FCC Test Report

Client Information:

Applicant: Rayson Technology Co.,Ltd.

Applicant add.: 1F, No.9, R&D II Road, Science-Based Industrial Park, Hsin-Chu, Taiwan

EUT Information:

EUT Name: Bluetooth phone adapter

Model No.: BTA-320,BTA-3XX(X=0~9)

Brand Name: N/A

Prepared By:

Asia Institute Technology (Dongguan) Limited
Add. : No.6 Binhe Road, Tianxin Village, Huangjiang,
Dongguan, Guangdong, China.

Date of Receipt: Otc. 1, 2009 Date of Test: Otc.1. ~ Otc.14, 2009

Date of Issue: Otc. 14, 2009 Test Result: **Pass**

Test procedure used: ANSI C63.4-2003

This device described above has been tested by Asia Institute Technology (Dongguan) Limited, and the test results show that the equipment under test (EUT) is in compliance with the FCC requirements. And it is applicable only to the tested sample identified in the report.
*This test report must not be used by the client to claim product endorsement by any agency of the U.S. government.

Reviewed by: _____ Test director

Approved by: _____ Technical director

1 Contents

2 Test Summary

2.1 Compliance with FCC Part 15 subpart C

Test	Test Requirement	Stanadard Paragraph	Result
Conduction Emissions	FCC Part 15 C:2008	Section 15.203	**PASS**
Antenna Requirement	FCC Part 15 C:2008	Section 15.247(c)	**PASS**
Occupied Bandwidth	FCC Part 15 C:2008	Section 15.247(a)	**PASS**
Carrier Frequencies Separated	FCC Part 15 C:2008	Section 15.247(a)(1)	**PASS**
Hopping Channel Number	FCC Part 15 C:2008	Section 15.247(a)(1) (iii)	**PASS**
Dwel Time	FCC Part 15 C:2008	Section 15.247(a)(1) (iii)	**PASS**
Maximum Peak Output Power	FCC Part 15 C:2008	Section 15.247(b)(1)	**PASS**
Band edge	FCC Part 15 C:2008	Section 15.247(d)	**PASS**
Conducted Spurious Emissions	FCC Part 15 C:2008	Section 15.247(d)	**PASS**
Radiated Emissions	FCC Part 15 C:2008	Section 15.247(d)	**PASS**
RF Exposure requirement	FCC Part 15 C:2008	Section 15.247(i)	**PASS**

2.2 Measurement Uncertainty

All measurements involve certain levels of uncertainties, The following measurements uncertainty Level have estimated based on ANSI C63.4:2003, the maximum value of the uncertainty as below

No.	Item	Uncertainty
1	Conducted Emission Test	±1.38dB
2	Radiated Emission Test	±3.57dB

3 Test Facility

The test facility is recognized, certified or accredited by the following organizations:

.FCC- Registration No: 248337

The 3m Semi-Anechoic Chamber, 3m/10m Open Area Test Site and Shielding Room of Asia Institute Technology (Dong guan) Limited have been registered by Federal Communications Commission (FCC) on Dec.07, 2006.

.Industry Canada(IC)-Registration No: IC6819A-1 & IC6819A-2

The 3m Semi-Anechoic Chamber and 3m/10m Open Area Test Site of Asia Institute Technology (Dongguan) Limited have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing on Nov.07, 2006.

.VCCI- Registration No: R-2482 & C-2730

The 3m/10m Open Area Test Site and Shielding Room of Asia Institute Technology (Dongguan) Limited have been registered by Voluntary Control Council for Interference on Jan.24, 2007.

.TUV Rhineland

Asia Institute Technology (Dongguan) Limited has been assessed on Jan.16, 2007 that it can carry out EMC tests by order and under supervision of TUV Rhineland.

.ITS- Registration No: TMPSHA031

Asia Institute Technology (Dongguan) Limited has been assessed and included in Intertek Shanghai TMP Program regarding Laboratory facilities and test equipment on Nov.10, 2006.

3.1 Deviation from standard

None

3.2 Abnormalities from standard conditions

None

4 General Information

4.1 General Description of EUT

Manufacturer:	Rayson Electronic Manufactory
Manufacturer Address:	No.1,Tongfu 1st Road, The 2nd Industrial Zone, Loucun, Gongming, Guangming New District, Shenzhen, China
EUT Name:	Bluetooth phone adapter
Model No:	BTA-320, BTA-3XX(X=0~9)
Operation frequency:	2402 MHz to 2480MHz
Channel Number:	79
Modulation Technology:	GFSK
AntennaType:	Printed on PCB
Brand Name:	N/A
Serial No:	N/A
Power Supply Range:	N/A
Power Supply:	DC 6V from adapter AC 100-240V 50/60Hz
Power Cord:	DC Input Line: 1.8m / Unshielded / Undetachable / Without ferrite core
Signal Cable:	audio Line: 1.8m / Unshielded / Detachable / Without ferrite core

Model description: BTA-3XX(X=0~9)
All the models are totally identical, 'x' means the product's color and 2.5mm audio in function depend on different markets' requirement.

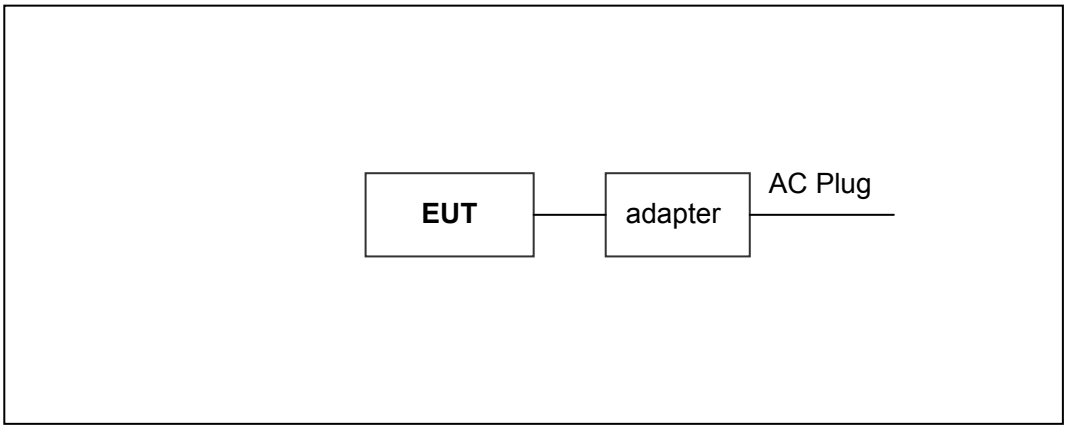
Description of Channel:

channel	Frequency (MHz)	channel	Frequency (MHz)
0	2402	…..	……
1	2403	……	……
2	2404	78	2480
.....	.....		
39	2441		
40	2442		
41	2443		
42	2444		

4.2 Description of Test conditions

(1) EUT was tested in normal configuration (Please See following Block diagram)

1. Block diagram of EUT configuration



(2) E.U.T. test conditions:

15.31(e) :For intentional radiators, measurements of the variation of the input power or the adiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% ofthe nominal rated supply voltage. For battery operated equipment, theequipment tests shall be performed using a new battery.

(3) Test frequencies:

According to the 15.31(m) Measurements on intentional radiators or receivers, other than TV broadcast receivers, shall be performed and. if required. reported for each band in which the device can be operated with the device operating at the number of fequencies in each band specified in the following table:

Frequency range over which device operates	Number of frequencies	Location in the range of operation
1 MHz or less	1	Middle
1 to 10 MHz	2	1 near top and 1 near bottom
More than 10 MHz	3	1 near top, 1 near middle and 1 near bottom

(4) Frequency range of radiated measurements:

According to the 15.33,The test range will be upto the tenth harmonic of the highest fundamental frequency

4.3 Peripheral List

No.	Equipment	Manufacturer	Model No.	Serial No.	Power cord	signal cable
1	N/A	N/A	N/A	N/A	N/A	N/A

5 Equipments List for All Test Items

No	Test Equipment	Manufacturer	Model No	Serial No	Cal. Date	Cal. Due Date
1	Spectrum Analyzer	ADVANTEST	R3182	150900201	2009.04.17	2010.04.16
2	EMI Measuring Receiver	Schaffner	SCR3501	235	2009.04.08	2010.04.07
3	Low Noise Pre Amplifier	Tsj	MLA-10K01-B01-27	1205323	2009.09.08	2010.03.07
4	Low Noise Pre Amplifier	Tsj	MLA-0120-A02-34	2648A04738	2009.04.08	2010.04.07
5	TRILOG Super Broadband test Antenna	SCHWARZBECK	VULB9160	9160-3206	2009.07.15	2010.07.14
6	Broadband Horn Antenna	SCHWARZBECK	BBHA9120A	451	2009.07.15	2010.07.14
7	50Ω Coaxial Switch	Anritsu	MP59B	6200264416	2009.09.08	2010.03.07
8	EMI Test Receiver	R&S	ESCI	100124	2008.12.29	2009.12.28
9	LISN	Kyoritsu	KNW-242	8-837-4	2009.04.08	2010.04.07
10	LISN	Kyoritsu	KNW-407	8-1789-3	2009.04.08	2010.04.07
11	50Ω Coaxial Switch	Anritsu	MP59B	6200264417	2009.09.08	2010.03.07

6 Test Result

6.1 Antenna Requirement

6.1.1 Standard requirement

15.203 requirement: For intentional device, according to 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.

15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

6.1.2 EUT Antenna

The antenna is integrated on the main PCB and no consideration of replacement.antenna gain is 2dbi max

6.2 Conduction Emissions Measurement

6.2.1 limit

Frequency of Emission (MHz)	Conducted Limit (dBμV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

Note:Decreases with the logarithm of the frequency.

6.2.2 Test procedure

EUT was placed upon a wooden test table 0.8m above the horizontal metal reference plane and 0.4m from the vertical ground plane, and it was connected to an AMN. The closest distance between the boundary of the EUT and the surface of the AMN is 0.8m. All peripherals were connected to another AMN, and placed at a distance of 10cm from each other. A spectrum and receiver was connected to the RF output port of the AMN. Both average and quasi-peak value were detected.

6.2.3 Test result

Test Data: 2009-10-10

Operating Environment: 20.3°C, 58% RH, 102 Kpa

Line

Frequency (MHz)	Factor (dB)	Reading Level (dBμV)	Quasi peak (dBμV)	Margin (dB)	Limit (dBμV)	Reading Level (dBuV)	Average (dBμV)	Margin (dB)	Limit (dBμV)
0.298	10.759	17.474	28.233	-33.538	61.771	11.374	22.133	-29.638	51.771
0.442	10.465	26.930	37.395	-20.262	57.657	15.830	26.295	-21.362	47.657
0.566	10.314	22.578	32.892	-23.108	56.000	12.978	23.292	-22.708	46.000
0.858	10.224	20.289	30.513	-25.487	56.000	11.689	21.913	-24.087	46.000
1.802	10.180	21.324	31.504	-24.496	56.000	12.224	22.404	-23.596	46.000
***6.389**	**10.200**	**33.491**	**43.691**	**-16.309**	**60.000**	**25.791**	**35.991**	**-14.009**	**50.000**

Neutral

Frequency (MHz)	Factor (dB)	Reading Level (dBuV)	Quasi peak (dBμV)	Margin (dB)	Limit (dBμV)	Reading Level (dBuV)	Average (dBμV)	Margin (dB)	Limit (dBμV)
***0.410**	**10.558**	**31.255**	**41.813**	**-16.758**	**58.571**	**21.655**	**32.213**	**-16.358**	**48.571**
0.454	10.461	28.412	38.873	-18.441	57.314	19.812	30.273	-17.041	47.314
0.870	10.226	18.308	28.534	-27.466	56.000	11.208	21.434	-24.566	46.000
1.070	10.200	20.128	30.328	-25.672	56.000	12.028	22.228	-23.772	46.000
1.630	10.180	18.630	28.810	-27.190	56.000	9.030	19.210	-26.790	46.000
6.381	10.210	31.871	42.081	-17.919	60.000	21.271	31.481	-18.519	50.000

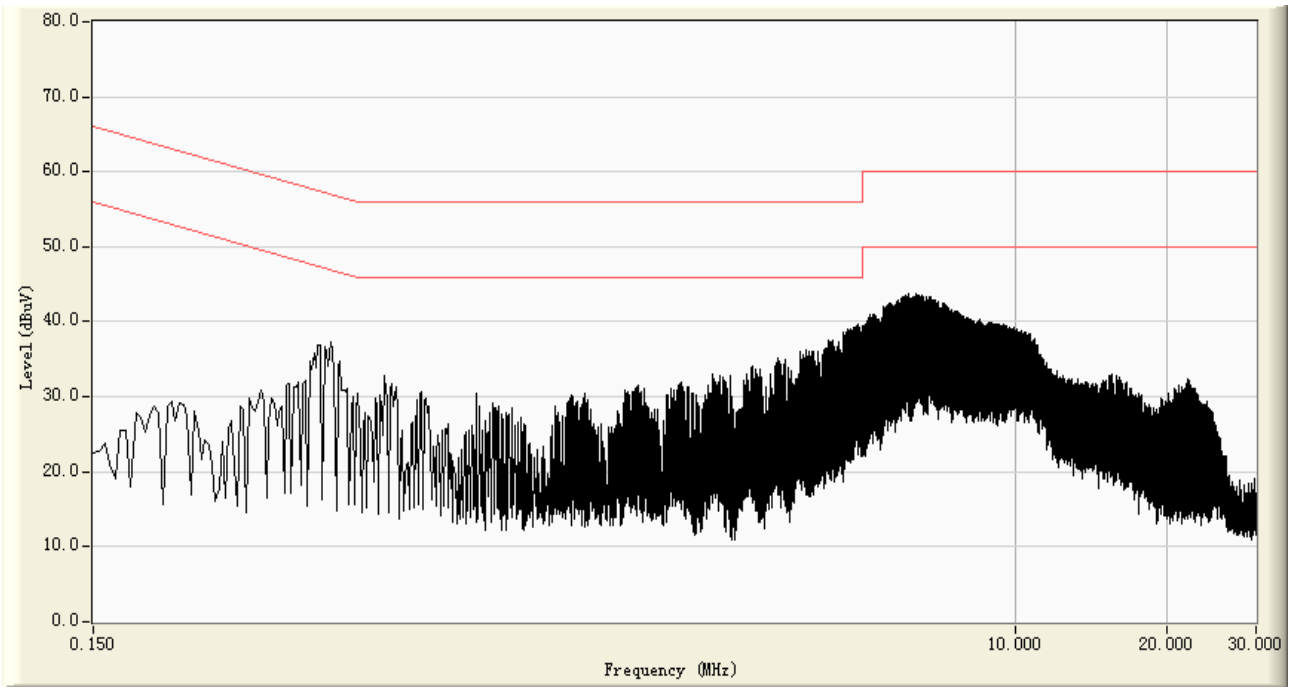
Note: '*' means the worst case

Quasi peak/Average = Reading Level + Factor

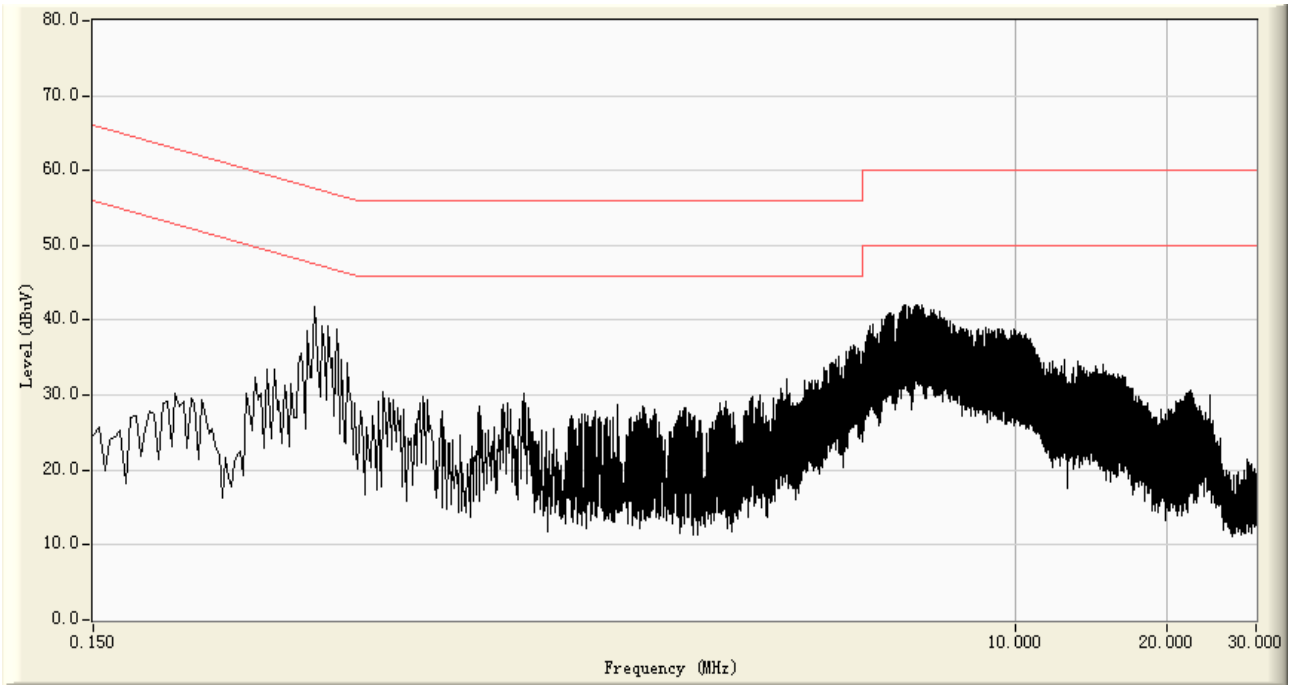
Factor= Cable Loss + LISN insertion loss

Mode: Running

Line --Operating mode: running



Neutral --Operating mode: running



6.3 Occupied Bandwidth

6.3.1 limit

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

6.3.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer , set the Spectrum Analyzer as RBW=30kHz,VB𝕎≧RBW,Sweep time=Auto, Detector Function=Peak

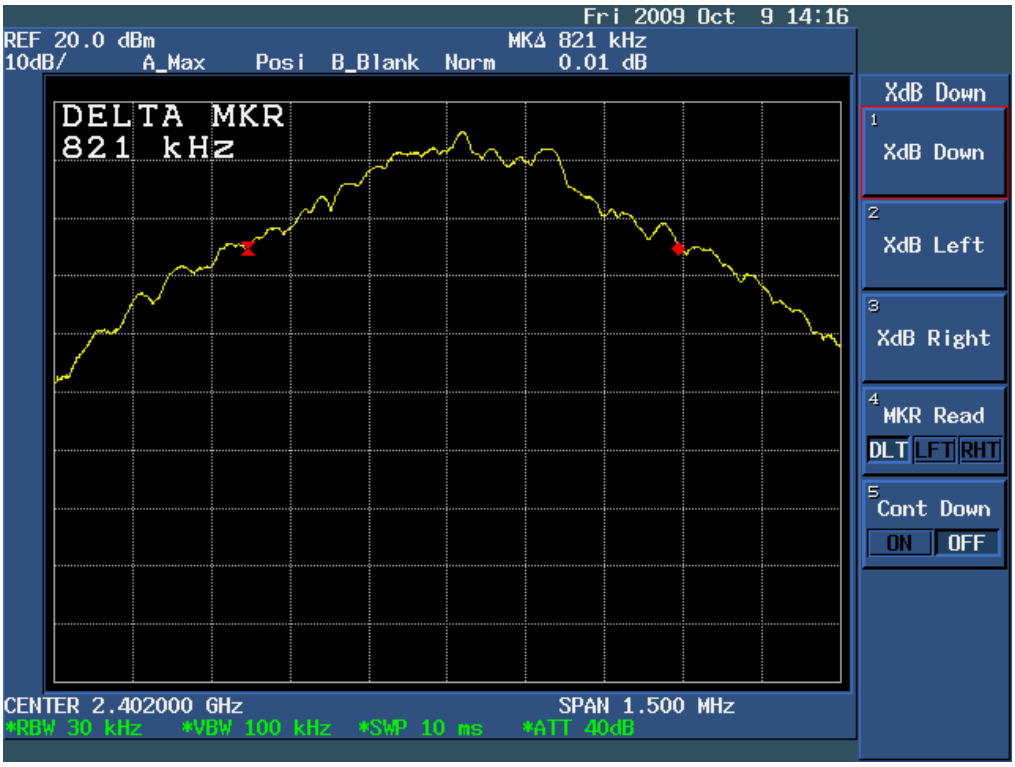
(2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission.

(3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. also shall be performed at different modes of operation

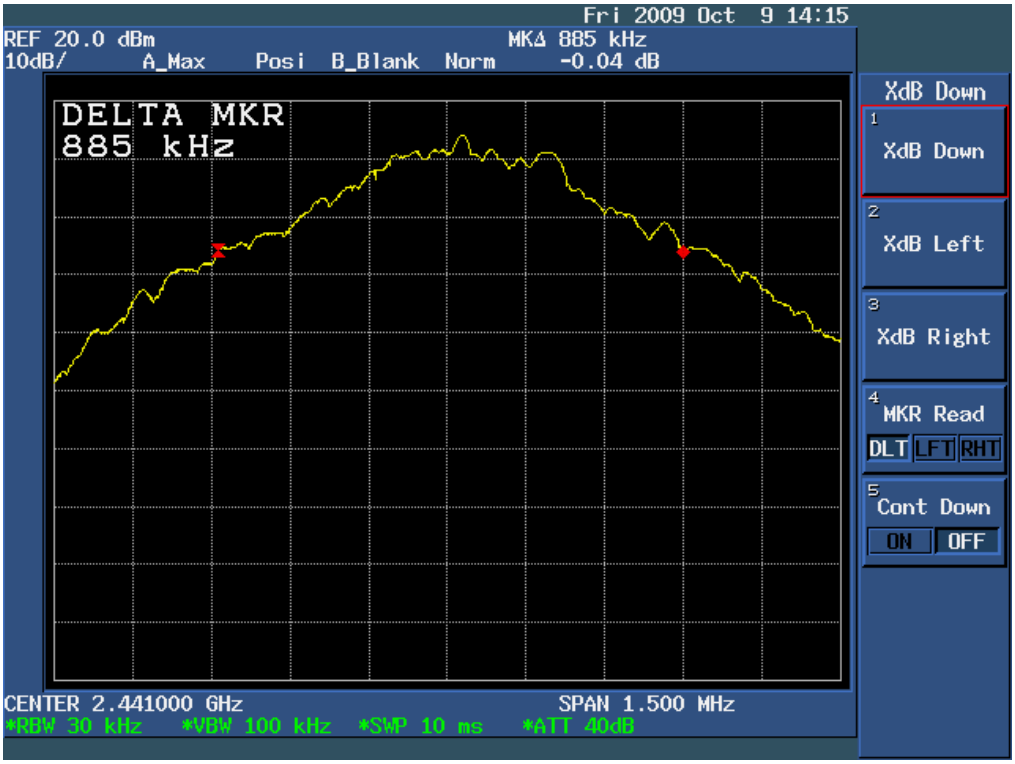
6.3.3 Test result

channel	Channel frenqucy (MHz)	20dB bandwidth (KHz)	Limit (KHz)	Conclusion
Low	2402	821	N/A	Pass
Middle	2441	885	N/A	Pass
Highest	2480	894	N/A	Pass

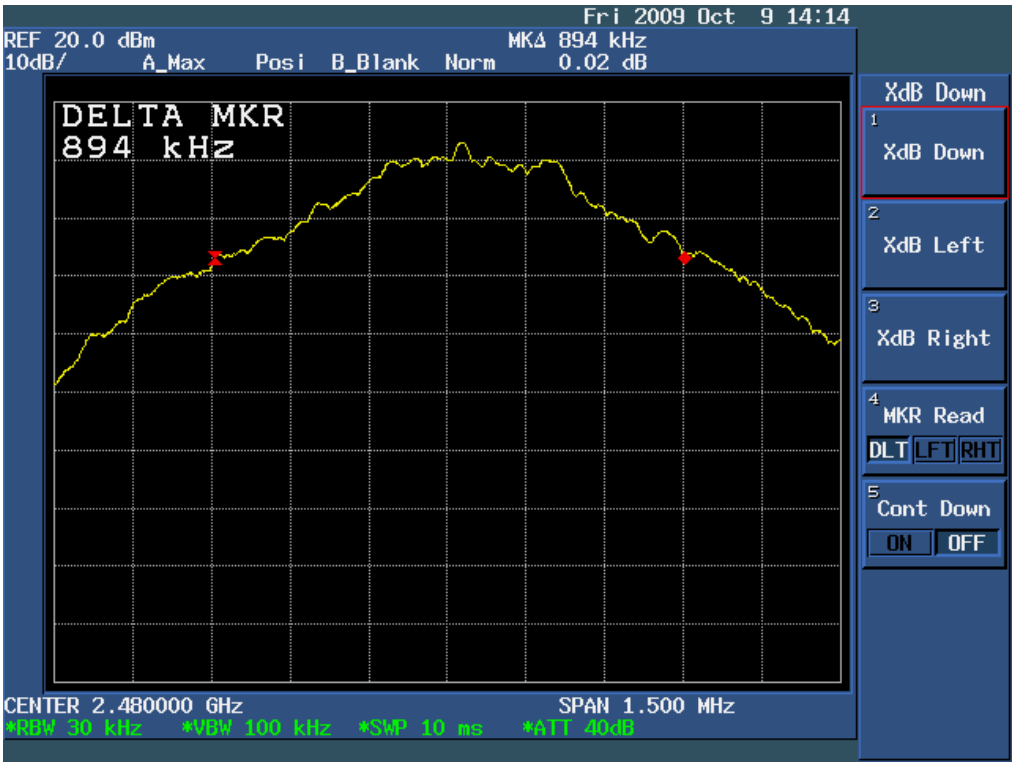
CH0


Fri 2009 Oct 9 14:16
REF 20.0 dBm
MKΔ 821 kHz
10dB/ A_Max Posi B_Blank Norm 0.01 dB
DELTA MKR
821 kHz
XdB Down
1 XdB Down
2 XdB Left
3 XdB Right
4 MKR Read
DLT LFT RHT
5 Cont Down
ON OFF
CENTER 2.402000 GHz
SPAN 1.500 MHz
*RBW 30 kHz *VBW 100 kHz *SWP 10 ms *ATT 40dB

CH39


Fri 2009 Oct 9 14:15
REF 20.0 dBm
MKΔ 885 kHz
10dB/ A_Max Posi B_Blank Norm -0.04 dB
DELTA MKR
885 kHz
XdB Down
1 XdB Down
2 XdB Left
3 XdB Right
4 MKR Read
DLT LFT RHT
5 Cont Down
ON OFF
CENTER 2.441000 GHz
SPAN 1.500 MHz
*RBW 30 kHz *VBW 100 kHz *SWP 10 ms *ATT 40dB

CH79


Fri 2009 Oct 9 14:14
REF 20.0 dBm
MKΔ 894 kHz
10dB/ A_Max Posi B_Blank Norm 0.02 dB
DELTA MKR
894 kHz
XdB Down
1
XdB Down
2
XdB Left
3
XdB Right
4
MKR Read
DLT LFT RHT
5
Cont Down
ON OFF
CENTER 2.480000 GHz
SPAN 1.500 MHz
*RBW 30 kHz *VBW 100 kHz *SWP 10 ms *ATT 40dB

6.4 Carrier Frequencies Separated

6.4.1 limit

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

6.4.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as RBW=100kHz,VBW≧RBW,Sweep time=Auto, Detector Function=Peak

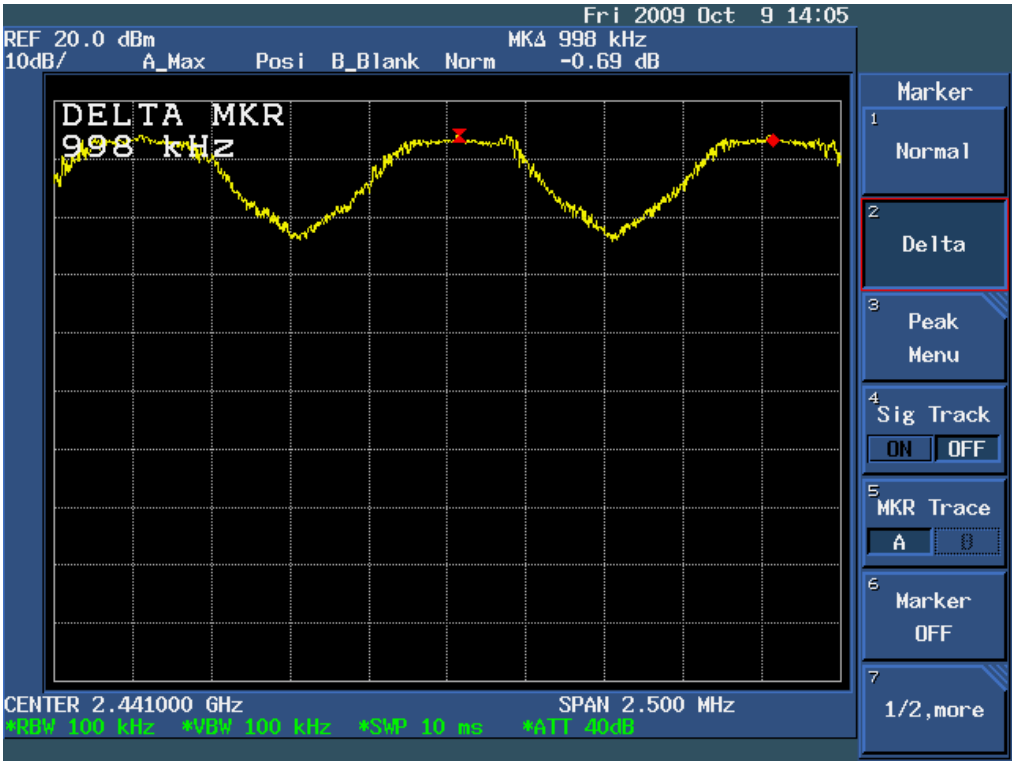
(2) The EUT should be transmitting at its maximum data rate. Use the marker-delta function to determine the separation between the peaks of the adjacent channels

(3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. also shall be performed at different modes of operation

6.4.3 Test result

channel	Channel frenqucy (MHz)	Channel Separation (MHz)	20dB bandwidth (MHz)	Conclusion
Low	2402	1.003	821	Pass
Middle	2441	0.998	885	Pass
Highest	2480	1.01	894	Pass


Fri 2009 Oct 9 14:06
REF 20.0 dBm
MKΔ 1.003 MHz
10dB/ A_Max Posi B_Blank Norm -0.76 dB
DELTA MKR
1.003 MHz
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track ON OFF
5 MKR Trace A
6 Marker OFF
7 1/2,more
CENTER 2.402000 GHz
SPAN 2.500 MHz
*RBW 100 kHz *VBW 100 kHz *SWP 10 ms *ATT 40dB


Fri 2009 Oct 9 14:05
REF 20.0 dBm
MKΔ 998 kHz
10dB/ A_Max Posi B_Blank Norm -0.69 dB
DELTA MKR
998 kHz
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track ON OFF
5 MKR Trace A
6 Marker OFF
7 1/2,more
CENTER 2.441000 GHz
SPAN 2.500 MHz
*RBW 100 kHz *VBW 100 kHz *SWP 10 ms *ATT 40dB


Fri 2009 Oct 9 14:08
REF 20.0 dBm
MKΔ 1.010 MHz
10dB/ A_Max Posi B_Blank Norm -0.12 dB
DELTA MKR
1.010 MHz
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track
ON OFF
5 MKR Trace
A B
6 Marker OFF
7 1/2,more
CENTER 2.480000 GHz
SPAN 2.500 MHz
*RBW 100 kHz *VBW 100 kHz *SWP 10 ms *ATT 40dB

6.5 Hopping Channel Number

6.5.1 limit

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

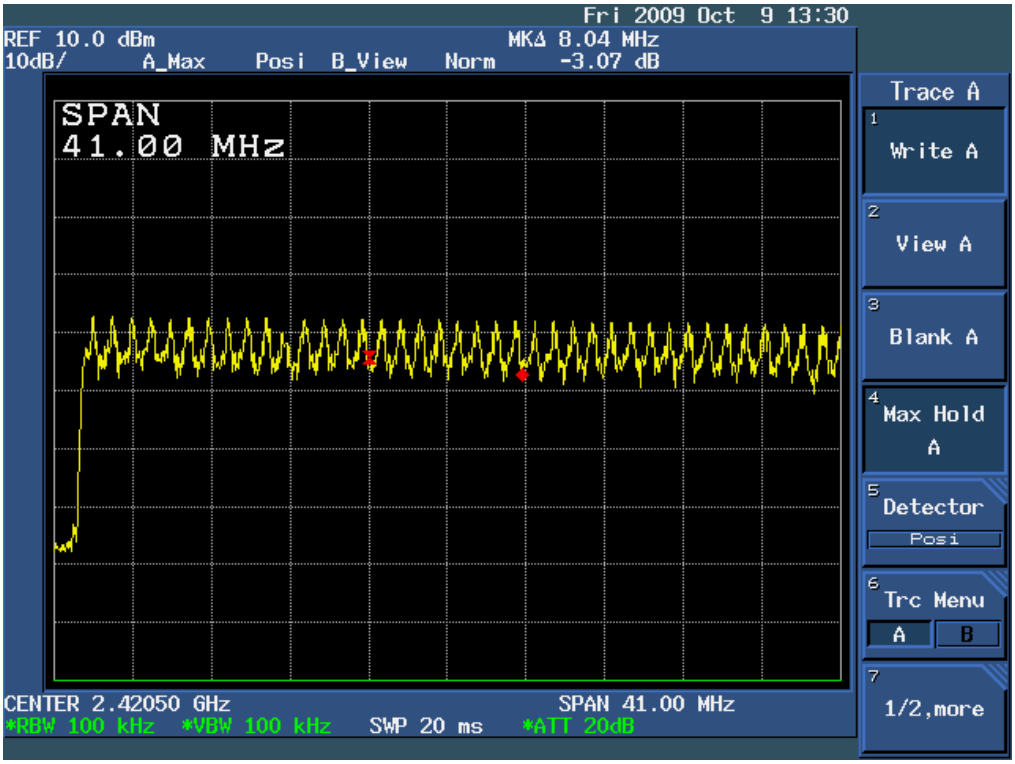
6.5.2 Test procedure

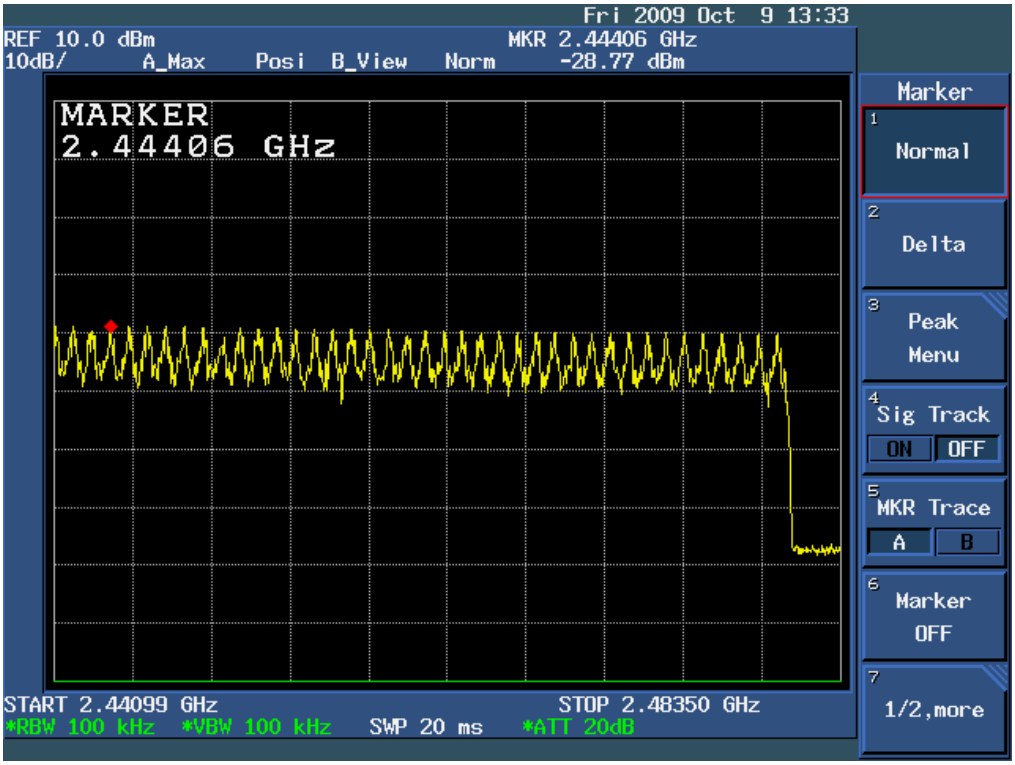
(1) Connected the antenna port to the Spectrum Analyzer , set the Spectrum Analyzer as RBW=100kHz,VBW≧RBW,Sweep time=Auto, Detector Function=Peak Trace=Maxhold

(2) The EUT should be have its hopping function enabled. Maxhold and record hopping channels It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

6.5.3 Test result

Hopping Channel Number result		
Operating Mode: GFSK Mode	Test date:2009-10-09	
Result	Limit	Conclusion
79	15	Pass


Fri 2009 Oct 9 13:30
REF 10.0 dBm
10dB/ A_Max Posi B_View Norm
MKΔ 8.04 MHz
-3.07 dB
SPAN
41.00 MHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
6 Trc Menu
A B
7 1/2,more
CENTER 2.42050 GHz
SPAN 41.00 MHz
*RBW 100 kHz *VBW 100 kHz SWP 20 ms *ATT 20dB


Fri 2009 Oct 9 13:33
REF 10.0 dBm
10dB/ A_Max Posi B_View Norm
MKR 2.44406 GHz
-28.77 dBm
MARKER
2.44406 GHz
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track
ON OFF
5 MKR Trace
A B
6 Marker OFF
7 1/2,more
START 2.44099 GHz
STOP 2.48350 GHz
*RBW 100 kHz *VBW 100 kHz SWP 20 ms *ATT 20dB

6.6 Dwell time

6.6.1 limit

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

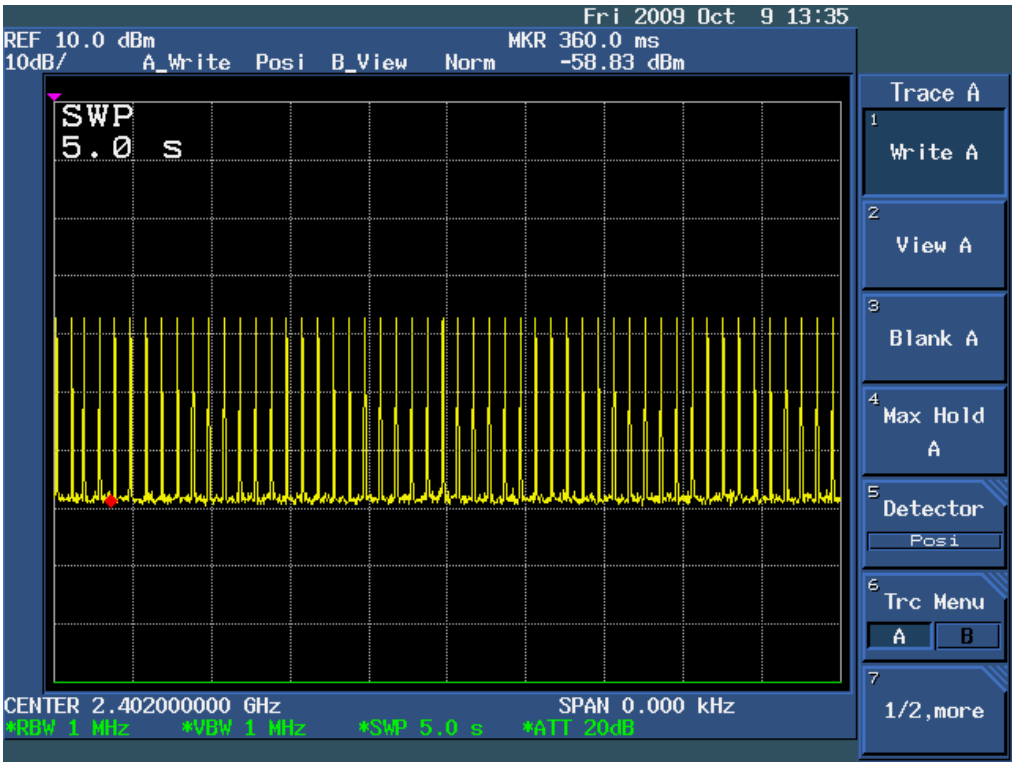
6.6.2 Test procedure

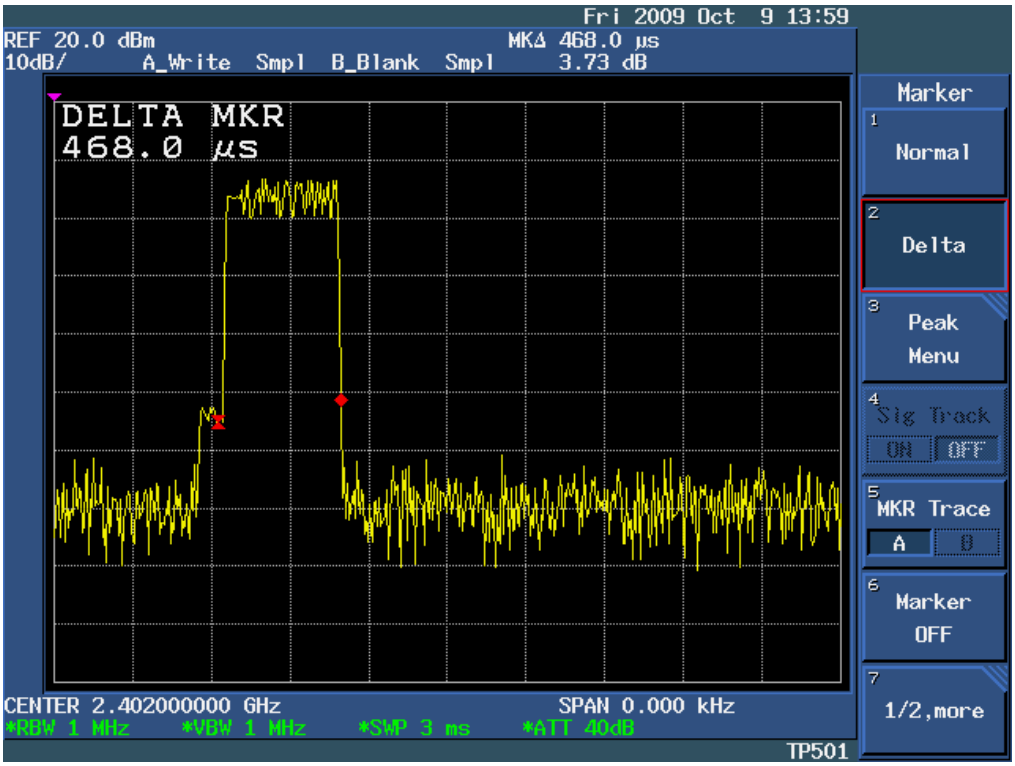
(1) connect the antenna port of the EUT to spectrum analyzer and set it in transmitting mode.
(2) Set center frequency of spectrum analyzer = operating frequency.
(3) Set the spectrum analyzer as RBW=1MHz, VBW=1MHz, Span=0Hz, Adjust Sweep=5s. Record theburst (in 1 sec.).
(4) Set the spectrum analyzer as Adjust Sweep=5ms. Record the pulse time.
(5) Repeat above procedures until all frequency measured were complete.

6.6.3 Test result

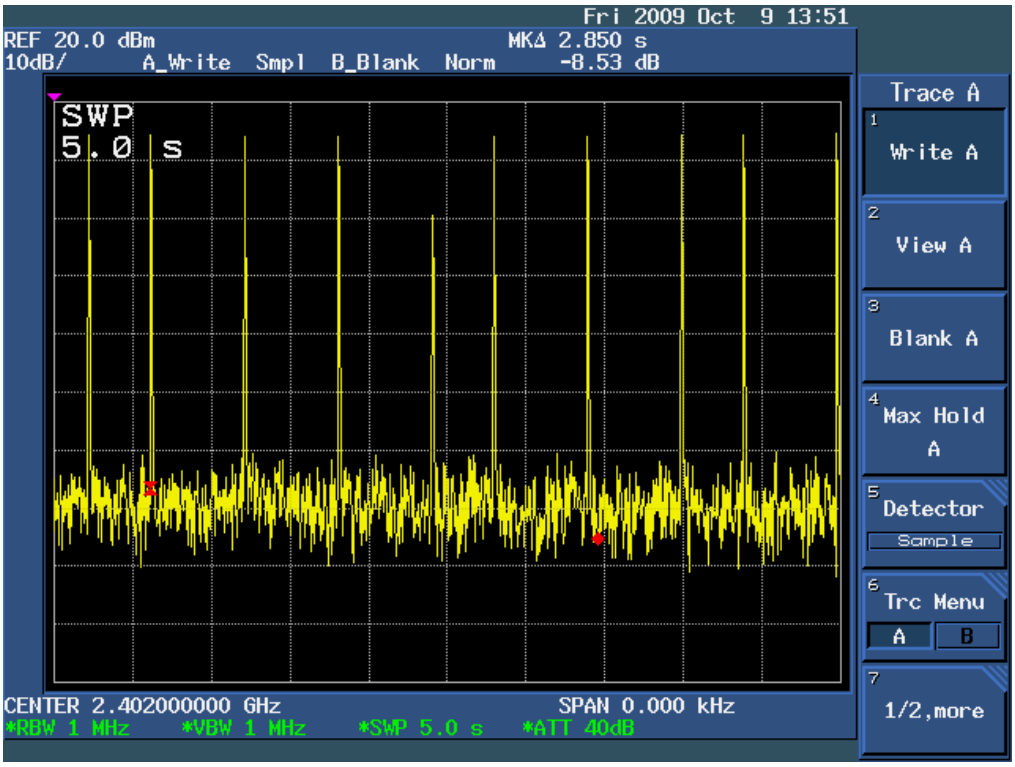
Dwell Time result						
Operating Mode: GFSK Mode			Test date:2009-10-09			
A period transmit time=79×0.4=31.6 Dwell time= Pulse Time×Number of transmmision in a 31.6(79hopping*0.4)						
Mode	Channel Frequency (MHz)	Pulse Time (ms)	Number of transmmision in a 31.6(79hopping*0.4)	Dwell time (ms)	Limit (ms)	result
DH1	2402	0.468	50(times/5sec)*31.6	147.888	400	Pass
DH3	2402	1.71	10(times/5sec)*31.6	27.018	400	Pass
DH5	2402	3.06	17(times/5sec)*31.6	328.766	400	Pass

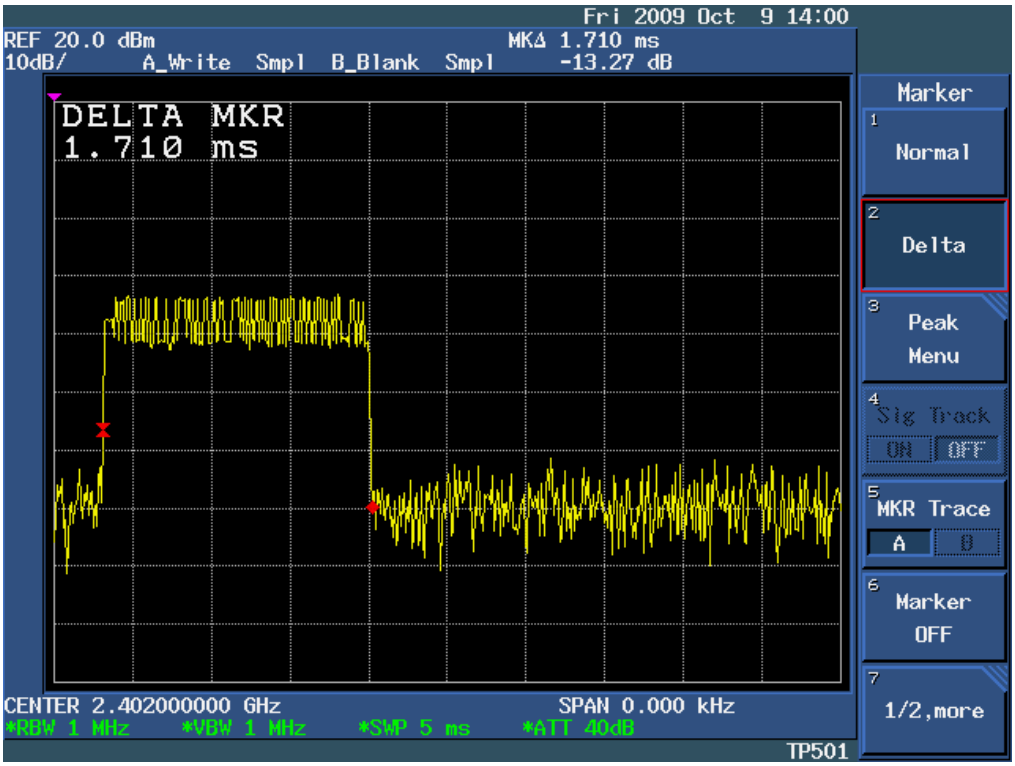
DH1


Fri 2009 Oct 9 13:35
REF 10.0 dBm
10dB/
A_Write Posi B_View Norm
MKR 360.0 ms
-58.83 dBm
SWP
5.0 s
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
6 Trc Menu
A B
7 1/2,more
CENTER 2.402000000 GHz
SPAN 0.000 kHz
*RBW 1 MHz
*VBW 1 MHz
*SWP 5.0 s
*ATT 20dB

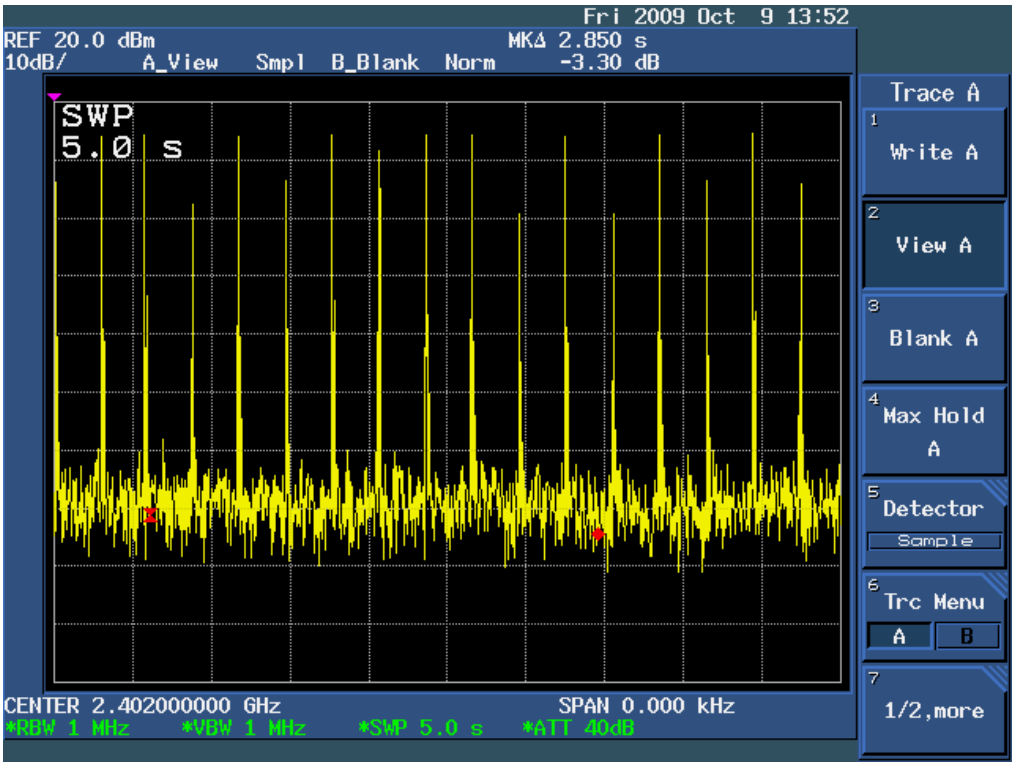

Fri 2009 Oct 9 13:59
REF 20.0 dBm
10dB/
A_Write Smpl B_Blank Smpl
MKΔ 468.0 µs
3.73 dB
DELTA MKR
468.0 µs
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track
ON OFF
5 MKR Trace
A B
6 Marker OFF
7 1/2,more
CENTER 2.402000000 GHz
SPAN 0.000 kHz
*RBW 1 MHz
*VBW 1 MHz
*SWP 3 ms
*ATT 40dB
TP501

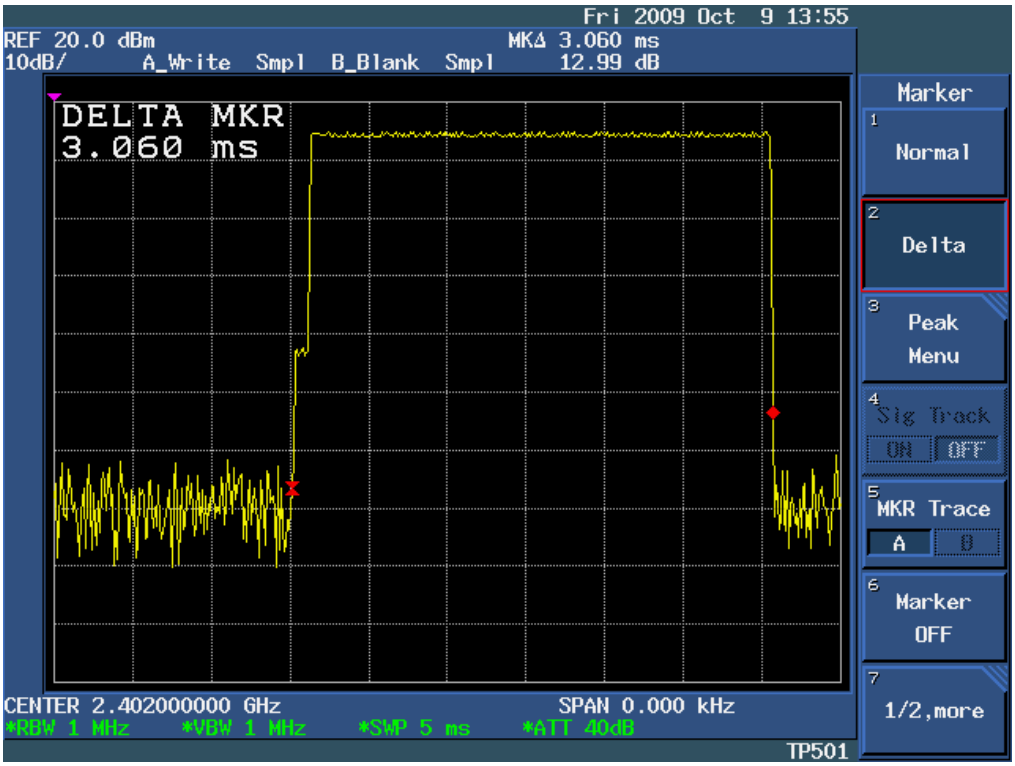
DH3


Fri 2009 Oct 9 13:51
REF 20.0 dBm
MKΔ 2.850 s
10dB/ A_Write Smpl B_Blank Norm -8.53 dB
SWP
5.0 s
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Sample
6 Trc Menu
A B
7 1/2,more
CENTER 2.402000000 GHz
SPAN 0.000 kHz
*RBW 1 MHz *VBW 1 MHz *SWP 5.0 s *ATT 40dB


Fri 2009 Oct 9 14:00
REF 20.0 dBm
MKΔ 1.710 ms
10dB/ A_Write Smpl B_Blank Smpl -13.27 dB
DELTA MKR
1.710 ms
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track
ON OFF
5 MKR Trace
A B
6 Marker OFF
7 1/2,more
CENTER 2.402000000 GHz
SPAN 0.000 kHz
*RBW 1 MHz *VBW 1 MHz *SWP 5 ms *ATT 40dB
TP501

DH5


Fri 2009 Oct 9 13:52
REF 20.0 dBm
MKΔ 2.850 s
10dB/ A_View Smpl B_Blank Norm -3.30 dB
SWP
5.0 s
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Sample
6 Trc Menu
A B
7 1/2,more
CENTER 2.402000000 GHz
SPAN 0.000 kHz
*RBW 1 MHz *VBW 1 MHz *SWP 5.0 s *ATT 40dB


Fri 2009 Oct 9 13:55
REF 20.0 dBm
MKΔ 3.060 ms
10dB/ A_Write Smpl B_Blank Smpl 12.99 dB
DELTA MKR
3.060 ms
Marker
1 Normal
2 Delta
3 Peak Menu
4 Sig Track
ON OFF
5 MKR Trace
A B
6 Marker OFF
7 1/2,more
CENTER 2.402000000 GHz
SPAN 0.000 kHz
*RBW 1 MHz *VBW 1 MHz *SWP 5 ms *ATT 40dB
TP501

6.7 Maximum Peak Output Power

6.7.1 limit

15.247(b) (1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

6.7.2 Test procedure

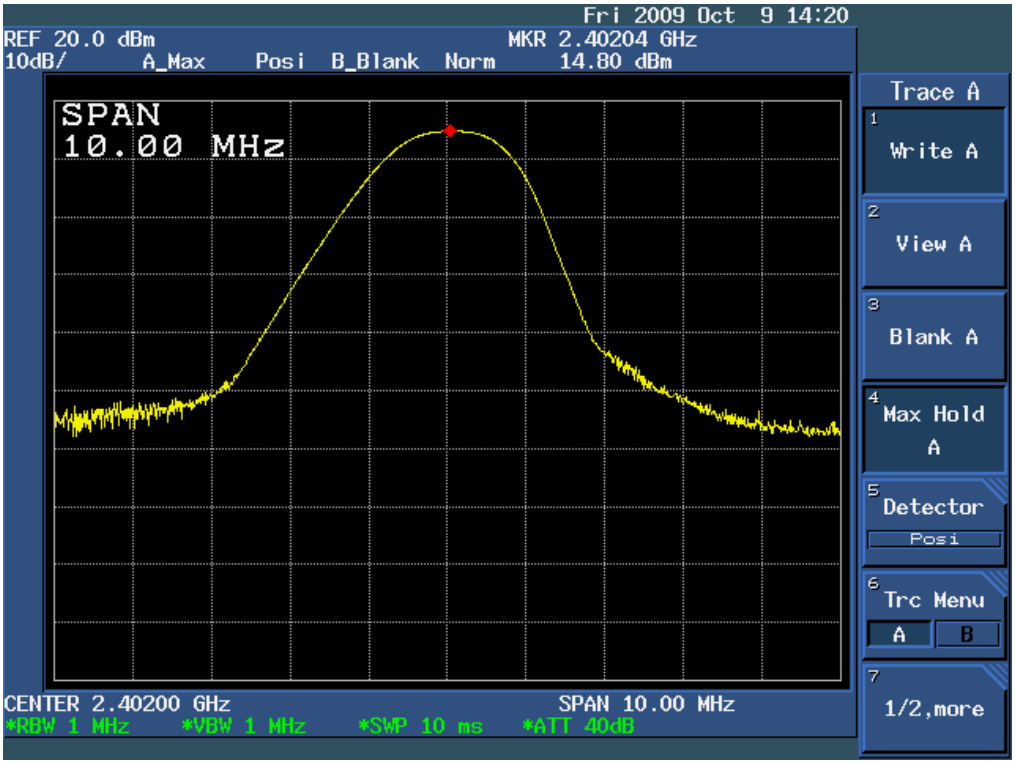
(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as RBW=1MHz,VBW≧RBW,Sweep time=Auto, Detector Function=Peak

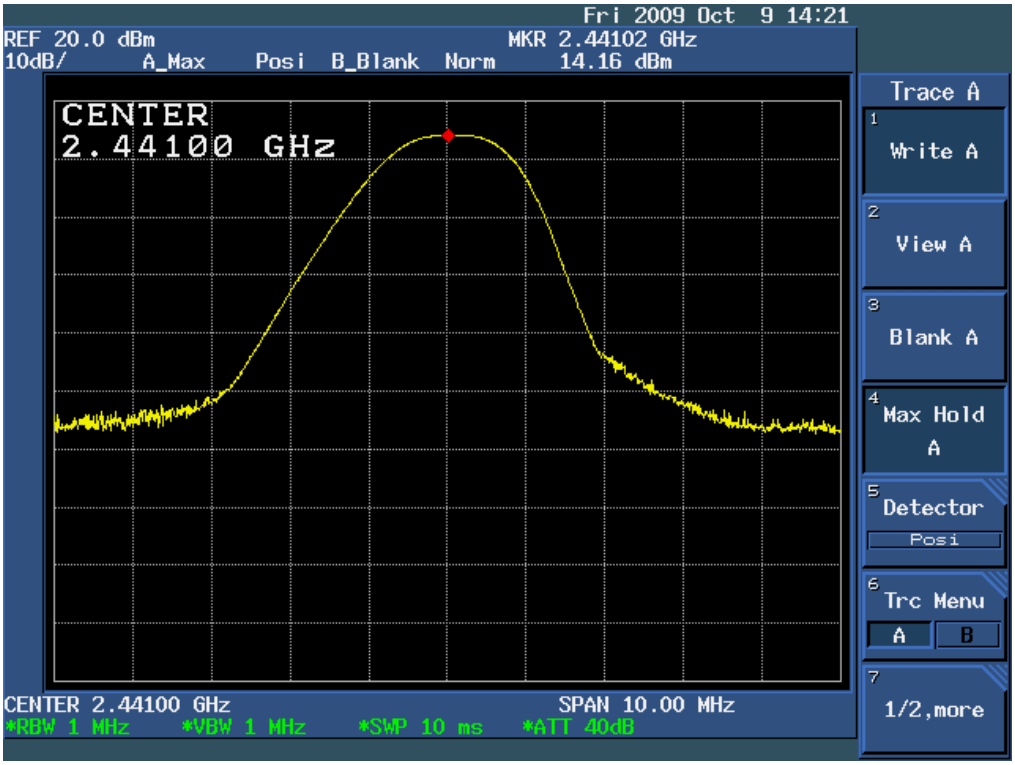
(2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power

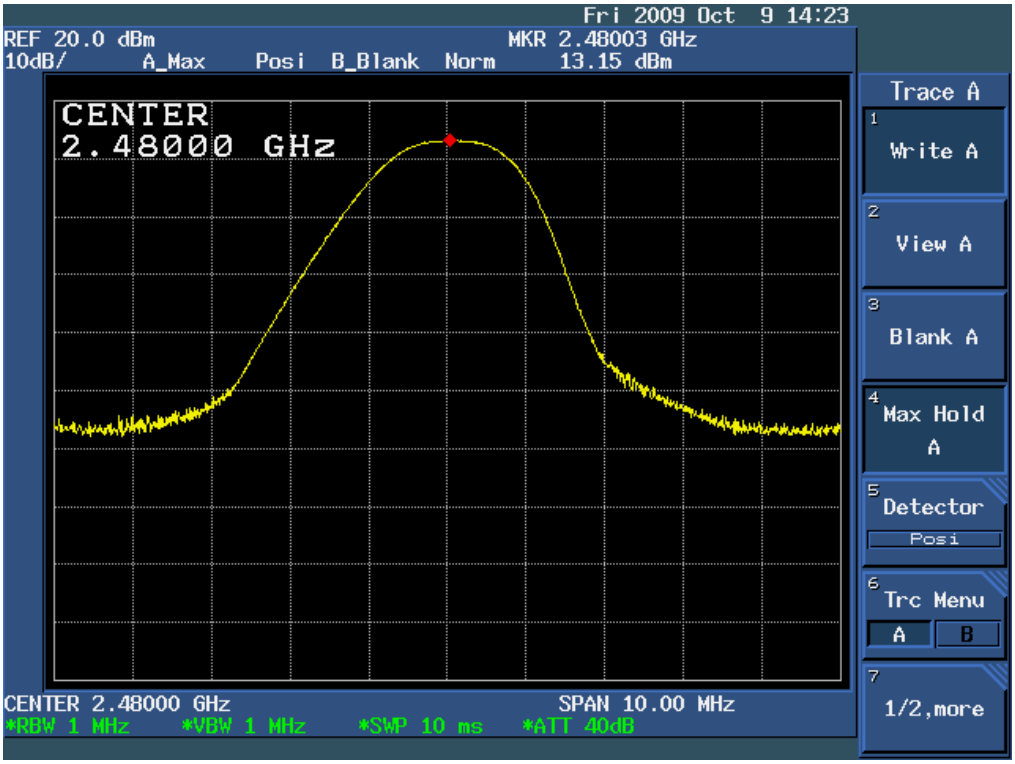
(3) The above procedure shall be repeated at the lowest, the middle, and the highest frequency of the stated frequency range with modulated mode. also shall be performed at different modes of operation

6.7.3 Test result

channel	Channel frenqucy (MHz)	Read Power (dBm)	Cable loss (dB)	Output power (dBm)	Limit (dBm)	Conclusion
Low	2402	14.8	1.5	16.3	30	Pass
Middle	2441	14.16	1.5	15.66	30	Pass
Highest	2480	13.15	1.5	14.65	30	Pass


Fri 2009 Oct 9 14:20
REF 20.0 dBm
10dB/ A_Max Posi B_Blank Norm
MKR 2.40204 GHz
14.80 dBm
SPAN
10.00 MHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector Posi
6 Trc Menu A B
7 1/2,more
CENTER 2.40200 GHz
SPAN 10.00 MHz
*RBW 1 MHz *VBW 1 MHz *SWP 10 ms *ATT 40dB


Fri 2009 Oct 9 14:21
REF 20.0 dBm
10dB/ A_Max Posi B_Blank Norm
MKR 2.44102 GHz
14.16 dBm
CENTER
2.44100 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector Posi
6 Trc Menu A B
7 1/2,more
CENTER 2.44100 GHz
SPAN 10.00 MHz
*RBW 1 MHz *VBW 1 MHz *SWP 10 ms *ATT 40dB


Fri 2009 Oct 9 14:23
REF 20.0 dBm
10dB/
A_Max
Posi
B_Blank
Norm
MKR 2.48003 GHz
13.15 dBm
CENTER
2.48000 GHz
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
6 Trc Menu
A
B
7 1/2,more
CENTER 2.48000 GHz
SPAN 10.00 MHz
*RBW 1 MHz
*VBW 1 MHz
*SWP 10 ms
*ATT 40dB

6.8 Band edge

6.8.1 limit

15.247(d) 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.8.2 Test procedure

(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as RBW=100KHz,VBW≧RBW,Sweep time=Auto, Detector Function=Peak

(2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. And then marker the bandedge Level.

(3) The above procedure shall be repeated at the lowest, and the highest frequency of the stated frequency range with modulated mode.

6.8.3 Test result

CH0


Wed 2009 Oct 14 14:48
REF 20.0 dBm
MKR 2.3058 GHz
10dB/ A_Max Posi B_View Norm -54.08 dBm
MARKER
2.3058 GHz
START 2.3000 GHz
STOP 2.4080 GHz
*RBW 100 kHz *VBW 100 kHz SWP 30 ms *ATT 30dB
Multi Marker List
1: 2.4022 GHz 14.28 dBm
2: 2.3901 GHz -51.99 dBm
3: 2.3540 GHz -50.93 dBm
4: 2.3516 GHz -53.68 dBm
5: 2.3058 GHz -54.08 dBm
6:
7:
8:
9:
10:
Δ:
MKR Setup
1 Marker No.
5
2 Marker ON
3 Marker OFF
4 Active Marker
7 Reset Marker

CH78


Wed 2009 Oct 14 14:52
REF 20.0 dBm
MKR 2.48194 GHz
10dB/ A_Max Posi B_View Norm -28.50 dBm
START 2.47800 GHz
STOP 2.50000 GHz
*RBW 100 kHz *VBW 100 kHz SWP 20 ms *ATT 30dB
Multi Marker List
1: 2.48020 GHz 13.15 dBm
2: 2.48099 GHz -20.32 dBm
3: 2.48194 GHz -28.50 dBm
4:
5:
6:
7:
8:
9:
10:
Δ:
Sweep
1 SWP Time
AUTO MNL
2 Auto All
4 Trig Delay
5 Gated Sweep
6 Gated Sweep
ON OFF
7 Ext Gate In
ON OFF

6.9 Conducted Spurious Emissions

6.9.1 limit

15.247(d) 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

6.9.2 Test procedure

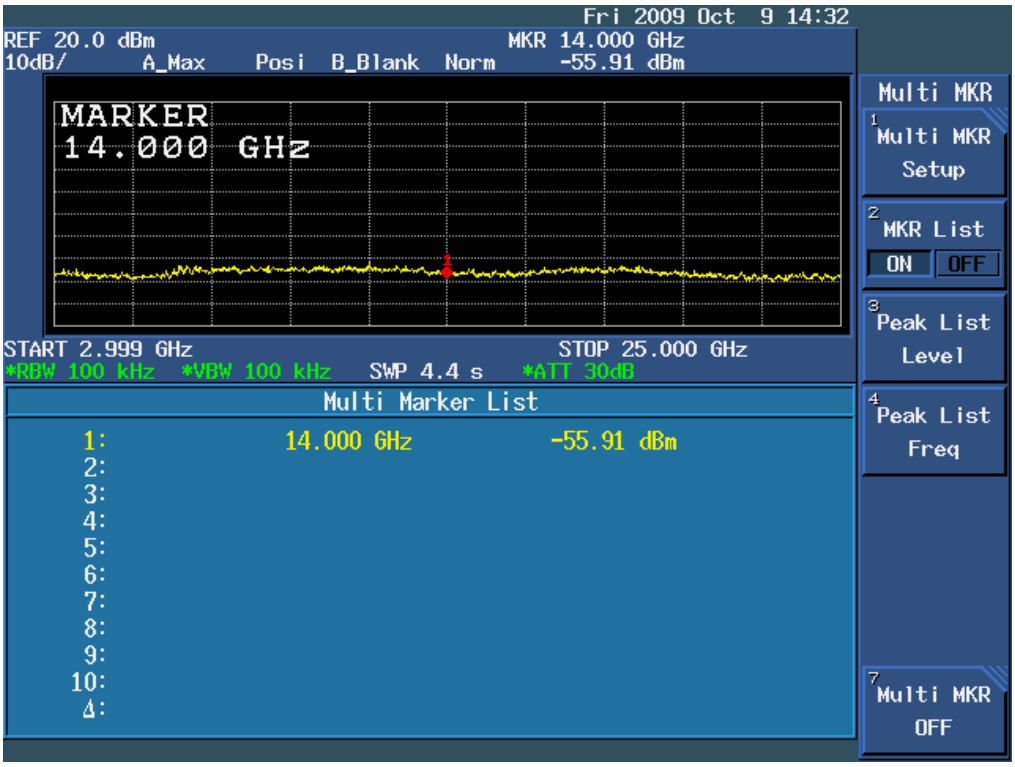
(1) Connected the antenna port to the Spectrum Analyzer, set the Spectrum Analyzer as RBW=100KHz,VBW≧RBW,Sweep time=Auto, Detector Function=Peak

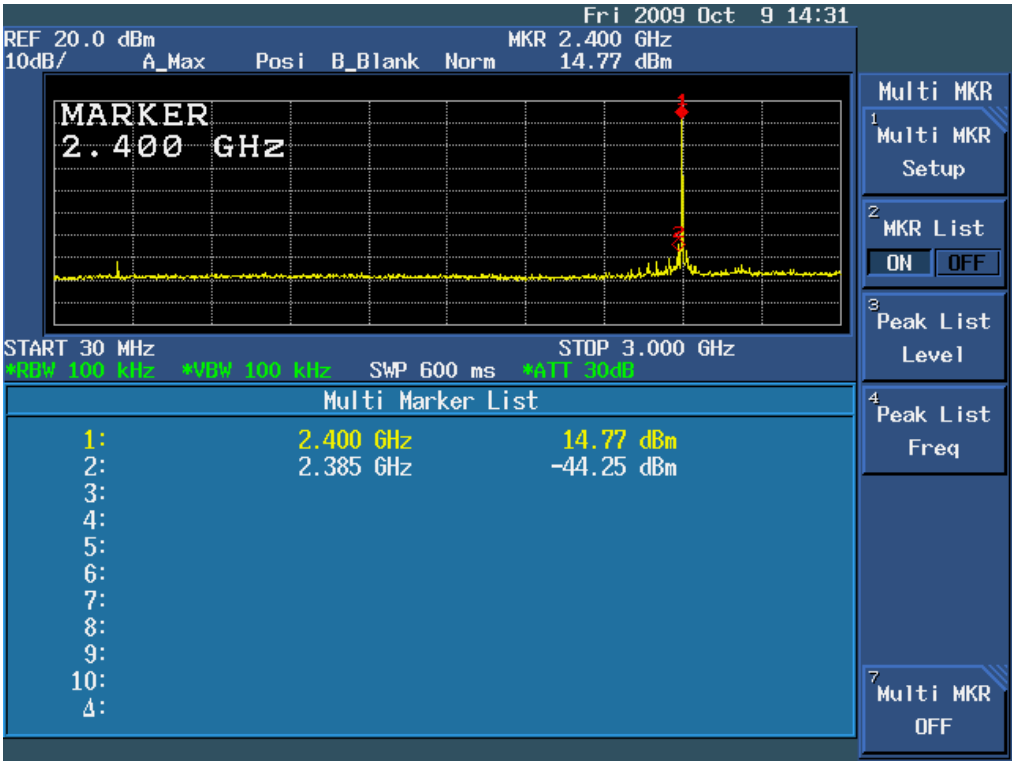
(2) The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. And then marker the bandedge Level.

(3) The above procedure shall be repeated at the lowest, and the highest frequency of the stated frequency range with modulated mode.

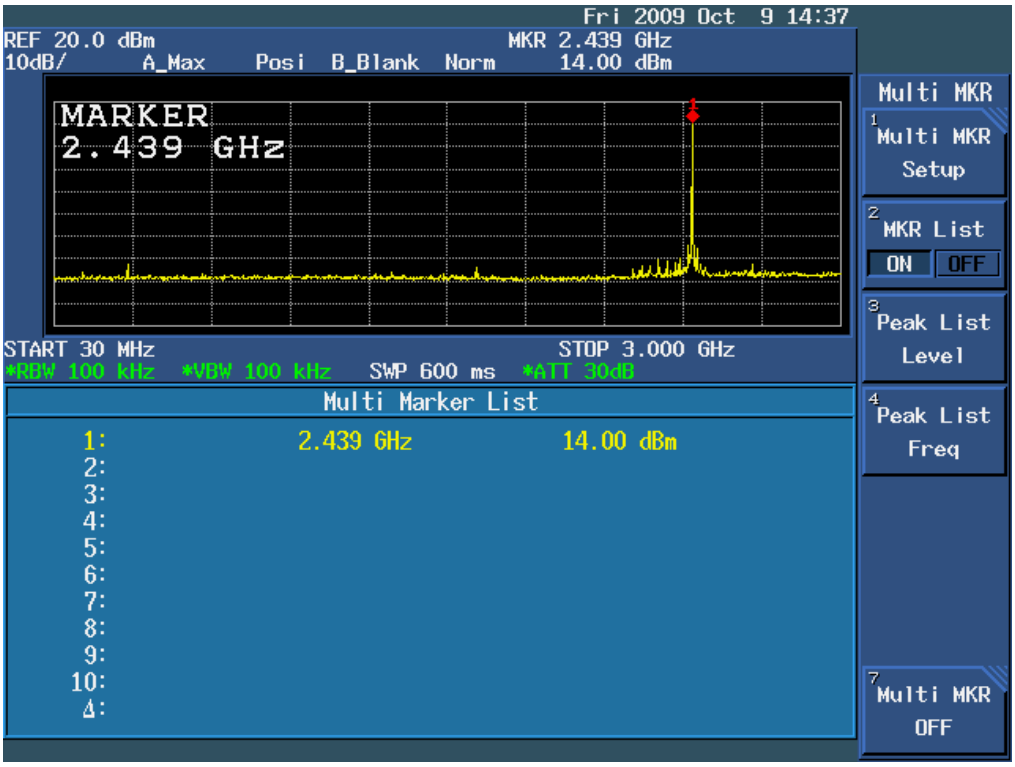
6.9.3 Test result

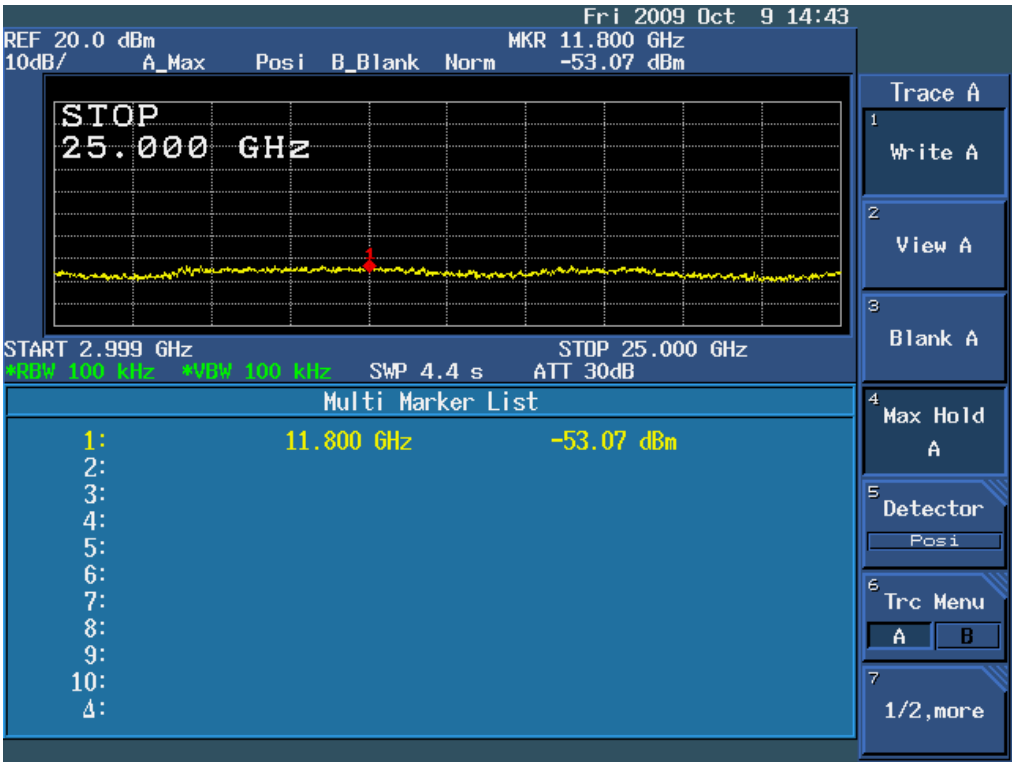
CH0


Fri 2009 Oct 9 14:32
REF 20.0 dBm
10dB/ A_Max Posi B_Blank Norm
MKR 14.000 GHz
-55.91 dBm
MARKER
14.000 GHz
START 2.999 GHz
STOP 25.000 GHz
*RBW 100 kHz *VBW 100 kHz SWP 4.4 s *ATT 30dB
Multi Marker List
1: 14.000 GHz -55.91 dBm
2:
3:
4:
5:
6:
7:
8:
9:
10:
Δ:
Multi MKR
1 Multi MKR Setup
2 MKR List
ON OFF
3 Peak List Level
4 Peak List Freq
7 Multi MKR OFF

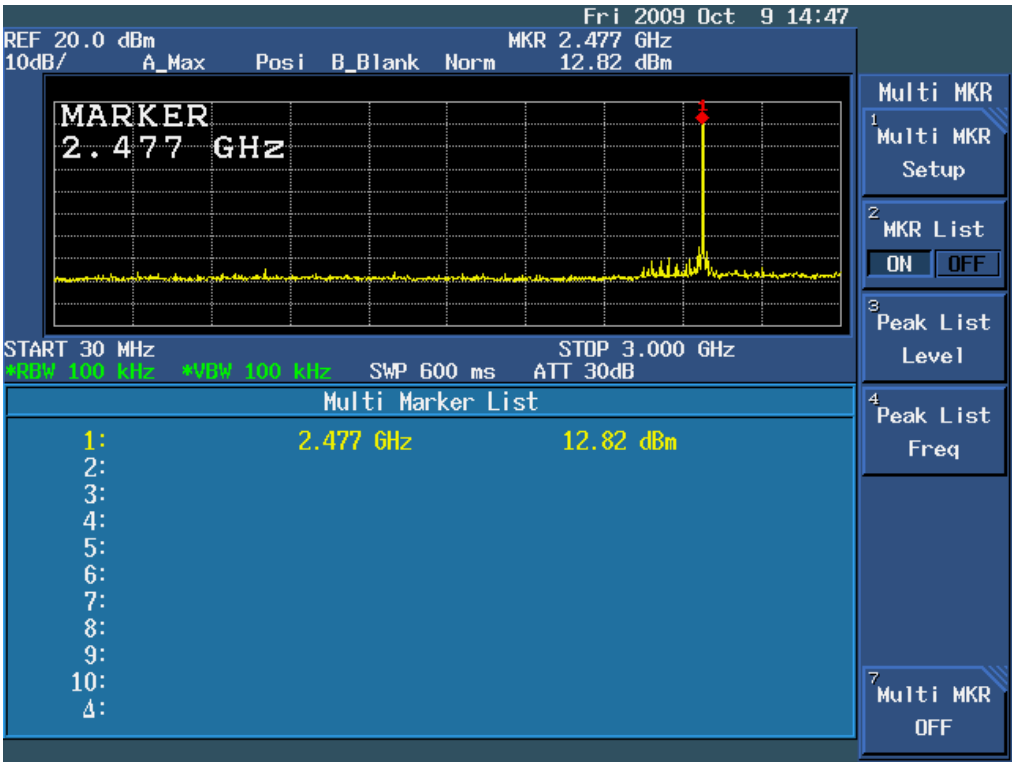

Fri 2009 Oct 9 14:31
REF 20.0 dBm
10dB/ A_Max Posi B_Blank Norm
MKR 2.400 GHz
14.77 dBm
MARKER
2.400 GHz
START 30 MHz
STOP 3.000 GHz
*RBW 100 kHz *VBW 100 kHz SWP 600 ms *ATT 30dB
Multi Marker List
1: 2.400 GHz 14.77 dBm
2: 2.385 GHz -44.25 dBm
3:
4:
5:
6:
7:
8:
9:
10:
Δ:
Multi MKR
1 Multi MKR Setup
2 MKR List
ON OFF
3 Peak List Level
4 Peak List Freq
7 Multi MKR OFF

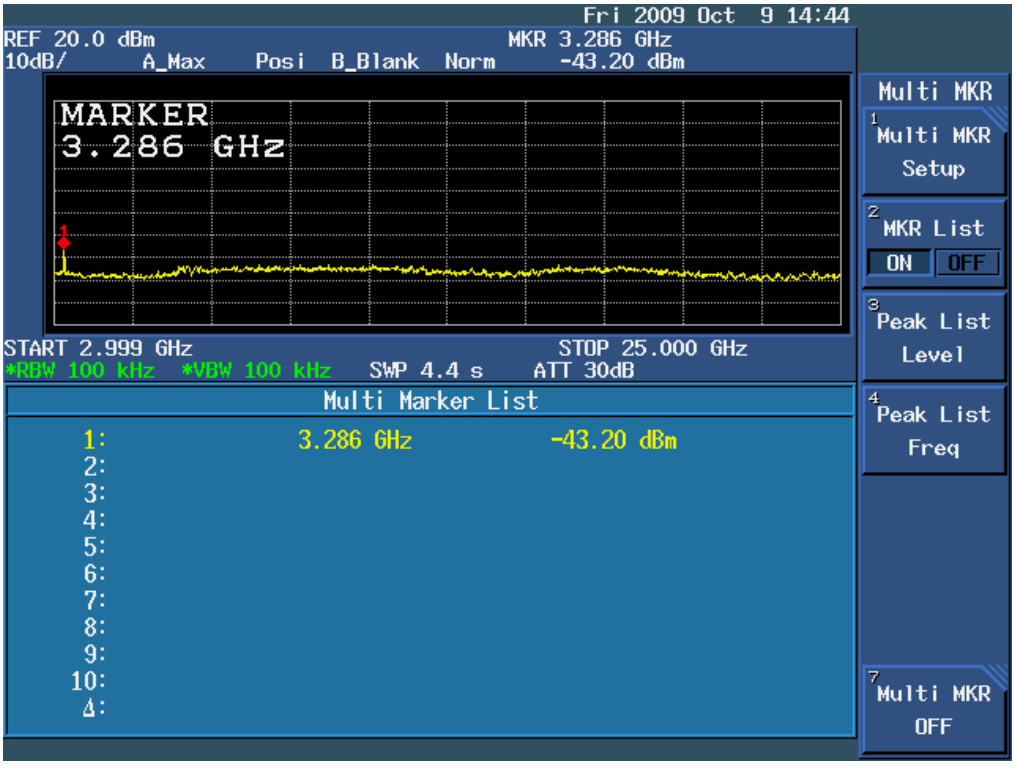
CH39


Fri 2009 Oct 9 14:37
REF 20.0 dBm
10dB/
A_Max
Posi
B_Blank
Norm
MKR 2.439 GHz
14.00 dBm
MARKER
2.439 GHz
START 30 MHz
STOP 3.000 GHz
*RBW 100 kHz
*VBW 100 kHz
SWP 600 ms
*ATT 30dB
Multi Marker List
1: 2.439 GHz 14.00 dBm
2:
3:
4:
5:
6:
7:
8:
9:
10:
Δ:
Multi MKR
1 Multi MKR Setup
2 MKR List
ON OFF
3 Peak List Level
4 Peak List Freq
7 Multi MKR OFF


Fri 2009 Oct 9 14:43
REF 20.0 dBm
10dB/
A_Max
Posi
B_Blank
Norm
MKR 11.800 GHz
-53.07 dBm
STOP
25.000 GHz
START 2.999 GHz
STOP 25.000 GHz
*RBW 100 kHz
*VBW 100 kHz
SWP 4.4 s
ATT 30dB
Multi Marker List
1: 11.800 GHz -53.07 dBm
2:
3:
4:
5:
6:
7:
8:
9:
10:
Δ:
Trace A
1 Write A
2 View A
3 Blank A
4 Max Hold A
5 Detector
Posi
6 Trc Menu
A B
7 1/2,more

CH78


Fri 2009 Oct 9 14:47
REF 20.0 dBm
10dB/ A_Max Posi B_Blank Norm
MKR 2.477 GHz
12.82 dBm
MARKER
2.477 GHz
START 30 MHz
STOP 3.000 GHz
*RBW 100 kHz *VBW 100 kHz SWP 600 ms ATT 30dB
Multi Marker List
1: 2.477 GHz 12.82 dBm
2:
3:
4:
5:
6:
7:
8:
9:
10:
Δ:
Multi MKR
1 Multi MKR Setup
2 MKR List
ON OFF
3 Peak List Level
4 Peak List Freq
7 Multi MKR OFF


Fri 2009 Oct 9 14:44
REF 20.0 dBm
10dB/ A_Max Posi B_Blank Norm
MKR 3.286 GHz
-43.20 dBm
MARKER
3.286 GHz
START 2.999 GHz
STOP 25.000 GHz
*RBW 100 kHz *VBW 100 kHz SWP 4.4 s ATT 30dB
Multi Marker List
1: 3.286 GHz -43.20 dBm
2:
3:
4:
5:
6:
7:
8:
9:
10:
Δ:
Multi MKR
1 Multi MKR Setup
2 MKR List
ON OFF
3 Peak List Level
4 Peak List Freq
7 Multi MKR OFF

6.10 Radiated Emissions Measurement

6.10.1 Limit

15.247(d) 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c))

Frequency of Emission (MHz)	Field Strength		Measurement Distance (meters)
	μV/m	dBμV/m	
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

6.10.2 Test procedure

EUT was placed upon a wooden test table which was placed on the turn table 0.8m above the horizontal metal ground plane, and operating in the mode as mentioned above. A receiving antenna was placed 3m away from the EUT. During testing, turn around the turn table and move the antenna from 1m to 4m to find the maximum field-strength reading. All peripherals were placed at a distance of 10cm between each other. Both horizontal and vertical antenna polarities were tested and performed pretest to three orthogonal axis. The worst case emissions were reported.

6.10.3Test Result

Test Data: 2009-10-10

Frenqucy Range: 30MHz to 1GHz

RBW/VBW: 100KHz/300KHz for spectrum, RBW=120KHz for receiver

Measurement Distance: 3 m

Operating Environment: 25.3°C, 58% RH, 102 Kpa

(a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
176.470	15.710	7.364	23.074	-16.926	40.000	QUASIPEAK
207.510	13.700	10.483	24.183	-15.817	40.000	QUASIPEAK
319.060	17.670	6.449	24.119	-22.881	47.000	QUASIPEAK
387.930	19.520	1.817	21.337	-25.663	47.000	QUASIPEAK
431.580	20.750	-0.484	20.266	-26.734	47.000	QUASIPEAK
***812.790**	**28.700**	**13.440**	**42.140**	**-4.860**	**47.000**	**QUASIPEAK**

(b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
79.470	10.800	14.978	25.778	-14.222	40.000	QUASIPEAK
111.480	13.460	15.719	29.179	-10.821	40.000	QUASIPEAK
286.080	16.740	9.767	26.507	-20.493	47.000	QUASIPEAK
429.640	20.690	6.967	27.657	-19.343	47.000	QUASIPEAK
748.770	27.960	5.136	33.096	-13.904	47.000	QUASIPEAK
***812.790**	**28.700**	**12.248**	**40.948**	**-6.052**	**47.000**	**QUASIPEAK**

Note: '*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Test Data: 2009-10-10
Frenqucy Range: 1GHz to 25GHz
RBW/VBW:1MHz/1MHz for Peak, 1MHz/10Hz for Average
Measurement Distance: 3 m
Operating Environment: 25.3°C, 58% RH, 102 Kpa

(a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1195	-5.552	48.993	43.44	-30.56	74	PEAK
1195	-5.552	45.36	39.807	-14.193	54	AVERAGE
1440	-4.523	50.406	45.883	-28.117	74	PEAK
1440	-4.523	45.26	40.737	-13.263	54	AVERAGE
1600	-4.48	49.82	45.34	-28.66	74	PEAK
1600	-4.48	42.56	38.08	-15.92	54	AVERAGE
2390	33.843	5.817	39.66	-14.34	54	AVERAGE
2390	33.843	11.717	45.56	-28.44	74	PEAK
1845	-2.728	50.118	47.39	-26.61	74	PEAK
***1845**	**-2.728**	**48.22**	**45.492**	**-8.508**	**54**	**AVERAGE**
4805	2.972	39.348	42.32	-11.68	54	AVERAGE
4805	2.972	47.848	50.82	-23.18	74	PEAK

(b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1600	-4.48	57.148	52.668	-21.332	74	PEAK
***1600**	**-4.48**	**55.13**	**50.65**	**-3.35**	**54**	**AVERAGE**
1810	-3.075	49.969	46.894	-27.106	74	PEAK
1810	-3.075	39.5	36.425	-17.575	54	AVERAGE
2390	33.843	5.615	39.458	-14.542	54	AVERAGE
2390	33.843	12.115	45.958	-28.042	74	PEAK
2495	-0.867	53.453	52.586	-21.414	74	PEAK
2495	-0.867	49.62	48.753	-5.247	54	AVERAGE
4805	2.972	35.129	38.101	-15.899	54	AVERAGE
4805	2.972	47.329	50.301	-23.699	74	PEAK

Note: '*' means the worst case
Measurement Level = Reading Level + Factor
Factor=Ant Factor + Cable Loss
Low Channel:2402 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1210	-5.465	43.925	38.46	-15.54	54	AVERAGE
1210	-5.465	49.125	43.66	-30.34	74	PEAK
1430	-4.527	45.144	40.617	-13.383	54	AVERAGE
1430	-4.527	50.344	45.817	-28.183	74	PEAK
***1625**	**-4.316**	**49.449**	**45.133**	**-8.867**	**54**	**AVERAGE**
1625	-4.316	52.649	48.333	-25.667	74	PEAK
1835	-2.818	44.189	41.371	-12.629	54	AVERAGE
1835	-2.818	49.289	46.471	-27.529	74	PEAK
4880	3.927	39.568	43.495	-10.505	54	AVERAGE
4880	3.927	47.568	51.495	-22.505	74	PEAK

(b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1440	-4.523	43.978	39.455	-14.545	54	AVERAGE
1440	-4.523	53.578	49.055	-24.945	74	PEAK
1625	-4.316	46.97	42.654	-11.346	54	AVERAGE
1625	-4.316	54.57	50.254	-23.746	74	PEAK
1810	-3.075	40.286	37.211	-16.789	54	AVERAGE
1810	-3.075	49.586	46.511	-27.489	74	PEAK
***2500**	**-0.88**	**48.694**	**47.814**	**-6.186**	**54**	**AVERAGE**
2500	-0.88	52.594	51.714	-22.286	74	PEAK
4880	3.927	39.812	43.739	-10.261	54	AVERAGE
4880	3.927	47.112	51.039	-22.961	74	PEAK

Note: '*' means the worst case

Measurement Level = Reading Level + Factor

Factor=Ant Factor + Cable Loss

Middle Channel :2441 MHz

(a) Antenna polarization: Horizontal

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1440	-4.523	43.736	39.213	-14.787	54	AVERAGE
1440	-4.523	52.836	48.313	-25.687	74	PEAK
1580	-4.487	41.439	36.952	-17.048	54	AVERAGE
1580	-4.487	48.539	44.052	-29.948	74	PEAK
1650	-4.152	46.916	42.764	-11.236	54	AVERAGE
1650	-4.152	52.016	47.864	-26.136	74	PEAK
1835	-2.818	42.87	40.052	-13.948	54	AVERAGE
1835	-2.818	49.57	46.752	-27.248	74	PEAK
***2483.5**	**34.135**	**14.366**	**48.501**	**-5.499**	**54**	**AVERAGE**
2483.5	34.135	13.927	48.062	-25.938	74	PEAK
4960	4.96	39.508	44.468	-9.532	54	AVERAGE
4965	5.028	47.803	52.831	-21.169	74	PEAK

(b) Antenna polarization: vertical

Frequency (MHz)	Correct Factor (dB)	Reading Level (dBuV)	Measure Level (dBuV/m)	Margin (dB)	Limit (dBuV/m)	Detector Type
1440	-4.523	45.384	40.861	-13.139	54	AVERAGE
1440	-4.523	53.984	49.461	-24.539	74	PEAK
1580	-4.487	43.494	39.007	-14.993	54	AVERAGE
1580	-4.487	50.094	45.607	-28.393	74	PEAK
1650	-4.152	46.463	42.311	-11.689	54	AVERAGE
1650	-4.152	54.563	50.411	-23.589	74	PEAK
1810	-3.075	41.15	38.075	-15.925	54	AVERAGE
1810	-3.075	49.25	46.175	-27.825	74	PEAK
***2483.5**	**34.135**	**15.99**	**50.125**	**-3.875**	**54**	**AVERAGE**
2483.5	34.135	21.99	56.125	-17.875	74	PEAK
4960	4.96	39.898	44.858	-9.142	54	AVERAGE
4960	4.96	47.398	52.358	-21.642	74	PEAK

Note: '*' means the worst case
Measurement Level = Reading Level + Factor
Factor=Ant Factor + Cable Loss
High Channel :2480 MHz

6.11 RF Exposure requirement

6.11.1 Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm2)	Averaging Times | E | 2 , | H | 2 or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100000			1.0	30

6.11.2 MPE Calculation Method

$E (V/m) = (30*P*G)^{0.5}/d$ Power Density: $Pd (W/m2) = E^2/377$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m) The formula can be changed to

$\mathbf{Pd} = (30*P*G) / (377*d^2)$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained.

6.11.3 Result

Operating Mode:GFSK Mode

Channal (MHz)	Antenna Gain (Numeric)	Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (S) (mW/cm_2)	Limit of Power Density (S) (mW/cm_2)	Result
2402	2	16.3	42.66	0.017	1	Pass
2441	2	15.66	36.81	0.0146	1	Pass
2480	2	14.65	29.17	0.0116	1	Pass