TEST REPORT

Report Number		RAPA13-O-616
Type of Equipment		Keyless Entry System
Model Name		2W1BR-SP
FCC ID		VA5RED300-2WSP
IC Number		7087A-2WRED300SP
Applicant	Name	SEGI LIMITED
	Logo	SEGI
	Address	UNIT F, 7/F, CENTURY INDUSTRIAL CENTER, 33-35 AU PUI WAN STREET, SHANTIN, NT, HONGKONG
Manufacturer	Name	SEGI ELECTRONICS CO., LTD.
	Address	Chenjiapucun, Liaobu Town, Dongguan City, Guangdong Province, P.R.China
Test duration		September 6, 2013 to September 10, 2013
Issuance date of report		September 12, 2013
Total Page		17 pages (including this page)

SUMMARY

The equipment complies with FCC CFR 47 Part 15 Subpart C Section 15.231 and IC RSS-210 Issue8 Annex 1-2010.

This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Date : September 12, 2013

Tested by Tae Yang Yoon

Manager

Date : September 12, 2013

Reviewed by Sukil Park

Executive Managing Director

CONTENTS

1. General description of EUT

1.1 Applicant

- Company name : SEGI LIMITED
- Address : UNIT F, 7/F, CENTURY INDUSTRIAL CENTER, 33-35 AU PUI WAN STREET, SHANTIN, NT, HONGKONG
- Contact person : Eui Seok, Chung
- Phone/Fax : 82-32-623-5550 / 82-32-623-6667

1.2 Manufacturer

- Company name : SEGI ELECTRONICS CO., LTD
- Address : Chenjiapucun, Liaobu Town, Dongguan City, Guangdong Province, P.R.China
- Contact person : Eui Seok, Chung
- Phone / Fax : 82-32-623-5550 / 82-32-623-6667

1.3 Basic description of EUT

- Product name : Keyless Entry System
- Model name : 2W1BR-SP
- Serial number : Not available(Proto Type)
- Frequency : 433.92 MHz(Tx)
- Channel number : 1 Channel
- Modulation method : ASK
- FCC Rule Part(s) : FCC CFR47 Part 15 Subpart C Section 15.231
- IC Rule Part(s) : IC RSS-210 Issue8 Annex 1-2010
- FCC classification : DSC / Part 15 Security/Remote control Transmitter
- IC classification : Annex 1 / Momentarily Operated Devices and Remote Control
- Date of test : September 6, 2013 to September 10, 2013
- Date of issue : September 12, 2013
- Place of test : Head office

  824 & B104, Anyang Megavalley, 799, Gwanyang-dong, Dongan-gu, Anyang-si, Gyeonggi-do 431-767, Korea

  Open area test site

  80, Jeil-ri, Yangji-myun, Cheoin-gu, Yongin-si, Gyeonggi-do 449-825, Korea

  (FCC Registration Number : 337229)

  (IC Submission Number : 143881)

  (KCC Designation Number : KR0027)

1.4 Technical specification of EUT

Model Name	2W1BR-SP
Product Name	Keyless Entry System
Size(mm)	28.4 x 46.6 x 9.3 (W x L x H)
Battery Size	6.0 Vdc (CR2025 * 2)
Transmit Frequency	433.92 MHz
Modulation Method	ASK

2. General information of test

2.1 Standard for measurement methods and test result

Applied Standard : FCC CFR47 Part 15 Subpart C, IC RSS-210 Issue8 Annex 1-2010				
FCC	**IC**	**Description of Test**	**Limit**	**Result**
15.231(a)	A1.1.1	Transmission Time(s)	5	Pass
15.231(b)	A1.1.2	Field Strength of Fundamental (dBμV/m)	100.8(Peak) / 80.8(AVG)	Pass
15.231(b) & 15.209	A1.1.2	Radiated Emission(dBμV/m)	80.8(Peak) / 60.8(AVG)	Pass
15.231(c)	A1.1.3	Occupied Bandwidth(kHz)	1 084.8 kHz	Pass

2.2 Description of EUT modification

During the test, there was no mechanical or circuitry modification to improve RF and spurious characteristic, and any RF and spurious suppression device(s) was not added against the device tested.

2.3 Test configuration

• Type of peripheral equipment used

Description	Model Name	Serial No.	Manufacturer	FCC ID	IC Number
EUT	2W1BR-SP	N/A	SEGI Electronics Co., Ltd.	VA5RED300-2WSP	7087A-2WRED300SP

• Type of cable used

Device from	Device to	Type of Cable	Cable Number	Length
-	-	-	-	-

3. Measurement data

3.1 Transmission time

3.1.1 Definitions

A transmission time is a switching time that will automatically deactivate the transmission of transmitter of EUT.

3.1.2 Specification

• FCC Rules Part 15 Subpart C Section 15.231(a)(1)
• IC Rules RSS-210 Issue8 Annex 1-2010 A1.1.1

3.1.3 Measurement method

The device output is connected to the spectrum analyzer.

3.1.4 Set-Up

3.1.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W1BR-SP	SEGI Electronics Co., Ltd.
Spectrum Analyzer	FSV	Agilent

3.1.6 Test procedure

Spectrum analyzer setting;

- Center Frequency: 433.92 MHz
- Span: Zero
- RBW: 1 MHz
- VBW: 3 MHz
- Sweep time: 1 s
- Detect Mode: Peak

3.1.7 Test condition

- Test place: Shield Room
- Test mode: Normal Operation
- Test environment: 26 °C, 57 % R.H.

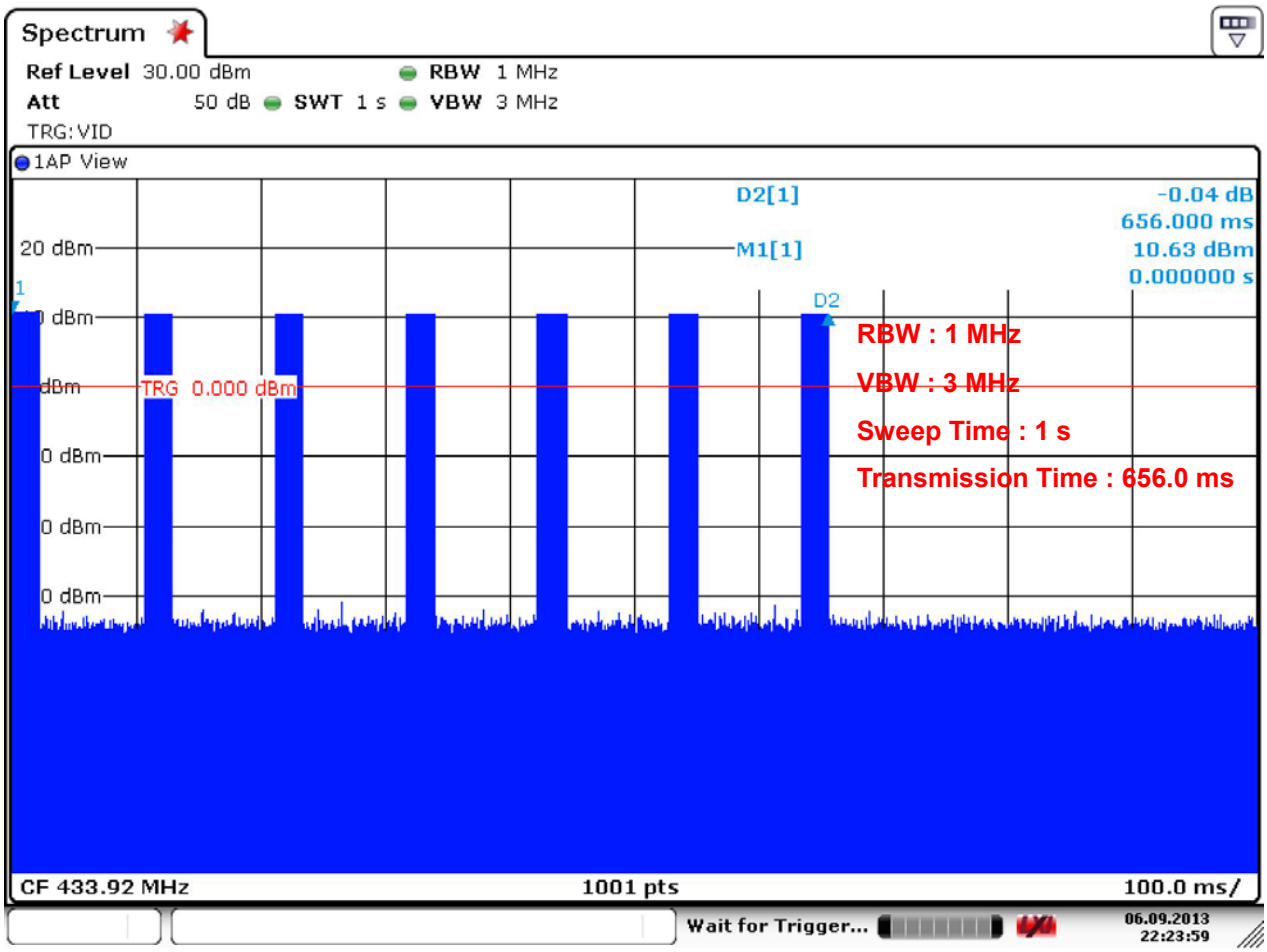
3.1.8 Test result

Frequency (MHz)	Transmission Time (s)	Limit (s)
433.92	0.656	5.00

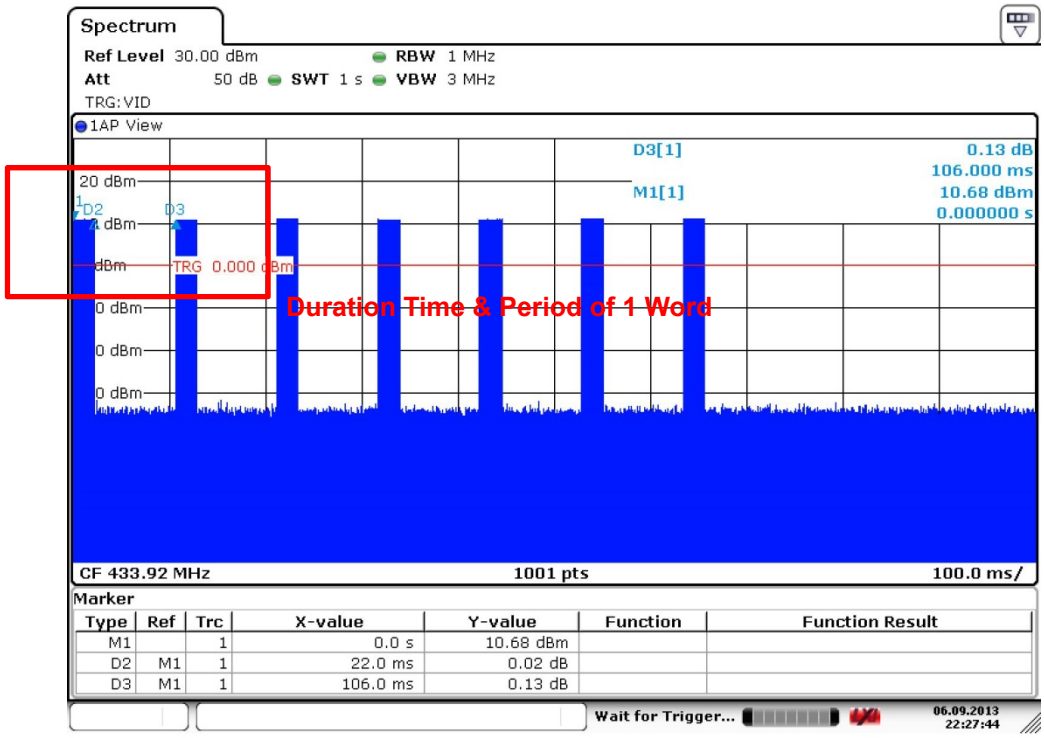
3.1.9 Limit

Less than 5 seconds.

3.1.10 Plots of transmission time (7 words)

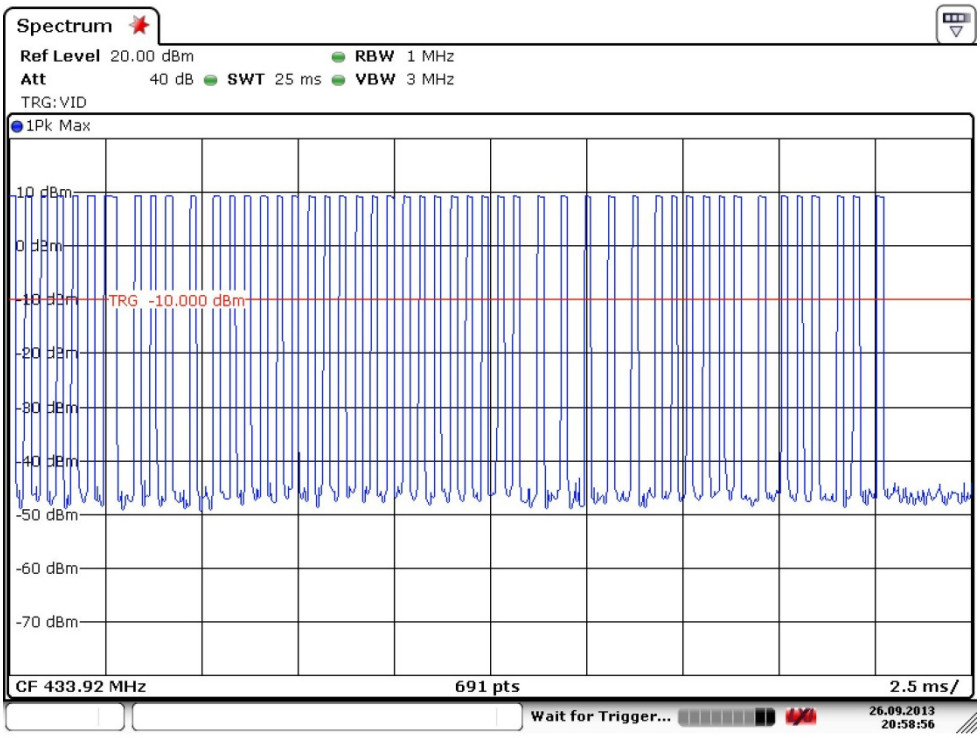


3.1.11 Plot of 1 word



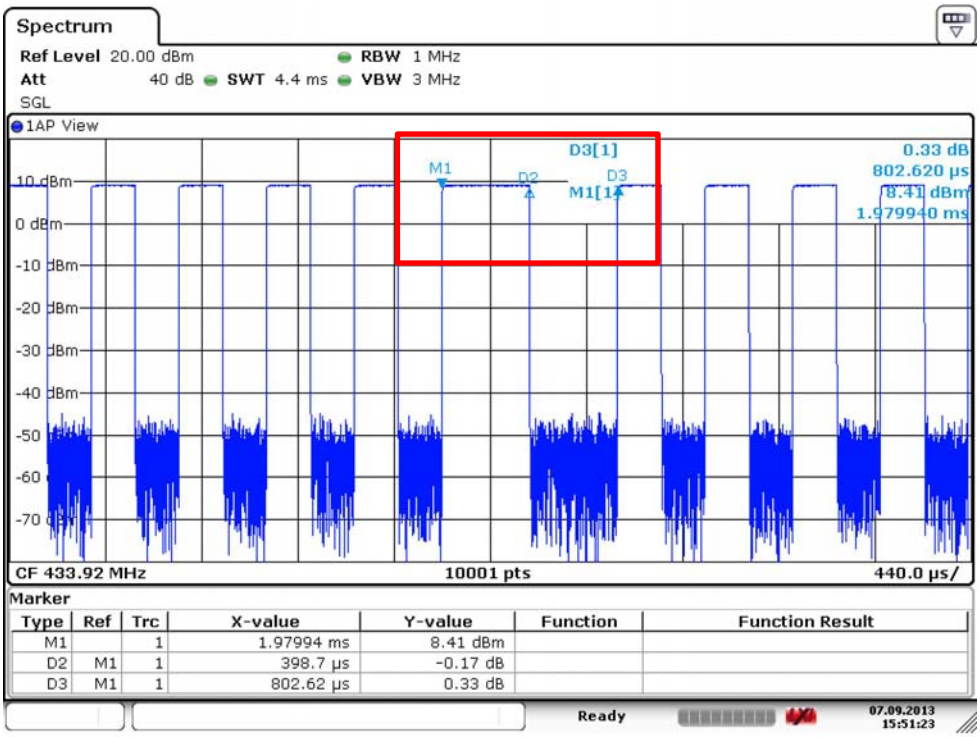
Duration Time of 1 word : 22.0 ms, Period of 1 word : 106.0 ms

3.1.12 Plot of 1 word Format



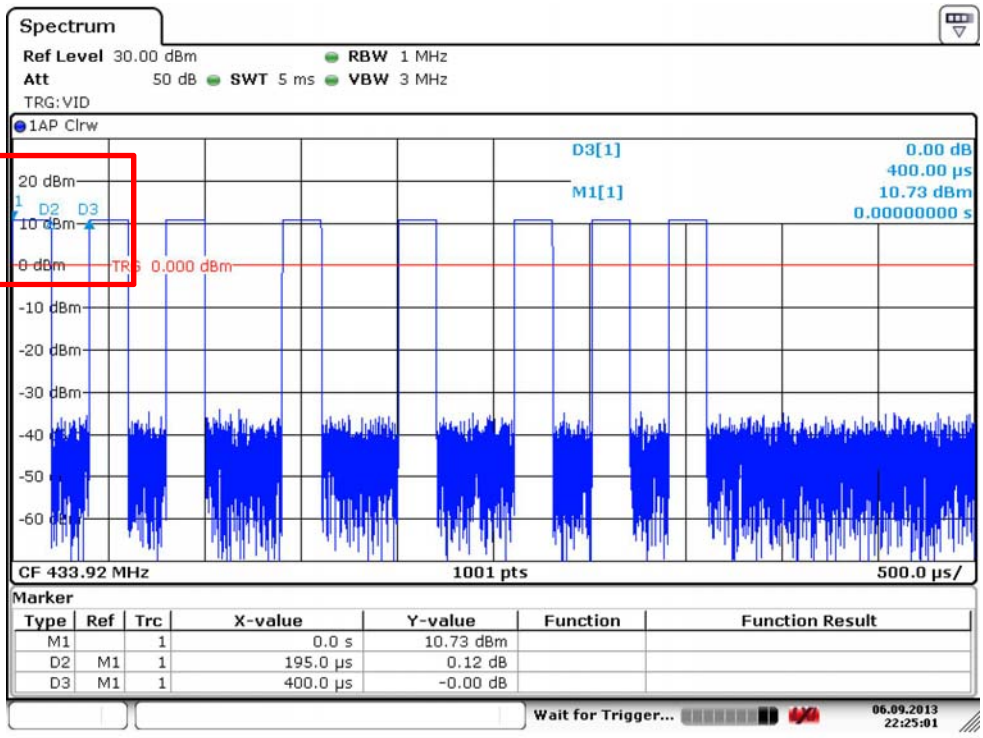
1 word Format

3.1.13 Plot of Data Format Type 1 (Leading)



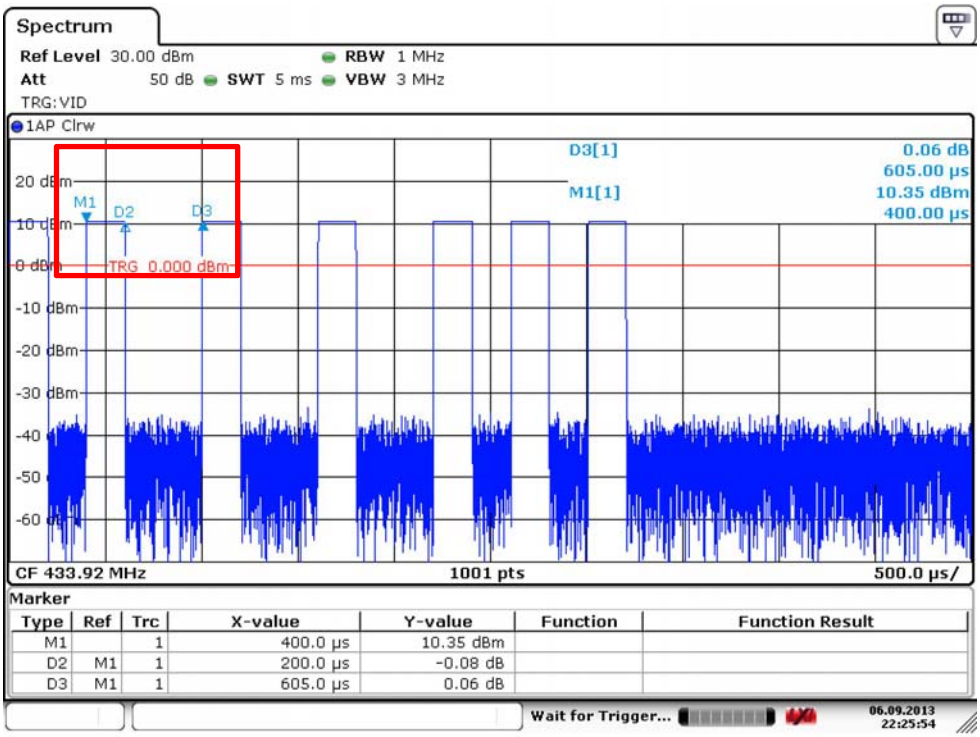
Duration Time of Type 1 (Leading) : 398.7 µs, Period of Type 1 (Leading) : 802.6 µs

3.1.14 Plot of Data Format Type 2 (Bit 0)



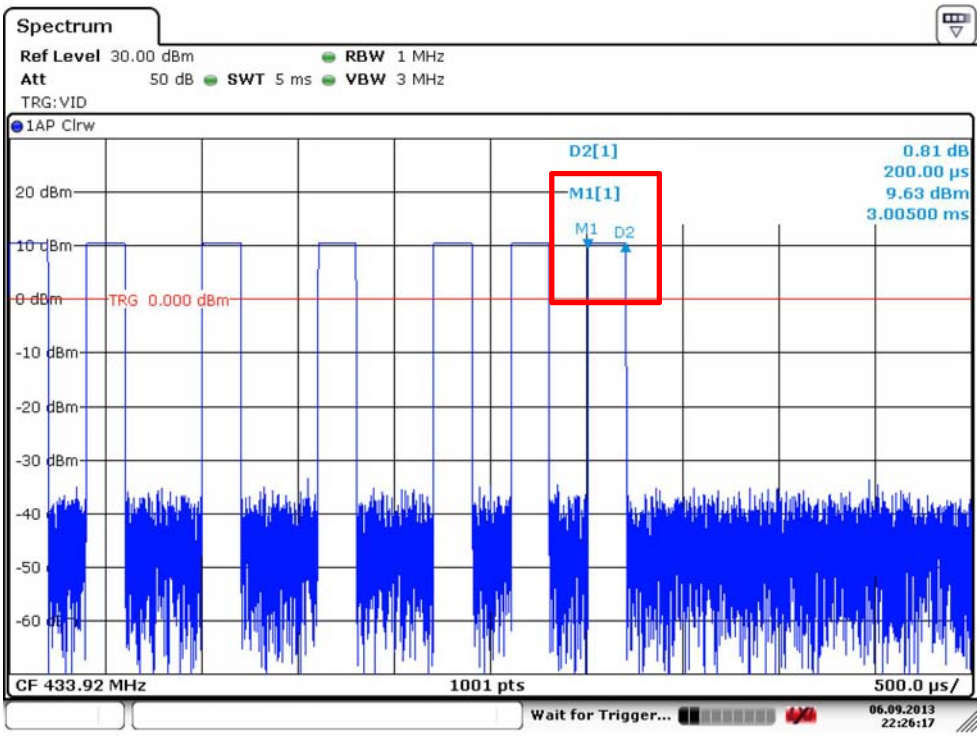
Duration Time of Type 2 (Bit 0) : 195.0 µs, Period of Type 2 (Bit 0) : 400.0 µs

3.1.15 Plot of Data Format Type 3 (Bit 1)



Duration Time of Type 3 (Bit 1) : 200.0 µs, Period of Type 3 (Bit 1) : 605.0 µs

3.1.16 Plot of Data Format Type 4 (END)



Duration Time of Type 4 (END) : 200.0 µs

3.1.17 Data Format of 1 Word

Data Type	Format	Duration Time (μs)	
Dummy Data	(Bit 0) x 6	200.0 x 6	1 200.0
SYNC	(Leading + Bit 0) x 1	398.7 + 200.0	598.7
Data	(Bit 0 or Bit 1) x 32	200.0 x 32	6 400.0
CRC	(Bit 0 or Bit 1) x 8	200.0 x 8	1 600.0
END	(END) x 1	200.0 x 1	200.0

3.1.18 Average Factor

$$\text{Total Average Factor} = 20\log\left[\frac{(1200 + 598.7 + 6400 + 1600 + 200)}{100000}\right] dB$$

$$= -20.00 \text{ dB}$$

3.2 Field strength of fundamental and spurious emission

3.2.1 Definitions

A field strength emission is a emission from the equipment when transmitting into a non-radiating load on fundamental frequency and frequencies that are outside an occupied band sufficient to ensure transmission of information of required quality for the class of communications desired.

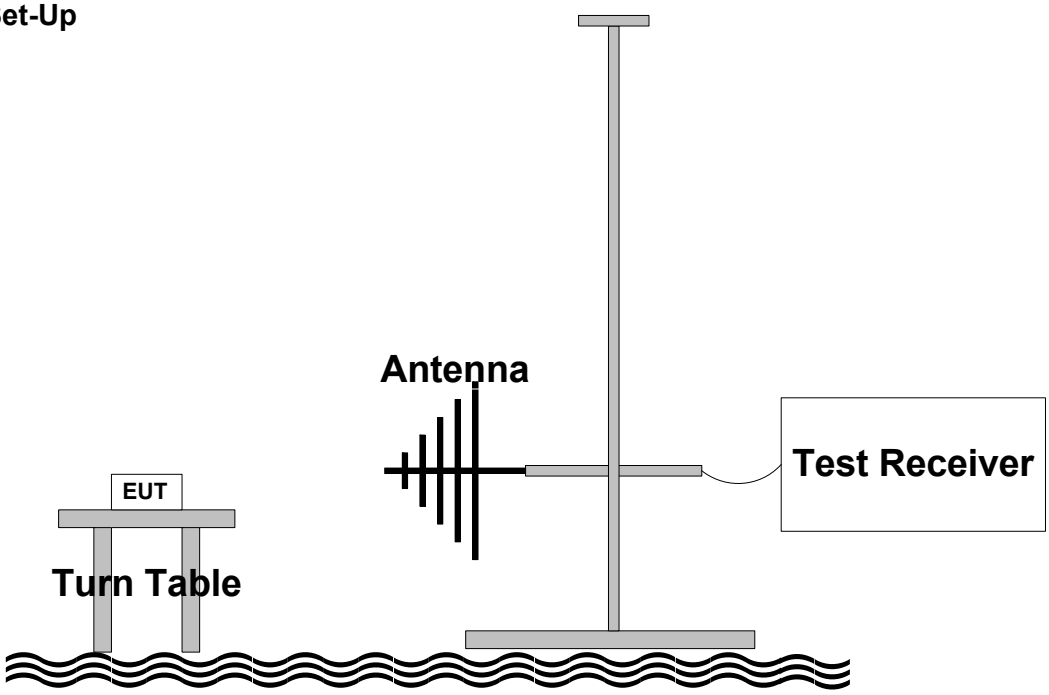
3.2.2 Specification

• FCC Rules Part 15 Subpart C Section 15.231(b)
• IC Rules RSS-210 Issue8 Annex 1-2010 A1.1.2

3.2.3 Measurement method

• ANSI Standard C63.4-2009 8.3

3.2.4 Set-Up



3.2.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W1BR-SP	SEGI Electronics Co., Ltd.
Test Receiver	ESCI 7	Rohde & Schwarz
Loop Antenna	EMCO 6502	EMCO
Bi-conical Antenna	VHA9103	Schwarzbeck
Log Periodic Antenna	VULP9118A	Schwarzbeck
Horn Antenna	BBHA-9120D	Schwarzbeck

3.2.6 Test procedure

The EUT is placed on a turntable, which is 0.8 meter high above ground.
The turntable rotates 360 degrees to determine the position of the maximum emission level.
EUT is set 3.0 meters away from the receiving antenna, broadband antenna, which is mounted on an antenna mast.

The antenna moved up and down between 1 meter and 4 meters to find out the maximum emission level form the EUT. Both horizontal and vertical polarizations of the antenna are set on measurement. In order to find out the maximum emission levels, all of the EUT location were manipulated according to ANSI 63.4 during the radiated emission measurement. The EUT was tested in 3 orthogonal planes.

The bandwidth of test receiver is set at 120 kHz between 30 to 1000 MHz, and 1 MHz between 1 to 5 GHz.

3.2.7 Test condition

- Test place: Open area test site
- Test mode: Normal operation
- Test environment: 27 °C, 62 % R.H.

3.2.8 Test result

Freq. [MHz]	Pol. [H/V]	plane [X/Y/Z]	Detect Mode [Peak/QP/AVG]	Reading [dBμV]	ANT. Factor [dB/m]	Cable Loss [dB]	AVG Factor [dB]	Pre-Amp Gain [dB]	Emission Level [dBμV]	Limit [dBμV]	Margin [dB]
434	H	Y	Peak	76.57	16.63	0.96	0	-	94.16	100.8	6.64
			**AVG				-20.00		74.16	80.8	6.64
*1 300	H	Y	Peak	44.25	24.84	1.88	0	-	70.97	74.0	3.03
			**AVG				-20.00		50.97	54.0	3.03
2 170	H	Y	Peak	25.41	26.69	2.50	0	-	54.60	80.8	26.20
			**AVG				-20.00		34.60	60.8	26.20
3 040	H	Y	Peak	24.63	28.65	3.24	0	-	56.52	80.8	24.28
			**AVG				-20.00		36.52	60.8	24.28
3 475	V	Y	Peak	23.52	29.00	3.68	0	-	56.20	80.8	24.60
			**AVG				-20.00		36.20	60.8	24.60
*3 905	H	Y	Peak	21.12	29.93	3.94	0	-	54.99	74.0	19.01
			**AVG				-20.00		34.99	54.0	19.01
*4 340	H	Y	Peak	21.49	30.47	4.20	0	-	56.16	74.0	17.84
			**AVG				-20.00		36.16	54.0	17.84

Here, * is restricted frequency, ** is the average value applied with average factor.

3.2.9 Limit

• Fundamental (Average Value)

Fundamental Frequency (MHz)	Field Strength of Fundamental (μV/m)	Field Strength of Fundamental (dBμV/m)
40.66 – 40.70	2 250	67.04
70 – 130	1 250	61.94
130 – 174	1 250 to 3 750	61.94 to 71.48
174 – 260	3 750	71.48
260 – 470	3 750 to 12 500	71.48 to 81.94
Above 470	12 500	81.94

• Spurious emission

Fundamental Frequency (MHz)	Field Strength of Spurious Emission (μV/m)	Field Strength of Spurious Emission (dBμV/m)
40.66 – 40.70	225	47.04
70 – 130	125	41.94
130 – 174	125 to 375	41.94 to 51.48
174 – 260	375	51.48
260 – 470	375 to 1 250	51.48 to 61.94
Above 470	1 250	61.94

• Spurious emission at restricted band

Frequency (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (m)
0.009 – 0.490	2 400 / F(kHz)	48.52 to 13.80	300
0.490 – 1.705	24 000 / F(kHz)	33.80 to 22.97	30
1.705 – 30.0	30	29.54	30
30 – 88	100	40.00	3
88 – 216	150	43.52	3
216 – 960	200	46.02	3
Above 960	500	53.98	3

Here, restricted bands are 1 301 to 1 427 MHz and 3 600 to 4 400 MHz.

3.3 20 dB Bandwidth

3.3.1 Definitions

A 20 dB Bandwidth is width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each lower 20 dB of the total mean power of a given emission

3.3.2 Specification

• FCC Rules Part 15, Subpart C, Section 15.231(c)

3.3.3 Measurement methods

• ANSI Standard C63.4-2009 10.1.8.8

3.3.4 Set-Up

3.3.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W1BR-SP	SEGI Electronics Co., Ltd.
Spectrum Analyzer	FSV	R&S

3.3.6 Test procedure

Spectrum Analyzer setting

- Center Frequency: 433.92 MHz
- Span: 1 MHz
- RBW: 30 kHz
- VBW: 100 kHz
- Detect Mode: Peak, Max Hold

3.3.7 Test condition

- Test Place: Shield Room
- Test Mode: Normal Operation
- Test environment: 26 °C, 55 %R.H.

3.3.8 Test result

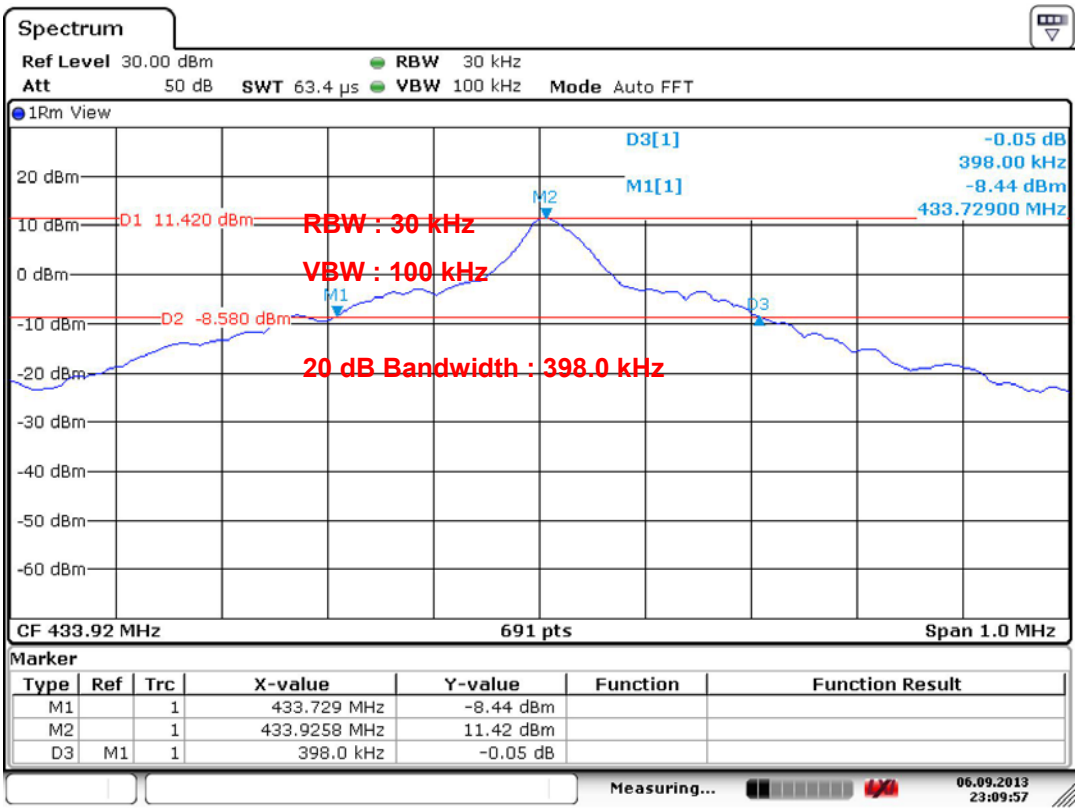
Frequency (MHz)	RBW (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
433.92	30 kHz	0.398	0.532	1.085

3.3.9 Limit

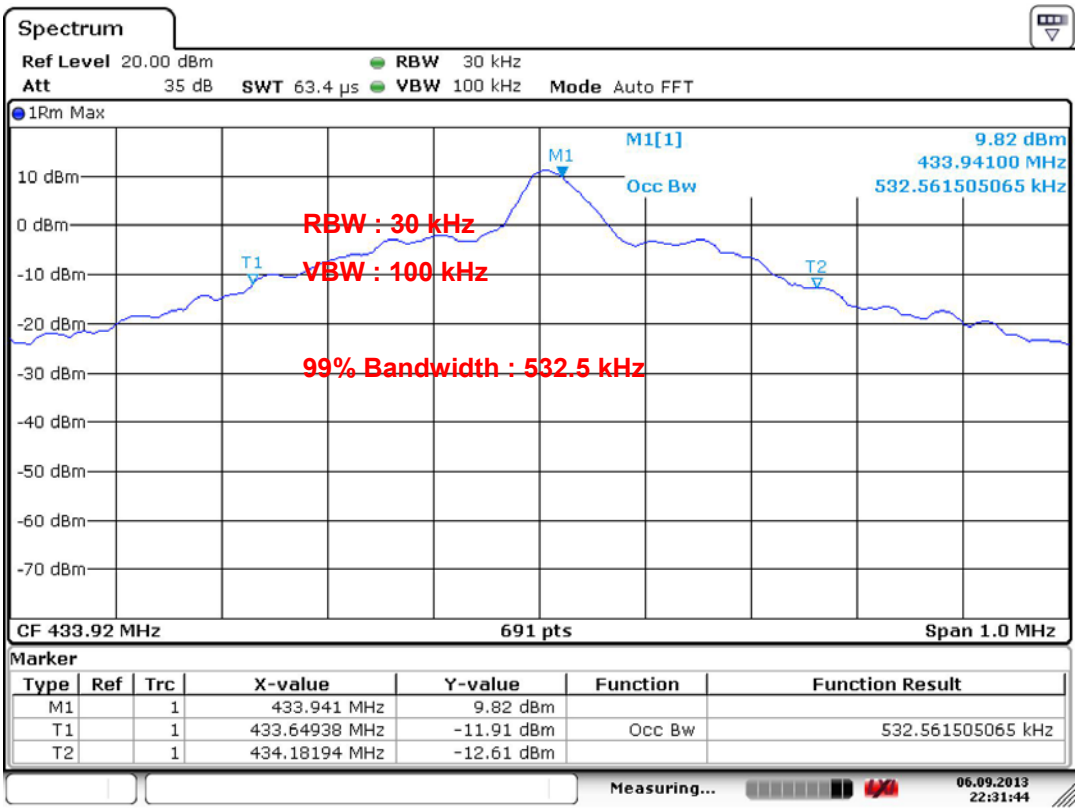
Less than 0.25 % (1.085 MHz).

3.3.10 Plots of 20 dB bandwidth and 99% bandwidth

3.3.10.1 20 dB bandwidth



3.3.10.2 99% bandwidth



4. Test equipment list

The listing below denotes the test equipment for the test(s).

No.	Equipment	Model	Manufacturer	Serial Number	Calibration Due date
1	Spectrum Analyzer	FSV	R&S	101673	02/04/14
2	Biconical Antenna	BBAK9137	Schwarzbeck	2217	11/23/14
3	Log-Periodic Antenna	VULP9118A	Schwarzbeck	382	11/23/14
4	Horn Antenna	BBHA 9120 D	Schwarzbeck	395	08/07/14
5	Turn Table	N/A	Daeil EMC	N/A	N/A
6	Antenna Mast	EAM4.5	Daeil EMC	N/A	N/A
7	Controller	DE200	Daeil EMC	AAA69813111	N/A