



Hong Kong

RF - TEST REPORT

Report Number : **68/760.8.147.01** Date of Issue: 5 Jan 2009

Model : **SB1122**

Product Type : 2.4GHz Digital Wireless Transceiver

Applicant : Creative Labs Inc

Address : 1901 McCarthy Blvd

: Milpitas, CA 95035

Production Facility : Concord Electronic (Huizhou) Factory

Address : 21, Ping'An Road, Longhu Industrial Zone, Longjin, Shuikou,
Huizhou, Guangdong, China

Test Result : ☒ **Positive** ☐ **Negative**

Total pages including
Appendices : 36

TÜV SÜD Hong Kong Ltd. is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO 17025.

TÜV SÜD Hong Kong Ltd. reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Hong Kong Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Hong Kong Ltd. issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval.

1 Table of Contents

1	Table of Contents.....	2
2	Details about the Test Laboratory.....	3
3	Description of the Equipment Under Test.....	4
4	Summary of Test Standards.....	5
5	Summary of Test Results.....	6
6	General Remarks.....	7
7	Technical Requirements.....	8
7.1	Conducted Emission AC Power Port.....	8
7.2	Conducted Peak Power.....	12
7.3	Band edge compliance of RF emission.....	14
7.4	Spurious RF Conducted emission.....	19
7.5	Spurious radiated emissions.....	24
7.6	6dB bandwidth.....	27
7.7	Power spectral density.....	31
8	MPE Calculation.....	35
9	System Measurement Uncertainty.....	36



Hong Kong

2 Details about the Test Laboratory

Details about the Test Laboratory

Company name: TÜV SÜD HONG KONG LTD.
Unit 601, InnoCentre,
72 Tat Chee Avenue,
Kowloon Tong,
Hong Kong

Telephone: 852 2776 1323
Fax: 852 2776 1206

Company name: Shenzhen Timeway Technology Consulting Co., Ltd.
5/Block 4, Anhua Industrial Zone, No. 8 Tairan Rd.
Chegongmiao, Futian District,
Shenzhen, 518040
China

Telephone: 755 8344 8688
Fax: 755 8344 2996

3 Description of the Equipment Under Test

Description of the Equipment Under Test

Product:	2.4GHz Digital Wireless Transceiver
Model no.:	SB1122
Serial number:	NIL
Options and accessories:	NIL
Rating:	DC 5V 1000mA AC Adaptor: Model: SW0510 Input: 100-240V~ 50-60Hz 0.3A 20VA Output: DC 5V 1000mA
Antenna:	Integral antenna inside enclosure of EUT, NOT accessible by end user
RF Transmission Frequency:	2400-2483.5MHz
Description of the EUT:	The EUT consists 2 antennas, antenna A transmits and receives signal, antenna B only receives signal.

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

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	24	☒	☐	☐
15.247(a)(2) 6dB bandwidth	27	☒	☐	☐
15.247(e) Power spectral density	31	☒	☐	☐

6 General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: IBAAVPSB1122 filing to comply with Section 15.207, 15.209, 15.247 of the FCC Part 15, Subpart C Rules. Tests has been carried out in accordance with FCC rules Part 15 Subpart C, ANSI C63.4 (2003), Public Notice DA 00-705 and DTS procedures KDB 558074.

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: Dec 27 2008

Testing Start Date: Dec 27 2008

Testing End Date: Dec 31 2008

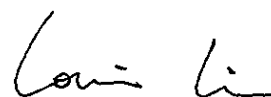
- TÜV SÜD HONG KONG LTD. -

Reviewed by:



Paul Yu
EMC Project Manager

Prepared by:



Louis Lin
EMC Assistant Project Manager

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

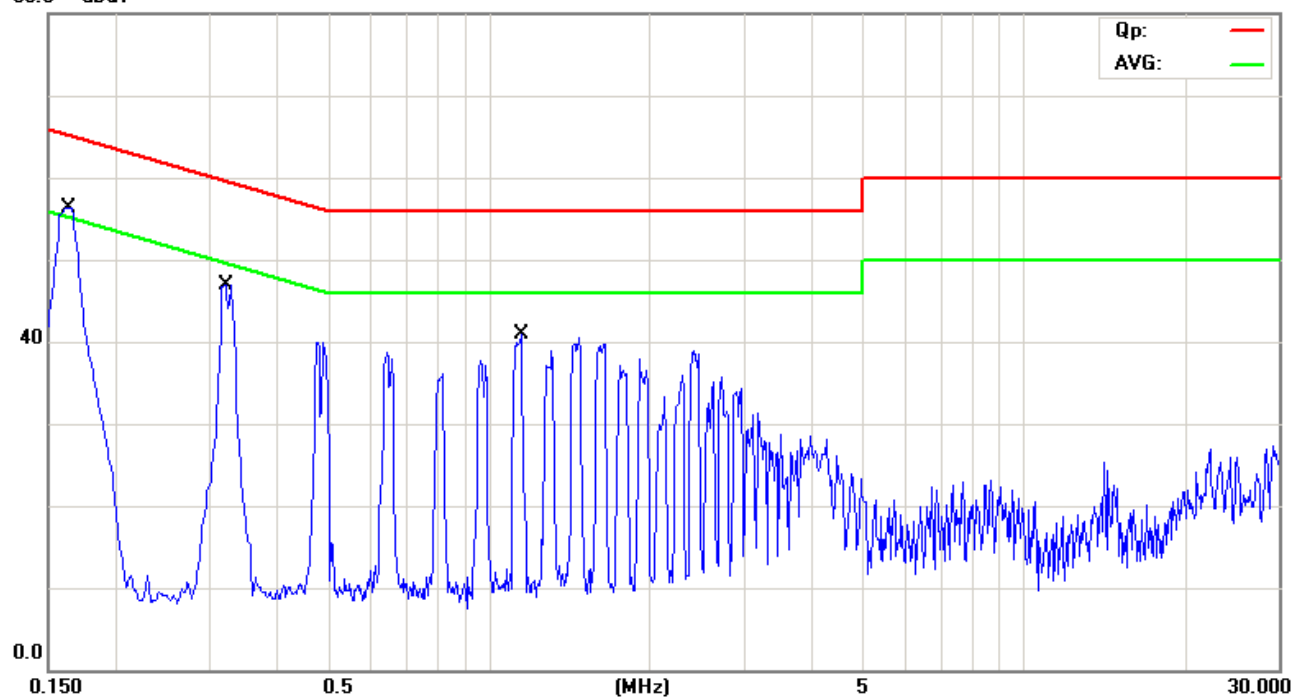
Frequency MHz	QP Limit dB μ V	AV Limit dB μ V
0.150-0.500	66-56*	56-46*
0.500-5	56	46
5-30	60	50

Decreasing linearly with logarithm of the frequency

Conducted Emission

Phase L

80.0 dB μ V

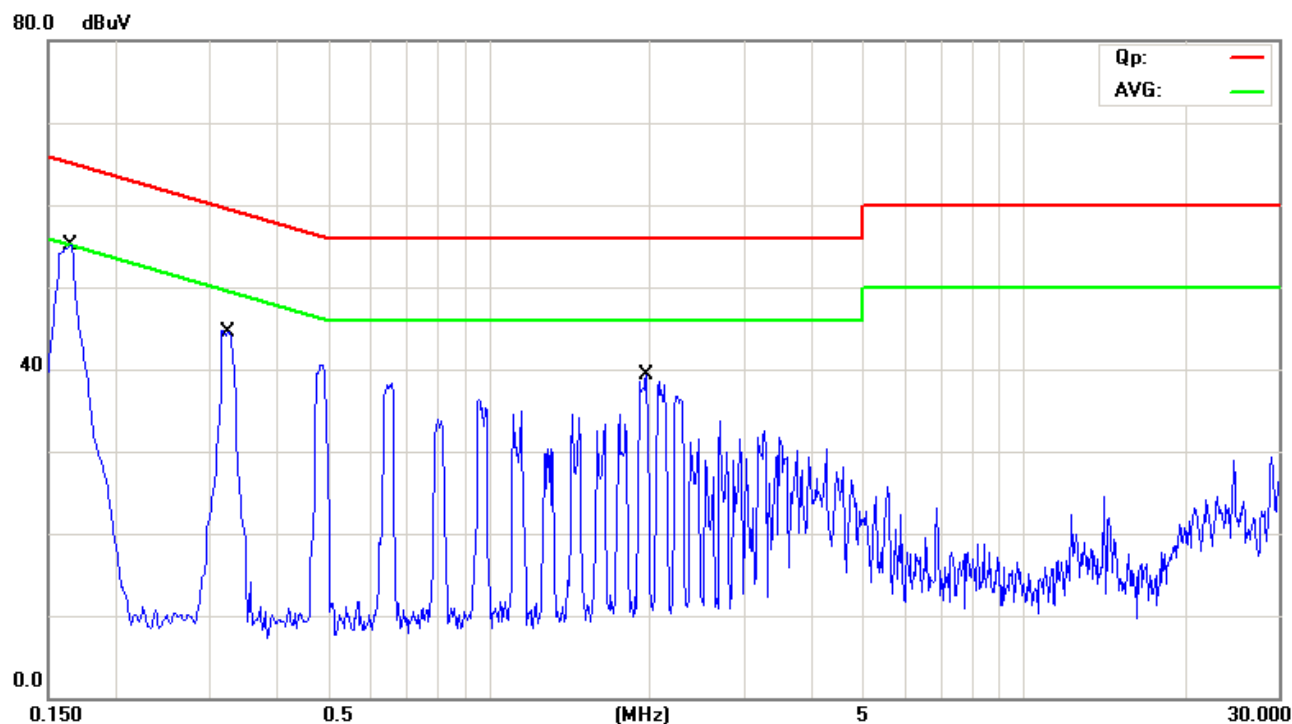


Frequency MHz	Reading dB μ V	Factor dB	Test result dB μ V	Limit dB μ V	Margin dB	Detector
0.1618	41.9	11.01	52.91	65.37	-12.46	QP
0.1618	24.6	11.01	35.61	55.37	-19.76	AVG
0.322	31	11.18	42.18	59.66	-17.48	QP
0.322	24.7	11.18	35.88	49.66	-13.78	AVG
1.1368	20.9	11.95	32.85	56	-23.15	QP
1.1368	10.4	11.95	22.35	46	-23.65	AVG

Remark: Test Result= Reading + Cable Loss

Conducted Emission

Phase N



Frequency MHz	Reading dB μ V	Factor dB	Test result dB μ V	Limit dB μ V	Margin dB	Detector
0.1628	40.4	11.01	51.41	65.32	-13.91	QP
0.1628	24.7	11.01	35.71	55.32	-19.61	AVG
0.325	29.2	11.19	40.39	59.58	-19.19	QP
0.325	15.8	11.19	26.99	49.58	-22.59	AVG
1.971	22.2	12.29	34.49	56	-21.51	QP
1.971	7.4	12.29	19.69	46	-26.31	AVG

Remark: Test Result= Reading + Cable Loss



Hong Kong

Test Equipment List

Conducted Emission Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DA TE
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

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.

The measurement is made according to DTS procedures KDB 558074.

Limits for conducted peak output power measurements

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

Conducted peak output power

Frequency MHz	Test Result Conducted Peak Output Power dBm	Result
CH1 2412MHz	15.31	Pass
CH2 2438MHz	14.25	Pass
CH3 2464MHz	13.11	Pass



Hong Kong

Test Equipment

Maximum transmit power Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DA TE
Spectrum	ROHDE&SCHWAR Z	FSEM	8485971001	2009-04-25

7.3 Band edge compliance of RF emissions

Test Method

The measurement is made according to DTS procedures KDB 558074.

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 is 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)).

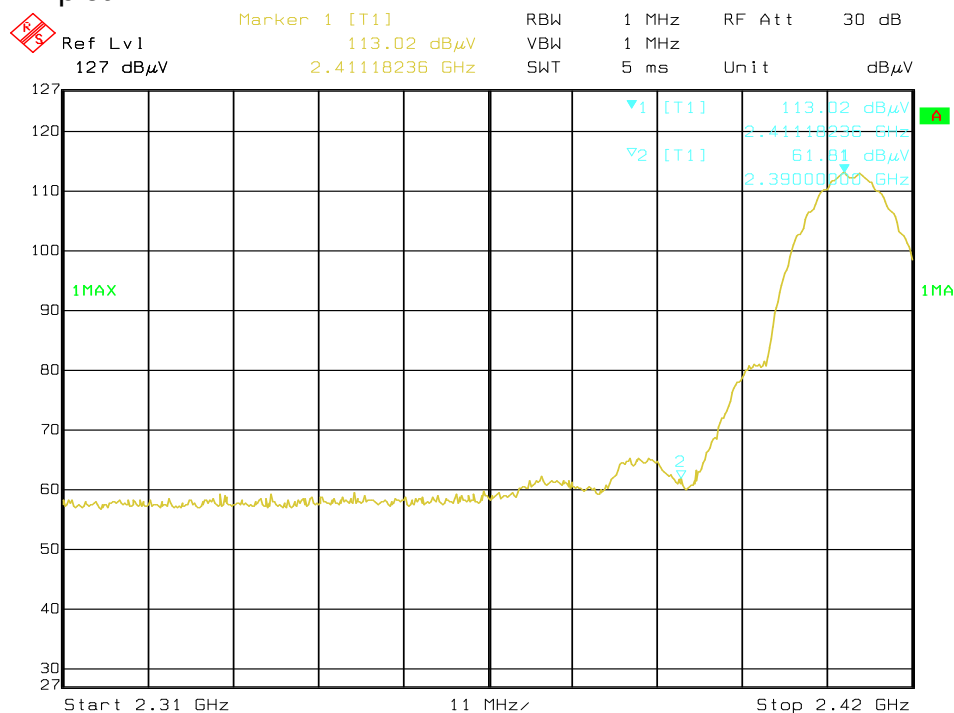
Frequency MHz	Limit Average dBuV/m	Limit Peak dBuV/m
Below 2390 Above 2483.5	54	74

Band edge compliance of RF emissions

Maximum Carrier Field strength

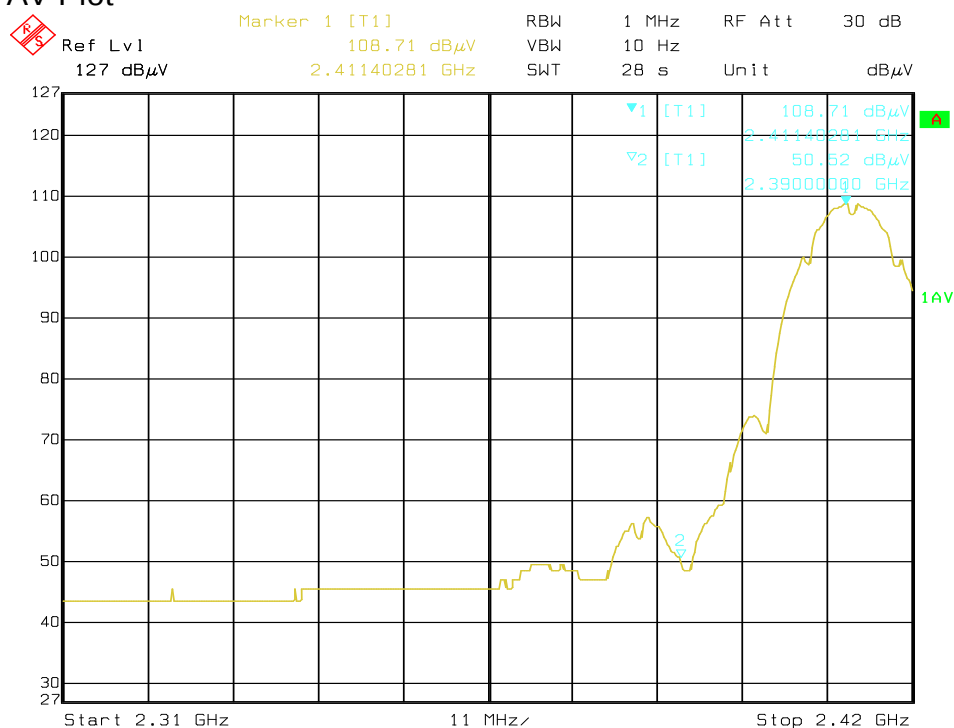
Frequency MHz	Cable Loss dB	Antenna Factor dB/m	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBuV/m	Detector	Result
2412.000	8.1	26.8	61.6	96.5	Vertical	---	PK	---
2412.000	8.1	26.8	55.5	90.4	Vertical	---	AV	---
2464.000	8.1	26.8	58.3	93.2	Vertical	---	PK	---
2464.000	8.1	26.8	53.9	88.8	Vertical	---	AV	---

Lower Edge PK plot



Date: 30.DEC.2008 10:27:35

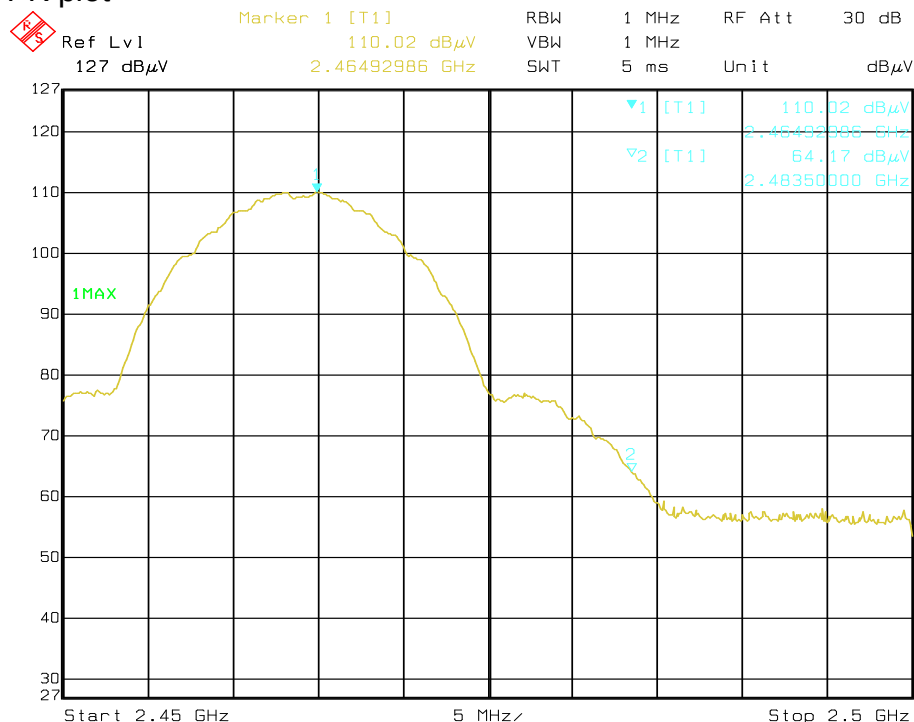
AV Plot



Date: 26.DEC.2008 17:27:09

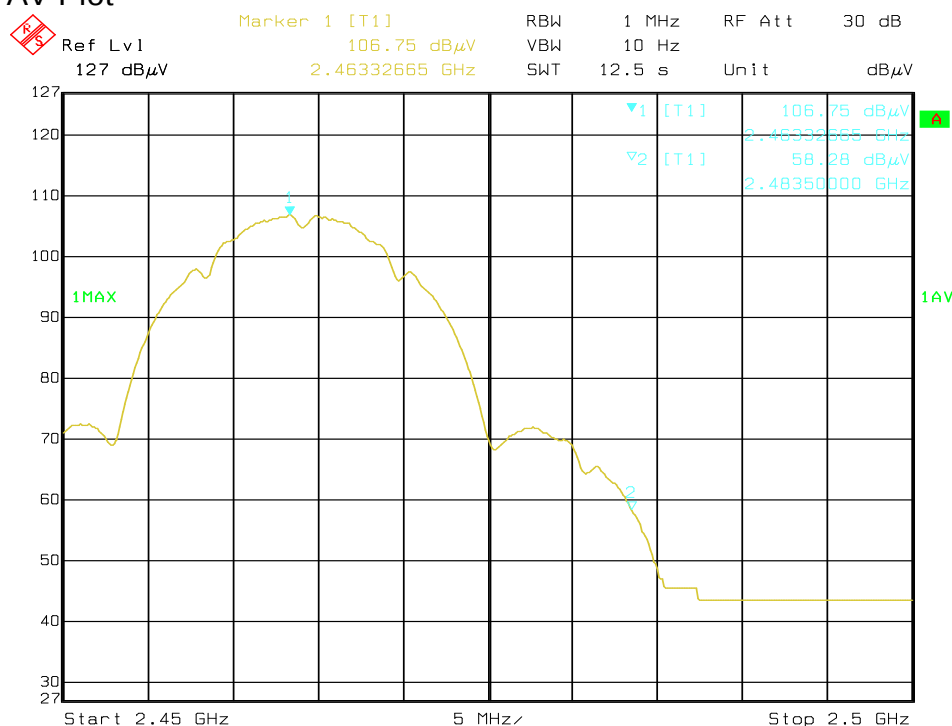
Max carrier field strength PK 96.5dBuV/m, AV 90.4dBuV/m
At 2.390GHz, the deviation of PK plot is 51.21dB, AV plot is 58.19dB
The field strength at 2.390GHz PK 45.29dBuV/m, AV 32.21dBuV/m
Which fulfills the requirement of PK 74dBuV/m and AV 54dBuV/m

Upper Edge PK plot



Date: 26.DEC.2008 17:33:05

AV Plot



Date: 26.DEC.2008 17:48:16

Max carrier field strength PK 93.2dBuV/m, AV 88.8dBuV/m

At 2.4835GHz, the deviation of PK plot is 45.85dB, AV plot is 48.47dB

The field strength at 2.4835GHz PK 47.35dBuV/m, AV 40.33dBuV/m

Which fulfills the requirement of PK 74dBuV/m and AV 54dBuV/m

Test Equipment List

Band edge compliance of RF emissions

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

7.4 Spurious RF conducted emissions

Test Method

The measurement is made according to DTS procedures KDB 558074.

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.

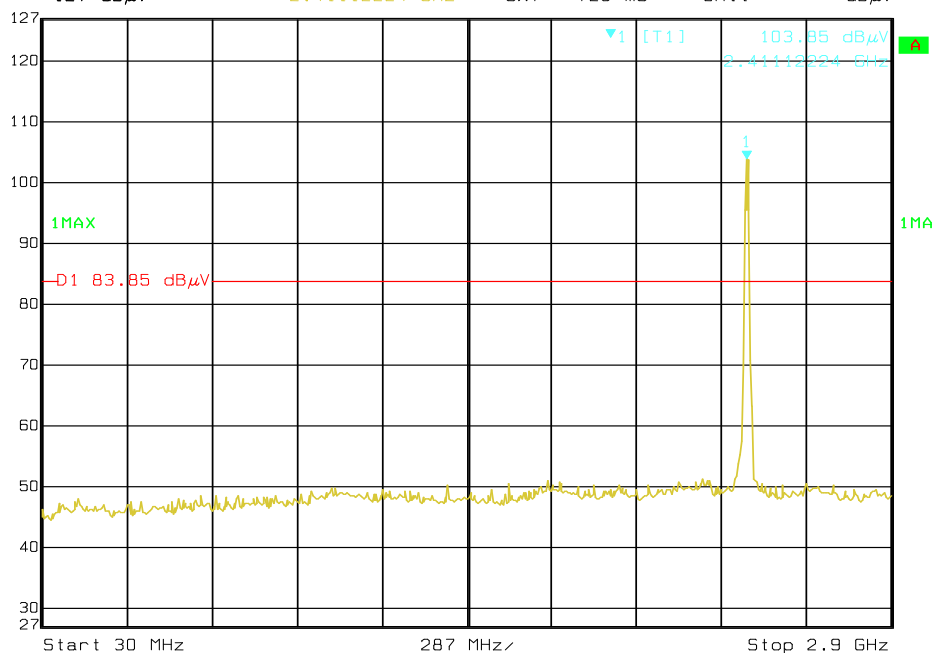
Limit

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

Spurious RF conducted emissions

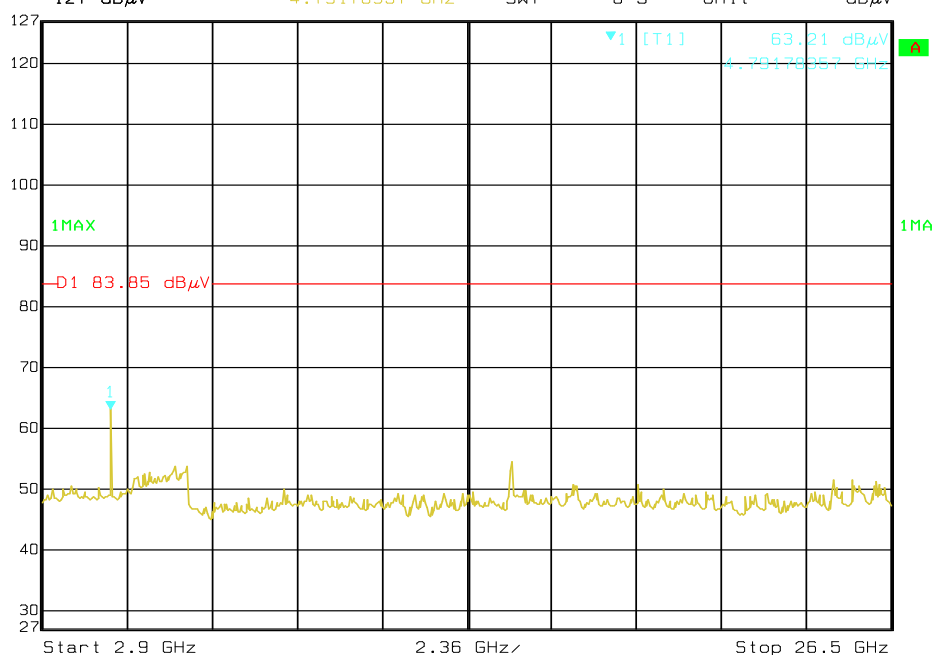
CH1 Test Result


 Ref Lvl 127 dB μ V
 Marker 1 [T1] 103.85 dB μ V
 2.41112224 GHz
 RBW 100 kHz RF Att 30 dB
 VBW 100 kHz
 SWT 720 ms Unit dB μ V



Date: 26.DEC.2008 12:45:36

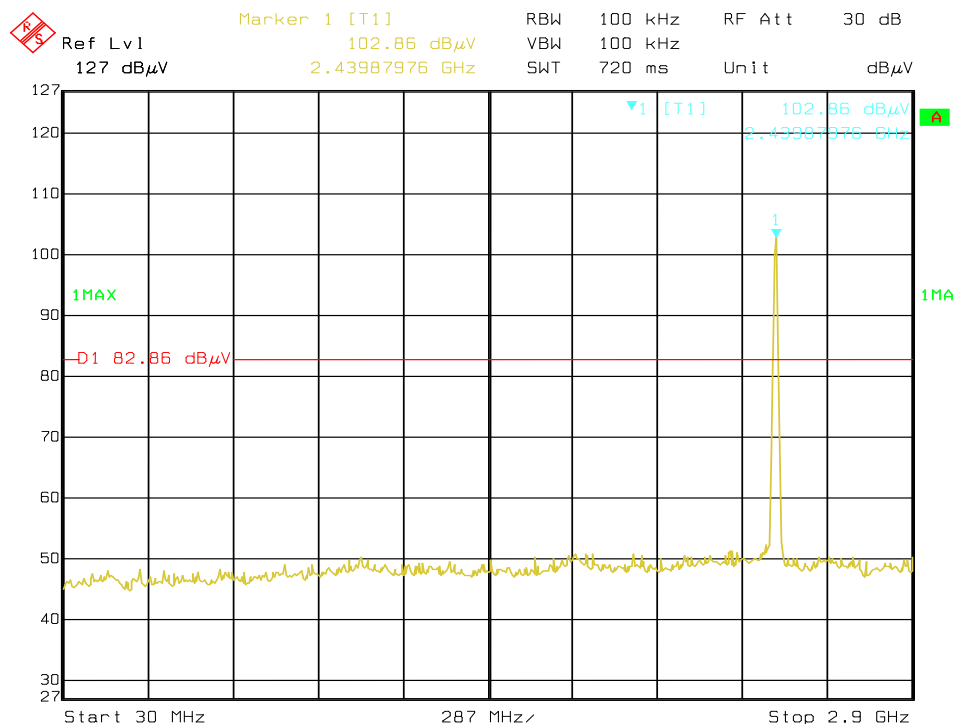

 Ref Lvl 127 dB μ V
 Marker 1 [T1] 63.21 dB μ V
 4.79178357 GHz
 RBW 100 kHz RF Att 30 dB
 VBW 100 kHz
 SWT 6 s Unit dB μ V



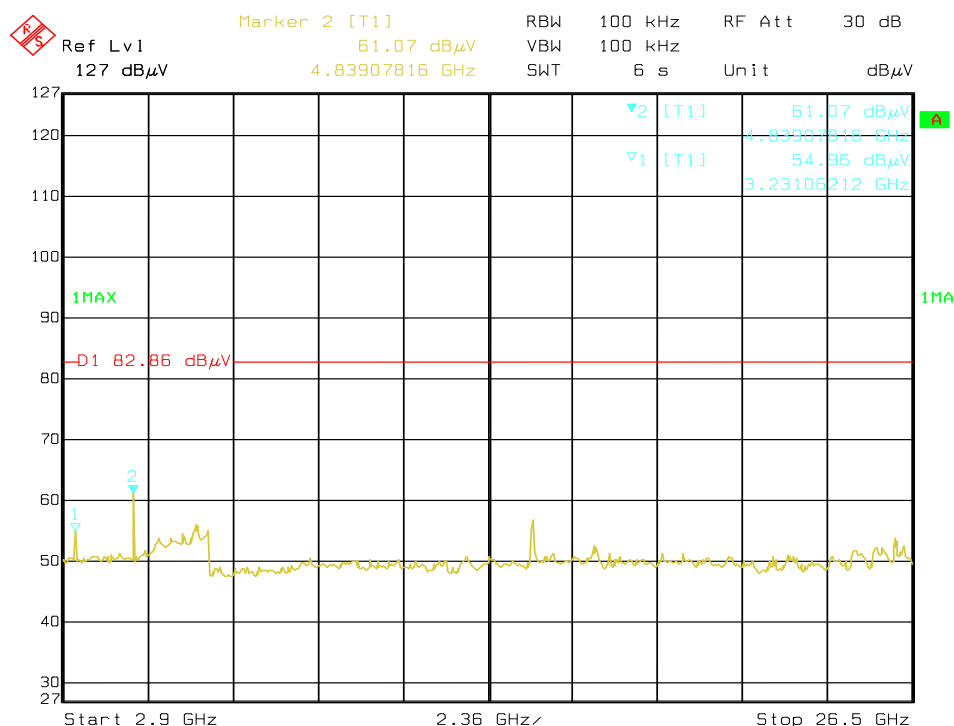
Date: 26.DEC.2008 12:46:41

Spurious RF conducted emissions

CH2 Test Result



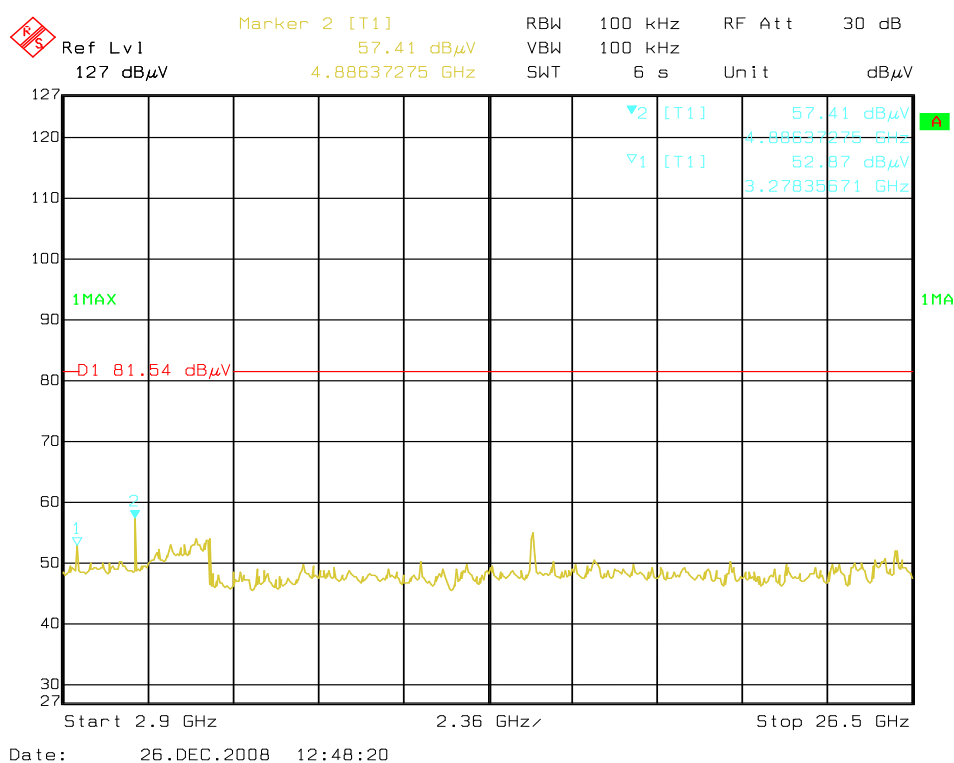
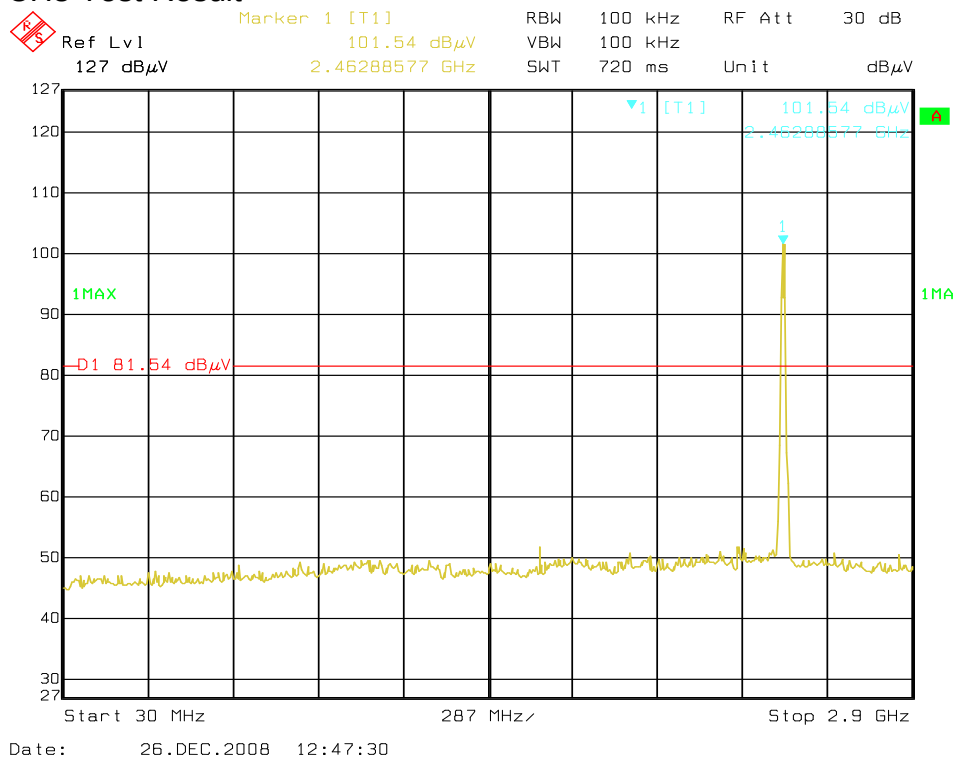
Date: 26.DEC.2008 12:20:25



Date: 26.DEC.2008 12:40:43

Spurious RF conducted emissions

CH3 Test Result





Hong Kong

Test Equipment List

Spurious Emissions Test

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DA TE
Spectrum	ROHDE&SCHWAR Z	FSEM	8485971001	2009-04-25

7.5 Spurious radiated emissions

Test Method

The measurement is made according to DTS procedures KDB 558074.

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

Radiated Emission

CH1 Test Result

Frequency MHz	Cable Loss dB	Antenna Factor dB/m	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBμV/m	Detector	Result
32.080	0.9	17.6	14.5	33.0	Vertical	40	QP	Pass
3235.540	3.4	31.4	9.4	44.2	Horizontal	54	PK	Pass
4780.630	3.8	33.3	8.1	45.2	Horizontal	54	PK	Pass
6577.154	3.8	36.0	6.3	46.1	Vertical	54	PK	Pass

CH2 Test Result

Frequency MHz	Cable Loss dB	Antenna Factor dB/m	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBμV/m	Detector	Result
3235.800	3.4	31.4	11.5	46.3	Horizontal	54	PK	Pass
4839.727	3.8	33.3	12.8	51.9	Vertical	54	PK	Pass
6577.154	3.8	36.0	8.5	47.3	Vertical	54	PK	Pass

CH3 Test Result

Frequency MHz	Cable Loss dB	Antenna Factor dB/m	Reading dBuV	Emission Level dBuV/m	Polarization	Limit dBμV/m	Detector	Result
3235.732	3.4	31.4	8.2	43.0	Horizontal	54	PK	Pass
4927.230	3.8	33.3	10.2	47.3	Vertical	54	PK	Pass
6577.154	3.8	36.0	11.2	51.0	Vertical	54	PK	Pass

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



Hong Kong

Test Equipment List

Radiated Emission 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

7.6 6 dB bandwidth

Test Method

The measurement is made according to DTS procedures KDB 558074.

- 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 –6dB (upper and lower) frequency.

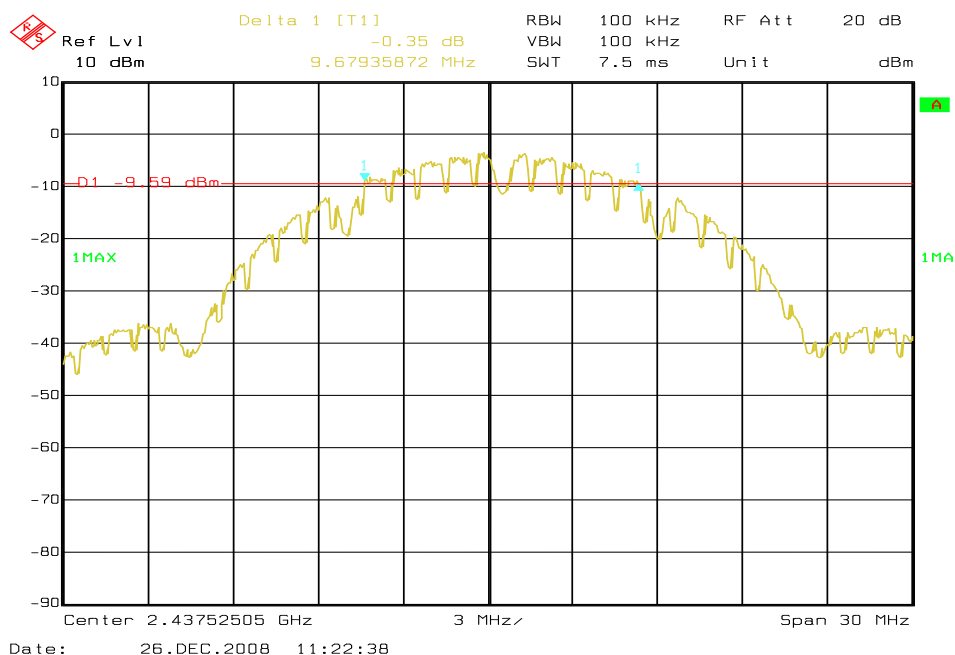
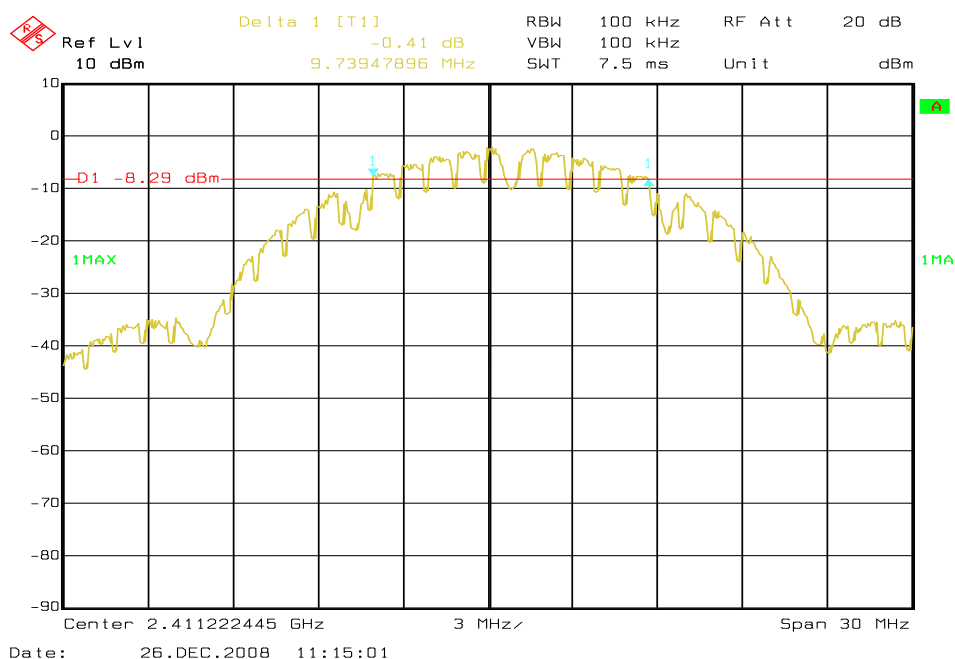
Limit

Limit [kHz]

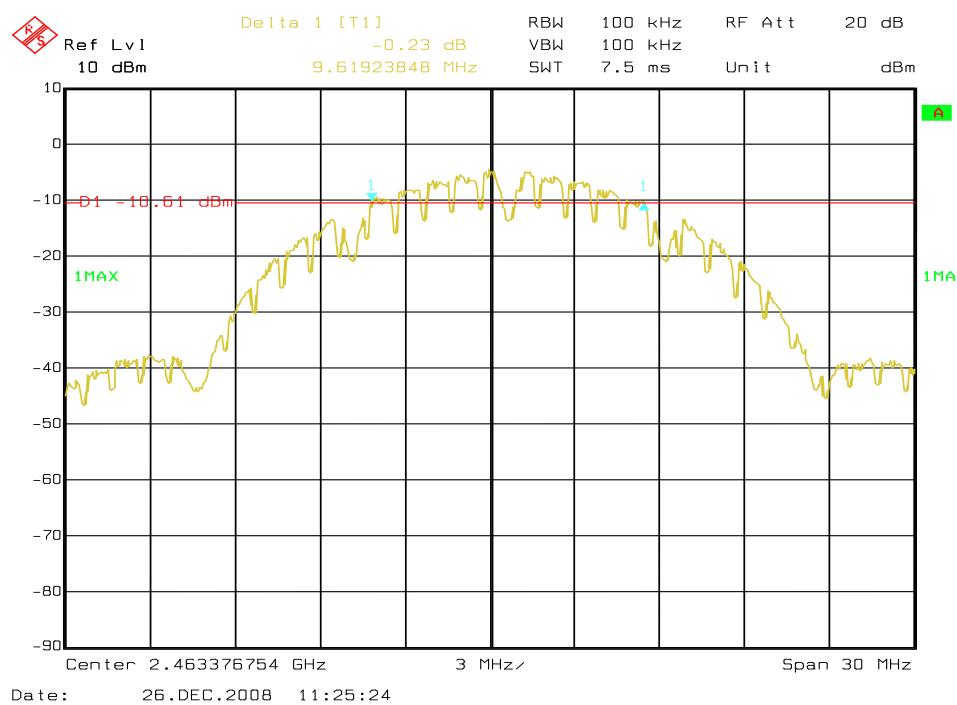
≥ 500

6 dB bandwidth

Frequency MHz	Bandwidth kHz	Limit kHz	Result
2412	9739	≥ 500	Pass
2438	9679	≥ 500	Pass
2464	9619	≥ 500	Pass



6 dB bandwidth





Hong Kong

Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DA TE
Spectrum	ROHDE&SCHWAR Z	FSEM	8485971001	2009-04-25

7.7 Power spectral density

Test Method

The measurement is made according to DTS procedures KDB 558074.

- 1 Place the EUT on the table and set it in transmitting mode. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the spectrum analyzer.
- 2 Set the spectrum analyzer as RBW = 3 kHz, VBW = 10 kHz, Span = 300 kHz, Sweep = 500 S
- 3 Record the max reading.

Limit

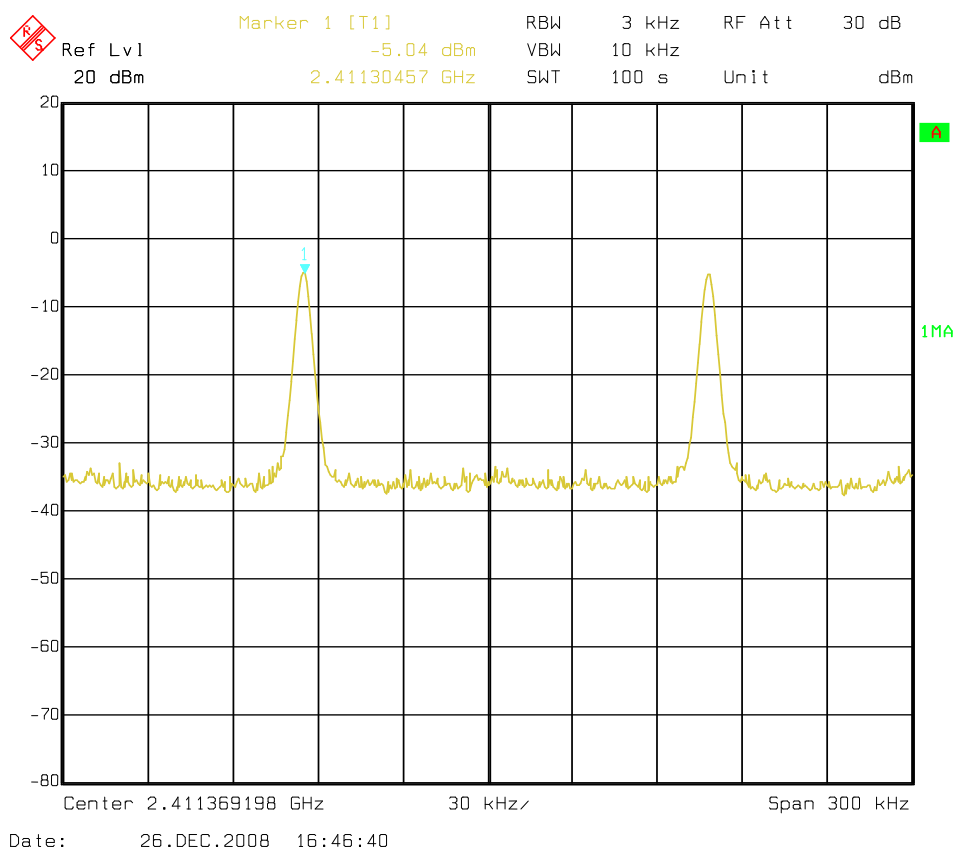
Limit
dBm / 3 kHz

8

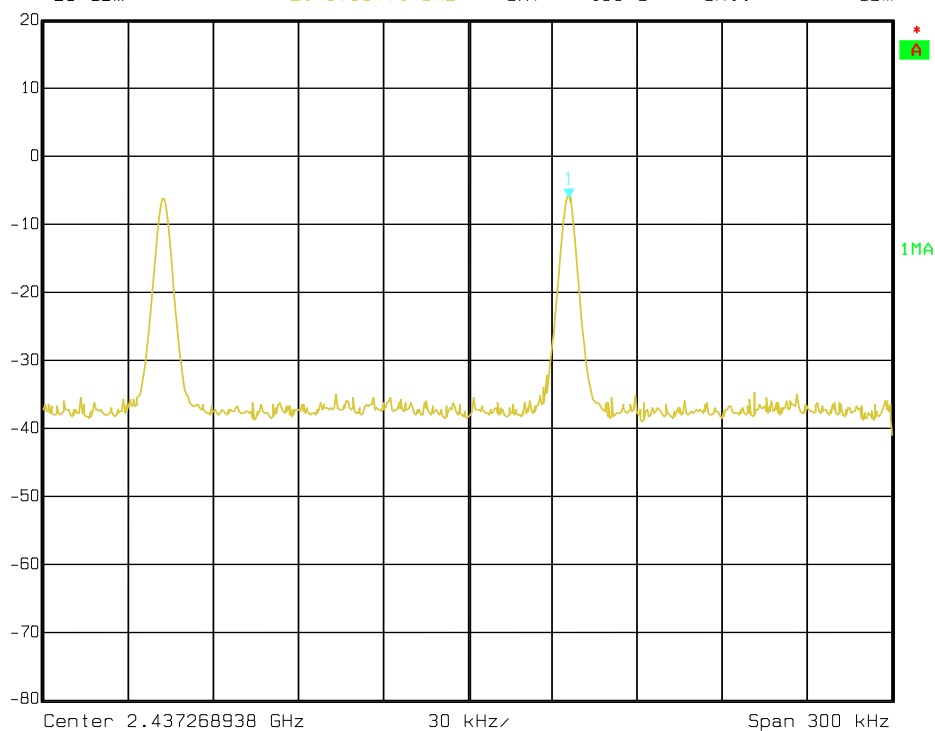
Power spectral density

Test Result

Frequency MHz	P dBm	Result
2412	-5.04	Pass
2438	-6.03	Pass
2464	-7.17	Pass

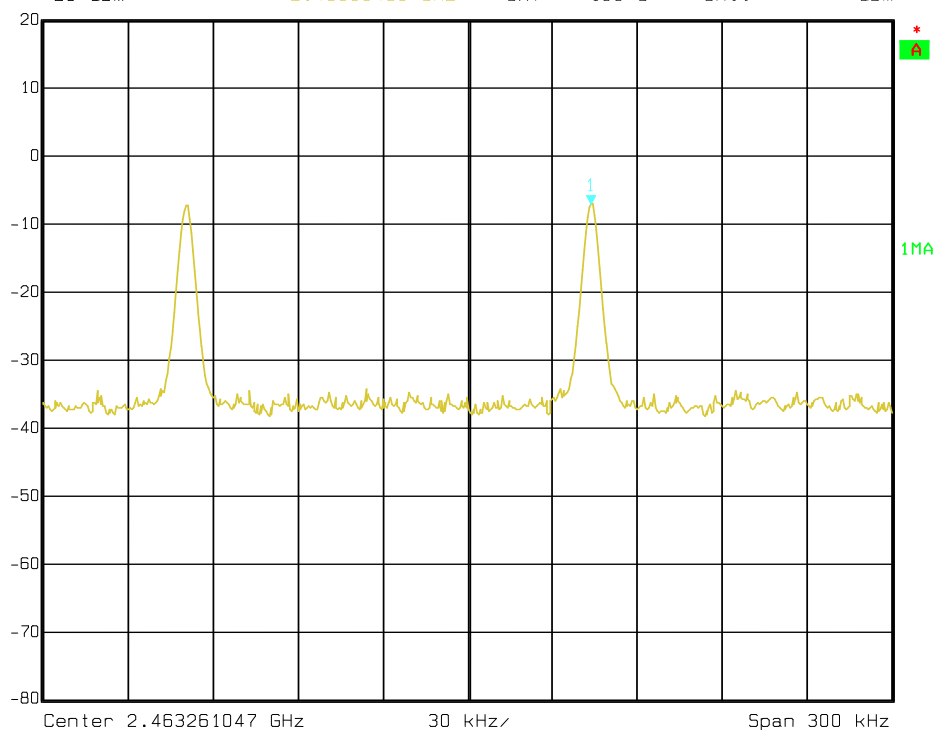



 Ref Lvl 20 dBm
 Marker 1 [T1] -6.03 dBm
 2.43730471 GHz
 RBW 3 kHz RF Att 30 dB
 VBW 10 kHz
 SWT 100 s Unit dBm



Date: 26.DEC.2008 16:37:31


 Ref Lvl 20 dBm
 Marker 1 [T1] -7.17 dBm
 2.46330463 GHz
 RBW 3 kHz RF Att 30 dB
 VBW 10 kHz
 SWT 100 s Unit dBm



Date: 26.DEC.2008 16:42:05



Hong Kong

Test Equipment

DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	CAL.DUE.DA TE
Spectrum	ROHDE&SCHWAR Z	FSEM	8485971001	2009-04-25

8 MPE Calculation

Maximum Power output:

$P_{out}=33.962\text{mW}$ (15.31dBm)

Max Antenna gain,:

Gain=1.0dBi=1.259

Maximum EIRP from transmit antenna

$EIRP=15.31 + 1.0 = 16.31 \text{ dBm}$

MPE Limit $1.00\text{mW}/\text{cm}^2$

To determine the overall exposure at 20 cm from the EUT.

$$P_d = (P_{out} * G) / (4 * \pi * r^2)$$

Where P_d =power density in mW/cm^2

P_{out} =output power to antenna in mW

G=gain of antenna in linear scale

$\pi=3.14159$

R=distance between observation point and center of the radiator in cm

$$P_d = 0.0085 \text{ mW}/\text{cm}^2$$

The power density 20cm from the antennas of the EUT is $0.0085\text{mW}/\text{cm}^2$, which is less than the permitted maximum power density.

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 (dB μ V/m)	U=4.6dB; k=2(30MHz-1GHz)
CE	Disturbance Voltage (dB μ V)	U=3.3dB; k=2