

NCC Test Report

Equipment : M2.COM LoRa IoT Node
Brand Name : Advantech
Model No. : WISE-1510
Standard : LP0002 Section 4.8.1 (2016-08-23)
Frequency : 920 MHz – 925 MHz
Function : ☒Point-to-multipoint; ☐Point-to-point
Applicant : 研華股份有限公司
 台北市內湖區瑞光路 26 巷 20 弄 1 號
Manufacturer : 研華股份有限公司
 台北市內湖區瑞光路 26 巷 20 弄 1 號

The product sample received on Dec. 28, 2016 and completely tested on Sep. 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.


Cliff Chang
SPORTON INTERNATIONAL INC.



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APPENDIX N. TEST PHOTOS

PHOTOGRAPHS OF EUT V01

Summary of Test Result

Conformance Test Specifications				
Report Clause	Ref. Std. Clause	Description	Limit	Result
1.1.2	4.8.1.2	Antenna Requirement	2.2	Complied
3.1	2.3	AC Power-line Conducted Emissions	2.3	Complied
DTS Test Method Performed- LoRa-500kHz				
4.1	4.8.1.4	DTS Bandwidth	≥500kHz	Complied
4.2	4.8.1.1	Maximum Conducted Output Power	Power [dBm]:30	Complied
4.3	4.8.1.4	Power Spectral Density	PSD [dBm/3kHz]:8	Complied
4.4	4.8.1.3	Emissions in Non-restricted Frequency Bands	Non-Restricted Bands: >30 dBc	Complied
4.5	2.8	Emissions in Restricted Frequency Bands	Restricted Bands: 2.7	Complied
Hybrid Test Method Performed- LoRa-125kHz				
5.1	4.8.1.4	20dB Bandwidth	4.8.1.4	Complied
5.1	4.8.1.4	Carrier Frequency Separation	4.8.1.4	Complied
5.2	4.8.1.1	Maximum Conducted Output Power	4.8.1.1	Complied
5.3	4.8.1.4	Power Spectral Density	PSD [dBm/3kHz]:8	Complied
5.4	4.8.1.4	Number of Hopping Frequencies and Hopping Band edge	4.8.1.4	Complied
5.5	4.8.1.4	Time of Occupancy (Dwell Time)	4.8.1.4	Complied
5.6	4.8.1.3	Emissions in Non-restricted Frequency Bands	4.8.1.3	Complied
5.7	2.8	Emissions in Restricted Frequency Bands	Restricted Bands: 2.7	Complied



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1 General Description

1.1 Information

1.1.1 RF General Information

Frequency Range	Lora Mode	Ch. Frequency (MHz)	Channel Number
920 MHz – 925 MHz	LoRa-125kHz	920.2 – 924.6	0-22 [23]
	LoRa-500kHz	920.9 – 924.5	0-6 [7]

Band	LoRa Mode	BWch	Nant
920 MHz – 925 MHz	LoRa-500kHz	600kHz	1
	LoRa-125kHz	200kHz	1

Note:

- ♦ 900M is the 900MHz band (920 MHz – 925 MHz)
 - ♦ LoRa-125kHz uses as a hybrid system using DTS & FHSS
 - ♦ LoRa-500kHz uses as a DTS
 - ♦ LoRa-125kHz, LoRa-500kHz uses Chirp Spread Spectrum (CSS) modulation
 - ♦ BWch is the nominal channel bandwidth.
 - ♦ Nss-Min is the minimum number of spatial streams.
 - ♦ Nant is the number of outputs. e.g., 2(2, 3) means have 2 outputs for port 2 and port 3. 2 means have 2 outputs for port 1 and port 2.
 - ♦ The EUT has two transmission modes for data transmissions as described below:
 1. LoRa-125kHz Hybrid (FHSS + DTS)
 2. LoRa-500kHz DTS
- Testing was performed in accordance with the applicable FCC requirement for each of two transmission modes.

1.1.2 Antenna Information

Ant.	Brand	Model Name (P/N)	Antenna Type	Connector	Gain (dBi)	Remark
1	PSA	RFDPA131000SMRB801	Dipole Antenna	I-PEX	3.01	1TX/1RX

1.1.3 Mode Test Duty Cycle

Mode	DC	DCF(dB)	T(s)	VBW(Hz) ≥ 1/T
LoRa-500kHz	0.461	3.363	247.922m	10
LoRa-125kHz	0.479	3.197	247.875m	10

1.1.4 EUT Operational Condition

EUT Power Type	From host system
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1.2 Testing Applied Standards

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

- ♦ LP0002 Section 4.8.1 (2016-08-23)
- ♦ ANSI C63.10-2013
- ♦ FCC KDB 558074 D01 v03r05
- ♦ FCC Public Notice DA 00-705
- ♦ FCC KDB 412172 D01 v01r01

1.3 Testing Location Information

Testing Location				
☐	HWA YA	ADD : No. 52, Hwa Ya 1st Rd., Kwei-Shan Hsiang, Tao Yuan Hsien, Taiwan, R.O.C.	TEL : 886-3-327-3456	FAX : 886-3-318-0055
☒	JHUBEI	ADD : No.8, Lane 724, Bo-ai St., Jhubei City, HsinChu County 302, Taiwan, R.O.C.	TEL : 886-3-656-9065	FAX : 886-3-656-9085

Test Condition	Test Site No.	Test Engineer	Test Environment	Test Date
AC Conduction	CO01-CB	Ryo Fan	23°C / 60%	Feb. 17, 2017
Radiated	03CH01-CB	Welson Chen	22°C / 54%	Sep. 07, 2017 Sep. 15, 2017
RF Conducted	TH01-CB	Eddie Weng, Gary Chu, Ron Huang	20°C / 45%	Aug. 16, 2017 Sep. 22, 2017

Test site Designation No. TW0006 with FCC.

Test site registered number IC 4086D with Industry Canada.

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)	3.2 dB	Confidence levels of 95%
Radiated Emission (30MHz ~ 1,000MHz)	3.6 dB	Confidence levels of 95%
Radiated Emission (1GHz ~ 18GHz)	3.7 dB	Confidence levels of 95%
Radiated Emission (18GHz ~ 40GHz)	3.5 dB	Confidence levels of 95%
Conducted Emission	1.7 dB	Confidence levels of 95%
Output Power Measurement	1.33 dB	Confidence levels of 95%
Power Density Measurement	1.27 dB	Confidence levels of 95%
Bandwidth Measurement	9.74 x10 ⁻⁸	Confidence levels of 95%

2 Test Configuration of EUT

2.1 Test Channel Mode

For LoRa-500kHz

Mode	Power Setting
LoRa_Nss1_1TX	-
920.9MHz	20
922.7MHz	20
924.5MHz	20

For LoRa-125kHz

Mode	Power Setting
LoRa_Nss1_1TX	-
920.2MHz	20
922.4MHz	20
924.6MHz	20

Note: Test Data Rate:

125k: 0.98kbps

500k: 0.98kbps

2.2 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	Normal Link

The Worst Case Mode for Following Conformance Tests	
Tests Item	DTS Bandwidth Maximum Conducted Output Power Power Spectral Density 20dB Bandwidth Carrier Frequency Separation Maximum Conducted Output Power Number of Hopping Frequencies and Hopping Bandedge Time of Occupancy (Dwell Time) 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	Intentional – CTX
1	EUT in X axis
2	EUT in Y axis
3	EUT in Z axis
For operating mode 3 are the worst case and it was record in this test report.	
Operating Mode < 1GHz	Unintentional – CRX
Mode 3 generated the worst test result for Radiated emission Intentional – CTX below 1GHz test, thus the measurement for Radiated emission unintentional – CRX below 1GHz test will follow this same test configuration.	
1	EUT in Z axis
Operating Mode > 1GHz	Unintentional – CRX 1GHz~5th Harmonic
The EUT was performed at X axis, Y axis and Z axis position for Radiated emission test, and the worst case was found at Z axis. So the measurement will follow this same test configuration.	
1	EUT in Z axis
Operating Mode > 1GHz	Intentional – CTX 1GHz~10th Harmonic
The EUT was performed at X axis, Y axis and Z axis position for Radiated emission test, and the worst case was found at Z axis. So the measurement will follow this same test configuration.	
1	EUT in Z axis (LoRa-500kHz)
2	EUT in Z axis (LoRa-125kHz)

2.3 EUT Operation during Test

For CTX/CRX Mode:

The EUT was programmed to be in continuously transmitting mode.

2.4 Accessories

N/A

2.5 Support Equipment

For Test Site No: CO01-CB

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	NB	DELL	E6430	DoC
2	Mouse	Logitech	M-U0026	DoC
3	Earphone	SHYARO CHI	MIC-04	DoC
4	Fixture1	Advantech	WISE-ES20	DoC
5	Fixture2	Advantech	WISE-ED30	DoC
6	Fixture3	Advantech	WISE-DB1500	DoC

For Test Site No: 03CH01-CB (below 1GHz for Intentional – CTX / Unintentional – Normal Link) and (above 1GHz for Unintentional – Normal Link)

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E4300	DoC
2	Mouse	Logitech	M-U0026	DoC
3	Earphone	SHYARO CHI	MIC-04	N/A
4	Fixture	Advantech	WISE-ED20	N/A

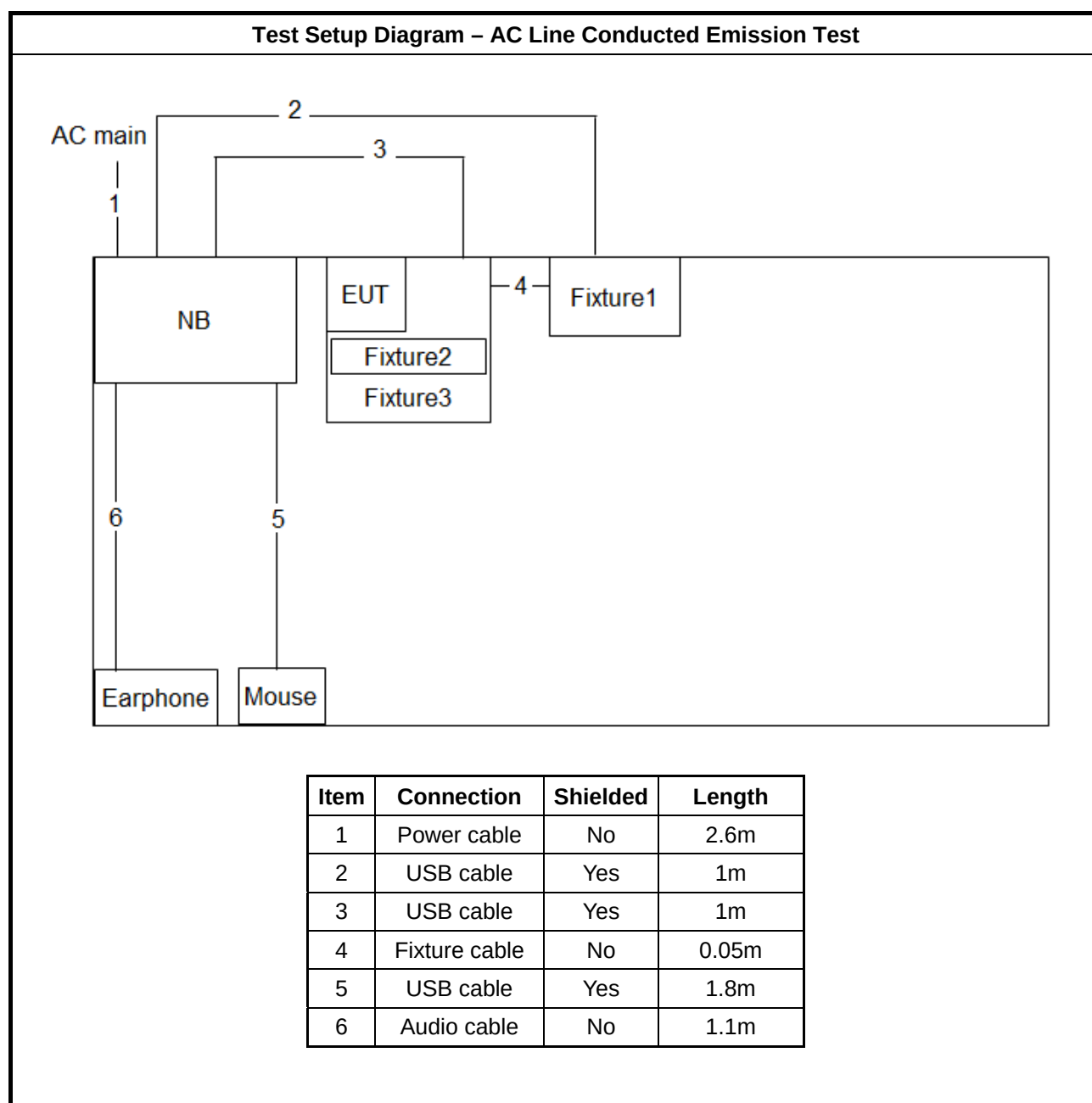
For Test Site No: 03CH01-CB (above 1GHz) Intentional – CTX

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E4300	DoC
2	Fixture	Advantech	WISE-ED20	N/A

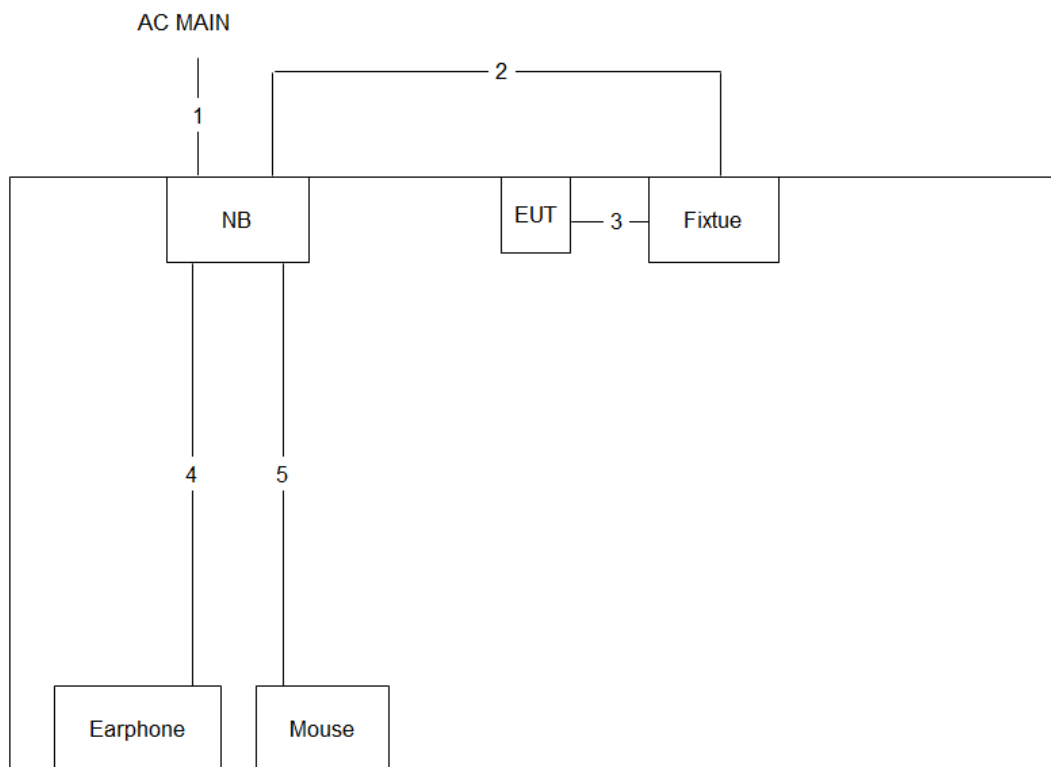
For Test Site No: TH01-CB

Support Equipment				
No.	Equipment	Brand Name	Model Name	FCC ID
1	Notebook	DELL	E4300	DoC
2	Fixture	Advantech	WISE-ED20	N/A

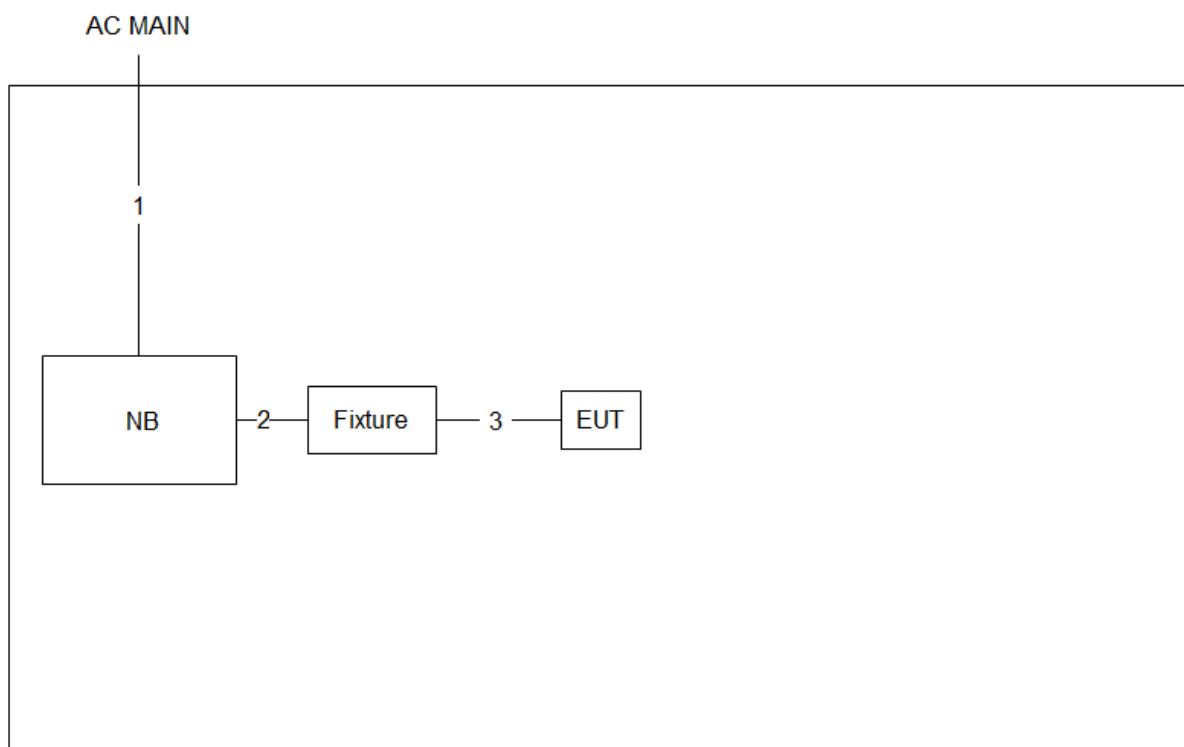
2.6 Test Setup Diagram



**Test Setup Diagram - Radiated Test < 1GHz / Intentional – CTX and Unintentional – CRX
Radiated Test > 1GHz Unintentional – CRX**



Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	1m
3	Fixture cable	No	0.05m
4	Audio cable	No	1.1m
5	USB cable	Yes	1.8m

Test Setup Diagram - Radiated Test > 1GHz / Intentional – CTX


Item	Connection	Shielded	Length
1	Power cable	No	2.6m
2	USB cable	Yes	1m
3	Fixture cable	No	0.05m

3 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.

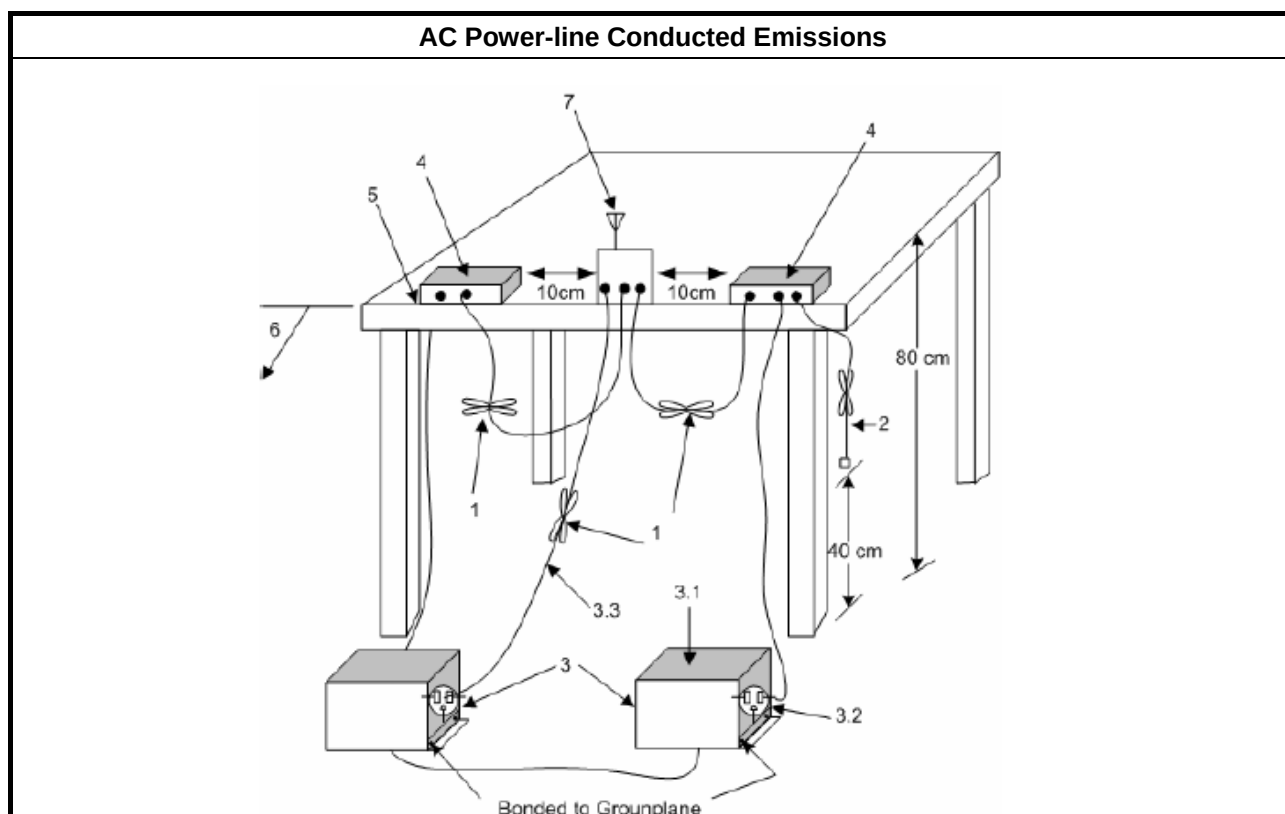
3.1.2 Measuring Instruments

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

4 Transmitter Test Result – DTS

4.1 DTS Bandwidth

4.1.1 6dB Bandwidth Limit

6dB Bandwidth Limit
Systems using digital modulation techniques:
6 dB bandwidth $\geq$ 500 kHz.

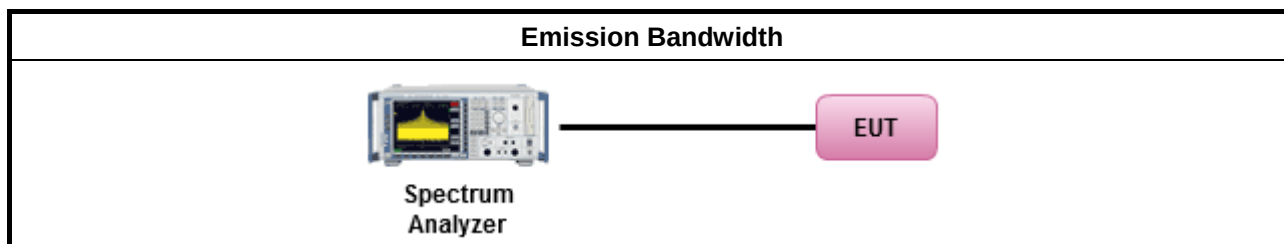
4.1.2 Measuring Instruments

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

4.1.3 Test Procedures

Test Method
For the emission bandwidth shall be measured using one of the options below:
☒ Refer as FCC KDB 558074, clause 8.1 Option 1 for 6 dB bandwidth measurement.
☐ Refer as FCC KDB 558074, clause 8.2 Option 2 for 6 dB bandwidth measurement.
☐ Refer as ANSI C63.10, clause 6.9.1 for occupied bandwidth testing.

4.1.4 Test Setup



4.1.5 Test Result of Emission Bandwidth

Refer as Appendix B

4.2 Maximum Conducted Output Power

4.2.1 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
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi.	

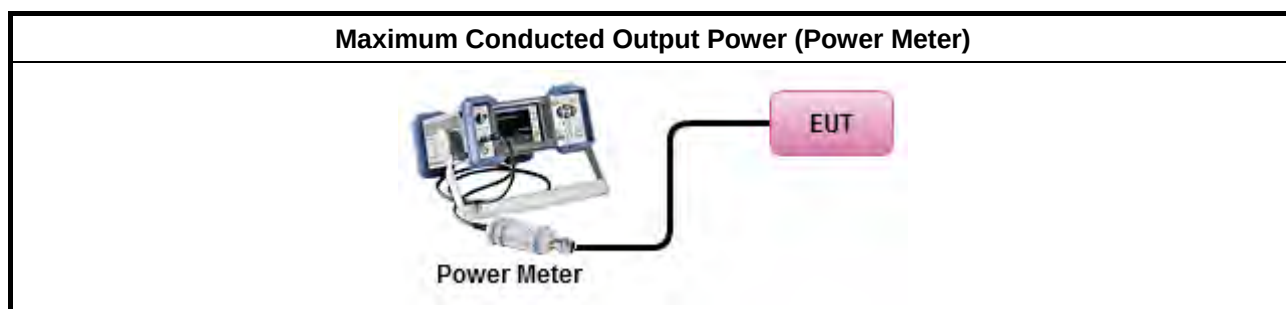
4.2.2 Measuring Instruments

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

4.2.3 Test Procedures

Test Method	
Maximum Peak Conducted Output Power	
☐	Refer as FCC KDB 558074, clause 9.1.1 Option 1 (RBW ≥ EBW method).
☐	Refer as FCC KDB 558074, clause 9.1.2 Option 2 (peak power meter for VBW ≥ DTS BW)
Maximum Conducted Output Power	
[duty cycle ≥ 98% or external video / power trigger]	
☐	Refer as FCC KDB 558074, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging).
☐	Refer as FCC KDB 558074, clause 9.2.2.3 Method AVGSA-1 Alt. (slow sweep speed)
duty cycle < 98% and average over on/off periods with duty factor	
☐	Refer as FCC KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
☐	Refer as FCC 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 FCC KDB 558074, clause 9.2.3 Method AVGPM-G (using an RF average power meter).
For conducted measurement.	
If the EUT supports multiple transmit chains using options given below: Refer as FCC 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]) $EIRP_{total} = P_{total} + DG$	

4.2.4 Test Setup



4.2.5 Test Result of Maximum Conducted Output Power

Refer as Appendix C

4.3 Power Spectral Density

4.3.1 Power Spectral Density Limit

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

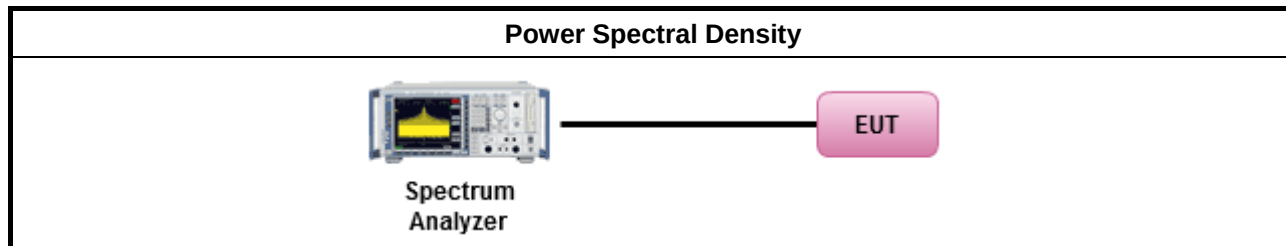
4.3.2 Measuring Instruments

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

4.3.3 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 FCC KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz; Detector=peak). [duty cycle $\geq 98\%$ or external video / power trigger]
☐ Refer as FCC KDB 558074, clause 10.3 Method AVGPS-1 (spectral trace averaging).
☐ Refer as FCC KDB 558074, clause 10.4 Method AVGPS-2 (slow sweep speed)
duty cycle $< 98\%$ and average over on/off periods with duty factor
☐ Refer as FCC KDB 558074, clause 10.5 Method AVGPS-1 Alt (spectral trace averaging).
☐ Refer as FCC KDB 558074, clause 10.6 Method AVGPS-2 Alt. (slow sweep speed)
For conducted measurement.
If The EUT supports multiple transmit chains using options given below:
☒ Option 1: Measure and sum the spectra across the outputs. Refer as FCC 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.
☐ Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,
☐ Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.

4.3.4 Test Setup



4.3.5 Test Result of Power Spectral Density

Refer as Appendix D

4.4 Emissions in Non-restricted Frequency Bands

4.4.1 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.	

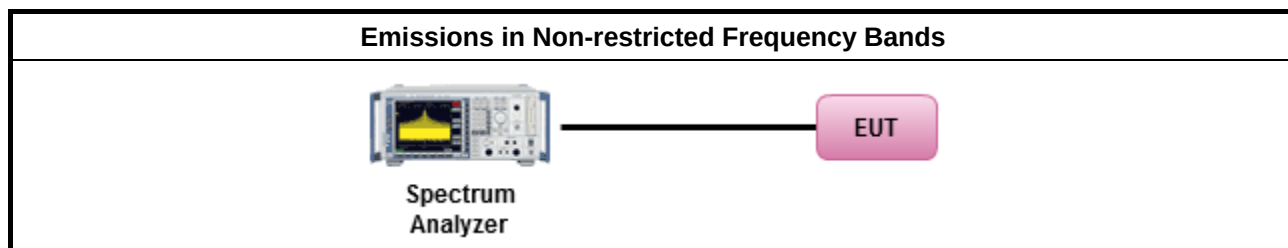
4.4.2 Measuring Instruments

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

4.4.3 Test Procedures

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

4.4.4 Test Setup



4.4.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix E

4.5 Emissions in Restricted Frequency Bands

4.5.1 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.

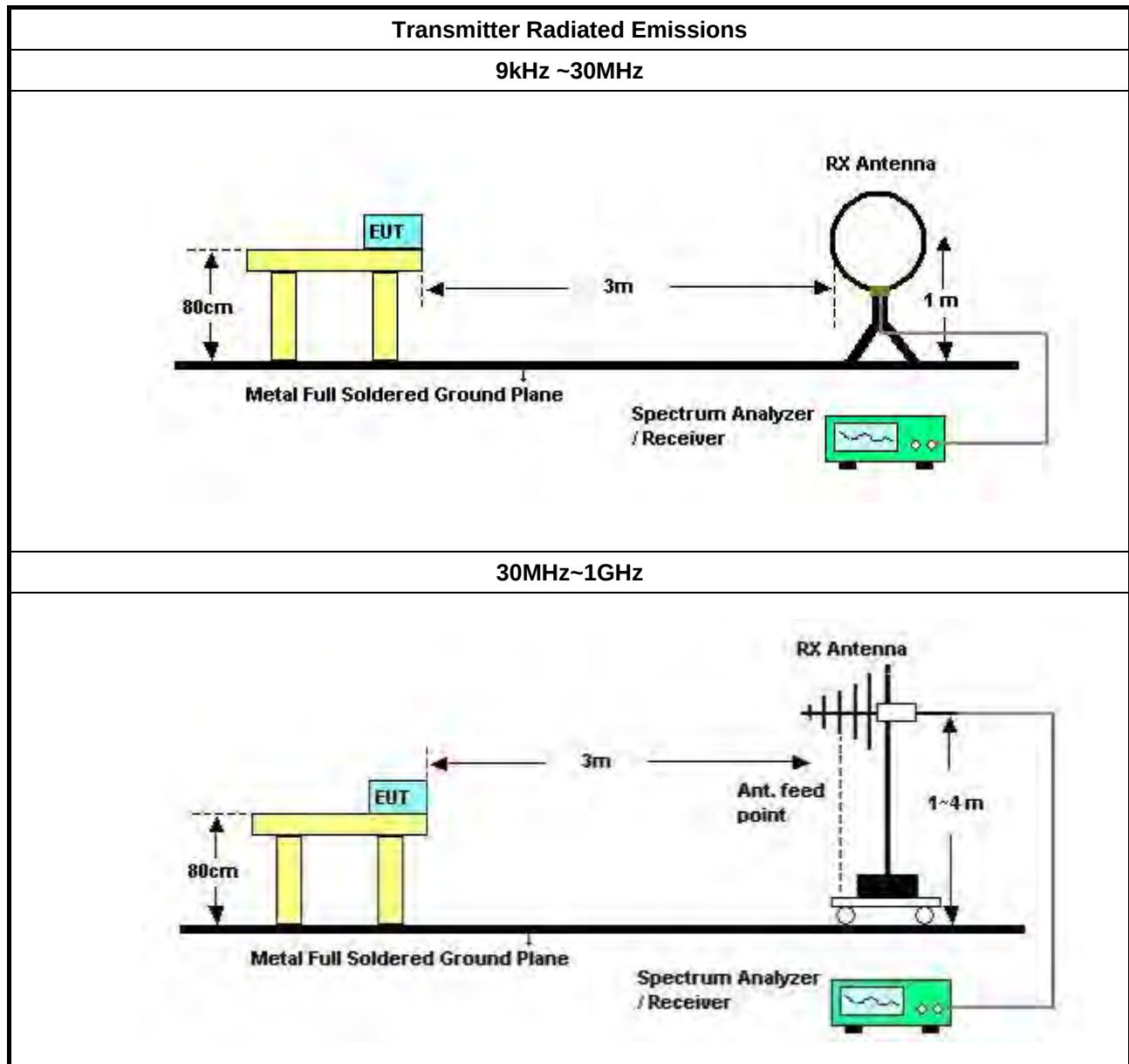
4.5.2 Measuring Instruments

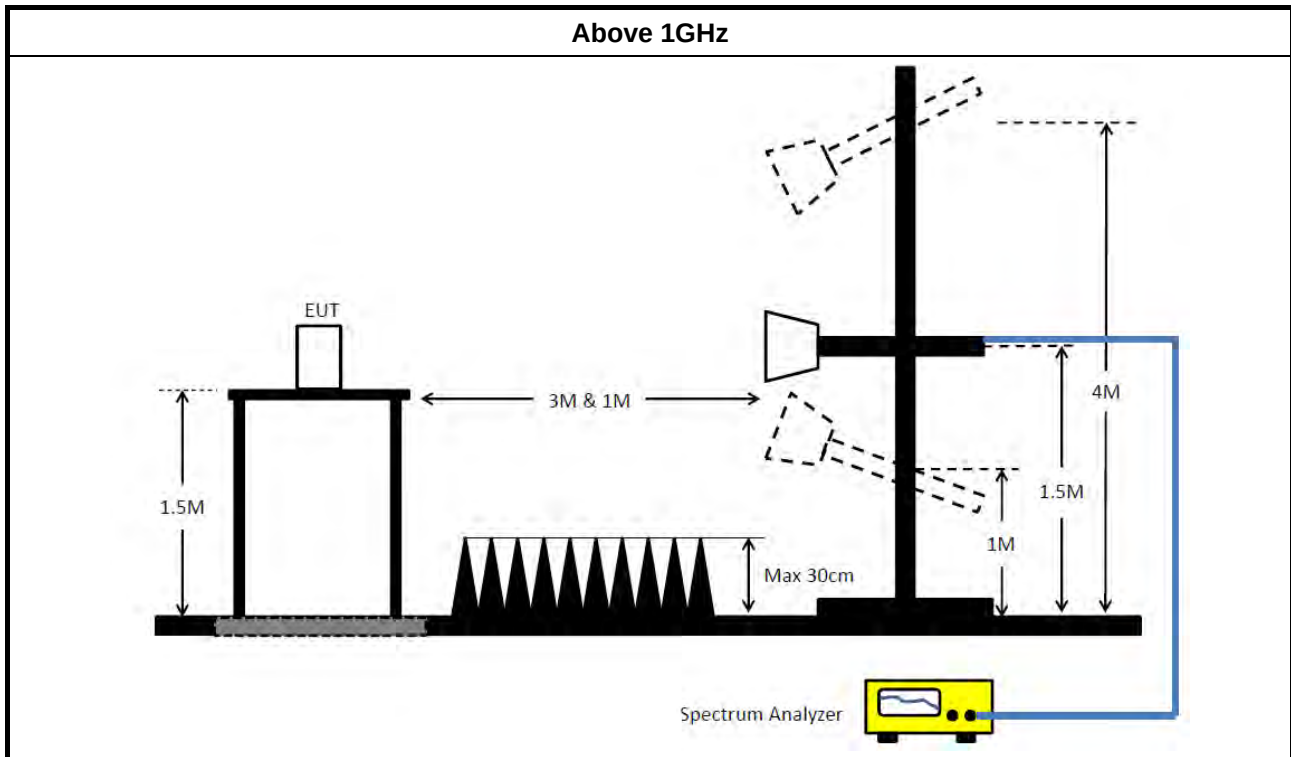
Refer a test equipment and calibration data table in this test report.

4.5.3 Test Procedures

Test Method	
The average emission levels shall be measured in [duty cycle ≥ 98 or duty factor].	
Refer as ANSI C63.10, clause 6.9.2.2 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 FCC KDB 558074, clause 12 for unwanted emissions into restricted bands.
	☐ Refer as FCC KDB 558074, clause 12.2.5.1 Option 1 (trace averaging for duty cycle $\geq 98\%$)
	☐ Refer as FCC KDB 558074, clause 12.2.5.2 Option 2 (trace averaging + duty factor).
	☒ Refer as FCC KDB 558074, clause 12.2.5.3 Option 3 (Reduced VBW $\geq 1/T$).
	☐ Refer as ANSI C63.10, clause 4.2.3.2.3 (Reduced VBW). VBW $\geq 1/T$, where T is pulse time.
	☐ Refer as ANSI C63.10, clause 4.2.3.2.4 average value of pulsed emissions.
	☒ Refer as FCC 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 FCC 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 FCC KDB 558074, clause 13.2 (ANSI C63.10, clause 6.9.3) for marker-delta method for band-edge measurements.
	Refer as FCC 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 FCC 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 FCC 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.

4.5.4 Test Setup





4.5.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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

4.5.6 Transmitter Radiated Unwanted Emissions

Refer as Appendix F

5 Transmitter Test Result – Hybrid

5.1 20dB Bandwidth and Carrier Frequency Separation

5.1.1 20dB Bandwidth and Carrier Frequency Separation Limit

20dB Bandwidth and Carrier Frequency Separation Limit for Frequency Hopping Systems	
▪ 920-925 MHz Band:	
	▪ $N \geq 50$ and $ChS \geq \text{MAX}$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth $\leq$ 250 kHz.
	▪ $50 > N \geq 25$ and $ChS \geq \text{MAX}$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth $>$ 250 kHz.
▪ 2400-2483.5 MHz Band:	
	▪ $N \geq 75$ and $ChS \geq \text{MAX}$ (20 dB bandwidth, 25 kHz).
	▪ $75 > N \geq 15$ and $ChS \geq \text{MAX}$ (20 dB bandwidth 2/3, 25 kHz).
▪ 5725-5850 MHz Band:	
	▪ $N \geq 75$ and $ChS \geq \text{MAX}$ (20 dB bandwidth, 25 kHz); 20 dB bandwidth $\leq$ 1 MHz.
N: Number of Hopping Frequencies; ChS: Hopping Channel Separation	

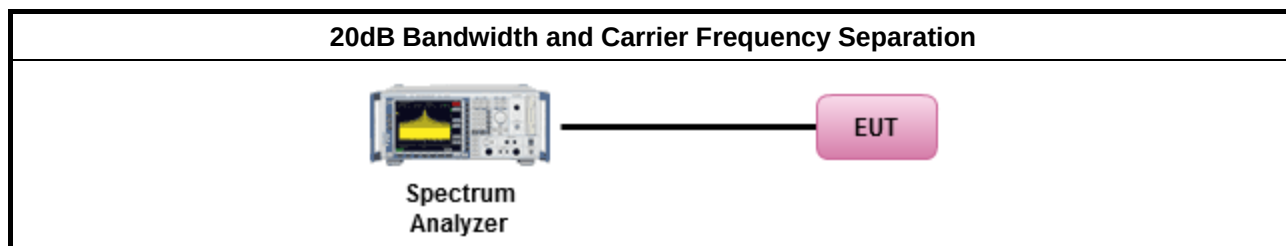
5.1.2 Measuring Instruments

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

5.1.3 Test Procedures

Test Method
▪ Refer as ANSI C63.10-2013, clause 6.9.1 for 20 dB bandwidth measurement.
▪ Refer as ANSI C63.10-2013, clause 7.8.2 for carrier frequency separation measurement.

5.1.4 Test Setup



5.1.5 Test Result of 20dB Bandwidth

Refer as Appendix G

5.1.6 Test Result of Carrier Frequency Separation

Refer as Appendix G

5.2 Maximum Conducted Output Power

5.2.1 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
P_{Out} = maximum peak conducted output power or maximum conducted output power in dBm, G_{TX} = the maximum transmitting antenna directional gain in dBi.	

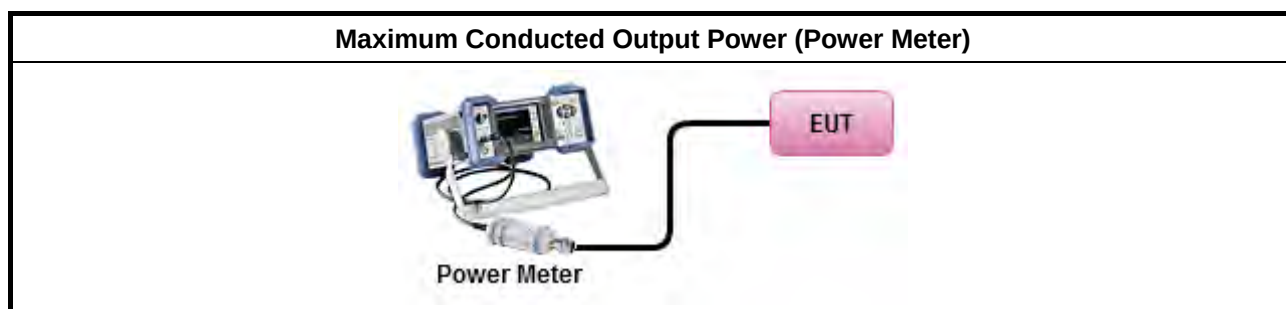
5.2.2 Measuring Instruments

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

5.2.3 Test Procedures

Test Method	
Maximum Peak Conducted Output Power	
☐	Refer as FCC KDB 558074, clause 9.1.1 Option 1 (RBW ≥ EBW method).
☐	Refer as FCC KDB 558074, clause 9.1.2 Option 2 (peak power meter for VBW ≥ DTS BW)
Maximum Conducted Output Power	
[duty cycle ≥ 98% or external video / power trigger]	
☐	Refer as FCC KDB 558074, clause 9.2.2.2 Method AVGSA-1 (spectral trace averaging).
☐	Refer as FCC KDB 558074, clause 9.2.2.3 Method AVGSA-1 Alt. (slow sweep speed)
duty cycle < 98% and average over on/off periods with duty factor	
☐	Refer as FCC KDB 558074, clause 9.2.2.4 Method AVGSA-2 (spectral trace averaging).
☐	Refer as FCC 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 FCC KDB 558074, clause 9.2.3 Method AVGPM-G (using an RF average power meter).
For conducted measurement.	
If the EUT supports multiple transmit chains using options given below: Refer as FCC 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: $P_{\text{total}} = P_1 + P_2 + \dots + P_n$ (calculated in linear unit [mW] and transfer to log unit [dBm]) $\text{EIRP}_{\text{total}} = P_{\text{total}} + \text{DG}$	

5.2.4 Test Setup



5.2.5 Test Result of Maximum Conducted Output Power

Refer as Appendix H

5.3 Power Spectral Density

5.3.1 Power Spectral Density Limit

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

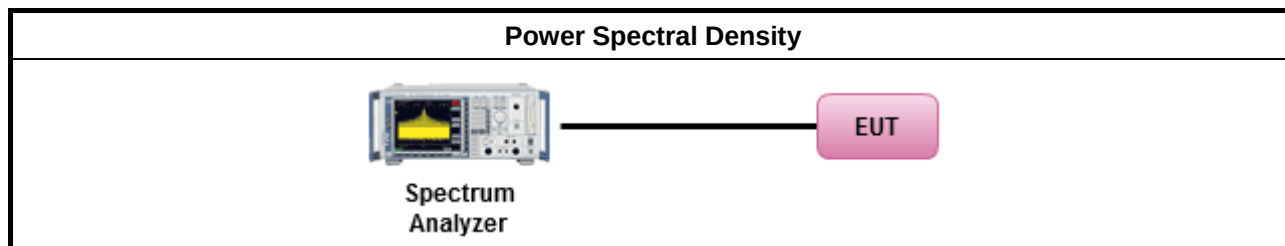
5.3.2 Measuring Instruments

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

5.3.3 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 FCC KDB 558074, clause 10.2 Method PKPSD (RBW=3-100kHz; Detector=peak). [duty cycle $\geq 98\%$ or external video / power trigger]
☐ Refer as FCC KDB 558074, clause 10.3 Method AVGPS-1 (spectral trace averaging).
☐ Refer as FCC KDB 558074, clause 10.4 Method AVGPS-2 (slow sweep speed)
duty cycle $< 98\%$ and average over on/off periods with duty factor
☐ Refer as FCC KDB 558074, clause 10.5 Method AVGPS-1 Alt (spectral trace averaging).
☐ Refer as FCC KDB 558074, clause 10.6 Method AVGPS-2 Alt. (slow sweep speed)
For conducted measurement.
If The EUT supports multiple transmit chains using options given below:
☒ Option 1: Measure and sum the spectra across the outputs. Refer as FCC 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.
☐ Option 2: Measure and sum spectral maxima across the outputs. With this technique, spectra are measured at each output of the device at the required resolution bandwidth. The maximum value (peak) of each spectrum is determined. These maximum values are then summed mathematically in linear power units across the outputs. These operations shall be performed separately over frequency spans that have different out-of-band or spurious emission limits,
☐ Option 3: Measure and add 10 log(N) dB, where N is the number of transmit chains. Refer as FCC KDB 662911, In-band power spectral density (PSD). Performed at each transmit chains and each transmit chains shall be compared with the limit have been reduced with 10 log(N). Or each transmit chains shall be add 10 log(N) to compared with the limit.

5.3.4 Test Setup



5.3.5 Test Result of Power Spectral Density

Refer as Appendix I

5.4 Number of Hopping Frequencies and Hopping Bandedge

5.4.1 Number of Hopping Frequencies Limit

Number of Hopping Frequencies Limit	
920-925 MHz Band:	
	ChS $\geq$ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth $\leq$ 250 kHz.
	ChS $\geq$ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth $>$ 250 kHz.
2400-2483.5 MHz Band:	
	ChS $\geq$ MAX (20 dB bandwidth, 25 kHz).
	ChS $\geq$ MAX (20 dB bandwidth 2/3, 25 kHz).
5725-5850 MHz Band:	
	ChS $\geq$ MAX (20 dB bandwidth, 25 kHz); 20 dB bandwidth $\leq$ 1 MHz.
ChS : Hopping Channel Separation	

5.4.2 Hopping Bandedge Limit

Refer clause 5.6.1 and clause 5.7.1

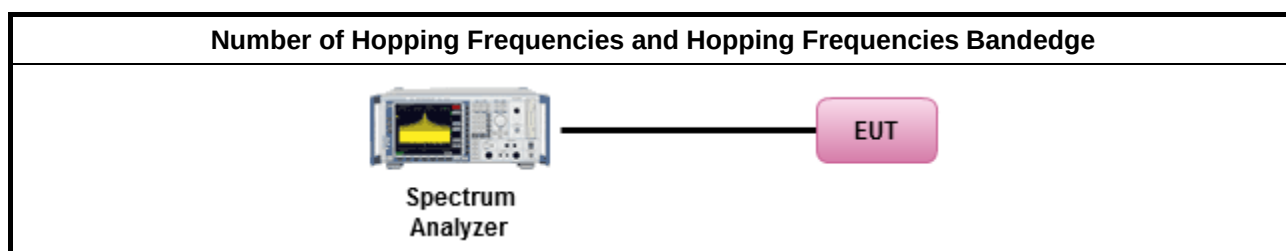
5.4.3 Measuring Instruments

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

5.4.4 Test Procedures

Test Method
Refer as ANSI C63.10-2013, clause 7.8.3 for number of hopping frequencies measurement.
Refer as ANSI C63.10-2013, clause 7.8.6 for hopping frequencies Bandedge measurement.

5.4.5 Test Setup



5.4.6 Test Result of Number of Hopping Frequencies

Refer as Appendix J

5.4.7 Test Result of Number of Hopping Frequencies Bandedge

Refer as Appendix J

5.5 Time of Occupancy (Dwell Time)

5.5.1 Time of Occupancy (Dwell Time) Limit

20dB Bandwidth and Carrier Frequency Separation Limit for Frequency Hopping Systems	
▪ 920-925 MHz Band:	
	▪ 0.4s in N x 0.4 period
▪ 2400-2483.5 MHz Band:	
	▪ 0.4s in N x 0.4 period
▪ 5725-5850 MHz Band:	
	▪ 0.4s in N x 0.4 period
N: Number of Hopping Frequencies	

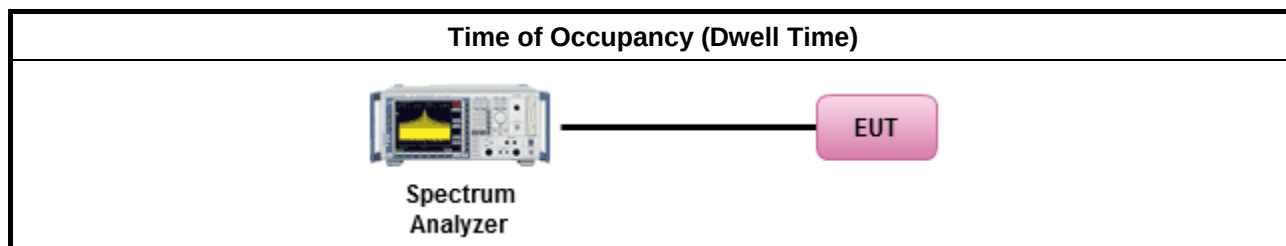
5.5.2 Measuring Instruments

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

5.5.3 Test Procedures

Test Method	
▪ Refer as ANSI C63.10-2013, clause 7.8.4 for dwell time measurement.	
▪ Bluetooth ACL packets can be 1, 3, or 5 time slots. Following as dwell time. Operate DH5 at maximum dwell time and maximum duty cycle.	
	▪ The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms. DH5 Packet permit maximum $1600 / 79 / 6 = 3.37$ hops per second in each channel.

5.5.4 Test Setup



5.5.5 Test Result of Time of Occupancy (Dwell Time)

Refer as Appendix K

5.6 Emissions in Non-restricted Frequency Bands

5.6.1 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.	

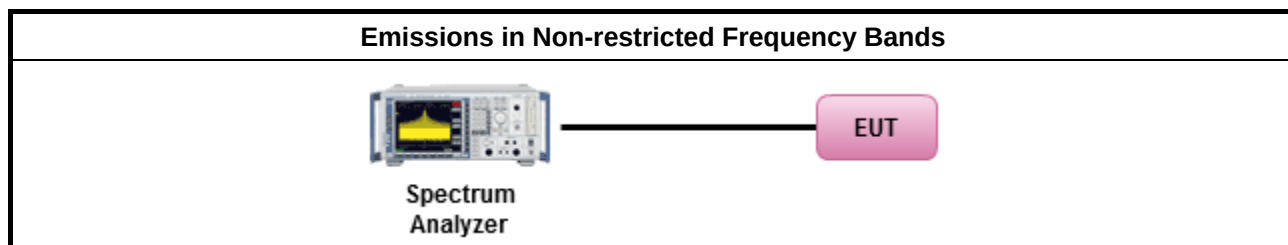
5.6.2 Measuring Instruments

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

5.6.3 Test Procedures

Test Method
Refer as ANSI C63.10-2013, clause 7.8.8 for unwanted emissions into non-restricted bands.

5.6.4 Test Setup



5.6.5 Test Result of Emissions in Non-restricted Frequency Bands

Refer as Appendix L

5.7 Emissions in Restricted Frequency Bands

5.7.1 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.

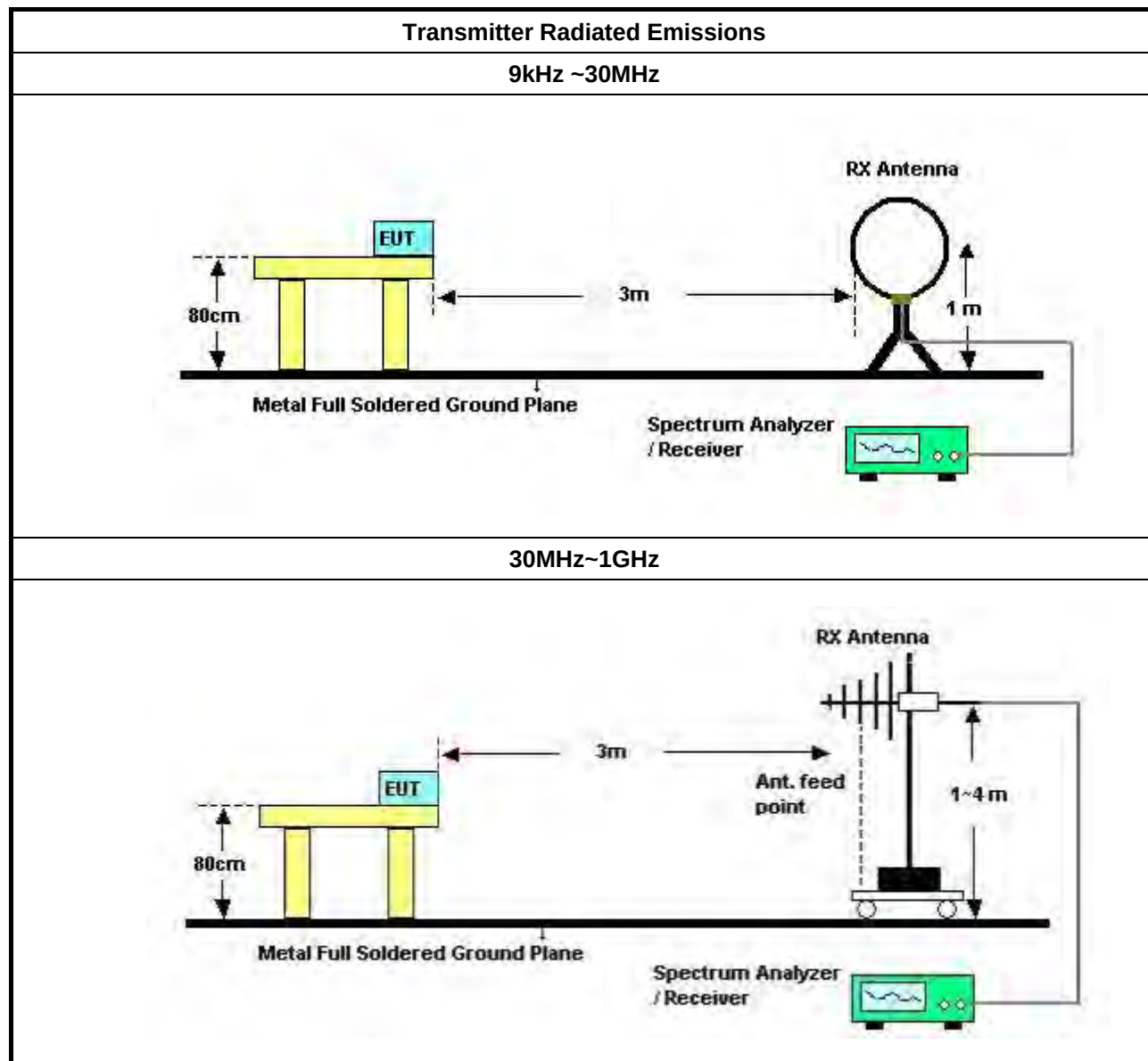
5.7.2 Measuring Instruments

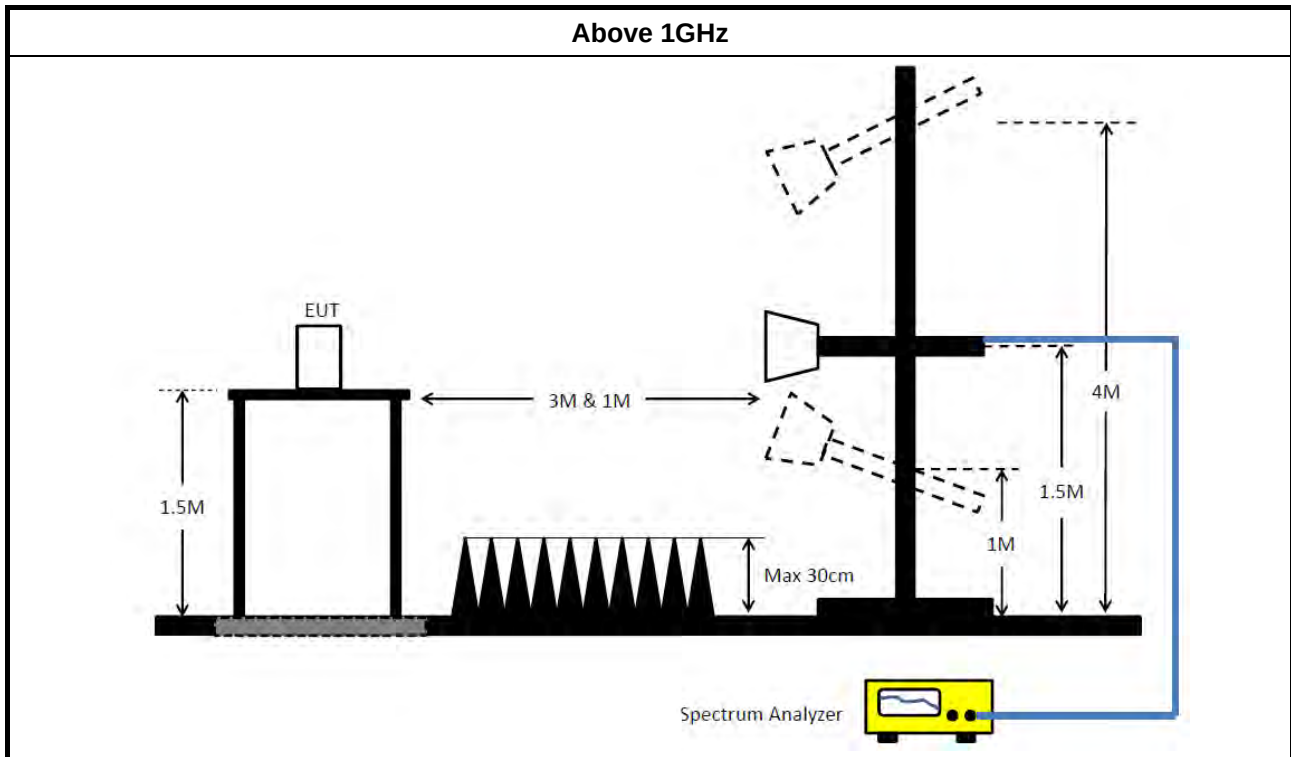
Refer a test equipment and calibration data table in this test report.

5.7.3 Test Procedures

Test Method	
▪ The average emission levels shall be measured in [hopping duty factor].	
▪ Refer as ANSI C63.10; clause 6.9.2.2 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 ANSI C63.10, clause 4.1.4.2.1 QP value.
	▪ Refer as ANSI C63.10, clause 4.1.4.2.2 measurement procedure peak.
	▪ Refer as ANSI C63.10, clause 4.1.4.2.4 average value of hopping pulsed emissions.

5.7.4 Test Setup





5.7.5 Transmitter Radiated Unwanted Emissions (Below 30MHz)

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

5.7.6 Transmitter Radiated Unwanted Emissions

Below 1GHz and above 1GHZ Unintentional – CRX 1GHz~5th Harmonic
Refer as Appendix F

Above 1GHz Intentional – CTX 1GHz~10th Harmonic
Refer as Appendix M

6 Test Equipment and Calibration Data

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
EMI Receiver	Agilent	N9038A	My52260123	9kHz ~ 8.45GHz	Jan. 23, 2017	Jan. 22, 2018	Conduction (CO01-CB)
LISN	F.C.C.	FCC-LISN-50-16-2	04083	150kHz ~ 100MHz	Dec. 14, 2016	Dec. 13, 2017	Conduction (CO01-CB)
LISN	Schwarzbeck	NSLK 8127	8127647	9kHz ~ 30MHz	Dec. 21, 2016	Dec. 20, 2017	Conduction (CO01-CB)
COND Cable	Woken	Cable	01	150kHz ~ 30MHz	May 24, 2016	May 23, 2017	Conduction (CO01-CB)
Software	Audix	E3	6.120210n	-	N.C.R.	N.C.R.	Conduction (CO01-CB)
BILOG ANTENNA with 6dB Attenuator	TESEQ & EMCi	CBL6112D & N-6-06	37880 & AT-N0609	20MHz ~ 2GHz	Aug. 30, 2017	Aug. 29, 2018	Radiation (03CH01-CB)
Horn Antenna	EMCO	3115	00075790	750MHz ~ 18GHz	Nov. 10, 2016	Nov. 09, 2017	Radiation (03CH01-CB)
Horn Antenna	Schwarzbeck	BBHA 9170	BBHA9170252	15GHz ~ 40GHz	Jul. 05, 2017	Jul. 04, 2018	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8447D	2944A10991	0.1MHz ~ 1.3GHz	Mar. 13, 2017	Mar. 12, 2018	Radiation (03CH01-CB)
Pre-Amplifier	Agilent	8449B	3008A02310	1GHz ~ 26.5GHz	Jan. 16, 2017	Jan. 15, 2018	Radiation (03CH01-CB)
Pre-Amplifier	MITEQ	TTA1840-35-H G	1864479	18GHz ~ 40GHz	Jul. 10, 2017	Jul. 09, 2018	Radiation (03CH01-CB)
Spectrum Analyzer	R&S	FSP40	100056	9kHz ~ 40GHz	Nov. 22, 2016	Nov. 21, 2017	Radiation (03CH01-CB)
EMI Test	R&S	ESCS	100355	9kHz ~ 2.75GHz	May 06, 2017	May 05, 2018	Radiation (03CH01-CB)
RF Cable-low	Woken	Low Cable-16+17	N/A	30 MHz ~ 1 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16	N/A	1 GHz ~ 18 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-16+17	N/A	1 GHz ~ 18 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#1	N/A	18GHz ~ 40 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
RF Cable-high	Woken	High Cable-40G#2	N/A	18GHz ~ 40 GHz	Oct. 24, 2016	Oct. 23, 2017	Radiation (03CH01-CB)
Test Software	Audix	E3	6.2009-10-7	N/A	N/A	N/A	Radiation (03CH01-CB)
Loop Antenna	Teseq	HLA 6120	24155	9kHz - 30 MHz	Mar. 16, 2016*	Mar. 15, 2018*	Radiation (03CH01-CB)
Spectrum analyzer	R&S	FSV40	100979	9kHz~40GHz	Dec. 26, 2016	Dec. 25, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-6	1 GHz ~ 26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)



NCC Test Report

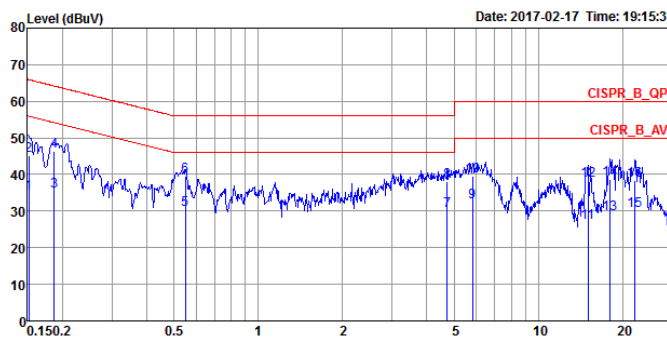
Report No. : TR690609-01

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Calibration Due Date	Remark
RF Cable-high	Woken	RG402	High Cable-7	1 GHz –26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-8	1 GHz –26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-9	1 GHz –26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
RF Cable-high	Woken	RG402	High Cable-10	1 GHz –26.5 GHz	Oct. 24, 2016	Oct. 23, 2017	Conducted (TH01-CB)
Power Sensor	Agilent	U2021XA	MY53410001	50MHz~18GHz	Nov. 22, 2016	Nov. 23, 2017	Conducted (TH01-CB)

Note: Calibration Interval of instruments listed above is one year.

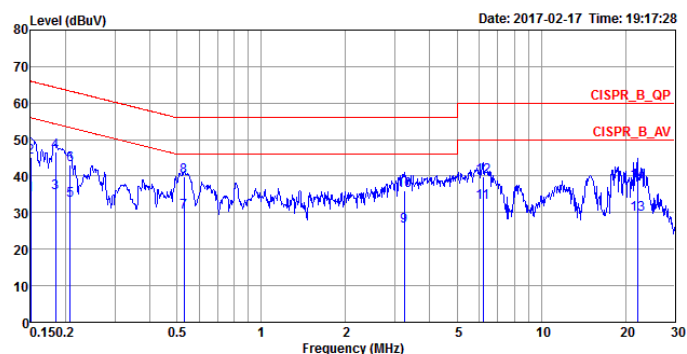
“*” Calibration Interval of instruments listed above is two years.

N.C.R. means Non-Calibration required.

AC Power-line Conducted Emissions Result																																																																																																																																																																																											
Operating Mode		1			Power Phase			Neutral																																																																																																																																																																																			
Operating Function		Normal Link																																																																																																																																																																																									
Level (dBuV)  Date: 2017-02-17 Time: 19:15:31 <table><tr><th></th><th>Freq</th><th>Level</th><th>Over</th><th>Limit</th><th>Read</th><th>LISN</th><th>Cable</th><th rowspan="2">Remark</th><th rowspan="2">Pol/Phase</th></tr><tr><th></th><th>MHz</th><th>dBuV</th><th>Limit</th><th>Line</th><th>Level</th><th>Factor</th><th>Loss</th></tr><tr><td>1</td><td>0.1516</td><td>34.98</td><td>-20.93</td><td>55.91</td><td>25.00</td><td>9.94</td><td>0.04</td><td>Average</td><td>NEUTRAL</td></tr><tr><td>2</td><td>0.1516</td><td>45.06</td><td>-20.85</td><td>65.91</td><td>35.08</td><td>9.94</td><td>0.04</td><td>QP</td><td>NEUTRAL</td></tr><tr><td>3</td><td>0.1864</td><td>35.53</td><td>-18.67</td><td>54.20</td><td>25.51</td><td>9.97</td><td>0.05</td><td>Average</td><td>NEUTRAL</td></tr><tr><td>4</td><td>0.1864</td><td>46.34</td><td>-17.86</td><td>64.20</td><td>36.32</td><td>9.97</td><td>0.05</td><td>QP</td><td>NEUTRAL</td></tr><tr><td>5</td><td>0.5493</td><td>30.48</td><td>-15.52</td><td>46.00</td><td>20.47</td><td>9.97</td><td>0.04</td><td>Average</td><td>NEUTRAL</td></tr><tr><td>6</td><td>0.5493</td><td>39.69</td><td>-16.31</td><td>56.00</td><td>29.68</td><td>9.97</td><td>0.04</td><td>QP</td><td>NEUTRAL</td></tr><tr><td>7</td><td>4.7213</td><td>30.03</td><td>-15.97</td><td>46.00</td><td>19.80</td><td>10.09</td><td>0.14</td><td>Average</td><td>NEUTRAL</td></tr><tr><td>8</td><td>4.7213</td><td>38.19</td><td>-17.81</td><td>56.00</td><td>27.96</td><td>10.09</td><td>0.14</td><td>QP</td><td>NEUTRAL</td></tr><tr><td>9</td><td>5.8358</td><td>32.60</td><td>-17.40</td><td>50.00</td><td>22.34</td><td>10.11</td><td>0.15</td><td>Average</td><td>NEUTRAL</td></tr><tr><td>10</td><td>5.8358</td><td>39.57</td><td>-20.43</td><td>60.00</td><td>29.31</td><td>10.11</td><td>0.15</td><td>QP</td><td>NEUTRAL</td></tr><tr><td>11</td><td>15.0656</td><td>27.01</td><td>-22.99</td><td>50.00</td><td>16.55</td><td>10.24</td><td>0.22</td><td>Average</td><td>NEUTRAL</td></tr><tr><td>12</td><td>15.0656</td><td>38.44</td><td>-21.56</td><td>60.00</td><td>27.98</td><td>10.24</td><td>0.22</td><td>QP</td><td>NEUTRAL</td></tr><tr><td>13</td><td>17.9441</td><td>29.25</td><td>-20.75</td><td>50.00</td><td>18.74</td><td>10.27</td><td>0.24</td><td>Average</td><td>NEUTRAL</td></tr><tr><td>14</td><td>17.9441</td><td>38.71</td><td>-21.29</td><td>60.00</td><td>28.20</td><td>10.27</td><td>0.24</td><td>QP</td><td>NEUTRAL</td></tr><tr><td>15</td><td>22.1801</td><td>30.06</td><td>-19.94</td><td>50.00</td><td>19.50</td><td>10.30</td><td>0.26</td><td>Average</td><td>NEUTRAL</td></tr><tr><td>16</td><td>22.1801</td><td>38.50</td><td>-21.50</td><td>60.00</td><td>27.94</td><td>10.30</td><td>0.26</td><td>QP</td><td>NEUTRAL</td></tr></table>											Freq	Level	Over	Limit	Read	LISN	Cable	Remark	Pol/Phase		MHz	dBuV	Limit	Line	Level	Factor	Loss	1	0.1516	34.98	-20.93	55.91	25.00	9.94	0.04	Average	NEUTRAL	2	0.1516	45.06	-20.85	65.91	35.08	9.94	0.04	QP	NEUTRAL	3	0.1864	35.53	-18.67	54.20	25.51	9.97	0.05	Average	NEUTRAL	4	0.1864	46.34	-17.86	64.20	36.32	9.97	0.05	QP	NEUTRAL	5	0.5493	30.48	-15.52	46.00	20.47	9.97	0.04	Average	NEUTRAL	6	0.5493	39.69	-16.31	56.00	29.68	9.97	0.04	QP	NEUTRAL	7	4.7213	30.03	-15.97	46.00	19.80	10.09	0.14	Average	NEUTRAL	8	4.7213	38.19	-17.81	56.00	27.96	10.09	0.14	QP	NEUTRAL	9	5.8358	32.60	-17.40	50.00	22.34	10.11	0.15	Average	NEUTRAL	10	5.8358	39.57	-20.43	60.00	29.31	10.11	0.15	QP	NEUTRAL	11	15.0656	27.01	-22.99	50.00	16.55	10.24	0.22	Average	NEUTRAL	12	15.0656	38.44	-21.56	60.00	27.98	10.24	0.22	QP	NEUTRAL	13	17.9441	29.25	-20.75	50.00	18.74	10.27	0.24	Average	NEUTRAL	14	17.9441	38.71	-21.29	60.00	28.20	10.27	0.24	QP	NEUTRAL	15	22.1801	30.06	-19.94	50.00	19.50	10.30	0.26	Average	NEUTRAL	16	22.1801	38.50	-21.50	60.00	27.94	10.30	0.26	QP	NEUTRAL
	Freq	Level	Over	Limit	Read	LISN	Cable	Remark	Pol/Phase																																																																																																																																																																																		
	MHz	dBuV	Limit	Line	Level	Factor	Loss																																																																																																																																																																																				
1	0.1516	34.98	-20.93	55.91	25.00	9.94	0.04	Average	NEUTRAL																																																																																																																																																																																		
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5	0.5493	30.48	-15.52	46.00	20.47	9.97	0.04	Average	NEUTRAL																																																																																																																																																																																		
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7	4.7213	30.03	-15.97	46.00	19.80	10.09	0.14	Average	NEUTRAL																																																																																																																																																																																		
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9	5.8358	32.60	-17.40	50.00	22.34	10.11	0.15	Average	NEUTRAL																																																																																																																																																																																		
10	5.8358	39.57	-20.43	60.00	29.31	10.11	0.15	QP	NEUTRAL																																																																																																																																																																																		
11	15.0656	27.01	-22.99	50.00	16.55	10.24	0.22	Average	NEUTRAL																																																																																																																																																																																		
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13	17.9441	29.25	-20.75	50.00	18.74	10.27	0.24	Average	NEUTRAL																																																																																																																																																																																		
14	17.9441	38.71	-21.29	60.00	28.20	10.27	0.24	QP	NEUTRAL																																																																																																																																																																																		
15	22.1801	30.06	-19.94	50.00	19.50	10.30	0.26	Average	NEUTRAL																																																																																																																																																																																		
16	22.1801	38.50	-21.50	60.00	27.94	10.30	0.26	QP	NEUTRAL																																																																																																																																																																																		
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	Normal Link		



	Freq	Level	Over	Limit	Read	LISN	Cable	Remark	Pol/Phase
	MHz	dBuV	Limit	Line	Level	Factor	Loss		
			dB	dBuV	dBuV	dB	dB		
1	0.1500	34.98	-21.02	56.00	24.99	9.95	0.04	Average	LINE
2	0.1500	45.30	-20.70	66.00	35.31	9.95	0.04	QP	LINE
3	0.1844	35.48	-18.80	54.28	25.49	9.94	0.05	Average	LINE
4	0.1844	46.50	-17.78	64.28	36.51	9.94	0.05	QP	LINE
5	0.2072	33.22	-20.10	53.32	23.24	9.93	0.05	Average	LINE
6	0.2072	43.22	-20.10	63.32	33.24	9.93	0.05	QP	LINE
7	0.5293	30.02	-15.98	46.00	20.07	9.91	0.04	Average	LINE
8	0.5293	39.73	-16.27	56.00	29.78	9.91	0.04	QP	LINE
9	3.2411	26.22	-19.78	46.00	16.14	9.97	0.11	Average	LINE
10	3.2411	35.93	-20.07	56.00	25.85	9.97	0.11	QP	LINE
11	6.1861	32.70	-17.30	50.00	22.55	10.00	0.15	Average	LINE
12	6.1861	39.93	-20.07	60.00	29.78	10.00	0.15	QP	LINE
13	22.0629	29.53	-20.47	50.00	19.01	10.26	0.26	Average	LINE
14	22.0629	38.29	-21.71	60.00	27.77	10.26	0.26	QP	LINE

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)
LoRa_Nss1_1TX	-	-	-	-	-
920-925MHz	773.125k	610.945k	611kD1D	745k	577.836k

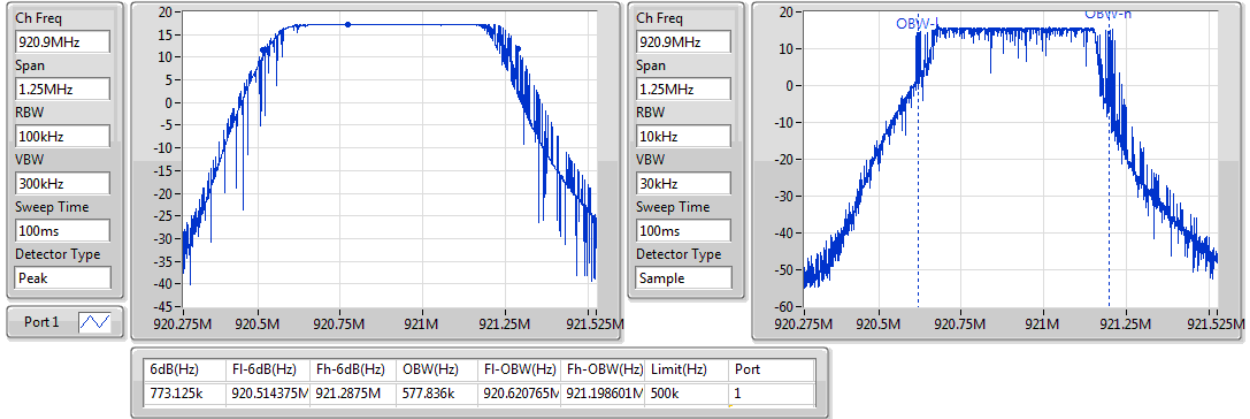
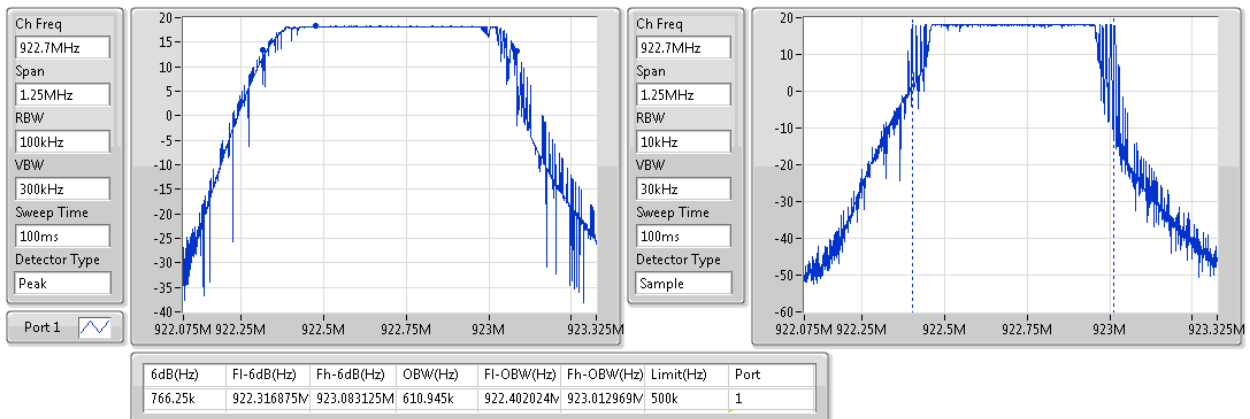
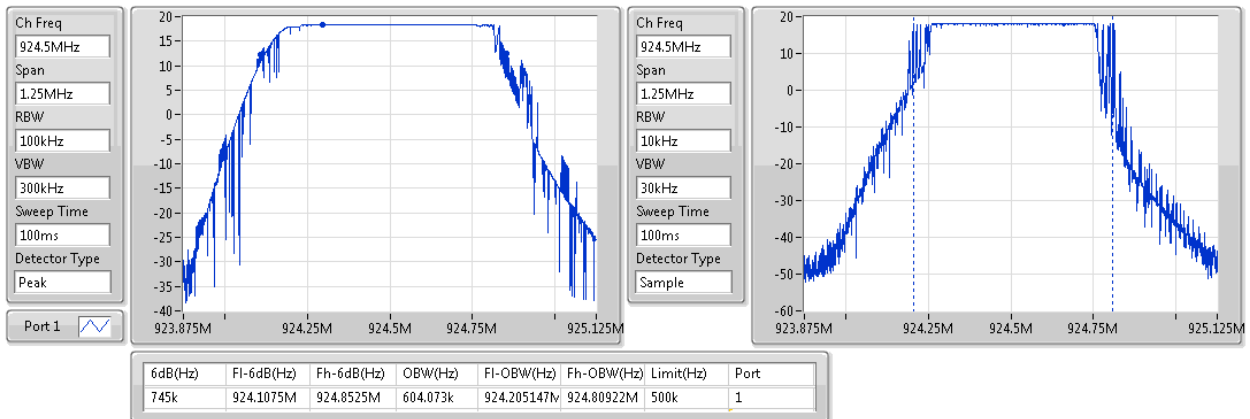
Max-N dB = Maximum 6dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;

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)
LoRa_Nss1_1TX	-	-	-	-
920.9MHz	Pass	500k	773.125k	577.836k
922.7MHz	Pass	500k	766.25k	610.945k
924.5MHz	Pass	500k	745k	604.073k

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

LoRa_Nss1_1TX
EBW
920.9MHz

LoRa_Nss1_1TX
EBW
922.7MHz

LoRa_Nss1_1TX
EBW
924.5MHz


**Summary**

Mode	Total Power (dBm)	Total Power (W)
LoRa_Nss1_1TX	-	-
924.5MHz	18.28	0.0672977

Result

Mode	Result	DG (dBi)	Port 1 (dBm)	Total Power (dBm)	Power Limit (dBm)
LoRa_Nss1_1TX	-	-	-	-	-
920.9MHz	Pass	3.01	18.26	18.26	30.00
922.7MHz	Pass	3.01	18.27	18.27	30.00
924.5MHz	Pass	3.01	18.28	18.28	30.00

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

**Summary**

Mode	PD (dBm/RBW)
LoRa_Nss1_1TX	-
922.7MHz	2.60

RBW=3kHz.

Result

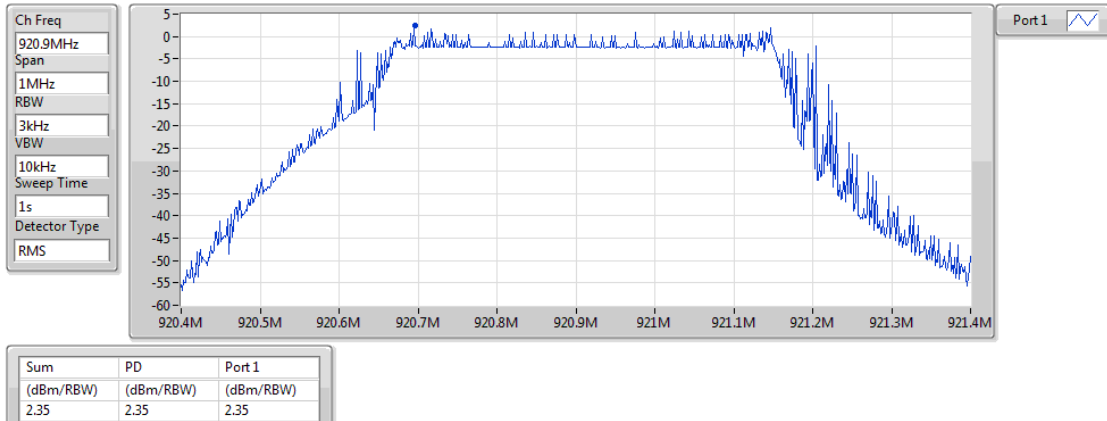
Mode	Result	DG (dBi)	Port 1 (dBm/RBW)	PD (dBm/RBW)	PD Limit (dBm/RBW)
LoRa_Nss1_1TX	-	-	-	-	-
920.9MHz	Pass	3.01	2.35	2.35	8.00
922.7MHz	Pass	3.01	2.60	2.60	8.00
924.5MHz	Pass	3.01	2.12	2.12	8.00

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;

LoRa_Nss1_1TX

PSD

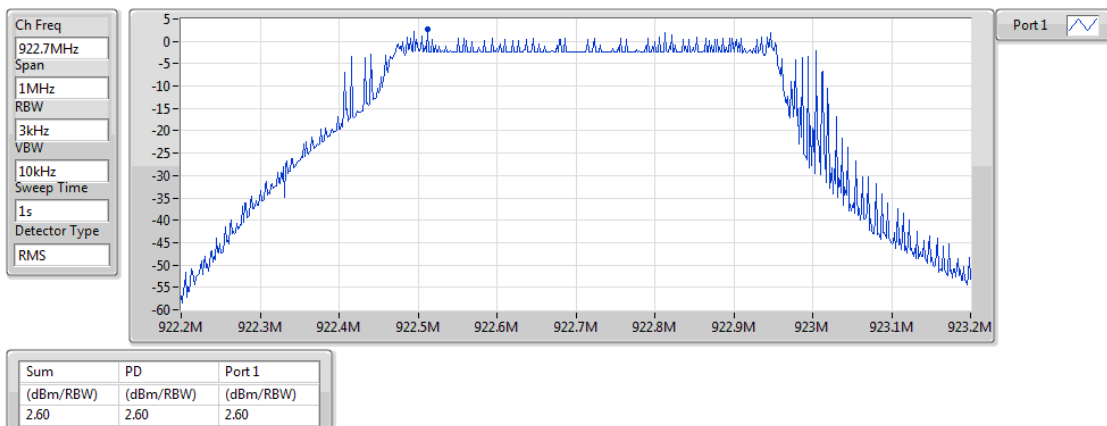
920.9MHz



LoRa_Nss1_1TX

PSD

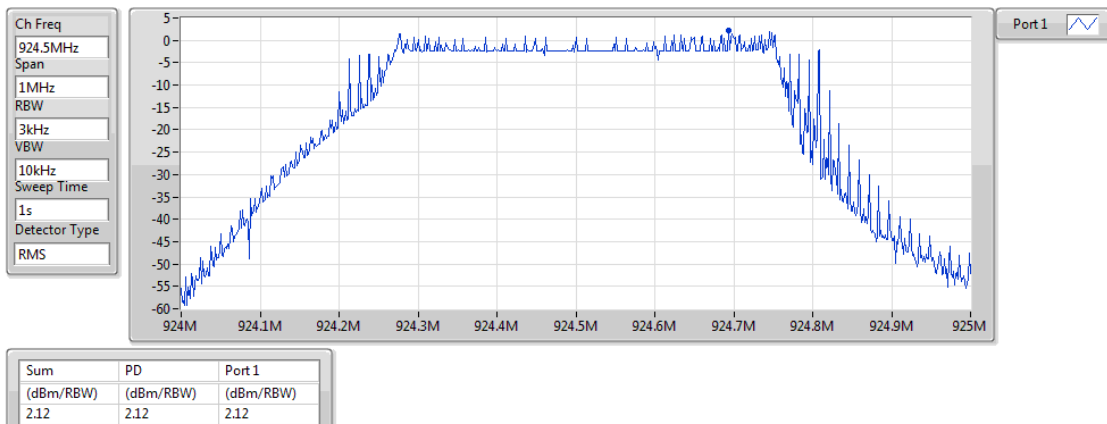
922.7MHz



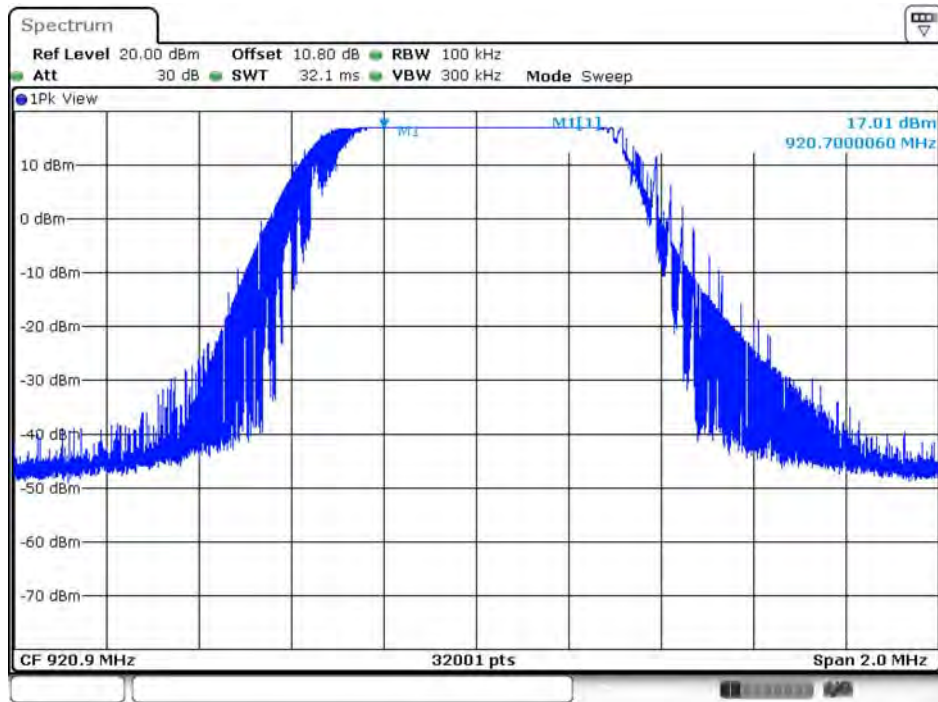
LoRa_Nss1_1TX

PSD

924.5MHz

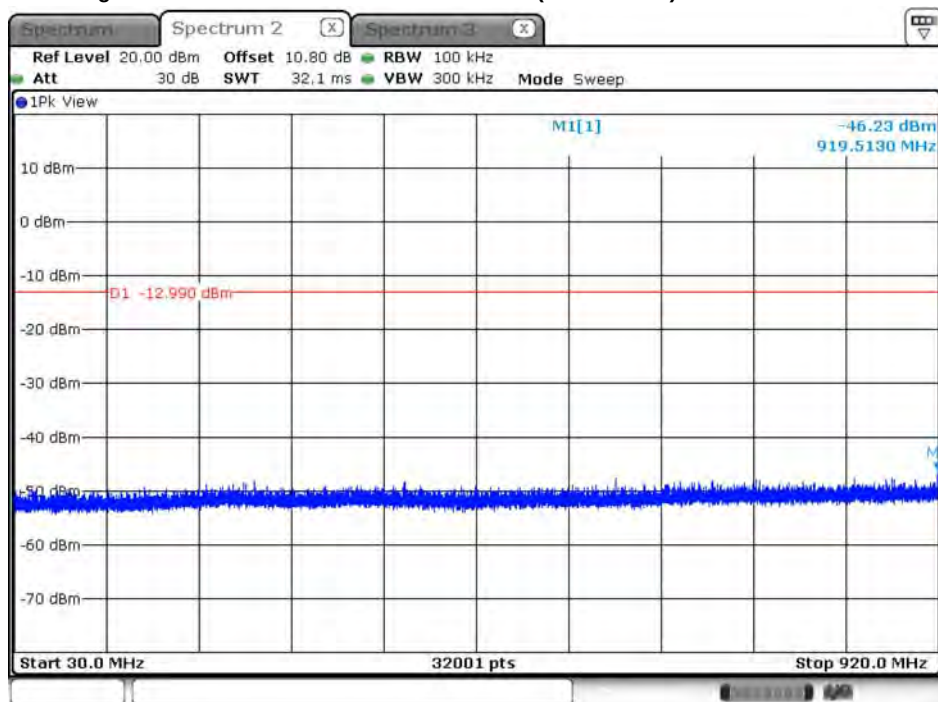


Band Edge Plot on Configuration CSS / 920.9 MHz Reference Level



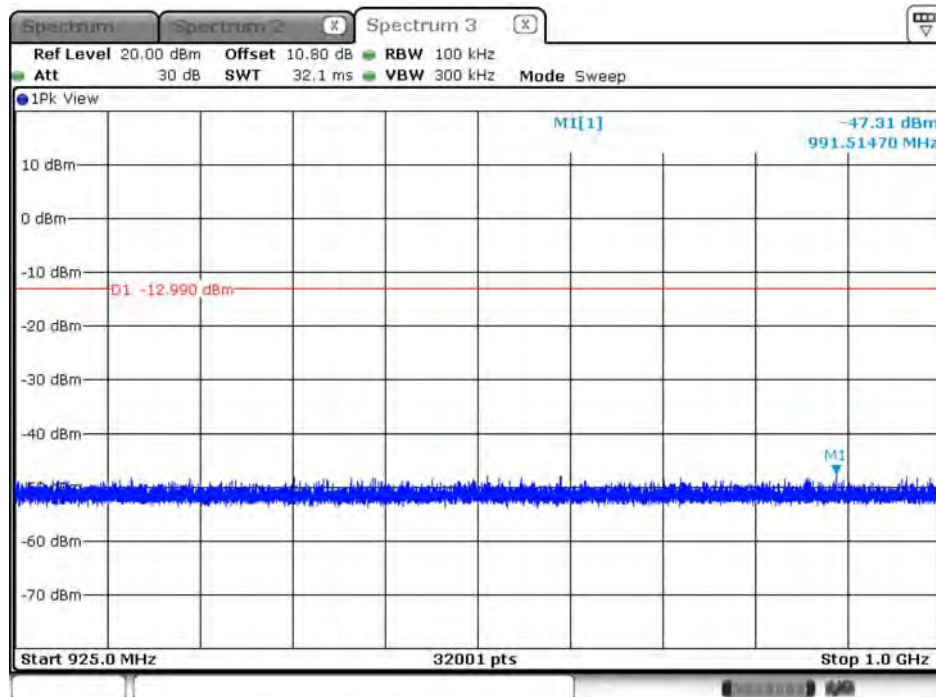
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Band Edge Plot on Configuration CSS / 920 MHz / 30MHz ~ 902 MHz (down 30dBc)



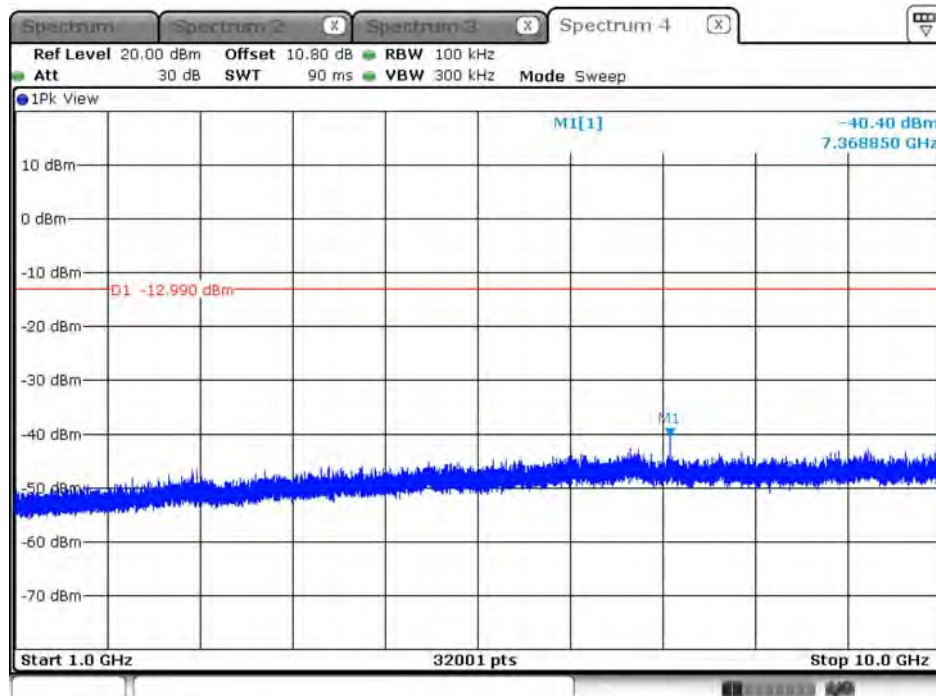
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Band Edge Plot on Configuration CSS / 920 MHz / 925 MHz ~ 1GHz (down 30dBc)



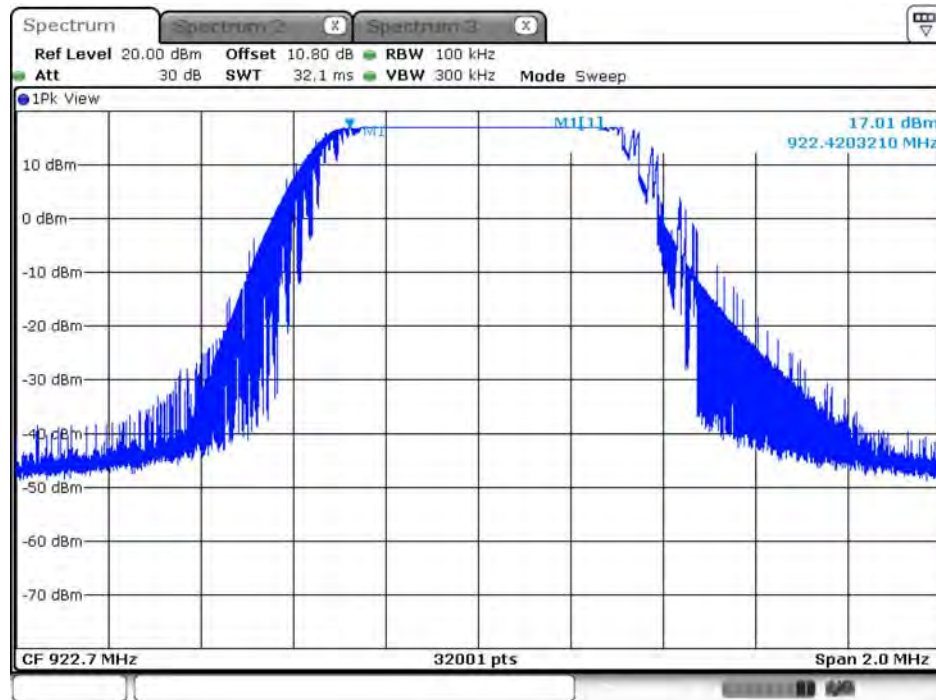
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Band Edge Plot on Configuration CSS / 920 MHz / 1GHz ~ 10GHz (down 30dBc)



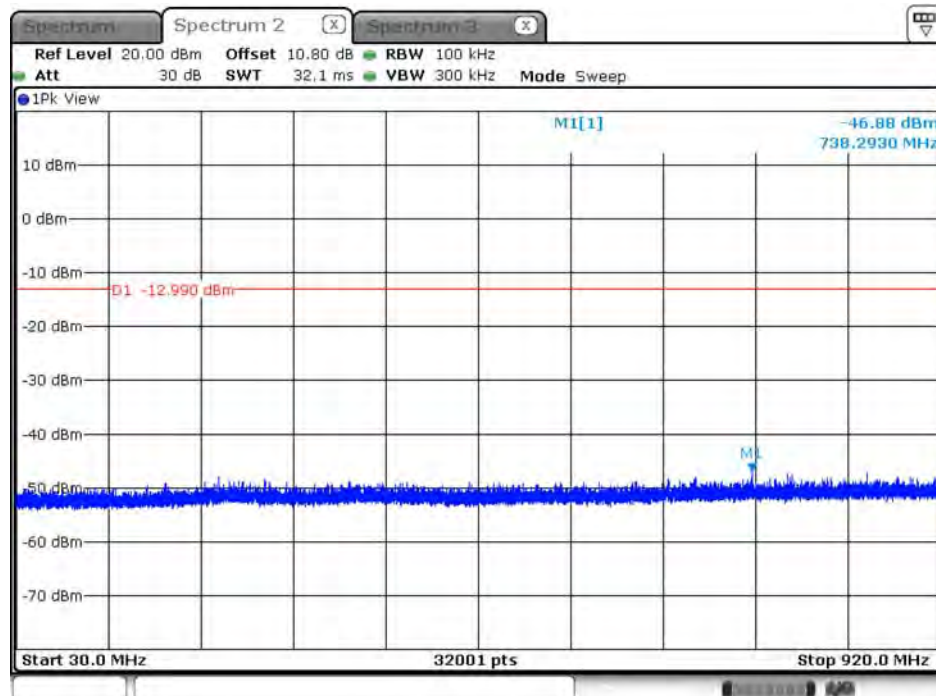
Date: 22-SEP-2017 02:35:17

Band Edge Plot on Configuration CSS / 922.7 MHz Reference Level



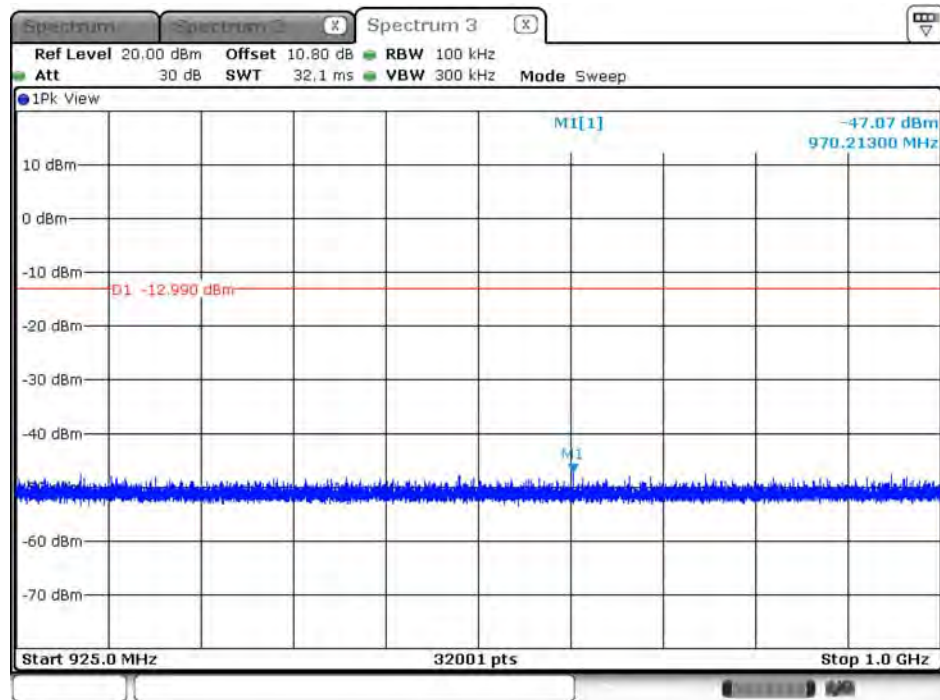
Date: 22.SEP.2017 02:06:05

Band Edge Plot on Configuration CSS / 922.7MHz / 30MHz ~ 920 MHz (down 30dBc)



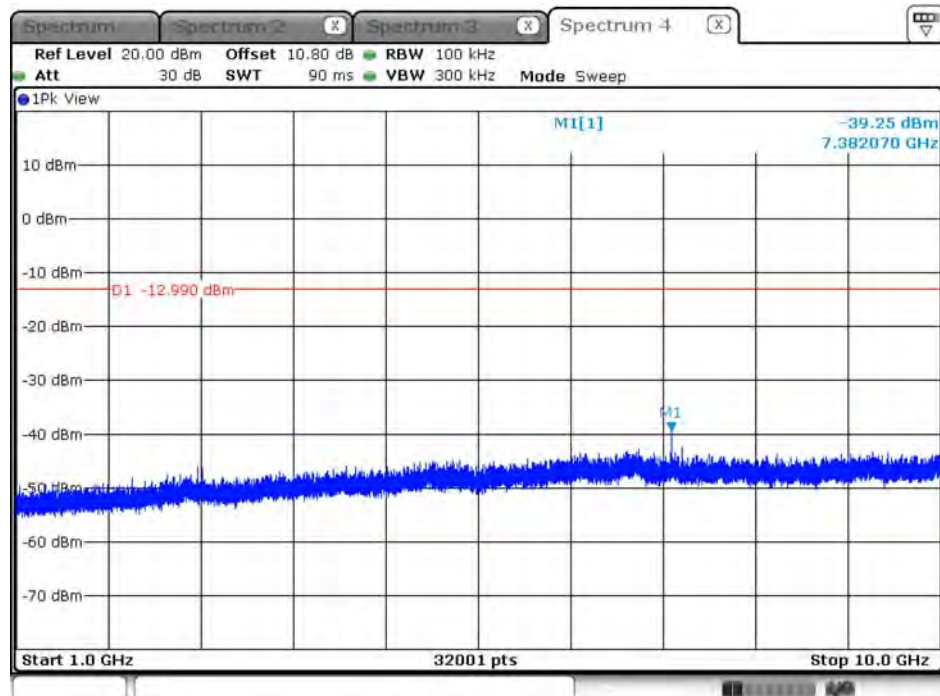
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Band Edge Plot on Configuration CSS / 922.7MHz / 925 MHz ~ 1GHz (down 30dBc)



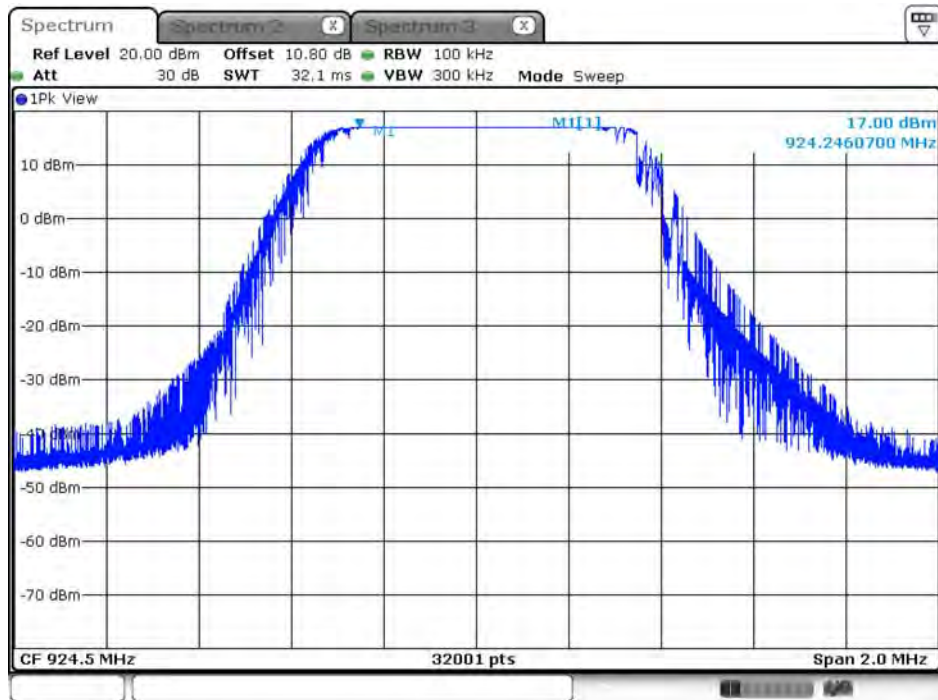
Date: 22.SEP.2017 02:07:56

Band Edge Plot on Configuration CSS / 922.7 MHz / 1GHz ~ 10GHz (down 30dBc)



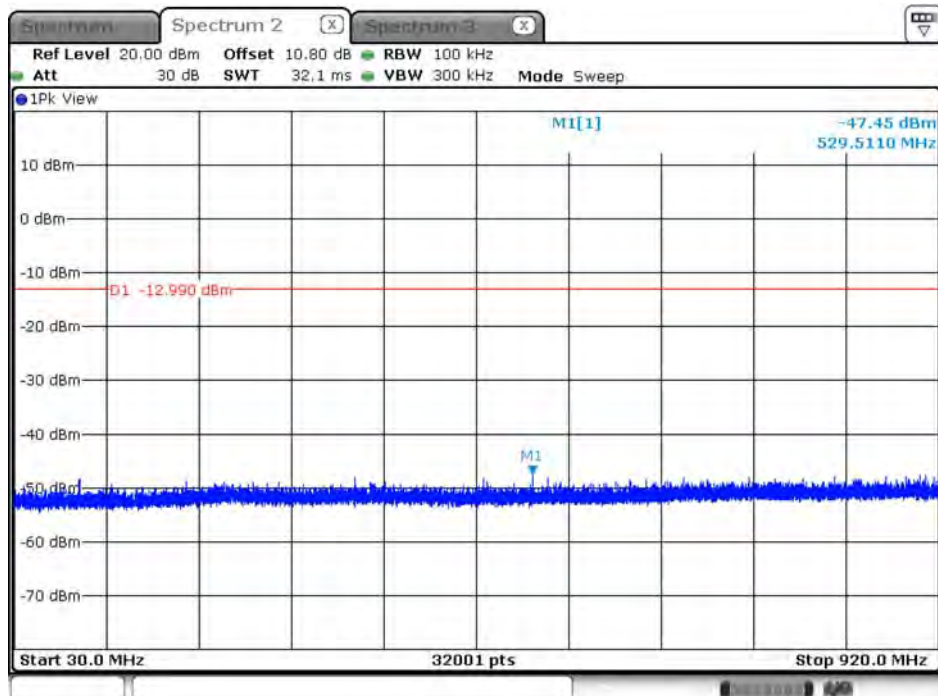
Date: 22.SEP.2017 02:34:05

Band Edge Plot on Configuration CSS / 924.5 MHz Reference Level



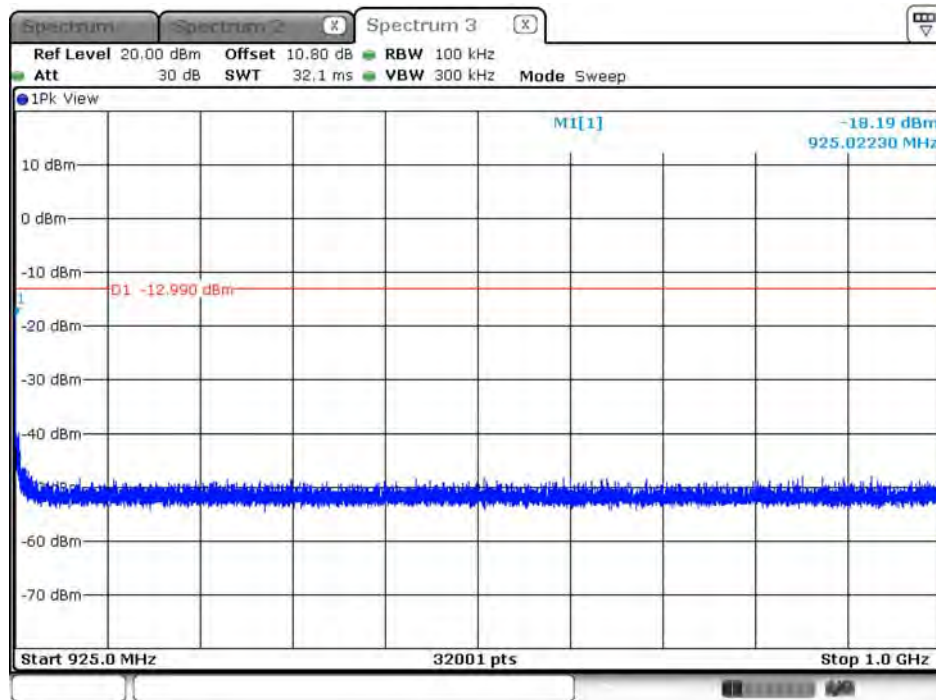
Date: 22.SEP.2017 02:14:10

Band Edge Plot on Configuration CSS / 924.5 MHz / 30MHz ~ 920 MHz (down 30dBc)



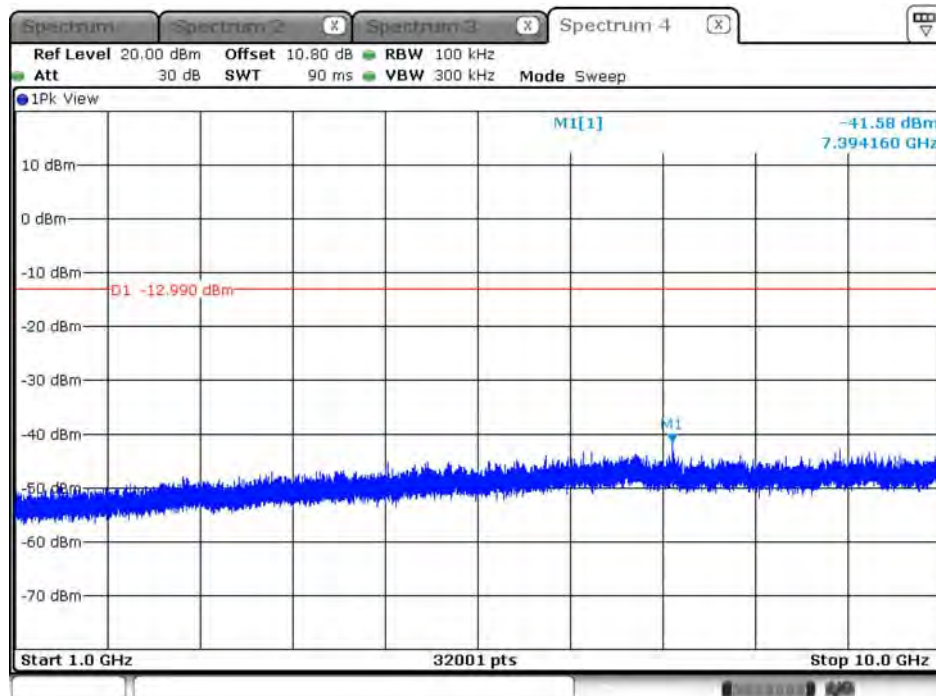
Date: 22.SEP.2017 04:56:18

Band Edge Plot on Configuration CSS / 924.5 MHz / 925 MHz ~ 1GHz (down 30dBc)



Date: 22.SEP.2017 04:55:11

Band Edge Plot on Configuration CSS / 924.5 MHz / 1GHz ~ 10GHz (down 30dBc)



Date: 22.SEP.2017 04:57:54

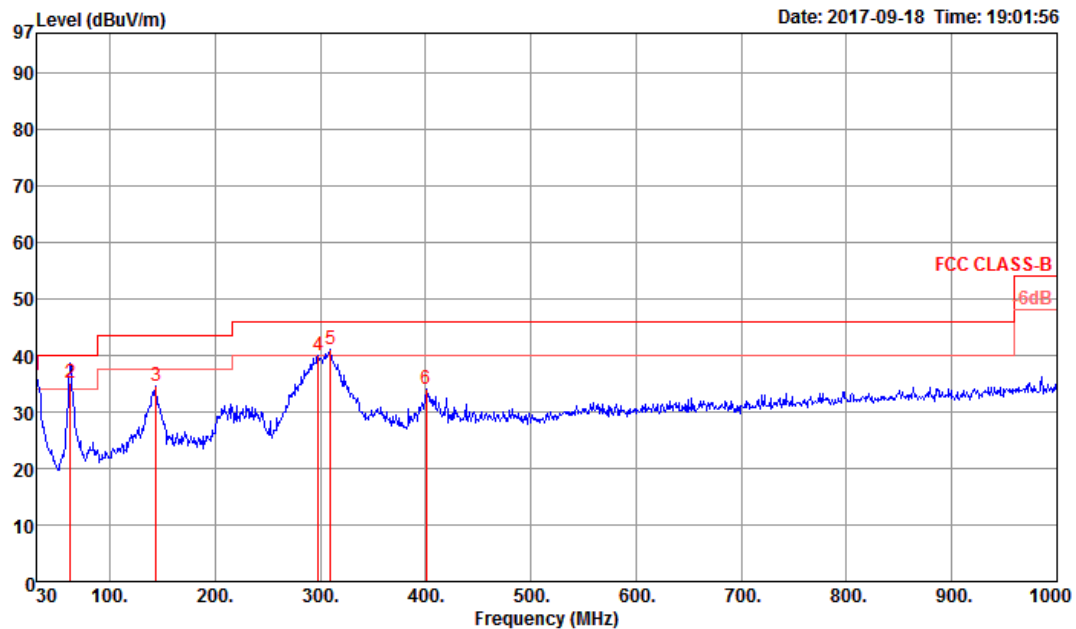


RSE below 1GHz and RSE Above 1GHz 1GHz~5th Harmonic Result

Appendix F.1

RSE below 1GHz Result / Intentional – CTX

Operating Mode	3	Polarization	Horizontal
Operating Function	CTX		



	Freq	Level	Limit Line	Over Limit	Read Level	CableAntenna Loss	Preamp Factor	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	30.00	36.37	40.00	-3.63	38.61	2.10	24.24	28.58	100	132 Peak	HORIZONTAL
2	62.01	35.06	40.00	-4.94	49.30	2.17	12.11	28.52	134	198 QP	HORIZONTAL
3	143.49	34.56	43.50	-8.94	43.62	2.32	16.85	28.23	100	289 Peak	HORIZONTAL
4	297.72	39.86	46.00	-6.14	45.92	2.76	18.99	27.81	100	233 Peak	HORIZONTAL
5	309.36	41.14	46.00	-4.86	47.02	2.81	19.21	27.90	100	102 Peak	HORIZONTAL
6	400.54	33.99	46.00	-12.01	38.00	3.10	21.63	28.74	100	261 Peak	HORIZONTAL

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.)

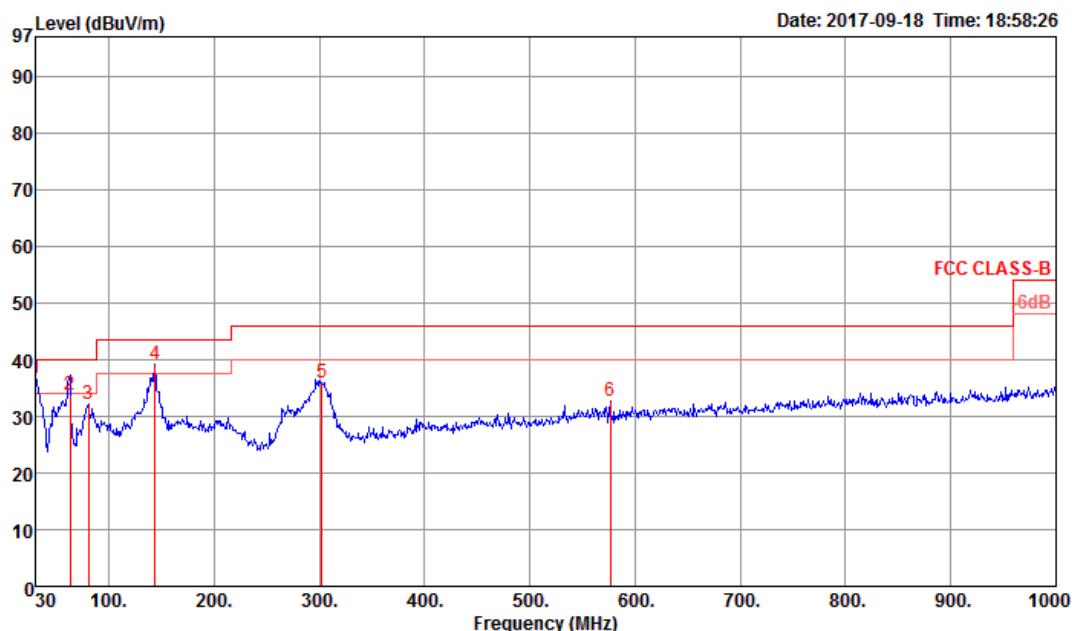


RSE below 1GHz and RSE Above 1GHz 1GHz~5th Harmonic Result

Appendix F.1

RSE below 1GHz Result / Intentional – CTX

Operating Mode	3	Polarization	Vertical
Operating Function	CTX		



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	30.00	36.84	40.00	-3.16	39.08	2.10	24.24	28.58	100	172 Peak	VERTICAL
2	62.98	33.87	40.00	-6.13	48.10	2.17	12.12	28.52	124	211 QP	VERTICAL
3	80.44	32.22	40.00	-7.78	45.33	2.24	13.12	28.47	100	213 Peak	VERTICAL
4	143.49	39.12	43.50	-4.38	48.18	2.32	16.85	28.23	100	287 Peak	VERTICAL
5	302.57	35.98	46.00	-10.02	41.93	2.78	19.10	27.83	100	192 Peak	VERTICAL
6	576.11	32.70	46.00	-13.30	33.79	3.64	24.63	29.36	100	209 Peak	VERTICAL

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.)

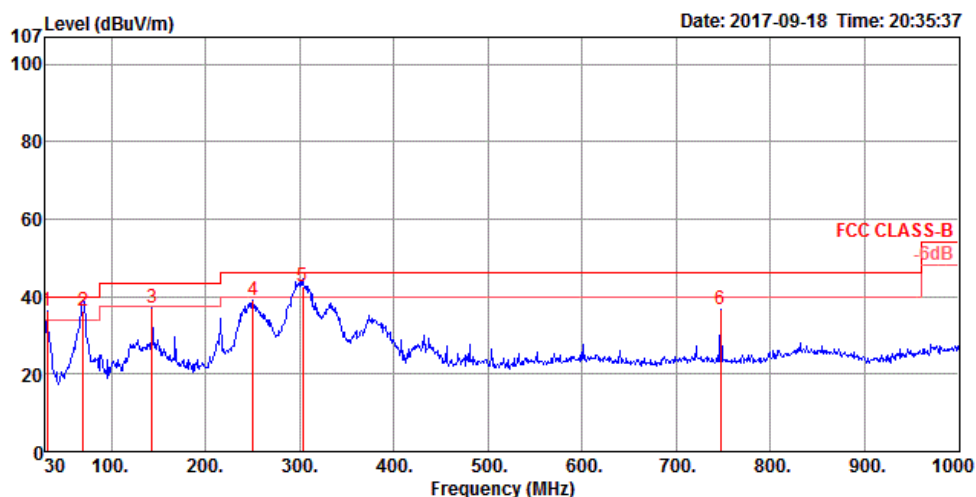


RSE below 1GHz and RSE Above 1GHz 1GHz~5th Harmonic Result

Appendix F.1

RSE below 1GHz Result / Unintentional – CRX

Operating Mode	1	Polarization	Horizontal
Operating Function	CRX		



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	31.94	36.40	40.00	-3.60	44.18	0.53	23.19	31.50	203	338 Peak	HORIZONTAL
2	69.77	36.20	40.00	-3.80	54.92	0.74	12.37	31.83	126	254 QP	HORIZONTAL
3	143.49	37.19	43.50	-6.31	51.22	0.94	16.92	31.89	189	162 Peak	HORIZONTAL
4	250.19	39.22	46.00	-6.78	51.55	1.25	18.38	31.96	101	143 Peak	HORIZONTAL
5	303.54	42.57	46.00	-3.43	54.11	1.38	19.12	32.04	100	136 QP	HORIZONTAL
6	746.83	36.71	46.00	-9.29	41.30	2.18	25.78	32.55	298	65 Peak	HORIZONTAL

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.)

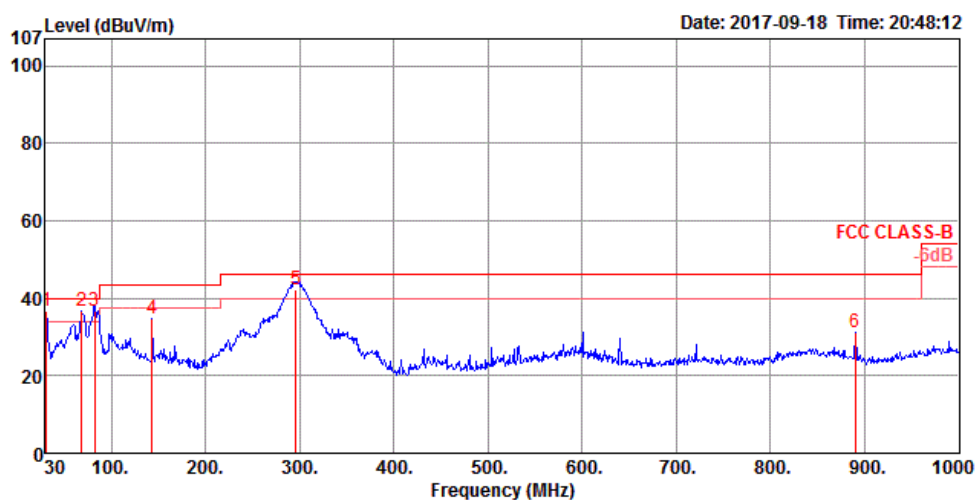


RSE below 1GHz and RSE Above 1GHz 1GHz~5th Harmonic Result

Appendix F.1

RSE below 1GHz Result / Unintentional – CRX

Operating Mode	1	Polarization	Vertical
Operating Function	CRX		



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	30.97	36.76	40.00	-3.24	43.89	0.53	23.82	31.48	103	52 Peak	VERTICAL
2	68.80	36.57	40.00	-3.43	55.33	0.72	12.35	31.83	103	62 Peak	VERTICAL
3	82.38	36.70	40.00	-3.30	54.65	0.75	13.16	31.86	105	136 QP	VERTICAL
4	143.49	34.65	43.50	-8.85	48.68	0.94	16.92	31.89	100	130 Peak	VERTICAL
5	295.78	42.29	46.00	-3.71	53.96	1.36	19.00	32.03	167	213 QP	VERTICAL
6	890.39	31.28	46.00	-14.72	34.86	2.39	26.44	32.41	300	190 Peak	VERTICAL

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.)

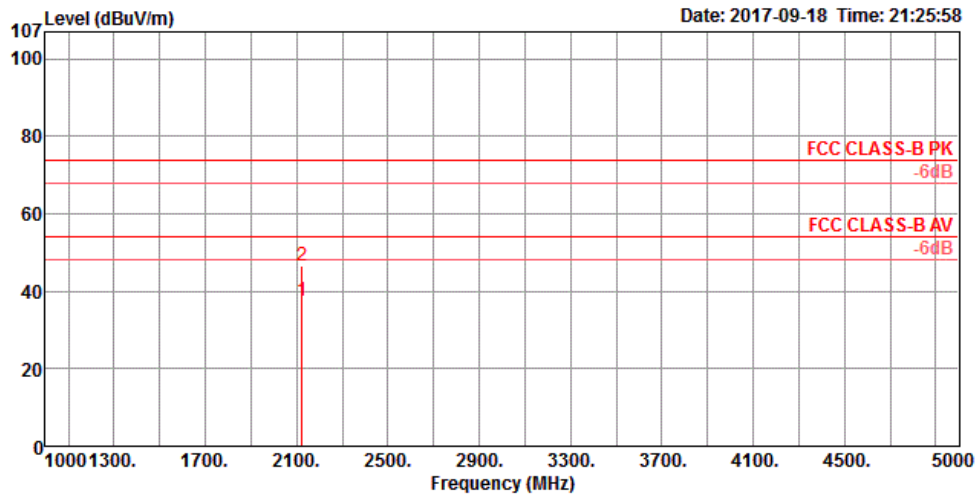


RSE below 1GHz and RSE Above 1GHz 1GHz~5th Harmonic Result

Appendix F.1

RSE above 1GHz Result / Unintentional – CRX 1GHz~5th Harmonic

Operating Mode	1	Polarization	Horizontal
Operating Function	Normal Link		



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2123.48	37.43	54.00	-16.57	40.99	4.96	28.85	37.37	125	312 Average	HORIZONTAL
2	2123.48	46.67	74.00	-27.33	50.23	4.96	28.85	37.37	125	312 Peak	HORIZONTAL

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.)

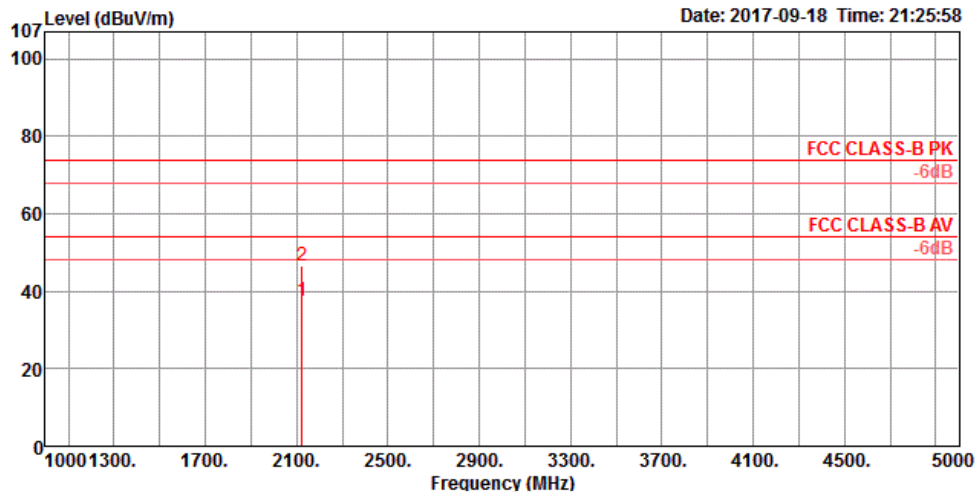


RSE below 1GHz and RSE Above 1GHz 1GHz~5th Harmonic Result

Appendix F.1

RSE above 1GHz Result / Unintentional – CRX 1GHz~5th Harmonic

Operating Mode	1	Polarization	Vertical
Operating Function	Normal Link		



	Freq	Level	Limit	Over	Read	CableAntenna	Preamp	A/Pos	T/Pos	Remark	Pol/Phase
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB	dB/m	dB	cm	deg	
1	2123.48	37.43	54.00	-16.57	40.99	4.96	28.85	37.37	125	312 Average	HORIZONTAL
2	2123.48	46.67	74.00	-27.33	50.23	4.96	28.85	37.37	125	312 Peak	HORIZONTAL

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.)

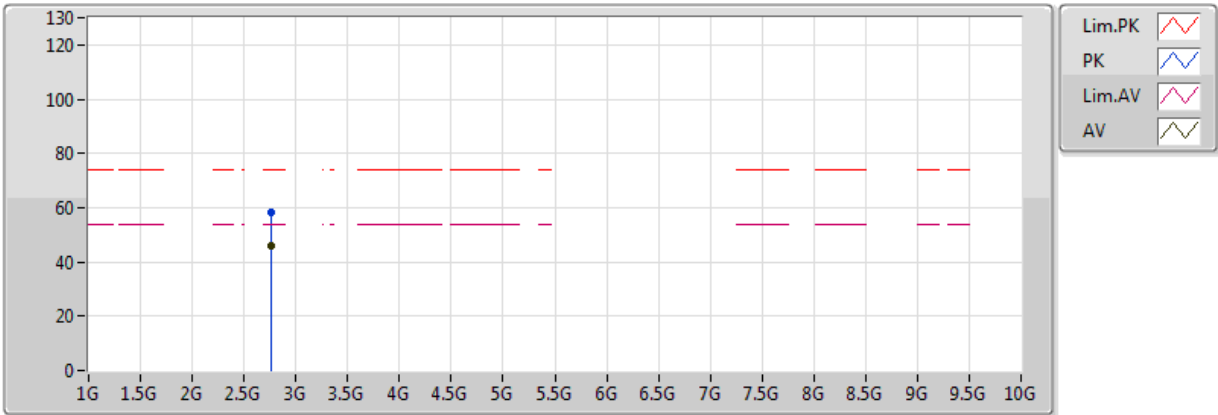


Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
LoRa_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
902-928MHz	Pass	AV	2.7687G	47.20	54.00	-6.80	31.92	3	H	235	1.08	-

LoRa_Nss1_1TX

920.9MHz_TX

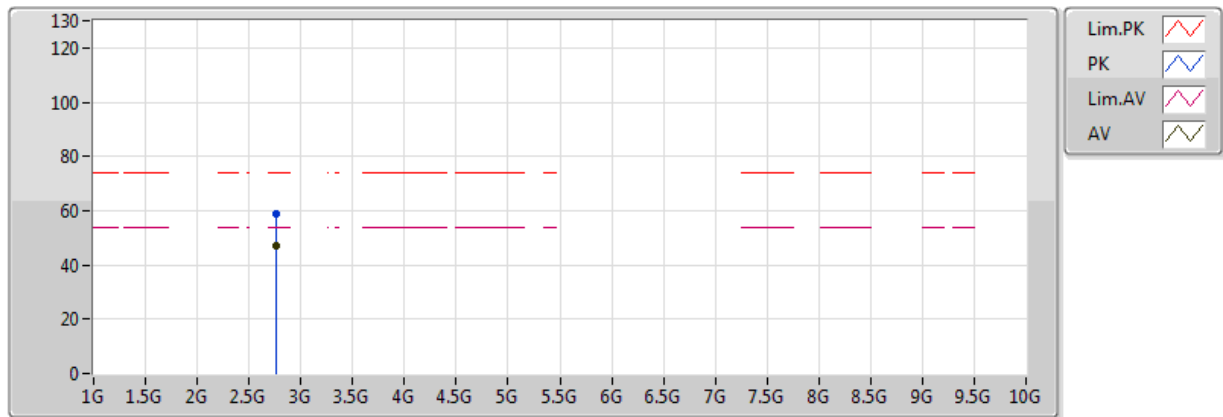


20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.7622G	46.02	54.00	-7.98	31.89	3	V	173	1.49	-
PK	2.763096G	58.04	74.00	-15.96	31.90	3	V	173	1.49	-

LoRa_Nss1_1TX

920.9MHz_TX

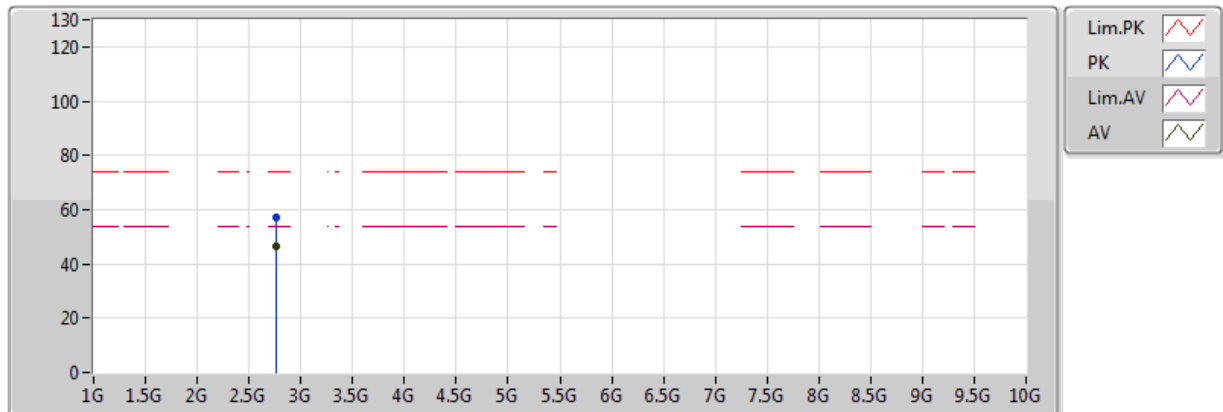


20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.762968G	46.80	54.00	-7.20	31.90	3	H	237	1.08	-
PK	2.763154G	58.73	74.00	-15.27	31.90	3	H	237	1.08	-

LoRa_Nss1_1TX

922.7MHz_TX

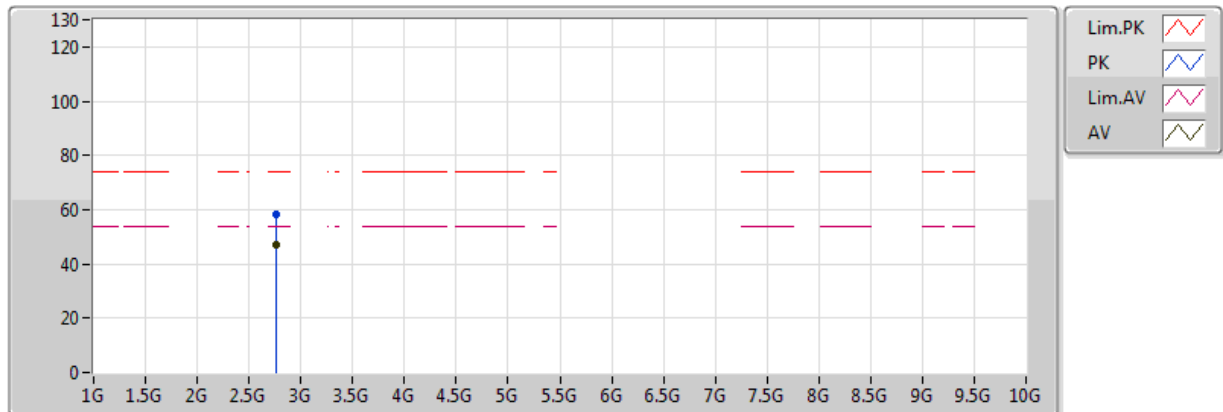


20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.768616G	46.24	54.00	-7.76	31.92	3	V	88	1.43	-
PK	2.767664G	57.41	74.00	-16.59	31.91	3	V	88	1.43	-

LoRa_Nss1_1TX

922.7MHz_TX

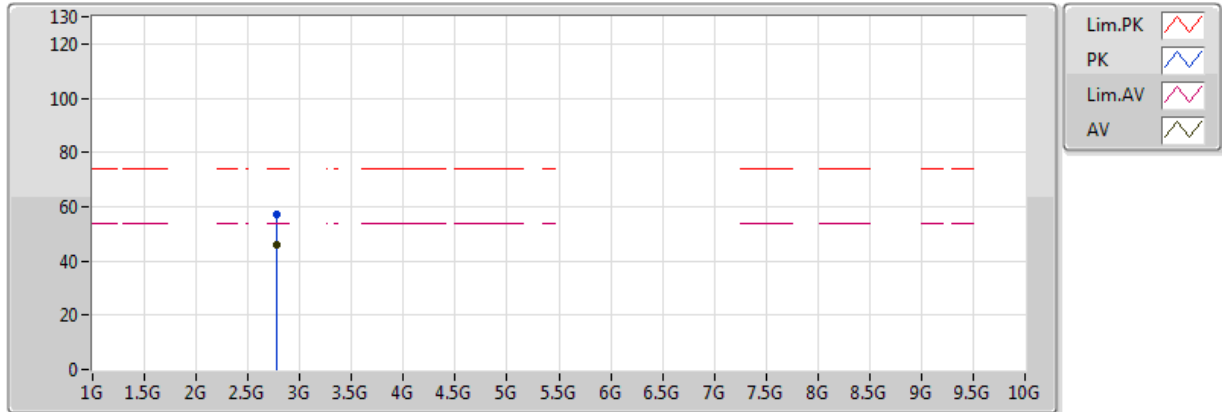


20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.7687G	47.20	54.00	-6.80	31.92	3	H	235	1.08	-
PK	2.768272G	58.55	74.00	-15.45	31.92	3	H	235	1.08	-

LoRa_Nss1_1TX

924.5MHz_TX

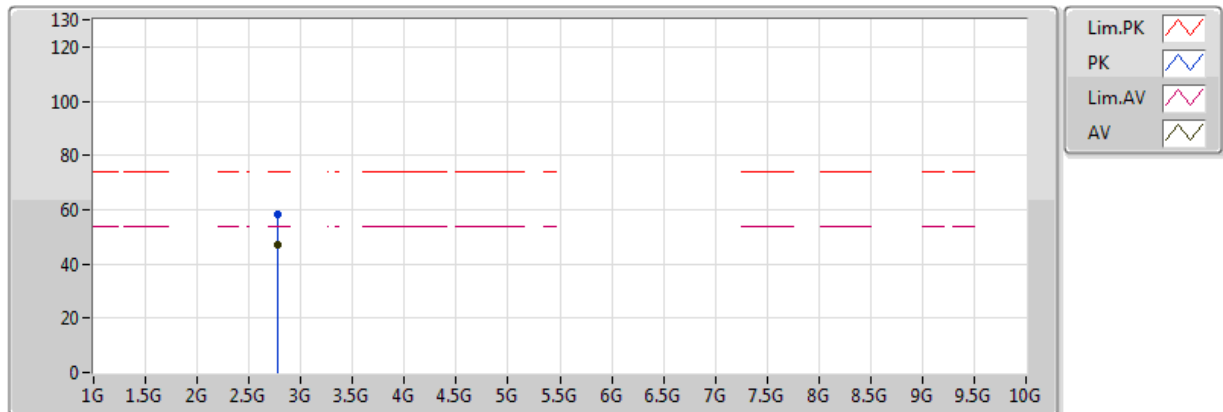


20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.773744G	46.09	54.00	-7.91	31.94	3	V	175	1.50	-
PK	2.773612G	57.23	74.00	-16.77	31.94	3	V	175	1.50	-

LoRa_Nss1_1TX

924.5MHz_TX



20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.773924G	47.00	54.00	-7.00	31.94	3	H	231	1.04	-
PK	2.773912G	58.02	74.00	-15.98	31.94	3	H	231	1.04	-

Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
LoRa_Nss1_1TX	-	-	-	-	-
924.6MHz	136.562k	124.313k	124kD1D	135.312k	124.157k

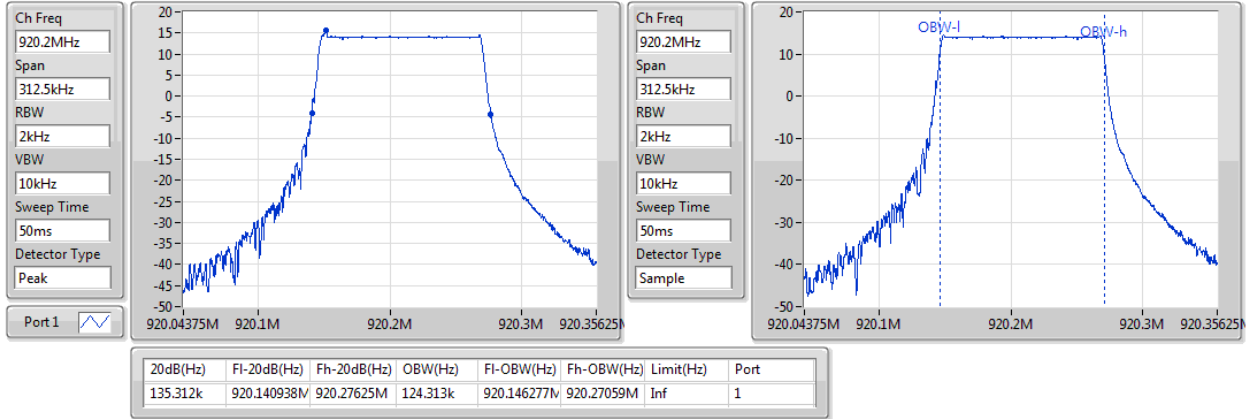
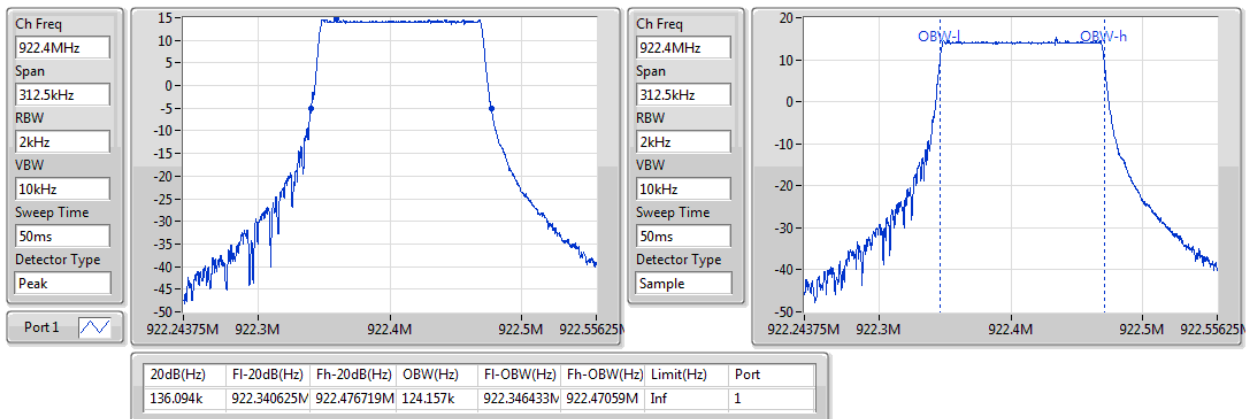
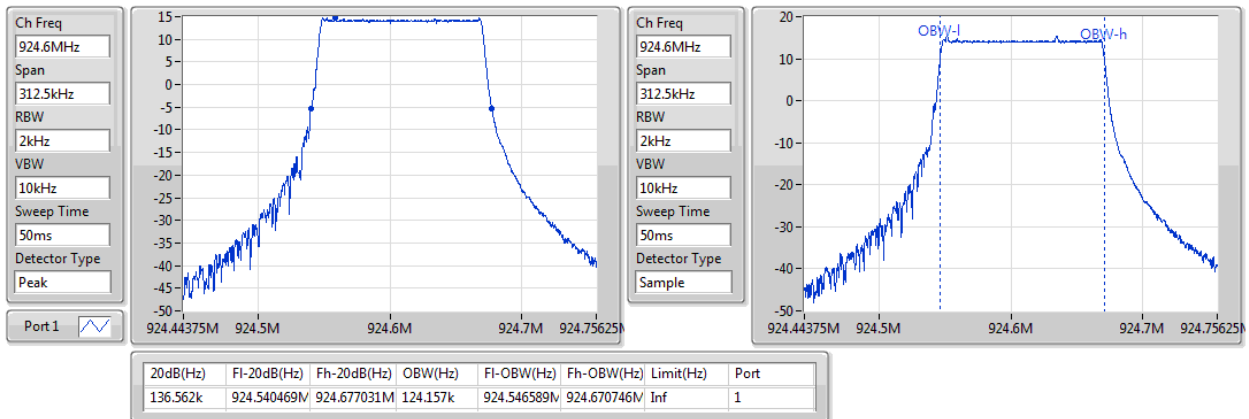
Max-N dB = Maximum 20dB down bandwidth; **Max-OBW** = Maximum 99% occupied bandwidth;

Min-N dB = Minimum 20dB down bandwidth; **Min-OBW** = Minimum 99% occupied bandwidth;

Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
LoRa_Nss1_1TX	-	-	-	-
920.2MHz	Pass	Inf	135.312k	124.313k
922.4MHz	Pass	Inf	136.094k	124.157k
924.6MHz	Pass	Inf	136.562k	124.157k

Port X-N dB = Port X 20dB down bandwidth; **Port X-OBW** = Port X 99% occupied bandwidth;

LoRa_Nss1_1TX
EBW
920.2MHz

LoRa_Nss1_1TX
EBW
922.4MHz

LoRa_Nss1_1TX
EBW
924.6MHz


Summary

Mode	Max-Space (Hz)	Min-Space (Hz)
LoRa_Nss1_1TX	-	-
920~925MHz	263.5k	146k

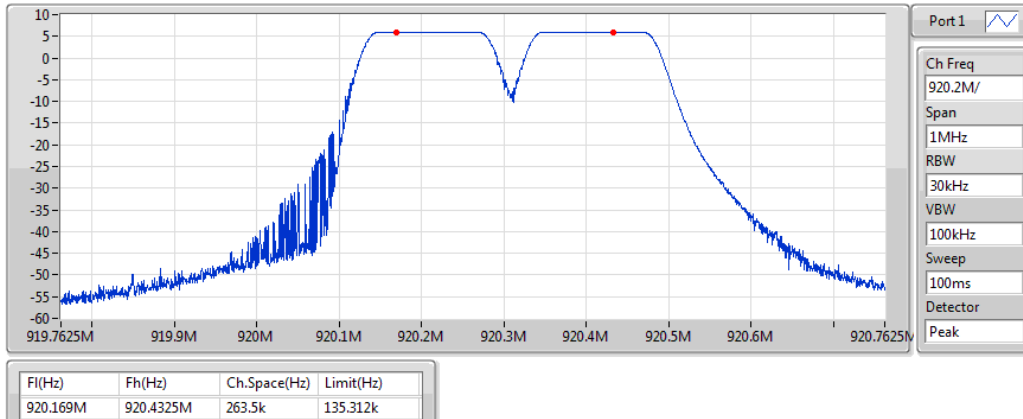
Result

Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
LoRa_Nss1_1TX	-	-	-	-	-
920.2MHz	Pass	920.169M	920.4325M	263.5k	135.312k
922.4MHz	Pass	922.401M	922.547M	146k	136.094k
924.6MHz	Pass	924.398M	924.624M	226k	136.562k

LoRa_Nss1_1TX

Channel Separation

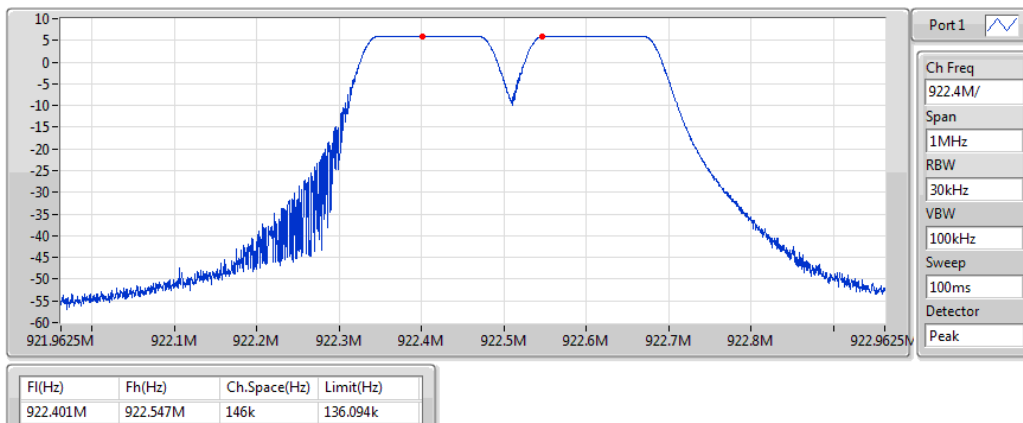
920.2M/920.325MHz



LoRa_Nss1_1TX

Channel Separation

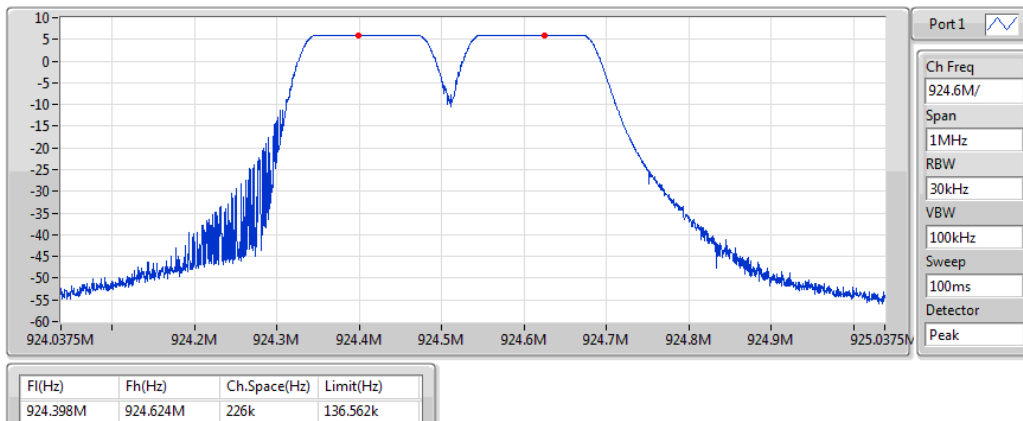
922.4M/922.525MHz



LoRa_Nss1_1TX

Channel Separation

924.6M/924.475MHz



**Summary**

Mode	Power	Power
	(dBm)	(W)
LoRa_Nss1_1TX	-	-
924.6MHz	17.88	0.06714

Result

Mode	Result	Gain (dBi)	PK Power (dBm)	PK Power Limit (dBm)
LoRa_Nss1_1TX	-	-	-	-
920.2MHz	Pass	3.01	18.26	30.00
922.4MHz	Pass	3.01	18.26	30.00
924.6MHz	Pass	3.01	18.27	30.00

Summary

Mode	PD (dBm/RBW)
LoRa_Nss1_1TX	-
922.4MHz	1.41

RBW=3kHz.

Result

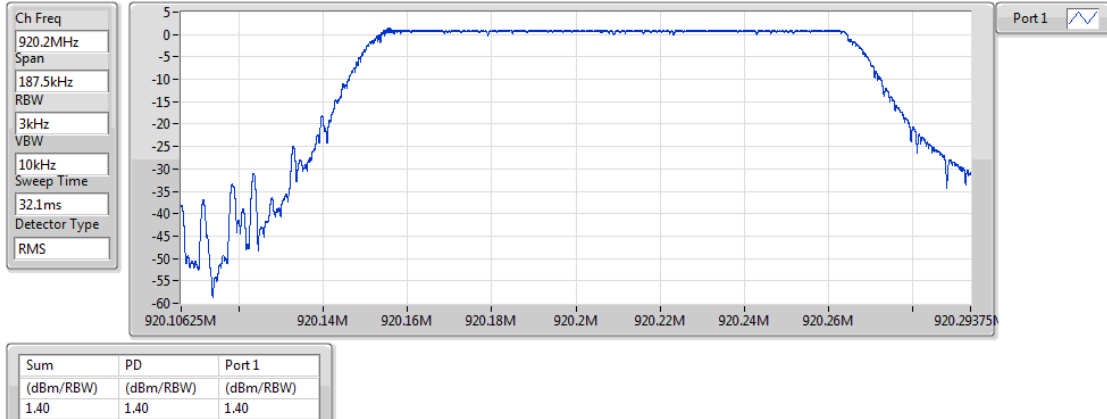
Mode	Result	Gain (dBi)	PD (dBm/RBW)	PD Limit (dBm/RBW)
LoRa_Nss1_1TX	-	-	-	-
920.2MHz	Pass	3.01	1.40	8.00
922.4MHz	Pass	3.01	1.41	8.00
924.6MHz	Pass	3.01	1.13	8.00

RBW=3kHz.

LoRa_Nss1_1TX

PSD

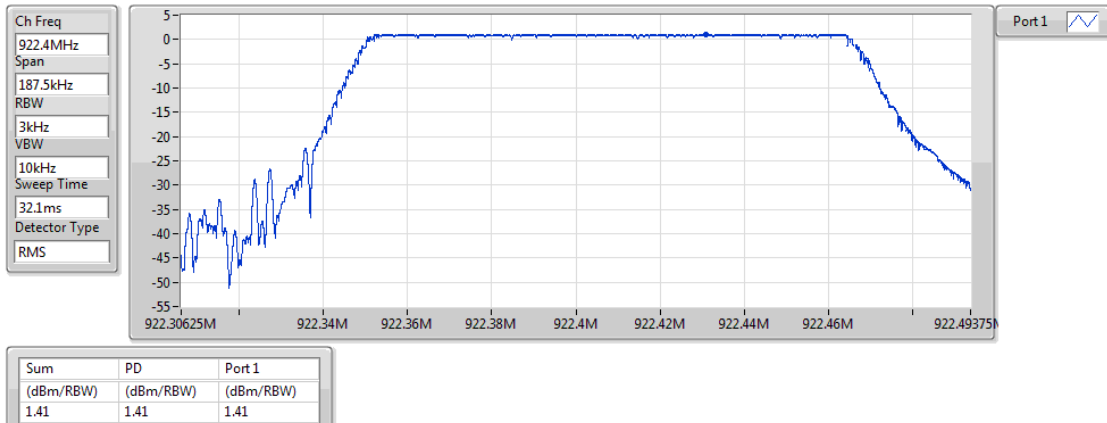
920.2MHz



LoRa_Nss1_1TX

PSD

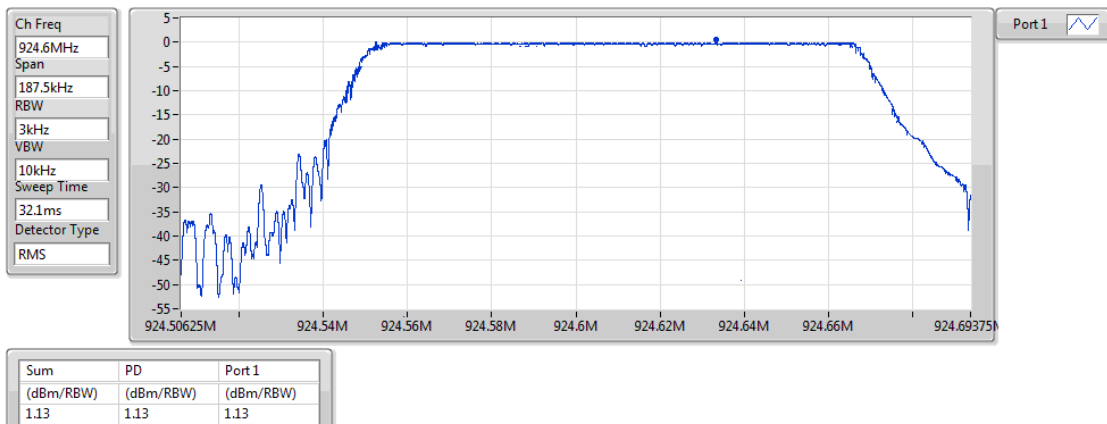
922.4MHz



LoRa_Nss1_1TX

PSD

924.6MHz



Summary

Mode	Max-Hop No
LoRa_Nss1_1TX	-
922.4MHz	22

Result

Mode	Result	Hopping No	Limit
LoRa_Nss1_1TX	-	-	-
920.2MHz	Pass	22	12
922.4MHz	Pass	22	12
924.6MHz	Pass	22	12

Summary

Mode	Max-Dwell (s)
LoRa_Nss1_1TX	-
924.6MHz	113.25m

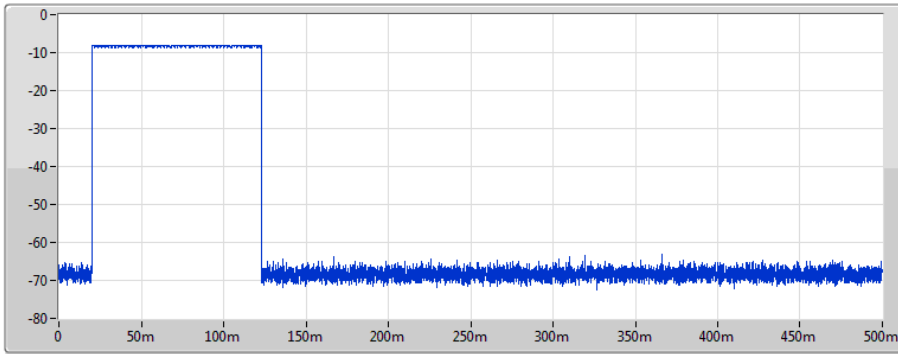
Result

Mode	Result	Period (s)	Dwell (s)	Limit (s)	Tx On (s)
LoRa_Nss1_1TX	-	-	-	-	-
920.2MHz	Pass	1	103.0625m	0.4	103.0625m
922.4MHz	Pass	1	103.0625m	0.4	103.0625m
924.6MHz	Pass	1	113.25m	0.4	113.25m

LoRa_Nss1_1TX

Dwell

920.2MHz



Port 1 

Ch Freq
920.2MHz

RBW
300kHz

VBW
1MHz

Sweep Time
500ms

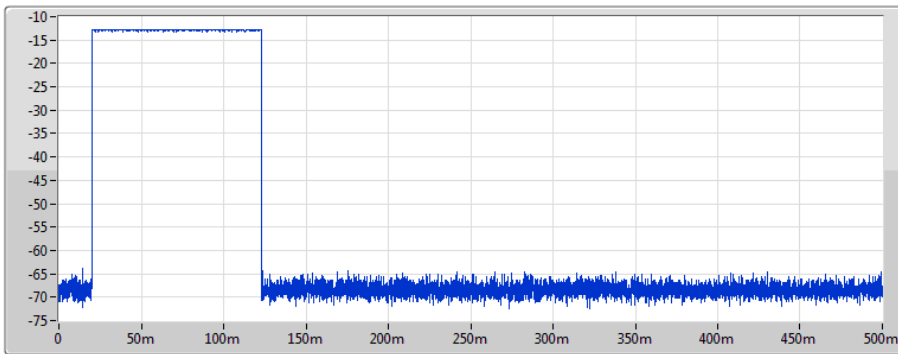
TX Time
103.0625ms

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
Inf	Inf	Inf	103.0625m

LoRa_Nss1_1TX

Dwell

922.4MHz



Port 1 

Ch Freq
922.4MHz

RBW
300kHz

VBW
1MHz

Sweep Time
500ms

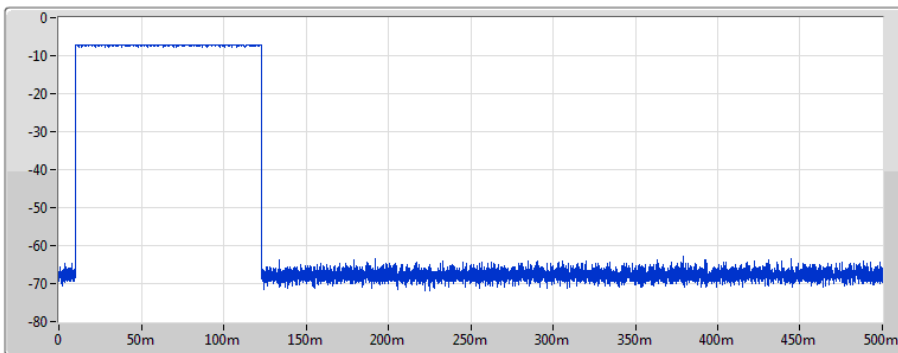
TX Time
103.0625ms

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
Inf	Inf	Inf	103.0625m

LoRa_Nss1_1TX

Dwell

924.6MHz



Port 1 

Ch Freq
924.6MHz

RBW
300kHz

VBW
1MHz

Sweep Time
500ms

TX Time
113.25ms

Period(s)	Dwell(s)	Limit(s)	Tx On(s)
Inf	Inf	Inf	113.25m

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
LoRa_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
922.4MHz	Pass	922.436M	16.96	-3.04	890.41725M	-61.01	901.9555M	-61.41	928.0605M	-62.60	6.457482G	-50.81	1

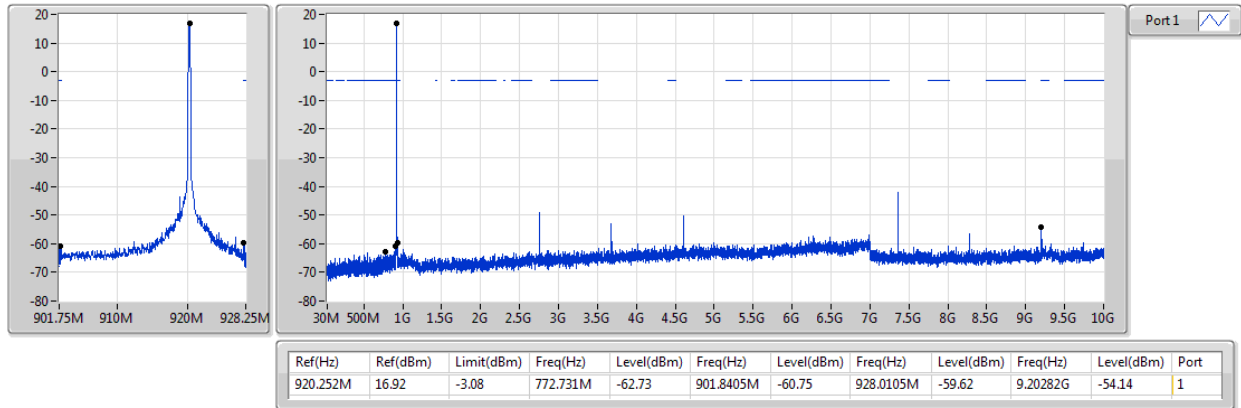
Result

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
LoRa_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
920.2MHz	Pass	920.252M	16.92	-3.08	772.731M	-62.73	901.8405M	-60.75	928.0105M	-59.62	9.20282G	-54.14	1
922.4MHz	Pass	922.436M	16.96	-3.04	890.41725M	-61.01	901.9555M	-61.41	928.0605M	-62.60	6.457482G	-50.81	1
924.6MHz	Pass	924.672M	17.05	-2.95	802.806375M	-62.99	901.9885M	-61.09	928.0185M	-52.12	9.247045G	-53.12	1

LoRa_Nss1_1TX

CSE NdB

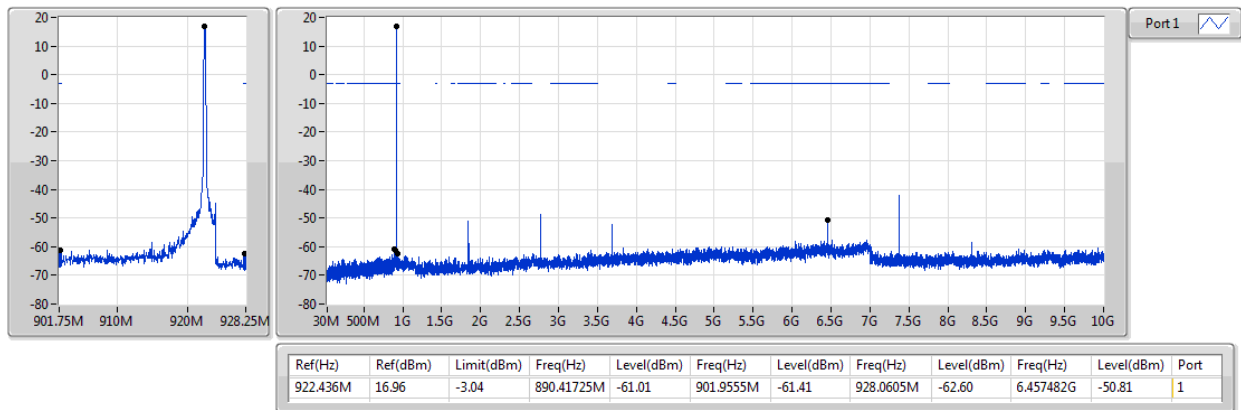
920.2MHz



LoRa_Nss1_1TX

CSE NdB

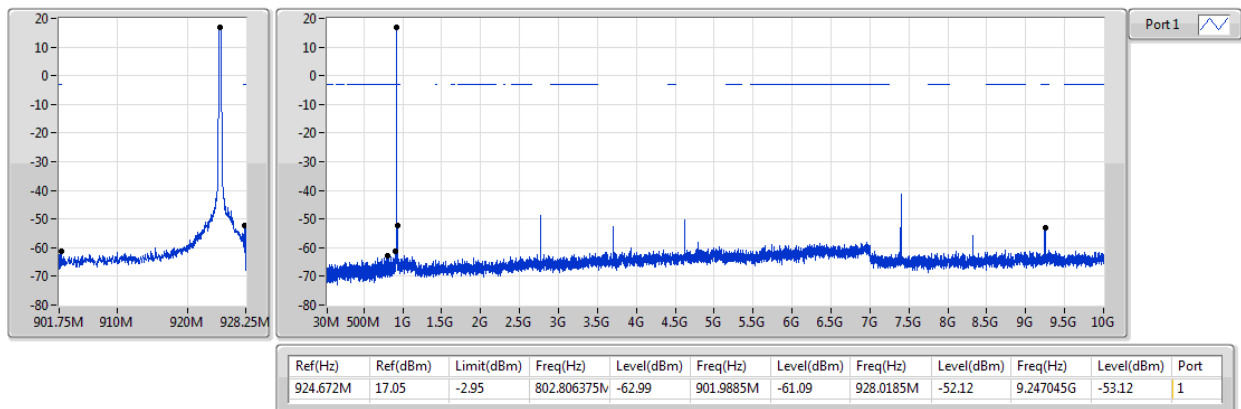
922.4MHz



LoRa_Nss1_1TX

CSE NdB

924.6MHz



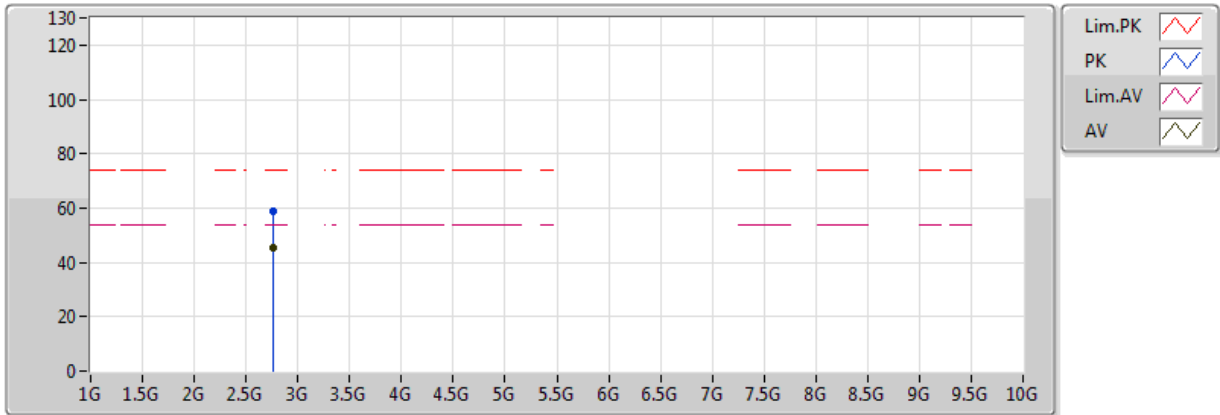


Summary

Mode	Result	Type	Freq (Hz)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Factor (dB)	Dist (m)	Pol. (H/V)	Azimuth (°)	Height (m)	Comments
LoRa_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-
902-928MHz	Pass	AV	2.767114G	47.39	54.00	-6.61	31.91	3	H	233	1.15	-

LoRa_Nss1_1TX

920.2MHz_TX

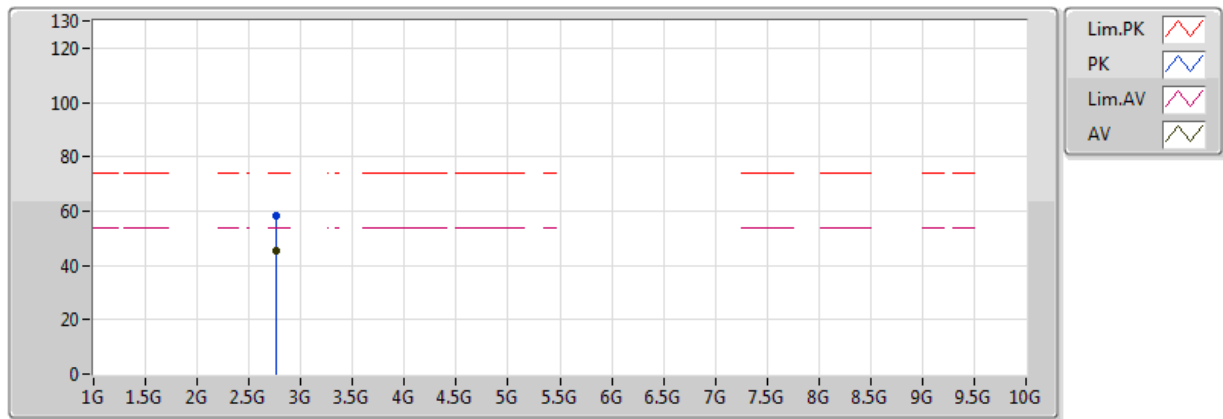


20170907
EUT_Z_1TX
Setting 20
05-W-3
FSP 3G

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.760616G	45.36	54.00	-8.64	33.60	3	V	5	1.39	-
PK	2.761532G	58.96	74.00	-15.04	33.60	3	V	5	1.39	-

LoRa_Nss1_1TX

920.2MHz_TX

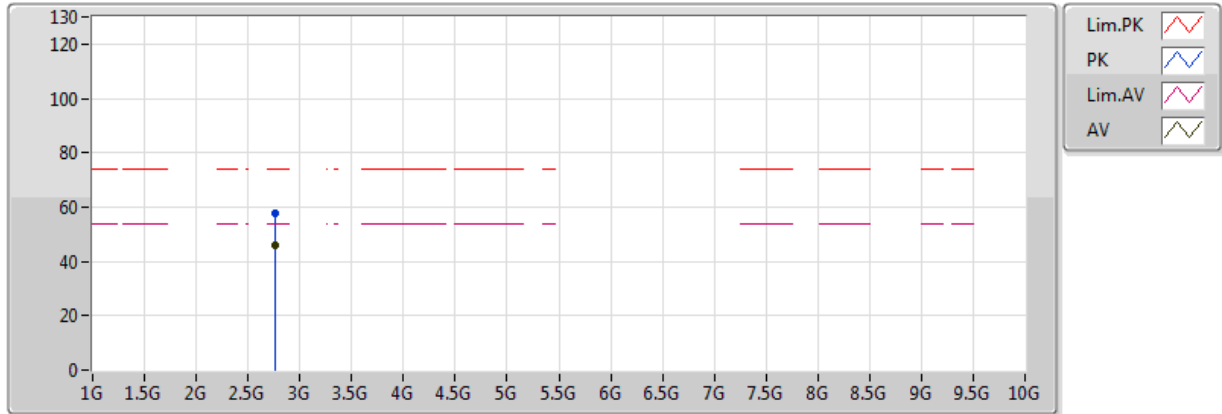


20170907
EUT_Z_1TX
Setting 20
05-W-3
FSP 3G

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.7605G	45.33	54.00	-8.67	33.60	3	H	279	1.89	-
PK	2.760432G	58.15	74.00	-15.85	33.60	3	H	279	1.89	-

LoRa_Nss1_1TX

922.4MHz_TX

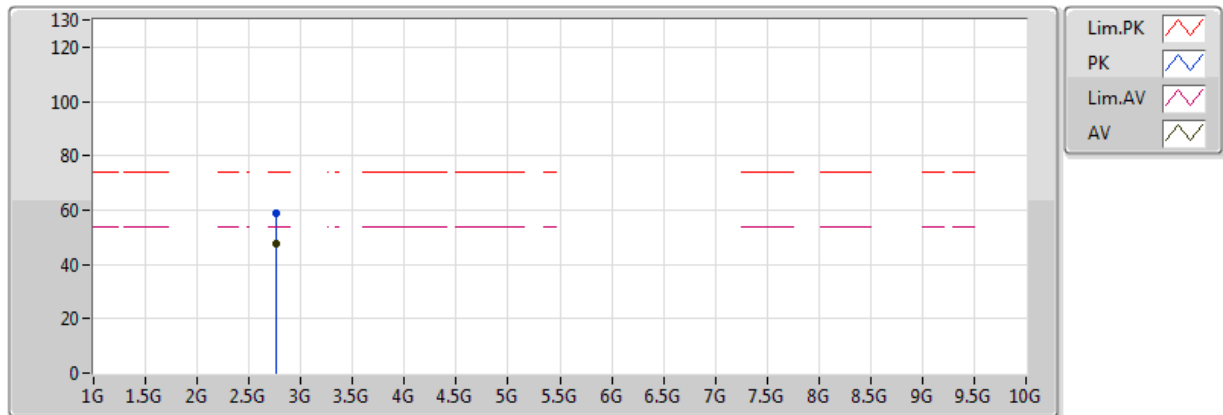


20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.767104G	46.18	54.00	-7.82	31.91	3	V	239	1.02	-
PK	2.767236G	57.87	74.00	-16.13	31.91	3	V	239	1.02	-

LoRa_Nss1_1TX

922.4MHz_TX

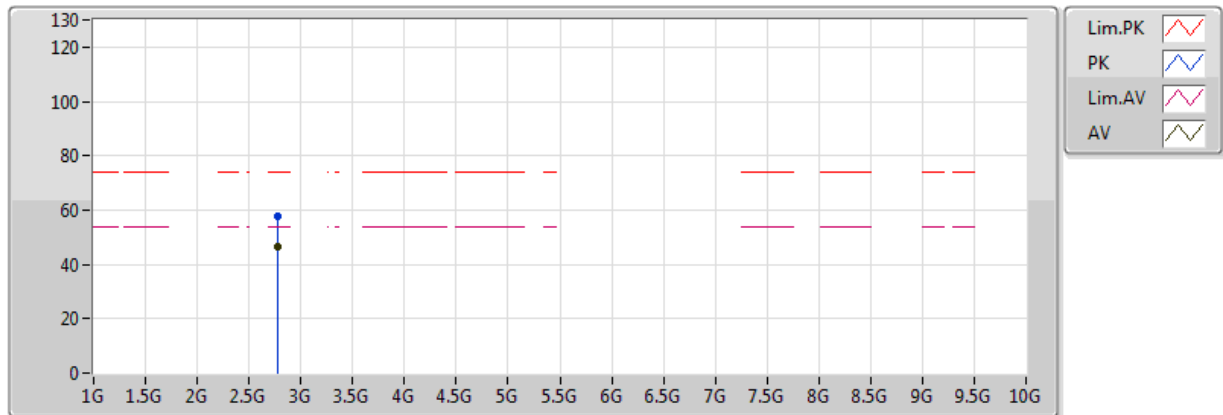


20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.767114G	47.39	54.00	-6.61	31.91	3	H	233	1.15	-
PK	2.766812G	59.02	74.00	-14.98	31.91	3	H	233	1.15	-

LoRa_Nss1_1TX

924.6MHz_TX

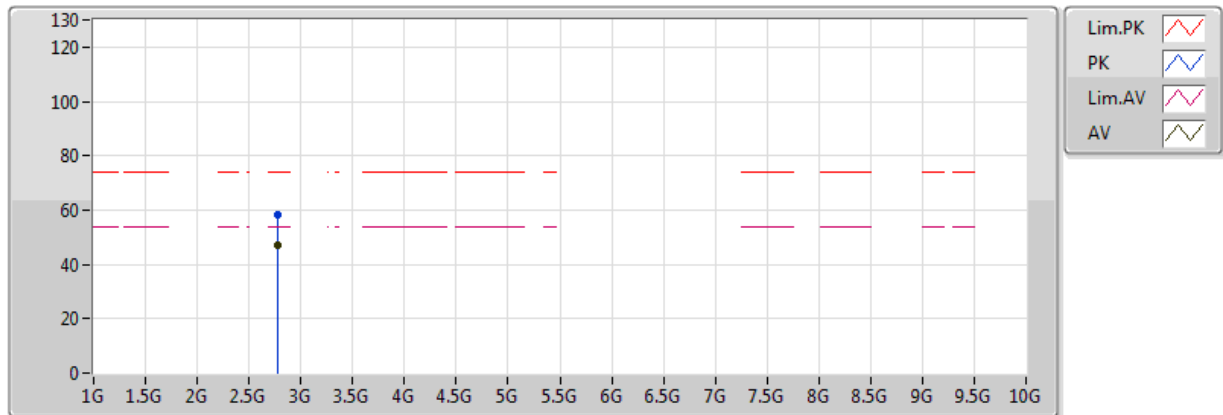


20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.773644G	46.25	54.00	-7.75	31.94	3	V	172	1.50	-
PK	2.773684G	57.84	74.00	-16.16	31.94	3	V	172	1.50	-

LoRa_Nss1_1TX

924.6MHz_TX



20170912
EUT_Z_1TX
Setting 20
01-W-3
FSP(100080)

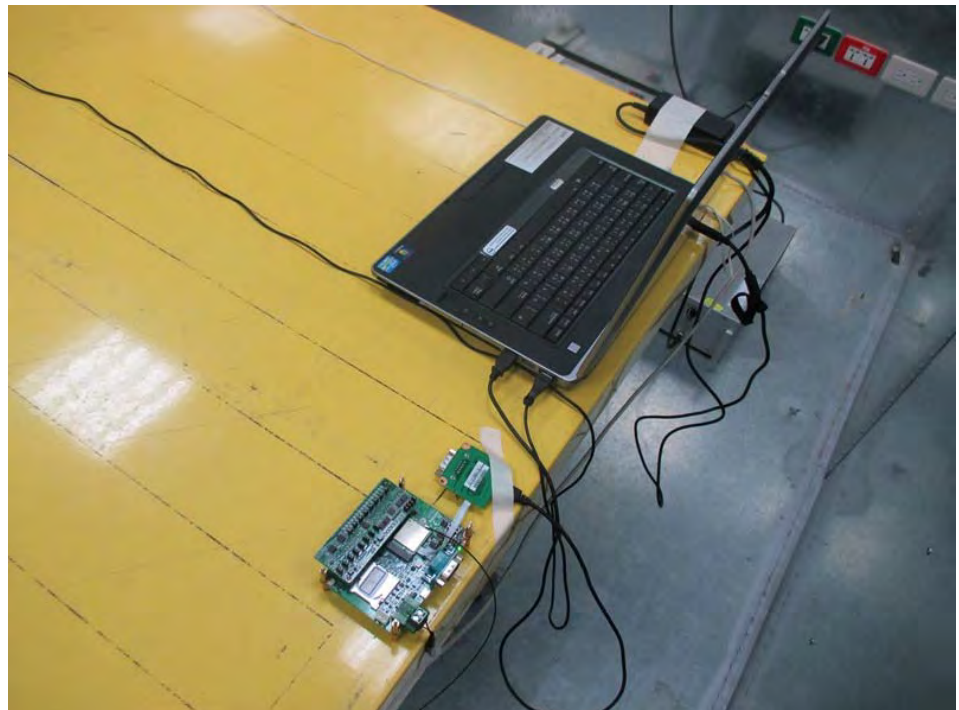
Type	Freq(Hz)	Level(dBuV/m)	Limit(dBuV/m)	Margin(dB)	Factor(dB)	Dist(m)	Pol.(H/V)	Azimuth(°)	Height(m)	Comments
AV	2.773614G	47.01	54.00	-6.99	31.94	3	H	231	1.05	-
PK	2.773542G	58.52	74.00	-15.48	31.93	3	H	231	1.05	-

1. Photographs of Conducted Emissions Test Configuration

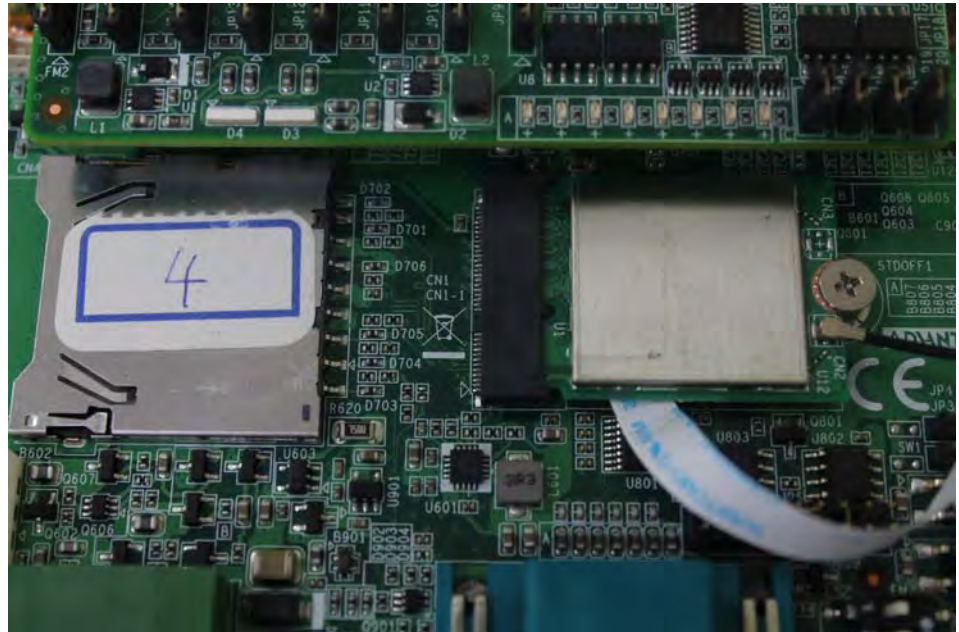
FRONT VIEW



REAR VIEW



CLOSE-UP VIEW

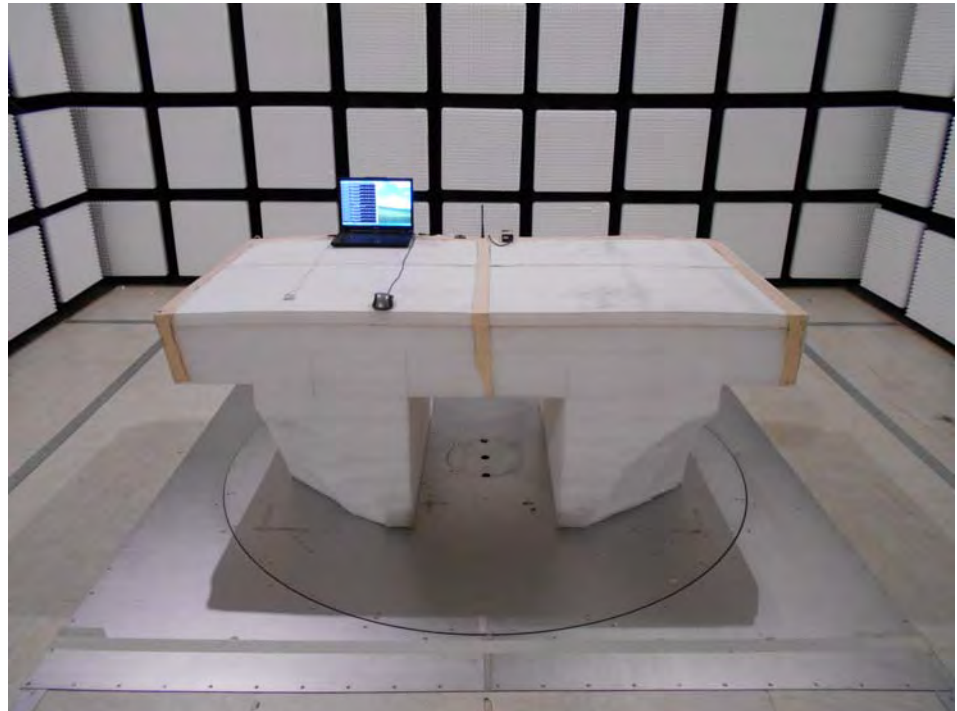


2. Photographs of Radiated Emissions Test Configuration

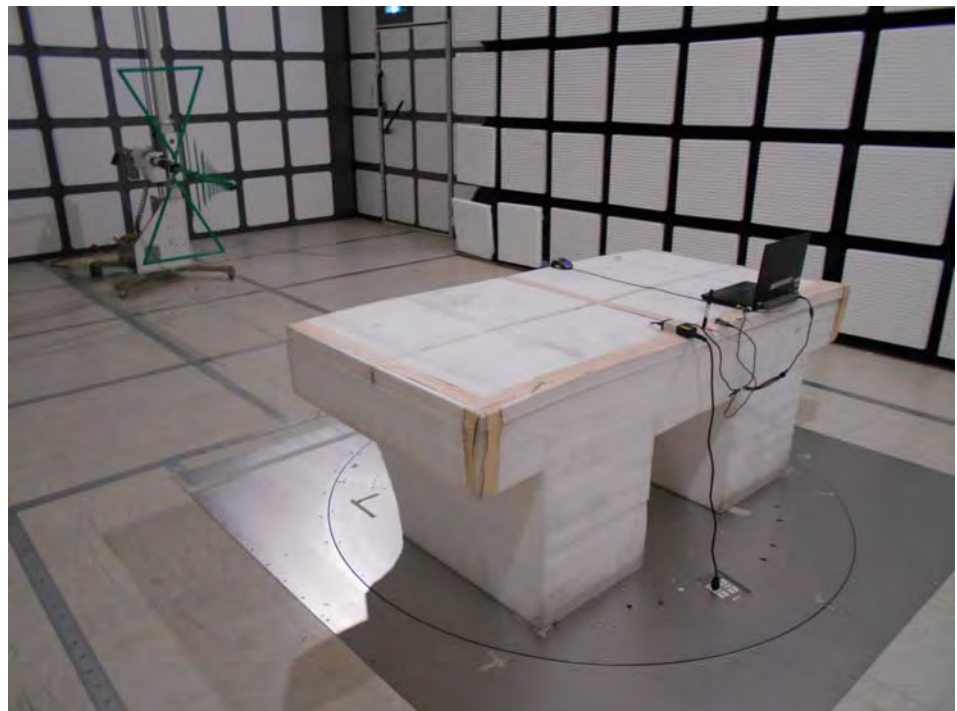
Test Configuration: 30MHz~1GHz

Intentional – CTX Test Mode: Mode 3 / Unintentional – CRX

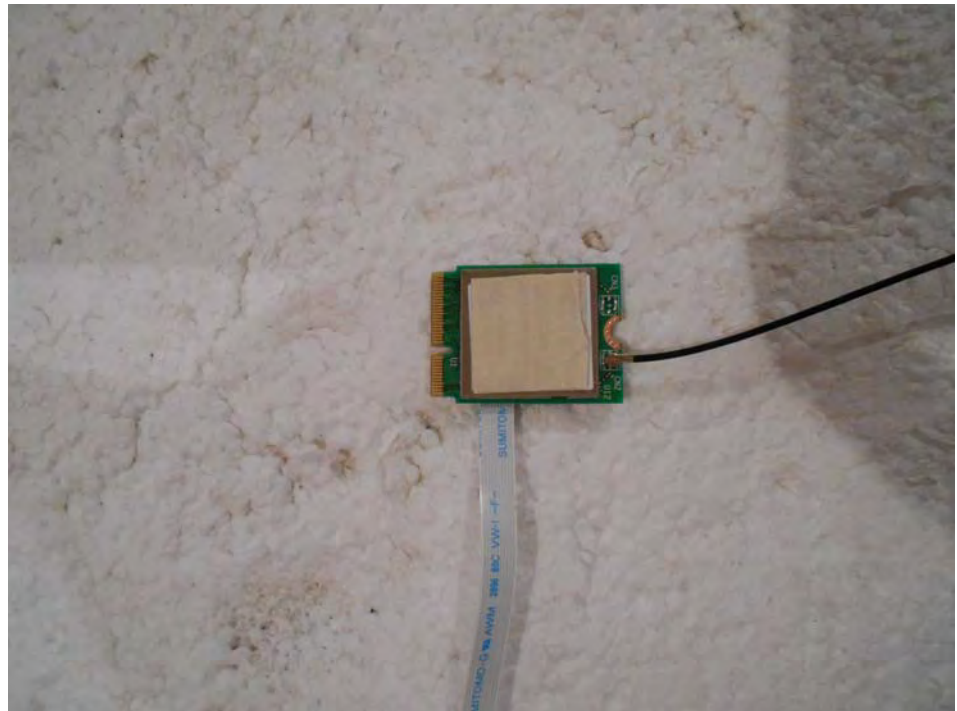
FRONT VIEW



REAR VIEW



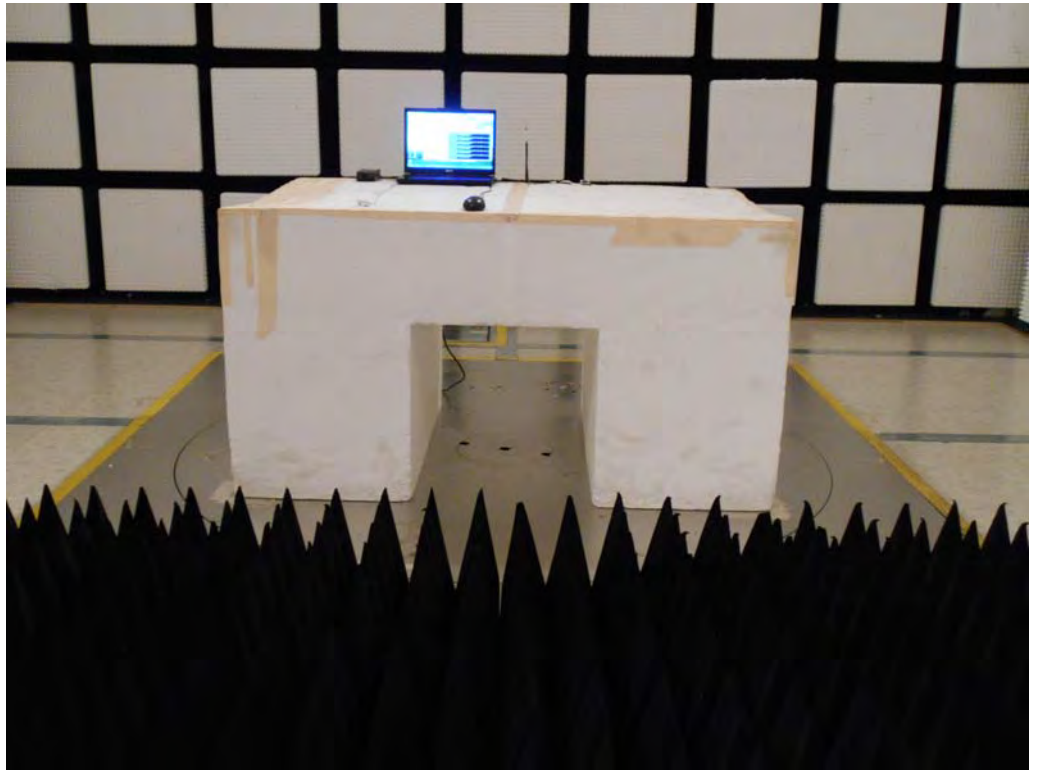
CLOSE-UP VIEW



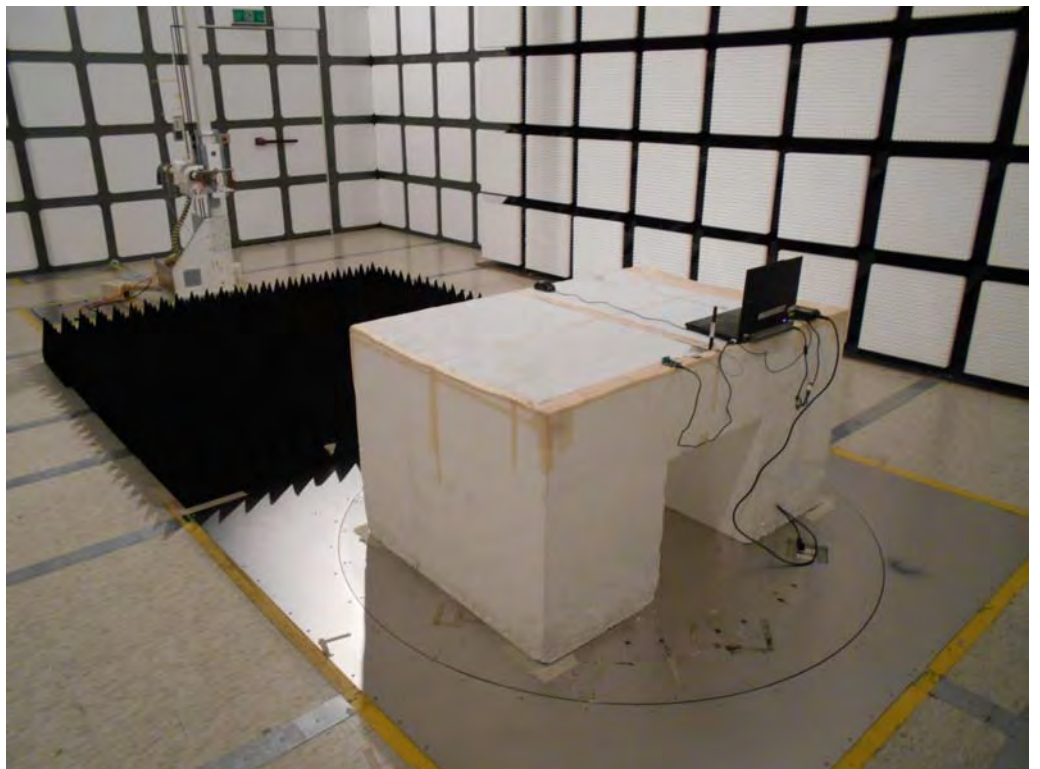
Test Configuration: Above 1GHz

Unintentional – CRX 1GHz~5th Harmonic

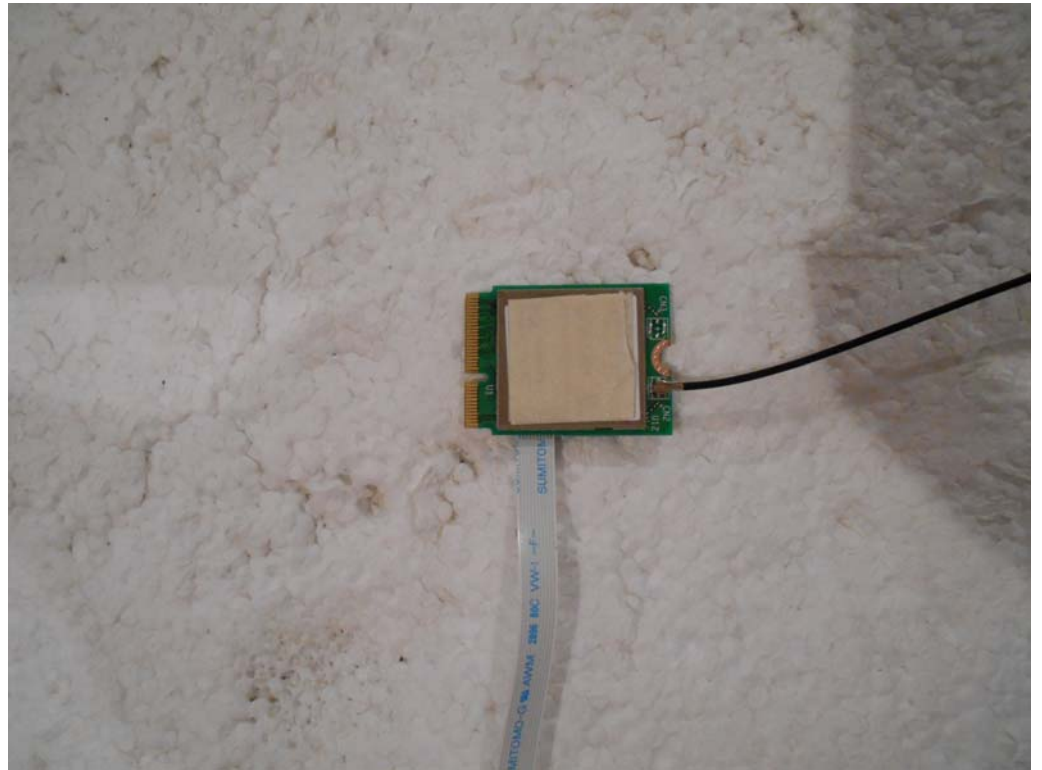
FRONT VIEW



REAR VIEW



CLOSE-UP VIEW



Intentional – CTX 1GHz~10th Harmonic

FRONT VIEW



REAR VIEW



CLOSE-UP VIEW

