

JAPAN MIC
TEST REPORT
For
SZ DJI TECHNOLOGY CO., LTD

14th floor, West Wing, Skyworth Semiconductor Design Building NO.18 Gaoxin South 4th Ave,
Nanshan, Shenzhen, Guangdong, China

Model: WM334R

This Report Concerns: <input checked="" type="checkbox"/> Original Report		Equipment Type: Phantom 4 RTK
Test Engineer:	Emily Wang <i>Emily Wang</i>	
Report Number:	RDG180118005-07A	
Report Date:	2018-02-08	
Reviewed By:	Allen Qiao RF Engineer <i>Allen Qiao</i>	
Test Laboratory:	Bay Area Compliance Laboratories Corp. (Dongguan) No.69 Pulongcun, Puxinhu Industry Area, Tangxia, Dongguan, Guangdong, China Tel: +86-769-86858888 Fax: +86-769-86858891 www.baclcorp.com.cn	

Note: This test report is prepared for the customer shown above and for the device described herein. It may not be duplicated or used in part without prior written consent from Bay Area Compliance Laboratories Corp. (Dongguan).

TABLE OF CONTENTS

GENERAL INFORMATION.....	5
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	5
OBJECTIVE	5
TEST METHODOLOGY	5
EUT TEST CONFIGURATION.....	6
DESCRIPTION OF TEST CONFIGURATION	6
EUT EXERCISE SOFTWARE	6
EQUIPMENT MODIFICATIONS	6
SUPPORT EQUIPMENT LIST AND DETAILS	7
CONFIGURATION OF TEST SETUP	7
SUMMARY OF TEST RESULTS	8
FREQUENCY ERROR	9
LIMIT	9
TEST EQUIPMENT LIST AND DETAILS.....	9
TEST PROCEDURE	9
TEST DATA	9
OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH	14
LIMIT	14
TEST EQUIPMENT LIST AND DETAILS.....	14
TEST PROCEDURE	14
TEST DATA	15
TRANSMITTER SPURIOUS EMISSION STRENGTH AND UNWANTED EMISSION INTENSITY.....	18
LIMIT	18
TEST PROCEDURE	18
TEST EQUIPMENT LIST AND DETAILS.....	18
TEST DATA	19
ANTENNA OUTPUT POWER, ANTENNA POWER TOLERANCE AND TRANSMISSION ANTENNA GAIN.....	37
LIMIT	37
TEST EQUIPMENT LIST AND DETAILS.....	37
TEST PROCEDURE	37
TEST DATA	38
RECEIVER SPURIOUS EMISSION AND UNWANTED EMISSION INTENSITY	42
LIMIT	42
TEST EQUIPMENT LIST AND DETAILS.....	42
TEST PROCEDURE	42
MEASUREMENT RESULT	43
FREQUENCY HOPPING DWELL TIME.....	50
APPLICABLE STANDARD	50
TEST EQUIPMENT LIST AND DETAILS.....	50
TEST PROCEDURE	50
TEST DATA	51
INTERFERENCE PREVENTION FUNCTION.....	54

REQUIREMENT	54
TEST PROCEDURE	54
MEASUREMENT RESULT	54
CONSTRUCTION PROTECTION CONFIRMATION	55
LIMIT	55
CONFIRMATION METHOD	55
EXHIBIT A - EUT PHOTOGRAPHS	56
EUT –ALL VIEW	56
EUT –ADAPTER TOP VIEW	56
EUT –ADAPTER BOTTOM VIEW	57
EUT –ADAPTER LABEL VIEW	57
EUT –TOP VIEW	58
EUT –BOTTOM VIEW	58
EUT –SIDE VIEW	59
EUT –SIDE VIEW	59
EUT –SIDE VIEW	60
EUT –SIDEVIEW	60
EUT –PORT VIEW	61
EUT –UNCOVER VIEW	61
EUT –BATTERY TOP VIEW	62
EUT –BATTERY BOTTOM VIEW	62
EUT –BATTERY LABEL1 VIEW	63
EUT –BATTERY LABEL2 VIEW	63
EUT –UNCOVER-2 VIEW	64
EUT –UNCOVER-3 VIEW	64
EUT –PCB1 TOP VIEW	65
EUT –PCB2 BOTTOM VIEW	65
EUT –UNCOVER4 VIEW	66
EUT –UNCOVER5 VIEW	66
EUT –PCB2 TOP VIEW	67
EUT –PCB2 BOTTOM VIEW	67
EUT –UNCOVER6 VIEW	68
EUT –UNCOVER7 VIEW	68
EUT –PCB3 TOP VIEW	69
EUT –PCB3 BOTTOM VIEW	69
EUT – UNCOVER8 VIEW	70
EUT –UNCOVER9 VIEW	70
EUT –PCB-4 TOP VIEW	71
EUT –PCB-4 BOTTOM VIEW	71
EUT –UNCOVER10 VIEW	72
EUT –PCB5 TOP VIEW	72
EUT –PCB5 BOTTOM VIEW	73
EUT –UNCOVER11 VIEW	73
EUT –UNCOVER12 VIEW	74
EUT –UNCOVER13 VIEW	74
EUT –RF ANT 1 TOP VIEW	75
EUT –RF ANT 1 BOTTOM VIEW	75
EUT –PCB-6 TOP VIEW	76
EUT –PCB-6 BOTTOM VIEW	76
EUT –RF ANT 2 TOP VIEW	77
EUT –RF ANT 2 BOTTOM VIEW	77
EUT –PCB7 TOP VIEW	78
EUT –PCB7 BOTTOM VIEW	78
EUT – UNCOVER14 VIEW	79
EUT –UNCOVER15 VIEW	79
EUT –PCB-8 TOP VIEW	80
EUT –UNCOVER16 VIEW	80
EUT –PCB-8 TOP UNCOVER VIEW	81
EUT –PCB-8 BOTTOM VIEW	81

EUT –UNCOVER16 VIEW.....	82
EUT –UNCOVER17 VIEW.....	82
EUT –PCB-9 TOP VIEW	83
EUT –PCB-9 BOTTOM VIEW.....	83
EUT –UNCOVER18 VIEW.....	84
EUT – PCB10 TOP VIEW	84
EUT – PCB10 BOTTOM VIEW	85
EUT – UNCOVER19 VIEW.....	85
EUT –UNCOVER20 VIEW.....	86
EUT – PCB11 TOP VIEW	86
EUT – PCB11 BOTTOM VIEW	87
EUT –UNCOVER21 VIEW.....	87
EUT –PCB12 TOP VIEW.....	88
EUT –PCB12 BOTTOM VIEW	88
EUT –UNCOVER22 VIEW.....	89
EUT –PCB13 TOP VIEW.....	89
EUT –PCB-13 BOTTOM VIEW	90
EUT –UNCOVER23 VIEW.....	90
EUT –PCB14 TOP VIEW.....	91
EUT –PCB14 TOP UNCOVER VIEW.....	91
EUT –PCB14 BOTTOM VIEW	92
EUT –UNCOVER24 VIEW.....	92
EUT –UNCOVER25 VIEW.....	93
EUT –PCB15 TOP VIEW.....	93
EUT –PCB15 BOTTOM VIEW	94
EUT –PCB15 BOTTOM UNCOVER VIEW.....	94
EUT –GPS ANT VIEW	95
EUT –RF CHIP VIEW	95
EXHIBIT B - TEST SETUP PHOTOGRAPH	96
TEST SETUP PHOTO	96

GENERAL INFORMATION

Product Description for Equipment Under Test (EUT)

Equipment Name		Phantom 4 RTK
Model Number		WM334R
Radio Type		1.4/10M Mode
1.4M Technical Parameters	Modulation Type	OFDM: PSK/QPSK/16QAM/64QAM
	Frequency Range	2403.5-2477.5MHz
	Output Power	0.5mW/MHz
	Antenna Gain	3dBi
10M Mode Technical Parameters	Modulation Type	OFDM: QPSK,16QAM
	Frequency Range	2406.5-2476.5MHz
	Output Power	3.5mW/MHz for 2409.5-2476.5MHz, 0.15mW/MHz for 2406.5-2408.5MHz
	Antenna Gain	3dBi
Nominal Power Supply:		DC15.2V from battery
External Dimension		29 cm (L) x 29 cm (W) x 21 cm (H)
Software Version		V1.0
serial number		180118005 (assigned by BACL, Dongguan)
Received Date		2018-01-18

Objective

The objective of the manufacturer is to demonstrate compliance with Radio Law of Japan item 19 of Article 2 Paragraph 1

Test Methodology

All measurements contained in this report were conducted with technical regulations of the Radio Law of Japan.

EUT TEST CONFIGURATION

Description of Test Configuration

The system was configured for testing in engineering mode, which was provided by manufacturer.

The device has two antenna used for LB mode, but the system only configured one antenna for using (1T1R) Judge by good performance.

For LB mode, 38 channels are provided to testing:

Channel	Frequency (MHz)	Channel	Frequency (MHz)
1	2403.5	21	2443.5
2	2405.5
...
...
...	...	37	2475.5
20	2441.5	38	2477.5

3channels were tested: 2403.5MHz, 2441.5MHz and 2477.5MHz

The extreme voltage test conditions which were declared by the manufacturer and the normal conditions are as below:

NV: Normal Voltage 15.2V_{DC}

LV: Low Voltage 13.68V_{DC}

HV: High Voltage 16.72V_{DC}

EUT Exercise Software

The software 'DjiRfCertConsole_V1.3.0.51' was used in test, which was provided by manufacturer. The worst condition (maximum power) was configured as following setting.

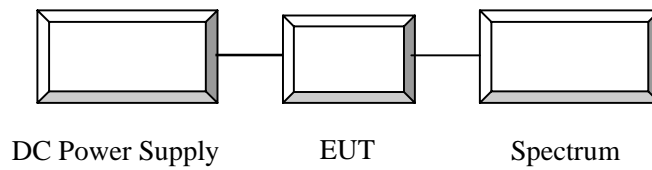
Software and version			DjiRfCertConsole_V1.3.0.51	
Mode	Channel	Frequency (MHz)	Power Level	
			Ant 1	Ant 2
1.4M	Low	2403.5	2	2
	Middle	2441.5	2	2
	High	2477.5	2	2

Equipment Modifications

No modification was made to the EUT tested.

Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Pro instrument	DC Power Supply	pps3300	N/A

Configuration of Test Setup

SUMMARY OF TEST RESULTS

MIC Notice No.88 Appendix No.43 Article 2, Paragraph 1, Item 19 Rules Section	Description of Test	Result
3	Frequency Error	Compliance
4	Occupied Bandwidth and Spreading Bandwidth	Compliance
5	Transmitter Spurious Emission and Unwanted Emission Intensity	Compliance
6	Antenna Output Power and Output Power Tolerance	Compliance
7	Receiver Spurious Emission and Unwanted Emission Intensity	Compliance
8	Transmission Antenna Gain	Not Applicable
9	Transmission Radiation Angle Width	Not Applicable
10	Frequency Hopping Dwell Time	Compliance
11	Interference Prevention Function	Compliance
Note 1	Construction Protection Confirmation	Compliance

Not Applicable: Please refer to 'Note 2' of Antenna Output Power and Output Power Tolerance section.

FREQUENCY ERROR

Limit

50 ppm or below

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

*** Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

Set the EUT to the measurement frequency without modulation.

Setting of SA is following as: RB: 30 kHz / VB: 100 kHz / Sweep time: Auto / Sweep Mode: Continuous sweep / Detect mode: Positive peak / Trace mode: Max hold.

Record the peak spot frequency.

If the EUT can't set at un-modulation mode, measure the 10dBc center frequency.

Test Data

Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	46 %
ATM Pressure:	101 kPa

The testing was performed by Emily Wang on 2018-01-24.

Test Result: Compliant

Test Mode: Transmitting

Ant 1

Frequency	Voltage	Measured frequency		Result (MHz)	Tolerance (ppm)	Limit
		F1(MHz)	F2(MHz)			
Low Channel	LV	2402.932	2404.085	2403.509	3.74	<50ppm
	NV	2402.942	2404.070	2403.506	2.50	
	HV	2402.877	2404.112	2403.495	-2.08	
Middle Channel	LV	2440.923	2442.081	2441.502	0.82	
	NV	2440.936	2442.076	2441.506	2.46	
	HV	2440.887	2442.101	2441.494	-2.46	
High channel	LV	2476.944	2478.034	2477.489	-4.44	
	NV	2476.936	2478.076	2477.506	2.42	
	HV	2476.922	2478.061	2477.492	-3.23	

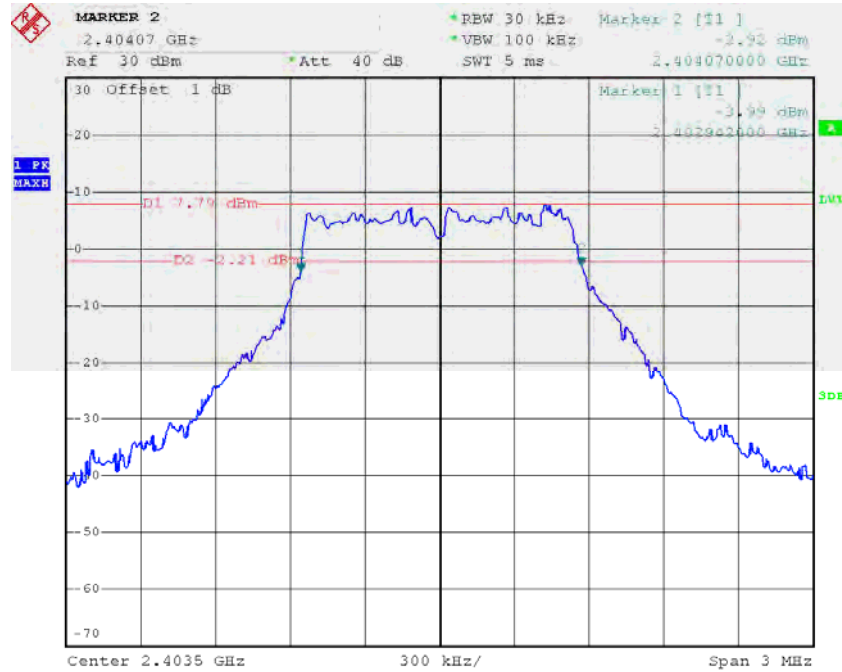
Ant 2

Frequency	Voltage	Measured frequency		Result (MHz)	Tolerance (ppm)	Limit
		F1(MHz)	F2(MHz)			
Low Channel	LV	2402.948	2404.079	2403.514	5.82	<50ppm
	NV	2402.942	2404.082	2403.512	4.99	
	HV	2402.938	2404.091	2403.515	6.24	
Middle Channel	LV	2440.887	2442.121	2441.504	1.64	
	NV	2440.936	2442.076	2441.506	2.46	
	HV	2440.996	2442.012	2441.504	1.64	
High channel	LV	2476.940	2478.083	2477.512	4.84	
	NV	2476.942	2478.076	2477.509	3.63	
	HV	2476.951	2478.069	2477.510	4.04	

Please refer to the plots for normal voltage test.

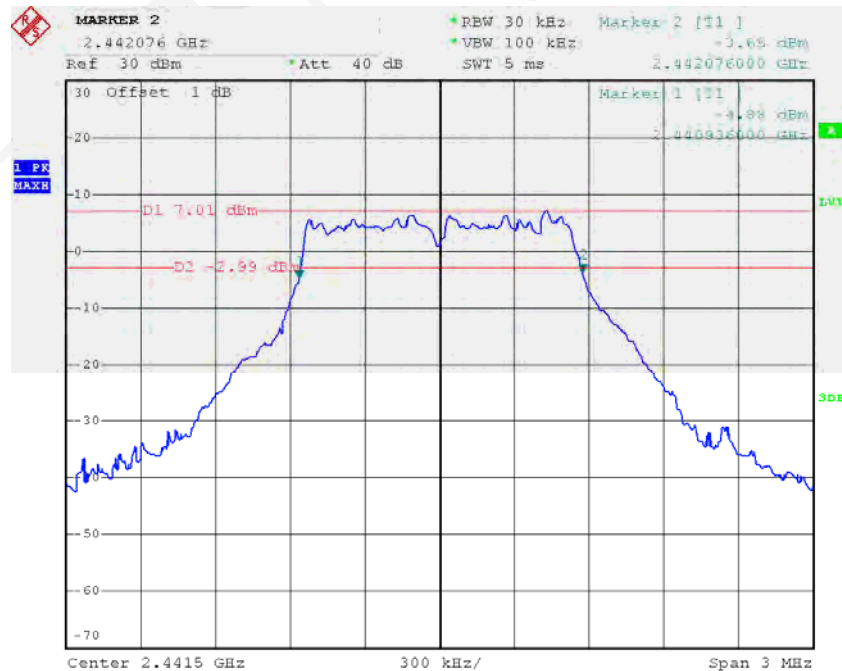
Ant 1

2403.5MHz



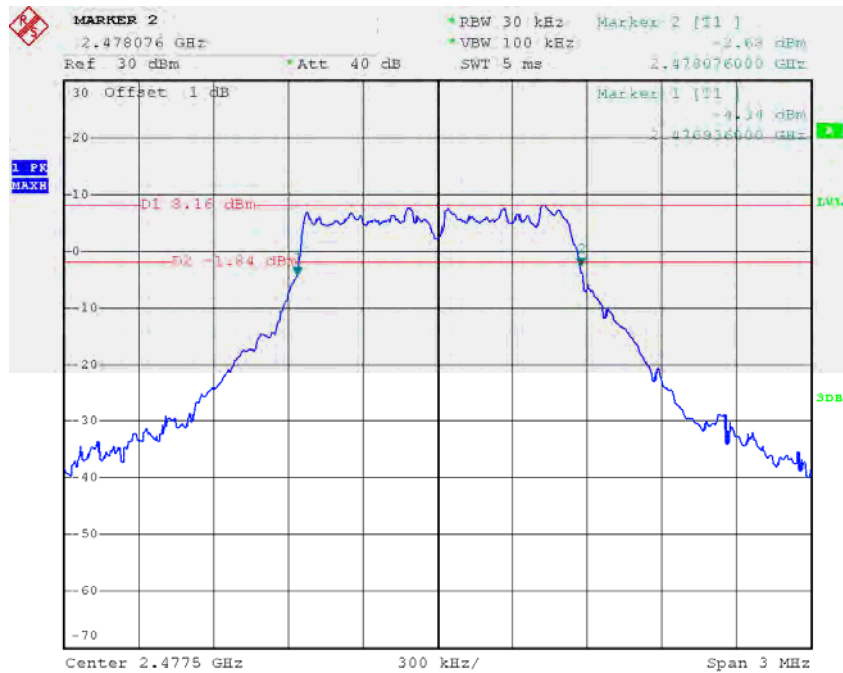
Date: 24.JAN.2018 14:59:54

2441.5MHz



Date: 24.JAN.2018 15:02:12

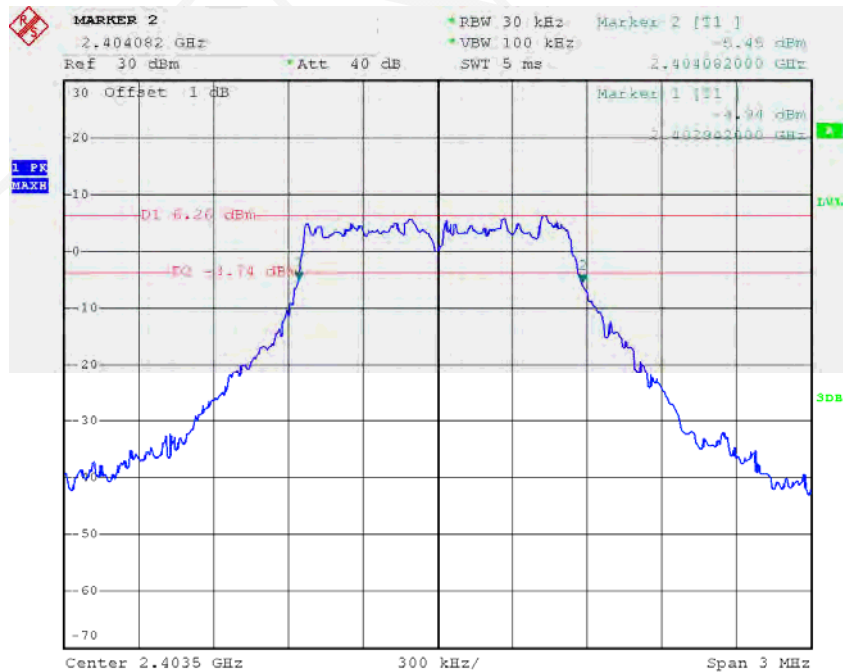
2477.5MHz



Date: 24.JAN.2018 15:04:09

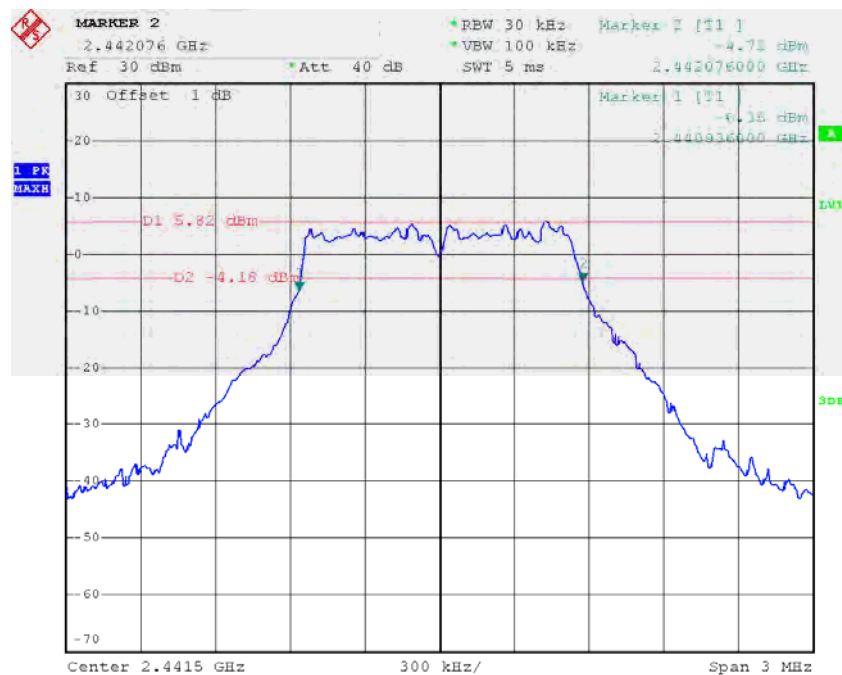
Ant 2

2403.5MHz



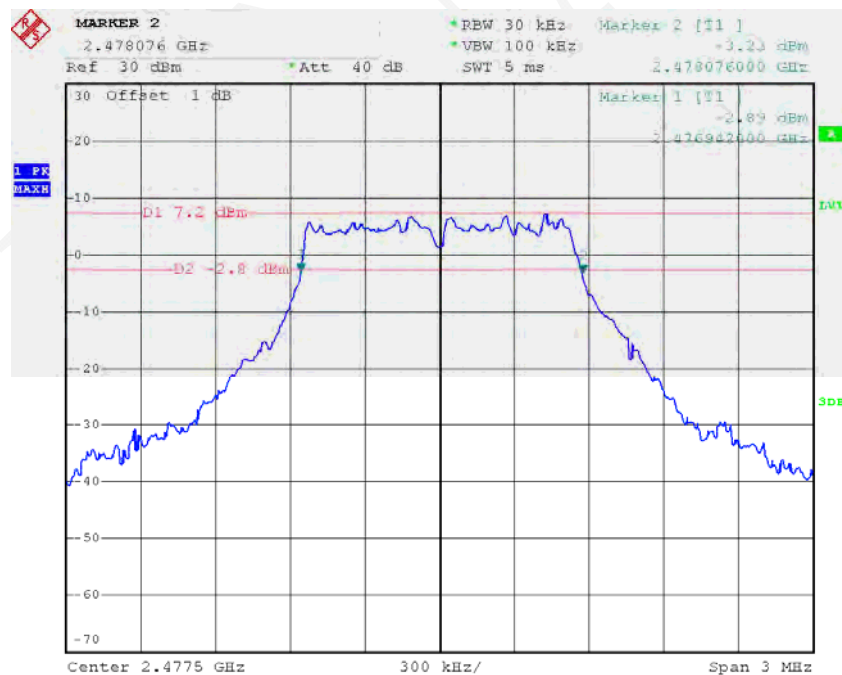
Date: 24.JAN.2018 15:11:22

2441.5MHz



Date: 24.JAN.2018 15:13:38

2477.5MHz



Date: 24.JAN.2018 15:15:21

OCCUPIED BANDWIDTH AND SPREADING BANDWIDTH

Limit

- Occupied bandwidth: FH≤83.5 MHz; DS≤26 MHz; OFDM≤38 MHz, Others≤26 MHz
- Spread Bandwidth: ≥ 500 kHz(FH,DS), Spread factor>5.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be “continuous frequency-hopping mode” by spread spectrum.

❖ Spectrum Analyzer Conditions

- Span: 200 MHz
- RBW: 300 kHz
- VBW: 300 kHz
- Sweep time: Auto, Marker: Marker Off
- Log scal : 10dB/Div, Data points : 501points (400 points or more)
- Reference level: 10dBm, Attenuator: 20dB
- Detection: Positive Peak, Sweep mode: Continuous

Spread Factor= Spread Bandwidth/modulation rate. The modulation rate: MR=1.

Test Data**Environmental Conditions**

Temperature:	24.6°C
Relative Humidity:	46 %
ATM Pressure:	101 kPa

The testing was performed by Emily Wang on 2018-01-24

Test Result: Compliant

Test Mode: Transmitting

Ant 1

Voltage	LV	NV	HV	Limit
Occupied Bandwidth(MHz)	75.20	75.20	75.31	$\leq 83.5\text{MHz}$
Spreading Bandwidth(MHz)	70.10	69.60	69.60	$\geq 500\text{KHz}$
Spreading Factor	70.10	69.60	69.60	>5

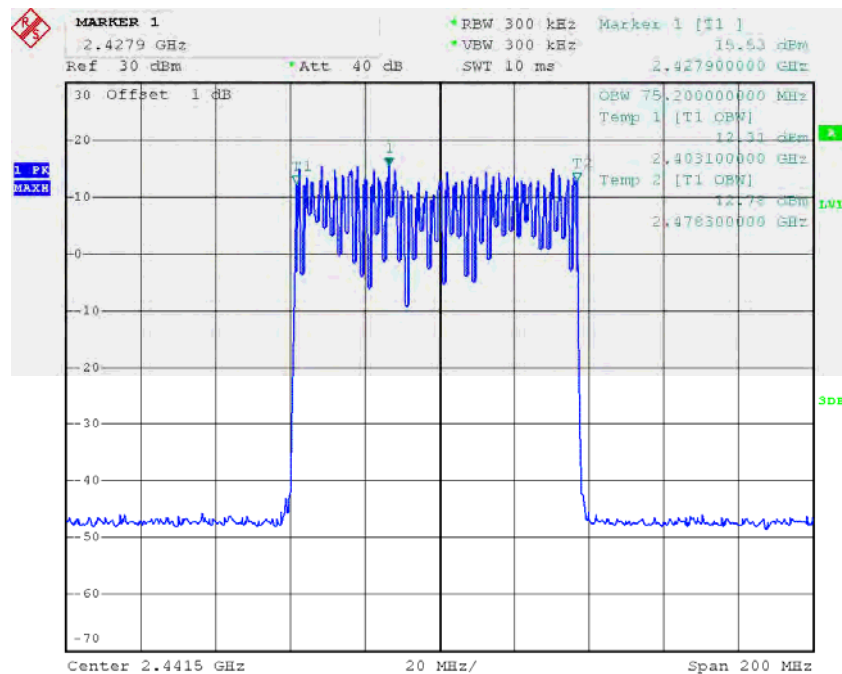
Ant 2

Voltage	LV	NV	HV	Limit
Occupied Bandwidth(MHz)	76.00	75.20	75.20	$\leq 83.5\text{MHz}$
Spreading Bandwidth(MHz)	69.60	69.60	70.00	$\geq 500\text{KHz}$
Spreading Factor	69.60	69.60	70.00	>5

Please refer to the below plots for normal voltage test.

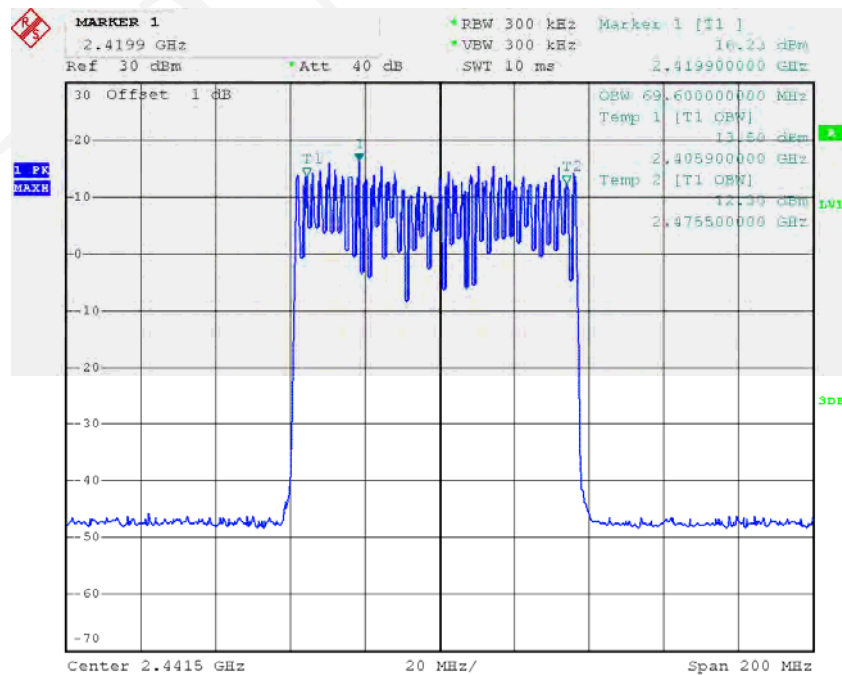
Ant 1

Occupied bandwidth



Date: 24.JAN.2018 14:41:30

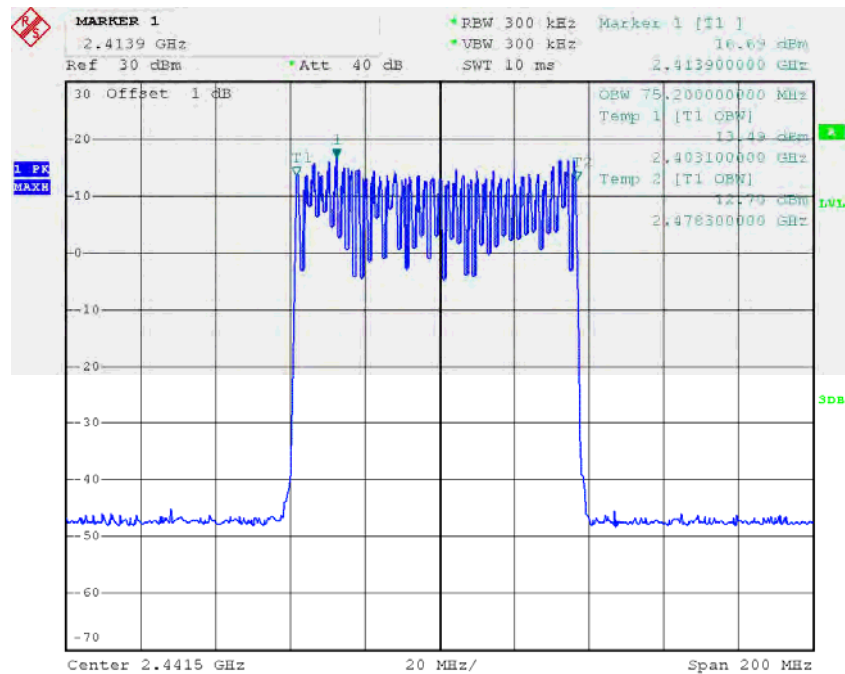
Spreading bandwidth



Date: 24.JAN.2018 14:44:24

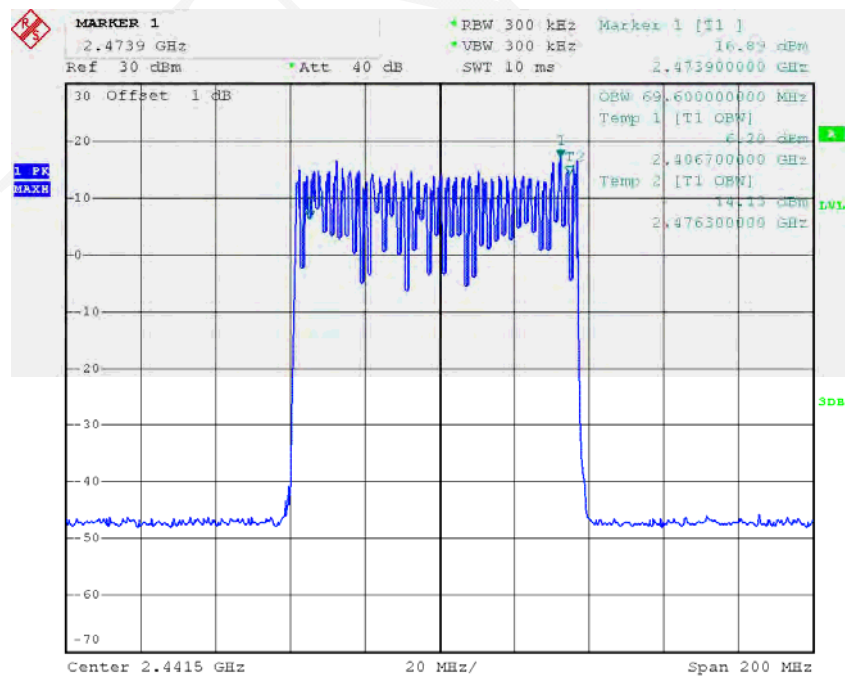
Ant 2

Occupied bandwidth



Date: 24.JAN.2018 15:21:01

Spreading bandwidth



Date: 24.JAN.2018 15:25:51

TRANSMITTER SPURIOUS EMISSION STRENGTH AND UNWANTED EMISSION INTENSITY

Limit

- $f < 1000 \text{ MHz}$: $\leq 0.25 \mu\text{W}/100\text{kHz}$
- $1000\text{MHz} \leq f < 2387 \text{ MHz}$, $f > 2496.5 \text{ MHz}$: $\leq 2.5 \mu\text{W}/\text{MHz}$
- $2387 \text{ MHz} \leq f \leq 2400 \text{ MHz}$; $2483.5 \text{ MHz} < f \leq 2496.5 \text{ MHz}$: $\leq 25 \mu\text{W}/\text{MHz}$

Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be in continuously transmitting mode.

❖ Spectrum Analyzer Conditions

- Setting of SA start 30MHz and stop frequency 1000MHz, RBW: 100kHz/VBW: 100kHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $0.25 \mu\text{W}/100\text{kHz}$.
- Setting of SA start 1000MHz and stop frequency 2387MHz, RBW: 1MHz/VBW: 1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $2.5 \mu\text{W}/\text{MHz}$.
- Setting of SA start 2387MHz and stop frequency 2400MHz, RBW: 1MHz/VBW: 1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $25 \mu\text{W}/\text{MHz}$.
- Setting of SA start 2483.5MHz and stop frequency 2496.5MHz, RBW: 1MHz/VBW: 1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $25 \mu\text{W}/\text{MHz}$.
- Setting of SA start 2496.5MHz and stop frequency 12500MHz, RBW: 1MHz/VBW: 1MHz, Sweep time: Auto. Sweep mode: continuous sweep .Detect mode: Positive peak/Trace mode: max hold. Then to mark peak. Reading value + cable loss shall be less than $2.5 \mu\text{W}/\text{MHz}$.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-8	2018-12-8
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Data**Environmental Conditions**

Temperature:	20.9~22.7°C
Relative Humidity:	40~41 %
ATM Pressure:	101.5~102.2 kPa

The testing was performed by Emily Wang from 2018-01-29 to 2018-01-31.

Test Result: Compliant

Test Mode: Transmitting

	Frequency band	2403.5 MHz			2441.5 MHz			2477.5 MHz			Limit
		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Raw data Ant 1	Band I (dBm/100kHz)	-67.16	-66.92	-66.69	-66.99	-67.04	-67.00	-66.79	-66.74	-66.84	-36dBm /100kHz
	Band II (dBm/MHz)	-60.54	-60.79	-60.69	-60.17	-60.31	-60.16	-60.28	-60.21	-60.47	-26dBm /MHz
	Band III (dBm/MHz)	-43.13	-43.27	-43.56	-51.48	-51.20	-51.06	-52.33	-52.20	-52.38	-16dBm /MHz
	Band IV (dBm/MHz)	-50.27	-50.32	-50.20	-52.26	-52.02	-52.09	-51.24	-51.44	-51.32	-16dBm /MHz
	Band V (dBm/MHz)	-40.17	-40.41	-40.50	-40.22	-40.06	-39.97	-40.86	-40.58	-40.64	-26dBm /MHz
Unwanted Emission Intensity Ant 1	Band I (μW/100kHz)	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.0002	0.25 μW /100kHz
	Band II (μW/MHz)	0.0009	0.0008	0.0009	0.0010	0.0009	0.0010	0.0009	0.0010	0.0009	2.5 μW /MHz
	Band III (μW/MHz)	0.0486	0.0471	0.0441	0.0071	0.0076	0.0078	0.0058	0.0060	0.0058	25 μW /MHz
	Band IV (μW/MHz)	0.0094	0.0093	0.0095	0.0059	0.0063	0.0062	0.0075	0.0072	0.0074	25 μW /MHz
	Band V (μW/MHz)	0.0962	0.0910	0.0891	0.0951	0.0986	0.1007	0.0820	0.0875	0.0863	2.5 μW /MHz

Note:

Band I: 30MHz~1000MHz

Band II: 1000MHz~2387MHz

Band III: 2387MHz~2400MHz

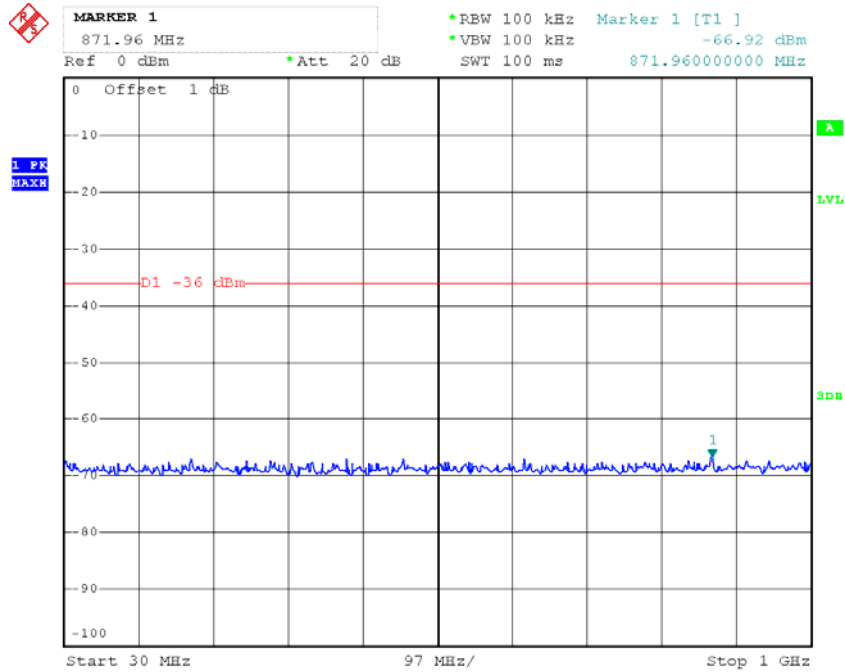
Band IV: 2483.5MHz~2496.5MHz

Band V: 2496.5MHz~12500MHz

Please refer to the below plots for normal voltage test.

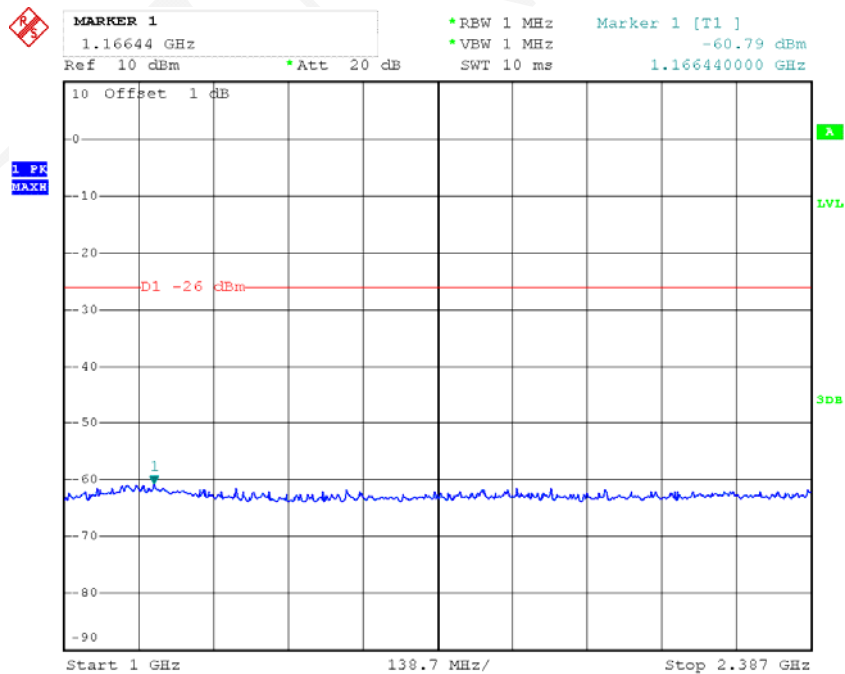
2403.5MHz:

30MHz~1GHz



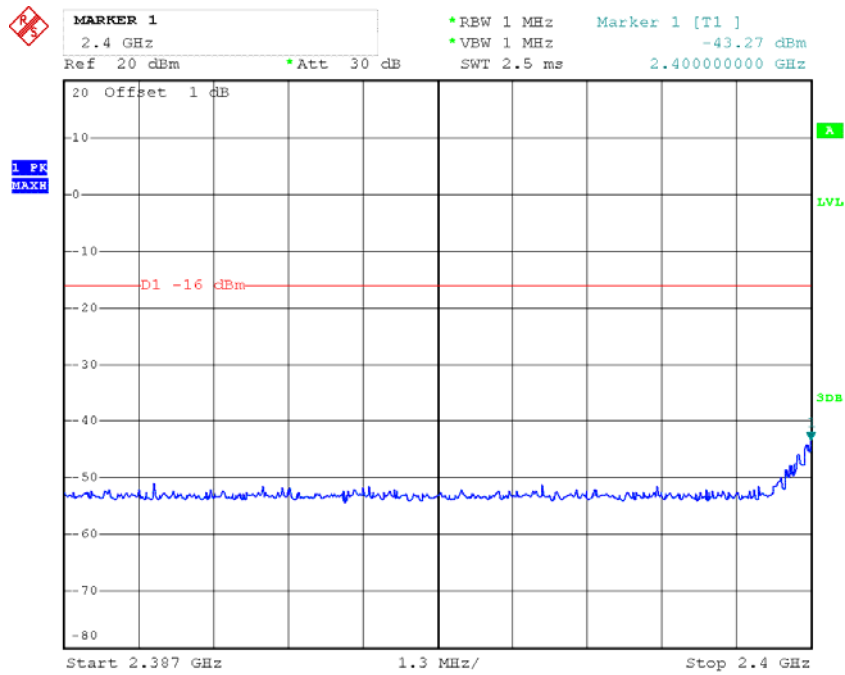
Date: 29.JAN.2018 16:42:15

1GHz~2.387GHz



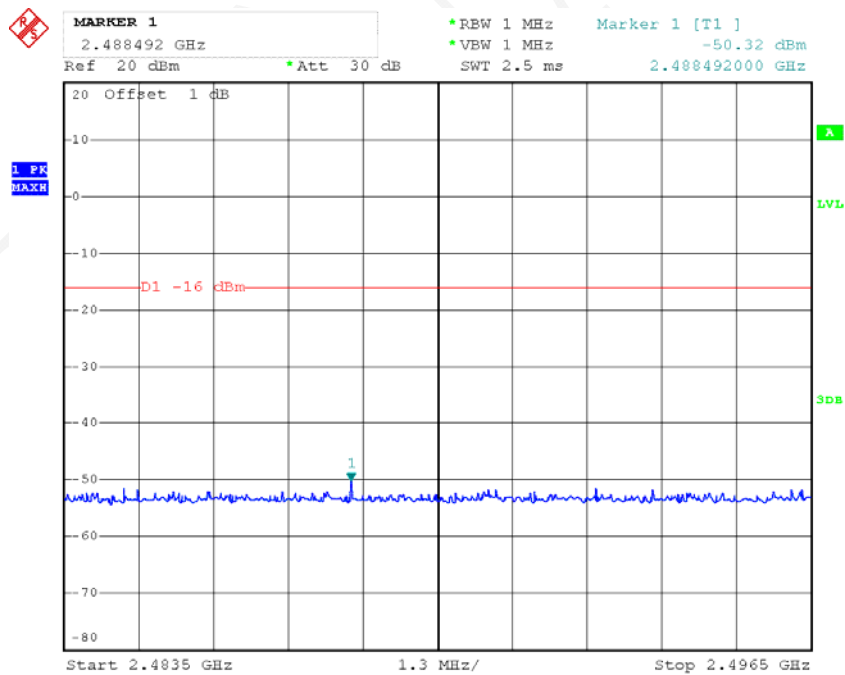
Date: 29.JAN.2018 16:46:30

2.387GHz~2.4GHz



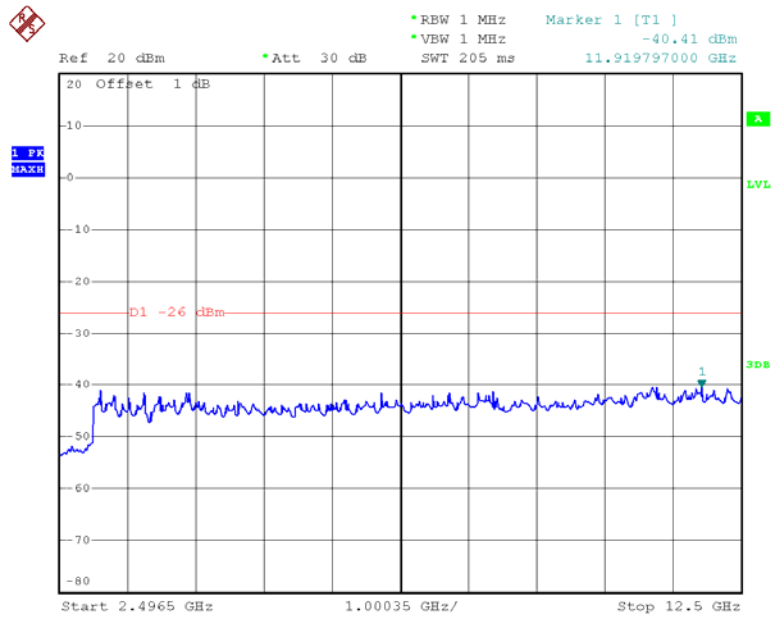
Date: 29.JAN.2018 16:53:24

2.4835GHz~2.4965GHz



Date: 29.JAN.2018 16:55:05

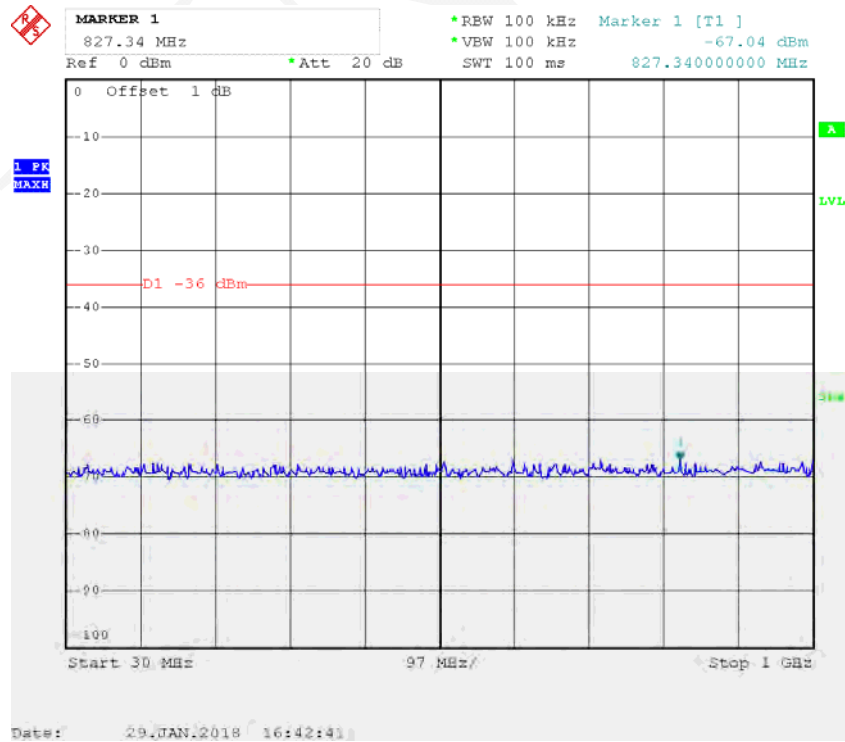
2.4965GHz~12.5GHz



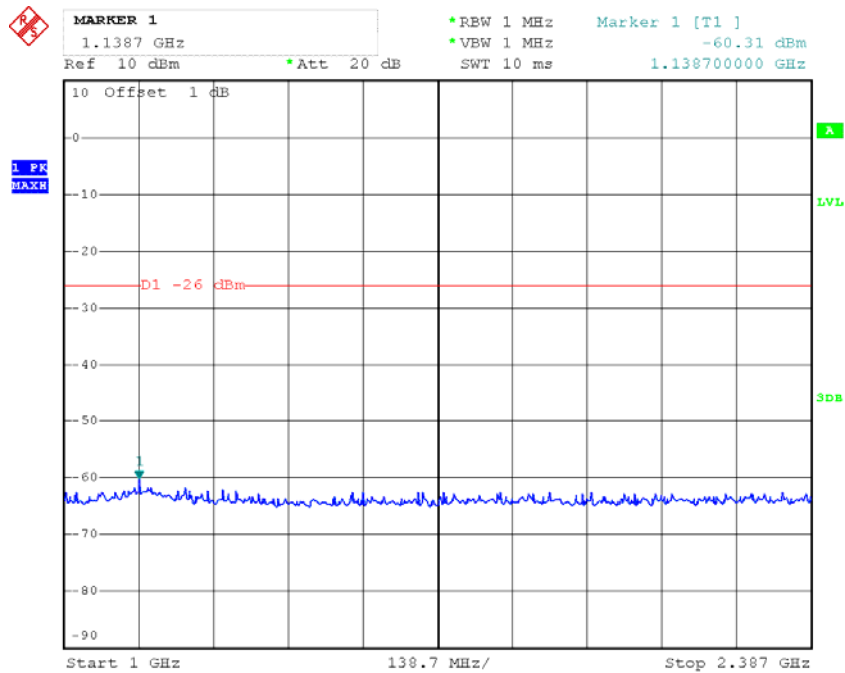
Date: 31.JAN.2018 12:51:28

2441.5MHz:

30MHz~1GHz

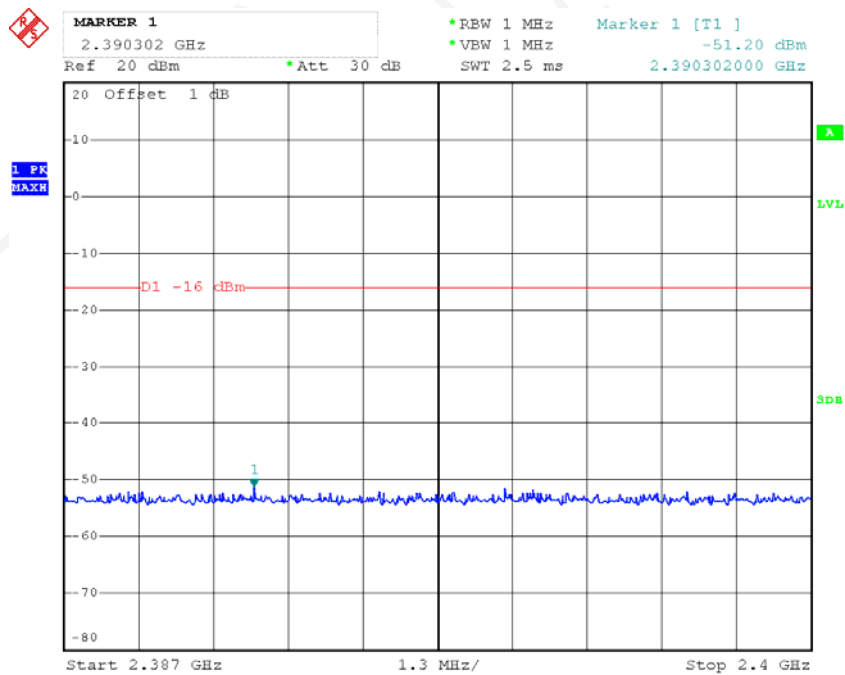


1GHz~2.387GHz



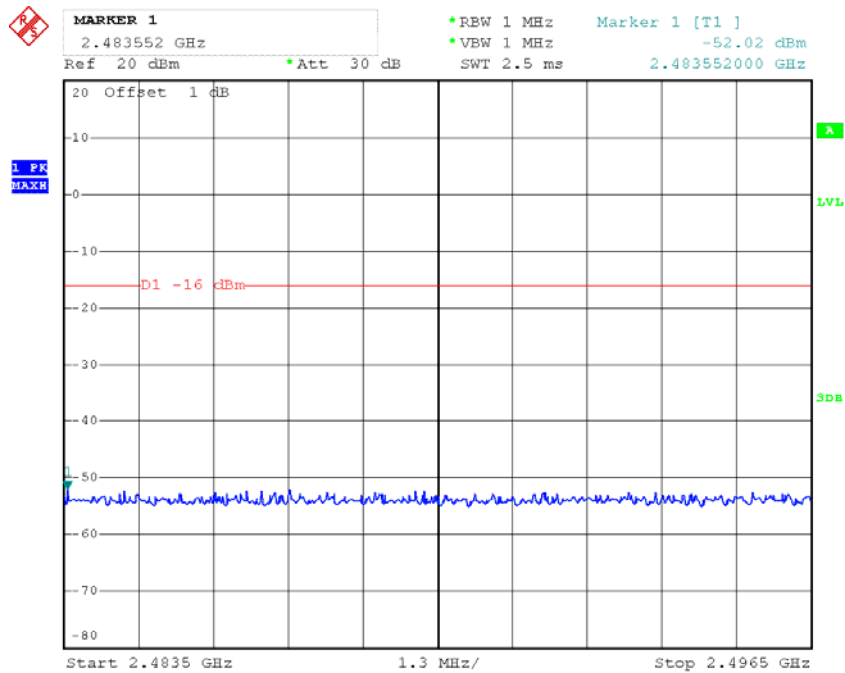
Date: 29.JAN.2018 16:46:54

2.387GHz~2.4GHz



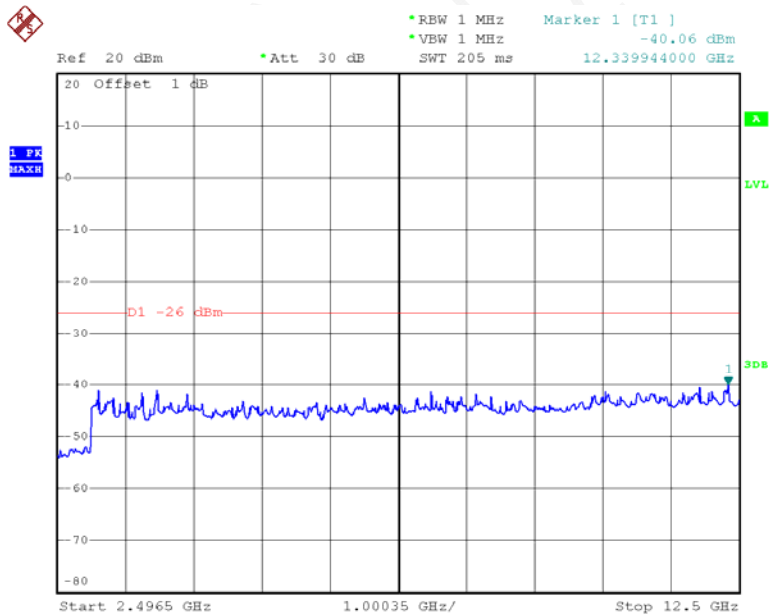
Date: 29.JAN.2018 16:53:54

2.4835GHz~2.4965GHz



Date: 29.JAN.2018 16:55:27

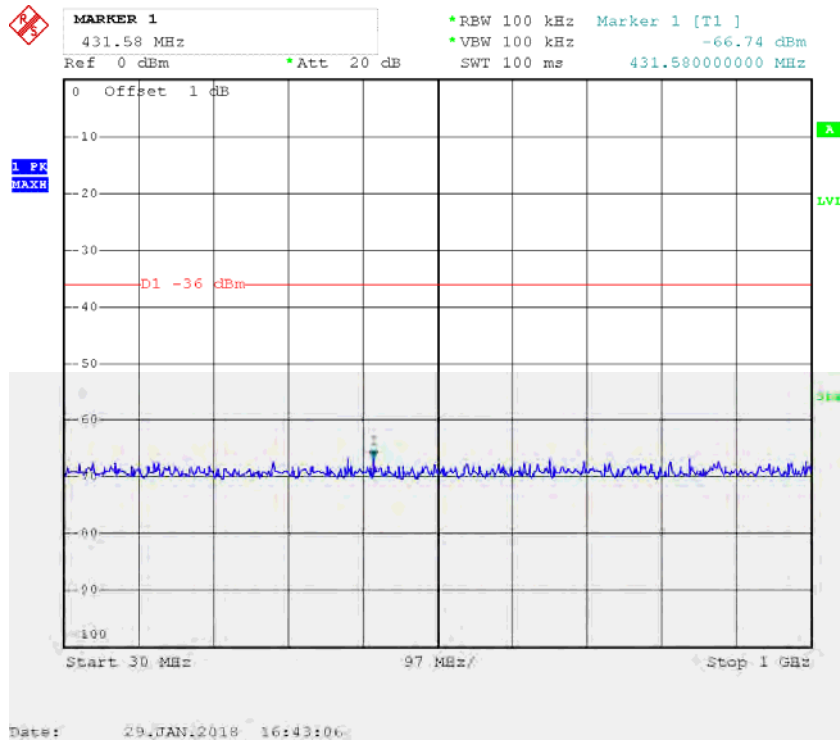
2.4965GHz~12.5GHz



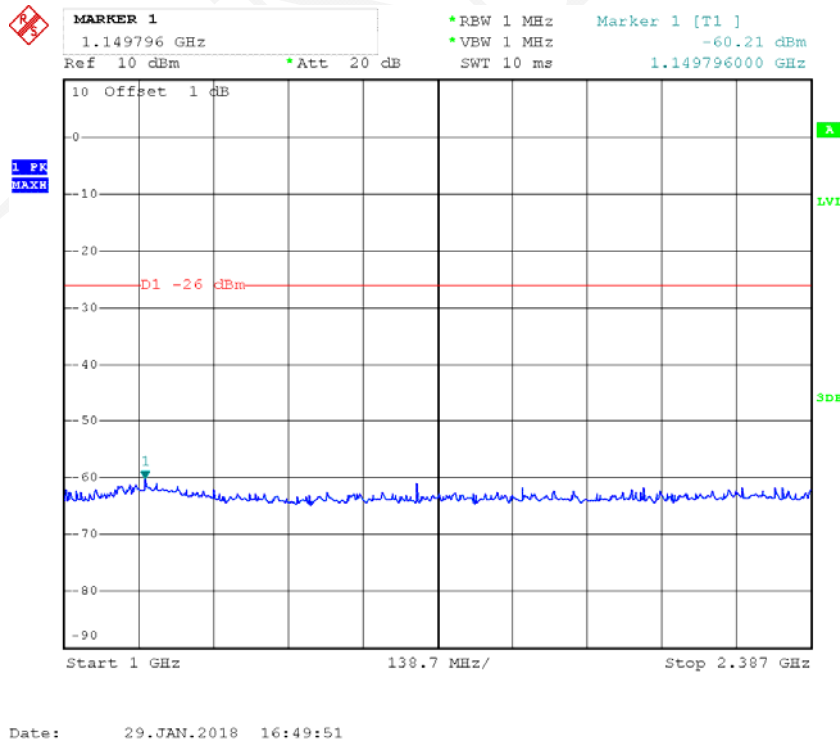
Date: 31.JAN.2018 12:51:48

2477.5MHz:

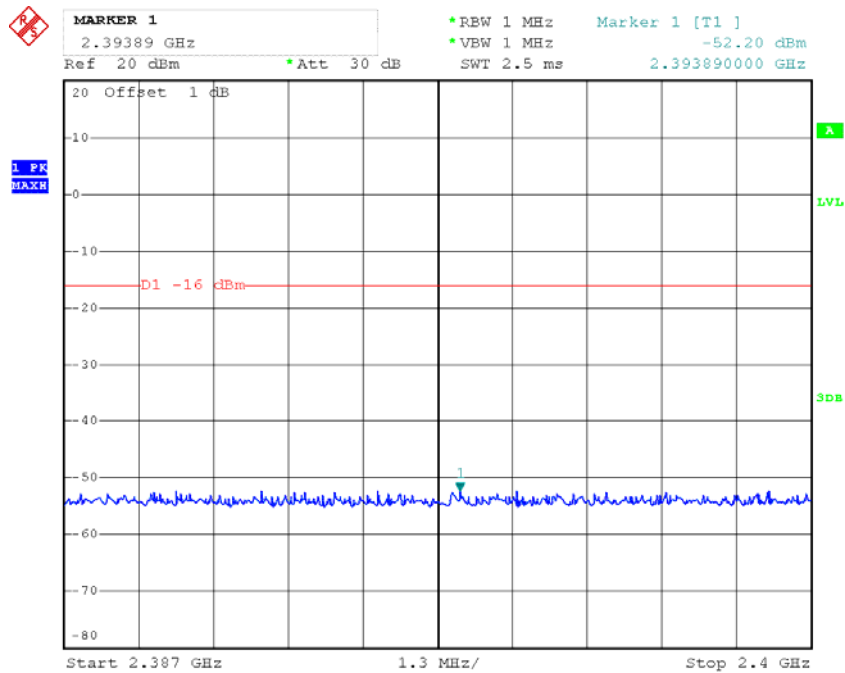
30MHz~1GHz



1GHz~2.387GHz

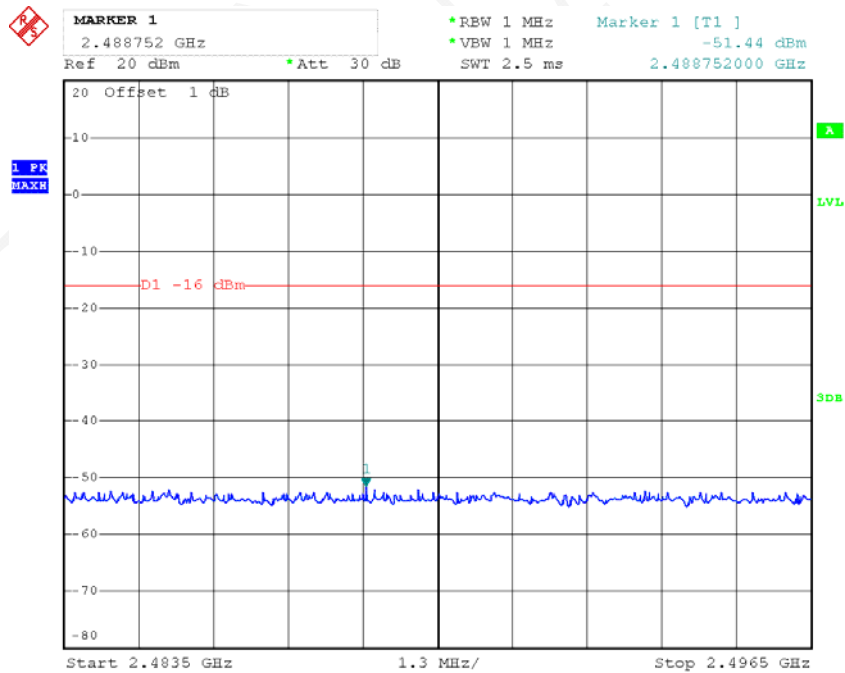


2.387GHz~2.4GHz

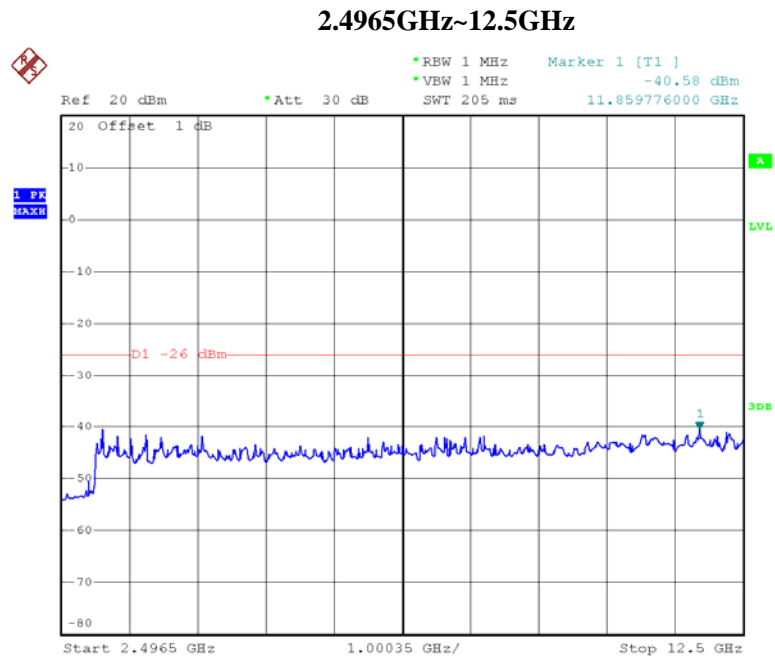


Date: 29.JAN.2018 16:54:10

2.4835GHz~2.4965GHz



Date: 29.JAN.2018 16:57:30



Date: 31.JAN.2018 12:52:14

Ant 2:

	Frequency band	2403.5 MHz			2441.5 MHz			2477.5 MHz			Limit
		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Raw data Ant 2	Band I (dBm/100kHz)	-50.25	-50.44	-50.53	-54.76	-54.63	-54.71	-51.89	-52.05	-51.83	-36dBm /100kHz
	Band II (dBm/MHz)	-51.17	-51.45	-51.75	-51.80	-51.66	-51.66	-52.28	-52.03	-51.99	-26dBm /MHz
	Band III (dBm/MHz)	-24.33	-24.36	-24.43	-42.15	-42.12	-41.93	-41.56	-41.76	-41.89	-16dBm /MHz
	Band IV (dBm/MHz)	-41.92	-41.62	-41.92	-41.87	-41.76	-41.48	-39.64	-39.56	-39.56	-16dBm /MHz
	Band V (dBm/MHz)	-39.78	-39.84	-40.05	-40.37	-40.40	-40.38	-41.16	-41.03	-41.24	-26dBm /MHz
Unwanted Emission Intensity Ant 2	Band I (μW/100kHz)	0.0094	0.0090	0.0089	0.0033	0.0034	0.0034	0.0065	0.0062	0.0066	0.25 μW /100kHz
	Band II (μW/MHz)	0.0076	0.0072	0.0067	0.0066	0.0068	0.0068	0.0059	0.0063	0.0063	2.5 μW /MHz
	Band III (μW/MHz)	3.6898	3.6644	3.6058	0.0610	0.0614	0.0641	0.0698	0.0667	0.0647	25 μW /MHz
	Band IV (μW/MHz)	0.0643	0.0689	0.0643	0.0650	0.0667	0.0711	0.1086	0.1107	0.1107	25 μW /MHz
	Band V (μW/MHz)	0.1052	0.1038	0.0989	0.0918	0.0912	0.0916	0.0766	0.0789	0.0752	2.5 μW /MHz

Note:

Band I: 30MHz~1000MHz

Band II: 1000MHz~2387MHz

Band III: 2387MHz~2400MHz

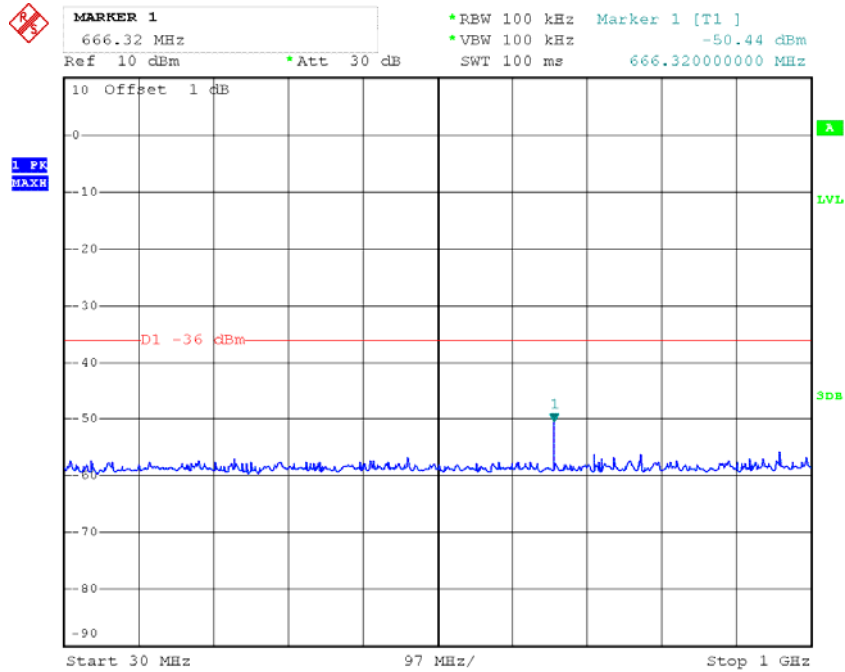
Band IV: 2483.5MHz~2496.5MHz

Band V: 2496.5MHz~12500MHz

Please refer to the below plots for normal voltage test.

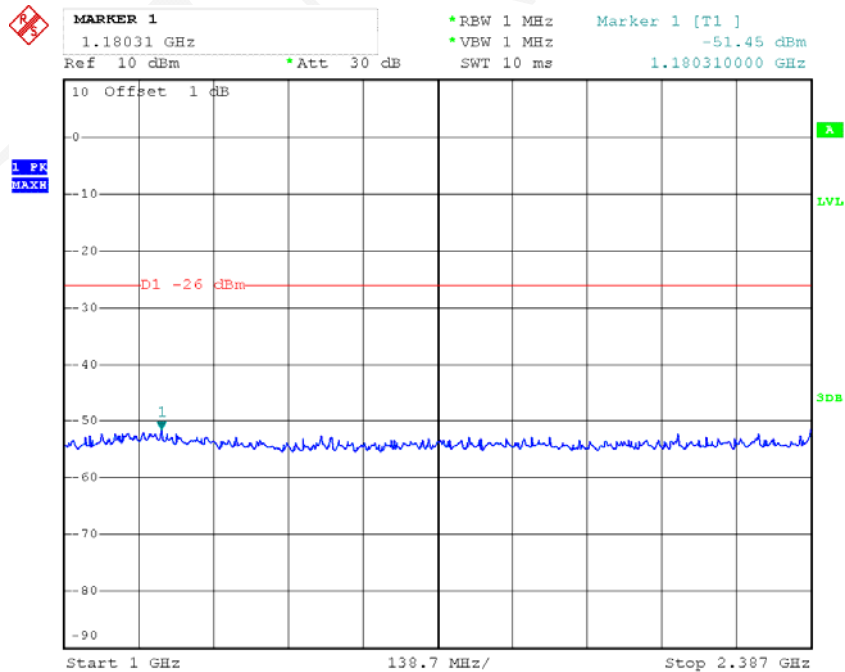
2403.5MHz:

30MHz~1GHz



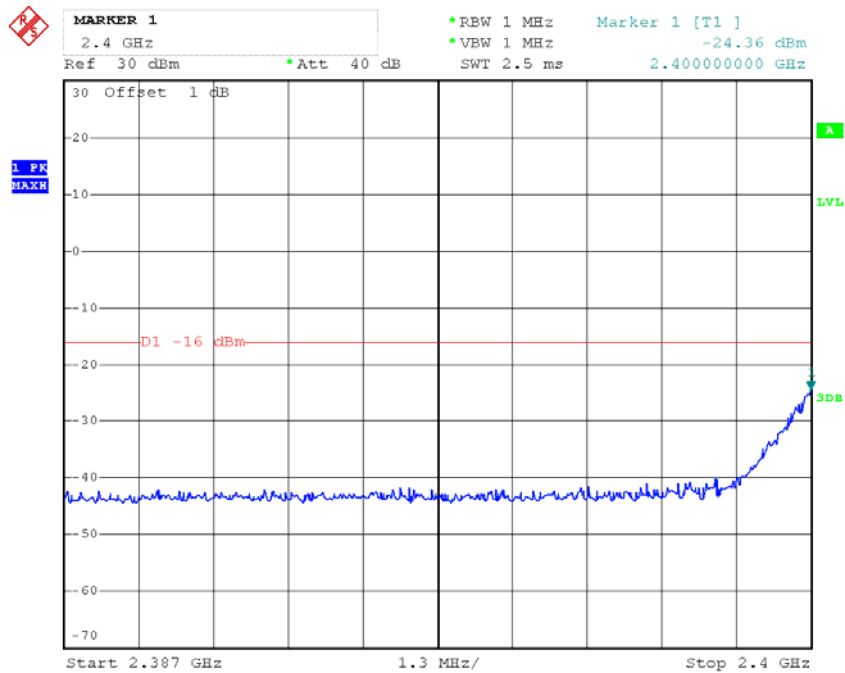
Date: 29.JAN.2018 17:35:21

1GHz~2.387GHz



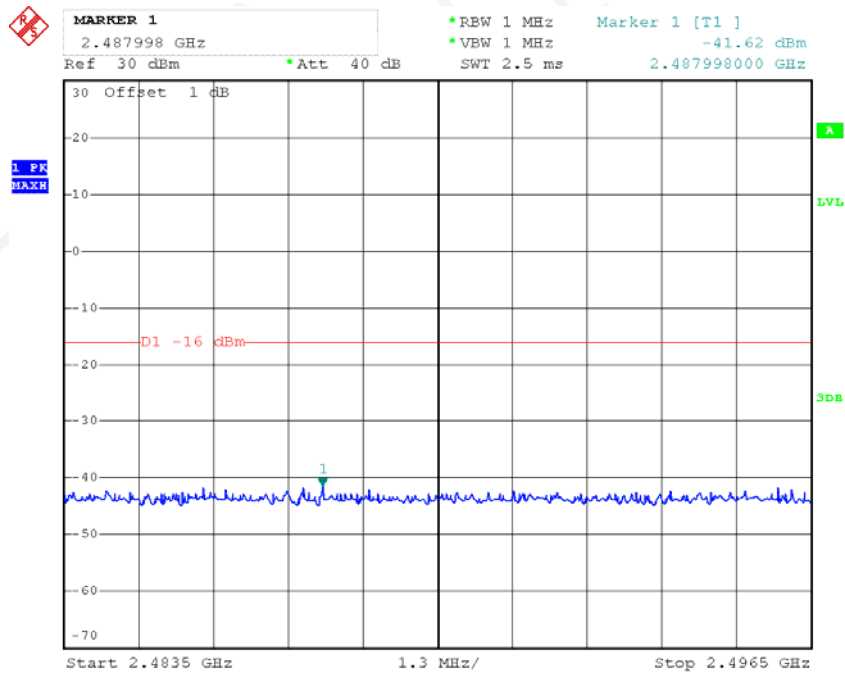
Date: 29.JAN.2018 17:47:55

2.387GHz~2.4GHz



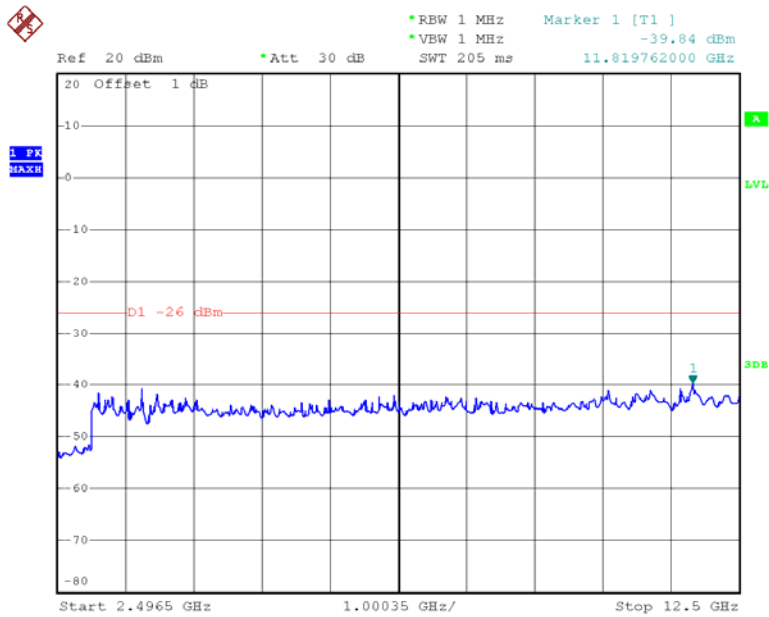
Date: 29.JAN.2018 17:51:26

2.4835GHz~2.4965GHz



Date: 29.JAN.2018 17:53:29

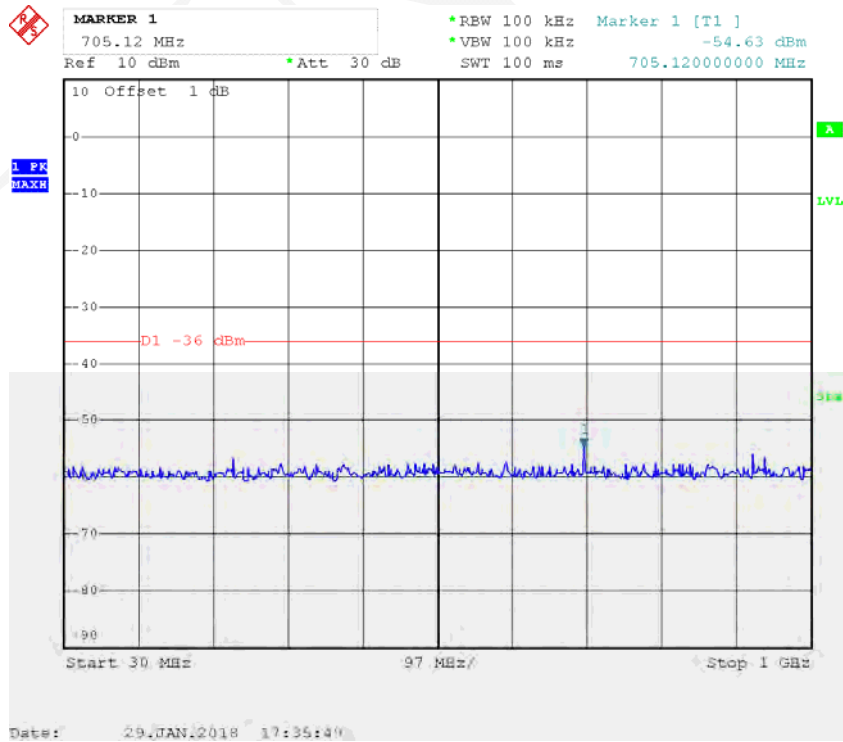
2.4965GHz~12.5GHz



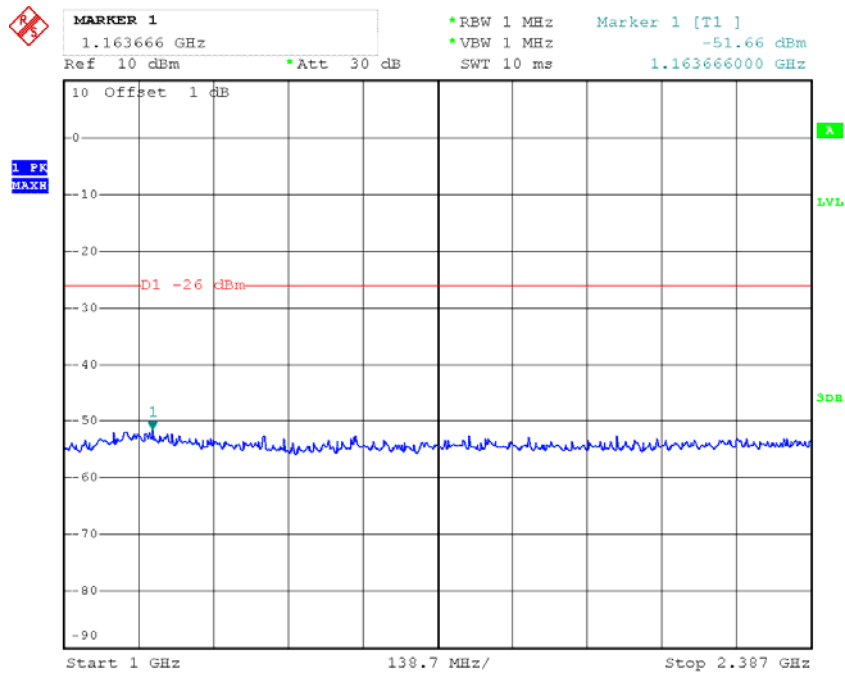
Date: 31.JAN.2018 12:52:48

2441.5MHz:

30MHz~1GHz

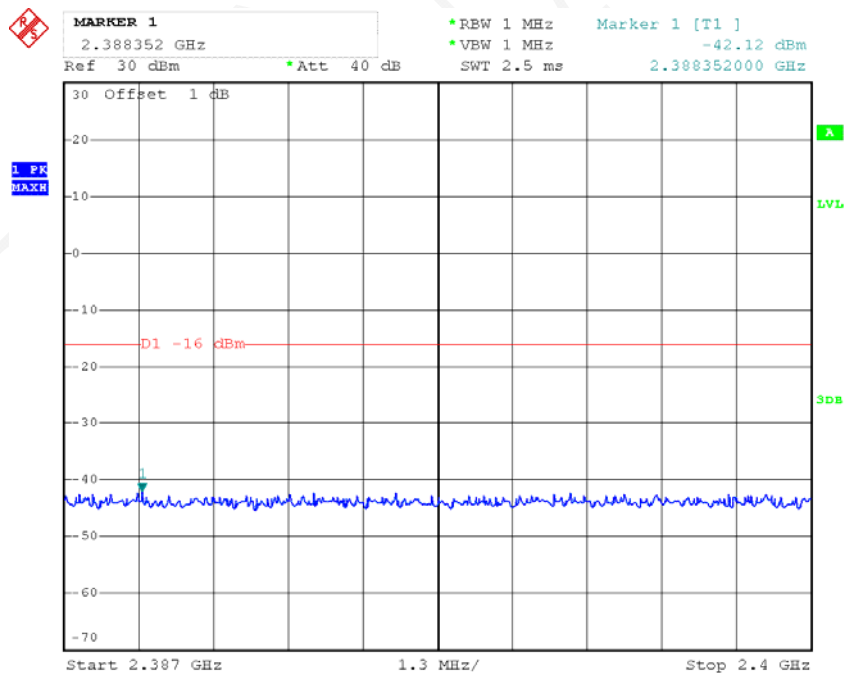


1GHz~2.387GHz



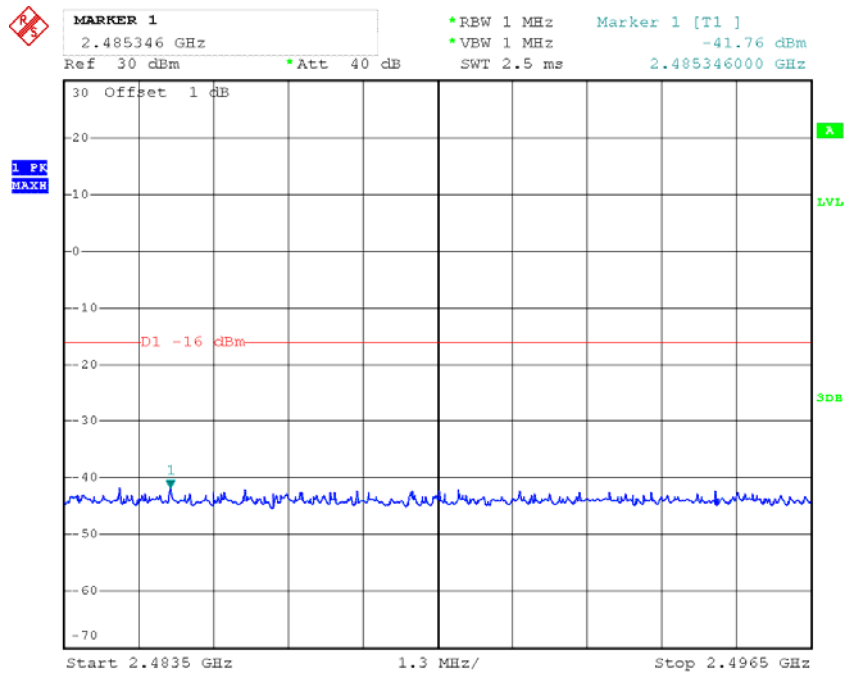
Date: 29.JAN.2018 17:48:34

2.387GHz~2.4GHz



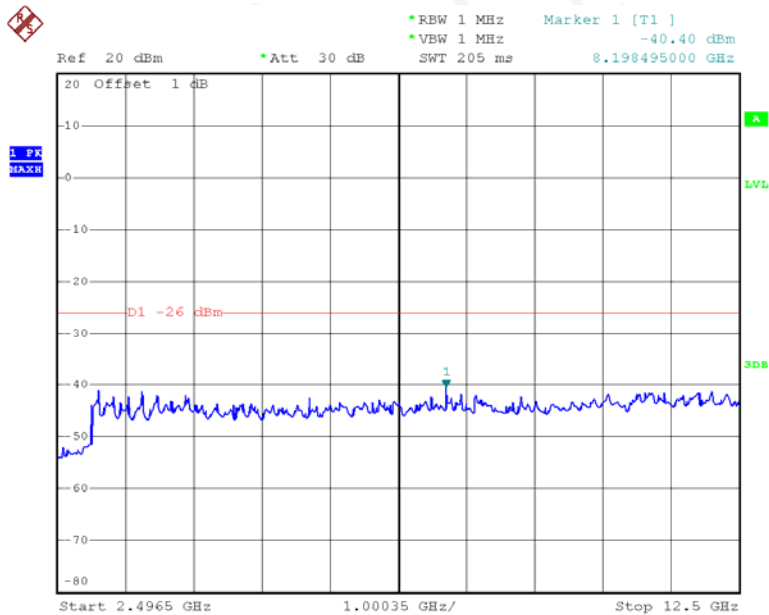
Date: 29.JAN.2018 17:52:05

2.4835GHz~2.4965GHz



Date: 29.JAN.2018 17:54:34

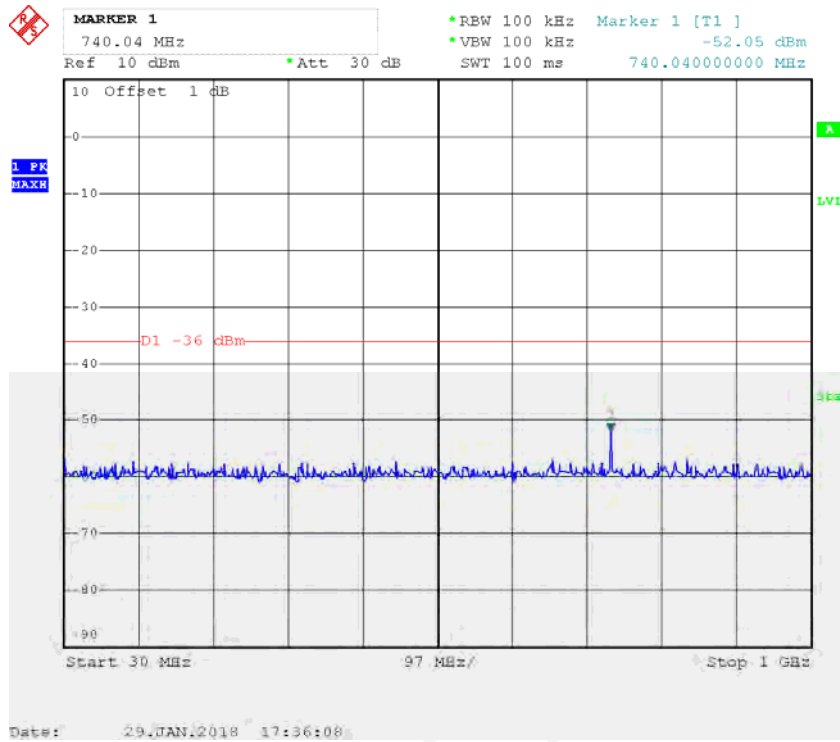
2.4965GHz~12.5GHz



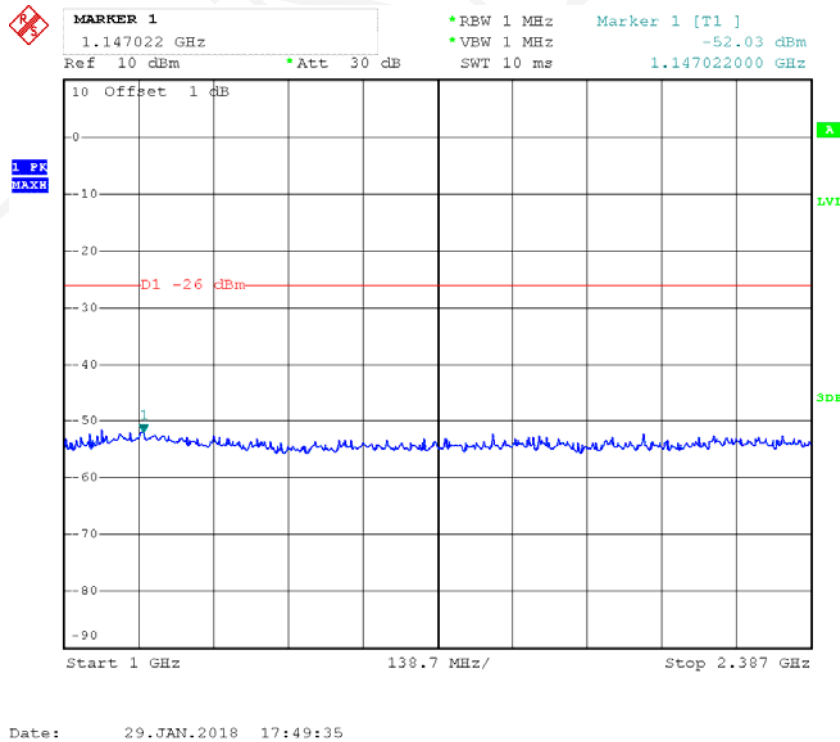
Date: 31.JAN.2018 12:53:11

2477.5MHz:

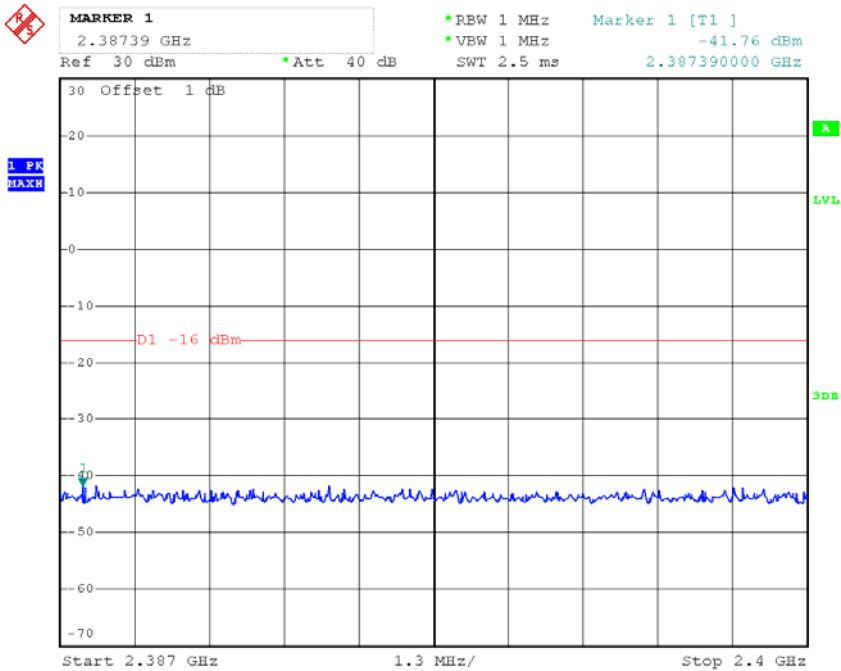
30MHz~1GHz



1GHz~2.387GHz

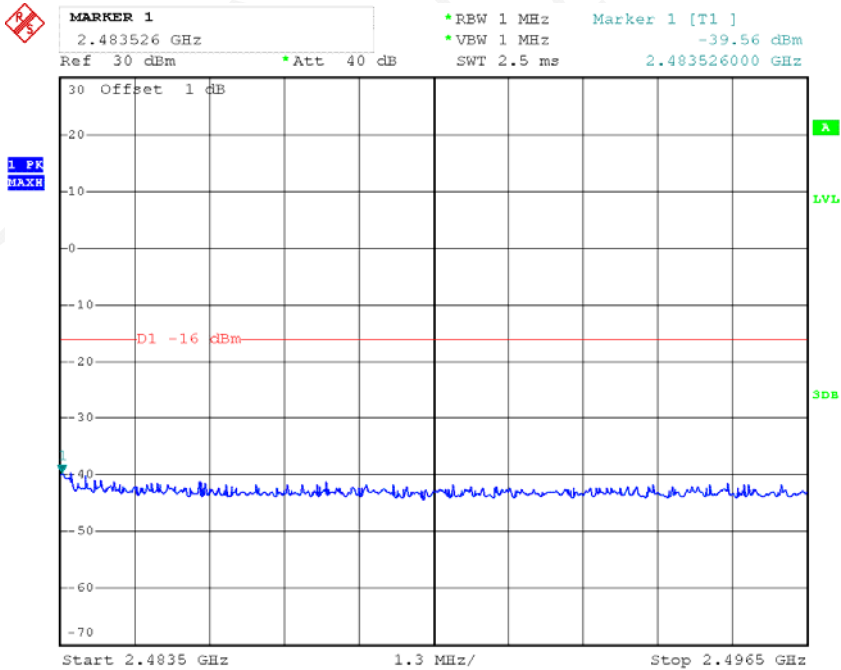


2.387GHz~2.4GHz

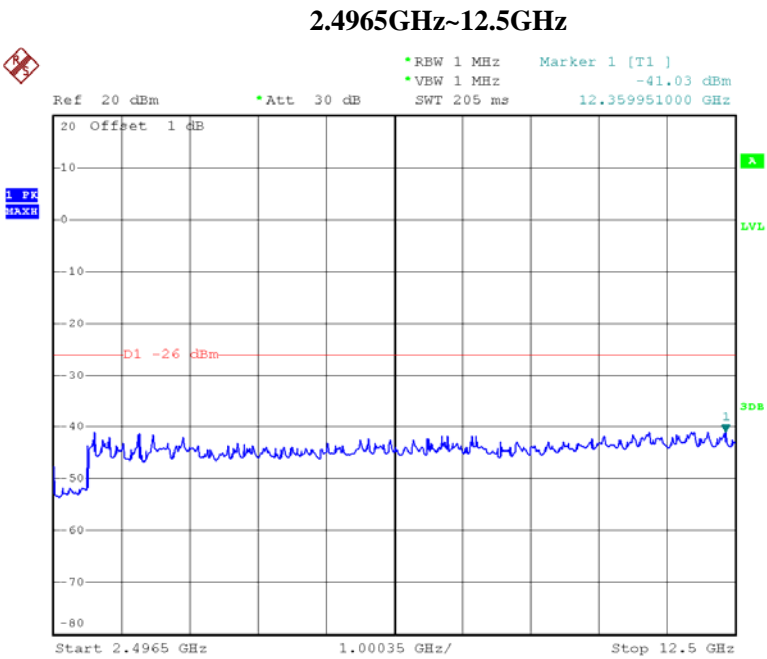


Date: 29.JAN.2018 17:52:27

2.4835GHz~2.4965GHz



Date: 29.JAN.2018 17:55:26



Date: 31.JAN.2018 12:53:46

ANTENNA OUTPUT POWER, ANTENNA POWER TOLERANCE AND TRANSMISSION ANTENNA GAIN

Limit

- $\leq 3 \text{ mW /MHz}$ (FHSS from 2402-2480 MHz which contains 2427-2470.75MHz)
- $\leq 10 \text{ mW/MHz}$ (OFDM, DSSS from 2400-2483.5 MHz)
- $\leq 10 \text{ mW}$ (other from 2400-2483.5 MHz)

The Output Power Tolerance must be within +20%, -80%.

E.i.r.p:

- $\leq 6.91 \text{ dBm/MHz}$ (FHSS from 2400-2483.5MHz which contains 2427-2470.75MHz)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Wideband Power	N1921A	MY54170013	2017-11-03	2018-11-03
Agilent	P-Series Power Meter	N1912A	MY5000448	2017-11-03	2018-11-03
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

For FHSS UUT:

Connect the UUT to the power meter in a state of hopping mode.

For OFDM, DSSS UUT:

Step 1:

Connect the UUT to the spectrum analyser and use the following settings:

- Centre Frequency: The centre frequency of the channel under test.
- RBW: 1 MHz.
- VBW: 1 MHz.
- Span: Wide enough to cover the complete power envelope of the signal of the UUT.
- Detector: Peak.
- Trace Mode: Max Hold.

Step 2:

When the trace is complete, find the peak value of the power envelope and record the frequency.

Step 3:

Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: Equal to the frequency recorded in step 2.
- Span: 3 MHz.
- RBW: 1 MHz.
- VBW: 1 MHz.

- Detector: Average (see note).
- Trace Mode: Max Hold.

For other UUT:

Make the following changes to the settings of the spectrum analyser:

- Centre Frequency: The centre frequency of the channel under test.
- Span: 5MHz.
- RBW: 3 MHz.
- VBW: 10 MHz.
- Detector: Peak
- Trace Mode: Max Hold.

NOTE: The detector mode "Average" is often referred to as "RMS Average" or "Sample" but do not use Video Average.

When the trace is complete, capture the trace, for example using the "View" option on the spectrum analyser. For Find the peak value of the trace and place the analyser marker on this peak. This level is recorded as D.

D shall be recorded in the test report.

The maximum PD, which is e.i.r.p. PSD (spectral density power) or power, is calculated from the above measured value D, and the applicable antenna assembly gain "G" in dBi, according to the formula below. If more than one antenna assembly is intended for this power setting, the gain of the antenna assembly with the highest gain shall be used.

$$PD = D + G$$

Test Setup Block diagram



Test Data

Environmental Conditions

Temperature:	25.2°C
Relative Humidity:	48%
ATM Pressure:	100.8 kPa

The testing was performed by Emily Wang on 2018-01-23.

Test Result: Compliant

*Test Mode: Transmitting***Ant 1**

Test Mode	Hopping			Limit
	Voltage	LV	NV	
Antenna Output Power (dBm)		7.361	7.381	7.372
Antenna Output Power (mW)		5.45	5.47	5.46
Spread Bandwidth (MHz)		70.10	69.60	69.60
Duty Cycle (%)		14.46	14.46	14.46
Antenna Power (mW/MHz)		0.5377	0.5435	0.5425
Antenna Power Error (%)		7.54	8.70	8.50
EIRP (dBm/MHz)		0.31	0.35	0.34

Ant 2

Test Mode	Hopping			Limit
	Voltage	LV	NV	
Antenna Output Power (dBm)		6.463	6.461	6.470
Antenna Output Power (mW)		4.43	4.43	4.44
Spread Bandwidth (MHz)		69.60	69.60	69.60
Duty Cycle (%)		13.86	13.86	13.86
Antenna Power (mW/MHz)		0.4592	0.4592	0.4603
Antenna Power Error (%)		-8.16	-8.16	-7.94
EIRP (dBm/MHz)		-0.38	-0.38	-0.37

Note 1:

1) Antenna Output power (mW/MHz) = Antenna Output Power (mW)/Duty cycle (%)/Spread Bandwidth (MHz)

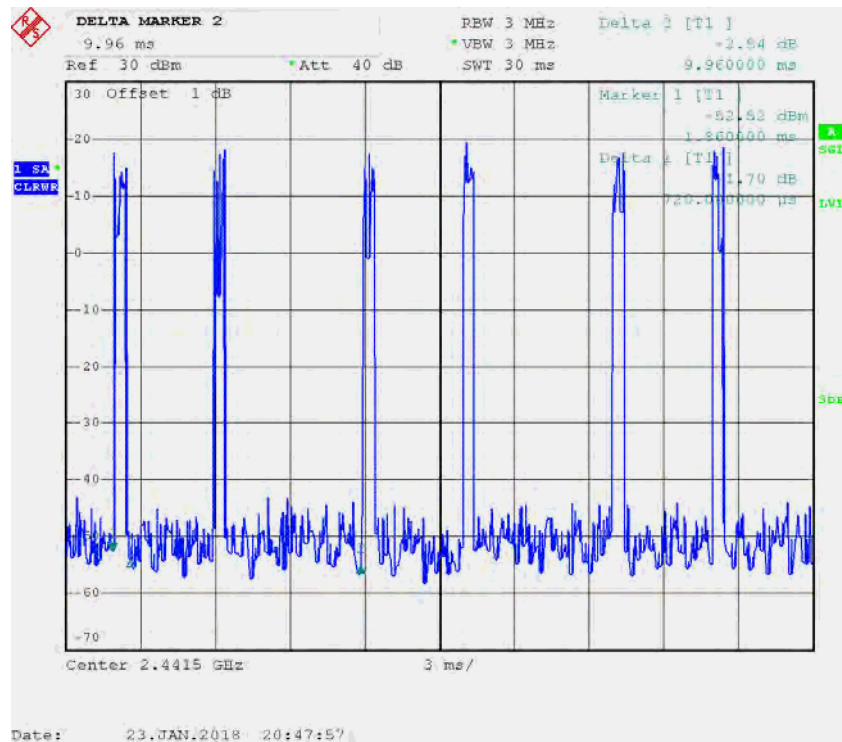
2) Antenna Output Power Tolerance = (Antenna Output power -Declared Power)/ Declared Power*100%

3) Declared Power is 0.5mW/MHz and antenna gain is 2dBi.

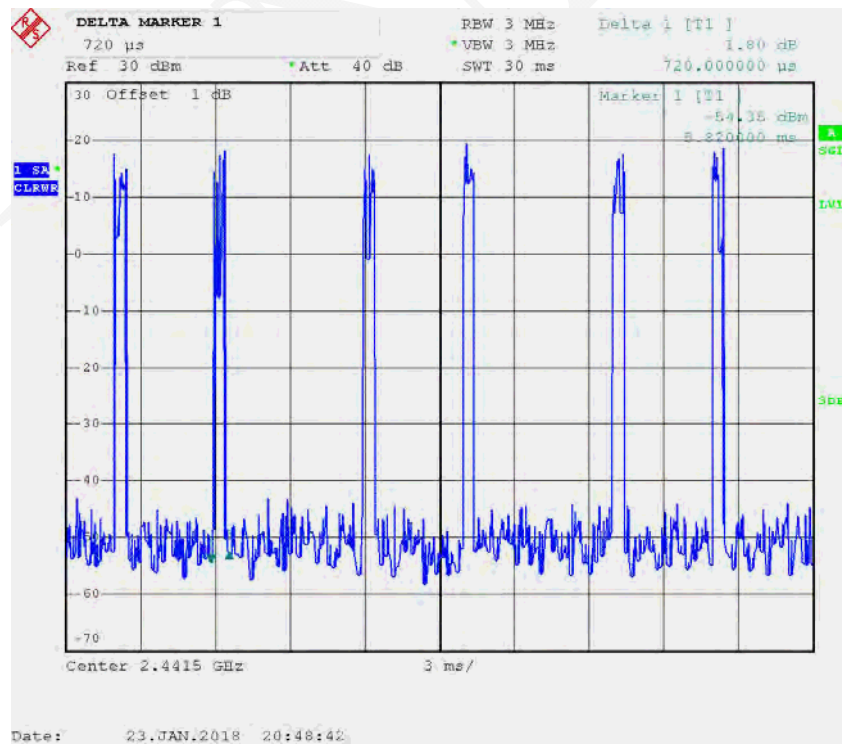
Note 2: Transmission Antenna Gain and Transmission Radiation Angle Width are not required since EIRP less than 6.91dBm/MHz.

Ant 1

Duty Cycle-1

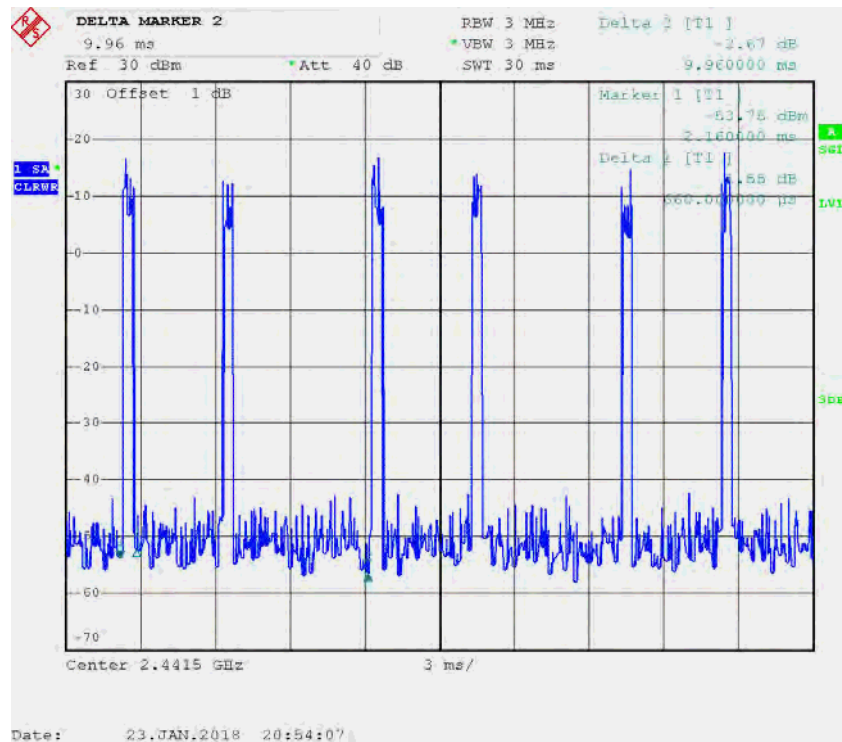


Duty Cycle-2

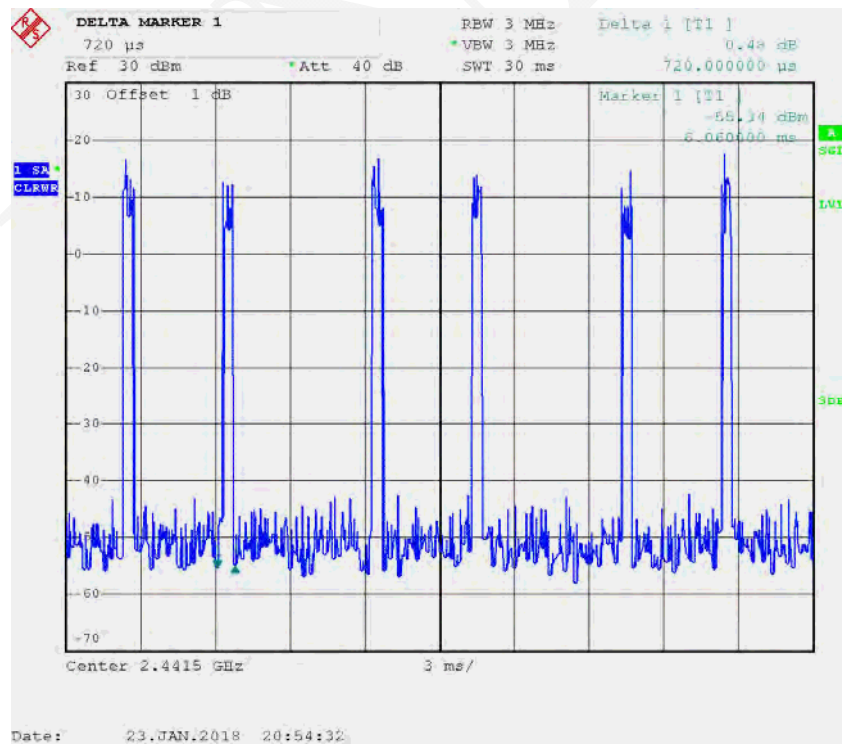


Ant 2

Duty Cycle-1



Duty Cycle-2



RECEIVER SPURIOUS EMISSION AND UNWANTED EMISSION INTENSITY

Limit

- $\leq 4 \text{ nW}$ ($30 \text{ MHz} \leq f \leq 1000 \text{ MHz}$)
- $\leq 20 \text{ nW}$ ($1 \text{ GHz} \leq f \leq 12.5 \text{ GHz}$)

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	Spectrum Analyzer	FSP 38	100478	2017-12-8	2018-12-8
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

❖ Conditions of Application Equipment (EUT)

- The modulation state shall be “continuous receiving mode”.

❖ Spectrum Analyzer Conditions

- Start Frequency: Start Frequency of frequency range to measure (30MHz or 1GHz)
- Stop Frequency: Stop Frequency of frequency range to measure (1GHz or 12.5GHz)
- Span: AUTO (Measurement Range)
- RBW: 100 kHz, VBW: 100 kHz for Frequency < 1 GHz
- RBW: 1MHz, VBW: 1MHz for Frequency > 1 GHz
- Sweep time: AUTO or more
- Sweep mode: Auto Sweep
- Detection: Positive Peak
- Reference Level: Enough level for maximum dynamic range

Measurement Result**Environmental Conditions**

Temperature:	20.9°C
Relative Humidity:	41%
ATM Pressure:	101.5 kPa

The testing was performed by Emily Wang on 2018-01-31.

Test Result: Compliant, please see the below tables and plots

Test Mode: Receiving

Frequency		Low Channel			Middle Channel			High Channel			Limit
Voltage		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Raw data Ant 1	Band VI	-68.51	-68.47	-68.67	-68.80	-68.69	-68.65	-68.74	-68.66	-68.64	- 54dB m
	Band VII	-60.13	-59.92	-60.00	-60.80	-60.83	-61.01	-61.32	-61.15	-61.06	- 47dB m
Unwanted Emission Intensity Ant 1	Band VI	0.1409	0.1422	0.1358	0.1318	0.1352	0.1365	0.1337	0.1361	0.1368	4nW
	Band VII	0.9705	1.0186	1.0000	0.8318	0.8260	0.7925	0.7379	0.7674	0.7834	20nW

Frequency		Low Channel			Middle Channel			High Channel			Limit
Voltage		LV	NV	HV	LV	NV	HV	LV	NV	HV	
Raw data Ant 2	Band VI	-68.71	-68.74	-68.75	-68.31	-68.54	-68.39	-68.57	-68.58	-68.71	- 54dB m
	Band VII	-60.82	-60.64	-60.89	-58.42	-58.62	-58.89	-60.43	-60.14	-60.18	- 47dB m
Unwanted Emission Intensity Ant 2	Band VI	0.1346	0.1337	0.1334	0.1476	0.1400	0.1449	0.1390	0.1387	0.1346	4nW
	Band VII	0.8279	0.8630	0.8147	1.4388	1.3740	1.2912	0.9057	0.9683	0.9594	20nW

Note:

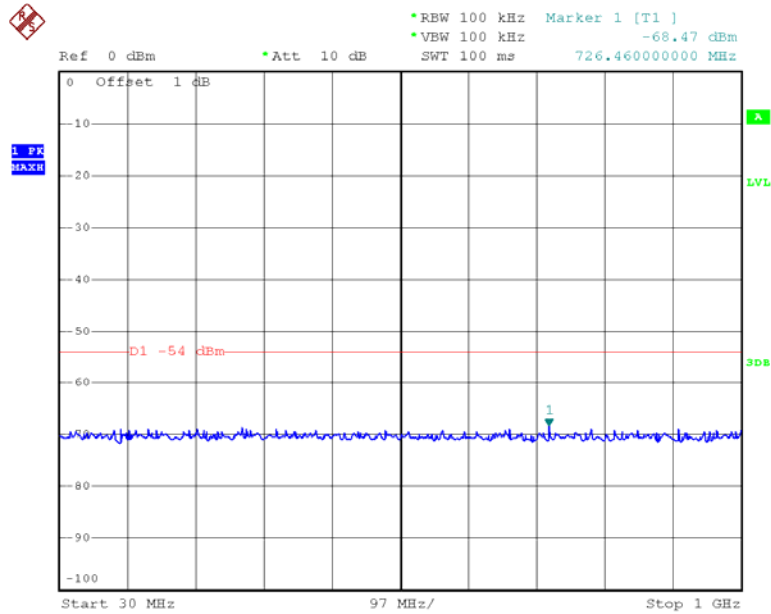
band I: 30MHz~1000MHz

band II: 1000MHz~12500MHz

Please refer to the below plots for normal voltage test.

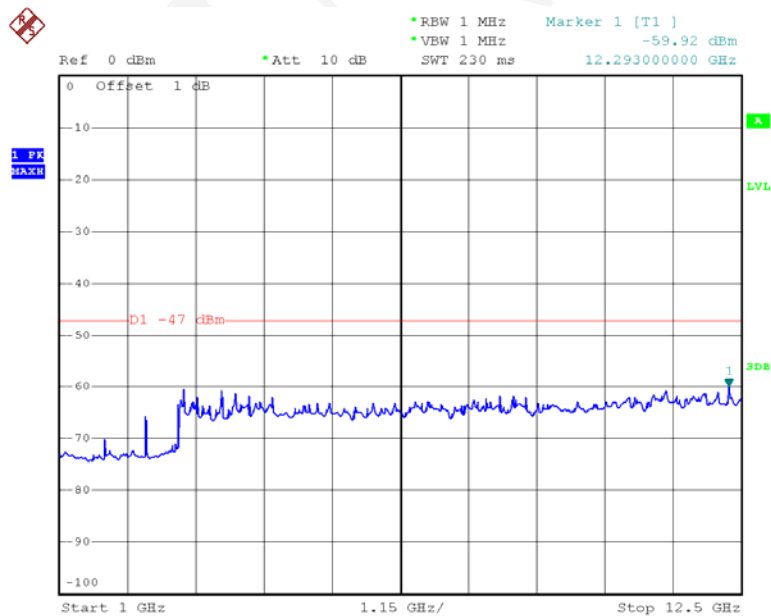
Ant 1
2403.5MHz:

30MHz~1GHz



Date: 31.JAN.2018 12:55:27

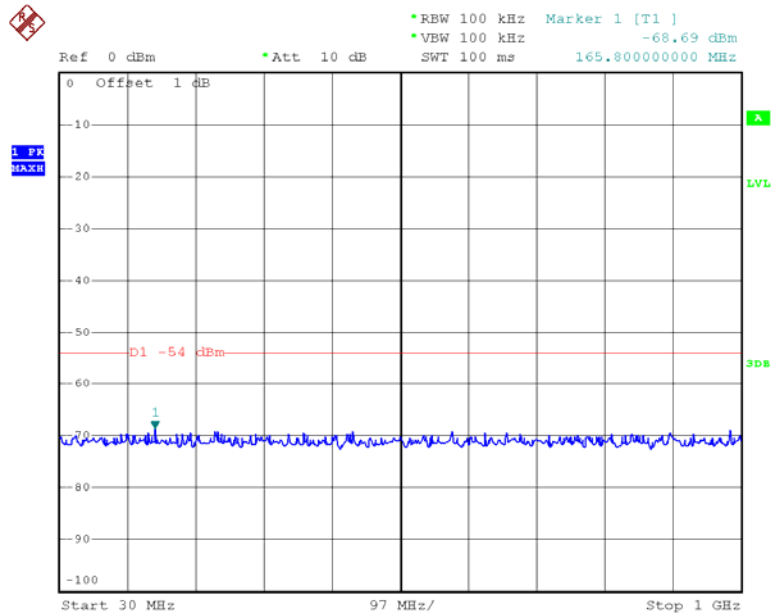
1GHz~12.5GHz



Date: 31.JAN.2018 13:02:15

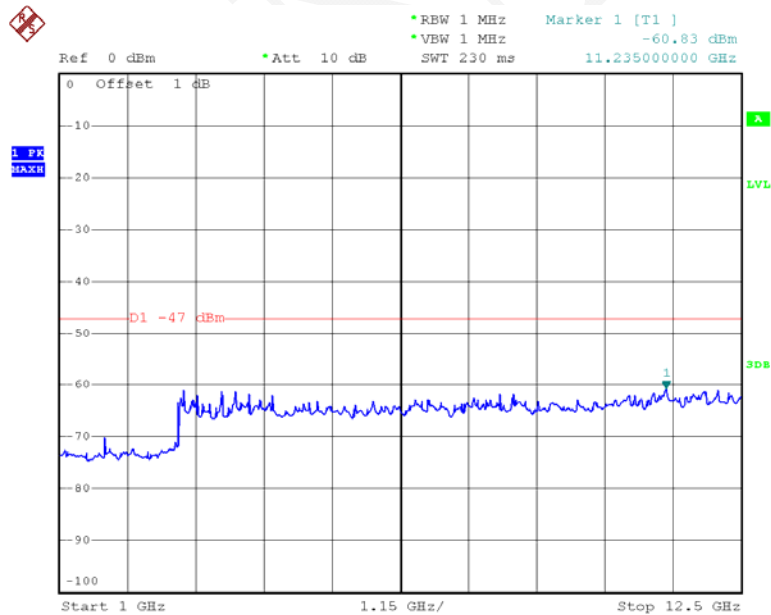
2441.5MHz:

30MHz~1GHz



Date: 31.JAN.2018 12:55:43

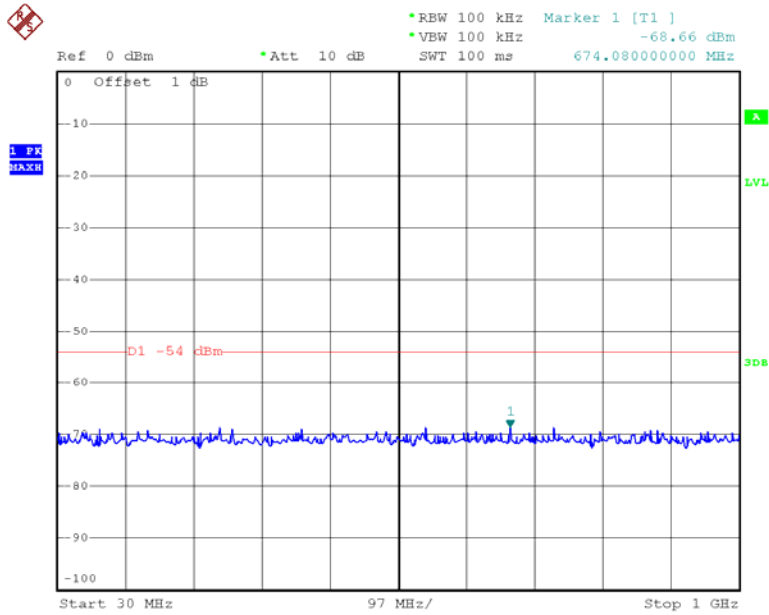
1GHz~12.5GHz



Date: 31.JAN.2018 13:02:06

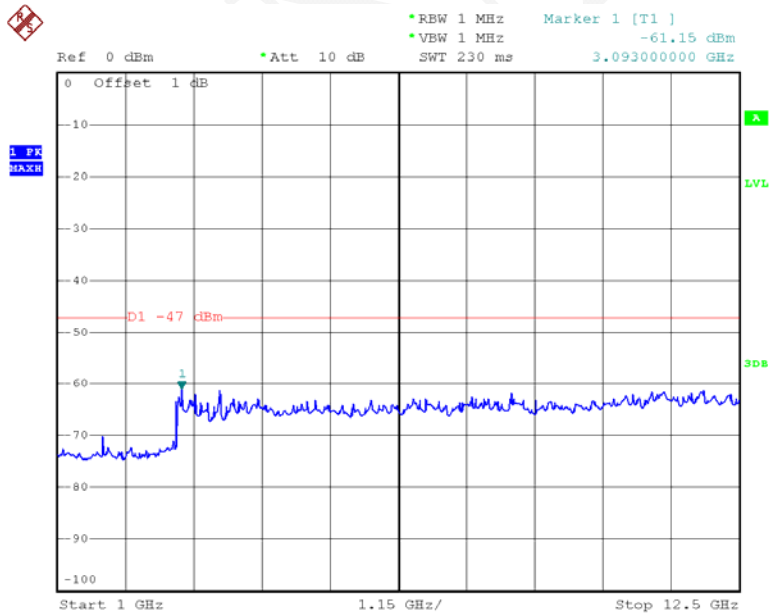
2477.5MHz:

30MHz~1GHz



Date: 31.JAN.2018 12:56:06

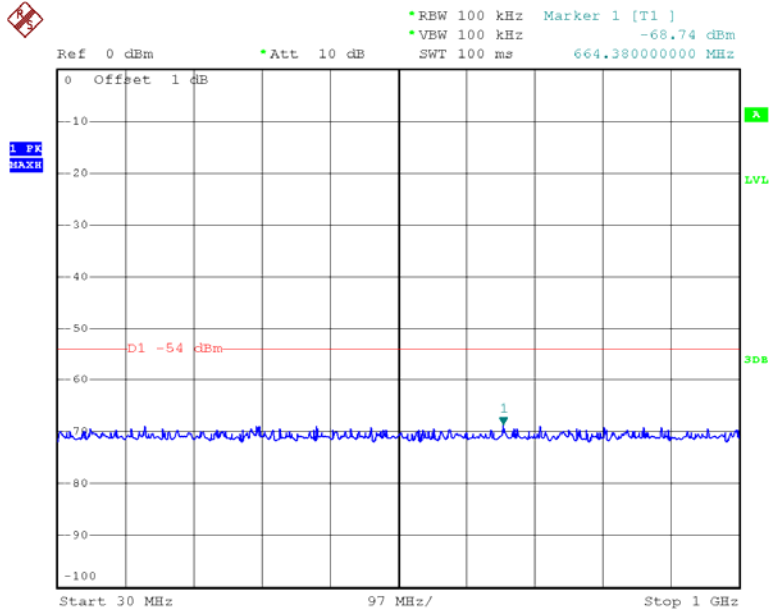
1GHz~12.5GHz



Date: 31.JAN.2018 13:01:57

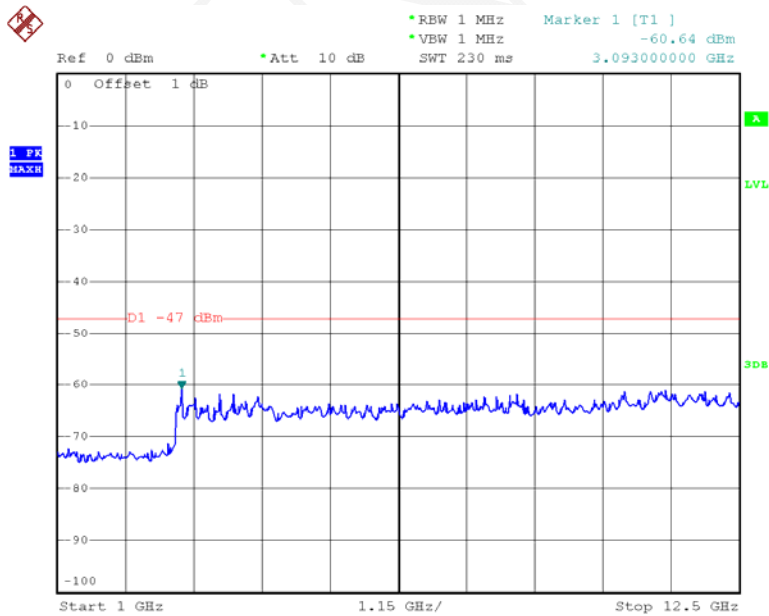
Ant 2
2403.5MHz:

30MHz~1GHz



Date: 31.JAN.2018 12:56:38

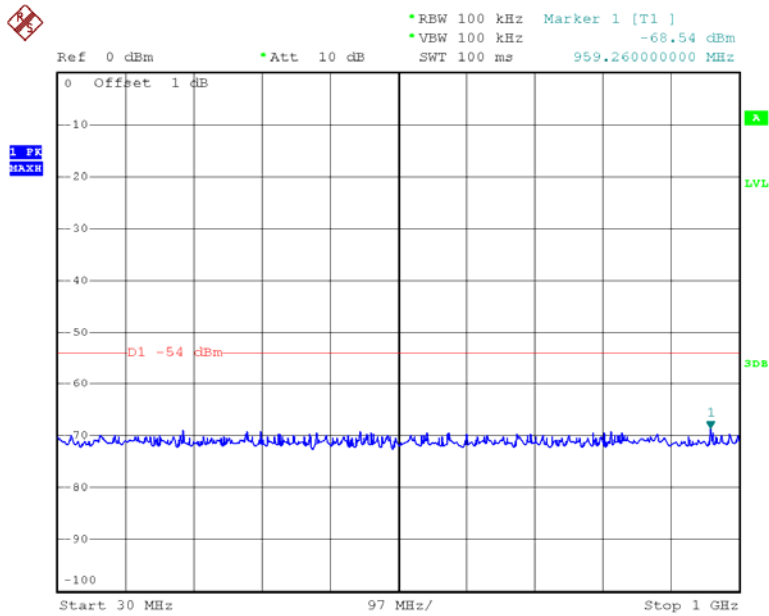
1GHz~12.5GHz



Date: 31.JAN.2018 13:01:30

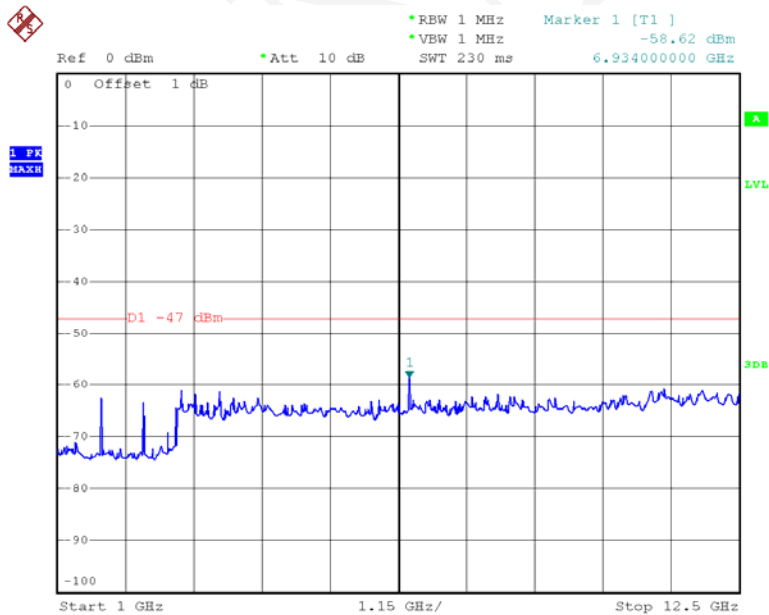
2441.5MHz:

30MHz~1GHz



Date: 31.JAN.2018 12:56:55

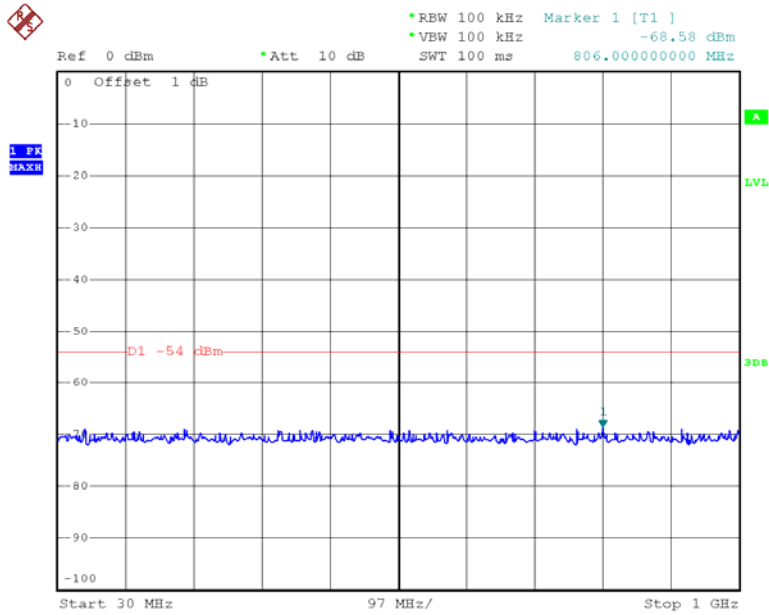
1GHz~12.5GHz



Date: 31.JAN.2018 13:01:10

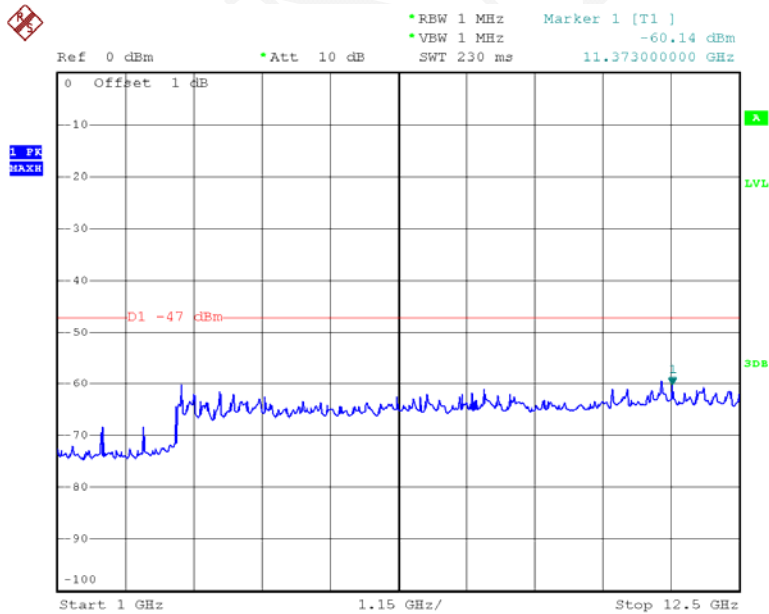
2477.5MHz:

30MHz~1GHz



Date: 31.JAN.2018 12:57:26

1GHz~12.5GHz



Date: 31.JAN.2018 13:00:17

FREQUENCY HOPPING DWELL TIME

Applicable Standard

According to Radio Law Radio Equipment Regulations Article 49-20, frequency dwell time is 0.4 seconds or below.

Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
R&S	EMI Test Receiver	ESPI	100120	2017-12-11	2018-12-11
Pro instrument	DC Power Supply	pps3300	N/A	N/A	N/A
N/A	Coaxial Cable	C-SJ00-0010	C0010/01	Each time	N/A

* **Statement of Traceability:** Bay Area Compliance Laboratories Corp. (Dongguan) attests that all calibrations have been performed, traceable to National Primary Standards and International System of Units (SI).

Test Procedure

❖ Conditions of Application Equipment (EUT)

- Set the application equipment (EUT) to the measurement frequency.
- The modulation state shall be “continuous (burst) transmission mode”. If impossible, it shall be “continuous frequency-hopping mode”.

❖ Spectrum Analyzer Conditions

For duty cycle and hopping number:

- Center Frequency: Equal to middle channel for each mode
- RBW: 1MHz, VBW: 1MHz
- Log scale: 10dB/Div, Data points: 501points (400 points or more)
- Attenuator: 30dB
- Detection: Sample, Sweep mode: Single

For spreading bandwidth:

- Start Frequency: 2400MHz, Stop Frequency: 2483.5MHz
- RBW: 300kHz, VBW: 300kHz
- Log scale: 10dB/Div, Data points: 501points (400 points or more)
- Attenuator: 30dB
- Detection: Positive Peak, Sweep mode: Continuous

Test Data**Environmental Conditions**

Temperature:	24.6°C
Relative Humidity:	46 %
ATM Pressure:	101 kPa

The testing was performed by Emily Wang on 2018-01-24.

Test Result: Compliant (Test performed normal voltage)

Test Mode: Transmitting

Time of Occupancy**Ant 1**

Spreading bandwidth (MHz)	Ton (ms)	Observed Period (s)	Hops in Observed Period	Dwell Time (s)	Limit (s)
69.60	1.44	27.84	146	0.21	0.4

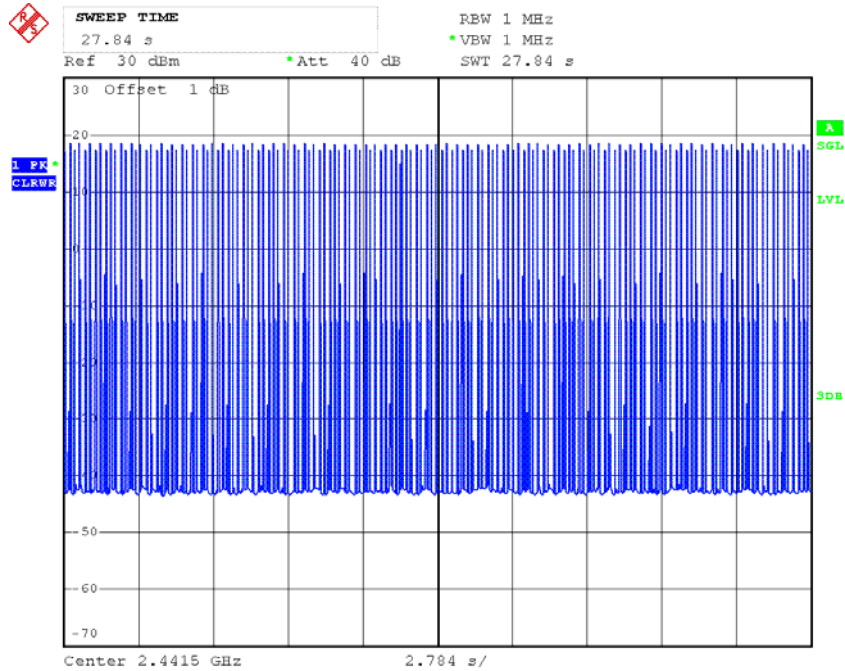
Ant 2**Time of Occupancy**

Spreading bandwidth (MHz)	Ton (ms)	Observed Period (s)	Hops in Observed Period	Dwell Time (s)	Limit (s)
69.60	1.38	27.84	146	0.20	0.4

Note1: Dwell time = Time per one hopping (On time) * hopping number (within the time obtained by multiplying the spread rate by 0.4s)

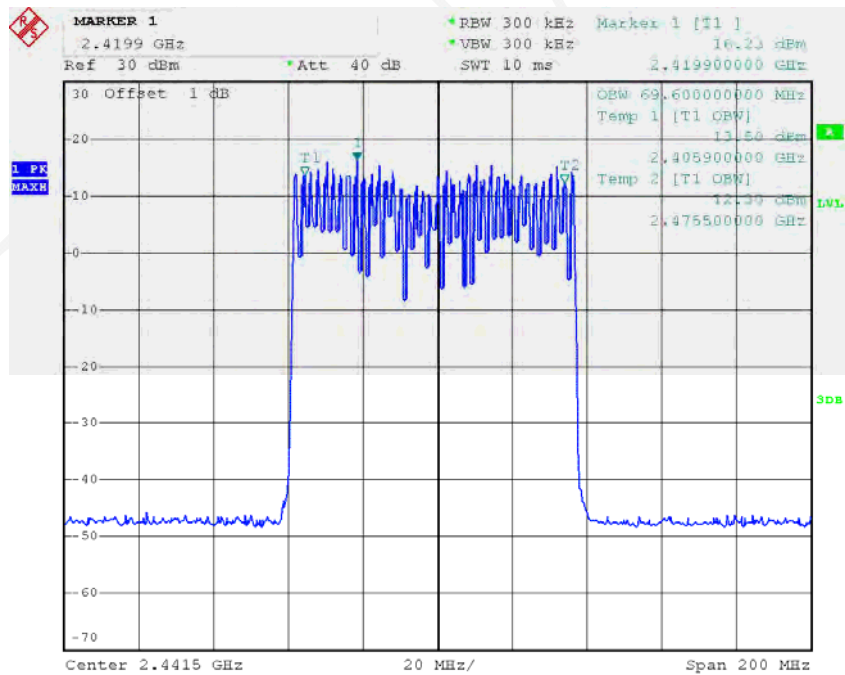
Note2: On time please refer to Duty Cycle.

Hopping Number



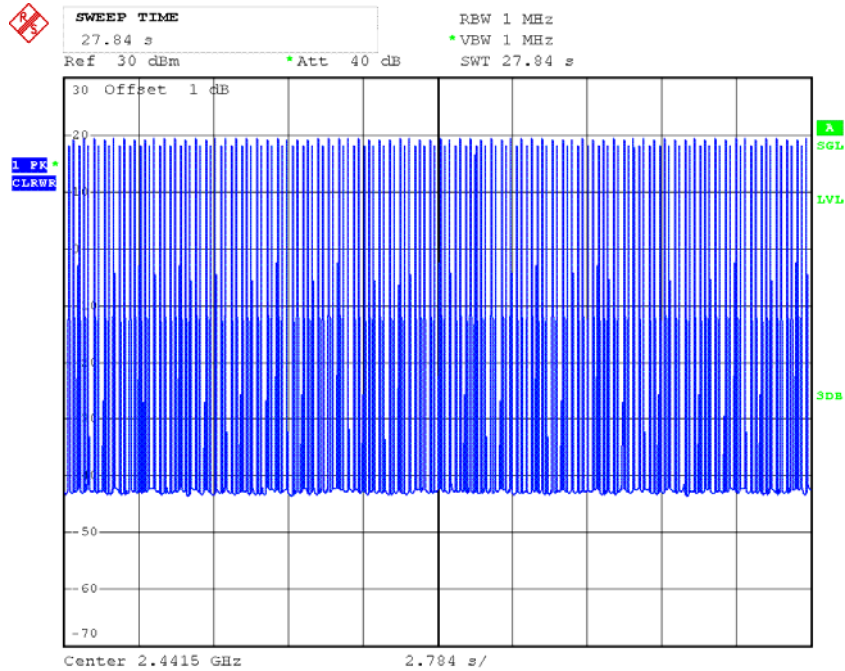
Date: 24.JAN.2018 14:52:02

Spreading Bandwidth



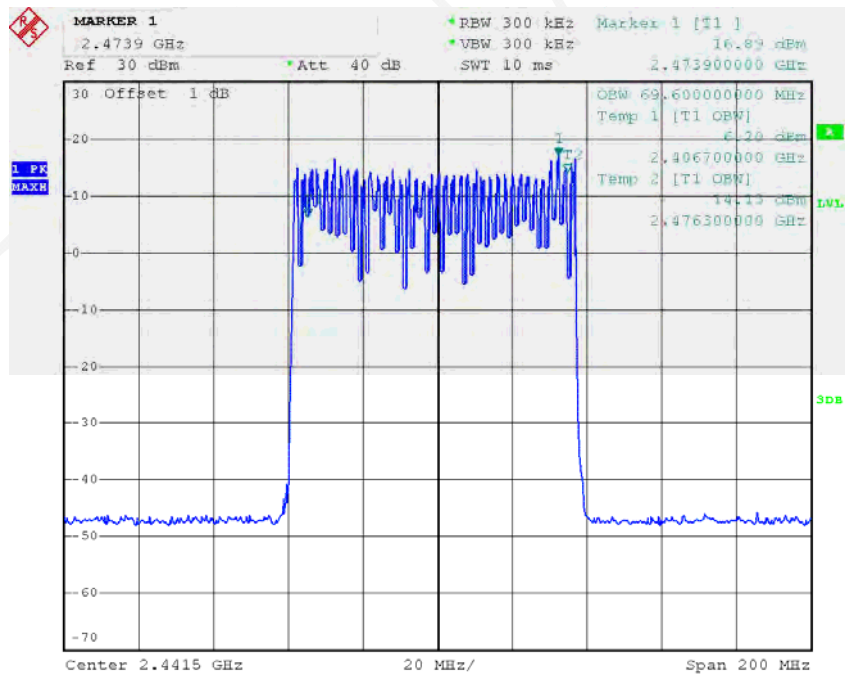
Date: 24.JAN.2018 14:44:24

Hopping Number



Date: 24.JAN.2018 15:29:28

Spreading Bandwidth



Date: 24.JAN.2018 15:25:51

INTERFERENCE PREVENTION FUNCTION

Requirement

The EUT shall have the interference prevention capability to transmit or to receive the identification automatically, so that sender and receiver shall exclude other equipment.

Test Procedure

In the case that the EUT has the function of automatically transmitting the identification code:

1. Transmit the predetermined identification codes from EUT
2. Check the transmitted identification codes with the demodulator.

In the case of receiving the identification codes:

1. Transmit the predetermined identification codes from the counterpart.
2. Check if communication is normal
3. Transmit the signal other than predetermined ID codes from the counterpart.
4. Check if the EUT stops the transmission, or if it displays that identification codes are different from the predetermined ones.

Measurement Result

Environmental Conditions

Temperature:	24.6°C
Relative Humidity:	46 %
ATM Pressure:	101 kPa

The testing was performed by Emily Wang on 2018-01-24.

Test Result: Good

CONSTRUCTION PROTECTION CONFIRMATION

Limit

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

Confirmation Method

The EUT was shielded by shielding case. Please refer the EUT photo.

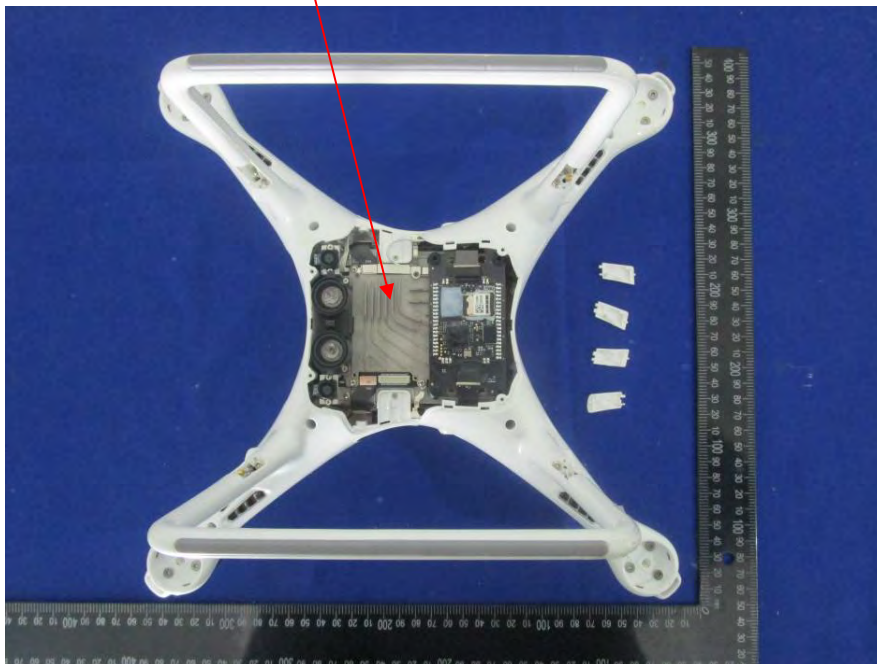


EXHIBIT A - EUT PHOTOGRAPHS

EUT –All View



EUT –Adapter Top View



EUT –Adapter Bottom View



EUT –Adapter Label View



EUT –Top View



EUT –Bottom View



EUT –Side View



EUT –Side View



EUT –Side View



EUT –SideView



EUT –Port View



EUT –Uncover View

