

TEST REPORT

Report Number		RAPA15-O-026
Type of Equipment		Keyless Entry System
Model Name		1WG13R-SH
FCC ID		VA5REF301-1W433
IC Number		7087A-1WREF301433
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		July 20, 2015 to July 24, 2015
Issuance date of report		July 27, 2015
Total Page		13 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.

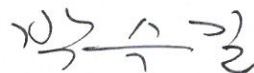
This test report contains only the results of a single test of the sample supplied for the examination. It is not a general valid assessment of the features of the respective products of the mass-production.

Date: July 27, 2015



Prepared and tested by SangHoon Lee
Assistant Manager

Date: July 27, 2015



Reviewed by Sukil Park
Executive Managing Director

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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 : 1WG13R-SH
- 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 : July 20, 2015 to July 24, 2015
- Date of issue : July 27, 2015
- Place of test : Head office
#101 & B104 Anyang Megavalley, 268, Hagui-ro, Dongan-gu, Anyang-si, Gyeonggi-do, 431-767, Korea

Open area test site

103, Anseok-gil, 138beon-gil, Hwaseong-si, Gyeonggi-do, Korea

(FCC Registration Number : 931589)

(IC Submission Number : 9355B)

(KCC Designation Number : KR0027)

1.4 Technical specification of EUT

Model Name	1WG13R-SH
Product Name	Keyless Entry System
Size(mm)	30 x 70 x 13 (W x L x H)
Battery Size	6.0 Vdc (CR2016 * 2)
Transmit Frequency	433.92 MHz
Modulation Method	ASK

2. General information of test

2.1 Standard for measurement methods

Applied Standard : FCC CFR47 Part 15 Subpart C and 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(MHz)	1.085	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	1WG1R-SH	N/A	SEGI Electronics Co., Ltd.	VA5REF301-1W433	7087A-1WREF301433

• 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.

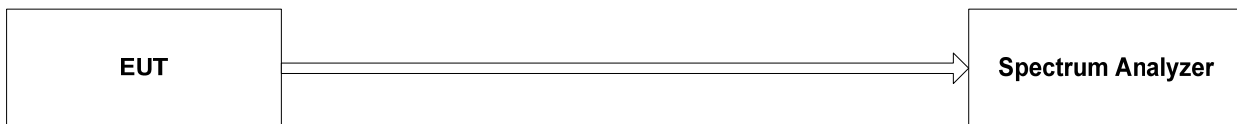
3.1.2 Specification

- 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	1WG1R-SH	SEGI Electronics Co., Ltd.
Spectrum Analyzer	FSV	R&S

3.1.6 Test procedure

- **Spectrum analyzer setting;**
 - Center Frequency: 433.92 MHz
 - Span: Zero
 - RBW: 100 kHz
 - VBW: 100 kHz
 - Sweep time: 5 s
 - Detect Mode: Peak

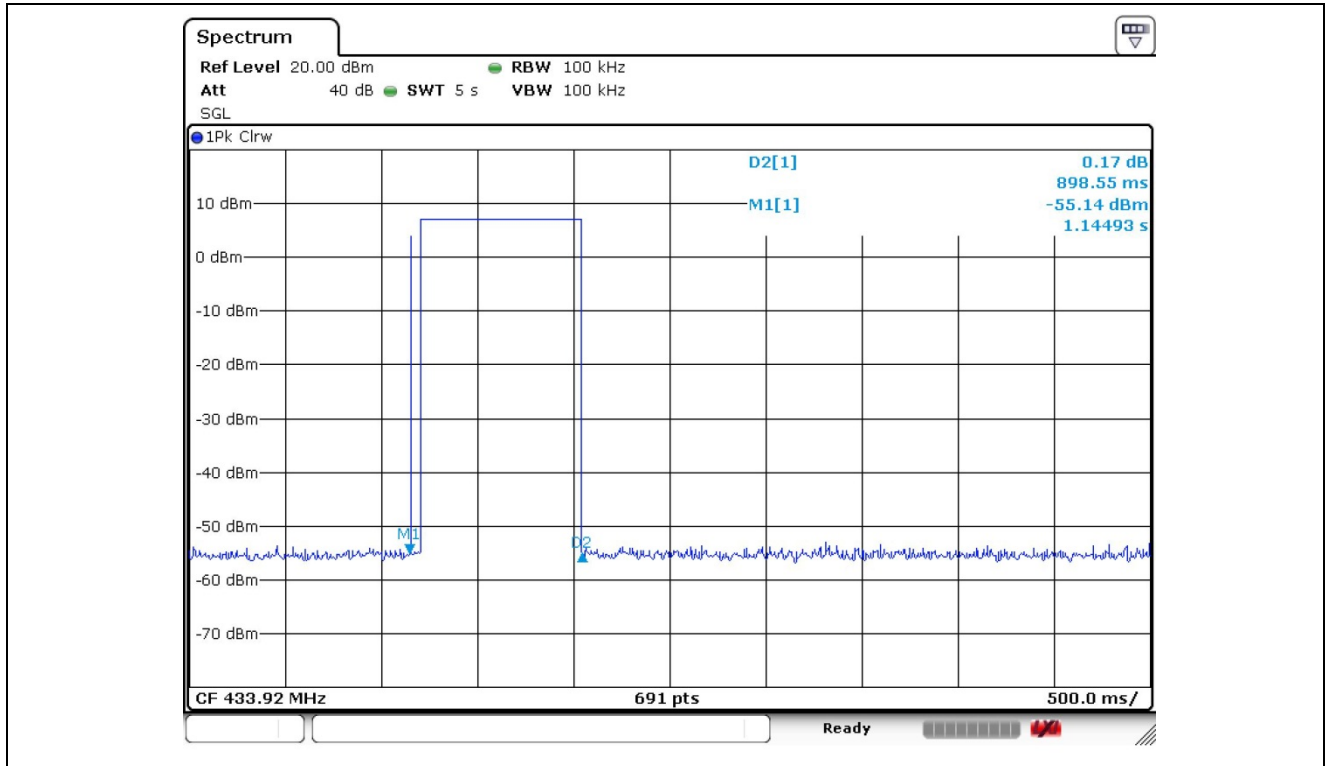
3.1.7 Test condition

- Test place: Shield Room
- Test mode: Normal Operation
- Test environment: 25 °C, 54 % R.H.

3.1.8 Limit and test result

Frequency (MHz)	Transmission Time (s)	Limit (s)
433.92	0.898	5.00

3.1.9 Plots of transmission time



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.

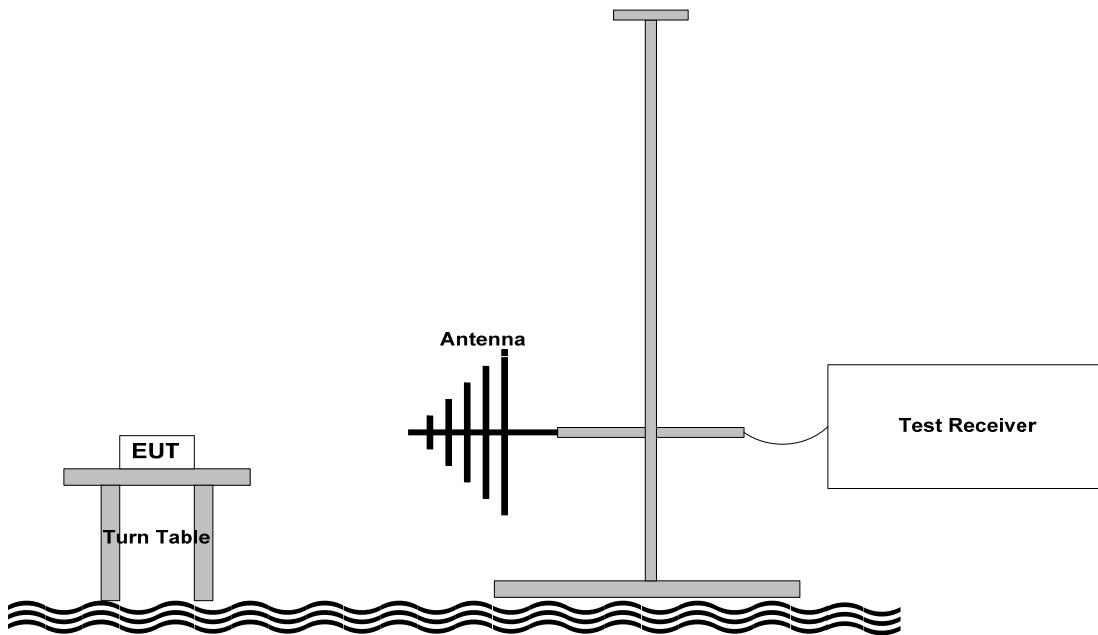
3.2.2 Specification

- 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	1WG1R-SH	SEGI Electronics Co., Ltd.
Test Receiver	ESCI	Rohde & Schwarz
Bi-conical Antenna	VHA9103	Schwarzbeck
Log Periodic Antenna	VULP9118A	Schwarzbeck
Horn Antenna	3115	EMCO

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 from 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

• Below 1 GHz

- Test place: Open area test site
- Test mode: Continuous Transmitting Mode
- Test environment: 27 °C, 62 % R.H.

• Above 1 GHz

- Test place: 3 m Chamber
- Test mode: Continuous Transmitting Mode
- Test environment: 24 °C, 49 % 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/m]	Limit [dBμV/m]	Margin [dB]
433.92	H	Y	Peak	65.94	16.31	3.04	0	-	85.29	100.80	15.51
			**AVG				-9.24		76.05	80.80	4.75
867.84	H	Y	Peak	32.43	22.85	4.07	0	-	59.35	80.80	21.45
			**AVG				-9.24		50.11	60.80	10.69
*1 301.76	H	Y	Peak	51.79	25.17	1.58	0	33.69	44.85	73.98	29.13
			**AVG				-9.24		35.61	53.98	18.37
1 735.68	H	Y	Peak	62.79	26.35	2.08	0	32.85	58.37	80.80	22.43
			**AVG				-9.24		49.13	60.80	11.67
2 169.60	H	Y	Peak	70.85	22.77	2.47	0	33.11	62.98	80.80	17.82
			**AVG				-9.24		53.74	60.80	7.06
2 603.52	H	Y	Peak	59.05	28.87	2.88	0	32.13	58.67	80.80	22.13
			**AVG				-9.24		49.43	60.80	11.37
3 037.44	H	Y	Peak	56.70	30.10	3.28	0	32.49	57.59	80.80	23.21
			**AVG				-9.24		48.35	60.80	12.45
3 471.36	H	Y	Peak	58.45	30.91	3.77	0	33.75	59.38	80.80	21.42
			**AVG				-9.24		50.14	60.80	10.66
*3 905.28	H	Y	Peak	46.63	32.18	4.30	0	35.15	47.96	73.98	26.02
			**AVG				-9.24		38.72	53.98	15.26
*4 339.20	H	Y	Peak	44.10	32.27	4.71	0	36.23	44.85	73.98	29.13
			**AVG				-9.24		35.61	53.98	18.37

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

3.2.9 Limit

• Fundamental (Average)

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

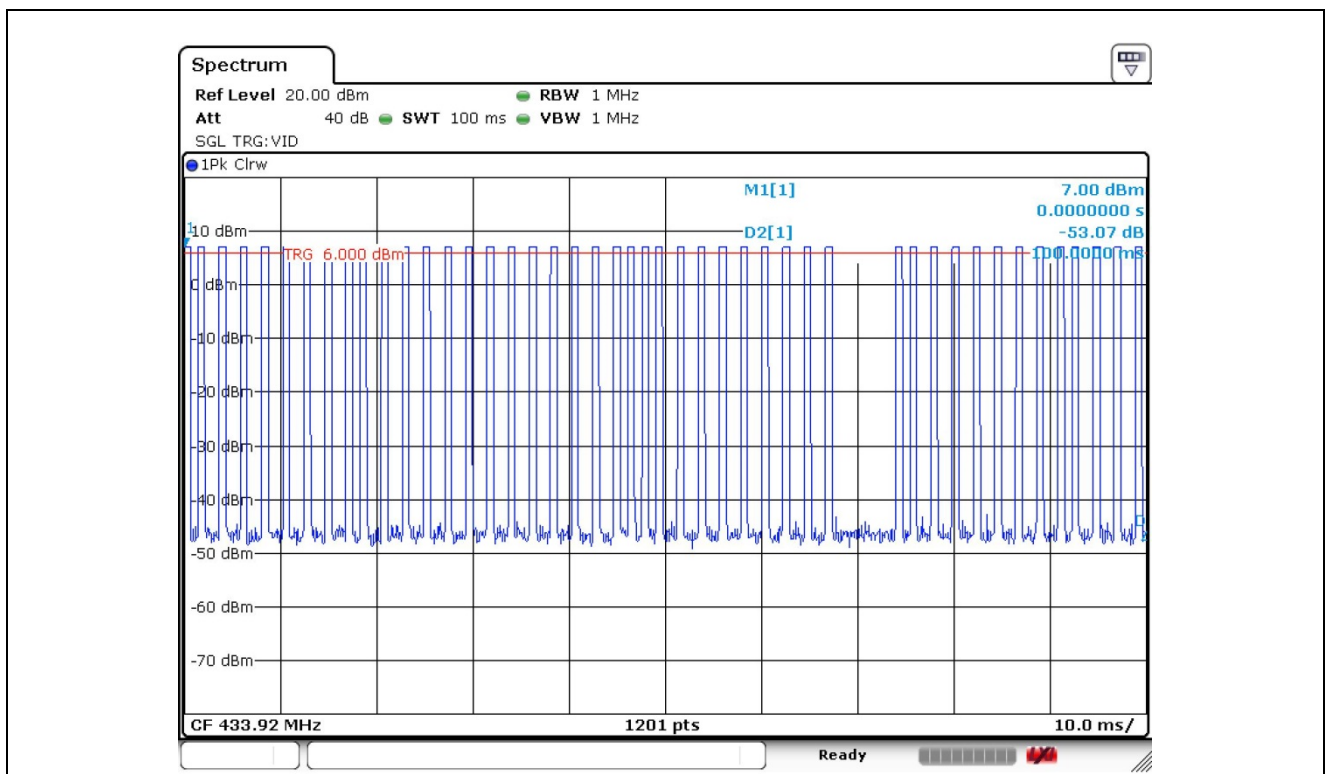
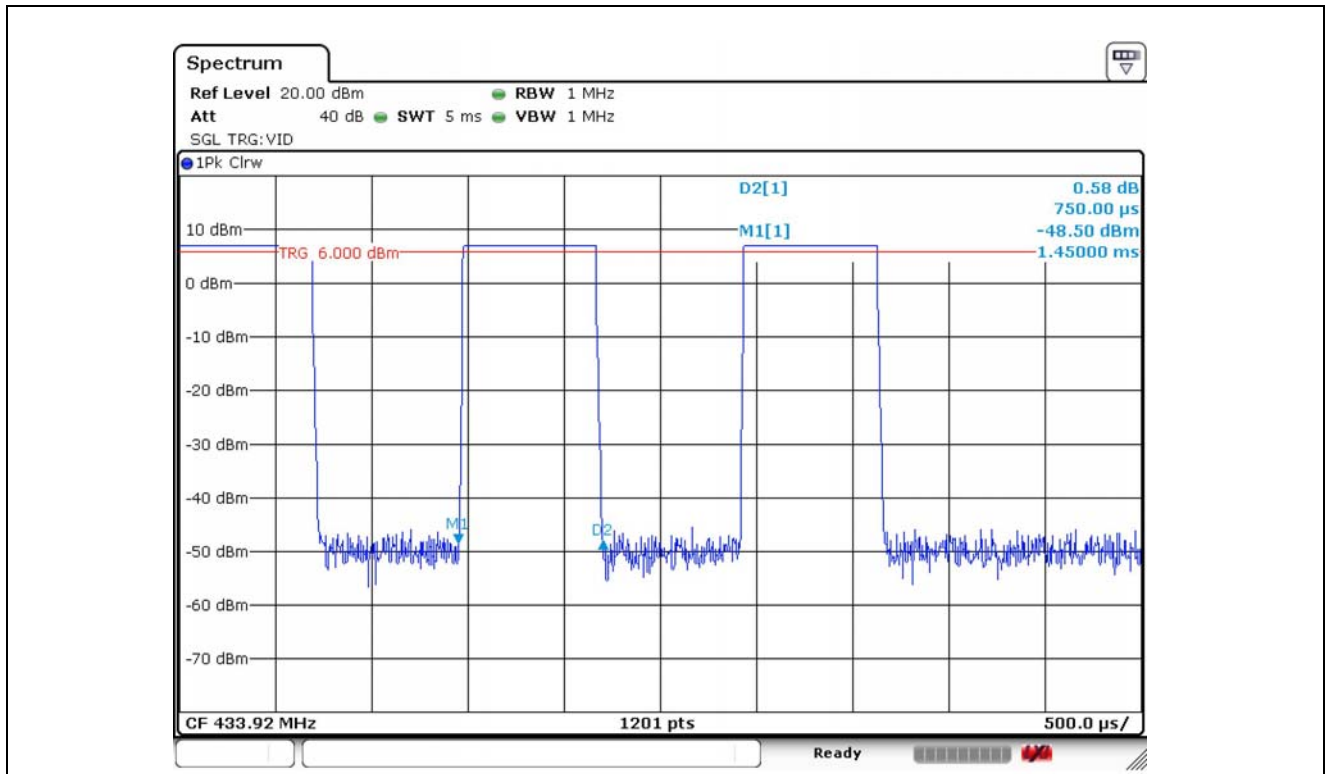
Frequency (MHz)	Field Strength (μV/m)	Field Strength (dBμV/m)	Measurement Distance (m)
0.009 – 0.490	2 400 / F(kHz)	48.52 to 13.80	300
0.490 – 1.705	24 000 / F(kHz)	33.80 to 22.97	30
1.705 – 30.0	30	29.54	30
30 – 88	100	40.00	3
88 – 216	150	43.52	3
216 – 960	200	46.02	3
Above 960	500	53.98	3

Here, restricted bands are 1 300 MHz to 1 427 MHz and 3 600 MHz to 4 400 MHz.

3.2.10 Duty Cycle

ON time[ms]	Cycle[ms]	Duty[ON time / Cycle]	Average Factor[dB]
0.75 X 46 = 34.5	100	0.345	-9.24

* Average Factor : $20 \log(34.5 \text{ ms} / 100 \text{ ms}) = -9.24 \text{ dB}$



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

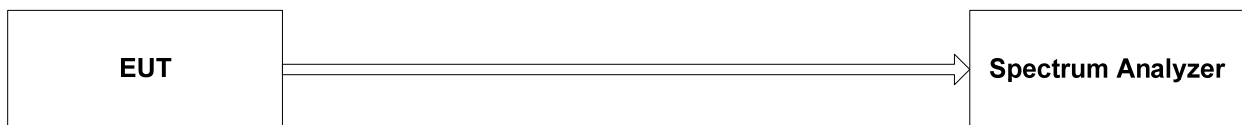
3.3.2 Specification

- 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	1WG1R-SH	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

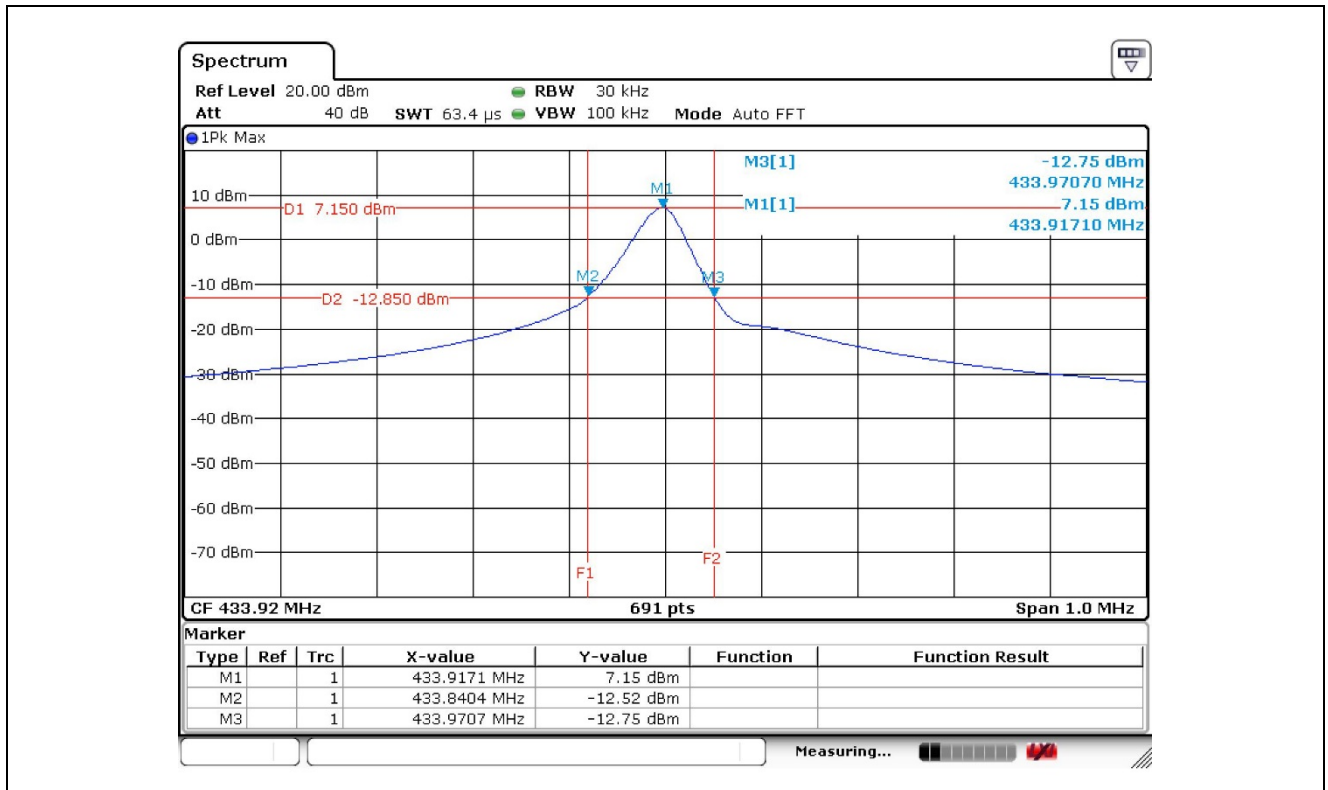
- Test Place: Shield Room
- Test Mode: Normal Operation
- Test environment: 25 °C, 54 %R.H.

3.3.8 Limit and test result

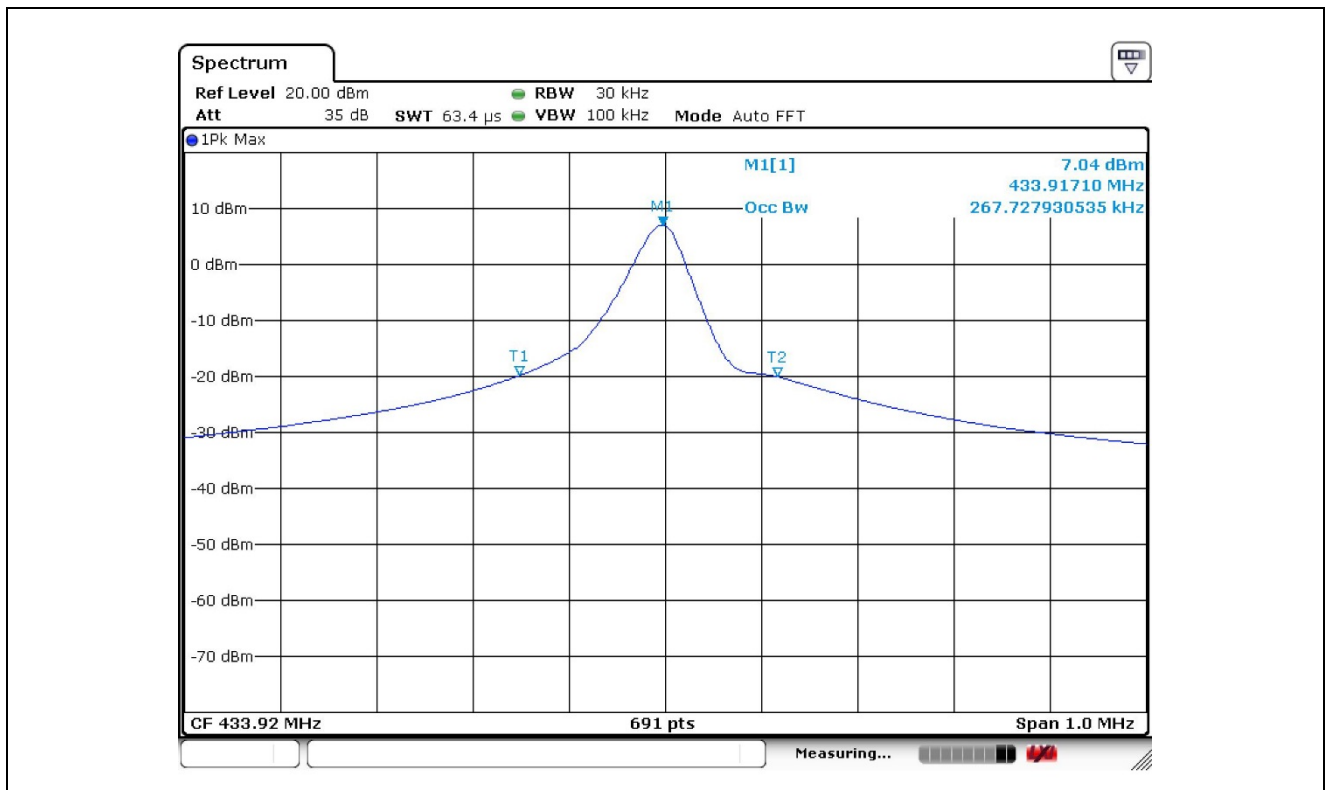
Frequency (MHz)	RBW (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)	Limit (MHz)
433.92	30 kHz	0.130	0.267	1.085

3.3.9 Plots of 20 dB bandwidth and 99% bandwidth

3.3.9.1 20 dB bandwidth



3.3.9.2 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	01/20/16
2	EMI Test Receiver	ESPI	R&S	101002	09/02/15
3	Biconical Antenna	VHA9103	Schwarzbeck	2217	11/15/15
4	Log-Periodic Antenna	VULP9118A	Schwarzbeck	382	11/15/15
5	Horn Antenna	3115	EMCO	9402-4229	07/15/16
6	Broadband Pre-AMP	AMP 1000-6000	Infinitetech	2013 05 00002/1	01/19/16
7	Turn Table	DS 1500 S-1t-O	Innco GmbH	N/A	N/A
8	Turn Table	ALL1.5TT	Airlinklab	N/A	N/A
9	Antenna Mast	ALL2.2MA	Airlinklab	N/A	N/A
10	Antenna Mast	MA4000-O	Innco GmbH	N/A	N/A