



**HCT CO., LTD.**

Product Compliance Division

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**CERTIFICATE OF COMPLIANCE**  
**FCC PART 15.247 Certification**

**Applicant Name:**

Pantech Co., Ltd.

**Date of Issue:**

November 19, 2009

**Test Site/Location:**

HCT.CO., LTD., San 136-1 Ami-ri, Bubal-eup, Icheon-si,  
Kyungki-do, Korea

**Test Report No.:** HCTR0911FR14

**HCT FRN:** 0005866421

**IC Recognition No.:** 5944A-1

**FCC ID:** **JYCP2000**

**APPLICANT:** **Pantech Co., Ltd.**

**Model(s):** P2000

**EUT Type:** Dual-Band Dual-Mode GSM/ WCDMA Phone with Bluetooth

**Max. RF Output Power:** 2.97 dBm(1.98 mW)

**Frequency Range:** 2402 - 2480 MHz (Bluetooth)

**Modulation type** GFSK, PSK

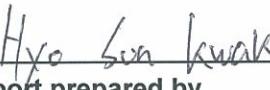
**FCC Classification:** FCC Part 15 Frequency Hopping Spread Spectrum Transceiver

**FCC Rule Part(s):** Part 15 subpart C 15.247

Engineering Statement:

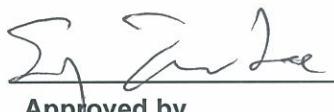
The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT.CO., LTD. Certifies that no party to this application has been denied FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.862

  
**Report prepared by**

**: Hyo Sun Kwak**

**Test engineer of RF Team**

  
**Approved by**

**: Sang Jun Lee**

**Manager of RF Team**

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## 1. GENERAL INFORMATION

**Applicant:** Pantech Co., Ltd.  
**Address:** PANTECH Building, I-2, DMC Sangam-dong, Mapo-gu, Seoul, 121-792, Korea  
**FCC ID:** JYCP2000  
**EUT:** Dual-Band Dual-Mode GSM/ WCDMA Phone with Bluetooth  
**Model:** P2000  
**Date of Test:** November 15, 2009 ~ November 18, 2009  
**Contact person:** Name: SamSouk Yoon  
Phone #: 02-2030-1335/ FAX #: 02-3660-5990

## 2. EUT DESCRIPTION

<b>Product</b>	Dual-Band Dual-Mode GSM/ WCDMA Phone with Bluetooth
<b>Model Name</b>	P2000
<b>Power Supply</b>	DC 3.7 V
<b>Battery type</b>	Standard
<b>Frequency Range</b>	2402 ~ 2480 MHz
<b>Transmit Power</b>	2.97 dBm(1.98 mW)
<b>Modulation Type</b>	GFSK(Normal), PSK(EDR)
<b>Modulation Technique</b>	FHSS
<b>Number of Channels</b>	79 Channels
<b>Antenna Specification</b>	Manufacturer: PARTRON Antenna type: Chip Antenna Peak Gain : -0.51 dBi

### \* 15.247 Requirements for Bluetooth transmitter.

- This Bluetooth module has been tested by a Bluetooth Qualification Lab, and we confirm the following:
  - 1) This system is hopping pseudorandomly.
  - 2) Each frequency is used equally on the average by each transmitter.
  - 3) The receiver input bandwidths that match the hopping channel bandwidths of their corresponding transmitters
  - 4) The receiver shifts frequencies in synchronization with the transmitted signals.
- 15.247(g): The system, consisting of both the transmitter and the receiver, must be designed to comply with all of the regulations in this Section 15.247 should the transmitter be presented with a continuous data (or information) stream.
- 15.247(h): The coordination of frequency hopping systems in any other manner for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters is not permitted.

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### 3. TEST METHODOLOGY

The measurement procedure described in the American National Standard for Methods of Measurement of Radio-Noise Emission from Low-Voltage Electrical and Electronic Equipment in the Range of 9kHz to 40GHz(ANSI C63.4-2003) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems" were used in the measurement of the **Pantech Co., Ltd.**

**Dual-Band Dual-Mode GSM/ WCDMA Phone with Bluetooth FCC ID: JYCP2000**

#### 3.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

#### 3.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

#### 3.3 GENERAL TEST PROCEDURES

##### Conducted Emissions

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version :2003) Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

##### Radiated Emissions

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the max. emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 13.1.4.1 of ANSI C63.4. (Version: 2003)

#### 3.4 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition. Test program used to control the EUT for staying in continuous transmitting and receiving mode is programmed.

Channel low, mid and high with highest data rate (worst case) is chosen for full testing.

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## 4. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is traceable to recognized national standards.

## 5. FACILITIES AND ACCREDITATIONS

### 5.1 FACILITIES

The open area test site and conducted measurement facility used to collect the radiated data are located at the 254-1, Maekok-Ri, Hobup-Myun, Ichon-Si, Kyoungki-Do, 467-701, KOREA. The site is constructed in conformance with the requirements of ANSI C63.4. (Version :2003) and CISPR Publication 22. Detailed description of test facility was submitted to the Commission and accepted dated June 10, 2009 (Registration Number: 90661)

### 5.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, "Radio Interference Measuring Apparatus and Measurement Methods."

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## 6. ANTENNA REQUIREMENTS

### According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.”

\* The antennas of this E.U.T are permanently attached.

\*The E.U.T Complies with the requirement of §15.203

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## 7. FCC PART 15.247 REQUIREMENTS

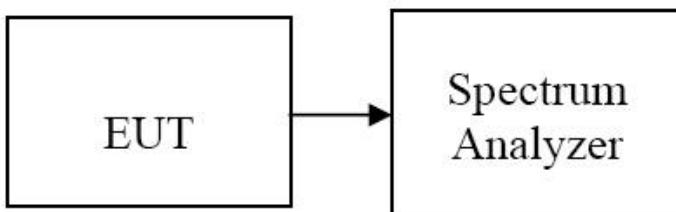
### 7.1 PEAK POWER

#### LIMIT

The maximum peak output power of the intentional radiator shall not exceed the following:

1. For systems using digital modulation in the bands of 902 ~ 928 MHz, 2400 ~ 2483.5 MHz, and 5725 ~ 5850 MHz: 1 watt.
2. Except as shown in paragraphs (b)(3) (i), (ii) and (iii) of this section, if transmitting antennas of directional gain greater than 6 dBi are used the peak output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1) or (b)(2) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

#### Test Configuration



#### TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer. The Spectrum Analyzer is set to the peak detector mode.

1. Span = 2 MHz (GFSK) / 5 MHz (8DPSK)
2. RBW = 1 MHz (GFSK) / 3 MHz (8DPSK)
3. VBW = 1 MHz (GFSK) / 3 MHz (8DPSK)
4. Sweep = auto
5. Packet type= DH5 (GFSK) / 3-DH5 (8DPSK)

#### TEST RESULTS

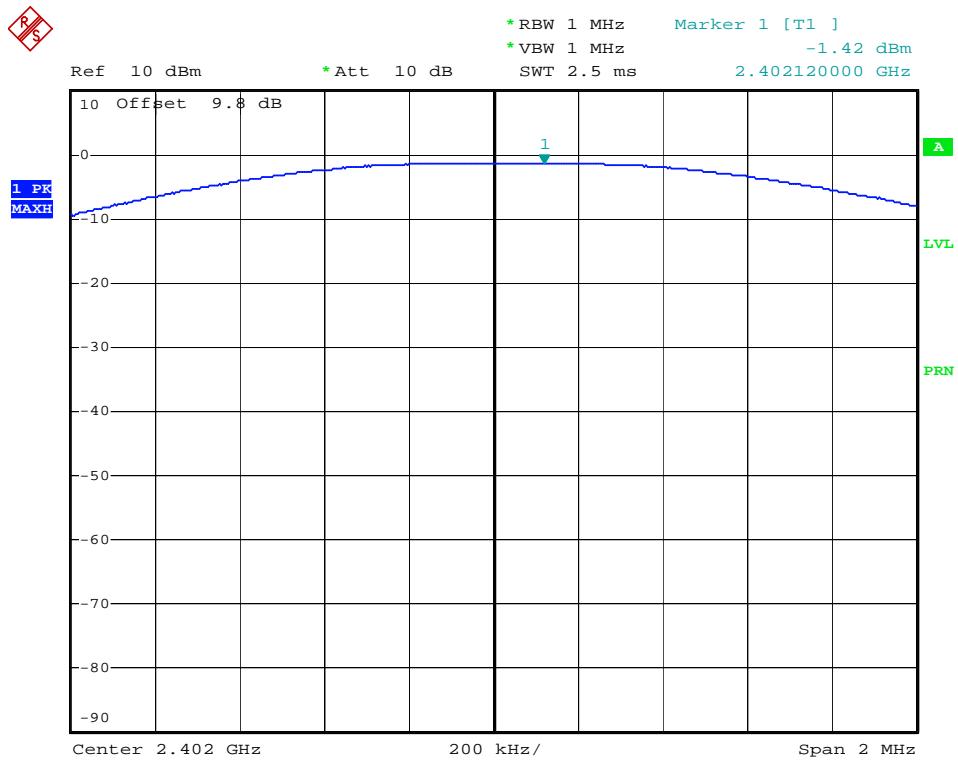
No non-compliance noted

#### Test Data

Channel	Frequency (MHz)	Output Power(GFSK)		Output Power(8DPSK)		Limit (W)	Result
		(dBm)	(mW)	(dBm)	(mW)		
Low	2402	-1.42	0.72	2.44	1.75	1	PASS
Mid	2441	-1.22	0.76	2.69	1.86		PASS
High	2480	-0.99	0.80	2.97	1.98		PASS

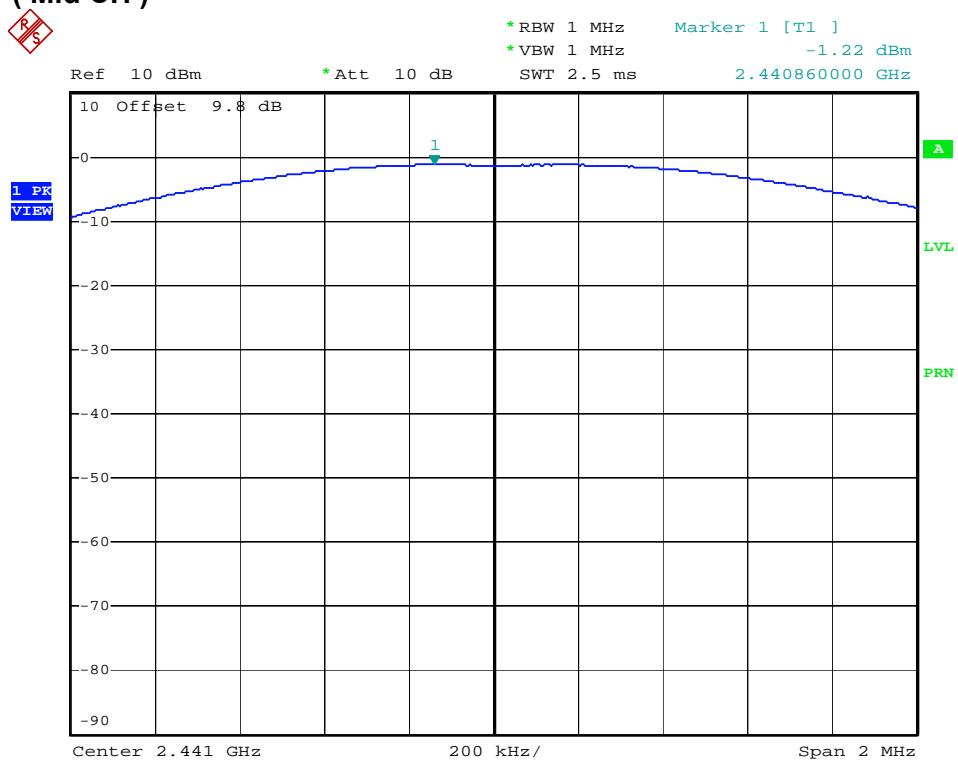
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Test Plots  
(GFSK)  
**Peak Power ( Low CH )**



Date: 15.NOV.2009 15:22:24

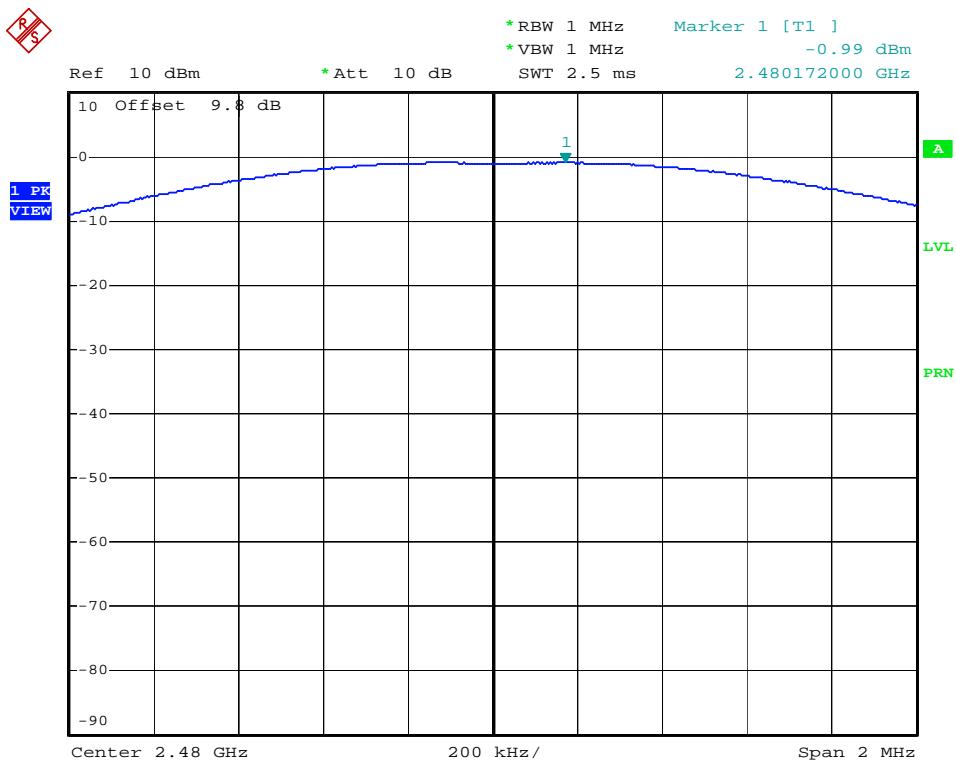
**Peak Power ( Mid CH )**



Date: 15.NOV.2009 15:26:33

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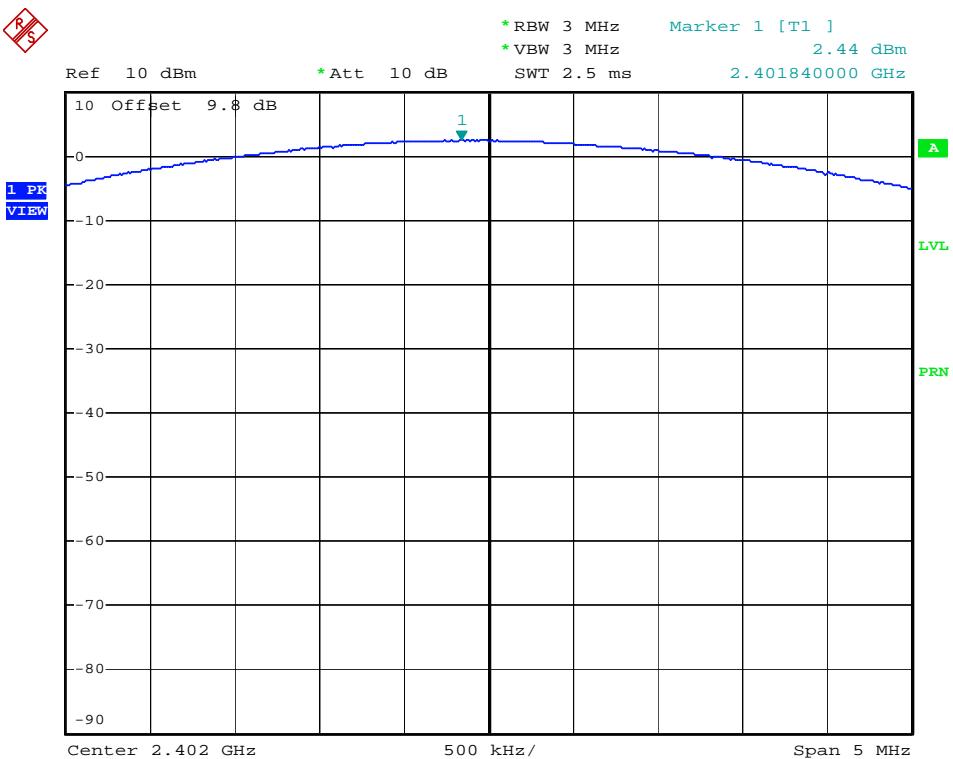
## Peak Power ( High CH )



Date: 15.NOV.2009 15:31:07

(8DPSK)

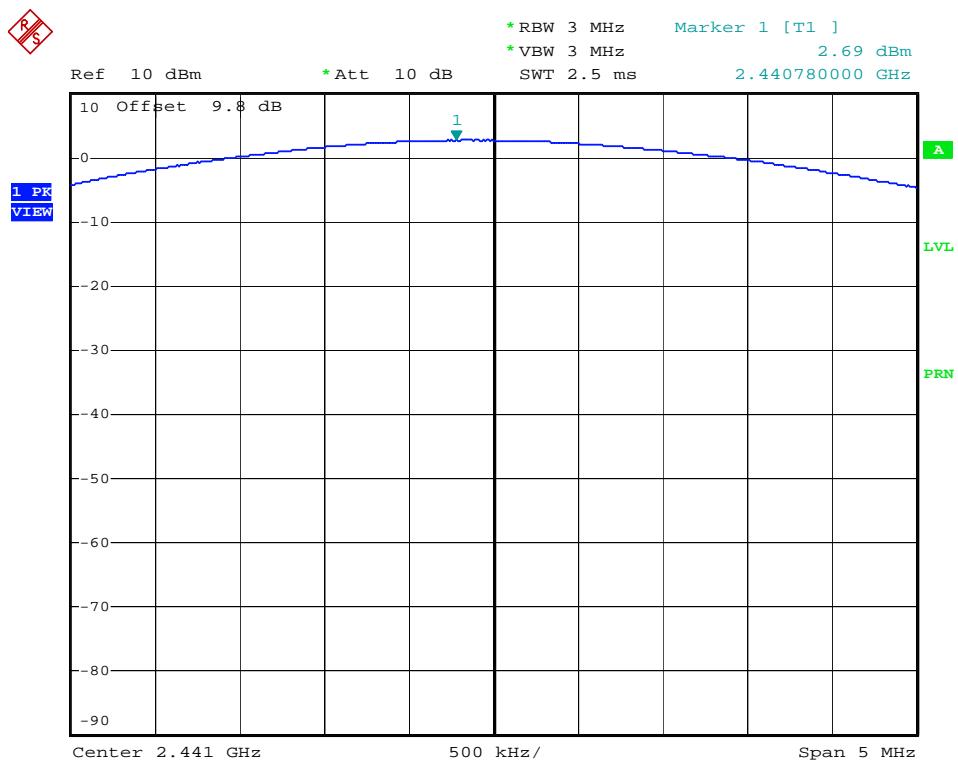
## Peak Power ( Low CH )



Date: 15.NOV.2009 15:32:04

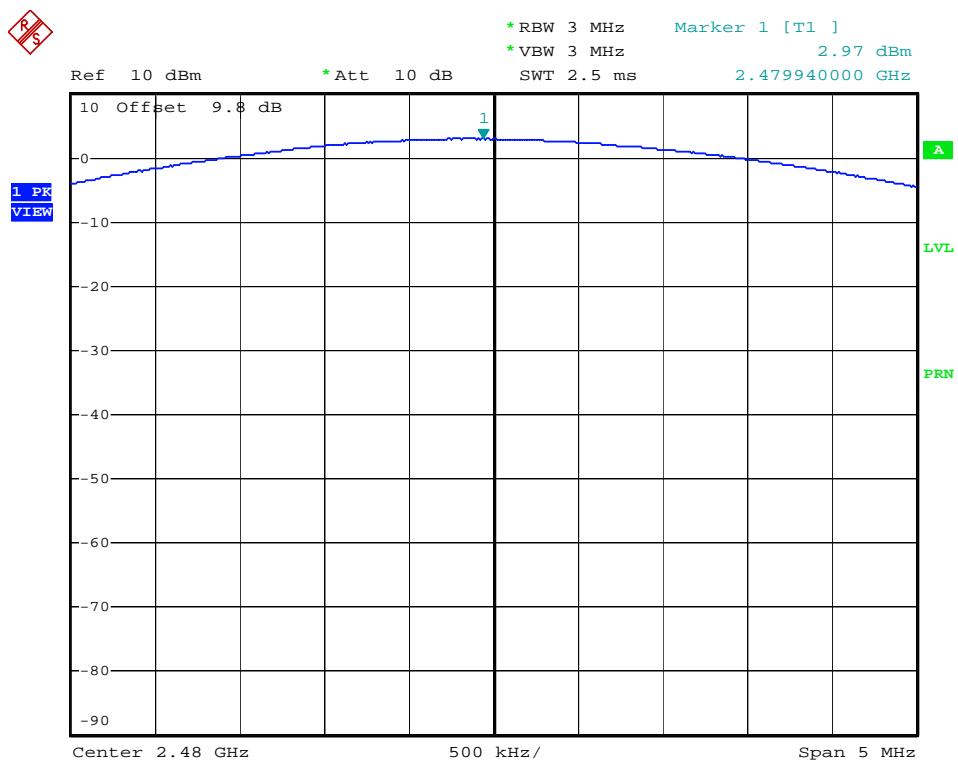
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## Peak Power ( Mid CH )



Date: 15.NOV.2009 15:33:31

## Peak Power ( High CH )



Date: 15.NOV.2009 15:34:25

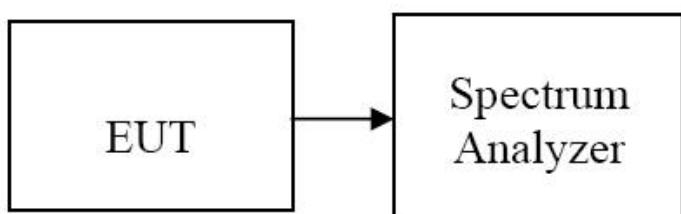
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## 7.2 BAND EDGES MEASUREMENT

### LIMIT

According to §15.247(d), in any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits.

### Test Configuration



### TEST PROCEDURE

The spectrum analyzer is set to :

1. Span = 8 MHz
2. RBW = 100 kHz
3. VBW = 300 kHz
4. Sweep = auto
5. Detector Mode = Peak

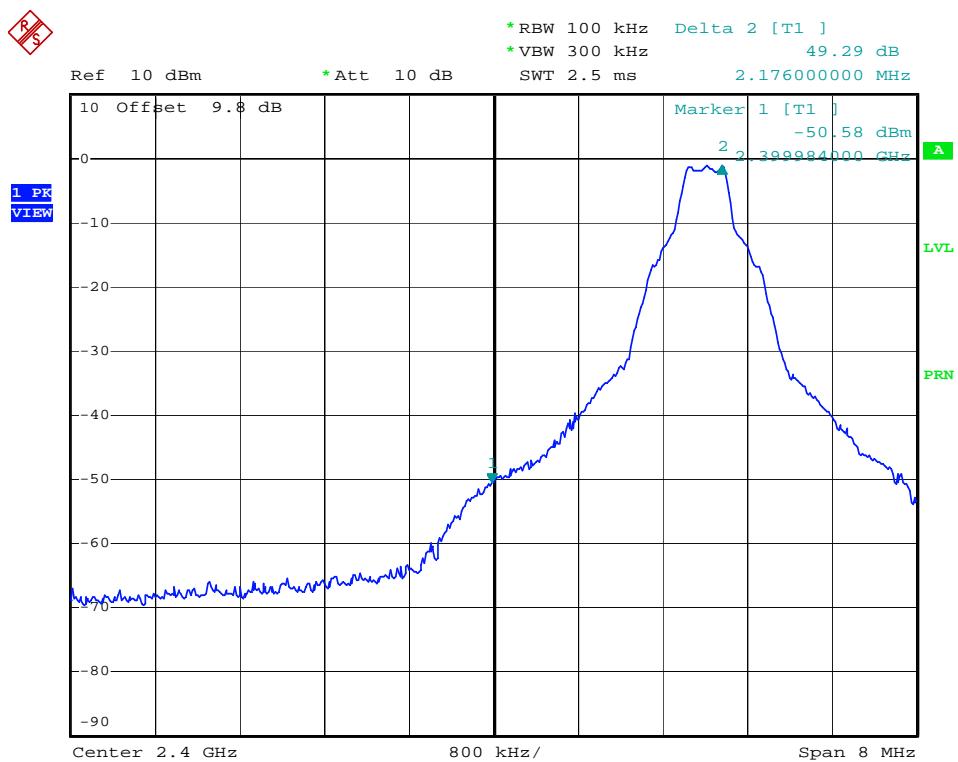
### TEST RESULTS

See attached.

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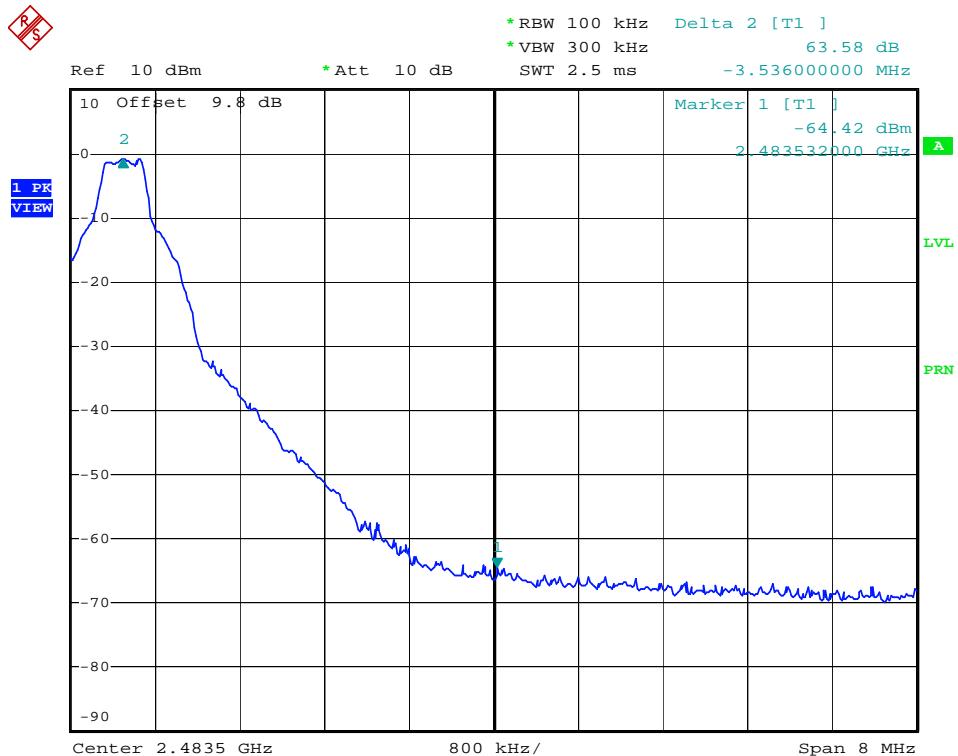
Test Data (GFSK)

### Band Edges (Low-CH)



Date: 15.NOV.2009 15:37:06

### Band Edges (High-CH)

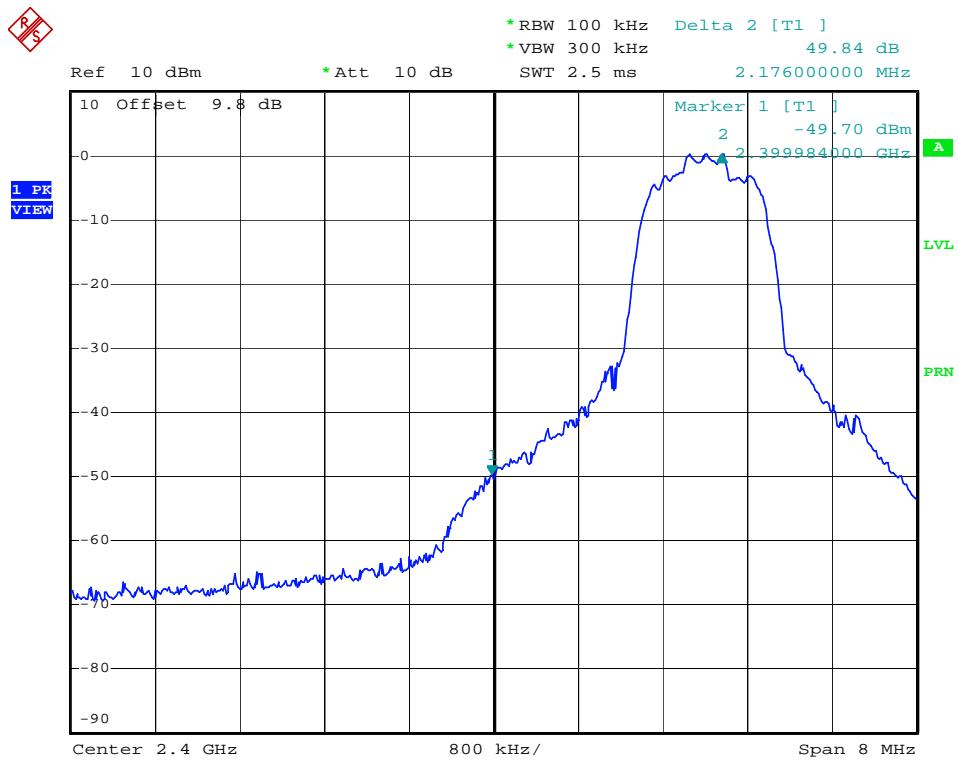


Date: 15.NOV.2009 15:42:00

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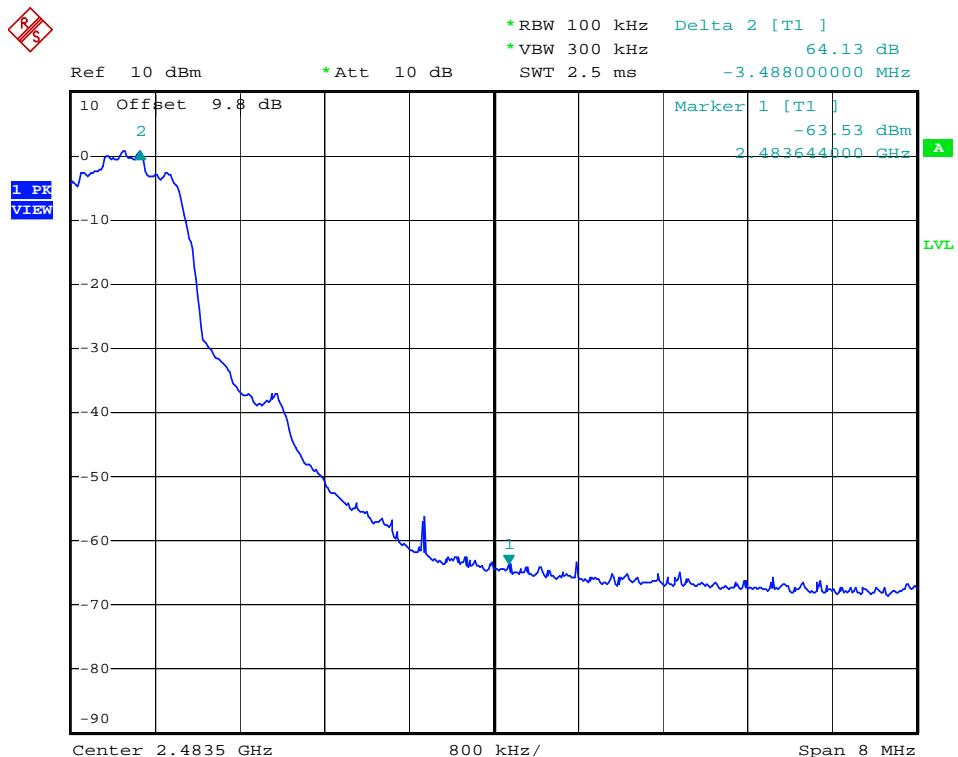
Test Data (8DPSK)

### Band Edges (Low- CH)



Date: 15.NOV.2009 15:43:37

### Band Edges (High-CH)



Date: 15.NOV.2009 15:52:49

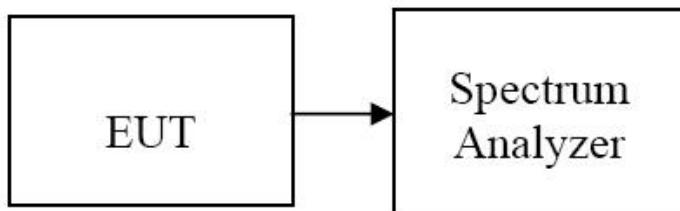
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### 7.3 FREQUENCY SEPARATION

#### LIMIT

According to §15.247(a)(1), Frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

#### Test Configuration



#### TEST PROCEDURE

The spectrum analyzer is set to :

1. Span = 3 MHz
2. RBW = 30 kHz
3. VBW = 100 kHz
4. Sweep = auto

The trace was allowed to stabilize. The marker-delta function was used to determine the separation between the peaks of the adjacent channels.

#### TEST RESULTS

No non-compliance noted

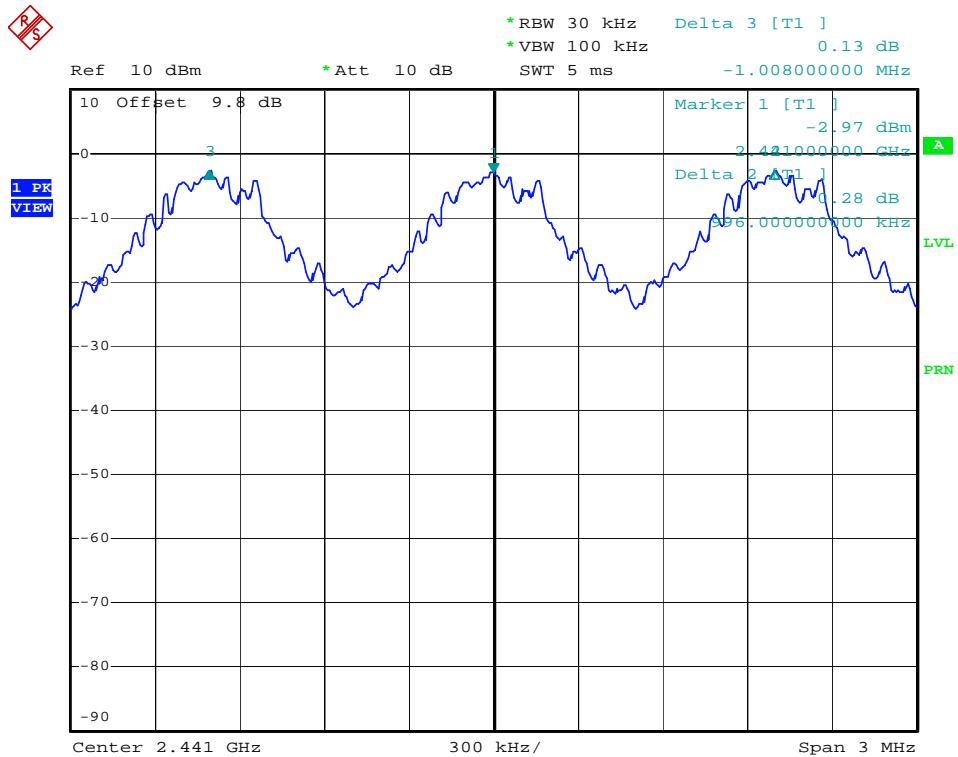
#### Test Data

Channel Separation (kHz)		20dB Bandwidth (kHz)			Limit (kHz)	Result
GFSK	8DPSK	Channel	GFSK	8DPSK		
996	846	Low CH	954	1290	>25 or >2/3 of the 20dB BW	Pass
		Middle CH	960	1302		
		High CH	960	1302		

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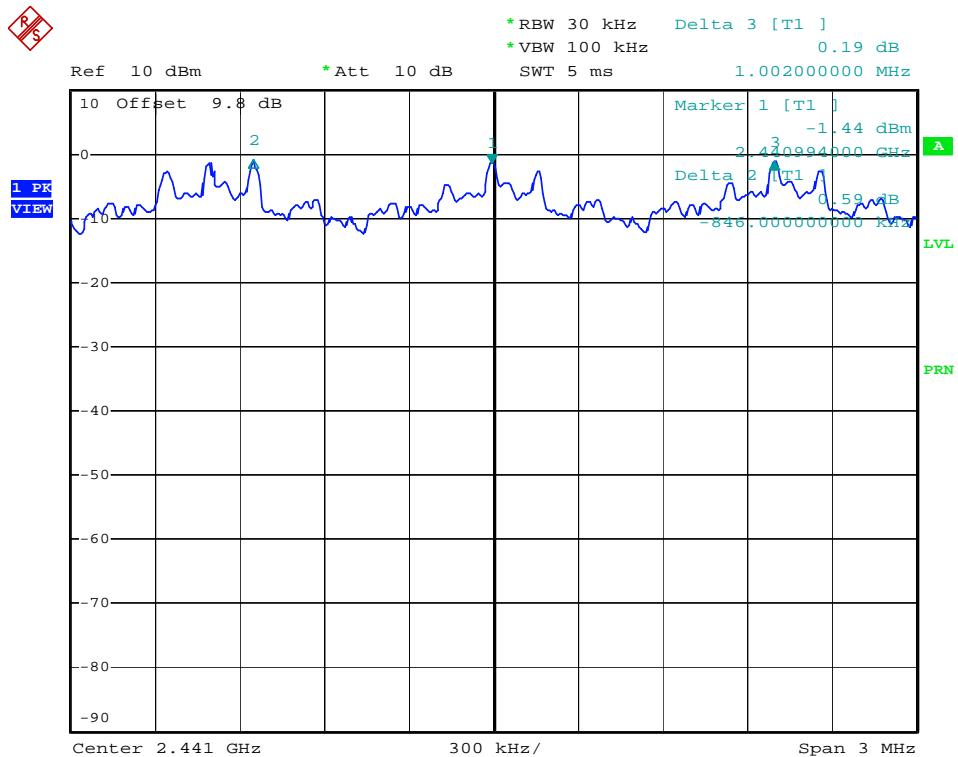
## Test Plot

Measurement of Channel Separation



Date: 15.NOV.2009 16:04:54

Measurement of Channel Separation(8DPSK)

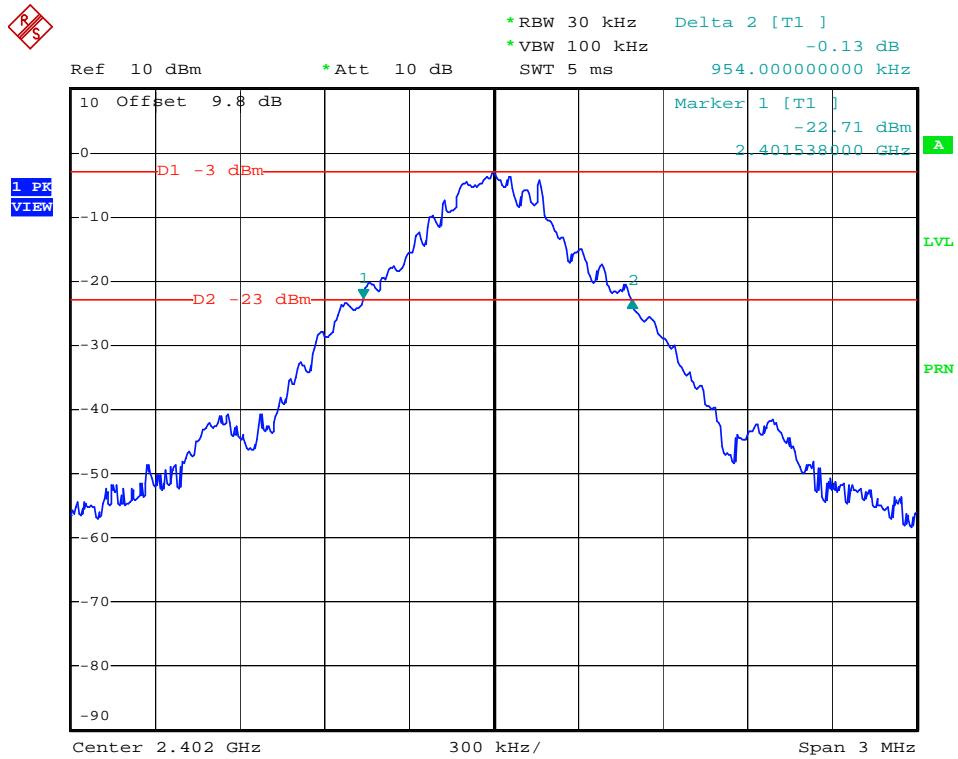


Date: 15.NOV.2009 16:07:41

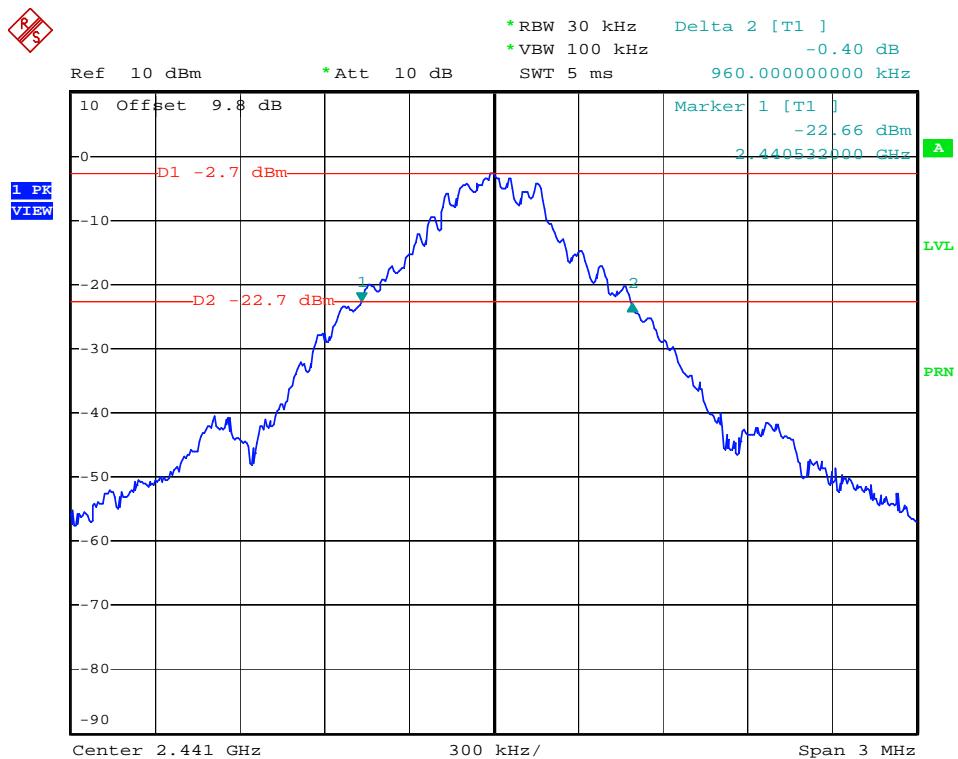
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**Test Plot (GFSK)**

20 dB bandwidth

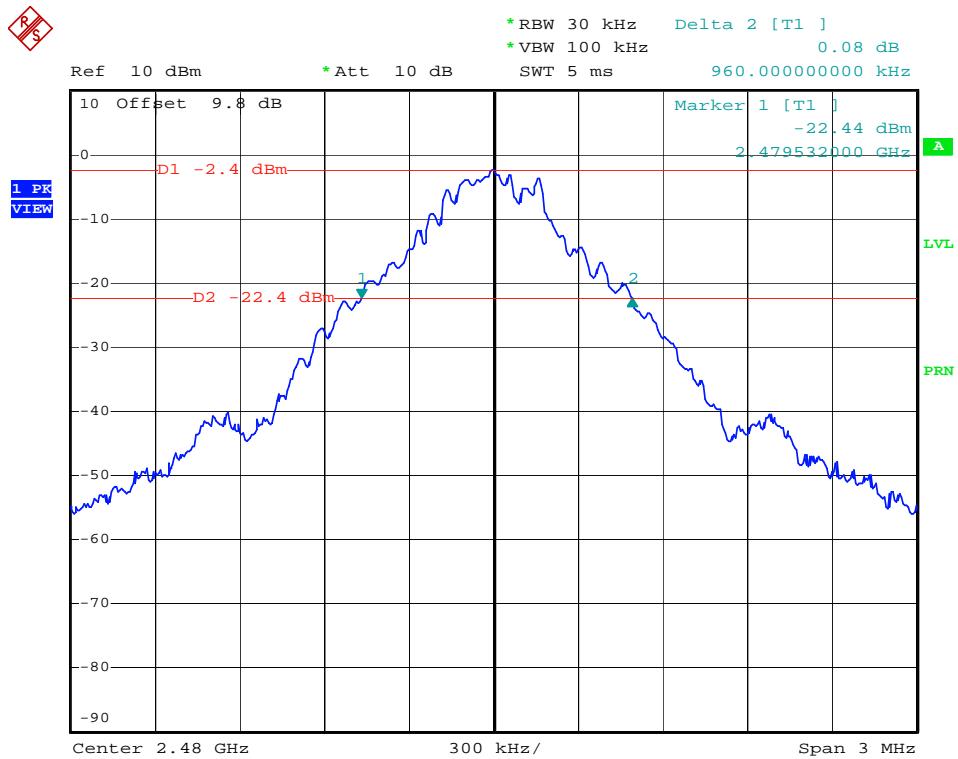
**(Low CH)**


Date: 15.NOV.2009 15:13:49

**( Mid CH)**


Date: 15.NOV.2009 15:11:44

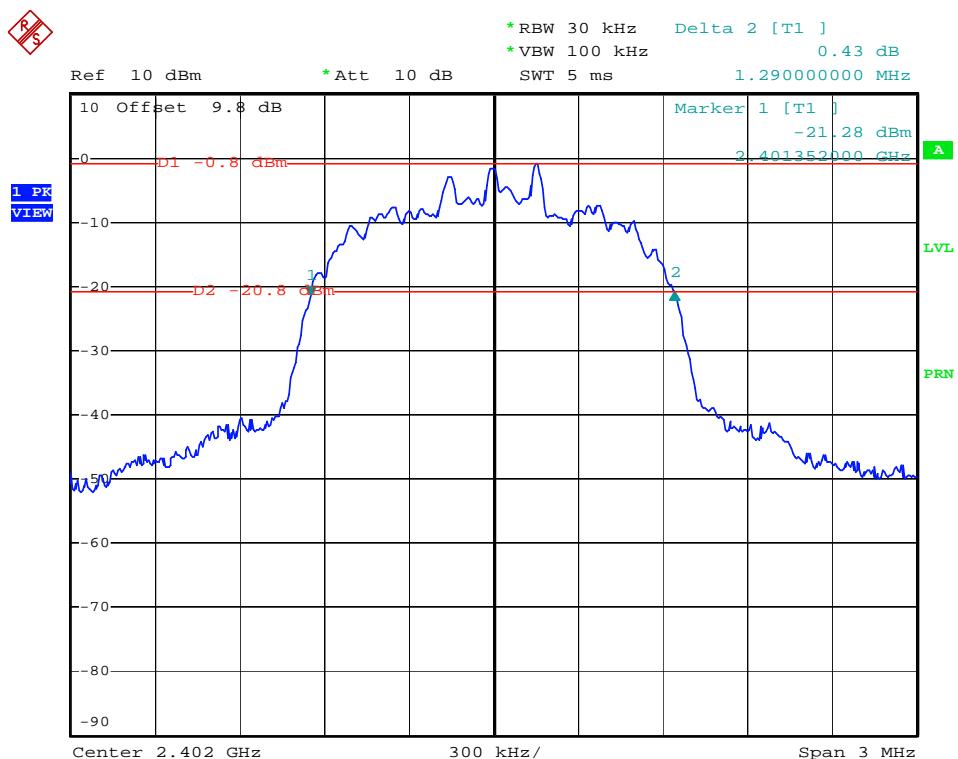
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**(High CH)**


Date: 15.NOV.2009 15:12:47

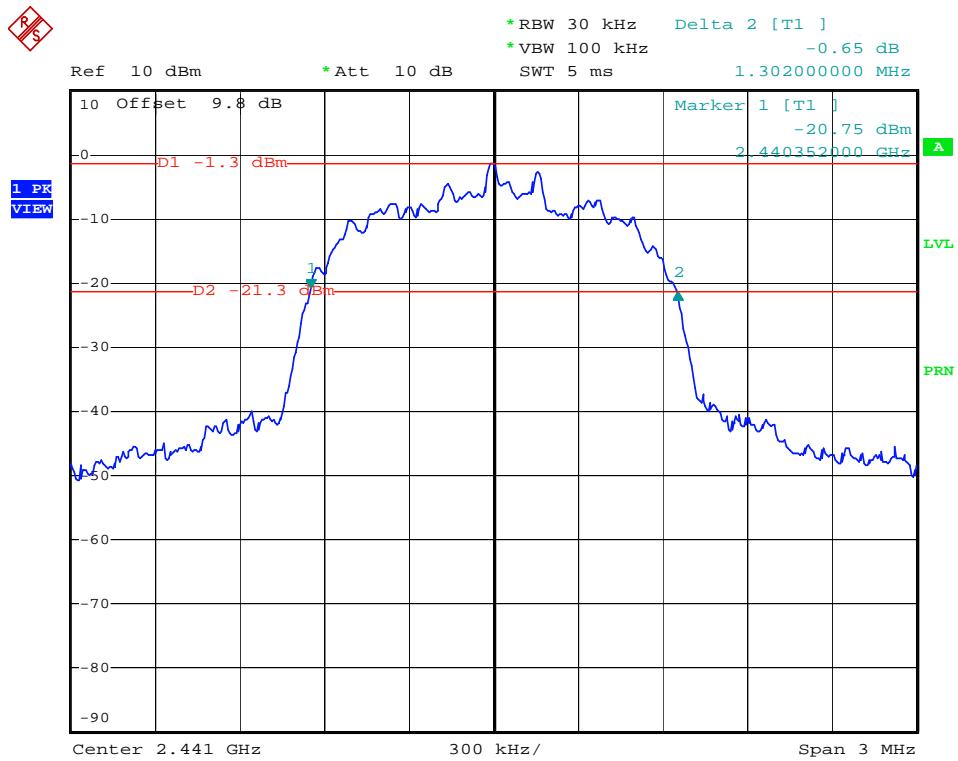
**Test Plot (8DPSK)**

20 dB bandwidth

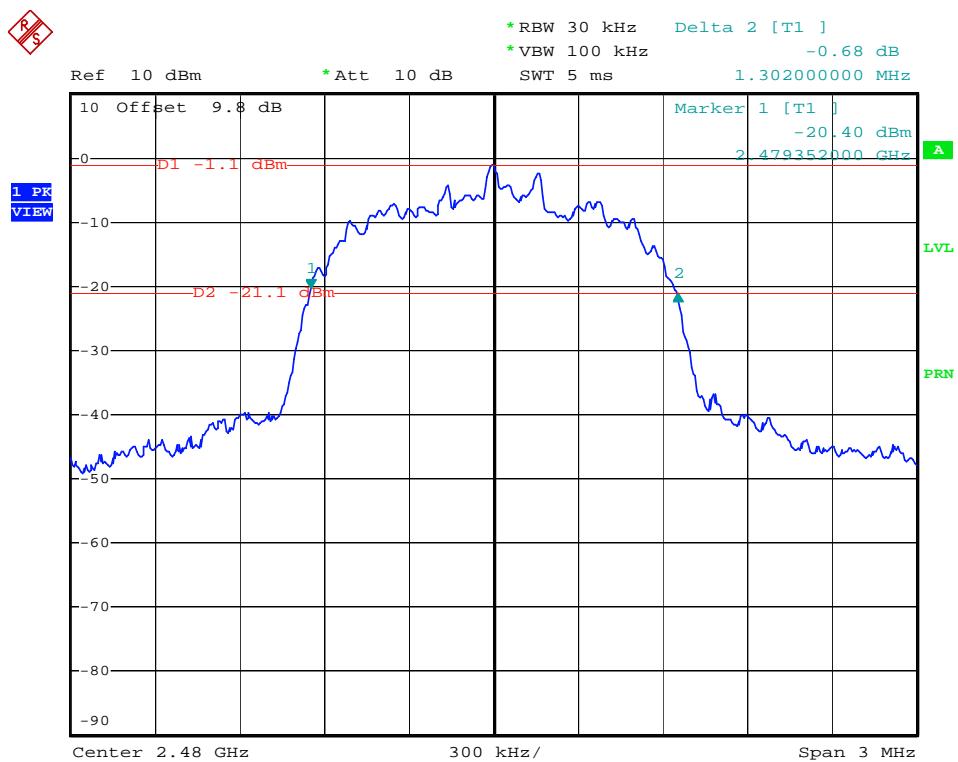
**(Low CH)**


Date: 15.NOV.2009 15:15:52

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**( Mid CH)**


Date: 15.NOV.2009 15:20:31

**(High CH)**


Date: 15.NOV.2009 15:21:31

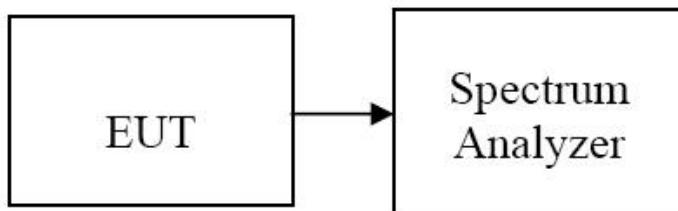
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## 7.4 NUMBER OF HOPPING FREQUENCY

### LIMIT

According to §15.247(a)(1)(ii), Frequency hopping systems operating in the 2400 MHz ~ 2483.5 MHz bands shall use at least 15 hopping frequencies.

### Test Configuration



### TEST PROCEDURE

The Bluetooth frequency hopping function of the EUT was enabled. The spectrum analyzer was set to :

1. Span = the frequency band of operation ( Start = 2400 MHz, Stop = 2483.5 MHz )
2. RBW = 300 kHz
3. VBW = 300 kHz
4. Sweep = auto

The trace was allowed to stabilize.

### TEST RESULTS

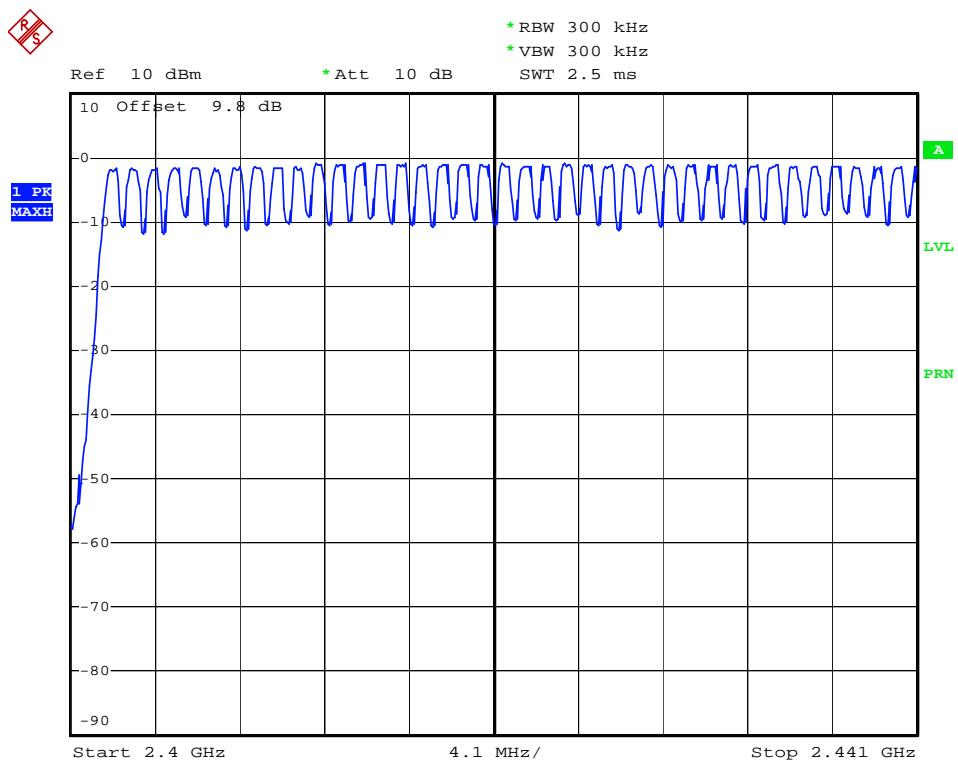
No non-compliance noted

### Test Data

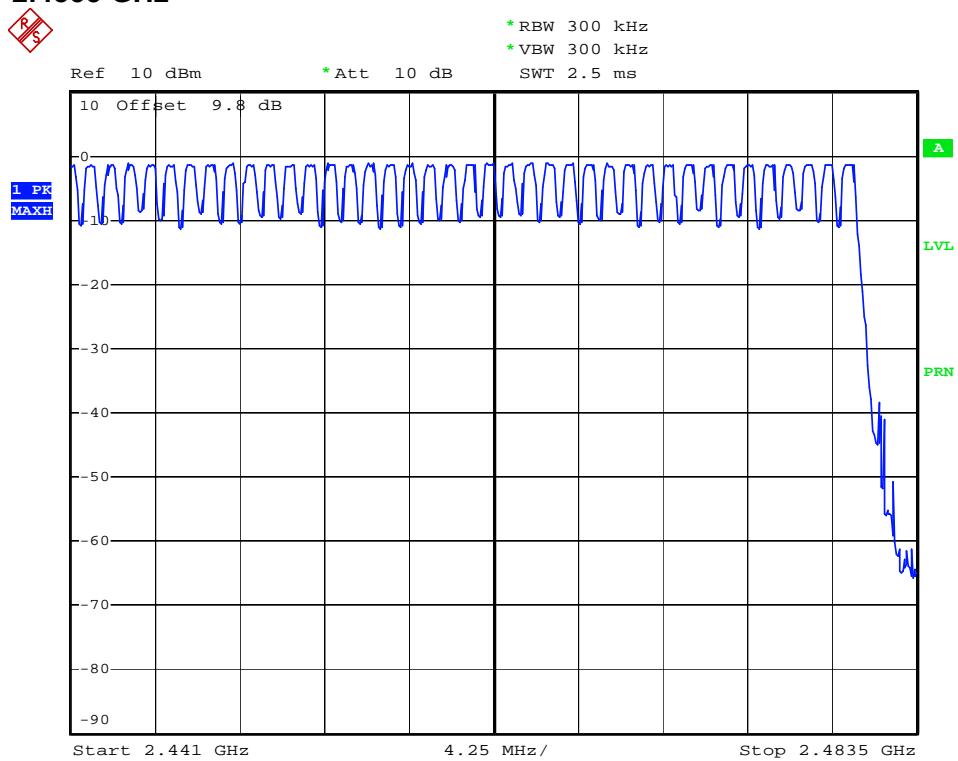
Result (No. of CH)	Limit (No. of CH)	Result
79	>15	Pass

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## Test Plot

**Number of Channels (GFSK)**
**2.4 GHz – 2.441 GHz**


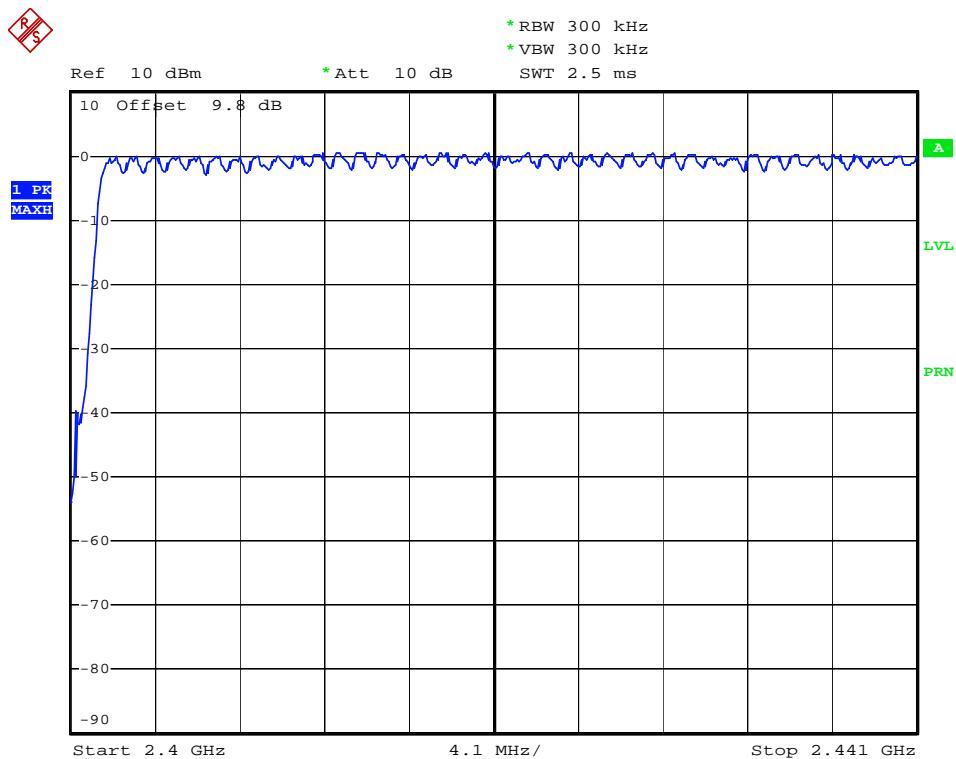
Date: 15.NOV.2009 16:09:57

**2.441 GHz – 2.4835 GHz**


Date: 15.NOV.2009 16:11:01

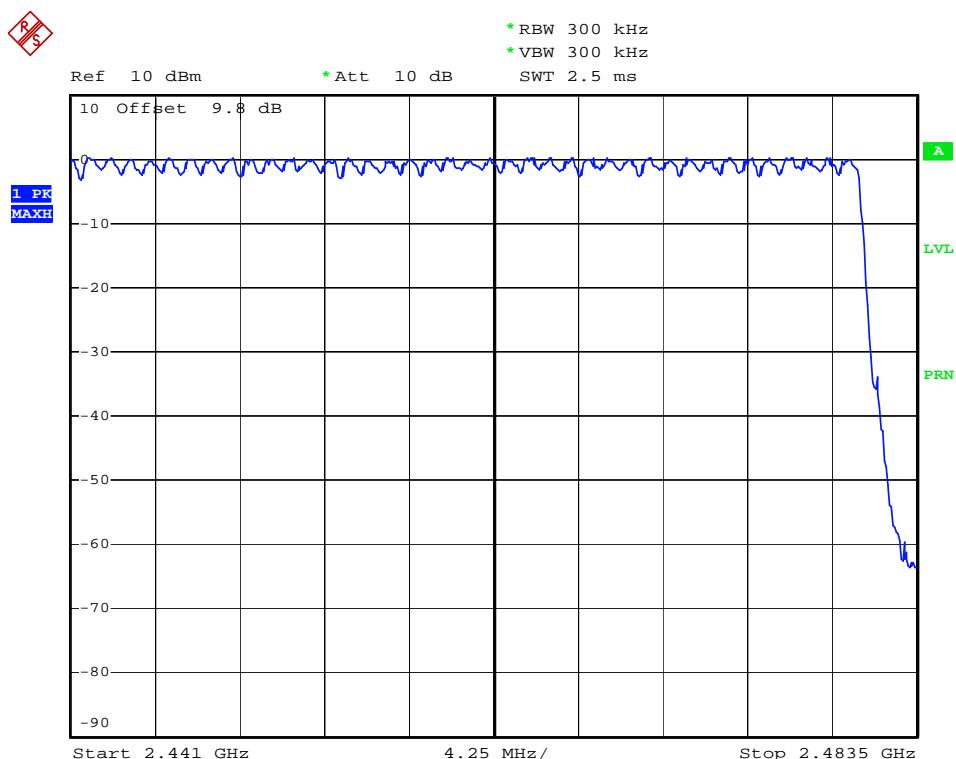
<b>HCT PT.15.247 TEST REPORT</b>	<b>FCC CERTIFICATION REPORT</b>			<a href="http://www.hct.co.kr">www.hct.co.kr</a>
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**Number of Channels (8DPSK)**  
**2.4 GHz – 2.441 GHz**



Date: 15.NOV.2009 16:13:51

**2.441 GHz – 2.4835 GHz**



Date: 15.NOV.2009 16:16:08

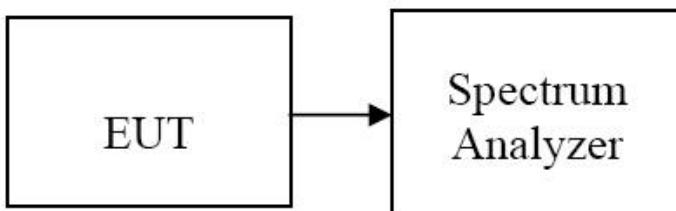
<b>HCT PT.15.247</b> <b>TEST REPORT</b>	<b>FCC CERTIFICATION REPORT</b>			<a href="http://www.hct.co.kr">www.hct.co.kr</a>
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## 7.5 TIME OF OCCUPANCY (DWELL TIME)

### LIMIT

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400 MHz ~ 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.

### Test Configuration



### TEST PROCEDURE

EUT was set to transmit the longest packet type (DH5)

1. Span = zero span
2. RBW = 1 MHz
3. VBW = 1 MHz
4. Sweep = as necessary to capture the entire dwell time per channel

The marker-delta function was used to determine the dwell time.

### TEST RESULTS

See the table.

#### DH 5(The longest packet type for GFSK)

CH Mid :  $2.90 * (1600/6)/79 * 31.6 = 309.33$  (ms)

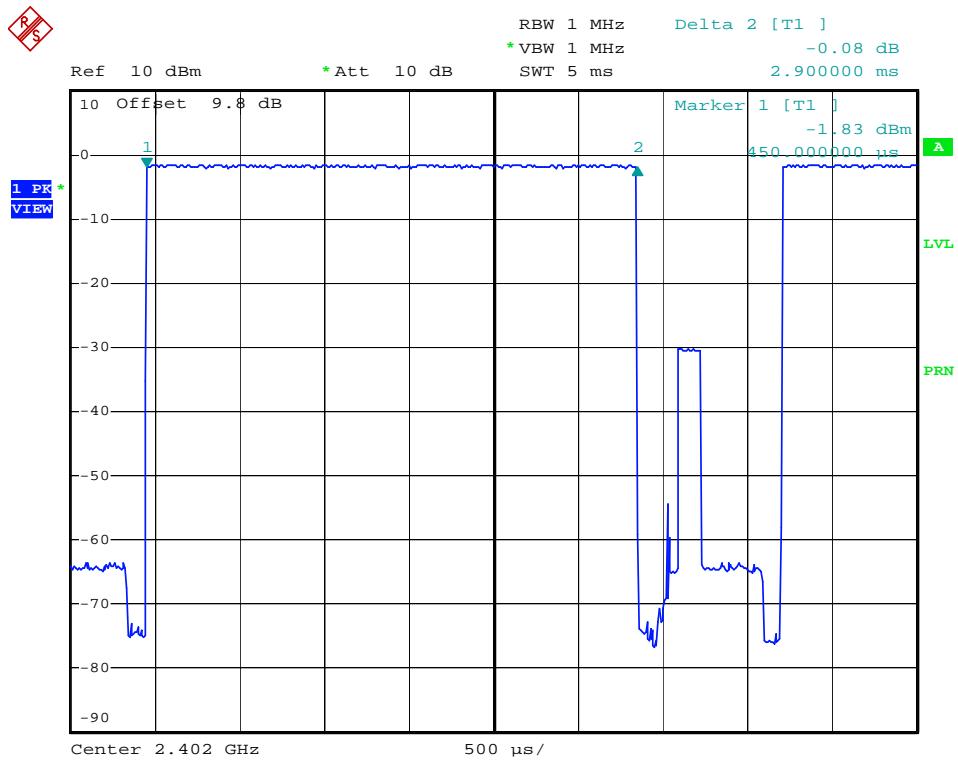
#### 3-DH 5(The longest packet type for 8DPSK)

CH Mid :  $2.90 * (1600/6)/79 * 31.6 = 309.33$  (ms)

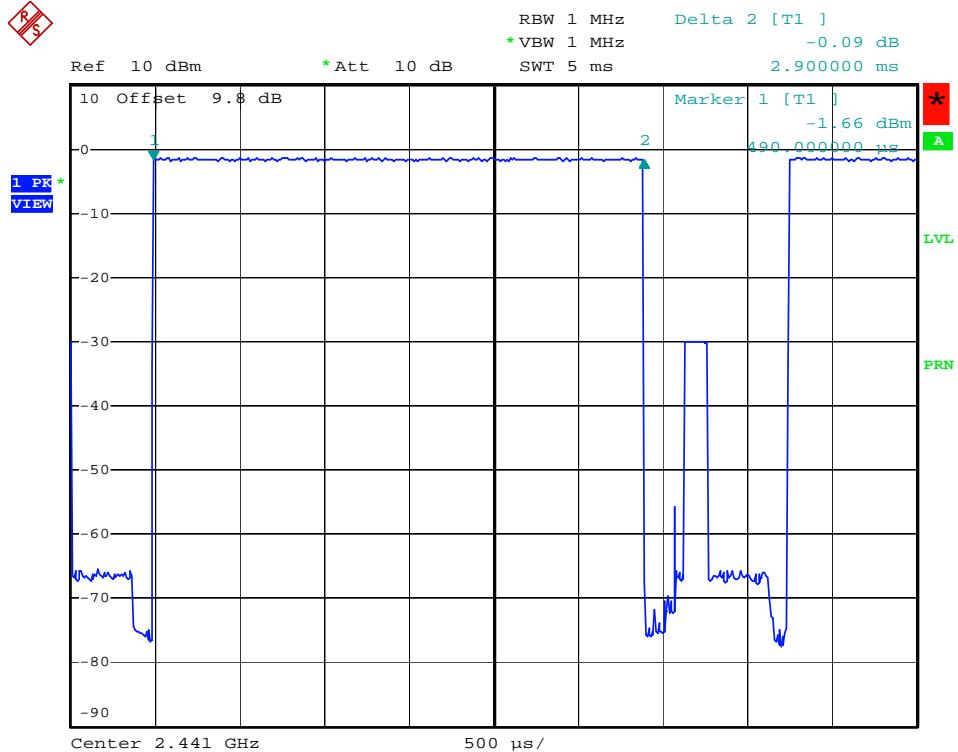
Channel	Pulse Time (ms)		Total of Dwell (ms)		Period Time (s)	Limit (ms)	Result
	GFSK	8DPSK	GFSK	8DPSK			
Low	2.90	2.90	309.33	309.33	31.6	400	PASS
Mid	2.90	2.90	309.33	309.33	31.6		PASS
High	2.90	2.90	309.33	309.33	31.6		PASS

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## Test Plots (GFSK)

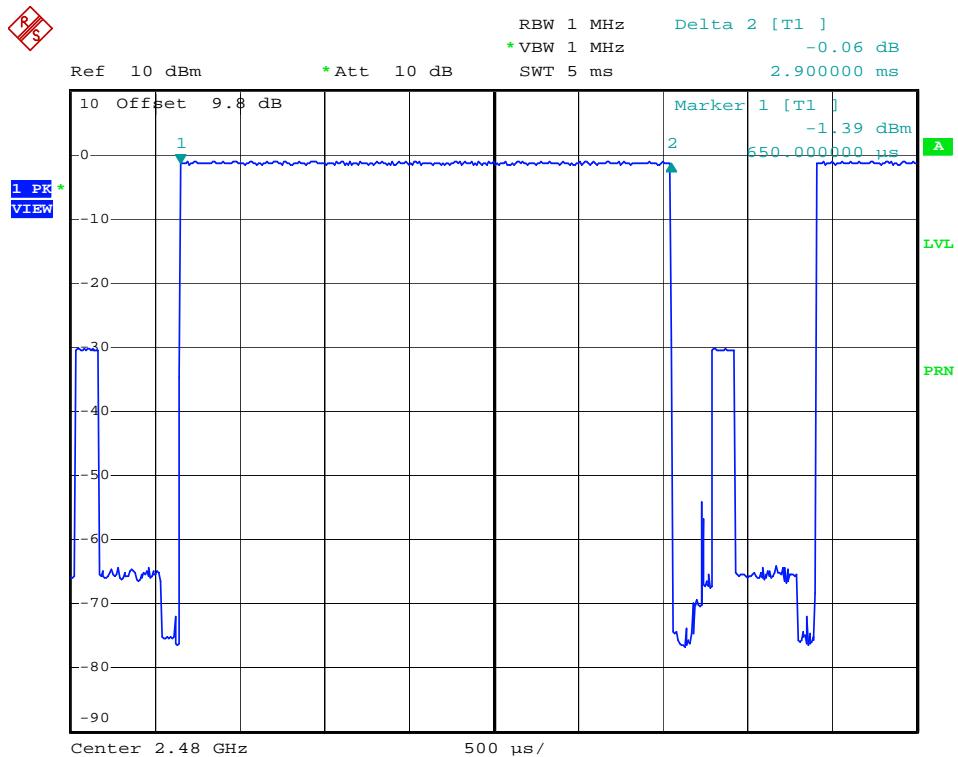
**DH 5**  
**( Low CH )**


Date: 15.NOV.2009 16:16:47

**( Mid CH )**


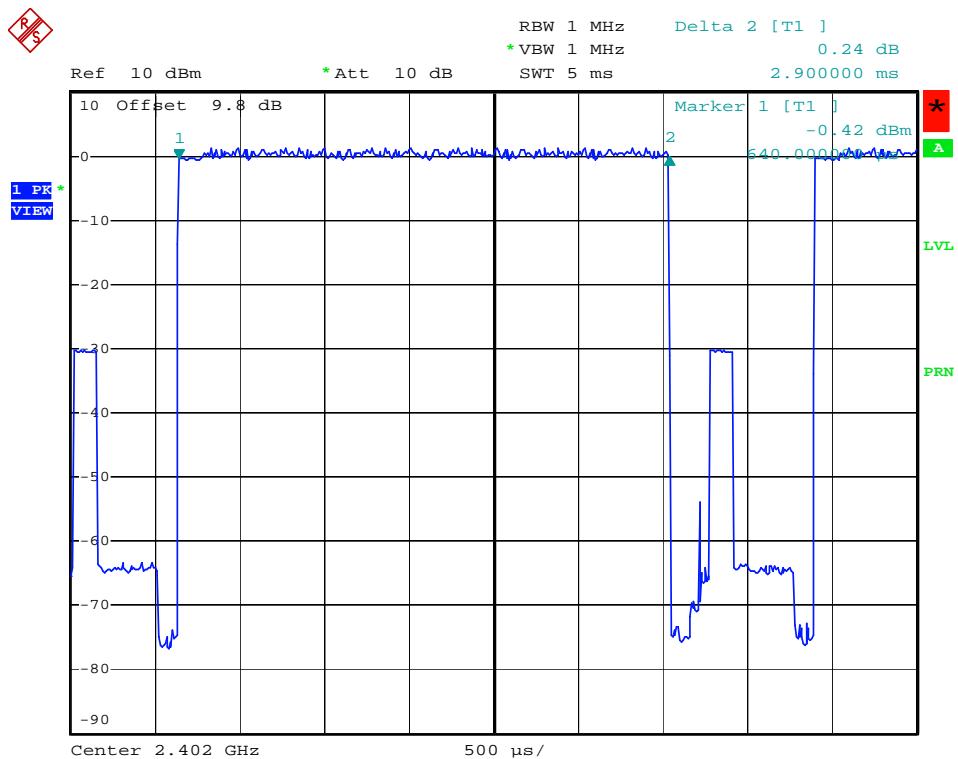
Date: 15.NOV.2009 16:17:25

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**(CH High)**


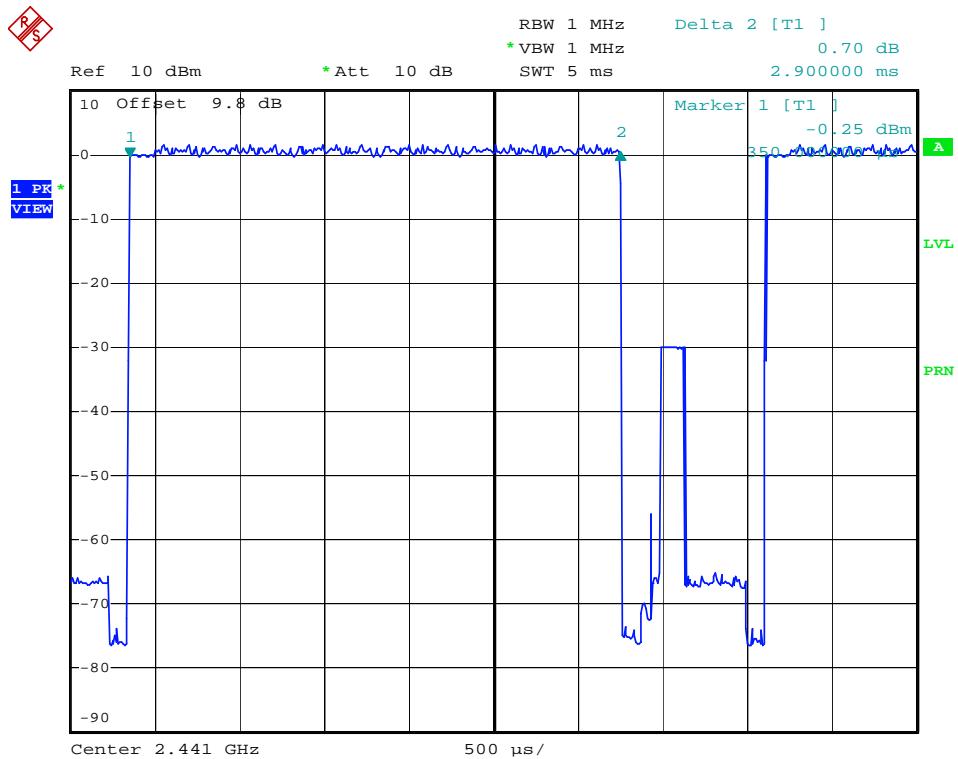
Date: 15.NOV.2009 16:17:54

Test Plots (8DPSK)

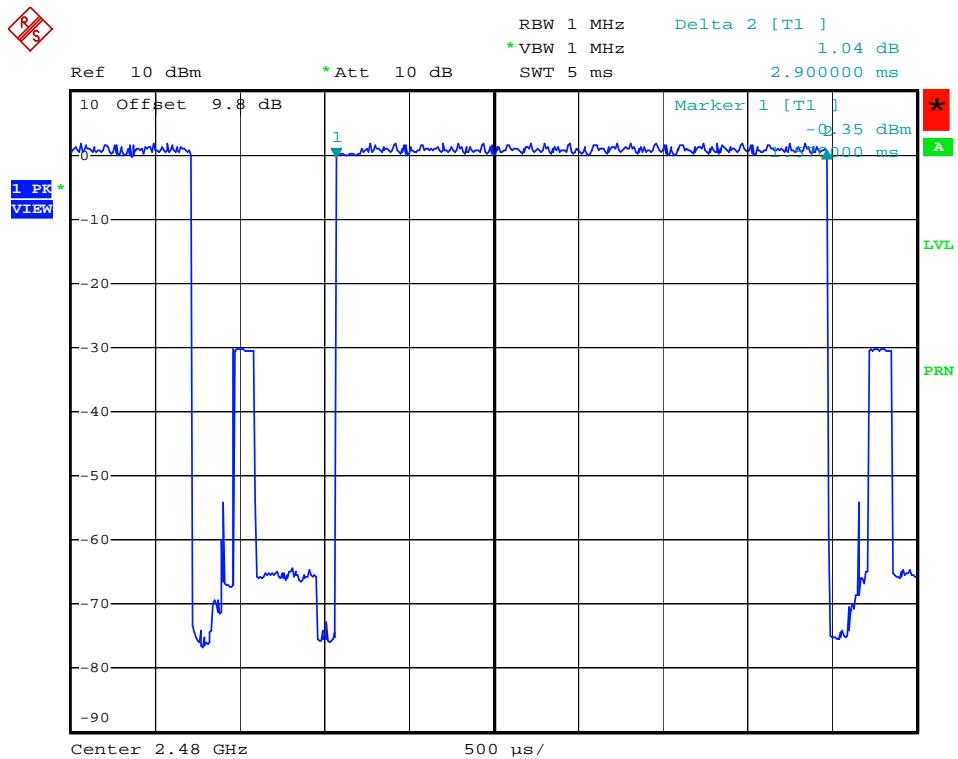
**3-DH 5**
**( Low CH )**


Date: 15.NOV.2009 16:18:42

HCT PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			<a href="http://www.hct.co.kr">www.hct.co.kr</a>
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**( Mid CH )**


Date: 15.NOV.2009 16:19:19

**(CH High)**


Date: 15.NOV.2009 16:19:54

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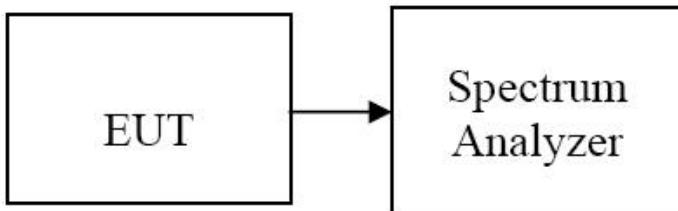
## 7.6 SPURIOUS EMISSIONS

### 7.6.1 Conducted Spurious Measurement

#### LIMIT

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

#### Test Configuration



#### TEST PROCEDURE

Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The transmitter output is connected to the spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz.

Detector Mode is set to a peak detector Mode.

Measurements are made over the 30 MHz to 26 GHz range with the transmitter set to the lowest, middle, and highest channels.

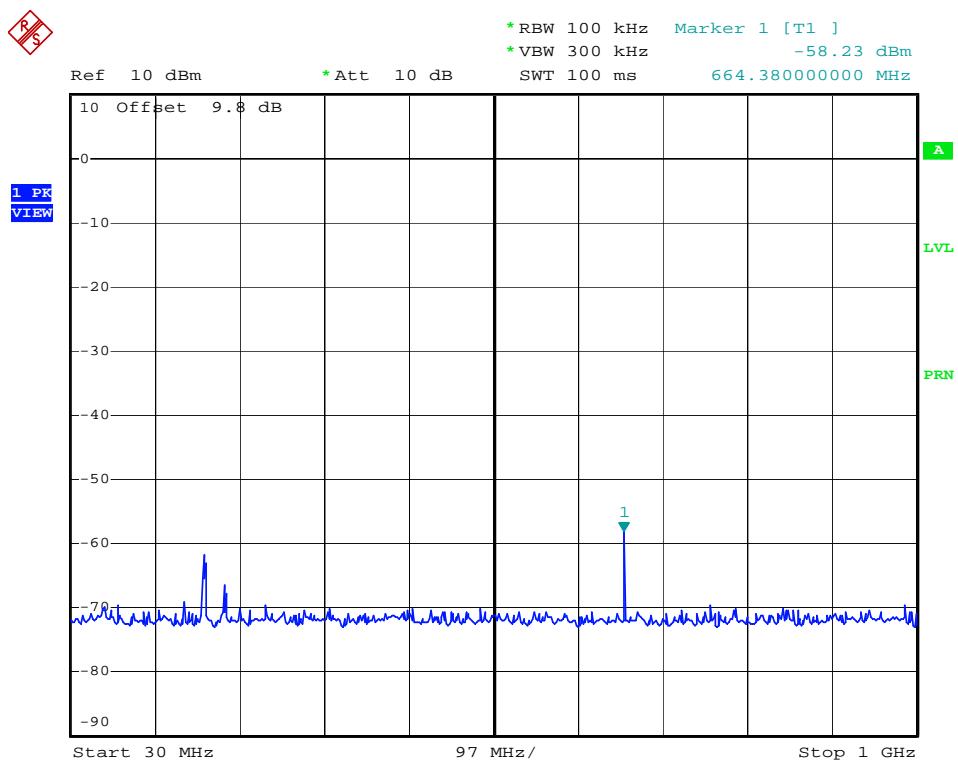
#### TEST RESULTS

No non-compliance noted

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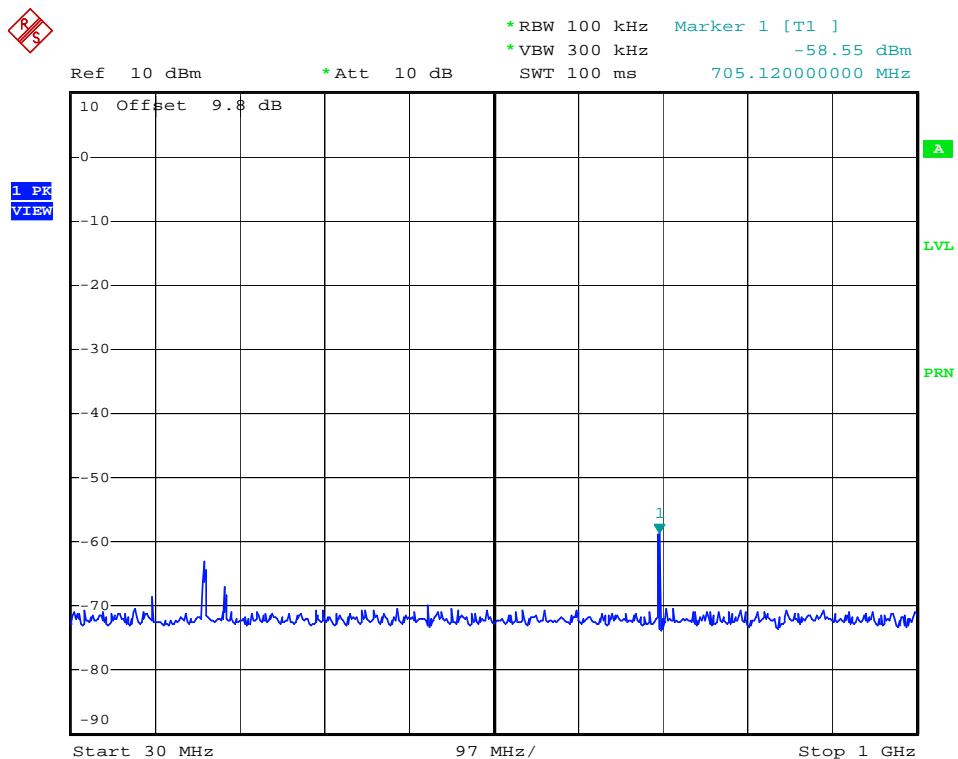
Test Plots (GFSK) – 30 MHz ~ 1 GHz(RBW:100 kHz, VBW: 300 kHz)

**( Low CH )**



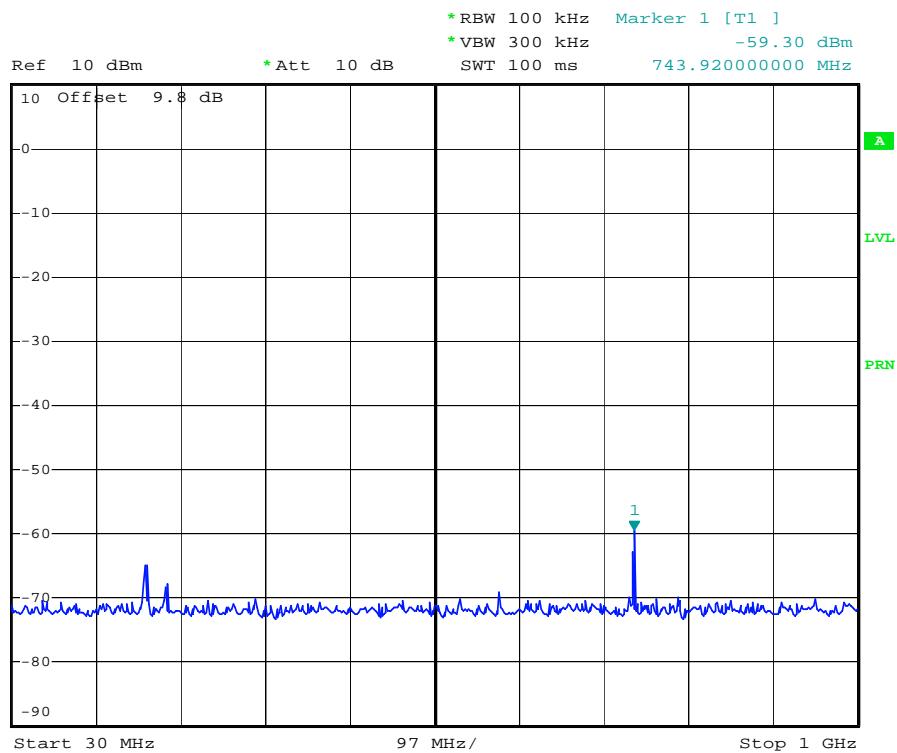
Date: 15.NOV.2009 16:20:54

**(Mid CH )**



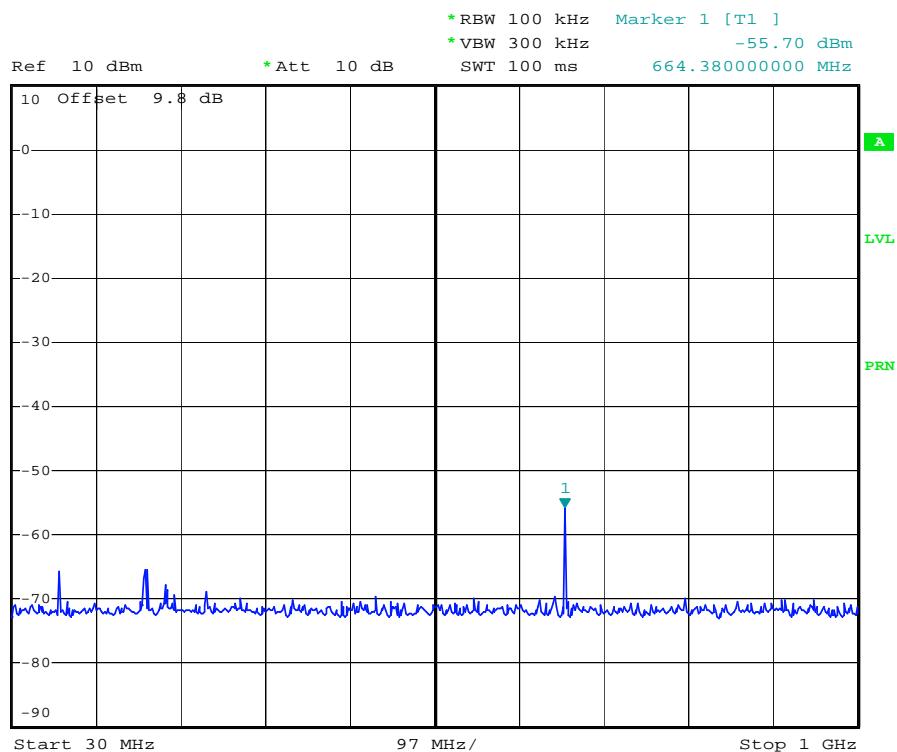
Date: 15.NOV.2009 16:21:25

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**( High CH )**


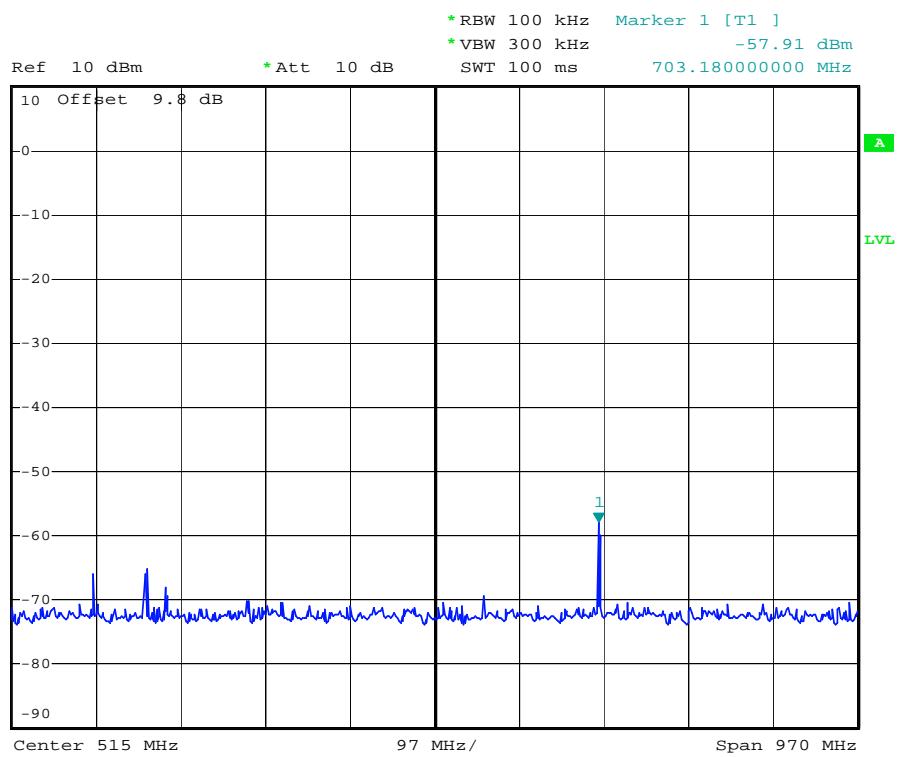
Date: 15.NOV.2009 16:22:01

Test Plots (8DPSK) – 30 MHz ~ 1 GHz(RBW:100 kHz, VBW: 300 kHz)

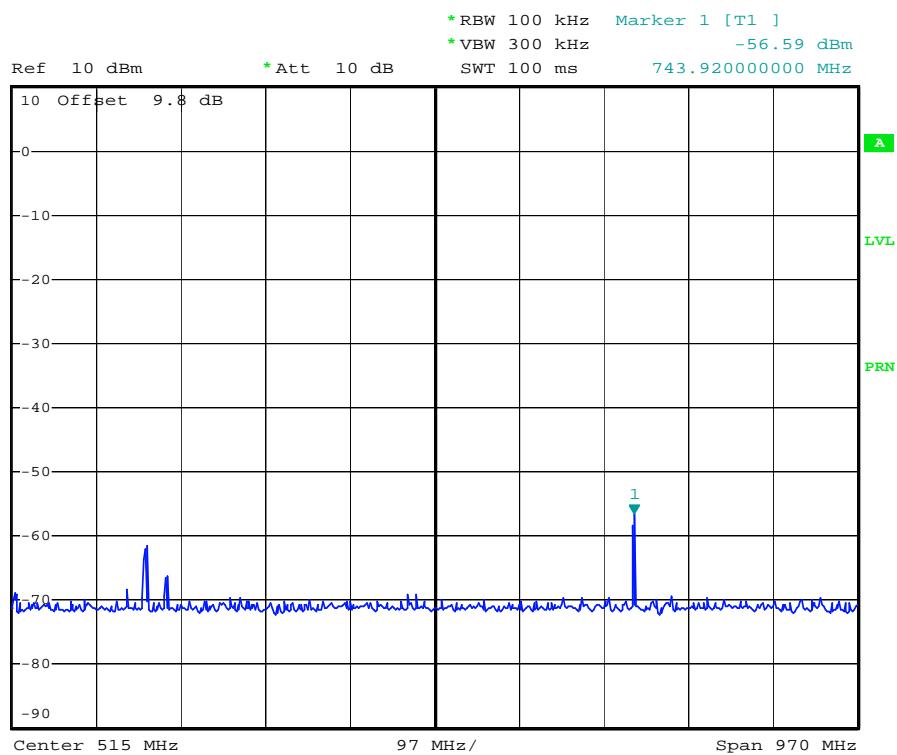
**( Low CH )**


Date: 15.NOV.2009 16:22:43

HCT PT.15.247 TEST REPORT		FCC CERTIFICATION REPORT			<a href="http://www.hct.co.kr">www.hct.co.kr</a>
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**(Mid CH )**


Date: 15.NOV.2009 16:23:14

**( High CH )**


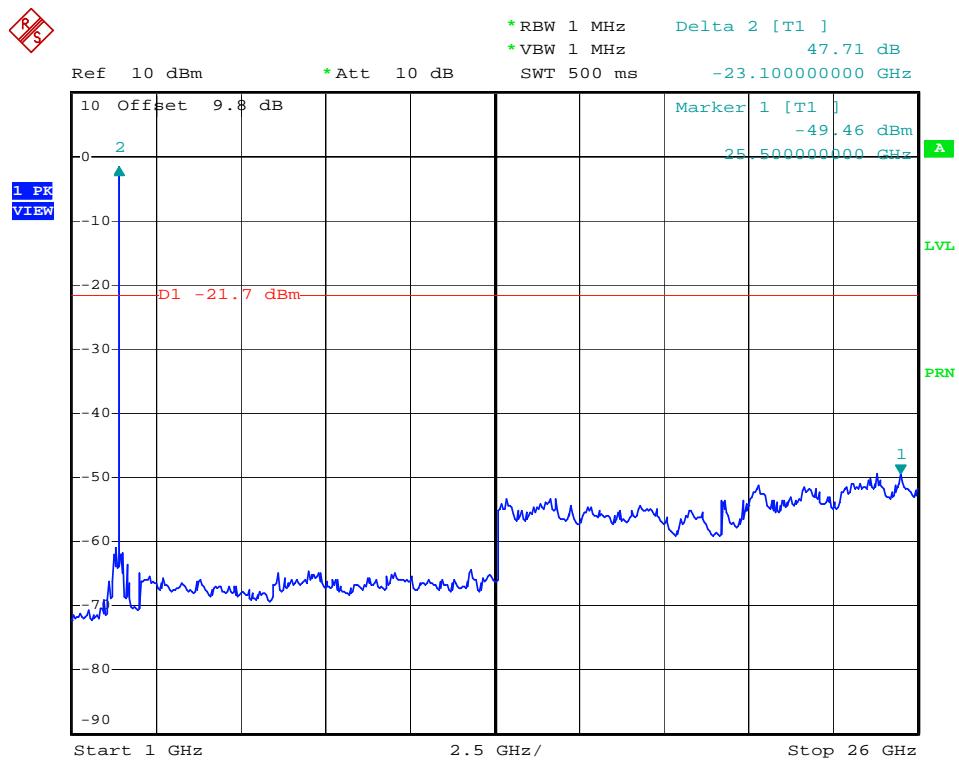
Date: 15.NOV.2009 16:25:27

HCT PT.15.247 TEST REPORT	FCC CERTIFICATION REPORT			<a href="http://www.hct.co.kr">www.hct.co.kr</a>
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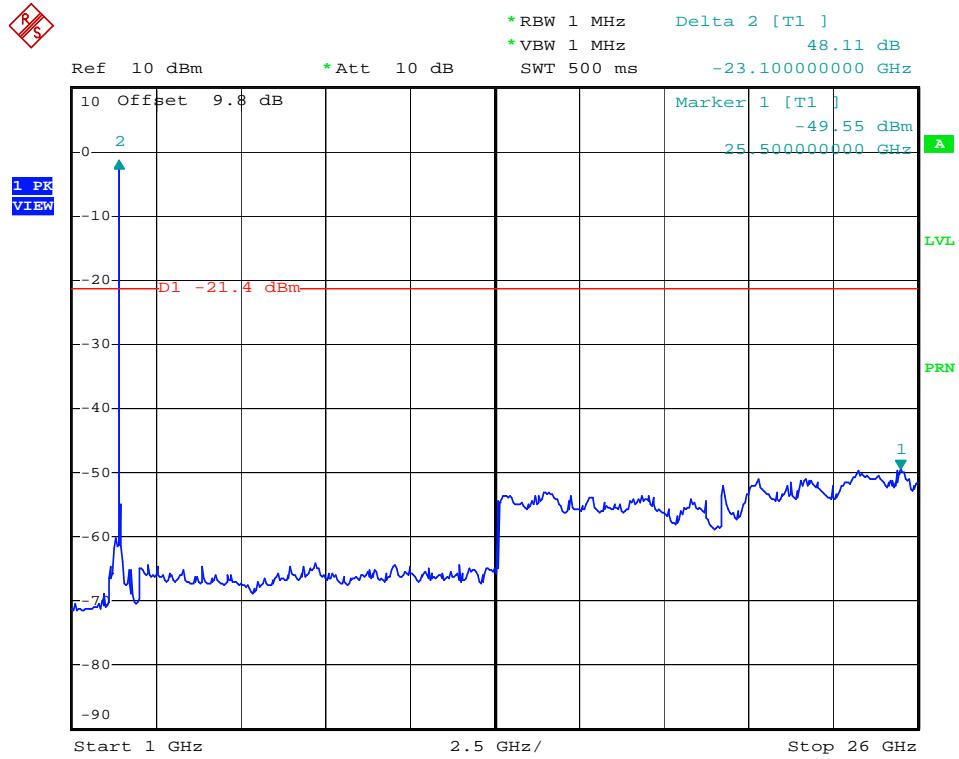
Test Plots (GFSK) – 1 GHz ~ 26 GHz (RBW: 1 MHz, VBW: 1 MHz)

( Low CH )



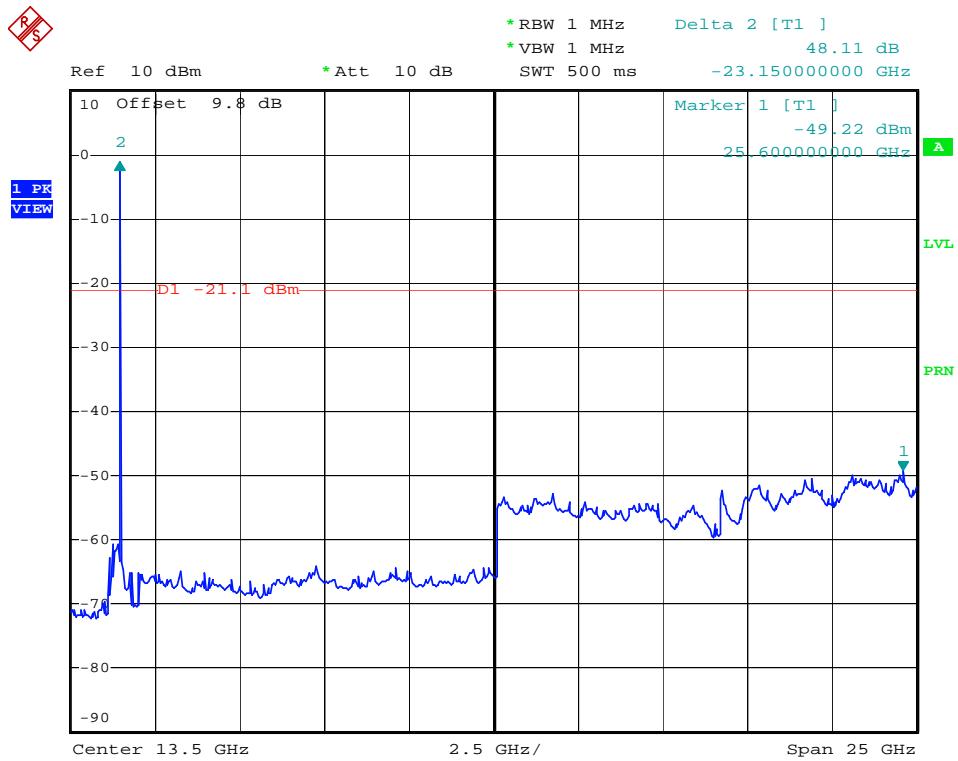
Date: 15.NOV.2009 16:26:14

**(Mid CH )**



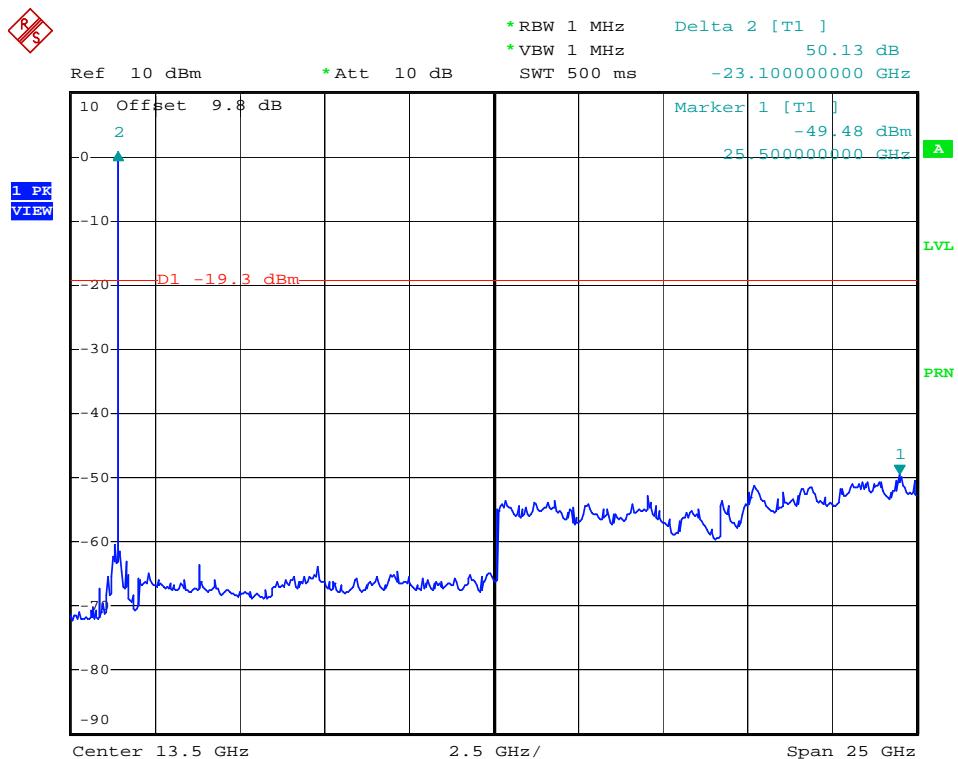
Date: 15.NOV.2009 16:27:23

FCC CERTIFICATION REPORT		<a href="http://www.hct.co.kr">www.hct.co.kr</a>		
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**( High CH )**


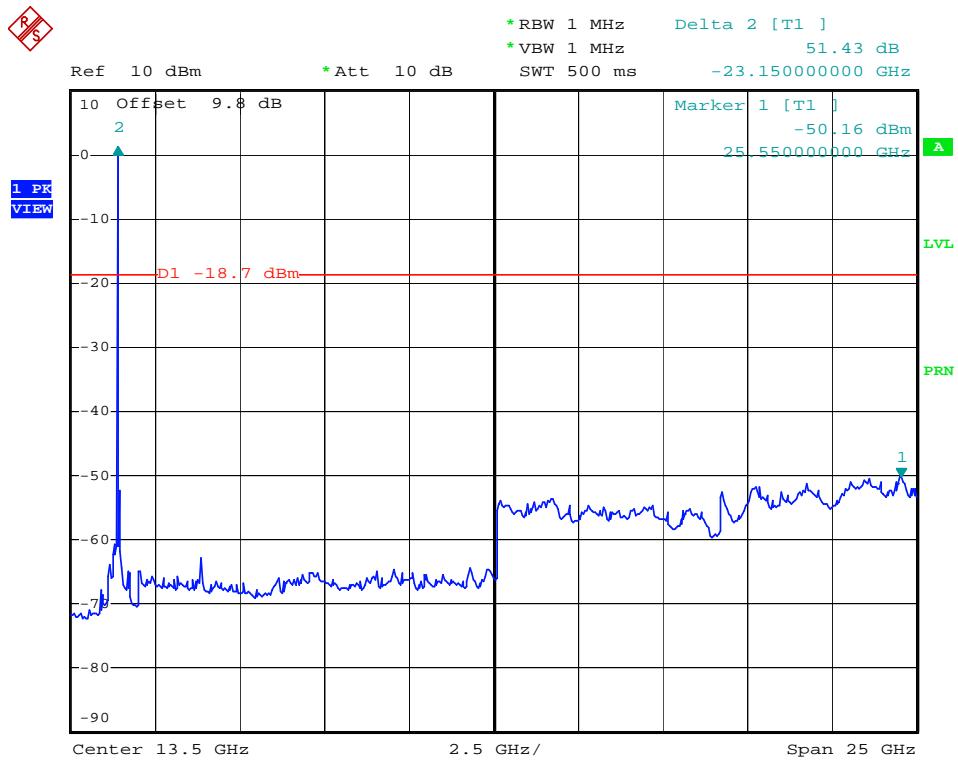
Date: 15.NOV.2009 16:28:04

Test Plots (8DPSK) – 1 GHz ~ 26 GHz (RBW: 1 MHz, VBW: 1 MHz)

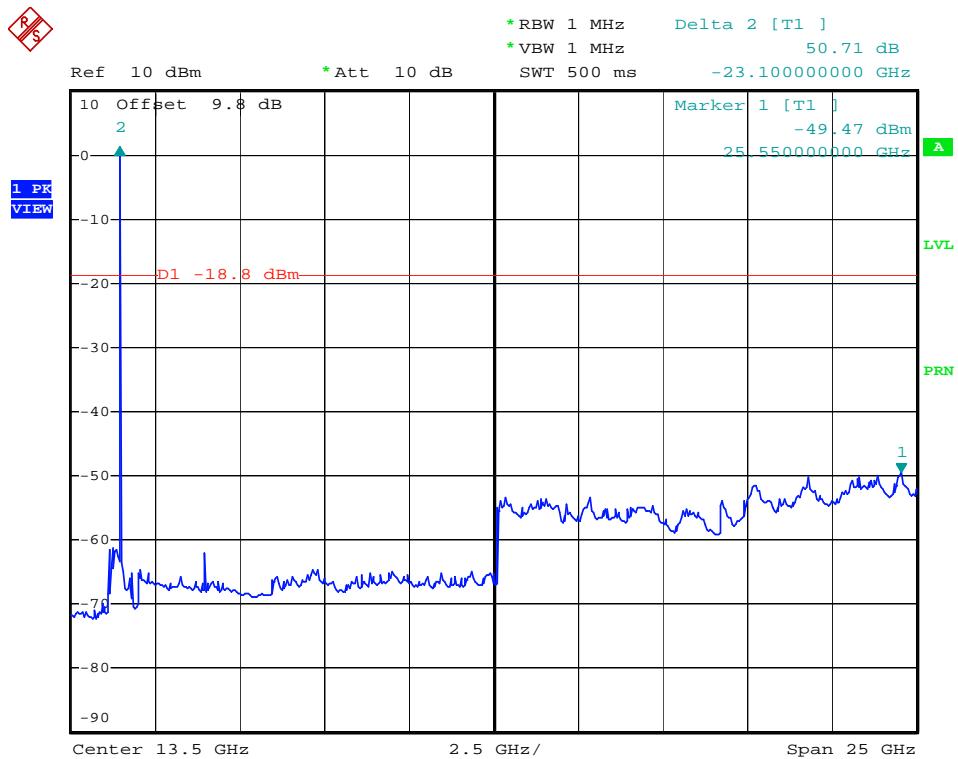
**( Low CH )**


Date: 15.NOV.2009 16:28:44

<b>HCT PT.15.247 TEST REPORT</b>	<b>FCC CERTIFICATION REPORT</b>			<a href="http://www.hct.co.kr">www.hct.co.kr</a>
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**(Mid CH )**


Date: 15.NOV.2009 16:29:26

**( High CH )**


Date: 15.NOV.2009 16:30:07

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### 7.6.2 Radiated Spurious Emissions

#### LIMIT

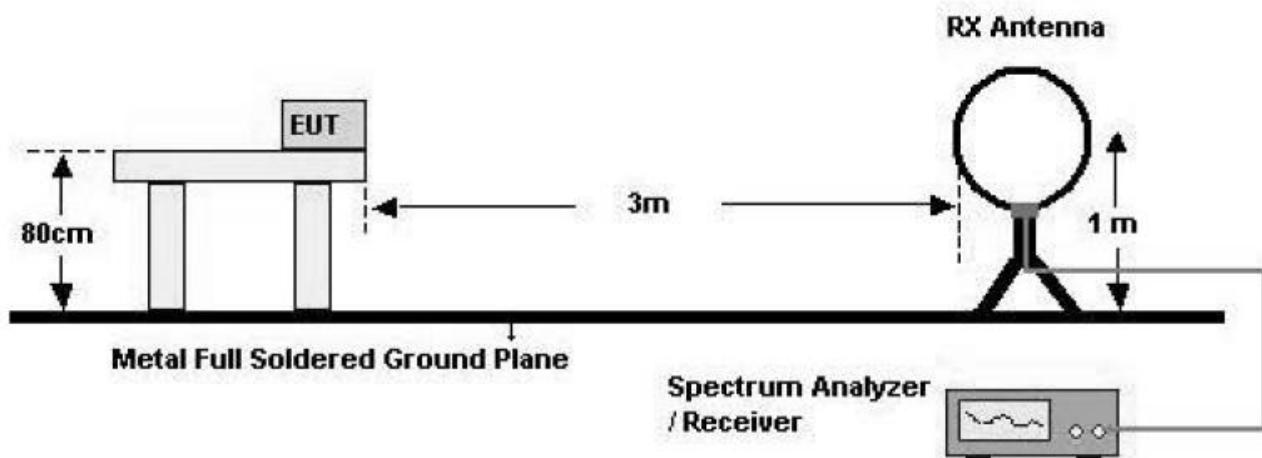
1. 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed

Frequency (MHz)	Field Strength (uV/m)	Measurement Distance (m)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	24000/F(kHz)	30
1.705 – 30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

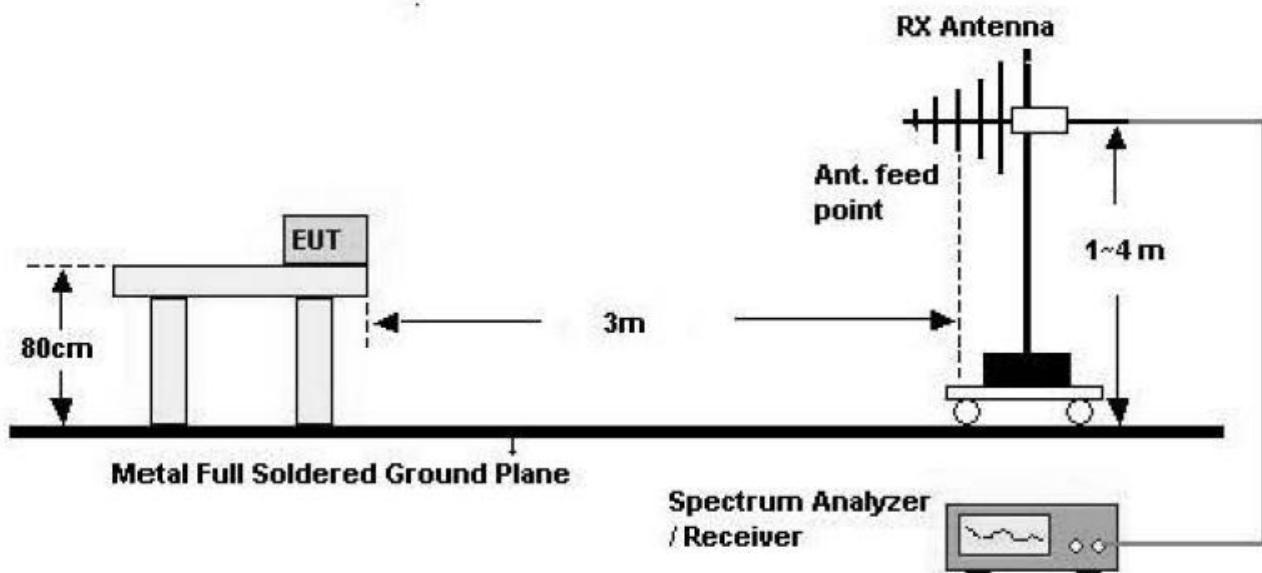
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## Test Configuration

### Below 30 MHz

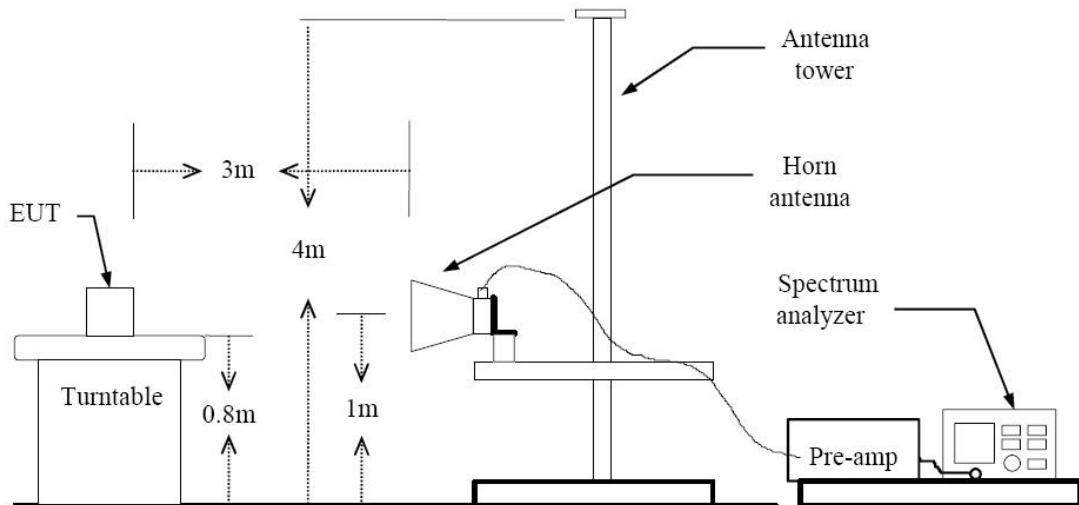


### 30 MHz - 1 GHz



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## Above 1 GHz



## TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

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## TEST RESULTS

9 kHz – 30MHz

**Operation Mode:** Normal Link

### Notes:

1. Measuring frequencies from 9 kHz to the 30MHz.
2. The reading of emissions are attenuated more than 20 dB below the permissible limits or the field strength is too small to be measured.
3. Distance extrapolation factor =  $40 \log (\text{specific distance} / \text{test distance})$  (dB)
4. Limit line = specific Limits (dBuV) + Distance extrapolation factor

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## TEST RESULTS

### Below 1 GHz

#### Operation Mode: Normal Link

Frequency MHz	Reading dBuV	Ant. Factor dB/m	Cable Loss dB	ANT POL (H/V)	Total dBuV/m	Limit dBuV/m	Margin dB
71.0	13.4	10.0	0.9	V	24.25	40.0	15.8
81.0	13.3	8.4	1.0	V	22.69	40.0	17.3

#### Notes:

1. Measuring frequencies from 30 MHz to the 1 GHz.
2. Radiated emissions measured in frequency range from 30 MHz to 1000 MHz were made with an instrument using Quasi peak detector mode.

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## Above 1 GHz

### Operation Mode: CH Low (EDR)

Frequency [MHz]	Reading dBuV	AN.+CL-AMP GAIN. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4804	46.53	-4.79	V	41.74	74	32.26	PK
4804	33.79	-4.79	V	29.00	54	25.00	AV
7206	48.74	1.21	V	49.95	74	24.05	PK
7206	35.79	1.21	V	37.00	54	17.00	AV
4804	46.57	-4.79	H	41.78	74	32.22	PK
4804	34.21	-4.79	H	29.42	54	24.58	AV
7206	49.13	1.21	H	50.34	74	23.66	PK
7206	36.03	1.21	H	37.24	54	16.76	AV

### Notes:

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.

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**Operation Mode: CH Mid (EDR)**

Frequency [MHz]	Reading dBuV	AN.+CL-AMP GAIN. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4882	46.32	-4.61	V	41.71	74	32.29	PK
4882	33.72	-4.61	V	29.11	54	24.89	AV
7323	49.07	1.62	V	50.69	74	23.31	PK
7323	36.24	1.62	V	37.86	54	16.14	AV
4882	46.89	-4.61	H	42.28	74	31.72	PK
4882	33.38	-4.61	H	28.77	54	25.23	AV
7323	48.83	1.62	H	50.45	74	23.55	PK
7323	36.23	1.62	H	37.85	54	16.15	AV

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20 dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000 MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.

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**Operation Mode: CH High (EDR)**

Frequency [MHz]	Reading dBuV	AN.+CL-AMP GAIN. [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
4960	46.87	-4.42	V	42.45	74	31.55	PK
4960	34.03	-4.42	V	29.61	54	24.39	AV
7440	49.03	2.04	V	51.07	74	22.93	PK
7440	36.04	2.04	V	38.08	54	15.92	AV
4960	47.44	-4.42	H	43.02	74	30.98	PK
4960	35.06	-4.42	H	30.64	54	23.36	AV
7440	48.05	2.04	H	50.09	74	23.91	PK
7440	35.94	2.04	H	37.98	54	16.02	AV

**Notes:**

1. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.
2. Measurements above show only up to 6 maximum emissions noted, or would be lesser if no specific emissions from the EUT are recorded (ie: margin > 20dB from the applicable limit) and considered that's already beyond the background noise floor.
3. Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column.
4. Spectrum setting:
  - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MH.
  - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.

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### 7.6.3 Radiated Restricted Band Edge Measurements

#### Test Requirements and limit, §15.247(d)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in section 15.209(a) (See section 15.205(c)).

Operation Mode:	GFSK(Normal )		
Operating Frequency	2402, 2480 MHz		
Channel No.	0, 78 Ch		

Frequency [MHz]	Reading dBuV	AN.+CL-AMP G [dB]	ANT. POL [H/V]	Total [dBuV/m]	Limit [dBuV/m]	Margin [dB]	Detect
2312.40	47.92	-10.49	H	37.43	74	36.57	PK
2312.40	36.15	-10.49	H	25.66	54	28.34	AV
2360.08	49.31	-10.29	V	39.02	74	34.98	PK
2360.08	34.95	-10.29	V	24.66	54	29.34	AV
2490.43	48.21	-9.73	H	38.48	74	35.52	PK
2490.43	35.98	-9.73	H	26.25	54	27.75	AV
2492.81	48.20	-9.72	V	38.48	74	35.52	PK
2492.81	35.77	-9.72	V	26.05	54	27.95	AV

#### Notes:

1. Spectrum setting:
  - a. Peak Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 1 MHz.
  - b. AV Setting 1 GHz – 26 GHz, RBW = 1 MHz, VBW = 10 Hz.

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## 7.7 POWERLINE CONDUCTED EMISSIONS

### LIMIT

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range is listed as follows:

Frequency Range (MHz)	Limits (dB $\mu$ V)	
	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

### Test Configuration

See test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

### TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

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## Test Plot

Conducted emissions (Line 1 / Mid CH)

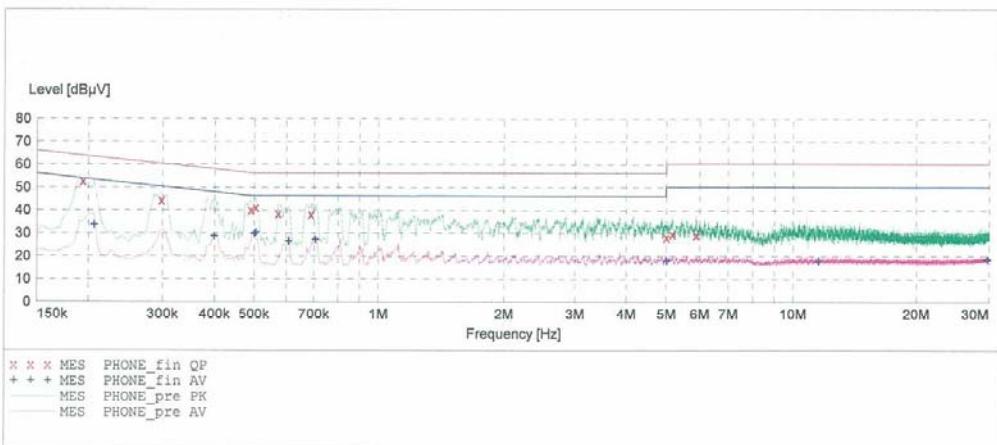
**HCT**

**EMC**

**EUT:** P2000  
**Manufacturer:** PANTECH  
**Operating Condition:** BT MODE  
**Test Site:** SHIELD ROOM  
**Operator:** HS-KWAK  
**Test Specification:** CISPR22 CLASS B  
**Comment:** N

**SCAN TABLE: "EN 55022 Voltage"**

EN 55022 Voltage						
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
150.1 kHz	500.0 kHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	ESH3-Z5-2009.9.16
			Average			
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	ESH3-Z5-2009.9.16
			Average			
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak	10.0 ms	9 kHz	ESH3-Z5-2009.9.16
			Average			



**MEASUREMENT RESULT: "PHONE\_fin\_QP"**

11/18/2009 2:22PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.194100	52.70	10.1	64	11.2	1	---
0.298100	44.20	10.1	60	16.1	1	---
0.490100	39.90	10.0	56	16.3	1	---
0.504000	41.20	10.0	56	14.8	1	---
0.572000	38.30	10.0	56	17.7	1	---
0.688000	38.10	10.1	56	17.9	1	---
5.000000	28.20	10.3	56	27.8	1	---
5.168000	29.70	10.4	60	30.3	1	---
5.880000	29.20	10.4	60	30.8	1	---

**MEASUREMENT RESULT: "PHONE\_fin\_AV"**

11/18/2009 2:22PM

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.206100	33.70	10.1	53	19.7	1	---
0.398100	28.70	10.0	48	19.2	1	---

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**MEASUREMENT RESULT: "PHONE\_fin AV"**

(continued)

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line	PE
0.500000	29.80	10.0	46	16.2	1	---
0.504000	30.40	10.0	46	15.6	1	---
0.608000	26.30	10.0	46	19.7	1	---
0.704000	27.20	10.1	46	18.8	1	---
5.000000	18.00	10.3	46	28.0	1	---
11.500000	17.90	10.9	50	32.1	1	---
29.652000	18.50	12.0	50	31.5	1	---

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## Conducted emissions (Line 2 / Mid CH )

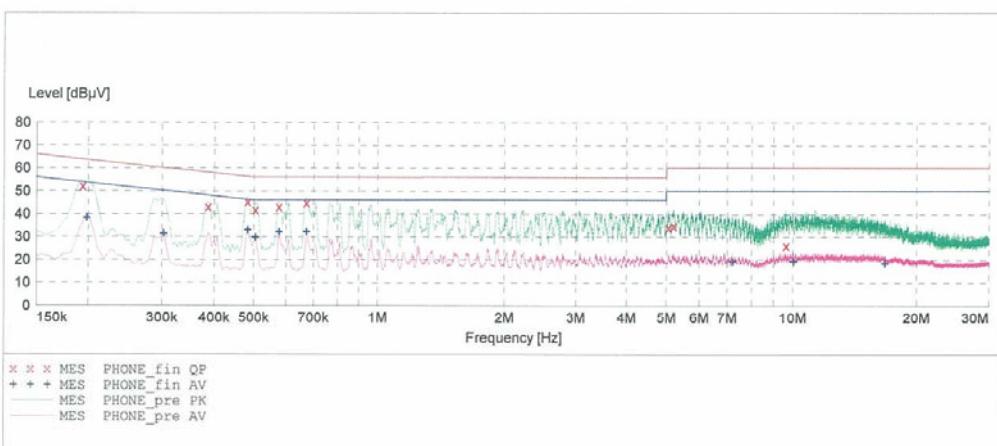
**HCT**

**EMC**

EUT: P2000  
 Manufacturer: PANTECH  
 Operating Condition: BT MODE  
 Test Site: SHIELD ROOM  
 Operator: HS-KWAK  
 Test Specification: CISPR22 CLASS B  
 Comment: H

### SCAN TABLE: "EN 55022 Voltage"

EN 55022 Voltage						
Start Frequency	Stop Frequency	Step Width	Detector	Meas.	IF Time	Transducer
150.1 kHz	500.0 kHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	ESH3-Z5-2009.9.16
500.0 kHz	5.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	ESH3-Z5-2009.9.16
5.0 MHz	30.0 MHz	4.0 kHz	MaxPeak Average	10.0 ms	9 kHz	ESH3-Z5-2009.9.16



### MEASUREMENT RESULT: "PHONE\_fin\_QP"

11/18/2009 2:28PM

Frequency MHz	Level dB <sub>μ</sub> V	Transd dB	Limit dB <sub>μ</sub> V	Margin dB	Line	PE
0.194100	52.20	10.1	64	11.6	1	---
0.386100	43.10	10.0	58	15.0	1	---
0.482100	45.40	10.0	56	10.9	1	---
0.504000	41.80	10.0	56	14.2	1	---
0.576000	43.10	10.0	56	12.9	1	---
0.672000	44.90	10.1	56	11.1	1	---
5.056000	34.20	10.4	60	25.8	1	---
5.204000	34.90	10.4	60	25.1	1	---
9.624000	26.30	10.7	60	33.7	1	---

### MEASUREMENT RESULT: "PHONE\_fin\_AV"

11/18/2009 2:28PM

Frequency MHz	Level dB <sub>μ</sub> V	Transd dB	Limit dB <sub>μ</sub> V	Margin dB	Line	PE
0.198100	38.40	10.1	54	15.3	1	---
0.302100	31.40	10.1	50	18.8	1	---

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**MEASUREMENT RESULT: "PHONE\_fin AV"**

(continued)

Frequency MHz	Level dB $\mu$ V	Transd dB	Limit dB $\mu$ V	Margin dB	Line dB	PE
0.482100	33.00	10.0	46	13.3	1	---
0.504000	29.80	10.0	46	16.2	1	---
0.576000	32.10	10.0	46	13.9	1	---
0.672000	32.20	10.1	46	13.8	1	---
7.196000	19.30	10.5	50	30.7	1	---
10.008000	19.40	10.7	50	30.6	1	---
16.696000	18.50	11.3	50	31.5	1	---

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## 8. LIST OF TEST EQUIPMENT

Manufacturer	Model / Equipment	Cal Interval	Calibration Due	Serial No.
Rohde & Schwarz	ESH2-Z5/ LISN	Annual	04/10/2010	861741/013
Rohde & Schwarz	ESH3-Z6/ LISN	Annual	06/13/2010	100329
Schwarzbeck	VULB 9160/ TRILOG Antenna	Biennial	12/18/2010	9160-3150
HD	MA240/ Antenna Position Tower	N/A	N/A	556
EMCO	1050/ Turn Table	N/A	N/A	114
HD GmbH	HD 100/ Controller	N/A	N/A	13
HD GmbH	KMS 560/ SlideBar	N/A	N/A	12
Rohde & Schwarz	ESH3-Z2/ PULSE LIMITER	Annual	10/30/2010	375.8810.352
MITEQ	AMF-60-0010 1800-35-20P/AMP	Annual	05/20/2010	1200937
Schwarzbeck	BBHA 9120D/ Horn Antenna	Biennial	03/26/2010	147
Rohde & Schwarz	6502/Loop Antenna	Biennial	12/26/2009	9009-2536
Rohde & Schwarz	FSP30/Spectrum Analyzer	Annual	07/31/2010	839117/011
Agilent	E4416A /Power Meter	Annual	01/21/2010	GB41291412
Wainwright Instrument	WHF3.3/18G-10EF / High Pass Filter	Annual	06/29/2010	1
Hewlett Packard	11636B/Power Divider	Annual	12/24/2009	11377
DIGITAL	EP-3010 /DC POWER SUPPLY	Annual	01/07/2010	3110117

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