

Report No.: ER/2011/60018 Issue Date: Jul. 18, 2011

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## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT

OF

Product Name: Bluetooth V4.0 Dual-Mode Dongle

Marketing Name: Bluetooth V4.0 Dual-Mode Dongle

Brand Name: CC&C

Model No.: BT-400

**Model Difference:** N/A

FCC ID: PANBT400

**Report No.:** ER/2011/60018

**Issue Date: Jul. 18, 2011** 

FCC Rule Part: §15.247, Cat: DSS

CC&C Technologies, Inc.

Prepared for: 8F, No. 150, Jian Yi Road, Zhonghe District,

New Taipei City, Taiwan 235, R.O.C.

SGS Taiwan Ltd.

Prepared by: Electronics & Communication Laboratory

No. 134, Wu Kung Rd., Wuku Industrial Zone,

Taipei County, Taiwan



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## VERIFICATION OF COMPLIANCE

CC&C Technologies, Inc.

**Applicant:** 8F, No. 150, Jian Yi Road, Zhonghe District, New Taipei City, Taiwan

235, R.O.C.

**Product Description:** Bluetooth V4.0 Dual-Mode Dongle

Marketing Name: Bluetooth V4.0 Dual-Mode Dongle

**Brand Name:** CC&C

Model No.: BT-400

**Model Difference:** N/A

FCC ID: PANBT400

**File Number:** ER/2011/60018

**Date of test:** Jun. 29, 2011 ~ Jul. 18, 2011

**Date of EUT Received:** Jun. 29, 2011

## 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:	Lion Wang	Date:	Jul. 18, 2011	
Prepared By:	Lion Wang / Engineer  Cherry Cherr	Date:	Jul. 18, 2011	
Approved By:	Cherry Chen / Clerk  Jim Chang / Supervisor	Date:	Jul. 18, 2011	

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## Version

Version No.	Date	Description
00	Jul. 18, 2011	Initial creation of document

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\*\*SCST always Ltd\*\*

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\*\*No 134 Wilk Lyung Road Wilks Individual Artifacto



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## 1. GENERAL INFORMATION

#### General:

Product Name:	Bluetooth V4.0 Dual-Mode Dongle
Marketing Name:	Bluetooth V4.0 Dual-Mode Dongle
Brand Name:	CC&C
Model No.:	BT-400
Model Difference:	N/A
Hardware Version:	289G1D4300-A0
Software Version:	00-1D4300-01[F/W,BT-400][V 1][0]
Power Supply:	5Vdc form USB port

#### Bluetooth:

Frequency Range:	2402 – 2480MHz
Bluetooth Version:	$V2.1 + EDR (GFSK + \pi/4DQPSK + 8DPSK)$
Channel number:	79 channels
Modulation type:	Frequency Hopping Spread Spectrum
Transmit Power:	0.05 dBm (Peak)
Dwell Time:	<= 0.4s
Operating Mode:	Point-to-Point
Antenna Designation:	PCB Antenna, 0.6dBi

This test report applies for Bluetooth function.

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

This submittal(s) (test report) is intended for **FCC ID:** <u>PANBT400</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.

## 1.2. 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.

Tested in accordance with FCC Public Notice DA 00-705

#### 1.3. Test Facility

The measurement facilities used to collect the 3m Radiated Emission and AC power line conducted data are located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 134, Wu Kung Rd., Wuku Industrial Zone, Taipei Country, Taiwan which are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003. FCC Registration Number are: 990257 and 236194, Canada Registration Number: 4620A-4

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. Electronics & Communication Laboratory No. 29, Pau-Tou-Tsuo Valley Chia-Pau Tsuen, Linkou Hsiang, Taipei county, which is constructed and calibrated to meet the CISPR 22/EN 55022 requirements. SGS Site No. 1(3 & 10 meters) and FCC Registration Number: 94644.

#### 1.4. Special Accessories

Not available for this EUT intended for grant.

#### 1.5. 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 and measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna. according to the requirements in Section 8 and 13 and Subclause 8.3.1.2 of ANSI C63.4: 2003.

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# 2.4. Configuration of Tested System

Fig. 2-1 Configuration of Tested System

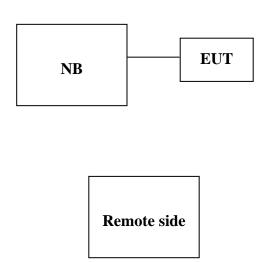


Table 2-1 Equipment Used in Tested System

Item	Equipment	Mfr/Brand	Model/Type No.	Series No.	Data Cable	<b>Power Cord</b>
1.	Notebook	DELL	E5400	3704625136	Un-shielding	Un-shielding
2.	Bluetooth Test Set	Anritsu	MT8852B	6k00006107	Un-shielding	Un-shielding

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## 3. SUMMARY OF TEST RESULTS

FCC Rules	<b>Description Of Test</b>	Result
§15.207(a)	Conducted Emission	N/A
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(a)	20dB Bandwidth	No Limit
§15.247I	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§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
§15.203, §15.247(b)(4)(i)	Antenna Requirement	Compliant

## 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 worst case EDR mode is 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.

Frequency range		nits (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 120Vac/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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## 5.4. Measurement Equipment Used:

Conducted Emission Test Site						
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.	
TYPE		NUMBER	NUMBER	CAL.		
EMI Test Receiver	R&S	ESCS30	828985/004	09/16/2010	09/15/2011	
LISN	Rolf-Heine	NNB-2/16Z	99012	02/02/2011	02/01/2012	
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	02/02/2011	02/01/2012	
Coaxial Cables	N/A	WK CE Cable	N/A	11/28/2010	11/27/2011	

#### 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-peaked.

Test Result: 5V DC powered by USB port

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## 6. PEAK OUTPUT POWER MEASUREMENT

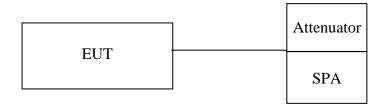
## 6.1. Standard Applicable

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 Equipment Used

Conducted Emission Test Site						
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.	
TYPE		NUMBER	NUMBER	CAL.		
Power Sensor	Anritsu	MA2411B	917032	01/21/2010	01/20/2012	
Power Meter	Anritsu	ML2495A	1005007	02/17/2010	02/16/2012	
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2010	04/18/2012	
Spectrum Analyzer	Agilent	E4440A	MY45304525	01/25/2011	01/24/2012	
DC Block	Agilent	BLK-18	155452	07/05/2011	07/04/2012	
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2011	01/04/2012	
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2011	07/04/2012	
Attenuator	Mini-Circuit	BW-S10W5	001	07/05/2011	07/04/2012	
Attenuator	Mini-Circuit	BW-S20W5	001	07/05/2011	07/04/2012	
Splitter	Agilent	11636B	N/A	07/05/2011	07/04/2012	

## 6.3. Test Set-up:



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#### **6.4.** 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. (Max peak function, >20dB bandwidth, >=RBW)
- 3. Record the max. reading.
- 4. Repeat above procedures until all frequency measured were complete.

#### 6.5. Measurement Result

#### **BDR** mode:

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	-3.38	-3.38	0.00046	1
2441.00	-4.08	-4.08	0.00039	1
2480.00	-3.59	-3.59	0.00044	1

#### EDR mode:

Frequency (MHz)	Reading Power (dBm)	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	0.05	0.05	0.00101	1
2441.00	-0.81	-0.81	0.00083	1
2480.00	-0.24	-0.24	0.00095	1

\*Note: offset 6dB

Note: Refer to next page for plots.

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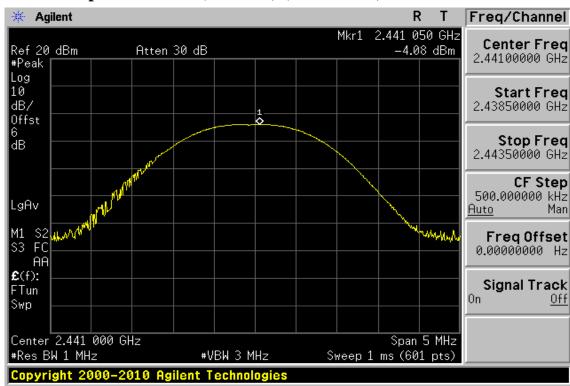
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# Peak Power Output Data Plot (CH Low) (BDR mode)



## Peak Power Output Data Plot (CH Mid) (BDR mode)



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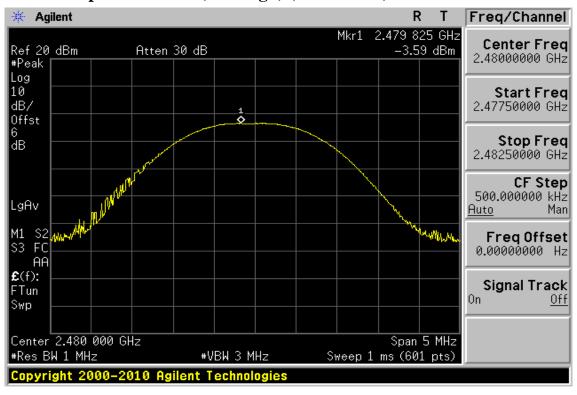
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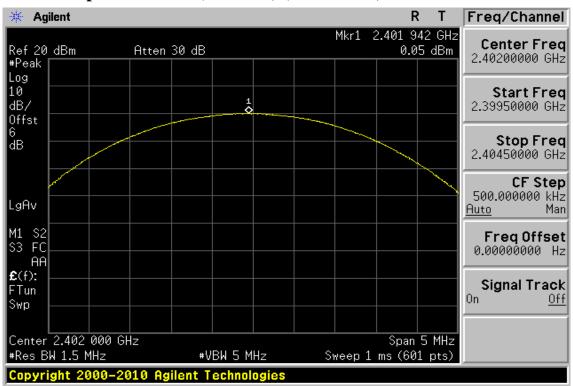
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## Peak Power Output Data Plot (CH High) (BDR mode)



## Peak Power Output Data Plot (CH Low) (EDR mode)



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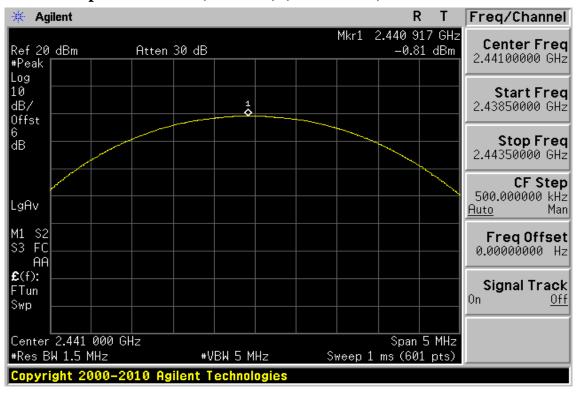
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## Peak Power Output Data Plot (CH Mid) (EDR mode)



## Peak Power Output Data Plot (CH High) (EDR mode)



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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 Equipment Used

Refer to section 6.2 for details.

## 7.3. Test Set-up

Refer to section 6.3 for details.

#### 7.4. 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.

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#### 7.5. Measurement Result:

#### **BDR** mode

СН	Bandwidth
	(kHz)
Lower	926.723
Mid	927.848
Higher	926.707

#### **EDR** mode

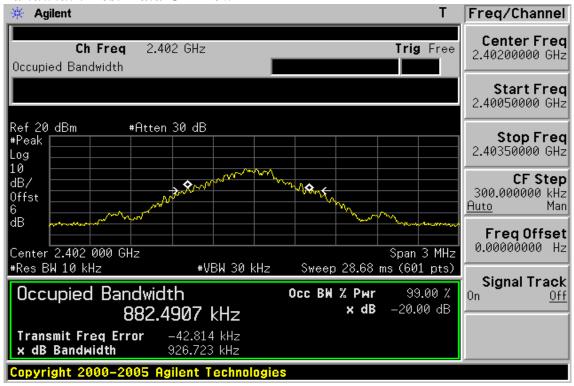
СН	Bandwidth	2/3 Bandwidth
	(MHz)	(MHz)
Lower	1.282	0.855
Mid	1.288	0.859
Higher	1.309	0.873



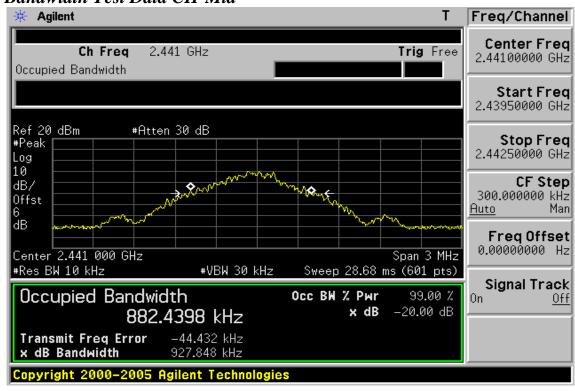
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# BDR Mode 20dB Bandwidth Test Data CH-Low



#### 20dB Bandwidth Test Data CH-Mid



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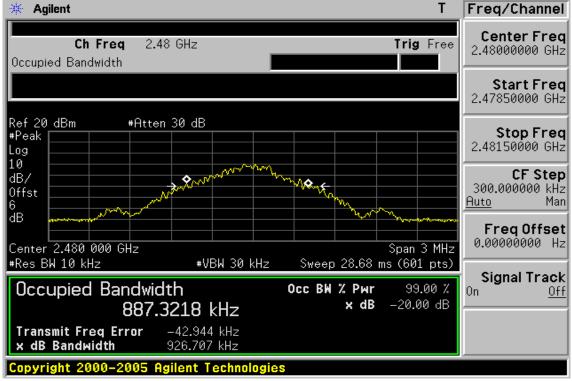
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# 20dB Bandwidth Test Data CH-High



#### EDR Mode

## 20dB Bandwidth Test Data CH-Low



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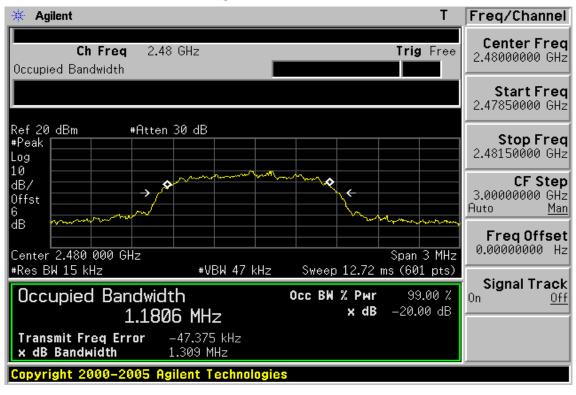
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#### 20dB Bandwidth Test Data CH-Mid



## 20dB Bandwidth 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 Equipment Used

## 8.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 8.2.2. Radiated emission:

966 Chamber										
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.					
Spectrum Analyzer	R&S	FSP 40	100034	02/12/2011	02/11/2012					
Loop antenna	MESSTEC	FLA30	03/10086	07/08/2011	07/07/2013					
Bilog Antenna	SCHWAZBECK	VULB9160	9160-3136	11/19/2010	11/18/2011					
Horn antenna	SCHWAZBECK	BBHA 9120D	9120D-673	05/09/2010	05/08/2012					
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2010	11/27/2011					
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2012	01/04/2012					
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	01/05/2011	01/04/2012					
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA-3M	3m	01/05/2011	01/04/2012					
3m Site	SGS	966 chamber	N/A	11/08/2010	11/09/2011					

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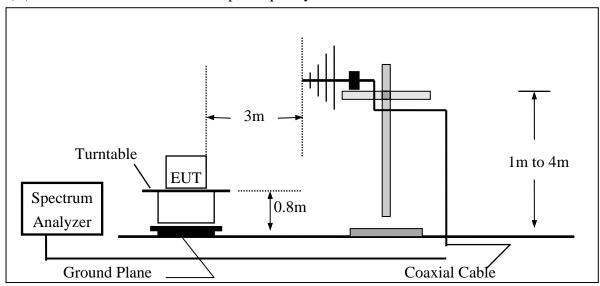
#### 8.3. Test SET-UP:

#### 8.3.1. Conducted Emission at antenna port:

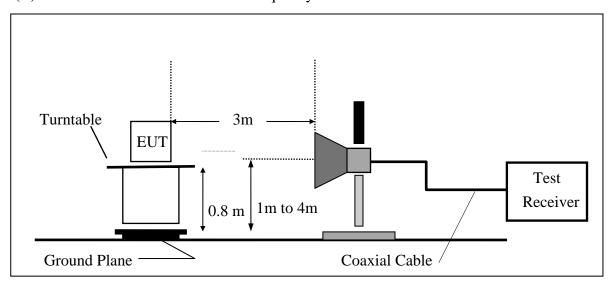
Refer to section 6.3 for details.

#### 8.3.2. Radiated emission:

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



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



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#### **8.4.** 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.

#### 8.5. 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	

#### 8.6. Measurement Result

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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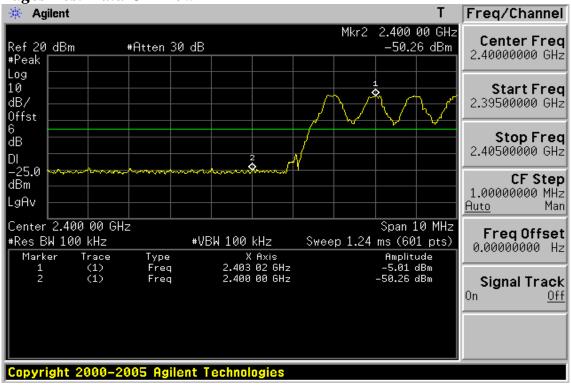
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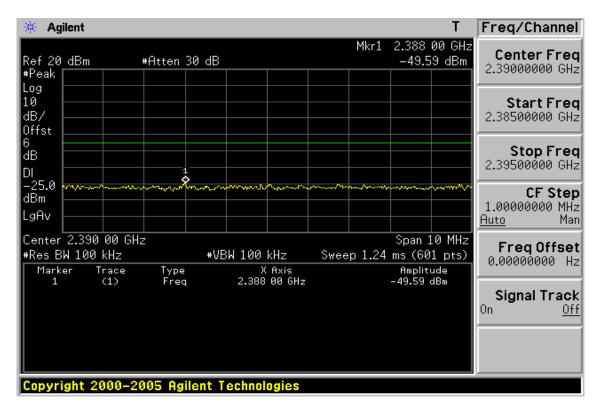


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# BDR Mode Band Edges Test Data CH-Low





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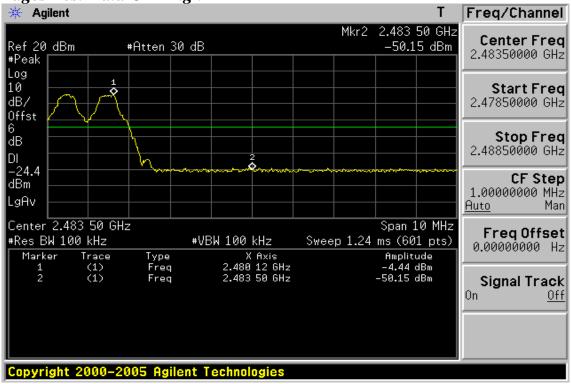
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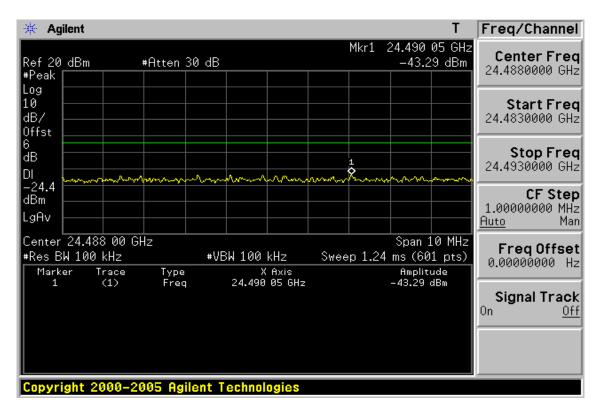


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# Band Edges Test Data CH-High





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**Radiated Emission: (BDR mode)** 

Operation Mode TX CH Low Test Date Jul. 14, 2011

Fundamental Frequency 2402 MHz Test By Lion Temperature 24  $^{\circ}$ C Pol Ver.

Humidity 63 %

	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)	
2390.00	46.10		-1.06	45.04		74.00	54.00	-8.96	Peak

Operation Mode TX CH Low Test Date Jul. 14, 2011

Fundamental Frequency 2402 MHz Test By Lion Temperature 24  $^{\circ}$ C Pol Hor. Humidity 63  $^{\circ}$ 

Peak  $\mathbf{AV}$ **Actual FS** Peak  $\mathbf{AV}$ Peak Reading Reading Ant/CL Limit Limit Margin Remark Freq. AV(MHz)(dBuV) CF(dB) (dBuV/m) (dBuV/m) (dBuV/m)(dB)(dBuV) 2390.00 -9.76 45.30 -1.0644.24 74.00 54.00 Peak

#### Remark:

- (1) 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.
- (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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Operation Mode TX CH High **Test Date** Jul. 14, 2011 Fundamental Frequency 2480 MHz

Test By Lion Pol Ver. **Temperature** 25 °C 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)	
•	2483.50	46.31		-0.59	45.72		74.00	54.00	-8.28	Peak

Operation Mode TX CH High Test Date Jul. 14, 2011

Fundamental Frequency 2480 MHz Test By Lion **Temperature** Pol Hor. 25 °C Humidity 65 %

Peak  $\mathbf{AV}$ AVActual FS Peak Reading Reading Ant/CL Freq. Peak  $\mathbf{AV}$ Limit Limit Margin Remark (MHz)(dBuV) (dBuV) CF(dB) (dBuV/m) (dBuV/m) (dBuV/m) (dBuV/m)(dB)45.00 2483.50 45.59 -0.5974.00 54.00 -9.00 Peak

#### Remark:

- (1) 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.
- (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.
- (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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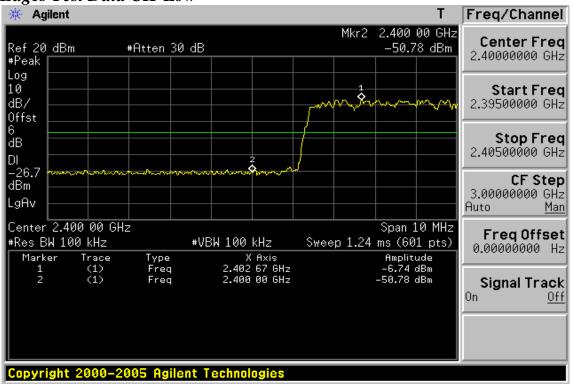
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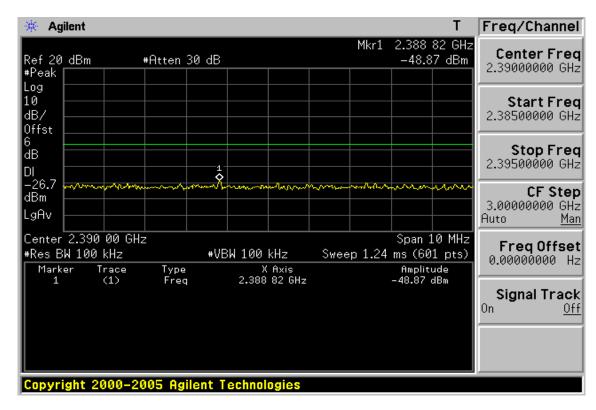


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# EDR Mode Band Edges Test Data CH-Low





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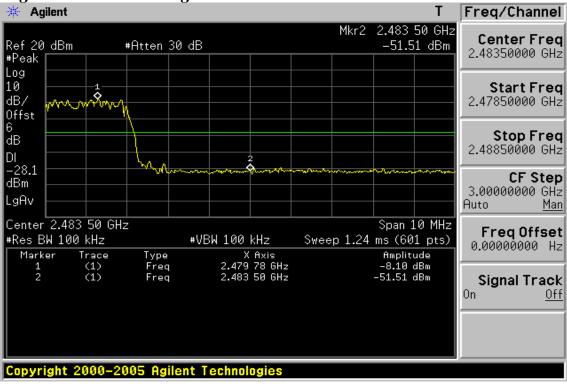
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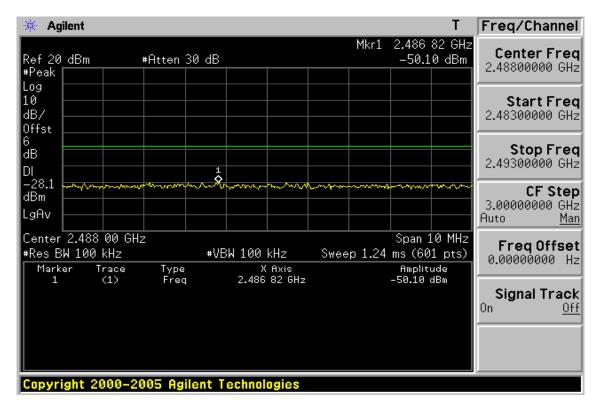


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# Band Edges Test Data CH-High





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**Radiated Emission: (EDR mode)** 

Operation Mode TX CH Low Test Date Jul. 14, 2011

Fundamental Frequency 2402 MHz Test By Lion 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	Remark
(MHz)	(dBuV)	(dBuV)	CF (dB)	(dBuV/m)	(dBuV/m	) (dBuV/m)	(dBuV/m)	(dB)	
2390.00	46.32		-1.06	45.26		74.00	54.00	-8.74	Peak

Operation Mode TX CH Low Test Date Jul. 14, 2011

Fundamental Frequency 2402 MHz Test By Lion Temperature 25  $^{\circ}$ C Pol Hor. Humidity 65  $^{\circ}$ 

Peak  $\mathbf{AV}$ **Actual FS** Peak  $\mathbf{AV}$ Reading Reading Ant/CL Limit Limit Margin Remark Freq. Peak AV(MHz)(dBuV) CF(dB) (dBuV/m) (dBuV/m) (dBuV/m)(dB)(dBuV) 43.55 2390.00 -10.4544.61 -1.0674.00 54.00 Peak

#### Remark:

- (1) 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.
- (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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Operation Mode TX CH High Test Date Jul. 14, 2011

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

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)	( <b>dBuV/m</b> )	(dB)	
2483.50	45.75		-0.59	45.16		74.00	54.00	-8.84	Peak

Operation Mode TX CH High Test Date Jul. 14, 2011

Fundamental Frequency 2480 MHz Test By Lion Temperature Pol Hor. 25 °C

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)	
2483.50	45.91		-0.59	45.32		74.00	54.00	-8.68	Peak

#### Remark:

- (1) 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.
- (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.
- (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. Measurement Equipment Used:

#### 9.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 9.2.2. Radiated emission:

Refer to section 7.2 for details.

#### 9.3. Test SET-UP:

#### 9.3.1. Conducted Emission at antenna port:

Refer to section 6.3 for details.

#### 9.3.2. Radiated emission:

Refer to section 7.3 for details.

#### 9.4. 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. When measurement procedures for electric field radiated emissions above 1 GHz the EUT measurement is to be made "while keeping the antenna in the 'cone of radiation' from that area and pointed at the area both in azimuth and elevation, with polarization oriented for maximum response." is still within the 3dB illumination BW of the measurement antenna.
- 5. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
- 6. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
- 7. Repeat above procedures until all frequency measured were complete.

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## 9.5. 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	

#### 9.6. Measurement Result:

Note: Refer to next page spectrum analyzer data chart and tabular data sheets.

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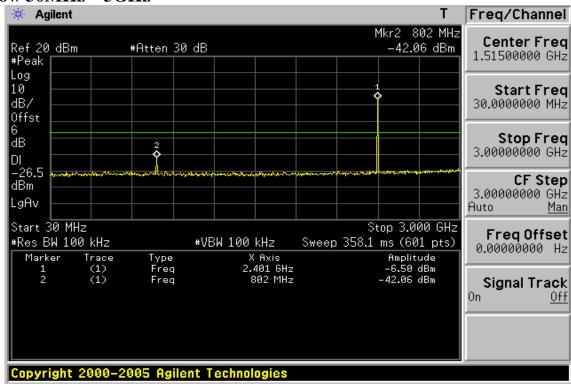
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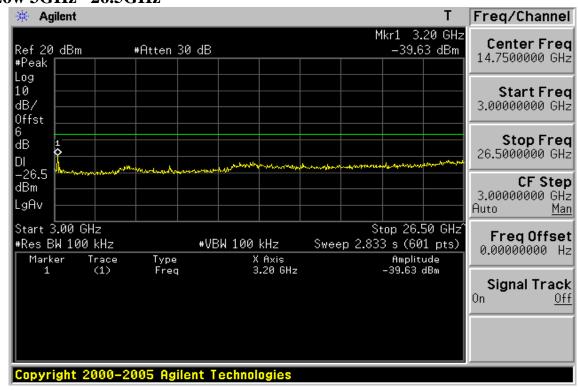
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# EDR Mode Conducted Spurious Emission Measurement Result Ch Low 30MHz – 3GHz



#### Ch Low 3GHz -26.5GHz



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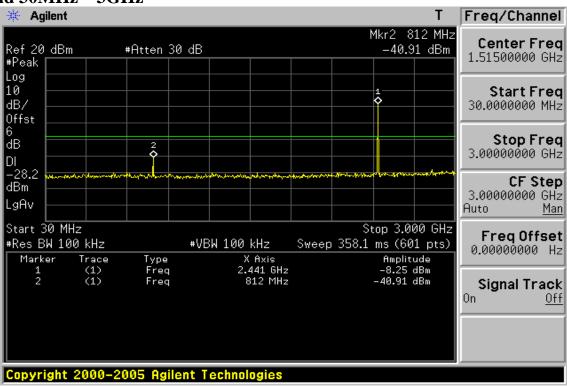
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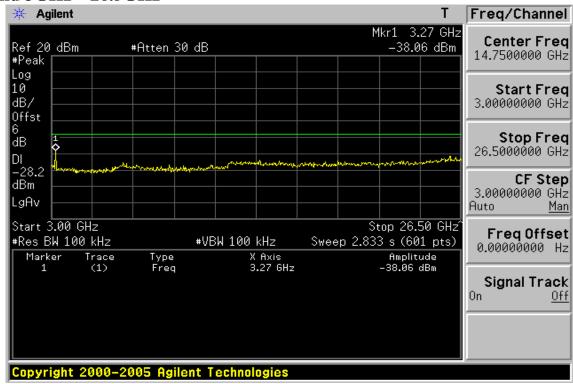
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### Ch Mid 30MHz - 3GHz



## Ch Mid 3GHz - 26.5GHz



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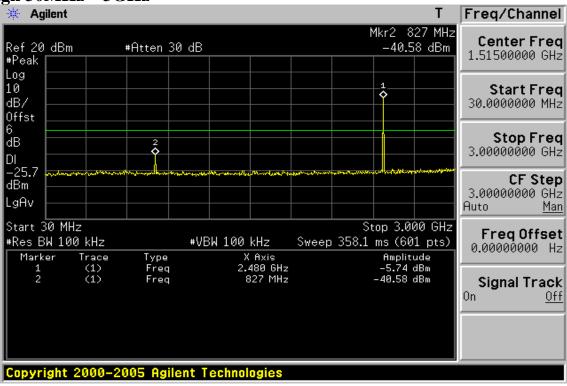
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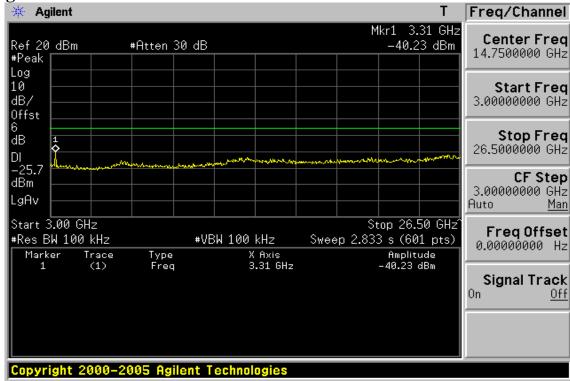
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# Ch High 30MHz - 3GHz



# Ch High 3GHz - 26.5GHz



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Report No.: ER/2011/60018 Issue Date: Jul. 18, 2011

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### Radiated Spurious Emission Measurement Result (below 1GHz) (Worst EDR mode)

Operation Mode TX CH Low Test Date Jul. 14, 2011

Fundamental Frequency 2402 MHz Test By Lion Temperature  $25 \, ^{\circ}\text{C}$  Pol Ver./Hor.

Humidity 65 %

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)
30.97	V	Peak	45.66	-14.19	31.47	40.00	-8.53
162.89	V	Peak	42.95	-12.16	30.79	43.50	-12.71
298.69	V	Peak	39.99	-12.45	27.54	46.00	-18.46
453.89	V	Peak	37.03	-9.74	27.29	46.00	-18.71
527.61	V	Peak	35.91	-8.58	27.33	46.00	-18.67
630.43	V	Peak	35.76	-6.40	29.36	46.00	-16.64
36.79	Н	Peak	32.05	-14.07	17.98	40.00	-22.02
168.71	Н	Peak	41.47	-12.72	28.75	43.50	-14.75
298.69	Н	Peak	50.53	-12.45	38.08	46.00	-7.92
366.59	Н	Peak	48.40	-11.34	37.06	46.00	-8.94
431.58	Н	Peak	38.85	-10.20	28.65	46.00	-17.35
799.21	Н	Peak	30.50	-3.66	26.84	46.00	-19.16

## 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 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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Humidity

FCC ID: PANBT400

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Operation Mode TX CH Mid Fundamental Frequency 2441MHz Temperature 25 °C

65 %

**Test Date** Test By

Jul. 14, 2011

Lion Pol Ver./Hor.

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
31.94	V	Peak	44.92	-14.19	30.73	40.00	-9.27
160.95	V	Peak	42.33	-11.98	30.35	43.50	-13.15
299.66	V	Peak	40.97	-12.45	28.52	46.00	-17.48
497.54	V	Peak	37.96	-9.19	28.77	46.00	-17.23
632.37	V	Peak	35.43	-6.37	29.06	46.00	-16.94
698.33	V	Peak	34.25	-5.31	28.94	46.00	-17.06
35.82	Н	Peak	32.29	-14.08	18.21	40.00	-21.79
162.89	Н	Peak	40.59	-12.16	28.43	43.50	-15.07
298.69	Н	Peak	50.34	-12.45	37.89	46.00	-8.11
364.65	Н	Peak	47.32	-11.38	35.94	46.00	-10.06
431.58	Н	Peak	39.06	-10.20	28.86	46.00	-17.14
697.36	Н	Peak	32.78	-5.33	27.45	46.00	-18.55

## 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 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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Operation Mode TX CH High Fundamental Frequency 2480MHz
Temperature 25 °C

Humidity 65 %

Test Date Jul. 14, 2011

Test By Lion Pol Ver./Hor.

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
31.94	V	Peak	45.52	-14.19	31.33	40.00	-8.67
159.98	V	Peak	42.53	-11.98	30.55	43.50	-12.95
298.69	V	Peak	39.50	-12.45	27.05	46.00	-18.95
453.89	V	Peak	35.33	-9.74	25.59	46.00	-20.41
527.61	V	Peak	35.56	-8.58	26.98	46.00	-19.02
623.64	V	Peak	34.42	-6.51	27.91	46.00	-18.09
35.82	Н	Peak	32.31	-14.08	18.23	40.00	-21.77
166.77	Н	Peak	41.14	-12.54	28.60	43.50	-14.90
299.66	Н	Peak	50.75	-12.45	38.30	46.00	-7.70
364.65	Н	Peak	47.44	-11.38	36.06	46.00	-9.94
431.58	Н	Peak	39.46	-10.20	29.26	46.00	-16.74
797.27	Н	Peak	30.95	-3.68	27.27	46.00	-18.73

## 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 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.
- 4 The IF bandwidth of SPA between 30MHz to 1GHz was 100KHz.

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### Radiated Spurious Emission Measurement Result (above 1GHz) (Worst EDR mode)

Operation Mode TX CH Low Test Date Jul. 14, 2011

Fundamental Frequency 2402 MHz Test By Lion Temperature  $25 \text{ }^{\circ}\text{C}$  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)
3203.5	47.56		0.78	48.34		74.00	54.00	-5.66
4804.0						74.00	54.00	
7206.0						74.00	54.00	
9608.0						74.00	54.00	
12010.0						74.00	54.00	
14412.0						74.00	54.00	
16814.0						74.00	54.00	
19216.0						74.00	54.00	
21618.0						74.00	54.00	
24020.0						74.00	54.00	

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (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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Operation Mode TX CH Low Test Date Jul. 14, 2011

Fundamental Frequency 2402 MHz Test By Lion Temperature 25  $^{\circ}\mathrm{C}$  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)
3203.5	43.25		0.78	44.03		74.00	54.00	-9.97
4804.0						74.00	54.00	
7206.0						74.00	54.00	
9608.0						74.00	54.00	
12010.0						74.00	54.00	
14412.0						74.00	54.00	
16814.0						74.00	54.00	
19216.0						74.00	54.00	
21618.0						74.00	54.00	
24020.0						74.00	54.00	

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (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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Operation Mode **Test Date** Jul. 14, 2011 TX CH Mid

Fundamental Frequency 2441 MHz Test By Lion 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
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
3255.5	47.78		0.61	48.39		74.00	54.00	-5.61
4882.0						74.00	54.00	
7323.0						74.00	54.00	
9764.0						74.00	54.00	
12205.0						74.00	54.00	
14646.0						74.00	54.00	
17087.0						74.00	54.00	
19528.0						74.00	54.00	
21969.0						74.00	54.00	
24410.0						74.00	54.00	

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (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
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.

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Operation Mode **Test Date** Jul. 14, 2011 TX CH Mid

Fundamental Frequency 2441 MHz Test By Lion 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
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
3255.5	45.84		0.61	46.45		74.00	54.00	-7.55
4882.0						74.00	54.00	
7323.0						74.00	54.00	
9764.0						74.00	54.00	
12205.0						74.00	54.00	
14646.0						74.00	54.00	
17087.0						74.00	54.00	
19528.0						74.00	54.00	
21969.0						74.00	54.00	
24410.0						74.00	54.00	

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (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
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.

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Operation Mode Test Date Jul. 14, 2011 TX CH High

Fundamental Frequency 2480 MHz Test By Lion 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
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
3307.5	48.77		0.41	49.18		74.00	54.00	-4.82
4960.0						74.00	54.00	
7440.0						74.00	54.00	
9920.0						74.00	54.00	
12400.0						74.00	54.00	
14880.0						74.00	54.00	
17360.0						74.00	54.00	
19840.0						74.00	54.00	
22320.0						74.00	54.00	
24800.0						74.00	54.00	

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (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
- (5) Spectrum AV Setting: 1GHz-26GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.

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Operation Mode **Test Date** Jul. 14, 2011 TX CH High

Fundamental Frequency 2480 MHz Test By Lion 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
(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)
3307.5	46.11		0.41	46.52		74.00	54.00	-7.48
4960.0						74.00	54.00	
7440.0						74.00	54.00	
9920.0						74.00	54.00	
12400.0						74.00	54.00	
14880.0						74.00	54.00	
17360.0						74.00	54.00	
19840.0						74.00	54.00	
22320.0						74.00	54.00	
24800.0						74.00	54.00	

#### Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (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
- (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 Equipment Used:

Refer to section 6.2 for details.

### 10.3. Test Set-up:

Refer to section 6.3 for details.

### 10.4. 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 3.0 MHz, Sweep = auto.
- 5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

#### 10.5. Measurement Result:

Channel separation (MHz)	Limit	Result
1	>=25KHz or 2/3 times 20dB bandwidth	PASS

Note: Refer to next page for plots.

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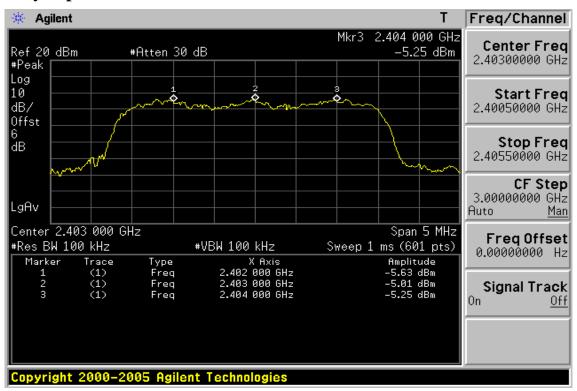
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# **Frequency Separation Test Data**



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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 Equipment Used:

Refer to section 6.2 for details.

### 11.3. Test Set-up:

Refer to section 6.3 for details.

#### 11.4. 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=430KHz,, VBW=1MHz.
- 5. Max hold, view and count how many channel in the band.

#### 11.5. Measurement Result:

Note: Refer to next page for plots.

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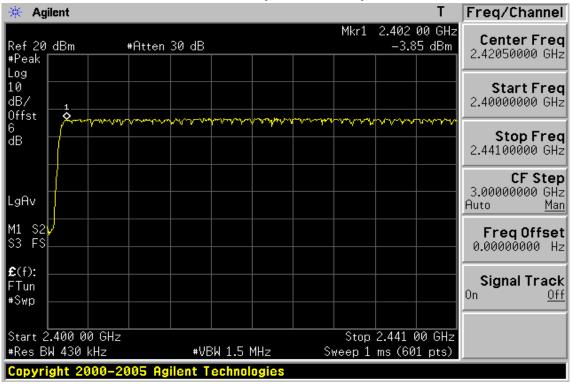


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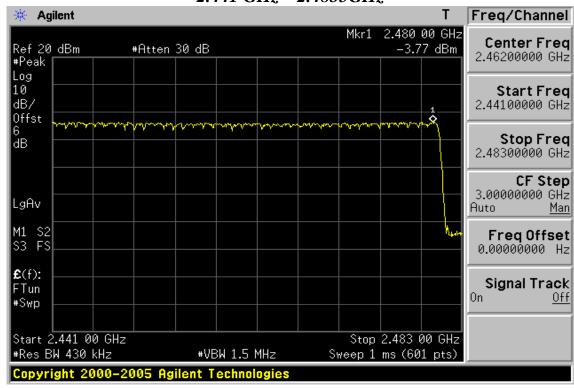
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## **Channel Number**

## 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 Equipment Used:

Refer to section 6.2 for details.

### 12.3. Test Set-up:

Refer to section 6.3 for details.

#### 12.4. 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 =  $2\sim7$ ms.
- 5. Repeat above procedures until all frequency measured were complete.

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#### 12.5. Measurement Result

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

CH Low: DH1 time slot = 0.390 (ms) \* (1600/(2\*79)) \* 31.6 = 126.40 (ms)

DH3 time slot = 1.642 (ms) \* (1600/(4\*79)) \* 31.6 = 262.72 (ms)

DH5 time slot = 2.883 (ms) \* (1600/(6\*79)) \* 31.6 = 307.52 (ms)

CH Mid: DH1 time slot = 0.3867 (ms) \* (1600/(2\*79)) \* 31.6 = 123.74 (ms)

DH3 time slot = 1.633 (ms) \* (1600/(4\*79)) \* 31.6 = 261.28 (ms)

DH5 time slot = 2.870 (ms) \* (1600/(6\*79)) \* 31.6 = 306.13 (ms)

CH High: DH1 time slot = 0.3867 (ms) \* (1600/(2\*79)) \* 31.6 = 123.74 (ms)

DH3 time slot = 1.642 (ms) \* (1600/(4\*79)) \* 31.6 = 262.72 (ms)

DH5 time slot = 2.895 (ms) \* (1600/(6\*79)) \* 31.6 = 308.80 (ms)

Note: Refer to next page for plots.

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 f (886-2) 2298-0488
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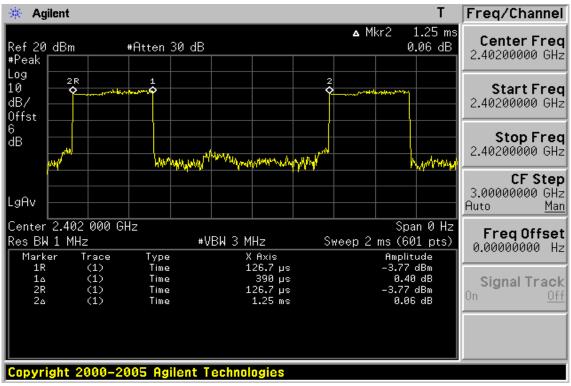


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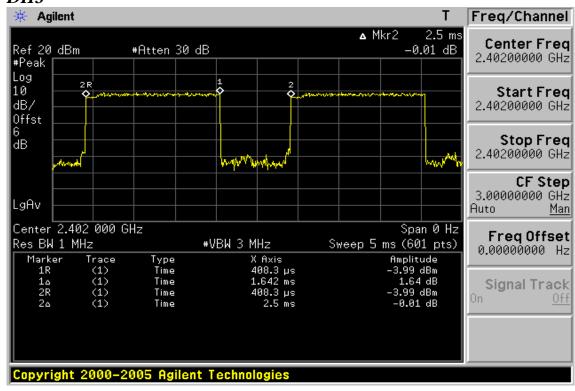
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## CH-Low

#### DH1



### DH3



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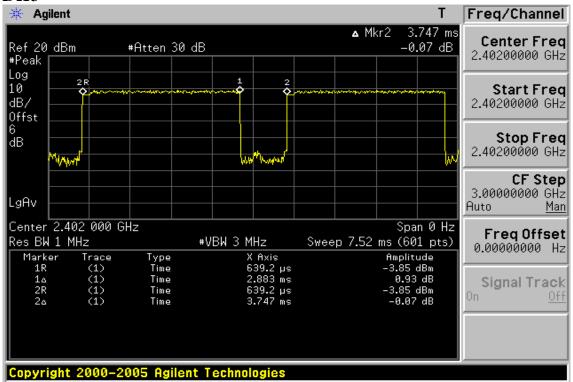
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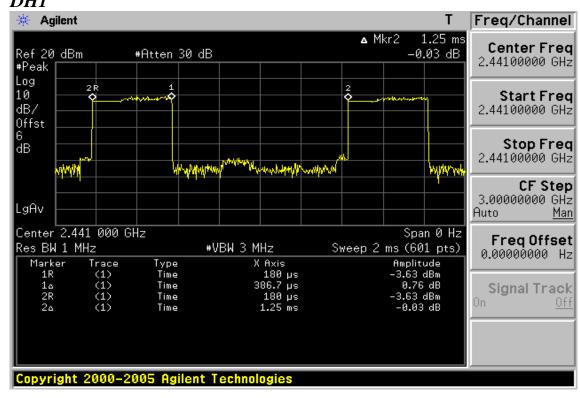
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### DH5



# CH-Mid DH1



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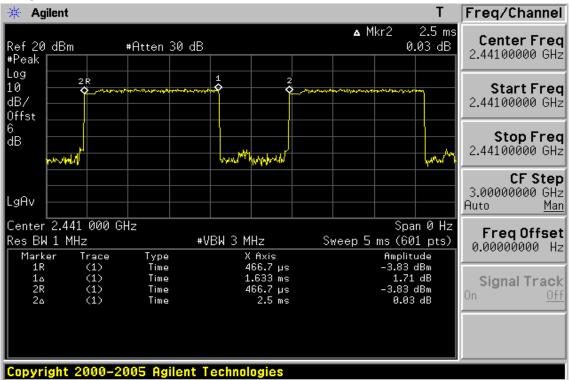
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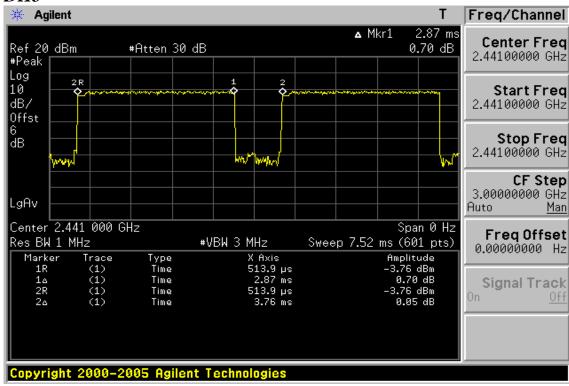
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### DH3



### DH5



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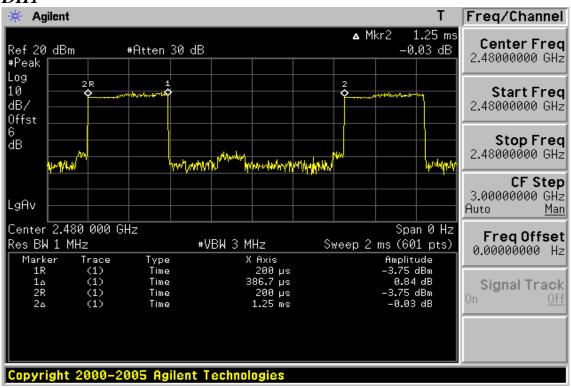
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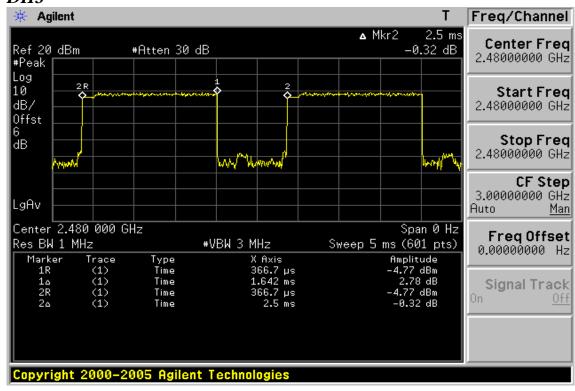
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# CH-High DH1



### DH3



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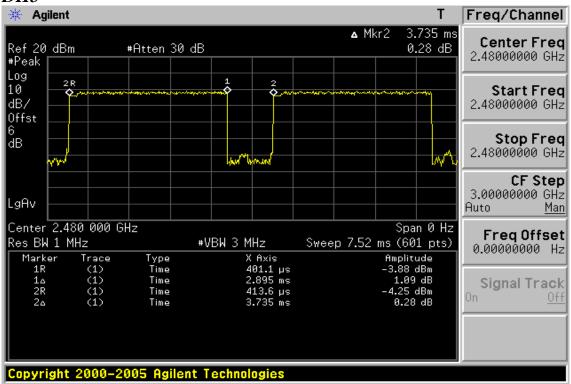
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### DH5



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# 13. ANTENNA REQUIREMENT

### 13.1. 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.

#### 13.2. Antenna Connected Construction

The directional gains of antenna used for transmitting is 0.6 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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### 14. RF EXPOSURE

## 14.1. Standard Applicable

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

This is a portable device.

#### 14.2. Measurement Result:

This is a portable device and the Max peak output power is 0.05 dBm (0.00101W) lower than low threshold 60/fGHz mW (24.48mW), d<2.5cm in general population category;

The SAR measurement is not necessary.

~End of Report ~

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