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Test Report S/N: LR500172302R

Test Site : LTA CO., LTD.

## JAPAN MIC Test Report

Equipment Under Test	Hwajeon-Japan.,llc
Modle Name	6516
Serial Number	N/A
Applicant	Hwajeon-Japan.,llc
Manufacturer	Traxxas
Date of Test(s)	December 01, 2022 ~ February 15, 2023
Date of Issue	December 12, 2022

This test report is prepared according to the requirements of ISO / IEC 17025.

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

Issue to	Issue by
<b>Hwajeon-Japan.,llc</b>  <b>Hwa Jeon Building 5th, 237, Wonhyo-ro, Yongsan-gu, Seoul, Republic of Korea</b>  <b>Tel: +82-10-3698-0528</b> <b>Fax: +82-31-376-6456</b>	<b>LTA</b>  <b>243 Jubug-Ri, Yangji-Myeon, Yongin-Si, Gyeonggi-Do, Korea 17159</b>  <b>Tel: +82-31-444-7270</b> <b>Fax: +82-31-444-7271</b>

This test report is issued under the authority of:

The test was supervised by:

*JaBeom.Koo*

*延正*

Ja-Beom Koo, Manager

Jae-Hum Yeon, Test Engineer

**Revision history**

Revision	Date of issue	Description	Revised by
--	February 15 ,2022	Initial	-

## **TABLE OF CONTENTS**

1.	Applicant Information-----	4
2.	Summary of test results-----	5
3.	Frequency tolerance-----	6
4.	Occupied bandwidth (99%) & Spread Bandwidth (90%)-----	8
5.	Antenna power-----	11
6.	Unwanted emission strength-----	12
7.	RX spurious emission-----	17
8.	Interference prevention function-----	19
9.	CONSTRUCTION PROTECTION CONFIRMATION METHOD-----	20
	Test Photo -----	21
	APPENDIX -----	22
	APPENDIX TEST EQUIPMENT USED FOR TESTS-----	22

## 1. Applicant Information

### 1.1. Details of applicant

Applicant : Hwajeon-Japan.,llc  
Address : Hwa Jeon Building 5th, 237, Wonhyo-ro, Yongsan-gu, Seoul, Republic of Korea  
TEL / FAX : +82-02-704-7341 / +82-02-704-7341

### 1.2. Manufacturer Information

Manufacturer : Traxxas  
Address : 6250 Traxxas Way McKinney, TX 75070  
TEL / FAX : (972) 549-3000 / (972) 549-3011

### 1.3. EUT Description

Kind of product	TQ Transmitter
Model name	6516
Serial Number	N/A
Power supply	DC 6 V
Frequency range	2 406 MHz ~ 2 453 MHz
RF output power	0.0015 W
Moduleation technique	F1D
Number of channels	48 ch.
Antenna gain	PCB Pattern Antenna (Max Gain : 0.8 dBi)

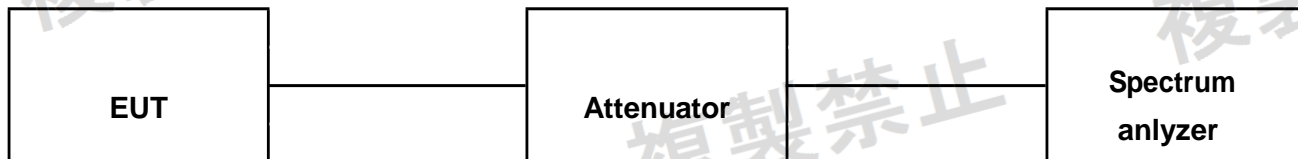
## 2. Summary of Test results

The EUT has been tested according to the following specifications

Section in Radio equipment regulations	Description of Test	Results
RE 5 Table No. 1	Frequency Tolerance	C
RE 6 Table No. 2	Occupied Bandwidth (99%) & Spread Bandwidth (90%)	C
RE 14, RE 49.20	Antenna power	C
RE 7	Unwanted emission strength	C
RE 24	RX spurious emission	C
RE 11	Dwell Time	C
RLE 6-2, RE 9-4	Interference Prevention Function	C
<u>Note 1</u> : C=Complies    NC=Not Complies    NT=Not Tested    NA=Not Applicable		
Standard: Article 2, Paragraph 1, item 19.		

### 3. Frequency tolerance

#### 3.1 Test setup



#### 3.2 Limit

$\pm 50 \times 10^{-6}$  (50 ppm or below)

#### 3.3 Test procedure

The transmitter output is connected to the Spectrum analyzer	
Setting the spectrum analyzer is as follows.	
Center frequency	Operating frequency
Resolution BW	10 kHz
Video BW	10 kHz
Span	1 MHz
Sweep time	Auto
Detector mode	Positive peak
Trace mode	Max. hold



**3.4 Test results**

Ambient temperature: 24℃ Relative humidity: 50% R.H

Test mode : 2.4 GHz

Test voltage	Test voltage (DC)	Measured value (MHz)	Tolerance (ppm)	Result	Limit
Normal Voltage	Low frequency	2406.0149	6.19	Pass	± 50 ppm
	Middle frequency	2429.0217	8.93	Pass	
	High frequency	2453.0185	7.54	Pass	
Low Voltage	Low frequency	2406.0161	6.69	Pass	
	Middle frequency	2429.0233	9.59	Pass	
	High frequency	2453.0194	7.91	Pass	
High Voltage	Low frequency	2406.0175	7.27	Pass	
	Middle frequency	2429.0241	9.92	Pass	
	High frequency	2453.0205	8.36	Pass	

**\* Remark**

$$FT \text{ (ppm)} = [(Measured \text{ value (MHz)} - Operating \text{ frequency (MHz)}) / Operating \text{ frequency (MHz)}] \times 10^6$$

## 4. Occupied bandwidth (99%) & Spread Bandwidth (90%)

### 4.1 Test setup



### 4.2 Limit

Occupied Bandwidth (99%):	26 MHz or less
Spread Bandwidth (90%)	500 kHz more

### 4.3 Test procedure

The transmitter output is connected to the Spectrum analyzer	
Setting the spectrum analyzer is as follows.	
Center frequency	Operating frequency
Resolution BW	300 KHz
Video BW	300 KHz
Span	5 MHz
Sweep time	Auto
Detector mode	Positive peak
Trace mode	Max. hold



**4.4 Test results**Ambient temperature: 24 °C Relative humidity: 50% R.H.

Test mode : 2.4 GHz

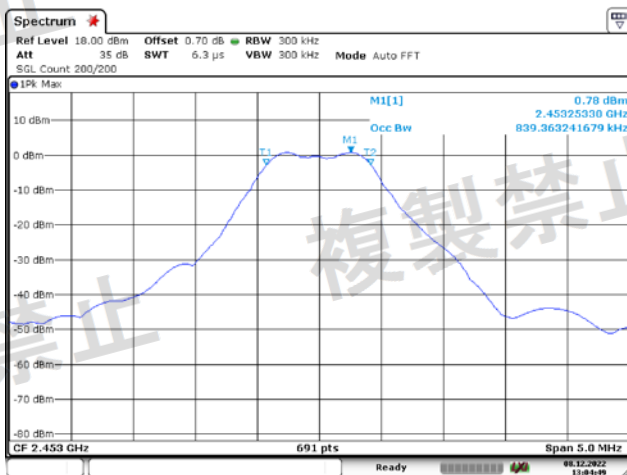
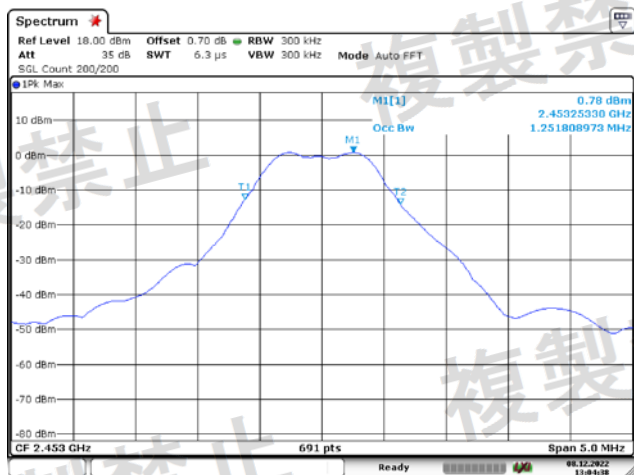
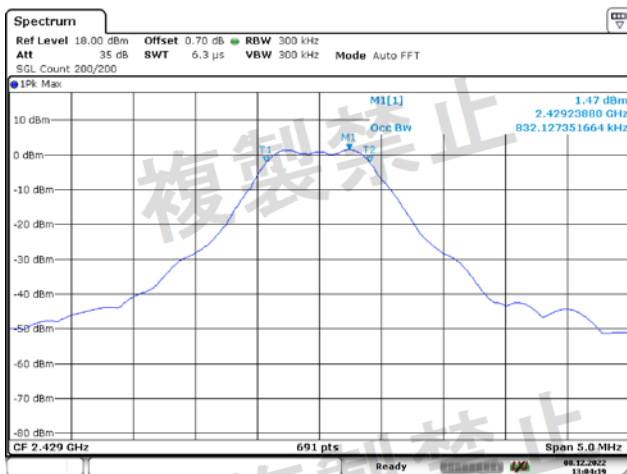
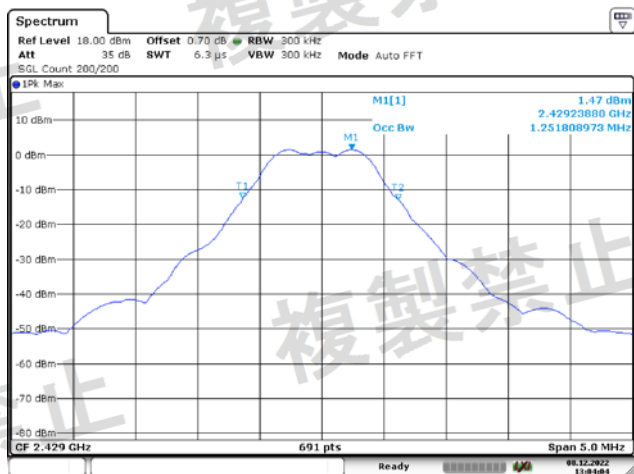
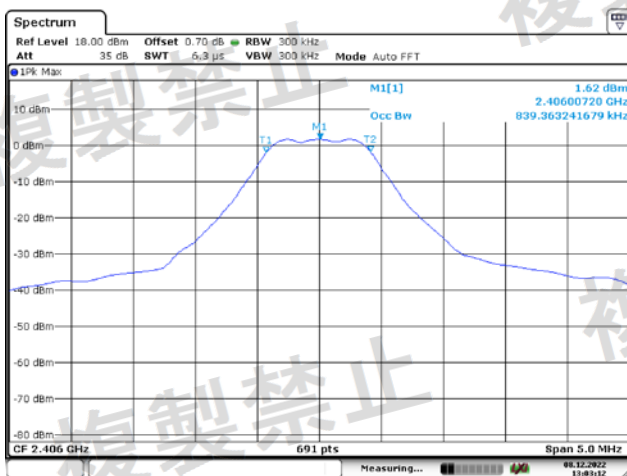
Test voltage	2,406 MHz	2,429 MHz	2,453 MHz	Result	Limit
	99% (MHz)	99% (MHz)	99% (MHz)		
6.6 (V)	1.21	1.25	1.25	Pass	26 MHz or less
6.0 (V)	1.21	1.25	1.25	Pass	
5.4 (V)	1.22	1.25	1.25	Pass	
Test	90% (MHz)	90% (MHz)	90% (MHz)		
6.6 (V)	0.84	0.83	0.84	Pass	500 kHz or more
6.0 (V)	0.84	0.83	0.84	Pass	
5.4 (V)	0.84	0.84	0.84	Pass	

## Test Mode : 2.4 GHz / CH01,CH20,CH40 (Nomal Voltage)\_Right

99 % OBW



90 % OBW



## 5. Antenna power

### 5.1 Test setup



### 5.2 Limit

Output power: 0.01 W or Below

Output power tolerance: Maximum +20 %, Minimum -80 %

### 5.3 Test procedure

1. The transmitter output is connected to the Power meter
2. Setting the EUT is operating frequency.

### 5.4 Test results

Ambient temperature: 24℃ Relative humidity: 50% R.H.

Test mode : 2.4 GHz

Result : Pass

Test voltage (DC)	Frequency (MHz)	Measure value	Power tolerance(%)
		(mW)	
6.6 (V)	2 406	1.45	-3.42
	2 429	1.39	-7.12
	2 453	1.21	-19.48
6.0 (V)	2 406	1.46	-2.52
	2 429	1.41	-6.05
	2 453	1.21	-19.11
5.4 (V)	2 406	1.48	-1.39
	2 429	1.42	-5.18
	2 453	1.22	-18.55
Declared power(W)		0.0015 ( 0.0018 ~ 0.0003)	
Antenna gain(dBi)		0.8 dBi	
Limit		-80 ~ 20 %	

Remark: Power tolerance (%) = {[Output power- Declared power] ÷ Declared power} ×100

## 6. Unwanted emission strength

### 6.1 Test setup



### 6.2 Limit

Spurious Emission / Unwanted Emission Strength, Spurious area	30MHz - 2387MHz ; 2.5 $\mu$ W/MHz or less
	2387MHz - 2400MHz ; 25 $\mu$ W/MHz or less
	2483.5MHz - 2496.5MHz ; 25 $\mu$ W/MHz or less
	2496.5MHz - 12.5GHz ; 2.5 $\mu$ W/MHz or less

### 6.3 Test procedure

1. Connect transmitter output to the spectrum analyzer input port.
2. The EUT should be transmitting at hopping mode
3. Unwanted emission strength is measured by following setting:
4. Set the spectrum analyzer RBW: 1 MHz, VBW: same as RBW  
Sweep time : auto, Start : 30 MHz, Stop : 2387 MHz. Sweep mode: single and mark highest level.
5. Set the spectrum analyzer RBW: 1 MHz, VBW: 1 MHz, Sweep time: auto, Start: 2 387 MHz, Stop: 2 400 MHz. Sweep mode: single and mark highest level.
6. Set the spectrum analyzer RBW: 1 MHz, VBW: 1 MHz, Sweep time: auto, Start: 2 483.5 MHz, Stop: 2 496.5 MHz Sweep mode: single and mark highest level.
7. Set the spectrum analyzer RBW: 1 MHz, VBW: 1 MHz, Sweep time: auto, Start: 2 496.5 MHz, Stop: 12.5 GHz. Sweep mode: single and mark highest level.
8. Detector mode: Peak mode.

## 6.4 Test results

Ambient temperature: 24℃ Relative humidity: 50% R.H.

Result : Pass

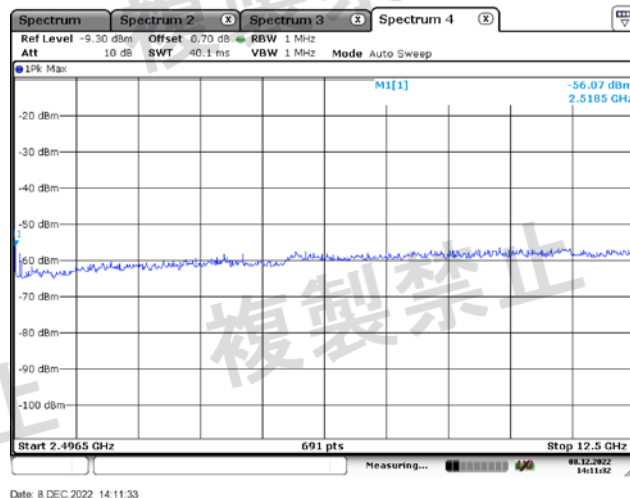
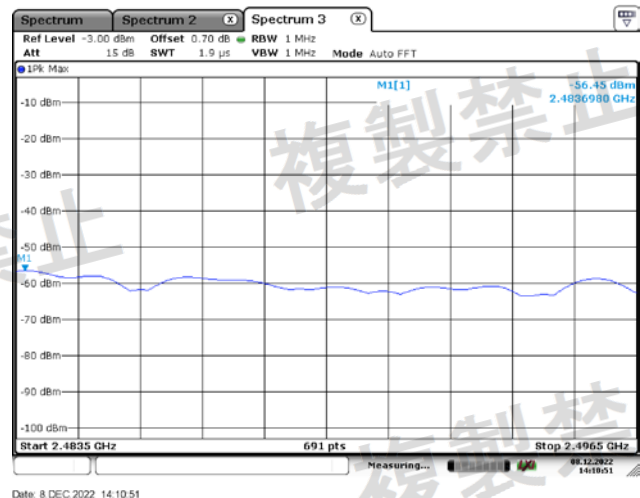
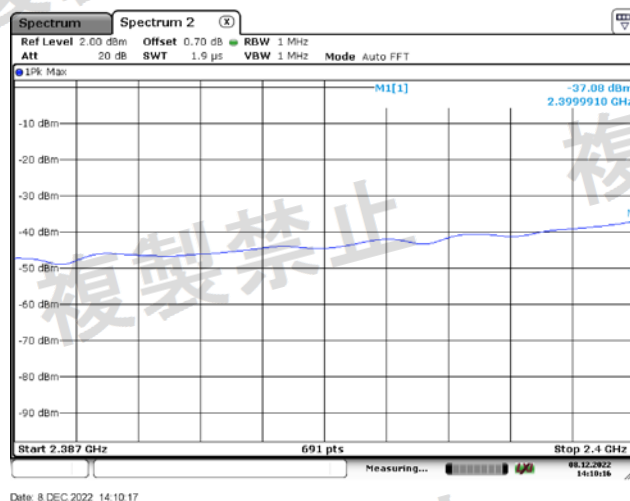
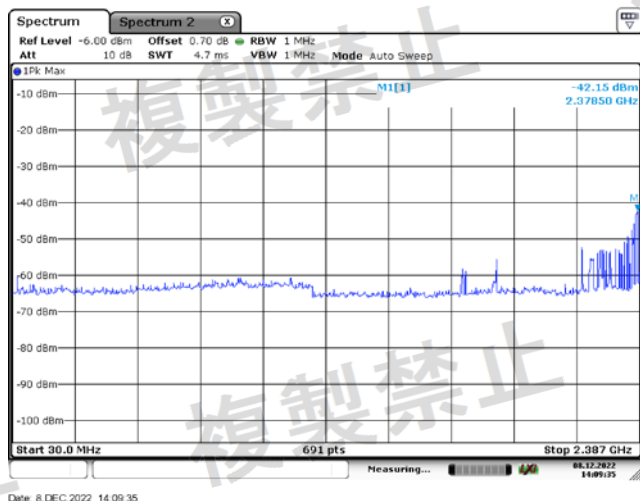
mode : 2.4 GHz

Voltage	Frequency	Frequency Range	Result			Limit
V	MHz	MHz	MHz	dBm	uW	uW
<b>-10 % (DC 5.4 V)</b>	<b>2402</b>	30 ~ 2387	2378.78	-42.05	0.0624	2.5
		2387 ~ 2400	2398.27	-36.98	0.2007	25
		2483.5 ~ 2496.5	2484.28	-56.39	0.0023	25
		2496.5 ~ 12500	2519.05	-56.00	0.0025	2.5
	<b>2442</b>	30 ~ 2387	2167.52	-44.73	0.0336	2.5
		2387 ~ 2400	2395.51	-41.84	0.0654	25
		2483.5 ~ 2496.5	2486.97	-49.75	0.0106	25
		2496.5 ~ 12500	2518.79	-53.58	0.0044	2.5
	<b>2480</b>	30 ~ 2387	2167.38	-43.39	0.0459	2.5
		2387 ~ 2400	2391.19	-49.56	0.0111	25
		2483.5 ~ 2496.5	2484.32	-46.66	0.0216	25
		2496.5 ~ 12500	2532.68	-53.61	0.0044	2.5
<b>0 % (DC 6.0 V)</b>	<b>2402</b>	30 ~ 2387	2378.50	-42.15	0.0610	2.5
		2387 ~ 2400	2399.99	-37.08	0.1959	25
		2483.5 ~ 2496.5	2483.70	-56.45	0.0023	25
		2496.5 ~ 12500	2518.50	-56.07	0.0025	2.5
	<b>2442</b>	30 ~ 2387	2167.00	-44.83	0.0329	2.5
		2387 ~ 2400	2399.99	-41.94	0.0640	25
		2483.5 ~ 2496.5	2486.46	-49.94	0.0101	25
		2496.5 ~ 12500	2518.50	-53.76	0.0042	2.5
	<b>2480</b>	30 ~ 2387	2167.00	-43.49	0.0448	2.5
		2387 ~ 2400	2390.81	-49.66	0.0108	25
		2483.5 ~ 2496.5	2483.81	-46.87	0.0206	25
		2496.5 ~ 12500	2532.50	-53.71	0.0043	2.5
<b>+10 % (DC 6.6 V)</b>	<b>2402</b>	30 ~ 2387	2378.50	-42.15	0.0610	2.5
		2387 ~ 2400	2394.37	-36.99	0.2002	25
		2483.5 ~ 2496.5	2483.93	-56.26	0.0024	25
		2496.5 ~ 12500	2519.00	-55.95	0.0025	2.5
	<b>2442</b>	30 ~ 2387	2167.00	-44.83	0.0329	2.5
		2387 ~ 2400	2399.35	-41.85	0.0652	25
		2483.5 ~ 2496.5	2487.07	-49.88	0.0103	25
		2496.5 ~ 12500	2519.02	-53.60	0.0044	2.5



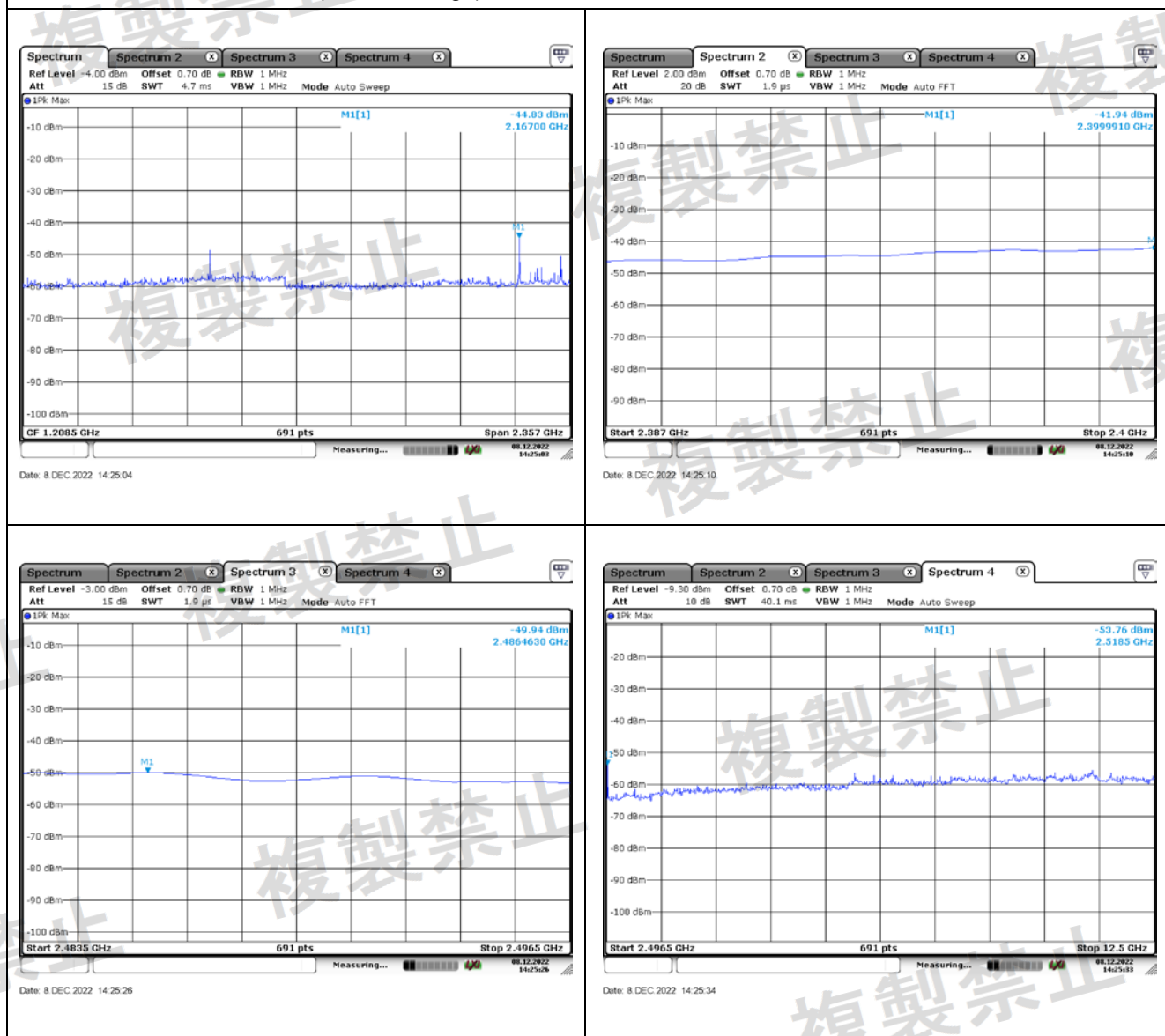
2480	30 ~ 2387	2167.00	-43.49	0.0448	2.5
	2387 ~ 2400	2391.22	-49.50	0.0112	25
	2483.5 ~ 2496.5	2484.03	-46.62	0.0218	25
	2496.5 ~ 12500	2533.01	-53.50	0.0045	2.5

Test Mode : 2.4 GHz / CH1 (Nomal Voltage)

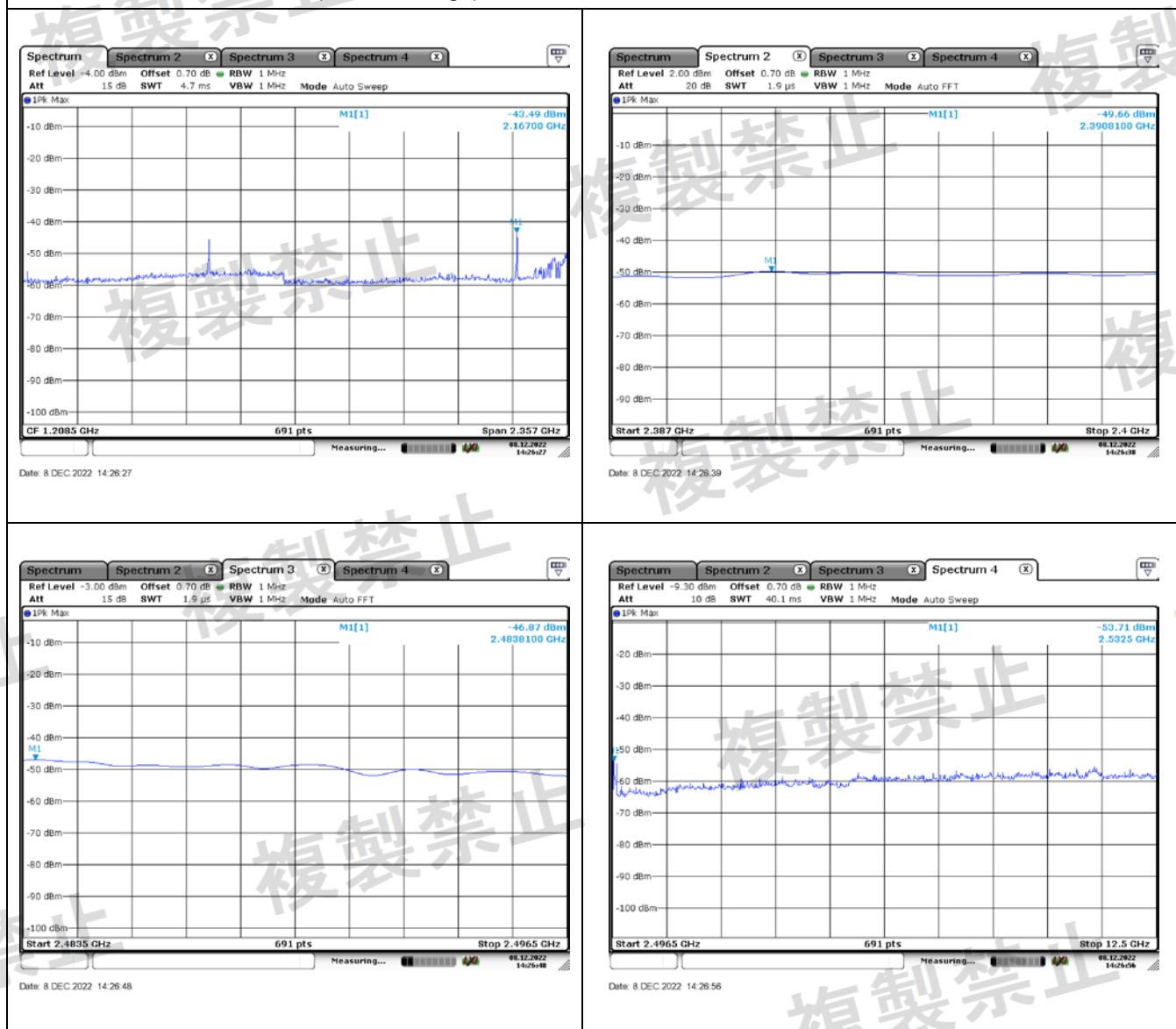




Test Mode : 2.4 GHz / CH20 (Nomal Voltage)



Test Mode : 2.4 GHz / CH40 (Nomal Voltage)



## 7. RX spurious emission

### 7.1 Test setup



### 7.2 Limit

Below 1 GHz: 4 nW ( - 54 dBm ) or less

Above 1 GHz: 20 nW ( - 47 dBm ) or less

### 7.3 Test procedure

1. Connecy transmitter output to the spectrum analyzer input port
2. The EUT should be transmitting at low, middle and high channel.
3. RX spurious emission is measured by following setting:
4. Set the spectrum analyzer RBW: 100 kHz, VBW: 100 kHz, Sweep: Auto, Start: 30 MHz, Stop: 1 000 MHz  
Max hold view, mark highest level.
5. Set the spectrum analyzer RBW: 1 MHz, VBW: 1 MHz, Sweep: Auto, Start: 1 000 MHz, Stop: 12.5 GHz.  
Max hold view, mark highest level.
6. Detector mode: Peak mode

**7.4 Test results**Ambient temperature: 24℃ Relative humidity: 50% R.H

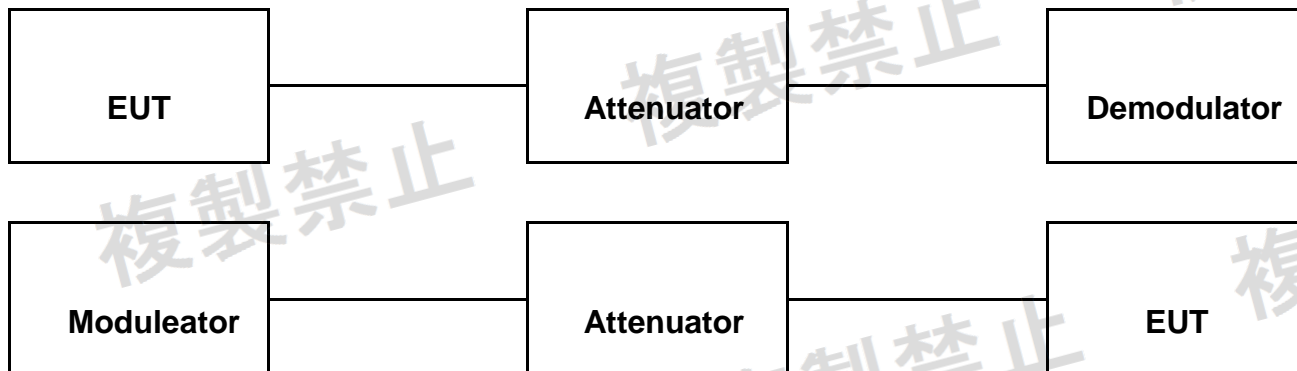
Test mode : 2.4 GHz

Result : Pass

Voltage	Measurement Frequency	Frequency Range	Result			Limit
V	MHz	MHz	MHz	dBm	nW	nW
<b>-10 % (DC 5.4 V)</b>	<b>2402</b>	30 ~ 1000	865.70	-67.26	0.188	<b>4</b>
		1000 ~ 12750	2170.56	-51.22	7.550	<b>20</b>
	<b>2442</b>	30 ~ 1000	869.12	-64.60	0.347	<b>4</b>
		1000 ~ 12750	2172.58	-55.29	2.957	<b>20</b>
	<b>2480</b>	30 ~ 1000	873.14	-67.07	0.196	<b>4</b>
		1000 ~ 12750	8166.73	-54.38	3.647	<b>20</b>
<b>0 % (DC 6.0 V)</b>	<b>2402</b>	30 ~ 1000	865.23	-67.41	0.182	<b>4</b>
		1000 ~ 12750	2169.41	-51.39	7.261	<b>20</b>
	<b>2442</b>	30 ~ 1000	868.59	-64.72	0.337	<b>4</b>
		1000 ~ 12750	2171.51	-55.48	2.831	<b>20</b>
	<b>2480</b>	30 ~ 1000	872.4	-67.15	0.193	<b>4</b>
		1000 ~ 12750	8165.75	-54.59	3.475	<b>20</b>
<b>+10 % (DC 6.6 V)</b>	<b>2402</b>	30 ~ 1000	865.60	-67.20	0.190	<b>4</b>
		1000 ~ 12750	2170.45	-51.29	7.435	<b>20</b>
	<b>2442</b>	30 ~ 1000	869.02	-64.54	0.351	<b>4</b>
		1000 ~ 12750	2171.78	-55.37	2.905	<b>20</b>
	<b>2480</b>	30 ~ 1000	873.34	-67.02	0.199	<b>4</b>
		1000 ~ 12750	8166.15	-54.38	3.652	<b>20</b>

## 8 Interference prevention function

### 8.1 Test Setup



### 8.2 Limit

Radio equipment used mainly on the same premises and automatically transmits or receives identification code

### 8.3 Test results

Ambient temperature: 24℃ Relative humidity: 50% R.H.

Test Power:	Normal Voltage
Test Mode:	2.4 GHz
Test Result:	Good

## 9. CONSTRUCTION PROTECTION CONFIRMATION METHOD

### 9.1 Limit

(See Article 49-20, Item1-a of the Ordinance Regulating Radio Equipment)

The high-frequency section and modulation section of the radio equipment except for the antenna system shall not be capable of being opened easily.

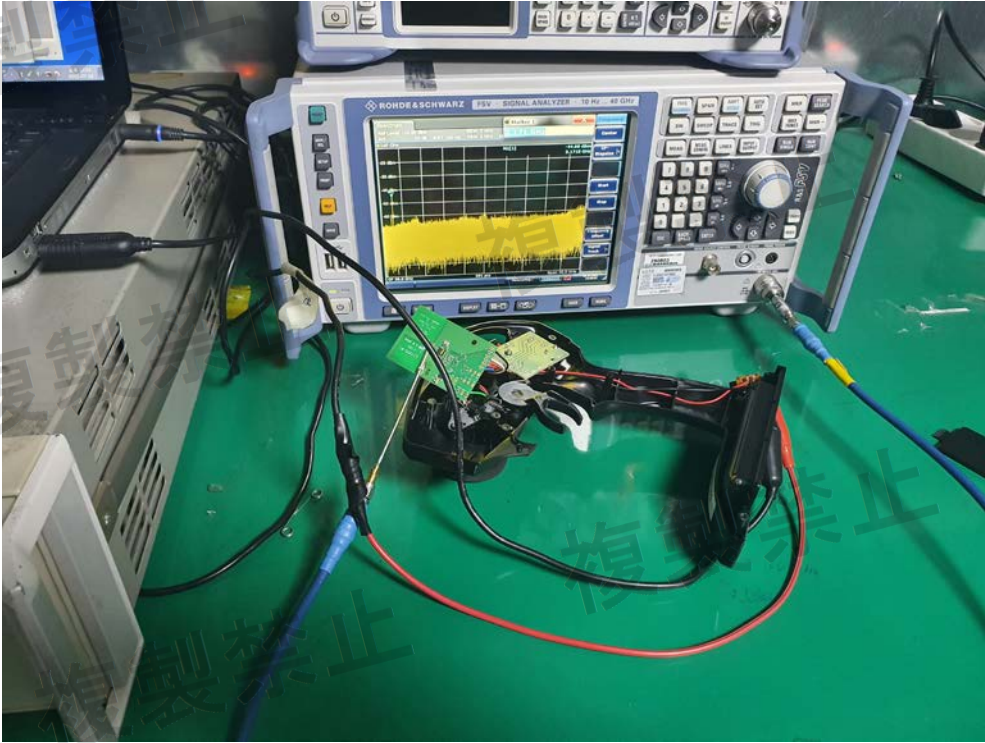
### 9.2 CONFIRMATION METHOD

The RF and modulation portions are protected against illegal modification as following method:

Tick the appropriate box	
	1. Sealed with special screws.
O	2. Plastic chassis is being welded using ultrasonic waves.
	3. Chassis is glued using a special adhesive.
	4. Metal covers are spot-fused.
	5. Cover is specially interlocked.
	6. RF and Modulation components are covered with shielding case and this shielding case is soldered.
	7. Shield case is welded at RF and modulation parts, and ID-ROM is welded using the BGA Method.
	8. Shield case is welded at RF and modulation parts, and ID-ROM is glued at its lead with a special adhesive
	9. Shield case is welded at RF and modulation parts, and ID-ROM is glued with a non-transparent laminating agent.
	10. RF and Modulation parts are mounted on PCB with surface mount technology, and there is no any adjustable part on PCB or adjustable parts are not exposed.



Test Photo



## APPENDIX

### TEST EQUIPMENT USED FOR TESTS

	Use	Description	Model No.	Serial No.	Manufacturer	Interval	Next Cal. Date
1	■	Signal Analyzer (9 kHz ~ 30 GHz)	FSV30	100757	R&S	1 year	2023-09-06
2	■	Signal Generator (~3.2 GHz)	8648C	3623A02597	HP	1 year	2023-03-16
3		SYNTHESIZED CW GENERATOR	83711B	US34490456	HP	1 year	2023-03-16
4		Attenuator (3 dB)	8491A	37822	HP	1 year	2023-09-06
5		Attenuator (10 dB)	8491A	63196	HP	1 year	2023-09-06
6		EMI Test Receiver (~7 GHz)	ESCI7	100722	R&S	1 year	2023-09-06
7		RF Amplifier (~1.3 GHz)	8447D OPT 010	2944A07684	HP	1 year	2023-09-06
8		RF Amplifier (1~26.5 GHz)	8449B	3008A02126	HP	1 year	2023-03-16
9		Horn Antenna (1~18 GHz)	3115	00114105	ETS	2 year	2023-09-06
10		DRG Horn (Small)	3116B	81109	ETS-Lindgren	2 year	2024-03-18
11		DRG Horn (Small)	3116B	133350	ETS-Lindgren	2 year	2024-03-18
12		TRILOG Antenna	VULB 9160	9160-3237	SCHWARZBECK	2 year	2023-03-20
13		Temp.Humidity Data Logger	SK-L200TH II A	00801	SATO	1 year	2023-03-16
14		Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
15	■	DC Power Supply	6674A	3637A01657	Agilent	-	-
17	■	Power Meter	EPM-441A	GB32481702	HP	1 year	2023-03-16
18	■	Power Sensor	8481A	3318A94972	HP	1 year	2023-09-06
19		Audio Analyzer	8903B	3729A18901	HP	1 year	2023-09-06
20		Modulation Analyzer	8901B	3749A05878	HP	1 year	2023-09-06
21	■	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2023-09-06
22		Stop Watch	HS-3	812Q08R	CASIO	2 year	2024-03-18
23		LISN	KNW-407	8-1430-1	Kyoritsu	1 year	2023-03-16
24		Two-Lime V-Network	ESH3-Z5	893045/017	R&S	1 year	2023-03-16
25		UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	1 year	2023-03-16
26		Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	1 year	2023-03-16
27		Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	1 year	2023-03-16
28		OSP120 BASE UNIT	OSP120	101230	R&S	1 year	2023-03-16
29		Signal Generator(100 kHz ~ 40 GHz)	SMB100A03	177621	R&S	1 year	2023-03-16
30		Signal Analyzer (10 Hz ~ 40 GHz)	FSV40	101367	R&S	1 year	2023-03-16
31		Active Loop Antenna	FMZB 1519	1519-031	SCHWARZBECK	2 year	2023-09-07