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Dates of Tests: March 18~April 08, 2013
Test Report S/N: LR500111304F
Test Site : LTA CO., LTD.

CERTIFICATION OF COMPLIANCE

FCC ID

SNL- 36204210

APPLICANT

SJ INCORPORATED

Equipment Class	:	Part 15 Spread Spectrum Transmitter (DSS)
Manufacturing Description	:	Frequency hopping Module
Manufacturer	:	SJ INCORPORATED
Model name	:	TM01
Test Device Serial No.:	:	Identical prototype
Rule Part(s)	:	FCC Part 15.247 Subpart C; ANSI C-63.4-2003
Frequency Range	:	2404.056 ~ 2474.044MHz
RF power	:	Max 18.53 dBm – Conducted
Data of issue	:	April 08, 2013

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.
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 Web site : <http://www.ltalab.com>
 E-mail : chahn@ltalab.com
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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	2013-09-30	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

Company name : SJ INCORPORATED
 Address : 8th F, 202 Dong, Chunui Techno-Park 2, 202, Chunui-Dong, Wonmi-Gu,
 Bucheon-Shi, Kyungki-Do, South Korea, 420-857
 Telephone / Facsimile : +82-32-623-0728/+82-32-623-0732

2-2 Manufacturer

Company name : SJ INCORPORATED
 Address(Factory in Korea) : 8th F, 202 Dong, Chunui Techno-Park 2, 202, Chunui-Dong, Wonmi-Gu,
 Bucheon-Shi, Kyungki-Do, South Korea, 420-857
 Address(Factory in China) : F6, 1 BLDG, A AREA, YINTIANXIFA INDUSTRIAL AREA, XIXIANG
 TOWN, BAOAN DISTRICT SHENZHEN, GUANGDONG PROVINCE, CHINA
 Telephone / Facsimile : +82-32-623-0728/+82-32-623-0732

2-3 Equipment Under Test (EUT)

Model name : TM01
 Serial number : Identical prototype
 Date of receipt : March 15, 2013
 EUT condition : Pre-production, not damaged
 Antenna type : KMAP2440S2522T1: 2.4GHz Patch Antenna, 0dBi
 KMAP2440S2525T1: 2.4GHz Patch Antenna, 0.5dBi
 WPC.25A.07.0150C: 2.4GHz Patch Antenna, 0.5dBi
 : C329-RF-001: 2.4GHz Dipole Antenna, 1.2dBi
 AT000067: 2.4GHz Dipole Antenna, 1.2dBi
 Frequency Range : 2404.056 ~ 2474.044MHz
 RF output power : Max. 18.53 dBm - Conducted
 Number of channels : 70
 Channel spacing : 1MHz
 Channel Access Protocol : Frequency Hopping Spread Spectrum (FHSS)
 Power Source : DC 3.3V
 Firmware Version : V1.0.0

2-4 Tested frequency

Bluetooth	LOW	MID	HIGH
Frequency (MHz)	2404.056	2438.550	2474.044

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	N/A
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 **SJ INCORPORATED** FCC ID:**SNL-36204210** unit complies with the requirement of §15.203.

The antenna type is patch antenna, dipole antenna.

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

Note 3: 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 **SJ INCORPORATED** FCC ID: **SNL- 36204210**

3.2 Information about the FHSS characteristics:

3.2.1 Pseudorandom Frequency Hopping Sequence

The pseudorandom sequence may be generated in a nine-stage shift register whose 5th and 9th stage outputs are added in a modulo-two addition stage, and the result is fed back to the input of the first stage. The sequence begins with the first ONE of 9 consecutive ONES; i.e. the shift register is initialized with nine ones. Number of shift register stages: 9

Length of pseudo-random sequence: $2^9 - 1 = 511$ bits

Longest sequence of zeros: 8 (non-inverted signal)

Number	Channel	Frequency	Number	Channel	Frequency
[0]	51	2455.772	[35]	43	2447.660
[1]	63	2467.940	[36]	67	2471.997
[2]	1	2405.070	[37]	13	2417.239
[3]	20	2424.337	[38]	17	2421.295
[4]	36	2440.562	[39]	31	2435.491
[5]	46	2450.702	[40]	47	2451.716
[6]	64	2468.955	[41]	60	2464.898
[7]	12	2416.225	[42]	9	2413.182
[8]	23	2427.379	[43]	22	2426.365
[9]	39	2443.604	[44]	33	2437.519
[10]	53	2457.800	[45]	45	2449.688
[11]	56	2460.842	[46]	69	2474.044
[12]	7	2411.154	[47]	6	2410.140
[13]	25	2429.407	[48]	19	2423.323
[14]	34	2438.550	[49]	32	2436.505
[15]	55	2459.828	[50]	48	2452.730
[16]	61	2465.912	[51]	58	2462.870
[17]	10	2414.197	[52]	3	2407.098
[18]	18	2422.309	[53]	27	2431.435
[19]	41	2445.632	[54]	28	2432.449
[20]	49	2453.744	[55]	50	2454.758
[21]	59	2463.884	[56]	57	2461.856
[22]	4	2408.112	[57]	11	2415.210
[23]	15	2419.267	[58]	26	2430.421
[24]	40	2444.618	[59]	30	2434.477
[25]	54	2458.814	[60]	52	2456.786
[26]	66	2470.983	[61]	62	2466.927
[27]	8	2412.169	[62]	0	2404.056
[28]	21	2425.351	[63]	16	2420.281
[29]	38	2442.590	[64]	29	2433.463
[30]	44	2448.674	[65]	42	2446.646
[31]	65	2469.969	[66]	68	2473.011
[32]	2	2406.084	[67]	5	2409.126
[33]	14	2418.253	[68]	24	2428.393
[34]	37	2441.575	[69]	35	2439.547

3.2.2 Equal Hopping Frequency Use

All 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(a)(1):

The hopping sequence must be pseudorandom all Channels are used equally on average the receiver input bandwidth is approximately equal to the transmit bandwidth the receiver hops in sequence with the transmitted signal

15.247(g):

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)

15.247(h):

The system does not coordinate its channel 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 = 3 MHz (wide enough to capture the peaks of two adjacent channels)

RBW = 30 kHz

Sweep = auto

VBW = 30 kHz

Detector function = peak

Trace = max hold

Measurement Data:

Test Results	
Carrier Frequency Separation (MHz)	Result
1.015	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

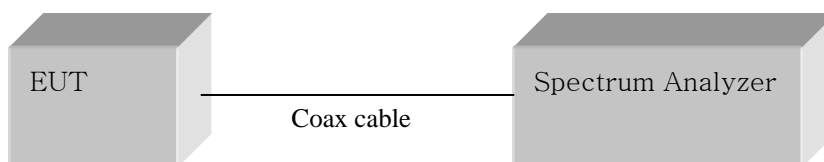
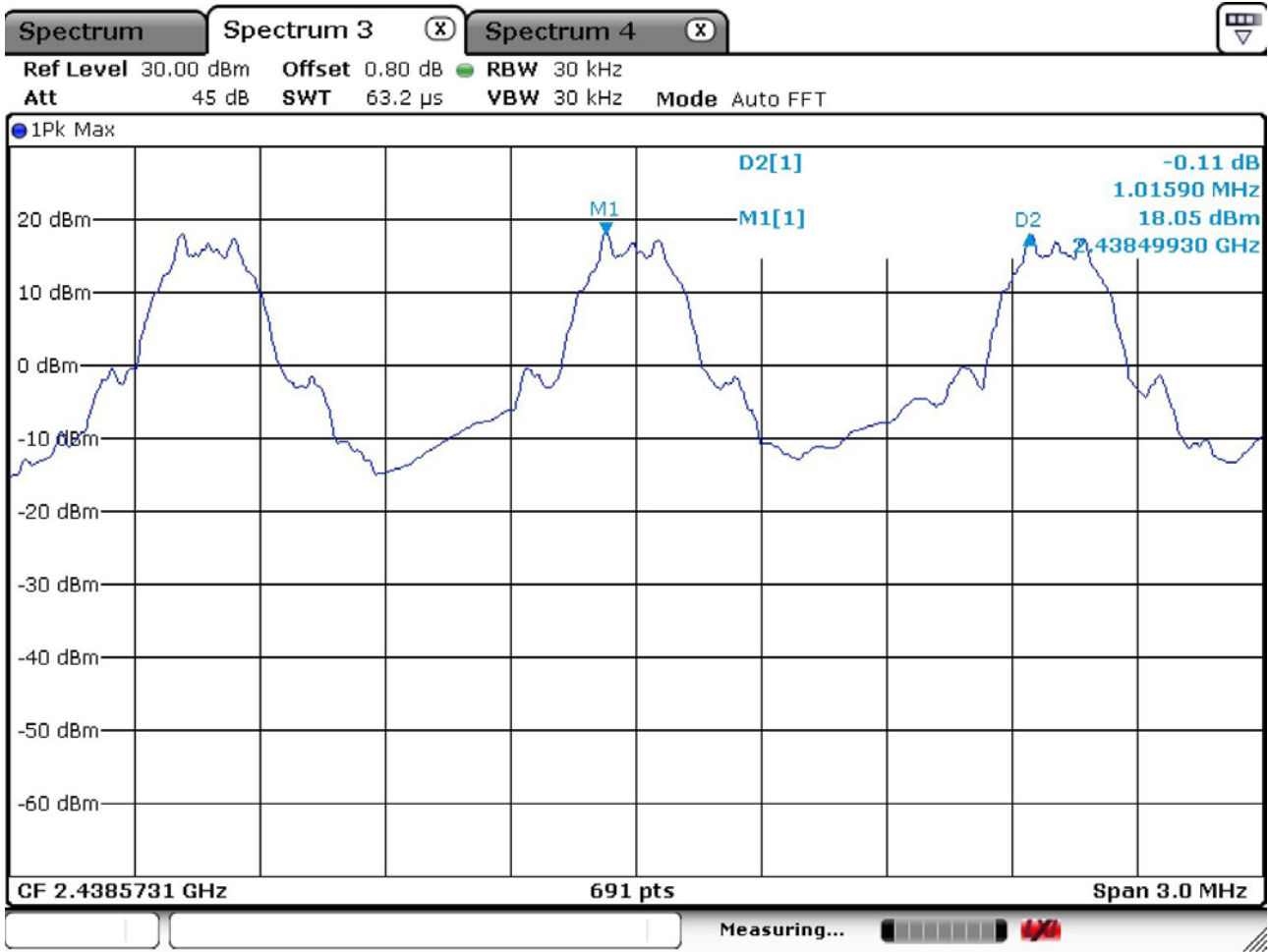
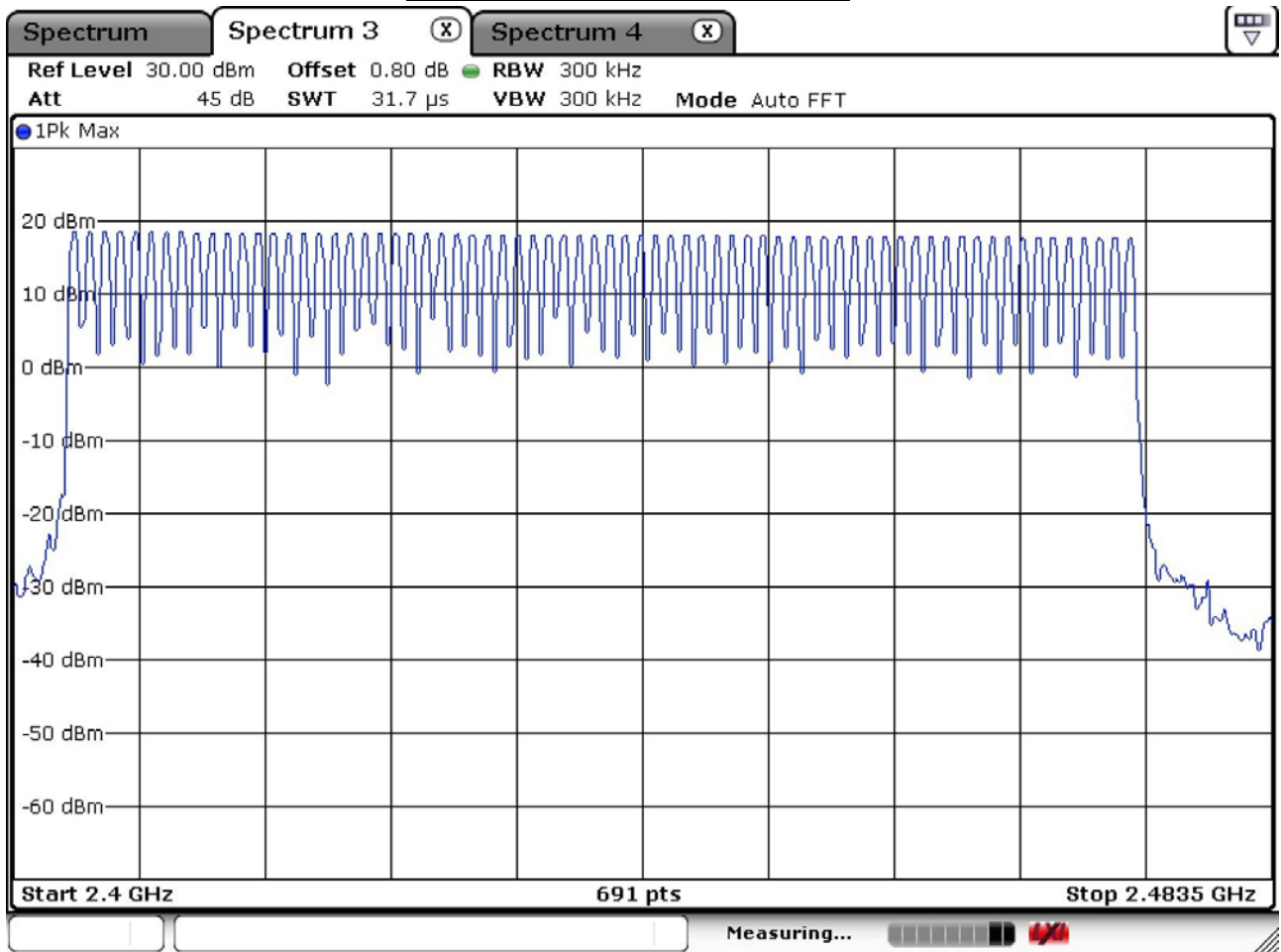


Figure 1: Measurement setup for the carrier frequency separation

Carrier Frequency Separation



Number of Hopping Frequencies



3.3.3 20 dB Bandwidth

Procedure:

The bandwidth at 20 dB below the highest in band 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:

Center frequency = the highest, middle and the lowest channels

Span = 5 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 :

Frequency (MHz)	Channel No.	Test Results(MHz)
		20dB Bandwidth
2404.056	0	0.398
2438.550	34	0.361
2474.044	69	0.369

- See next pages for actual measured spectrum plots.

Minimum Standard:

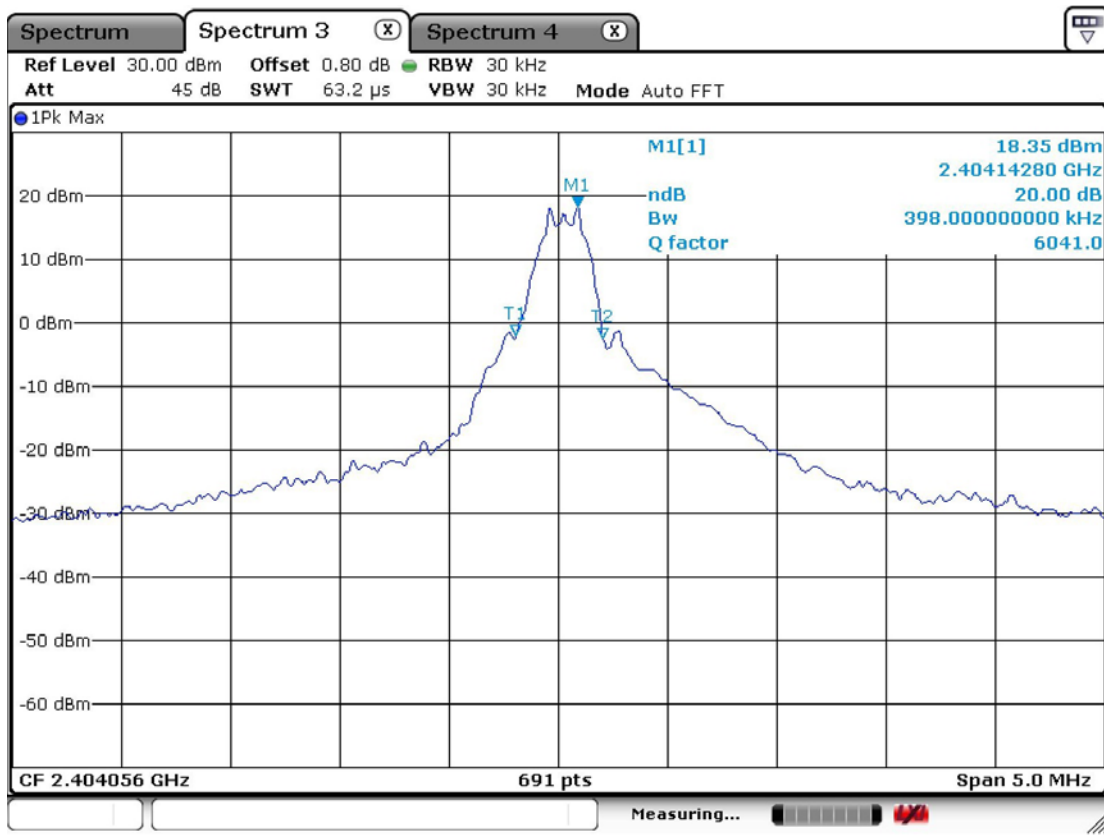
N/A

Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

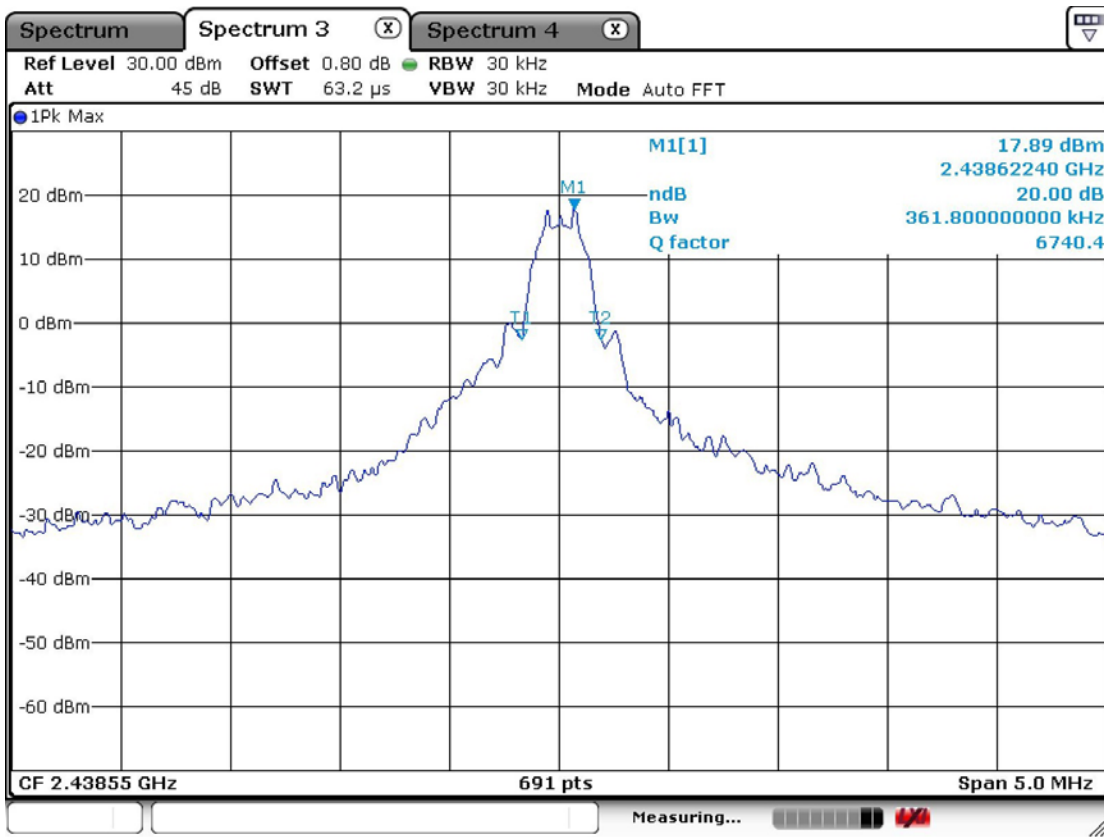
Channel 1 of basic mode

20 dB Bandwidth



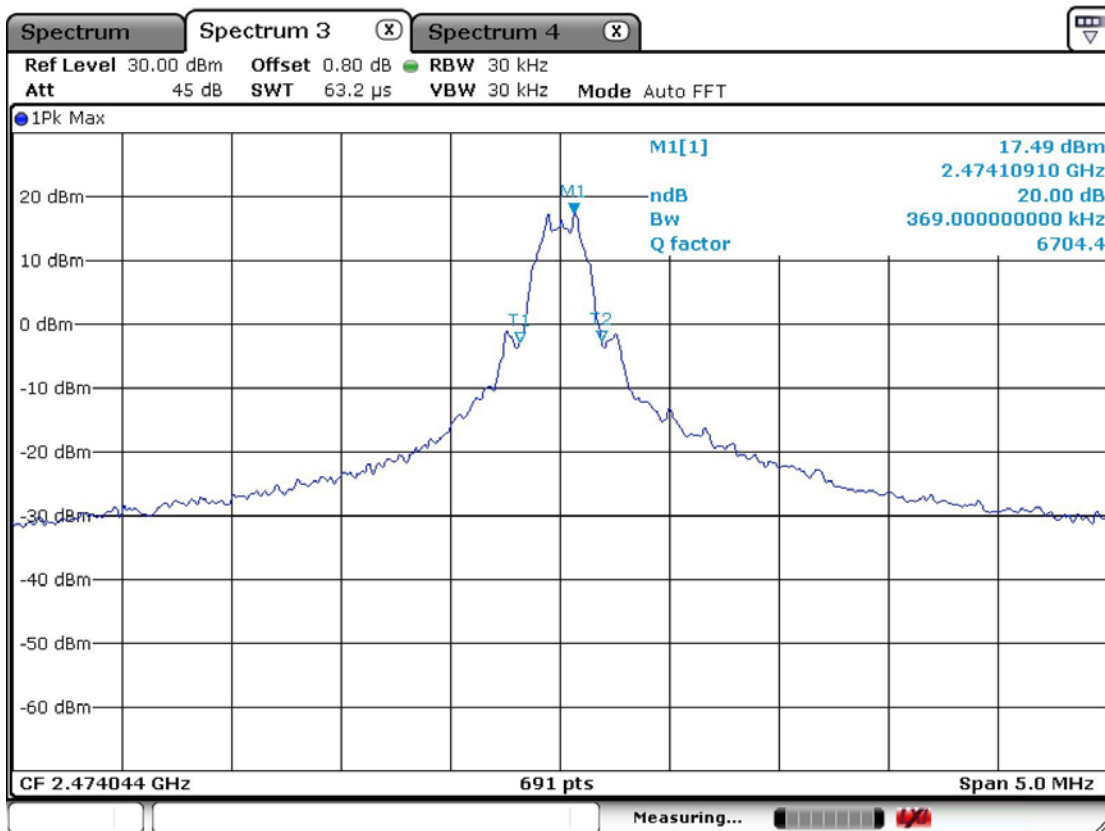
Channel 2 of basic mode

20 dB Bandwidth



Channel 3 of basic mode

20 dB Bandwidth



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 :

Center frequency = 2438 .550MHz

Span = zero

RBW = 1 MHz

VBW = 1 MHz (VBW \geq RBW)

Trace = single sweep

Detector function = peak

Measurement Data:

Number of transmission in a 28s (70 Hopping*0.4)	Length of Transmission Time (msec)	Result (msec)	Limit (msec)
4(Times / 3sec) *9.33=37.32	3.782	141.14	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

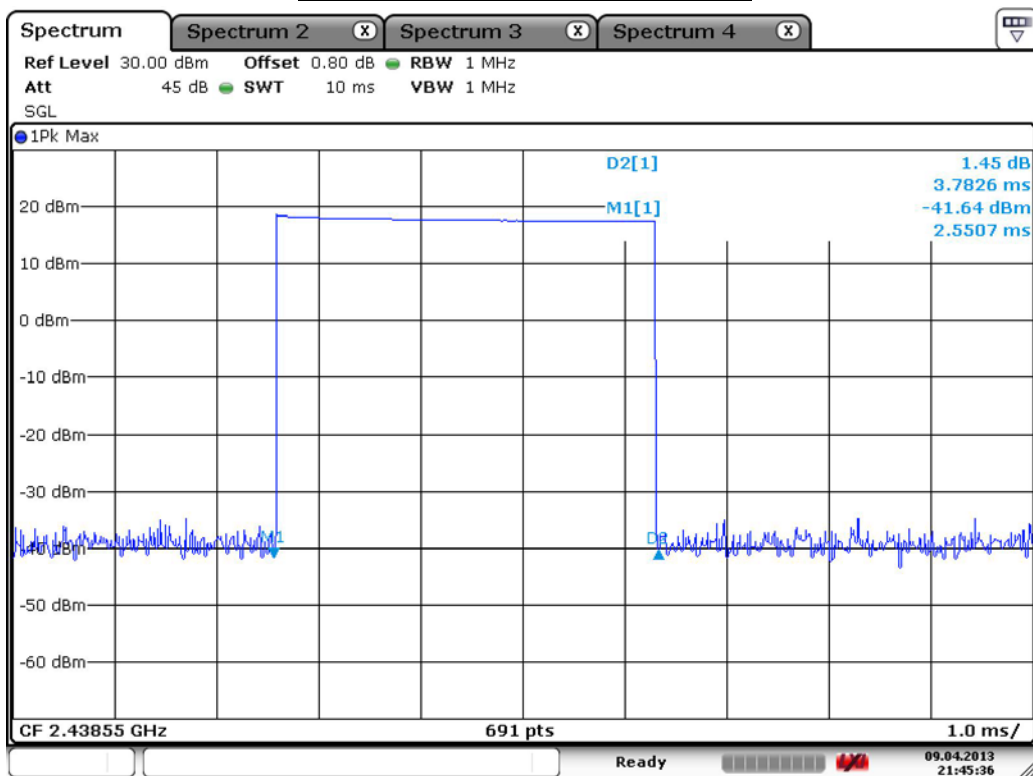
Minimum Standard:

0.4 seconds within a 30 second period per any frequency

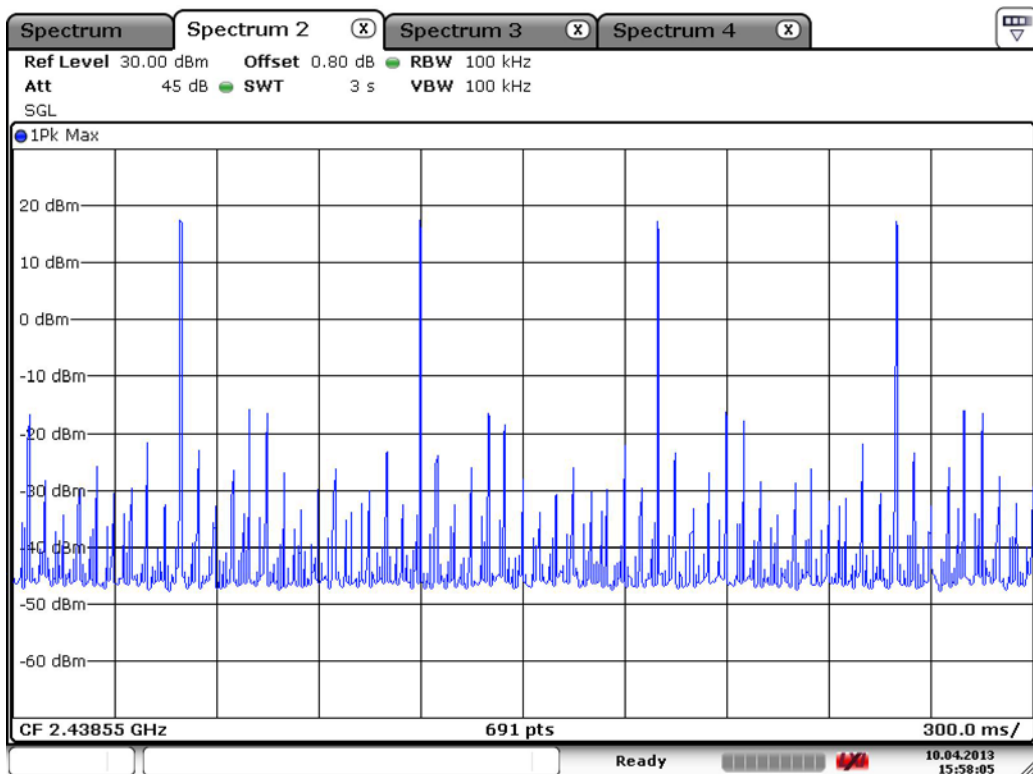
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

Time of Occupancy for PACKET



Date: 9.APR.2013 21:45:37



Date: 10.APR.2013 15:58:03

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 :

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 :

Frequency (MHz)	Ch.	Test Results		
		dBm	mW	Result
2404.056	1	18.53	71.29	Complies
2438.550	34	17.98	62.81	Complies
2474.044	70	17.64	58.08	Complies

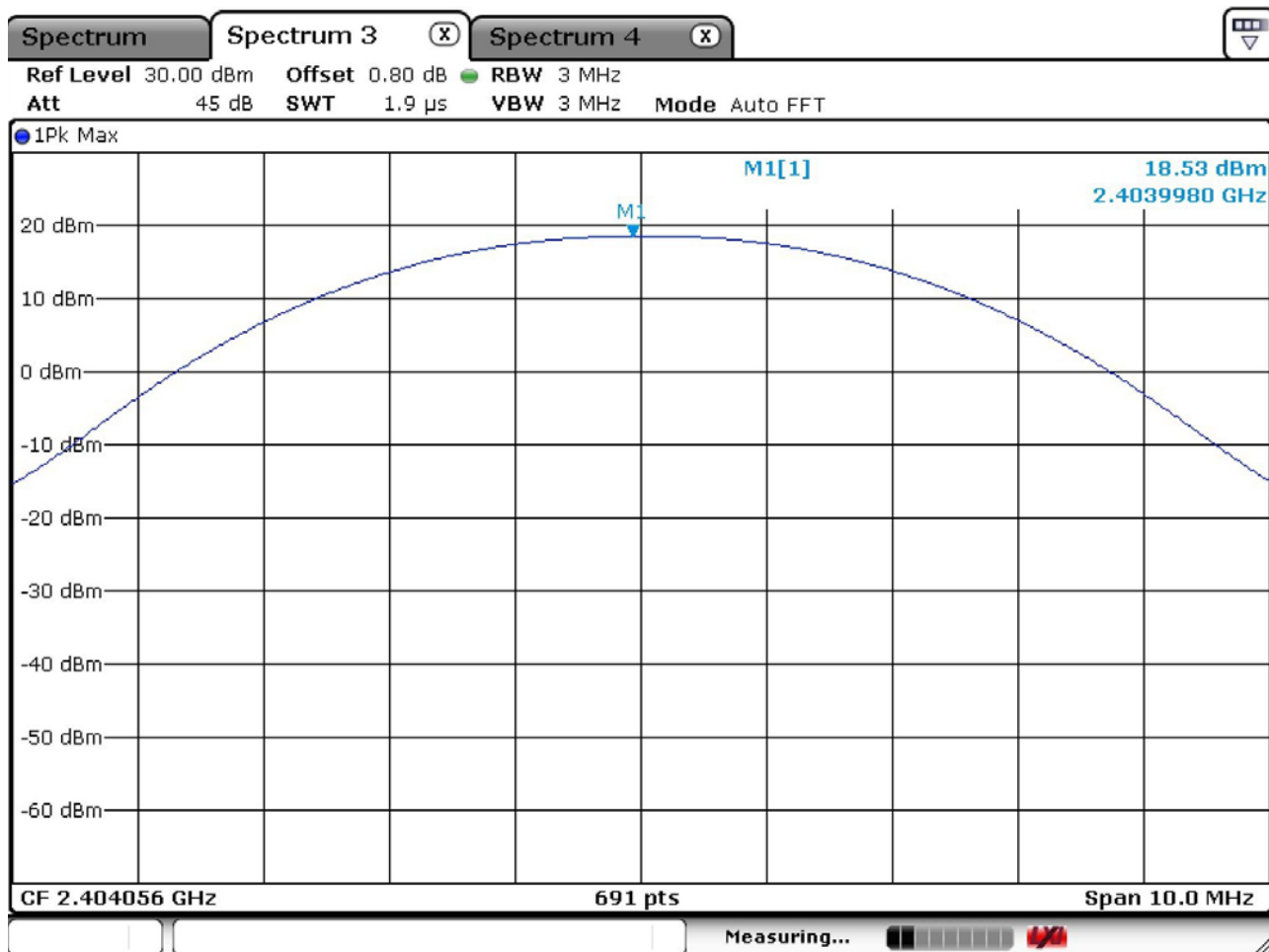
- See next pages for actual measured spectrum plots.

Minimum Standard:	< 250 mW
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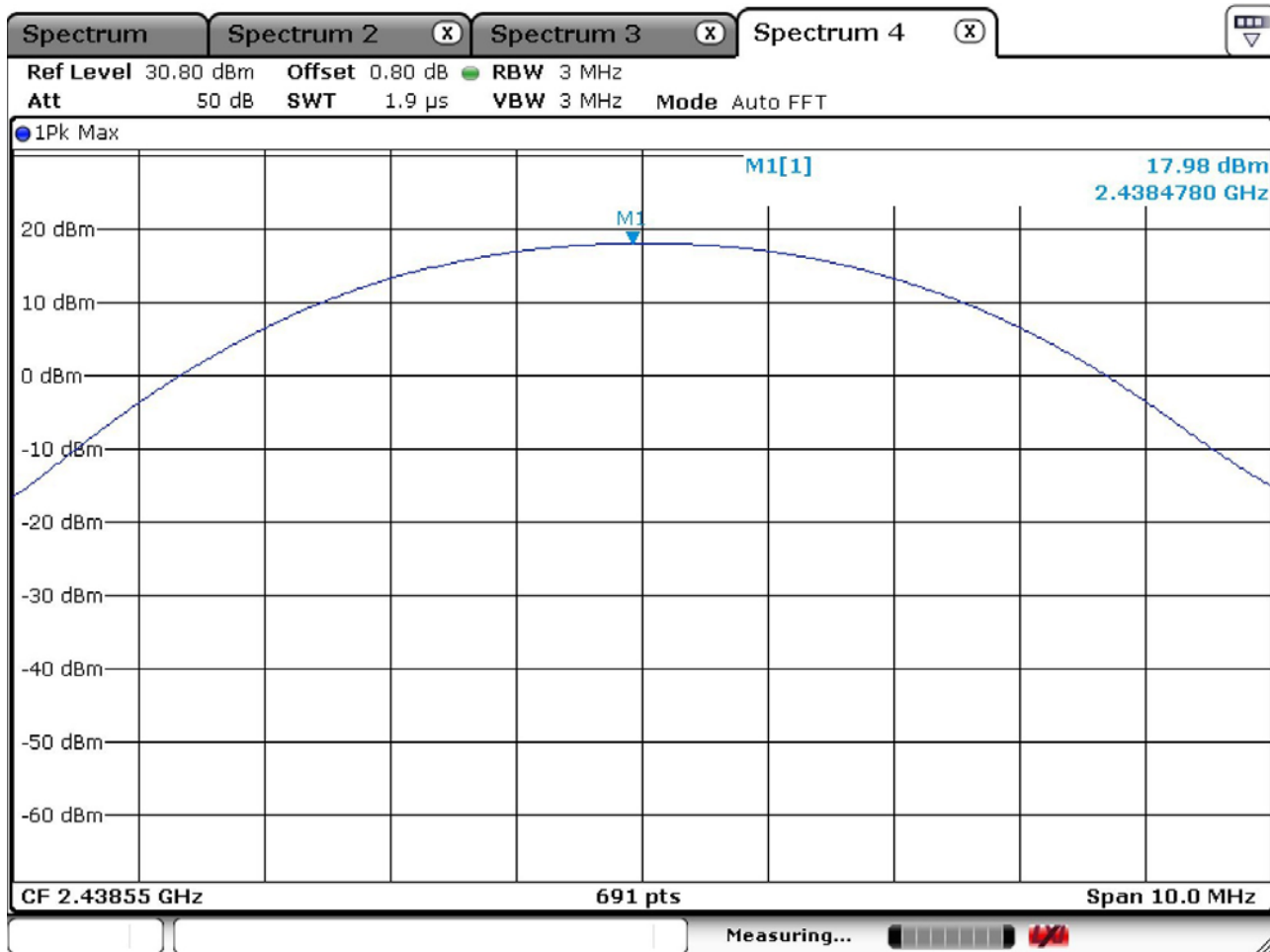
Measurement Setup

Same as the Chapter 3.2.1 (Figure 1)

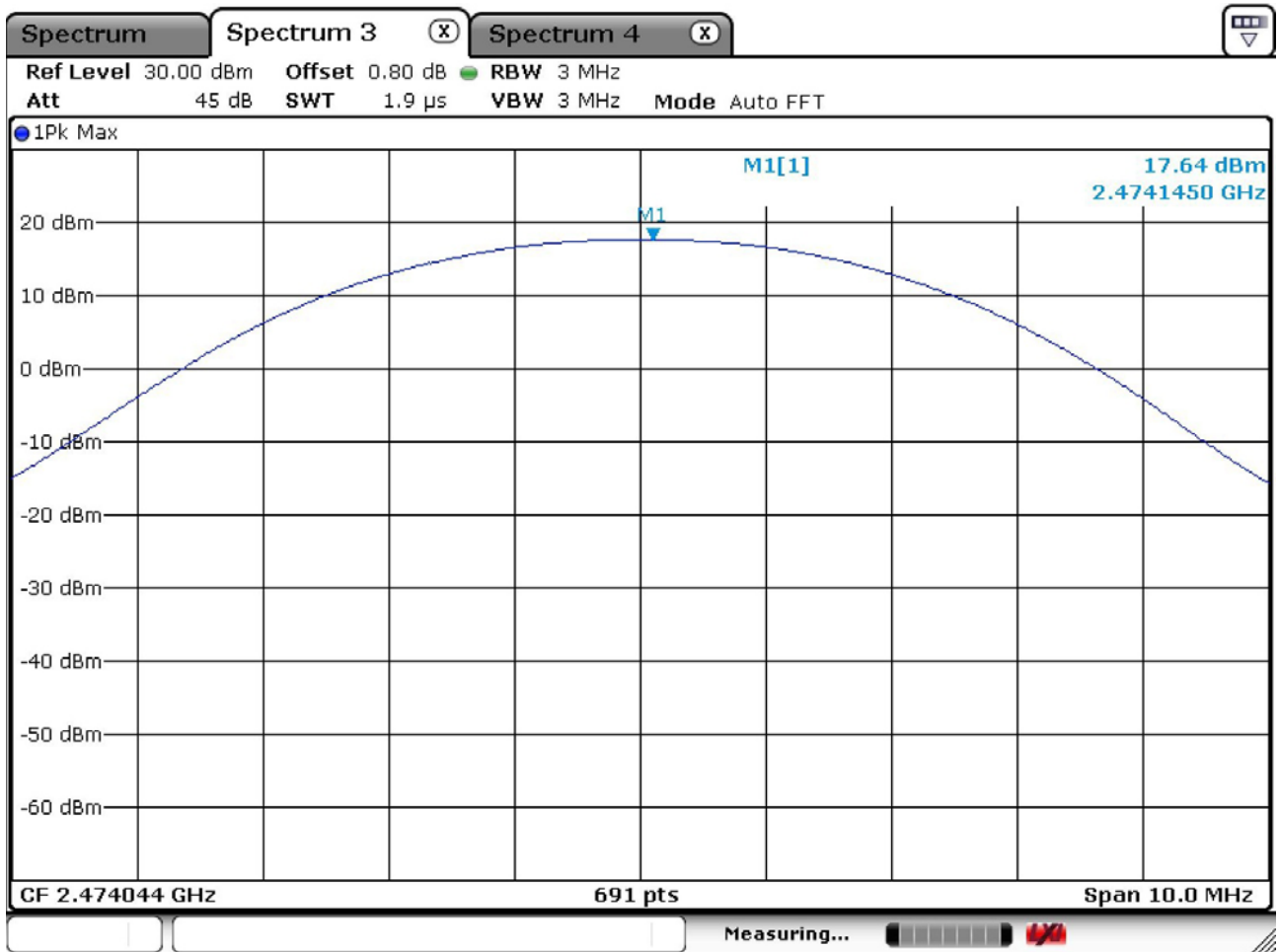
Channel 1



Channel 2



Channel 3



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

RBW = 100 kHz

VBW = 100 kHz

Span = 30MHz

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.

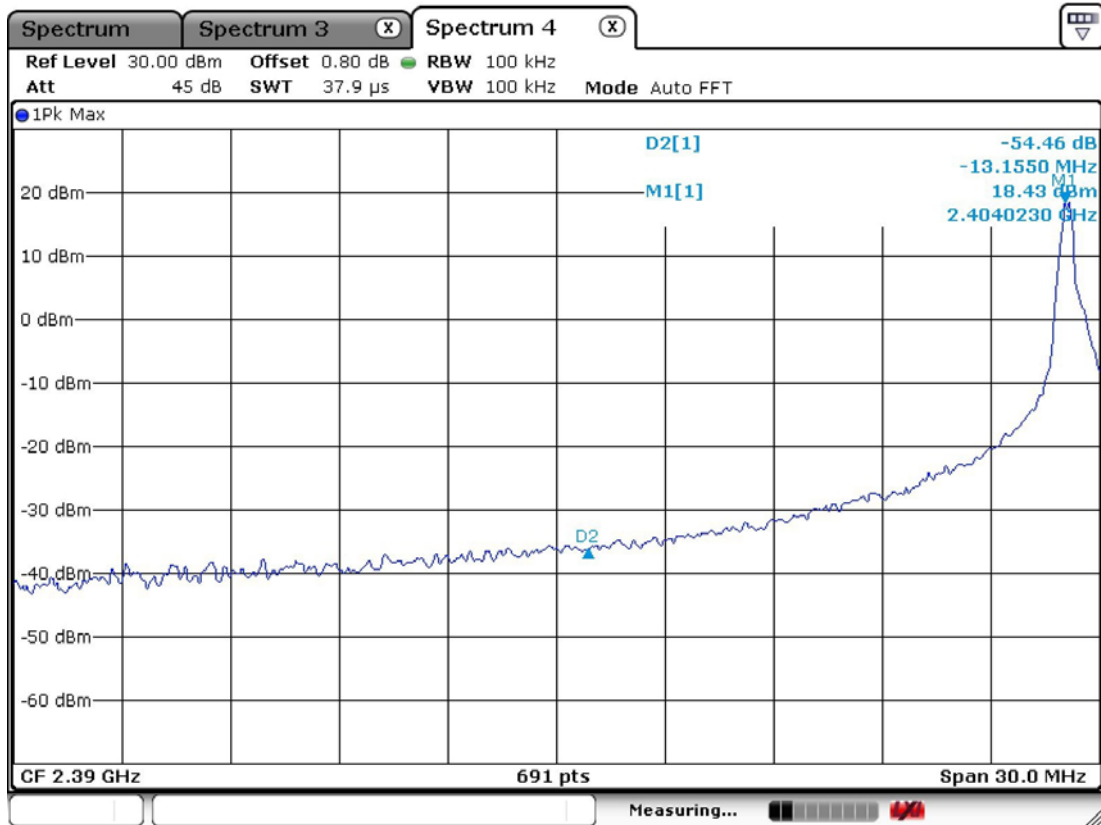
Minimum Standard:	> 20 dBc
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Measurement Setup

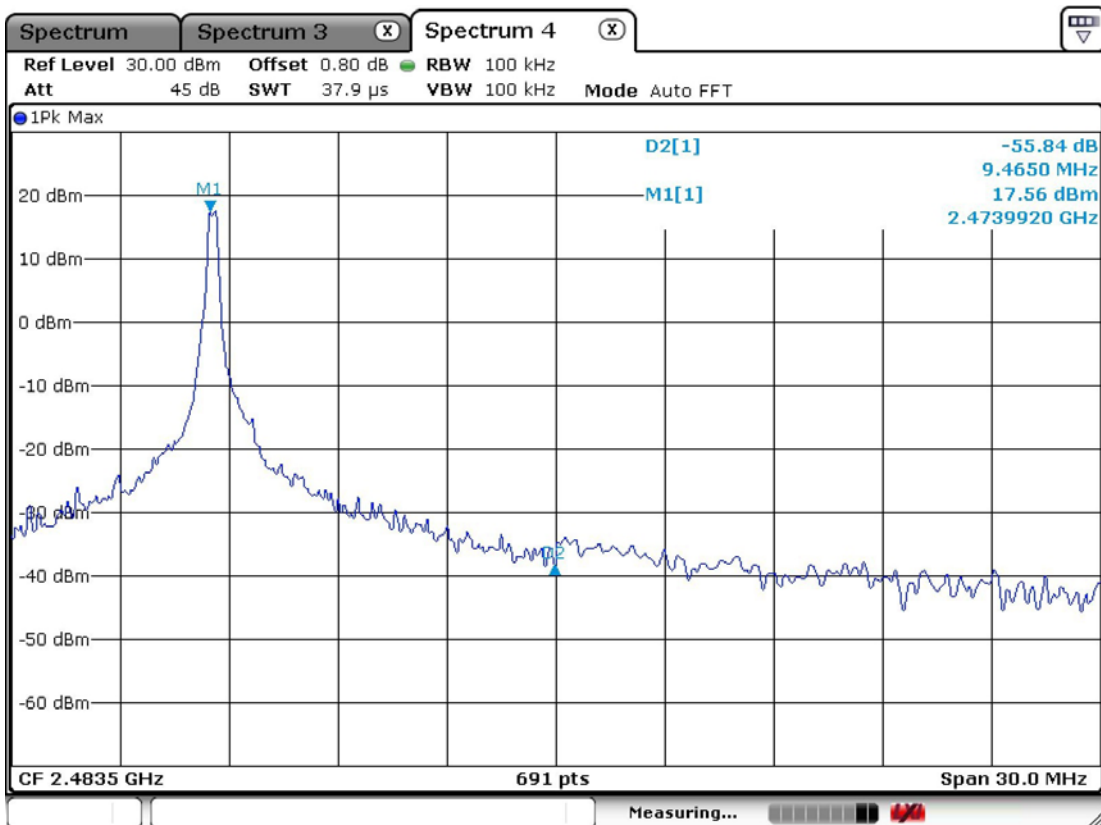
Same as the Chapter 3.2.1 (Figure 1)

Band – edge

Lower edge



Upper edge



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

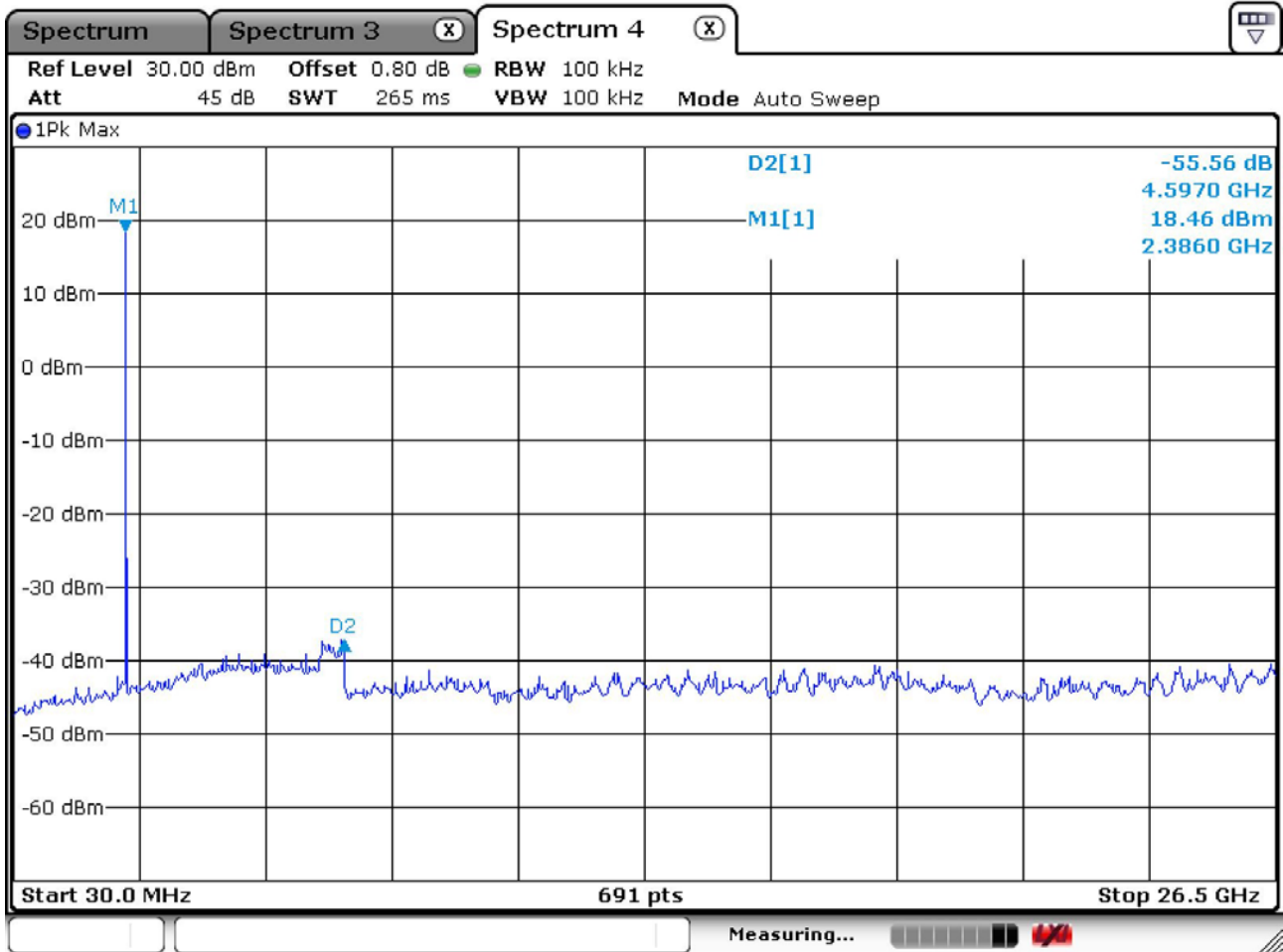
Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Cable Loss	AV / Peak		AV / Peak		AV / Peak	
2368.7	20	31.4	H	27.9	10.8	54	74	37.1	48.5	16.9	25.5

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

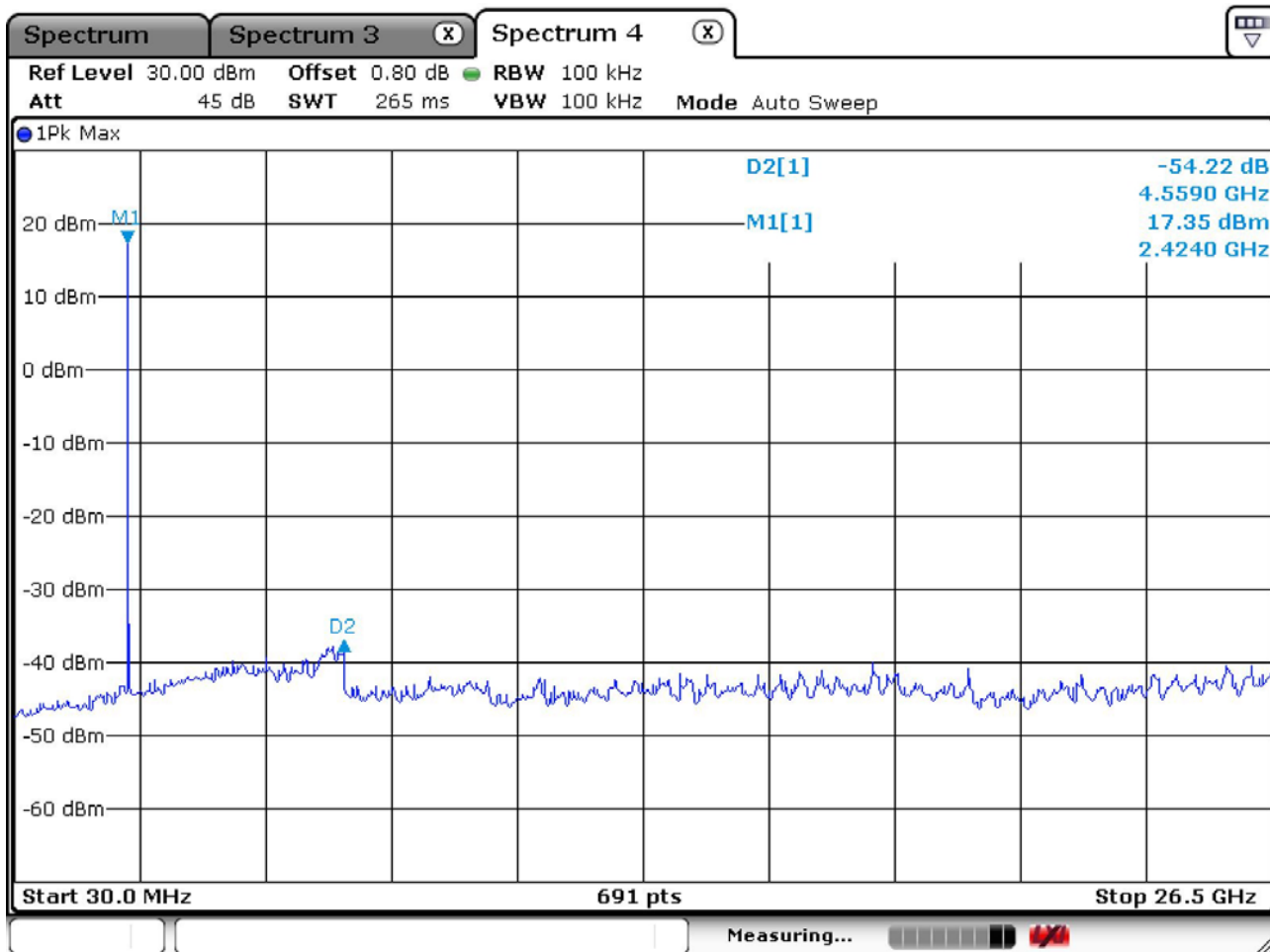
Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
	AV / Peak			Antenna	Cable Loss	AV / Peak		AV / Peak		AV / Peak	
2493.9	19.1	29.8	H	27.9	10.8	54	74	36.2	46.9	17.8	27.1

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

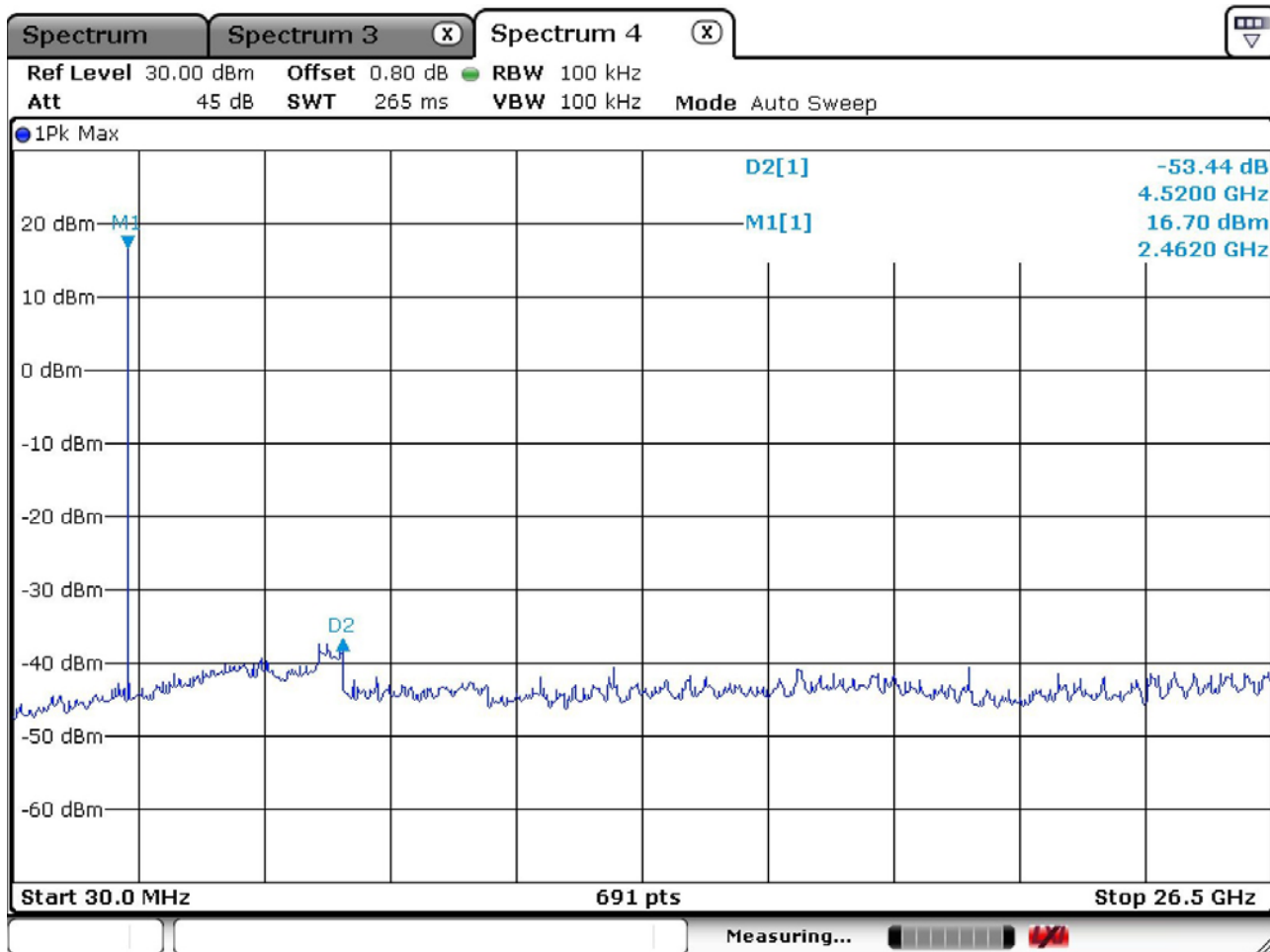
Unwanted Emission – Low channel
Frequency Range = 30 MHz ~ 26.5 GHz



Unwanted Emission – Middle channel
Frequency Range = 30 MHz ~ 26.5 GHz



Unwanted Emission – High channel
Frequency Range = 30 MHz ~ 26.5 GHz



3.3.7 Field Strength of Harmonics

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 = 9KHz ~ 30 MHz

RBW = 100 kHz (30MHz ~ 1 GHz)
= 1 MHz (1 GHz ~ 10th harmonic)

Span = 100 MHz

Trace = max hold

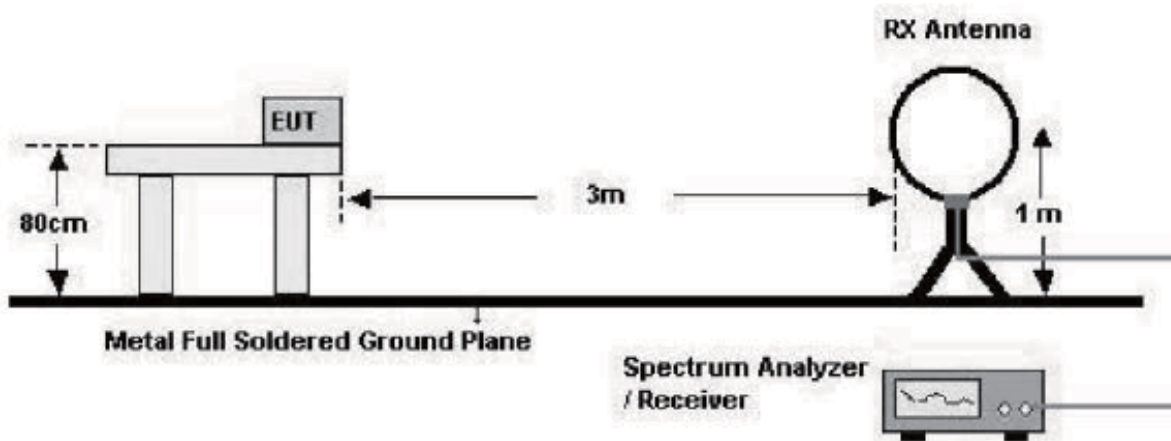
Peak: VBW \geq RBW

Average: VBW=10Hz

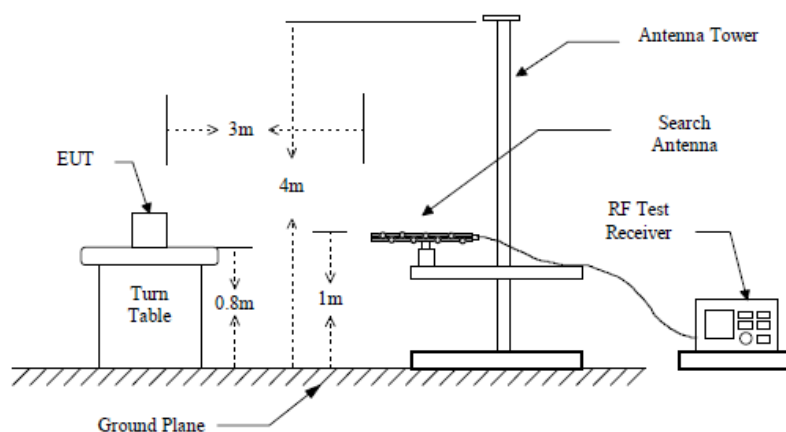
Detector function = peak

Sweep = auto

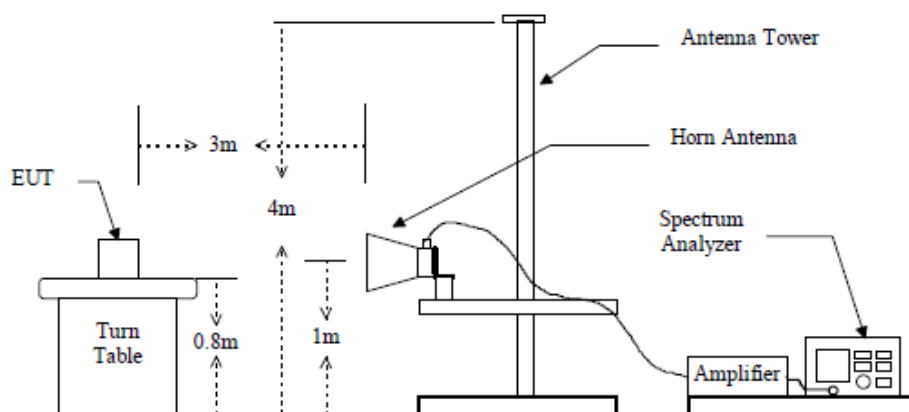
below 30MHz



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.

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 :

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	
4808.2	36.6	53.2	H	29.8	32.4	54.0	74.0	34.0	50.6	20.0	23.4
Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
[MHz]	AV / Peak			Antenna	Amp.Gain+Cable	AV/Peak		AV/Peak		AV / Peak	
4877.2	35.0	52.6	H	29.8	32.4	54.0	74.0	32.4	50.0	21.6	24.0
Frequency [MHz]	Reading [dBuV/m]		Pol.	Correction Factor		Limits [dBuV/m]		Result [dBuV/m]		Margin [dB]	
[MHz]	AV / Peak			Antenna	Amp.Gain+Cable	AV/Peak		AV/Peak		AV / Peak	
4948.0	33.2	52.0	H	29.8	32.4	54.0	74.0	30.6	49.4	23.4	24.6

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

Measurement Data: (9kHz - 30MHz)

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

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

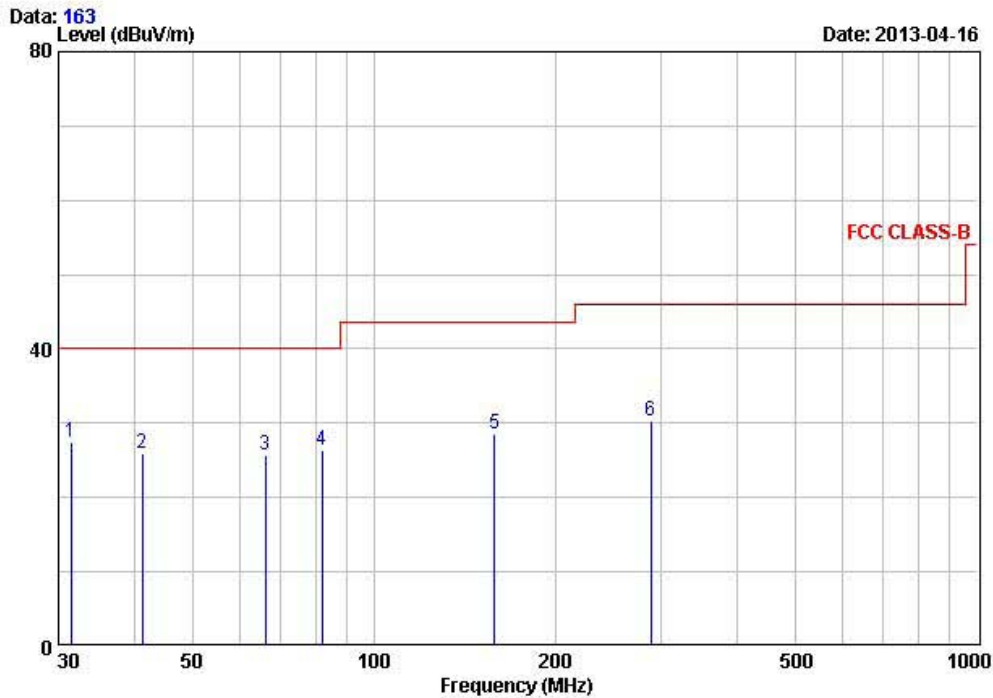
Radiated Emissions – Wireless mode



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EUT/Model No. : TM01 TEST MODE: Tx mode

Temp Humi : 15 / 46 Tested by: Ko Gun



Freq	Reading	C.F	Result	Limit	Margin	Height	Angle	Polarity
MHz	dBuV/m	dB/m	dBuV/m	dBuV/m	dB	cm	deg	
1	31.52	45.90	-18.39	27.51	40.00	12.49	100	115 VERTICAL
2	41.28	43.30	-17.39	25.91	40.00	14.09	100	55 VERTICAL
3	66.17	44.10	-18.34	25.76	40.00	14.24	100	200 VERTICAL
4	82.18	47.80	-21.44	26.36	40.00	13.64	100	47 VERTICAL
5	158.62	44.50	-15.94	28.56	43.50	14.94	100	196 VERTICAL
6	288.15	45.90	-15.61	30.29	46.00	15.71	386	224 HORIZONTAL

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: Not Applicable

(This Product is operated by battery.)

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

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	2013-01-15
2	Spectrum Analyzer (~2.9GHz)	8594E	3649A03649	HP	2 year	2012-03-26
3	Signal Generator (~3.2GHz)	8648C	3623A02597	HP	1 year	2013-03-25
4	Signal Generator (1~20GHz)	83711B	US34490456	HP	1 year	2013-03-25
5	Attenuator (3dB)	8491A	37822	HP	2 year	2012-09-22
6	Attenuator (10dB)	8491A	63196	HP	2 year	2012-09-22
7	Test Receiver (~30MHz)	ESHS10	828404/009	R&S	1 year	2013-03-25
8	EMI Test Receiver (~7GHz)	ESCI7	100722	R&S	1 year	2012-09-22
9	RF Amplifier (~1.3GHz)	8447D	2439A09058	HP	2 year	2012-09-22
10	RF Amplifier (1~18GHz)	8449B	3008A02126	HP	2 year	2012-03-26
11	Horn Antenna (1~18GHz)	BBHA 9120D	9120D122	SCHWARZBECK	2 year	2012-12-21
12	Horn Antenna (18 ~ 40GHz)	SAS-574	154	Schwarzbeck	2 year	2012-03-15
13	Horn Antenna (18 ~ 40GHz)	SAS-574	155	Schwarzbeck	2 year	2012-03-15
14	TRILOG Antenna	VULB 9160	9160-3172	SCHWARZBECK	2 year	2012-09-20
15	Hygro-Thermograph	THB-36	0041557-01	ISUZU	1 year	2012-09-26
16	Splitter (SMA)	ZFSC-2-2500	SF617800326	Mini-Circuits	-	-
17	Power Divider	11636A	6243	HP	2 year	2012-09-22
18	DC Power Supply	6622A	3448A03079	HP	-	-
19	Frequency Counter	5342A	2826A12411	HP	1 year	2013-03-25
20	Power Meter	EPM-441A	GB32481702	HP	1 year	2013-03-25
21	Power Sensor	8481A	US41030291	HP	1 year	2012-09-22
22	Audio Analyzer	8903B	3729A18901	HP	1 year	2012-09-22
23	Modulation Analyzer	8901B	3749A05878	HP	1 year	2012-09-22
24	TEMP & HUMIDITY Chamber	YJ-500	LTAS06041	JinYoung Tech	1 year	2012-09-22
25	Stop Watch	HS-3	601Q09R	CASIO	2 year	2012-03-26
26	LISN	ENV216	100408	R&S	1 year	2012-09-22
27	UNIVERSAL RADIO COMMUNICATION TESTER	CMU200	106243	R&S	2 year	2012-06-27
28	Highpass Filter	WHKX1.5/15G-10SS	74	Wainwright Instruments	-	-
29	Highpass Filter	WHKX3.0/18G-10SS	118	Wainwright Instruments	-	-
30	Active Loop Antenna	FMZB 1519	1519-031	SCHWARZBECK	1 year	2013-12-14