Oct. 31, 2017



# 1 General Description

## 1.1 Information

### 1.1.1 RF General Information

Frequency Range (MHz)	IEEE Std.	Ch. Frequency (MHz)	Channel Number
2400-2483.5	802.15.4	2405-2480	11-26 [16]

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

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	1	-	-	Omini	I-PEX	7.5

### 1.1.3 EUT Information

Operational Condition	
EUT Power Type	From PoE
Type of EUT	
<input checked="" type="checkbox"/>	Stand-alone
<input type="checkbox"/>	Combined (EUT where the radio part is fully integrated within another device)
	Combined Equipment - Brand Name / Model No.: ...
<input type="checkbox"/>	Plug-in radio (EUT intended for a variety of host systems)
	Host System - Brand Name / Model No.: ...
<input type="checkbox"/>	Other:

### 1.1.4 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
Zigbee	0.88	0.555	2.663m	1k



### 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 v04

### 1.3 Testing Location Information

Testing Location		
<input checked="" type="checkbox"/>	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.		
<input type="checkbox"/>	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	Ryan Hsiao	24.6°C / 65%	07/Oct/2017
Radiated	03CH02-HY	Lynus Tsai	23.3°C / 57%	29/Sep/2017
AC Conduction	CO04-HY	Eric lee	24.8°C / 61.2%	11/Oct/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

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

### 2.2 Test Channel Mode




Test Software	Dos

Mode	Power Setting
Zigbee	-
2405MHz	32
2440MHz	32
2480MHz	32

### 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	PoE 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	PoE mode		
Operating Mode > 1GHz	CTX		
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	Bluetooth+WLAN 2.4GHz+WLAN 5GHz
2	Zigbee+WLAN 2.4GHz+WLAN 5GHz
3	Bluetooth+WLAN 2.4GHz+4.9G
4	Zigbee+WLAN 2.4GHz+4.9G
Refer to Sporton Test Report No.: FA780809 for Co-location RF Exposure Evaluation.	





## 2.4 Support Equipment

Support Equipment – RF Conducted				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E5410	DoC
2	Adapter for Notebook	DELL	HA65NM130	DoC
3	PoE	EnGenius	EPA5006GP	-
4	AC Source	G.W	APS-9102	-

Note: Support equipment No.3 was provided by customer.

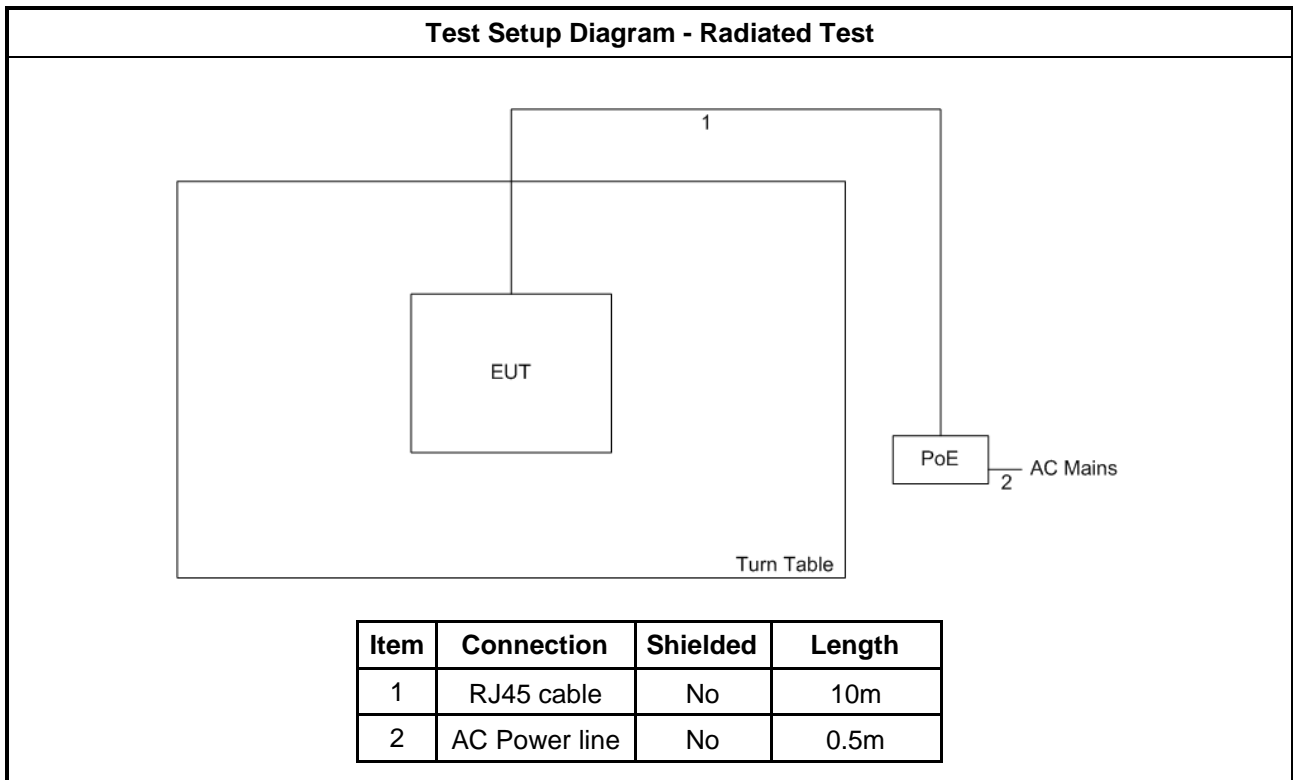
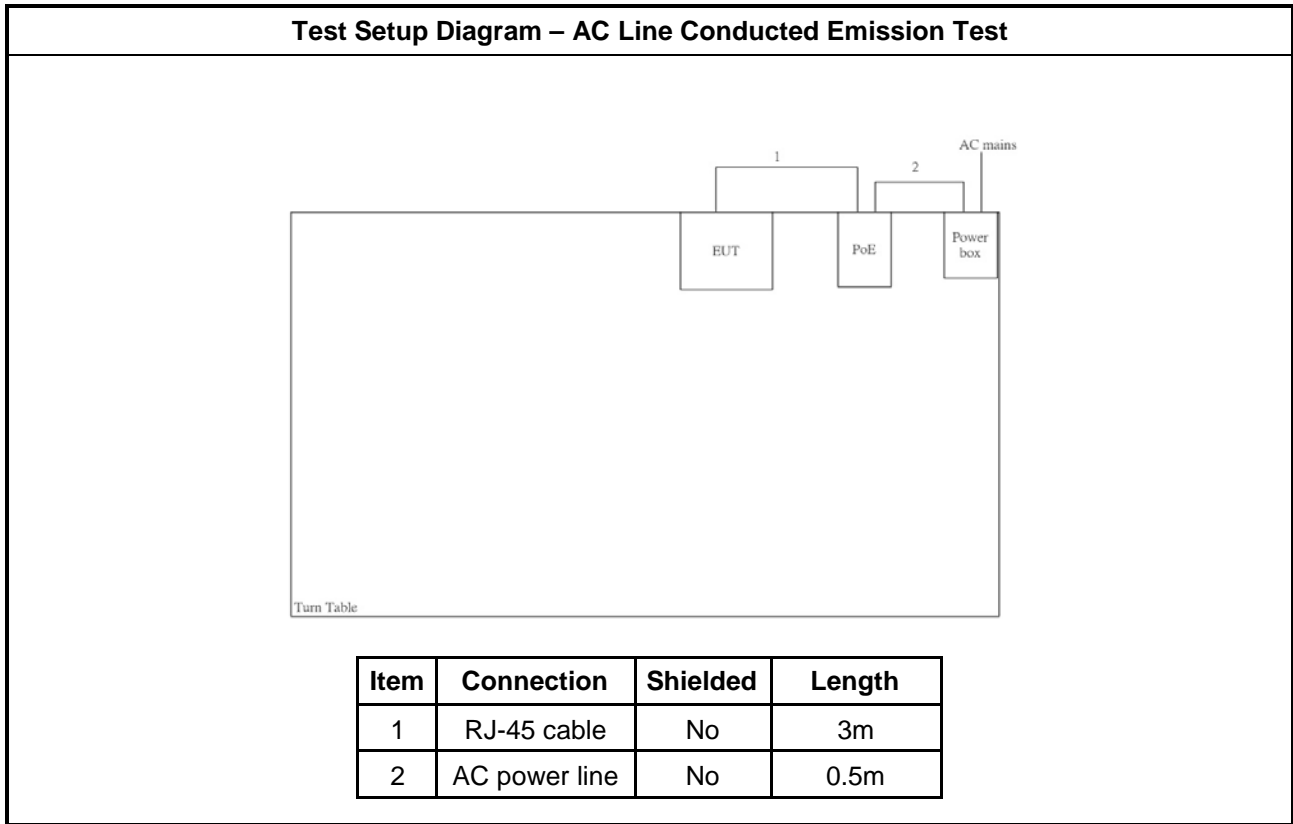
Support Equipment – Radiated Emission				
No.	Equipment	Brand Name	Model Name	FCC ID
1	PoE	EnGenius	EPA5006GP	-

Note: Support equipment No.1 was provided by customer.

Support Equipment – AC Conduction				
No.	Equipment	Brand Name	Model Name	FCC ID
1	PoE	EnGenius	EPA5006GP	-

Note: Support equipment No.1 was provided by customer.

## 2.5 Test Setup Diagram



### 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.

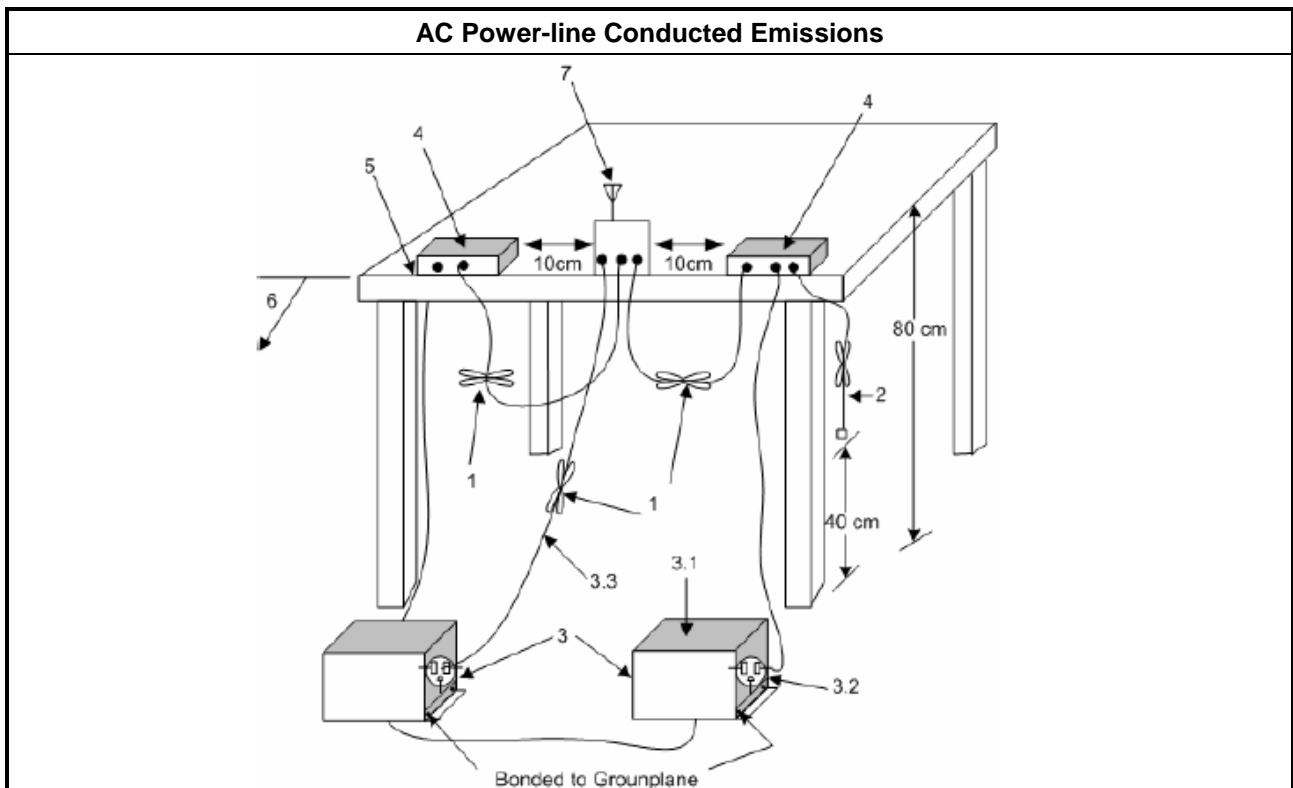
##### 3.1.2 Measuring Instruments

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

##### 3.1.3 Test Procedures

Test Method
<input checked="" type="checkbox"/> Refer as ANSI C63.10-2013, clause 6.2 for AC power-line conducted emissions.

##### 3.1.4 Test Setup



##### 3.1.5 Test Result of AC Power-line Conducted Emissions

Refer as Appendix A

### 3.2 DTS Bandwidth

#### 3.2.1 6dB Bandwidth Limit

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

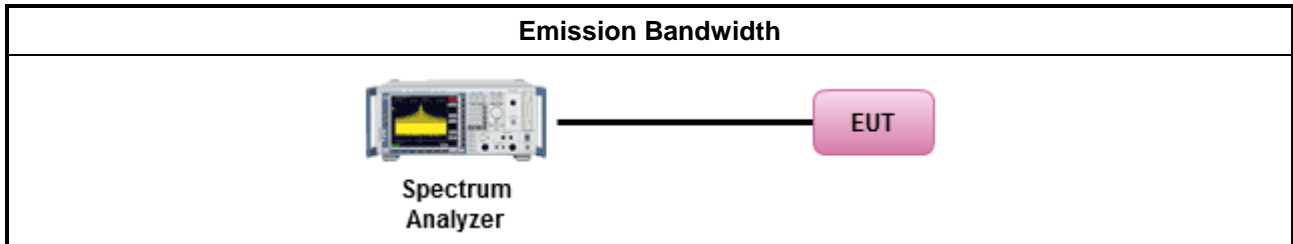
#### 3.2.2 Measuring Instruments

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

#### 3.2.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> <li>▪ For the emission bandwidth shall be measured using one of the options below:</li> </ul>	
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.
<input type="checkbox"/>	Refer as KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.
<input type="checkbox"/>	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	
	<ul style="list-style-type: none"> <li>▪ If <math>G_{TX} \leq 6</math> dBi, then <math>P_{Out} \leq 30</math> dBm (1 W)</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Point-to-multipoint systems (P2M): If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)</math> dBm</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Point-to-point systems (P2P): If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)/3</math> dBm</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Smart antenna system (SAS):               <ul style="list-style-type: none"> <li>- Single beam: If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)/3</math> dBm</li> <li>- Overlap beam: If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)/3</math> dBm</li> <li>- Aggregate power on all beams: If <math>G_{TX} &gt; 6</math> dBi, then <math>P_{Out} = 30 - (G_{TX} - 6)/3 + 8</math> dB dBm</li> </ul> </li> </ul>
e.i.r.p. Power Limit:	
	<ul style="list-style-type: none"> <li>▪ 2400-2483.5 MHz Band</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Point-to-multipoint systems (P2M): <math>P_{eirp} \leq 36</math> dBm (4 W)</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Point-to-point systems (P2P): <math>P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX}])</math> dBm</li> </ul>
	<ul style="list-style-type: none"> <li>▪ Smart antenna system (SAS)               <ul style="list-style-type: none"> <li>- Single beam: <math>P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})</math> dBm</li> <li>- Overlap beam: <math>P_{eirp} \leq \text{MAX}(36, P_{Out} + G_{TX})</math> dBm</li> <li>- Aggregate power on all beams: <math>P_{eirp} \leq \text{MAX}(36, [P_{Out} + G_{TX} + 8])</math> dBm</li> </ul> </li> </ul>
<p><math>P_{Out}</math> = maximum peak conducted output power or maximum conducted output power in dBm,  <math>G_{TX}</math> = the maximum transmitting antenna directional gain in dBi.</p>	

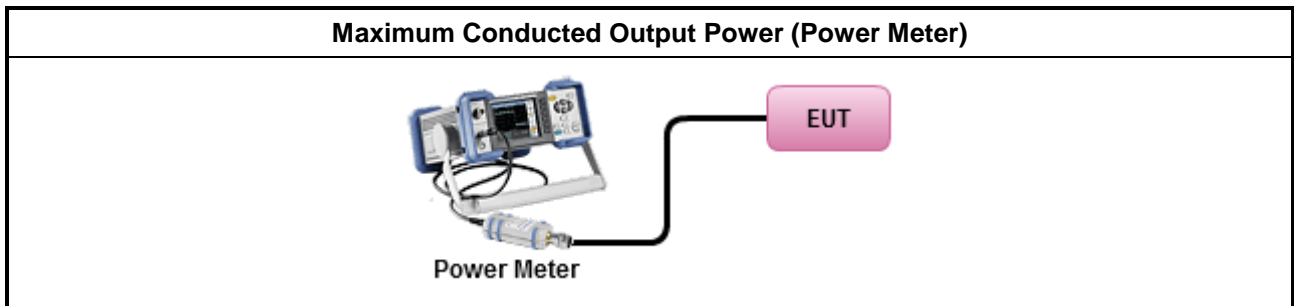
#### 3.3.2 Measuring Instruments

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

### 3.3.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> <li>Maximum Peak Conducted Output Power</li> </ul>	
<input type="checkbox"/>	Refer as KDB 558074, clause 9.1.1 Option 1 (RBW ≥ EBW method).
<input type="checkbox"/>	Refer as KDB 558074, clause 9.1.2 Option 2 (integrated band power method)
<input type="checkbox"/>	Refer as KDB 558074, clause 9.1.3 Option 3 (peak power meter for VBW ≥ DTS BW)
<ul style="list-style-type: none"> <li>Maximum Average Conducted Output Power</li> </ul>	
Duty cycle ≥ 98%	
<input type="checkbox"/>	Refer as KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
Duty cycle < 98%	
<input type="checkbox"/>	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	
<input checked="" type="checkbox"/>	Refer as KDB 558074, clause 9.2.3.1 Method AVGPM (using an RF average power meter).
<ul style="list-style-type: none"> <li>For conducted measurement.</li> </ul>	
<ul style="list-style-type: none"> <li>If the EUT supports multiple transmit chains using options given below: Refer as KDB 662911, In-band power measurements. Using the measure-and-sum approach, measured all transmit ports individually. Sum the power (in linear power units e.g., mW) of all ports for each individual sample and save them.</li> </ul>	
<ul style="list-style-type: none"> <li>If multiple transmit chains, EIRP calculation could be following as methods:  <math display="block">P_{total} = P_1 + P_2 + \dots + P_n</math>                     (calculated in linear unit [mW] and transfer to log unit [dBm])  <math display="block">EIRP_{total} = P_{total} + DG</math> </li> </ul>	

### 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
<ul style="list-style-type: none"> <li>Power Spectral Density (PSD) <math>\leq</math> 8 dBm/3kHz</li> </ul>

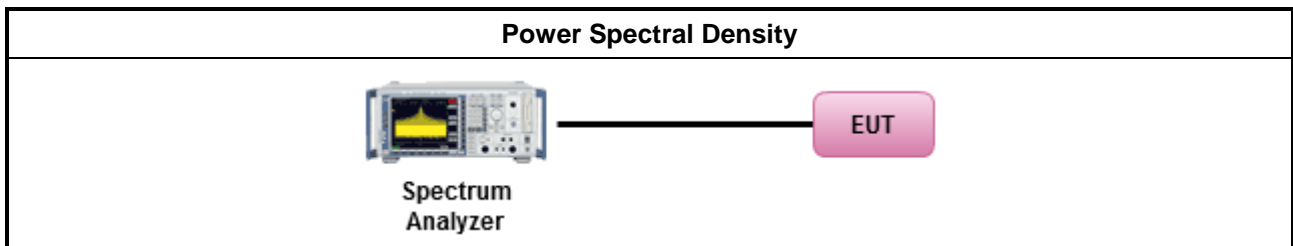
#### 3.4.2 Measuring Instruments

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

#### 3.4.3 Test Procedures

Test Method
<ul style="list-style-type: none"> <li>Peak power spectral density procedures that the same method as used to determine the conducted output power. If maximum peak conducted output power was measured to demonstrate compliance to the output power limit, then the peak PSD procedure below (Method PKPSD) shall be used. If maximum conducted output power was measured to demonstrate compliance to the output power limit, then one of the average PSD procedures shall be used, as applicable based on the following criteria (the peak PSD procedure is also an acceptable option).</li> </ul>
<input checked="" type="checkbox"/> Refer as KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz; Detector=peak).
<ul style="list-style-type: none"> <li>For conducted measurement.             <ul style="list-style-type: none"> <li>If The EUT supports multiple transmit chains using options given below:                 <ul style="list-style-type: none"> <li>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.</li> </ul> </li> </ul> </li> </ul>

#### 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.

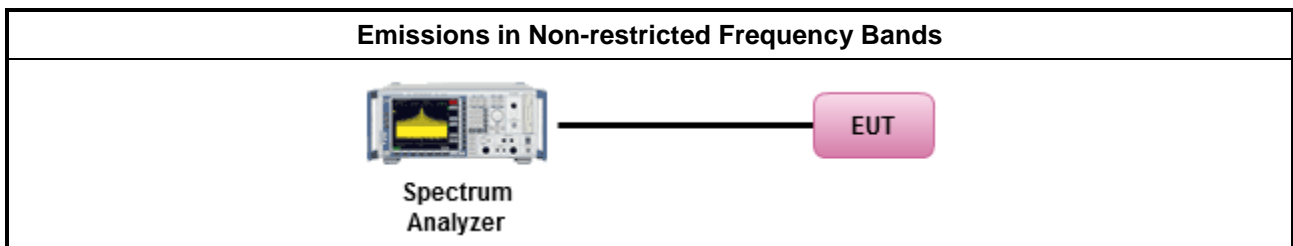
#### 3.5.2 Measuring Instruments

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

#### 3.5.3 Test Procedures

Test Method
<ul style="list-style-type: none"> <li>Refer as KDB 558074, clause 11 for unwanted emissions into non-restricted bands.</li> </ul>

#### 3.5.4 Test Setup



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

Refer as Appendix E



### 3.6 Emissions in Restricted Frequency Bands

#### 3.6.1 Emissions in Restricted Frequency Bands Limit

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

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

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

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

#### 3.6.2 Measuring Instruments

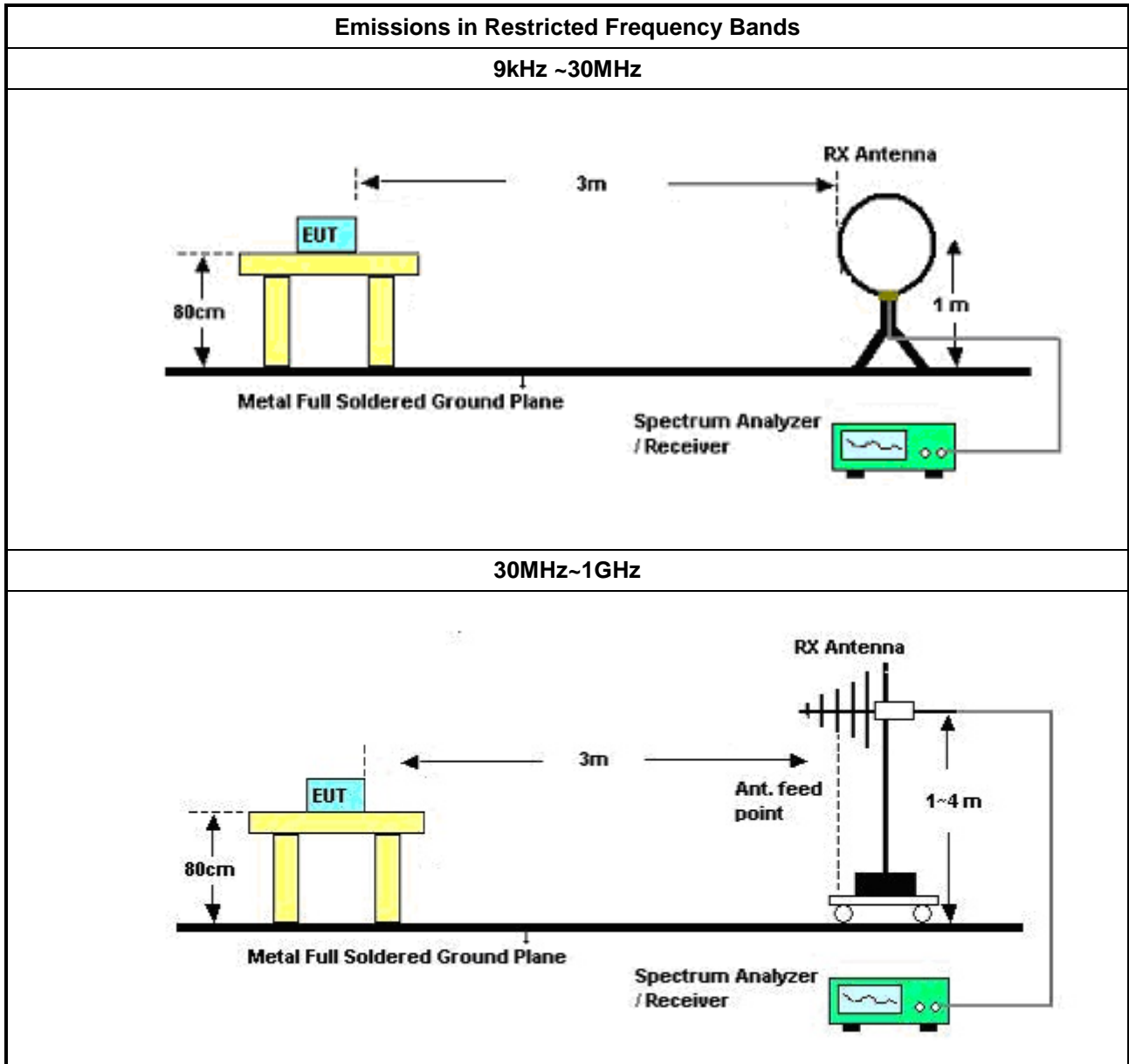
Refer a test equipment and calibration data table in this test report.

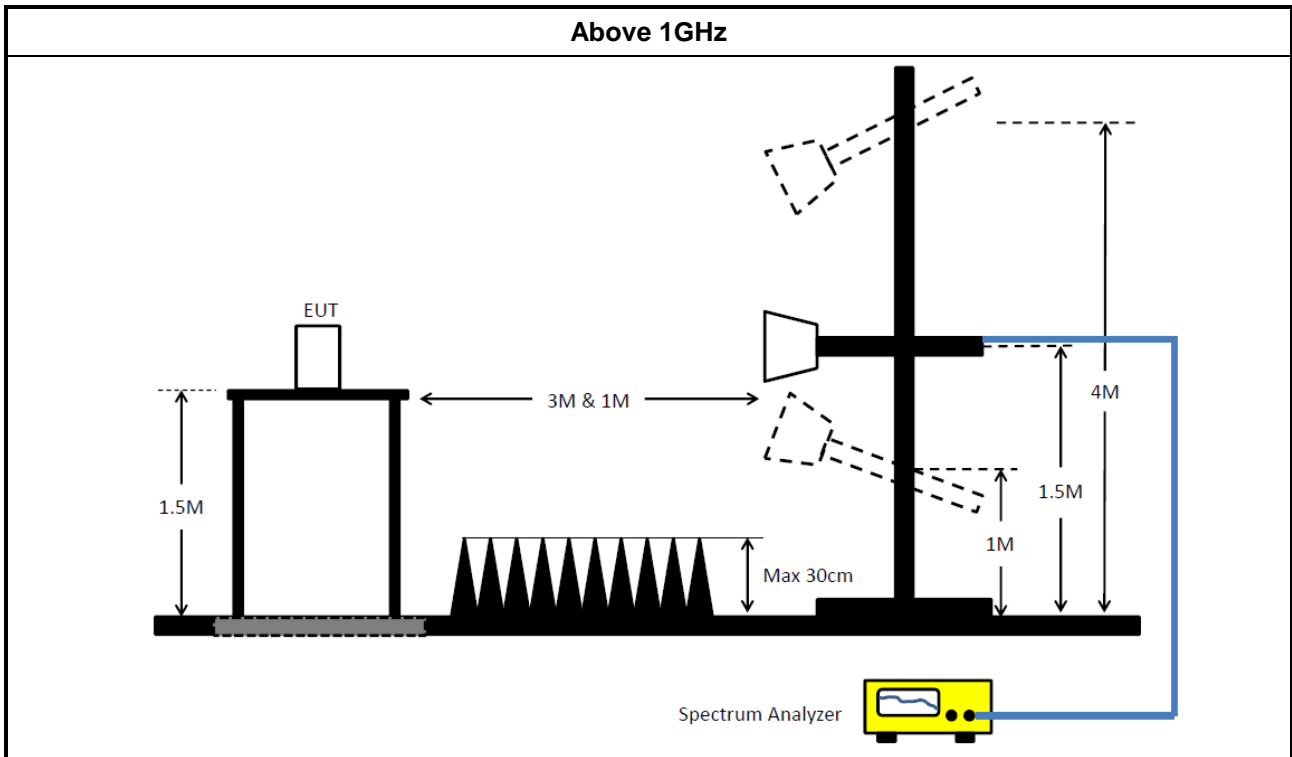


3.6.3 Test Procedures

Test Method	
<ul style="list-style-type: none"> <li>▪ The average emission levels shall be measured in [duty cycle <math>\geq</math> 98 or duty factor].</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Refer as ANSI C63.10, clause 6.10.3 band-edge testing shall be performed at the lowest frequency channel and highest frequency channel within the allowed operating band.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ For the transmitter unwanted emissions shall be measured using following options below:</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Refer as KDB 558074, clause 12 for unwanted emissions into restricted bands.</li> </ul>	
	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Refer as KDB 558074, clause 12.2.5.3 (ANSI C63.10, clause 4.1.4.2.3), Reduced VBW<math>\geq</math>1/T.</li> </ul>
	<ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Refer as KDB 558074, clause 12.2.4 measurement procedure peak limit.</li> </ul>
<ul style="list-style-type: none"> <li>▪ For the transmitter band-edge emissions shall be measured using following options below:</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Refer as 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.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Refer as KDB 558074, clause 13.2 (ANSI C63.10, clause 6.10.6) for marker-delta method for band-edge measurements.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ Refer as KDB 558074, clause 13.3 for narrower resolution bandwidth (100kHz) using the band power and summing the spectral levels (i.e., 1 MHz).</li> </ul>	
<ul style="list-style-type: none"> <li>▪ For conducted and cabinet radiation measurement, refer as KDB 558074, clause 12.2.2.</li> </ul>	
<ul style="list-style-type: none"> <li>▪ For conducted unwanted emissions into restricted bands (absolute emission limits). Devices with multiple transmit chains using options given below: (1) Measure and sum the spectra across the outputs or (2) Measure and add 10 log(N) dB</li> </ul>	
<ul style="list-style-type: none"> <li>▪ For KDB 662911 The methodology described here may overestimate array gain, thereby resulting in apparent failures to satisfy the out-of-band limits even if the device is actually compliant. In such cases, compliance may be demonstrated by performing radiated tests around the frequencies at which the apparent failures occurred.</li> </ul>	

### 3.6.4 Test Setup





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

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

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

Refer as Appendix F



## 4 Test Equipment and Calibration Data

### Instrument for AC Conduction

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
EMC Receiver	R&S	ESR3	102052	9KHz ~ 3.6GHz	29/Apr/2017	28/Apr/2018
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
AC POWER	APC	AFC-11005G	F310050055	47Hz~63Hz 5~300V	NCR	NCR
Impuls Begrenzer Pulse Limiter	R&S	ESH3-Z2	100921	10 kHz ~ 30 MHz	21/Oct/2016	20/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	21/Oct/2016	20/Oct/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	29/Jun/2017	28/Jun/2018
Amplifier	Ketsight	83017A	MY53270197	1GHz-26.5GHz	19/Sep/2017	18/Sep/2018
Horn Antenna	SCHWARZBECK	BBHA9120D	BBHA9120D 01531	1GHz-18GHz	11/May/2017	10/May/2018
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	18GHz-40GHz	06/Feb/2017	05/Feb/2018
Bilog Antenna	SCHAFFNER	CBL6112B	2723	30MHz-1GHz	09/Sep/2017	08/Sep/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
Receiver	R&S	ESU3	102052	9kHz ~ 3.6GHz	29/Apr/2017	28/Apr/2018

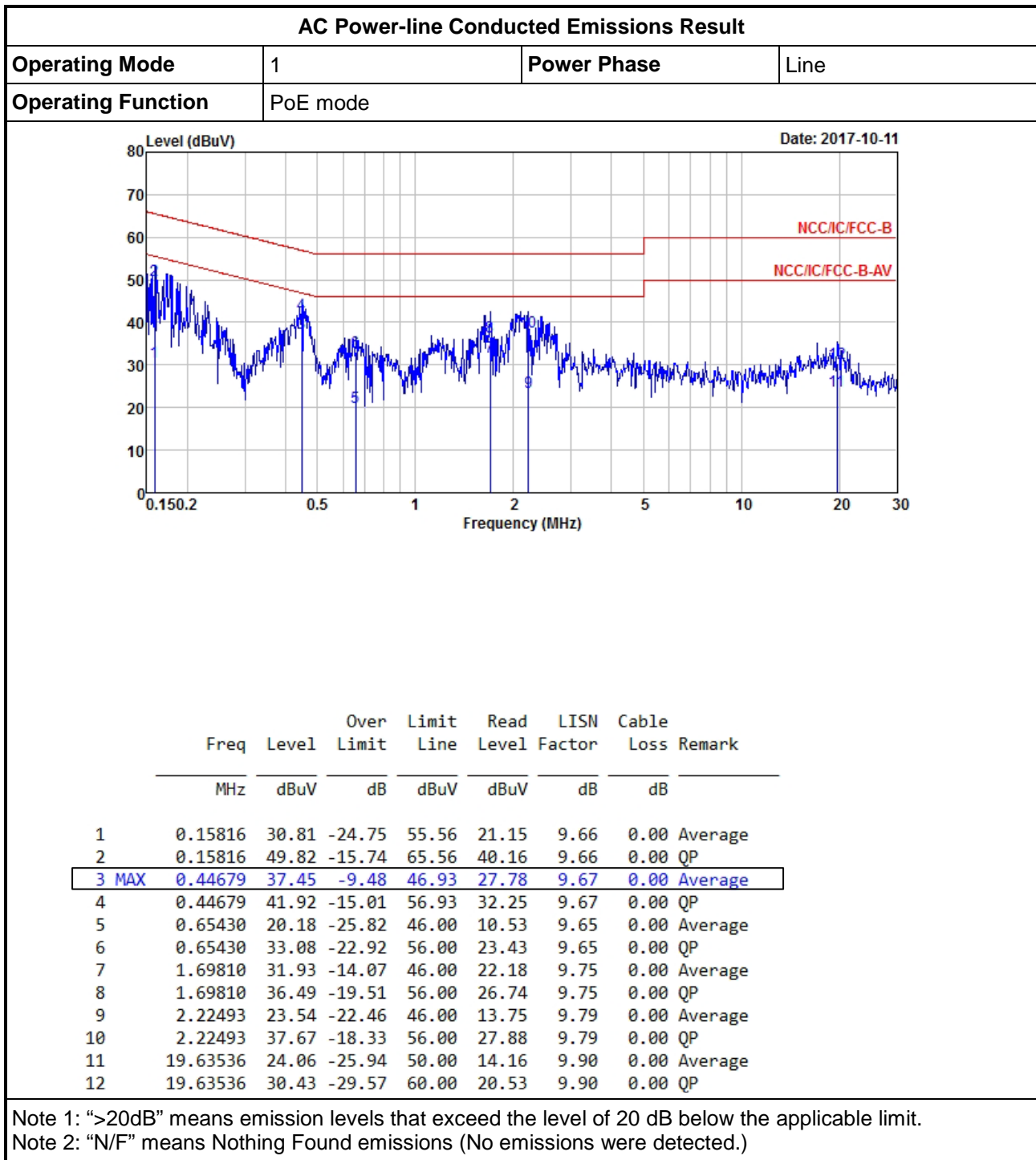
### Instrument for Conducted Test

Instrument	Manufacturer	Model No.	Serial No.	Spec.	Calibration Date	Calibration Due Date
Spectrum Analyzer	R&S	FSV 40	101013	9kHz-40GHz	30/Dec/2016	29/Dec/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	27/Jul/2017	26/Jul/2018
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10710/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018
RF Cable-0.2m	HUBER+SUHNER	SUCOFLEX_104	MY10709/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018
RF Cable-0.5m	HUBER+SUHNER	SUCOFLEX_104	MY10713/4	30MHz ~ 26.5GHz	25/Aug/2017	24/Aug/2018



AC Power-line Conducted Emissions Result			
Operating Mode	1	Power Phase	Neutral
Operating Function	PoE mode		
<div style="text-align: right;">Date: 2017-10-11</div> <p>The graph displays the AC power-line conducted emissions. The y-axis represents the level in dBUV, ranging from 0 to 80. The x-axis represents the frequency in MHz, ranging from 0.1502 to 30. Two red lines indicate the NCC/IC/FCC-B and NCC/IC/FCC-B-AV limits. A blue line shows the measured emission levels, with a peak of 32.03 dBUV at 2.14392 MHz.</p>			
	Freq	Level	Over Limit
	MHz	dBuV	dB
			Limit Line
			dBuV
			Read Level
			dBuV
			LISN Factor
			dB
			Cable Loss
			dB
			Remark
1	0.15816	27.98	-27.58
2	0.15816	46.02	-19.54
3	0.45395	24.38	-22.42
4	0.45395	41.87	-14.93
5	0.61400	27.78	-18.22
6	0.61400	34.44	-21.56
7	1.14126	24.93	-21.07
8	1.14126	34.80	-21.20
9 MAX	2.14392	32.03	-13.97
10	2.14392	39.79	-16.21
11	17.10851	25.78	-24.22
12	17.10851	31.38	-28.62
			55.56
			18.37
			9.61
			0.00
			Average
			65.56
			36.41
			9.61
			0.00
			QP
			46.80
			14.76
			9.62
			0.00
			Average
			56.80
			32.25
			9.62
			0.00
			QP
			46.00
			18.17
			9.61
			0.00
			Average
			56.00
			24.83
			9.61
			0.00
			QP
			46.00
			15.33
			9.60
			0.00
			Average
			56.00
			25.20
			9.60
			0.00
			QP
			46.00
			22.37
			9.66
			0.00
			Average
			56.00
			30.13
			9.66
			0.00
			QP
			50.00
			15.92
			9.86
			0.00
			Average
			60.00
			21.52
			9.86
			0.00
			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)
2.4-2.4835GHz	-	-	-	-	-
Zigbee	1.613M	2.324M	2M32G1D	1.569M	2.293M

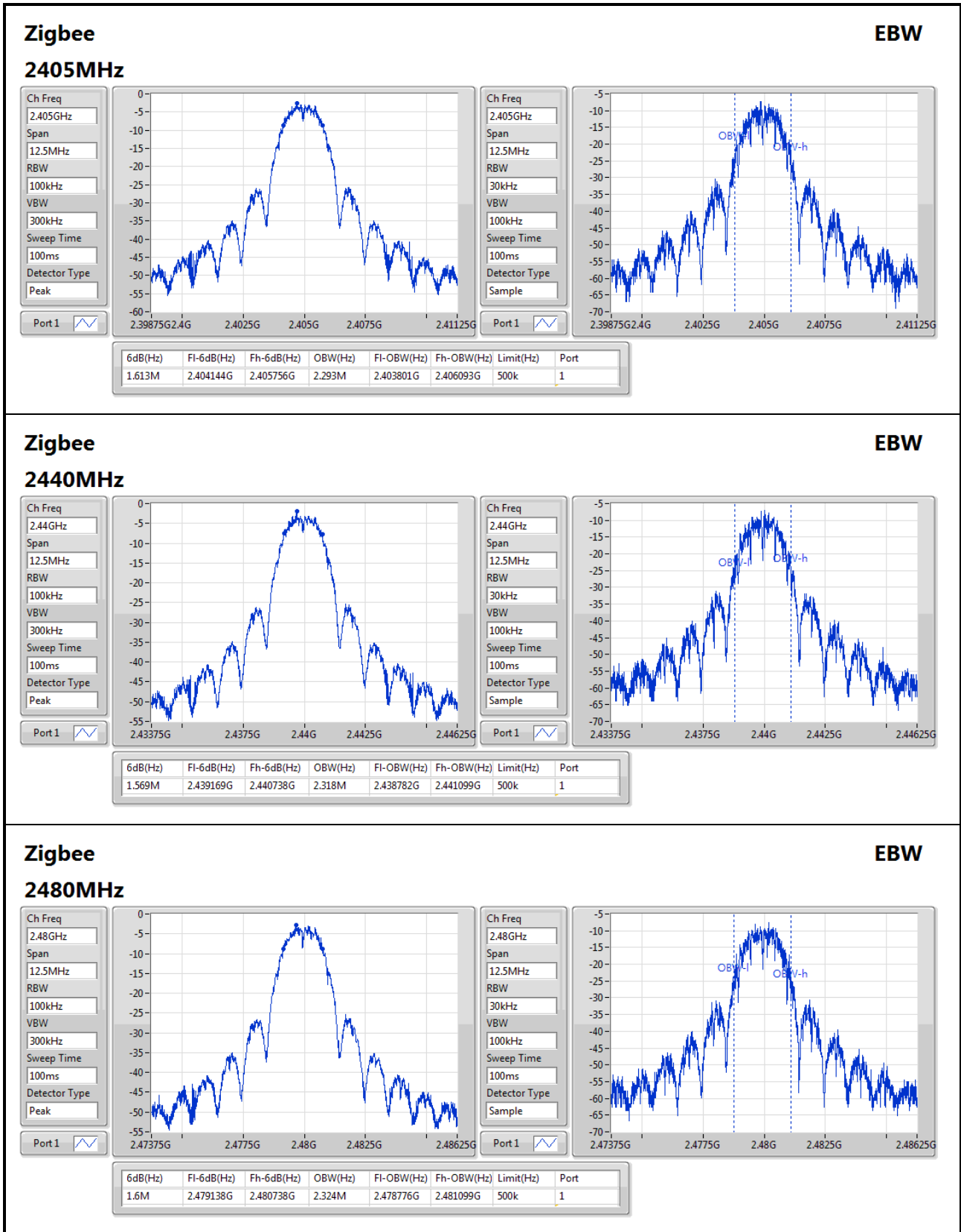
**Max-N dB** = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;  
**Min-N dB** = Minimum 6dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

**Result**

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
Zigbee	-	-	-	-
2405MHz	Pass	500k	1.613M	2.293M
2440MHz	Pass	500k	1.569M	2.318M
2480MHz	Pass	500k	1.6M	2.324M

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







Summary

Mode	Total Power (dBm)	Total Power (W)
2.4-2.4835GHz	-	-
Zigbee	2.63	0.00183

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
Zigbee	-	-	-	-	-
2405MHz	Pass	7.50	2.63	2.63	28.50
2440MHz	Pass	7.50	2.54	2.54	28.50
2480MHz	Pass	7.50	2.59	2.59	28.50

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



**Summary**

Mode	PD (dBm/RBW)
2.4-2.4835GHz	-
Zigbee	-13.80

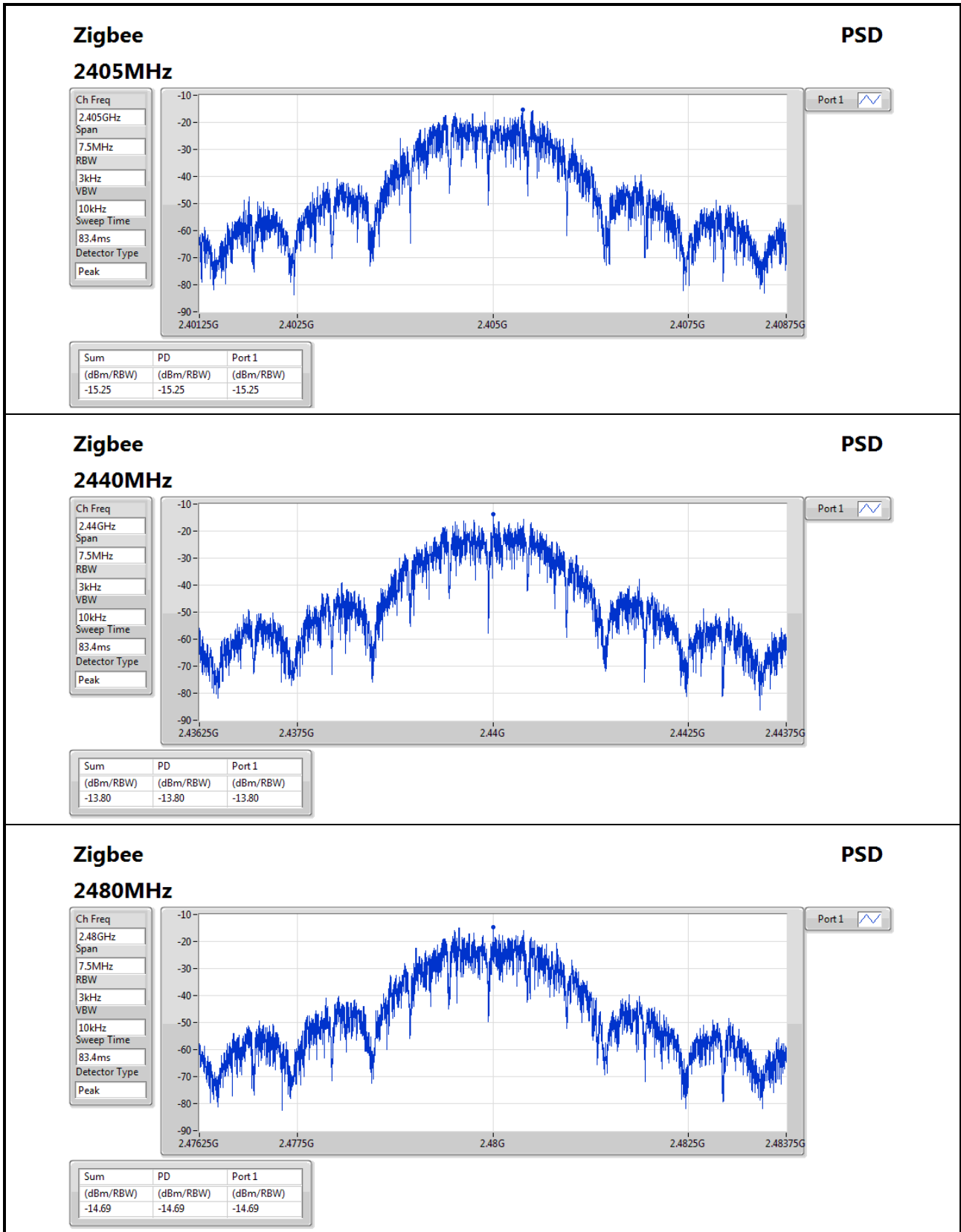
RBW=3kHz.

**Result**

Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
Zigbee	-	-	-	-	-
2405MHz	Pass	7.50	-15.25	-15.25	6.50
2440MHz	Pass	7.50	-13.80	-13.80	6.50
2480MHz	Pass	7.50	-14.69	-14.69	6.50

**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;



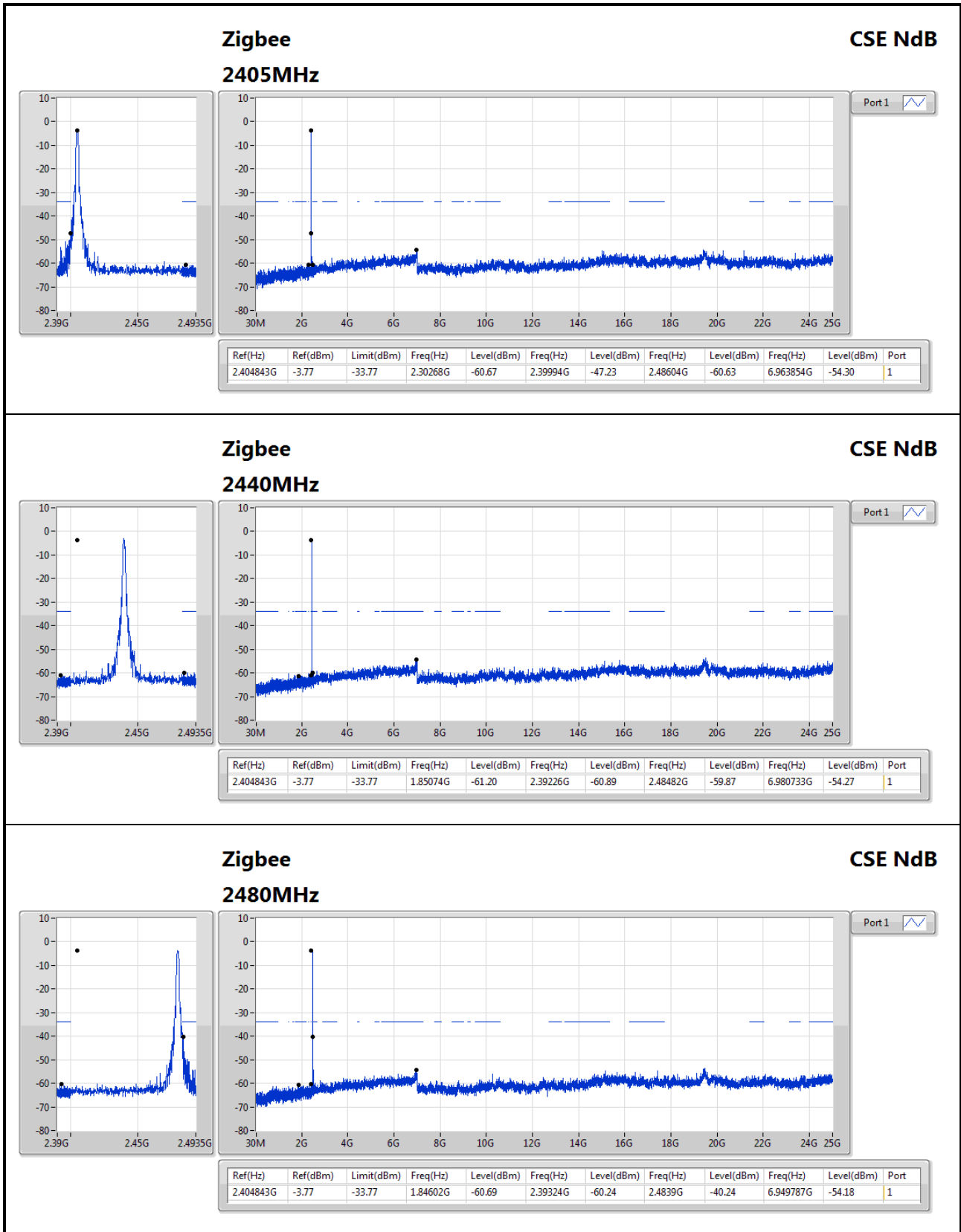


**Summary**

Mode	Result	Ref (Hz)	Ref (dBm)	Limit (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Freq (Hz)	Level (dBm)	Port
2.4-2.4835GHz	-	-	-	-	-	-	-	-	-	-	-	-	-
Zigbee	Pass	2.404843G	-3.77	-33.77	1.84602G	-60.69	2.39324G	-60.24	2.4839G	-40.24	6.949787G	-54.18	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	2.404843G	-3.77	-33.77	2.30268G	-60.67	2.39994G	-47.23	2.48604G	-60.63	6.963854G	-54.30	1
2440MHz	Pass	2.404843G	-3.77	-33.77	1.85074G	-61.20	2.39226G	-60.89	2.48482G	-59.87	6.980733G	-54.27	1
2480MHz	Pass	2.404843G	-3.77	-33.77	1.84602G	-60.69	2.39324G	-60.24	2.4839G	-40.24	6.949787G	-54.18	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	-	-	-	-	-	-	-	-	-	-	-	-
Zigbee_Nss1_1TX	Pass	QP	33.88M	34.75	40.00	-5.25	-4.75	3	Vertical	250	1.00	-



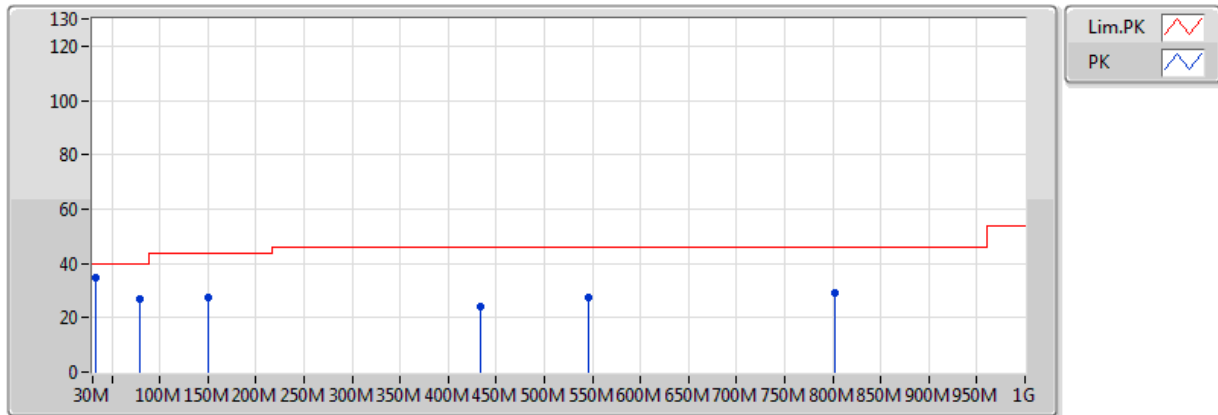
**Result**

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
Zigbee_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
2440MHz	Pass	PK	30M	29.70	40.00	-10.30	-2.39	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	103.72M	23.67	43.50	-19.83	-8.93	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	255.04M	22.26	46.00	-23.74	-6.04	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	489.78M	25.73	46.00	-20.27	-1.79	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	683.78M	28.22	46.00	-17.78	0.21	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	800.18M	29.26	46.00	-16.74	1.92	3	Horizontal	360	1.00	-
2440MHz	Pass	PK	78.5M	26.95	40.00	-13.05	-13.60	3	Vertical	360	1.00	-
2440MHz	Pass	PK	150.28M	27.60	43.50	-15.90	-9.67	3	Vertical	360	1.00	-
2440MHz	Pass	PK	433.52M	24.09	46.00	-21.91	-2.73	3	Vertical	360	1.00	-
2440MHz	Pass	PK	546.04M	27.25	46.00	-18.75	-0.32	3	Vertical	360	1.00	-
2440MHz	Pass	PK	802.12M	29.16	46.00	-16.84	1.93	3	Vertical	360	1.00	-
2440MHz	Pass	QP	33.88M	34.75	40.00	-5.25	-4.75	3	Vertical	250	1.00	-



### Zigbee\_Nss1\_1TX

### 2440MHz\_PoE

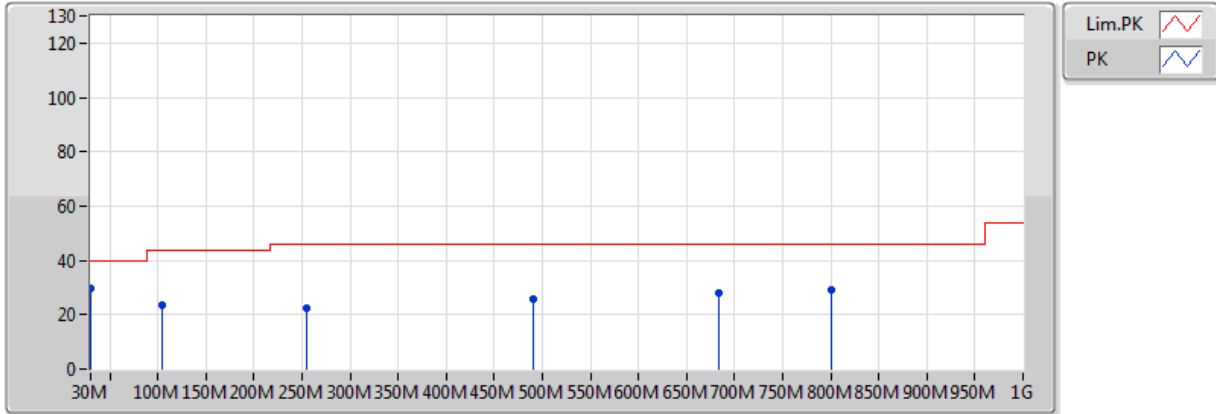


EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	78.5M	26.95	40.00	-13.05	-13.60	3	Vertical	360	1.00	-	40.55	11.84	2.01	27.44
PK	150.28M	27.60	43.50	-15.90	-9.67	3	Vertical	360	1.00	-	37.27	15.37	2.10	27.14
PK	433.52M	24.09	46.00	-21.91	-2.73	3	Vertical	360	1.00	-	26.82	21.44	3.31	27.47
PK	546.04M	27.25	46.00	-18.75	-0.32	3	Vertical	360	1.00	-	27.57	23.93	3.65	27.90
PK	802.12M	29.16	46.00	-16.84	1.93	3	Vertical	360	1.00	-	27.23	24.98	4.69	27.74
QP	33.88M	34.75	40.00	-5.25	-4.75	3	Vertical	250	1.00	-	39.50	21.05	1.77	27.57

### Zigbee\_Nss1\_1TX

### 2440MHz\_PoE



EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
PK	30M	29.70	40.00	-10.30	-2.39	3	Horizontal	360	1.00	-	32.09	23.48	1.71	27.58
PK	103.72M	23.67	43.50	-19.83	-8.93	3	Horizontal	360	1.00	-	32.60	16.45	1.98	27.35
PK	255.04M	22.26	46.00	-23.74	-6.04	3	Horizontal	360	1.00	-	28.30	18.32	2.42	26.78
PK	489.78M	25.73	46.00	-20.27	-1.79	3	Horizontal	360	1.00	-	27.52	22.47	3.52	27.78
PK	683.78M	28.22	46.00	-17.78	0.21	3	Horizontal	360	1.00	-	28.01	24.03	4.14	27.96
PK	800.18M	29.26	46.00	-16.74	1.92	3	Horizontal	360	1.00	-	27.34	24.97	4.69	27.74



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	-	-	-	-	-	-	-	-	-	-	-	-
Zigbee_Nss1_1TX	Pass	AV	2.483502G	52.88	54.00	-1.12	30.79	3	Vertical	257	1.67	-

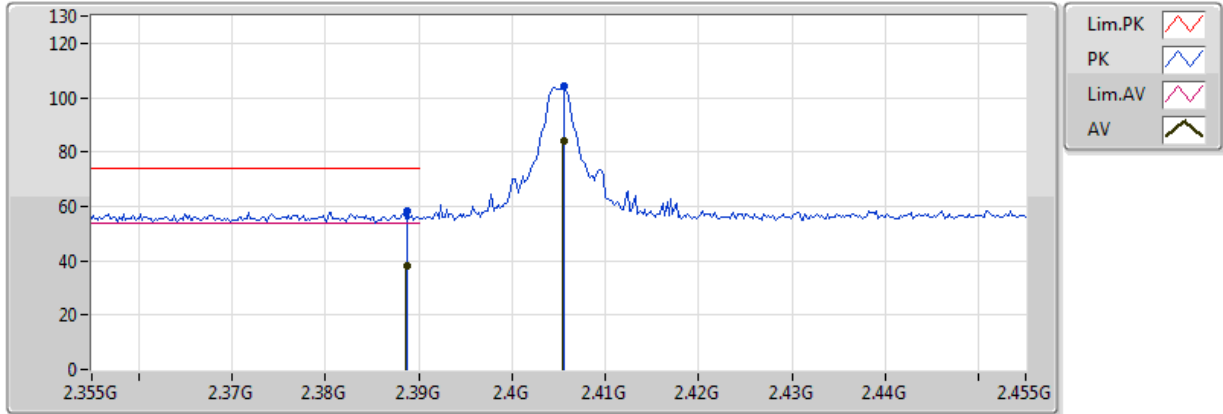


Result

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments
Zigbee_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
2405MHz	Pass	AV	2.3888G	38.02	54.00	-15.98	30.45	3	Vertical	11	1.53	-
2405MHz	Pass	AV	2.4056G	84.03	Inf	-Inf	30.51	3	Vertical	11	1.53	-
2405MHz	Pass	PK	2.3888G	58.02	74.00	-15.98	30.45	3	Vertical	11	1.53	-
2405MHz	Pass	PK	2.4056G	104.03	Inf	-Inf	30.51	3	Vertical	11	1.53	-
2405MHz	Pass	AV	4.808862G	25.91	54.00	-28.09	5.86	3	Horizontal	360	1.09	-
2405MHz	Pass	PK	4.808862G	45.91	74.00	-28.09	5.86	3	Horizontal	360	1.09	-
2405MHz	Pass	AV	4.810878G	26.48	54.00	-27.51	5.87	3	Vertical	28	1.50	-
2405MHz	Pass	PK	4.810878G	46.48	74.00	-27.52	5.87	3	Vertical	28	1.50	-
2440MHz	Pass	AV	2.3472G	37.96	54.00	-16.03	30.31	3	Vertical	314	1.49	-
2440MHz	Pass	AV	2.4396G	84.31	Inf	-Inf	30.63	3	Vertical	314	1.49	-
2440MHz	Pass	AV	2.4932G	37.65	54.00	-16.35	30.83	3	Vertical	314	1.49	-
2440MHz	Pass	PK	2.3472G	57.96	74.00	-16.04	30.31	3	Vertical	314	1.49	-
2440MHz	Pass	PK	2.4396G	104.31	Inf	-Inf	30.63	3	Vertical	314	1.49	-
2440MHz	Pass	PK	2.4932G	57.65	74.00	-16.35	30.83	3	Vertical	314	1.49	-
2440MHz	Pass	AV	4.880679G	26.23	54.00	-27.76	6.03	3	Horizontal	158	1.19	-
2440MHz	Pass	PK	4.880679G	46.23	74.00	-27.77	6.03	3	Horizontal	158	1.19	-
2440MHz	Pass	AV	4.880838G	26.40	54.00	-27.60	6.03	3	Vertical	78	1.22	-
2440MHz	Pass	PK	4.880838G	46.40	74.00	-27.60	6.03	3	Vertical	78	1.22	-
2480MHz	Pass	AV	2.4806G	84.15	Inf	-Inf	30.78	3	Vertical	257	1.67	-
2480MHz	Pass	AV	2.483502G	52.88	54.00	-1.12	30.79	3	Vertical	257	1.67	-
2480MHz	Pass	PK	2.4806G	104.15	Inf	-Inf	30.78	3	Vertical	257	1.67	-
2480MHz	Pass	PK	2.483502G	72.88	74.00	-1.12	30.79	3	Vertical	257	1.67	-
2480MHz	Pass	AV	4.959002G	27.41	54.00	-26.58	6.21	3	Horizontal	357	1.10	-
2480MHz	Pass	PK	4.959002G	47.41	74.00	-26.59	6.21	3	Horizontal	357	1.10	-
2480MHz	Pass	AV	4.960798G	28.29	54.00	-25.71	6.21	3	Vertical	79	1.18	-
2480MHz	Pass	PK	4.960798G	48.29	74.00	-25.71	6.21	3	Vertical	79	1.18	-

### Zigbee\_Nss1\_1TX

### 2405MHz\_TX

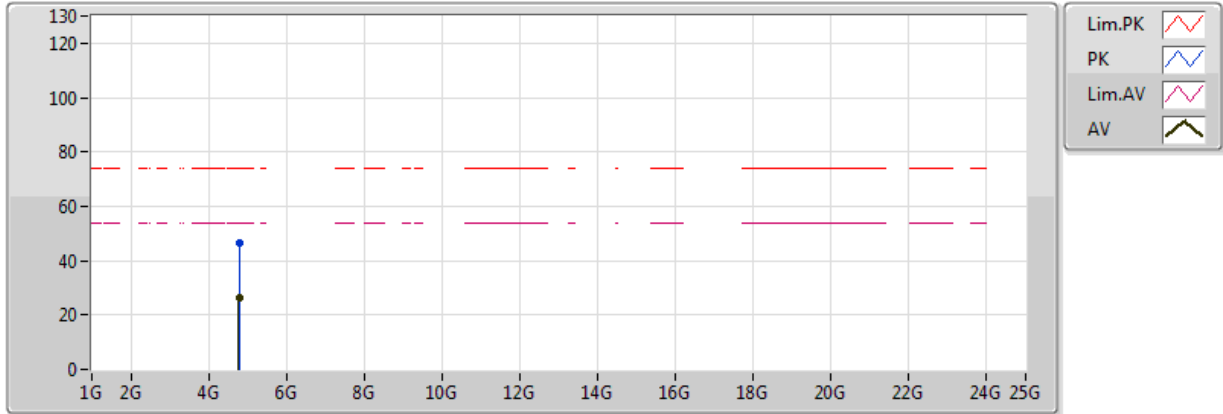


EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3888G	38.02	54.00	-15.98	30.45	3	Vertical	11	1.53	-	7.57	27.21	3.24	-
AV	2.4056G	84.03	Inf	-Inf	30.51	3	Vertical	11	1.53	-	53.52	27.25	3.26	-
PK	2.3888G	58.02	74.00	-15.98	30.45	3	Vertical	11	1.53	-	27.57	27.21	3.24	-
PK	2.4056G	104.03	Inf	-Inf	30.51	3	Vertical	11	1.53	-	73.52	27.25	3.26	-

### Zigbee\_Nss1\_1TX

### 2405MHz\_TX

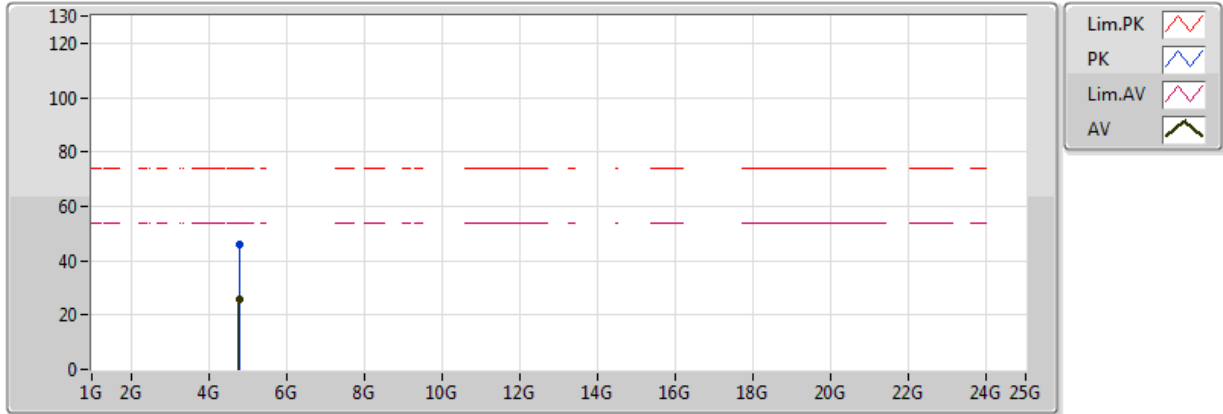


EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.810878G	26.48	54.00	-27.51	5.87	3	Vertical	28	1.50	-	20.62	31.20	4.52	29.85
PK	4.810878G	46.48	74.00	-27.52	5.87	3	Vertical	28	1.50	-	40.62	31.20	4.52	29.85

### Zigbee\_Nss1\_1TX

### 2405MHz\_TX

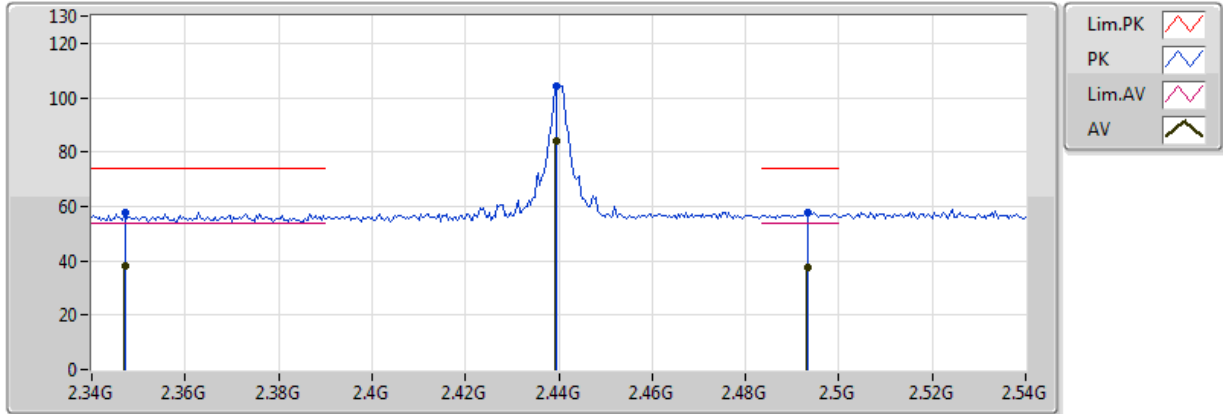


EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.808862G	25.91	54.00	-28.09	5.86	3	Horizontal	360	1.09	-	20.05	31.19	4.51	29.85
PK	4.808862G	45.91	74.00	-28.09	5.86	3	Horizontal	360	1.09	-	40.05	31.19	4.51	29.85

### Zigbee\_Nss1\_1TX

### 2440MHz\_TX



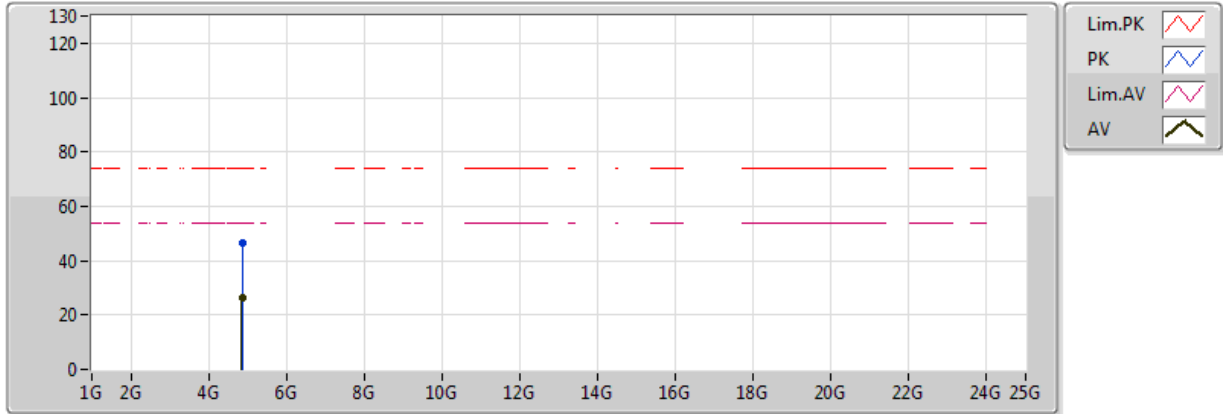
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Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.3472G	37.96	54.00	-16.03	30.31	3	Vertical	314	1.49	-	7.66	27.10	3.20	-
AV	2.4396G	84.31	Inf	-Inf	30.63	3	Vertical	314	1.49	-	53.67	27.34	3.29	-
AV	2.4932G	37.65	54.00	-16.35	30.83	3	Vertical	314	1.49	-	6.82	27.48	3.34	-
PK	2.3472G	57.96	74.00	-16.04	30.31	3	Vertical	314	1.49	-	27.66	27.10	3.20	-
PK	2.4396G	104.31	Inf	-Inf	30.63	3	Vertical	314	1.49	-	73.67	27.34	3.29	-
PK	2.4932G	57.65	74.00	-16.35	30.83	3	Vertical	314	1.49	-	26.82	27.48	3.34	-



### Zigbee\_Nss1\_1TX

### 2440MHz\_TX

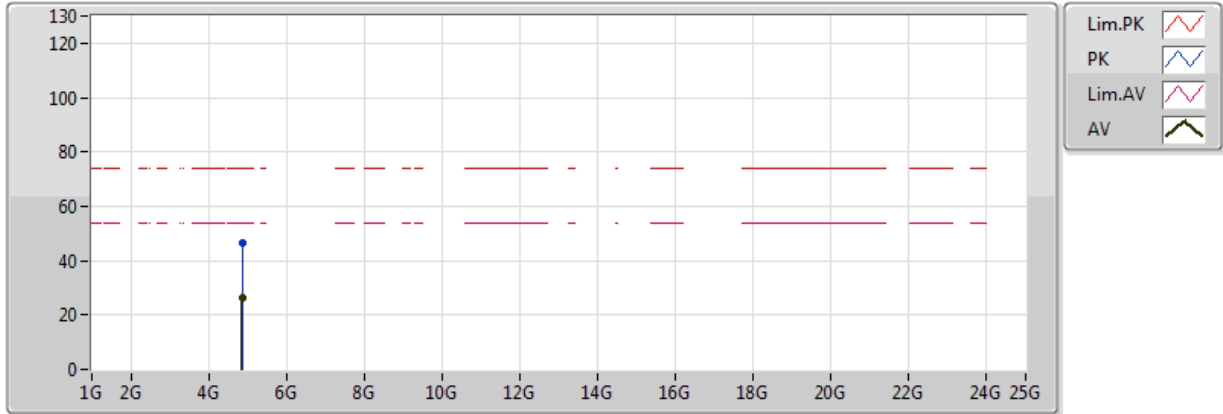


EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.880838G	26.40	54.00	-27.60	6.03	3	Vertical	78	1.22	-	20.37	31.31	4.55	29.83
PK	4.880838G	46.40	74.00	-27.60	6.03	3	Vertical	78	1.22	-	40.37	31.31	4.55	29.83

### Zigbee\_Nss1\_1TX

### 2440MHz\_TX

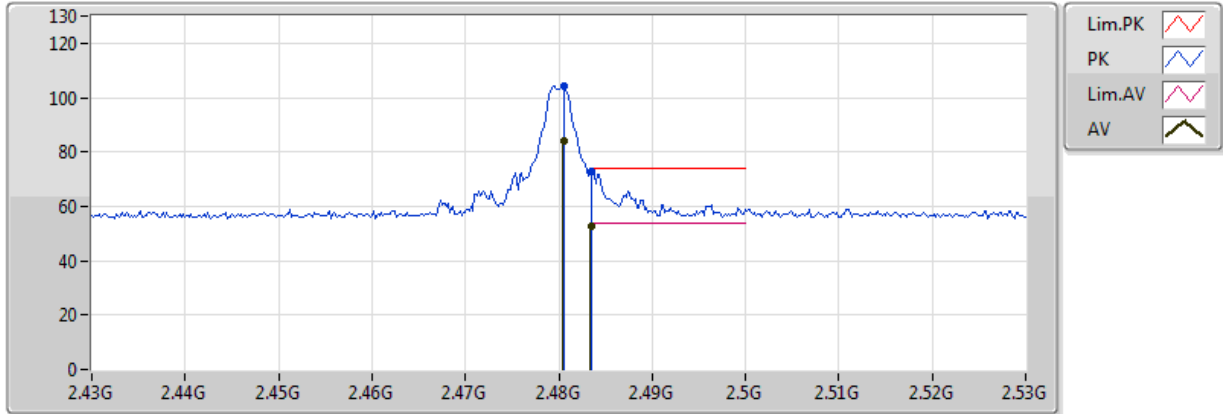


EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.880679G	26.23	54.00	-27.76	6.03	3	Horizontal	158	1.19	-	20.21	31.31	4.55	29.83
PK	4.880679G	46.23	74.00	-27.77	6.03	3	Horizontal	158	1.19	-	40.21	31.31	4.55	29.83

### Zigbee\_Nss1\_1TX

### 2480MHz\_TX

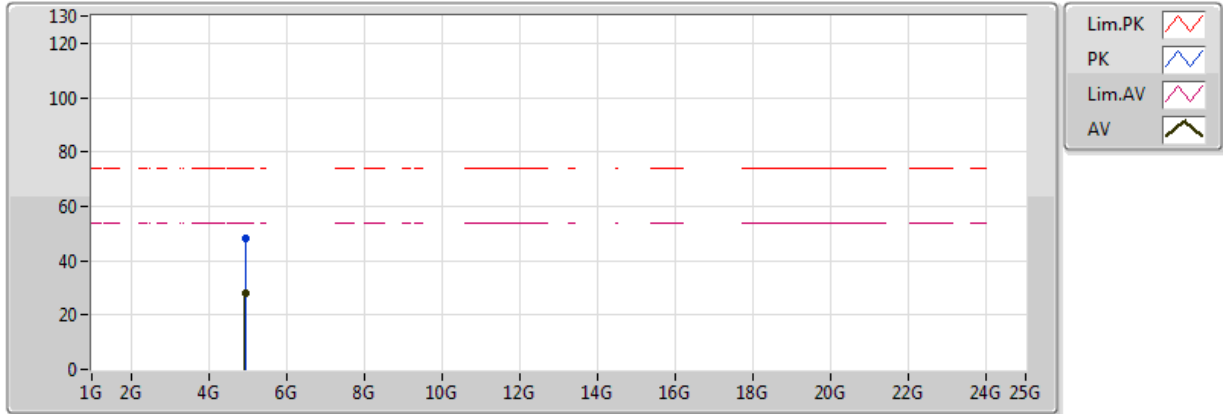


EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	2.4806G	84.15	Inf	-Inf	30.78	3	Vertical	257	1.67	-	53.37	27.45	3.33	-
AV	2.483502G	52.88	54.00	-1.12	30.79	3	Vertical	257	1.67	-	22.09	27.46	3.33	-
PK	2.4806G	104.15	Inf	-Inf	30.78	3	Vertical	257	1.67	-	73.37	27.45	3.33	-
PK	2.483502G	72.88	74.00	-1.12	30.79	3	Vertical	257	1.67	-	42.09	27.46	3.33	-

### Zigbee\_Nss1\_1TX

### 2480MHz\_TX

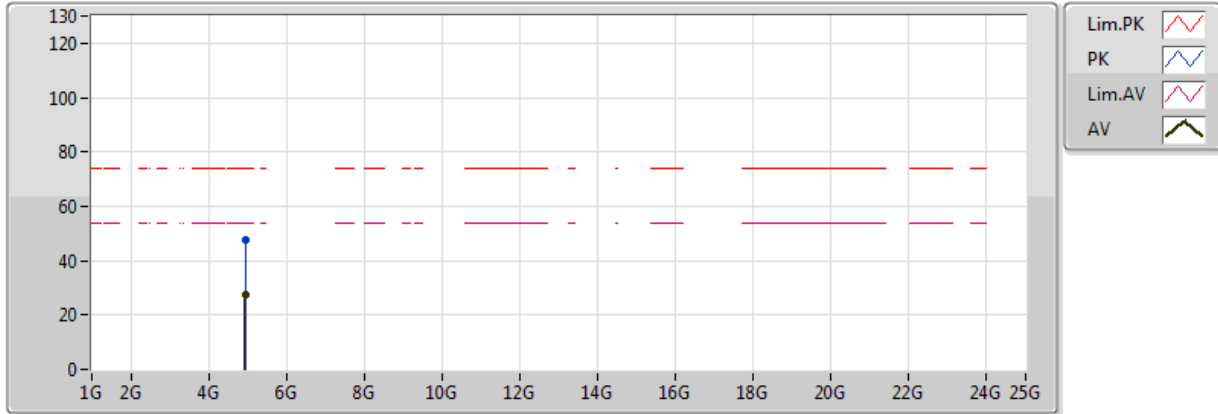


EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.960798G	28.29	54.00	-25.71	6.21	3	Vertical	79	1.18	-	22.08	31.44	4.59	29.82
PK	4.960798G	48.29	74.00	-25.71	6.21	3	Vertical	79	1.18	-	42.08	31.44	4.59	29.82

### Zigbee\_Nss1\_1TX

### 2480MHz\_TX



EUT=Y,ANT=Y

Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Condition	Azimuth (°)	Height (m)	Comments	Raw (dBuV)	AF (dB)	CL (dB)	PA (dB)
AV	4.959002G	27.41	54.00	-26.58	6.21	3	Horizontal	357	1.10	-	21.21	31.43	4.59	29.82
PK	4.959002G	47.41	74.00	-26.59	6.21	3	Horizontal	357	1.10	-	41.21	31.43	4.59	29.82