



CERTIFICATION OF COMPLIANCE

FCC ID

RQKSM-R400

APPLICANT

Sammi Information Systems Co., Ltd.

Equipment Class	:	Part 15 Spread Spectrum Transmitter (DSS)
Manufacturing Description	:	UHF RFID Reader (Bluetooth Embedded)
Manufacturer	:	Sammi Information System Co., Ltd.
Model name	:	SM-R400
Varient Model name	:	Smart-R400
Test Device Serial No.:	:	Identical prototype
Rule Part(s)	:	FCC Part 15.247 Subpart C; ANSI C-63.4-2003
Frequency Range	:	2402 ~ 2480MHz (Bluetooth) 902.75 ~ 927.25MHz (RFID)
RF power	:	Max 6.77 dBm – Conducted (Bluetooth) Max 17.56dBm – Conducted (RFID)
Data of issue	:	July 18, 2012

This test report is issued under the authority of:



Kyu-Hyun Lee, Manager

The test was supervised by:



Jung-Moo Her, Test Engineer

This test result only responds to the tested sample. It is not allowed to copy this report even partly without the allowance of the test laboratory. The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.



NVLAP LAB Code.: 200723-0

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1. General information's

1-1 Test Performed

Company name : LTA Co., Ltd.
 Address : 243, Jubug-ri, Yangji-Myeon, Youngin-Si, Kyunggi-Do, Korea. 449-822
 Web site : <http://www.ltalab.com>
 E-mail : chahn@ltalab.com
 Telephone : +82-31-323-6008
 Facsimile : +82-31-323-6010

Quality control in the testing laboratory is implemented as per ISO/IEC 17025 which is the “General requirements for the competents of calibration and testing laboratory”.

1-2 Accredited agencies

LTA Co., Ltd. is approved to perform EMC testing by the following agencies:

Agency	Country	Accreditation No.	Validity	Reference
NVLAP	U.S.A	200723-0	2012-09-30	ECT accredited Lab.
RRL	KOREA	KR0049	2013-04-24	EMC accredited Lab.
FCC	U.S.A	610755	2014-04-27	FCC filing
FCC	U.S.A	649054	2013-04-13	FCC CAB
VCCI	JAPAN	R2133(10m), C2307	2014-06-21	VCCI registration
VCCI	JAPAN	T-2009	2013-12-23	VCCI registration
VCCI	JAPAN	G-563	2015-05-28	VCCI registration
IC	CANADA	5799A-1	2015-06-21	IC filing

2. Information's about test item

2-1 Client & Manufacturer

Company name : Sammi Information Systems Co., Ltd.
 Address : 11F Kolon Aston Bldg, 505-14, Gasan-dong, Guemcheon-Gu,
 Seoul, 153-803 KOREA
 Telephone / Facsimile : +82 2 790-5505 / +82 2 797-9206

2-2 Equipment Under Test (EUT)

Trade name : UHF RFID Reader (Bluetooth Embedded)
 Model name : SM-R400
 Variant Model name : Smart-R400
 Serial number : Identical prototype
 Date of receipt : June 18, 2012
 EUT condition : Pre-production, not damaged
 Antenna type : PCB Pattern antenna, Max Gain -0.94 dBi (Bluetooth)
 Patch Antenna, Max Gain 0.135 dBi (RFID)
 Frequency Range : 2402 ~ 2480MHz (Bluetooth)
 902.75 ~ 927.25MHz (RFID)
 RF output power : Max. 6.77 dBm - Conducted (Bluetooth)
 Max 17.56 dBm - Conducted (RFID)
 Number of channels : 79 (Bluetooth) / 50 (RFID)
 Duty cycle : 82.40 % (Bluetooth)
 Channel spacing : 1MHz (Bluetooth) / 500kHz (RFID)
 Channel Access Protocol : Frequency Hopping Spread Spectrum (FHSS)
 Power Source : 3.7 Vdc from Internal Battery (Li-Ion Polymer Battery)
 Firmware Version : V1.0.0

2-4 Tested frequency

Bluetooth	LOW	MID	HIGH
Frequency (MHz)	2402	2441	2480

RFID	LOW	MID	HIGH
Frequency (MHz)	902.75	914.75	927.25

2-5 Ancillary Equipment

Equipment	Model No.	Serial No.	Manufacturer
-	-	-	-

3. Test Report

3.1 Summary of tests

FCC Part Section(s)	Parameter	Limit	Test Condition	Status (note 1)
15.247(a)	Carrier Frequency Separation	> 25 kHz	Conducted	C
15.247(a)	Number of Hopping Frequencies	> 15 hops		C
15.247(a)	20 dB Bandwidth 99% Bandwidth	> 1.5 MHz		C
15.247(a)	Dwell Time	< 0.4 seconds		C
15.247(b)	Transmitter Output Power	< 250 mWatt		C
15.247(d)	Conducted Spurious emission	> 20 dBc		C
15.247(d)	Band Edge	> 20 dBc		C
15.249 / 15.209	Field Strength of Harmonics	< 54 dBuV (at 3m)	Radiated	C
15.109	Field Strength	-		C
15.207 /15.107	AC Conducted Emissions	EN 55022	Line Conducted	C
15.203	Antenna requirement	-	-	C

Note 1: C=Complies NC=Not Complies NT=Not Tested NA=Not Applicable

Note 2: The data in this test report are traceable to the national or international standards.

Note 1: Antenna Requirement

→ The **Sammi Information Systems Co.,Ltd.** FCC ID:RQKSM-R400 unit complies with the requirement of §15.203.

The antenna type is PCB Pattern antenna (Bluetooth) / Patch Antenna (RFID)

Note 2: The sample was tested according to the following specification:
FCC Parts 15.247; ANSI C-63.4-2003

Note3: TEST METHODOLOGY

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices(ANSI C63.10-2009) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled “**Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems**” were used in the measurement of the **Sammi Information Systems Co., Ltd.** FCC ID: RQKSM-R400

3.2 Information about the FHSS characteristics:

3.2.1 Pseudorandom Frequency Hopping Sequence

The channel is represented by a pseudo-random hopping sequence hopping through the 79 RF channels. The hopping sequence is unique for the piconet and is determined by the Bluetooth device address of the master; the phase in the hopping sequence is determined by the Bluetooth clock of the master. The channel is divided into time slots where each slot corresponds to an RF hop frequency. Consecutive hops correspond to different RF hop frequencies. The nominal hop rate is 1600 hops/s.

3.2.2 Equal Hopping Frequency Use

All Bluetooth units participating in the piconet are time and hop-synchronized to the channel.

3.2.3 System Receiver Input Bandwidth

Each channel bandwidth is 1MHz

3.2.4 Equipment Description

15.247(g): In accordance with the Bluetooth Industry Standard, the system is designed to comply with all of the regulations in Section 15.247 when the transmitter is presented with a continuous data (or information) system.

15.247(h): In accordance with the Bluetooth Industry Standard, the system does not coordinate its channels selection/ hopping sequence with other frequency hopping systems for the express purpose of avoiding the simultaneous occupancy of individual hopping frequencies by multiple transmitters.

3.3 Transmitter requirements

3.3.1 Carrier Frequency Separation

Procedure:

The test follows DA000705. The carrier frequency separation was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

After the trace being stable, the reading value between the peaks of the adjacent channels using the marker-delta function was recorded as the measurement results.

The spectrum analyzer is set to:

Span = 1~ 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 10 kHz (1% of the span or more) Sweep = auto

VBW = 10 kHz Detector function = peak

Trace = max hold

Measurement Data:

Test Results		
Mode	Carrier Frequency Separation (KHz)	Result
Bluetooth	998.6	Complies
RFID	499.3	Complies

- See next pages for actual measured spectrum plots.

Minimum Standard:

The EUT shall have hopping channel carrier frequencies separated by a minimum of 25kHz or two-thirds of 20dB bandwidth of the hopping channel, whichever is greater.

Measurement Setup

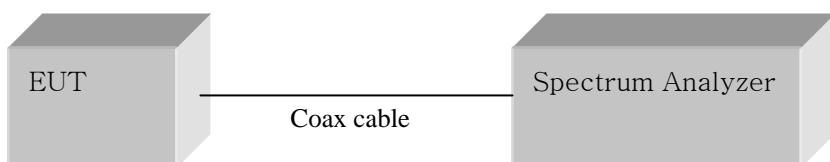
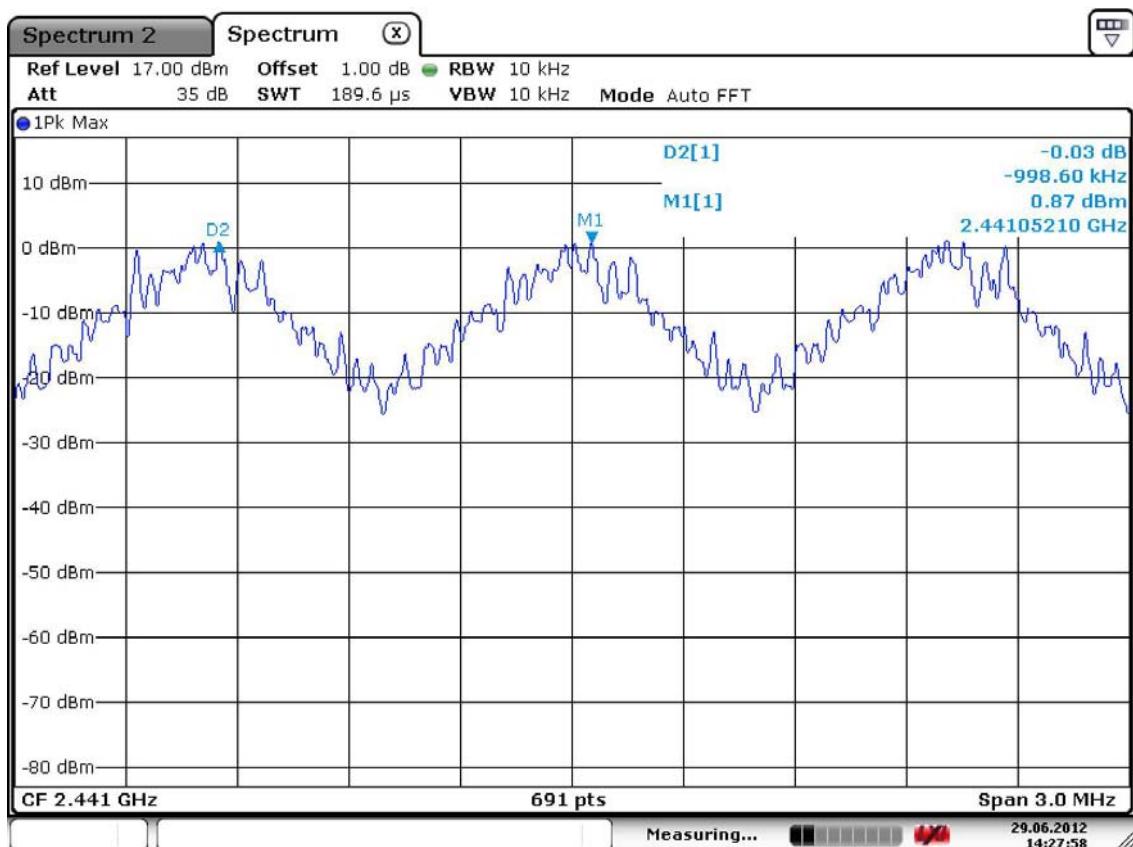
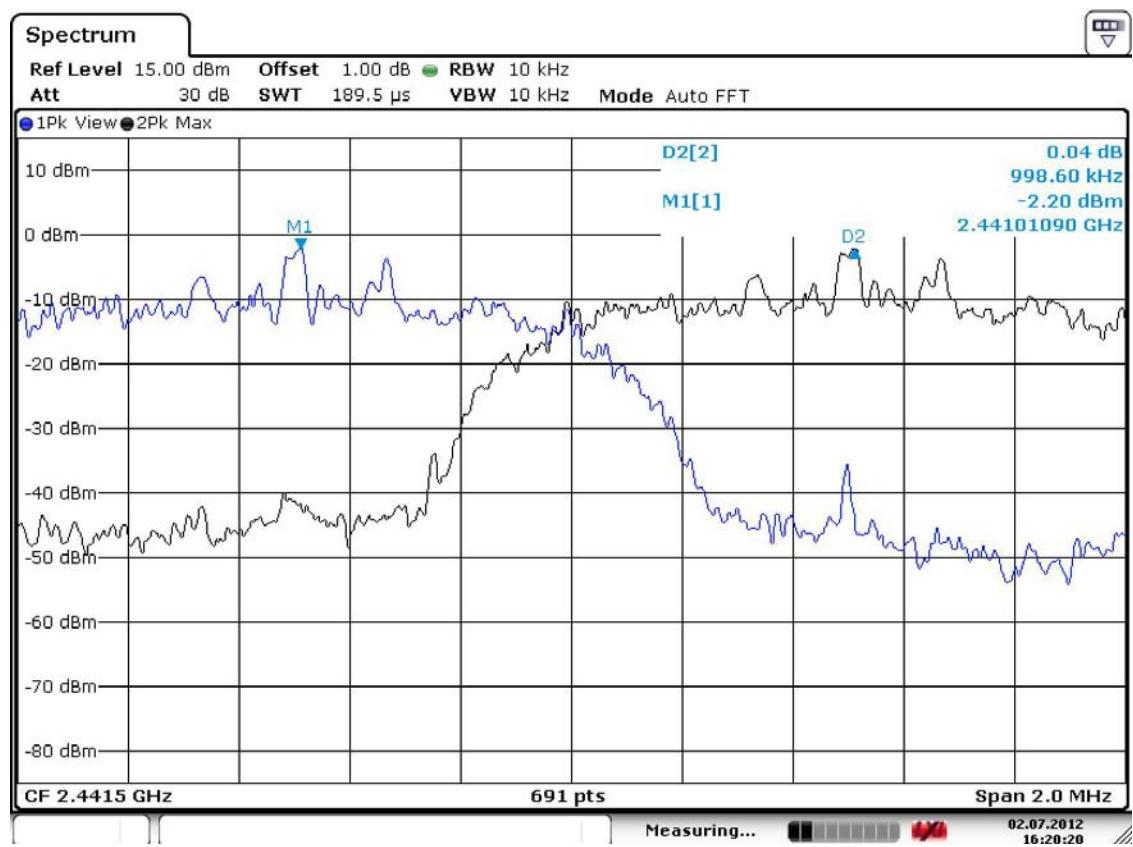
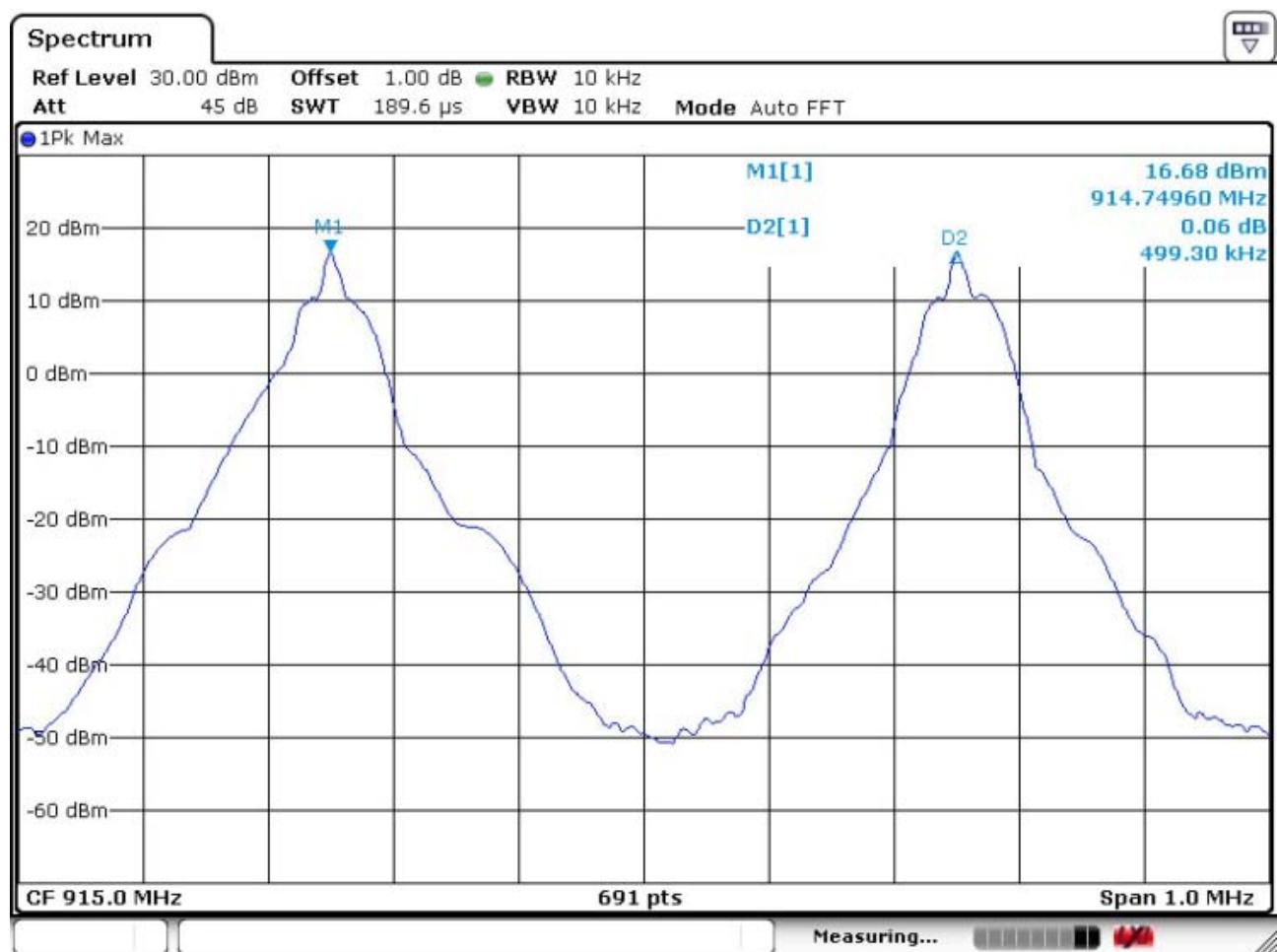


Figure 1: Measurement setup for the carrier frequency separation

Carrier Frequency Separation (Bluetooth)Basic ModeEDR Mode

Carrier Frequency Separation (RFID)

3.3.2 Number of Hopping Frequencies

Procedure:

The test follows DA000705. The number of hopping frequencies was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

To get higher resolution, four frequency ranges within the 2400 ~ 2483.5 MHz FH band were examined.

The spectrum analyzer is set to (Bluetooth):

Frequency range Start = 2400.0MHz, Stop = 2483.5 MHz

RBW = 100 kHz (1% of the span or more) Sweep = auto

VBW = 100 kHz (VBW \geq RBW) Detector function = peak

Trace = max hold Span > 40MHz

Measurement Data (Bluetooth) : Complies

Total number of Hopping Channels	79
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- See next pages for actual measured spectrum plots.

The spectrum analyzer is set to (RFID):

Frequency range 1: Start = 900 MHz, Stop = 930 MHz

RBW = 10 kHz Sweep = auto

VBW = 10 kHz (VBW \geq RBW) Detector function = peak

Trace = max hold Span = 30MHz

Measurement Data (RFID) : Complies

Total number of Hopping Channels	50
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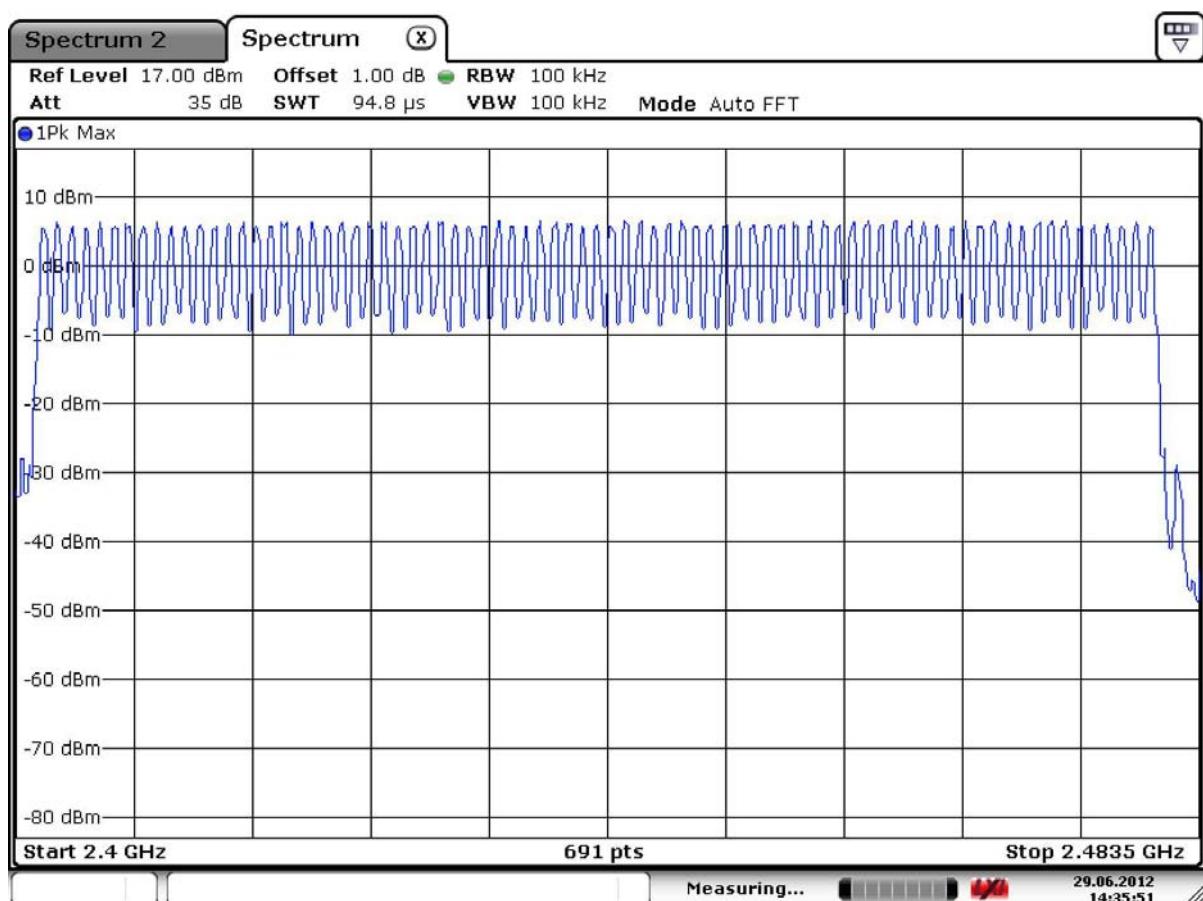
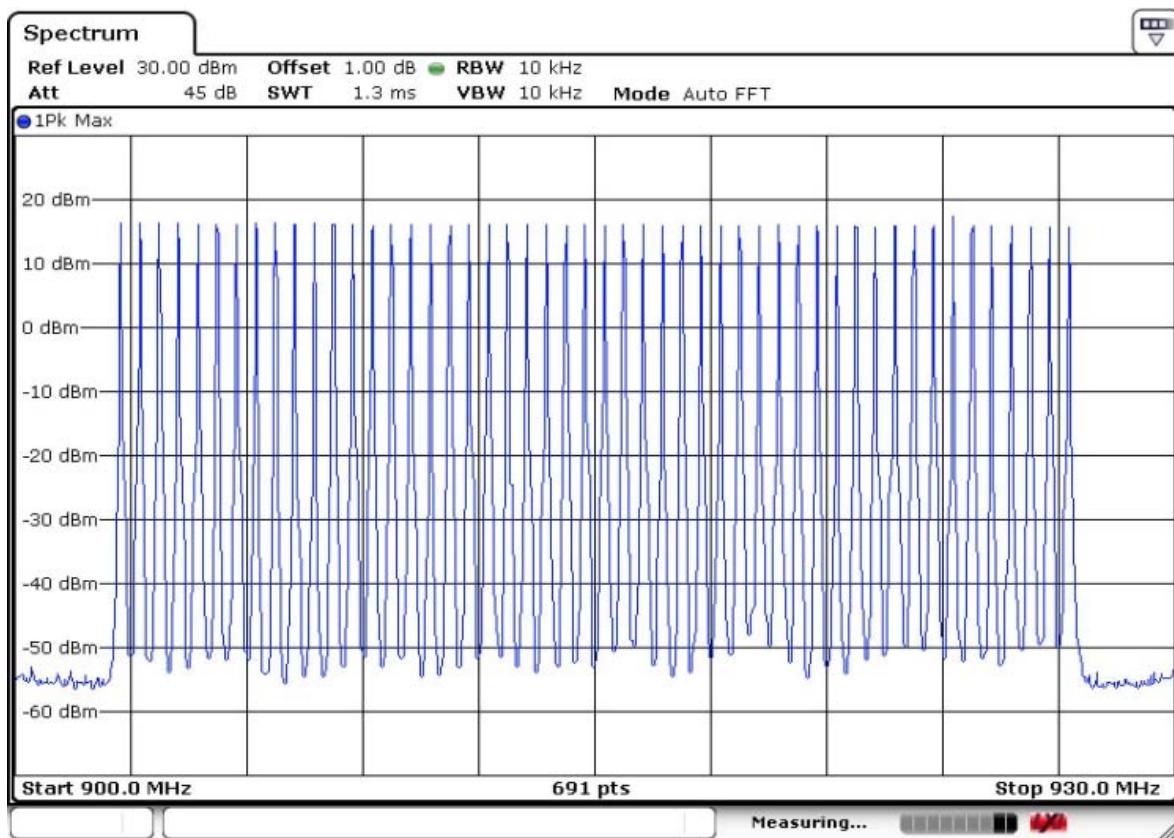
- See next pages for actual measured spectrum plots.

Minimum Standard:

At least 15 hopes

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Number of Hopping Frequencies (Bluetooth)Number of Hopping Frequencies (RFID)

3.3.3 20 dB Bandwidth

Procedure:

The bandwidth at 20 dB below the highest inband spectral density was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 20 dB bandwidth of the emission.

The spectrum analyzer is set to (Bluetooth):

Center frequency = the highest, middle and the lowest channels

Span = 3 MHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz (VBW \geq RBW)

Detector function = peak

Trace = max hold

Measurement Data (Bluetooth) : Basic Mode

Frequency (MHz)	Channel No.	Test Results(MHz)	
		20dB Bandwidth	99% Bandwidth
2402	0	0.821	0.877
2441	39	0.821	0.881
2480	78	0.825	0.881

Measurement Data (Bluetooth) : EDR Mode

Frequency (MHz)	Channel No.	Test Results(MHz)	
		20dB Bandwidth	99% Bandwidth
2402	0	1.263	1.164
2441	39	1.259	1.164
2480	78	1.255	1.164

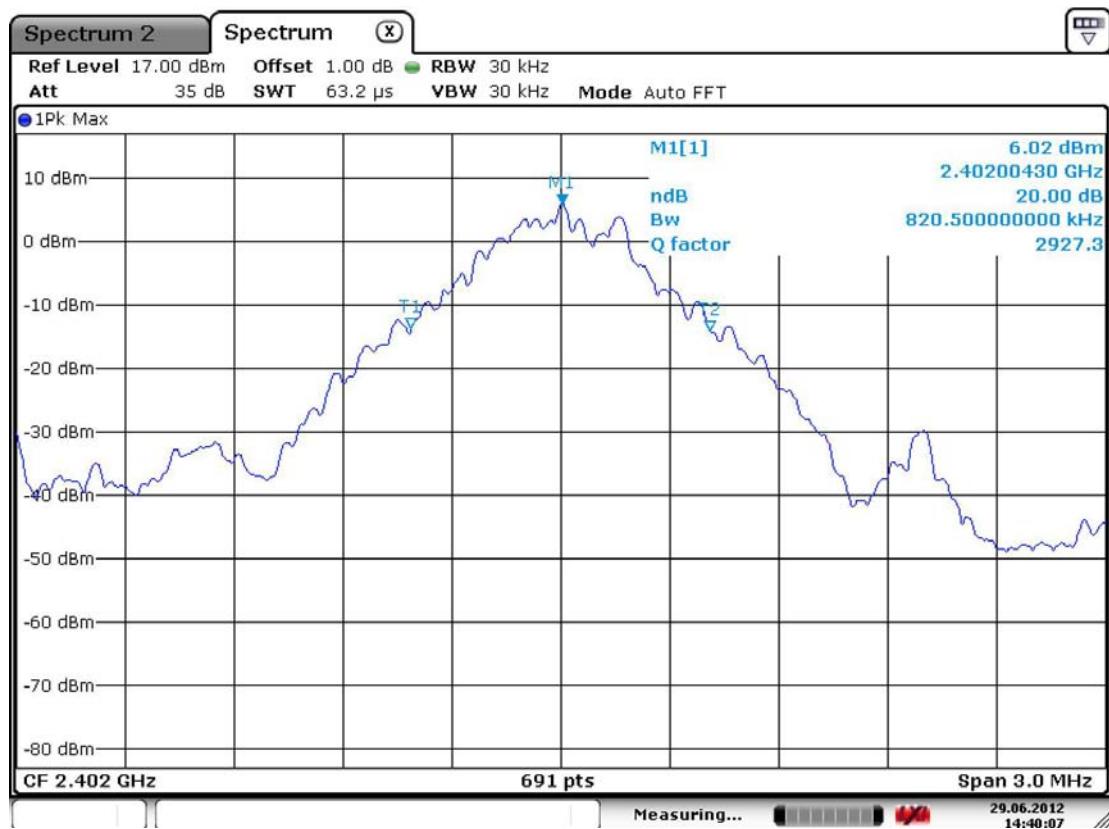
- See next pages for actual measured spectrum plots.

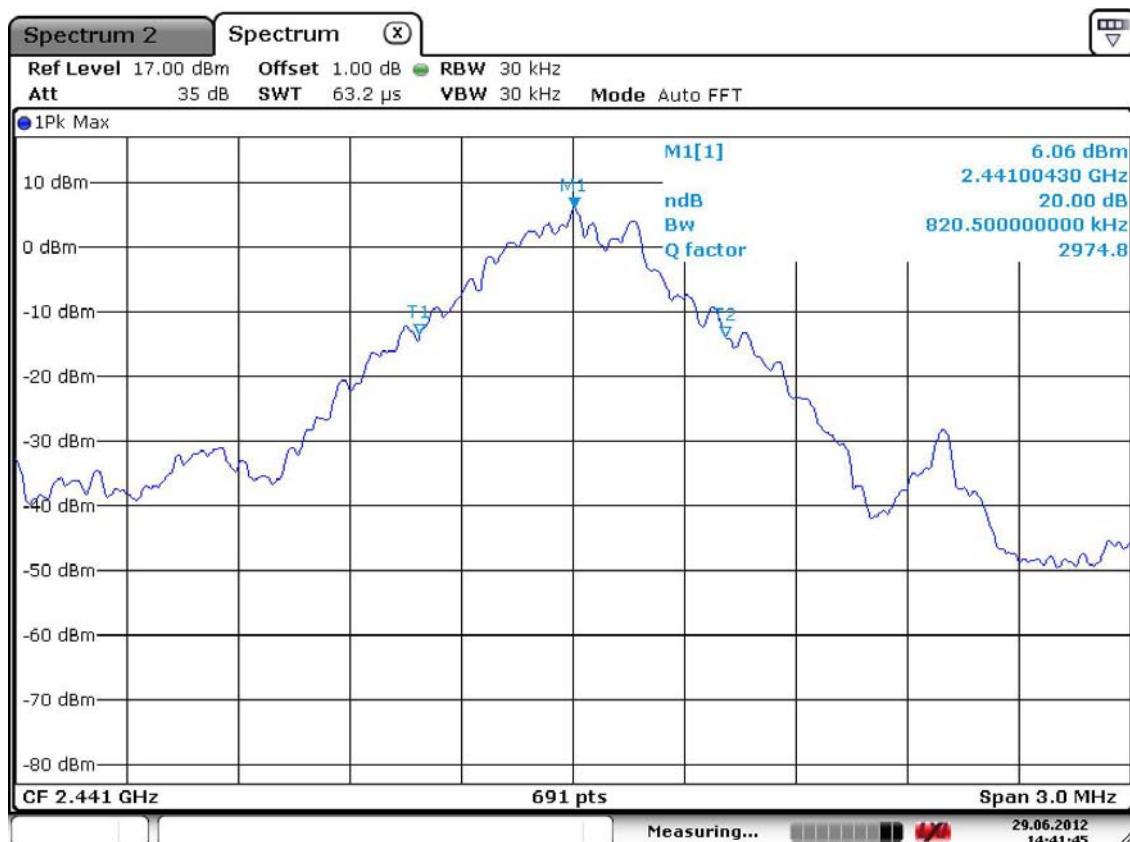
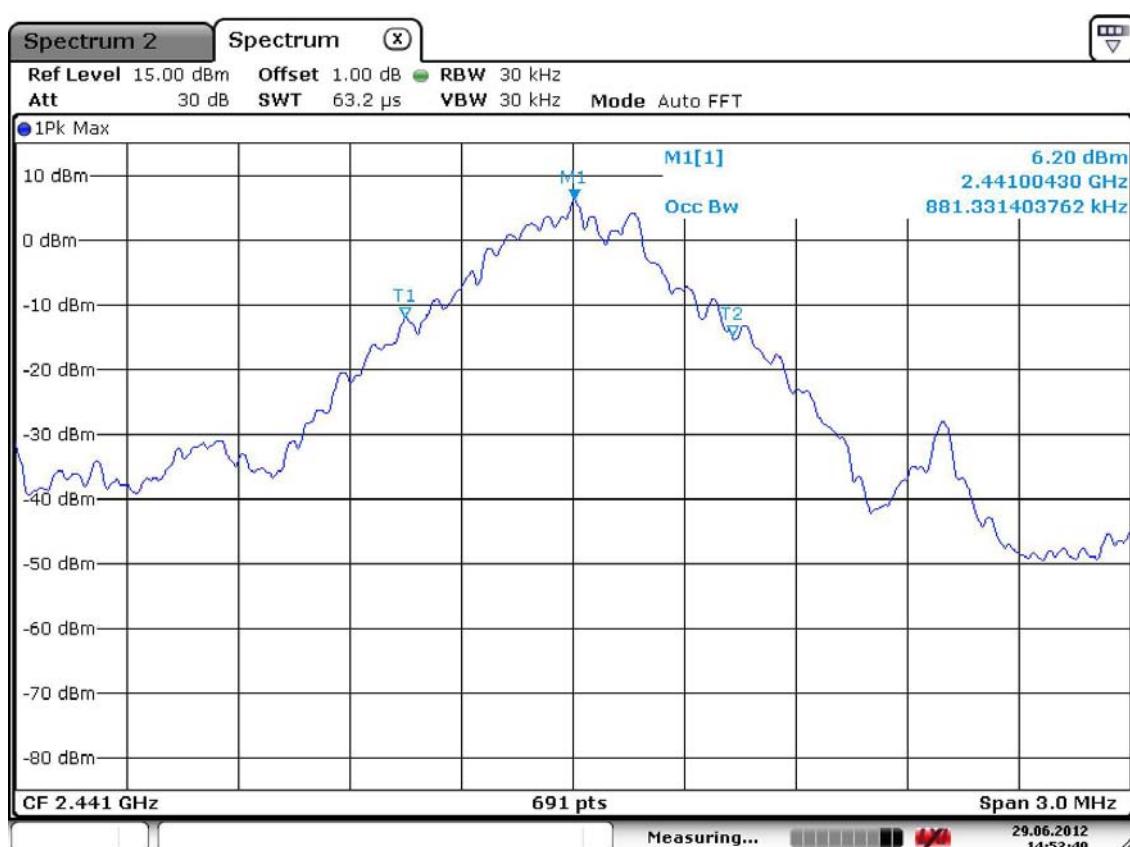
Minimum Standard:

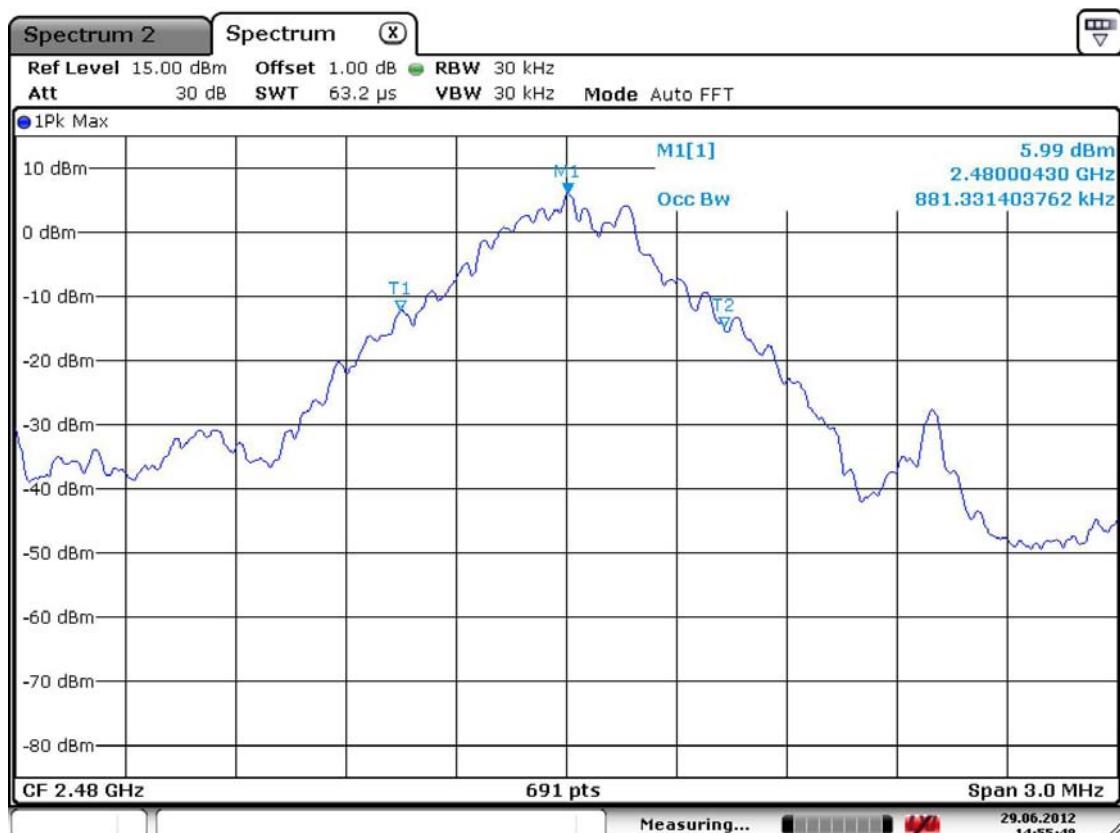
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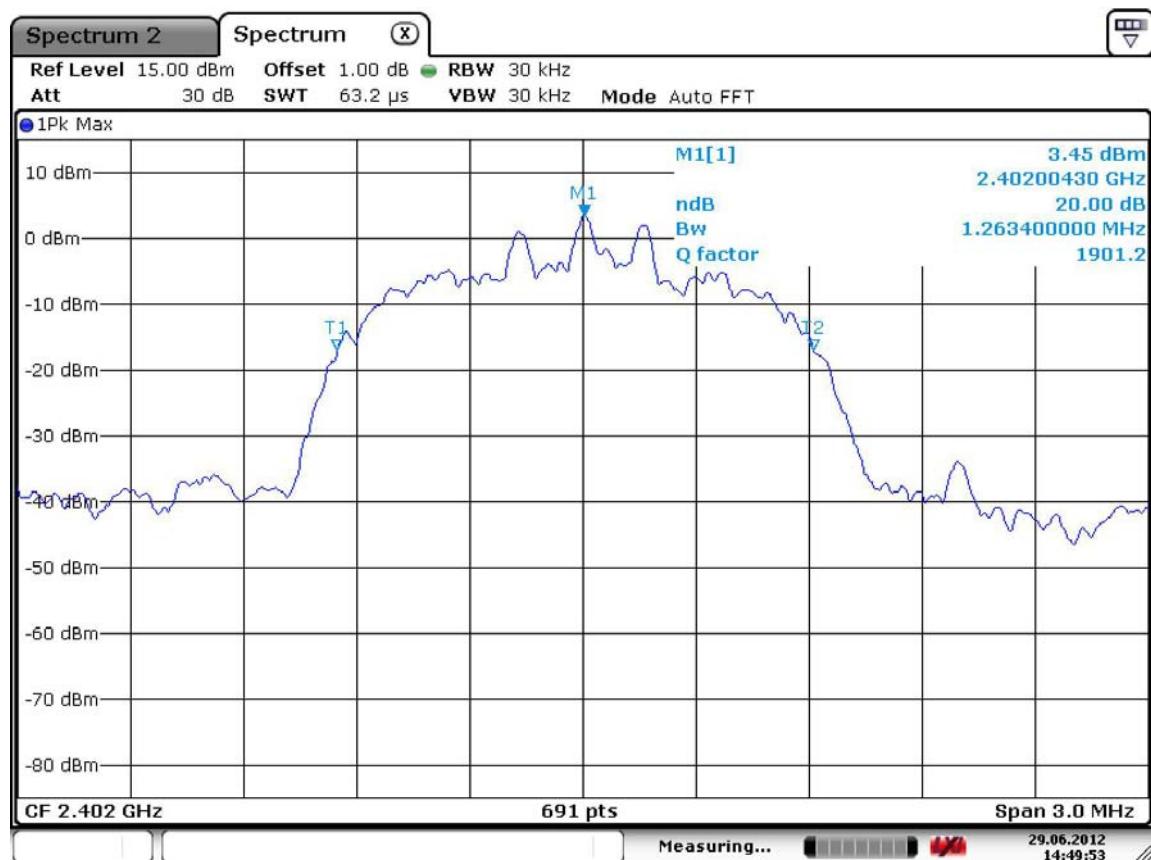
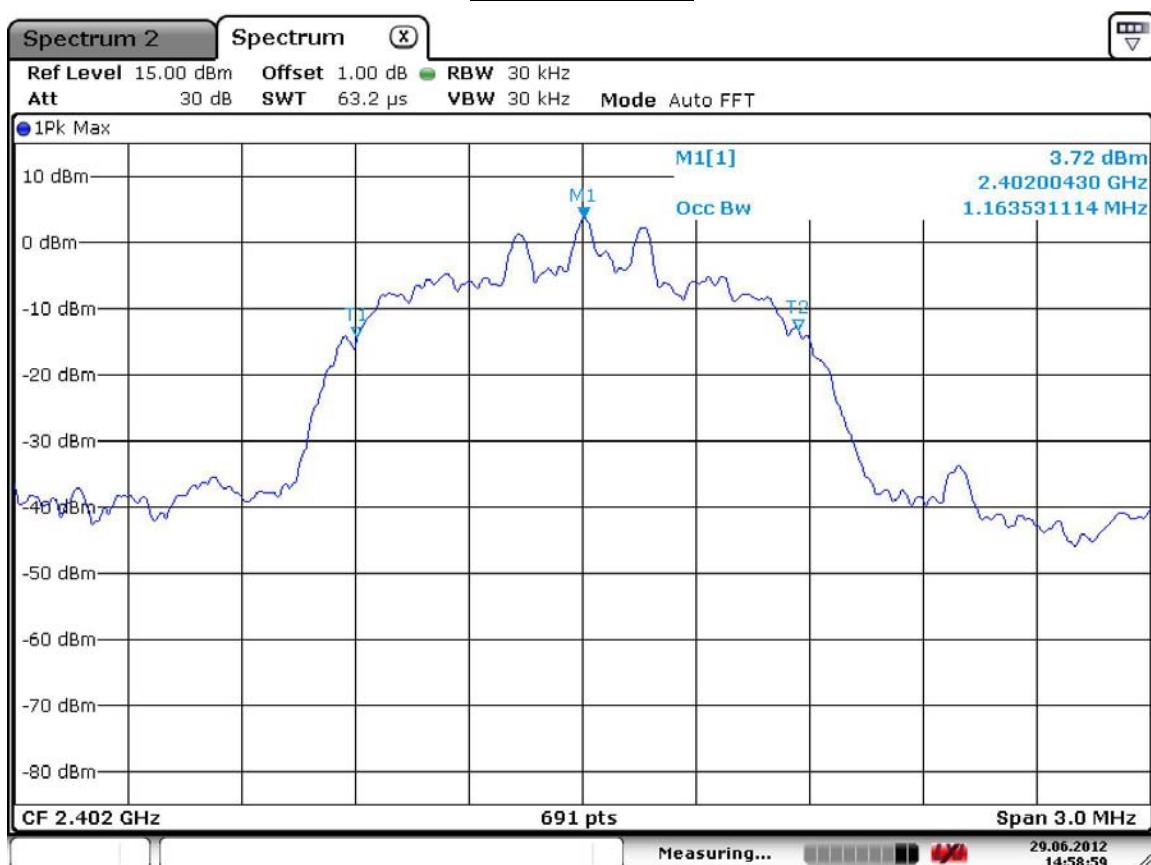
Measurement Setup

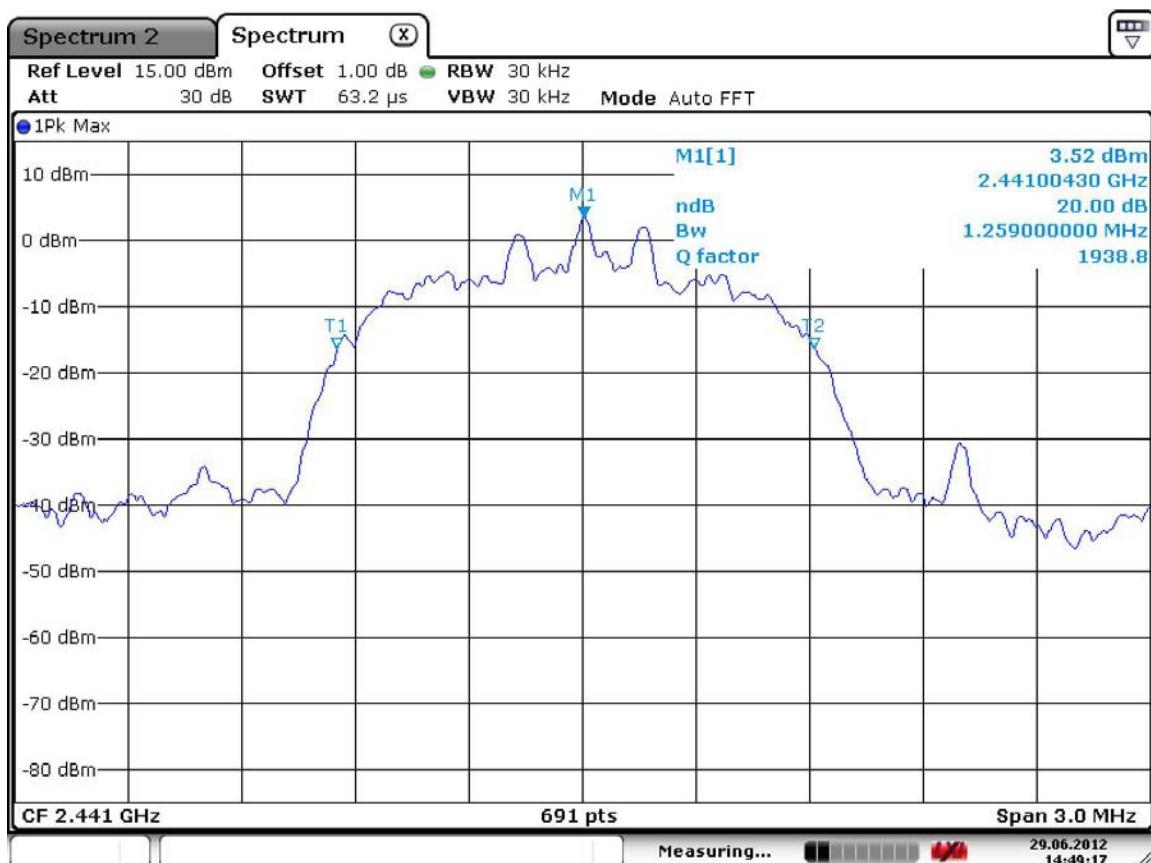
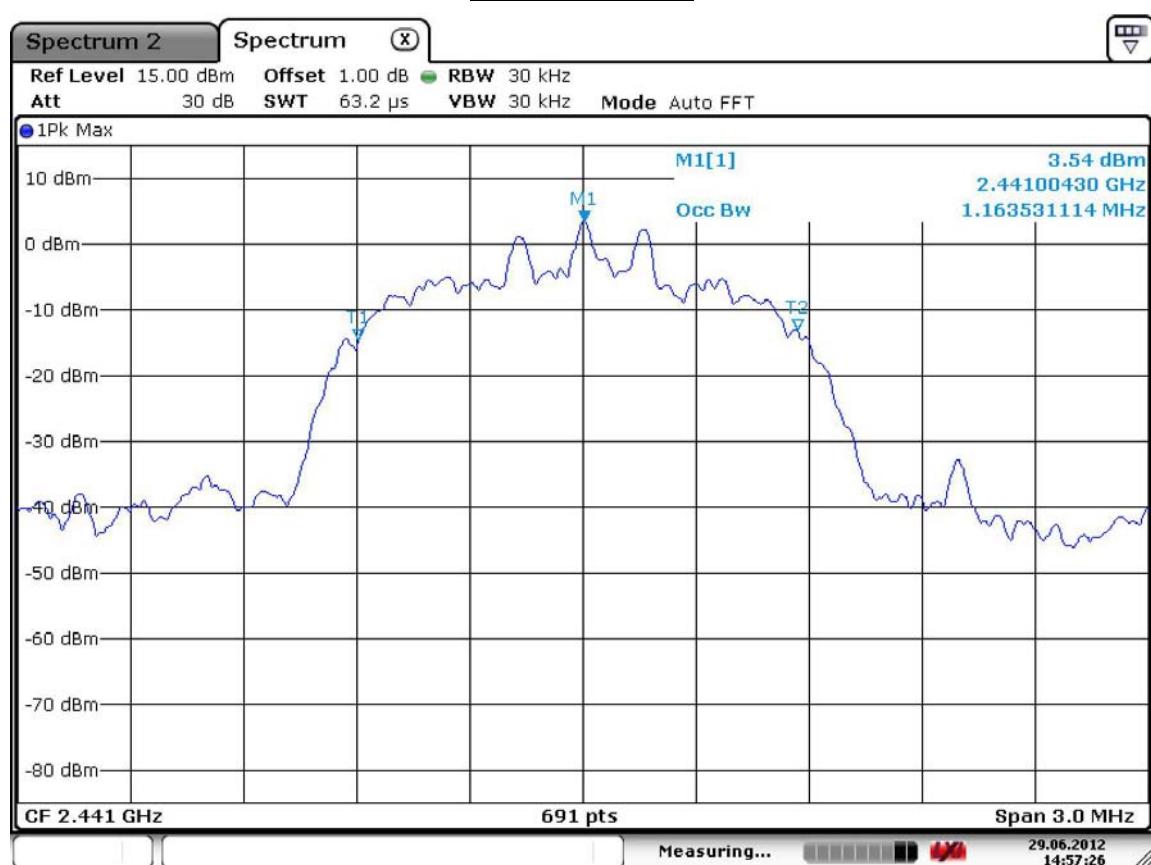
Same as the Chapter 3.2.1 (Figure 1)

Channel 1 of basic mode (Bluetooth)20 dB Bandwidth99% Bandwidth

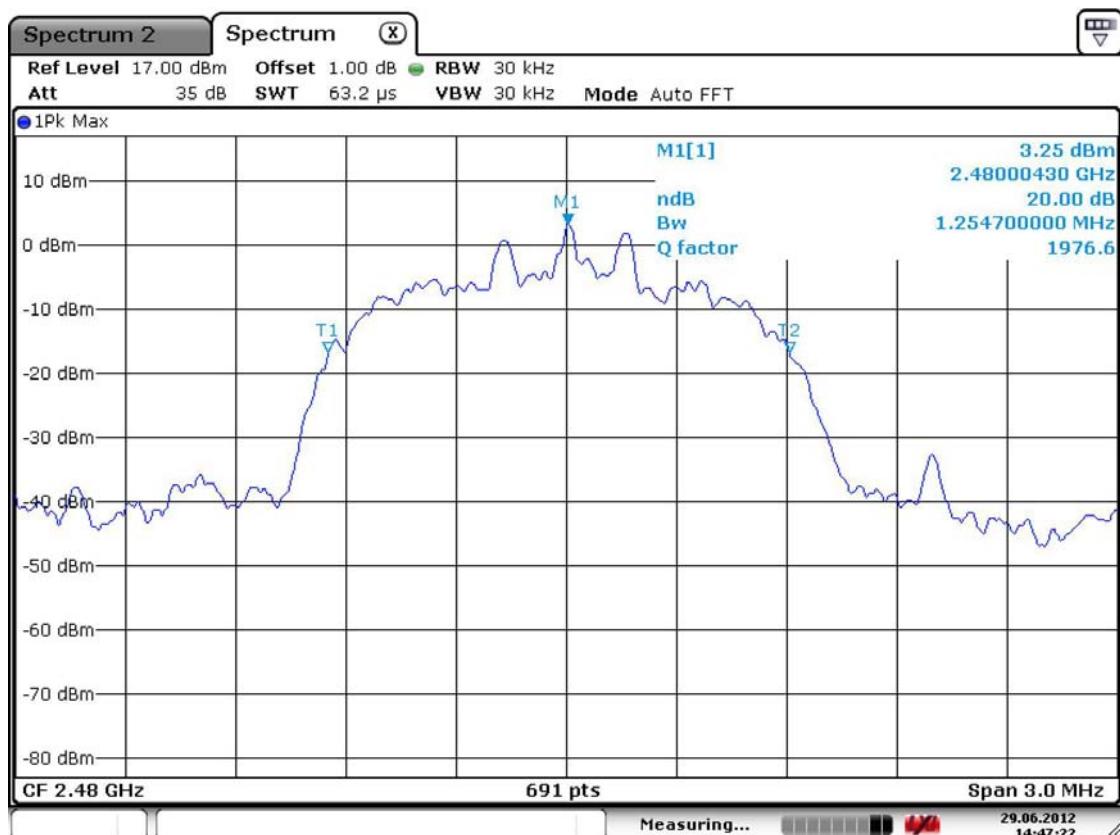
Channel 2 of basic mode (Bluetooth)20 dB Bandwidth99% Bandwidth

Channel 3 of basic mode (Bluetooth)20 dB Bandwidth99% Bandwidth

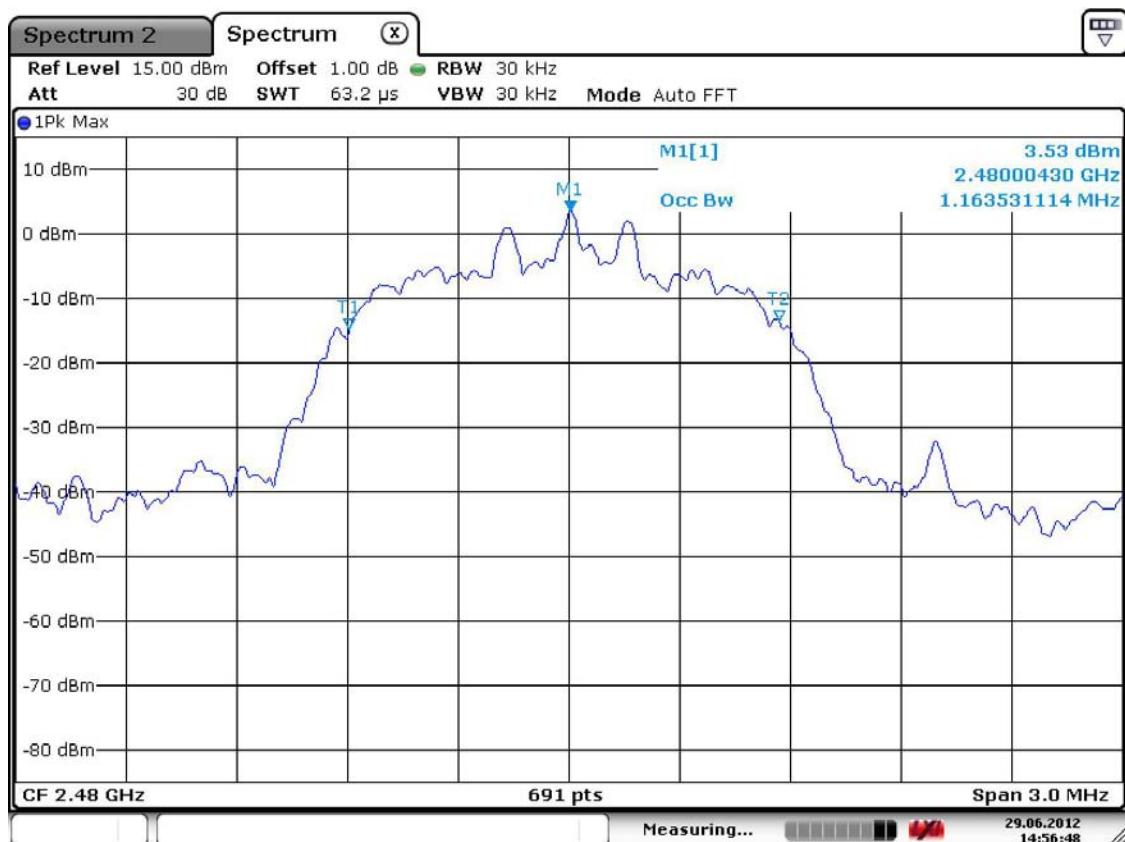
Channel 1 at EDR mode (Bluetooth)20 dB Bandwidth99% Bandwidth

Channel 2 at EDR mode (Bluetooth)20 dB Bandwidth99% Bandwidth

Channel 3 at EDR mode (Bluetooth)
20 dB Bandwidth



99% Bandwidth



The spectrum analyzer is set to (RFID):

Center frequency = the highest, middle and the lowest channels

Span = 200 KHz (approximately 2 or 3 times of the 20 dB bandwidth)

RBW = 3 kHz

Sweep = auto

VBW = 3 kHz (VBW \geq RBW)

Detector function = peak

Trace = max hold

Measurement Data (RFID) :

Frequency (MHz)	Test Results	
	Measured Bandwidth (kHz)	Result
902.75	57.89	Complies
914.75	66.57	Complies
927.25	55.86	Complies

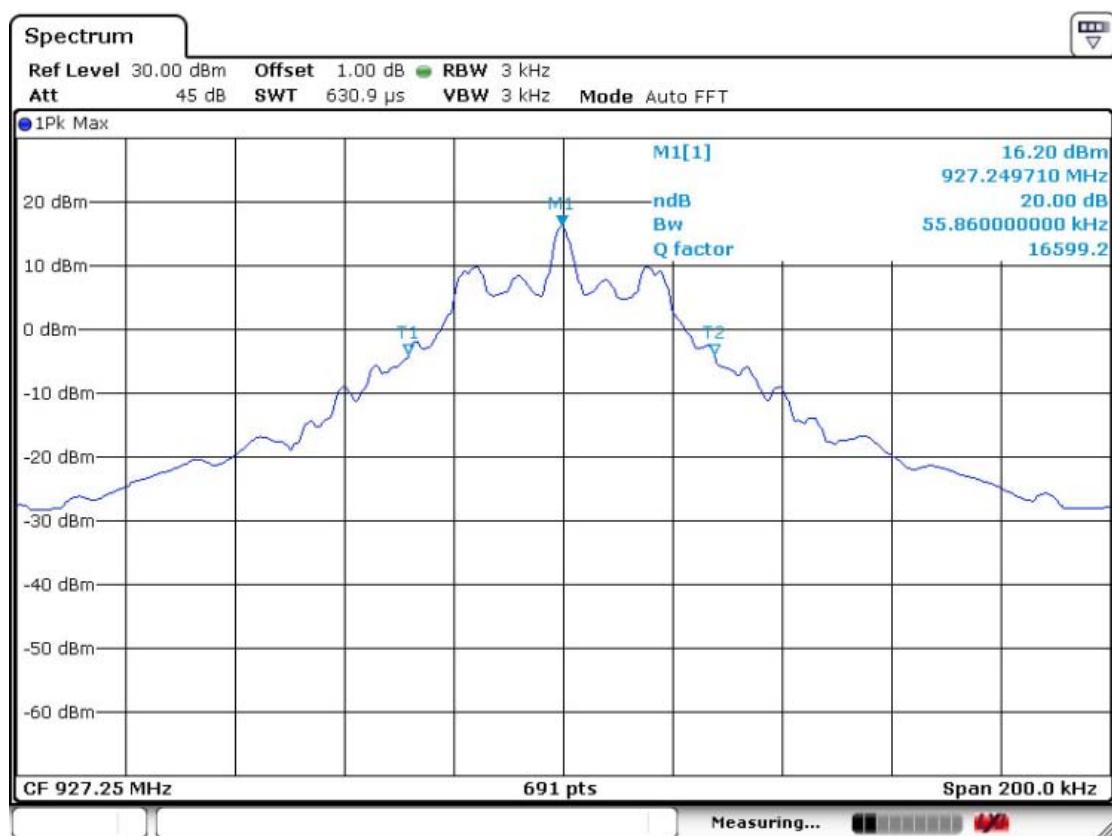
- See next pages for actual measured spectrum plots.

Minimum Standard:

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

20 dB Bandwidth (RFID)**Low Channel****Mid Channel**

High Channel

3.3.4 Time of Occupancy (Dwell Time)

Procedure:

The test follows DA000705. The dwell time was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function enabled.

The spectrum analyzer is set to (Bluetooth):

Center frequency = 2441 MHz	Span = zero
RBW = 1 MHz	VBW = 1 MHz (VBW \geq RBW)
Trace = max hold	Detector function = peak

Measurement Data (Bluetooth):

Mode	Number of transmission in a 31.6s (79Hopping*0.4)	Length of Transmission Time (msec)	Result (msec)	Limit (msec)
DH1	30(Times / 3sec) *10.533 = 315.99	0.545	172.21	400
DH3	15(Times / 3sec) *10.533 = 158.00	1.809	285.82	400
DH5	10(Times / 3sec) *10.533 = 105.33	3.087	325.15	400
EDR 3Mbps DH5	10(Times / 3sec) *10.533 = 105.33	3.051	321.36	400

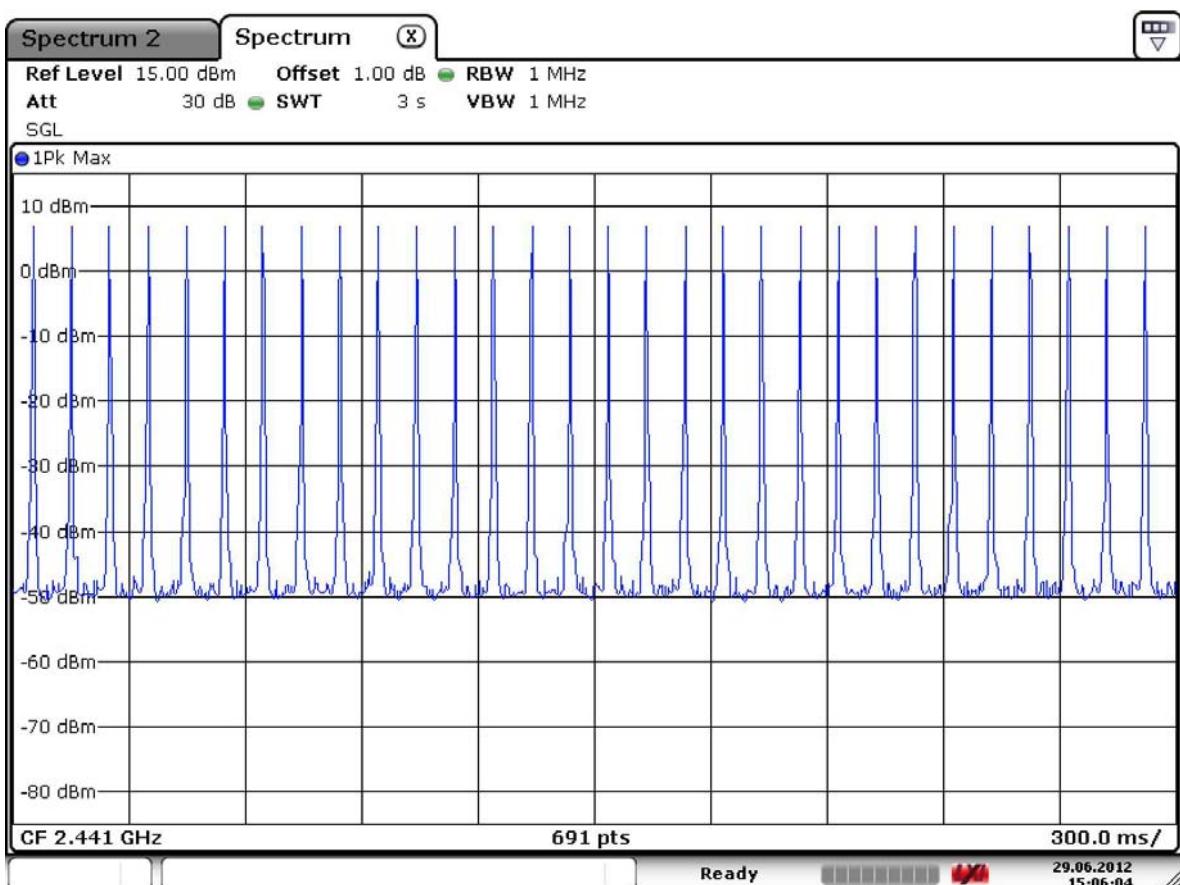
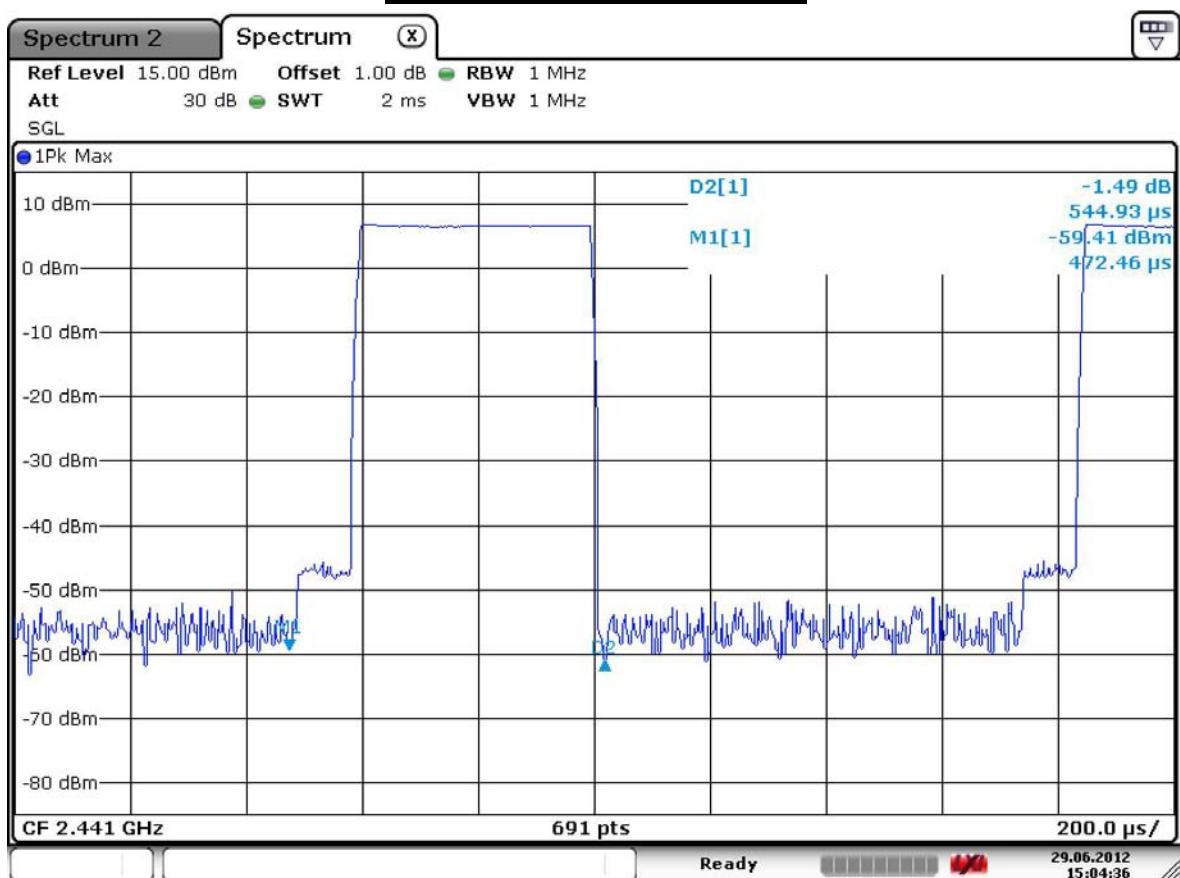
- See next pages for actual measured spectrum plots.
- dwell time = {(number of hopping per second / number of slot) x duration time per channel} x 0.4 ms

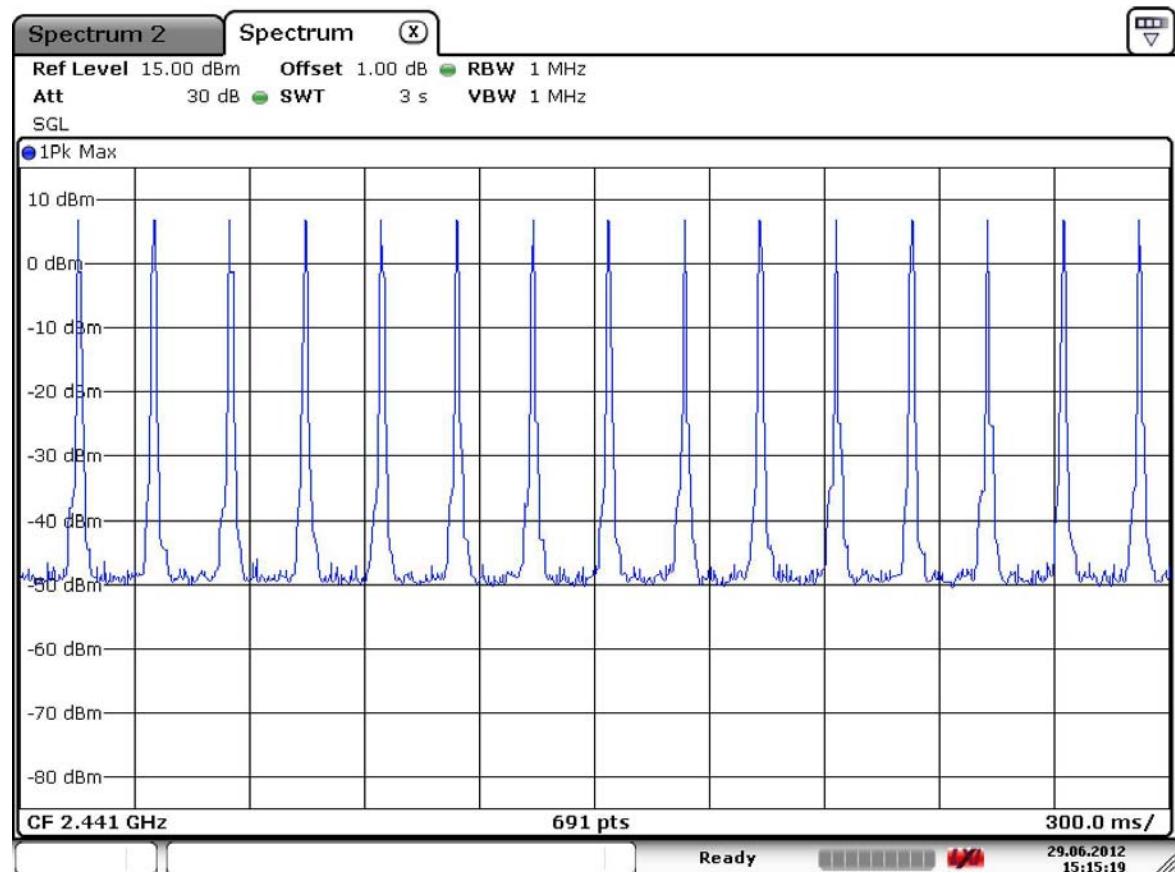
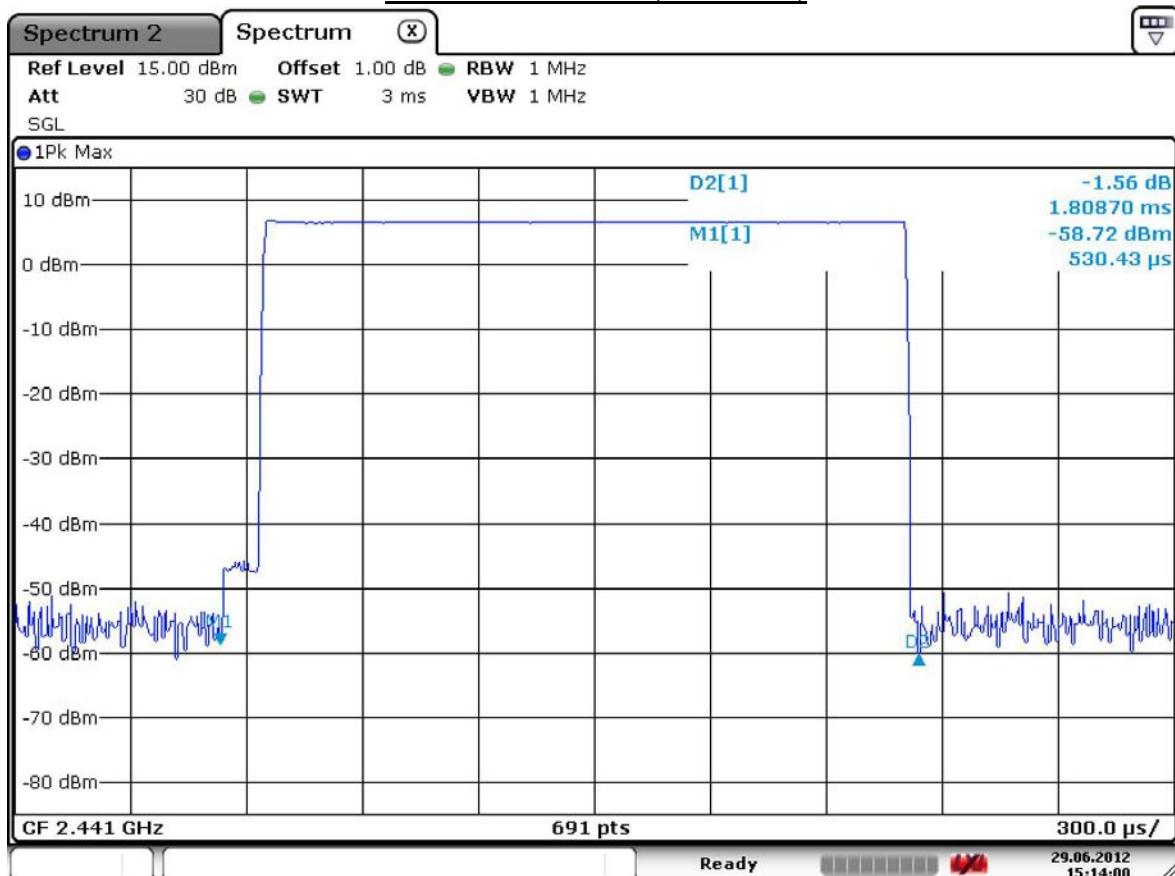
Minimum Standard:

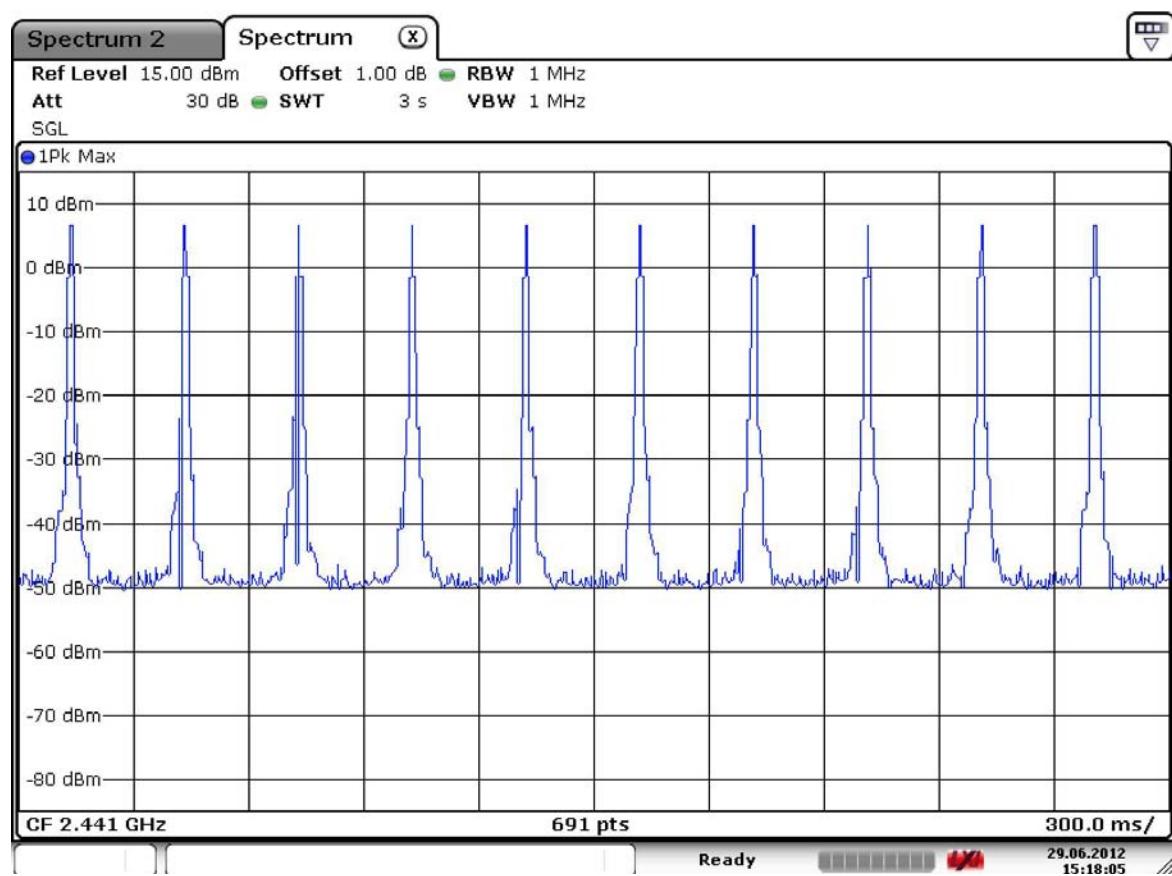
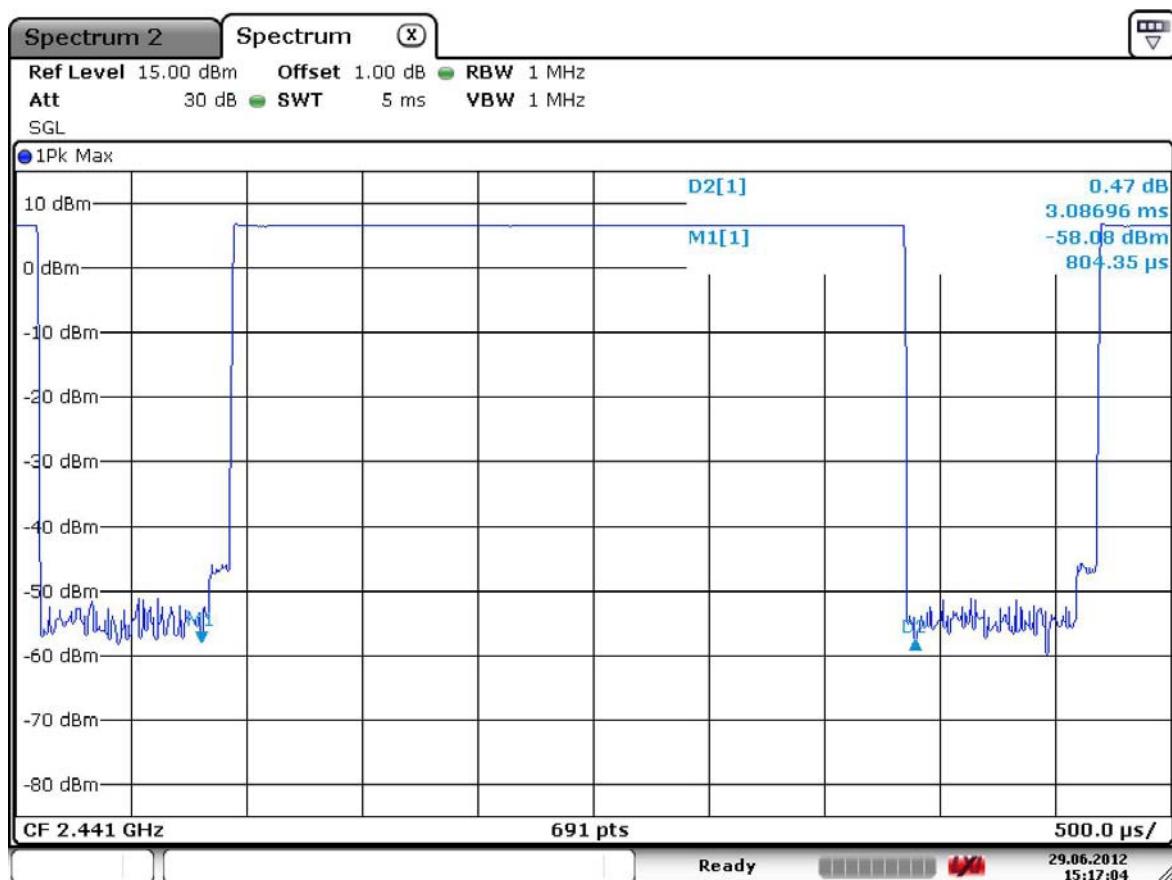
0.4 seconds within a 30 second period per any frequency

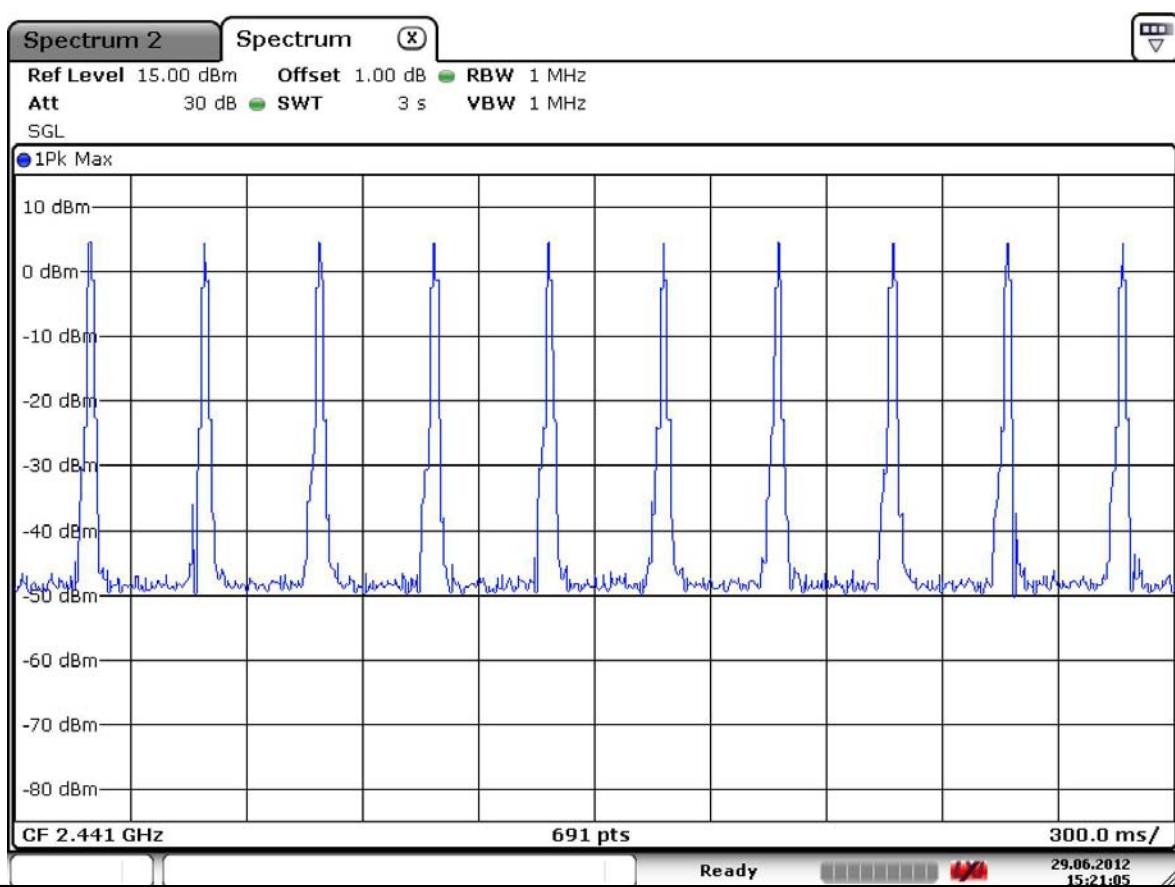
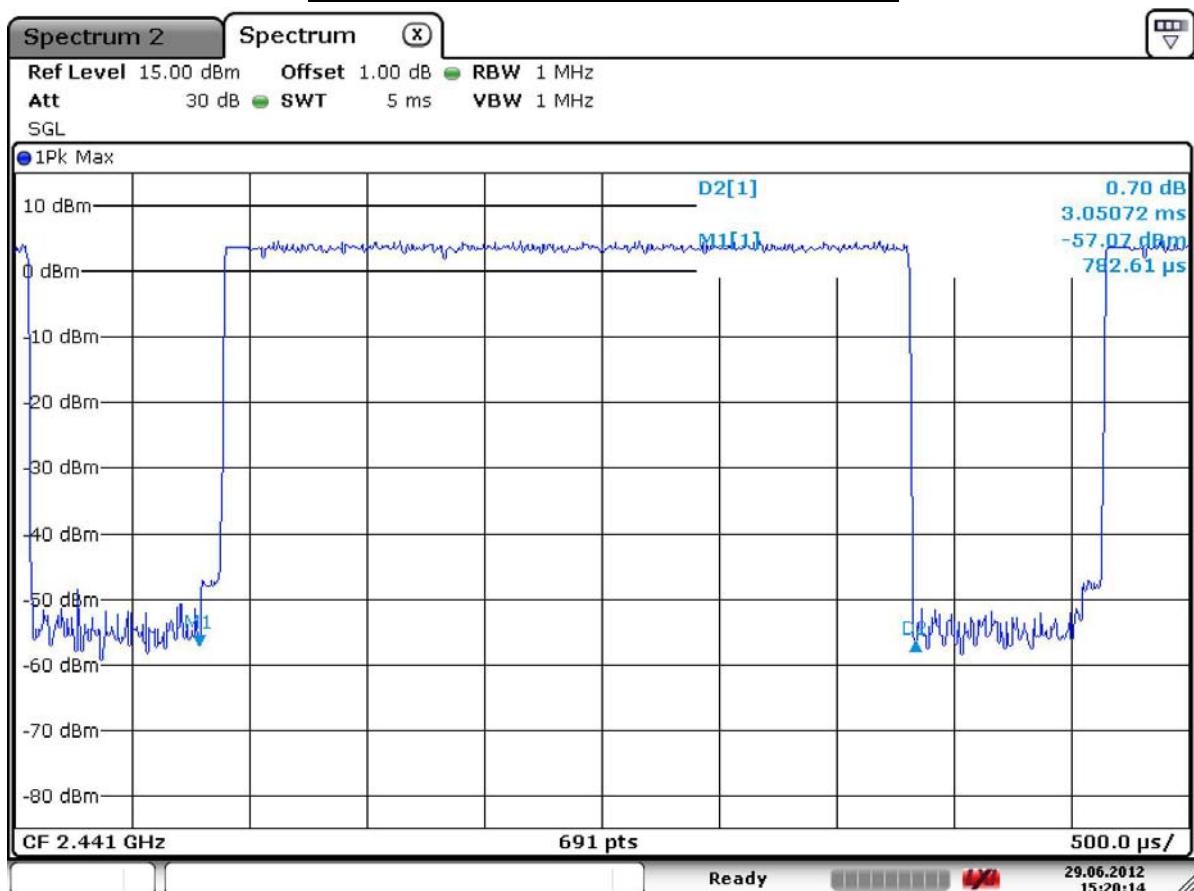
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

DH1 at basic mode (Bluetooth)

DH3 at basic mode (Bluetooth)

DH5 at basic mode (Bluetooth)

DH5 at EDR mode with 3Mbps (Bluetooth)

The spectrum analyzer is set to (RFID):

Center frequency = 914.75 MHz

Span = zero

RBW = 100KHz

VBW = 100KHz (VBW \geq RBW)

Trace = Single SWEEP

Detector function = peak

Measurement Data (RFID):

Channel Frequency (MHz)	Test Results			
	Length (ms)	number	Dwell Time (ms)	Result
914.75	102.90	1	102.90	Complies

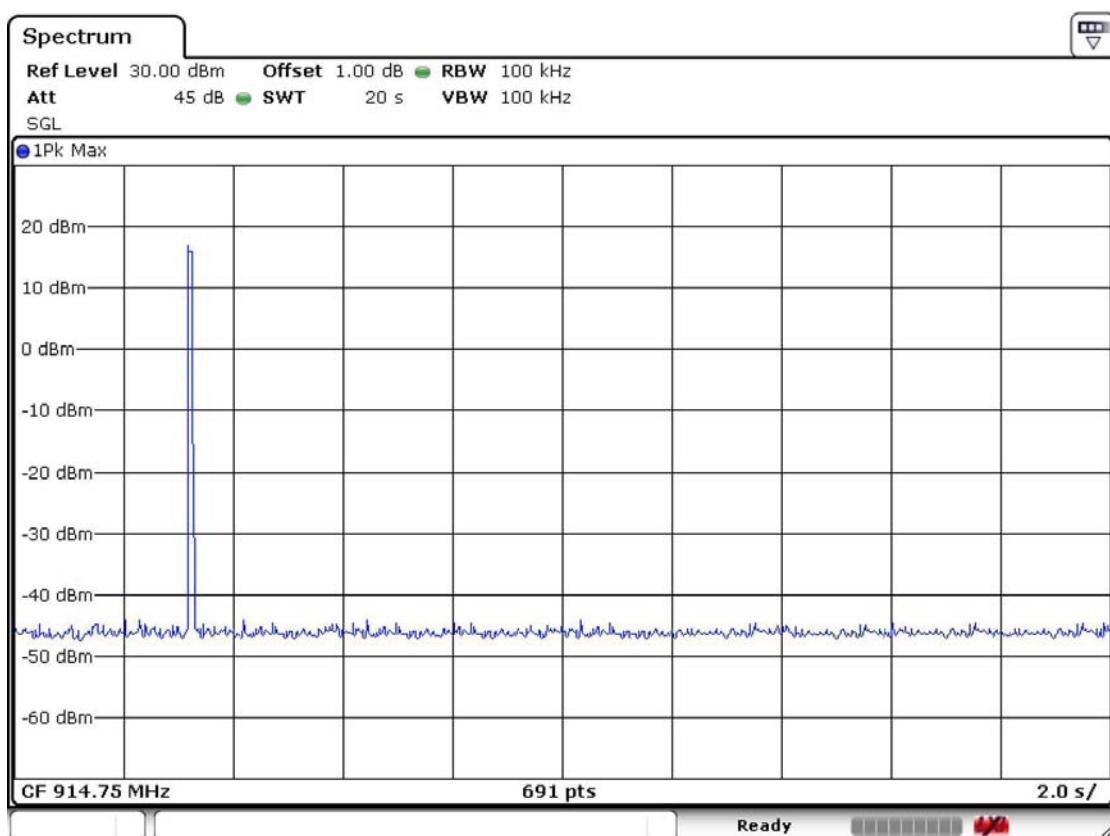
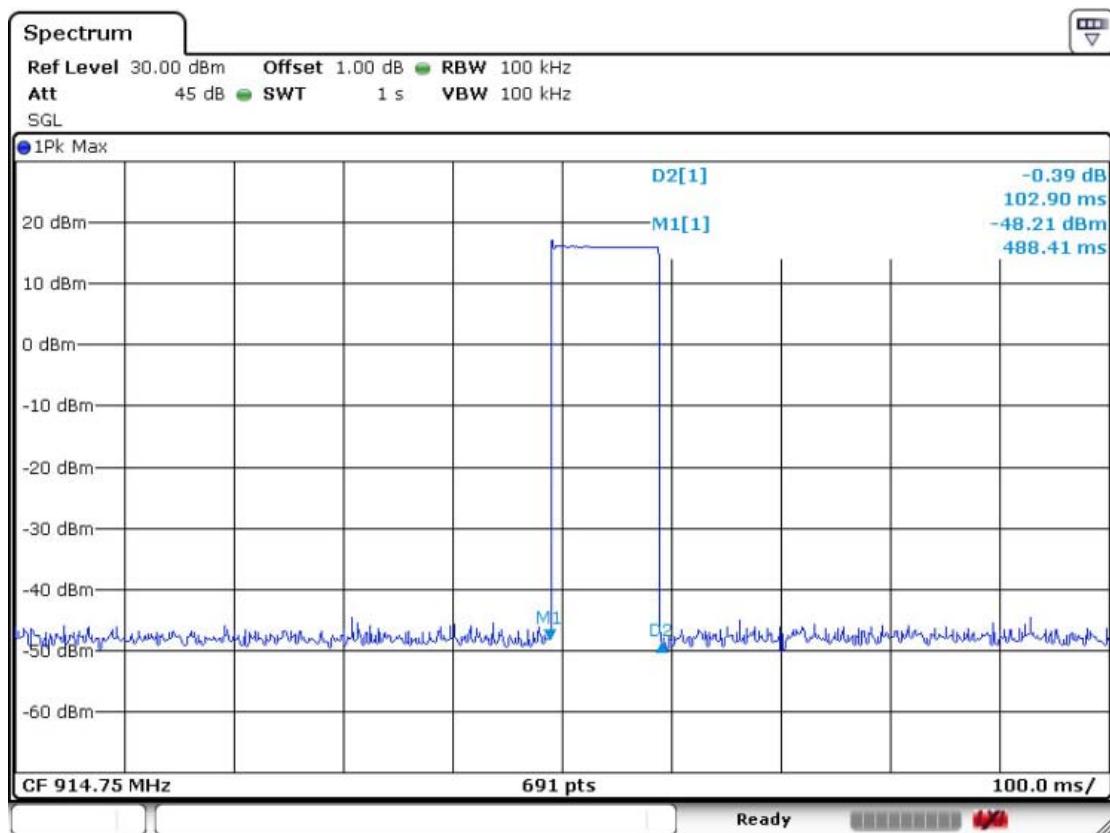
- See next pages for actual measured spectrum plots.

Minimum Standard:

0.4 seconds within a 20 second period per any frequency

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)



3.3.5 Transmitter Output Power

Procedure:

The test follows DA000705. The peak output power was measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels..

After the trace being stable, Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

The spectrum analyzer is set to (Bluetooth):

Center frequency = the highest, middle and the lowest channels

Span = 10 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 3 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 3 MHz (VBW \geq RBW) Detector function = peak

Trace = max hold Sweep = auto

Measurement Data (Bluetooth) : Basic Mode

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	0	6.54	4.51	Complies
2441	39	6.77	4.75	Complies
2480	78	6.69	4.67	Complies

Measurement Data (Bluetooth) : EDR Mode

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2402	0	4.98	3.15	Complies
2441	39	5.02	3.18	Complies
2480	78	4.87	3.07	Complies

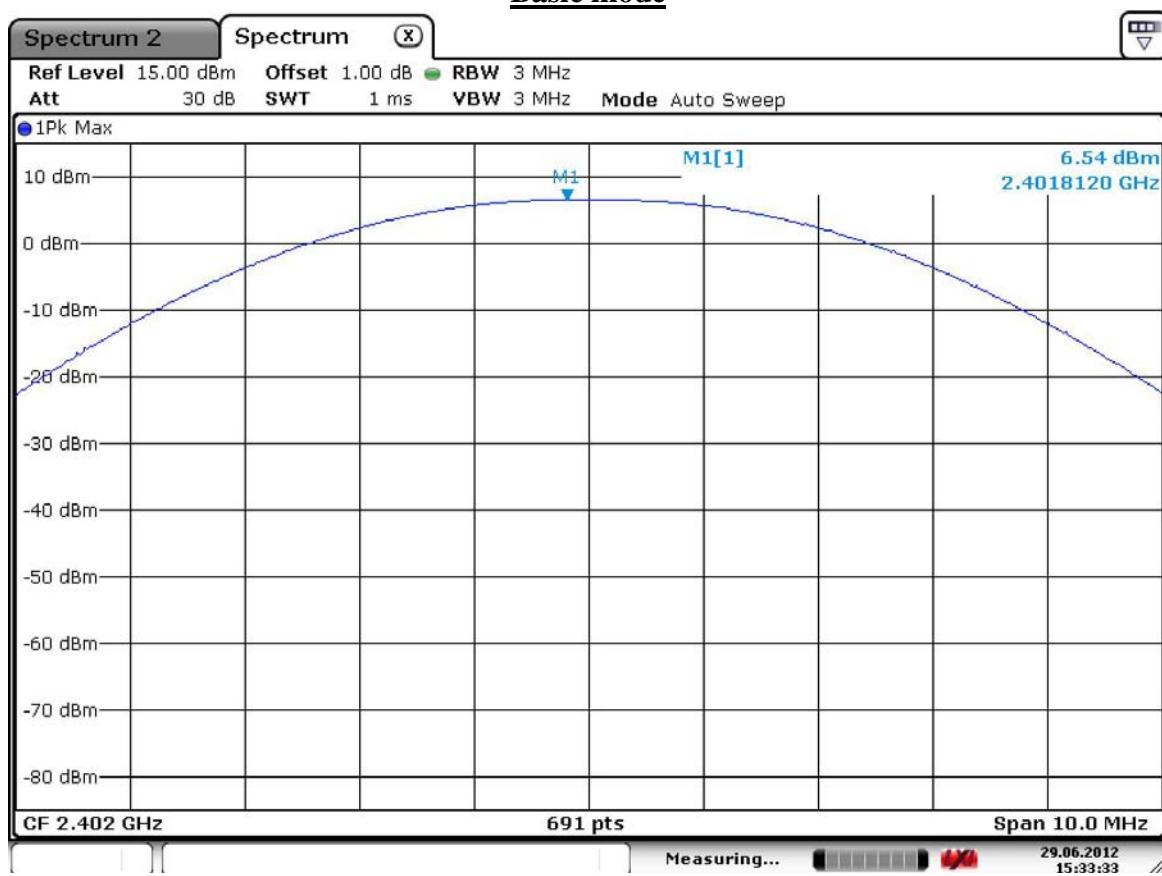
- See next pages for actual measured spectrum plots.

Minimum Standard:	< 250 mW
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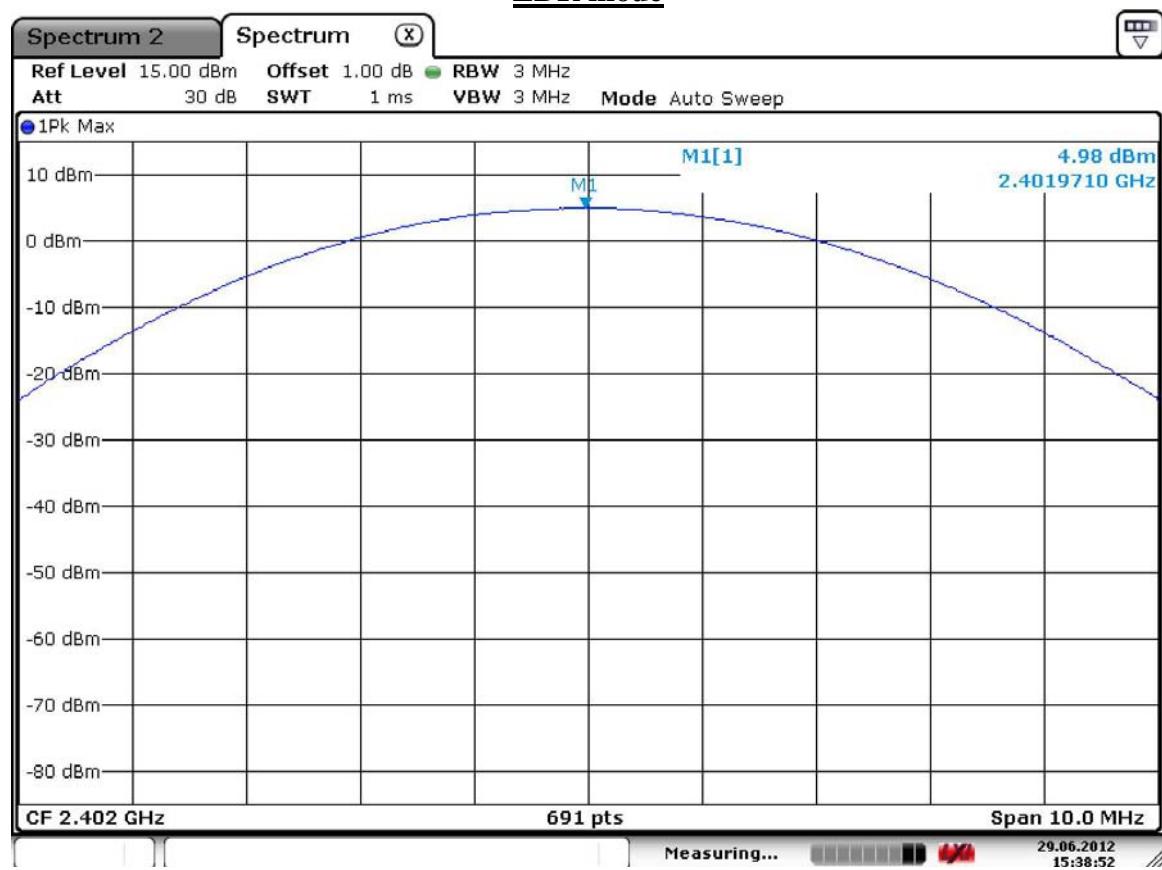
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

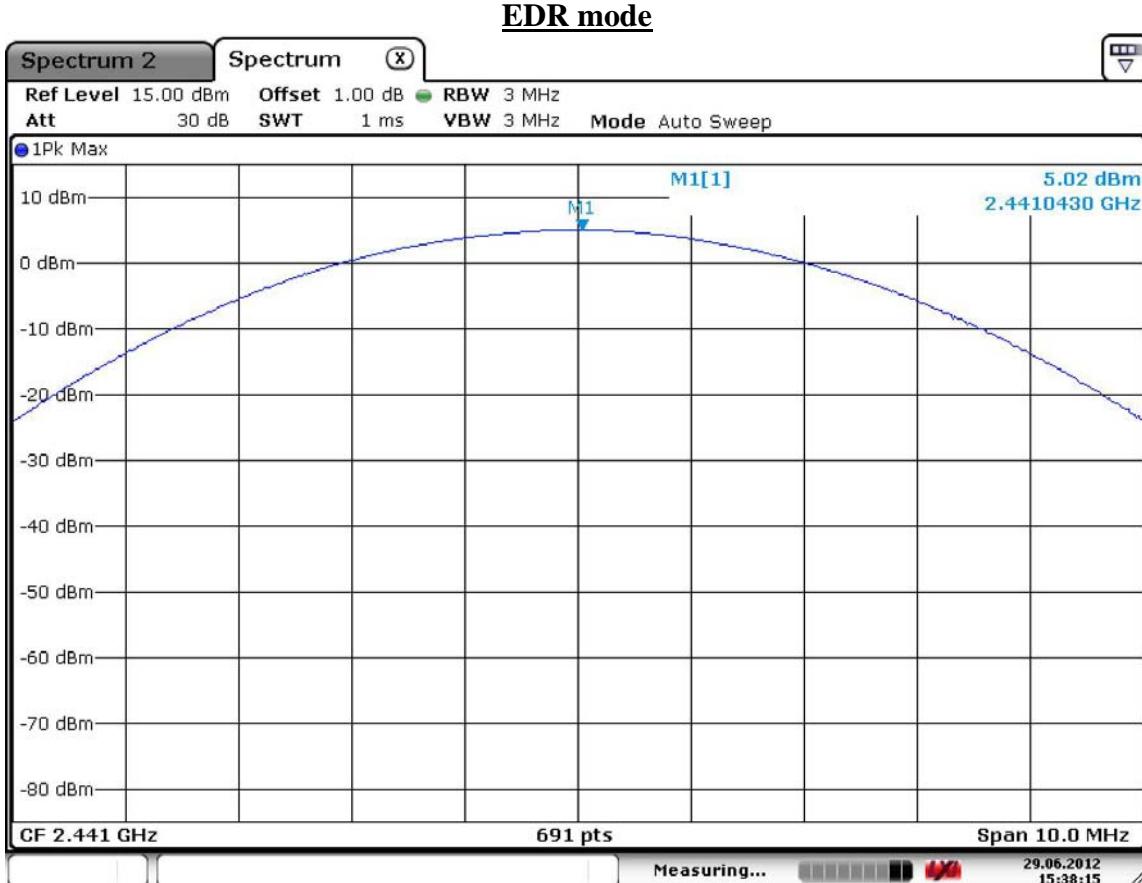
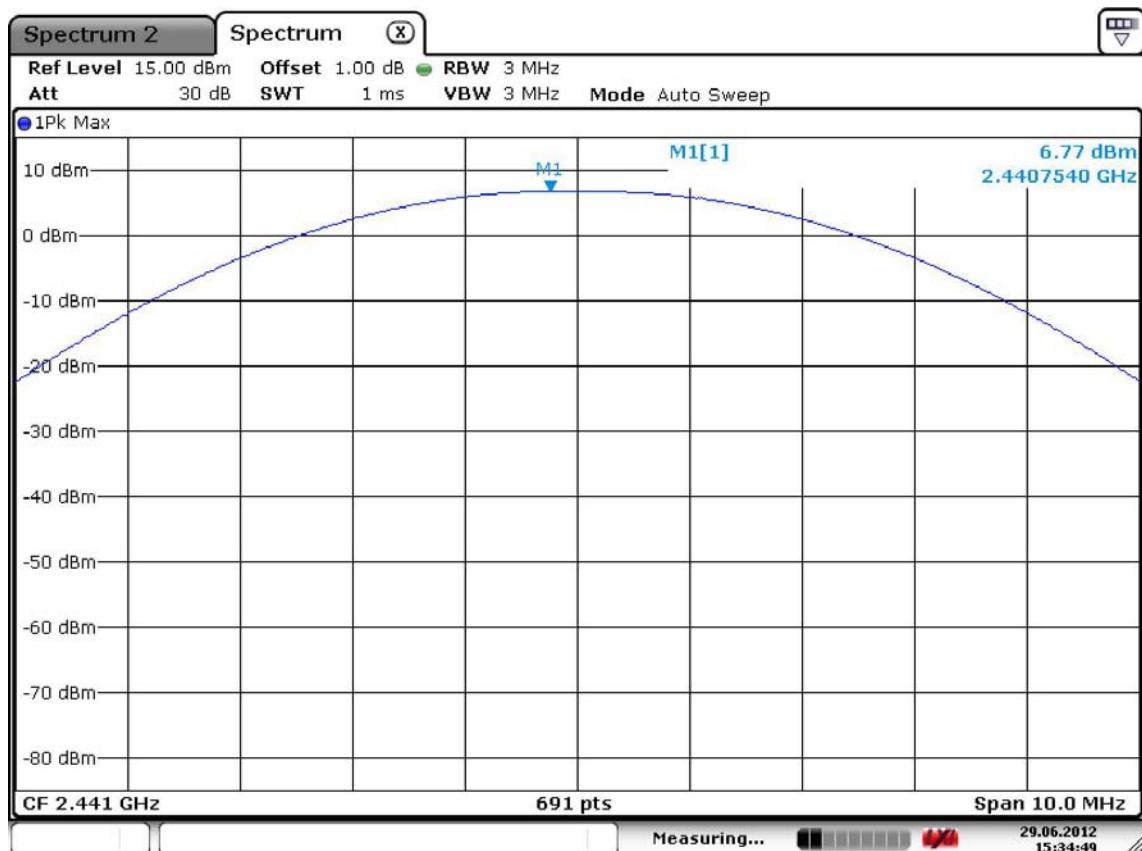
Channel 1 (Bluetooth)
Basic mode



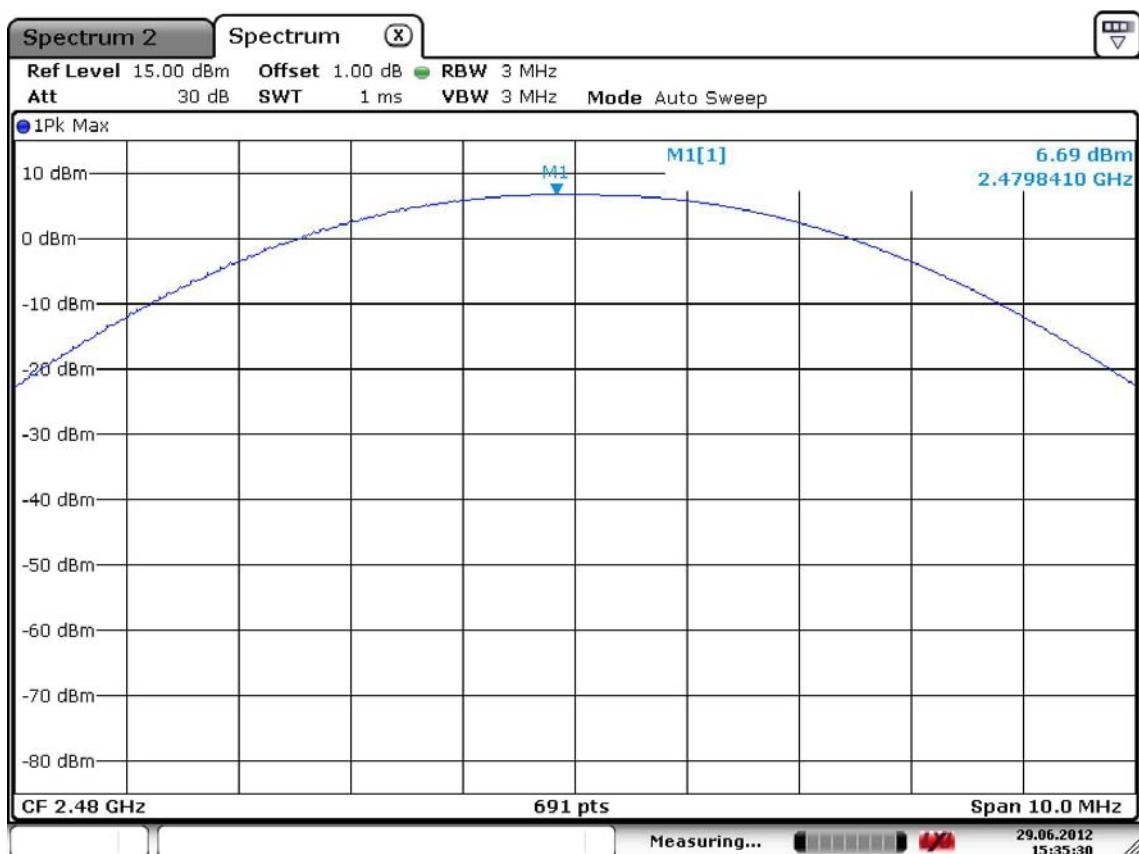
EDR mode



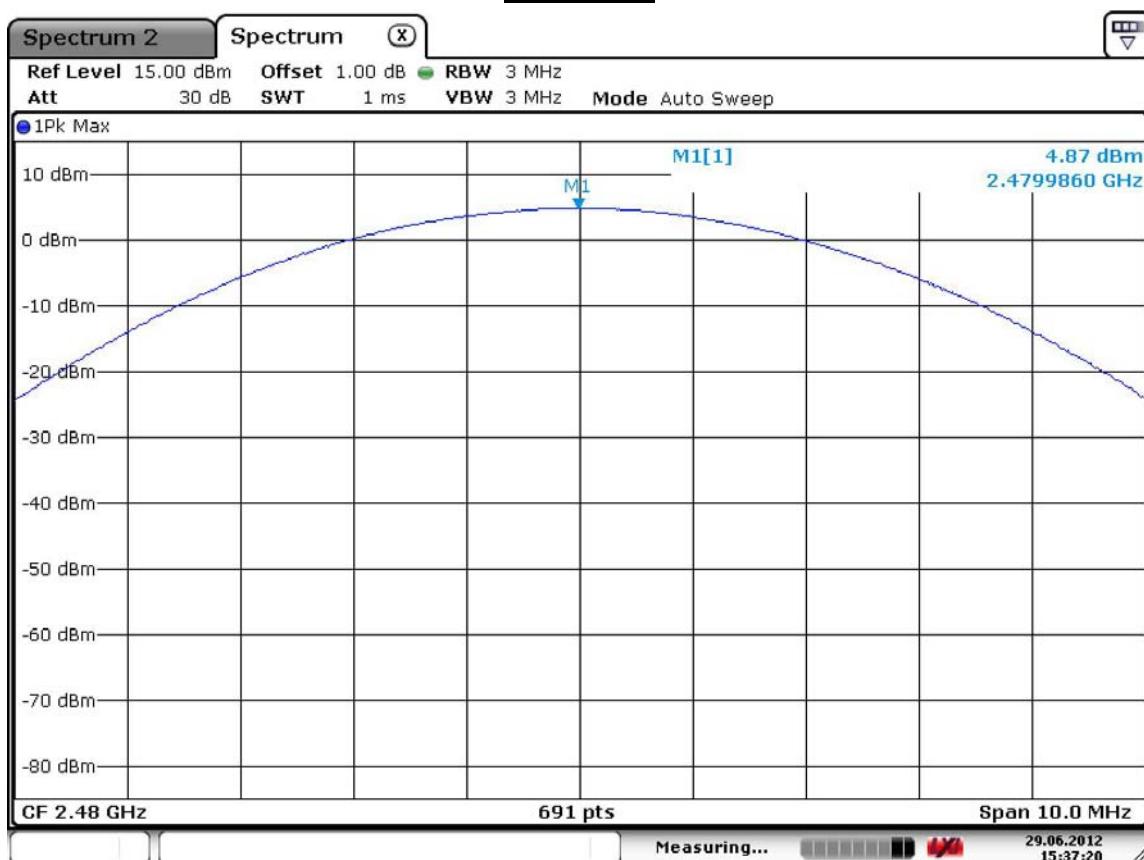
Channel 2 (Bluetooth)
Basic mode



Channel 3 (Bluetooth)
Basic mode



EDR mode



The spectrum analyzer is set to (RFID):

Center frequency = the highest, middle and the lowest channels

Span = 5 MHz (approximately 5 times of the 20 dB bandwidth)

RBW = 1 MHz (greater than the 20dB bandwidth of the emission being measured)

VBW = 1 MHz (VBW \geq RBW)

Detector function = peak

Trace = max hold

Sweep = auto

Measurement Data:

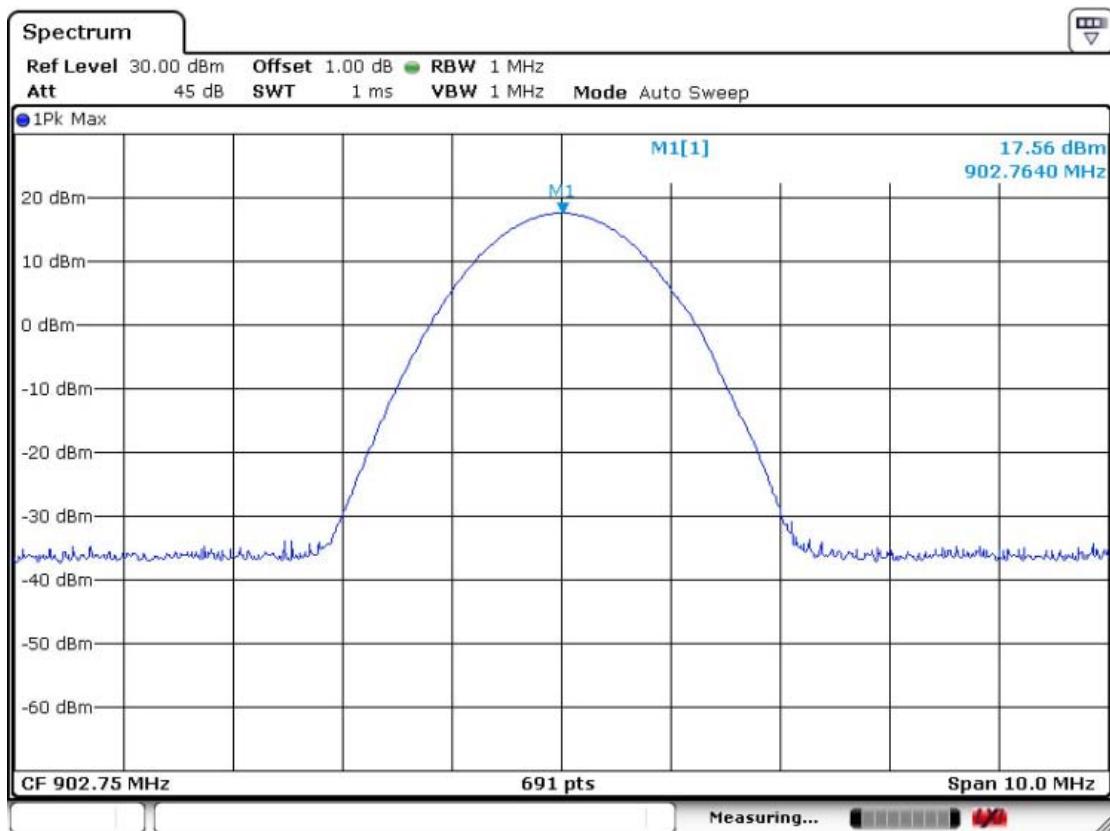
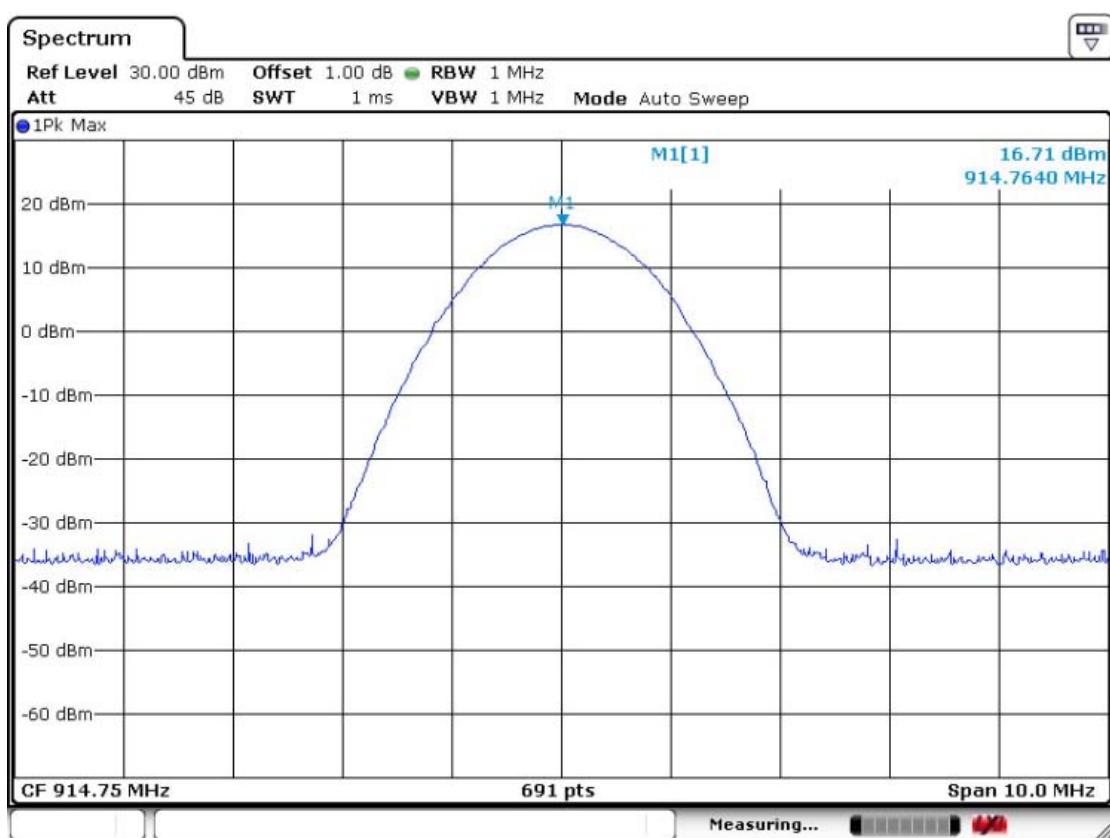
Frequency (MHz)	Test Results		
	dBm	W	Result
902.75	17.56	0.057	Complies
914.75	16.71	0.046	Complies
927.25	16.21	0.041	Complies

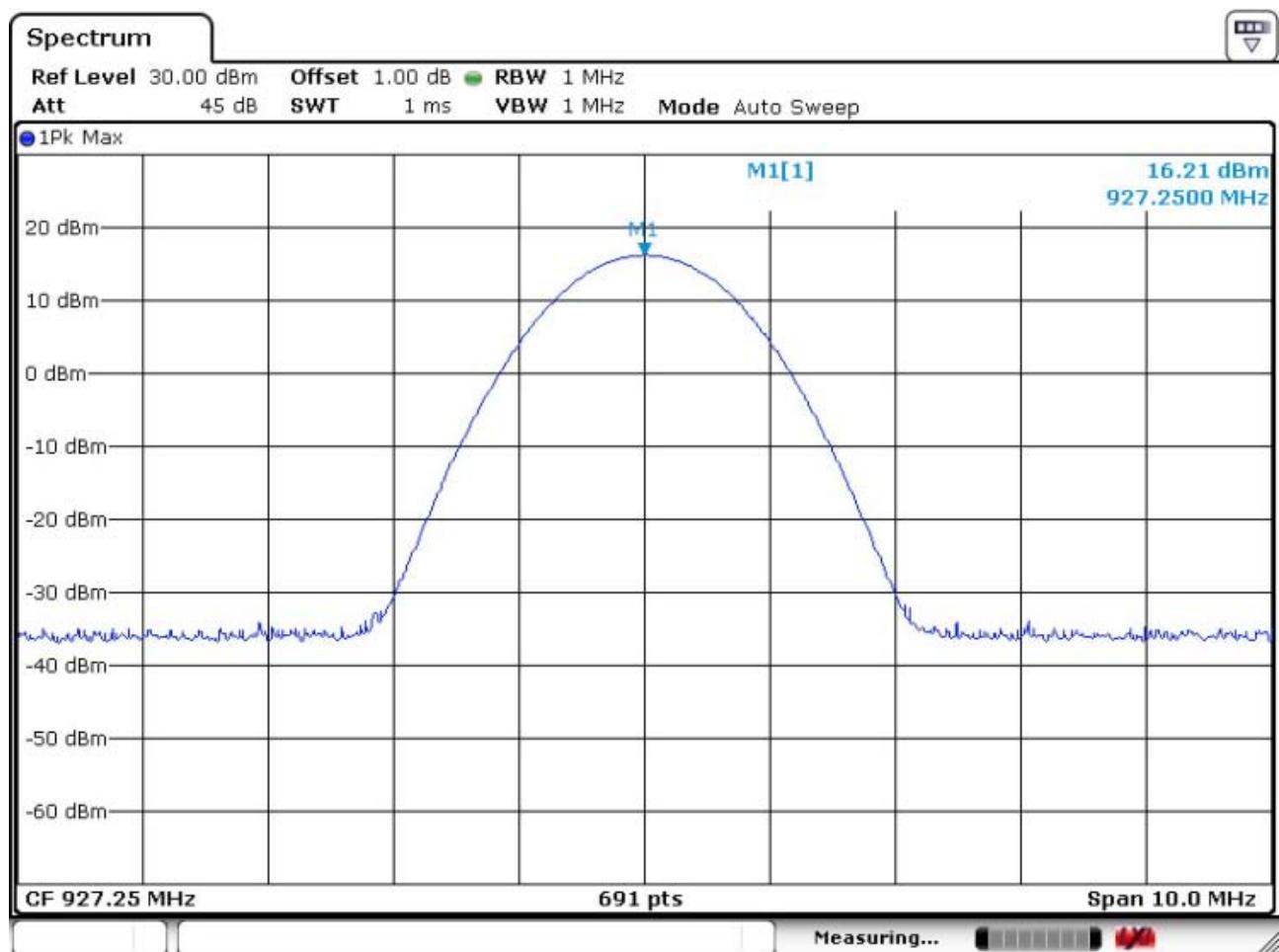
- See next pages for actual measured spectrum plots.

Minimum Standard:	< 1W
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Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Low Channel (RFID)Mid Channel

High Channel

3.3.6 Band Edge

Procedure:

The bandwidth at 20dB down from the highest inband spectral density is measured with a spectrum analyzer connected to the antenna terminal, while EUT had its hopping function disabled at the highest, middle and the lowest available channels.

After the trace being stable, Use the marker-to-peak function to measure 20 dB down both sides of the intentional emission.

The spectrum analyzer is set to:

Center frequency = the highest, middle and the lowest channels

Span = 2~30 MHz Detector function = peak

Trace = max hold Sweep = auto

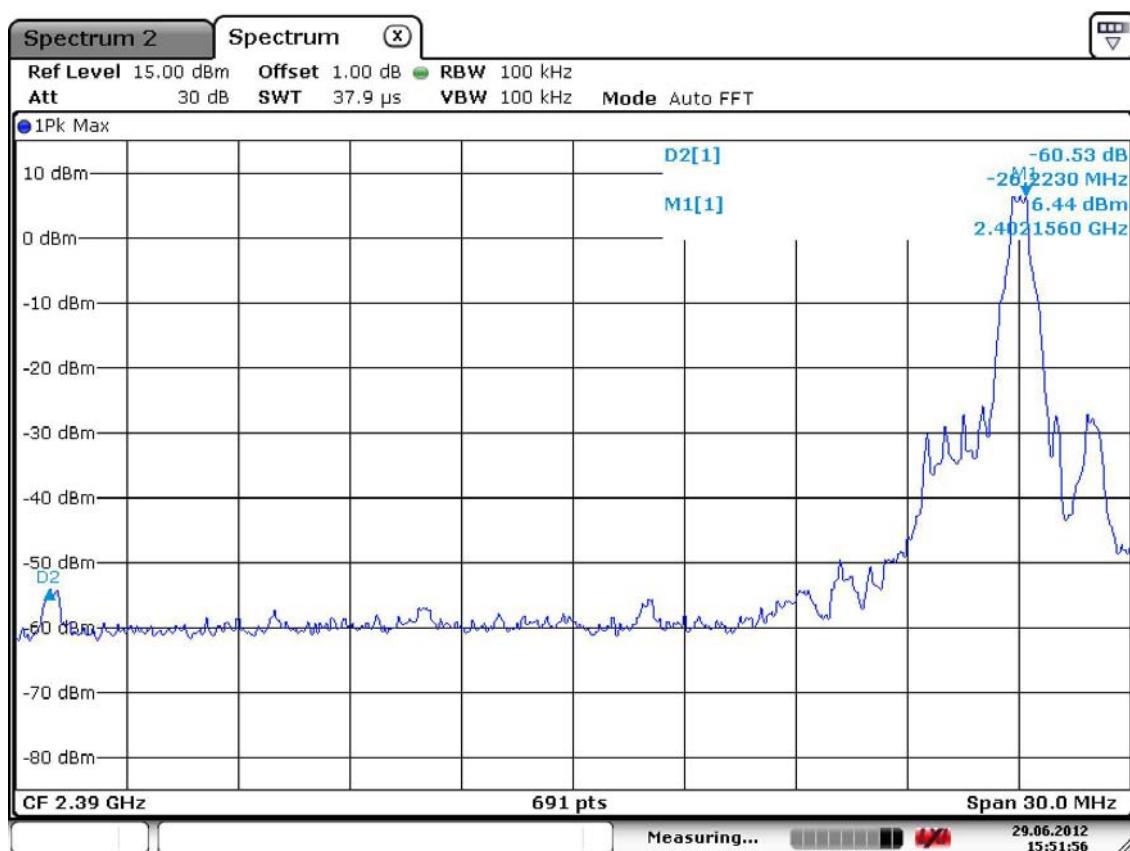
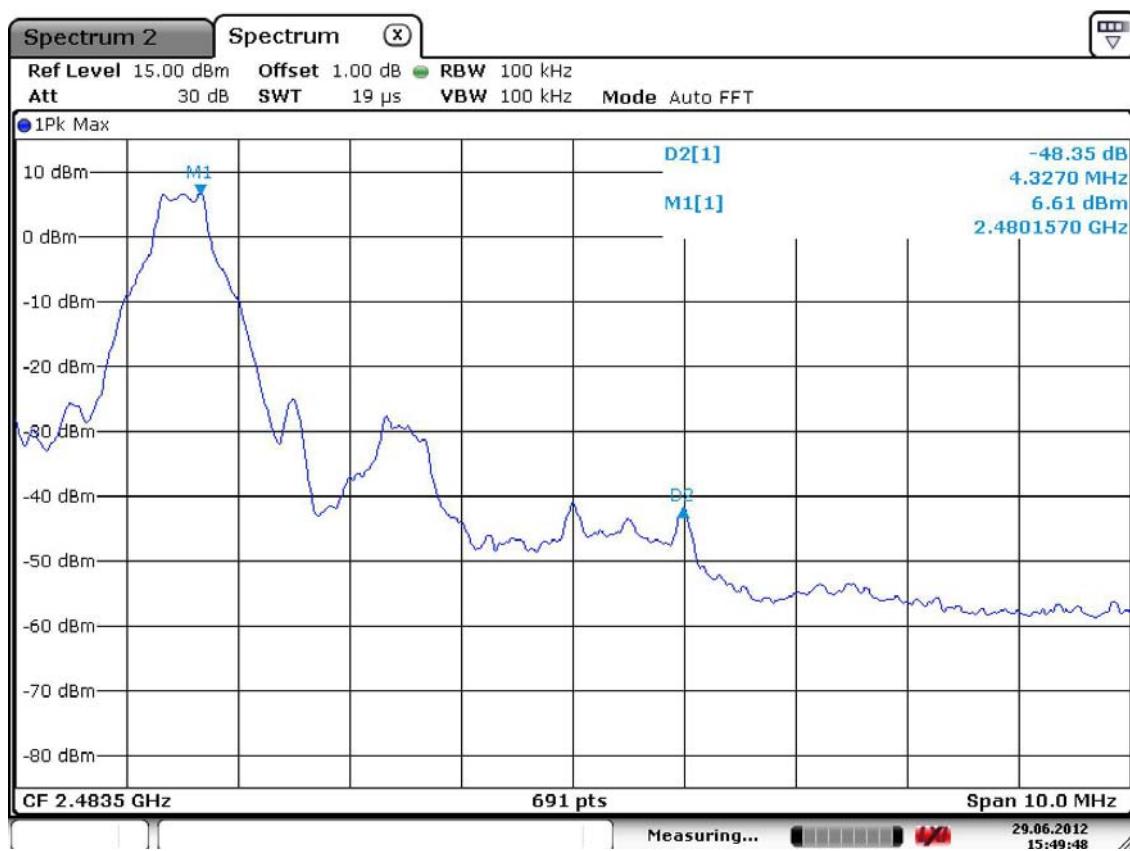
Measurement Data: Complies

- All conducted emission in any 100kHz bandwidth outside of the spread spectrum band was at least 20dB lower than the highest inband spectral density. Therefore the applying equipment meets the requirement.
 - See next pages for actual measured spectrum plots.

Minimum Standard:	> 20 dBc
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Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Band – edge (Bluetooth)Lower edgeUpper edge

Band – edge (RFID)Lower edgeUpper edge

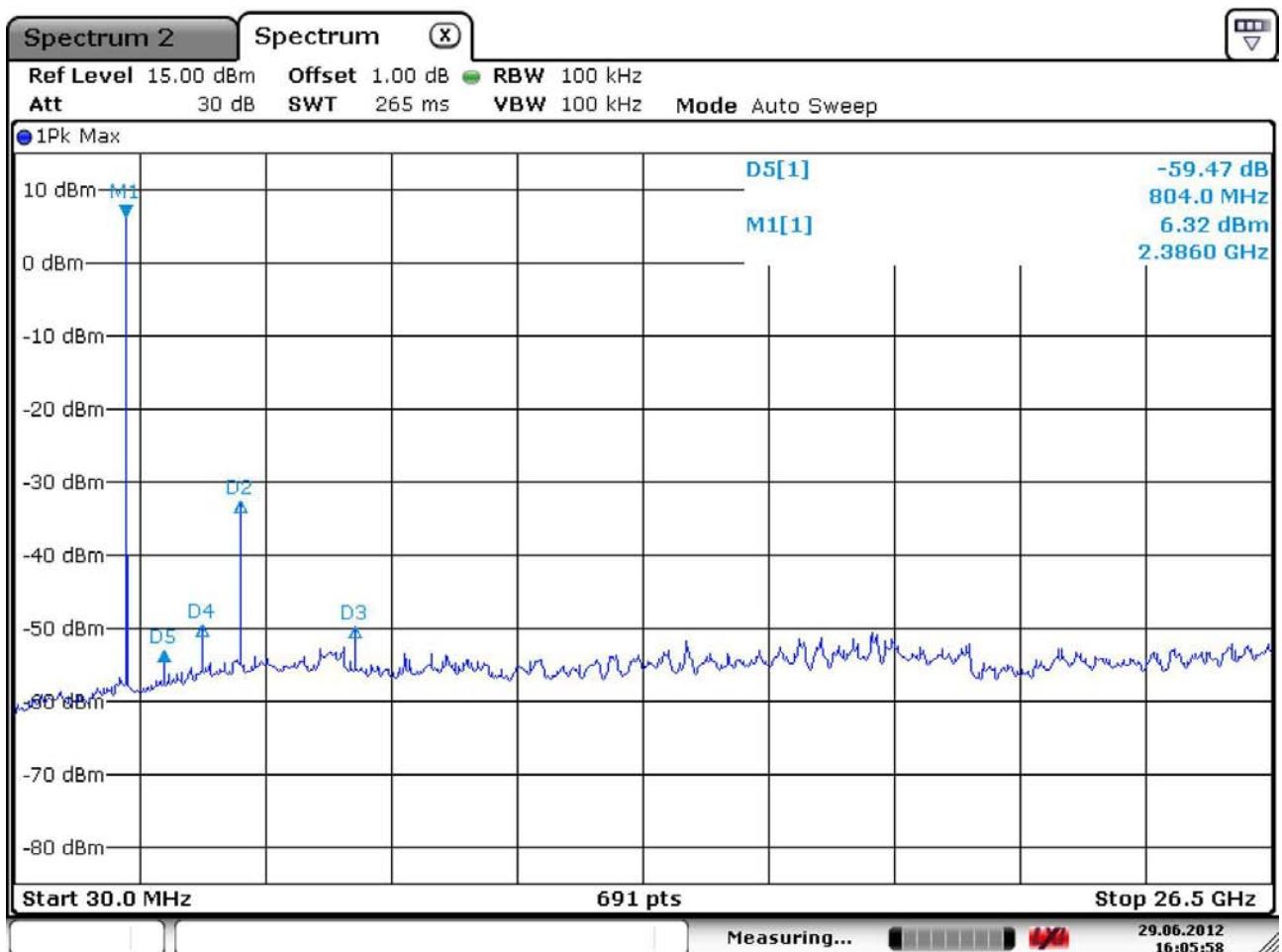
Band-edges in the restricted band 2310-2390 MHz measurement

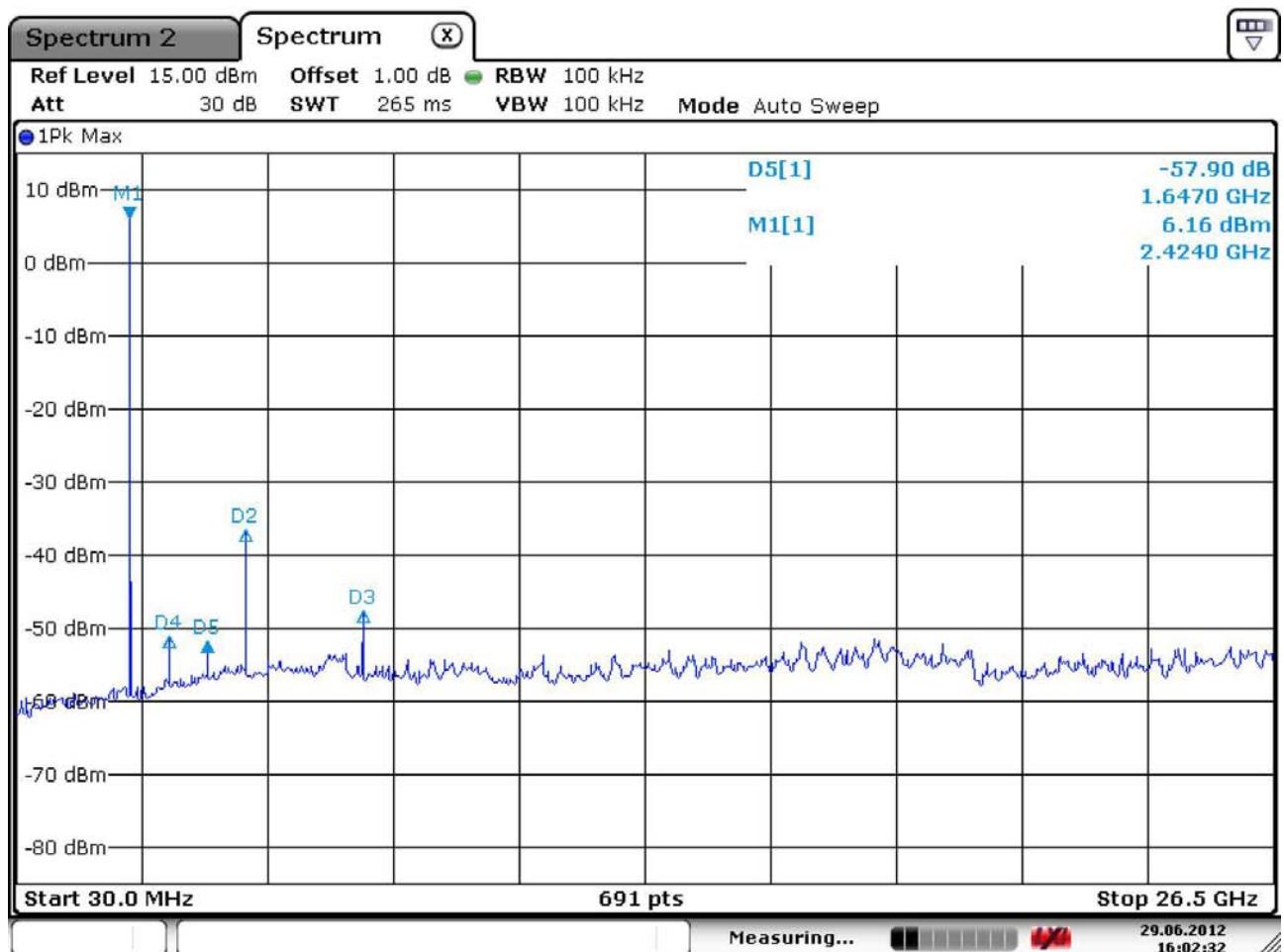
Frequency [MHz]	Reading [dBuV/m]	Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]		
			Antenna	Amp. Gain + Cable Loss	AV / Peak	AV / Peak	AV / Peak	AV / Peak	AV / Peak	AV / Peak	
2389.0	33.2	49.4	V	27.9	27.0	54.0	74.0	34.1	50.3	19.9	23.7

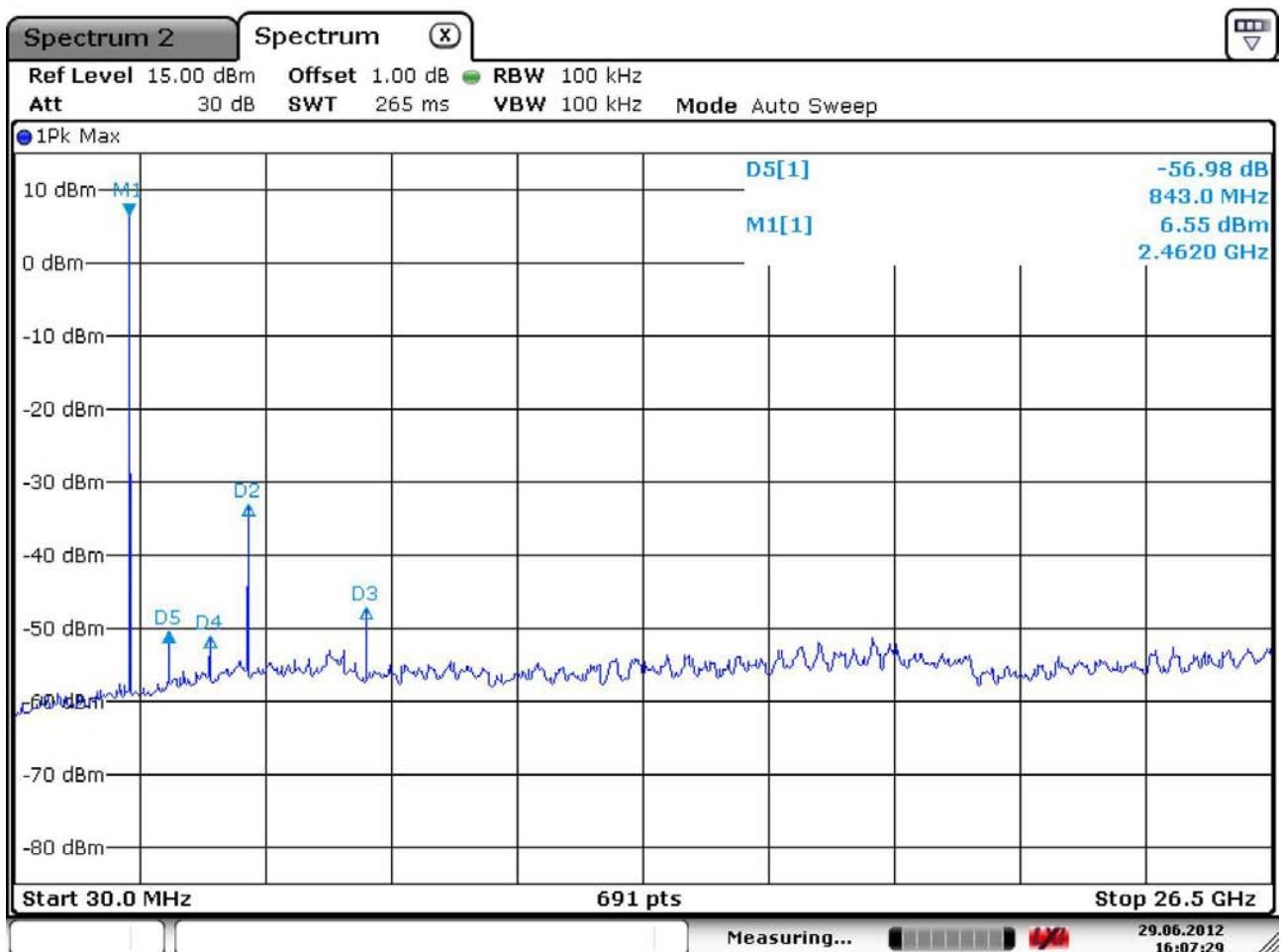
Band-edges in the restricted band 2483.5-2500 MHz measurement

Frequency [MHz]	Reading [dBuV/m]	Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]		
			Antenna	Amp. Gain + Cable Loss	AV / Peak	AV / Peak	AV / Peak	AV / Peak	AV / Peak	AV / Peak	
2494.0	31.1	45.92	V	27.9	27.0	54.0	74.0	32.0	46.8	22.0	27.2

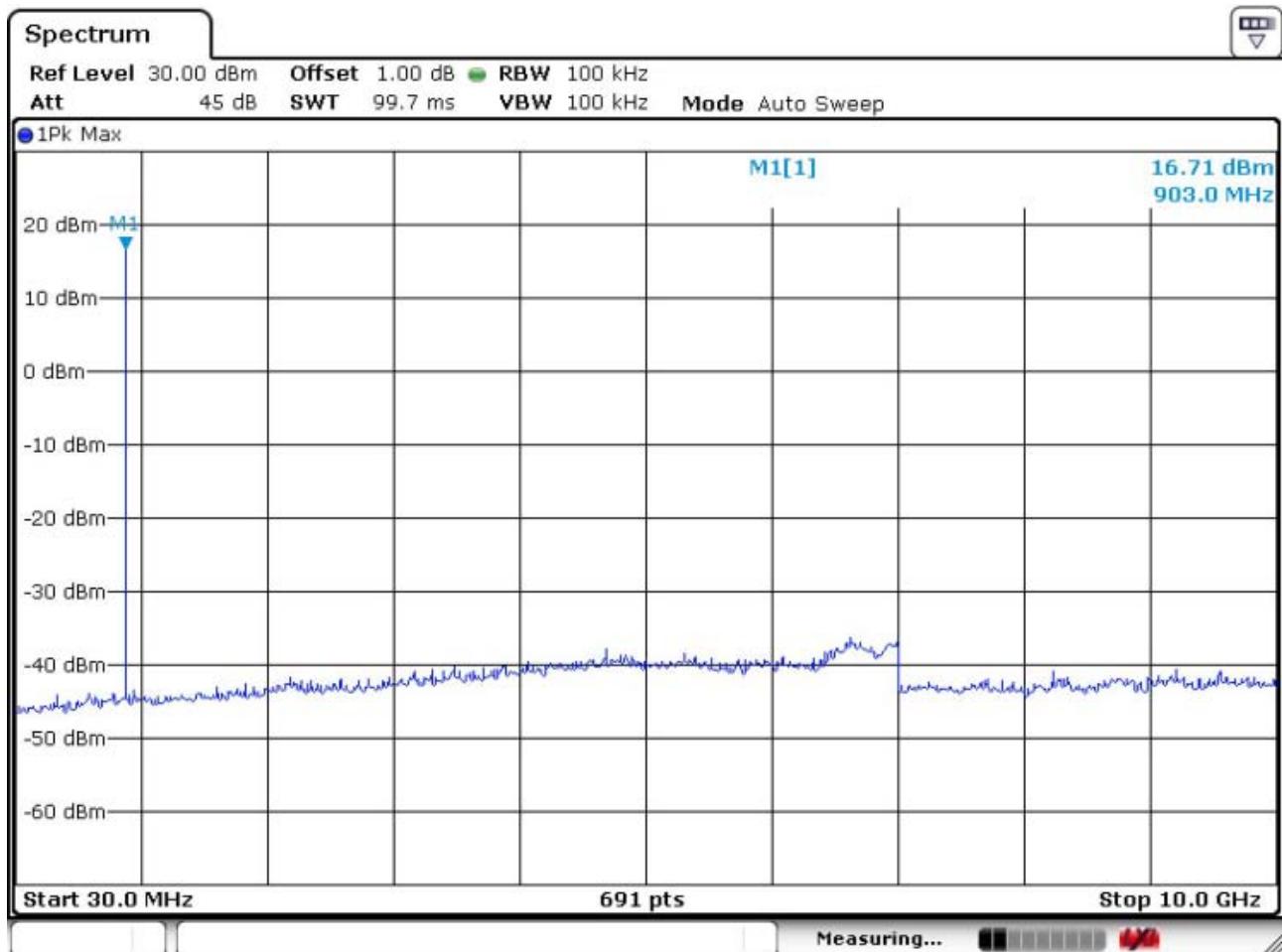
Note : This EUT was tested in 3 orthogonal positions and the worst-case data was presented.

Unwanted Emission (Bluetooth) – Low channelFrequency Range = 30 MHz ~ 26.5 GHz

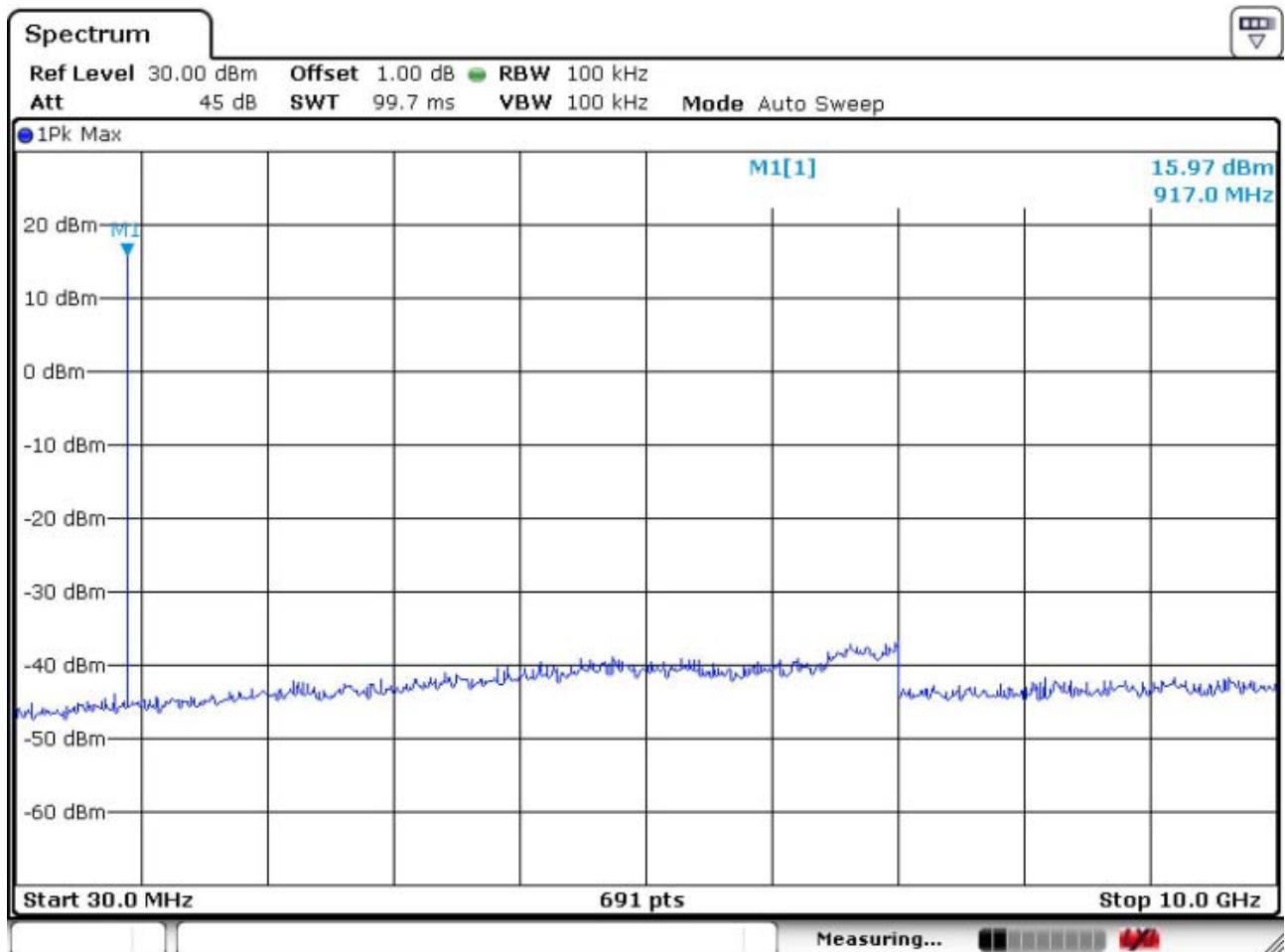
Unwanted Emission (Bluetooth) – Middle channelFrequency Range = 30 MHz ~ 26.5 GHz

Unwanted Emission (Bluetooth) – High channelFrequency Range = 30 MHz ~ 26.5 GHz

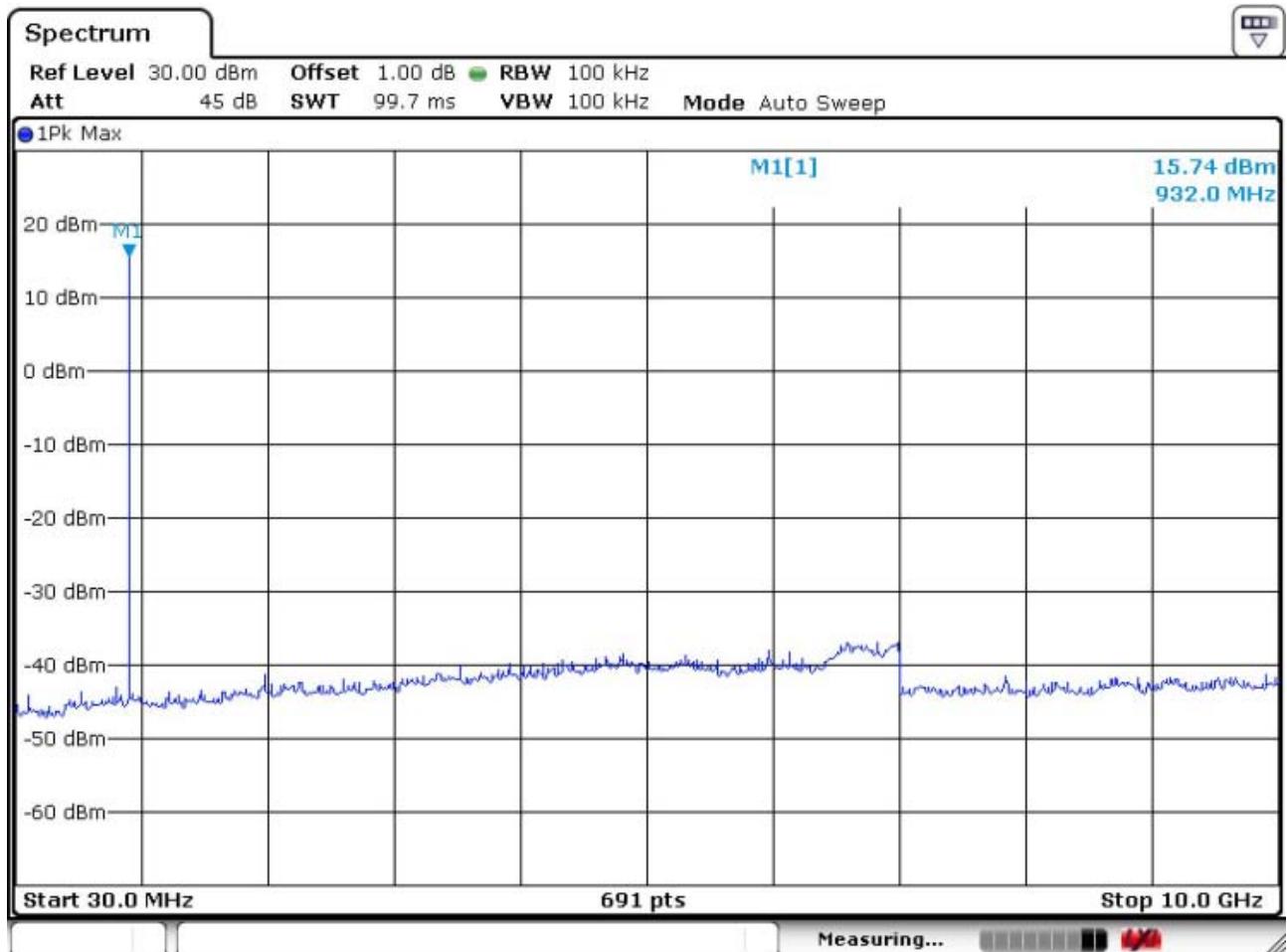
Unwanted Emission (RFID) – Low channel
Frequency Range = 30 MHz ~ 10th harmonic.



Unwanted Emission (RFID) – Middle channel
Frequency Range = 30 MHz ~ 10th harmonic.



Unwanted Emission (RFID) – High channel
Frequency Range = 30 MHz ~ 10th harmonic.



3.3.7 Field Strength of Harmonics - Transmitter

Procedure:

Radiated emissions from the EUT were measured according to the dictates of DA000705. The EUT was placed on a 0.8m high wooden table inside a shielded enclosure. An antenna was placed near the EUT and measurements of frequencies and amplitudes of field strengths were recorded for reference during final measurements. For final radiated testing, measurements were performed in OATS. Measurements were performed with the EUT oriented in 3 orthogonal axis and rotated 360 degrees to determine worst-case orientation for maximum emissions.

- (a) In the frequency range of 9kHz to 30 MHz, magnetic field is measured with Loop Test Antenna. The Test Antenna is positioned with its plane vertical at 1m distance from the EUT. The center of the Loop Test Antenna is 1m above the ground. During the measurement the Loop Test Antenna rotates about its vertical axis for maximum response at each azimuth about the EUT.
- (b) In the frequency range above 30MHz, Bi-Log Test Antenna (30MHz to 1GHz) and Horn Test Antenna (above 1GHz) are used. Test Antenna is 3m away from the EUT. Test Antenna height is carried from 1m to 4m above the ground to determine the maximum value of the field strength. The emission levels at both horizontal and vertical polarizations should be tested.

The spectrum analyzer is set to:

Center frequency = the worst channel

Frequency Range = 10 MHz ~ 10th harmonic.

RBW = 100 kHz (10MHz ~ 1 GHz)

VBW \geq RBW

= 1 MHz (1 GHz ~ 10th harmonic)

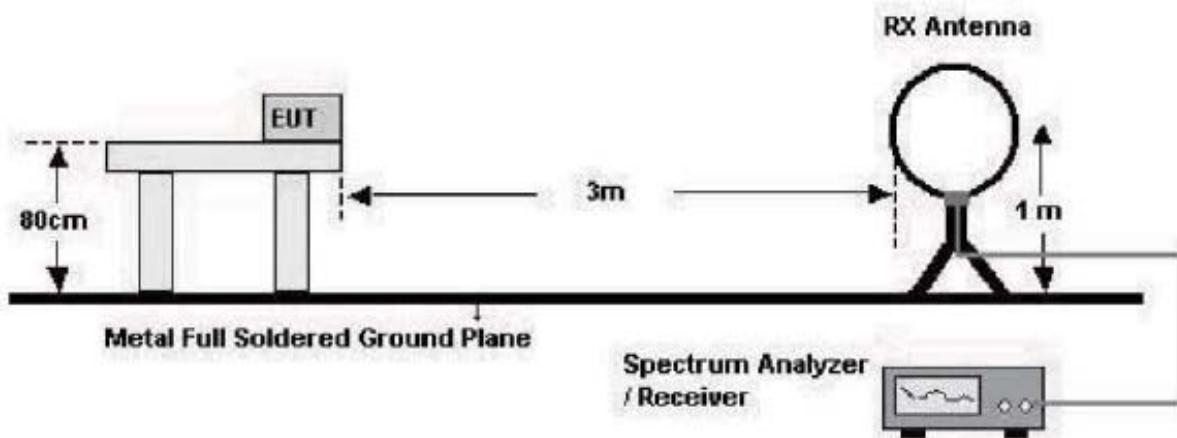
Span = 100 MHz

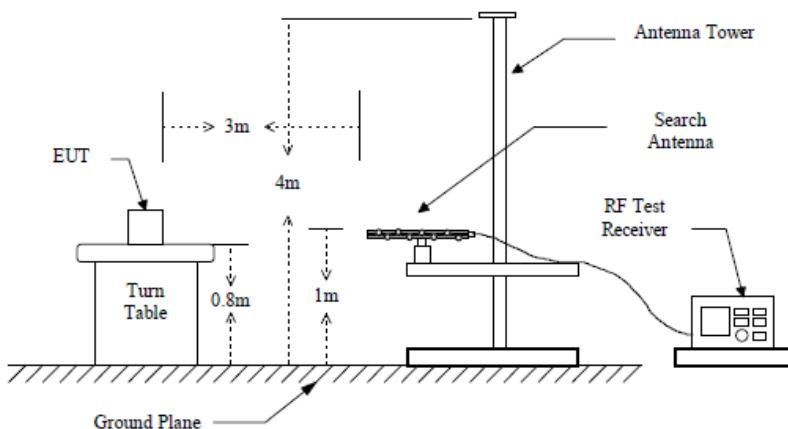
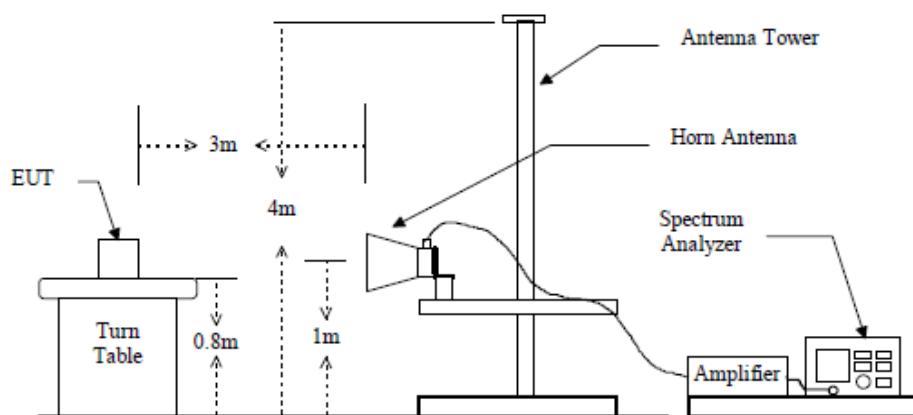
Detector function = peak

Trace = max hold

Sweep = auto

below 30MHz



below 1GHz (30MHz to 1GHz)**above 1GHz****Measurement Data: Complies**

- See next pages for actual measured data.
- No other emissions were detected at a level greater than 20dB below limit include from 9KHz to 30MHz.

Minimum Standard: FCC Part 15.209(a)

Frequency (MHz)	Limit (uV/m) @ 3m
0.009 ~ 0.490	2400/F(kHz) (@ 300m)
0.490 ~ 1.705	24000/F(kHz) (@ 30m)
1.705 ~ 30	30(@ 30m)
30 ~ 88	100 **
88 ~ 216	150 **
216 ~ 960	200 **
Above 960	500

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88MHz, 174-216MHz or 470-806MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

Measurement Data (Bluetooth) :

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		D.C.F	Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV	Peak		Antenna	Amp.Gain+Cable		AV/Peak	AV/Peak	AV/Peak	AV/Peak	AV / Peak	AV / Peak
4804	45.76	53.06	V	29.8	21.6	-30.21	54.0	74.0	23.8	31.1	30.2	42.9
4881	38.78	45.15	V	29.8	21.6	-30.21	54.0	74.0	16.8	23.2	37.2	50.8
4960	43.5	49.83	V	29.8	21.6	-30.21	54.0	74.0	21.5	27.9	32.5	46.2

- No other emissions were detected at a level greater than 20dB below limit.

- D.C.F (Duty Cycle Correction Factor) = $20\log(\text{The worst Case DWELL Time}/100\text{ms})$

$$= 20\log(3.087\text{ms}/100\text{ms}) = -30.21$$

Measurement Data (RFID) :

Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV	Peak		Antenna	Amp.Gain+Cable	AV	Peak	AV	Peak	AV	Peak
1864	35.75	49.19	V	25.1	23.8	54.0	74.0	37.1	50.5	16.9	23.5
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV	Peak		Antenna	Amp.Gain+Cable	AV	Peak	AV	Peak	AV	Peak
1864	35.94	49.58	V	25.1	23.8	54.0	74.0	37.3	50.9	16.7	23.1
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV	Peak		Antenna	Amp.Gain+Cable	AV	Peak	AV	Peak	AV	Peak
1865	36.66	50.33	V	25.1	23.8	54.0	74.0	38.0	51.7	16.0	22.3
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-	-	-

- No other emissions were detected at a level greater than 20dB below limit.

Radiated Emissions – BT + Charging mode

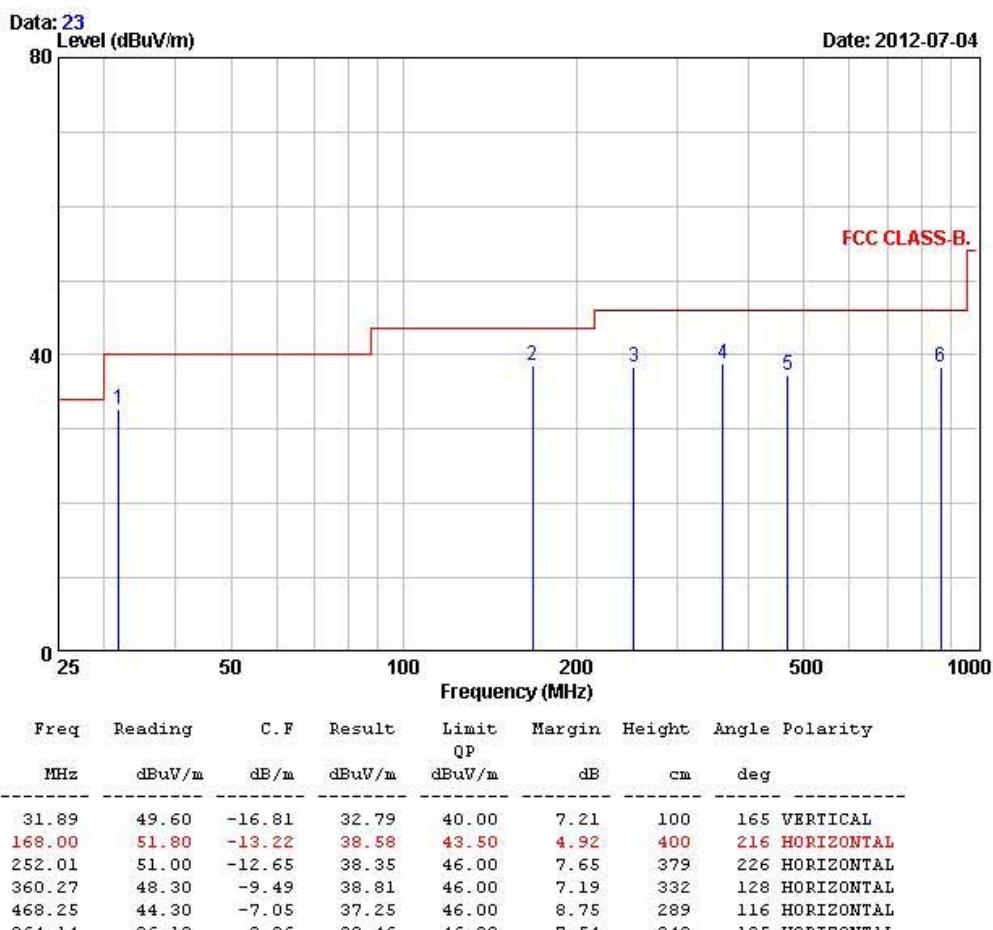
243 Jibug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel. +82-31-3236008,9
Fax. +82-31-3236010

EUT/Model No.: SM-R400

TEST MODE: BT+Charging mode

Temp Humi : 26 / 45

Tested by: PARK H W



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

Radiated Emissions – RFID + Charging mode

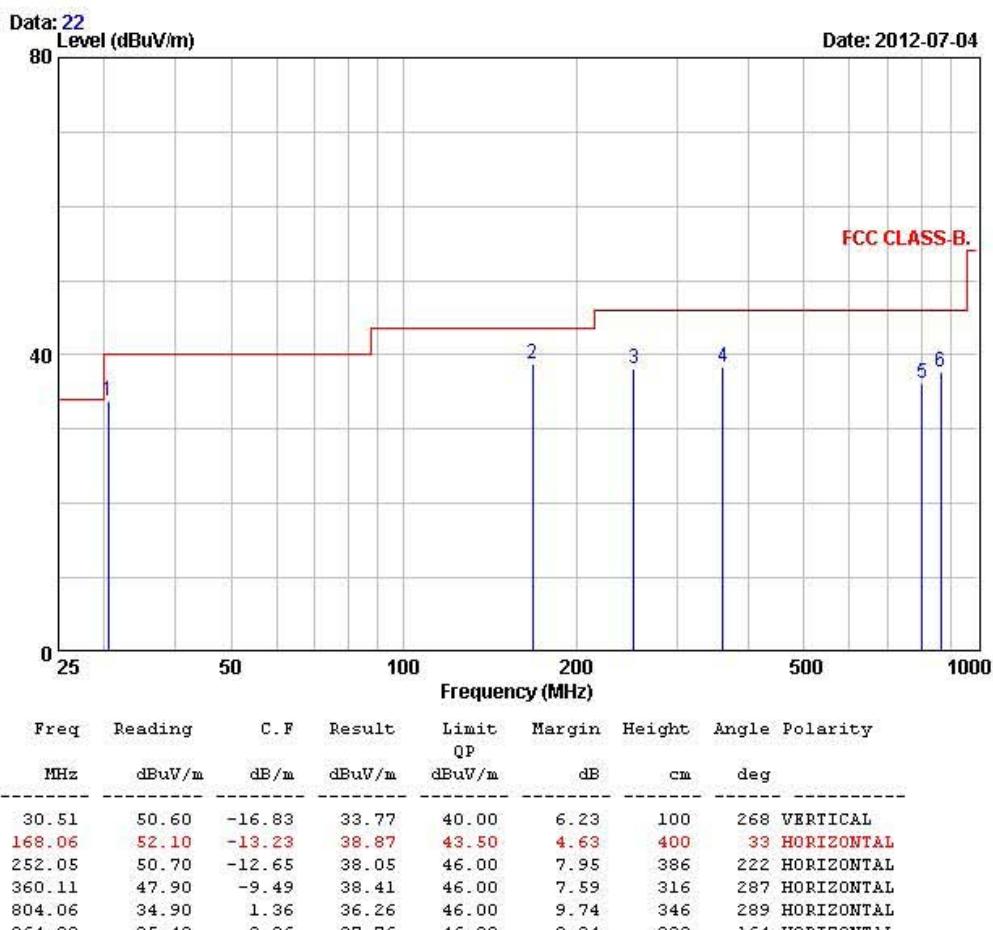
243 Jibug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel. +82-31-3236008,9
Fax. +82-31-3236010

EUT/Model No.: SM-R400

TEST MODE: RFID+Charging mode

Temp Humi : 26 / 45

Tested by: PARK H W



Remarks: C.F (Correction Factor) = Antenna factor + Cable loss - Preamp gain

3.3.8 AC Conducted Emissions

Procedure:

AC power line conducted emissions from the EUT were measured according to the dictates of ANSI C63.4:2003. The conducted emissions are measured in the shielded room with a spectrum analyzer in peak hold. While the measurement, EUT had its hopping function disabled at the middle channels in line with Section 15.31(m). Emissions closest to the limit are measured in the quasi-peak mode (QP) with the tuned receiver using a bandwidth of 9 kHz. The emissions are maximized further by cable manipulation and Exerciser operation. The highest emissions relative to the limit are listed.

Measurement Data: **Complies**

- Refer to the next page.
- No other emissions were detected at a level greater than 20dB below limit
- It gave the worse case emissions

Minimum Standard: FCC Part 15.207(a)/EN 55022

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

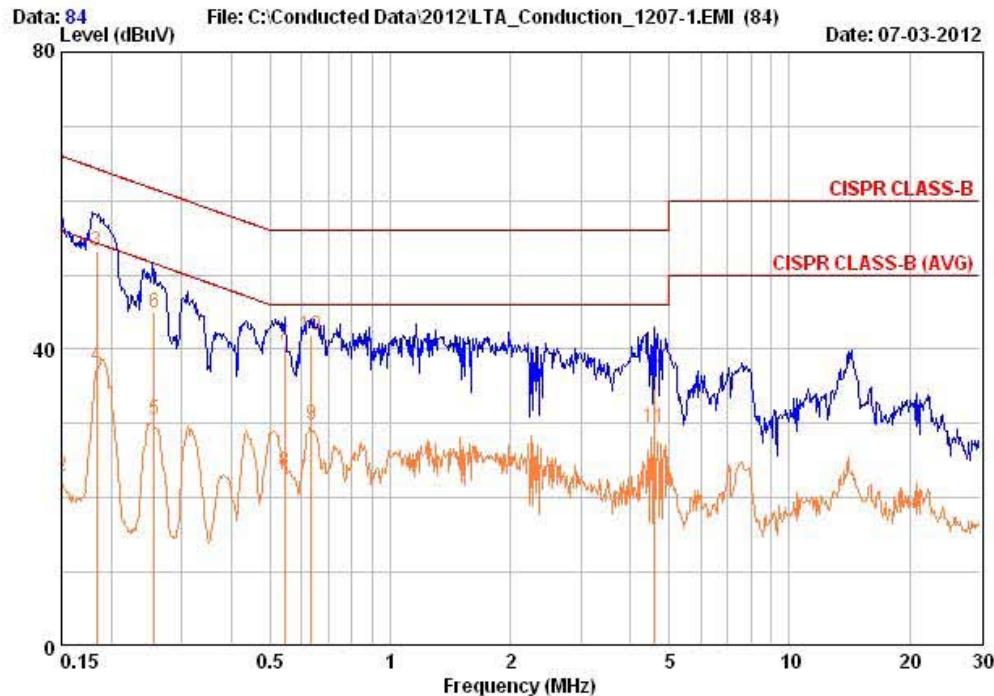
* Note: The limits will decrease with the frequency logarithmically within 0.15MHz to 0.5MHz

Radiated Emissions – BT + Charging LINE

243 Jubug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel :+82-31-3236008,9
Fax :+82-31-3236010

EUT / Model No. : SM-R400 Phase : LINE

Test Mode : BT+Charging mode Test Power : 120 / 60
Temp./Humi. : 24 / 43 Test Engineer : PARK.H.W



Freq MHz	RD QP		RD AV		C. F dB	Result dBuV	Result QP		Result AV		Limit QP	Limit dBuV	Margin QP	Margin dB
	dBuV	dBuV	dBuV	dBuV			dBuV	dBuV	dBuV	dBuV				
0.150	38.04	13.24	9.67	47.71	47.71	22.91	66.00	56.00	56.00	18.29	33.09			
0.184	43.64	28.04	9.63	53.27	53.27	37.67	64.30	54.30	54.30	11.03	16.63			
0.256	35.33	21.03	9.57	44.90	44.90	30.60	61.56	51.56	51.56	16.66	20.96			
0.544	31.02	13.82	9.62	40.64	40.64	23.44	56.00	46.00	46.00	15.36	22.56			
0.634	32.22	20.32	9.65	41.87	41.87	29.97	56.00	46.00	46.00	14.13	16.03			
4.580	27.75	19.75	9.72	37.47	37.47	29.47	56.00	46.00	46.00	18.53	16.53			

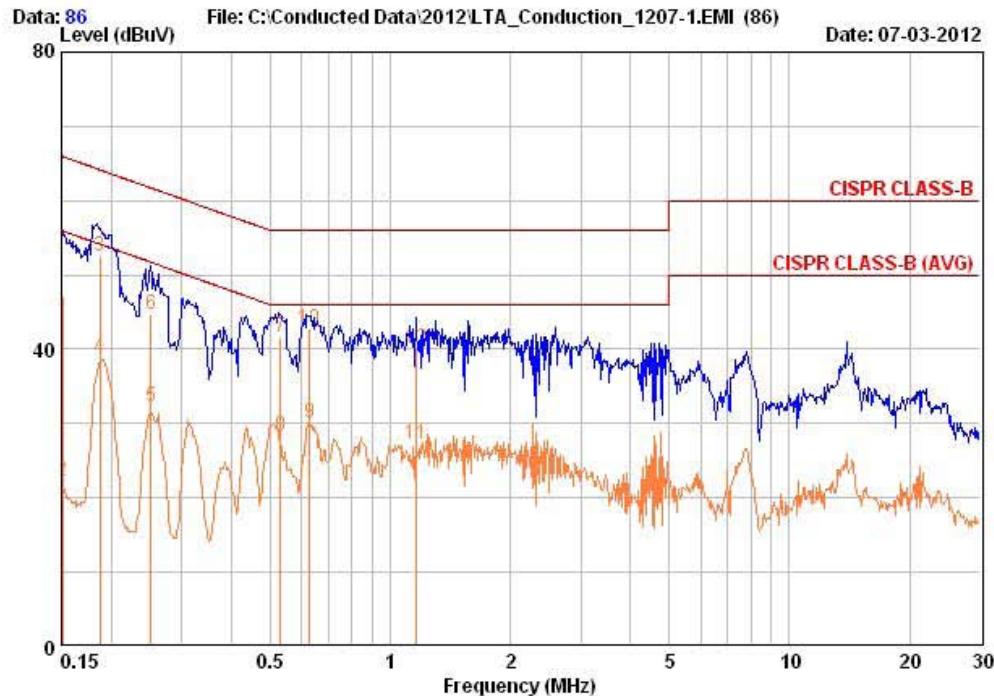
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

Radiated Emissions – BT + Charging NEUTRAL

243 Jubug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel :+82-31-3236008,9
Fax :+82-31-3236010

EUT / Model No. : SM-R400 Phase : NEUTRAL

Test Mode : BT+Charging mode Test Power : 120 / 60
Temp./Humi. : 24 / 43 Test Engineer : PARK.H.W



Freq MHz	RD QP		RD AV		C. F dB	Result dBuV	Result QP		Result AV		Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB						
	dBuV	dBuV	dBuV	dBuV			dBuV	dBuV	dBuV	dBuV										
0.151	37.54	12.74	9.60	47.14	47.14	22.34	65.94	55.94	55.94	18.81	55.94	55.94	18.81	33.61						
0.187	42.94	29.34	9.53	52.47	52.47	38.87	64.17	54.17	54.17	11.70	64.17	54.17	11.70	15.30						
0.251	35.03	22.53	9.66	44.69	44.69	32.19	61.72	51.72	51.72	17.04	61.72	51.72	17.04	19.54						
0.530	32.02	18.62	9.68	41.70	41.70	28.30	56.00	46.00	46.00	14.30	56.00	46.00	14.30	17.70						
0.628	33.02	20.52	9.62	42.64	42.64	30.14	56.00	46.00	46.00	13.36	56.00	46.00	13.36	15.86						
1.163	30.53	17.53	9.65	40.18	40.18	27.18	56.00	46.00	46.00	15.82	56.00	46.00	15.82	18.82						

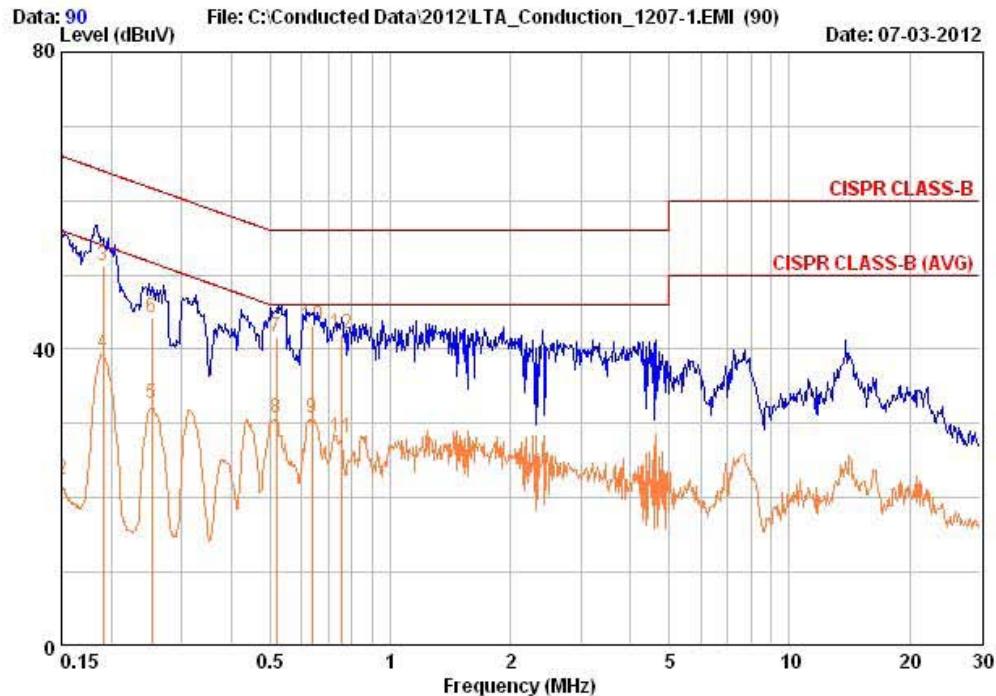
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

Radiated Emissions – RFID + Charging LINE

243 Jubug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel :+82-31-3236008,9
Fax :+82-31-3236010

EUT / Model No. : SM-R400 Phase : LINE

Test Mode : RFID+Charging mode Test Power : 120 / 60
Temp./Humi. : 24 / 43 Test Engineer : PARK.H.W



Freq MHz	RD QP		RD AV		C. F dB	Result dBuV	Result dBuV	Limit QP		Limit AV		Margin dB	Margin dB					
	dBuV	dBuV	dB	dBuV				dBuV	dBuV	dBuV	dB							
0.150	37.24	12.74	9.67	46.91	22.41	66.00	56.00	56.00	56.00	19.09	33.59							
0.191	41.54	29.74	9.62	51.16	39.36	63.99	53.99	53.99	53.99	12.83	14.63							
0.252	34.73	23.03	9.57	44.30	32.60	61.69	51.69	51.69	51.69	17.39	19.09							
0.519	32.12	21.02	9.62	41.74	30.64	56.00	46.00	46.00	46.00	14.26	15.36							
0.637	33.42	21.02	9.65	43.07	30.67	56.00	46.00	46.00	46.00	12.93	15.33							
0.755	32.32	18.52	9.67	41.99	28.19	56.00	46.00	46.00	46.00	14.01	17.81							

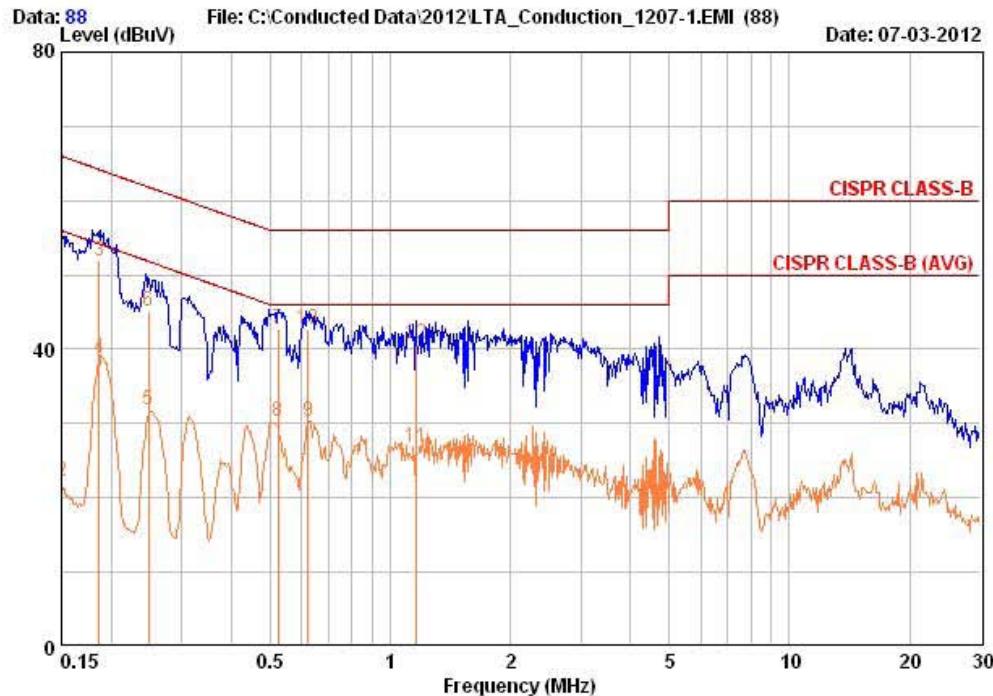
Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

Radiated Emissions -RFID+ Charging NEUTRAL

243 Jubug-ri, yangji-Myeon, Youngin-si,
Gyeonggi-do 449-822 Korea
Tel :+82-31-3236008,9
Fax :+82-31-3236010

EUT / Model No. : SM-R400 Phase : NEUTRAL

Test Mode : RFID+Charging mode Test Power : 120 / 60
Temp./Humi. : 24 / 43 Test Engineer : PARK.H.W



Freq MHz	RD QP		RD AV		C. F dB	Result dBuV	Result QP		Result AV		Limit QP dBuV	Limit AV dBuV	Margin QP dB	Margin AV dB						
	dBuV	dBuV	dBuV	dBuV			dBuV	dBuV	dBuV	dBuV										
0.150	37.24	12.54	9.60	46.84	46.84	46.84	22.14	66.00	56.00	56.00	19.16	33.86								
0.186	42.24	29.34	9.53	51.77	51.77	51.77	38.87	64.21	54.21	54.21	12.44	15.34								
0.248	35.53	22.23	9.65	45.18	45.18	45.18	31.88	61.82	51.82	51.82	16.64	19.94								
0.523	33.02	20.52	9.68	42.70	42.70	42.70	30.20	56.00	46.00	46.00	13.30	15.80								
0.621	33.02	20.62	9.62	42.64	42.64	42.64	30.24	56.00	46.00	46.00	13.36	15.76								
1.166	31.03	17.23	9.65	40.68	40.68	40.68	26.88	56.00	46.00	46.00	15.32	19.12								

Remarks: C.F (Correction Factor) = Insertion loss + Cable loss

APPENDIX

TEST EQUIPMENT USED FOR TESTS

	Description	Model No.	Serial No.	Manufacturer	Interval	Last Cal. Date
1	Spectrum Analyzer (~30GHz)	FSV-30	100757	R&S	1 year	2012-01-10
2	Signal Generator (~3.2GHz)	8648C	3623A02597	HP	1 year	2012-03-26
3	Signal Generator (1~20GHz)	83711B	US34490456	HP	1 year	2012-03-26
4	Attenuator (3dB)	8491A	37822	HP	2 year	2010-10-08
5	Attenuator (10dB)	8491A	63196	HP	2 year	2010-10-08
6	Attenuator (30dB)	8498A	3318A10929	HP	2 year	2011-01-05
7	Test Receiver (~30MHz)	ESHS10	828404/009	R&S	1 year	2012-03-26
8	EMI Test Receiver (~1GHz)	ESCI7	100722	R&S	1 year	2011-10-07
9	RF Amplifier (~1.3GHz)	8447D	2439A09058	HP	2 year	2010-10-08
10	RF Amplifier (1~18GHz)	8449B	3008A02126	HP	2 year	2012-03-26
11	Horn Antenna (1~18GHz)	BBHA 9120D	9120D122	SCHWARZBECK	2 year	2010-12-24
12	Horn Antenna (18 ~ 40GHz)	SAS-574	154	Schwarzbeck	2 year	2010-11-25
13	Horn Antenna (18 ~ 40GHz)	SAS-574	155	Schwarzbeck	2 year	2010-11-25
14	TRILOG Antenna	VULB 9160	9160-3172	SCHWARZBECK	2 year	2010-10-07
15	Dipole Antenna	VHA9103	2116	SCHWARZBECK	2 year	2010-11-25
16	Dipole Antenna	VHA9103	2117	SCHWARZBECK	2 year	2010-11-25
17	Dipole Antenna	VHA9105	2261	SCHWARZBECK	2 year	2010-11-25
18	Dipole Antenna	VHA9105	2262	SCHWARZBECK	2 year	2010-11-25
19	Hygro-Thermograph	THB-36	0041557-01	ISUZU	2 year	2012-04-11
20	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
21	Power Divider	11636A	6243	HP	2 year	2010-10-08
22	DC Power Supply	6622A	3448A03079	HP	-	-
23	Frequency Counter	5342A	2826A12411	HP	1 year	2012-03-26
24	Power Meter	EPM-441A	GB32481702	HP	1 year	2012-03-26
25	Power Sensor	8481A	US41030291	HP	1 year	2011-10-07
26	Audio Analyzer	8903B	3729A18901	HP	1 year	2011-10-07
27	Modulation Analyzer	8901B	3749A05878	HP	1 year	2011-10-07
28	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	Jin Young Tech	1 year	2011-10-07
29	Stop Watch	HS-3	601Q09R	CASIO	2 year	2012-03-26
30	LISN	ENV216	100408	R&S	1 year	2011-10-07
31	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	2 year	2010-05-13
32	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	-	-
33	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	-	-
34	Loop Antenna	FMZB 1516	151602/94	SCHWARZBECK	2 year	2011-04-05