

TEST REPORT

Part 15 Subpart C 15.247 & IC RSS-210(Issue 8)

Equipment under test	Keyless Entry System
Model name	MR1040-2WAY(Variant model: REB500-2WAY)
FCC ID	VA5JR1040-2WSSL
IC Certification	7087A-2WR1040SSL
Applicant	SEGI LIMITED
Manufacturer	SEGI ELECTRONICS CO.,LTD.
Date of test(s)	$2012.03.27 \sim 2012.04.10$
Date of issue	2012.04.17

Issued to

SEGI LIMITED

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Issued by

KES Co., Ltd.

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Test report No.: KES-RF-120026

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Revision history

Revision	Date of issue	Test report No.	Description
-	2012.04.17	KES-RF-120026	Initial



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1.0 General product description

Equipment under test Keyless Entry System							
Model name MR1040-2WAY(Variant model: REB500-2WAY)							
Serial number	N/A						
Frequency Range	910.92 MHz ~ 919.08 MHz						
Modulation technique	FHSS						
Number of channels	25						
Antenna type & gain	Helical antenna / -8.586 dBi						
Power source	DC 6 V						

1.1 Test frequency

	Low channel	Middle channel	High channel
Frequency (Mz)	910.92	915.00	919.08

1.2 Information about variant model

Please refer to the family model cover letter.

1.3 Device modifications

No modifications were made during testing.



1.4 Test facility

C3701 Dongil Techno Town, 889-1, Gwanyang 2-dong, Dongan-gu, Anyang-si, Gyeonggi-do, 431-716, Korea 477-6, Hageo-ri, Yeoju-eup, Yeoju-gun, Gyeonggi-do, 469-803, Korea

The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.5 Test measurement procedure

The measurement procedure described in the American National Standard for Testing Unlicensed Wireless Devices (ANSI C63.4-2003) and FCC Public Notice DA 00-705 dated March 30, 2000 entitled "Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems"

Country	Agency	Scope of accreditation	Logo
USA	FCC	3 & 10 meter Open Area Test Sites and one conducted site to perform FCC Part 15/18 measurements.	FC 343818
KOREA	KC	EMI (10 meter Open Area Test Site and two conducted sites) Radio (3 & 10 meter Open Area Test Sites and one conducted site)	KR0100
Canada	IC	3 & 10 meter Open Area Test Sites and one conducted site	4769B-1

1.6 Laboratory accreditations and listings



2.0 Summary of test	ts	
Section in FCC Part 15 & RSS-210	Parameter	Status
15.247(b)(2) RSS-210 8.4(1)	Maximum peak output power	С
15.247(d) RSS-210 A8.5	Conducted spurious emission & band edge	С
15.247(a)(1)(i) RSS-210 A8.1(c)	20 dB bandwidth	С
15.247(a)(1) RSS-210 A8.1(b)	Frequency separation	С
15.247(b)(2) RSS-210 A8.1(c)	Number of hopping frequency	С
15.247(a)(1)(i) RSS-210 A8.1(c)	Time of occupancy(Dwell time)	С
15.247(d) RSS-210 A8.5	Radiated spurious emission & band edge	С
RSS-Gen 4.6.1	99 % Occupied bandwidth	С
Note 1: C=Complies NC	=Not complies NT=Not tested NA=Not applicable	·



2.1 Test data

2.1.1 Maximum peak power

Test setup

EUT	 Attenuator	Spectrum analyzer
201		

Test procedure

- 1. Use the following spectrum analyzer setting
 - Center frequency: Lowest, middle and highest channels
 - Span = 5 MHz (Approximately 5 times the 20 dB bandwidth, centered on a hopping channel)
 - RBW = 1 M/z (the 20 dB bandwidth of the emission being measured)

VBW = 1 M/z ($\geq RBW$)

Sweep = auto

Detector function = peak

Trace = max hold

2. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. The indicated level is the peak output power.

Limit

For frequency hopping systems operating in the $902 \sim 928$ MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.



Test results

Frequency(Mz)	Output power (W)	Limit (W)
910.92	0.027	0.25
915.00	0.028	0.25
919.08	0.028	0.25

Spectrum				Service & source in					
Ref Level Att	151.01 mW 20 dB	Offset 2 SWT		RBW 1 MHz VBW 1 MHz	Mode A	uto Sweep			
●1Pk Max	20 00	ont	2 1115		mode A	uto Sweep			
					M1 M	1[1]			71129 mV 08640 MH:
10 mW		/							
1.mW		/					1		
100 μW								1	
10 µW								1	/
1 μW									herde
10 nW									
1 nW									
100 pW									
10 pW									
1 pW									
CF 910.92	MHz			691	ots	1		Spa	n 5.0 MHz
][]				Mea	suring			5.04.2012 20:16:45

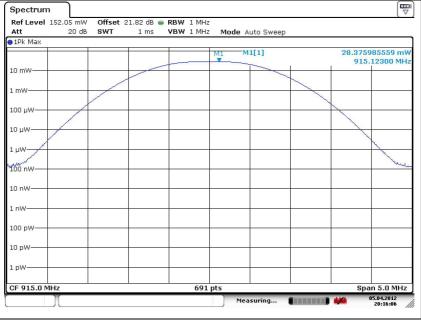
Low channel



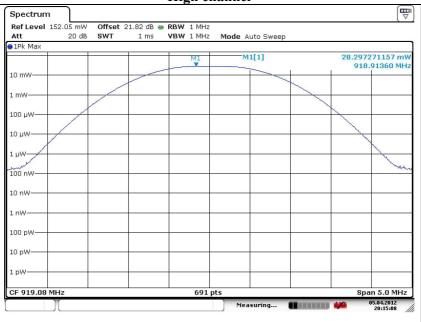
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Middle channel

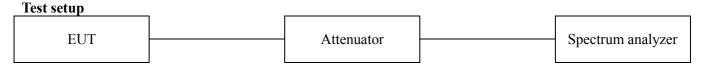


High channel





2.1.2 Conducted spurious emission & band edge



Test procedure for band edge

- 1. Use the following spectrum analyzer setting
 - Center frequency: Low, middle and high channel.

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.

RBW = 100 kHz

 $VBW = 100 \text{ kHz} (\geq RBW)$ Sweep = auto Detector function = peak

Trace = max hold

2. Allow the trace to stabilize. Set the marker on the emission at the band edge, or on the highest modulation on product outside of the band, if this level is greater than that at the band edge. Enable the marker-delta function, then use the marker-to-peak function to move the marker to the peak of the in-band emission

Test procedure for spurious emission

- 1. Use the following spectrum analyzer setting
 - Center frequency: Low, middle and high channel.

Span = wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation.

RBW = 100 kHz

 $VBW = 100 \text{ kHz} (\geq RBW)$ Sweep = auto

Detector function = peak

Trace = max hold

2. Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded.



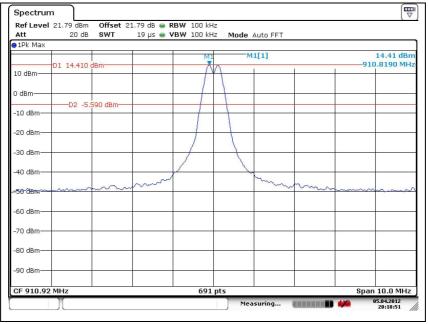
Limit

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 either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval , as permitted under paragraph(b)(3) of this section , the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in section 15.209(a) is not required. In addition, radiated emission which in the restricted band, as define in section 15.205(a), must also comply the radiated emission limits specified in section 15.209(a) (see section 15.205(c))



Test results

Low channel



Ref Level Att		20 dB	SWT			100 kH 100 kH		Auto Sweep			
1Pk Max			1						1		
10 dBm	D1 1	4.410	dBm								
0 dBm											
-10 dBm	(02 -5.	590 dBm								
-20 dBm	-				 						
-30 dBm											
-40 dBm			1		 Monard	man	workery .	munder	hi uz		a marine i
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-60 dBm											
-70 dBm											
-80 dBm											
-90 dBm											



Middle channel

Spectrur Ref Level	n 21.82 dBm	Offset :	21.82 dB 👄 F	BW 100 kH	z				
Att	20 dB	SWT		BW 100 kH		Auto FFT			
∋1Pk Max									
				MI	M	1[1]			14.51 dBm
10 dBm	D1 14.510	dBm		-	<u> </u>			-91	4.8990 MHz
0 dBm									
-10 dBm—	D2 -5.	490 dBm							
-20 dBm—									
-30 dBm—					-				
-40 dBm—			~		1	<u></u>			
-50 dBm- /\	<u>~~~</u> ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m				m	m	-	
-60 dBm									
-70 dBm—									
-80 dBm									
-90 dBm—									
CF 915.0	MHz		1	691	pts	1	1	Spai	n 10.0 MHz
) Mea	isuring		444	05.04.2012 20:20:47

Att	21.82	20 dB	SWT	21.82 c 128 m			100 kH		Auto Sweep			
1Pk Max									· ·			
10 dBm	D1 14	4.510 (dBm									
TO UBIII												
0 dBm												
-10 dBm —	C)2 -5.4	190 dBm-			-						
-20 dBm	Ŧ	_										
-30 dBm												
-40 dBrr				1.00.004	and the states	Marth	munder	weddy 1	phanhum	a an ata		a collected as
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-60 dBm												
-70 dBm—												
-80 dBm												



High channel

	21.82 dBm		21.82 dB 🔵 F						
Att	20 dB	SWT	19 µs 🖷 🕻	'BW 100 kH	z Mode	Auto FFT			
JIFK MdA			-	MI	M	1[1]			14.51 dBm
	D1 14.510	dBm		X	Δ	-1-1			8.9790 MHz
10 dBm				-	1				-
0 dBm									
	D2 -5.	490 dBm	-						
-10 dBm									-
-20 dBm									
					(
-30 dBm									-
-40 dBm			-	r	7				
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	5 N								
-60 dBm									-
-70 dBm									
yo abiii									
-80 dBm									
-90 dBm									
CF 919.08	MHz			691	pts			Spa	n 10.0 MHz
	1				Mea	suring		-	05.04.2012 20:21:44

			-						
1Pk Max		1			1		I		1
10 dBm	D1 14.510	dBm							
D dBm	D2 _5	.490 dBm							
-10 dBm—	02.0								
-20 dBm—	1								
-30 dBm—									
-40 dBm—	uns for the handle	woodenterrand	hupertinithered	mannin	hall have	uwa butata	bridenstand	Were Worth and	mohnure
-60 dBm—									
-70 dBm—									
-80 dBm—									
-90 dBm—									
Start 320	.0 MHz		1	691	pts			Stop	12.75 GHz



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Band edge (Hopping mode)

Ref Level 21.82 dBm Offset 21.82 dB & RBW 100 kHz Mode Auto FFT • VBW 100 kHz Mode Auto FFT • IPk Max • Image Autor FT Image Autor FT Image Autor FT • IPk Max • Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT • In Also Image Autor FT Image Autor FT Image Autor FT Image Autor FT	Spectrun					- T T - E				
ID I 14.550 dBm //**/////////////////////////////////										
D1 14.550 dBm //**/////////////////////////////////	100-0-100-000	20 dB	SWT	37.9 µs 👄 🕻	/BW 100 kH	z Mode .	Auto FFT			
10 dBm 0 dBm) 1Pk Max		1							
-10 dBm -20 dBm -30 dBm -30 dBm -40 dBm -60 dBm -70 dBm -70 dBm -70 dBm -70 dBm -80 dBm -70		D1 14.550	dBm	hundred	wwwwww	wwwww	ppppp			
-10 dBm -20 dBm -30 dBm -40 dBm -40 dBm -60 dBm -70 dBm -70 dBm -70 dBm -80 dBm	0 dBm									
-30 dBm -40 dBm -50 dBm -70 dBm -70 dBm -80 dBm	-10 dBm	D2 -5.	450 dBm							
-40 dBm	-20 dBm			1						
-50 dBm	-30 dBm									
-60 dBm	-40 dBm						}			
-70 dBm	59.dB00	munt	men Ander	pre				mound	walnut	montal
-80 dBm-										
-9U @BM										
	2.00000 10000000000	0.001-							01	00.0.1
Start 902.0 MHz 691 pts Stop 928.0 MH; Measuring Measuring ## 05.04.2012 2002301	start 902.				691	<u> </u>	suring			5.04.2012

Ref Level Att	21.0	20 dB	SWT				100 kH 100 kH		Auto Sweep)		
1Pk Max												
10 dBm	D1	14.550	dBm									
D dBm—						_						
-10 dBm —		-U2 -5.	450 dBm									
-20 dBm —												
-30 dBr —												
-40 dBm —		unterest	all and all	undulula	Andre	mohren	rowand	human	about the work where	manutar	Contraction	Mupetingetime
5Q-demail	المراجع	X0000-0V										
-60 dBm												
-70 dBm												
-80 dBm												
-90 dBm												12.75 GHz



2.1.3 20 dB bandwidth & 99 % occupied bandwidth



Test procedure

1. Use the following spectrum analyzer setting

Center frequency: Lowest, middle and highest channels

Span = 1 Mz (Approximately 2 to 3 times the 20 dB bandwidth, centered on a hopping channel)

RBW = 10 kHz (\geq 1% of the span)

 $VBW = 10 \text{ kHz} (\geq RBW)$

Sweep = auto

Detector function = peak

Trace = max hold

2. The EUT should be transmitting at its maximum data rate. Allow the trance to stabilize. Use the marker-topeak function to set the marker to the peak of the emission. Use the marker-delta function to measure 20 dB down on 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.

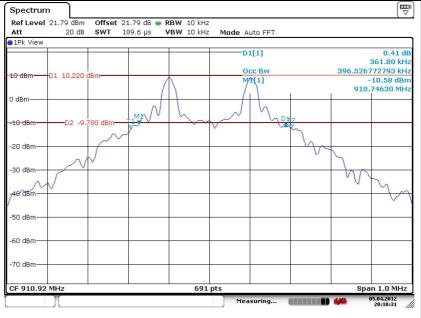
Limit

Not applicable



Test results

Frequency(Mz)	20 dB bandwidth(khz)	99 % occupied bandwidth(始z)
910.92	361.80	396.53
915.00	347.30	382.05
919.08	367.60	405.21



Low channel



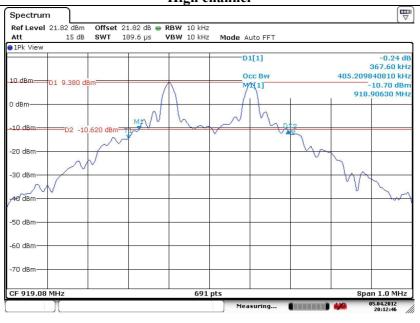
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Middle channel



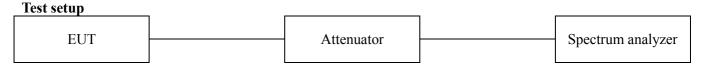
High channel





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2.1.4 Frequency separation



Test procedure

- 1. The EUT must have its hopping function enabled.
- 2. Use the following spectrum analyzer setting
 - Span = 1 MHz (wide enough to capture the peaks of two adjacent channels)
 - $RBW = 3 \text{ kHz} (\geq 1\% \text{ of the span})$
 - $VBW = 3 \text{ kHz} (\geq RBW)$

Sweep = auto

Detector function = peak

Trace = max hold

3. All the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

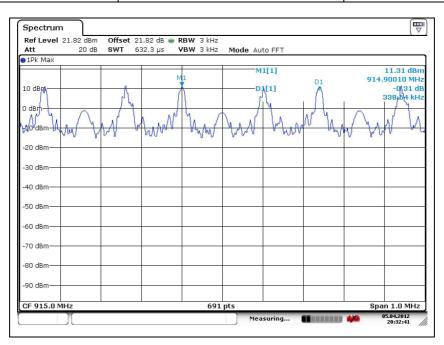
Limit

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.



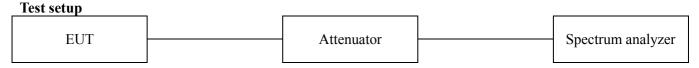
Test results

Operation mode	Channel separation(姑z)	Minimum bandwidth (龀)
Hopping mode	338.64	25





2.1.5 Number of hopping frequency



Test procedure

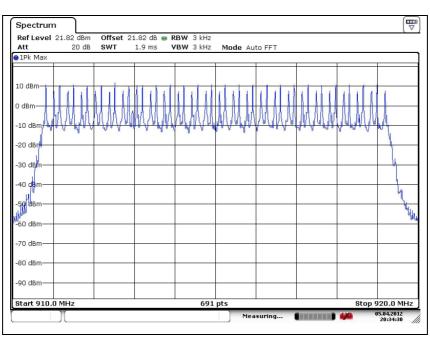
- 1. The EUT must have its hopping function enabled.
- 2. Use the following spectrum analyzer setting
- Frequency range: 910 M½ ~ 920 M½
 Span = the frequency band of operation
 RBW = 3 kH₂ (≥ 1% of the span)
 VBW = 3 kH₂ (≥ RBW)
 Sweep = auto
 Detector function = peak
 Trace = max hold
 All the trace to stabilize. Use the marker-operation
- 3. All the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels.

Limit

For frequency hopping systems operating in the $902 \sim 928$ MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

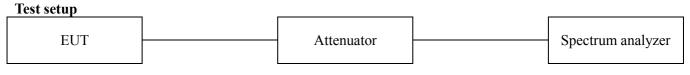


Test resultsOperation modeNumber of hopping frequencyLimitGFSK25≥25





2.1.6 Time of occupancy (Dwell time)



Test procedure

 Use the following spectrum analyzer setting Operation frequency: center frequency Span = Zero span, centered on a hopping channel RBW = 300 kHz
 VBW = 300 kHz (≥ RBW) Sweep = as necessary to capture the entire dwell time per hopping channel Detector function = peak Trace = max hold

Limit

For frequency hopping systems operating in the $902 \sim 928$ MHz band: if the 20 dB bandwidth of the hopping channel is less than 250 kHz, the system shall use at least 50 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 20 second period; if the 20 dB bandwidth of the hopping channel is 250 kHz or greater, the system shall use at least 25 hopping frequencies and the average time of occupancy on any frequency shall not be greater than 0.4 seconds within a 10 second period. The maximum allowed 20 dB bandwidth of the hopping channel is 500 kHz.



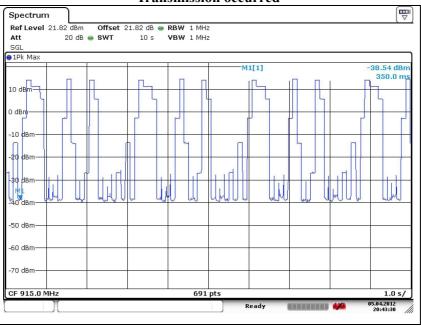
Test results

Frequency	Dwell time	Transmission	Result	Limit
(Mz)	(ms)	occurred	(ms)	(ms)
915	107.25	3	321.75	400

			Jwen um	e			
Spectrum							(E
Ref Level 41.72	dBm Offset	21.72 dB 🔵 RB	W 300 kHz				
Att 40	D dB 👄 SWT	1 s VB	W 300 kHz				
SGL							
1AP Clrw							
				D1[1]			0.07 d
							107.25 n
30 dBm				_M1[1]			14.51 dB
				1	T	1	701.45 n
20 dBm							
co abiii				N	11	D1	
					-	1	
LO dBm							
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CF 915.0 MHz	in the data of the second	National district dist	dal ut. mana a l. 691 pts	dia dina dia kana sa dia		to an har hard	100.0 ms
5F 913.0 MHz			Dathes				16.04.2012
				Ready			09:48:33

Dwell time

Transmission occurred





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2.1.7 Radiated spurious emission & band edge

Test location

Testing was performed at a test distance of 3 meter Open Area Test Site

Test procedures

[9 kHz to 30 MHz]

The EUT was placed on the top of a rotating table 0.8 meter above the ground at a 3 meter OATS. The table was rotated 360 degrees to determine the position of the highest radiation. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading. The test-receiver system was set to Quasi-peak function and specified bandwidth with maximum hold mode.

The spectrum analyzer is set to:

- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 200 Hz for Quasi-peak detection (QP) at frequency below 9 kHz~150 kHz.
- 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 9 kHz for Quasi-peak detection (QP) at frequency below 150 kHz~ 30 MHz.

[30 MHz to 1 GHz and 1 GHz to 24 GHz]

The height of the measuring antenna was varied between 1 to 4 m and the table was rotated a full revolution in order to obtain maximum values of the electric field intensity.

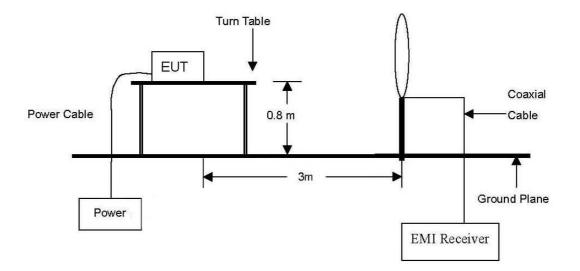
The measurement was made in both the vertical and horizontal polarization, and the maximum value is presented in the report.

The spectrum analyzer is set to:

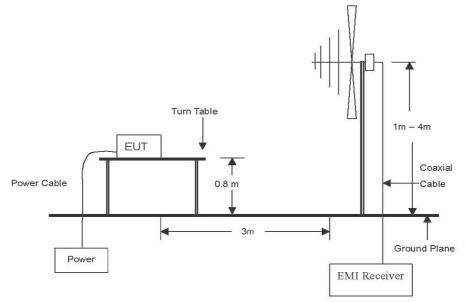
- 1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer 120 kHz for Peak detection (PK) or Quasi-peak detection (QP) at frequency below 1 GHz.
- 2. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 1 Mz for Peak detection at frequency above 1 Gz.
- 3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 10 Hz for Average detection (AV) at frequency above 1 GHz.



The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.

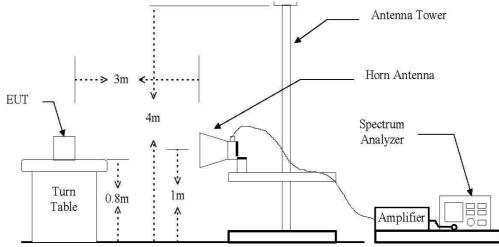


The diagram below shows the test setup that is utilized to make the measurements for emission from 30 Mz to 1 Gz emissions.





The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 24 GHz emissions.



Limit

According to 15.209(a), for an intentional radiator devices, the general required of field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values :

Frequency (Mz)	Distance (Meters)	Radiated (µV/m)
0.009 ~ 0.490	300	2400 / F(kllz)
0.490 ~ 1.705	30	24000 / F(kHz)
1.705 ~ 30.0	30	30
30 ~ 88	3	100**
88~216	3	150**
216~960	3	200**
Above 960	3	500

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands $54 \sim 72$ Mb, $76 \sim 88$ Mb, $174 \sim 216$ Mb or $470 \sim 806$ Mb. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241.



Test results (Below 30 M拉)

Radiated e	emissions	Ant.	(Correction factor	°S	Total	Liı	nit
Frequency (Mbz)	Reading (dBµV)	Pol.	Ant. Factor (dB/m)	Cable loss (dB)	F _d (dB)	Actual (dBµV/m)	Limit (dBµV/m)	Margin (dB)
	Not applicable							

※ Remark

- 1. All spurious emission at channels are almost the same below 30 Mz, so that N/A was chosen at representative in final test.
- 2. Actual = Reading + Ant. factor + Cable loss + F_d

3. $F_d = 40 \log(D_m / D_s)$

Where:

- F_d = Distance factor in dB
- D_m = Measurement distance in meters
- D_s = Specification distance in meters

Test results (Below 1 000 Mz)

The frequency spectrum from 30 MHz to 1 000 MHz was investigated.

Radiated e	emissions	Ant.	Correction factors		Total	Liı	nit		
Frequency (Mbz)	Reading (dBµV)	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBµN/m)	Limit (dBµN/m)	Margin (dB)		
	Emission levels are not reported much lower than the limits by over 20 dB								

※ Remark

- 1. All spurious emission at channels are almost the same below 1 GHz, so that <u>high channel</u> was chosen at representative in final test.
- 2. Actual = Reading + Ant. factor + Amp + CL (Cable loss)
- 3. Detector mode: Quasi peak
- 4. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.



Test results (Above 1 000 Mz) – Basic model

	Low channel									
Rad	liated emissions	5	Ant.	Correctio	on factors	Total	Li	mit		
Frequency (Mz)	Reading (dBµN)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBµV/m)	Limit (dBµV/m)	Margin (dB)		
2732.76	66.41	Peak	V	29.01	-38.33	57.09	74.00	16.91		
2732.76	62.46	Average	V	29.01	-38.33	53.14	54.00	0.86		
3643.68	58.68	Peak	Н	30.65	-36.12	53.21	74.00	20.79		
4554.60	58.32	Peak	V	33.08	-33.64	57.76	74.00	16.24		
4554.60	54.36	Average	V	33.08	-33.64	53.80	54.00	0.20		
4554.60	56.88	Peak	Н	33.08	-33.64	56.32	74.00	17.68		
4554.60	53.71	Average	Н	33.08	-33.64	53.15	54.00	0.85		

	Middle channel									
Rad	liated emissions	5	Ant.	Correctio	on factors	Total	Li	mit		
Frequency (Mz)	Reading (dBµN)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBµV/m)	Limit (dBµV/m)	Margin (dB)		
2745.00	64.87	Peak	V	29.03	-38.31	55.59	74.00	18.41		
2745.00	61.66	Average	V	29.03	-38.31	52.38	54.00	1.62		
3660.00	59.71	Peak	Н	30.68	-36.05	54.34	74.00	19.66		
3660.00	57.09	Average	Н	30.68	-36.05	51.72	54.00	2.28		
4575.00	58.00	Peak	V	33.15	-33.48	57.67	74.00	16.33		
4575.00	54.01	Average	V	33.15	-33.48	53.68	54.00	0.32		
4575.00	56.99	Peak	Н	33.15	-33.48	56.66	74.00	17.34		
4575.00	53.74	Average	Н	33.15	-33.48	53.41	54.00	0.59		



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	High channel									
Rad	liated emissions	5	Ant.	Correctio	Correction factors		Liı	mit		
Frequency (Mbz)	Reading (dBµV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBµV/m)	Limit (dBµV/m)	Margin (dB)		
2757.24	65.23	Peak	V	29.06	-38.29	56.00	74.00	18.00		
2757.24	61.43	Average	V	29.06	-38.29	52.20	54.00	1.80		
4595.40	57.63	Peak	V	33.22	-33.32	57.53	74.00	16.47		
4595.40	53.73	Average	V	33.22	-33.32	53.63	54.00	0.37		
3676.32	61.28	Peak	Н	30.71	-35.97	56.01	74.00	17.99		
3676.32	57.42	Average	Н	30.71	-35.97	52.15	54.00	1.85		
4595.40	56.99	Peak	Н	33.22	-33.32	56.89	74.00	17.11		
4595.40	53.73	Average	Н	33.22	-33.32	53.63	54.00	0.37		

※ Remark

1. "*" means the restricted band.

2. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

3. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.

4. Average test would be performed if the peak result were greater than the average limit.

5. Actual = Reading + Ant. factor + Amp + CL (Cable loss)

6. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.



Test results (Above 1 000 Mz) – Variant model

	Low channel									
Rad	liated emissions	5	Ant.	Correctio	on factors	Total	Li	mit		
Frequency (Mz)	Reading (dBµN)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBµV/m)	Limit (dBµV/m)	Margin (dB)		
2732.76	66.29	Peak	V	29.01	-38.33	56.97	74.00	17.03		
2732.76	62.65	Average	V	29.01	-38.33	53.33	54.00	0.67		
3643.68	58.45	Peak	Н	30.65	-36.12	52.98	74.00	21.02		
4554.60	58.22	Peak	V	33.08	-33.64	57.66	74.00	16.34		
4554.60	53.77	Average	V	33.08	-33.64	53.21	54.00	0.79		
4554.60	56.96	Peak	Н	33.08	-33.64	56.40	74.00	17.60		
4554.60	53.24	Average	Н	33.08	-33.64	52.68	54.00	1.32		

	Middle channel									
Rad	liated emissions	5	Ant.	Correctio	on factors	Total	Liı	mit		
Frequency (Mz)	Reading (dBµV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBµV/m)	Limit (dBµV/m)	Margin (dB)		
2745.00	64.70	Peak	V	29.03	-38.31	55.42	74.00	18.58		
2745.00	61.71	Average	V	29.03	-38.31	52.43	54.00	1.57		
3660.00	59.38	Peak	V	30.68	-36.05	54.01	74.00	19.99		
3660.00	57.49	Average	V	30.68	-36.05	52.12	54.00	1.88		
4575.00	58.13	Peak	Н	33.15	-33.48	57.80	74.00	16.20		
4575.00	53.73	Average	Н	33.15	-33.48	53.40	54.00	0.60		
4575.00	56.70	Peak	Н	33.15	-33.48	56.37	74.00	17.63		
4575.00	53.28	Average	Н	33.15	-33.48	52.95	54.00	1.05		



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High channel									
Rad	liated emission	5	Ant.	Correctio	on factors	Total	Li	mit	
Frequency (Mbz)	Reading (dBµV)	Detector mode	Pol.	Ant. factor (dB/m)	Amp + CL (dB)	Actual (dBµV/m)	Limit (dBµV/m)	Margin (dB)	
2757.24	65.32	Peak	V	29.06	-38.29	56.09	74.00	17.91	
2757.24	61.01	Average	V	29.06	-38.29	51.78	54.00	2.22	
4595.40	58.05	Peak	V	33.22	-33.32	57.95	74.00	16.05	
4595.40	53.63	Average	V	33.22	-33.32	53.53	54.00	0.47	
3676.32	61.64	Peak	Н	30.71	-35.97	56.37	74.00	17.63	
3676.32	57.81	Average	Н	30.71	-35.97	52.54	54.00	1.46	
4595.40	57.00	Peak	Н	33.22	-33.32	56.90	74.00	17.10	
4595.40	53.32	Average	Н	33.22	-33.32	53.22	54.00	0.78	

※ Remark

1. "*" means the restricted band.

2. Measuring frequencies from 1 GHz to the 10th harmonic of highest fundamental frequency.

3. Radiated emissions measured in frequency above 1 000 MHz were made with an instrument using peak/average detector mode.

4. Average test would be performed if the peak result were greater than the average limit.

5. Actual = Reading + Ant. factor + Amp + CL (Cable loss)

6. To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.



Appendix A. Test equipment used for test									
Equipment	Manufacturer	Model	Calibration due.						
Spectrum Analyzer	R&S	FSV30	2013.01.10						
Vector Signal Generator	R&S	SMBV2100A	2013.01.10						
DC Power Supply	Agilent	6632B	2012.05.06						
DC Power Supply	SMTECHNO	SDP 30-5D	2012.11.14						
Trilog-Broadband Antenna	SCHWARZBECK	VULB 9168	2013.10.25						
Horn Antenna	A.H. System	SAS-571	2013.03.22						
High Pass Filter	Wainwright Instrument	WHKX1.5/15G-6SS	2013.03.30						
Preamplifier	A.H. System	PAM-0118	2012.05.04						
EMI Test Receiver	R&S	ESVS10	2012.05.20						

Peripheral devices

Device	Manufacturer	Model No.	Serial No.
N/A			



Appendix B. Test setup photos

Radiated field emissions

