



ESTECH Co., Ltd.

Rm 1015, World Venture Center 11,
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Seoul, 158-803, Korea



**Electromagnetic
Interference
Test Report**

Test Report for IC & FCC

FCC ID:BJI-HTK10
IC Number: 1004C-HTK10

Report Number		ESTF151301-005		
Applicant	Company name	TOSHIBA TEC CORPORATION		
	Address	6-78, Minami-cho, Mishima-shi, Shizuoka-ken, 411-8520, Japan		
	Telephone	81-(0)55-976-7305		
Product	Product name	Handy terminal		
	Model No.	HT-K10	Manufacturer	TOSHIBA TEC CORPORATION
	Serial No.	NONE	Country of origin	CHINA
Test date	2012-11-29 ~ 2013-01-16		Date of issue	17-Jan-13
Testing location	ESTECH. Co., Ltd. 97-1 Hoiuk-Ri Majang-Myon, Icheon-city, KyungKi-Do, Korea			
Standard	FCC PART 15 (2010) , ANSI C 63.4 2003 , RSS-210			
Measurement facility registration number	915135	IC Number	4475B-2	
Tested by	Manager K.S.Kyong		(Signature)	
Reviewed by	Engineering Manager J.M.Yang		(Signature)	
Abbreviation	OK, Pass = Passed, Fail = Failed, N/A = not applicable			
<p>* Note</p> <ul style="list-style-type: none"> - EUT's the difference is between 1D and 2D scanner by request applicant.(Worst data is 1D Scanner.) - 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 				

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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.

97-1, Hoeok-ri, Majang-myun, Ichion-city, Kyonggi-do, South 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

3. Test Standards

Test Standard : FCC PART 15 (2010) & RSS-210

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 devices 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 methods apply to the measurement of individual units or systems comprised of multiple units.

Summary of Test Results

Applied Standard : 47 CFR Part 15 Subpart C & RSS 210 Part I and II					remark
FCC Standard	IC Standard	Test Type	Result	Remark	Limit
15.207	RSS-Gen 7.2.2	AC Power Conducted Emission	Pass	Meet the requirement	
15.205 & 15.209	A8.5	Intentional Radiated Emission	Pass	Meet the requirement	
15.247(a)(1)	A8.1(b),A8.1(a) RSS-Gen 4.6.1	Carrier Frequency Separation & 20 Bandwidth ,99% Bandwidth	Pass	Meet the requirement	>25 kHz
15.247(b)	A8.4(2)	Maximum Peak output power	Pass	Meet the requirement	30dBm(1W)
15.247(a)(1)(ii)	A8.1(d)	Number of Hopping Frequency	Pass	Meet the requirement	>75
15.247(c)	A8.5	Transmitter Radiated Emission	Pass	Meet the requirement	
15.247(a)(1)(iii)	A8.1(d)	Time of Occupancy (Dwell Time)	Pass	Meet the requirement	<400ms
15.247(d)	A8.5	Band Edge Measurement	Pass	Meet the requirement	
15.107	RSS-Gen 7.2.2	Receiver conducted Emission	Pass	Meet the requirement	
15.109	RSS-Gen 7.2.3.2	Receiver radiated emission	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(2402 MHz), Middle(2441 MHz),High(2480 MHz)

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

d. Test rate :3 Mbps



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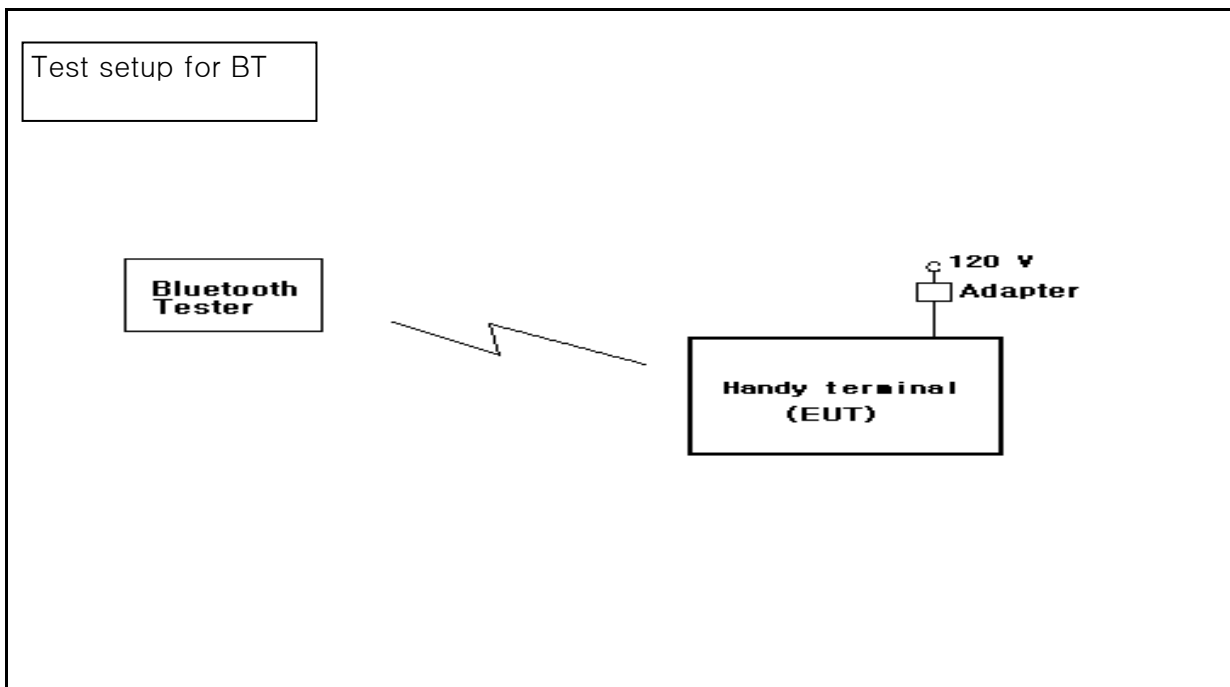


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4.2 EUT Operation.

- * The EUT was in the following operation mode during all testing
- * The operational conditions of the EUT was determined by the manufacturer according to the typical use of the EUT with respect to the expected highest level of emission
- * Execute a RF test program to enable EUT under transmission/receiving condition continuously at specific channel frequency.
- *. Test Mode: Handy terminal 1D Scanner : battery 2200 mAh , battery 3300 mAh
- *. Test Mode: Handy terminal 2D Scanner : battery 2200 mAh , battery 3300 mAh
- *. Transmit mode and receive mode was each test.
- *. Highest frequency of the EUT is above 1 GHz, the measurement shall be made up to 10 times the highest frequency or 40 GHz,

4.3 Configuration and Peripherals



4.4 EUT and Support equipment

Equipment Name	Model Name	S/N	Manufacturer	Remark (FCC ID)
Handy terminal	HT-K10	NONE	TOSHIBA TEC CORPORATION	EUT
Adapter	KSAS0100500200D5	NONE	Kuantech(Beihai)Co., Ltd.	
Bluetooth Tester	TC-3000A	3000A570224	TESCOM	

4.5 Cable Connecting

Start Equipment		End Equipment		Cable Standard		Remark
Name	I/O port	Name	I/O port	Length	Shielded	
Handy terminal	Wireless(BT)	Bluetooth Tester	Wireless(BT)	-	-	
Handy terminal	Power	Adapter	-	1.5	Unshielded	

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= 30KHz
- . VBW= 300KHz
- . Span= 3MHz
- . Sweep= suitable duration based on the EUT specification.

20dB Bandwidth Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US41421291	2013-09-11
Bluetooth Tester	TC-3000A	3000A570224	2013-12-26
Dual Directional Coupler	778D	16502	2013-02-23
-Spectrum Analyzer <=> EUT	Loss: 22.0dB	-	

5.3 Measurement results

EUT	Handy terminal	MODEL	HT-K10
MODE	FHSS	ENVIRONMENTAL CONDITION	26 °C, 43 % R.H .
INPUT POWER	5Vdc		

CHANNEL	Channel Frequency (MHz)	Bandwidth at 99% (kHz)	Bandwidth at 20dB below(kHz)	Channel Separation (kHz)	Limit (kHz)	PASS/FAIL
0	2402	929	977	1000	651	PASS
39	2441	887	950	1000	633	PASS
78	2480	888	953	1000	635	PASS

(8DPSK)

CHANNEL	Channel Frequency (MHz)	Bandwidth at 99% (MHz)	Bandwidth at 20dB below(kHz)	Channel Separation (kHz)	Limit (kHz)	PASS/FAIL
0	2402	1.201	1346	1000	897	PASS
39	2441	1.212	1322	1000	881	PASS
78	2480	1.178	1310	1000	873	PASS



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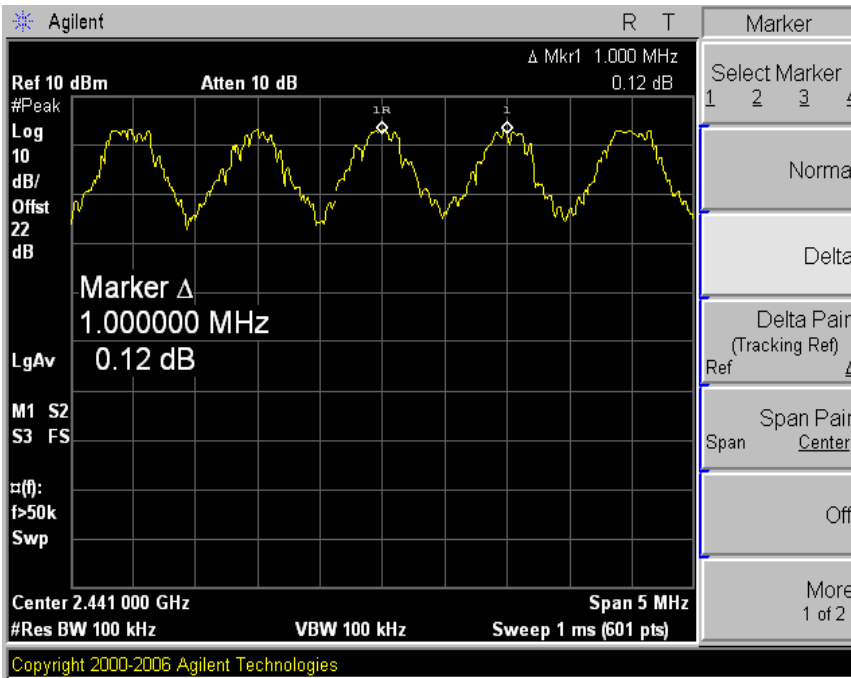
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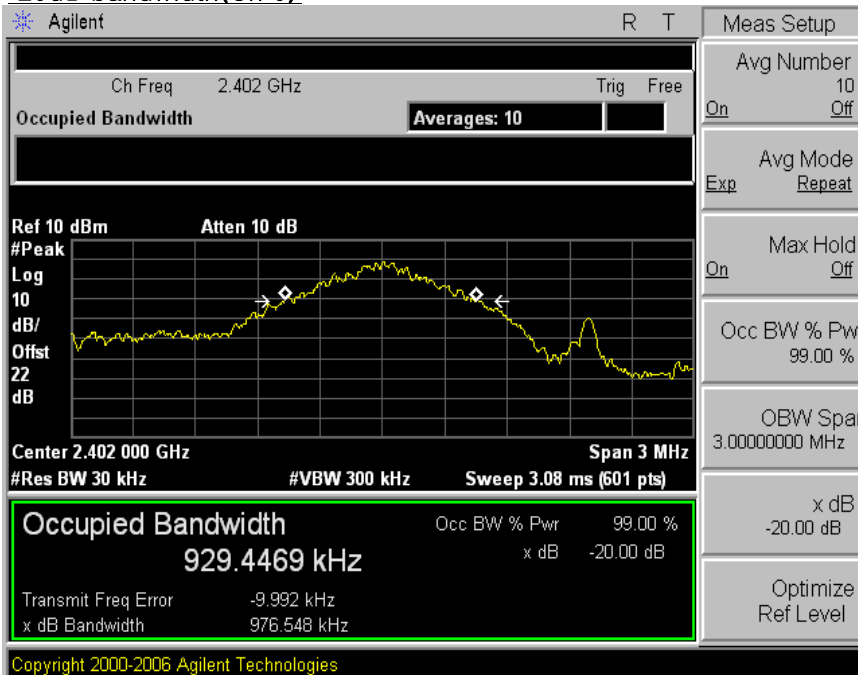
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5.4 Trace data (GFSK)

Channel Separation



20dB bandwidth(Ch 0)





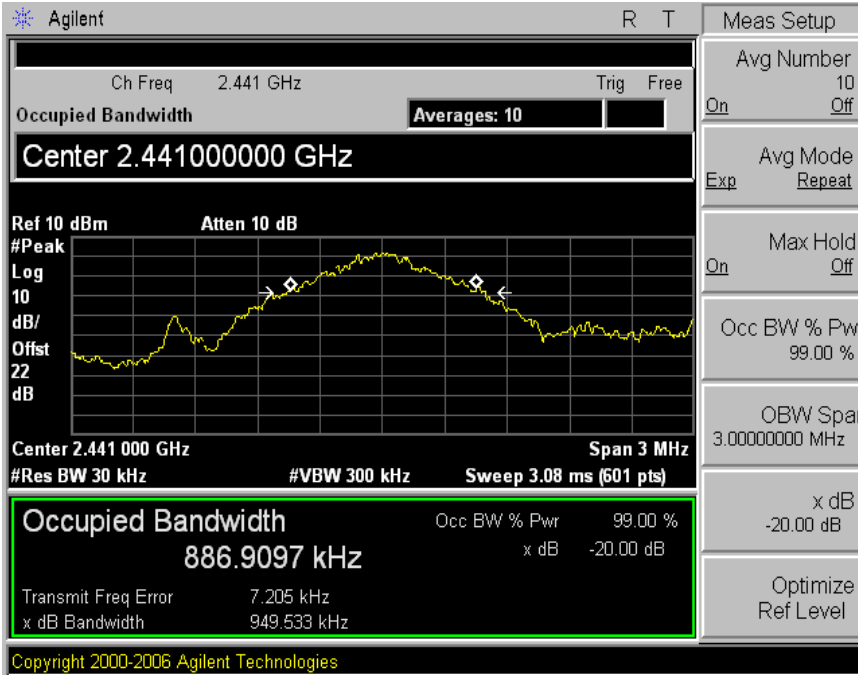
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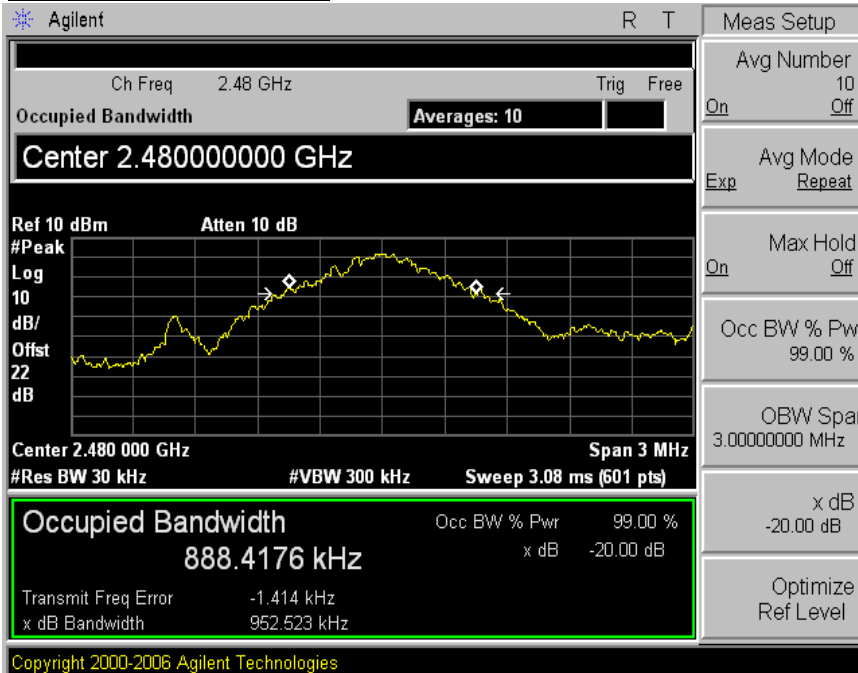


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20dB bandwidth(CH 39)



20dB bandwidth(CH 78)





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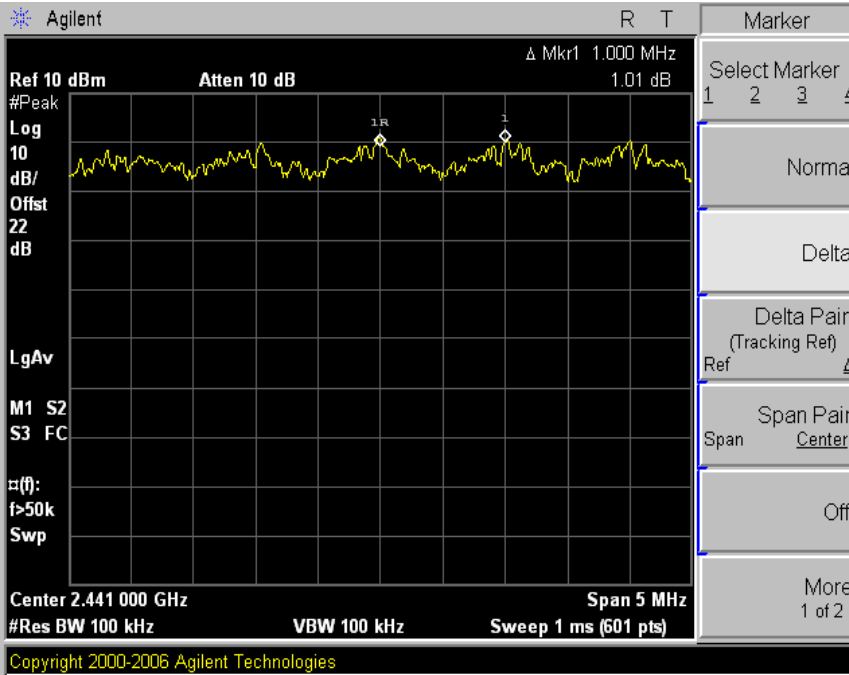
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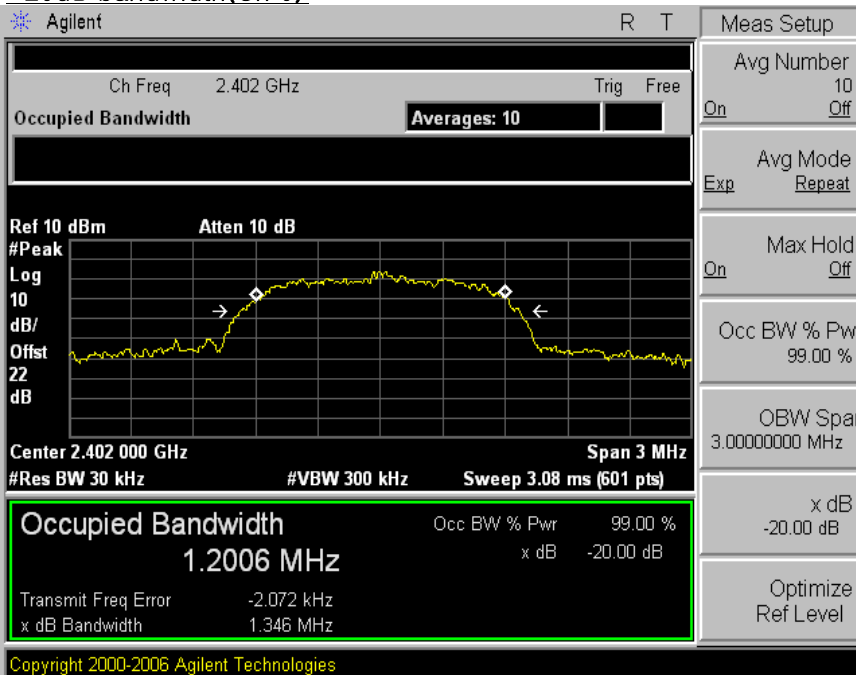
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(8DPSK)

Channel Separation



20dB bandwidth(Ch 0)





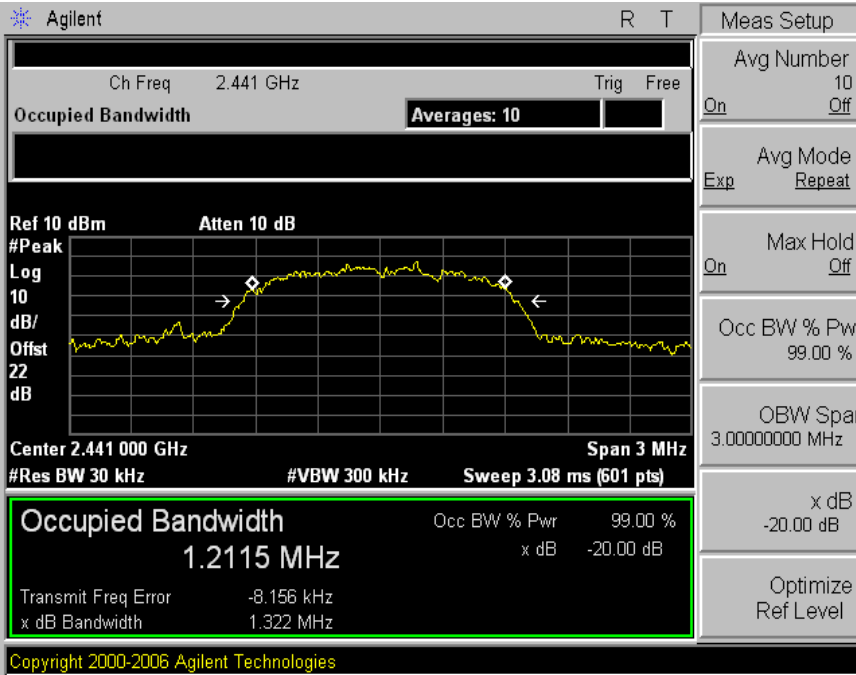
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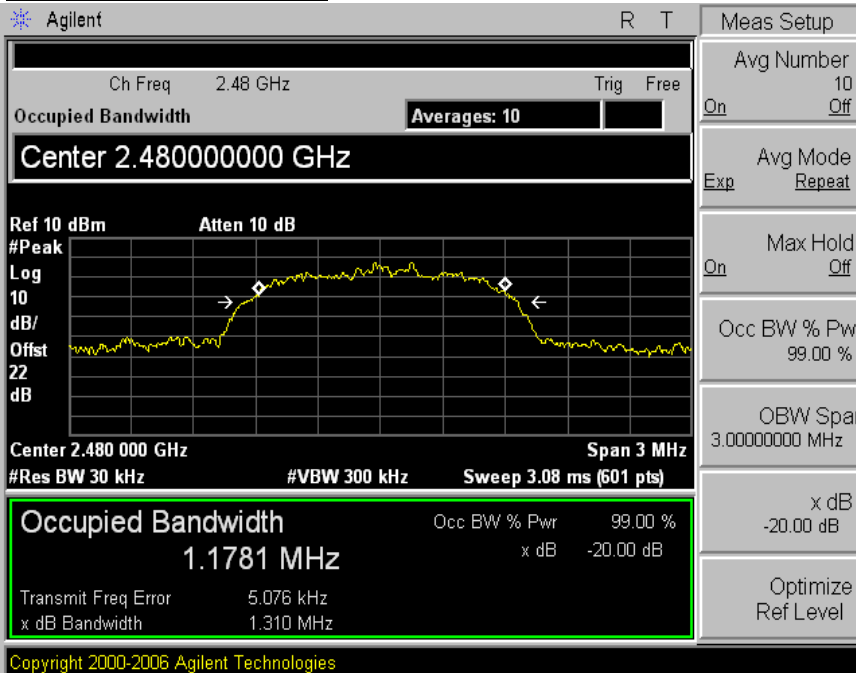


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20dB bandwidth(CH 39)



20dB bandwidth(CH 78)





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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	2014-02-27
Power Sensor	NRV-251	325948/013	2014-02-27
Bluetooth Tester	TC-3000A	3000A570224	2013-12-26
Dual Directional Coupler	778D	16502	2013-02-23
-Spectrum Analyzer <=> EUT	Loss: 22.0dB	-	

6.2 Measurement results

EUT	Handy terminal	MODEL	HT-K10
MODE	GFSK,8DPSK DH5	ENVIRONMENTAL CONDITION	24 °C, 43 % R.H.
INPUT POWER	5Vdc		

GFSK

CHANNEL	Channel Frequency (MHz)	Peak Power Output(dBm)		Limit[mW]	PASS/ FAIL
		(dBm)	(mW)		
0	2402	0.09	1.0209	125	PASS
39	2441	3.51	2.2439	125	PASS
78	2480	3.59	2.2856	125	PASS

8DPSK

CHANNEL	Channel Frequency (MHz)	Peak Power Output(dBm)		Limit[mW]	PASS/ FAIL
		(dBm)	(mW)		
0	2402	1.62	1.4521	125	PASS
39	2441	2.36	1.7219	125	PASS
78	2480	1.62	1.4521	125	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	2013-09-11
Bluetooth Tester	TC-3000A	3000A570224	2013-12-26
Dual Directional Coupler	778D	16502	2013-02-23
-Spectrum Analyzer <=> EUT	Loss: 22.0dB		

7.3 Measurement results

EUT	Handy terminal	MODEL	HT-K10
MODE	FHSS	ENVIRONMENTAL CONDITION	26 °C, 43 % R.H.
INPUT POWER	5Vdc		
Number of CH	Limit (Number of CH)	PASS/FAIL	
79	>75	PASS	



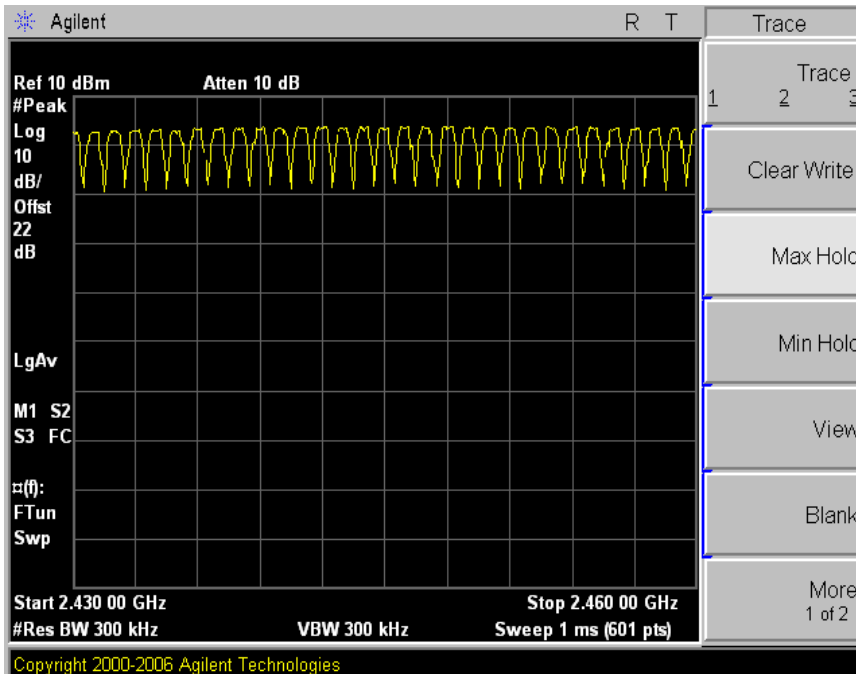
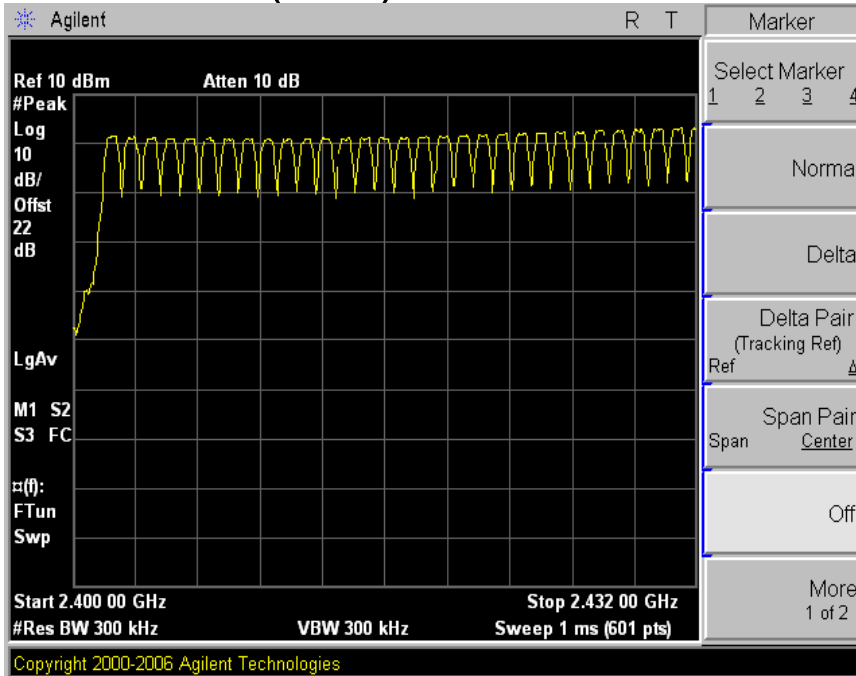
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7.4 Trace data(GFSK)



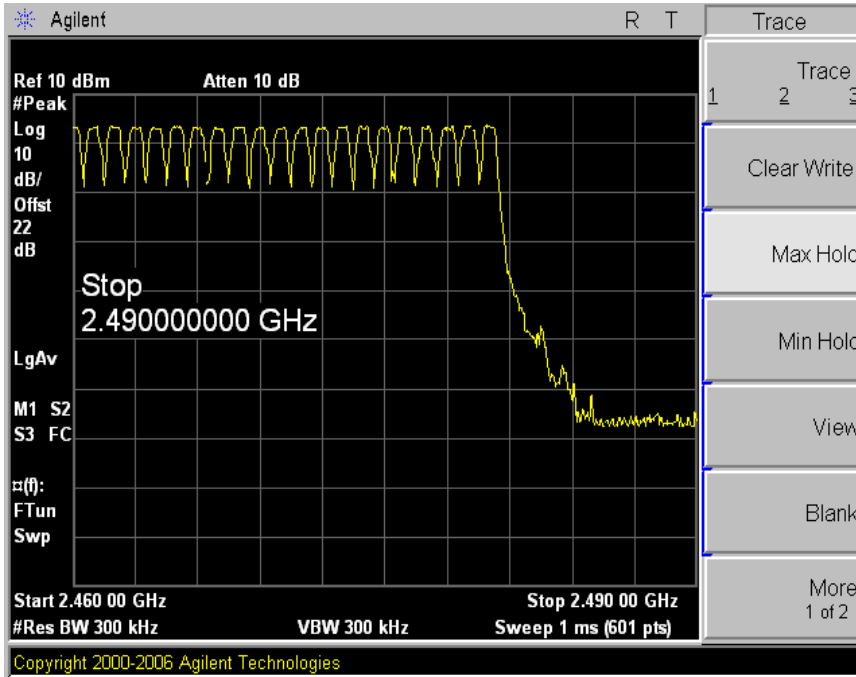


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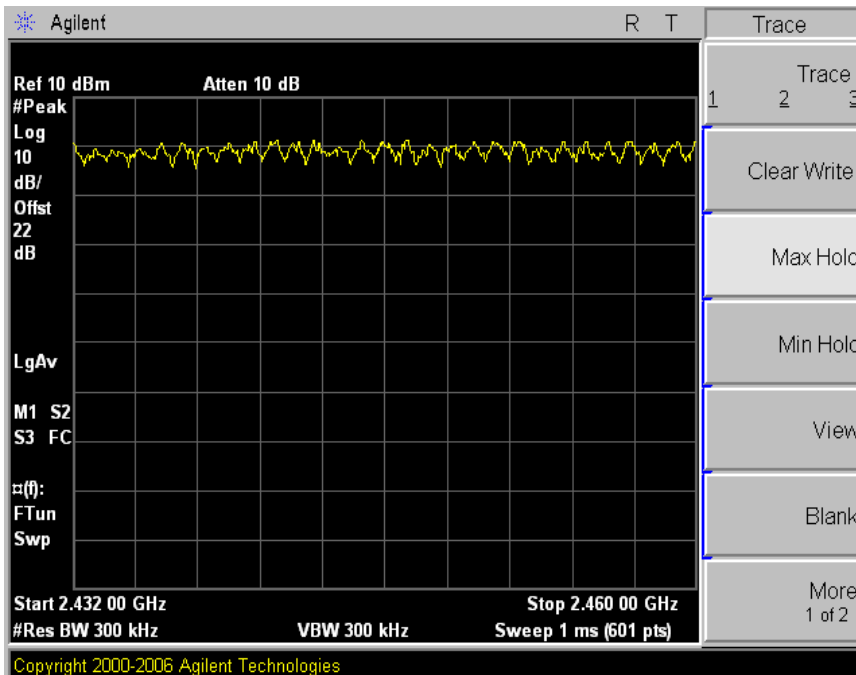
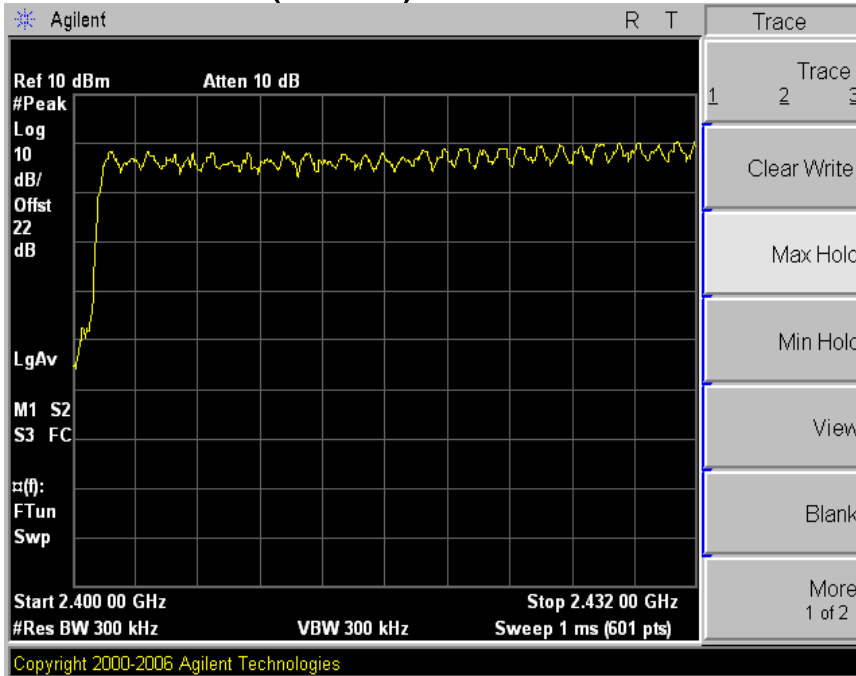
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7.4 Trace data(8DPSK)



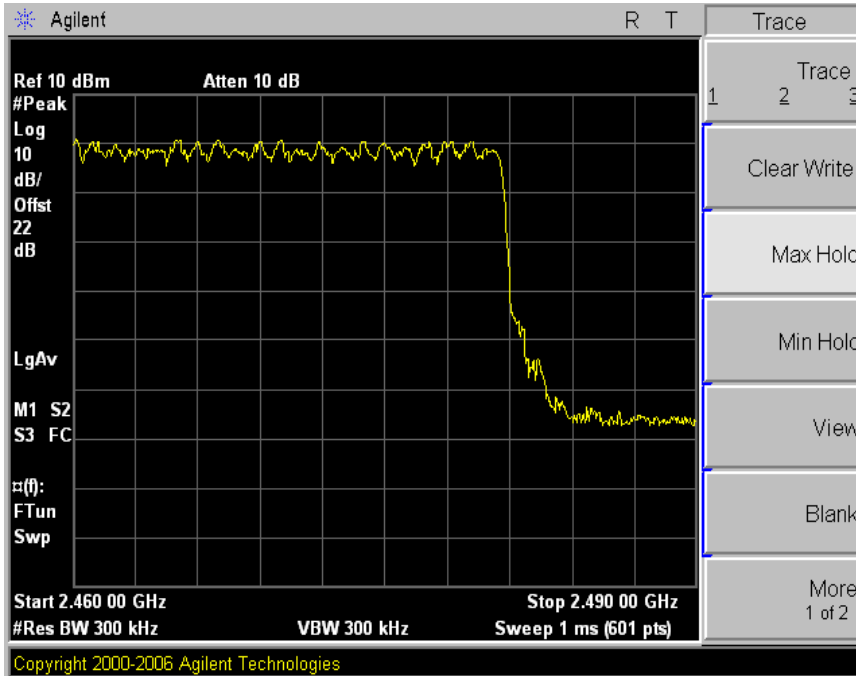


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8. Time of Occupancy (Dwell Time)

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 hopping channel
- . Sweep = as necessary to capture the entire dwell time per hopping channel
- . Detector function = Peak
- . Trace = Max hold

The Time of Occupancy Test Instruments

Description	Model	Serial Number	Cal. Due Date
Spectrum Analyzer	E4440A	US41421291	2013-09-11
Bluetooth Tester	TC-3000A	3000A570224	2013-12-26
Dual Directional Coupler	778D	16502	2013-02-23
-Spectrum Analyzer <=> EUT	Loss:22.0dB	-	

8.3 Measurement results

EUT	Handy terminal	MODEL	HT-K10
MODE	FHSS	ENVIRONMENTAL CONDITION	26 °C, 43 % R.H.
INPUT POWER	5Vdc		



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A. DH1 Mode

One period for each particular channel : $0.420 \text{ ms} \times 320.1 = 134.44 \text{ ms}$

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
73	134.44	400	PASS

Calculation: The Bluetooth system hops at a rate of 1600 times per second. This means there are 1600 timeslots in one second, the DH1 data rate operates on a one-slot transmission and one-slot receiving basis. Thus there are $1600/(1+1)=800$ transmissions per second. In one period for each particular channel there are $10.13 \times 31.6=320.1$ times of transmissions.

B. DH3 Mode

One period for each particular channel : $1.675 \text{ ms} \times 159.9 = 267.83 \text{ ms}$

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
39	267.83	400	PASS

Calculation: The Bluetooth system hops at a rate of 1600 times per second. This means there are 1600 timeslots in one second, the DH3 data rate operates on a three-slot transmission and one-slot receiving basis. Thus there are $1600/(3+1)=400$ transmissions per second. In one period for each particular channel there are $5.06 \times 31.6=159.9$ times of transmissions.

C. DH5 Mode

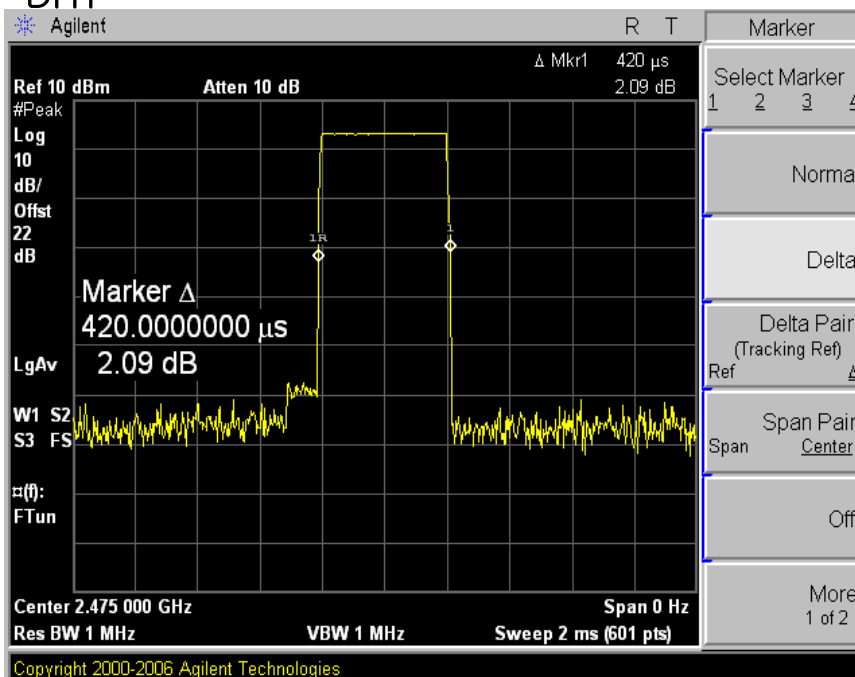
One period for each particular channel : $2.933 \text{ ms} \times 106.81 = 313.27 \text{ ms}$

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
39	313.27	400	PASS

Calculation: The Bluetooth system hops at a rate of 1600 times per second. This means there are 1600 timeslots in one second, the DH5 data rate operates on a five-slot transmission and one-slot receiving basis. Thus there are $1600/(5+1)=266.7$ transmissions per second. In one period for each particular channel there are $3.38 \times 31.6=106.81$ times of transmissions.

8.4 Trace data

DH1





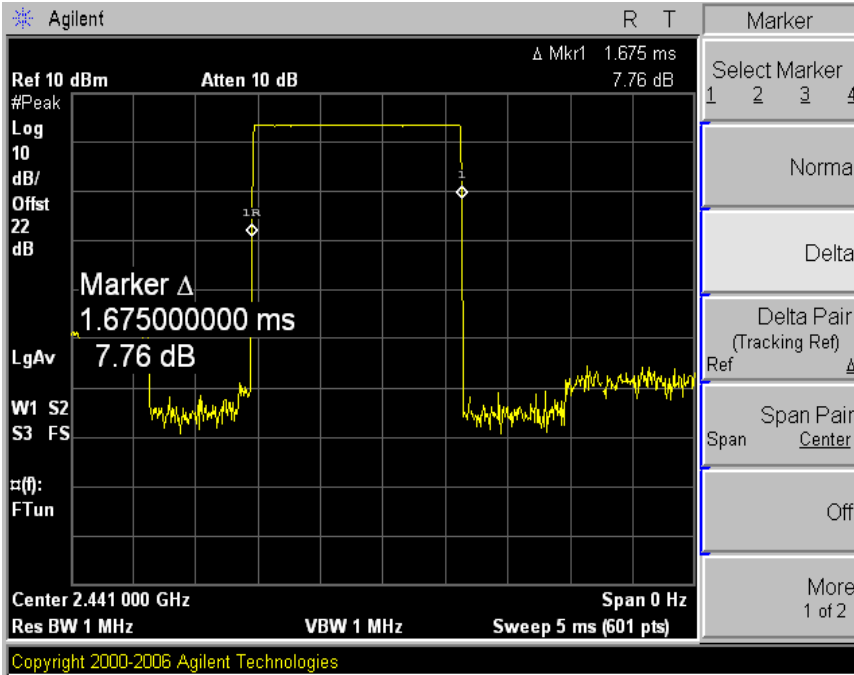
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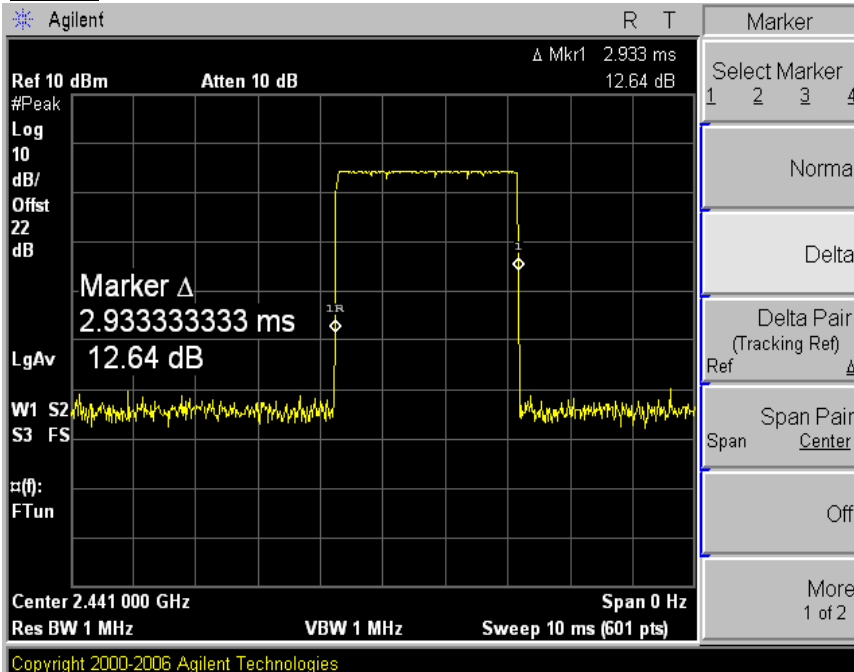


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DH3



DH5





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8DPSK

A. DH1 Mode

One period for each particular channel : $0.430 \text{ ms} \times 320.1 = 137.64 \text{ ms}$

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
39	131.6	400	PASS

B. DH3 Mode

One period for each particular channel : $1.725 \text{ ms} \times 159.9 = 275.83 \text{ ms}$

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
39	275.83	400	PASS

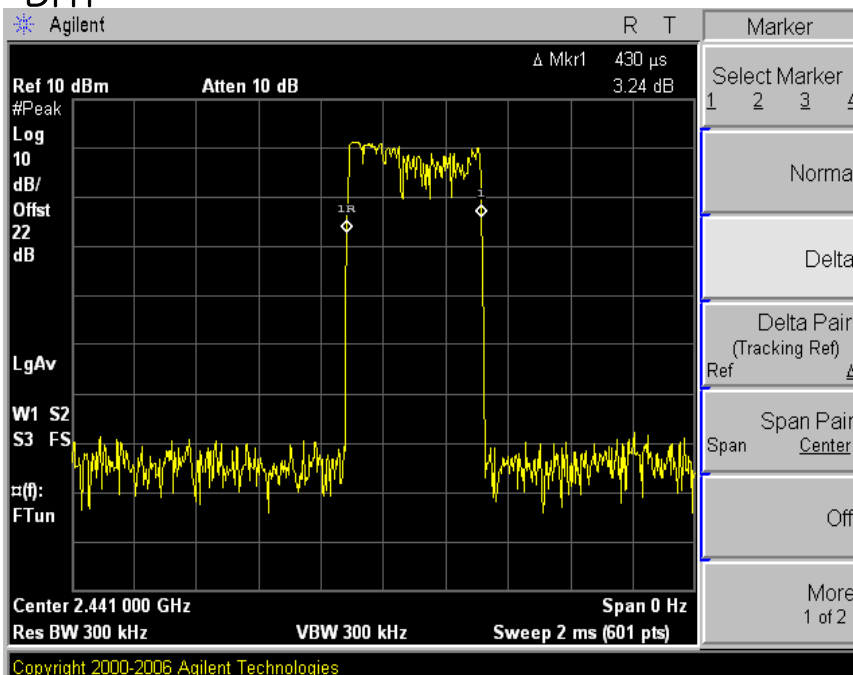
C. DH5 Mode

One period for each particular channel : $2.967 \text{ ms} \times 106.81 = 316.91 \text{ ms}$

Channel	Pulse Time(ms)	Limit (ms)	PASS/FAIL
39	316.91	400	PASS

8.5 Trace data

DH1





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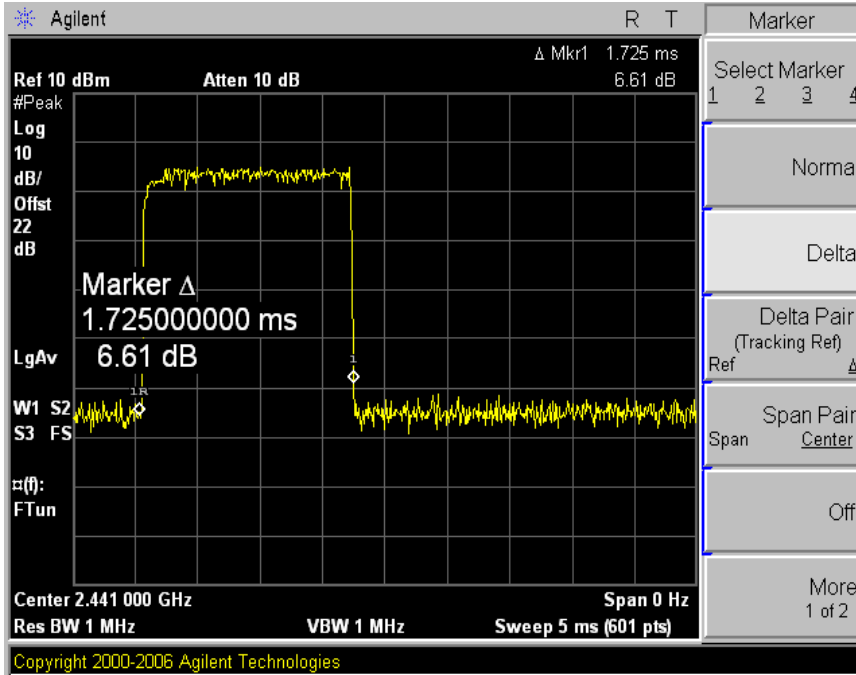
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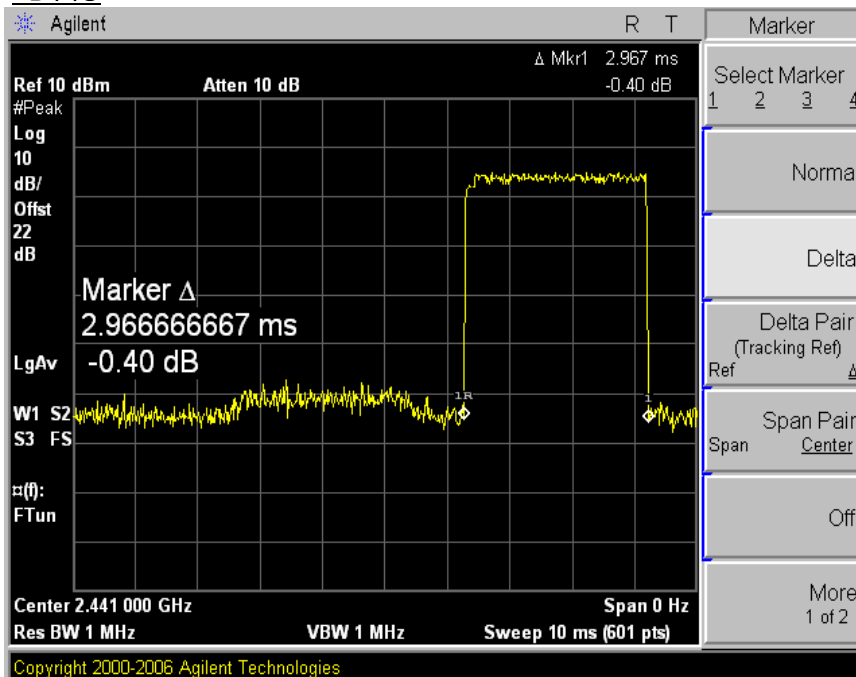
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8DPSK

DH3



DH5



9. band-edge and out of band emissions.

9.1 Test procedure

The radio frequency 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	2013-09-11
Bluetooth Tester	TC-3000A	3000A570224	2013-12-26
Dual Directional Coupler	778D	16502	2013-02-23
-Spectrum Analyzer <=> EUT	Loss: 22.0dB		

9.3 Measurement results of band-edge & out of emission

EUT	Handy terminal	MODEL	HT-K10
MODE	GFSK	ENVIRONMENTAL CONDITION	24 °C, 43 % R.H.
INPUT POWER	5Vdc		

* Refer to attach spectrum analyzer data chart.



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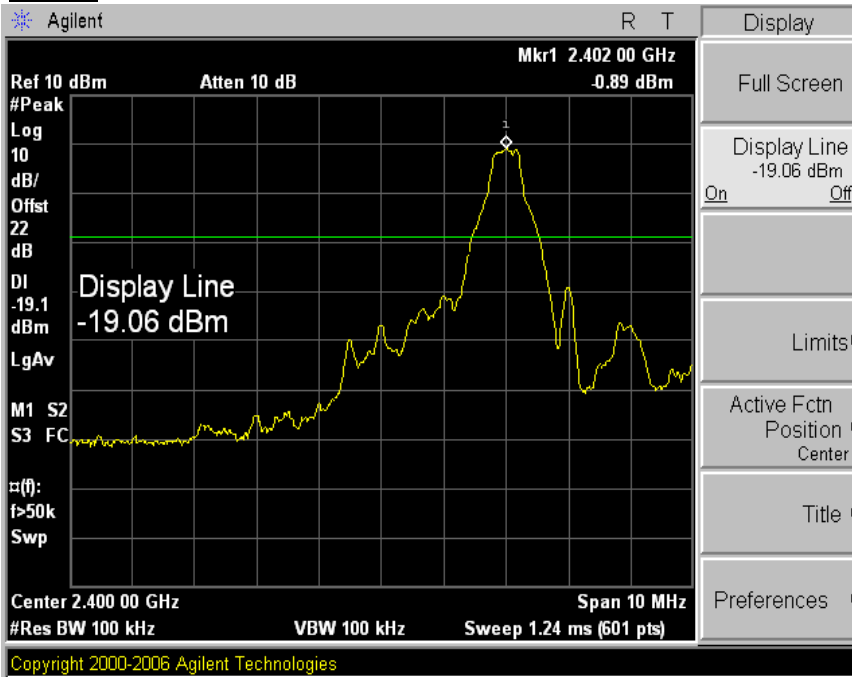
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9.4 Trace data of band-edge & Out of Emission

CH0



CH78





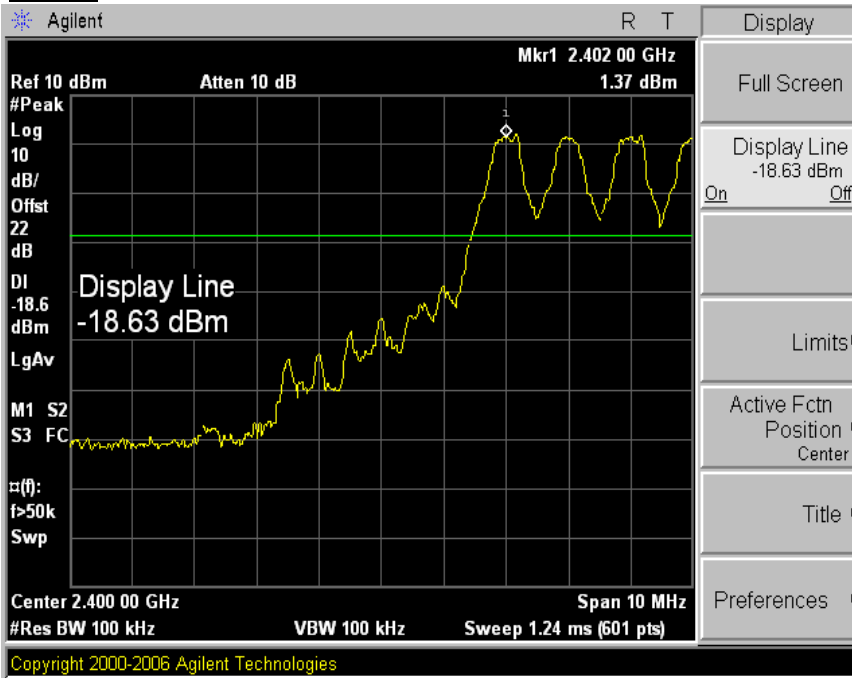
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Seoul, 158-803, Korea

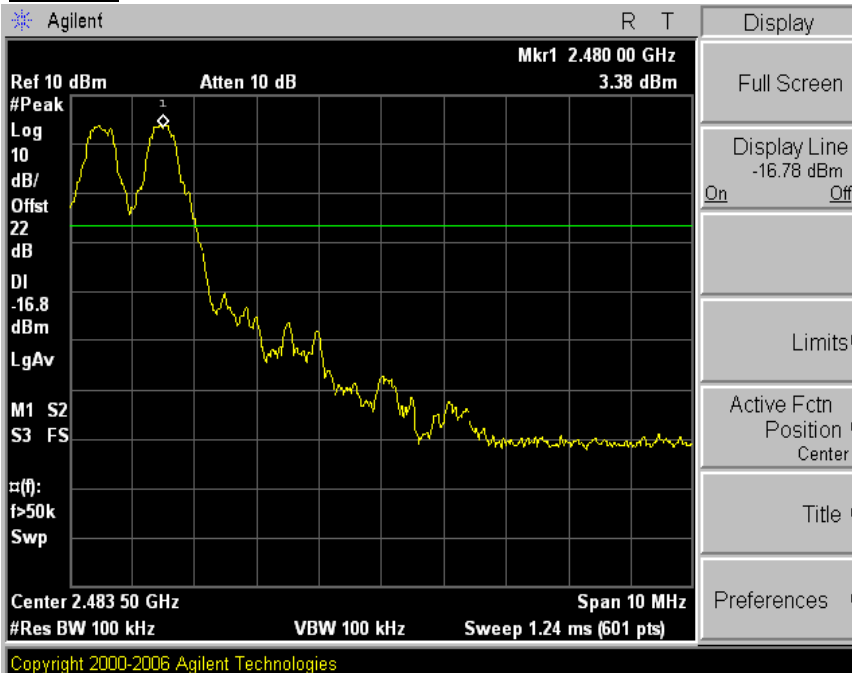


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Hopping on CH0



CH78





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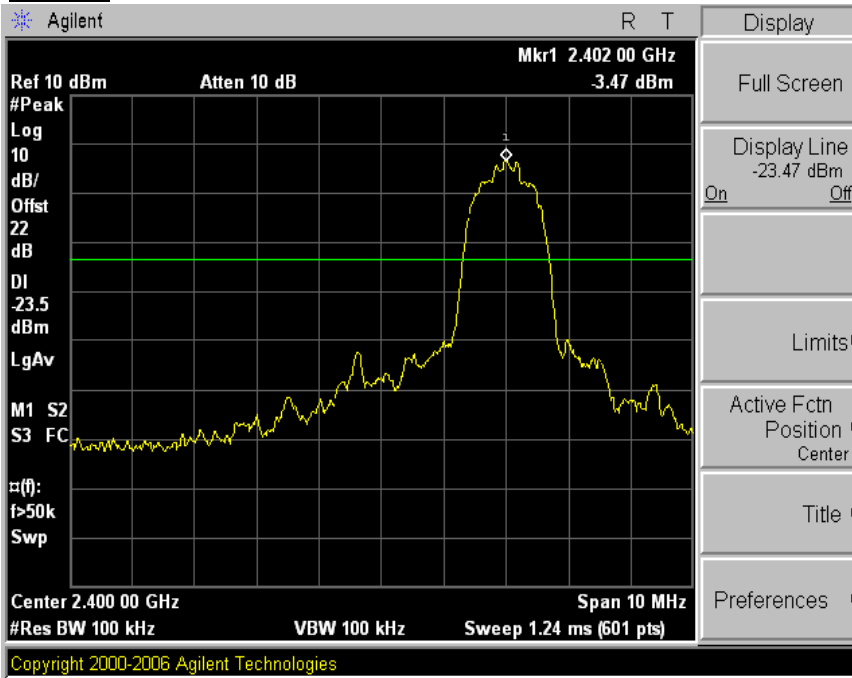
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Seoul, 158-803, Korea



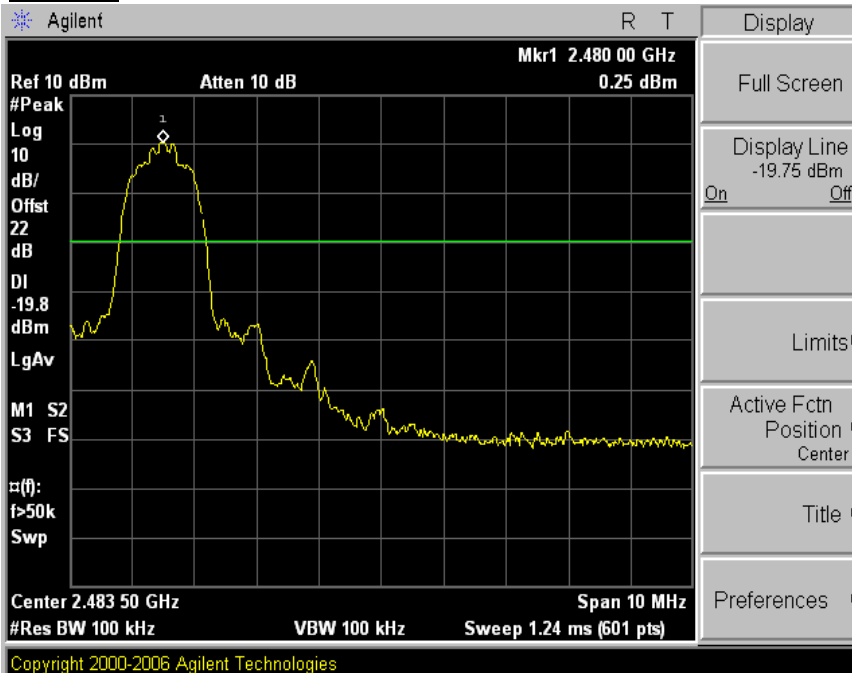
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8DPSK

CH 0



CH78





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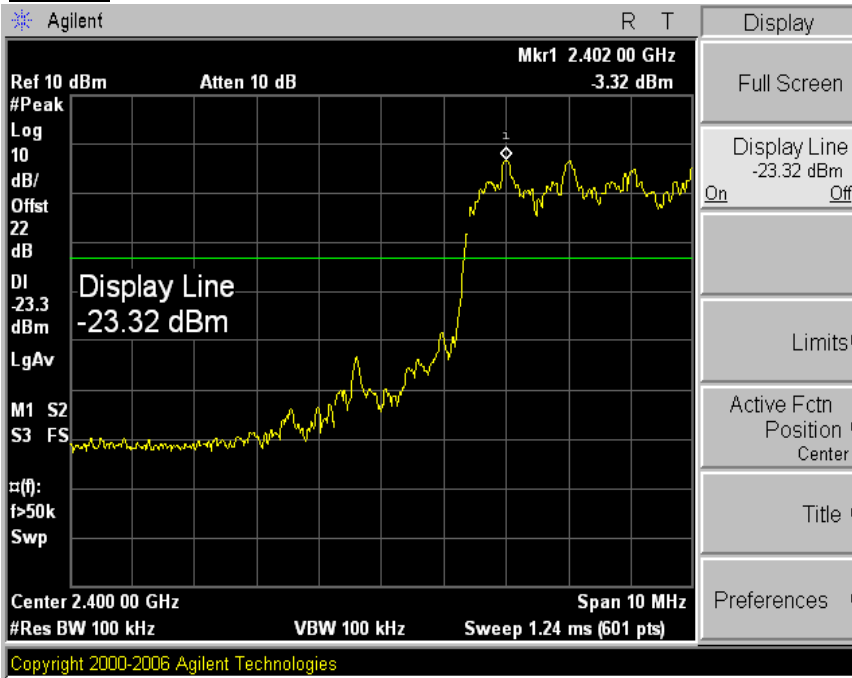
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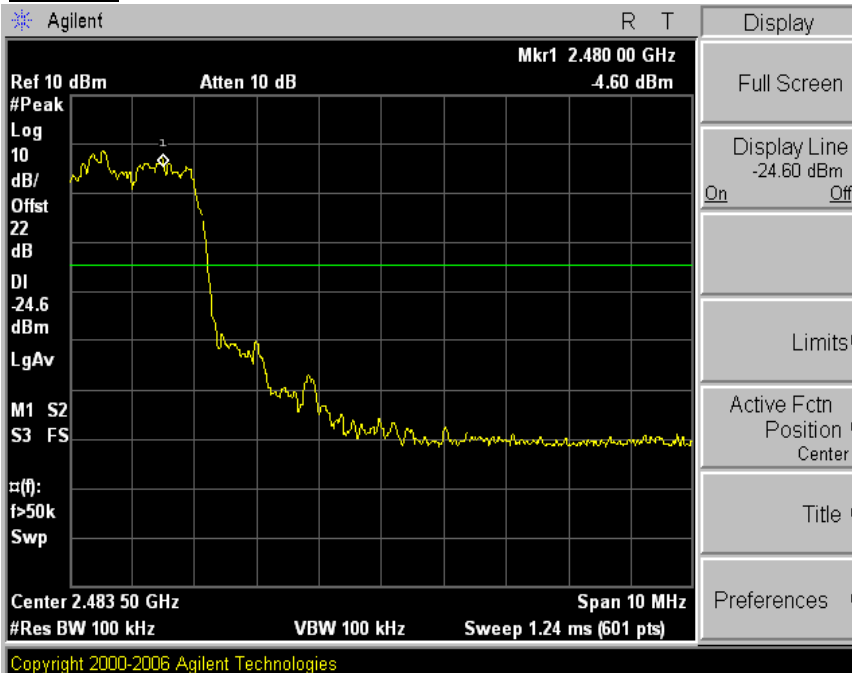
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Hopping on

CH 0



CH78





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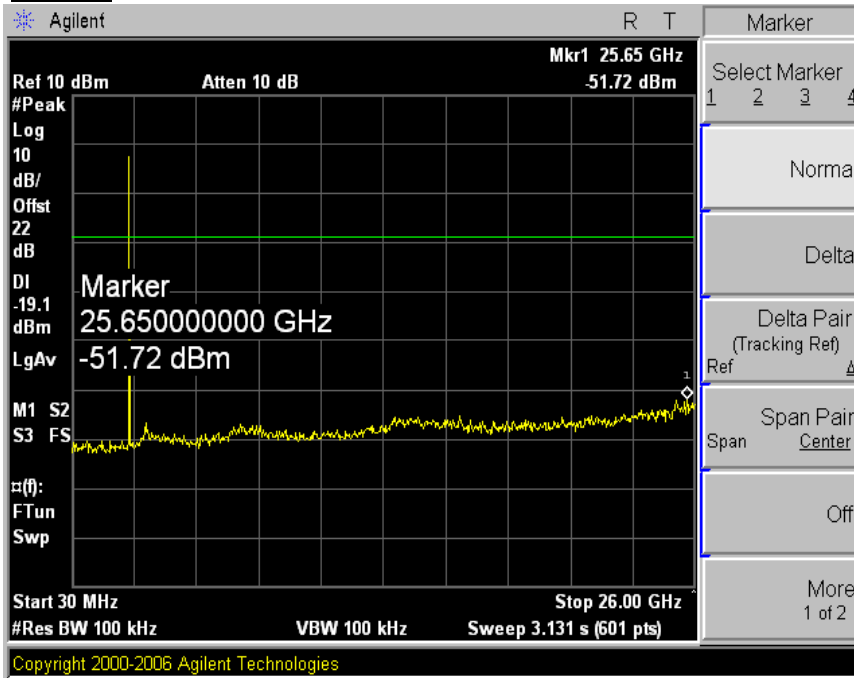
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GFSK

CH 0





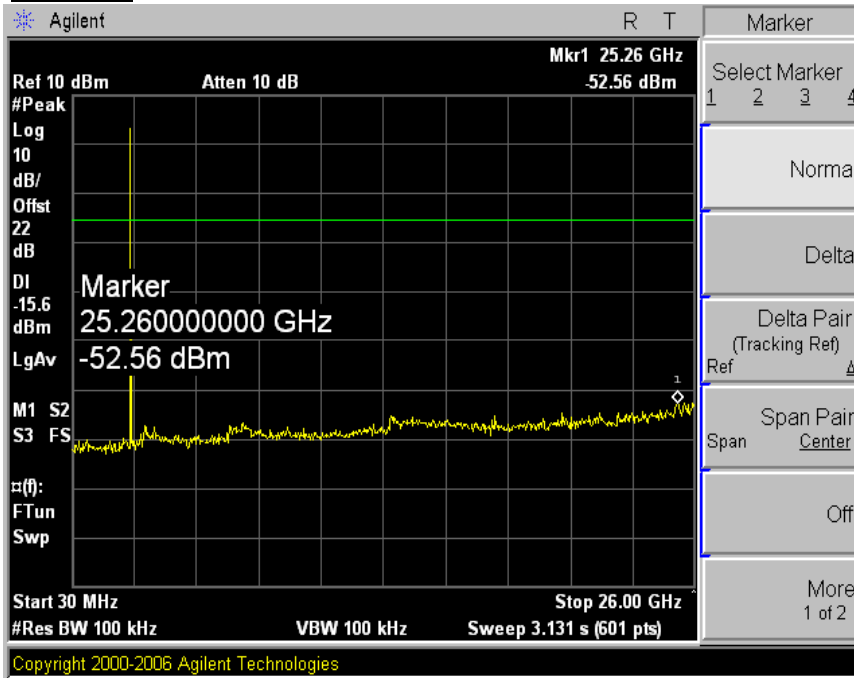
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CH 39





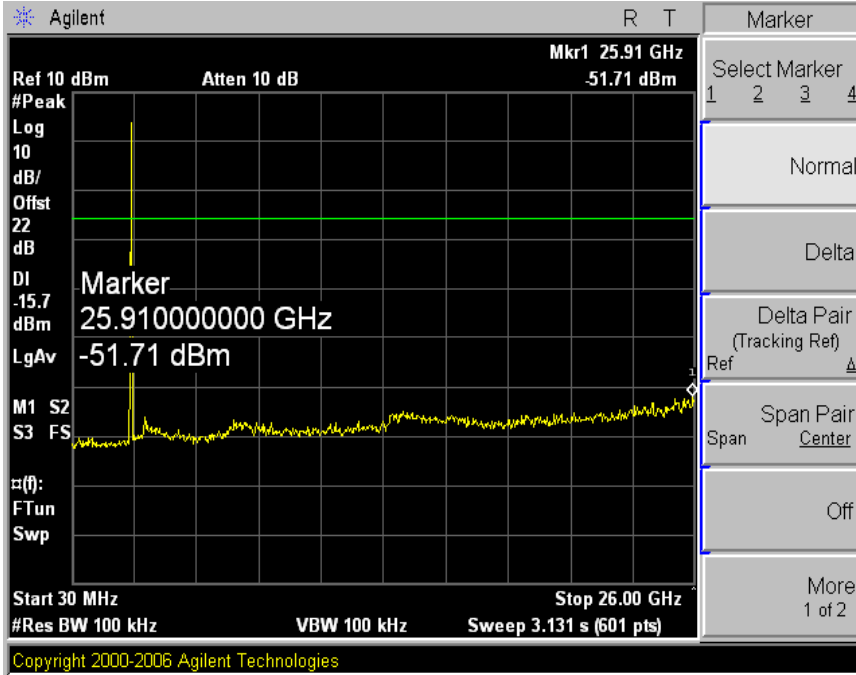
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CH 78





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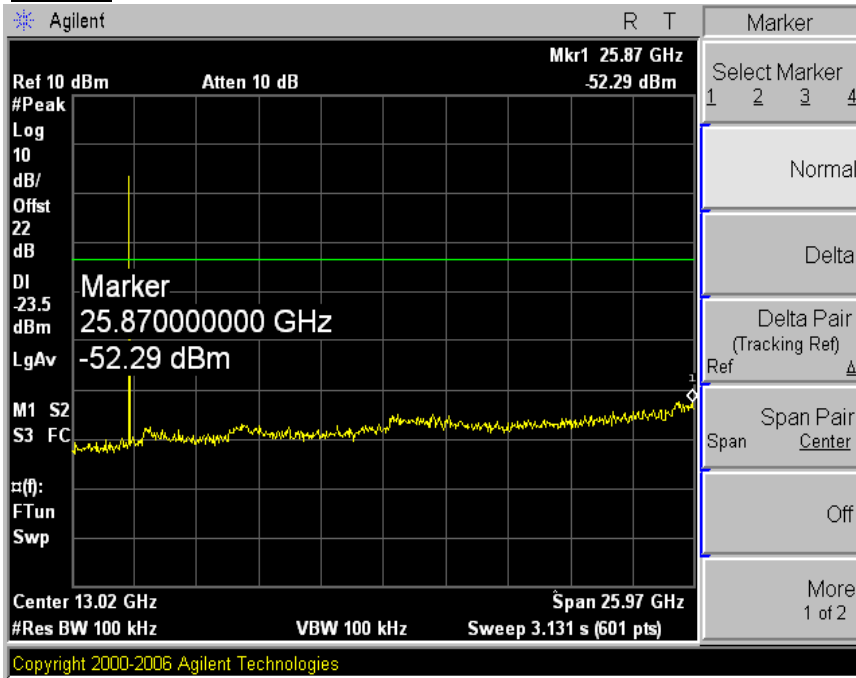
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8DPSK

CH 0





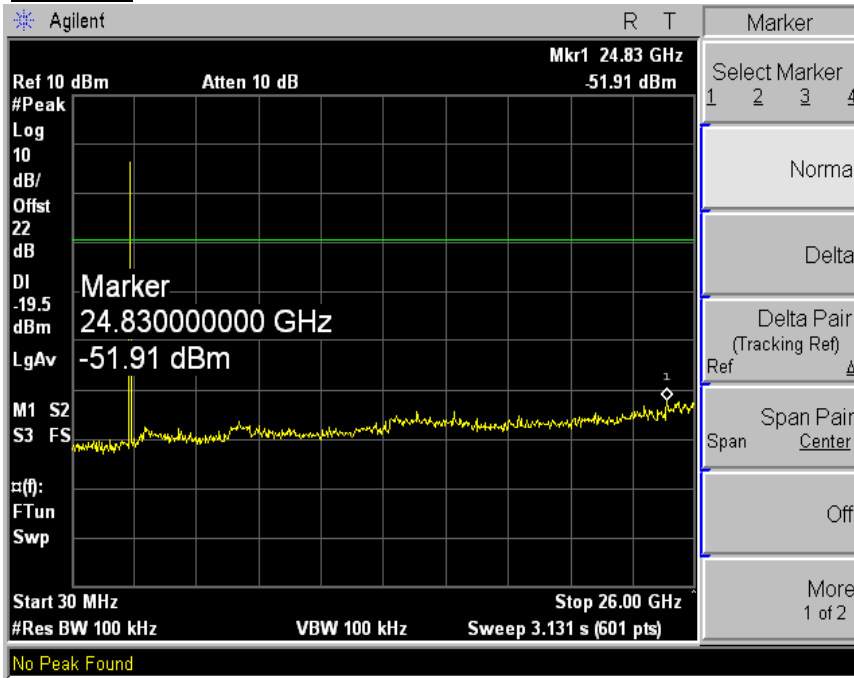
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CH 39





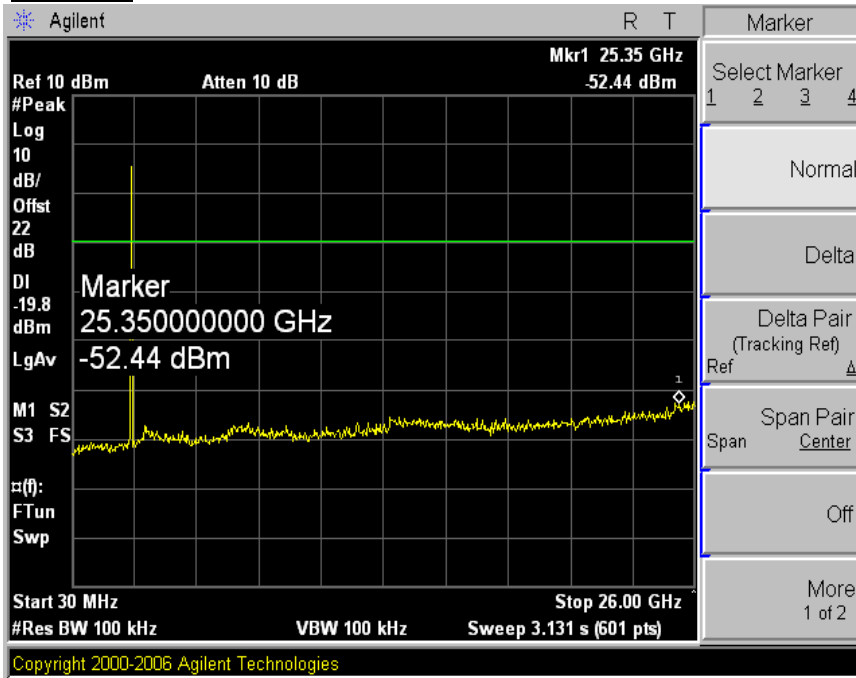
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CH 78



10. Measurement of radiated disturbance

Above 30 MHz Electric Field strength was measured in accordance with FCC Part 15 (2010) & RSS-210. 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	ESCI7	ROHDE & SCHWARZ	1166.5950.07	28-Mar-13
Logbicon Antenna	VULB 9168	SCHWARZBECK	237	20-Jan-13
Turn Table	DT3000-2t	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
Antenna Master & Turn table controller	CO2000-P	Innco System GmbH	CO2000/641 /28051111/L	-
TEST Receiver	ESPI7	ROHDE & SCHWARZ	100185	25-Jan-13
PREAMPLIFIER	8449B	AGILENT	3008A00595	25-Jan-13
Horn Antenna	BBHA9120D	SCHWARZBECK	352	15-May-13
Spectrum Analyzer	R3273	ADVANTEST	110600592	26-Jan-13
Pyramidal Horn Antenna	3160-09-01	ETS-LINDGREN	102642	22-Oct-13
Turn Table	DT1500-S	Innco System GmbH	N/A	-
Antenna Mast	MA4000-EP	Innco System GmbH	N/A	-
Antenna Master & Turn table controller	CO2000-P	Innco System GmbH	CO2000/642 /28051111/L	-
Bluetooth Tester	TC-3000A	TESCOM	3000A570224	23-Aug-13

10.2 Environmental Condition

Below 1 GHz –Test Place : 10 m Semi-anechoic chamber

BT Basic Rate Mode

Temperature (°C) : 23.3 °C
Humidity (% R.H.) : 42.6 % R.H.

BT EDR Mode

Temperature (°C) : 22.4 °C
Humidity (% R.H.) : 56.2 % R.H.

Above 1 GHz–Test Place : 3 m Semi-anechoic chamber

BT Basic Rate Mode

Temperature (°C) : 22.2 °C
Humidity (% R.H.) : 42.2 % R.H.

BT EDR Mode

Temperature (°C) : 21.9 °C
Humidity (% R.H.) : 50.4 % R.H.

10.3 Test Data for Bluetooth (Basic Rate)

Test Date : 18-Dec-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
67.70	11.30	V	1.0	11.25	1.20	40.00	23.75	-16.25
72.00	11.43	V	1.0	10.67	1.24	40.00	23.34	-16.66
75.70	5.92	V	1.0	9.99	1.31	40.00	17.23	-22.77
139.20	4.33	V	1.0	11.87	1.88	43.50	18.08	-25.42
191.70	5.34	H	2.0	9.90	2.10	43.50	17.34	-26.16
269.70	7.37	V	1.0	11.97	2.50	46.00	21.83	-24.17
282.70	8.76	V	1.0	12.48	2.53	46.00	23.77	-22.23
406.20	5.50	V	1.0	15.52	3.13	46.00	24.15	-21.85
451.70	5.85	V	1.0	16.61	3.40	46.00	25.86	-20.14
991.50	3.22	H	1.0	23.65	4.96	54.00	31.83	-22.17
Remark	<p>H : Horizontal, V : Vertical Bluetooth (Basic Rate , 39 CH , 2441 MHz)</p> <p>*Checked in all 3 axis and the maximum measured data were reported.</p> <p>*CL = Cable Loss(In case of below 1 000 MHz)</p> <p>*The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1 GHz.</p>							



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10.3-1 Test Data for Bluetooth(Basic Rate)

Test Date 19-Dec-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1 MHz VBW:1 MHz)									
2323.2	25.64	V	1.2	26.49	5.0	0	74.0	57.13	-16.87
2323.2	24.38	H	1.1	26.49	5.0	0	74.0	55.87	-18.13
2332.8	26.01	H	1.1	26.52	5.0	0	74.0	57.53	-16.47
2332.8	25.36	V	1.2	26.52	5.0	0	74.0	56.88	-17.12
2390	24.94	H	1.1	26.69	5.0	0	74.0	56.63	-17.37
2390	24.68	V	1.2	26.69	5.0	0	74.0	56.37	-17.63
2402	64.94	H	1.1	26.73	5.0	0	*OB	96.67	-
2402	59.37	V	1.2	26.73	5.0	0	*OB	91.10	-
4804	45.49	H	1.1	31.36	-22.8	0	74.0	54.04	-19.96
4804	45.40	V	1.2	31.36	-22.8	0	74.0	53.95	-20.05
Average Value = Peak value + Duty Cycle Correction Factor									
2323.2	57.13	V	1.2			-30.65	54.0	26.48	-27.52
2323.2	55.87	H	1.1			-30.65	54.0	25.22	-28.78
2332.8	57.53	H	1.1			-30.65	54.0	26.88	-27.12
2332.8	56.88	V	1.2			-30.65	54.0	26.23	-27.77
2390	56.63	H	1.1			-30.65	54.0	25.98	-28.02
2390	56.37	V	1.2			-30.65	54.0	25.72	-28.28
4804	54.04	H	1.1			-30.65	54.0	23.39	-30.61
4804	53.95	V	1.2			-30.65	54.0	23.30	-30.70
Remark	<p>H : Horizontal, V : Vertical TEST MODE : Bluetooth Basic Rate-CH0(2402 MHz)</p> <p>*The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz.</p> <p>FYI : Duty Cycle Correction Factor (79 channel hopping) a. Time to cycle through all channels= $\Delta t = \tau$ [ms] x 79 channels = 231.707 ms, where τ = pulse width b. 100 ms/ Δt [ms] = H \rightarrow Round up to next highest integer, H' =1 c. Worst Case Dwell Time = τ [ms] x H' = 2.933 ms d. Duty Cycle Correction = 20log (Worst Case Dwell Time/ 100ms) dB = - 30.65 dB</p>								

10.3-2 Test Data for Bluetooth(Basic Rate)

Test Date 20-Dec-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1 MHz VBW:1 MHz)									
2441	65.77	H	1.1	26.85	5.0	0	*OB	97.62	-
2441	62.17	V	1.2	26.85	5.0	0	*OB	94.02	-
4882	44.81	H	1.1	31.50	-22.5	0	74.0	53.79	-20.21
4882	44.95	V	1.2	31.50	-22.5	0	74.0	53.93	-20.07
Average Value = Peak value + Duty Cycle Correction Factor									
4882	53.79	H	1.1			-30.65	54.0	23.14	-30.86
4882	53.93	V	1.2			-30.65	54.0	23.28	-30.72
Remark	<p>H : Horizontal, V : Vertical TEST MODE : Bluetooth Basic Rate-CH39(2441 MHz)</p> <p>*The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz.</p> <p>FYI : Duty Cycle Correction Factor (79 channel hopping) a. Time to cycle through all channels= $\Delta t = \tau$ [ms] x 79 channels = 231.707 ms, where τ = pulse width b. 100 ms/ Δt [ms] = H \rightarrow Round up to next highest integer, H' =1 c. Worst Case Dwell Time = τ [ms] x H' = 2.933 ms d. Duty Cycle Correction = 20log (Worst Case Dwell Time/ 100ms) dB = - 30.65 dB</p>								

10.3-3 Test Data for Bluetooth(Basic Rate)

Test Date 21-Dec-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1 MHz VBW:1 MHz)									
2480	68.04	H	1.1	26.97	5.0	0	*OB	100.01	-
2480	68.02	V	1.2	26.97	5.0	0	*OB	99.99	-
2483.5	29.81	H	1.1	26.98	5.0	0	74.0	61.79	-12.21
2483.5	29.67	V	1.2	26.98	5.0	0	74.0	61.65	-12.35
2492.5	24.27	H	1.1	27.01	5.0	0	74.0	56.28	-17.72
2492.5	24.82	V	1.2	27.01	5.0	0	74.0	56.83	-17.17
2494.3	25.79	H	1.1	27.02	5.0	0	74.0	57.81	-16.19
2494.3	23.66	V	1.2	27.02	5.0	0	74.0	55.68	-18.32
4960	44.80	H	1.1	31.63	-22.3	0	74.0	54.18	-19.82
4960	44.21	V	1.2	31.63	-22.3	0	74.0	53.59	-20.41
Average Value = Peak value + Duty Cycle Correction Factor									
2483.5	61.79	H	1.1			-30.65	54.0	31.14	-22.86
2483.5	61.65	V	1.2			-30.65	54.0	31.00	-23.00
2492.5	56.28	H	1.1			-30.65	54.0	25.63	-28.37
2492.5	56.83	V	1.2			-30.65	54.0	26.18	-27.82
2494.3	57.81	H	1.1			-30.65	54.0	27.16	-26.84
2494.3	55.68	V	1.2			-30.65	54.0	25.03	-28.97
4960	54.18	H	1.1			-30.65	54.0	23.53	-30.47
4960	53.59	V	1.2			-30.65	54.0	22.94	-31.06
Remark	<p>H : Horizontal, V : Vertical TEST MODE : Bluetooth Basic rate-CH78(2480 MHz)</p> <p>*The TX signal isn't detected from 3th harmonics. *OB = Operating band</p> <p>*Checked in all 3 axis and the maximum measured data were reported.</p> <p>*Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz)</p> <p>*The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz.</p> <p>FYI : Duty Cycle Correction Factor (79 channel hopping)</p> <p>a. Time to cycle through all channels= $\Delta t = \tau$ [ms] x 79 channels = 231.707 ms, where τ = pulse width</p> <p>b. 100 ms/ Δt [ms] = H \rightarrow Round up to next highest integer, H' =1</p> <p>c. Worst Case Dwell Time = τ [ms] x H' = 2.933 ms</p> <p>d. Duty Cycle Correction = 20log (Worst Case Dwell Time/ 100ms) dB = - 30.65 dB</p>								



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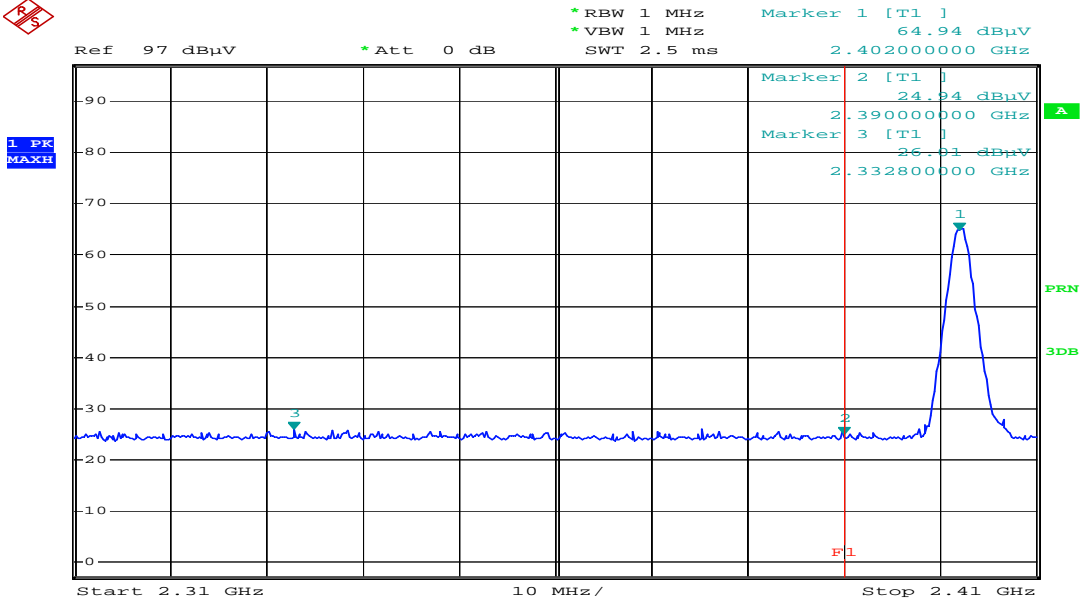
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10.4 Restricted Band Edges for BT(Basic Rate)

Band Edges(CH Low)

Detector mode:Peak

Polarity:Horizontal





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Band Edges(CH Low)

Detector mode:Peak

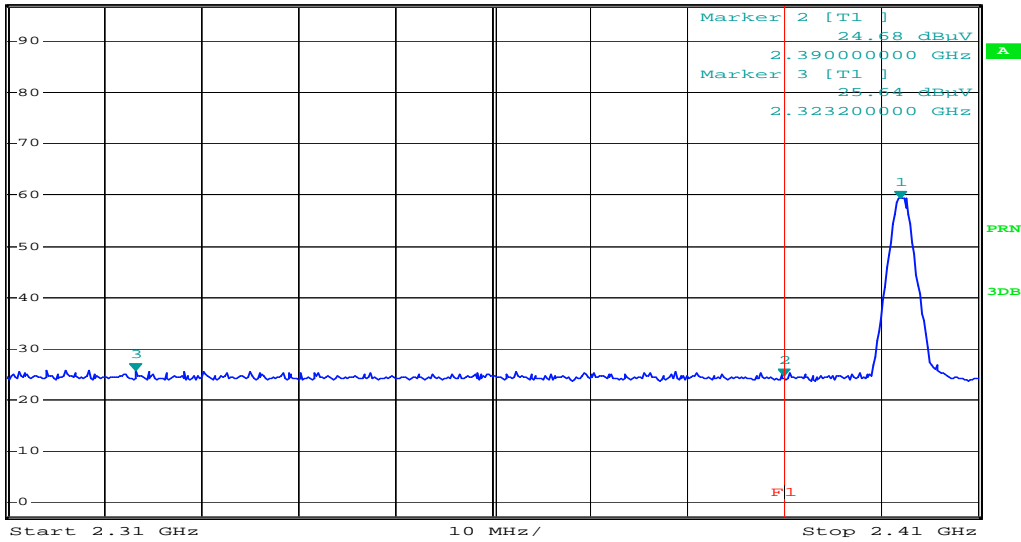
Polarity:Vertical



*RBW 1 MHz Marker 1 [T1]
*VBW 1 MHz 59.37 dBuV
SWT 2.5 ms 2.402000000 GHz

Ref 97 dBuV *Att 0 dB

1 PK
MAXH





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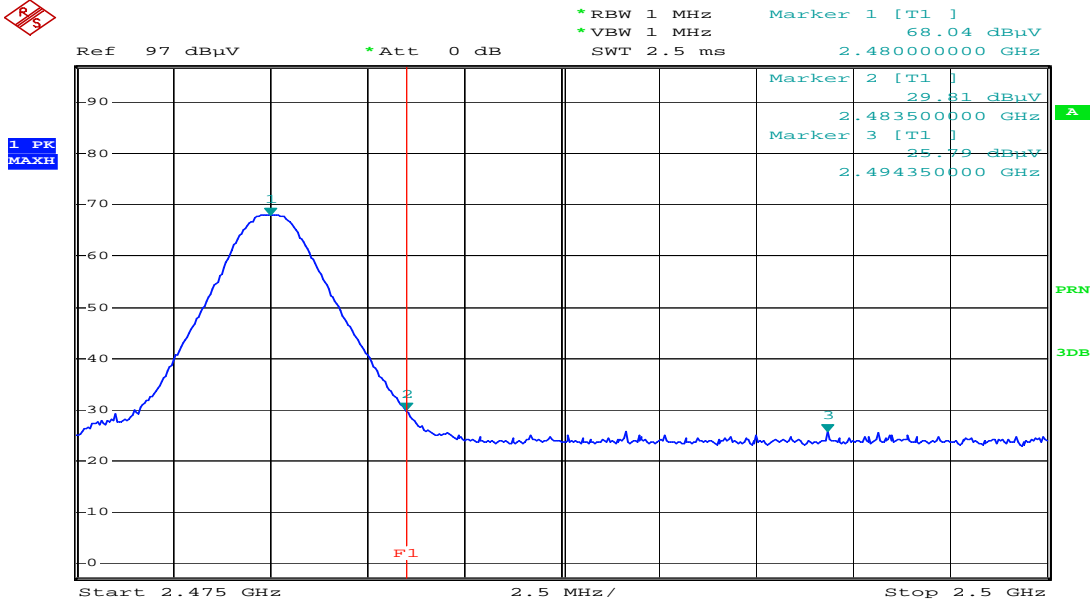


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Band Edges(CH High)

Detector mode:Peak

Polarity:Horizontal





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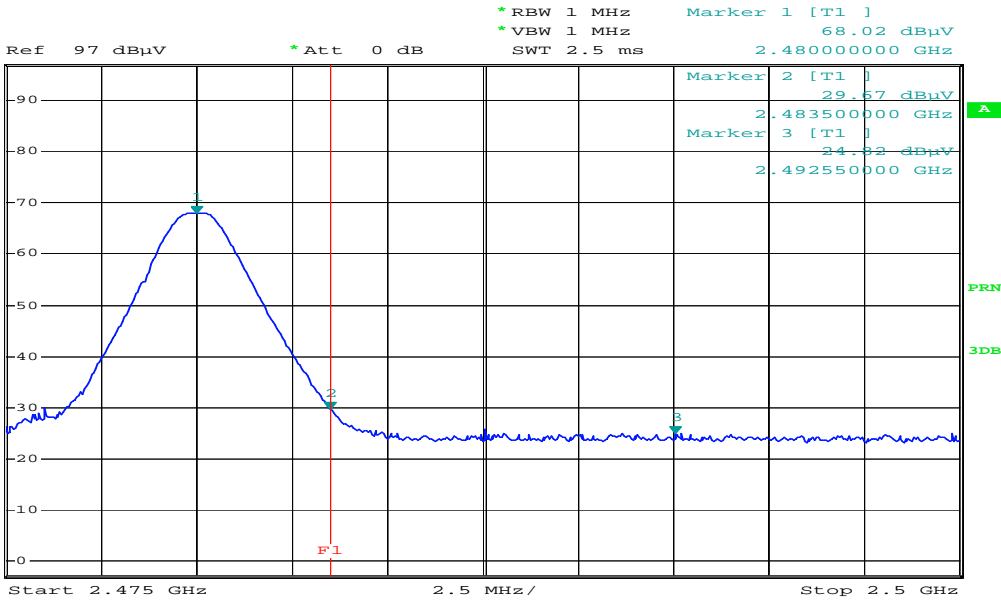


**Electromagnetic
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Band Edges(CH High)

Detector mode:Peak

Polarity:Vertical



10.5 Test Data for Bluetooth (EDR)

Test Date : 22-Dec-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Result Value		
				Ant Factor (dB)	Cable (dB)	Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
42.20	3.84	V	1.0	12.34	1.00	40.00	17.18	-22.82
69.50	6.04	V	1.0	11.08	1.20	40.00	18.32	-21.68
80.40	6.92	V	1.0	9.15	1.40	40.00	17.47	-22.53
82.60	6.29	V	1.0	8.80	1.40	40.00	16.49	-23.51
102.90	6.89	V	1.0	8.36	1.60	43.50	16.85	-26.65
349.50	1.55	H	1.5	14.25	2.90	46.00	18.70	-27.30
387.60	1.01	H	1.2	15.10	3.04	46.00	19.14	-26.86
614.10	2.62	V	1.0	19.88	3.80	46.00	26.30	-19.70
888.10	3.60	V	1.0	22.89	4.64	46.00	31.13	-14.87
894.00	3.15	H	1.1	22.93	4.67	46.00	30.75	-15.25
Remark	<p>H : Horizontal, V : Vertical Bluetooth (EDR , 39 CH , 2441 MHz)</p> <p>*Checked in all 3 axis and the maximum measured data were reported.</p> <p>*CL = Cable Loss(In case of below 1 000 MHz)</p> <p>*The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection at frequency below 1 GHz.</p>							



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10.5-1 Test Data for Bluetooth(EDR)

Test Date 23-Dec-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1 MHz VBW:1 MHz)									
2367.6	25.46	H	1.1	26.62	5.0	0	74.0	57.08	-16.92
2367.6	23.27	V	1.2	26.62	5.0	0	74.0	54.89	-19.11
2379.4	24.72	H	1.1	26.66	5.0	0	74.0	56.38	-17.62
2379.4	25.82	V	1.2	26.66	5.0	0	74.0	57.48	-16.52
2390	24.01	H	1.1	26.69	5.0	0	74.0	55.70	-18.30
2390	23.85	V	1.2	26.69	5.0	0	74.0	55.54	-18.46
2402	59.33	H	1.1	26.73	5.0	0	*OB	91.06	-
2402	57.39	V	1.2	26.73	5.0	0	*OB	89.12	-
4804	44.95	H	1.1	31.36	-22.8	0	74.0	53.50	-20.50
4804	45.46	V	1.2	31.36	-22.8	0	74.0	54.01	-19.99
Average Value = Peak value + Duty Cycle Correction Factor									
2367.6	57.08	H	1.1			-30.55	54.0	26.53	-27.47
2367.6	54.89	V	1.2			-30.55	54.0	24.34	-29.66
2379.4	56.38	H	1.1			-30.55	54.0	25.83	-28.17
2379.4	57.48	V	1.2			-30.55	54.0	26.93	-27.07
2390	55.70	H	1.1			-30.55	54.0	25.15	-28.85
2390	55.54	V	1.2			-30.55	54.0	24.99	-29.01
4804	53.50	H	1.1			-30.55	54.0	22.95	-31.05
4804	54.01	V	1.2			-30.55	54.0	23.46	-30.54
Remark	<p>H : Horizontal, V : Vertical TEST MODE : Bluetooth EDR-CH0(2402 MHz)</p> <p>*The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz.</p> <p>FYI : Duty Cycle Correction Factor (79 channel hopping) a. Time to cycle through all channels= $\Delta t = \tau$ [ms] x 79 channels = 234.393 ms, where τ = pulse width b. 100 ms/ Δt [ms] = H \rightarrow Round up to next highest integer, H' =1 c. Worst Case Dwell Time = τ [ms] x H' = 2.967 ms d. Duty Cycle Correction = 20log (Worst Case Dwell Time/ 100ms) dB = - 30.55 dB</p>								

10.5-2 Test Data for Bluetooth(EDR)

Test Date 24-Dec-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1 MHz VBW:1 MHz)									
2441	63.56	H	1.1	26.85	5.0	0	*OB	95.41	-
2441	59.93	V	1.2	26.85	5.0	0	*OB	91.78	-
4882	44.26	H	1.1	31.50	-22.5	0	74.0	53.24	-20.76
4882	43.85	V	1.2	31.50	-22.5	0	74.0	52.83	-21.17
Average Value = Peak value + Duty Cycle Correction Factor									
4882	53.24	H	1.1			-30.55	54.0	22.69	-31.31
4882	52.83	V	1.2			-30.55	54.0	22.28	-31.72
Remark	<p>H : Horizontal, V : Vertical TEST MODE : Bluetooth EDR-CH39(2441 MHz)</p> <p>*The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz.</p> <p>FYI : Duty Cycle Correction Factor (79 channel hopping) a. Time to cycle through all channels= $\Delta t = \tau$ [ms] x 79 channels = 234.393 ms, where τ = pulse width b. 100 ms/ Δt [ms] = H \rightarrow Round up to next highest integer, H' =1 c. Worst Case Dwell Time = τ [ms] x H' = 2.967 ms d. Duty Cycle Correction = 20log (Worst Case Dwell Time/ 100ms) dB = - 30.55 dB</p>								

10.5-3 Test Data for Bluetooth(EDR)

Test Date 25-Dec-12

Measurement Distance : 3 m

Frequency (MHz)	Reading (dB μ V)	Position (V/H)	Height (m)	Correction Factor		Duty Cycle Correction(dB)	Result Value		
				Ant Factor (dB)	Cable (dB)		Limit (dB μ V/m)	Result (dB μ V/m)	Margin (dB)
PEAK(RBW:1 MHz VBW:1 MHz)									
2480	64.98	H	1.1	26.97	5.0	0	*OB	96.95	-
2480	61.14	V	1.2	26.97	5.0	0	*OB	93.11	-
2483.5	26.26	H	1.1	26.98	5.0	0	74.00	58.24	-15.76
2483.5	24.32	V	1.2	26.98	5.0	0	74.00	56.30	-17.70
2493.5	24.38	H	1.1	27.01	5.0	0	74.0	56.39	-17.61
2493.5	25.54	V	1.2	27.01	5.0	0	74.0	57.55	-16.45
2497.7	25.36	H	1.1	27.03	5.0	0	74.0	57.39	-16.61
2497.7	23.92	V	1.2	27.03	5.0	0	74.0	55.95	-18.05
4960	44.85	H	1.1	31.63	-22.3	0	74.0	54.23	-19.77
4960	45.44	V	1.2	31.63	-22.3	0	74.0	54.82	-19.18
Average Value = Peak value + Duty Cycle Correction Factor									
2483.5	58.24	H	1.1			-30.55	54.00	27.69	-26.31
2483.5	56.30	V	1.2			-30.55	54.00	25.75	-28.25
2493.5	56.39	H	1.1			-30.55	54.0	25.84	-28.16
2493.5	57.55	V	1.2			-30.55	54.0	27.00	-27.00
2497.7	57.39	H	1.1			-30.55	54.0	26.84	-27.16
2497.7	55.95	V	1.2			-30.55	54.0	25.40	-28.60
4960	54.23	H	1.1			-30.55	54.0	23.68	-30.32
4960	54.82	V	1.2			-30.55	54.0	24.27	-29.73
Remark	<p>H : Horizontal, V : Vertical TEST MODE : Bluetooth EDR-CH78(2480 MHz)</p> <p>*The TX signal isn't detected from 3th harmonics. *OB = Operating band *Checked in all 3 axis and the maximum measured data were reported. *Multiple of CL = Cable Loss-Amplifier Gain(In case of above1000 MHz) *The resolution bandwidth and video bandwidth of spectrum analyzer is 1 MHz and 10 Hz for average detection at frequency above 1 GHz.</p> <p>FYI : Duty Cycle Correction Factor (79 channel hopping) a. Time to cycle through all channels= $\Delta t = \tau$ [ms] x 79 channels = 234.393 ms, where τ = pulse width b. 100 ms/ Δt [ms] = H \rightarrow Round up to next highest integer, H' =1 c. Worst Case Dwell Time = τ [ms] x H' = 2.967 ms d. Duty Cycle Correction = 20log (Worst Case Dwell Time/ 100ms) dB = - 30.55 dB</p>								



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**Electromagnetic
Interference
Test Report**

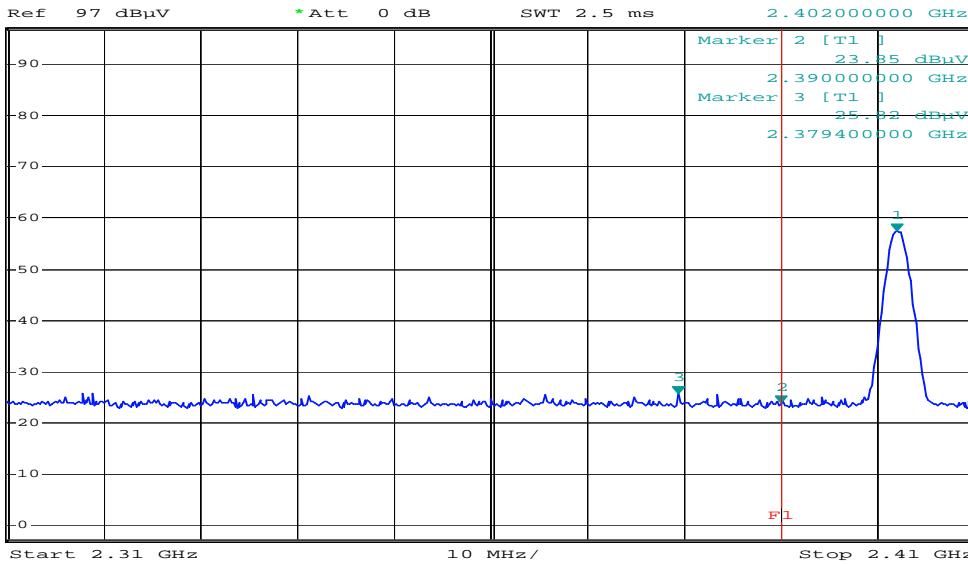
Band Edges(CH Low)

Detector mode:Peak

Polarity:Vertical



*RBW 1 MHz Marker 1 [T1]
*VBW 1 MHz 57.39 dBμV
SWT 2.5 ms 2.402000000 GHz





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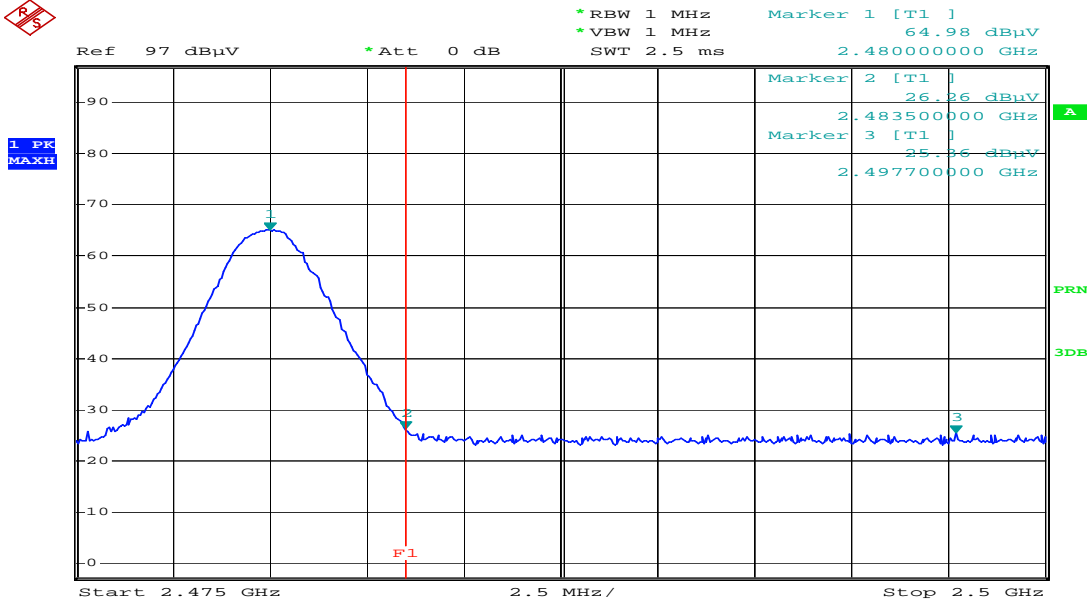


Electromagnetic Interference Test Report

Band Edges(CH High)

Detector mode:Peak

Polarity:Horizontal





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**Electromagnetic
Interference
Test Report**

11. Measurement of conducted disturbance

The continuous disturbance voltage of AC Mains in the frequency from 0.15 to 30 MHz was measured in accordance to FCC Part 15 (2010) & RSS-210. 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	14-Dec-13
LISN	ENV216	Rohde & Schwarz	101231	19-Sep-13
LISN	ESH3-Z5	Rohde & Schwarz	838979/010	26-Jan-13
Pulse Limiter	ESH3Z2	Rohde & Schwarz	NONE	25-Jan-13
Bluetooth Tester	TC-3000A	TESCOM	3000A570224	23-Aug-13

11.2 Environmental Condition

Test Place : Shielded Room

BT Basic Mode

Temperature (°C) : 22.8 °C

Humidity (% R.H.) : 50.6 % R.H.

BT EDR Mode

Temperature (°C) : 21.5 °C

Humidity (% R.H.) : 38.7 % R.H.



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**Electromagnetic
Interference
Test Report**

11.3-1 Test Data for Bluetooth (Basic Rate)

Test Date : 18-Dec-12

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.19	0.05	0.28	H	64.04	54.14	54.47	54.04	39.53	39.86
0.20	0.05	0.28	N	63.61	52.21	52.54	53.61	37.55	37.88
0.27	0.05	0.30	H	61.12	21.99	22.34	51.12	10.41	10.76
0.29	0.05	0.30	H	60.52	44.49	44.85	50.52	27.46	27.82
0.30	0.05	0.31	H	60.24	44.87	45.23	50.24	33.42	33.78
0.39	0.06	0.33	H	58.06	37.55	37.94	48.06	18.60	18.99
0.49	0.06	0.36	N	56.17	35.54	35.96	46.17	22.78	23.20
0.61	0.06	0.37	H	56.00	40.68	41.11	46.00	29.08	29.51
0.62	0.06	0.37	N	56.00	35.44	35.87	46.00	17.93	18.36
Remark	H : Hot Line, N : Neutral Line TEST MODE : Bluetooth Basic Rate CH39(2441 MHz)								



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**Electromagnetic
Interference
Test Report**

11.3-2 Test Data for Bluetooth (EDR)

Test Date : 22-Dec-12

Frequency (MHz)	Correction Factor		Line (H/N)	Quasi-peak Value			Average Value		
	Lisn (dB)	Cable (dB)		Limit (dB μ V)	Reading (dB μ V)	Result (dB μ V)	Limit (dB μ V)	Reading (dB μ V)	Result (dB)
0.18	0.05	0.28	N	64.49	34.61	34.94	54.49	15.48	15.81
0.19	0.05	0.28	H	64.04	48.99	49.32	54.04	34.91	35.24
0.20	0.05	0.28	H	63.61	49.21	49.54	53.61	36.53	36.86
0.29	0.05	0.30	N	60.52	40.28	40.64	50.52	25.05	25.41
0.30	0.05	0.31	H	60.24	40.35	40.71	50.24	32.52	32.88
0.59	0.06	0.37	H	56.00	39.98	40.41	46.00	26.81	27.24
0.62	0.06	0.37	H	56.00	40.74	41.17	46.00	28.66	29.09
13.42	0.67	0.54	N	60.00	32.98	34.19	50.00	24.43	25.64
Remark	H : Hot Line, N : Neutral Line TEST MODE : Bluetooth EDR-CH39(2441 MHz)								



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12. Photographs of test setup

12.1. Setup for Radiated Test : 30 ~ 1 000 MHz

[Front]



[Rear]





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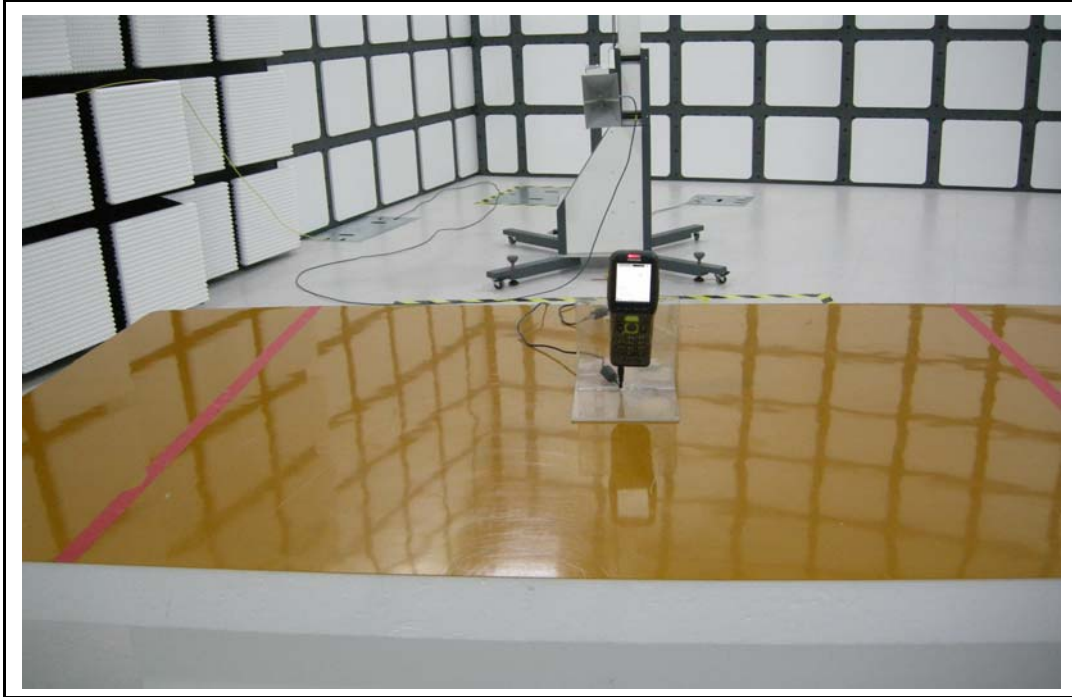
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Seoul, 158-803, Korea



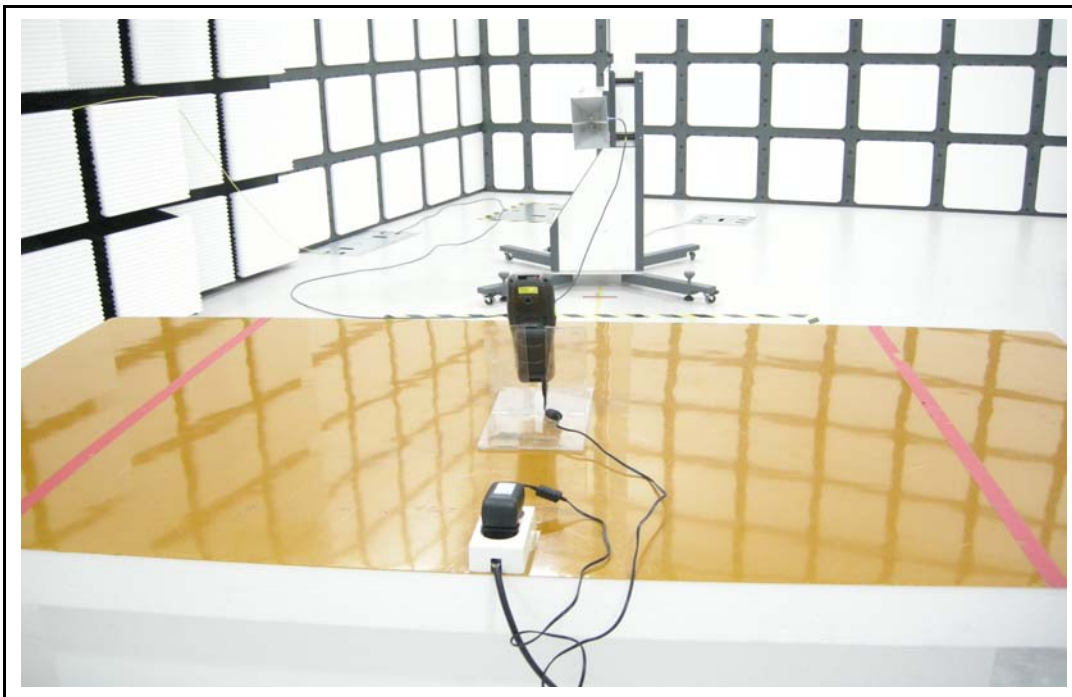
**Electromagnetic
Interference
Test Report**

12.2. Setup for Radiated Test :Above 1 000 MHz

[Front]



[Rear]



12.3. Setup for Conducted Test : 0.15 ~ 30 MHz

[Front]



[Rear]





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**Electromagnetic
Interference
Test Report**

12.4. Photographs of EUT

[Front]



[Rear]



Appendix 1. Special diagram for Bluetooth (Basic Rate)

Bluetooth – CH 39

*HOT

ES TECH
HOT LINE

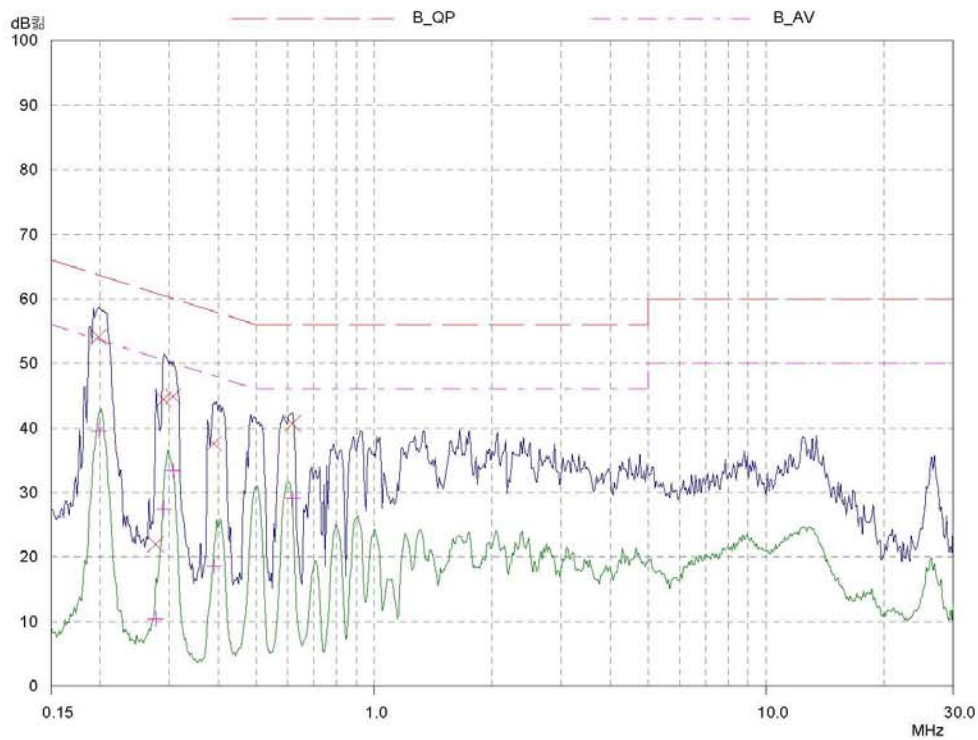
18 Dec 2012 14:15

EUT: HT-K10
Manuf:
Op Cond: 120 Va.c.
Operator: K.S.Kyong
Test Spec: CLASS B
Comment: 1D Scanner_Bluetooth Basic Rate Mode

Result File: 130105_h.dat : TOSHIBA TEC CORPORATION

Scan Settings			Receiver Settings					
Frequencies								
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



Special diagram for Bluetooth (Basic Rate)

Bluetooth – CH 39

*NEUTRAL

ES TECH

18 Dec 2012 14:20

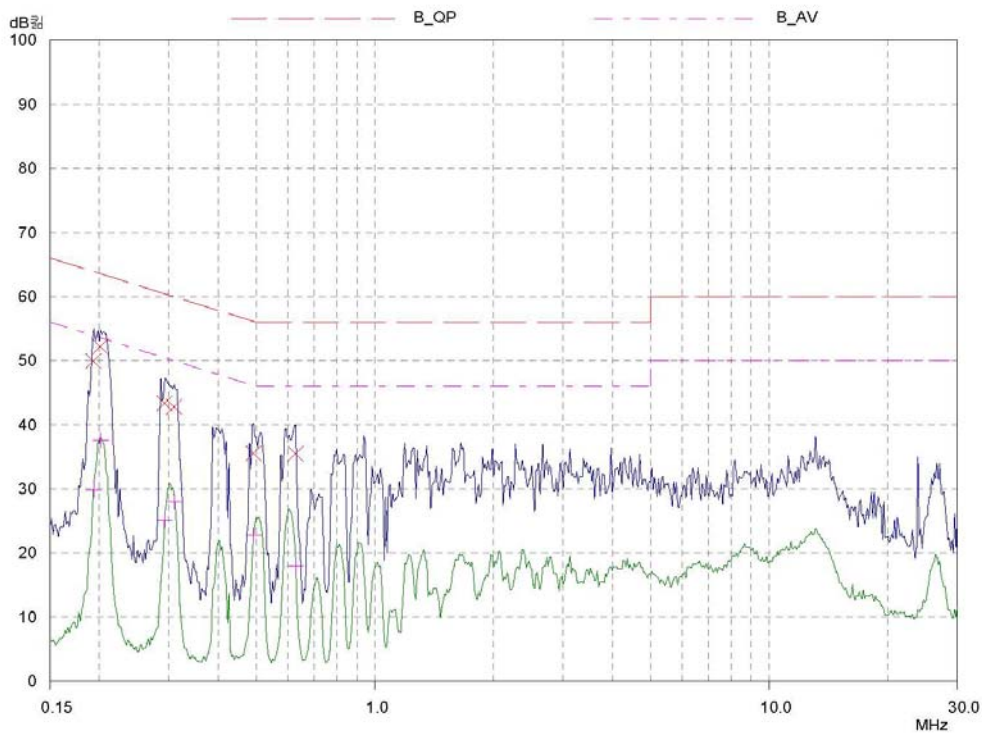
NEUTRAL LINE

EUT: HT-K10
Manuf:
Op Cond: 120 Va.c.
Operator: K.S.Kyong
Test Spec: CLASS B
Comment: '1D Scanner_Bluetooth Basic Rate Mode

Result File: 130105_n.dat : TOSHIBA TEC CORPORATION

Scan Settings			Receiver Settings					
(1 Range)								
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



Special diagram for Bluetooth EDR

Bluetooth – CH 39

*HOT

ES TECH
HOT LINE

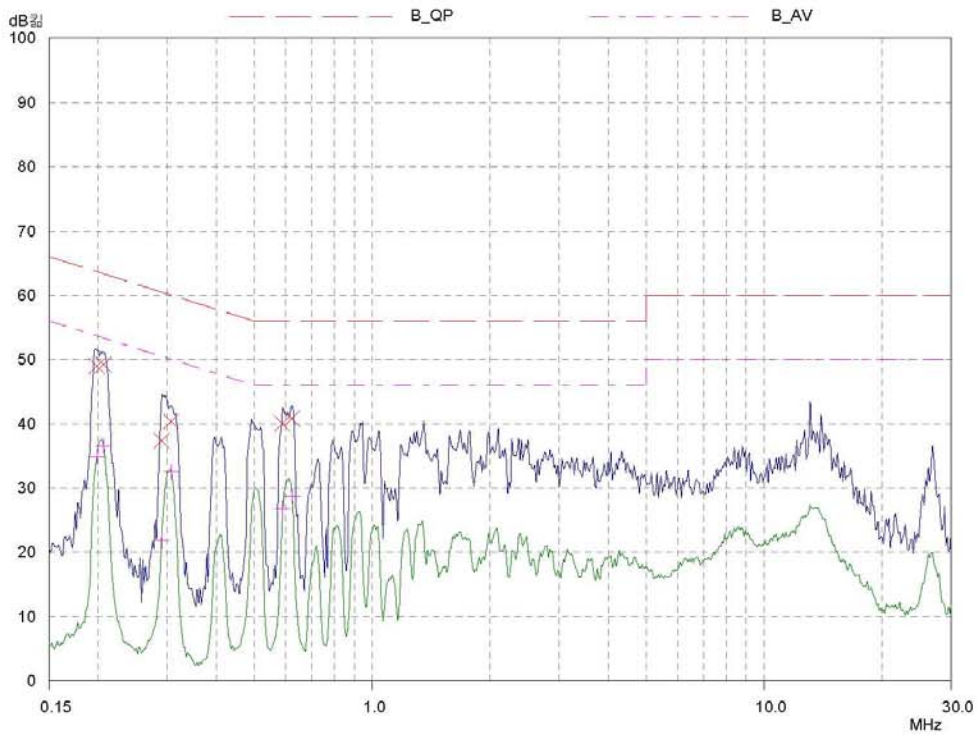
22 Dec 2012 14:37

EUT: HT-K10
 Manuf:
 Op Cond: 120 V.a.c.
 Operator: K.S.Kyong
 Test Spec: CLASS B
 Comment: 1D Scanner_Bluetooth EDR Mode

Result File: 130105_h.dat : TOSHIBA TEC CORPORATION

Scan Settings			Receiver Settings					
(1 Range) Frequencies								
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



Special diagram for Bluetooth EDR

Bluetooth – CH 39

*NEUTRAL

ES TECH

22 Dec 2012 14:44

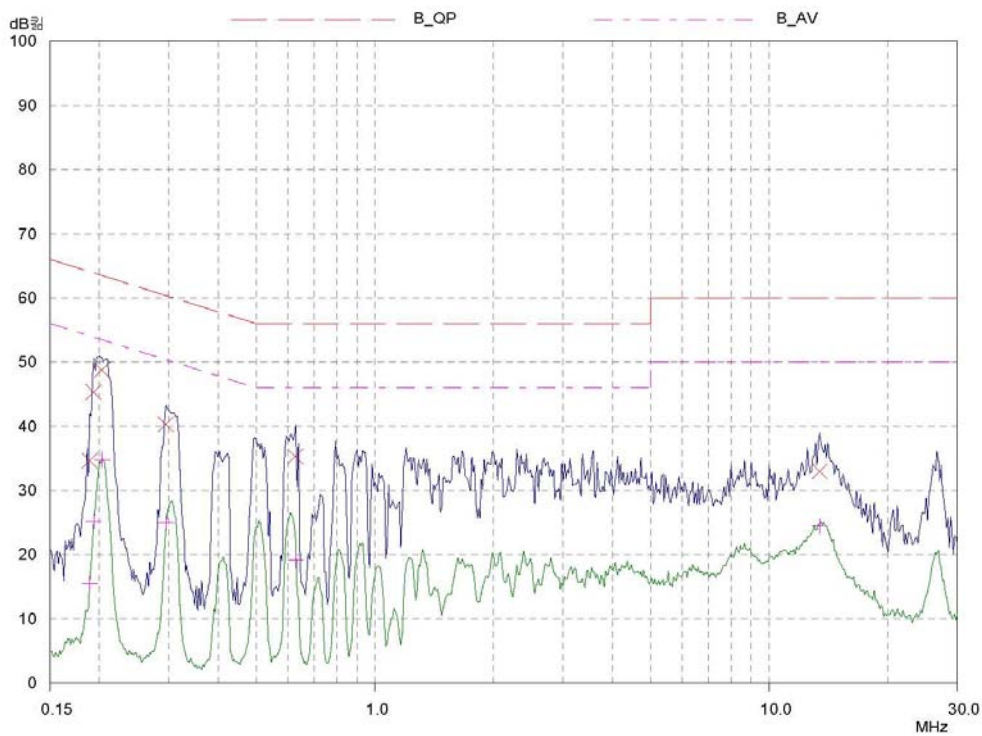
NEUTRAL LINE

EUT: HT-K10
Manuf:
Op Cond: 120 Va.c.
Operator: K.S.Kyong
Test Spec: CLASS B
Comment: 1D Scanner_Bluetooth EDR Mode

Result File: 130105_n.dat : TOSHIBA TEC CORPORATION

Scan Settings			Receiver Settings					
(1 Range) Frequencies								
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 Sandwich antenna . The maximum Gain of this antenna is 0.77 dBi.