

CFR 47 FCC Part 15.247

TEST REPORT

Product : **Skypro Bluetooth Device**

Trade Name : N/A

Model Number : SKHPAASKYPRO-V2

FCC ID : X8F-SKYPRO-BT

Prepared for

SkyHawke Technologies, LLC

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Prepared by

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Remark :

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The test result in this report is only subjected to the test sample.

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Statement of Compliance

Applicant: SkyHawke Technologies, LLC

Manufacturer: Season Group USA

Product: Skypro Bluetooth Device

Model No.: SKHPAASKYPRO-V2

Tested Power Supply: DC 3.7V

Date of Final Test: Feb. 07, 2013

Revision of Report: Rev. 02

Configuration of Measurements and Standards Used :

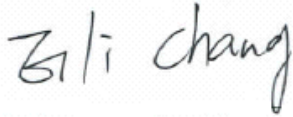
FCC Rules and Regulations Part 15 Subpart C

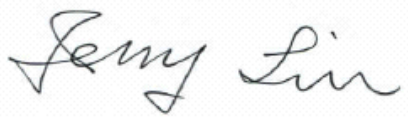
I HEREBY CERTIFY THAT: The data shown in this report were made in accordance with the procedures given in ANSI C63.4, and the energy emitted by the device was founded to be within the limits applicable. I assume full responsibility for accuracy and completeness of these data.

Note: 1. The result of the testing report relate only to the item tested.

2. The testing report shall not be reproduced expect in full, without the written approval of IETC

Report Issued: 2013/03/01

Project Engineer: 
Elli Chang

Approved: 
Jerry Liu

1 General Information

1.1 Description of Equipment Under Test

Product	: Skypro Bluetooth Device
Model Number	: SKHPAASKYPRO-V2
Applicant	: SkyHawke Technologies, LLC Ridgeland Technology Center 274 Commerce Park Drive Ridgeland, MS 39157
Manufacturer	: Season Group USA Season Group USA, LCC 12801 Wetmore Road San Antonio, Texas 78247
Power Supply	: DC 3.7V
Operating Frequency	: 2402MHz ~ 2480MHz
Channel Number	: 79 channels
Type of Modulation	: GFSK; $\pi/4$ DPSK; 8DPSK
Antenna description	: This device uses PCB Printed Antenna. The antenna is integral to the device, thereby meeting the requirement of FCC 15.203.
Date of Test	: Jan. 16 ~ Feb. 07, 2013
Additional Description	: 1) The Model Number " SKHPAASKYPRO-V2 " is representative selected in the test and included in this report. 2) This product has various colors. 3) For more detail specification about EUT, please refer to the user's manual. 4) Compliant with Bluetooth Ver 2.1

1.2 Details of tested peripheral equipment

1.2.1 Personal Computer

PC30

Model Number : SGH017PFW0
CPU Speed : Intel Core 2 Duo E5400
RAM : 2GB DDR3 1333MHz
EMC Compliance : CE, TUV, NCC, BSMI: R33275
Hard Disk Driver : 250GB Serial ATA2 3.0Gb/s 7200rpm
Manufacturer : HP
Switching Power Supply : LiteOn, PS-4321-9HP, 320W
Power Cord : Non-shielded, Detachable, 1.8m, w/o core

1.2.2 Monitor

MT26

Model Number : CMV 92GH 19"
Serial Number : P2GHAGCN P120322
EMC Compliance : FCC, CE, BSMI: R31374, UL, TUV
Manufacturer : CHIMEI
Power Cord : Non-shielded, Detachable, 1.8m, w/o core
D-Sub Cable : Non-shielded, Detachable, 1.8m, with core

1.2.3 Mouse

USB60

Model Number : M-U0028
Serial Number : N/A
EMC Compliance : FCC, CE, BSMI T41126, VCCI
Manufacturer : LOGITECH
Data Cable : Non-shielded, Un-detachable, 1.8m

1.2.4 Keyboard

KB37 (USB)

Model Number : Y-U0011
Serial Number : N/A
EMC Compliance : CE, FCC, C-Tick, BSMI T51160, VCCI
Manufacturer : LOGITECH
Data Cable : Non-Shielded, Un-detachable, 1.5m

1.2.5 Printer

PR20

Model Number : ESPON ACULASER M1200
Serial Number : LWVZ127636
EMC Compliance : BSMI 33126, CE
Manufacturer : EPSON
Data Cable : Shielded, Detachable, 1.8m
Power Cord : Non-shielded, Un-detachable, 1.8m

1.2.6 I-Phone 4

Manufacture : Apple
Model No. : I-Phone 4

1.2.7 Test Cable

Mini USB Cable : Shielded, Detachable, 1.4m, w/o core

1.3 Table for Carrier Frequencies

Channel	Frequency	Channel	Frequency	Channel	Frequency
0	2402 MHz	30	2432 MHz	60	2462 MHz
1	2403 MHz	31	2433 MHz	61	2463 MHz
2	2404 MHz	32	2434 MHz	62	2464 MHz
3	2405 MHz	33	2435 MHz	63	2465 MHz
4	2406 MHz	34	2436 MHz	64	2466 MHz
5	2407 MHz	35	2437 MHz	65	2467 MHz
6	2408 MHz	36	2438 MHz	66	2468 MHz
7	2409 MHz	37	2439 MHz	67	2469 MHz
8	2410 MHz	38	2440 MHz	68	2470 MHz
9	2411 MHz	39	2441 MHz	69	2471 MHz
10	2412 MHz	40	2442 MHz	70	2472 MHz
11	2413 MHz	41	2443 MHz	71	2473 MHz
12	2414 MHz	42	2444 MHz	72	2474 MHz
13	2415 MHz	43	2445 MHz	73	2475 MHz
14	2416 MHz	44	2446 MHz	74	2476 MHz
15	2417 MHz	45	2447 MHz	75	2477 MHz
16	2418 MHz	46	2448 MHz	76	2478 MHz
17	2419 MHz	47	2449 MHz	77	2479 MHz
18	2420 MHz	48	2450 MHz	78	2480 MHz
19	2421 MHz	49	2451 MHz		
20	2422 MHz	50	2452 MHz		
21	2423 MHz	51	2453 MHz		
22	2424 MHz	52	2454 MHz		
23	2425 MHz	53	2455 MHz		
24	2426 MHz	54	2456 MHz		
25	2427 MHz	55	2457 MHz		
26	2428 MHz	56	2458 MHz		
27	2429 MHz	57	2459 MHz		
28	2430 MHz	58	2460 MHz		
29	2431 MHz	59	2461 MHz		

1.4 Test Facility

- Site Description** : ☑RF Test Room ☑OATS 1 ☑Conducted 1
- Name of Firm** : Interocean EMC Technology Corp.
- Company web** : <http://www.ietc.com.tw>
- Location** : No. 5-2, Lin 1, Tin-Fu, Lin-Kou Dist., New Taipei City, Taiwan 244, R.O.C.
- Site Filing** :
- Federal Communication Commissions – USA
Registration No.: 96399 (OATS 1 & 2)
Registration No.: 518958 (OATS 3)
Designation No.: TW1020
 - Voluntary Control Council for Interference by Information Technology Equipment (VCCI) – Japan
Member No.: 1349
Registration No. (Conducted Room): C-1094
Registration No. (Conducted Room): T-1562
Registration No. (OATS 1): R-1040; G-274
Registration No. (OATS 2): R-1041
 - Industry Canada (IC)
OUR FILE: 46405-4437 Submission: 145171
Registration No. (OATS 1): Site# 4437A-1
Registration No. (OATS 2): Site# 4437A-2
Registration No. (OATS 3): Site# 4437A-3
- Site Accreditation** :
- Bureau of Standards and Metrology and Inspection (BSMI) – Taiwan, R.O.C.
Accreditation No.:
SL2-IN-E-0026 for CNS13438 / CISPR22
SL2-R1-E-0026 for CNS13439 / CISPR13
SL2-R2-E-0026 for CNS13439 / CISPR13
SL2-A1-E-0026 for CNS13783-1 / CISPR14-1
SL2-L1-E-0026 for CNS 14115 / CISPR 15
 - Taiwan Accreditation Foundation (TAF)
Accrditation No.: 1113
 - TÜV NORD
Certificate No: TNTW0801R-04



1.5 Test Equipment

Instrument	Manufacturer	Model	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSP40	100478	2013/05/29
Preamplifier	Agilent	8449B	3008A01434	2013/05/02
Preamplifier	Agilent	83050A	3950A00225	2013/08/28
Horn Antenna	COM-POWER	AH-118	10081	2013/05/29
Horn Antenna	Schwarzbeck	BBHA 9120	9120D-583	2013/05/01
Horn Antenna	Schwarzbeck	BBHA 9170	213	2013/07/24
Cable	HARBOUR	27478LL142	CBL22	2013/09/27
EMI Test Receiver	Rohde & Schwarz	ESVS10	826148/011	2013/10/16
Biconical Antenna	Schwarzbeck	BBA 9106	VHA 9103-2418	2013/03/28
Log Antenna	Schwarzbeck	UHALP 9108 A	0738	2013/03/28
Pre-Amplifier	Agilent	8447D	2944A09703	2013/05/01
RF Cable	PACIFIC	CBL41	CBL41	2013/11/16
RF Cable	Mini-Circuits	CBL-3FL-NMNM	CBL56	2013/08/31
EMI Test Receiver	Rohde & Schwarz	ESCS 30	830245/027	2013/10/10
RF Cable	HARBOUR	RG58/U	CBL48	2013/07/30
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2013/08/07
L.I.S.N.	Schaffner	MN2050D	1596	2013/07/22

Note: The above equipments are within the valid calibration period.

1.6 Summary of Measurement

Report Clause	Test Parameter	Reference Document CFR47 Part15	Results
2	20dB Bandwidth test	§15.247(a)(1)	Pass
3	Carrier Frequency Separation test	§15.247(a)(1)	Pass
4	Number of hopping frequencies test	§15.247(a)(1)	Pass
5	Time of Occupancy (dwell time) test	§15.247(a)(1)	Pass
6	Maximum Peak output power test	§15.247(b)	Pass
7	RF Conducted spurious emission	§15.247(c)	Pass
8	RF Radiated spurious emission test	§15.205, 15.209	Pass
9	Emission on the Band Edge test	§15.247(d)	Pass
10	AC Power Line Conducted Emission test	§15.207	Pass

1.7 Justification

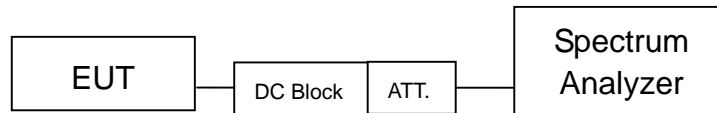
The test of radiated measurements according to FCC Part15 Section 15.33(a) had been conducted and the field strength of the frequency band were all arrive limit requirement, thus we evaluate the EUT pass the specified test.

2 20dB Bandwidth test

2.1 Limit

No regulation limit, for reference purpose.

2.2 Configuration of Measurement



2.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The 20dB bandwidth per FCC §15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 100 kHz, the video bandwidth \geq RBW, and the SPAN may equal to approximately 2 to 3 time the 20dB bandwidth.

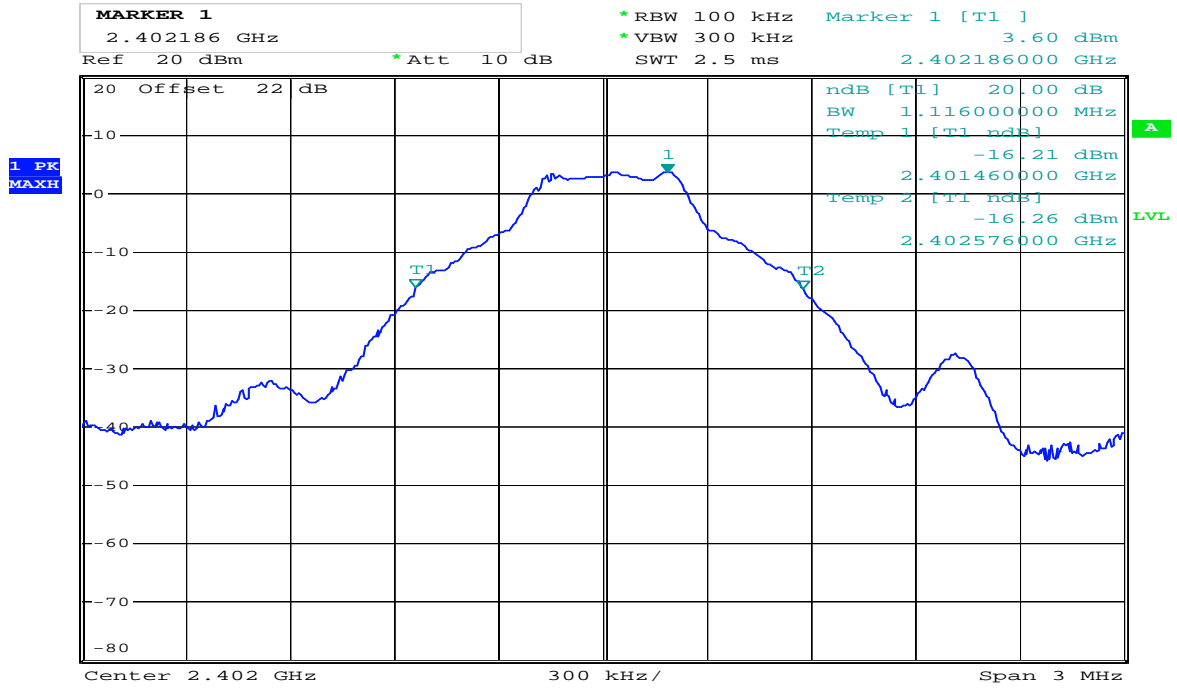
2.4 Test Result

PASS.

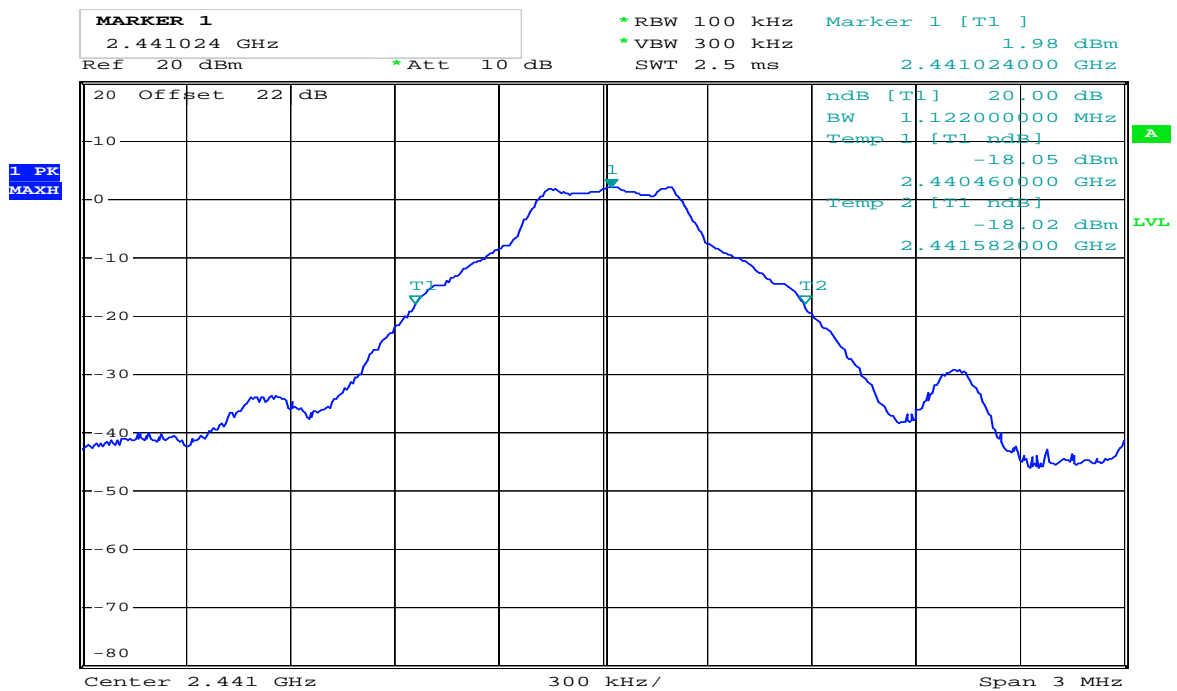
The final test data is shown as below and following pages.

Modulation type	Frequency (MHz)	20dB Bandwidth (MHz)
GFSK	2402	1.116
	2441	1.122
	2480	1.110
8DPSK	2402	1.374
	2441	1.386
	2480	1.386

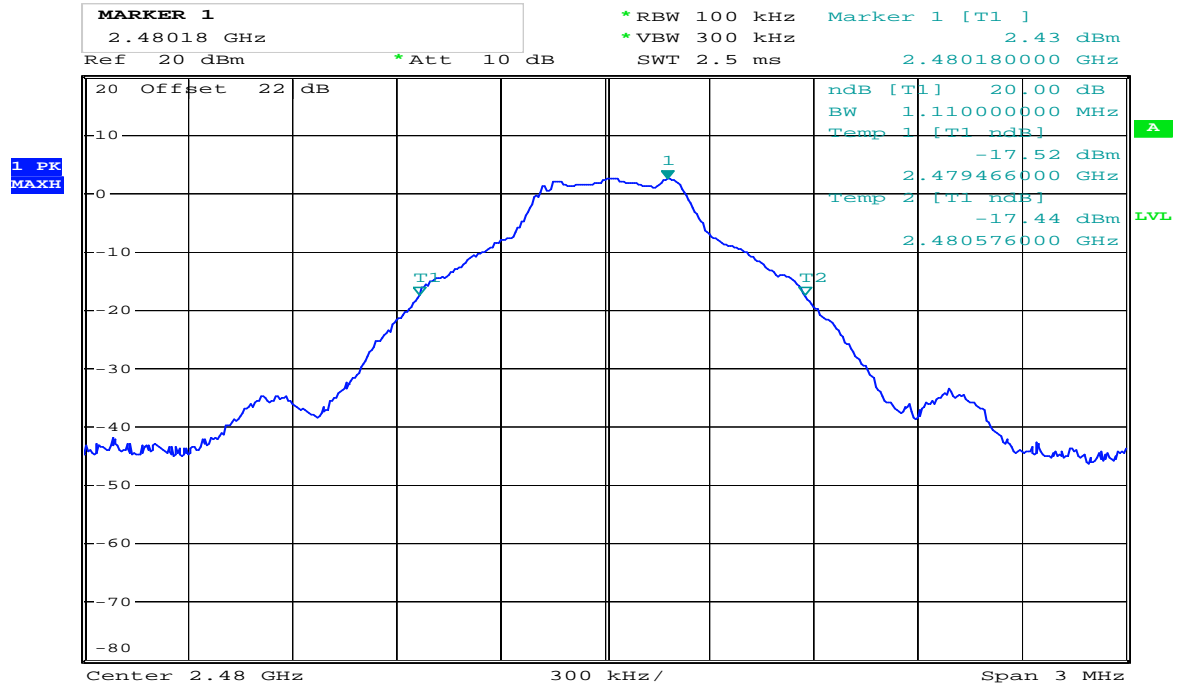
GFSK 2402MHz 20dB BW



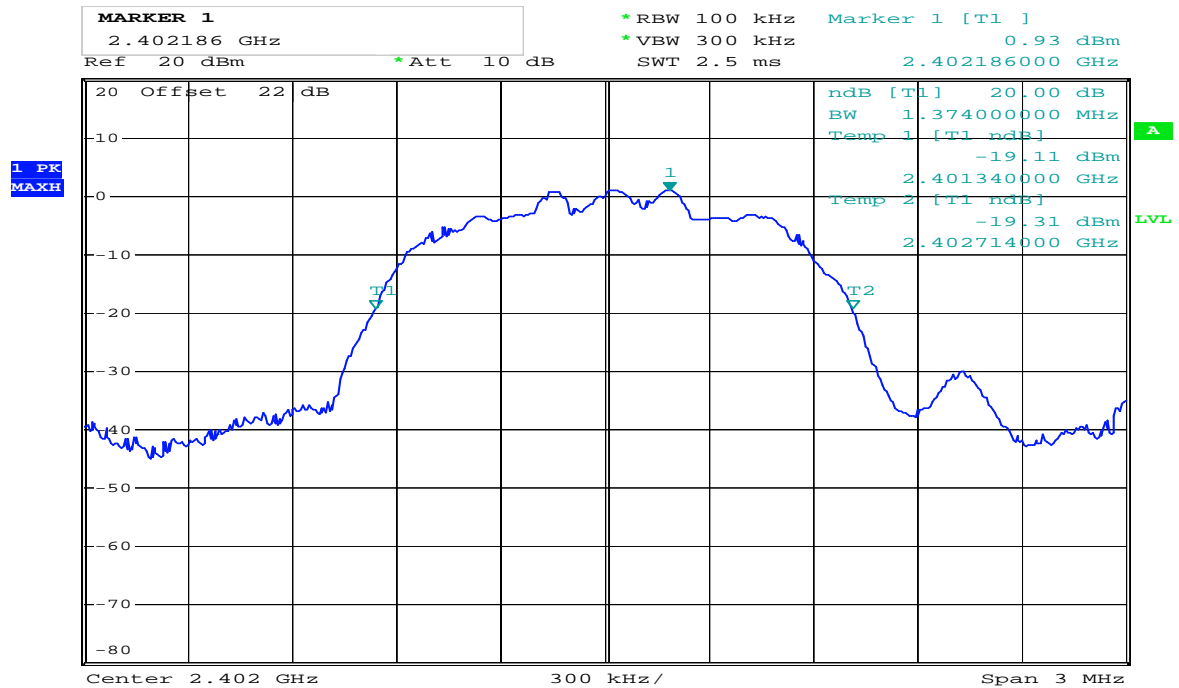
GFSK 2441MHz 20dB BW



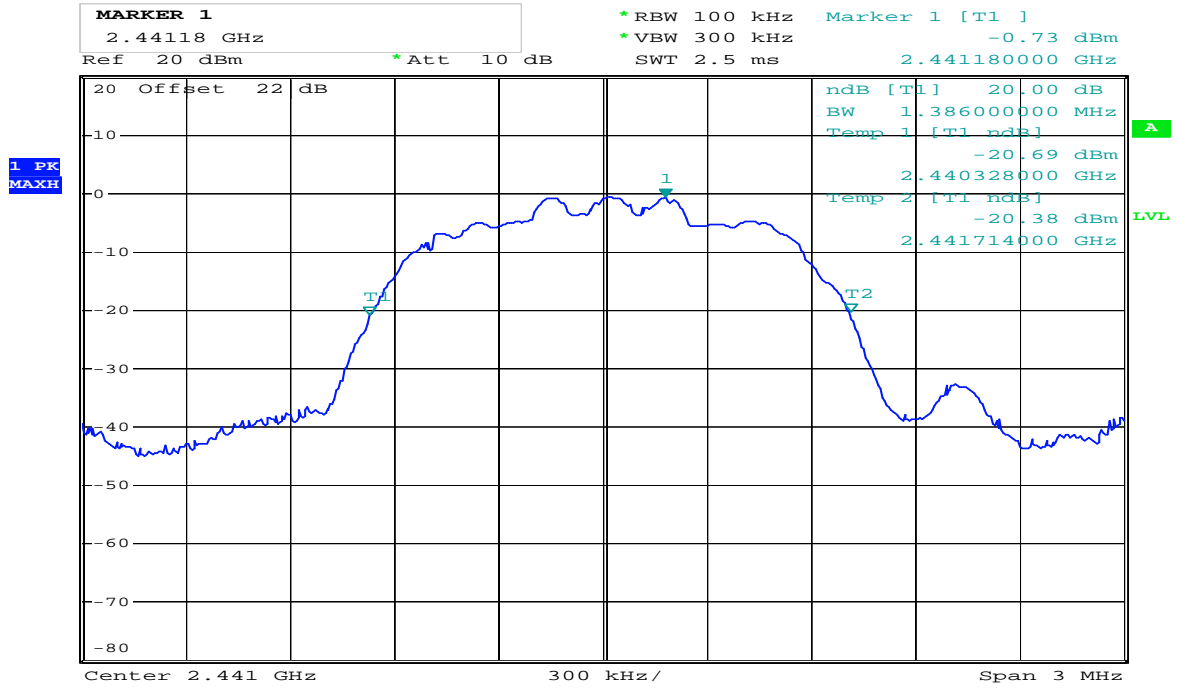
GFSK 2480MHz 20dB BW



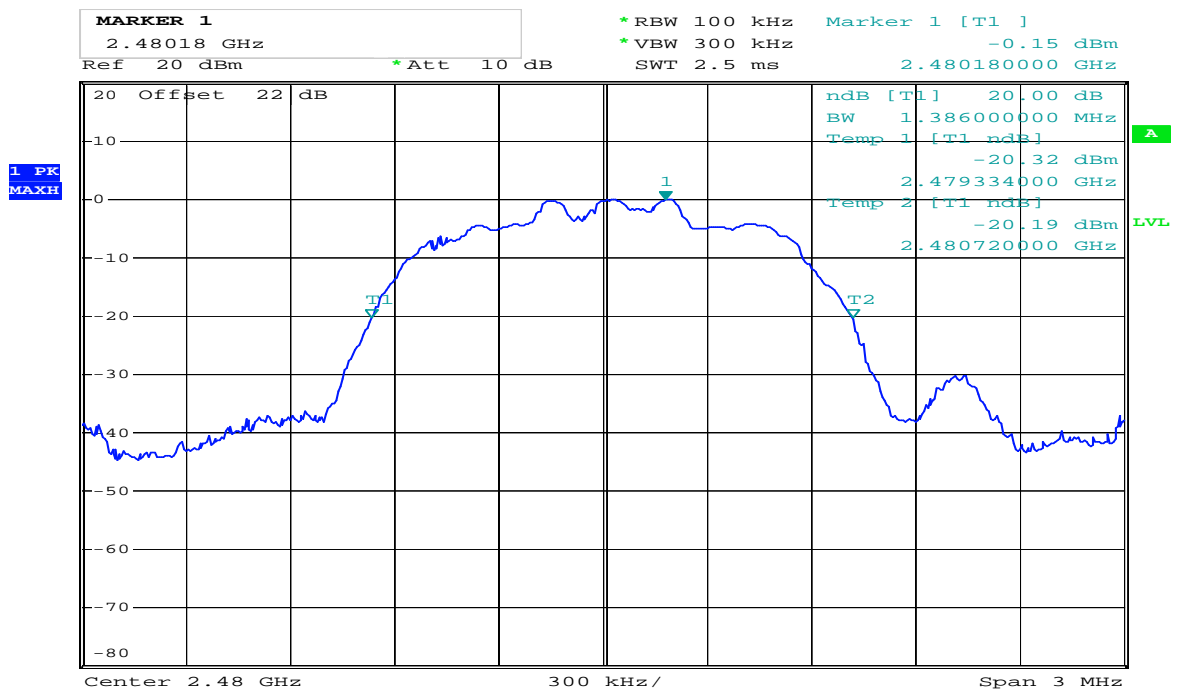
8DPSK 2402MHz 20dB BW



8DPSK 2441MHz 20dB BW



8DPSK 2480MHz 20dB BW

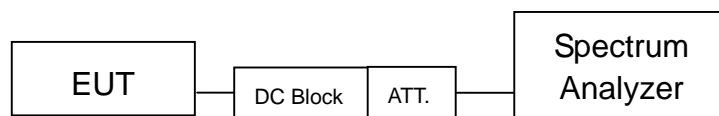


3 Carrier Frequency Separation test

3.1 Limit

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25kHz or the 20dB 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 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

3.2 Configuration of Measurement



3.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The carrier frequency separation per FCC Part15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at $\geq 1\%$ of the span, the video bandwidth \geq RBW, and the SPAN was wide enough to capture the peaks of two adjacent channels.

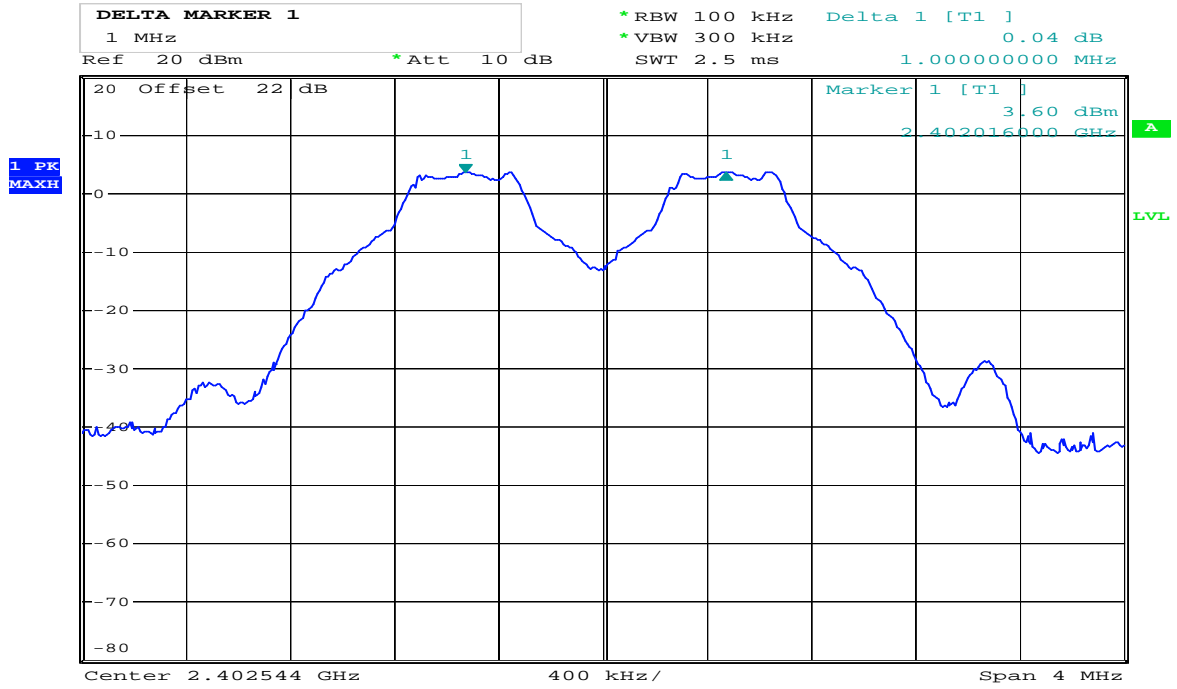
3.4 Test Result

PASS.

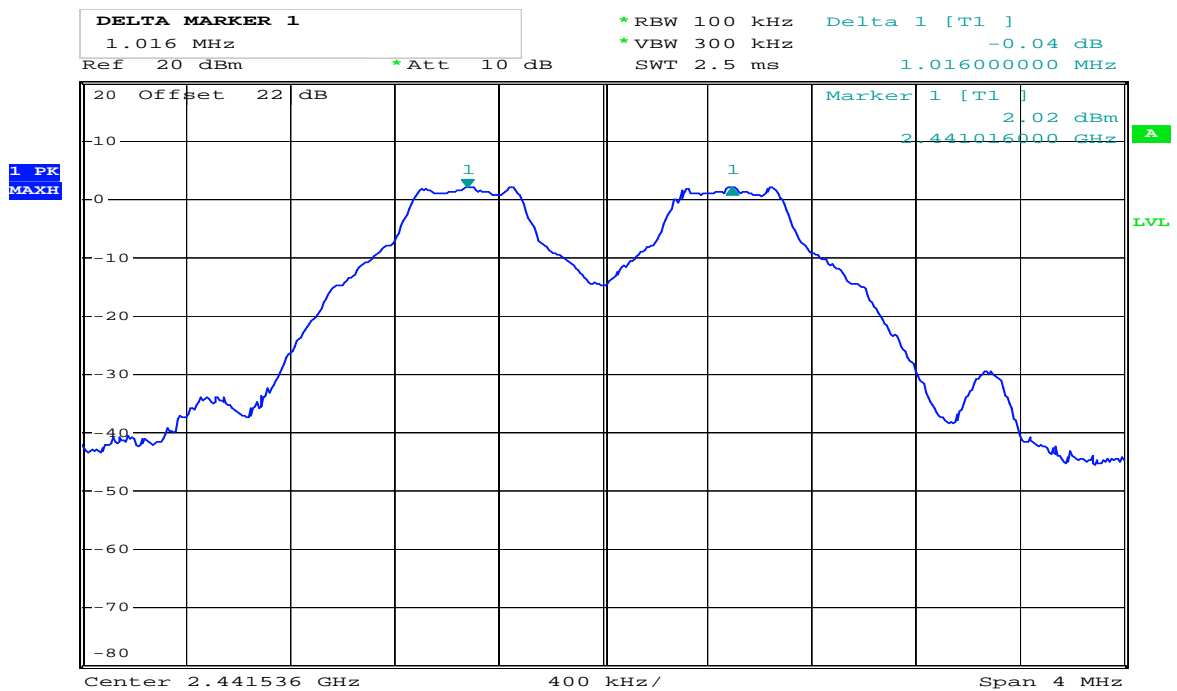
The final test data is shown as below and following pages.

Modulation type	Frequency 21 (MHz)	Separation (MHz)
GFSK	2402-2403	1.0000
	2441-2442	1.0016
	2479-2480	1.0000
8DPSK	2402-2403	1.0000
	2441-2442	1.0080
	2479-2480	1.0080

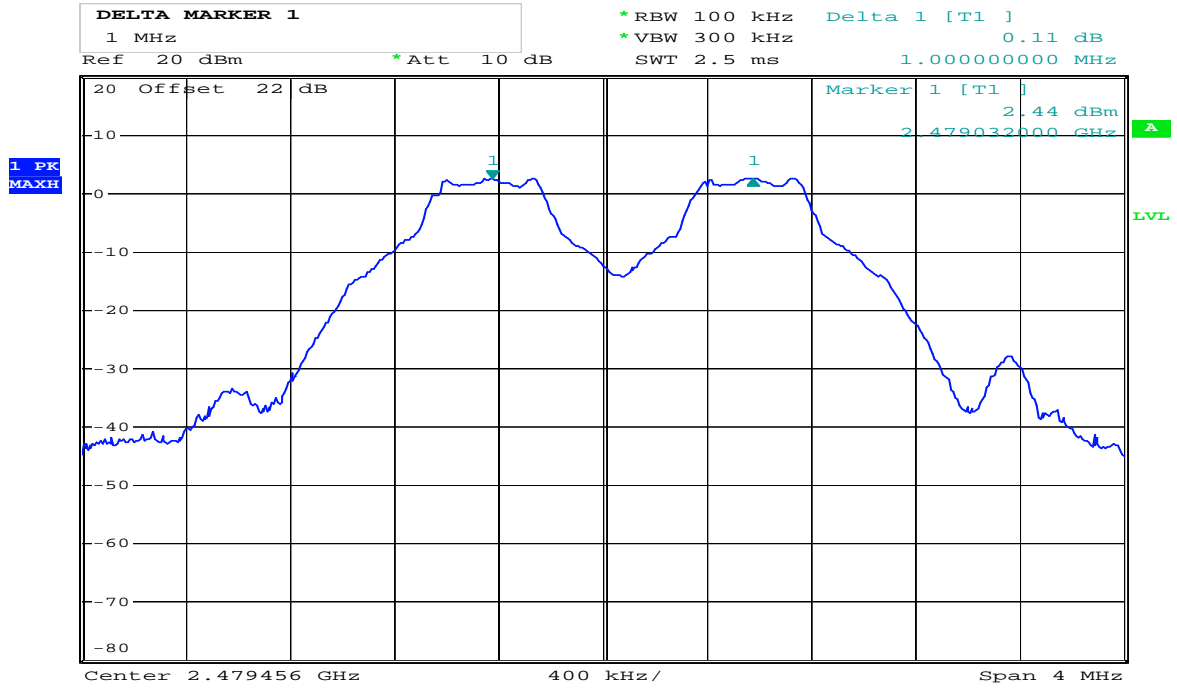
GFSK 2402MHz Channel Separation



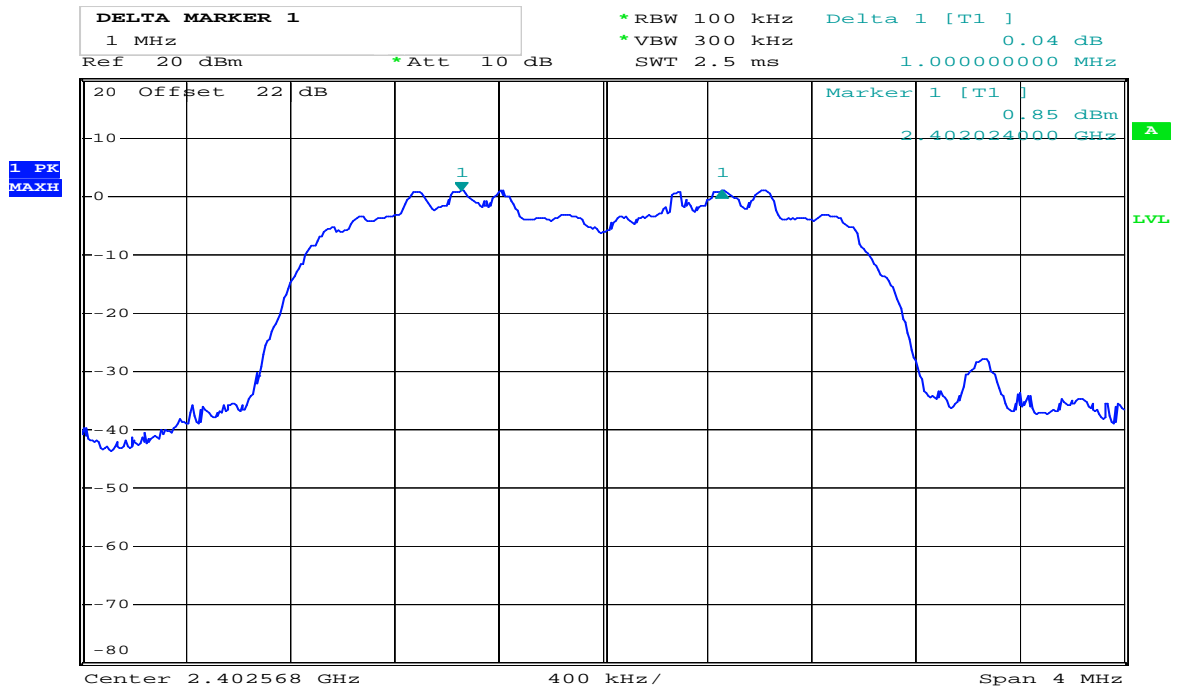
GFSK 2441MHz Channel Separation



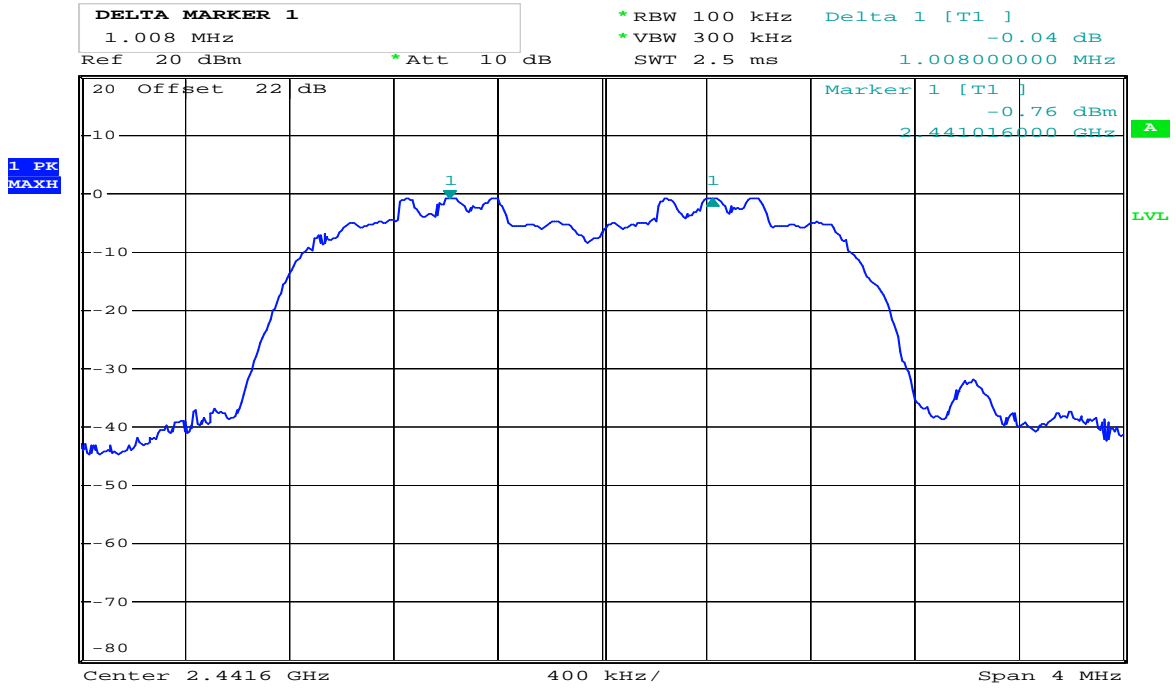
GFSK 2480MHz Channel Separation



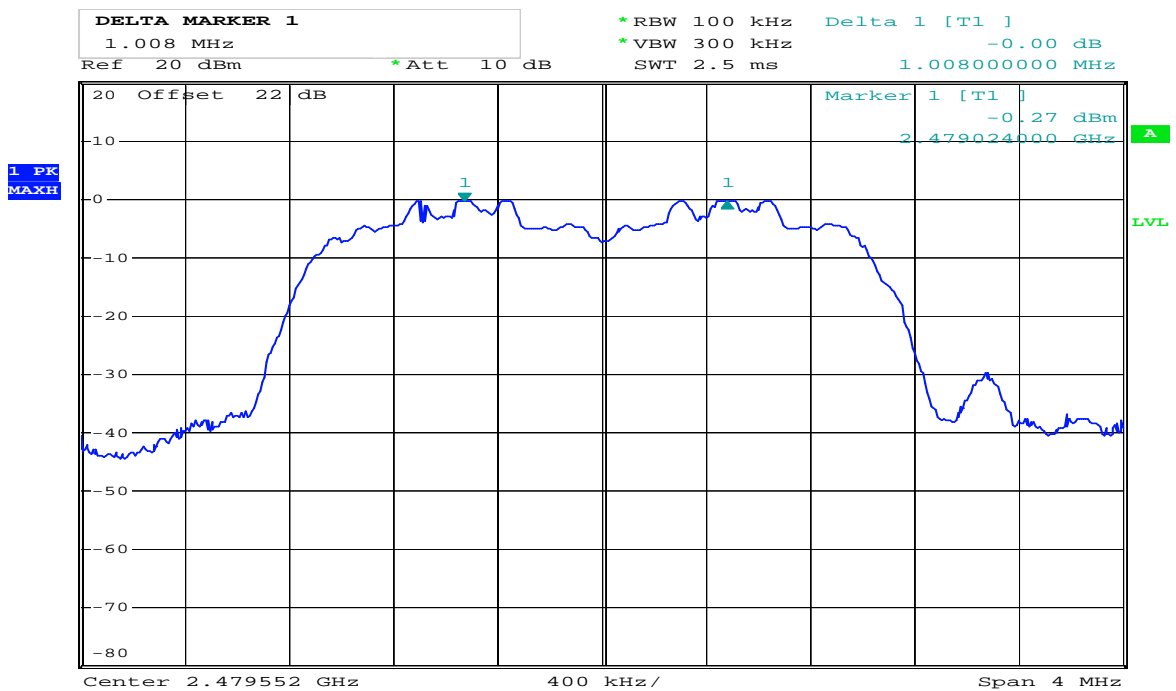
8DPSK 2402MHz Channel Separation



8DPSK 2441MHz Channel Separation

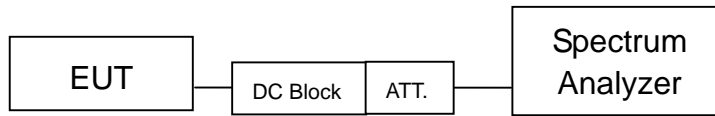


8DPSK 2480MHz Channel Separation



4 Number of hopping frequencies test

4.1 Configuration of Measurement



4.2 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The number of hopping frequencies per FCC Part15.247(a)(1) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at $\geq 1\%$ of the span, the video bandwidth \geq RBW, and the SPAN was the frequency band of operation.

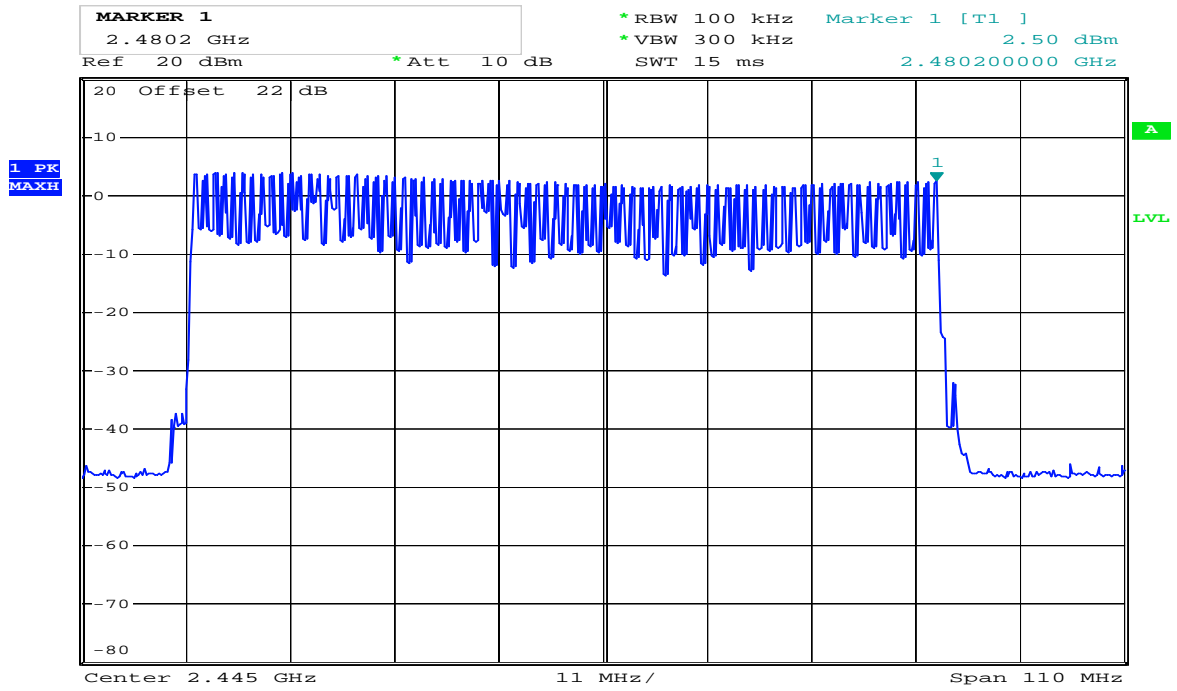
4.3 Test Result

PASS.

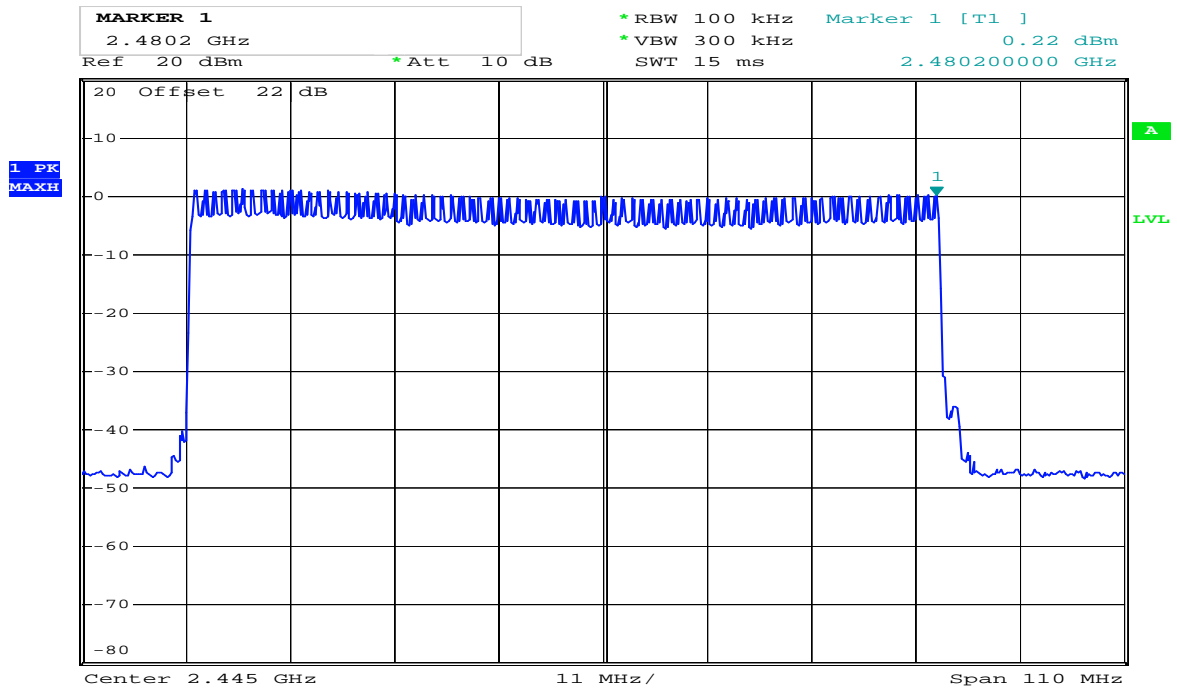
The final test data is shown as below and following pages.

Modulation	No. of Hopping CH.
GFSK	79
8DPSK	79

GFSK Channel Number



8DPSK Channel Number

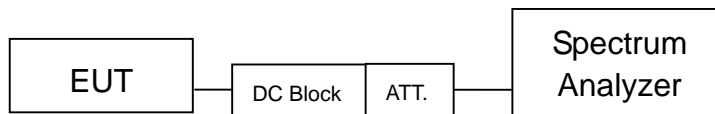


5 Time of Occupancy (dwell time) test

5.1 Limit

Frequency hopping systems in the 2400–2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 second within a period of 0.4 second multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

5.2 Configuration of Measurement



5.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

According to FCC Part15.247(a)(1) the time of occupancy (dwell time) was measured using a 50 ohm spectrum analyzer with the resolutions bandwidth set at 1MHz, the video bandwidth \geq RBW and the zero span function of spectrum analyzer was enable. The EUT has its hopping function enable.

Formula for Dwell time calculation:

$$\text{Dwell time} = \text{time slot} * \text{hop rate} * 1/s / 79 * 31.6s$$

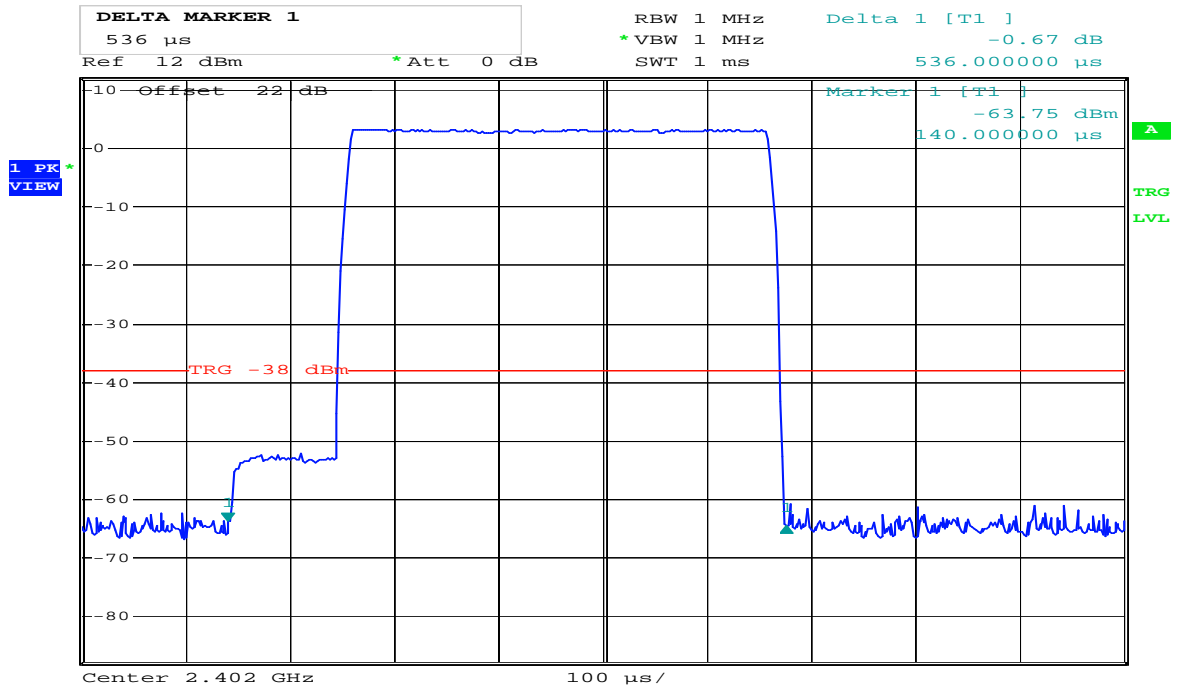
5.4 Test Result

PASS.

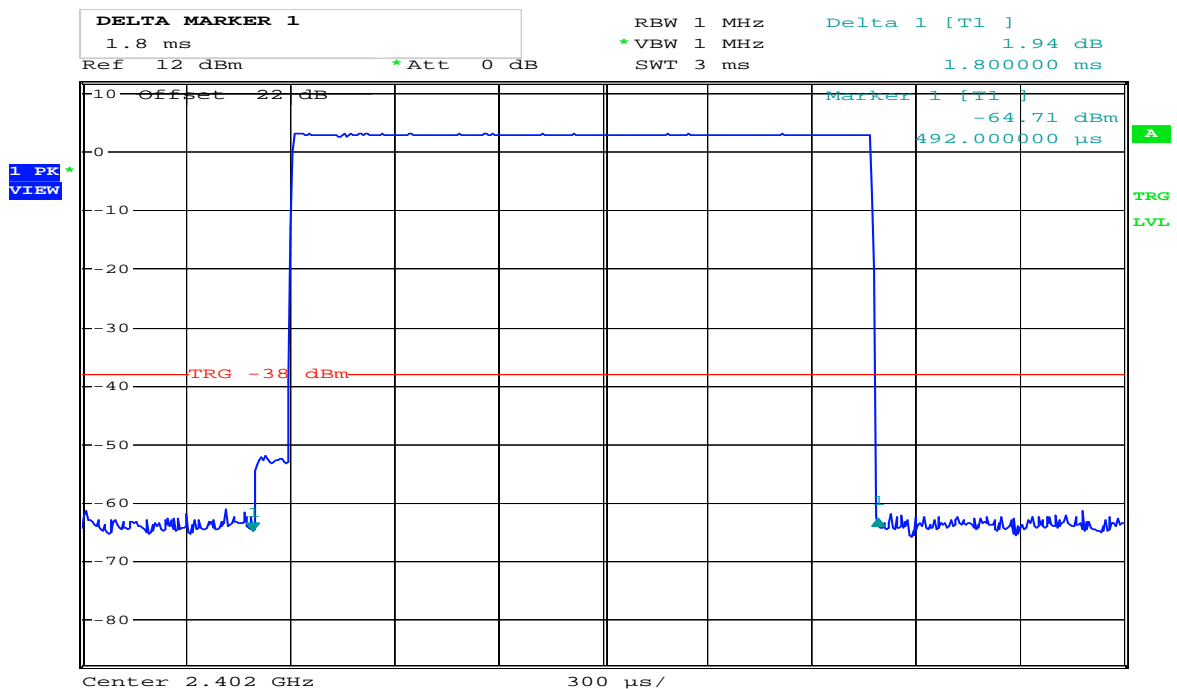
The final test data is shown as below and following pages.

Dwell Time Test						
Modulation Type	Packet Type	Time Slot Length (ms)	Hop Rate (Hz)	Dwell Time (s)	Limit (s)	Test Result
GFSK	DH1	0.536	800	0.172	<0.4	Pass
	DH3	1.800	400	0.288	<0.4	Pass
	DH5	3.072	266	0.327	<0.4	Pass
8DPSK	DH1	0.540	800	0.173	<0.4	Pass
	DH3	1.810	400	0.290	<0.4	Pass
	DH5	3.072	266	0.327	<0.4	Pass

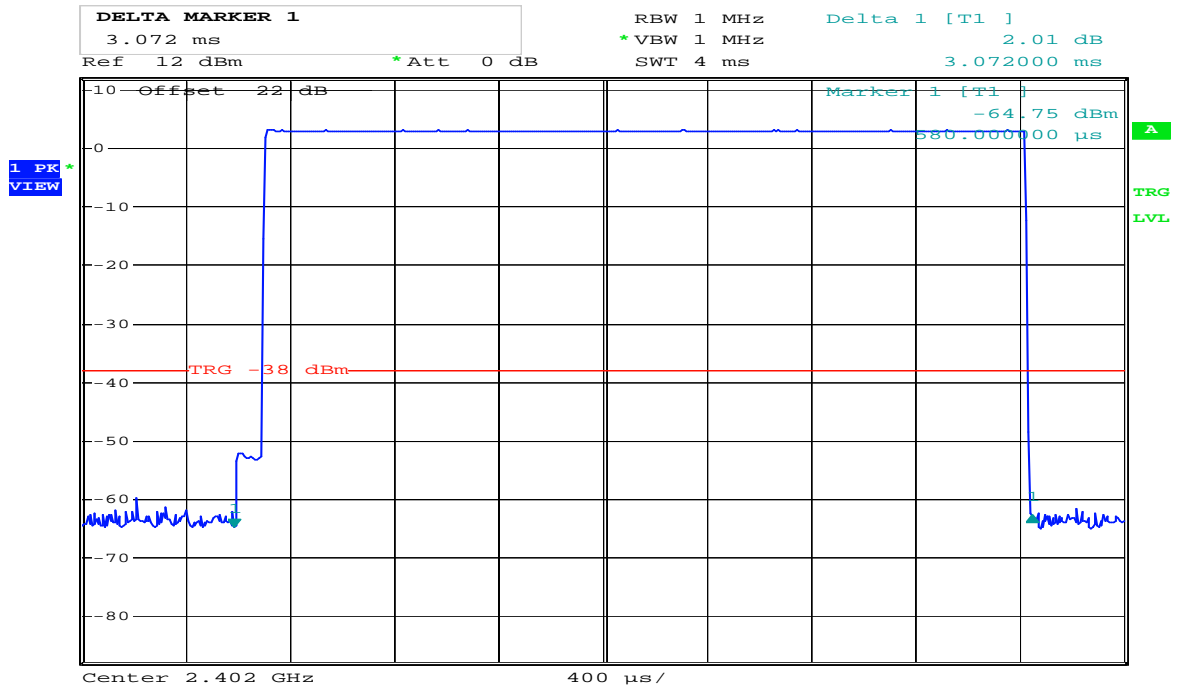
GFSK 2402Mhz DH1 Time Slot



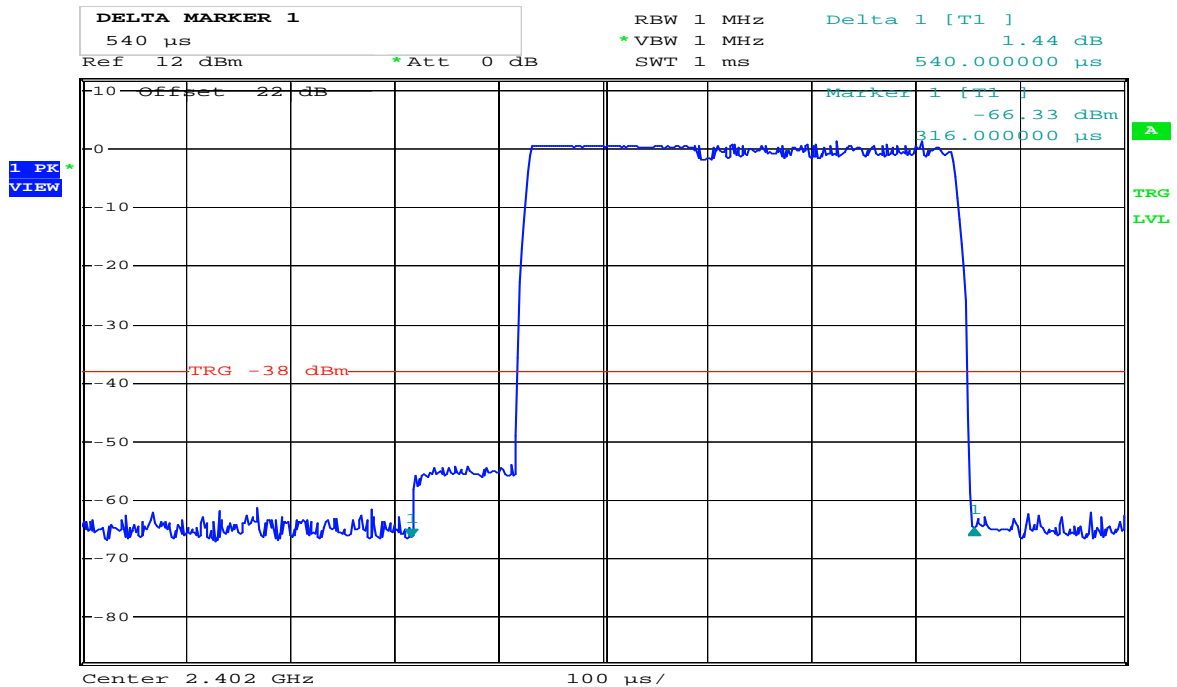
GFSK 2402Mhz DH3 Time Slot



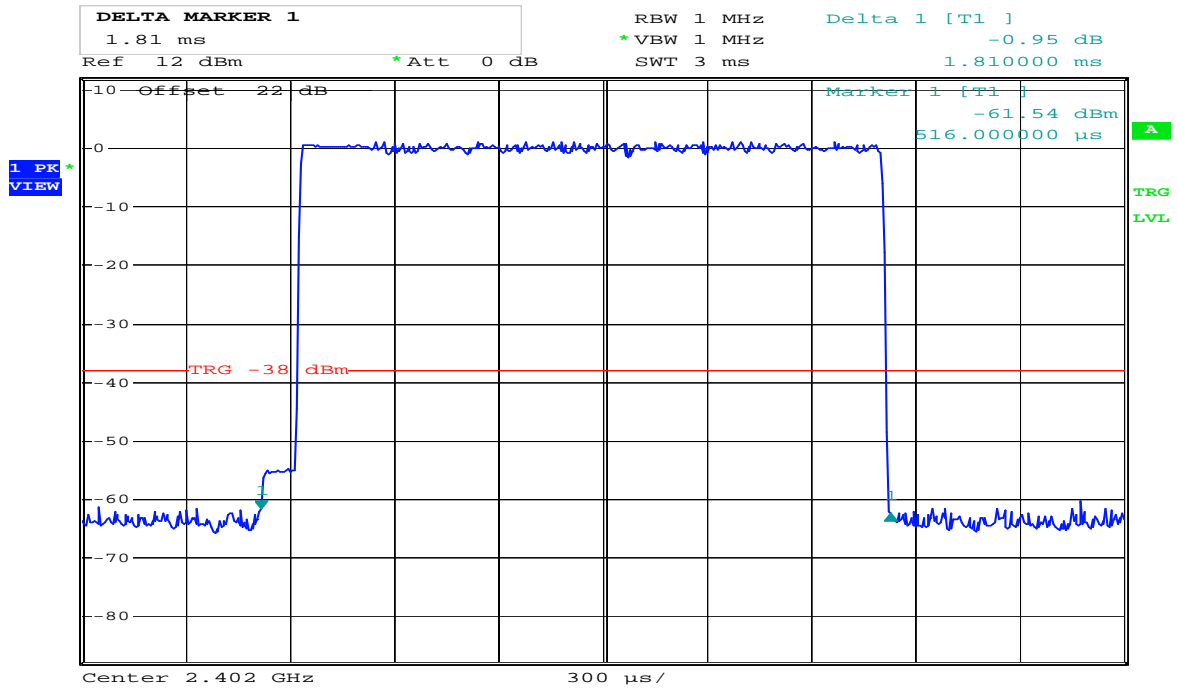
GFSK 2402Mhz DH5 Time Slot



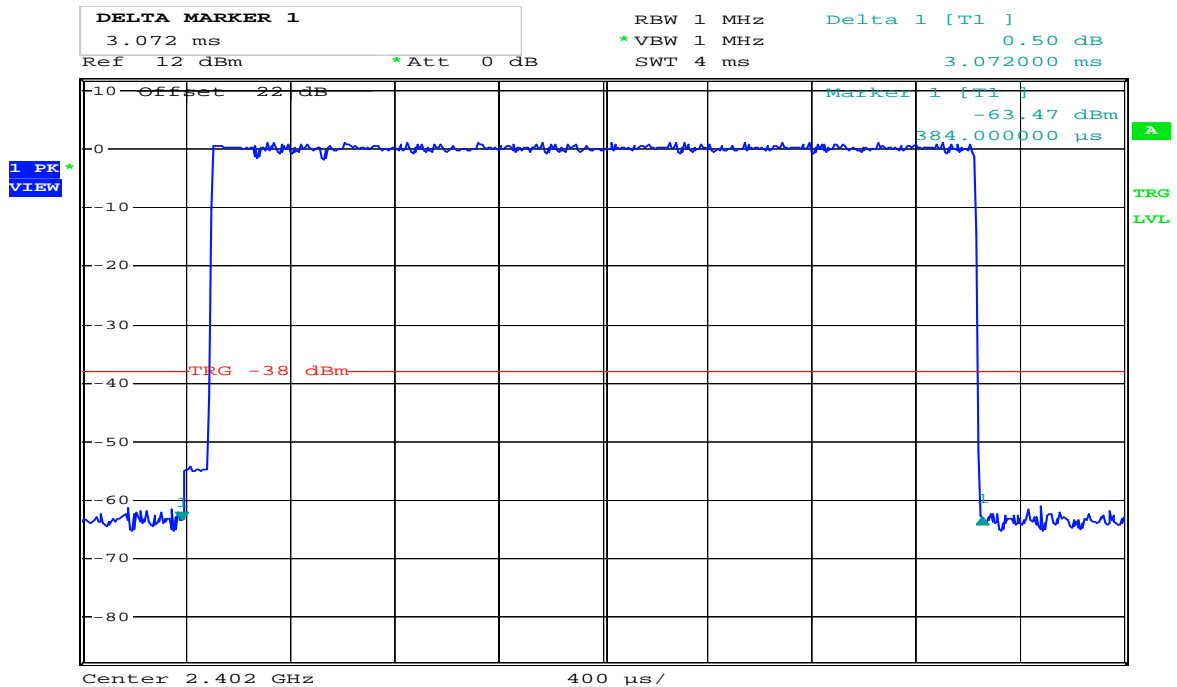
8DPSK 2402Mhz DH1 Time Slot



8DPSK 2402Mhz DH3 Time Slot



8DPSK 2402Mhz DH5 Time Slot



6 Maximum Output Power test

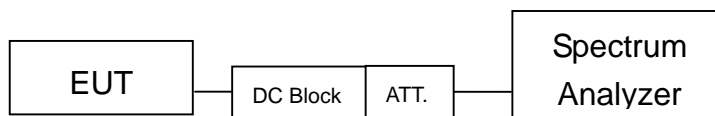
6.1 Limit

For frequency hopping systems operating in the 2400-2483.5MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1 watt.

Frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125mW.

For all other frequency hopping systems in the 2400-2483.5MHz band: 0.125 watts.

6.2 Configuration of Measurement



6.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

The test was performed at 3 channels (lowest, middle and highest).

6.4 Test Result

PASS.

The final test data is shown as following table.

Modulation Type	CH	Test Voltage (Vdc)	Maximum transmit power		Limit (dBm)	Margin (dB)
			dBm	Watts		
GFSK	0	3.7	4.45	0.00279	21	-16.55
	39	3.7	2.58	0.00181	21	-18.42
	78	3.7	3.29	0.00213	21	-17.71
8DPSK	0	3.7	2.69	0.00186	21	-18.31
	39	3.7	1.03	0.00127	21	-19.97
	78	3.7	1.52	0.00142	21	-19.48

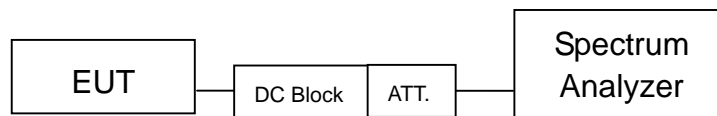
7 RF Conducted spurious emission

7.1 Limit

According to FCC Part 15.247(d) requirement :

In any 100 kHz 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 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

7.2 Configuration of Measurement



7.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

RF antenna conducted spurious emissions was measured from the EUT antenna port using a 50ohm spectrum analyzer with the resolution bandwidth set at 100 kHz, and the video bandwidth set at 100 kHz.

The measurements were performed from 30MHz to 25GHz.

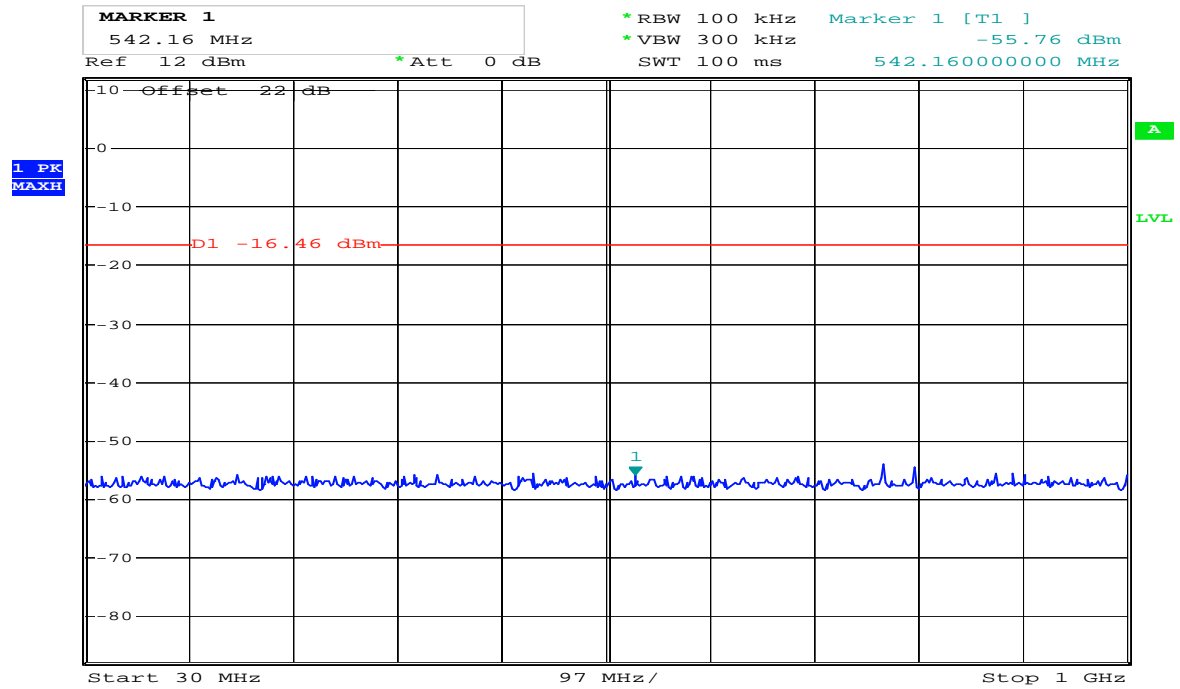
7.4 Test Result

PASS.

The final test data is shown as following pages.

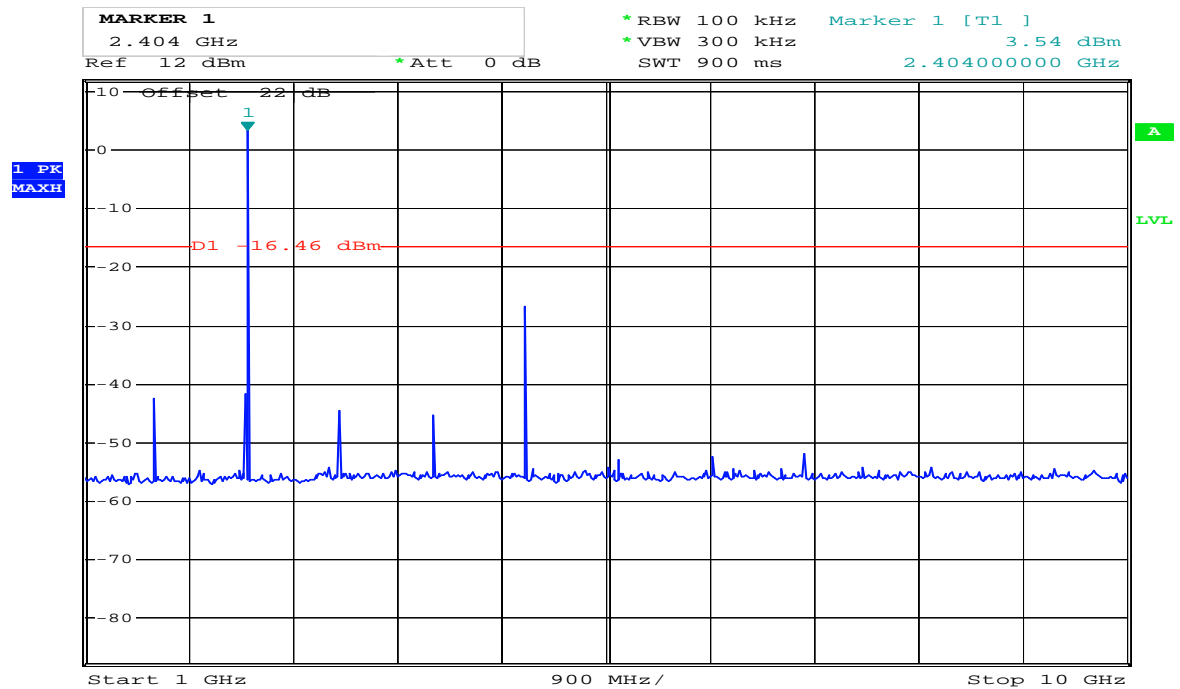
Conducted spurious emission

GFSK 2402MHz (30M ~ 1GHz)

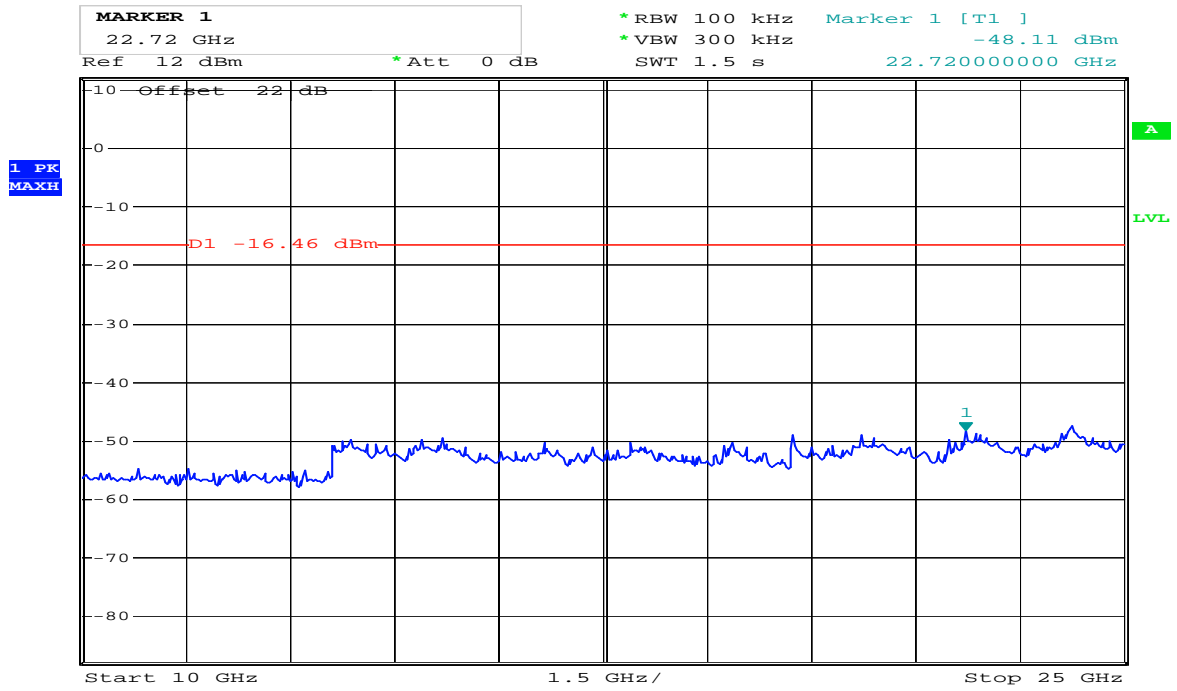


Date: 6.FEB.2013 12:31:52

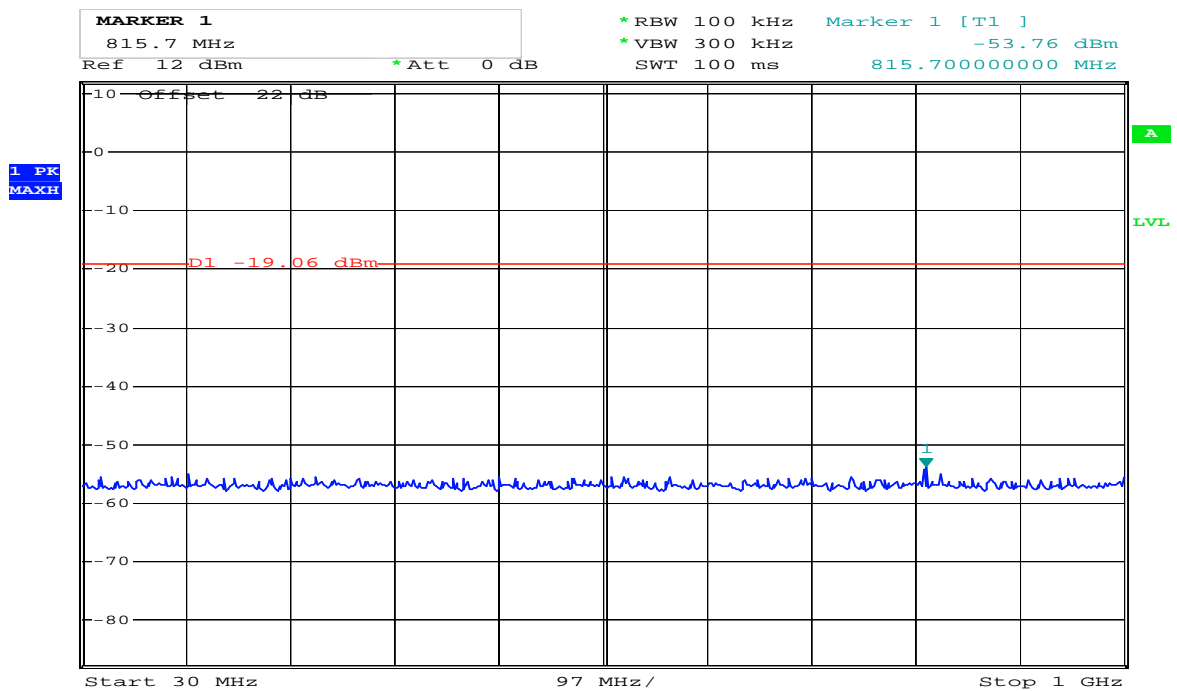
GFSK 2402MHz (1G ~ 10GHz)



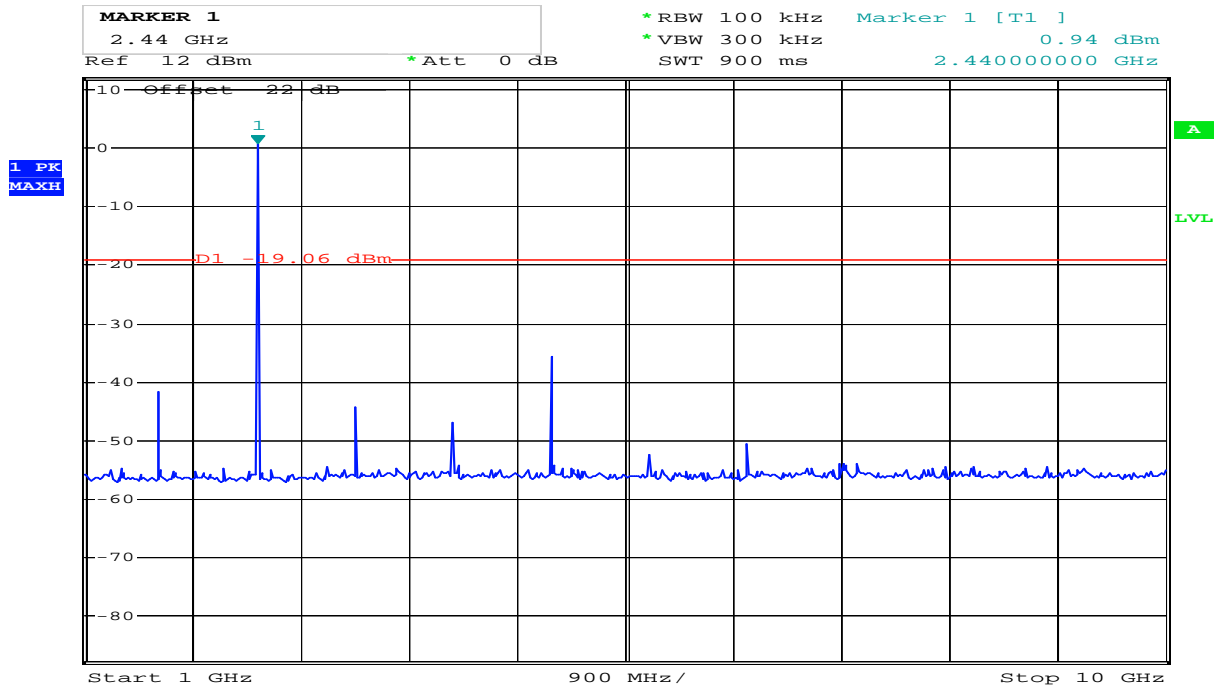
GFSK 2402MHz (10G ~ 25GHz)



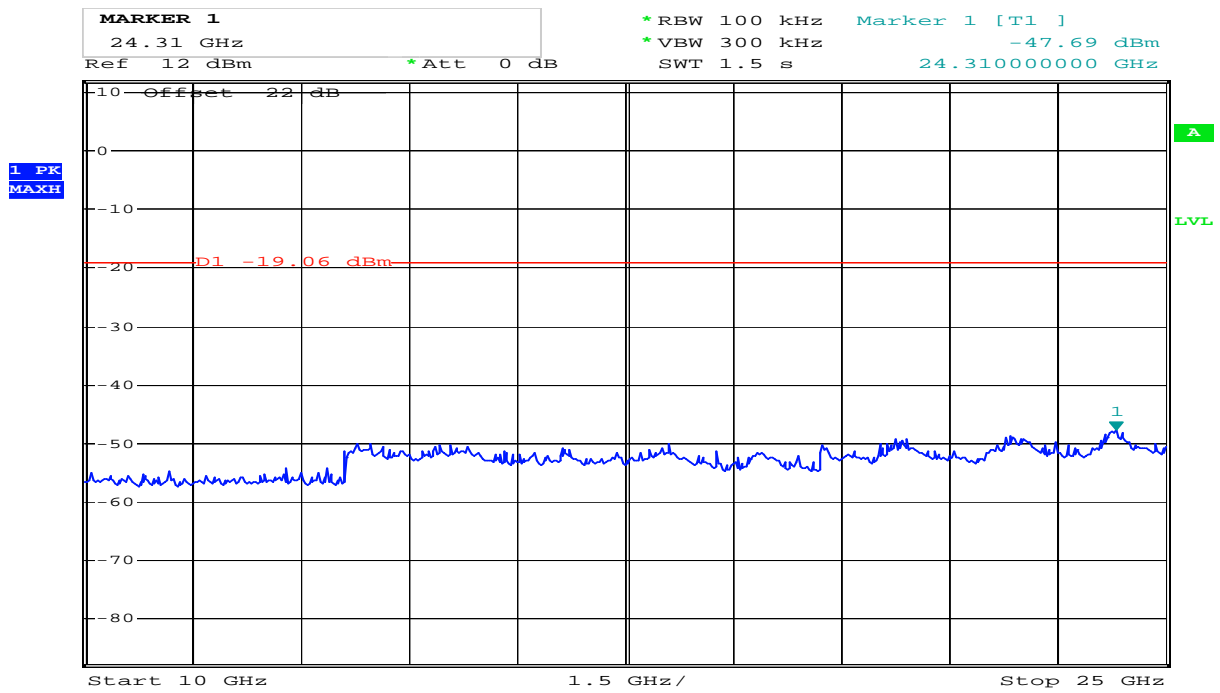
GFSK 2441MHz (30M ~ 1GHz)



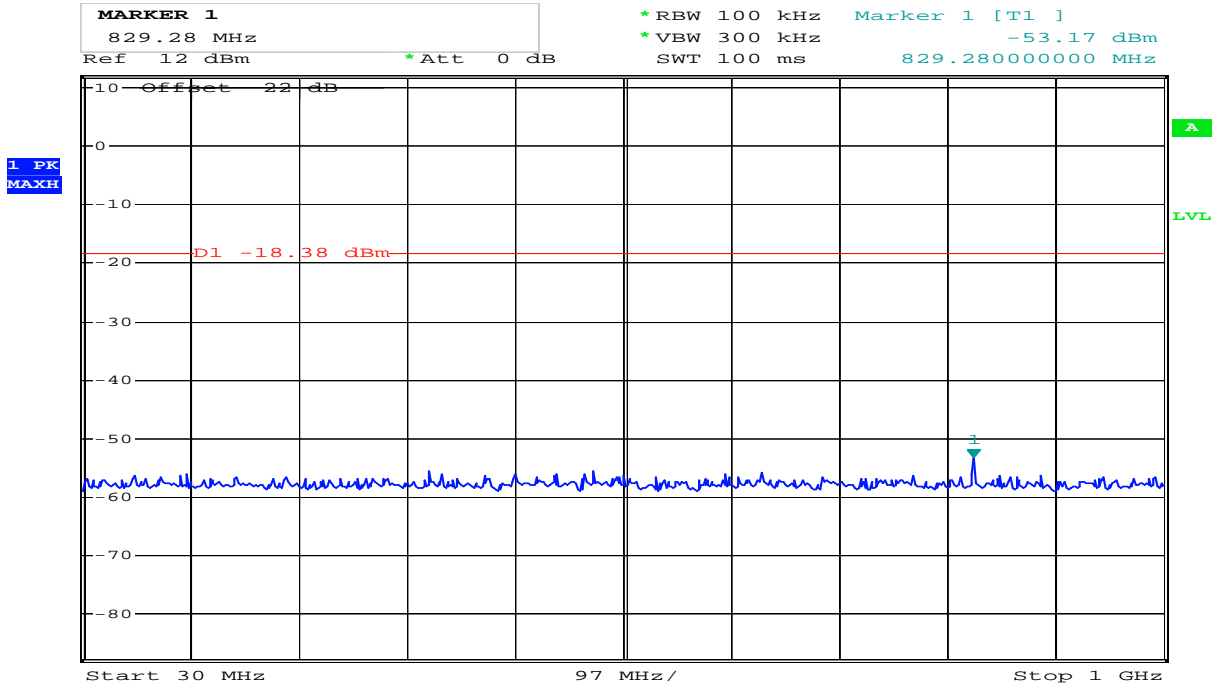
GFSK 2441MHz (1G ~ 10GHz)



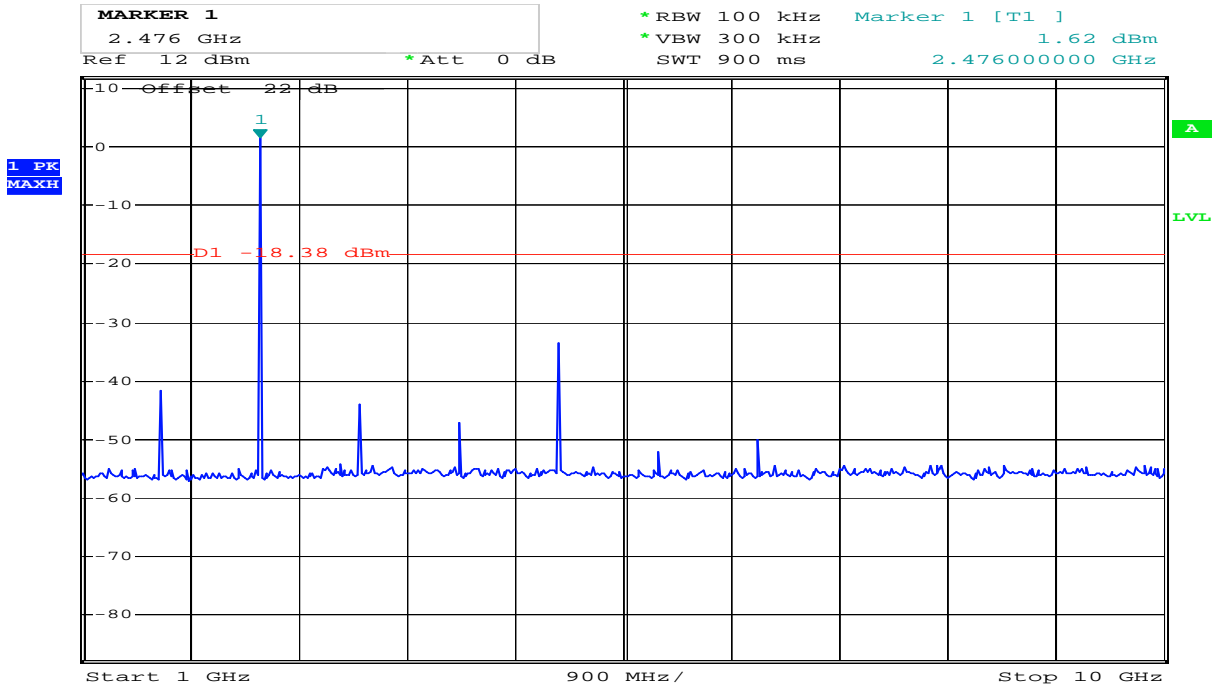
GFSK 2441MHz (10G ~ 25GHz)



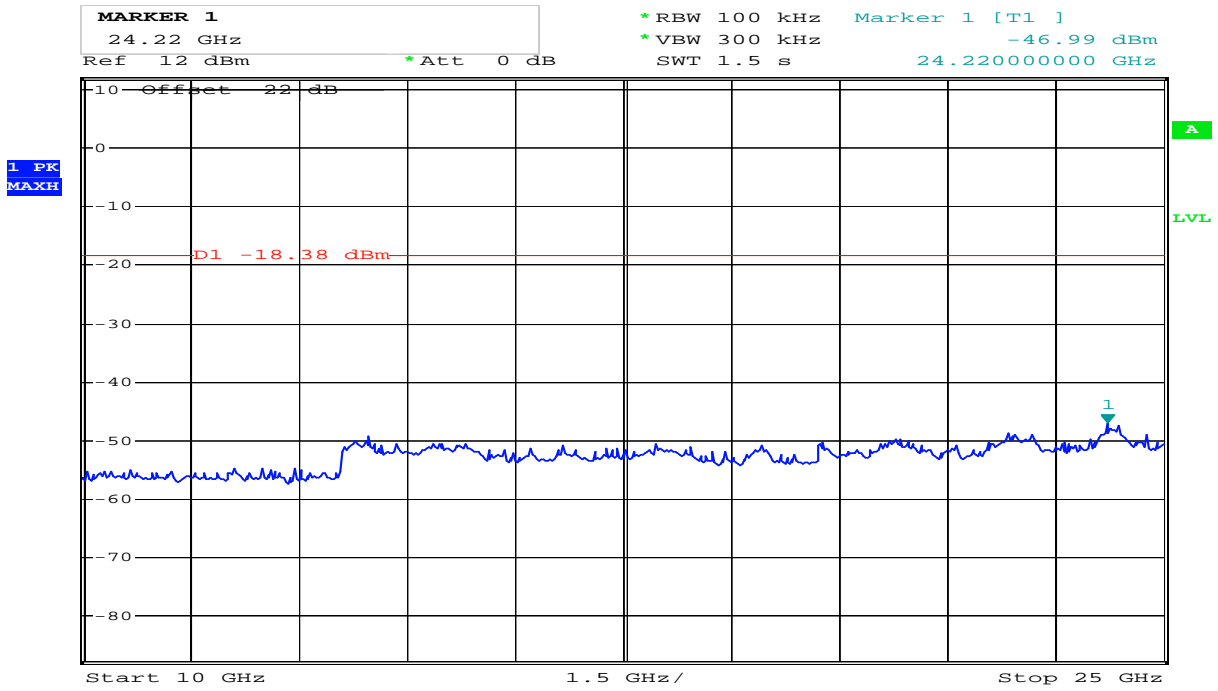
GFSK 2480MHz (30M ~ 1GHz)



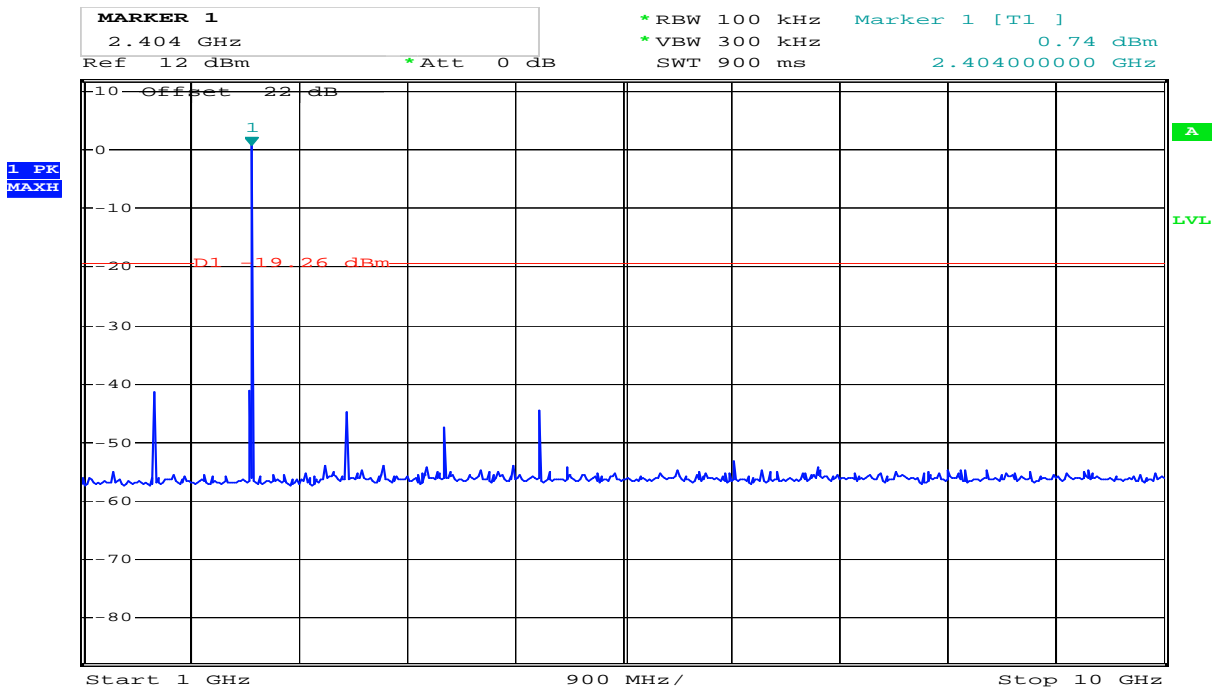
GFSK 2480MHz (1G ~ 10GHz)



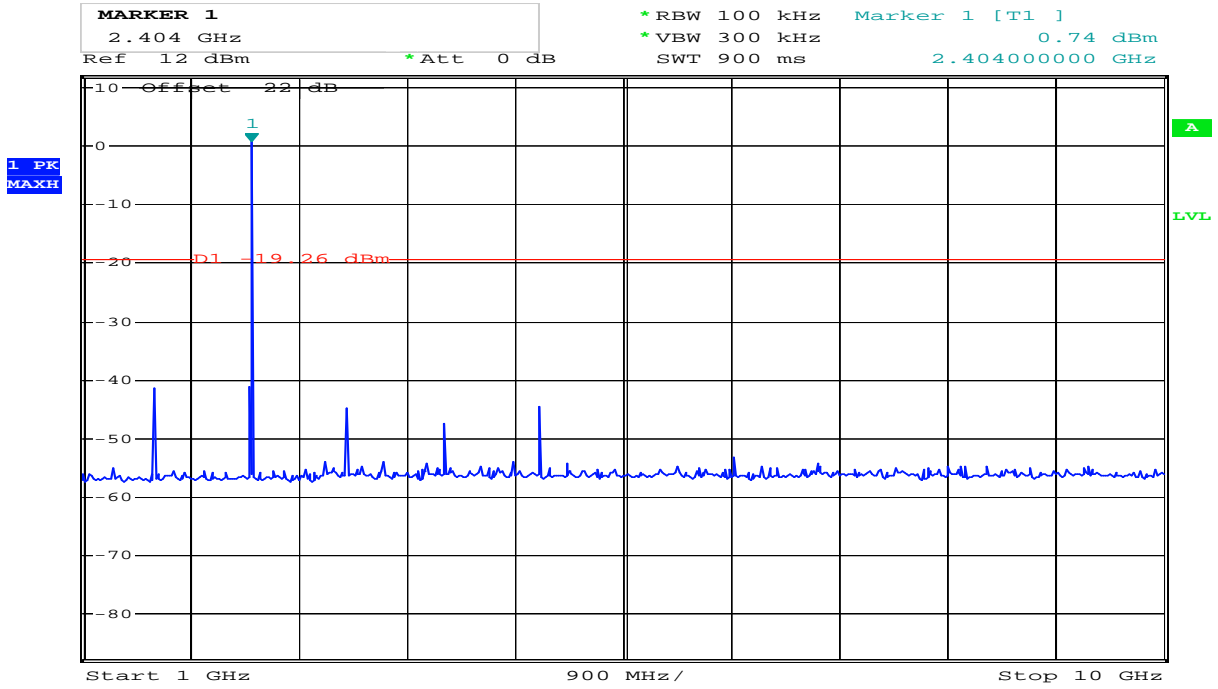
GFSK 2480MHz (10G ~ 25GHz)



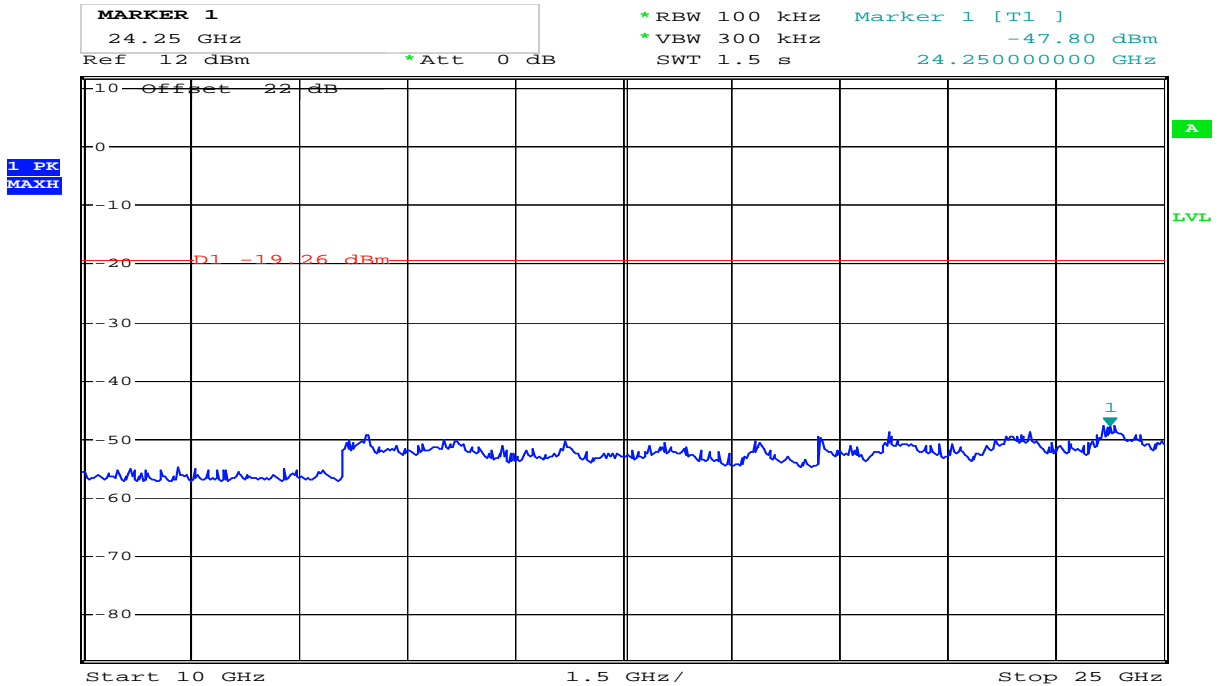
8DPSK 2402MHz (30M ~ 1GHz)



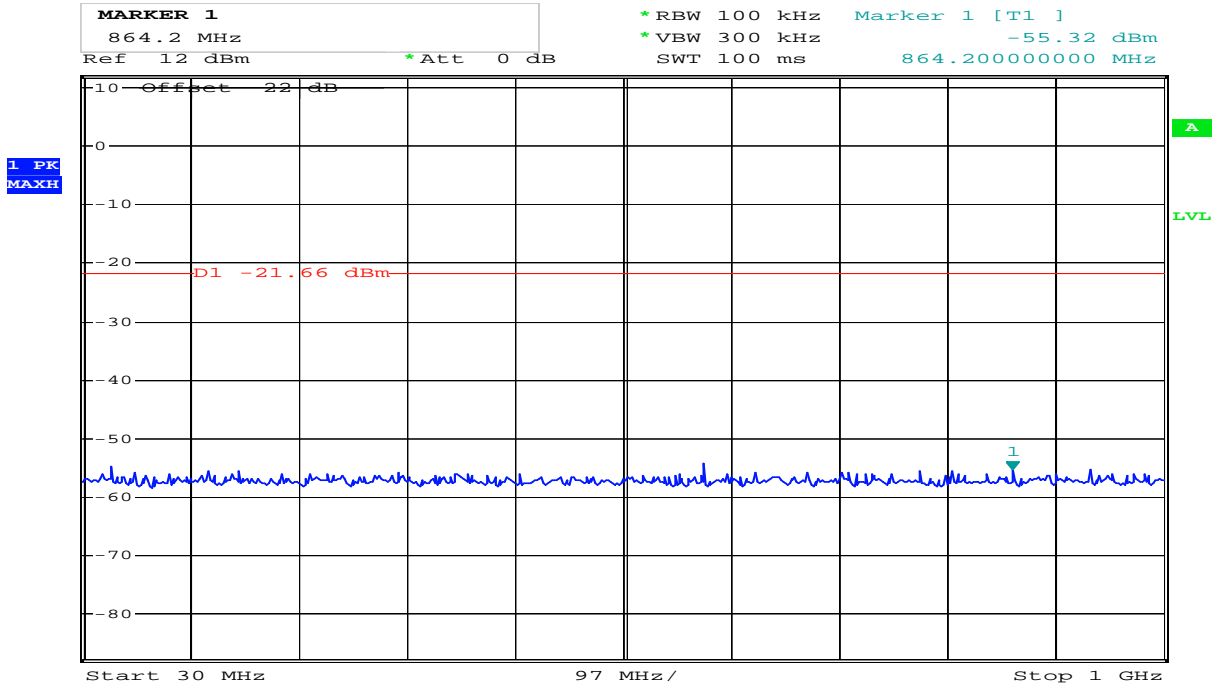
8DPSK 2402MHz (1G ~ 10GHz)



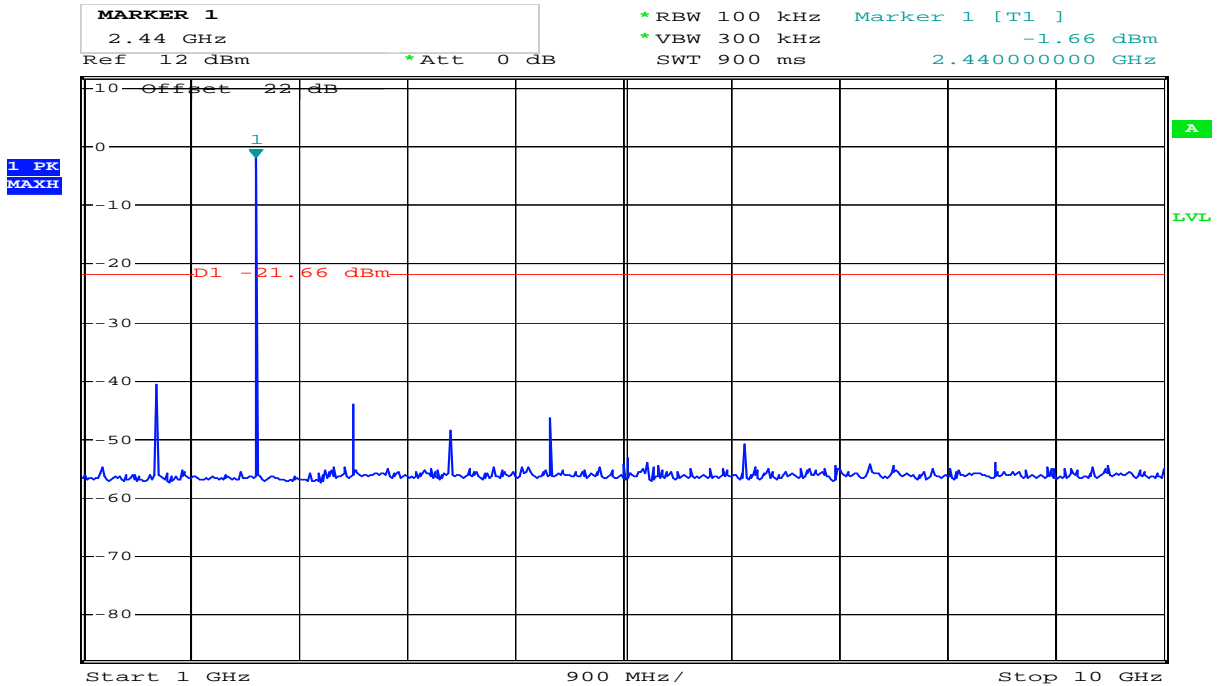
8DPSK 2402MHz (10G ~ 25GHz)



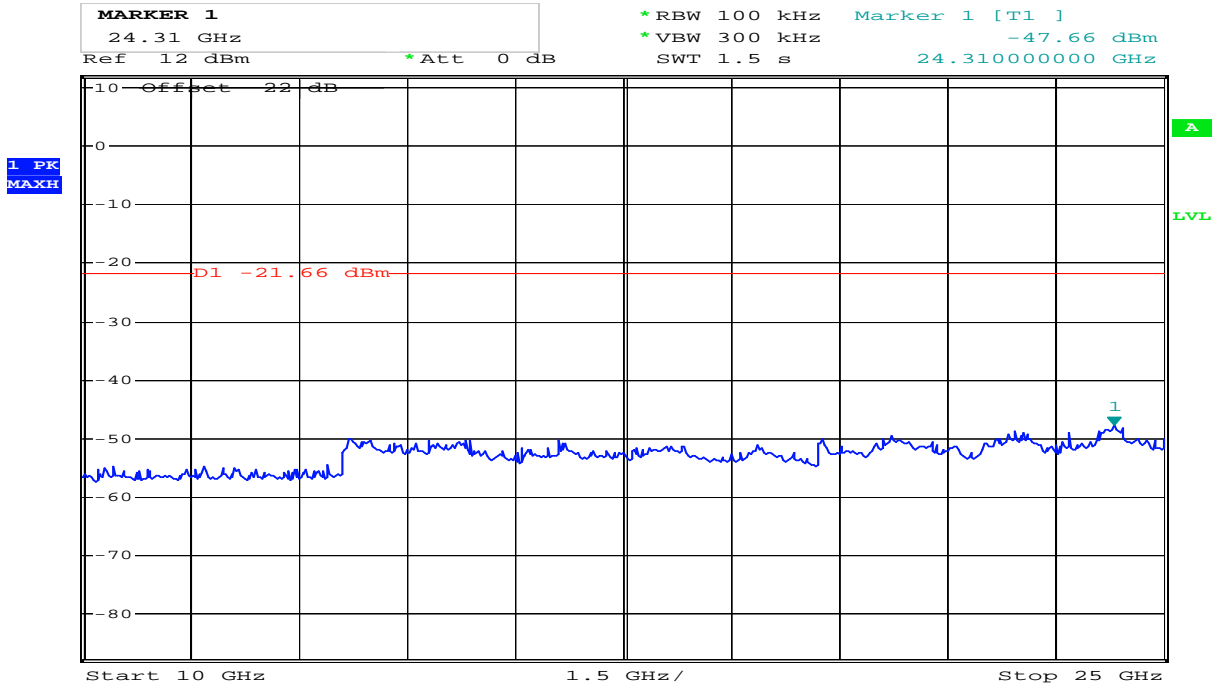
8DPSK 2441MHz (30M ~ 1GHz)



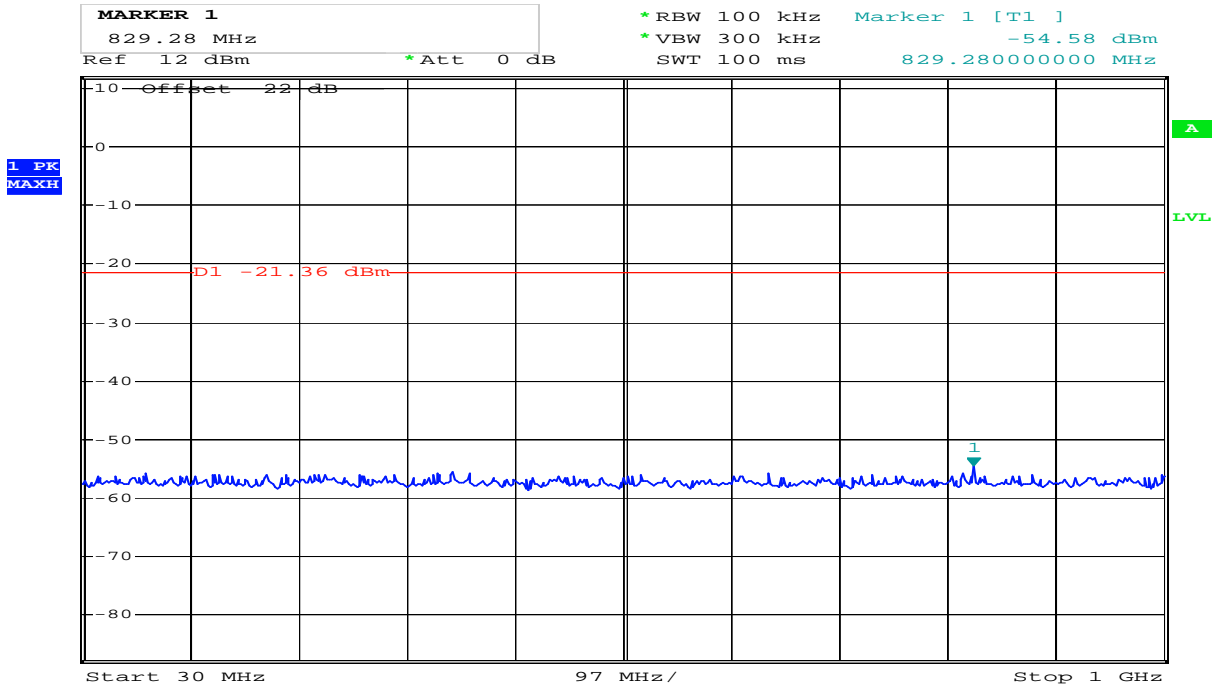
8DPSK 2441MHz (1G ~ 10GHz)



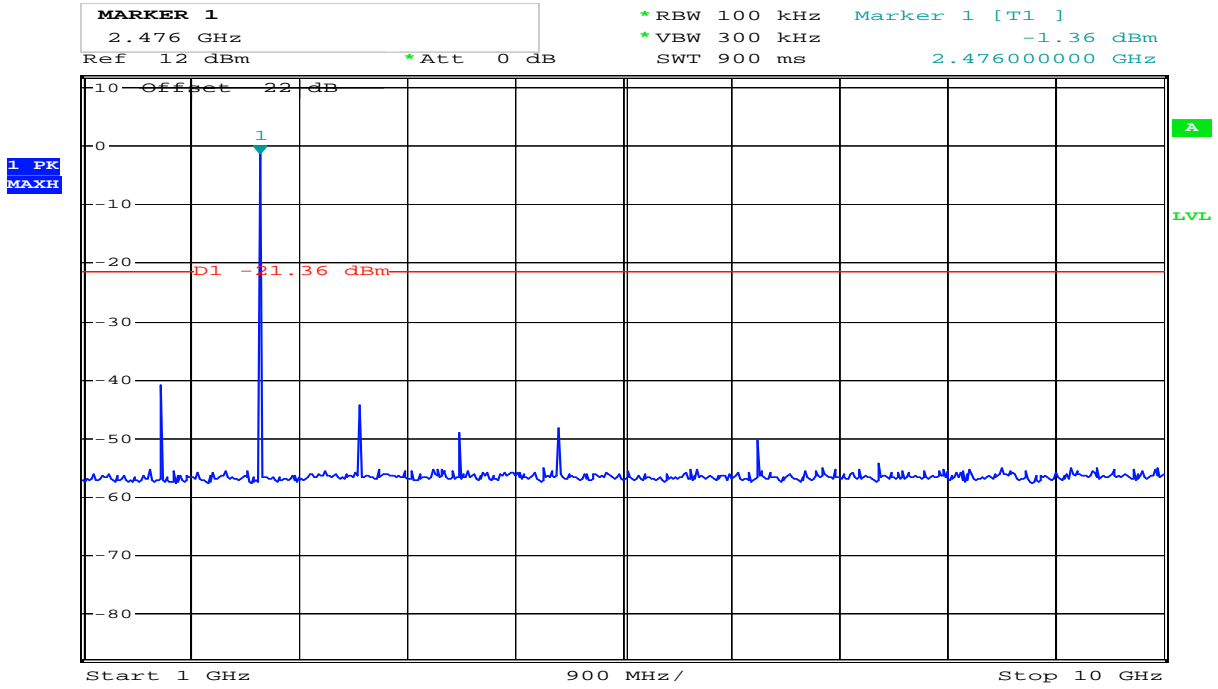
8DPSK 2441MHz (10G ~ 25GHz)



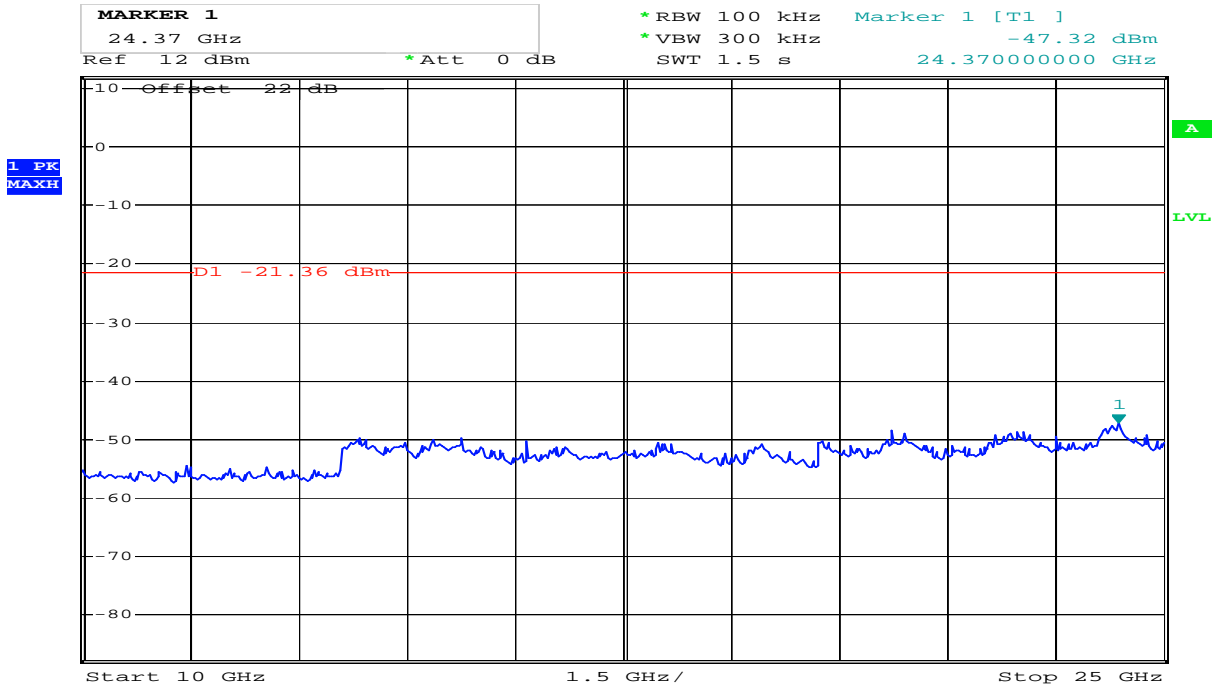
8DPSK 2480MHz (30M ~ 1GHz)



8DPSK 2480MHz (1G ~ 10GHz)



8DPSK 2480MHz (10G ~ 25GHz)



8 RF Radiated spurious emission test

8.1 Limit

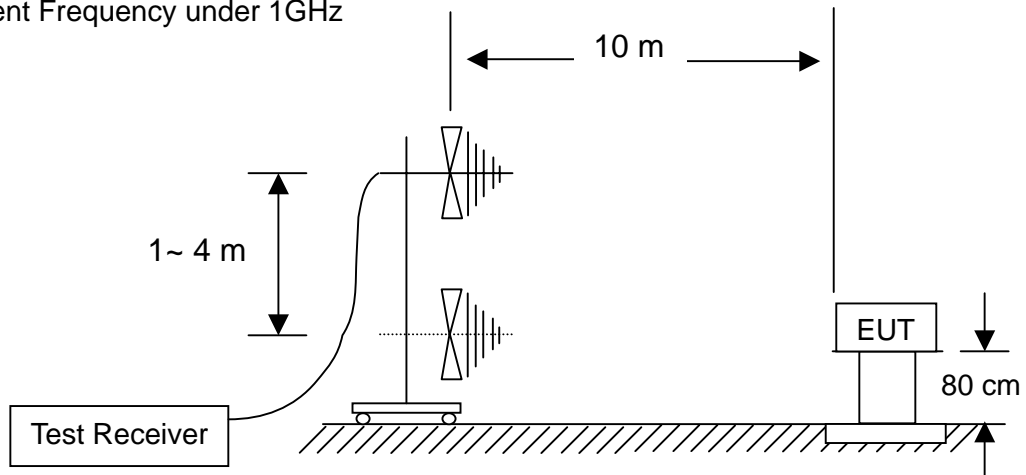
For intentional radiator, the radiated emission shall comply with FCC Part 15.209(a).

For intentional radiators, according to FCC Part 15.247 (a), operation under this provision is limited to frequency hopping and direct sequence spread spectrum, and the out band emission shall be comply with FCC Part 15.247 (c)

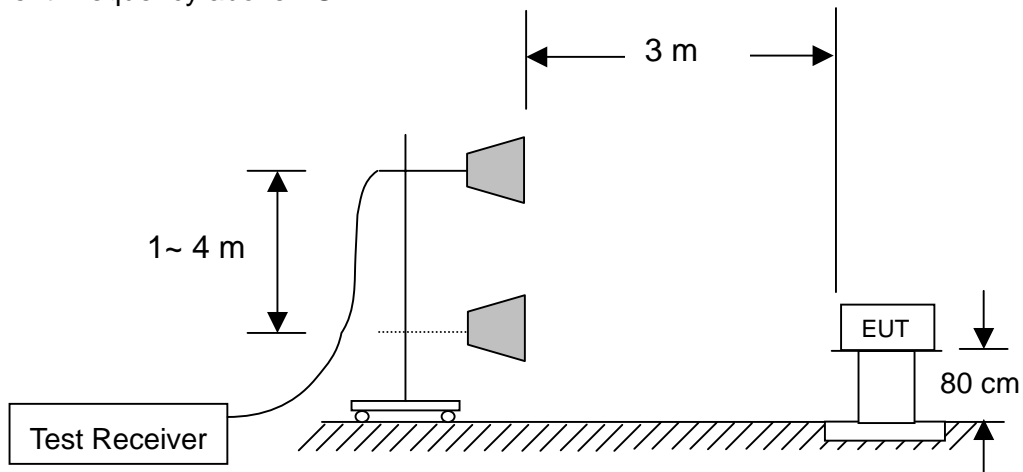
Frequency (MHz)	Field strength dB(μ V/m)	Measurement distance (meters)
1.705~30.0	29.5	30
30 ~ 88	40	3
88~216	43.5	3
216~960	46	3
Above 960	54	3

8.2 Configuration of Measurement

Measurement Frequency under 1GHz



Measurement Frequency above 1GHz



8.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

Radiated emission measurements were performed from 30MHz to 25GHz. Spectrum Analyzer set as below: For frequency range from 30MHz to 1GHz: RBW=100kHz or greater. For frequencies above 1GHz: set RBW=VBW=1MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and whole system. During the test, all cables were arranged to present worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meter and down to 1 meter.

8.4 Test Result

PASS.

The final test data is shown as following pages.

Radiated Emission below 1GHz

After verifying low, middle and high channel, the worst case was found at GFSK Low channel

Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
134.750	H	40.68	29.95	16.13	26.86	43.52	-16.66	QP
189.470	H	39.94	29.79	19.26	29.41	43.52	-14.11	QP
234.780	H	39.50	30.06	20.37	29.81	46.02	-16.21	QP
288.590	H	38.22	29.94	23.32	31.60	46.02	-14.42	QP
347.590	H	40.10	29.44	18.63	29.29	46.02	-16.73	QP
417.700	H	38.54	29.25	21.02	30.31	46.02	-15.71	QP
122.320	V	43.26	29.82	15.38	28.82	43.52	-14.70	QP
162.850	V	40.22	30.11	18.45	28.56	43.52	-14.96	QP
218.370	V	41.89	30.05	20.19	32.03	46.02	-13.99	QP
269.700	V	40.55	30.08	22.01	32.48	46.02	-13.54	QP
395.120	V	42.72	29.56	20.40	33.56	46.02	-12.46	QP
481.230	V	38.33	29.30	22.06	31.09	46.02	-14.93	QP

Remark : Corrected Level = Reading + Correction Factor – Preamp
 Correction Factor = Antenna Factor + Cable Loss

Radiated Emission above 1GHz

GFSK CH0 (2402MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4804	H	51.98	27.43	37.65	62.20	74	-11.80	PK
4804	H	31.24	27.43	37.65	41.46	54	-12.54	AV
7206	H	35.29	26.89	44.13	52.53	74	-21.47	PK
7206	H	22.35	26.89	44.13	39.59	54	-14.41	AV
*9608	H	31.26	26.34	47.63	52.55	54	-1.45	PK
4804	V	59.56	27.43	37.65	69.78	74	-4.22	PK
4804	V	38.12	27.43	37.65	48.34	54	-5.66	AV
7206	V	36.38	26.89	44.13	53.62	74	-20.38	PK
7206	V	22.70	26.89	44.13	39.94	54	-14.06	AV
*9608	V	31.29	26.34	47.63	52.58	54	-1.42	PK

GFSK CH39 (2441MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4882	H	52.65	27.46	37.86	63.05	74	-10.95	PK
4882	H	32.25	27.46	37.86	42.65	54	-11.35	AV
7323	H	35.63	26.91	44.75	53.47	74	-20.53	PK
7323	H	22.18	26.91	44.75	40.02	54	-13.98	AV
*9764	H	31.20	26.32	48.11	52.99	54	-1.01	AV
4882	V	60.17	27.46	37.86	70.57	74	-3.43	PK
4882	V	38.38	27.46	37.86	48.78	54	-5.22	AV
7323	V	36.08	26.91	44.75	53.92	74	-20.08	PK
7323	V	22.41	26.91	44.75	40.25	54	-13.75	AV
*9764	V	31.09	26.32	48.11	52.88	54	-1.12	PK

Remark : Corrected Level = Reading + Correction Factor – Preamp
 Correction Factor = Antenna Factor + Cable Loss
 * Mark indicated background noise level.

GFSK CH78 (2480MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4960	H	52.38	27.48	38.06	62.96	74	-11.04	PK
4960	H	31.89	27.48	38.06	42.47	54	-11.53	AV
7440	H	35.48	26.92	45.37	53.93	74	-20.07	PK
7440	H	22.11	26.92	45.37	40.56	54	-13.44	AV
*9920	H	31.06	26.31	48.59	53.34	54	-0.66	PK
4960	V	59.22	27.48	38.06	69.80	74	-4.20	PK
4960	V	37.59	27.48	38.06	48.17	54	-5.83	AV
7440	V	36.23	26.92	45.37	54.68	74	-19.32	PK
7440	V	23.20	26.92	45.37	41.65	54	-12.35	AV
*9920	V	31.10	26.31	48.59	53.38	54	-0.62	PK

8DPSK CH0 (2402MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4804	H	51.71	27.43	37.65	61.93	74	-12.07	PK
4804	H	29.23	27.43	37.65	39.45	54	-14.55	AV
7206	H	35.76	26.89	44.13	53.00	74	-21.00	PK
7206	H	21.87	26.89	44.13	39.11	54	-14.89	AV
*9608	H	31.23	26.34	47.63	52.52	54	-1.48	PK
4804	V	53.89	27.43	37.65	64.11	74	-9.89	PK
4804	V	29.76	27.43	37.65	39.98	54	-14.02	AV
7206	V	35.78	26.89	44.13	53.02	74	-20.98	PK
7206	V	22.06	26.89	44.13	39.30	54	-14.70	AV
*9608	V	31.38	26.34	47.63	52.67	54	-1.33	PK

Remark : Corrected Level = Reading + Correction Factor – Preamp
 Correction Factor = Antenna Factor + Cable Loss
 * Mark indicated background noise level.

8DPSK CH39 (2441MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4882	H	51.62	27.46	37.86	62.02	74	-11.98	PK
4882	H	28.94	27.46	37.86	39.34	54	-14.66	AV
7323	H	35.86	26.91	44.75	53.70	74	-20.30	PK
7323	H	21.83	26.91	44.75	39.67	54	-14.33	AV
*9764	H	31.21	26.32	48.11	53.00	54	-1.00	PK
4882	V	53.97	27.46	37.86	64.37	74	-9.63	PK
4882	V	30.75	27.46	37.86	41.15	54	-12.85	AV
7323	V	35.71	26.91	44.75	53.55	74	-20.45	PK
7323	V	21.89	26.91	44.75	39.73	54	-14.27	AV
*9764	V	31.05	26.32	48.11	52.84	54	-1.16	PK

8DPSK CH78 (2480MHz)								
Frequency (MHz)	Antenna Polarization	Reading (dB μ V)	Preamp (dB)	Correction Factor (dB/m)	Corrected Level (dB μ V/m)	Limits (dB μ V/m)	Margin (dB)	Det. Mode
4960	H	50.79	27.48	38.06	61.37	74	-12.63	PK
4960	H	28.64	27.48	38.06	39.22	54	-14.78	AV
7440	H	35.72	26.92	45.37	54.17	74	-19.83	PK
7440	H	21.88	26.92	45.37	40.33	54	-13.67	AV
*9920	H	31.08	26.31	48.59	53.36	54	-0.64	PK
4960	V	53.05	27.48	38.06	63.63	74	-10.37	PK
4960	V	29.66	27.48	38.06	40.24	54	-13.76	AV
7440	V	35.80	26.92	45.37	54.25	74	-19.75	PK
7440	V	22.01	26.92	45.37	40.46	54	-13.54	AV
*9920	V	31.03	26.31	48.59	53.31	54	-0.69	PK

Remark : Corrected Level = Reading + Correction Factor – Preamp
 Correction Factor = Antenna Factor + Cable Loss
 * Mark indicated background noise level.

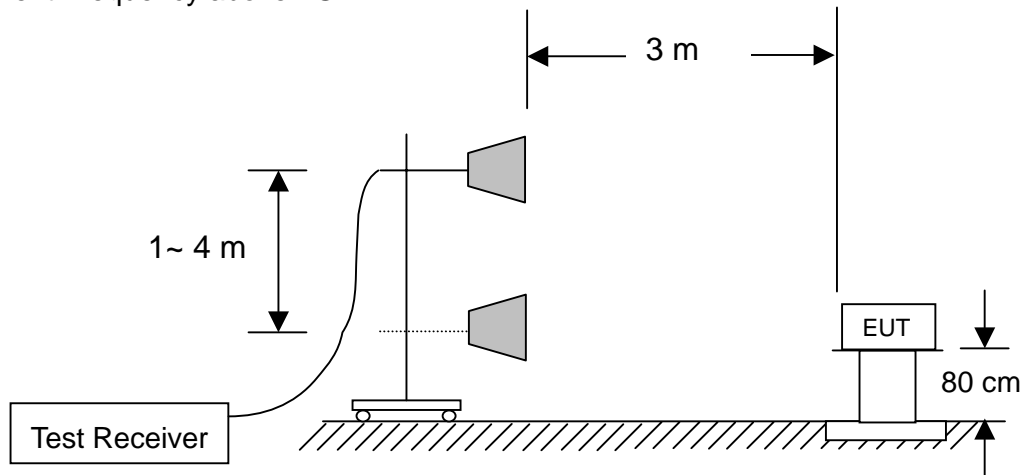
9 Emission on the Band Edge test

9.1 Limit

In any 100kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 KHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement.

9.2 Configuration of Measurement

Measurement Frequency above 1GHz



9.3 Test Procedure

The EUT was setup to ANSI C63.4, 2003; tested to FHSS test procedure of FCC Public Notice DA 00-705 for compliance to FCC 47CFR 15.247 requirements.

Radiated emission measurements were performed from 30MHz to 25GHz. Spectrum Analyzer set as below: For frequency range from 30MHz to 1GHz: RBW=100kHz or greater. For frequencies above 1GHz: set RBW=VBW=1MHz for peak detector and RBW=1MHz, VBW=10Hz for average detector.

The EUT for testing is arranged on a wooden turntable. If some peripherals apply to the EUT, the peripherals will be connected to EUT and whole system. During the test, all cables were arranged to present worst-case emissions. The signal is maximized through rotation. The height of antenna and polarization is changing constantly for exploring for maximum signal level. The height of antenna can be up to 4 meter and down to 1 meter.

9.4 Test Result

PASS.

The final test data is shown as following pages.

GFSK

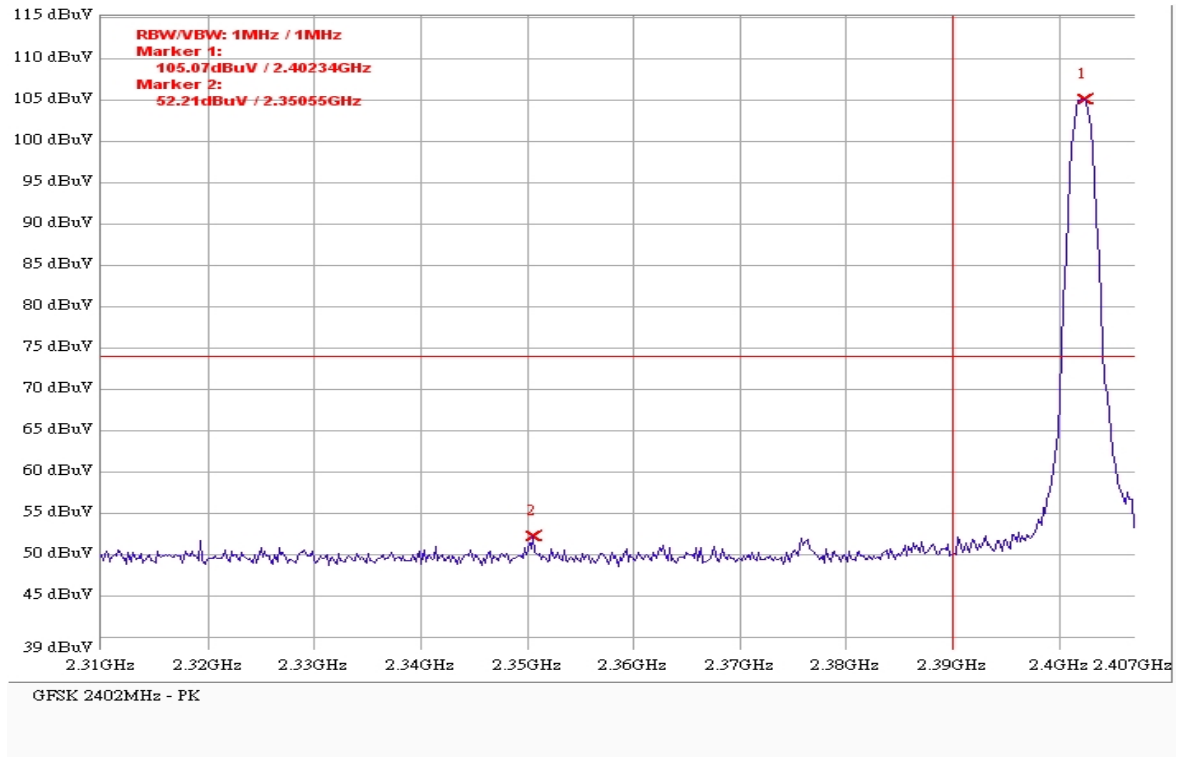
CH	Restrict Freq. Band (MHz)	Detector Mode	Reading (dBuV/m)	Limit (dBuV/m)	Magin (dB)
0	2310~2390	PK	52.21	74	-21.79
0	2310~2390	AV	40.30	54	-13.70
78	2483.5~2500	PK	56.73	74	-17.27
78	2483.5~2500	AV	43.09	54	-10.91

8DPSK

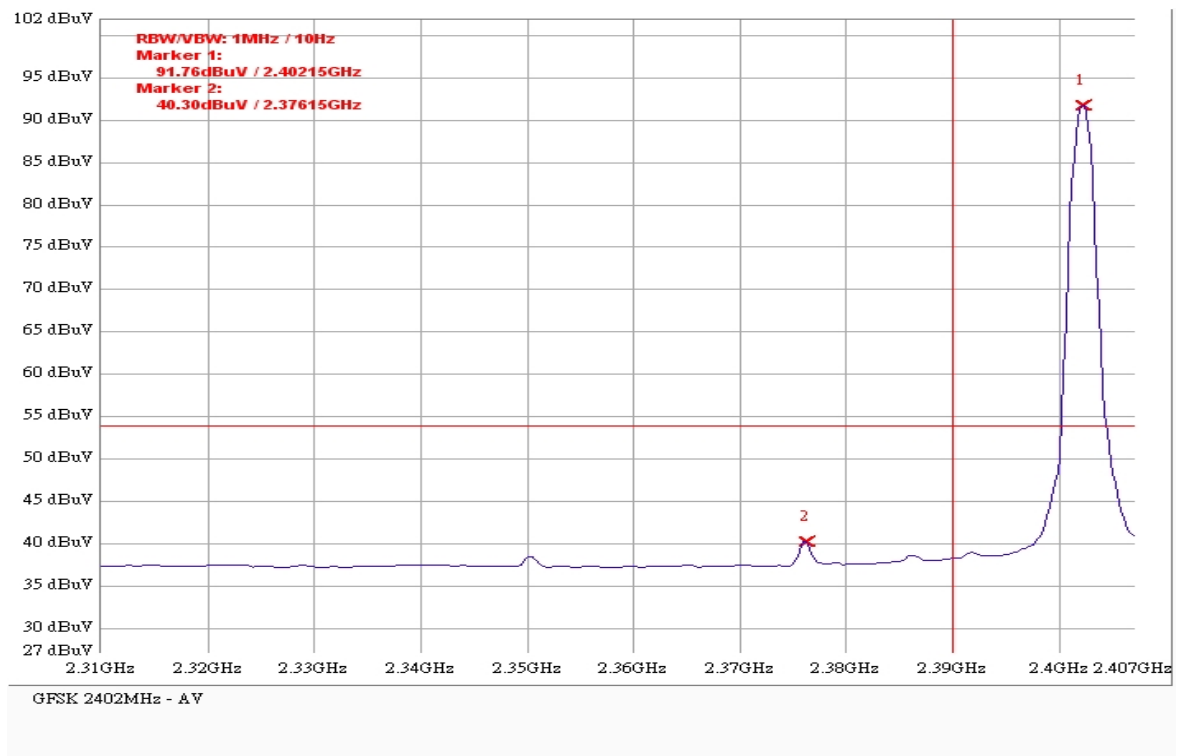
CH	Restrict Freq. Band (MHz)	Detector Mode	Reading (dBuV/m)	Limit (dBuV/m)	Magin (dB)
0	2310~2390	PK	51.91	74	-22.09
0	2310~2390	AV	39.34	54	-14.66
78	2483.5~2500	PK	61.25	74	-12.75
78	2483.5~2500	AV	46.55	54	-7.45

Remark : Correction Level = Reading + Correction Factor
 Correction Factor = Cable loss + Ant. Factor - Amp Gain

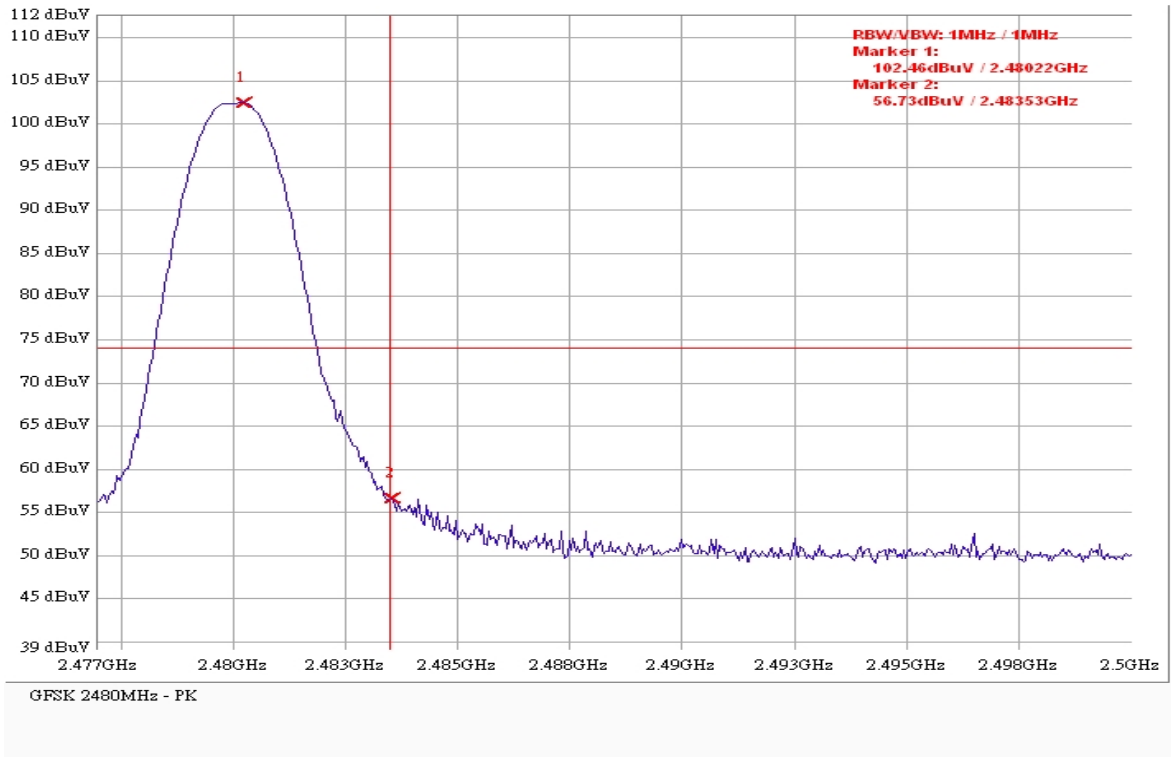
GFSK 2402MHz PK



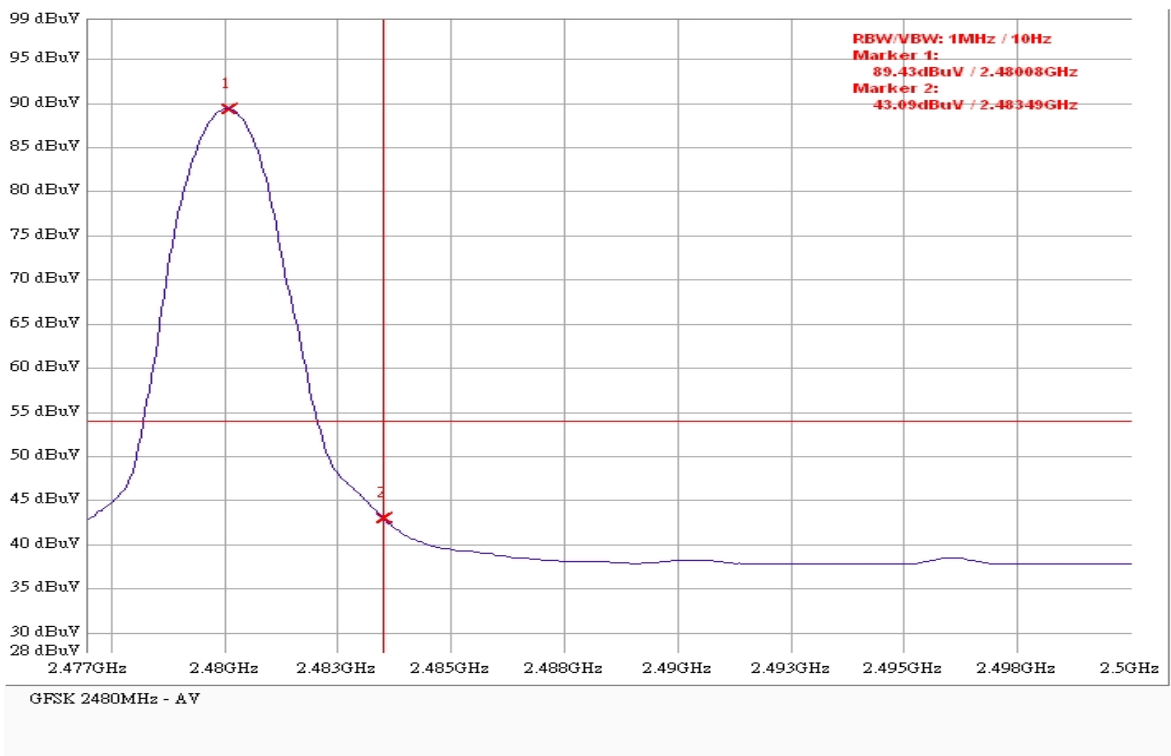
GFSK 2402MHz AV



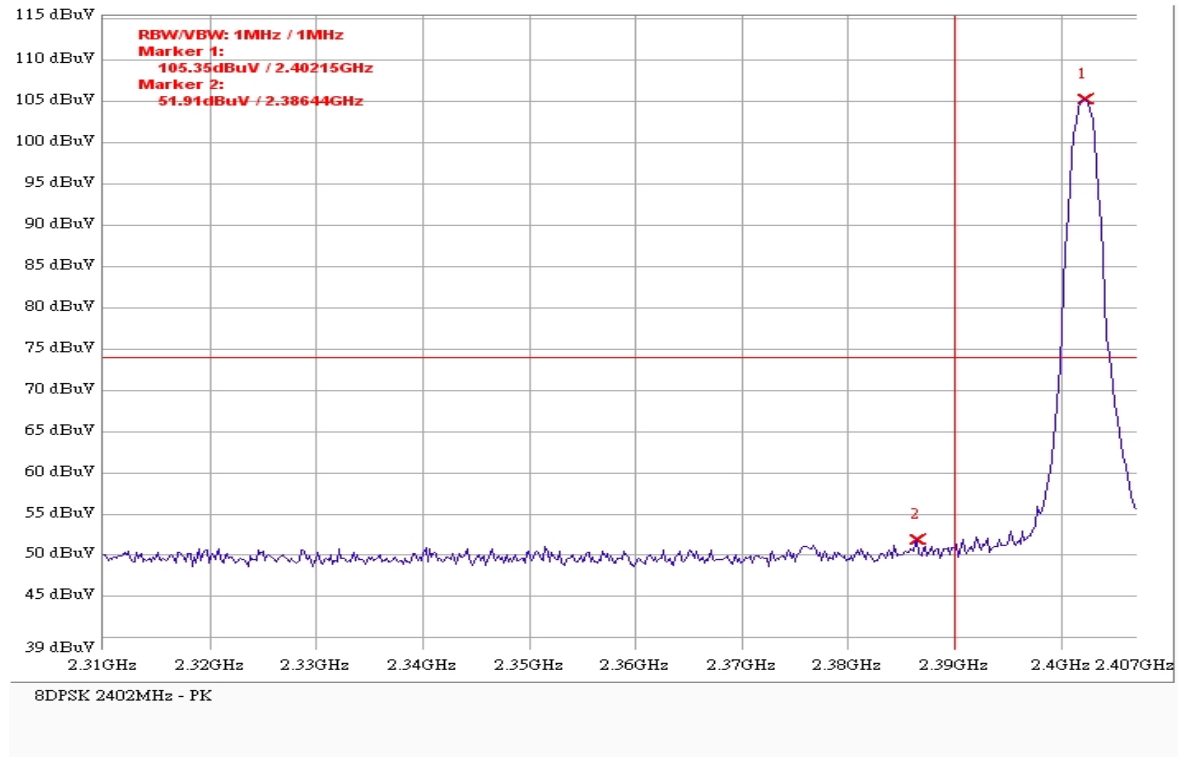
GFSK 2480MHz PK



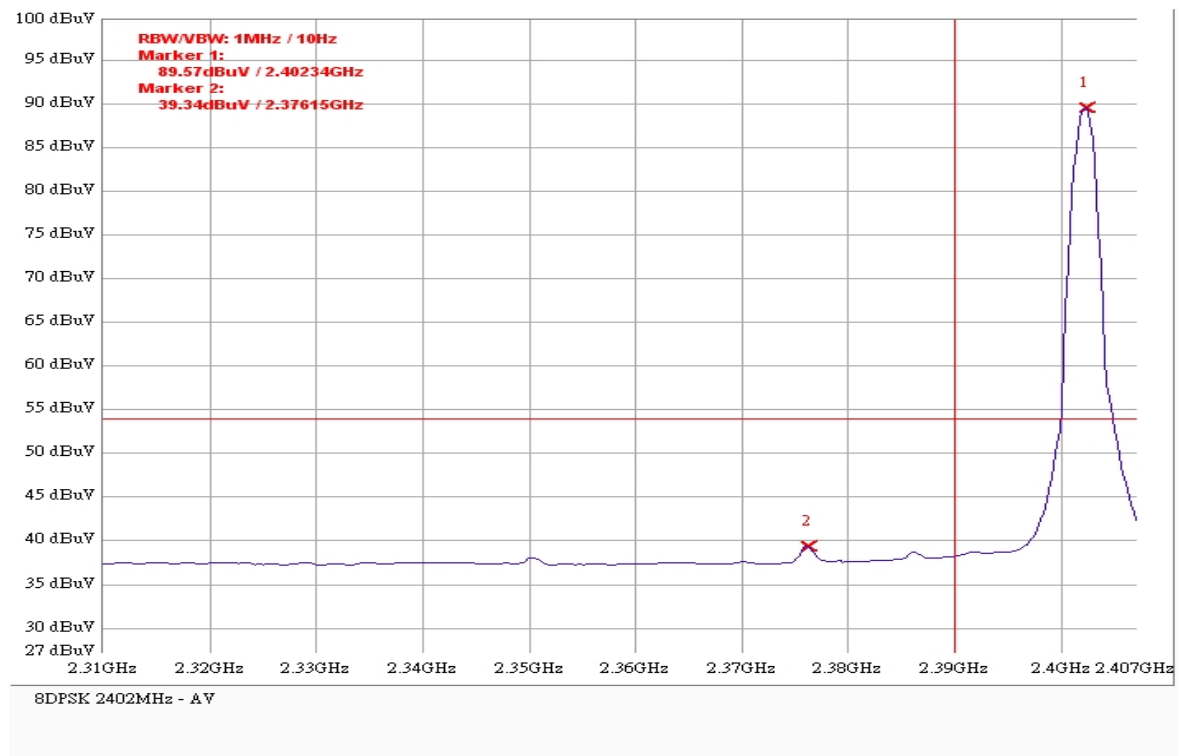
GFSK 2480MHz AV



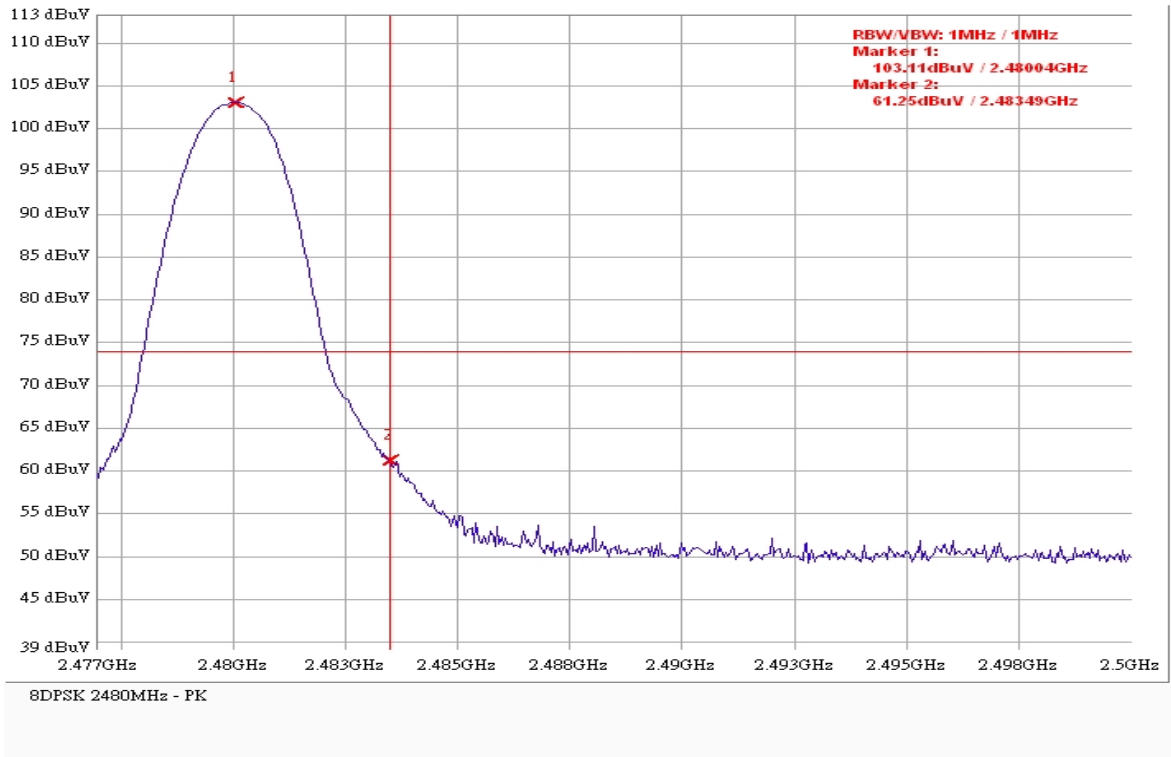
8DPSK 2402MHz PK



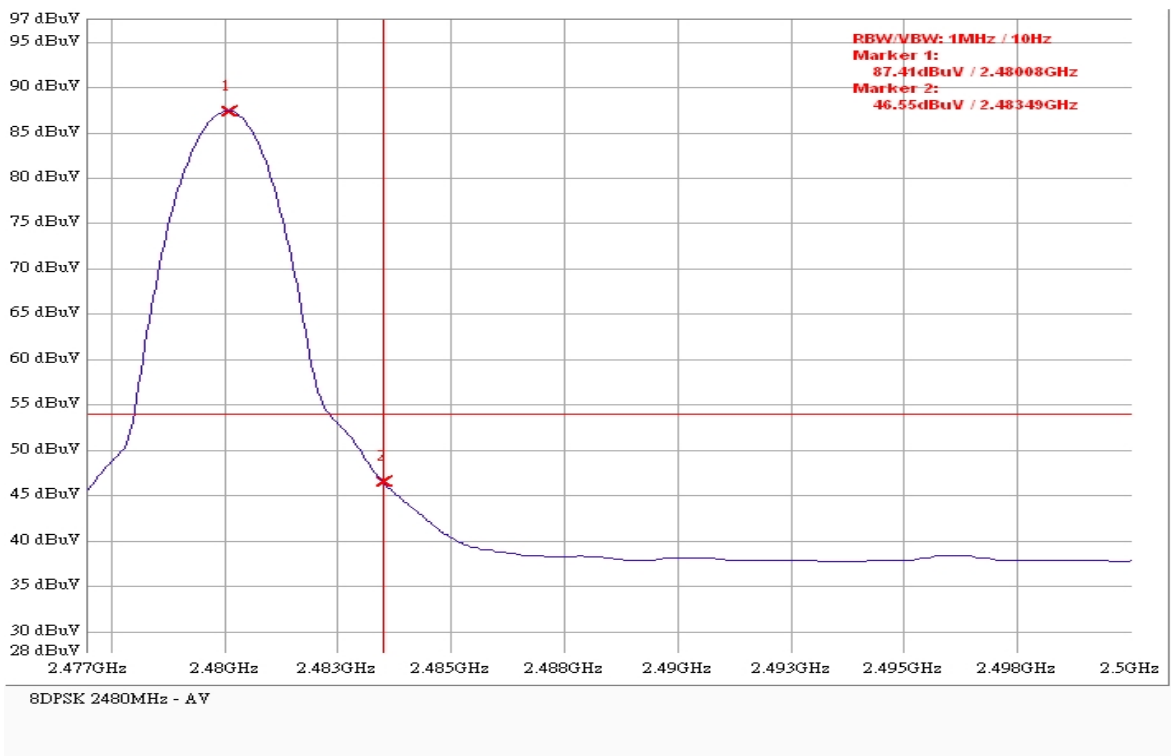
8DPSK 2402MHz AV



8DPSK 2480MHz PK



8DPSK 2480MHz AV



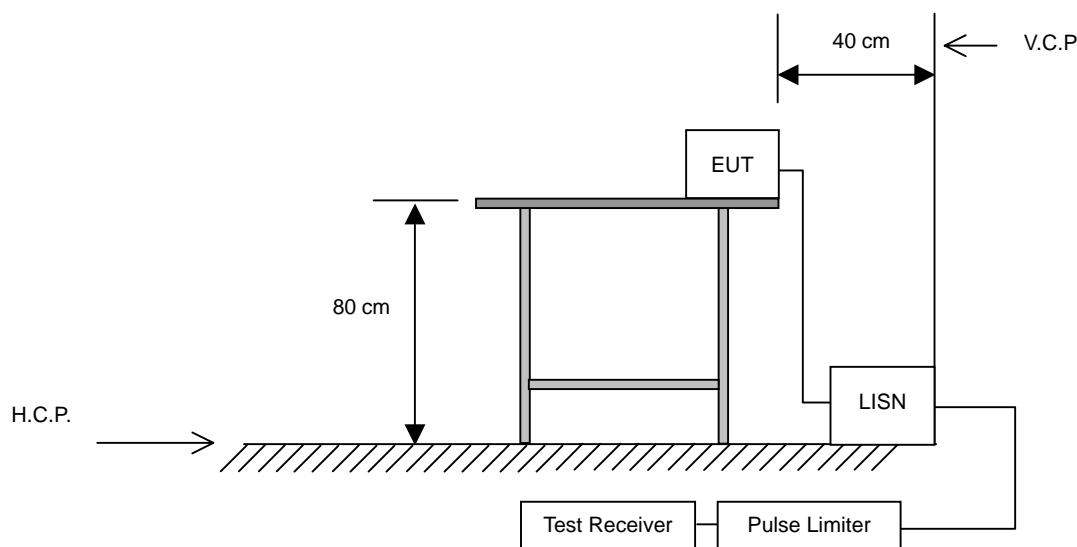
10 AC Power Line Conducted Emission test

10.1 Limits

Frequency (MHz)	Quasi-Peak (dB μ V)	Average (dB μ V)
0.15 to 0.5	66 to 56	56 to 46
> 0.5 to 5	56	46
> 5 to 30	60	50

NOTE: The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.

10.2 Configuration of Measurement



10.3 Test Procedures

- 10.3.1 The EUT was placed 80cm height above ground on a non-conductive table and vertical conducting plane located 40cm to the rear of the EUT.
- 10.3.2 The EUT was connected to the main power through Line Impedance Stabilization Networks (LISN). This setup provided a 50ohm/50mH coupling impedance for the measuring equipment. The auxiliary equipment will place in secondary LISN.
- 10.3.3 Both sides (Line and Neutral) of AC line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface cables must be changed according to ANSI C63.4/2003 on conducted measurement.
- 10.3.4 The bandwidth of the field strength meter (R & S Test Receiver ESCS 30) is set at 9kHz.

10.4 Test Result

PASS.

The final test data is shown as following pages.

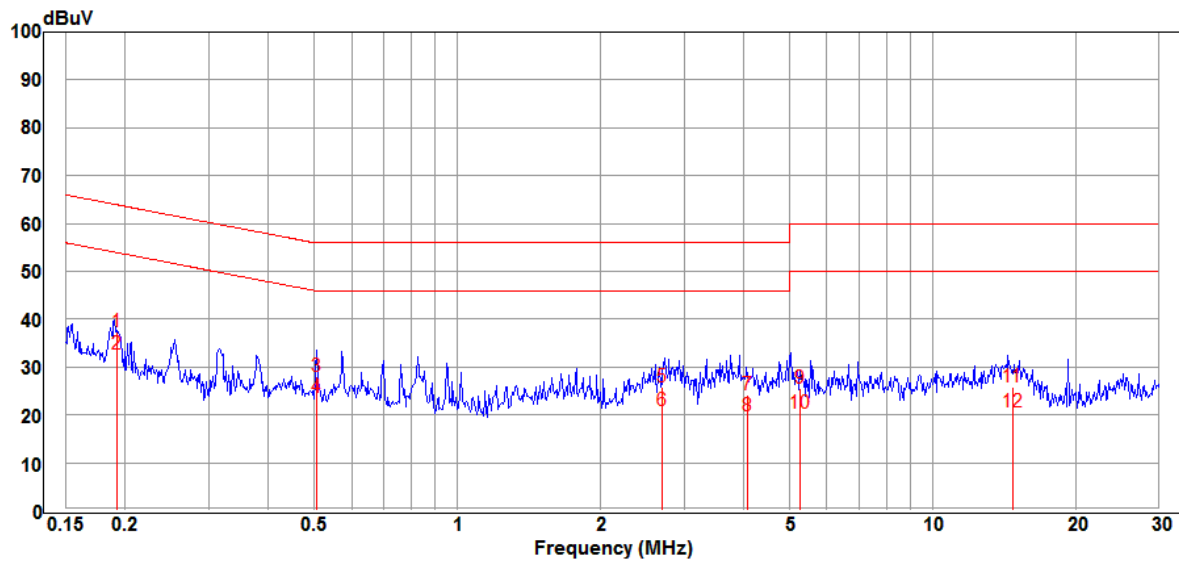
Power Line Conducted Test Data

CLIENT: SkyHawke Technologies, LLC
 EUT: Skypro Bluetooth Device
 MODEL: SKHPAASKYPRO-V2
 RATING: From PC
 COMMENT: charger mode

OPERATOR: Vic
 TEST SITE: Conducted 1
 POLARIZATION: Line
 TEMP/HUM: 26.3°C / 60%

Data:2 J:\E3_28\2013\SkyHawke.EM8

2013-02-05



Item Mark	Freq. MHz	Reading dBμV	Factor dB	Level dBμV	Limit dBμV	Margin dB	Remark
1	0.192	37.24	0.14	37.38	63.94	-26.56	QP
2	0.192	32.59	0.14	32.73	53.94	-21.21	Average
3	0.507	27.84	0.14	27.98	56.00	-28.02	QP
4	0.507	23.48	0.14	23.62	46.00	-22.38	Average
5	2.708	25.62	0.14	25.76	56.00	-30.24	QP
6	2.708	20.68	0.14	20.82	46.00	-25.18	Average
7	4.079	23.98	0.20	24.18	56.00	-31.82	QP
8	4.079	19.47	0.20	19.67	46.00	-26.33	Average
9	5.283	25.19	0.28	25.47	60.00	-34.53	QP
10	5.283	19.99	0.28	20.27	50.00	-29.73	Average
11	14.729	25.09	0.66	25.75	60.00	-34.25	QP
12	14.729	19.91	0.66	20.57	50.00	-29.43	Average

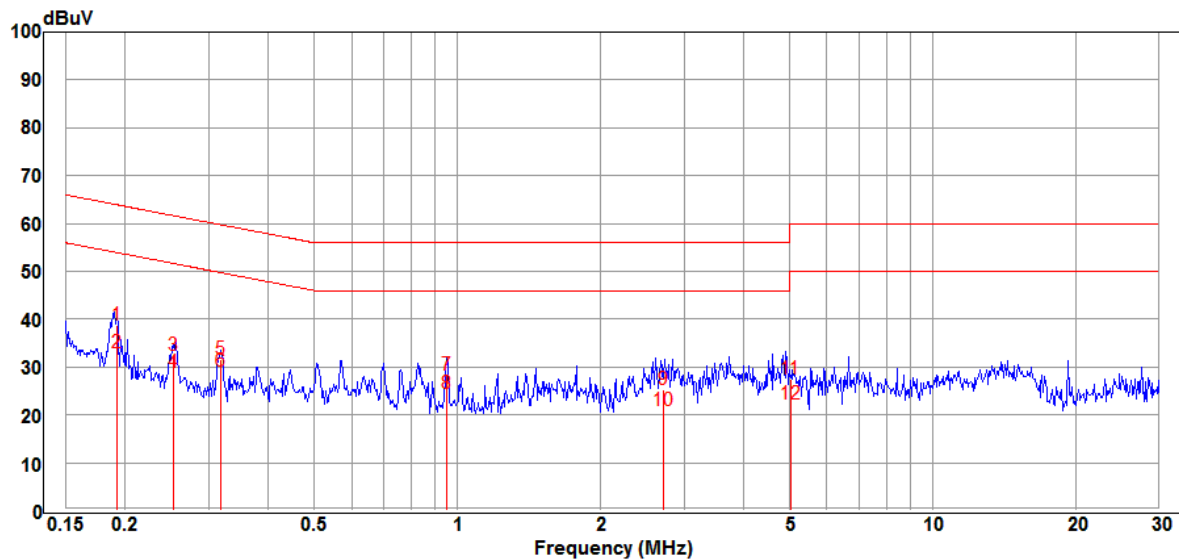
Power Line Conducted Test Data

CLIENT: SkyHawke Technologies, LLC
 EUT: Skypro Bluetooth Device
 MODEL: SKHPAASKYPRO-V2
 RATING: From PC
 COMMENT: charger mode

OPERATOR: Vic
 TEST SITE: Conducted 1
 POLARIZATION: Neutral
 TEMP/HUM: 26.3°C / 60%

Data:1 J:\E3_28\2013\SkyHawke.EM8

2013-02-05



Item Mark	Freq. MHz	Reading dB μ V	Factor dB	Level dB μ V	Limit dB μ V	Margin dB	Remark
1	0.192	38.51	0.13	38.64	63.94	-25.30	QP
2	0.192	32.75	0.13	32.88	53.94	-21.06	Average
3	0.254	32.40	0.13	32.53	61.64	-29.11	QP
4	0.254	28.84	0.13	28.97	51.64	-22.67	Average
5	0.318	31.52	0.13	31.65	59.75	-28.10	QP
6	0.318	29.00	0.13	29.13	49.75	-20.62	Average
7	0.953	28.12	0.14	28.26	56.00	-27.74	QP
8	0.953	24.32	0.14	24.46	46.00	-21.54	Average
9	2.713	25.28	0.13	25.41	56.00	-30.59	QP
10	2.713	20.78	0.13	20.91	46.00	-25.09	Average
11	5.024	27.24	0.27	27.51	60.00	-32.49	QP
12	5.024	22.03	0.27	22.30	50.00	-27.70	Average

11 RF Exposure Evaluation

Portable Device

According to §15.247(e)(i) and §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to KDB 447498_D01_V05 4.3.1(1)

SAR exclusion thresholds by:

$[\text{max. power of channel, including tune-up tolerance, mW}] / (\text{min, test separation distances, mm}) \cdot [\sqrt{f(\text{GHz})}] \leq 3.0$ for 1-g SAR

and ≤ 7.5 for 10-g extremity SAR.

Maximum measured transmitter power

Frequency Range (MHz)	Maximum peak power (dBm)	Maximum peak power (mW)
GFSK 2402MHz	4.45	2.79
GFSK 2441MHz	2.58	1.81
GFSK 2480MHz	3.29	2.13
8DPSK 2402MHz	2.69	1.86
8DPSK 2441MHz	1.03	1.27
8DPSK 2480MHz	1.52	1.42

$$(2.79/5) \cdot (\sqrt{2.402}) = 0.8636 \leq 3.$$

Conclusion: No SAR is required.

SIMULTANEOUS TRANSMISSION EVALUATION

N/A