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# ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

**Product Name:** Stereo Headphone

**Brand Name: AmbiCom** 

**Model Name:** BT-HPC,WST-KIT

FCC ID: P5T-BTHPC

**Report No.:** ER/2006/10016-02

**Issue Date:** May. 17, 2007

§15.247 **FCC Rule Part:** 

AmbiCom, Inc. Prepared for:

405 River Oaks Parkway, San Jose. CA 95134

USA

SGS Taiwan Ltd. Prepared by:

No. 134, Wu Kung Rd., Wuku Industrial

Zone, Taipei County, Taiwan.





Testing Laboratory 0513

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# VERIFICATION OF COMPLIANCE

**Applicant:** AmbiCom, Inc.

405 River Oaks Parkway, San Jose. CA 95134 USA

**Equipment Under Test:** Stereo Headphone

**Brand Name:** AmbiCom, Inc.

FCC ID Number: P5T-BTHPC

**Model No.:** BT-HPC,WST-KIT

**Model Difference:** Different market

**File Number:** ER/2006/10016-02

**Date of test:** Jan 26, 2006 ~ Feb. 19, 2006

**Date of EUT Received:** Jan. 25, 2006

# We hereby certify that:

The above equipment was tested by SGS Taiwan Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with conducted and radiated emission limits of FCC Rules Part 15.247

The test results of this report relate only to the tested sample identified in this report.

Test By:	Vanny Yeh	Date	May. 17, 2007	
	Danny Yeh / Engineer			
Prepared By:	Gigi yeh	Date	May. 17, 2007	
_	Gigi Yeh / Clerk			
Approved By:	Timent Lu	Date	May. 17, 2007	
	Vincent Su / Manager			

Vincent Su / Manager



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# Version

Version No.	Date		
00	May. 17, 2007		



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## 1. GENERAL INFORMATION

# 1.1. Product Description

The AmbiCom, Inc. Model: BT-HPC, WST-KIT are Stereo Headphone. The EUT is compliance with Bluetooth Standard.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2402 2480MHz, 79 channels
- B). Rated output power:2.45dBm
- C). Modulation type: Frequency Hopping Spread Spectrum (FHSS)
- D). Antenna Designation: Chip Antenna, 0 dBi, Non-User Replaceable (Fixed)
- E). Power Supply: 3.7Vdc re-chargeable battery; 5Vdc from USB port of PC 5 Vdc from AC/DC Power Adaptor; Mode name:SA01-6US05R-A

## 1.2. Related Submittal(s) / Grant (s)

This submittal(s) (test report) is intended for FCC ID: **P5T-BTHPC** filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rule. The composite system (receiver) is compliance with Subpart B is authorized under a Doc procedure.

# 1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003). Radiated testing was performed at an antenna to EUT distance 3 meters.

## 1.4. Test Facility

The open area test site and conducted measurement facility used to collect the radiated data is located on the address of SGS Taiwan Ltd. No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. The Open Area Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements. Site No. 1(3 &10 meters) Registration Number: 94644, Both OATS and Anechoic chamber (3 meters) was accredited by CNLA (0513) and NVLAP (200704-0)

## 1.5. Special Accessories

Not available for this EUT intended for grant.

## 1.6. Equipment Modifications

Not available for this EUT intended for grant.



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## 2. SYSTEM TEST CONFIGURATION

## 2.1. EUT Configuration

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

## 2.2. EUT Exercise

The EUT (Transmitter) was operated in the engineering mode to fix the Tx frequency that was for the purpose of the measurements.

## 2.3. Test Procedure

### 2.3.1 Conducted Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. According to the requirements in Section 7 and 13 of ANSI C63.4-2003. Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-Peak and Average detector mode.

#### 2.3.2 Radiated Emissions

The EUT is a placed on as turn table which is 0.8 m above ground plane. The turn table shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna which varied from 1m to 4m 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 8 and 13 of ANSI C63.4-2003.



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# 2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System (Fixed channel)



**Table 2-1 Equipment Used in Tested System** 

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Cable	Power Cord
1.	Notebook	IBM	T2367	DOC	99GLD64	120cm, shielded	Un-shield
2.	BT development kit	N/A	N/A	N/A	N/A	Un-shield	Un-shield

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## 3. SUMMARY OF TEST RESULTS

FCC Rules	<b>Description Of Test</b>	Result
§15.207(a)	Conducted Emission	Compliant
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(a)	20dB Bandwidth	Compliant
§15.247(c)	100 KHz Bandwidth Of Fre-	Compliant
	quency Band Edges	
§15.209(a) (f)	Spurious Emission	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(iii)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii)	Time of Occupancy	Compliant
§15.247	Peak Power Density	Compliant
§15.203,	Antenna Requirement	Compliant
§15.247(b)(4)(i)		

## 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 (2402MHz) · mid (2441MHz) and high (2480MHz) with 741k highest data rate are chosen for full testing.

The EUT was placed on a 5 mm high non-metal supporter which was on the wooden table.

The AC power line conducted Emission was performed at Notebbok.

The Radiated Spurious Emission was performed at X. Y. and Z. axle. The worst carse.

Yaxle was reported.



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## 5. CONDUCTED EMISSION TEST

# 5.1. Standard Applicable

According to §15.207. frequency within 150KHz to 30MHz shall not exceed the limit table as be-

Frequency range	Limits dB(uV)		
MHz	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	

### Note

# 5.2. EUT Setup

- 1. The conducted emission tests were performed in the test site, using the setup in accordance with the ANSI C63.4-2003.
- 2. The EUT was plug-in the AC/DC Power adapter. The host system was placed on the center of the back edge on the test table. The peripherals was placed on the side of the host PC system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The spacing between the peripherals was 10 centimeters.
- 4. External I/O cables were draped along the edge of the test table and bundle when necessary.
- 5. The host system was connected with 110Vac/60Hz power source.

### **5.3.** Measurement Procedure

- 1. The EUT was placed on a table which is 0.8m above ground plane.
- 2. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 3. Repeat above procedures until all frequency measured were complete.

<sup>1.</sup> The lower limit shall apply at the transition frequencies

<sup>2.</sup> The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz.



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# 5.4. Measurement Equipment Used:

Conducted Emission Test Site									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
EMC Analyzer	HP	8594EM	3624A00203	09/02/2005	09/03/2006				
EMI Test Receiver	R&S	ESCS30	828985/004	06/09/2005	06/10/2006				
Transient Limiter	HP	11947A	3107A02062	09/02/2005	09/03/2006				
LISN	Rolf-Heine	NNB-2/16Z	99012	12/31/2005	12/30/2006				
LISN	Rolf-Heine	NNB-2/16Z	99013	12/24/2005	12/23/2006				
Coaxial Cables	N/A	No. 3, 4	N/A	12/01/2005	12/01/2006				

## 5.5. Measurement Result

The initial step in collecting conducted data is a spectrum analyzer peak scan of the measurement range. Significant peaks are then marked as shown on the following data page, and these signals are then quasi-peake.



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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode: Operation Mode			Test Date:	Feb. 15, 2006	
Temperature:	24 °C	Humidity:	56 %	Test By:	Danny

FREQ	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	NOTE
MHz	Raw	Raw	Limit	Limit	Margin	Margin	
	dBuV	dBuV	dBuV	dBuV	dB	dB	
0.158	57.59	35.85	65.58	55.58	-7.99	-19.73	L1
0.177	51.42		64.61	54.61	-13.19		L1
1.084	43.58		56.00	46.00	-12.42		L1
1.283	44.04	42.23	56.00	46.00	-11.96	-3.77	L1
6.509	44.35		60.00	50.00	-15.65		L1
17.506	46.86		60.00	50.00	-13.14		L1
0.158	57.42	40.60	65.58	55.58	-8.16	-14.98	L2
0.177	51.22		64.61	54.61	-13.39		L2
0.423	40.45		57.38	47.38	-16.93		L2
7.201	44.34		60.00	50.00	-15.66		L2
17.963	45.70		60.00	50.00	-14.30		L2
20.259	41.63		60.00	50.00	-18.37		L2

### Remark:

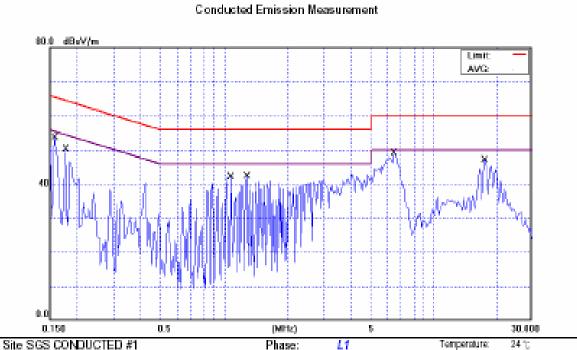
- (1) Measuring frequencies from 0.15 MHz to 30MHz  $\circ$
- (2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Qusia-Peak detector and Average detector.
- (3) "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
- (4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz; The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;
- (5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)



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## **Conducted Emission Test Plot**



Power:

Distance:

A C110W60HZ

Humidity:

Air Pressure:

hps.

Limit: EN65022 Class B Conduction(QP)

EUT: BULETOOTH HEADSET

M/N: BES005 Note: Charge mode

No.	Mc.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
		MHz	dBuWm	dΒ	dBuWim	dBuV/m	dΒ	Detector	Comment
1		0.1578	67.39	0.20	57,59	65.58	-7.99	QP	
2		0.1578	35.65	0.20	35.85	55.58	-19.73	AVG	
3		0.1773	51.22	0.20	51.42	64.61	-13.19	QP	
4		0.1773	34.39	0.20	34.59	54.61	-20.02	AVG	
5		1.0836	43.38	0.20	43.58	56.00	-12.42	QP	
6		1.0836	42.85	0.20	43.05	46.00	-2.95	AVG	
7		1.2828	43.84	0.20	44.04	56.00	-11.98	QP	
8		1.2828	42.03	0.20	42.23	46.00	-3.77	AVG	
9		6.5094	43.82	0.53	44.35	60.00	-15.65	QP	
10		6.5094	43.35	0.53	43.88	50.00	-6.12	AVG	
11		17.5065	46.16	0.70	46.86	60.00	-13.14	QP	
12		17.5065	40.79	0.70	41.49	60.00	-8.61	AVG	



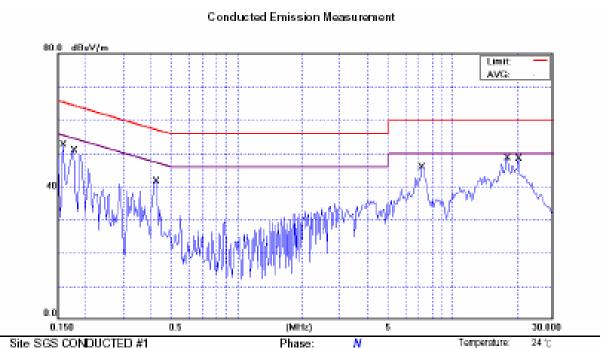
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Humidity:

Air Pressure:

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Power:

Distance:

A C110W60HZ

Limit: EN65022 Class B Conduction(QP)

EUT: BULETOOTH HEADSET

M/N: BES005 Note: Charge mode

No.	uk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
		MHz	dBuW/m	dΒ	dBuWlm	dBuV/m	dΒ	Detector	Comment
1		0.1678	57.22	0.20	57.4 <b>2</b>	65.58	-8.16	QP	
2		0.1578	40.47	0.20	40.67	55.58	-14.91	AVG	
3		0.1773	51.02	0.20	51.22	64.61	-13.39	QP	
4		0.1773	36.47	0.20	36.67	64.61	-17.94	AVG	
6		0.4234	40.25	0.20	40.45	67.38	-16.93	QP	
6		0.4234	39.89	0.20	40.09	47.38	7.29	AVG	
7		7.2008	43.78	0.68	44.34	60.00	-15.66	QP	
8		7.2008	36.53	0.66	37.09	60.00	-12.91	AVG	
9		17.9625	44.98	0.76	45.74	60.00	-14.26	QP	
10		17.9625	36.90	0.76	37.66	60.00	-12.34	AVG	
11		20.2594	40.82	0.81	41.63	60.00	-18.37	QP	
12		20.2594	32.82	0.81	33.63	60.00	-16.37	AVG	



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## AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Charger Mode			Test Date:	Feb. 15, 2006
Temperature:	22 °C	Humidity: 58	Danny	Test By:	Danny

FREQ	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	NOTE
MHz	Raw	Raw	Limit	Limit	Margin	Margin	
	dBuV	dBuV	dBuV	dBuV	dB	dB	
0.435	43.85		57.15	47.15	-13.30		L1
0.584	33.73		56.00	46.00	-22.27		L1
1.236	38.70		56.00	46.00	-17.30		L1
2.037	45.15		56.00	46.00	-10.85		L1
2.838	46.36	37.66	56.00	46.00	-9.64	-8.34	L1
3.638	44.17		56.00	46.00	-11.83		L1
0.160	55.49	32.09	65.46	55.46	-9.97	-23.37	L2
0.310	49.50	25.10	59.97	49.97	-10.47	-24.87	L2
0.365	51.22	44.12	58.61	48.61	-7.39	-4.49	L2
0.870	45.36	39.46	56.00	46.00	-10.64	-6.54	L2
1.525	42.32		56.00	46.00	-13.68		L2
2.255	43.94		56.00	46.00	-12.06		L2

### Remark:

- (1) Measuring frequencies from 0.15 MHz to 30MHz  $\circ$
- (2) The emissions measured in frequency range from 0.15 MHz to 30MHz were made with an instrument using Qusia-Peak detector and Average detector.
- (3) "---" denotes the emission level was or more than 2dB below the Average limit, so no re-check anymore.
- (4) The IF bandwidth of SPA between 0.15MHz to 30MHz was 10KHz; The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;
- (5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)

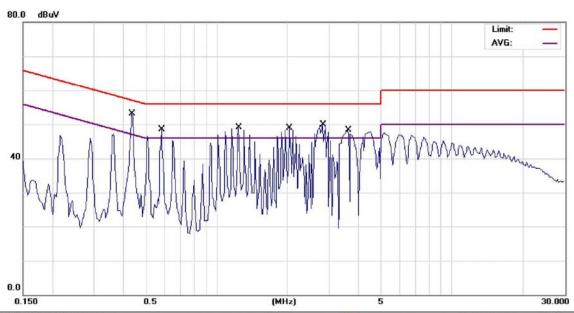


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## **Conducted Emission Test Plot**

### Conducted Emission Measurement



Site SGS CONDUCTED #1

Limit: CISPR22 Class B Conduction(QP)

EUT: Bluetiith Headset

M/N: BES005 Note: Charger mode Phase: L1 Temperature: 22 ℃ AC 120V/60Hz Power: Humidity: Air Pressure: hpa Distance:

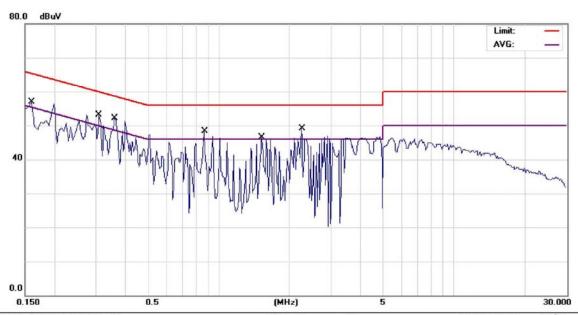
No.	Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.4352	43.00	0.85	43.85	57.15	-13.30	QP	
2		0.4352	30.60	0.85	31.45	47.15	-15.70	AVG	
3		0.5836	32.90	0.83	33.73	56.00	-22.27	QP	
4		0.5836	22.70	0.83	23.53	46.00	-22.47	AVG	
5		1.2359	38.10	0.60	38.70	56.00	-17.30	QP	
6		1.2359	26.00	0.60	26.60	46.00	-19.40	AVG	
7		2.0367	44.50	0.65	45.15	56.00	-10.85	QP	
8		2.0367	35.70	0.65	36.35	46.00	-9.65	AVG	
9		2.8375	45.70	0.66	46.36	56.00	-9.64	QP	
10	*	2.8375	37.00	0.66	37.66	46.00	-8.34	AVG	
11		3.6383	43.50	0.67	44.17	56.00	-11.83	QP	
12		3.6383	30.20	0.67	30.87	46.00	-15.13	AVG	



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#### **Conducted Emission Measurement**



Site SGS CONDUCTED #1

Limit: CISPR22 Class B Conduction(QP)

EUT: Bluetiith Headset

M/N: BES005

Note: Charger mode

Phase:		N	remperature:	22 (	
Power:	AC	120V/60Hz	Humidity:	58 %	
Distance:			Air Pressure:	hpa	

No.	Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.1600	54.80	0.69	55.49	65.46	-9.97	QP	
2		0.1600	31.40	0.69	32.09	55.46	-23.37	AVG	
3		0.3100	48.70	0.80	49.50	59.97	-10.47	QP	
4		0.3100	24.30	0.80	25.10	49.97	-24.87	AVG	
5		0.3650	50.40	0.82	51.22	58.61	-7.39	QP	
6	*	0.3650	43.30	0.82	44.12	48.61	-4.49	AVG	
7		0.8700	44.70	0.66	45.36	56.00	-10.64	QP	
8		0.8700	38.80	0.66	39.46	46.00	-6.54	AVG	
9		1.5250	41.70	0.62	42.32	56.00	-13.68	QP	
10		1.5250	36.70	0.62	37.32	46.00	-8.68	AVG	
11		2.2550	43.30	0.65	43.95	56.00	-12.05	QP	
12		2.2550	37.10	0.65	37.75	46.00	-8.25	AVG	

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## 6. PEAK OUTPUT POWER MEASUREMENT

# 6.1. Standard Applicable

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850MHz band: 1Watt. For all other frequency hopping systems in the 2400 – 2483.5MHz band: 0.125 Watts.

### **6.2.** Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the power meter or spectrum. (Channel power function, RBW, VBW = 1MHz)
- 3. Record the max. reading.
- 4. Repeat above procedures until all frequency measured were complete.

## 6.3. Measurement Result

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	2.02	0.10	2.12	0.00163	1
2441.00	2.12	0.10	2.22	0.00167	1
2480.00	2.35	0.10	2.45	0.00176	1

## 6.4. Measurement Equipment Used:

	Conducte	ed Emission T	est Site		
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2005	03/28/2006
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006
Splitter	Mini-Circult	ZFSC-2-10G	N/A	10/07/2005	10/06/2006



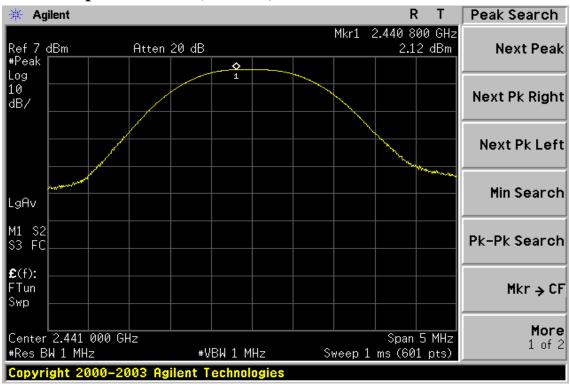
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# Peak Power Output Data Plot (CH Low)



# Peak Power Output Data Plot (CH Mid)





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# Peak Power Output Data Plot (CH High)



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## 7. 20dB BAND WIDTH

# 7.1. Standard Applicable

For frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

## 7.2. Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW=10KHz (1 % of Bandwidth.), Span= 3MHz, Sweep=auto
- 4. Mark the peak frequency and –20dB (upper and lower) frequency.
- 5. Repeat above procedures until all frequency measured were complete.

### 7.3. Measurement Result

СН	Bandwidth
	(MHz)
Lower	0.742
Mid	0.739
Higher	0.779

# 7.4. Measurement Equipment Used:

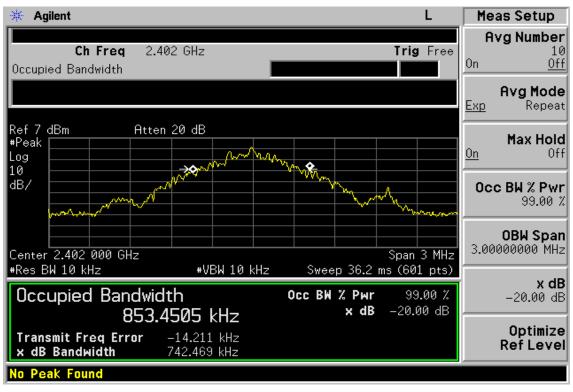
7.1. Proudure Equipment eseut										
	Conducte	ed Emission T	est Site							
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.					
TYPE		NUMBER	NUMBER	CAL.						
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2005	03/28/2006					
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006					
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006					
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA	N/A	N/A	N/A					
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006					
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006					
Splitter	Mini-Circult	ZFSC-2-10G	N/A	10/07/2005	10/06/2006					



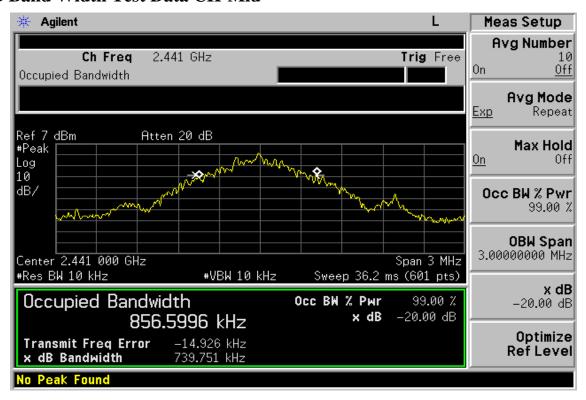
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## 20dB Band Width Test Data CH-Low



## 20dB Band Width Test Data CH-Mid





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# 20dB Band Width Test Data CH-High



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## 8. 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

# 8.1. Standard Applicable

According to §15.247(c), in any 100 KHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100KHz bandwidth within the band that contains the highest level of the desired power, In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in 15.209(a).

### 8.2. Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW, VBW=100KHz, Span=25MHz, Sweep = auto
- 5. Mark Peak, 2.390GHz and 2.488GHz and record the max. level.
- 6. Repeat above procedures until all frequency measured were complete.
- 7. Radiated Emission refer to section 9.

## 8.3. Measurement Result

Refer to attach spectrum analyzer data chart.

# **8.4.** Measurement Equipment Used:

	Conducte	ed Emission T	est Site		
EQUIPMENT	MFR	MODEL	MODEL SERIAL		CAL DUE.
TYPE		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2005	03/28/2006
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006
Splitter	Mini-Circult	ZFSC-2-10G	N/A	10/07/2005	10/06/2006

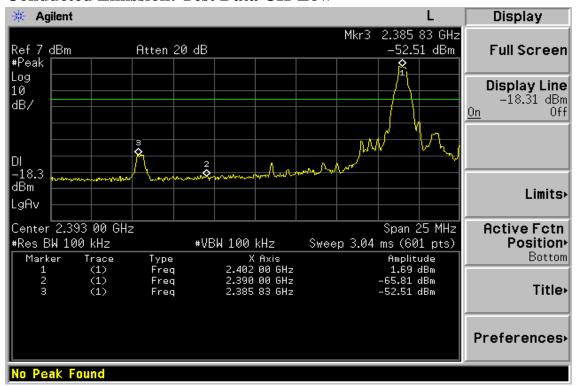
Note: Measurement Equipment for radiated emission refers to section 9.



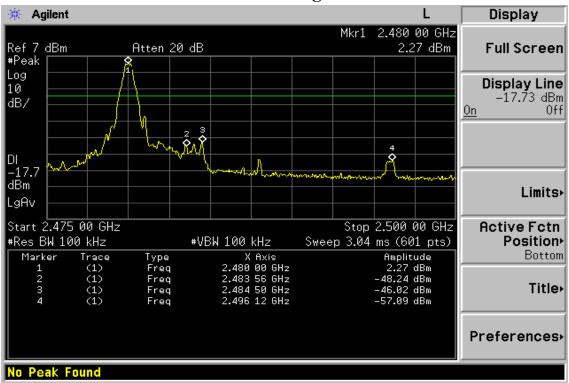
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## **Conducted Emission: Test Data CH-Low**



# **Conducted Emission: Test Data CH-High**





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### **Radiated Emission:**

Operation Mode TX CH Low Test Date Feb. 09, 2006

Fundamental Frequency 2402 MHz Test By Henk Temperature 25 °C Pol Ver.

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m	) (dBuV/m)(	(dBuV/m)	(dB)	
2390.0						74.00	54.00		Peak
2385.3						74.00	54.00		Peak

Operation Mode TX CH Low Test Date Feb. 09, 2006

Fundamental Frequency 2402 MHz Test By Henk Temperature 25 °C Pol Hor.

Humidity 65 %

		Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
	Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m	) (dBuV/m)(	dBuV/m)	(dB)	
,	2390.0						74.00	54.00		Peak
	2385.3						74.00	54.00		Peak

### Remark:

- (1) Datas of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) 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  $\circ$
- (3) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (4) Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.



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### **Radiated Emission:**

TX CH High **Test Date** Feb. 09, 2006 Operation Mode

Fundamental Frequency 2480 MHz Test By Henk Temperature 25 °C Pol Ver.

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/n	(dB)	
2483.5						74.00	54.00		
2484.5						74.00	54.00		
2496.1						74.00	54.00		
Operation Mode TX CH			CH High			Tes	t Date	Feb. 09, 2	006
Fundamen	ncy 2480	MHz			Test By		Henk		
Temperatu	25 °(	$\mathbb{C}$			Pol		Hor.		
Humidity	65 %								

		Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
	Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
•	2483.5						74.00	54.00		
	2484.5						74.00	54.00		
	2496.1						74.00	54.00		

## Remark:

- (1) Datas of measurement within this frequency range shown " " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) 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 o
- (3) Spectrum Peak Setting: 1GHz-26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200
- (4) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.

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## 9. SPURIOUS RADIATED EMISSION TEST

# 9.1. Standard Applicable

According to §15.247(c), all other emissions outside these bands shall not exceed the general radiated emission limits specified in §15.209(a). And according to §15.33(a)(1), for an intentional radiator operates below 10GHz, the frequency range of measurements: to the tenth harmonic of the highest fundamental frequency or to 40GHz, whichever is lower.

# 9.2. EUT Setup

- 1. The radiated emission tests were performed in the 3 meter open-test site, using the setup in accordance with the ANSI C63.4-2003.
- 2. The EUT was put in the front of the test table. The peripherals was placed on the side of the host system. The rear of the EUT and peripherals were placed flushed with the rear of the tabletop.
- 3. The spacing between the peripherals was 10 centimeters.
- 4. External I/O cables were draped along the edge of the test table and bundle when necessary.
- 5. The host PC system was connected with 110Vac/60Hz power source.

### 9.3. Measurement Procedure

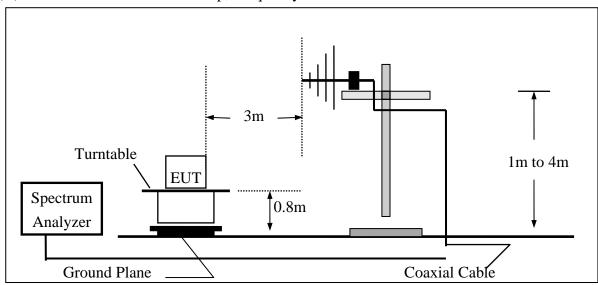
- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 4. Maximum procedure 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 all frequency measured were complete.

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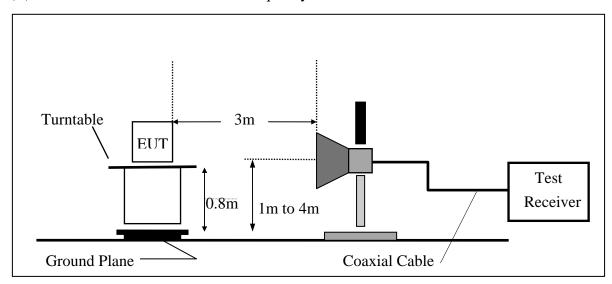
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# 9.4. Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1000MHz



# (B) Radiated Emission Test Set-UP Frequency Over 1 GHz



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#### 9.5. **Measurement Equipment Used:**

966 Chamber									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2005	05/26/2006				
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/26/2006				
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2005	06/02/2006				
Horn antenna	Schwarzbeck	BBHA 9120D	309/320	08/16/2005	08/15/2006				
Horn antenna	Schwarzbeck	BBHA 9170	184/185	07/04/2005	07/03/2006				
Pre-Amplifier	HP	8447D	2944A09469	07/19/2005	07/18/2006				
Pre-Amplifier	HP	8494B	3008A00578	02/26/2005	02/25/2006				
Turn Table	HD	DT420	N/A	N.C.R	N.C.R				
Antenna Tower	HD	MA240-N	240/657	N.C.R	N.C.R				
Controller	HD	HD100	N/A	N.C.R	N.C.R				
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-10M	10m	10/09/2005	10/08/2006				
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	10/09/2005	10/08/2006				
Site NSA SGS		966 chamber	N/A	11/17/2005	11/16/2006				

# 9.6. Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor and subtracting the Amplifier Gain and Duty Cycle Correction Factor(if any) from the measured reading. The basic equation with a sample calculation is as follows:

$$FS = RA + AF + CL - AG$$

Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

## 9.7. Measurement Result

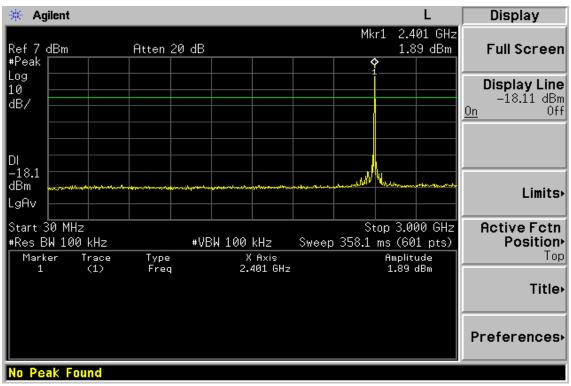
Refer to attach tabular data sheets.



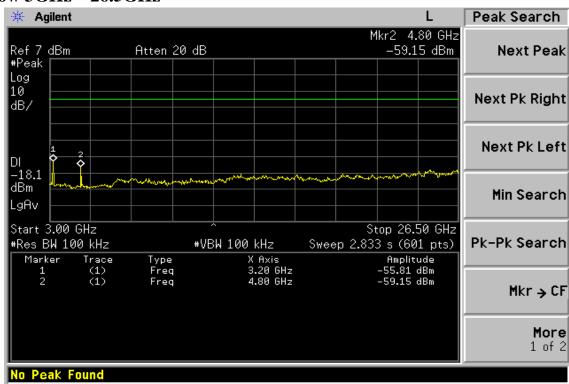
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# **Conducted Spurious Emission Measurement Result** Ch Low 30MHz - 3GHz



### Ch Low 3GHz – 26.5GHz

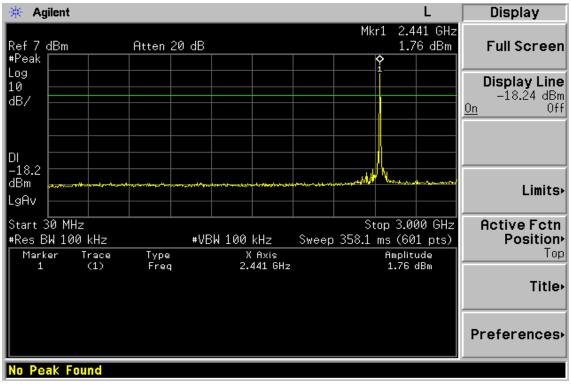




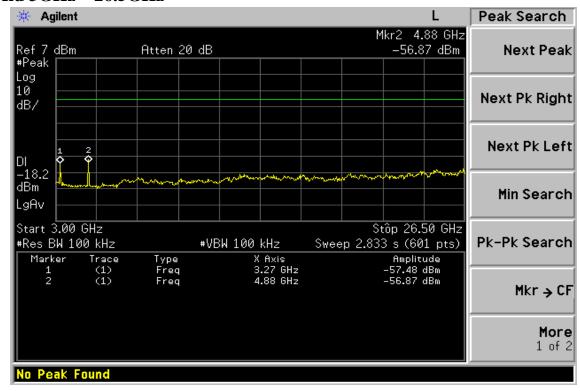
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## Ch Mid 30MHz - 3GHz



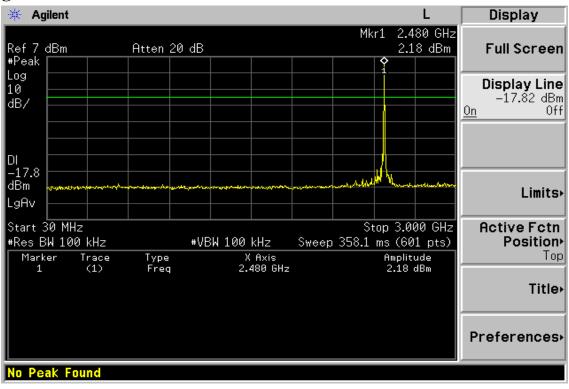
## Ch Mid 3GHz – 26.5GHz



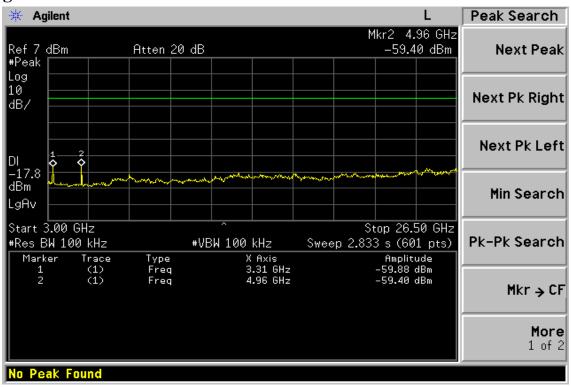


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# Ch High 30MHz - 3GHz



# Ch High 3GHz - 26.5GHz





Humidity

### FCC ID: P5T-BTHPC

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## Radiated Spurious Emission Measurement Result (below 1GHz)

65 %

Feb. 09, 2006 TX CH Low Operation Mode Test Date Fundamental Frequency 2402MHz Test By Danny Temperature Pol Ver./Hor. 25 °C

**Detector** Ant.Pol. Reading **Factor Actual FS** Limit3m Safe Margin Freq. Mode (MHz) H/V (PK/QP) (dBuV) (dB) (dBuV/m)(dBuV/m)(dB)40.00 36.79 Peak 43.09 -14.93 28.16 -11.84 V 201.69 V Peak 47.60 30.97 43.50 -12.53-16.63 300.63 V 43.70 -13.37 30.33 46.00 -15.67 Peak 499.48 V Peak 40.72 -9.30 31.42 46.00 -14.5865.89 Η Peak 41.70 26.35 40.00 -13.65 -15.35201.69 Peak 46.85 30.22 43.50 -13.28Η -16.63300.63 46.00 -16.20 Η Peak 43.17 -13.37 29.80 46.00 -13.27499.48 Η Peak 42.03 -9.3032.73 599.39 Η Peak 39.93 -7.64 32.29 46.00 -13.71623.64 Η Peak 39.35 -7.10 32.25 46.00 -13.75

### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz •
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Datas of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.



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## Radiated Spurious Emission Measurement Result (below 1GHz)

TX CH Mid **Test Date** Feb. 09, 2006 Operation Mode

Fundamental Frequency 2441MHz Test By Danny Temperature 25 °C Pol Ver./Hor

Humidity 65 %

Ant.Pol.	Detector Mode	Reading	Factor	<b>Actual FS</b>	Limit3m	Safe Margin
H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
V	Peak	43.61	-14.93	28.68	40.00	-11.32
V	Peak	45.62	-16.57	29.05	43.50	-14.45
V	Peak	41.94	-13.37	28.57	46.00	-17.43
V	Peak	40.97	-9.30	31.67	46.00	-14.33
H	Peak	41.69	-15.35	26.34	40.00	-13.66
H	Peak	43.86	-16.57	27.29	43.50	-16.21
Н	Peak	44.44	-13.37	31.07	46.00	-14.93
Н	Peak	42.58	-9.30	33.28	46.00	-12.72
H	Peak	39.71	-7.64	32.07	46.00	-13.93
Н	Peak	39.85	-7.10	32.75	46.00	-13.25
	H/V V V V H H H H	Mode H/V (PK/QP)  V Peak V Peak V Peak V Peak H Peak	Ant.Pol.         Mode         Reading           H/V         (PK/QP)         (dBuV)           V         Peak         43.61           V         Peak         45.62           V         Peak         41.94           V         Peak         40.97           H         Peak         43.86           H         Peak         43.86           H         Peak         44.44           H         Peak         42.58           H         Peak         39.71	Mode         Reading         Factor           H/V         (PK/QP)         (dBuV)         (dB)           V         Peak         43.61         -14.93           V         Peak         45.62         -16.57           V         Peak         41.94         -13.37           V         Peak         40.97         -9.30           H         Peak         43.86         -16.57           H         Peak         44.44         -13.37           H         Peak         42.58         -9.30           H         Peak         39.71         -7.64	Ant.Pol.Mode ModeReading (dBuV)Factor (dB)Actual FSVPeak43.61-14.9328.68VPeak45.62-16.5729.05VPeak41.94-13.3728.57VPeak40.97-9.3031.67HPeak41.69-15.3526.34HPeak43.86-16.5727.29HPeak44.44-13.3731.07HPeak42.58-9.3033.28HPeak39.71-7.6432.07	Ant.Pol.         Mode         Reading         Factor         Actual FS         Limit3m           H/V         (PK/QP)         (dBuV)         (dB)         (dBuV/m)         (dBuV/m)           V         Peak         43.61         -14.93         28.68         40.00           V         Peak         45.62         -16.57         29.05         43.50           V         Peak         41.94         -13.37         28.57         46.00           V         Peak         40.97         -9.30         31.67         46.00           H         Peak         43.86         -16.57         27.29         43.50           H         Peak         44.44         -13.37         31.07         46.00           H         Peak         42.58         -9.30         33.28         46.00           H         Peak         39.71         -7.64         32.07         46.00

### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz •
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- Datas of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.



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## Radiated Spurious Emission Measurement Result (below 1GHz)

TX CH High **Test Date** Feb. 09, 2006 Operation Mode

Fundamental Frequency 2480MHz Test By Danny Temperature 25 °C Pol Ver./Hor

65 % Humidity

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	<b>Actual FS</b>	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
36.79	V	Peak	42.74	-14.93	27.81	40.00	-12.19
201.69	V	Peak	47.27	-16.63	30.64	43.50	-12.86
300.63	V	Peak	44.51	-13.37	31.14	46.00	-14.86
499.48	V	Peak	41.08	-9.30	31.78	46.00	-14.22
65.89	Н	Peak	41.51	-15.35	26.16	40.00	-13.84
201.69	Н	Peak	46.99	-16.63	30.36	43.50	-13.14
300.63	Н	Peak	44.97	-13.37	31.60	46.00	-14.40
499.48	Н	Peak	42.68	-9.30	33.38	46.00	-12.62
599.39	Н	Peak	41.27	-7.64	33.63	46.00	-12.37
623.64	Н	Peak	40.82	-7.10	33.72	46.00	-12.28

### Remark:

- (1) Measuring frequencies from 30 MHz to the 1GHz •
- (2) Radiated emissions measured in frequency range from 30 MHz to 1000MHz were made with an instrument using Peak/QP detector mode.
- (3) Datas of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (4) The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.



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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode TX CH Low Test Date Feb. 09, 2006 Fundamental Frequency 2402 MHz Test By Danny Temperature 25  $^{\circ}$ C Pol Ver.

Humidity 65 %

	Peak	$\mathbf{AV}$		Act	ual FS	Peak	$\mathbf{AV}$		
Freq.	U	Reading			$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m	)(dBuV/m	)(dBuV/m)	(dBuV/m	<b>(dB)</b>	_
1598.0	46.44		-6.81	39.63		74.00	54.00	-14.37	Peak
4804.0	45.72		2.95	48.67		74.00	54.00	-5.33	Peak
7206.0									
9608.0									
12010.0									
14412.0									
16814.0									
19216.0									
21618.0									
24020.0									

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (2) Datas of measurement within this frequency range shown " " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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 o
- (4) Spectrum Peak Setting: 1GHz-26GHz, RBW=1MHz, VBW=3MHz, Sweep time=200 ms.
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.



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### Radiated Spurious Emission Measurement Result (above 1GHz)

TX CH Low Operation Mode Test Date Feb. 09, 2006

Fundamental Frequency 2402 MHz Test By Danny Temperature 25 °C Pol Hor

Humidity 65 %

	Peak	$\mathbf{AV}$		Act	ual FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m	)(dBuV/m	)(dBuV/m)	(dBuV/m)	( <b>dB</b> )	_
1045.5	43.75		-9.25	34.50		74.00	54.00	-19.50	Peak
1500.5	41.99		-7.17	34.82		74.00	54.00	-19.18	Peak
1598.0	49.75		-6.81	42.93		74.00	54.00	-11.07	Peak
3203.5	43.05		-1.64	41.42		74.00	54.00	-12.58	Peak
4804.0	50.85		2.95	53.81		74.00	54.00	-0.19	Peak
7206.0									
9608.0									
12010.0									
14412.0									
16814.0									
19216.0									
21618.0									
24020.0									

### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency o
- (2) Datas of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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 o
- (4) Spectrum Peak Setting: 1GHz-26GHz, RBW=1MHz, VBW=3MHz, Sweep time=200 ms.
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.



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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode TX CH Mid Test Date Feb. 09, 2006

Fundamental Frequency 2441 MHz Test By Danny Temperature 25  $^{\circ}$ C Pol Ver

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
1630.5	44.50		-6.64	37.86		74.00	54.00	-16.14	Peak
4880.5	45.30		3.18	48.48		74.00	54.00	-5.52	Peak
7323.0									
9764.0									
12205.0									
14646.0									
17087.0									
19528.0									
21969.0									
24410.0									

### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency o
- (2) Datas of measurement within this frequency range shown " " in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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 Peak Setting: 1GHz-26GHz, RBW=1MHz, VBW=3MHz, Sweep time=200 ms.
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.



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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode TX CH Mid Test Date Feb. 09, 2006

Fundamental Frequency 2441 MHz Test By Danny Temperature 25  $^{\circ}$ C Pol Hor

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
1045.5	44.98		0.25	45.23		74.00	54.00	-8.77	Peak
1500.5	40.86		-7.17	33.69		74.00	54.00	-20.31	Peak
1630.5	48.72		-6.64	42.08		74.00	54.00	-11.92	Peak
4880.5	48.21		3.18	51.39		74.00	54.00	-2.61	Peak
7323.0									
9764.0									
12205.0									
14646.0									
17087.0									
19528.0									
21969.0									
24410.0									

### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency  $\circ$
- (2) Datas of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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 Peak Setting: 1GHz-26GHz, RBW=1MHz, VBW=3MHz, Sweep time=200 ms.
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.



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### Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode TX CH High Test Date Feb. 09, 2006

Fundamental Frequency 2480 MHz Test By Danny Temperature 25  $^{\circ}$ C Pol Ver.

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	-
1643.5	44.77		-6.60	38.17		74.00	54.00	-15.83	Peak
4958.0	45.01		3.40	48.41		74.00	54.00	-5.59	Peak
7440.0									
9920.0									
12400.0									
14880.0									
17360.0									
19840.0									
22320.0									
24800.0									

### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency •
- (2) Datas of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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  $\circ$
- (4) Spectrum Peak Setting: 1GHz-26GHz, RBW=1MHz, VBW=3MHz, Sweep time=200 ms.
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.



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## Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode TX CH High Test Date Feb. 09, 2006

Fundamental Frequency 2480 MHz Test By Danny Temperature  $25 \text{ }^{\circ}\text{C}$  Pol Hor

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	_
1045.5	44.45		-9.25	35.20		74.00	54.00	-18.80	Peak
1643.5	48.91		-6.60	42.31		74.00	54.00	-11.69	Peak
4958.0	46.43		3.40	49.83		74.00	54.00	-4.17	Peak
7440.0									
9920.0									
12400.0									
14880.0									
17360.0									
19840.0									
22320.0									
24800.0									

### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency o
- (2) Datas of measurement within this frequency range shown "-" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (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 Peak Setting: 1GHz-26GHz, RBW=1MHz, VBW=3MHz, Sweep time=200 ms.
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.

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# 10. FREQUENCY SEPARATION

## 10.1. Standard Applicable

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.

### 10.2. Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = middle of hopping channel.
- 4. Set the spectrum analyzer as RBW, VBW=100KHz, Adjust Span to 5 MHz, Sweep = auto.
- 5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

### 10.3. Measurement Result

Channel separation	Limit	Result
MHz	kHz	
1	>=25KHz or 2/3*20 dB bandwidth	PASS

## 10.4. Measurement Equipment Used:

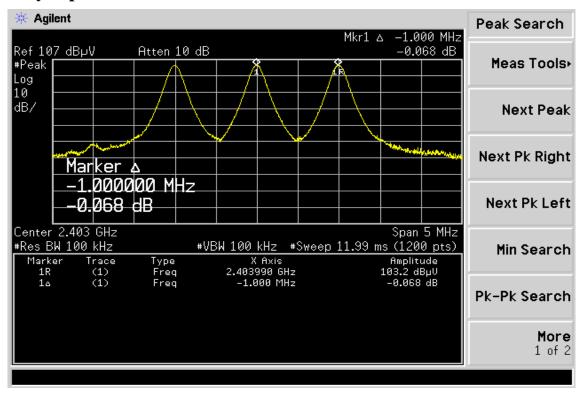
	Conducted Emission Test Site										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.						
TYPE		NUMBER	NUMBER	CAL.							
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2005	03/28/2006						
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006						
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006						
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA	N/A	N/A	N/A						
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006						
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006						
Splitter	Mini-Circult	ZFSC-2-10G	N/A	10/07/2005	10/06/2006						



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## **Frequency Separation Test Data**



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# 11. NUMBER OF HOPPING FREQUENCY

## 11.1. Standard Applicable

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

#### 11.2. Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- 4. Set the spectrum analyzer as RBW, VBW=100KHz,
- 5. Max hold, view and count how many channel in the band.

### 11.3. Measurement Result

The nominal channel spacing of the Bluetooth system is 1Mhz independent of the operating mode.

The maximum "initial carrier frequency tolerance" which is allowed for Bluetooth is fcenter = 75 kHz.

This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/07-E) for three frequencies (2402, 2441, 2480 MHz).

Additionally an example for the channel separation is given in the test report

Total No of	Limit (CH)	Measurement result (CH)	Result
hopping channel	15	79	Pass



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# 11.4. Measurement Equipment Used:

	Conducted Emission Test Site										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.						
TYPE		NUMBER	NUMBER	CAL.							
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2005	03/28/2006						
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006						
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006						
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A						
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006						
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006						
Splitter	Mini-Circult	ZFSC-2-10G	N/A	10/07/2005	10/06/2006						

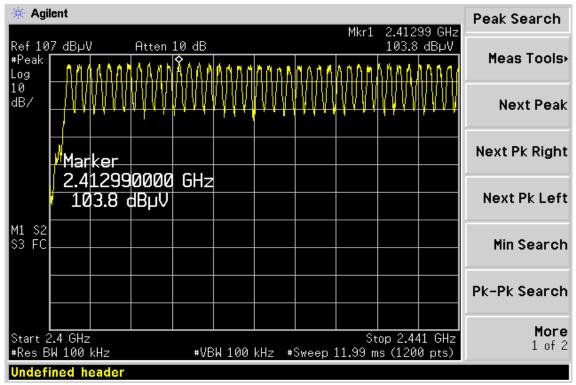


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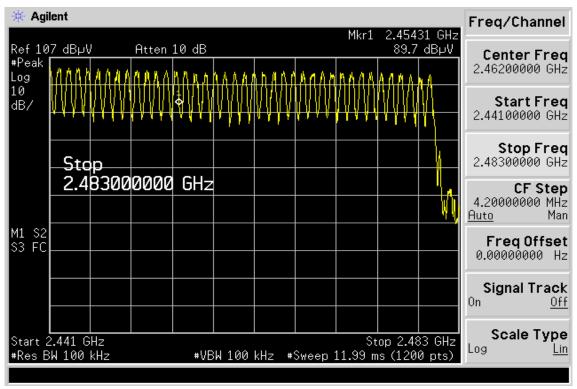
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### **Channel Number**

2.4 GHz - 2.441GHz



2.441 GHz - 2.4835GHz



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## 12. TIME OF OCCUPANCY (DWELL TIME)

## 12.1. Standard Applicable

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

### 12.2. Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW, VBW=100KHz, Span = 0Hz, Adjust Sweep = 30s.
- 5. Repeat above procedures until all frequency measured were complete.

## 12.3. Measurement Result

The dwell time of 0.312 s within a 30 second period in data mode is independent from the packet type (packet length). The calculation for a 30 second period is a follows:

Dwell time = time slot length \* hop rate / number of hopping channels \*30s

A period time = 
$$0.4 \text{ (ms)} * 79 = 31.6 \text{ (s)}$$

CH Low: DH1 time slot = 
$$0.405$$
 (ms) \*  $(1600/(2*79))$  \*  $31.6 = 129.6$  (ms)

DH3 time slot = 
$$1.675$$
 (ms) \*  $(1600/(4*79))$  \*  $31.6 = 268.0$  (ms)

DH5 time slot = 
$$2.925$$
 (ms) \*  $(1600/(6*79))$  \*  $31.6 = 312.0$  (ms)

CH Mid: DH1 time slot = 
$$0.405$$
 (ms) \*  $(1600/(2*79))$  \*  $31.6 = 129.6$  (ms)

DH3 time slot = 
$$1.675$$
 (ms) \*  $(1600/(4*79))$  \*  $31.6 = 268.0$  (ms)

DH5 time slot = 
$$2.906$$
 (ms) \*  $(1600/(6*79))$  \*  $31.6 = 309.9$  (ms)

CH High: DH1 time slot = 
$$0.416 \text{ (ms)} * (1600/(2*79)) * 31.6 = 133.12 \text{ (ms)}$$

DH3 time slot = 
$$1.662 \text{ (ms)} * (1600/(4*79)) * 31.6 = 265.92 \text{ (ms)}$$

DH5 time slot = 
$$2.906$$
 (ms) \*  $(1600/(6*79))$  \*  $31.6 = 309.97$  (ms)



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# 12.4. Measurement Equipment Used:

	Conducted Emission Test Site										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.						
TYPE		NUMBER	NUMBER	CAL.							
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2005	03/28/2006						
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006						
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006						
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA	N/A	N/A	N/A						
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006						
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006						
Splitter	Mini-Circult	ZFSC-2-10G	N/A	10/07/2005	10/06/2006						



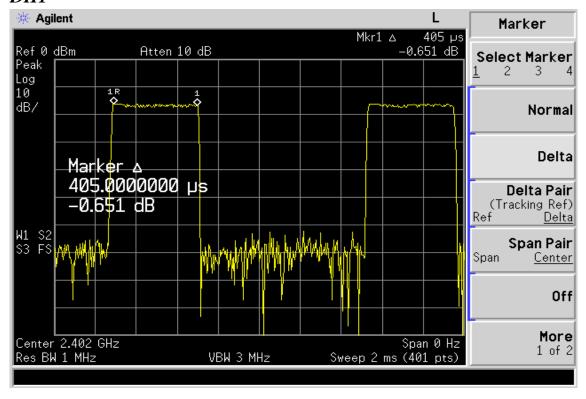
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## **Dwell Time Test Data**

## CH-Low

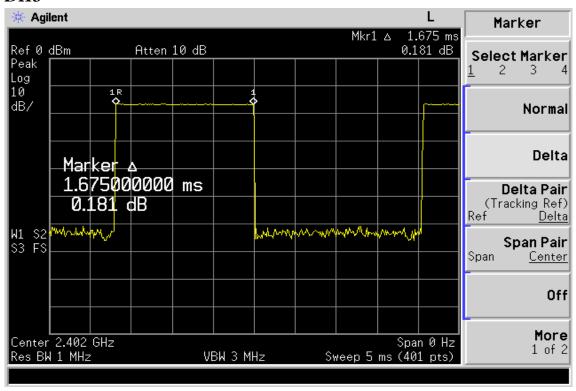
### DH1



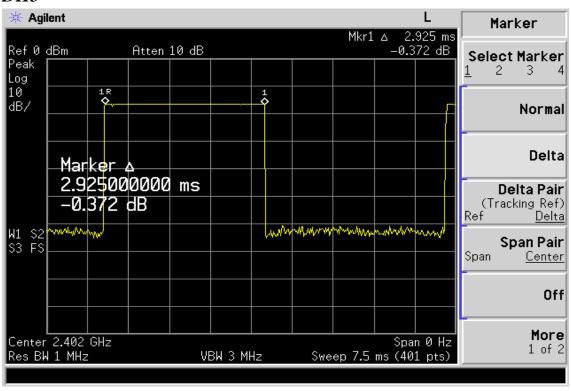


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### DH3



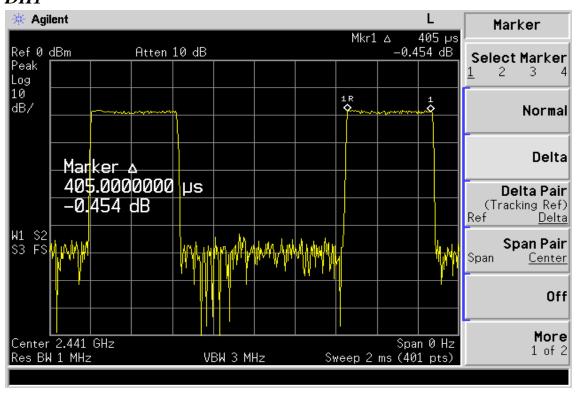
### DH5



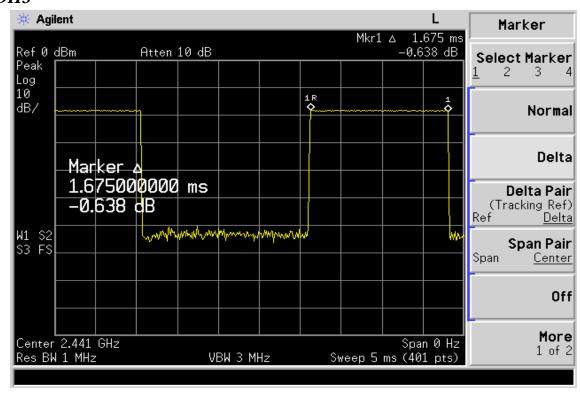


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CH-Mid DH1



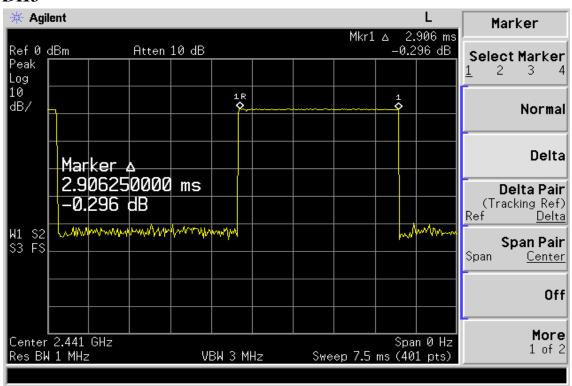
### DH3



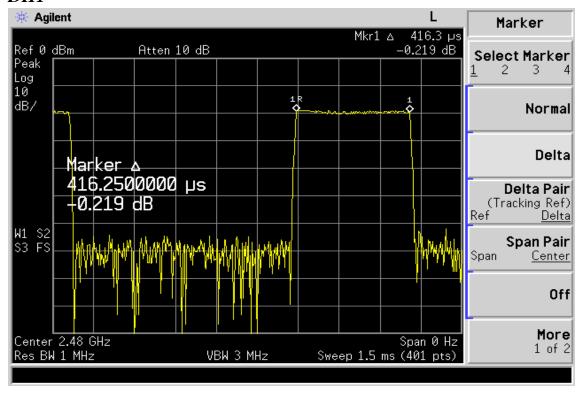


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### DH5



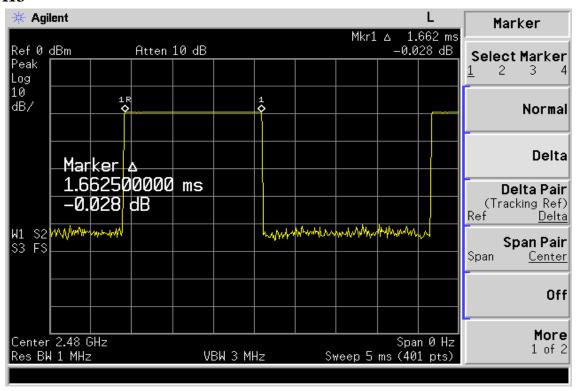
### CH-High ĎH1



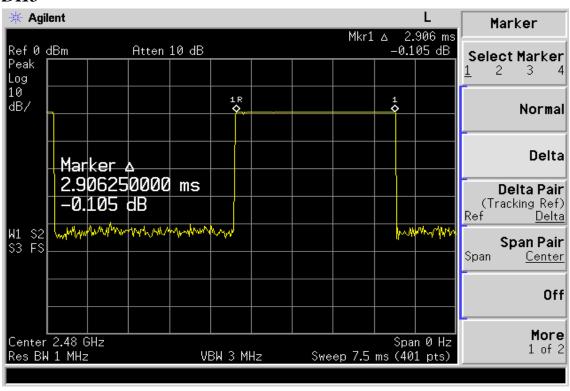


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### DH3



### DH5



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## 13. Peak Power Spectral Density

## 13.1. Standard Applicable

According to §15.247(d), for direct sequence systems, the peak power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3kHz band during any time interval of continuous transmission.

### 13.2. Measurement Procedure

- 1. Place the EUT on the table and set it in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 3. Set the spectrum analyzer as RBW = 3KHz, VBW = 10KHz, Span = 300KHz, Sweep=100s
- 4. Record the max. reading.
- 5. Repeat above procedures until all frequency measured were complete.

#### 13.3. Measurement Result

СН	<b>RF Power Density</b>	Cable loss	<b>RF Power Density</b>	Maximum Limit	
	Reading (dBm)	(dB)	Level (dBm)	(dBm)	
Low	-8.21	0.10	-8.11	8	
Mid	-7.68	0.10	-7.58	8	
High	-7.94	0.10	-7.84	8	

## 13.4. Measurement Equipment Used:

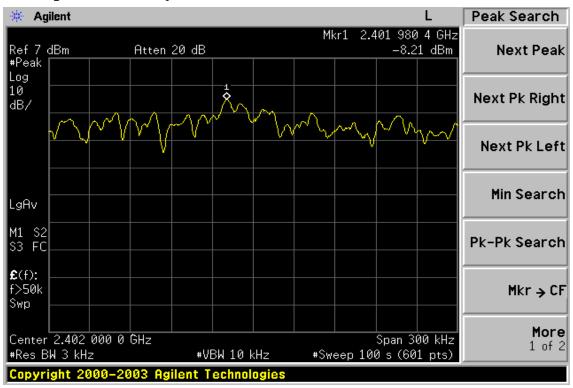
Conducted Emission Test Site									
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.				
TYPE		NUMBER	NUMBER	CAL.					
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2005	03/28/2006				
Spectrum Analyzer	Agilent	7405A	US41160416	06/28/2005	06/29/2006				
Spectrum Analyzer	R&S	FSP 40	100034	11/09/2005	11/10/2006				
Low Loss Cable	HUBER+SUHNE R	SUCOFLEX 104PEA	N/A	N/A	N/A				
Attenuator	Mini-Circult	BW-S10W5	N/A	10/07/2005	10/06/2006				
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006				
Splitter	Mini-Circult	ZFSC-2-10G	N/A	10/07/2005	10/06/2006				



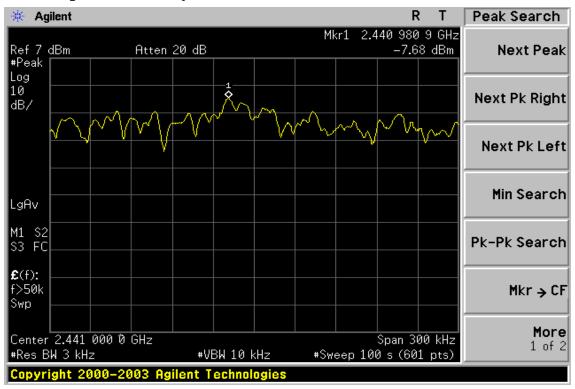
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# **Power Spectral Density Test Plot (CH-Low)**



# **Power Spectral Density Test Plot (CH-Mid)**

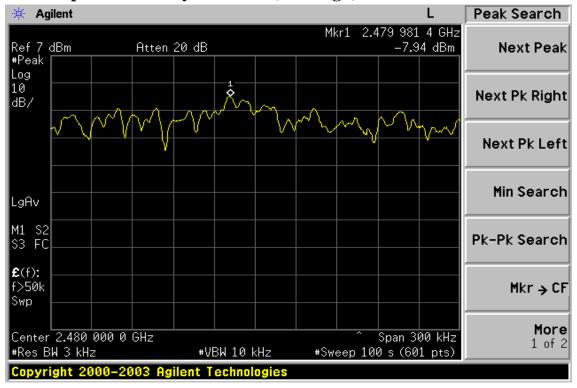




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# **Power Spectral Density Test Plot (CH-High)**





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## 14. ANTENNA REQUIREMENT

## 14.1. Standard Applicable

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by the responsible party shall be used with the device.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

### 14.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 0 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.