

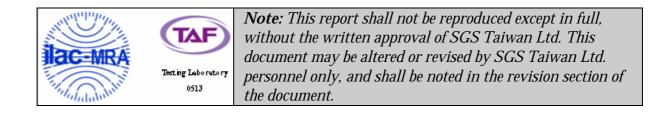
Report No : ER/2006/70006 Issue Date : Jul. 17, 2006 Page: 1 of 67

# **ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT**

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name:	SOYO Freestyler Bluetooth ST Audio Transmitter
Brand Name:	SOYO
Model Name:	SYBETX10
Model Differences:	N/A
FCC ID:	UFP-SYBETX10
Report No.:	ER/2006/70006
Issue Date:	Jul. 17, 2006
FCC Rule Part:	§15.247
Prepared for:	SOYO Group Inc.
	1420 S. Vintage Avenue Ontario, CA 91761
Prepared by:	SGS Taiwan Ltd.
	No. 134, Wu Kung Rd., Wuku Industrial
	Zone, Taipei County, Taiwan.



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Report No : ER/2006/70006 Issue Date : Jul. 17, 2006 Page: 2

# **VERIFICATION OF COMPLIANCE**

Applicant:	SOYO Group Inc.
	1420 S. Vintage Avenue Ontario, CA 91761
Equipment Under Test:	SOYO Freestyler Bluetooth ST Audio Transmitter
Brand Name:	SOYO
FCC ID Number:	UFP-SYBETX10
Model No.:	SYBETX10
Model Difference:	N/A
File Number:	ER/2006/70006
Date of test:	Oct. 31, 2005 ~ Nov. 11, 2005
Date of EUT Received:	Oct. 31, 2005

# 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:	Danny Yeh	Date	Jul. 17, 2006	
	Danny Yeh			
Prepared By:	Cathy Kuo	Date	Jul. 17, 2006	
	Cathy Kuo			
Approved By:	Timent du	Date	Jul. 17, 2006	
_	Vincent Su			

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### Version

Version No.	Date
00	Jul. 17, 2006

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# 1. GENERAL INFORMATION

#### **1.1. Product Description**

The SOYO Group Inc., Model: SYBETX10 is a SOYO Freestyler Bluetooth ST Audio Transmitter.

The EUT is compliance with Bluetooth Standard.

A major technical descriptions of EUT is described as following:

A). Operation Frequency: 2402 – 2480Hz, 79 channels

B). Rated output power: 3.15 dBm

C). Modulation type: Frequency Hopping Spread Spectrum (FHSS)

D). Antenna Designation: Micro-strip Antenna, 0 dBi, Non-User Replaceable (Fixed)

E). Power Supply: 3.3Vdc re-chargeable battery or

5V from AC/DC Adapter, Model: SA01-6US05R-A

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

This submittal(s) (test report) is intended for **FCC ID:** <u>UFP-SYBETX10</u> filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (digital device) 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).

#### **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



### Fig. 2-2 Configuration of Tested System (Audio-in Mode)



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

Item	Equipment	Mfr/Brand	Model/ Type No.	FCC ID	Series No.	Data Ca- ble	Power Cord
1.	Notebook	IBM	T40	N/A	99HCYF4	N/A	Un-shielding
2.	Test Kit	N/A	N/A	N/A	N/A	N/A	Un-shielding
3.	Audio Player	GODOT	M1580	N/A	030100142723	N/A	Un-shielding
4.	BT Headset	Nolan	NSRX3C2	TNZNSRX3C2XXX	N/A	N/A	Un-shielding
5.	Test software	BlueSuite 1.22	CSR	Version1.22	N/A	N/A	N/A

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# 3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	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 EDR continuous transmitting and receiving mode is programmed.

Channel low (2402MHz)  $\cdot$  mid (2441MHz) and high (2480MHz) with highest data rate are chosen for full testing.

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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 below.

	Limits				
Frequency range	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					

1. The lower limit shall apply at the transition frequencies

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

#### 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.

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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	06/09/2006	06/10/2007	
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	

# **5.4.** Measurement Equipment Used:

### 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 and Charge Mode Test Date: Nov. 04, 2005								
Temperature:		24 °C	Hı	umidity:	57 %	Test E	By: S	ky
FF	REQ	Q.P.	AVG	Q.P.	AVG	Q.P.	AVG	NOTE
M	1Hz	Raw	Raw	Limit	Limit	Margin	Margin	
		dBuV	dBuV	dBuV	dBuV	dB	dB	
0.	365	52.71	47.01	58.62	48.62	-5.91	-1.61	L1
0.	802	44.92	39.12	56.00	46.00	-11.08	-6.88	L1
1.4	459	44.53	39.23	56.00	46.00	-11.47	-6.77	L1
2.	115	41.85	36.65	56.00	46.00	-14.15	-9.35	L1
2.	.627	38.07		56.00		-17.93		L1
3.	287	40.99	32.29	56.00	46.00	-15.01	-13.71	L1
0.4	.439	52.11	41.21	57.08	47.08	-4.97	-5.87	L2
1.	244	47.43	36.33	56.00	46.00	-8.57	-9.67	L2
1.	904	46.85	36.95	56.00	46.00	-9.15	-9.05	L2
2.	490	46.66	34.86	56.00	46.00	-9.34	-11.14	L2
3.	517	45.80	34.30	56.00	46.00	-10.20	-11.70	L2
4.	.318	44.32	32.02	56.00	46.00	-11.68	-13.98	L2

Remark :

- (1) Measuring frequencies from 0.15 MHz to 30MHz<sub>o</sub>
- (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;

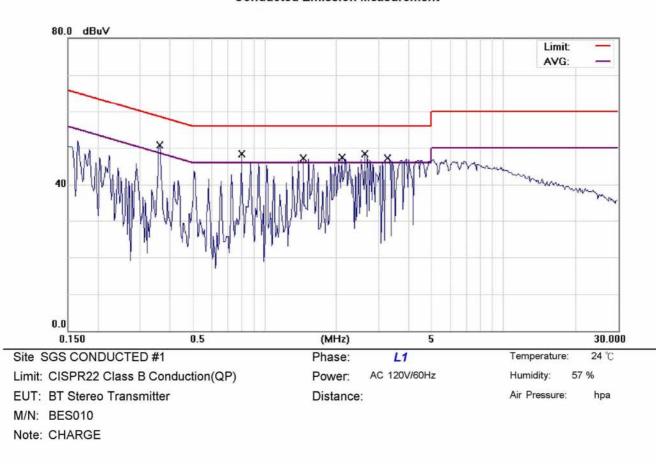
The IF bandwidth of Test Receiver between 0.15MHz to 30MHz was 9KHz;

(5) L1 = Line One (Hot side) / L2 = Line Two (Neutral side)



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# **Conducted Emission Test Plot**



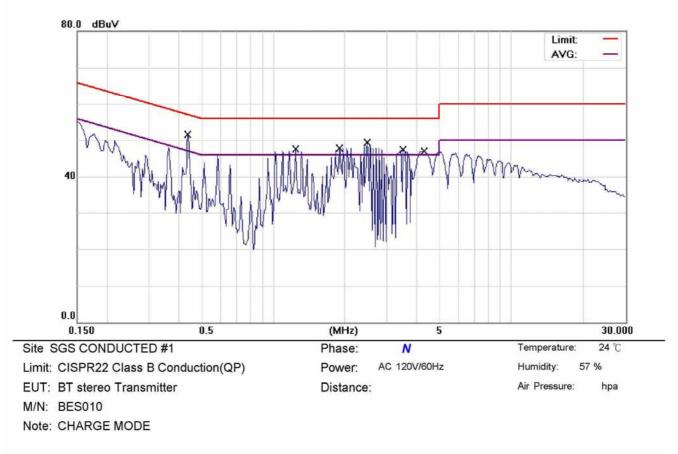
Conducted	Emiccion	Measurement
Conducted	LIIIISSIOII	Measurement

No.	Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1		0.3648	52.10	0.61	52.71	58.62	-5.91	QP	
2	*	0.3648	46.40	0.61	47.01	48.62	-1.61	AVG	
3		0.8023	44.30	0.62	44.92	56.00	-11.08	QP	
4		0.8023	38.50	0.62	39.12	46.00	-6.88	AVG	
5		1.4586	43.90	0.63	44.53	56.00	-11.47	QP	
6		1.4586	38.60	0.63	39.23	46.00	-6.77	AVG	
7		2.1148	41.20	0.65	41.85	56.00	-14.15	QP	
8		2.1148	36.00	0.65	36.65	46.00	-9.35	AVG	
9		2.6266	37.40	0.67	38.07	56.00	-17.93	QP	
10		2.6266	29.70	0.67	30.37	46.00	-15.63	AVG	
11		3.2867	40.30	0.69	40.99	56.00	-15.01	QP	
12		3.2867	31.60	0.69	32.29	46.00	-13.71	AVG	



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#### **Conducted Emission Measurement**



No.	Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
		MHz	dBuV	dB	dBuV	dBuV	dB	Detector	Comment
1	*	0.4391	51.50	0.61	52.11	57.08	-4.97	QP	
2		0.4391	40.60	0.61	41.21	47.08	-5.87	AVG	
3		1.2437	46.80	0.63	47.43	56.00	-8.57	QP	
4		1.2437	35.70	0.63	36.33	46.00	-9.67	AVG	
5		1.9039	46.20	0.65	46.85	56.00	-9.15	QP	
6		1.9039	36.30	0.65	36.95	46.00	-9.05	AVG	
7		2.4898	46.00	0.66	46.66	56.00	-9.34	QP	
8		2.4898	34.20	0.66	34.86	46.00	-11.14	AVG	
9		3.5172	45.10	0.70	45.80	56.00	-10.20	QP	
10		3.5172	33.60	0.70	34.30	46.00	-11.70	AVG	
11		4.3180	43.60	0.72	44.32	56.00	-11.68	QP	
12		4.3180	31.30	0.72	32.02	46.00	-13.98	AVG	



# 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.

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	2.84	0.10	2.94	0.00197	1
2441.00	2.90	0.10	3.00	0.00200	1
2480.00	3.05	0.10	3.15	0.00207	1

## 6.3. Measurement Result

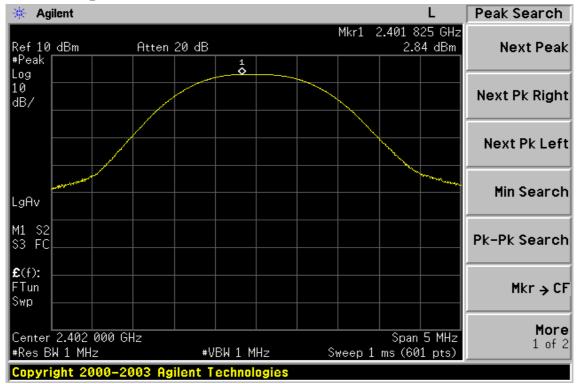
## 6.4. Measurement Equipment Used:

EQUIPMENT	EQUIPMENT MFR		SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2006	05/26/2007
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/27/2006
Spectrum Analyzer	Agilent	E4446A	MY43360126	01/22/2006	01/21/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006

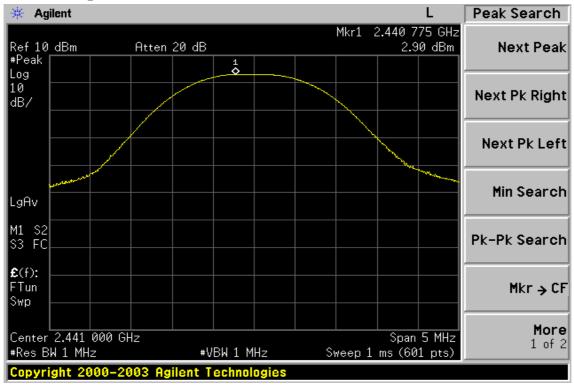
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# Peak Power Output Data Plot (CH Low)



## 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	0.730
Mid	0.805
Higher	0.825

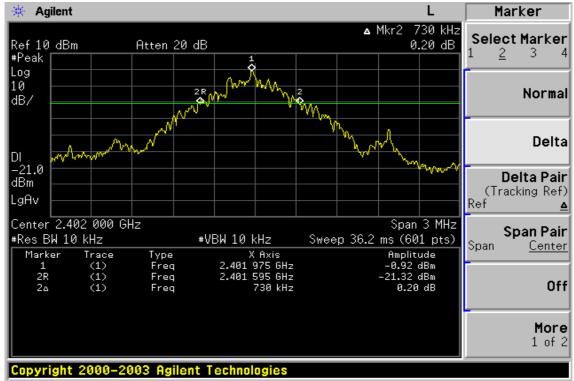
## 7.4. Measurement Equipment Used:

EQUIPMENT	MFR	R MODEL S		LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2006	05/26/2007
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/27/2006
Spectrum Analyzer	Agilent	E4446A	MY43360126	01/22/2006	01/21/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006

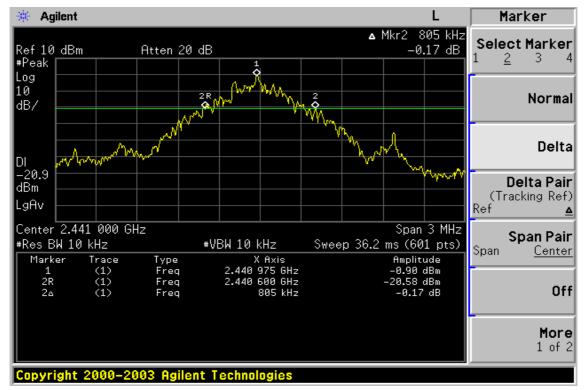
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# 20dB Band Width Test Data CH-Low



### 20dB Band Width Test Data CH-Mid

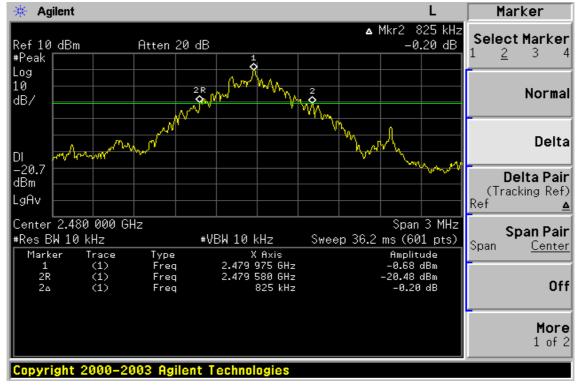


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# 20dB Band Width Test Data CH-High



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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 in15.209(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 2.4835GHz 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.

EQUIPMENT MFR		MODEL	SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2006	05/26/2007
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/26/2006
Spectrum Analyzer	Agilent	E4446A	MY43360126	01/22/2006	01/21/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator Mini-Circult		BW-S6W5	N/A	10/07/2005	10/06/2006

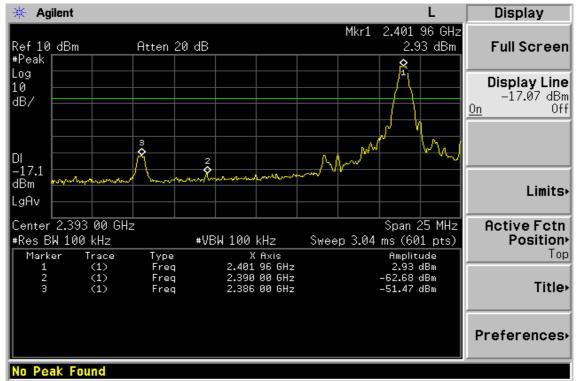
## 8.4. Measurement Equipment Used:

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

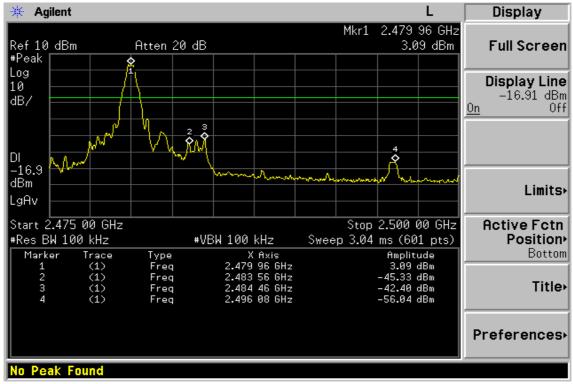
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# **Conducted Emission: Test Data CH-Low**



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



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#### **Radiated Emission:**

Operation Mode	TX CH Low	Test Date	Nov. 07, 2005
Fundamental Frequency	2402 MHz	Test By	Danny
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)(	dBuV/m	<b>(dB</b> )	
2386.0	33.56		-3.43	30.13		74.00	54.00	-23.87	Peak
2390.0	33.32		-3.40	29.92		74.00	54.00	-24.08	Peak
Operation Fundamen Temperat Humidity	ntal Freque ure						t Date t By	Feb. 09, 2 Danny Hor.	2006
	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)(	dBuV/m	<b>) (dB)</b>	
2386.0	36.20		-3.43	32.77		74.00	54.00	-21.23	Peak

-3.40

\_\_\_\_

30.65

#### Remark :

34.05

2390.0

(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.

\_\_\_\_

74.00

54.00

-23.35

Peak

- (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<sub>o</sub>
- (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:**

Operation Mode	TX CH High	Test Date	Nov. 07, 2005
Fundamental Frequency	2480 MHz	Test By	Danny
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/n	n) ( <b>dB</b> )	
2483.6	34.25		-3.04	31.21		74.00	54.00	-22.79	Peak
2484.5	34.98		-3.04	31.94		74.00	54.00	-22.06	Peak
2496.1	34.25		-2.95	31.30		74.00	54.00	-22.70	Peak
Operation Fundamen Temperatu Humidity	ntal Freque ure		-				st Date st By I	Nov. 07, 2 Danny Hor.	2005

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )	
2483.6	37.57		-3.04	34.53		74.00	54.00	-19.47	Peak
2484.5	42.84		-3.04	39.80		74.00	54.00	-14.20	Peak
2496.1	33.76		-2.95	30.81		74.00	54.00	-23.19	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<sub>o</sub>
- (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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# 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

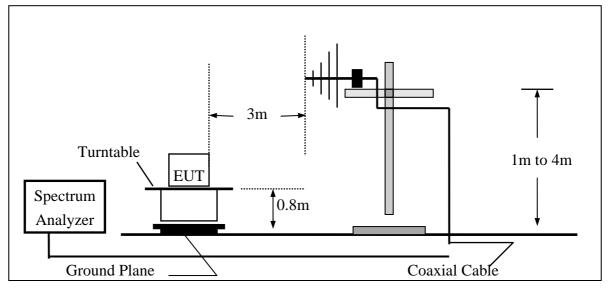
- 1. The EUT was placed on a turn table which is 0.8m above ground plane.
- 2. The turn table shall rotate 360 degrees to determine the position of maximum emission level.
- 3. EUT is set 3m away from the receiving antenna which varied from 1m to 4m to find out the highest emissions.
- 4. Maximum procedure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



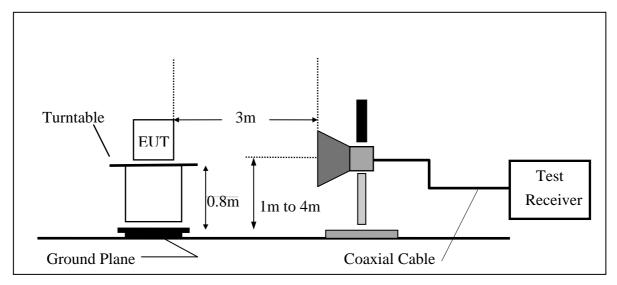
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# 9.4. Test SET-UP (Block Diagram of Configuration)

(A) Radiated Emission Test Set-Up, Frequency Below 1GHz



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



 SGS Taiwan Ltd.
 No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan. / 台北縣五股工業區五工路134號

 台灣檢驗科技股份有限公司
 t (886-2) 2299-3939
 f (886-2) 2298-2698
 www.sas.com.tw



# 9.5. Measurement Equipment Used:

966 Chamber								
EQUIPMENT MFR MODEL SERIAL LAST C								
ТҮРЕ		NUMBER	NUMBER	CAL.				
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2006	05/26/2007			
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/26/2006			
Bilog Antenna	SCHWAZBECK	VULB9163	152	06/03/2006	06/02/2007			
Horn antenna	Schwarzbeck	BBHA 9120D	309/320	08/16/2005	08/15/2006			
Horn antenna	Schwarzbeck	BBHA 9170	184/185	07/04/2006	07/03/2007			
Pre-Amplifier	HP	8447D	2944A09469	07/19/2005	07/18/2006			
Pre-Amplifier	HP	8494B	3008A00578	02/26/2006	02/25/2007			
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:

#### $\mathbf{FS} = \mathbf{RA} + \mathbf{AF} + \mathbf{CL} - \mathbf{AG}$

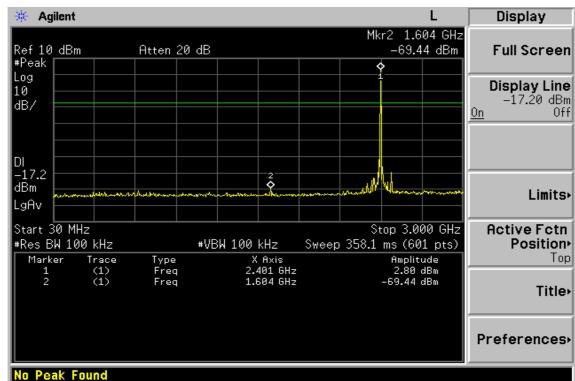
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
	RA = Reading Amplitude	AG = Amplifier Gain
	AF = Antenna Factor	

## 9.7. Measurement Result

Refer to attach tabular data sheets.

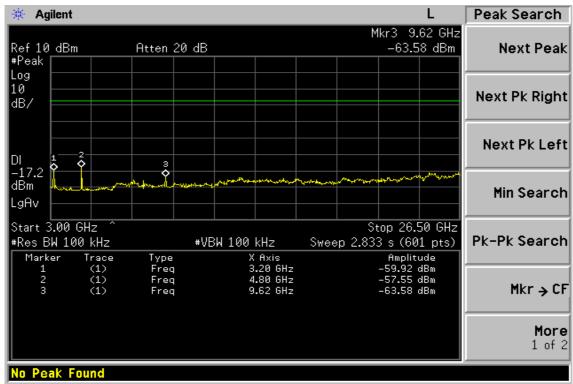
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# Conducted Spurious Emission Measurement Result Ch Low 30MHz – 3GHz

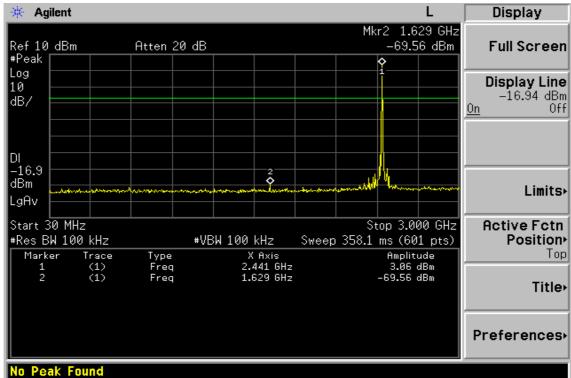




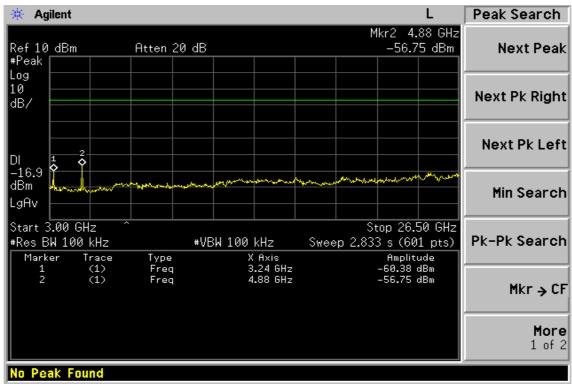
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# Ch Mid 30MHz – 3GHz



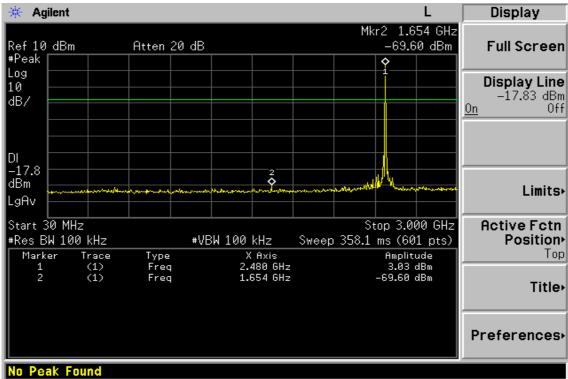
## Ch Mid 3GHz – 26.5GHz



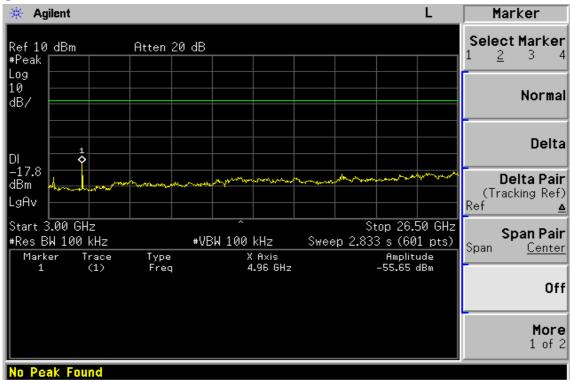
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# Ch High 30MHz – 3GHz



# Ch High 3GHz – 26.5GHz



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

Operation Mode	TX CH Low	Test Date	Nov. 08, 2005
Fundamental Frequency	2402MHz	Test By	Danny
Temperature	25 °C	Pol	Ver./Hor.
Humidity	65 %		

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	( <b>dB</b> )	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
34.85	V	Peak	39.72	-15.09	24.63	40.00	-15.37
240.49	V	Peak	43.53	-15.55	27.98	46.00	-18.02
300.63	V	Peak	43.03	-13.37	29.66	46.00	-16.34
499.48	V	Peak	36.89	-9.30	27.59	46.00	-18.41
240.49	Н	Peak	48.80	-15.55	33.25	46.00	-12.75
300.63	Н	Peak	49.02	-13.37	35.65	46.00	-10.35
499.48	Н	Peak	38.80	-9.30	29.5	46.00	-16.50
599.39	Н	Peak	39.62	-7.64	31.98	46.00	-14.02

Remark:

- 1 Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- 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)**

Operation Mode	TX CH Mid	Test Date	Nov. 08, 2005
Fundamental Frequency	2441MHz	Test By	Danny
Temperature	25 °C	Pol	Ver./Hor.
Humidity	65 %		

Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
H/V	(PK/QP)	(dBuV)	( <b>dB</b> )	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
V	Peak	41.92	-15.13	26.79	40.00	-13.21
V	Peak	40.66	-15.55	25.11	46.00	-20.89
V	Peak	46.42	-13.37	33.05	46.00	-12.95
V	Peak	37.20	-9.30	27.90	46.00	-18.10
Н	Peak	47.02	-15.55	31.47	46.00	-14.53
Н	Peak	49.84	-13.37	36.47	46.00	-9.53
Н	Peak	38.81	-9.30	29.51	46.00	-16.49
Н	Peak	38.89	-7.64	31.25	46.00	-14.75
	H/V V V V H H H	Ant.Pol.Mode ModeH/V(PK/QP)VPeakVPeakVPeakVPeakHPeakHPeakHPeakHPeakHPeak	Ant.Pol.         Mode Mode         Reading           H/V         (PK/QP)         (dBuV)           V         Peak         41.92           V         Peak         40.66           V         Peak         46.42           V         Peak         37.20           H         Peak         49.84           H         Peak         38.81	Ant.Pol.         Mode Mode         Reading         Factor           H/V         (PK/QP)         (dBuV)         (dB)           V         Peak         41.92         -15.13           V         Peak         40.66         -15.55           V         Peak         46.42         -13.37           V         Peak         37.20         -9.30           H         Peak         47.02         -15.55           H         Peak         49.84         -13.37           H         Peak         38.81         -9.30	Ant.Pol.         Mode Mode         Reading         Factor         Actual FS           H/V         (PK/QP)         (dBuV)         (dB)         (dBuV/m)           V         Peak         41.92         -15.13         26.79           V         Peak         40.66         -15.55         25.11           V         Peak         46.42         -13.37         33.05           V         Peak         37.20         -9.30         27.90           H         Peak         47.02         -15.55         31.47           H         Peak         49.84         -13.37         36.47           H         Peak         38.81         -9.30         29.51	Ant.Pol.         Divide Mode         Reading         Factor         Actual FS         Limit3m           H/V         (PK/QP)         (dBuV)         (dB)         (dBuV/m)         (dBuV/m)           V         Peak         41.92         -15.13         26.79         40.00           V         Peak         40.66         -15.55         25.11         46.00           V         Peak         46.42         -13.37         33.05         46.00           V         Peak         37.20         -9.30         27.90         46.00           H         Peak         47.02         -15.55         31.47         46.00           H         Peak         49.84         -13.37         36.47         46.00           H         Peak         38.81         -9.30         29.51         46.00

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- 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)**

Operation Mode	TX CH High	Test Date	Nov. 08, 2005
Fundamental Frequency	2480MHz	Test By	Danny
Temperature	25 °C	Pol	Ver./Hor.
Humidity	65 %		

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	( <b>dB</b> )	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
33.88	V	Peak	41.97	-15.13	26.84	40.00	-13.16
279.29	V	Peak	39.96	-14.19	25.77	46.00	-20.23
300.63	V	Peak	44.85	-13.37	31.48	46.00	-14.52
499.48	V	Peak	39.73	-9.30	30.43	46.00	-15.57
240.49	Н	Peak	46.30	-15.55	30.75	46.00	-15.25
300.63	Н	Peak	49.66	-13.37	36.29	46.00	-9.71
599.39	Н	Peak	39.41	-7.64	31.77	46.00	-14.23
623.64	Н	Peak	37.12	-7.10	30.02	46.00	-15.98

Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- 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)**

Operation Mode	Audio In	Test Date	Nov. 08, 2005
Fundamental Frequency	Hopping	Test By	Sky
Temperature	25 °C	Pol	Ver./Hor.
Humidity	65 %		

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
38.73	V	Peak	41.96	-14.77	27.19	40.00	-12.81
99.84	V	Peak	44.72	-17.23	27.49	43.50	-16.01
300.63	V	Peak	38.93	-13.37	25.56	46.00	-20.44
366.59	V	Peak	39.22	-11.51	27.71	46.00	-18.29
499.48	V	Peak	35.93	-9.30	26.63	46.00	-19.37
599.39	V	Peak	36.71	-7.64	29.07	46.00	-16.93
332.64	Н	Peak	46.36	-12.43	33.93	46.00	-12.07
415.09	Н	Peak	43.68	-10.32	33.36	46.00	-12.64
473.29	Н	Peak	43.45	-9.55	33.9	46.00	-12.10
596.48	Н	Peak	38.71	-7.68	31.03	46.00	-14.97
730.34	Н	Peak	35.81	-4.82	30.99	46.00	-15.01
863.23	Н	Peak	33.73	-2.65	31.08	46.00	-14.92

#### Remark :

- 1 Measuring frequencies from 30 MHz to the 1GHz<sub>o</sub>
- 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	Nov. 08, 2005
Fundamental Frequency	2402 MHz	Test By	Danny
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

	Peak	AV		Actu	ial FS	Peak	AV	
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin
(MHz)	(dBuV)	(dBuV)	$\mathbf{CF}(\mathbf{dB})$	(dBuV/m	](dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
1598.0	42.69		-6.81	35.88		74.00	54.00	-18.12
4804.0	42.02		2.95	44.97		74.00	54.00	-9.03
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.
- (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<sub>o</sub>
- (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 Low	Test Date	Nov. 08, 2005
Fundamental Frequency	2402 MHz	Test By	Danny
Temperature	25 °C	Pol	Hor.
Humidity	65 %		

	Peak	AV		Actu	al FS	Peak	AV	
Freq. (MHz)	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)	Limit (dBuV/m)	Margin (dB)
1045.5	43.38		-9.25	34.13		74.00	54.00	-19.87
1598.0	46.26		-6.81	39.45		74.00	54.00	-14.55
4804.0	45.67		2.95	48.62		74.00	54.00	-5.38
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<sub>o</sub>
- (2) Data 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<sub>o</sub>
- (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)**

Operatio Fundam Temper Humidi	nental i rature	de Frequency	TX CH 1 2441 MI 25 °C 65 %				Test Da Test By Pol		08, 2005 y
		Peak	AV		Actu	al FS	Peak	AV	
F	req.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin
(N	(Hz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
16.	30.5	43.09		-6.64	36.45		74.00	54.00	-17.55
488	82.0	39.40		3.18	42.58		74.00	54.00	-11.42
732	23.0								
97	64.0								
122	205.0								
146	646.0								
170	)87.0								
195	528.0								
219	969.0								
244	10.0								

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency<sub>o</sub>
- (2) Data 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	Nov. 08, 2005
Fundamental Frequency	2441 MHz	Test By	Danny
Temperature	25 °C	Pol	Hor.
Humidity	65 %		

	Peak	AV		Actu	al FS	Peak	AV	
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
1045.5	43.24		-9.25	33.99		74.00	54.00	-20.01
1630.5	45.60		-6.64	38.96		74.00	54.00	-15.04
4882.0	39.00		3.18	42.18		74.00	54.00	-11.82
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<sub>o</sub>
- (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<sub>o</sub>
- (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	Nov. 08, 2005
Fundamental Frequency	2480 MHz	Test By	Danny
Temperature	<b>25</b> ℃	Pol	Ver.
Humidity	65 %		

	Peak	AV		Actu	al FS	Peak	AV	
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )
1643.5	43.73		-6.60	37.13		74.00	54.00	-16.87
4960.0								
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<sub>o</sub>
- (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<sub>o</sub>
- (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	Nov. 08, 2005
Fundamental Frequency	2480 MHz	Test By	Danny
Temperature	25 °C	Pol	Hor.
Humidity	65 %		

	Peak	AV		Actu	al FS	Peak	AV	
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
1045.5	42.36		-9.25	33.11		74.00	54.00	-20.89
1643.5	46.62		-6.60	40.02		74.00	54.00	-13.98
4980.0	40.18		3.40	43.58		74.00	54.00	-10.42
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<sub>o</sub>
- (2) Data 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<sub>o</sub>
- (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 with audio in mode	Test Date	Nov. 08, 2005
Fundamental Frequency	Hopping	Test By	Sky
Temperature	25 °C	Pol	Ver.
Humidity	65 %		

		Peak	AV		Actu	al FS	Peak	AV		
	Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Note
_	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )	
	1630.5	44.91		-6.64	38.27		74.00	54.00	-15.73	Peak
	4932.5	49.74	46.20	3.31	53.05	49.51	74.00	54.00	-4.49	AV

### 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<sub>o</sub>
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, 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 with audio in mode	Test Date	Nov. 08, 2005
Fundamental Frequency	Hopping	Test By	Sky
Temperature	25 °C	Pol	Hor
Humidity	65 %		

	Peak	AV		Actu	al FS	Peak	AV		
Freq.	Reading	Reading	Ant./CL	Peak	AV	Limit	Limit	Margin	Note
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	( <b>dB</b> )	
1630.5	51.36		-6.60	44.76		74.00	54.00	-9.24	Peak
4861.0	45.71		3.12	48.83		74.00	54.00	-5.17	Peak

#### 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<sub>o</sub>
- (4) Spectrum Peak Setting : 1GHz- 26GHz, RBW= 1MHz, VBW= 1MHz, 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 2/3\*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

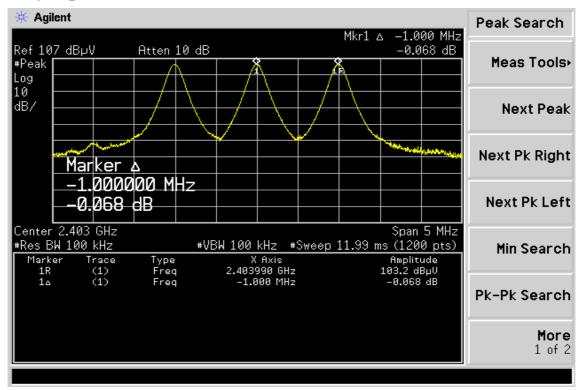
### 10.4. Measurement Equipment Used:

EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2006	05/26/2007
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/26/2006
Spectrum Analyzer	Agilent	E4446A	MY43360126	01/22/2006	01/21/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	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**

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

### 11.4. Measurement Equipment Used:

EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2006	05/26/2007
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/26/2006
Spectrum Analyzer	Agilent	E4446A	MY43360126	01/22/2006	01/21/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006

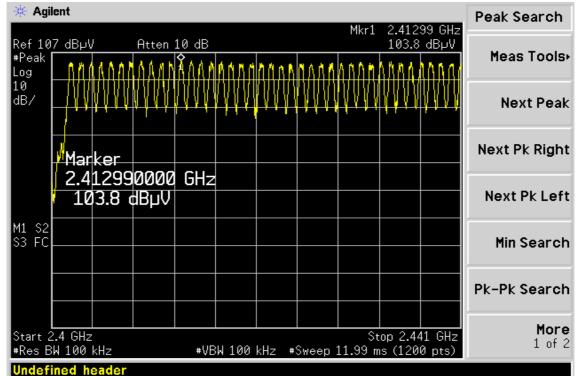
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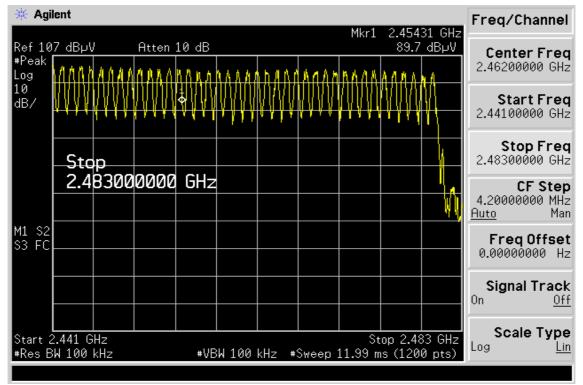
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# **Channel Number**

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**

A period time = 0.4 (ms) \* 79 = 31.6 (s)

CH Low: DH1 time slot = 
$$0.388 \text{ (ms)} * (1600/(1*79)) * 31.6 = 248.28 \text{ (ms)}$$
  
DH3 time slot =  $1.634 \text{ (ms)} * (1600/(3*79)) * 31.6 = 348.53 \text{ (ms)}$   
DH5 time slot =  $2.884 \text{ (ms)} * (1600/(5*79)) * 31.6 = 369.09 \text{ (ms)}$ 

CH Mid:	DH1 time slot = $0.388 \text{ (ms)} * (1600/(1*79)) * 31.6 = 248.28 \text{ (ms)}$
	DH3 time slot = $1.642 \text{ (ms)} * (1600/(3*79)) * 31.6 = 350.23 \text{ (ms)}$
	DH5 time slot = 2.884 (ms) * (1600/(5*79)) * 31.6 = 369.09 (ms)

CH High:	DH1 time slot = $0.388 \text{ (ms)} * (1600/(1*79)) * 31.6 = 248.28 \text{ (ms)}$
	DH3 time slot = $1.642$ (ms) * $(1600/(3*79))$ * $31.6 = 350.23$ (ms)
	DH5 time slot = $2.884 \text{ (ms)} * (1600/(5*79)) * 31.6 = 369.09 \text{ (ms)}$

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### 12.4. Measurement Equipment Used:

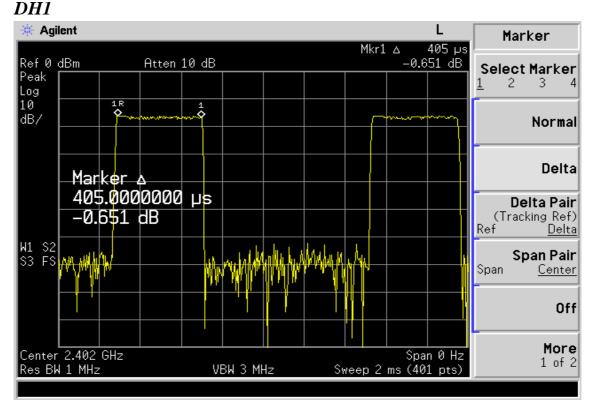
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2006	05/26/2007
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/27/2006
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2006	03/28/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006

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# Dwell Time Test Data

# CH-Low

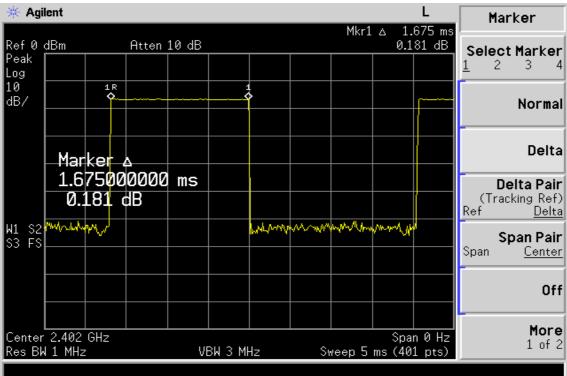


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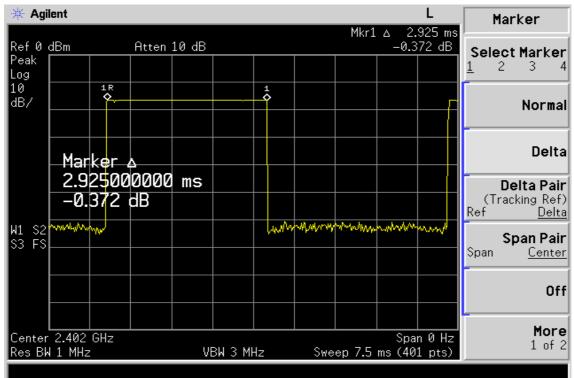


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### DH5

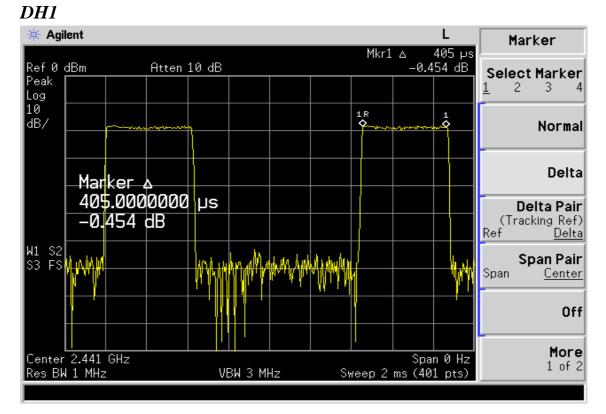


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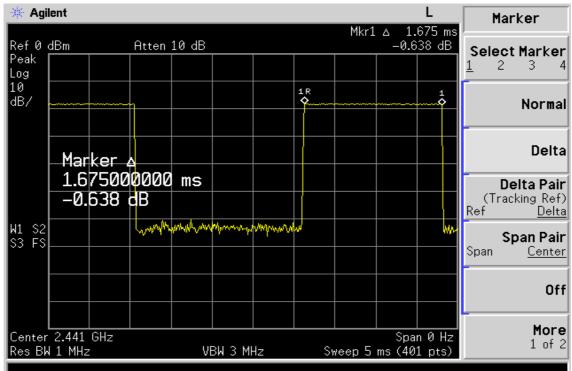


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# CH-Mid



### DH3

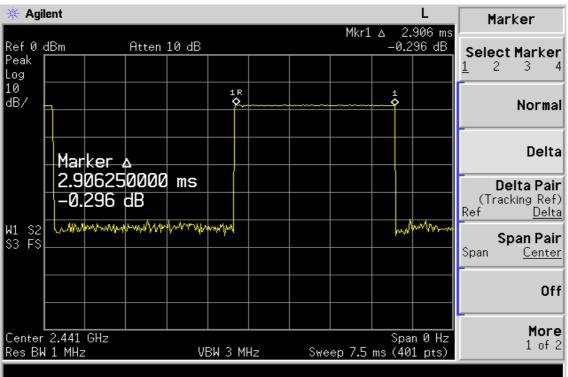


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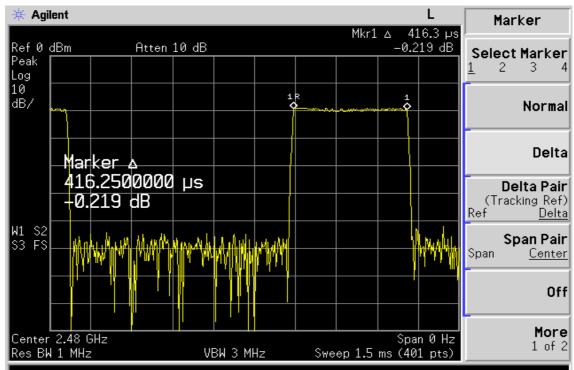
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# CH-High



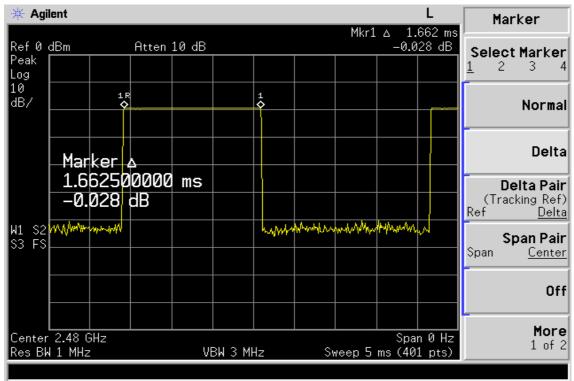


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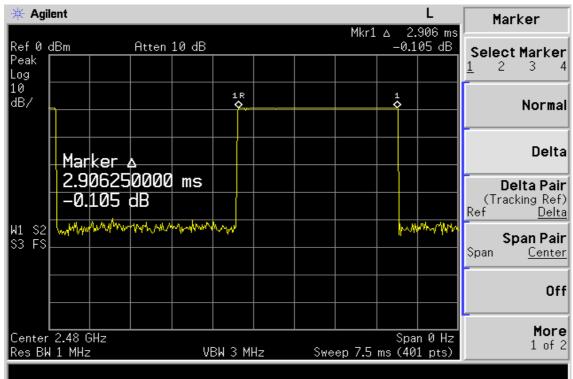


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DH3



### 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 = 1.5MHz, 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)	( <b>dB</b> )	Level (dBm)	(dBm)
Low	-7.16	0.10	-7.06	8
Mid	-7.19	0.10	-7.09	8
High	-6.80	0.10	-6.70	8

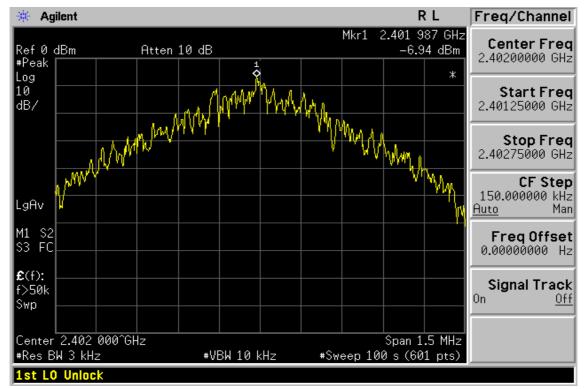
### 13.4. Measurement Equipment Used:

EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.
ТҮРЕ		NUMBER	NUMBER	CAL.	
Spectrum Analyzer	R&S	FSP 40	100034	05/27/2006	05/26/2007
Spectrum Analyzer	Agilent	E7405A	US41160416	08/27/2005	08/27/2006
Spectrum Analyzer	Agilent	E4446A	MY43360126	03/29/2006	03/28/2007
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	N/A	N/A
Attenuator	Mini-Circult	BW-S6W5	N/A	10/07/2005	10/06/2006

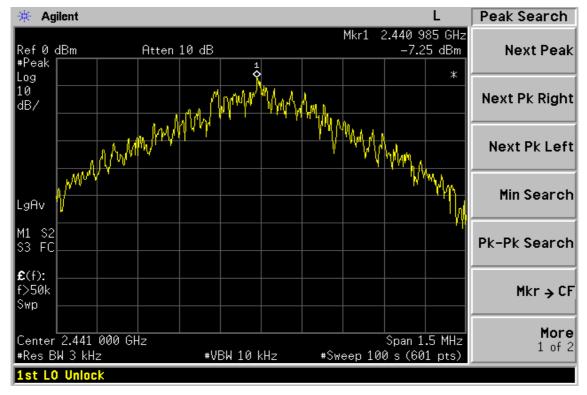
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# Power Spectral Density Test Plot (CH-Low)



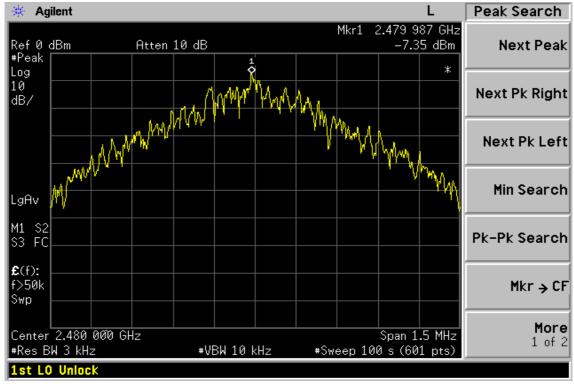
# **Power Spectral Density Test Plot (CH-Mid)**



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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.

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