

# TECHNICAL REPORT



Report No.: TW2103124E  
File reference No.: 2021-04-02

Applicant: Shenzhen Newer Technology Co., Ltd

Product: APP RING LIGHT

Model No.: RGB18-APP, RGB14-APP, RGB16-APP, RGB20-APP

Trademark: NEEWER

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



Dated: April 02, 2021

**Results appearing herein relate only to the sample tested**

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

**SHENZHEN TIMEWAY TESTING LABORATORIES**

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

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



### **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. 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 17025:2005 General Requirements) for the Competence of testing Laboratories.

#### **FCC-Registration No.: 744189**

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

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

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

#### **A2LA (Certification Number:5013.01)**

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

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## 1.0 General Details

### 1.1 Test Lab Details

Name : SHENZHEN TIMEWAY TESTING LABORATORIES.  
Address: Zone C, 1st Floor, Block B, Jun Xiang Da Building, Zhongshan Park Road West, Tong Le Village, Nanshan District, Shenzhen, China  
Telephone: (755) 83448688  
Fax: (755) 83442996  
Site Listed with Federal Communications commission (FCC)  
Registration Number:744189  
For 3m Anechoic Chamber  
Site Listed with Industry Canada of Ottawa, Canada  
Registration Number: IC: 5205A  
For 3m Anechoic Chamber

### 1.2 Applicant Details

Applicant: Shenzhen Neewer Technology Co., Ltd  
Address: ROOM 1901-1903, Block A, LU SHAN BUILDING NO.3023 CHUNFENGRD LUO HU DISTRICT, SHENZHEN, GUANGDONG, 518001, CHINA  
Telephone: --  
Fax: --

### 1.3 Description of EUT

Product: APP RING LIGHT  
Manufacturer: Shenzhen Neewer Technology Co., Ltd  
Address: ROOM 1901-1903, Block A, LU SHAN BUILDING NO.3023 CHUNFENGRD LUO HU DISTRICT, SHENZHEN, GUANGDONG, 518001, CHINA  
Brand Name: NEEWER  
Model Number: RGB18-APP  
Additional Model Number: RGB14-APP, RGB16-APP, RGB20-APP  
Type of Modulation GFSK,  $\pi/4$ -DQPSK, 8DPSK for Bluetooth  
Frequency range 2402-2480MHz for Bluetooth  
Channel Spacing 1MHz for Bluetooth  
Frequency Selection By software  
Channel Number 79 channels for Bluetooth  
Antenna: PCB antenna used. The gain of the antenna is 2.0dBi. (get from the antenna specification provided the applicant)  
Input Voltage: DC12V-15V, 42W  
Power Supply: Model: NW-120500D2;  
Input: 100-240V~50/60Hz ,1.6A Max; Output: 12V, 5A,60W

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1.4 Submitted Sample: 2 Samples

1.5 Test Duration  
2021-03-11 to 2021-04-02

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%  
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





<b>2.0 Test Equipment</b>					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2020-06-23	2021-06-22
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2020-06-23	2021-06-22
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2020-06-23	2021-06-22
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2020-06-23	2021-06-22
Loop Antenna	EMCO	6507	00078608	2020-06-23	2021-06-22
Spectrum	R&S	FSIQ26	100292	2020-06-23	2021-06-22
Horn Antenna	A-INFO	LB-180400-KF	J211060660	2020-06-23	2021-06-22
Horn Antenna	R&S	BBHA 9120D	9120D-631	2018-07-09	2021-07-08
Power meter	Anritsu	ML2487A	6K00003613	2020-06-23	2021-06-22
Power sensor	Anritsu	MA2491A	32263	2020-06-23	2021-06-22
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2018-07-04	2021-07-03
9*6*6 Anechoic	--	--	N/A	2020-07-06	2021-07-05
EMI Test Receiver	RS	ESVB	826156/011	2020-06-23	2021-06-22
EMI Test Receiver	RS	ESH3	860904/006	2020-06-23	2021-06-22
Spectrum	HP/Agilent	ESA-L1500A	US37451154	2020-06-23	2021-06-22
Spectrum	HP/Agilent	E4407B	MY50441392	2020-06-23	2021-06-22
Spectrum	RS	FSP	1164.4391.38	2021-01-16	2022-01-15
RF Cable	Zhengdi	ZT26-NJ-NJ-8 M/FA	--	2020-06-23	2021-06-22
RF Cable	Zhengdi	7m	--	2020-06-23	2021-06-22
RF Switch	EM	EMSW18	060391	2020-06-23	2021-06-22
Pre-Amplifier	Schwarebeck	BBV9743	#218	2020-06-23	2021-06-22
Pre-Amplifier	HP/Agilent	8449B	3008A00160	2020-06-23	2021-06-22
LISN	SCHAFFNER	NNB42	00012	2021-01-06	2022-01-05

## 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**

<b>The EUT has been tested according to the following specifications:</b>			
<b>Requirement</b>	<b>CFR 47 Section</b>	<b>Result</b>	<b>Notes</b>
<b>Antenna Requirement</b>	<b>15.203, 15.247(b)(4)</b>	<b>PASS</b>	<b>Complies</b>
<b>Maximum Peak Out Power</b>	<b>15.247 (b)(1), (4)</b>	<b>PASS</b>	<b>Complies</b>
<b>Carrier Frequency Separation</b>	<b>15.247(a)(1)</b>	<b>PASS</b>	<b>Complies</b>
<b>20dB Channel Bandwidth</b>	<b>15.247 (a)(1)</b>	<b>PASS</b>	<b>Complies</b>
<b>Number of Hopping Channels</b>	<b>15.247(a)(iii), 15.247(b)(1)</b>	<b>PASS</b>	<b>Complies</b>
<b>Time of Occupancy (Dwell Time)</b>	<b>15.247(a)(iii)</b>	<b>PASS</b>	<b>Complies</b>
<b>Spurious Emission, Band Edge, and Restricted bands</b>	<b>15.247(d),15.205(a), 15.209 (a),15.109</b>	<b>PASS</b>	<b>Complies</b>
<b>Conducted Emissions</b>	<b>15.207(a), 15.107</b>	<b>PASS</b>	<b>Complies</b>
<b>RF Exposure</b>	<b>15.247(i), 1.1307(b)(1)</b>	<b>PASS</b>	<b>Complies</b>

**3.2 Test Standards**

**FCC Part 15 Subpart & Subpart C, Paragraph 15.247**

**4.0 EUT Modification**

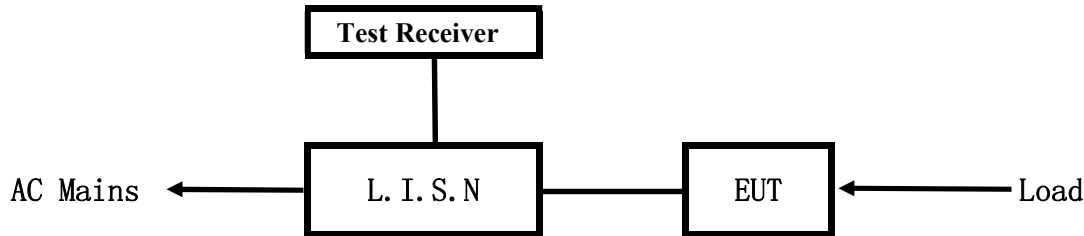
**No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.**

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## 5. Power Line Conducted Emission Test

### 5.1 Schematics of the test



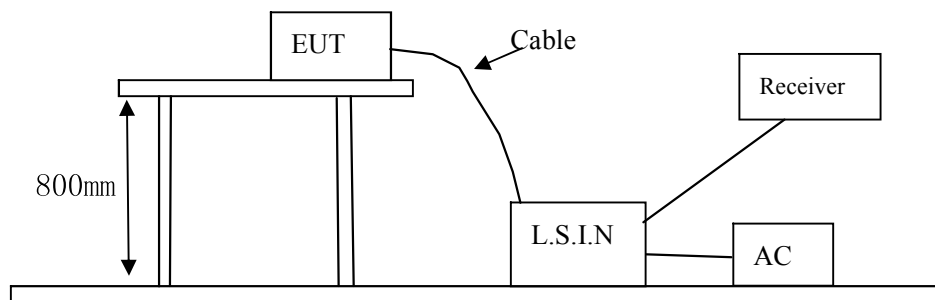
EUT: Equipment Under Test

### 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.

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A. EUT

Device	Manufacturer	Model	FCC ID
APP RING LIGHT	Shenzhen Neewer Technology Co., Ltd	RGB18-APP, RGB14-APP, RGB16-APP, RGB20-APP	2ANIV-RGB18-APP

B. Internal Device

Device	Manufacturer	Model	Rating

C. Peripherals

Device	Manufacturer	Model	Rating

5.4 EUT Operating Condition

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

A Setup the EUT and simulators as shown on follow

B Enable AF signal and confirm EUT active to normal condition

5.5 Power line conducted Emission Limit according to Paragraph 15.207

Frequency (MHz)	Class B Limits (dB $\mu$ V)	
	Quasi-peak Level	Average Level
0.15 ~ 0.50	66.0~56.0*	56.0~46.0*
0.50 ~ 5.00	56.0	46.0
5.00 ~ 30.00	60.0	50.0

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

5.6 Test Results

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

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

**EUT Operating Environment**

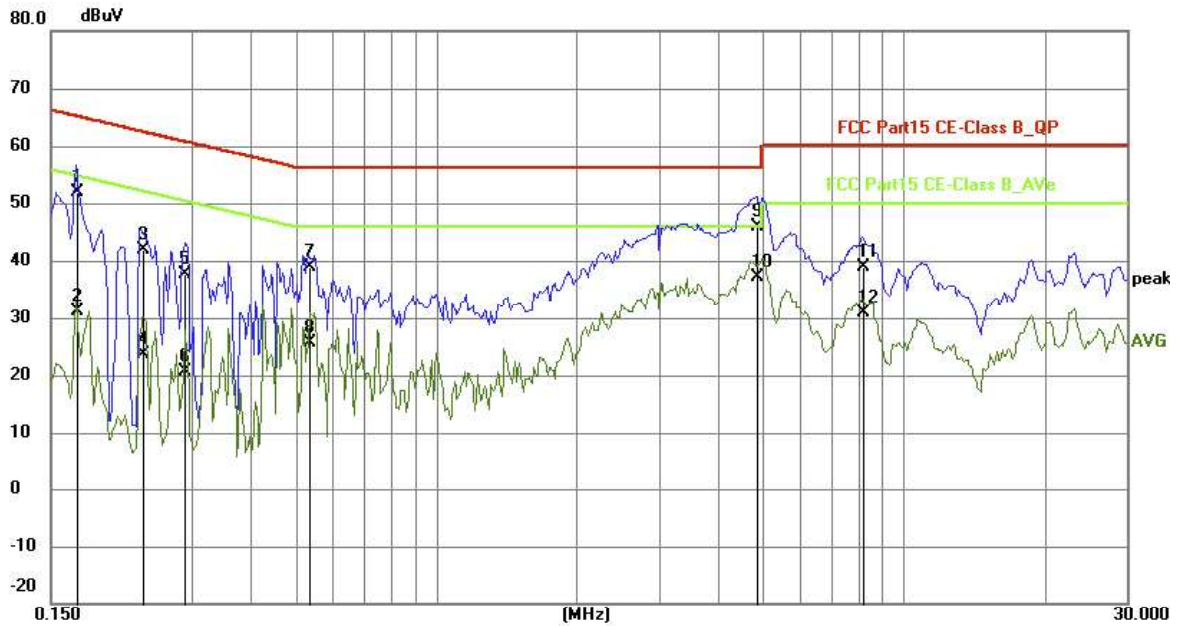
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Keep Bluetooth Transmitting**

**Equipment Level: Class B**

**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	0.1695	42.04	9.77	51.81	64.98	-13.17	QP	P
2	0.1695	21.37	9.77	31.14	54.98	-23.84	AVG	P
3	0.2358	32.12	9.75	41.87	62.24	-20.37	QP	P
4	0.2358	13.98	9.75	23.73	52.24	-28.51	AVG	P
5	0.2904	27.81	9.76	37.57	60.51	-22.94	QP	P
6	0.2904	10.81	9.76	20.57	50.51	-29.94	AVG	P
7	0.5322	29.06	9.77	38.83	56.00	-17.17	QP	P
8	0.5322	15.78	9.77	25.55	46.00	-20.45	AVG	P
9	4.8486	35.96	9.92	45.88	56.00	-10.12	QP	P
10	4.8486	27.21	9.92	37.13	46.00	-8.87	AVG	P
11	8.1597	28.76	10.07	38.83	60.00	-21.17	QP	P
12	8.1597	20.84	10.07	30.91	50.00	-19.09	AVG	P

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

**EUT Operating Environment**

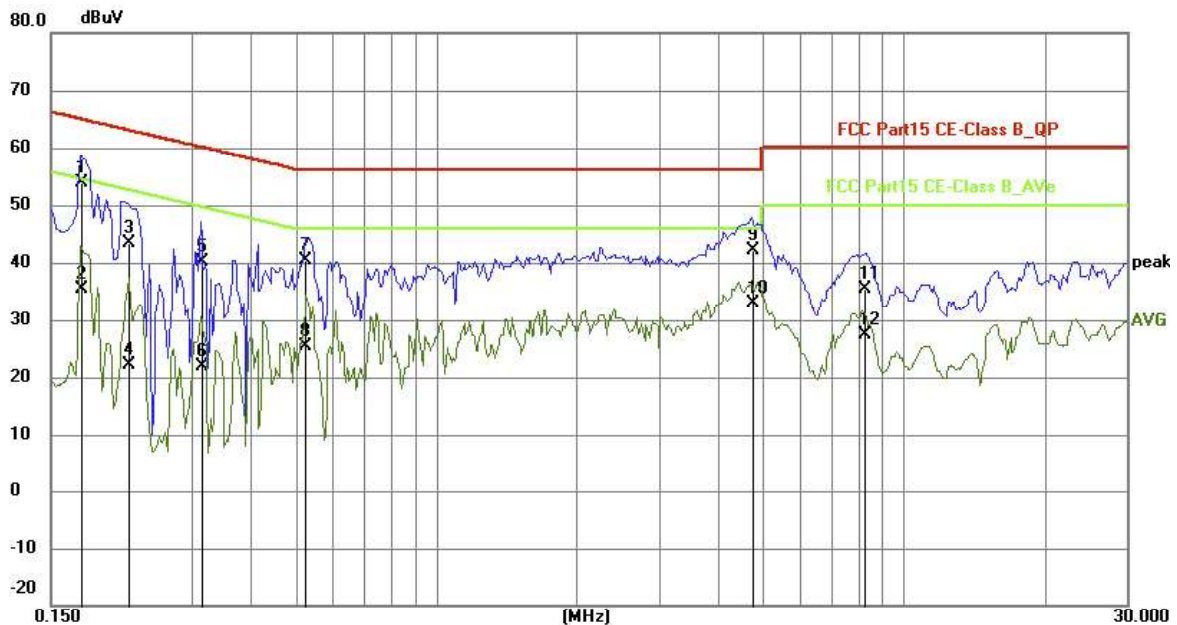
Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

**EUT set Condition: Keep Bluetooth Transmitting**

**Equipment Level: Class B**

**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	0.1734	44.07	9.77	53.84	64.80	-10.96	QP	P
2	0.1734	25.50	9.77	35.27	54.80	-19.53	AVG	P
3	0.2202	33.72	9.75	43.47	62.81	-19.34	QP	P
4	0.2202	12.34	9.75	22.09	52.81	-30.72	AVG	P
5	0.3138	30.26	9.76	40.02	59.87	-19.85	QP	P
6	0.3138	12.20	9.76	21.96	49.87	-27.91	AVG	P
7	0.5243	30.70	9.77	40.47	56.00	-15.53	QP	P
8	0.5243	15.72	9.77	25.49	46.00	-20.51	AVG	P
9	4.7277	32.12	9.92	42.04	56.00	-13.96	QP	P
10	4.7277	22.96	9.92	32.88	46.00	-13.12	AVG	P
11	8.2728	25.37	10.07	35.44	60.00	-24.56	QP	P
12	8.2728	17.27	10.07	27.34	50.00	-22.66	AVG	P

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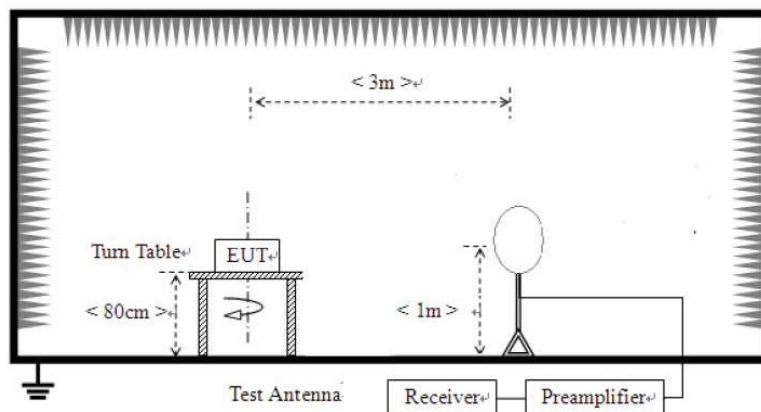
## 6 Radiated Emission Test

### 6.1 Test Method and test Procedure:

- (1) The EUT was tested according to ANSI C63.10-2013. The radiated test was performed at Timeway EMC Laboratory. This site is on file with the FCC laboratory division, Registration No. 744189
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10-2013.
- (3) The frequency spectrum from 30 MHz to 25GHz 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=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK 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

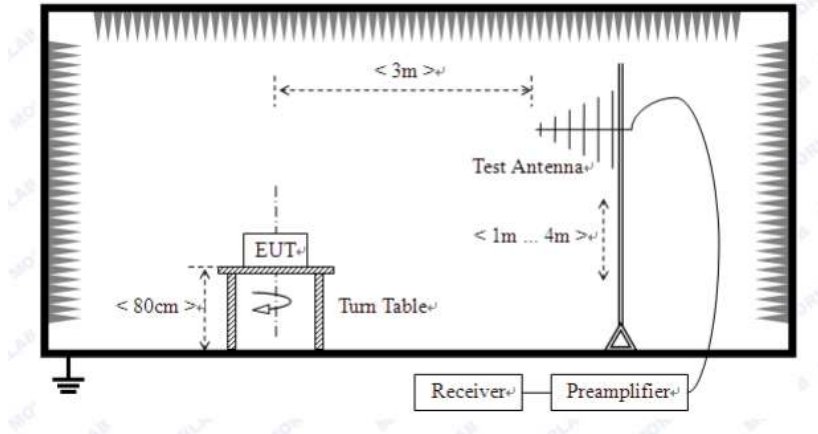


The report refers only to the sample tested and does not apply to the bulk.

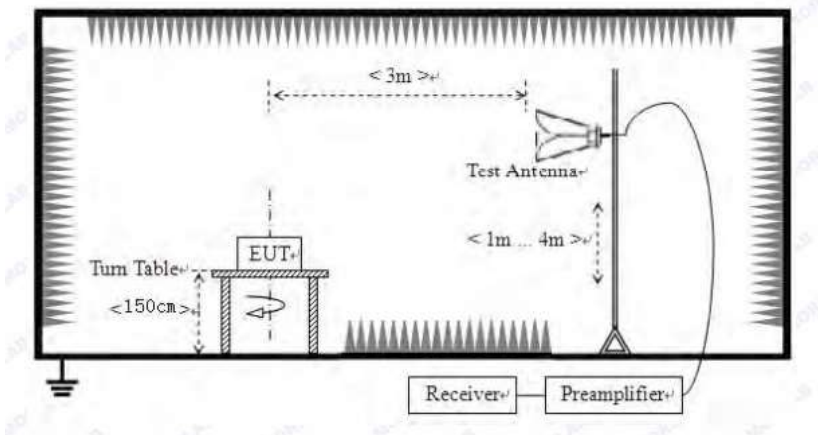
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For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



## 6.2 Configuration of The EUT

Same as section 5.3 of this report

## 6.3 EUT Operating Condition

Same as section 5.4 of this report.

## 6.4 Radiated Emission Limit

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

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

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**Frequencies in restricted band are complied to limit on Paragraph 15.209**

Frequency Range (MHz)	Distance (m)	Field strength (dB $\mu$ V/m)
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 ( $\mu$ V)
  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
  4. /4DQPSK was the worst case and only worse case is reported

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**Test result**

**General Radiated Emission Data and Harmonics Radiated Emission Data**

**Radiated Emission In Horizontal/Vertical (30MHz----1000MHz)**

EUT set Condition:       Keep Bluetooth Transmitting

**Results:**               **Pass**

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

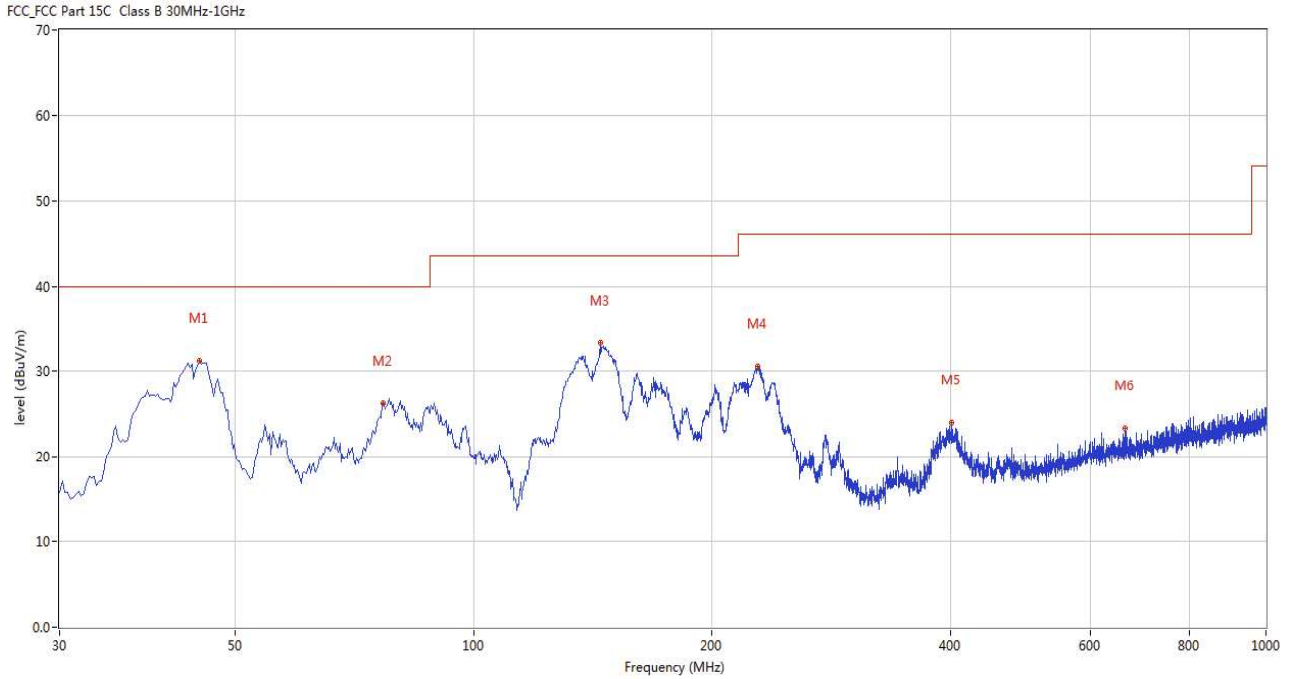
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Test Figure:

H



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	45.031	31.27	-11.41	40.0	-8.73	Peak	31.00	200	Horizontal	Pass
2	76.791	26.28	-17.62	40.0	-13.72	Peak	341.00	200	Horizontal	Pass
3	144.431	33.33	-17.14	43.5	-10.17	Peak	272.00	200	Horizontal	Pass
4	228.558	30.56	-12.74	46.0	-15.44	Peak	78.00	100	Horizontal	Pass
5	400.932	23.95	-8.59	46.0	-22.05	Peak	360.00	200	Horizontal	Pass
6	663.737	23.38	-4.42	46.0	-22.62	Peak	5.00	100	Horizontal	Pass

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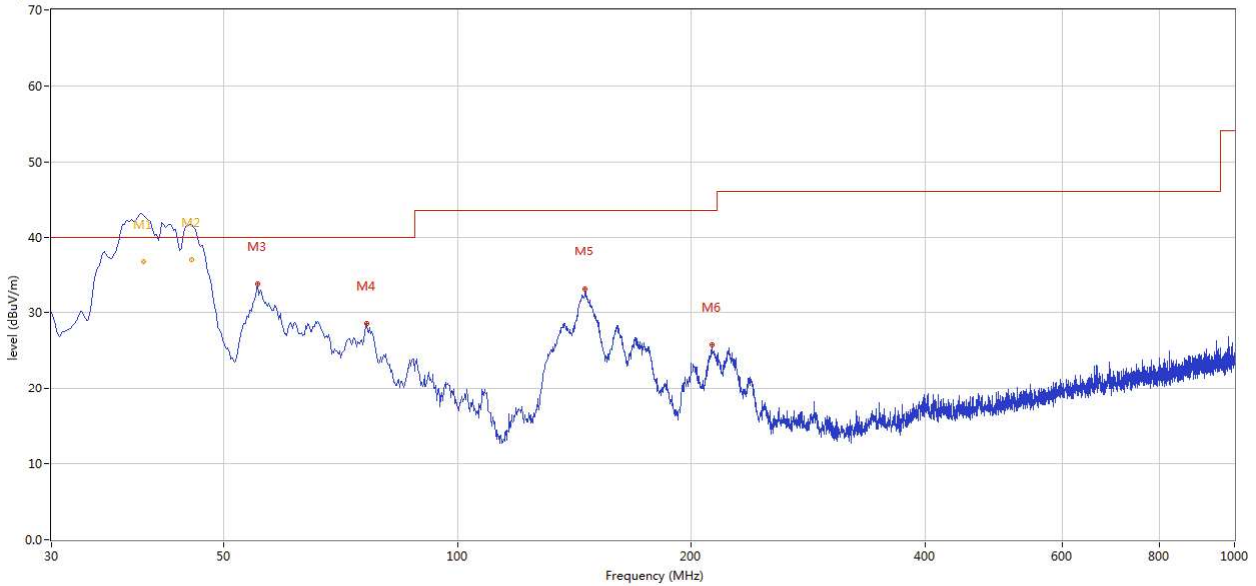




Test Figure:

V

FCC\_FCC Part 15C Class B 30MHz-1GHz



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	39.442	42.66	-12.55	40.0	2.66	Peak	320.00	100	Vertical	N/A
1*	39.442	36.66	-12.55	40.0	-3.34	QP	320.00	100	Vertical	Pass
2	45.486	41.32	-11.40	40.0	1.32	Peak	346.00	100	Vertical	N/A
2*	45.486	36.87	-11.40	40.0	-3.13	QP	346.00	100	Vertical	Pass
3	55.214	33.77	-11.83	40.0	-6.23	Peak	233.00	100	Vertical	Pass
4	76.306	28.44	-17.58	40.0	-11.56	Peak	263.00	100	Vertical	Pass
5	145.886	33.07	-17.30	43.5	-10.43	Peak	8.00	100	Vertical	Pass
6	212.314	25.70	-13.67	43.5	-17.80	Peak	48.00	100	Vertical	Pass

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**Operation Mode: Transmitting under Low Channel (2402MHz)**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
4804	--	H	74(Peak)/ 54(AV)
4804	--	V	4(Peak)/ 54(AV)
7206	--	H/V	74(Peak)/ 54(AV)
9608	--	H/V	74(Peak)/ 54(AV)
12010	--	H/V	74(Peak)/ 54(AV)
14412	--	H/V	74(Peak)/ 54(AV)
16814	--	H/V	74(Peak)/ 54(AV)
19216	--	H/V	74(Peak)/ 54(AV)
21618	--	H/V	74(Peak)/ 54(AV)
24020	--	H/V	74(Peak)/ 54(AV)

- Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit  
 2. Remark “---” means that the emissions level is too low to be measured

**Operation Mode: Transmitting g under Middle Channel (2441MHz)**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
4882	--	H	74(Peak)/ 54(AV)
4882	--	V	74(Peak)/ 54(AV)
7323	--	H/V	74(Peak)/ 54(AV)
9764	--	H/V	74(Peak)/ 54(AV)
12205	--	H/V	74(Peak)/ 54(AV)
14646	--	H/V	74(Peak)/ 54(AV)
17087	--	H/V	74(Peak) 54(AV)
19528	--	H/V	74(Peak)/ 54(AV)
21969	--	H/V	74(Peak)/ 54(AV)
24410	--	H/V	74(Peak)/ 54(AV)

- Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit  
 2. Remark “---” means that the emissions level is too low to be measured

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**Operation Mode: Transmitting under High Channel (2480MHz)**

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Antenna Polarity	Limit@3m (dB $\mu$ V/m)
4960	--	H	74(Peak)/ 54(AV)
4960	--	V	74(Peak)/ 54(AV)
7440	--	H/V	74(Peak)/ 54(AV)
9920	--	H/V	74(Peak)/ 54(AV)
12400	--	H/V	74(Peak)/ 54(AV)
14880	--	H/V	74(Peak)/ 54(AV)
17360	--	H/V	74(Peak)/ 54(AV)
19840	--	H/V	74(Peak)/ 54(AV)
22320	--	H/V	74(Peak)/ 54(AV)
24800	--	H/V	74(Peak)/ 54(AV)

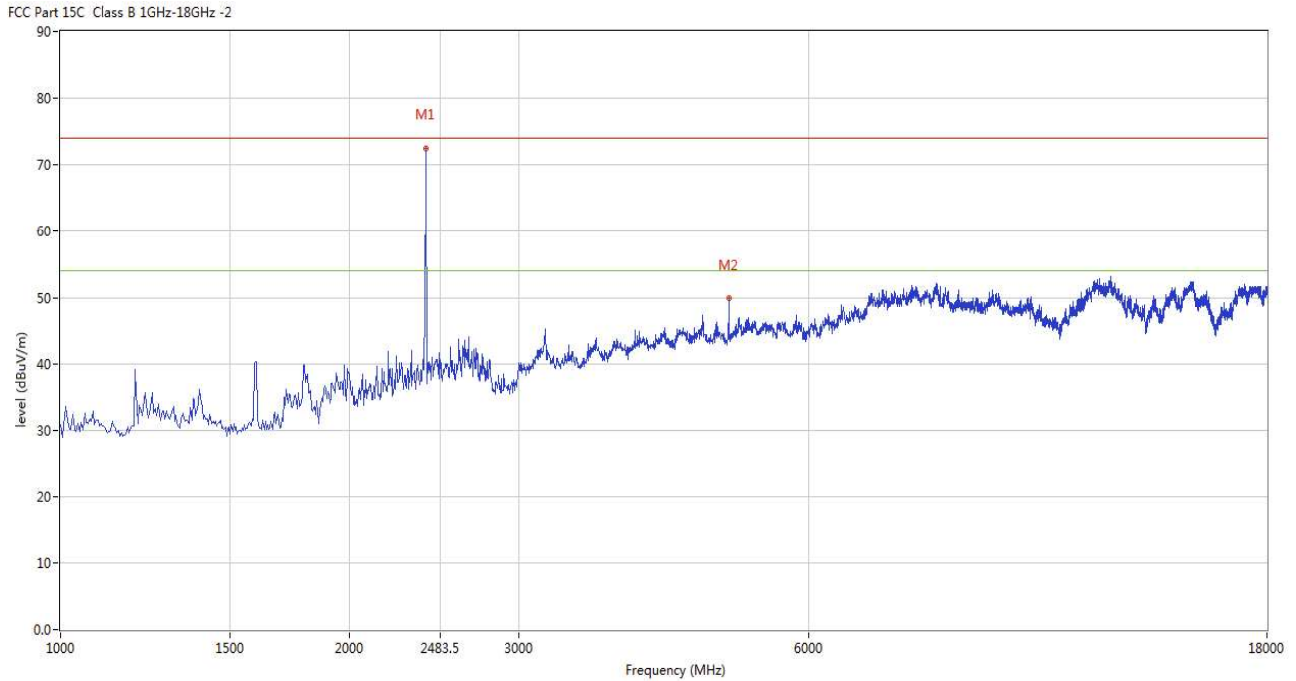
- Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit  
 2. Remark “---” means that the emissions level is too low to be measured

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Please refer to the following test plots for details:

**Low Channel: Vertical**



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2	4803.750	49.97	3.13	74.0	-24.03	Peak	308.00	100	Vertical	Pass

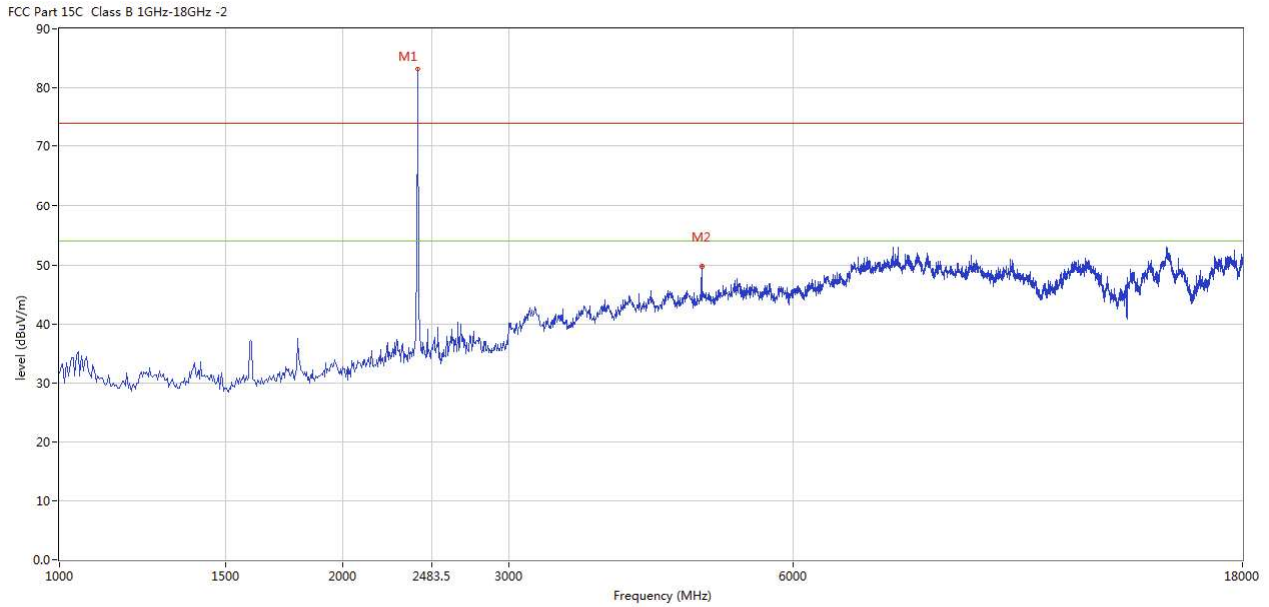
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**Low Channel: Horizontal**

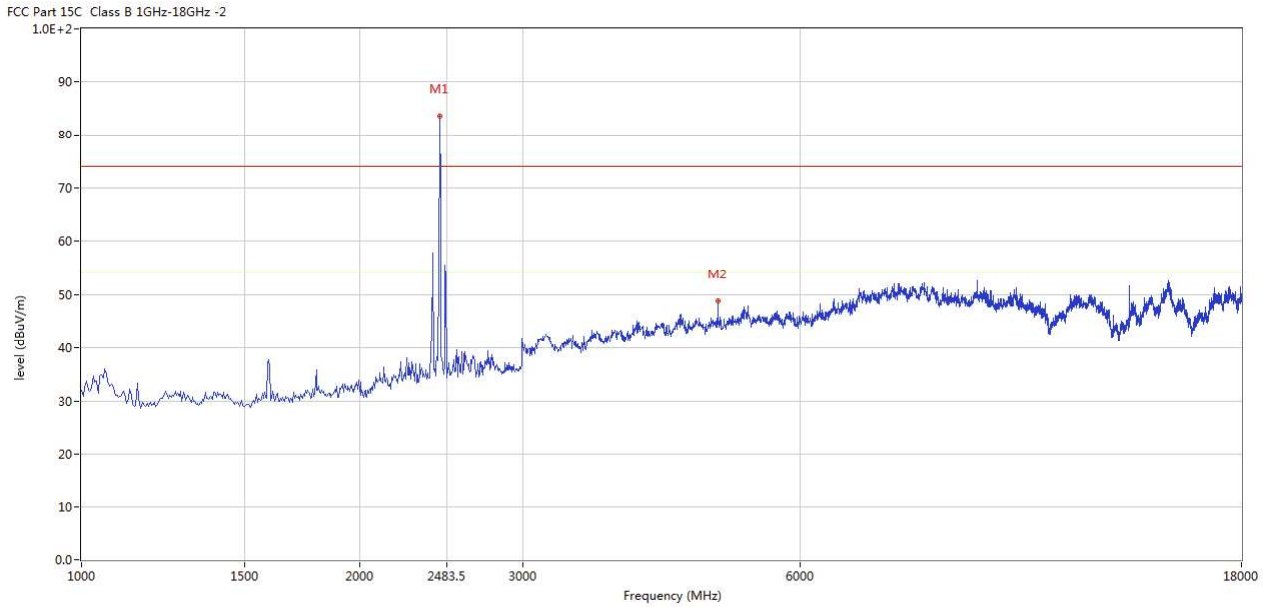


No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2	4803.750	49.78	3.13	74.0	-24.22	Peak	141.00	100	Horizontal	Pass

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**Middle Channel: Horizontal**



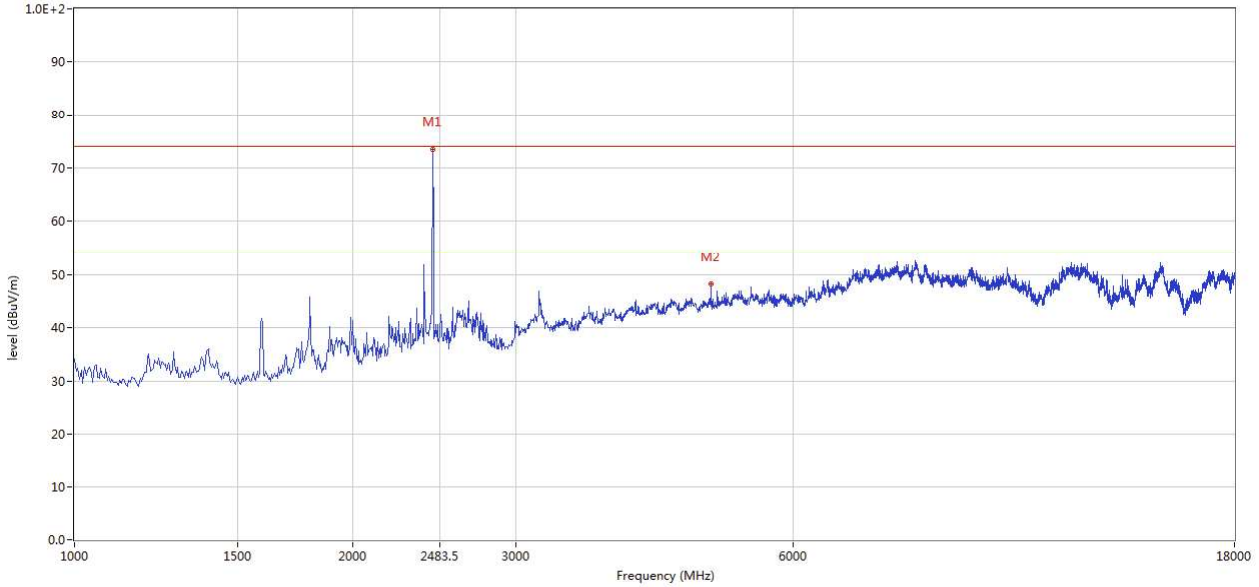
No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2	4884.500	48.86	3.20	74.0	-25.14	Peak	300.00	100	Horizontal	Pass

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**Middle Channel: Vertical**

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



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2	4884.500	48.22	3.20	74.0	-25.78	Peak	35.00	100	Vertical	Pass

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

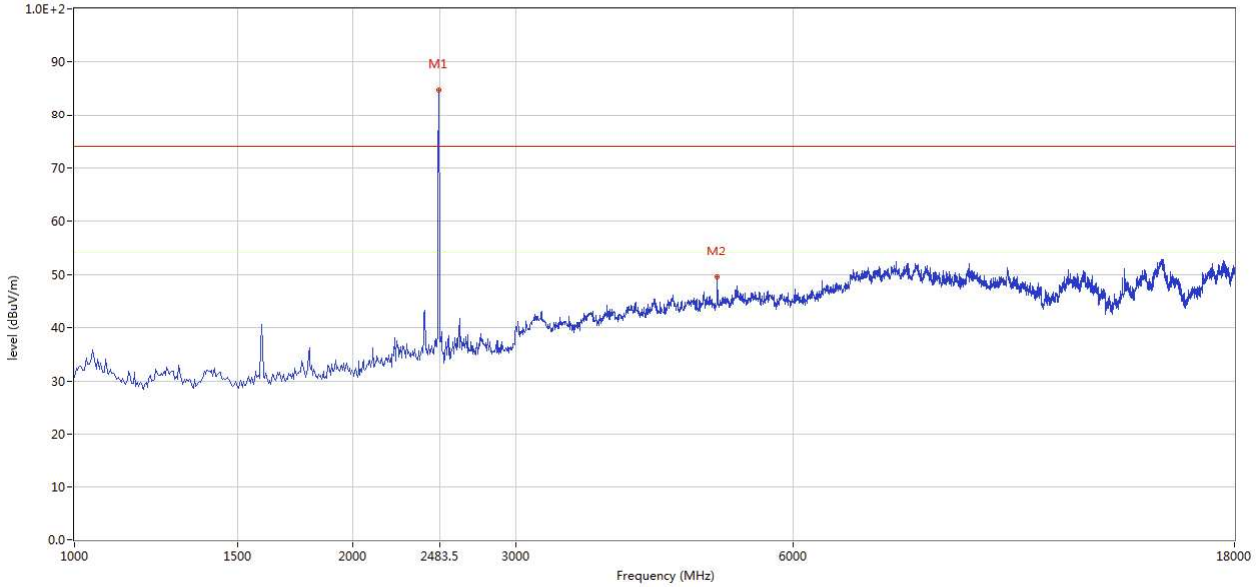
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**High Channel: Horizontal**

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



No	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2	4959.750	49.44	3.35	74.0	-24.56	Peak	323.00	100	Horizontal	Pass

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

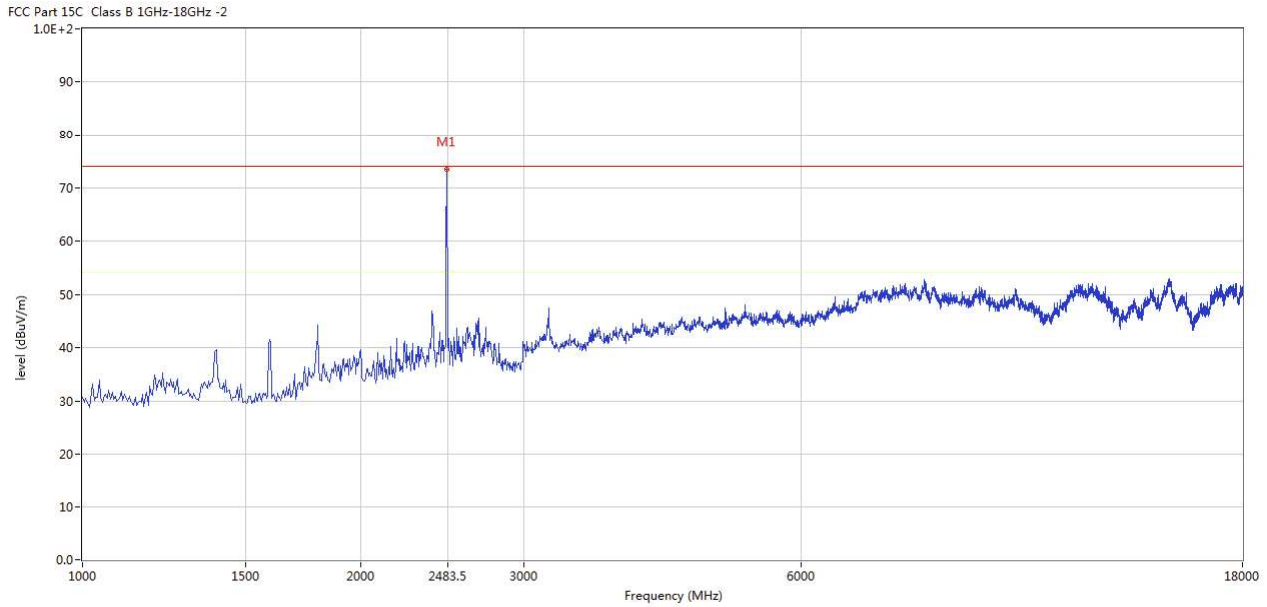
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### High Channel : Vertical



1. Result Level = Reading + Factor
2. Factor= AF + Cable Loss- Preamp
3. Margin = Result- Limit
4. For radiated Emissions from 18-25GHz, it is only the floor noise.
5. The peak value less than the AV limit, no necessary to take down the AV measurement result.

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## 7.0 20dB Bandwidth Measurement

### 7.1 Regulation

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

### 7.2 Limits of 20dB Bandwidth Measurement

N/A

### 7.3 Test Procedure.

1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2. Set the spectrum analyzer as follows: Span = 3MHz, RBW = 30 kHz, VBW = 100 kHz, Sweep = auto Detector function = peak, Trace = max hold
3. Measure the highest amplitude appearing on spectral display and record the level to calculate results. 6. Repeat above procedures until all frequencies measured were complete.

### 7.4 Test Result

#### Type of Modulation: GFSK

EUT	APP RING LIGHTs		Model	RGB18-APP
Mode	Keep Transmitting		Test Voltage	DC12V
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Minimum Limit (kHz)	Pass/ Fail
Low	2402	782	--	Pass
Middle	2441	782	--	Pass
High	2480	782	--	Pass

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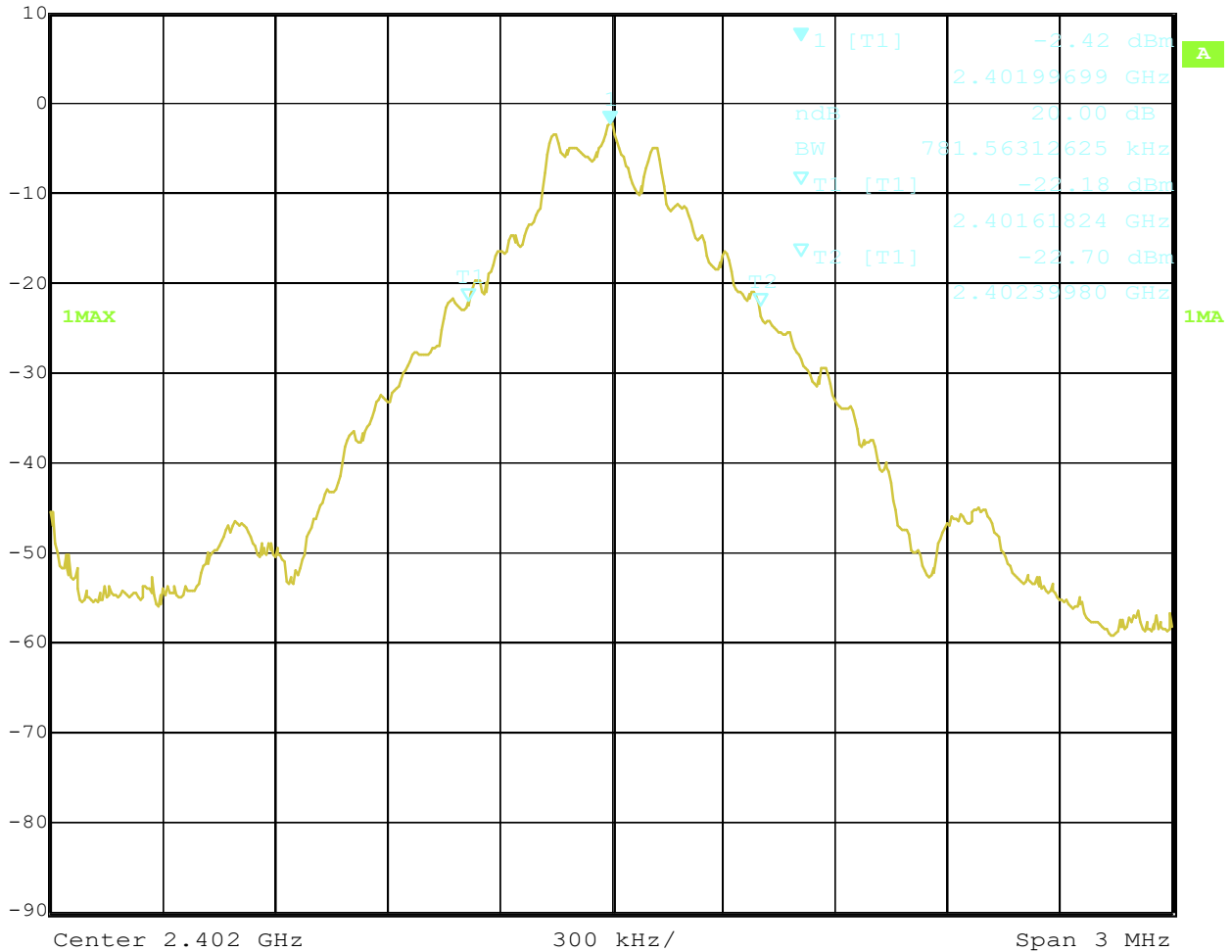
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Test Figure:

**1. Condition: Low Channel**

	Ref Lvl	Marker 1 [T1 ndB]	RBW	30 kHz	RF Att	20 dB
	10 dBm	ndB 20.00 dB	VBW	100 kHz		
		BW 781.56312625 kHz	SWT	8.5 ms	Unit	dBm



Date: 1.APR.2021 18:06:24

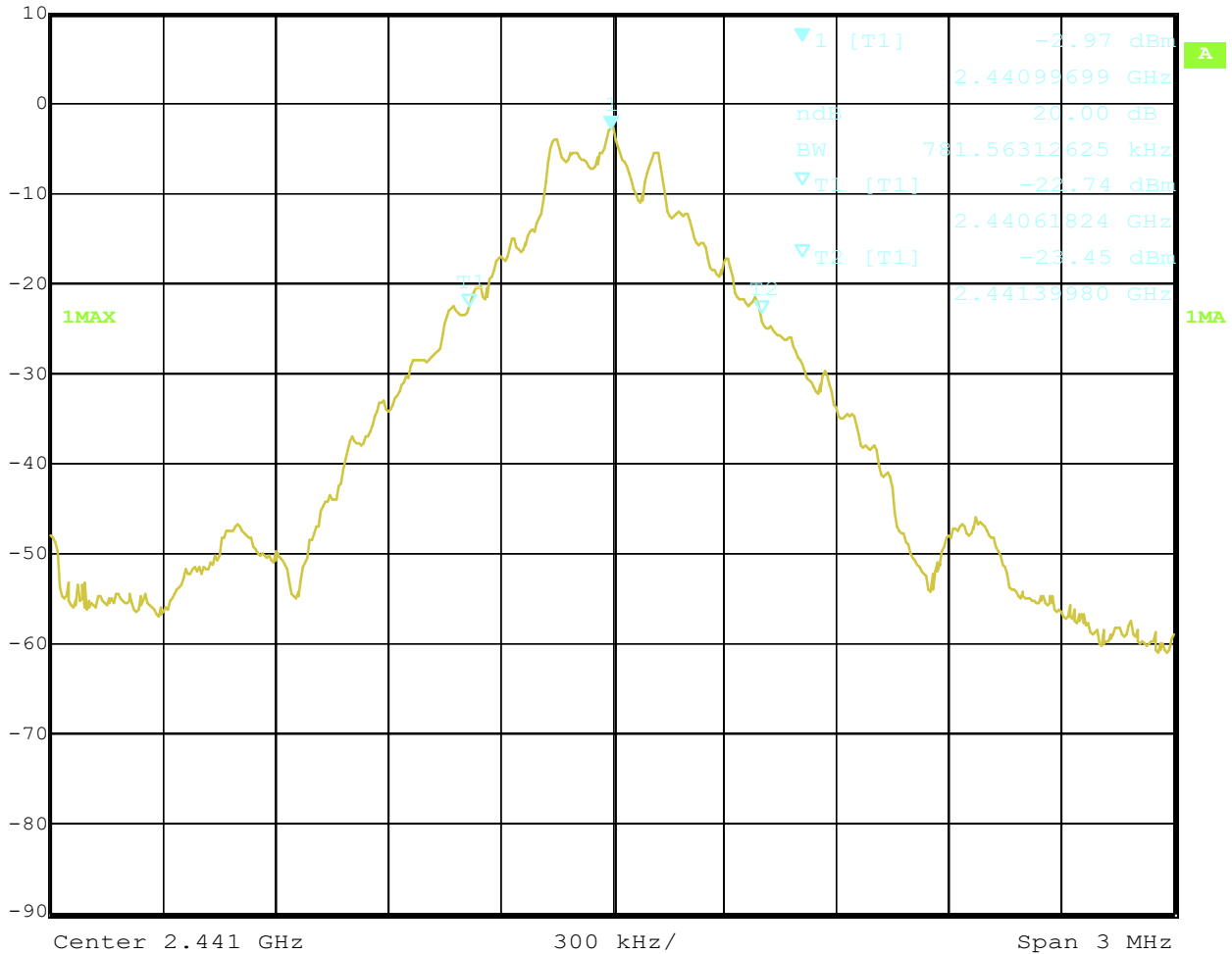
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2. Condition: Middle Channel



Ref Lvl	Marker 1 [T1 ndB]	RBW	30 kHz	RF Att	20 dB
10 dBm	ndB 20.00 dB	VBW	100 kHz		
	BW 781.56312625 kHz	SWT	8.5 ms	Unit	dBm



Date: 1.APR.2021 18:07:37

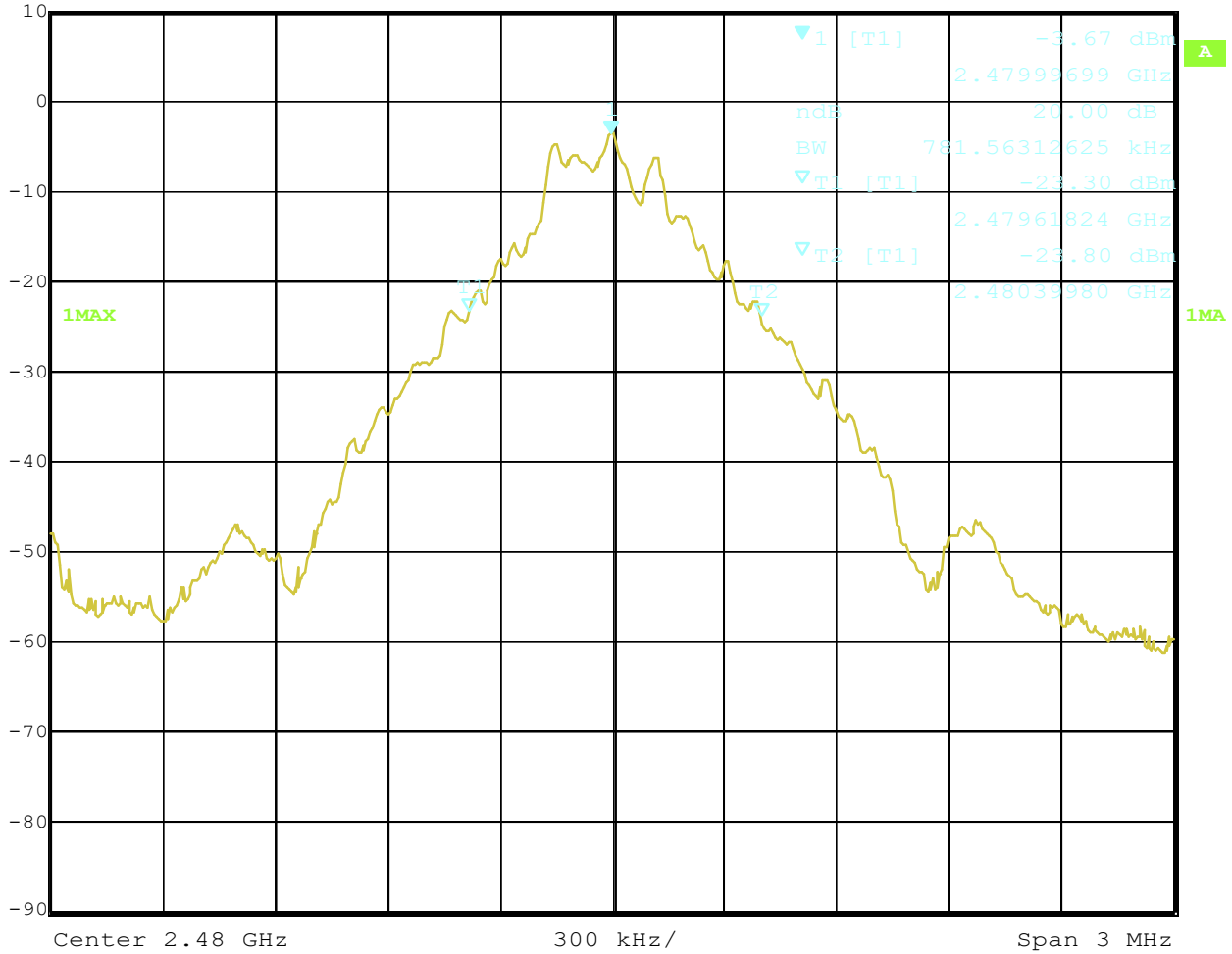
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3. High Channel



Ref Lvl	Marker 1 [T1 ndB]	RBW	30 kHz	RF Att	20 dB
10 dBm	ndB 20.00 dB	VBW	100 kHz		
	BW 781.56312625 kHz	SWT	8.5 ms	Unit	dBm



Date: 1.APR.2021 18:09:14

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**Test Result**

**Type of Modulation:**  $\pi/4$ -DQPSK

EUT	APP RING LIGHTs		Model	RGB18-APP
Mode	Keep Transmitting		Test Voltage	DC12V
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass/ Fail
Low	2402	1214	--	Pass
Middle	2441	1214	--	Pass
High	2480	1214	--	Pass

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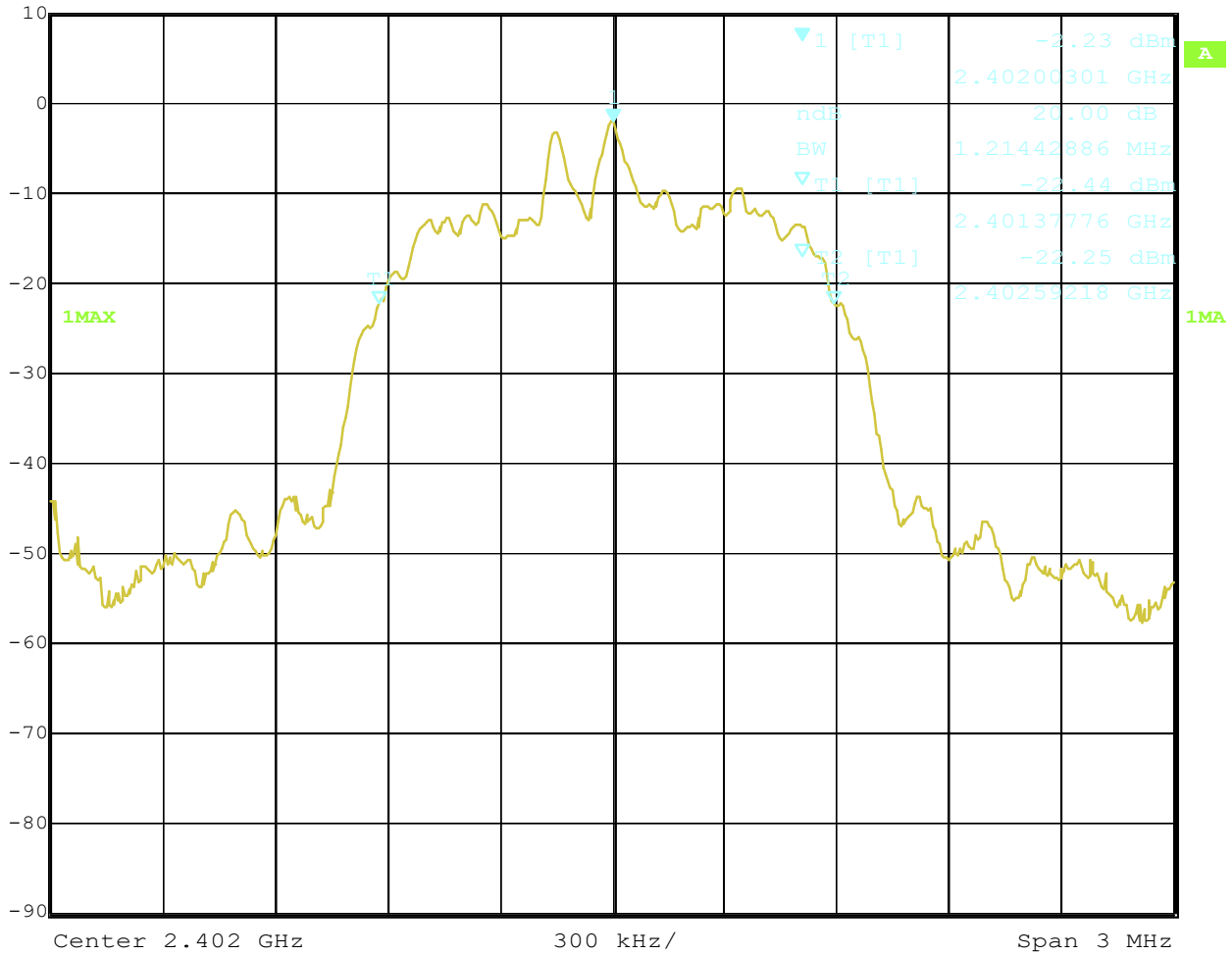
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Test Figure:

**1. Condition: Low Channel**

	Marker 1 [T1 ndB]	RBW	30 kHz	RF Att	20 dB
	Ref Lvl	ndB	20.00 dB	VBW	100 kHz
	10 dBm	BW	1.21442886 MHz	SWT	8.5 ms



Date: 1.APR.2021 15:47:53

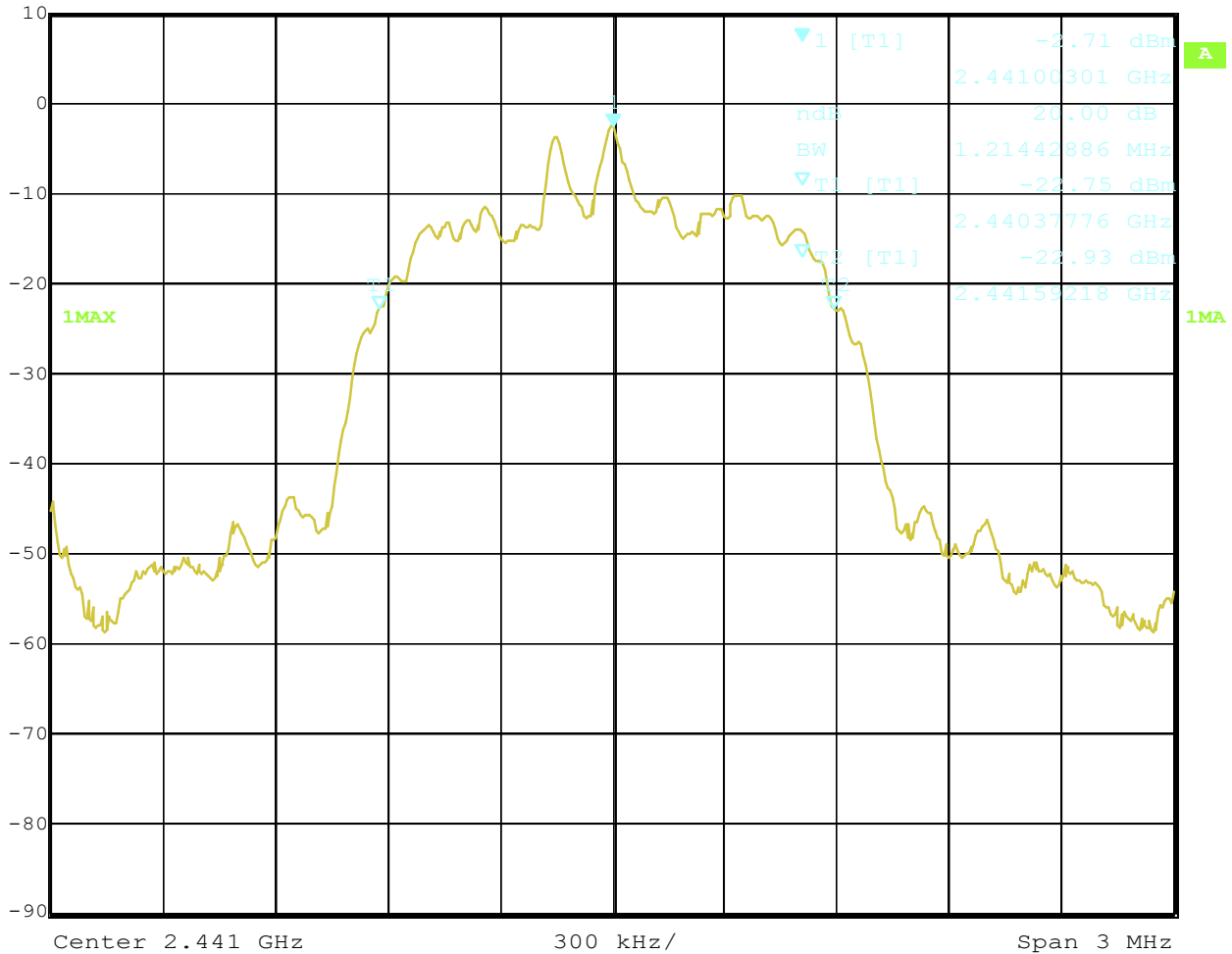
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2. Condition: Middle Channel



Ref Lvl	Marker 1 [T1 ndB]	RBW	30 kHz	RF Att	20 dB
10 dBm	ndB 20.00 dB	VBW	100 kHz		
	BW 1.21442886 MHz	SWT	8.5 ms	Unit	dBm



Date: 1.APR.2021 15:49:34

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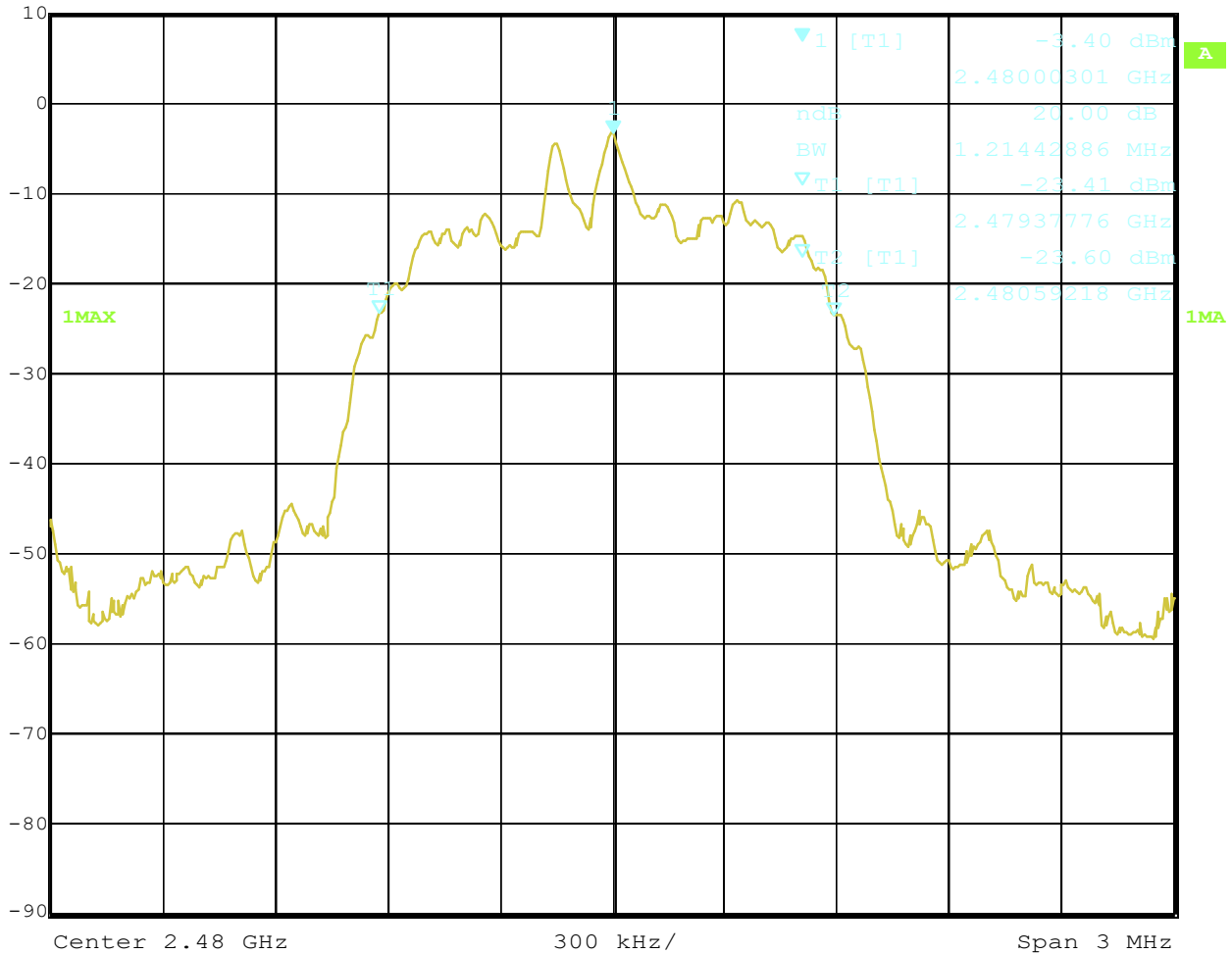




### 3. High Channel



Ref Lvl	10 dBm	Marker 1 [T1 ndB]	ndB	20.00 dB	RBW	30 kHz	RF Att	20 dB
		BW	1.21442886 MHz		VBW	100 kHz	Unit	dBm
					SWT	8.5 ms		



Date: 1.APR.2021 15:50:22

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**Test Result**

**Type of Modulation: 8DPSK**

EUT	APP RING LIGHTs		Model	RGB18-APP
Mode	Keep Transmitting		Test Voltage	DC12V
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	20 dB Bandwidth (kHz)	Maximum Limit (kHz)	Pass/ Fail
Low	2402	1214	--	Pass
Middle	2441	1202	--	Pass
High	2480	1214	--	Pass

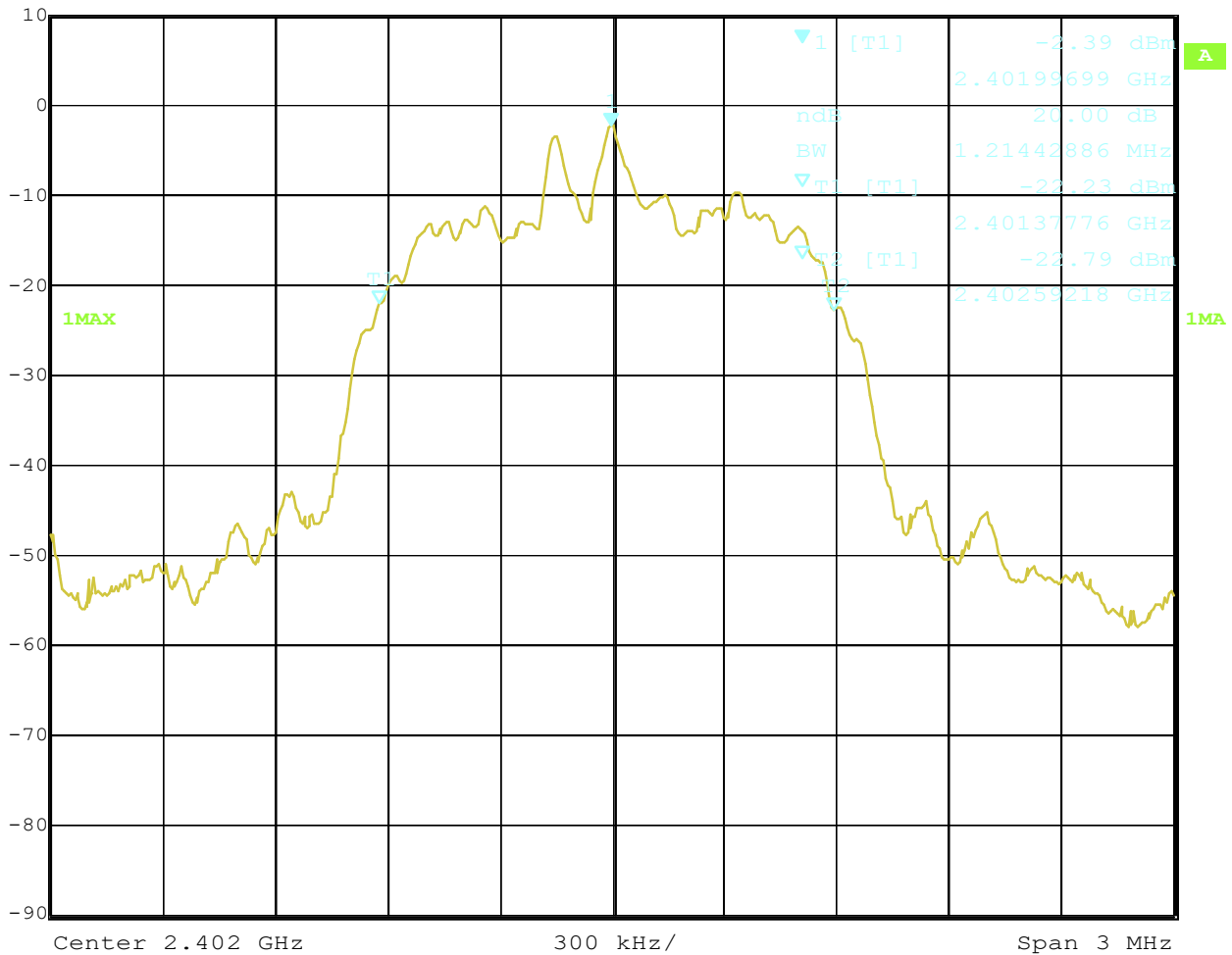
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Test Figure:

**1. Condition: Low Channel**

	Marker 1 [T1 ndB]	RBW	30 kHz	RF Att	20 dB
	Ref Lvl	ndB	20.00 dB	VBW	100 kHz
	10 dBm	BW	1.21442886 MHz	SWT	8.5 ms



Date: 1.APR.2021 18:46:21

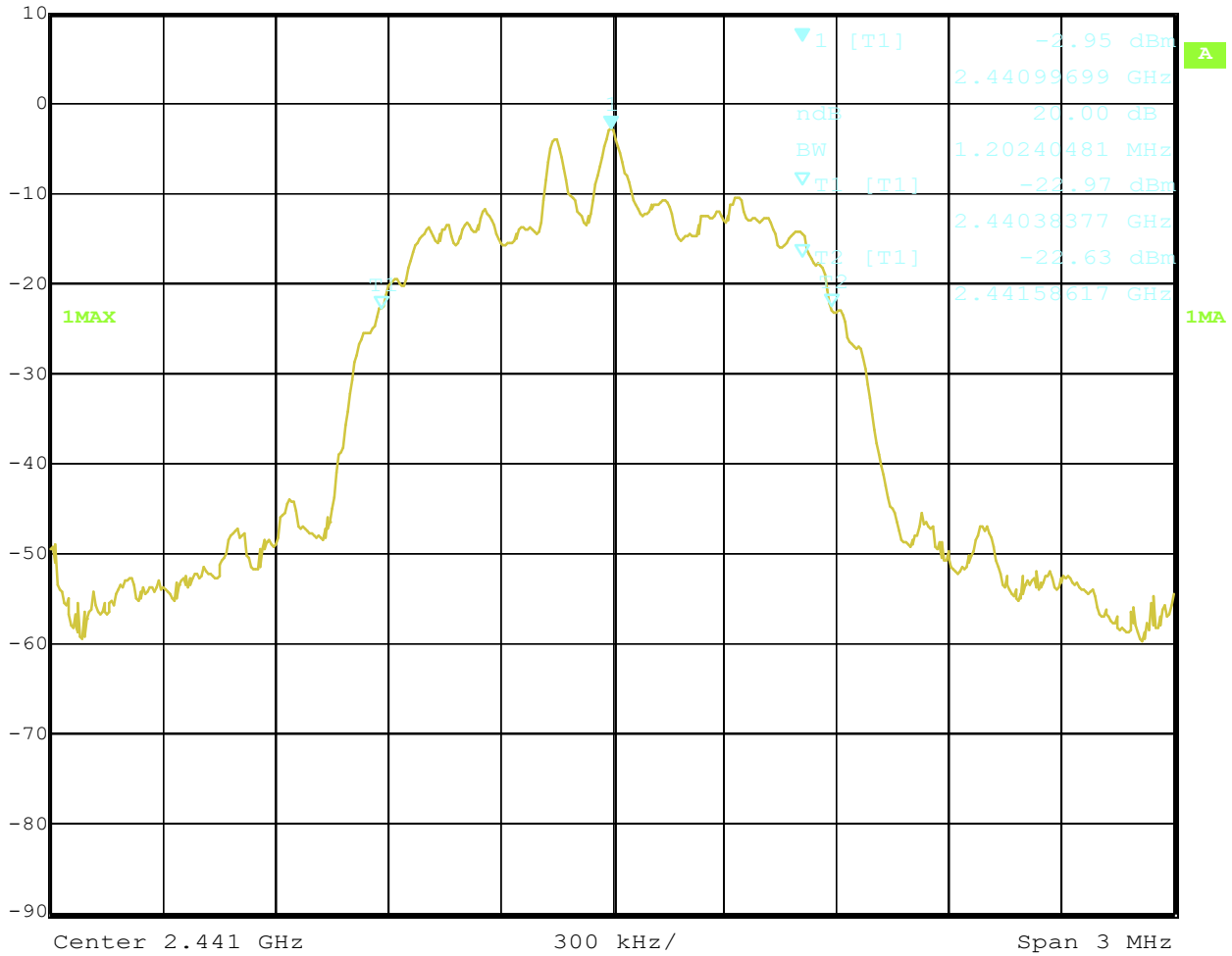
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**2. Condition: Middle Channel**



Ref Lvl	Marker 1 [T1 ndB]	RBW	30 kHz	RF Att	20 dB
10 dBm	ndB 20.00 dB	VBW	100 kHz		
	BW 1.20240481 MHz	SWT	8.5 ms	Unit	dBm



Date: 1.APR.2021 18:46:58

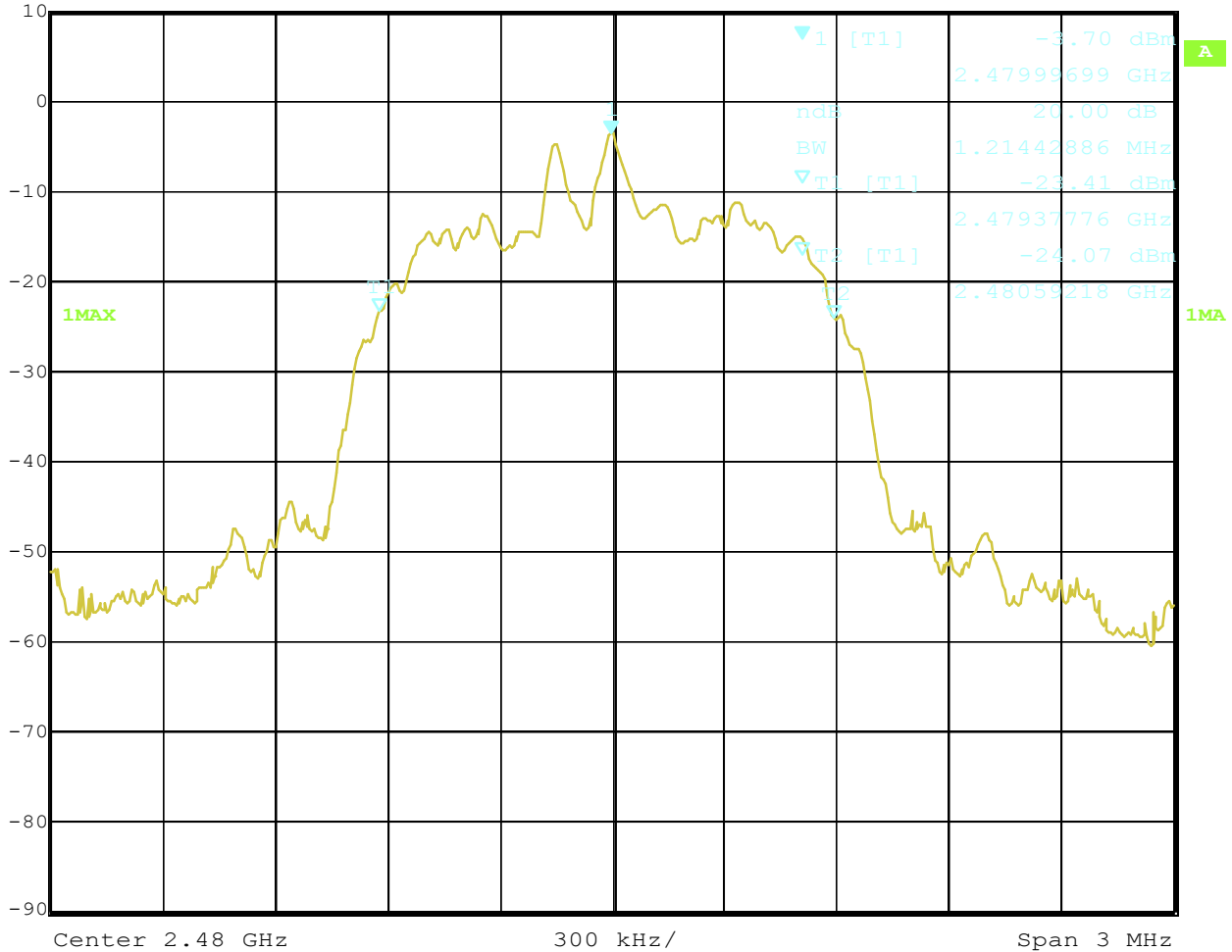
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### 3. High Channel



Ref Lvl	Marker 1 [T1 ndB]	RBW	30 kHz	RF Att	20 dB
10 dBm	ndB 20.00 dB	VBW	100 kHz	Unit	dBm
	BW 1.21442886 MHz	SWT	8.5 ms		



Date: 1.APR.2021 18:47:27

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## **8. Maximum Output Power**

### **8.1 Regulation**

According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band:0.125 watts. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### **8.2 Limits of Maximum Output Power**

The Maximum Output Power Measurement is 30dBm.

### **8.3 Test Procedure**

1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
2. Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel; RBW > the 20 dB bandwidth of the emission being measured; RBW =3MHz, VBW=10MHz; Sweep = 5ms; Detector function = PK; Trace = max hold
3. Measure the highest amplitude appearing on spectral display and record the level to calculate results.
4. Repeat above procedures until all frequencies measured were complete.

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**8.4 Test Results**

**Type of Modulation: GFSK**

EUT	APP RING LIGHTs		Model	RGB18-APP
Mode	Keep Transmitting		Test Voltage	DC12V
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
		PK		
Low	2402	-1.21	30	Pass
Middle	2441	-1.73	30	Pass
High	2480	-2.48	30	Pass

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

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

2. The worse case was recorded

**Type of Modulation: 16-QAM**

EUT	APP RING LIGHTs		Model	RGB18-APP
Mode	Keep Transmitting		Test Voltage	DC12V
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
		PK		
Low	2402	-0.24	30	Pass
Middle	2441	-0.74	30	Pass
High	2480	-1.37	30	Pass

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

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

2. The worse case was recorded

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**Type of Modulation: 8DPSK**

EUT	APP RING LIGHTs		Model	RGB18-APP
Mode	Keep Transmitting		Test Voltage	DC12V
Temperature	24 deg. C,		Humidity	56% RH
Channel	Channel Frequency (MHz)	Max. Power Output (dBm)	Peak Power Limit (dBm)	Pass/ Fail
		PK		
Low	2402	-1.21	30	Pass
Middle	2441	-1.85	30	Pass
High	2480	-2.48	30	Pass

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

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

2. The worse case was recorded

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## 9. Carrier Frequency Separation

### 9.1 Regulation

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

### 9.2 Limits of Carrier Frequency Separation

The Maximum Power Spectral Density Measurement is 25kHz or two-thirds of the 20dB bandwidth of the hopping Channel which is great.

### 9.3 Test Procedure

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span; Video (or Average) Bandwidth (VBW)  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold
3. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
4. Repeat above procedures until all frequencies measured were complete.

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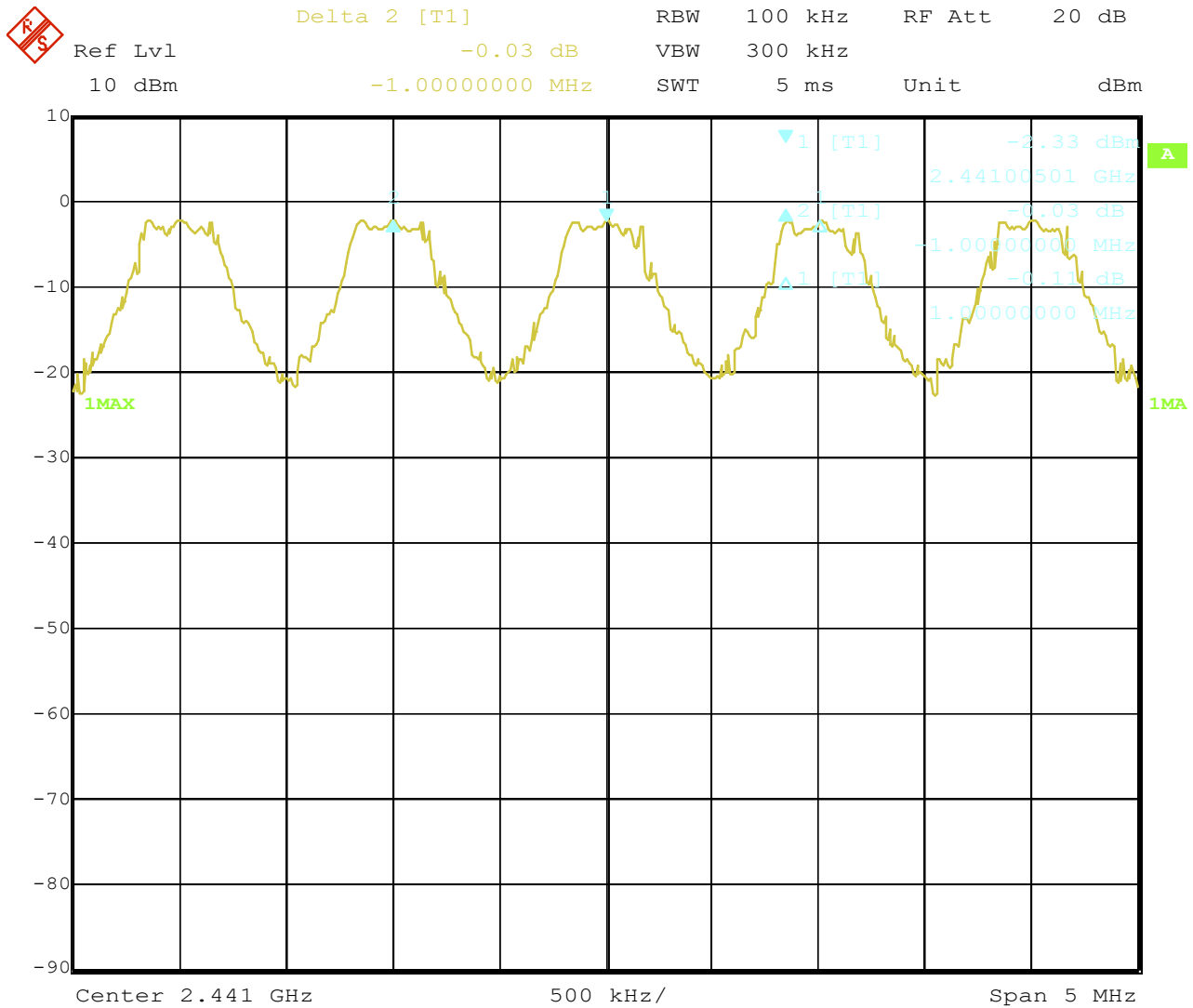


**9.4 Test Result**

**Type of Modulation: GFSK**

EUT	APP RING LIGHTs	Model	RGB18-APP
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Carrier Frequency Separation		Limit	Pass/ Fail
1.000MHz		$\geq 25$ kHz or 2/3 of the 20 dB bandwidth	Pass

**Test Plots**



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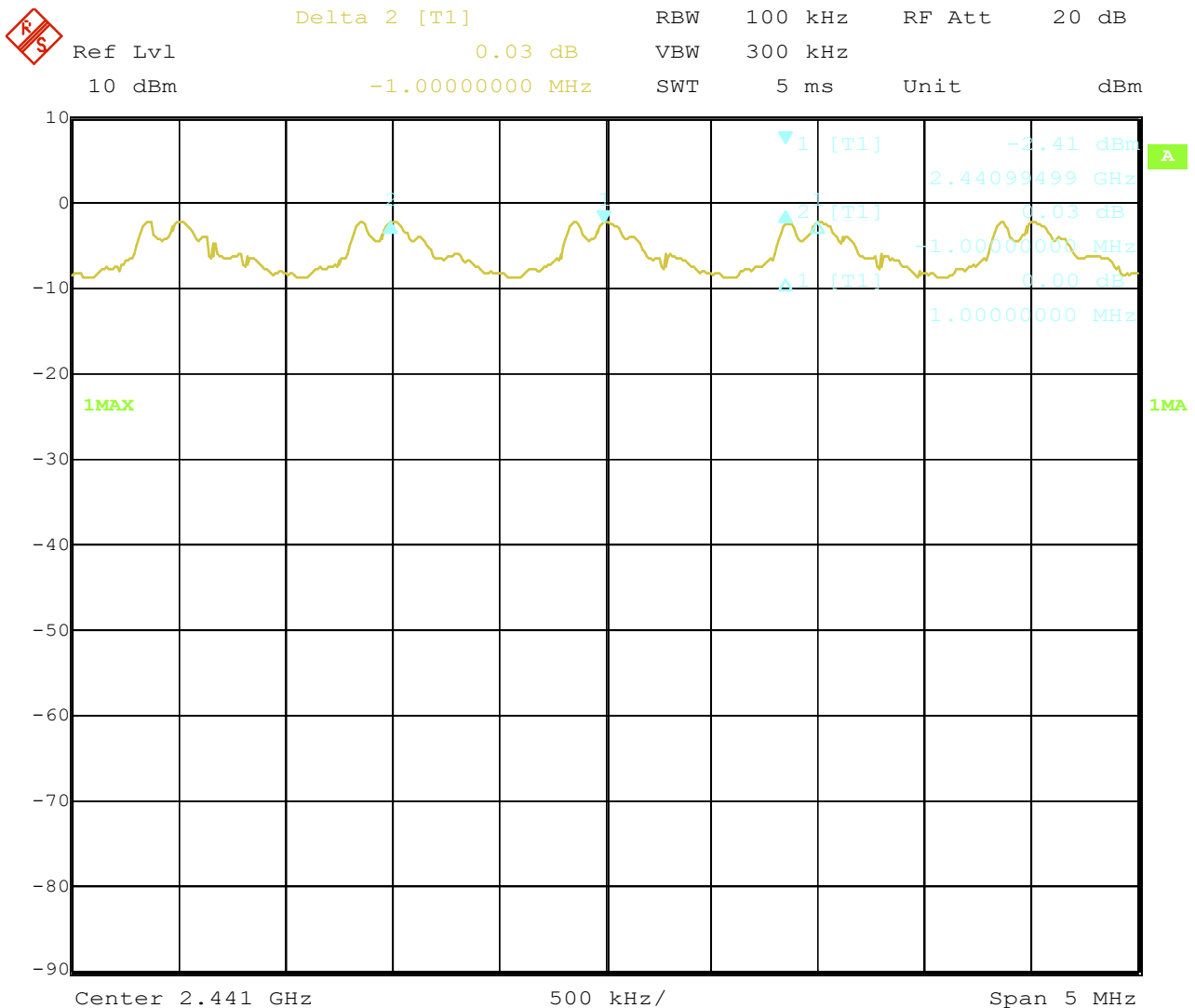
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**Type of Modulation:  $\pi/4$ -DQPSK**

EUT	APP RING LIGHTs	Model	RGB18-APP
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Carrier Frequency Separation		Limit	Pass/ Fail
1.000MHz		$\geq 25$ kHz or 2/3 of 20 dB bandwidth	Pass

**Test Plots**



Date: 1.APR.2021 16:33:24

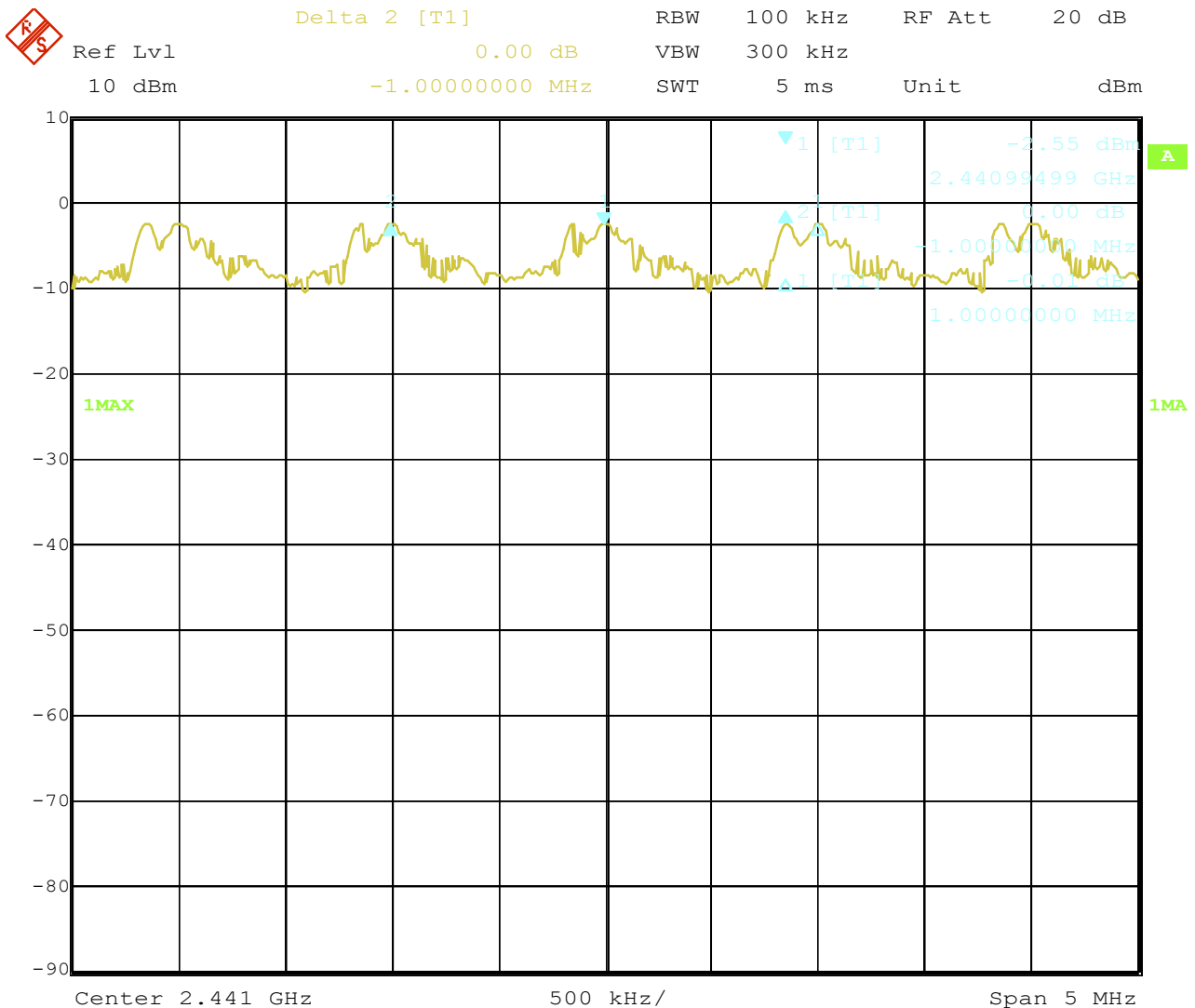
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**Type of Modulation: 8DPSK**

EUT	APP RING LIGHTs	Model	RGB18-APP
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Carrier Frequency Separation		Limit	Pass/ Fail
1.000MHz		≥ 25 kHz or 2/3 of 20 dB bandwidth	Pass

**Test Plots**



Date: 1.APR.2021 19:06:18

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## **10. Number of Hopping Channels**

### **10.1 Regulation**

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

### **10.2 Limits of Number of Hopping Channels**

The frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels.

### **10.3 Test Procedure**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW=100 kHz, VBW=300 kHz; Sweep = auto; Detector function = peak; Trace = max hold
3. Record the number of hopping channels.

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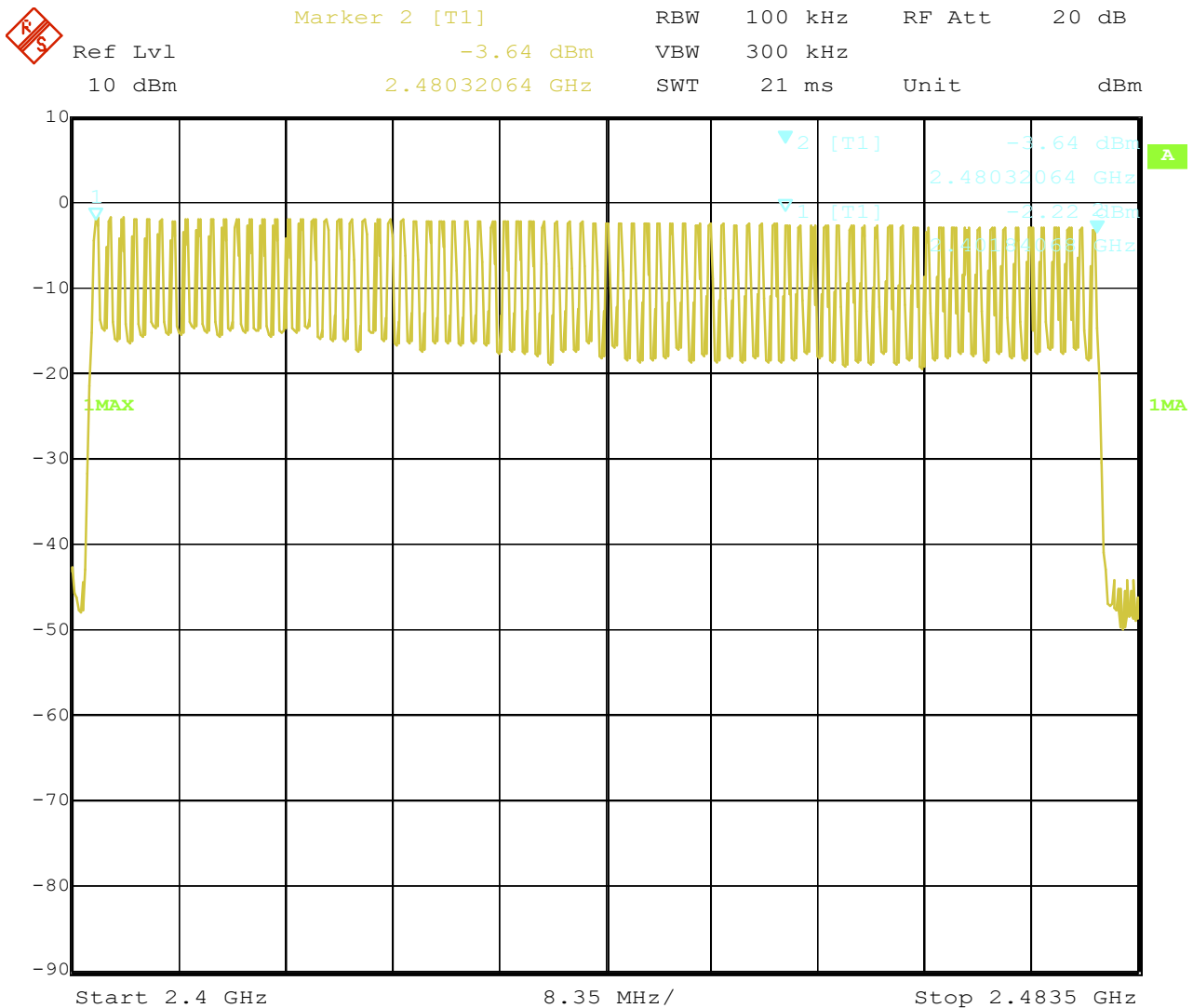


**10.4 Test Result**

**Type of Modulation: GFSK**

EUT	APP RING LIGHTs	Model	RGB18-APP
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Operating Frequency	Number of hopping channels	Limit	Pass/ Fail
2402-2480MHz	79	≥ 15	Pass

**Test Plot**



Date: 1.APR.2021 17:17:25

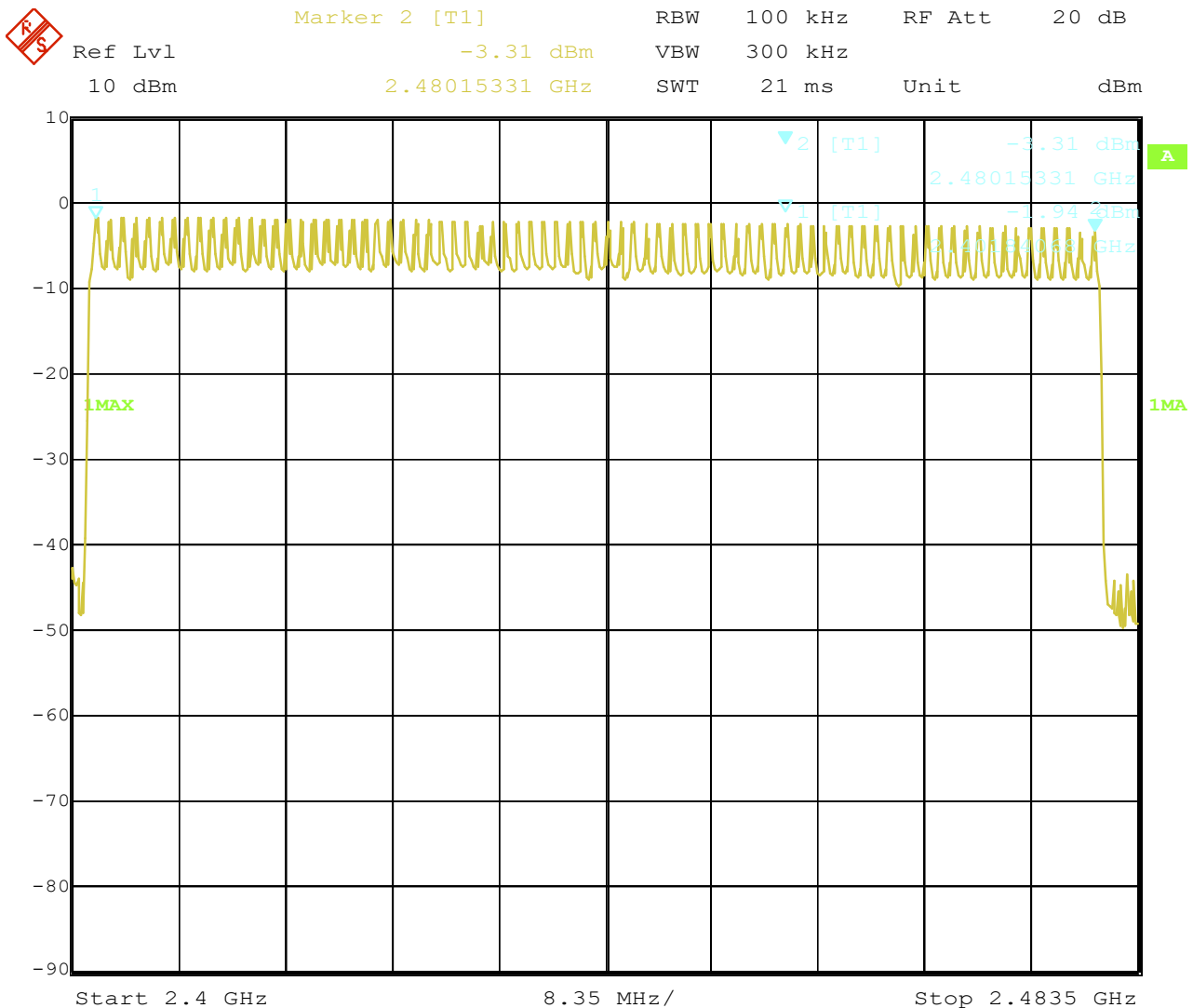
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**Type of Modulation:  $\pi/4$ -DQPSK**

EUT	APP RING LIGHTs	Model	RGB18-APP
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Operating Frequency	Number of hopping channels	Limit	Pass/ Fail
2402-2480MHz	79	$\geq 15$	Pass

**Test Plot**



Date: 1.APR.2021 16:05:54

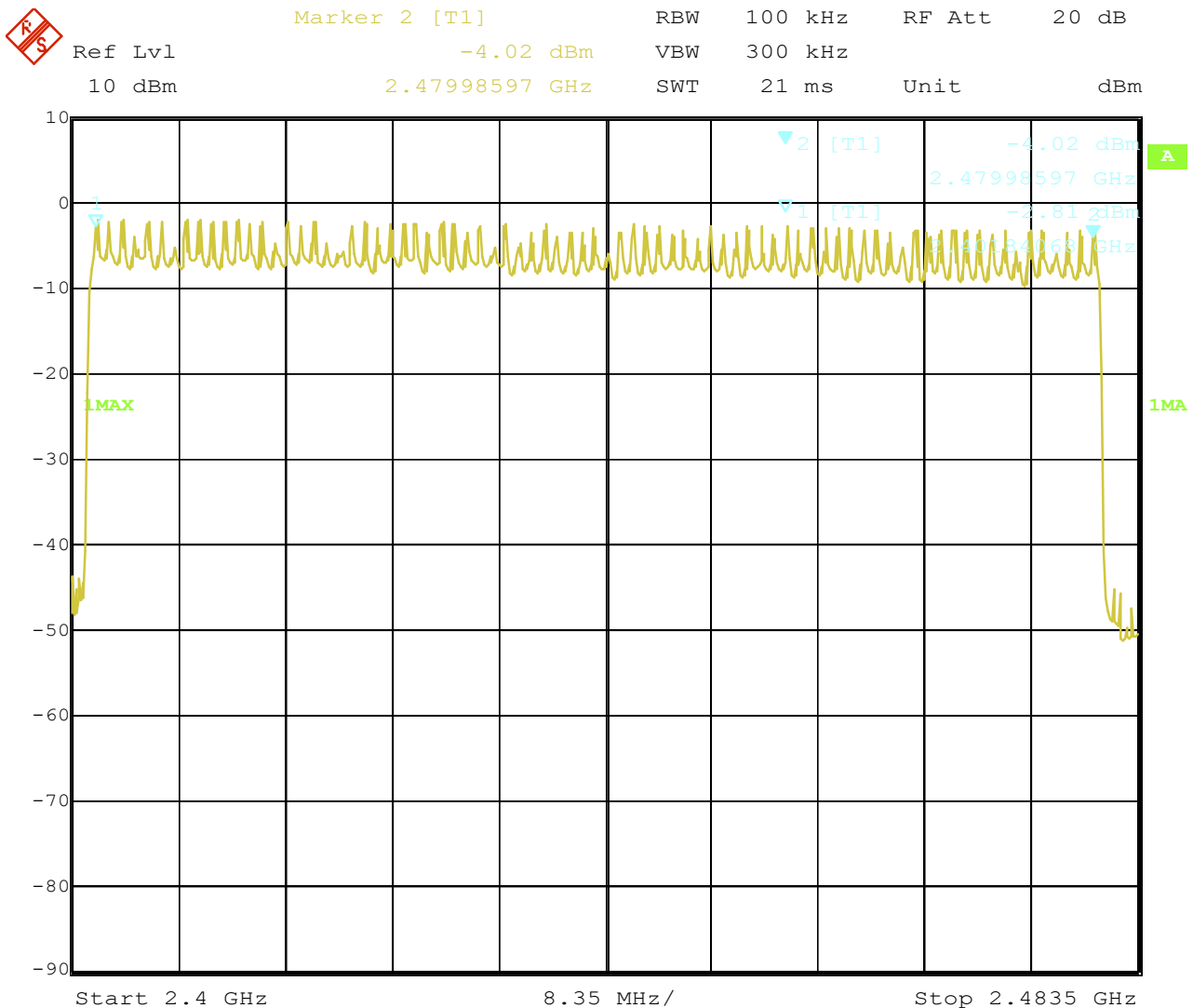
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**Type of Modulation: 8DPSK**

EUT	APP RING LIGHTs	Model	RGB18-APP
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Operating Frequency	Number of hopping channels	Limit	Pass/ Fail
2402-2480MHz	79	≥ 15	Pass

**Test Plot**



Date: 1.APR.2021 18:54:46

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## **11. Time of Occupancy (Dwell Time)**

### **11.1 Regulation**

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

### **11.2 Limits of Carrier Frequency Separation**

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed

### **11.3 Test Procedure**

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Set the spectrum analyzer as follows: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW  $\geq$  RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold
3. Measure the dwell time using the marker-delta function.
4. Repeat above procedures until all frequencies measured were complete.
5. Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

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

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**11.4 Test Result**

**Type of Modulation: GFSK**

EUT	Bluetooth Remote Control Unit		Model	DSR-0828	
Mode	Keep Transmitting		Input Voltage	DC12V	
Temperature	24 deg. C,		Humidity	56% RH	
Channel	Reading	Hoping Rate		Actual	Limit
DH5					
Middle	2.986ms	266.667 hop/s		0.319s	0.4s
DH3					
Middle	1.723ms	400 hop/s		0.276s	0.4s
DH1					
Middle	0.461ms	800 hop/s		0.148s	0.4s

Actual = Reading × (Hopping rate / Number of channels) × Test period, Test period = 0.4 [seconds / channel] × 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

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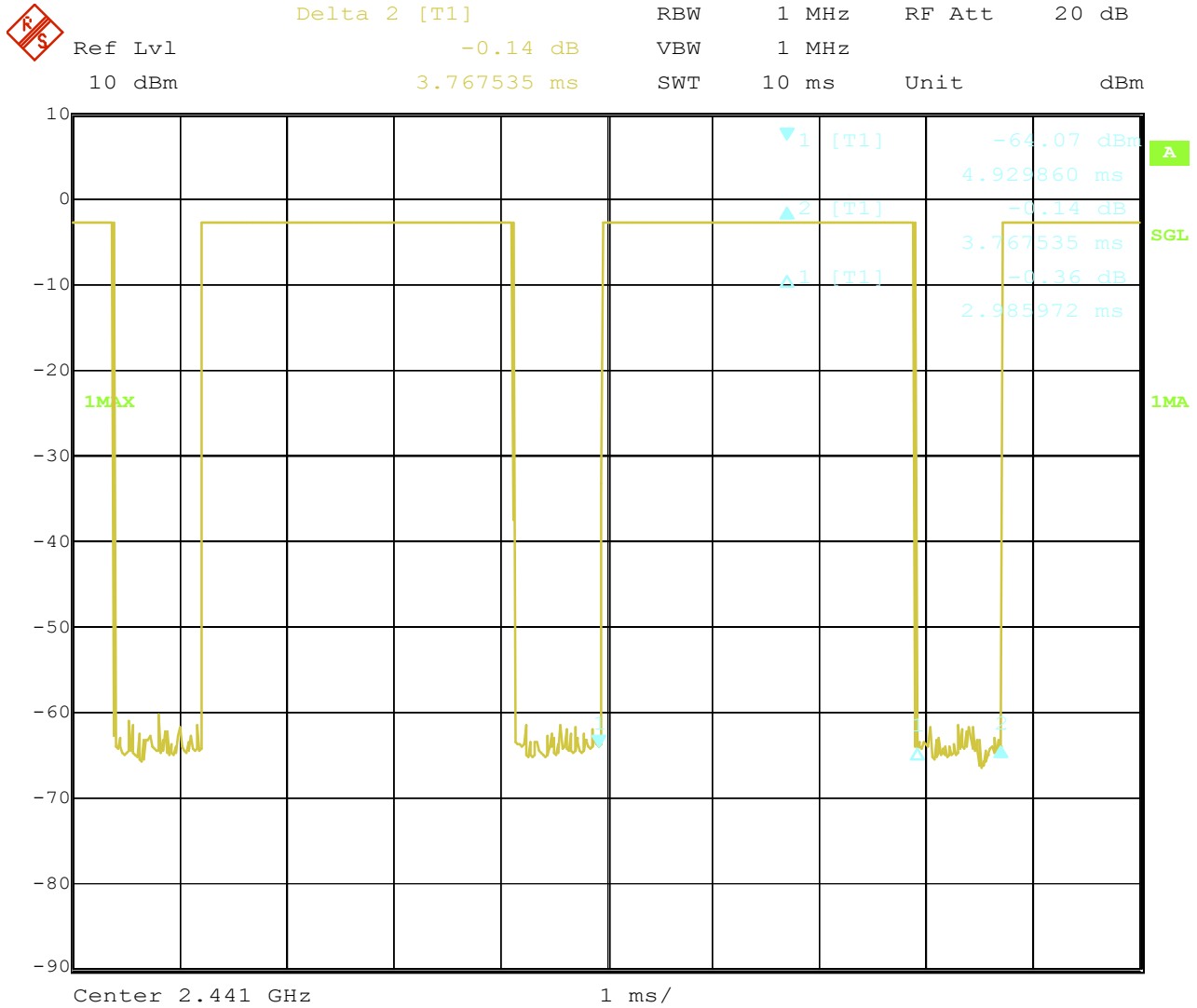
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Test Plots:

**DH5**



Date: 1.APR.2021 17:20:59

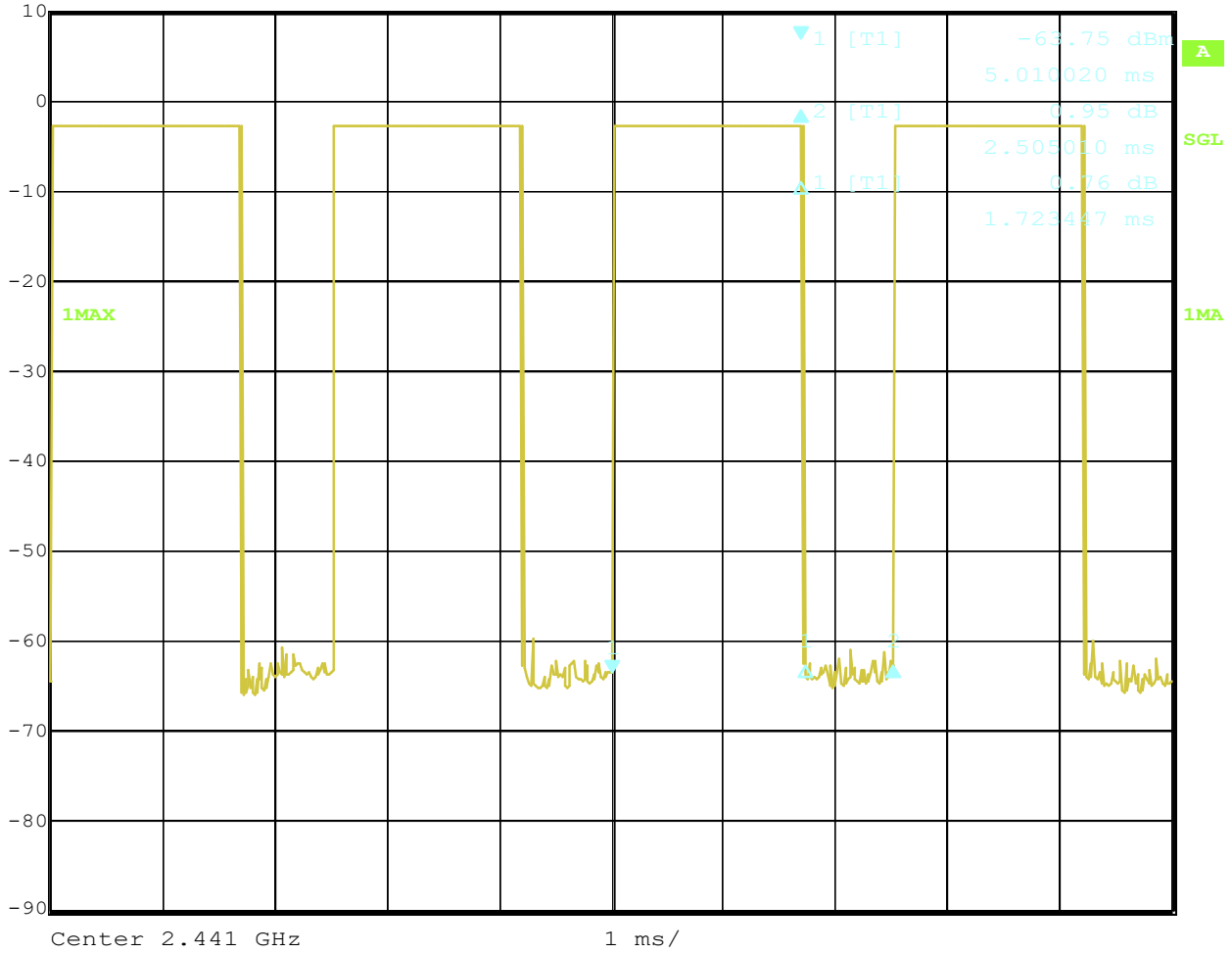
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**DH3**



	Delta 2 [T1]	RBW	1 MHz	RF Att	20 dB
Ref Lvl	0.95 dB	VBW	1 MHz		
10 dBm	2.505010 ms	SWT	10 ms	Unit	dBm



Date: 1.APR.2021 17:20:07

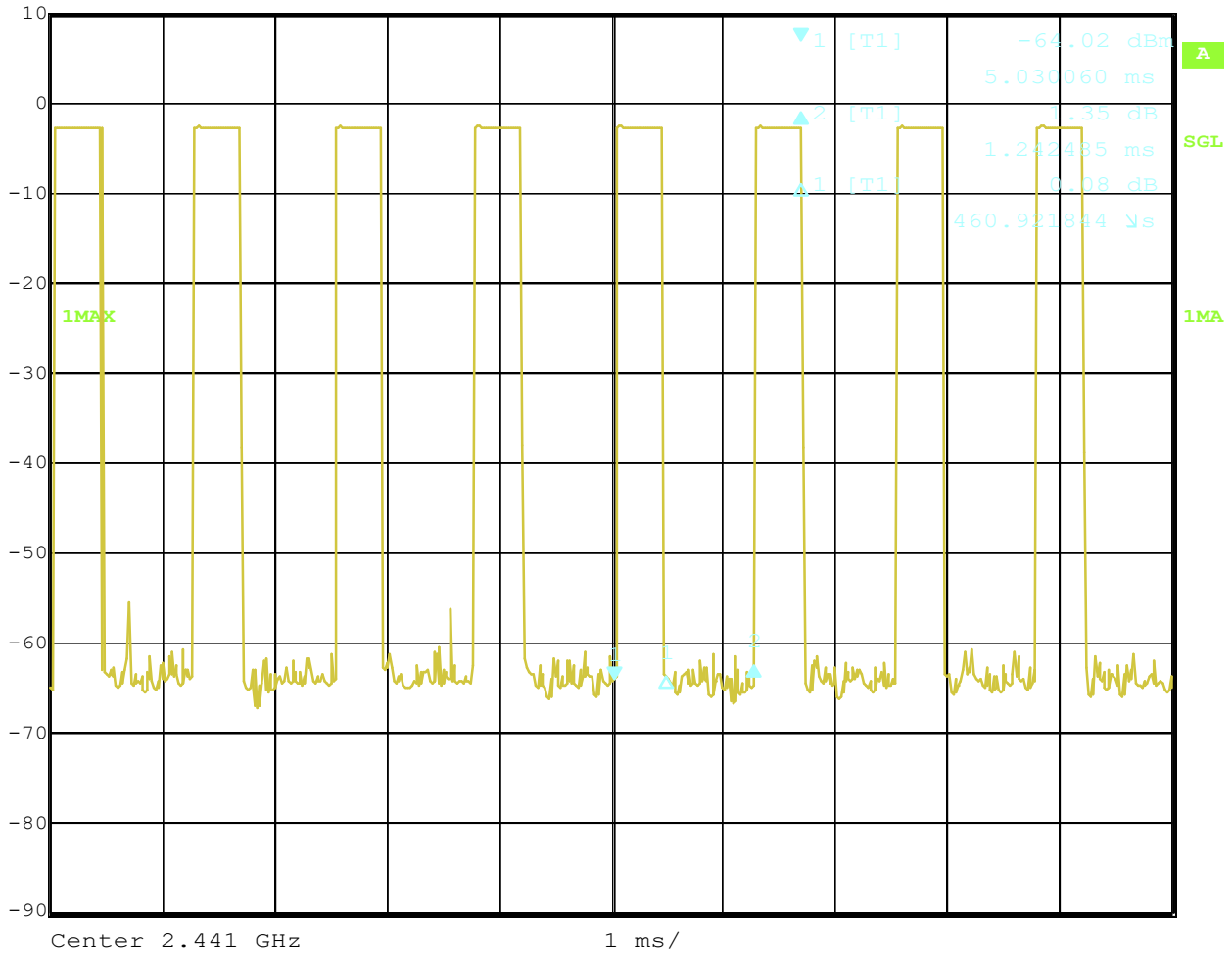
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**DH1**



	Delta 2 [T1]	RBW	1 MHz	RF Att	20 dB
Ref Lvl	1.35 dB	VBW	1 MHz		
10 dBm	1.242485 ms	SWT	10 ms	Unit	dBm



Date: 1.APR.2021 17:19:01

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**Test Result**

**Type of Modulation:**  $\pi/4$ DQPSK

EUT	Bluetooth Remote Control Unit		Model	DSR-0828	
Mode	Keep Transmitting		Input Voltage	DC12V	
Temperature	24 deg. C,		Humidity	56% RH	
Channel	Reading	Hoping Rate		Actual	Limit
2DH5					
Middle	2.986ms	266.667 hop/s		0.319s	0.4s
2DH3					
Middle	1.743ms	400 hop/s		0.279s	0.4s
2DH1					
Middle	0.481ms	800 hop/s		0.154s	0.4s

Actual = Reading × (Hopping rate / Number of channels) × Test period, Test period = 0.4 [seconds / channel] × 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

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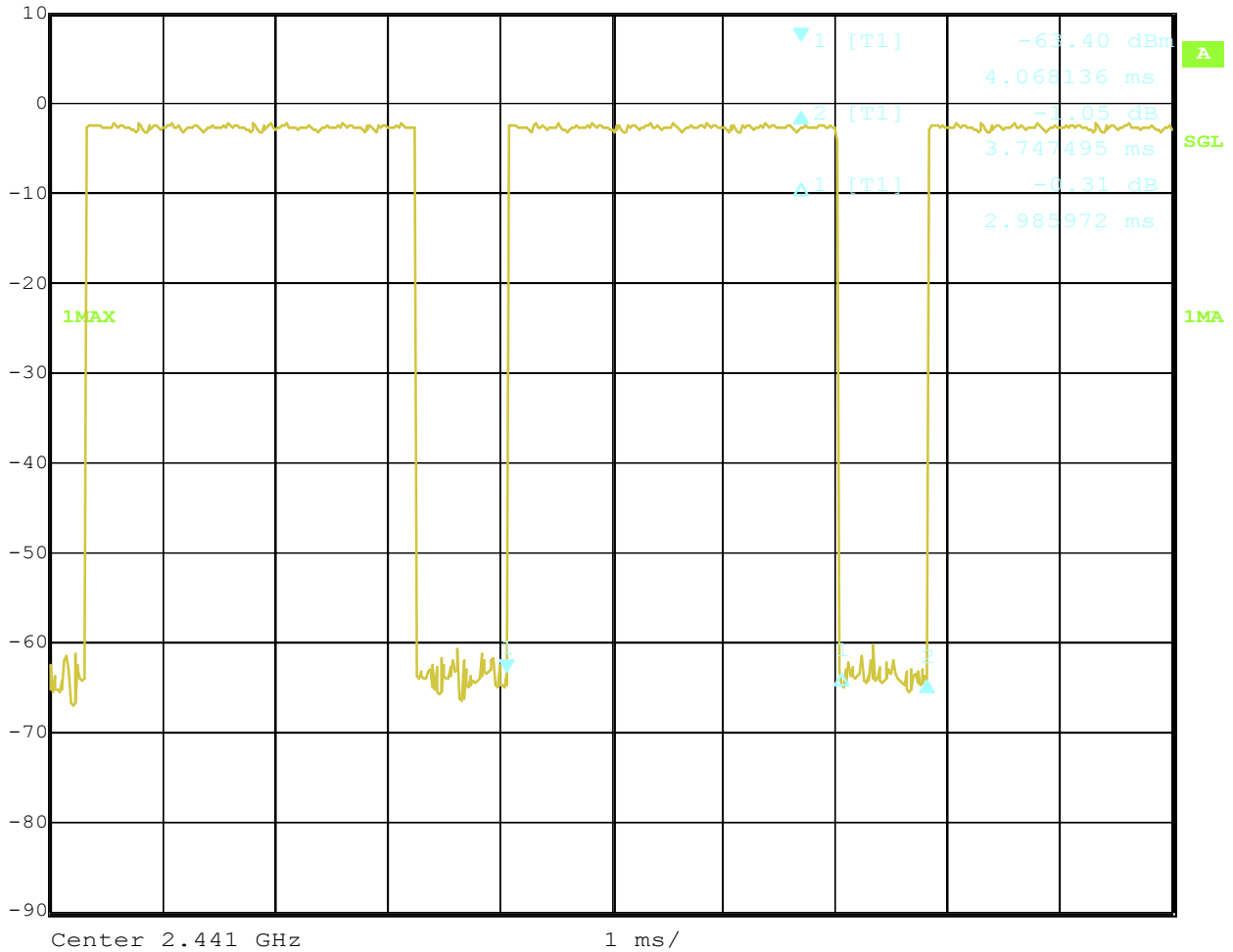
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Test Plots:

**2DH5**

	Delta 2 [T1]	RBW	1 MHz	RF Att	20 dB
	Ref Lvl	-1.05 dB	VBW	1 MHz	
	10 dBm	3.747495 ms	SWT	10 ms	Unit



Date: 1.APR.2021 15:57:15

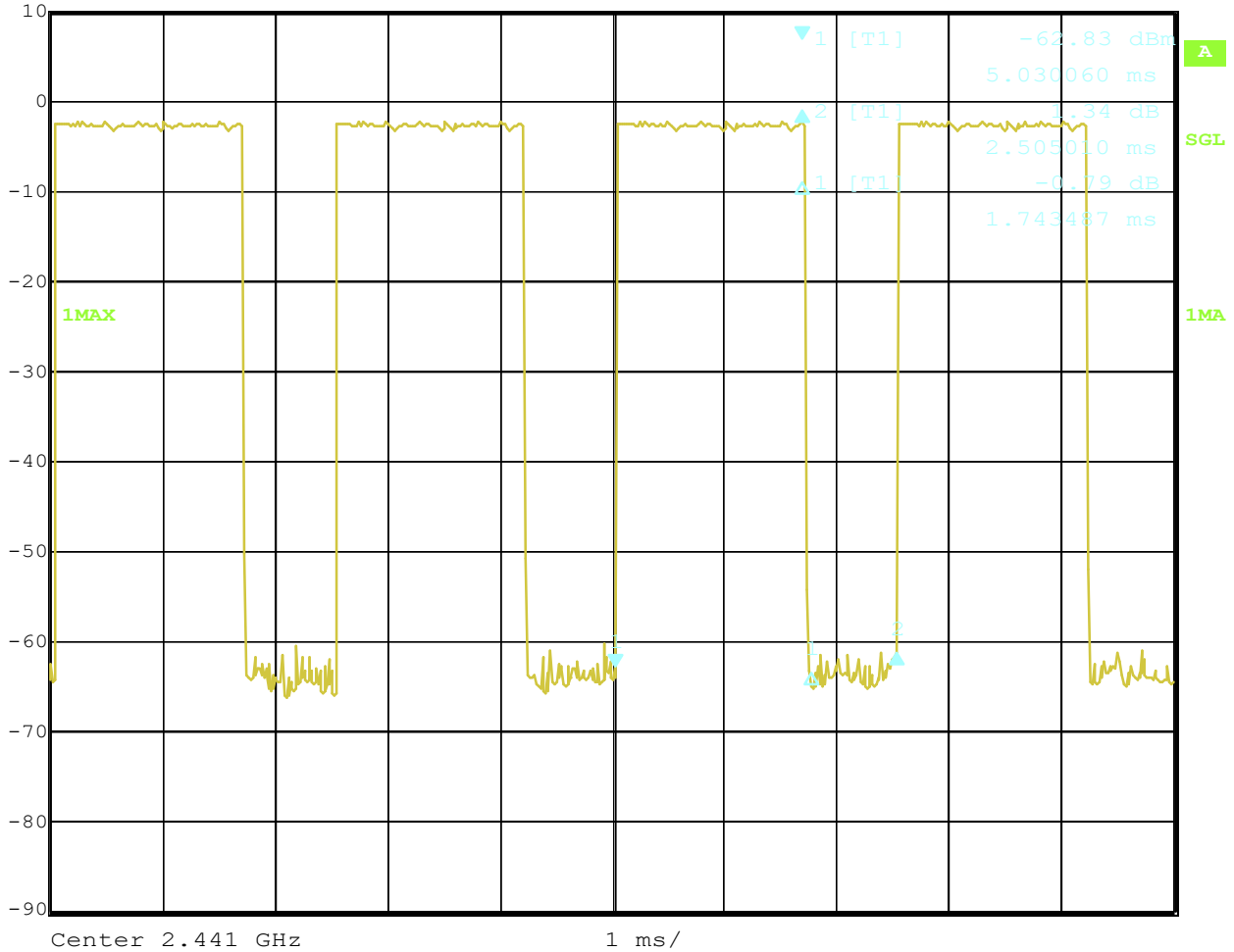
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2DH3



	Delta 2 [T1]	RBW	1 MHz	RF Att	20 dB
Ref Lvl	1.34 dB	VBW	1 MHz		
10 dBm	2.505010 ms	SWT	10 ms	Unit	dBm



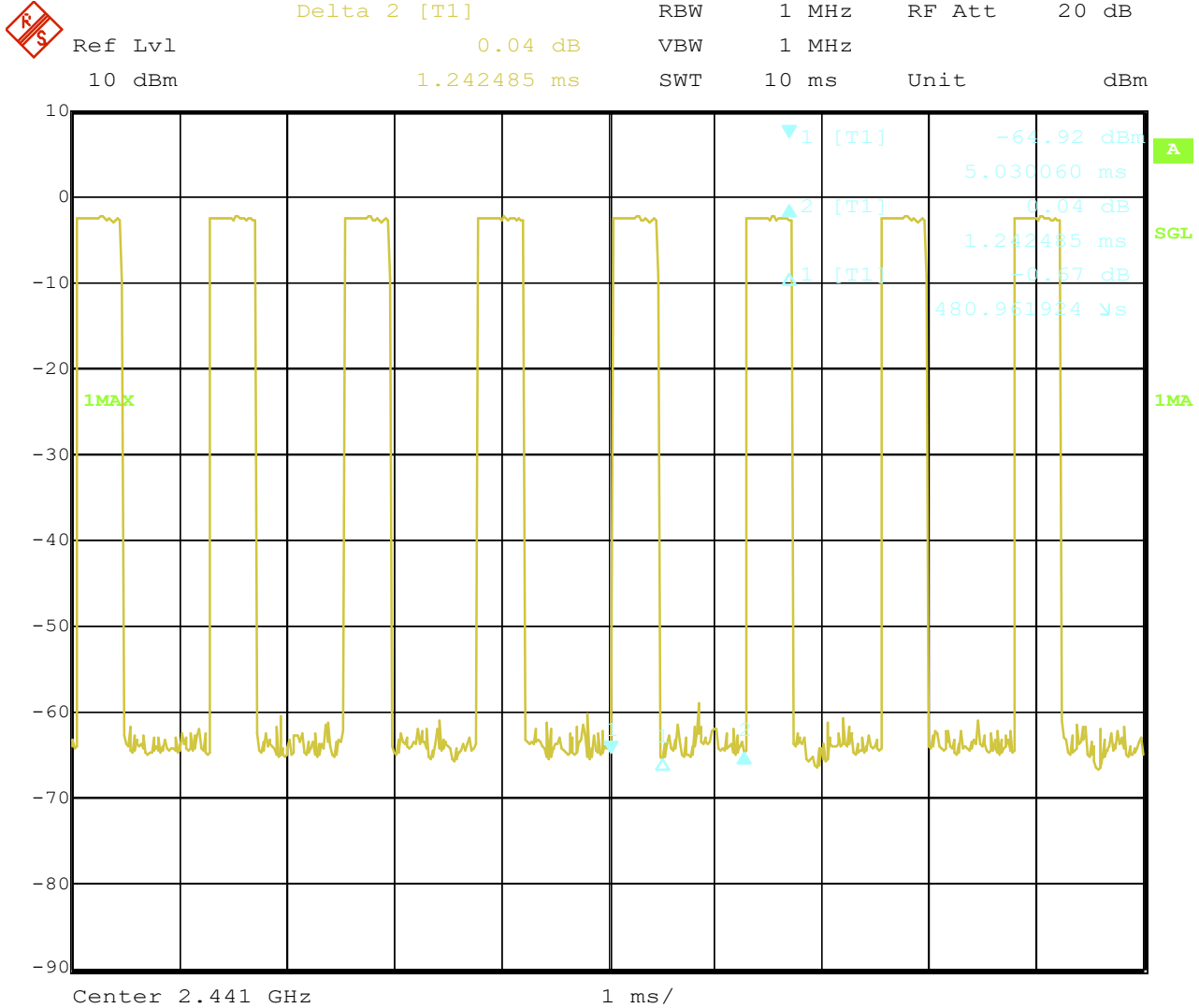
Date: 1.APR.2021 15:55:25

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2DH1



Date: 1.APR.2021 15:53:50

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**Type of Modulation: 8DPSK**

EUT	Bluetooth Remote Control Unit		Model	DSR-0828	
Mode	Keep Transmitting		Input Voltage	DC12V	
Temperature	24 deg. C,		Humidity	56% RH	
Channel	Reading	Hopping Rate		Actual	Limit
3DH5					
Middle	2.986ms	266.667 hop/s		0.319s	0.4s
3DH3					
Middle	1.743ms	400 hop/s		0.279s	0.4s
3DH1					
Middle	0.481ms	800 hop/s		0.154s	0.4s

Actual = Reading × (Hopping rate / Number of channels) × Test period, Test period = 0.4 [seconds / channel] × 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

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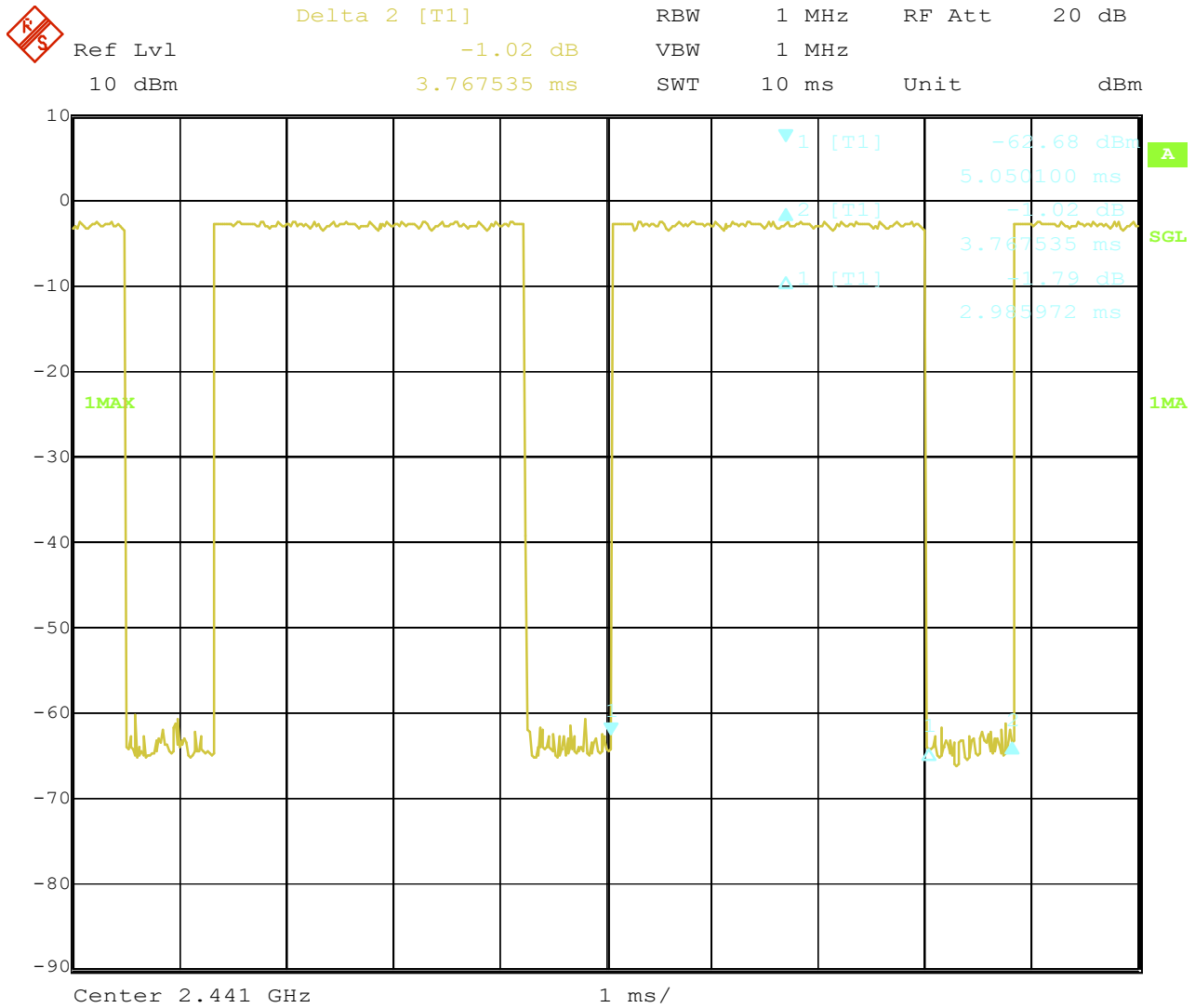
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Test Plots:

3DH5



Date: 1.APR.2021 18:51:13

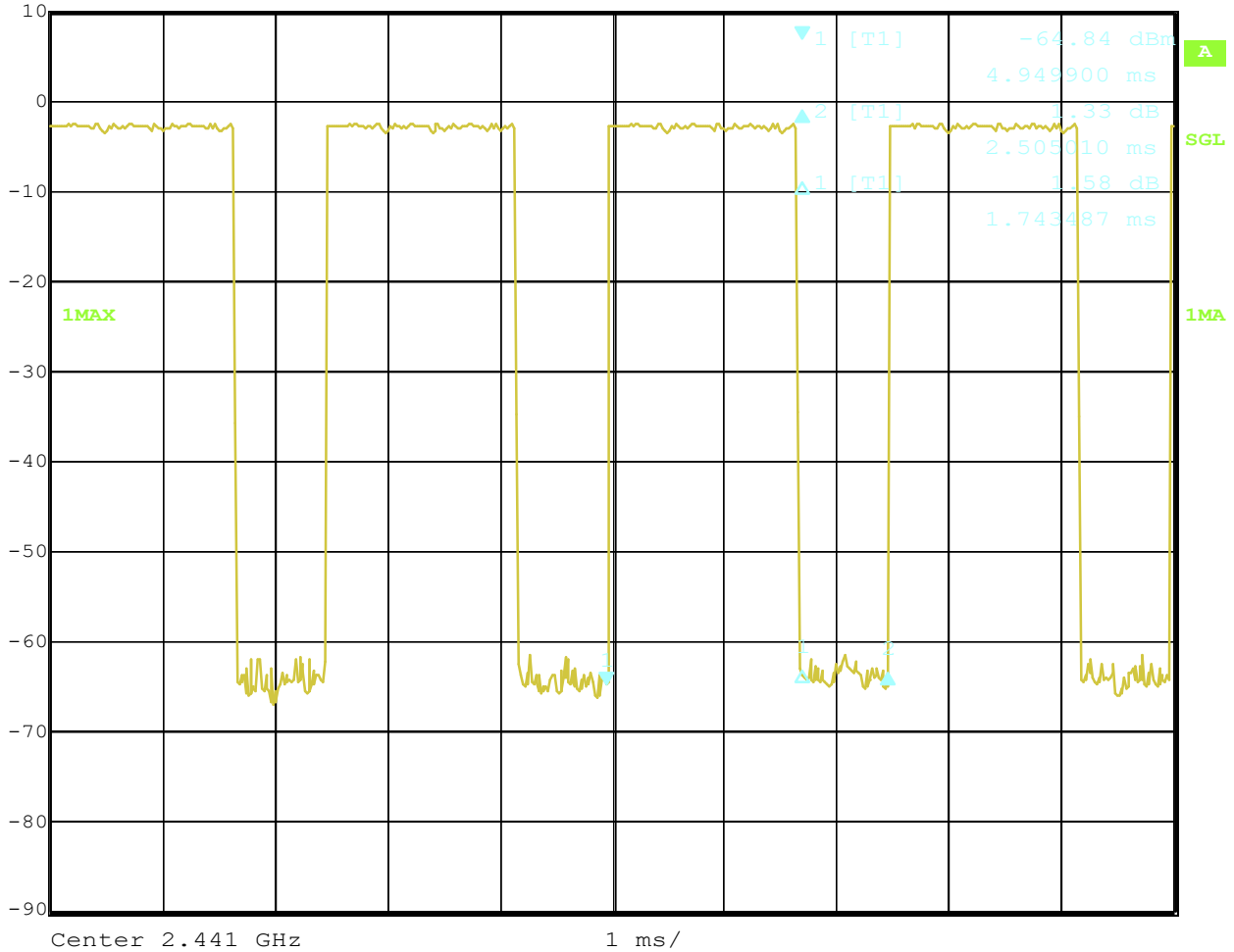
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3DH3



Delta 2 [T1] RBW 1 MHz RF Att 20 dB  
 Ref Lvl 1.33 dB VBW 1 MHz  
 10 dBm 2.505010 ms SWT 10 ms Unit dBm

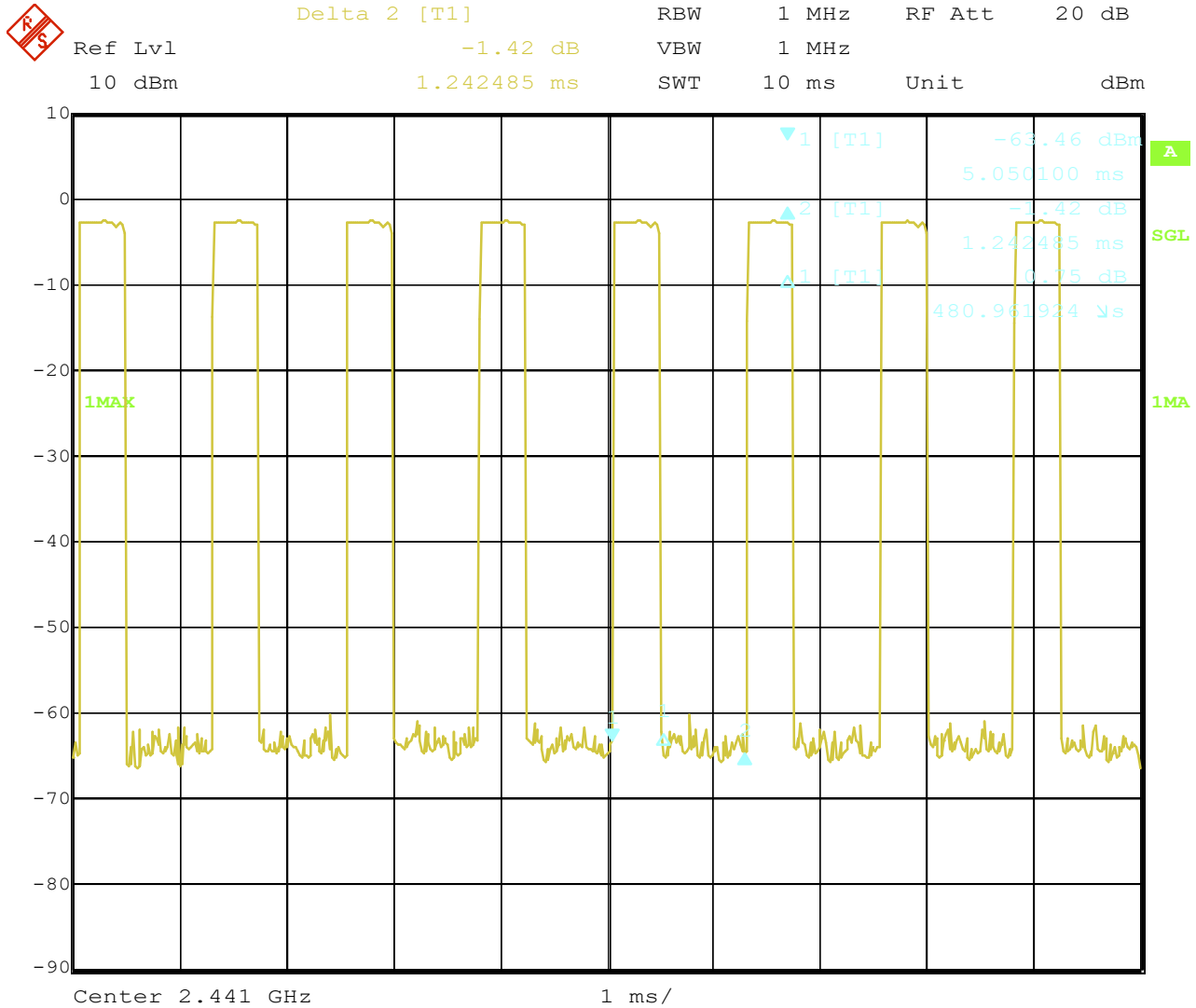


Date: 1.APR.2021 18:50:28

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3DH1



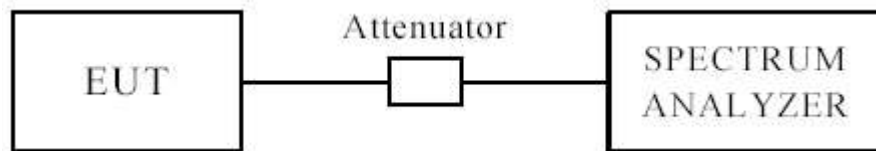
Date: 1.APR.2021 18:49:03

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## 12 Out of Band Measurement

### 12.1 Test Setup



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

### 12.2 Limits of Out of Band Emissions Measurement

1. Below  $-20\text{dB}$  of the highest emission level of operating band (in  $100\text{kHz}$  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.

### 12.3 Test Procedure

For signals in the restricted bands above and below the  $2.4\text{-}2.483\text{GHz}$  allocated band a measurement was made of radiated emission test. Peak values with  $\text{RBW}=\text{VBW}=1\text{MHz}$  and PK detector.

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

Note: 1. For band-edge measurement, the frequency from  $30\text{MHz}\text{-}25\text{GHz}$  was tested. And It met the FCC rule.

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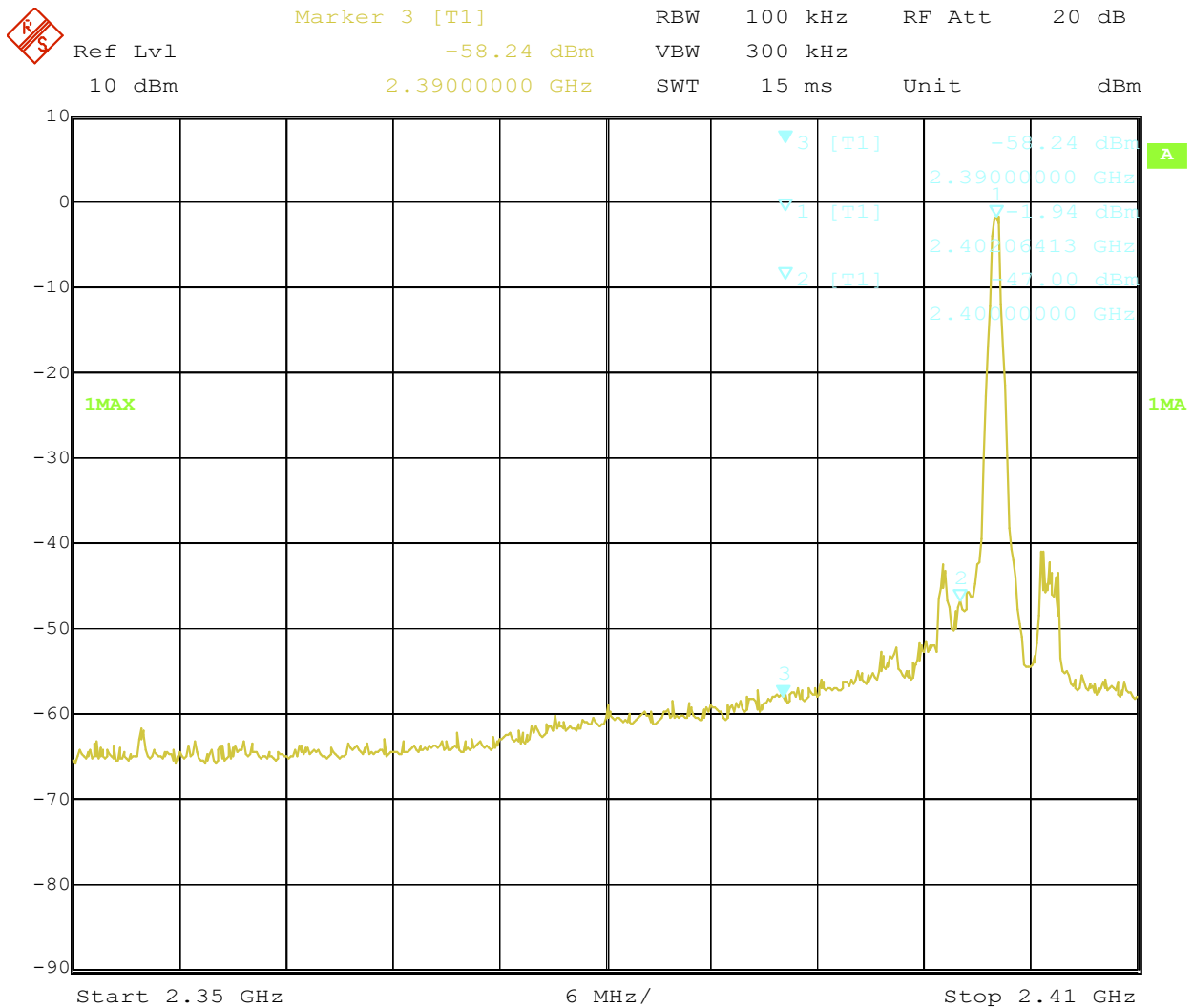


**Type of Modulation: GFSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	Low Channel
Mode	Keeping Transmitting	Test Voltage	DC12V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 18:18:53

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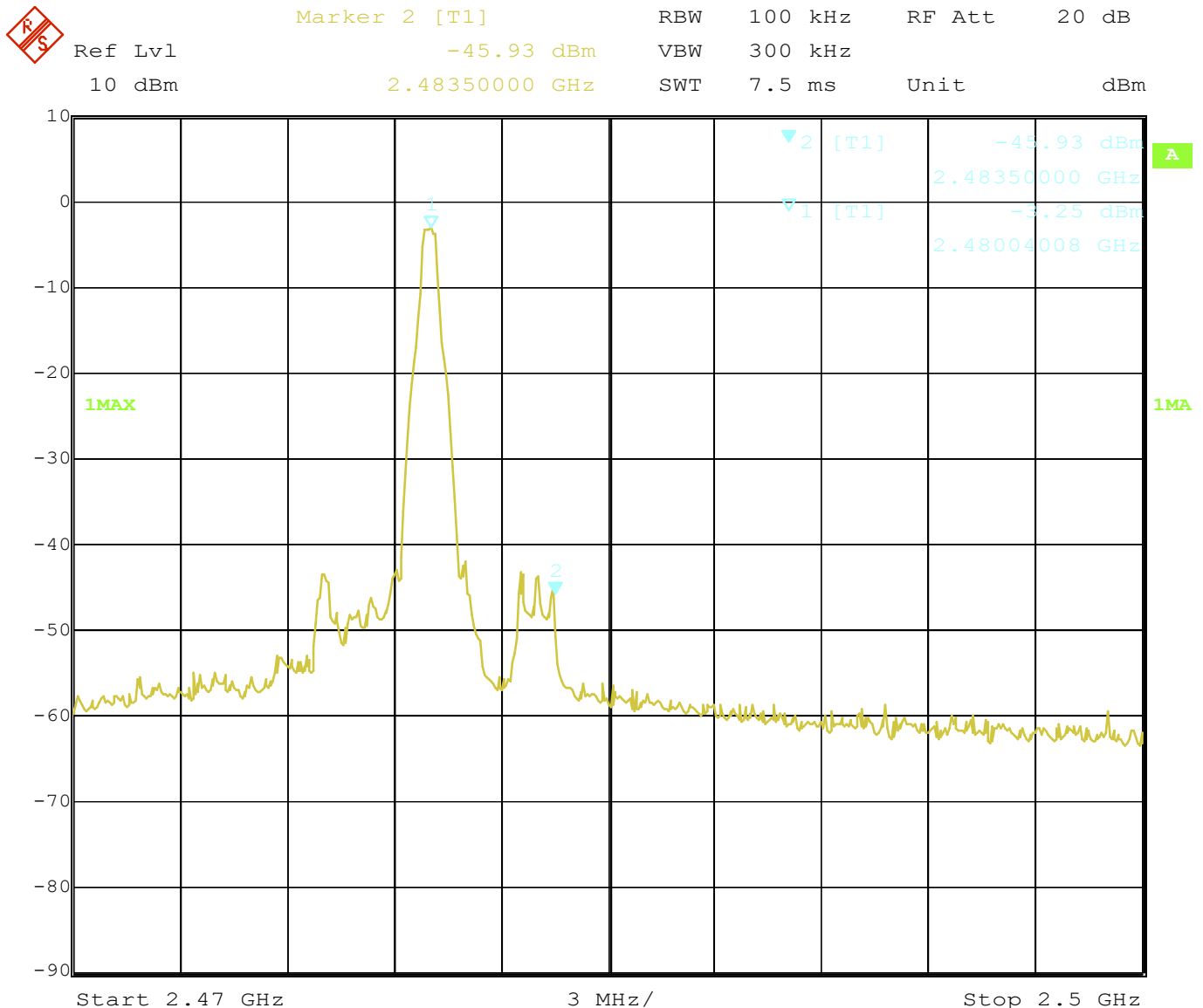


**Type of Modulation: GFSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	High Channel
Mode	Keeping Transmitting	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 18:16:53

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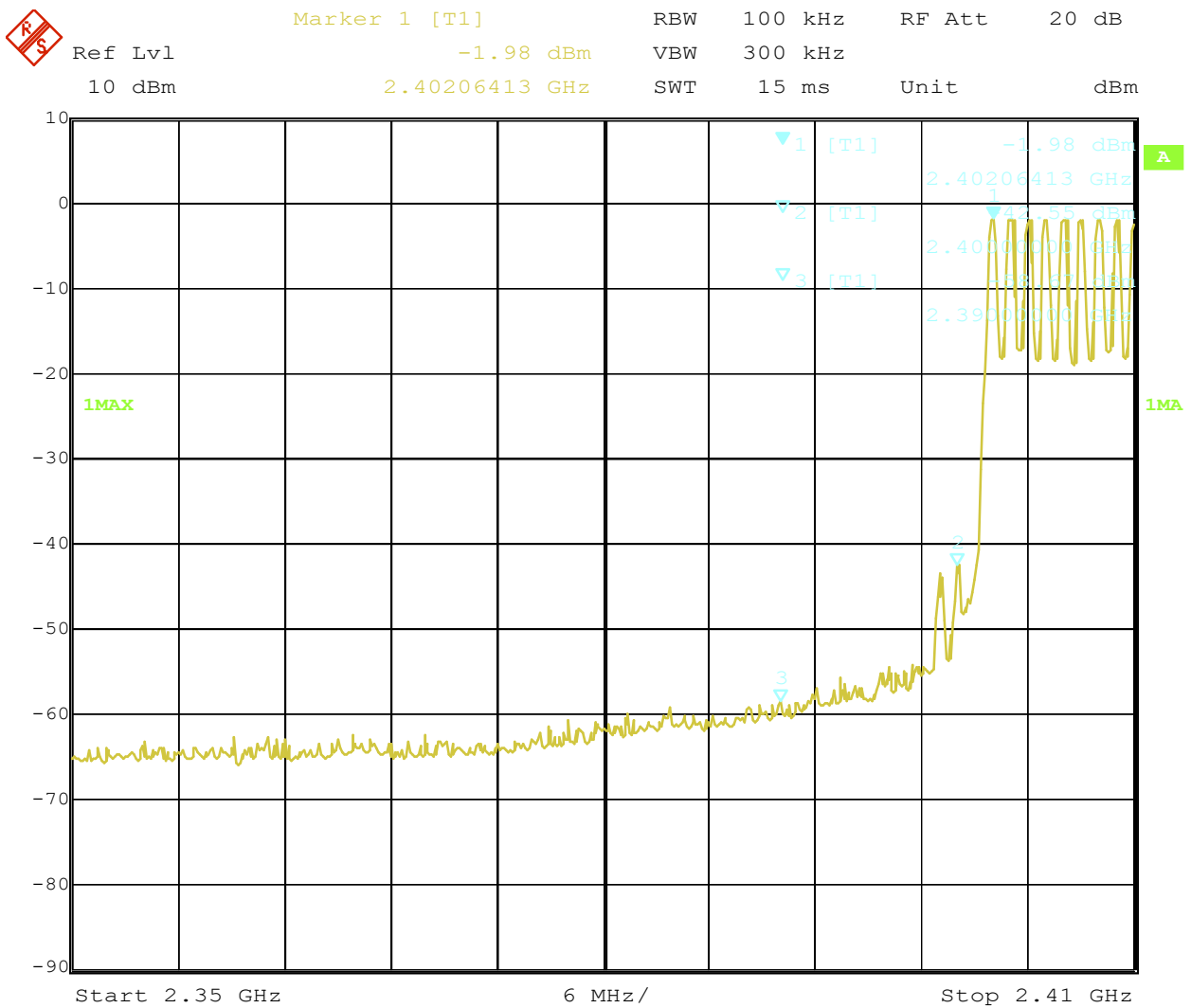


**Type of Modulation: GFSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	Hopping mode
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 18:23:53

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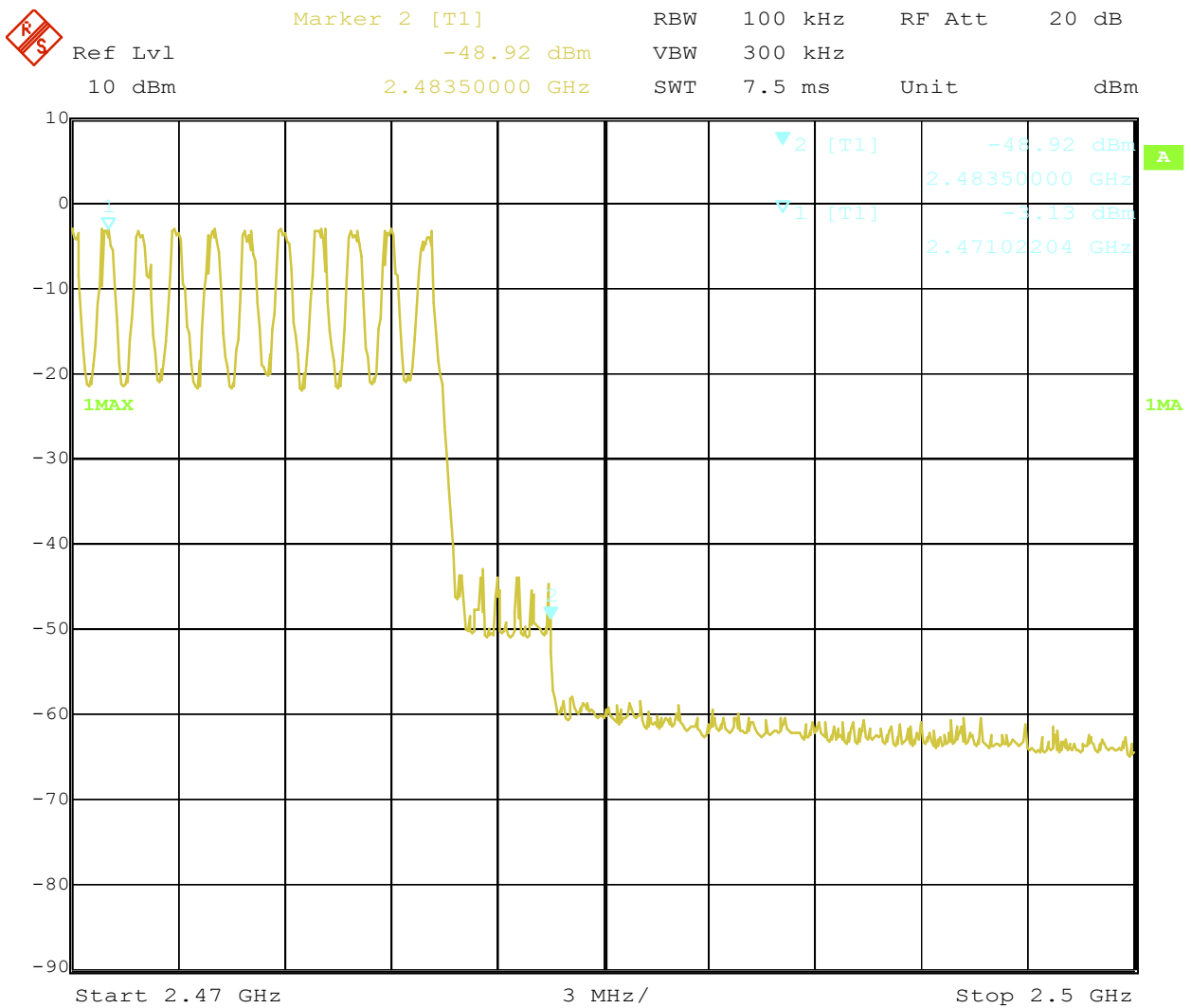


**Type of Modulation: GFSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	Hopping mode
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 18:28:49

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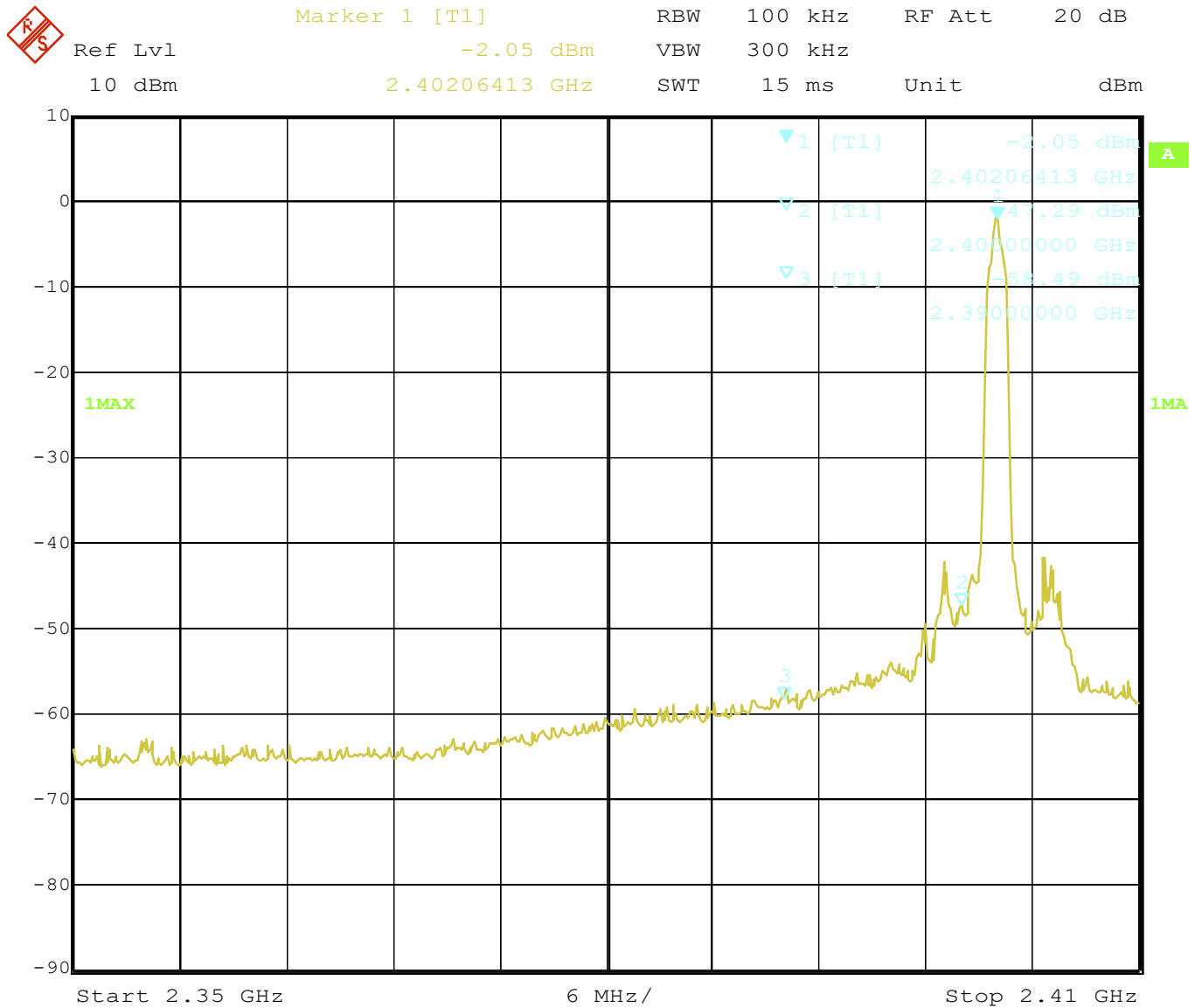


**Type of Modulation:  $\pi/4$ -DQPSK**

**12.4 Out of Band Test Result**

Product:	APP RING LIGHT	Test Mode:	Low Channel
Mode	Keeping Transmitting	Test Voltage	DC12V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 19:13:20

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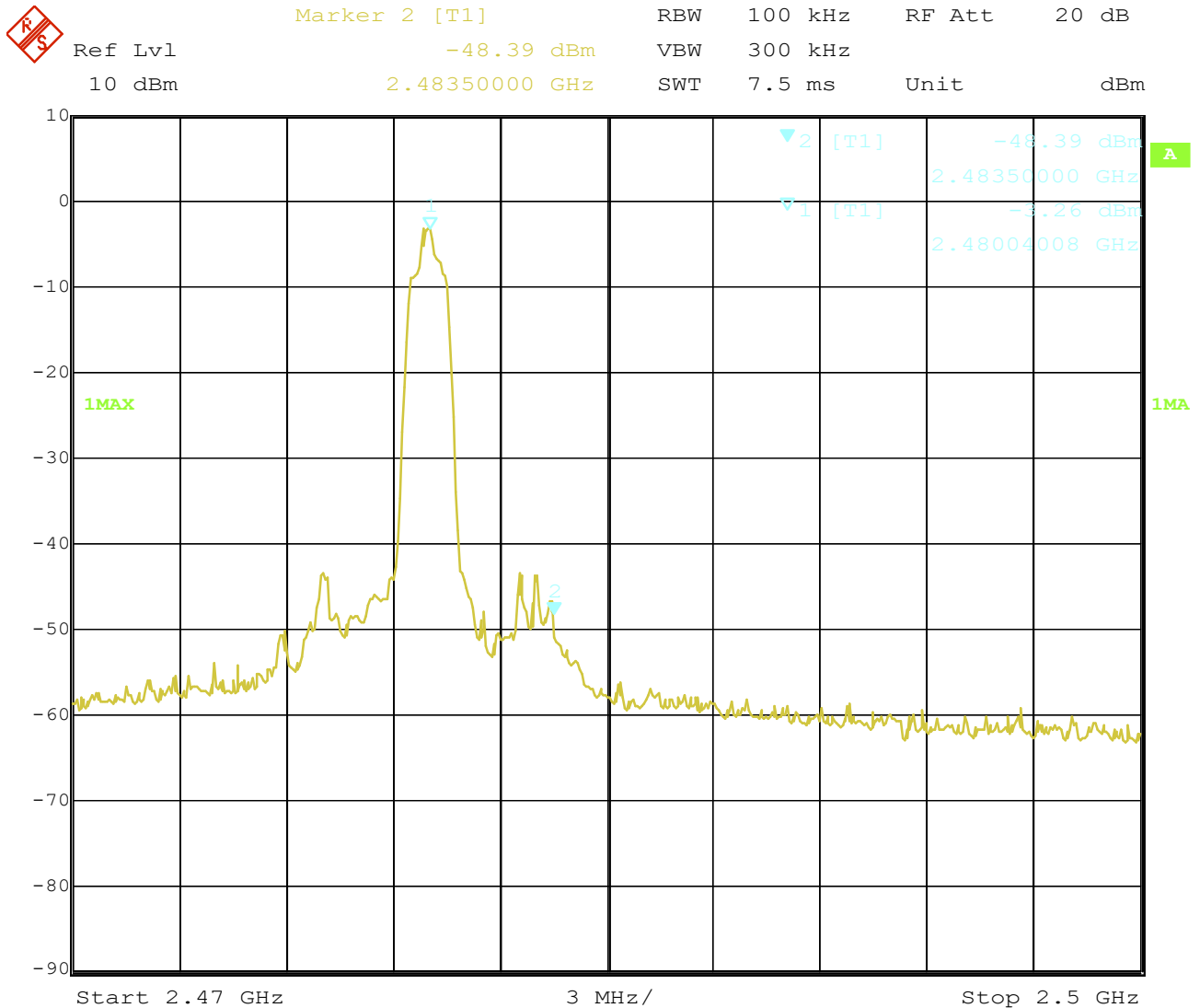


**Type of Modulation:  $\pi/4$ -DQPSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	High Channel
Mode	Keeping Transmitting	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 19:17:48

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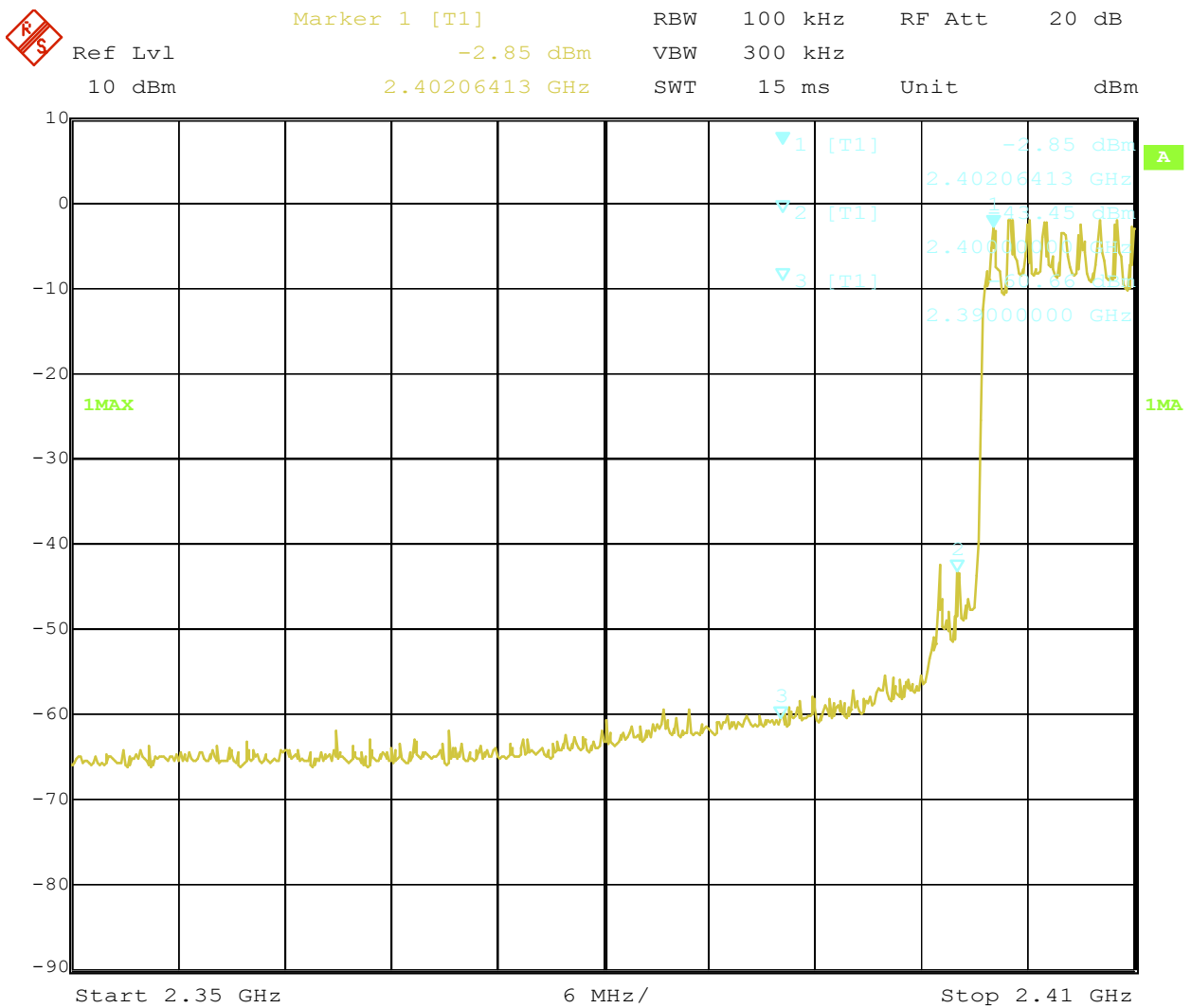


**Type of Modulation:  $\pi/4$ -DQPSK**

**12.4 Out of Band Test Result**

Product:	APP RING LIGHT	Test Mode:	Hopping mode
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 19:14:51

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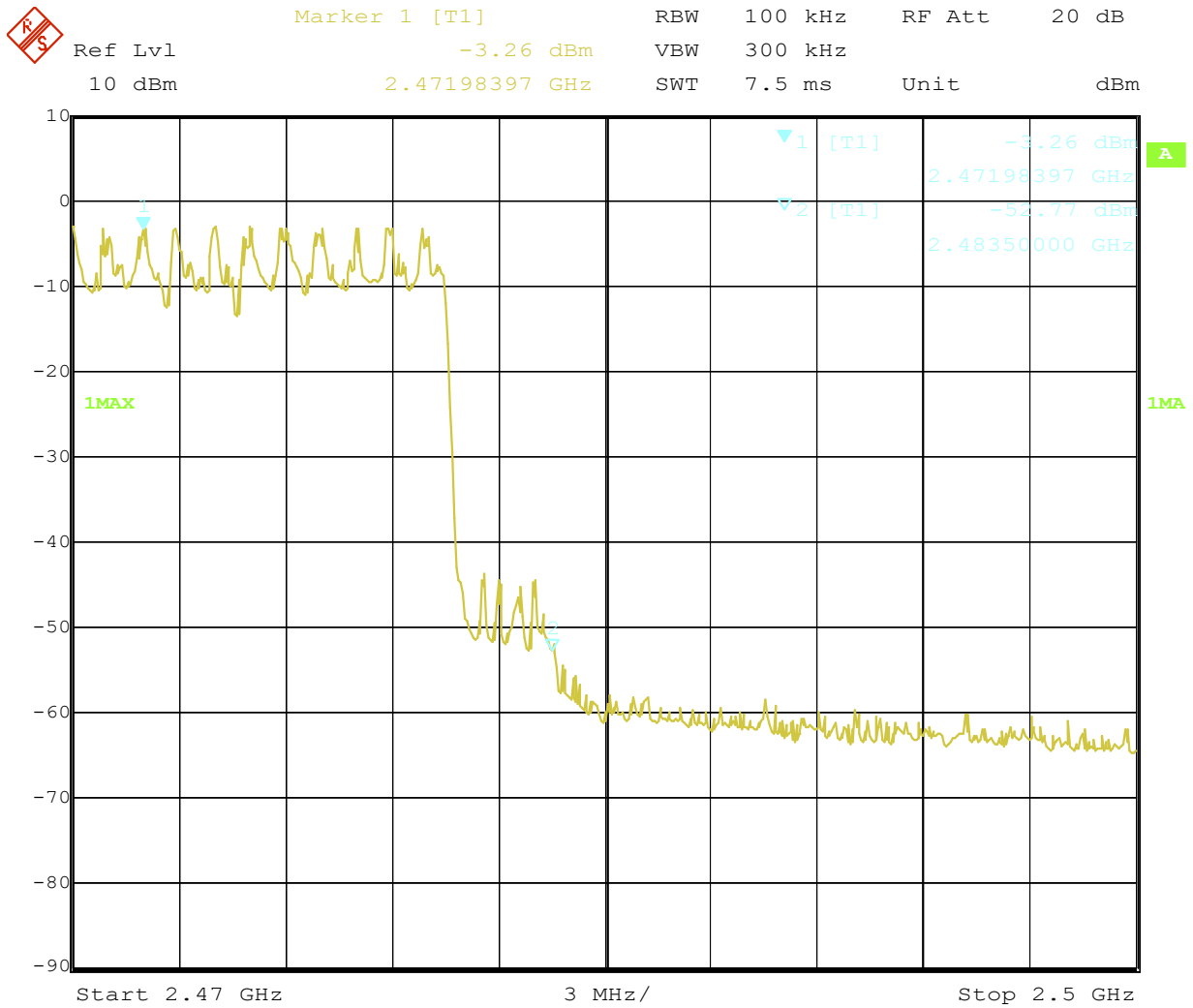


**Type of Modulation:  $\pi/4$ -DQPSK**

**12.4 Out of Band Test Result**

Product:	APP RING LIGHT	Test Mode:	Hopping mode
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 19:20:25

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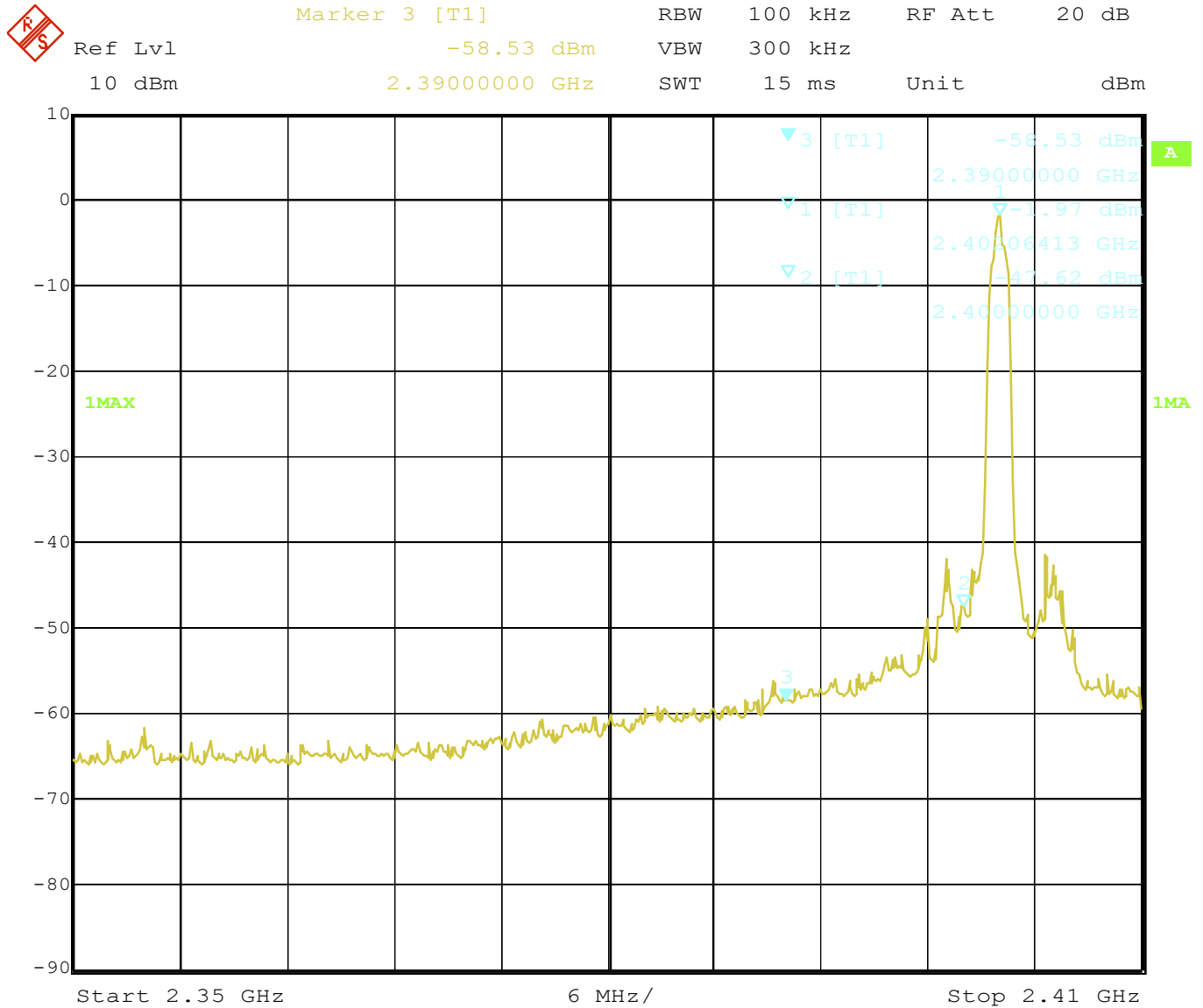


**Type of Modulation: 8DPSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	Low Channel
Mode	Keeping Transmitting	Test Voltage	DC12V
Temperature	24 deg. C	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 18:34:28

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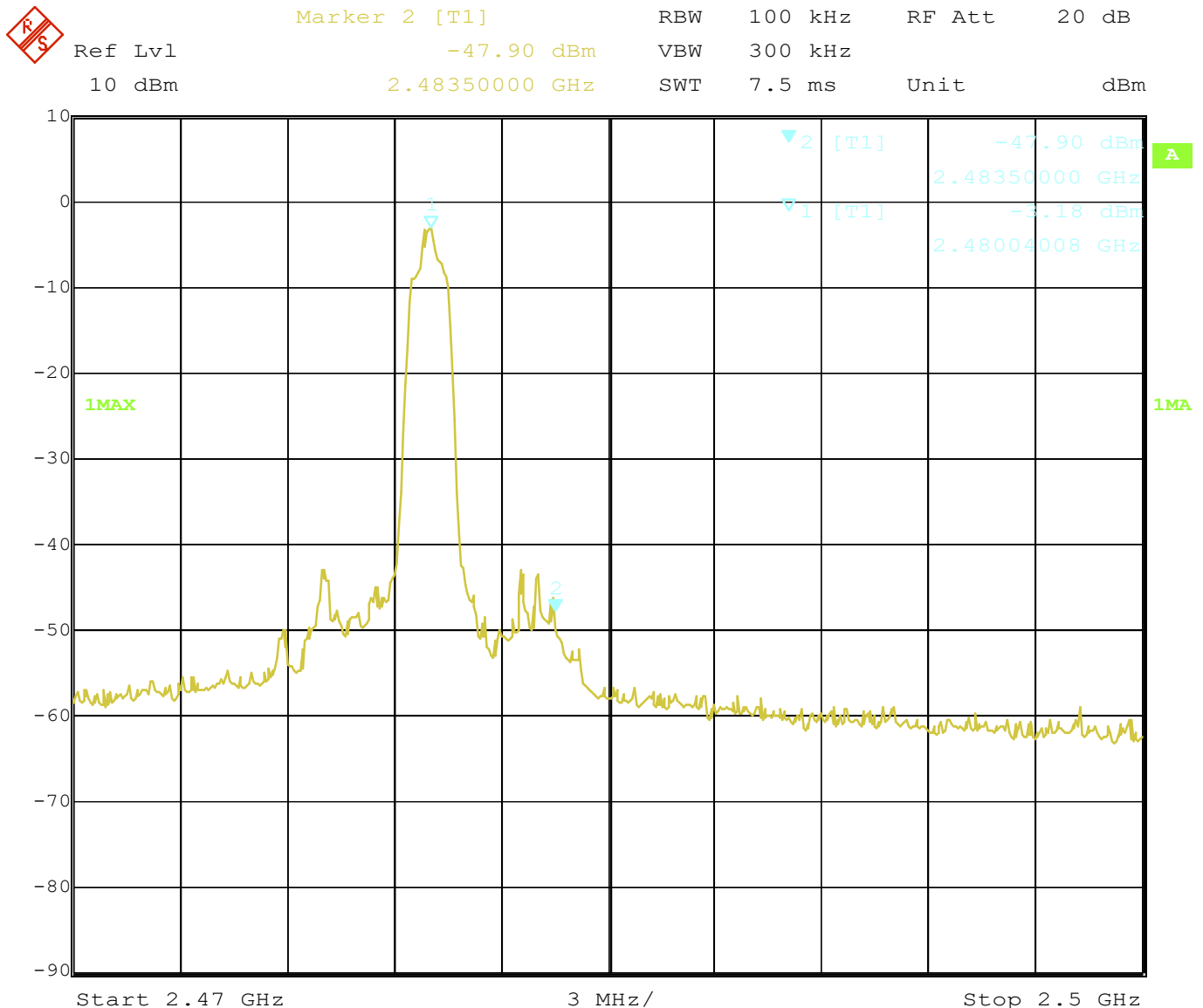


**Type of Modulation: 8DPSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	High Channel
Mode	Keeping Transmitting	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 18:33:12

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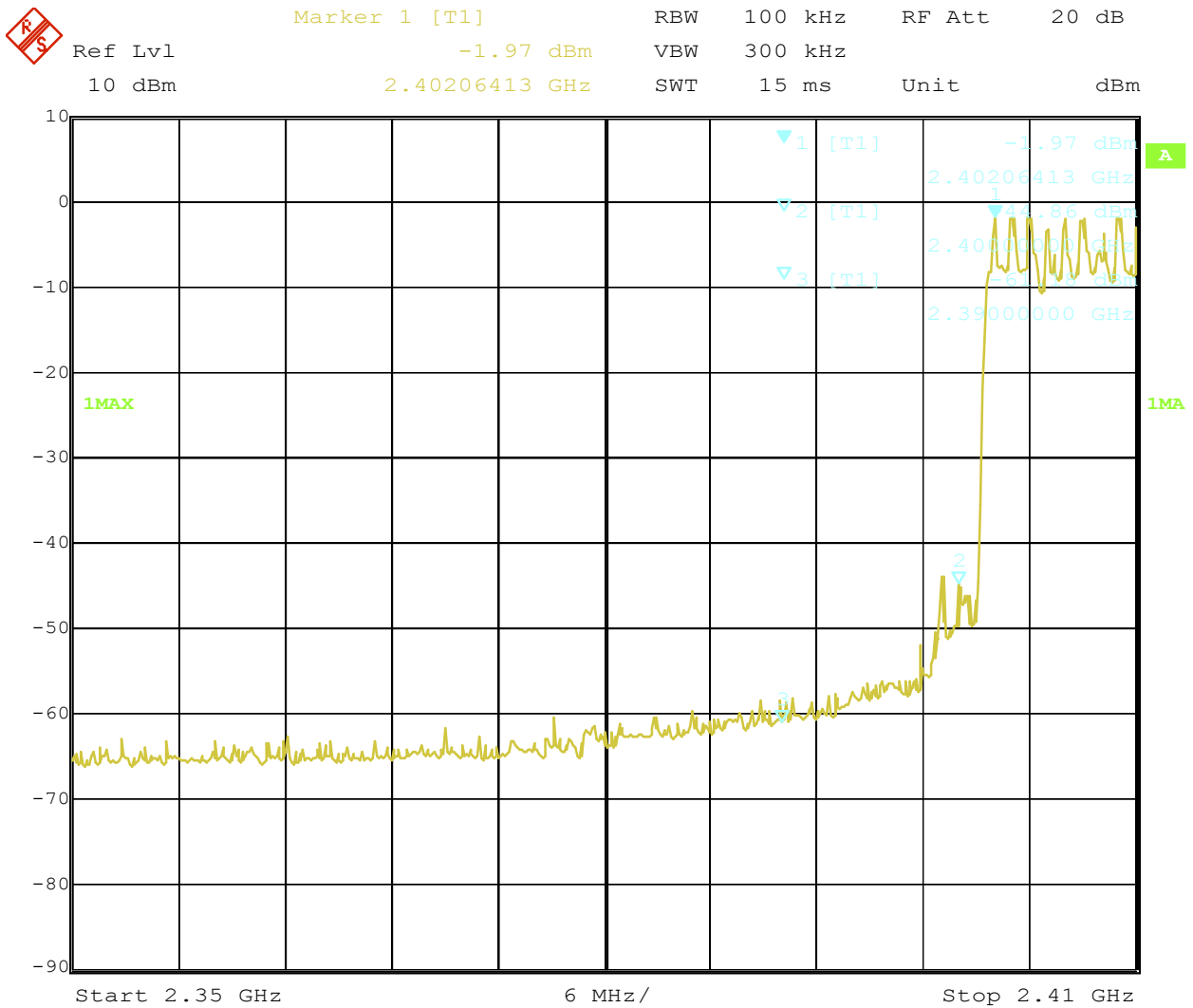


**Type of Modulation: 8DPSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	Hopping mode
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



Date: 1.APR.2021 18:36:03

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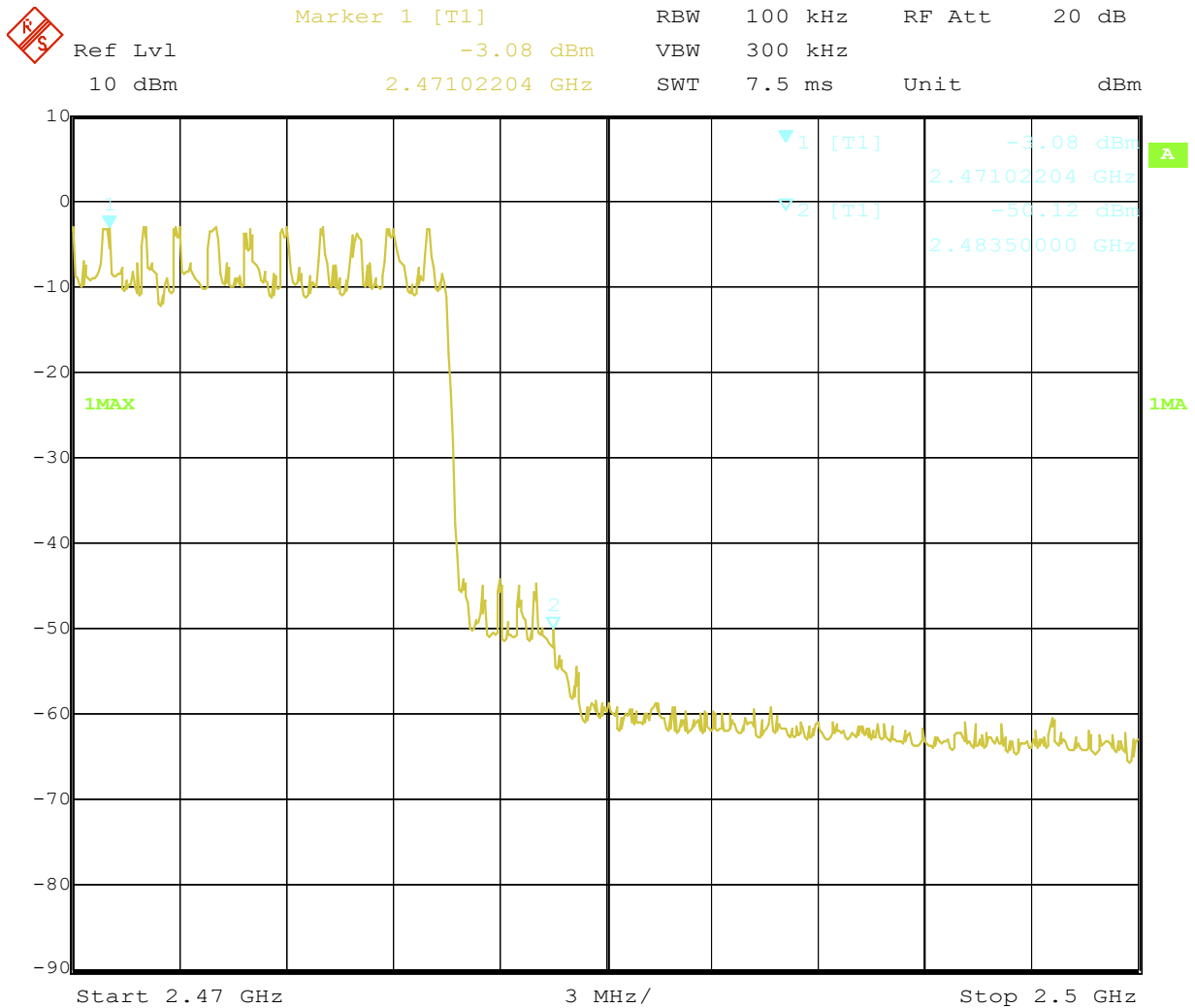


**Type of Modulation: 8DPSK**

**12.4 Band Edge Test Result**

Product:	APP RING LIGHT	Test Mode:	Hopping mode
Mode	Hopping On	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Detector	PK

**Test Figure:**



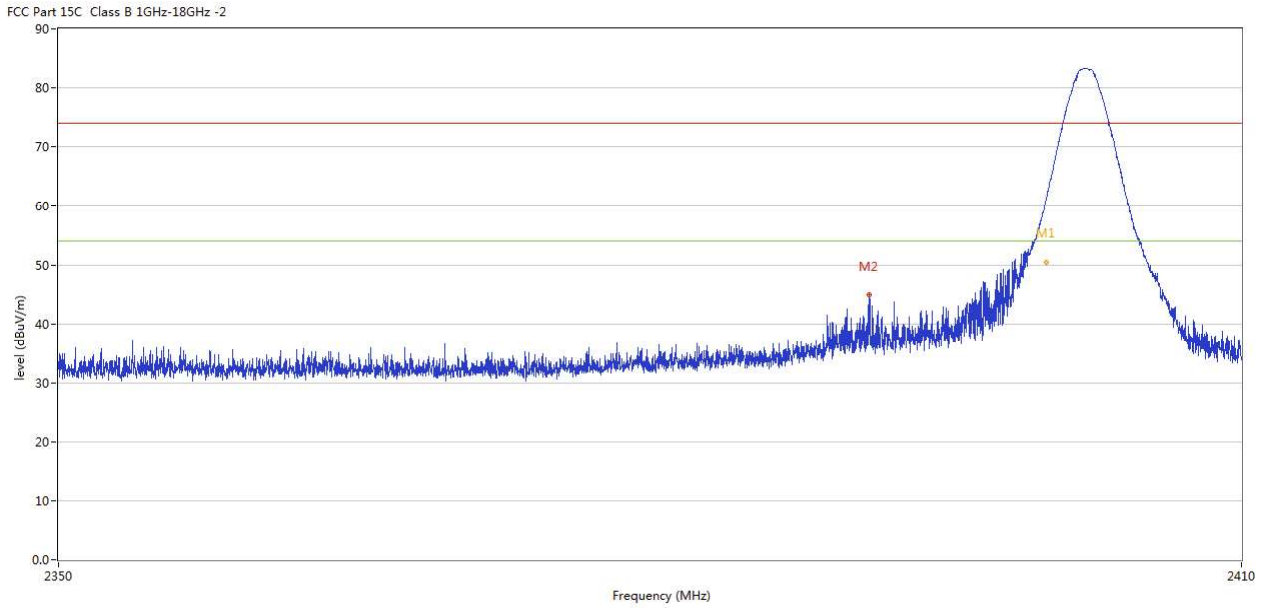
Date: 1.APR.2021 18:31:07

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**12.4 Restrict Band Measurement**

EUT	APP RING LIGHT	Model	RGB18-APP
Mode	Keep Transmitting	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Modulation Type	π/4-DQPSK



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2	2390.965	46.86	-3.53	74.0	-27.14	Peak	44.00	100	Horizontal	Pass

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

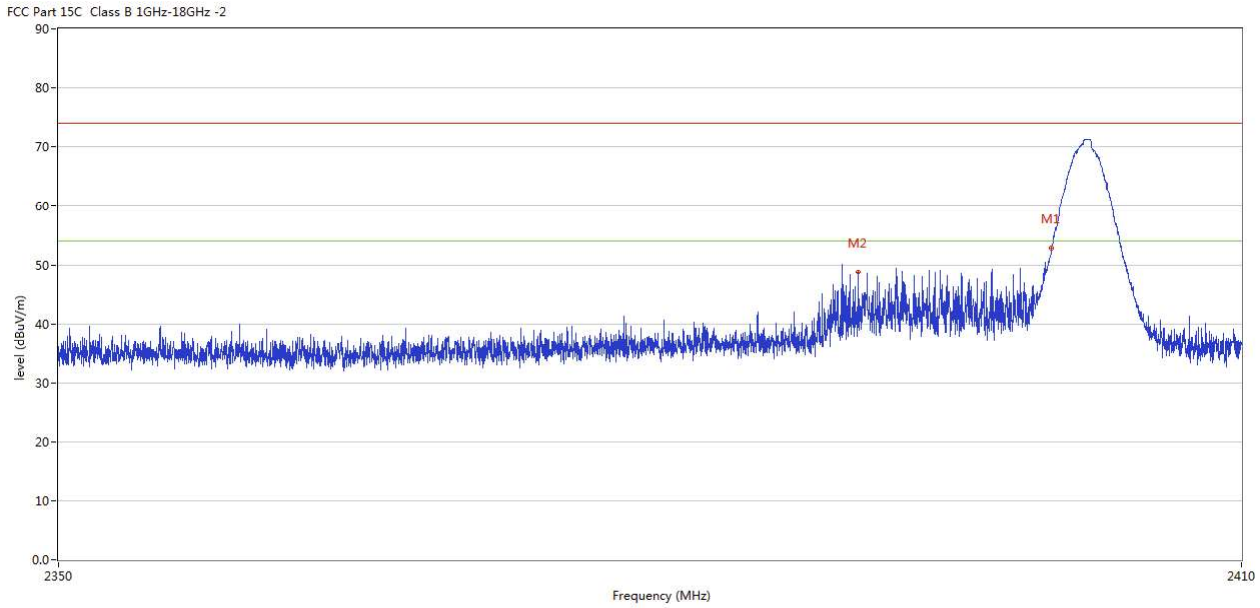
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**12.4 Restrict Band Measurement**

EUT	APP RING LIGHT	Model	RGB18-APP
Mode	Keep Transmitting	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Modulation Type	π/4-DQPSK



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
2	2390.410	52.80	-3.53	74.0	-21.20	Peak	118.00	100	Vertical	Pass

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

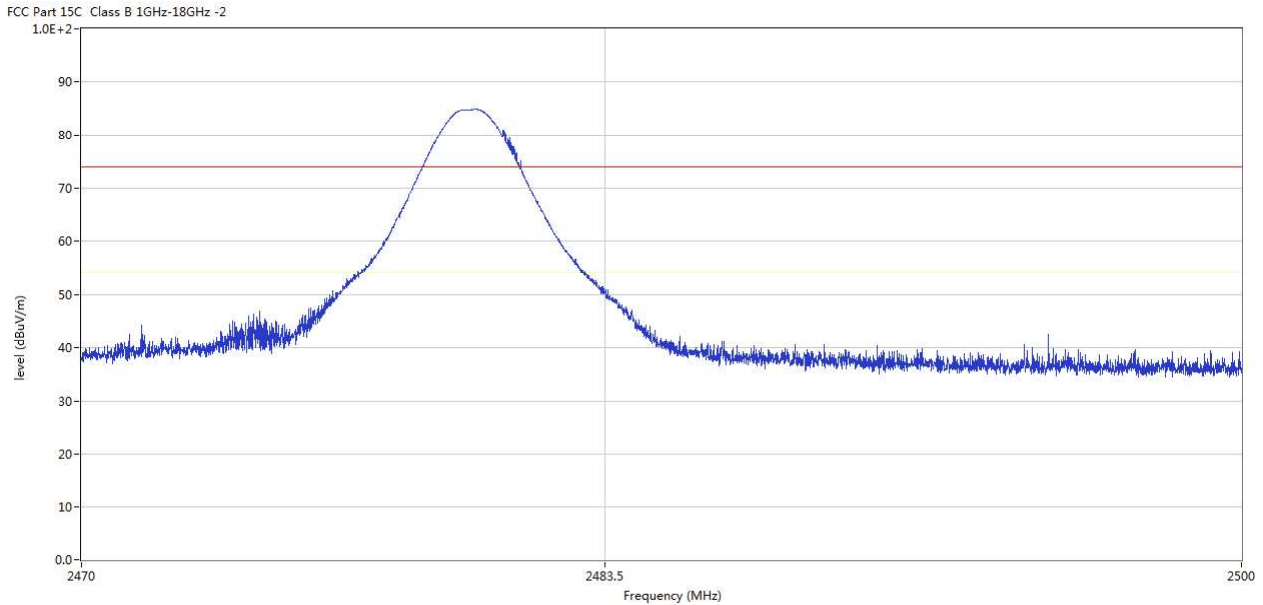
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**12.4 Restrict Band Measurement**

EUT	APP RING LIGHT	Model	RGB18-APP
Mode	Keep Transmitting	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Modulation Type	PI/4-DQPSK



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2483.567	50.84	-3.57	74.0	-23.16	Peak	102.00	100	Horizontal	Pass

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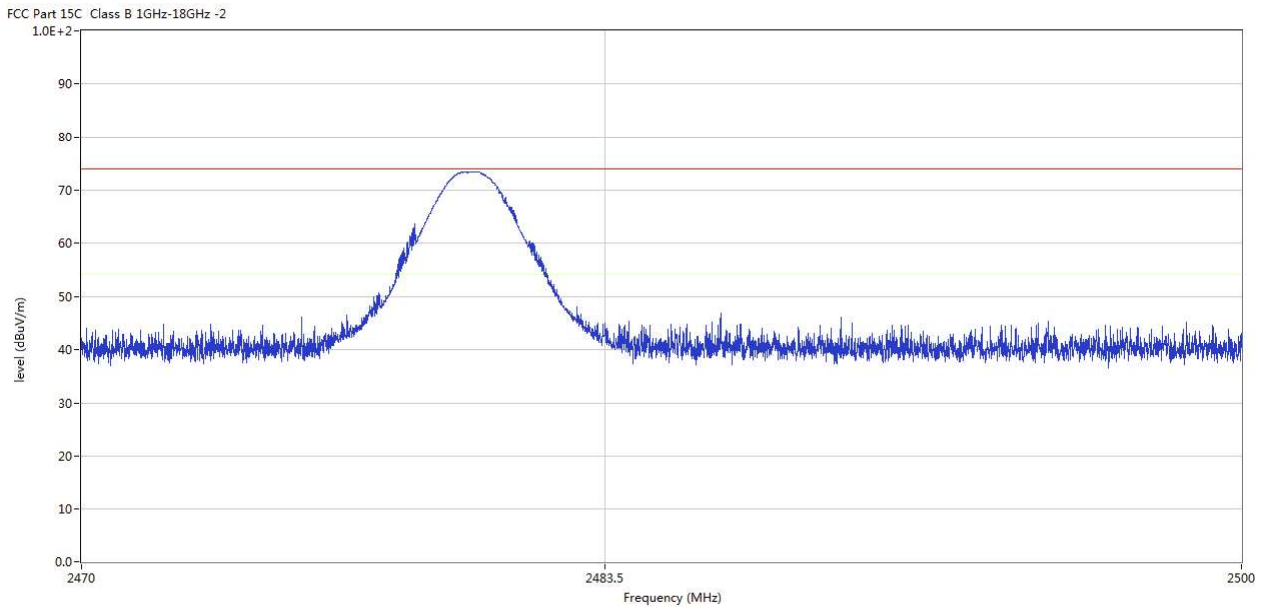
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**12.4 Restrict Band Measurement**

EUT	APP RING LIGHT	Model	RGB18-APP
Mode	Keep Transmitting	Test Voltage	DC12V
Temperature	24 deg. C,	Humidity	56% RH
Test Result:	Pass	Modulation Type	$\pi/4$ -DQPSK



No.	Frequency (MHz)	Results (dBuV/m)	Factor (dB)	Limit (dBuV/m)	Over Limit (dB)	Detector	Table (o)	Height (cm)	ANT	Verdict
1	2483.405	45.46	-3.57	74.0	-28.54	Peak	118.00	100	Vertical	Pass

**Note: For Restricted band test, only the worst case was reported. And  $\pi/4$ -DQPSK modulation was the worst case.**

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### **13.0 Antenna Requirement**

#### 13.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### 13.2 Antenna Connected constructions

PCB antenna used. The gain of the antennas is 2.0dBi. (get from the antenna specification provided the applicant)

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#### 14.0 FCC ID Label

##### FCC ID: 2ANIV-RGB18-APP

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:



Label Location

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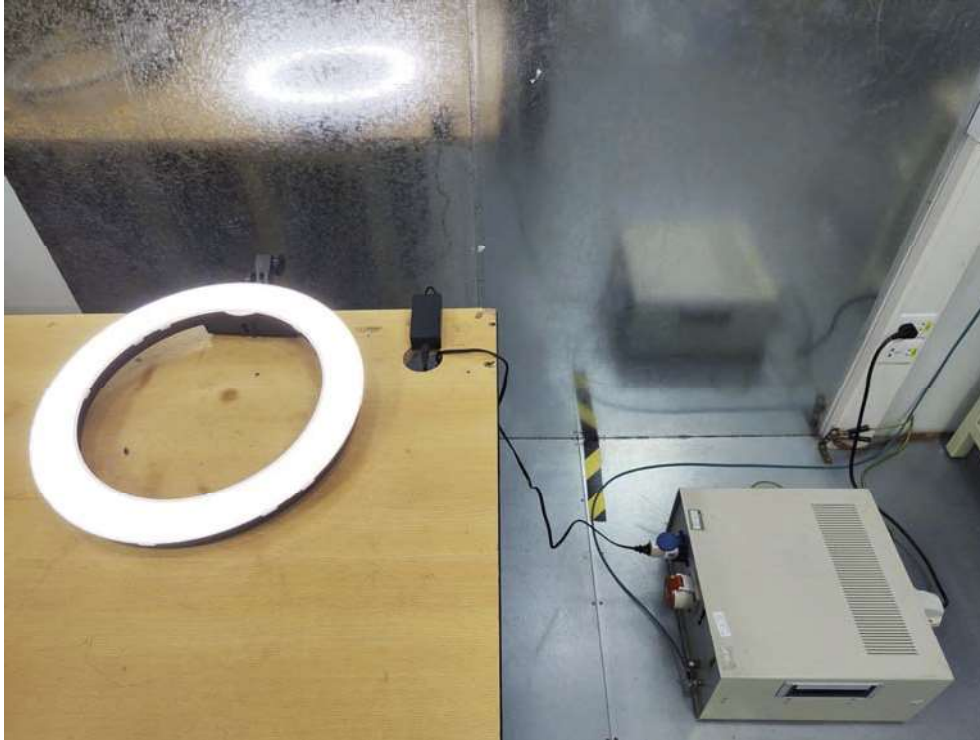
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### 15.0 Photo of testing

Conducted Emission Test Setup:



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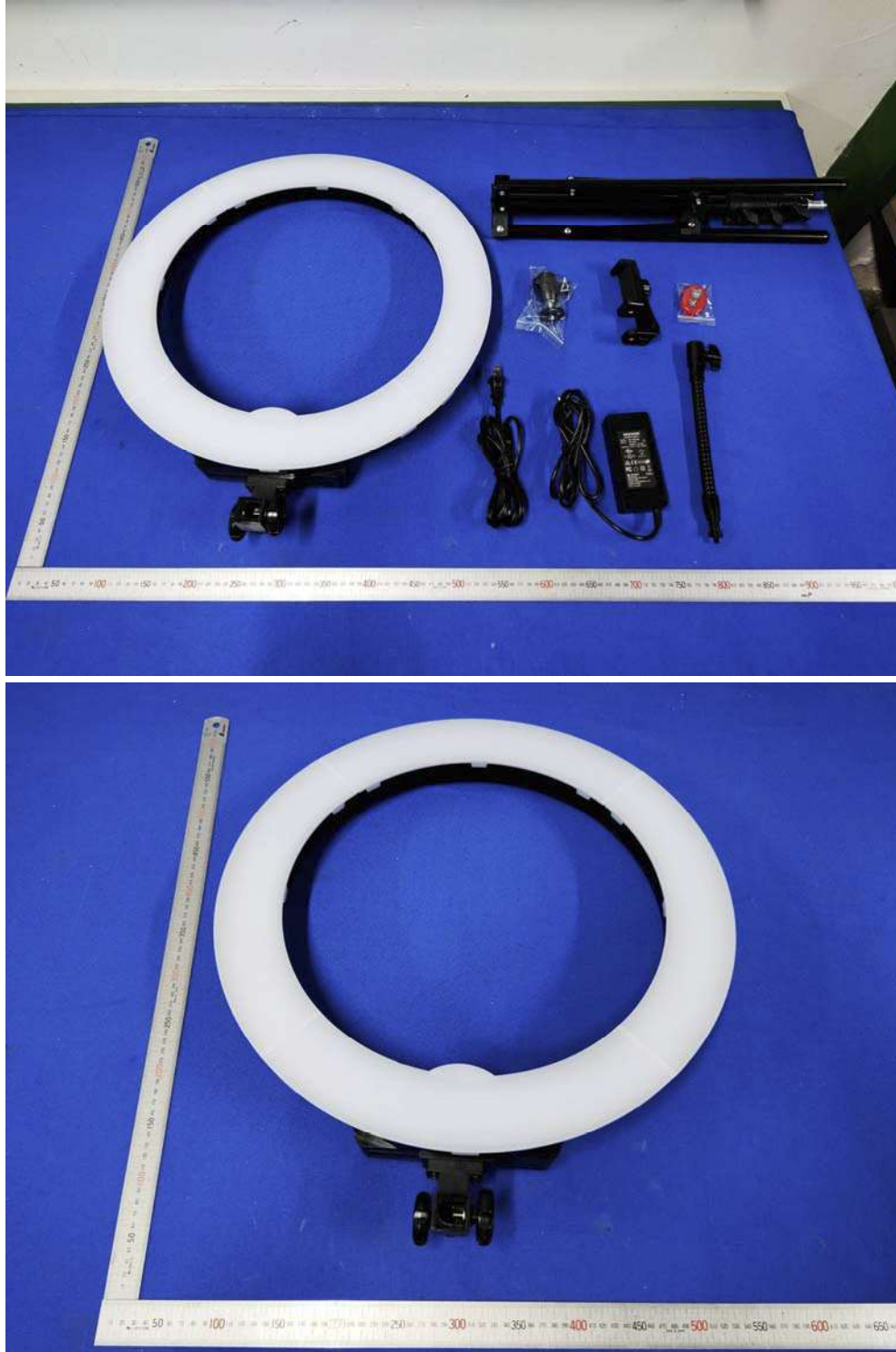


Radiated Emission Test Setup:



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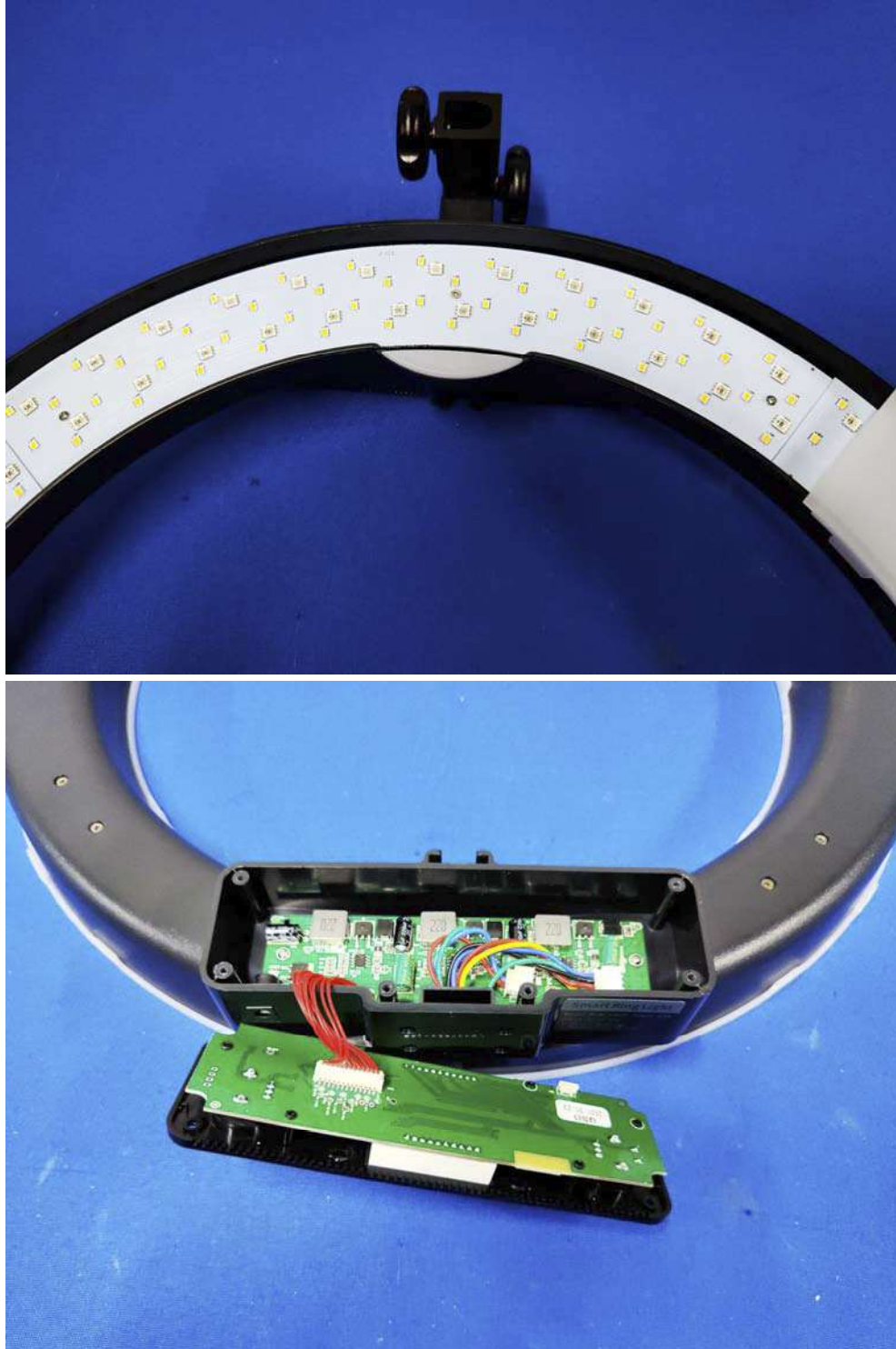
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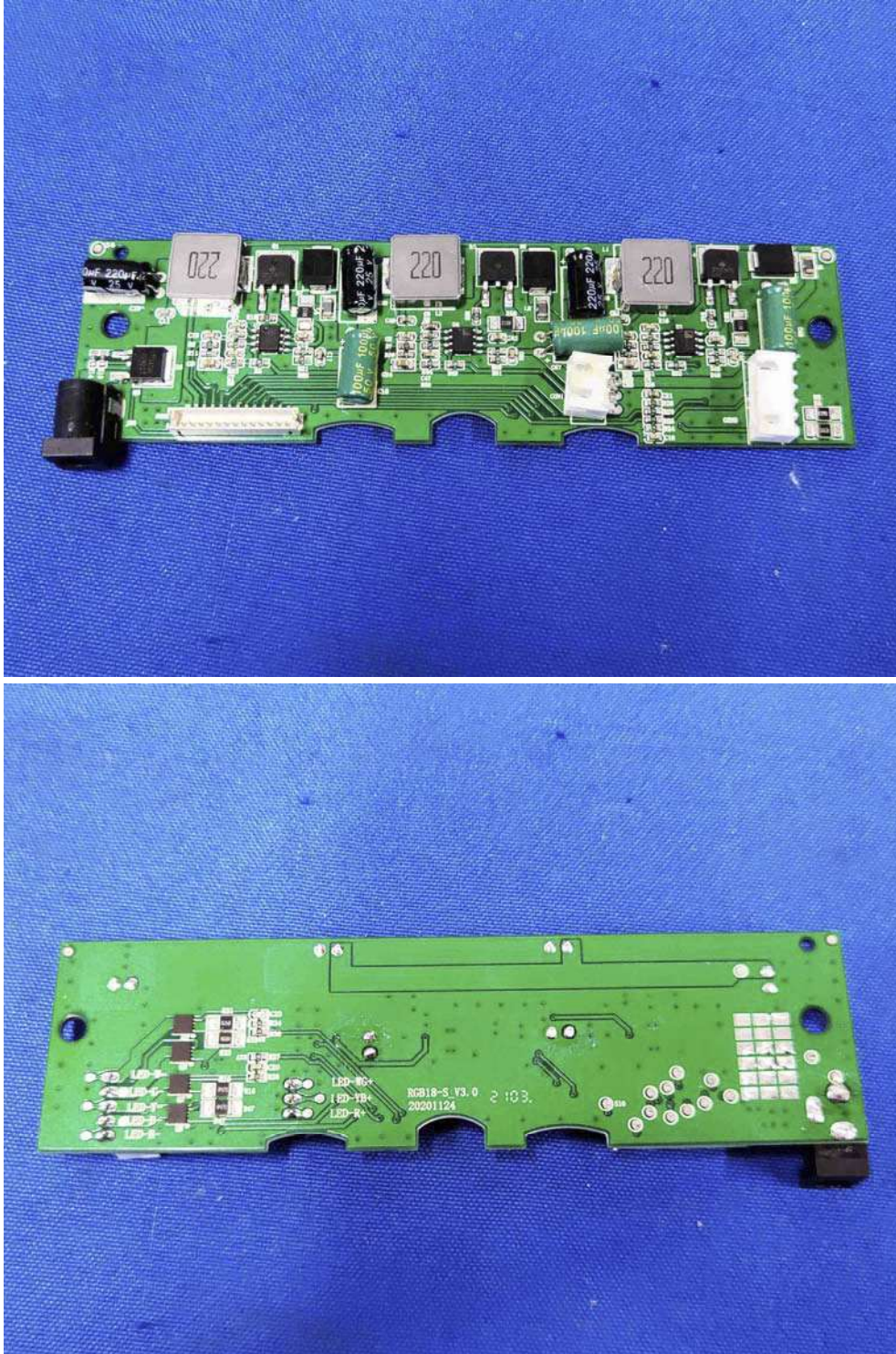


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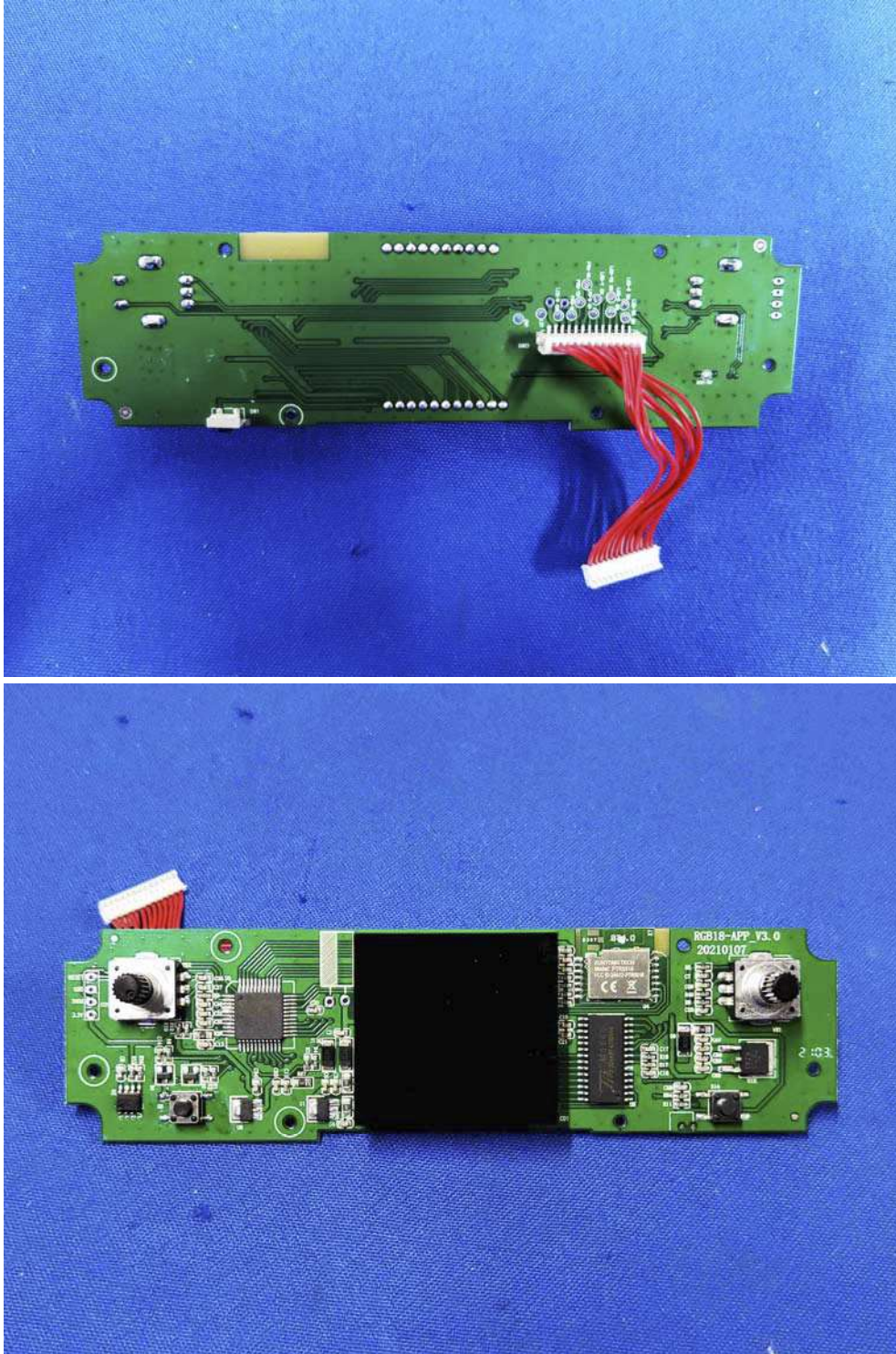


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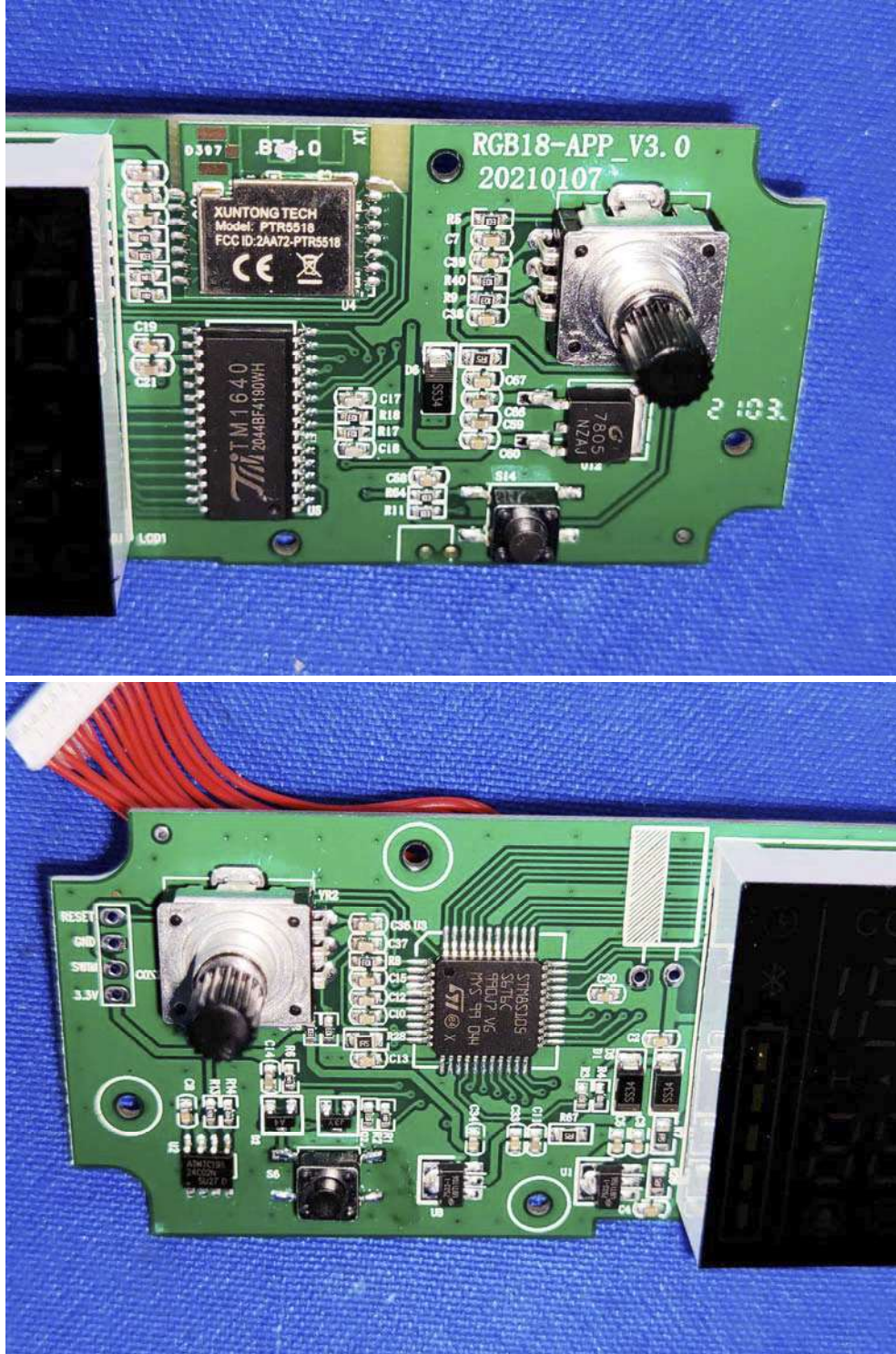


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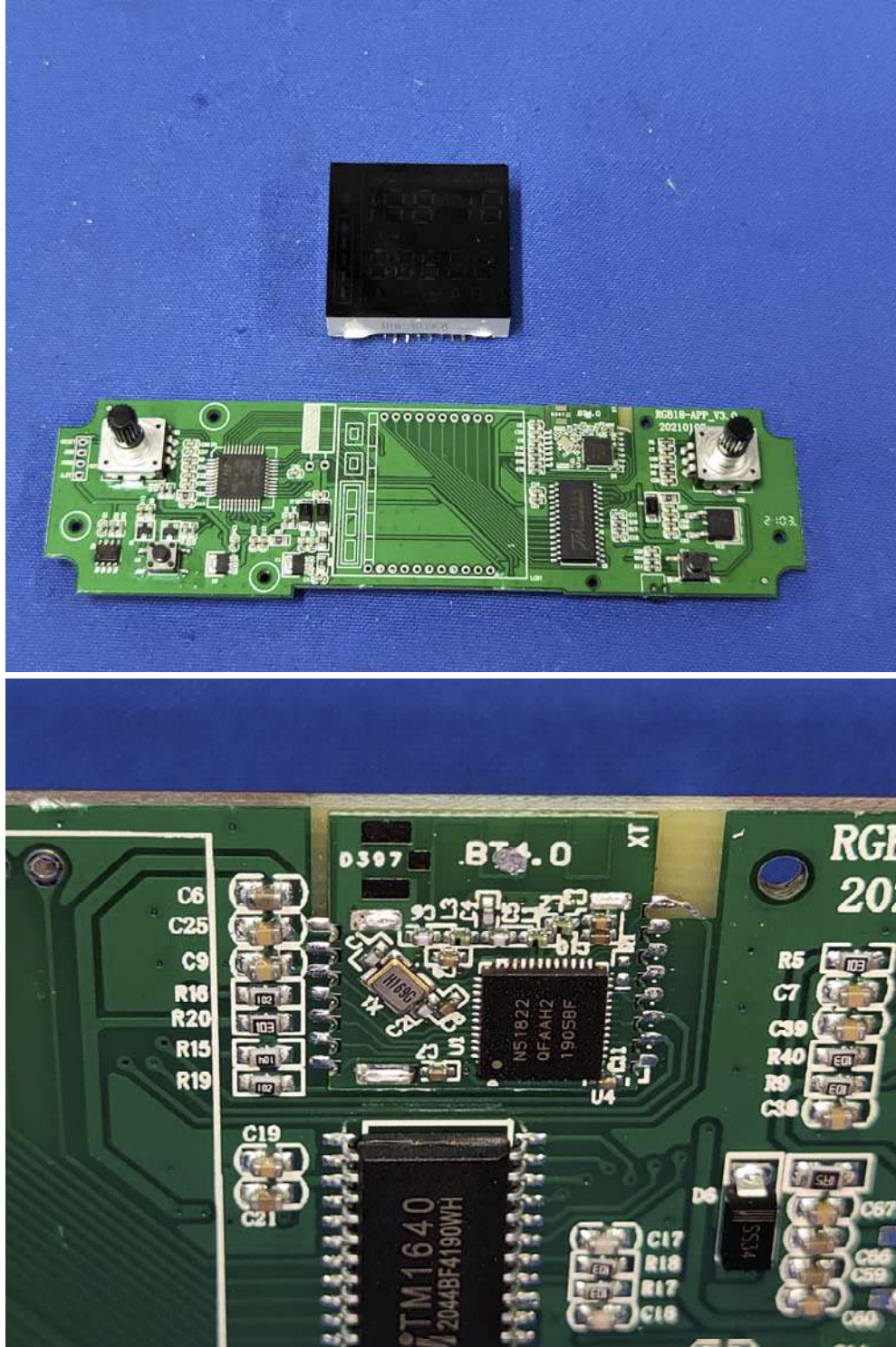
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-End of Report-

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