TÜVRheinland®

Produkte
Products

Prüfbericht - Nr.: *Test Report No.:*	**10038030 001**		**Seite 1 von 29** *Page 1 of 29*
Auftraggeber: *Client:*	**Schneider Electric (Australia) Pty Ltd.** 33-37 Port Wakefield Road, Gepps Cross, S.A 5094, Australia		
Gegenstand der Prüfung: *Test item:*	USB Zigbee Interface		
Bezeichnung: *Identification:*	WHC2_5921, 5200UZI	**Serien-Nr.:** *Serial No.:*	N/A
Wareneingangs-Nr.: *Receipt No.:*	TPE75713	**Eingangsdatum:** *Date of receipt:*	2012/07/26
Zustand des Prüfgegenstandes bei Anlieferung: **Condition of test item at delivery:**	The sample is ok for testing and not damaged		
Prüfort: *Testing location:*	**TÜV Rheinland Taiwan Ltd.** 11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105 Taiwan **FCC Registration No.: 365730**		
Prüfgrundlage: *Test specification:*	**FCC CFR47 Part 15: Subpart C Section 15.247** KDB 558074 of March 23, 2005		
Prüfergebnis: *Test Result:*	**Der Prüfgegenstand entspricht oben genannter Prüfgrundlage(n).** *The test item passed the test specification(s).*		
Prüflaboratorium: *Testing Laboratory:*	**TÜV Rheinland Taiwan Ltd.** **11F., No.758, Sec. 4, Bade Rd., Songshan Dist., Taipei City 105, Taiwan, R.O.C.**		

geprüft/ *tested by:*

Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*
2012-08-30	Arvin Ho/Section Manager	

kontrolliert/ *reviewed by:*

Datum *Date*	**Name/Stellung** *Name/Position*	**Unterschrift** *Signature*
2012-08-31	Rene Charton/Senior Project Manager	

Sonstiges/ *Other Aspects:*

Abkürzungen:				*Abbreviations:*			
	P(ass)	=	*entspricht Prüfgrundlage*		*P(ass)*	=	*passed*
	F(ail)	=	*entspricht nicht Prüfgrundlage*		*F(ail)*	=	*failed*
	N/A	=	*nicht anwendbar*		*N/A*	=	*not applicable*
	N/T	=	*nicht getestet*		*N/T*	=	*not tested*

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.2 PEAK OUTPUT POWER
RESULT: Passed

5.1.3 6DB BANDWIDTH
RESULT: Passed

5.1.4 POWER DENSITY
RESULT: Passed

5.1.5 CONDUCTED SPURIOUS EMISSIONS AND FREQUENCY BAND EDGE MEASURED IN 100KHZ BANDWIDTH
RESULT: Passed

5.1.6 SPURIOUS EMISSION
RESULT: Passed

6.1.1 ELECTROMAGNETIC FIELDS
RESULT: Passed

Contents

1. General Remarks

1.1 Complementary Materials

All attachments are integral parts of this test report. This applies especially to the following appendix:

Appendix 1: IUT Photos
(File:10038030APPENDIX1)
Appendix 2: Test Result of Radiated Emissions
(File:10038030APPENDIX2)

Test Specifications
The following standards were applied (in bold: product standards, otherwise: basic standards).

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.247 KDB 558074 of March 23, 2005

2. Test Sites

2.1 Test Facilities

TUV Rheinland Taiwan Ltd.

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)
FCC Registration No.: 365730

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until
EMI Test Receiver	R&S	ESCI 7	1166.5950K07-100797-Pt	9-Nov-12
Bilog Antenna	TESEQ	CBL6111D	29802	1-Oct-12
Pre-Amplifier	HP	8447F	2805A03335	22-Dec-12
Spectrum Analyzer	R&S	FSV 40	100921	12-Oct-12
Horn Antenna (1GHz~18GHz)	COM-POWER	AHA118	701101	27-Dec-12
Horn Antenna (18GHz~25GHz)	COM-POWER	AH840	101031	1-Oct-12
Power meter	R&S	NRVD	100439	27-Mar-13
Power sensor	R&S	NRV-Z1	100013	27-Mar-13
Temp. & Humid. Chamber	Giant Force	GCT-099-40-S	MAF0103-007	13-May-13

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 10^{-7}
RF power, conducted	± 1 dB
Adjacent channel power	± 3 dB
Radiated emission of transmitter, valid up to 26 GHz	± 6 dB
Radiated emission of receiver, valid up to 26 GHz	± 6 dB
Temperature	± 2 ºC
Humidity	± 10 %

3. General Product Information

3.1 Product Function and Intended Use

The subject sample is an “USB Zigbee Interface”, which is designed to work with Zoolkit software from Schneider Electric. The hardware and software interface allows you to configure, monitor and control a ZigBee network and produces files that are used by C-Bus Toolkit and PICED software programs.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 Ratings and System Details

Table 4: Technical Specification of EUT

Technical Specification	Value
Kind of Equipment	USB Zigbee Interface
Brand Name	Schneider Electric (Australia) Pty Ltd.
FCC ID	WZCS1B15258
Type Designation	WHC2_5921, 5200UZI
Operating Frequency	2405MHz~2480MHz
Channel Spacing	5 MHz
Channel number	16
Operation Voltage	5 V (via USB interface)
Modulation	OQPSK
Antenna gain	4.763 dB

3.3 Independent Operation Modes

The basic operation modes are:

A. Transmitting
   1. Low channel
   2. Middle channel
   3. High channel
B. Receiving
C. Standby
D. Off

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Bill of Material
- Circuit Diagram
- PCB Layout
- Instruction Manual
- Photo Document
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 4. All testing were performed according to the procedures in ANSI C63.10: 2009 and KDB 558074 of March 23, 2005.

Full test was applied on all test modes, but only worst case was shown.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

Kind of Equipment	Manufacturer	Model Name	S/N
Laptop	MSI	MSI4532 (CX420MX)	CX420 MX-233TWK 1008000096

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test

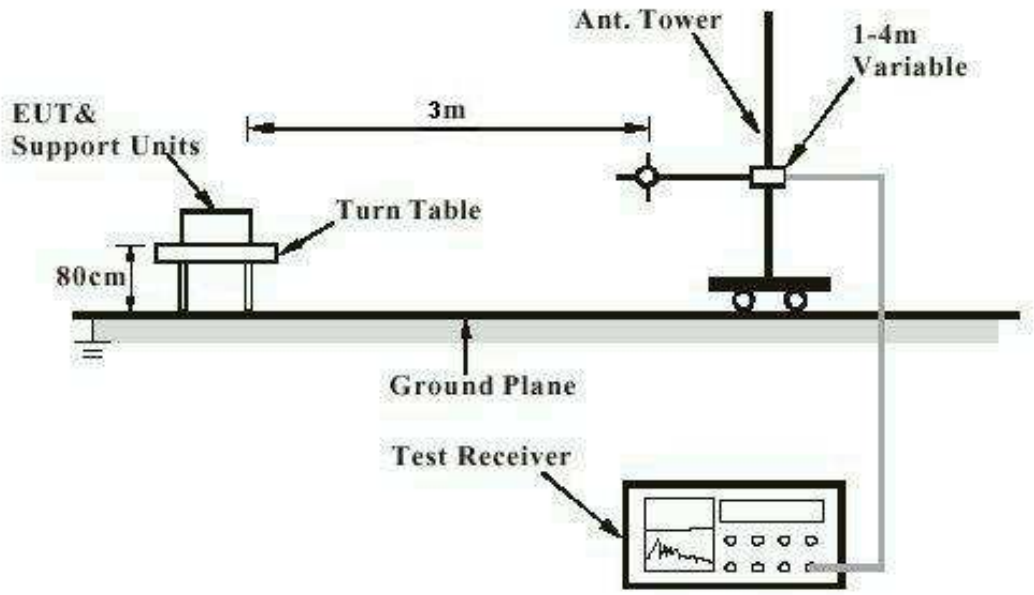
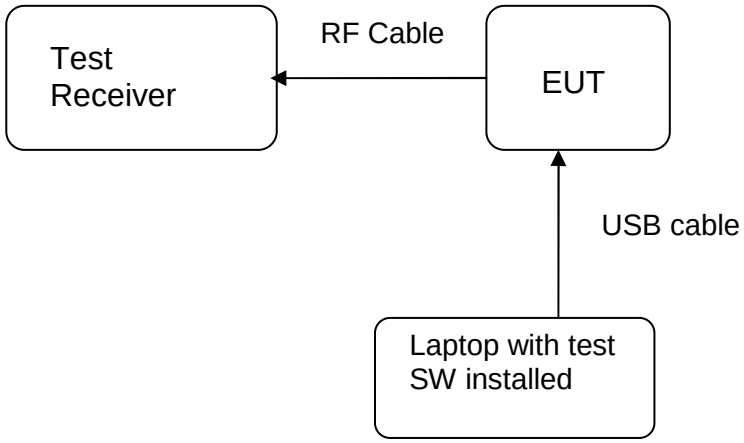


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Test date	:	2012-07-30
Test standard	:	FCC Part 15.247(b)(4), Part 15.203
Limit	:	the use of antennas with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an internal antenna with an directional gain of 4.763 dBi, and the antenna is a printed PCB trace with no possibility of replacement. Therefore, the EUT is considered to comply the provision.

Refer to EUT photo for details.

5.1.2 Peak Output Power

RESULT: **Passed**

Test date	:	2012-07-30
Test standard	:	FCC Part 15.247(b)(1)
Basic standard	:	KDB 558074 of March 23, 2005
Limit	:	1 Watt
Kind of test site	:	Shielded room

Test setup

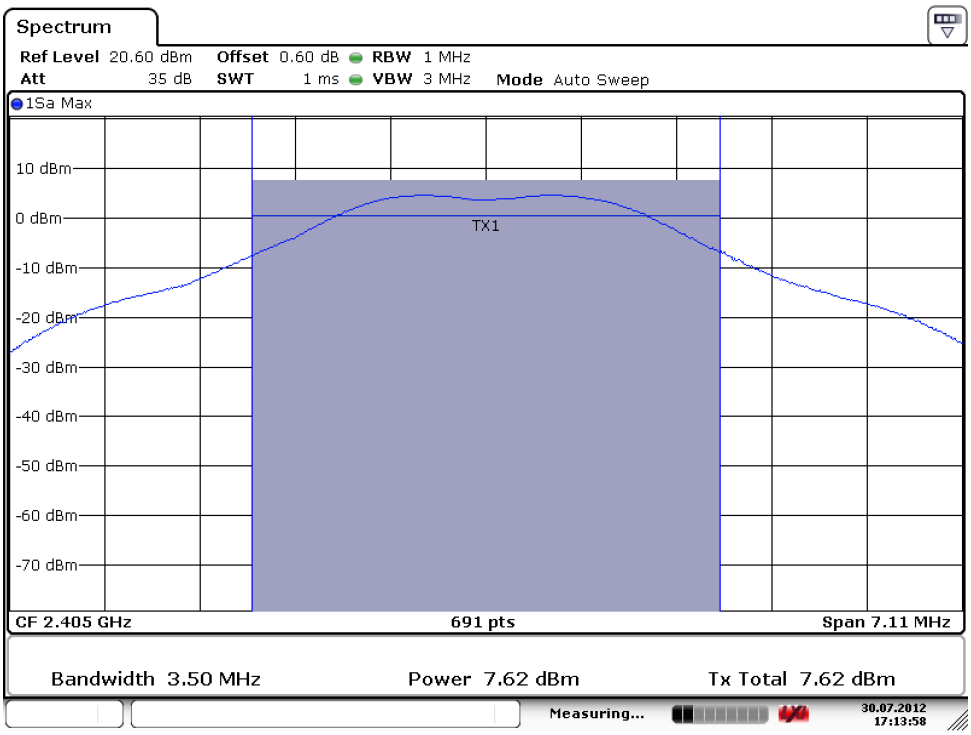
Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

Table 5: Test result of Peak Output Power

Channel	Channel Frequency (MHz)	Peak Output Power		Limit
		(dBm)	(W)	(W)
Low Channel	2405	7.62	0.0058	1
Middle Channel	2440	7.37	0.0055	1
High Channel	2480	7.13	0.0052	1

Test Plot of Peak Output Power

Low Channel



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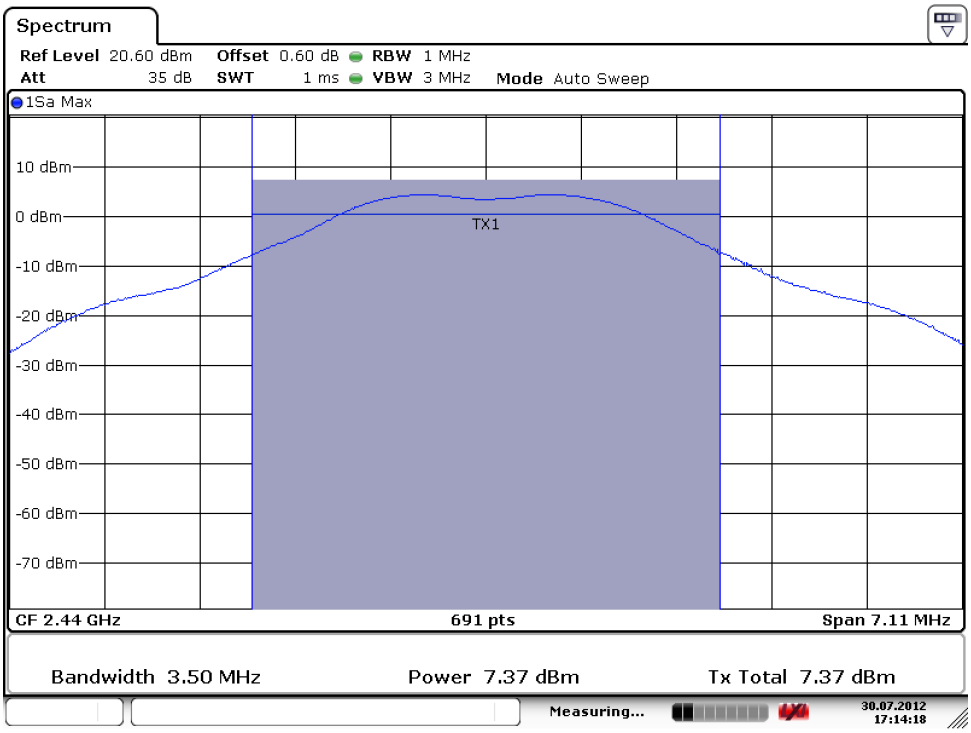
Middle Channel



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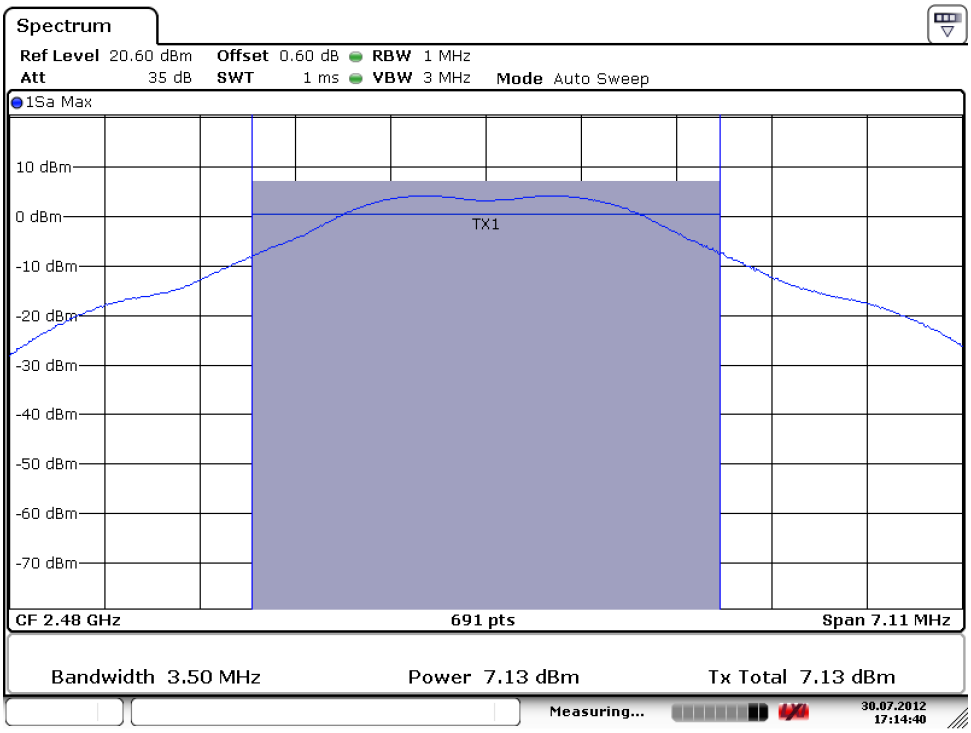
High Channel



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5.1.3 6dB Bandwidth

RESULT: **Passed**

Date of testing	:	2012-07-30
Test standard	:	FCC Part 15.247(a)(1)
Basic standard	:	KDB 558074 of March 23, 2005
Kind of test site	:	Shielded room

Test setup

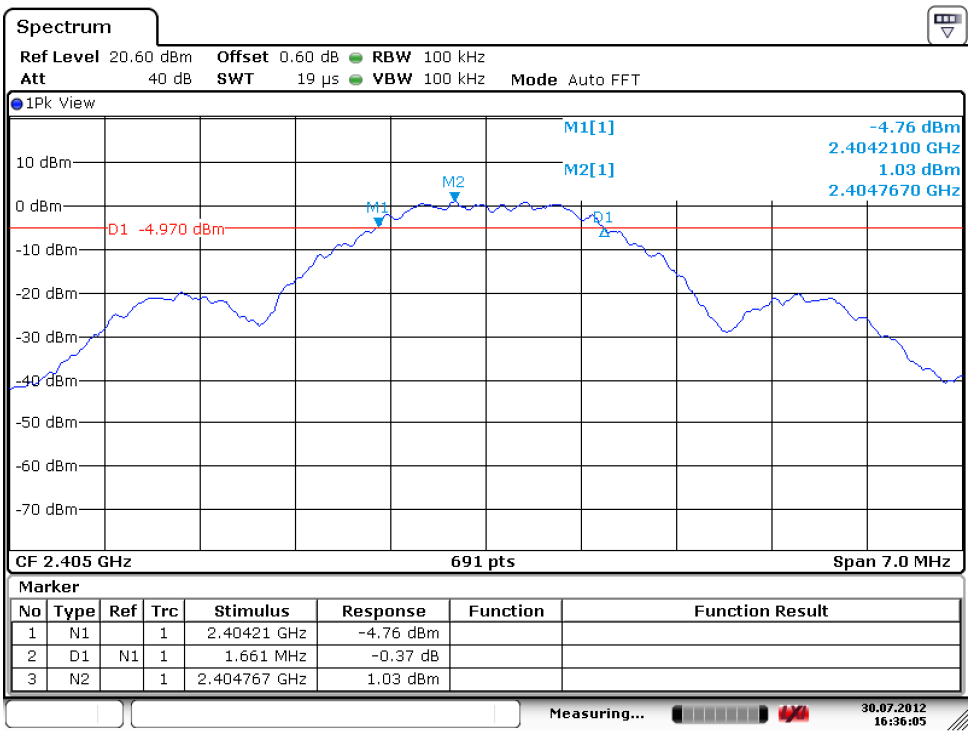
Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 6: Test result of 20dB Bandwidth

Channel	Channel Frequency (MHz)	6dB Bandwidth (kHz)	Limit (MHz)	Result
Low Channel	2405	1661	> 0.5MHz	Pass
Mid Channel	2440	1641	> 0.5MHz	Pass
High Channel	2480	1641	> 0.5MHz	Pass

Test Plot of 6dB Bandwidth

Low Channel



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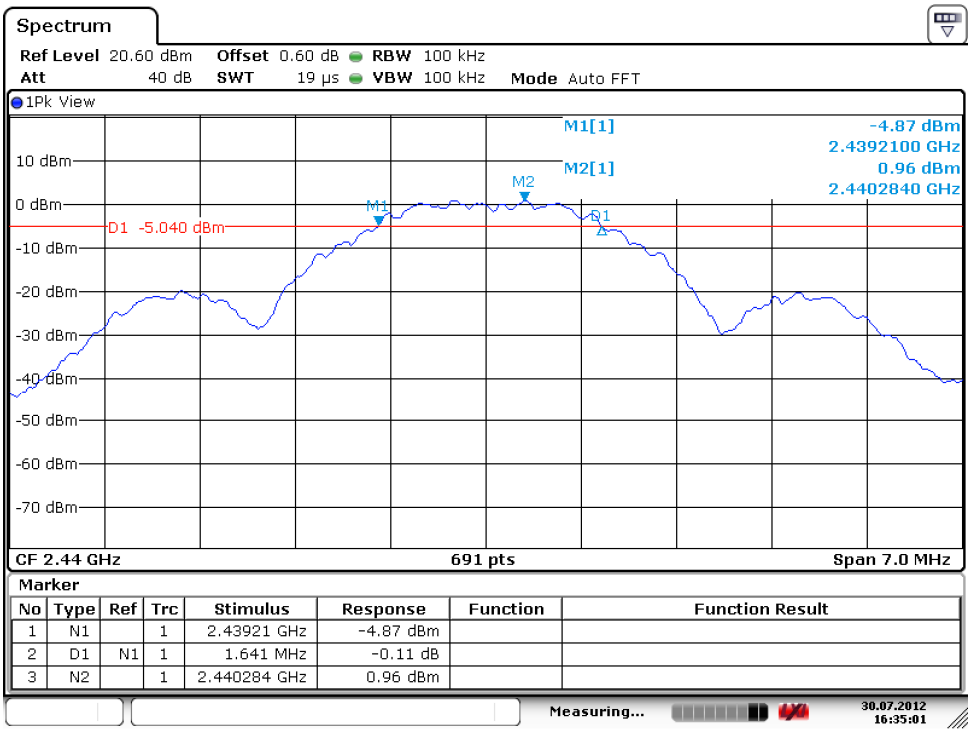
Middle Channel



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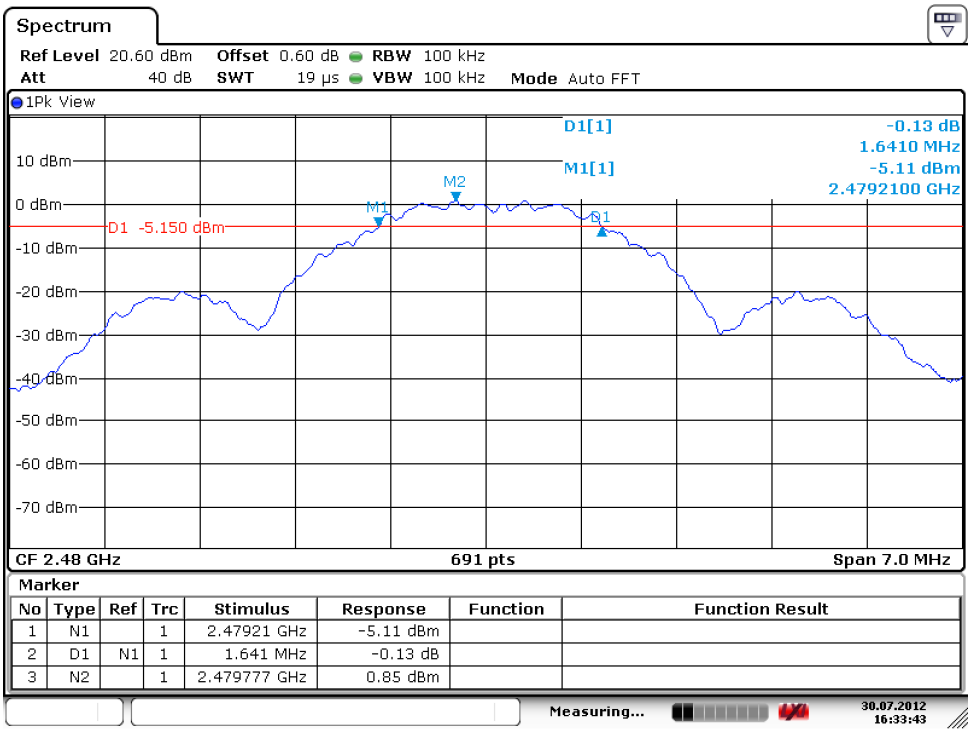
High Channel



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5.1.4 Power Density

RESULT: **Passed**

Date of testing	:	2012-07-30
Test standard	:	FCC Part 15.247(e)
Basic standard	:	KDB 558074 of March 23, 2005
Kind of test site	:	Shielded room

Test setup

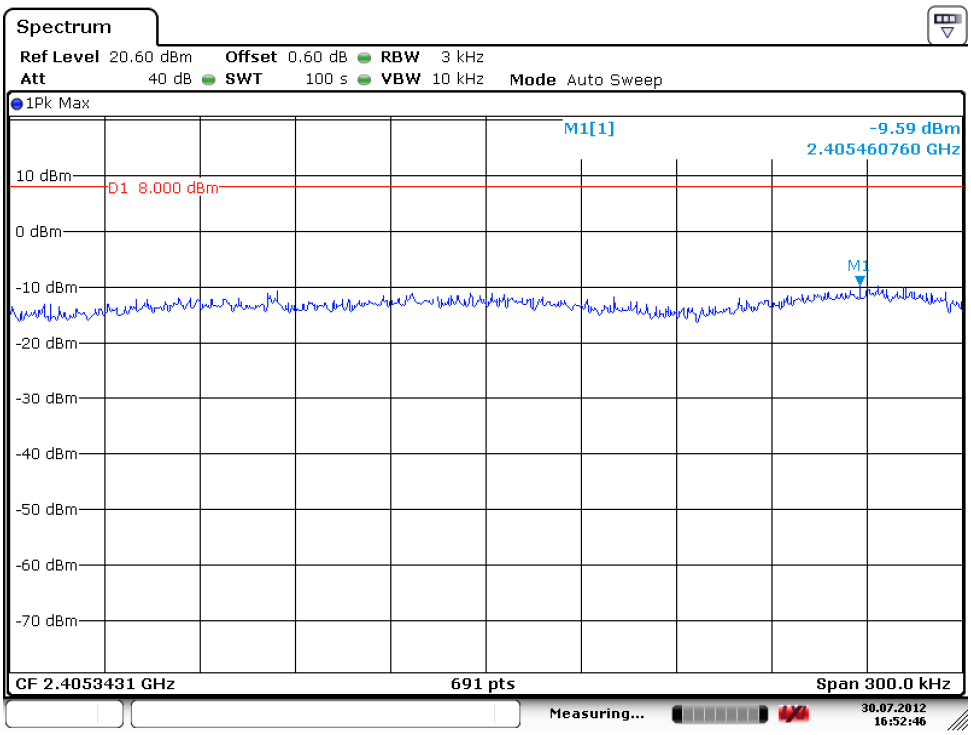
Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%
Atmospheric pressure	:	102 kPa

Table 7: Test result of Power Density

Channel	Channel Frequency (MHz)	Peak Power Density (dBm/3kHz)	Limit (dBm/3kHz)	Result
Low Channel	2402	-9.59	8	Pass
Mid Channel	2442	-9.87	8	Pass
High Channel	2480	-10.89	8	Pass

Test Plot of Power Density

Low Channel



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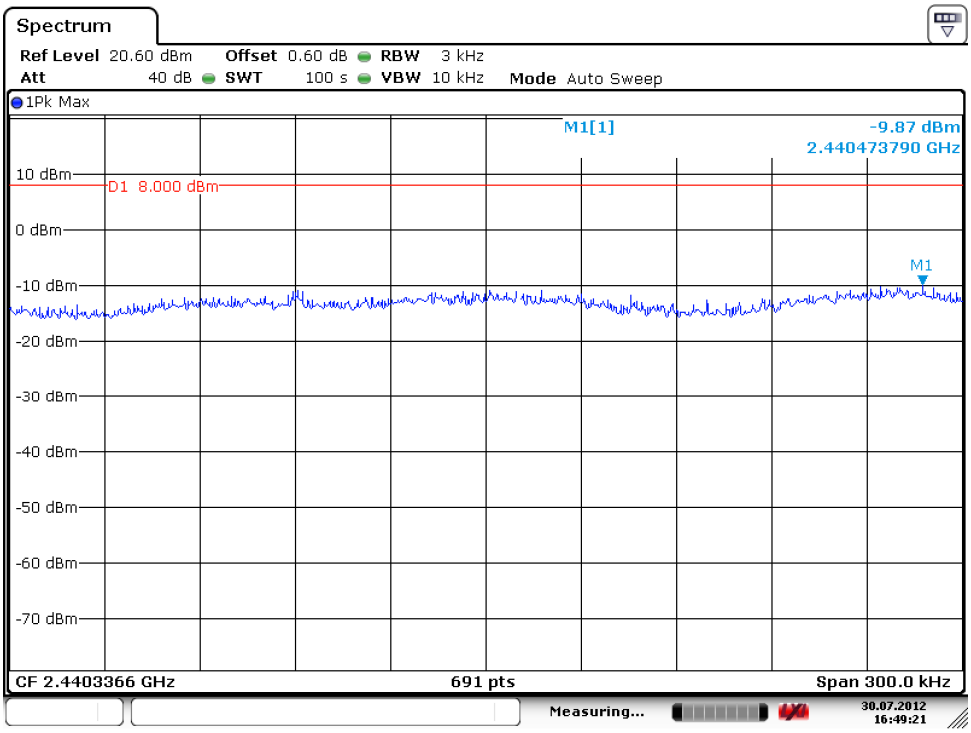
Middle Channel



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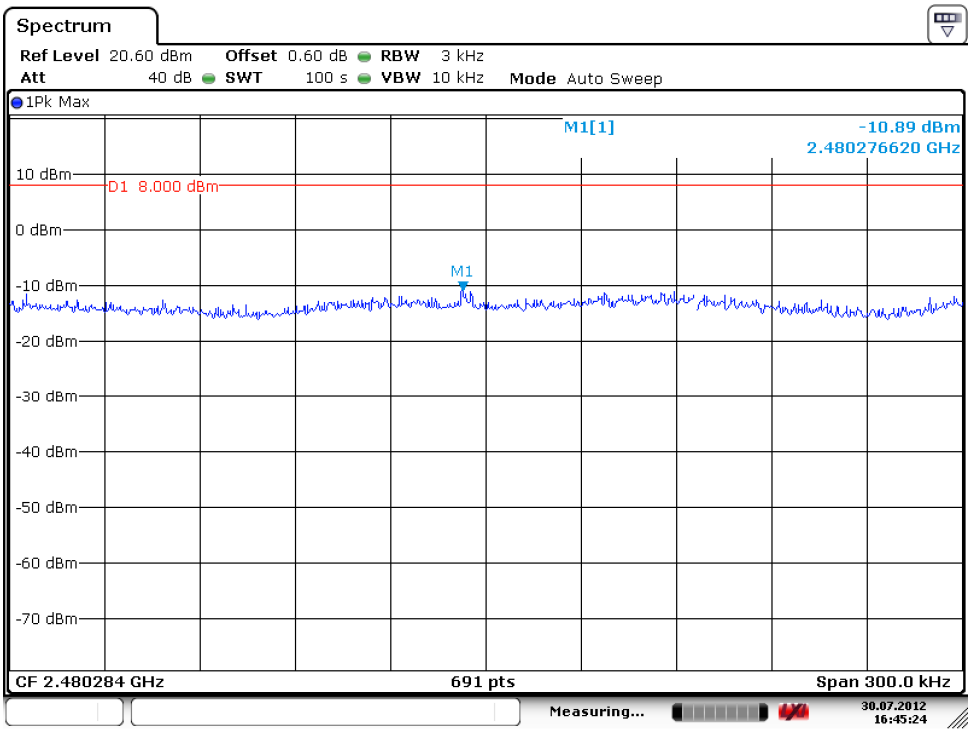
High Channel



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5.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth

RESULT: **Passed**

Date of testing	:	2012-07-30
Test standard	:	FCC part 15.247(d)
Basic standard	:	KDB 558074 of March 23, 2005
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

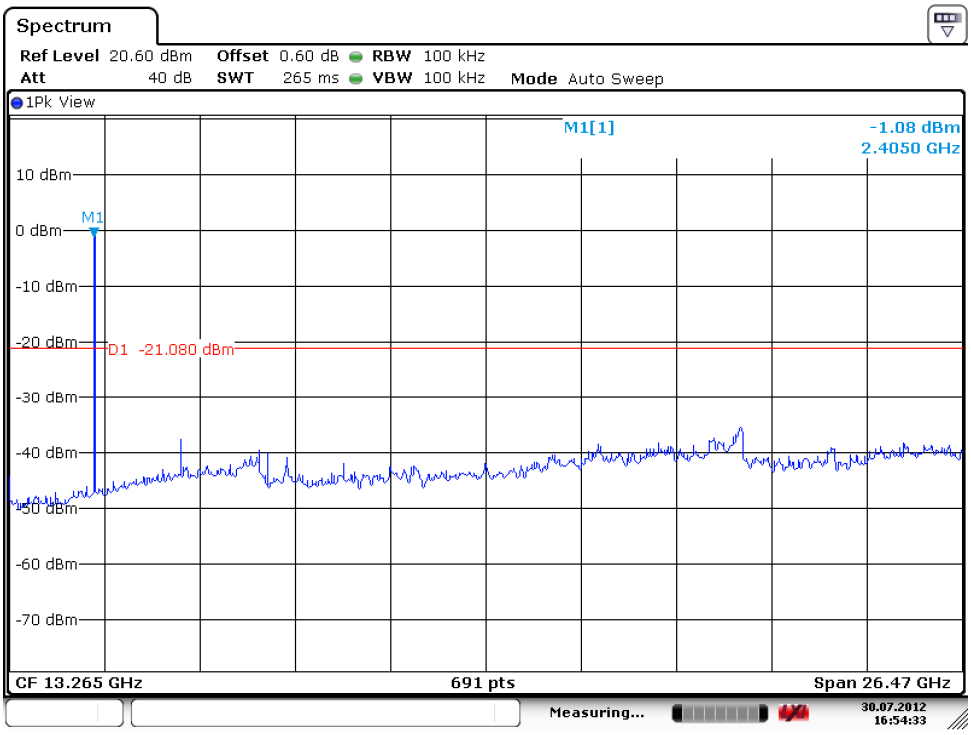
Test setup

Test Channel	:	Low/ High
Operation mode	:	A
Ambient temperature	:	22℃
Relative humidity	:	52%
Atmospheric pressure	:	102 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achived as well.
Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

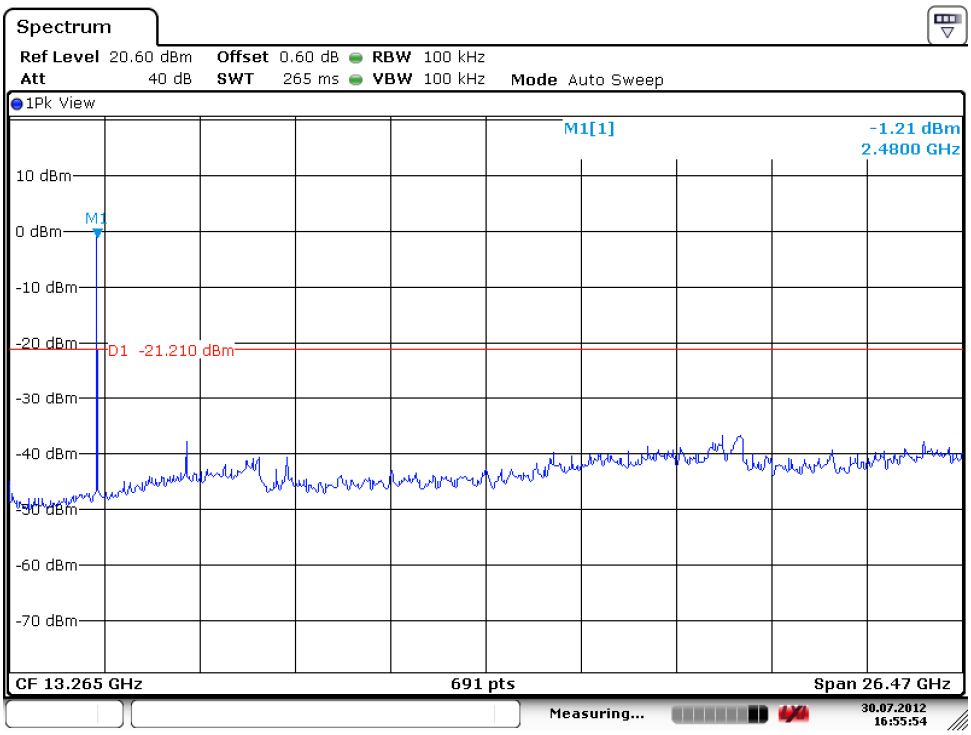
Test Plot of 100kHz Conducted Emissions

Low Channel



Date: 30.JUL.2012 16:54:33

High Channel



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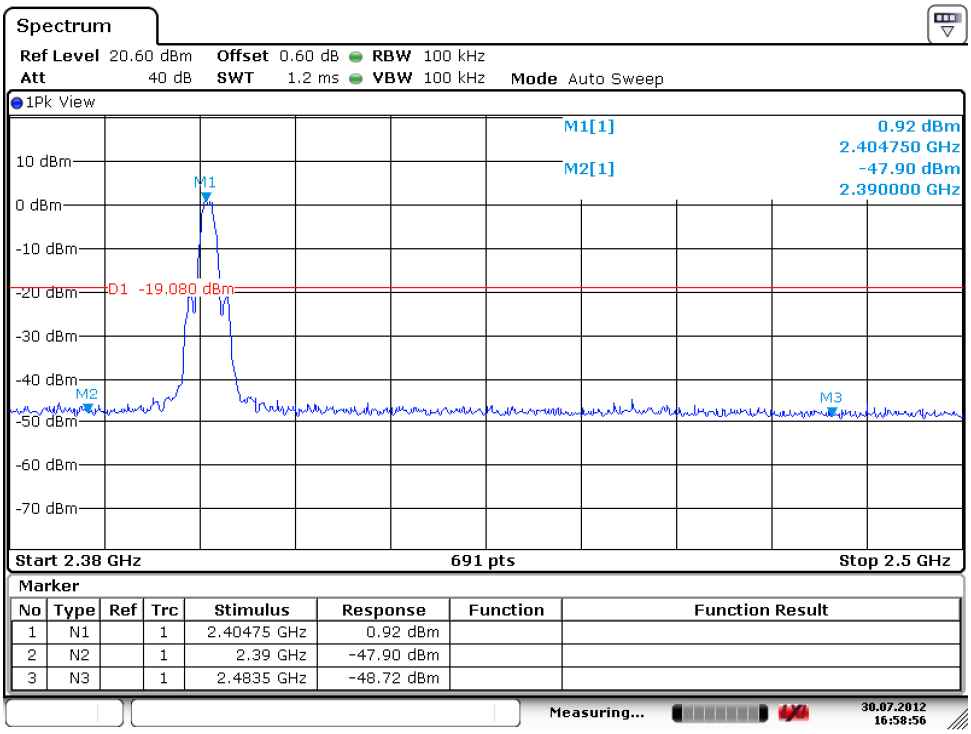
Test Plot of 100kHz Bandwidth of Frequency Band Edge

Low Channel



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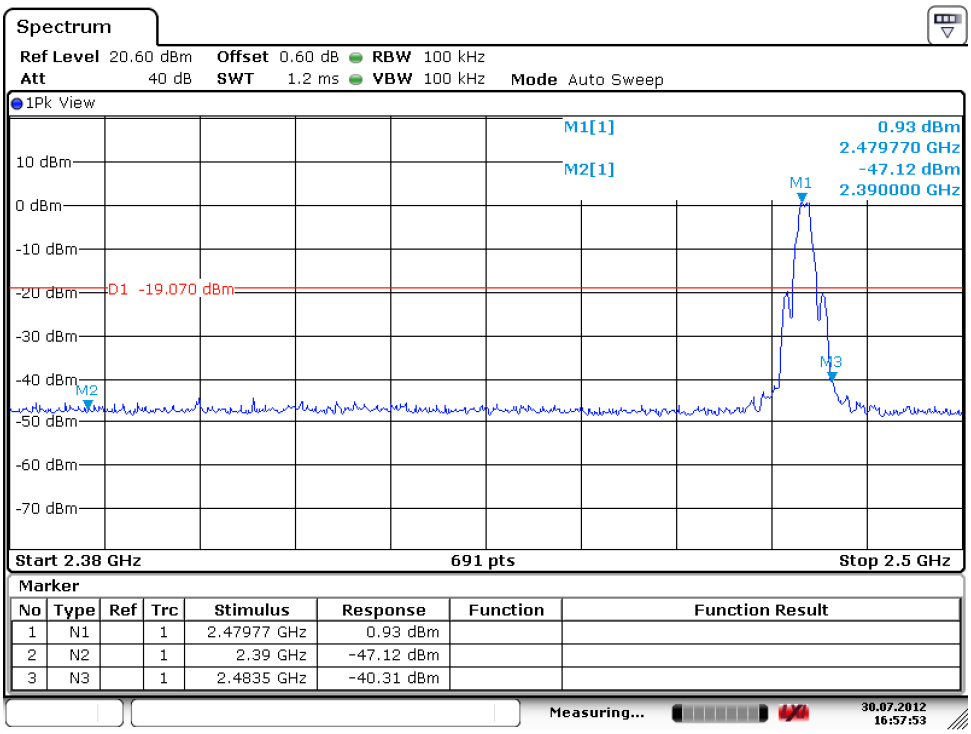
High Channel



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5.1.6 Spurious Emission

RESULT: **Passed**

Date of testing	:	2012-07-30
Test standard	:	FCC part 15.247(d), FCC 15.205, FCC 15.209
Basic standard	:	ANSI C63.10: 2009
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must comply with the radiated emission limits specified in FCC 15.209(a). Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a) and FCC 15.249(a).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation mode	:	A, C
Ambient temperature	:	24℃
Relative humidity	:	56%
Atmospheric pressure	:	102 kPa

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic. For details refer to Appendix 2. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The X Axis orientation is the worst-case and recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

RESULT: **Passed**

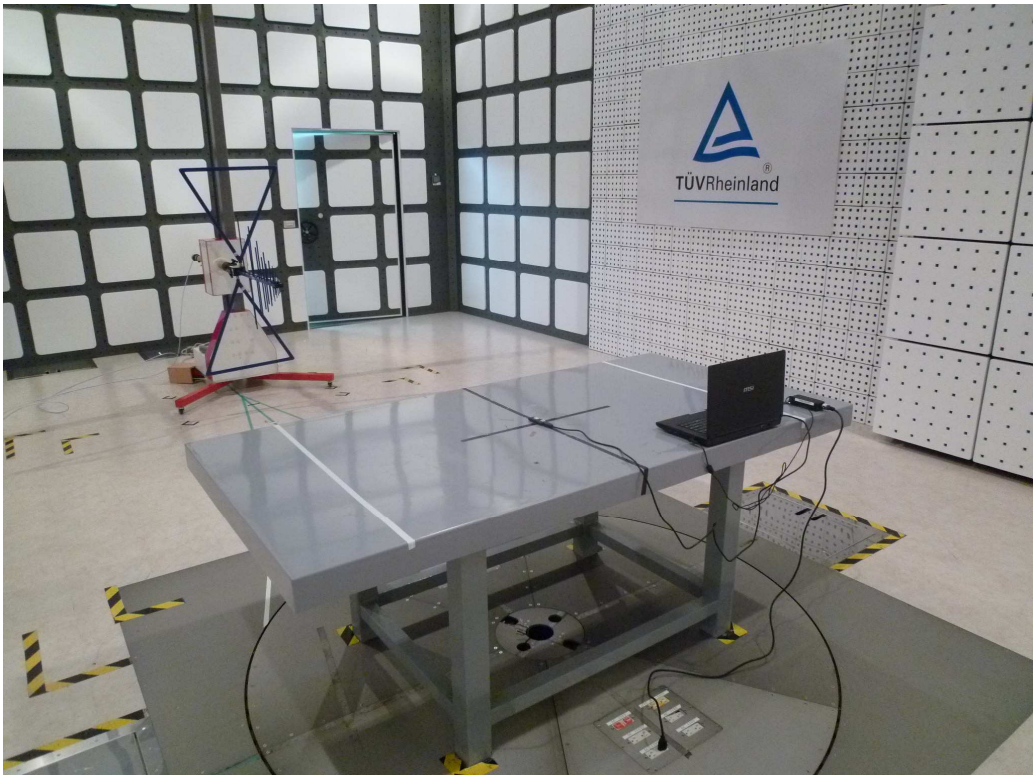
Test standard : FCC KDB Publication 447498

Since maximum peak output power of the transmitter is <60/f(GHz)mW, i.e. 5.7810 mW<25(=60/2.4)mW, hence the EUT is exclueded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

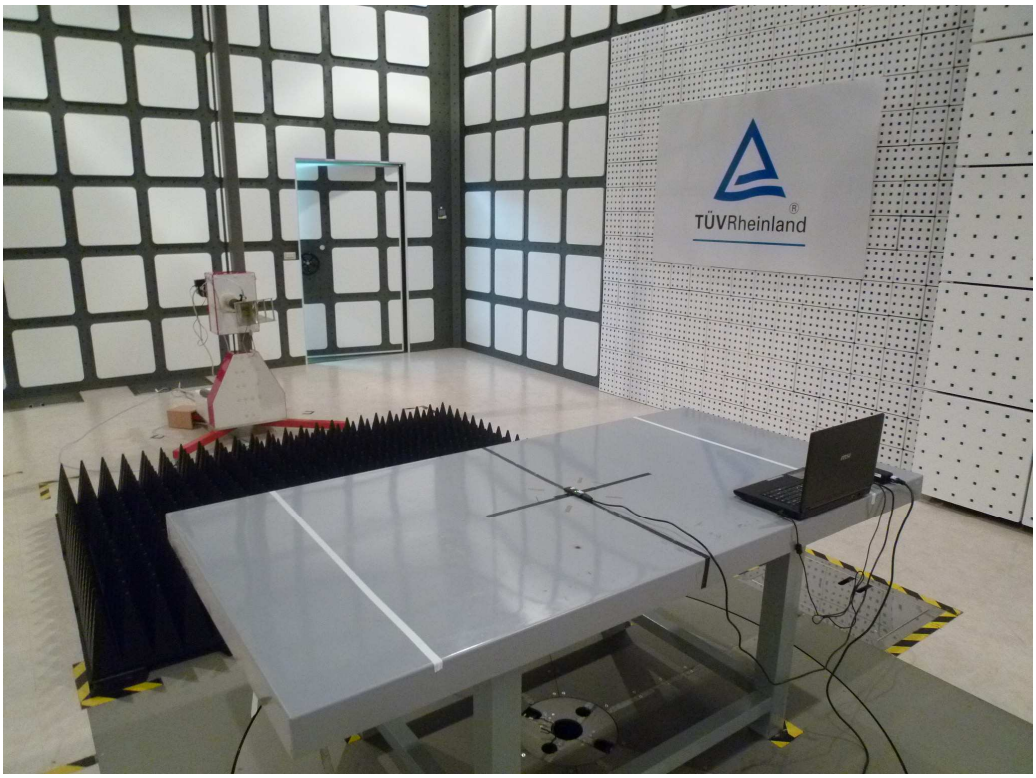
7. Photographs of the Test Set-Up

Photograph 1: Set-up for Spurious Emissions (Front View)

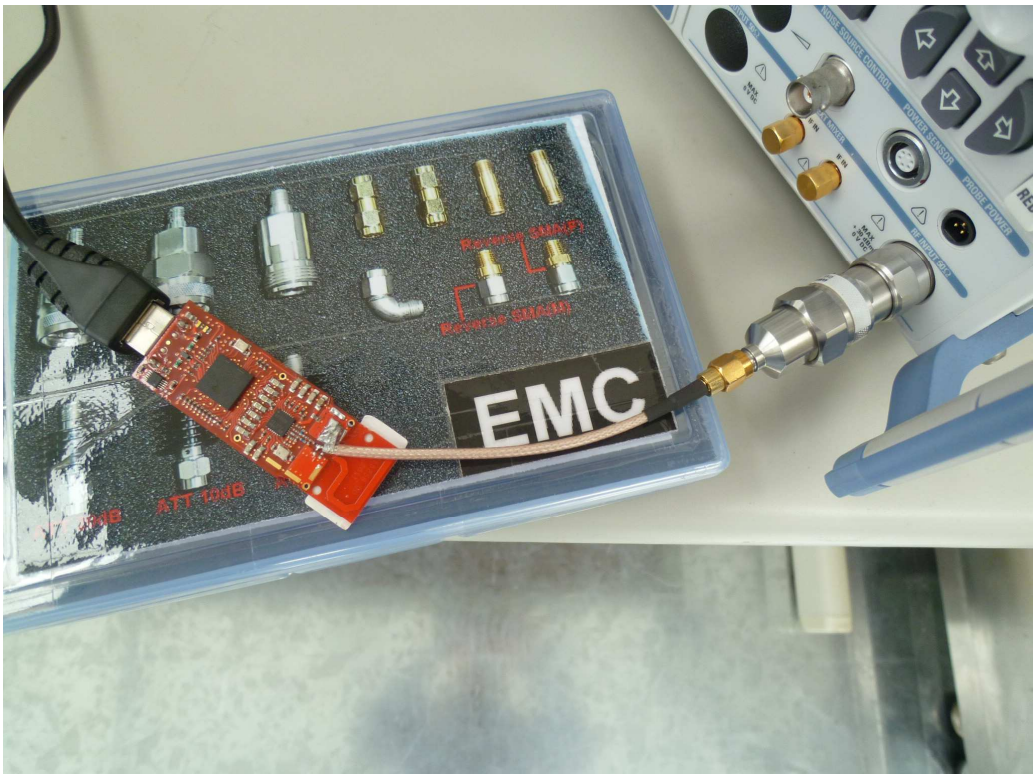
Photograph 2: Set-up for Spurious Emissions (Back View 1)



Photograph 3: Set-up for Spurious Emissions (Back View 2)



Photograph 4: Set-up for Conducted testing



8. List of Tables

9. List of Photographs