

TEST REPORT

Report Number		RAPA13-O-732
Type of Equipment		Keyless Entry System
Model Name		RED301-1WAY
FCC ID		VA5RED301-1WSS
IC Number		7087A-1WRED301SS
	Name	SEGI LIMITED
Applicant	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
Manufacturer	Address	Chenjiapucun, Liaobu Town, Dongguan City, Guangdong Province, P.R.China
Test period		October 28, 2013 to November 13, 2013
Issuing date of r	eport	November 21, 2013
Total page		39 pages (including this page)

SUMMARY

The equipment complies with FCC Part 15.247: Operation within the bands 902 MHz to 928 MHz, 2 400 MHz to 2 483.5 MHz, and 5 725 MHz to 5 850 MHz 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 : November 21, 2013

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Prepared and tested by Tae Yang Yoon Manager / TCL of RAPA

Date : November 21, 2013

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Reviewed by Sukil Park Executive Managing Director / TCL of RAPA



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1. GENERAL DESCRIPTION

1.1 Applicant

 Company name 	:	SEGI LIMITED								
• Address	:	NIT F, 7/F, CENTURY INDUSTRIAL CENTER, 33-35 AU PUI WAN TREET, SHANTIN, NT, HONGKONG								
 Contact person 	:	i 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 E	UT									

Product name : Keyless Entry System Model name : RED301-1WAY Serial number : N/A • Frequency : 910.92 MHz ~ 919.08 MHz • Number of channel(s) : 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 DSS / Part 15 Spread Spectrum Transmitter (FHSS) 5 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 • Test period : October 28, 2013 to November 13, 2013 • Issuing date of report November 21, 2013 1 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 Electrical specification

Item	Specifications
Type of Equipment	Keyless Entry Remote
Model Name	RED301-1WAY
Transmit Frequency	910.92 MHz ~ 919.08 MHz (25 CH / 340 kHz Step)
Receive Frequency	-
Modulation Method	FHSS
Power Source	6.0 Vdc (CR2025 * 2)
Size (mm)	28.4 x 46.6 x 9.3 mm (L x H x W)



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	Limit	Result							
15.209	RSS-210_2.2	Radiated Emission in Restricted Band	See 15.207	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 CH	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 & Band Edge	≥ 20 dBc	Pass						

2.2 Description of EUT modification

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

2.3 Description of test system configuration

• Peripheral equipment used;

Description	Model name	name Serial No. Manufacturer		FCC ID	IC Number	
EUT	RED301-1WAY	N/A	SEGI	VA5RED301-1WSS	7087A-1WRED301SS	

Cables used

Device from	Device to	Type of cable	Type of connector	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.

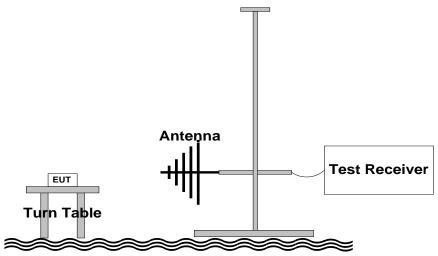
3.1.2 Specification

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

3.1.3 Measurement method

• ANSI Standard C63.4-2003 8.3

3.1.4 Set-up



3.1.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	RED301-1WAY	SEGI
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



3.1.6 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 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 to 3 orthogonal planes.

The RBW of test receiver is 120 kHz between 30 to 1 000 MHz, and 1 MHz above 1 GHz.

3.1.7 Test condition

- Test place : Open area test site
- Test environment : 24.1 °C, 53 % R.H.
- Test mode : Operation at single channel

3.1.8 Limit

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	2 4000 / 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

Remark: Radiated emissions which fall in the restricted bands must also comply with the limits as this table.



3.1.9 Test result

Operation frequency: 910.92 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]		Reading [dBµV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBµV]	Limit [dBµV]	Margin [dB]
910.92	Н	Y	Peak	78.9	22.6	4.1	0	105.6	-	-
910.92	Н	Y	AVG	75.0	22.6	4.1	0	101.7	-	-

Operation frequency: 915.00 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]		Reading [dBµV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBµV]	Limit [dBµV]	Margin [dB]
915.00	Н	Y	Peak	79.0	22.6	4.1	0	105.7	-	-
915.00	Н	Y	AVG	72.5	22.6	4.1	0	99.2	-	-

Operation frequency: 919.08 MHz

Frequency [MHz]	Pol. [H/V]	Plane [X/Y/Z]	Detect mode [Peak/AVG]	Reading [dBµV]	Antenna factor [dB/m]	Cable loss [dB]	Pre-amp gain [dB]	Emission level [dBµV]	Limit [dBµV]	Margin [dB]
919.08	Н	Y	Peak	77.9	22.6	4.1	0	104.6	-	-
919.08	Н	Y	AVG	69.6	22.6	4.1	0	96.3	-	-

Remark: The other emissions were not detected.



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 A8.1 B

3.2.3 Measurement method

• Public Notice "DA 00-705"

3.2.4 Set-up



3.2.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	RED301-1WAY	SEGI LIMITED
Spectrum analyzer	FSV	Rohde & Schwarz

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 : Test room
- Test environment : 22.5 °C, 43 % R.H.
- Test mode : Operation at full hopping

3.2.8 Test result

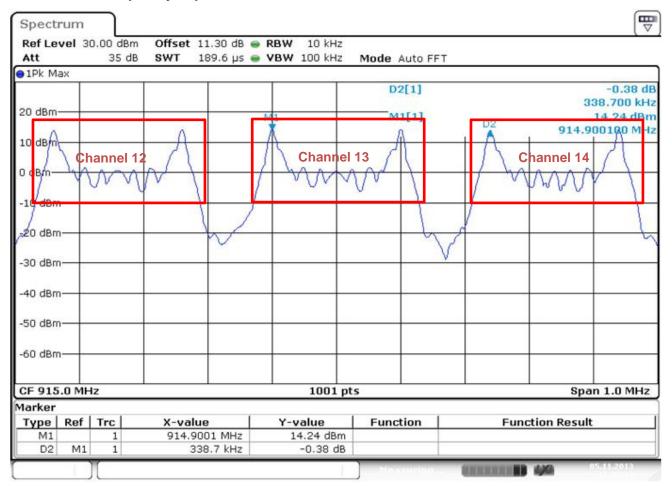
Channel	Frequency separation [kHz]	Limit [kHz]
Full hopping	338.7	≥ 270.6

Remark: For the limit value, please refer to the maximum 20 dB Bandwidth value of section 3.4.8 in this report.



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3.2.9 Plots of frequency separation



Operating frequency :	Full hopping
RBW :	10 kHz
VBW :	100 kHz
Detector mode :	Peak
Trace mode :	Max hold
Sweep time :	Auto

Frequency separation : 338.7 kHz



3.3 Number of hopping channels

3.3.1 Definitions

Frequency hopping systems operating in the 902 MHz - 928 MHz should employ 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 method

• Public Notice "DA 00-705"

3.3.4 Set-up



3.3.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	RED301-1WAY	SEGI LIMITED
Spectrum analyzer	FSV	Rohde & Schwarz

3.3.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Measure the hopping channels of EUT using spectrum analyzer.
- With the analyzer set to max hold readings were taken for 1 ~ 2 minutes in each band.

3.3.7 Test condition

- Test place : Test room
- Test environment : 22.5 °C, 43 % R.H.
- Test mode : Operation at full hopping

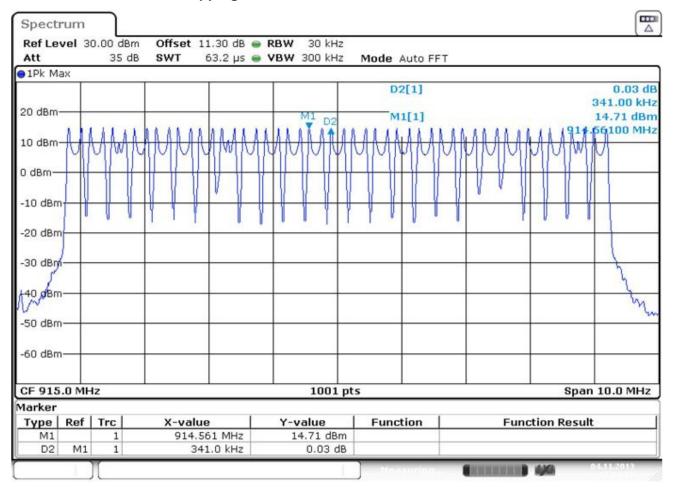
3.3.8 Test result

Channel	Number of hopping channels	Limit
Full hopping	25	≥ 25 Channels



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3.3.9 Plots of number of hopping channels



Operating frequency :	Full hopping
<u>RBW :</u>	30 kHz
<u>VBW :</u>	300 kHz
Detector mode :	Peak
<u>Trace mode :</u>	Max hold
Sweep time :	Auto

Number of hopping channels : 25



3.4 Occupied bandwidth

3.4.1 Definitions

A 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

• Public Notice "DA 00-705"

3.4.4 Set-up



3.4.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	RED301-1WAY	SEGI LIMITED
Spectrum analyzer	FSV	Rohde & Schwarz

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.

3.4.7 Test condition

- Test place : Test room
- Test environment : 22.5 °C, 43 % R.H.
- Test mode : Operation at single channel

3.4.8 Test result

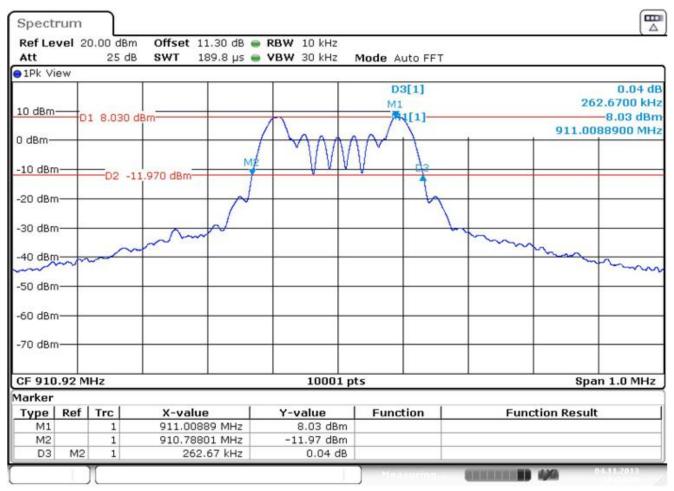
Frequency [MHz]	20 dB Bandwidth [kHz]	99 % Bandwidth [kHz]
910.92	262.67	243.67
915.00	262.67	243.57
919.08	262.67	243.87



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3.4.9 Plots of 20 dB bandwidth

3.4.9.1 Channel 1



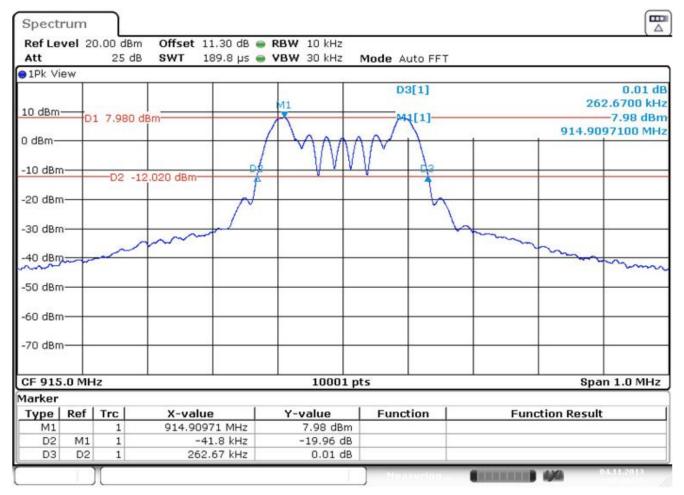
Operating frequency :	910.92 MHz
RBW :	10 kHz
VBW :	30 kHz
Detector mode :	Sample
Trace mode :	Max hold
Sweep time :	Auto

20 dB bandwidth : 262.67 kHz



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3.4.9.2 Channel 13

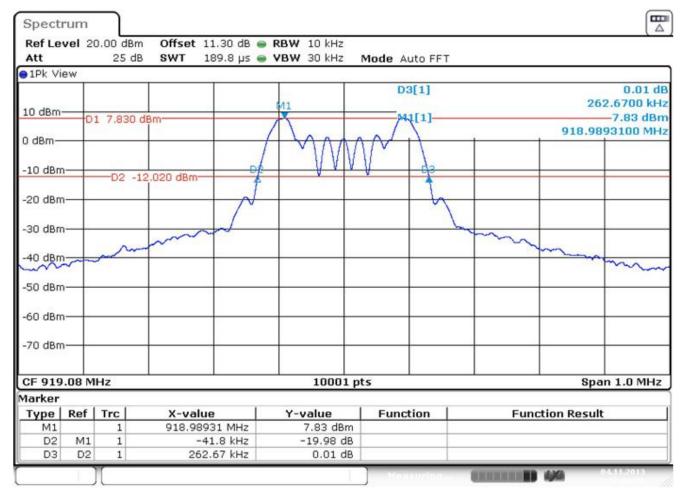


Operating frequency :	915.00 MHz
RBW :	10 kHz
VBW :	30 kHz
Detector mode :	Sample
Trace mode :	Max hold
Sweep time :	Auto
<u>20 dB bandwidth :</u>	262.67 kHz



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3.4.9.3 Channel 25



Operating frequency :	919.08 MHz
RBW :	10 kHz
VBW :	30 kHz
Detector mode :	Sample
<u>Trace mode :</u>	Max hold
Sweep time :	Auto

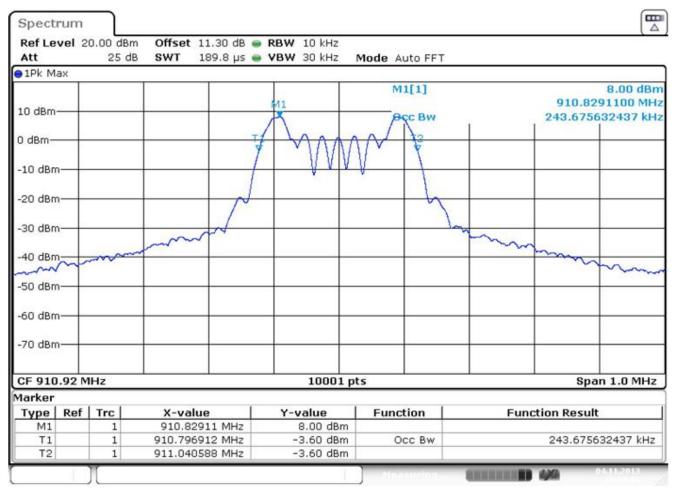
20 dB bandwidth : 262.67 MHz



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3.4.10 Plots of 99 % bandwidth

3.4.10.1 Channel 1



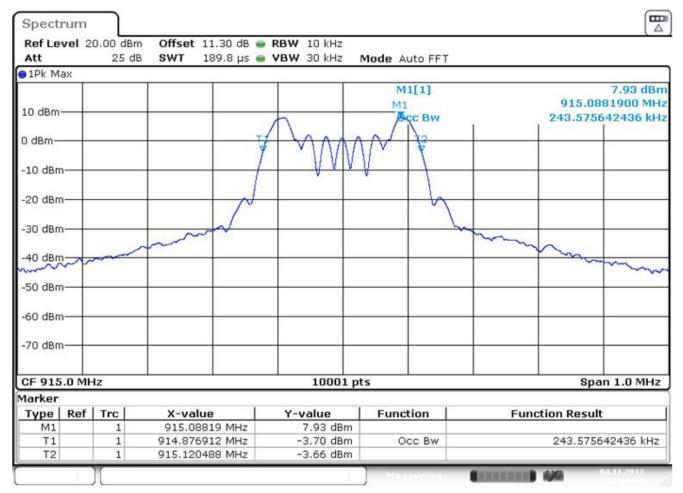
Operating frequency :	910.92 MHz
RBW :	10 kHz
VBW :	30 kHz
Detector mode :	Sample
Trace mode :	Max hold
Sweep time :	Auto

99 % bandwidth : 243.67 kHz



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3.4.10.2 Channel 13



Operating frequency :	915.00 MHz
RBW :	10 kHz
VBW :	30 kHz
Detector mode :	Sample
Trace mode :	Max hold
Sweep time :	Auto
<u>99 % bandwidth :</u>	243.57 kHz



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3.4.10.3 Channel 25

Spectru	m	٦								
Ref Leve					RBW 10 kHz					
Att 1Pk Max		25 dB	SWT	189.8 µs 🖷	VBW 30 kHz	Mode	Auto FFT			
	1		<u> </u>			r	M1[1]			7.80 dBr
10 dBm-			-		111				918.98	92100 MH
10 aBm—					X	1	acc Bw		243.875	612439 kH
0 dBm				т	AAAA	AN	12			
						IV.	Y			
-10 dBm—	-				V V	v V		-		
- 2										
-20 dBm—				N			N			1
-30 dBm—			-						_	
50 abiii			m	~				Jum		
-40 dBm-	m	~~~	1000		-		-		mon	
~~~····										m
-50 dBm-	-		-		-					
-60 dBm—										
-00 ubin-										
-70 dBm-	-						-			
CF 919.0	8 MHz	8			10001	pts			Spa	an 1.0 MHz
Marker										
Type   R	ef   Tr	rc	X-va	and the second se	Y-value		ction	Fun	ction Resul	t
M1		1		3921 MHz	7.80 dBr					
T1 T2	_	1		5812 MHz	-3.82 dBr -3.86 dBr		Occ Bw		243.875	612439 kHz
12		1	919.200		-3.00 UBI					0111-2012
	Л					1			100	01-11-2018

Operating frequency :	919.08 MHz
RBW :	10 kHz
VBW :	30 kHz
Detector mode :	Sample
<u>Trace mode :</u>	Max hold
Sweep time :	Auto

99 % bandwidth : 243.87 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	RED301-1WAY	SEGI LIMITED
Spectrum analyzer	FSV	Rohde & Schwarz

#### 3.5.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Sets RBW 100 kHz, VBW 1 MHz, Max hold

#### 3.5.7 Test condition

- Test place : Test room
- Test environment : 22.7 °C, 43 % R.H.
- Test mode : Operation at full hopping

#### 3.5.8 Test result

Frequency [MHz]	Dwell time [ms]	Transmission Occurred	Result [ms]	Limit [ms]
915	300	1	300	400

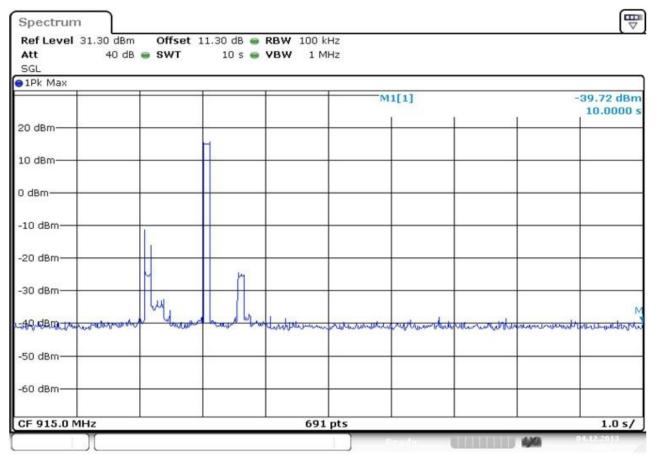
#### 3.5.9 Limit

Less than 0.4 seconds within 10 seconds period.



#### 3.5.10 Plots of channel occupation

#### 3.5.10.1 Within 10 seconds period



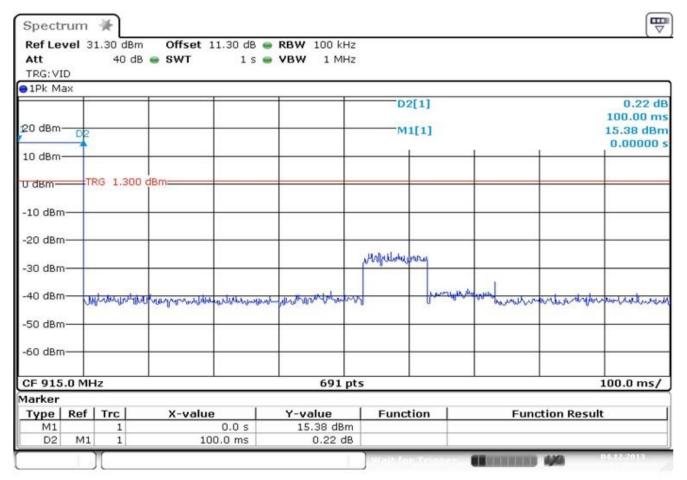
<b>Operating frequency :</b>	Full hopping
<u>RBW :</u>	100 kHz
VBW :	1 MHz
Detector mode :	Peak
<u>Trace mode :</u>	View
Sweep time :	10 s

Number of channel within 10 s : 1



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#### 3.5.10.2 Dwell time



<b>Operating frequency :</b>	Full hopping
RBW :	100 kHz
VBW :	1 MHz
Detector mode :	Peak
Trace mode :	View
Sweep time :	1 s
<u>Dwell time :</u>	100.0 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.

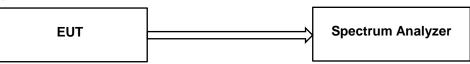
## 3.6.2 Specification

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

#### 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	RED301-1WAY	SEGI LIMITED
Spectrum analyzer	FSV	Rohde & Schwarz

#### 3.6.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Peak Power : Sets RBW 1 MHz, VBW 3 MHz, Max hold
- Average Power : Sets RBW 100 kHz, VBW 300 kHz, RMS

#### 3.6.7 Test condition

- Test place : Test room
- Test environment : 22.5 °C, 43 % R.H.
- Test mode : Operation at full hopping

#### 3.6.8 Test result

	Peak	Power	Average Power		
Frequency [MHz]	Output Power [dBm]	Output Power [W]	Output Power [dBm]	Output Power [W]	Limit [W]
910.92	14.53	0.02837	10.82	0.01207	0.25
915.00	14.47	0.02798	10.74	0.01185	0.25
919.08	14.32	0.02703	10.58	0.01142	0.25

# 3.6.9 Limit

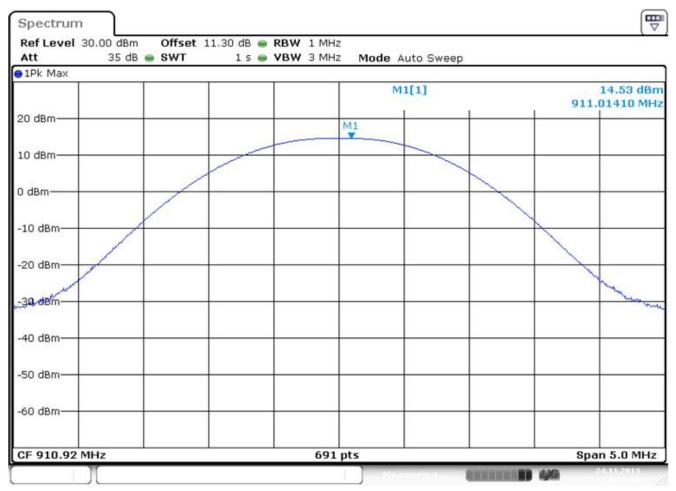
Less than 0.25 Watts.



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#### 3.6.10 Plots of peak output power at Peak power

#### 3.6.10.1 Channel 1



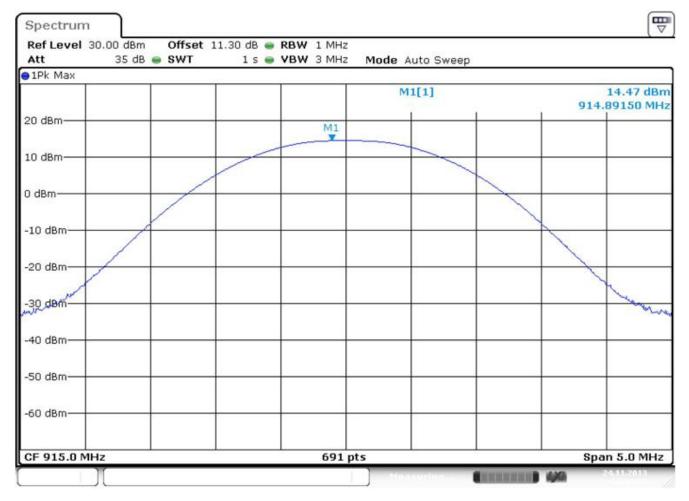
Operating frequency :910.92 MHzRBW :1 MHzVBW :20 MHzDetector mode :PeakTrace mode :Max holdSweep time :Auto

Output power : 14.53 dBm (=0.02837 W)



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#### 3.6.10.2 Channel 13



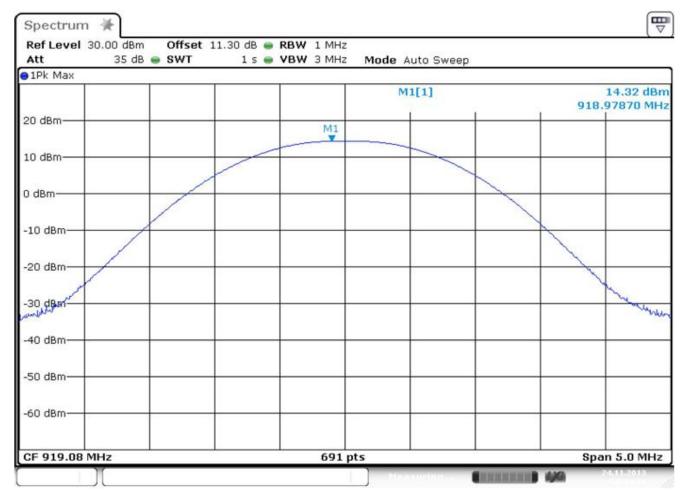
<u>Operating frequency :</u> 915.00 MHz <u>RBW :</u> 1 MHz <u>VBW :</u> 20 MHz <u>Detector mode :</u> Peak <u>Trace mode :</u> Max hold <u>Sweep time :</u> Auto

Output power : 14.47 dBm (=0.02798 W)



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#### 3.6.10.3 Channel 25



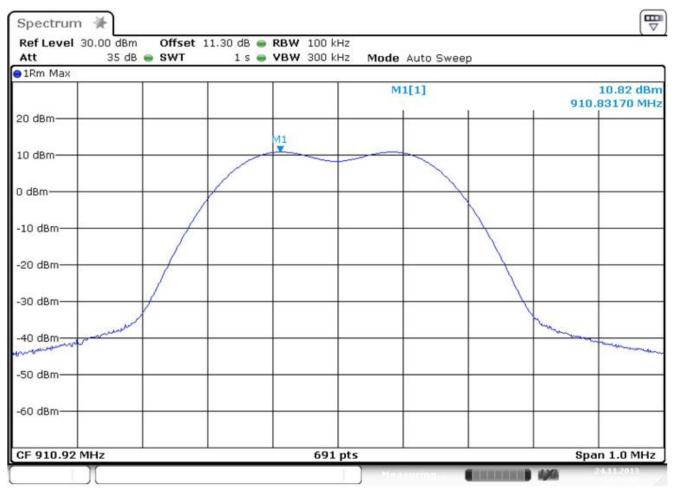
<u>Operating frequency :</u> 919.08 MHz <u>RBW :</u> 1 MHz <u>VBW :</u> 20 MHz <u>Detector mode :</u> Peak <u>Trace mode :</u> Max hold <u>Sweep time :</u> Auto

Output power : 14.32 dBm (=0.02703 W)



#### 3.6.11 Plots of peak output power at Average power

#### 3.6.11.1 Channel 1



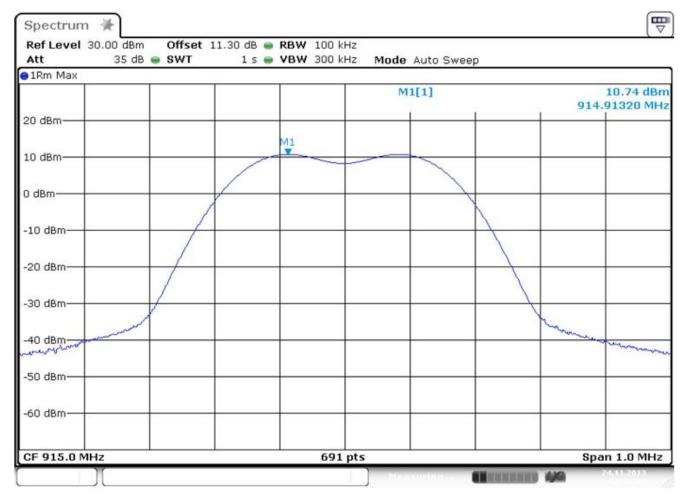
Operating frequency :910.92 MHzRBW :100 kHzVBW :300 kHzDetector mode :RMSTrace mode :Max holdSweep time :Auto

Output power : 10.82 dBm (=0.01207 W)



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#### 3.6.11.2 Channel 13



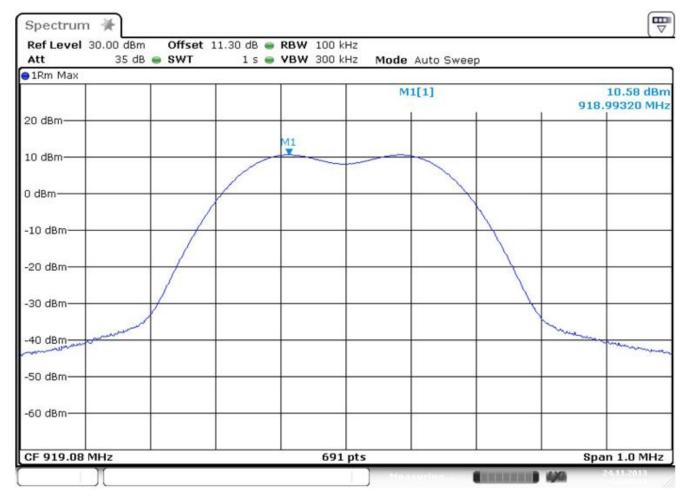
Operating frequency :	915.00 MHz
<u>RBW :</u>	100 kHz
<u>VBW :</u>	300 kHz
Detector mode :	RMS
<u>Trace mode :</u>	Max hold
Sweep time :	Auto

Output power : 10.74 dBm (=0.01185 W)



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#### 3.6.11.3 Channel 25



Operating frequency :	919.08 MHz
RBW :	100 kHz
VBW :	300 kHz
Detector mode :	RMS
Trace mode :	Max hold
Sweep time :	Auto

Output power : 10.58 dBm (=0.01142 W)



#### 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"

# 3.7.4 Set-up



# 3.7.5 Test equipment list

Equipment	Model name	Manufacturer
EUT	RED301-1WAY	SEGI LIMITED
Spectrum analyzer	FSV	Rohde & Schwarz

#### 3.7.6 Test procedure

- The output of EUT was connected to the spectrum analyzer.
- Sets RBW 100 kHz, VBW 1 MHz, Max hold

#### 3.7.7 Test condition

- Test place : Test room
- Test environment : 22.4 °C, 43 % R.H.
- Test mode : Operation at full hopping

#### 3.7.8 Limit

Less than 20 dBc.



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# 3.7.9 Plots of conducted emission & band edge

# 3.7.9.1 Channel 1

Spect	rum										
Ref Le Att	vel 2	0.00 dB 25 d		1.30 dB 🥌 99.7 ms 🖷	RBW 100 kH VBW 1 MH		Mode	Auto Swe	еер		
●1Pk Ma	ах			211	- 22						
10 dBm-	M	11						2[1] 1[1]			-50.29 df 906.40 MH 15.00 dBn 911.50 MH
0 dBm—						-			1	-	
-10 dBm	1		-		_						0
-20 dBm	<b>1</b>							-		-	
-30 dBm	<u>+</u>	D	2		-	$\vdash$					
-40 dBm					-						-
-50 dBm -50 dBm		durina	and and the second of the	anglo and a dissific	and states and states and states	- n And	Marco Barth	appi ^{tell} es a th ess	openne Valenterdensenter	halfdaerenbenselber	manufanna
-70 dBm					_				_		
Start 3	0.0 M	IHz			1001	L pts	;	7		Sto	o 10.0 GHz
Marker Type	Pof	Trc	X-valu	. 1	Y-value	1	Func	tion	Eur	nction Resul	
M1 D2	M1	1	911	5 MHz	15.00 dB -50.29 d		Full		Fui	iccion kesui	
02	INIT	T T	900	5 T IVIN4	-30.291		100	surie e		1 444	0.1.11.2013

Operating frequency :910.92 MHzRBW :100 kHzVBW :1 MHzDetector mode :PeakTrace mode :Max holdSweep time :Auto

Spurious emission (2nd harmonic) : 50.2 dBc



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#### 3.7.9.2 Channel 13

Spect	rum								
Ref Le Att	vel 2	0.00 dB 25 d		11.30 dB 🖷 99.7 ms 🖷	RBW 100 kHz VBW 1 MHz		Auto Swe	ер	
91Pk Ma	ах		25		12			1c	
10 dBm-	M	11				1.01	2[1] 1[1]		-50.27 ( 916.30 M 14.88 dB 911.50 M
0 dBm—							-	1	911.50 (4)
-10 dBm	<b>-</b>							-	
-20 dBm	<u> </u>		_						
-30 dBm	,	D	2						
-40 dBm									
-50 dBm سرامیریاسی -60 dBm		in the second	hopennesses	all and a state of the second	ug for a for the second se	rd free baring whited,	all the second and a second a second a second	uel enobermierant	huner of the stand of the and the state of t
-70 dBm	-								
Start 3	0.0 M	IHz			1001	pts			Stop 10.0 GH
Marker			1995 - 74					32) 32)	
Type M1	Ref	Trc 1	X-va	11.5 MHz	Y-value 14.88 dBn	Func	tion	Fu	nction Result
D2	M1	1		16.3 MHz	-50.27 di				
		Y				1.0	suring -		01.11.2013

<b>Operating frequency</b> :	915.00 MHz
RBW :	100 kHz
VBW :	1 MHz
Detector mode :	Peak
Trace mode :	Max hold
Sweep time :	Auto

Spurious emission (2nd harmonic) : 50.2 dBc



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## 3.7.9.3 Channel 25

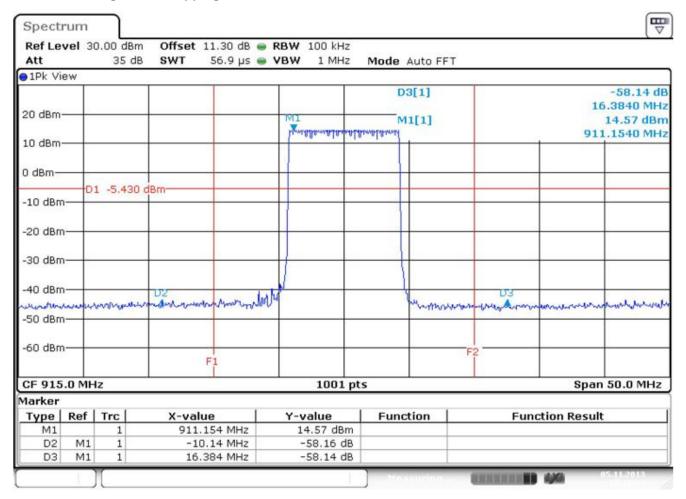
Spect	rum								
Ref Le Att	vel 2	0.00 dB 25 d			Mode /	Auto Swee	эр		
91Pk M	ах		75 7717	72					
10 dBm	M	11				2[1] 1[1]			-51.08 df 16.30 MH 14.79 dBn
0 dBm—							1		21.40 MH
-10 dBm	n						-		·
-20 dBm	n						-		
-30 dBm	n	D	2						
-40 dBm						-			
-50 dBm سیاریسانیا -60 dBm	n Lagelandor N	erentetroll	ng with you want a stranged	without he was a share of the	te ve _{nn} ustanny	man Mul	and when the second sec	Anararanahaahaana	how where
-70 dBm									
Start 3	0.0 M	IHz		1001 pt	5			Stop	10.0 GHz
Marker									
Type M1	Ref	Trc 1	X-value 921.4 MHz	Y-value 14.79 dBm	Funct	tion	Fun	ction Result	2
D2	M1	ĩ	916.3 MHz	-51.08 dB					
		Y			100	surio a	C	100	1.11.2013

<b>Operating frequency :</b>	919.08 MHz
RBW :	100 kHz
VBW :	1 MHz
Detector mode :	Peak
Trace mode :	Max hold
Sweep time :	Auto

Spurious emission (2nd harmonic) : 51.0 dBc



#### 3.7.9.4 Band edge at full hopping mode



<b>Operating frequency :</b>	Full hopping
<u>RBW :</u>	100 kHz
<u>VBW :</u>	1 MHz
Detector mode :	Peak
Trace mode :	Max hold
Sweep time :	Auto
Lower band edge : Upper band edge :	52.72 dBc 54.64 dBc



# 3.7.9.5 Band edge at Nomal mode

## 3.7.9.5.1 1 Channel

Ref Le Att	vel 3	0.00 dBm 35 dB		11.30 dB 🖷 56.9 µs 🖷			Mode	Auto FFT				
∋1Pk Ma	эх											
							D	3[1]				-58.30 d
20 dBm-	-				143		M	1[1]				.6240 MH 15.53 dBr
					ň			+L+1				.8040 MH
10 dBm-												
0 dBm—	_							-	_			
-10 dBm	-			_				-	_			
-20 dBm	+											
-30 dBm	+							-	-			
-40 dBm			D2	N		10			_			D3
mener	armound	mehren	un Auron	anumber	4	When	maler	anterna	monterna	Inrentry	metoplan	
-50 dBm					+							
-60 dBm	-				_			-	E	2		
			F1									
CF 915	.0 MH	Iz				1001 pt	s				Span	50.0 MHz
Marker					5218							
Type	Ref	Trc	X-val	the second s	Y	-value	Func	tion		Functio	n Result	
M1 D2	M1	1		.804 MHz 9.64 MHz		15.53 dBm -58.33 dB						
D3	M1	1		.624 MHz		-58.30 dB						

Operating frequency :	Full hopping
RBW :	100 kHz
<u>VBW :</u>	1 MHz
Detector mode :	Peak
<u>Trace mode :</u>	Max hold
Sweep time :	Auto
Lower band edge :	58.33 dBc
<u>Upper band edge :</u>	58.30 dBc



#### 3.7.9.5.2 13 Channel

	vel 3	0.00 dBr			RBW 100 kHz			×
Att		35 di	B SWT	56.9 µs 🥯	VBW 1 MHz	Mode Auto FF	Г	
DIAK M	ax					D3[1]		-59.32 d 21.0790 MH
20 dBm					MI	M1[1]		15.48 dBr 914.9000 MH
10 dBm	-							914.9000 MH
0 dBm—							_	
-10 dBm							_	
-20 dBm	+							
-30 dBm	-							
-40 dBm		tu ba ne	2 annu nu	www.www.	Indered	Twee on the second second second	and and a second second second	p3
-50 dBm	l	- Wo offering				to the state of the state of		Marganese
-60 dBm	-		F1				F2	
CF 915	.0 MH	łz	Î		1001 p	ts		Span 50.0 MHz
Marker								
Type M1	Ref	Trc 1	X-Va	914.9 MHz	Y-value 15.48 dBm	Function	Functi	ion Result
D2	M1	1		5.435 MHz	-59.68 dB			
D3	M1	1		1.079 MHz	-59.32 dB			

Operating frequency :	Full hopping
RBW :	100 kHz
VBW :	1 MHz
<b>Detector mode :</b>	Peak
Trace mode :	Max hold
Sweep time :	Auto
Lower band edge :	59.68 dBc
Upper band edge :	59.32 dBc



#### 3.7.9.5.3 25 Channel

	1.00 dBm			RBW 100 kHz					
	35 dB	SWT	56.9 µs 🖷	VBW 1 MHz	Mode	Auto FFT			
_		T T							
					D	03[1]			-59.01 dl
-				++	M	11[1]			15.42 dBn
					7	terel.		91	19.1960 MH
+				-		1			1
_									
					1				
		-						_	-
					- 11				
+							-		-
					1	V			
		D2	e e dada una como		went	Maria		US	010
man	unun	- and	and a starter of the	e all and when the best of the		marker	man manager	Lavester Marine	and the second
-				-		-	E2		
		F1					Ĩ		
MH	z			1001 p	ts		_	Spa	n 50.0 MHz
Ref	Trc	X-va	lue	Y-value	Fund	ction	F	unction Resu	lt
	1	0.01010	and a second	15.42 dBm					
			all states in a local sector water and the sector of the s						
		M. MHz Ref Trc 1 M1 1	D2           Mummulu         D2           Mumulu         D2           F1         F1           O MHz         F1           Ref         Trc         X-va           1         919           M1         1         -18	D2           munuluuluuluuluuluuluuluuluuluuluuluuluul	D2         D2           Multiple         D2           Multiple         Multiple           F1         1001 p           Ref         Trc         X-value         Y-value           1         919.196 MHz         15.42 dBm           M1         1         -18.032 MHz         -59.63 dB	D2         D3         D4         D4 <thd4< th="">         D4         D4         D4<!--</td--><td>D3[1]           D3[1]           D3[1]           D3[1]           D1[1]           D2           D3           D3</td><td>D3[1]           D3[1]           D3[1]<!--</td--><td>D3[1]         1           D3[1]         1           D3[1]         1           D1[1]         91           D2         0           D2         0           D2         0           D1         0           D2         0           D2         0           D2         0           D3         0</td></td></thd4<>	D3[1]           D3[1]           D3[1]           D3[1]           D1[1]           D2           D3           D3	D3[1]           D3[1] </td <td>D3[1]         1           D3[1]         1           D3[1]         1           D1[1]         91           D2         0           D2         0           D2         0           D1         0           D2         0           D2         0           D2         0           D3         0</td>	D3[1]         1           D3[1]         1           D3[1]         1           D1[1]         91           D2         0           D2         0           D2         0           D1         0           D2         0           D2         0           D2         0           D3         0

Operating frequency :	Full hopping
RBW :	100 kHz
VBW :	1 MHz
Detector mode :	Peak
Trace mode :	Max hold
Sweep time :	Auto
Lower band edge :	59.63 dBc
Upper band edge :	59.01 dBc





# 4. RF Exposure Compliance Requirement

According to KDB447498 D01 General RF Exposure Guidance v05r01

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances  $\leq$  50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] • [ $\sqrt{f(GHz)}$ ]  $\leq$  3.0 for 1-g SAR and  $\leq$  7.5 for 10-g extremity SAR, where

- f(GHz) is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

The test exclusions are applicable only when the minimum test separation distance is  $\leq$  50 mm and for transmission frequencies between 100 MHz and 6 GHz.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Channel Number	Frequency [MHz]	Max. Average Power [dBm]	Max. Average Power [mW]	Separation distance [mm]	1-g SAR value	Test exclusion thresholds
1	910.92	10.82	12.1	5	2.31	3.0
13	915.00	10.74	11.9	5	2.27	3.0
25	919.08	10.58	11.4	5	2.19	3.0

#### **Result:**

SAR is not required.



# 5. 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	Rohde & Schwarz	101673	02/04/14
2	Test receiver	ESCI 7	Rohde & Schwarz	1166.5950.07	01/30/14
3	Power supply	E3633A	Agilent	SG40002272	01/28/14
4	Loop antenna	6502	EMCO	9609-9087	03/03/14
5	Biconical antenna	VHA9103	Schwarzbeck	2217	11/23/13
6	Log-Periodic antenna	VULP9118A	Schwarzbeck	382	11/23/13
7	Horn antenna	BBHA 9120 D	Schwarzbeck	395	08/07/14
8	Turn table	N/A	Daeil EMC	N/A	N/A
9	Antenna mast	EAM4.5	Daeil EMC	N/A	N/A
10	Controller	DE200	Daeil EMC	AAA69813111	N/A