Product Service

RF - TEST REPORT

Report Number	:	**68/720.8.119.01**	Date of Issue:	29 December 2008

Model	:	**SHB7110/00, SHB7110/05, SHB7110/10, SHB7110/27, SHB7110/97**
Product Type	:	Bluetooth Headset
Applicant	:	Philips Consumer Electronics B.V.
Address	:	B.U. Accessories Building SBP6, PO Box 80002, 5600 JB Eindhoven,
	:	Netherlands
Production Facility	:	Concord Electronic (HuiZhou) Factory
Address	:	21, Ping An Road, ShuiKou, HuiCheng District, HuiZhou,
		GuangDong, China 516005

Test Result	:	■ **Positive** ☐ **Negative**
Total pages including Appendices	:	**49**

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Product Service

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2 Details about the Test Laboratory

Details about the Test Laboratory

Company name: Jiangsu TÜV Product Service Ltd. – Shenzhen Branch
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Company name: Shenzhen Timeway Technology Consulting Co., Ltd
FCC Registration Number: 899988
IC Registration Number: 5205

East 5/F Block4, Anhua Industrial Park,
Tairan Rd., CheGongMiao
Futian District
Shenzhen

Telephone: 755 8344 8688
Fax: 755 8344 2996

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	Bluetooth Headset
Model no.:	SHB7110/10
Serial number:	NIL
Options and accessories:	NIL
Rating:	5V DC 500mA AC Adaptor: Model: CM-3AD05005/37 Input: 100-240V~ 50/60Hz 100mA Ouput: 5VDC 500mA
Antenna:	Integral antenna inside enclosure of EUT, NOT accessible by end user
RF Transmission Frequency:	2400-2483.5MHz
Description of the EUT:	Wireless device

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4 Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C	PART 15 - RADIO FREQUENCY DEVICES Subpart C - Intentional Radiators
FCC Part 15 Subpart B	PART 15 - RADIO FREQUENCY DEVICES Subpart B - Unintentional Radiators

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5 Summary of Test Results

Technical Requirements				
FCC Part 15 Subpart C				
Test Condition	Pages	Test Result		
		Pass	Fail	N/A
15.107 15.207 Conducted Emission AC Power Port	8	☒	☐	☐
15.247 (b) (1) Conducted peak output power	12	☒	☐	☐
15.247(d) Band edge compliance of RF emissions	14	☒	☐	☐
15.247(d) Spurious RF conducted emissions	19	☒	☐	☐
15.247(d) 15.209 15.109 Spurious radiated emissions	25	☒	☐	☐
15.247(a)(1) 20dB bandwidth	28	☒	☐	☐
15.247(a)(1) Carrier frequency separation	32	☒	☐	☐
15.247(a)(1)(iii) Number of hopping frequencies	36	☒	☐	☐
15.247(a)(1)(iii) Dwell Time	40	☒	☐	☐

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6 General Remarks

Remarks
This submittal(s) (test report) is intended for FCC ID: OYMSHB7110 filing to comply with Section 15.207，15.209，15.247 of the FCC Part 15, Subpart C Rules.

SHB7110/00, SHB7110/05, SHB7110/10, SHB7110/27 and SHB7110/97 are identical except model number. So EMC testing was applied on SHB7110/10, other models are deemed to fulfill relevant EMC requirement without further testing.

SUMMARY:

All tests according to the regulations cited on page 5 were

■ - Performed

☐ - **Not** Performed

The Equipment Under Test

■ - **Fulfills** the general approval requirements.

☐ - **Does not** fulfill the general approval requirements.

Sample Received Date: 28 October 2008

Testing Start Date: 3 November 2008

Testing End Date: 21 November 2008

- JIANGSU TÜV PRODUCT SERVICE LTD. – SHENZHEN BRANCH -

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EMC Project Manager

Prepared by:

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EMC Engineer

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7 Technical Requirement

7.1 Conducted Emission

Test Method

1 The EUT was placed on a table, which is 0.8m above ground plane
2 The power line of the EUT is connected to the AC mains through a Artificial Mains Network (A.M.N.).
3 Maximum procedure was performed to ensure EUT compliance
4 A EMI test receiver (R&S Test Receiver ESCS30) is used to test the emissions from both sides of AC line

Limit

Frequency MHz	QP Limit dBµV	AV Limit dBµV
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

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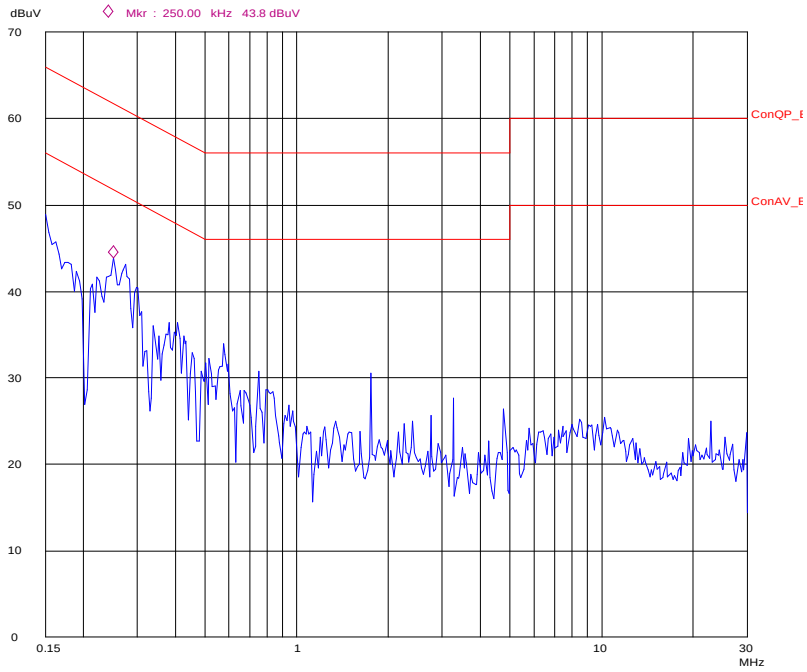
Conducted Emission

Conducter Disturbance

EUT: M/N:SHB7110
Op Cond: ON
Test Spec: L
Comment: AC 120V/60Hz



Frequency MHz	Cable Loss dB	Reading dBµV	QP Test result dBµV	QP Limit dBµV	Margin dB
0.150	9.8	34.6	44.4	66	21.6
0.250	9.8	28.6	38.4	61.7	23.3

Frequency MHz	Cable Loss dB	Reading dBµV	AV Test result dBµV	AV Limit dBµV	Margin dB
0.150	9.8	16.6	26.4	56	29.6
0.250	9.8	14.8	24.6	51.7	27.1

Remark: Test Result= Reading + Cable Loss

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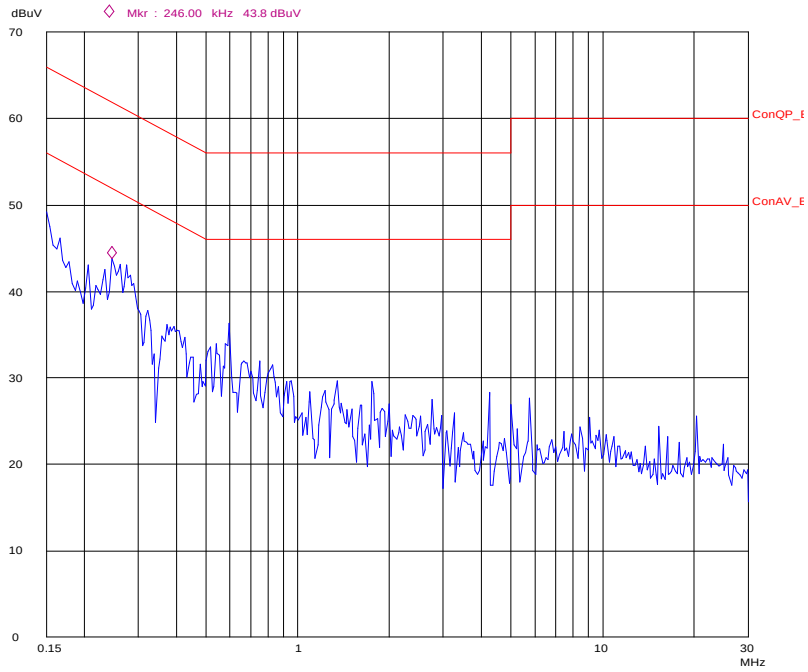
Conducted Emission

Conducter Disturbance

EUT: M/N:SHB7110
Op Cond: ON
Test Spec: N
Comment: AC 120V/60Hz



Frequency MHz	Cable Loss dB	Reading dBµV	QP Test result dBµV	QP Limit dBµV	Margin dB
0.150	9.8	34.7	44.5	66	21.5
0.246	9.8	28.7	38.5	61.8	23.3

Frequency MHz	Cable Loss dB	Reading dBµV	AV Test result dBµV	AV Limit dBµV	Margin dB
0.150	9.8	17.1	26.9	56	29.1
0.246	9.8	13.9	23.7	51.8	28.1

Remark: Test Result= Reading + Cable Loss

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Test Equipment List

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
ESPI Test Receiver	ROHDE&SCHWARZ	ESPI 3	100379	2009-12-05
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100294	2009-12-05
TWO Line-V-NETW	ROHDE&SCHWARZ	EZH3-Z5	100253	2009-12-05

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7.2 Conducted peak output power

Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.

Limits for conducted peak output power measurements

Frequency Range MHz	Limit W	Limit dBm
2400-2483	≤1	≤30

Conducted peak output power

Test Result

Frequency MHz	Conducted Peak Output Power dBm	Result
CH1 2402MHz	4.11	Pass
CH2 2441MHz	4.09	Pass
CH3 2480MHz	4.29	Pass

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Test Equipment

Maximum transmit power Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum	ROHDE&SCHWARZ	FSEM	8485971001	2009-04-25

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7.3 Band edge compliance of RF emissions

Test Method

The band edge compliance of RF radiated emission should be measured by following the guidance in ANSI C63.4 with respect to maximizing the emission by rotating the EUT, measuring the emission while the EUT is situated in three orthogonal planes (if appropriate), adjusting the measurement antenna height and polarization etc. Set RBW and VBW to 1MHz to measure the peak field strength and set RBW to 1MHz and VBW to 10Hz to measure the average radiated field strength.
The conducted RF band edge was measured by using a spectrum analyzer. Set span wide enough to capture the highest in-band emission and the emission at the band edge. Set RBW and VBW to 100kHz, to measure the conducted peak band edge.

Limits

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 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. 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) (see Section 15.205(c)).

Frequency MHz	Limit Average dBuV/m	Limit Peak dBuV/m
Below 2390 Above 2483.5	54	74

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Band edge compliance of RF emissions

Test Result

Carrier Field strength

Frequency MHz	Cable Loss dB	Antenna Factor dB/m	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Result
2402.000	5.6	28.5	61.5	95.6	Vertical	---	PK	---
2402.000	5.6	28.5	61.3	95.4	Vertical	---	AV	---
2402.000	5.6	28.5	52.7	86.8	Horizontal	---	PK	---
2402.000	5.6	28.5	52.6	86.7	Horizontal	---	AV	---
2480.000	5.6	28.5	49.5	83.6	Vertical	---	PK	---
2480.000	5.6	28.5	49.3	83.4	Vertical	---	AV	---
2480.000	5.6	28.5	38.3	72.4	Horizontal	---	PK	---
2480.000	5.6	28.5	38.0	72.1	Horizontal	---	AV	---

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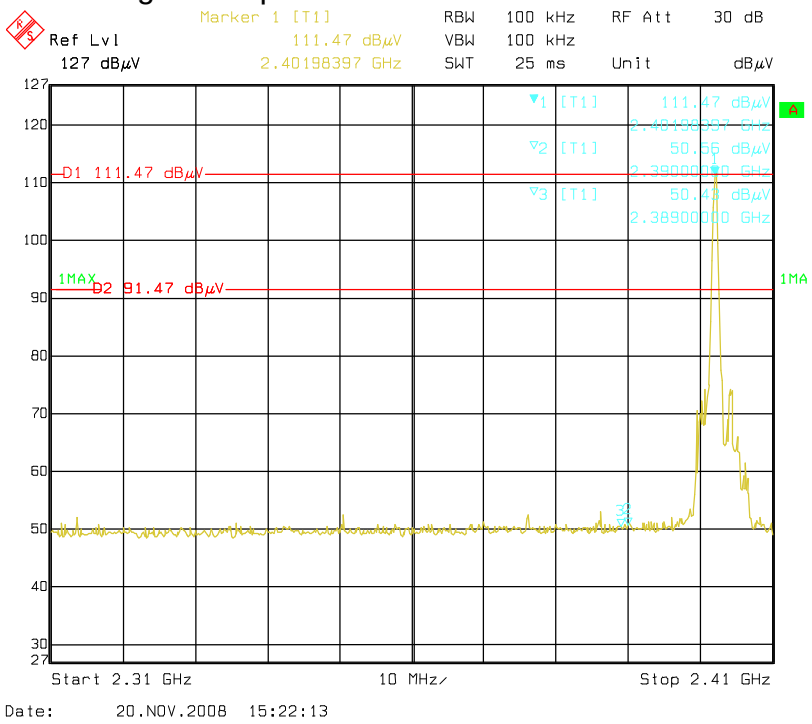
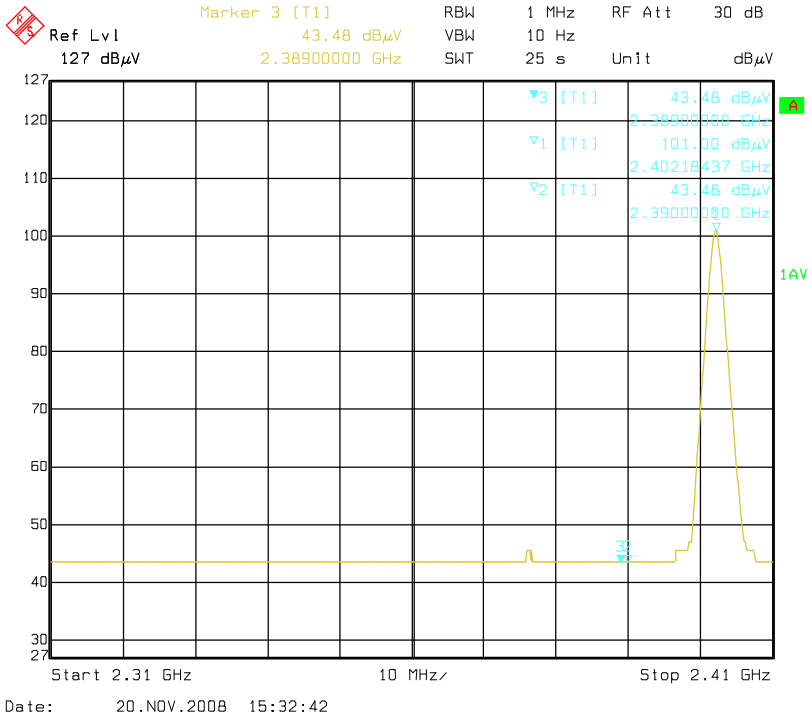
Band edge compliance of RF emissions

Lower Edge PK plot



AV Plot



Max carrier field strength PK 95.6dBuV/m, AV 95.4dBuV/m
At 2.390GHz, the deviation of PK plot is 60.91dB, AV plot is 57.52dB
The field strength at 2.390GHz PK 34.69dBuV/m, AV 37.88dBuV/m
Which fulfills the requirement of PK 74dBuV/m and AV 54dBuV/m

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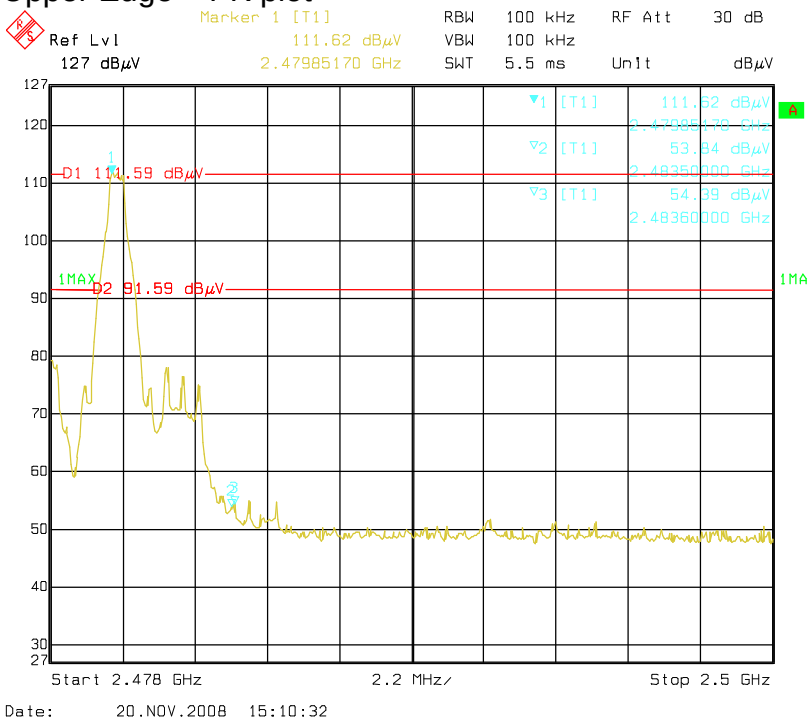
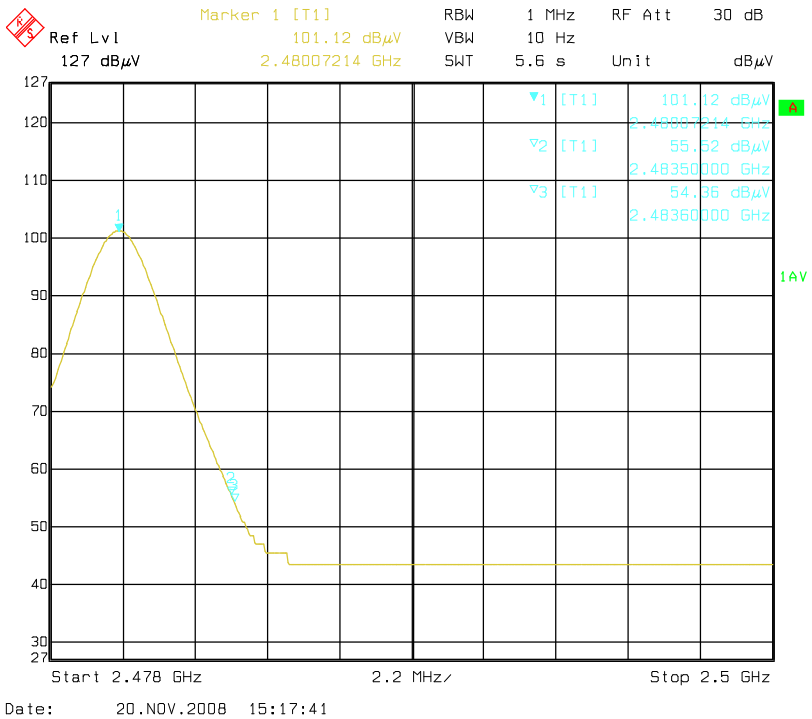
Band edge compliance of RF emissions

Upper Edge PK plot



AV Plot



Max carrier field strength PK 83.6dBuV/m, AV 83.4dBuV/m
At 2.4835GHz, the deviation of PK plot is 57.78dB, AV plot is 45.6dB
The field strength at 2.4835GHz PK 25.82dBuV/m, AV 37.8dBuV/m
Which fulfills the requirement of PK 74dBuV/m and AV 54dBuV/m

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Test Equipment List

Band edge compliance of RF emissions

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum	ROHDE&SCHWARZ	FSEM	8485971001	2009-04-25
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2009-04-25

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7.4 Spurious RF conducted emissions

Test Method

The transmitter output is connected to the Spectrum analyzer. The Spectrum analyzer is set to the peak power detection.
Conducted RF measurements of the transmitter output were made to confirm that the EUT antenna port conducted emissions meet the specified limit and to identify any spurious signals that require further investigation or measurements on the radiated emissions site.

The resolution bandwidth(RBW) and the video bandwidth (VBW) of the spectrum analyzer were respectively set to 100kHz and 300kHz.

Limit

Frequency Range MHz	Limit (dBc)
1000-25000	-20

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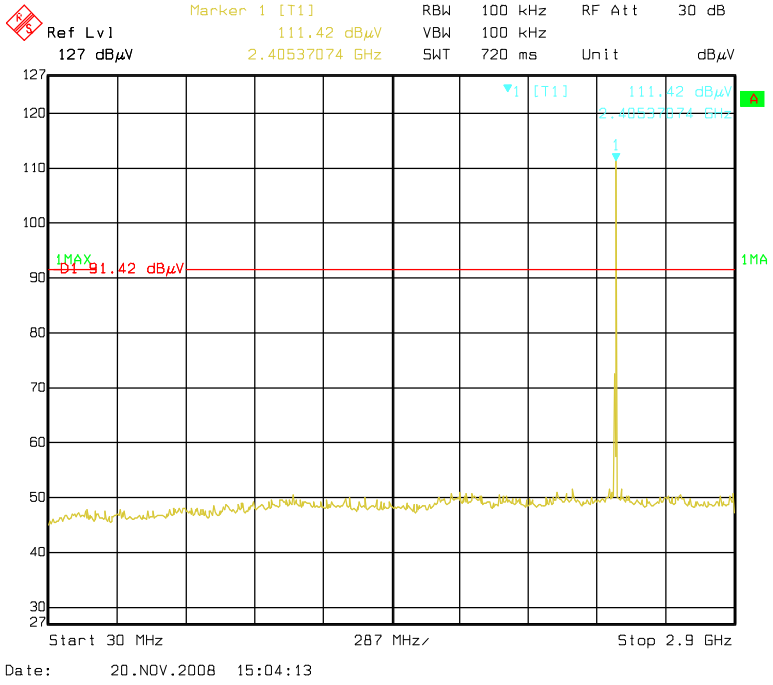
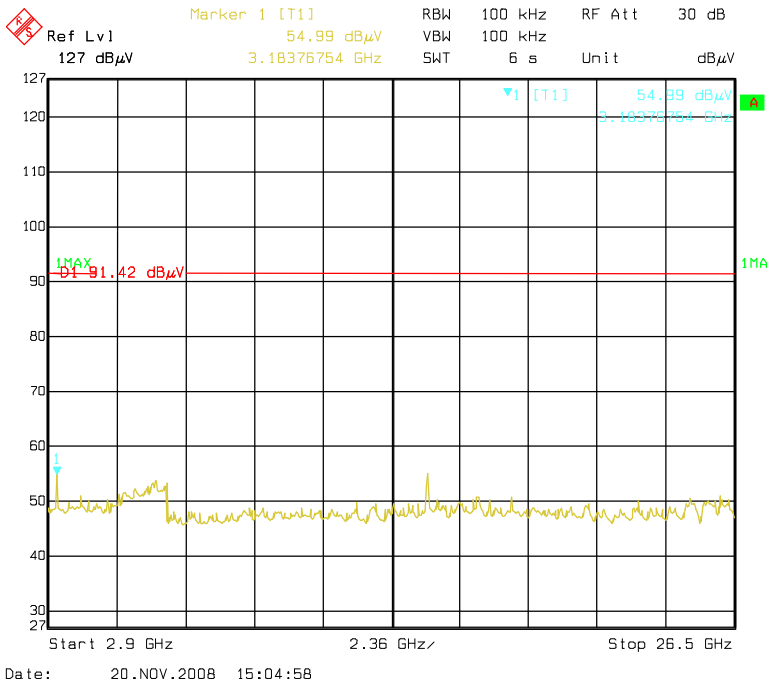
Spurious RF conducted emissions

Test Result-2402MHz





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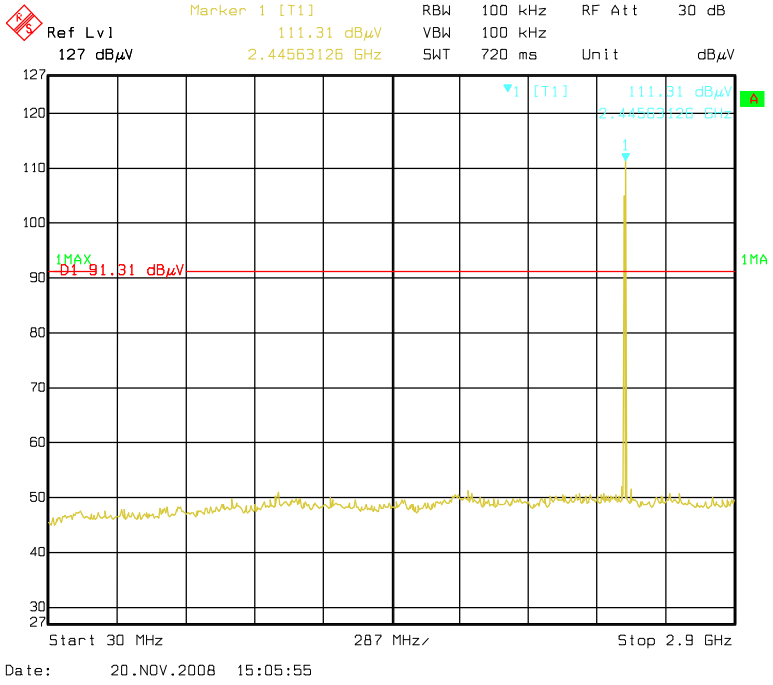
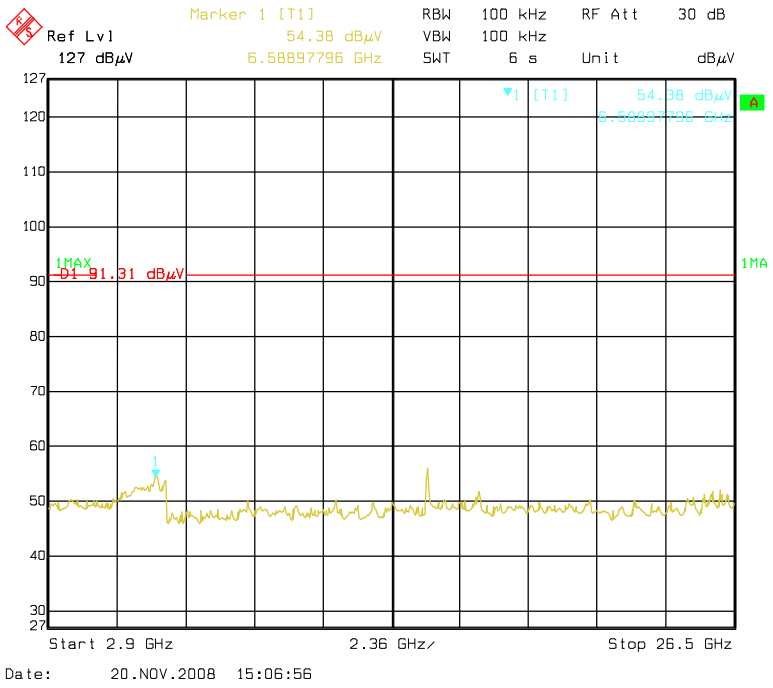
Spurious RF conducted emissions

Test Result-2441MHz





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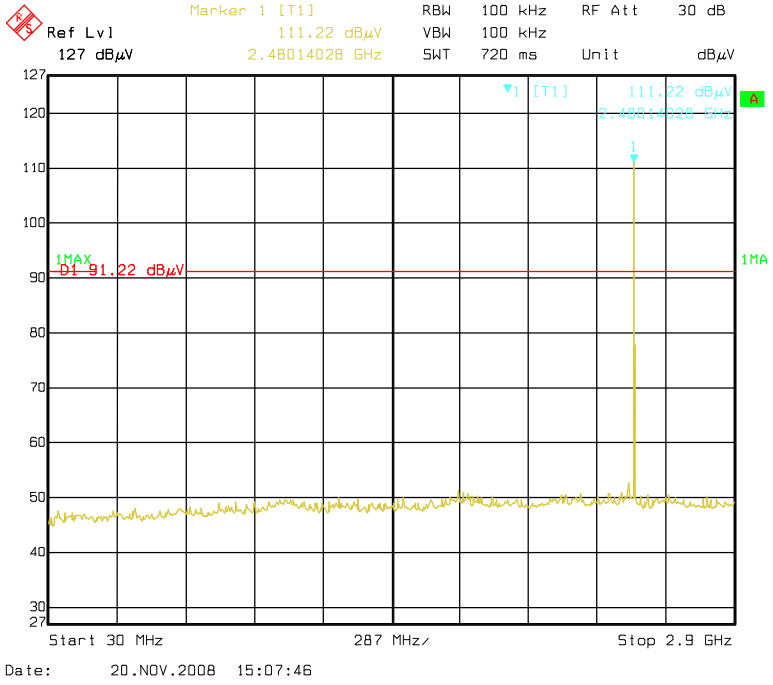
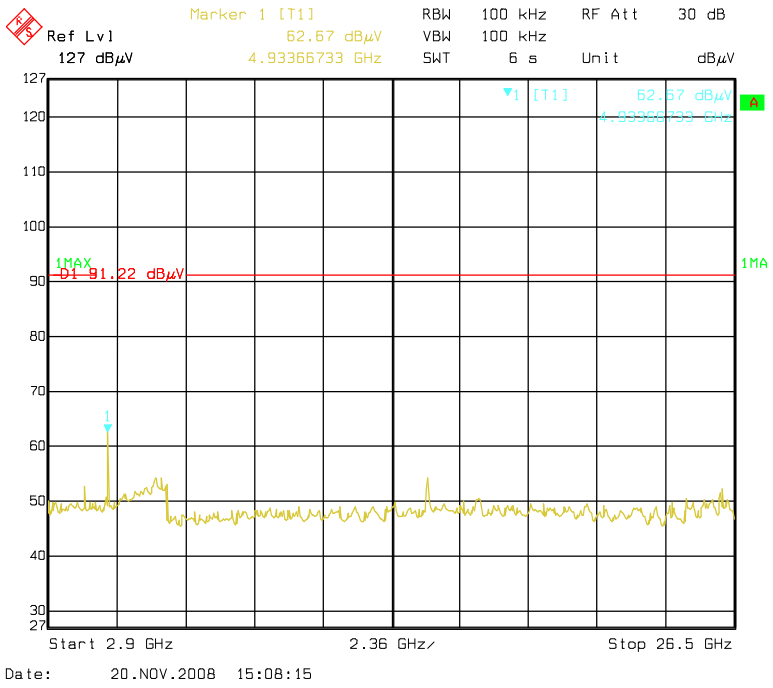
Spurious RF conducted emissions

Test Result-2480MHz





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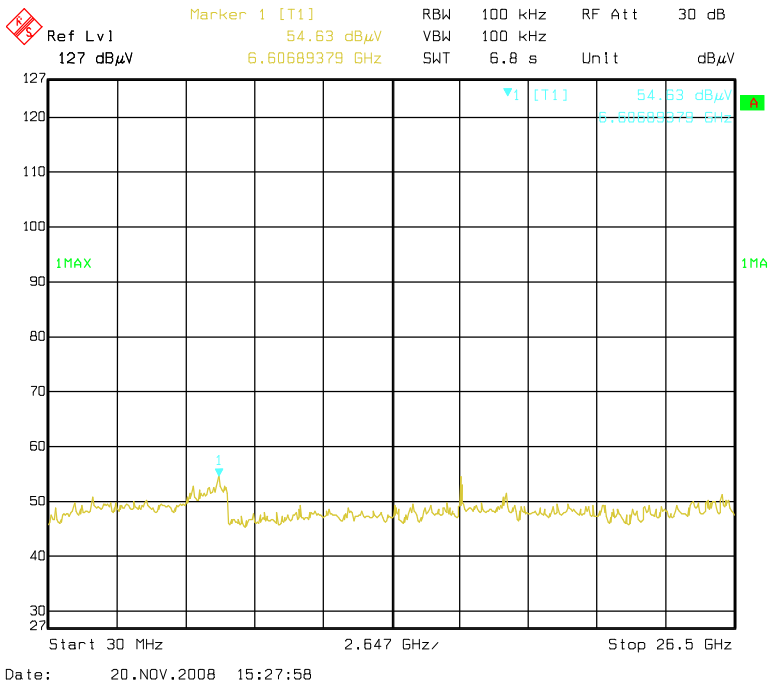
Spurious RF conducted emissions

Test Result-Rx



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Test Equipment List

Spurious RF conducted emissions Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum	ROHDE&SCHWARZ	FSEM	8485971001	2009-04-25

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7.5 Spurious radiated emissions

Test Method

1 The EUT is placed on a turntable, which is 0.8m above ground plane.
2 The turntable shall be rotated for 360 degrees to determine the position of maximum emission level
3 EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4 Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5 each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.

Limit

Frequency MHz	Field Strength uV/m	Field Strength dBµV/m	Detector
30-88	100	40	QP
88-216	150	43.5	QP
216-960	200	46	QP
960-1000	500	54	QP
Above 1000	500	54	AV
Above 1000	5000	74	PK

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Spurious radiated emissions

Test Result-2402MHz

Frequency MHz	Cable Loss dB	Antenna Factor dB/m	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBµV/m	Detector	Result
4804.000	4.2	33.3	10.3	47.8	Horizontal	54	QP	Pass
4804.000	3.8	33.3	14.1	51.2	Vertical	54	PK	Pass

Test Result-2441MHz

Frequency MHz	Cable Loss dB	Antenna Factor dB/m	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBµV/m	Detector	Result
4881.982	3.8	33.3	14.9	51.9	Horizontal	54	PK	Pass
4881.982	3.8	33.3	15.6	52.7	Vertical	54	PK	Pass

Test Result-2480MHz

Frequency MHz	Cable Loss dB	Antenna Factor dB/m	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBµV/m	Detector	Result
4960.000	3.8	33.3	11.7	48.8	Horizontal	54	PK	Pass
4960.000	3.8	33.3	12.6	49.7	Vertical	54	PK	Pass

Remark: Emission Level= Cable Loss(include amplifier factor) + Antenna Factor + Reading

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Test Equipment List

Spurious radiated emissions Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum	ROHDE&SCHWARZ	FSEM	8485971001	2009-04-25
Ultra Broadband ANT	ROHDE&SCHWARZ	HL562	100157	2009-12-05
Horn Antenna	SCHWARZBECK	BBHA 9120D	9120D-631	2009-04-25

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7.6 20 dB bandwidth

Test Method

1 Place the EUT on the table and set it in the 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 Mark the peak frequency and –20dB (upper and lower) frequency.

Limit

Limit [kHz]
N/A

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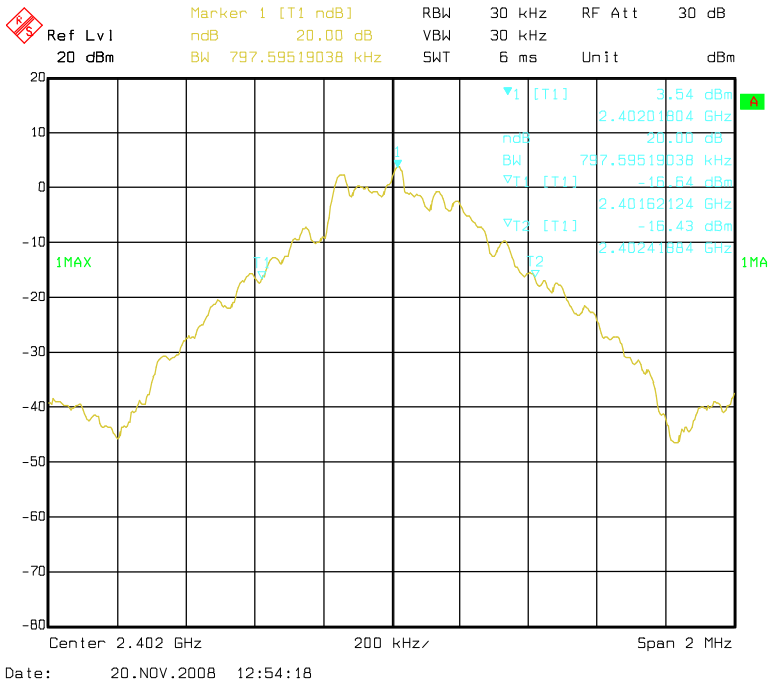
20 dB bandwidth

Test Result

Frequency MHz	Bandwidth kHz	Result
2402	797.595	Pass
2441	801.603	Pass
2480	797.595	Pass



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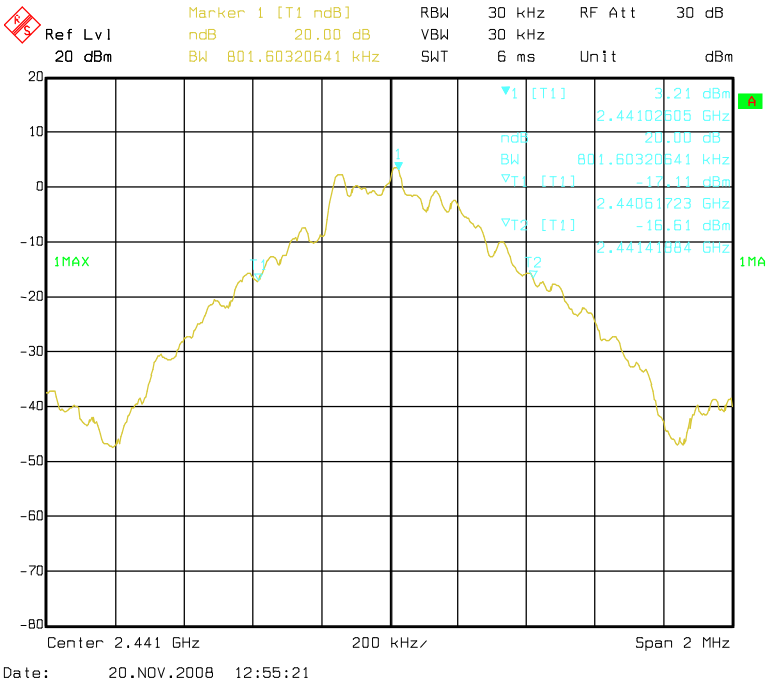
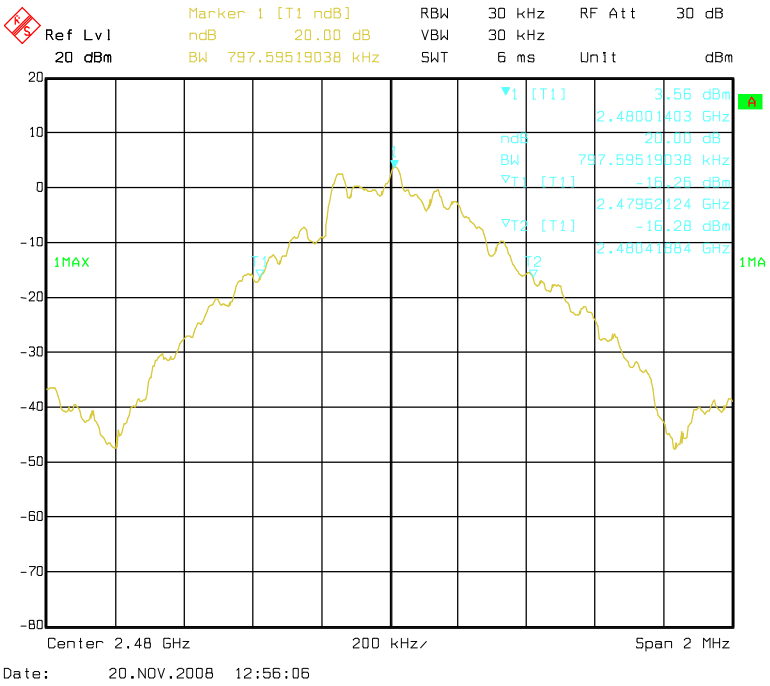
20 dB bandwidth





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Test Equipment

20 dB bandwidth Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum	ROHDE&SCHWARZ	FSEM	8485971001	2009-04-25

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7.7 Carrier Frequency Separation

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
RBW: 100KHz; VBW: 300KHz; SPAN:3MHz
2. By using the Max-Hold function record the separation of two adjacent channels.
3. Measure the frequency difference of these two adjacent channels by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

Limit MHz
⩾ 0.025 or 2/3 of the 20 dB bandwidth

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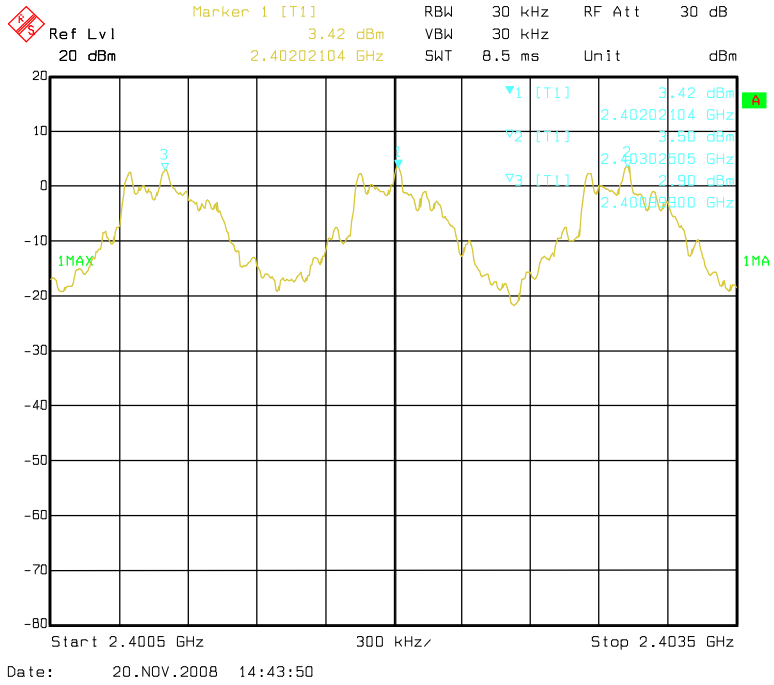
Carrier Frequency Separation

Test Result

Frequency MHz	Carrier Frequency Separation kHz	Result
2402	1022	Pass
2441	991	Pass
2480	1010	Pass



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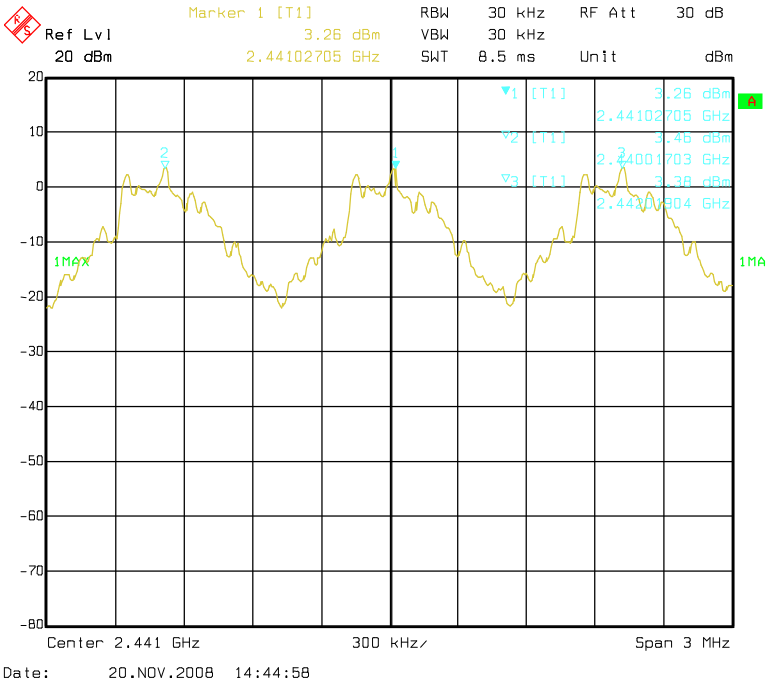
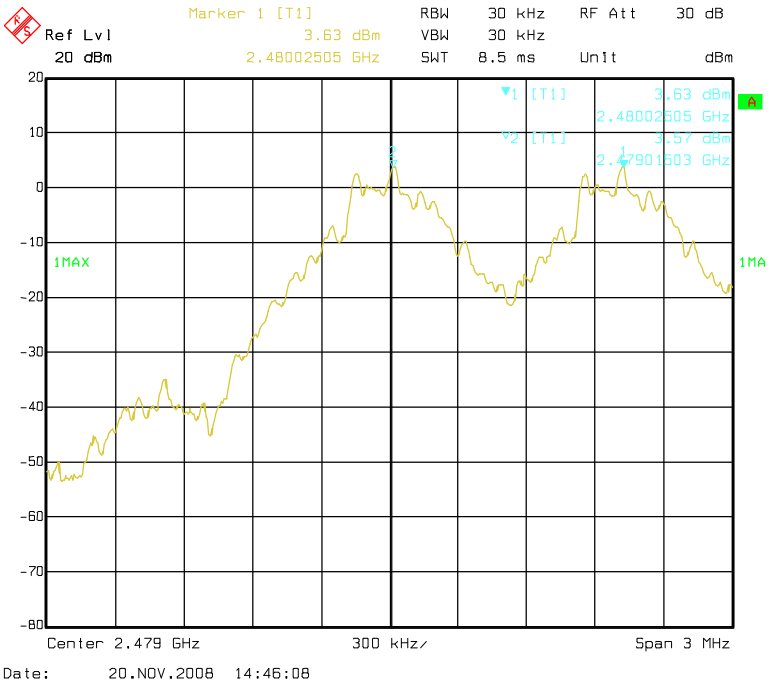
Carrier Frequency Separation





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Test Equipment

Carrier Frequency Separation Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum	ROHDE&SCHWARZ	FSEM	8485971001	2009-04-25

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7.8 Number of hopping frequencies

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
RBW: 300KHz; VBW: 1MHz
2. Set the spectrum analyzer on Max-Hold Mode, and then keep the EUT in hopping mode. Record all the signals from each channel until each one has been recorded.
3. Repeat above procedures until all frequencies measured were complete.

Limit

Limit number
⩾ 15

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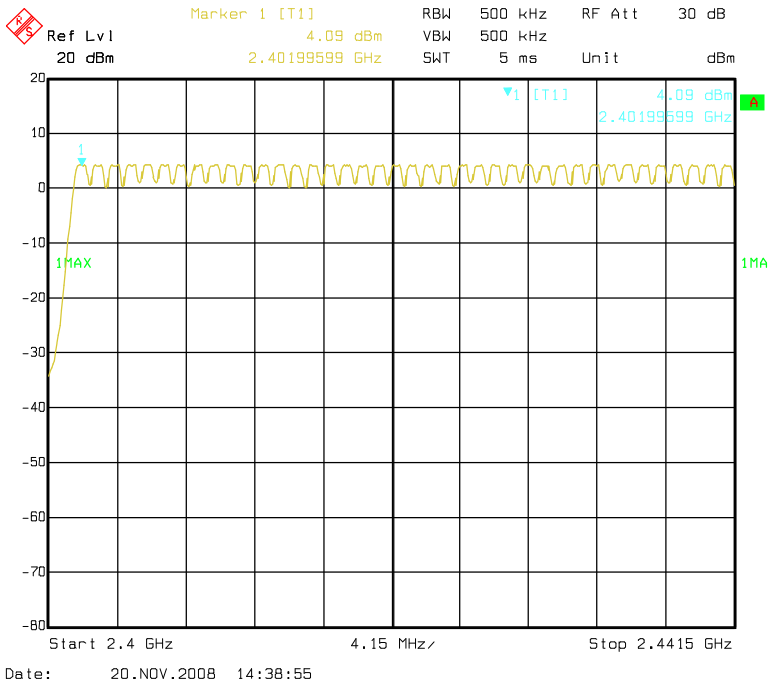
Number of hopping frequencies

Test Result

Number of hopping frequencies	Result
79	Pass



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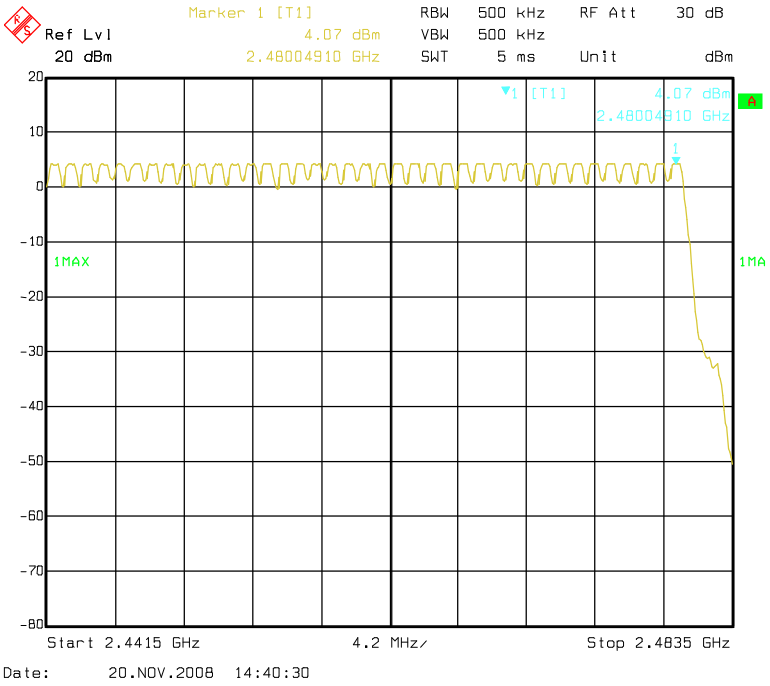
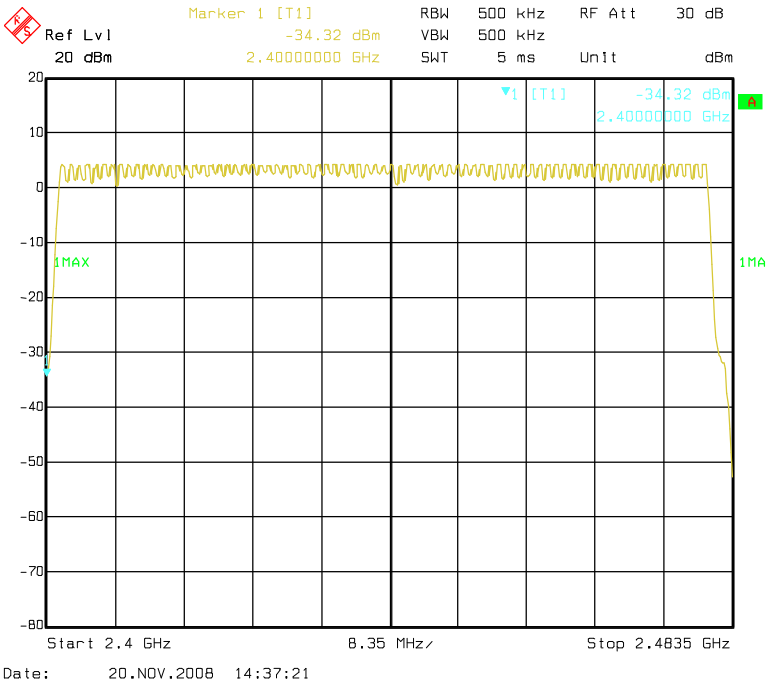
Number of hopping frequencies





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Test Equipment

Number of hopping frequencies Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DATE
Spectrum	ROHDE&SCHWARZ	FSEM	8485971001	2009-04-25

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7.9 Dwell Time

Test Method

1. Connect EUT antenna terminal to the spectrum analyzer with a low loss cable.
Equipment mode: Spectrum analyzer
RBW: 1MHz; VBW: 1MHz; SPAN: Zero Span
2. Adjust the center frequency of spectrum analyzer on any frequency be measured.
3. Measure the Dwell Time by spectrum analyzer Marker function.
4. Repeat above procedures until all frequencies measured were complete.

Limit

The average time of occupancy on any frequency shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

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Dwell Time

Test Result

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Result
DH1	2402	390	249.59	< 400	Pass
DH3	2402	1653	352.63	< 400	Pass
DH5	2402	2904	371.71	< 400	Pass

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Result
DH1	2441	390	249.59	< 400	Pass
DH3	2441	1653	352.63	< 400	Pass
DH5	2441	2904	371.71	< 400	Pass

Mode	Frequency (MHz)	Spectrum Reading (μs)	Test Result (ms)	Limit (ms)	Result
DH1	2480	390	249.59	< 400	Pass
DH3	2480	1653	352.63	< 400	Pass
DH5	2480	2904	371.71	< 400	Pass

Note:
A period time=79x0.4(s)=31.6(s)

2402MHz	DH1	time slot= 390 (μs)*(1600/(1*79))*31.6= 249.59 (ms)
	DH3	time slot= 1653 (μs)*(1600/(3*79))*31.6= 352.63 (ms)
	DH5	time slot= 2904 (μs)*(1600/(5*79))*31.6= 371.71 (ms)
2441MHz	DH1	time slot= 390 (μs)*(1600/(1*79))*31.6= 249.59 (ms)
	DH3	time slot= 1653 (μs)*(1600/(3*79))*31.6= 352.63 (ms)
	DH5	time slot= 2904 (μs)*(1600/(5*79))*31.6= 371.71 (ms)
2480MHz	DH1	time slot= 390 (μs)*(1600/(1*79))*31.6= 249.59 (ms)
	DH3	time slot= 1653 (μs)*(1600/(3*79))*31.6= 352.63 (ms)
	DH5	time slot= 2904 (μs)*(1600/(5*79))*31.6= 371.71 (ms)

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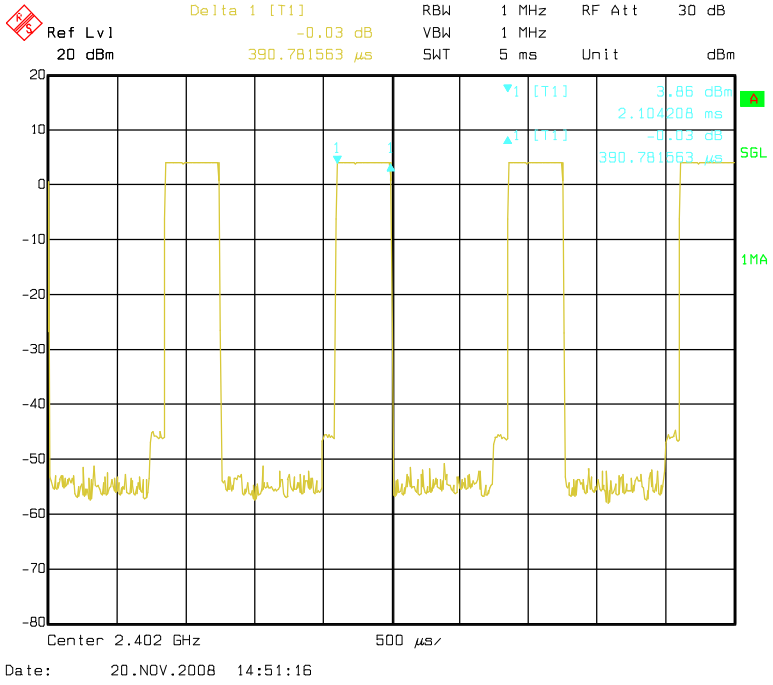
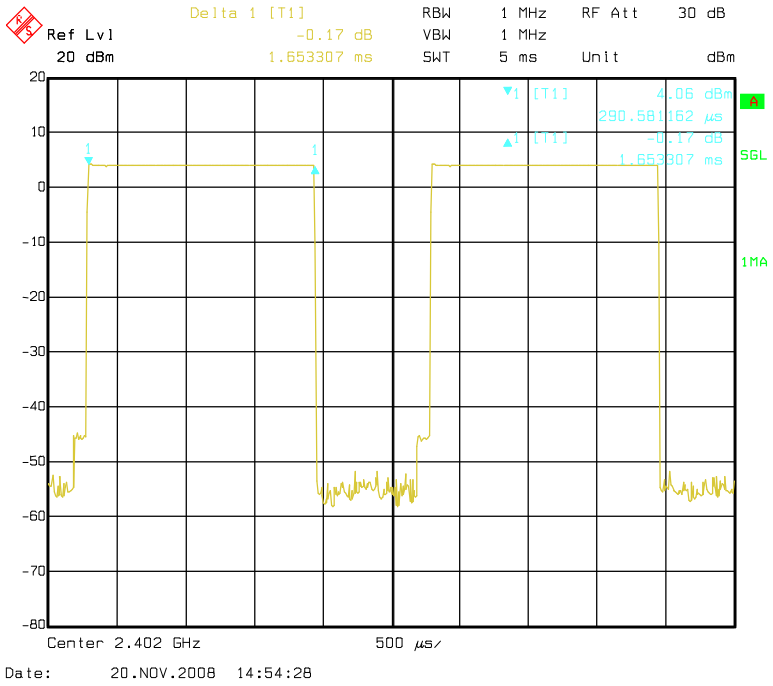
Dwell Time

2402MHz - DH1



2402MHz – DH3



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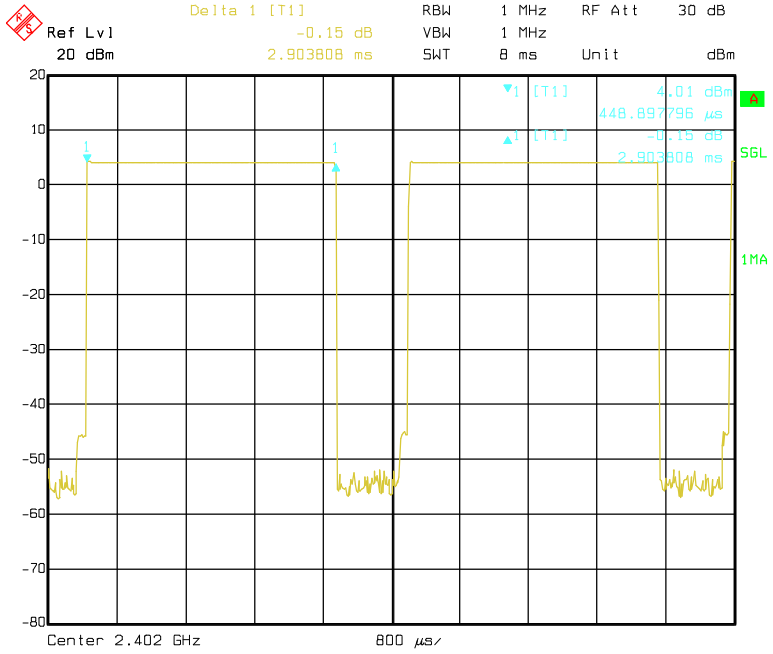
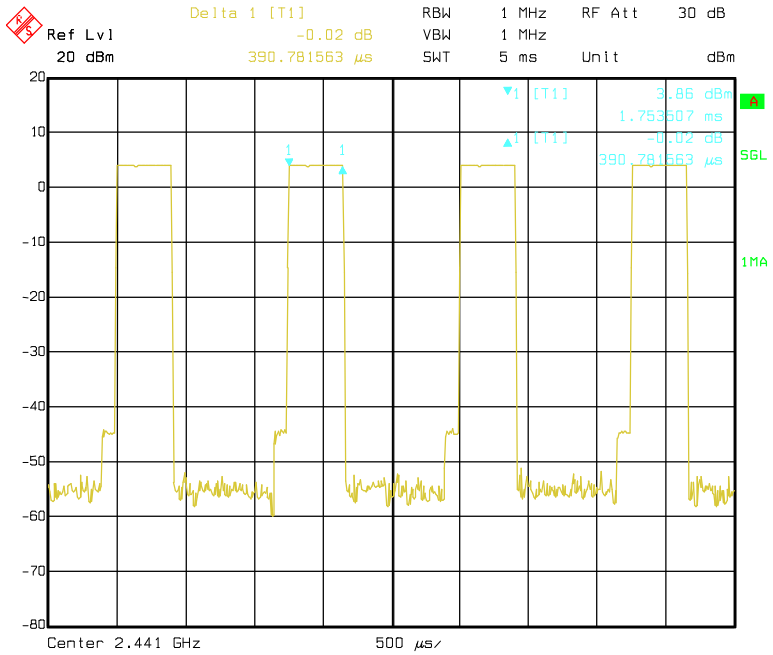
Dwell Time

2402MHz – DH5



Date: 20.NOV.2008 15:02:02

2441MHz – DH1



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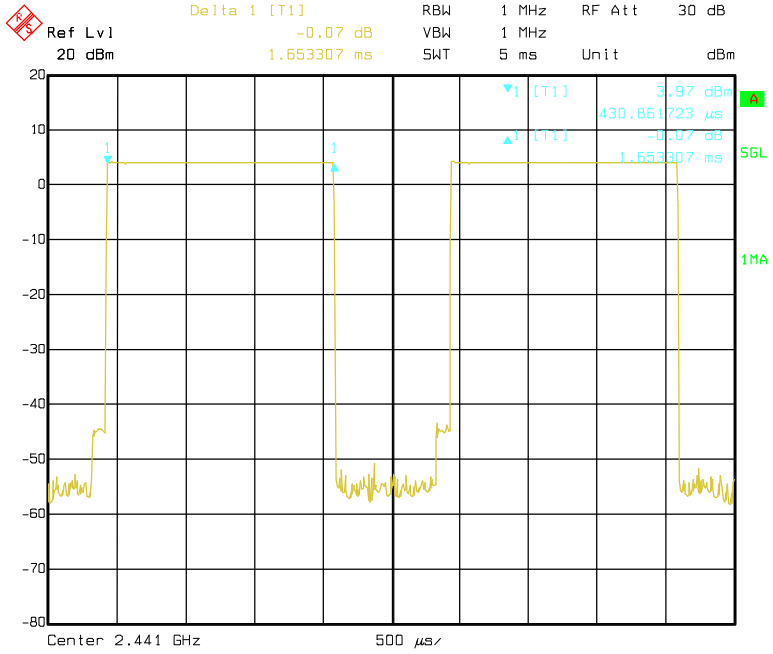
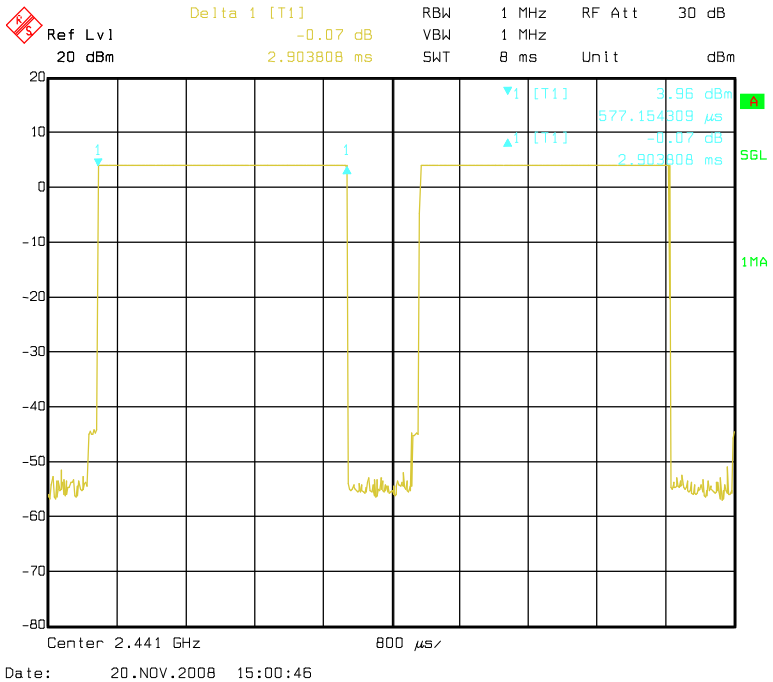
Dwell Time

2441MHz – DH3



2441MHz – DH5



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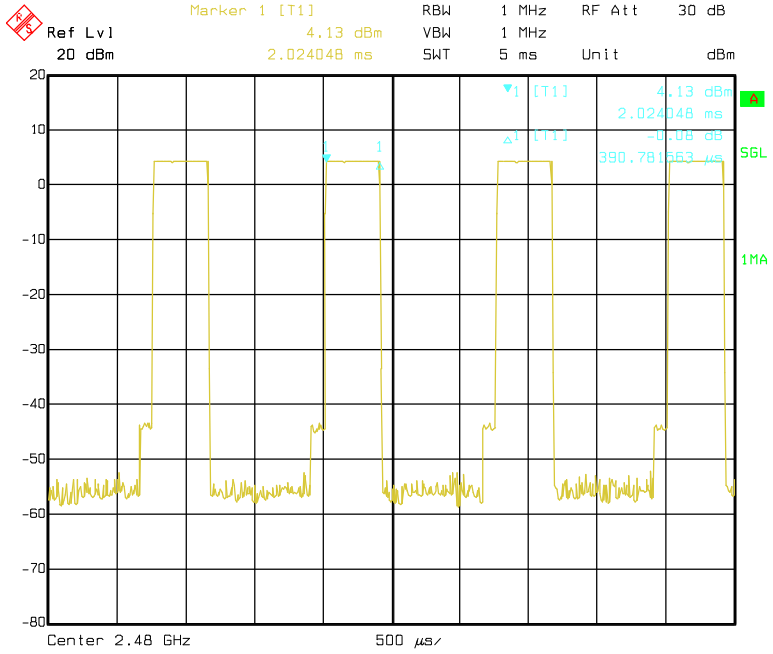
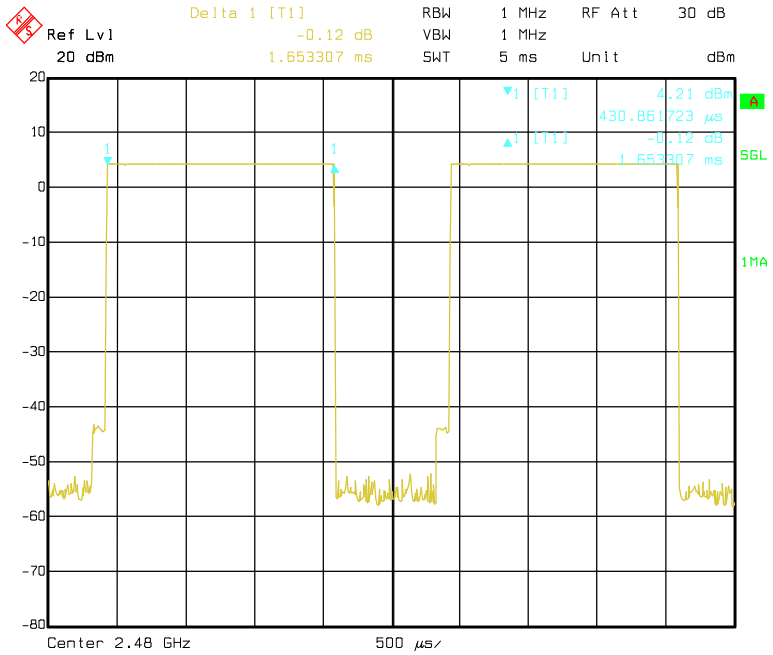
Dwell Time

2480MHz – DH1



Date: 20.NOV.2008 14:48:24

2480MHz – DH3



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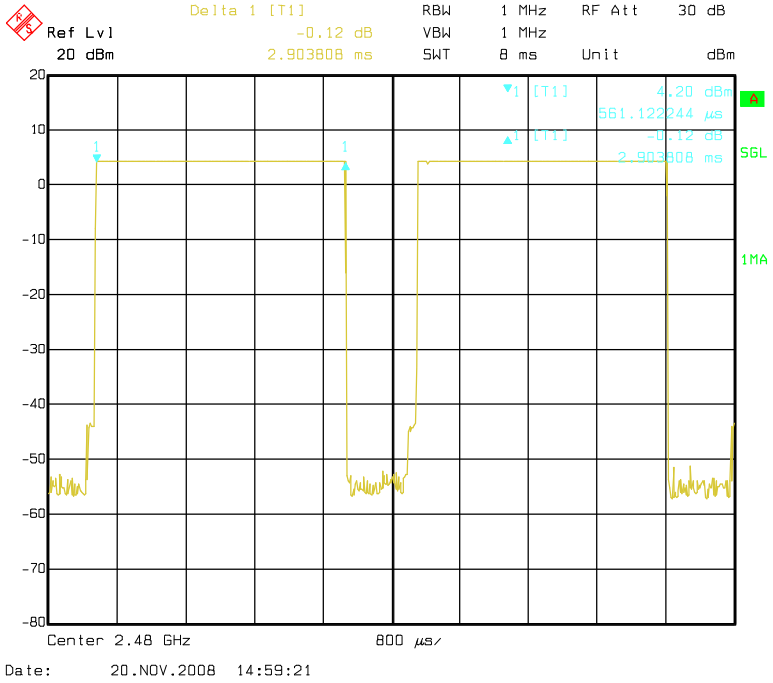
Dwell Time

2480MHz – DH5



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Test Equipment

Dwell Time Test

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Spectrum	ROHDE&SCHWARZ	FSEM	8485971001	2009-04-25

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8 MPE Calculation

Maximum Conducted Peak Power output:
Pout=2.68mW (4.29dBm)

Max Antenna gain,:
Gain=5dBi=3.16

The Low power threshold (No Evaluation Required if power is below this threshold)
60/f(GHz) mW=60/2.462=24.37mW

The Conducted Power of the EUT is lower than low power threshold and the antenna gain is less than 6dBi, therefore No SAR evaluation required since Transmitter Pout is below FCC threshold.

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9 System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dBμV/m)	U=4.6dB; k=2(30MHz-1GHz)
CE	Disturbance Voltage (dBμV)	U=3.3dB; k=2

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