

# FCC Radio Test Report

## FCC ID: 2AFMD-FM25

### Original Grant

**Report No.** : TB-FCC145006  
**Applicant** : SHENZHEN SPRING TECHNOLOGY CO.,LIMITED  
**Equipment Under Test (EUT)**  
**EUT Name** : Bluetooth FM Transmitter  
**Model No.** : FM25  
**Brand Name** : N/A  
**Receipt Date** : 2015-08-05  
**Test Date** : 2015-08-05 to 2015-08-18  
**Issue Date** : 2015-08-19  
**Standards** : FCC Part 15: 2014, Subpart C(15.247)  
**Test Method** : ANSI C63.10:2013  
**Conclusions** : **PASS**

In the configuration tested, the EUT complied with the standards specified above,  
The EUT technically complies with the FCC requirements

**Test/Witness Engineer** :

WANG SU

**Approved& Authorized** :

Long Li



This report details the results of the testing carried out on one sample. The results contained in this test report do not relate to other samples of the same product. The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in the report.



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## 1. General Information about EUT

### 1.1 Client Information

**Applicant** : SHENZHEN SPRING TECHNOLOGY CO.,LIMITED  
**Address** : 5/Fablock, NO162 TongFuYu industry park KuKeng GuanLan  
LongHua new district, Shenzhen, China.  
**Manufacturer** : SHENZHEN SPRING TECHNOLOGY CO.,LIMITED  
**Address** : 5/Fablock, NO162 TongFuYu industry park KuKeng GuanLan  
LongHua new district, Shenzhen, China.

### 1.2 General Description of EUT (Equipment Under Test)

EUT Name	:	Bluetooth FM Transmitter	
Models No.	:	FM25	
Model Difference	:	N/A	
Product Description	:	Operation Frequency: Bluetooth:2402~2480MHz	
		Number of Channel:	Bluetooth:79 Channels see note (2)
	:	Max Peak Output Power:	GFSK:4.469dBm (Conducted Power)
		Antenna Gain:	0 dBi PCB Antenna
		Modulation Type:	GFSK 1Mbps(1 Mbps) π /4-DQPSK(2 Mbps) 8-DPSK(3 Mbps)
Power Supply	:	DC Voltage supplied from Car Charger.	
Power Rating	:	Car Charger Input: DC 9~26V Output: 5V	
Connecting I/O Port(S)	:	Please refer to the User's Manual	

#### Note:

- (1) For a more detailed features description, please refer to the manufacturer's specifications or the User's Manual.
- (2) This Test Report is FCC Part 15.247 for Bluetooth, and test procedure in accordance with Public Notice: DA 00-705.
- (3) Channel List:

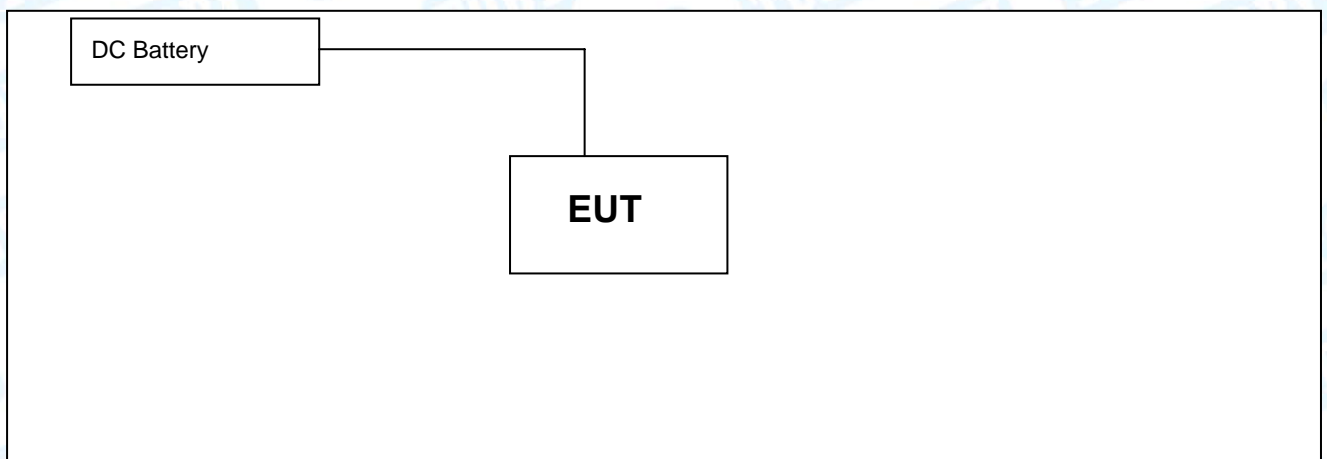
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	27	2429	54	2456
01	2403	28	2430	55	2457

02	2404	29	2431	56	2458
03	2405	30	2432	57	2459
04	2406	31	2433	58	2460
05	2407	32	2434	59	2461
06	2408	33	2435	60	2462
07	2409	34	2436	61	2463
08	2410	35	2437	62	2464
09	2411	36	2438	63	2465
10	2412	37	2439	64	2466
11	2413	38	2440	65	2467
12	2414	<b>39</b>	<b>2441</b>	66	2468
13	2415	40	2442	67	2469
14	2416	41	2443	68	2470
15	2417	42	2444	69	2471
16	2418	43	2445	70	2472
17	2419	44	2446	71	2473
18	2420	45	2447	72	2474
19	2421	46	2448	73	2475
20	2422	47	2449	74	2476
21	2423	48	2450	75	2477
22	2424	49	2451	76	2478
23	2425	50	2452	77	2479
24	2426	51	2453	<b>78</b>	<b>2480</b>
25	2427	52	2454		
26	2428	53	2455		

(4) The Antenna information about the equipment is provided by the applicant.

### 1.3 Block Diagram Showing the Configuration of System Tested

#### TX Mode





## 1.4 Description of Support Units

Equipment Information				
Name	Model	FCC ID/DOC	Manufacturer	Used “√”
Cable Information				
Number	Shielded Type	Ferrite Core	Length	Note

## 1.5 Description of Test Mode

To investigate the maximum EMI emission characteristics generates from EUT, the test system was pre-scanning tested base on the consideration of following EUT operation mode or test configuration mode which possible have effect on EMI emission level. Each of these EUT operation mode(s) or test configuration mode(s) mentioned follow was evaluated respectively.

For Conducted Test	
Final Test Mode	Description
Mode 1	DC Charging with TX GFSK Mode

For Radiated Test	
Final Test Mode	Description
Mode 1	DC Charging with TX GFSK Mode
Mode 2	TX Mode(GFSK) Channel 00/39/78
Mode 3	TX Mode( $\pi/4$ -DQPSK) Channel 00/39/78
Mode 4	TX Mode(8-DPSK) Channel 00/39/78
Mode 5	Hopping Mode(GFSK)
Mode 6	Hopping Mode( $\pi/4$ -DQPSK)
Mode 7	Hopping Mode(8-DPSK)

### Note:

- (1) For all test, we have verified the construction and function in typical operation. And all the test modes were carried out with the EUT in transmitting operation in maximum power with all kinds of data rate. We have pretested all the test mode above.  
According to ANSI C63.10 standards, the measurements are performed at the highest,

middle, lowest available channels, and the worst case data rate as follows:

TX Mode: GFSK (1 Mbps)

TX Mode: 8-DPSK (3 Mbps)

- (2) The EUT is considered a portable unit; it was pre-tested on the positioned of each 3 axis, X-plane, Y-plane and Z-plane. The worst case was found positioned on X-plane as the normal use. Therefore only the test data of this X-plane was used for radiated emission measurement test.

## 1.6 Description of Test Software Setting

During testing channel& Power controlling software provided by the customer was used to control the operating channel as well as the output power level. The RF output power selection is for the setting of RF output power expected by the customer and is going to be fixed on the firmware of the final end product power parameters of Bluetooth mode.

Test Software Version	N/A		
	Frequency	2402 MHz	2441MHz
GFSK	DEF	DEF	DEF
$\pi/4$ -DQPSK	DEF	DEF	DEF
8-DPSK	DEF	DEF	DEF



## 1.7 Measurement Uncertainty

The reported uncertainty of measurement  $y \pm U$ , where expanded uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

Test Item	Parameters	Expanded Uncertainty ( $U_{Lab}$ )
Conducted Emission	Level Accuracy: 9kHz~150kHz 150kHz to 30MHz	$\pm 3.42$ dB $\pm 3.42$ dB
Radiated Emission	Level Accuracy: 9kHz to 30 MHz	$\pm 4.60$ dB
Radiated Emission	Level Accuracy: 30MHz to 1000 MHz	$\pm 4.40$ dB
Radiated Emission	Level Accuracy: Above 1000MHz	$\pm 4.20$ dB

## 1.8 Test Facility

The testing report were performed by the Shenzhen Toby Technology Co., Ltd., in their facilities located at 1A/F., Bldg.6, Yusheng Industrial Zone, The National Road No.107 Xixiang Section 467, Xixiang, Bao'an, Shenzhen, Guangdong, China. At the time of testing, the following bodies accredited the Laboratory:

### **CNAS (L5813)**

The Laboratory has been accredited by CNAS to ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories for the competence in the field of testing. And the Registration No.: CNAS L5813.

### **FCC List No.: (811562)**

The Laboratory is listed in the United States of American Federal Communications Commission (FCC), and the registration number is 811562.

### **IC Registration No.: (11950A-1)**

The Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing. The site registration: Site# 11950A-1.

May 22, 2014 certificated by TUV Rheinland(China) Co., Ltd. with TUV certificate No.: UA 50282953 0001 and report No.: 17026822 002. The certificate is valid until the next scheduled audit or up to 18 months, at the discretion of TUV Rhineland.



## 2. Test Summary

FCC Part 15 Subpart C(15.247)/ RSS 247 Issue 1				
Standard Section		Test Item	Judgment	Remark
FCC	IC			
15.203		Antenna Requirement	PASS	N/A
15.207	RSS-GEN 7.2.2	Conducted Emission	PASS	N/A
15.205	RSS-Gen 7.2.3	Restricted Bands	PASS	N/A
15.247(a)(1)	RSS 247 5.1 (2)	Hopping Channel Separation	PASS	N/A
15.247(a)(1)	RSS 247 5.1 (4)	Dwell Time	PASS	N/A
15.247(b)(1)	RSS 247 5.4 (2)	Peak Output Power	PASS	N/A
15.247(b)(1)	RSS 247 5.1 (4)	Number of Hopping Frequency	PASS	N/A
15.247(c)	RSS 247 5.5	Radiated Spurious Emission	PASS	N/A
15.247(a)	RSS 247 5.1 (1)	99% Occupied Bandwidth & 20dB Bandwidth	PASS	99%OBW GFSK:834.9934kHz $\pi$ /4-DQPSK: 1153.60kHz 8-DPSK: 1135.80kHz
<b>Note:</b> N/A is an abbreviation for Not Applicable.				



### 3. Test Equipment

Conducted Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
EMI Test Receiver	Rohde & Schwarz	ESCI	100321	Aug. 07, 2015	Aug. 06, 2016
RF Switching Unit	Compliance Direction Systems Inc	RSU-A4	34403	Aug. 07, 2015	Aug. 06, 2016
AMN	SCHWARZBECK	NNBL 8226-2	8226-2/164	Aug. 07, 2015	Aug. 06, 2016
LISN	Rohde & Schwarz	ENV216	101131	Aug. 07, 2015	Aug. 06, 2016
Radiation Emission Test					
Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Cal. Due Date
Spectrum Analyzer	Agilent	E4407B	MY45106456	Sep. 01, 2014	Aug. 31, 2015
EMI Test Receiver	Rohde & Schwarz	ESCI	100010/007	Aug. 07, 2015	Aug. 06, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117537	Mar. 28, 2015	Mar. 27, 2016
Bilog Antenna	ETS-LINDGREN	3142E	00117542	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143207	Mar. 28, 2015	Mar. 27, 2016
Horn Antenna	ETS-LINDGREN	3117	00143209	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	Sonoma	310N	185903	Mar. 28, 2015	Mar. 27, 2016
Pre-amplifier	HP	8447B	3008A00849	Mar. 28, 2015	Mar. 27, 2016
Cable	HUBER+SUHNER	100	SUCOFLEX	Mar. 28, 2015	Mar. 27, 2016
Positioning Controller	ETS-LINDGREN	2090	N/A	N/A	N/A



## 4. Conducted Emission Test

### 4.1 Test Standard and Limit

4.1.1 Test Standard  
FCC Part 15.207

4.1.2 Test Limit

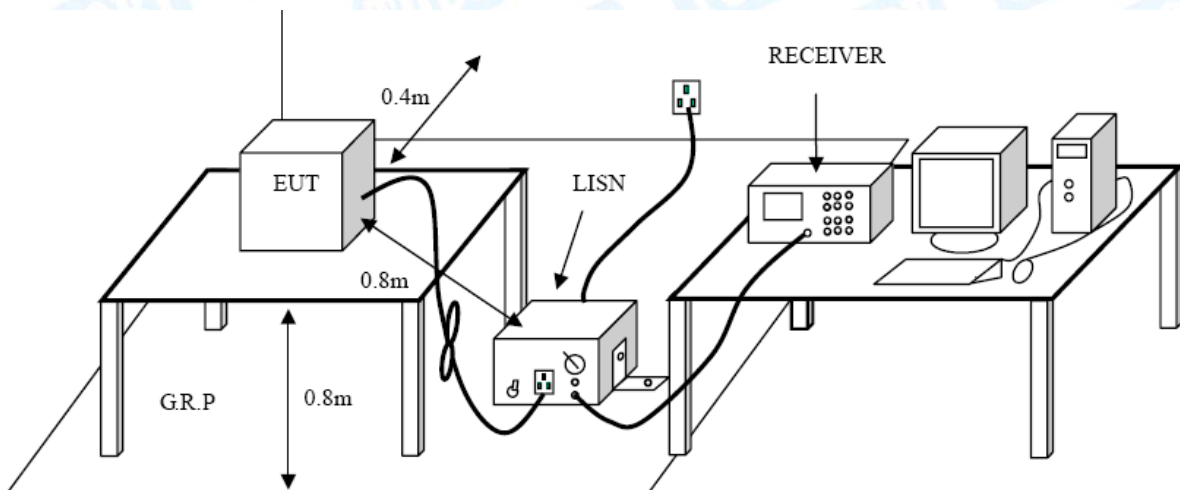
**Conducted Emission Test Limit**

Frequency	Maximum RF Line Voltage (dB $\mu$ V)	
	Quasi-peak Level	Average Level
150kHz~500kHz	66 ~ 56 *	56 ~ 46 *
500kHz~5MHz	56	46
5MHz~30MHz	60	50

Notes:

- (1) \*Decreasing linearly with logarithm of the frequency.
- (2) The lower limit shall apply at the transition frequencies.
- (3) The limit decrease in line with the logarithm of the frequency in the range of 0.15 to 0.50MHz.

### 4.2 Test Setup



### 4.3 Test Procedure

The EUT was placed 0.8 meters from the horizontal ground plane with EUT being connected to the power mains through a line impedance stabilization network (LISN). All other support equipments powered from additional LISN(s). The LISN provide 50 Ohm/ 50uH of coupling impedance for the measuring instrument.

Interconnecting cables that hang closer than 40 cm to the ground plane shall be folded back and forth in the center forming a bundle 30 to 40 cm long.



I/O cables that are not connected to a peripheral shall be bundled in the center. The end of the cable may be terminated, if required, using the correct terminating impedance. The overall length shall not exceed 1 m.

LISN at least 80 cm from nearest part of EUT chassis

The bandwidth of EMI test receiver is set at 9kHz, and the test frequency band is from 0.15MHz to 30MHz.

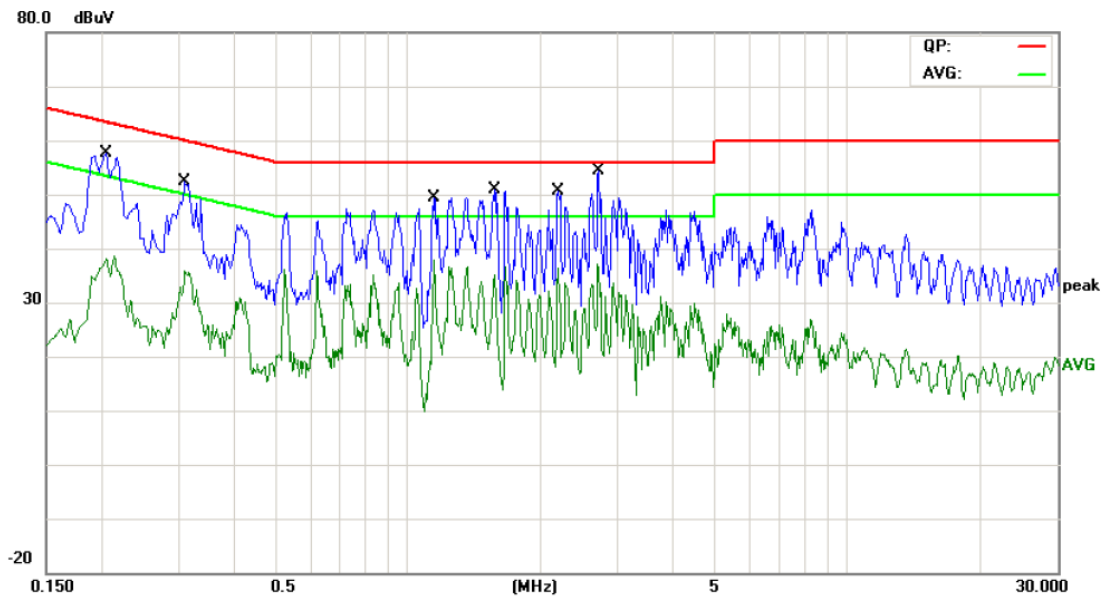
#### 4.4 EUT Operating Mode

Please refer to the description of test mode.

#### 4.5 Test Data

Please see the next page.

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 9V		
<b>Terminal:</b>	Line		
<b>Test Mode:</b>	DC Charging with TX GFSK Mode 2402 MHz		
<b>Remark:</b>	Only worse case is reported		

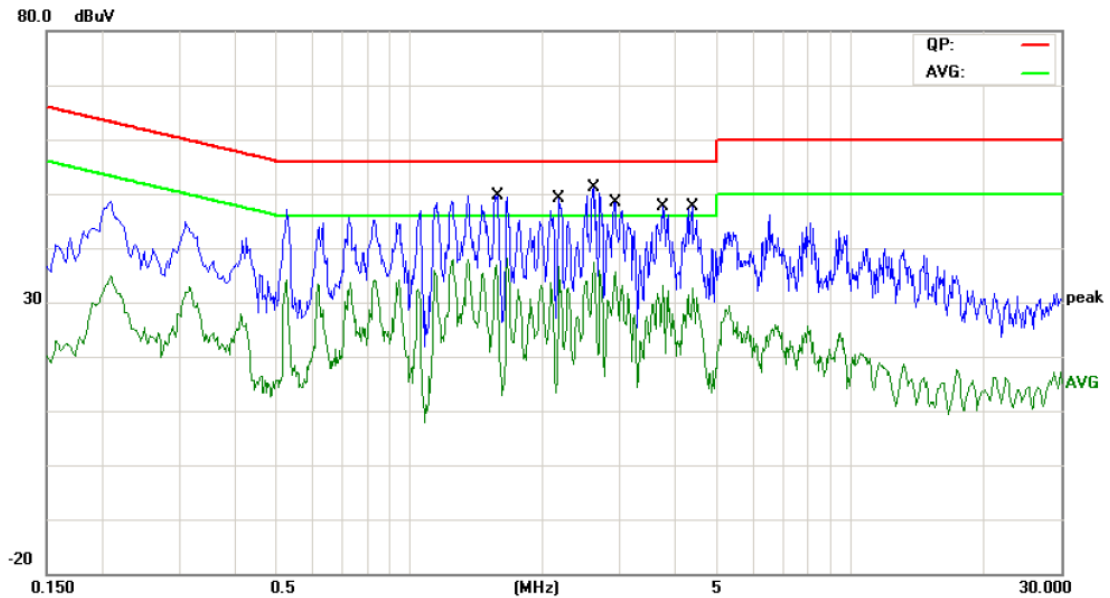


No. Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1	0.2060	36.59	10.02	46.61	63.36	-16.75	QP
2	0.2060	25.32	10.02	35.34	53.36	-18.02	AVG
3	0.3100	34.42	10.02	44.44	59.97	-15.53	QP
4	0.3100	23.70	10.02	33.72	49.97	-16.25	AVG
5	1.1420	37.38	10.06	47.44	56.00	-8.56	QP
6	1.1420	25.63	10.06	35.69	46.00	-10.31	AVG
7 *	1.5700	38.89	10.06	48.95	56.00	-7.05	QP
8	1.5700	24.18	10.06	34.24	46.00	-11.76	AVG
9	2.1900	38.64	10.05	48.69	56.00	-7.31	QP
10	2.1900	23.70	10.05	33.75	46.00	-12.25	AVG
11	2.7180	37.08	10.04	47.12	56.00	-8.88	QP
12	2.7180	20.78	10.04	30.82	46.00	-15.18	AVG

Emission Level= Read Level+ Correct Factor



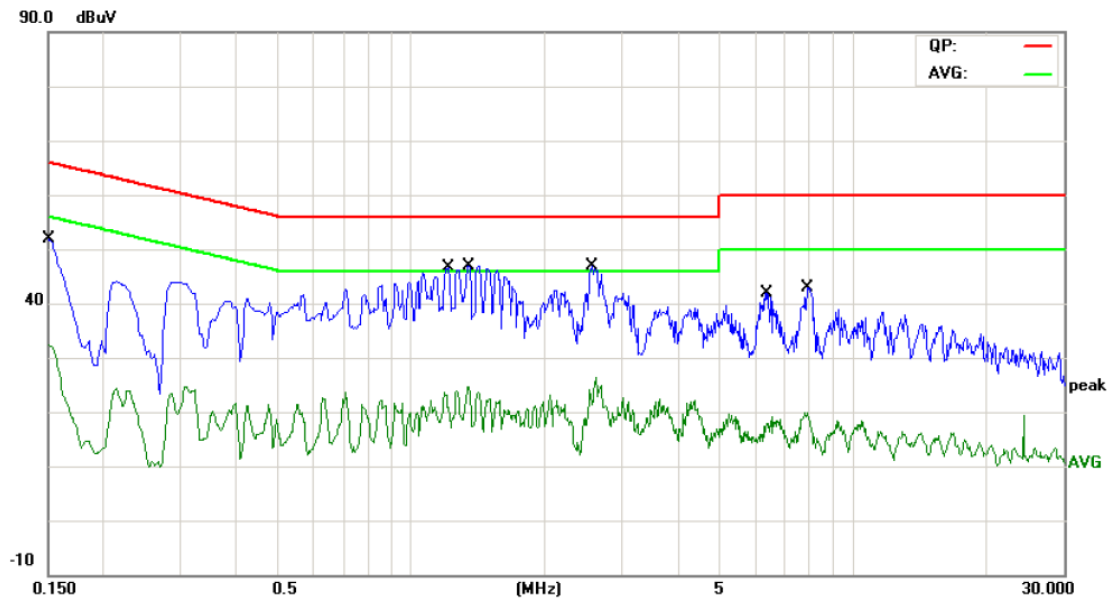
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 9V		
<b>Terminal:</b>	Neutral		
<b>Test Mode:</b>	DC Charging with TX GFSK Mode 2402 MHz		
<b>Remark:</b>	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		1.5859	30.06	10.10	40.16	56.00	-15.84	QP
2		1.5859	15.06	10.10	25.16	46.00	-20.84	AVG
3		2.1860	35.46	10.06	45.52	56.00	-10.48	QP
4		2.1860	22.83	10.06	32.89	46.00	-13.11	AVG
5	*	2.6099	38.51	10.06	48.57	56.00	-7.43	QP
6		2.6099	25.66	10.06	35.72	46.00	-10.28	AVG
7		2.9219	33.25	10.06	43.31	56.00	-12.69	QP
8		2.9219	24.09	10.06	34.15	46.00	-11.85	AVG
9		3.7540	33.86	10.06	43.92	56.00	-12.08	QP
10		3.7540	18.71	10.06	28.77	46.00	-17.23	AVG
11		4.3659	33.72	10.06	43.78	56.00	-12.22	QP
12		4.3659	19.74	10.06	29.80	46.00	-16.20	AVG

Emission Level= Read Level+ Correct Factor

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Terminal:</b>	Line		
<b>Test Mode:</b>	DC Charging with TX GFSK Mode 2402 MHz		
<b>Remark:</b>	Only worse case is reported		

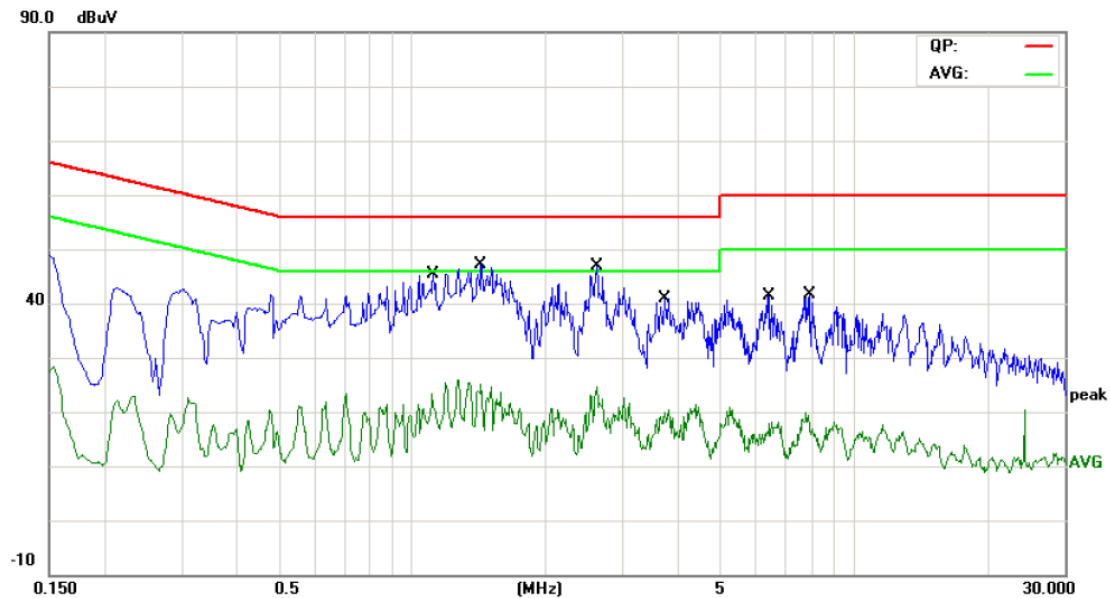


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		0.1500	37.98	10.12	48.10	65.99	-17.89	QP
2		0.1500	19.68	10.12	29.80	55.99	-26.19	AVG
3		1.2100	31.85	10.14	41.99	56.00	-14.01	QP
4		1.2100	9.70	10.14	19.84	46.00	-26.16	AVG
5	*	1.3460	32.04	10.13	42.17	56.00	-13.83	QP
6		1.3460	13.76	10.13	23.89	46.00	-22.11	AVG
7		2.5660	29.32	10.06	39.38	56.00	-16.62	QP
8		2.5660	10.64	10.06	20.70	46.00	-25.30	AVG
9		6.3540	23.74	10.06	33.80	60.00	-26.20	QP
10		6.3540	7.10	10.06	17.16	50.00	-32.84	AVG
11		7.8540	21.69	10.09	31.78	60.00	-28.22	QP
12		7.8540	8.32	10.09	18.41	50.00	-31.59	AVG

Emission Level= Read Level+ Correct Factor



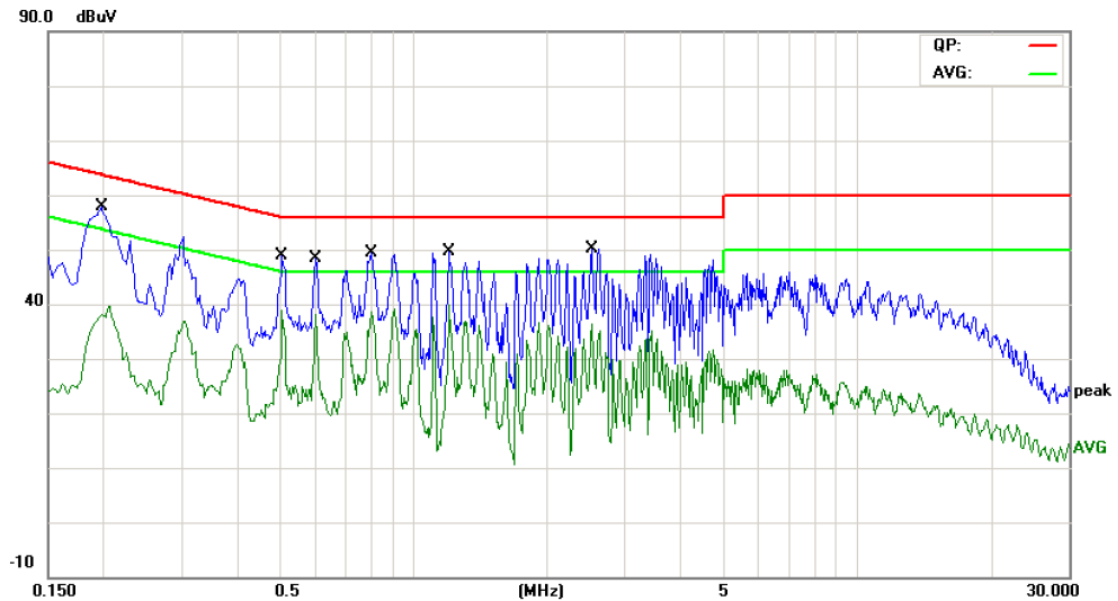
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Terminal:</b>	Neutral		
<b>Test Mode:</b>	DC Charging with TX GFSK Mode 2402 MHz		
<b>Remark:</b>	Only worse case is reported		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector
1		1.1140	30.18	10.06	40.24	56.00	-15.76	QP
2		1.1140	11.05	10.06	21.11	46.00	-24.89	AVG
3	*	1.4299	31.27	10.06	41.33	56.00	-14.67	QP
4		1.4299	14.29	10.06	24.35	46.00	-21.65	AVG
5		2.6180	30.63	10.04	40.67	56.00	-15.33	QP
6		2.6180	14.10	10.04	24.14	46.00	-21.86	AVG
7		3.7340	25.05	10.00	35.05	56.00	-20.95	QP
8		3.7340	9.65	10.00	19.65	46.00	-26.35	AVG
9		6.4380	21.86	10.03	31.89	60.00	-28.11	QP
10		6.4380	6.90	10.03	16.93	50.00	-33.07	AVG
11		7.9460	20.80	10.09	30.89	60.00	-29.11	QP
12		7.9460	6.61	10.09	16.70	50.00	-33.30	AVG

Emission Level= Read Level+ Correct Factor

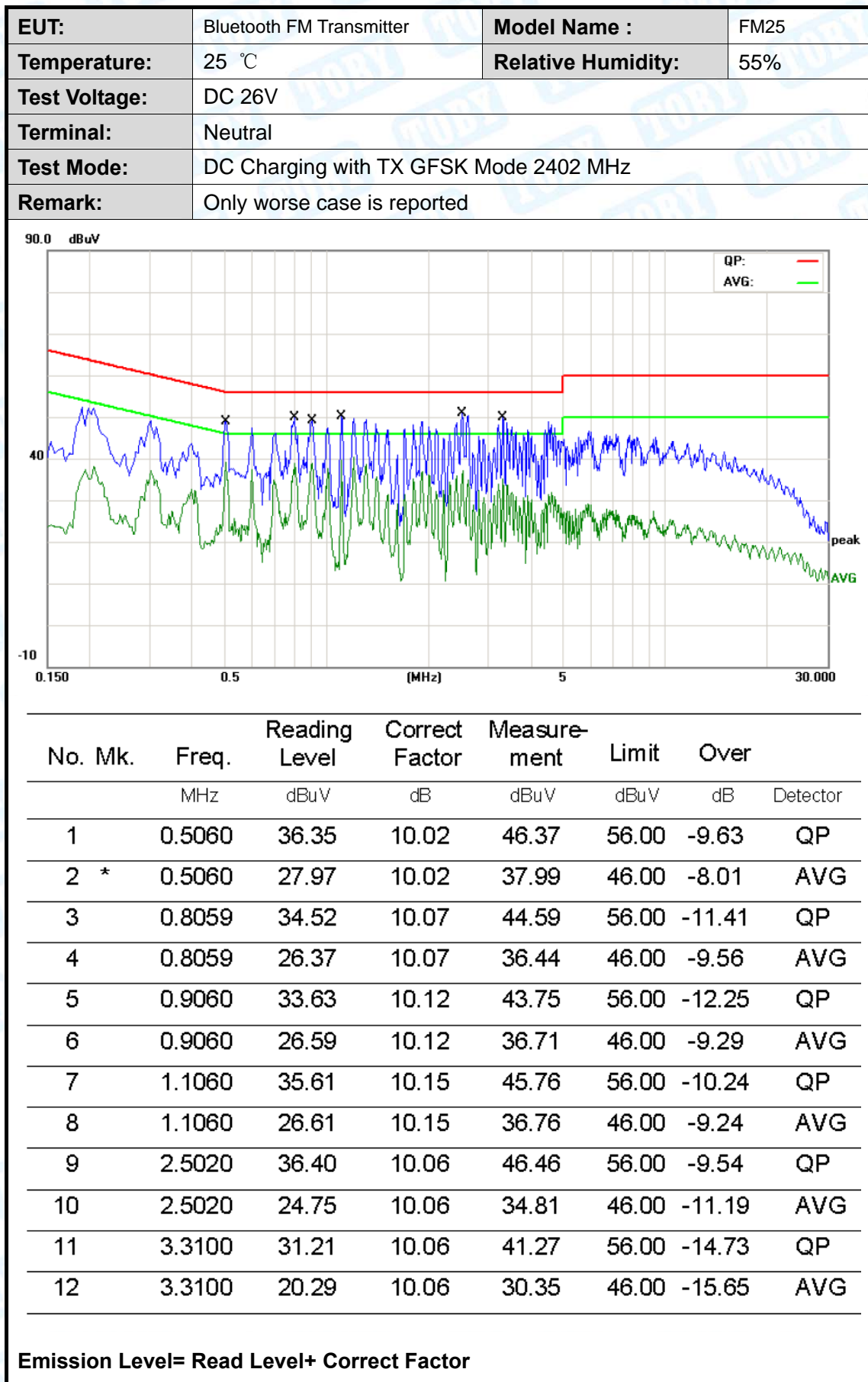
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 26V		
<b>Terminal:</b>	Line		
<b>Test Mode:</b>	DC Charging with TX GFSK Mode 2402 MHz		
<b>Remark:</b>	Only worse case is reported		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB	Measure- ment dBuV	Limit dBuV	Over dB	Detector
1		0.1980	38.92	10.02	48.94	63.69	-14.75	QP
2		0.1980	27.60	10.02	37.62	53.69	-16.07	AVG
3		0.5060	37.11	10.02	47.13	56.00	-8.87	QP
4		0.5060	27.94	10.02	37.96	46.00	-8.04	AVG
5		0.6020	35.42	10.07	45.49	56.00	-10.51	QP
6		0.6020	27.12	10.07	37.19	46.00	-8.81	AVG
7		0.8020	36.79	10.10	46.89	56.00	-9.11	QP
8		0.8020	28.23	10.10	38.33	46.00	-7.67	AVG
9		1.2020	36.68	10.06	46.74	56.00	-9.26	QP
10	*	1.2020	29.20	10.06	39.26	46.00	-6.74	AVG
11		2.5220	33.76	10.04	43.80	56.00	-12.20	QP
12		2.5220	25.43	10.04	35.47	46.00	-10.53	AVG

Emission Level= Read Level+ Correct Factor





## 5. Radiated Emission Test

### 5.1 Test Standard and Limit

#### 5.1.1 Test Standard

FCC Part 15.209

#### 5.1.2 Test Limit

#### Radiated Emission Limit (9 kHz~1000MHz)

Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

#### Radiated Emission Limit (Above 1000MHz)

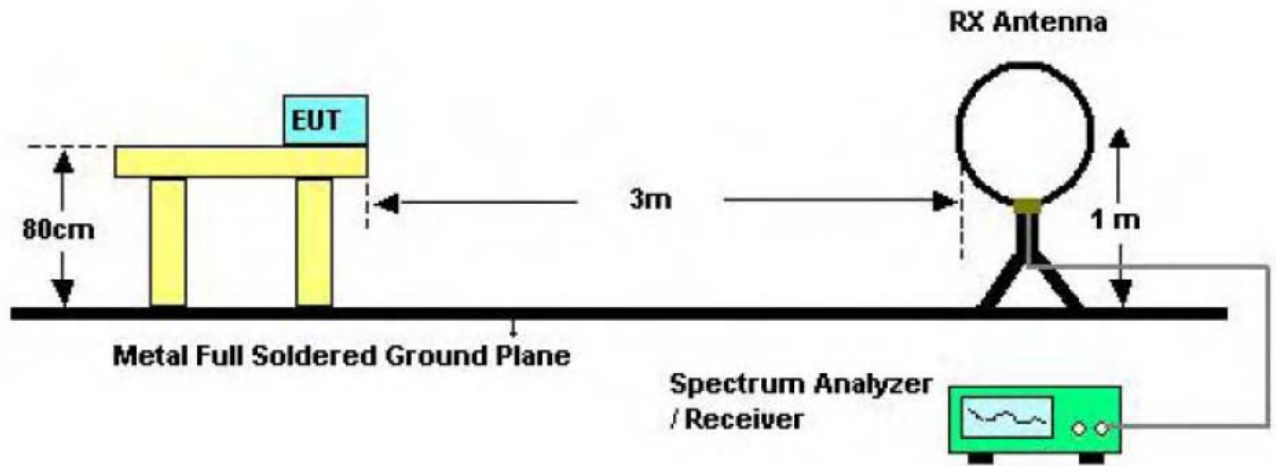
Frequency (MHz)	Class B (dBuV/m)(at 3m)	
	Peak	Average
Above 1000	74	54

**Note:**

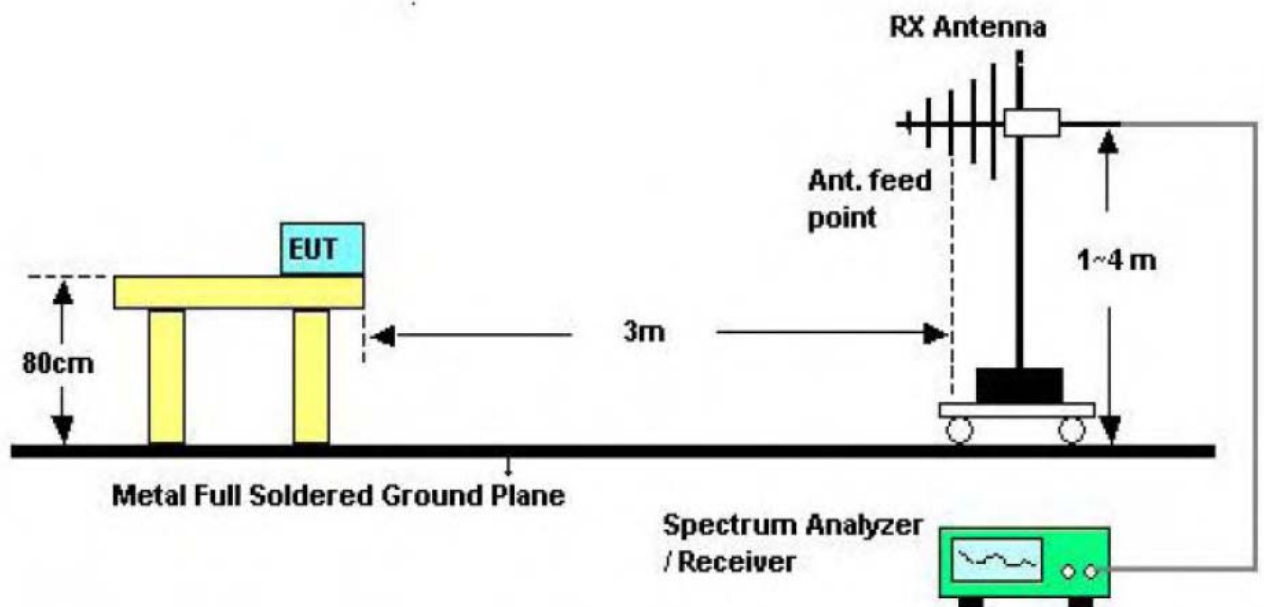
- (1) The tighter limit applies at the band edges.
- (2) Emission Level (dBuV/m)=20log Emission Level (uV/m)



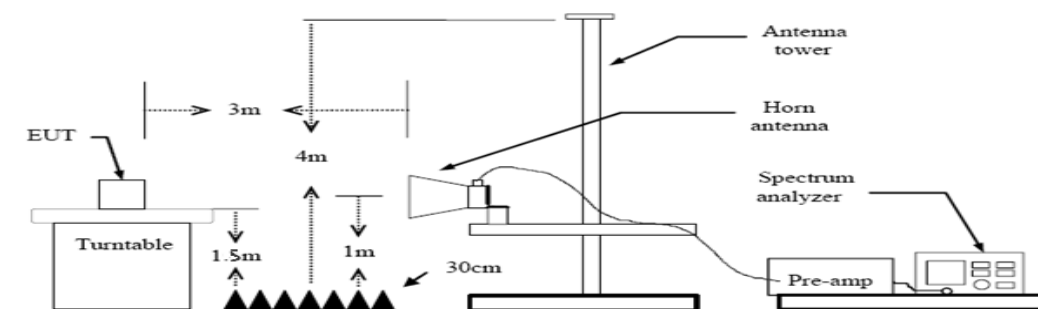
## 5.2 Test Setup



Bellow 30MHz Test Setup



Bellow 1000MHz Test Setup



**Above 1GHz Test Setup**

### 5.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz. The EUT was placed on a rotating 0.8m high above the ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.
- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

### 5.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power in TX mode.

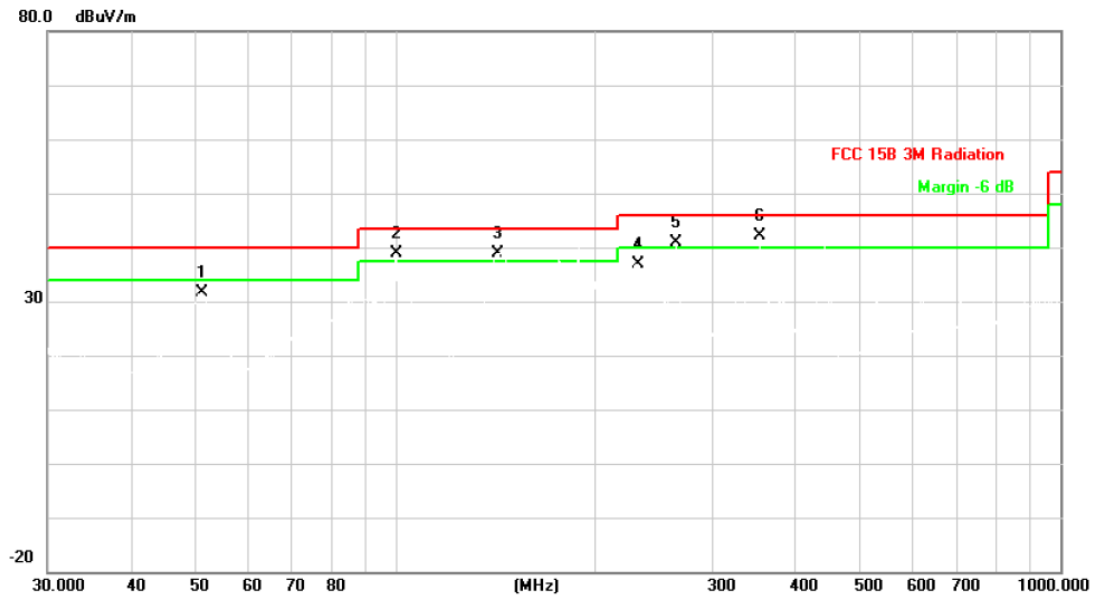
### 5.5 Test Data

Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.

Test data please refer the following pages.



<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX GFSK Mode 2402MHz		
<b>Remark:</b>	Only worse case is reported		

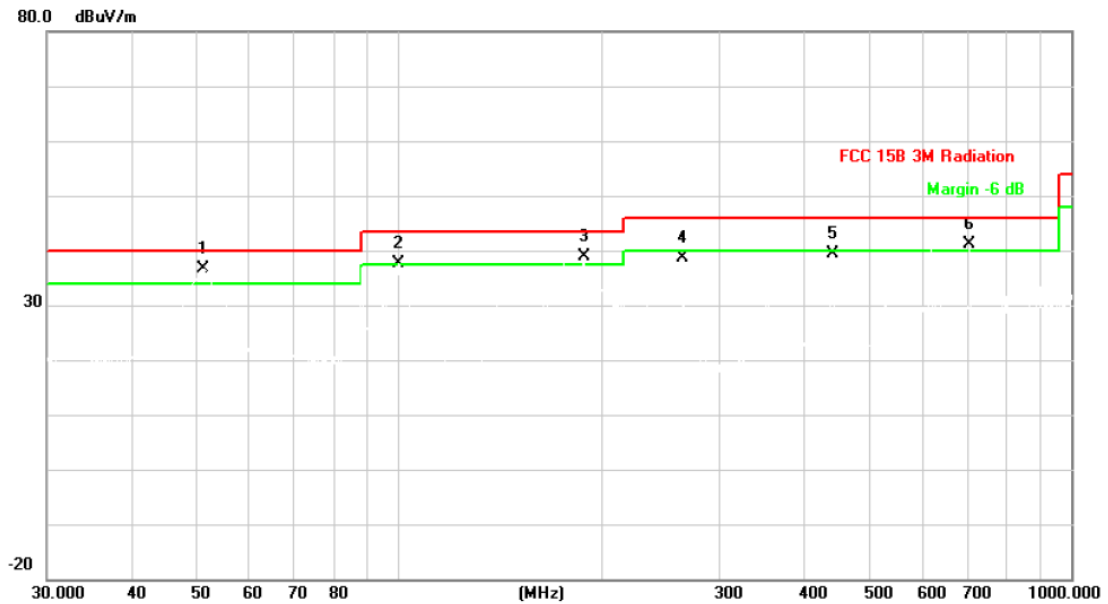


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		51.3004	55.94	-24.41	31.53	40.00	-8.47	peak
2	!	100.2286	60.63	-21.82	38.81	43.50	-4.69	peak
3	!	142.8242	60.72	-21.76	38.96	43.50	-4.54	peak
4		231.7178	55.85	-18.99	36.86	46.00	-9.14	peak
5	!	264.7456	58.60	-17.80	40.80	46.00	-5.20	peak
6	*	352.9433	56.60	-14.59	42.01	46.00	-3.99	peak

\*:Maximum data x:Over limit !:over margin

**Emission Level= Read Level+ Correct Factor**

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX GFSK Mode 2402MHz		
<b>Remark:</b>	Only worse case is reported		



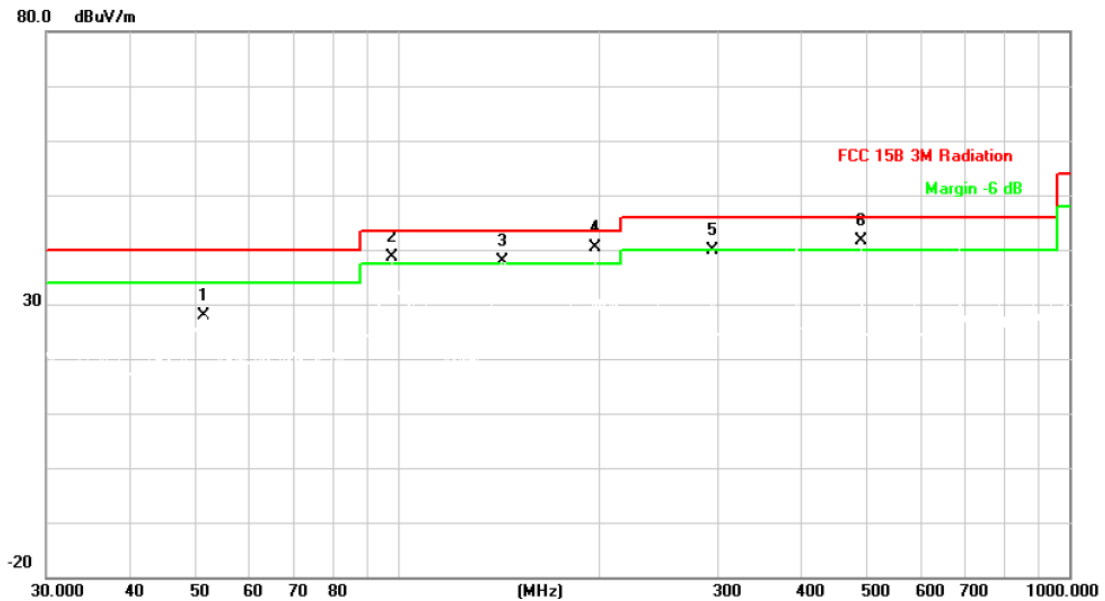
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	51.3004	61.15	-24.41	36.74	40.00	-3.26	peak
2	!	99.8777	59.57	-21.83	37.74	43.50	-5.76	peak
3	!	188.4123	59.70	-20.85	38.85	43.50	-4.65	peak
4		264.7456	56.41	-17.80	38.61	46.00	-7.39	peak
5		441.7425	52.10	-12.61	39.49	46.00	-6.51	peak
6	!	706.6997	48.14	-6.94	41.20	46.00	-4.80	peak

\*:Maximum data x:Over limit !:over margin

**Emission Level= Read Level+ Correct Factor**



<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX GFSK Mode 2441MHz		
<b>Remark:</b>	Only worse case is reported		

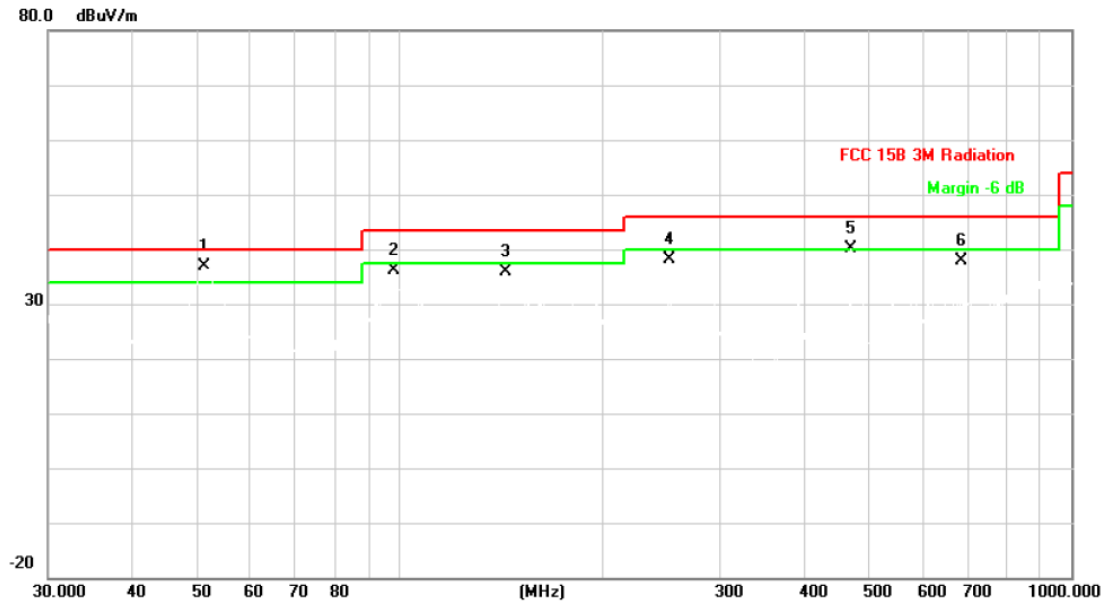


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		51.4806	52.37	-24.41	27.96	40.00	-12.04	peak
2	!	98.1419	60.52	-21.98	38.54	43.50	-4.96	peak
3	!	143.3260	59.51	-21.71	37.80	43.50	-5.70	peak
4	*	196.5098	60.98	-20.57	40.41	43.50	-3.09	peak
5		294.1136	57.18	-17.20	39.98	46.00	-6.02	peak
6	!	490.7447	53.35	-11.66	41.69	46.00	-4.31	peak

\*:Maximum data x:Over limit !:over margin

**Emission Level= Read Level+ Correct Factor**

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX GFSK Mode 2441MHz		
<b>Remark:</b>	Only worse case is reported		



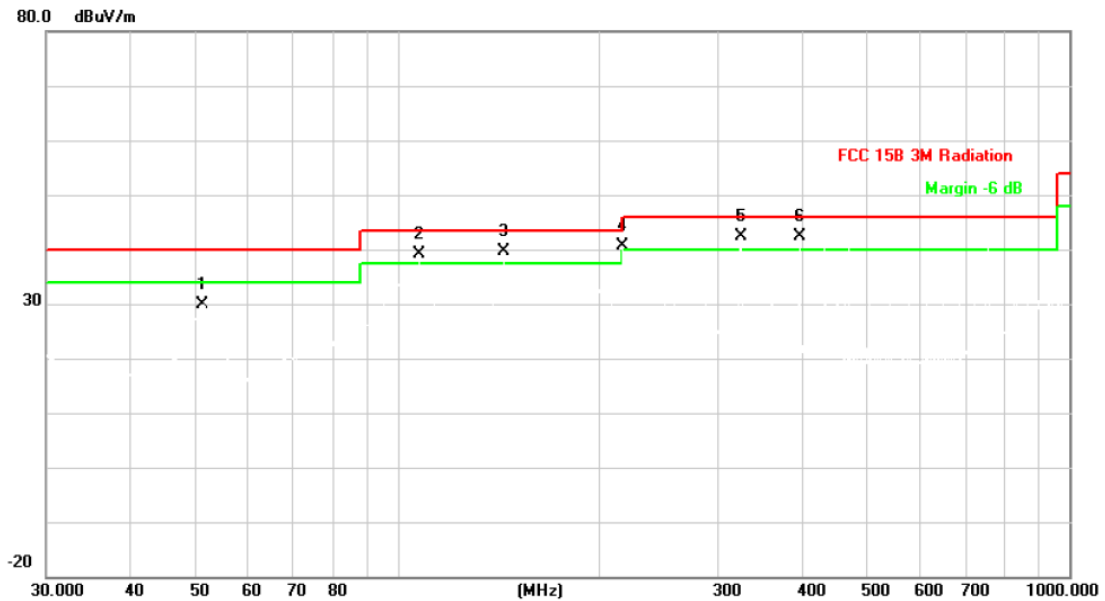
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	51.3004	61.34	-24.41	36.93	40.00	-3.07	peak
2		98.1419	58.04	-21.98	36.06	43.50	-7.44	peak
3		143.8294	57.63	-21.67	35.96	43.50	-7.54	peak
4		252.0627	56.27	-18.07	38.20	46.00	-7.80	peak
5	!	468.8761	51.88	-11.81	40.07	46.00	-5.93	peak
6		687.1507	44.98	-7.22	37.76	46.00	-8.24	peak

\*:Maximum data x:Over limit !:over margin

**Emission Level= Read Level+ Correct Factor**



<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX GFSK Mode 2480MHz		
<b>Remark:</b>	Only worse case is reported		

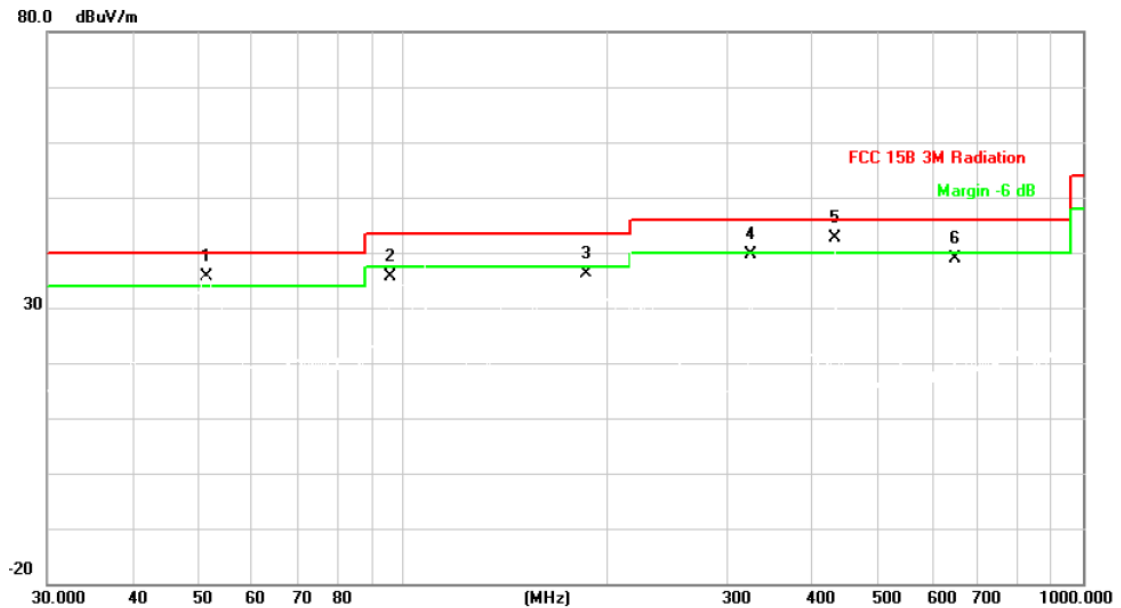


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		51.1208	54.37	-24.41	29.96	40.00	-10.04	peak
2	!	107.8876	61.07	-21.86	39.21	43.50	-4.29	peak
3	!	143.8294	61.20	-21.67	39.53	43.50	-3.97	peak
4	!	216.0240	60.32	-19.70	40.62	46.00	-5.38	peak
5	!	324.4560	58.43	-16.16	42.27	46.00	-3.73	peak
6	*	396.2414	55.47	-13.05	42.42	46.00	-3.58	peak

\*:Maximum data x:Over limit !:over margin

**Emission Level= Read Level+ Correct Factor**

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX GFSK Mode 2480MHz		
<b>Remark:</b>	Only worse case is reported		



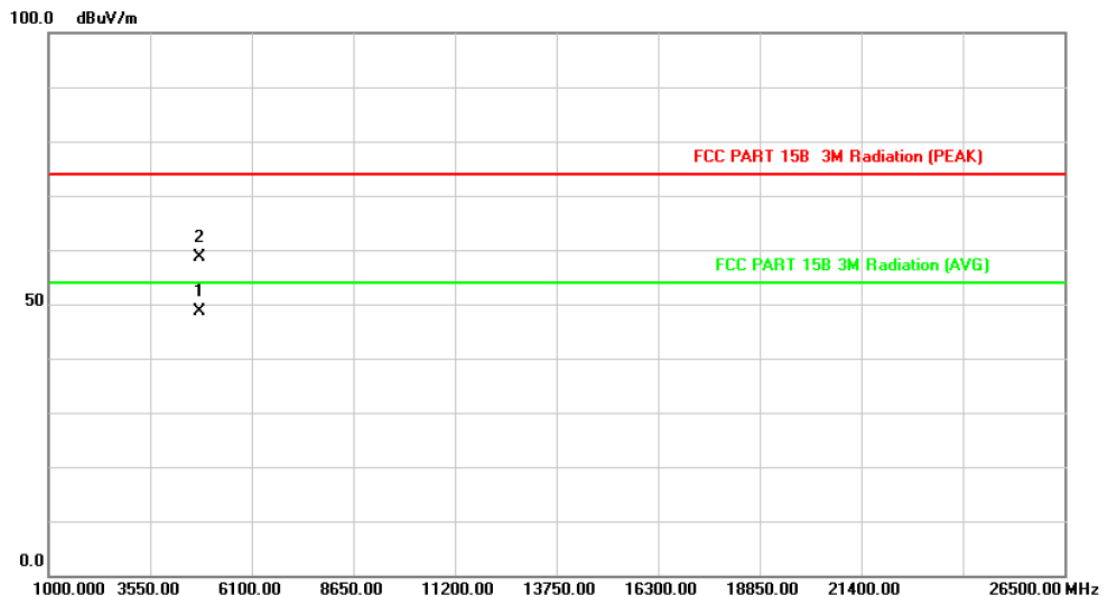
No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	!	51.4806	60.09	-24.41	35.68	40.00	-4.32	peak
2		95.7622	57.75	-22.19	35.56	43.50	-7.94	peak
3		186.4408	56.87	-20.79	36.08	43.50	-7.42	peak
4		324.4560	55.82	-16.16	39.66	46.00	-6.34	peak
5	*	432.5457	55.46	-12.78	42.68	46.00	-3.32	peak
6		647.3855	47.62	-8.71	38.91	46.00	-7.09	peak

\*:Maximum data x:Over limit !:over margin

**Emission Level= Read Level+ Correct Factor**



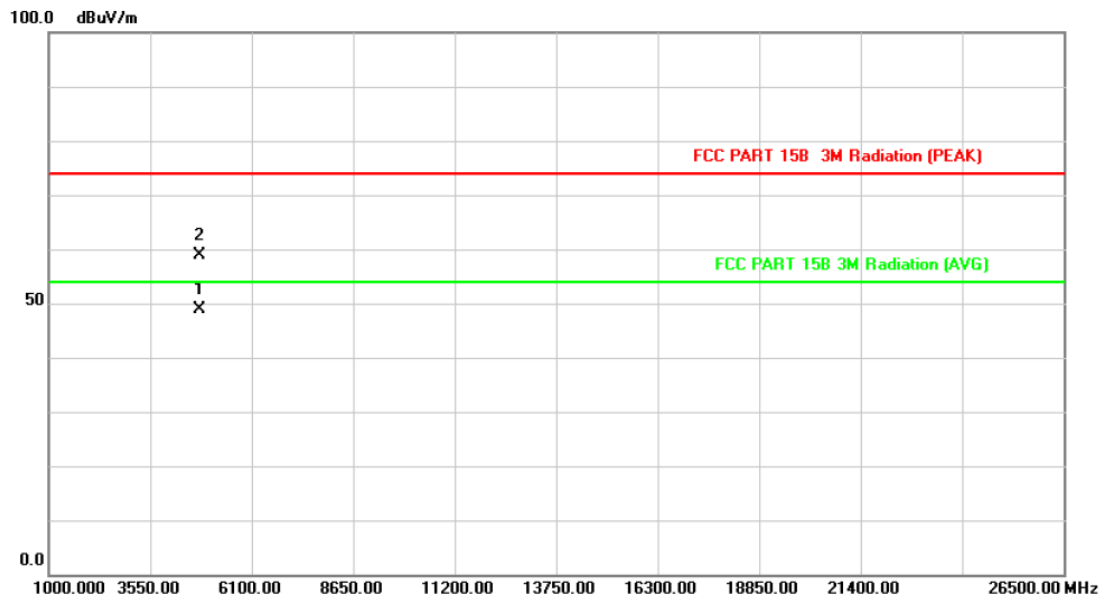
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX GFSK Mode 2402MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.684	35.17	13.44	48.61	54.00	-5.39	AVG
2		4803.847	45.23	13.44	58.67	74.00	-15.33	peak

Emission Level= Read Level+ Correct Factor

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX GFSK Mode 2402MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		

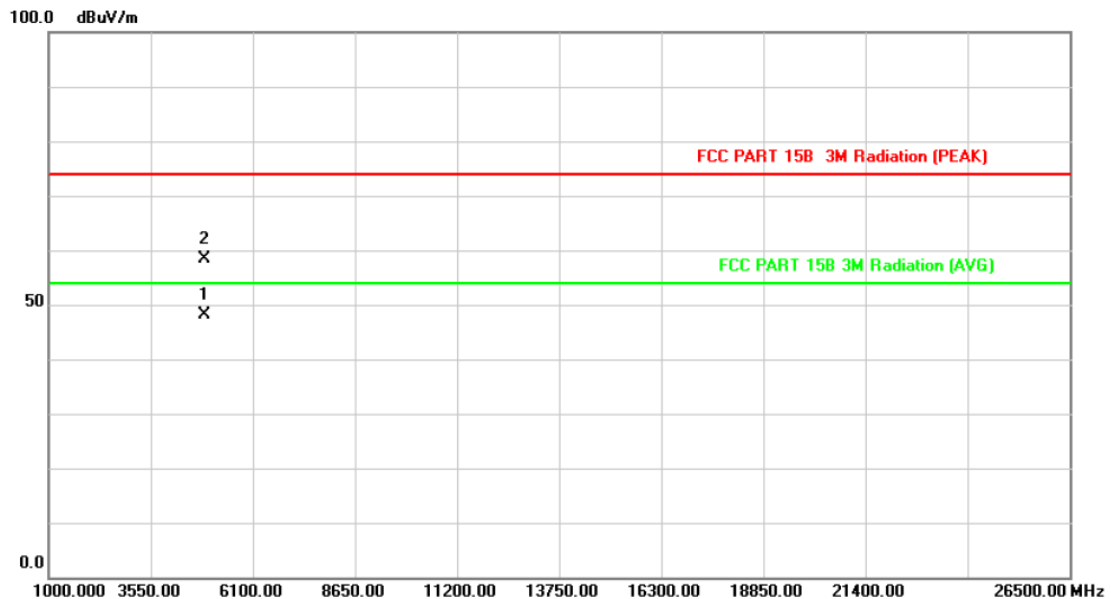


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.324	35.42	13.44	48.86	54.00	-5.14	AVG
2		4804.357	45.45	13.44	58.89	74.00	-15.11	peak

Emission Level= Read Level+ Correct Factor



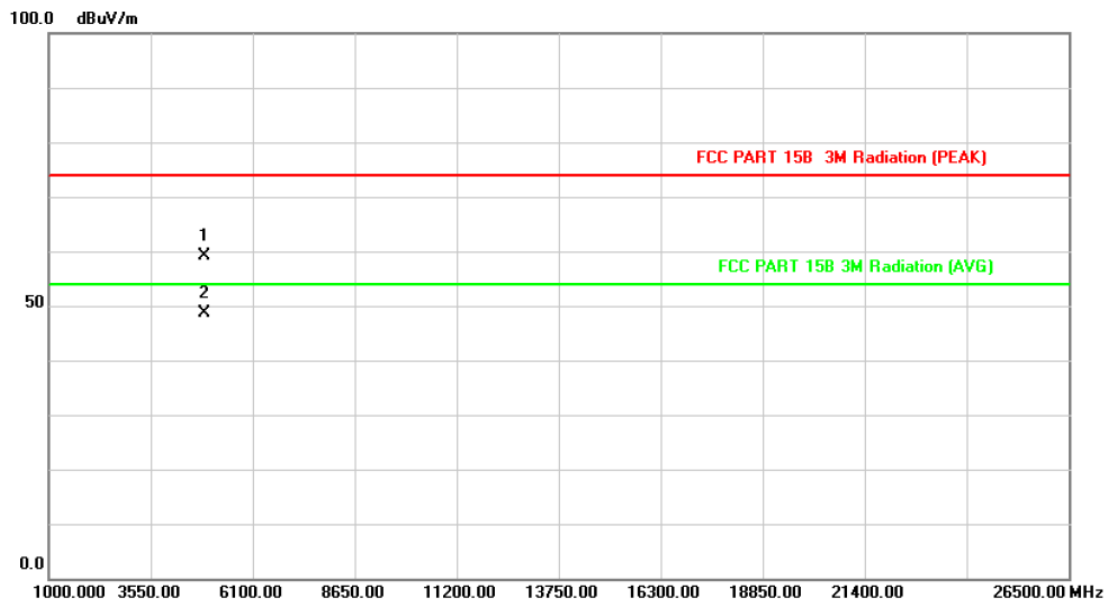
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX GFSK Mode 2441MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4881.371	34.16	13.90	48.06	54.00	-5.94	AVG
2		4882.368	44.41	13.90	58.31	74.00	-15.69	peak

Emission Level= Read Level+ Correct Factor

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX GFSK Mode 2441MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		

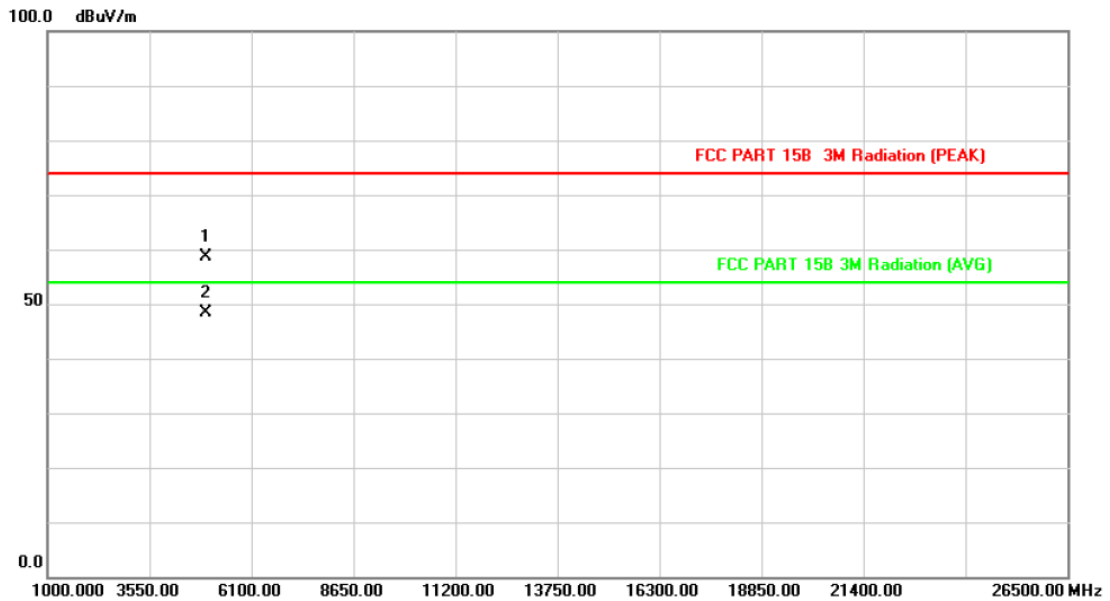


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4881.387	45.20	13.90	59.10	74.00	-14.90	peak
2	*	4881.954	34.61	13.90	48.51	54.00	-5.49	AVG

Emission Level= Read Level+ Correct Factor



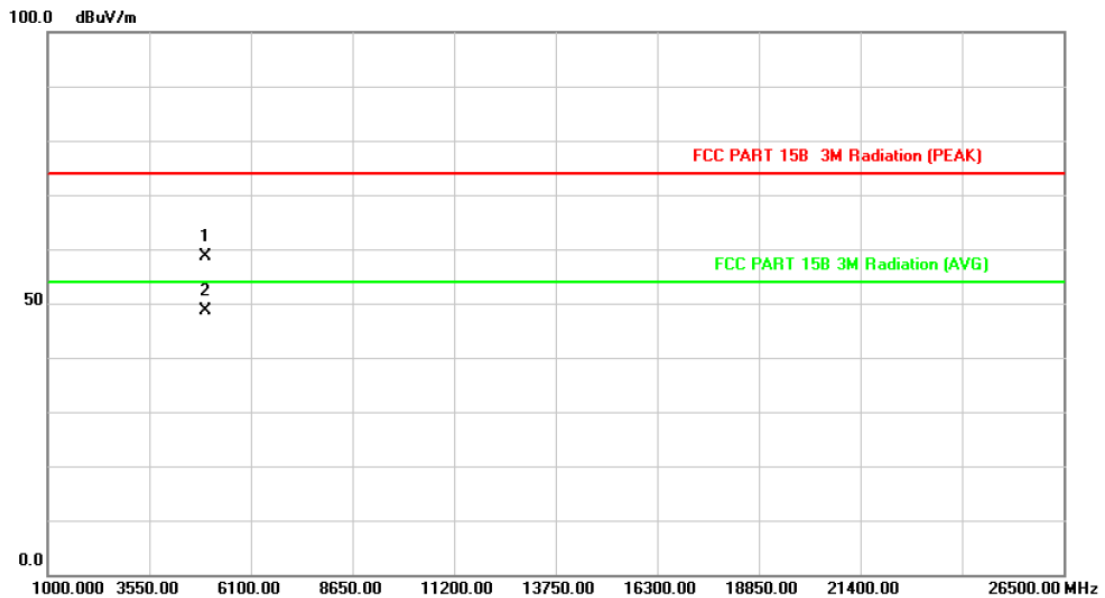
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX GFSK Mode 2480MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1		4959.647	44.30	14.36	58.66	74.00	-15.34	peak
2	*	4959.651	34.04	14.36	48.40	54.00	-5.60	AVG

Emission Level= Read Level+ Correct Factor

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX GFSK Mode 2480MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		

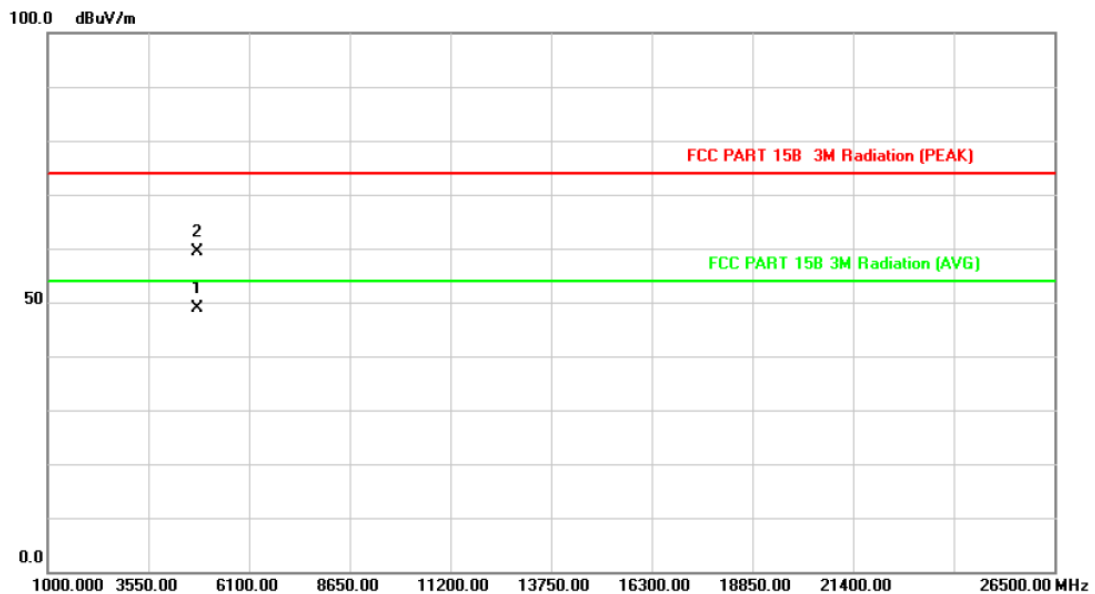


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		4959.367	44.33	14.36	58.69	74.00	-15.31	peak
2	*	4959.951	34.32	14.36	48.68	54.00	-5.32	AVG

Emission Level= Read Level+ Correct Factor



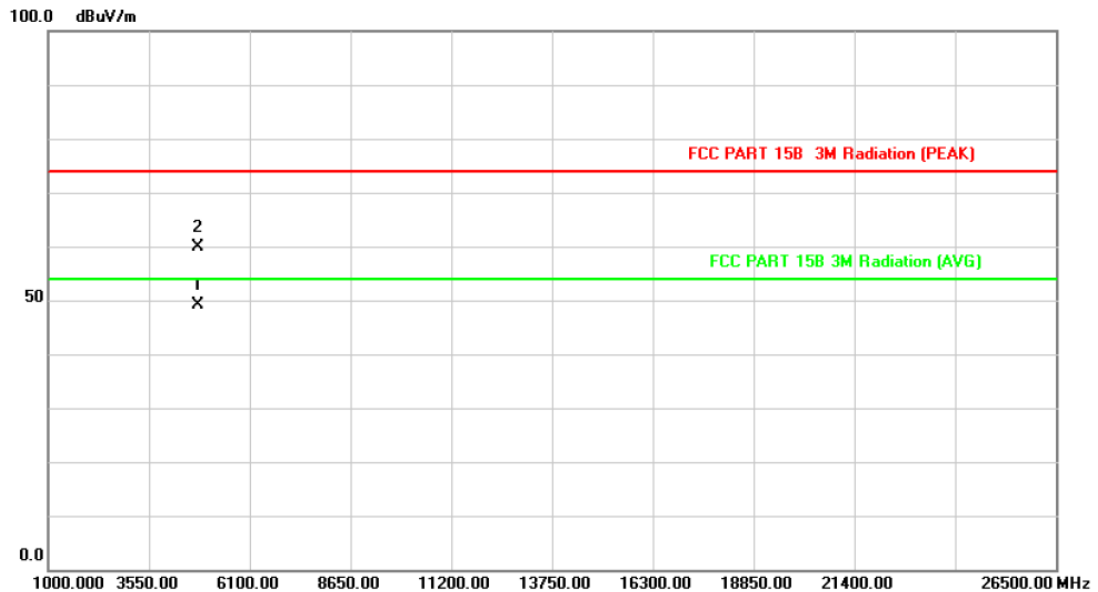
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX 8-DPSK Mode 2402MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.637	35.51	13.44	48.95	54.00	-5.05	AVG
2		4804.312	45.89	13.44	59.33	74.00	-14.67	peak

Emission Level= Read Level+ Correct Factor

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX 8-DPSK Mode 2402MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		

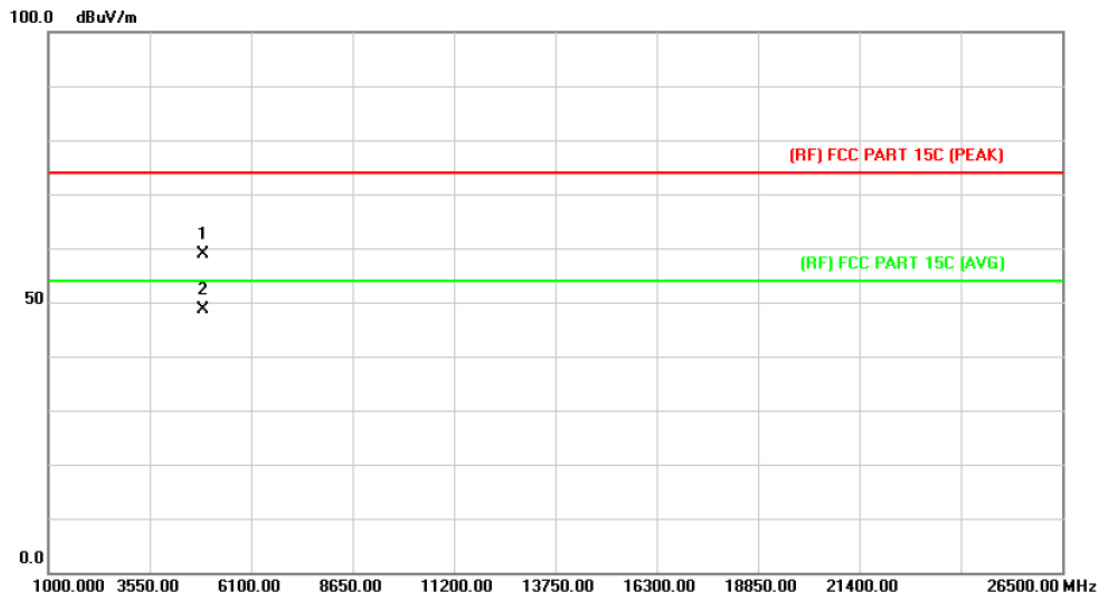


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4803.387	35.68	13.44	49.12	54.00	-4.88	AVG
2		4804.961	46.42	13.44	59.86	74.00	-14.14	peak

Emission Level= Read Level+ Correct Factor



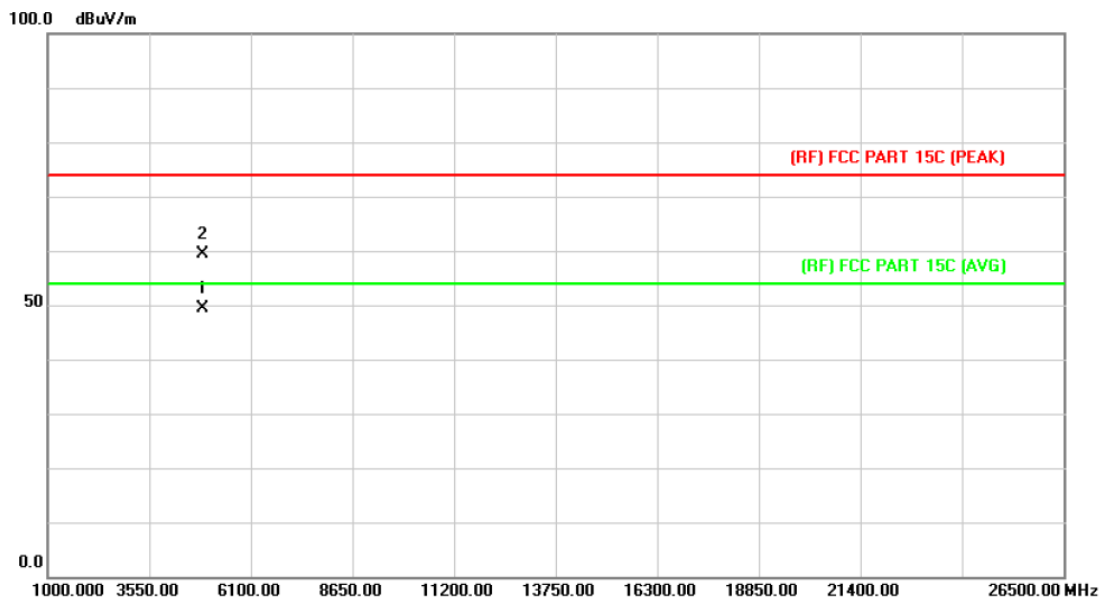
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX 8-DPSK Mode 2441MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		



No. Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
	MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	4881.339	45.04	13.90	58.94	74.00	-15.06	peak
2 *	4881.417	34.71	13.90	48.61	54.00	-5.39	AVG

Emission Level= Read Level+ Correct Factor

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX 8-DPSK Mode 2441MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		

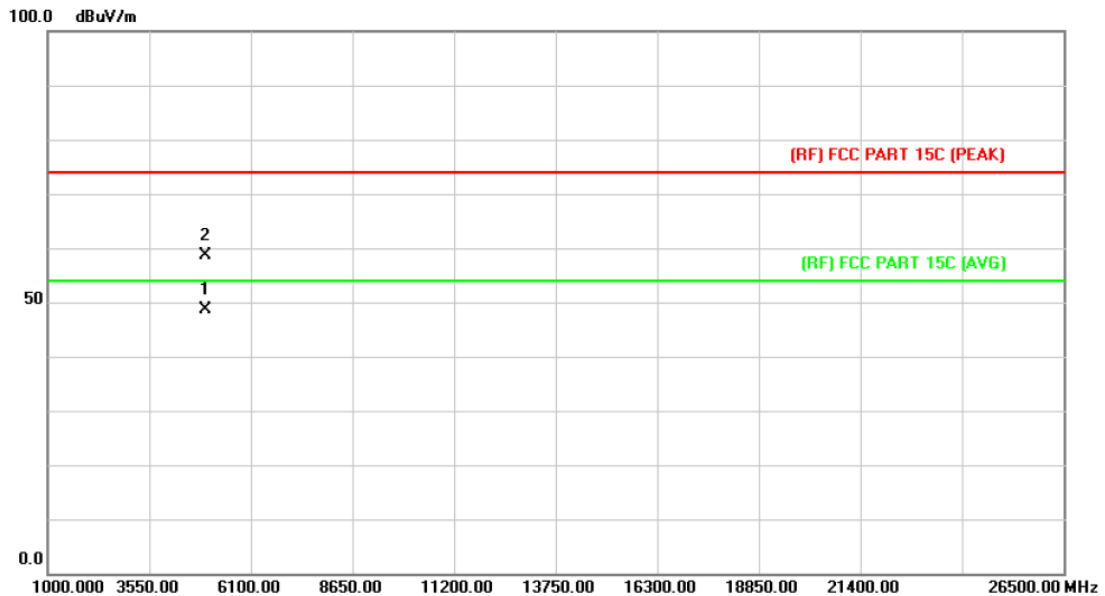


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4881.332	35.48	13.90	49.38	54.00	-4.62	AVG
2		4882.365	45.51	13.90	59.41	74.00	-14.59	peak

Emission Level= Read Level+ Correct Factor



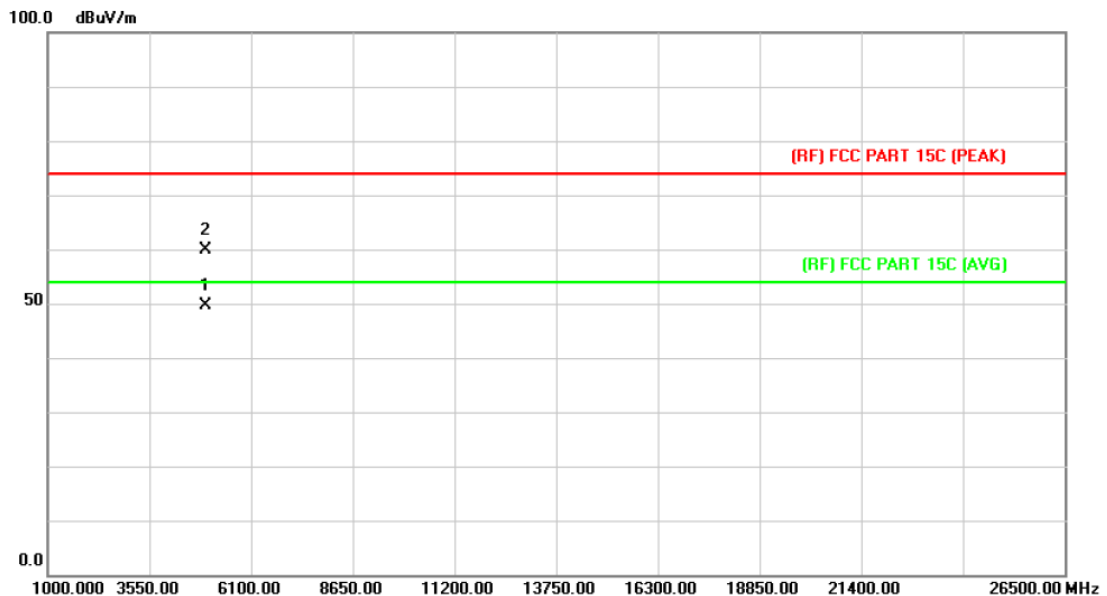
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX 8-DPSK Mode 2480MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	*	4959.337	34.31	14.36	48.67	54.00	-5.33	AVG
2		4959.368	44.31	14.36	58.67	74.00	-15.33	peak

Emission Level= Read Level+ Correct Factor

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX 8-DPSK Mode 2480MHz		
<b>Remark:</b>	No report for the emission which more than 10 dB below the prescribed limit.		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over	
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB	Detector
1	*	4959.359	35.15	14.36	49.51	54.00	-4.49	AVG
2		4959.954	45.48	14.36	59.84	74.00	-14.16	peak

Emission Level= Read Level+ Correct Factor



## 6. Restricted Bands Requirement

### 6.1 Test Standard and Limit

#### 6.1.1 Test Standard

FCC Part 15.209

FCC Part 15.205

#### 6.1.2 Test Limit

Restricted Frequency Band (MHz)	Class B (dBuV/m)(at 3m)	
	Peak	Average
2310 ~2390	74	54
2483.5 ~2500	74	54

**Note: All restriction bands have been tested, only the worst case is reported.**

### 6.2 Test Setup



### 6.3 Test Procedure

- (1) The measuring distance of 3m shall be used for measurements at frequency up to 1GHz. The EUT was placed on a rotating 0.8m high above the ground, the table was rotated 360 degrees to determine the position of the highest radiation.
- (2) Measurements at frequency above 1GHz. The EUT was placed on a rotating 1.5m high above the ground. RF absorbers covered the ground plane with a minimum area of 3.0m by 3.0m between the EUT and measurement receiver antenna. The RF absorber shall not exceed 30cm in high above the conducting floor. The table was rotated 360 degrees to determine the position of the highest radiation.

- (3) The Test antenna shall vary between 1m and 4m, Both Horizontal and Vertical antenna are set to make measurement.
- (4) The initial step in collecting conducted emission data is a spectrum analyzer peak detector mode pre-scanning the measurement frequency range. Significant peaks are then marked and then Quasi Peak detector mode re-measured.
- (5) If the Peak Mode measured value compliance with and lower than Quasi Peak Mode Limit Bellow 1 GHz, the EUT shall be deemed to meet QP Limits and then no additional QP Mode measurement performed. But the Peak Value and average value both need to comply with applicable limit above 1 GHz.
- (6) Testing frequency range below 1GHz the measuring instrument use VBW=120 kHz with Quasi-peak detection.
- (7) Testing frequency range above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=10 Hz with Peak Detector for Average Values.
- (8) For the actual test configuration, please see the test setup photo.

#### 6.4 EUT Operating Condition

The Equipment Under Test was set to Continual Transmitting in maximum power.

#### 6.4 Test Data

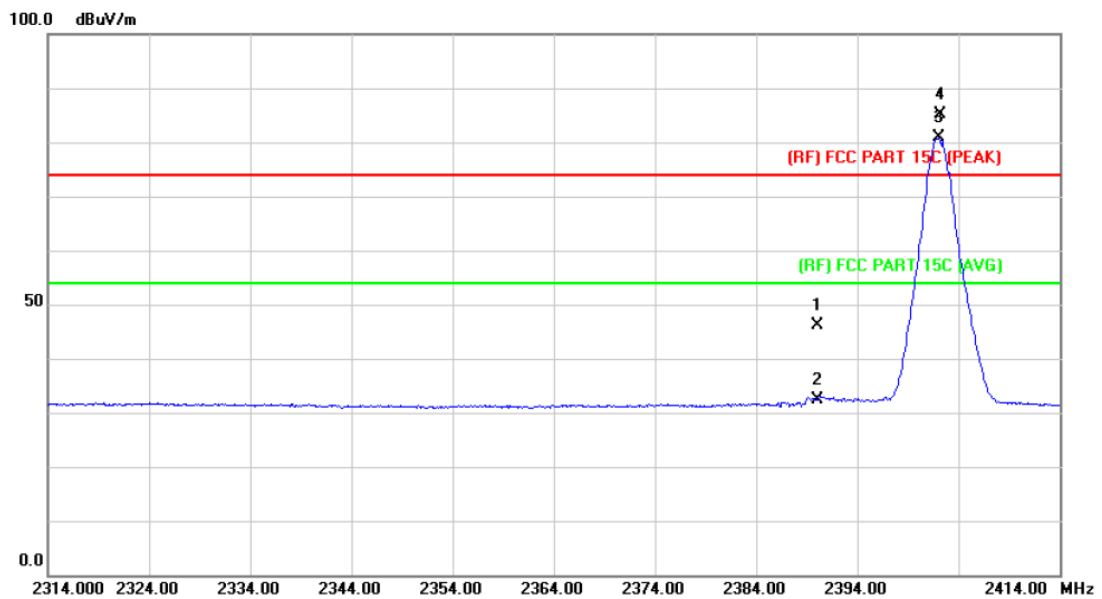
Remark: During testing above 1GHz the measuring instrument use RBW=1 MHz and VBW=3 MHz with Peak Detector for Peak Values, and use RBW=1 MHz and VBW=1 KHz with Peak Detector for Average Values.

All restriction bands have been tested, only the worst case is reported.



**(1) Radiation Test**

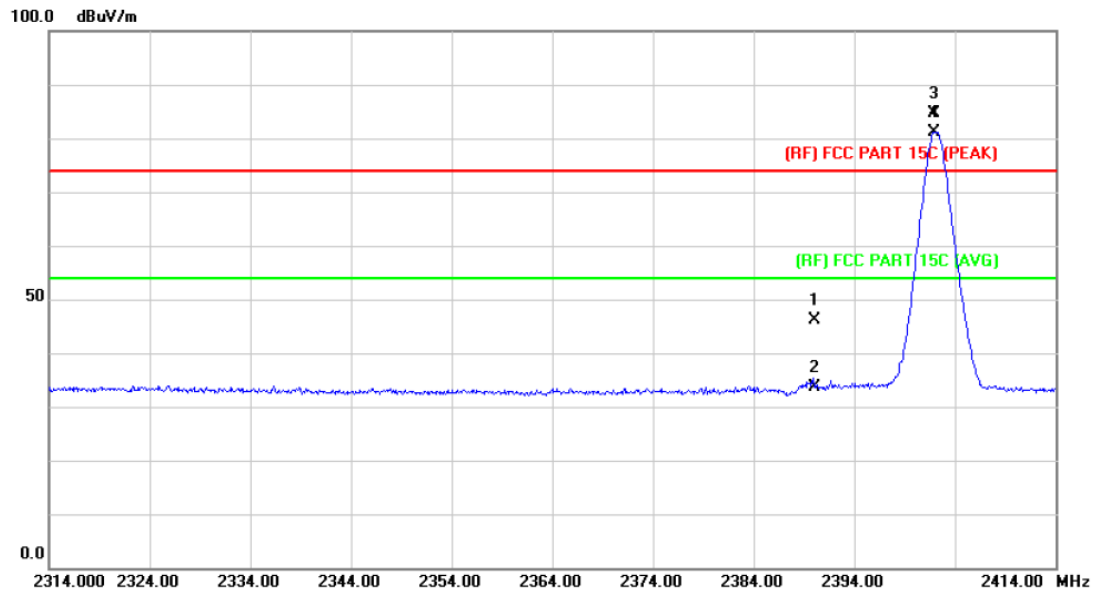
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX GFSK Mode 2402MHz		
<b>Remark:</b>	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1		2390.000	45.47	0.77	46.24	74.00	-27.76	peak
2		2390.000	31.59	0.77	32.36	54.00	-21.64	AVG
3	*	2402.000	80.09	0.82	80.91	Fundamental Frequency		AVG
4	X	2402.200	84.35	0.82	85.17	Fundamental Frequency		peak

**Emission Level= Read Level+ Correct Factor**

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX GFSK Mode 2402MHz		
<b>Remark:</b>	N/A		

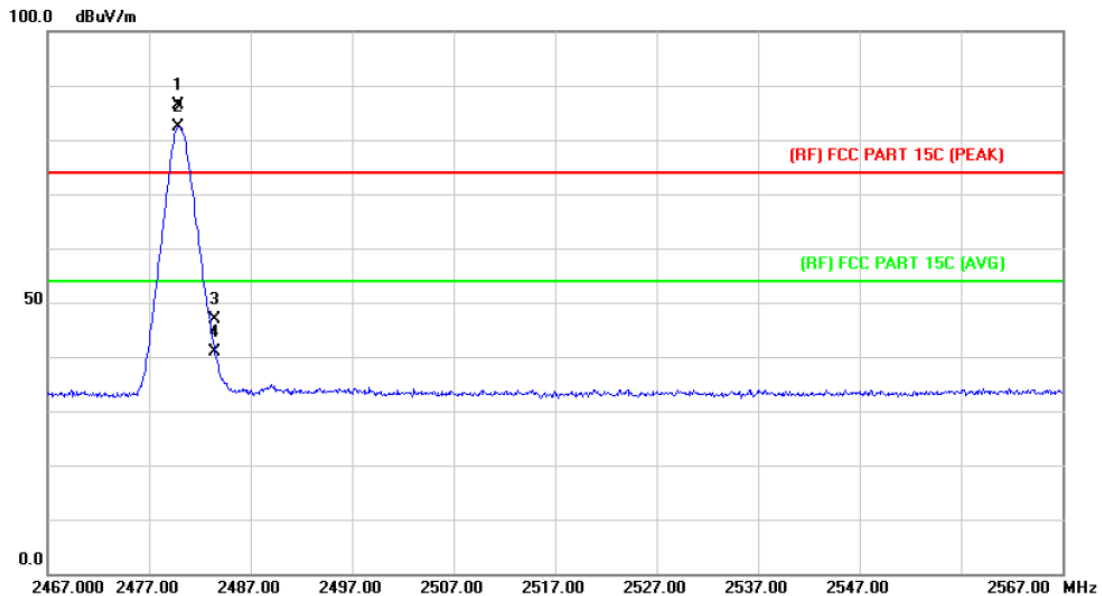


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB Detector
1		2390.000	45.43	0.77	46.20	74.00	-27.80 peak
2		2390.000	32.92	0.77	33.69	54.00	-20.31 AVG
3	X	2401.900	83.87	0.82	84.69	Fundamental Frequency peak	
4	*	2401.900	80.41	0.82	81.23	Fundamental Frequency AVG	

**Emission Level= Read Level+ Correct Factor**



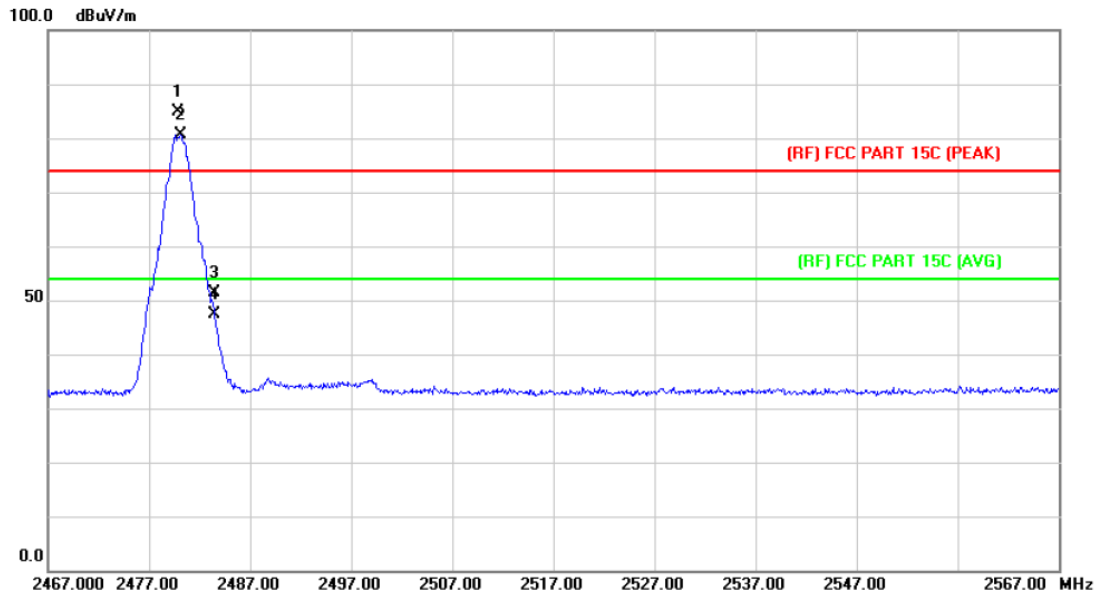
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX GFSK Mode 2480 MHz		
<b>Remark:</b>	N/A		



No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2479.900	85.19	1.15	86.34	Fundamental Frequency		peak
2	*	2479.900	81.20	1.15	82.35	Fundamental Frequency		AVG
3		2483.500	45.70	1.17	46.87	74.00	-27.13	peak
4		2483.500	39.76	1.17	40.93	54.00	-13.07	AVG

**Emission Level= Read Level+ Correct Factor**

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX GFSK Mode 2480 MHz		
<b>Remark:</b>	N/A		

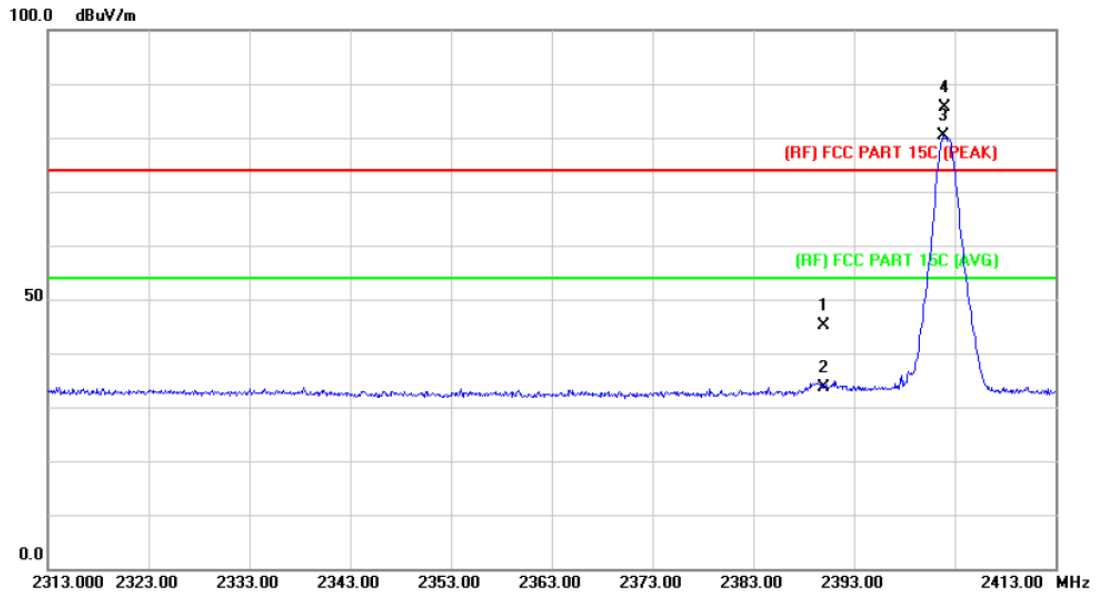


No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2479.900	83.72	1.15	84.87	Fundamental Frequency		peak
2	*	2480.100	79.51	1.15	80.66	Fundamental Frequency		AVG
3		2483.500	50.20	1.17	51.37	74.00	-22.63	peak
4		2483.500	46.21	1.17	47.38	54.00	-6.62	AVG

Emission Level= Read Level+ Correct Factor



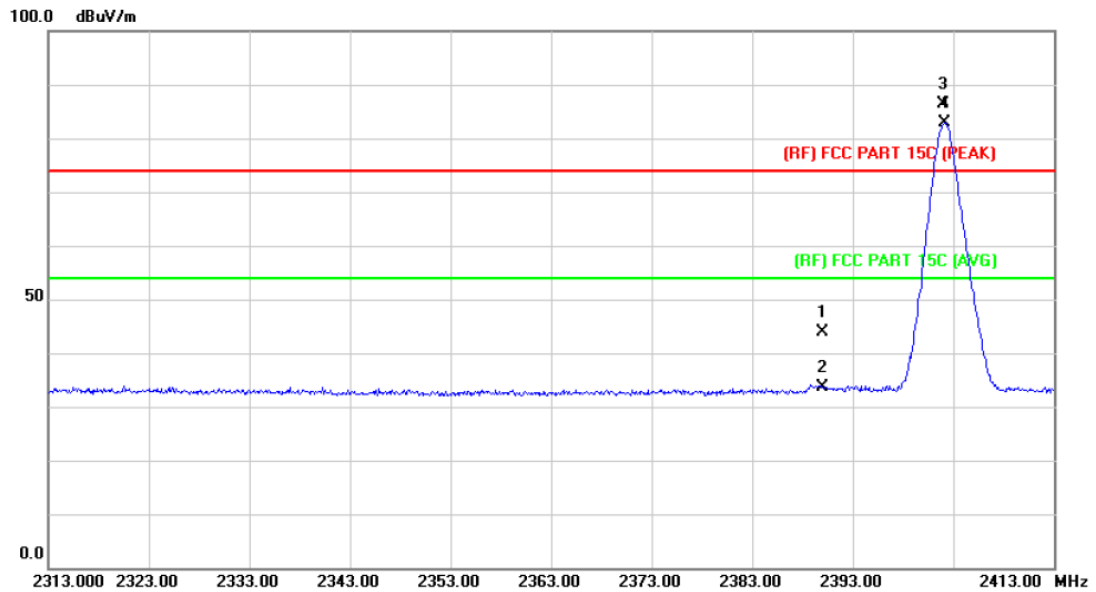
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX 8-DPSK Mode 2402MHz		
<b>Remark:</b>	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB Detector
1		2390.000	44.48	0.77	45.25	74.00	-28.75 peak
2		2390.000	32.97	0.77	33.74	54.00	-20.26 AVG
3	*	2401.800	79.57	0.82	80.39	Fundamental Frequency AVG	
4	X	2402.000	84.92	0.82	85.74	Fundamental Frequency peak	

**Emission Level= Read Level+ Correct Factor**

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX 8-DPSK Mode 2402MHz		
<b>Remark:</b>	N/A		

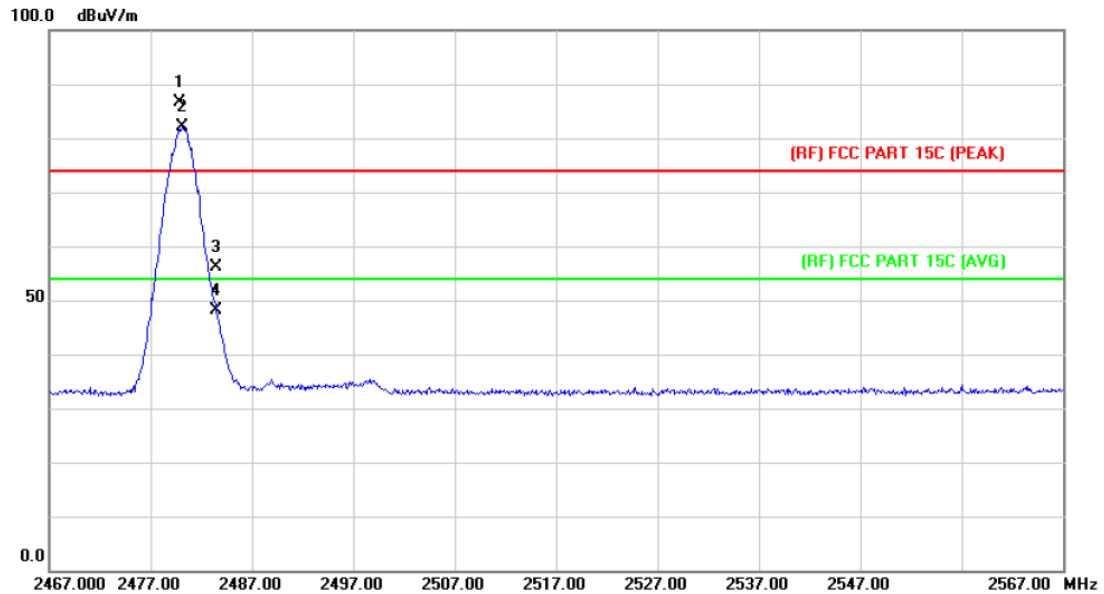


No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB Detector
1		2390.000	43.01	0.77	43.78	74.00	-30.22 peak
2		2390.000	32.78	0.77	33.55	54.00	-20.45 AVG
3	X	2402.000	85.53	0.82	86.35	Fundamental Frequency peak	
4	*	2402.200	82.02	0.82	82.84	Fundamental Frequency AVG	

**Emission Level= Read Level+ Correct Factor**



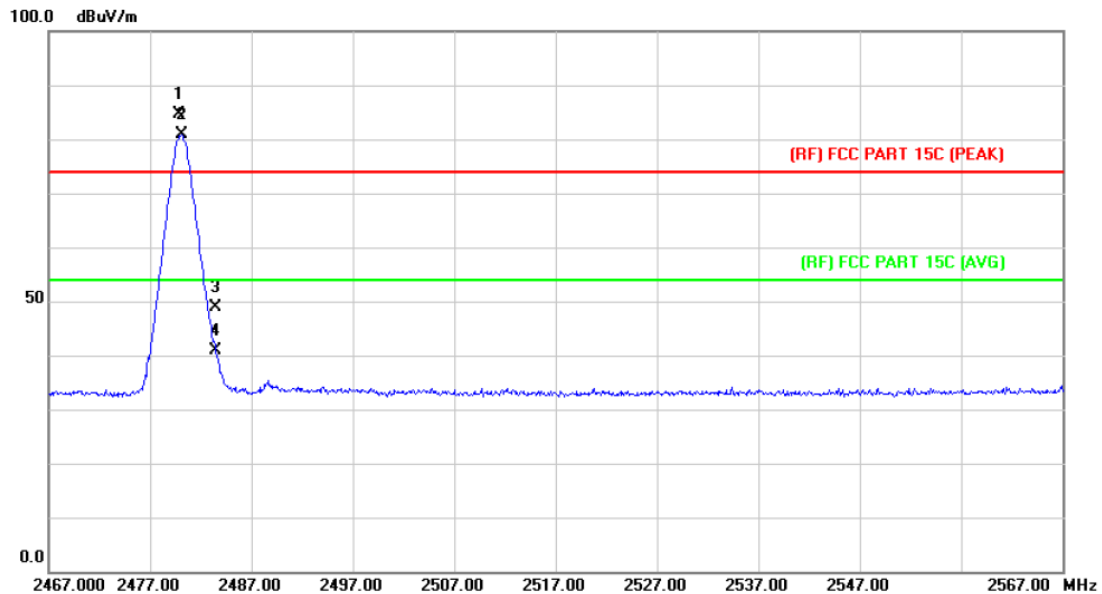
<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Horizontal		
<b>Test Mode:</b>	TX 8-DPSK Mode 2480MHz		
<b>Remark:</b>	N/A		



No.	Mk.	Freq.	Reading Level	Correct Factor	Measurement	Limit	Over
		MHz	dBuV	dB/m	dBuV/m	dBuV/m	dB Detector
1	X	2479.800	85.39	1.15	86.54	Fundamental Frequency	peak
2	*	2480.100	80.87	1.15	82.02	Fundamental Frequency	AVG
3		2483.500	54.92	1.17	56.09	74.00	-17.91 peak
4		2483.500	46.90	1.17	48.07	54.00	-5.93 AVG

**Emission Level= Read Level+ Correct Factor**

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 12V		
<b>Ant. Pol.</b>	Vertical		
<b>Test Mode:</b>	TX 8-DPSK Mode 2480MHz		
<b>Remark:</b>	N/A		



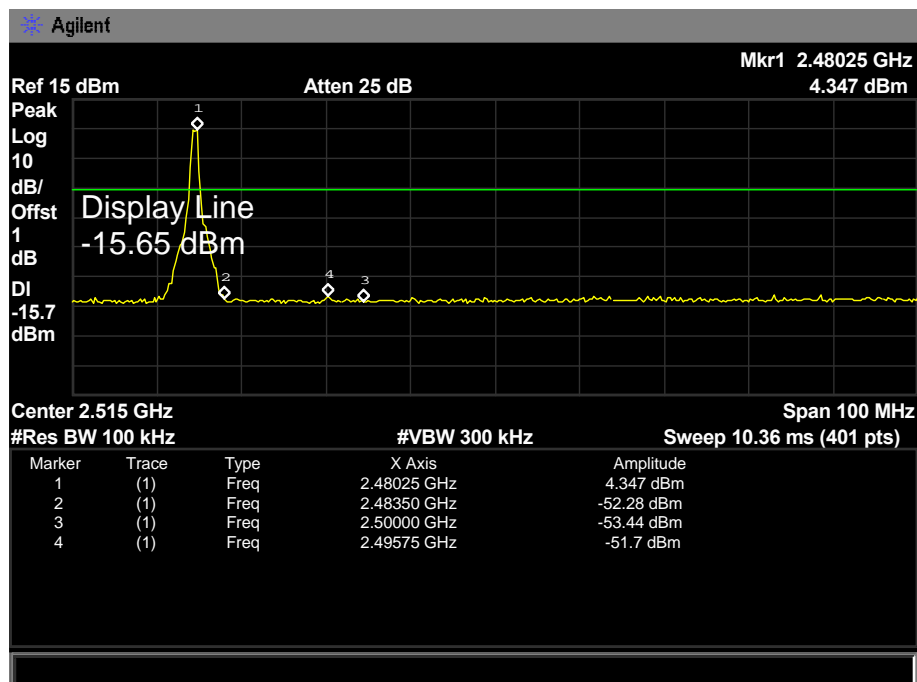
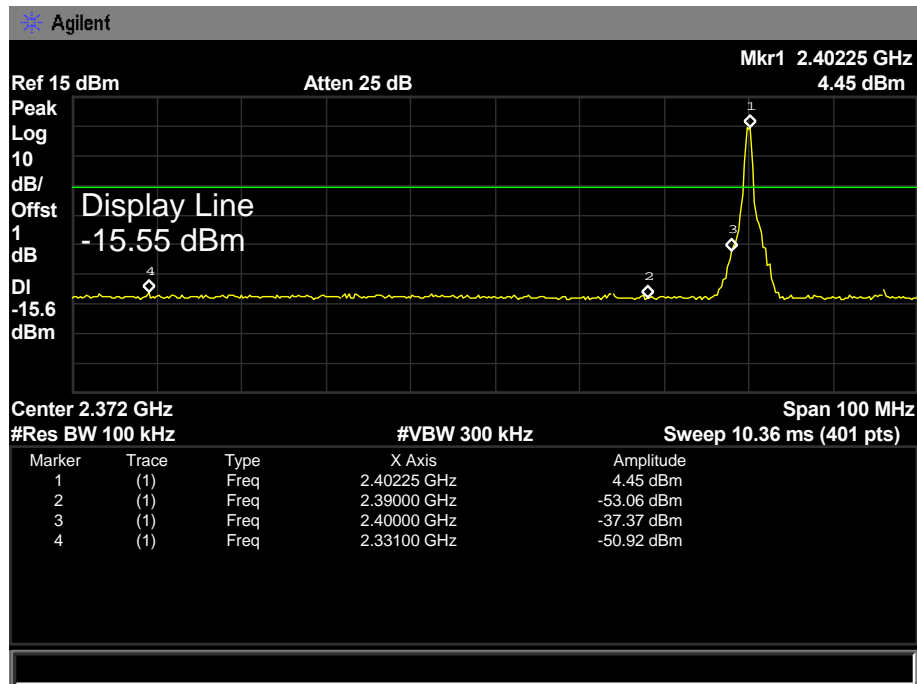
No.	Mk.	Freq. MHz	Reading Level dBuV	Correct Factor dB/m	Measure- ment dBuV/m	Limit dBuV/m	Over dB	Detector
1	X	2479.900	83.53	1.15	84.68	Fundamental Frequency		peak
2	*	2480.100	79.64	1.15	80.79	Fundamental Frequency		AVG
3		2483.500	47.76	1.17	48.93	74.00	-25.07	peak
4		2483.500	39.60	1.17	40.77	54.00	-13.23	AVG

**Emission Level= Read Level+ Correct Factor**

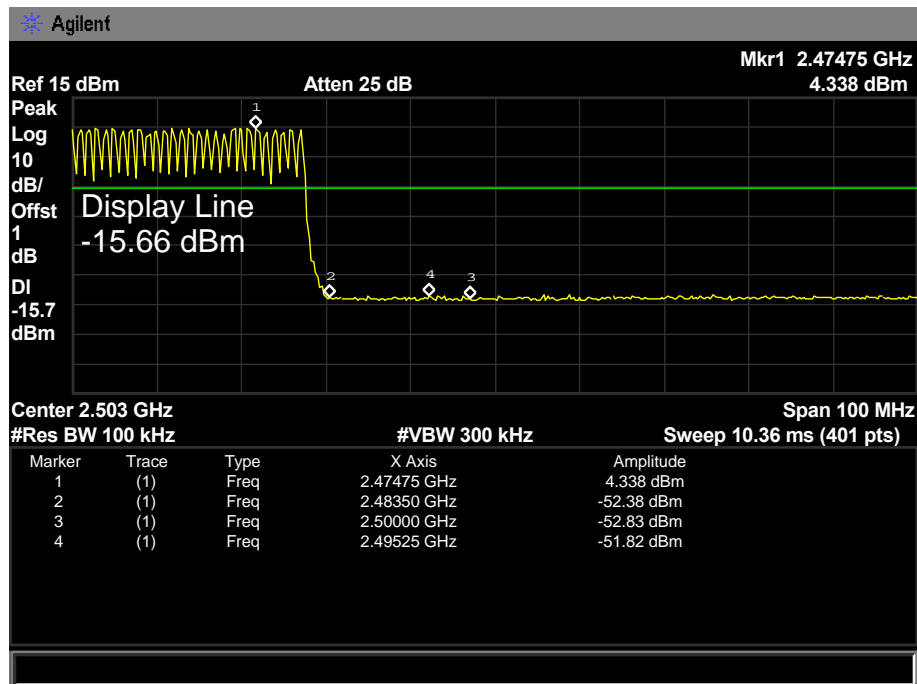
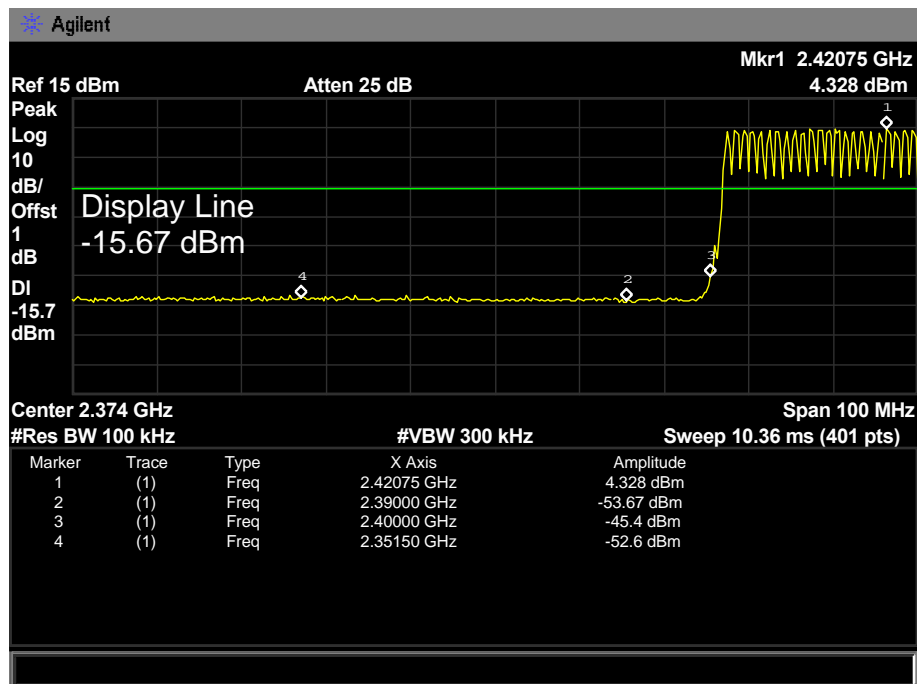


## (2) Conducted Test

EUT:	Bluetooth FM Transmitter	Model Name :	FM25
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	TX GFSK Mode 2402MHz / 2480 MHz		
Remark:	N/A		

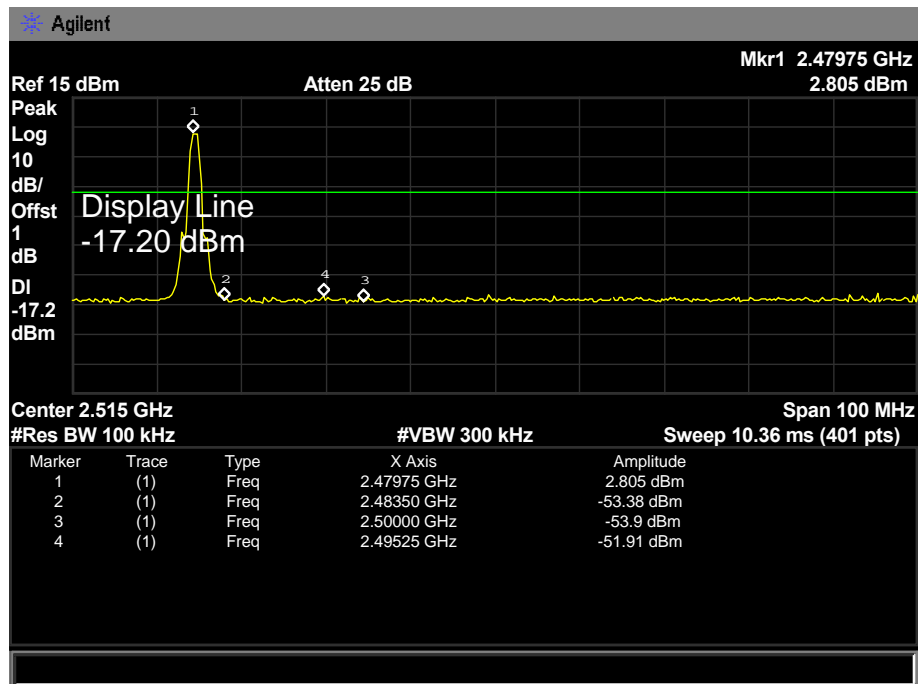
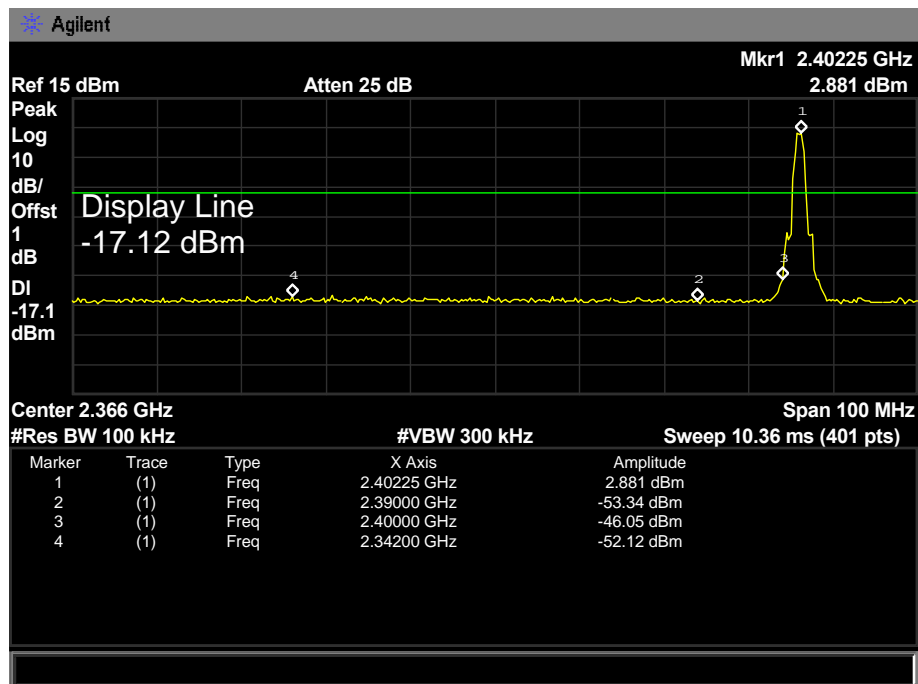


EUT:	Bluetooth FM Transmitter	Model Name :	FM25
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	GFSK Hopping Mode		
Remark:	N/A		

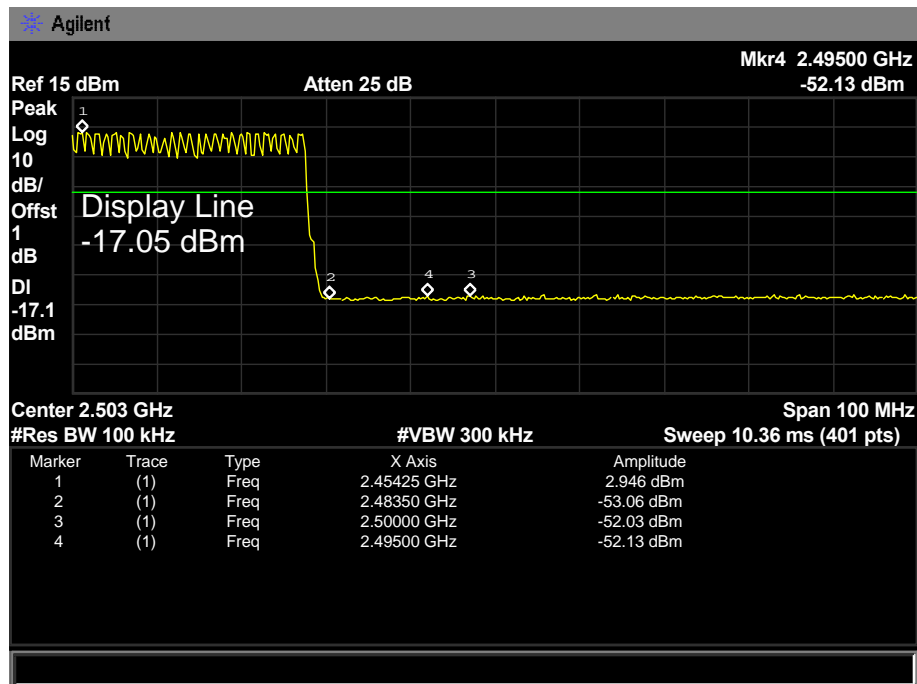
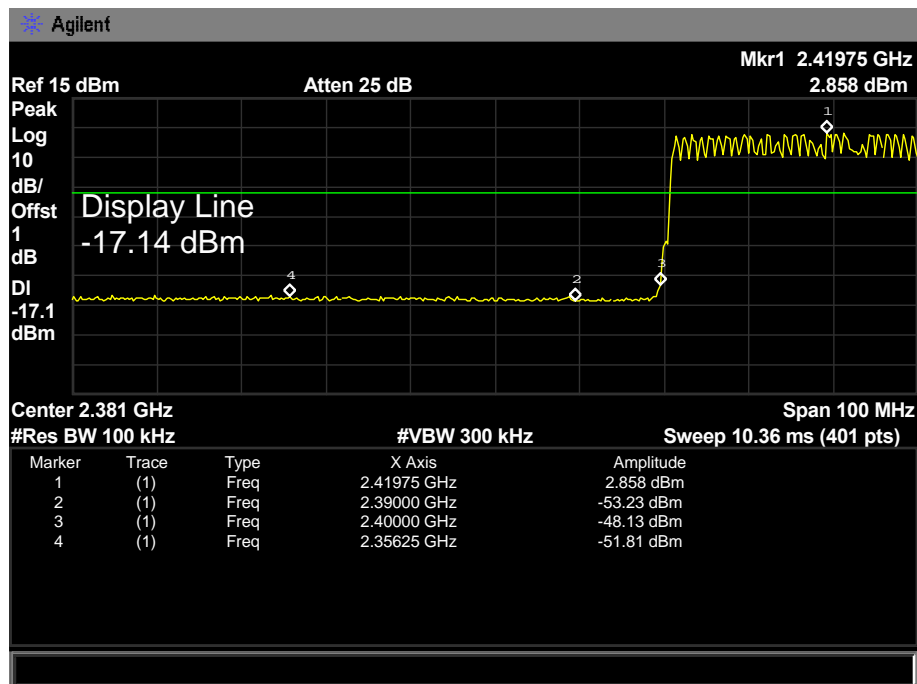




EUT:	Bluetooth FM Transmitter	Model Name :	FM25
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	TX 8-DPSK Mode 2402MHz / 2480 MHz		
Remark:	N/A		



EUT:	Bluetooth FM Transmitter	Model Name :	FM25
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	8-DPSK Hopping Mode		
Remark:	N/A		





## 7. Number of Hopping Channel

### 7.1 Test Standard and Limit

#### 6.1.1 Test Standard

FCC Part 15.247 (a)(1)

#### 6.1.2 Test Limit

Section	Test Item	Limit
15.247	Number of Hopping Channel	>15

### 7.2 Test Setup



### 7.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=100 KHz, VBW=100 KHz, Sweep time= Auto.

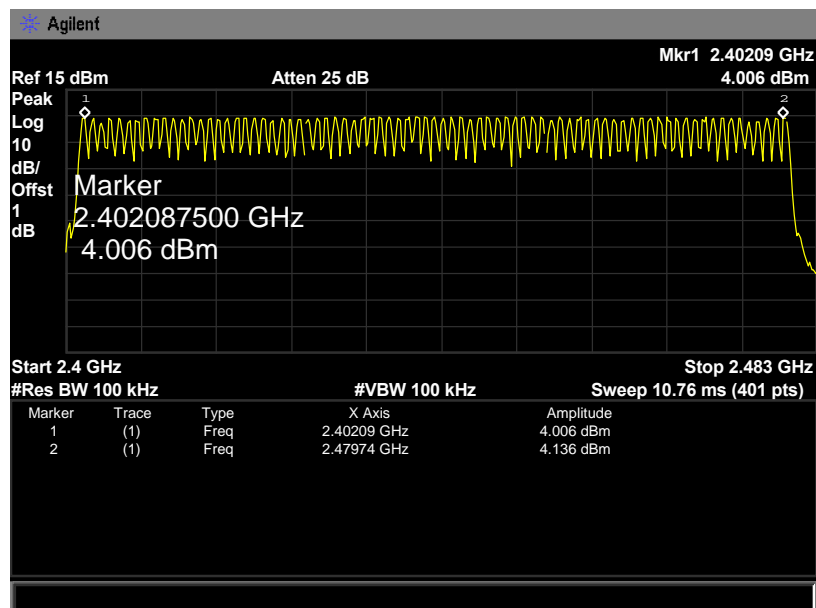
### 7.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.

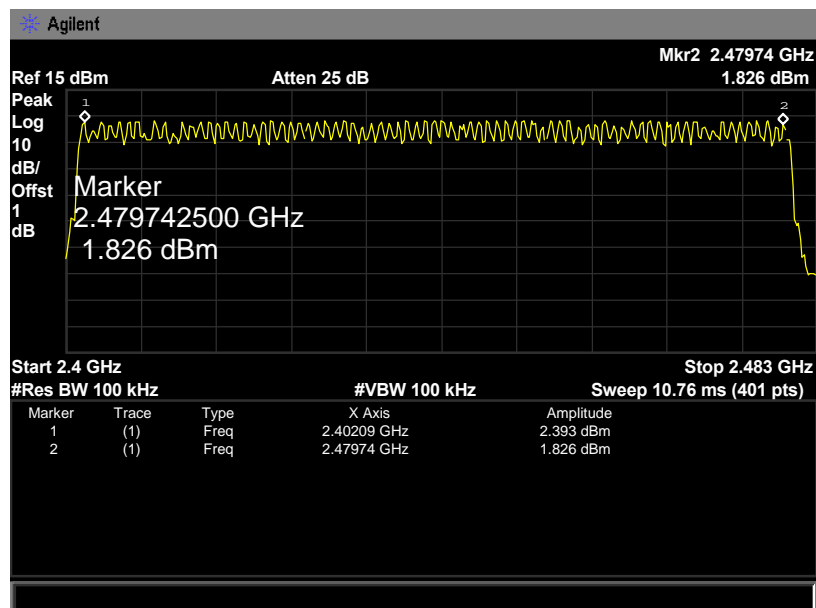
### 7.5 Test Data

EUT:	Bluetooth FM Transmitter	Model Name :	FM25
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	Hopping Mode (GFSK/ 8-DPSK)		
Frequency Range	Quantity of Hopping Channel	Limit	
2402MHz~2480MHz	79	>15	
	79		

## GFSK Mode



## 8-DPSK Mode





## 8. Average Time of OcCupancy

### 8.1 Test Standard and Limit

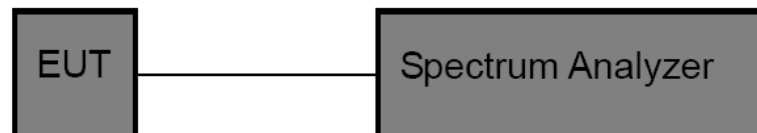
#### 8.1.1 Test Standard

FCC Part 15.247 (a)(1)

#### 8.1.2 Test Limit

Section	Test Item	Limit
15.247(a)(1)/ RSS-210 Annex 8(A8.1d)	Average Time of OcCupancy	0.4 sec

### 8.2 Test Setup



### 8.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting: RBW=1MHz, VBW=1MHz.
- (3) Use video trigger with the trigger level set to enable triggering only on full pulses.
- (4) Sweep Time is more than once pulse time.
- (5) Set the center frequency on any frequency would be measure and set the frequency span to zero.
- (6) Measure the maximum time duration of one single pulse.
- (7) Set the EUT for packet transmitting.
- (8) Measure the maximum time duration of one single pulse.

### 8.4 EUT Operating Condition

The EUT was set to the Hopping Mode by the Customer.

## 8.5 Test Data

EUT:	Bluetooth FM Transmitter		Model Name :	FM25	
Temperature:	25 °C		Relative Humidity:	55%	
Test Voltage:	DC 3.7V				
Test Mode:	Hopping Mode (GFSK DH1)				
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	0.430	137.60	31.60	400	PASS
2441	0.430	137.60			
2480	0.430	137.60			

GFSK Hopping Mode DH1

2402 MHz

Agilent

Ref 15 dBm

Atten 25 dB

Mkr1 Δ 430 μs  
-2.239 dB

Peak

Log

10

dB/

Offst

1

dB

Marker Δ

430.000000 μs

-2.239 dB

W1 S2

S3 FS

AA

Center 2.402 GHz

Res BW 1 MHz

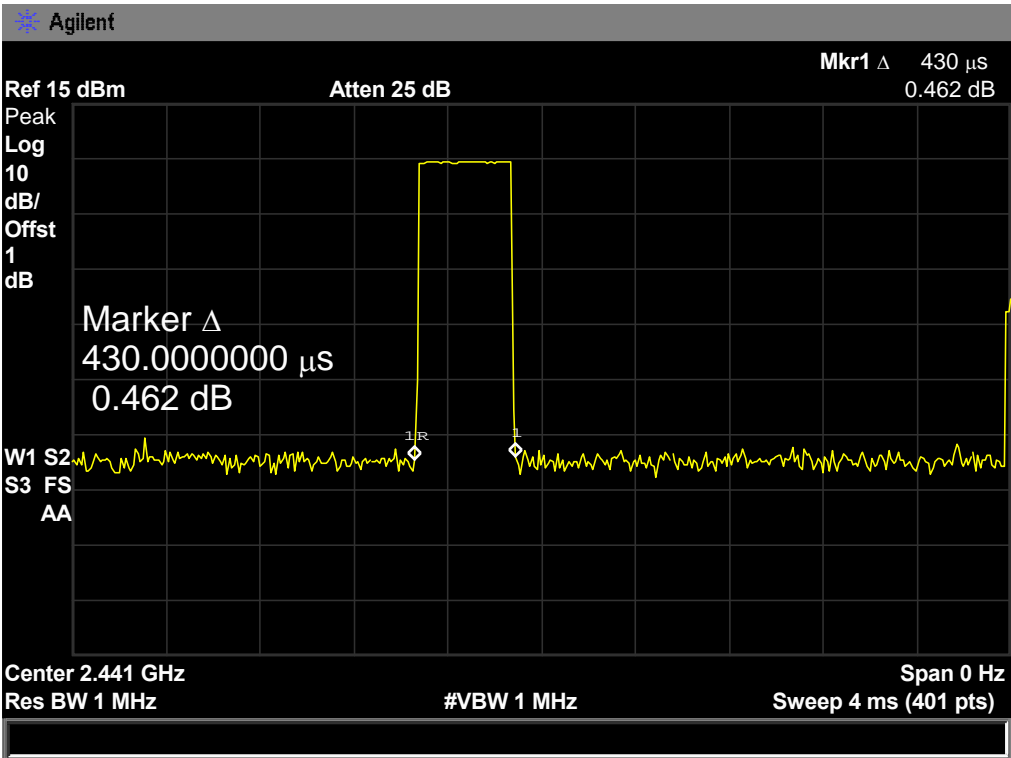
#VBW 1 MHz

Span 0 Hz

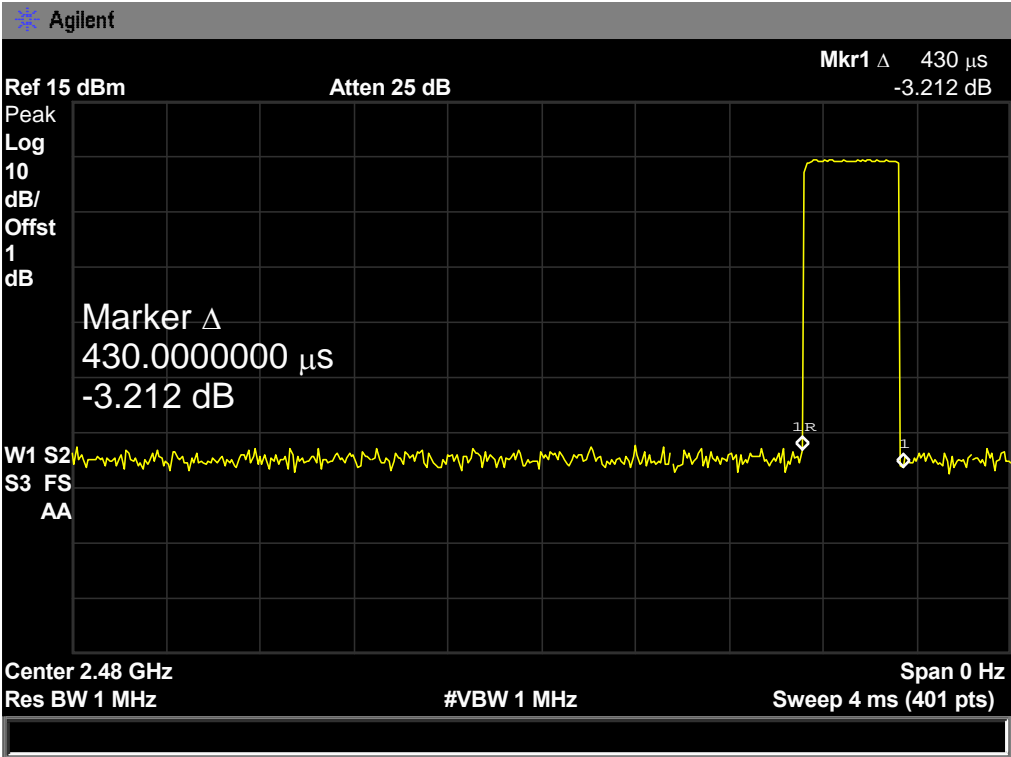
Sweep 4 ms (401 pts)



GFSK Hopping Mode DH1  
 2441 MHz



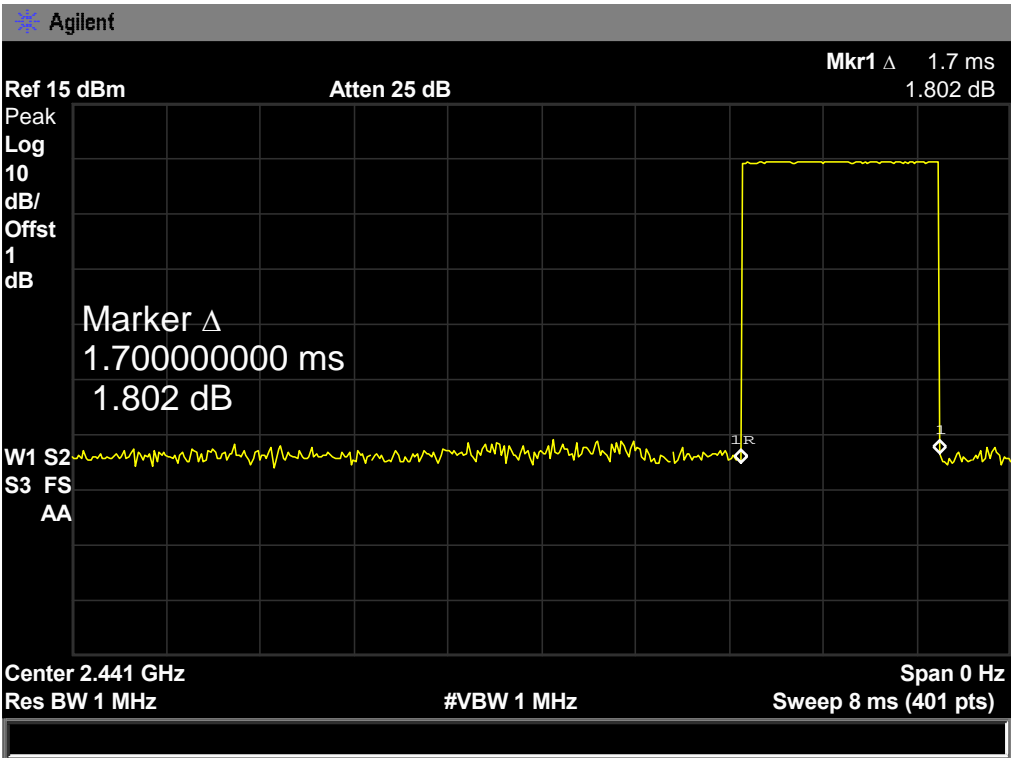
GFSK Hopping Mode DH1  
 2480 MHz



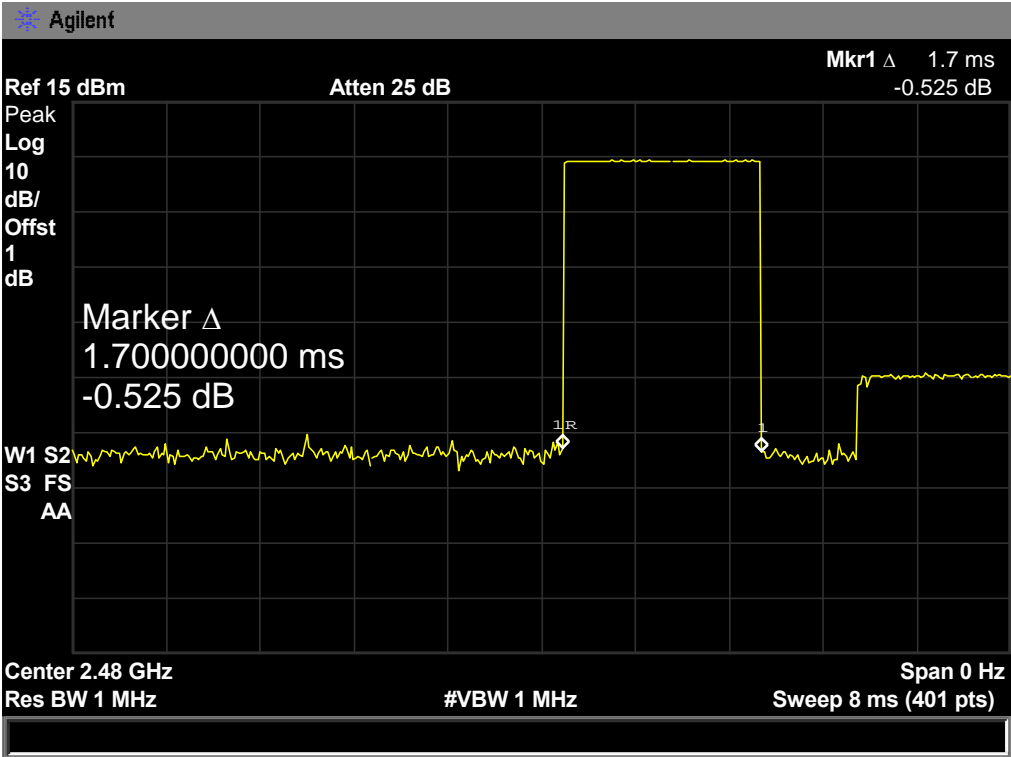
EUT:	Bluetooth FM Transmitter		Model Name :	FM25	
Temperature:	25 °C		Relative Humidity:	55%	
Test Voltage:	DC 3.7V				
Test Mode:	Hopping Mode (GFSK DH3)				
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	1.700	272.00	31.60	400	PASS
2441	1.700	272.00			
2480	1.700	272.00			
GFSK Hopping Mode DH3					
2402 MHz					
<div><div>Agilent</div><div><div>Ref 15 dBm</div><div>Atten 25 dB</div><div>Mkr1 Δ 1.7 ms 1.321 dB</div><div>Peak Log 10 dB/ Offst 1 dB</div><div>Marker Δ 1.700000000 ms 1.321 dB</div><div>W1 S2 S3 FS AA</div><div>Center 2.402 GHz Res BW 1 MHz</div><div>Span 0 Hz Sweep 8 ms (401 pts)</div></div></div>					



GFSK Hopping Mode DH3  
 2441 MHz



GFSK Hopping Mode DH3  
 2480 MHz



EUT:		Bluetooth FM Transmitter		Model Name :		FM25	
Temperature:		25 °C		Relative Humidity:		55%	
Test Voltage:		DC 3.7V					
Test Mode:		Hopping Mode (GFSK DH5)					
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)		Period Time (s)	Limit (ms)	Result	
2402	3.000	320.00		31.60	400	PASS	
2441	3.000	320.00					
2480	3.000	320.00					
GFSK Hopping Mode DH5							
2402 MHz							

Agilent

Ref 15 dBm

Atten 25 dB

Mkr1 Δ 3 ms  
-1.535 dB

Peak Log 10 dB/ Offst 1 dB

Marker Δ 3.000000000 ms  
-1.535 dB

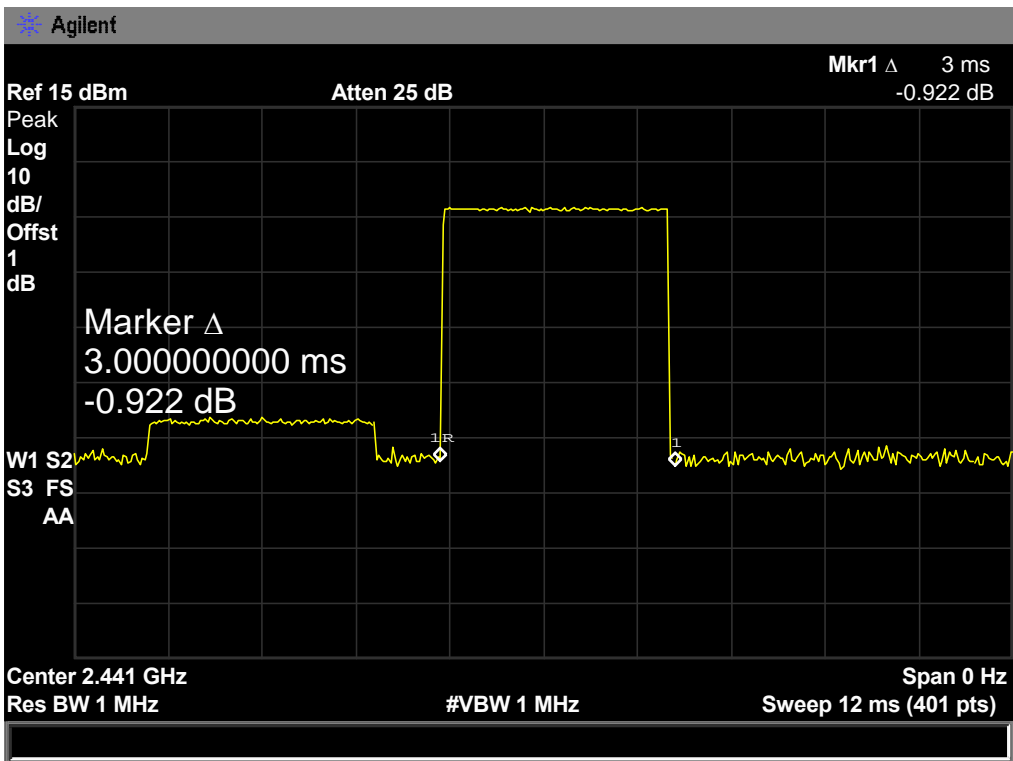
W1 S2  
S3 FS  
AA

Center 2.402 GHz  
Res BW 1 MHz

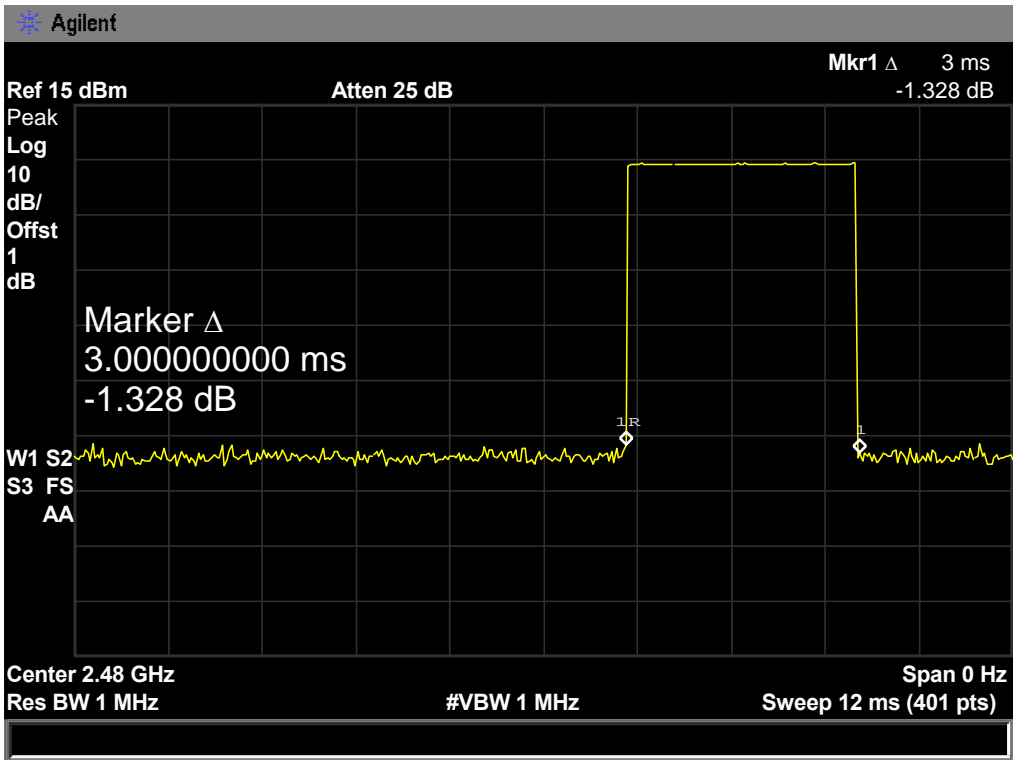
Span 0 Hz  
Sweep 12 ms (401 pts)



GFSK Hopping Mode DH5  
 2441 MHz



GFSK Hopping Mode DH5  
 2480 MHz

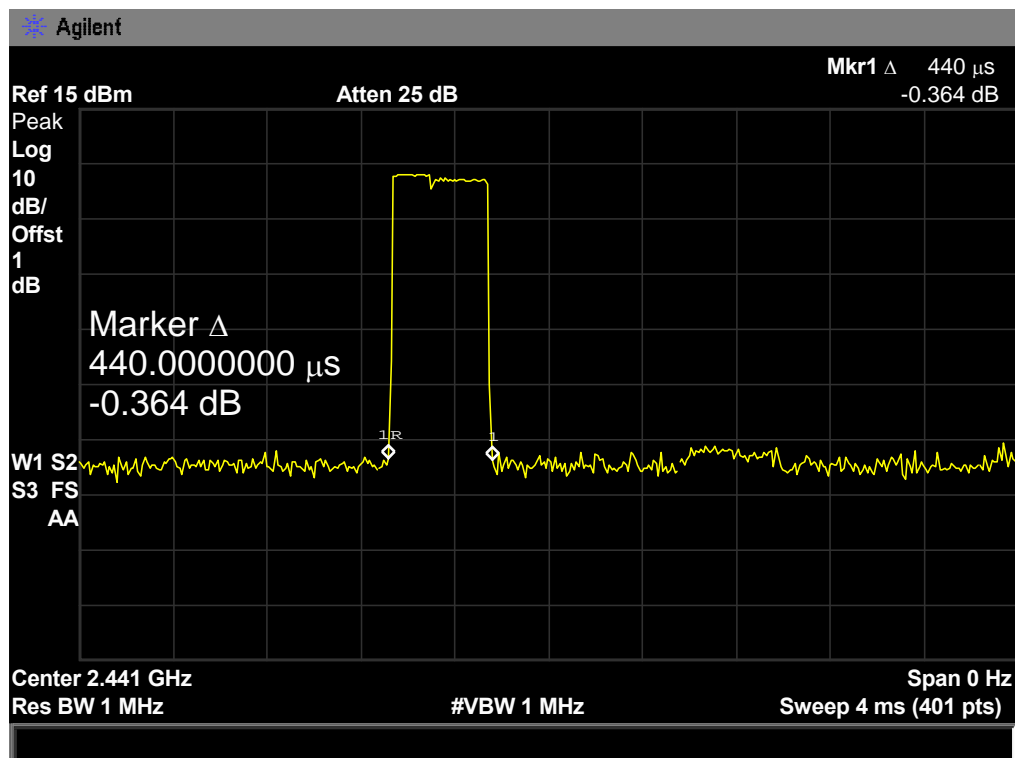






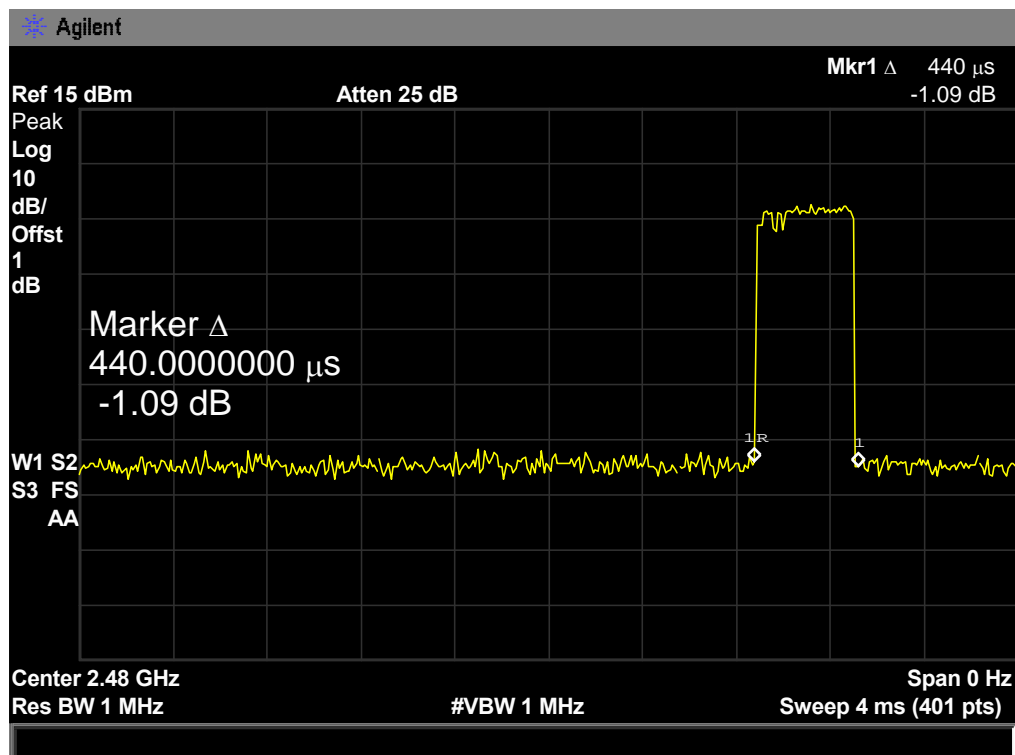
$\pi$  /4-DQPSK Hopping Mode DH1

2441 MHz



$\pi$  /4-DQPSK Hopping Mode DH1

2480 MHz

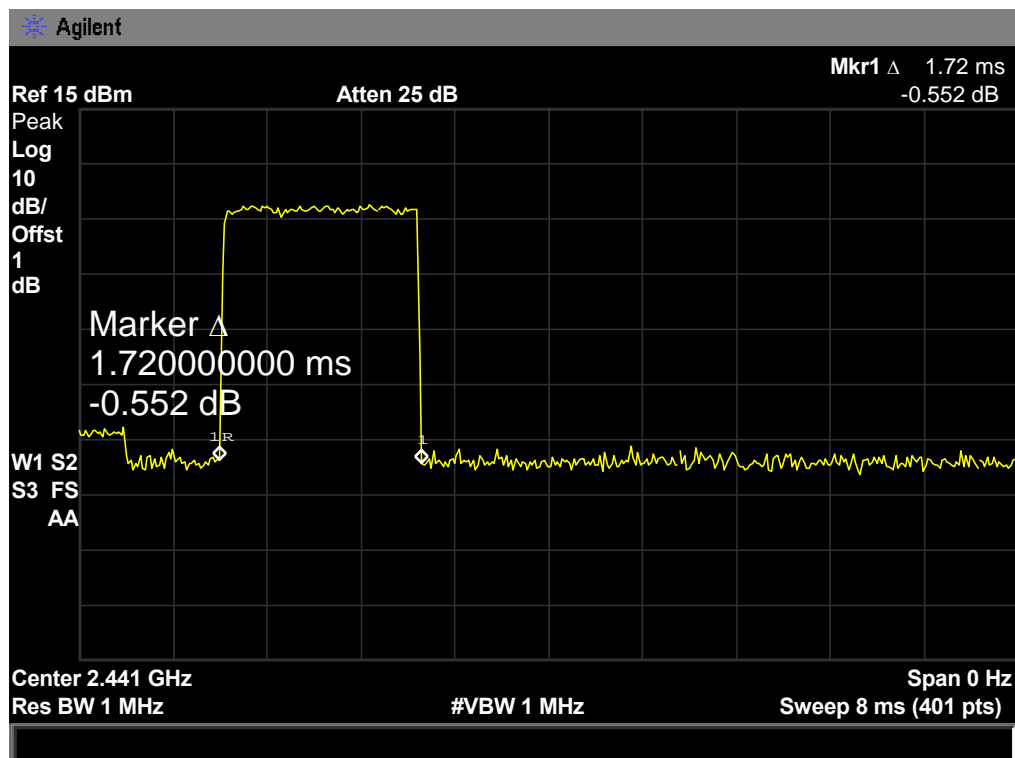






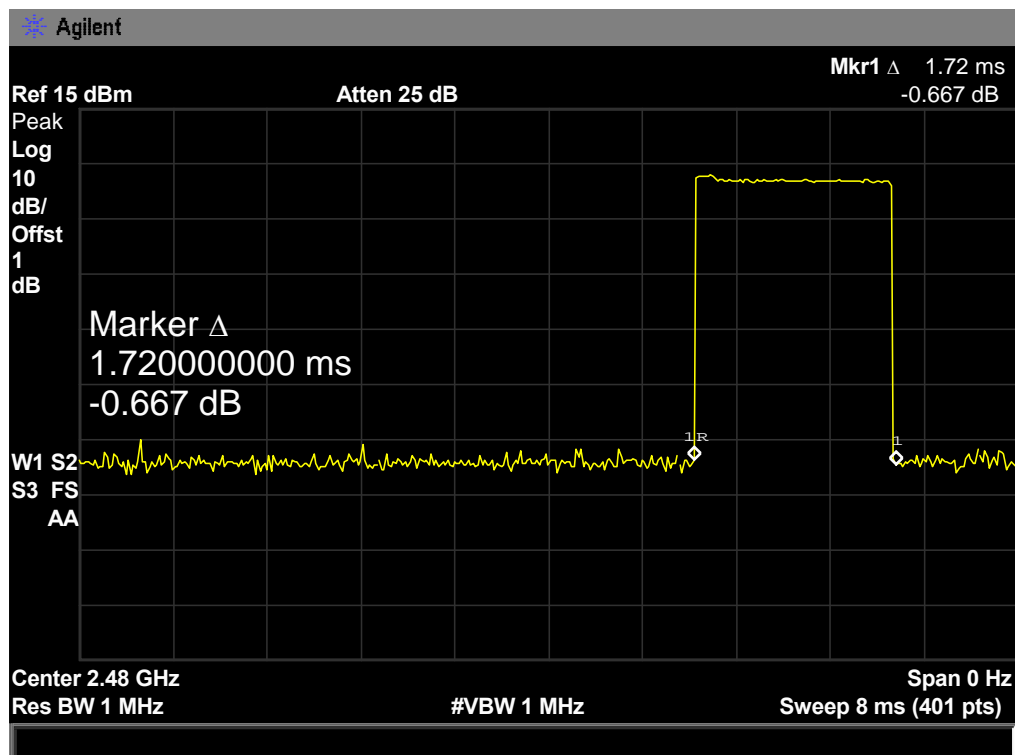
$\pi$  /4-DQPSK Hopping Mode DH3

2441 MHz



$\pi$  /4-DQPSK Hopping Mode DH3

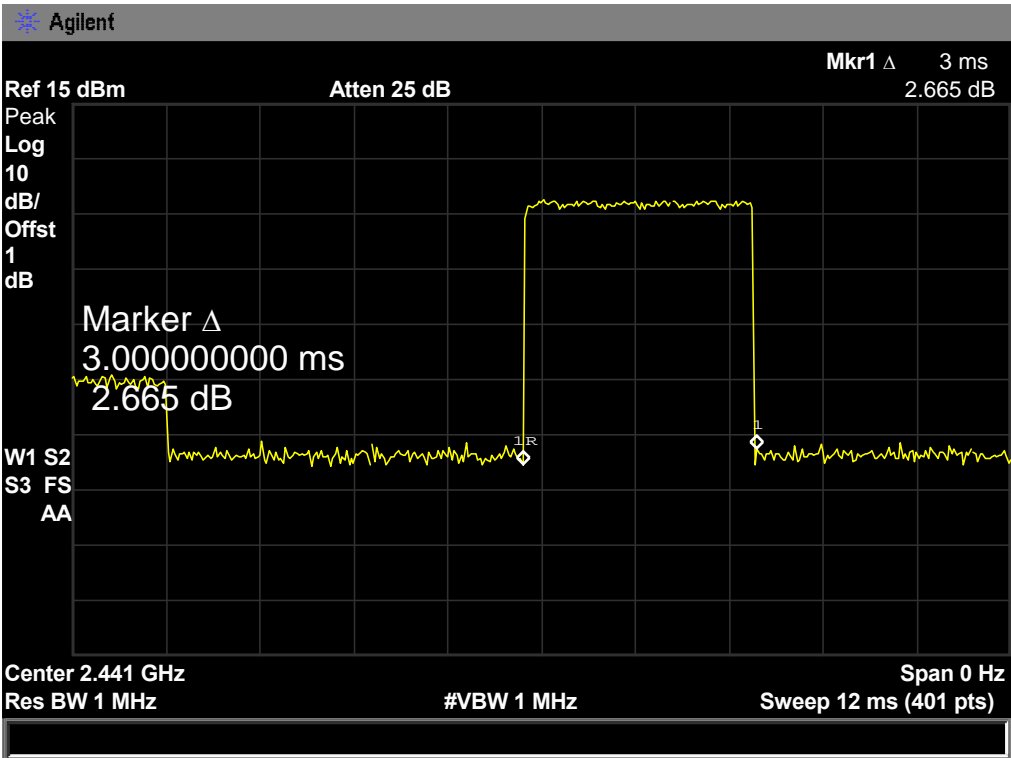
2480 MHz



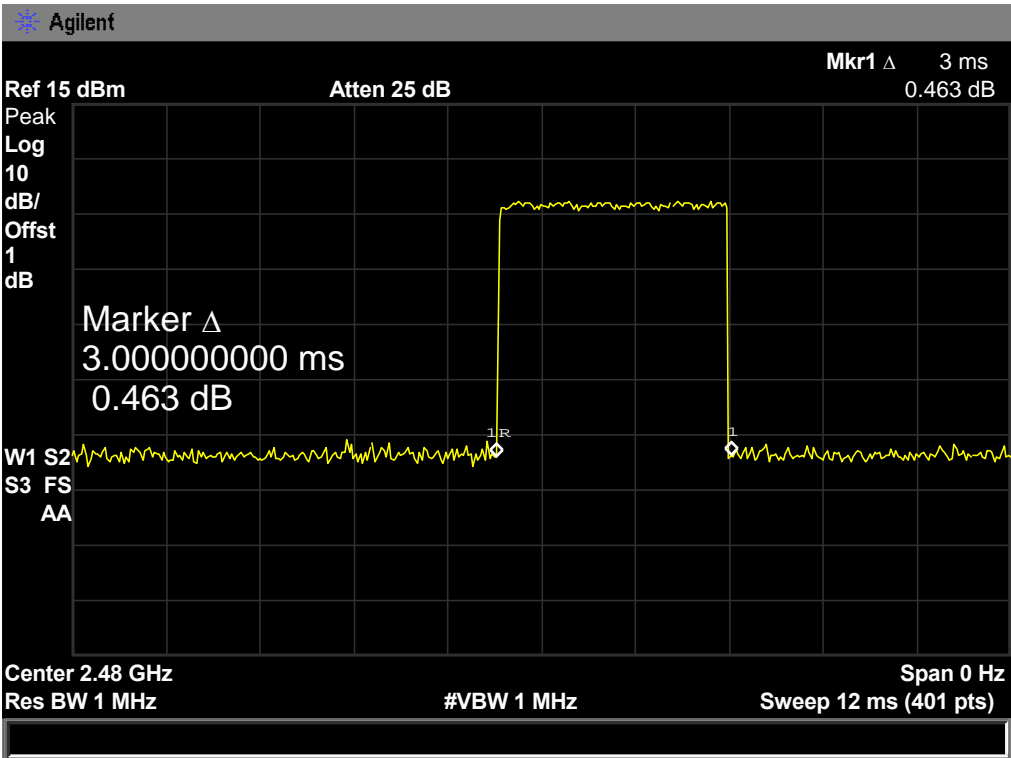




$\pi$  /4-DQPSK Hopping Mode DH5  
 2441 MHz



$\pi$  /4-DQPSK Hopping Mode DH5  
 2480 MHz



EUT:		Bluetooth FM Transmitter		Model Name :		FM25	
Temperature:		25 °C		Relative Humidity:		55%	
Test Voltage:		DC 3.7V					
Test Mode:		Hopping Mode (8-DPSK DH1)					
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)		Period Time (s)	Limit (ms)	Result	
2402	0.430	137.60		31.60	400	PASS	
2441	0.440	140.80					
2480	0.440	140.80					

8-DPSK Hopping Mode DH1

2402 MHz

Agilent

Ref 15 dBm

Atten 25 dB

Mkr1 Δ 430 μs  
-0.529 dB

Peak Log 10 dB/Offst 1 dB

Marker Δ 430.000000 μs  
-0.529 dB

W1 S2  
S3 FS  
AA

Center 2.402 GHz

Res BW 1 MHz

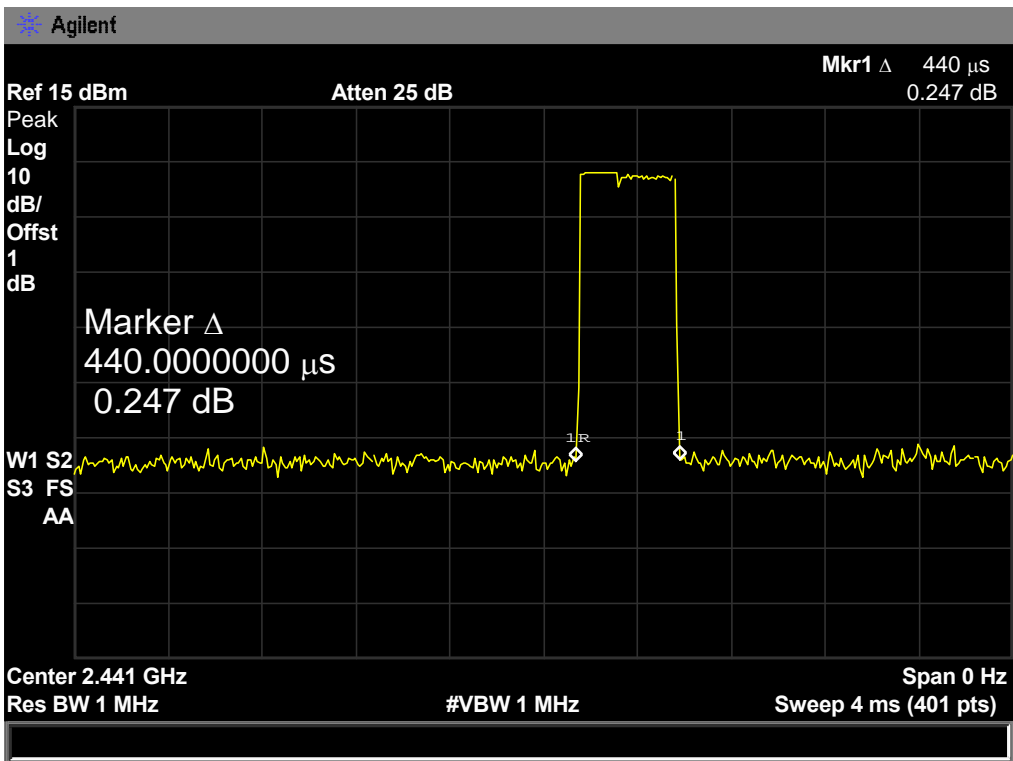
#VBW 1 MHz

Sweep 4 ms (401 pts)

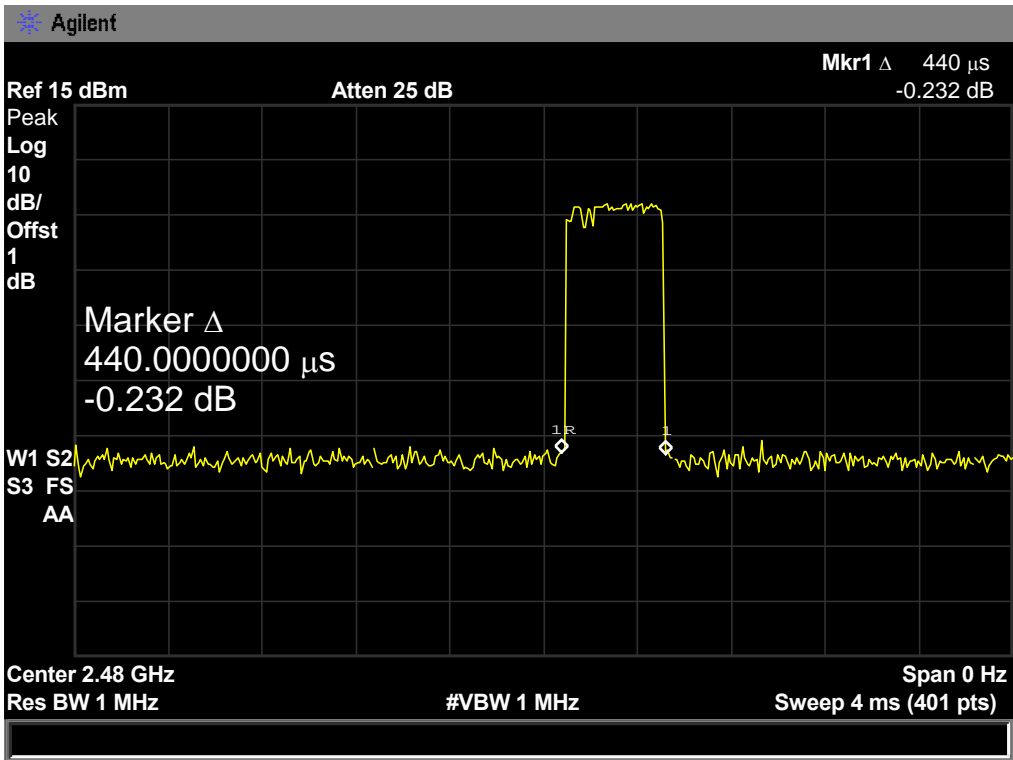
Span 0 Hz



8-DPSK Hopping Mode DH1  
 2441 MHz



8-DPSK Hopping Mode DH1  
 2480 MHz



EUT:	Bluetooth FM Transmitter		Model Name :	FM25	
Temperature:	25 °C		Relative Humidity:	55%	
Test Voltage:	DC 3.7V				
Test Mode:	Hopping Mode (8-DPSK DH3)				
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	1.720	275.20	31.60	400	PASS
2441	1.740	278.40			
2480	1.700	272.00			
8-DPSK Hopping Mode DH3					
2402 MHz					

Agilent

Ref 15 dBm

Atten 25 dB

Mkr1 Δ 1.72 ms  
-0.462 dB

Peak Log 10 dB/ Offst 1 dB

Marker Δ 1.72000000 ms  
-0.462 dB

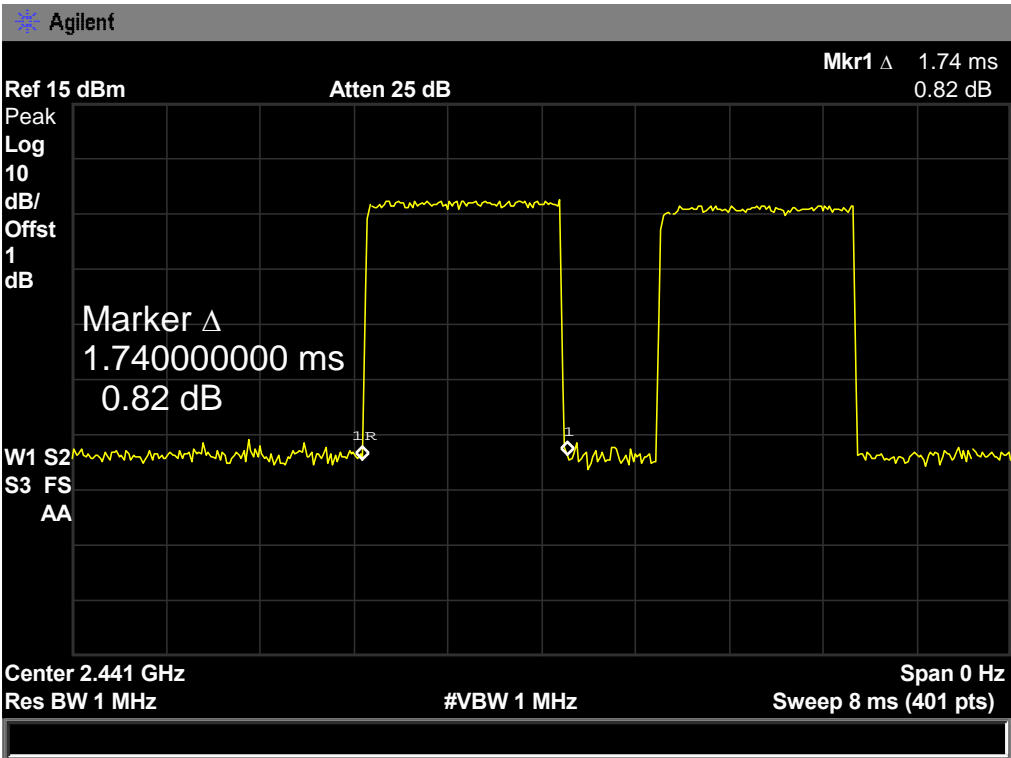
W1 S2  
S3 FS  
AA

Center 2.402 GHz  
Res BW 1 MHz

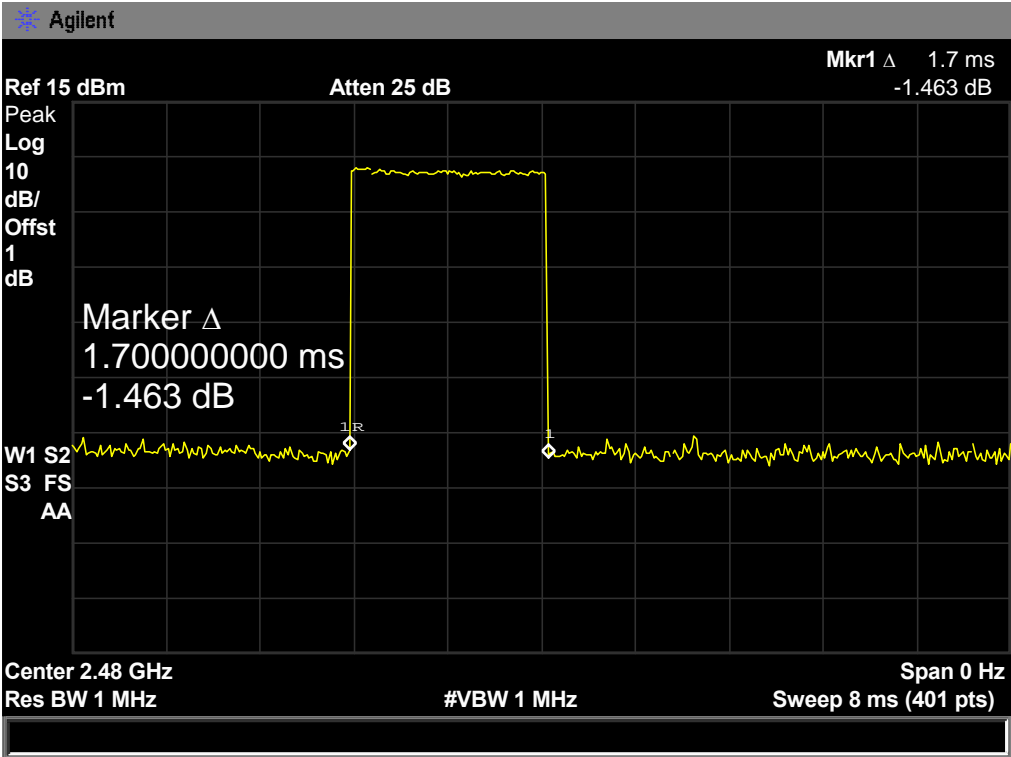
Span 0 Hz  
Sweep 8 ms (401 pts)



8-DPSK Hopping Mode DH3  
 2441 MHz



8-DPSK Hopping Mode DH3  
 2480 MHz



EUT:	Bluetooth FM Transmitter		Model Name :	FM25	
Temperature:	25 °C		Relative Humidity:	55%	
Test Voltage:	DC 3.7V				
Test Mode:	Hopping Mode (8-DPSK DH5)				
Channel (MHz)	Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2402	3.000	320.00	31.60	400	PASS
2441	3.000	320.00			
2480	3.000	320.00			
8-DPSK Hopping Mode DH5					
2402 MHz					

Agilent

Ref 15 dBmAtten 25 dB

Mkr1 Δ 3 ms-1.05 dB

Peak Log 10 dB/ Offst 1 dB

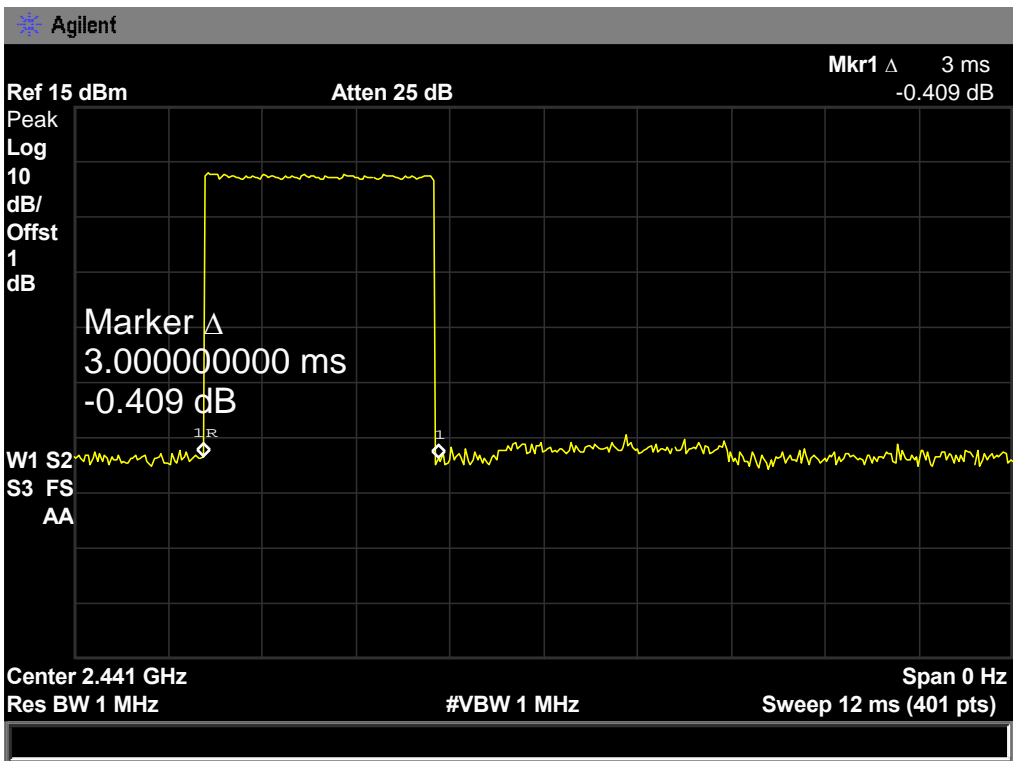
Marker Δ 3.000000000 ms-1.05 dB

W1 S2 S3 FS AA

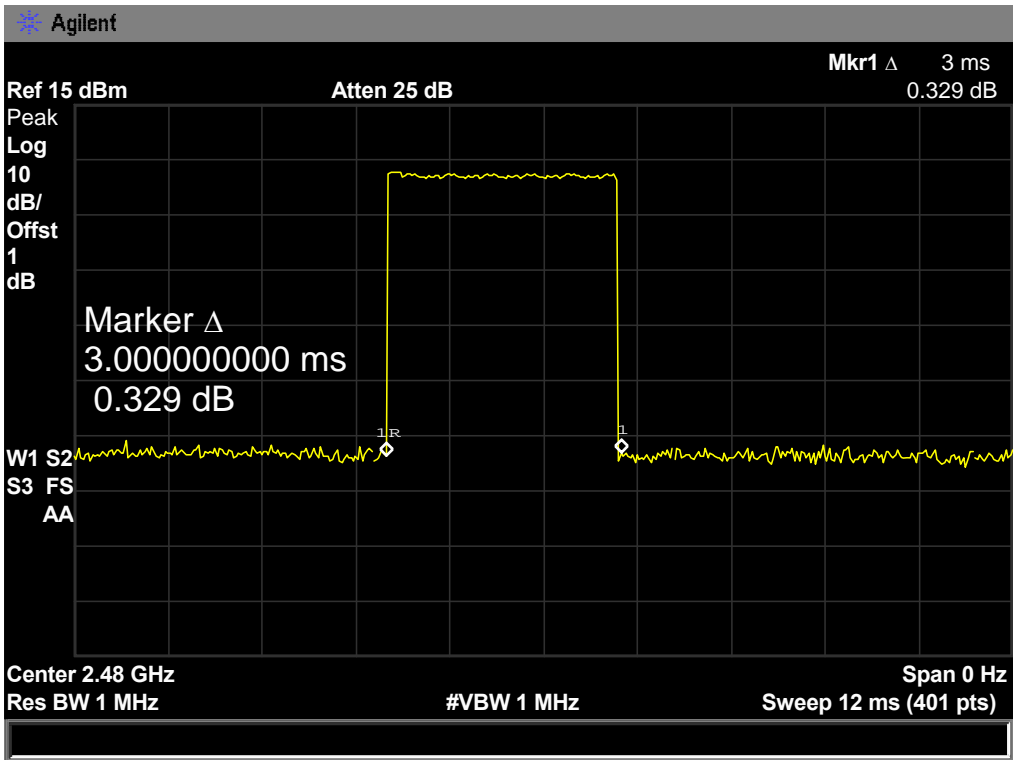
Center 2.402 GHzRes BW 1 MHz#VBW 1 MHzSpan 0 HzSweep 12 ms (401 pts)



8-DPSK Hopping Mode DH5  
 2441 MHz



8-DPSK Hopping Mode DH5  
 2480 MHz



## 9. Channel Separation and Bandwidth Test

### 9.1 Test Standard and Limit

9.1.1 Test Standard  
FCC Part 15.247

9.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Bandwidth	$\leq 1$ MHz (20dB bandwidth)	2400~2483.5
Channel Separation	$>25$ KHz or $>$ two-thirds of the 20 dB bandwidth Which is greater	2400~2483.5

### 9.2 Test Setup



### 9.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:  
Channel Separation: RBW=30 kHz, VBW=100 kHz.  
Bandwidth: RBW=30 kHz, VBW=100 kHz.
- (3) The bandwidth is measured at an amplitude level reduced 20dB from the reference level. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst –case (i.e the widest) bandwidth.
- (4) Measure the channel separation the spectrum analyzer was set to Resolution Bandwidth:30 kHz, and Video Bandwidth:100 kHz. Sweep Time set auto.

### 9.4 EUT Operating Condition

The EUT was set to the Hopping Mode for Channel Separation Test and continuously transmitting for the Bandwidth Test.



## 9.5 Test Data

<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 3.7V		
<b>Test Mode:</b>	TX Mode (GFSK)		
Channel frequency (MHz)	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402	833.0161	854.411	
2441	834.9934	850.492	
2480	829.2618	843.294	

GFSK TX Mode			
2402 MHz			

Agilent

Ref 15 dBm Atten 25 dB

#Peak Log 10 dB/ Offst 1 dB

Center 2.402000000 GHz

Center 2.402 GHz #Res BW 30 kHz #VBW 100 kHz Span 3 MHz Sweep 5 ms (401 pts)

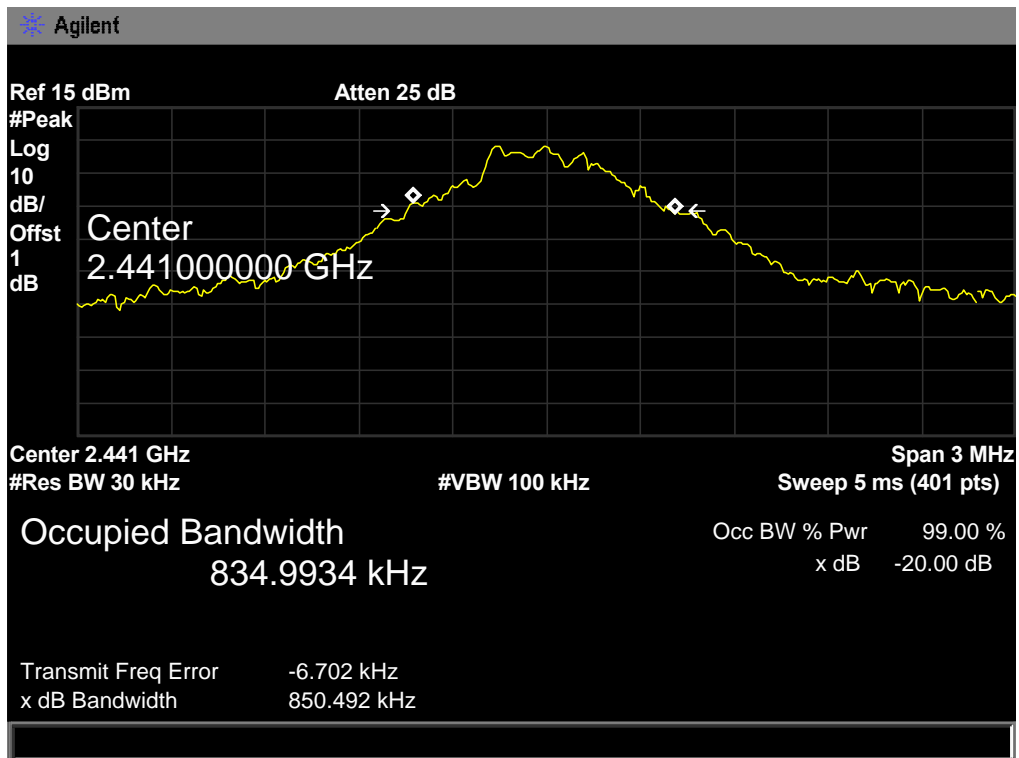
Occupied Bandwidth 833.0161 kHz

Occ BW % Pwr 99.00 % x dB -20.00 dB

Transmit Freq Error -4.829 kHz x dB Bandwidth 854.411 kHz

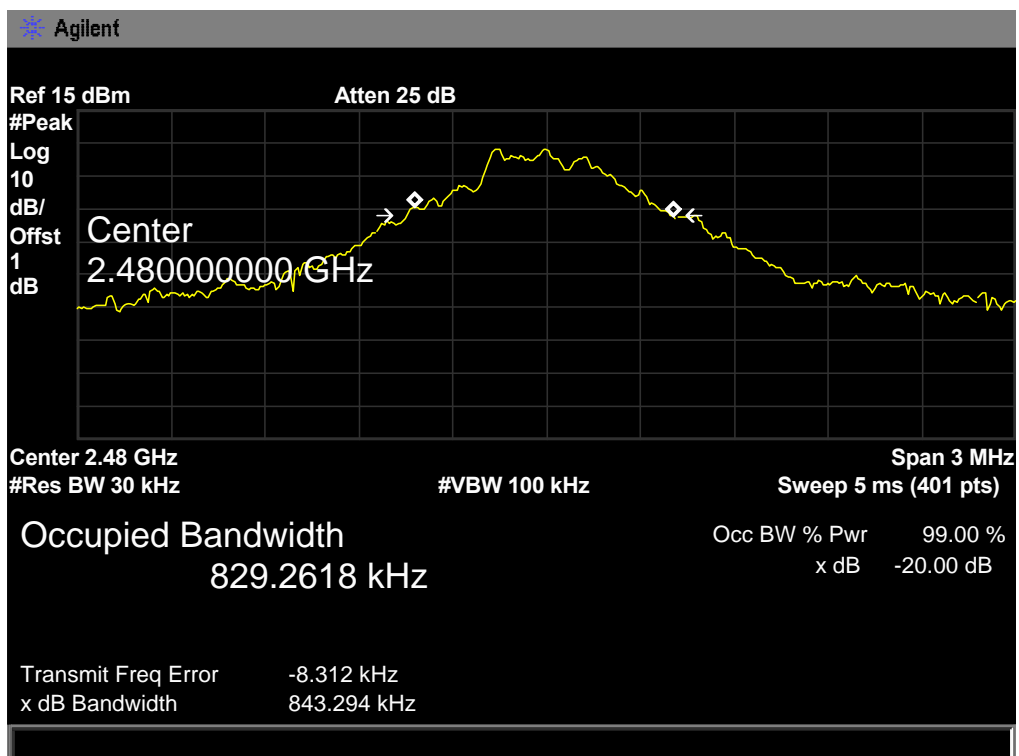
GFSK TX Mode

2441 MHz



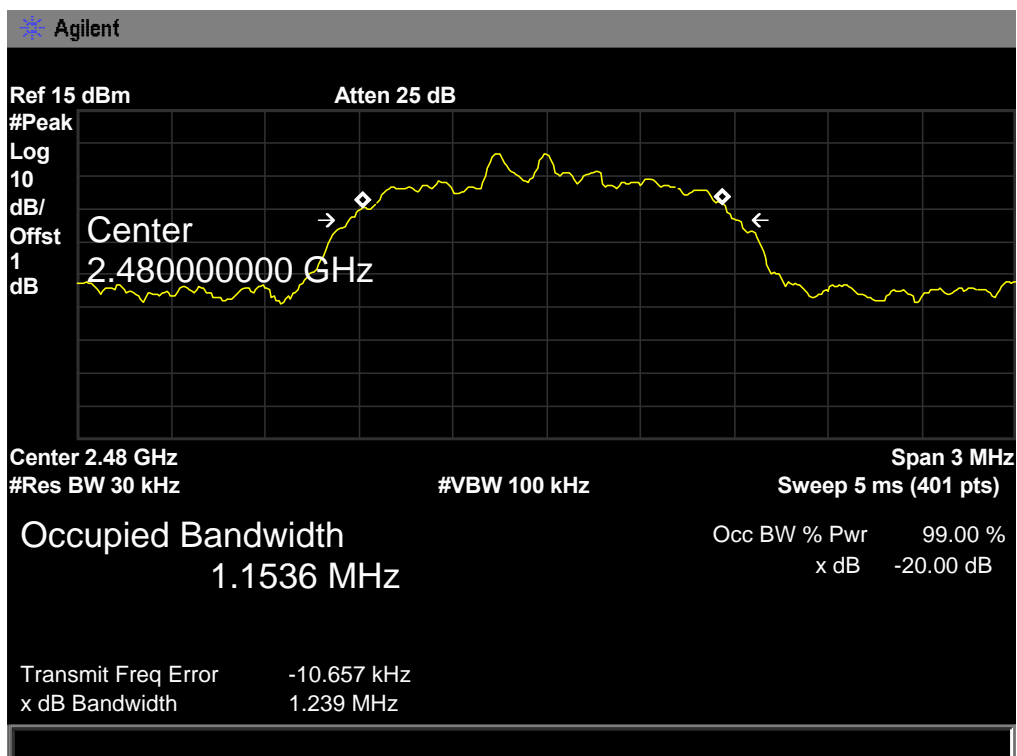
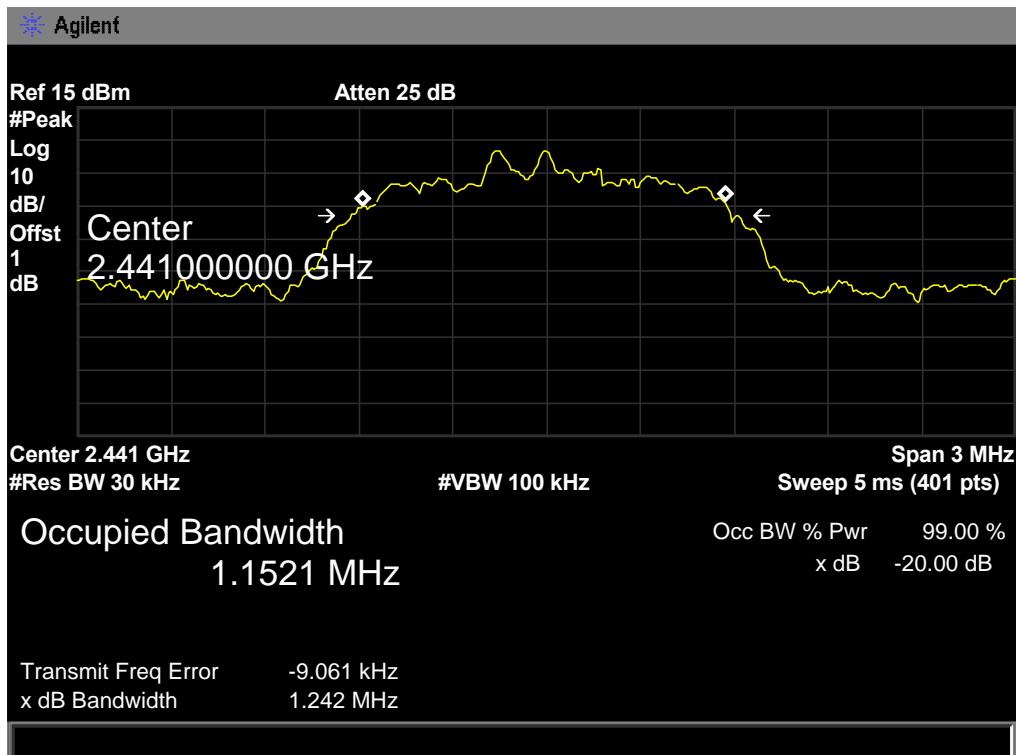
GFSK TX Mode

2480 MHz





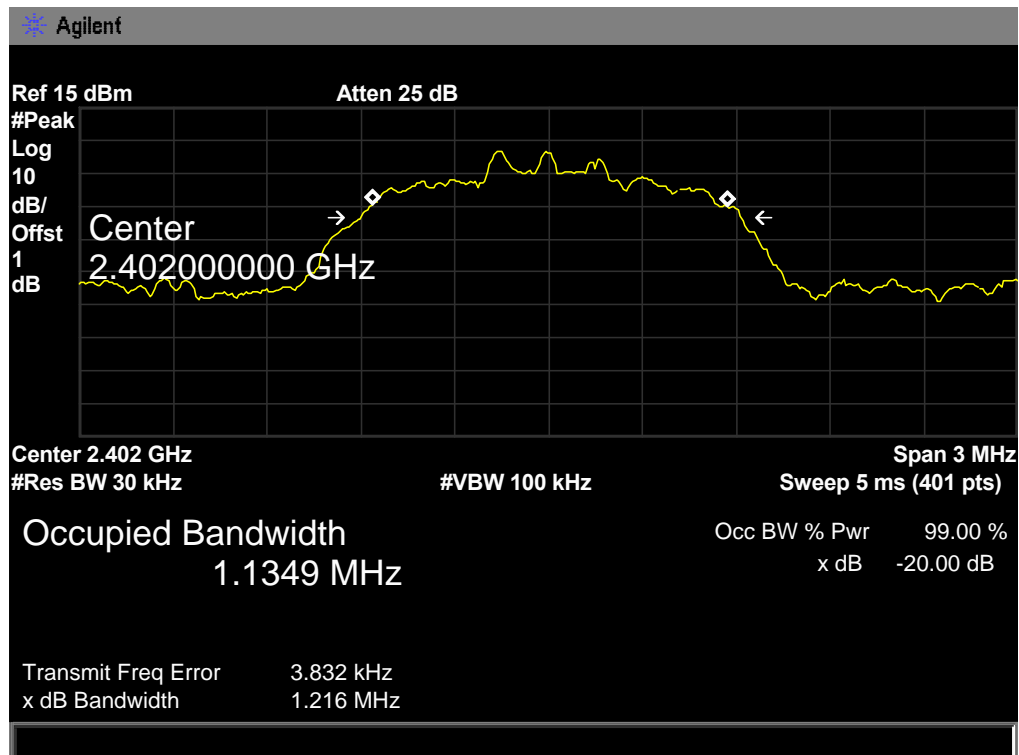




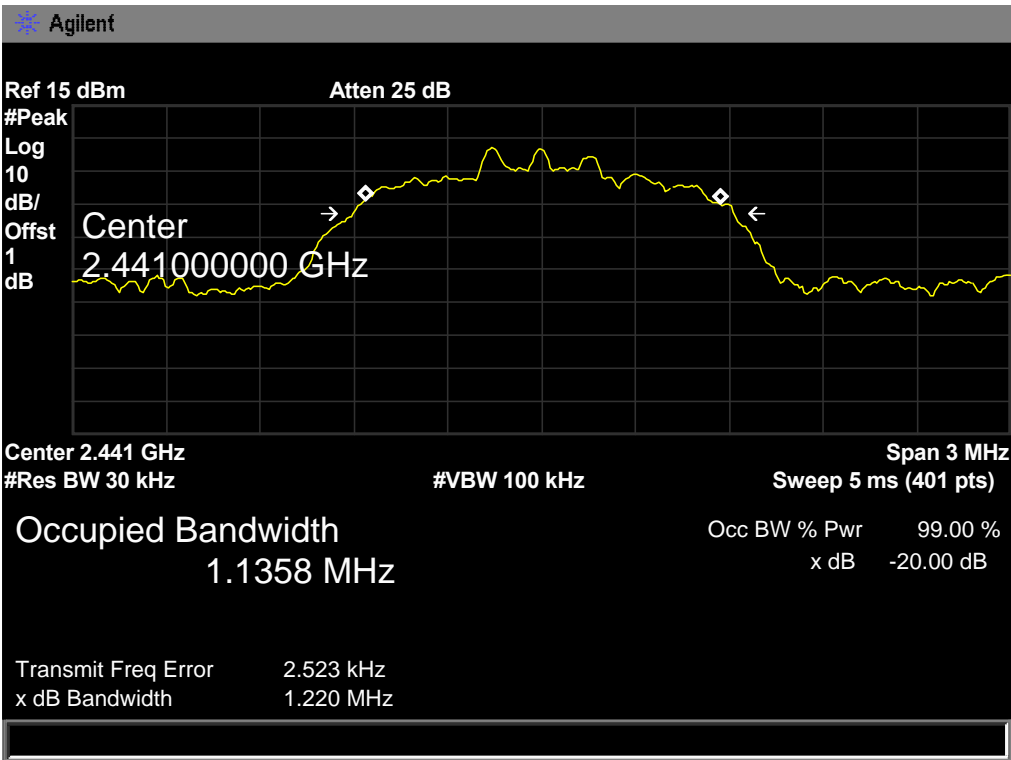


<b>EUT:</b>	Bluetooth FM Transmitter	<b>Model Name :</b>	FM25
<b>Temperature:</b>	25 °C	<b>Relative Humidity:</b>	55%
<b>Test Voltage:</b>	DC 3.7V		
<b>Test Mode:</b>	TX Mode (8-DPSK)		
Channel frequency (MHz)	99% OBW (kHz)	20dB Bandwidth (kHz)	20dB Bandwidth *2/3 (kHz)
2402	1134.90	1216.00	810.67
2441	1135.80	1220.00	813.33
2480	1129.90	1220.00	813.33

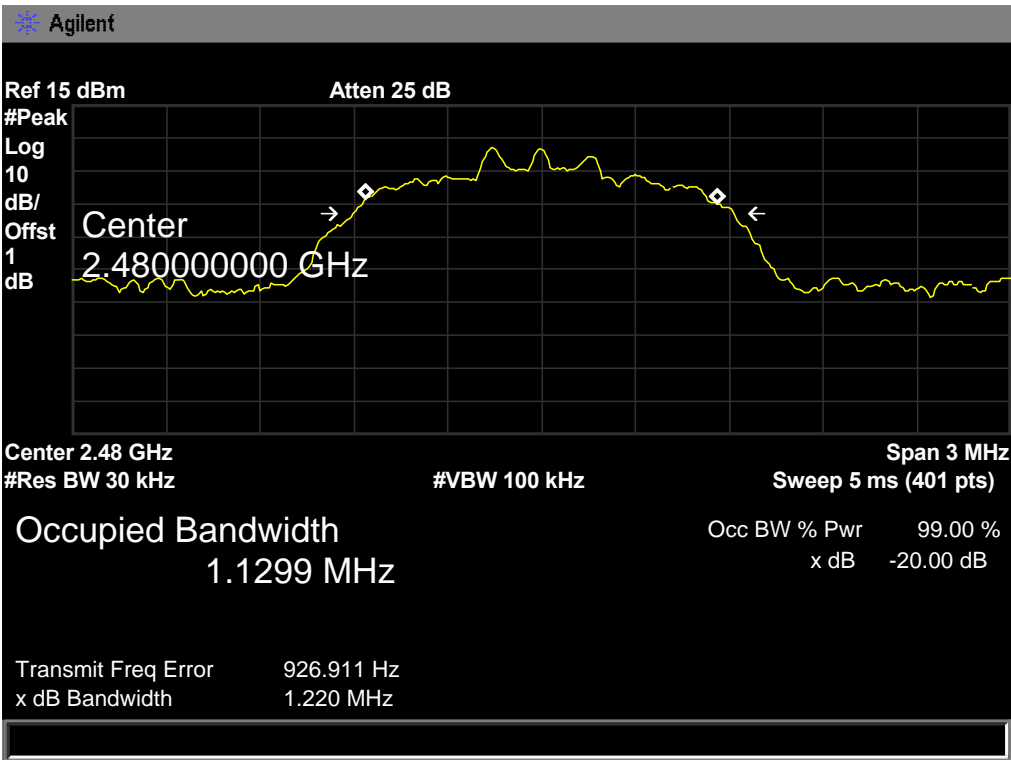
**8-DPSK TX Mode**  
**2402 MHz**



8-DPSK TX Mode  
 2441 MHz



8-DPSK TX Mode  
 2480 MHz





EUT:	Bluetooth FM Transmitter	Model Name :	FM25
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	Hopping Mode (GFSK)		
Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit (kHz)	
2402	1005.00	854.411	
2441	1005.00	850.492	
2480	1005.00	843.294	
GFSK Hopping Mode			
2402 MHz			

Agilent

Ref 15 dBm

Peak

Log

10

dB/

Offst

1

dB

Mkr1 Δ 1.0050 MHz

-0.286 dB

Atten 25 dB

1R

1

Marker

1.005000 MHz

-0.286 dB

Center 2.402 GHz

#Res BW 30 kHz

#VBW 100 kHz

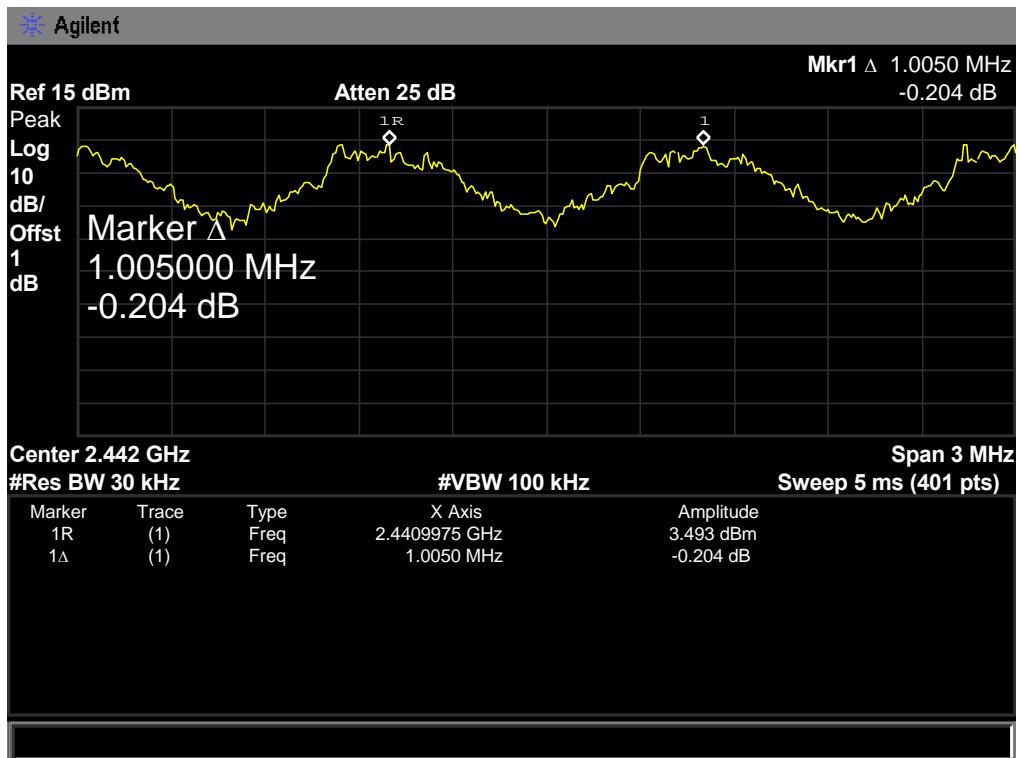
Span 3 MHz

Sweep 5 ms (401 pts)

Marker	Trace	Type	X Axis	Amplitude
1R	(1)	Freq	2.401990 GHz	3.183 dBm
1Δ	(1)	Freq	1.0050 MHz	-0.286 dB

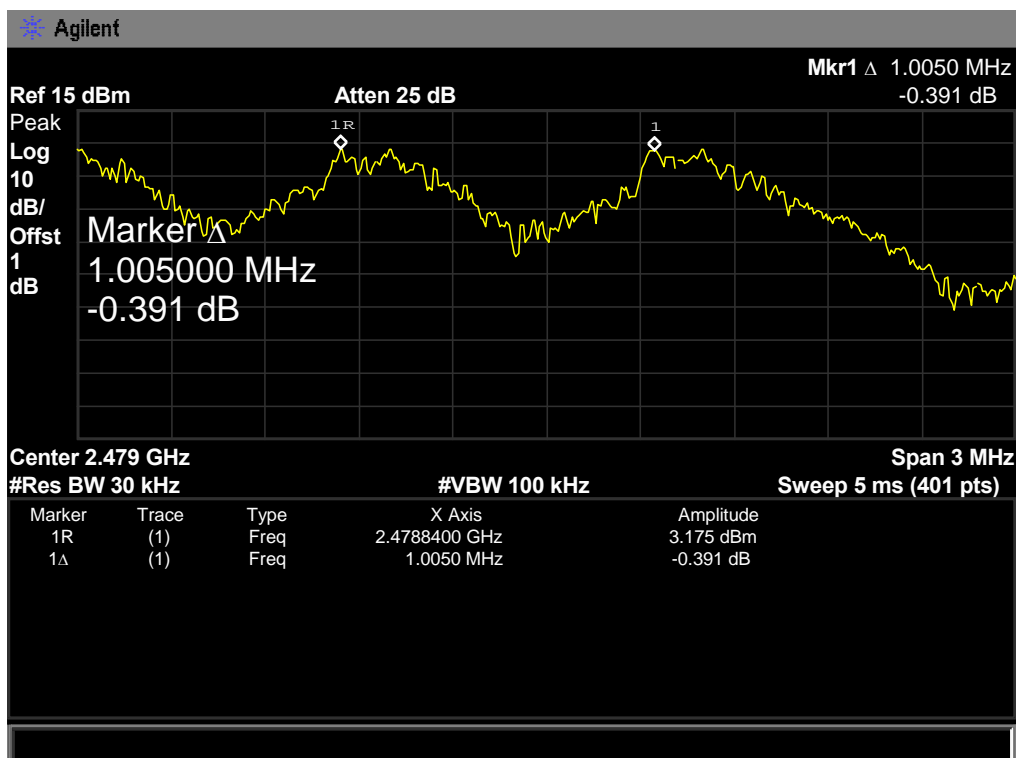
### GFSK Hopping Mode

2441 MHz

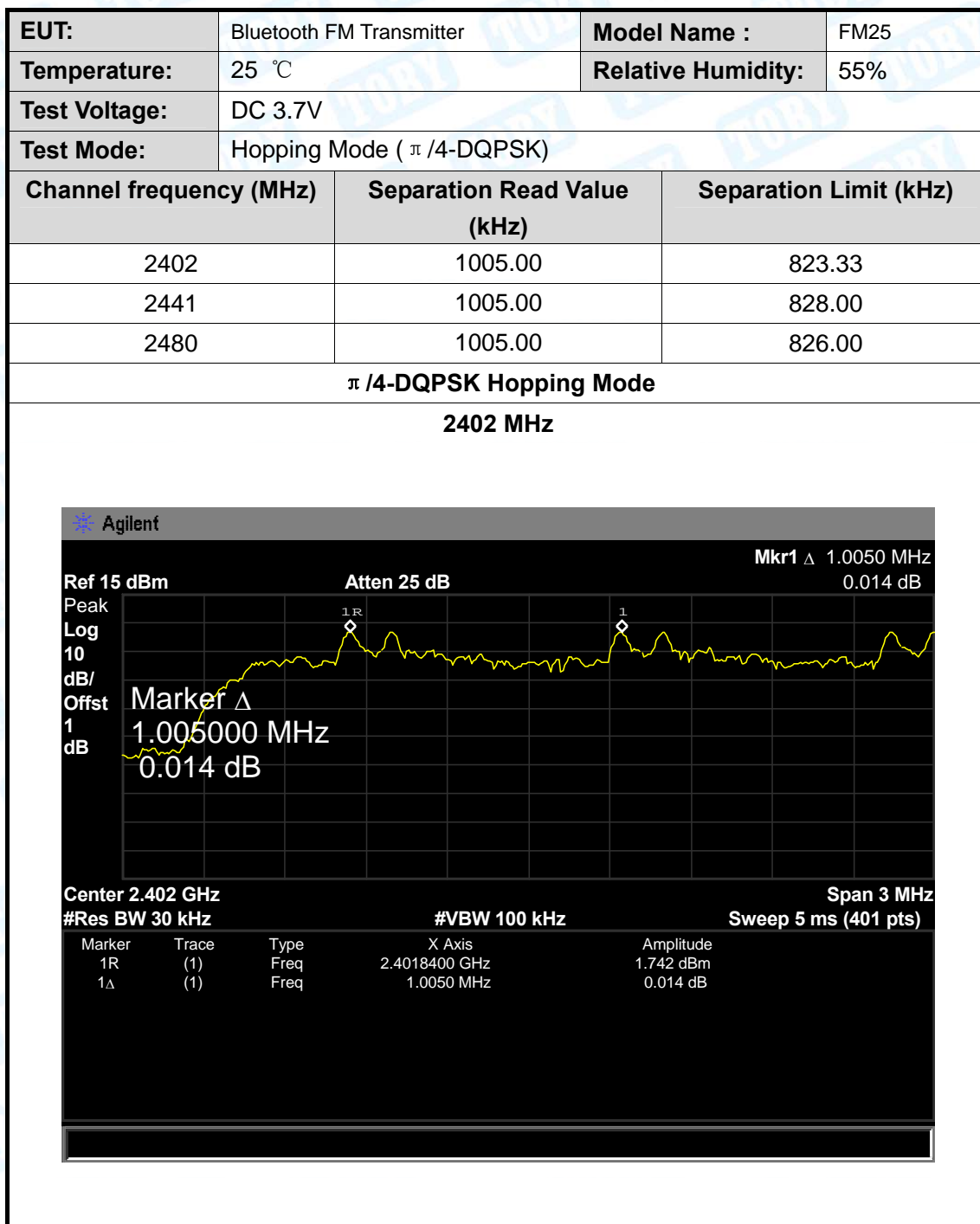


### GFSK Hopping Mode

2480 MHz

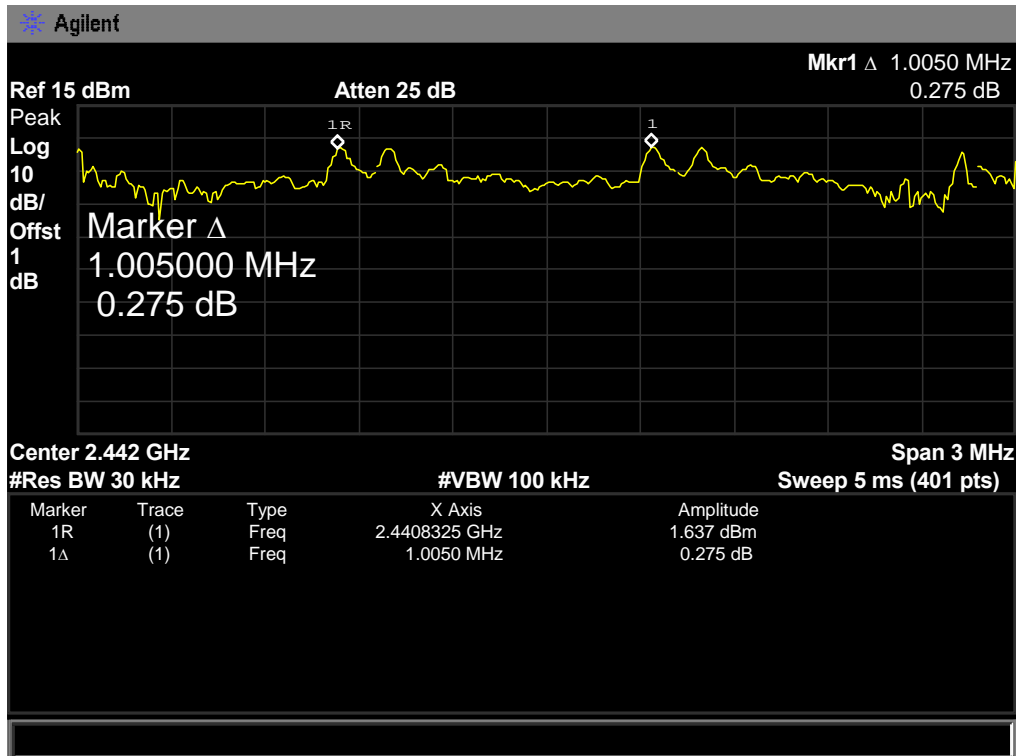






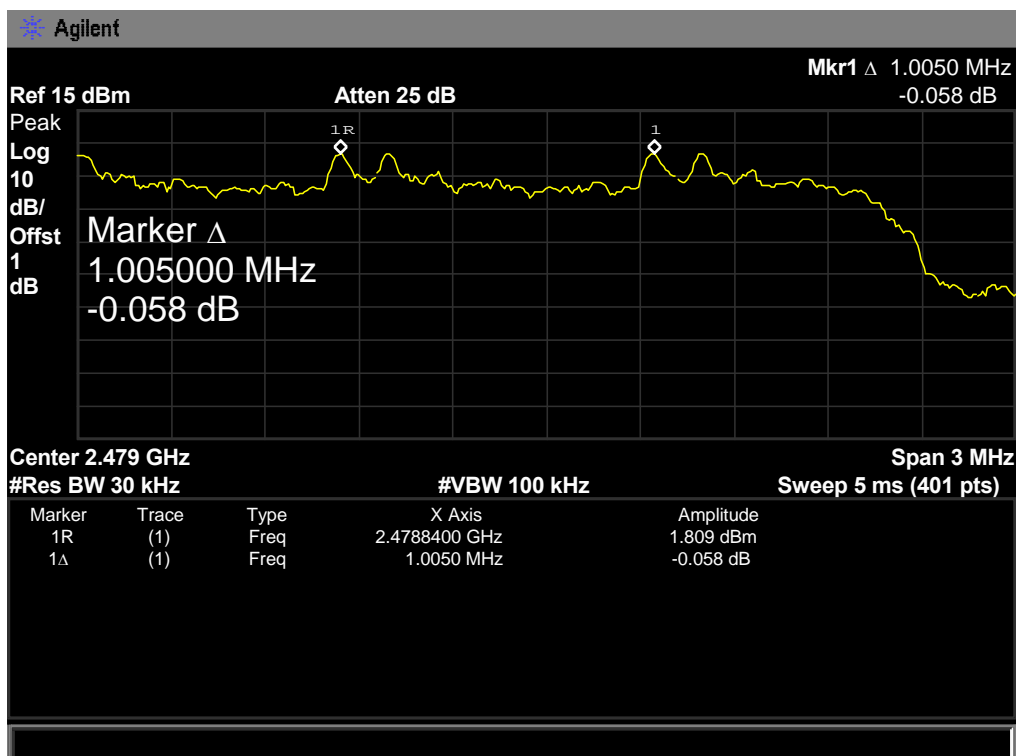
$\pi/4$ -DQPSK Hopping Mode

2441 MHz



$\pi/4$ -DQPSK Hopping Mode

2480 MHz

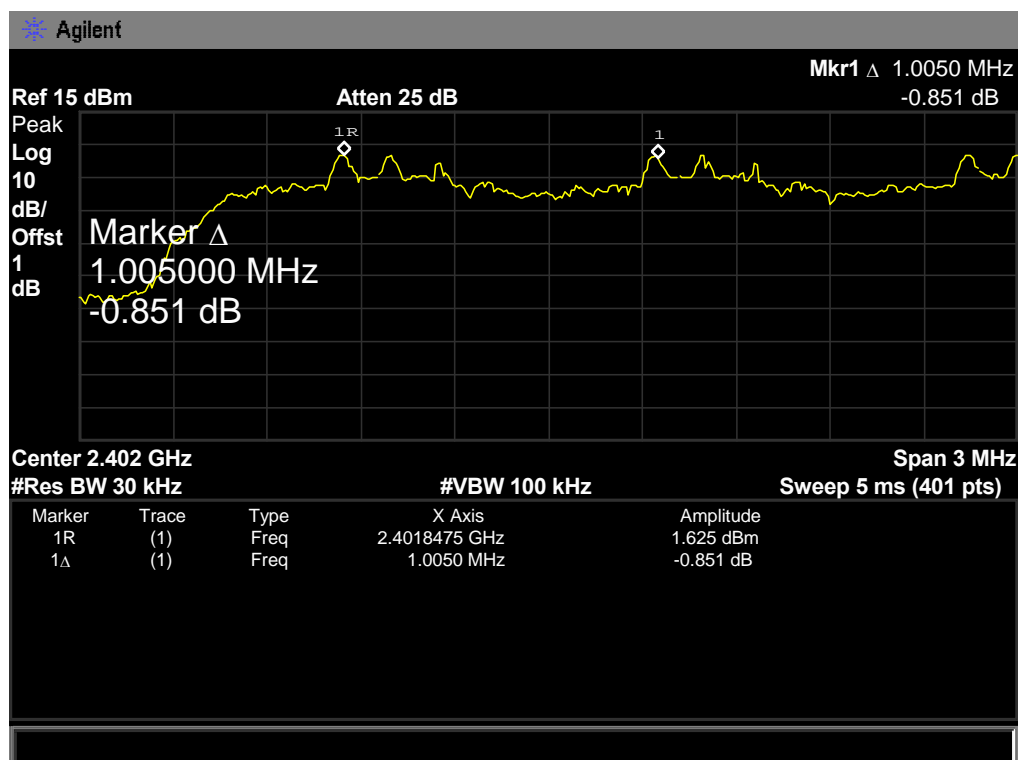




EUT:	Bluetooth FM Transmitter	Model Name :	FM25
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	Hopping Mode (8-DPSK)		
Channel frequency (MHz)	Separation Read Value (kHz)	Separation Limit (kHz)	
2402	1005.00	810.67	
2441	1005.00	813.33	
2480	1005.00	813.33	

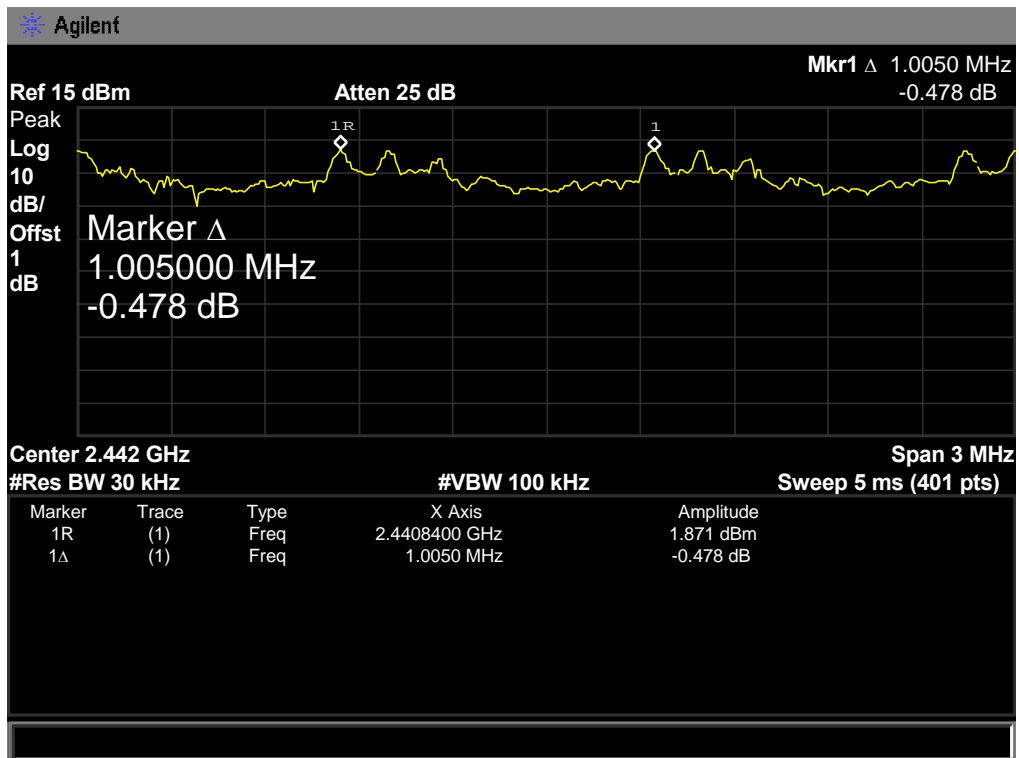
## 8-DPSK Hopping Mode

2402 MHz



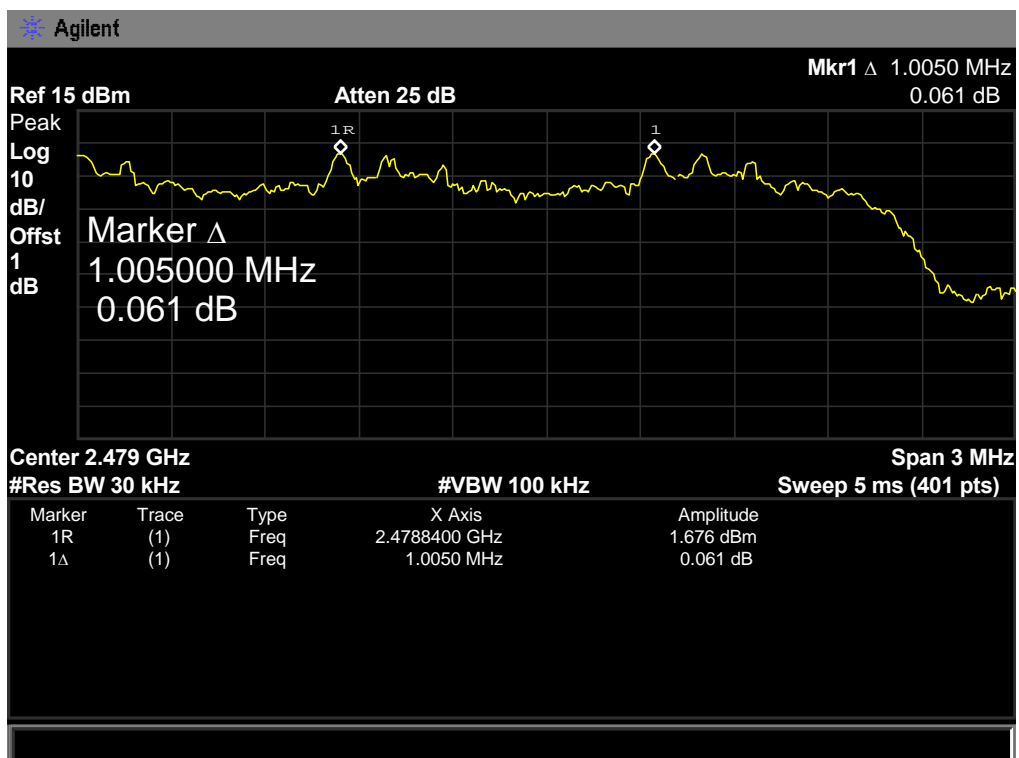
### 8-DPSK Hopping Mode

2441 MHz



### 8-DPSK Hopping Mode

2480 MHz





## 10. Peak Output Power Test

### 10.1 Test Standard and Limit

#### 10.1.1 Test Standard

FCC Part 15.247 (b) (1)

#### 10.1.2 Test Limit

Test Item	Limit	Frequency Range(MHz)
Peak Output Power	Hopping Channels>75 Power<1W(30dBm) Other <125 mW(21dBm)	2400~2483.5

### 10.2 Test Setup



### 10.3 Test Procedure

- (1) The EUT was directly connected to the spectrum analyzer and antenna output port as show in the block diagram above.
- (2) Spectrum Setting:  
Peak Detector: RBW=1 MHz, VBW=3 MHz for bandwidth less than 1MHz.  
RBW=3 MHz, VBW=3 MHz for bandwidth more than 1MHz.

### 10.4 EUT Operating Condition

The EUT was set to continuously transmitting in the max power during the test.

## 10.5 Test Data

EUT:	Bluetooth FM Transmitter	Model Name :	FM25
Temperature:	25 °C	Relative Humidity:	55%
Test Voltage:	DC 3.7V		
Test Mode:	TX Mode (GFSK)		
Channel frequency (MHz)	Test Result (dBm)	Limit (dBm)	
2402	4.445	30	
2441	4.469		
2480	4.357		
GFSK TX Mode			
2402 MHz			

Agilent

Ref 15 dBm

Atten 25 dB

Mkr1 2.4021650 GHz  
4.445 dBm

Peak Log 10 dB/Offst 1 dB

Marker  
2.402165000 GHz  
4.445 dBm

M1 S2  
S3 FC  
AA

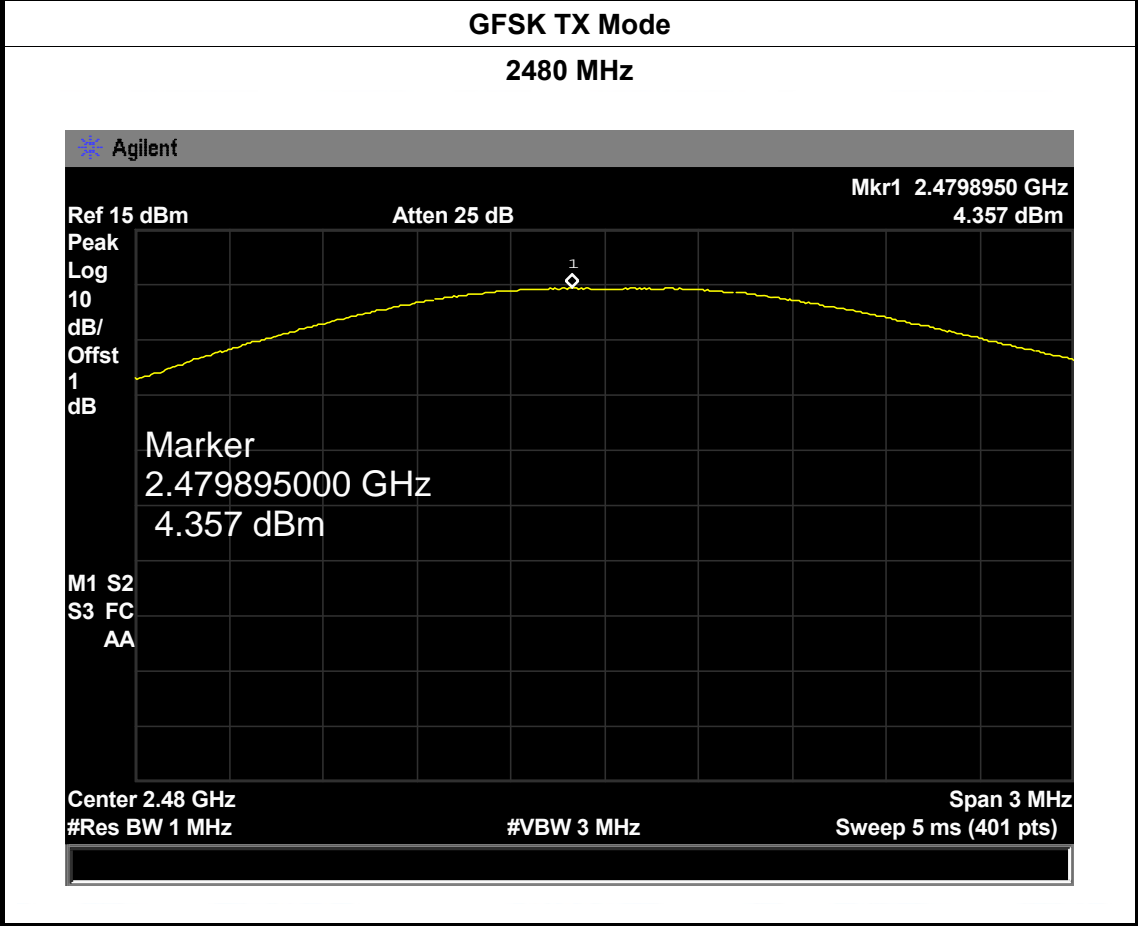
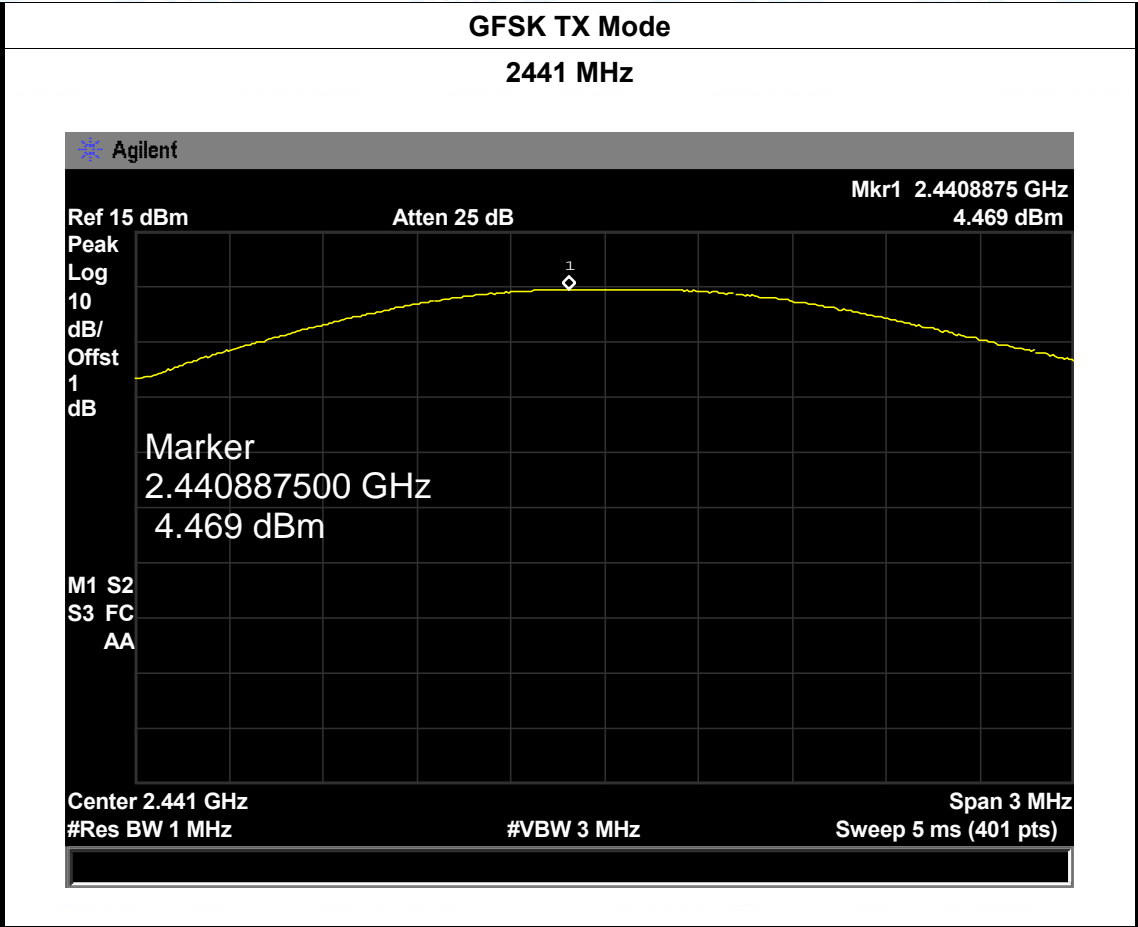
Center 2.402 GHz

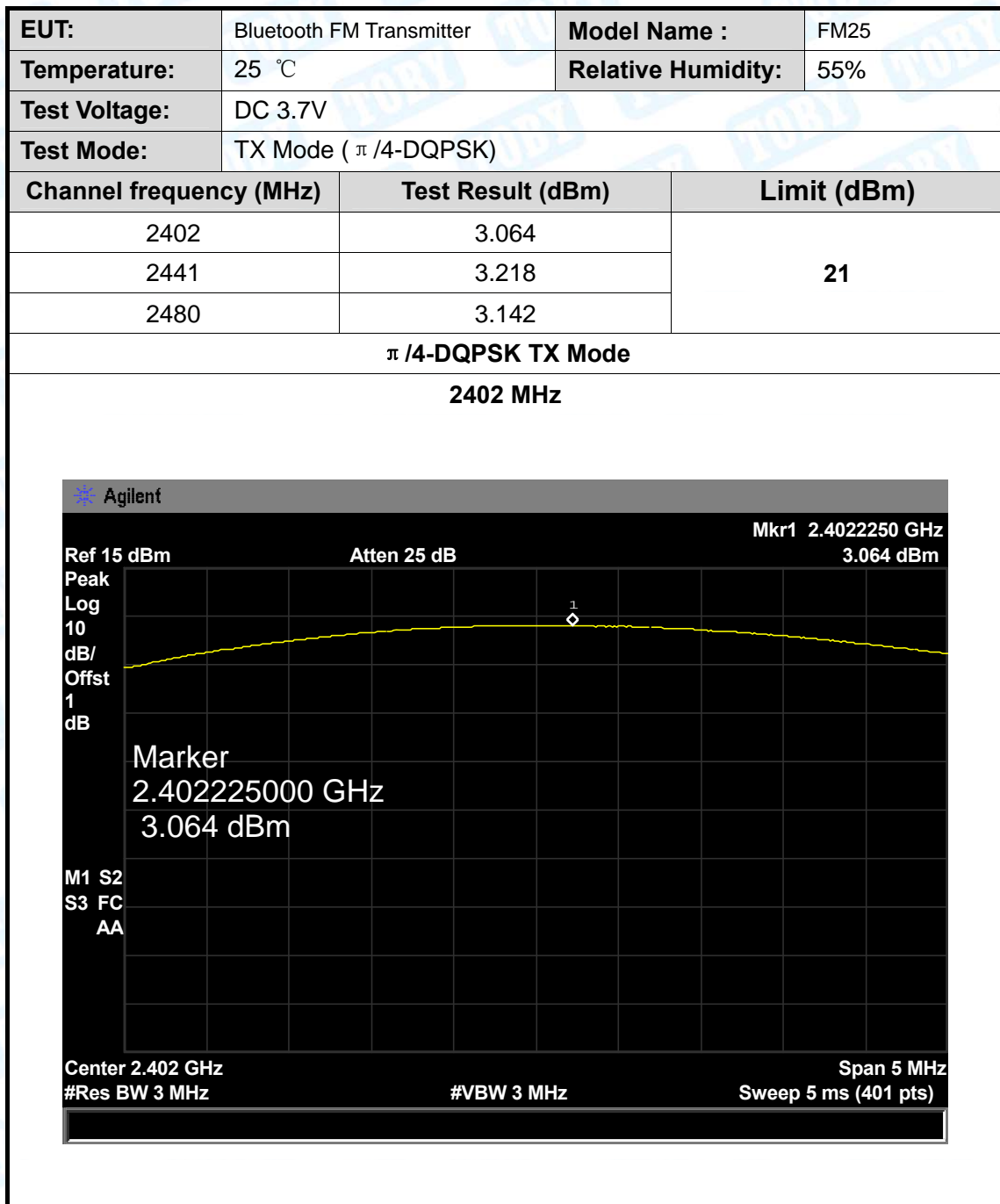
#Res BW 1 MHz

#VBW 3 MHz

Span 3 MHz  
Sweep 5 ms (401 pts)

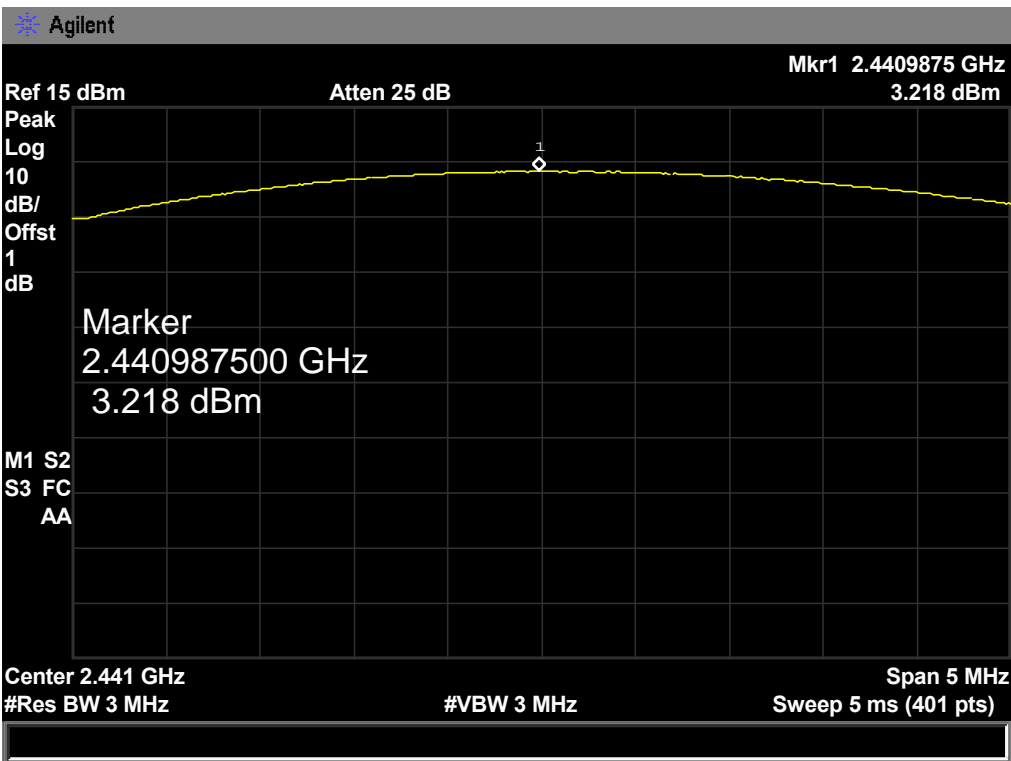




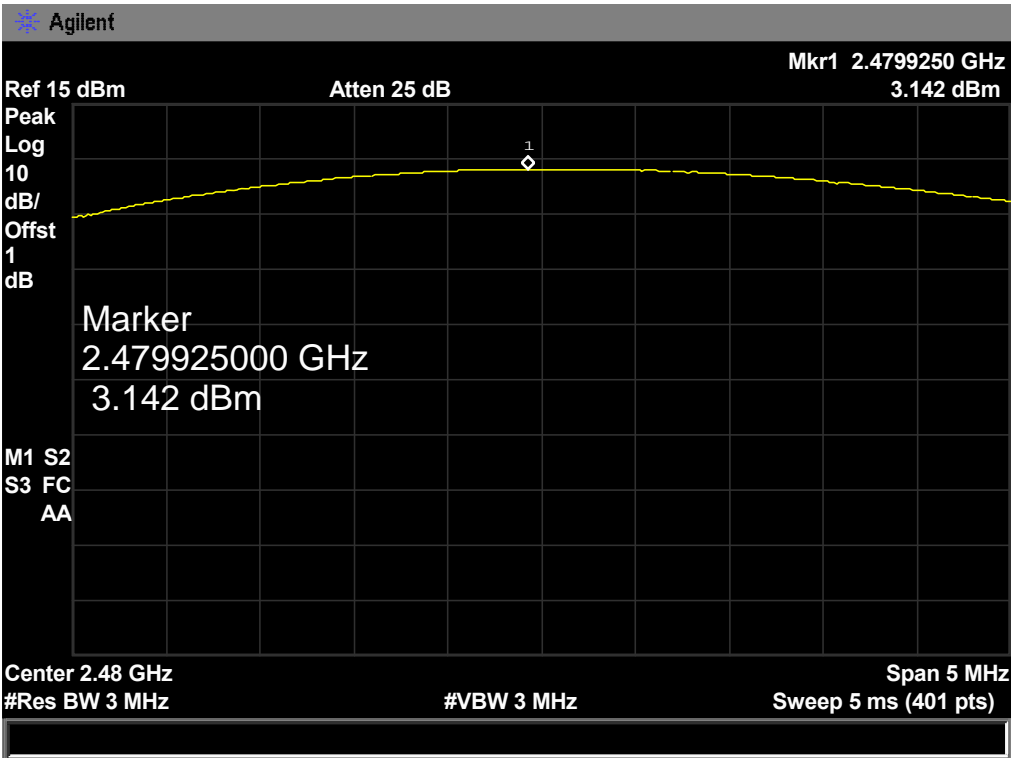


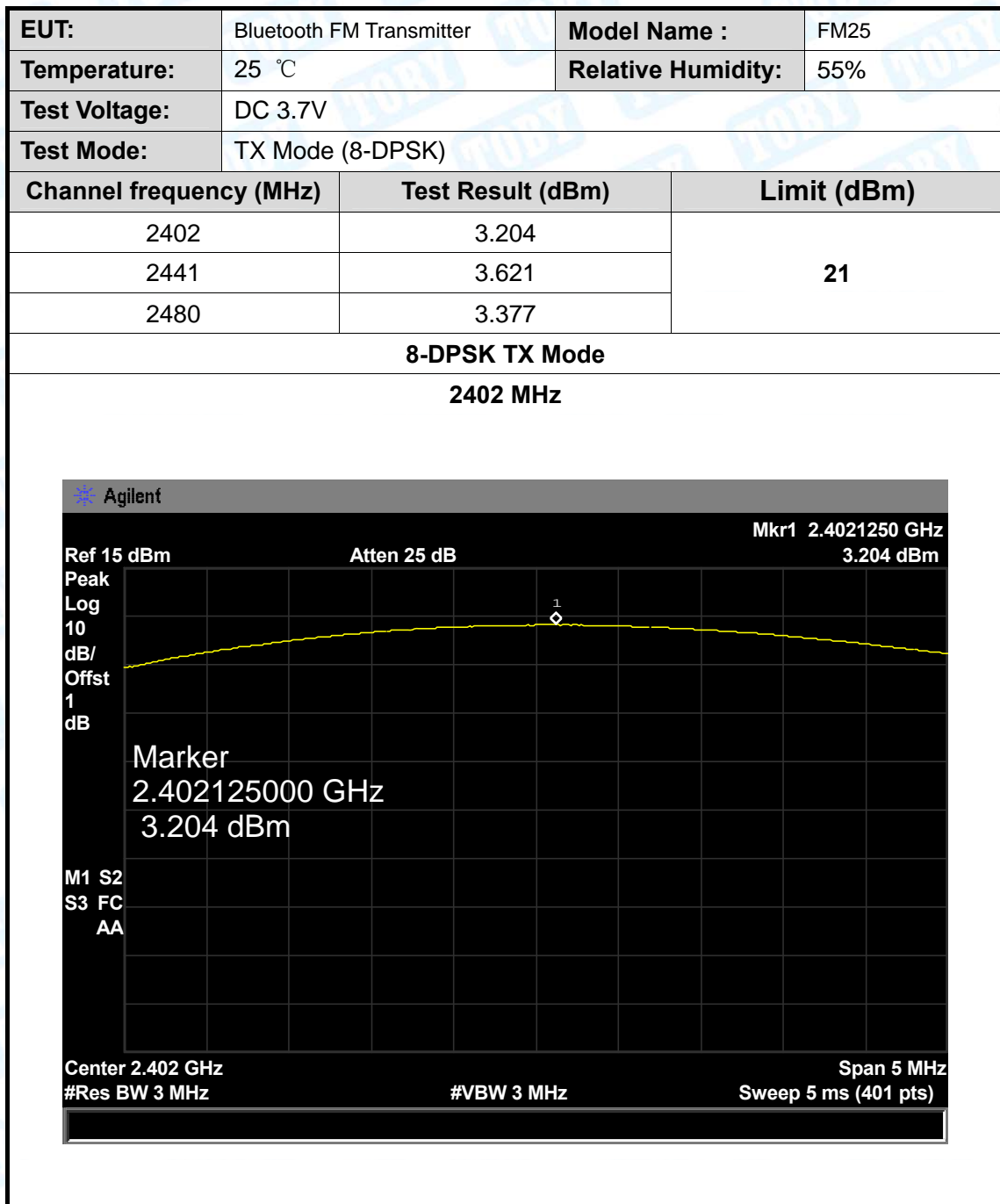


$\pi$  /4-DQPSK TX Mode  
 2441 MHz



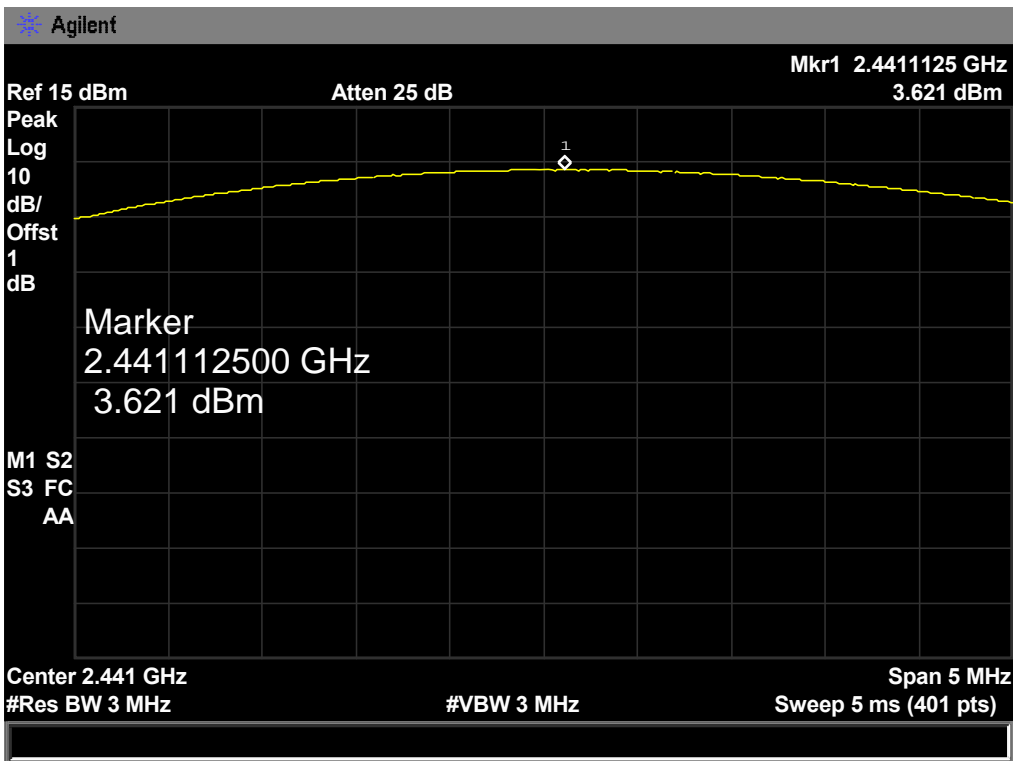
$\pi$  /4-DQPSK TX Mode  
 2480 MHz



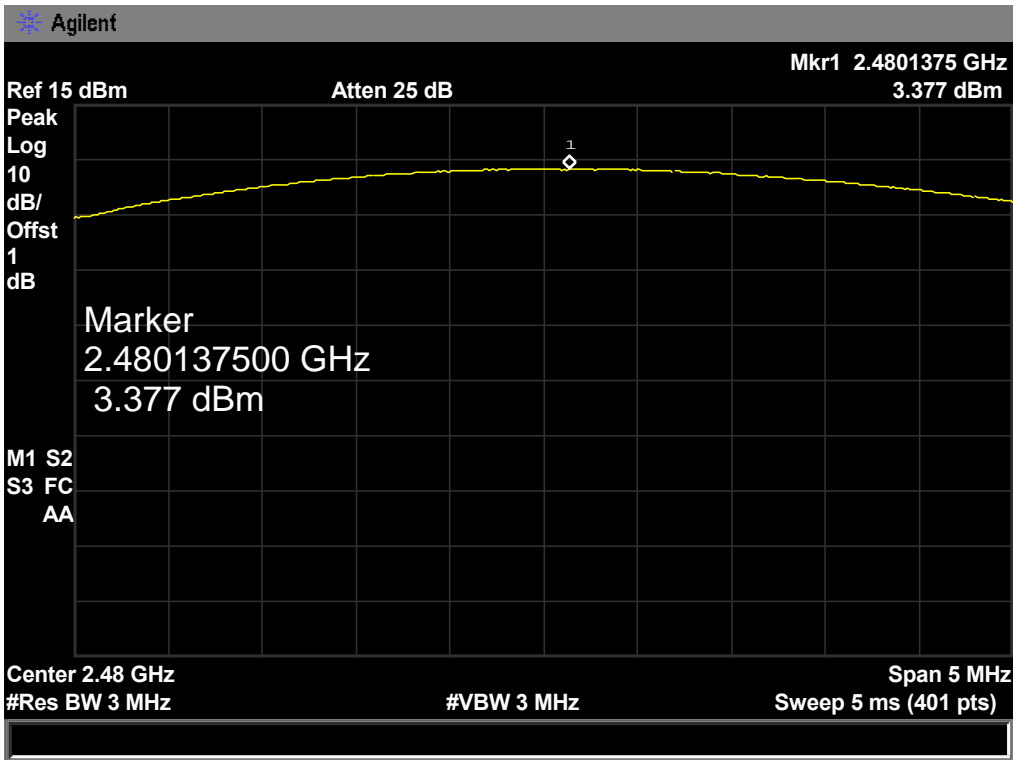




8-DPSK TX Mode  
2441 MHz



8-DPSK TX Mode  
2480 MHz



## 11. Antenna Requirement

### 11.1 Standard Requirement

#### 11.1.1 Standard

FCC Part 15.203

#### 11.1.2 Requirement

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

### 11.2 Antenna Connected Construction

The directional gains of the antenna used for transmitting is 0 dBi, and the antenna connector is de-signed with permanent attachment and no consideration of replacement. Please see the EUT photo for details.

The EUT antenna is a PCB Antenna. It complies with the standard requirement.

Antenna Type
<input checked="" type="checkbox"/> Permanent attached antenna
<input type="checkbox"/> Unique connector antenna
<input type="checkbox"/> Professional installation antenna