

**ELECTROMAGNETIC EMISSIONS COMPLIANCE REPORT
INTENTIONAL RADIATOR CERTIFICATION TO
FCC PART 15 SUBPART C REQUIREMENT**

OF

BLUETOOTH MONO HEADSET

FCC ID: UHTBTH18

MODEL No.: BTH-F1

**LISTED MODELS: BTH-18, BTH-19,
BTH-20, BTH-21, BELLO**

BRAND NAME: N/A

REPORT NO: WE07040005

ISSUE DATE: Apr 23, 2007

Prepared for

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Prepared by

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d.b.a.

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VERIFICATION OF COMPLIANCE

Applicant:	V THREE INTERNATIONAL LIMITED Room 620, Advanced Technology Centre, 2 Choi Fat Street, Sheung Shui, Hong Kong
Product Description:	Bluetooth Mono Headset
Brand Name:	N/A
Model Number:	BTH-F1(Representative model for test)
Serial Number:	BTH-18; BTH-19; BTH-20; BTH-21; BELLO
File Number:	WE07040005
Date of Test:	Apr 10, 2007 ~ Apr 19, 2007

We hereby certify that:

The above equipment was tested by SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.4 (2003) and the energy emitted by the sample EUT tested as described in this report is in compliance with radiated emission limits of FCC Rules Part 15.247.

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

Approved By



Jimmy Li / Executive Manager
SHENZHEN HUA TONG WEI
INTERNATIONAL INSPECTION CO., LTD.

Reviewed By



Tracy Qi / RF Engineer
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1. GENERAL INFORMATION

1.1 PRODUCT DESCRIPTION

The tested product in the report, Model: BTH-F1 is a Bluetooth Headset.

The EUT is compliance with Bluetooth Standard.

A major technical descriptions of EUT is described as following:

- A). Operation Frequency: 2402~2480MHz, 79 channels
- B). Modulation type: FHSS
- C). Antenna Designation: Micro-strip Antenna, -1.01 dBi, Non-User Replaceable(Fixed)
- D). Power Supply: DC 3.7 V From Battery
- E). The series models BTH-F1,BTH-18; BTH-19; BTH-20; BTH-21 and BELLO have the same circuit diagram, PCB layout , only the model name are difference intend for market requirement.

1.2 RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for FCC ID: UHTBTH18 filing to comply with Section 15.247 of the FCC Part 15, Subpart C Rules. The composite system (receiver) is compliance with Subpart B is authorized under a Declaration of Conformity procedure.

1.3 TEST METHODOLOGY

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

1.4 TEST FACILITY

The fully anechoic chamber test site and conducted measurement facility used to collect the radiated data is located on the address of SHENZHEN HUA TONG WEI INTERNATIONAL INSPECTION CO., LTD Huatongwei Building, Keji Rd. 12 S., High-tech Park, Nanshan District, Shenzhen, Guangdong, P.R.China.

The fully anechoic chamber Test Sites and the Line Conducted labs are constructed and calibrated to meet the FCC requirements in documents ANSI C63.4: 2003 and CISPR 22/EN 55022 requirements.

1.5 SPECIAL ACCESSORIES

Not available for this EUT intended for grant.

1.6 EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

1.7 LABORATORY ACCREDITATIONS AND LISTINGS

The test facility is recognized, certified, or accredited by the following organizations:

CNAS-Lab Code: L1225

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed and proved to be in compliance with CNAS-CL01 Accreditation Criteria for Testing and Calibration Laboratories (identical to ISO/IEC 17025: 1999 General Requirements) for the Competence of Testing and Calibration Laboratories.

A2LA-Lab Cert. No. 2243.01

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 1999 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. Valid time is from Aug 24, 2005 to Sept 30, 2007

FCC-Registration No.: 662850

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Registration 662850, Renewal date September 12, 2006.

IC-Registration No.: 5377

The 3m Alternate Test Site of Shenzhen Huatongwei International Inspection Co., Ltd has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 5377 on November 28th, 2005.

ACA

Shenzhen Huatongwei International Inspection Co., Ltd, EMC Laboratory can also perform testing for the Australian C-Tick mark as a result of our A2LA accreditation.

NEMKO-Aut. No.: ELA125

Shenzhen Huatongwei International Inspection Co., Ltd has been assessed the quality assurance system, the testing facilities, qualifications and testing practices of the relevant parts of the organization. The quality assurance system of the Laboratory has been validated against ISO/IEC 17025 or equivalent. The laboratory also fulfils the conditions described in Nemko Document NLA-10.

VCCI

The 3m Semi-anechoic chamber (12.2m×7.95m×6.7m) and Shielded Room (8m×4m×3m) of Shenzhen Huatongwei International Inspection Co., Ltd has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-2484. Date of Registration: December 20, 2006. Valid time is until December 19, 2009.

Main Ports Conducted Interference Measurement of Shenzhen Huatongwei International Inspection Co., Ltd has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: C-2726. Date of Registration: December 20, 2006. Valid time is until December 19, 2009.

IECEE CB

Shenzhen Huatongwei International Inspection Co Ltd has been assessed and determined to fully comply with the requirements of ISO/IEC 17025: 2005-05, The Basic Rules, IECEE 01: 2006-10 and Rules of Procedure IECEE 02: 2006-10, and the relevant IECEE CB-Scheme Operational Documents.

It is therefore entitled to operate as a CB Testing Laboratory under the responsibility of Nemko A/S. This certificate remains valid until May 25th 2009 at which time it will be reissued by the IECEE Executive Secretary upon successful completion of the normally scheduled 3-year Reassessment Program administered by the IECEE CB Scheme.

DNV

Shenzhen Huatongwei International Inspection Co Ltd has been found to comply with the requirements of DNV towards subcontractor of EMC and safety testing services in conjunction with the EMC and Low voltage Directives and in the voluntary field. The acceptance is based on a formal quality Audit and follow-ups according to relevant parts of ISO/IEC Guide 17025(2005), in accordance with the requirements of the DNV Laboratory Quality Manual towards subcontractors. Valid time is until 19 April, 2007.

2. SYSTEM TEST CONFIGURATION

2.1 EUT CONFIGURATION

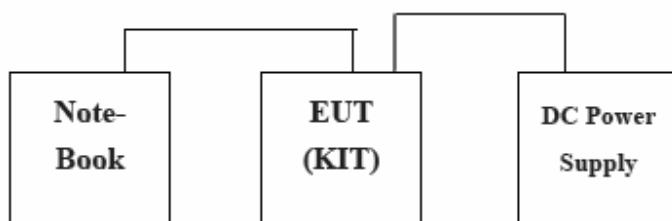
The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner which intends to maximize its emission characteristics in a continuous normal application.

2.2 EUT EXERCISE

The Transmitter was operated in the normal operating mode. The TX frequency was fixed which was for the purpose of the measurements.

2.3 CONFIGURATION OF TESTED SYSTEM

Fig. 2-1 Configuration of Tested System



Tested System (Fixed channel)

Table 2-1 Equipment Used in Tested System

No.	Product	Manufacturer	Model No.	Serial No.	FCC ID
1	Notebook PC	IBM	R50e	L3-XGMC3	DoC

3. SUMMARY OF TEST RESULTS

FCC Rules	Description Of Test	Result
§15.207(a)	Conducted Emission	Compliant
§15.247(b)(1)	Peak Output Power	Compliant
§15.247(a)	20dB Bandwidth	Compliant
§15.247(c)	100 KHz Bandwidth Of Frequency Band Edges	Compliant
§15.209(a) (f)	Spurious Emission	Compliant
§15.247(a)(1)	Frequency Separation	Compliant
§15.247(a)(1)(iii)	Number of hopping frequency	Compliant
§15.247(a)(1)(iii)	Time of Occupancy	Compliant
§15.247	Peak Power Density	Compliant
§15.203, §15.247(b)(4)(i)	Antenna Requirement	Compliant
§1.1310	RF Exposure	Compliant

4. DESCRIPTION OF TEST MODES

1. The EUT has been tested under normal operating condition.
2. 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.

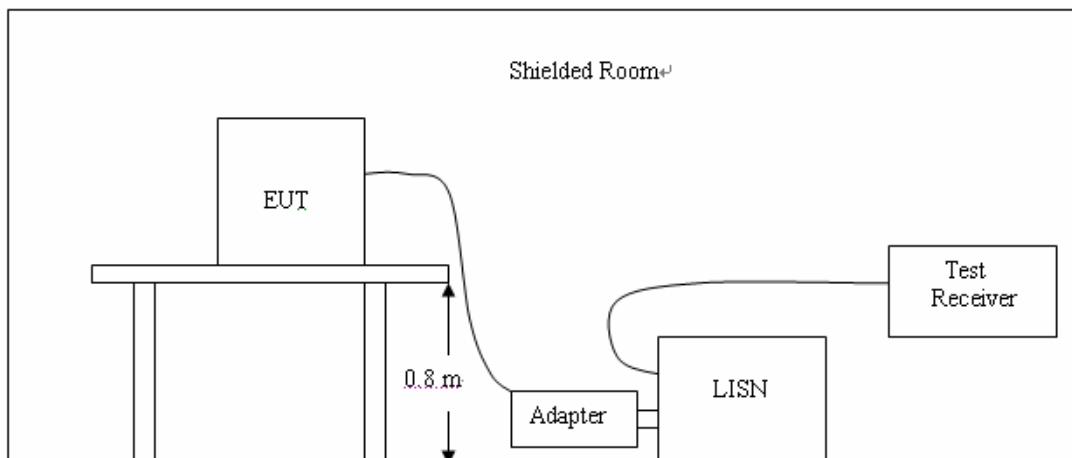
5. CONDUCTED EMISSIONS TEST (NOT APPLICABLE TO THIS DEVICE)

5.1 MEASUREMENT PROCEDURE:

The EUT was tested according to ANSI C63.4 - 2003. The frequency spectrum from 0.15 MHz to 30 MHz was investigated. The LISN used was 50 ohm / 50 u Henry as specified by section 5.1 of ANSI C63.4 - 2003. Cables and peripherals were moved to find the maximum emission levels for each frequency.

Note: The EUT will not be operated during charging the battery with the power adapter.

5.2 TEST SET-UP (Block Diagram of Configuration)



5.3 MEASUREMENT EQUIPMENT USED:

Conducted Emission Test Site # 3					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCS30	100038	2006/11	2007/10
ARTIFICIAL MAINS	ROHDE & SCHWARZ	ESH2-Z5	100028	2006/11	2007/10
PULSE LIMITER	ROHDE & SCHWARZ	ESHSZ2	100044	2006/11	2007/10
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ES-K1 1.71	N/A	2006/11	2007/10

Note: Each piece of equipment is scheduled for calibration once a year.

5.4 CONDUCTED POWER LINE EMISSION LIMIT

For unintentional device, according to § 15.107(a) Line Conducted Emission Limits is as following :

Frequency (MHz)	Maximum RF Line Voltage (dB μ V)			
	CLASS A		CLASS B	
	Q.P.	Ave.	Q.P.	Ave
0.15 - 0.50	79	66	66-56*	56-46*
0.50 - 5.00	73	60	56	46
5.00 - 30.0	73	60	60	50

* Decreasing linearly with the logarithm of the frequency

For intentional device, according to §15.207(a) Line Conducted Emission Limit is same as above table.

5.5 MEASUREMENT RESULT:

Owing to the DC operation of EUT, this test item is not performed.

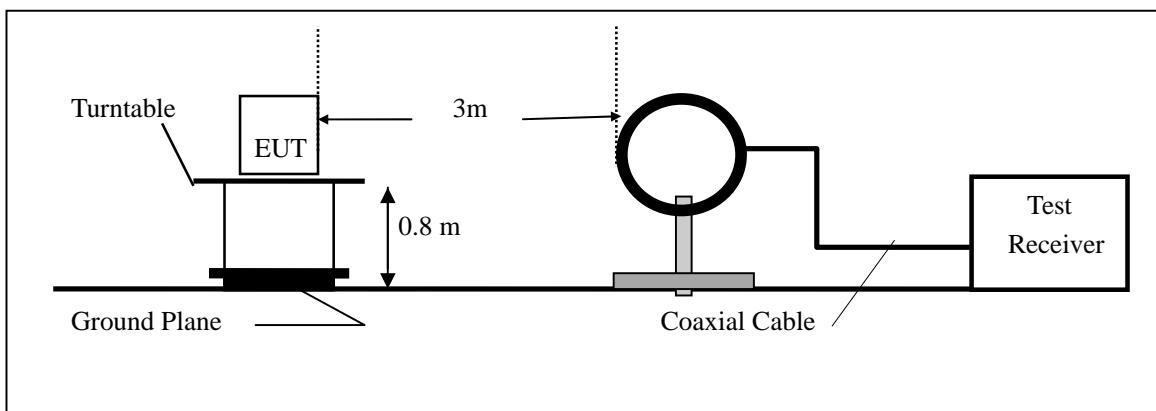
6. SPURIOUS RADIATED EMISSION TEST

6.1 MEASUREMENT PROCEDURE

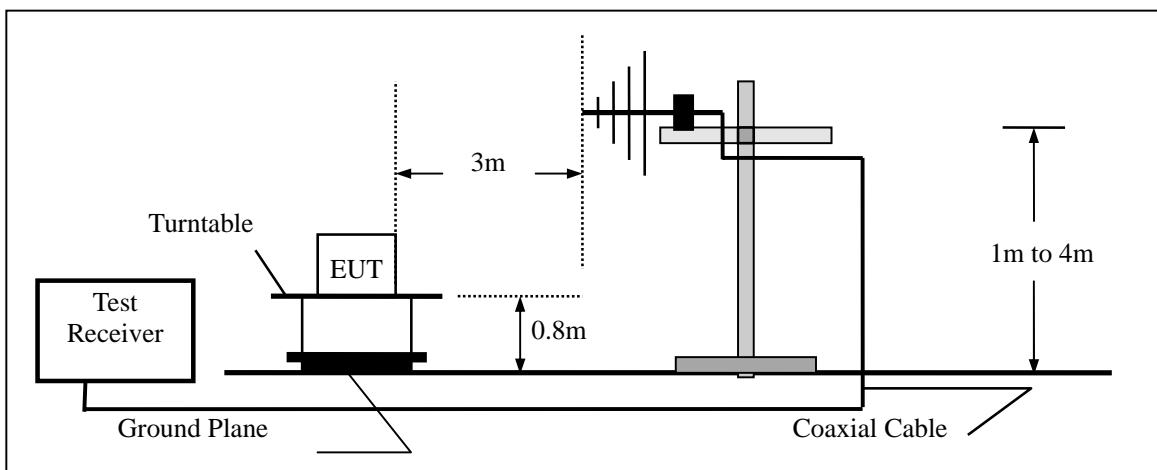
1. The EUT was placed on a turn table which is 0.8m above ground plane.
2. Maximum procedure was performed by raising the receiving antenna from 1m to 4m and rotating the turn table from 0°C to 360°C to acquire the highest emissions from EUT
3. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
4. Repeat above procedures until all frequency measurements have been completed.

6.2 TEST SET-UP (Block Diagram of Configuration)

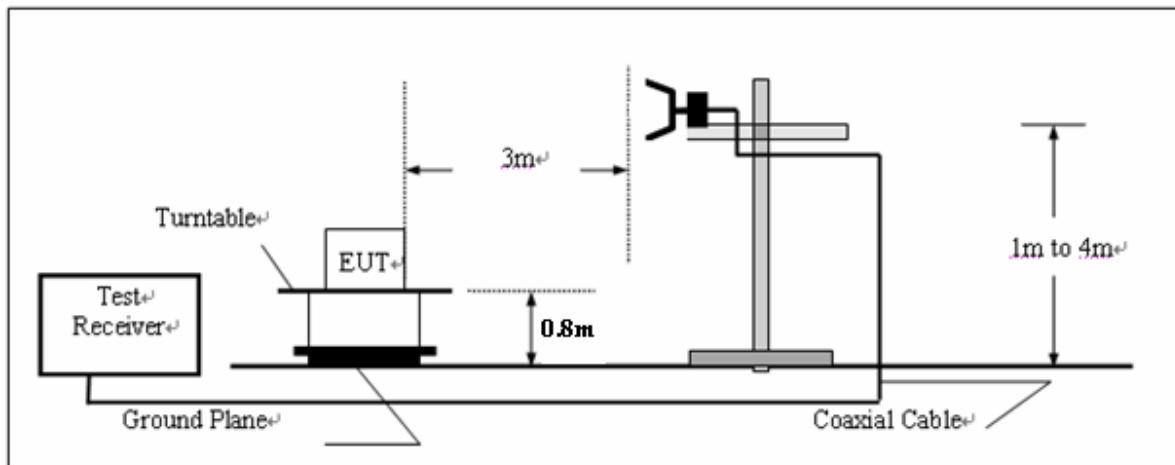
(A) Radiated Emission Test Set-Up, Frequency Below 30MHz



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



(C) Radiated Emission Test Set-Up, Frequency above 1000MHz

**6.3 MEASUREMENT EQUIPMENT USED:**

3/5 Anechoic Chamber Radiation Test Site # 4					
EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
ULTRA-BROADBAND ANTENNA	ROHDE & SCHWARZ	HL562	100015	2006/11	2007/10
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2006/11	2007/10
RF TEST PANEL	ROHDE & SCHWARZ	TS / RSP	335015/ 0017	N/A	N/A
TURNTABLE	ETS	2088	2149	N/A	N/A
HORN ANTENNA	ROHDE & SCHWARZ	HF906	100039	2006/11	2007/10
ANTENNA MAST	ETS	2075	2346	N/A	N/A
EMI TEST SOFTWARE	ROHDE & SCHWARZ	ES-K1 1.71	N/A	2006/11	2007/10

Note: Each piece of equipment is scheduled for calibration once a year.

6.4 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:

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

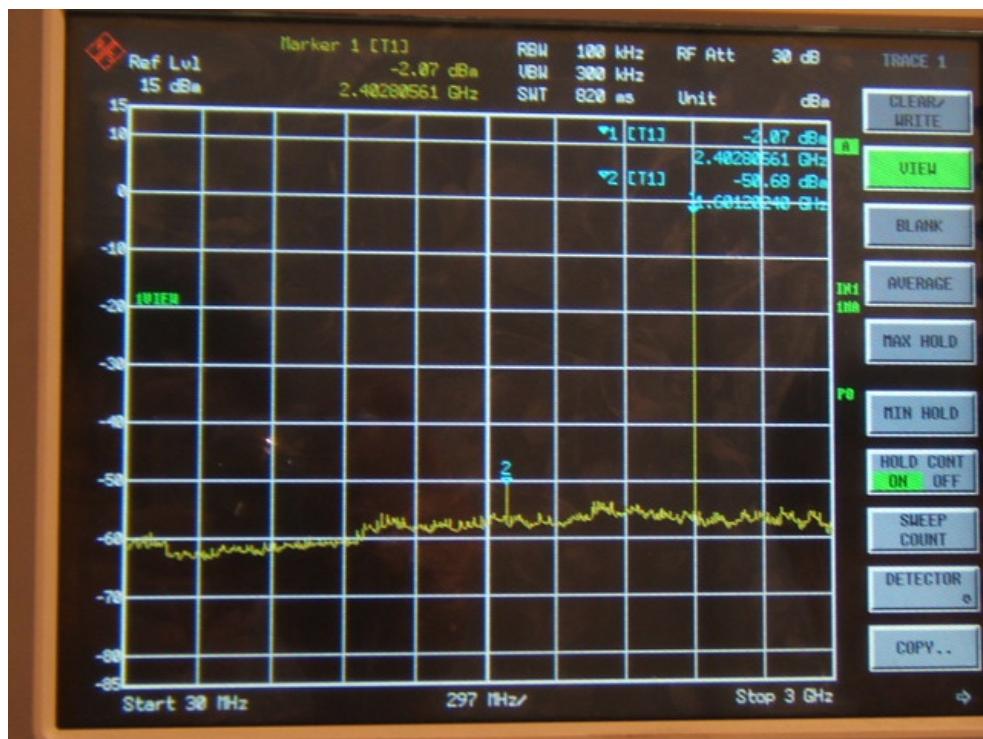
Where	FS = Field Strength	CL = Cable Attenuation Factor (Cable Loss)
RA = Reading Amplitude		AG = Amplifier Gain
AF = Antenna Factor		

6.5 MEASUREMENT RESULT

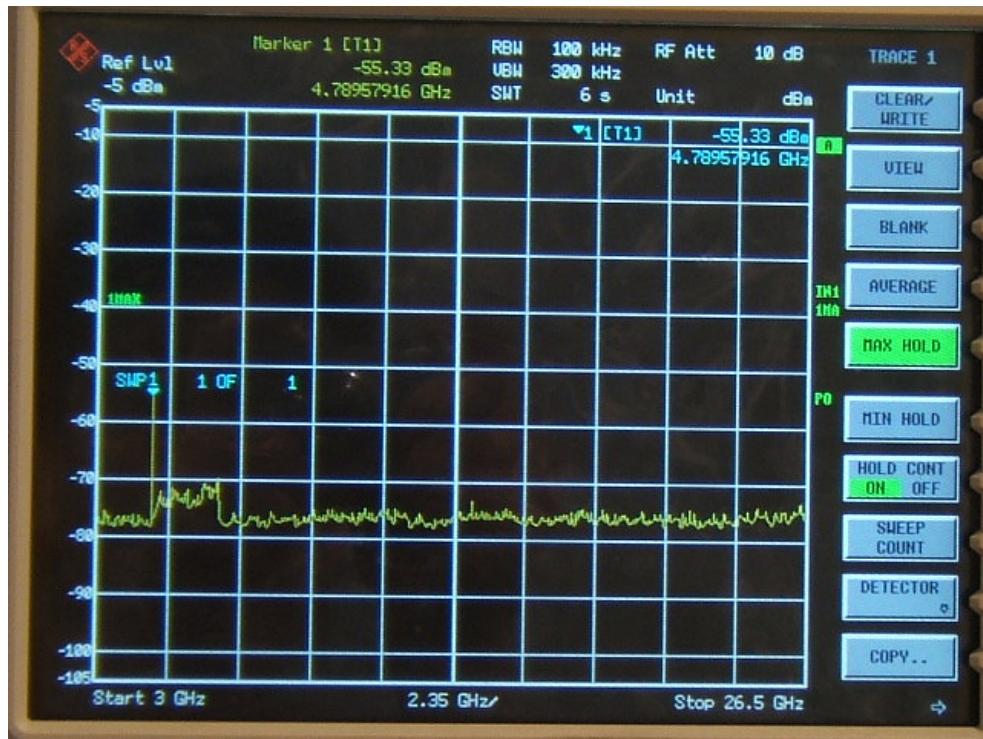
Refer to attach tabular data sheets.

Conducted Spurious Emission Measurement Results

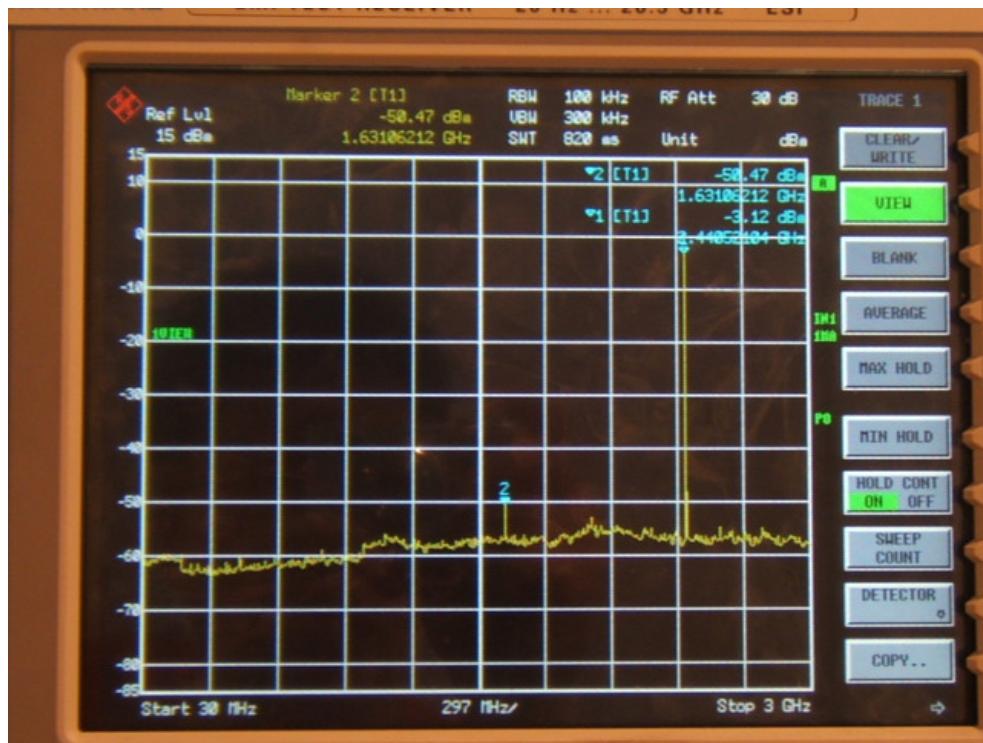
CH Low 30MHz – 3GHz



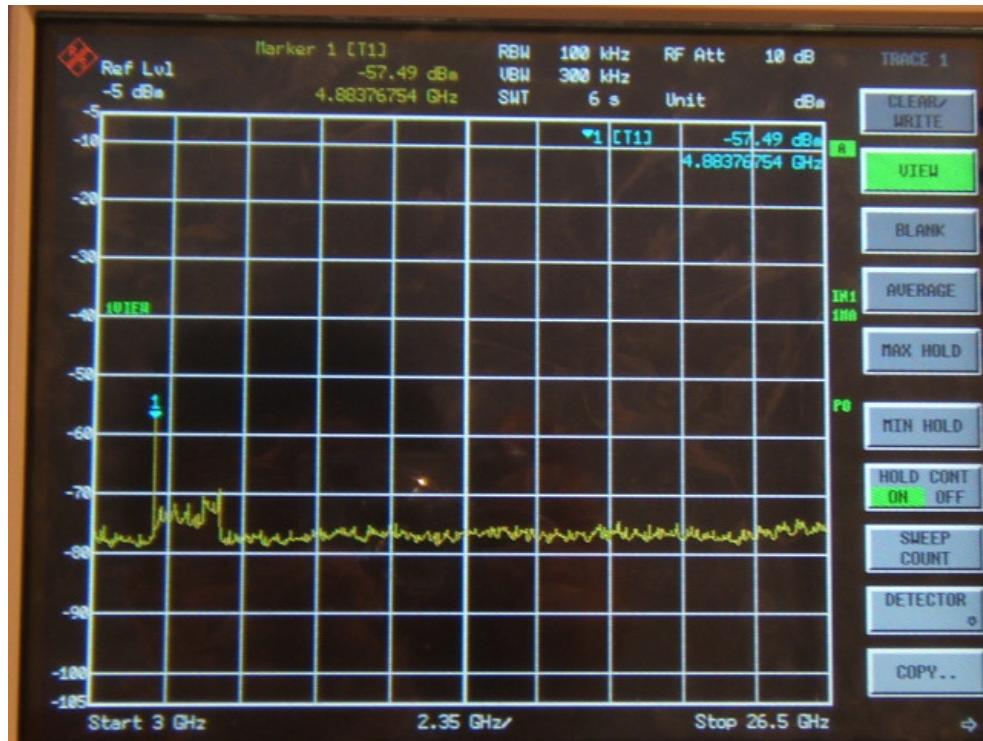
CH Low 3G Hz – 26.5GHz



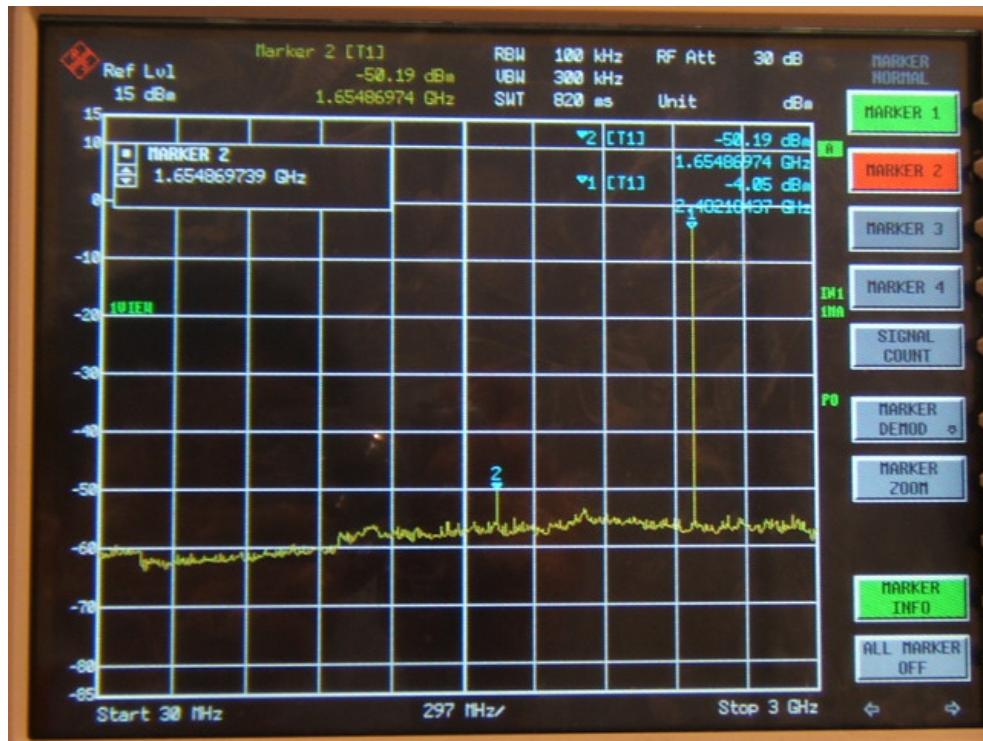
CH Mid 30MHz – 3GHz



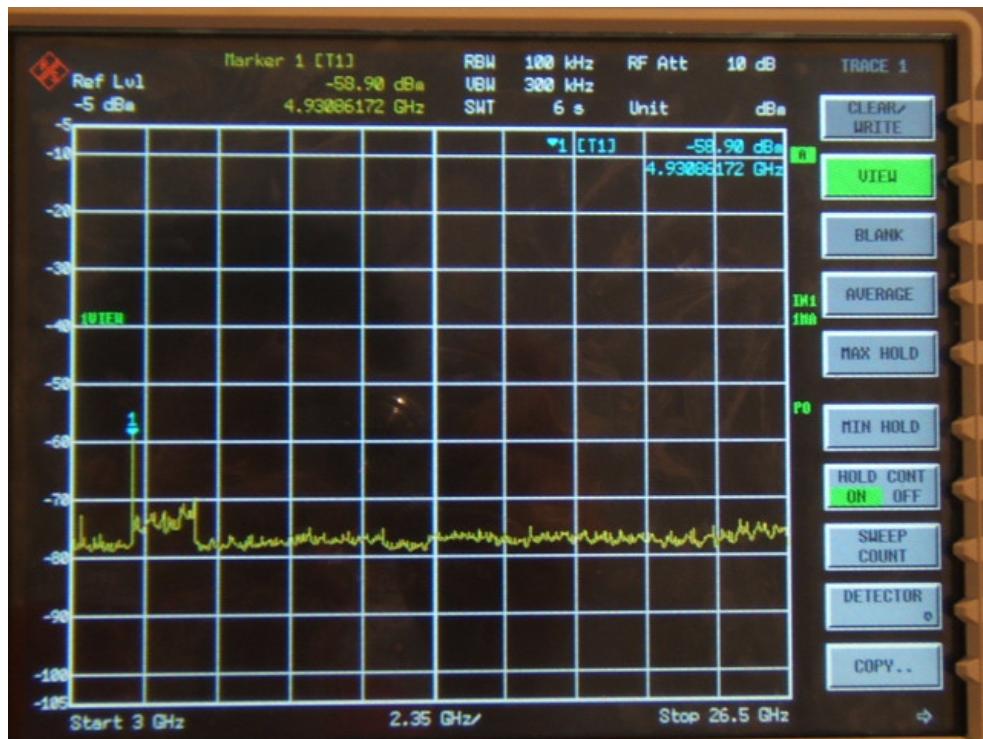
CH Mid 3G Hz – 26.5GHz



CH High 30MHz – 3GHz



CH High 3G Hz – 26.5GHz



Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode: TX CH Low

Test Date: Apr 12, 2007

Fundamental Frequency: 2402 MHz

Test By: Tracy

Temperature: 25 °C

Pol: Ver. /Hor.

Humidity: 55%

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
30.00	V	Peak	1.40	21.20	22.60	40.00	-17.40
76.11	V	Peak	5.60	11.60	17.20	40.00	-22.80
171.90	V	Peak	20.60	10.70	31.30	43.50	-12.20
525.69	V	Peak	5.30	20.80	26.10	46.00	-19.90
935.85	V	Peak	5.90	25.50	31.40	46.00	-14.60
30.00	H	Peak	1.40	21.20	22.60	40.00	-17.40
86.37	H	Peak	5.70	11.80	17.50	40.00	-22.50
175.79	H	Peak	18.40	10.80	29.20	43.50	-14.30
549.02	H	Peak	4.50	21.50	26.00	46.00	-20.00
947.52	H	Peak	6.50	25.50	32.00	46.00	-14.00

Remark:

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz 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 EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode: TX CH Mid
 Fundamental Frequency: 2441 MHz
 Temperature: 25 °C
 Humidity: 55%

Test Date: Apr 12, 2007
 Test By: Tracy
 Pol: Ver. /Hor.

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
30.00	V	Peak	1.90	21.20	23.10	40.00	-16.90
77.21	V	Peak	5.10	11.50	16.60	40.00	-23.40
170.27	V	Peak	20.60	10.60	33.50	43.50	-10.00
531.22	V	Peak	3.30	20.90	24.20	46.00	-21.80
911.02	V	Peak	5.50	25.30	30.80	46.00	-15.20
30.00	H	Peak	2.2	21.20	23.40	40.00	-16.60
79.80	H	Peak	7.40	12.10	19.50	40.00	-20.50
174.58	H	Peak	16.00	10.80	26.80	43.50	-14.30
548.25	H	Peak	6.80	21.50	28.30	46.00	-20.00
927.24	H	Peak	6.70	25.40	32.10	46.00	-14.00

Remark:

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz 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 EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

Radiated Spurious Emission Measurement Result (below 1GHz)

Operation Mode: TX CH High
 Fundamental Frequency: 2480 MHz
 Temperature: 25 °C
 Humidity: 55%

Test Date: Apr 12, 2007
 Test By : Tracy
 Pol : Ver./Hor.

Freq. (MHz)	Ant.Pol. H/V	DetectorMode (PK/AV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Actual FS (dBuV/m)	Limit3m (dBuV/m)	Safe Margin (dB)
30.00	V	Peak	5.00	21.20	26.20	40.00	-13.80
81.25	V	Peak	7.00	11.80	18.80	40.00	-21.20
170.33	V	Peak	24.50	10.70	35.20	43.50	-8.30
542.12	V	Peak	5.70	21.40	27.10	46.00	-18.90
915.38	V	Peak	5.80	25.30	31.10	46.00	-14.90
30.00	H	Peak	3.5	21.20	24.70	40.00	-15.30
74.31	H	Peak	6.80	12.10	18.90	40.00	-21.10
171.28	H	Peak	18.70	10.70	29.40	43.50	-14.10
544.25	H	Peak	6.10	21.40	27.50	46.00	-18.50
925.33	H	Peak	6.20	25.40	31.60	46.00	-14.40

Remark:

- (1) Measuring frequencies from 30 MHz to the 1 GHz.
- (2) Radiated emissions measured in frequency range from 30MHz 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 EMI Test Receiver was 120KHz for measuring from 30 MHz to 1 GHz.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode: TX CH Low

Test Date: Apr 12, 2007

Fundamental Frequency: 2402 MHz

Test By : Tracy

Temperature: 25 °C

Pol : Ver.

Humidity: 55%

Freq. (MHz)	Peak	A V	Actual FS		Peak	A V	Margin (dB)
	Reading (dBuV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Peak (dBuV/n)	AV (dBuV/n)	Limit (dBuV/m)	
1579.16	59.00	--	-7.40	51.60	--	74.00	54.00 -22.40
3997.99	46.20	--	2.10	48.30	--	74.00	54.00 -25.70
4804.00	----						
7206.00	----						
9608.00	----						
12010.00	----						
14412.00	----						
16814.00	----						
19216.00	----						
21618.00	----						
24020.00	----						

Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode: TX CH Low

Test Date: Apr 12, 2007

Fundamental Frequency: 2402 MHz

Test By: Tracy

Temperature: 25 °C

Pol : Hor.

Humidity: 55%

Freq. (MHz)	Peak	A V	Ant./CL/ Amp. CF(dB)	Actual FS		Peak	A V	Margin (dB)
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/n)	AV (dBuV/n)	Limit (dBuV/m)	Limit (dBuV/m)	
4124.00	46.60	--	2.10	48.70	--	74.00	54.00	-25.30
4804.00	----							
7206.00	----							
9608.00	----							
12010.00	----							
14412.00	----							
16814.00	----							
19216.00	----							
21618.00	----							
24020.00	----							

Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode: TX CH Mid

Test Date: Apr 12, 2007

Fundamental Frequency: 2441MHz

Test By: Tracy

Temperature: 25 °C

Pol : Hor.

Humidity: 55%

Freq. (MHz)	Peak	A V	Ant./CL/ Amp. CF(dB)	Actual FS		Peak	A V	Margin (dB)
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/n)	AV (dBuV/n)	Limit (dBuV/m)	Limit (dBuV/m)	
3997.00	41.70	--	2.10	43.80	--	74.00	54.00	-9.80
4882.00	----							
7323.00	----							
9764.00	----							
12205.00	----							
14646.00	----							
17087.00	----							
19528.00	----							
21969.00	----							
24410.00	----							

Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode: TX CH Mid

Test Date: Apr 12, 2007

Fundamental Frequency: 2441MHz

Test By: Tracy

Temperature: 25 °C

Pol : Ver.

Humidity: 55%

Freq. (MHz)	Peak	A V		Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)	Ant./CL/ Amp. CF(dB)	Peak (dBuV/n)	AV (dBuV/n)	Limit (dBuV/m)	Limit (dBuV/m)	
1613.23	45.50	--	-7.20	38.30	--	74.00	54.00	-35.70
3986.50	37.50	--	2.10	39.60	--	74.00	54.00	-34.40
4882.00	----							
7323.00	----							
9764.00	----							
12205.00	----							
14646.00	----							
17087.00	----							
19528.00	----							
21969.00	----							
24410.00	----							

Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode: TX CH High

Test Date: Apr 12, 2007

Fundamental Frequency: 2480MHz

Test By: Tracy

Temperature: 25 °C

Pol : Hor.

Humidity: 55%

Freq. (MHz)	Peak	A V		Ant./CL/ Amp. CF(dB)	Actual FS		Peak	AV	Margin (dB)
	Reading (dBuV)	Reading (dBuV)	Peak		Peak	AV	Limit	Limit	
1647.29	58.30	--	-7.00	-7.00	51.30	--	74.00	54.00	-22.70
4202.00	41.70	--	2.20	2.20	43.90	--	74.00	54.00	-30.10
4960.00	----								
7440.00	----								
9920.00	----								
12400.00	----								
14800.00	----								
17360.00	----								
19840.00	----								
22320.00	----								
24800.00	----								

Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

Radiated Spurious Emission Measurement Result (above 1GHz)

Operation Mode: TX CH High

Test Date: Apr 12, 2007

Fundamental Frequency: 2480MHz

Test By: Tracy

Temperature: 25 °C

Pol : Ver.

Humidity: 55%

Freq. (MHz)	Peak	A V	Ant./CL/ Amp. CF(dB)	Actual FS		Peak	A V	Margin (dB)
	Reading (dBuV)	Reading (dBuV)		Peak (dBuV/n)	AV (dBuV/n)	Limit (dBuV/m)	Limit (dBuV/m)	
1647.29	57.20	--	-8.50	50.20	--	74.00	54.00	-23.80
4066.00	41.60	--	2.10	43.70	--	74.00	54.00	-30.30
4960.00	----							
7440.00	----							
9920.00	----							
12400.00	----							
14800.00	----							
17360.00	----							
19840.00	----							
22320.00	----							
24800.00	----							

Remark:

- (1) Measuring frequencies from 1GHz to the 10th harmonic of highest fundamental frequency.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode of the emission shown in Actual FS column.
- (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) Spectrum Peak Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 3MHz, Sweep time= 200 ms.
Spectrum AV Setting: 1GHz- 26GHz, RBW= 1MHz, VBW= 10Hz, Sweep time= 200 ms.

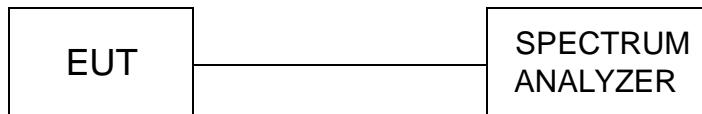
7. 20dB BANDWIDTH MEASUREMENT

7.1 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=100 KHz (1% of Bandwidth).Span=1MHz, Sweep=auto
4. Mark the peak frequency and -20dB (upper and lower) frequency.
5. Repeat above procedures until all frequency measured were complete.

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

7.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



7.3 MEASUREMENT EQUIPMENT USED:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2006/11	2007/10

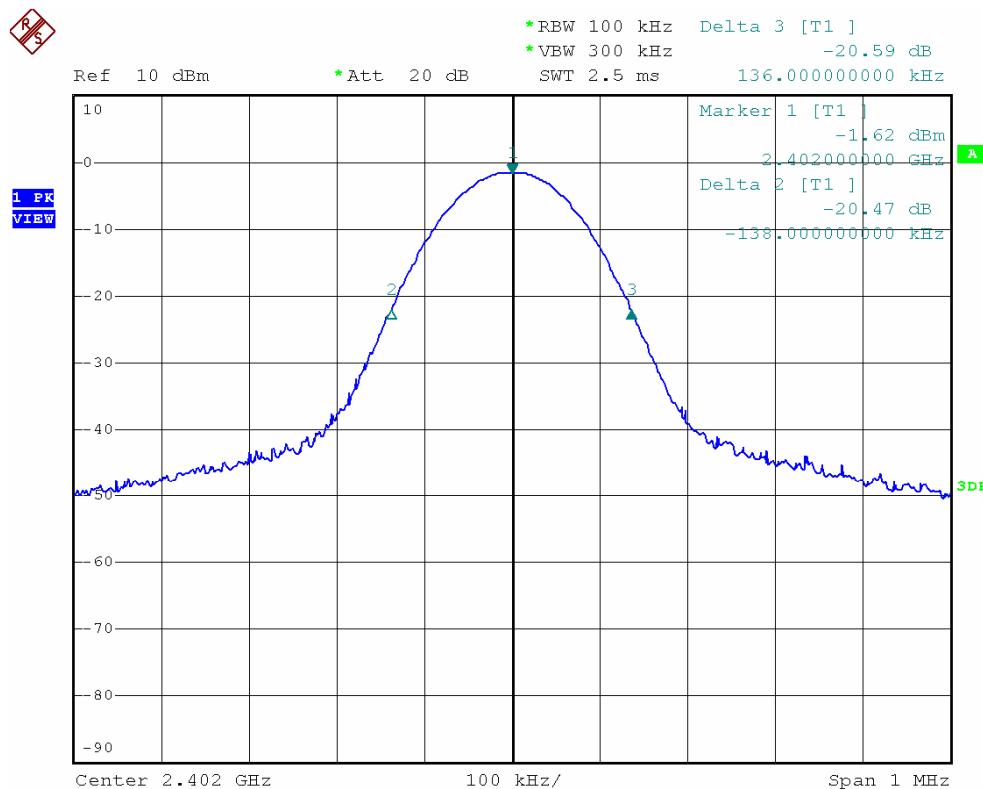
Note: Each piece of equipment is scheduled for calibration once a year.

7.4 MEASUREMENT RESULTS:

Channel	20 dB Bandwidth (MHz)	Pass / Fail
Lower	0.274	PASS
Mid	0.272	PASS
Higher	0.272	PASS

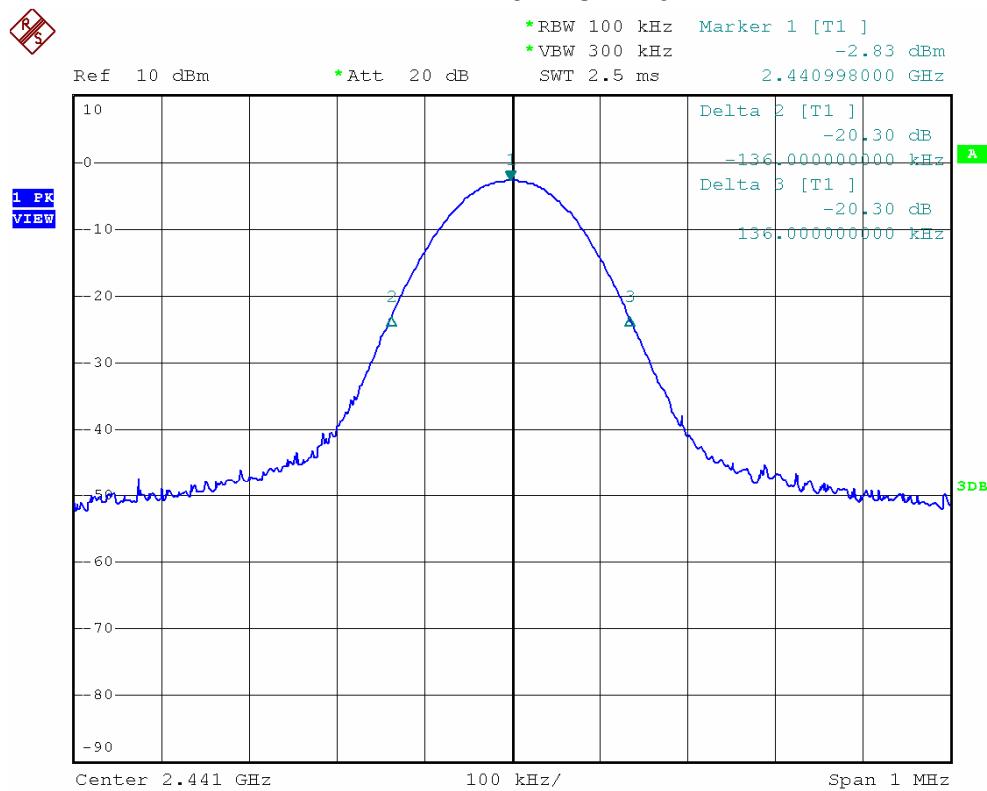
20dB Bandwidth Test Plots:

Channel Low



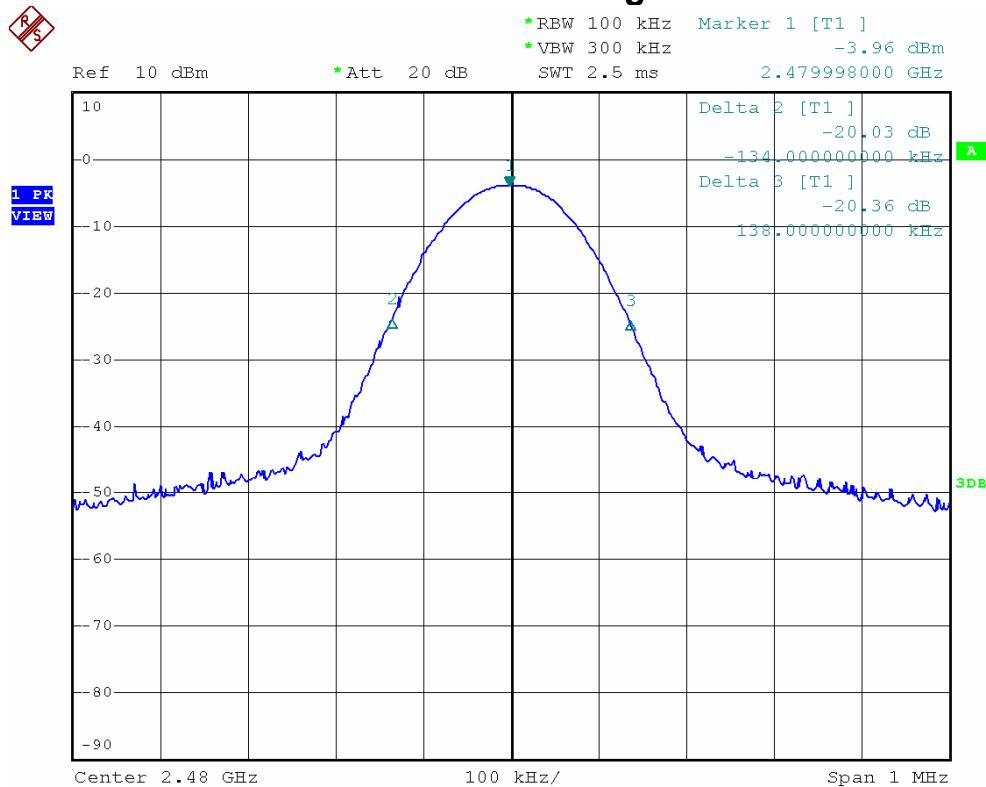
Date: 19.APR.2007 00:25:55

Channel Mid



Date: 19.APR.2007 00:24:43

Channel Higher



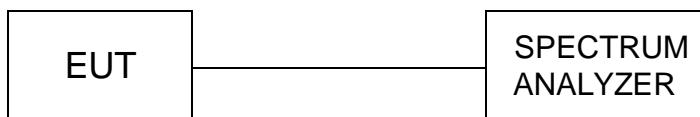
Date: 19.APR.2007 00:22:44

8. PEAK OUTPUT POWER MEASUREMENT

8.1 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, VBW = 1MHz
4. Repeat above procedures until all frequency measured were complete

8.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



8.3 MEASUREMENT EQUIPMENT USED:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2006/11	2007/10

Note: Each piece of equipment is scheduled for calibration once a year.

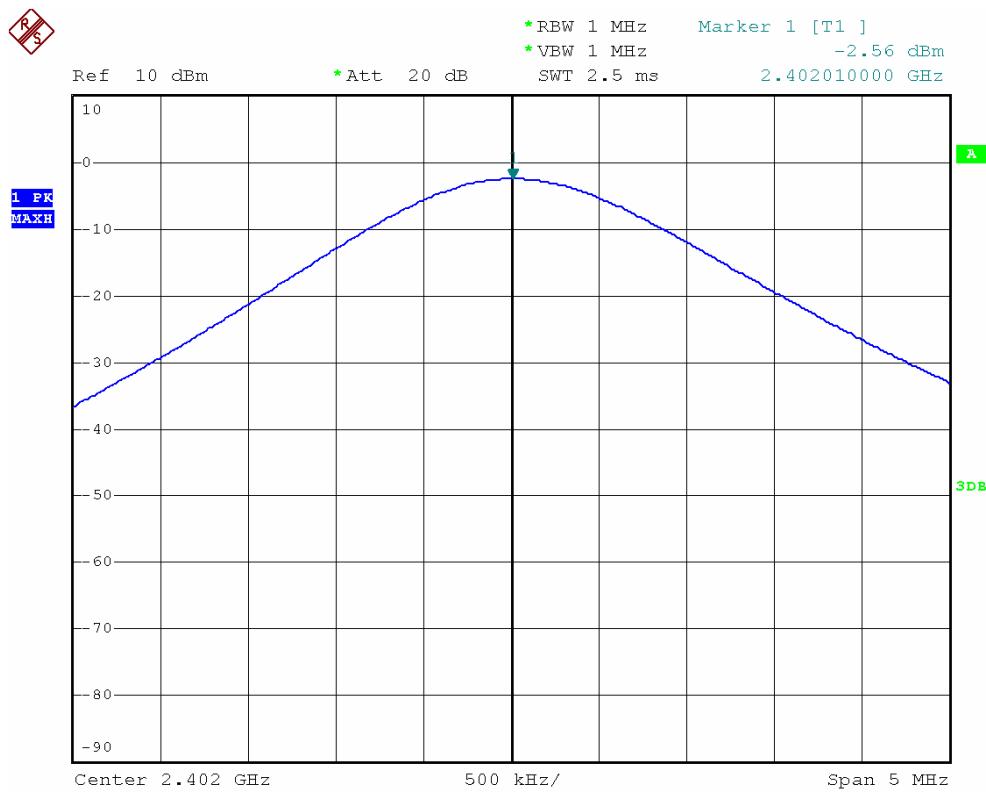
8.4 LIMITS OF MAXIMUM PEAK OUTPUT POWER

The Peak Output Power Measurement limits are 30dBm.

8.5 MEASUREMENT RESULTS:

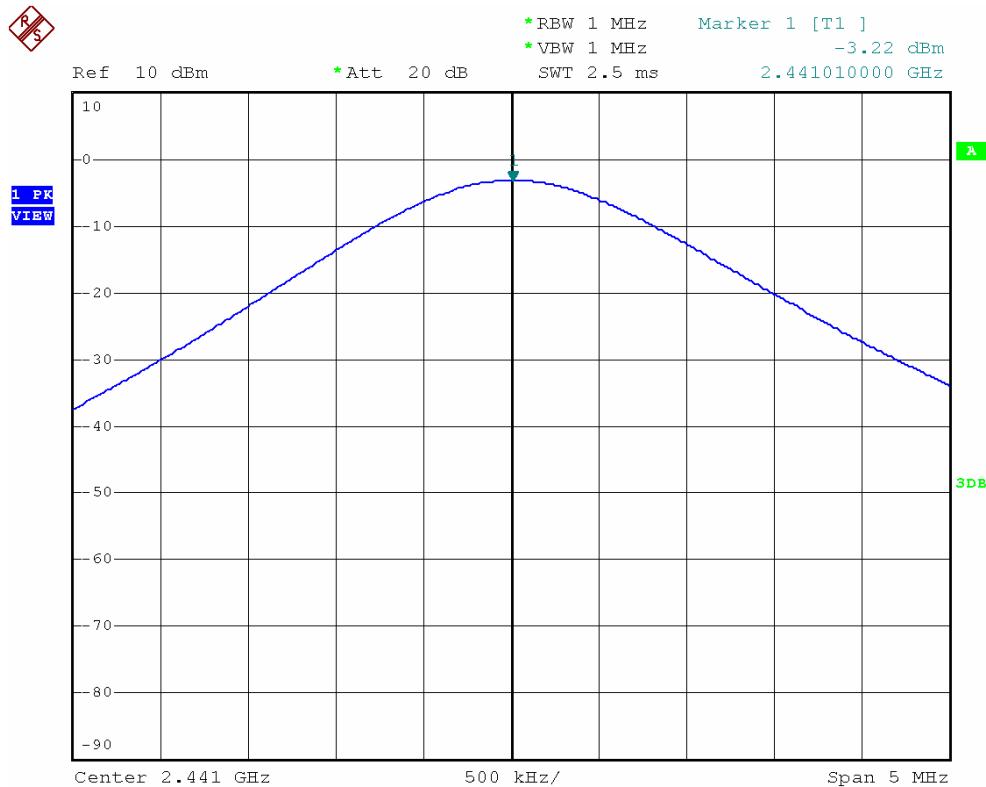
Channel	Channel Frequency (MHz)	Peak Power Output (dBm)	Peak Power Limit (dBm)	Pass / Fail
LOW	2402.00	-2.56	30	PASS
MID	2441.00	-3.22	30	PASS
HIGH	2480.00	-4.50	30	PASS

Photo of Peak Output Power Measurement: Channel Low



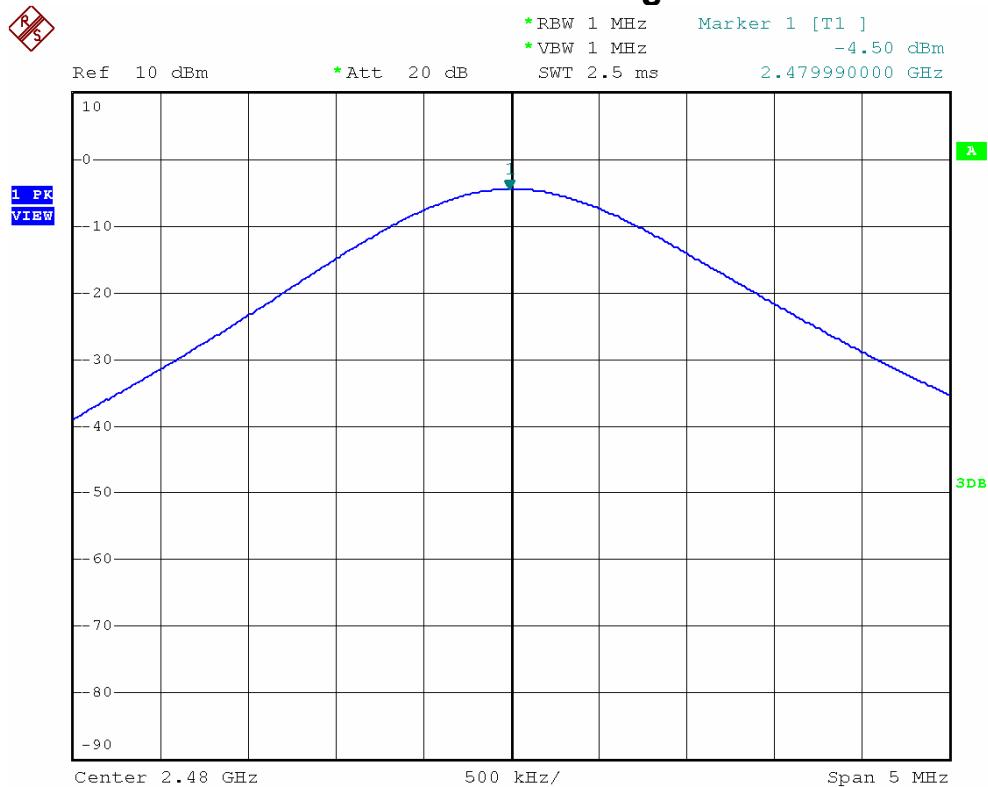
Date: 19.APR.2007 00:17:50

Channel Mid



Date: 19.APR.2007 00:18:47

Channel High



Date: 19.APR.2007 00:19:53

9. PEAK POWER SPECTRAL DENSITY MEASUREMENT

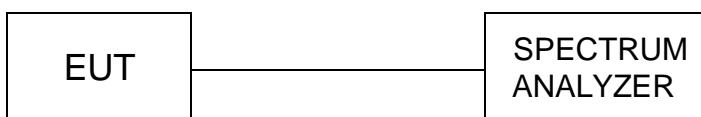
9.1 MEASUREMENT PROCEDURE

The transmitter output was connected to the spectrum analyzer, the bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3KHz RBW and 30KHz VBW, set sweep time=span / 3KHz.

The power spectral density was measured and recorded.

The sweep time is allowed to be longer than span / 3 KHz for a full response of the mixer in the spectrum analyzer.

9.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



9.3 MEASUREMENT EQUIPMENT USED:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2006/11	2007/10

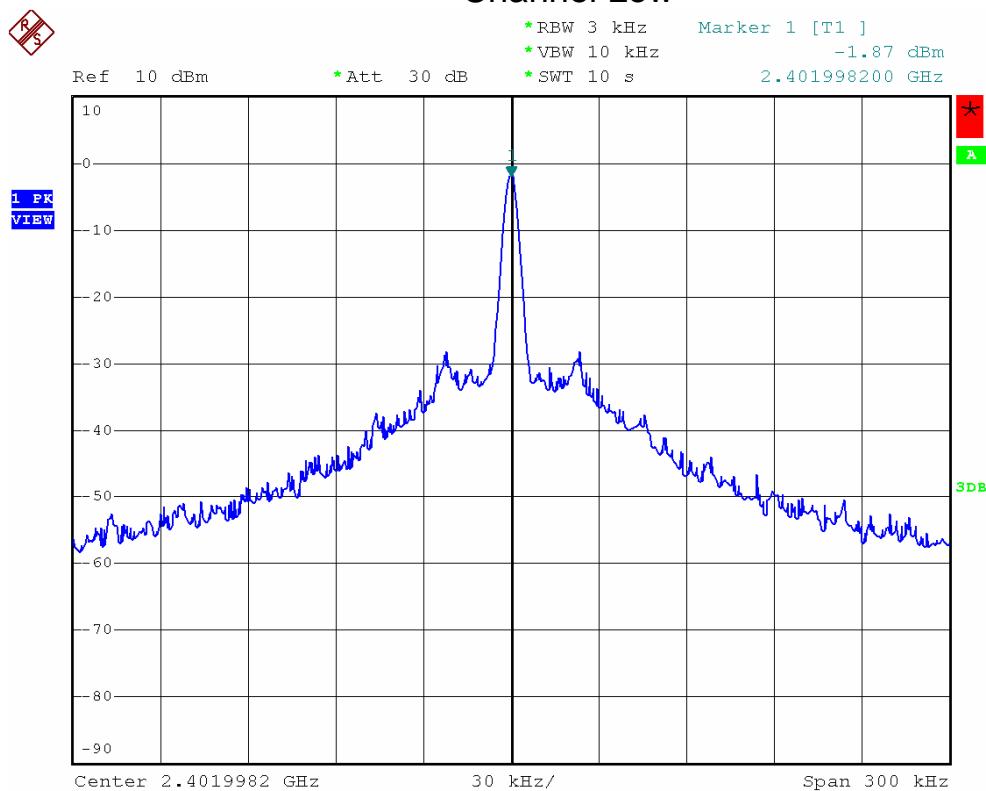
Note: Each piece of equipment is scheduled for calibration once a year.

9.4 LIMITS OF MAXIMUM PEAK OUTPUT POWER

The Maximum Power Spectral Density Measurement is 8dBm/3KHz.

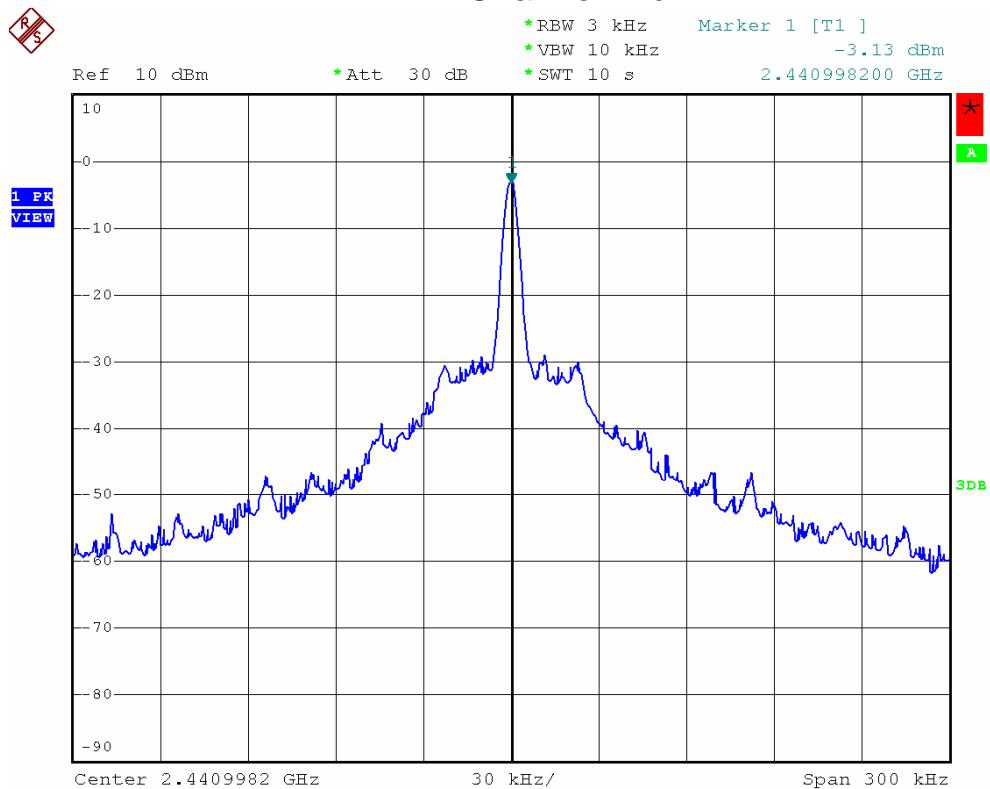
9.5 MEASUREMENT RESULTS:

Channel	Channel Frequency (MHz)	Final RF Power Density Level(dBm)	Maximum Limit (dBm)	Pass / Fail
LOW	2402.00	-1.87	8	PASS
MID	2441.00	-3.13	8	PASS
HIGH	2480.00	-3.98	8	PASS

Photo of Power Spectral Density Measurement**Channel Low**

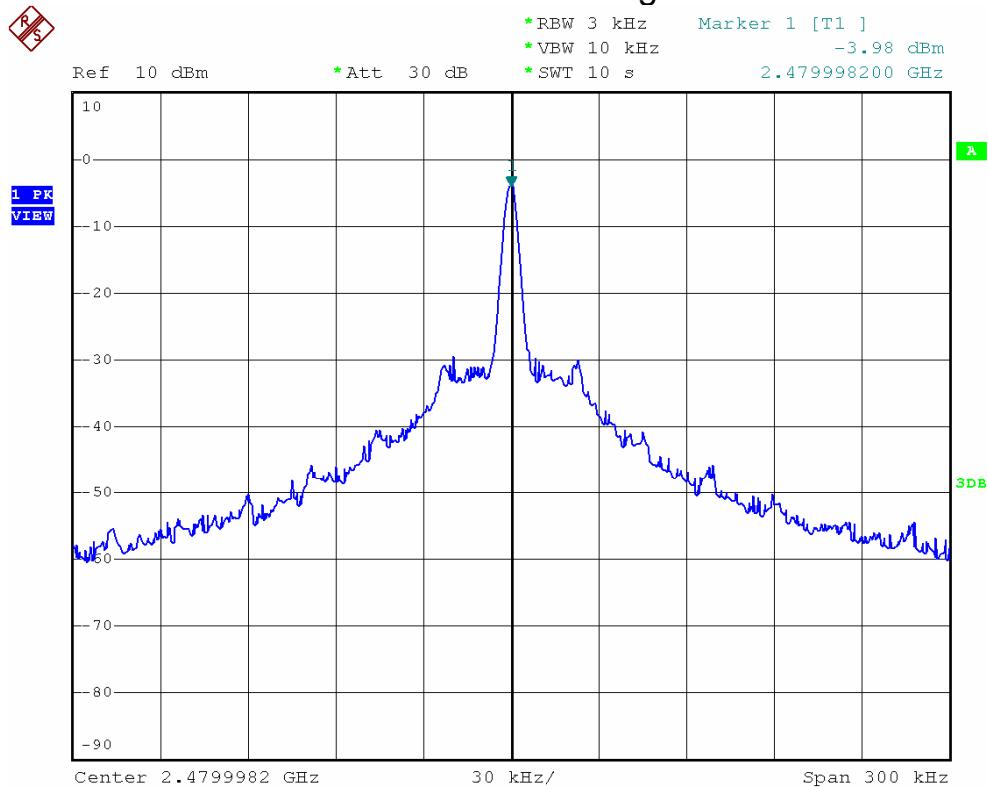
Date: 19.APR.2007 01:05:17

Channel Mid



Date: 19.APR.2007 01:06:12

Channel High



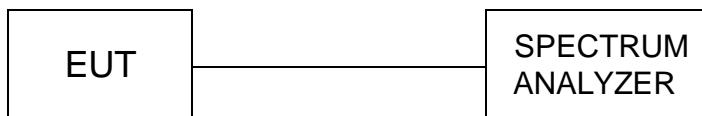
Date: 19.APR.2007 01:07:20

10. 100 KHz BANDWIDTH OF BAND EDGES MEASUREMENT

10.1 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, VBW=100 KHz. Span=25MHz, Sweep=auto
4. Set center frequency of spectrum analyzer = operating frequency.
5. Repeat above procedures until all frequency measured was complete.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)



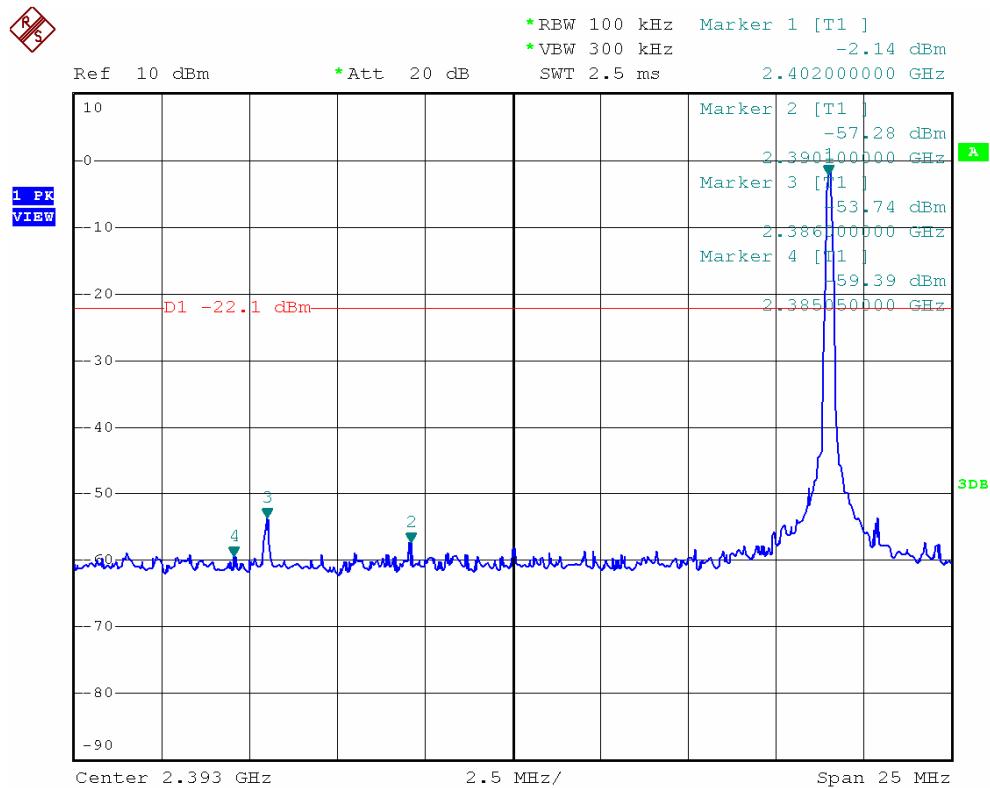
10.3 MEASUREMENT EQUIPMENT USED:

EQUIPMENT TYPE	MFR	MODEL NUMBER	SERIAL NUMBER	LAST CAL.	CAL DUE.
EMI TEST RECEIVER	ROHDE & SCHWARZ	ESI 26	100009	2006/11	2007/10

Note: Each piece of equipment is scheduled for calibration once a year.

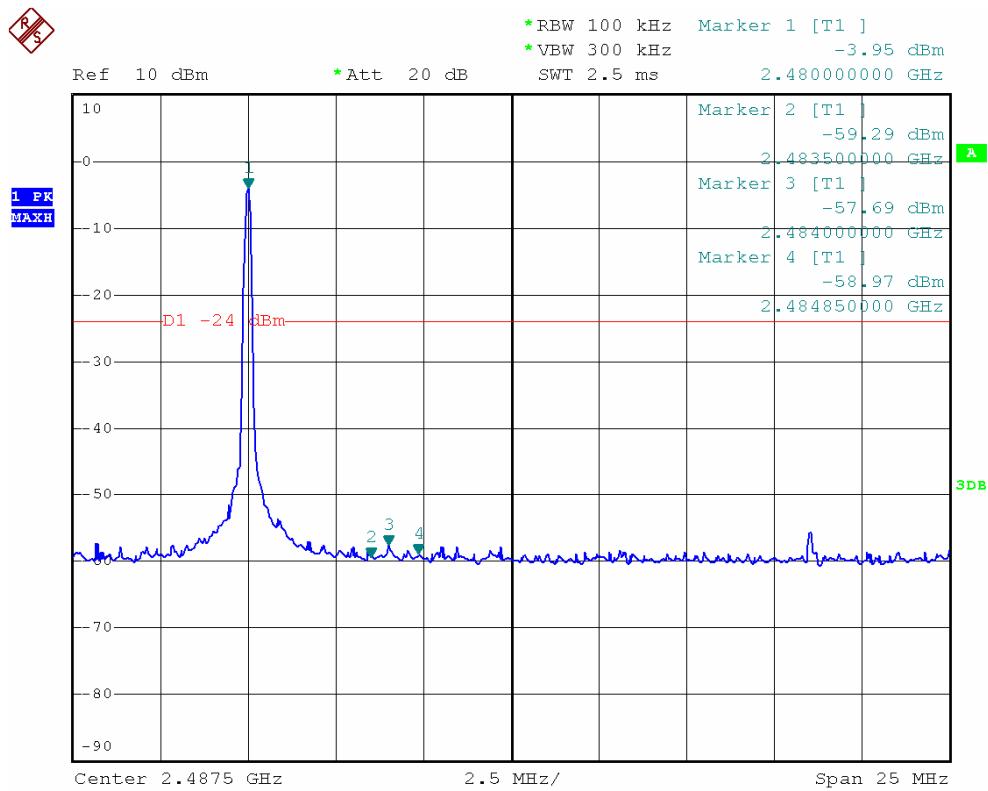
10.4 MEASUREMENT RESULTS:

Conducted Emission: Test Data CH- Low



Date: 19.APR.2007 00:31:28

Conducted Emission: Test Data CH-High



Date: 19.APR.2007 00:35:23

Radiated Emission:

Operation Mode : TX CH Low

Test Date: Apr 12, 2007

Fundamental Frequency: 2402 MHz

Test By : Tracy

Temperature: 25 °C

Pol : Ver.

Humidity: 55%

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)		
2390.0	---				74.00	54.00		Peak
2386.0	---				74.00	54.00		Peak
2384.0	---				74.00	54.00		Peak

Operation Mode TX CH Low

Test Date Apr. 06, 2005

Fundamental Frequency 2402 MHz

Test By Willis

Temperature 25 °C

Pol Hor.

Humidity 65 %

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)		
2390.0	---				74.00	54.00		Peak
2386.0	---				74.00	54.00		Peak
2384.0	---				74.00	54.00		Peak

Remark :

- (1) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column .
- (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.

Operation Mode: TX CH High

Test Date: Apr 12, 2007

Fundamental Frequency: 2480 MHz

Test By : Tracy

Temperature: 25 °C

Pol : Ver.

Humidity: 55%

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)		
2483.6	---	---	---	---	74.00	54.00	---	Peak
2484.0	---	---	---	---	74.00	54.00	---	Peak
2484.8	---	---	---	---	74.00	54.00	---	Peak

Operation Mode TX CH High

Test Date Apr. 06, 2005

Fundamental Frequency 2480 MHz

Test By Willis

Temperature 25 °C

Pol Hor.

Humidity 65 %

Freq. (MHz)	Peak	AV	Actual FS		Peak	AV	Margin (dB)	Remark
	Reading (dBuV)	Reading (dBuV)	Ant./CL CF(dB)	Peak (dBuV/m)	AV (dBuV/m)	Limit (dBuV/m)		
2483.6	---	---	---	---	74.00	54.00	---	Peak
2484.0	---	---	---	---	74.00	54.00	---	Peak
2484.8	---	---	---	---	74.00	54.00	---	Peak

Remark :

- (1) Datas of measurement within this frequency range shown “ - ” in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.
- (2) Radiated emissions measured in frequency above 1000MHz were made with an instrument using Peak detector mode and average detector mode of the emission shown in Actual FS column .
- (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.

11. FREQUENCY SEPARATION

11.1 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, VBW=10 KHz. Span=3MHz, Sweep=auto.
4. Set center frequency of spectrum analyzer = middle of hopping channel.
5. Max hold. Mark 3 Peaks of hopping channel and record the 3 peaks frequency.

11.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in Section 10.2.

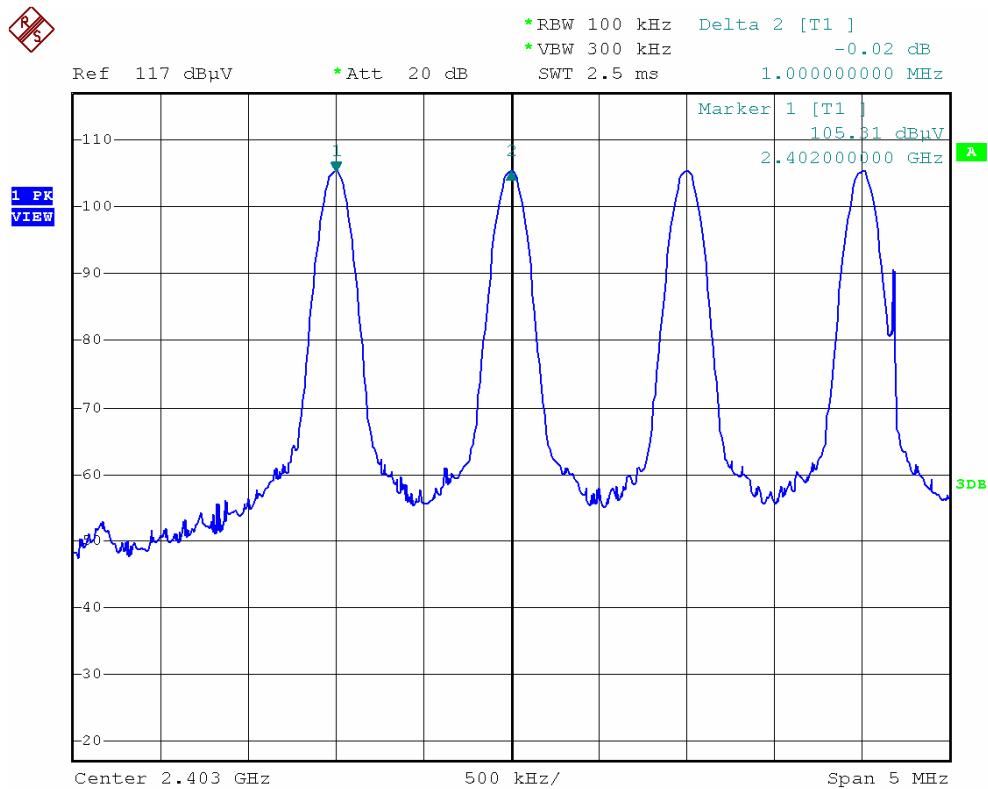
11.3 MEASUREMENT EQUIPMENT USED:

The same as described in Section 10.3

11.4 LIMITS AND MEASUREMENT RESULT:

Limits and Measurement Result Of Channel Separation		
Applicable Limits	Measurement Result	
	Test Data	Criteria
Per 15.247 (a)(1) At least 25 KHz or 20 dB bandwidth of the hopping Channel, whichever is greater	1 MHz	PASS

Frequency Separation Test Data



Date: 19.APR.2007 00:40:15

12. NUMBER OF HOPPING FREQUENCY

12.1 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 Start=2400MHz, Stop=2483.5MHz, Sweep=auto.
4. Set the spectrum analyzer as RBW, VBW=100 KHz.
5. Max hold. view and count how many channel in the band.

12.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in Section 10.2.

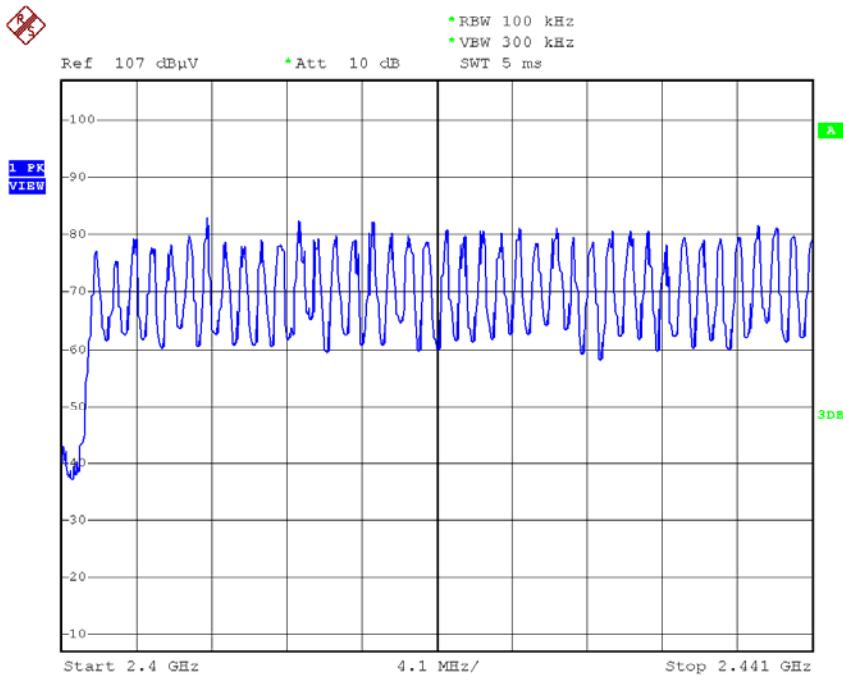
12.3 MEASUREMENT EQUIPMENT USED:

The same as described in Section 10.3

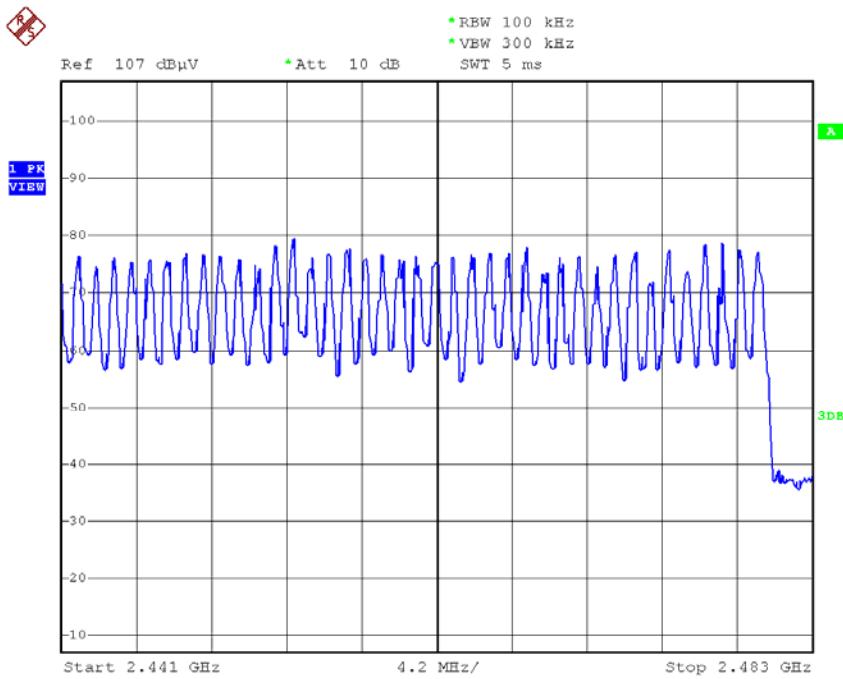
12.4 LIMITS AND MEASUREMENT RESULT:

Limits and Measurement Result Of Hopping Channel		
Applicable Limits	Measurement Result	
	Test Data	Criteria
Per 15.247 (a)(1)(iii) At least 15 hopping Frequencies	Total 79 Channels	PASS

Channel Number



Date: 19.APR.2007 01:16:42



Date: 19.APR.2007 01:18:25

13. DWELL TIME

13.1 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 =1 MHz , VBW =3 MHz. Span=0Hz,
4. Set center frequency of spectrum analyzer = operating frequency.
5. Repeat above procedures until all frequency measured was complete.

13.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in Section 10.2.

13.3 MEASUREMENT EQUIPMENT USED:

The same as described in Section 10.3

13.4 LIMITS AND MEASUREMENT RESULT:

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

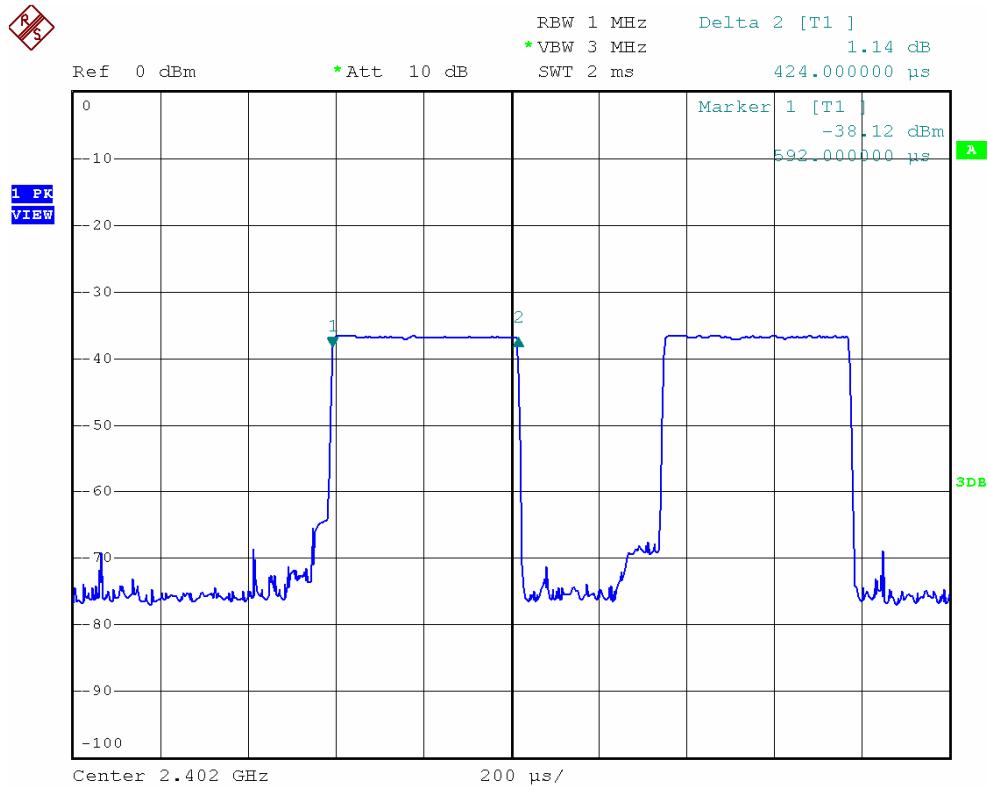
CH Low: Dwell time = 0.424 (ms) * (1600/ (2*79))*31.6 = 135.68 (ms)

CH Mid: Dwell time = 0.424 (ms) * (1600/ (2*79))*31.6 = 135.68 (ms)

CH High: Dwell time = 0.420 (ms) * (1600/ (2*79))*31.6 = 134.40 (ms)

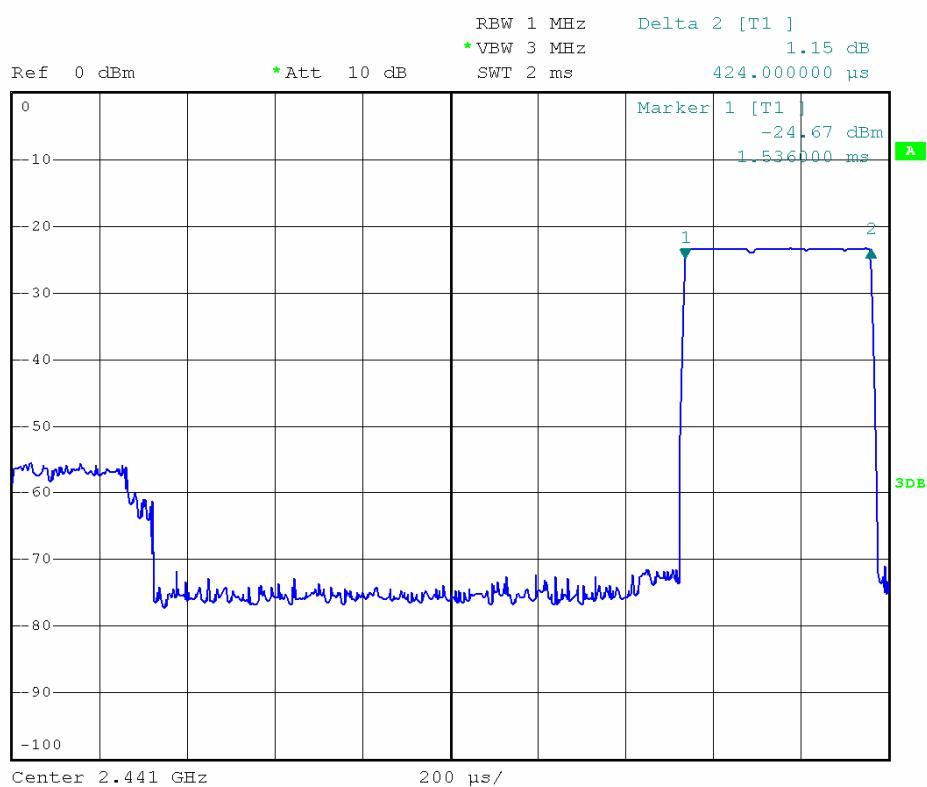
Dwell Time Test Data

CH-Low



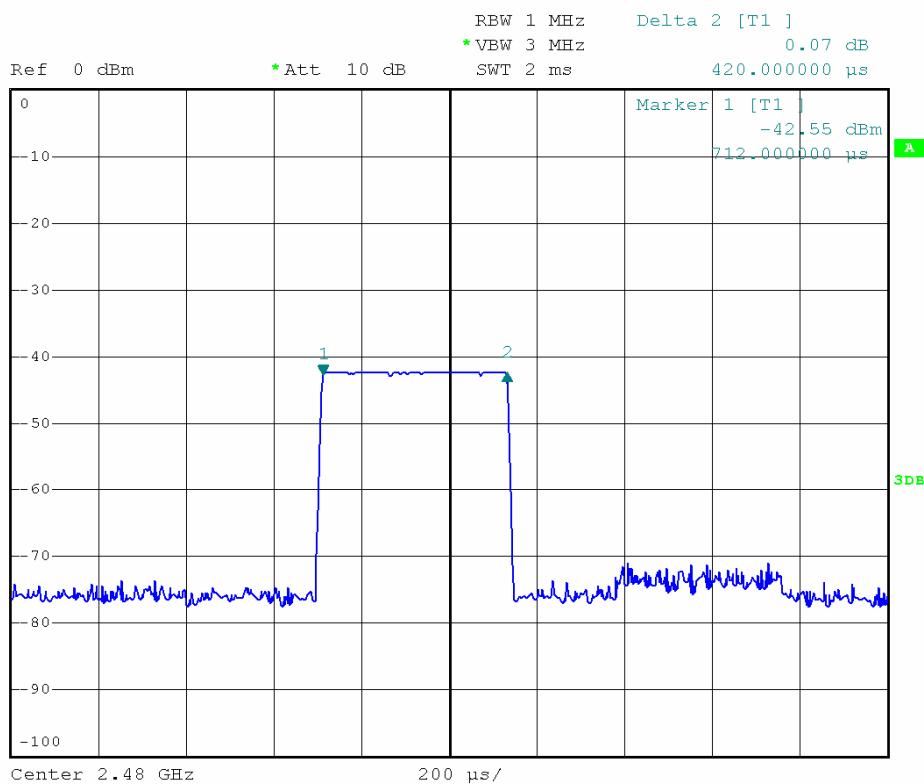
Date: 19.APR.2007 01:36:25

CH-Mid



Date: 19.APR.2007 01:41:46

CH-High



Date: 19.APR.2007 01:43:31

14. ANTENNA REQUIREMENT

14.1 Standard Applicable

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

And according to § 15247 (4)(1), system operation in the 2400-2483.5 MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

14.2 Antenna Connected Construction

The directional gains of antenna used for transmitting is -1.01 dBi, and the antenna connector is designed with permanent attachment and no consideration of replacement. Please see EUT photo for details.

15. RF EXPOSURE

15.1 Standard Applicable

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

This is a Portable device.

15.2 Measurement Result

This is a portable device and the Max peak output power is -2.56dBm (0.55 mW) lower than low threshold 60/fGHz mW (24.48 mW), $d < 2.5\text{cm}$ in general population category.

The SAR measurement is not necessary.

APPENDIX 1

PHOTOGRAPHS OF SET UP

Radiated Emission Setup Photos



APPENDIX 2

PHOTOGRAPHS OF EUT

Top View of EUT



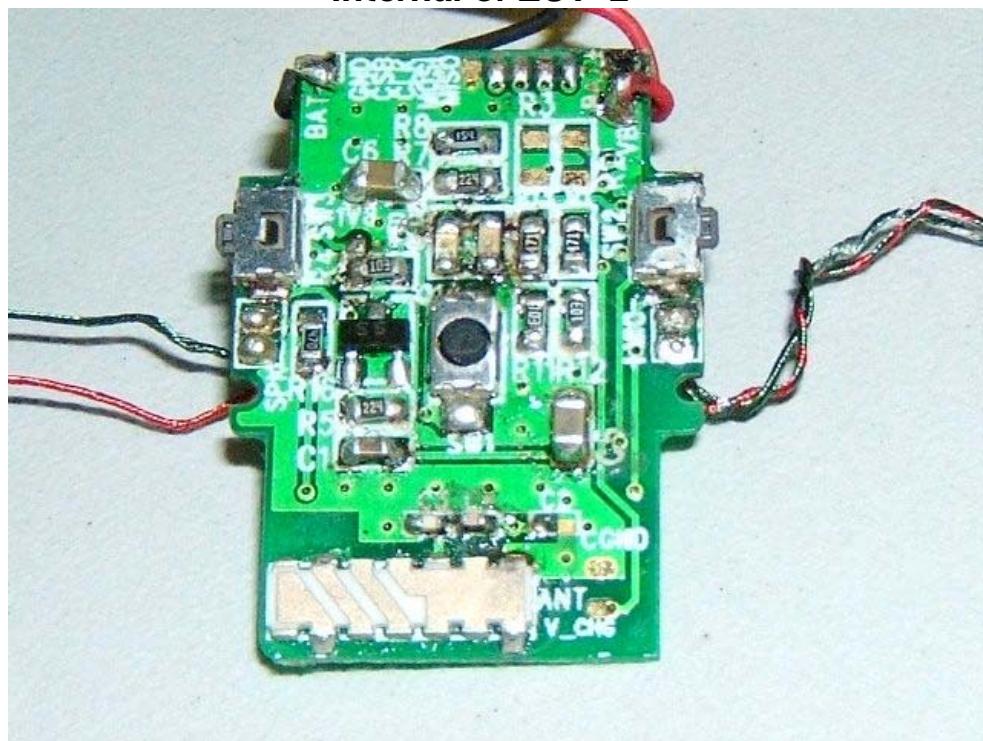
Bottom View of EUT



Internal of EUT- 1



Internal of EUT-2



Internal of EUT-3

