

File Reference No.: 2022-05-16

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

Terry Tong

Terry Tang

Manager

Dated: May 16, 2022

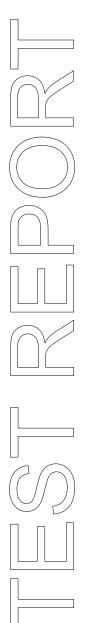
Results appearing herein relate only to the sample tested

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



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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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Test Report Conclusion

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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 N/A

Number:

Hardware Version: V0.1 Software Version: V0.1

Type of Modulation GFSK (Bluetooth BLE)

Frequency range 2402-2480MHz Frequency Selection By software

Channel Number 40

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 Sample

1.5 Test Duration

2022-03-28 to 2022-05-16

The report refers only to the sample tested and does not apply to the bulk.

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1.6 Test Uncertainty

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%

Conducted Emissions Uncertainty = 3.6dB

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

Print Name: Andy Xing

Andy-xing

Date: 2022-05-16



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		
LISN	R&S	EZH3-Z5	100294	2021-06-18	2022-06-17		
LISN	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	2022-07-01		
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	2021-01-15	2022-05-16		
RF Cable	Zhengdi	ZT26-NJ-NJ-8M/F		2021-06-18	2022-06-17		
22.011	_	A					
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		
2.4G Band Filter	Micro-Tronics	BRM50701	S/N-041	2021-06-18	2022-06-17		

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**

Standard	Test Type	Result	Notes
2 111-2-11-0			
FCC Part 15, Paragraph 15.203	Antenna Requirement	Pass	Complies
FCC Part 15, Paragraph 15.207	Conducted Emission Test	Pass	Complies
	Spectrum bandwidth of a	Pass	Complies
FCC Part 15 Subpart C	Orthogonal Frequency		
Paragraph 15.247(a)(2) Limit	Division Multiplex System		
r aragraph 13.247(a)(2) Limit	Limit: 6dB		
	bandwidth>500kHz		
EGG D. 115 D. J.	Maximum peak output	Pass	
FCC Part 15, Paragraph	power		Complies
15.247(b)	Limit: max. 30dBm		
FCC Part 15, Paragraph 15.205	Transmitter Radiated	Pass	Complies
& 15.209	Emission		
	Limit: Table 15.209		
FCC Part 15, Paragraph	Power Spectral Density	Pass	Complies
15.247(e)	Limit: max. 8dBm/3kHz		
FCC Part 15, Paragraph	Out of Band Emission and	Pass	Complies
15.247(d)	Restricted Band		
	Radiation		
	Limit: 20dB less than		
	peak value of fundamental		
	frequency		
	Restricted band limit:		
	Table 15.209		

3.2 **Test Standards**

FCC Part 15 Subpart & Subpart C, Paragraph 15.247

4.0 **EUT Modification**

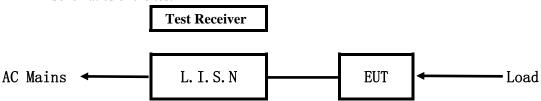
No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

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5.Power Line Conducted Emission Test

5.1 Schematics of the test

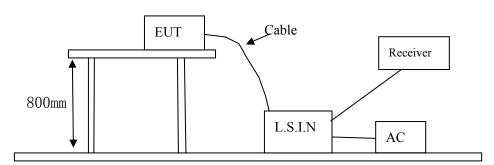


EUT: Equipment Under Test

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	Hangzhou Roombanker Technology	DSGW-010C	2AUXBDSGW-010C
Gateway	Co., Ltd	D30 W-010C	2AUADDSGW-010C

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B. Internal Device

Device	Manufacturer	Model	Rating
N/A			

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	Limits (dB μ V)				
(MHz)	Quasi-peak Level	Average Level			
$0.15 \sim 0.50$	66.0~56.0*	56.0~46.0*			
$0.50 \sim 5.00$	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.

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

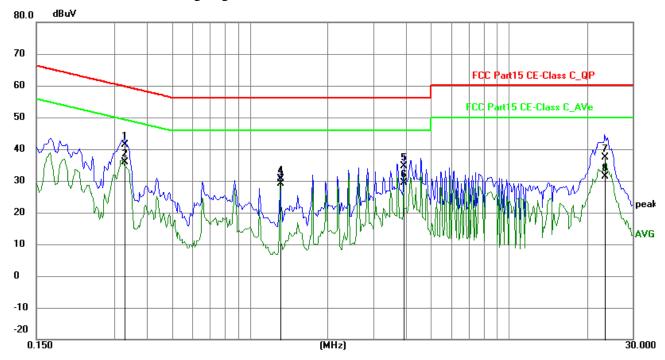
EUT Operating Environment

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	0.3294	31.51	9.76	41.27	59.47	-18.20	QP	Р
2	0.3294	26.15	9.76	35.91	49.47	-13.56	AVG	Р
3	1.3122	19.26	9.79	29.05	56.00	-26.95	QP	Р
4	1.3122	20.94	9.79	30.73	46.00	-15.27	AVG	Р
5	3.9399	24.81	9.88	34.69	56.00	-21.31	QP	Р
6	3.9399	19.53	9.88	29.41	46.00	-16.59	AVG	Р
7	23.3931	26.40	10.89	37.29	60.00	-22.71	QP	Р
8	23.3931	20.42	10.89	31.31	50.00	-18.69	AVG	Р

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

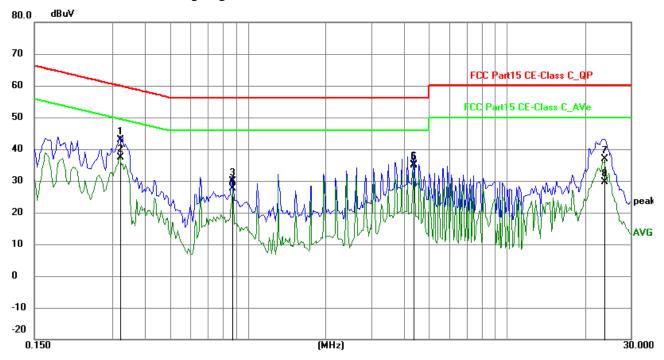
EUT Operating Environment

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	33.23	9.76	42.99	59.67	-16.68	QP	Р
2	0.3215	27.67	9.76	37.43	49.67	-12.24	AVG	Р
3	0.8754	20.16	9.79	29.95	56.00	-26.05	QP	Р
4	0.8754	17.89	9.79	27.68	46.00	-18.32	AVG	Р
5	4.3728	25.07	9.90	34.97	56.00	-21.03	QP	Р
6	4.3728	25.20	9.90	35.10	46.00	-10.90	AVG	Р
7	23.8338	26.03	10.92	36.95	60.00	-23.05	QP	Р
8	23.8338	18.73	10.92	29.65	50.00	-20.35	AVG	Р

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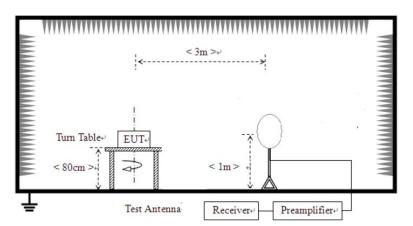


6 Radiated Emission Test

- 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 25 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



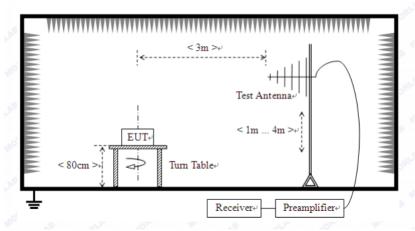
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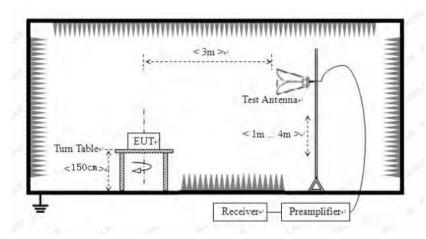
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For radiated emissions from 30MHz to1GHz



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

	<u> </u>	8 1
Frequency Range (MHz)	Distance (m)	Field strength (dB μ V/m)
0.009-0.490	3	20log(2400/F(kHz)) +40log (300/3)
0.490-1.705	3	20log(24000/F(kHz)) +40log (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 (uV)
- 2. In the Above Table, the higher limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT

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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:

No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	66.123	40.29	-13.97	40.0	0.29	Peak	341.00	120	Horizontal	N/A
1*	66.123	36.17	-13.97	40.0	-3.83	QP	341.00	120	Horizontal	Pass
2	141.037	32.44	-17.26	43.5	-11.06	Peak	360.00	120	Horizontal	Pass
3	224.921	41.97	-12.93	46.0	-4.03	Peak	352.00	120	Horizontal	Pass
4	699.860	36.03	-4.20	46.0	-9.97	Peak	310.00	120	Horizontal	Pass
5	900.115	40.73	-1.86	46.0	-5.27	Peak	227.00	120	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:

No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table (o)	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)			(cm)		
1	38.970	38.20	-12.59	40.0	-1.80	Peak	19.00	100	Vertical	Pass
1*	38.970	35.73	-12.59	40.0	-4.27	QP	19.00	100	Vertical	Pass
2	62.729	40.39	-13.30	40.0	0.39	Peak	55.00	100	Vertical	N/A
2*	62.729	35.91	-13.30	40.0	-4.09	QP	55.00	100	Vertical	Pass
3	141.037	36.25	-17.26	43.5	-7.25	Peak	66.00	100	Vertical	Pass
4	224.921	35.61	-12.93	46.0	-10.39	Peak	45.00	100	Vertical	Pass
5	699.860	34.12	-4.20	46.0	-11.88	Peak	0.00	100	Vertical	Pass

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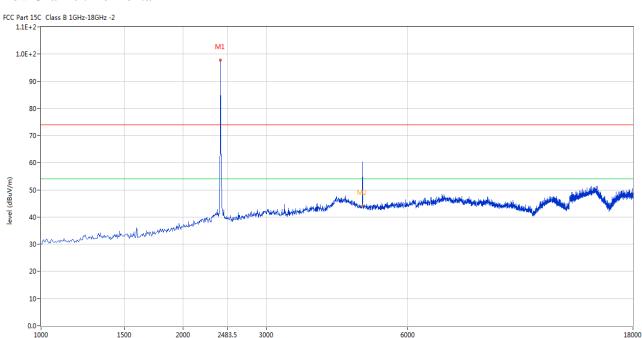
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Please refer to the following test plots for details:

Low Channel: Horizontal



No.	Frequency	Results	Factor	Limit	Over	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	Limit (dB)		(o)	(cm)		
1	2402	97.74	-3.57	74.0	23.74	Peak	152.00	100	Horizontal	N/A
2	4802.799	60.33	3.12	74.0	-13.67	Peak	156.00	100	Horizontal	Pass
2**	4802.799	44.17	3.12	54.0	-9.83	AV	156.00	100	Horizontal	Pass

Frequency (MHz)

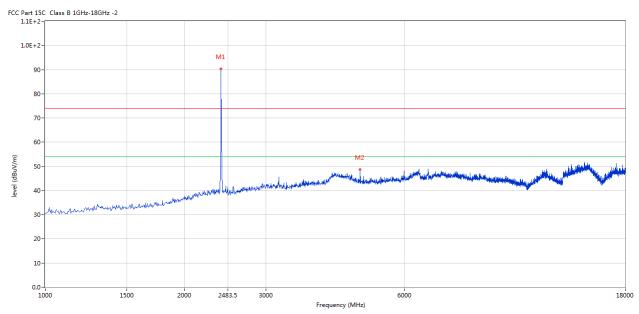
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Low Channel: Vertical



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2402	90.24	-3.57	74.0	16.24	Peak	204.00	100	Vertical	N/A
2	4802.799	48.59	3.12	74.0	-25.41	Peak	176.00	100	Vertical	Pass

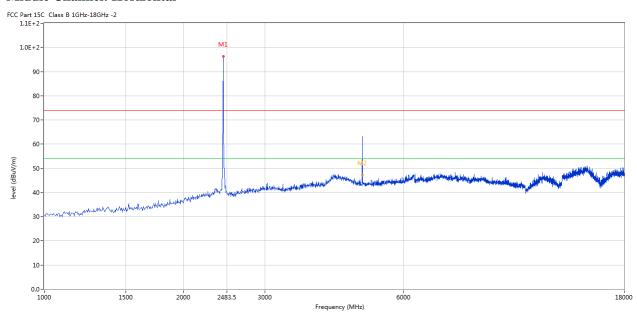
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Middle Channel: Horizontal



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2440	96.40	-3.57	74.0	22.40	Peak	143.00	100	Horizontal	N/A
2	4879.280	63.18	3.20	74.0	-10.82	Peak	147.00	100	Horizontal	Pass
2**	4879.280	47.19	3.20	54.0	-6.81	AV	147.00	100	Horizontal	Pass

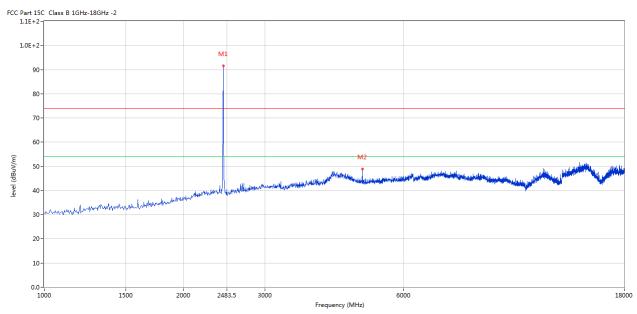
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Middle Channel: Vertical



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2440	91.52	-3.57	74.0	17.52	Peak	174.00	100	Vertical	N/A
2	4879.280	52.93	3.20	74.0	-21.07	Peak	174.00	100	Vertical	Pass

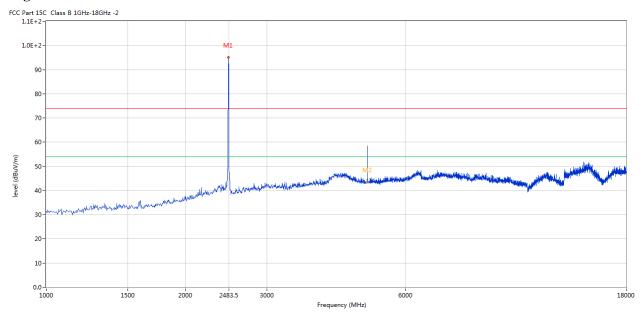
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High Channel: Horizontal



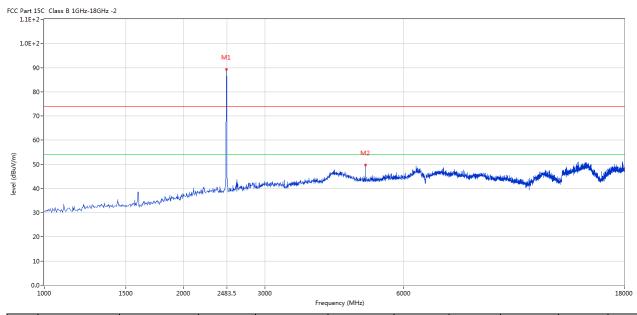
No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2480	95.10	-3.57	74.0	21.10	Peak	214.00	100	Horizontal	N/A
2	4960.010	58.39	3.36	74.0	-15.61	Peak	152.00	100	Horizontal	Pass
2**	4960.010	43.59	3.36	54.0	-10.41	AV	152.00	100	Horizontal	Pass

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High Channel: Vertical



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2480	89.21	-3.57	74.0	15.21	Peak	180.00	100	Vertical	N/A
2	4960.010	49.70	3.36	74.0	-24.30	Peak	188.00	100	Vertical	Pass

Note: 1. Level = Reading + AF + Cable - Preamp

- 2. For the radiated emissions above 18G and below 30MHz, it is the floor noise.
- 3. The measured PK value less than the AV limit, no necessary to take down the AV measurement result.
- 4. A 2.4G Band filter used radiated emission measurement

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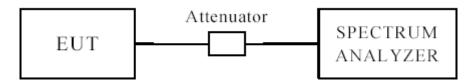
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7.0 6dB Bandwidth Measurement

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 x 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

Data Rate: 1Mbps

EUT	(Outdoor LoraWA	AN Gateway	Model		DS	SGW-010C
Mode		Keep Trans	mitting	Input Voltage	e		DC48V
Temperat	mperature 24 de		eg. C, Humidity				56% RH
Channel	Chanı	nel Frequency (MHz)	v 42 2.	nndwidth Hz)	M	inimum Limit (kHz)	Pass/ Fail
Low		2402	7:	21	0.5		Pass
Middle	Middle 2440		721			0.5	Pass
High	High 2480		721			0.5	Pass

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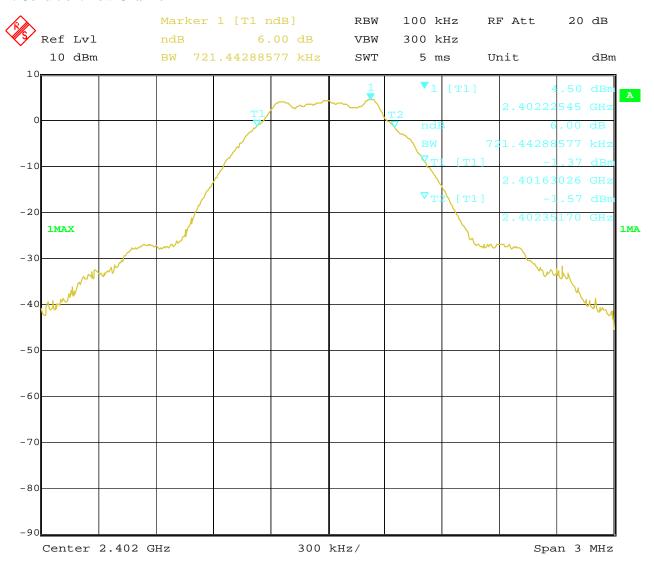
Report No.: TW2203419-01E

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Test Figure:

1. Condition: Low Channel



Date: 19.APR.2022 19:36:17

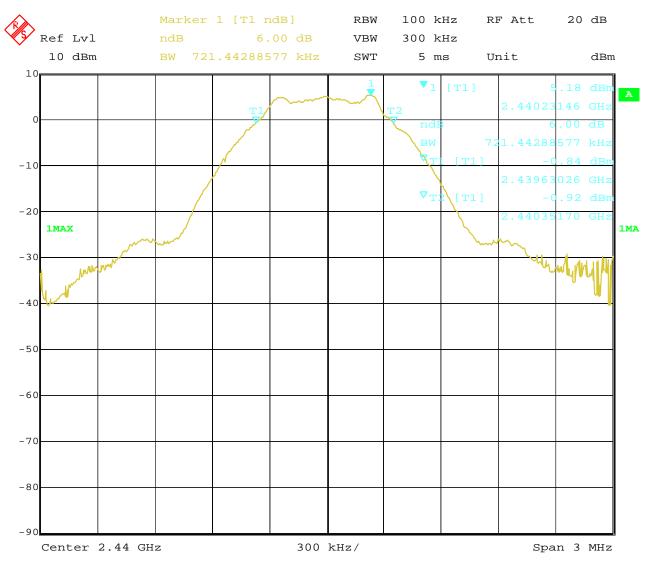
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2. Condition: Middle Channel



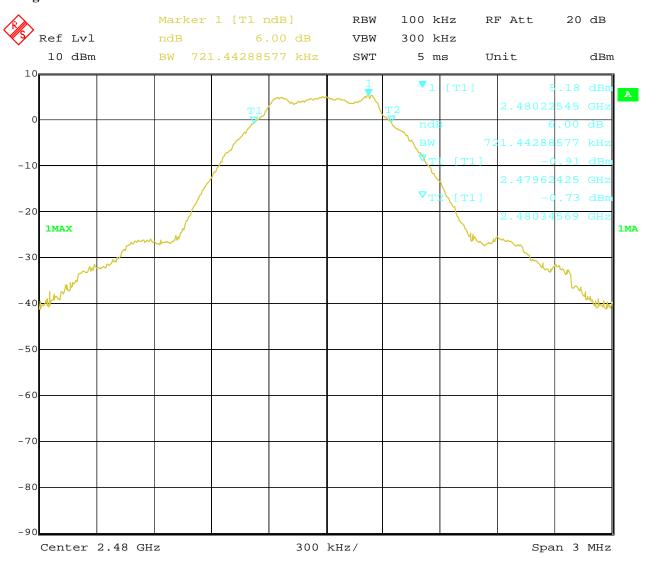
Date: 19.APR.2022 19:41:46

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3. High Channel



Date: 19.APR.2022 19:43:23

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Data Rate: 2Mbps

EUT		Outdoor LoraW	AN Gateway	Model		D	SGW-010C
Mode		Keep Trans	smitting	Input Voltag	e		DC48V
Temperat	Temperature 24 de		. C,	Humidity			56% RH
Channel	Ch	annel Frequency (MHz)		andwidth Hz)	M	inimum Limit (kHz)	Pass/ Fail
Low		2402	20)94	0.5		Pass
Middle	Middle 2440		2104			0.5	Pass
High 2480		2104			0.5	Pass	

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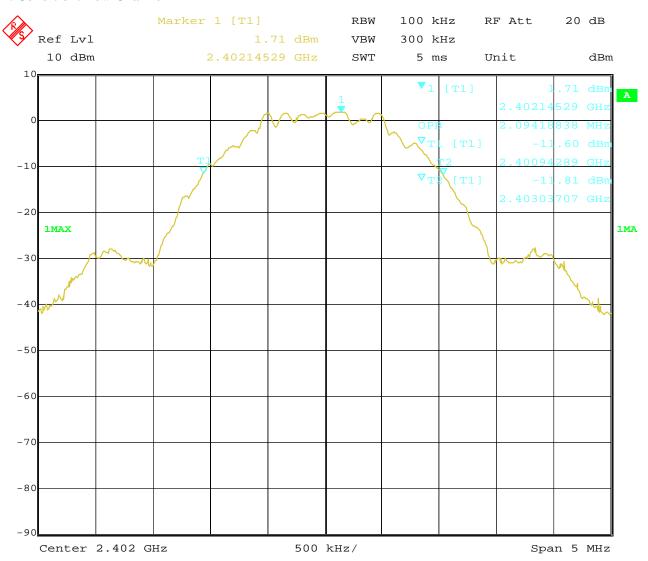
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Test Figure:

1. Condition: Low Channel



Date: 22.APR.2022 11:22:46

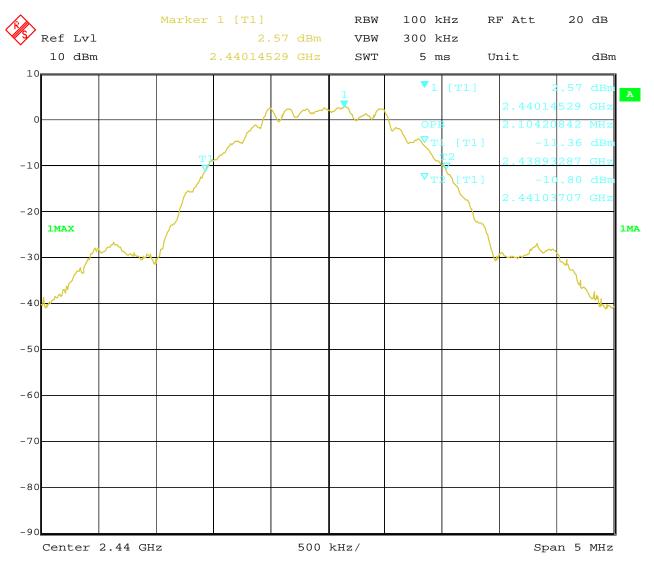
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2. Condition: Middle Channel



Date: 22.APR.2022 11:24:44

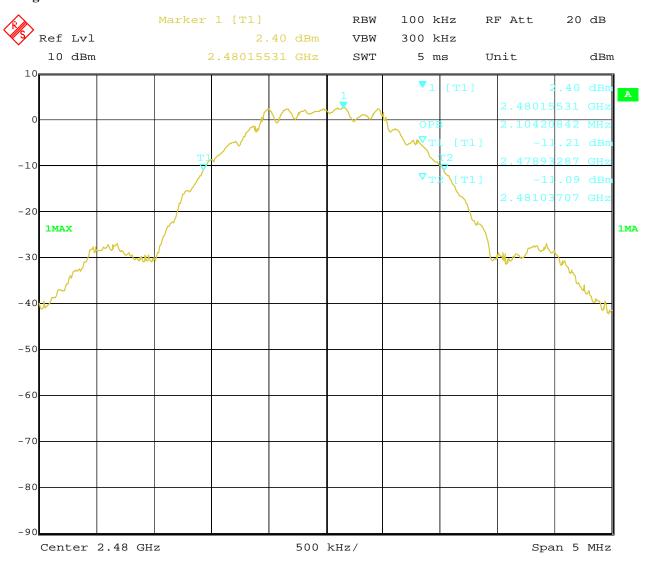
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3. High Channel



Date: 22.APR.2022 11:29:41

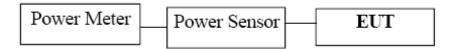
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8. Maximum Output Power

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 Peak power were measured.

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8.4Test Results

Data Rate: 1Mbps

EUT		Outdoor Lora Gatewa		Model		DSGW-01	0C
Mode		Keep Transm	nitting	Input Voltage		DC48V	7
Temperatu	ure 24 deg. C		Ξ,	Humidity		56% RI	H
Channel	Cł	nannel Frequency	Max. Power Output (dBm		m)	Peak Power Limit	Pass/ Fail
		(MHz)		Peak		(dBm)	
Low		2402		4.80		30	Pass
Middle	dle 2440		5.53		30	Pass	
High	High 2480		5.47		30	Pass	

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

Max. Power Output = Power Reading + Cable loss + Attenuator

Data Rate: 2Mbps

EUT		Outdoor Lora Gateway		Model		DSGW-010C			
Mode		Keep Transm	nitting			DC48V	7		
Temperatu	re	24 deg. (g. C, Humidity			56% RH			
Channel	Cł	nannel Frequency	Max	x. Power Output (dB:	m)	Peak Power Limit	Pass/ Fail		
Chamici		(MHz)		Peak		(dBm)			
Low		2402		4.60		30	Pass		
Middle		2440	5.33		5.33			30	Pass
High		2480	5.32			30	Pass		

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

Max. Power Output = Power Reading + Cable loss + Attenuator

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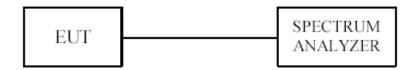
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9. Power Spectral Density Measurement

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 = 10 kHz.
- 3. Set the VBW \geq 30 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 $\leq 8 \text{ dBm/3kHz}$.

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9.4Test Result

Data Rate: 1Mbps

EUT		Outdoor LoraWAN Gateway			Model		DSGW-010C	
Mode		Keep Transmitting			Input Voltage		DC48V	
Temperature		24 deg. C,			Humidity		56% RH	
	Peak Power		Cable	Final Power Spectral		Max	ximum	
Channel	Reading		Loss	Density		Limit		Pass/ Fail
	(dBm)		(dB)	(dBm/10kHz)		(dBm/3kHz)		
Low	-4.45		0.2	-4.25		8		Pass
Middle	-3.72		0.2	-	-3.52		8	Pass
High	-3.76		0.2	-	-3.56		8	Pass

Note: The result basic equation calculation as follow:

Peak Power Output = Peak Power Reading + Cable loss

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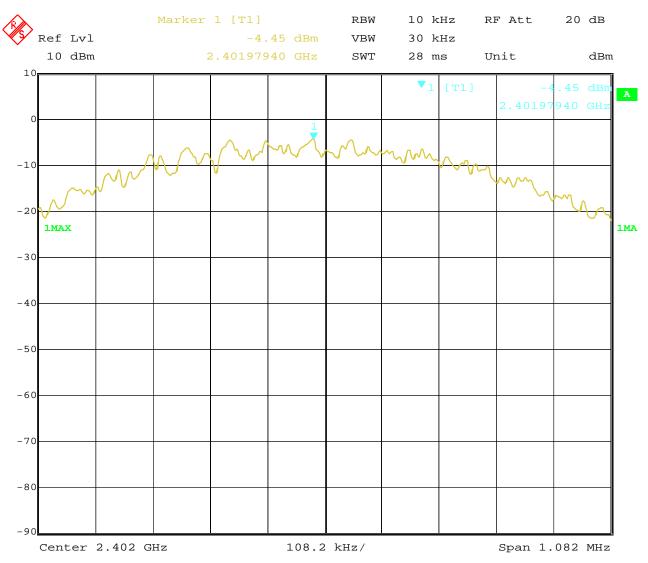
Report No.: TW2203419-01E

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Test Figure:

1. Condition: Low Channel



Date: 19.APR.2022 19:46:07

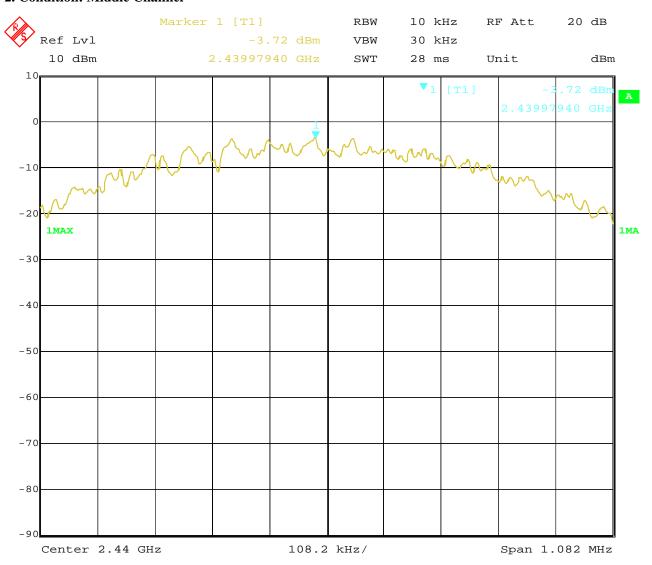
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2. Condition: Middle Channel



Date: 19.APR.2022 19:46:54

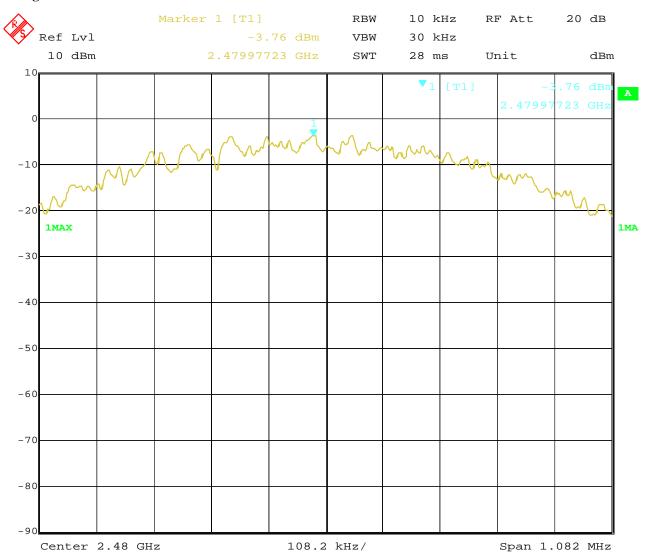
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3. High Channel



Date: 19.APR.2022 19:47:20

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Data Rate: 2Mbps

EUT	UT Outdoor LoraWAN C			Gateway	y Model		D	SGW-010C
Mode		Ke	ep Transmitt	ting Input Voltage		age		DC48V
Temperat	ure		24 deg. C,		Humidit	y		56% RH
	Peak	Power	Cable	Final Po	wer Spectral	Max	ximum	
Channel	Re	ading	Loss	Density		Limit		Pass/ Fail
	(d	lBm)	(dB)	(dBm/10kHz)		(dBm/3kHz)		
Low	Low -8.17 0.2		-7.97		8		Pass	
Middle	-'	7.48	0.2	-	-7.28	8		Pass
High	-'	7.38	0.2	-	-7.18		8	Pass

Note: The result basic equation calculation as follow:

Peak Power Output = Peak Power Reading + Cable loss

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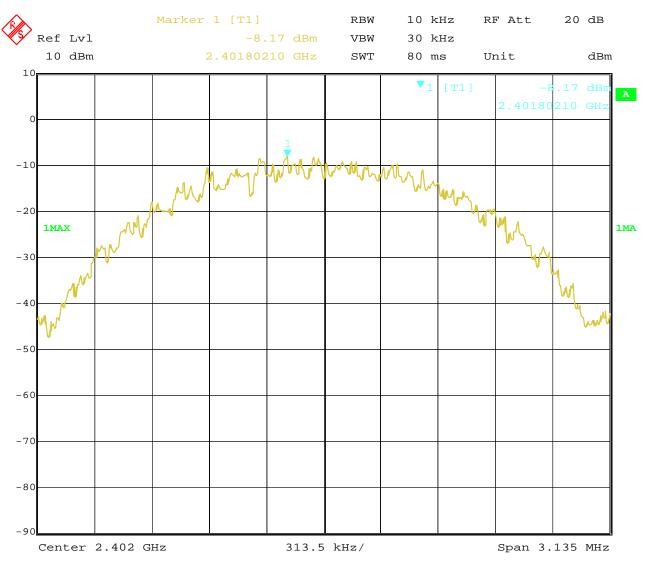
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Test Figure:

1. Condition: Low Channel



Date: 22.APR.2022 11:33:23

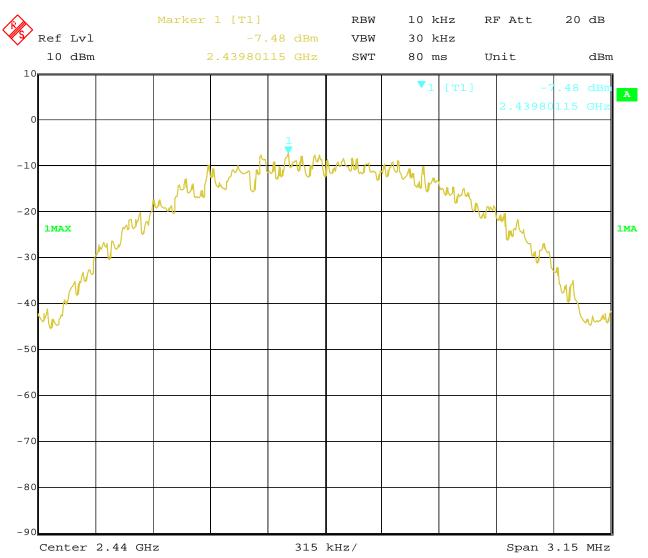
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2. Condition: Middle Channel



Date: 22.APR.2022 11:34:26

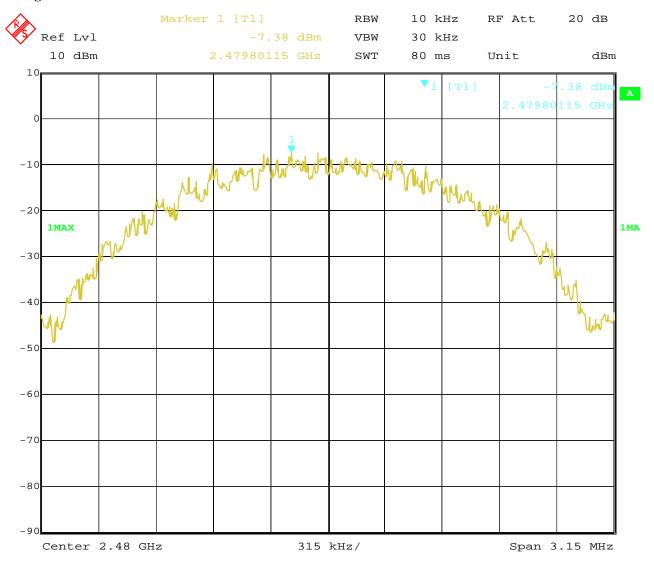
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3. High Channel



Date: 22.APR.2022 11:35:05

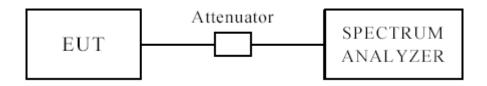
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10 Out of Band Measurement 10.1 Test Setup for band edge



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 2.4-2.483GHz allocated band a measurement was made of Radiated emission test. (Peak values with RBW=1MHz, VBW=3MHz and PK detector. AV value with RBW=1MHz, VBW=3MHz and RMS 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: For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule.

Date: 2022-05-16

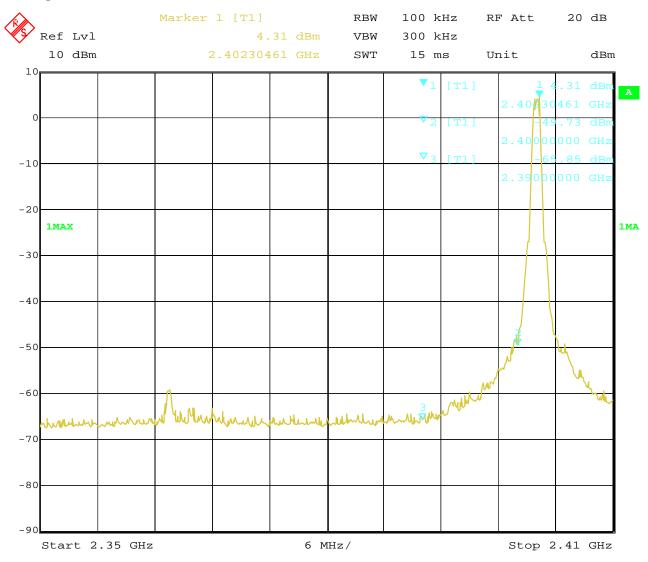


Data Rate: 1Mbps

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:



Date: 19.APR.2022 19:48:48

Date: 2022-05-16

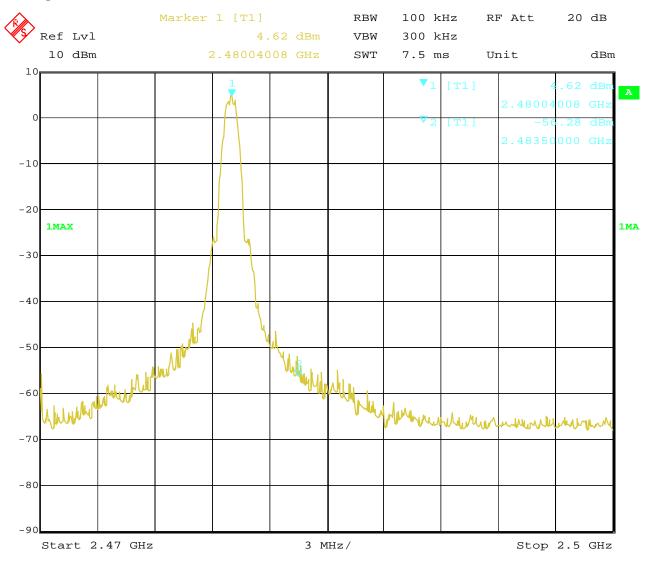


Data Rate: 1Mbps

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:



Date: 19.APR.2022 19:48:04

Date: 2022-05-16

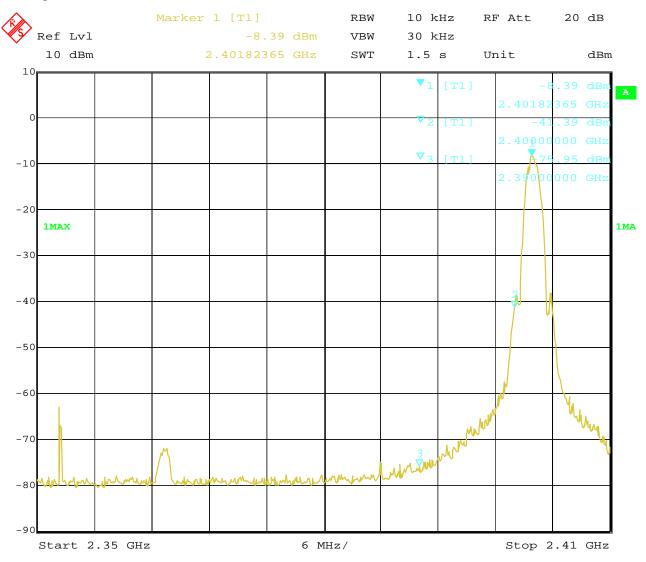


Data Rate: 2Mbps

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:



Date: 22.APR.2022 11:36:50

Date: 2022-05-16

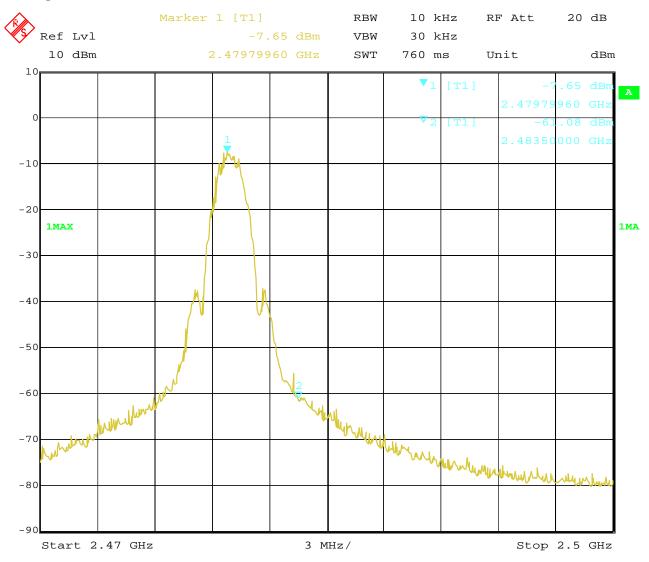


Data Rate: 2Mbps

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:



Date: 22.APR.2022 11:35:34

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10.4 Restrict Band Measurement

	EUT	Outdoor LoraWAN Gateway						DSGW-010C			
	Mode	Keep Transmitting			Input Voltage		DC48V				
Те	mperature				Humidity		56% RH				
Те	est Result:		Pass								
C Part 1	.5C Class B 1GHz-18GHz	-2		<u> </u>							
1.0E+									M1		
9	0-										
8	0-										
7	0-								$\overline{}$		
_	0-							M ₂	-		
6											
	O-lines had all and any old Ale	ide and the part of the second	elisagens all a d issaide de la c	iti de altre dispersabilità con diferenti,	andre i benedicina altre e mai de la la	M3	A September 1	Wildelight of the Control of the Con	Variable 1	white the state of	
3	O-line to the state and the state of the sta	isila eessa maka ferka haynda yila saami	odinagon nadda Afrikaldidadad	literature parties en estimatica de	dangkan debenseryt en jept debyt ten art gebebebel.	M3	and the second s	o englishedishe	- Voya	al-thaling.	
3 2		taling constant facility beautiful and an annual section of the se	ntinggen in Dinglis it didelede n	ita da jara partima antikari	india jalaa vartaajynisidii saarjabidad	M3	and the second property of the second propert	ang bank o	- Anaph	al-thalings.	
5 4 3 2		ishin canamatan (antambayata di Assania	odinagyon indda affiy atilladariya	Market apparties and have	Frequency (MHz)	M3	Andrew Property of the Annual Property of the	ang bakkara	- Variable Control of the Control of	2410	
5 4 3 2 1		Results	Factor	Limit		Detector	Table	Height	ANT	2410	
. 5 . 4 . 3 . 2 . 1	0 - Internal and a second of the second of t	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Frequency (MHz)					2410	
3 2 1 0.	o-line line line line line line line line				Frequency (MHz) Over Limit		Table	Height		2410	
3 3 2 1 0.	o-line line and the line and th	(dBuV/m)	(dB)	(dBuV/m)	Frequency (MHz) Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	2410 Verdic	
5 4 3 2	Frequency (MHz)	(dBuV/m) 97.30	(dB) -3.57	(dBuV/m) 74.0	Over Limit (dB) 23.30	Detector Peak	Table (o) 159.00	Height (cm)	ANT Horizontal	verdic	

Note: The measured PK value less than the AV limit, no necessary to take down the AV measurement result.

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10.4 Restrict Band Measurement

EUT		Outdoor LoraWAN Gateway		Mode	Model		DSGV	V-010C			
Mode		Kee	p Transmitt	ting	Input Vol	ltage		DC	48V		
Te	mperature	24 deg. C,			Humidity			56% RH			
Te	est Result:		Pass								
Part 1	15C Class B 1GHz-18GHz -	2				•					
1.0E+											
								M1	L		
9	10-										
8	60-										
7	70-								$\overline{}$		
								/	-		
6	-00										
5	00-	المعادية والمعادلة والمعاد	المرابع المارية	or defendance, had a labera.	المرادان والمراد والمراد والمرادان و	M3	ويتل أورابه أحداث عراقه بهم يهو	M2	The appropriate in the second	talan pa	
34	0-	Likado, iriquelechi idi eyeridy nizadism	سرطعماري الخالج فاريخا بإديبيال	المراجعة الم	المراد ال	M3	_{daga} na awa bayah ku	M2	Magnifie	ngriloù-khil	
5 4 3 2 1		Lineary separative adjustant metalogism	a sheel a dhiba dheedharadh		equency (MHz)	M3	horas and shake	M2	Western	2410	
5 4 4 3 2 1 1 0 0 d		Results	Factor			Detector	Table	Height	ANT	2410	
5 4 4 3 2 1 1 0 0 s	00-			Fn	equency (MHz)	The second secon				2410	
5 4 4 3 2 1 1 0.	00- 00- 00- 00- 00- 00- 00- 00- 00- 00-	Results	Factor	Fn Limit	equency (MHz) Over Limit	The second secon	Table	Height		2410	
50 44 3 2 2 1 1 0.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	equency (MHz) Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	verdic	
56 44 36 26 10	Frequency (MHz) 2402.082	Results (dBuV/m) 90.35	Factor (dB) -3.57	Limit (dBuV/m) 74.0	Over Limit (dB) 16.35	Detector Peak	Table (o) 188.00	Height (cm)	ANT Vertical	verdic	

Note: The measured PK value less than the AV limit, no necessary to take down the AV measurement result.

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10.4 Restrict Band Measurement

	EUT	Outdoor Lo	oraWAN (Gateway	Model			DSGV	W-010C	
	Mode		Keep Transmitting		Input Volta	nge			248V	
Те	emperature	24 deg. C,			Humidit					
	est Result:		Pass		<u> </u>					
CC Part 1.1E-	15C Class B 1GHz-18GHz	-2								
1.0E+	+2-									
9	90-									
;	во-									
	70-									
	50 -	/								
	20-	The state of the s			A CONTRACTOR OF THE PARTY AND A	HARLES HARLES	L. n			
	50 -	Mary Constitution of the State		M2 •	A STATE OF THE PARTY OF THE PAR	history and the second	hosterial de company d	A Service and the service of the ser	رورا ريامة لرس والمرافعة ليتروز التناويخين	ll de
level (dBuV/m)	40-	The second secon		M2 •	Andrews year and	Water plant the William Party State of the Willi	hadding had been been been been been been been bee	the state of the state of a state of the sta		halvajt
level (dBuV/m)	30-			M2 •	And the state of t	tine di Antonia di Ant	hodenkurski engelsking	hidenside of a significant design	annani assa kalendari kalendari kalendari kalendari kalendari kalendari kalendari kalendari kalendari kalendar	Hadrigh
level (dBuV/m)	40			M2 •	And the state of t	A CONTRACTOR OF THE CONTRACTOR	hadinika wilah sapati dalam	ikation niki kanista pirka njek kanasa tr	anne de son displacificado de del reduc	h-ak-uft
level (dBuV/m)	30-			M2 •	And the second second second	And the state of t	hadarahaan da ay	alaman da parte de la part	o de la companya de	
level (dBuV/m)	40			M2 •	3.5	history of the source of the s	hadan kanada da kana	harmala parte pira para para para para para para para	and the state of t	2500
level (dBuV/m)	40			248	3.5 Frequency (MHz)					2500
level (dBuV/m)	40- 30- 20- 10- 2470 Frequency	Results	Factor	248	3.5 Frequency (MHz) Over Limit	Detector	Table	Height	ANT	
(m/vmgb) level	60- 20- 10- 2470 Frequency (MHz)	(dBuV/m)	(dB)	Limit (dBuV/m)	3.5 Frequency (MHz) Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	2500 Verdict
level (dBuV/m)	40- 30- 20- 10- 2470 Frequency			248	3.5 Frequency (MHz) Over Limit	Detector Peak	Table	Height		2500
(m/vmgb) level	60- 20- 10- 2470 Frequency (MHz)	(dBuV/m)	(dB)	Limit (dBuV/m)	3.5 Frequency (MHz) Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	2500 Verdict

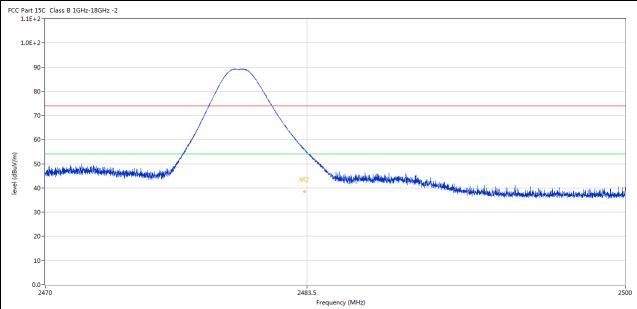
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10.4 Restrict Band Measurement

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



No.	Frequency	Results	Factor	Limit	Over Limit	Detector	Table	Height	ANT	Verdict
	(MHz)	(dBuV/m)	(dB)	(dBuV/m)	(dB)		(o)	(cm)		
1	2480.062	89.29	-3.57	74.0	15.29	Peak	186.00	100	Vertical	N/A
2	2483.369	56.00	-3.57	74.0	-18.00	Peak	181.00	100	Vertical	Pass
2**	2483.369	38.50	-3.57	54.0	-15.50	AV	181.00	100	Vertical	Pass

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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 mount 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 2.80dBi (Declared by the manufacturer)

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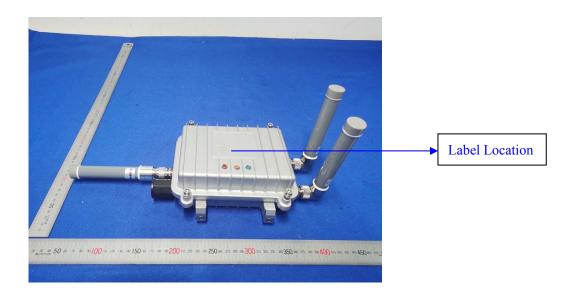
12.0 FCC ID Label

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

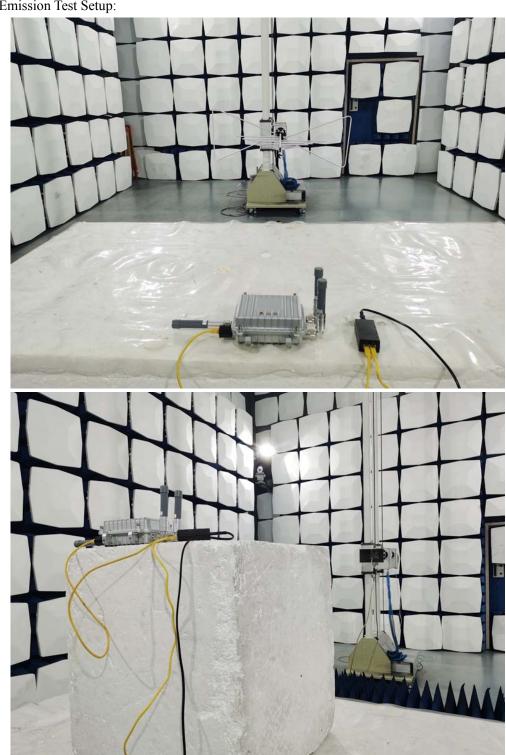
Conducted Emission Test Setup:



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Radiated Emission Test Setup:



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Photographs – EUT

Outside View



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In the event of the improper use of the report. The SHENZHEN TIMEWAY TESTING LABORATORIES. reserves the rights to withdraw it and to

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Outside View



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Outside View



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Inside View





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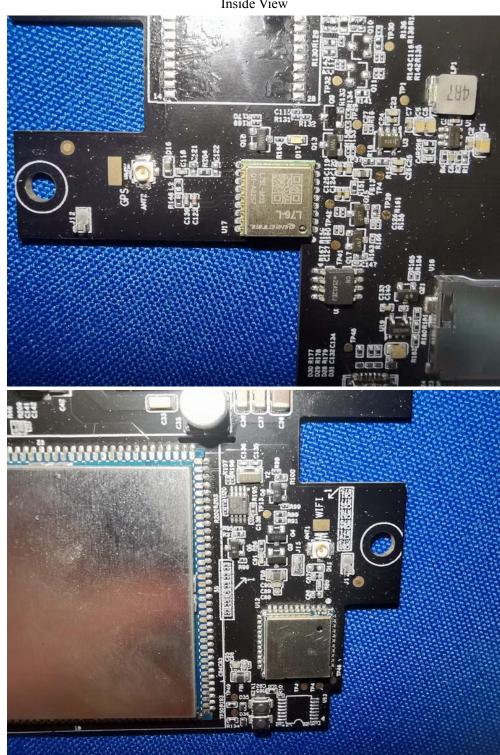
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Inside View



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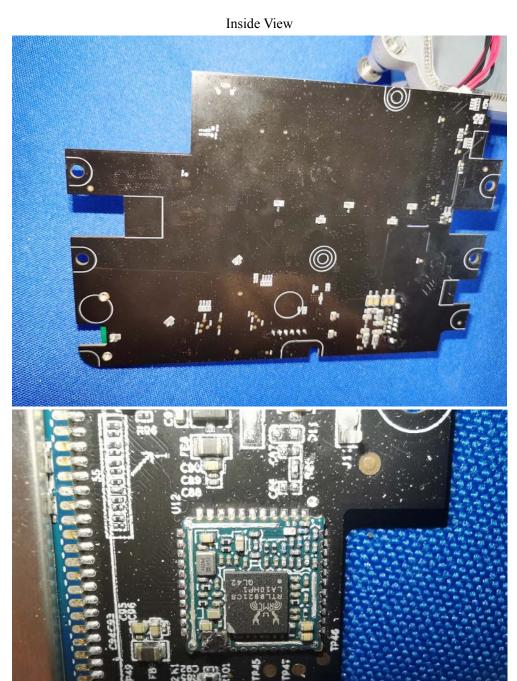
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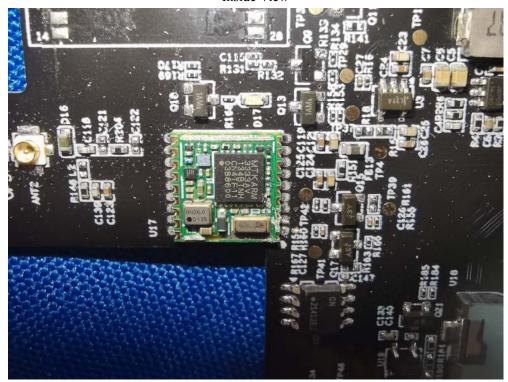
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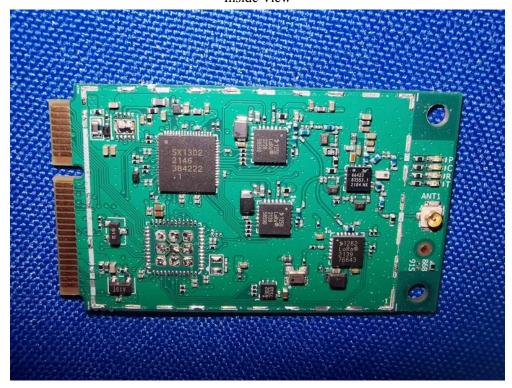
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End of the report