

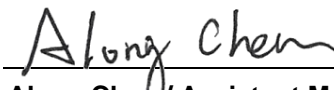
# FCC Test Report

**FCC ID** : P27-IG502L  
**Equipment** : Monitor Gateway  
**Model No.** : IG-502L  
**Brand Name** : OxTech, LLC  
**Applicant** : Sercomm Corporation  
**Address** : 8F, No. 3-1, YuanQu St., NanKang, Taipei 115,  
Taiwan, R.O.C.  
**Standard** : 47 CFR FCC Part 15.247  
**Received Date** : Dec. 21, 2021  
**Tested Date** : Jan. 06 ~ Jan. 24, 2022

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

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## Release Record

Report No.	Version	Description	Issued Date
FR1D2104AH	Rev. 01	Initial issue	Feb. 17, 2022

## Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.207	Conducted Emissions	[dBuV]: 0.419MHz 35.60 (Margin -11.86dB) - AV	Pass
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 875.12MHz 41.95 (Margin -4.05dB) - PK	Pass
15.247(b)(3)	Maximum Output Power	Max Power [dBm]: 27.89	Pass
15.247(a)(2)	6dB Bandwidth	Meet the requirement of limit	Pass
15.247(e)	Power Spectral Density	Meet the requirement of limit	Pass
15.203	Antenna Requirement	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)

RF General Information					
Frequency Range (MHz)	Ch. Frequency (MHz)	Channel Number	Physical bit rate (bit/sec)	Spread Factor	Channel Bandwidth (kHz)
902 ~ 928	923.3 ~ 927.5	0 ~ 7 [8]	3900 ~ 21900	10 ~ 7	500
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. Note 2: The device uses LoRa modulation.					

### 1.1.2 Antenna Details

Ant. No.	Type	Gain (dBi)	Connector	Remark
1	Dipole	2.1	R-SMA	---

### 1.1.3 Power Supply Type of Equipment under Test (EUT)

Power Supply Type	12Vdc from adapter
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### 1.1.4 Accessories

Accessories		
No.	Equipment	Description
1	AC Adapter	Brand: Leader Model: MU18D1120150-A1 Power Rating: I/P: 100-240Vac, 50/60Hz, 0.6A O/P:12Vdc, 1.5A Power Line: 1.45m non-shielded without core
2	AC Adapter	Brand: Sercomm Model: PU18W120ULB15-DPX-00 Power Rating: I/P: 100-240Vac, 50/60Hz, 0.7A O/P:12Vdc, 1.5A, 18.0W
3	RJ45	1.45m non-shielded without core

### 1.1.5 Channel List

Frequency Band (MHz)		902 ~928	
Channel	Frequency(MHz)	Channel	Frequency(MHz)
0	923.3	4	925.7
1	923.9	5	926.3
2	924.5	6	926.9
3	925.1	7	927.5

### 1.1.6 Test Tool and Duty Cycle

Test Tool	Putty command, V0.6	
Duty Cycle and Duty Factor	Duty Cycle (%)	Duty Factor (dB)
	100.00%	0.00

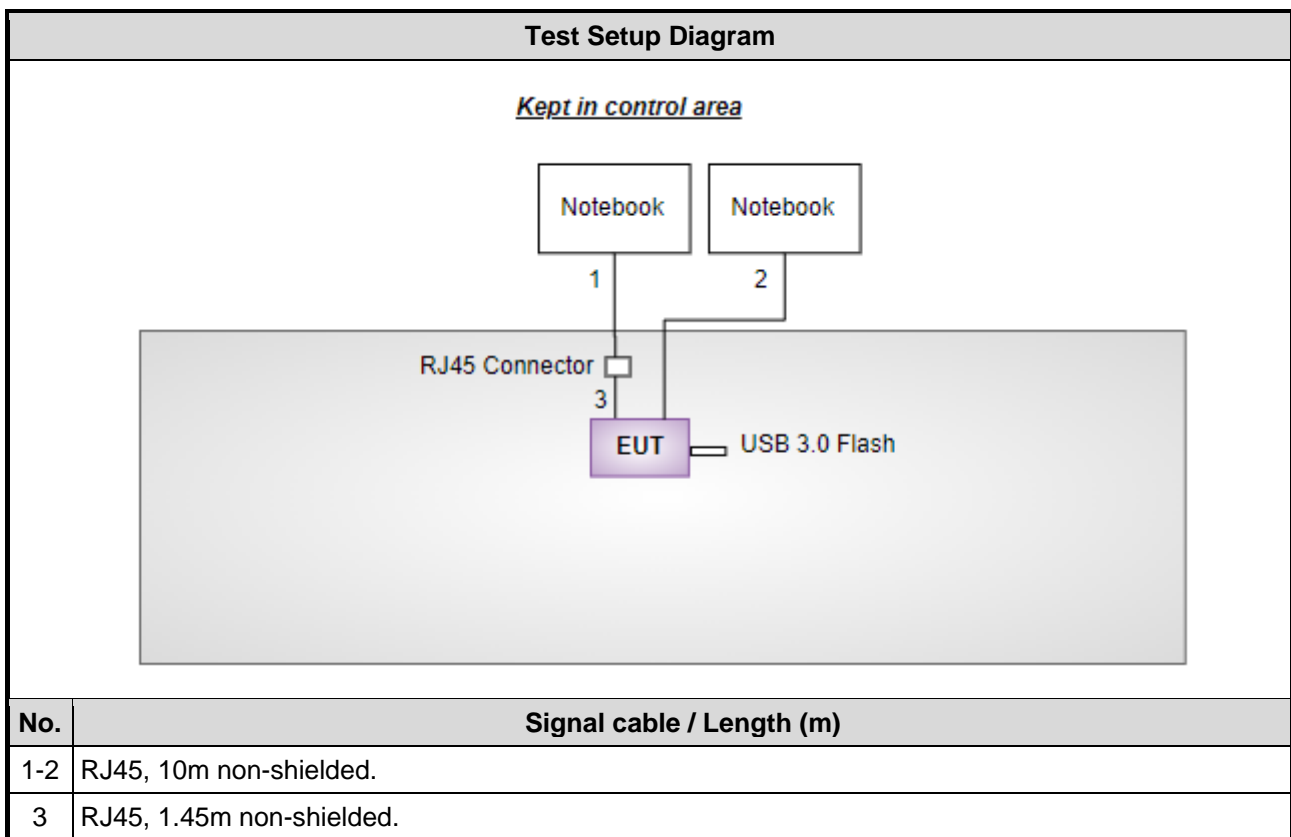
### 1.1.7 Power Index of Test Tool

Modulation Mode	Test Frequency (MHz)	Power Index
LoRa	923.3	--pa 1 --pwid 14
LoRa	927.5	--pa 1 --pwid 14

## 1.2 Local Support Equipment List

Support Equipment List					
No.	Equipment	Brand	Model	FCC ID	Remarks
1	Notebook	DELL	Latitude E5470	DoC	---
2	Notebook	DELL	Latitude E5470	DoC	---
3	USB 3.0 Flash	Transcend	JetFlash 700	---	---

## 1.3 Test Setup Chart



## 1.4 The Equipment List

<b>Test Item</b>	Conducted Emission				
<b>Test Site</b>	Conduction room 1 / (CO01-WS)				
<b>Tested Date</b>	Jan. 24, 2022				
<b>Instrument</b>	<b>Brand</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Receiver	R&S	ESR3	101658	Feb. 08, 2021	Feb. 07, 2022
LISN	R&S	ENV216	101579	Mar. 17, 2021	Mar. 16, 2022
LISN (Support Unit)	SCHWARZBECK MESS-ELEKTRONIK	NSLK 8127	8127477	Feb. 25, 2021	Feb. 24, 2022
RF Cable-CON	Woken	CFD200-NL	CFD200-NL-001	Oct. 19, 2021	Oct. 18, 2022
50 ohm terminal (Support Unit)	NA	50	04	May 25, 2021	May 24, 2022
Measurement Software	AUDIX	e3	6.120210k	NA	NA
Note: Calibration Interval of instruments listed above is one year.					

<b>Test Item</b>	Radiated Emission				
<b>Test Site</b>	966 chamber1 / (03CH01-WS)				
<b>Tested Date</b>	Jan. 06 ~ Jan. 08, 2022				
<b>Instrument</b>	<b>Brand</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Receiver	R&S	ESR3	101657	Mar. 12, 2021	Mar. 11, 2022
Spectrum Analyzer	R&S	FSV40	101063	Apr. 19, 2021	Apr. 18, 2022
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 08, 2021	Nov. 07, 2022
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jun. 30, 2021	Jun. 29, 2022
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Dec. 03, 2021	Dec. 02, 2022
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 04, 2021	Nov. 03, 2022
Preamplifier	EMC	EMC02325	980225	Jun. 29, 2021	Jun. 28, 2022
Preamplifier	Agilent	83017A	MY39501308	Sep. 28, 2021	Sep. 27, 2022
Preamplifier	EMC	EMC184045B	980192	Jul. 14, 2021	Jul. 13, 2022
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 05, 2021	Oct. 04, 2022
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Oct. 05, 2021	Oct. 04, 2022
LF cable 11M	EMC	EMCCFD400-NW-N W-11000	200801	Oct. 05, 2021	Oct. 04, 2022
LF cable 1M	EMC	EMCCFD400-NM-N M-1000	160502	Oct. 05, 2021	Oct. 04, 2022
RF Cable	EMC	EMC104-35M-35M- 8000	210920	Oct. 05, 2021	Oct. 04, 2022
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Oct. 05, 2021	Oct. 04, 2022
Measurement Software	AUDIX	e3	6.120210g	NA	NA
Note: Calibration Interval of instruments listed above is one year.					



<b>Test Item</b>	RF Conducted				
<b>Test Site</b>	(TH01-WS)				
<b>Tested Date</b>	Jan. 24, 2022				
<b>Instrument</b>	<b>Brand</b>	<b>Model No.</b>	<b>Serial No.</b>	<b>Calibration Date</b>	<b>Calibration Until</b>
Spectrum Analyzer	R&S	FSV40	101498	Nov. 29, 2021	Nov. 28, 2022
Power Meter	Anritsu	ML2495A	1241002	Nov. 07, 2021	Nov. 06, 2022
Power Sensor	Anritsu	MA2411B	1207366	Nov. 07, 2021	Nov. 06, 2022
Measurement Software	Sporton	SENSE-15247_FS	V5.10.7.11	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	$\pm 34.130$ Hz
Conducted power	$\pm 0.808$ dB
Power density	$\pm 0.583$ dB
Conducted emission	$\pm 2.715$ dB
AC conducted emission	$\pm 2.92$ dB
Radiated emission $\leq 1$ GHz	$\pm 3.41$ dB
Radiated emission $> 1$ GHz	$\pm 4.59$ dB

## 2 Test Configuration

### 2.1 Testing Facility

<b>Test Laboratory</b>	International Certification Corporation
<b>Test Site</b>	CO01-WS, 03CH01-WS, TH01-WS
<b>Address of Test Site</b>	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	Modulation Mode	Test Frequency (MHz)	Separating Factor	Test Configuration
Conducted Emissions	LoRa	923.3 / 927.5	SF 7 ~ 10	2
Maximum Output Power 6dB bandwidth Power spectral density	LoRa	923.3 / 927.5	SF 7 ~ 10	1
Radiated Emissions ≤1GHz Radiated Emissions >1GHz	LoRa	923.3 / 927.5	SF 7 ~ 10	1

**NOTE:**

1. Two adapters (Leader and Sercomm) had been covered during the pretest, and found that **Sercomm adapter** was the worst case of AC Power line conducted emission test item and **Leader adapter** was the worst case of Radiated Spurious emission test item.
2. Test configurations are as below  
 Configuration 1: Leader adapter for Radiated emission and antenna port conducted test  
 Configuration 2: Sercomm adapter for AC Power Line Conducted Emissions

## 3 Transmitter Test Results

### 3.1 Conducted Emissions

#### 3.1.1 Limit of 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.

#### 3.1.2 Test Procedures

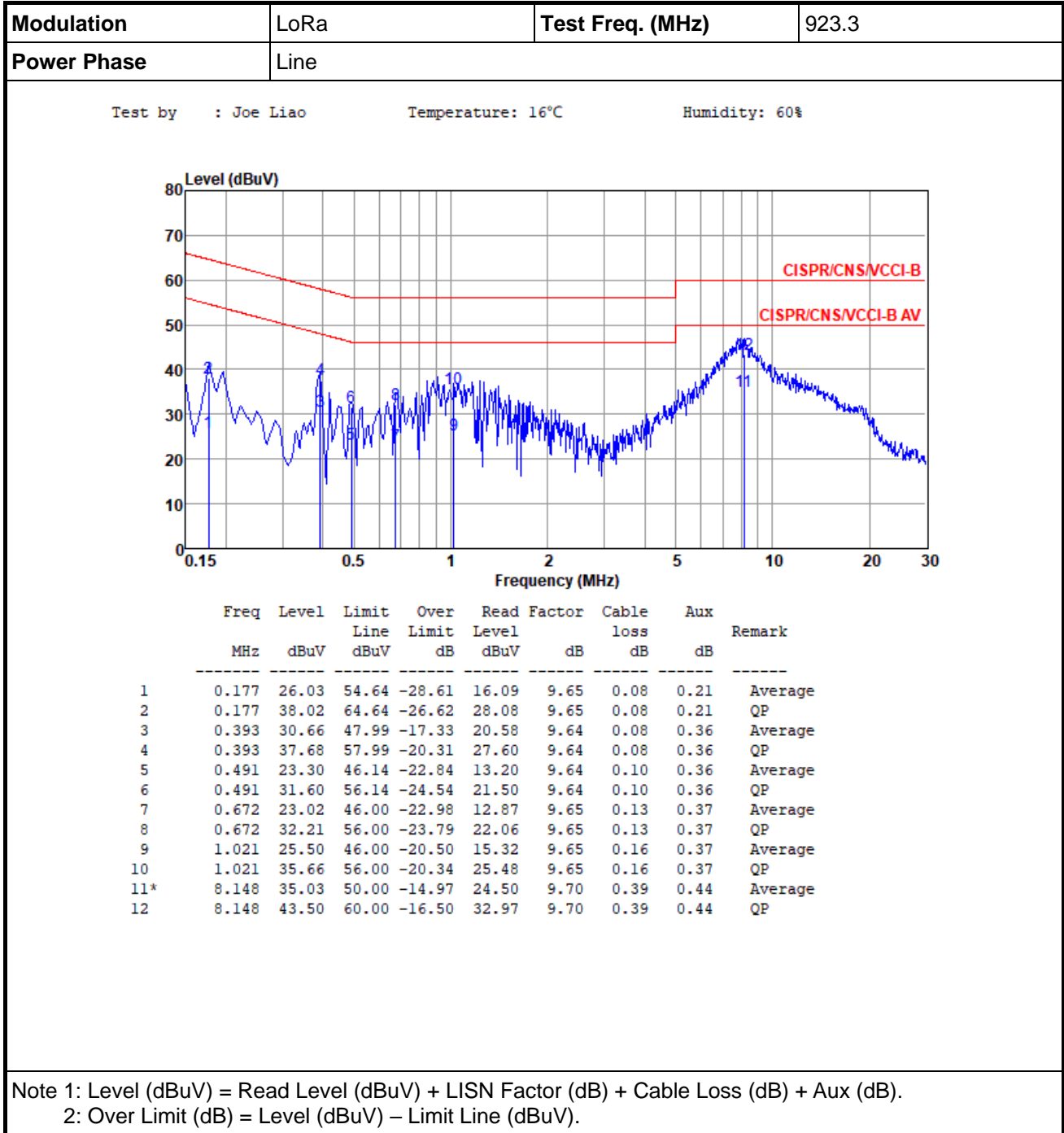
1. The device is placed on a test table, raised 80 cm above the reference ground plane. The vertical conducting plane is located 40 cm to the rear of the device.
2. The device is connected to line impedance stabilization network (LISN) and other accessories are connected to other LISN. Measured levels of AC power line conducted emission are across the 50  $\Omega$  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.

#### 3.1.3 Test Setup



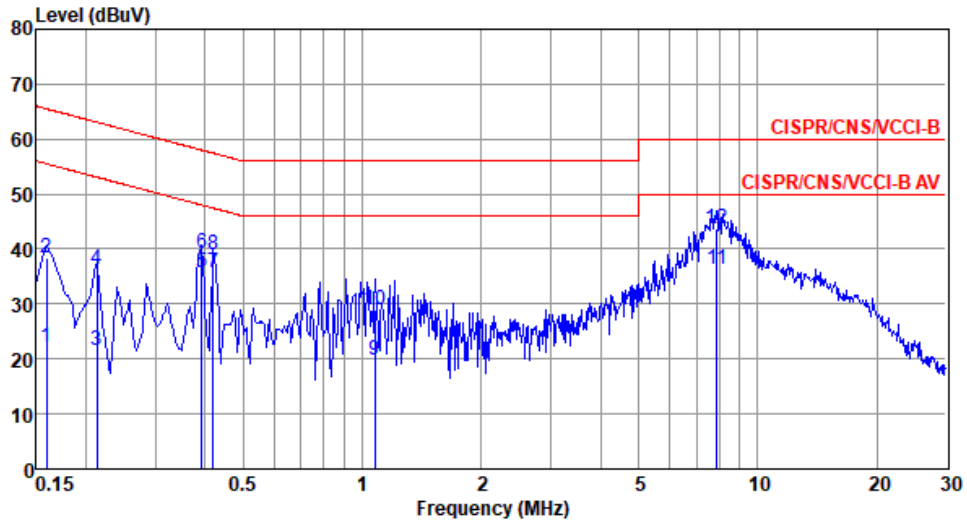
- Note: 1. Support units were connected to second LISN.  
 2. Both of LISNs (AMN) are 80 cm from EUT and at least 80 cm from other units and other metal planes

### 3.1.4 Test Result of Conducted Emissions



<b>Modulation</b>	LoRa	<b>Test Freq. (MHz)</b>	923.3
<b>Power Phase</b>	Neutral		

Test by : Joe Liao      Temperature: 16°C      Humidity: 60%

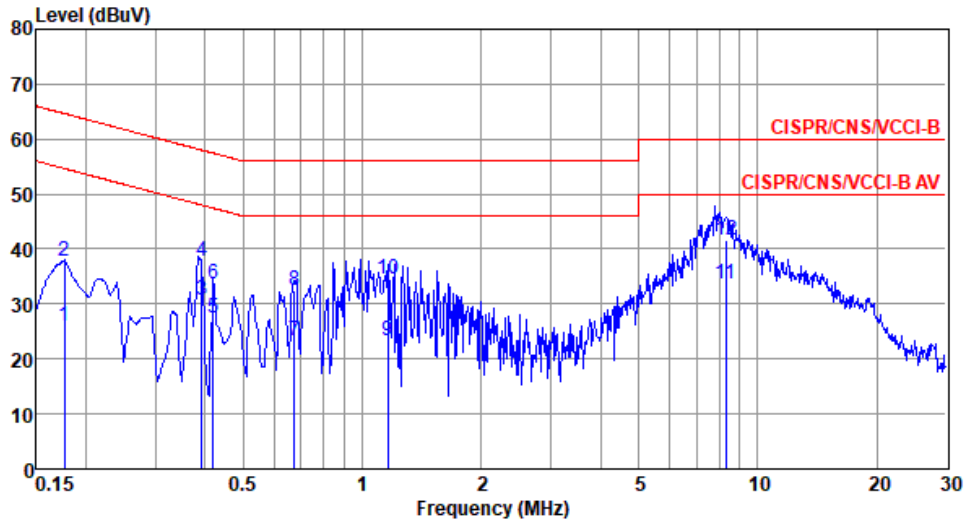


	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.159	22.29	55.52	-33.23	12.36	9.69	0.08	0.16	Average
2	0.159	38.31	65.52	-27.21	28.38	9.69	0.08	0.16	QP
3	0.213	21.65	53.10	-31.45	11.71	9.68	0.08	0.18	Average
4	0.213	36.38	63.10	-26.72	26.44	9.68	0.08	0.18	QP
5	0.393	35.75	47.99	-12.24	25.81	9.67	0.08	0.19	Average
6	0.393	39.37	57.99	-18.62	29.43	9.67	0.08	0.19	QP
7*	0.419	35.60	47.46	-11.86	25.66	9.67	0.08	0.19	Average
8	0.419	39.01	57.46	-18.45	29.07	9.67	0.08	0.19	QP
9	1.077	19.86	46.00	-26.14	9.74	9.68	0.16	0.28	Average
10	1.077	28.94	56.00	-27.06	18.82	9.68	0.16	0.28	QP
11	7.893	36.25	50.00	-13.75	25.76	9.74	0.39	0.36	Average
12	7.893	43.78	60.00	-16.22	33.29	9.74	0.39	0.36	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).

<b>Modulation</b>	LoRa	<b>Test Freq. (MHz)</b>	927.5
<b>Power Phase</b>	Line		

Test by : Joe Liao      Temperature: 16°C      Humidity: 60%

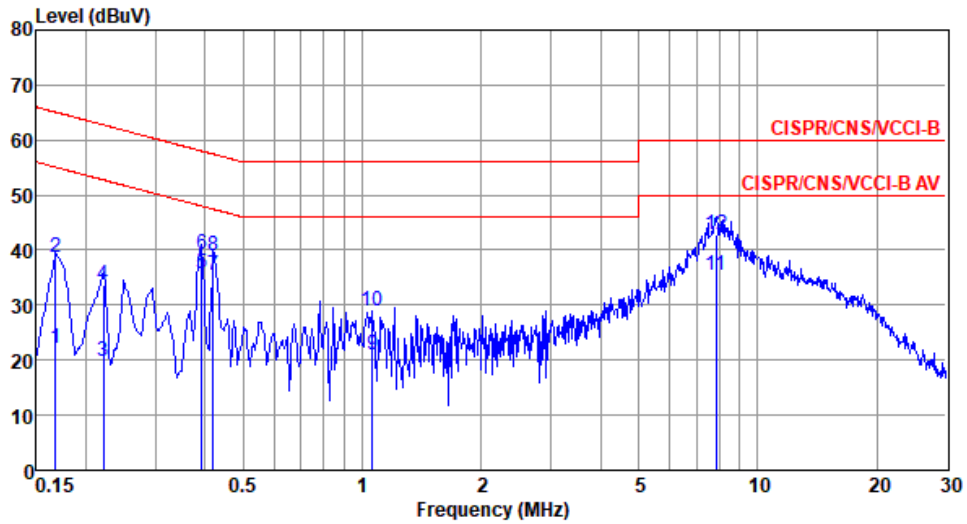


	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.177	26.05	54.64	-28.59	16.11	9.65	0.08	0.21	Average
2	0.177	37.66	64.64	-26.98	27.72	9.65	0.08	0.21	QP
3	0.393	30.73	47.99	-17.26	20.65	9.64	0.08	0.36	Average
4	0.393	37.65	57.99	-20.34	27.57	9.64	0.08	0.36	QP
5	0.419	27.59	47.46	-19.87	17.51	9.64	0.08	0.36	Average
6	0.419	33.54	57.46	-23.92	23.46	9.64	0.08	0.36	QP
7	0.672	23.39	46.00	-22.61	13.24	9.65	0.13	0.37	Average
8	0.672	32.42	56.00	-23.58	22.27	9.65	0.13	0.37	QP
9	1.160	23.20	46.00	-22.80	13.01	9.65	0.17	0.37	Average
10	1.160	34.61	56.00	-21.39	24.42	9.65	0.17	0.37	QP
11*	8.323	33.75	50.00	-16.25	23.21	9.70	0.40	0.44	Average
12	8.323	41.52	60.00	-18.48	30.98	9.70	0.40	0.44	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).

<b>Modulation</b>	LoRa	<b>Test Freq. (MHz)</b>	927.5
<b>Power Phase</b>	Neutral		

Test by : Joe Liao      Temperature: 16°C      Humidity: 60%



	Freq MHz	Level dBuV	Limit Line dBuV	Over Limit dB	Read Level dBuV	Factor dB	Cable loss dB	Aux dB	Remark
1	0.168	22.18	55.08	-32.90	12.24	9.69	0.08	0.17	Average
2	0.168	38.76	65.08	-26.32	28.82	9.69	0.08	0.17	QP
3	0.222	19.90	52.74	-32.84	9.96	9.68	0.08	0.18	Average
4	0.222	33.59	62.74	-29.15	23.65	9.68	0.08	0.18	QP
5	0.393	35.81	47.99	-12.18	25.87	9.67	0.08	0.19	Average
6	0.393	39.40	57.99	-18.59	29.46	9.67	0.08	0.19	QP
7*	0.419	35.37	47.46	-12.09	25.43	9.67	0.08	0.19	Average
8	0.419	38.83	57.46	-18.63	28.89	9.67	0.08	0.19	QP
9	1.060	21.04	46.00	-24.96	10.92	9.68	0.16	0.28	Average
10	1.060	28.79	56.00	-27.21	18.67	9.68	0.16	0.28	QP
11	7.852	35.35	50.00	-14.65	24.86	9.74	0.39	0.36	Average
12	7.852	42.81	60.00	-17.19	32.32	9.74	0.39	0.36	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).

## 3.2 6dB and Occupied Bandwidth

### 3.2.1 Limit of 6dB Bandwidth

The minimum 6dB bandwidth shall be at least 500 kHz.

### 3.2.2 Test Procedures

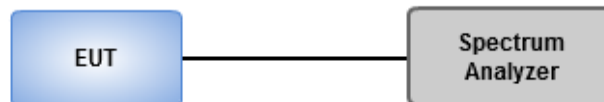
#### 6dB Bandwidth

1. Set resolution bandwidth (RBW) = 100 kHz, Video bandwidth = 300 kHz.
2. Detector = Peak, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. 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 6dB relative to the maximum level measured in the fundamental emission.

#### Occupied Bandwidth

1. Set resolution bandwidth (RBW) = 1% ~ 5 % of OBW, Video bandwidth = 3 x RBW
2. Detector = Sample, Trace mode = max hold.
3. Sweep = auto couple, Allow the trace to stabilize.
4. Use the OBW measurement function of spectrum analyzer to measure the occupied bandwidth.

### 3.2.3 Test Setup





### 3.2.4 Test Result of 6dB and Occupied Bandwidth

<b>Ambient Condition</b>	22°C / 67%	<b>Tested By</b>	Aska Huang
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#### Summary

Mode	Max-N dB (Hz)	Max-OBW (Hz)	ITU-Code	Min-N dB (Hz)	Min-OBW (Hz)
902-928MHz	-	-	-	-	-
LoRa (500kHz)	637.681k	501.085k	501KF1D	637.681k	497.467k

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

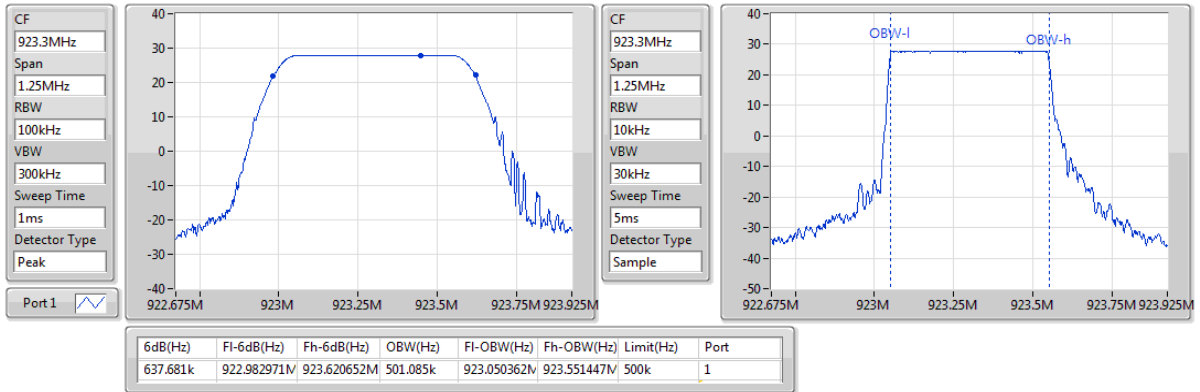
Mode	Result	Limit (Hz)	Port 1-N dB (Hz)	Port 1-OBW (Hz)
LoRa (500kHz)	-	-	-	-
923.3MHz	Pass	500k	637.681k	501.085k
927.5MHz	Pass	500k	637.681k	497.467k

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

### LoRa (500kHz)

### EBW-DTS

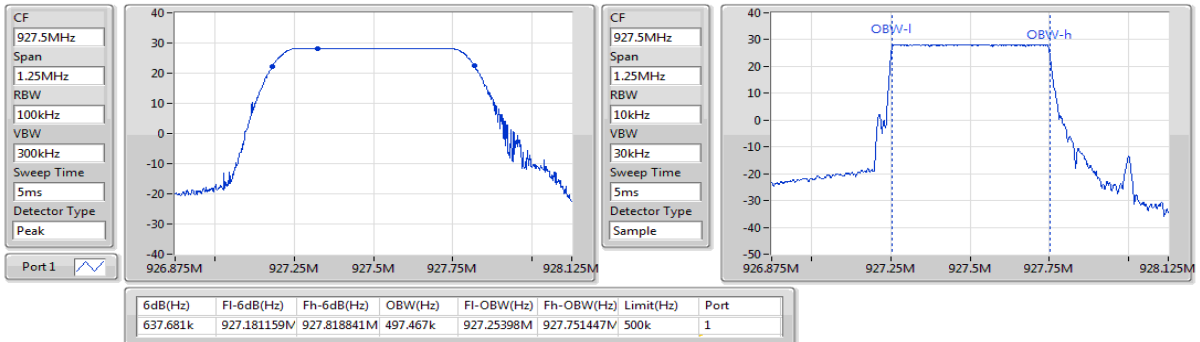
#### 923.3MHz



### LoRa (500kHz)

### EBW-DTS

#### 927.5MHz



### 3.3 RF Output Power

#### 3.3.1 Limit of RF Output Power

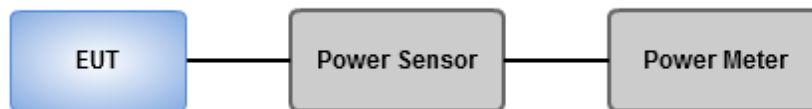
Conducted power shall not exceed 1Watt.

Antenna gain  $\leq$  6dBi, no any corresponding reduction is in output power limit.

#### 3.3.2 Test Procedures

A broadband RF power meter is used for output power measurement. The video bandwidth of power meter is greater than DTS bandwidth of EUT. 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 Result of Maximum Output Power

<b>Ambient Condition</b>	22°C / 67%	<b>Tested By</b>	Aska Huang
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##### Summary

Mode	Power (dBm)	Power (W)
902-928MHz	-	-
LoRa (500kHz)	27.89	0.61518

##### Result

Mode	Result	Antenna Gain (dBi)	Power (dBm)	Power Limit (dBm)
LoRa (500kHz)	-	-	-	-
923.3MHz	Pass	2.10	27.79	30.00
927.5MHz	Pass	2.10	27.89	30.00

## 3.4 Power Spectral Density

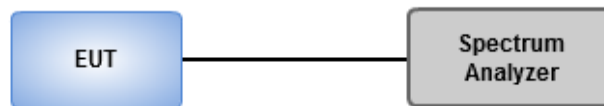
### 3.4.1 Limit of Power Spectral Density

Power spectral density shall not be greater than 8 dBm in any 3 kHz band.

### 3.4.2 Test Procedures

1. Set the RBW = 3 kHz, VBW = 10 kHz.
2. Detector = RMS, Sweep time = auto couple.
3. Sweep time = auto couple.
4. Employ trace averaging (RMS) mode over a minimum of 100 traces.
5. Use the peak marker function to determine the maximum amplitude level.

### 3.4.3 Test Setup



### 3.4.4 Test Result of Power Spectral Density

<b>Ambient Condition</b>	22°C / 67%	<b>Tested By</b>	Aska Huang
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#### Summary

<b>Mode</b>	<b>PD (dBm/3kHz)</b>
902-928MHz	-
LoRa (500kHz)	7.66

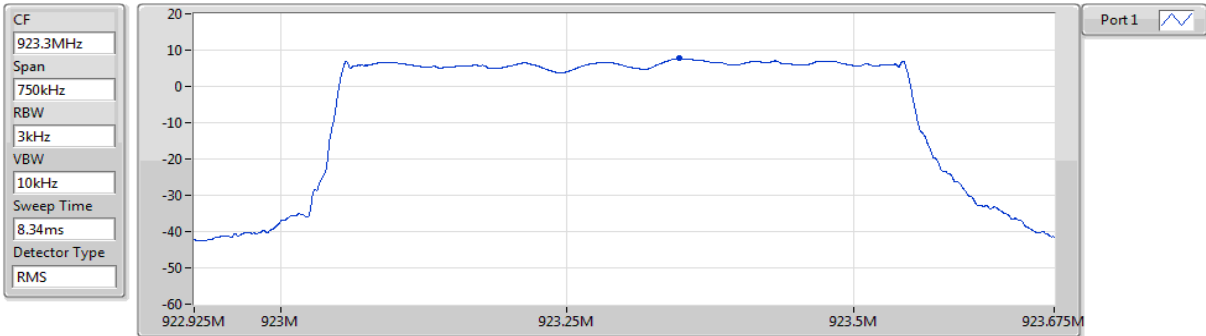
#### Result

<b>Mode</b>	<b>Result</b>	<b>Antenna Gain (dBi)</b>	<b>Power Density (dBm/3kHz)</b>	<b>Power Density Limit (dBm/3kHz)</b>
LoRa (500kHz)	-	-	-	-
923.3MHz	Pass	2.10	7.66	8.00
927.5MHz	Pass	2.10	7.52	8.00

### LoRa (500kHz)

PSD

#### 923.3MHz

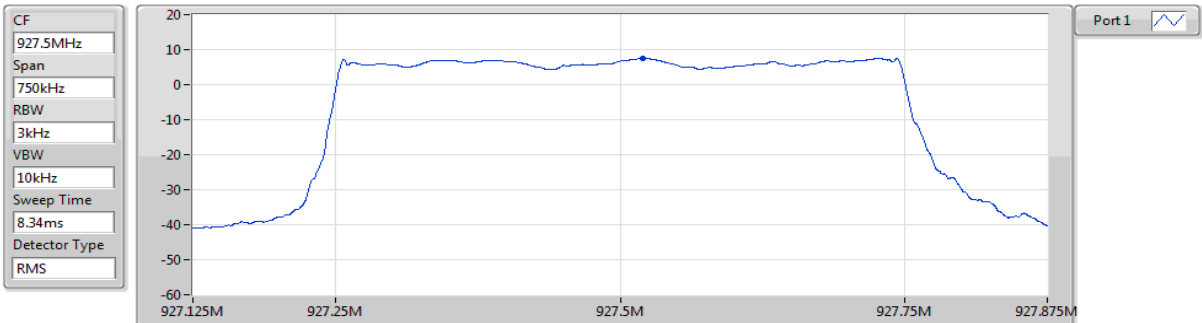


Sum (dBm/RBW)	PD (dBm/RBW)	Port 1 (dBm/RBW)
7.66	7.66	7.66

### LoRa (500kHz)

PSD

#### 927.5MHz



Sum (dBm/RBW)	PD (dBm/RBW)	Port 1 (dBm/RBW)
7.52	7.52	7.52

## 3.5 Unwanted Emissions into Restricted Frequency Bands

### 3.5.1 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:**  
Quasi-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.

### 3.5.2 Test Procedures

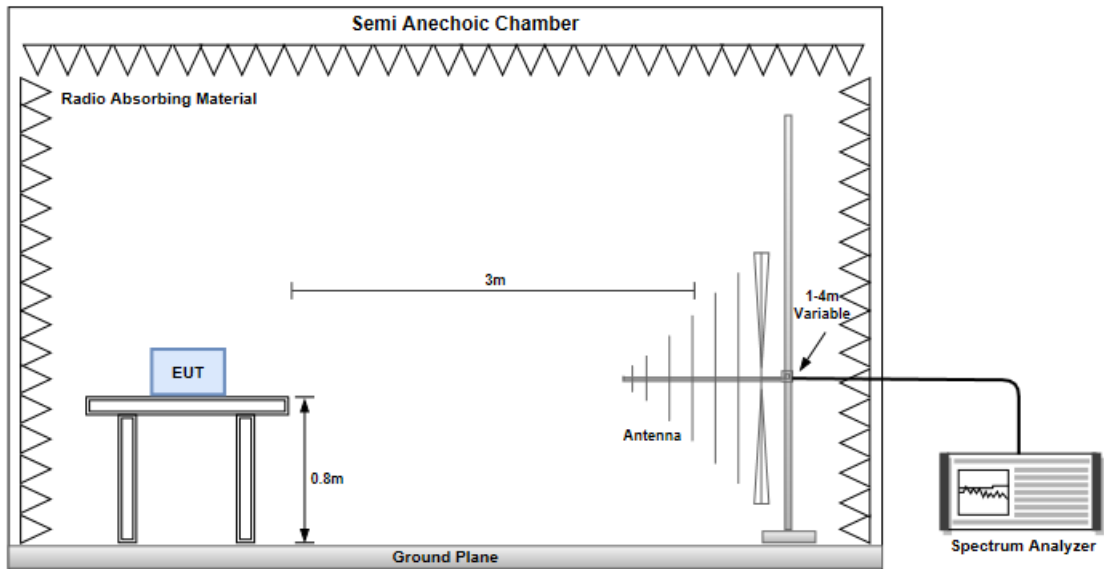
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission 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:

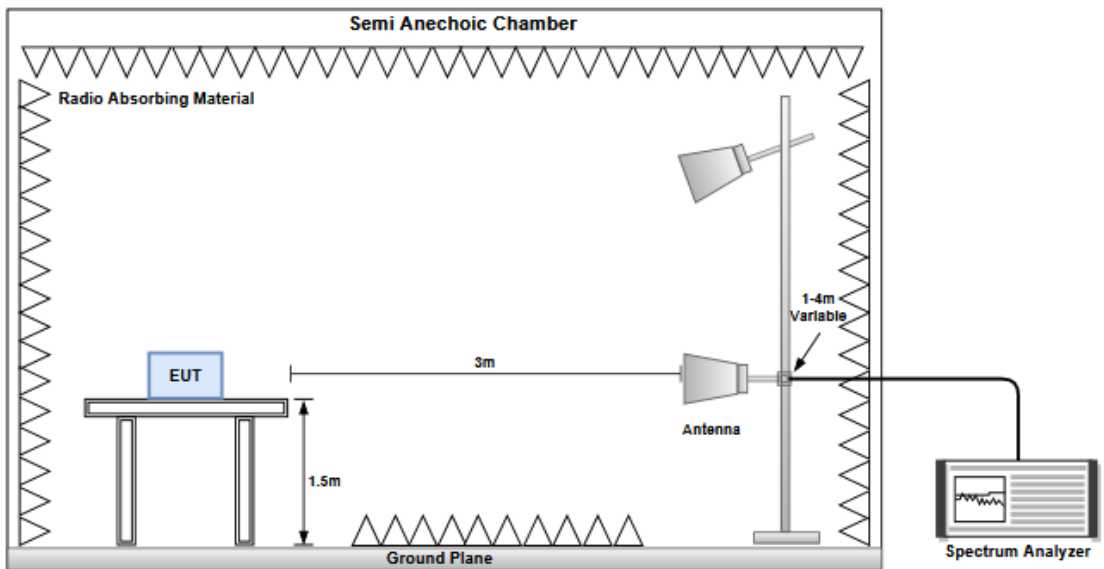
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

### 3.5.3 Test Setup

#### Radiated Emissions below 1 GHz



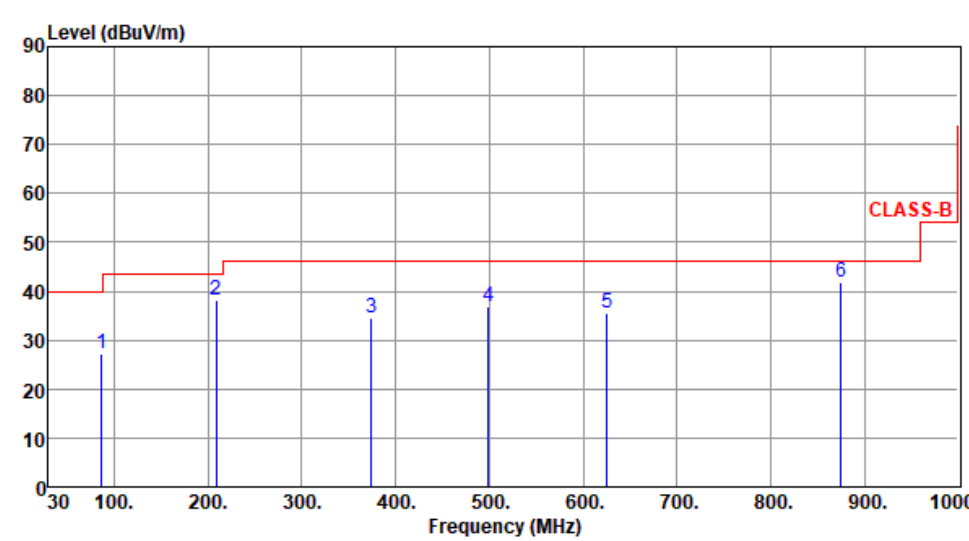
#### Radiated Emissions above 1 GHz





### 3.5.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

<b>Modulation / SF</b>	LORA / 7 ~ 10	<b>Test Freq. (MHz)</b>	923.3
<b>Polarization</b>	Horizontal		
Test By : Roger Lu		Temperature(°C): 23	Humidity(%): 67

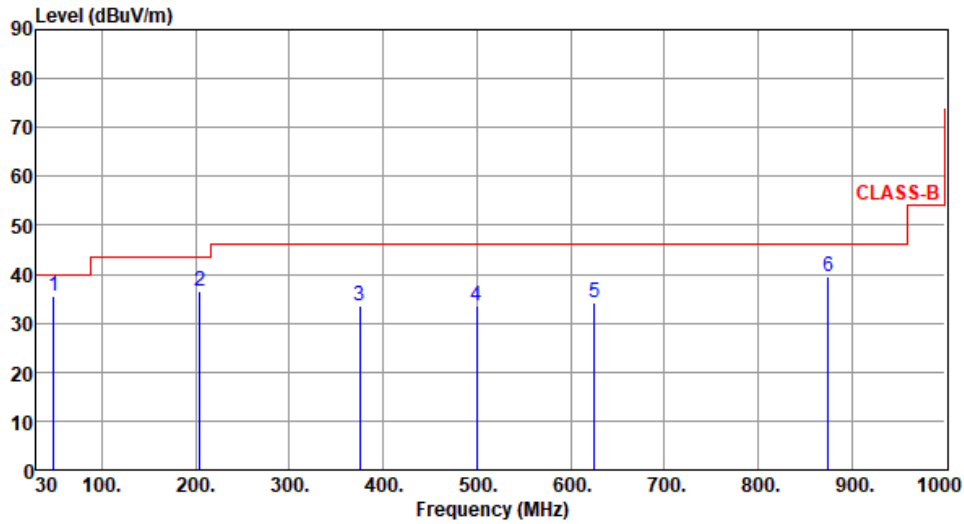
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	86.59	27.22	40.00	-12.78	41.85	-14.63	Peak	---	---
2	208.65	38.35	43.50	-5.15	50.31	-11.96	Peak	---	---
3	374.59	34.58	46.00	-11.42	40.92	-6.34	Peak	---	---
4	499.12	36.94	46.00	-9.06	40.25	-3.31	Peak	---	---
5	625.28	35.46	46.00	-10.54	35.91	-0.45	Peak	---	---
6	875.12	41.95	46.00	-4.05	38.80	3.15	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).

<b>Modulation / SF</b>	LORA / 7 ~ 10	<b>Test Freq. (MHz)</b>	923.3
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):23      Humidity(%):67



	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	48.45	35.66	40.00	-4.34	44.25	-8.59	QP	100	160
2	204.83	36.58	43.50	-6.92	48.55	-11.97	Peak	---	---
3	375.15	33.58	46.00	-12.42	39.91	-6.33	Peak	---	---
4	500.26	33.68	46.00	-12.32	36.96	-3.28	Peak	---	---
5	625.26	34.15	46.00	-11.85	34.60	-0.45	Peak	---	---
6	875.25	39.58	46.00	-6.42	36.43	3.15	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

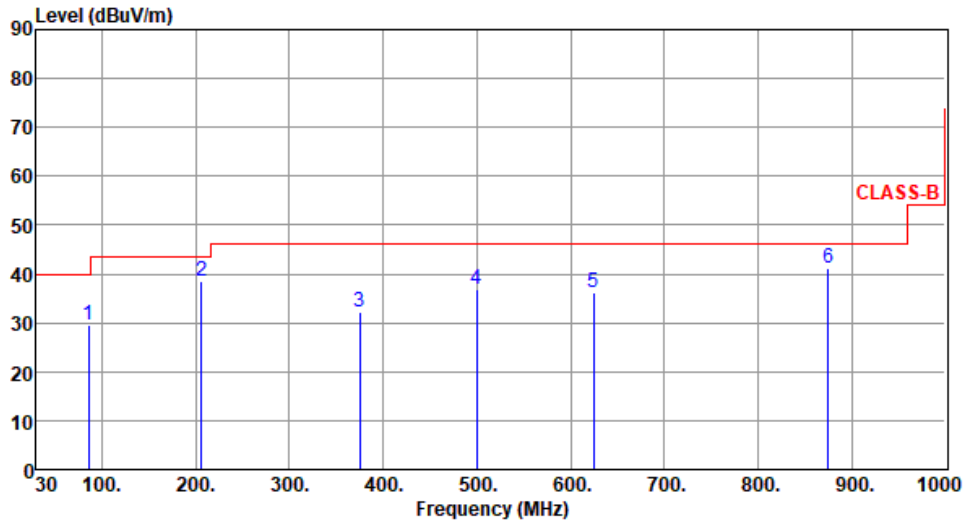
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

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<b>Modulation / SF</b>	LORA / 7 ~ 10	<b>Test Freq. (MHz)</b>	927.5
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<b>Polarization</b>	Horizontal
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Test By :Roger Lu      Temperature(°C):23      Humidity(%):67



	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	85.79	29.65	40.00	-10.35	44.15	-14.50	Peak	---	---
2	206.58	38.45	43.50	-5.05	50.41	-11.96	Peak	---	---
3	375.15	32.19	46.00	-13.81	38.52	-6.33	Peak	---	---
4	499.55	36.94	46.00	-9.06	40.24	-3.30	Peak	---	---
5	624.86	36.25	46.00	-9.75	36.71	-0.46	Peak	---	---
6	875.15	41.06	46.00	-4.94	37.91	3.15	Peak	---	---

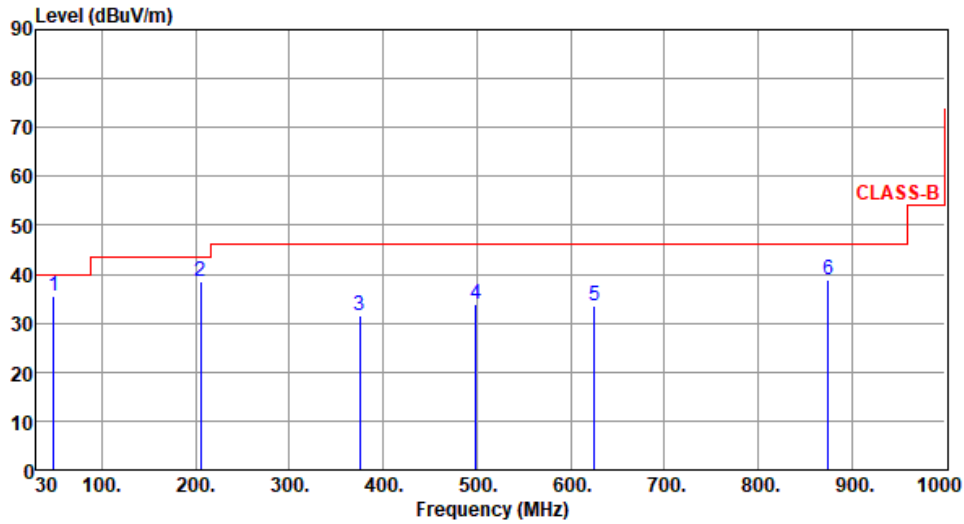
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation / SF</b>	LORA / 7 ~ 10	<b>Test Freq. (MHz)</b>	927.5
<b>Polarization</b>	Vertical		

Test By :Roger Lu      Temperature(°C):23      Humidity(%):67



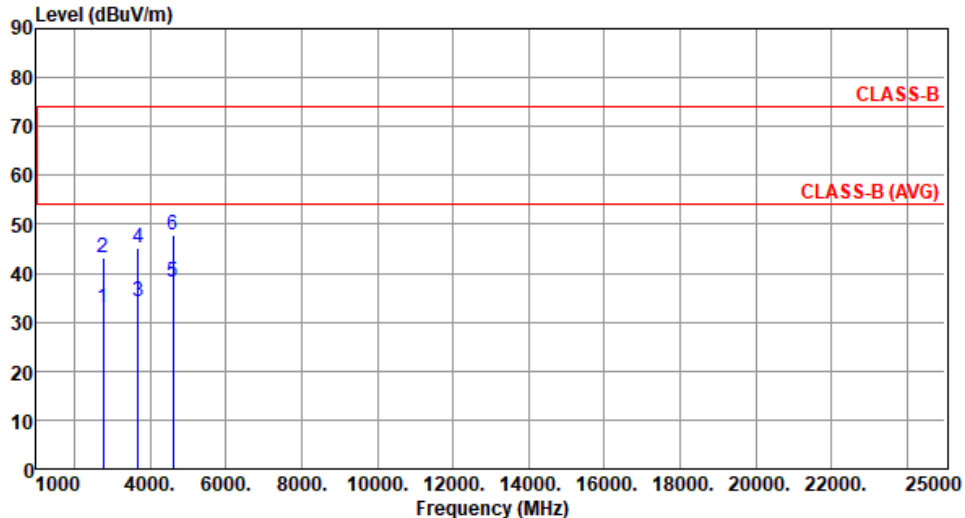
	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB/m	Remark	ANT High cm	Turn Table deg
1	48.55	35.62	40.00	-4.38	44.21	-8.59	QP	100	161
2	205.15	38.45	43.50	-5.05	50.42	-11.97	Peak	---	---
3	375.15	31.58	46.00	-14.42	37.91	-6.33	Peak	---	---
4	499.25	33.85	46.00	-12.15	37.15	-3.30	Peak	---	---
5	625.15	33.64	46.00	-12.36	34.09	-0.45	Peak	---	---
6	875.15	38.86	46.00	-7.14	35.71	3.15	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).

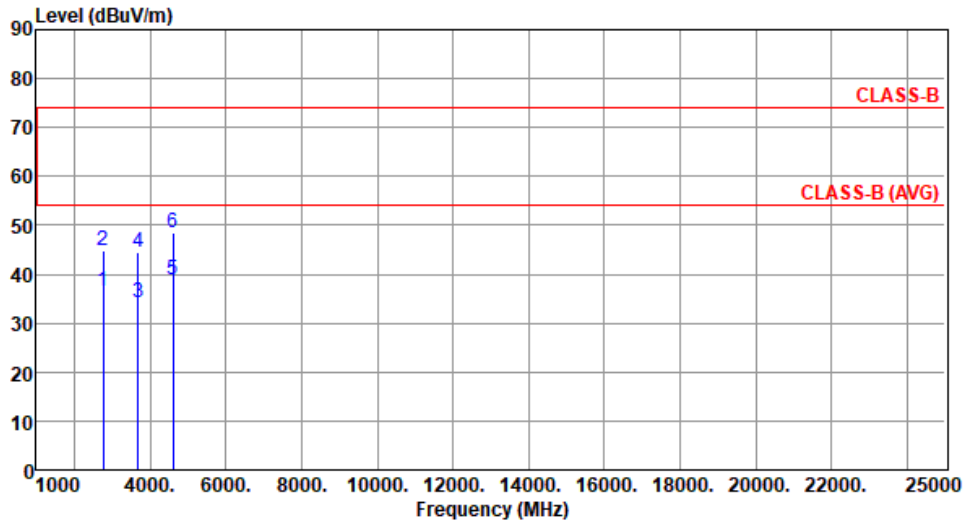
### 3.5.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

<b>Modulation / SF</b>	LORA / 7 ~ 10	<b>Test Freq. (MHz)</b>	923.3						
<b>Polarization</b>	Horizontal								
Test By : Akun Chung      Temperature(°C): 22      Humidity(%): 69									
									
	Freq.	Emission level	Limit	Margin	SA reading	Factor	Remark	ANT High	Turn Table
	MHz	dBuV/m	dBuV/m	dB	dBuV	dB/m		cm	deg
1	2769.90	32.79	54.00	-21.21	34.27	-1.48	Average	140	301
2	2769.90	43.07	74.00	-30.93	44.55	-1.48	Peak	140	301
3	3693.20	34.23	54.00	-19.77	33.56	0.67	Average	100	285
4	3693.20	45.14	74.00	-28.86	44.47	0.67	Peak	100	285
5	4616.50	38.25	54.00	-15.75	34.77	3.48	Average	315	105
6	4616.50	47.73	74.00	-26.27	44.25	3.48	Peak	315	105

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).

<b>Modulation / SF</b>	LORA / 7 ~ 10	<b>Test Freq. (MHz)</b>	923.3
<b>Polarization</b>	Vertical		

Test By : Akun Chung      Temperature(°C): 22      Humidity(%): 69



	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	2769.90	36.52	54.00	-17.48	38.00	-1.48	Average	379	88
2	2769.90	44.87	74.00	-29.13	46.35	-1.48	Peak	379	88
3	3693.20	34.22	54.00	-19.78	33.55	0.67	Average	326	99
4	3693.20	44.36	74.00	-29.64	43.69	0.67	Peak	326	99
5	4616.50	38.70	54.00	-15.30	35.22	3.48	Average	298	350
6	4616.50	48.36	74.00	-25.64	44.88	3.48	Peak	298	350

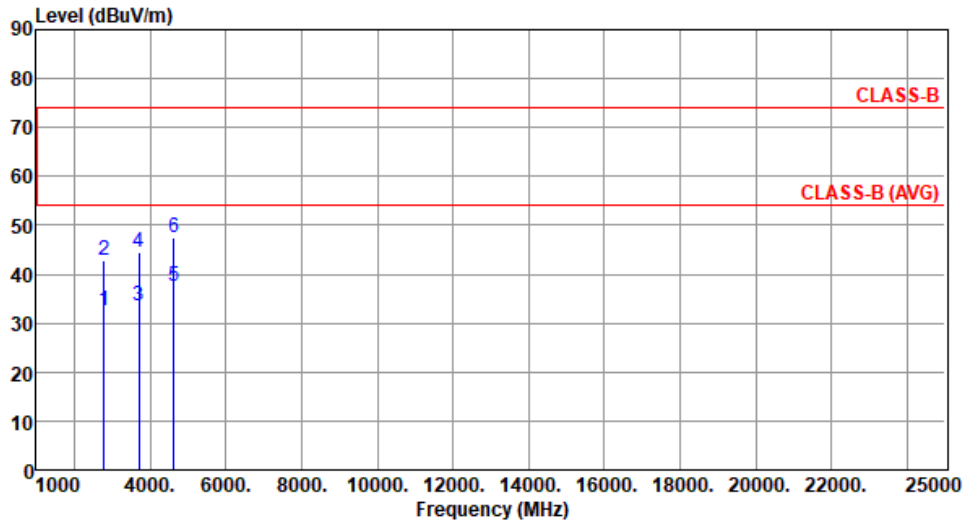
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation / SF</b>	LORA / 7 ~ 10	<b>Test Freq. (MHz)</b>	927.5
<b>Polarization</b>	Horizontal		

Test By : Akun Chung      Temperature(°C): 22      Humidity(%): 69



	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	2782.50	32.51	54.00	-21.49	33.95	-1.44	Average	138	298
2	2782.50	42.78	74.00	-31.22	44.22	-1.44	Peak	138	298
3	3710.00	33.56	54.00	-20.44	32.86	0.70	Average	100	277
4	3710.00	44.49	74.00	-29.51	43.79	0.70	Peak	100	277
5	4637.50	37.57	54.00	-16.43	33.97	3.60	Average	304	101
6	4637.50	47.45	74.00	-26.55	43.85	3.60	Peak	304	101

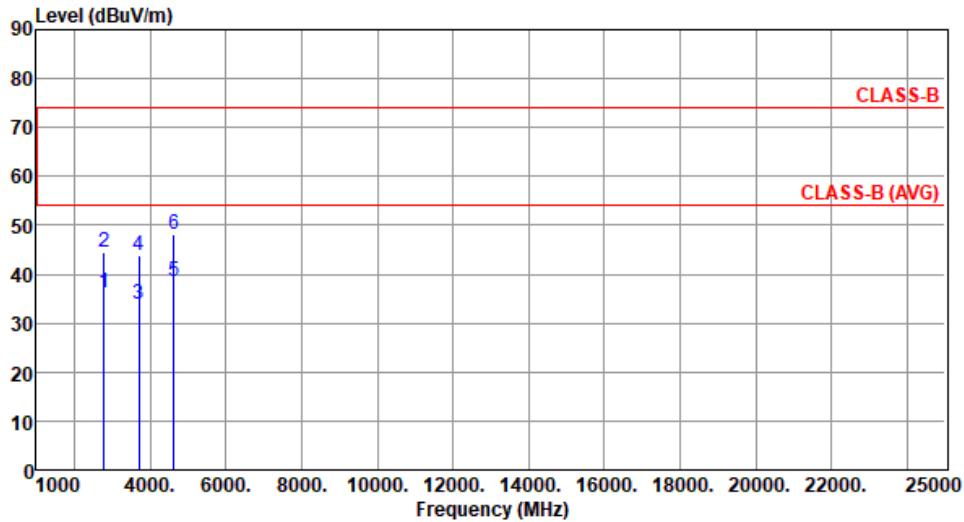
Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor\* (dB)

\*Factor includes antenna factor , cable loss and amplifier gain

Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

<b>Modulation / SF</b>	LORA / 7 ~ 10	<b>Test Freq. (MHz)</b>	927.5
<b>Polarization</b>	Vertical		

Test By : Akun Chung      Temperature(°C): 22      Humidity(%): 69



	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	2782.50	36.11	54.00	-17.89	37.55	-1.44	Average	358	79
2	2782.50	44.43	74.00	-29.57	45.87	-1.44	Peak	358	79
3	3710.00	33.96	54.00	-20.04	33.26	0.70	Average	316	90
4	3710.00	43.96	74.00	-30.04	43.26	0.70	Peak	316	90
5	4637.50	38.38	54.00	-15.62	34.78	3.60	Average	303	348
6	4637.50	48.25	74.00	-25.75	44.65	3.60	Peak	303	348

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).



## 3.6 Emissions in Non-Restricted Frequency Bands

### 3.6.1 Emissions in Non-Restricted Frequency Bands Limit

Peak power in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum in-band peak PSD level in 100 kHz.

### 3.6.2 Test Procedures

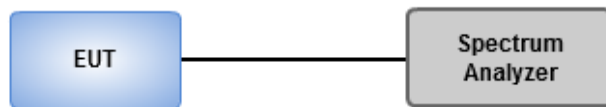
#### Reference level measurement

1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Use the peak marker function to determine the maximum PSD level

#### Emission level measurement

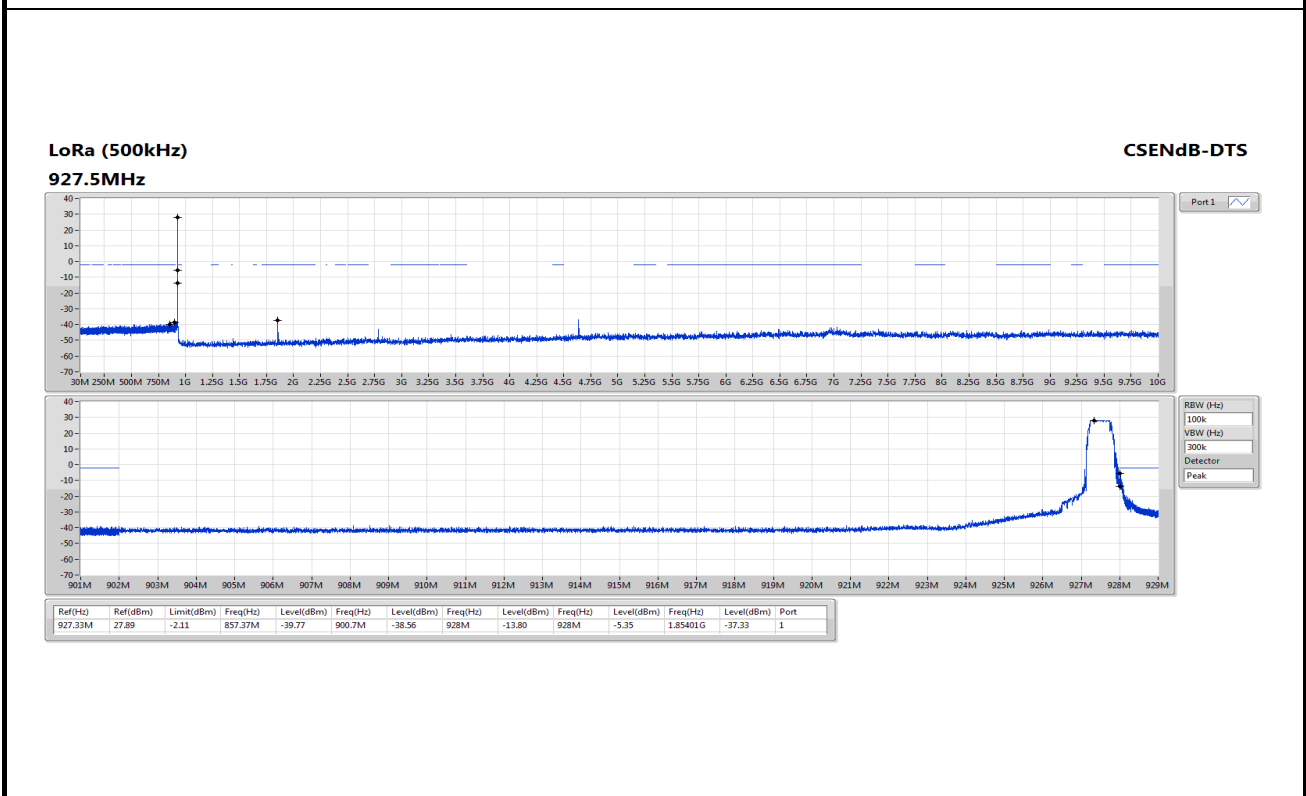
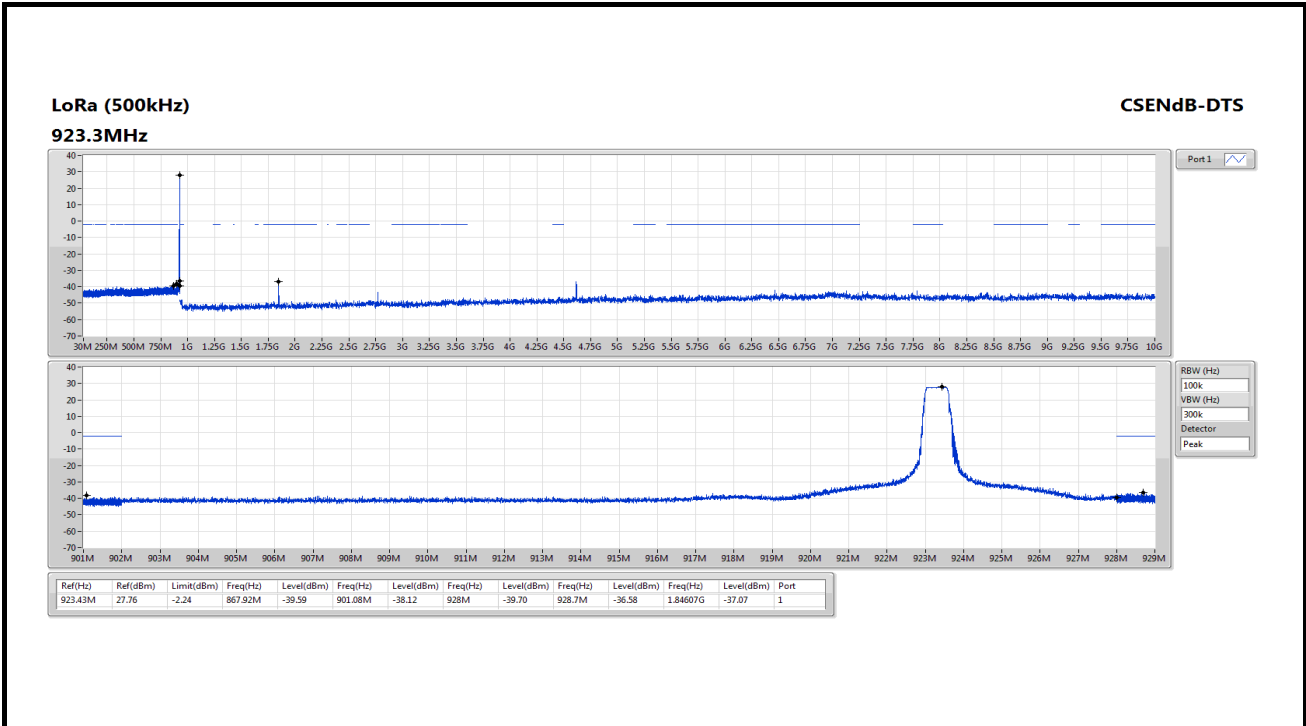
1. Set RBW=100kHz, VBW = 300kHz , Detector = Peak, Sweep time = Auto
2. Trace = max hold , Allow Trace to fully stabilize
3. Scan Frequency range is up to 25GHz
4. Use the peak marker function to determine the maximum amplitude level

### 3.6.3 Test Setup



### 3.6.4 Unwanted Emissions into Non-Restricted Frequency Bands

Ambient Condition	22°C / 67%	Tested By	Aska Huang
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## 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 333, 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==