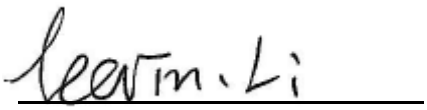
FCC RADIO TEST REPORT

Applicant	:	Measurement Specialties (China), Ltd.
Address	:	No. 26 Langshan Road Shenzhen High-Tech Park (North) Nanshan District Shenzhen 518057 China
Equipment	:	Wireless Vibration Sensor
Model No.	:	8911N-NX-A, 8911N-EX-A, 8931N-NX-A, 8931N-EX-A
Trade Name	:	TE Connectivity
FCC ID	:	2A85PA89X1N
Standard	:	FCC part 15 Subpart C §15.247

I HEREBY CERTIFY THAT :

The sample was received on Mar. 24, 2023 and the testing was completed on Apr. 21, 2023 at Cerpass Technology Corp. The test result refers exclusively to the test presented test model / sample. Without written approval of Cerpass Technology Corp., the test report shall not be reproduced except in full.

Approved by:



Leevin Li /Supervisor

Contents

History of this test report

Version No.	Report No.	Issue Date	Description
Rev. 01	DEFN2202046	Nov. 09, 2022	Initial Issue
Rev. 02	DEFN2212104	Apr. 24, 2023	1.Antenna pattern change 2.Contact spring changed from copper to stainless steel 3.PCB layout change for contact spring change 4.Lora matching circuit change 5.Antenna gain change

1. Summary of Test Procedure and Test Results

1.1 Applicable Standards

ANSI C63.10:2013
FCC Rules and Regulations Part 15 Subpart C §15.247

FCC Rule	. Description of Test	Result
15.203	. Antenna Requirement	PASS
15.209 15.205	. Radiated Spurious Emission	PASS
15.247(b)	. Maximum Peak Output Power	PASS

Note: Deviations Yes ☐ No ■
N/A denote not applicable
*The lab has reduced the uncertainty risk factor from test equipment, environment and staff technicians which according to the standard on contract. Therefore, the test result will only be determined by standard requirement.

This is an amended report application based on Cerpass Report No.: DEFN2202046. The details as below:
1.Antenna pattern change
2.Contact spring changed from copper to stainless steel
3.PCB layout change for contact spring change
4.Lora matching circuit change
5.Antenna gain change
After engineering evaluation, Maximum Peak Output Power and Radiated Spurious Emission need to be retested and shown in this report. For other test result please refer to original report.

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Equipment	Wireless Vibration Sensor
Model Name	8911N-NX-A, 8911N-EX-A, 8931N-NX-A, 8931N-EX-A
Model Discrepancy	All models are identical except for Detection Angle (1 represents uniaxial and 3 represents triaxial) and explosion-proof performance (EX represents ATEX and NX represents Non-ATEX). Model 8911N-EX-A and 8931N-EX-A were chosen for final test.
Operation Frequency Range	902MHz~928MHz
Center Frequency Range	500KHz:903MHz~914.2MHz
Modulation Type	LoRa
Antenna Gain.	-1.22dBi
Antenna Type	monopole Antenna
Working Temperature	-40°C to +60°C
Operating Voltage	DC 3.6V from Battery

Note: For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.

2.2 Carrier Frequency of Channels

500KHz (SF08)

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
***00**	**903.0**	***03**	**907.8**	06	912.6
01	904.6	04	909.4	***07**	**914.2**
02	906.2	05	911.0	---	---

Note: Channels remarked * are selected to perform test.

2.3 Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.10.
b. The complete test system included Notebook, Dongle and EUT for RF test.
c. Run the test software “Nrf Connect for Desktop.exe (Ver.: 3.12.0.0)” under Win 10 System was executed to transmit and receive data via Lora.
d. The following test modes were performed for the test:

Radiation Emissions (Below 1GHz)	
Test Mode	Operating Description
1	Lora(500KHz) for SF08 with 8911N-NX-A
caused “Test Mode 1” generated the worst case, they were reported as the final data.	
Radiation Emissions (1GHz ~ 10GHz)	
Test Mode	Operating Description
1	Lora(500KHz) for SF08 with 8911N-NX-A
caused “Test Mode 1” generated the worst case, they were reported as the final data.	

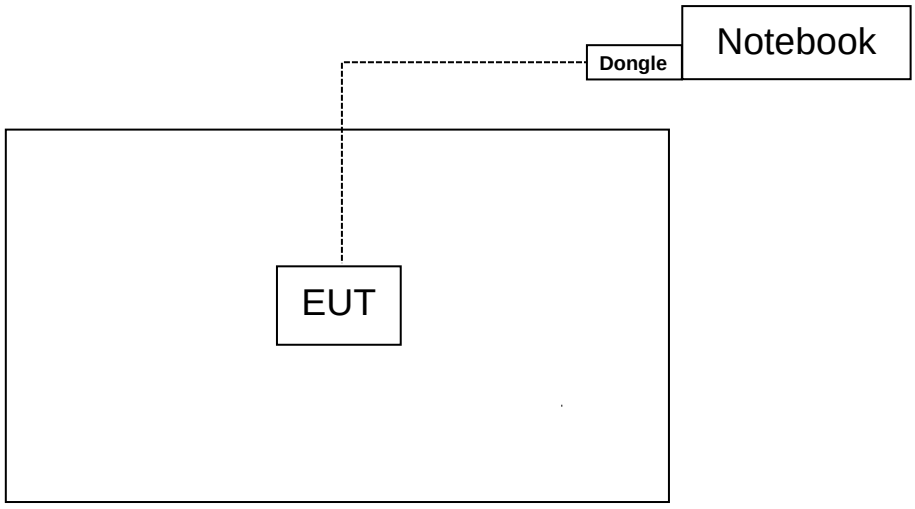
2.4 Power Parameter Value of the test software

Mode	Frequency (MHz)	Power Setting
Lora(500KHz)	903.0	8
	907.8	8
	914.2	8

2.5 Description of Test System

Product		Manufacturer	Model No.	Power Cord
1	Notebook	DELL	Dell Optitle 380	Non-Shielded, 1.8m
2	Dongle	NORDIC	nRF52840-Dongle	N/A

Connection Diagram



Signal Cable Type	Quantity	Signal cable Description
N/A	N/A	N/A

2.6 General Information of Test

Test Site	**Cerpass Technology Corporation(Cerpass Laboratory)** Address: Room 102, No. 5, Xing'an Road, Chang'an Town, Dongguan City, Guangdong Province Tel: +86-769-8547-1212 Fax: +86-769-8547-1912
FCC Designation No.:	CN1288
Frequency Range Investigated:	Conducted: from 150kHz to 30 MHz Radiation: from 30 MHz to 10,000MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.

Test Item	Test Site	Test period	Environmental Conditions	Tested By
Radiated Emissions	3M01-DG	2023/04/19	22°C / 52%	Amos Zhang
RF Conducted	RFCON01-DG	2023/04/21	24°C /54%	Amos Zhang

2.7 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2).

Measurement Item	Uncertainty
AC Power Line Conduction(150K~30MHz)	±2.60dB
Radiated Spurious Emission(9KHz~30MHz)	±4.99dB
Radiated Spurious Emission(30MHz~1GHz)	±4.39dB
Radiated Spurious Emission(1GHz~18GHz)	±5.36dB
Radiated Spurious Emission(18GHz~40GHz)	±5.43dB
6dB Bandwidth&20dB Bandwidth	±4.4%
Occupied Bandwidth	±4.4%
Peak Output Power(Conducted Power Meter)	±0.57 dB
Power Spectral Density	±1.01 dB
Dwell Time / Deactivation Time	±1.1%

3. Test Equipment and Ancillaries Used for Tests

Radiated Emissions					
Test Site	3M01-DG				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
EMI Test Receiver	R&S	ESCI	100565	2022.05.07	2023.05.06
Amplifier	EMCI	EMC330	980082	2022.05.07	2023.05.06
Loop Antenna	R&S	HFH2-Z2	100150	2022.05.11	2024.05.10
Bilog Antenna	Sunol Science	JB6	A111218	2023.01.12	2025.01.11
Preamplifier	Agilent	8449B	3008A02342	2023.01.06	2024.01.05
Preamplifier	COM-POWER	PA-840	711885	2022.05.07	2023.05.06
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-619	2022.05.22	2024.05.21
Standard Gain Horn Antenna	TRC	HA-2640	18050	2022.05.09	2024.05.08
Standard Gain Horn Antenna	TRC	HA-1726	18051	2022.05.09	2024.05.08
FSQ Signal Analyzer	R&S	FSQ40	200012	2022.05.07	2023.05.06
Temperature/ Humidity Meter	GEMLEAD	STH200A	N/A	2022.08.05	2023.08.04

RF Conducted					
Test Site	RFCON01-DG				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date
MXA Signal Analyzer	KEYSIGHT	N9020A	US46220290	2022.05.07	2023.05.06
EXA Signal Analyzer	KEYSIGHT	N9010A	MY53400169	2022.05.07	2023.05.06
ESG VECTOR SIGNAL GENERATOR	Agilent	E4438C	MY45092582	2022.05.07	2023.05.06
MXG VECTOR SIGNAL GENERATOR	Agilent	N5182B	MY53050127	2022.05.07	2023.05.06
USB Wideband Power Sensor	Boonton	55006	9778	2023.01.06	2024.01.05
Temperature/ Humidity Meter	mingle	ETH529	N/A	2023.01.06	2024.01.05

4. Antenna Requirements

4.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

4.2 Antenna Construction and Directional Gain

Antenna Type	monopole Antenna
Antenna Gain	-1.22dBi

5. Test of Spurious Emission (Radiated)

5.1 Test Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

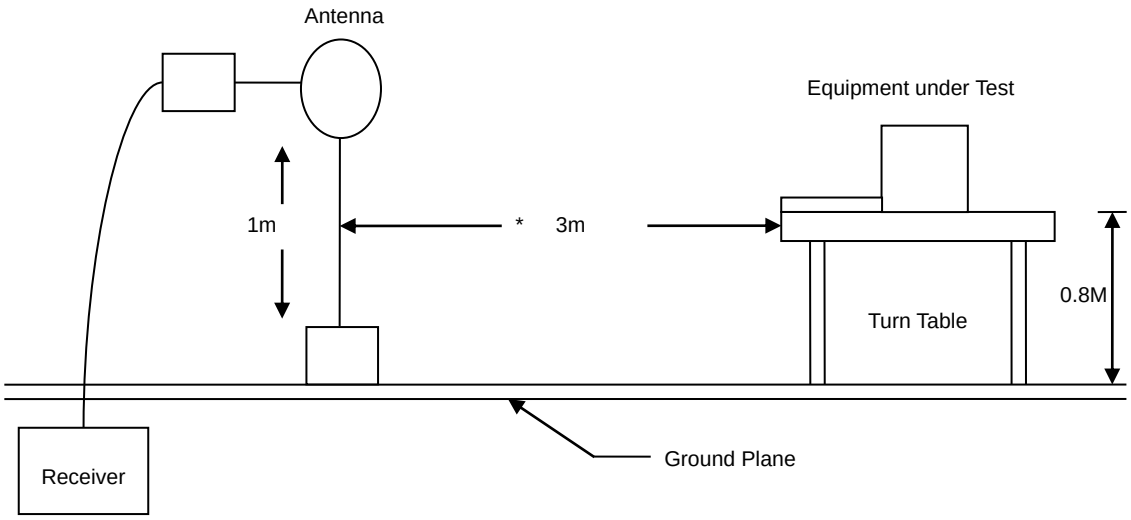
5.2 Test Procedures

a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
i. “Cone of radiation” has been considered to be 3dB bandwidth of the measurement antenna.

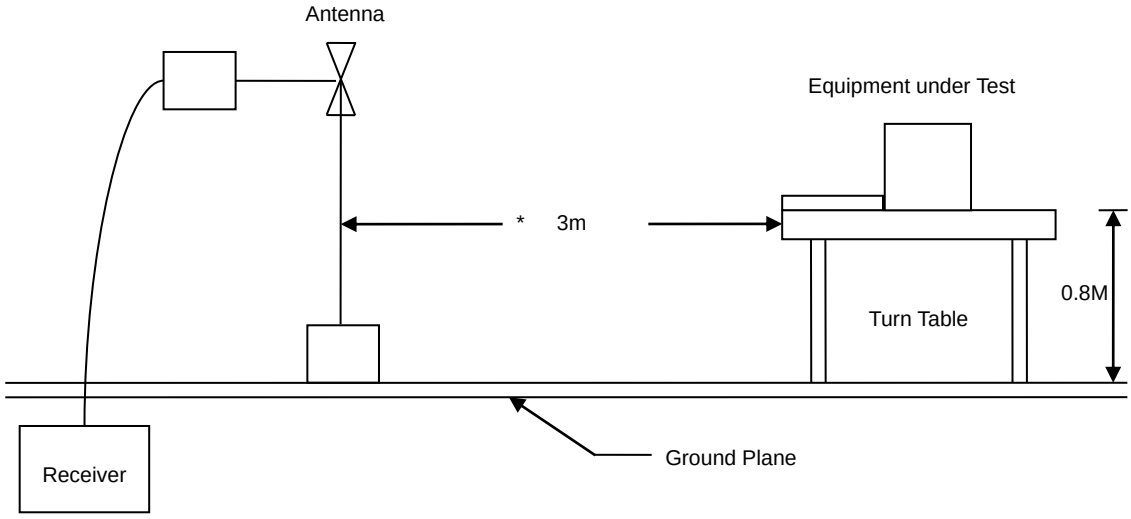
Note: The supporting fixture shall permit orientation of the EUT in each of three orthogonal axis positions such that emissions from the EUT are maximized.(X AXIS is the worst.)

5.3 Typical Test Setup

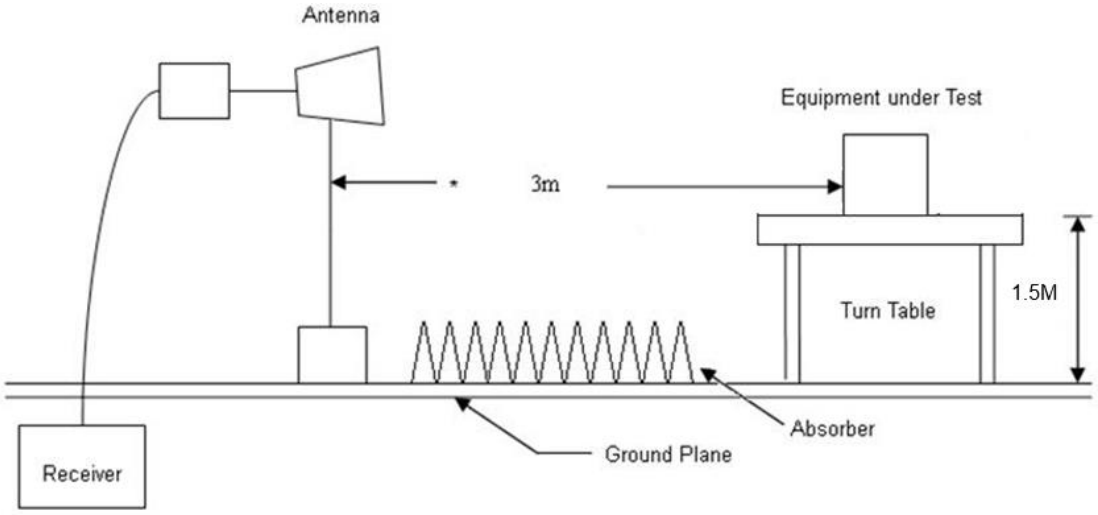
Below 30MHz test setup



30MHz- 1GHz Test Setup



Above 1GHz Test Setup



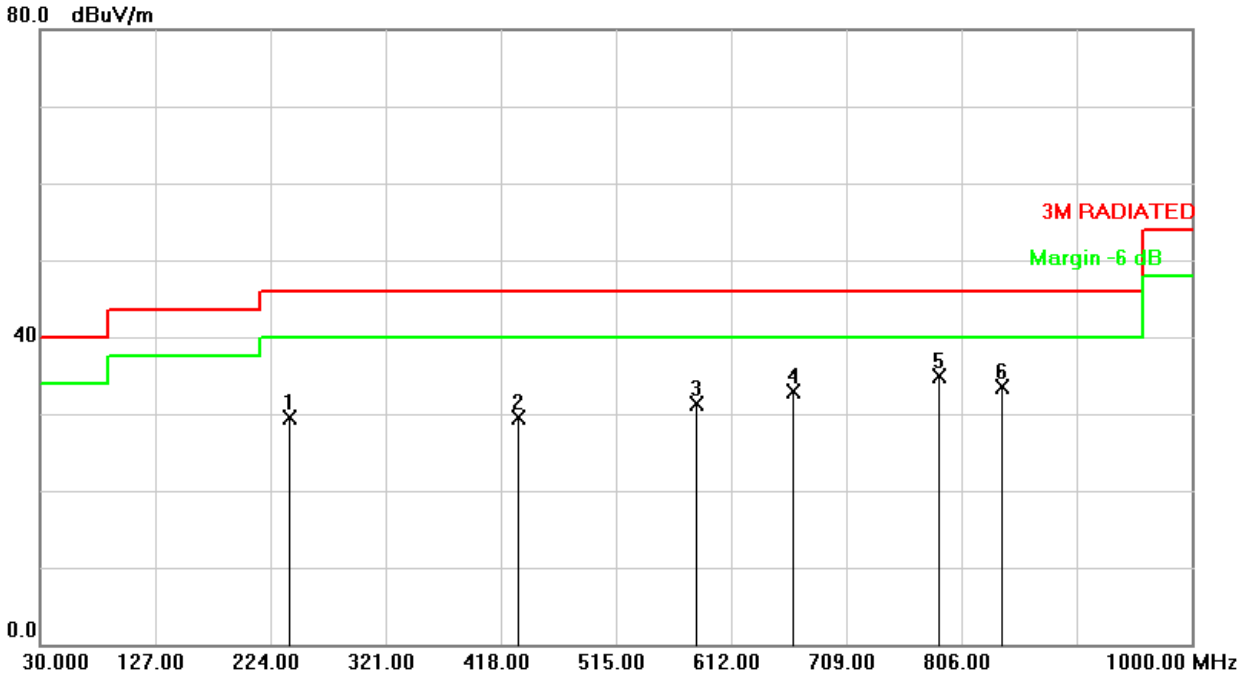
5.4 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

5.5 Test Result and Data (30MHz ~ 1GHz)

Power	DC 3.6V from battery	Pol/Phase	VERTICAL
Test Mode	Mode 1		

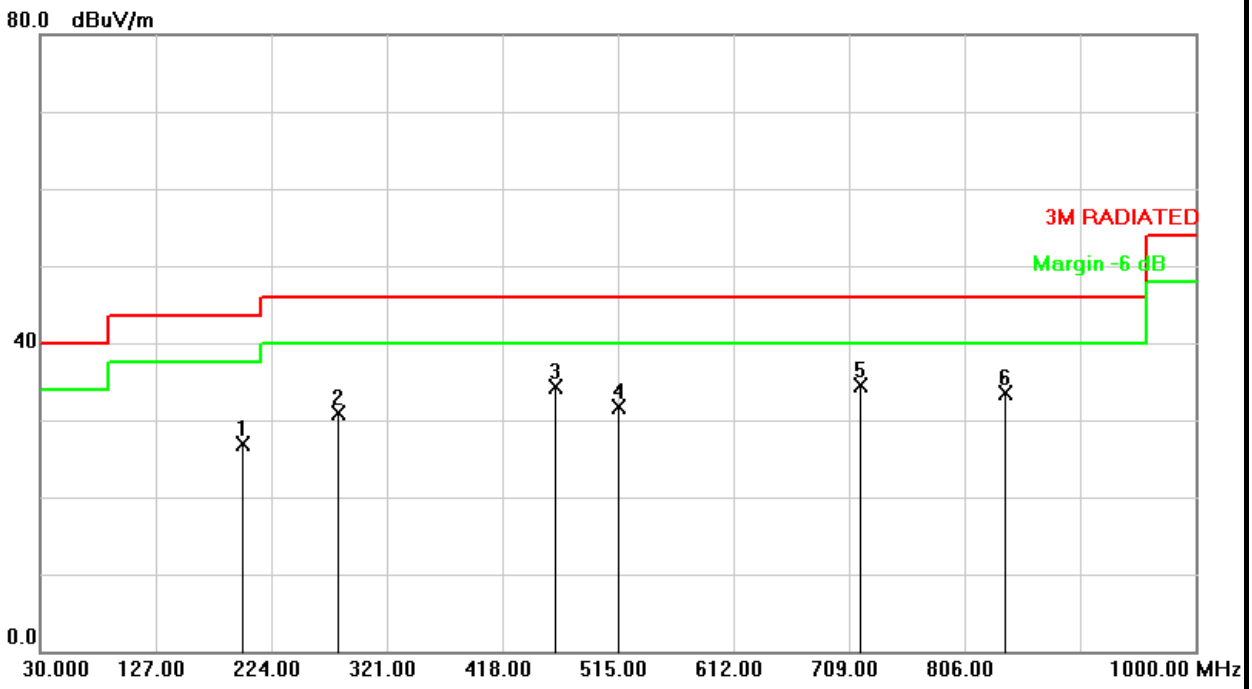
Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	239.5200	-23.38	52.94	29.56	46.00	-16.44	peak	100	175
2	433.5199	-22.74	52.21	29.47	46.00	-16.53	peak	200	344
3	582.8999	2.55	28.68	31.23	46.00	-14.77	peak	100	299
4	664.3799	4.11	28.82	32.93	46.00	-13.07	peak	100	103
5	786.6000	6.15	28.79	34.94	46.00	-11.06	peak	100	317
6	840.9198	7.24	26.24	33.48	46.00	-12.52	peak	200	252

Power	DC 3.6V from battery	Pol/Phase	HORIZONTAL
Test Mode	Mode 1		

Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor

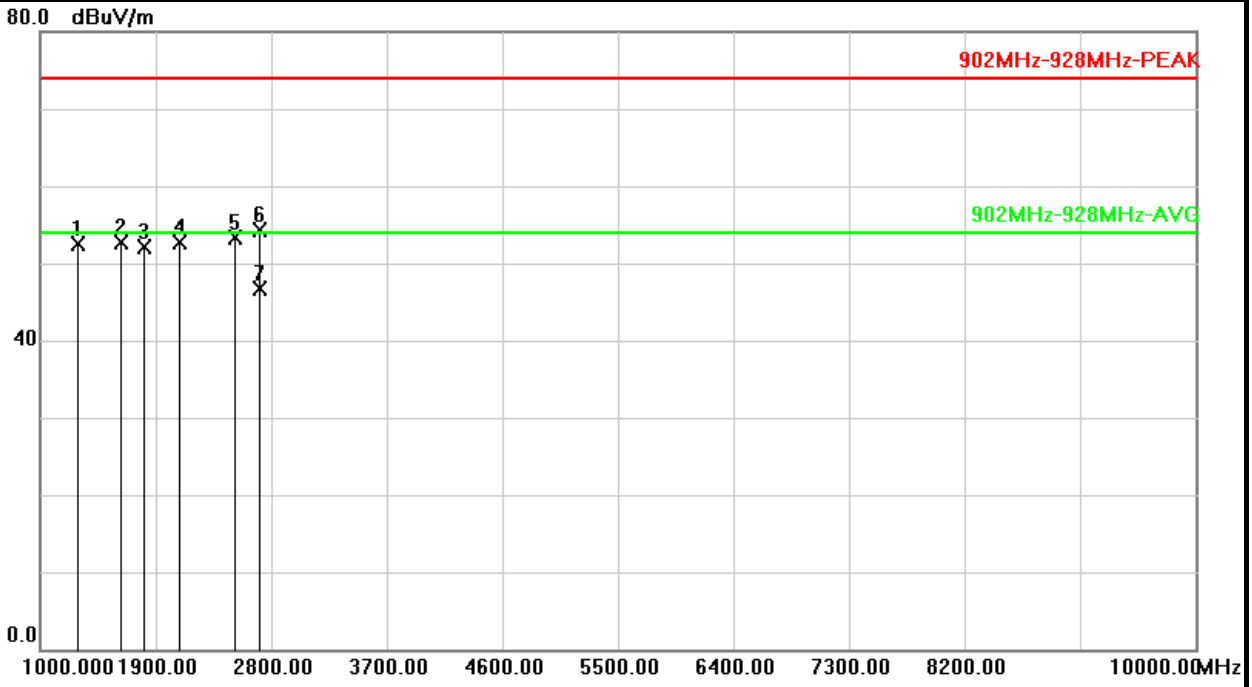


No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.	Height (cm)	Azimuth (deg)
1	199.7500	-23.66	50.53	26.87	43.50	-16.63	peak	200	113
2	280.2599	-23.11	53.93	30.82	46.00	-15.18	peak	200	327
3	462.6200	-22.69	57.04	34.35	46.00	-11.65	peak	100	168
4	515.9699	-22.54	54.32	31.78	46.00	-14.22	peak	200	251
5	718.7000	5.22	29.25	34.47	46.00	-11.53	peak	100	342
6	840.9198	7.24	26.17	33.41	46.00	-12.59	peak	100	297

5.6 Test Result and Data (1GHz ~ 10GHz)

Power	DC 3.6V from battery	Pol/Phase	VERTICAL
Test Mode	Mode 1, 903MHz	Operation mode	TX

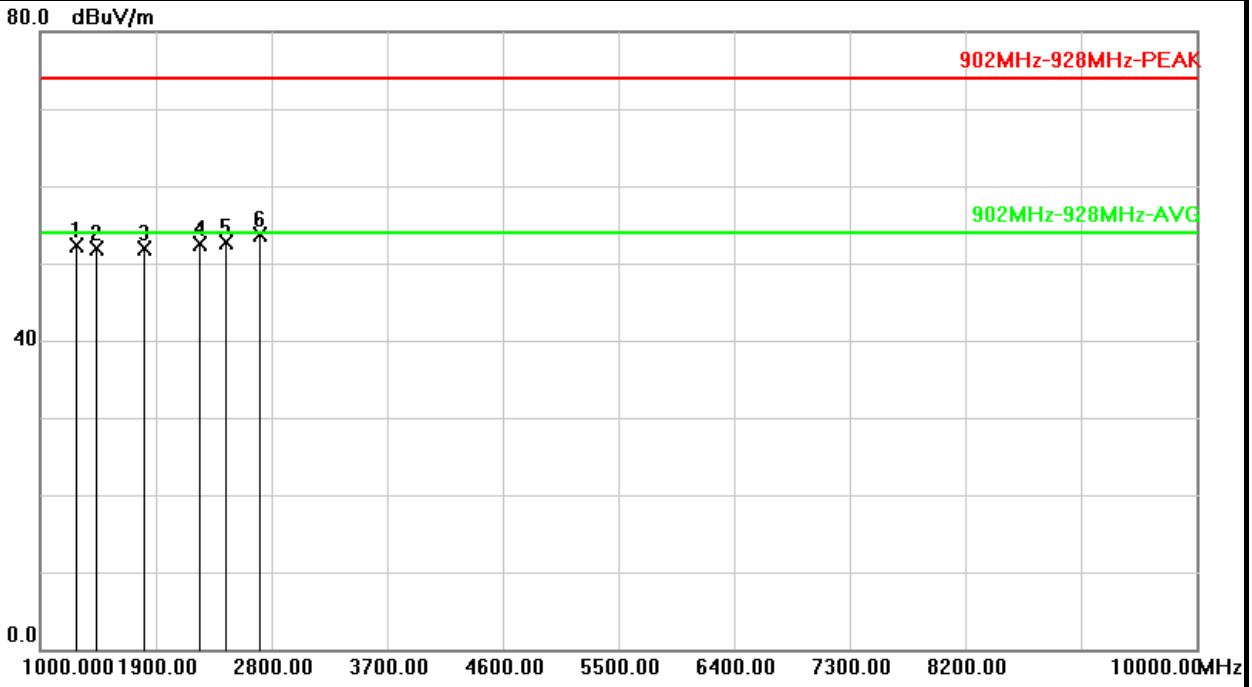
Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1297.000	9.12	43.48	52.60	74.00	-21.40	peak
2	1630.000	8.56	44.21	52.77	74.00	-21.23	peak
3	1806.000	8.64	43.43	52.07	74.00	-21.93	peak
4	2089.000	10.47	42.27	52.74	74.00	-21.26	peak
5	2512.000	12.09	41.14	53.23	74.00	-20.77	peak
6	2709.000	12.12	42.21	54.33	74.00	-19.67	peak
7	2709.000	12.12	34.60	46.72	54.00	-7.28	AVG

Power	DC 3.6V from battery	Pol/Phase	HORIZONTAL
Test Mode	Mode 1, 903MHz	Operation mode	TX

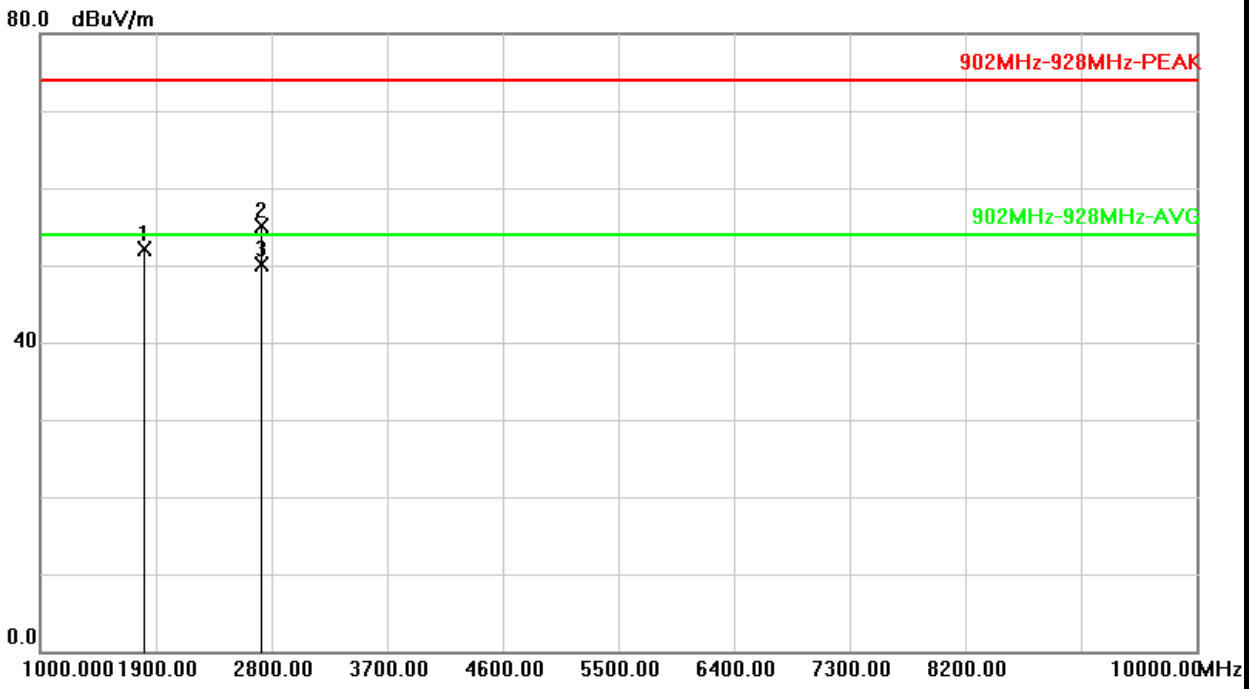
Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1279.000	9.08	43.20	52.28	74.00	-21.72	peak
2	1441.000	9.17	42.65	51.82	74.00	-22.18	peak
3	1806.000	8.64	43.26	51.90	74.00	-22.10	peak
4	2242.000	11.07	41.44	52.51	74.00	-21.49	peak
5	2440.000	11.85	40.94	52.79	74.00	-21.21	peak
6	2709.000	12.12	41.54	53.66	74.00	-20.34	peak

Power	DC 3.6V from battery	Pol/Phase	VERTICAL
Test Mode	Mode 1, 907.8MHz	Operation mode	TX

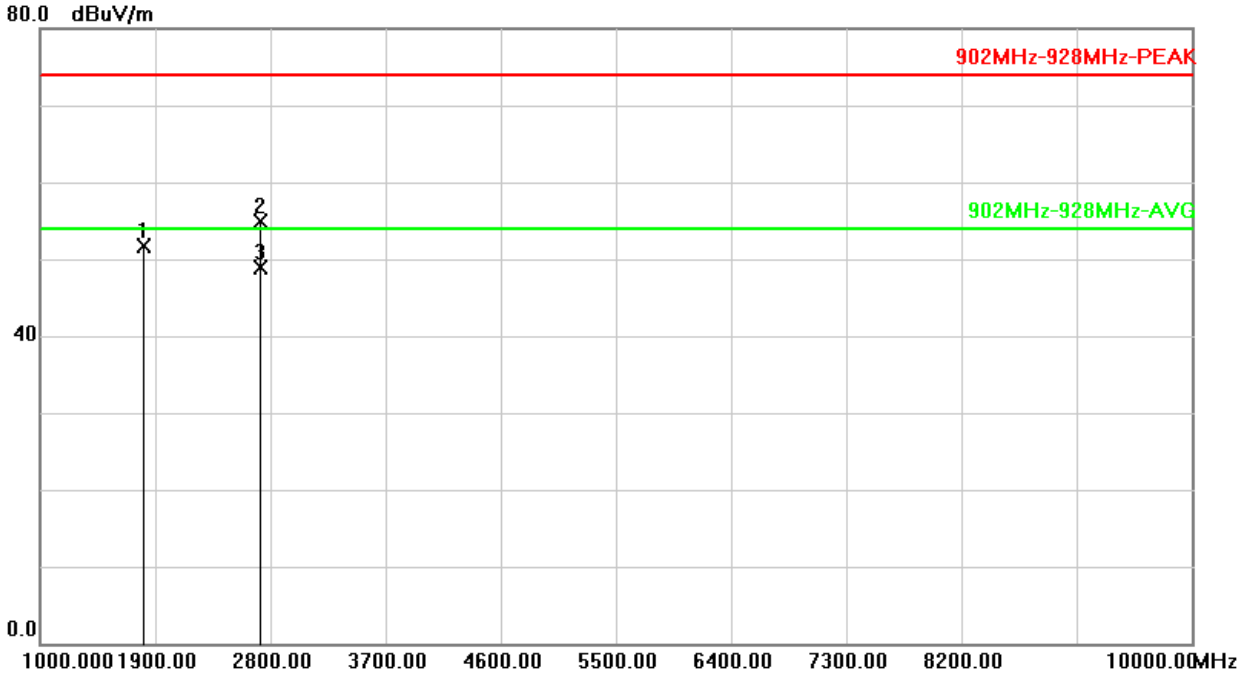
Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1815.600	8.71	43.40	52.11	74.00	-21.89	peak
2	2723.400	12.12	42.95	55.07	74.00	-18.93	peak
3	2723.400	12.12	37.96	50.08	54.00	-3.92	AVG

Power	DC 3.6V from battery	Pol/Phase	HORIZONTAL
Test Mode	Mode 1, 907.8MHz	Operation mode	TX

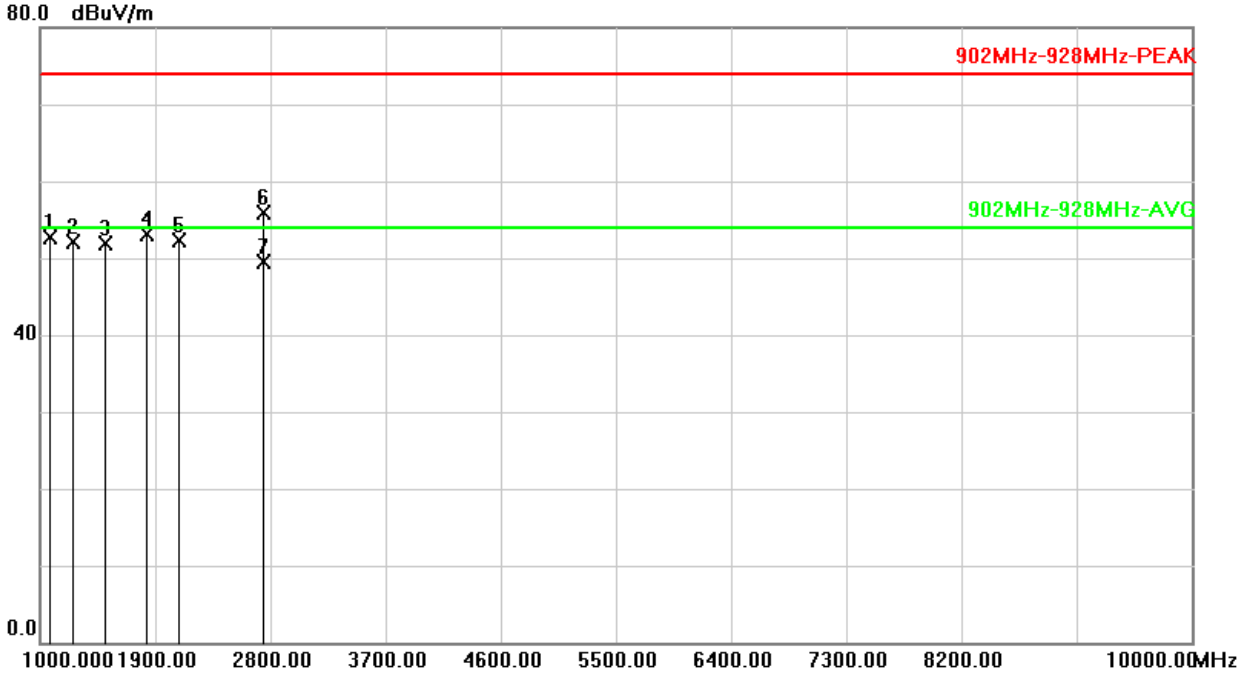
Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1815.600	8.71	43.05	51.76	74.00	-22.24	peak
2	2723.400	12.12	42.88	55.00	74.00	-19.00	peak
3	2723.400	12.12	36.85	48.97	54.00	-5.03	peak

Power	DC 3.6V from battery	Pol/Phase	VERTICAL
Test Mode	Mode 1, 914.2MHz	Operation mode	TX

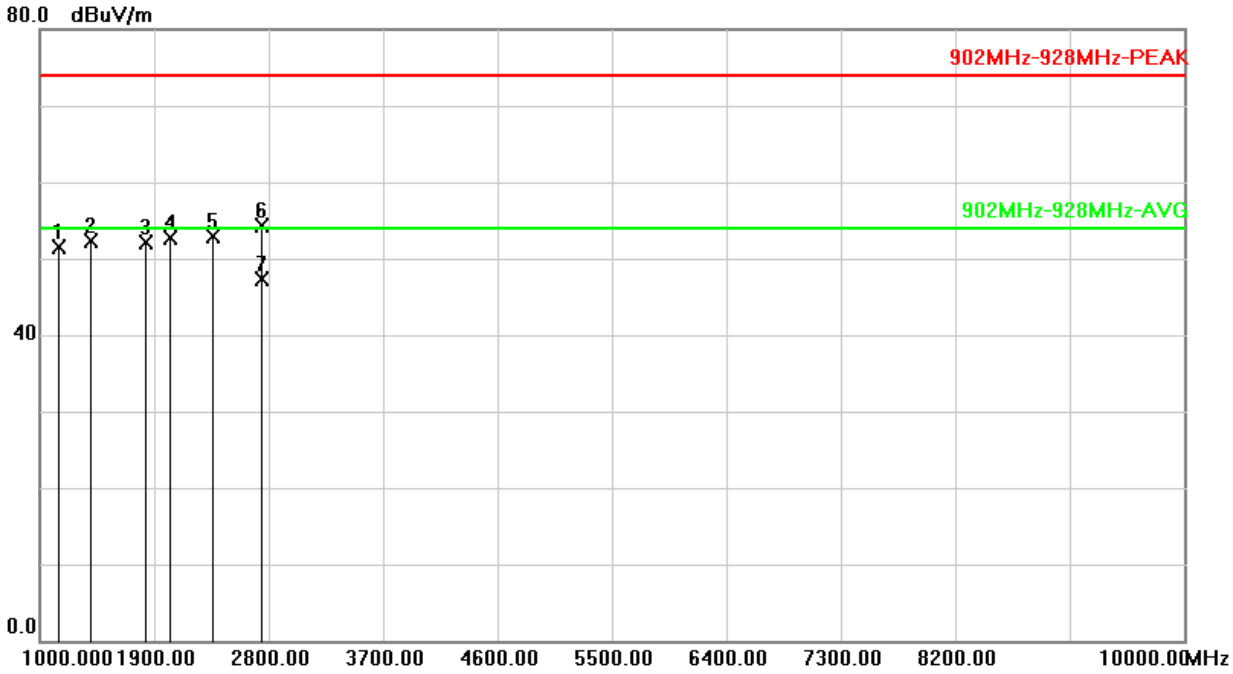
Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1081.000	8.41	44.26	52.67	74.00	-21.33	peak
2	1252.000	9.02	43.11	52.13	74.00	-21.87	peak
3	1504.000	8.88	42.99	51.87	74.00	-22.13	peak
4	1828.400	8.81	44.28	53.09	74.00	-20.91	peak
5	2089.000	10.47	41.92	52.39	74.00	-21.61	peak
6	2742.600	12.13	43.75	55.88	74.00	-18.12	peak
7	2742.600	12.13	37.45	49.58	54.00	-4.42	AVG

Power	DC 3.6V from battery	Pol/Phase	HORIZONTAL
Test Mode	Mode 1, 914.2MHz	Operation mode	TX

Note : Level = Reading + Factor
Margin = Level – Limit
Factor = Antenna Factor + Cable Loss – Amplifier Factor



No.	Frequency (MHz)	Factor (dB/m)	Reading (dBuV)	Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Det.
1	1144.000	8.67	42.77	51.44	74.00	-22.56	peak
2	1396.000	9.32	42.93	52.25	74.00	-21.75	peak
3	1828.400	8.81	43.30	52.11	74.00	-21.89	peak
4	2026.000	10.21	42.44	52.65	74.00	-21.35	peak
5	2359.000	11.53	41.38	52.91	74.00	-21.09	peak
6	2742.600	12.13	42.23	54.36	74.00	-19.64	peak

6. Maximum Peak Output Power

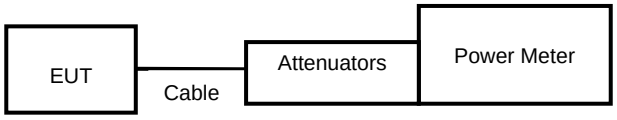
6.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

6.2 Test Procedures

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

6.3 Test Setup Layout



6.4 Test Result and Data

Modulation Type	Frequency (MHz)	Power Output (dBm)	Peak Power Output (mW)
Lora 500KHz (SF08)	903.0	4.952	3.128
	907.8	4.835	3.044
	914.2	4.754	2.988

---------- End of the report ----------