

TEST REPORT



Report No.: TW2203419-04E
File Reference No.: 2022-05-17

Applicant: Hangzhou Roombanker Technology Co., Ltd

Product: Outdoor LoraWAN Gateway

Model No.: DSGW-010C

Trademark: N/A

Test Standards: FCC Part 15.247

Test Result: It is herewith confirmed and found to comply with the requirements set up by ANSI C63.10, FCC Part 15.247 for the evaluation of electromagnetic compatibility

Approved By

A handwritten signature in black ink that reads 'Terry Tang'.

Terry Tang

Manager

Dated: May 17, 2022

Results appearing herein relate only to the sample tested

The technical reports is issued errors and omissions exempt and is subject to withdrawal at

SHENZHEN TIMEWAY TESTING LABORATORIES

Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China

Tel (755) 83448688, Fax (755) 83442996, E-Mail:info@timeway-lab.com



Special Statement:

The testing quality ability of our laboratory meet with “Quality Law of People’s Republic of China” Clause 19.

The testing quality system of our laboratory meet with ISO/IEC-17025 requirements, which is approved by CNAL. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

CNAS-LAB Code: L2292

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2017 General Requirements) for the Competence of testing Laboratories.

FCC-Registration No.: 744189

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.: 744189.

Industry Canada (IC) —Registration No.:5205A

The EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 5205A.

A2LA (Certification Number:5013.01)

The EMC Laboratory has been accredited by the American Association for Laboratory Accreditation (A2LA). Certification Number:5013.01



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1.0 General Details

1.1 Test Lab Details

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.
Address: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China
Telephone: (755) 83448688
Fax: (755) 83442996

1.2 Applicant Details

Applicant: Hangzhou Roombanker Technology Co., Ltd
Address: A#801 Wantong center, Hangzhou, China
Telephone: +86-18768289112
Fax: --

1.3 Description of EUT

Product: Outdoor LoraWAN Gateway
Manufacturer: Hangzhou Roombanker Technology Co., Ltd
Address: A#801 Wantong center, Hangzhou, China
Trademark: N/A
Additional Trademark: N/A
Model Number: DSGW-010C
Additional Model Number: N/A
Hardware Version: V0.1
Software Version: V0.1
Modulation Technique: LoRa/Chirp Spread Spectrum
Frequency range: 923.3-927.5MHz
Channel Separation: 0.6M
Channel Number: 8
Rating: DC48V, 0.32A
Power Supply: Model: RP028-4800320Z
Input: 100-240V~, 50/60Hz, 0.6A Max; Output:48V, 0.32A, 15.36W

1.4 Submitted Sample: 1 Samples

1.5 Test Duration

2022-03-28 to 2022-05-17

1.6 Test Uncertainty

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Conducted Emissions Uncertainty =3.6dB

Radiated Emissions below 1GHz Uncertainty =4.7dB

Radiated Emissions above 1GHz Uncertainty =6.0dB

Conducted Power Uncertainty =6.0dB

Occupied Channel Bandwidth Uncertainty =5%

Note: The measurement uncertainty is for coverage factor of k=2 and a level of confidence of 95%.

1.7 Test Engineer

The sample tested by

Andy Xing

Print Name: Andy Xing

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2.0 Test Equipment					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2021-06-18	2022-06-17
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2021-06-18	2022-06-17
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2021-06-18	2022-06-17
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2021-06-18	2022-06-17
Loop Antenna	EMCO	6507	00078608	2021-06-18	2022-06-17
Spectrum	R&S	FSIQ26	100292	2021-06-18	2022-06-17
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2021-06-18	2022-06-17
Horn Antenna	R&S	BBHA 9120D	9120D-631	2021-07-02	2024-07-01
Power meter	Anritsu	ML2487A	6K00003613	2021-06-18	2022-06-17
Power sensor	Anritsu	MA2491A	32263	2021-06-18	2022-06-17
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2021-07-02	2024-07-01
9*6*6 Anechoic	--	--	N/A	2021-07-02	2024-07-01
EMI Test Receiver	RS	ESVB	826156/011	2021-06-18	2022-06-17
EMI Test Receiver	RS	ESH3	860904/006	2021-06-18	2022-06-17
Spectrum	HP/Agilent	ESA-L1500A	US37451154	2021-06-18	2022-06-17
Spectrum	HP/Agilent	E4407B	MY50441392	2021-06-18	2022-06-17
Spectrum	RS	FSP	1164.4391.38	2022-01-14	2023-01-13
RF Cable	Zhengdi	ZT26-NJ-NJ-8M/F A	--	2021-06-18	2022-06-17
RF Cable	Zhengdi	7m	--	2021-06-18	2022-06-17
RF Switch	EM	EMSW18	060391	2021-06-18	2022-06-17
Pre-Amplifier	Schwarebeck	BBV9743	#218	2021-06-18	2022-06-17
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2021-06-18	2022-06-17
LISN	SCHAFFNER	NNB42	00012	2022-01-05	2023-01-04

2.2 Automation Test Software

For Conducted Emission Test

Name	Version
EZ-EMC	Ver.EMC-CON 3A1.1

For Radiated Emissions

Name	Version
EMI Test Software BL410-EV18.91	V18.905
EMI Test Software BL410-EV18.806 High Frequency	V18.06

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3.0 Technical Details

3.1 Summary of test results

The EUT has been tested according to the following specifications:			
Standard	Test Type	Result	Notes
FCC Part 15, Paragraph 15.203 15.247(b)(4)	Antenna Requirement	Pass	Complies
FCC Part 15, Paragraph 15.207	Conducted Emission Test	Pass	Complies
FCC Part 15 Subpart C Paragraph 15.247(a)(2) Limit	Spectrum bandwidth of a Orthogonal Frequency Division Multiplex System Limit: 6dB bandwidth>500kHz	Pass	Complies
FCC Part 15, Paragraph 15.247(b)	Maximum peak output power Limit: max. 30dBm	Pass	Complies
FCC Part 15, Paragraph 15.205 & 15.209	Transmitter Radiated Emission Limit: Table 15.209	Pass	Complies
FCC Part 15, Paragraph 15.247(e)	Power Spectral Density Limit: max. 8dBm	Pass	Complies
FCC Part 15, Paragraph 15.247(d)	Out of Band Emission and Restricted Band Radiation Limit: 20dB less than peak value of fundamental frequency Restricted band limit: Table 15.209	Pass	Complies

3.2 Test Standards

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

4.0 EUT Modification

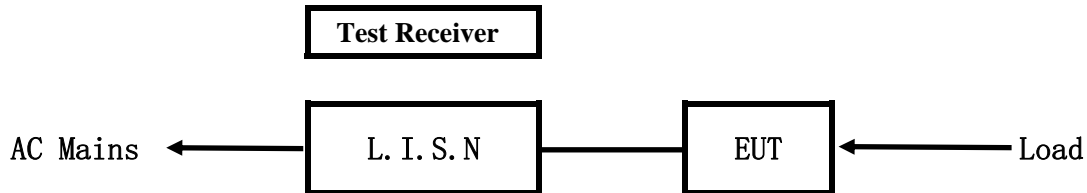
No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

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5.0 Power Line Conducted Emission Test

5.1 Schematics of the test



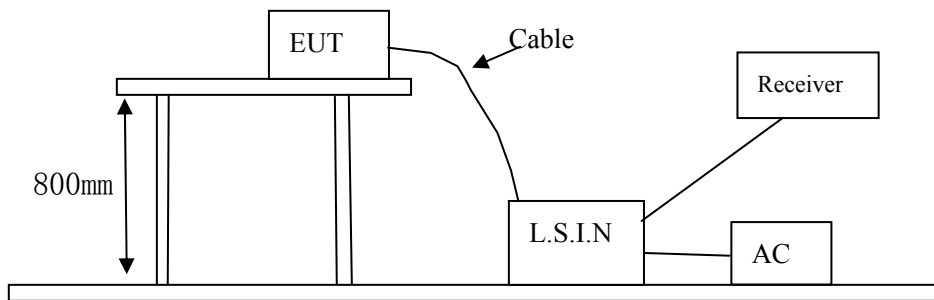
EUT: Equipment Under Test

5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.10-2013. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.10-2013.

Test Voltage: 120V~, 60Hz

Block diagram of Test setup



5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.10-2013. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

A. EUT

Device	Manufacturer	Model	FCC ID
Outdoor LoraWAN Gateway	Hangzhou Roombanker Technology Co., Ltd	DSGW-010C	2AUXBDSGW-010C

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B. Internal Device

Device	Manufacturer	Model	Rating

C. Peripherals

Device	Manufacturer	Model	Rating
N/A			

5.4 EUT Operating Condition

Operating condition is according to ANSI C63.10-2013.

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency (MHz)	Limits (dB μ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

- Notes: 1. *Decreasing linearly with logarithm of frequency.
 2. The tighter limit shall apply at the transition frequencies

5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.



A: Conducted Emission on Live Terminal (150kHz to 30MHz)

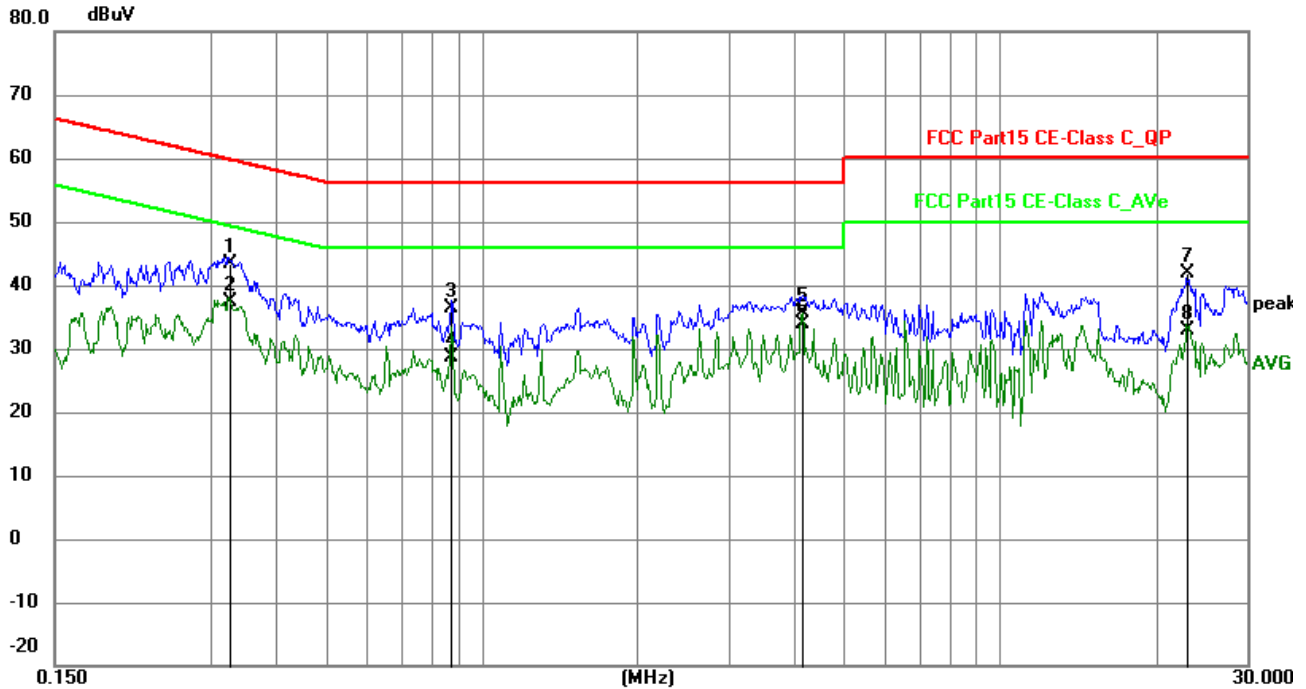
EUT Operating Environment

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 kPa

EUT set Condition: Keep Transmitting

Results: Pass

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.3264	33.61	9.76	43.37	59.54	-16.17	QP	P
2	0.3264	27.69	9.76	37.45	49.54	-12.09	AVG	P
3	0.8754	26.65	9.79	36.44	56.00	-19.56	QP	P
4	0.8754	18.85	9.79	28.64	46.00	-17.36	AVG	P
5	4.1544	25.76	9.89	35.65	56.00	-20.35	QP	P
6	4.1544	23.98	9.89	33.87	46.00	-12.13	AVG	P
7	22.9602	30.95	10.86	41.81	60.00	-18.19	QP	P
8	22.9602	22.02	10.86	32.88	50.00	-17.12	AVG	P

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B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

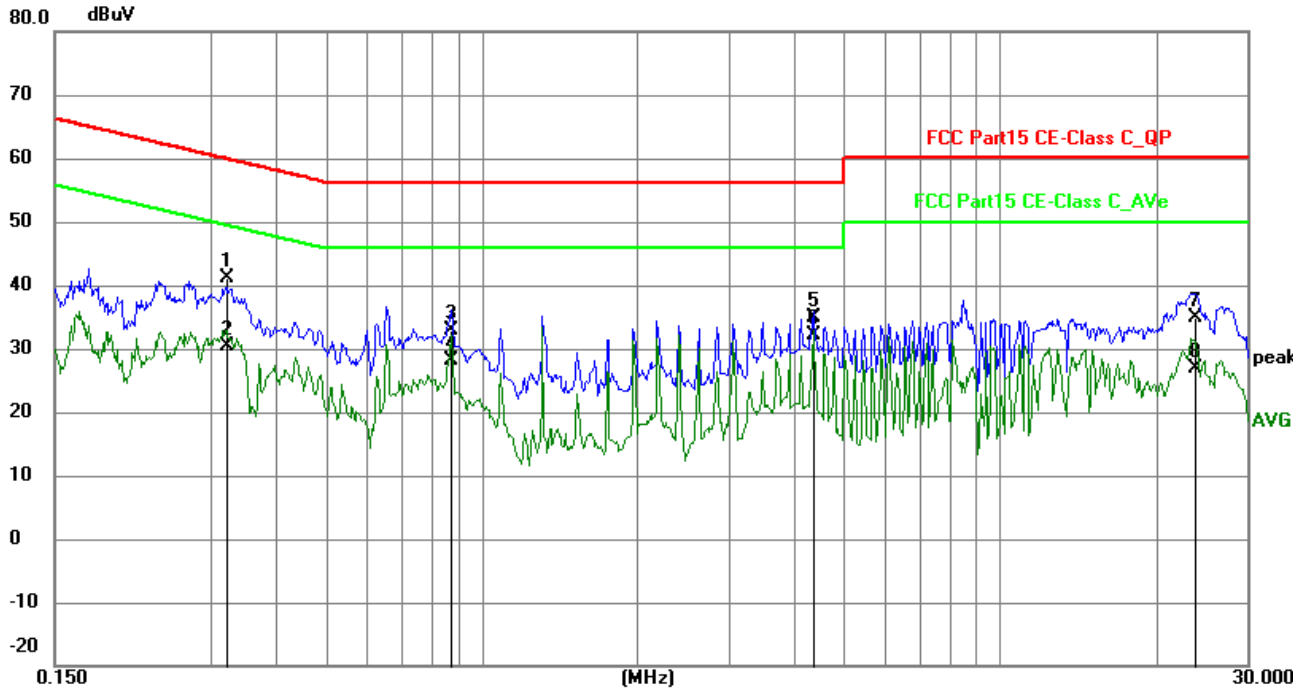
EUT Operating Environment

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 kPa

EUT set Condition: Keep Transmitting

Results: Pass

Please refer to following diagram for individual



No.	Frequency (MHz)	Reading (dBuV)	Factor (dB)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector	P/F
1	0.3215	31.47	9.76	41.23	59.67	-18.44	QP	P
2	0.3215	20.68	9.76	30.44	49.67	-19.23	AVG	P
3	0.8754	22.99	9.79	32.78	56.00	-23.22	QP	P
4	0.8754	18.32	9.79	28.11	46.00	-17.89	AVG	P
5	4.3728	24.98	9.90	34.88	56.00	-21.12	QP	P
6	4.3728	22.31	9.90	32.21	46.00	-13.79	AVG	P
7	23.8338	23.99	10.92	34.91	60.00	-25.09	QP	P
8	23.8338	16.08	10.92	27.00	50.00	-23.00	AVG	P

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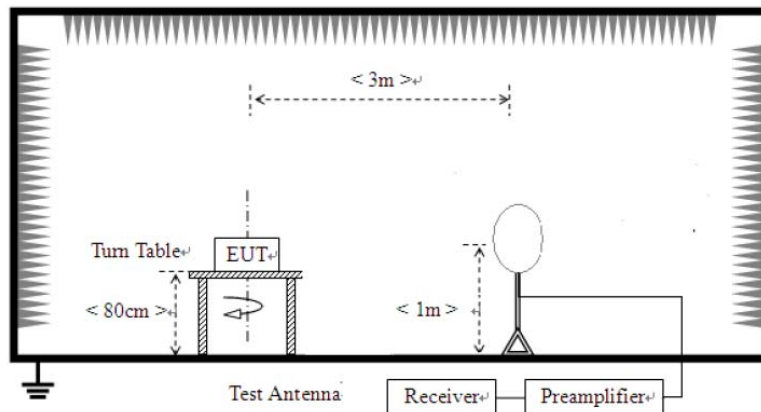
6 Radiated Emission Test

6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No.744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 10 GHz was investigated. All readings from 30 MHz to 1 GHz are Quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=1MHz VBW=3MHz and PK detector. AV value with RBW=1MHz, VBW=3MHz and RMS detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a “QP” in the data table.
- (6) The antenna polarization: Vertical polarization and Horizontal polarization.

Block diagram of Test setup

For radiated emissions from 9kHz to 30MHz

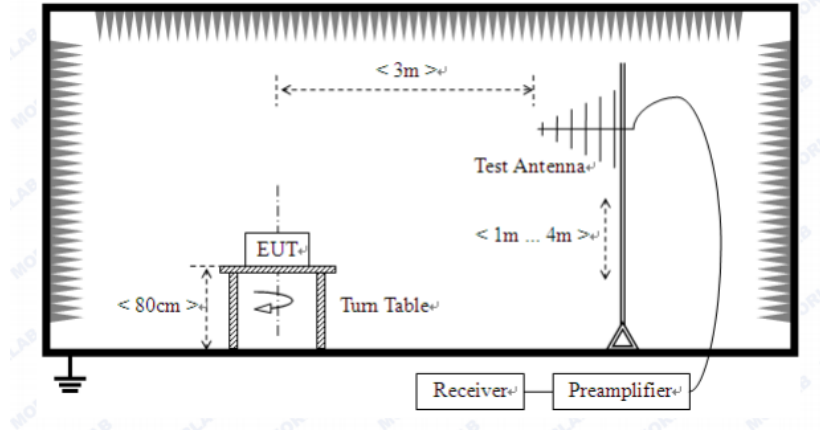


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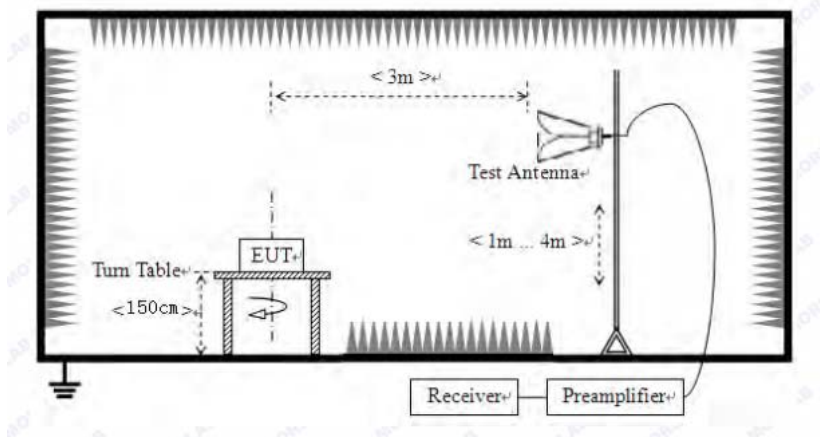
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For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



6.2 Configuration of The EUT

Same as section 5.3 of this report

6.3 EUT Operating Condition

Same as section 5.4 of this report.

6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

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Frequencies in restricted band are complied to limit on Paragraph 15.209

Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	$20\log(2400/F(\text{kHz})) + 40\log(300/3)$
0.490-1.705	3	$20\log(24000/F(\text{kHz})) + 40\log(30/3)$
1.705-30	3	69.5
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

- Note:
1. RF Voltage (dBuV) = 20 log RF Voltage (μ V)
 2. In the Above Table, the tighter limit applies at the band edges.
 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
 4. All scanning using PK detector. And the final emission level was get using QP detector for frequency range from 30-1000MHz.As to 1G-10G, the final emission level got using PK. For fundamental measurement, PK detector used.
 5. For radiated emissions from 9kHz to 30MHz, the emission level is much less than the limit for more than 20dB. No necessary to take down the record.

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Test result

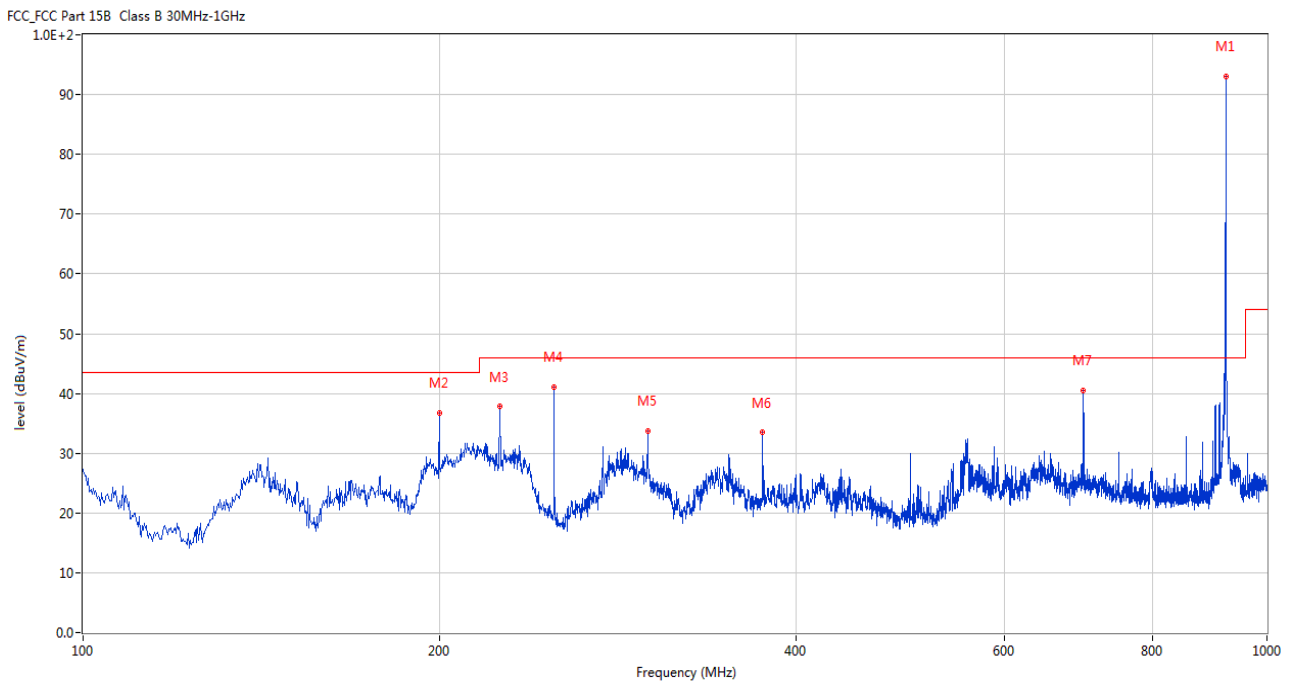
General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Bluetooth Transmitting

Results: Pass

Test Figure for Low Channel



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	923.147	93.12	-1.80	46.0	47.12	Peak	209.00	100	Horizontal	N/A
2	199.950	36.81	-13.45	43.5	-6.69	Peak	109.00	100	Horizontal	Pass
3	224.921	37.83	-12.93	46.0	-8.17	Peak	315.00	100	Horizontal	Pass
4	249.893	41.07	-12.08	46.0	-4.93	Peak	75.00	100	Horizontal	Pass
5	299.835	33.80	-11.03	46.0	-12.20	Peak	260.00	100	Horizontal	Pass
6	374.991	33.49	-9.44	46.0	-12.51	Peak	120.00	100	Horizontal	Pass
7	699.860	40.57	-4.20	46.0	-5.43	Peak	249.00	100	Horizontal	Pass

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Test result

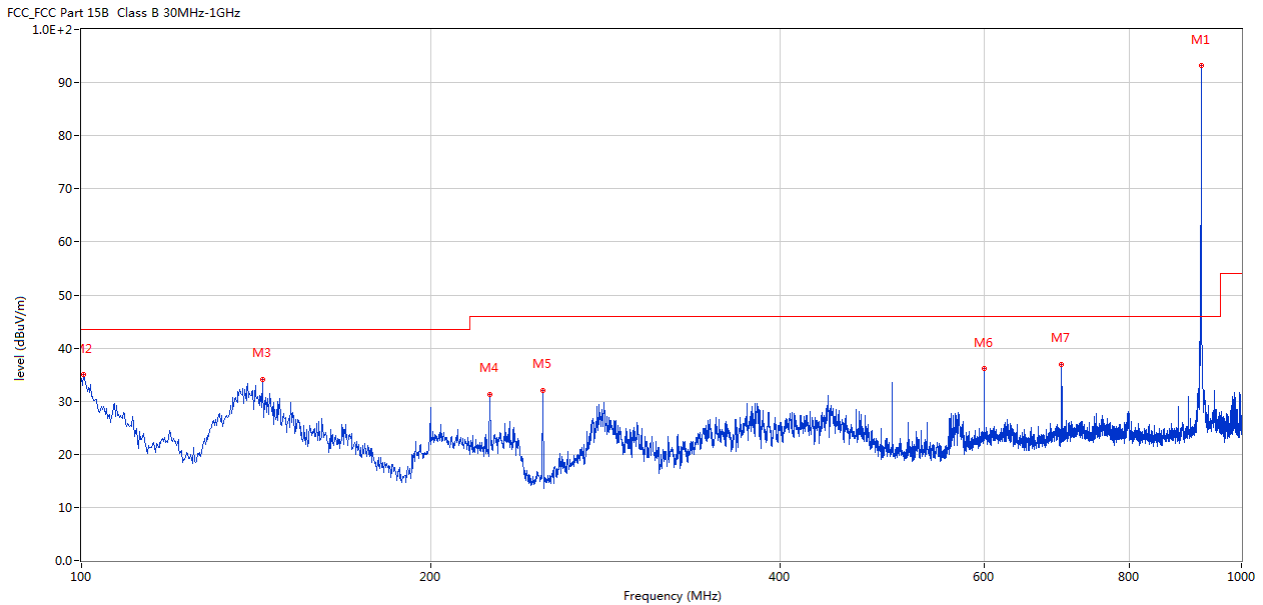
General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Vertical (30MHz----1000MHz)

EUT set Condition: **Keep Transmitting**

Results: Pass

Test Figure for Low Channel



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	923.294	93.13	-1.79	46.0	47.13	Peak	80.00	100	Vertical	N/A
2	100.225	32.87	-13.51	43.5	-10.63	Peak	191.00	100	Vertical	Pass
3	143.189	34.12	-17.22	43.5	-9.38	Peak	202.00	100	Vertical	Pass
4	225.069	31.33	-12.92	46.0	-14.67	Peak	44.00	100	Vertical	Pass
5	249.813	32.02	-12.09	46.0	-13.98	Peak	285.00	100	Vertical	Pass
6	600.050	36.11	-4.94	46.0	-9.89	Peak	345.00	100	Vertical	Pass
7	699.925	36.92	-4.19	46.0	-9.08	Peak	144.00	100	Vertical	Pass

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Test result

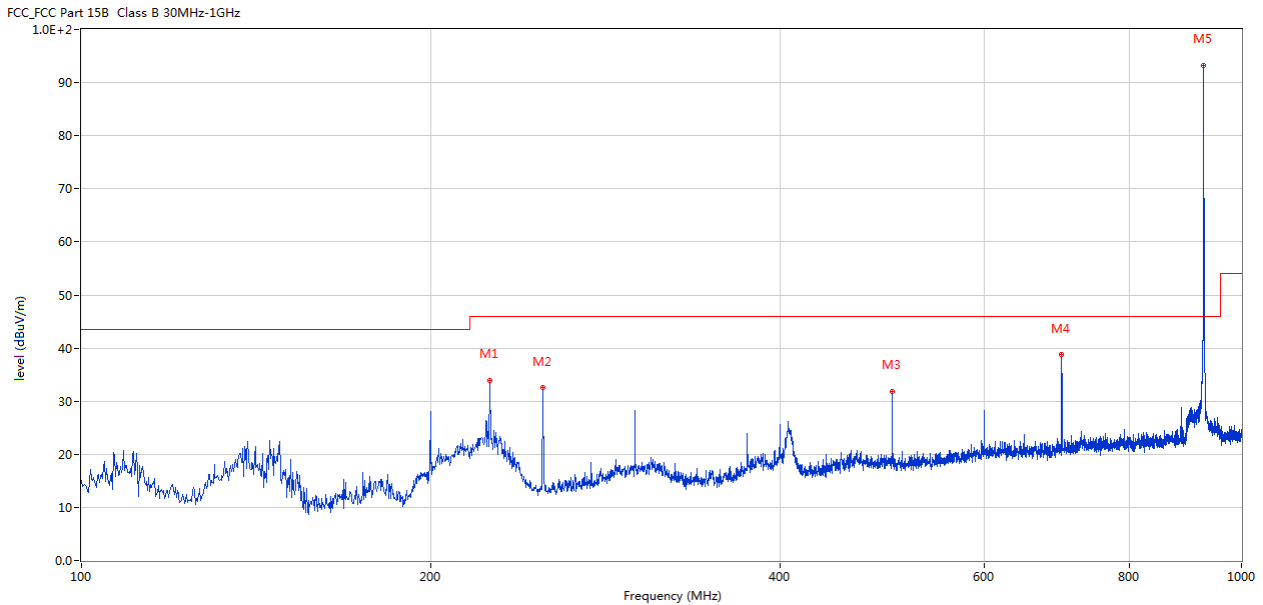
General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Horizontal (30MHz----1000MHz)

EUT set Condition: Keep Bluetooth Transmitting

Results: Pass

Test Figure for High Channel



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	225.069	33.97	-12.92	46.0	-12.03	Peak	52.00	100	Horizontal	Pass
2	250.037	32.50	-12.07	46.0	-13.50	Peak	96.00	100	Horizontal	Pass
3	499.950	31.85	-6.90	46.0	-14.15	Peak	233.00	100	Horizontal	Pass
4	699.925	38.75	-4.19	46.0	-7.25	Peak	283.00	100	Horizontal	Pass
5	927.493	93.26	-1.67	46.0	47.26	Peak	136.00	100	Horizontal	N/A

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Test result

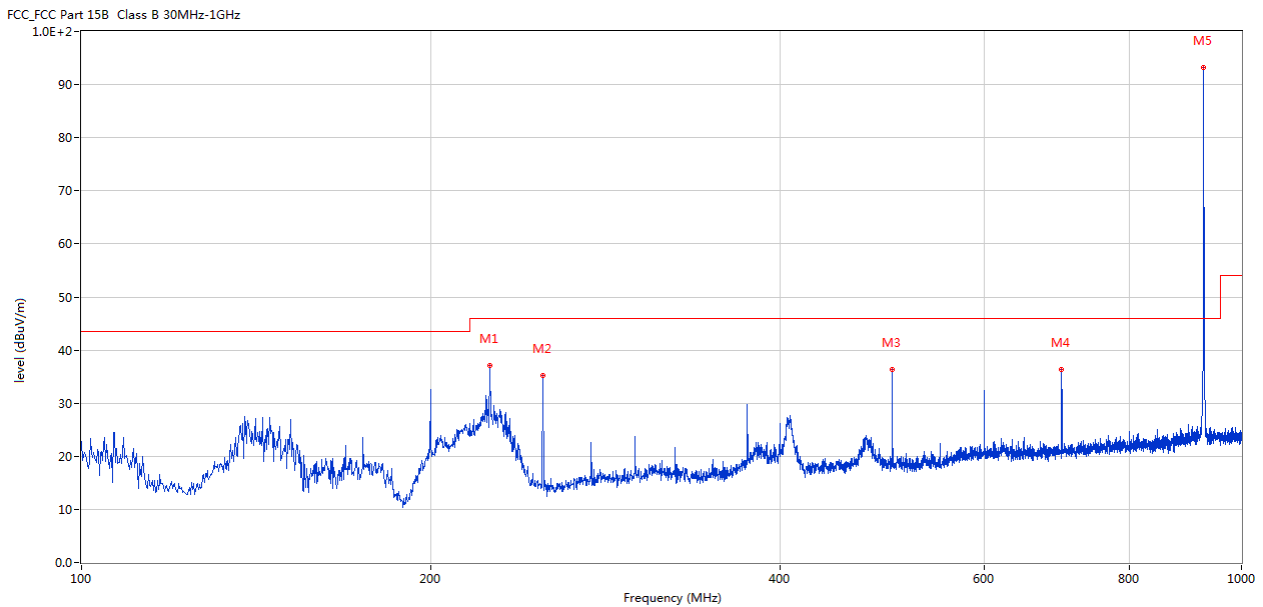
General Radiated Emission Data and Harmonics Radiated Emission Data

Radiated Emission In Vertical (30MHz----1000MHz)

EUT set Condition: **Keep Transmitting**

Results: Pass

Test Figure for High Channel



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	225.069	37.13	-12.92	46.0	-8.87	Peak	72.00	100	Vertical	Pass
2	249.813	35.27	-12.09	46.0	-10.73	Peak	95.00	100	Vertical	Pass
3	499.950	36.43	-6.90	46.0	-9.57	Peak	324.00	100	Vertical	Pass
4	699.925	36.41	-4.19	46.0	-9.59	Peak	65.00	100	Vertical	Pass
5	927.493	93.26	-1.67	46.0	47.26	Peak	177.00	100	Vertical	N/A

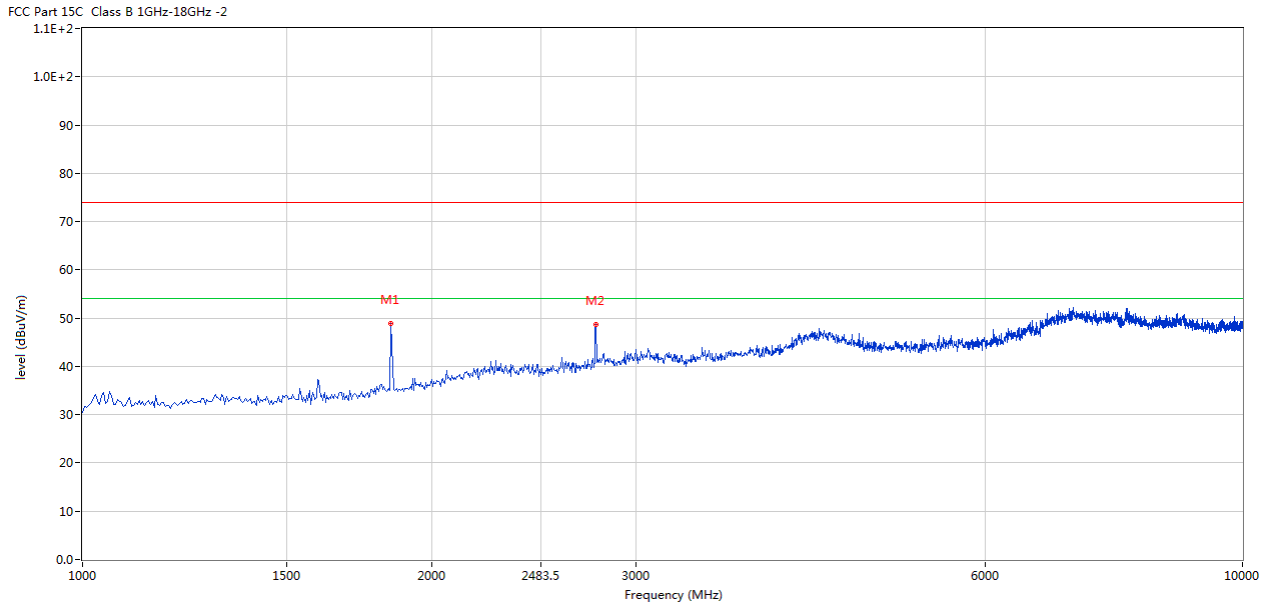
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Test Figures above 1GHz:

Please refer to the following test plots for details:

Low Channel: Horizontal



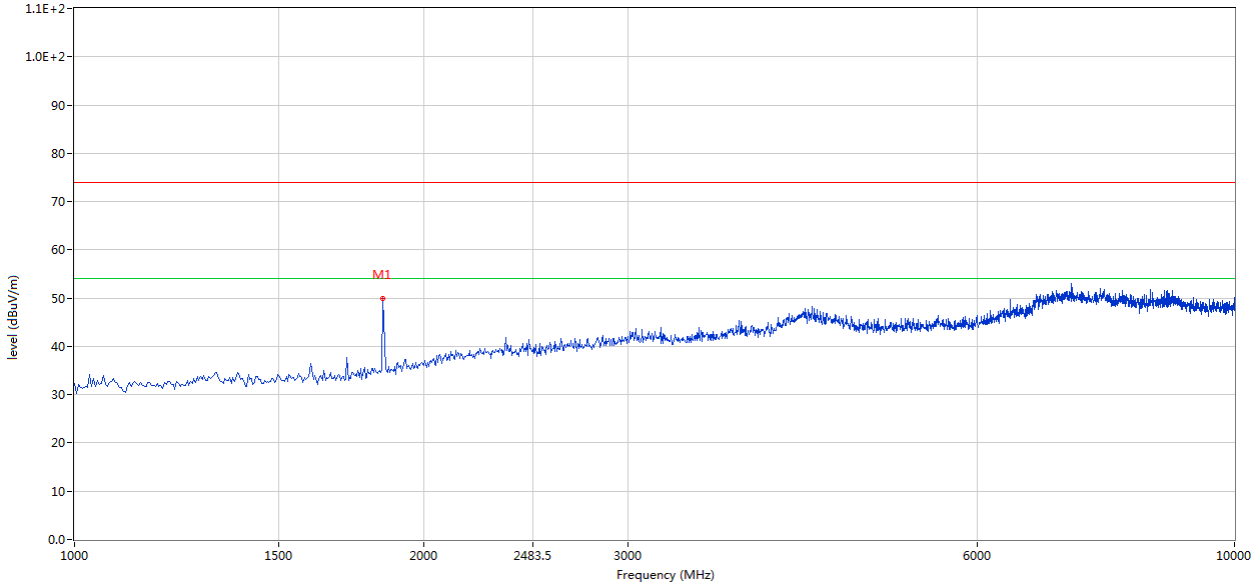
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1845.539	48.89	-6.41	74.0	-25.11	Peak	332.00	100	Horizontal	N/A
2	2771.807	48.72	-2.77	74.0	-25.28	Peak	332.00	100	Horizontal	Pass

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Low Channel: Vertical

FCC Part 15C Class B 1GHz-18GHz -2



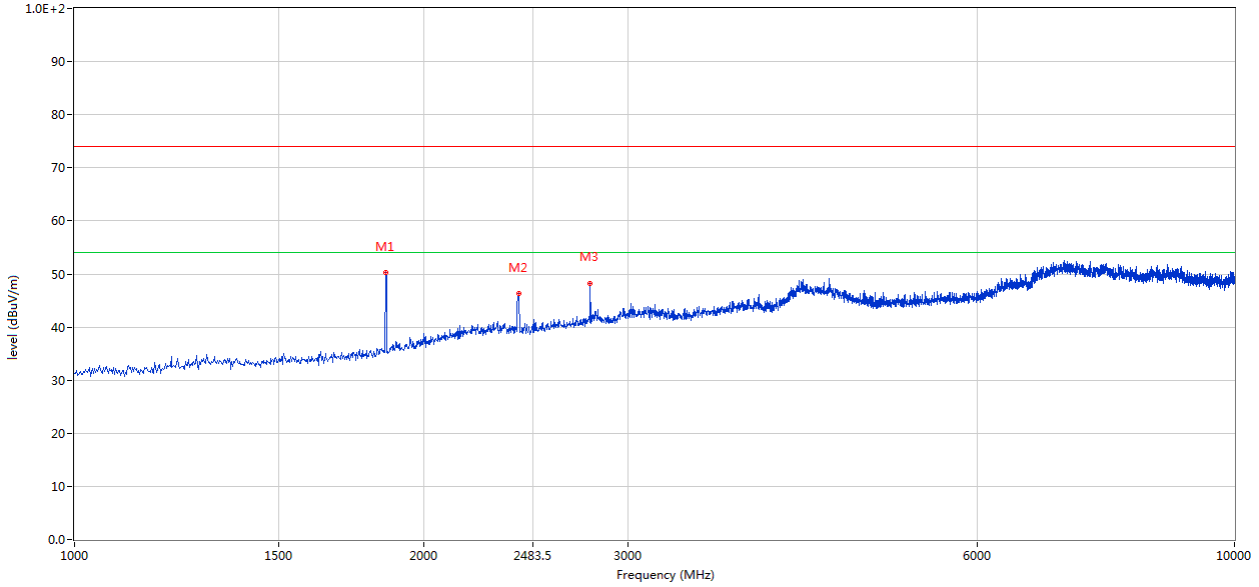
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1845.539	49.87	-6.41	74.0	-24.13	Peak	11.00	100	Vertical	Pass

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High Channel: Horizontal

FCC Part 15C Class B 1GHz-18GHz -2



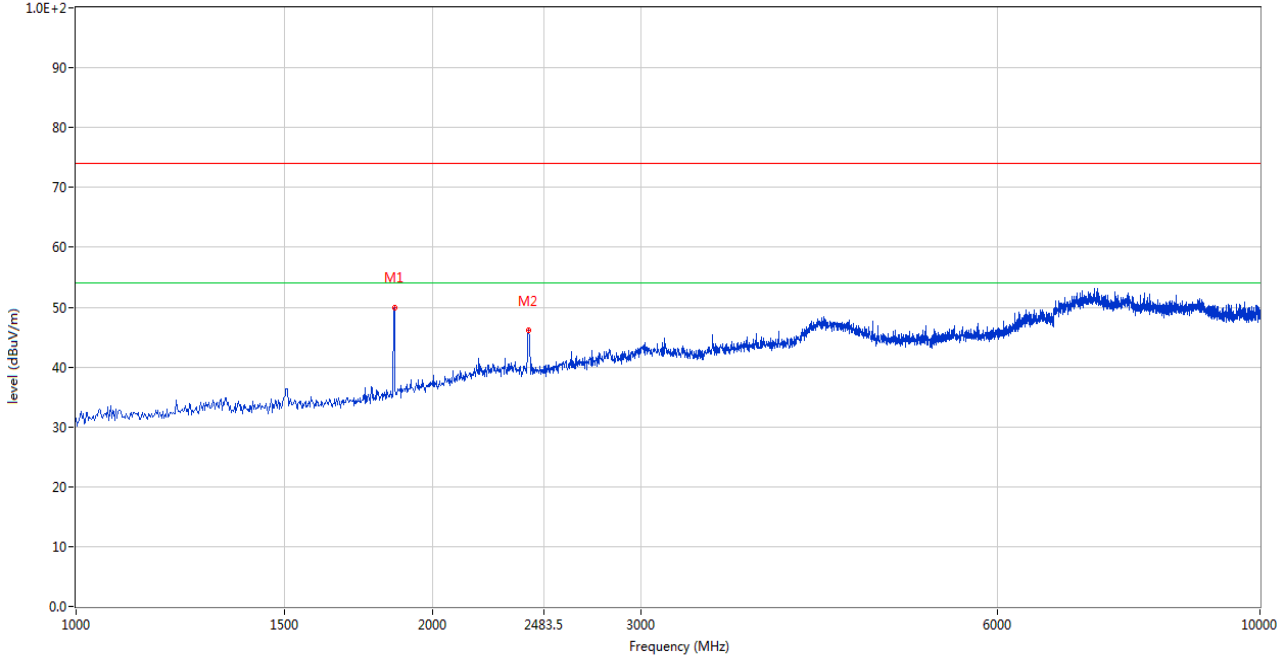
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1854.786	50.32	-6.33	74.0	-23.68	Peak	56.00	100	Horizontal	Pass
2	2414.896	46.32	-3.57	74.0	-27.68	Peak	20.00	100	Horizontal	Pass
3	2783.804	48.22	-2.74	74.0	-25.78	Peak	56.00	100	Horizontal	Pass

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High Channel: Vertical

FCC Part 15C Class B 1GHz-18GHz -2



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	1857.036	49.99	-6.31	74.0	-24.01	Peak	348.00	100	Vertical	Pass
2	2410.397	46.12	-3.57	74.0	-27.88	Peak	355.00	100	Vertical	Pass

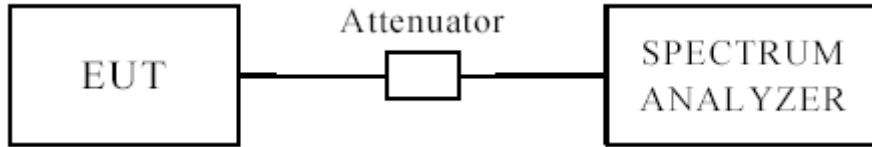
- Note: 1. Level = Reading + AF + Cable - Preamp
 2. The measured PK value less than the AV limit, no necessary to take down the AV measurement result.

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7.0 6dB Bandwidth Measurement

7.1 Test Setup



7.2 Limits of 6dB Bandwidth Measurement

The minimum of 6dB Bandwidth Measurement is >500 kHz

7.3 Test Procedure

1. Set resolution bandwidth (RBW) = 100 kHz
2. Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
3. Detector = Peak.
4. Trace mode = max hold.
5. Sweep = auto couple.
6. Allow the trace to stabilize.
7. 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 6 dB relative to the maximum level measured in the fundamental emission.

7.4 Test Result

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6dB BW

EUT	Outdoor LoraWAN Gateway		Model	DSGW-010C
Mode	Keep Transmitting		Input Voltage	DC48V
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	6 dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass/ Fail
Low	923.3	649	500	Pass
High	927.5	673	500	Pass

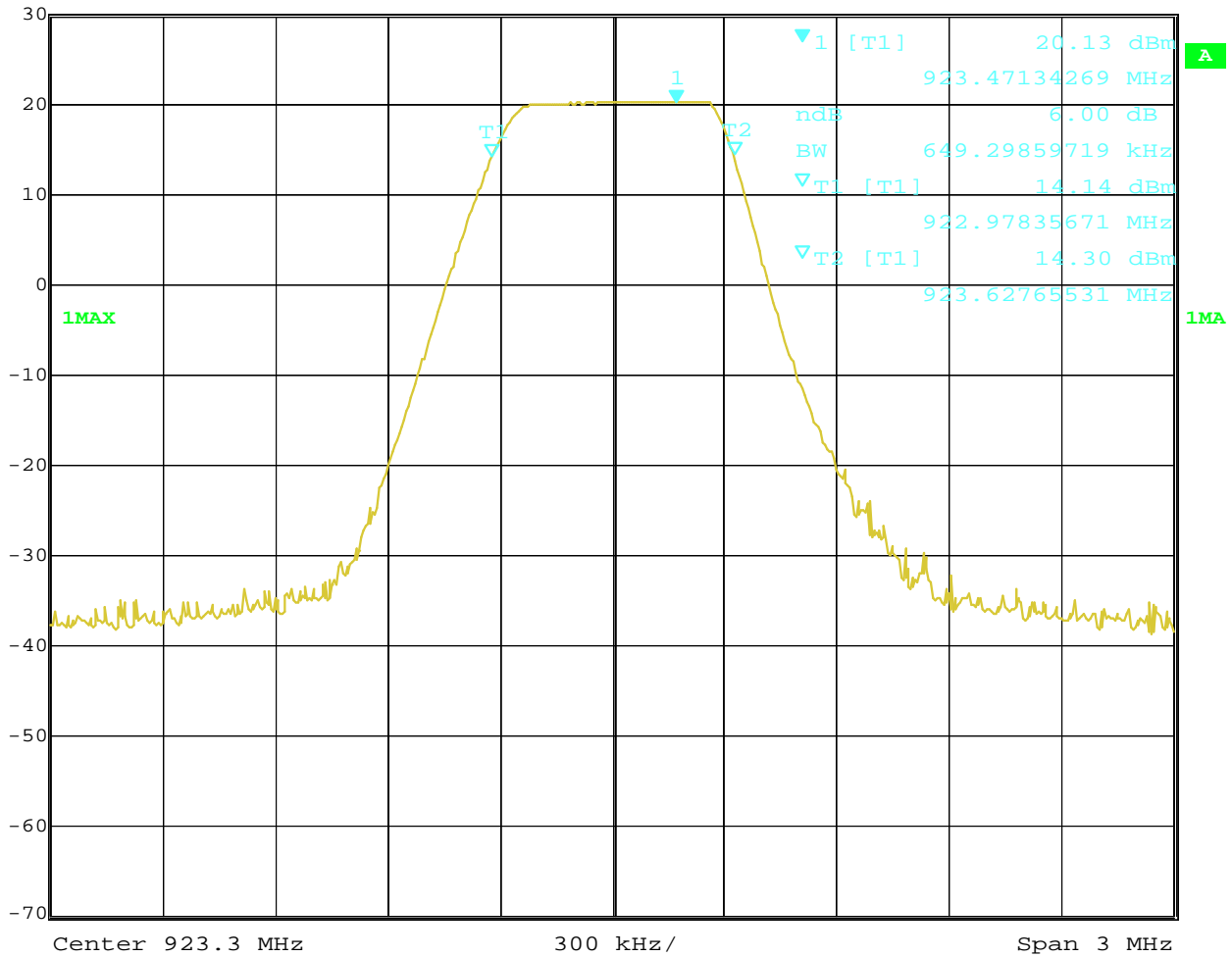
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Test Figure:

1. Condition: Low Channel

	Marker 1 [T1 ndB]	RBW	100 kHz	RF Att	50 dB
	Ref Lvl	ndB	6.00 dB	VBW	300 kHz
	30 dBm	BW	649.29859719 kHz	SWT	5 ms



Date: 18.APR.2022 10:06:58

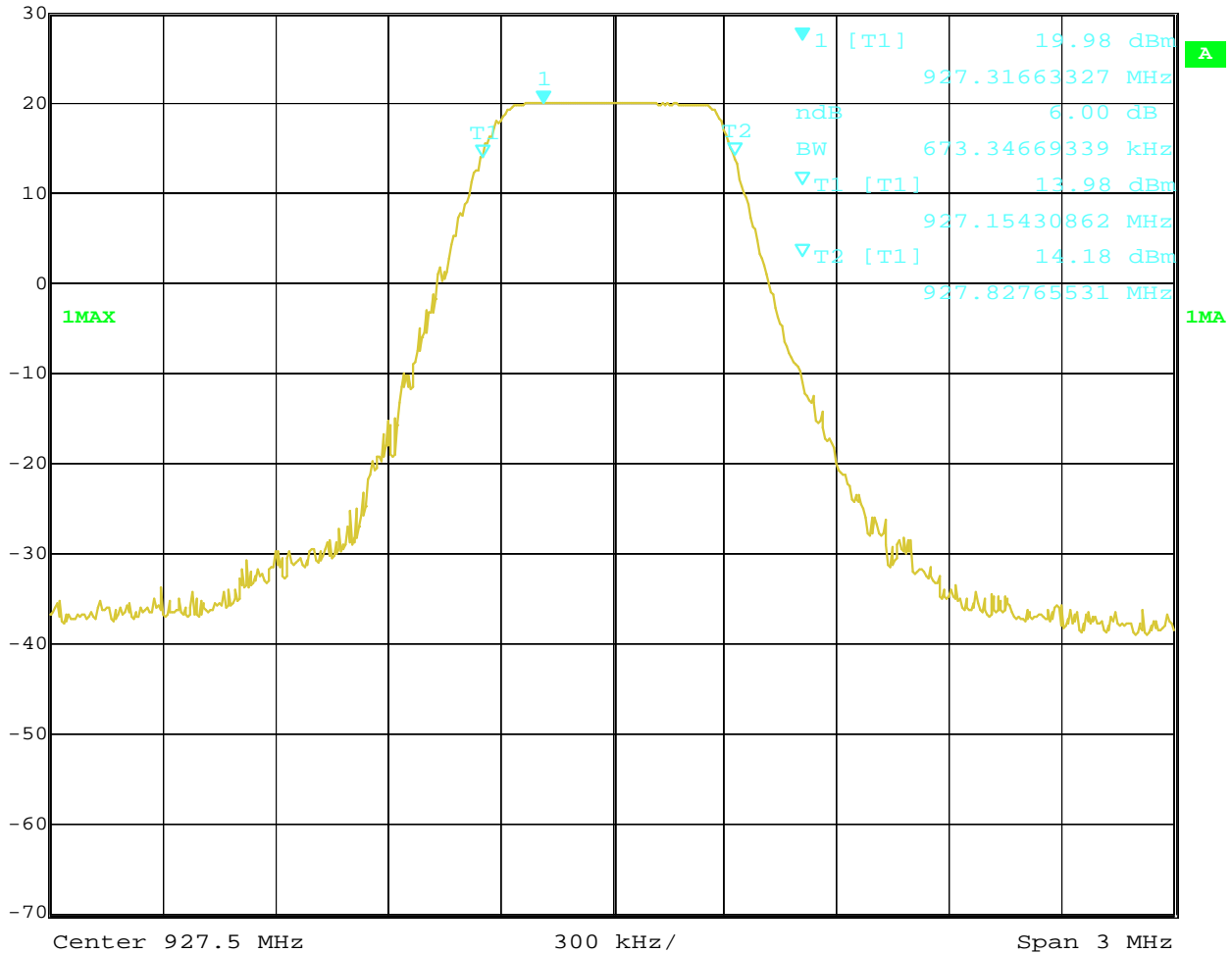
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2. High Channel



Ref Lvl	Marker 1 [T1 ndB]	RBW	100 kHz	RF Att	50 dB
30 dBm	ndB 6.00 dB	VBW	300 kHz	Unit	dBm
	BW 673.34669339 kHz	SWT	5 ms		



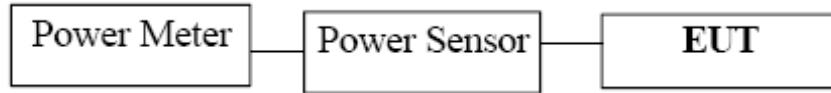
Date: 18.APR.2022 10:06:20

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8. Maximum Output Power

8.1 Test Setup



8.2 Limits of Maximum Output Power

The Maximum Output Power Measurement is 30dBm.

8.3 Test Procedure

The RF power output was measured with a Power meter connected to the RF Antenna connector (conducted measurement) while EUT was operating in transmit mode at the appropriate centre frequency.

Note: the PK power were measured.

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8.4 Test Results

EUT	Outdoor LoraWAN Gateway		Model	DSGW-010C	
Mode	Keep Transmitting		Input Voltage	DC48V	
Temperature	24 deg. C,		Humidity	56% RH	
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)		Peak Power Limit (dBm)	Pass/ Fail
		PK			
Low	923.3	26.27		30	Pass
High	927.5	25.80		30	Pass

Note: 1. the result basic equation calculation as follow:

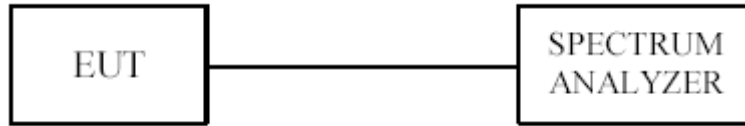
$$\text{Max. Power Output} = \text{Power Reading} + \text{Cable loss} + \text{Attenuator}$$

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9. Power Spectral Density Measurement

9.1 Test Setup



9.2 Limits of Power Spectral Density Measurement

The Maximum Power Spectral Density Measurement is 8dBm/3kHz.

9.3 Test Procedure

1. Use this procedure when the maximum peak conducted output power in the fundamental emission is used to demonstrate compliance.
2. Set the RBW = 3 kHz.
3. Set the VBW \geq 10 kHz.
4. Set the span to 1.5 times the DTS channel bandwidth.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum amplitude level.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.
11. The resulting peak PSD level must be \leq 8 dBm/3kHz.

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9.4 Test Result

EUT	Outdoor LoraWAN Gateway			Model	DSGW-010C
Mode	Keep Transmitting			Input Voltage	DC48V
Temperature	24 deg. C,			Humidity	56% RH
Channel	Peak Power Reading (dBm)	Cable Loss (dB)	Final Power Spectral Density (dBm/3kHz)	Maximum Limit (dBm/3kHz)	Pass/ Fail
Low	6.02	0.2	6.22	8	Pass
High	6.22	0.2	6.42	8	Pass

Note: The result basic equation calculation as follow:

$$\text{Peak Power Output} = \text{Peak Power Reading} + \text{Cable loss}$$

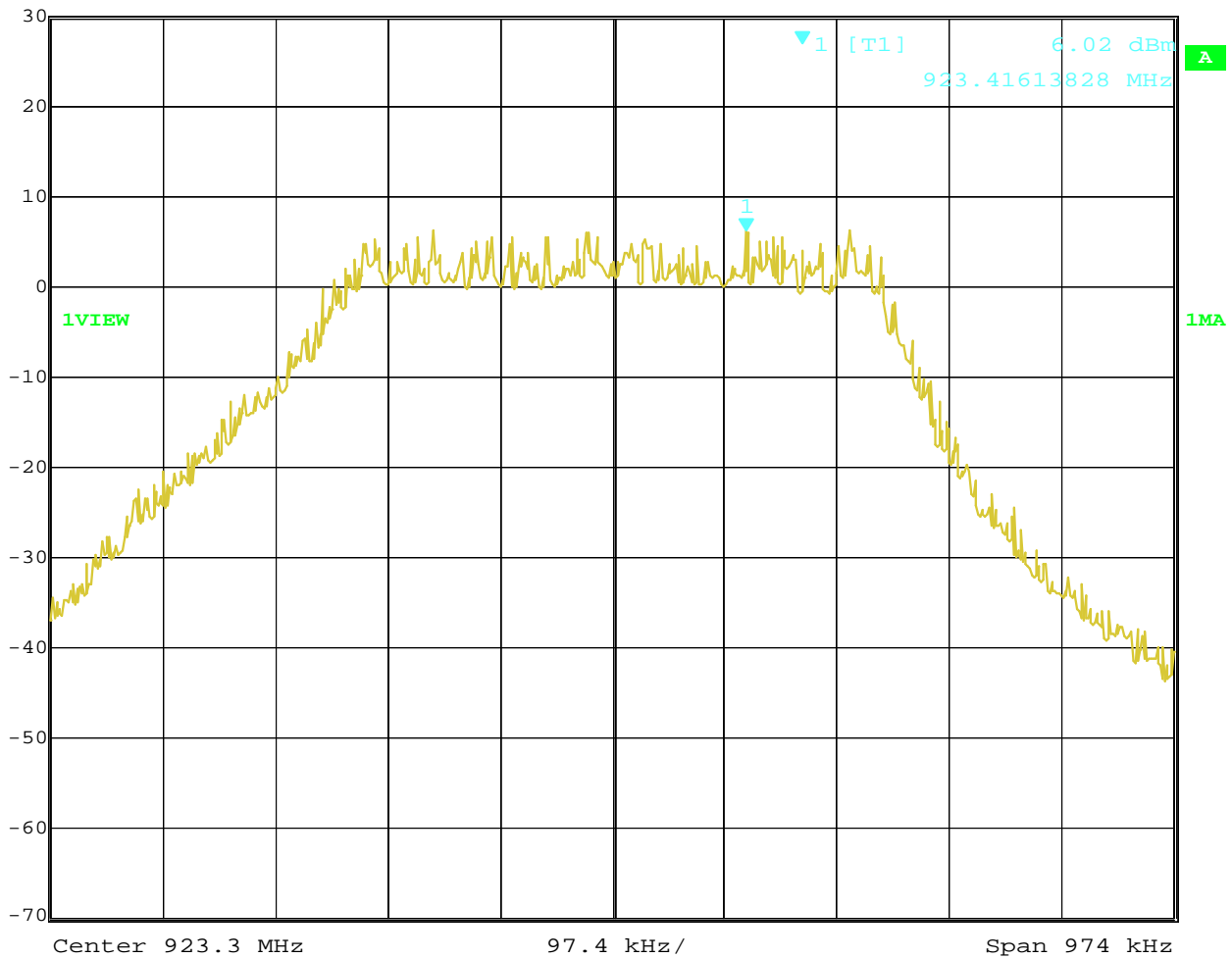
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Test Figure:

1. Condition: Low Channel

	Marker 1 [T1]	RBW	3 kHz	RF Att	50 dB
	Ref Lvl	6.02 dBm	VBW	10 kHz	
	30 dBm	923.41613828 MHz	SWT	280 ms	Unit dBm



Date: 16.MAY.2022 14:31:25

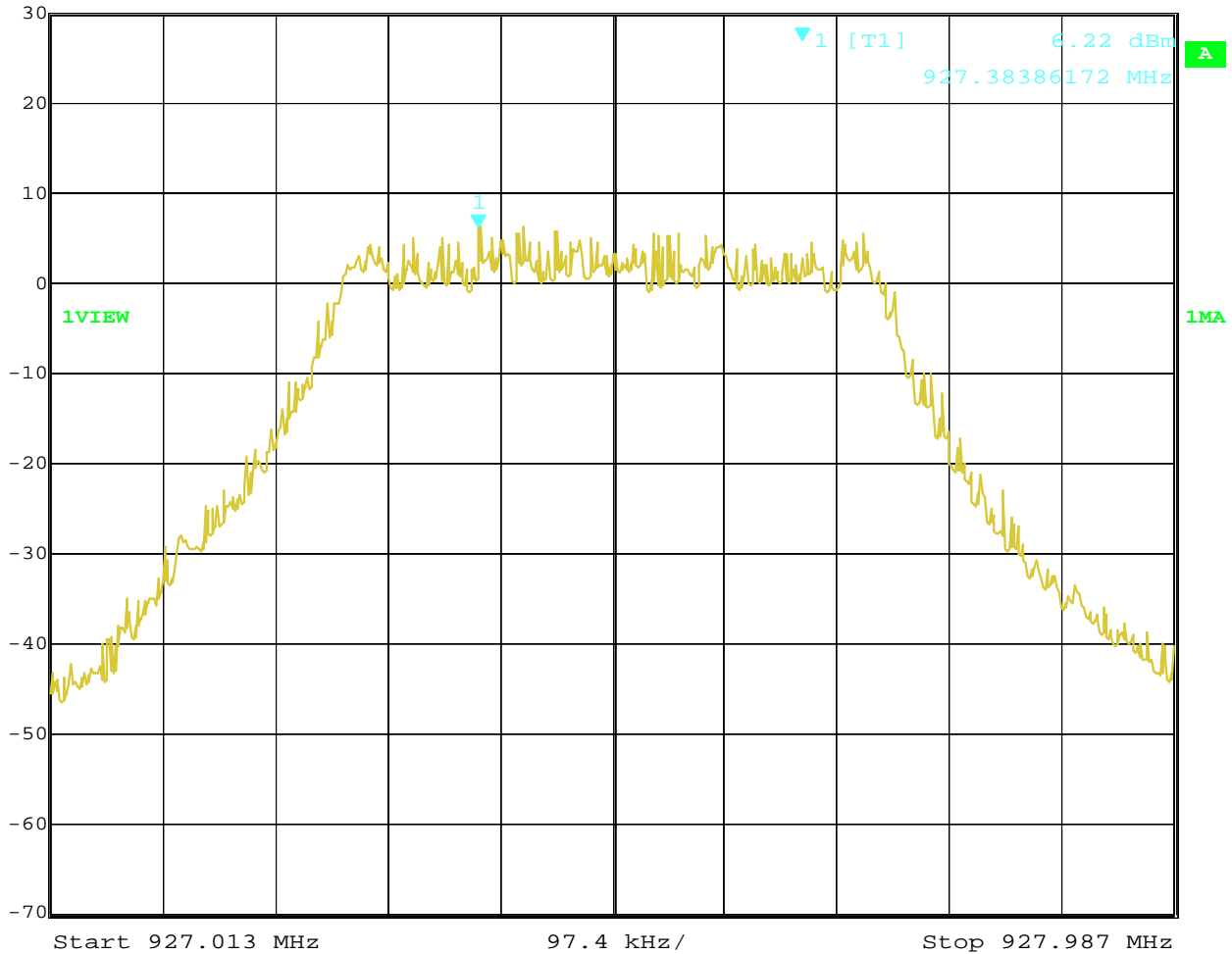
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2. High Channel



Ref Lvl	Marker 1 [T1]	RBW	3 kHz	RF Att	50 dB
30 dBm	6.22 dBm	VBW	10 kHz	Unit	dBm
	927.38386172 MHz	SWT	280 ms		



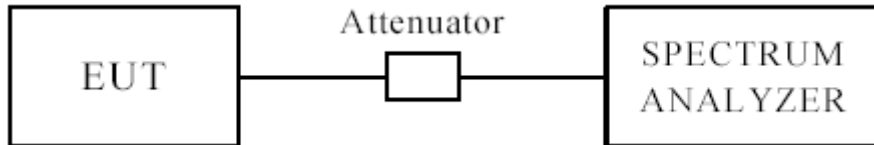
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10 Out of Band Measurement

10.1 Test Setup for band edge



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

10.2 Limits of Out of Band Emissions Measurement

1. Below -20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

10.3 Test Procedure

For signals in the restricted bands above and below the 902-928MHz allocated band a measurement was made of Radiated emission test. (QP values with RBW=100kHz, VBW=300kHz and QK detector.)

For bandage test, the spectrum set as follows: RBW=100 kHz, VBW=300 kHz. A conducted measurement used

10.4 Test Result

Please see next pages

Note: 1. For band-edge measurement, the frequency from 30MHz-10GHz was tested. And It met the FCC rule.

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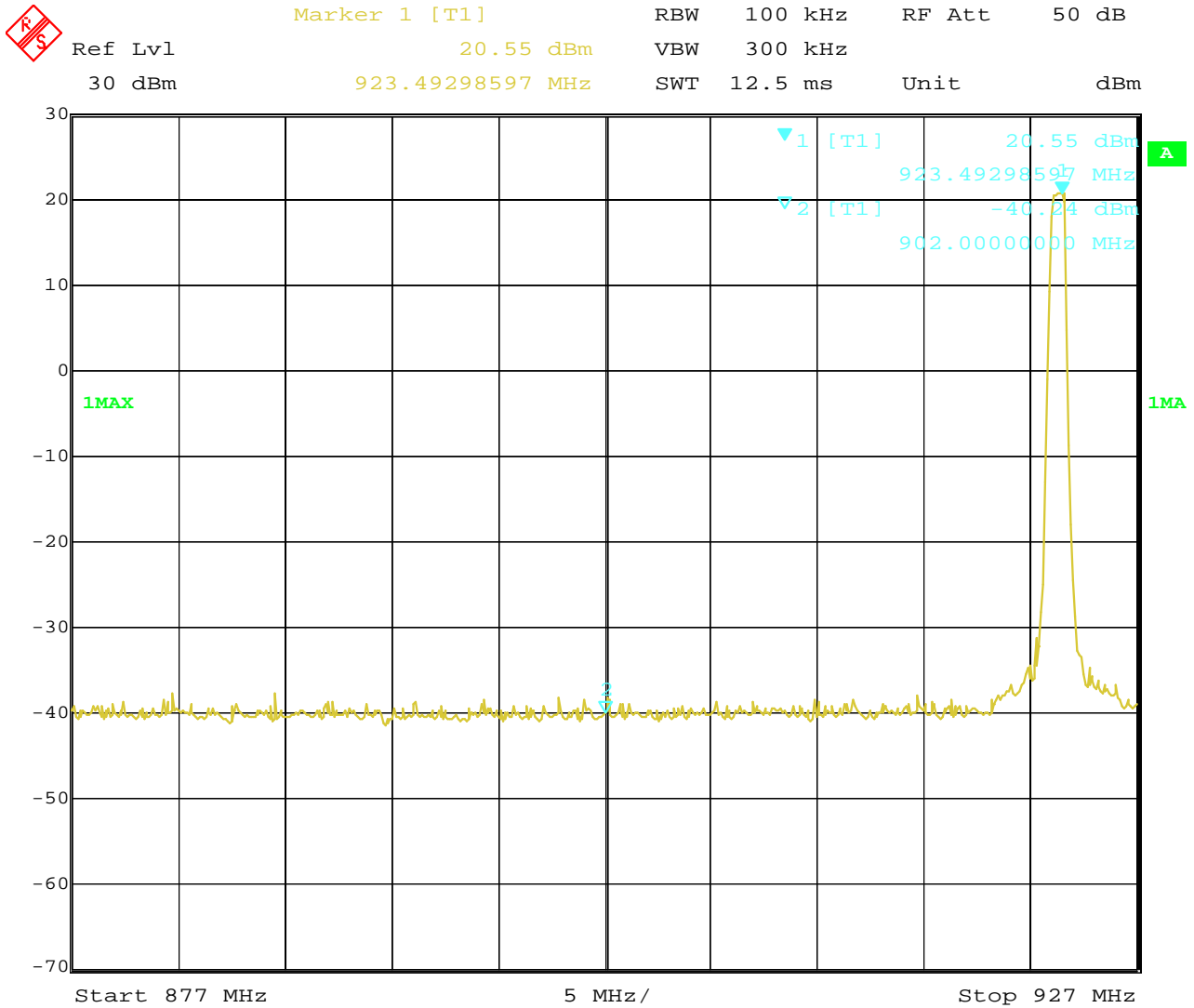
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10.4 Band-edge Measurement

EUT	Outdoor LoraWAN Gateway	Model	DSGW-010C
Mode	Keep Transmitting	Input Voltage	DC48V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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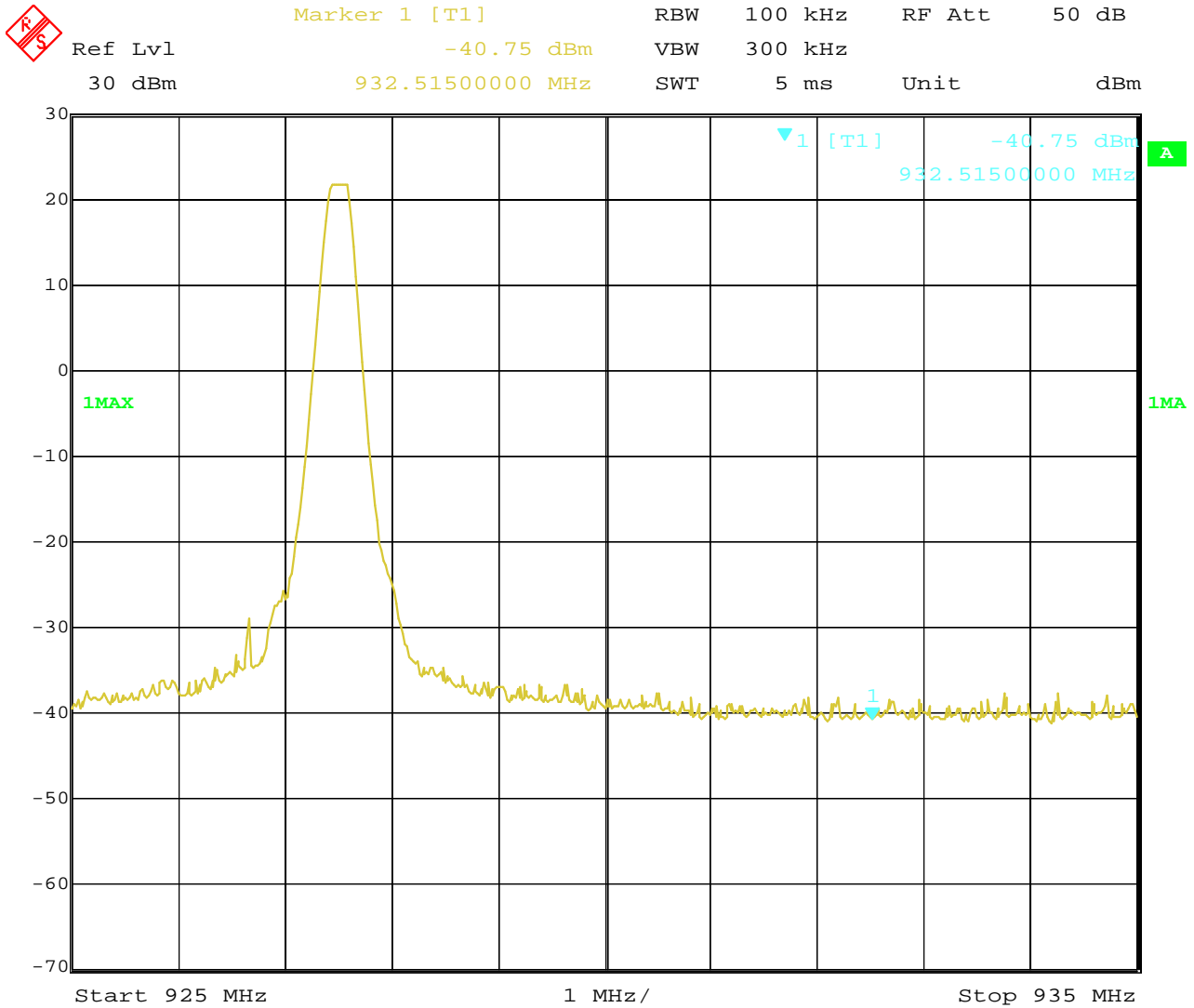
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10.4 Band-edge Measurement

EUT	Outdoor LoraWAN Gateway	Model	DSGW-010C
Mode	Keeping Transmitting	Input Voltage	DC48V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

Test Figure:



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10.4 Restricted band Measurement

EUT	Outdoor LoraWAN Gateway		Model	DSGW-010C
Mode	Keeping Transmitting		Test Voltage	DC48V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	QP
Low Channel, Horizontal				
614	PK (dB μ V/m)	26.56	Limit	46(dB μ V/m)
Low Channel, Vertical				
614	PK (dB μ V/m)	26.13	Limit	46(dB μ V/m)

10.4 Restricted band Measurement

EUT	Outdoor LoraWAN Gateway		Model	DSGW-010C
Mode	Keeping Transmitting		Test Voltage	DC48V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	QP
High Channel, Horizontal				
960	PK (dB μ V/m)	26.87	Limit	46(dB μ V/m)
High Channel, Vertical				
960	PK (dB μ V/m)	27.05	Limit	46(dB μ V/m)

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11.0 Antenna Requirement

11.1 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 transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

11.2 Antenna Connected construction

External antenna with Reverse polarity N connector used. The gain of the antennas is 1.1dBi (Declared by the manufacturer)

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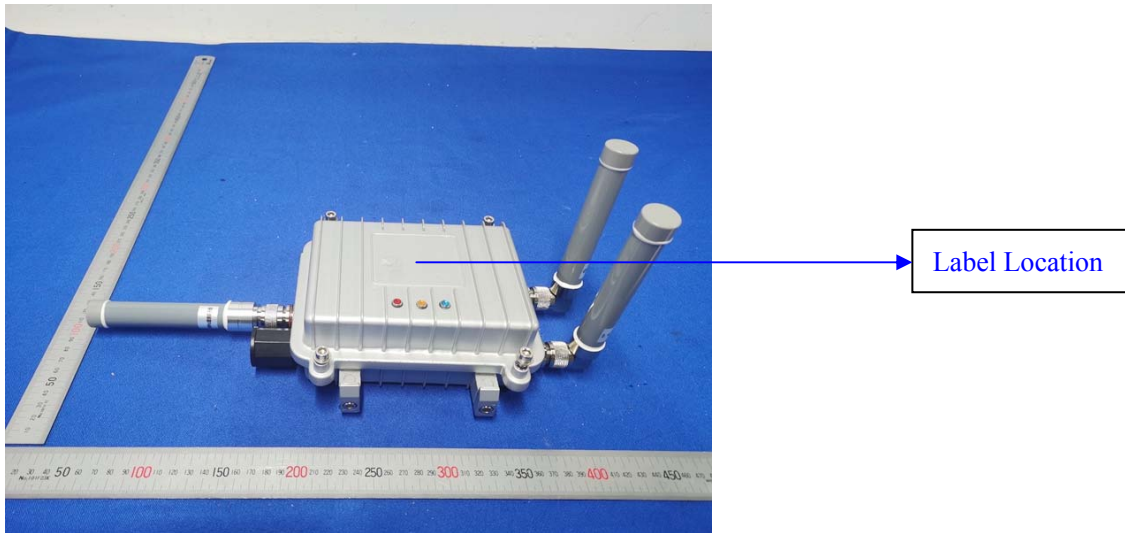
12.0 FCC ID Label

FCC ID: 2AUXBDSGW-010C

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

Mark Location:



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13.0 Photo of testing

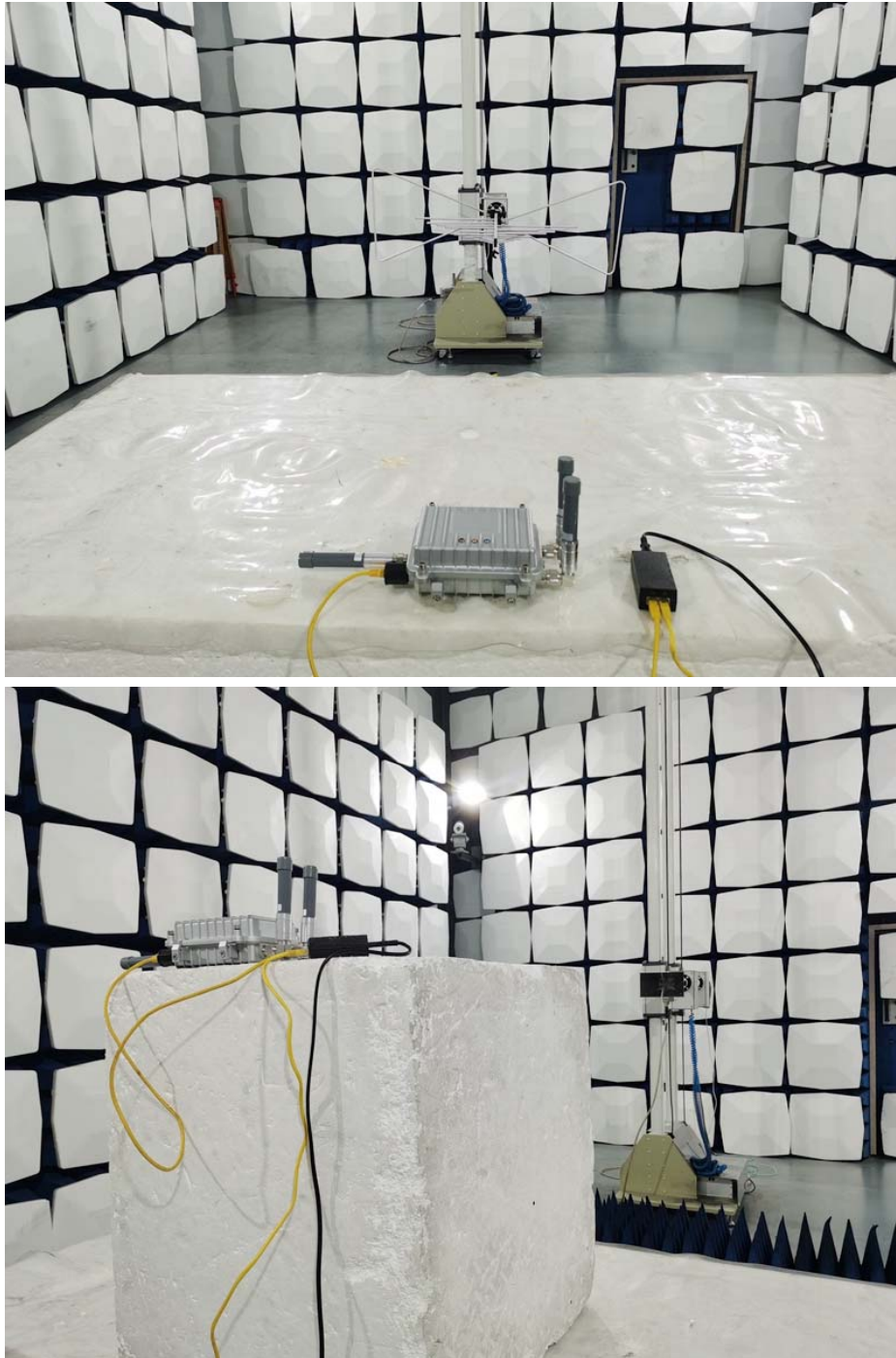
Conducted Emission Test Setup:



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Radiated Emission Test Setup:



Photographs – EUT

Please refer test report TW2203419-01E

End of the report

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