


TEST REPORT

Report Number		RAPA12-O-413
Type of Equipment		Keyless Entry System
Model Name		2W940R-SS
FCC ID		VA5JR940-2WSS
IC Number		7087A-R940WSS
Applicant	Name	SEGI LIMITED
	Logo	
	Address	Room 1808, 18/F, Tower 2, Admiralty Centre, 18 Harcourt Rd., Admiralty, Hong Kong
Manufacturer	Name	SEGI ELECTRONICS CO., LTD.
	Address	Chenjiapucun, Liaobu Town, Dongguan City, Guangdong Province, P.R.China
Date of reception		June 13, 2012
Date of test		June 13, 2012 to July 2, 2012
Date of issue		July 3, 2012
Total Page		25 pages (including this page)

SUMMARY

The equipment complies with FCC CFR 47 Part 15 Subpart C Section 15.247 and IC RSS-210 Issue8 Annex 8-2010.

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 3, 2012



Tested by **Chang Young Choi**
Deputy General Manager

Date : July 3, 2012



Reviewed by **Sukil Park**
Executive Managing Director

CONTENTS

1. General description of EUT	3
1.1 Applicant	3
1.2 Manufacturer	3
1.3 Basic description of EUT	3
1.4 Technical specification of EUT	4
2. General information of test	5
2.1 Standard for measurement method	5
2.2 Description of EUT modification	5
2.3 Test configuration	5
3. Measurement data	6
3.1 Radiated emission in restricted band	6
3.2 Frequency separation	9
3.3 Number of hopping channels	11
3.4 Occupied bandwidth	13
3.5 Average time of occupancy	17
3.6 Maximum peak output power	19
3.7 Conducted emission and band edge	22
4. Test equipment list	25

1. General description of EUT

1.1 Applicant

- Company name : SEGI LIMITED
- Address : Room 1808, 18/F, Tower 2, Admiralty Centre, 18 Harcourt Rd., Admiralty, Hong Kong
- 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 2-32-623-6667

1.3 Basic description of EUT

- Product name : Keyless Entry System
- Model name : 2W940R-SS
- Serial number : S000007
- Frequency : 910.92 MHz ~ 919.08 MHz
- Channel number : 25 Channels
- Modulation method : FHSS
- FCC Rule Part(s) : FCC CFR47 Part 15 Subpart C Section 15.247
- IC Rule Part(s) : IC RSS-210 Issue8 Annex 8-2010
- FCC classification : DTS / Part 15 Digital Transmission System
- IC classification : Annex 8 / Frequency Hopping and Digital Modulation Systems Operating in the bands 902 - 928 MHz, 2 400 - 2 483.5 MHz and 5 725 - 5 850 MHz
- Date of test : June 13, 2012 to July 2, 2012
- Date of issue : July 3, 2012
- Place of test : Head office

824, B104, Anyang Megavalley, 799, Gwanyang-dong,
Dongan-gu, Anyang-si, Gyeonggi-do, Korea, 483-060

Open area test site

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

(FCC Registration Number : 337229)

(IC Submission Number : 143881)

(KCC Designation Number : KR0027)

1.4 Technical specification of EUT

Model Name	2W940R-SS
Product Name	Keyless Entry System
Size(mm)	30.5 x 59.0 x 8.5 (W x L x H)
Battery Size	CR2450 Battery (DC 1.5 V)
Transmit Frequency	910.92 ~ 919.08 MHz (25 CH / 340 kHz Step)
Modulation Method	FHSS

2. General information of test

2.1 Standard for measurement methods

Applied Standard : FCC CFR47 Part 15 Subpart C, IC RSS-210 Issue8 Annex 8-2010				
FCC	IC	Description of Test	Limit	Result
15.209	RSS-210_2.2	Radiated emission in restricted band	Variation	Pass
15.247(a)(1)	RSS-210_A8.1_B	Frequency separation	≥ 20 dB Bandwidth	Pass
15.247(a)(1)(i)	RSS-210_A8.1_C	Number of hopping channels	≥ 25	Pass
15.247(a)(1)(i)	RSS-210_A8.1_C	Occupied bandwidth	≤ 500 kHz	Pass
15.247(a)(1)(i)	RSS-210_A8.1_C	Average time of occupancy	≤ 0.4 s within 10 s	Pass
15.247(b)(2)	RSS-210_A8.4_1	Maximum peak output power	≤ 0.25 Watt	Pass
15.247(d)	RSS-210_A8.5	Conducted emission and band edge	≥ 20 dBc	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	2W940R-SS	S000007	SEGI Electronics Co., Ltd.	VA5JR940-2WSS	7087A-R940WSS

• Type of cable used

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

3. Measurement data

3.1 Radiated emission in restricted band

3.1.1 Definitions

A radiated emission is a emission from the equipment when transmitting into a non-radiating load on frequencies that are restricted band sufficient to ensure transmission of information of required quality for the class of communications desired.

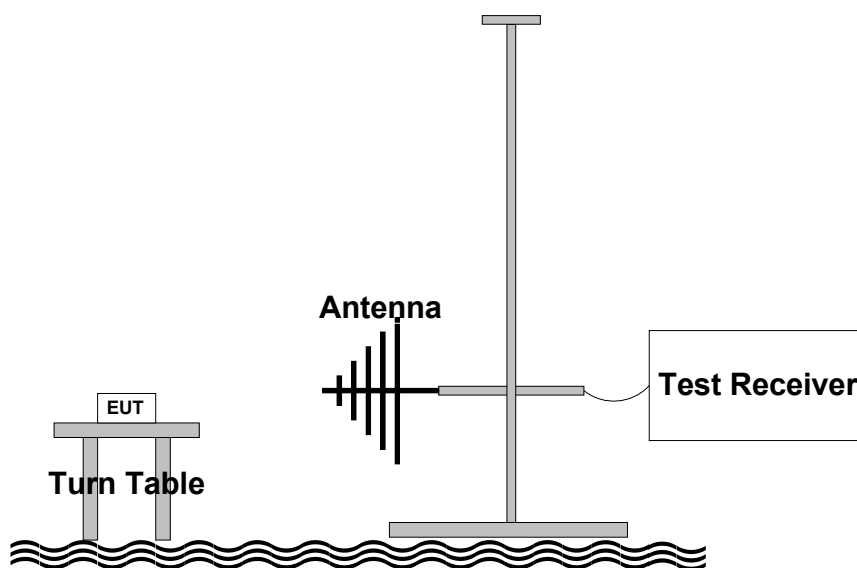
3.1.2 Specification

FCC Rules Part 15 Subpart C Section 15.209
IC Rules RSS-210 2.2

3.1.3 Measurement method

The device ANSI Standard C63.4-2009 8.3

3.1.4 Set-Up



3.1.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W940R-SS	SEGI Electronics Co., Ltd.
Spectrum Analyzer	N9020A	Agilent
Loop Antenna	EMCO 6502	EMCO
Bi-conical Antenna	VHA9103	Schwarzbeck
Log Periodic Antenna	VULP9118A	Schwarzbeck
Horn Antenna	BBHA-9120D	Schwarzbeck
Pre-Amplifier	SCU-01	R&S
Pre-Amplifier	ESMI-Z7	R&S

3.1.6 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 4 GHz.

3.1.7 Test condition

- Test place : Open area test site
- Test mode : Normal operation
- Test environment : 21 °C, 52 % R.H.

3.1.8 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]	Pre-Amp Gain [dB]	Emission Level [dBμV]	Limit [dBμV]	Margin [dB]
910.92	V	Y	Peak	109.2	22.6	9.2	40.5	100.5	100.5	-
1821.84	H	Y	Peak	24.3	24.9	18.3	16.6	50.9	80.5	29.6
All emission is not within restricted band.										
915.00	V	Y	Peak	109.2	22.6	9.2	40.5	100.5	100.5	-
1830.00	H	Y	Peak	33.0	24.9	18.3	16.6	59.6	80.5	20.9
All emission is not within restricted band.										
919.08	V	Y	Peak	108.4	22.6	9.2	40.5	99.7	99.7	-
1838.16	H	Y	Peak	34.1	24.9	18.3	16.6	60.7	79.7	19.0
All emission is not within restricted band.										

No emission found in restricted bands.

3.1.9 Limit

Frequency (MHz)	Field Strength ($\mu\text{V/m}$)	Field Strength (dB $\mu\text{V/m}$)	Measurement Distance (m)
0.009 – 0.490	$2\,400 / F(\text{kHz})$	48.52 to 13.80	300
0.490 – 1.705	$2\,4000 / F(\text{kHz})$	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 470	500	53.98	3

3.2 Frequency separation

3.2.1 Definitions

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

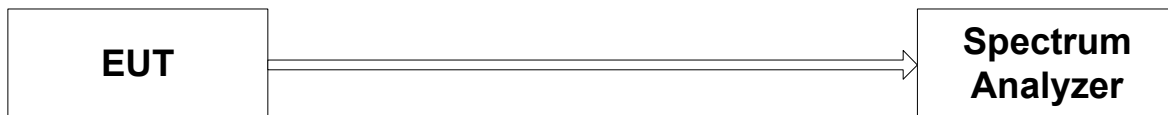
3.2.2 Specification

FCC Rules Part 15 Subpart C Section 15.247(a)(1)
IC Rules RSS-210 Issue8 Annex 8-2010 A8.1B

3.2.3 Measurement method

Public notice "DA00-705"

3.2.4 Set-Up



3.2.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W940R-SS	SEGI Electronics Co., Ltd.
Spectrum Analyzer	N9020A	Agilent

3.2.6 Test procedure

The output of EUT was connected to the spectrum analyzer.
The Hopping channel separation is defined as the channel is separated with next channel.

3.2.7 Test condition

- Test place: Shield room
- Test mode: Normal operation
- Test environment: 26 °C, 49 % R.H.

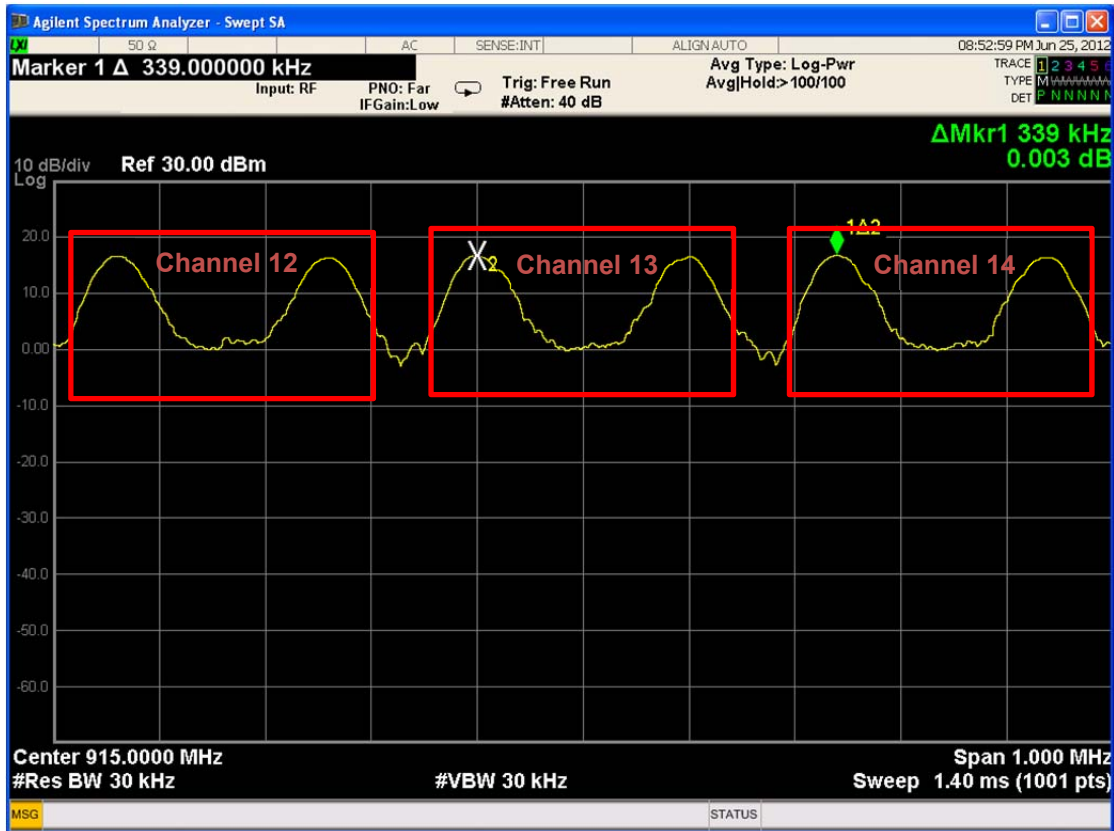
3.2.8 Test result

Channel	Frequency Separation (kHz)	20 dB Bandwidth (kHz)	Limit (kHz)
Full hopping	339.0	287.6	≥ 287.6

3.2.9 Limit

More than 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

3.2.10 Plots of Frequency Separation



3.3 Number of hopping channels

3.3.1 Definitions

For frequency hopping, systems are operating in the 902 MHz - 928 MHz employing at least 25 hopping channels.

3.3.2 Specification

FCC Rules Part 15, Subpart C, Section 15.247(a)(1)(i)
IC Rules RSS-210 Issue8 Annex 8-2010 A8.1 C

3.3.3 Measurement methods

Public Notice "DA00-705"

3.3.4 Set-Up



3.3.5 Test equipment list

Equipment	Model Name	Manufacture
EUT	2W940R-SS	SEGI Electronics Co., Ltd.
Spectrum Analyzer	N9020A	Agilent

3.3.6 Test procedure

The output of EUT was connected to the spectrum analyzer.

The Hopping channel separation is defined as the channel is separated with next channel.

3.3.7 Test condition

- Test Place: Shield Room
- Test Mode: Normal Operation
- Test environment: 26 °C, 49 %R.H.

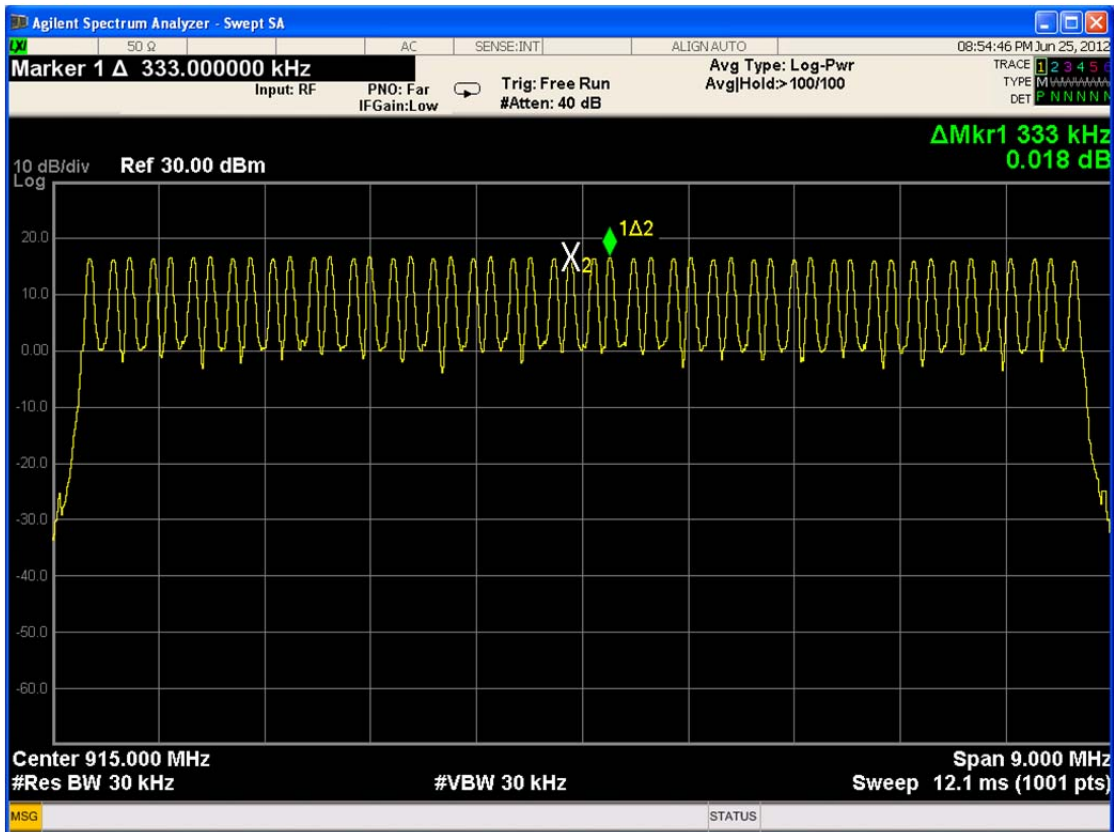
3.3.8 Test result

Number of hopping channels	Limit
25	≥ 25

3.3.9 Limit

The system shall use at least 25 hopping frequencies.

3.3.10 Plots of number of hopping channels



3.4 Occupied bandwidth

3.4.1 Definitions

An occupied 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

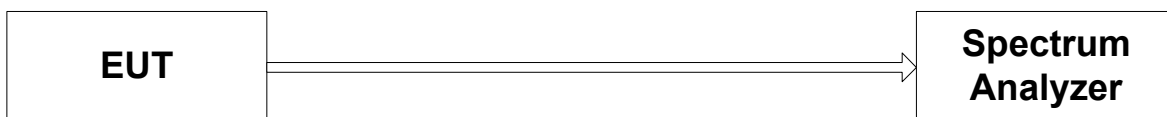
3.4.2 Specification

FCC Rules Part 15 Subpart C Section 15.247(a)(1)(i)
IC Rules RSS-210 Issue8 Annex 8-2010 A8.1 C

3.4.3 Measurement method

ANSI/TIA-603-D-2010 Section 2.2.11

3.4.4 Set-Up



3.4.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W940R-SS	SEGI Electronics Co., Ltd.
Spectrum Analyzer	N9020A	Agilent

3.4.6 Test procedure

The output of EUT was connected to the spectrum analyzer.

Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level.

- RBW: 30 kHz, VBW: 100 kHz, Max Hold

3.4.7 Test condition

- Test Place: Shield Room
- Test Mode: Normal Operation
- Test environment: 26 °C, 49 % R.H.

3.4.8 Test result

Frequency (MHz)	20 dB Bandwidth (MHz)	99% Bandwidth (MHz)
910.92	287.3	281.9
915.00	287.6	283.0
919.08	287.4	282.4

3.4.9 Plots of occupied bandwidth at channel 1 (910.92 MHz)



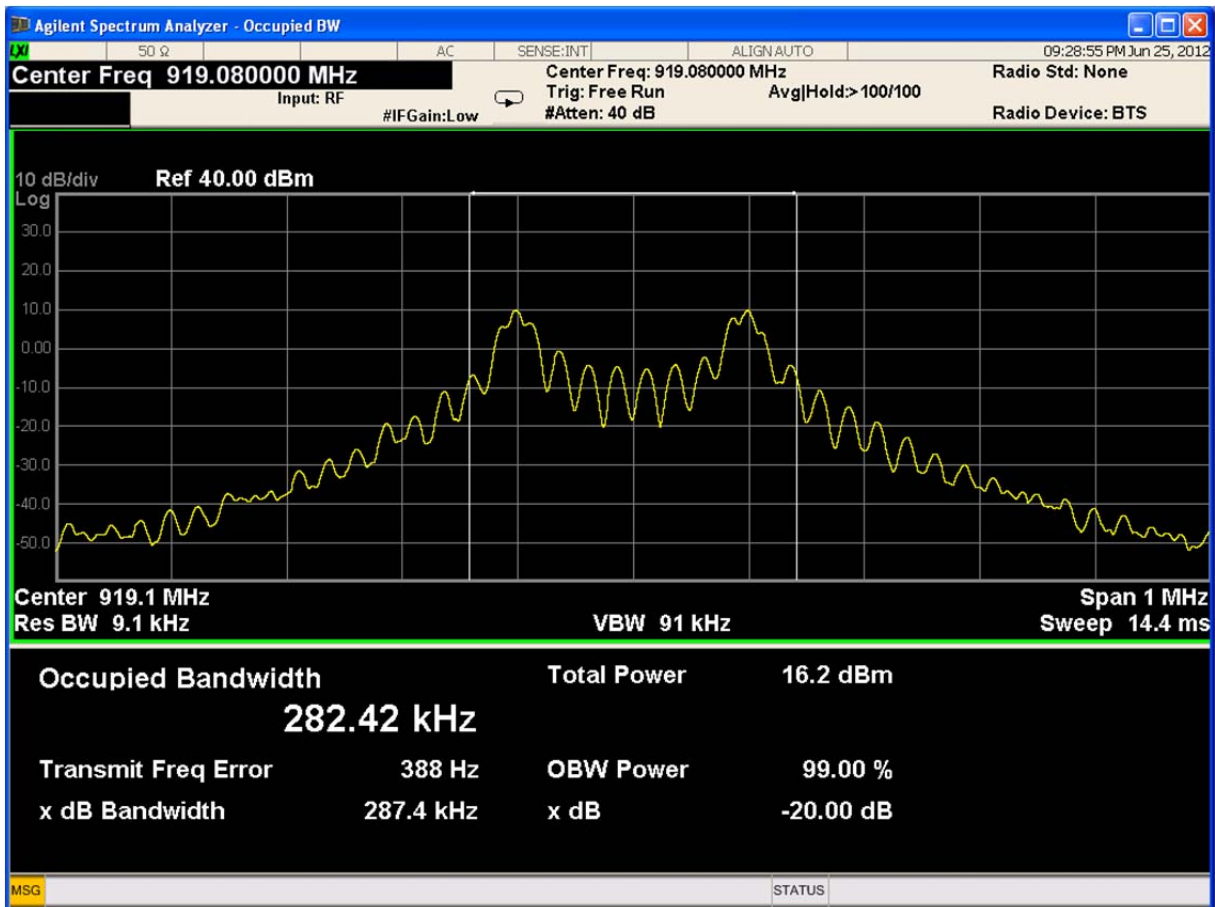
- 20 dB bandwidth: 287.3 kHz
- 99 % bandwidth: 281.85 kHz

3.4.10 Plots of occupied bandwidth at channel 13 (915.00 MHz)



- 20 dB Bandwidth: 287.6 kHz
- 99 % Bandwidth: 282.95 kHz

3.4.11 Plots of occupied bandwidth at channel 25 (919.08 MHz)



- 20 dB Bandwidth: 287.4 kHz
- 99 % Bandwidth: 282.42 kHz

3.5 Average time of occupancy

3.5.1 Definitions

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a 10 second period.

3.5.2 Specification

FCC Rules Part 15 Subpart C Section 15.247(a)(1)(i)
IC Rules RSS-210 Issue8 Annex 8-2010 A8.1 C

3.5.3 Measurement method

Public Notice "DA 00-705"

3.5.4 Set-Up



3.5.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W940R-SS	SEGI Electronics Co., Ltd.
Spectrum Analyzer	N9020A	Agilent

3.5.6 Test procedure

The output of EUT was connected to the spectrum analyzer.
RBW: 30 kHz, VBW: 3 kHz, Sweep Time: 10 s

3.5.7 Test condition

- Test Place: Shield Room
- Test Mode: Normal Operation
- Test environment: 26 °C, 49 %R.H.

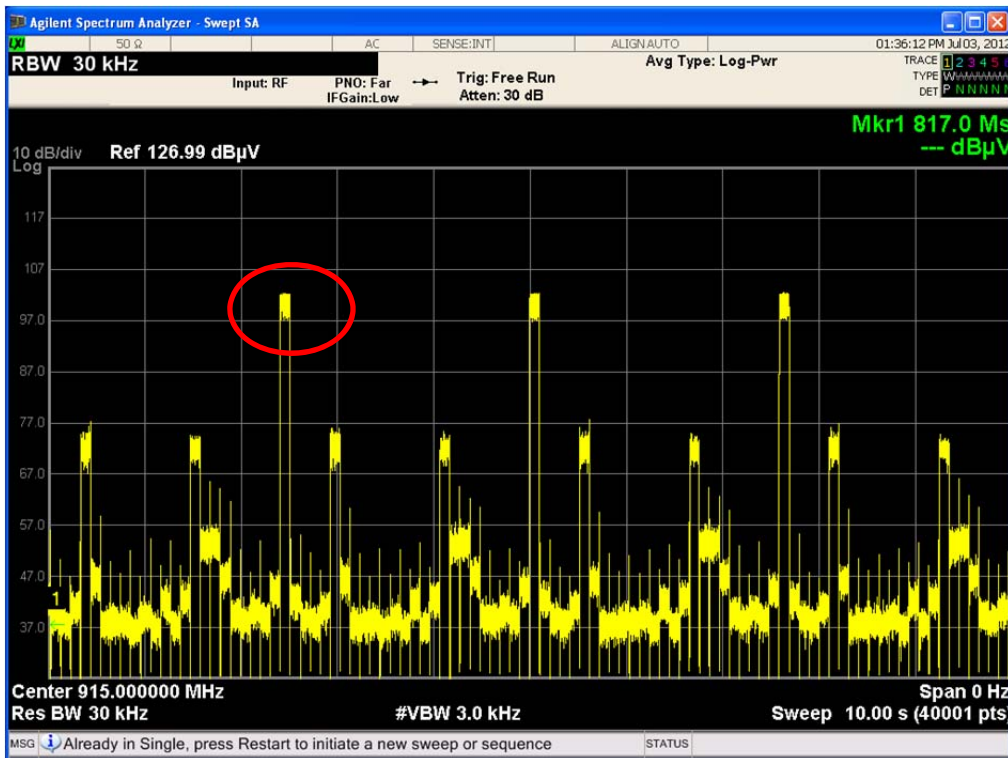
3.5.8 Test result

Dwell Time (ms)	Limit (ms)
297	400

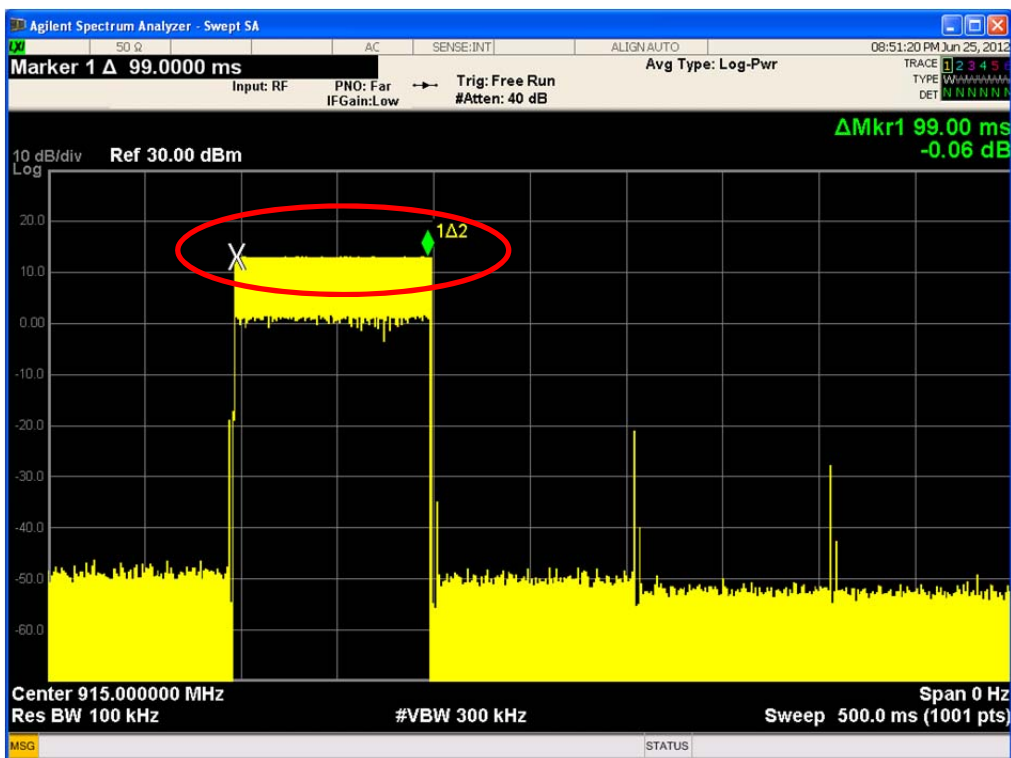
3.5.9 Limit

Less than 0.4 s within 10 seconds period.

3.5.10 Plots of channel occupation within 10 second period



At one time press button to transmit data of 3 channels



- 1 Channel duration time : 99 ms
- Channel occupation within 10 Second Period = 99 ms X 3 = 297 ms

3.6 Maximum peak output power

3.6.1 Definitions

Maximum conducted output power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level.

3.6.2 Specification

FCC Rules Part 15 Subpart C Section 15.247(b)(2)
IC Rules RSS-210 Issue8 Annex 8-2010 A8.4_1

3.6.3 Measurement method

Public Notice "DA 00-705"

3.6.4 Set-Up



3.6.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W940R-SS	SEGI
Spectrum Analyzer	N9020A	Agilent

3.6.6 Test procedure

The output of EUT was connected to the spectrum analyzer.
RBW: 1 MHz, VBW: 1 MHz, Max Hold

3.6.7 Test condition

- Test Place: Shield Room
- Test Mode: Normal Operation
- Test environment: 26 °C, 49 % R.H.

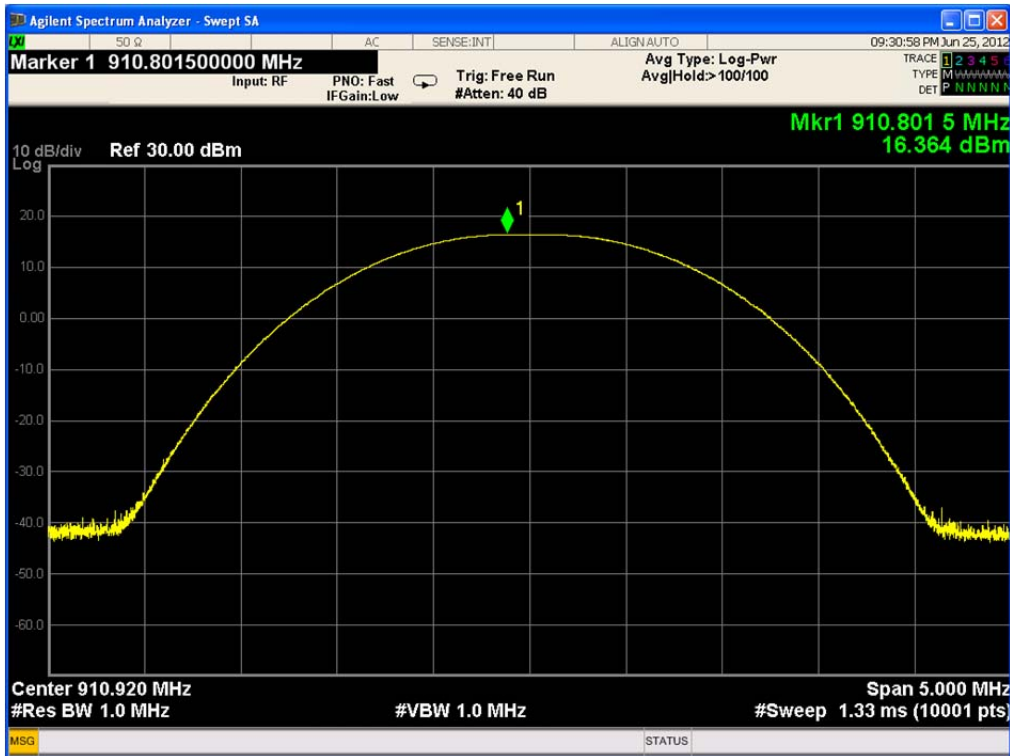
3.6.8 Test result

Frequency (MHz)	Peak Output Power (mW)	Limit (mW)
910.92	43.29	250.00
915.00	44.58	250.00
919.08	42.53	250.00

3.6.9 Limit

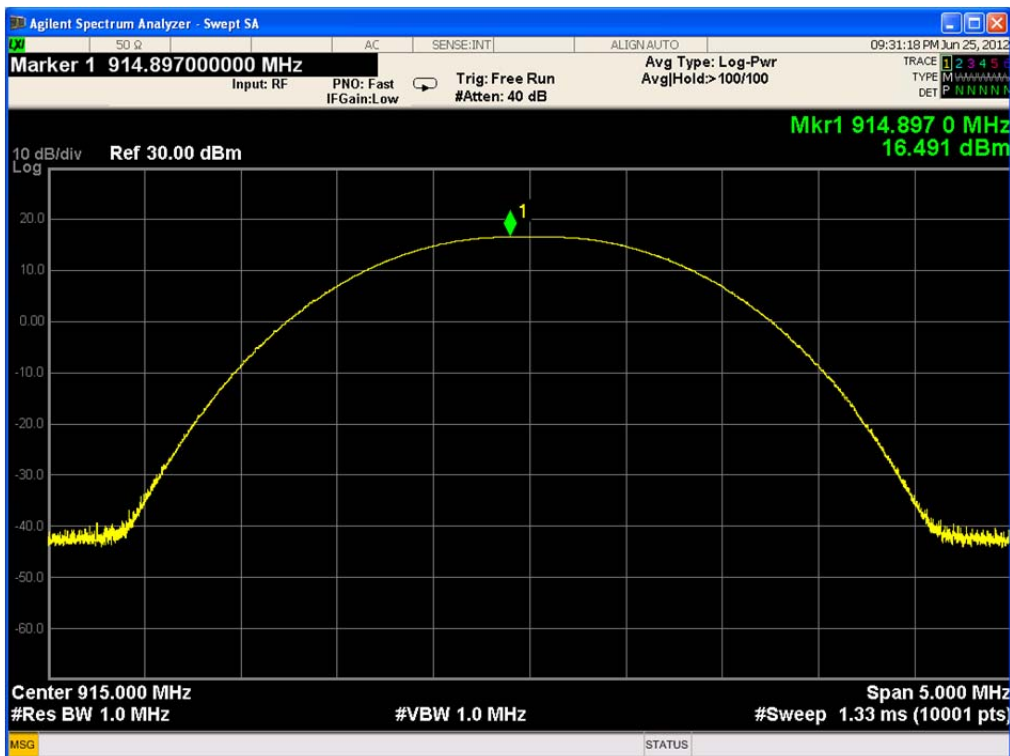
Less than 0.25 Watt

3.6.10 Plots of peak output power at channel 1



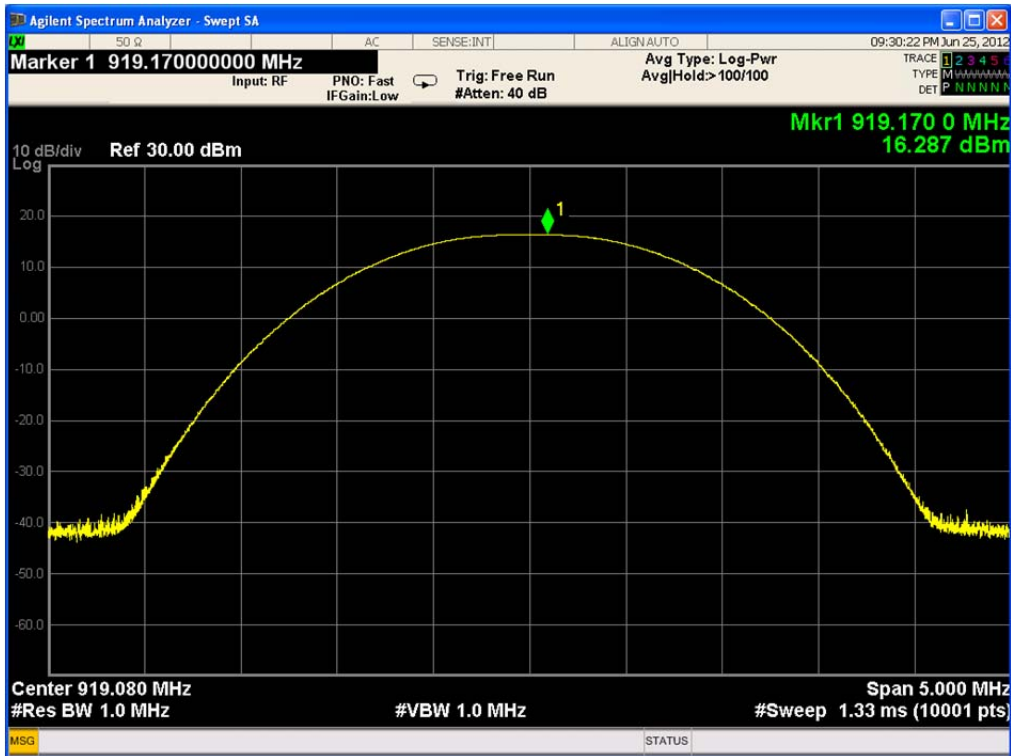
Channel 1 : 16.364 dBm (43.29 mW)

3.6.11 Plots of peak output power at channel 13



Channel 13 : 16.491 dBm (44.58 mW)

3.6.12 Plots of peak output power at channel 25



Channel 25 : 16.287 dBm (42.53 mW)

3.7 Conducted emission and band edge

3.7.1 Definitions

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on RF conducted measurement.

3.7.2 Specification

FCC Rules Part 15 Subpart C Section 15.247(d)
IC Rules RSS-210 Issue8 Annex 8-2010 A8.5

3.7.3 Measurement method

Public Notice "DA 00-705",
ANSI/TIA-603-D-2010 Section 2.2.13

3.7.4 Set-Up



3.7.5 Test equipment list

Equipment	Model Name	Manufacturer
EUT	2W940R-SS	SEGI Electronics Co., Ltd.
Spectrum Analyzer	N9020A	Agilent

3.7.6 Test procedure

The output of EUT was connected to the spectrum analyzer.
RBW: 100 kHz, VBW: 100 kHz, Max Hold

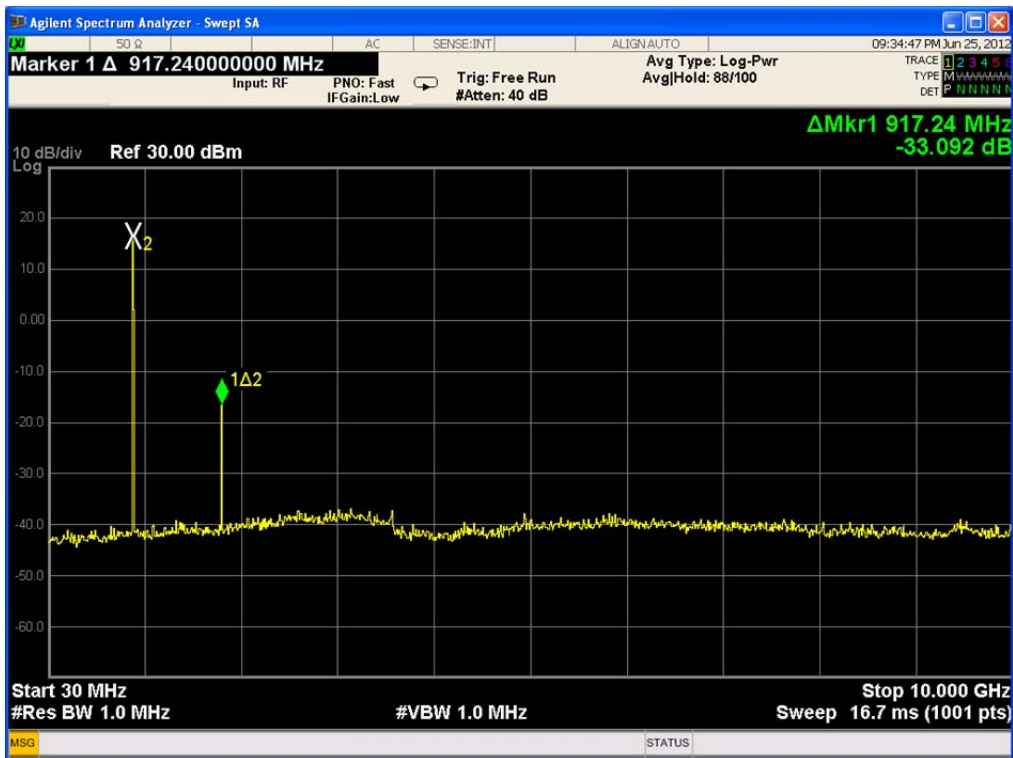
3.7.7 Test condition

- Test Place: Shield Room
- Test Mode: Normal Operation
- Test environment: 26 °C, 49 %R.H.

3.7.8 Limit

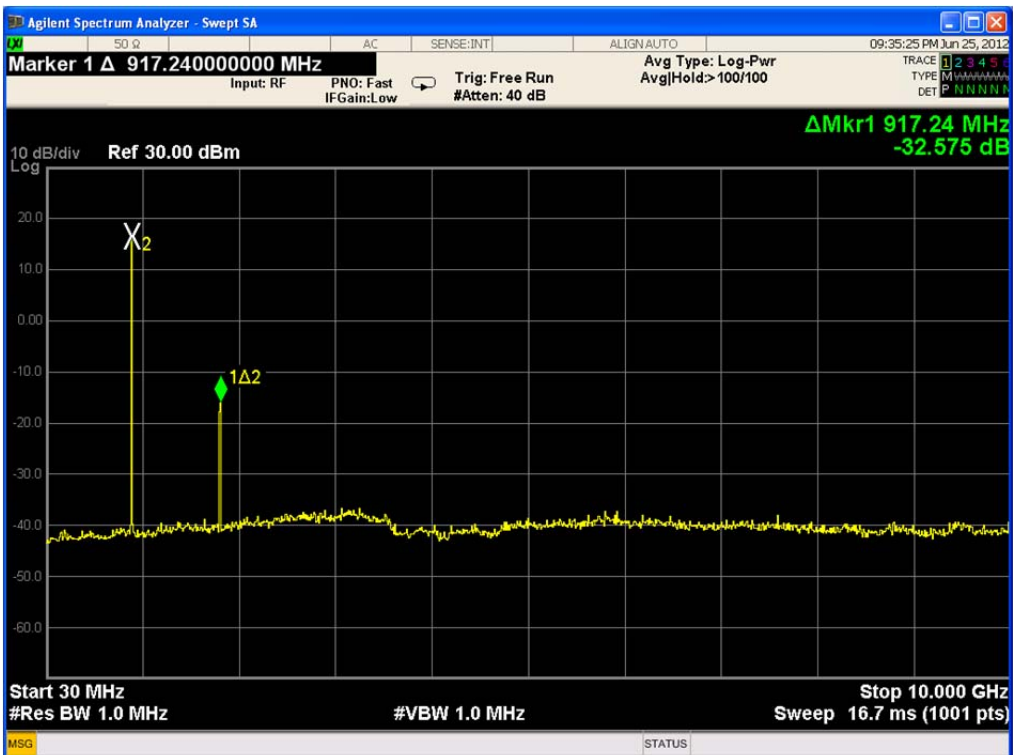
Less than 20 dBc

3.7.9 Plots of peak output power at channel 1



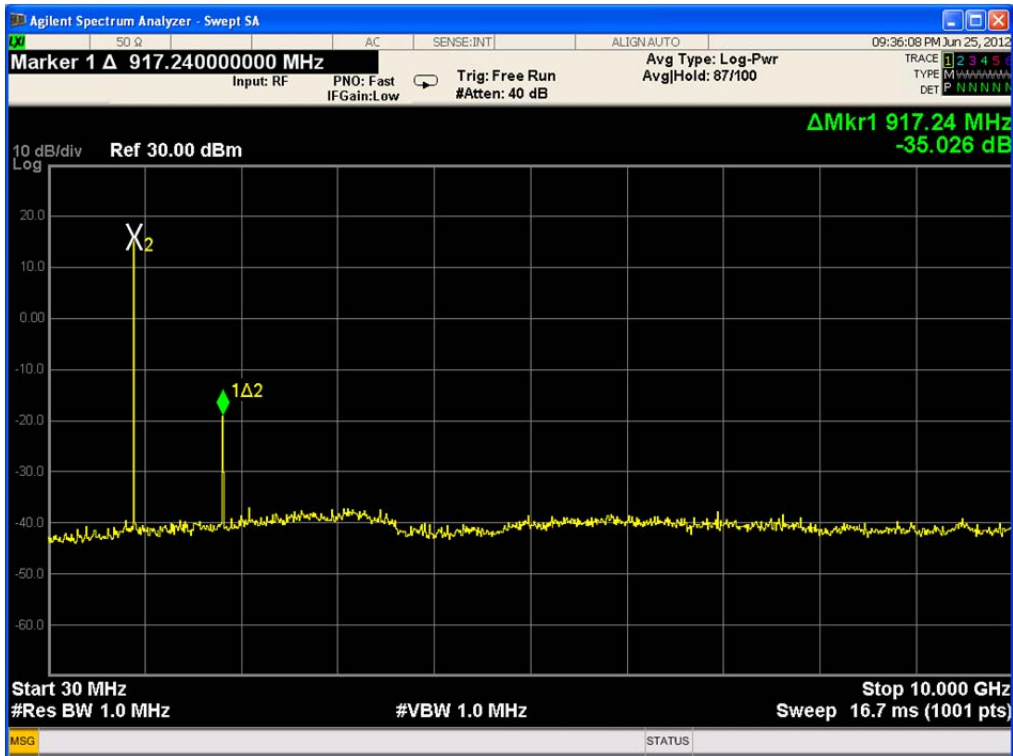
Channel 1 : 33.09 dBc (Worst case is 2nd Harmonic)

3.7.10 Plots of peak output power at channel 13



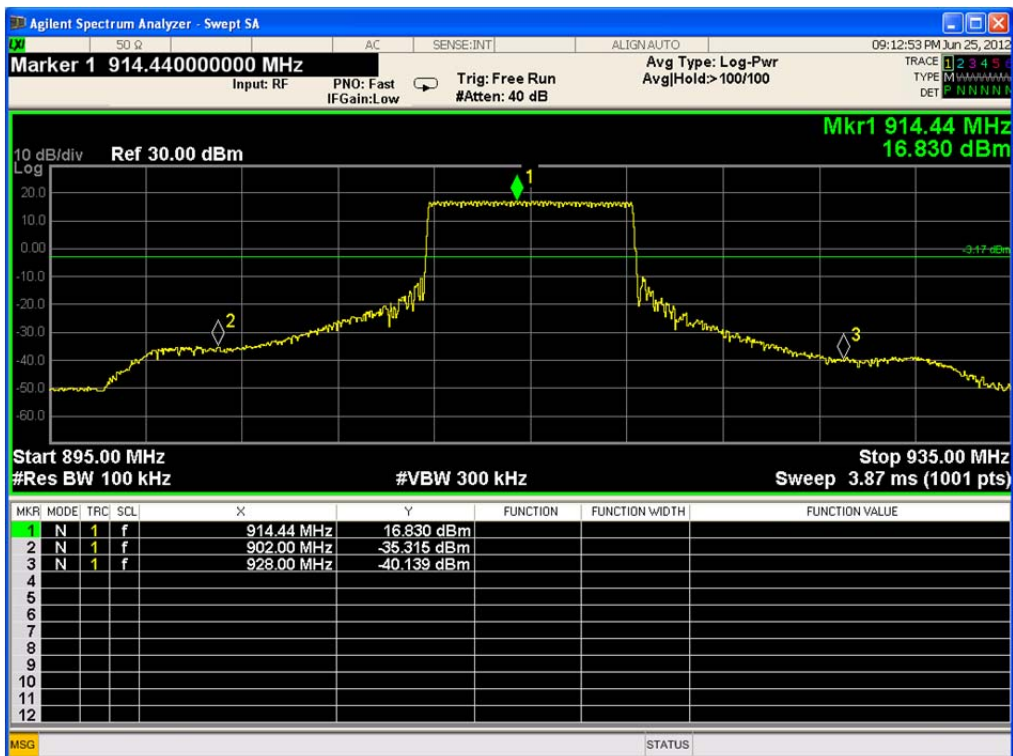
Channel 13 : 32.58 dBc (Worst case is 2nd Harmonic)

3.7.11 Plots of peak output power at channel 25



Channel 25 : 35.03 dBc (Worst case is 2nd Harmonic)

3.7.12 Plots of band edge at full hopping mode



Lower : 52.15 dBc

Upper : 56.97 dBc

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	N9020A	Agilent	MY48010456	03/10/13
2	Biconical Antenna	BBAK9137	Schwarzbeck	2217	11/29/12
3	Log-Periodic Antenna	VULP9118A	Schwarzbeck	382	11/29/12
4	Horn Antenna	BBHA 9120 D	Schwarzbeck	395	08/13/12
5	Pre-Amplifier	SCU-01	R&S	383521	09/28/12
6	Pre-Amplifier	ESMI-Z7	R&S	N/A	12/29/12
7	Turn Table	N/A	Daeil EMC	N/A	N/A
8	Antenna Mast	EAM4.5	Daeil EMC	N/A	N/A
9	Controller	DE200	Daeil EMC	AAA69813111	N/A