FCC 47 CFR PART 15 SUBPART C 15.247

TEST REPORT

FOR

SG700BT Wireless Linear Imager Bar Code Scanner

Model : SG700BT, SGXX0BT (X=0~9)

Trade Name: Champtek

Issued to

Champtek Incorporated
5/F, No. 2, Alley 2, Shih-Wei Lane, Chung-Cheng Rd., Xindian Dist.,
New Taipei City 231, Taiwan

Issued by
WEISHANG Certification Co., Ltd.

Xizhi Office	**12F.-3, No.27-1, Ln. 169, Kangning St., Xizhi Dist., New Taipei City 221, Taiwan (R.O.C.)**
Test Site	**No. 74-1, Shibachong Xi, Shiding Shiang, New Taipei City 223, Taiwan (R.O.C.)**

Contents

1. General Information

Applicant	:	**Champtek Incorporated**
Address	:	**5/F, No. 2, Alley 2, Shih-Wei Lane, Chung-Cheng Rd., Xindian Dist., New Taipei City 231, Taiwan**
Manufacturer	:	**Champtek Incorporated**
Address	:	**5/F, No. 2, Alley 2, Shih-Wei Lane, Chung-Cheng Rd., Xindian Dist., New Taipei City 231, Taiwan**
EUT	:	**SG700BT Wireless Linear Imager Bar Code Scanner**
Model Name	:	**SG700BT, SGXX0BT (X=0~9)**
Model Differences	:	**For marketing purpose**

Is here with confirmed to comply with the requirements set out in the FCC Rules and Regulations Part 15 Subpart C and the measurement procedures were according to ANSI C63.10-2013. The said equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

FCC part 15 subpart C

Receipt Date : 07/14/2015 Final Test Date : 07/27/2015

Tested By: **Reviewed by:**

July 28, 2015 Ben Lu / Engineer
Date

July 28, 2015 Brian Yu / Manager
Date Designation Number: TW1048

2. Report of Measurements and Examinations

2.1 List of Measurements and Examinations

FCC Rule	. Description of Test	Result
15.203	. Antenna Requirement	Pass
15.207	. Conducted Emission	Pass
15.209	. Radiated Emission	Pass
15.247(a)(1)	. Channel Carrier Frequencies Separation	Pass
15.247(a)(1)	. 20dB Bandwidth Measurement	Pass
15.247(a)(1)	. Dwell Time	Pass
15.247(b)	. Number of Hopping Channels	Pass
FCC PUBLIC NOTICE DA-00-0705	Pseudorandom Frequency Hopping Sequence	Pass
15.247(b)	. Peak Output Power Measurement Data	Pass
15.247(d)	. Band Edges Measurement Data	Pass

*Note : All test sites and the data are completed in the lab with TAF qualifications. (TW1048)

3. Test Configuration of Equipment under Test

3.1 Description of the tested samples

EUT Name	:	SG700BT Wireless Linear Imager Bar Code Scanner
Model Number	:	SG700BT
Receipt Date	:	07/14/2015
Input Voltage	:	(1) DC 3.6V (From Li-ion Battery) (2) DC 5V (From PC or Notebook) (3) Input : AC 100-240V 50/60Hz 0.5A (From Adapter-- Charger) Output: DC 5V, 2A
RF Output Power	:	3 dBm
Power From	:	☑Inside ☑Outside ☑Adaptor ☑Battery ☐AC Power Source ☐DC Power Source ☑Support Unit PC or Notebook
Operate Frequency	:	Refer to the channel list as described below (2.402 ~2.480 GHz)
Modulation Technique	:	GFSK，π/4-DQPSK，8DPSK
Number of Channels	:	79
Channel spacing	:	☐N/A ☑ 1 MHz
Operating Mode	:	☐Simplex ☑ Duplex
Antenna Type	:	Chip antenna
Channel bandwidth	:	1 MHz
Antenna gain	:	2 dBi

3.2 Carrier Frequency of Channels

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
00	2402	20	2422	40	2442	60	2462
01	2403	21	2423	41	2443	61	2463
02	2404	22	2424	42	2444	62	2464
03	2405	23	2425	43	2445	63	2465
04	2406	24	2426	44	2446	64	2466
05	2407	25	2427	45	2447	65	2467
06	2408	26	2428	46	2448	66	2468
07	2409	27	2429	47	2449	67	2469
08	2410	28	2430	48	2450	68	2470
09	2411	29	2431	49	2451	69	2471
10	2412	30	2432	50	2452	70	2472
11	2413	31	2433	51	2453	71	2473
12	2414	32	2434	52	2454	72	2474
13	2415	33	2435	53	2455	73	2475
14	2416	34	2436	54	2456	74	2476
15	2417	35	2437	55	2457	75	2477
16	2418	36	2438	56	2458	76	2478
17	2419	37	2439	57	2459	77	2479
18	2420	38	2440	58	2460	78	2480
19	2421	39	2441	59	2461	---	---

3.3 Test Mode and Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.10.
b. The complete test system included Notebook and EUT for RF test.
c. An executive “BLUETEST3” under WIN8 was executed to keep transmitting and receiving data via Wireless.
d. New Battery was used for all testing and the worst radiated emission case from X,Y and Z axis evaluation was selected for testing.
e. The following test modes were performed for test:
   - GFSK: CH 00: 2402MHz, CH 39: 2441MHz, CH 78: 2480MHz.
   - π/4-DQPSK: CH 00: 2402MHz, CH 39: 2441MHz, CH 78: 2480MHz.
   - 8DPSK: CH 00: 2402MHz, CH 39: 2441MHz, CH 78: 2480MHz.

3.4 TEST Methodology & General Test Procedures

All testing as described bellowed were performed in accordance with ANSI C63.10:2013 and FCC CFR 47 Part 15 Subpart C.

Conducted Emissions

The EUT is placed on a wood table, which is at 0.8 m above ground plane acceding to clause 15.207 and requirements of ANSI C63.10:2013. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz are using CISPR Quasi-Peak / Average detectors.

Radiated Emissions

The EUT is a placed on a turn table, which is 0.8 m above ground plane. The turntable was rotated through 360 degrees to determine the position of maximum emission level. The EUT is placed at 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. Each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

1) Putting the EUT on the platform and turning on the EUT (on/off button on the bottom of the EUT).
2) Setting test channel described as “Channel setting and operating condition”, and testing channel by channel.
3) For the spurious emission test based on ANSI C63.10, at the frequency where below 1GHz
used quasi-peak detector mode; where above 1GHz used the peak and average detector mode. IF the peak value may be under average limit, the average mode will not be performed.

3.5 Measurement Uncertainty

Measurement Item	Uncertainty
Conducted emissions	±2.24 dB
Radiated emissions (30MHz ~ 1GHz)	±3.96 dB
Radiated emissions (above 1GHz)	±3.74 dB

3.6 Description of the Support Equipments

Setup Diagram

See test photographs attached in appendix 1 for the actual connections between EUT and support equipment.

Support Equipment

Peripherals Devices:

OUTSIDE SUPPORT EQUIPMENT							
No.	Equipment	Model	Serial No.	FCC ID/ BSMI ID	Trade name	Data Cable	Power Cord
1.	PC	IV8	99AKDV1	FCC DOC	IBM	N/A	Unshielded/ 1.8m
2.	LCD Monitor	SDM-HS74	1356906	FCC DOC	SONY	Shielded/1.8m	Unshielded/ 1.8m
3.	Printer	C4562B	H946151BZ	FCC DOC	HP	Shielded/1m	N/A
4.	Keyboard	SK-8115	MY-0DJ325-71 619-885-0166	FCC DOC	DELL	Shielded/1.8m	N/A
5	Mouse	MOC5UO	HOYO2HZ4	FCC DOC	DELL	Shielded/1.8m	N/A
6.	Modem	DFM-560EL	ES0O25A00 0007	FCC DOC	D-Link	N/A	N/A

Note: All the above equipment /cable were placed in worse case position to maximize emission signals during emission test

Grounding: Grounding was in accordance with the manufacturer's requirement and conditions for the intended use.

4. Test and measurement equipment

4.1 calibration

The measuring equipment utilized to perform the tests documented in the report has been calibrated once a year or in accordance with the manufacturer's recommendations, and is traceable to recognized national standards.

4.2 equipment

The following list contains measurement equipment used for testing. The equipment conforms to the requirement of CISPR 16-1, ANSI C63.2 and. Other required standards.

Calibration of all test and measurement, including any accessories that may effect such calibration, is checked frequently to ensure the accuracy. Adjustments are made and correction factors are applied in accordance with the instructions contained in the respective.

TABLELIST OF TEST AND MEASUREMENT EQUIPMENT

Iten	Instrument	Manufacturer	Model No.	S/N	Next Cal. Date
1.	Spectrum Analyzer	HP	8691EM	72412A00110	2016/09/29
2.	Pre Amplifier	MLT	PREAMP6G-01	20110209	2016/03/16
3.	Pre Amplifier	MLT	PREAMP6G-02	20110301	2016/03/16
4.	Biconilog Antenna	EMCO	3142C	00044568	2015/09/11
5.	Spectrum Analyzer	Agilent	E7403A	US40240137	2016/03/15
6.	LISN	EMCO	3825/2	2658	2015/11/09
7.	Spectrum Analyzer	Agilent	E4446A	US44300422	2016/02/03
8.	Biconilog Antenna	EMCO	3142C	00059739	2015/09/11
9.	Home Antenna	SCHWARZBECK	BBHA 9120D	304	2015/10/28
10.	Home Antenna	SCHWARZBECK	BBHA 9170	181	2015/10/29
11.	TA	TA	0.10~19.1GHz 60dBm	RF01	2015/08/21
12.	Herotek	Pre Amplifier	A402-417	30690	2015/11/16
13.	Spectrum Analyzer	Agilent	N9010A	MY50060164	2016/04/08
14.	Spectrum Analyzer	ROHDE & SCHWARZ	FSP	830180/006	2015/11/16

#: Calibration interval of instruments listed above is one year

5. Antenna Requirements

5.1 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 transmitting antennas of directional gain greater than 6dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

5.2 Antenna Construction and Directional Gain

Antenna Type: Chip Antenna
Antenna Gain: 2 dBi

6. Test of Conducted Emission

6.1 Test Limit

Conducted Emissions were measured from 150 kHz to 30 MHz with a bandwidth of 9 KHz on the 120 VAC power and return leads of the EUT according to the methods defined in ANSI C63.4-2013 Section 3.1. The EUT was placed on a nonmetallic stand in a shielded room 0.8 meters above the ground plane as shown in section 2.2. The interface cables and equipment positioning were varied within limits of reasonable applications to determine the position produced maximum conducted emissions.

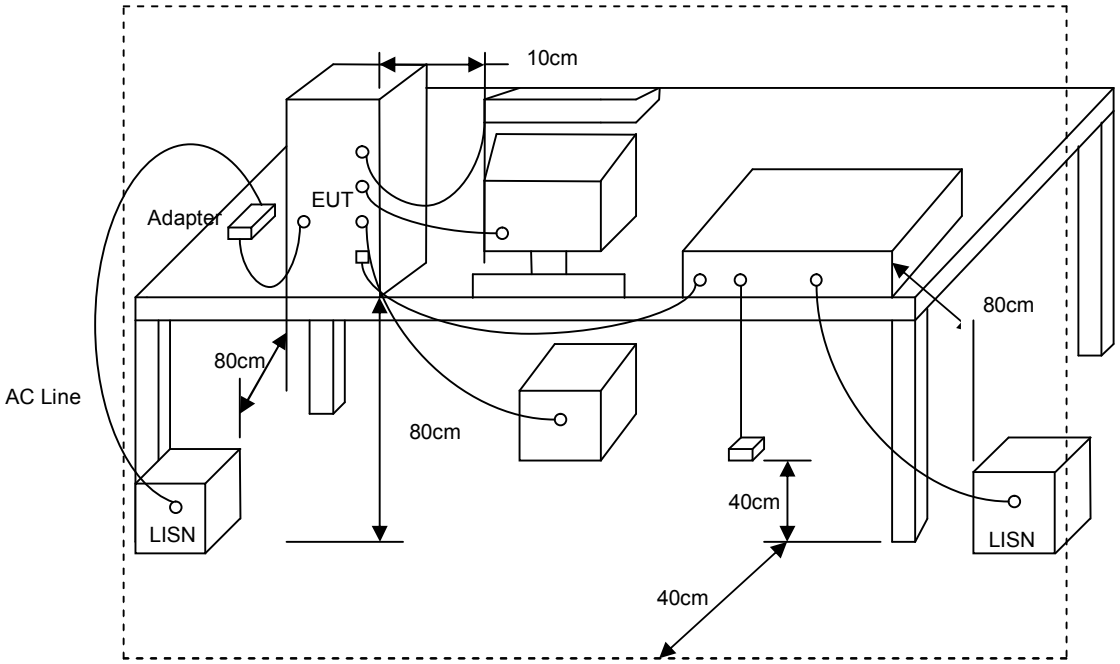
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

6.2 Test Procedures

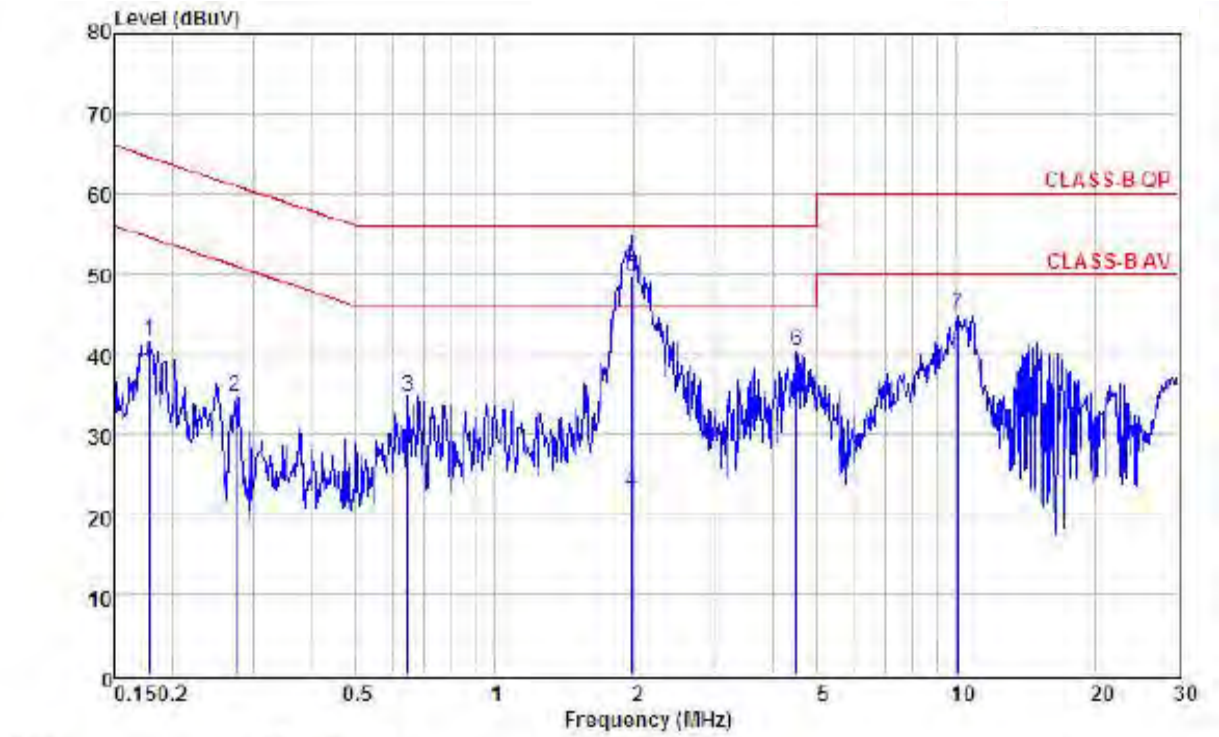
a. The EUT was placed 0.4 meter from the conducting wall of the shielding room was kept at least 80 centimeters from any other grounded conducting surface.
b. Connect EUT to the power mains through a line impedance stabilization network (LISN).
c. All the support units are connecting to the other LISN.
d. The LISN provides 50 ohm coupling impedance for the measuring instrument.
e. The FCC states that a 50 ohm, 50 micro-Henry LISN should be used.
f. Both sides of AC line were checked for maximum conducted interference.
g. The frequency range from 150 kHz to 30 MHz was searched.
h. Set the test-receiver system to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.

6.3 Typical Test Setup



6.4 Test Result and Data

Power	:	AC 120V	Pol/Phase	:	LINE
Test Mode 1	:	GFSK, CH0	Temperature	:	25 °C
Test Date	:	July 18, 2015	Humidity	:	55 %

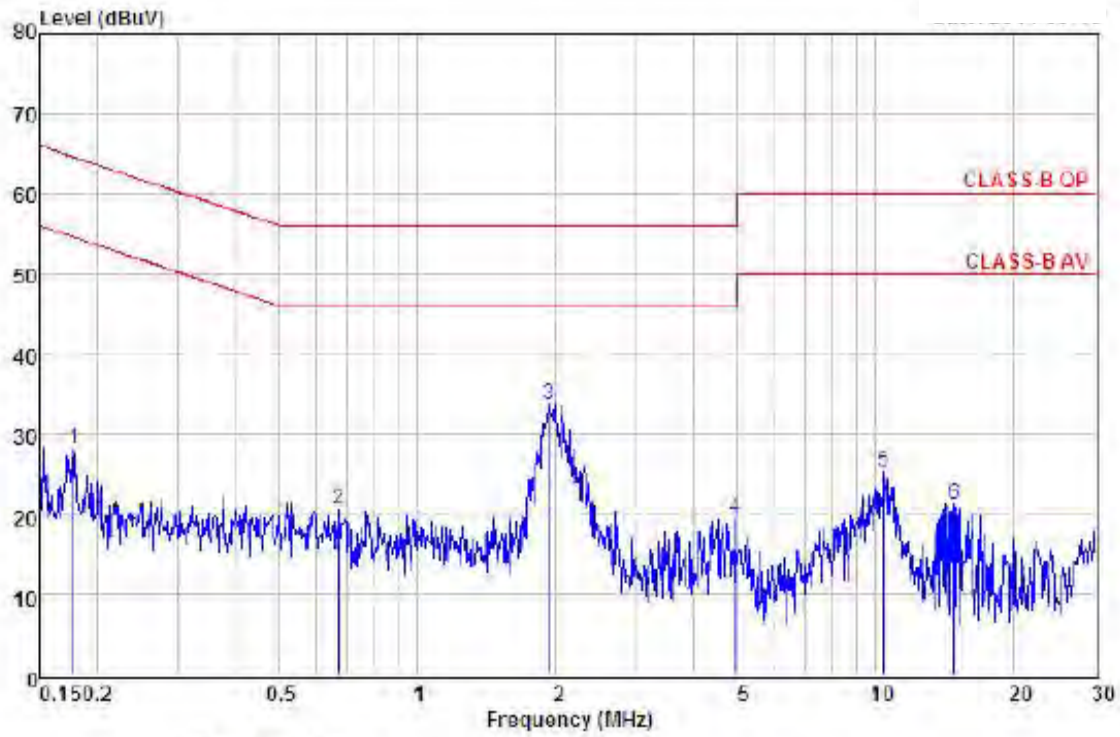


Site : Conduction
Condition : CLASS-B QP CON-LISN(103) LINE
EUT :
Power : AC 120V
Mode : Transmit
Temperature : 25
Humidity : 50
Memo : GFSK CH0

Remarks: : Factor=Insertion loss+Cable loss

	Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	
1	0.18	41.48	41.60	0.12	-22.95	64.55	Peak
2	0.27	34.64	34.76	0.12	-26.22	60.98	Peak
3	0.65	34.63	34.79	0.16	-21.21	56.00	Peak
4	1.97	22.50	22.73	0.23	-23.27	46.00	Average
5	1.97	49.45	49.68	0.23	-6.32	56.00	QP
6	4.48	39.93	40.25	0.32	-15.75	56.00	Peak
7	10.02	44.45	44.93	0.48	-15.07	60.00	Peak

Power	AC 120V	Pol/Phase	NEUTRAL
Test Mode 1	GFSK, CH0	Temperature	25 °C
Test Date	July 18, 2015	Humidity	50 %



Site : Conduction
Condition : CLASS-B QP CON-LISN(103) NEUTRAL
EUT :
Power : AC 120V
Mode : Transmit
Temperature : 25
Humidity : 50
Memo : GFSK CH0

Remarks: : Factor=Insertion loss+Cable loss

	Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV	dBuV	dB	dB	dBuV	
1	0.18	27.99	28.10	0.11	-36.49	64.59	Peak
2	0.67	20.52	20.66	0.14	-35.34	56.00	Peak
3	1.94	33.51	33.72	0.21	-22.28	56.00	Peak
4	4.90	19.18	19.50	0.32	-36.50	56.00	Peak
5	10.34	24.92	25.36	0.44	-34.64	60.00	Peak
6	14.75	20.77	21.28	0.51	-38.72	60.00	Peak

7. Test of Radiated Emission

7.1 Test Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. If the transmitter measurement is based on the maximum conducted output power, the attenuation required under this paragraph shall be 30dB instead of 20dB. In addition, radiated emissions which fall in section 15.205(a) the restricted bands must also comply with the radiated emission limit specified in section 15.209(a).

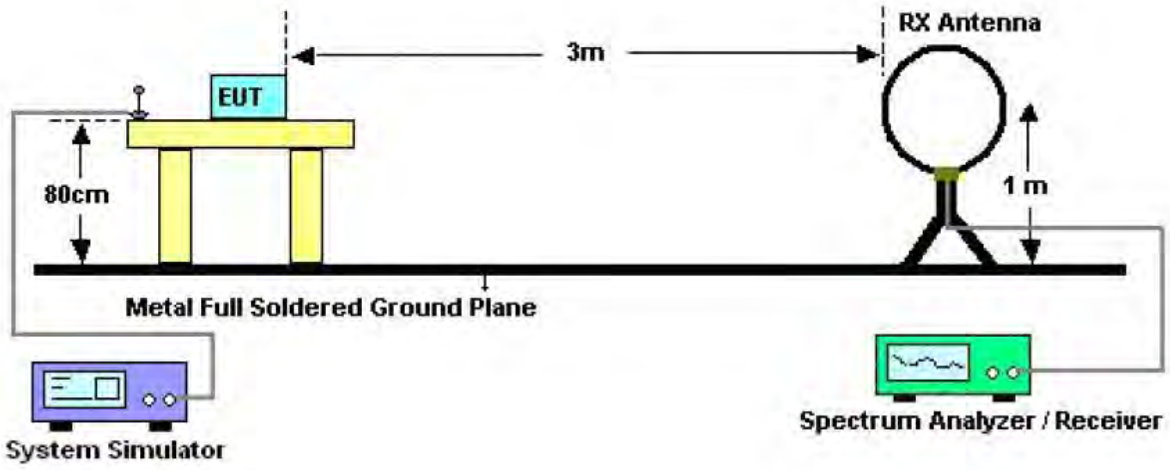
Frequency (MHz)	Field Strength (microvolt/meter)	Measurement Distance (meters)
0.009 ~ 0.490	2400/F(kHz)	300
0.490 ~ 1.705	24000/F(kHz)	30
1.705 ~ 30.0	30	30
30 ~ 88	100	3
88 ~ 216	150	3
216 ~ 960	200	3
Above 960	500	3

7.2 Test Procedures

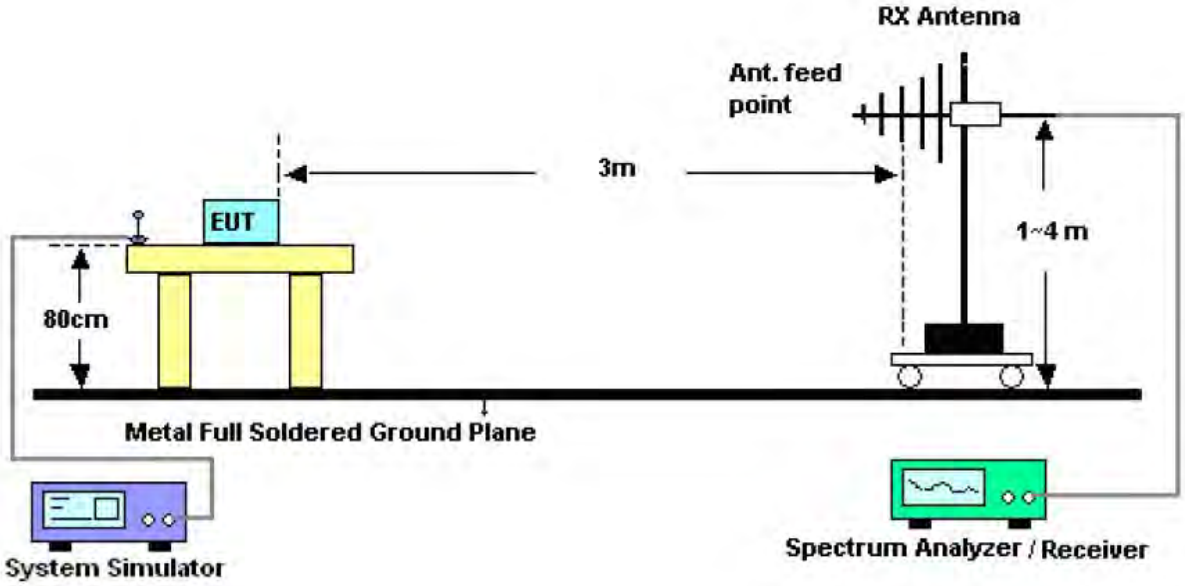
a. The EUT was placed on a rotatable table top 0.8 meter above ground.
b. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
c. The table was rotated 360 degrees to determine the position of the highest radiation.
d. The antenna is a broadband antenna and its height is varied between one meter and four meters above ground to find the maximum value of the field strength both horizontal polarization and vertical polarization of the antenna are set to make the measurement.
e. For each suspected emission the EUT was arranged to its worst case and then tune the antenna tower (from 1 M to 4 M) and turn table (from 0 degree to 360 degrees) to find the maximum reading.
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.
g. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions which do not have 3 dB margin will be repeated one by one using the quasi-peak method and reported.
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.
i. “Cone of radiation” has been considered to be 3dB bandwidth of the measurement antenna.

7.3 Typical Test Setup

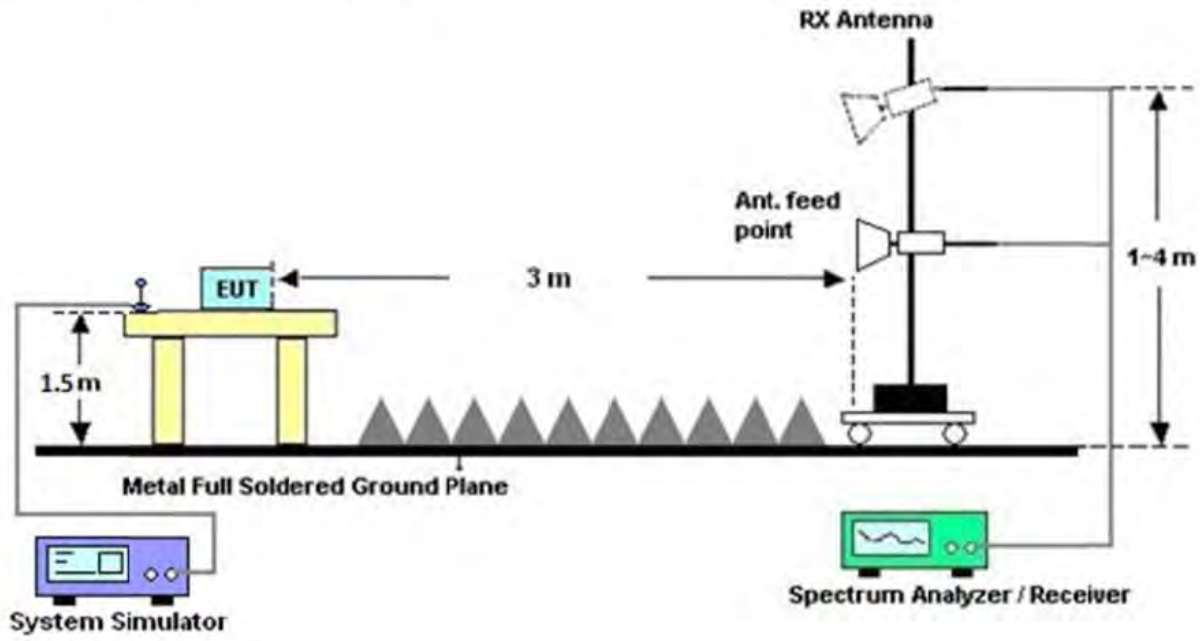
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz

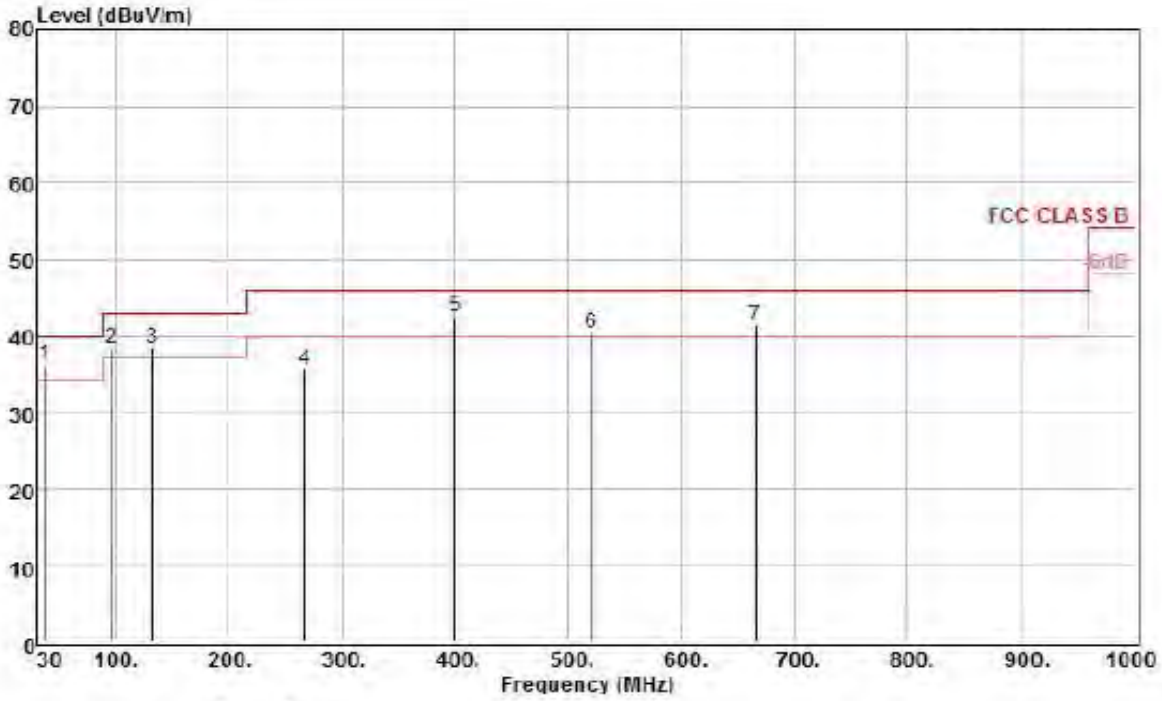


7.4 Test Result and Data (9kHz ~ 30MHz)

The 9kHz - 30MHz spurious emission is under limit 20dB more.

7.5 Test Result and Data (30MHz ~ 1GHz, worst emissions found)

Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	GFSK CH0	Temperature	:	26 °C
Test Date	:	July 22, 2015	Humidity	:	54 %

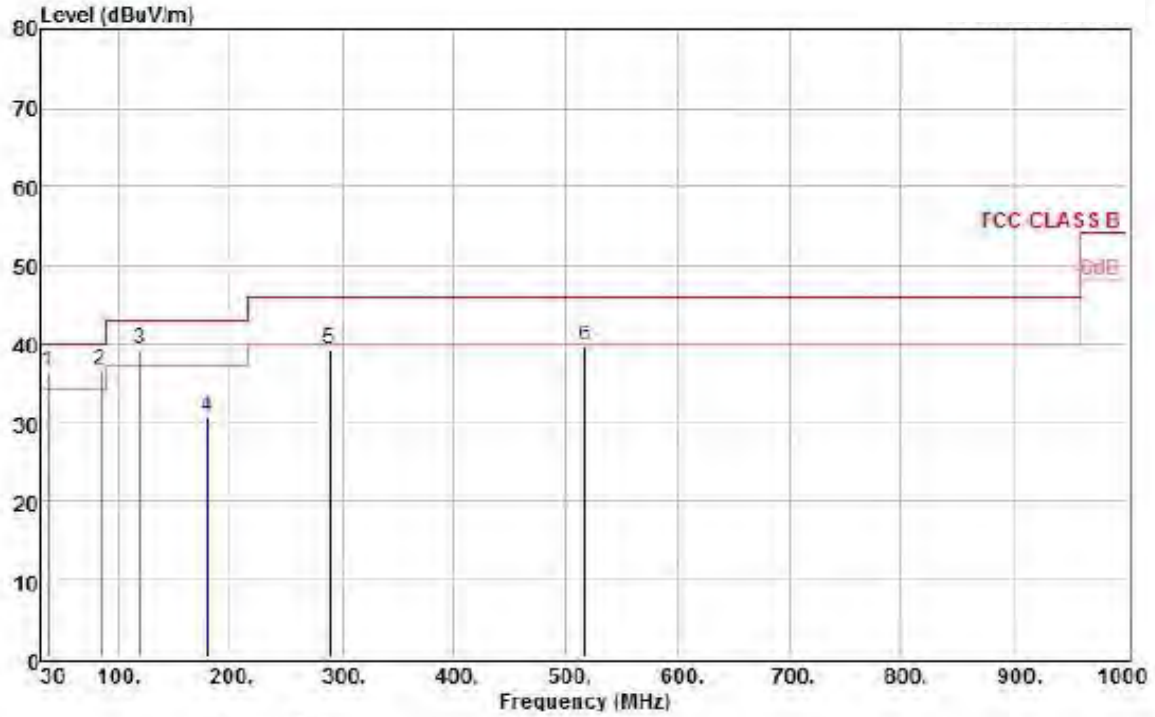


Site : Open Site
Condition : FCC_CLASS B 3m
EUT :
Power : AC 120V
Mode : Transmit
Temperature : 26
Humidity : 54
Memo :

Remarks: : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor+Cable loss-
: Amplifier Factor

		Freq	Level	Read Level	Factor	Over Limit	Limit Line	Remark
		MHz	dBuV/m	dBuV	dB/m	dB	dBuV/m	
1	!	37.76	36.26	42.63	-6.37	-3.74	40.00	QP
2	!	95.96	38.47	49.95	-11.48	-4.53	43.00	QP
3	!	131.85	38.45	44.01	-5.56	-4.55	43.00	QP
4		266.68	35.65	41.29	-5.64	-10.35	46.00	QP
5	!	399.57	42.44	47.07	-4.63	-3.56	46.00	QP
6	!	520.82	40.34	32.75	7.59	-5.66	46.00	QP
7	!	666.32	41.32	34.74	6.58	-4.68	46.00	QP

Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	GFSK CH0	Temperature	:	26 °C
Test Date	:	July 22, 2015	Humidity	:	54 %



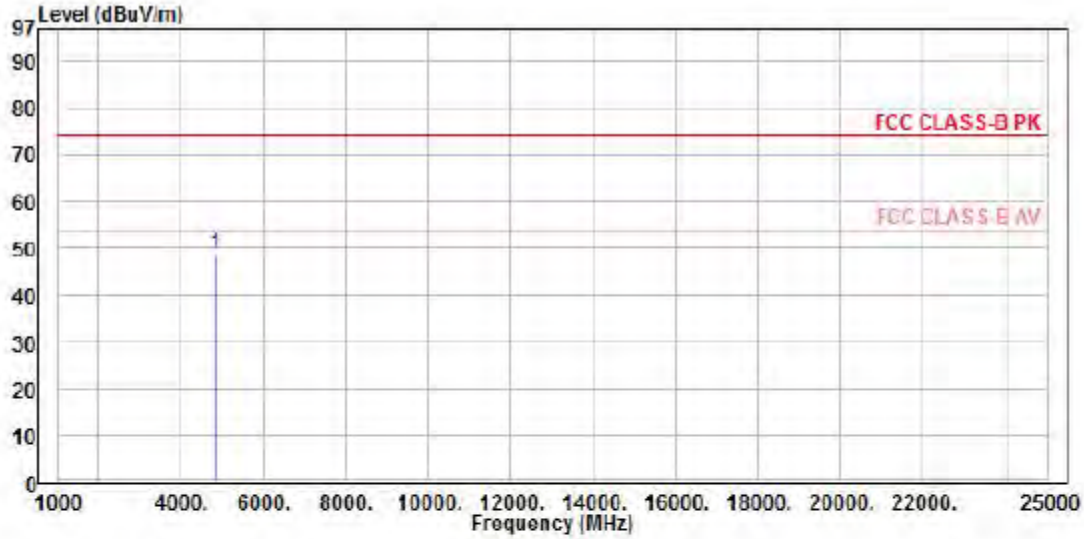
Site : Open Site
Condition : FCC CLASS B 3m
EUT :
Power : AC 120V
Mode : Transmit
Temperature : 26
Humidity : 54
Memo :

Remarks: : 1.Result=Read Value+Factor
: 2.Factor=Antenna Factor+Cable loss-
: Amplifier Factor

	Freq	Level	Read Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV/m	dBuV	dB/m	dB	dBuV/m	
1 !	35.82	36.50	43.66	-7.16	-3.50	40.00	QP
2 !	83.35	36.74	48.74	-12.00	-3.26	40.00	QP
3 !	119.24	39.19	48.37	-9.18	-3.81	43.00	QP
4	179.38	30.71	36.37	-5.66	-12.29	43.00	QP
5	288.02	39.17	44.31	-5.14	-6.83	46.00	QP
6	516.94	39.63	42.78	-3.15	-6.37	46.00	QP

7.6 Test Result and Data (Above 1GHz)

Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	GFSK CH0	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %

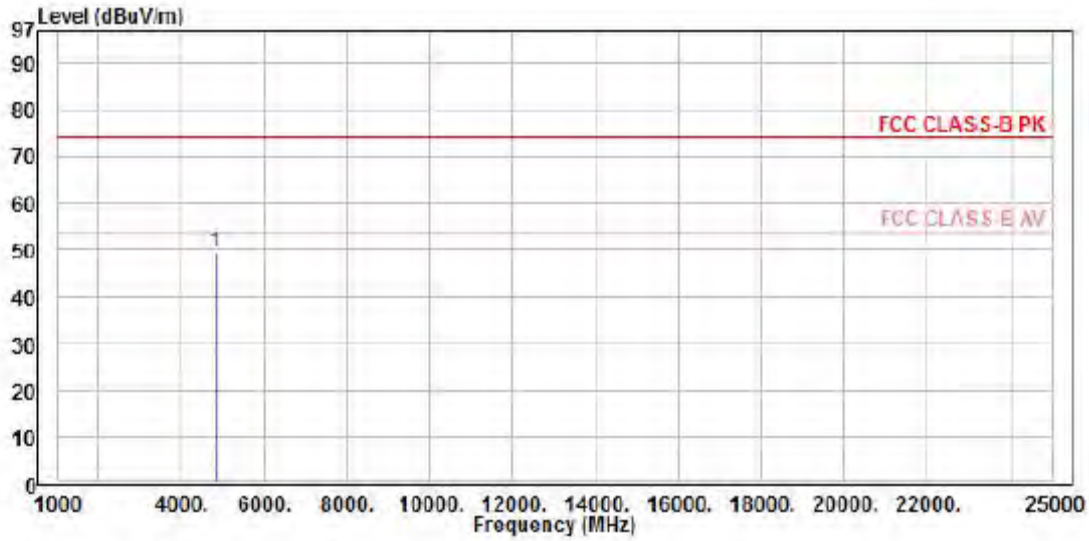


Condition : FCC CLASS-B PK 3m Vertical
EUT : 1507025
Power : AC 120V
Mode : Transmit
Temperature: 25
Humidity : 50
Memo : GFSK CH0

Remarks : 1. Result=Read Value+Factor
: 2. Factor=Antenna Factor+Cable loss-Amplifier Factor

	Freq	Read Level	Level	Factor	Over Limit	Limit Line	Remark
	MHz	dBuV	dBuV/m	dB/m	dB	dBuV/m	
1	4804.00	58.65	48.81	-9.84	-25.19	74.00	Peak

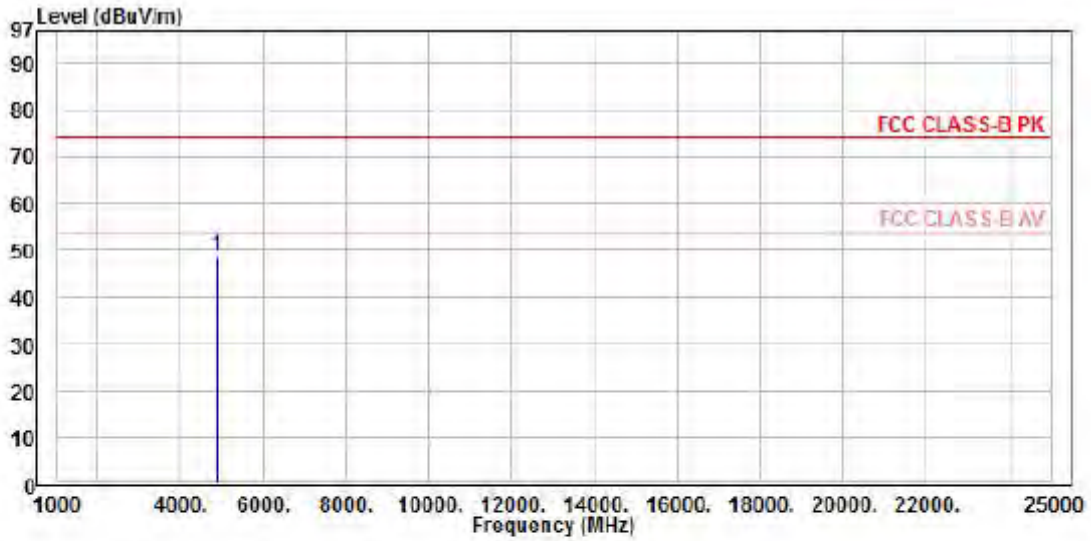
Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	GFSK CH0	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : GFSK CH0
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                 Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ _____ _____ _____ _________
            MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4803.50  59.23  49.39  -9.84 -24.61  74.00 Peak
```

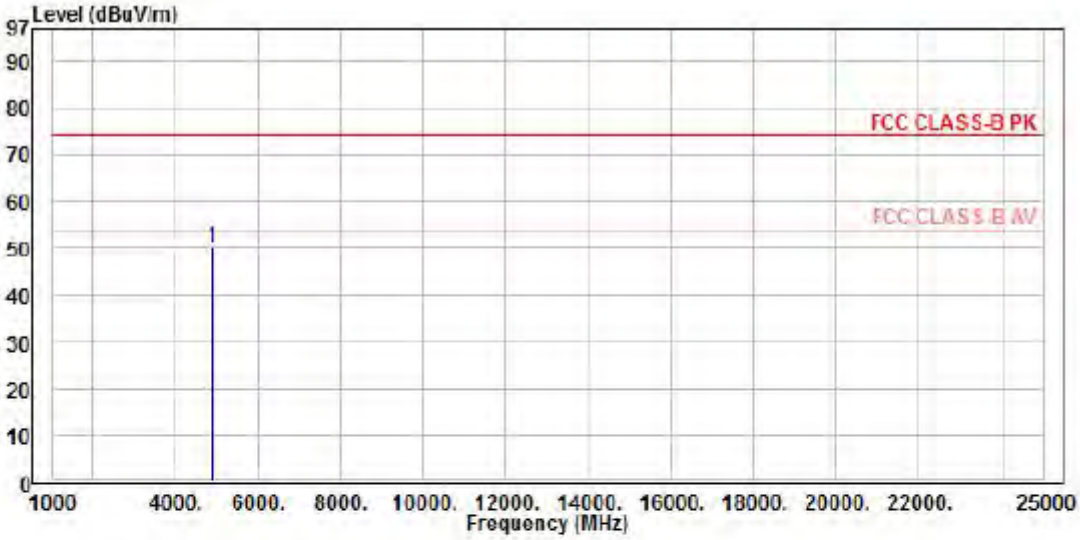
Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	GFSK CH39	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Vertical
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : GFSK CH39
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        ________ _____ _____ ______ ______ ______ _________
             MHz  dBuV dBuV/m   dB/m     dB dBuV/m

  1    4881.75  58.27  48.57  -9.70 -25.43  74.00 Peak
```

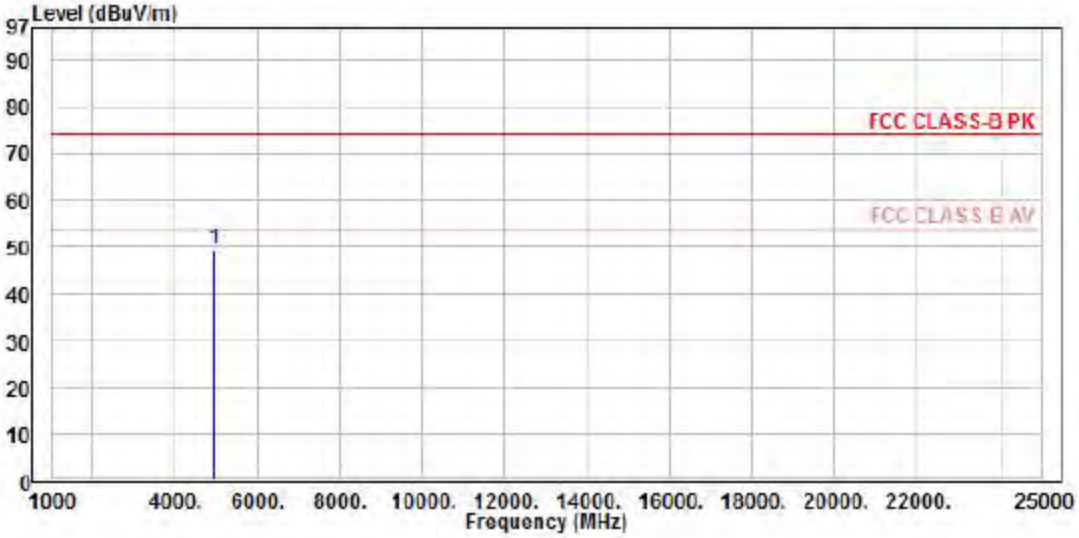
Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	GFSK CH39	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : GFSK CH39
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                  Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ _____ _____ _____ _________
             MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4882.00  59.90  50.20  -9.70 -23.80  74.00 Peak
```

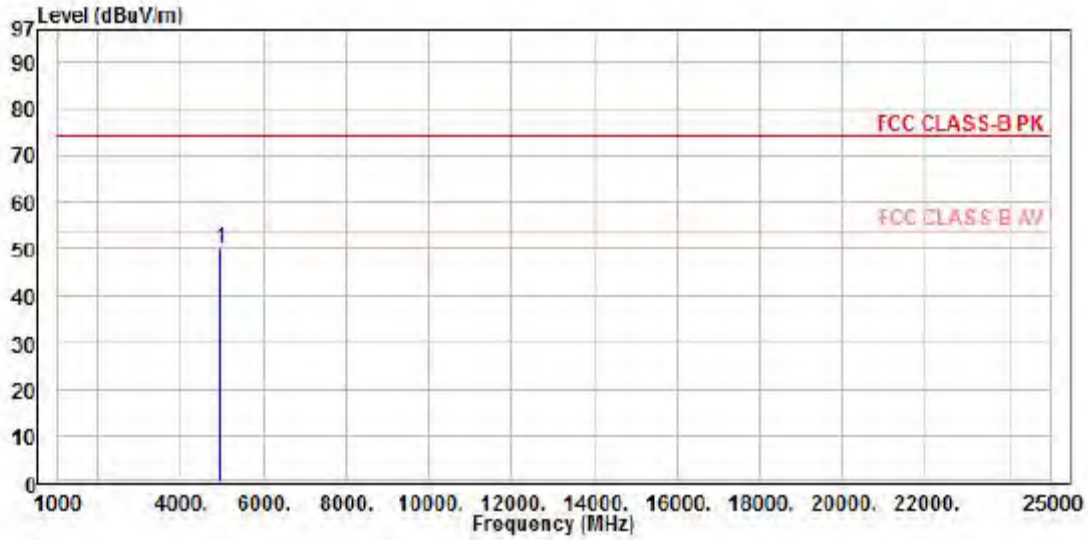
Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	GFSK CH78	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Vertical
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : GFSK CH78
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor-Antenna Factor+Cable loss-Amplifier Factor
                Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ ______ ______ _____ _________
             MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4959.75  59.02  49.47  -9.55 -24.53  74.00 Peak
```

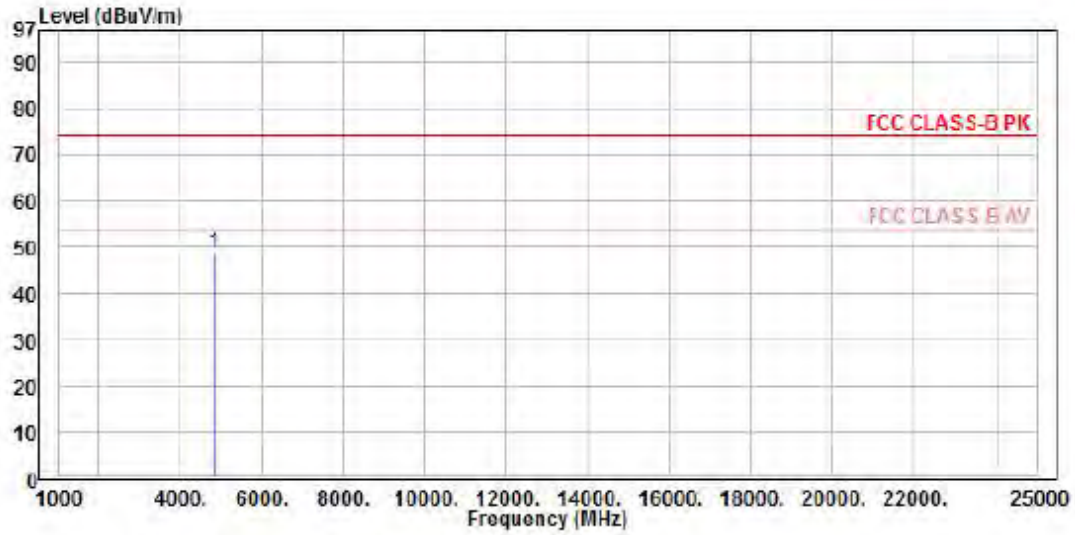
Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	GFSK CH78	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : GFSK CH78
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                  Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ _____ _____ _____ _________
             MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4959.75  59.79  50.24  -9.55 -23.76  74.00 Peak
```

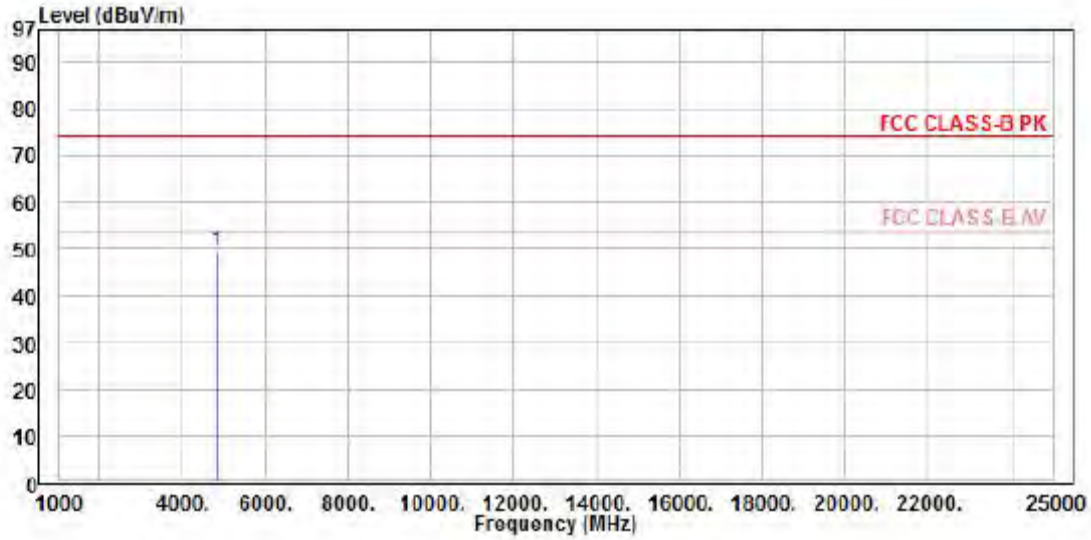
Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	pi/4-DQPSK CH0	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Vertical
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : pi/4-DQPSK CH0
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor-Antenna Factor+Cable loss-Amplifier Factor
                 Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ _____ _____ _____ _________
           MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4804.20  58.45  48.61  -9.84 -25.39  74.00 Peak
```

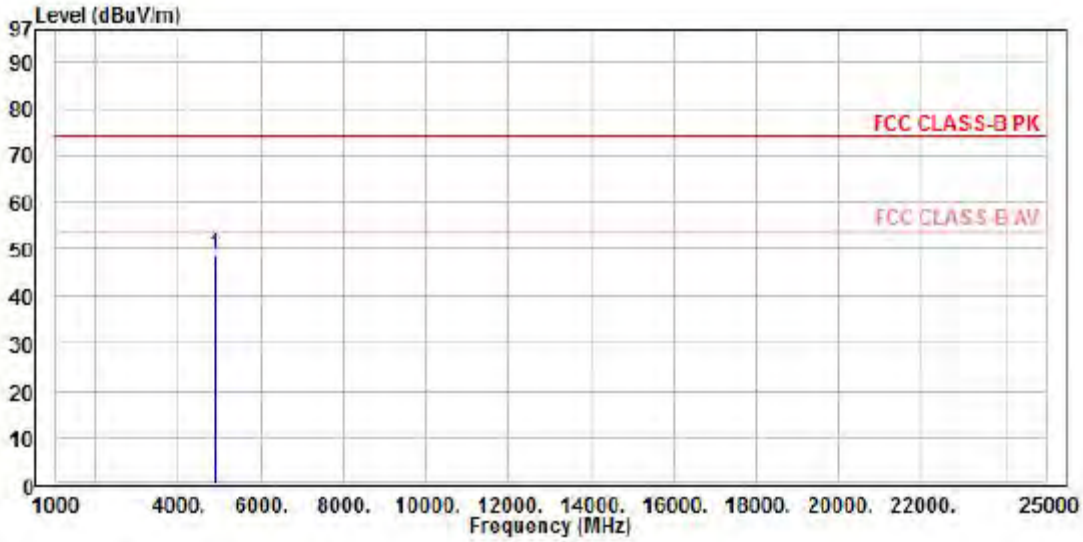
Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	pi/4-DQPSK CH0	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : pi/4-DQPSK CH0
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                Read                  Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        ------- ------ ------ ------ ------ ------ ----------
           MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4803.85  59.36  49.52  -9.84 -24.48  74.00 Peak
```

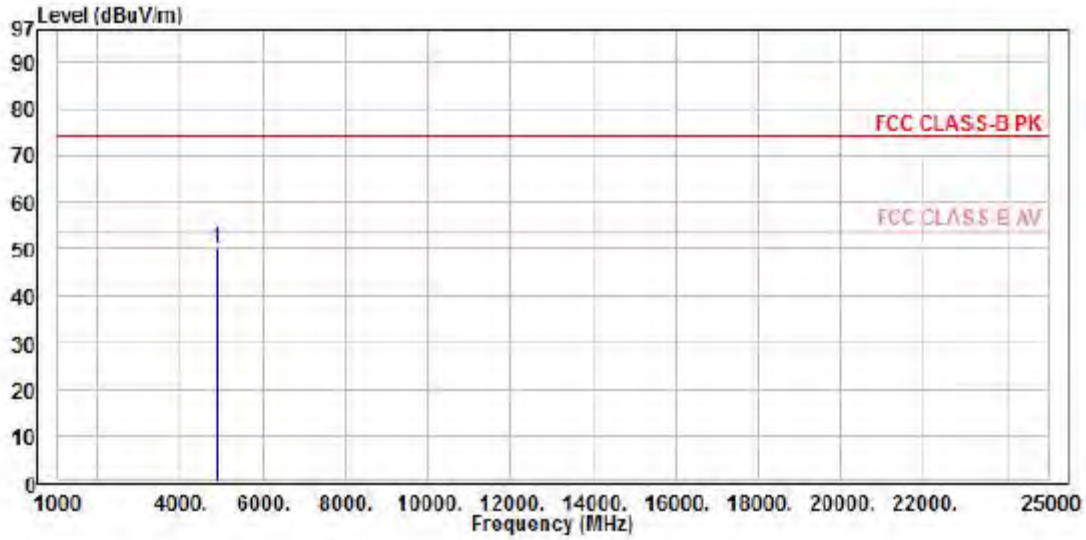
Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	pi/4-DQPSK CH39	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Vertical
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : pi/4-DQPSK CH39
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                 Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ ______ _____ _____ _________
             MHz  dBuV dBuV/m   dB/m    dB dBuV/m

  1    4881.75 58.56 48.86  -9.70 -25.14 74.00 Peak
```

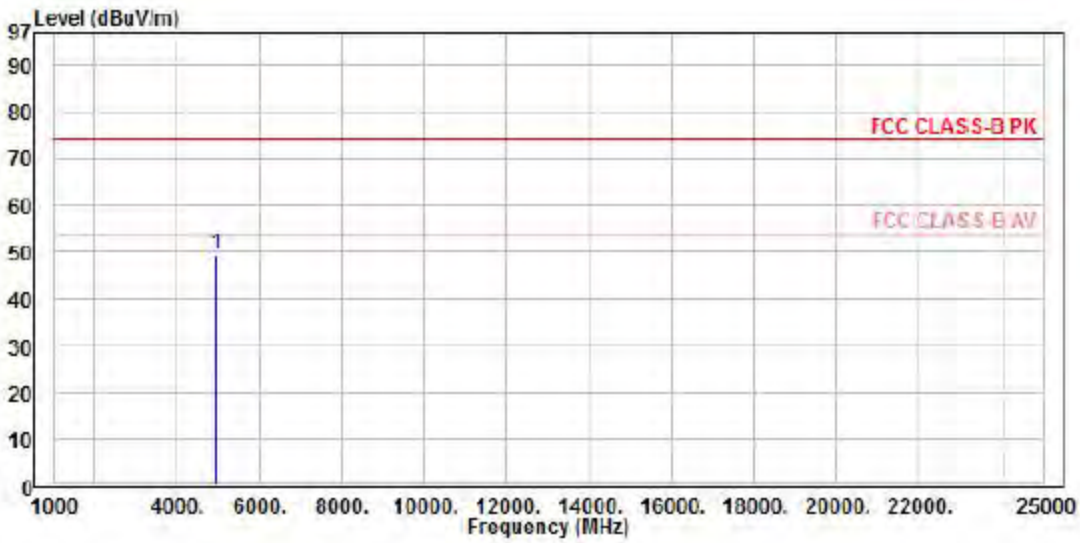
Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	pi/4-DQPSK CH39	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : pi/4-DQPSK CH39
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
      _________ _____ _____ _____ _____ _____ _________
            MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4882.00  60.04  50.34  -9.70 -23.66  74.00 Peak
```

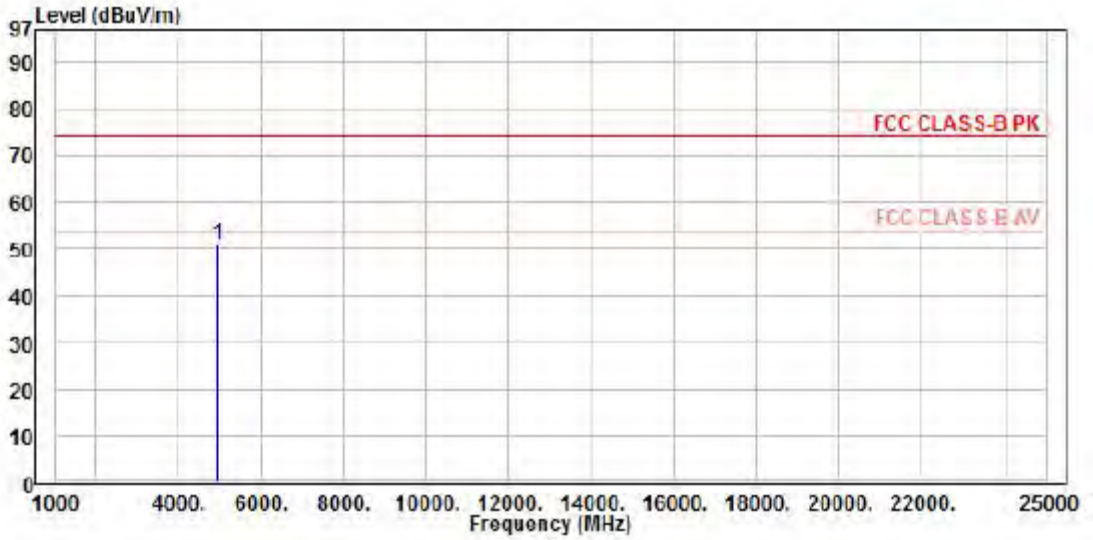
Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	pi/4-DQPSK CH78	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Vertical
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : pi/4-DQPSK CH78
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                 Read                  Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        ________ _____ _____ _____ _____ _____ _________
             MHz  dBuV dBuV/m  dB/m    dB dBuV/m

  1    4959.80  59.11  49.56  -9.55 -24.44  74.00 Peak
```

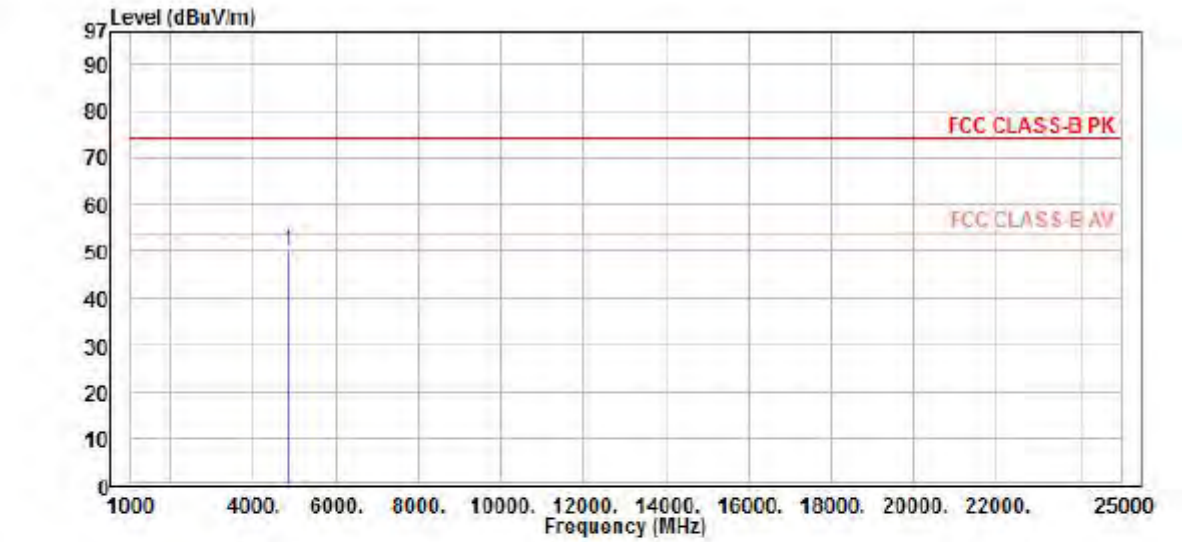
Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	pi/4-DQPSK CH78	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : pi/4-DQPSK CH78
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                 Read                  Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
       ________ _____ _____ _____ _____ _____ _________
            MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4960.00  60.40  50.85  -9.55 -23.15  74.00 Peak
```

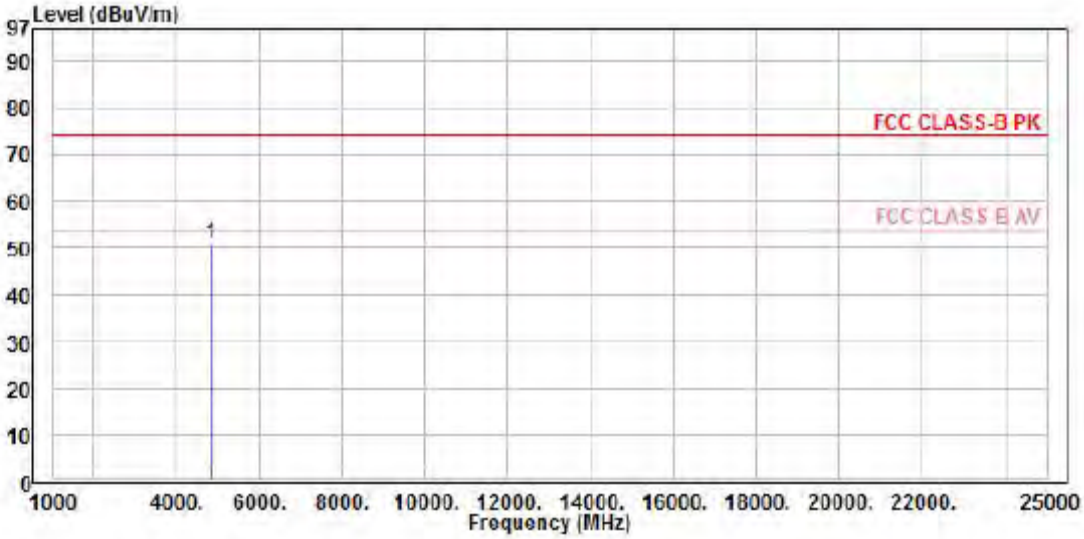
Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	8DPSK CH0	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Vertical
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : 8DPSK CH0
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor-Antenna Factor+Cable loss-Amplifier Factor
                 Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ ______ ______ _____ _________
             MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4803.95  59.96  50.12  -9.84 -23.88  74.00 Peak
```

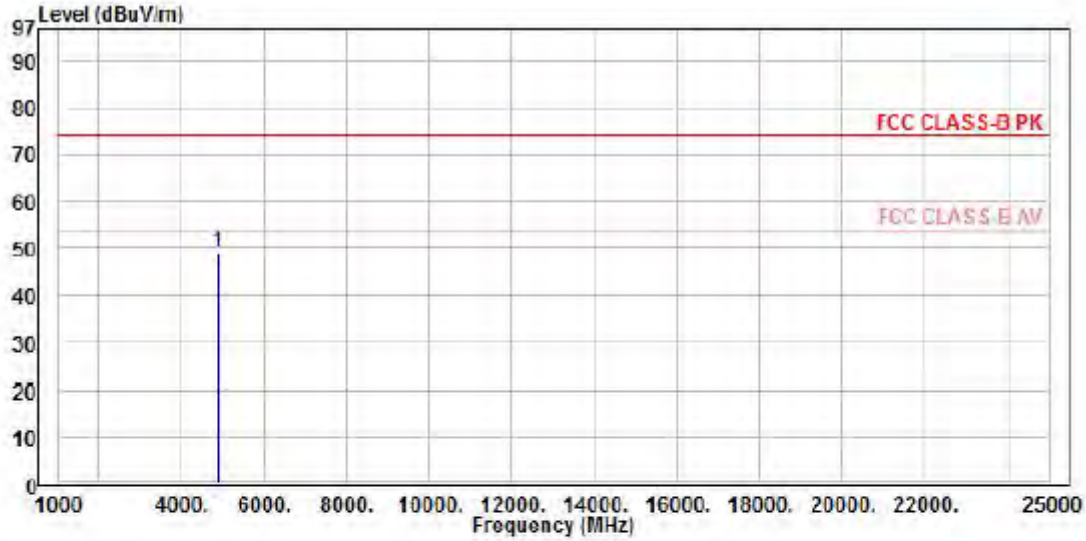
Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	8DPSK CH0	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : 8DPSK CH0
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                 Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        ________ _____ _____ ______ ______ _____ __________
             MHz  dBuV dBuV/m   dB/m     dB dBuV/m

  1    4804.00 60.85  51.01  -9.84 -22.99  74.00 Peak
```

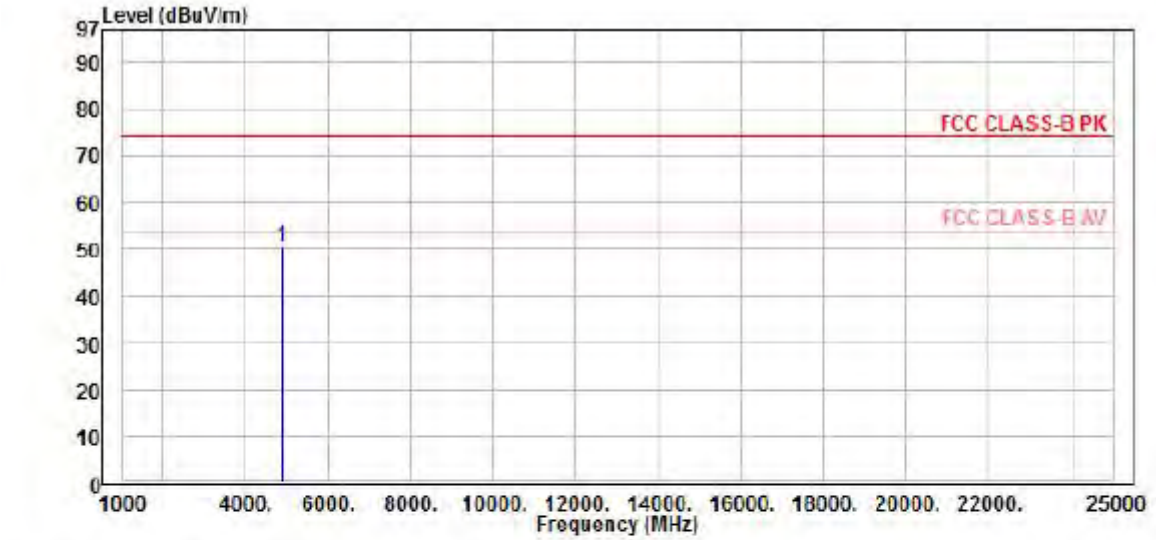
Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	8DPSK CH39	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Vertical
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : 8DPSK CH39
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                 Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ _____ _____ _____ _________
             MHz  dBuV dBuV/m  dB/m     dB dBuV/m

  1    4882.15 58.74 49.04 -9.70 -24.96 74.00 Peak
```

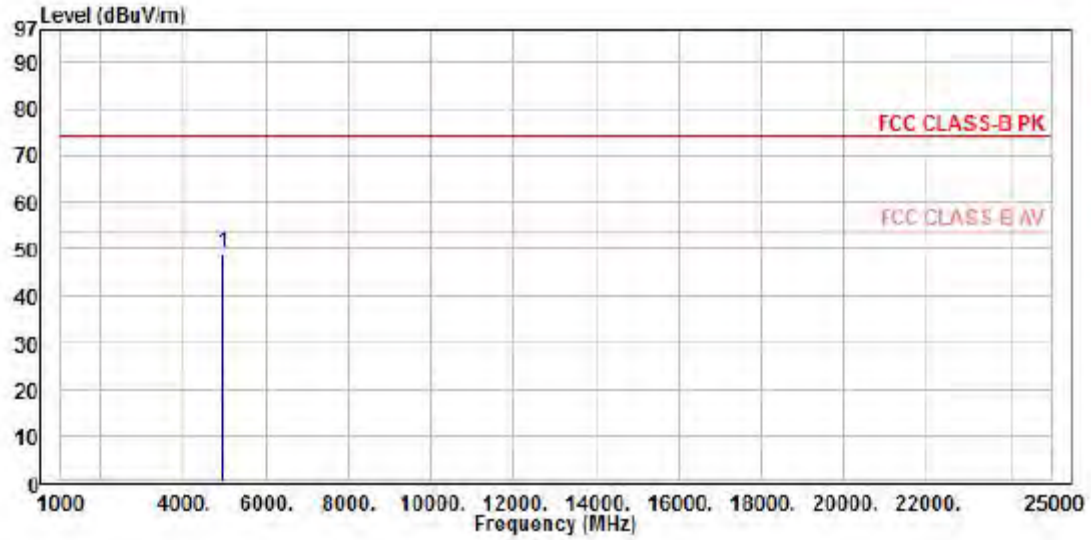
Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	8DPSK CH39	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : 8DPSK CH39
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                Read                  Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
      _______ _____ _____ _____ _____ _____ _______
            MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4882.05  60.18  50.48  -9.70 -23.52  74.00 Peak
```

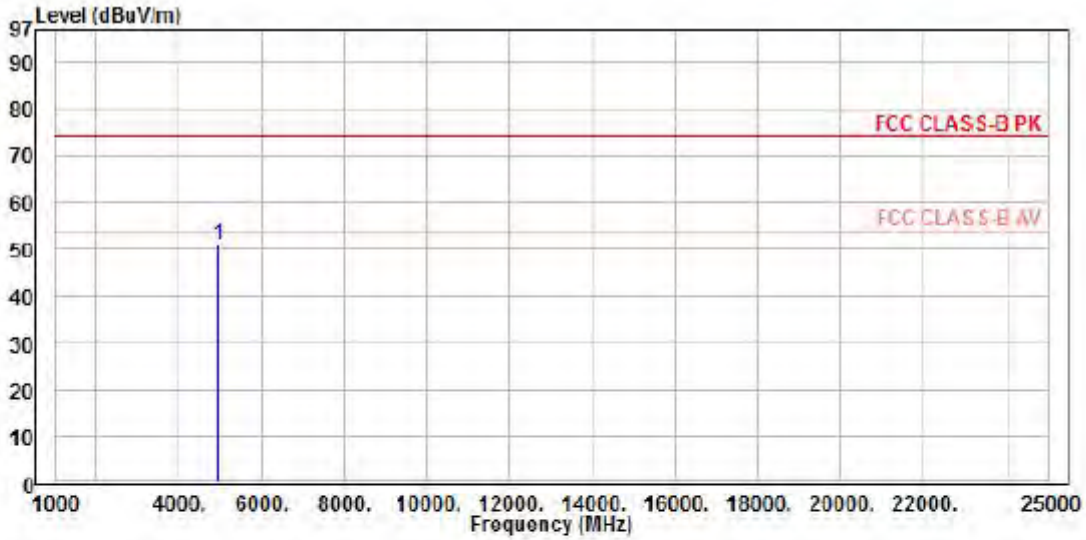
Power	:	AC 120V	Pol/Phase	:	VERTICAL
Test Mode 1	:	8DPSK CH78	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Vertical
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : 8DPSK CH78
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor-Antenna Factor+Cable loss-Amplifier Factor
                 Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        ________ _____ _____ ______ ______ ______ ________
             MHz  dBuV dBuV/m   dB/m     dB dBuV/m

  1    4959.75  58.47  48.92  -9.55 -25.08  74.00 Peak
```

Power	:	AC 120V	Pol/Phase	:	HORIZONTAL
Test Mode 1	:	8DPSK CH78	Temperature	:	25 °C
Test Date	:	July 24, 2015	Humidity	:	50 %




```
Condition  : FCC CLASS-B PK 3m Horizontal
EUT        : 1507025
Power      : AC 120V
Mode       : Transmit
Temperature: 25
Humidity   : 50
Memo       : 8DPSK CH78
-----------: ----------------------------------------------------
Remarks    : 1. Result=Read Value+Factor
           : 2. Factor=Antenna Factor+Cable loss-Amplifier Factor
                Read                    Over  Limit
          Freq  Level  Level Factor  Limit   Line Remark
        _______ _____ _____ ______ ______ _____ _________
           MHz   dBuV dBuV/m   dB/m     dB dBuV/m

  1    4960.25  60.35  50.80  -9.55 -23.20  74.00 Peak
```

8. 20dB Bandwidth Measurement Data

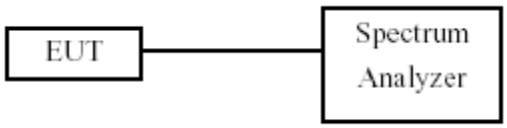
8.1 Test Limit

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.

8.2 Test Procedures

a. The transmitter output was connected to the spectrum analyzer.
b. Set RBW of spectrum analyzer to 30 KHz and VBW to 100 KHz.
c. The 20 dB bandwidth is defined as the total spectrum the power of which is higher than peak power minus 20 dB.

8.3 Test Setup Layout



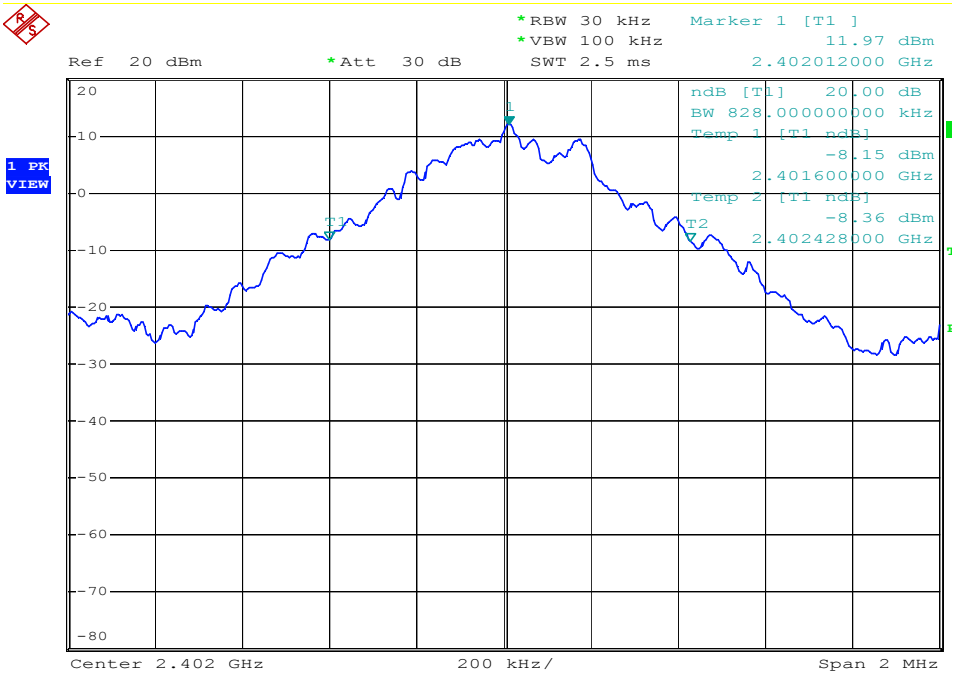
8.4 Test Result and Data

Test Date: July 21, 2015 Temperature: 25 °C

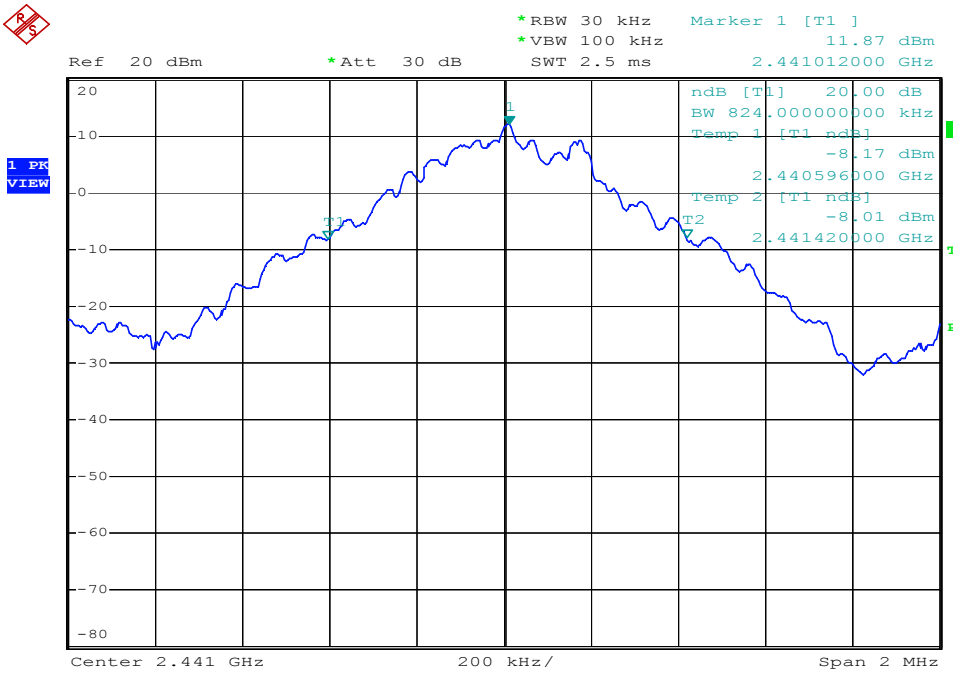
Atmospheric pressure: 1010 hPa Humidity: 50 %

Modulation Type	Channel	Frequency (MHz)	20dB Bandwidth (KHz)	2/3 20dB Bandwidth (KHz)
GFSK (1Mbps)	00	2402	828.00	552.00
	39	2441	824.00	549.33
	78	2480	820.00	546.67
π/4-DQPSK (2 Mbps)	00	2402	1316.00	877.33
	39	2441	1284.00	856.00
	78	2480	1272.00	848.00
8DPSK (3Mbps)	00	2402	1308.00	872.00
	39	2441	1304.00	869.33
	78	2480	1272.00	848.00

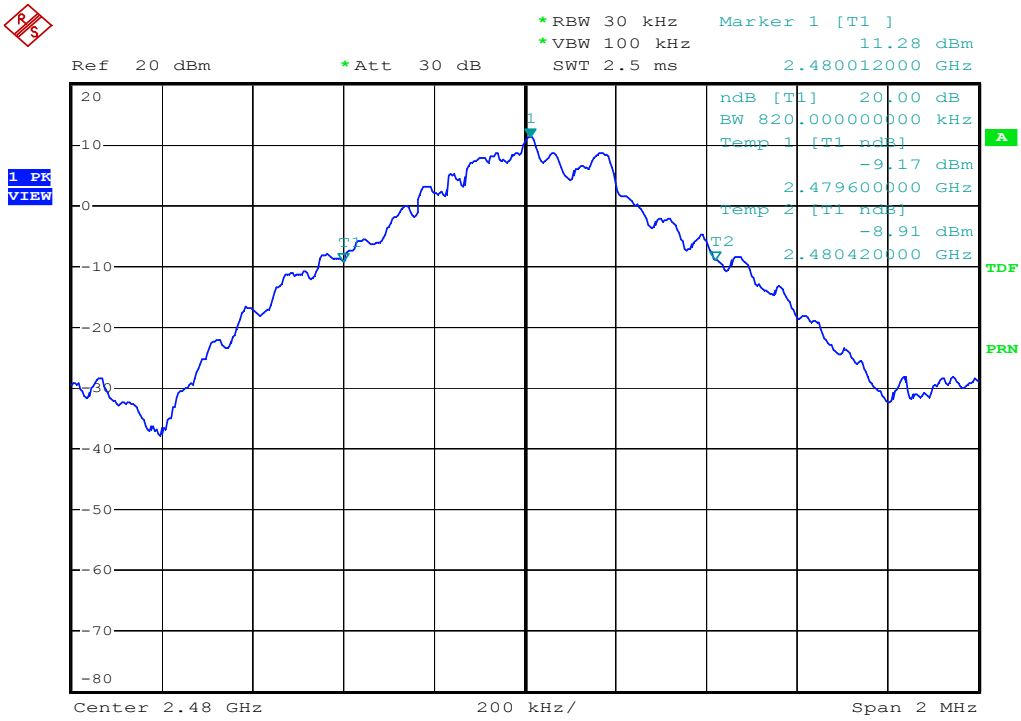
Modulation Standard: GFSK (1Mbps)
Channel: 00



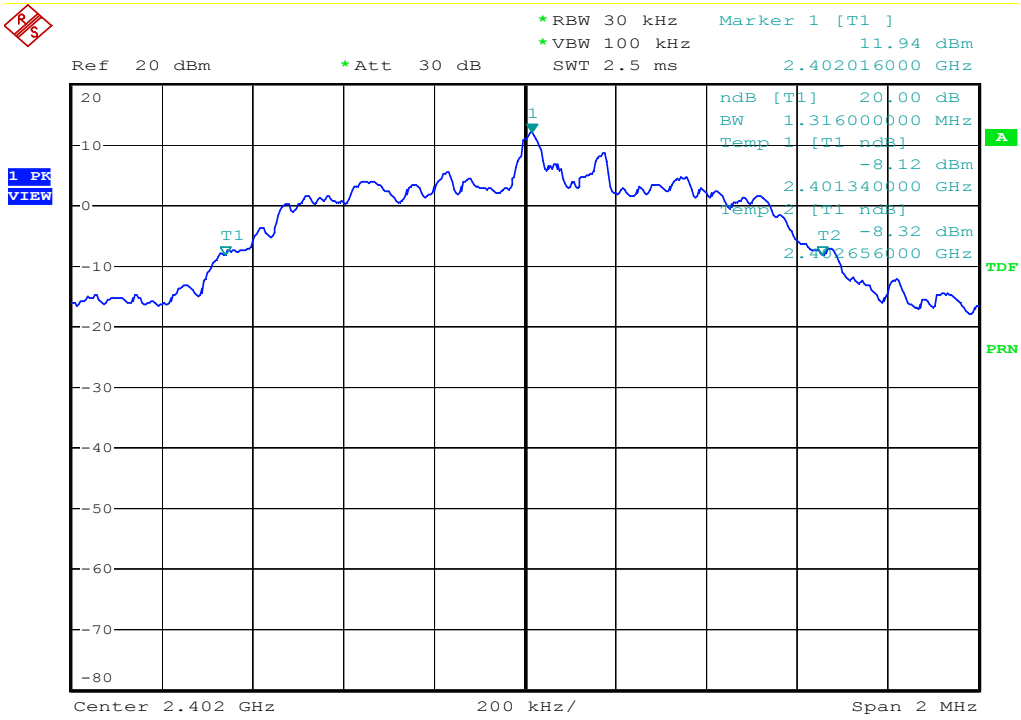
Modulation Standard: GFSK (1Mbps)
Channel: 39



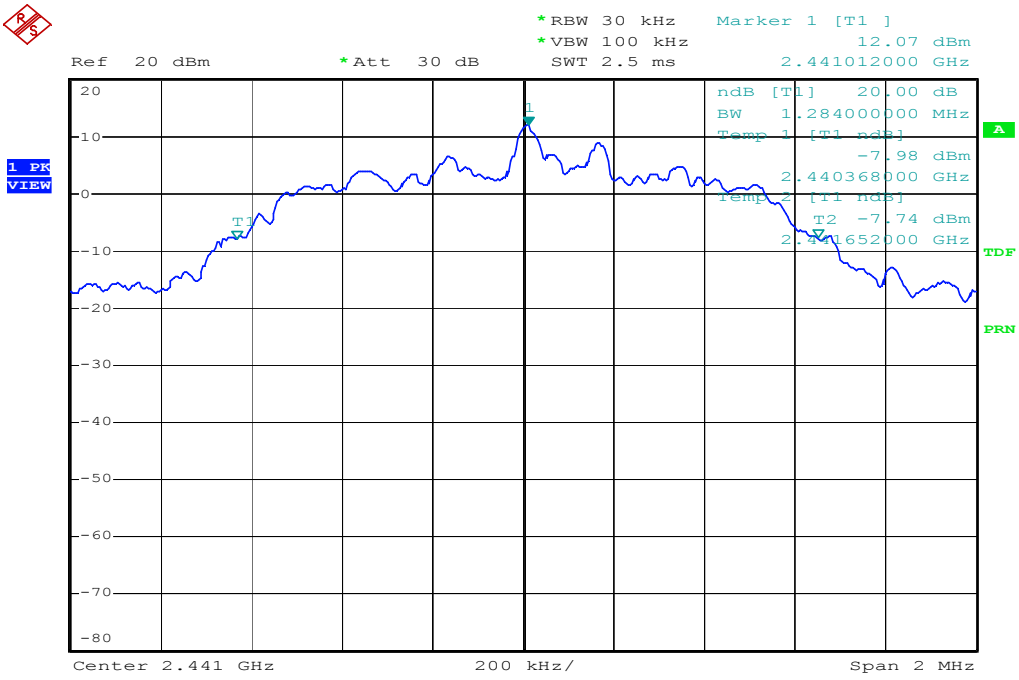
Modulation Standard: GFSK (1Mbps)
Channel: 78



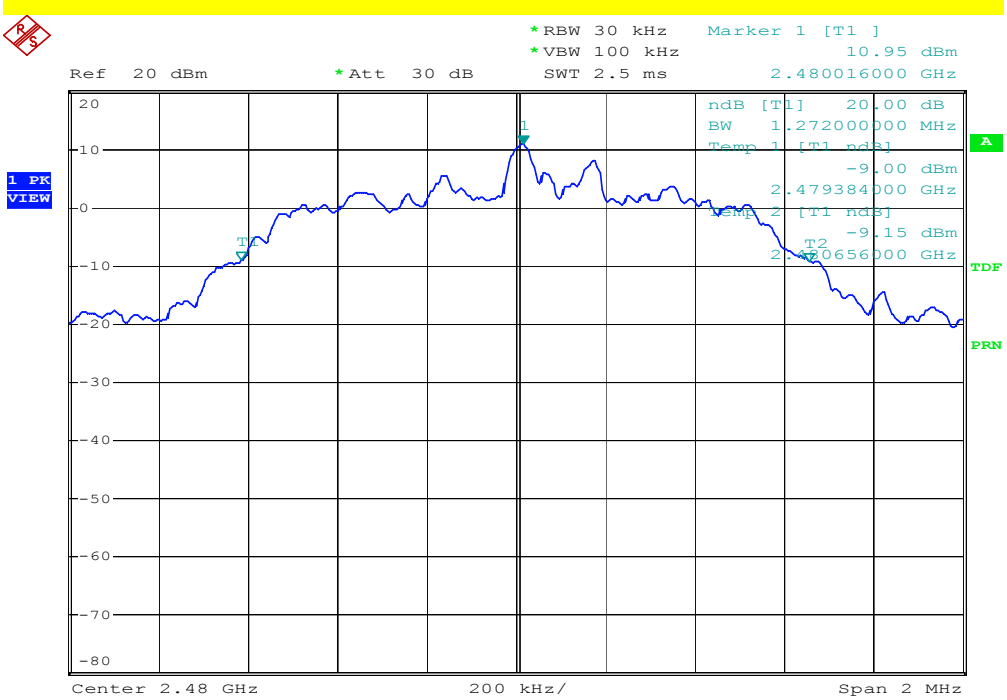
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 00



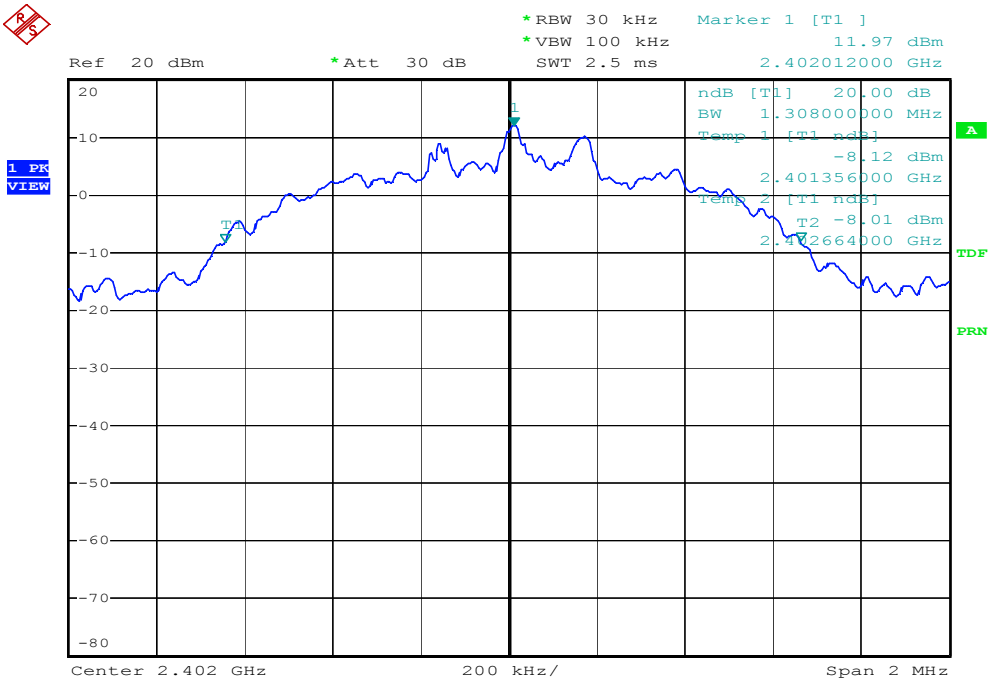
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 39



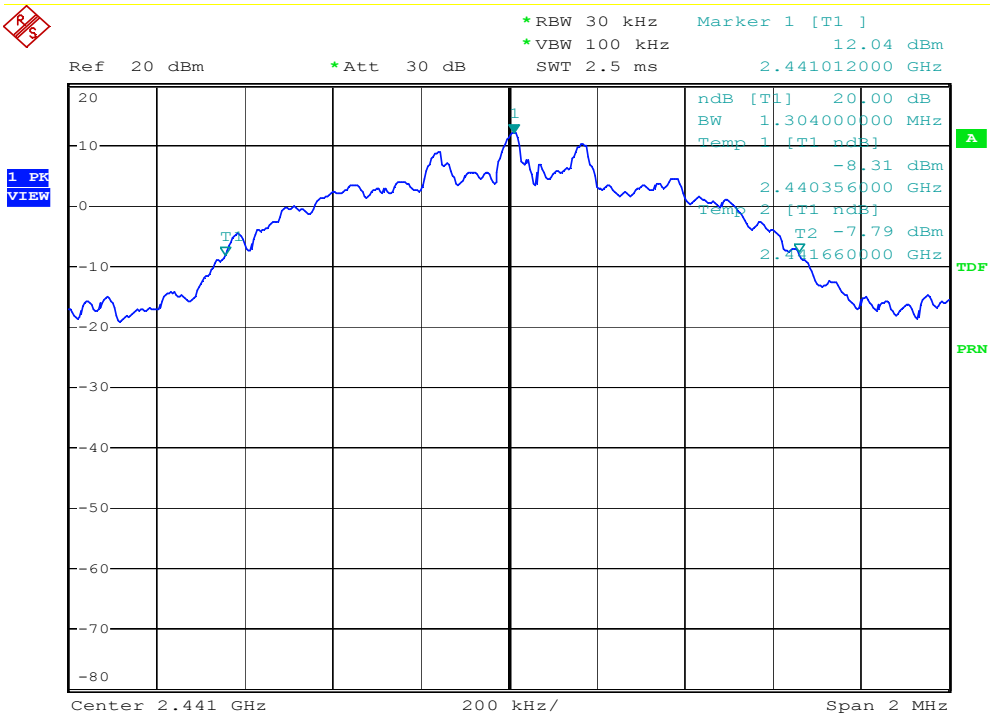
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 78



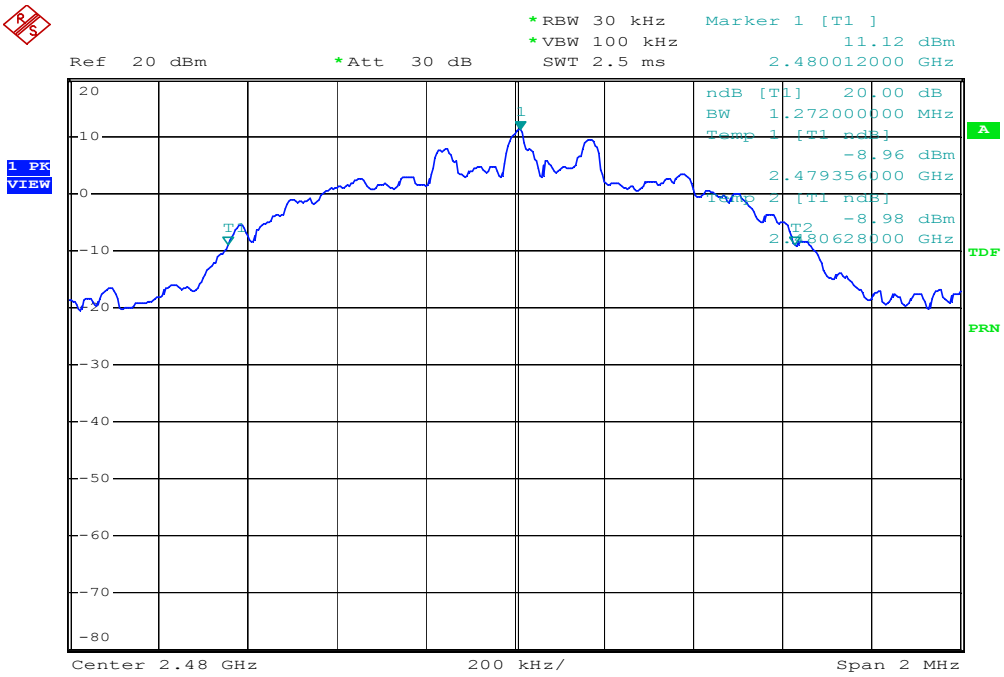
Modulation Standard: 8DPSK (3Mbps)
Channel: 00



Modulation Standard: 8DPSK (3Mbps)
Channel: 39



Modulation Standard: 8DPSK (3Mbps)
Channel: 78



9. Frequencies Separation

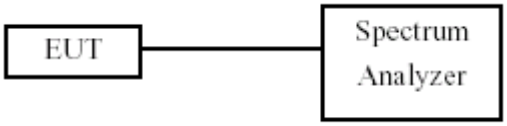
9.1 Test Limit

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.

9.2 Test Procedures

a. The transmitter output was connected to the spectrum analyzer.
b. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.
c. By using the Max Hold function record the separation of two adjacent channels.
d. Measure the frequency difference of these two adjacent channels.

9.3 Test Setup Layout



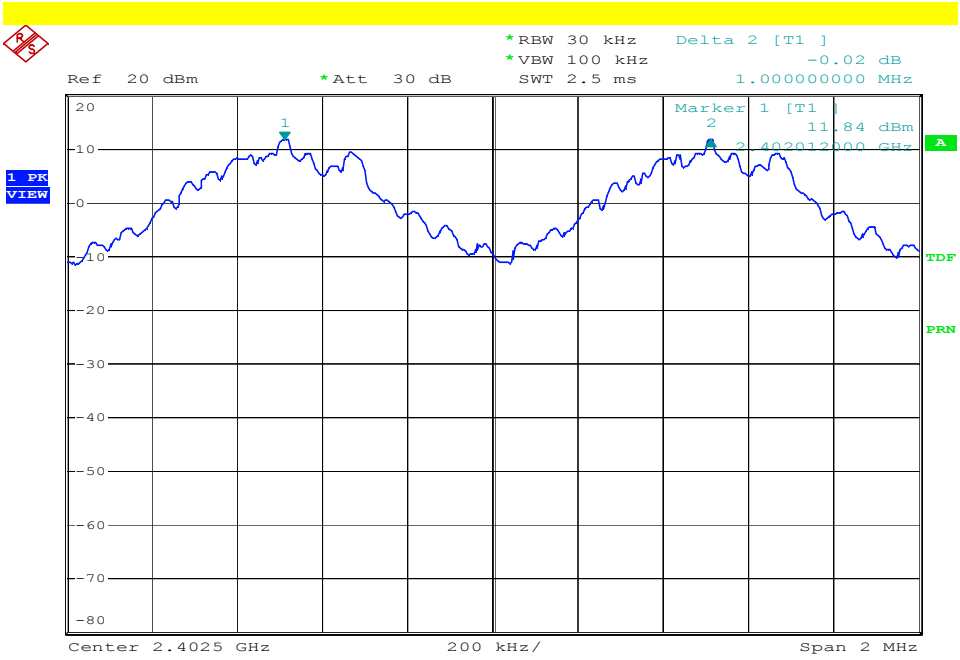
9.4 Test Result and Data

Test Date: July 22, 2015 Temperature: 26 °C

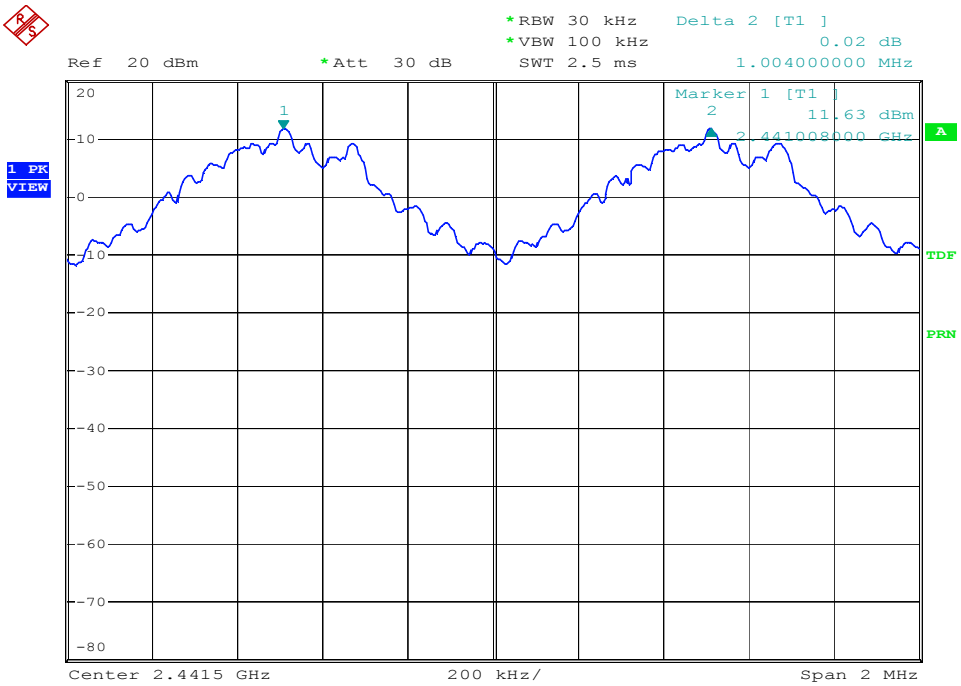
Atmospheric pressure: 1010 hPa Humidity: 52 %

Modulation Type	Channel	Frequency (MHz)	Frequency Sepration (MHz)
GFSK (1Mbps)	00	2402	1.000
	39	2441	1.004
	78	2480	0.996
π/4-DQPSK (2 Mbps)	00	2402	1.004
	39	2441	1.004
	78	2480	1.000
8DPSK (3Mbps)	00	2402	1.004
	39	2441	1.000
	78	2480	1.004

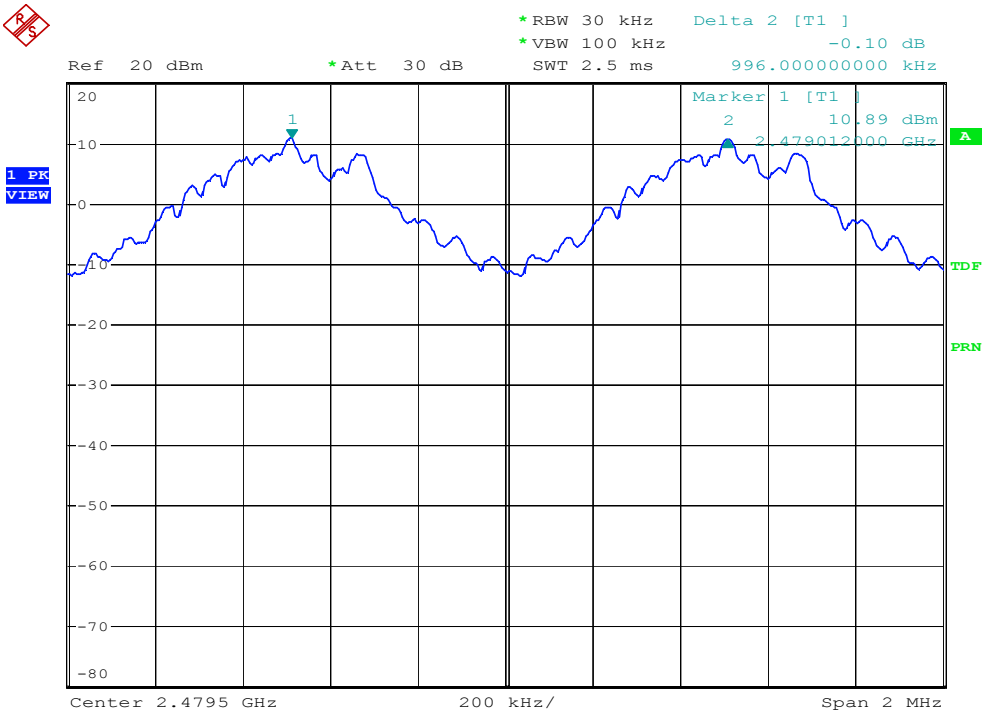
Modulation Standard: GFSK (1Mbps)
Channel: 00



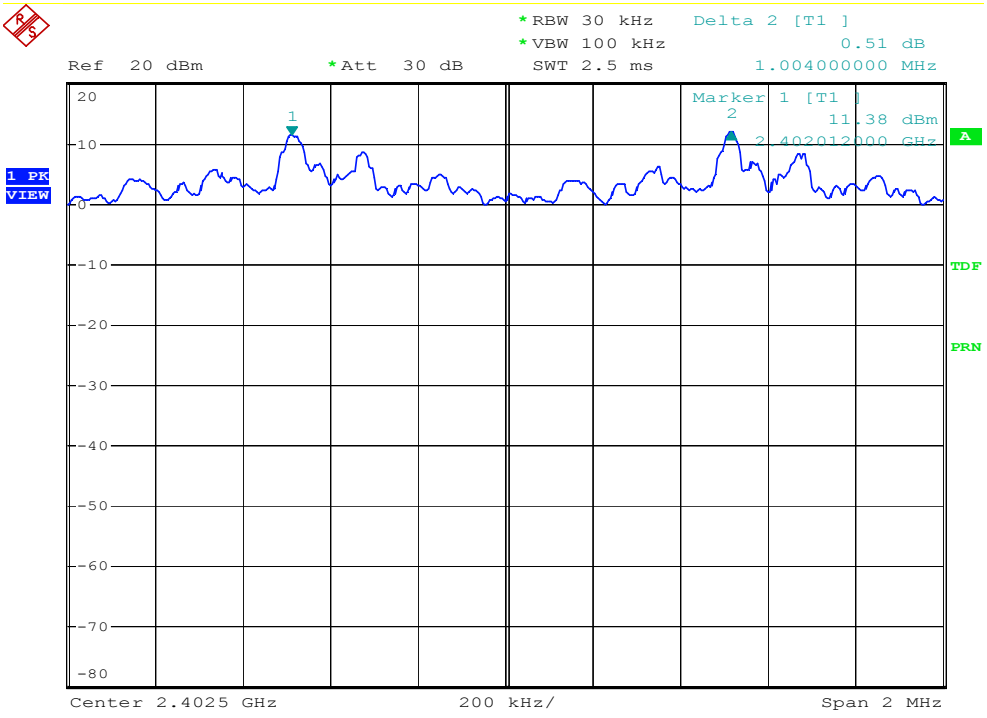
Modulation Standard: GFSK (1Mbps)
Channel: 39



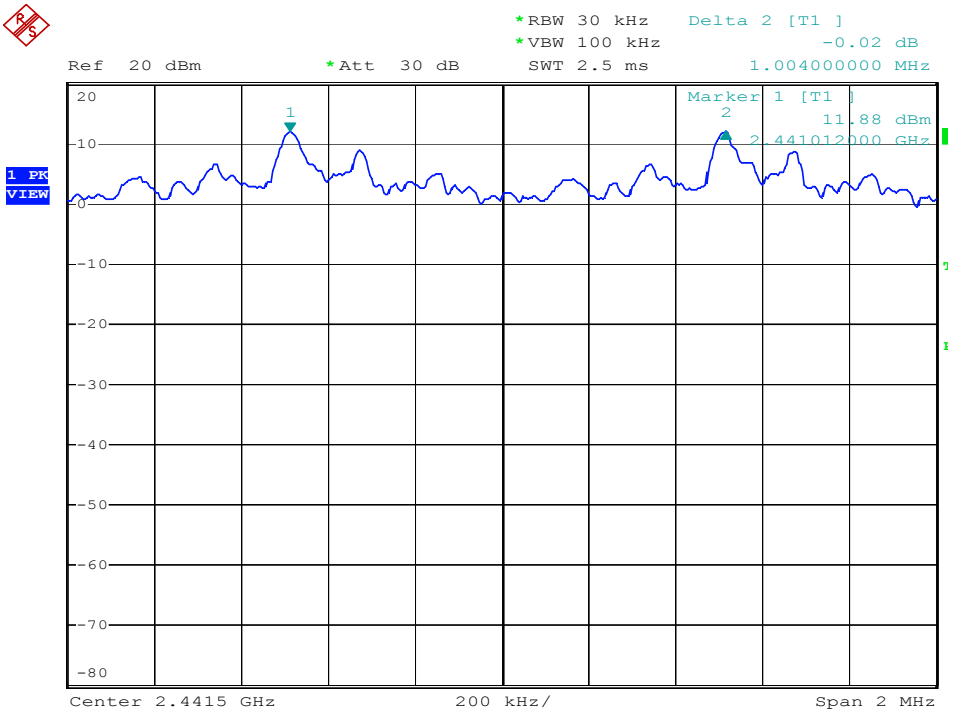
Modulation Standard: GFSK (1Mbps)
Channel: 78



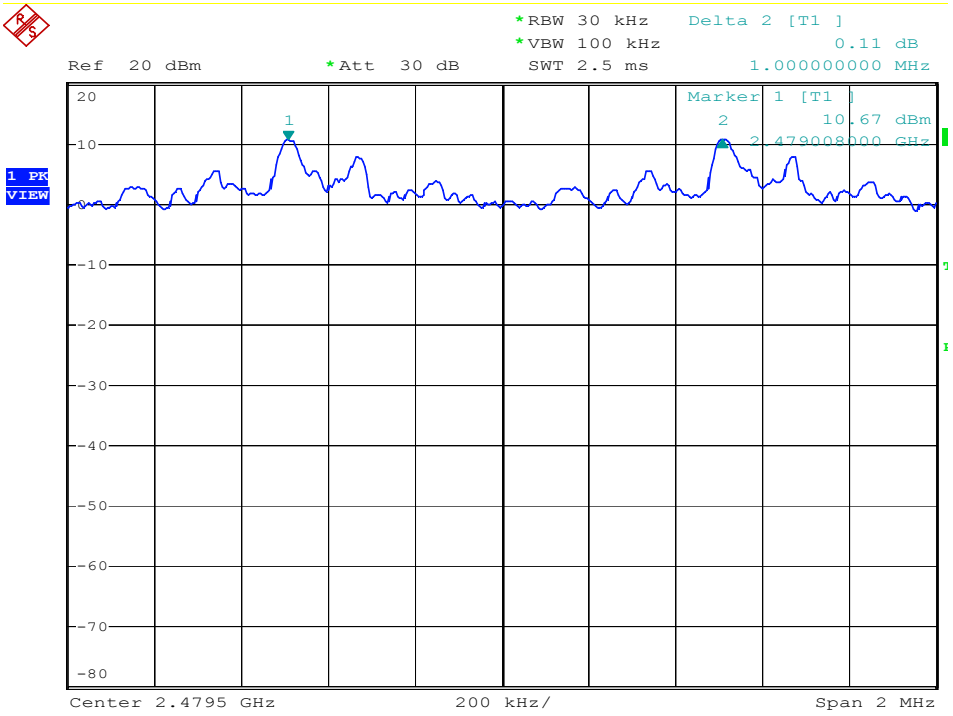
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 00



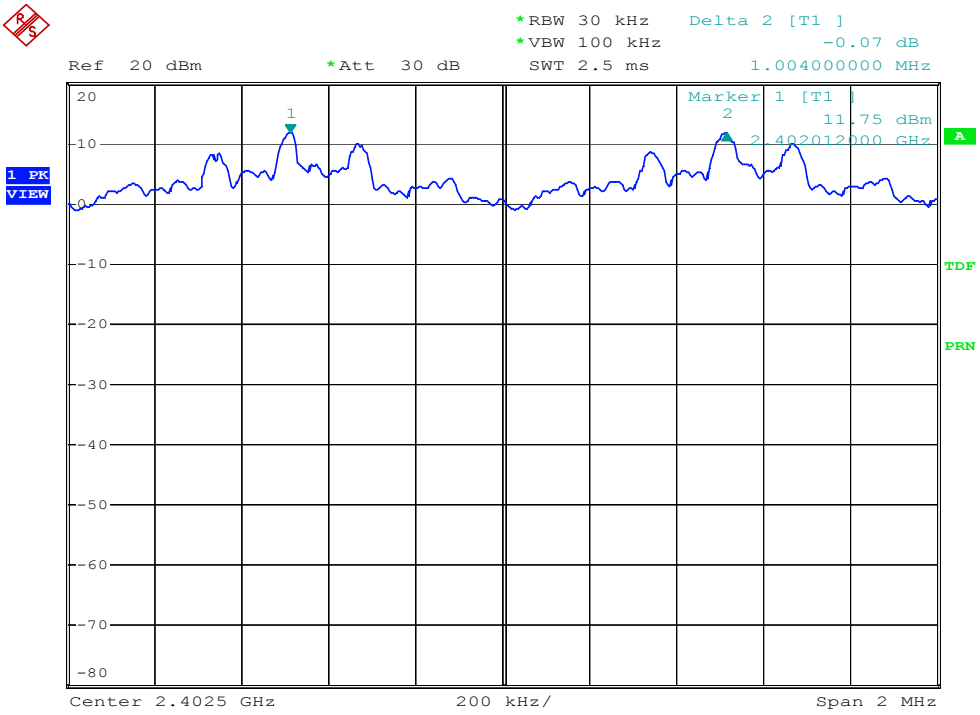
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 39



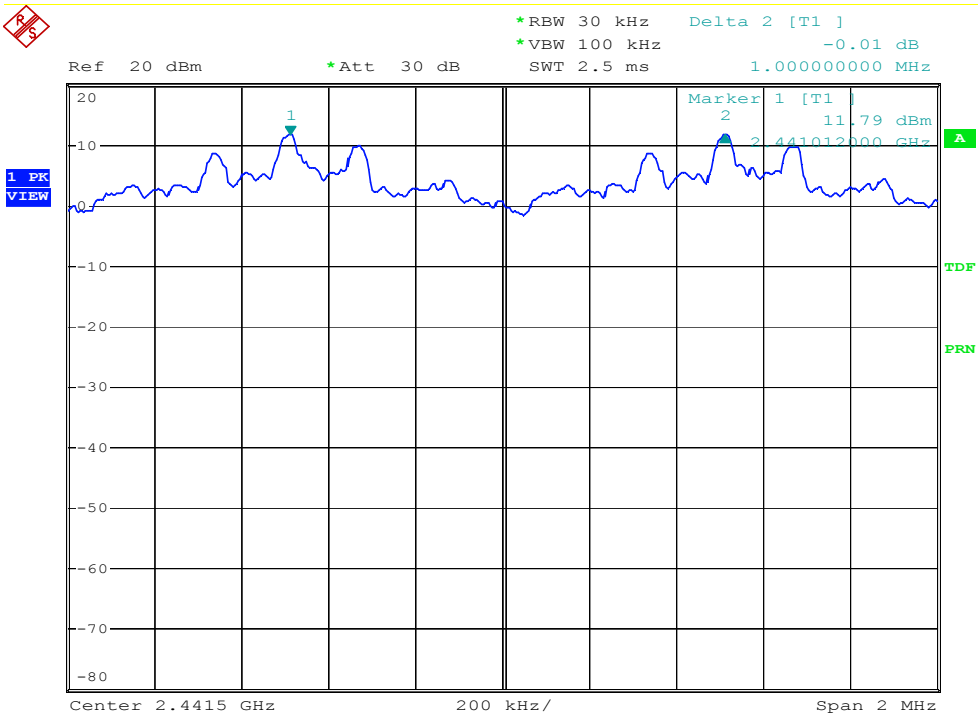
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 78



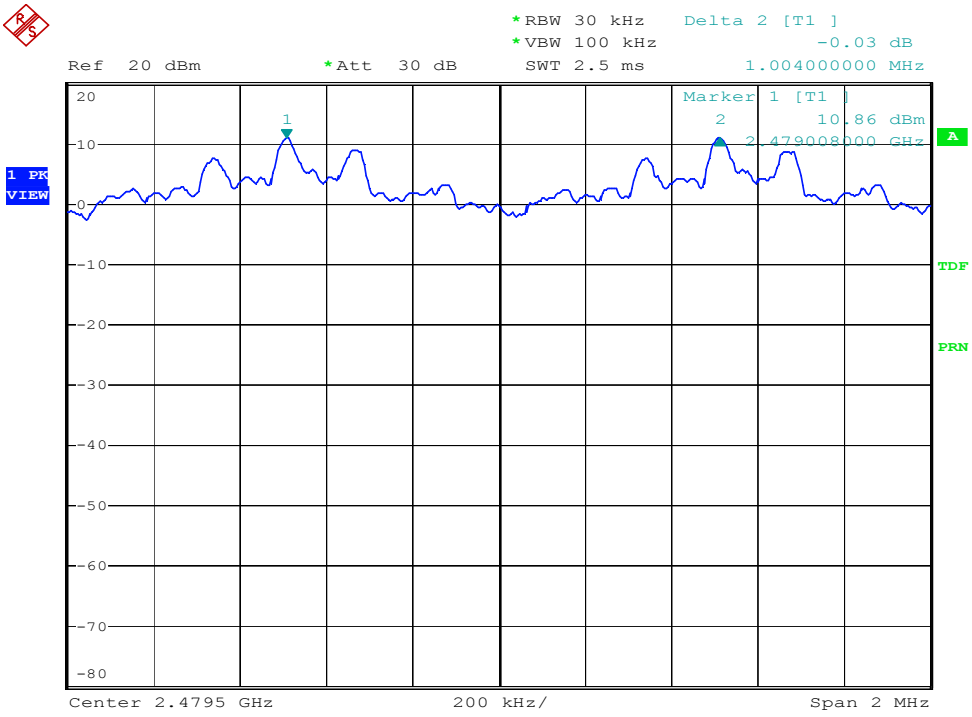
Modulation Standard: 8DPSK (3Mbps)
Channel: 00



Modulation Standard: 8DPSK (3Mbps)
Channel: 39



Modulation Standard: 8DPSK (3Mbps)
Channel: 78



10. Dwell Time on each channel

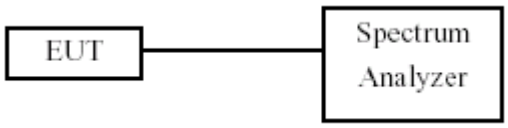
10.1 Test Limit

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.

10.2 Test Procedures

1. The transmitter output was connected to the spectrum analyzer.
2. Adjust the center frequency to measure frequency, then set zero span mode.
2. Set RBW of spectrum analyzer to 1 MHz and VBW to 1 MHz.
4. Measure the time duration of one transmission on the measured frequency.

10.3 Test Setup Layout



10.4 Test Result and Data

Test Date: July. 21, 2015 Temperature: 27 °C

Atmospheric pressure: 1010 hPa Humidity: 52 %

Modulation Type	Channel	Frequency (MHz)	Dwell Time (ms)
GFSK DH1	00	2402	133.12
	39	2441	133.12
	78	2480	133.12
GFSK DH3	00	2402	268.80
	39	2441	268.80
	78	2480	268.80
GFSK DH5	00	2402	312.34
	39	2441	312.34
	78	2480	312.34
π/4-DQPSK 2DH5	00	2402	312.34
	39	2441	312.34
	78	2480	312.34
8DPSK 3DH5	00	2402	313.40
	39	2441	313.40
	78	2480	313.40

Test period: 0.4(second/ channel) x 79 channel= 31.6 second

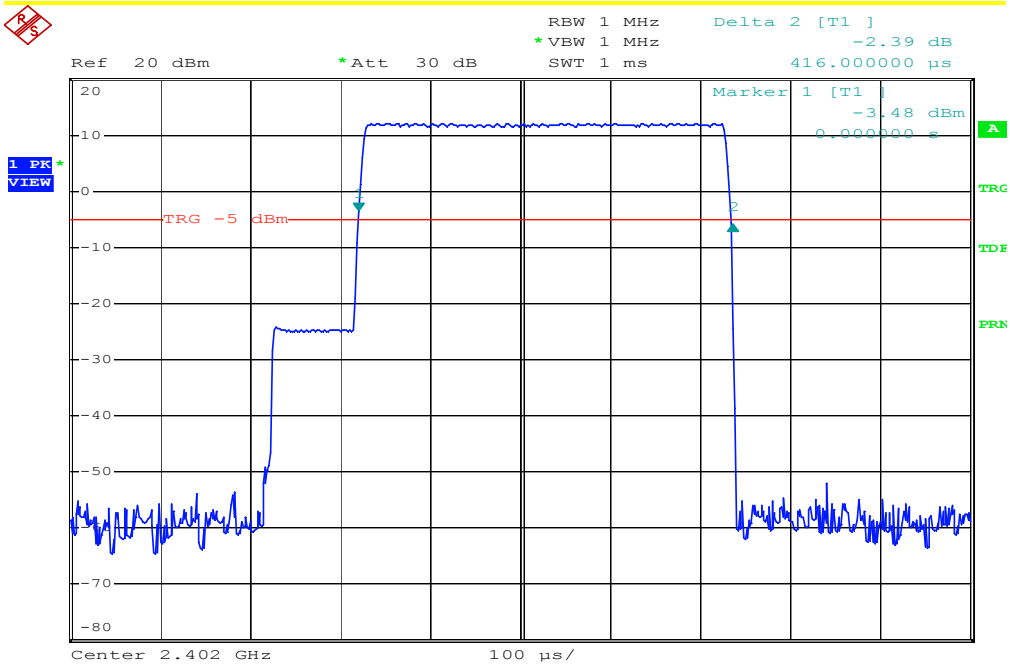
The DH1 packet can cover a single time slot. A maximum length packet has duration of 1 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 1/1600 seconds, or 0.625ms. DH1 Packet permit maximum 1600 / 79 /2 = 10.12 hops per second in each channel (1 time slot RX, 1 time slot TX). So, the dwell time is the time duration of the pulse times 10.12 x 31.6 = 320 within 31.6 seconds.

The DH3 packet can cover up to 3 time slots. A maximum length packet has duration of 3 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 3/1600 seconds, or 1.875ms. DH3 Packet permit maximum 1600 / 79 / 4 = 5.06 hops per second in each channel (3 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times 5.06 x 31.6 = 160 within 31.6 seconds.

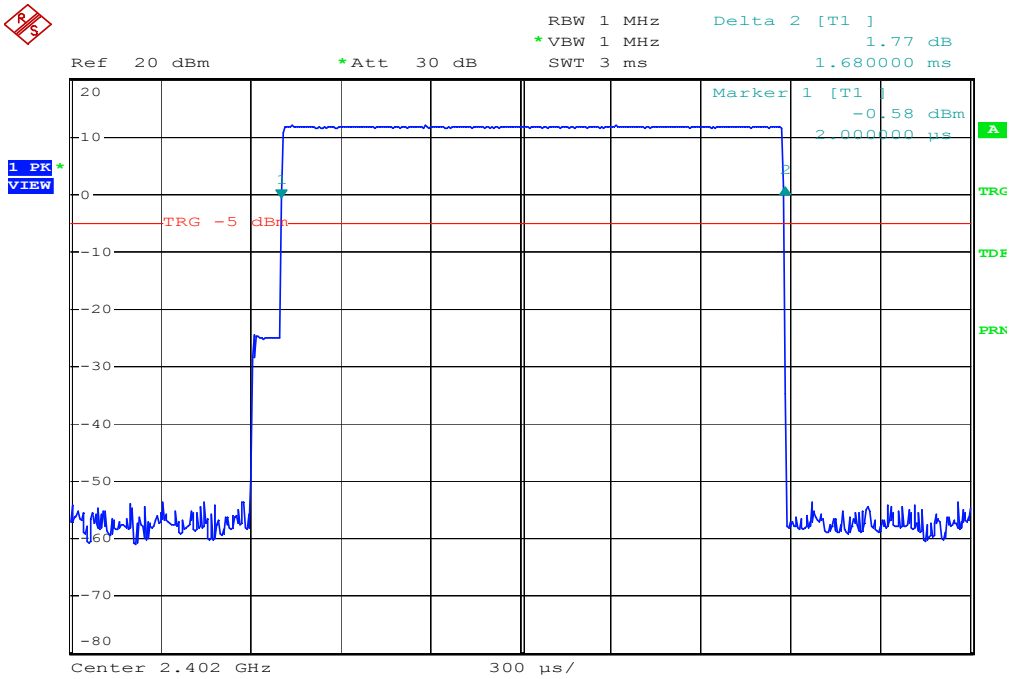
The DH5 packet can cover up to 5 time slots. Operate DH5 at maximum dwell time and maximum duty cycle. A maximum length packet has duration of 5 time slots. The hopping rate is 1600 hops/second so the maximum dwell time is 5/1600 seconds, or 3.125ms. DH5 Packet permit maximum 1600/ 79 / 6 = 3.37 hops per second in each channel (5 time slots TX, 1 time slot RX). So, the dwell time is the time duration of the pulse times
3.37 x 31.6 = 106.6 within 31.6 seconds

Example:
CH0,DH1 mode = 0.416 (ms)*(1600/79/2)*31.6= 133.12 (ms)
CH0,DH3 mode = 1.680 (ms)*(1600/79/4)*31.6= 268.80 (ms)
CH0,DH5 mode = 2.930 (ms)*(1600/79/6)*31.6= 312.34 (ms)

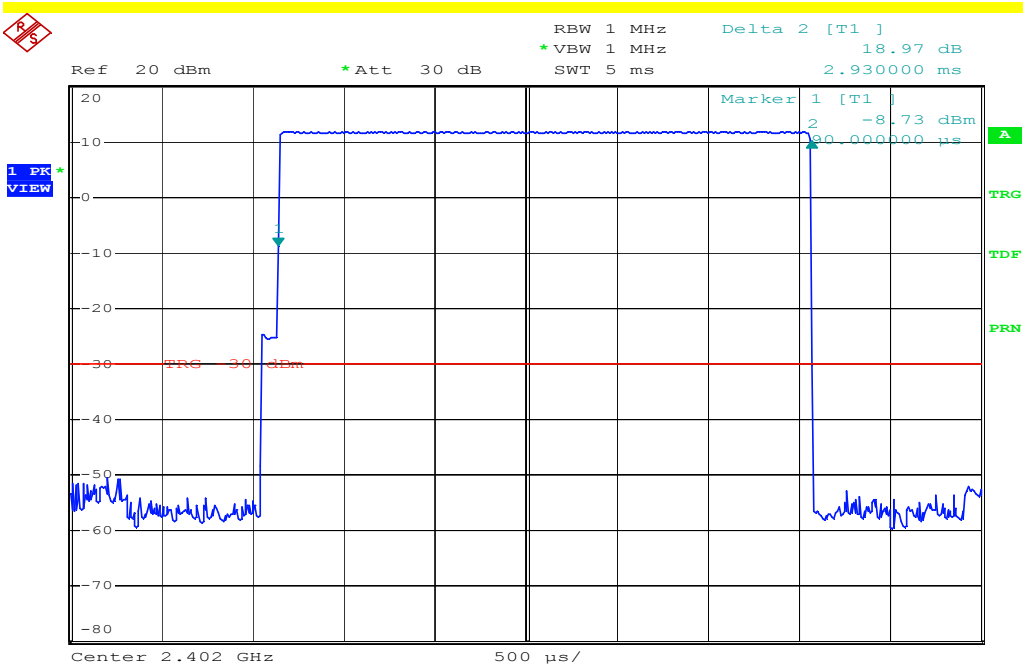
Modulation Standard: GFSK (1Mbps)
Channel: 00, Rate: DH1



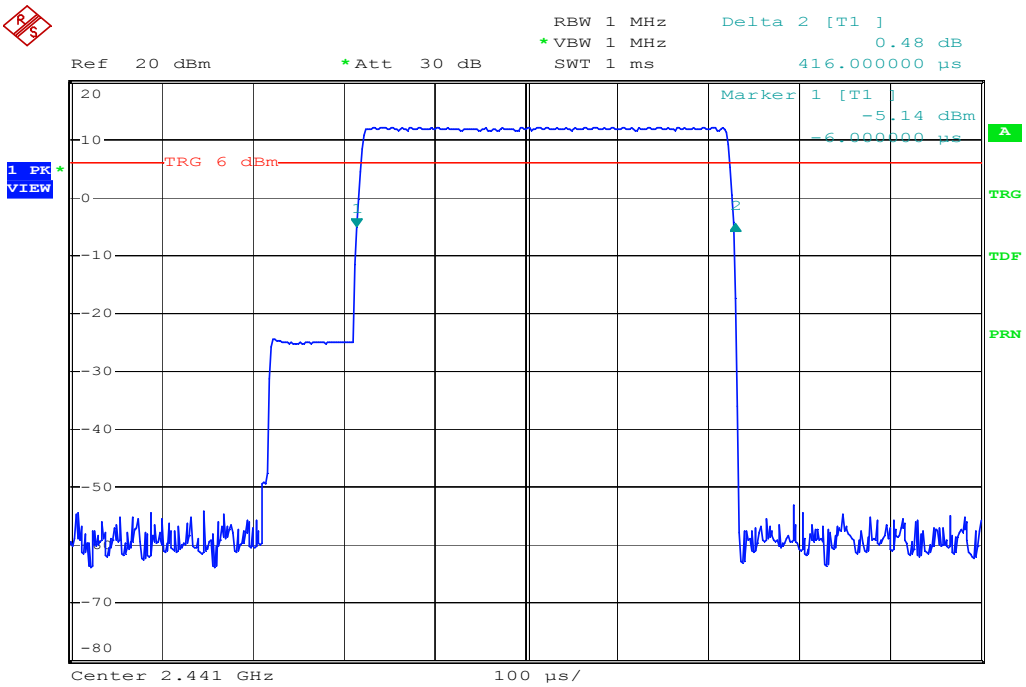
Modulation Standard: GFSK (1Mbps)
Channel: 00, Rate: DH3



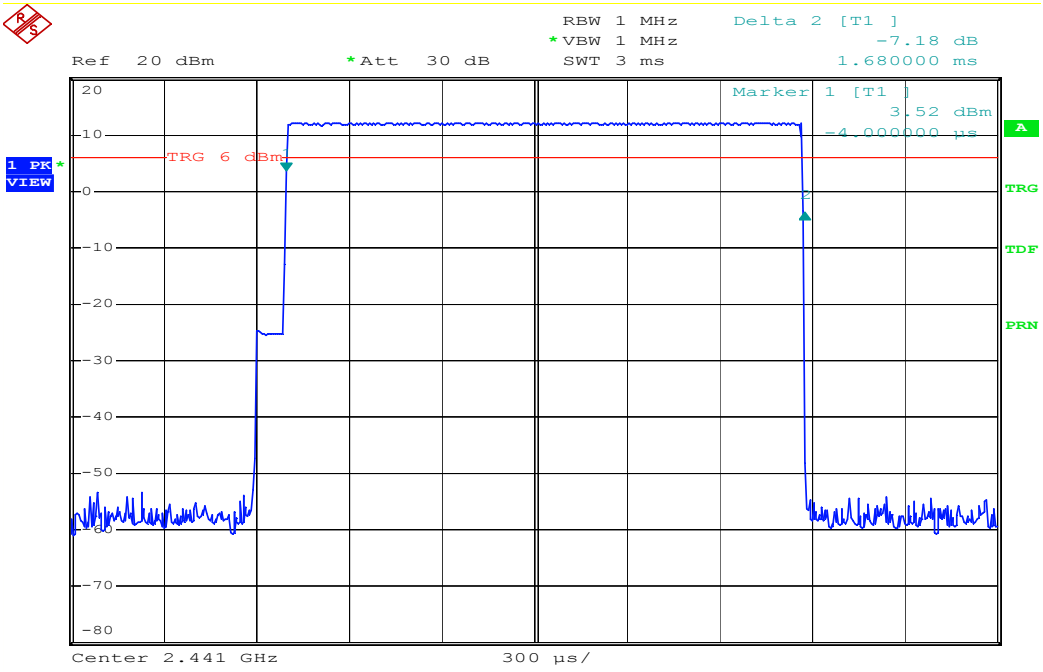
Modulation Standard: GFSK (1Mbps)
Channel: 00, Rate: DH5



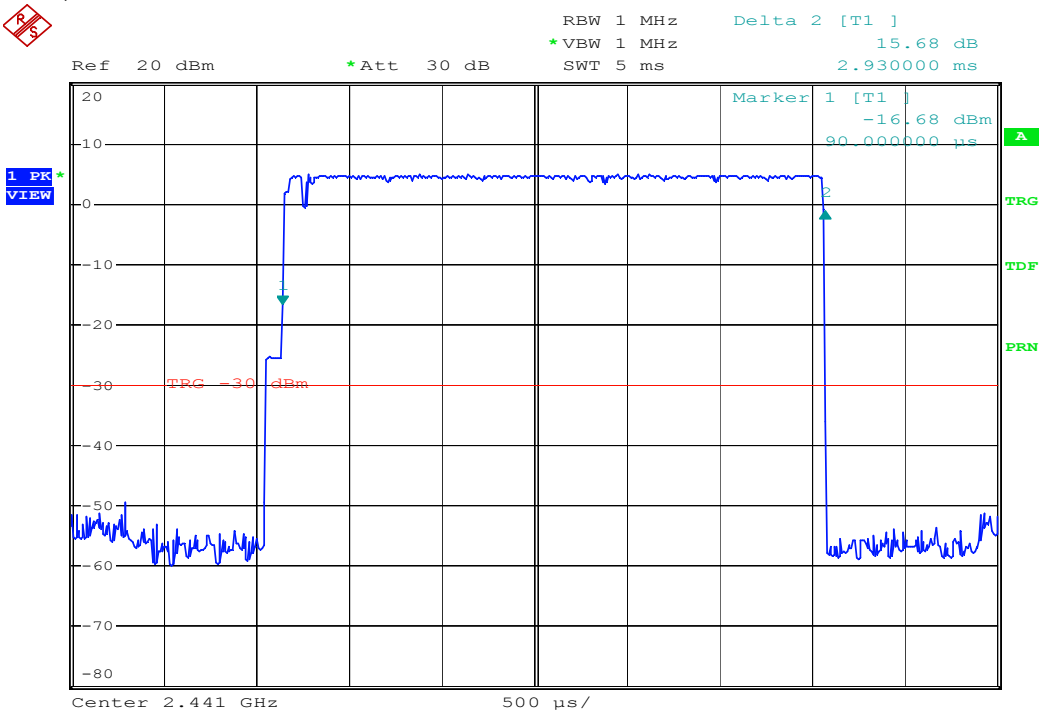
Modulation Standard: GFSK (1Mbps)
Channel: 39, Rate: DH1



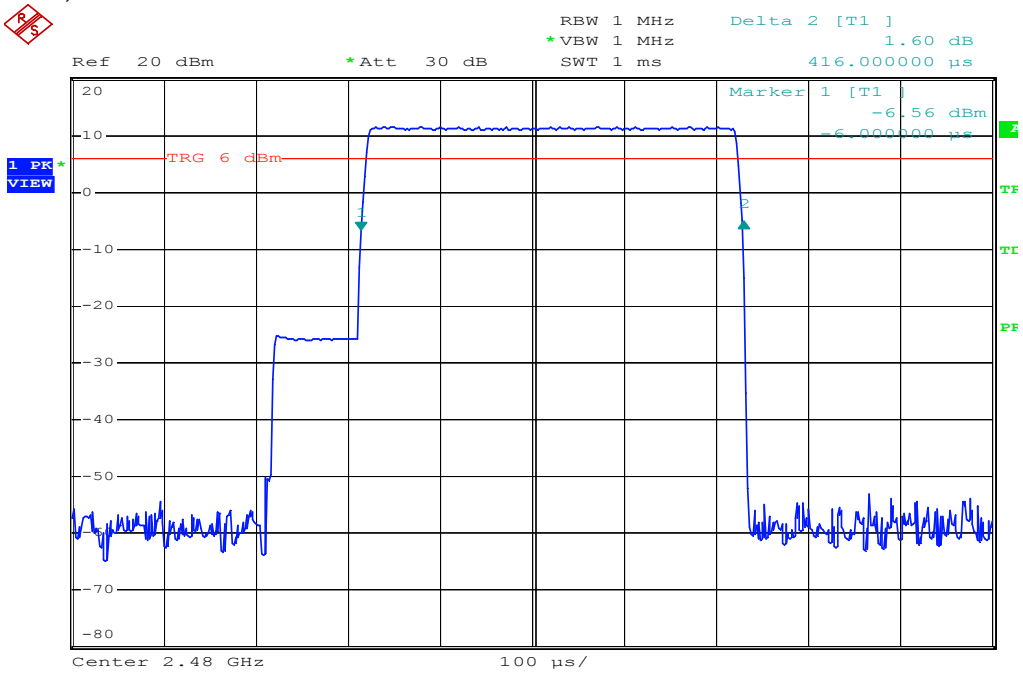
Modulation Standard: GFSK (1Mbps)
Channel: 39, Rate: DH3



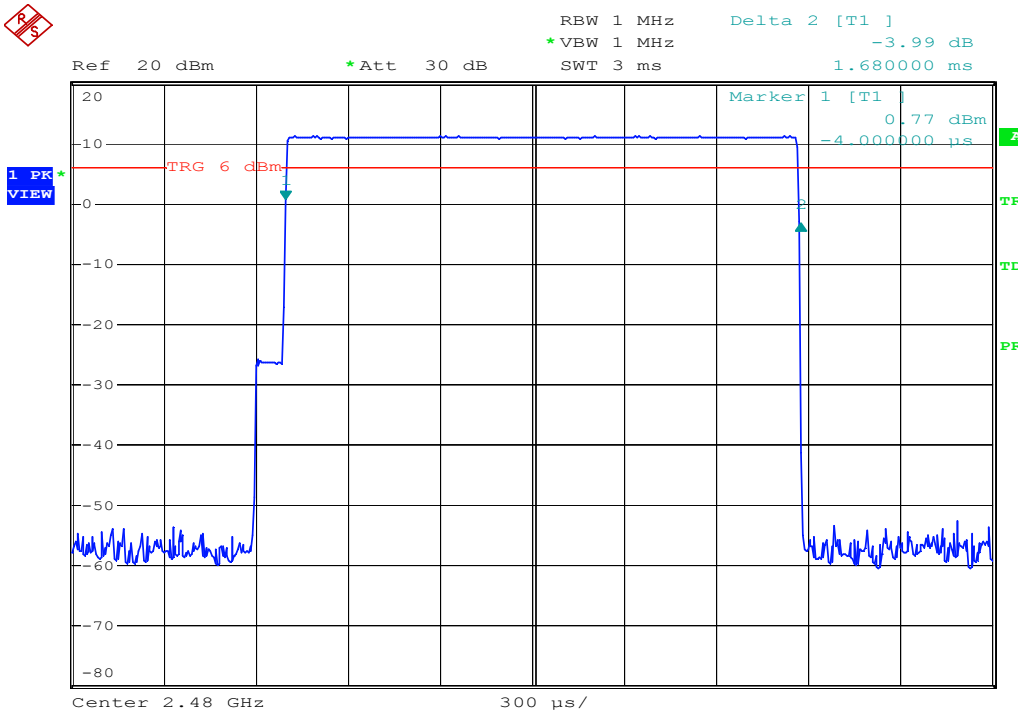
Modulation Standard: GFSK (1Mbps)
Channel: 39, Rate: DH5



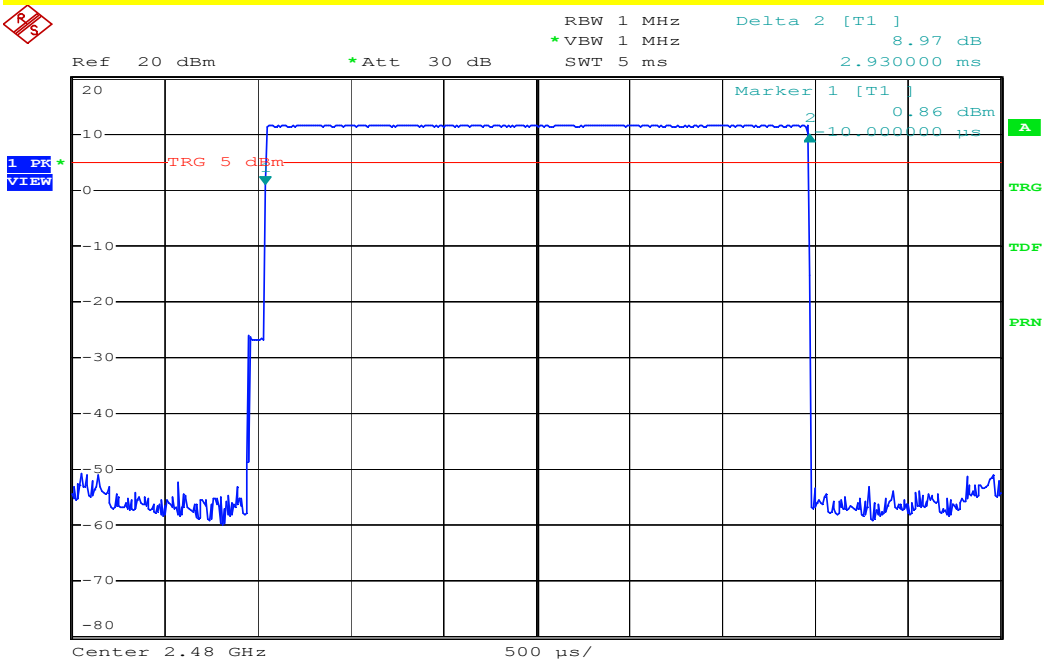
Modulation Standard: GFSK (1Mbps)
Channel: 78, Rate: DH1



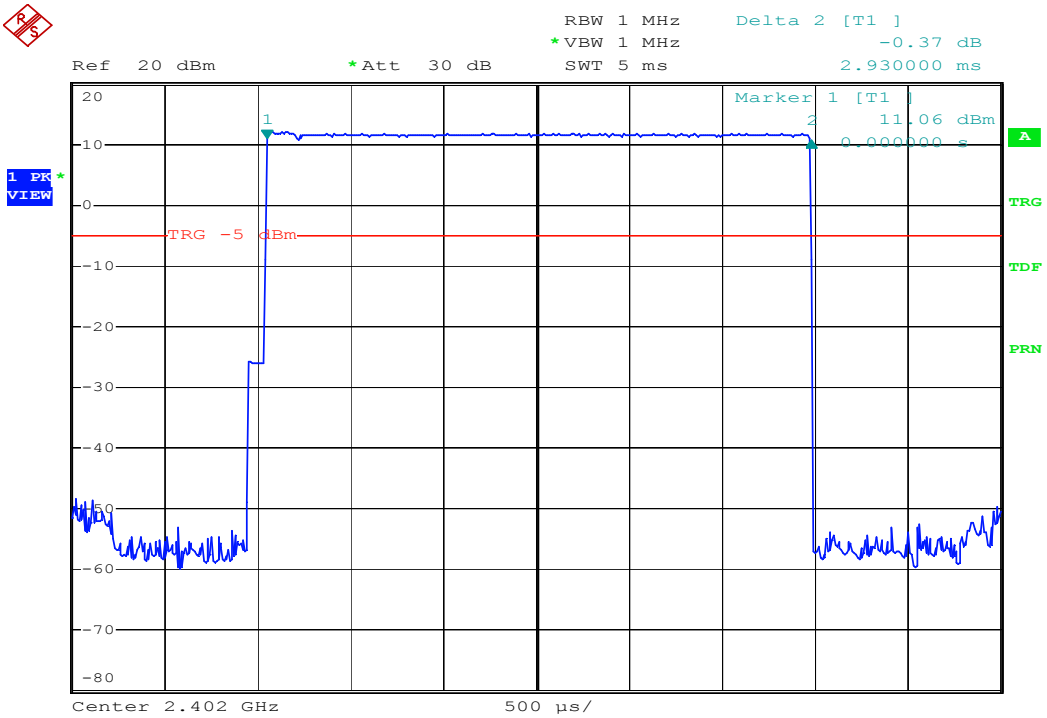
Modulation Standard: GFSK (1Mbps)
Channel: 78, Rate: DH3



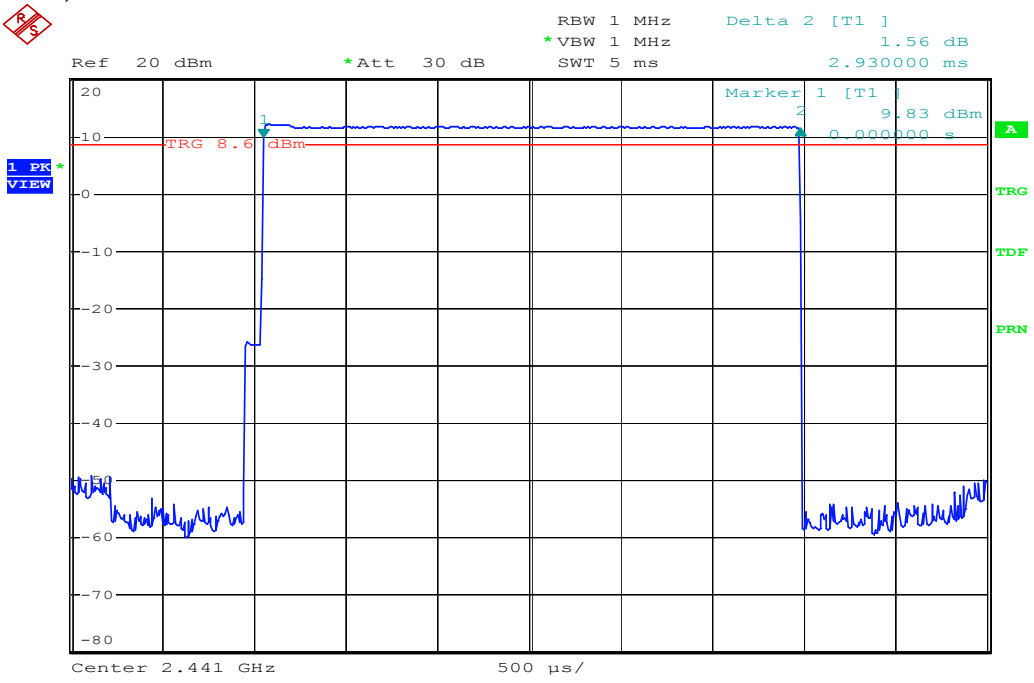
Modulation Standard: GFSK (1Mbps)
Channel: 78, Rate: DH5



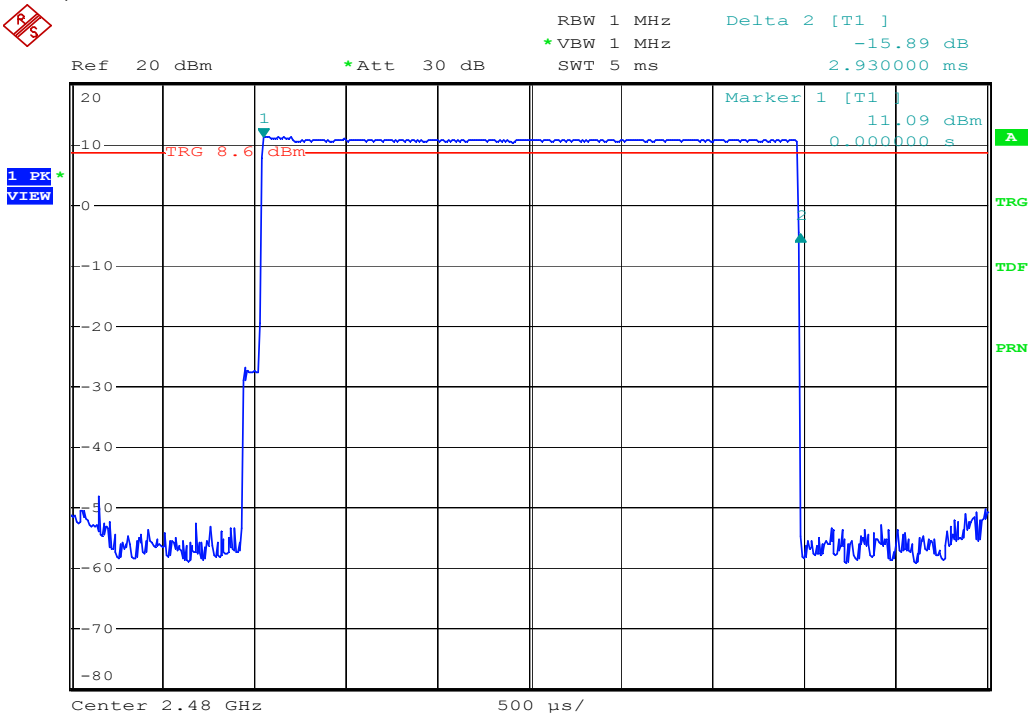
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 00, Rate: 2DH5



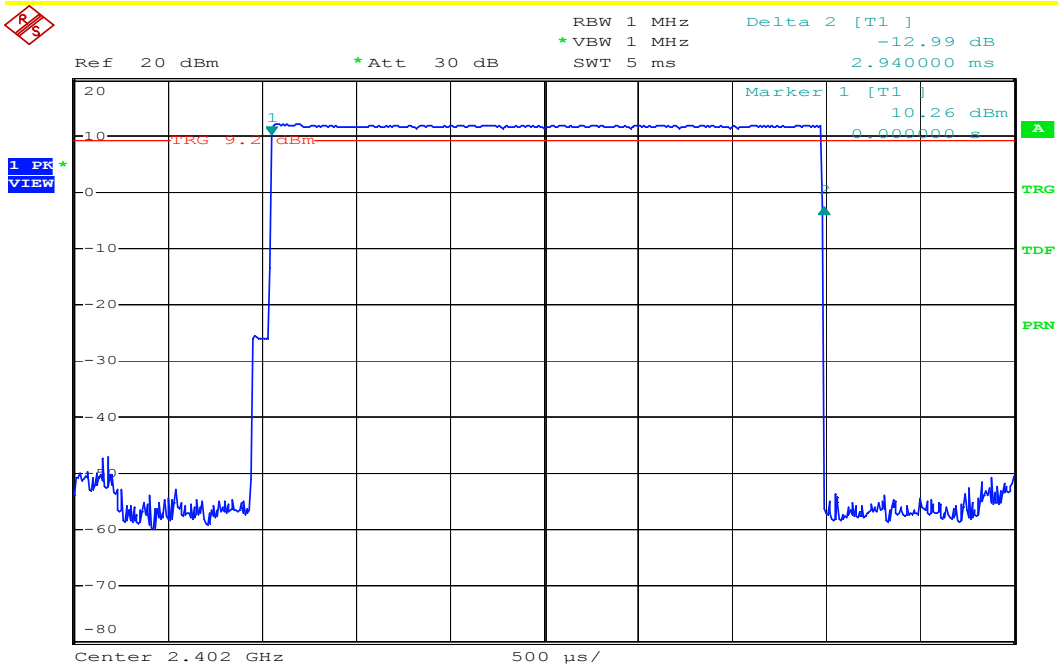
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 39, Rate: 2DH5



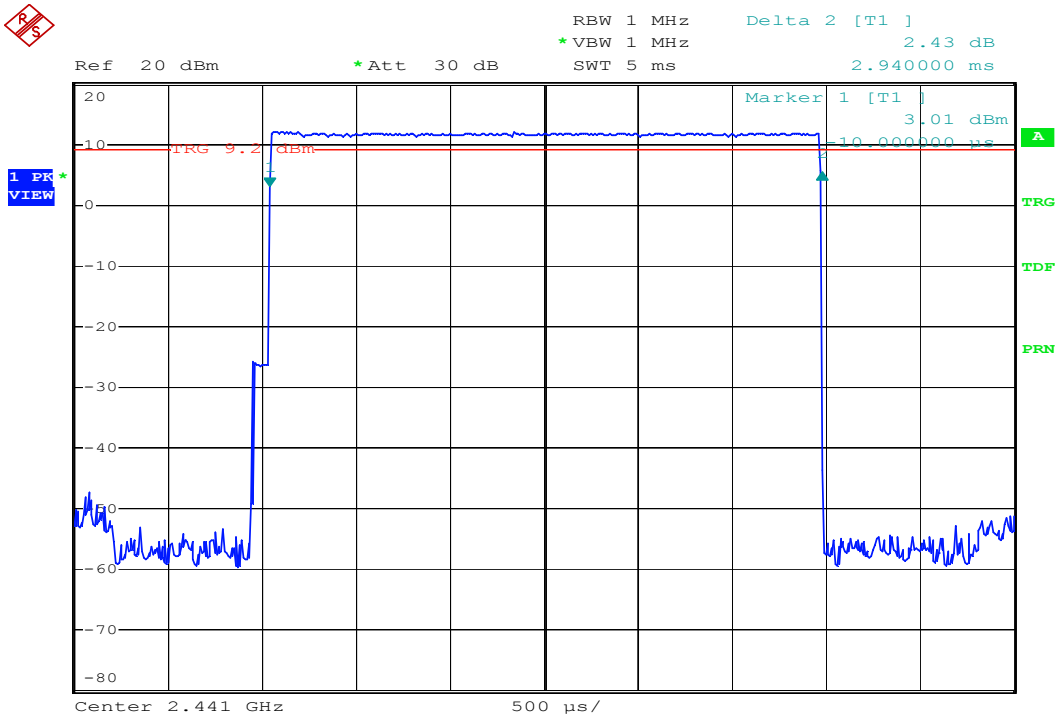
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 78, Rate: 2DH5



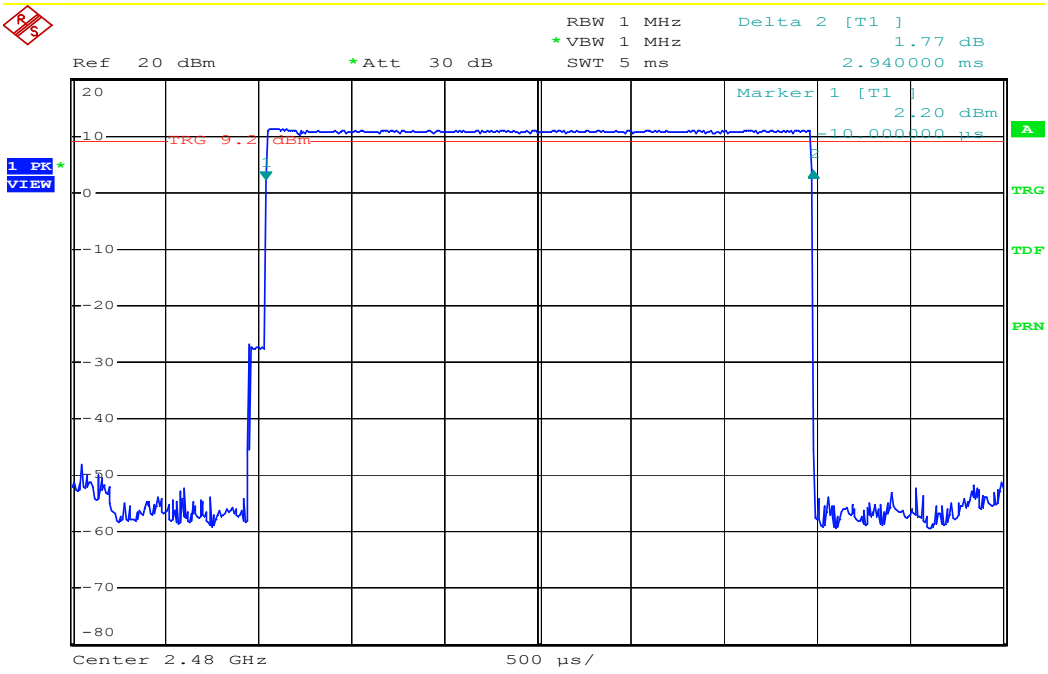
Modulation Standard: 8DPSK (3Mbps)
Channel: 00, Rate: 3DH5



Modulation Standard: 8DPSK (3Mbps)
Channel: 39, Rate: 3DH5



Modulation Standard: 8DPSK (3Mbps)
Channel: 78, Rate: 3DH5



11. Number of Hopping Channels

11.1 Test Limit

Frequency hopping systems in the 2400 ~ 2483.5 MHz band shall use at least 15 channels.

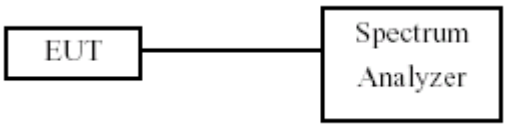
11.2 Test Procedures

a. The transmitter output was connected to the spectrum analyzer.

b. 2. Set RBW of spectrum analyzer to 100 KHz and VBW to 100 KHz.

c. 3. Set the MaxHold function, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been record.

11.3 Test Setup Layout



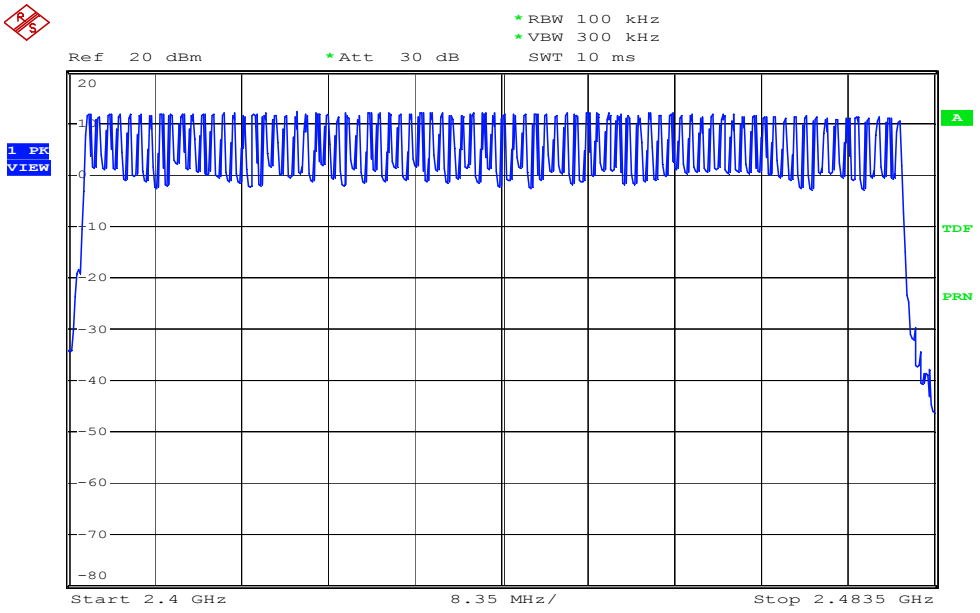
11.4 Test Result and Data

Test Date: July 21, 2015 Temperature: 26 °C

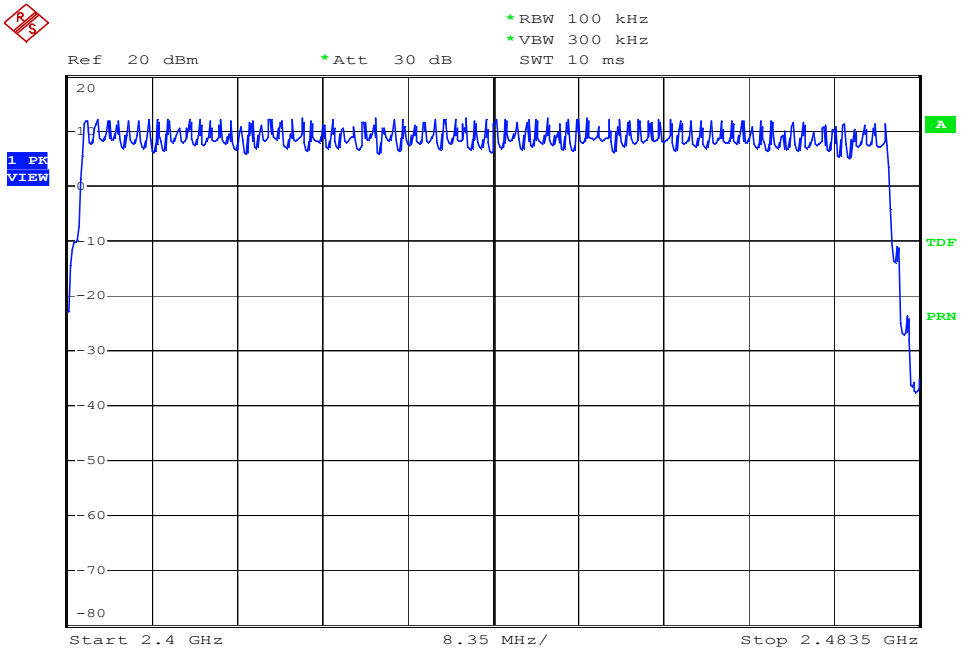
Atmospheric pressure: 1010 hPa Humidity: 52 %

Modulation Type	Hopping Channels
GFSK (1Mbps)	79
π/4-DQPSK (2Mbps)	79
8DPSK (3Mbps)	79

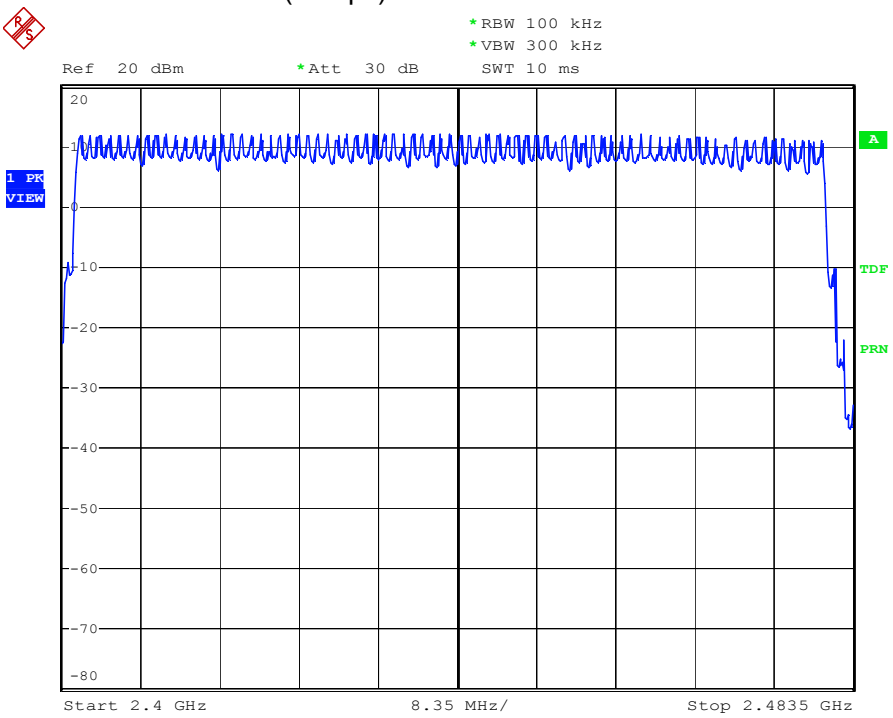
Modulation Standard: GFSK (1Mbps)



Modulation Standard: π/4-DQPSK (2Mbps)



Modulation Standard: 8DPSK (3Mbps)



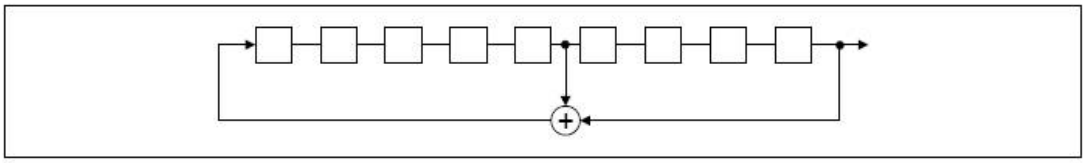
12. Pseudorandom Frequency Hopping Sequence

The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage. And the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONEs; i.e. the shift register is initialized with nine ones.

• Number of shift register stages: 9

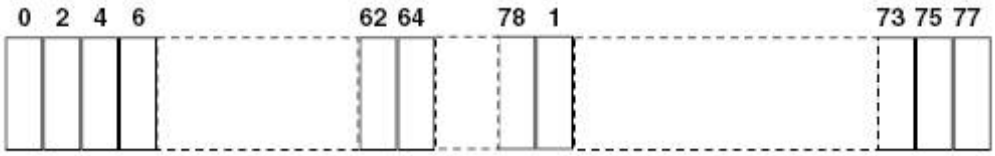
• Length of pseudo-random sequence: 2_9 -1 = 511 bits

• Longest sequence of zeros: 8 (non-inverted signal)



Linear Feedback Shift Register for Generation of the PRBS sequence

An example of Pseudorandom Frequency Hopping Sequence as follow:



Each frequency used equally on the average by each transmitter.

The system receivers have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shift frequencies in synchronization with the transmitted signals.

13. Maximum Peak Output Power

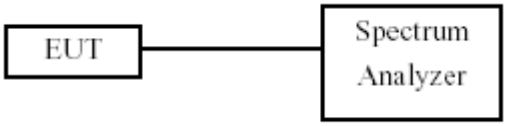
13.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

13.2 Test Procedures

The antenna port (RF output) of the EUT was connected to the input (RF input) of a power meter. Power was read directly from the meter and cable loss connection was added to the reading to obtain power at the EUT antenna terminal. The EUT Output Power was set to maximum to produce the worse case test result.

13.3 Test Setup Layout



13.4 Test Result and Data

Test Date: July 21, 2015 Temperature: 26 °C

Atmospheric pressure: 1010 hPa Humidity: 52 %

Modulation Type	Channel	Frequency (MHz)	Output Power (dBm)	Output Power (mW)
GFSK (1Mbps)	00	2402	3.090	2.04
	39	2441	3.076	2.03
	78	2480	2.294	1.70
π/4-DQPSK (2Mbps)	00	2402	2.862	1.93
	39	2441	2.102	1.62
	78	2480	1.005	1.26
8DPSK (3Mbps)	00	2402	3.171	2.08
	39	2441	2.563	1.80
	78	2480	1.323	1.36

Modulation Standard: GFSK (1Mbps)
Channel: 00

Modulation Standard: GFSK (1Mbps)
Channel: 39

Modulation Standard: GFSK (1Mbps)
Channel: 78

Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 00

Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 39

Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 78

Modulation Standard: 8DPSK (3Mbps)
Channel: 00

Modulation Standard: 8DPSK (3Mbps)
Channel: 39

Modulation Standard: 8DPSK (3Mbps)
Channel: 78

14. Band Edges Measurement

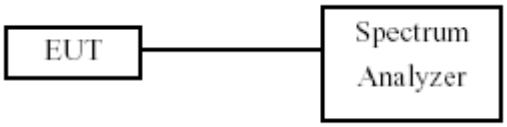
14.1 Test Limit

Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).

14.2 Test Procedure

a. The transmitter output was connected to the spectrum analyzer via a low lose cable.
b. Set both RBW and VBW of spectrum analyzer to 100 KHz with convenient frequency span including 100 KHz bandwidth from band edge.
c. The band edges was measured and recorded.

14.3 Test Setup Layout

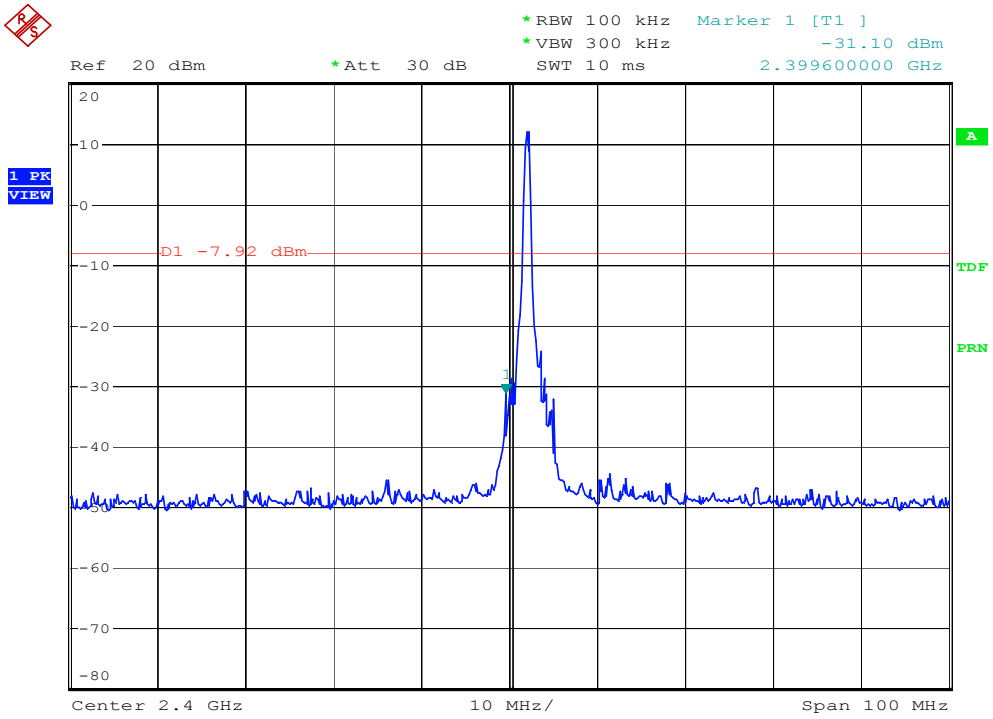


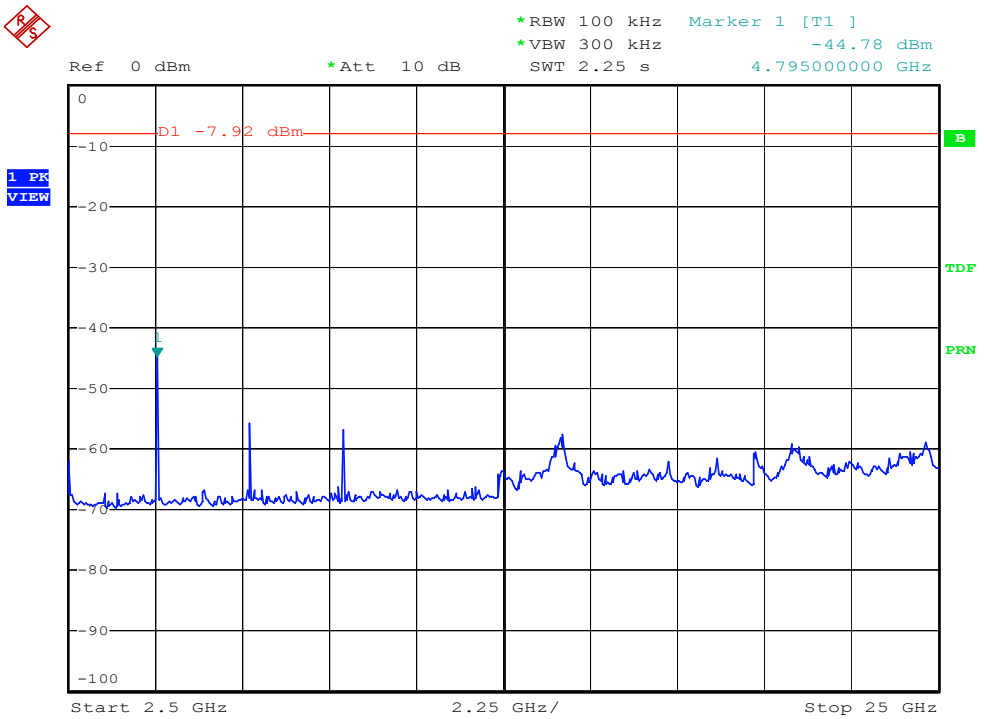
14.4 Test Result and Data

Test Date: July 21, 2015 Temperature: 26 °C
Atmospheric pressure: 1010 hPa Humidity: 52 %

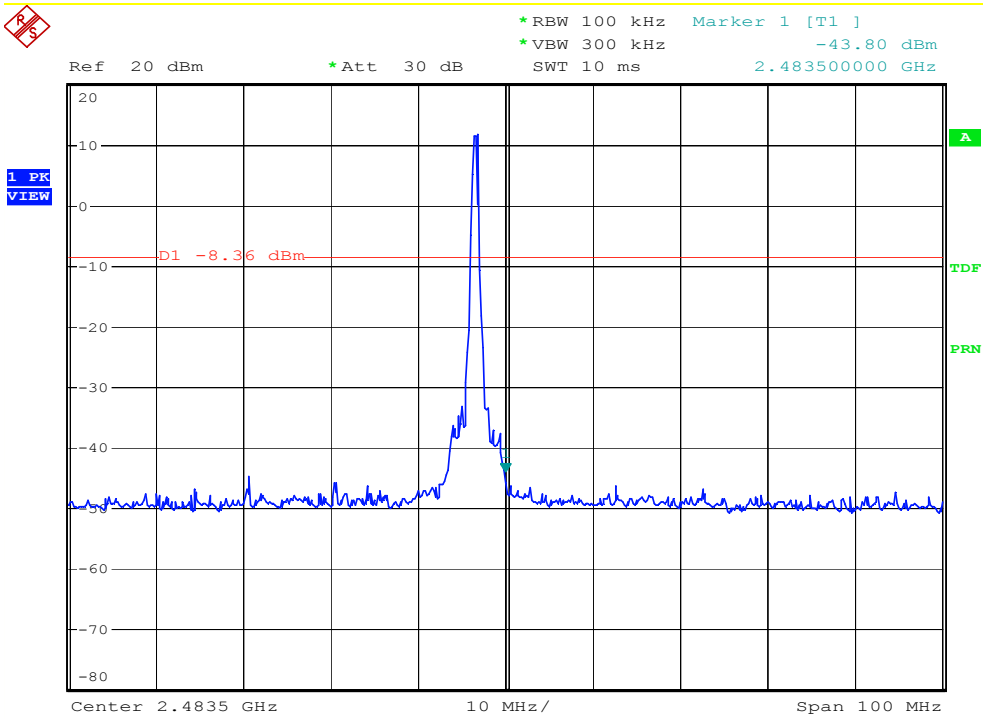
Modulation Type	Channel	Frequency	Max. Value in frequency(MHz)	Max. Value (dBm)
GFSK (1Mbps)	00	2402	2399.60	-31.10
	78	2480	2483.50	-43.80
π/4-DQPSK (2Mbps)	00	2402	2400.00	-20.25
	78	2480	2483.50	-34.12
8DPSK (3Mbps)	00	2402	2399.60	-21.00
	78	2480	2483.50	-29.56

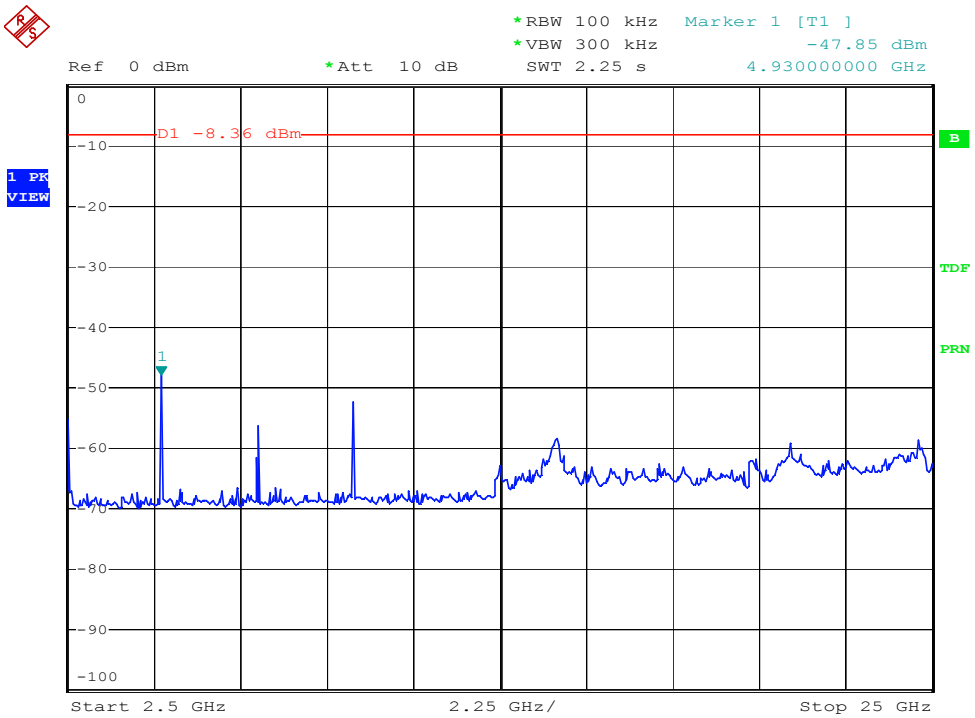
Modulation Standard: GFSK (1Mbps)
Channel: 00



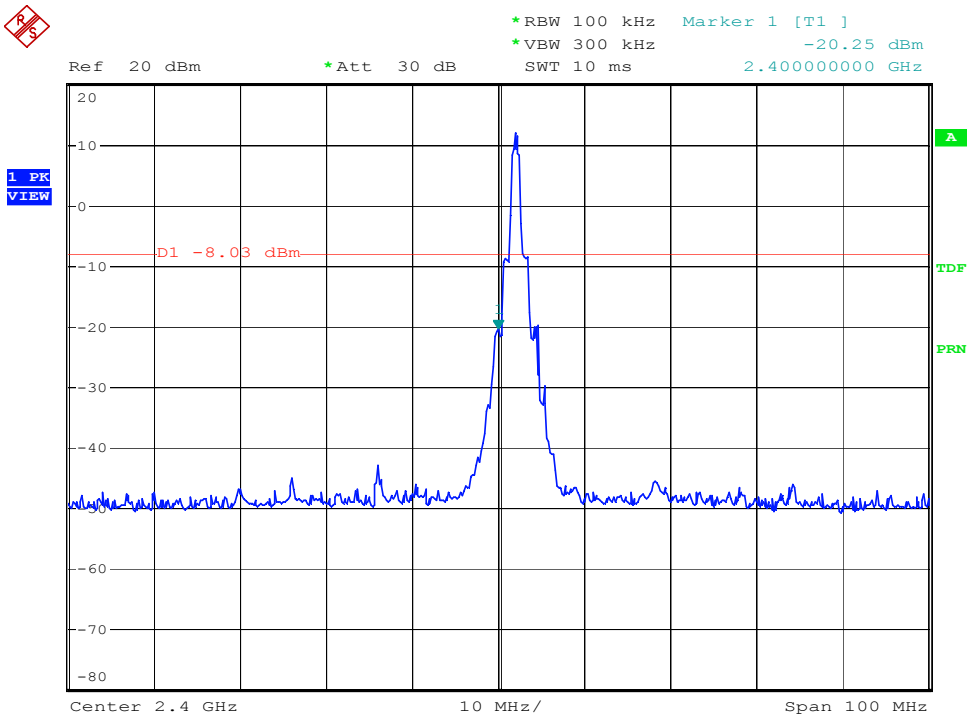


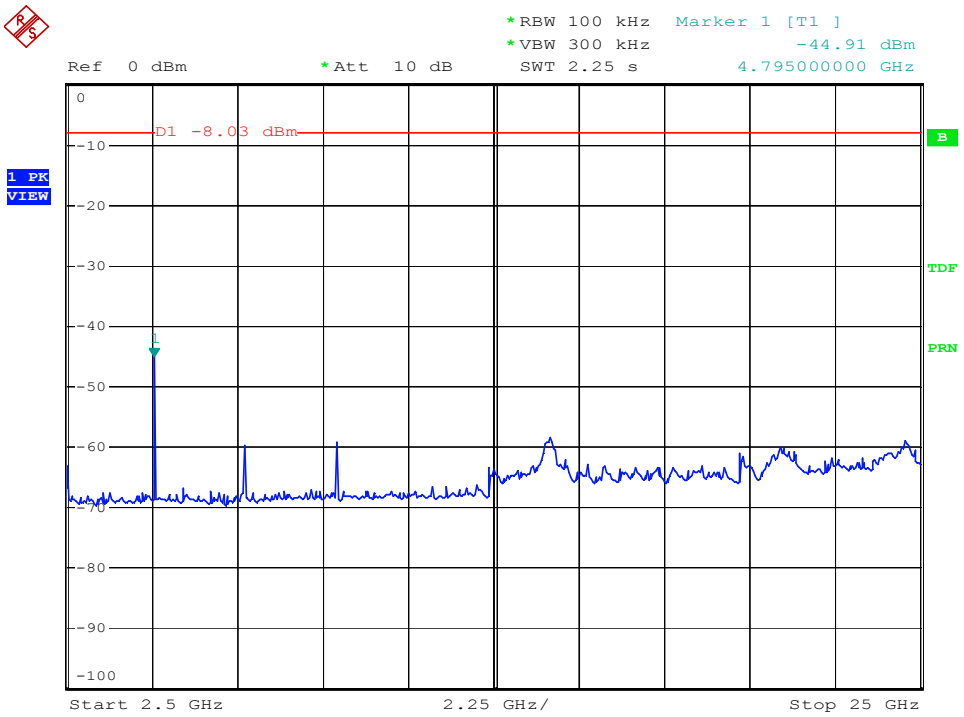
Modulation Standard: GFSK (1Mbps)
Channel: 78



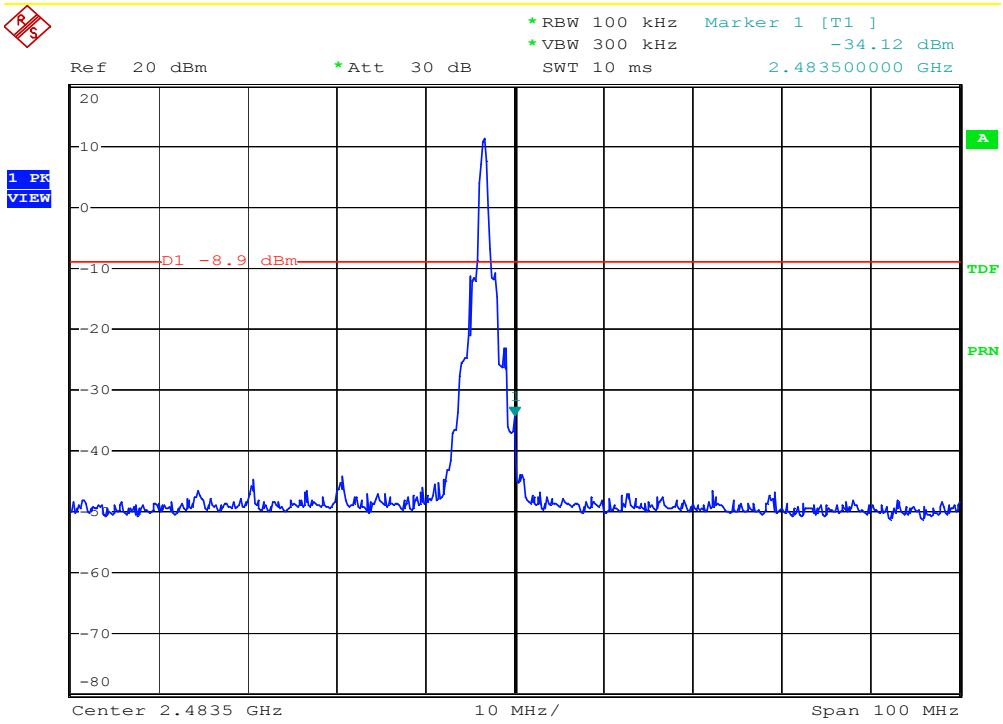


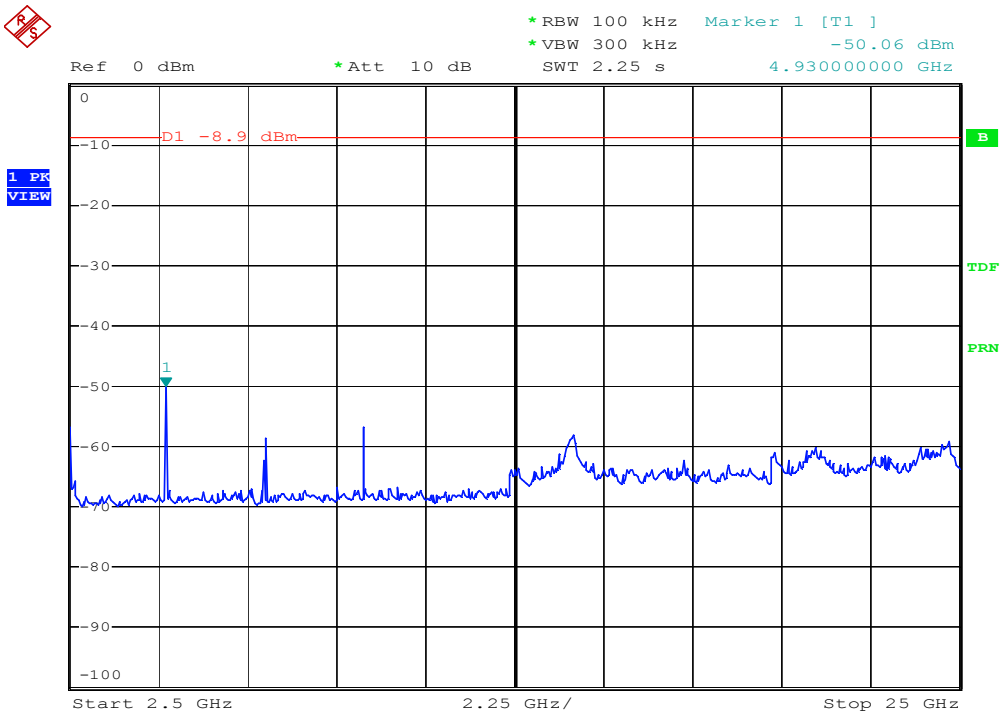
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 00



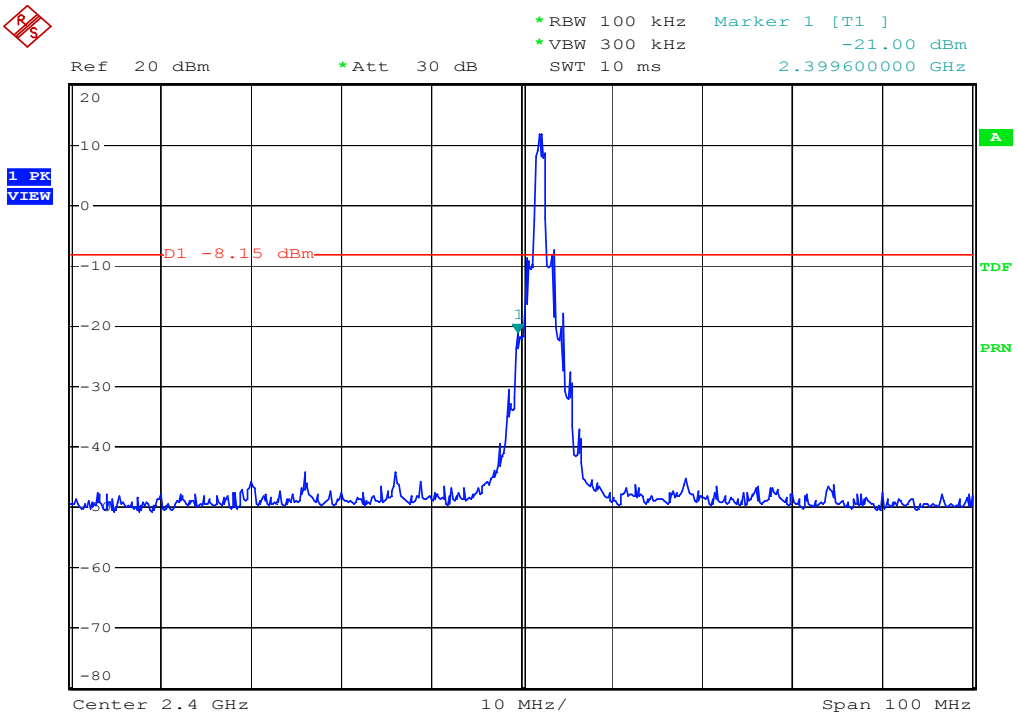


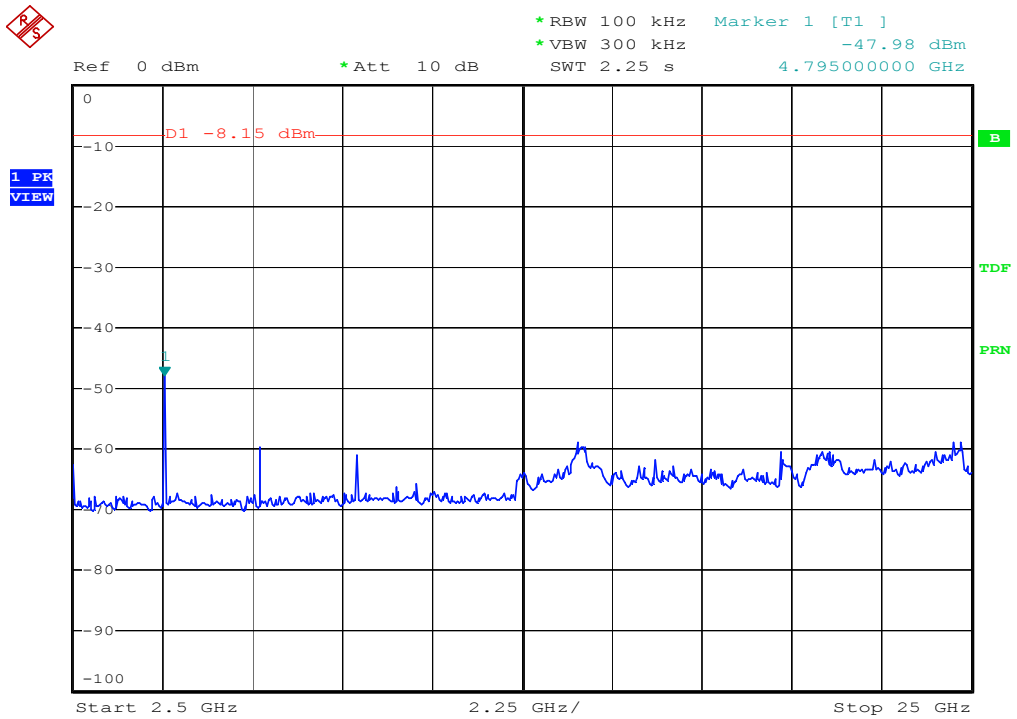
Modulation Standard: π/4-DQPSK (2Mbps)
Channel: 78



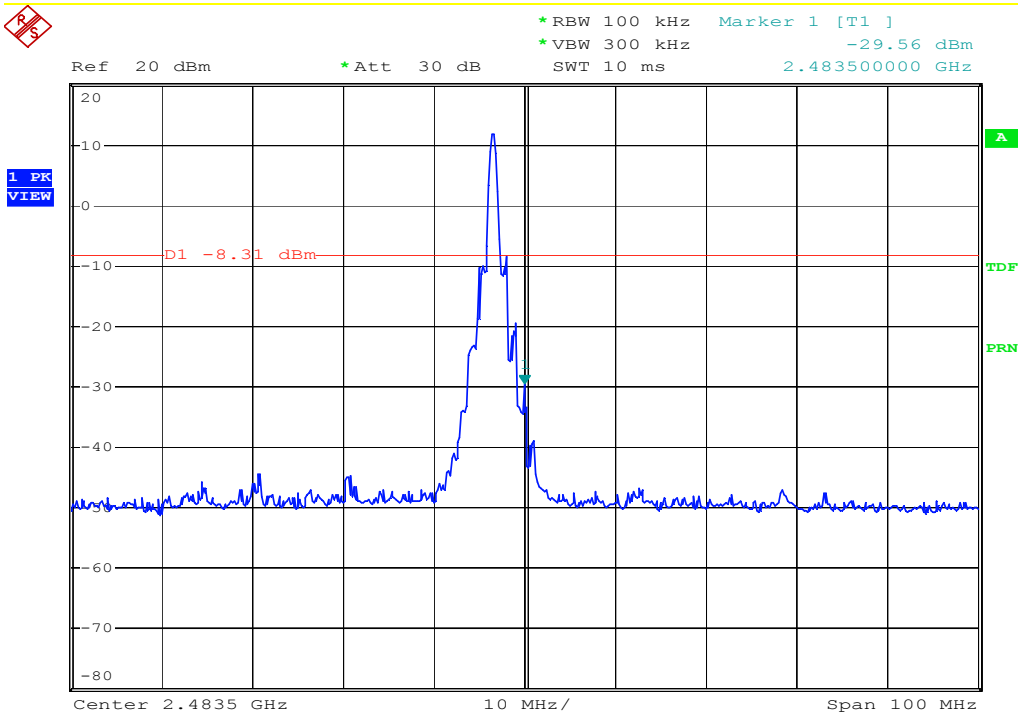


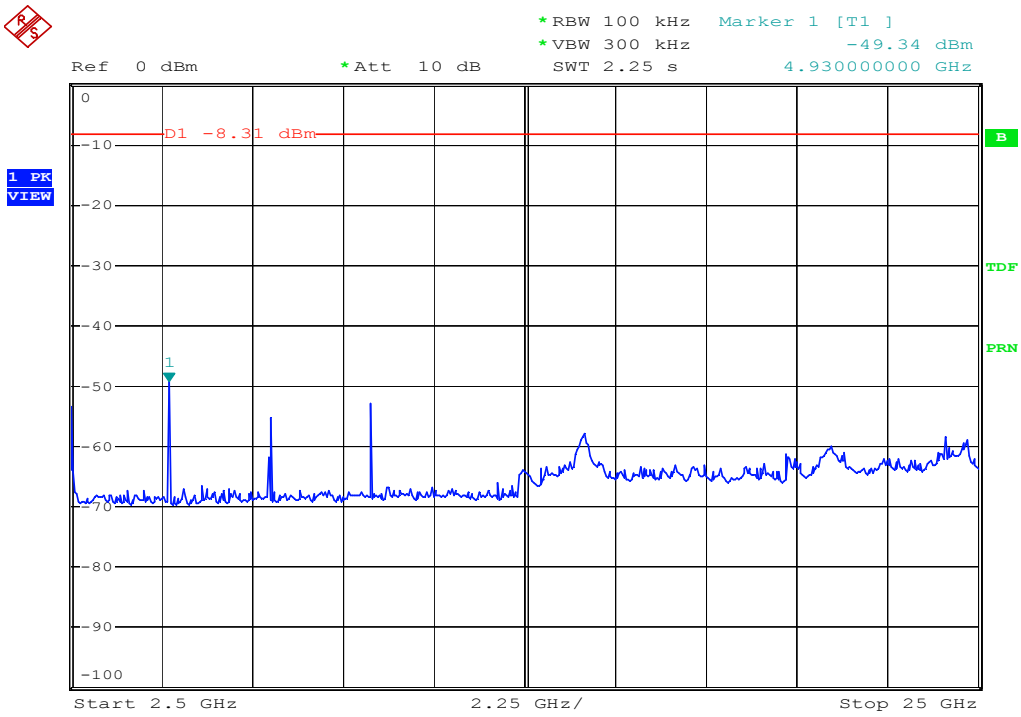
Modulation Standard: 8DPSK (3Mbps)
Channel: 00





Modulation Standard: 8DPSK (3Mbps)
Channel: 78





14.5 Restrict Band Emission Measurement Data

Test Date: July 22, 2015 Temperature: 26 °C

Atmospheric pressure: 1010 hPa Humidity: 52 %

Modulation Standard: GFSK (1Mbps)

Channel 0										Fundamental Frequency: 2402 MHz
Frequency (MHz)	Ant-Pol H/V	Meter Reading	Corrected Factor	Result (dBuV/m)	Remark	Limit@3m (dBuV/m)		Margin (dB)	Table (Deg.)	Ant High (m)
						Peak	Ave.			
2389.86	H	53.14	2.07	55.21	Peak	74	54	-18.79	120	1.50
2389.86	H	41.63	2.07	43.70	Ave	74	54	-10.30	120	1.50
2387.31	V	50.23	1.44	51.67	Peak	74	54	-22.33	150	1.50
---	V	---	---	---	Ave	74	54	---	---	---
Channel 78										Fundamental Frequency: 2480 MHz
2484.72	H	60.54	-2.61	57.93	Peak	74	54	-16.07	181	1.50
2483.54	H	46.33	-2.56	43.77	Ave	74	54	-10.23	181	1.50
2483.54	V	51.54	0.10	51.64	Peak	74	54	-22.36	153	1.50
---	V	---	---	---	Ave	74	54	---	---	---

Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz

Test Date: July 22, 2015 Temperature: 26 °C

Atmospheric pressure: 1010 hPa Humidity: 52 %

Modulation Standard: π/4-DQPSK (2Mbps)

Channel 0										Fundamental Frequency: 2402 MHz
Frequency (MHz)	Ant-Pol H/V	Meter Reading	Corrected Factor	Result (dBuV/m)	Remark	Limit@3m (dBuV/m)		Margin (dB)	Table (Deg.)	Ant High (m)
						Peak	Ave.			
2389.86	H	58.51	2.08	60.59	Peak	74	54	-13.41	126	1.50
2389.86	H	44.33	2.07	46.40	Ave	74	54	-7.60	126	1.50
2389.86	V	50.61	1.44	52.05	Peak	74	54	-21.95	157	1.50
---	V	---	---	---	Ave	74	54	---	---	---
Channel 78										Fundamental Frequency: 2480 MHz
2485.10	H	65.53	-2.63	62.90	Peak	74	54	-11.10	112	1.50
2488.12	H	46.32	-2.78	43.54	Ave	74	54	-10.46	112	1.50
2491.33	V	53.72	-0.02	53.70	Peak	74	54	-20.30	200	1.50
---	V	---	---	---	Ave	74	54	---	---	---

Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz

Test Date: July 22, 2015 Temperature: 26 °C

Atmospheric pressure: 1010 hPa Humidity: 52 %

Modulation Standard: 8DPSK (3Mbps)

Channel 0										Fundamental Frequency: 2402 MHz
Frequency (MHz)	Ant-Pol H/V	Meter Reading	Corrected Factor	Result (dBuV/m)	Remark	Limit@3m (dBuV/m)		Margin (dB)	Table (Deg.)	Ant High (m)
						Peak	Ave.			
2389.81	H	60.32	2.10	62.42	Peak	74	54	-11.58	124	1.50
2389.81	H	45.55	2.07	47.62	Ave	74	54	-6.38	124	1.50
2321.42	V	49.24	1.74	50.98	Peak	74	54	-23.02	171	1.50
---	V	---	---	---	Ave	74	54	---	---	---
Channel 78										Fundamental Frequency: 2480 MHz
2483.56	H	56.76	-2.57	54.19	Peak	74	54	-19.81	125	1.50
2483.56	H	45.33	-2.54	42.79	Ave	74	54	-11.21	125	1.50
2483.96	V	51.54	0.10	51.51	Peak	74	54	-22.49	205	1.50
---	V	---	---	---	Ave	74	54	---	---	---

Notes:

1. Result = Meter Reading + Factor
2. Factor = Antenna Factor + Cable Loss – Amplifier
3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and video bandwidth is 3 MHz for Peak detection at frequency above 1GHz.
4. The resolution bandwidth of test receiver/spectrum analyzer is 1MHz and video bandwidth is 10Hz for Average detection at frequency above 1GHz

15. Restricted Bands of Operation

Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.09000 – 0.11000	16.42000 – 16.42300	399.9 – 410.0	4.500 – 5.150
0.49500 – 0.505**	16.69475 – 16.69525	608.0 – 614.0	5.350 – 5.460
2.17350 – 2.19050	16.80425 – 16.80475	960.0 – 1240.0	7.250 – 7.750
4.12500 – 4.12800	25.50000 – 25.67000	1300.0 – 1427.0	8.025 – 8.500
4.17725 – 4.17775	37.50000 – 38.25000	1435.0 – 1626.5	9.000 – 9.200
4.20725 – 4.20775	73.00000 – 74.60000	1645.5 – 1646.5	9.300 – 9.500
6.21500 – 6.21800	74.80000 – 75.20000	1660.0 – 1710.0	10.600 – 12.700
6.26775 – 6.26825	108.00000 – 121.94000	1718.8 – 1722.2	13.250 – 13.400
6.31175 – 6.31225	123.00000 – 138.00000	2200.0 – 2300.0	14.470 – 14.500
8.29100 – 8.29400	149.90000 – 150.05000	2310.0 – 2390.0	15.350 – 16.200
8.36200 – 8.36600	156.52475 – 156.52525	2483.5 – 2500.0	17.700 – 21.400
8.37625 – 8.38675	156.70000 – 156.90000	2655.0 – 2900.0	22.010 – 23.120
8.41425 – 8.41475	162.01250 – 167.17000	3260.0 – 3267.0	23.600 – 24.000
12.29000 – 12.29300	167.72000 – 173.20000	3332.0 – 3339.0	31.200 – 31.800
12.51975 – 12.52025	240.00000 – 285.00000	3345.8 – 3358.0	36.430 – 36.500
12.57675 – 12.57725	322.00000 – 335.40000	3600.0 – 4400.0	Above 38.6
13.36000 – 13.41000			

**: Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz

15.1 Labeling Requirement

The device shall bear the following statement in a conspicuous location on the device:
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.