ESTECH Co., Ltd.
Rm 1015, World Venture Center II,
426-5 Gasan-dong, Guncheon-gu,
Seoul, 158-803, Korea

Electromagnetic Interference Test Report

Test Report for FCC

FCC ID:X59-HD-200B

Report Number		ESTF151111-002		
Applicant	Company name	H3 SYSTEM Co., Ltd.		
	Address	3F, 397-27, Doryong-dong, Yuseong-gu, Daejeon, R.O.Korea		
	Telephone	82-42-862-9314		
Product	Product name	USB-HDP Dongle		
	Model No.	HD-200B	Manufacturer	H3 SYSTEM Co., Ltd.
	Serial No.	NONE	Country of origin	KOREA
Test date	21-Oct-11 ~ 26-Oct-11		Date of issue	1-Nov-11
Testing location	ESTECH Co., Ltd. 58-1 OSan-Ri Kanam-Myon, Yeoju-Gun, KyungKi-Do, Korea			
Standard	FCC PART 15 (2010) & ICES-003 , ANSI C 63.4 2003			
Test item	■ Conducted Emission	□ Class A ■ Class B	Test result	OK
	■ Radiated Emission	□ Class A ■ Class B	Test result	OK
Measurement facility registration number		94696		
Tested by	Engineer J.H. KIM	(Signature)		
Reviewed by	Engineering Manager J.M.Yang	(Signature)		
Abbreviation	OK, Pass = Complied, Fail = Failed, N/A = not applicable			

* Note

- This test report is not permitted to copy partly without our permission
- This test result is dependent on only equipment to be used
- This test result based on a single evaluation of one sample of the above mentioned

Contents 1

Contents 2

1. Laboratory Information

1.1 General

This EUT (Equipment Under Test) has been shown to be capable of compliance with the applicable technical standards and is tested in accordance with the measurement procedures as indicated in this report.
ESTECH Lab attests to accuracy of test data. All measurement reported herein were performed by ESTECH Co., Ltd.
ESTECH Lab assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

1.2 Test Lab.

Corporation Name : ESTECH Co., Ltd.

Head Office : Rm 1015, World Venture Center II, 426-5, Gasan-dong, Geumcheon-gu, Seoul, Korea
(Safety & Telecom. Test Lab)

EMC Test Lab : 58-1 OSan-Ri Kanam-Myon, Yeoju-Gun, KyungKi-Do, Korea

1.3 Official Qualification(s)

KCC : Granted Accreditation from Ministry of Information & Communication for EMC, Safety and Telecommunication
KOLAS : Accredited Lab By Korea Laboratory Accreditation Schema base on CENELEC requirements
FCC : Filed Laboratory at Federal Communications Commission
VCCI : Granted Accreditation from Voluntary Control Council for Interference from ITE

2. Description of EUT

2.1 Summary of Equipment Under Test (Bluetooth)

Product Name	: USB-HDP Dongle
Model Number	: HD-200B
Modulation Type	: GFSK(FHSS) , DQPSK, 8DPSK
Transfer Rate	: 3Mbps
Number of Channel	: 79 ch
Channel Spacing	: 1MHz
Output Power	: GFSK : -5.76 dBm 8DPSK : -4.57 dBm
Serial Number	: NONE
Manufacturer	: H3 SYSTEM Co., Ltd.
Country of origin	: KOREA
Rating	: Supply USB D.C 5 V
Receipt Date	: 12-Oct-11

2.2 General descriptions of EUT

The device uses a minimum of 20 of the available 79 channels to comply with the 15.247 requirements for FHSS systems.
The Bluetooth frequency hoppoing transceiver is designed to operate between 2400 and 2483.5MHz.
- the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) stream. It is also comply with FHSS requirements in Section 15.247(a)(1).
: Its hopping sequence is pseudo random, all channels used equally on average.
The receiver input bandwidth approximately equal the transmit band bandwidth, and its hop in sequence with the transmit signal.
- the system does not coordinate its channel selection/hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

3. Test Standards

Test Standard : FCC PART 15 (2010)

This Standard sets out the regulations under which an intentional, unintentional, or incidental radiator may be operated without an individual license. It also contains the technical specifications, administrative requirements and other conditions relating to the marketing of Part 15 devices.

Test Method : ANSI C 63.4 (2003)

This standard sets forth uniform methods of measurement of radio-frequency (RF) signals and noise emitted from both unintentional and intentional emitters of RF energy in the frequency range 9 kHz to 40 GHz. Methods for the measurement of radiated and AC power-line conducted radio noise are covered and may be applied to any such equipment unless otherwise specified by individual equipment requirements. These methods cover measurement of certain decides that deliberately radiate energy, such as intentional emitters, but does not cover licensed transmitters. This standard is not intended for certification/approval of avionic equipment or for industrial, scientific, and medical (ISM) equipment These method apply to the measurement of individual units or systems comprised of multiple units

Summary of Test Results

Applied Satandard : 47 CFR Part 15, Subpart C				
Standard	Test Type	Result	Remark	Limit
15.207	AC Power Conducted Emission	Pass	Meet the requirement	
15.209	Intentional Radiated Emission	Pass	Meet the requirement	
15.247(a)(1)	Carrier Frequency Separation &	Pass	Meet the requirement	>25kHz
	20 Bandwidth			
15.247(b)	Maximum Peak ouput power	Pass	Meet the requirement	30dBm(1W)
15.247(a)(1)(ii)	Number of Hopping Frequency	Pass	Meet the requirement	>75
15.247(c)	Transmitter Radiated Emission	Pass	Meet the requirement	
15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Pass	Meet the requirement	<400ms
15.247(d)	Band Edge Measurement	Pass	Meet the requirement	

4. Measurement Condition

4.1 EUT Operation

a. Channel

Ch.	Frequency	Ch.	Frequency
0	2402 MHz	40	2442 MHz
1	2403 MHz	41	2443 MHz
2	2404 MHz	42	2444 MHz
3	2405 MHz	43	2445 MHz
4	2406 MHz	…	…
…	…	78	2480 MHz
39	2441 MHz		

b. Measurement Channel :Low(2402MHz), Middle(2441MHz),High(2480MHz)

c. Test Mode : DQPSK, 8DPSK, GFSK(worst case)

d. Test rate :3Mbps

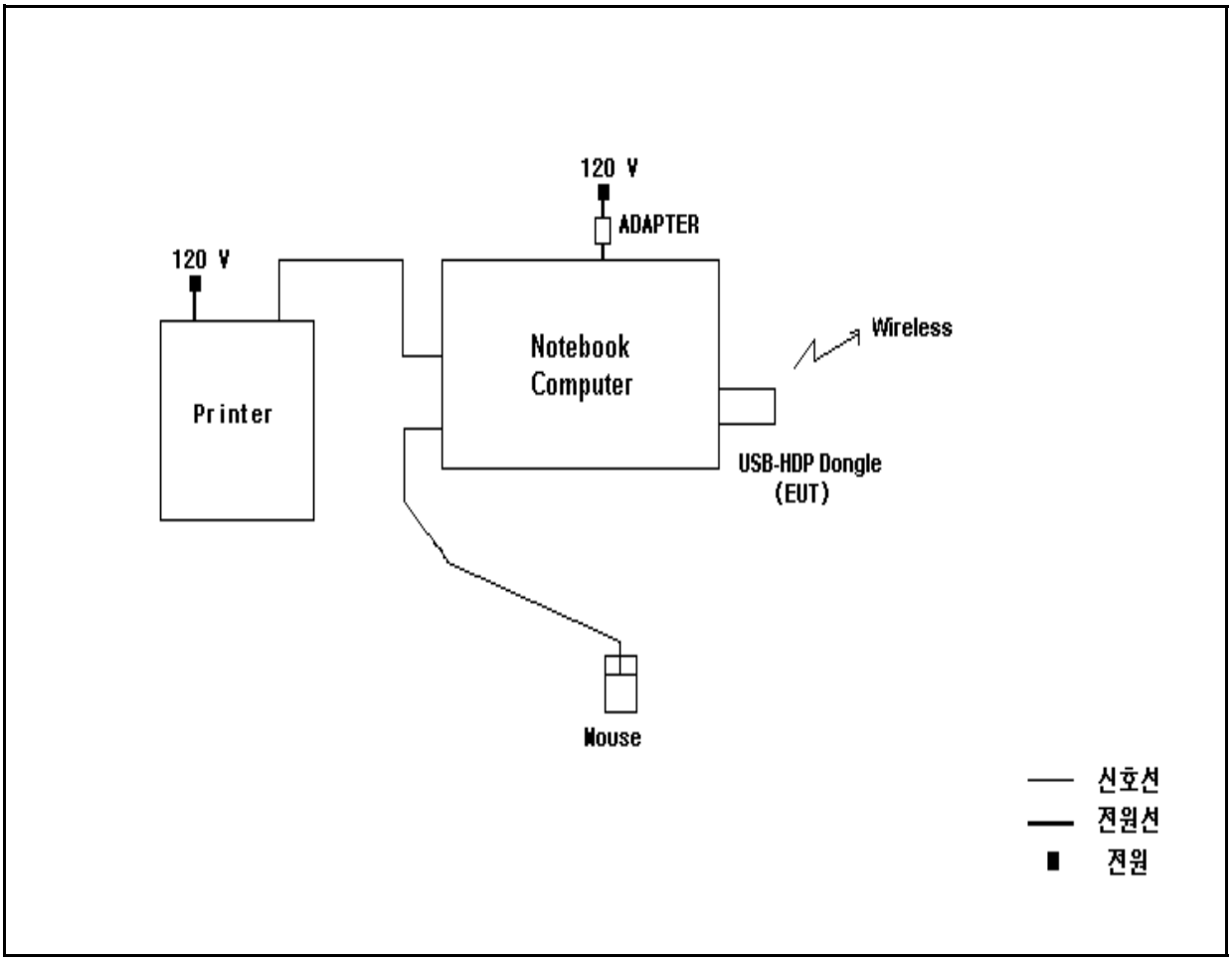
4.2 EUT Operation.

* The EUT was in the following operation mode during all testing

* Connect the EUT with Note PC.

* Execute a RF test program to enable EUT under transmission/receiving condition continuously at specific channel frequency

4.3 Configuration and Peripherals



4.4 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
USB-HDP Dongle	HD-200B	NONE	H3 SYSTEM Co., Ltd.	EUT
Notebook Computer	GW687AV	CNU0295R8D	Hewlett Packard Company	
ADAPTER	PPP009D	WBGSV0ADDZ3O3R	Delta Electronics(Jiang Su),Ltd.	
MOUSE	MO56UO	519048894	Dell	
PRINTER	K10229	NONE	Cannon Vietnam Co., Ltd.	

4.5 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
Notebook Computer	POWER	Adapter	-	1.5	Shielded	
Notebook Computer	USB	Mouse	USB	1.5	Shielded	
USB-HDP Dongle	USB	Notebook Computer	USB	-	-	
Notebook Computer	USB	Printer	USB	1.5	Shielded	

5. Carrier Frequency Separation

5.1 Test procedure

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25kHz or the 20dB bandwidth of the hopping channel, whichever is greater.

5.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

. RBW= 300KHz

. VBW= 300KHz

. Span= 3MHz

. Sweep= suitable duration based on the EUT specification.

20dB Bandwidth Test Instruments

Description	Model	Serial Number	Cal. Due Date
Bluetooth Tester	TC-3000A	3000A5B0298	2012-12-21
Dual Directional Coupler	778D	16502	2012-02-24
Spectrum Analyzer	E4440A	US41421291	2012-09-05
-Spectrum Analyzer <=> EUT	Loss: 1.0dB	-	

5.3 Measurement results

EUT	USB-HDP Dongle	MODEL	HD-200B
MODE	FHSS	ENVIRONMENTAL CONDITION	26℃, 43%RH
INPUT POWER	110 V a.c.		

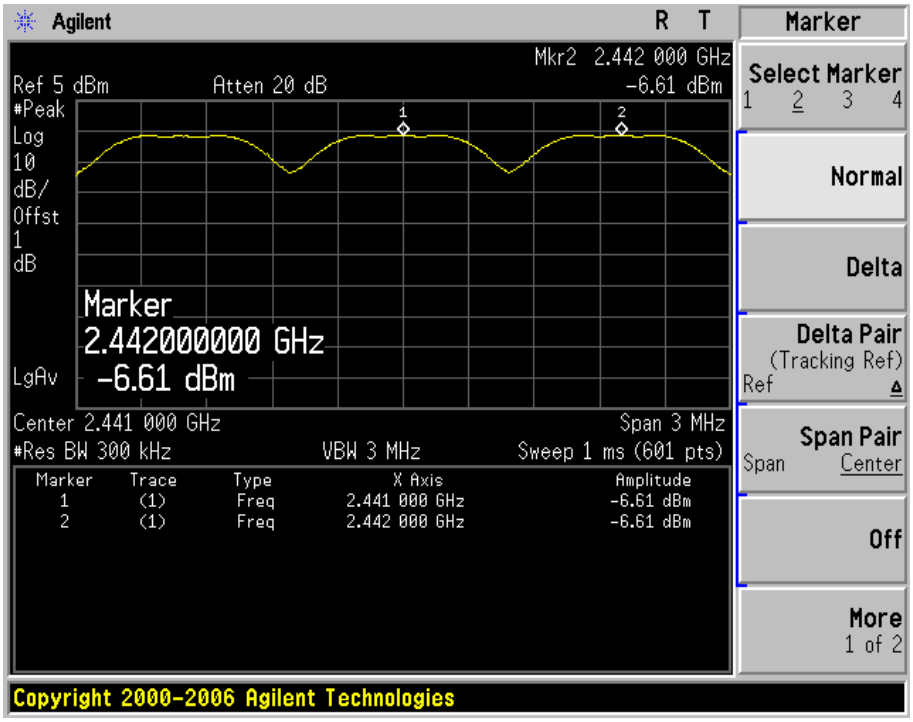
CHANNEL	Channel Frequency (MHz)	Bandwidth at 20dB below(kHz)	Channel Separation (MHz)	Limit (kHz)	PASS/FAIL
0	2402	931	1.0	>25	PASS
39	2441	980	1.0	>25	PASS
78	2480	934	1.0	>25	PASS

(8DPSK)

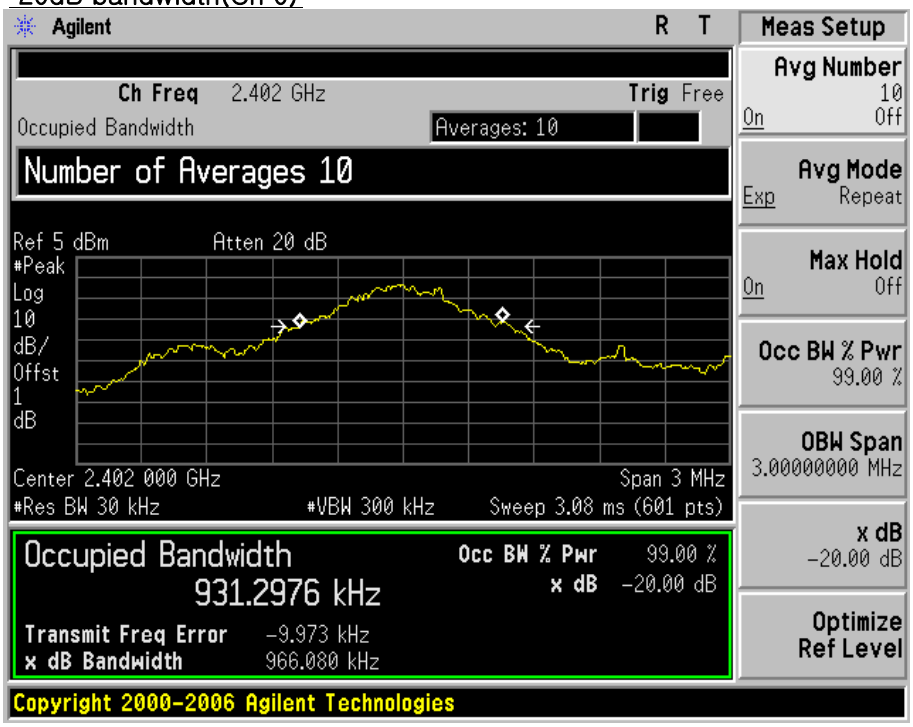
CHANNEL	Channel Frequency (MHz)	Bandwidth at 20dB below(MHz)	Channel Separation (MHz)	Limit (MHz)	PASS/FAIL
0	2402	1.194	1.0	>0.85	PASS
39	2441	1.200	1.0	>0.86	PASS
78	2480	1.222	1.0	>0.89	PASS

5.4 Trace data (GFSK)

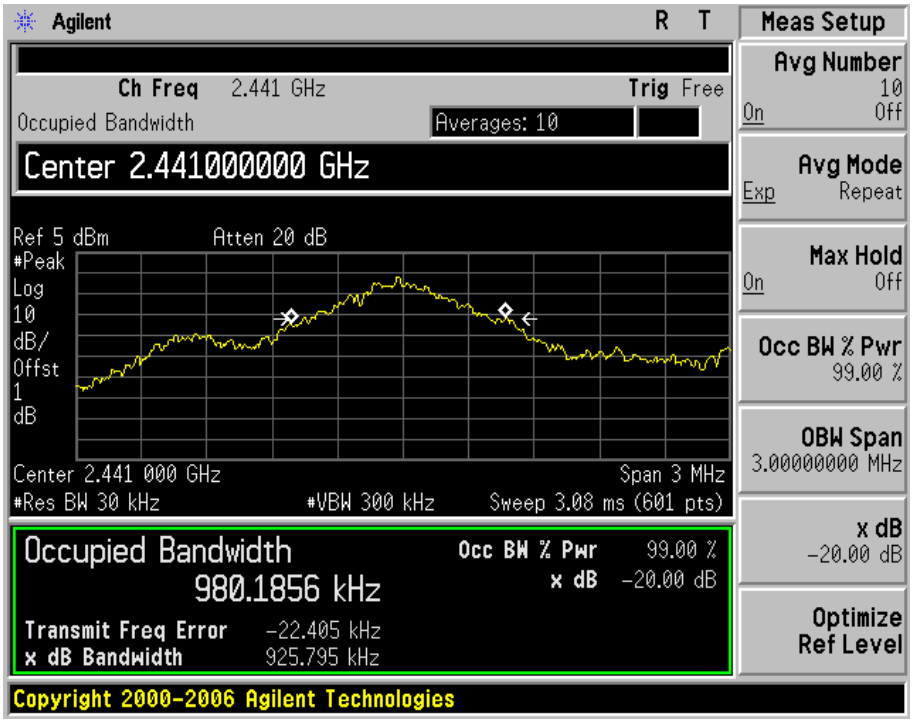
Channel Separation



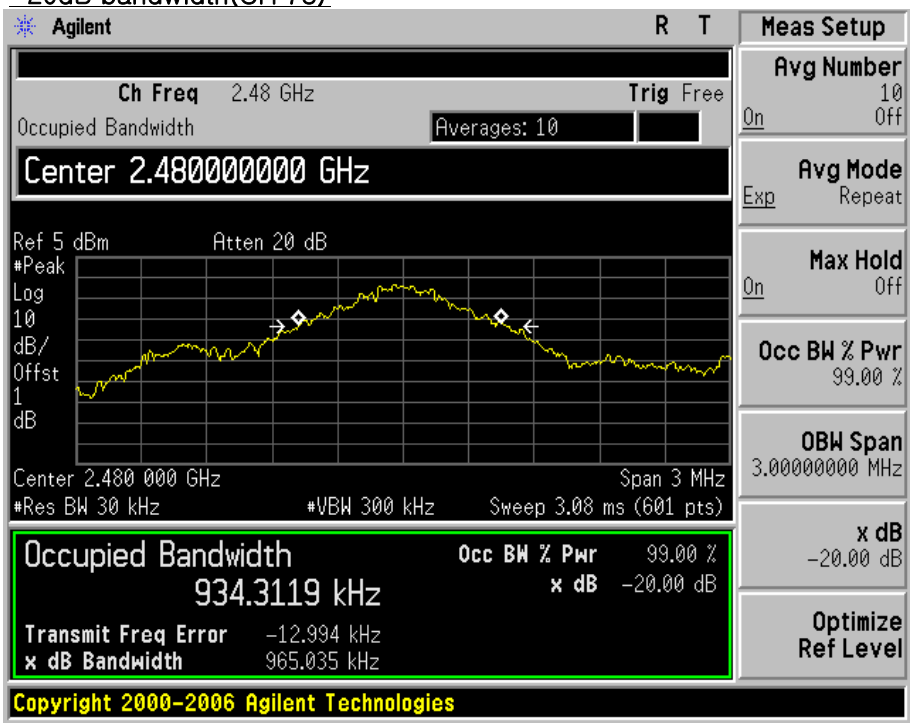
20dB bandwidth(Ch 0)



20dB bandwidth(CH 39)

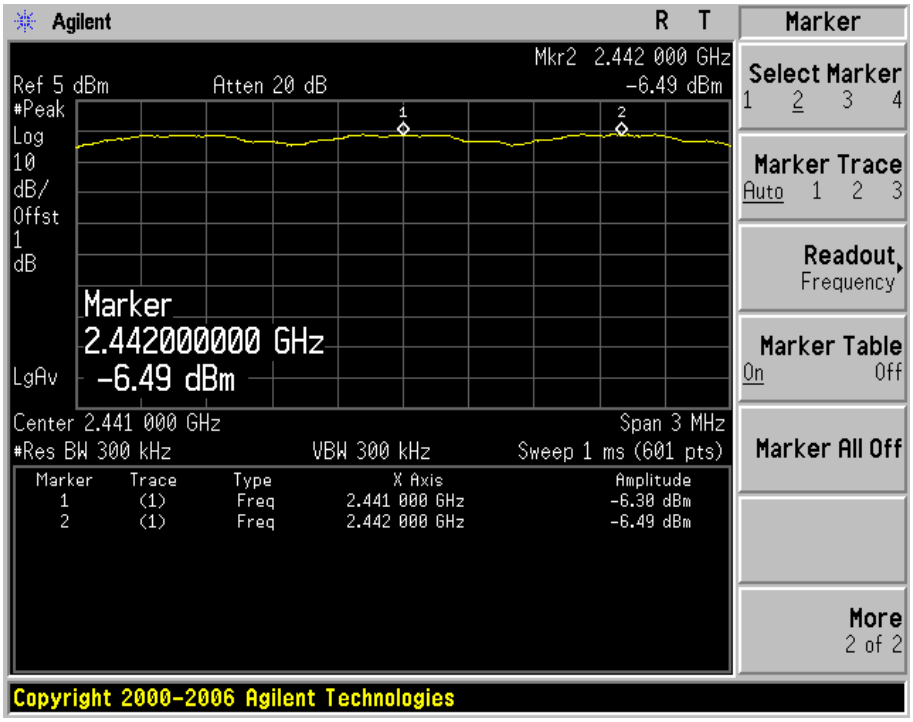


20dB bandwidth(CH 78)

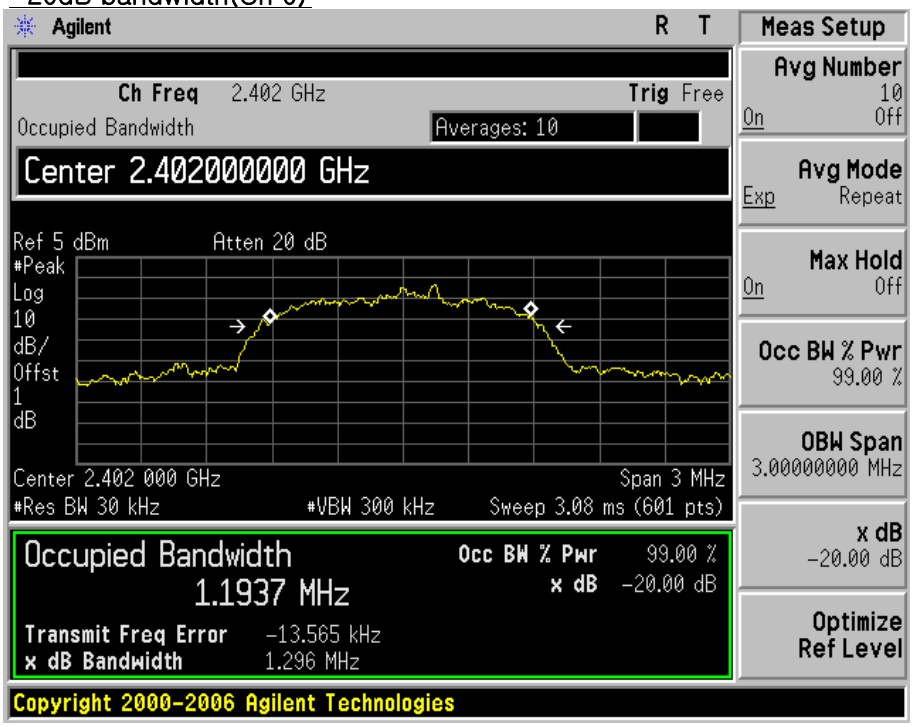


(8DPSK)

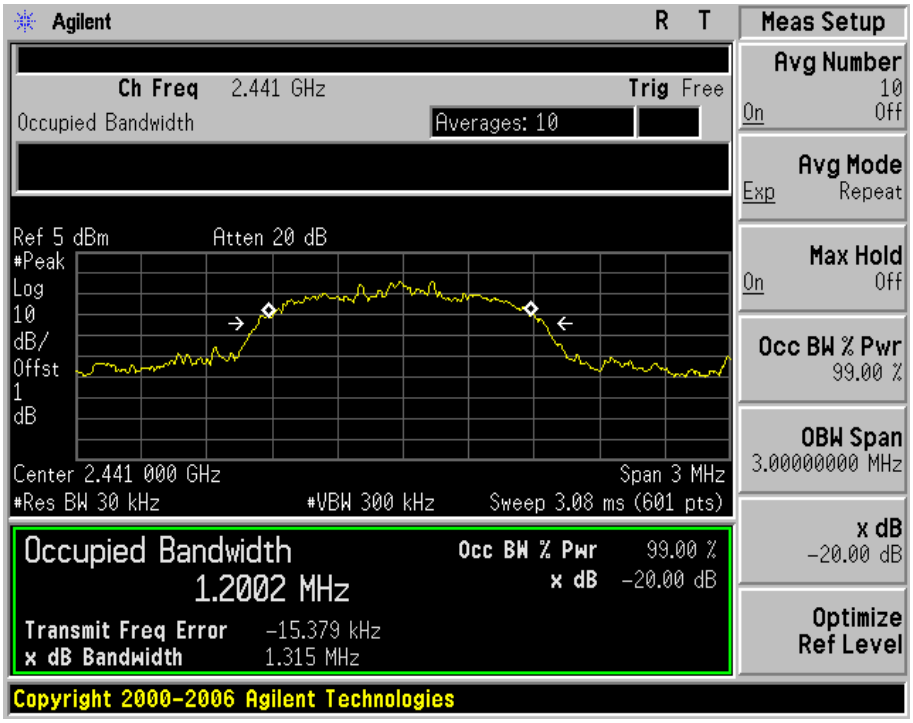
Channel Separation



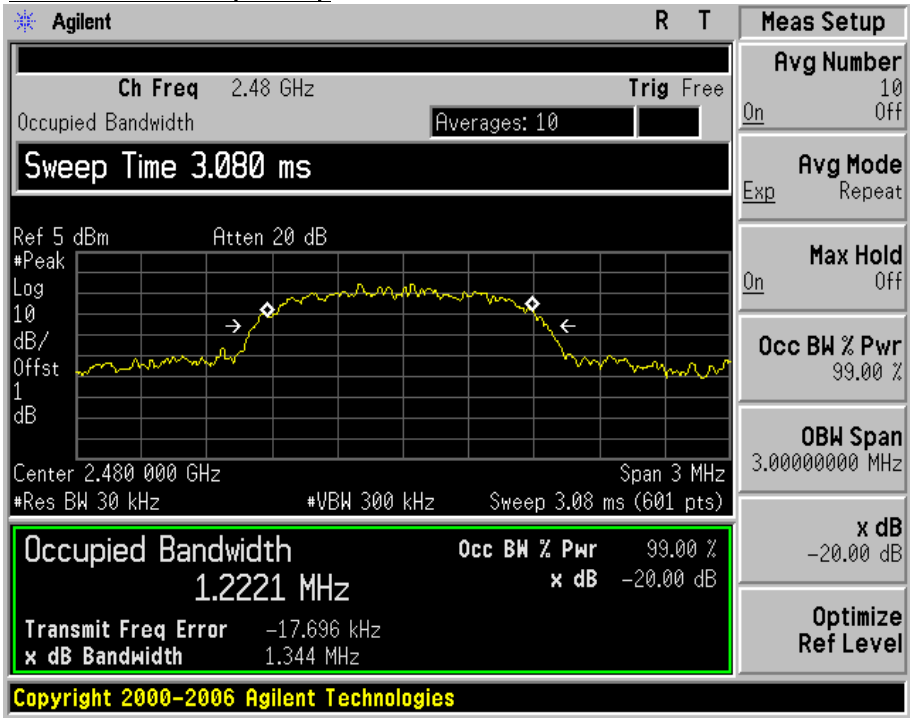
20dB bandwidth(Ch 0)



20dB bandwidth(CH 39)



20dB bandwidth(CH 78)



6. MAXIMUM PEAK OUTPUT POWER

6.1 Test procedure

The transmitter antenna terminal is connected to the input of a Power Sensor. Measurement is made while EUT is operating in transmission mode at the appropriate center frequency. The maximum peak output power measurement is 30dBm.

Description	Model	Serial Number	Cal. Due Date
Power Meter	NRVS	849622/045	2012-01-27
Power Sensor	NRV-251	325948/013	2012-01-27
Bluetooth Tester	TC-3000A	3000A5B0298	2012-12-21
Dual Directional Coupler	778D	16502	2012-02-24
-Spectrum Analyzer <=> EUT	Loss: 1.0dB	-	

6.2 Measurement results

EUT	USB-HDP Dongle	MODEL	HD-200B
MODE	GFSK,8DPSK DH5	ENVIRONMENTAL CONDITION	24℃, 43%RH
INPUT POWER	110 V a.c.		

GFSK

CHANNEL	Channel Frequency (MHz)	Peak Power Output(dBm)		Limit[1W] (dBm)	PASS/ FAIL
		(dBm)	(W)		
0	2402	-6.33	0.0002	30.0	PASS
39	2441	-6.65	0.0002	30.0	PASS
78	2480	-5.76	0.0003	30.0	PASS

8DPSK

CHANNEL	Channel Frequency (MHz)	Peak Power Output(dBm)		Limit[1W] (dBm)	PASS/ FAIL
		(dBm)	(W)		
0	2402	-6.34	0.0002	30.0	PASS
39	2441	-6.28	0.0002	30.0	PASS
78	2480	-4.57	0.0003	30.0	PASS

Note:GFSK mode is max power in three different modulations.

7. Number of Hopping Frequency

7.1 Test procedure

According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400MHz-2483.5MHz bands shall use at least 75 hopping frequencies.

7.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

. RBW= 300KHz

. VBW= 300KHz

. Span= the frequency band of operation

. Sweep= suitable duration based on the EUT specification.

The Number of Hopping Frequency Test Instruments

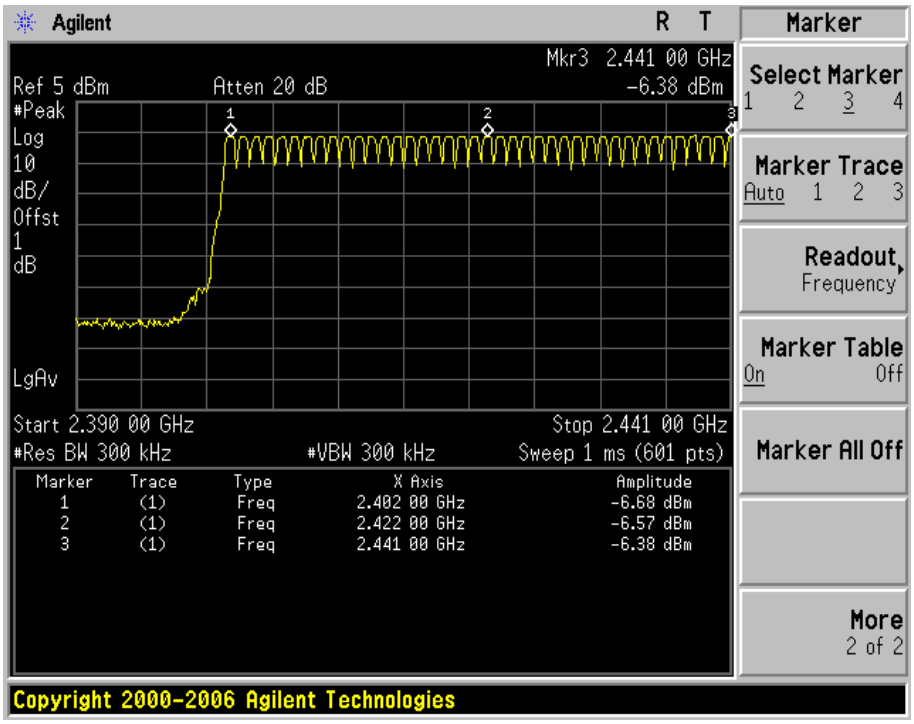
Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US41421291	2012-09-05
Bluetooth Tester	TC-3000A	3000A5B0298	2012-12-21
Dual Directional Coupler	778D	16502	2012-02-24
-Spectrum Analyzer <=> EUT	Loss: 1.0dB		

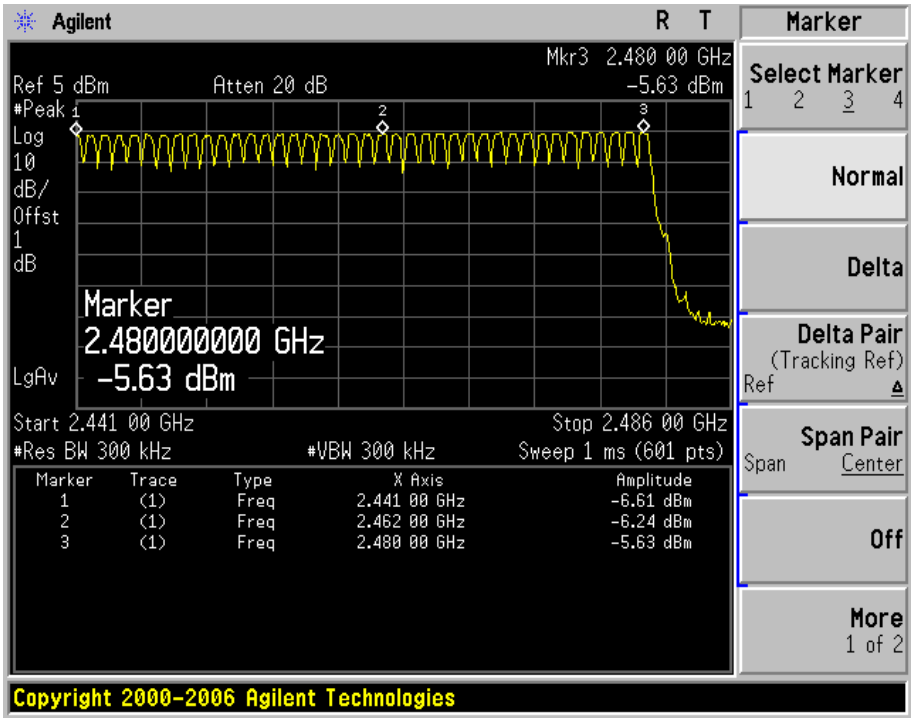
7.3 Measurement results

EUT	USB-HDP Dongle	MODEL	HD-200B
MODE	FHSS	ENVIRONMENTAL CONDITION	26℃, 43%RH
INPUT POWER	110 V a.c.		

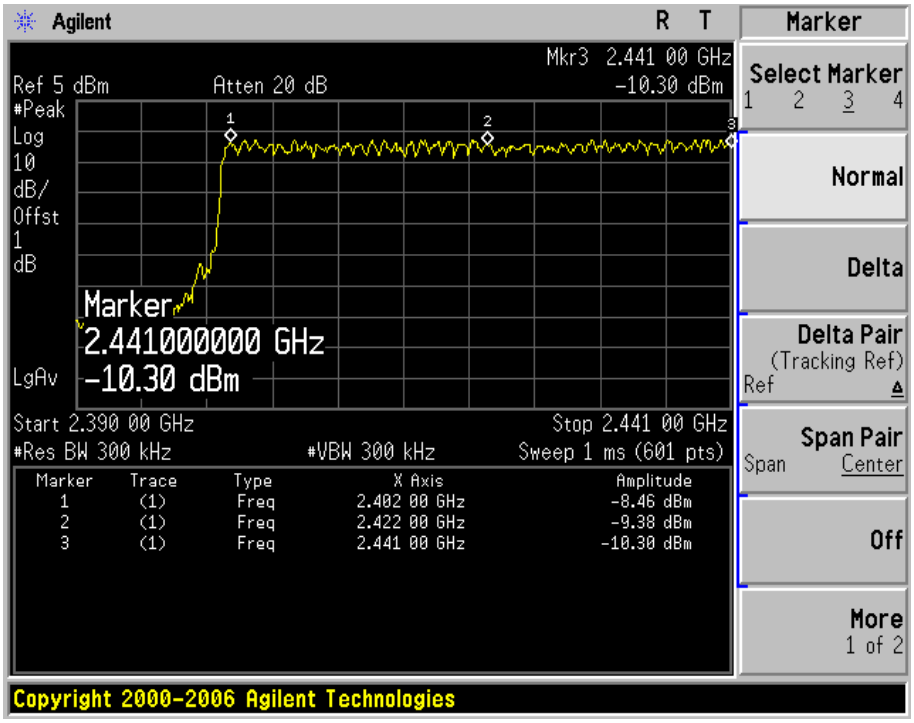
Number of CH	Limit (Number of CH)	PASS/FAIL
79	>75	PASS

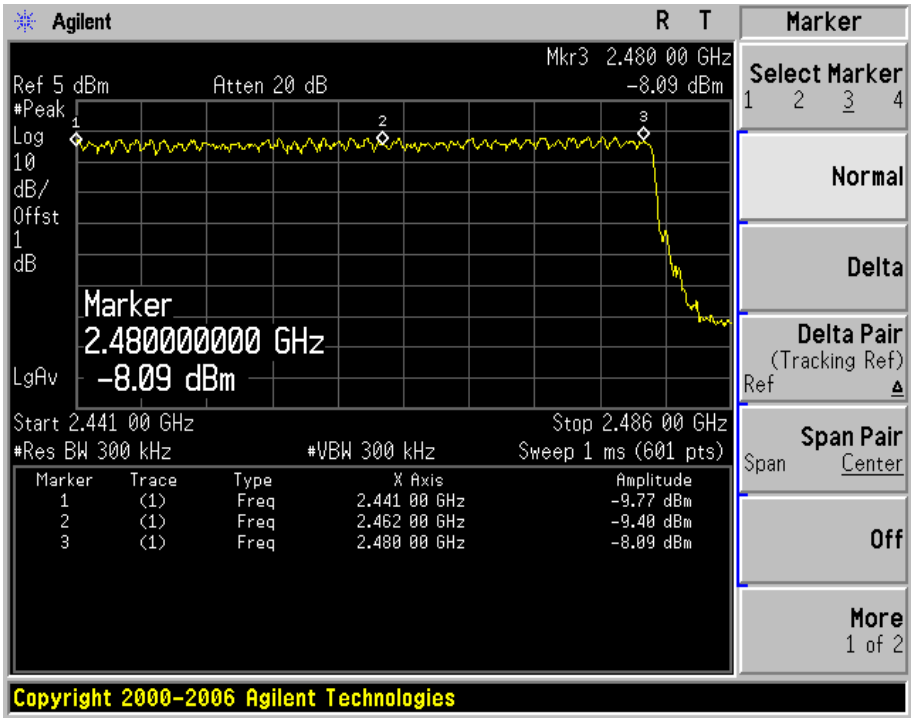
7.4 Trace data





7.4 Trace data





8. Time of Occupancy (Dwell Time)

8.1 Test procedure

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 s within a period 0.4 s multiplied by the number of hopping channels employed.

8.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

. RBW= 1MHz

. VBW≥RBW

. Span= zero span, centered on a hoppong channel

. Sweep = as necessary to capture the entire dwell time per hoppong channel

. Detector function = Peak

. Trace = Max hold

The Time of Occupancy Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US41421291	2012-09-05
Bluetooth Tester	TC-3000A	3000A5B0298	2012-12-21
Dual Directional Coupler	778D	16502	2012-02-24
-Spectrum Analyzer <=> EUT	Loss: 1.0dB	-	

8.3 Measurement results

EUT	USB-HDP Dongle	MODEL	HD-200B
MODE	FHSS	ENVIRONMENTAL CONDITION	26℃, 43%RH
INPUT POWER	110 V a.c.		

A. DH1 Mode

One peiod for each particular channel : 0.396 ms X 320.1 = 126.76 ms

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
0	126.76	400	PASS

B. DH3 Mode

One peiod for each particular channel : 1.664 ms X 159.9 = 266.07 ms

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
39	266.07	400	PASS

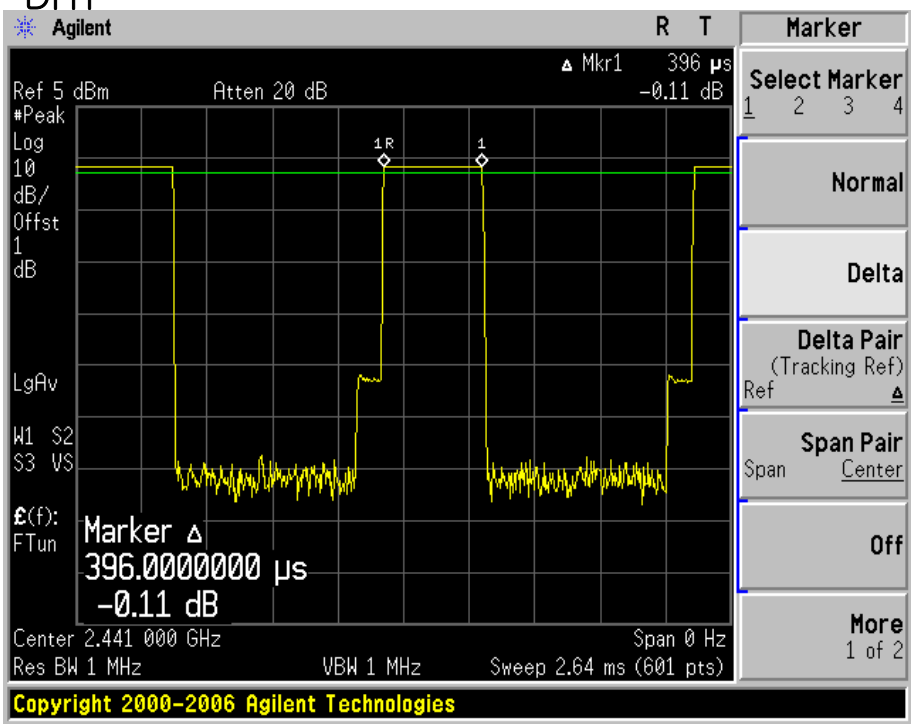
C. DH5 Mode

One peiod for each particular channel : 2.904 ms X 106.81 = 310.18 ms

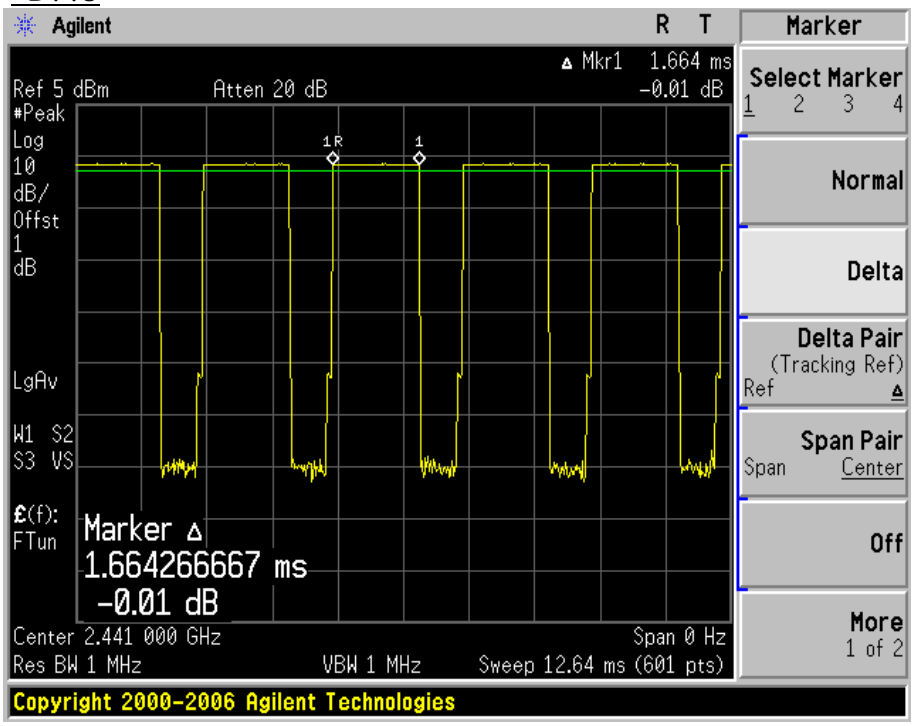
Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
78	310.18	400	PASS

8.4 Trace data

DH1



DH3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R T
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Δ Mkr1 1.664 ms
-0.01 dB
Ref 5 dBm
Atten 20 dB
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1
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S3 VS
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-0.01 dB
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
VBW 1 MHz
Sweep 12.64 ms (601 pts)
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Delta
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(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
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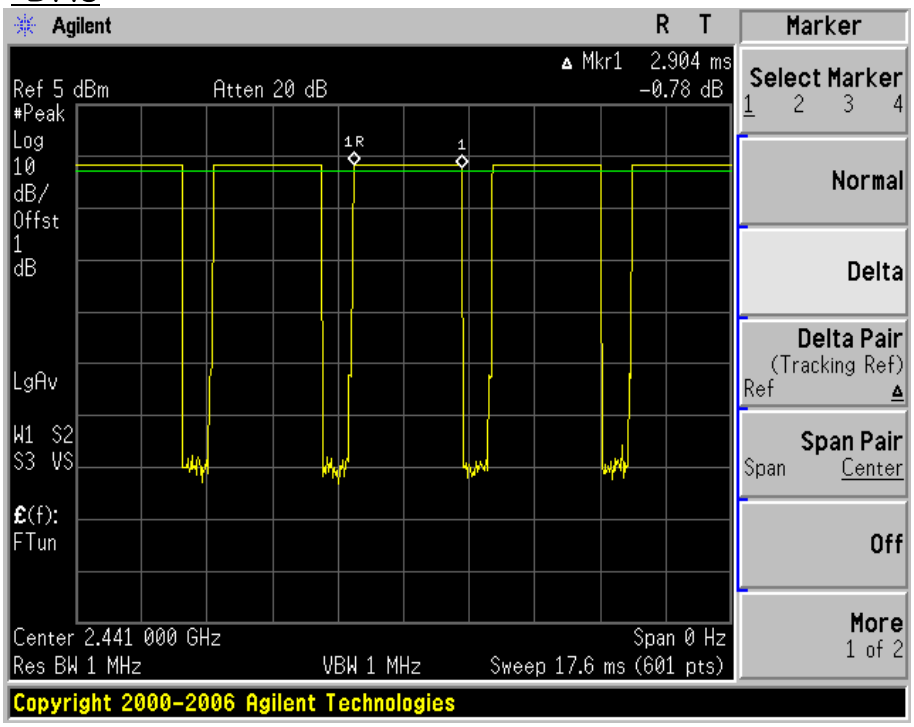
DH5


Agilent
R T
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Δ Mkr1 2.904 ms
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Ref 5 dBm
Atten 20 dB
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10
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W1 S2
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£(f):
FTun
Center 2.441 000 GHz
Span 0 Hz
Res BW 1 MHz
VBW 1 MHz
Sweep 17.6 ms (601 pts)
Select Marker
1 2 3 4
Normal
Delta
Delta Pair
(Tracking Ref)
Ref
Span Pair
Span Center
Off
More
1 of 2
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8DPSK

A. DH1 Mode

One peiod for each particular channel : 0.409 ms X 320.1 = 130.92 ms

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
0	130.92	400	PASS

B. DH3 Mode

One peiod for each particular channel : 1.661 ms X 159.9 = 265.59 ms

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
39	265.59	400	PASS

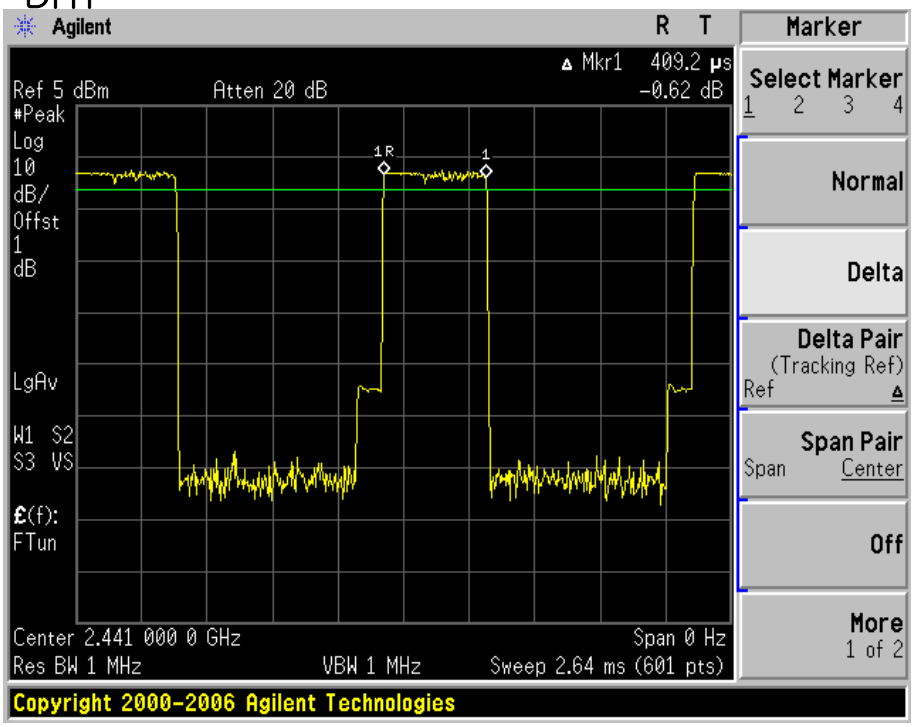
C. DH5 Mode

One peiod for each particular channel : 2.911 ms X 106.81 = 310.92 ms

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
78	310.92	400	PASS

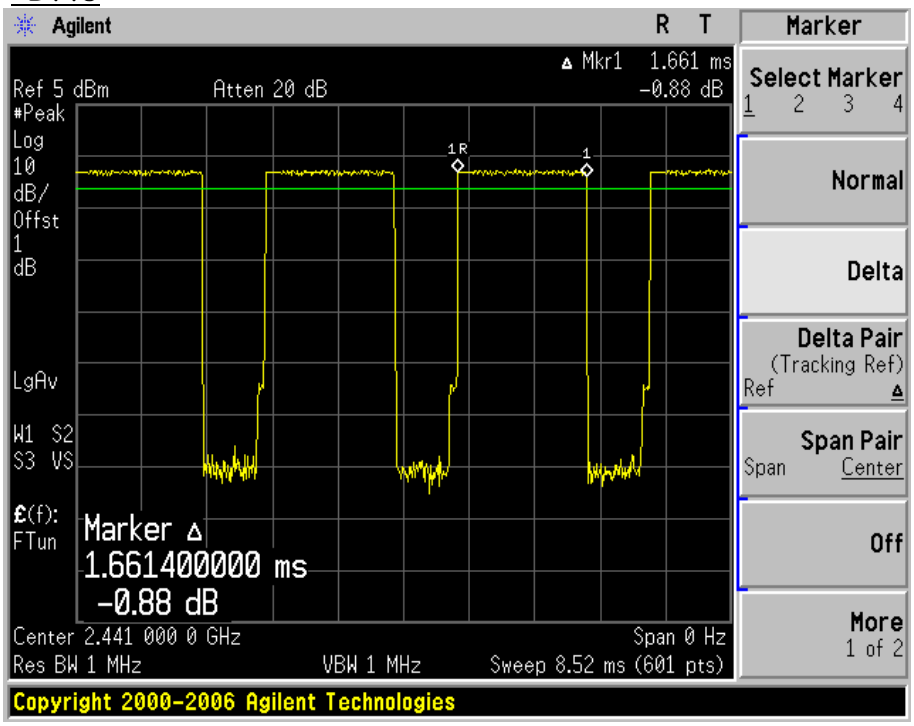
8.5 Trace data

DH1

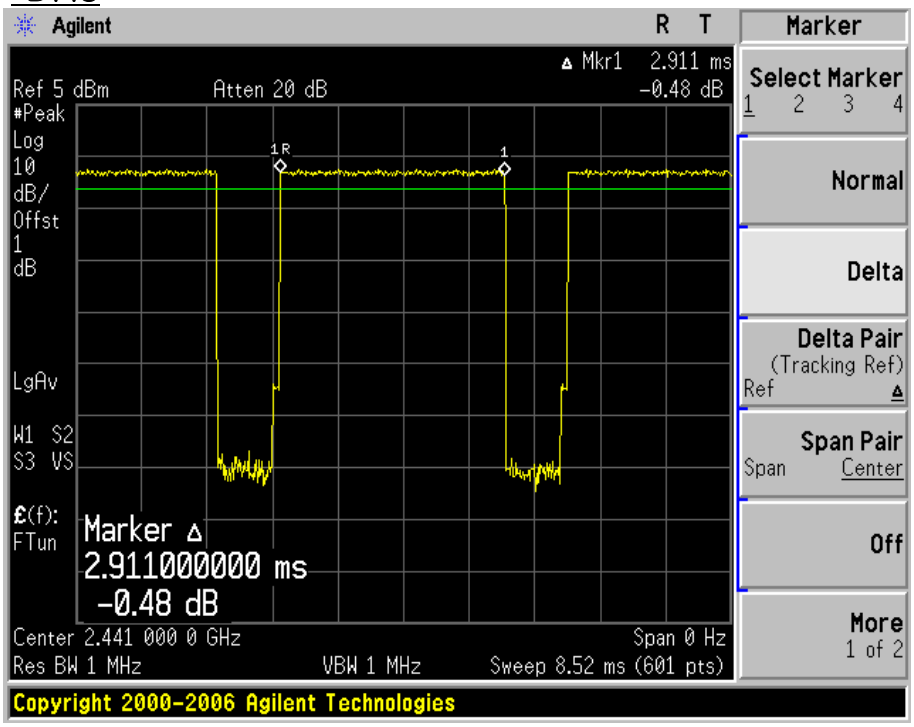


8DPSK

DH3



DH5



9. band-edge and out of band emissions.

9.1 Test procedure

The radio frequecy power at 20dB down from the highest inband power level is measured with a spectrum analyzer connected to the antenna terminal, while EUT is operating in transmission mode at the appropriate center frequency. The band edge&out of band emission shall be at least 20dB below of the highest inband power level.

9.2 Test instruments and measurement setup

The spectrum analyzer is set to as following.

. RBW= 100KHz

. VBW= 100KHz

. Span= suitable frequency span

. Sweep= suitable duration based on the EUT specification.

Band Edge&Out of Emission Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US41421291	2012-09-05
Bluetooth Tester	TC-3000A	3000A5B0298	2012-12-21
Dual Directional Coupler	778D	16502	2012-02-24
-Spectrum Analyzer <=> EUT	Loss: 1.0dB		

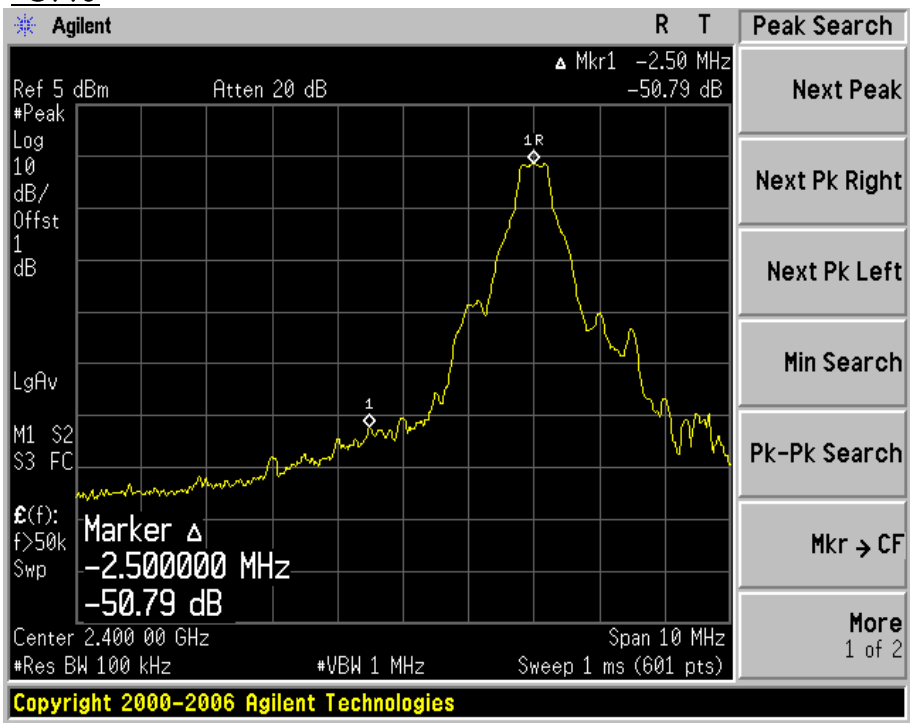
9.3 Measurement results of band-edge & out of emission

EUT	USB-HDP Dongle	MODEL	HD-200B
MODE	GFSK	ENVIRONMENTAL CONDITION	24℃, 43%RH
INPUT POWER	110 V a.c.		

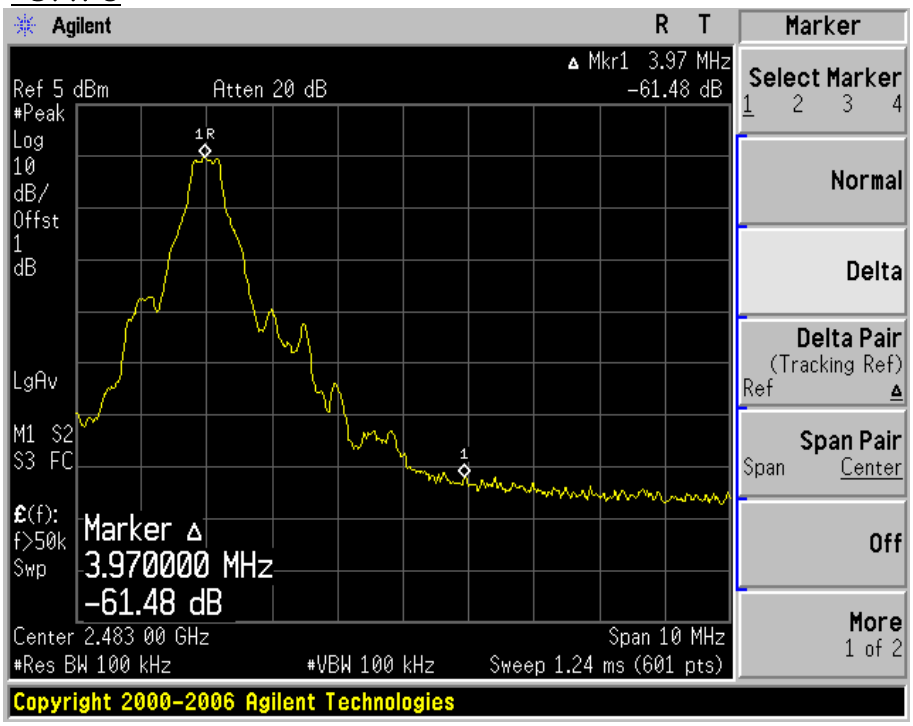
* Refer to attach spectrum analyzer data chart.

9.4 Trace data of band-edge & Out of Emission

CH0

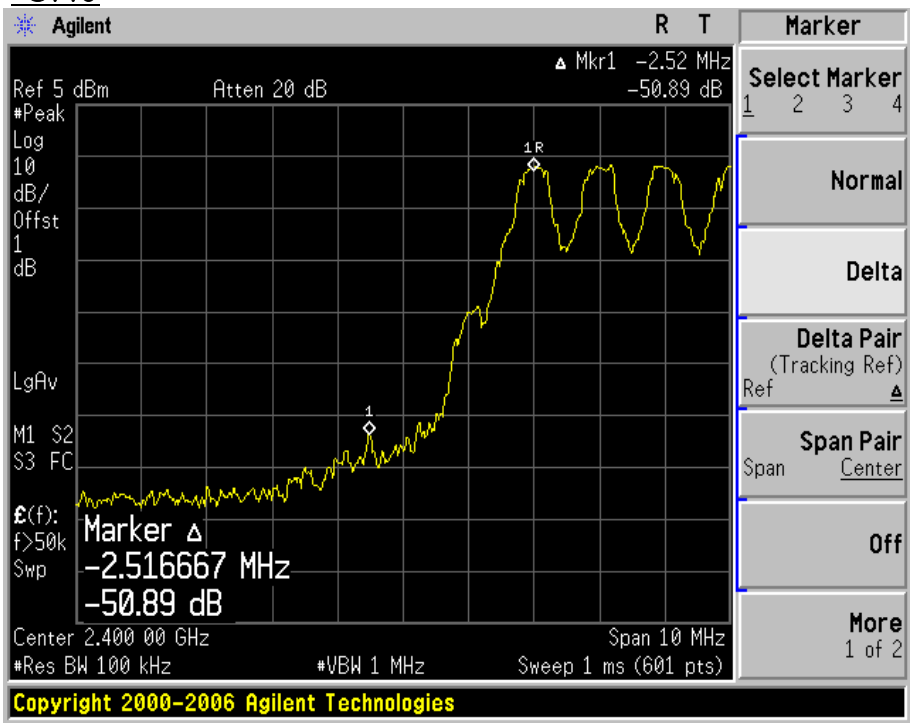


CH78



Hopping on

CH0



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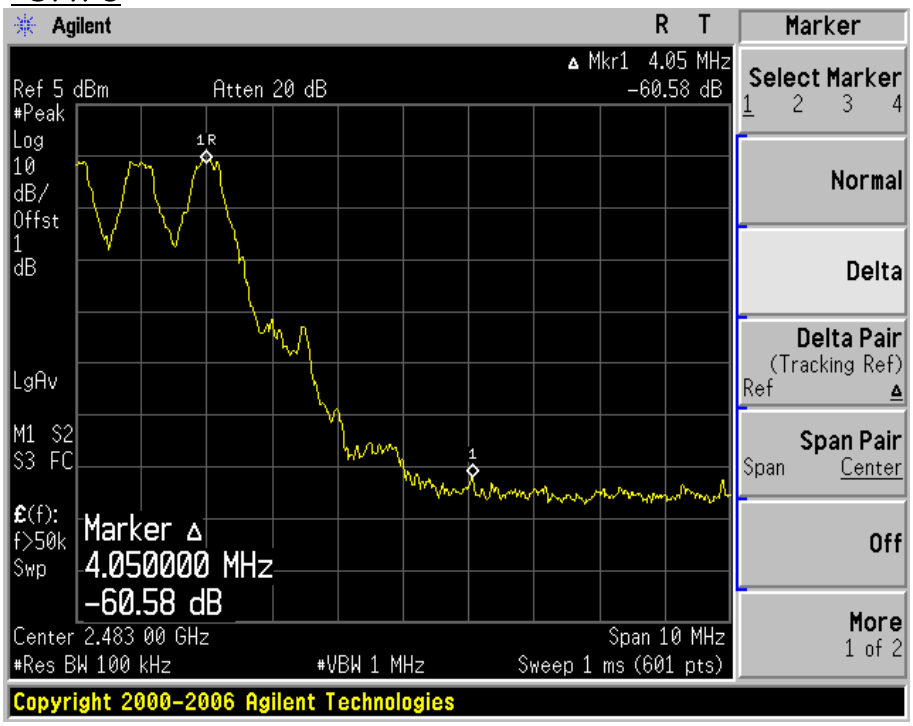
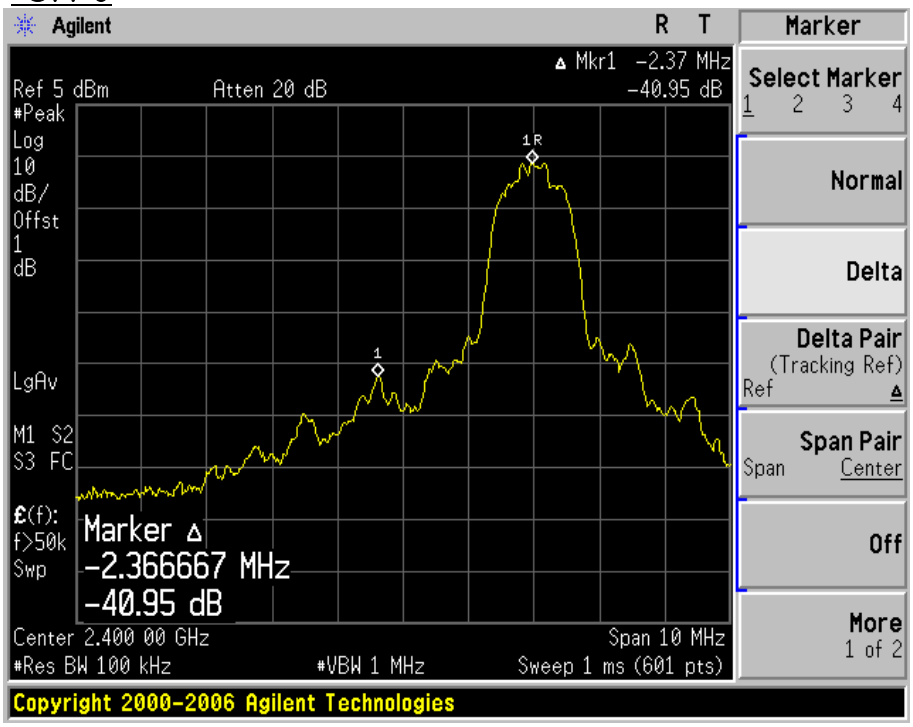


8DPSK

CH 0



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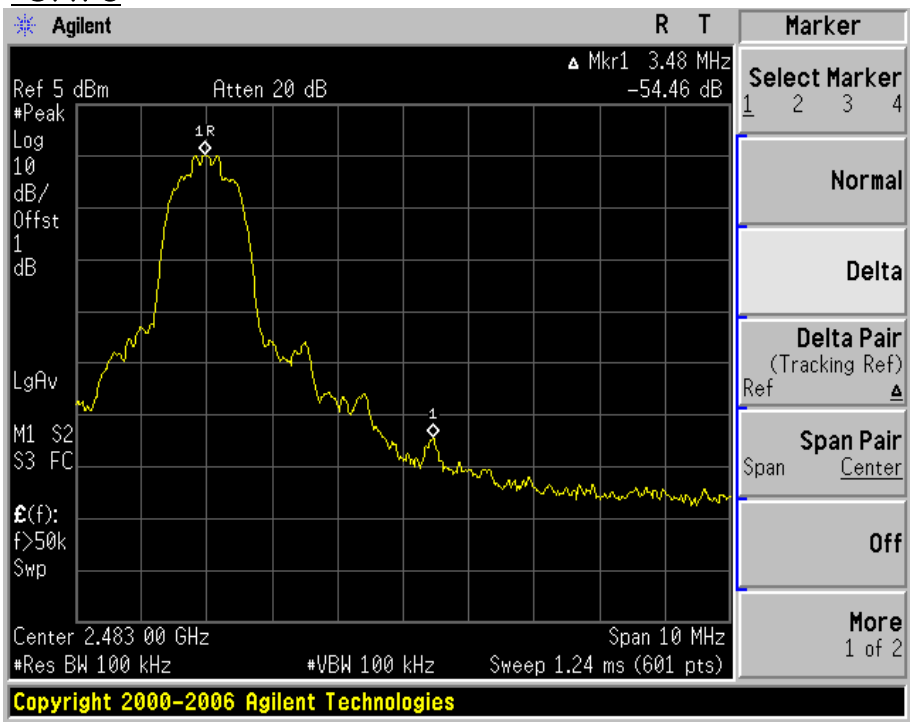
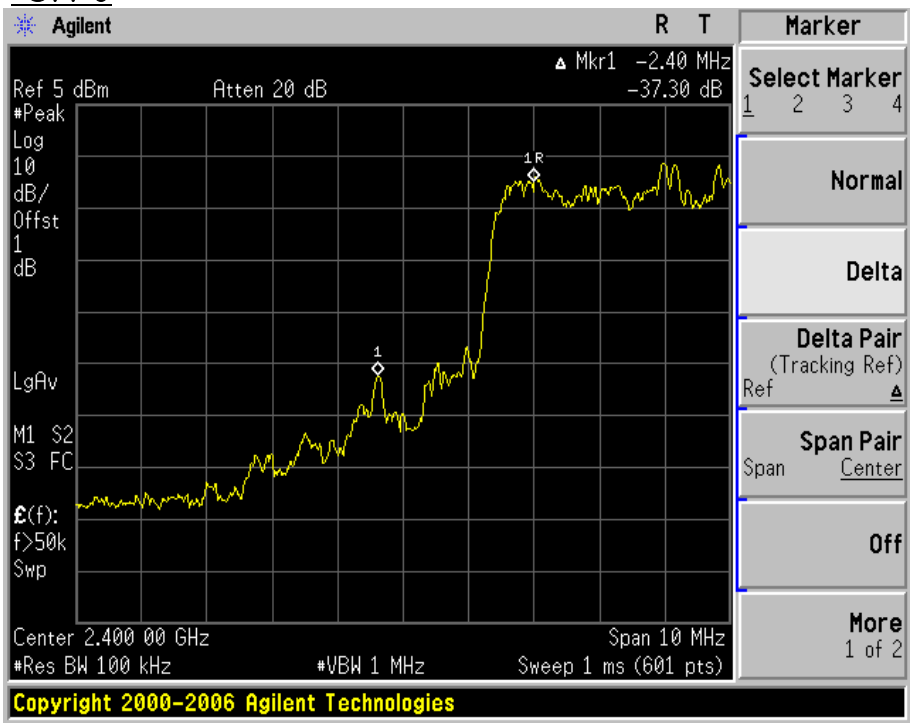
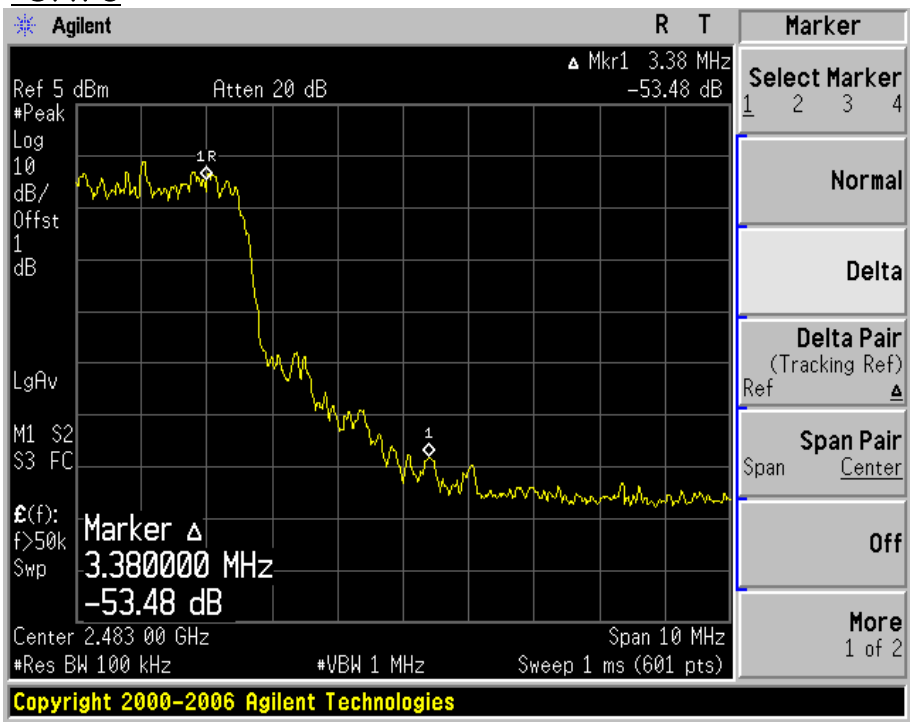


Hopping on

CH 0

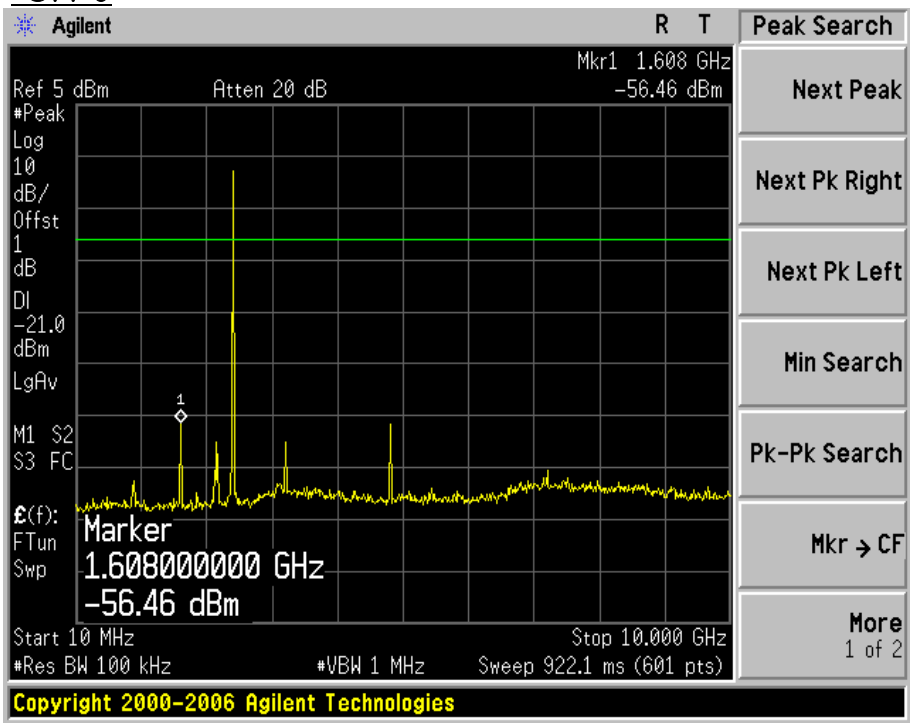


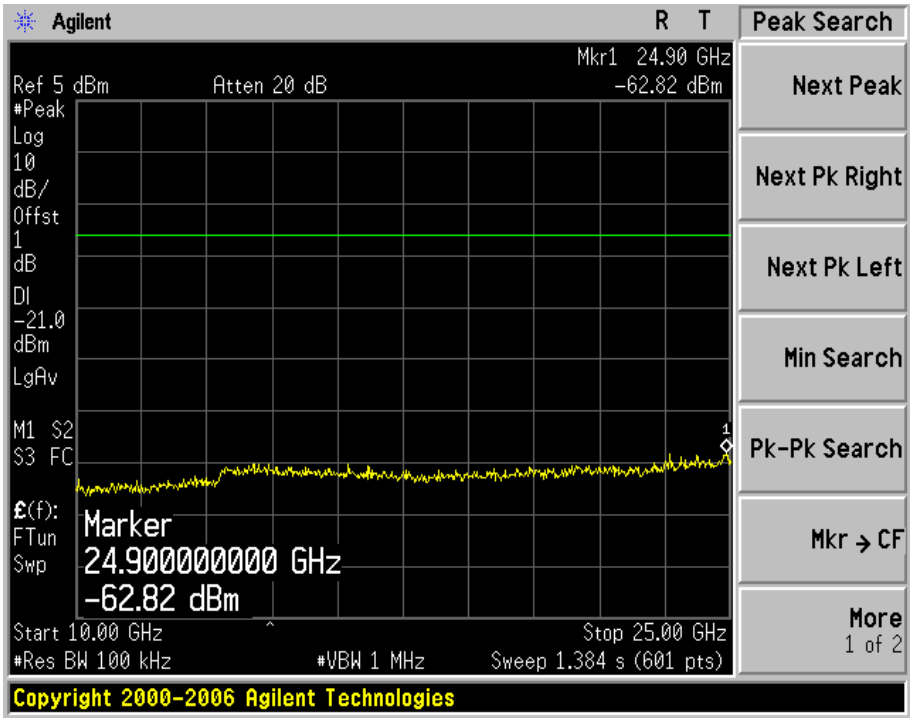
CH78



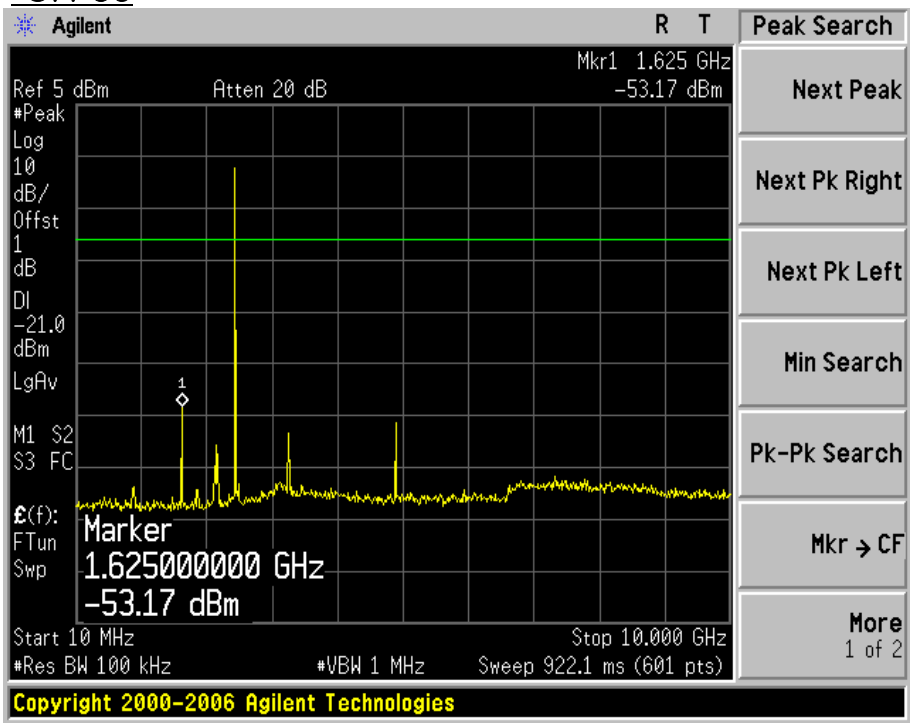
GFSK

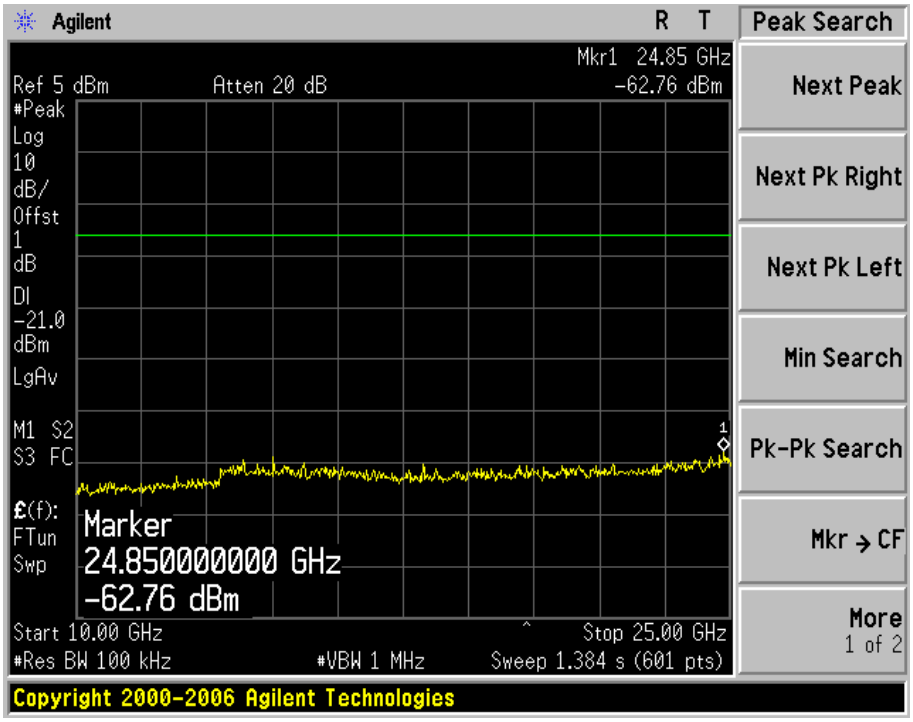
CH 0


Agilent
R T
Peak Search
Mkr1 1.608 GHz
Ref 5 dBm
Atten 20 dB
-56.46 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
1.608000000 GHz
-56.46 dBm
Mkr → CF
Start 10 MHz
Stop 10.000 GHz
More
1 of 2
#Res BW 100 kHz
#VBW 1 MHz
Sweep 922.1 ms (601 pts)
Copyright 2000-2006 Agilent Technologies

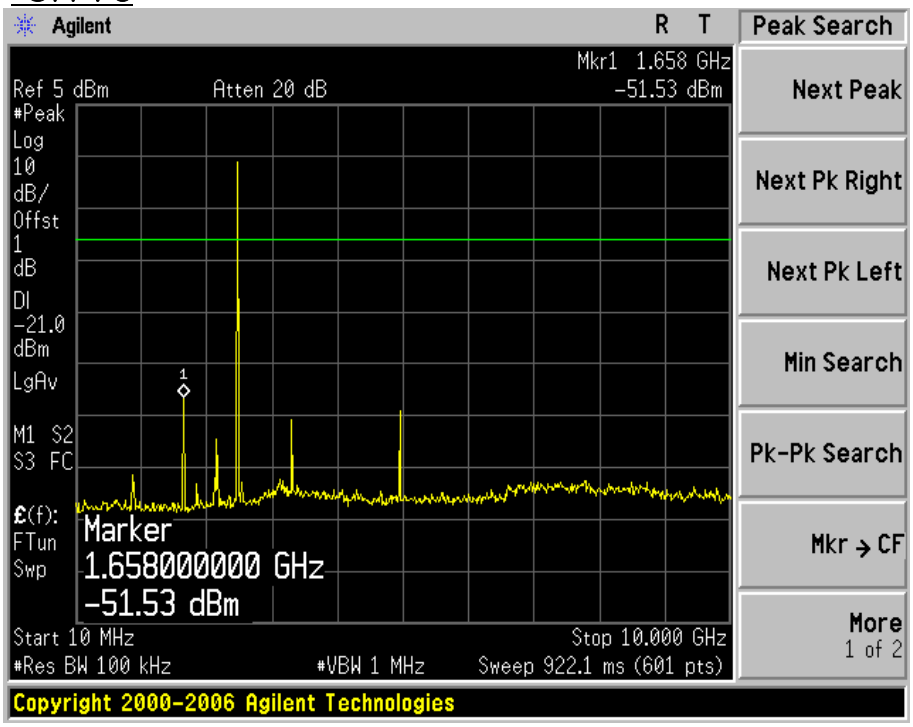

Agilent
R T
Peak Search
Mkr1 24.90 GHz
Ref 5 dBm
Atten 20 dB
-62.82 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
24.900000000 GHz
-62.82 dBm
Mkr → CF
Start 10.00 GHz
Stop 25.00 GHz
More
1 of 2
#Res BW 100 kHz
#VBW 1 MHz
Sweep 1.384 s (601 pts)
Copyright 2000-2006 Agilent Technologies

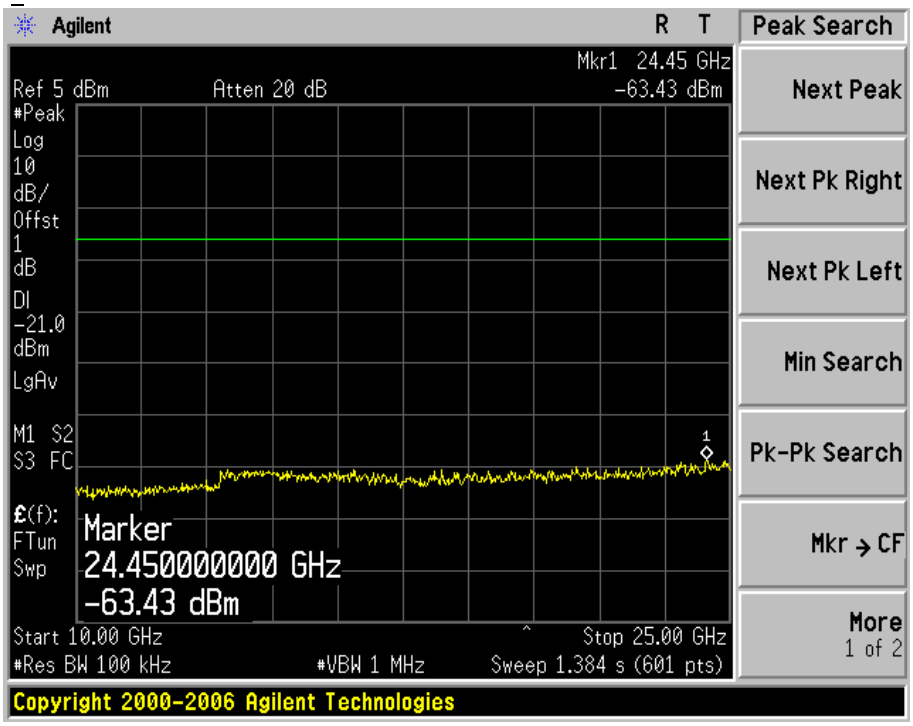
CH 39


Agilent
R T
Peak Search
Mkr1 1.625 GHz
Ref 5 dBm
Atten 20 dB
-53.17 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
1.625000000 GHz
-53.17 dBm
Mkr → CF
Start 10 MHz
Stop 10.000 GHz
More
1 of 2
#Res BW 100 kHz
#VBW 1 MHz
Sweep 922.1 ms (601 pts)
Copyright 2000-2006 Agilent Technologies


Agilent
R T
Peak Search
Mkr1 24.85 GHz
Ref 5 dBm
Atten 20 dB
-62.76 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
24.850000000 GHz
-62.76 dBm
Mkr → CF
Start 10.00 GHz
Stop 25.00 GHz
More
1 of 2
#Res BW 100 kHz
#VBW 1 MHz
Sweep 1.384 s (601 pts)
Copyright 2000-2006 Agilent Technologies

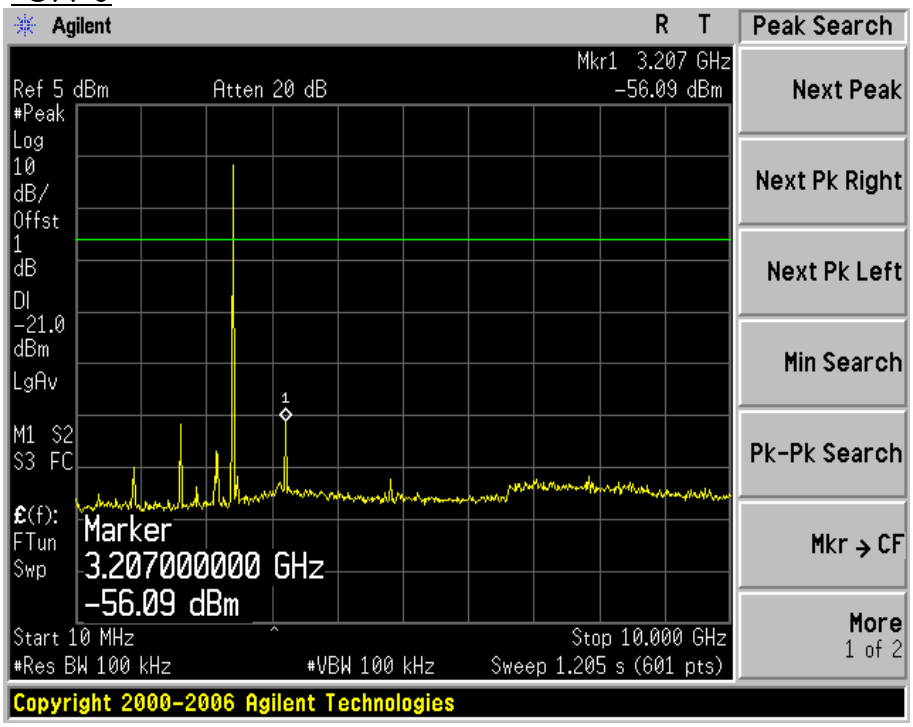
CH 78

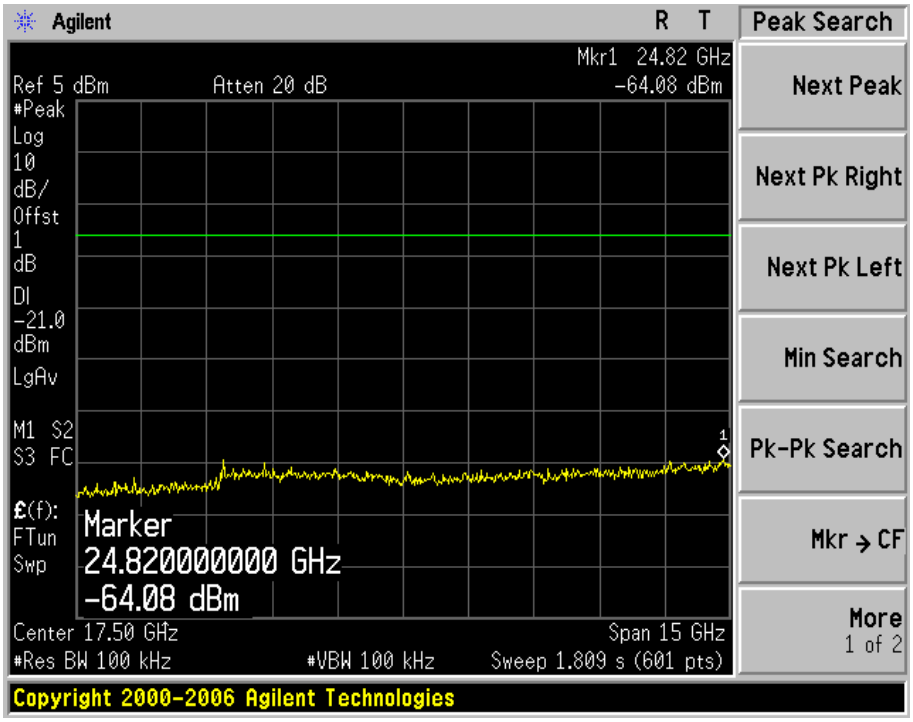

Agilent
R T
Peak Search
Mkr1 1.658 GHz
Ref 5 dBm
Atten 20 dB
-51.53 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
1.658000000 GHz
-51.53 dBm
Mkr → CF
Start 10 MHz
Stop 10.000 GHz
More
1 of 2
#Res BW 100 kHz
#VBW 1 MHz
Sweep 922.1 ms (601 pts)
Copyright 2000-2006 Agilent Technologies


Agilent
R T
Peak Search
Mkr1 24.45 GHz
Ref 5 dBm
Atten 20 dB
-63.43 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
24.450000000 GHz
-63.43 dBm
Mkr → CF
Start 10.00 GHz
Stop 25.00 GHz
More
1 of 2
#Res BW 100 kHz
#VBW 1 MHz
Sweep 1.384 s (601 pts)
Copyright 2000-2006 Agilent Technologies

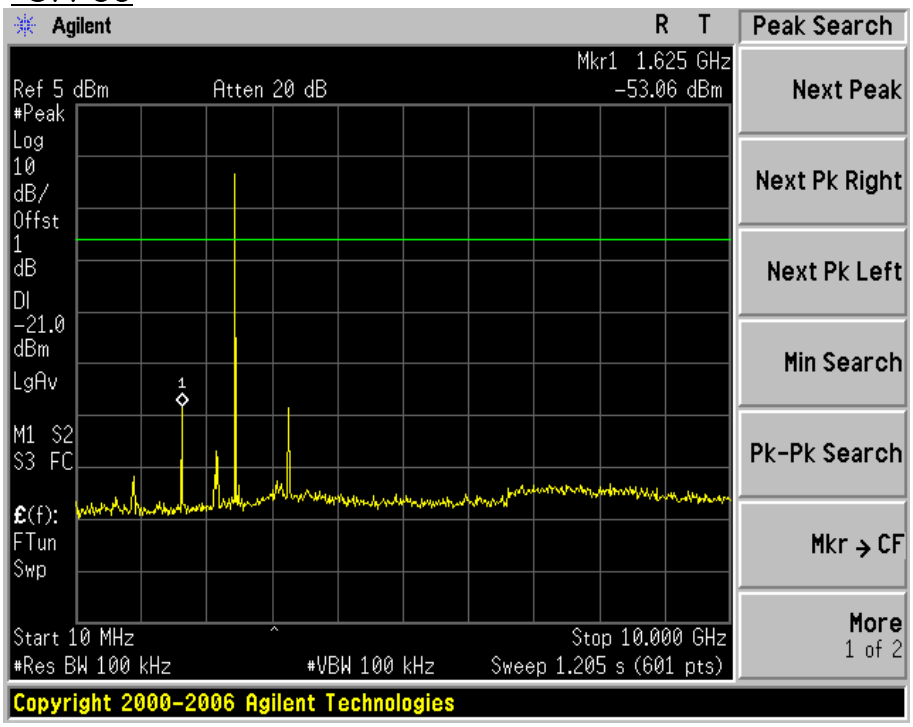
8DPSK

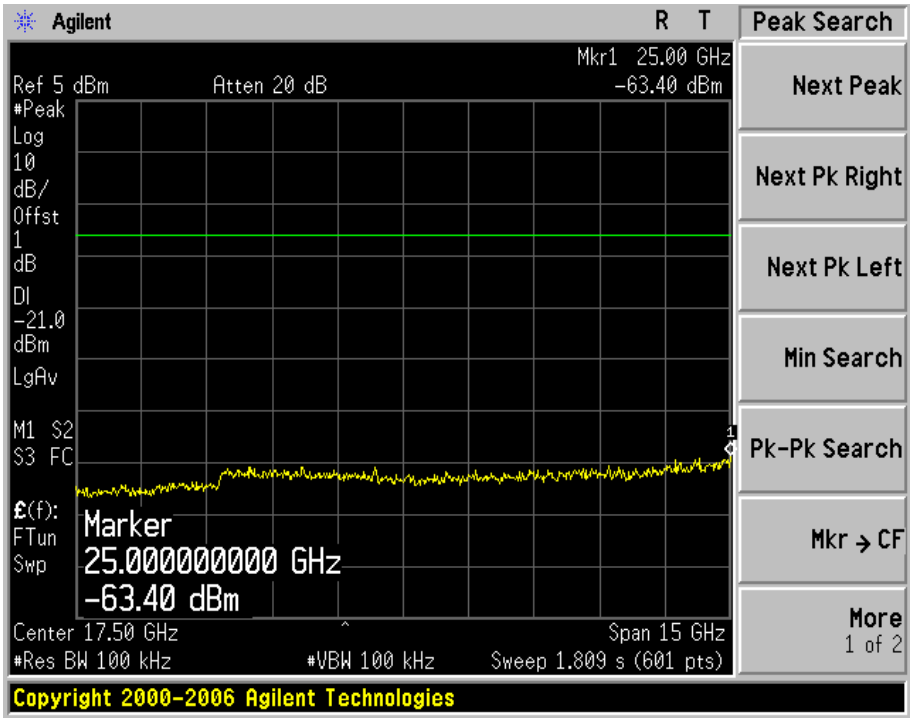
CH 0


Agilent
R T
Peak Search
Mkr1 3.207 GHz
Ref 5 dBm
Atten 20 dB
-56.09 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Dl
-21.0
dBm
LgAv
Next Pk Right
Next Pk Left
Min Search
M1 S2
S3 FC
£(f):
FTun
Swp
Marker
3.207000000 GHz
-56.09 dBm
Pk-Pk Search
Mkr → CF
Start 10 MHz
Stop 10.000 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 1.205 s (601 pts)
More
1 of 2
Copyright 2000-2006 Agilent Technologies

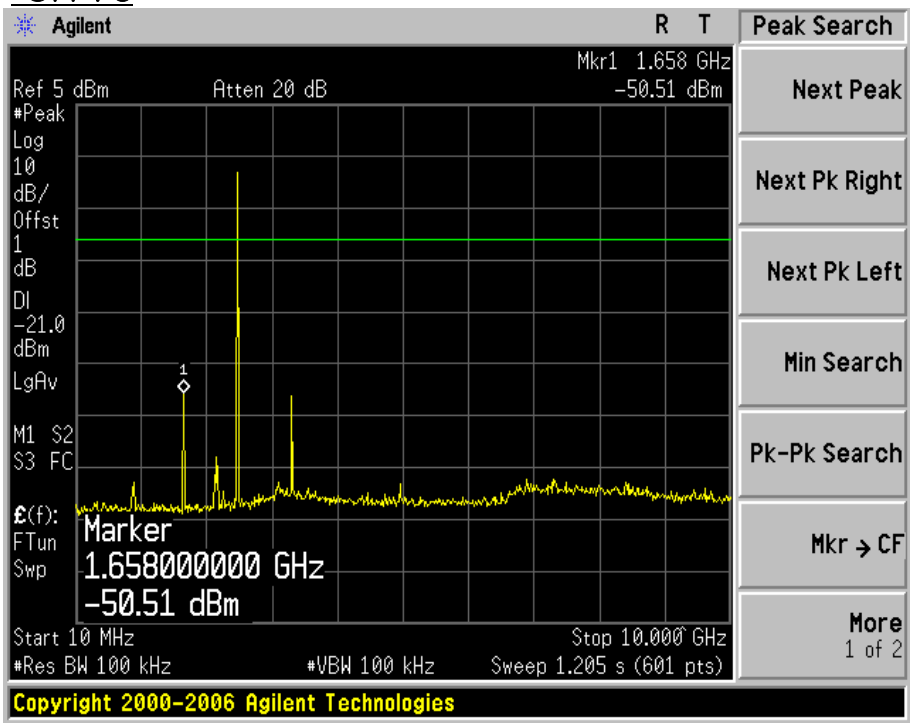

Agilent
R T
Peak Search
Mkr1 24.82 GHz
Ref 5 dBm
Atten 20 dB
-64.08 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Dl
-21.0
dBm
LgAv
Next Pk Right
Next Pk Left
Min Search
M1 S2
S3 FC
£(f):
FTun
Swp
Marker
24.820000000 GHz
-64.08 dBm
Pk-Pk Search
Mkr → CF
Center 17.50 GHz
Span 15 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 1.809 s (601 pts)
More
1 of 2
Copyright 2000-2006 Agilent Technologies

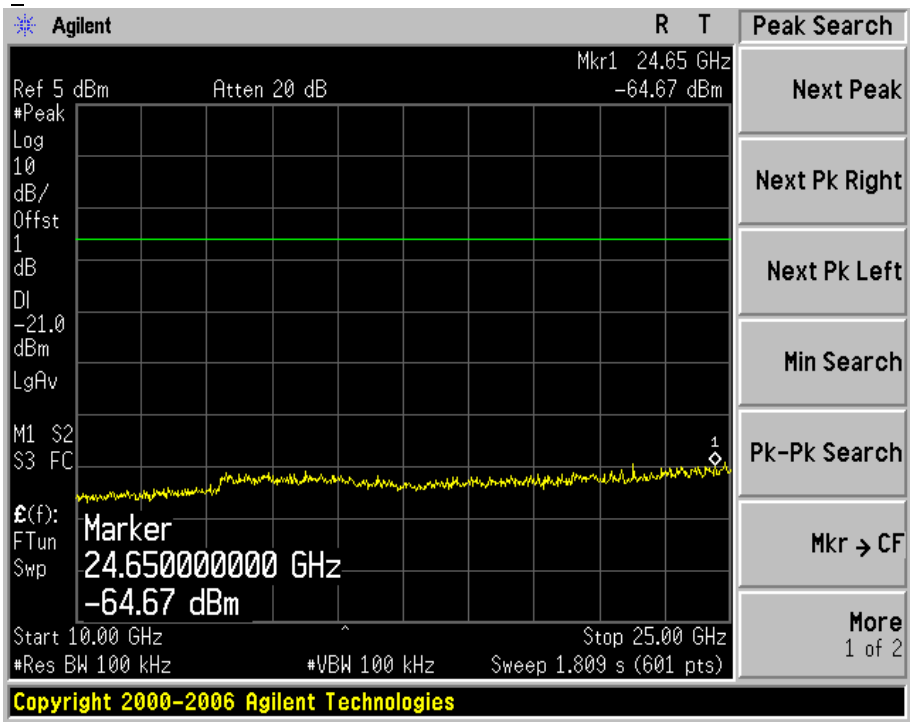
CH 39


Agilent
R T
Peak Search
Mkr1 1.625 GHz
Ref 5 dBm
Atten 20 dB
-53.06 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Mkr → CF
More
1 of 2
Start 10 MHz
Stop 10.000 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 1.205 s (601 pts)
Copyright 2000-2006 Agilent Technologies


Agilent
R T
Peak Search
Mkr1 25.00 GHz
Ref 5 dBm
Atten 20 dB
-63.40 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
25.000000000 GHz
-63.40 dBm
Mkr → CF
More
1 of 2
Center 17.50 GHz
Span 15 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 1.809 s (601 pts)
Copyright 2000-2006 Agilent Technologies

CH 78


Agilent
R T
Peak Search
Mkr1 1.658 GHz
Ref 5 dBm
Atten 20 dB
-50.51 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
1.658000000 GHz
-50.51 dBm
Mkr → CF
More
1 of 2
Start 10 MHz
Stop 10.000 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 1.205 s (601 pts)
Copyright 2000-2006 Agilent Technologies


Agilent
R T
Peak Search
Mkr1 24.65 GHz
Ref 5 dBm
Atten 20 dB
-64.67 dBm
Next Peak
#Peak
Log
10
dB/
Offst
1
dB
Next Pk Right
Dl
-21.0
dBm
Next Pk Left
LgAv
Min Search
M1 S2
S3 FC
Pk-Pk Search
£(f):
FTun
Swp
Marker
24.650000000 GHz
-64.67 dBm
Mkr → CF
More
1 of 2
Start 10.00 GHz
Stop 25.00 GHz
#Res BW 100 kHz
#VBW 100 kHz
Sweep 1.809 s (601 pts)
Copyright 2000-2006 Agilent Technologies

10. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC Part 15 (2010) . The test setup was made according to ANSI C 63.4 (2003) on an open test site, which allows a 3 m distance measurement. The EUT was placed in the center of wooden turntable. The height of this table was 0.8 m. The measurement was conducted with both horizontal and vertical antenna polarization. The turntable has fully rotated. For further description of the configuration refer to the picture of the test setup.

10.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESVS10	Rohde & Schwarz	838562/002	27-Jan-12
TEST Receiver	ESPI7	Rohde & Schwarz	100185	27-Jan-12
Spectrum Analyzer	R3273	ADVANTEST	110600592	27-Jan-12
LogBicon Antenna	VULB 9160	Schwarzbeck	3106	14-Apr-12
Amplifier	8447F	HP	2944A03711	11-Jan-12
Turn Table	2081-1.2M	EMCO	NONE	-
Antenna Mast	2070-1	EMCO	0005-2205	-
ANT Mast Controller	2090	EMCO	9612-1202	-
Horn Antenna	BBHA 9120 D	Schwarzbeck	352	22-Mar-12
PREAMPLIFIER	8449B	Agilent	3008A00595	27-Jan-12
Pyramidal Horn Antenna	3160-09	ETS-LINDGREN	00102642	7-Sep-12

10.2 Environmental Condition

Test Place : Open site(3 m)
Temperature (°C) : 10 ℃
Humidity (% R.H.) : 66 % R.H.

10.3 Test Data for Bluetooth

Test Date : 26-Oct-11 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value(Quasi-peak)		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
44.23	43.60	V	1.0	11.35	-25.45	40.00	29.50	10.50
58.98	40.50	V	1.0	11.20	-25.52	40.00	26.18	13.82
73.72	40.20	V	1.0	9.21	-24.64	40.00	24.77	15.23
147.45	38.50	H	2.4	12.57	-24.06	43.50	27.02	16.48
162.20	37.20	H	2.2	12.60	-23.59	43.50	26.21	17.29
176.94	39.50	H	2.0	11.51	-23.52	43.50	27.49	16.01
206.43	36.00	H	1.9	9.91	-23.32	43.50	22.59	20.91
250.67	38.50	H	1.7	11.64	-22.95	46.00	27.18	18.82
339.14	36.50	H	1.5	15.09	-22.82	46.00	28.77	17.23
398.13	37.50	H	1.4	15.63	-23.96	46.00	29.17	16.83
486.60	37.40	H	1.0	18.12	-24.20	46.00	31.32	14.68
560.33	36.00	H	1.0	20.42	-23.62	46.00	32.80	13.20
663.55	34.20	H	1.0	22.14	-23.03	46.00	33.31	12.69

Remark	H : Horizontal, V : Vertical *Reading = receiver reading + Amplifier Gain *CL = Cable Loss-Amplifier Gain *The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection *Checked in all 3 axis and the maximum measured data were reported in the report.

10.3-1 Test Data for Bluetooth(1.2)

Test Date : 21-Oct-11 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
Peak								
2390	24.52	H	1.3	27.03	2.30	74.00	53.85	20.15
2402	62.41	H	1.3	27.06	2.30	OB	91.77	-
4804	43.74	H	1.3	31.47	-31.57	74.00	43.64	30.36
2390	23.22	V	1.1	27.03	2.30	74.00	52.55	21.45
2402	62.39	V	1.1	27.06	2.30	OB	91.75	-
4804	44.98	V	1.1	31.47	-31.57	74.00	44.88	29.12
Average								
2390	13.10	H	1.3	27.03	2.30	54.00	42.43	11.57
2402	61.15	H	1.3	27.06	2.30	OB	90.51	-
4804	30.20	H	1.3	31.47	-31.57	54.00	30.10	23.90
2390	12.98	V	1.1	27.03	2.30	54.00	42.31	11.69
2402	60.96	V	1.1	27.06	2.30	OB	90.32	-
4804	30.64	V	1.1	31.47	-31.57	54.00	30.54	23.46
Remark	H : Horizontal, V : Vertical TEST MODE : Bluetooth-CH0(2402MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz. *Checked in all 3 axis and the maximum measured data were reported in the report.							

10.3-2 Test Data for Bluetooth(1.2)

Test Date : 21-Oct-11 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
Peak								
2441	62.15	H	1.1	27.15	2.30	OB	91.60	-
4882	43.28	H	1.1	31.63	-31.52	74.00	43.39	30.61
2441	62.18	V	1.1	27.15	2.30	OB	91.63	-
4882	42.98	V	1.1	31.63	-31.52	74.00	43.09	30.91
Average								
2441	59.47	H	1.1	27.15	2.30	OB	88.92	-
4882	31.21	H	1.1	31.63	-31.52	54.00	31.32	22.68
2441	60.50	V	1.1	27.15	2.30	OB	89.95	-
4882	31.14	V	1.1	31.63	-31.52	54.00	31.25	22.75

Remark	H : Horizontal, V : Vertical TEST MODE : Bluetooth-CH39(2441MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz. *Checked in all 3 axis and the maximum measured data were reported in the report.

10.3-3 Test Data for Bluetooth(1.2)

Test Date : 21-Oct-11 Measurement Distance : 3 m

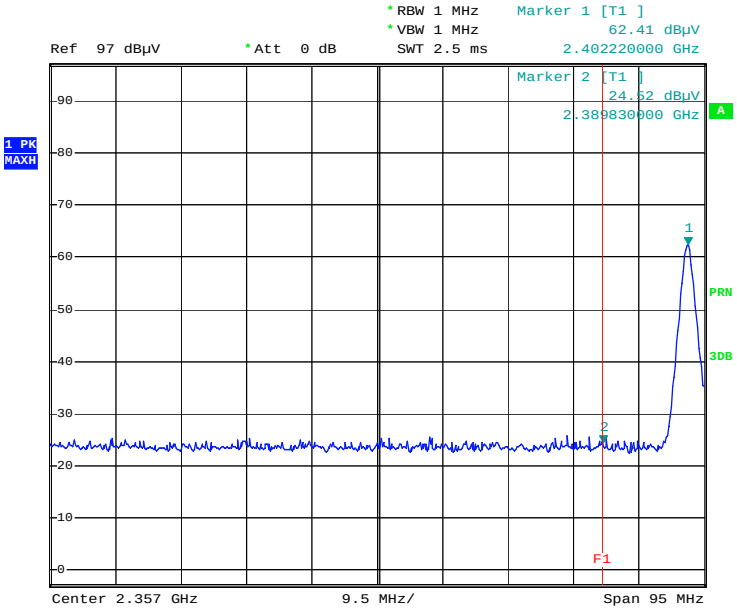
Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
Peak								
2480	63.53	H	1.3	27.25	2.30	OB	93.08	-
2483.5	25.39	H	1.3	27.25	2.30	74.00	54.94	19.06
4960	43.38	H	1.3	31.78	-31.38	74.00	43.78	30.22
2480	60.08	V	1.1	27.25	2.30	OB	89.63	-
2483.5	23.62	V	1.1	27.25	2.30	74.00	53.17	20.83
4960	42.95	V	1.1	31.78	-31.38	74.00	43.35	30.65
Average								
2480	61.64	H	1.3	27.25	2.30	OB	91.19	-
2483.5	20.23	H	1.3	27.25	2.30	54.00	49.78	4.22
4960	31.49	H	1.3	31.78	-31.38	54.00	31.89	22.11
2480	58.84	V	1.1	27.25	2.30	OB	88.39	-
2483.5	17.72	V	1.1	27.25	2.30	54.00	47.27	6.73
4960	31.20	V	1.1	31.78	-31.38	54.00	31.60	22.40

Remark	H : Horizontal, V : Vertical TEST MODE : Bluetooth-CH78(2480MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz. *Checked in all 3 axis and the maximum measured data were reported in the report.

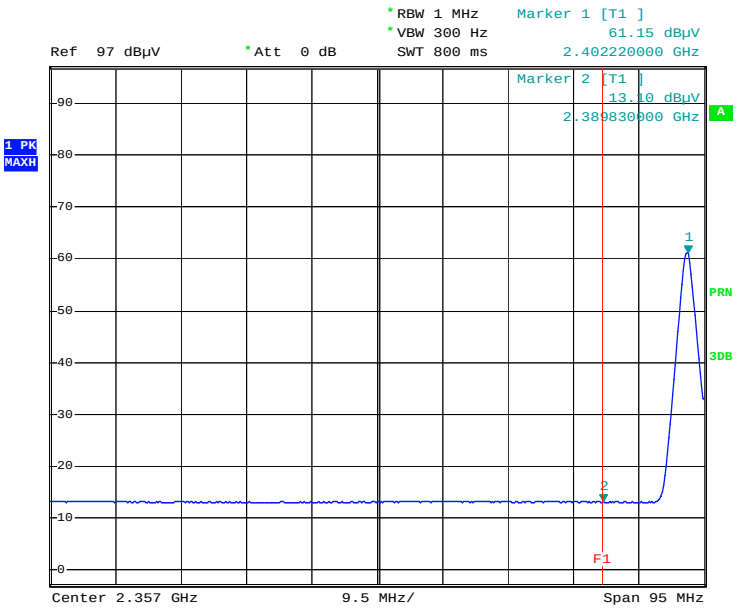
10.4 Restricted Band Edges for BT(1.2)

Band Edges(CH Low)

Detector mode:Peak Polarity:Horizontal

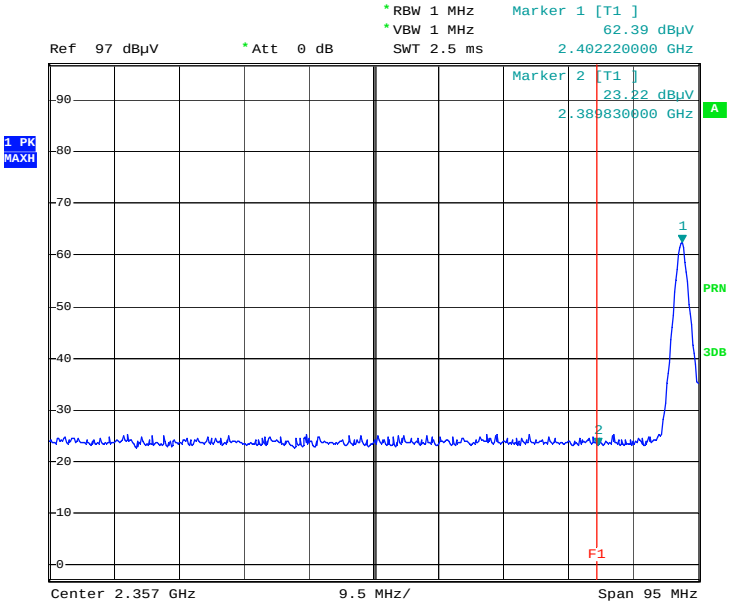


Detector mode:Average Polarity:Horizontal

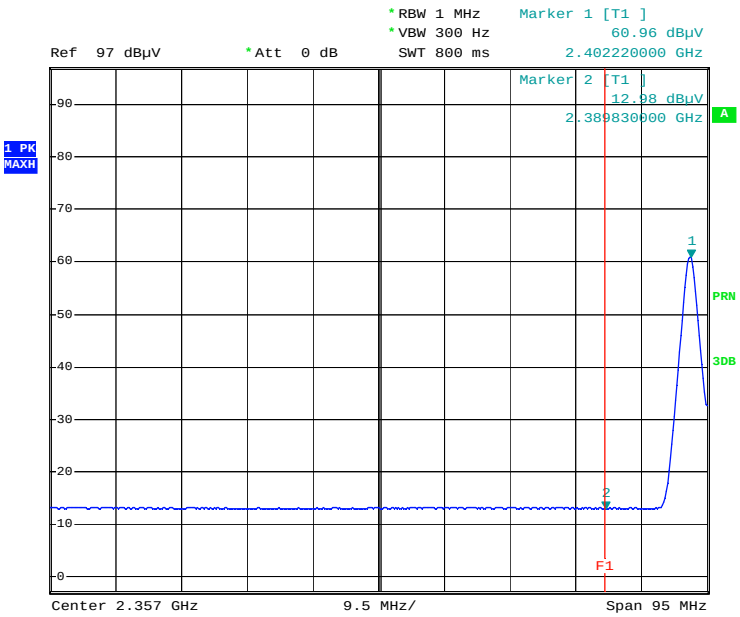


Band Edges(CH Low)

Detector mode:Peak Polarity:Vertical

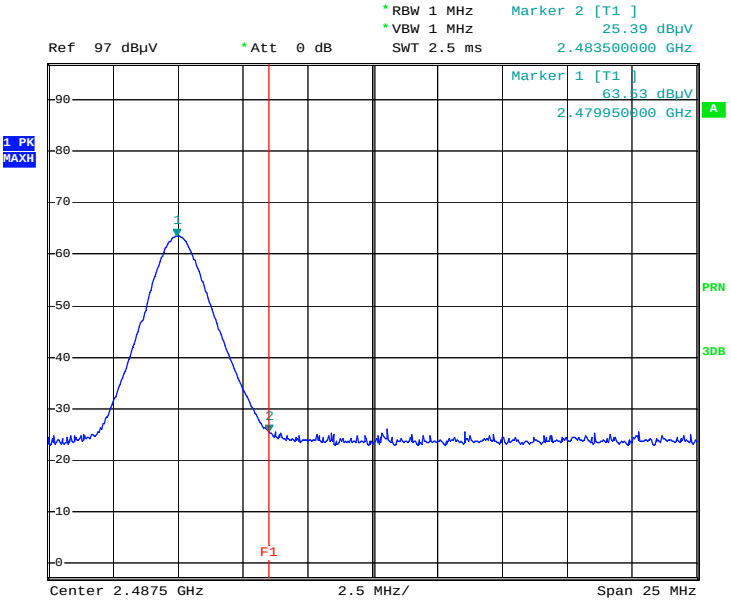


Detector mode:Average Polarity:Vertical

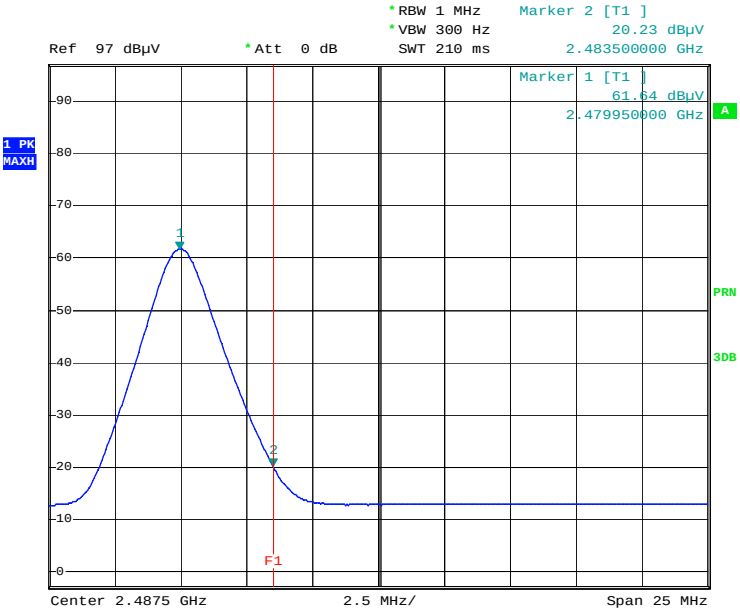


Band Edges(CH High)

Detector mode:Peak Polarity:Horizontal

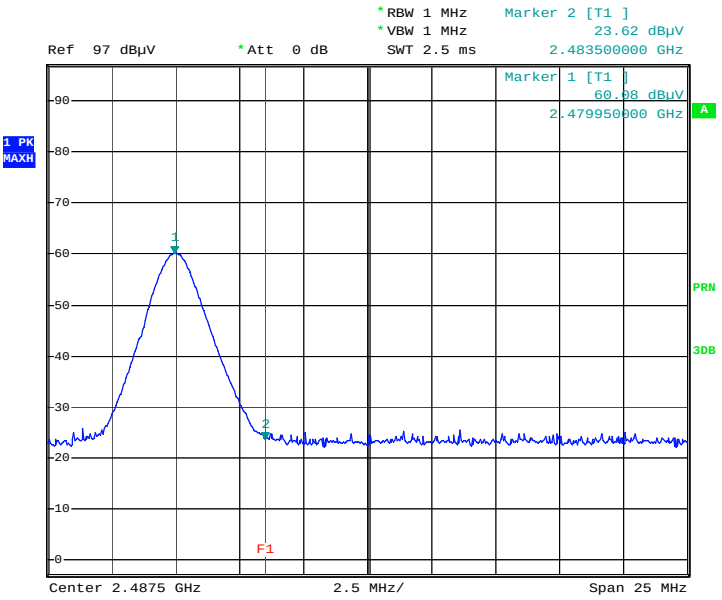


Detector mode:Average Polarity:Horizontal

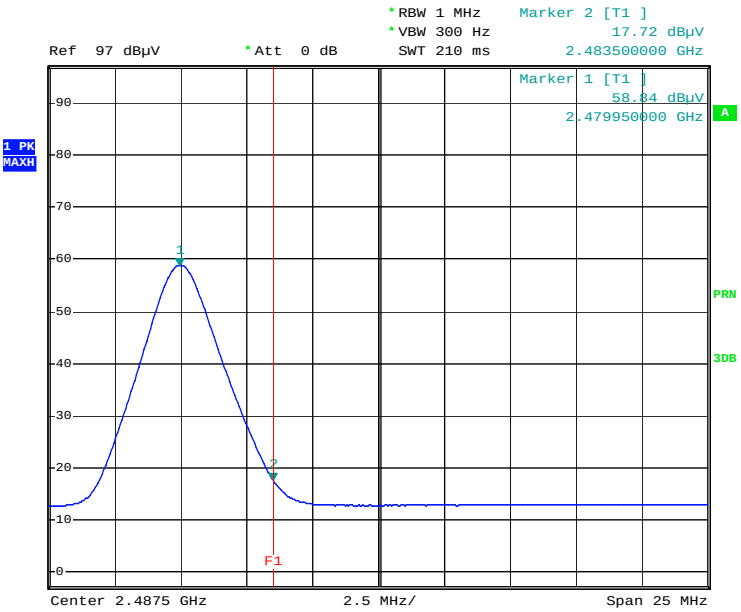


Band Edges(CH High)

Detector mode:Peak Polarity:Vertical



Detector mode:Average Polarity:Vertical



10.5 Test Data for Bluetooth(EDR)

Test Date : 21-Oct-11 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
Peak(RBW:1 MHz VBW:1 MHz)								
2390	23.39	H	1.3	27.03	2.30	74.00	52.72	21.28
2402	60.86	H	1.3	27.06	2.30	OB	90.22	-
4804	42.62	H	1.3	31.47	-31.57	74.00	42.52	31.48
2390	22.72	H	1.3	27.03	2.30	74.00	52.05	21.95
2402	59.85	V	1.1	27.06	2.30	OB	89.21	-
4804	43.01	V	1.1	31.47	-31.57	74.00	42.91	31.09
Average(RBW:1 MHz VBW:10 Hz)								
2390	12.98	H	1.3	27.03	2.30	54.00	42.31	11.69
2402	58.75	H	1.3	27.06	2.30	OB	88.11	-
4804	30.15	H	1.3	31.47	-31.57	54.00	30.05	23.95
2390	12.96	H	1.3	27.03	2.30	54.00	42.29	11.71
2402	57.61	V	1.1	27.06	2.30	OB	86.97	-
4804	30.50	V	1.1	31.47	-31.57	54.00	30.40	23.60

Remark	H : Horizontal, V : Vertical TEST MODE : Bluetooth-CH0(2402MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz. *Checked in all 3 axis and the maximum measured data were reported in the report.

10.5-1 Test Data for Bluetooth(EDR)

Test Date : 21-Oct-11 Measurement Distance : 3 m

Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
Peak(RBW:1 MHz VBW:1 MHz)								
2441	60.12	H	1.1	27.15	2.30	OB	89.57	-
4882	42.79	H	1.1	31.63	-31.52	74.00	42.90	31.10
2441	61.25	V	1.1	27.15	2.30	OB	90.70	-
4882	41.96	V	1.1	31.63	-31.52	74.00	42.07	31.93
Average(RBW:1 MHz VBW:10 Hz)								
2441	58.60	H	1.1	27.15	2.30	OB	88.05	-
4882	30.34	H	1.1	31.63	-31.52	54.00	30.45	23.55
2441	59.10	V	1.1	27.15	2.30	OB	88.55	-
4882	30.41	V	1.1	31.63	-31.52	54.00	30.52	23.48
Remark	H : Horizontal, V : Vertical TEST MODE : Bluetooth-CH39(2441MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz. *Checked in all 3 axis and the maximum measured data were reported in the report.							

10.5-2 Test Data for Bluetooth(EDR)

Test Date : 21-Oct-11 Measurement Distance : 3 m

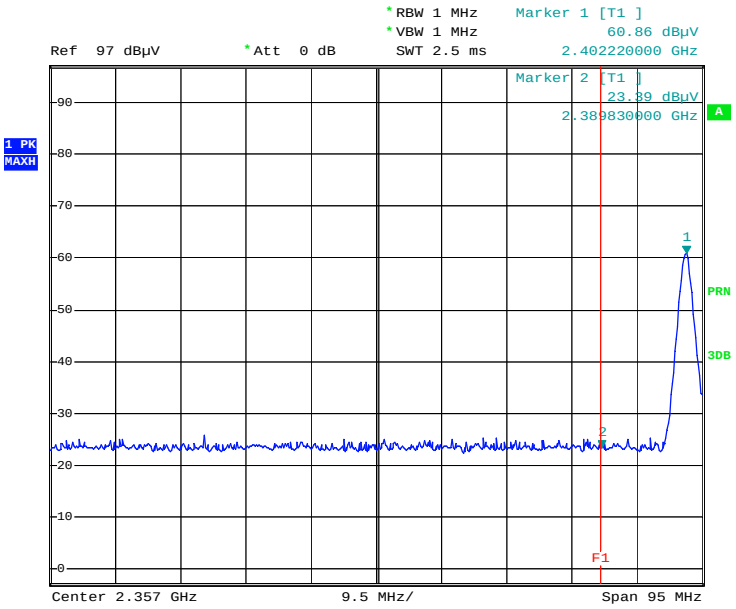
Frequency (MHz)	Reading (dBμV)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dBμV/m)	Result (dBμV/m)	Margin (dB)
Peak								
2480	60.83	H	1.3	27.25	2.30	OB	90.38	-
2483.5	24.21	H	1.3	27.25	2.30	74.00	53.76	20.24
4960	42.39	H	1.3	31.78	-31.38	74.00	42.79	31.21
2480	58.50	V	1.1	27.25	2.30	OB	88.05	-
2483.5	23.57	V	1.1	27.25	2.30	74.00	53.12	20.88
4960	42.24	V	1.1	31.78	-31.38	74.00	42.64	31.36
Average								
2480	58.80	H	1.3	27.25	2.30	OB	88.35	-
2483.5	17.68	H	1.3	27.25	2.30	54.00	47.23	6.77
4960	30.15	H	1.3	31.78	-31.38	54.00	30.55	23.45
2480	57.77	V	1.1	27.25	2.30	OB	87.32	-
2483.5	16.93	V	1.1	27.25	2.30	54.00	46.48	7.52
4960	30.40	V	1.1	31.78	-31.38	54.00	30.80	23.20

Remark	H : Horizontal, V : Vertical TEST MODE : Bluetooth-CH78(2480MHz) *The TX signal isn't detected from 3th harmonics. *OB = Operating band *CL = Cable Loss-Amplifier Gain(In case of above1000Mhz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1MHz and 10Hz for average detection at frequency above 1GHz. *Checked in all 3 axis and the maximum measured data were reported in the report.

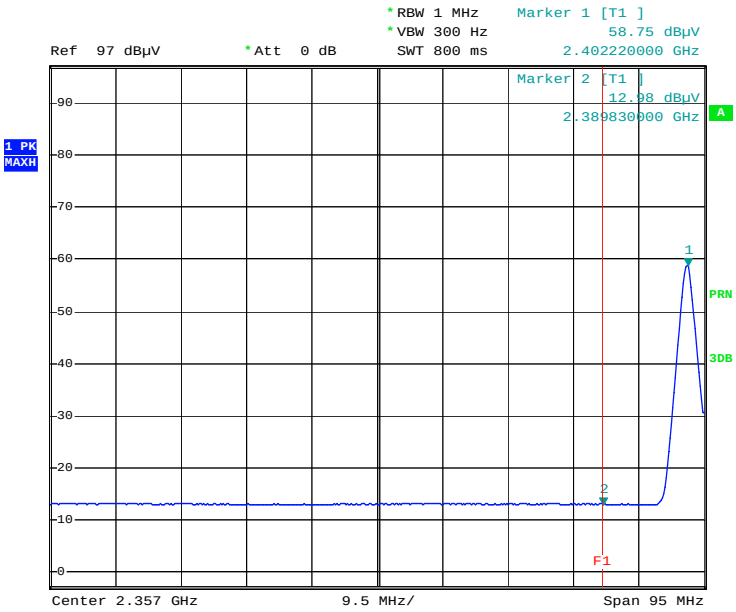
10.6 Restricted Band Edges for BT(EDR)

Band Edges(CH Low)

Detector mode:Peak Polarity:Horizontal

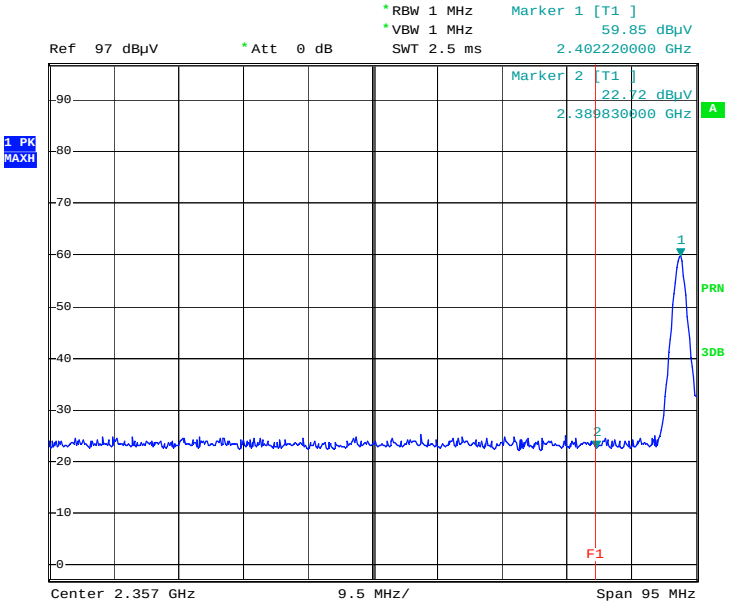


Detector mode:Average Polarity:Horizontal

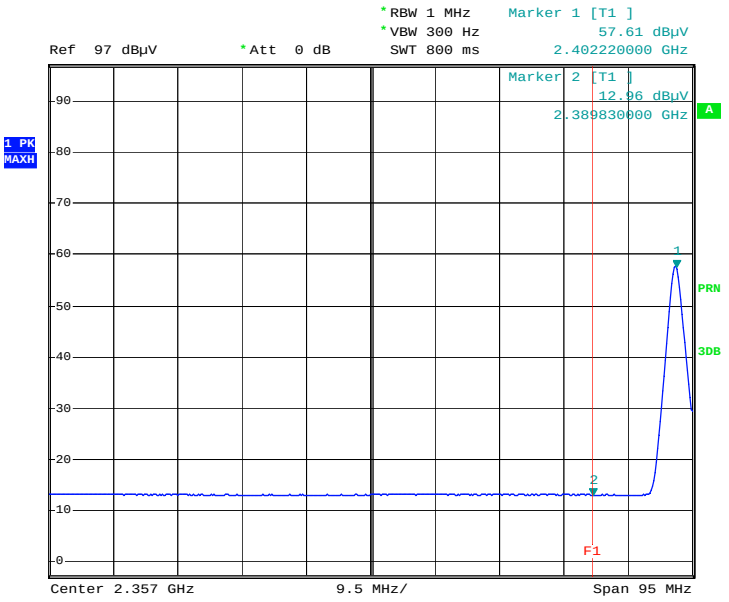


Band Edges(CH Low)

Detector mode:Peak Polarity:Vertical

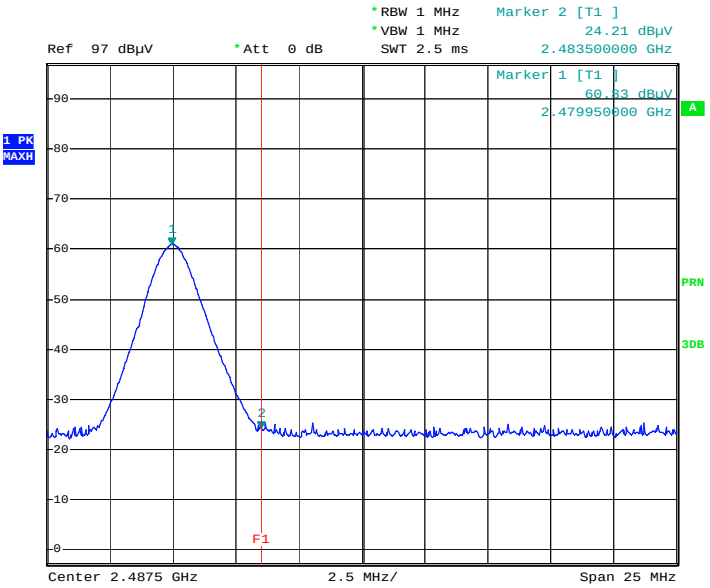


Detector mode:Average Polarity:Vertical

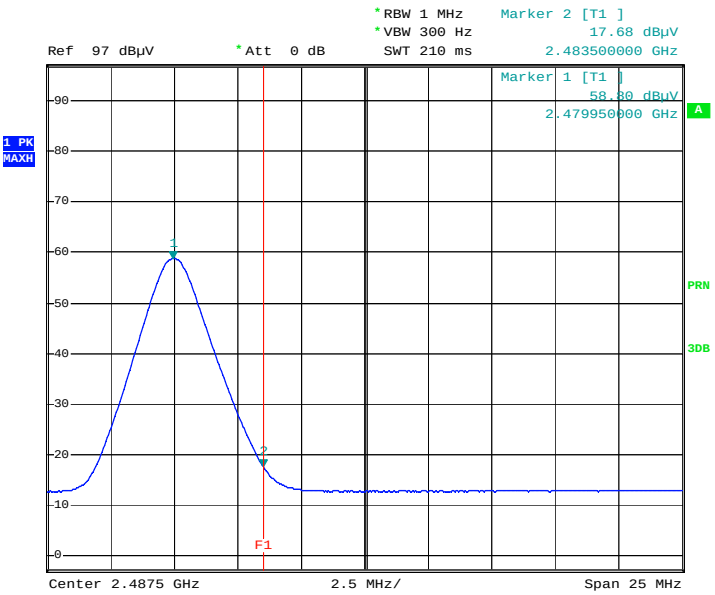


Band Edges(CH High)

Detector mode:Peak Polarity:Horizontal

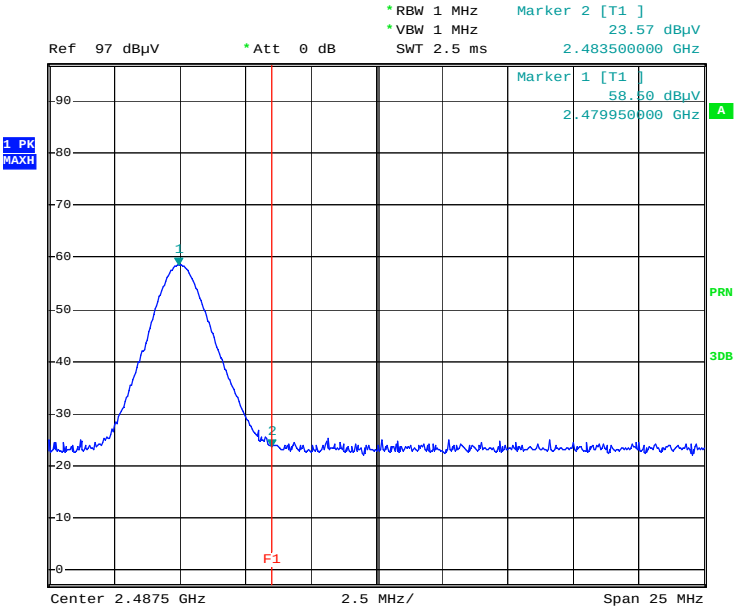


Detector mode:Average Polarity:Horizontal

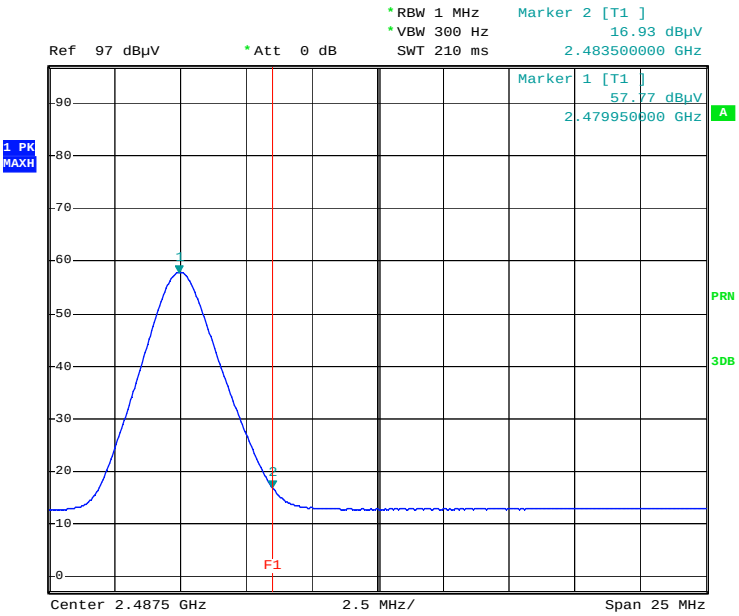


Band Edges(CH High)

Detector mode:Peak Polarity:Vertical



Detector mode:Average Polarity:Vertical



11. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 MHz to 30 MHz was measured in accordance to FCC Part 15 (2010) . The test setup was made according to ANSI C 63.4 (2003) in a shielded. The EUT was placed on a non-conductive table at least 0.8 m above the ground plan. A grounded vertical reference plane was positioned in a distance of 0.4 m from the EUT. The distance from the EUT to other metal surfaces was at least 0.8 m. The EUT was only earthen by its power cord through the line impedance stabilizing network. The power cord has been bundled to a length of 1.0 m.. The test receiver with Quasi Peak detector complies with CISPR 16.

11.1 Measurement equipments

Equipment Name	Type	Manufacturer	Serial No.	Next Calibration date
TEST Receiver	ESHS 30	Rohde & Schwarz	828765/002	17-Dec-11
LISN	ESH2-Z5	POLARAD	872461/048	11-Jan-12
LISN	ESH3-Z5	Rohde & Schwarz	836679/025	27-Sep-12
Pulse Limiter	ESH3Z2	Rohde & Schwarz	NONE	21-Mar-12

11.2 Environmental Condition

Test Place : Shielded Room

Temperature (°C) : 20 ℃

Humidity (% R.H.) : 46 % R.H.

11.3 Test Data for Bluetooth

Test Date : 26-Oct-11

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dBμV)	Reading (dBμV)	Result (dBμV)	Limit (dBμV)	Reading (dBμV)	Result (dB)
0.15	0.10	0.35	H	66.00	57.00	57.45	56.00	45.78	46.23
0.20	0.10	0.36	H	63.61	30.67	31.13	53.61		
0.23	0.10	0.36	H	62.45	45.19	45.65	52.45		
0.30	0.11	0.36	H	60.24	38.55	39.02	50.24		
0.38	0.11	0.37	H	58.28	31.61	32.09	48.28		
0.46	0.12	0.37	H	56.69	36.54	37.03	46.69		
0.54	0.12	0.37	H	56.00	35.32	35.81	46.00		
0.61	0.13	0.37	H	56.00	37.03	37.53	46.00		
1.38	0.22	0.46	N	56.00	33.38	34.06	46.00		
1.46	0.15	0.46	H	56.00	33.48	34.09	46.00		
2.08	0.24	0.44	N	56.00	33.88	34.56	46.00		
2.16	0.17	0.44	H	56.00	34.90	35.51	46.00		
8.94	0.38	0.44	N	60.00	21.92	22.74	50.00		
10.48	0.41	0.52	N	60.00	26.36	27.29	50.00		
10.56	0.32	0.52	H	60.00	26.92	27.77	50.00		
11.26	0.34	0.53	H	60.00	25.86	26.73	50.00		
12.10	0.46	0.53	N	60.00	25.43	26.42	50.00		
12.19	0.36	0.53	H	60.00	33.77	34.67	50.00		
Remark	H : Hot Line, N : Neutral Line *Correction Factor = Lisn + Cable *Result = Correction Factor + Reading								

12. Photographs of test setup

12.1.Setup for Radiated Test : 30 ~ 1000 MHz

[Front]

[Rear]

12.2. Setup for Radiated Test :Above 1000 MHz

[Front]

[Rear]

12.3. Setup for Conducted Test : 0.15 ~ 30 MHz

[Front]

[Rear]

12.4. Photographs of EUT

[Front]

[Rear]

Appendix 1. Special diagram

*HOT

ES TECH

26 Oct 2011 17:20

HOT LINE

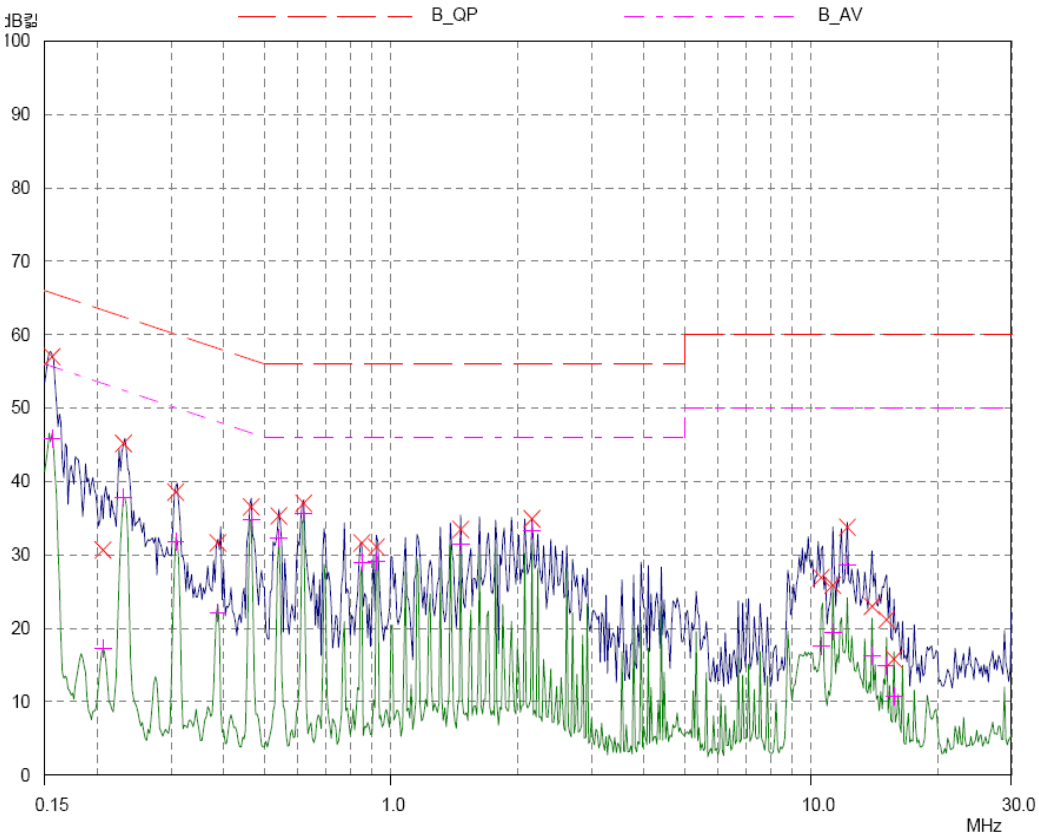
EUT: HD-200B
Manuf: H3 SYSTEM Co.,Ltd.
Op Cond: 120 V
Operator: Engineer J.H.Kim
Test Spec: CLASS B
Comment:

Result File: 111102_h.dat : ESTF151111-002

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	0.8%	10kHz	PK+AV	10msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 25
Acc Margin: 0 dB



*NEUTRAL

ES TECH

26 Oct 2011 17:13

NEUTRAL LINE

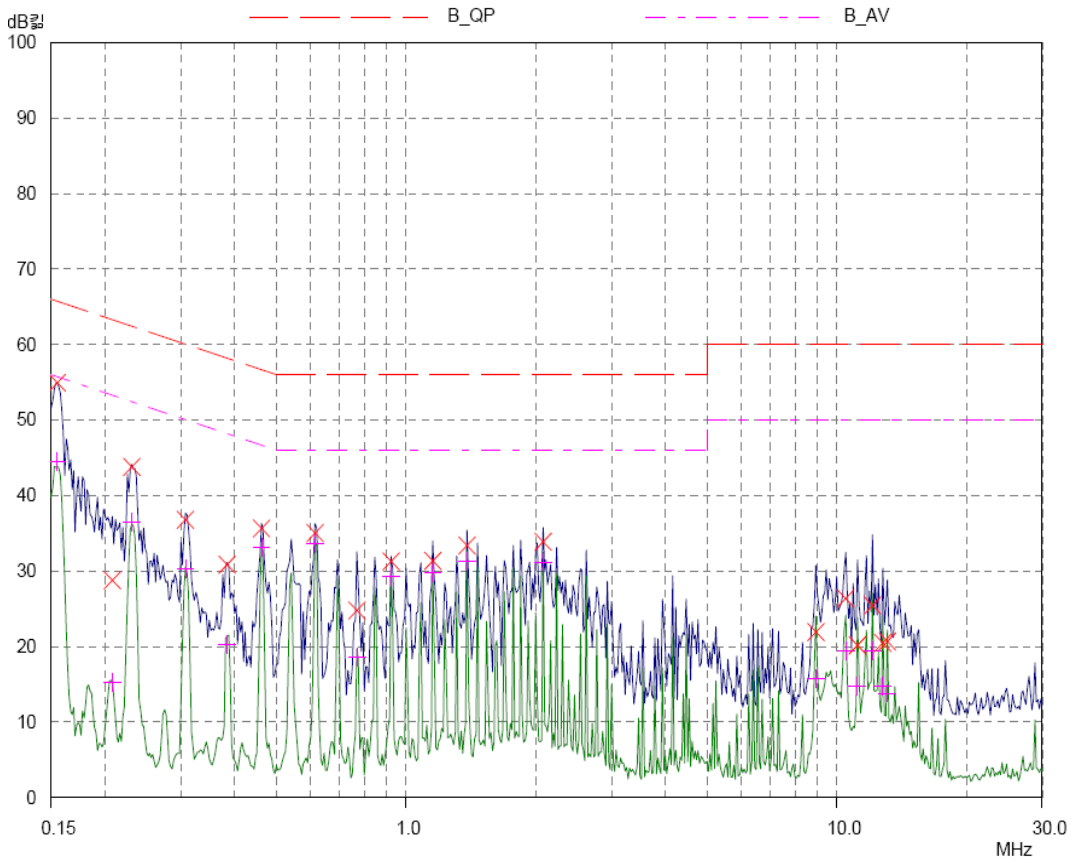
EUT:	HD-200B
Manuf:	H3 SYSTEM Co.,Ltd.
Op Cond:	120 V
Operator:	Engineer J.H.Kim
Test Spec:	CLASS B
Comment:	

Result File: 111102_n.dat : ESTF151111-002

Scan Settings (1 Range)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	30MHz	0.8%	10kHz	PK+AV	10msec	Auto	OFF	60dB

Final Measurement: Detectors: X QP / + AV
Meas Time: 1sec
Subranges: 25
Acc Margin: 0 dB



Appendix 2. Antenna Requirement

1. Antenna Requirement

1.1 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 15.24

1.2 Antenna Connected Construction

The antenna types used in this product are Intergrated Chip antenna . The maximum Gain of this antenna is -0.33 dBi.