EMC TEST REPORT

Applicant:	Shenzhen Dragino technology development Co., LTD.
Address of Applicant:	Room 202, Block B, BaoChengTai industrial park, No.8 CaiYunRoad , LongCheng Street, LongGang District, Shenzhen 518116, China
Manufacturer/Factory:	Shenzhen Dragino technology development Co., LTD.
Address of Manufacturer/Factory:	Room 202, Block B, BaoChengTai industrial park, No.8 CaiYunRoad , LongCheng Street, LongGang District, Shenzhen 518116, China
Equipment Under Test (EUT)	
Product Name:	LoRaWAN Sensor Node
Model No.:	LSN50v2, LSN50v2-D20, LSN50v2-D22, LSN50v2-D23, CPL01, LDS03A, SW3L
Trademark:	Dragino
Applicable standards:	ETSI EN 301 489-1 V2.2.3 (2019-11) ETSI EN 301 489-3 V2.1.1 (2019-03)
Date of sample receipt:	Jun. 11, 2022
Date of Test:	Jun. 12, 2022 –Jun. 24, 2022
Date of report issue:	Jun. 27, 2022
Test Result :	PASS *

* In the configuration tested, the EUT complied with the standards specified above.

The CE mark as shown below can be used, under the responsibility of the manufacturer, after completion of an EC Declaration of Conformity and compliance with all relevant EC Directives. The protection requirements with respect to electromagnetic compatibility contained in Directive 2014/53/EU are considered.

David Zhong
Laboratory Manager

2 Version

Version No.	Date	Description
00	*Jun. 27, 2022*	*Original*

Prepared By: kyle Wang ***Date:*** *Jun. 27, 2022*

Project Engineer

Check By: ***Date:*** *Jun. 27, 2022*

Reviewer

3 Contents

Page

4 Test Summary

EMI Test				
Test Item	Test Requirement	Test Method	Application	Result
Radiated Emission	ETSI EN 301 489-3	ETSI EN301 489-1 clause 8.2	Enclosure	Pass
Conducted Emission	ETSI EN 301 489-3	ETSI EN301 489-1 clause 8.4	AC port	N/A
Harmonic Current Emissions	ETSI EN 301 489-3	ETSI EN301 489-1 clause 8.5	AC port	N/A
Voltage Fluctuations and Flicker	ETSI EN 301 489-3	ETSI EN301 489-1 clause 8.6	AC port	N/A
EMS Test				
ESD (Electrostatic Discharge)	ETSI EN 301 489-3	EN 61000-4-2	Enclosure	Pass
Radio frequency electromagnetic field (80 MHz to 6 000 MHz)	ETSI EN 301 489-3	EN 61000-4-3	Enclosure	Pass
EFT (Electrical Fast Transients	ETSI EN 301 489-3	EN 61000-4-4	AC port	N/A
Surge Immunity	ETSI EN 301 489-3	EN 61000-4-5	AC port	N/A
Radio frequency, common mode	ETSI EN 301 489-3	EN 61000-4-6	AC port	N/A
Voltage Dips and Interruptions	ETSI EN 301 489-3	EN 61000-4-11	AC port	N/A

Remark:
Pass: The EUT complies with the essential requirements in the standard.
N/A: Not applicable

5 General Information

5.1 General Description of EUT

Product Name:	LoRaWAN Sensor Node
Model No.:	LSN50v2, LSN50v2-D20, LSN50v2-D22, LSN50v2-D23, CPL01, LDS03A, SW3L
Test Model:	LSN50v2 for all test, and all models for radiated emission(below 1GHz) test
Model difference:	Only the temperature probe configuration, sensor type is not the same, the internal motherboard, structure, circuit is completely the same.
Trademark:	Dragino
Power supply:	Powered by one 3.6VDC, 3.8Ah non-rechargeable 18505 battery
Operation Frequency:	867.1MHz-868.8MHz (Declared by manufacturer)
Modulation type:	FSK
Antenna type:	Integral antenna
Antenna gain:	2dBi(Declared by manufacturer)

5.2 Operating Modes

Operating mode	Detail description
Operation mode:	Keep the EUT in operation mode

5.3 Description of Support Units

None.

5.4 Test Location

All tests were performed at:

Shenzhen CST Testing Co., Ltd
Address: Room 202-203, Floor 2st, Building B, Baoan Zhigu Technology Park, Xixiang Street, Baoan District, Shenzhen, China. 518101
Tel: 0755-27907627
Fax: 0755-27907627

5.5 Deviation from Standards

None.

5.6 Abnormalities from Standard Conditions

None.

5.7 Other Information Requested by the Customer

None.

6 Equipment Used during Test

Radiated Emission:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	3m Semi- Anechoic Chamber	ZhongYu Electron	9.2(L)*6.2(W)* 6.4(H)	CST250	Oct. 15, 2021	Oct. 14, 2026
2	Control Room	ZhongYu Electron	6.2(L)*2.5(W)* 2.4(H)	CST251	N/A	N/A
3	EMI Test Receiver	Rohde & Schwarz	ESU26	CST203	Oct. 15, 2021	Oct. 14, 2022
4	BiConiLog Antenna	SCHWARZBECK MESS-ELEKTRONIK	VULB9163	CST214	Oct. 15, 2021	Oct. 14, 2022
5	Double -ridged waveguide horn	SCHWARZBECK MESS-ELEKTRONIK	BBHA 9120 D	CST208	Oct. 15, 2021	Oct. 14, 2022
6	Horn Antenna	ETS-LINDGREN	3160	CST217	Oct. 15, 2021	Oct. 14, 2022
7	EMI Test Software	AUDIX	E3	N/A	N/A	N/A
8	Coaxial Cable	CST	N/A	CST213	Oct. 15, 2021	Oct. 14, 2022
9	Coaxial Cable	CST	N/A	CST211	Oct. 15, 2021	Oct. 14, 2022
10	Coaxial cable	CST	N/A	CST210	Oct. 15, 2021	Oct. 14, 2022
11	Coaxial Cable	CST	N/A	CST212	Oct. 15, 2021	Oct. 14, 2022
12	Amplifier(100kHz-3GHz)	HP	8347A	CST204	Oct. 15, 2021	Oct. 14, 2022
13	Amplifier(2GHz-20GHz)	HP	84722A	CST206	Oct. 15, 2021	Oct. 14, 2022
14	Amplifier (18-26GHz)	Rohde & Schwarz	AFS33-18002 650-30-8P-44	CST218	Oct. 15, 2021	Oct. 14, 2022
15	Band filter	Amindeon	82346	CST219	Oct. 15, 2021	Oct. 14, 2022
16	Power Meter	Anritsu	ML2495A	CST540	Oct. 15, 2021	Oct. 14, 2022
17	Power Sensor	Anritsu	MA2411B	CST541	Oct. 15, 2021	Oct. 14, 2022
18	Wideband Radio Communication Tester	Rohde & Schwarz	CMW500	CST575	Oct. 15, 2021	Oct. 14, 2022
19	Splitter	Agilent	11636B	CST237	Oct. 15, 2021	Oct. 14, 2022
20	Loop Antenna	ZHINAN	ZN30900A	CST534	Oct. 15, 2021	Oct. 14, 2022
21	Breitband hornantenne	SCHWARZBECK	BBHA 9170	CST579	Oct. 18, 2021	Oct. 17, 2022
22	Amplifier	TDK	PA-02-02	CST574	Oct. 18, 2021	Oct. 17, 2022
23	Amplifier	TDK	PA-02-03	CST576	Oct. 18, 2021	Oct. 17, 2022
24	PSA Series Spectrum Analyzer	Rohde & Schwarz	FSP	CST578	Oct. 15, 2021	Oct. 14, 2022

ESD						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	ESD Simulator	KIKUSUI	KES4021A	CST242	Oct. 15, 2021	Oct. 14, 2022
2	Thermo meter	KTJ	TA328	CST243	Oct. 15, 2021	Oct. 14, 2022

Radiated Immunity						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Fully-Anechoic Chamber 2	Chang Zhou Zhong Shuo	854	SEM001-05	2020-05-09	2023-05-08
2	Power Sensor	Rohde & Schwarz	NRP-Z91	SEM009-09	2022-03-31	2023-03-30
3	Stacked Log.-Per.-Broadband Antenna (70MHz-10GHz)	Schwarzbeck	STLP 9129	SEM003-25	N/A	N/A
4	Signal Generator (9kHz-6GHz)	Rohde & Schwarz	SMB100A	SEM006-11	2022-03-31	2023-03-30
5	Broadband Amplifier (80MHz-1GHz)	Rohde & Schwarz	BBA150-BC250	SEM005-12	2022-03-31	2023-03-30
6	Broadband Amplifier(800MHz-3GHz)	Rohde & Schwarz	BBA150-D110	SEM005-13	2022-03-31	2023-03-30
7	Broadband Amplifier(2.5GHz-6GHz)	Rohde & Schwarz	BBA150-E60	SEM005-16	2022-03-31	2023-03-30
8	Measurement Software	Rohde & Schwarz	EMC32 V9.25.00	N/A	N/A	N/A

General used equipment:						
Item	**Test Equipment**	**Manufacturer**	**Model No.**	**Inventory No.**	**Cal.Date (mm-dd-yy)**	**Cal.Due date (mm-dd-yy)**
1	Humidity/ Temperature Indicator	KTJ	TA328	CST243	2022-03-31	2023-03-30
2	Barometer	ChangChun	DYM3	CST255	2022-03-31	2023-03-30

7 EMC Requirements Specification in ETSI EN 301 489-3

7.1 EMI (Emission)

7.1.1 Radiated Emission

Test Requirement:	ETSI EN 301 489-3
Test Method:	ETSI EN 301 489-1 and EN 55032
Test Frequency Range:	30MHz to 6GHz
Test site:	Measurement Distance: 3m

Receiver setup:

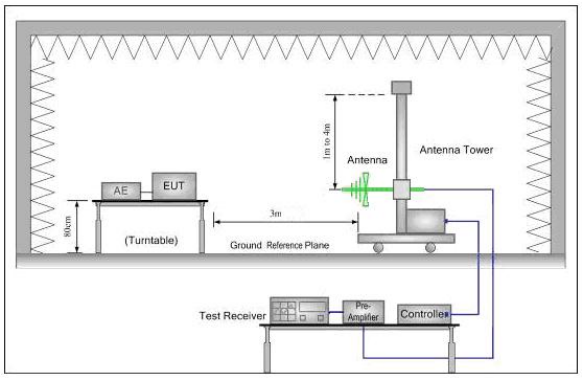
Frequency	Detector	RBW	VBW	Remark
30MHz-1GHz	Quasi-peak	120kHz	300kHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	AV	1MHz	3MHz	Average Value

Limit:

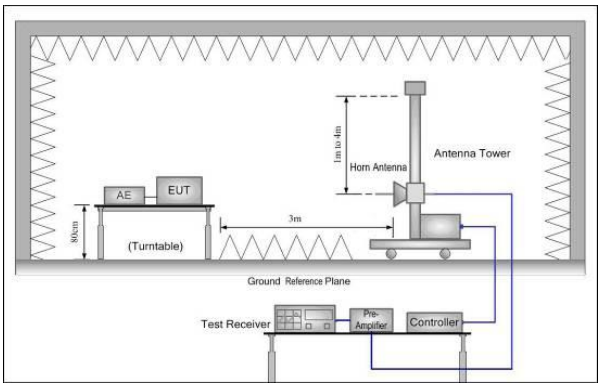
Frequency	Limit (dBuV/m @3m)	Remark
30MHz-230MHz	40.00	Quasi-peak Value
230MHz-1GHz	47.00	Quasi-peak Value
1GHz-3GHz	50.00	Average Value
	70.00	Peak Value
3GHz-6GHz	54.00	Average Value
	74.00	Peak Value

Test setup:

Below 1GHz

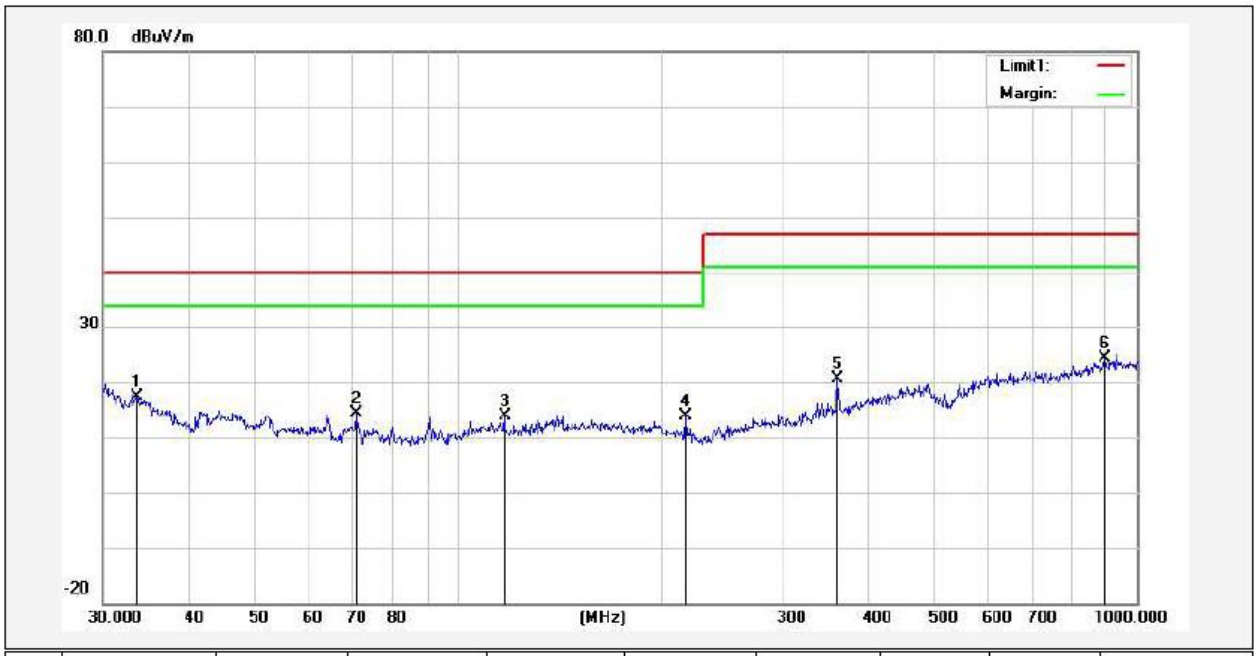


Above 1GHz



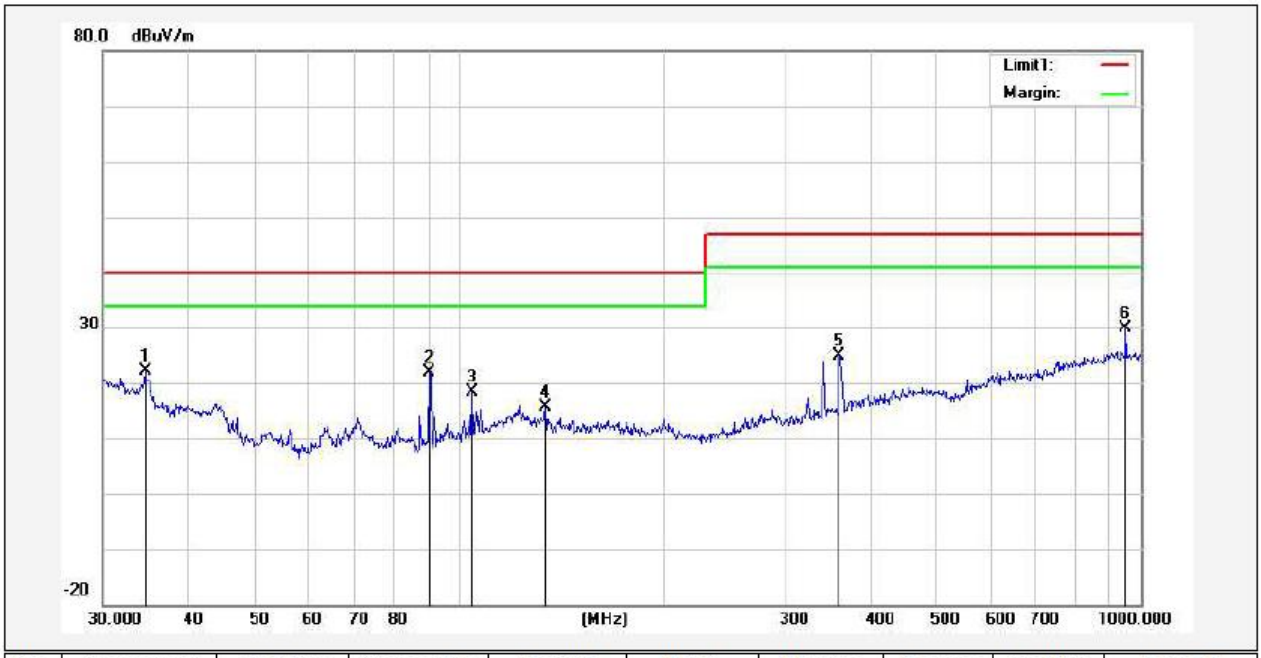
Test Procedure:	■ **From 30MHz to 1GHz:** 1. The radiated emissions test was conducted in a semi-anechoic chamber. 2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation. 3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emissions spectrum plots of the EUT. 4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization. ■ **Above 1GHz:** 1. The radiated emissions test was conducted in a fully-anechoic chamber. 2. The tabletop EUT was placed upon a non-metallic table 0.8m above the ground reference plane. And for floor-standing arrangement, the EUT was placed on the horizontal ground reference plane, but separated from metallic contact with the ground reference plane by 0.1m of insulation. 3. Before final measurements of radiated emissions, a pre-scan was performed in the spectrum mode with the peak detector to find out the maximum emission spectrum plots of the EUT. 4. The frequencies of maximum emission were determined in the final radiated emissions measurement. At each frequency, the EUT was rotated 360°, and the antenna was raised and lowered from 1 to 4 meters in order to determine the maximum disturbance. Measurements were performed for both horizontal and vertical antenna polarization.
Test environment:	Temp.: 25 °C Humid.: 50% Press.: 1 010mbar
Measurement Record:	Uncertainty: 3.8039dB （30MHz-200MHz） 3.9679dB （200MHz-1GHz） 4.29dB（1GHz-18GHz）
Test Instruments:	Refer to section 6.0 for details
Test mode:	Refer to section 5.2 for details and only show the worst mode.
Test results:	Pass

Measurement Data
Operation mode
Below 1GHz
LSN50v2:
Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	33.5623	27.07	-9.79	17.28	40.00	-22.72			peak
2	70.5836	35.00	-20.67	14.33	40.00	-25.67			peak
3	116.9495	30.58	-16.64	13.94	40.00	-26.06			peak
4	216.0240	31.12	-17.28	13.84	40.00	-26.16			peak
5	361.7140	34.46	-13.91	20.55	47.00	-26.45			peak
6*	893.8567	29.65	-5.32	24.33	47.00	-22.67			peak

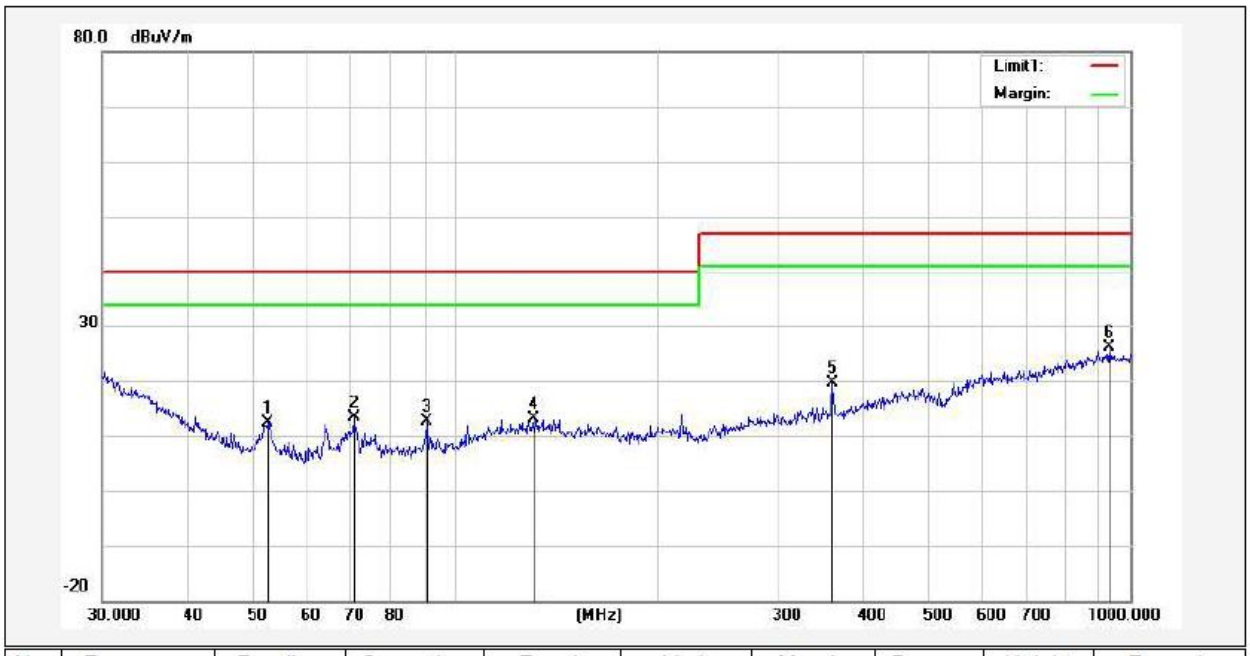
Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	34.5172	32.74	-10.50	22.24	40.00	-17.76			peak
2	90.2205	42.51	-20.71	21.80	40.00	-18.20			peak
3	104.1701	36.79	-18.37	18.42	40.00	-21.58			peak
4	133.6186	31.55	-16.01	15.54	40.00	-24.46			peak
5	360.4476	38.81	-13.92	24.89	47.00	-22.11			peak
6*	948.7610	35.07	-5.20	29.87	47.00	-17.13			peak

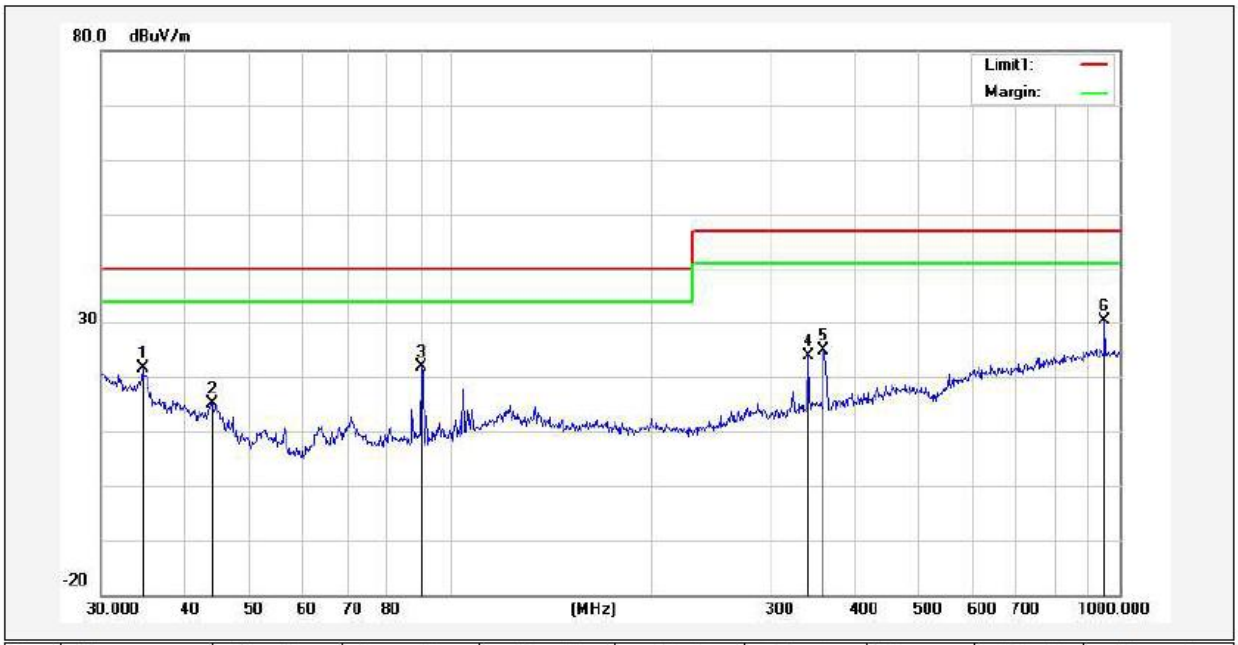
Note： Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

LSN50v2-D20
Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	52.5753	33.15	-20.70	12.45	40.00	-27.55			peak
2	70.5836	34.00	-20.67	13.33	40.00	-26.67			peak
3	90.5374	33.24	-20.66	12.58	40.00	-27.42			peak
4	130.3790	29.04	-15.98	13.06	40.00	-26.94			peak
5	361.7140	33.46	-13.91	19.55	47.00	-27.45			peak
6*	929.0082	31.11	-5.08	26.03	47.00	-20.97			peak

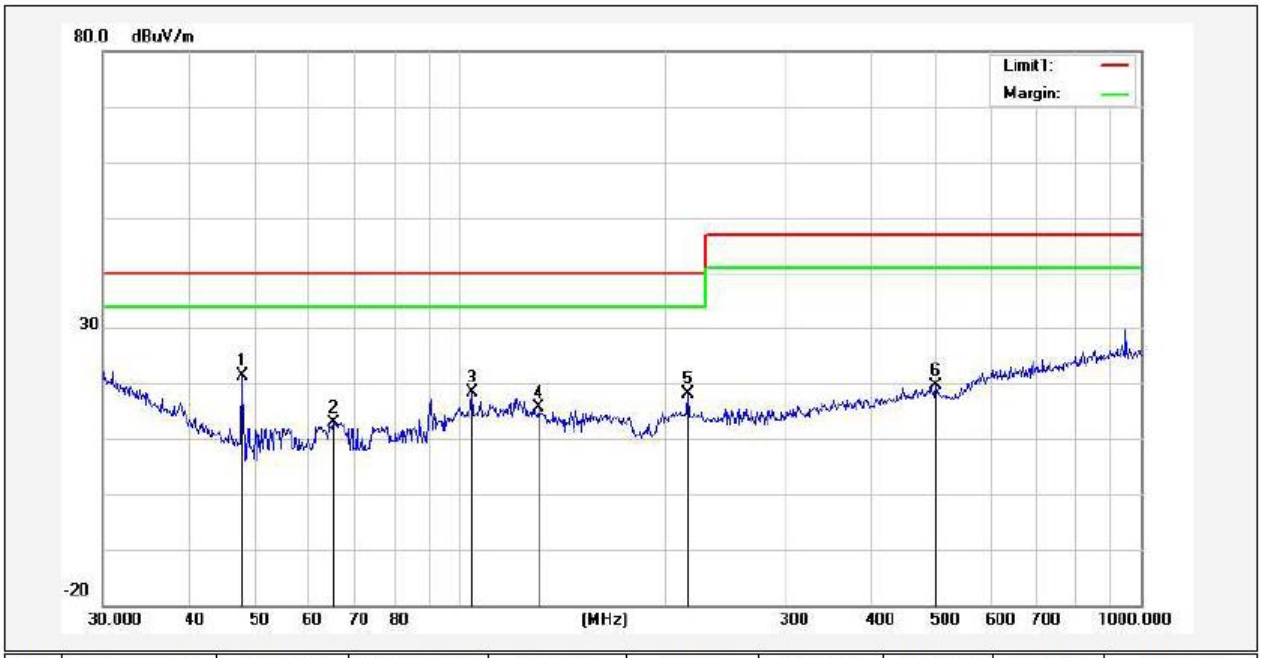
Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	34.5173	32.24	-10.50	21.74	40.00	-18.26			peak
2	43.8120	32.53	-17.38	15.15	40.00	-24.85			peak
3	90.2205	42.51	-20.71	21.80	40.00	-18.20			peak
4	341.9786	38.18	-14.23	23.95	47.00	-23.05			peak
5	360.4476	38.81	-13.92	24.89	47.00	-22.11			peak
6*	948.7610	35.57	-5.20	30.37	47.00	-16.63			peak

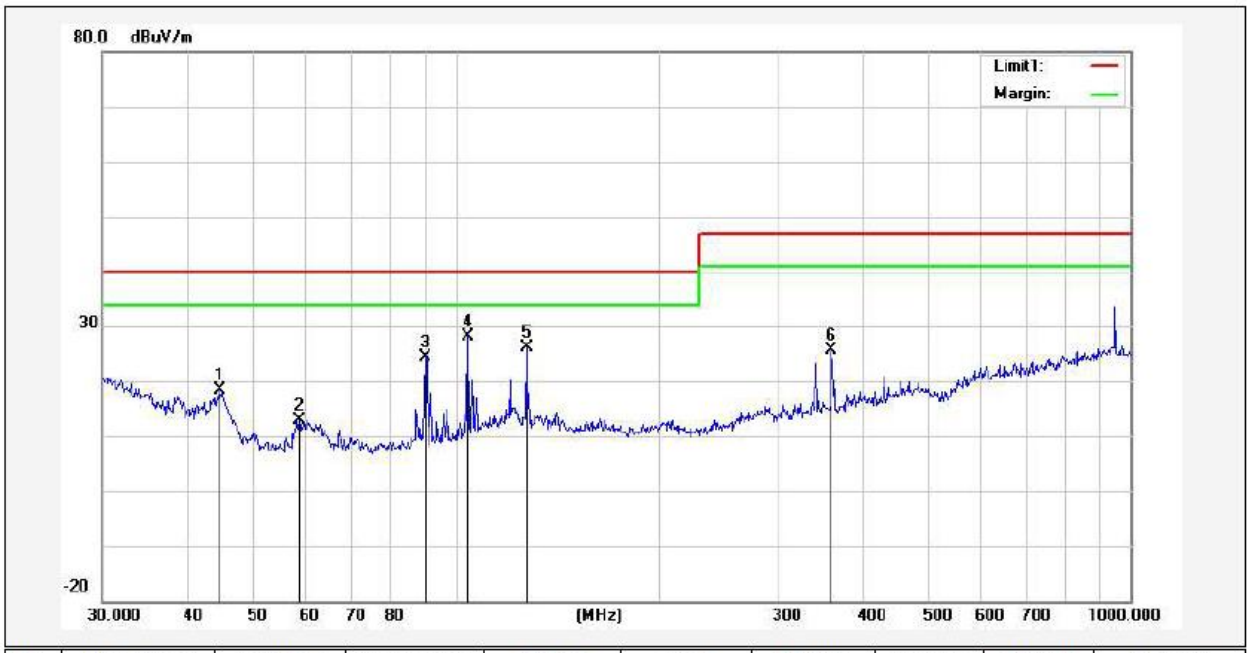
Note： Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

LSN50v2-D22
Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1*	47.9940	40.06	-18.80	21.26	40.00	-18.74			peak
2	65.3432	33.29	-20.48	12.81	40.00	-27.19			peak
3	104.1701	35.78	-17.37	18.41	40.00	-21.59			peak
4	130.3789	30.41	-14.85	15.56	40.00	-24.44			peak
5	216.0240	33.80	-15.76	18.04	40.00	-21.96			peak
6	499.4247	28.88	-9.26	19.62	47.00	-27.38			peak

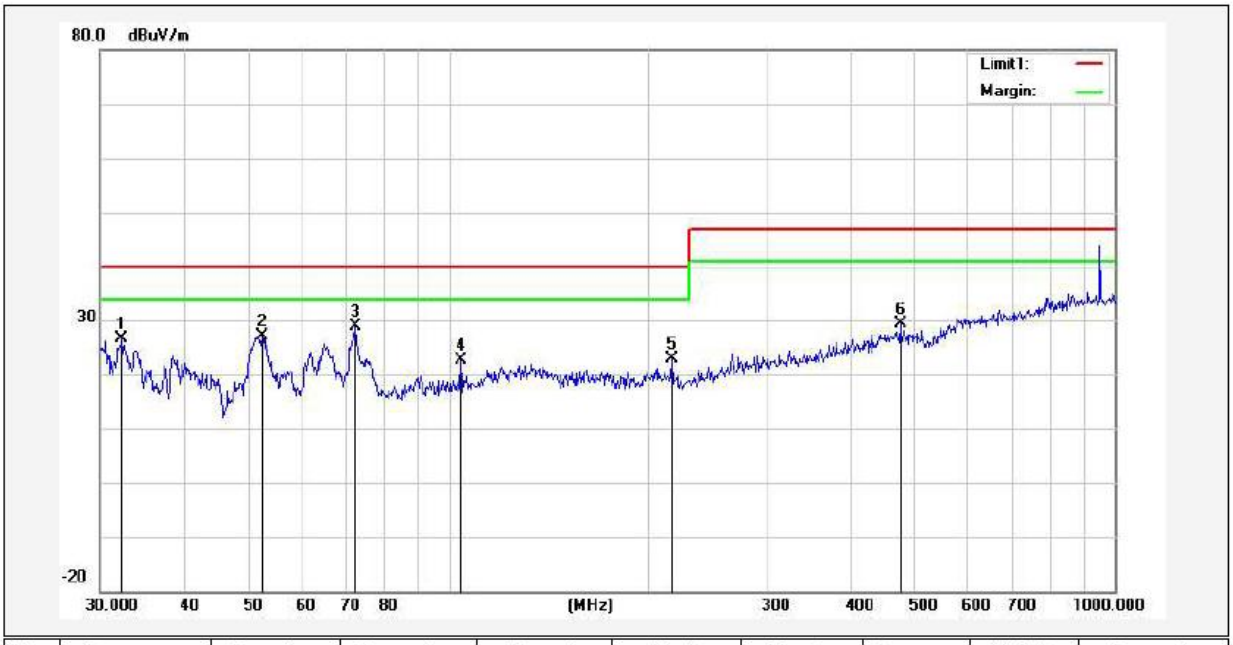
Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	44.7434	35.80	-17.35	18.45	40.00	-21.55			peak
2	58.6126	33.94	-20.95	12.99	40.00	-27.01			peak
3	90.2205	44.28	-19.78	24.50	40.00	-15.50			peak
4*	104.1701	45.48	-17.37	28.11	40.00	-11.89			peak
5	127.2176	41.03	-14.96	26.07	40.00	-13.93			peak
6	360.4477	37.62	-11.87	25.75	47.00	-21.25			peak

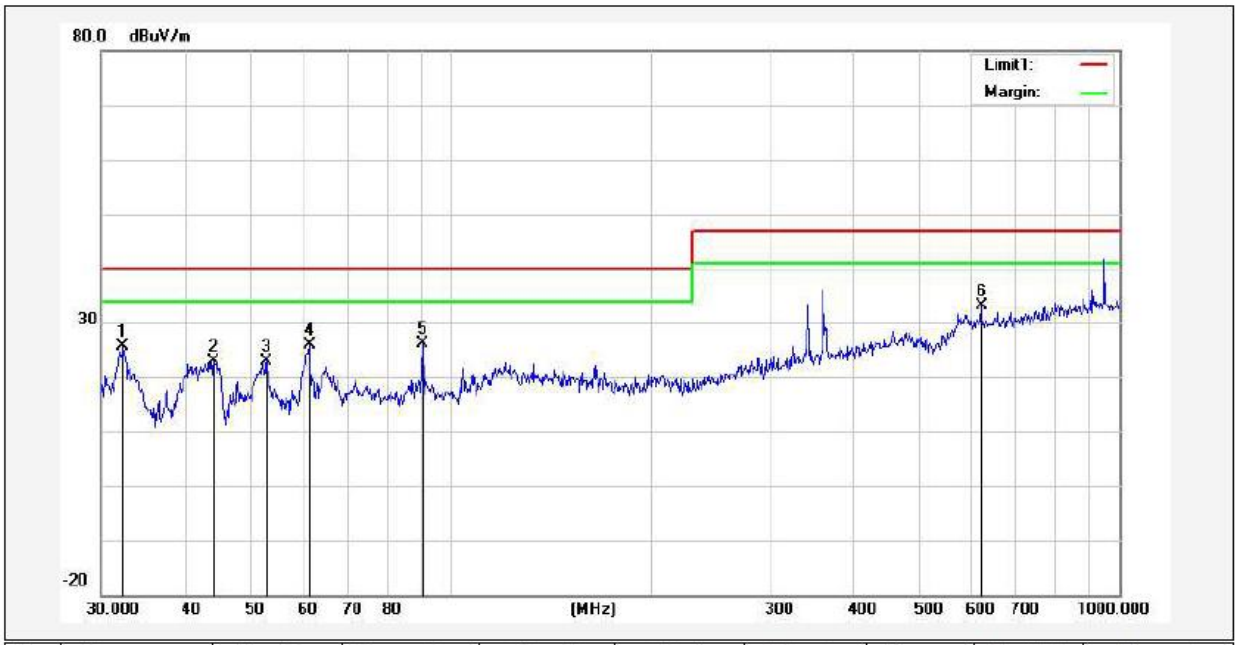
Note： Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

LSN50v2-D23
Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	32.2924	35.45	-8.83	26.62	40.00	-13.38			peak
2	52.3912	47.88	-20.68	27.20	40.00	-12.80			peak
3*	72.3375	49.54	-20.70	28.84	40.00	-11.16			peak
4	104.1701	41.03	-18.37	22.66	40.00	-17.34			peak
5	216.0240	40.21	-17.28	22.93	40.00	-17.07			peak
6	475.4990	40.77	-11.29	29.48	47.00	-17.52			peak

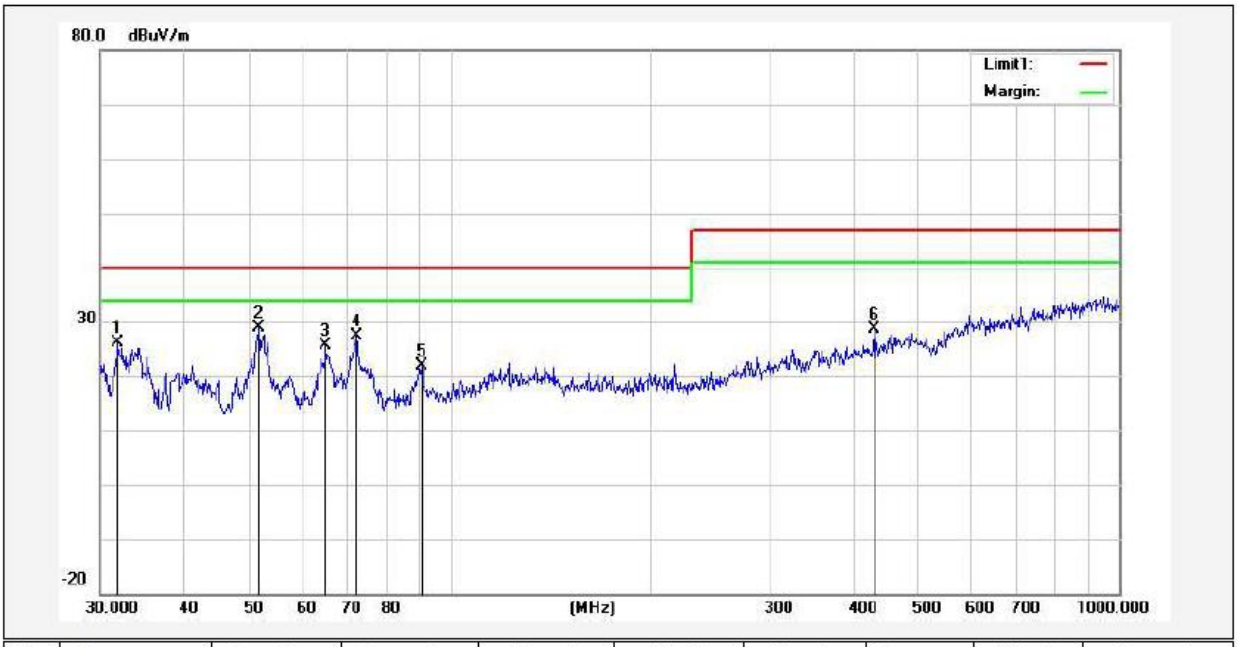
Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	32.2924	34.51	-8.83	25.68	40.00	-14.32			peak
2	44.1200	40.36	-17.57	22.79	40.00	-17.21			peak
3	52.9453	43.73	-20.76	22.97	40.00	-17.03			peak
4	61.3462	47.70	-21.75	25.95	40.00	-14.05			peak
5	90.5374	46.72	-20.66	26.06	40.00	-13.94			peak
6*	620.7096	42.09	-9.00	33.09	47.00	-13.91			peak

Note： Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

CPL01
Horizontal:



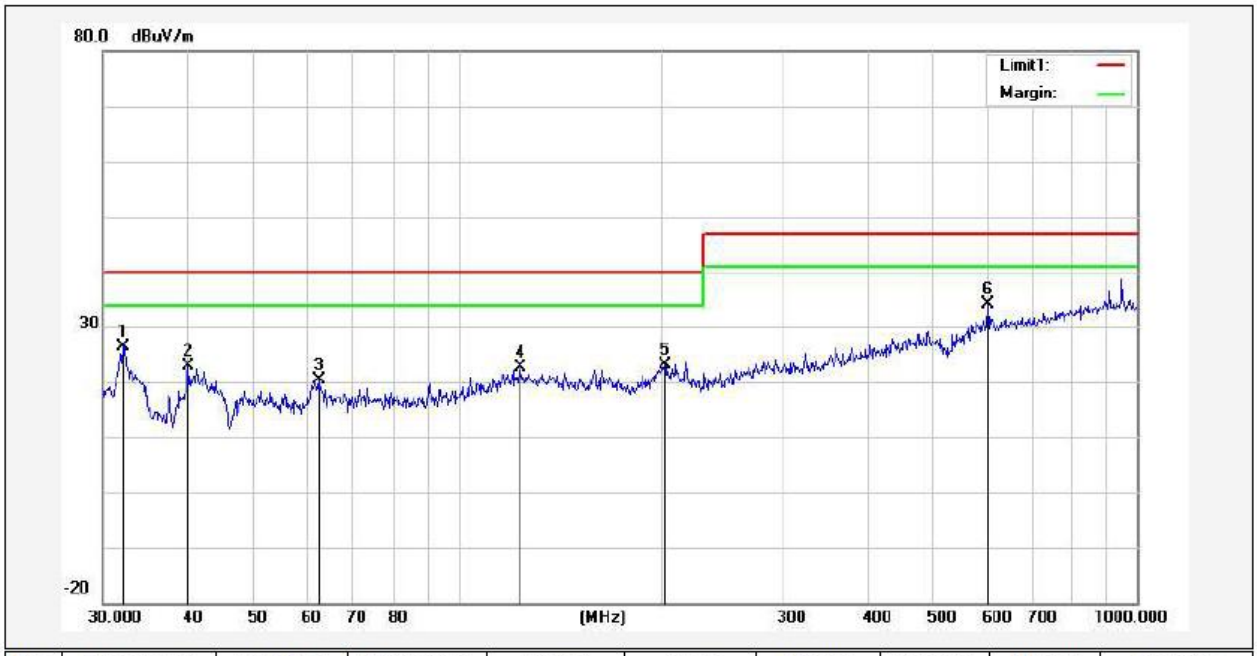
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	31.8427	34.60	-8.49	26.11	40.00	-13.89			peak
2*	51.6616	49.36	-20.55	28.81	40.00	-11.19			peak
3	65.1145	47.01	-21.28	25.73	40.00	-14.27			peak
4	72.3376	48.17	-20.70	27.47	40.00	-12.53			peak
5	90.5374	42.47	-20.66	21.81	40.00	-18.19			peak
6	429.5228	41.37	-12.73	28.64	47.00	-18.36			peak

Vertical:

No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	32.1794	34.40	-8.75	25.65	40.00	-14.35			peak
2	40.9881	45.25	-15.64	29.61	40.00	-10.39			peak
3*	90.5374	54.03	-20.66	33.37	40.00	-6.63			peak
4	104.1701	49.37	-18.37	31.00	40.00	-9.00			peak
5	360.4476	49.29	-13.92	35.37	47.00	-11.63			peak
6	948.7610	42.46	-5.20	37.26	47.00	-9.74			peak

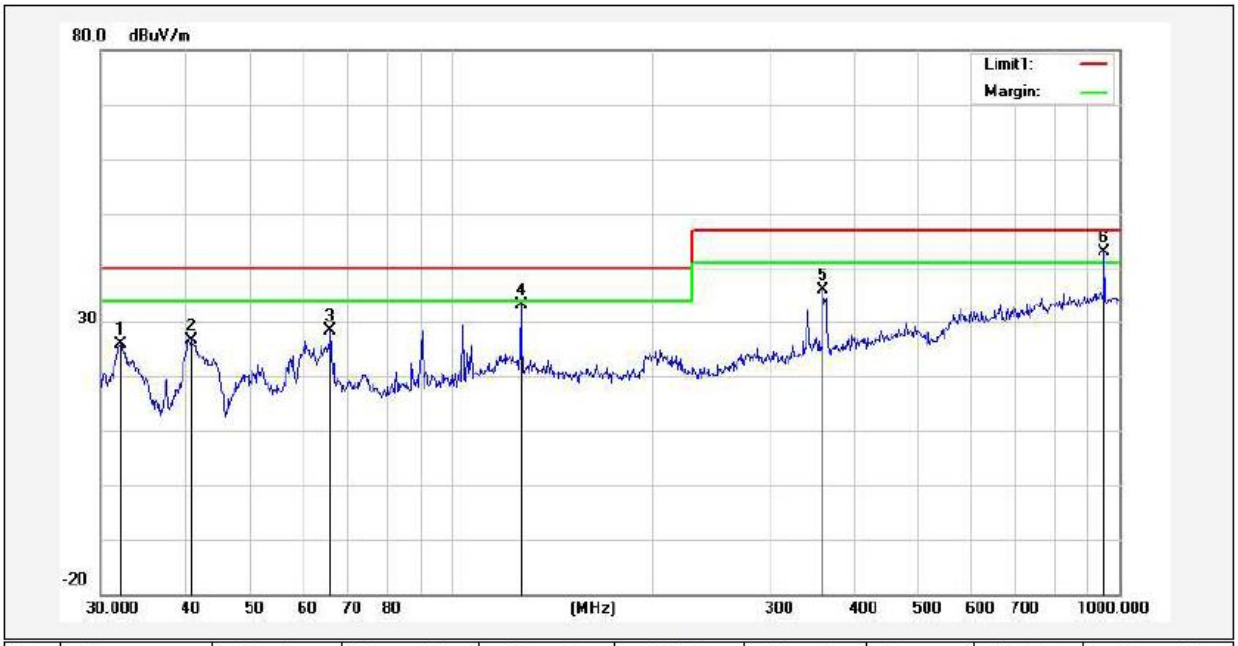
Note： Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

LDS03A
Horizontal:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	32.0668	37.18	-10.86	26.32	40.00	-13.68			peak
2	39.9942	37.86	-15.07	22.79	40.00	-17.21			peak
3	62.2128	41.15	-20.88	20.27	40.00	-19.73			peak
4	123.2655	37.64	-15.11	22.53	40.00	-17.47			peak
5	201.3930	38.17	-15.01	23.16	40.00	-16.84			peak
6*	601.4265	40.40	-6.31	34.09	47.00	-12.91			peak

Vertical:



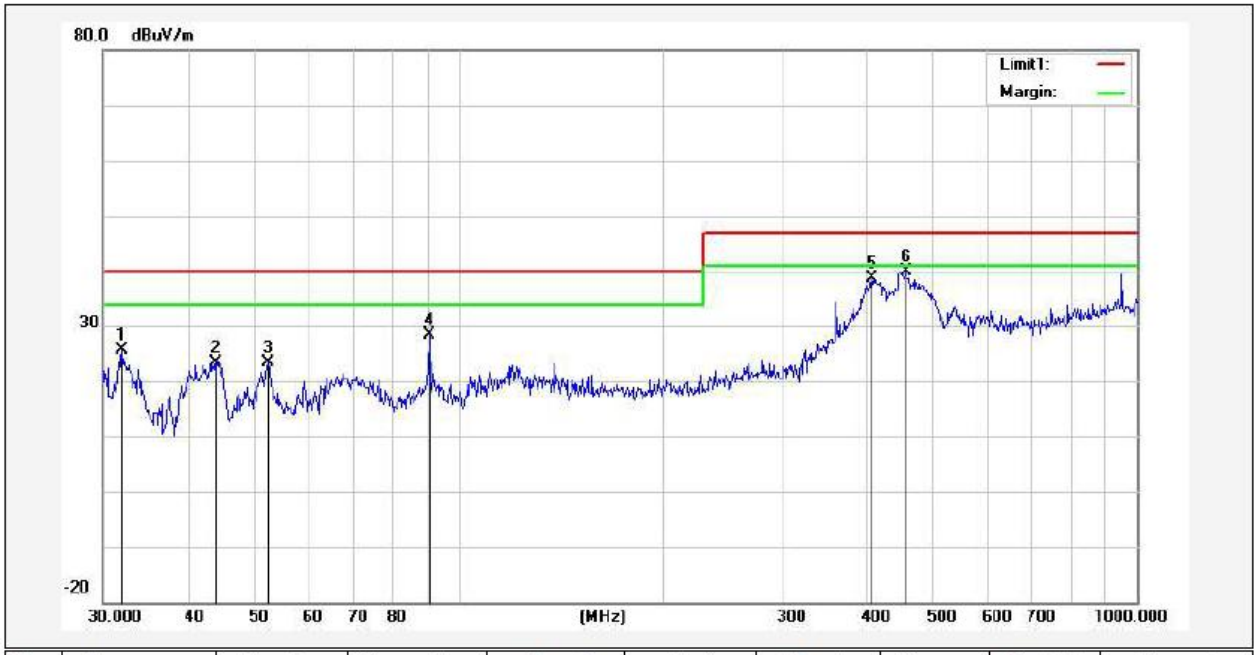
No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	32.0667	34.64	-8.66	25.98	40.00	-14.02			peak
2	40.8445	42.25	-15.55	26.70	40.00	-13.30			peak
3	66.0341	49.44	-21.16	28.28	40.00	-11.72			peak
4	127.2176	49.08	-16.07	33.01	40.00	-6.99			peak
5	360.4476	49.72	-13.92	35.80	47.00	-11.20			peak
6*	948.7610	48.16	-5.20	42.96	47.00	-4.04			peak

Note： Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

SW3L
Horizontal:

No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	31.9545	35.05	-8.58	26.47	40.00	-13.53			peak
2	52.3912	48.93	-20.68	28.25	40.00	-11.75			peak
3	72.5916	45.47	-20.69	24.78	40.00	-15.22			peak
4	307.8312	49.85	-14.74	35.11	47.00	-11.89			peak
5*	406.0880	49.68	-12.91	36.77	47.00	-10.23			peak
6	884.5028	39.58	-5.65	33.93	47.00	-13.07			peak

Vertical:



No.	Frequency (MHz)	Reading (dBuV)	Correction factor(dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Degree (deg.)	Height (cm)	Remark
1	31.9546	34.15	-8.58	25.57	40.00	-14.43			peak
2	43.9658	40.84	-17.48	23.36	40.00	-16.64			peak
3	52.3912	44.04	-20.68	23.36	40.00	-16.64			peak
4	90.5374	49.01	-20.66	28.35	40.00	-11.65			peak
5	406.0880	51.60	-12.91	38.69	47.00	-8.31			peak
6*	455.9058	51.62	-11.71	39.91	47.00	-7.09			peak

Note： Factor=Antenna Factor+ Cable loss, Margin=Measurement-Limit.

Above 1GHz

Peak measurement

Frequency (MHz)	Read Level (dBuV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Level (dBuV/m)	Limit Line (dBuV/m)	Over Limit (dB)	Polarity
1092.00	48.42	24.75	4.38	32.92	44.63	70	-25.37	Vertical
1914.00	47.62	25.75	4.91	34.29	43.99	70	-26.01	Vertical
2947.00	43.38	28.43	5.88	33.39	44.30	70	-25.70	Vertical
3828.00	38.67	29.4	7.58	32.38	43.27	74	-30.73	Vertical
4925.00	35.79	31.89	8.69	32.14	44.23	74	-29.77	Vertical
5885.00	35.36	32.74	10.04	32.2	45.94	74	-28.06	Vertical
1285.00	46.92	25.6	4.53	33.24	43.81	70	-26.19	Horizontal
1763.00	47.07	25.25	4.85	34.08	43.09	70	-26.91	Horizontal
2745.00	42.74	28.23	5.7	33.63	43.04	70	-26.96	Horizontal
3672.00	39.08	29.21	7.28	32.56	43.01	74	-30.99	Horizontal
4755.00	36.00	31.71	8.55	32.06	44.20	74	-29.80	Horizontal
5710.00	35.53	32.5	9.81	32.3	45.54	74	-28.46	Horizontal

Notes:

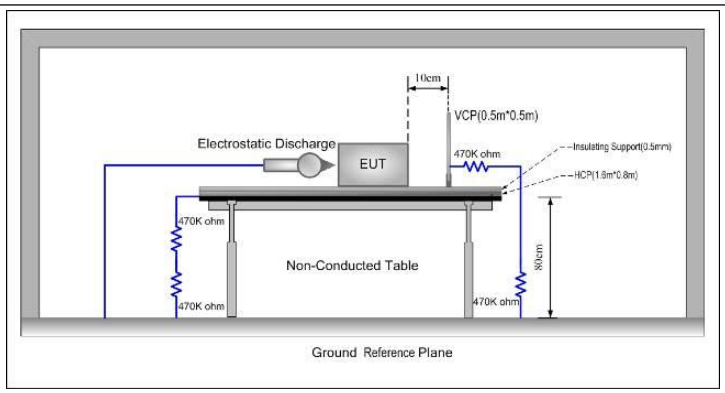
1. *The EUT was test at 3m in field chamber.*
2. *Final Level =Receiver Read level + Antenna Factor + Cable Loss – Preamplifier Factor*

7.2 Immunity

Performance Criteria of ETSI EN 301 489-1, clause 6	
6.0 Introduction	The performance criteria are used to take a decision on whether a radio equipment passes or fails immunity tests. For the purpose of the present document two categories of performance criteria apply: •Performance criteria for continuous phenomena. •Performance criteria for transient phenomena. NOTE: Normally, the performance criteria depends upon the type of radio equipment and/or its intended application. Thus, the present document only contains general performance criteria commonly used for the assessment of radio equipment.
6.1Performance criteria for continuous phenomena	During the test, the equipment shall: •continue to operate as intended; •not unintentionally transmit; •not unintentionally change its operating state; •not unintentionally change critical stored data.
6.2 Performance criteria for transient phenomena	For all ports and transient phenomena with the exception described below, the following applies: •The application of the transient phenomena shall not result in a change of the mode of operation (e.g. unintended transmission) or the loss of critical stored data. •After application of the transient phenomena, the equipment shall operate as intended. For surges applied to symmetrically operated wired network ports intended to be connected directly to outdoor lines the following criteria applies: •For products with only one symmetrical port intended for connection to outdoor lines, loss of function isallowed, provided the function is self-recoverable, or can be otherwise restored. Information stored in non-volatile memory, or protected by a battery backup, shall not be lost. •For products with more than one symmetrical port intended for connection to outdoor lines, loss of function onthe port under test is allowed, provided the function is self-recoverable. Information stored in non-volatilememory, or protected by a battery backup, shall not be lost.

Performance Criteria of ETSI EN 301 489-3, clause 6		
Criteria	During Test	After Test
A	Operate as intended No loss of function No unintentional responses	Operate as intended No loss of function No degradation of performance No loss of stored data or user programmable functions
B	May show loss of function No unintentional responses	Operate as intended Lost function(s) shall be self-recoverable No degradation of performance No loss of stored data or user programmable functions

7.2.1 Electrostatic Discharge

Test Requirement:	ETSI EN 301489-3
Test Method:	EN 61000-4-2
Discharge Voltage:	Contact Discharge:±4kV Air Discharge: ±2kV, ±4kV, ±8kV HCP/VCP: ±4kV
Polarity:	Positive & Negative
Number of Discharge:	Contact Discharge: Minimum 10 times at each test point, Air Discharge: Minimum 10 times at each test point.
Discharge Mode:	Single Discharge
Discharge Period:	1 second minimum
Limit:	Criteria B
Test setup:	
Test Procedure:	**Air discharge:** 1. The test was applied on non-conductive surfaces of EUT. 2. The round discharge tip of the discharge electrode was approached as fast as possible to touch the EUT. 3. After each discharge, the discharge electrode was removed from the EUT. 4. The generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. 5. This procedure was repeated until all the air discharge completed **Contact Discharge:** 1. The test was applied on conductive surfaces of EUT. 2. the generator was re-triggered for a new single discharge and repeated 10 times for each pre-selected test point. 3. the tip of the discharge electrode was touch the EUT before the discharge switch was operated. **Indirect discharge for horizontal coupling plane** 1. At least 10 single discharges shall be applied at the front edge of each HCP opposite the centre point of each unit of the EUT and 0.1m from the front of the EUT. 2. The long axis of the discharge electrode shall be in the plane of the HCP and perpendicular to its front edge during the discharge.

	3. Consideration should be given to exposing all sides of the EUT. **Indirect discharge for vertical coupling plane** 1. At least 10 single discharges were applied to the center of one vertical edge of the coupling plane. 2. The coupling plane, of dimensions 0.5m X 0.5m, was placed parallel to, and positioned at a distance of 0.1m from the EUT. 3. Discharges were applied to the coupling plane, with this plane in sufficient different positions that the four faces of the EUT are completely illuminated.					
Test environment:	Temp.:	24 °C	Humid.:	51%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					
Test mode:	Refer to section 5.2 for details					
Test results:	Pass					

Measurement Record:

Test points:	I: Screws
	II: All plastic seam

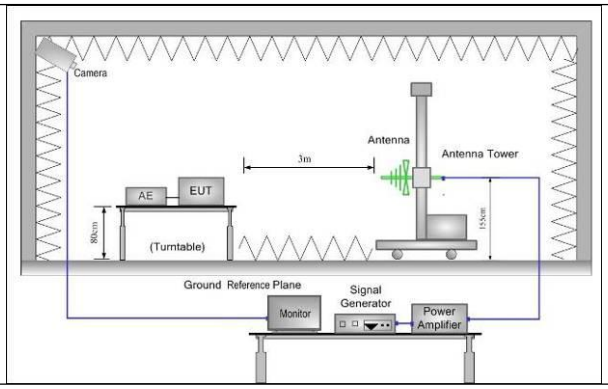
Direct discharge				
Discharge Voltage (KV)	**Type of discharge**	**Test points**	**Observations Performance**	**Result**
± 4	Contact	I	A	Pass
± 2, ± 4, ± 8	Air	II	A	Pass

Indirect discharge				
Discharge Voltage (KV)	**Type of discharge**	**Test points**	**Observation Performance**	**Result**
± 4	HCP-Bottom/Top/ Front/Back/Left/Right	Edge of the HCP	A	Pass
± 4	VCP-Front/Back /Left/Right	Center of the VCP	A	Pass

Remark:

A: Normal performance within the specification limits.

7.2.2 Radiated Immunity

Test Requirement:	ETSI EN 301489-3
Test Method:	EN 61000-4-3
Frequency range:	80MHz to 6GHz
Test Level:	3V/m
Modulation:	80%, 1kHz Amplitude Modulation
Performance Criterion:	Criteria A
Test setup:	
Test Procedure:	1. For table-top equipment, the EUT was placed in the chamber on a non-conductive table 0.8m high. For arrangement of floor-standing equipment, the EUT was mounted on a non-conductive support 0.1m above the supporting plane. For human body-mounted equipment, the EUT may be tested in the same manner as table top items. 2. If possible, a minimum of 1 m of cable is exposed to the electromagnetic field. Excess length of cables interconnecting units of the EUT shall be bundled low-inductively in the approximate center of the cable to form a bundle 30 cm to 40 cm in length. 3. The EUT was initially placed with one face coincident with the calibration plane. The EUT face being illuminated was contained within the UFA (Uniform Field Area). 4. The frequency ranges to be considered were swept with the signal modulated and pausing to adjust the RF signal level or to switch oscillators and antennas as necessary.Where the frequency range was swept incrementally, the step size was not exceed 1 % of the preceding frequency value. 5. The dwell time of the amplitude modulated carrier at each frequency was not be less than the time necessary for the EUT to be exercised and to respond, and was not less than 0,5 s. 6. The test normally was performed with the generating antenna facing each side of the EUT. 7. The polarization of the field generated by each antenna necessitates testing each selected side twice, once with the antenna positioned vertically and again with the antenna positioned horizontally. 8. The EUT was performed in a configuration to actual installation conditions, a video camera and/or a audio monitor were used to monitor the performance of the EUT.

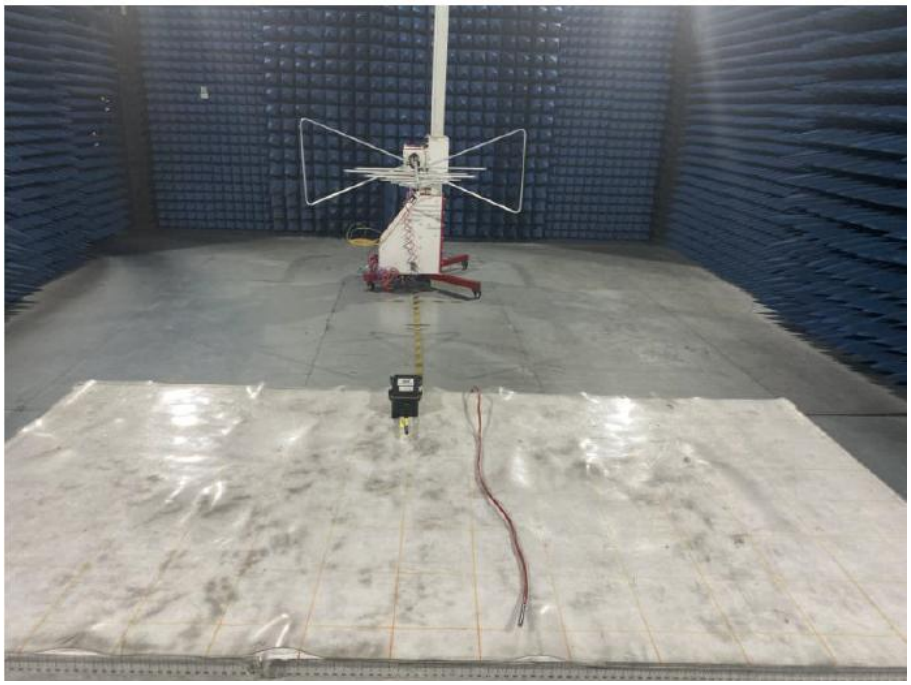
Test monitor:	**Traffic mode:** 1. The test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. 2. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages.					
	Idle mode: 1. The test system shall simulate a Base Station (BS) with Broadcast Control Channel/Common Control Channel (BCCH/CCCH) on one carrier. 2. The EUT shall be synchronized to the BCCH, listening to the CCCH and able to respond to paging messages.					
Test environment:	Temp.:	25 ◦C	Humid.:	52%	Press.:	1 010mbar
Test Instruments:	Refer to section 6.0 for details					
Test results:	Pass					

Measurement Record

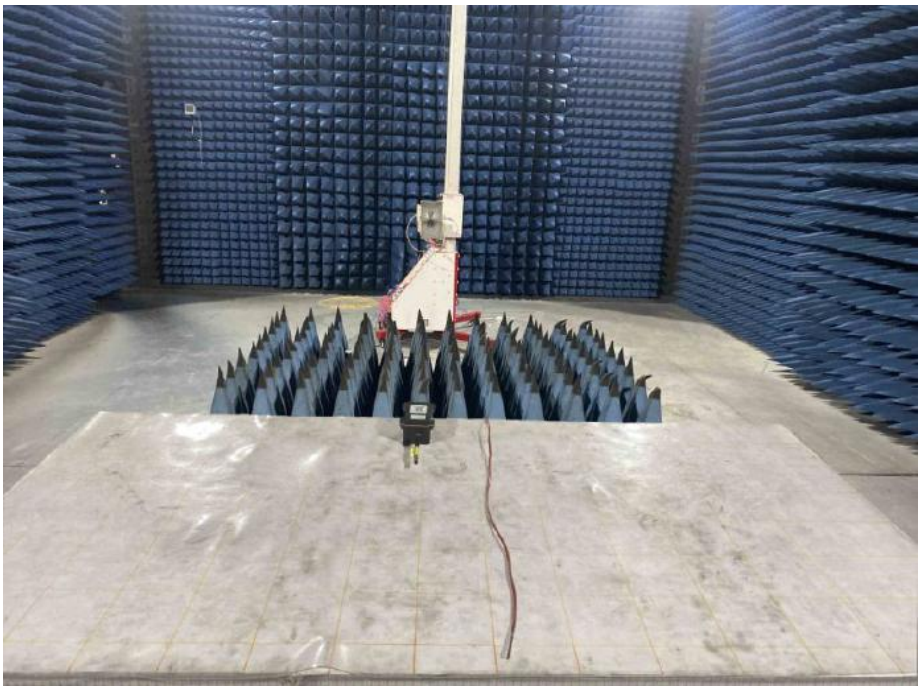
Frequency	Level	Modulation	Operating Mode	Antenna Polarization	EUT Face	Observations (Performance Criterion)
80 MHz-6 GHz	3 V/m	1 kHz, 80 % Amp. Mod, 1 % increment	Traffic mode	V	Front	A
				H		A
				V	Rear	A
				H		A
				V	Left	A
				H		A
				V	Right	A
				H		A
				V	Top	A
				H		A
				V	Bottom	A
				H		A

Remark:
A: normal performance within the specification limits.

8 Test Setup Photo



Radiated Emission Below 1GHz



Radiated Emission Above 1GHz

ESD

9 EUT Constructional Details

Reference to the **appendix I** for details.

------End------