FCC Test Report

FCC ID	:	**SQG-RM1262**
Equipment	:	**RM126X LoRaWAN Module**
Model No.	:	**RM1262**
Brand Name	:	**Laird Connectivity**
Applicant	:	**Laird Connectivity LLC**
Address	:	**W66N220 Commerce Court, Cedarburg, WI 53012 United States Of America**
Standard	:	**47 CFR FCC Part 15.247**
Received Date	:	**Dec. 29, 2022**
Tested Date	:	**Feb. 23 ~ Mar. 28, 2023**

We, International Certification Corporation, would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by: **Approved by:**

Along Chen / Assistant Manager **Gary Chang / Manager**

Table of Contents

Release Record

Report No.	Version	Description	Issued Date
FR2D2902	Rev. 01	Initial issue	Jun. 16, 2023

Summary of Test Results

FCC Rules	Test Items	Test method	Measured	Result
15.207	AC Power Line Conducted Emission	Conducted (TX)	[dBuV]: 0.538MHz 32.64 (Margin -13.36dB) - AV	Pass
15.247(d) 15.209	Unwanted Emissions	Conducted (TX) Radiated (TX)	[dBuV/m at 3m]: 70.74MHz 36.44 (Margin -3.56dB) - QP	Pass
15.247(d)	Band Edge	Conducted (TX)	Meet the requirement of limit	Pass
15.247(b)(2)(3)	Conducted Output Power	Conducted (TX)	Power [dBm]: 21.84	Pass
15.247(a)(1)(i)	Number of Hopping Channels	Conducted (TX)	Meet the requirement of limit	Pass
15.247(a)(1)	Hopping Channel Separation	Conducted (TX)	Meet the requirement of limit	Pass
15.247(f)	Dwell Time	Conducted (TX)	Meet the requirement of limit	Pass
15.203	Antenna Requirement	Conducted (TX)	Meet the requirement of limit	Pass

Declaration of Conformity:
The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.
Comments and Explanations:
The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

Country	USA
LoRaWAN Region	US902-928
Modulation	LoRa
Type	FHSS

RF Genera Information					
Channel Frequency (MHz)	**Channel List**	**UL/DL**	**Data Rate (bit/sec)**	**Spread Factor**	**Channel Bandwidth (kHz)**
902.3 ~ 914.9	64 channels	UL	980-5.47k bps	10 ~ 7	125
Note: RF output power specifies that Maximum Conducted (Average) Output Power.					

1.1.2 Antenna Details

Ant. No.	Manufacturer	Model	Part Number	Type	Connector	Gain (dBi)
1	Embedded Antenna Design (EAD)	BKR915	FBKR35301-RS-KR	Dipole	RP-SMA	2.00
2	Linx	OC-LG Series	ANT-916-OC-LG-RPS	Dipole	RP-SMA	2.20
3	Laird	900FlexPIFA	EFB9020A3S-15MH4L	PIFA	I-PEX MHF4L	-0.1
4	Laird	i-900FlexPIFA	EFG9020A3S-15MH4L	PIFA	I-PEX MHF4L	0.5

1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	3.3Vdc from host

1.1.4 Accessories

N/A

1.1.5 Channel List

Channel Bandwidth: 125kHz							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
0	902.3	16	905.5	32	908.7	48	911.9
1	902.5	17	905.7	33	908.9	49	912.1
2	902.7	18	905.9	34	909.1	50	912.3
3	902.9	19	906.1	35	909.3	51	912.5
4	903.1	20	906.3	36	909.5	52	912.7
5	903.3	21	906.5	37	909.7	53	912.9
6	903.5	22	906.7	38	909.9	54	913.1
7	903.7	23	906.9	39	910.1	55	913.3
8	903.9	24	907.1	40	910.3	56	913.5
9	904.1	25	907.3	41	910.5	57	913.7
10	904.3	26	907.5	42	910.7	58	913.9
11	904.5	27	907.7	43	910.9	59	914.1
12	904.7	28	907.9	44	911.1	60	914.3
13	904.9	29	908.1	45	911.3	61	914.5
14	905.1	30	908.3	46	911.5	62	914.7
15	905.3	31	908.5	47	911.7	63	914.9

1.1.6 Test Tool and Duty Cycle

Test Tool	UwTerminalX, v1.10a	
Mode	Duty Cycle (%)	Duty Factor (dB)
LoRa (125kHz)	100.00%	0.00

1.1.7 Power Index of Test Tool

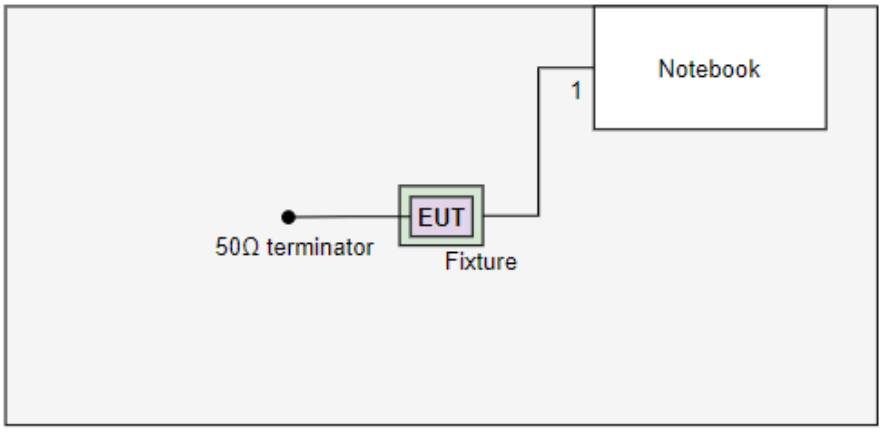
Test Frequency (MHz)	Power Index
902.3	22
908.5	22
914.9	22

1.2 Local Support Equipment List

Support Equipment List					
No.	**Equipment**	**Brand**	**Model**	**FCC ID**	**Remarks**
1	Notebook	DELL	Latitude E5470	DoC	---
2	Fixture	Laird	DVK-RM126X	---	Provided by applicant.
3	50Ω terminator	---	---	---	---
4	USB Cable	ICC	micro to A	---	---

1.3 Test Setup Chart

Test Setup Diagram



No.	Signal cable / Length (m)
1	USB, 1m shielded.

1.4 The Equipment List

Test Item	Conducted Emission				
Test Site	Conduction room 1 / (CO01-WS)				
Tested Date	Mar. 21, 2023				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101658	Feb. 17, 2023	Feb. 16, 2024
LISN	R&S	ENV216	101579	Apr. 21, 2022	Apr. 20, 2023
LISN (Support Unit)	SCHWARZBECK	Schwarzbeck 8127	8127667	Jan .02, 2023	Jan .03, 2024
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 17, 2022	Oct. 16, 2023
50 ohm terminal (Support Unit)	NA	50	01	May 10, 2022	May 09, 2023
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Tested Date	Feb. 23, 2023				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Receiver	R&S	ESR3	101657	Mar. 15, 2022	Mar. 14, 2023
Spectrum Analyzer	R&S	FSV40	101498	Nov. 21, 2022	Nov. 20, 2023
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 01, 2022	Oct. 31, 2023
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Aug. 03, 2022	Aug. 02, 2023
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Nov. 25, 2022	Nov. 24, 2023
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Oct. 27, 2022	Oct. 26, 2023
Preamplifier	EMC	EMC02325	980225	Jun. 28, 2022	Jun. 27, 2023
Preamplifier	EMC	EMC118A45SE	980898	Jul. 16, 2022	Jul. 15, 2023
Preamplifier	EMC	EMC184045SE	980903	Jul. 16, 2022	Jul. 15, 2023
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 04, 2022	Oct. 03, 2023
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 04, 2022	Oct. 03, 2023
LF cable 11M	EMC	EMCCFD400-NW-NW-11000	200801	Oct. 04, 2022	Oct. 03, 2023
LF cable 1M	EMC	EMCCFD400-NM-NM-1000	160502	Oct. 04, 2022	Oct. 03, 2023
RF Cable	EMC	EMC104-35M-35M-8000	210920	Oct. 04, 2022	Oct. 03, 2023
RF Cable	EMC	EMC104-35M-35M-3000	210922	Oct. 04, 2022	Oct. 03, 2023
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

Test Item	RF Conducted				
Test Site	(TH01-WS)				
Tested Date	Mar. 28, 2023				
Instrument	**Brand**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101910	Apr. 18, 2022	Apr. 17, 2023
Power Meter	Anritsu	ML2495A	1241002	Nov. 23, 2022	Nov. 22, 2023
Power Sensor	Anritsu	MA2411B	1207366	Nov. 23, 2022	Nov. 22, 2023
Measurement Software	Sporton	SENSE-15247_FS	V5.10.8	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

1.5 Test Standards

47 CFR FCC Part 15.247
ANSI C63.10-2013

1.6 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02

1.7 Deviation from Test Standard and Measurement Procedure

None

1.8 Measurement Uncertainty

The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)).

Measurement Uncertainty	
Parameters	**Uncertainty**
Bandwidth	±34.130 Hz
Conducted power	±0.808 dB
Power density	±0.583 dB
Unwanted Emission ≤ 1GHz	±3.41 dB
Unwanted Emission > 1GHz	±4.59 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	CO01-WS, 03CH01-WS, TH01-WS
Address of Test Site	No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

- FCC Designation No.: TW2732
- FCC site registration No.: 181692
- ISED#: 10807A
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Channel Bandwidth (kHz)	Test Frequency (MHz)	Separating Factor	Test method	Mode	Test Configuration
AC Power Line Conducted Emission Conducted Output Power Hopping Channel Separation 20dB and Occupied bandwidth Power Spectral Density	125	902.3 / 908.5 / 914.9	SF10	Conducted	TX	--
Number of Hopping Channels	125	902.3 ~ 914.9	SF10	Conducted	TX	--
Dwell Time	125	902.3	SF10, 9, 8, 7	Conducted	TX	--
Unwanted Emissions	125	902.3 / 908.5 / 914.9	SF10	Conducted	TX	--
Unwanted Emissions	125	902.3 / 908.5 / 914.9	SF10	Radiated	TX	Note2

NOTE:

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** result was found as the worst case and was shown in this report.
2. The 50Ω terminator is connected to antenna port of EUT for radiated emission measurement.
3. SX1262 chipset DCDC convertor mode A: DCDC ON (LDO OFF).
   SX1262 chipset DCDC convertor mode B: DCDC OFF (LDO ON).
   Mode A is the worst case

3 Transmitter Test Results

3.1 Unwanted Emissions into Restricted Frequency Bands

3.1.1 Limit of Unwanted Emissions into Restricted Frequency Bands

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:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.1.2 Test Procedures

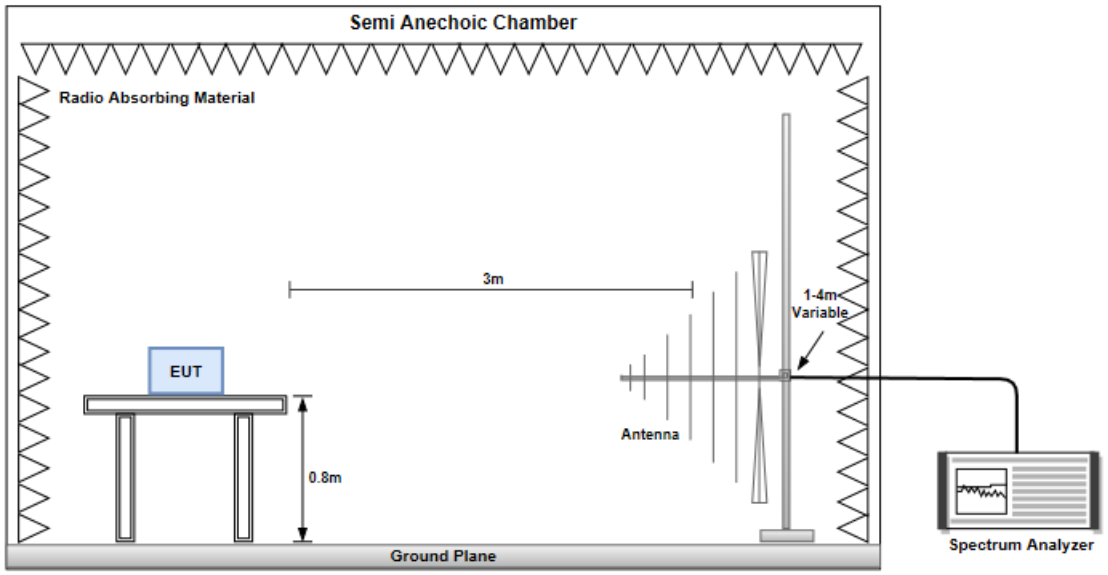
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

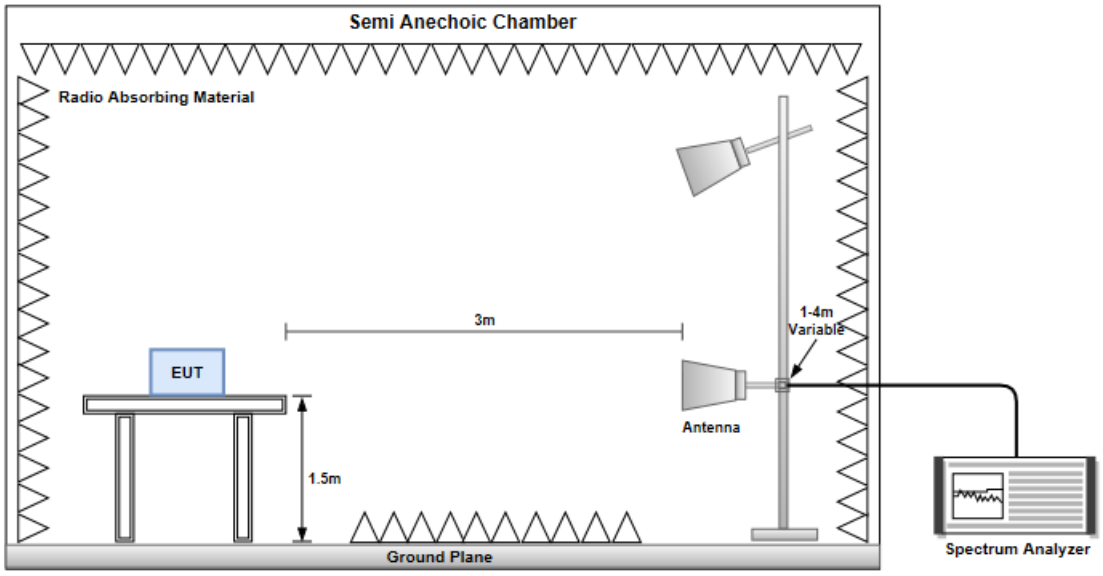
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.1.3 Test Setup

Radiated Emissions below 1 GHz



Radiated Emissions above 1 GHz



3.1.4 Test Results

Refer to Appendix A.

3.2 Unwanted Emissions into Non-Restricted Frequency Bands

3.2.1 Limit of Unwanted Emissions into Non-Restricted Frequency Bands

The peak output power measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz.

3.2.2 Test Procedures

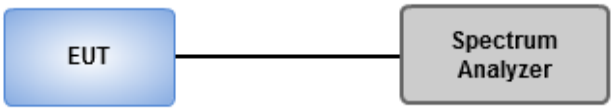
Reference Level Measurement

1. Set the RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Set Sweep time = auto couple, Trace mode = max hold.
3. Allow trace to fully stabilize.
4. Use the peak marker function to determine the maximum amplitude level.

Unwanted Emissions Level Measurement

1. Set RBW = 100 kHz, VBW = 300 kHz, Detector = peak.
2. Trace Mode = max hold, Sweep = auto couple.
3. Allow the trace to stabilize.
4. Use peak marker function to determine maximum amplitude of all unwanted emissions within any 100 kHz bandwidth.

3.2.3 Test Setup



3.2.4 Test Results

Ambient Condition	23°C / 65%	Tested By	Roger Lu

Refer to Appendix B.

3.3 Conducted Output Power

3.3.1 Limit of Conducted Output Power

1W

3.3.2 Test Procedures

1. A wideband power meter is used for power measurement. Bandwidth of power senor and meter is 50MHz
2 If duty cycle of test signal is not 100 %, trigger and gating function of power meter will be enabled to capture transmission burst for measuring output power

3.3.3 Test Setup

3.3.4 Test Results

Ambient Condition	23°C / 65%	Tested By	Roger Lu

Refer to Appendix C.

3.4 Number of Hopping Frequency

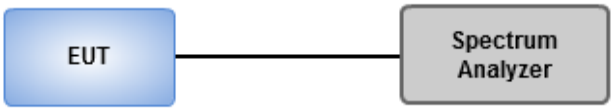
3.4.1 Limit of Number of Hopping Frequency

Number of Hopping Frequencies Limit for Frequency Hopping Systems		
☒	902-928 MHz Band:	
	☒	N ≥ 50, 20 dB bandwidth of the hopping channel is less than 250 kHz
	☐	N ≥ 25, 20 dB bandwidth of the hopping channel is 250 kHz or greater
	☐	Hybrid mode, No minimum number of hopping channels associated with hybrid system.
N: Number of Hopping Frequencies		

3.4.2 Test Procedures

1. Set RBW = 100kHz, VBW = 300kHz, Sweep time = Auto, Detector = Peak Trace max hold.
2 Allow trace to stabilize.

3.4.3 Test Setup



3.4.4 Test Results

Ambient Condition	23°C / 65%	**Tested By**	Roger Lu

Refer to Appendix D.

3.5 20dB and Occupied Bandwidth

3.5.1 Test Procedures

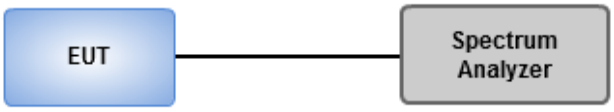
20dB Bandwidth

1. Set RBW=3kHz, VBW=10kHz, Sweep time=Auto, Detector=Peak Trace max hold.
2 Allow trace to stabilize.
3 Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower) that are attenuated by 20 dB relative to the maximum level measured in the fundamental emission.

Occupied Bandwidth

1. Set RBW=3kHz, VBW=10kHz,Sweep time = Auto, Detector=Peak, Trace max hold
2 Allow trace to stabilize
3. Use Occupied bandwidth function of spectrum analyzer to measuring 99% occupied bandwidth

3.5.2 Test Setup



3.5.3 Test Results

Ambient Condition	23°C / 65%	**Tested By**	Roger Lu

Refer to Appendix E.

3.6 Channel Separation

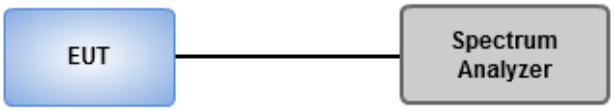
3.6.1 Limit of Channel Separation

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

3.6.2 Test Procedures

1. Set RBW=10kHz, VBW=30kHz, Sweep time=Auto, Detector=Peak Trace max hold.
2 Allow trace to stabilize.
3 Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The EUT shall show compliance with the appropriate regulatory limit

3.6.3 Test Setup



3.6.4 Test Results

Ambient Condition	23°C / 65%	**Tested By**	Roger Lu

Refer to Appendix F.

3.7 Number of Dwell Time

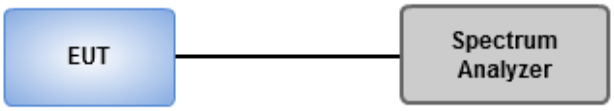
3.7.1 Limit of Dwell time

Time of Occupancy (Dwell Time) Limit for Frequency Hopping Systems		
☒	902-928 MHz Band:	
	☒	≤ 0.4 second within a 20 second period, 20 dB bandwidth of the hopping channel is less than 250 kHz
	☐	≤ 0.4 second within a 10 second period, 20 dB bandwidth of the hopping channel is 250 kHz or greater
	☐	Hybrid mode ,an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4

3.7.2 Test Procedures

1. Set RBW=200kHz, VBW=1000kHz, Sweep time=3.2s / 500ms, Detector=Peak, Span=0Hz, Trace max hold for 8 hopping channels.
2. Set RBW=200kHz, VBW=1000kHz, Sweep time=6.4s / 500ms, Detector=Peak, Span=0Hz, Trace max hold for 16 hopping channels.
3. Set RBW=200kHz, VBW=1000kHz, Sweep time=25.6s / 500ms, Detector=Peak, Span=0Hz, Trace max hold for 64 hopping channels.
4. Measure and record the burst on time.

3.7.3 Test Setup



3.7.4 Test Results

Ambient Condition	23°C / 65%	Tested By	Roger Lu

Refer to Appendix G.

3.8 AC Power Line Conducted Emissions

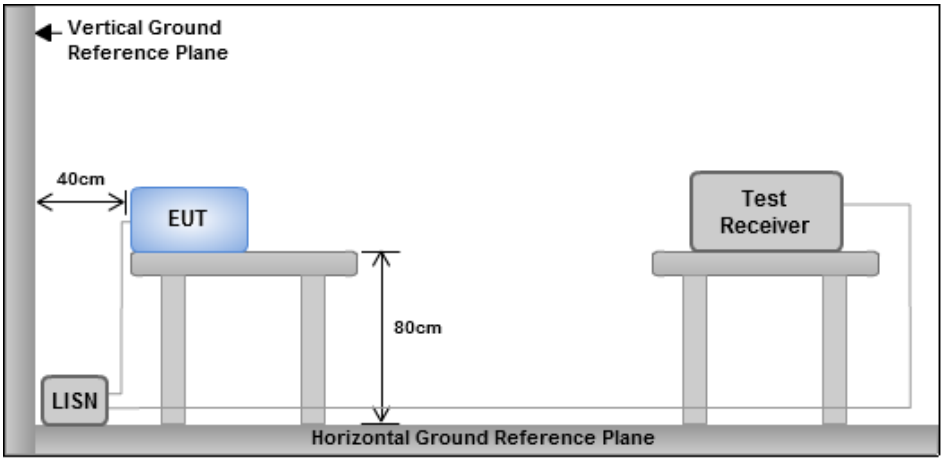
3.8.1 Limit of AC Power Line Conducted Emissions

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.		

3.8.2 Test Procedures

1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50 Ω LISN port.
3. AC conducted emission measurements is made over frequency range from 150 kHz to 30 MHz.
4. This measurement was performed with AC 120V / 60Hz.

3.8.3 Test Setup



Note: 1. Support units were connected to second LISN.
2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

3.8.4 Test Results

Refer to Appendix I.

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corporation (EMC and Wireless Communication Laboratory), it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan District. Location map can be found on our website http://www.icertifi.com.tw.

Linkou

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou District, New Taipei City, Taiwan (R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

No.3-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

No.2-1, Lane 6, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 33381, Taiwan (R.O.C.)

If you have any suggestion, please feel free to contact us as below information.

Tel: 886-3-271-8666
Fax: 886-3-318-0345
Email: ICC_Service@icertifi.com.tw

==END==

Unwanted Conducted Emissions (30M~1.5GHz)

Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	Psum (dBm)	GRF (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
LoRa (125kHz)	-	-	-	-	-	-	-		-	-	-
902.3MHz	Pass	88M	216M	QP	165.18M	2.20	-60.42	4.7	-53.52	-51.70	-1.82

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

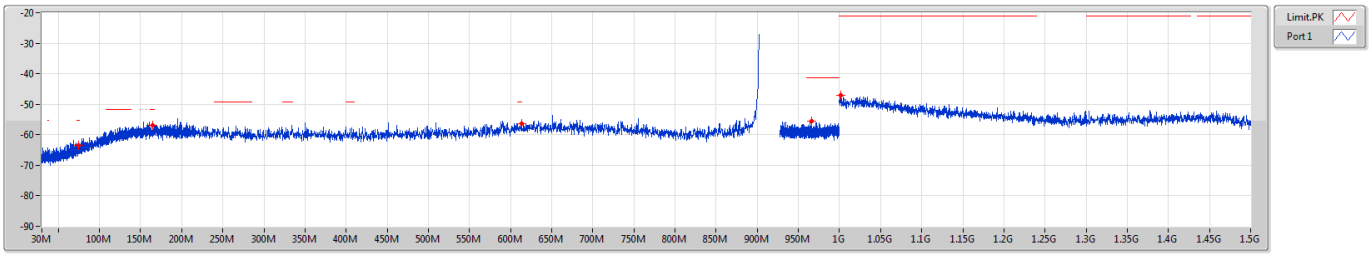
Result

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	Psum (dBm)	GRF (dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)
LoRa (125kHz)	-	-	-	-	-	-	-		-	-	-
902.3MHz	Pass	1G	1.5G	AV	1.01475G	2.20	-56.52	0	-54.32	-41.20	-13.12
902.3MHz	Pass	30M	88M	QP	74.31M	2.20	-66.53	4.7	-59.63	-55.20	-4.43
902.3MHz	Pass	88M	216M	QP	165.18M	2.20	-60.42	4.7	-53.52	-51.70	-1.82
902.3MHz	Pass	216M	902M	QP	613.54M	2.20	-59.81	4.7	-52.91	-49.20	-3.71
902.3MHz	Pass	928M	1G	PK	966.09M	2.20	-55.51	4.7	-48.61	-41.20	-7.41
902.3MHz	Pass	1G	1.5G	PK	1.002G	2.20	-47.14	0	-44.94	-21.20	-23.74
908.5MHz	Pass	1G	1.5G	AV	1.022G	2.20	-56.64	0	-54.44	-41.20	-13.24
908.5MHz	Pass	30M	88M	QP	75.04M	2.20	-66.61	4.7	-59.71	-55.20	-4.51
908.5MHz	Pass	88M	216M	QP	163.65M	2.20	-60.46	4.7	-53.56	-51.70	-1.86
908.5MHz	Pass	216M	902M	QP	612.17M	2.20	-59.95	4.7	-53.05	-49.20	-3.85
908.5MHz	Pass	928M	1G	PK	980.81M	2.20	-54.74	4.7	-47.84	-41.20	-6.64
908.5MHz	Pass	1G	1.5G	PK	1.00725G	2.20	-46.74	0	-44.54	-21.20	-23.34
914.9MHz	Pass	1G	1.5G	AV	1.02925G	2.20	-56.64	0	-54.44	-41.20	-13.24
914.9MHz	Pass	30M	88M	QP	74.31M	2.20	-66.58	4.7	-59.68	-55.20	-4.48
914.9MHz	Pass	88M	216M	QP	125.38M	2.20	-60.45	4.7	-53.55	-51.70	-1.85
914.9MHz	Pass	216M	902M	QP	612.17M	2.20	-59.88	4.7	-52.98	-49.20	-3.78
914.9MHz	Pass	928M	1G	PK	993.77M	2.20	-56.05	4.7	-49.15	-41.20	-7.95
914.9MHz	Pass	1G	1.5G	PK	1.0175G	2.20	-47.20	0	-45.00	-21.20	-23.80

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

902-928MHz_LoRa (125kHz) **CSE Other-FS [PK]**

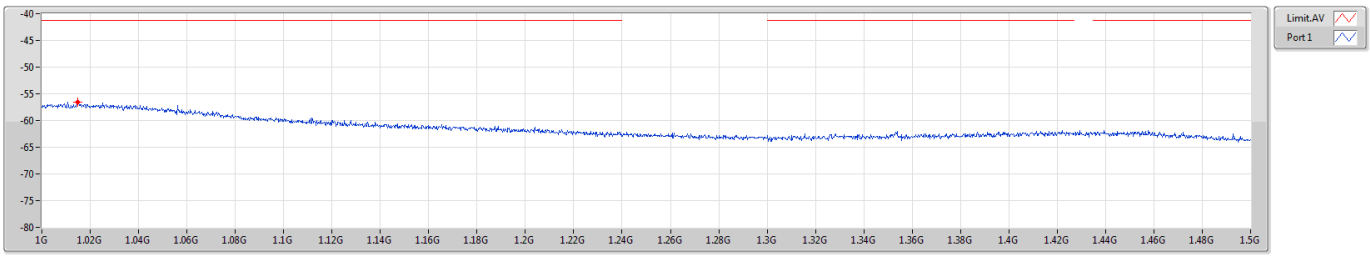
902.3MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
30M	88M	100k	PK	74.31M	-63.48	-63.48
88M	216M	100k	PK	165.18M	-56.84	-56.84
216M	902M	100k	PK	613.54M	-56.38	-56.38
928M	1G	100k	PK	966.09M	-55.51	-55.51
1G	1.5G	1M	PK	1.002G	-47.14	-47.14

902-928MHz_LoRa (125kHz) **CSE Other-FS [AV]**

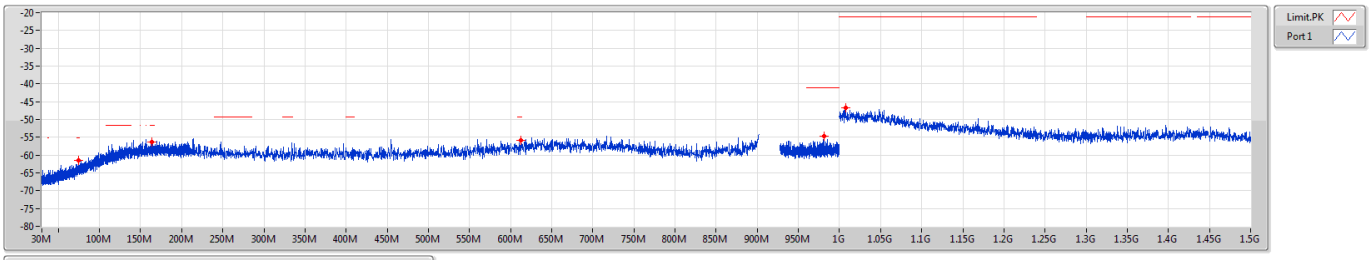
902.3MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	1.5G	1M	AV	1.01475G	-56.52	-56.52

902-928MHz_LoRa (125kHz) **CSE Other-FS [PK]**

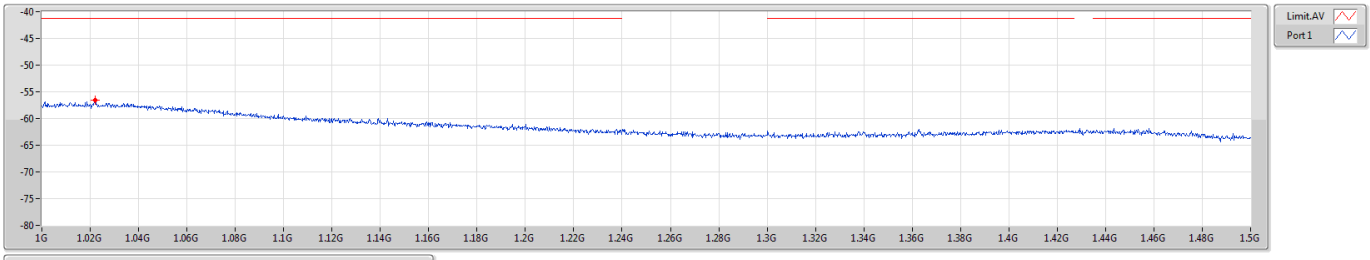
908.5MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
30M	88M	100k	PK	75.04M	-61.44	-61.44
88M	216M	100k	PK	163.65M	-56.43	-56.43
216M	902M	100k	PK	612.17M	-55.94	-55.94
928M	1G	100k	PK	980.81M	-54.74	-54.74
1G	1.5G	1M	PK	1.00725G	-46.74	-46.74

902-928MHz_LoRa (125kHz) **CSE Other-FS [AV]**

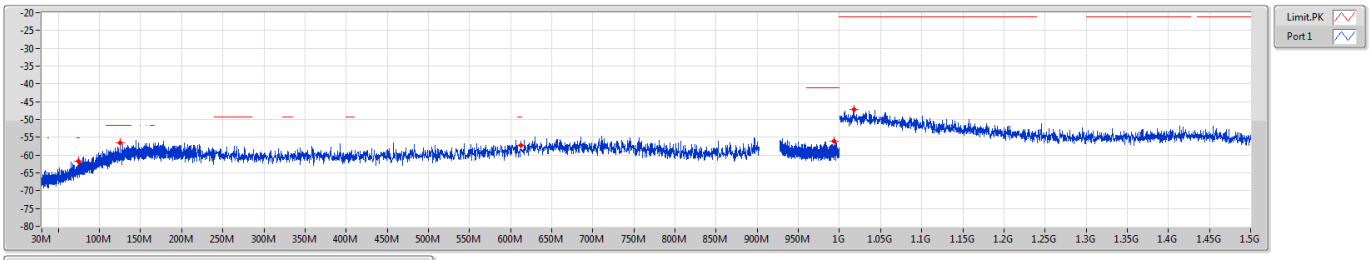
908.5MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	1.5G	1M	AV	1.022G	-56.64	-56.64

902-928MHz_LoRa (125kHz) **CSE Other-FS [PK]**

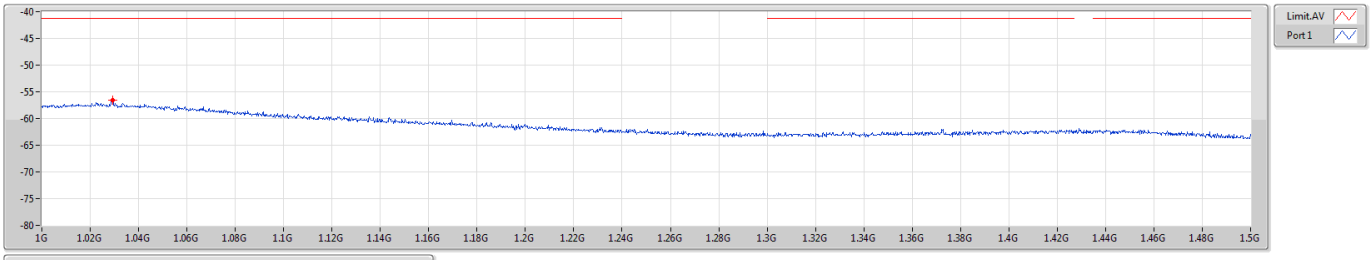
914.9MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
30M	88M	100k	PK	74.31M	-61.82	-61.82
88M	216M	100k	PK	125.38M	-56.52	-56.52
216M	902M	100k	PK	612.17M	-57.15	-57.15
928M	1G	100k	PK	993.77M	-56.05	-56.05
1G	1.5G	1M	PK	1.0175G	-47.20	-47.20

902-928MHz_LoRa (125kHz) **CSE Other-FS [AV]**

914.9MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1G	1.5G	1M	AV	1.02925G	-56.64	-56.64

Unwanted Conducted Emissions (1.5G~10GHz)

Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
902-928MHz	-	-	-	-	-	-	-	-	-	-
LoRa (125kHz)	Pass	1.5G	4G	AV	2.72563G	2.20	-48.29	-46.09	-41.20	-4.89

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

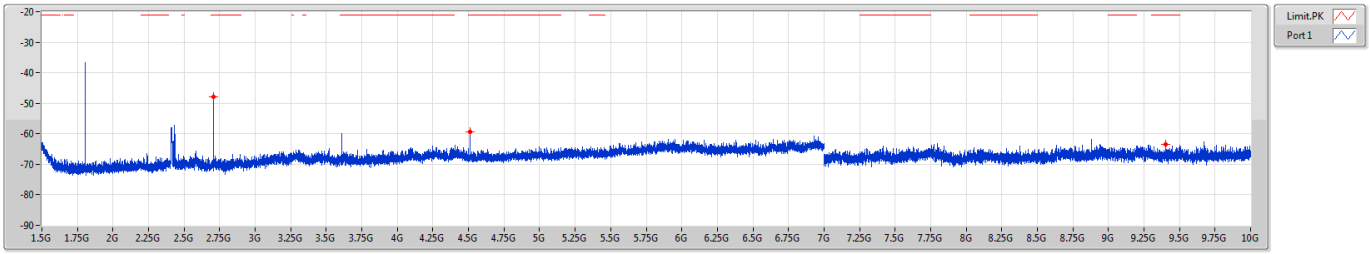
Result

Mode	Result	F-Start (Hz)	F-Stop (Hz)	Type	Freq (Hz)	DG (dBi)	Psum (dBm)	EIRP (dBm)	Limit (dBm)	Margin (dB)
LoRa (125kHz)	-	-	-	-	-	-	-	-	-	-
902.3MHz	Pass	1.5G	4G	AV	2.70719G	2.20	-48.38	-46.18	-41.20	-4.98
902.3MHz	Pass	4G	7G	AV	4.5115G	2.20	-62.16	-59.96	-41.20	-18.76
902.3MHz	Pass	7G	10G	AV	7.74888G	2.20	-73.42	-71.22	-41.20	-30.02
902.3MHz	Pass	1.5G	4G	PK	2.70719G	2.20	-47.91	-45.71	-21.20	-24.51
902.3MHz	Pass	4G	7G	PK	4.5115G	2.20	-59.24	-57.04	-21.20	-35.84
902.3MHz	Pass	7G	10G	PK	9.40075G	2.20	-63.48	-61.28	-21.20	-40.08
908.5MHz	Pass	1.5G	4G	AV	2.72563G	2.20	-48.29	-46.09	-41.20	-4.89
908.5MHz	Pass	4G	7G	AV	4.54263G	2.20	-63.66	-61.46	-41.20	-20.26
908.5MHz	Pass	7G	10G	AV	9.085G	2.20	-72.94	-70.74	-41.20	-29.54
908.5MHz	Pass	1.5G	4G	PK	2.72563G	2.20	-47.82	-45.62	-21.20	-24.42
908.5MHz	Pass	4G	7G	PK	4.543G	2.20	-60.33	-58.13	-21.20	-36.93
908.5MHz	Pass	7G	10G	PK	8.18913G	2.20	-63.39	-61.19	-21.20	-39.99
914.9MHz	Pass	1.5G	4G	AV	2.74469G	2.20	-48.46	-46.26	-41.20	-5.06
914.9MHz	Pass	4G	7G	AV	4.57413G	2.20	-65.45	-63.25	-41.20	-22.05
914.9MHz	Pass	7G	10G	AV	9.1495G	2.20	-72.31	-70.11	-41.20	-28.91
914.9MHz	Pass	1.5G	4G	PK	2.74469G	2.20	-47.85	-45.65	-21.20	-24.45
914.9MHz	Pass	4G	7G	PK	4.5745G	2.20	-61.53	-59.33	-21.20	-38.13
914.9MHz	Pass	7G	10G	PK	7.588G	2.20	-63.39	-61.19	-21.20	-39.99

DG = Directional Gain ; PX=Port X; Psum=P1+P2+...PX

902-928MHz_LoRa (125kHz) **CSE-FS [PK]**

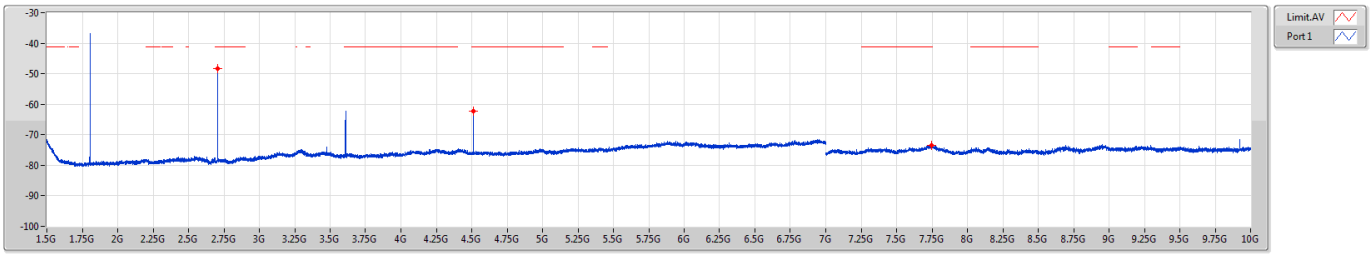
902.3MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1.5G	4G	1M	PK	2.70719G	-47.91	-47.91
4G	7G	1M	PK	4.5115G	-59.24	-59.24
7G	10G	1M	PK	9.40075G	-63.48	-63.48

902-928MHz_LoRa (125kHz) **CSE-FS [AV]**

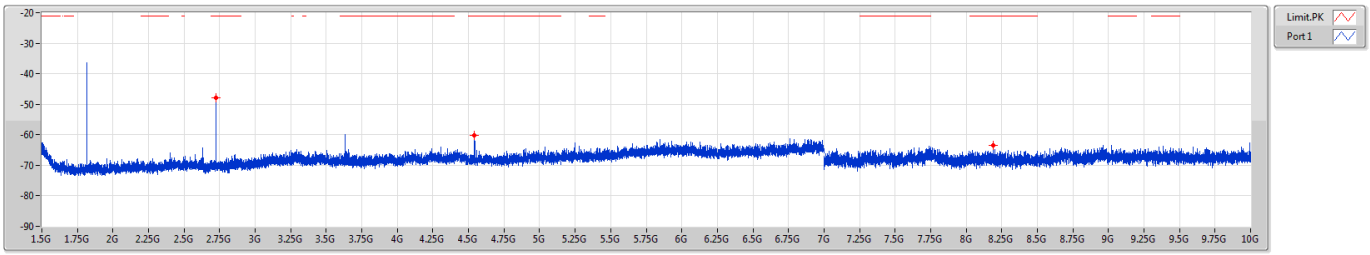
902.3MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1.5G	4G	1M	AV	2.70719G	-48.38	-48.38
4G	7G	1M	AV	4.5115G	-62.16	-62.16
7G	10G	1M	AV	7.74888G	-73.42	-73.42

902-928MHz_LoRa (125kHz) **CSE-FS [PK]**

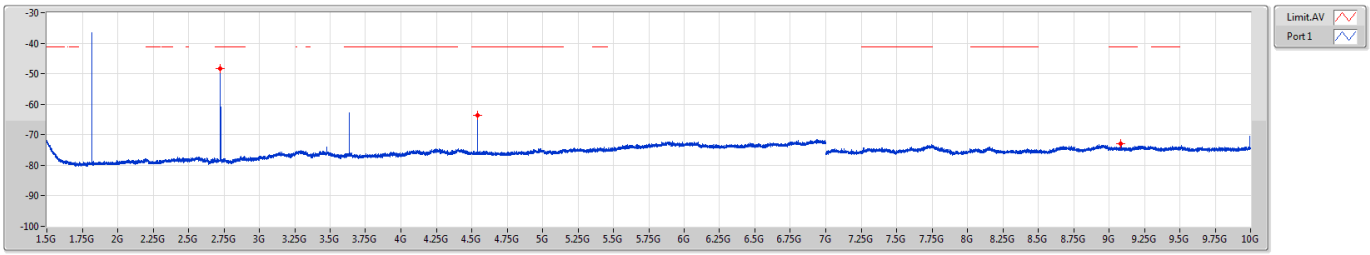
908.5MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1.5G	4G	1M	PK	2.72563G	-47.82	-47.82
4G	7G	1M	PK	4.543G	-60.33	-60.33
7G	10G	1M	PK	8.18913G	-63.39	-63.39

902-928MHz_LoRa (125kHz) **CSE-FS [AV]**

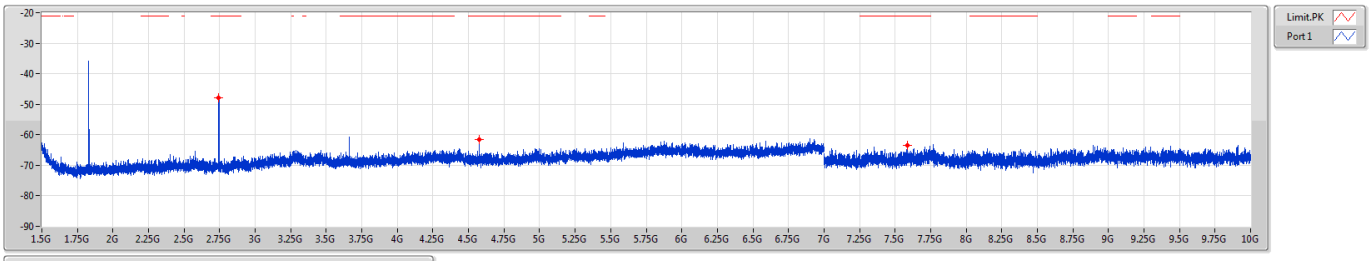
908.5MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1.5G	4G	1M	AV	2.72563G	-48.29	-48.29
4G	7G	1M	AV	4.54263G	-63.66	-63.66
7G	10G	1M	AV	9.085G	-72.94	-72.94

902-928MHz_LoRa (125kHz) **CSE-FS [PK]**

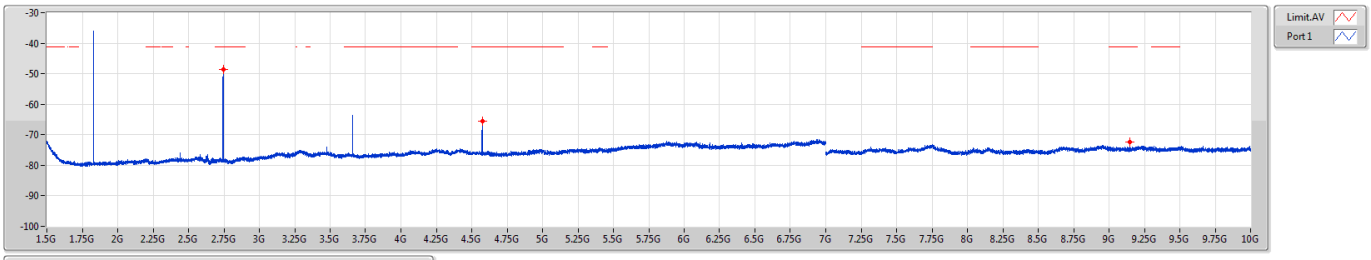
914.9MHz



F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1.5G	4G	1M	PK	2.74469G	-47.85	-47.85
4G	7G	1M	PK	4.5745G	-61.53	-61.53
7G	10G	1M	PK	7.588G	-63.39	-63.39

902-928MHz_LoRa (125kHz) **CSE-FS [AV]**

914.9MHz

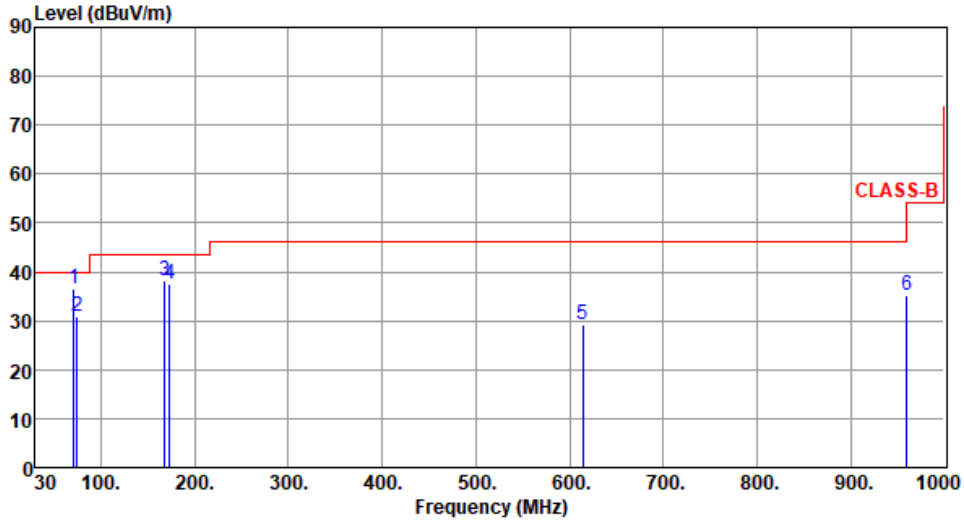


F-Start(Hz)	F-Stop(Hz)	RBW(Hz)	Type	Freq(Hz)	Psum(dBm)	P1(dBm)
1.5G	4G	1M	AV	2.74469G	-48.46	-48.46
4G	7G	1M	AV	4.57413G	-65.45	-65.45
7G	10G	1M	AV	9.1495G	-72.31	-72.31

Unwanted Radiated Emissions (Below 1GHz)

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	902.3
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

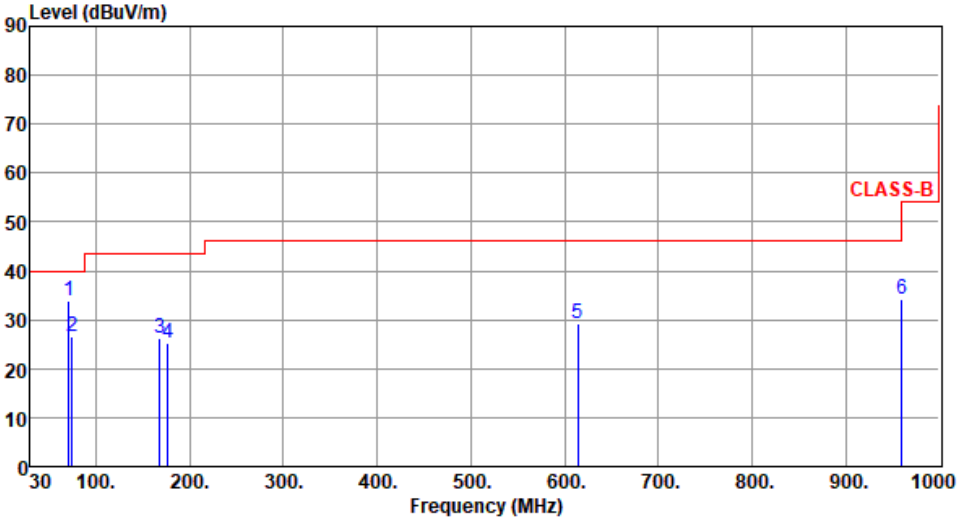


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	70.74	36.44	40.00	-3.56	47.76	-11.32	QP	154	200
2	74.62	30.72	40.00	-9.28	42.99	-12.27	Peak	---	---
3	167.74	38.29	43.50	-5.21	47.59	-9.30	Peak	---	---
4	173.56	37.45	43.50	-6.05	47.19	-9.74	Peak	---	---
5	614.00	29.30	46.00	-16.70	29.90	-0.60	Peak	---	---
6	960.00	35.17	46.00	-10.83	29.96	5.21	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	902.3
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

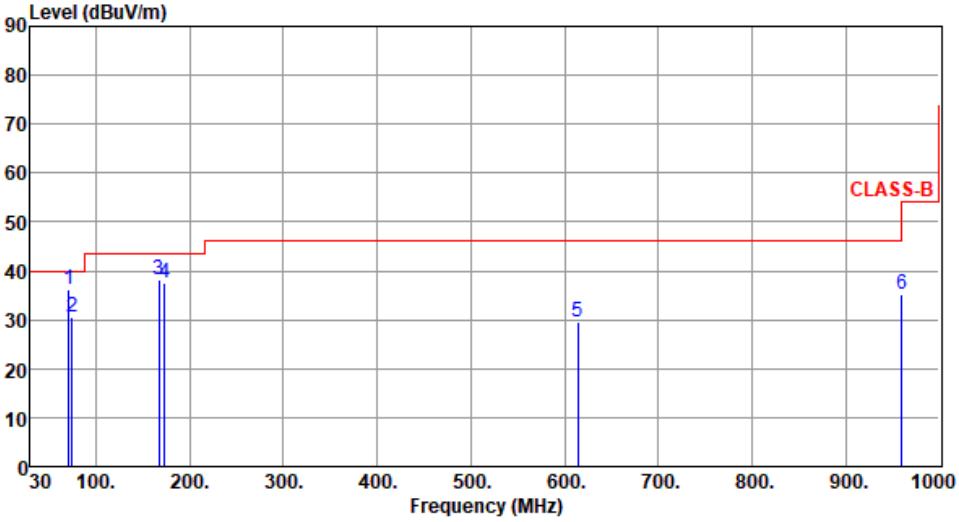


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	70.74	33.80	40.00	-6.20	45.12	-11.32	Peak	---	---
2	74.62	26.41	40.00	-13.59	38.68	-12.27	Peak	---	---
3	167.74	26.38	43.50	-17.12	35.68	-9.30	Peak	---	---
4	176.47	25.22	43.50	-18.28	35.24	-10.02	Peak	---	---
5	614.00	29.23	46.00	-16.77	29.83	-0.60	Peak	---	---
6	960.00	34.34	46.00	-11.66	29.13	5.21	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	908.5
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

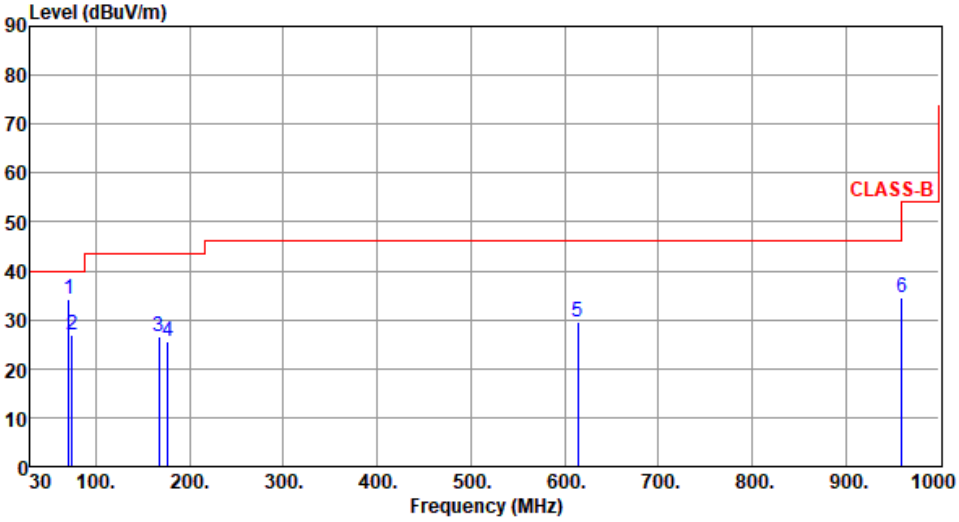


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	70.74	36.32	40.00	-3.68	47.64	-11.32	QP	152	201
2	74.58	30.66	40.00	-9.34	42.93	-12.27	Peak	---	---
3	167.62	38.11	43.50	-5.39	47.41	-9.30	Peak	---	---
4	173.47	37.56	43.50	-5.94	47.29	-9.73	Peak	---	---
5	614.00	29.64	46.00	-16.36	30.24	-0.60	Peak	---	---
6	960.00	35.29	46.00	-10.71	30.08	5.21	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	908.5
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

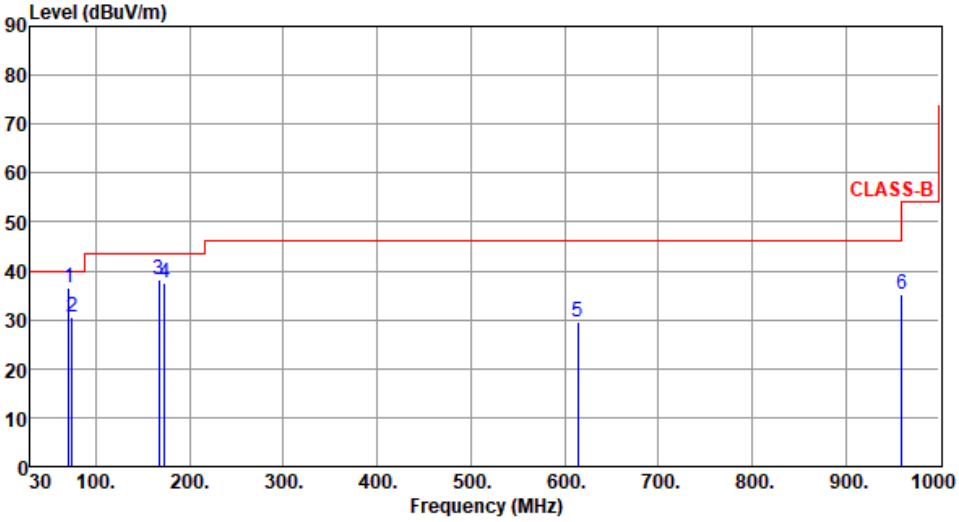


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	70.74	34.27	40.00	-5.73	45.59	-11.32	Peak	---	---
2	74.83	26.89	40.00	-13.11	39.18	-12.29	Peak	---	---
3	167.55	26.73	43.50	-16.77	36.03	-9.30	Peak	---	---
4	176.79	25.49	43.50	-18.01	35.54	-10.05	Peak	---	---
5	614.00	29.43	46.00	-16.57	30.03	-0.60	Peak	---	---
6	960.00	34.47	46.00	-11.53	29.26	5.21	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	914.9
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

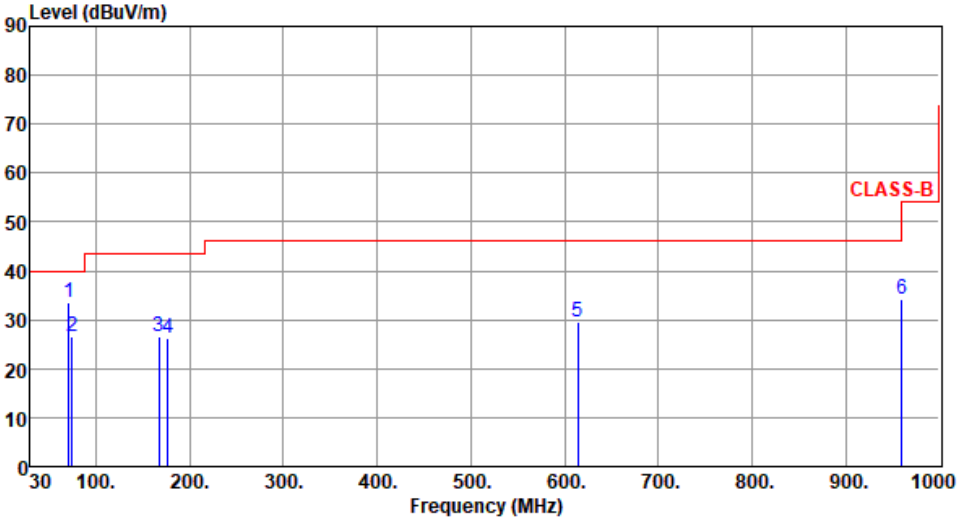


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	70.74	36.37	40.00	-3.63	47.69	-11.32	QP	158	202
2	74.58	30.66	40.00	-9.34	42.93	-12.27	Peak	---	---
3	167.62	38.13	43.50	-5.37	47.43	-9.30	Peak	---	---
4	173.49	37.66	43.50	-5.84	47.39	-9.73	Peak	---	---
5	614.00	29.47	46.00	-16.53	30.07	-0.60	Peak	---	---
6	960.00	35.22	46.00	-10.78	30.01	5.21	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	914.9
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64



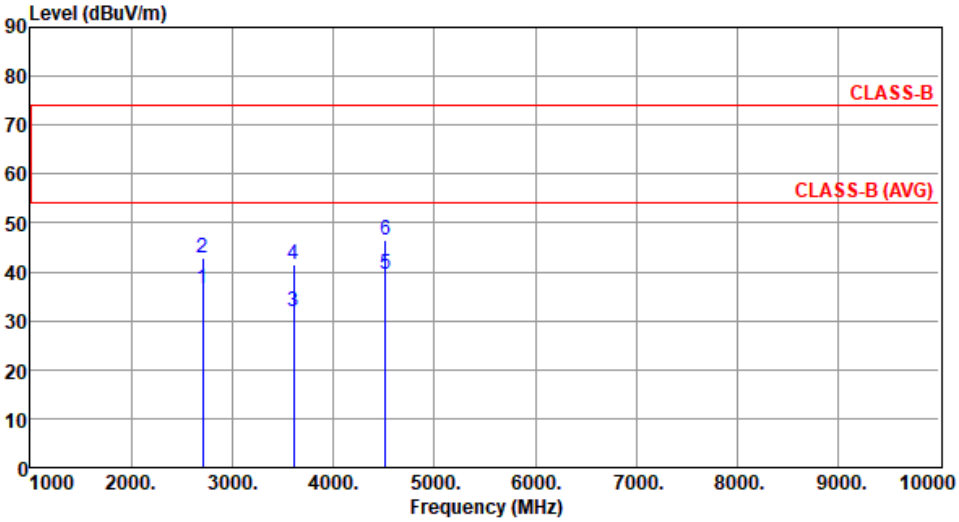
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	70.74	33.68	40.00	-6.32	45.00	-11.32	Peak	---	---
2	74.57	26.48	40.00	-13.52	38.75	-12.27	Peak	---	---
3	167.55	26.73	43.50	-16.77	36.03	-9.30	Peak	---	---
4	176.55	26.23	43.50	-17.27	36.25	-10.02	Peak	---	---
5	614.00	29.40	46.00	-16.60	30.00	-0.60	Peak	---	---
6	960.00	34.17	46.00	-11.83	28.96	5.21	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Unwanted Radiated Emissions (Above 1GHz)

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	902.3
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

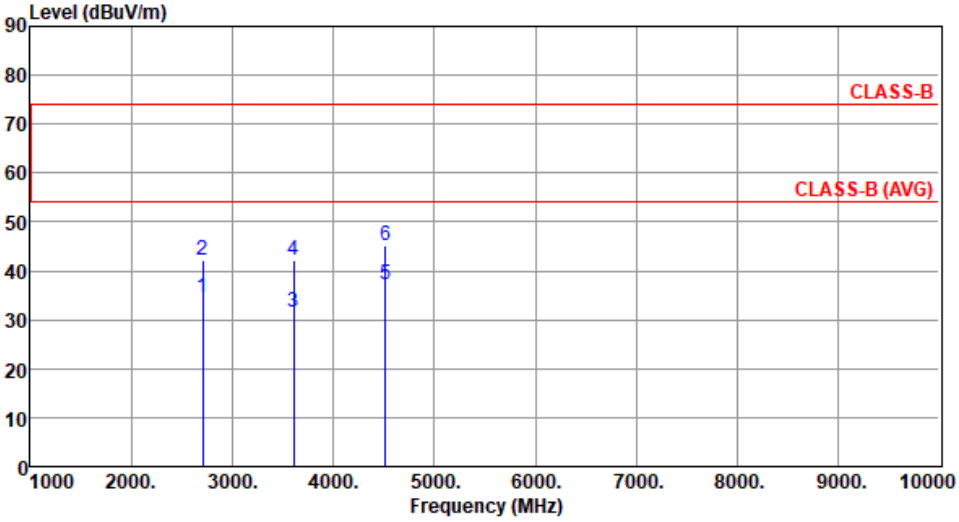


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2706.90	36.40	54.00	-17.60	40.63	-4.23	Average	223	229
2	2706.90	42.85	74.00	-31.15	47.08	-4.23	Peak	223	229
3	3609.20	32.01	54.00	-21.99	34.39	-2.38	Average	100	291
4	3609.20	41.54	74.00	-32.46	43.92	-2.38	Peak	100	291
5	4511.50	39.41	54.00	-14.59	40.50	-1.09	Average	208	207
6	4511.50	46.54	74.00	-27.46	47.63	-1.09	Peak	208	207

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	902.3
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

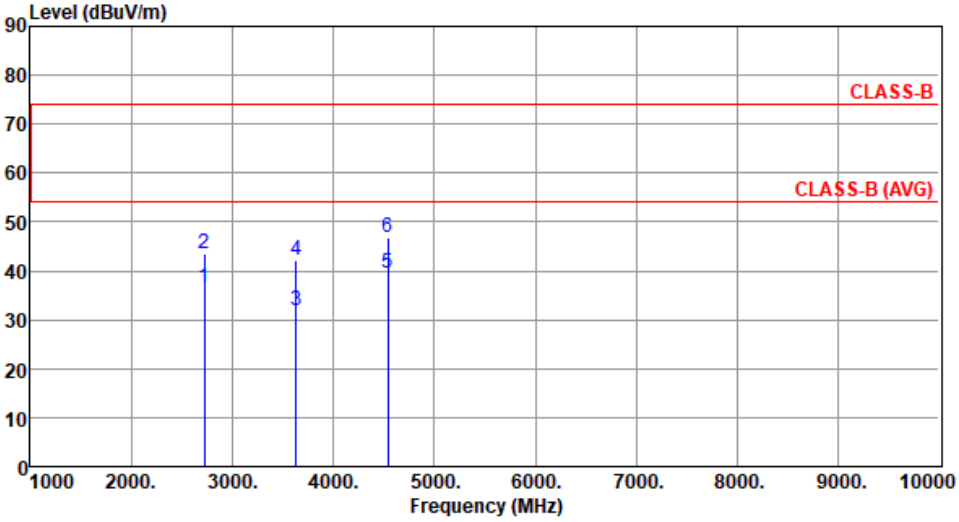


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2706.90	34.55	54.00	-19.45	38.78	-4.23	Average	295	276
2	2706.90	42.10	74.00	-31.90	46.33	-4.23	Peak	295	276
3	3609.20	31.53	54.00	-22.47	33.91	-2.38	Average	100	136
4	3609.20	42.03	74.00	-31.97	44.41	-2.38	Peak	100	136
5	4511.50	37.26	54.00	-16.74	38.35	-1.09	Average	299	273
6	4511.50	45.08	74.00	-28.92	46.17	-1.09	Peak	299	273

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	908.5
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

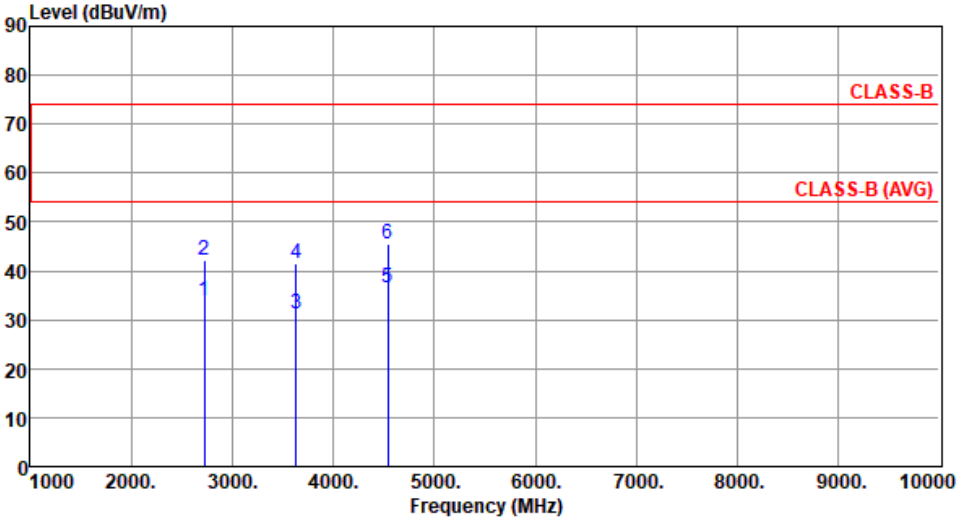


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2725.50	36.58	54.00	-17.42	40.67	-4.09	Average	200	223
2	2725.50	43.37	74.00	-30.63	47.46	-4.09	Peak	200	223
3	3634.00	31.85	54.00	-22.15	34.25	-2.40	Average	100	293
4	3634.00	42.05	74.00	-31.95	44.45	-2.40	Peak	100	293
5	4542.50	39.62	54.00	-14.38	40.58	-0.96	Average	216	205
6	4542.50	46.87	74.00	-27.13	47.83	-0.96	Peak	216	205

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	908.5
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64



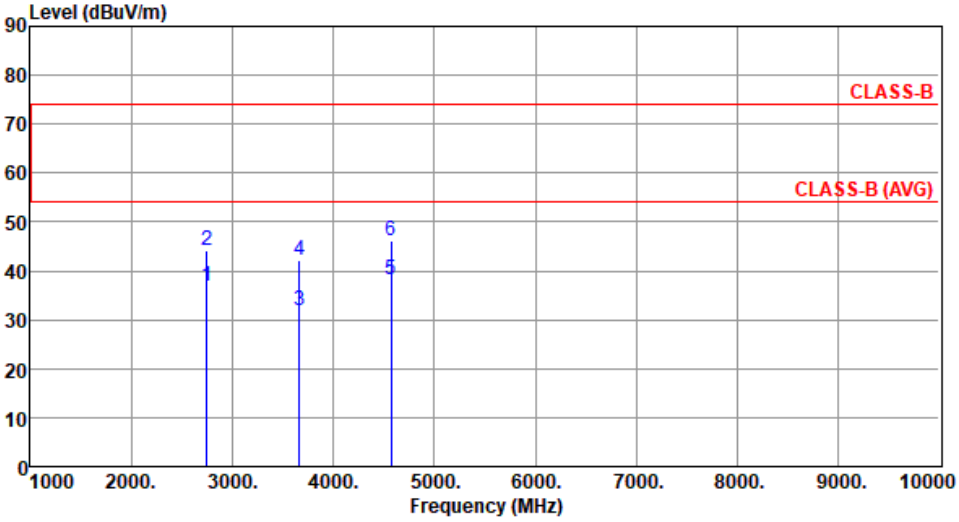
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2725.50	33.86	54.00	-20.14	37.95	-4.09	Average	303	273
2	2725.50	42.18	74.00	-31.82	46.27	-4.09	Peak	303	273
3	3634.00	31.10	54.00	-22.90	33.50	-2.40	Average	100	138
4	3634.00	41.43	74.00	-32.57	43.83	-2.40	Peak	100	138
5	4542.50	36.40	54.00	-17.60	37.36	-0.96	Average	300	279
6	4542.50	45.43	74.00	-28.57	46.39	-0.96	Peak	300	279

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

T

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	914.9
Polarization	Horizontal		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

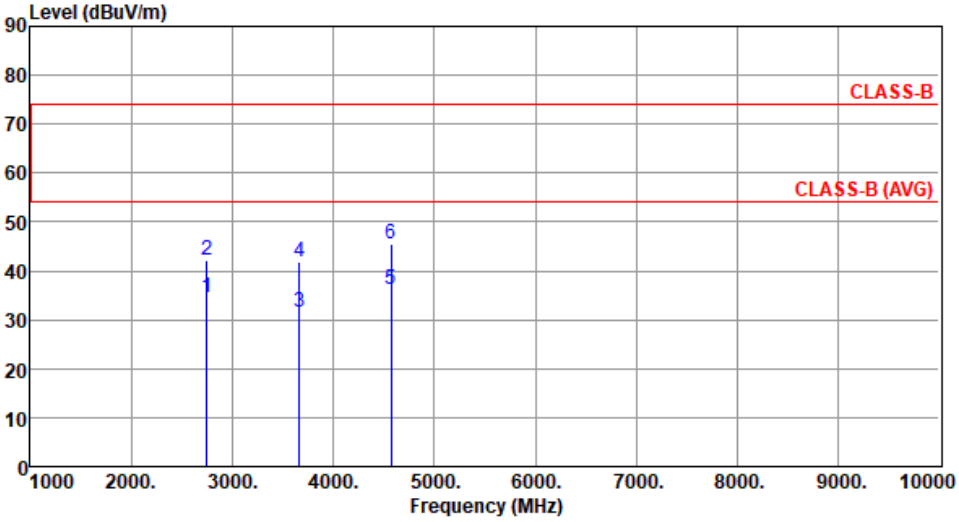


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2744.70	36.70	54.00	-17.30	40.65	-3.95	Average	219	301
2	2744.70	44.05	74.00	-29.95	48.00	-3.95	Peak	219	301
3	3659.60	32.02	54.00	-21.98	34.47	-2.45	Average	100	289
4	3659.60	42.19	74.00	-31.81	44.64	-2.45	Peak	100	289
5	4574.50	38.25	54.00	-15.75	39.13	-0.88	Average	217	206
6	4574.50	46.25	74.00	-27.75	47.13	-0.88	Peak	217	206

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Mode	LoRa (125kHz)	**Test Freq. (MHz)**	914.9
Polarization	Vertical		

Test By :Sean Yu Temperature(℃):23 Humidity(%):64

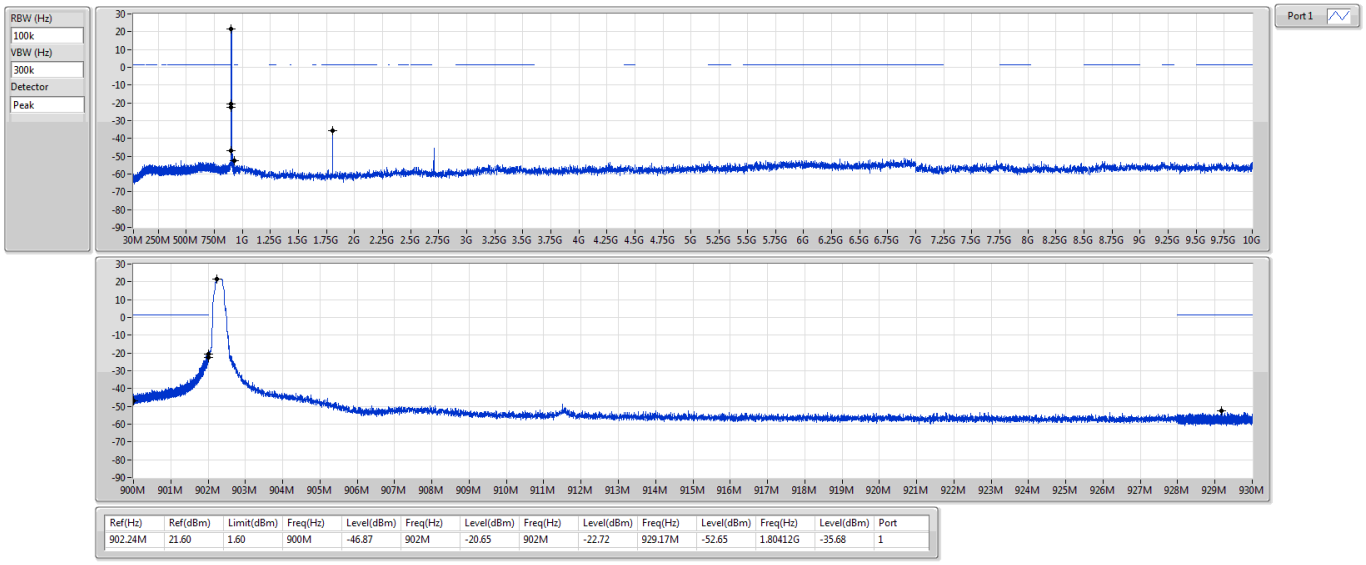


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	2744.70	34.50	54.00	-19.50	38.45	-3.95	Average	301	258
2	2744.70	42.34	74.00	-31.66	46.29	-3.95	Peak	301	258
3	3659.60	31.38	54.00	-22.62	33.83	-2.45	Average	100	133
4	3659.60	41.91	74.00	-32.09	44.36	-2.45	Peak	100	133
5	4574.50	36.23	54.00	-17.77	37.11	-0.88	Average	303	283
6	4574.50	45.42	74.00	-28.58	46.30	-0.88	Peak	303	283

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

902-928MHz_LoRa (125kHz) **CSENdB-FS**

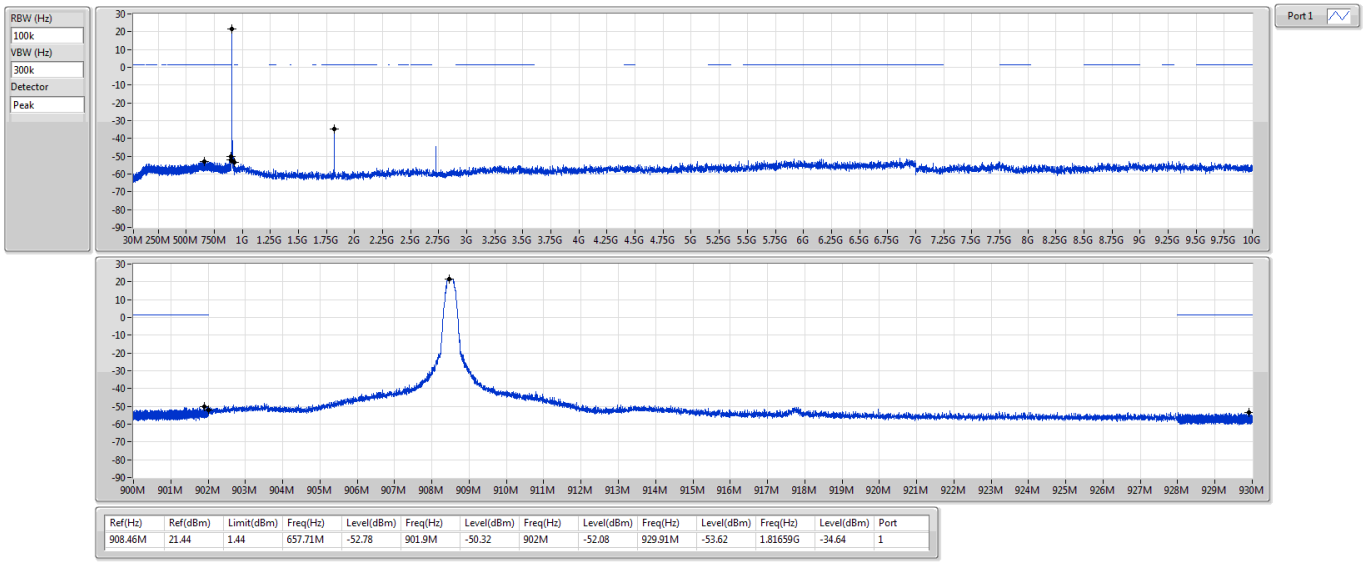
902.3MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
902.24M	21.60	1.60	900M	-46.87	902M	-20.65	902M	-22.72	929.17M	-52.65	1.80412G	-35.68	1

902-928MHz_LoRa (125kHz) **CSENdB-FS**

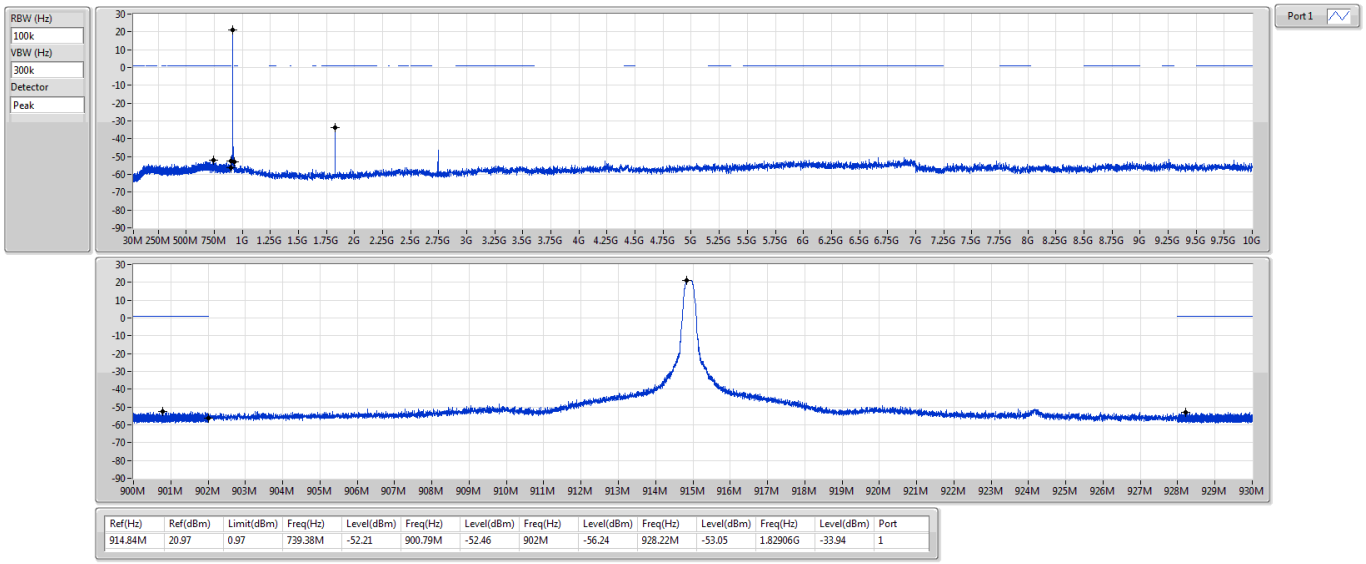
908.5MHz



Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
908.46M	21.44	1.44	657.71M	-52.78	901.9M	-50.32	902M	-52.08	929.91M	-53.62	1.81659G	-34.64	1

902-928MHz_LoRa (125kHz) **CSENdB-FS**

914.9MHz

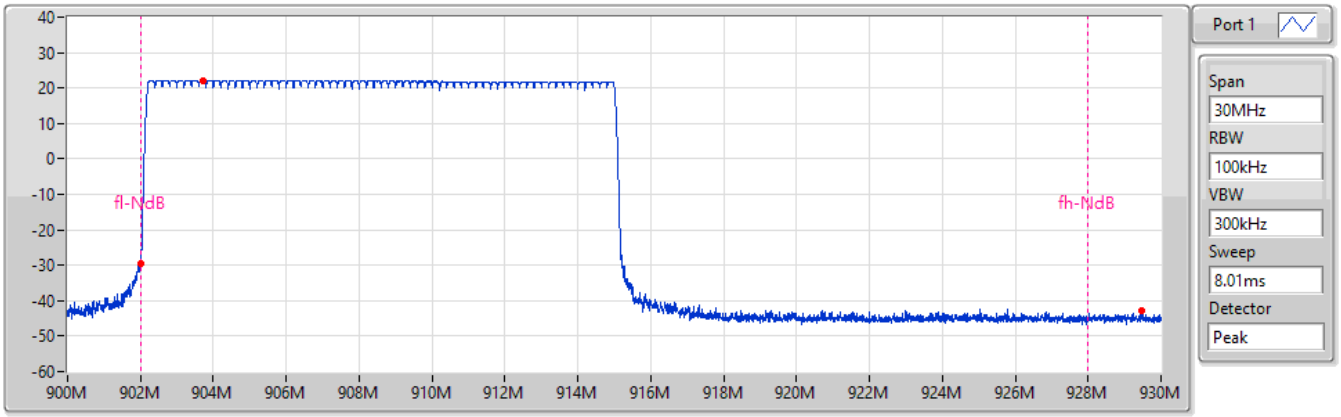


Ref(Hz)	Ref(dBm)	Limit(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Freq(Hz)	Level(dBm)	Port
914.84M	20.97	0.97	739.38M	-52.21	900.79M	-52.46	902M	-56.24	928.22M	-53.05	1.82906G	-33.94	1

902-928MHz_LoRa (125kHz)

902.3MHz-Hopping On

Hopping Ch Bandedge (Non-restricted Band)



Limit(dBm)	Ref(Hz)	Ref(dBm)	BE-l(Hz)	BE-l(dBm)	BE-h(Hz)	BE-h(dBm)
2.01	903.7275M	22.01	901.99875M	-29.65	929.4525M	-42.88

Summary

Mode	Total Power (dBm)	Power (W)
902-928MHz	-	-
LoRa (125kHz)	21.84	0.15276

Result

Mode	Result	DG (dBi)	Total Power (dBm)	Power Limit (dBm)
LoRa (125kHz)	-	-	-	-
902.3MHz	Pass	2.20	21.84	30.00
908.5MHz	Pass	2.20	21.72	30.00
914.9MHz	Pass	2.20	21.56	30.00

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

Summary

Mode	Total Power (dBm)	Power (W)
902-928MHz	-	-
LoRa (125kHz)	21.79	0.15101

Result

Mode	Result	DG (dBi)	Total Power (dBm)	Power Limit (dBm)
LoRa (125kHz)	-	-	-	-
902.3MHz	Pass	2.20	21.79	-
908.5MHz	Pass	2.20	21.66	-
914.9MHz	Pass	2.20	21.51	-

Note: Average power is for reference only.

Summary

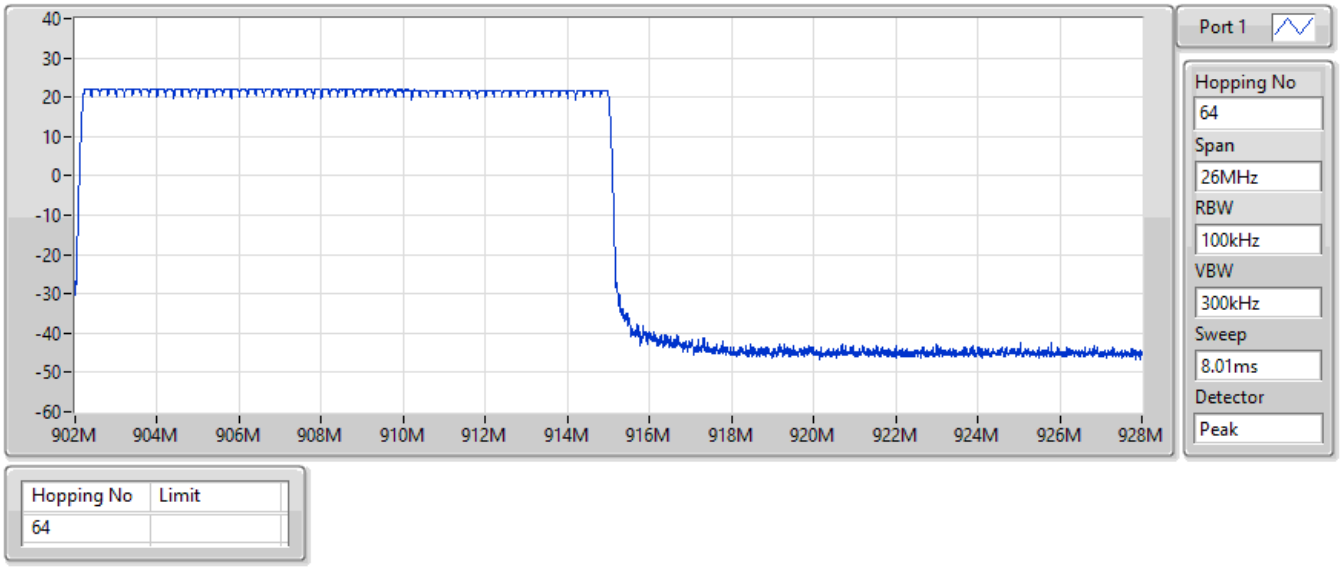
Mode	Max-Hop No
902-928MHz	-
LoRa (125kHz)	64

Result

Mode	Result	Hopping No	Limit
LoRa (125kHz)	-	-	-
902.3MHz-Hopping On	Pass	64	

902-928MHz_LoRa (125kHz) **Hopping-FS**

902.3MHz-Hopping On



Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
902-928MHz	-	-	-	-	-
LoRa (125kHz)	138.6k	125.937k	126KF1D	136.95k	125.687k

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

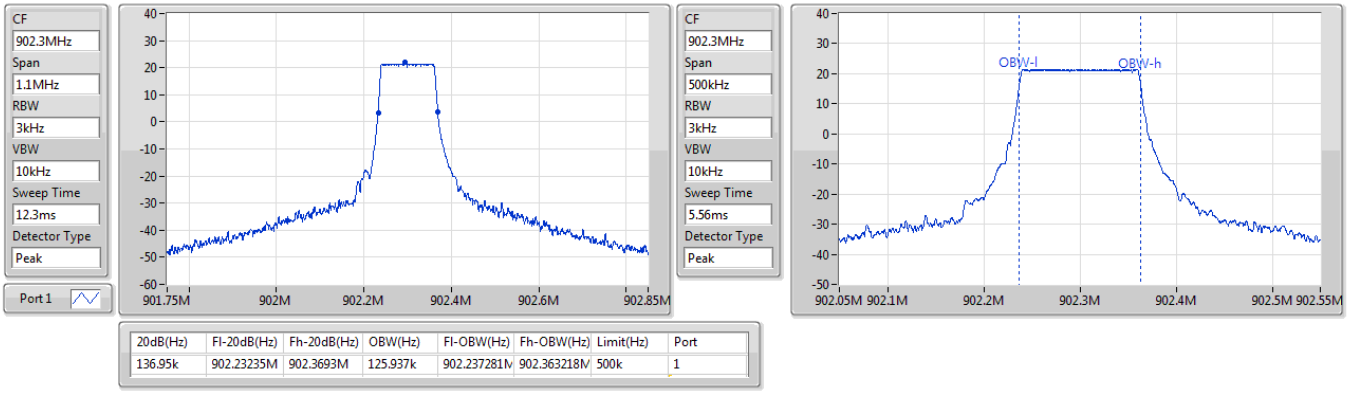
Result

Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
LoRa (125kHz)	-	-	-	-
902.3MHz	Pass	500k	136.95k	125.937k
908.5MHz	Pass	500k	138.6k	125.937k
914.9MHz	Pass	500k	138.05k	125.687k

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

902-928MHz_LoRa (125kHz) **EBW-FS**

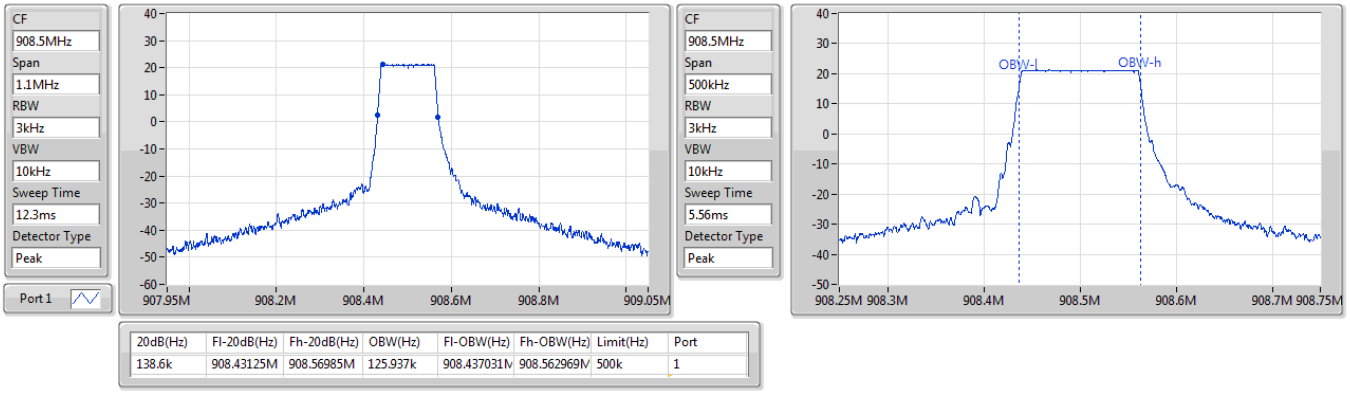
902.3MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
136.95k	902.23235M	902.3693M	125.937k	902.237281M	902.363218M	500k	1

902-928MHz_LoRa (125kHz) **EBW-FS**

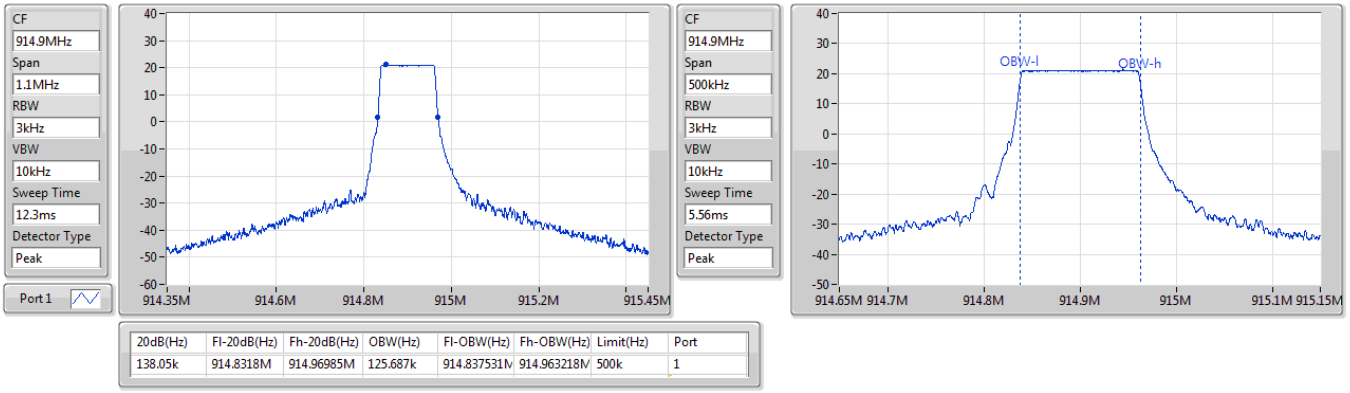
908.5MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
138.6k	908.43125M	908.56985M	125.937k	908.437031M	908.562969M	500k	1

902-928MHz_LoRa (125kHz) **EBW-FS**

914.9MHz



20dB(Hz)	Fl-20dB(Hz)	Fh-20dB(Hz)	OBW(Hz)	Fl-OBW(Hz)	Fh-OBW(Hz)	Limit(Hz)	Port
138.05k	914.8318M	914.96985M	125.687k	914.837531M	914.963218M	500k	1

Summary

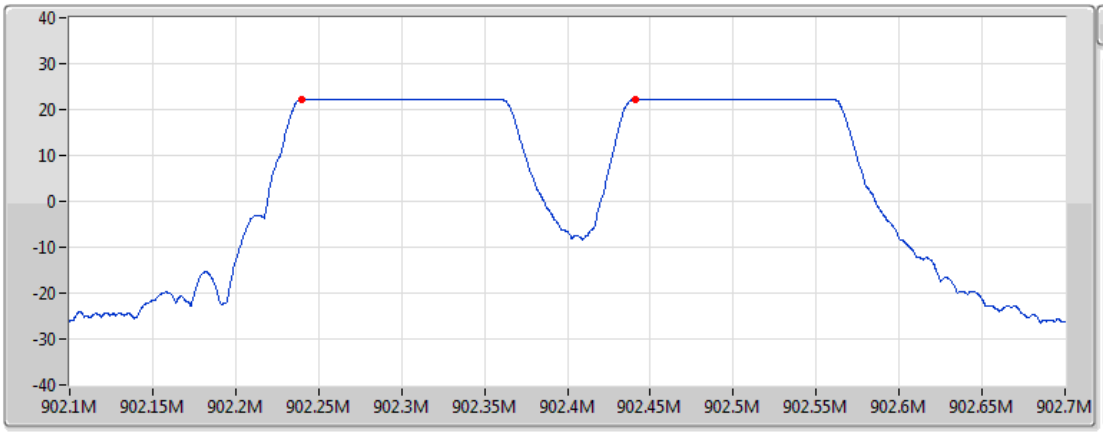
Mode	Max-Space (Hz)	Min-Space (Hz)
902-928MHz	-	-
LoRa (125kHz)	200k	200k

Result

Mode	Result	Fl (Hz)	Fh (Hz)	Ch.Space (Hz)	Limit (Hz)
LoRa (125kHz)	-	-	-	-	-
902.3MHz	Pass	902.2401M	902.4401M	200k	136.95k
908.5MHz	Pass	908.4416M	908.6416M	200k	138.6k
914.9MHz	Pass	914.6393M	914.8393M	200k	138.05k

902-928MHz_LoRa (125kHz) Channel Separation-FS

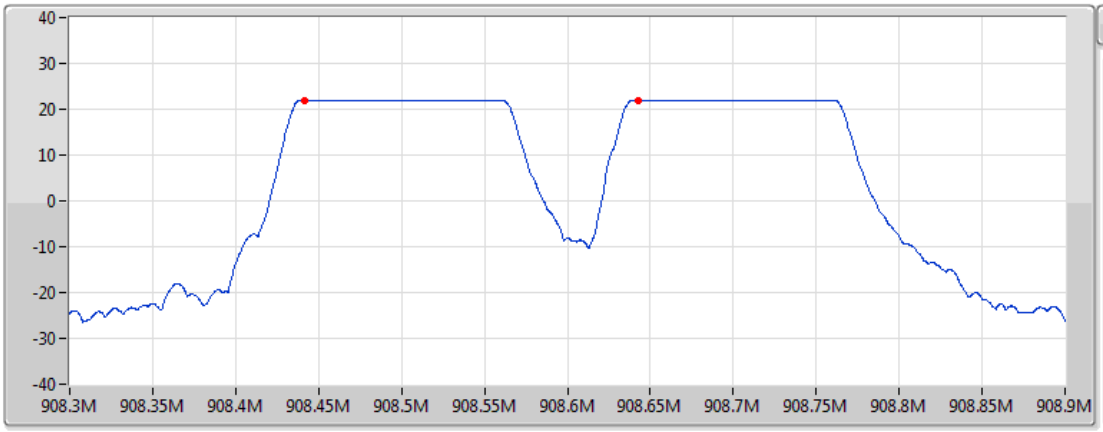
902.3M/902.5MHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
902.2401M	902.4401M	200k	136.95k

902-928MHz_LoRa (125kHz) Channel Separation-FS

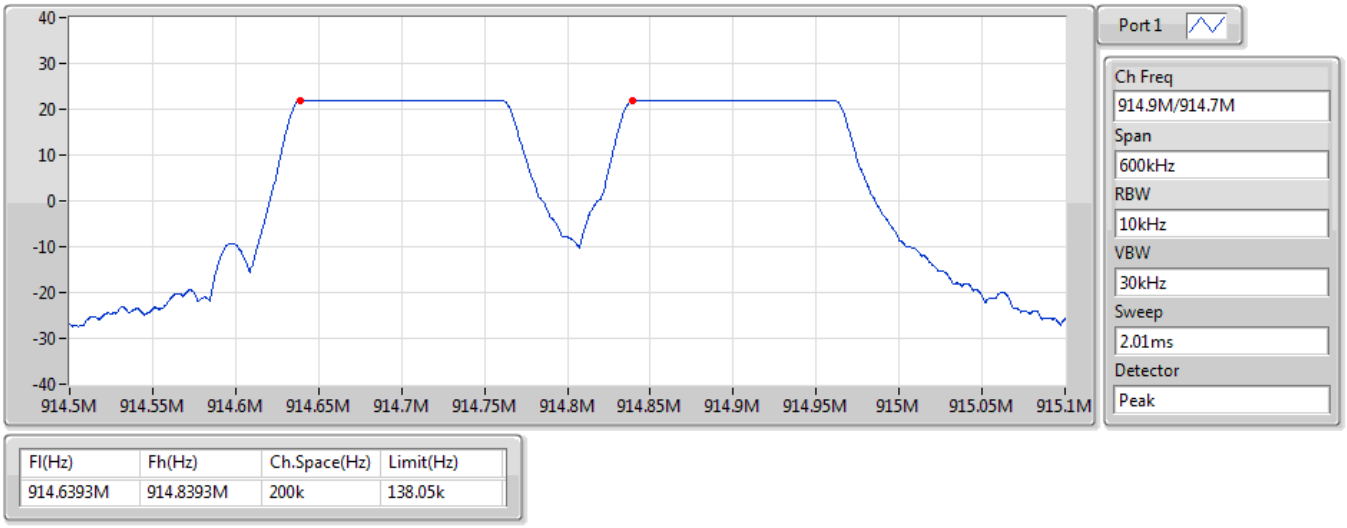
908.5M/908.7MHz



Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
908.4416M	908.6416M	200k	138.6k

902-928MHz_LoRa (125kHz) **Channel Separation-FS**

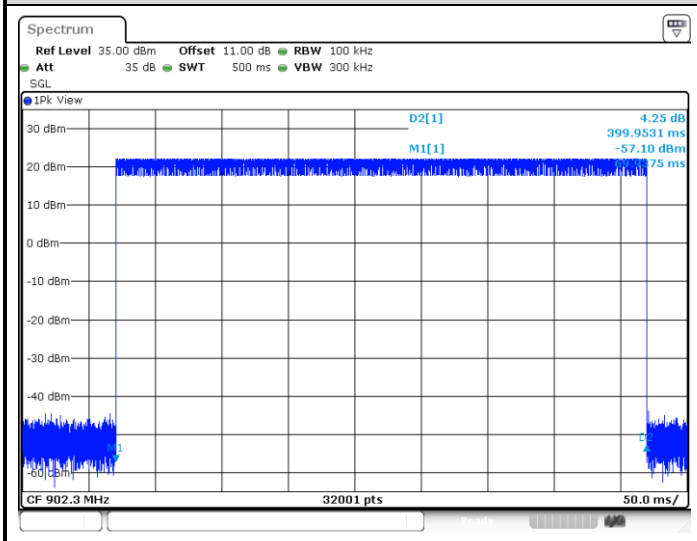
914.9M/914.7MHz

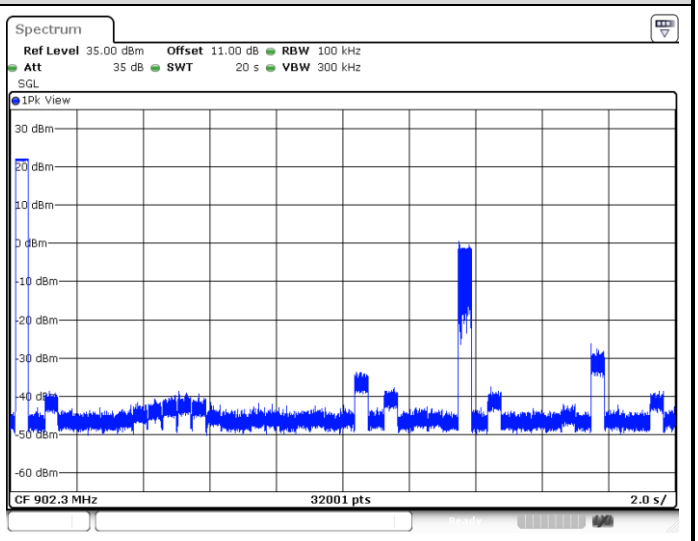


Fl(Hz)	Fh(Hz)	Ch.Space(Hz)	Limit(Hz)
914.6393M	914.8393M	200k	138.05k

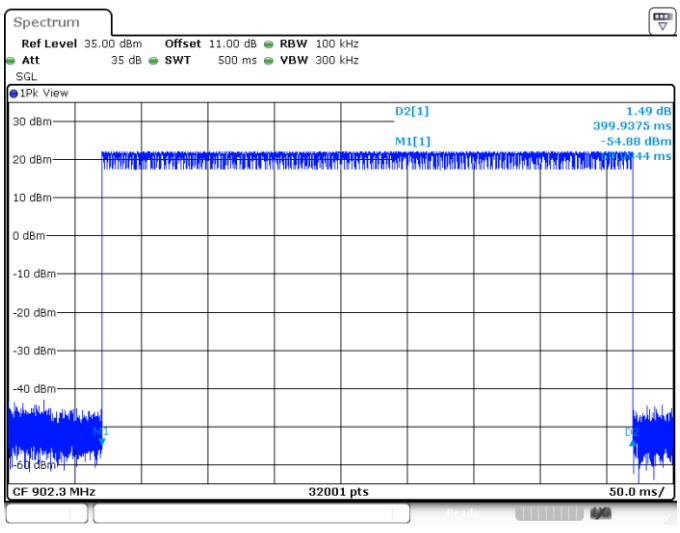
Mode / SF	Freq. (MHz)	Length of Transmission Time (sec)	Number of Transmission in a 20 s	Result (s)	Limit (s)
LoRa / 7	902.3	0.3999531	1	0.3999531	0.4
LoRa / 8	902.3	0.3999375	1	0.3999375	0.4
LoRa / 9	902.3	0.3906094	1	0.3906094	0.4
LoRa / 10	902.3	0.3708281	1	0.3708281	0.4

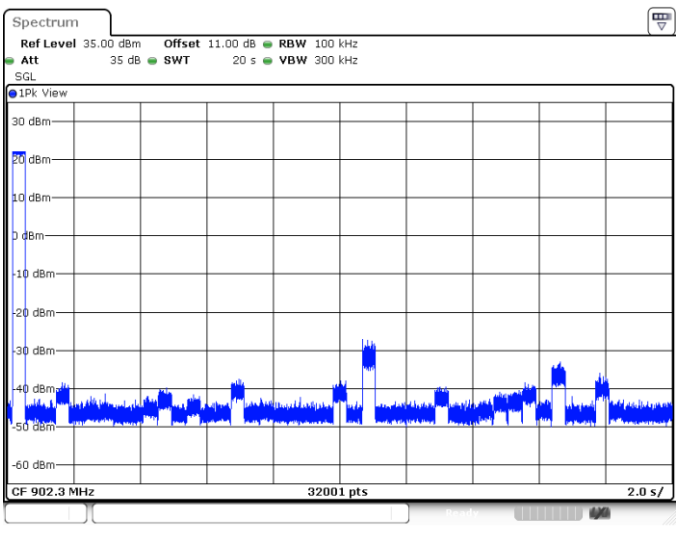
SF 7



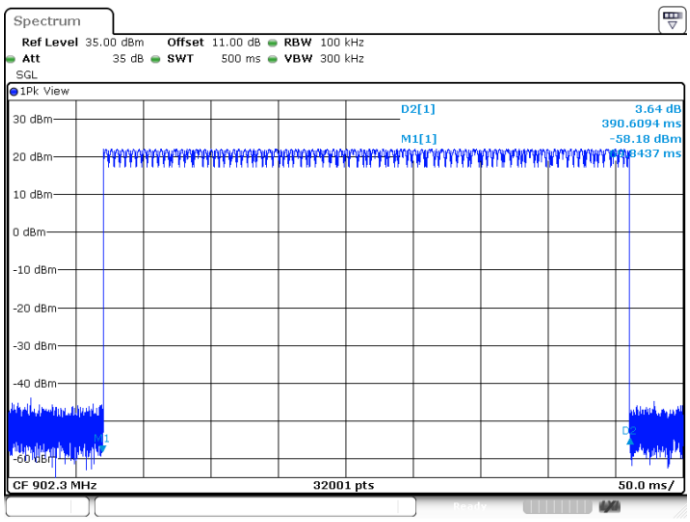


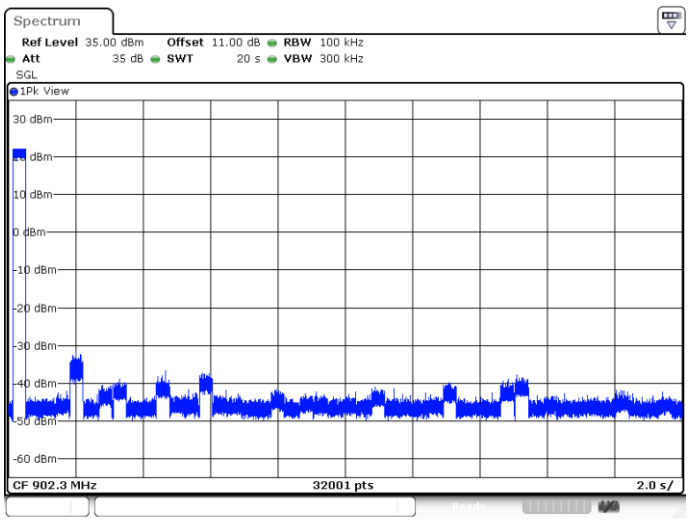
SF 8



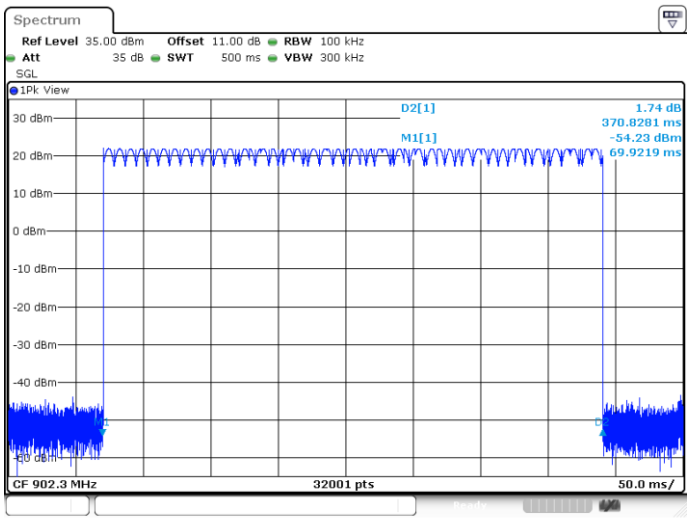


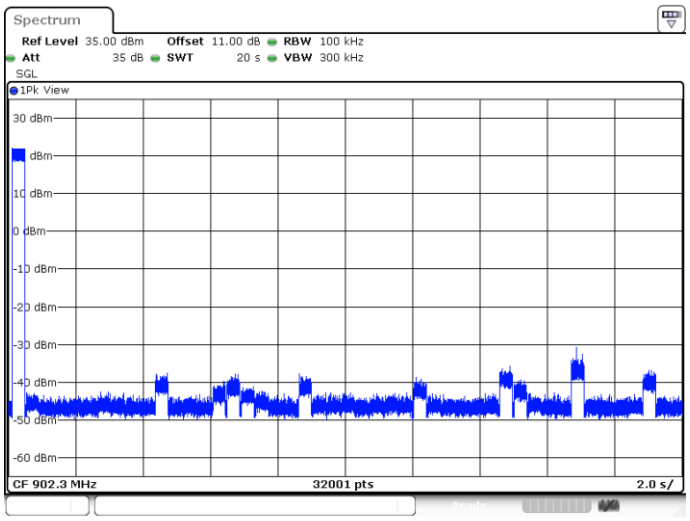
SF 9


Spectrum
Ref Level 35.00 dBm Offset 11.00 dB RBW 100 kHz
Att 35 dB SWT 500 ms VBW 300 kHz
SGL
1Pk View
D2[1] 3.64 dB
390.6094 ms
M1[1] -58.18 dBm
9437 ms
CF 902.3 MHz 32001 pts 50.0 ms/


Spectrum
Ref Level 35.00 dBm Offset 11.00 dB RBW 100 kHz
Att 35 dB SWT 20 s VBW 300 kHz
SGL
1Pk View
CF 902.3 MHz 32001 pts 2.0 s/

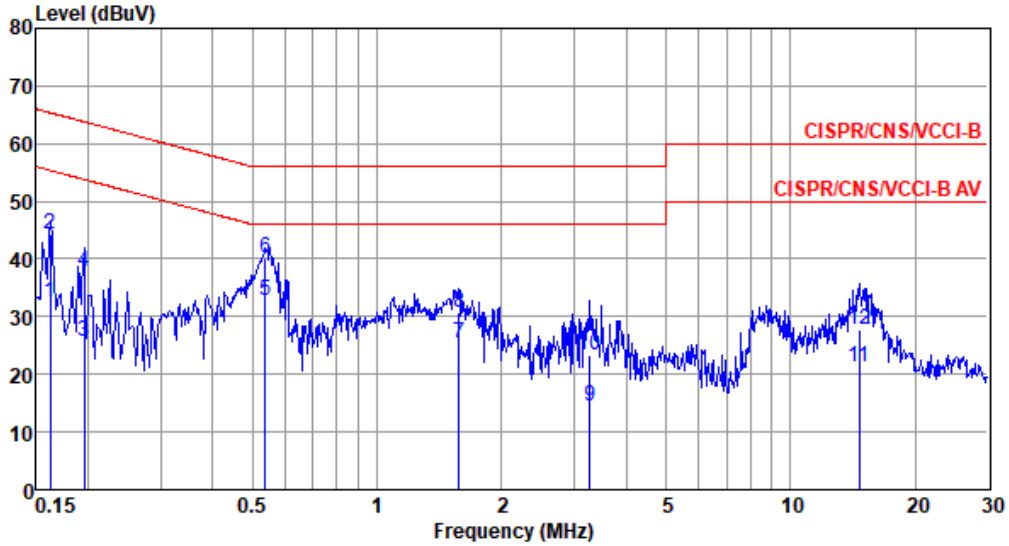
SF 10


Spectrum
Ref Level 35.00 dBm Offset 11.00 dB RBW 100 kHz
Att 35 dB SWT 500 ms VBW 300 kHz
SGL
1Pk View
D2[1] 1.74 dB
370.8281 ms
M1[1] -54.23 dBm
69.9219 ms
CF 902.3 MHz 32001 pts 50.0 ms/


Spectrum
Ref Level 35.00 dBm Offset 11.00 dB RBW 100 kHz
Att 35 dB SWT 20 s VBW 300 kHz
SGL
1Pk View
CF 902.3 MHz 32001 pts 2.0 s/

Power Phase	Line	**Test Freq. (MHz)**	902.3

Test by : Joe Liao Temperature: 21°C Humidity: 60%

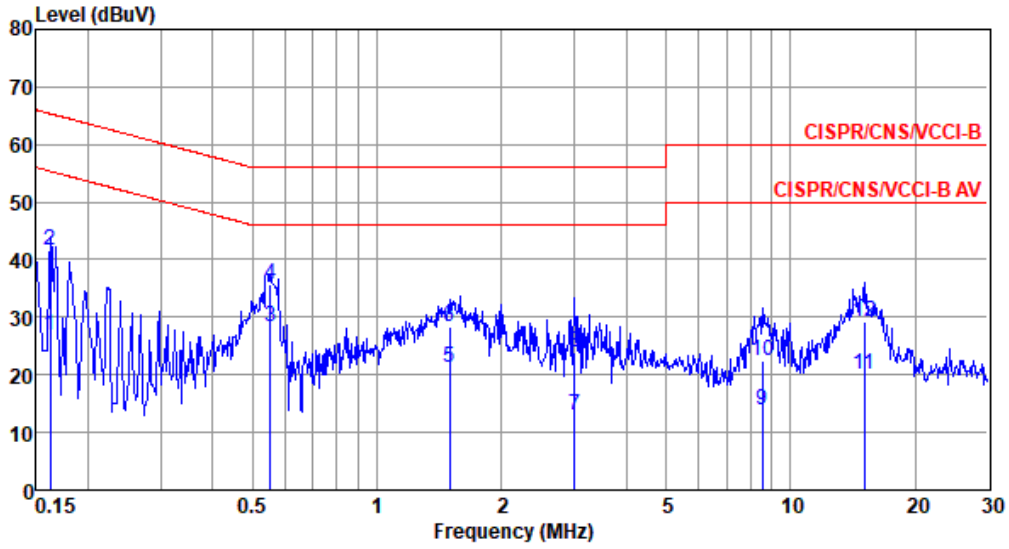


	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Aux	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	
1	0.162	32.60	55.34	-22.74	22.86	9.68	0.06	0.00	Average
2	0.162	44.14	65.34	-21.20	34.40	9.68	0.06	0.00	QP
3	0.195	25.71	53.80	-28.09	15.97	9.68	0.06	0.00	Average
4	0.195	37.68	63.80	-26.12	27.94	9.68	0.06	0.00	QP
5*	0.538	32.64	46.00	-13.36	22.89	9.67	0.08	0.00	Average
6	0.538	40.22	56.00	-15.78	30.47	9.67	0.08	0.00	QP
7	1.577	25.43	46.00	-20.57	15.62	9.69	0.12	0.00	Average
8	1.577	30.80	56.00	-25.20	20.99	9.69	0.12	0.00	QP
9	3.276	14.39	46.00	-31.61	4.52	9.70	0.17	0.00	Average
10	3.276	23.26	56.00	-32.74	13.39	9.70	0.17	0.00	QP
11	14.672	21.14	50.00	-28.86	10.97	9.73	0.44	0.00	Average
12	14.672	27.86	60.00	-32.14	17.69	9.73	0.44	0.00	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Power Phase	Neutral	**Test Freq. (MHz)**	902.3

Test by : Joe Liao Temperature: 21°C Humidity: 60%

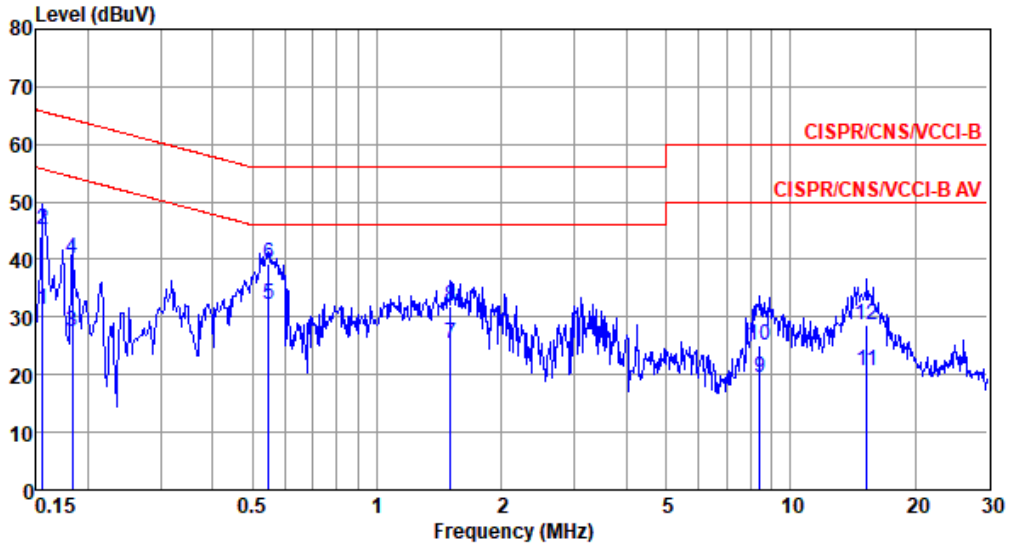


	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Aux	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	
1	0.162	26.96	55.34	-28.38	17.29	9.61	0.06	0.00	Average
2	0.162	41.74	65.34	-23.60	32.07	9.61	0.06	0.00	QP
3*	0.552	28.38	46.00	-17.62	18.69	9.61	0.08	0.00	Average
4	0.552	35.78	56.00	-20.22	26.09	9.61	0.08	0.00	QP
5	1.495	21.27	46.00	-24.73	11.53	9.62	0.12	0.00	Average
6	1.495	28.30	56.00	-27.70	18.56	9.62	0.12	0.00	QP
7	3.009	13.00	46.00	-33.00	3.21	9.63	0.16	0.00	Average
8	3.009	23.89	56.00	-32.11	14.10	9.63	0.16	0.00	QP
9	8.546	13.80	50.00	-36.20	3.79	9.68	0.33	0.00	Average
10	8.546	22.37	60.00	-37.63	12.36	9.68	0.33	0.00	QP
11	15.066	20.06	50.00	-29.94	9.87	9.75	0.44	0.00	Average
12	15.066	29.08	60.00	-30.92	18.89	9.75	0.44	0.00	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Power Phase	Line	**Test Freq. (MHz)**	908.5

Test by : Joe Liao Temperature: 21°C Humidity: 60%

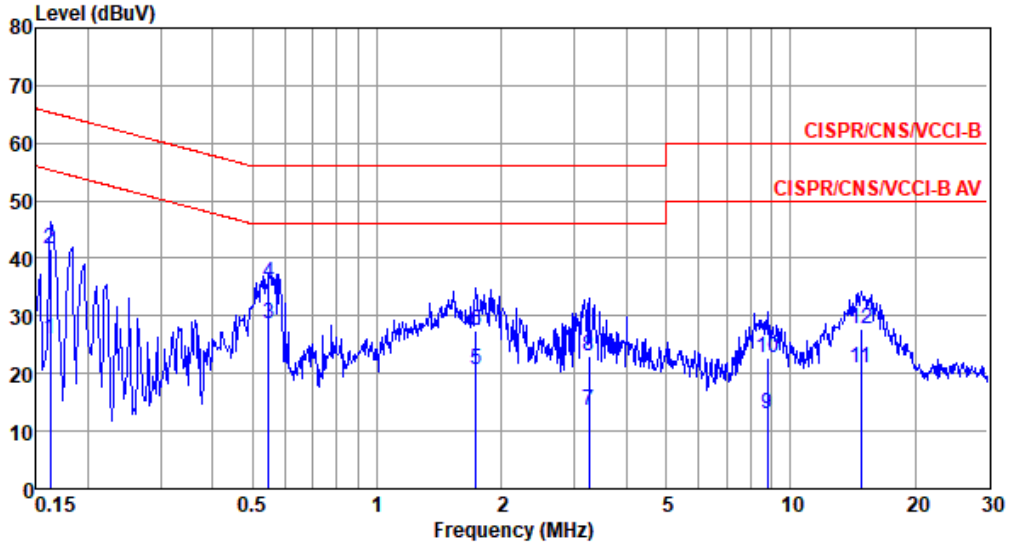


	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Aux	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	
1	0.156	31.33	55.69	-24.36	21.59	9.68	0.06	0.00	Average
2	0.156	45.11	65.69	-20.58	35.37	9.68	0.06	0.00	QP
3	0.183	27.42	54.33	-26.91	17.68	9.68	0.06	0.00	Average
4	0.183	40.23	64.33	-24.10	30.49	9.68	0.06	0.00	QP
5*	0.546	32.20	46.00	-13.80	22.45	9.67	0.08	0.00	Average
6	0.546	39.39	56.00	-16.61	29.64	9.67	0.08	0.00	QP
7	1.503	25.35	46.00	-20.65	15.54	9.69	0.12	0.00	Average
8	1.503	31.77	56.00	-24.23	21.96	9.69	0.12	0.00	QP
9	8.412	19.47	50.00	-30.53	9.41	9.73	0.33	0.00	Average
10	8.412	25.18	60.00	-34.82	15.12	9.73	0.33	0.00	QP
11	15.307	20.81	50.00	-29.19	10.64	9.73	0.44	0.00	Average
12	15.307	28.60	60.00	-31.40	18.43	9.73	0.44	0.00	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Power Phase	Neutral	**Test Freq. (MHz)**	908.5

Test by : Joe Liao Temperature: 21°C Humidity: 60%

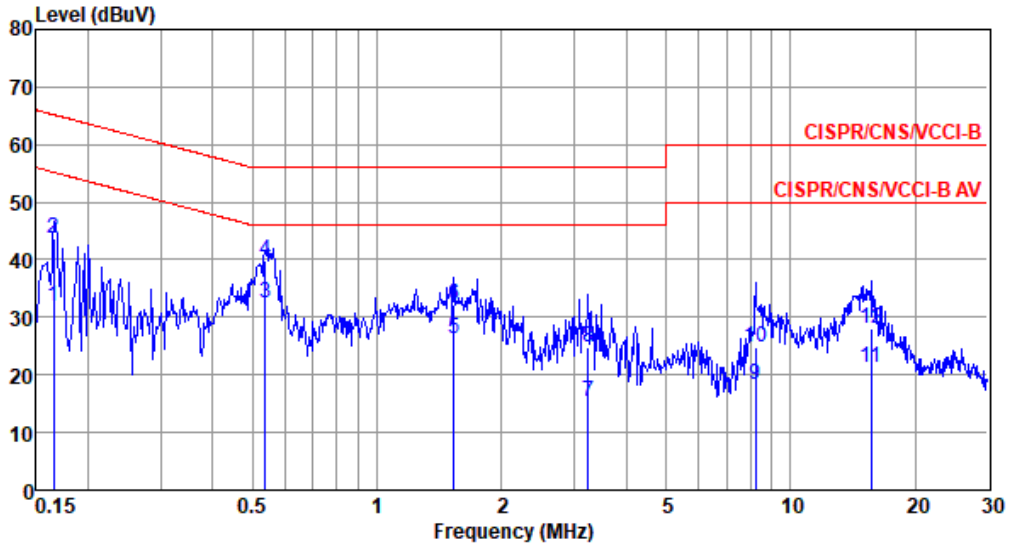


	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Aux	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	
1	0.162	26.04	55.34	-29.30	16.37	9.61	0.06	0.00	Average
2	0.162	41.66	65.34	-23.68	31.99	9.61	0.06	0.00	QP
3*	0.546	28.67	46.00	-17.33	18.98	9.61	0.08	0.00	Average
4	0.546	35.86	56.00	-20.14	26.17	9.61	0.08	0.00	QP
5	1.734	20.79	46.00	-25.21	11.04	9.62	0.13	0.00	Average
6	1.734	27.47	56.00	-28.53	17.72	9.62	0.13	0.00	QP
7	3.258	13.47	46.00	-32.53	3.67	9.63	0.17	0.00	Average
8	3.258	22.90	56.00	-33.10	13.10	9.63	0.17	0.00	QP
9	8.776	12.94	50.00	-37.06	2.93	9.68	0.33	0.00	Average
10	8.776	22.72	60.00	-37.28	12.71	9.68	0.33	0.00	QP
11	14.828	20.97	50.00	-29.03	10.78	9.75	0.44	0.00	Average
12	14.828	27.71	60.00	-32.29	17.52	9.75	0.44	0.00	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Power Phase	Line	**Test Freq. (MHz)**	914.9

Test by : Joe Liao Temperature: 21°C Humidity: 60%

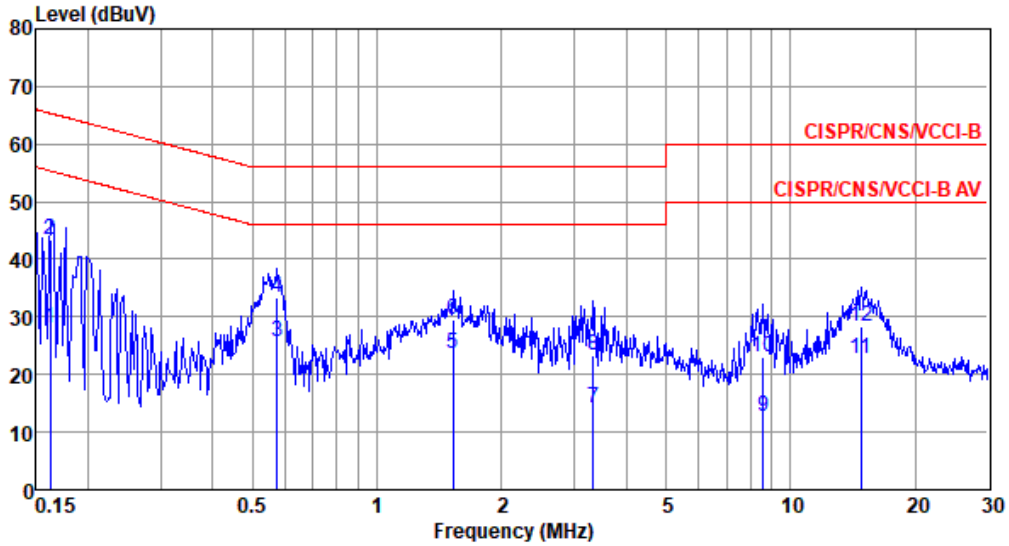


	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Aux	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	
1	0.165	31.90	55.21	-23.31	22.16	9.68	0.06	0.00	Average
2	0.165	43.67	65.21	-21.54	33.93	9.68	0.06	0.00	QP
3*	0.538	32.60	46.00	-13.40	22.85	9.67	0.08	0.00	Average
4	0.538	39.73	56.00	-16.27	29.98	9.67	0.08	0.00	QP
5	1.535	26.30	46.00	-19.70	16.49	9.69	0.12	0.00	Average
6	1.535	32.13	56.00	-23.87	22.32	9.69	0.12	0.00	QP
7	3.241	15.34	46.00	-30.66	5.48	9.70	0.16	0.00	Average
8	3.241	24.80	56.00	-31.20	14.94	9.70	0.16	0.00	QP
9	8.235	18.20	50.00	-31.80	8.15	9.73	0.32	0.00	Average
10	8.235	24.67	60.00	-35.33	14.62	9.73	0.32	0.00	QP
11	15.635	21.32	50.00	-28.68	11.14	9.73	0.45	0.00	Average
12	15.635	27.97	60.00	-32.03	17.79	9.73	0.45	0.00	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).

Power Phase	Neutral	**Test Freq. (MHz)**	914.9

Test by : Joe Liao Temperature: 21°C Humidity: 60%



	Freq	Level	Limit Line	Over Limit	Read Level	Factor	Cable loss	Aux	Remark
	MHz	dBuV	dBuV	dB	dBuV	dB	dB	dB	
1	0.162	27.99	55.34	-27.35	18.32	9.61	0.06	0.00	Average
2	0.162	43.40	65.34	-21.94	33.73	9.61	0.06	0.00	QP
3*	0.573	25.82	46.00	-20.18	16.13	9.61	0.08	0.00	Average
4	0.573	33.42	56.00	-22.58	23.73	9.61	0.08	0.00	QP
5	1.527	23.74	46.00	-22.26	14.00	9.62	0.12	0.00	Average
6	1.527	29.66	56.00	-26.34	19.92	9.62	0.12	0.00	QP
7	3.328	14.28	46.00	-31.72	4.48	9.63	0.17	0.00	Average
8	3.328	23.39	56.00	-32.61	13.59	9.63	0.17	0.00	QP
9	8.592	12.64	50.00	-37.36	2.63	9.68	0.33	0.00	Average
10	8.592	23.04	60.00	-36.96	13.03	9.68	0.33	0.00	QP
11	14.828	22.59	50.00	-27.41	12.40	9.75	0.44	0.00	Average
12	14.828	28.36	60.00	-31.64	18.17	9.75	0.44	0.00	QP

Note 1: Level (dBuV) = Read Level (dBuV) + LISN Factor (dB) + Cable Loss (dB) + Aux (dB).
2: Over Limit (dB) = Level (dBuV) – Limit Line (dBuV).