

Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 1 of 90

## ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT

# INTENTIONAL RADIATOR CERTIFICATION TO FCC PART 15 SUBPART C REQUIREMENT AND INDUSTRY CANADA RSS-210

**Product Name: Smartphone** 

**Brand Name: HTC** 

**Model Name: PB99220** 

**Model Difference:** N/A

IC: 4115B-PB99220 FCC ID: NM8PB99220

**Report No.:** EH/2010/30049

**Issue Date:** Apr. 08, 2010

§15.247, Cat: DSS **Rule Part:** 

RSS-210 issue 7:2007, Annex 8

**HTC Corporation** Prepared for:

No. 23 Xinghua Rd., Taoyuan City, Taoyuan

County 330, Taiwan, ROC

SGS Taiwan Ltd. Prepared by:

**Electronics & Communication Laboratory** 

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

Taipei County, Taiwan.





Testing Laboratory 0513

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 2 of 90

## CERTIFICATION OF COMPLIANCE

**Applicant: HTC Corporation** 

No. 23 Xinghua Rd., Taoyuan City, Taoyuan County 330, Taiwan,

**ROC** 

**Product Name:** Smartphone

**Brand Name:** HTC

IC: 4115B-PB99220

FCC ID: NM8PB99220

**Model No.:** PB99220

**Model Difference:** N/A

**File Number:** EH/2010/30049

Mar. 22, 2010 ~ Apr. 06, 2010 Date of test:

Mar. 22, 2010 **Date of EUT Received:** 

## 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 RSS-Gen. issue 2:2007, 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 15C:2007, §15.247 and RSS-210 issue 7: 2007 Annex 8.

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

11

Test By:	Jazz Huang	Date:	Apr. 08, 2010	
Prepared By:	Jazz Huang / Engineer	Date:	Apr. 08, 2010	
Approved By:	Eva Kao / Asst. Supervisor  Vincent Su / Manager	Date:	Apr. 08, 2010	

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Page: 3 of 90

# Version

Version No.	Date	Description
00	Apr. 08, 2010	Initial creation of document

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 4 of 90

### **Table of Contents**

1.	GEN	ERAL INFORMATION	7
	1.1.	Product Description	7
	1.2.	Related Submittal(s) / Grant (s)	11
	1.3.	Test Methodology	11
	1.4.	Test Facility	11
	1.5.	Special Accessories	11
	1.6.	Equipment Modifications	11
2.	SYS	TEM TEST CONFIGURATION	12
	2.1.	EUT Configuration	12
	2.2.	EUT Exercise	12
	2.3.	Test Procedure	12
	2.4.	Configuration of Tested System	13
3.	SUM	IMARY OF TEST RESULTS	14
4.	DES	CRIPTION OF TEST MODES	14
5.	AC F	POWER LINE CONDUCTED EMISSION TEST	15
	5.1.	Standard Applicable:	
	5.2.	Measurement Equipment Used:	15
	5.3.	EUT Setup:	15
	5.4.	Measurement Procedure:	16
	5.5.	Measurement Result:	16
6.	PEA	K OUTPUT POWER MEASUREMENT	19
	6.1.	Standard Applicable:	19
	6.2.	Measurement Equipment Used:	19
	6.3.	.Test Set-up:	20
	6.4.	Measurement Procedure:	20
	6.5.	Measurement Result:	21
7.	100K	CHz BANDWIDTH OF BAND EDGES MEASUREMENT	26
	7.1.	Standard Applicable:	26
	7.2.	Measurement Equipment Used:	27
	7.3.	Test SET-UP:	28
	7.4.	Measurement Procedure:	29
	7.5.	Field Strength Calculation	29
	7.6.	Measurement Result:	29

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 5 of 90

8.	SPUF	RIOUS EMISSION TEST	38
	8.1.	Standard Applicable:	38
	8.2.	Measurement Equipment Used:	38
	8.3.	Test SET-UP:	38
	8.4.	Measurement Procedure:	39
	8.5.	Field Strength Calculation	39
	8.6.	Measurement Result:	39
9.	FRE	QUENCY SEPARATION	66
	9.1.	Standard Applicable:	66
	9.2.	Measurement Equipment Used:	66
	9.3.	Test Set-up:	66
	9.4.	Measurement Procedure:	66
	9.5.	Measurement Result:	66
10.	NUM	BER OF HOPPING FREQUENCY	68
	10.1.	Standard Applicable:	
	10.2.	Measurement Equipment Used:	68
	10.3.	Test Set-up:	68
	10.4.	Measurement Procedure:	68
	10.5.	Measurement Result:	68
11.	TIMI	E OF OCCUPANCY (DWELL TIME)	70
	11.1.	Standard Applicable:	
	11.2.	Measurement Equipment Used:	70
	11.3.	Test Set-up:	70
	11.4.	Measurement Procedure:	70
	11.5.	Measurement Result:	71
12.	Peak	Power Spectral Density	77
	12.1.	Standard Applicable:	
	12.2.	Measurement Equipment Used:	77
	12.3.	Test Set-up:	
	12.4.	Measurement Procedure:	77
	12.5.	Measurement Result:	78

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 6 of 90

<b>13.</b>	<b>20dB</b>	Bandwidth & 99% Bandwidth	83
	13.1.	Standard Applicable:	83
	13.2.	Measurement Equipment Used:	83
	13.3.	Test Set-up:	83
	13.4.	Measurement Procedure:	83
	13.5.	Measurement Result:	84
14.	ANTI	ENNA REQUIREMENT	90
	14.1.	Standard Applicable:	90
	1/1/2	Antanna Connected Construction:	90



Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 7 of 90

## 1. GENERAL INFORMATION

### 1.1. Product Description

#### General:

Product Name	Smartnhor	ne	
	Smartphone		
Brand Name	HTC		
Model Name	PB99220		
Model Difference	N/A		
Data Cable (USB)	<ol> <li>Model No.: DC M410, Brand Name: MEC</li> <li>Model No.: DC M410, Brand Name: Foxlink</li> <li>Model No.: DC M410, Brand Name: COXOC</li> </ol>		
Simple Hands-free (SHF)	<ol> <li>Model No.: RC E160, Brand Name: Cotron</li> <li>Model No.: RC E160, Brand Name: Merry</li> </ol>		
LCD Panel:	Model No.: AMS369FG03-0, Brand Name: SMD		
Camera	<ol> <li>Model No.: 08PM15A, Brand Name: LITEON</li> <li>Model No.: CHT5A-007A, Brand Name: FOXCONN</li> </ol>		
	3.7 Vdc re	e-chargeable battery or 5Vdc by AC/DC power adapter	
	Battery:	<ol> <li>Model No.: BB99100, Brand Name: Formosa</li> <li>Model No.: BB99100, Brand Name: HT-Energy</li> </ol>	
Power Supply	Adapter:	<ol> <li>Model: TC X250 (X=C, U, E,),         Brand Name: Delta</li> <li>Model: TC X250 (X=B, U, E),         Brand Name: Emerson</li> <li>Model: TC P300, Brand Name: Delta</li> <li>Model: TC P300, Brand Name: Foxlink</li> </ol>	

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 8 of 90

#### GSM / WCDMA

GSM / WCDMA	Operating Frequency			
	GSM/GPRS 850, Class 12	824.2 MHz– 848.8 MHz	33 dBm	
	GSM/GPRS 900, Class 12	880.2MHz – 914.8MHz	33 dBm	
	GSM/GPRS 1800, Class 12	1710.2MHz – 1784.8MHz	30 dBm	
	GSM/GPRS 1900, Class 12	1850.2MHz – 1909.8MHz	30 dBm	
	EDGE 850, Class 12	824.2 MHz- 848.8 MHz	27 dBm	
Cellular Phone Standards Frequency Range and	EDGE 900, Class 12 880.2MHz – 914.8MHz		27 dBm	
Power:	EDGE 1800, Class 12	1710.2MHz – 1784.8MHz	26 dBm	
	EDGE 1900, Class 12	1850.2MHz – 1909.8MHz	26 dBm	
	WCDMA/HSUPA/HSDPA Band I	1922.4MHz –1977.6MHz	24 dBm	
	WCDMA/HSUPA/HSDPA Band II	1852.4MHz – 1907.6MHz	24 dBm	
	WCDMA/HSUPA/HSDPA Band V	826.4MHz – 846.6MHz	24dBm	
	HSUPA data rate: uplink up to 2Mbps HSDPA data rate: downlink up to 7.2Mbps			
Type of Emission:	GSM850: 249KGXW, GSM1900: 252KGXW EDGE 850: 248KG7W, EDGE 1900: 248KG7W WCDMA Band II: 4M18F9W, WCDMA Band V: 4M20F9W			
Hardware Version:	N/A			
Software Version:	N/A			
IMEI:	351961040010280			



Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 9 of 90

WLAN: 802.11 b/g

Frequency Range:	2412 – 2462 MHz
Channel number:	11 channels
Max. Output Power:	802.11 b: 20.12 dBm (Peak) / 17.59 dBm (Avg.) 802.11 g: 15.55 dBm (Peak) / 12.09 dBm (Avg.)
Modulation Technology:	DSSS, OFDM
Modulation type:	CCK, DQPSK, DBPSK for DSSS 64QAM. 16QAM, QPSK, BPSK for OFDM
Transition Rate:	802.11 b: 1/2/5.5/11 Mbps; 802.11 g: 6/9/12/18/24/36/48/54 Mbps
Antenna Designation:	PIFA Antenna, 1.1dBi.
Type of Emission:	16M4G1D

#### 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:	0.91 dBm
Dwell Time:	<= 0.4s
Operating Mode:	Point-to-Point
Antenna Designation:	PIFA Antenna, 1.1dBi.
Type of Emission:	1M17FXD

The EUT is compliance with Bluetooth 2.1 + EDR Standard.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 10 of 90

#### GPS:

Receiver Frequency	L1 Band, 1575.42MHz
Frequency Conversion oscillator	19.2MHz
Antenna Designation	PIFA antenna

**Final Amplifier Voltage and Current Information:** 

Test mode	DC voltage (V)	DC current (mA)
GSM 850	3.7Vdc	340
DCS 1900	3.7Vdc	260
EDGE 850	3.7Vdc	380
EDGE 1900	3.7Vdc	320
WCDMA B2	3.7Vdc	650
HSUPA B2	3.7Vdc	710
WCDMA B5	3.7Vdc	600
HSUPA B5	3.7Vdc	640

This report applies for Bluetooth and GPS.



Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 11 of 90

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

This submittal(s) (test report) is intended for FCC ID: NM8PB99220 filing to comply with Section 15.247 of the FCC Part 15C, Subpart C Rules. And IC: 4115B-PB99220 filing to comply with Industry Canada RSS-210 issue 7: 2007 Annex 8.

#### 1.3. Test Methodology

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4 (2003) and RSS-Gen: 2007. Radiated testing was performed at an antenna to EUT distance 3 meters.

Tested in accordance with FCC Public Notice DA 00-705

#### 1.4. 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. 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-1.

The 10 m Open Area Test Sites located on the address of SGS Taiwan Ltd. 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.

#### 1.5. 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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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 12 of 90

### 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 tested with a test program to fix the Tx/RX frequency that was for the purpose of the measurements. For more information please see test data and APPENDIX 1 for set-up photographs.

#### 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, 13 of ANSI C63.4-2003 and RSS-Gen:2007. 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 of ANSI C63.4-2003 and DA 00-705...

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 13 of 90

## 2.4. Configuration of Tested System

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



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

Item	Equipment	Mfr/Brand	Model/ Type No.	Series No.
1.	AC Adaptor	PHIHONG	TC U100	79H00055-38P
2.	Bluetooth Software	Bluesuite 1.22	CSR	Version 1.22

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 14 of 90

### SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)/	AC Paragraphics Constructed Envisories	C1:4
RSS-Gen §7.2.2	AC Power line Conducted Emission	Compliant
§15.247(b)(1)/	Deals Output Dawar	Compliant
RSS-210 issue 7,§A8.4(2)	Peak Output Power	Compliant
§15.247(d)	100 KHz Bandwidth Of	Compliant
RSS-210 issue 7,§A8.5	Frequency Band Edges	Compliant
§15.247(c)		
RSS-Gen §7.2.3	TX/RX Spurious Emission	Compliant
RSS-210 issue 7,§A2.9		
§15.247(a)(1)/	England on Company tion	C 11 4
RSS-210 issue 7,§A8.1(b)	Frequency Separation	Compliant
§15.247(a)(1)(iii)/	Number of housing for an array	Compliant
RSS-210 issue 7,§A8.1(d)	Number of hopping frequency	Compliant
§15.247(a)(1)(ii)/	Time of Occupancy	Compliant
RSS-210 issue 7,§A8.1(d)	Time of Occupancy	Compliant
§15.247/	D 1 D D '	C 1' 1
RSS-210 issue 7,§A8.2(b)	Peak Power Density	Compliant
§15.247(a)(1)	20dB Bandwidth	
RSS210 issue ,§A8.1(b)	& OOO/ Payer Pandayiddh	Compliant
	99% Power Bandwidth	
§15.203, §15.247(c)/		
RSS-GEN 7.1.4,	Antenna Requirement	Compliant
RSS-210 issue 7,§A8.4		

#### 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 highest data rate are chosen for full testing.

The field strength of radiation emission was measured as EUT stand-up position (H mode) and lie down position (E1, E2 mode) for Bluetooth Transmitter for channel Low, Mid and High, the worst case H position was reported.

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 15 of 90

#### 5. AC POWER LINE CONDUCTED EMISSION TEST

### 5.1. Standard Applicable:

According to §15.207 and RSS-Gen §7.2.2, frequency range within 150KHz to 30MHz shall not exceed the Limit table as below.

Fraguancy range		mits (uV)
Frequency range	üD(	(u v )
MHz	Quasi-peak	Average
0.15 to 0.50	66 to 56	56 to 46
0.50 to 5	56	46
5 to 30	60	50

#### Note

**5.2.** 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	09/15/2009	09/14/2010					
LISN	Rolf-Heine	NNB-2/16Z	99012	02/02/2010	02/01/2011					
LISN	FCC	FCC-LISN-50/250-25-2-01	04034	02/02/2010	02/01/2011					
Coaxial Cables	N/A	WK CE Cable	N/A	11/28/2009	11/27/2010					

### 5.3. 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 AC/DC Power adaptor of EUT was plug-in LISN. The EUT was placed flushed with the rear of the table.
- 3. The LISN was connected with 120Vac/60Hz power source.

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

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



Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 16 of 90

### **5.4.** 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.

#### 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.

Note: Refer to next page for measurement data and plots.

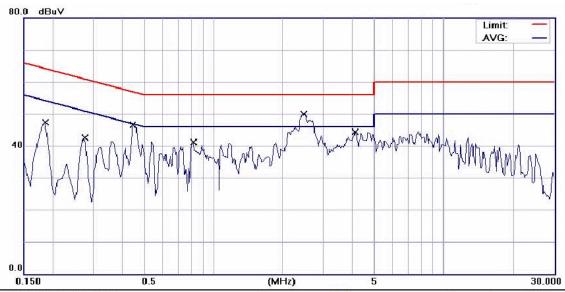


Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 17 of 90

### AC POWER LINE CONDUCTED EMISSION TEST DATA

Operation Mode:	Bluetooth Mode			Test Date:	Mar. 30, 2010
Temperature:	23 °C	Humidity:	58 %	Test By:	Jazz



Site SGS CONDUCTED #1

Limit: CISPR22/11 Class B Conduction(QP)

EUT: PDA Phone M/N: PB99110 Note: BT LINK MODE

23 °C Phase: L1 Temperature: AC120V/60Hz 58 % Power: Humidity: Air Pressure: Distance: hpa

No. Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over			
	MHz	dBuV	dB	dBu∀	dBuV	dB	Detector	Comment	
1	0.1850	39.10	0.14	39.24	64.26	-25.02	QP		
2	0.2750	38.10	0.11	38.21	60.97	-22.76	QP		
3	0.2750	22.30	0.11	22.41	50.97	-28.56	AVG		
4	0.4450	43.20	0.08	43.28	56.97	-13.69	QP		
5	0.4450	30.10	0.08	30.18	46.97	-16.79	AVG		
6	0.8200	37.50	0.08	37.58	56.00	-18.42	QP		
7	0.8200	20.70	0.08	20.78	46.00	-25.22	AVG		
8 *	2.4500	44.30	0.13	44.43	56.00	-11.57	QP		
9	2.4500	33.70	0.13	33.83	46.00	-12.17	AVG		
10	4.1300	36.80	0.15	36.95	56.00	-19.05	QP		
11	4.1300	26.20	0.15	26.35	46.00	-19.65	AVG		-

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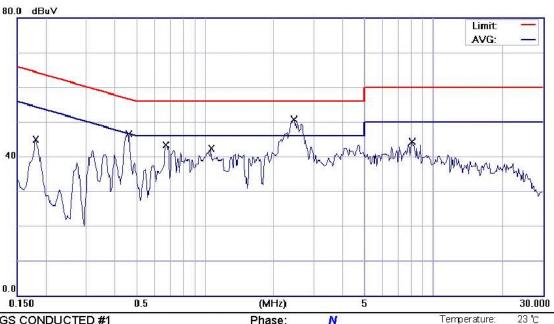


Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 18 of 90

Humidity: Air Pressure:

hpa



Site SGS CONDUCTED #1

Limit: CISPR22/11 Class B Conduction(QP)

EUT: PDA Phone M/N: PB99110

Note: BT LINK MODE

Phase:

Power:

Distance:

N

AC120V/60Hz

No. Mk.	Freq.	Reading Level	Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBu∀	dBuV	dB	Detector	Comment
1	0.1800	37.70	0.16	37.86	64.49	-26.63	QP	
2	0.1800	26.50	0.16	26.66	54.49	-27.83	AVG	
3	0.4600	43.60	0.10	43.70	56.69	-12.99	QP	
4	0.4600	33.30	0.10	33.40	46.69	-13.29	AVG	
5	0.6700	41.10	0.11	41.21	56.00	-14.79	QP	
6	0.6700	27.70	0.11	27.81	46.00	-18.19	AVG	
7	1.0600	36.40	0.12	36.52	56.00	-19.48	QP	
8	1.0600	21.00	0.12	21.12	46.00	-24.88	AVG	
9 *	2.4400	45.40	0.15	45.55	56.00	-10.45	QP	
10	2.4400	33.90	0.15	34.05	46.00	-11.95	AVG	
11	8.0600	38.90	0.32	39.22	60.00	-20.78	QP	
12	8.0600	28.20	0.32	28.52	50.00	-21.48	AVG	

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 19 of 90

## PEAK OUTPUT POWER MEASUREMENT

### 6.1. Standard Applicable:

According to §15.247(b)(1), 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.

According to RSS-210 issue 7,§A8.4(2), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

**6.2.** Measurement Equipment Used:

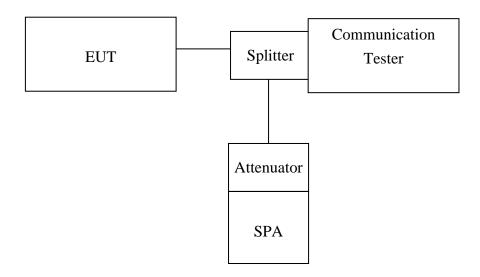
Conducted Emission Test Site										
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.					
ТҮРЕ		NUMBER	NUMBER	CAL.						
Spectrum Analyzer	Agilent	E4446A	MY43360126	04/19/2008	04/18/2010					
Spectrum Analyzer	Agilent	E4440A	MY45304525	01/25/2010	01/24/2011					
DC Block	Agilent	BLK-18	155452	07/05/2009	07/04/2010					
Low Loss Cable	HUBER+SUHNER	SUCOFLEX 104PEA	N/A	01/05/2010	01/04/2011					
Attenuator	Mini-Circuit	BW-S6W5	001	07/05/2009	07/04/2010					
Attenuator Mini-Circuit		BW-S10W5	001	07/05/2009	07/04/2010					
Attenuator Mini-Circuit		BW-S20W5	001	07/05/2009	07/04/2010					
Splitter	Agilent	11636B	N/A	07/05/2009	07/04/2010					



Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 20 of 90

## 6.3. .Test Set-up:



#### **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. (Channel power function, RBW, VBW = 1MHz)
- 3. Record the max. reading.
- 4. Repeat above procedures until all frequency measured were complete.

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 21 of 90

### 6.5. Measurement Result:

#### BDR mode:

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	0.31	0.00	0.31	0.00107	1
2441.00	0.64	0.00	0.64	0.00116	1
2480.00	-0.20	0.00	-0.20	0.00095	1

\*Note: offset 0.2dB

#### EDR mode:

Frequency (MHz)	Reading Power (dBm)	Cable Loss	Output Power (dBm)	Output Power (W)	Limit (W)
2402.00	0.53	0.00	0.53	0.00113	1
2441.00	0.91	0.00	0.91	0.00123	1
2480.00	0.06	0.00	0.06	0.00101	1

\*Note: offset 0.2dB

Note: Refer to next page for plots.

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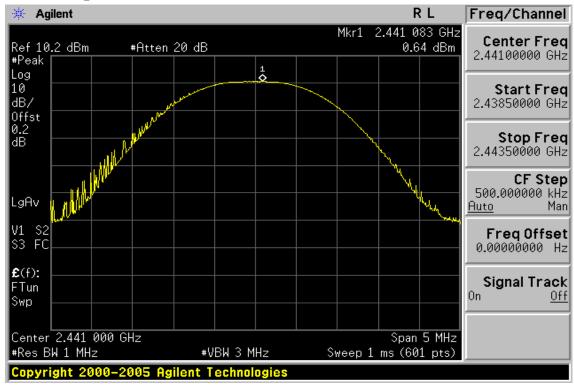
Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 22 of 90

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



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



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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 23 of 90

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



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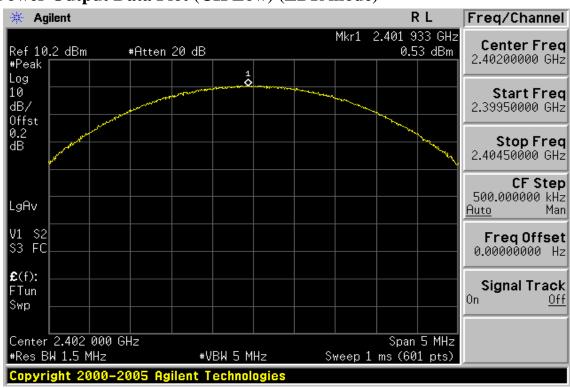
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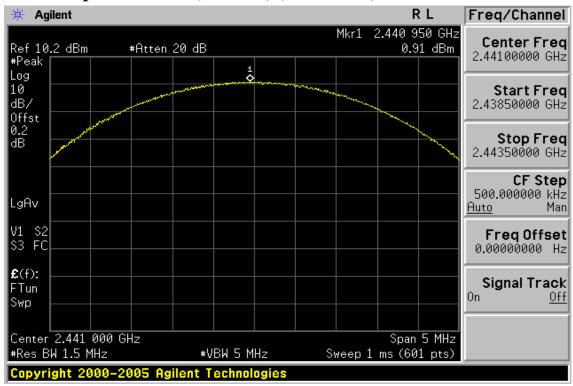
Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 24 of 90

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



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



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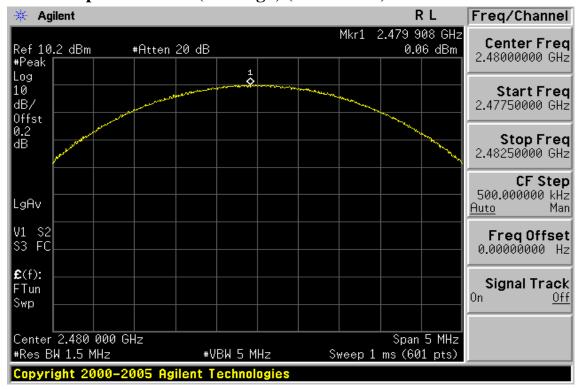
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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 25 of 90

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



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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 26 of 90

#### 100KHz BANDWIDTH OF BAND EDGES MEASUREMENT

### 7.1. Standard Applicable:

According to §15.247(d), 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).

According to RSS-210 issue 7,§A8.5, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.



Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 27 of 90

## 7.2. Measurement Equipment Used:

### 7.2.1. Conducted Emission at antenna port:

Refer to section 6.2 for details.

#### 7.2.2. Radiated emission:

	966 Chamber											
EQUIPMENT	MFR	MODEL	SERIAL	LAST	CAL DUE.							
ТҮРЕ		NUMBER	NUMBER	CAL.								
Spectrum Analyzer	R&S	FSP 40	100034	02/12/2010	02/11/2011							
Loop antenna	MESSTEC	FLA30	03/10086	07/08/2009	07/07/2011							
Bilog Antenna	SCHWAZBECK	VULB9160	3136	09/15/2009	09/14/2010							
Horn antenna	SCHWAZBECK	BBHA 9120D	9120D-673	05/09/2008	05/08/2010							
Pre-Amplifier	Agilent	8447D	1937A02834	11/28/2009	11/27/2010							
Pre-Amplifier	Agilent	8449B	3008A01973	01/05/2010	01/04/2011							
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	01/05/2010	01/04/2011							
Low Loss Cable HUBER+SUHNER		SUCOFLEX 104PEA-3M	3m	01/05/2010	01/04/2011							
3m Site	SGS	966 chamber	N/A	11/08/2009	11/09/2010							



Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 28 of 90

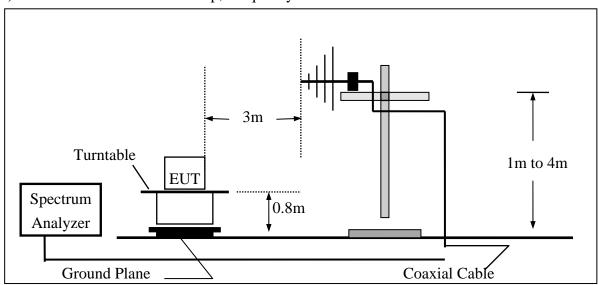
#### **7.3.** Test **SET-UP**:

### 7.3.1. Conducted Emission at antenna port:

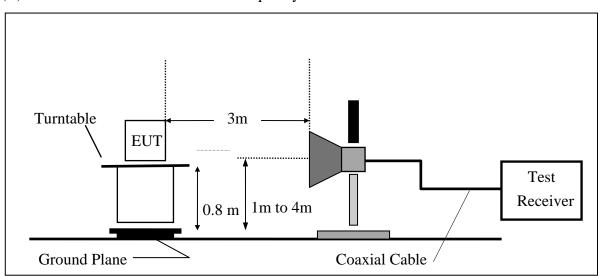
Refer to section 6.3 for details.

#### 7.3.2. 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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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 29 of 90

#### 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 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.

## 7.5. 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	

#### 7.6. Measurement Result:

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

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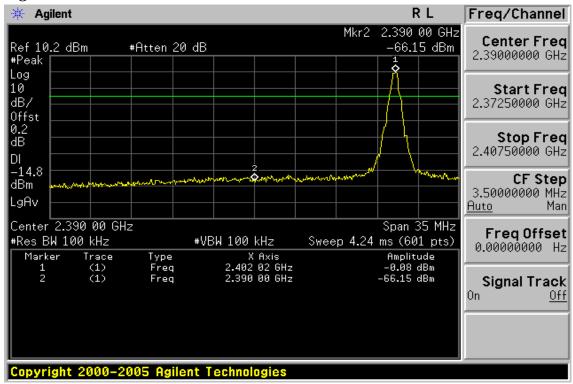
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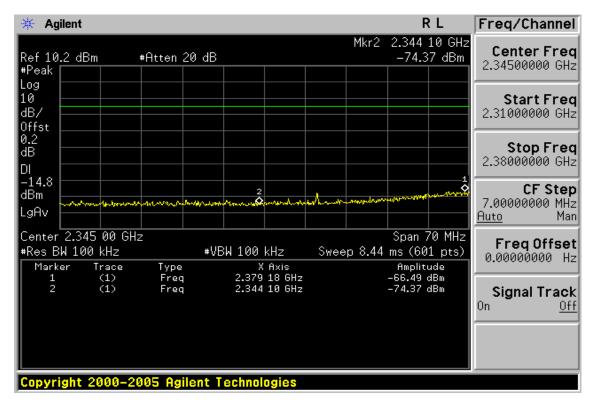


Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 30 of 90

## BDR Mode Band Edges Test Data CH-Low





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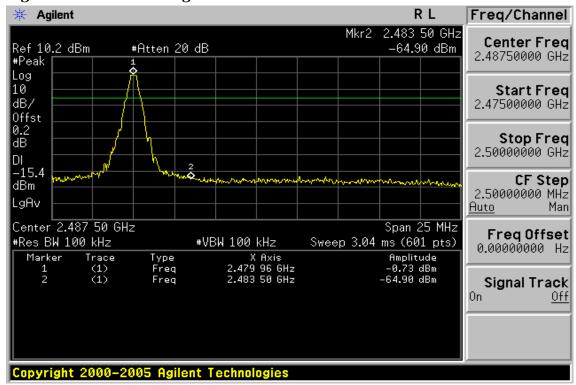
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Page: 31 of 90

## Band Edges Test Data CH-High



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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 32 of 90

**Radiated Emission: (BDR mode)** 

Operation Mode Test Date Mar. 30, 2010 TX CH Low

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

65 % Humidity

	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)	
2346.33	40.80		-1.62	39.18		74.00	54.00	-14.82	Peak
2390.00	39.56		-1.39	38.17		74.00	54.00	-15.83	Peak

Operation Mode TX CH Low Test Date Mar. 30, 2010 Fundamental Frequency 2402 MHz Test By Jazz 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)	
,	2399.54	41.00		-1.65	39.35		74.00	54.00	-14.65	Peak
	2399.00	39.87		-1.39	38.48		74.00	54.00	-15.52	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 o
- (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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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 33 of 90

#### **Radiated Emission:**

TX CH High Test Date Mar. 30, 2010 Operation Mode Fundamental Frequency 2480 MHz Jazz Test By Pol Temperature Ver. 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)	$\mathbf{CF}(\mathbf{dB})$	(d Bu V/m)	(dBuV/m)	(dBuV/m)	(dBuV/m	(dB)	

Operation Mode TX CH High Test Date Mar. 30, 2010 Fundamental Frequency 2480 MHz Test By Jazz Pol Temperature 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	( <b>dB</b> )	
2483.56	43.67		-0.92	42.75		74.00	54.00	-11.25	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 o
- (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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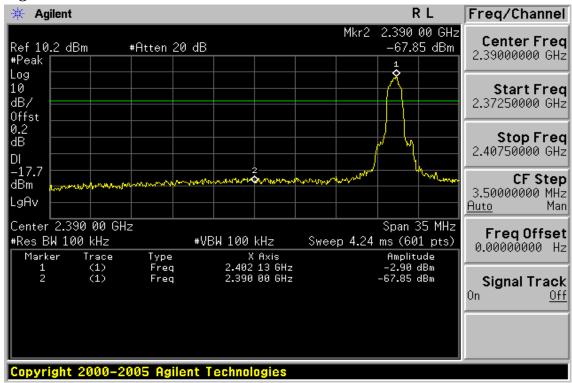
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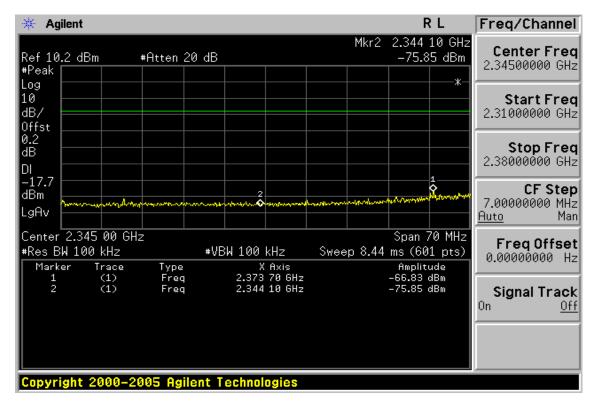


Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 34 of 90

# EDR Mode Band Edges Test Data CH-Low





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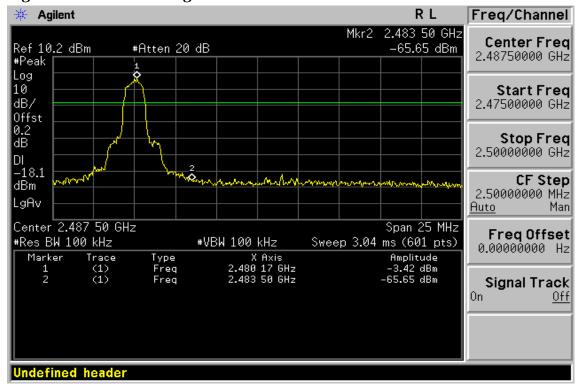
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Page: 35 of 90

## Band Edges Test Data CH-High



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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 36 of 90

### **Radiated Emission:**

Operation Mode TX CH Low Test Date Mar. 30, 2010

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

Humidity 65 %

	Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	Remark
(MHz)	(dBuV)	(dBuV)	$\mathbf{CF}(\mathbf{dB})$	(d Bu V/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
2351.79	41.19		-1.57	39.62		74.00	54.00	-14.38	Peak
2390.00	40.50		-1.39	39.11		74.00	54.00	-14.89	Peak

Operation Mode TX CH Low Test Date Mar. 30, 2010 Fundamental Frequency 2402 MHz Test By Jazz 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	Limi t	Margin	Remark
	(MHz)	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
,	2340.73	40.48		-1.65	38.83		74.00	54.00	-15.17	Peak
	2390.00	40.14		-1.39	38.75		74.00	54.00	-15.25	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 o
- (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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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 37 of 90

#### **Radiated Emission:**

TX CH High Test Date Mar. 30, 2010 Operation Mode Fundamental Frequency 2480 MHz Jazz Test By Pol Temperature Ver. 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)	( <b>dB</b> )	
2483.56	42.12		-0.92	41.20		74.00	54.00	-12.80	Peak

Operation Mode TX CH High Test Date Mar. 30, 2010 Fundamental Frequency 2480 MHz Test By Jazz Pol Temperature 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)	( <b>dB</b> )	
2483.56	45.62		-0.92	44.70		74.00	54.00	-9.30	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 o
- (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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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 38 of 90

### 8. SPURIOUS EMISSION TEST

### 8.1. 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.

According to RSS-Gen §7.2.3 and RSS-210 issue 7,§A2.9, In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the radio frequency power that is produced shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under section A8.4(4), the attenuation required shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Tables 2 and 3 is not required. In addition, radiated emissions which fall in the restricted bands of Table 1 must also comply with the radiated emission limits specified in Tables 2 and 3.

#### 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:

Refer to section 7.2 for details.

#### 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:

Refer to section 7.3 for details.



Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 39 of 90

#### **8.4.** 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.

### 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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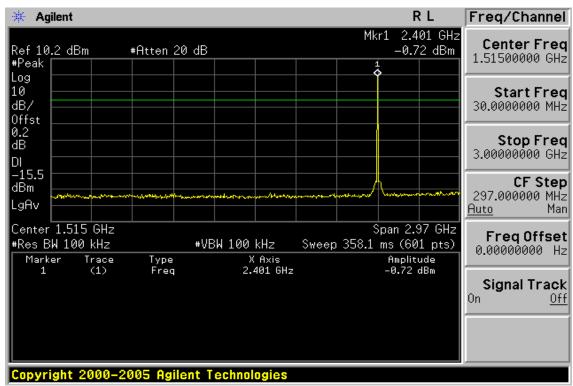
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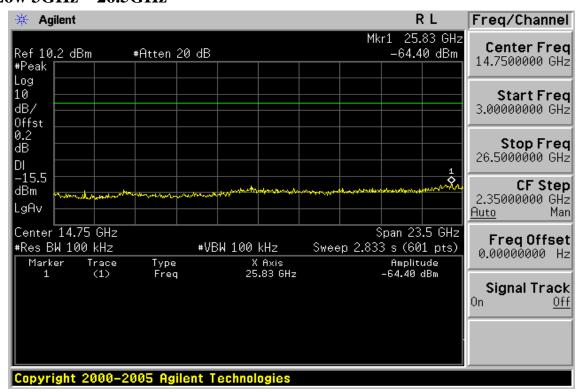
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Page: 40 of 90

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



## Ch Low 3GHz - 26.5GHz



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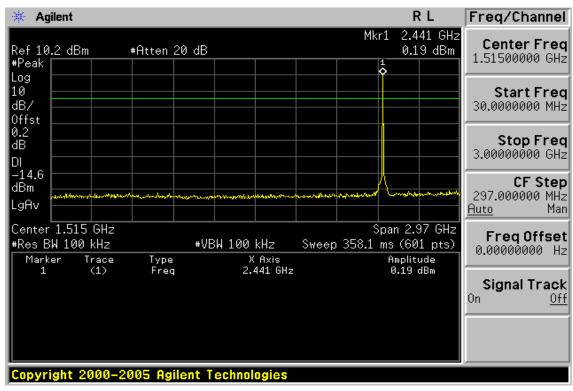
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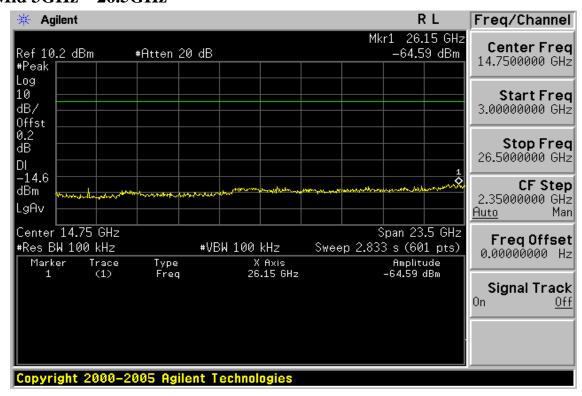
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Page: 41 of 90

### Ch Mid 30MHz - 3GHz



#### Ch Mid 3GHz – 26.5GHz



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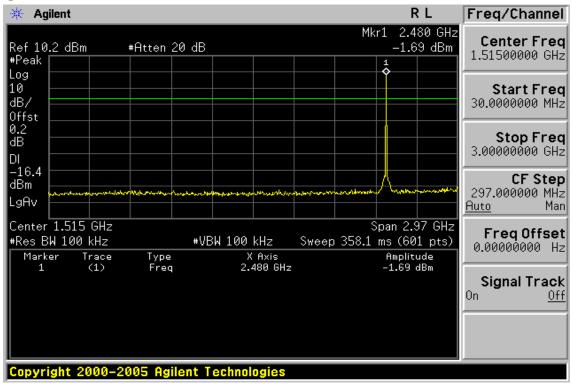
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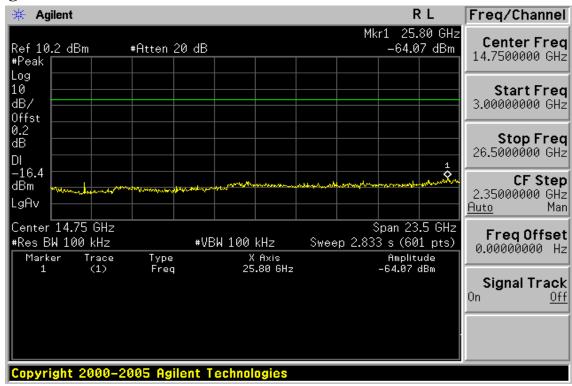
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Page: 42 of 90

# Ch High 30MHz - 3GHz



## Ch High 3GHz – 26.5GHz



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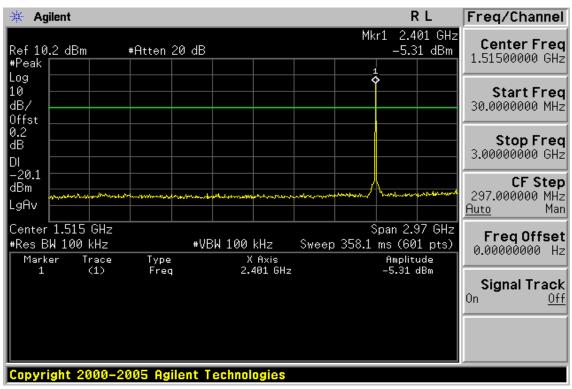
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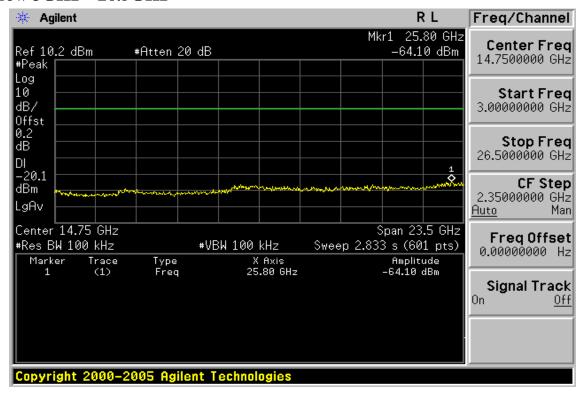
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Page: 43 of 90

# **Conducted Spurious Emission Measurement Result (EDR mode)** Ch Low 30MHz - 3GHz



#### Ch Low 3GHz - 26.5GHz



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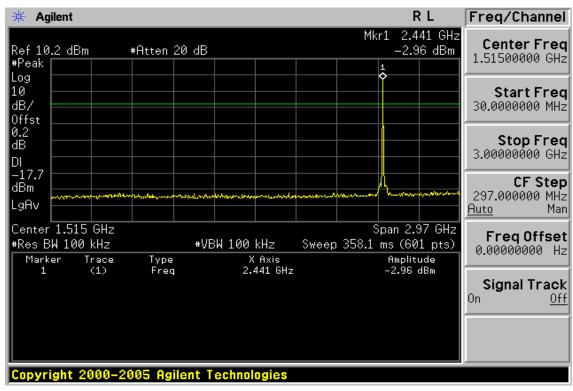
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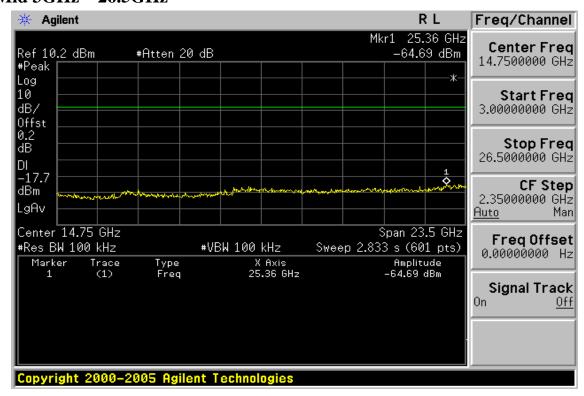
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Page: 44 of 90

### Ch Mid 30MHz - 3GHz



#### Ch Mid 3GHz – 26.5GHz



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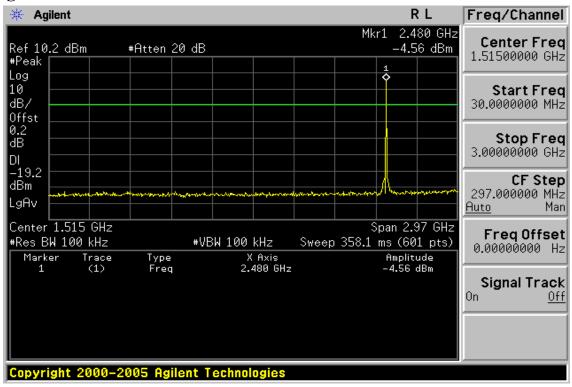
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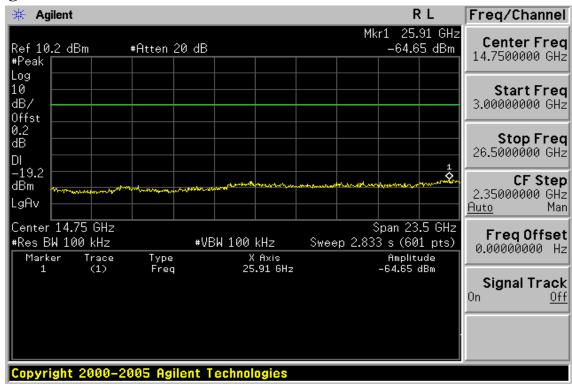
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Page: 45 of 90

## Ch High 30MHz - 3GHz



## Ch High 3GHz – 26.5GHz



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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 46 of 90

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

TX CH Low Operation Mode Test Date Mar. 30, 2010

Fundamental Frequency 2402MHz Test By Jazz Pol Temperature Ver./Hor. 25 °C

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)	(dB)
104.69	V	Peak	45.29	-16.63	28.66	43.50	-14.84
286.08	V	Peak	33.15	-13.26	19.89	46.00	-26.11
449.04	V	Peak	31.45	-8.61	22.84	46.00	-23.16
611.03	V	Peak	32.65	-5.79	26.86	46.00	-19.14
643.04	V	Peak	31.50	-5.14	26.36	46.00	-19.64
832.19	V	Peak	32.10	-2.37	29.73	46.00	-16.27
104.69	Н	Peak	37.97	-16.63	21.34	43.50	-22.16
286.08	Н	Peak	34.08	-13.26	20.82	46.00	-25.18
439.34	Н	Peak	31.86	-8.80	23.06	46.00	-22.94
565.44	Н	Peak	31.28	-7.15	24.13	46.00	-21.87
625.58	Н	Peak	32.23	-5.47	26.76	46.00	-19.24
819.58	Н	Peak	31.62	-2.61	29.01	46.00	-16.99

#### 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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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 47 of 90

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

TX CH Mid Operation Mode Test Date Mar. 30, 2010 Fundamental Frequency 2441MHz Test By Jazz Pol Ver./Hor. Temperature 25 °C

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)	(dB)
104.69	V	Peak	45.27	-16.63	28.64	43.50	-14.86
153.19	V	Peak	32.78	-13.00	19.78	43.50	-23.72
284.14	V	Peak	32.45	-13.28	19.17	46.00	-26.83
463.59	V	Peak	32.30	-8.55	23.75	46.00	-22.25
596.48	V	Peak	32.83	-6.12	26.71	46.00	-19.29
837.04	V	Peak	31.53	-2.22	29.31	46.00	-16.69
104.69	Н	Peak	37.65	-16.63	21.02	43.50	-22.48
138.64	Н	Peak	31.61	-13.80	17.81	43.50	-25.69
400.54	Н	Peak	32.86	-9.99	22.87	46.00	-23.13
514.03	Н	Peak	32.22	-8.30	23.92	46.00	-22.08
643.04	Н	Peak	31.73	-5.14	26.59	46.00	-19.41
846.74	Н	Peak	32.26	-2.04	30.22	46.00	-15.78

#### 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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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 48 of 90

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

TX CH High Operation Mode Test Date Mar. 30, 2010 Fundamental Frequency 2480MHz Test By Jazz Pol Ver./Hor. Temperature 25 °C

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)	(dB)
104.69	V	Peak	44.73	-16.63	28.10	43.50	-15.40
153.19	V	Peak	32.74	-13.00	19.74	43.50	-23.76
286.08	V	Peak	33.11	-13.26	19.85	46.00	-26.15
477.17	V	Peak	31.51	-8.56	22.95	46.00	-23.05
625.58	V	Peak	32.23	-5.47	26.76	46.00	-19.24
774.96	V	Peak	30.97	-3.67	27.30	46.00	-18.70
104.69	Н	Peak	37.47	-16.63	20.84	43.50	-22.66
167.74	Н	Peak	32.55	-13.85	18.70	43.50	-24.80
286.08	Н	Peak	33.20	-13.26	19.94	46.00	-26.06
453.89	Н	Peak	31.39	-8.60	22.79	46.00	-23.21
601.33	Н	Peak	32.46	-5.98	26.48	46.00	-19.52
832.19	Н	Peak	33.28	-2.37	30.91	46.00	-15.09

#### 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.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 49 of 90

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

Operation Mode TX CH Low Mar. 30, 2010 Test Date

Fundamental Frequency 2402 MHz Test By Jazz Pol Temperature Ver. 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)	
4804.0	37.78		6.04	43.82		74.00	54.00	-10.18	Peak
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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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 50 of 90

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

Operation Mode TX CH Low Test Date Mar. 30, 2010 Jazz Fundamental Frequency 2402 MHz Test By Pol Temperature 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)	
4804.0	38.11		6.04	44.15		74.00	54.00	-9.85	Peak
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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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 51 of 90

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

Operation Mode TX CH Mid Test Date Mar. 30, 2010

Fundamental Frequency 2441 MHz Test By Jazz Pol Temperature Ver. 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)	
4882.0	37.89		6.17	44.06		74.00	54.00	-9.94	Peak
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 ms.
- 5 Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 52 of 90

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

Operation Mode TX CH Mid Test Date Mar. 30, 2010

Jazz Fundamental Frequency 2441 MHz Test By Pol Temperature 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)	
4882.0	37.48		6.17	43.65		74.00	54.00	-10.35	Peak
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 ms.
- 5 Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 53 of 90

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

Operation Mode TX CH High Test Date Mar. 30, 2010 Fundamental Frequency 2480 MHz Test By **Jazz** 

Pol Temperature Ver. 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)	
4960.0	38.25		6.36	44.61		74.00	54.00	-9.39	Peak
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 ms.
- 5 Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 54 of 90

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

Operation Mode TX CH High Test Date Mar. 30, 2010

Jazz Fundamental Frequency 2480 MHz Test By Pol Temperature 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)	
4960.0	38.50		6.36	44.86		74.00	54.00	-9.14	Peak
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 ms.
- 5 Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 55 of 90

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

Operation Mode **RX CH Low Test Date** Mar. 30, 2010 Fundamental Frequency 2402MHz Test By **Jazz** Pol **Temperature** 25 °C Ver./Hor

65 % Humidity

Freq.	Ant.Pol.	Detector Mode	Reading	Factor	Actual FS	Limit3m	Safe Margin
(MHz)	H/V	(PK/QP)	(dBuV)	(dB)	(dBuV/m)	(dBuV/m)	(dB)
153.19	V	Peak	30.44	-13.00	17.44	43.50	-26.06
286.08	V	Peak	33.37	-13.26	20.11	46.00	-25.89
431.58	V	Peak	31.66	-9.09	22.57	46.00	-23.43
521.79	V	Peak	32.42	-8.10	24.32	46.00	-21.68
647.89	V	Peak	32.79	-4.99	27.80	46.00	-18.20
890.39	V	Peak	31.69	-1.20	30.49	46.00	-15.51
104.69	Н	Peak	44.97	-16.63	28.34	43.50	-15.16
153.19	Н	Peak	32.93	-13.00	19.93	43.50	-23.57
424.79	Н	Peak	33.60	-9.27	24.33	46.00	-21.67
557.68	Н	Peak	33.44	-7.41	26.03	46.00	-19.97
708.03	Н	Peak	32.13	-4.88	27.25	46.00	-18.75
875.84	Н	Peak	32.28	-1.51	30.77	46.00	-15.23

#### 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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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 56 of 90

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

Operation Mode RX CH Mid Test Date Mar. 30, 2010

Fundamental Frequency 2441MHz Test By Jazz Temperature  $25^{\circ}$ 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)	(dB)
104.69	V	Peak	45.36	-16.63	28.73	43.50	-14.77
286.08	V	Peak	32.87	-13.26	19.61	46.00	-26.39
327.79	V	Peak	32.71	-12.36	20.35	46.00	-25.65
431.58	V	Peak	32.42	-9.09	23.33	46.00	-22.67
620.73	V	Peak	31.70	-5.57	26.13	46.00	-19.87
856.44	V	Peak	31.49	-1.89	29.60	46.00	-16.40
104.69	Н	Peak	37.73	-16.63	21.10	43.50	-22.40
153.19	Н	Peak	31.30	-13.00	18.30	43.50	-25.20
286.08	Н	Peak	33.30	-13.26	20.04	46.00	-25.96
426.73	Н	Peak	32.16	-9.21	22.95	46.00	-23.05
633.34	Н	Peak	31.95	-5.32	26.63	46.00	-19.37
872.93	Н	Peak	32.01	-1.56	30.45	46.00	-15.55

#### 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.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

Shear States the East as within this east report released and social sample(s) are tealined for 90 days only. It was the sample of the Sample



Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 57 of 90

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

Operation ModeRX CH HighTest DateMar. 30, 2010Fundamental Frequency2480MHzTest ByJazzTemperature25 °CPolVer./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)	(dB)
104.69	V	Peak	45.05	-16.63	28.42	43.50	-15.08
153.19	V	Peak	32.58	-13.00	19.58	43.50	-23.92
363.68	V	Peak	32.85	-11.27	21.58	46.00	-24.42
446.13	V	Peak	31.58	-8.67	22.91	46.00	-23.09
615.88	V	Peak	32.11	-5.70	26.41	46.00	-19.59
837.04	V	Peak	31.72	-2.22	29.50	46.00	-16.50
104.69	Н	Peak	38.17	-16.63	21.54	43.50	-21.96
167.74	Н	Peak	31.94	-13.85	18.09	43.50	-25.41
284.14	Н	Peak	33.69	-13.28	20.41	46.00	-25.59
434.49	Н	Peak	31.41	-9.01	22.40	46.00	-23.60
640.13	Н	Peak	31.99	-5.19	26.80	46.00	-19.20
795.33	Н	Peak	31.71	-3.15	28.56	46.00	-17.44

### 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.

Unless otherwise stated the results shown in this test report refer only to the sample(s) tested and such sample(s) are retained for 90 days only.

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 58 of 90

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

Operation Mode **RX CH Low** Mar. 30, 2010 Test Date Fundamental Frequency 2402 MHz Test By **Jazz Temperature** 25°C Pol Ver. Humidity 65 %

**Peak** AV**Actual FS Peak** AVReading Ant./CL  $\mathbf{AV}$ Freq. Reading **Peak** Limit Limit Margin (dBuV/m) (dBuV/m) (dBuV/m)(MHz) (dBuV) (dBuV) CF(dB) (dB) 4804.0 39.62 6.04 45.66 74.00 54.00 -8.34Peak 7206.0 74.00 54.00 9608.0 74.00 54.00 12010.0 74.00 54.00 14412.0 74.00 54.00

#### Remark:

- Measuring frequencies scanned from 1GHz to the 10th harmonic of highest fundamental frequency.
- 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.
- 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-40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- Spectrum AV Setting: 1GHz-40GHz, RBW=1MHz, VBW=10Hz, Sweep time=200 ms.

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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 59 of 90

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

Operation Mode **RX CH Low** Mar. 30, 2010 Test Date Fundamental Frequency 2402 MHz Test By **Jazz** Pol **Temperature** 25 °C Hor

65 % Humidity

	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)	
4804.0	38.00		6.04	44.04		74.00	54.00	-9.96	Peak
7206.0						74.00	54.00		
9608.0						74.00	54.00		
12010.0						74.00	54.00		
14412.0						74.00	54.00		

#### Remark:

- Measuring frequencies scanned 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.
- 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- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting: 1GHz-40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 60 of 90

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

Operation Mode **RX CH Mid** Mar. 30, 2010 Test Date Fundamental Frequency 2441 MHz Test By **Jazz** 25 °C Pol **Temperature** Ver

65 % Humidity

	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)	
4882.0	40.03		6.17	46.20		74.00	54.00	-7.80	Peak
7323.0						74.00	54.00		
9764.0						74.00	54.00		
12205.0						74.00	54.00		
14646.0						74.00	54.00		

#### Remark:

- Measuring frequencies scanned 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.
- 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- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting: 1GHz-40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 61 of 90

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

Operation Mode **RX CH Mid** Mar. 30, 2010 Test Date Fundamental Frequency 2441 MHz Test By **Jazz** 25 °C Pol **Temperature** 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)	
4882.0	38.69		6.17	44.86		74.00	54.00	-9.14	Peak
7323.0						74.00	54.00		
9764.0						74.00	54.00		
12205.0						74.00	54.00		
14646.0						74.00	54.00		

#### Remark:

- Measuring frequencies scanned 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.
- 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- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting: 1GHz-40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 62 of 90

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

Operation Mode **RX CH High** Test Date Mar. 30, 2010 Fundamental Frequency 2480 MHz Test By **Jazz** Pol **Temperature** 25 °C Ver

65 % Humidity

	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)	
4960.0	38.69		6.36	45.05		74.00	54.00	-8.95	Peak
7440.0						74.00	54.00		
9920.0						74.00	54.00		
12400.0						74.00	54.00		
14880.0						74.00	54.00		

#### Remark:

- Measuring frequencies scanned 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.
- 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- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting: 1GHz-40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 63 of 90

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

Operation Mode **RX CH High** Mar. 30, 2010 Test Date Fundamental Frequency 2480 MHz Test By **Jazz** Pol **Temperature** 25 °C Hor

65 % Humidity

	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)	
4960.0	38.41		6.36	44.77		74.00	54.00	-9.23	Peak
7440.0						74.00	54.00		
9920.0						74.00	54.00		
12400.0						74.00	54.00		
14880.0						74.00	54.00		

#### Remark:

- Measuring frequencies scanned 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.
- 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- 40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting: 1GHz-40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 64 of 90

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

**GPS** Mode Operation Mode Mar. 30, 2010 Test Date

Fundamental Frequency N/A Test By **Jazz** Pol **Temperature** 25 °C 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)
	134.28	V	Peak	33.68	-18.50	15.18	43.50	-28.32
	240.60	V	Peak	34.58	-22.61	11.97	46.00	-34.03
	245.83	V	Peak	33.37	-21.78	11.59	46.00	-34.41
	301.60	V	Peak	40.86	-19.28	21.58	46.00	-24.42
	325.85	V	Peak	34.15	-19.46	14.69	46.00	-31.31
	500.45	V	Peak	31.00	-13.21	17.79	46.00	-28.21
	134.28	Н	Peak	33.68	-22.18	11.50	43.50	-32.00
	204.60	Н	Peak	34.58	-22.61	11.97	43.50	-31.53
	245.83	Н	Peak	33.37	-21.78	11.59	46.00	-34.41
	301.60	Н	Peak	40.86	-19.28	21.58	46.00	-24.42
	325.85	Н	Peak	34.15	-19.46	14.69	46.00	-31.31
	500.45	Н	Peak	31.00	-13.21	17.79	46.00	-28.21

### 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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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 65 of 90

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

GPS mode Operation Mode Mar. 30, 2010 Test Date Fundamental Frequency N/A Test By Jazz Pol Ver. / Hor. **Temperature** 25°C

Humidity 65 %

		Peak	$\mathbf{AV}$		Actu	al FS	Peak	$\mathbf{AV}$		
Freq.	Ant.Pol.	Reading	Reading	Ant./CL	Peak	$\mathbf{AV}$	Limit	Limit	Margin	
(MHz)	H/V	(dBuV)	(dBuV)	CF(dB)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dBuV/m)	(dB)	
1195.0	V	47.49		-15.61	31.88		74.00	54.00	-22.12	Peak
1370.0	V	50.21		-14.75	35.46		74.00	54.00	-18.54	Peak
1495.0	V	47.13		-14.37	32.76		74.00	54.00	-21.24	Peak
1635.0	V	48.02		-13.80	34.22		74.00	54.00	-19.78	Peak
3285.0	V	47.23		-10.38	36.85		74.00	54.00	-17.15	Peak
1370.0	Н	47.53		-14.75	32.78		74.00	54.00	-21.22	Peak
1635.0	Н	48.08		-13.80	34.28		74.00	54.00	-19.72	Peak
3285.0	Н	46.07		-10.38	35.69		74.00	54.00	-18.31	Peak
3970.0	Н	45.44		-8.73	36.71		74.00	54.00	-17.29	Peak

#### Remark:

- Measuring frequencies scanned 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.
- 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-40GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
- (5) Spectrum AV Setting: 1GHz-40GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 66 of 90

#### 9. FREQUENCY SEPARATION

### 9.1. Standard Applicable:

According to §15.247(a)(1), Frequency hopping systems shall have hopping channel carrier frequencies separated by minimum of 25KHz or the 20dB bandwidth of the hopping channel, whichever is greater.

According to RSS 210 issue 6, A8.1(b), frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater.

### 9.2. Measurement Equipment Used:

Refer to section 6.2 for details.

#### 9.3. Test Set-up:

Refer to section 6.3 for details.

#### 9.4. 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.

#### 9.5. Measurement Result:

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

Note: Refer to next page for plots.

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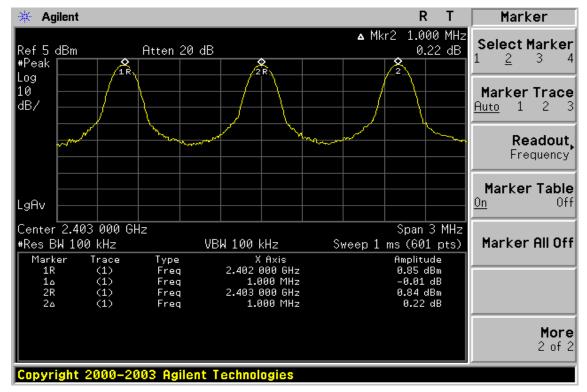
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Page: 67 of 90

# **Frequency Separation Test Data**



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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 68 of 90

## 10. NUMBER OF HOPPING FREQUENCY

### 10.1. 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.

According to RSS-210 issue 7,§A8.1(d), For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, the maximum conducted output power shall not exceed 1 W. For all other frequency hopping systems, the maximum peak conducted output power shall not exceed 0.125 W.

### 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 spectrum analyzer Start=2400MHz, Stop = 2483.5MHz, Sweep = auto.
- 4. Set the spectrum analyzer as RBW=430KHz, VBW=1.3MHz,
- 5. Max hold, view and count how many channel in the band.

#### 10.5. Measurement Result:

Note: Refer to next page for plots.

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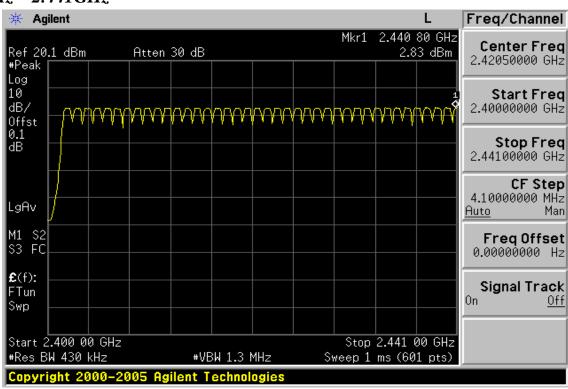
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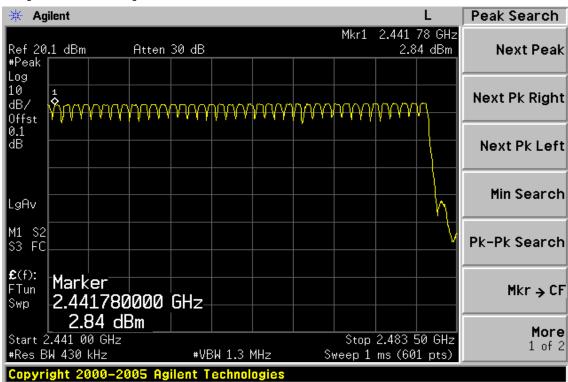
Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 69 of 90

## Channel Number 2.4 GHz – 2.441GHz



#### 2.441 GHz – 2.4835GHz



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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 70 of 90

## 11. TIME OF OCCUPANCY (DWELL TIME)

## 11.1. 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.

According to RSS-210 issue 7,§A8.1(d), Frequency hopping systems operating in the 2400-2483.5 MHz band shall use at least 15 hopping channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Transmissions on particular hopping frequencies may be avoided or suppressed provided that a minimum of 15 hopping channels are used.

### 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 center frequency of spectrum analyzer = operating frequency.
- 4. Set the spectrum analyzer as RBW=1KHz, VBW=3MHz, Span = 0Hz, Adjust Sweep = 15s.
- 5. Repeat above procedures until all frequency measured were complete.

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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 71 of 90

#### 11.5. Measurement Result:

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

CH Low: DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)CH Mid:

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

DH1 time slot = 0.417 (ms) \* (1600/(2\*79)) \* 31.6 = 133.44 (ms)CH High:

DH3 time slot = 1.667 (ms) \* (1600/(4\*79)) \* 31.6 = 266.72 (ms)

DH5 time slot = 2.925 (ms) \* (1600/(6\*79)) \* 31.6 = 312.00 (ms)

Note: Refer to next page for plots.

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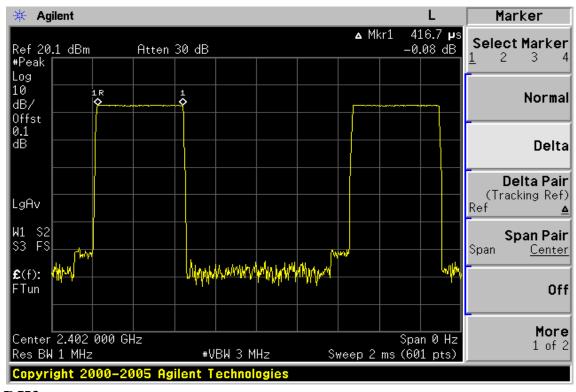
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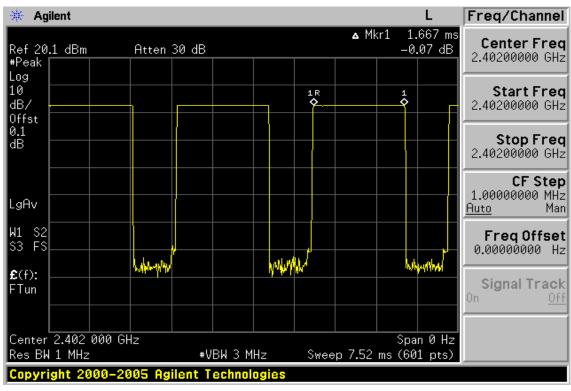
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Page: 72 of 90

## CH-Low DH1



#### DH3



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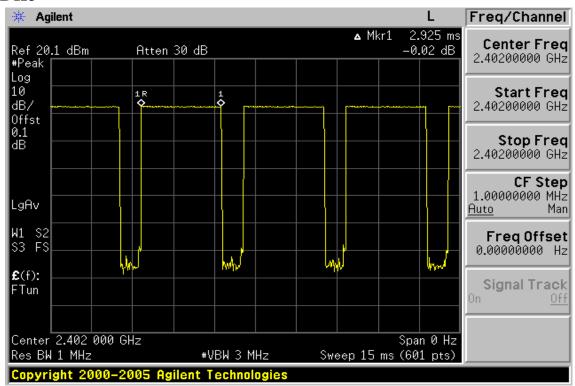
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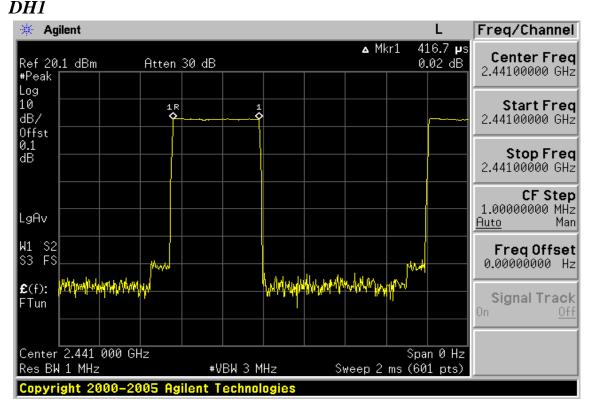
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Page: 73 of 90

#### DH<sub>5</sub>



# CH-Mid



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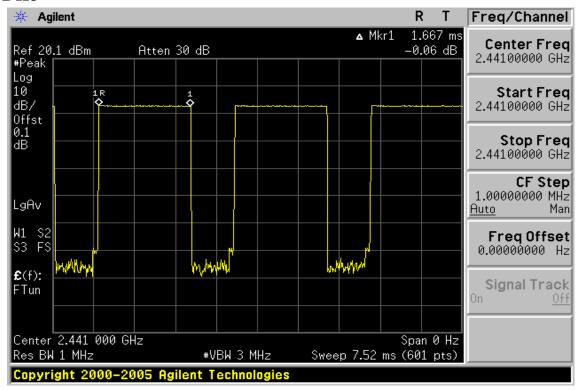
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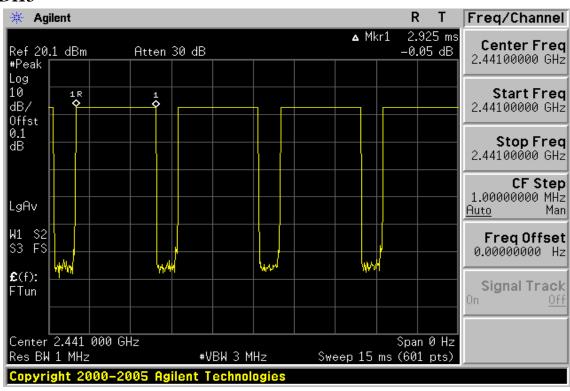
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Page: 74 of 90

#### DH3



#### DH5



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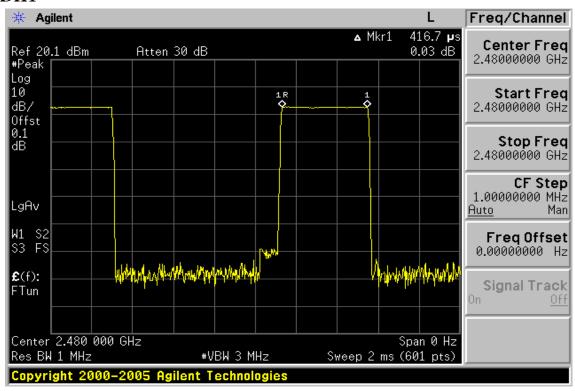
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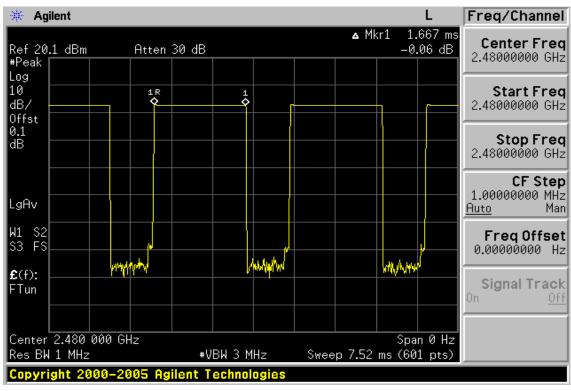
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Page: 75 of 90

# CH-High DH1



#### DH3



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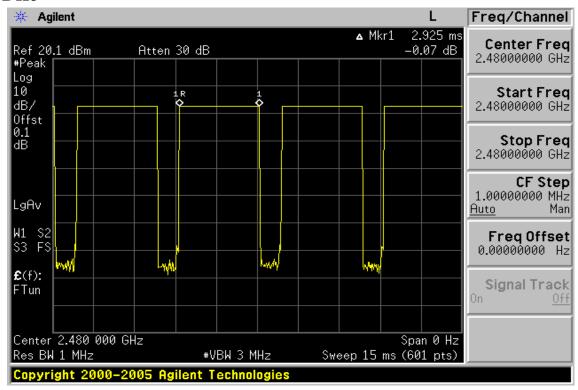
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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 76 of 90

#### DH<sub>5</sub>



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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 77 of 90

# 12. Peak Power Spectral Density

### 12.1. 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.

According to RSS-210 issue 7, §A8.2(b) and §A8.3(2), The transmitter power spectral density (into the antenna) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission or over 1.0 second if the transmission exceeds 1.0-second duration.

### 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 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.



Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 78 of 90

#### 12.5. Measurement Result:

**BDR Mode** 

СН	RF Power Density	Cable loss	RF Power Density	Maximum Limit
	Reading (dBm)	(dB)	Level (dBm)	(dBm)
Low	-11.60	0.00	-11.60	8
Mid	-11.39	0.00	-11.39	8
High	-11.96	0.00	-11.96	8

#### EDR Mode

СН	RF Power Density	Cable loss	<b>RF Power Density</b>	Maximum Limit
	Reading (dBm)	(dB)	Level (dBm)	(dBm)
Low	-17.00	0.00	-17.00	8
Mid	-16.43	0.00	-16.43	8
High	-17.31	0.00	-17.31	8

Note: offset 0.2dB for path lose. Note: Refer to next page for plots.

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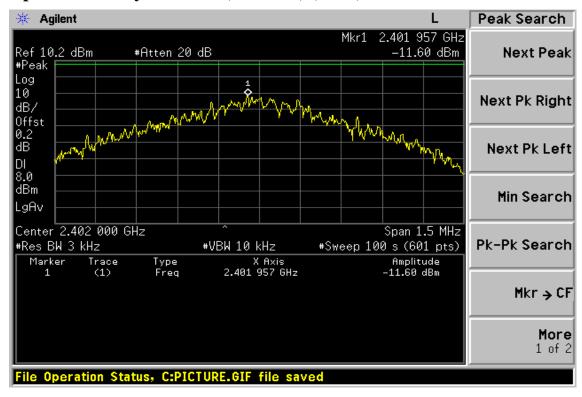
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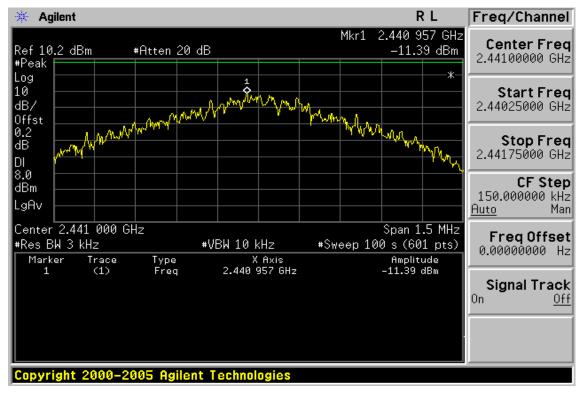
Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 79 of 90

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



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



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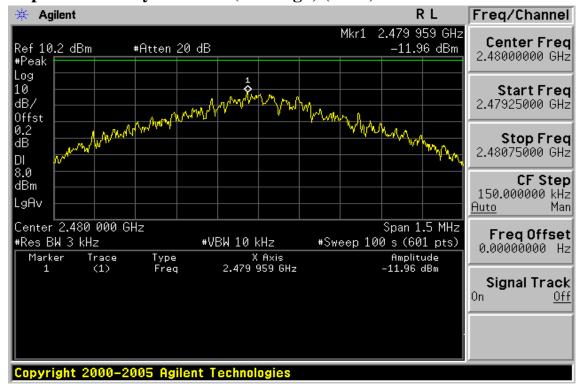
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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 80 of 90

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



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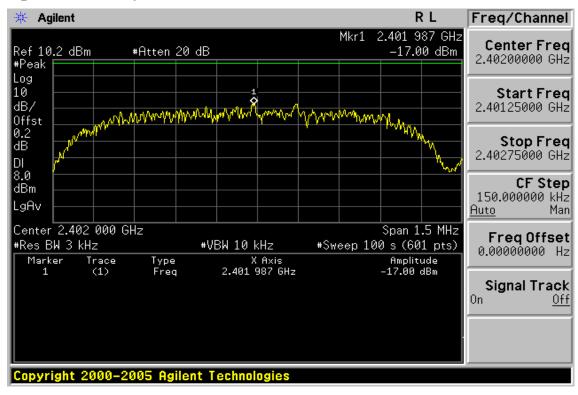
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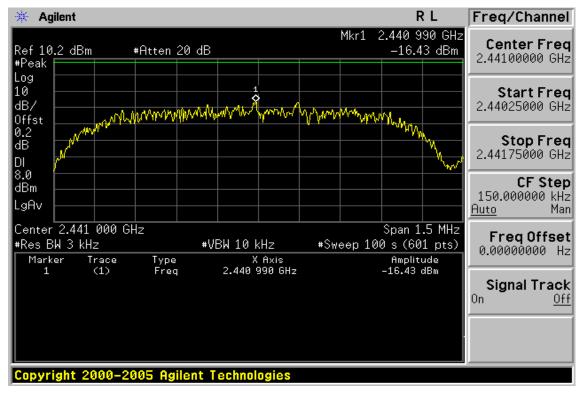
Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 81 of 90

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



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



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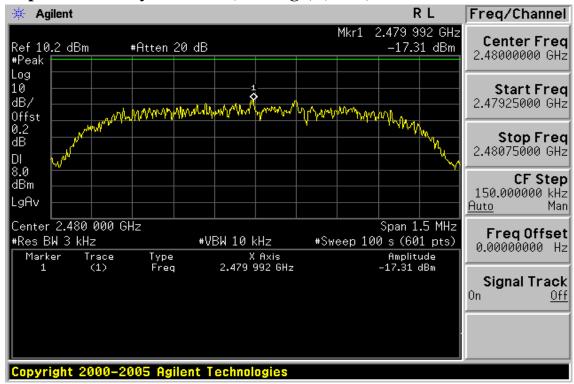
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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 82 of 90

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



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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 83 of 90

### 13. 20dB Bandwidth & 99% Bandwidth

### 13.1. Standard Applicable:

According to §15.247(a)(1), and RSS210 A8.1(b) for frequency hopping systems operating in the 2400MHz-2483.5 MHz no limit for 20dB bandwidth.

### 13.2. Measurement Equipment Used:

Refer to section 6.2 for details.

### 13.3. Test Set-up:

Refer to section 6.3 for details.

#### 13.4. 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.



Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 84 of 90

#### 13.5. Measurement Result:

20dB Bandwidth: BDR mode

СН	Bandwidth
	(kHz)
Lower	924.930
Mid	924.972
Higher	920.223

20dB Bandwidth: EDR mode

СН	Bandwidth	2/3 Bandwidth
	(MHz)	(MHz)
Lower	1.297	0.865
Mid	1.251	0.834
Higher	1.285	0.857



Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 85 of 90

99% Bandwidth: BDR Mode

СН	Bandwidth (kHz)
Lower	879.9689
Mid	884.3394
Higher	883.8468

99% Bandwidth: EDR Mode

СН	Bandwidth (MHz)
Lower	1.1704
Mid	1.1781
Higher	1.1756

Note: Refer to next page for plots.



Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 86 of 90

# BDR Mode 20dB Bandwidth & 99% Bandwidth Test Data CH-Low



### 20dB Bandwidth & 99% Bandwidth Test Data CH-Mid



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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 87 of 90

### 20dB Bandwidth & 99% Bandwidth Test Data CH-High



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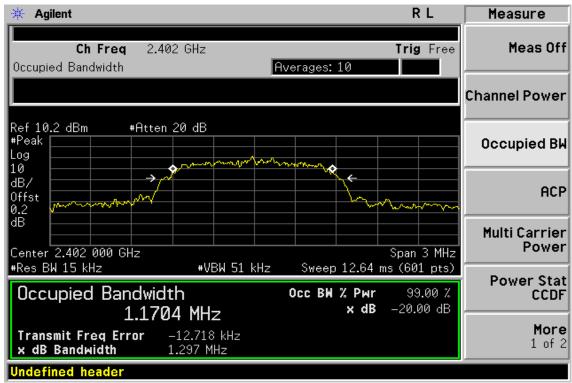
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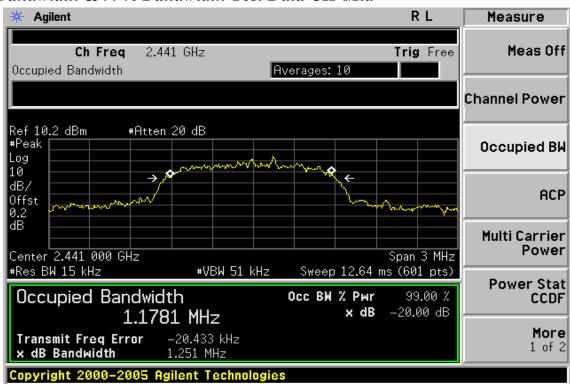
Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 88 of 90

# EDR Mode 20dB Bandwidth & 99% Bandwidth Test Data CH-Low



### 20dB Bandwidth & 99% Bandwidth Test Data CH-Mid



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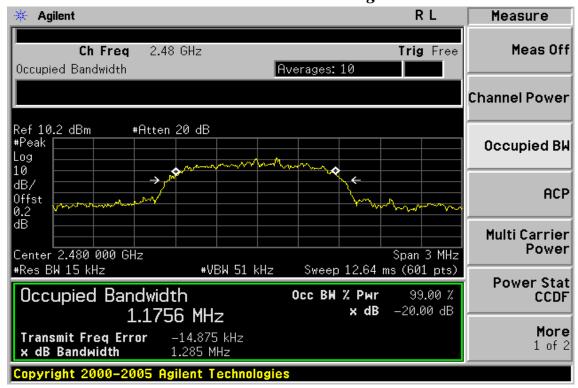
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Report No.: EH/2010/30049 **Issue Date: Apr. 08, 2010** 

Page: 89 of 90

### 20dB Bandwidth & 99% Bandwidth Test Data CH-High



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Report No.: EH/2010/30049 Issue Date: Apr. 08, 2010

Page: 90 of 90

### 14. ANTENNA REQUIREMENT

### 14.1. Standard Applicable:

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 §15.246(1), if transmitting antennas of directional gain greater than 6dBi are used the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

According to RSS-GEN 7.1.4, a transmitter can only be sold or operated with antennas with which it was certified. A transmitter may be certified with multiple antenna types. An antenna type comprises antennas having similar in-band and out-of-band radiation patterns. Testing shall be performed using the highest-gain antenna of each combination of transmitter and antenna type for which certification is being sought, with the transmitter output power set at the maximum level. Any antenna of the same type and having equal or lesser gain as an antenna that had been successfully tested for certification with the transmitter, will also be considered certified with the transmitter, and may be used and marketed with the transmitter. The manufacturer shall include with the application for certification a list of acceptable antenna types to be used with the transmitter.

When a measurement at the antenna connector is used to determine RF output power, the effective gain of the device's antenna shall be stated, based on measurement or on data from the antenna manufacturer. Any antenna gain in excess of 6 dBi (6 dB above isotropic gain) shall be added to the measured RF output power before using the power limits specified in RSS-210 or RSS-310 for devices of RF output powers of 10 milliwatts or less. For devices of output powers greater than 10 milliwatts, except devices subject to RSS-210 Annex 8 (Frequency Hopping and Digital Modulation Systems Operating in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz Bands) or RSS-210 Annex 9 (Local Area Network Devices), the total antenna gain shall be added to the measured RF output power before using the specified power limits. For devices subject to RSS-210 Annex 8 or Annex 9, the antenna gain shall not be added.

#### 14.2. Antenna Connected Construction:

The directional gains of antenna used for transmitting is 1.1dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

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