FCC TEST REPORT

according to

FCC Rules and Regulations Part 15 Subpart C

Applicant	:	DongGuan XuanTian Electronice CO.,Ltd
Address	:	5F, F lat B,NO.46 ShiBang Building, West of DeZheng Road, Chang`an T own, Dongguan City
Equipment	:	Mobile flash strap & Bag hanger
Model No.	:	TBP24C
FCC ID	:	ST4-TBP24C

- The test result refers exclusively to the test presented test model / sample.,
- Without written approval of ***Cerpass Technology (Suzhou) Co.,Ltd***. the test report shall not be reproduced except in full.
- The EUT is also considered as a kind of computer peripheral, because the connection to computer is necessary for typical use. It has been verified to comply with the requirements of FCC Rules and Regulations Part 15. The test report has been issued separately.
- The test report must not be used by the clients to claim product certification approval by ***NVLAP*** or any agency of the Government.

Contents

History of this test report

■ ORIGINAL.

☐ Additional attachment as following record:

Attachment No.	Issue Date	Description

CERTIFICATE OF COMPLIANCE

according to

FCC Rules and Regulations Part 15 Subpart C

Applicant	:	DongGuan XuanTian Electronice CO.,Ltd
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Equipment	:	Mobile flash strap & Bag hanger
Model No.	:	TBP24C
FCC ID	:	ST4-TBP24C

I **HEREBY** CERTIFY THAT :

The measurements shown in this test report were made in accordance with the procedures given in **ANSI C63.4** The equipment was ***passed*** the test performed according to **FCC Rules and Regulations Part 15 Subpart C (2010).**
The test was carried out on Apr 1, 2013 at ***Cerpass Technology (Suzhou) Co.,Ltd***

Signature

Miro Chueh/ Technical director

1. Report of Measurements and Examinations

1.1 List of Measurements and Examinations

FCC Rule	. Description of Test	Result
§ 15.203	. Antenna Requirement	Pass
§ 15.207(a)	. Conducted Emission	Pass
§ 15.209(a)	. 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
§ 15.247(b)	. Peak Output Power Measurement Data	Pass
§ 15.247(d)	. Band Edges Measurement Data	Pass

2. Test Configuration of Equipment under Test

2.1 Feature of Equipment under Test

Frequency	2.402GHz~2.480GHz
Number of Channel	79 channel
Modulation type	GFSK, π/4 PSK,8DPSK
Bluetooth Version	Bluetooth 3.0+EDR
Transmit Power	GFSK: 2.73dBm
	8DPSK: 2.70dBm
Antenna type	PCB Antenna 2 dBi
Operating Temperature	-20℃~55℃

2.2 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	---	---

2.3 Test Mode & Test Software

a. During testing, the interface cables and equipment positions were varied according to ANSI C63.4
b. The complete test system included EUT for RF test.
c. The EUT was executed to keep transmitting and receiving data via Bluetooth.
d. The following test mode was performed for conduction and radiation test:
GFSK: CH 00: 2402MHz, CH 39: 2441MHz, CH 78: 2480MHz.
8DPSK: CH 00: 2402MHz, CH 39: 2441MHz, CH 78: 2480MHz.

2.4 Description of Test System

Device	Manufacturer	Model No.	Description
Remote workstation			
NB	SONY	PCG-71811P	N/A

Use Cable:

Cable	Quantity	Description
USB Cable	1	Non-Shielded, 0.6M

2.5 General Information of Test

Test Site:	Cerpass Technology (Suzhou) Co.,Ltd
Test Site Location :	No.66,Tangzhuang Road, Suzhou Industrial Park, Jiangsu 215006, China
NVLAP LAB Code :	200814-0
FCC Registration Number :	916572, 331395
IC Registration Number :	7290A-1, 7290A-2
VCCI Registration Number :	T-1945 for Telecommunication Test C-2919 for Conducted emission test R-2670 for Radiated emission test below 1GHz G-227 for Radiated emission test above 1GHz
Frequency Range Investigated:	Conducted: from 150kHz to 30MHz Radiation: from 30MHz to 25000MHz
Test Distance:	The test distance of radiated emission from antenna to EUT is 3 M.

NVLAP LAB CODE 200814-0

2.6 Measurement Uncertainty

Measurement Item	Measurement Uncertainty
Conducted Emission	±2.71 dB
Radiation test (10m) below 1GHz	Vertical : ±3.89 dB
	Horizontal: ±4.11 dB
Radiation test (3m) below 1GHz	Vertical : ±4.11 dB
	Horizontal: ±4.10 dB
20 dB Bandwidth	7500 Hz
Maximum Peak Output Power	±1.4 dB
100kHz Bandwidth of Frequency Band Edges	±2.2 dB
Power Spectral Density	±1.3870 dB

3. Antenna Requirements

3.1 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.

3.2 Antenna Construction and Directional Gain

Antenna type: PCB Antenna

Antenna Gain: 2 dBi

4. Test of Conducted Emission

4.1 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 C63.4-2009 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.

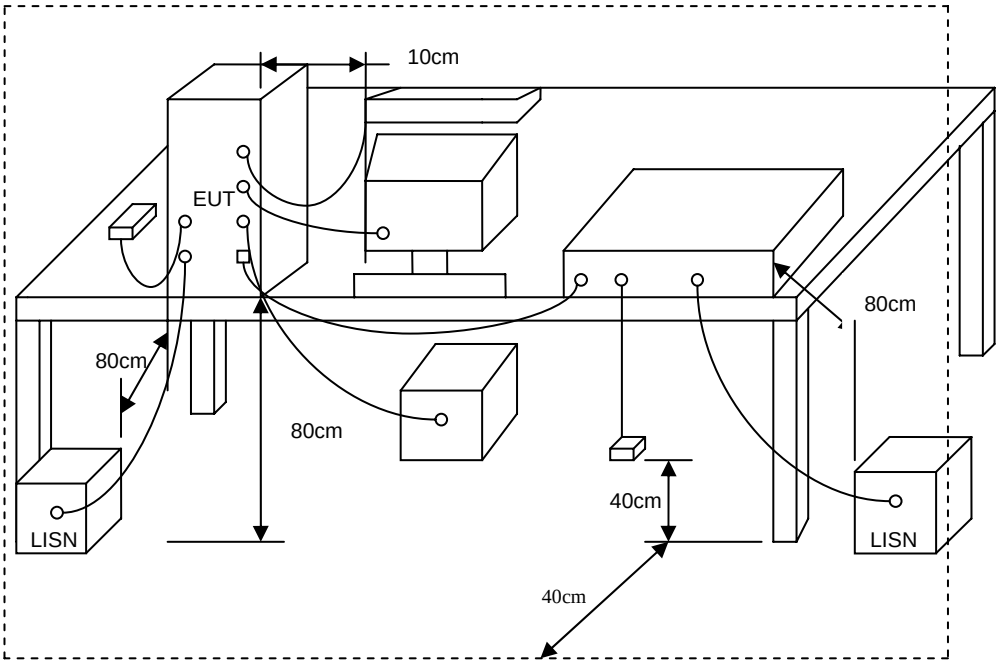
Frequency (MHz)	Quasi Peak (dB μ V)	Average (dB μ V)
0.15 – 0.5	66-56*	56-46*
0.5 – 5.0	56	46
5.0 – 30.0	60	50

*Decreases with the logarithm of the frequency.

4.2 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.

4.3 Typical Test Setup

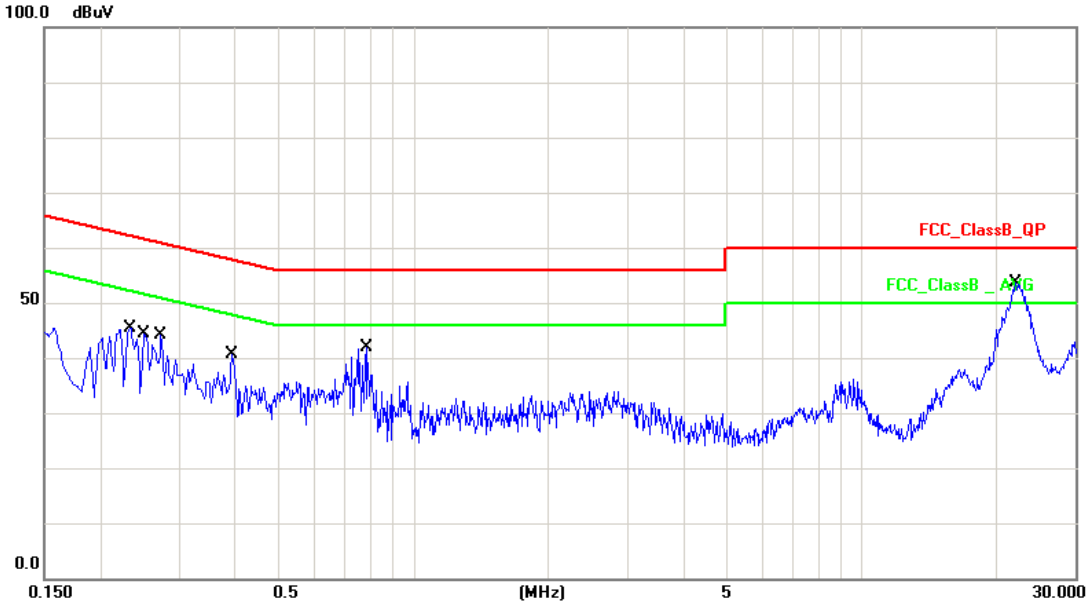


4.4 Measurement equipment

Instrument/Ancillary	Manufacturer	Model No.	Serial No.	Calibration Date	Valid Date.
Test Receiver	R&S	ESCI	100565	2012.11.05	2013.11.04
AMN	R&S	ESH2-Z5	100182	2012.11.05	2013.11.04
Two-Line V-Network	R&S	ENV216	100325	2013.03.10	2014.03.09
ISN	FCC	FCC-TLISN-T2-02	20379	2012.12.08	2013.12.07
ISN	FCC	FCC-TLISN-T4-02	20380	2012.12.08	2013.12.07
ISN	FCC	FCC-TLISN-T8-02	20381	2012.12.08	2013.12.07
ISN	TESEQ	ISN ST08	30175	2012.09.13	2013.09.12
Current Probe	R&S	EZ-17	100303	2013.03.10	2014.03.09
Passive Voltage Probe	R&S	ESH2-Z3	100026	2013.03.10	2014.03.09
Attenuator	R&S	ESH3-Z2	100529	2013.03.10	2014.03.09
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-004	2013.03.10	2014.03.09

4.5 Test Result and Data

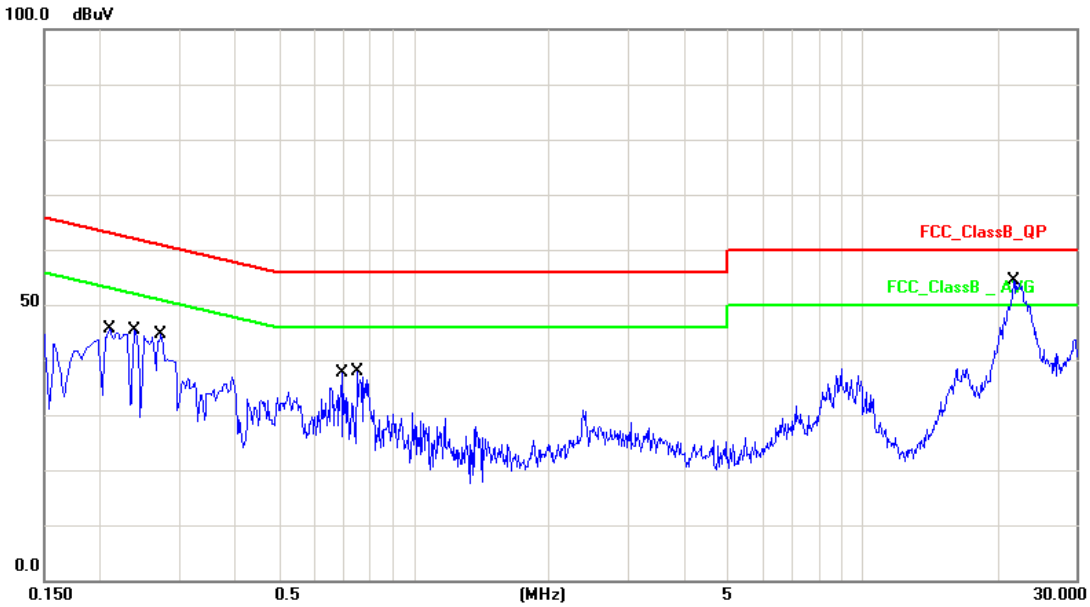
Test Mode :	Normal link		
AC Power :	AC 120V/60Hz	Phase :	LINE
Temperature :	22°C	Humidity :	50%
Pressure(mbar) :	1002	Date:	2012/03/27



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2340	9.87	31.40	41.27	62.31	-21.04	QP
2	0.2340	9.87	8.38	18.25	52.31	-34.06	AVG
3	0.2500	9.87	31.48	41.35	61.76	-20.41	QP
4	0.2500	9.87	14.13	24.00	51.76	-27.76	AVG
5	0.2740	9.86	28.73	38.59	61.00	-22.41	QP
6	0.2740	9.86	9.95	19.81	51.00	-31.19	AVG
7	0.3940	9.86	25.72	35.58	57.98	-22.40	QP
8	0.3940	9.86	7.42	17.28	47.98	-30.70	AVG
9	0.7860	9.81	27.23	37.04	56.00	-18.96	QP
10	0.7860	9.81	9.43	19.24	46.00	-26.76	AVG
11	22.1060	9.56	37.67	47.23	60.00	-12.77	QP
12	22.1060	9.56	29.71	39.27	50.00	-10.73	AVG

Note: Measurement Level = Reading Level + Correct Factor

Test Mode :	Normal link		
AC Power :	AC 120V/60Hz	Phase :	NEUTRAL
Temperature :	22°C	Humidity :	50%
Pressure(mbar) :	1002	Date:	2012/03/27



No.	Frequency (MHz)	Factor (dB)	Reading (dBuV)	Level (dBuV)	Limit (dBuV)	Margin (dB)	Detector
1	0.2100	9.50	29.99	39.49	63.21	-23.72	QP
2	0.2100	9.50	7.01	16.51	53.21	-36.70	AVG
3	0.2380	9.50	30.86	40.36	62.17	-21.81	QP
4	0.2380	9.50	8.26	17.76	52.17	-34.41	AVG
5	0.2740	9.50	28.25	37.75	61.00	-23.25	QP
6	0.2740	9.50	8.52	18.02	51.00	-32.98	AVG
7	0.6900	9.50	15.57	25.07	56.00	-30.93	QP
8	0.6900	9.50	1.19	10.69	46.00	-35.31	AVG
9	0.7500	9.49	22.11	31.60	56.00	-24.40	QP
10	0.7500	9.49	3.74	13.23	46.00	-32.77	AVG
11	21.8300	9.91	36.25	46.16	60.00	-13.84	QP
12	21.8300	9.91	28.04	37.95	50.00	-12.05	AVG

Note: Measurement Level = Reading Level + Correct Factor

5. Test of Radiated Emission

5.1 Test Limit

Radiated emissions from 30 MHz to 25 GHz were measured according to the methods defines in ANSI C63.4-2009. The EUT was placed, 0.8 meter above the ground plane, as shown in section 5.6.3. The interface cables and equipment positions were varied within limits of reasonable applications to determine the positions producing maximum radiated emissions
For unintentional device, according to § 15.109(a), except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

FREQUENCIES(MHz)	FIELD STRENGTH(microvolts/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

For unintentional device, according to CISPR PUB.22, for Class B digital devices, the general requirement of field strength of radiated emissions from intentional radiators at a distance of 10 meters shall not exceed the above table.

Frequency (MHz)	Distance Meters	Radiated (dB μ V/ M)
30-230	10	30
230-1000	10	37

5.2 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.

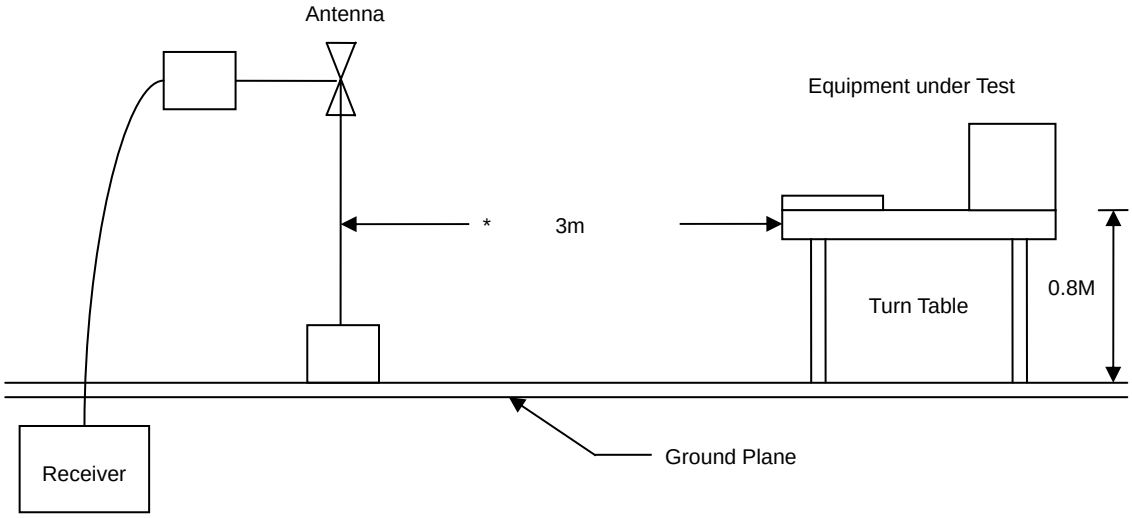
f. Set the test-receiver system to Peak or CISPR quasi-peak Detect Function and specified bandwidth with Maximum Hold Mode.

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.

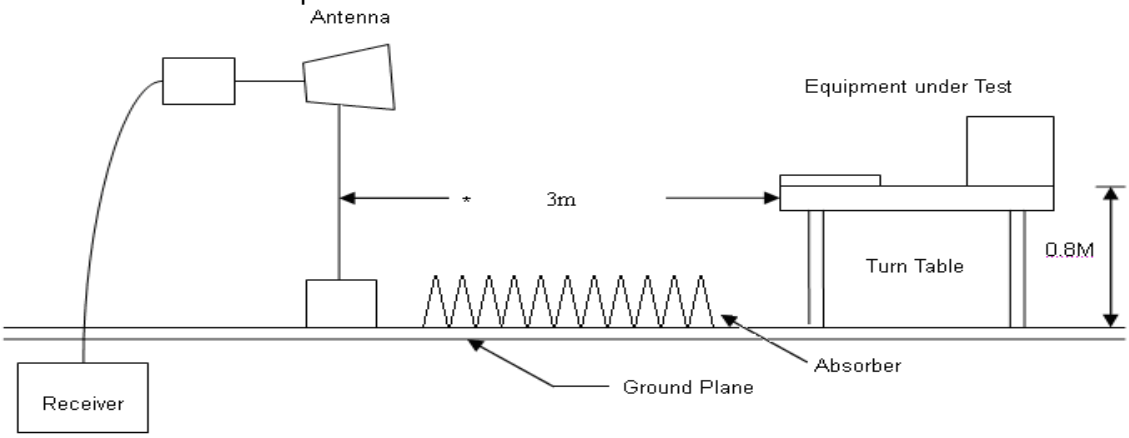
h. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in peak mode also complies with the limit in average mode), then testing will be stopped and peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

5.3 Typical Test Setup

Below 1GHz Test Setup



Above 1GHz Test Setup



5.4 Measurement equipment

Instrument	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
EMI Test Receiver	R&S	ESCI	100563	2013.03.10	2014.03.09
H64 Preamplifier	HP	8447F	3113A05582	2013.03.10	2014.03.09
Preamplifier	Agilent	8449B	3008A02342	2013.03.10	2014.03.09
Ultra Broadband Antenna	R&S	HL562	100362	2012.05.03	2013.05.02
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-619	2012.05.03	2013.05.02
Broad-Band Horn Antenna	Schwarzbeck	BBHA9170	9170-347	2012.05.15	2013.05.15
Spectrum Analyzer	R&S	FSP40	100324	2013.03.10	2014.03.09
Temperature/ Humidity Meter	Zhicheng	ZC1-11	CEP-TH-002	2013.03.10	2014.03.09

5.5 Test Result and Data

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

5.5.1 Test Result and Data of Transmitter

Under 1G

Site : EMC Lab AC 102	**Time : 2013-04-01**
Limit : FCC_CLASS_B_03M_QP	**Margin : 6**
Test mode: normal link	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	

Freq. (MHz)	Ant.Pol. H/V	Reading Level (dBuV)	Correct Factor (dB)	Measure Level (dBuV/m)	Limit 3m (dBuV/m)	Safe Margin (dB)	Detector Mode (PK/QP)
32.91	V	40.32	-6.65	33.67	40.00	-6.33	QP
62.01	V	54.09	-17.29	36.8	40.00	-3.2	QP
134.76	V	49.28	-10.74	38.54	43.50	-4.96	QP
503.36	V	41.59	-2.27	39.32	46.00	-6.68	QP
651.77	V	40.13	-0.42	39.71	46.00	-6.29	QP
909.79	V	36.34	2.89	39.23	46.00	-6.77	QP
110.51	H	43.28	-9.92	33.36	43.50	-10.14	QP
159.01	H	50.11	-13.05	37.06	43.50	-6.44	QP
405.39	H	42.11	-5	37.11	46.00	-8.89	QP
454.86	H	40.57	-3.13	37.44	46.00	-8.56	QP
909.79	H	36.47	2.89	39.36	46.00	-6.64	QP
922.40	H	35.41	3.72	39.13	46.00	-6.87	QP

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor

Above 1G

Site : EMC Lab AC 102	**Time : 2013-04-01**
Limit : FCC_CLASS_B_03M_QP	**Margin : 6**
Test mode: Transmit by GFSK(1M) 2402MHz	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4806.36	V	48.26	26.58	18.10	66.36	44.68	74	54	-9.32	average
7605.87	V	41.26	21.03	24.95	66.21	45.98	74	54	-8.02	average
4805.89	H	44.25	25.06	18.35	62.60	43.41	74	54	-10.59	average
7602.47	H	38.99	17.06	26.32	65.31	43.38	74	54	-10.62	average

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor

Site : EMC Lab AC 102	**Time : 2013-04-01**
Limit : FCC_CLASS_B_03M_QP	**Margin : 6**
Test mode: Transmit by GFSK(1M) 2441MHz	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4883.00	V	31.33	24.14	19.12	50.45	43.26	74	54	-10.74	average
7326.95	V	32.73	17.25	25.34	58.07	42.59	74	54	-11.41	average
4885.00	H	33.17	24.33	19.23	52.4	43.56	74	54	-10.44	average
7325.67	H	33.89	18.11	26.05	59.94	44.16	74	54	-9.84	average

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor

Site : EMC Lab AC 102	**Time : 2013-04-01**
Limit : FCC_CLASS_B_03M_QP	**Margin : 6**
Test mode: Transmit by GFSK(1M) 2480MHz	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4963.42	V	33.53	23.12	22.34	55.87	45.46	74	54	-8.54	average
7445.11	V	31.28	17.13	26.11	57.39	43.24	74	54	-10.76	average
4963.68	H	37.32	23.63	20.45	57.77	44.08	74	54	-9.92	average
7446.33	H	32.34	14.87	26.56	58.9	41.43	74	54	-12.57	average

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor

Site : EMC Lab AC 102	**Time : 2013-04-01**
Limit : FCC_CLASS_B_03M_QP	**Margin : 6**
Test mode: Transmit by 8DPSK(3M) 2402MHz	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4805.37	V	42.13	27.05	18.10	60.23	45.15	74	54	-8.85	average
7445.75	V	39.89	19.34	24.95	64.84	44.29	74	54	-9.71	average
4809.23	H	41.33	26.86	18.35	59.68	45.21	74	54	-8.79	average
7443.11	H	43.52	18.37	26.32	69.84	44.69	74	54	-9.31	average

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor

Site : EMC Lab AC 102	**Time : 2013-04-01**
Limit : FCC_CLASS_B_03M_QP	**Margin : 6**
Test mode: Transmit by 8DPSK(3M) 2441MHz	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4887.13	V	34.01	26.11	19.12	53.13	45.23	74	54	-8.77	average
7321.75	V	33.98	19.23	25.34	59.32	44.57	74	54	-9.43	average
4888.33	H	35.31	24.86	19.23	54.54	44.09	74	54	-9.91	average
7323.14	H	32.87	17.13	26.05	58.92	43.18	74	54	-10.82	average

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor

Site : EMC Lab AC 102	**Time : 2013-04-01**
Limit : FCC_CLASS_B_03M_QP	**Margin : 6**
Test mode: Transmit by 8DPSK(3M) 2480MHz	**Probe : VERTICAL/ HORIZONTAL**
Power : AC 120V/60Hz	

Freq. (MHz)	Ant. Pol H/V	Peak Reading (dBuV)	AV Reading (dBuV)	Ant. / CL CF (dB)	Actual Fs		Peak Limit (dBuV/m)	AV Limit (dBuV/m)	Margin (dB)	Remark
					Peak (dBuV/m)	AV (dBuV/m)				
4959.54	V	35.25	21.85	22.34	57.59	44.19	74	54	-9.81	average
7326.33	V	33.19	17.01	26.11	59.3	43.12	74	54	-10.88	average
4957.39	H	37.92	23.21	20.45	58.37	43.66	74	54	-10.34	average
7325.76	H	30.68	15.88	26.56	57.24	42.44	74	54	-11.56	average

Note:

1. All Readings below 1GHz are Quasi-Peak, above are performed with peak and/or average measurements as necessary.
2. Measurement Level = Reading Level + Correct Factor

6. 20dB Bandwidth Measurement Data

6.1 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 than125 mW.

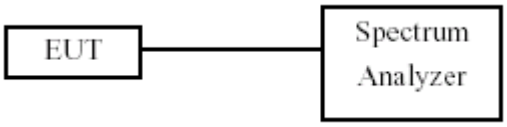
6.2 Test Procedures

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.

6.3 Test Setup Layout



6.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100324	2013.03.10	2014.03.09

6.5 Test Result and Data

Test Date: Apr 1, 2013 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

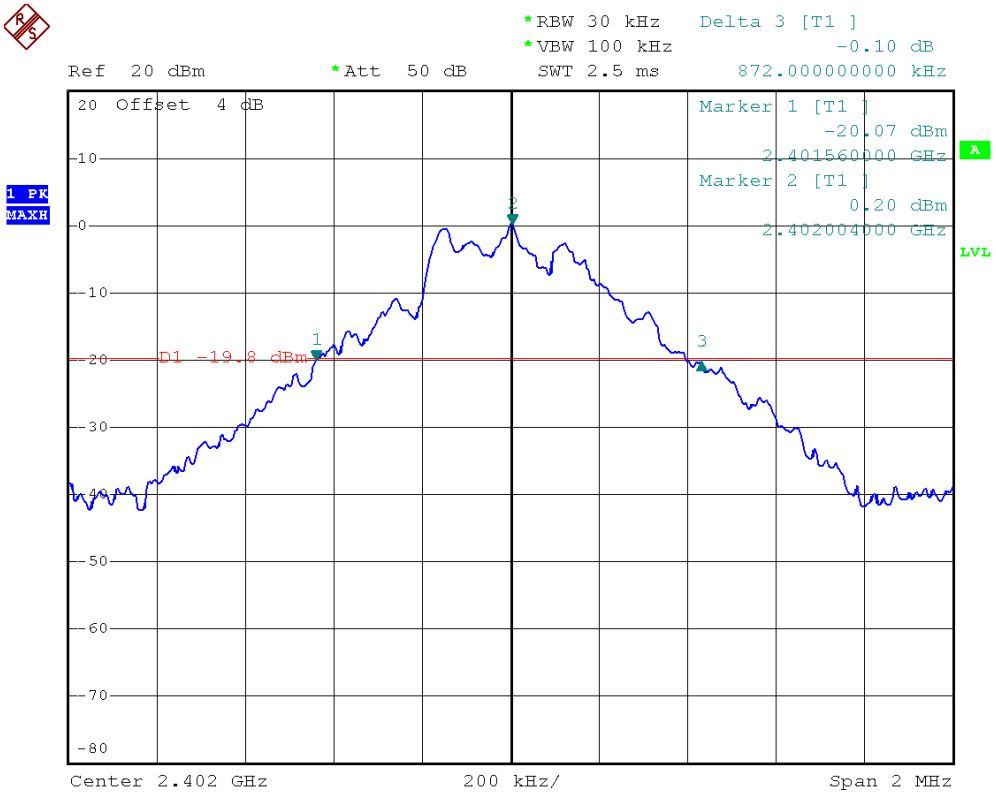
1M

Channel	Frequency (MHz)	20dB Bandwidth (KHz)
00	2402	872.00
39	2441	836.00
78	2480	844.00

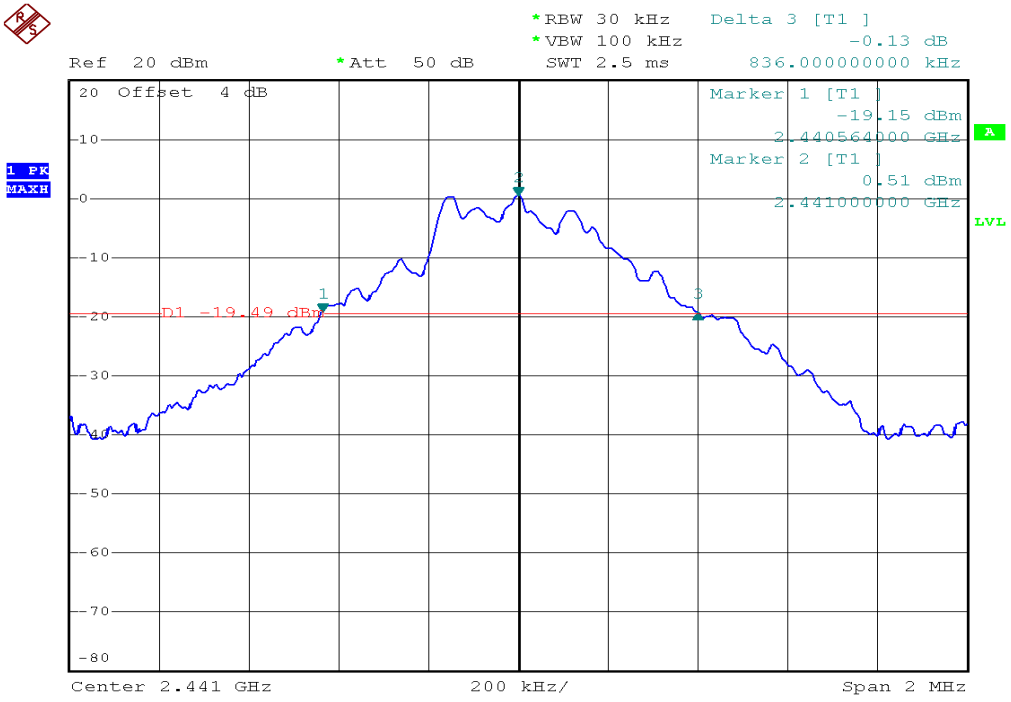
3M

Channel	Frequency (MHz)	20dB Bandwidth (KHz)
00	2402	1208.00
39	2441	1204.00
78	2480	1208.00

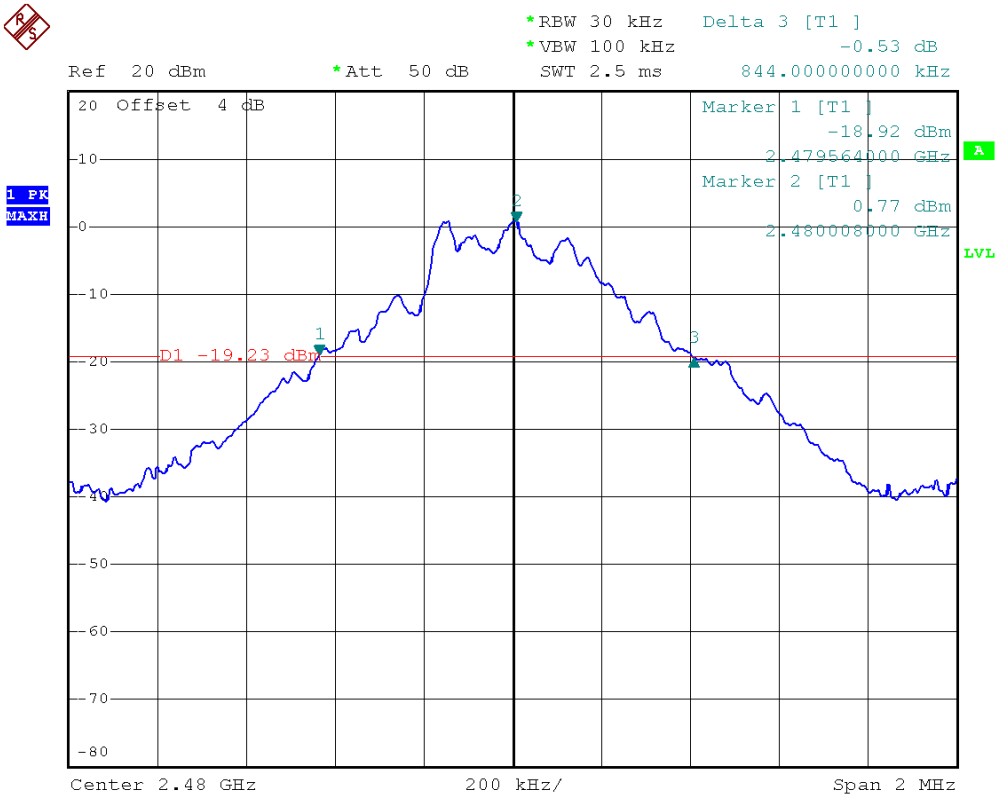
Modulation Standard: GFSK (1Mbps)
Channel: 00



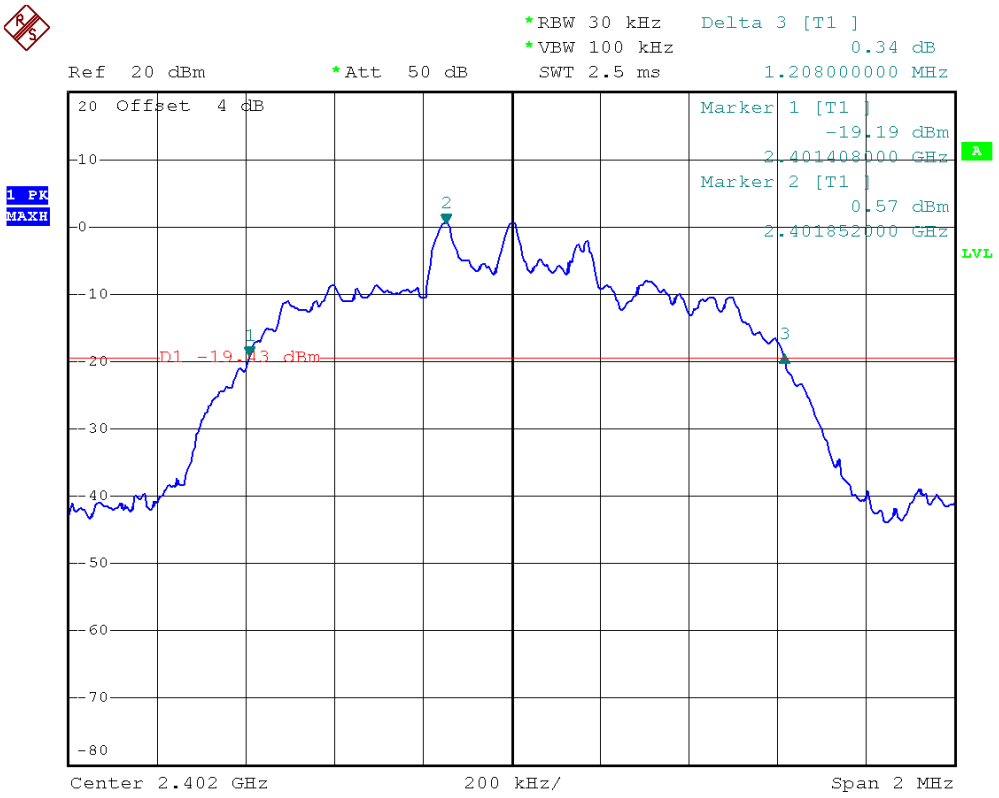
Modulation Standard: GFSK (1Mbps)
Channel: 39



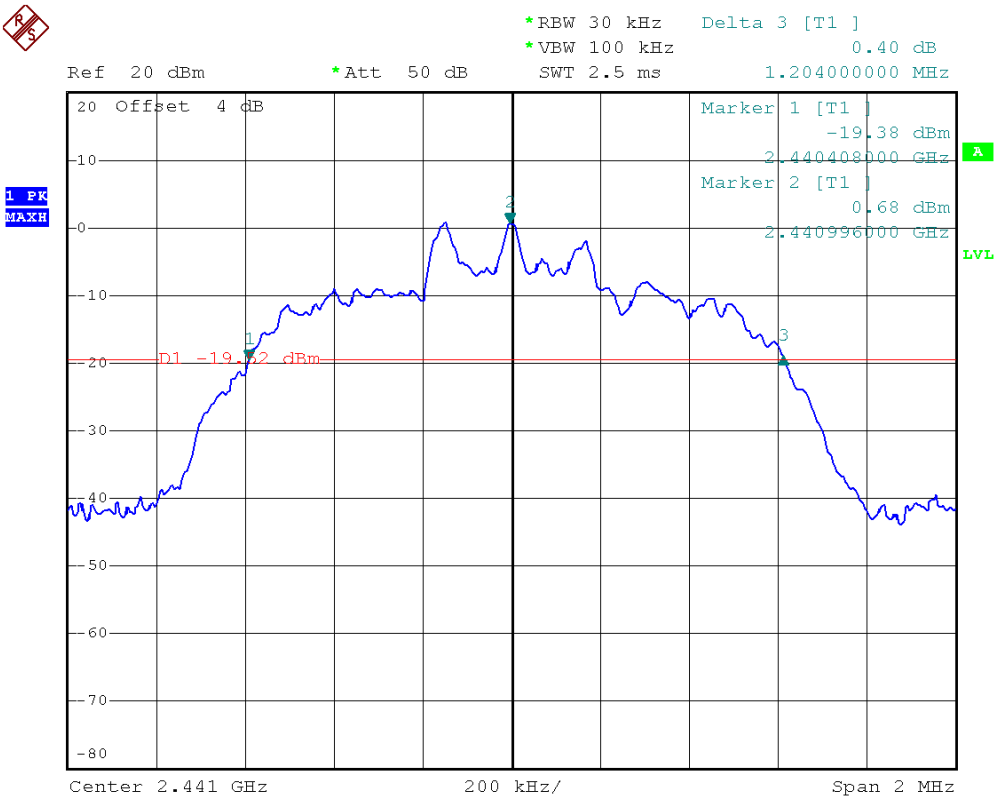
Modulation Standard: GFSK (1Mbps)
Channel: 78



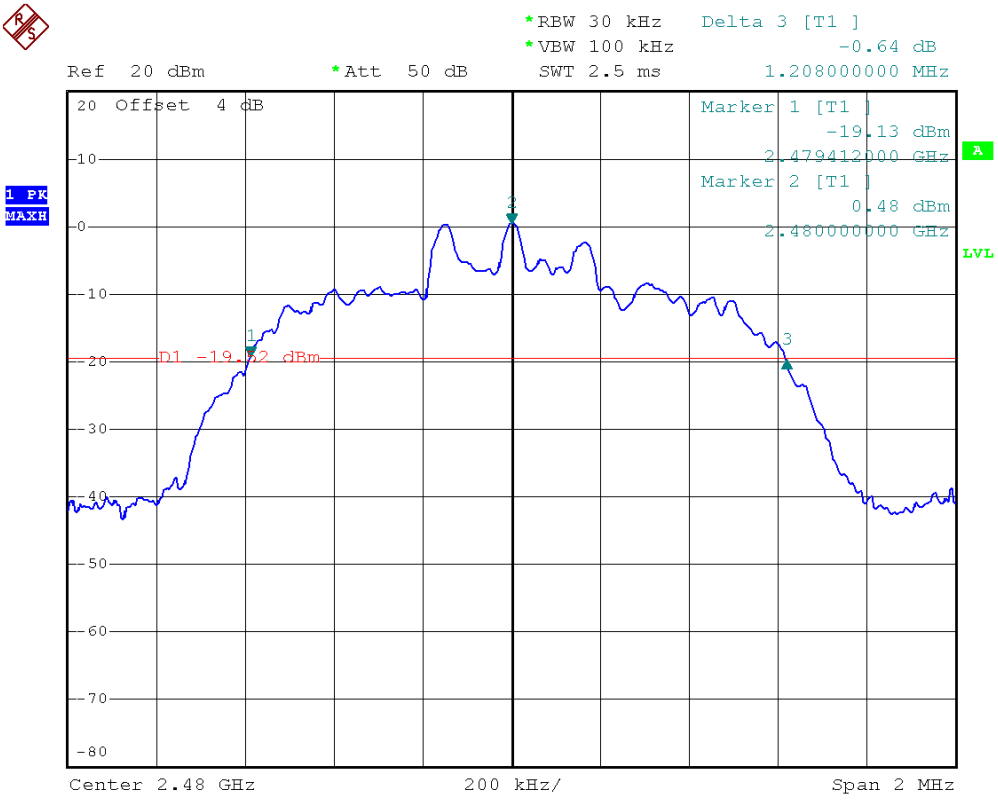
Modulation Standard: 8DPSK (3Mbps)
Channel: 00



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



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



7. Frequencies Separation

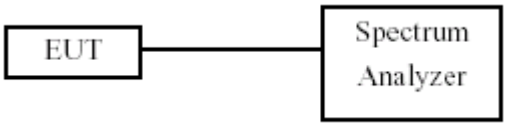
7.1 Test Limit

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.

7.2 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. By using the MaxHold function record the separation of two adjacent channels.
d. Measure the frequency difference of these two adjacent channels.

7.3 Test Setup Layout



7.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100324	2013.03.10	2014.03.09

7.5 Test Result and Data

Test Date: Apr 1, 2013 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

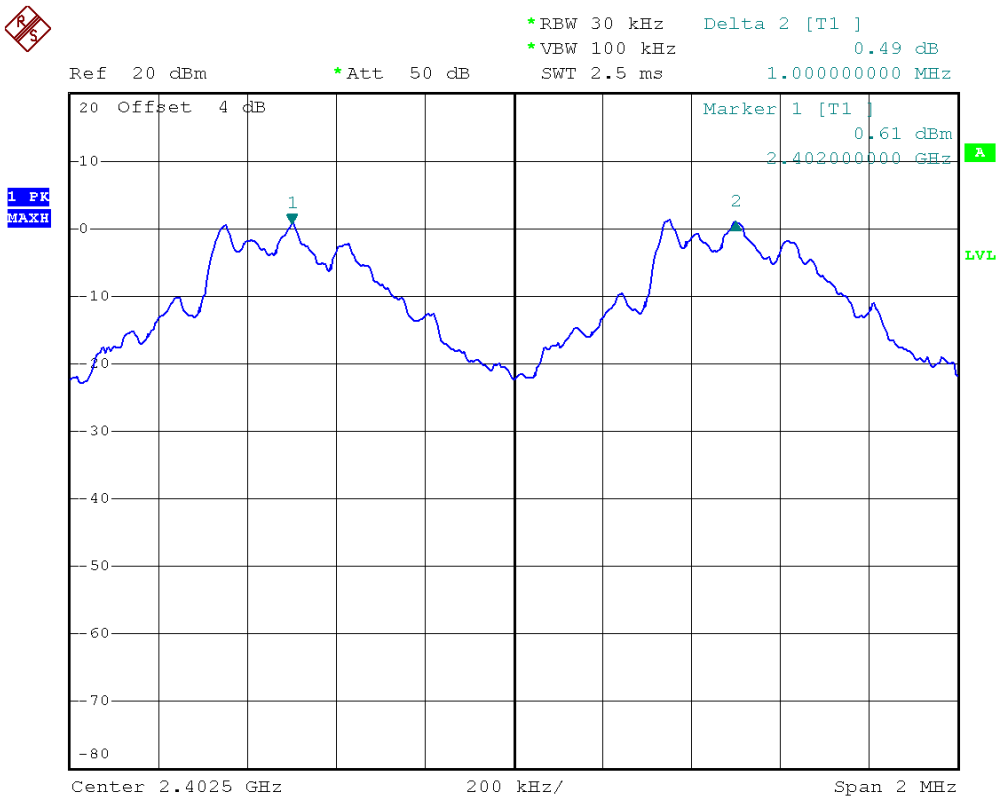
1M

Channel Separation	Result
(MHz)	
1.000	Pass

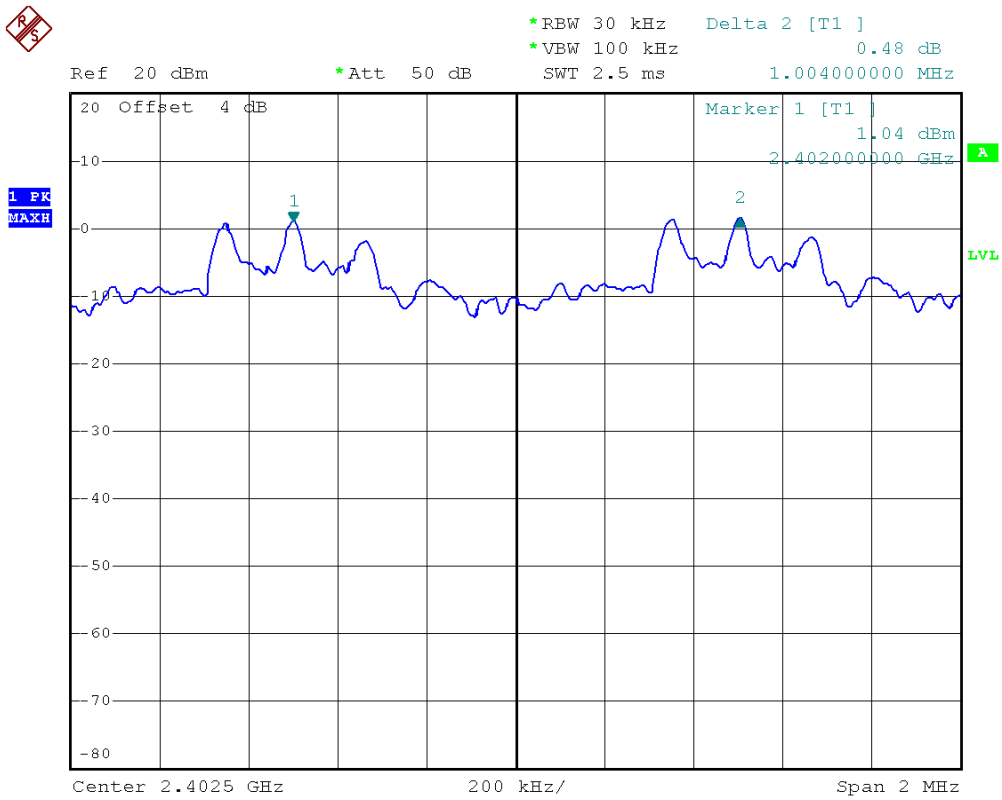
3M

Channel Separation	Result
(MHz)	
1.004	Pass

Modulation Standard: GFSK (1Mbps)



Modulation Standard:8DPSK (3Mbps)



8. Dwell Time on each channel

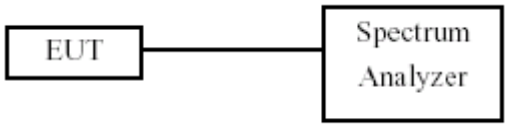
8.1 Test Limit

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.

8.2 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.

8.3 Test Setup Layout



8.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100324	2013.03.10	2014.03.09

8.5 Test Result and Data

Test Date: Apr 1, 2013 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

1M

DH 1

0.400 * (1600/2)/79 * 31.6 = 128.00 (ms)

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.400	128.00	31.60	400	PASS

DH 3

1.64 * (1600/4)/79 * 31.6 = 262.40 (ms)

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.64	262.40	31.60	400	PASS

DH 5

2.84* (1600/6)/79 * 31.6 = 302.93 (ms)

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.84	302.93	31.60	400	PASS

3M

DH 1

0.400 * (1600/2)/79 * 31.6 = 128.00 (ms)

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
0.400	128.00	31.60	400	PASS

DH 3

1.60 * (1600/4)/79 * 31.6 = 256.00 (ms)

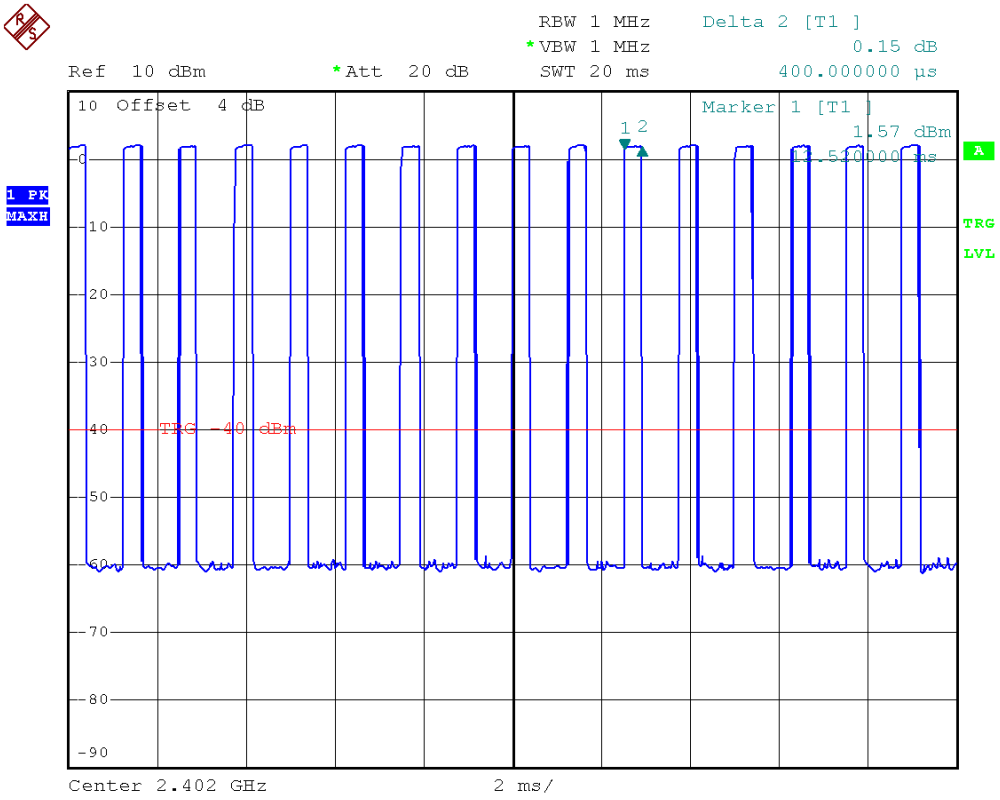
Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
1.60	256.00	31.60	400	PASS

DH 5

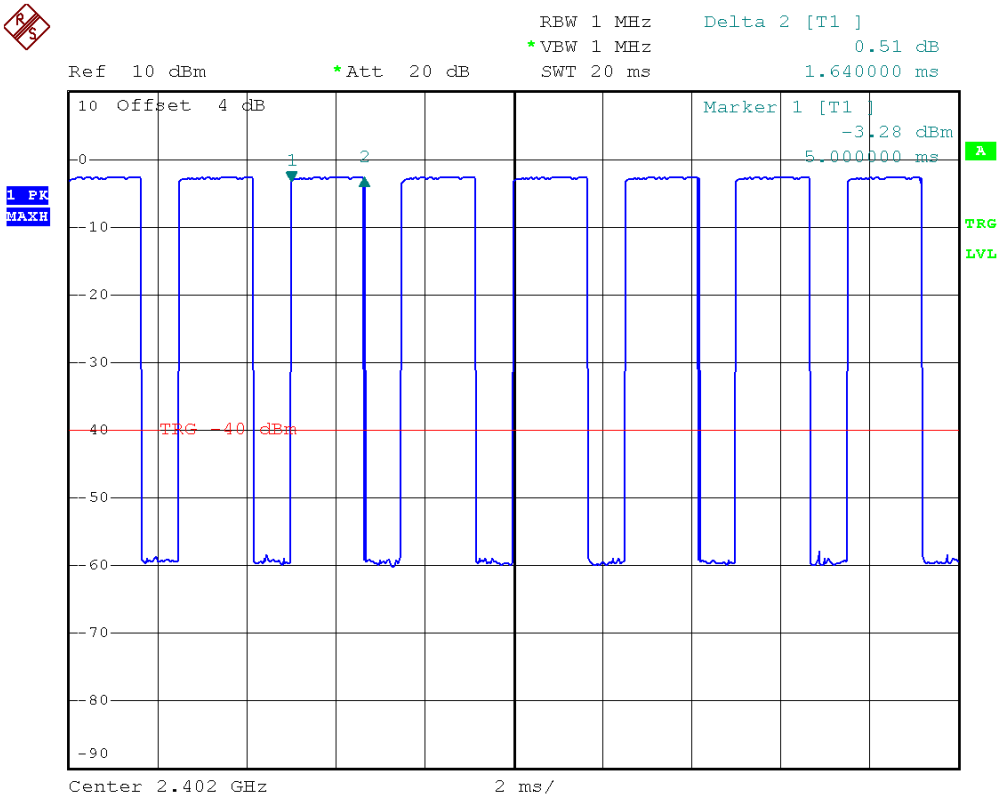
2.84* (1600/6)/79 * 31.6 =302.93 (ms)

Pulse Time (ms)	Total of Dwell (ms)	Period Time (s)	Limit (ms)	Result
2.84	302.93	31.60	400	PASS

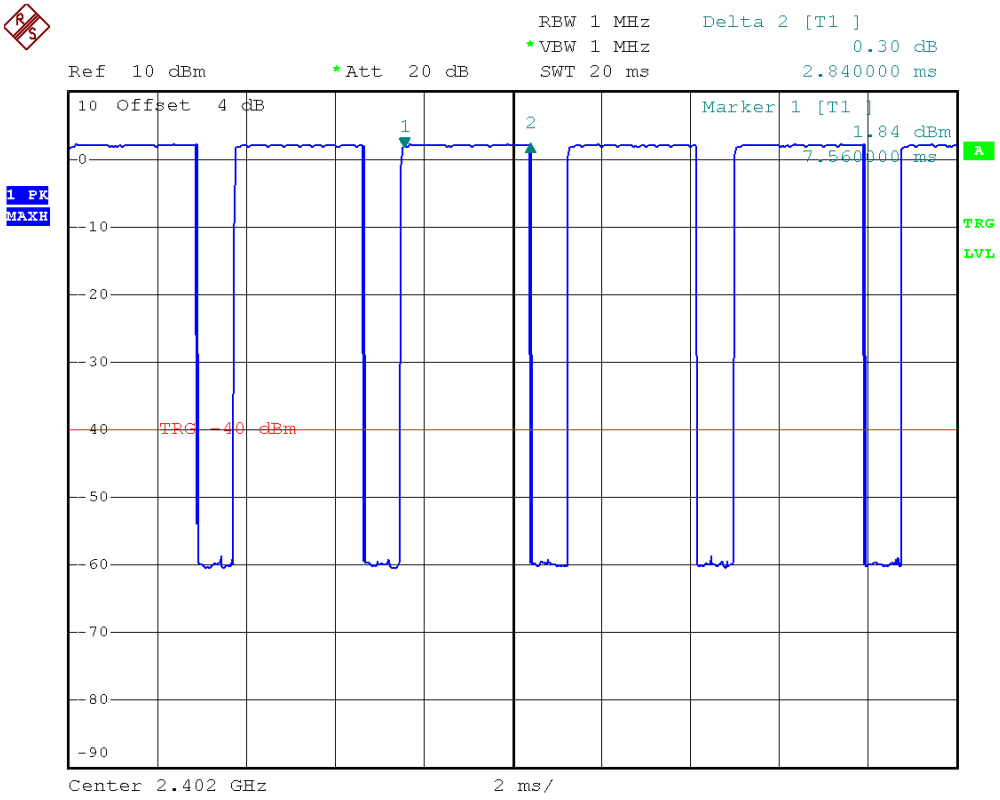
Modulation Standard: GFSK (1Mbps)
DH1



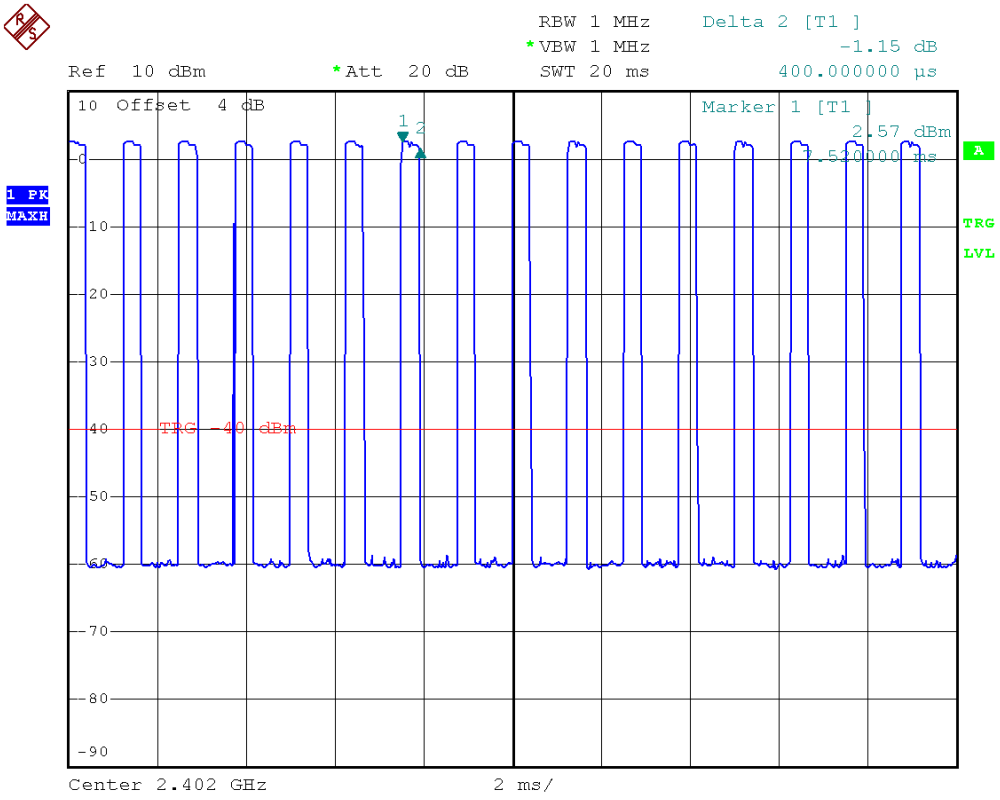
Modulation Standard: GFSK (1Mbps)
DH3



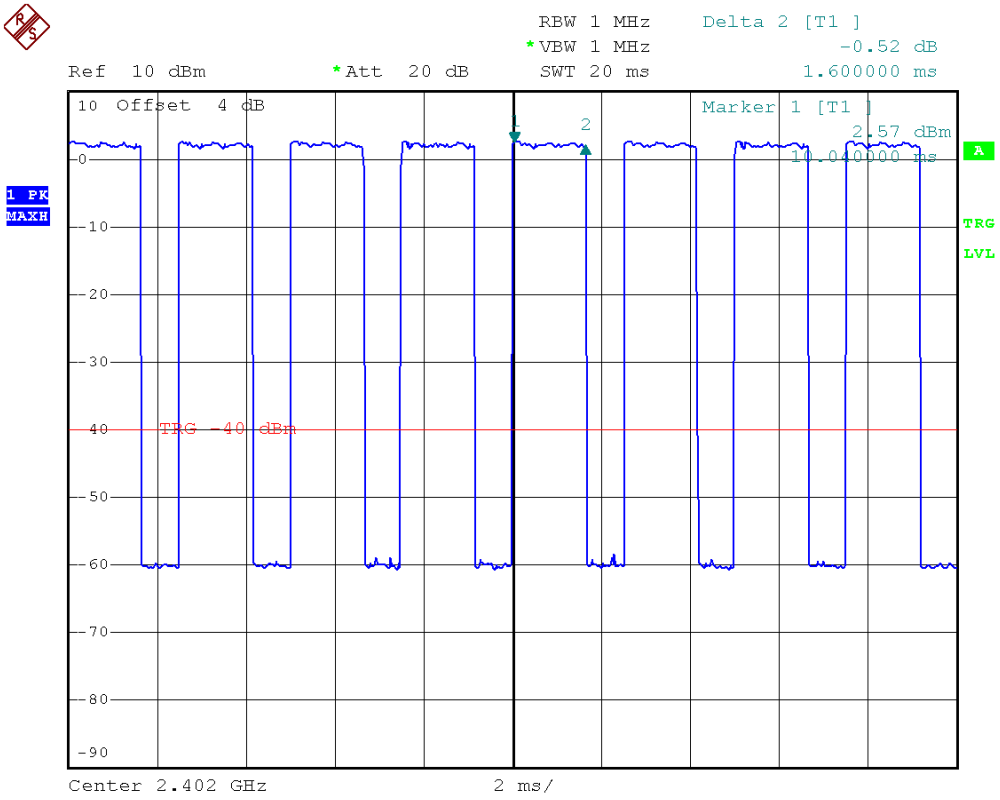
Modulation Standard: GFSK (1Mbps)
DH5



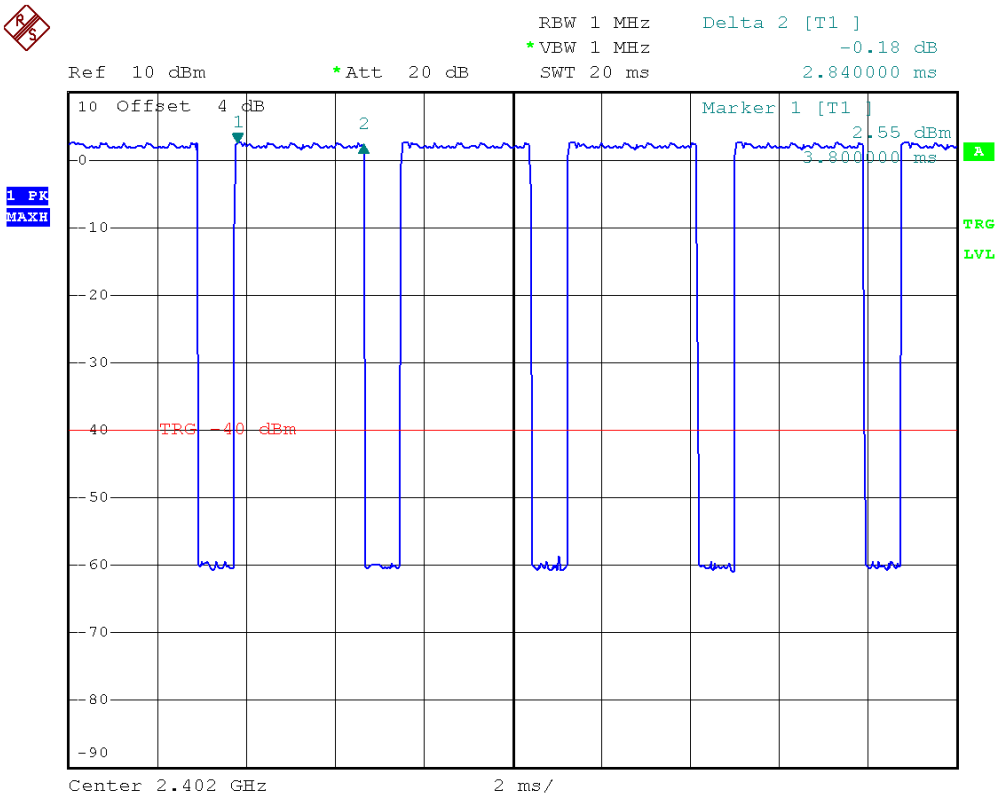
Modulation Standard: 8DPSK (3Mbps)
DH1



Modulation Standard: 8DPSK (3Mbps)
DH3



Modulation Standard: 8DPSK (3Mbps)
DH5



9. Number of Hopping Channels

9.1 Test Limit

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

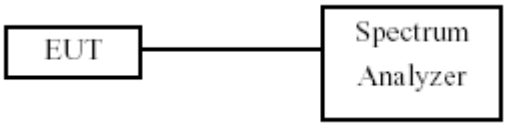
9.2 Test Procedures

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

b. 2. Set RBW of spectrum analyzer to 100 KHz and VBW to 300 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.

9.3 Test Setup Layout



9.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100324	2013.03.10	2014.03.09

9.5 Test Result and Data

Test Date: Apr 1, 2013 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

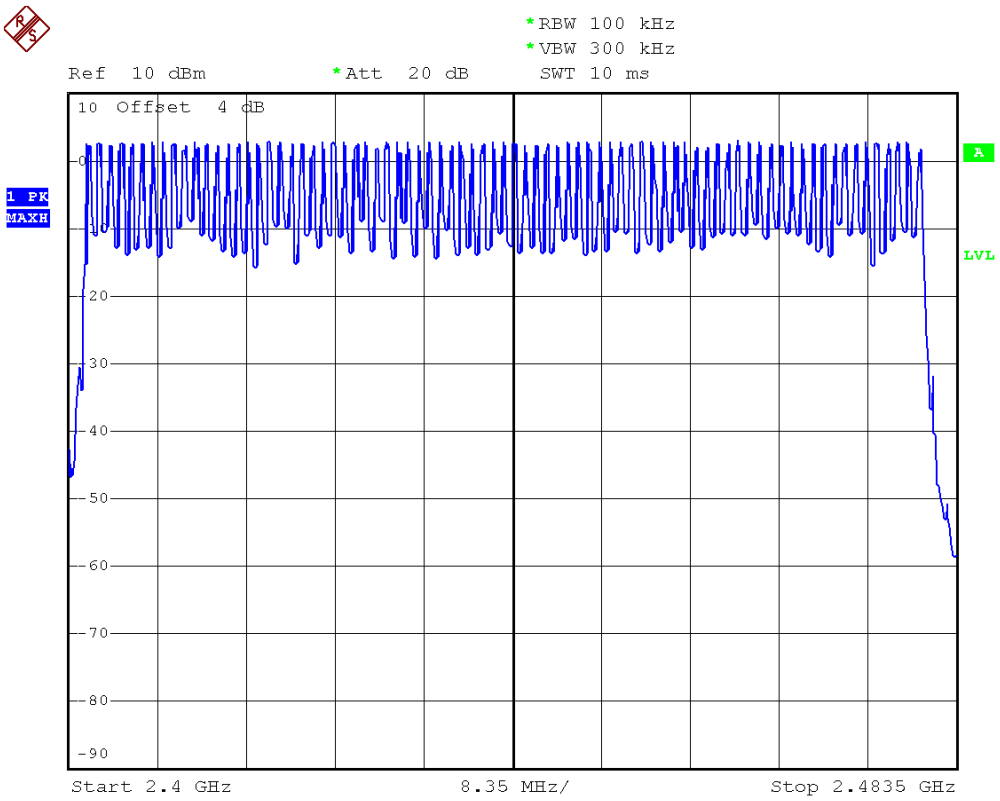
Modulation Standard: GFSK (1Mbps)

Number of hopping channels:	79	Channels

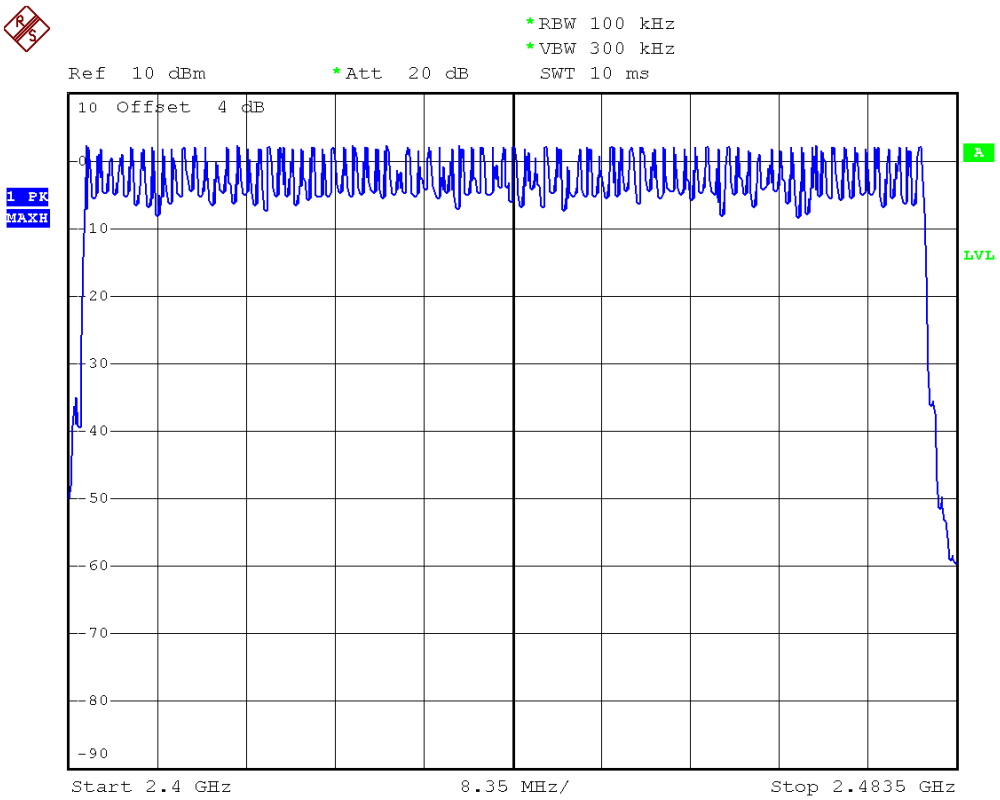
Modulation Standard: 8DPSK (3Mbps)

Number of hopping channels:	79	Channels

Modulation Standard: GFSK (1Mbps)



Modulation Standard: 8DPSK (3Mbps)



10. Maximum Peak Output Power

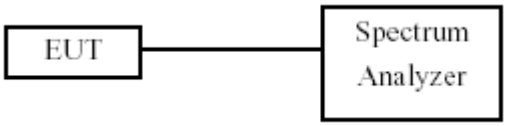
10.1 Test Limit

The Maximum Peak Output Power Measurement is 30dBm.

10.2 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.

10.3 Test Setup Layout



10.4 Measurement equipment

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100324	2013.03.10	2014.03.09

10.5 Test Result and Data

Test Date: Apr 1, 2013 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

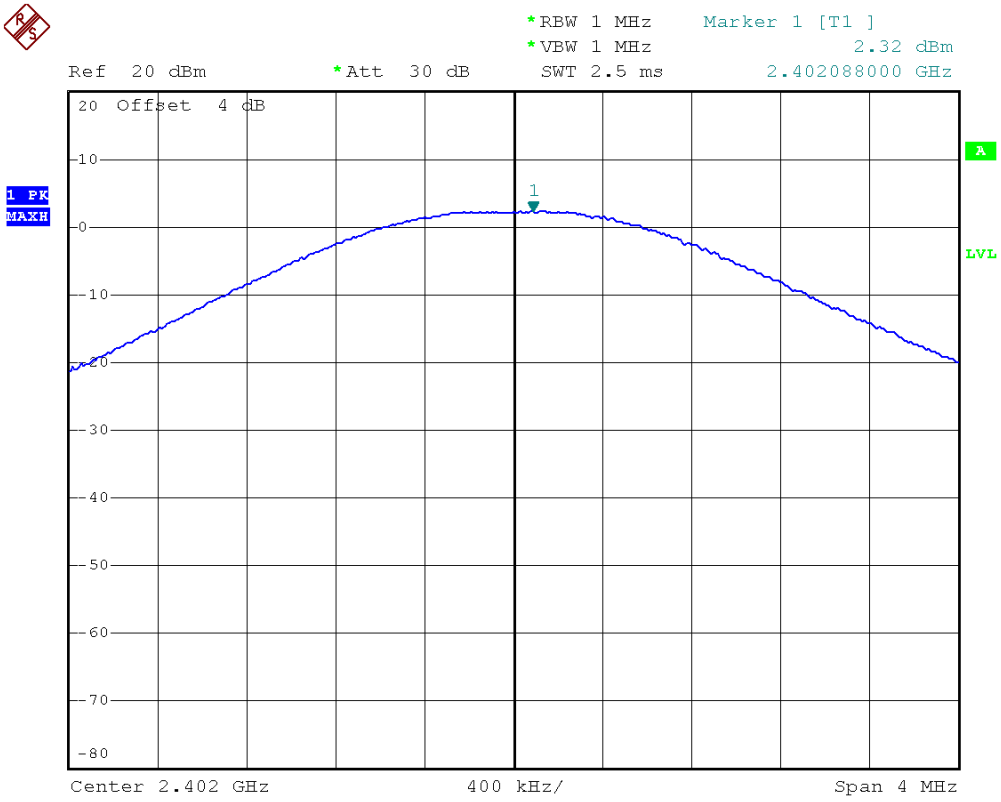
1M

Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)
00	2402	2.32	1.71
39	2441	2.73	1.87
78	2478	2.73	1.87

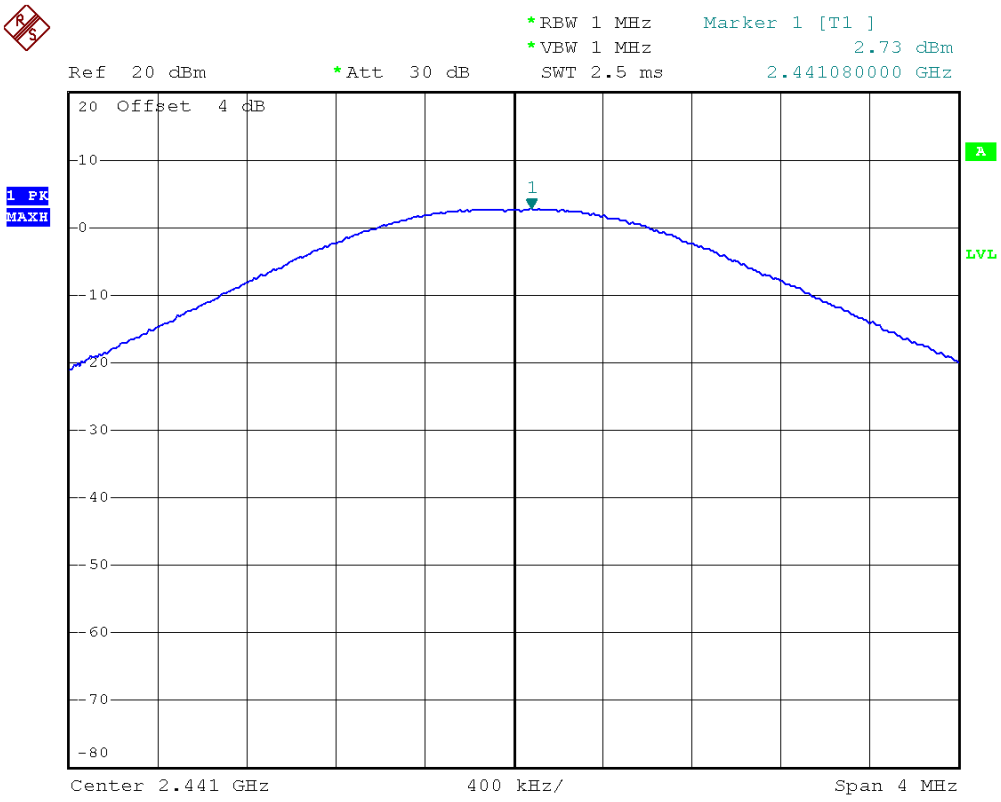
3M

Channel	Frequency (MHz)	Peak Power Output (dBm)	Peak Power Output (mW)
00	2402	2.70	1.86
39	2441	2.68	1.85
78	2478	2.37	1.73

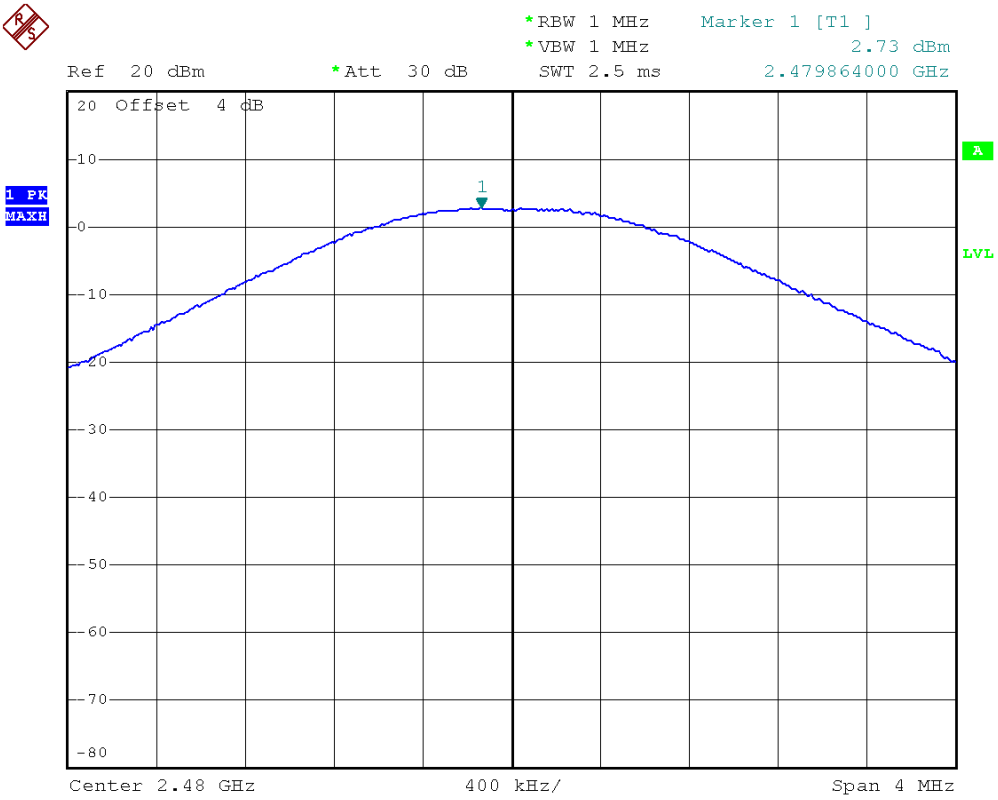
Modulation Standard: GFSK (1Mbps)
Channel: 00



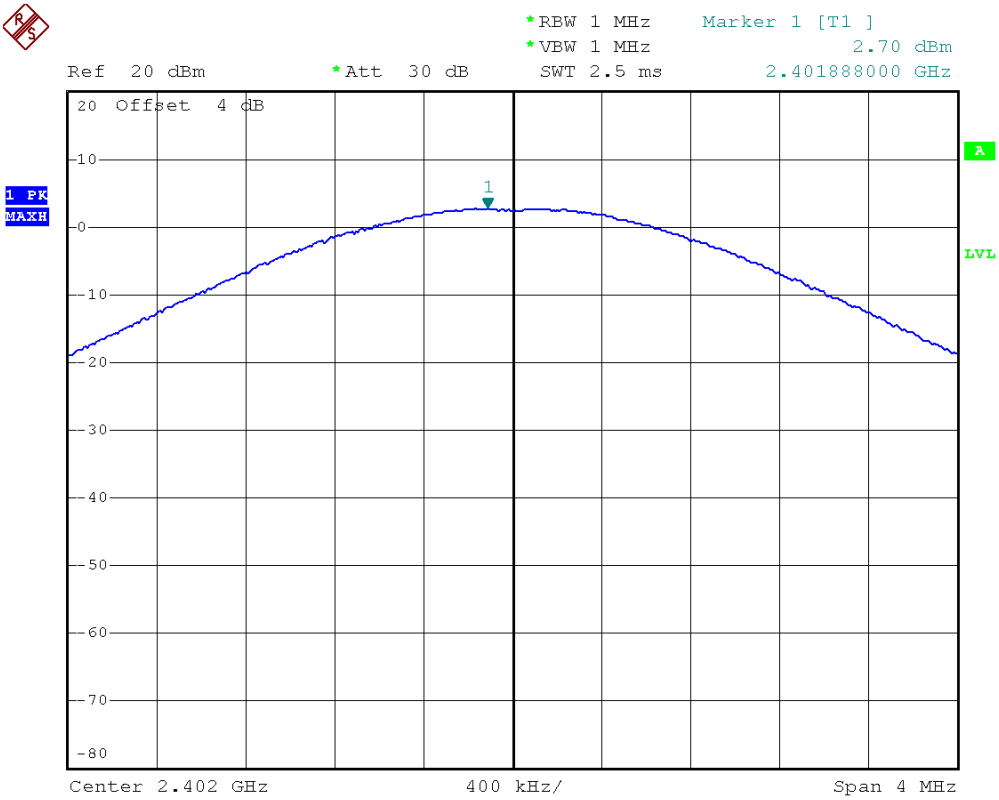
Modulation Standard: GFSK (1Mbps)
Channel: 39



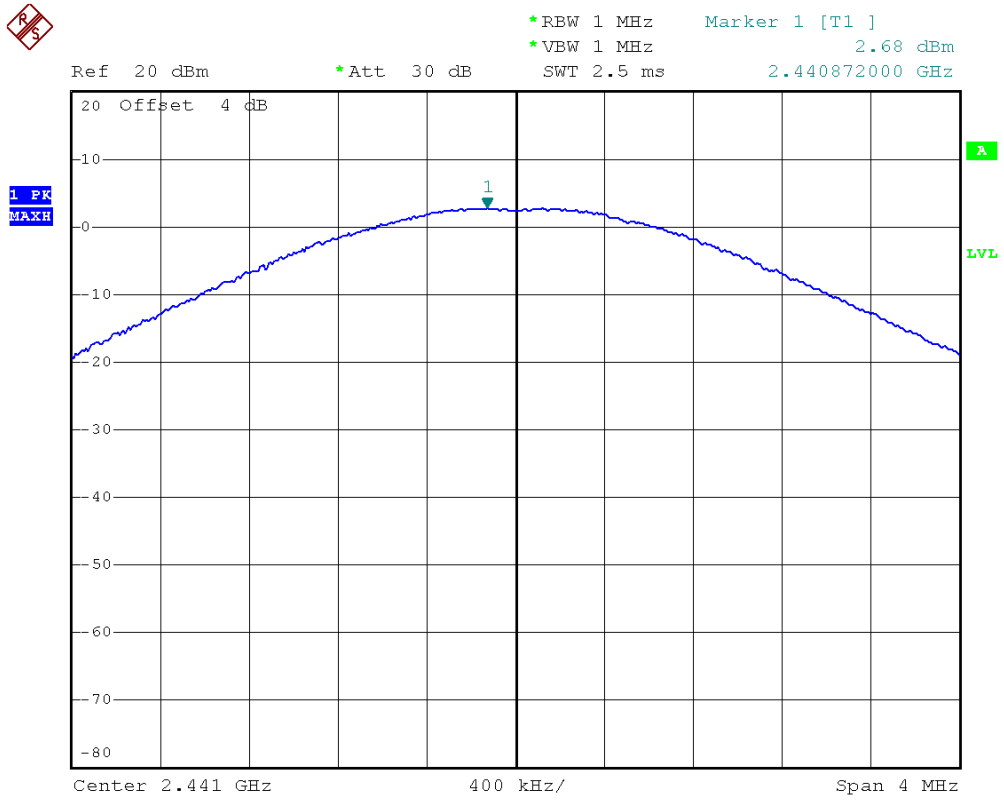
Modulation Standard: GFSK (1Mbps)
Channel: 78



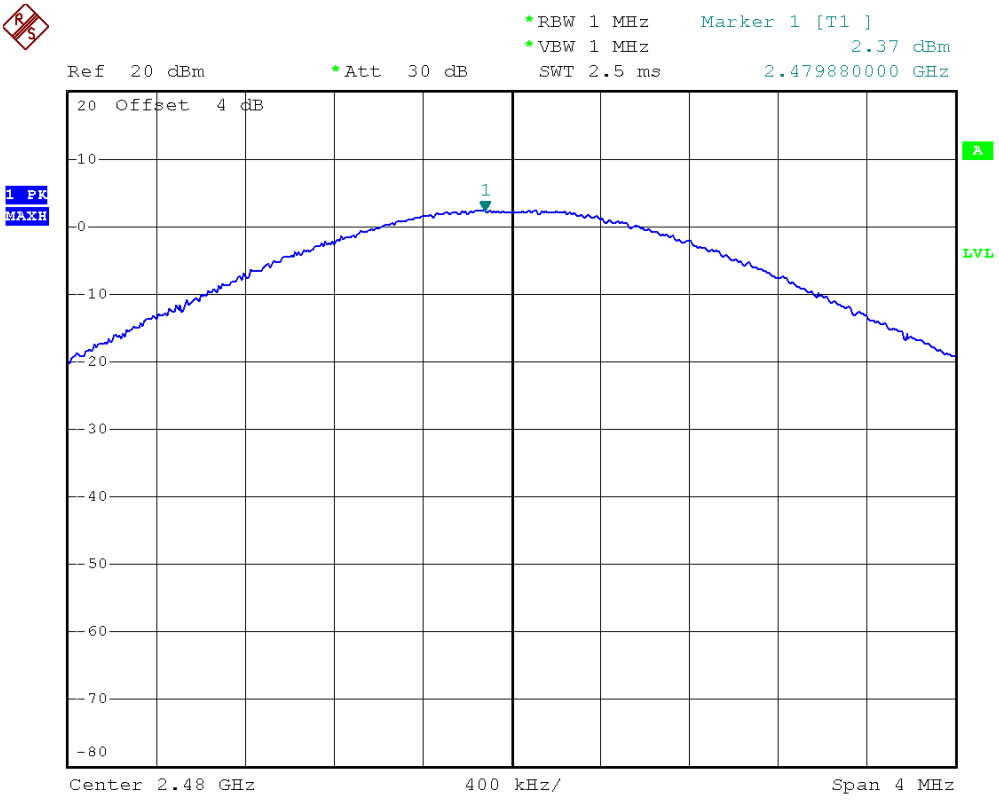
Modulation Standard:8DPSK (3Mbps)
Channel: 00



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



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



11. Band Edges Measurement

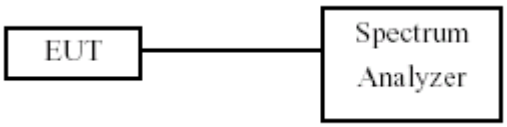
11.1 Test Limit

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

11.2 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.

11.3 Test Setup Layout



11.4 List of Measuring Equipment Used

Instrument/Ancillary	Model No.	Manufacturer	Serial No.	Calibration Date	Valid Date
Spectrum Analyzer	FSP40	R&S	100324	2013.03.10	2014.03.09

11.5 Test Result and Data

Test Date: Apr 1, 2013 Temperature: 25℃

Atmospheric pressure: 1020 hPa Humidity: 55%

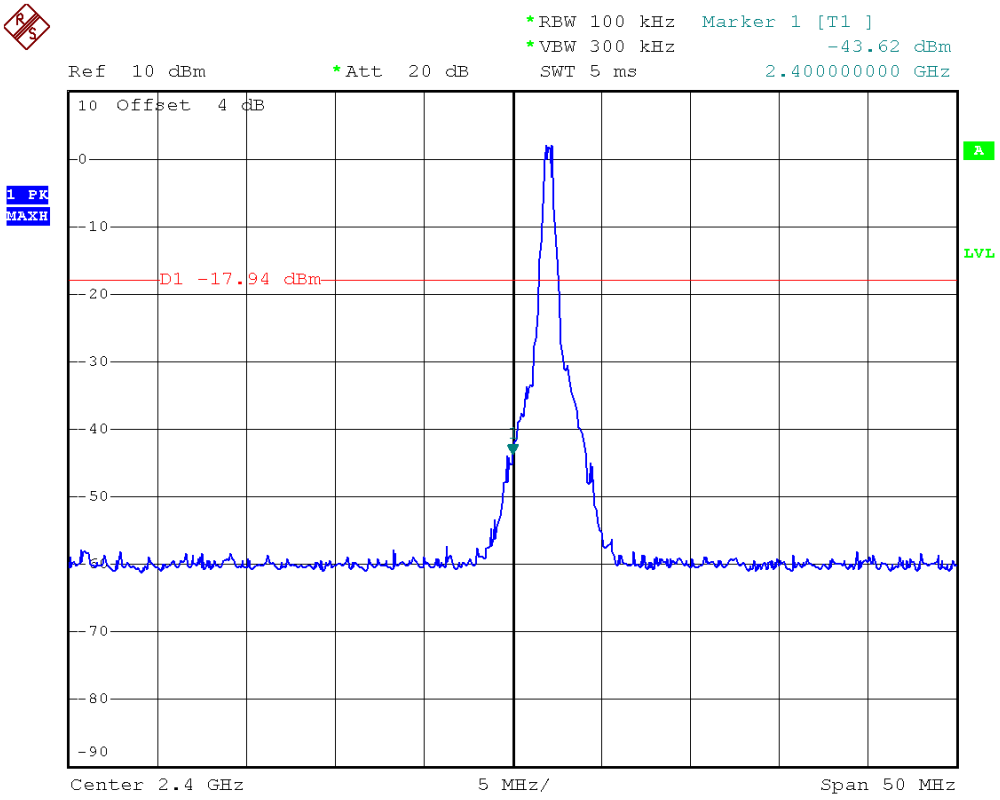
1M

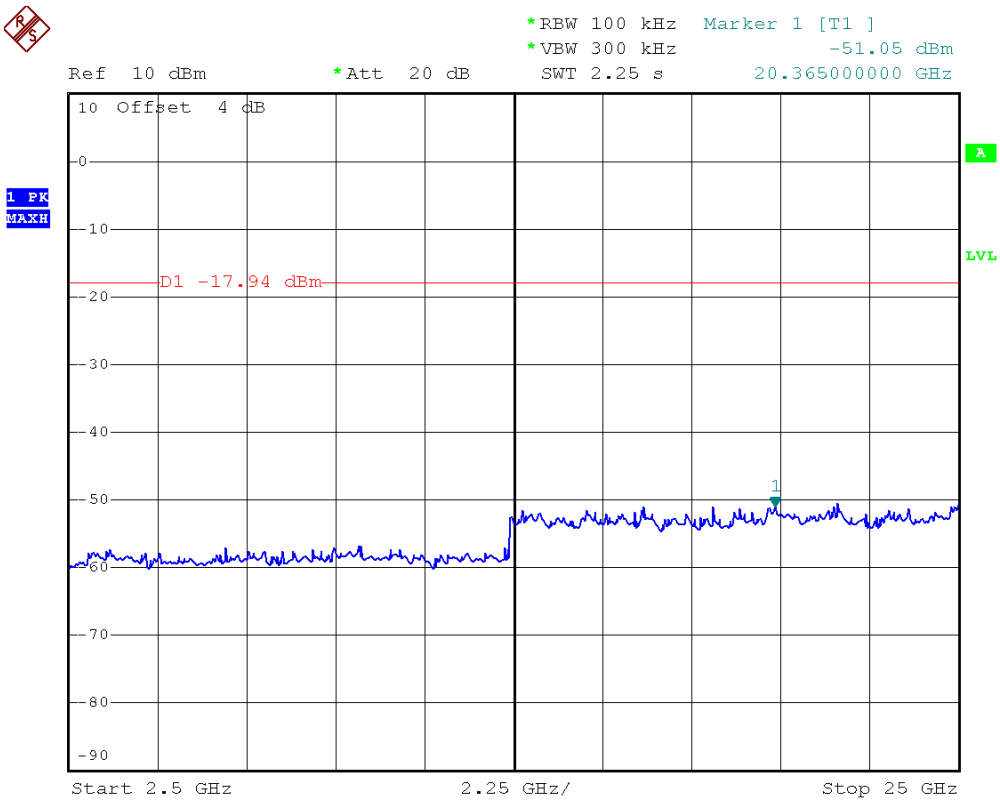
Channel	Frequency	maximum value in frequency (MHz)	maximum value is (dBm)
00	2402	2400.00	-43.62
78	2480	2483.50	-56.91

3M

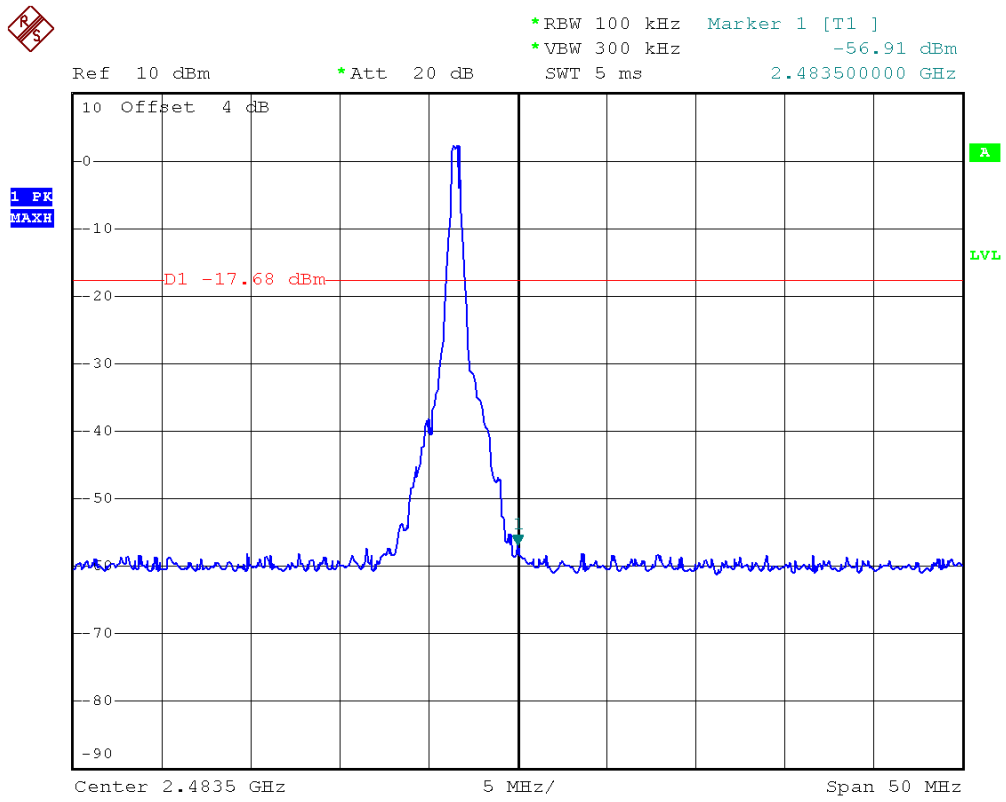
Channel	Frequency	maximum value in frequency (MHz)	maximum value is (dBm)
00	2402	2400.00	-49.1
78	2480	2483.50	-59.52

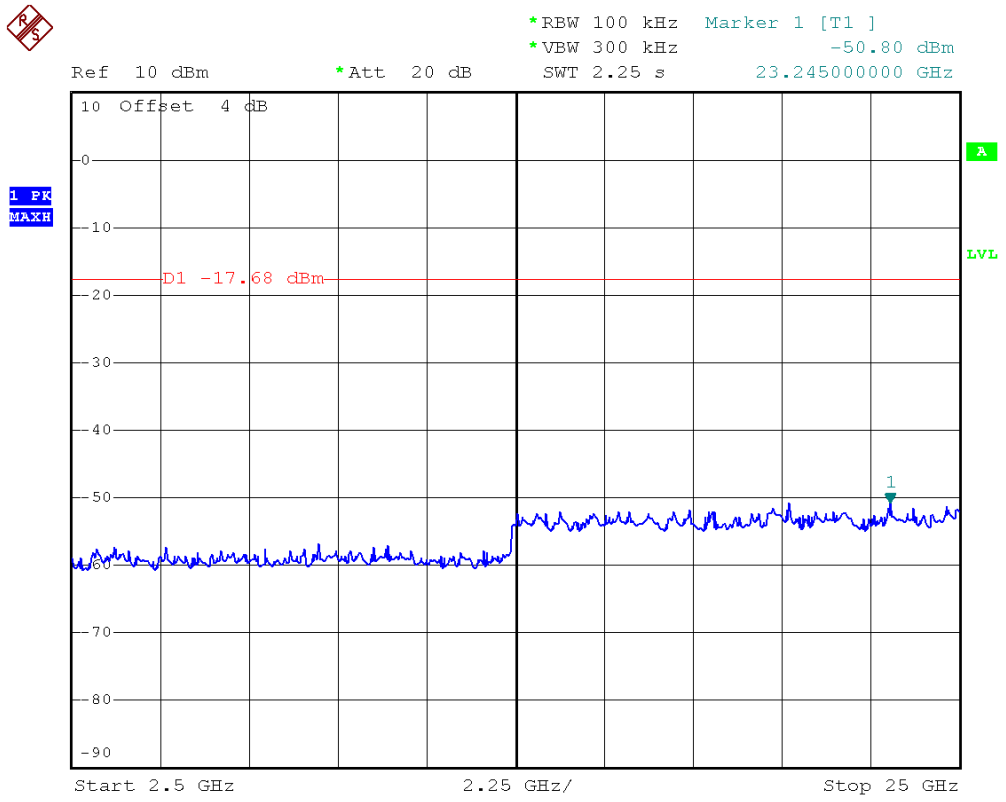
Modulation Standard: GFSK (1Mbps)
Channel: 00



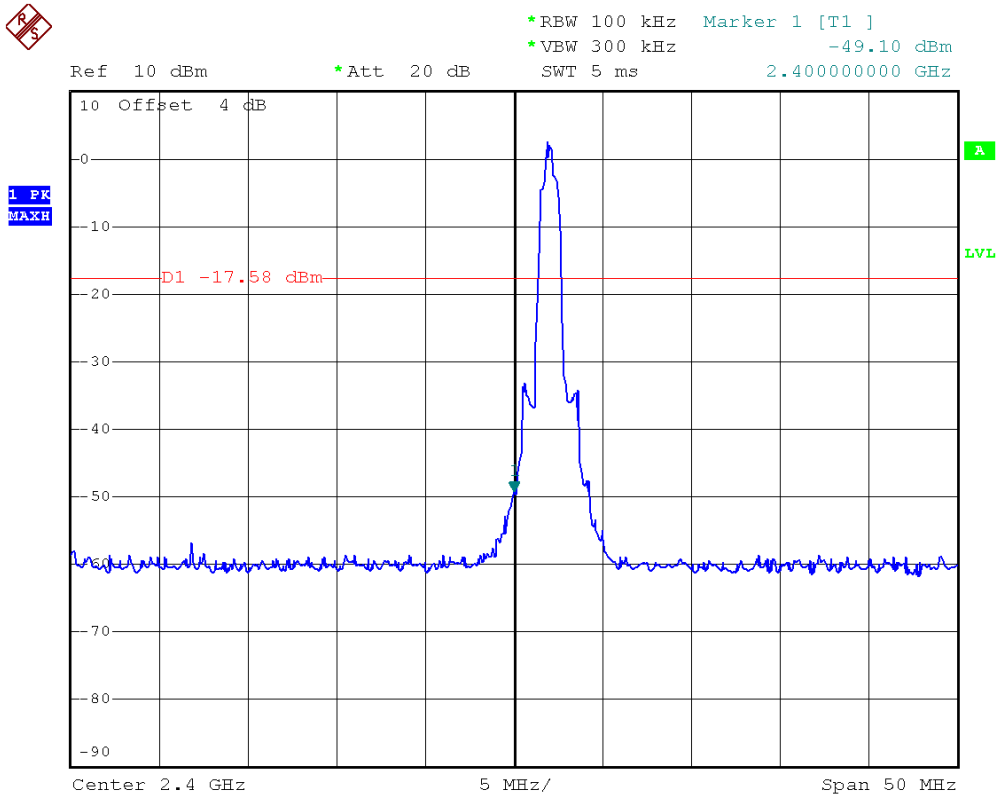


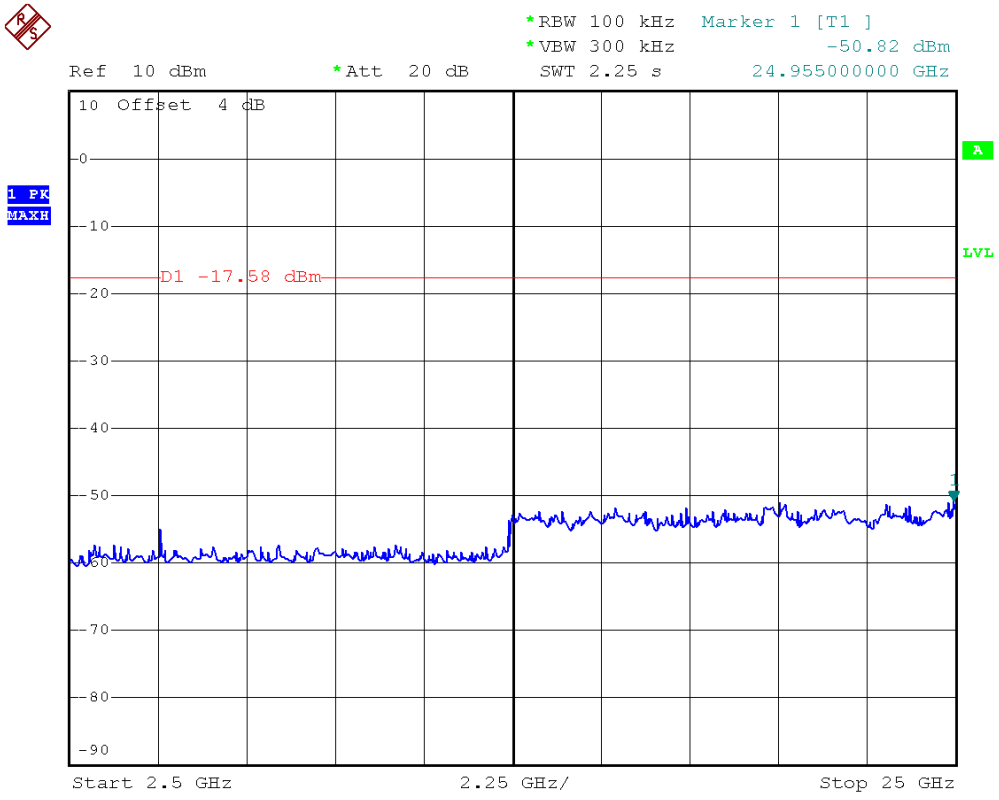
Modulation Standard: GFSK (1Mbps)
Channel: 78



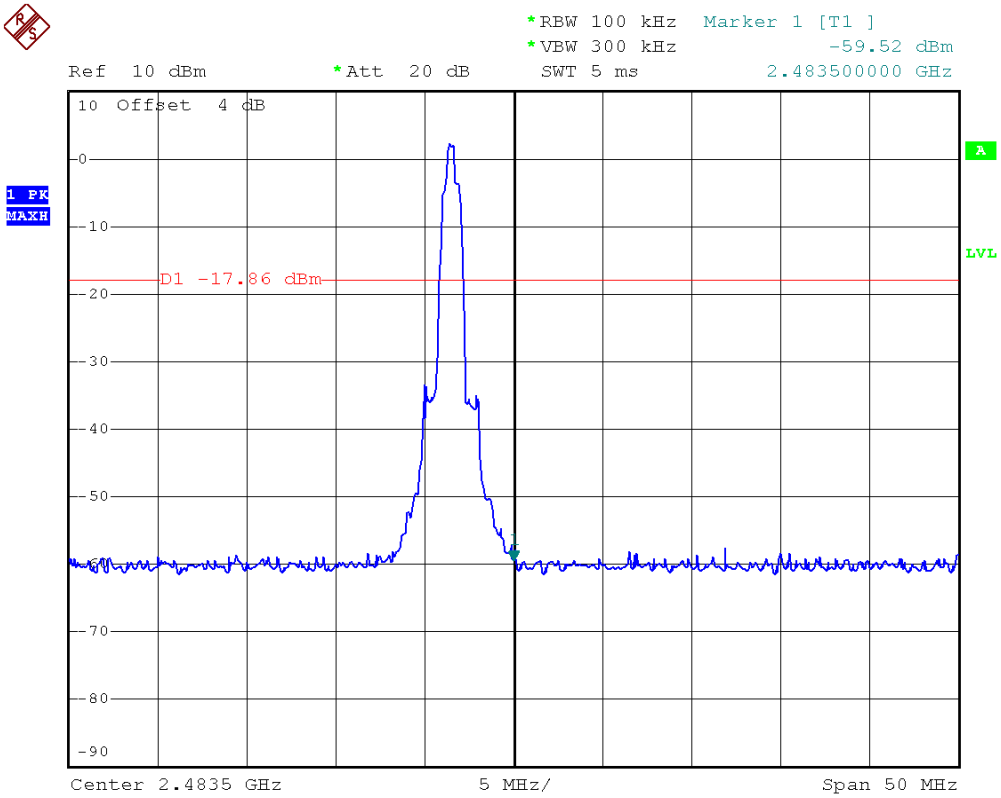


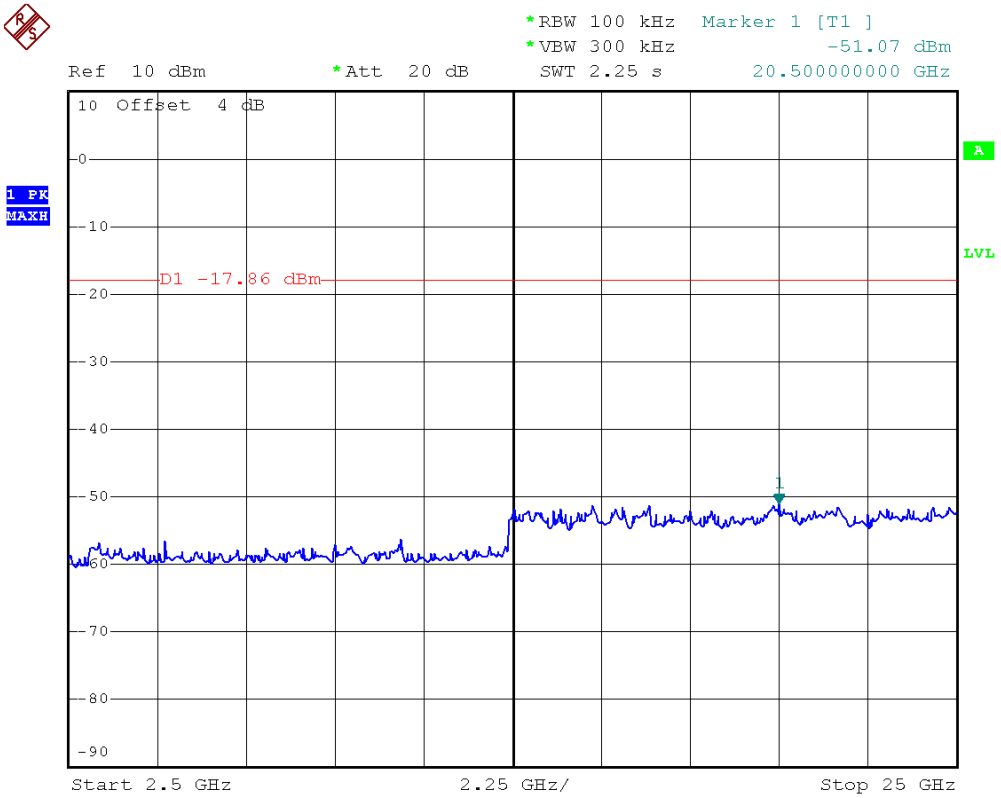
Modulation Standard: 8DPSK (3Mbps)
Channel: 00





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





11.6 Restrict band emission Measurement Data

Test Date : Apr 1,2013
Temperature : 25℃
Humidity : 55%
Atmospheric Pressure : 1020 hPa

1M

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 (cm)
						Peak	Ave.			
2386.23	H	42.58	11.08	53.66	Peak	74	54	-20.34	0	100
---	H	---	---	---	Ave	74	54	---	---	---
2387.24	V	43.78	10.6	54.38	Peak	74	54	-19.62	158	100
---	V	---	---	---	Ave	74	54	---	---	---
Channel 78										Fundamental Frequency: 2480 MHz
2495.15	H	41.54	10.62	52.16	Peak	74	54	-21.84	0	100
---	H	---	---	---	Ave	74	54	---	---	---
2495.86	V	43.14	10.63	53.77	Peak	74	54	-20.23	162	100
---	V	---	---	---	Ave	74	54	---	---	---

3M

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 (cm)
						Peak	Ave.			
2385.74	H	41.45	11.08	52.53	Peak	74	54	-21.47	0	100
---	H	---	---	---	Ave	74	54	---	---	---
2385.86	V	42.98	10.6	53.58	Peak	74	54	-20.42	157	100
---	V	---	---	---	Ave	74	54	---	---	---
Channel 78										Fundamental Frequency: 2480 MHz
2494.87	H	40.67	10.62	51.29	Peak	74	54	-22.71	0	100
---	H	---	---	---	Ave	74	54	---	---	---
2494.87	V	42.98	10.63	53.61	Peak	74	54	-20.39	153	100
---	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

12. 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 – 5.250
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

12.1 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.