

TEST REPORT

Report No: KST-FCR-090010

Applicant	Name	SEGI LIMITED.
	Address	ROOM 1808, 18/F, TOWER2, ADMIRALTY CENTER, 18 HARCOURT ROAD
Manufacturer	Name	SEGI LIMITED.
	Address	ROOM 1808, 18/F, TOWER2, ADMIRALTY CENTER, 18 HARCOURT ROAD
Equipment	Name	One-Way AM Remote
	Model No	1W900SHR-760
	Usage	Remote Controller for Car System
	FCC ID	VA5JR760A915
	IC ID	7087A-R760A915
Test Standard	FCC CFR 47, Part 15. Subpart C-15.249: 2009. RSS-210 Issue 7: 2007, RSS-Gen Issue 2: 2007	
Test Date(s)	2009. 09. 10 ~ 2009. 09. 12	
Issue Date	2009. 10. 08	
Test Result	Compliance	

Supplementary Information

The device bearing the brand name and FCC ID, CANADA IC specified above has been shown to comply with the applicable technical standards as indicated in the measurement report and was tested in accordance with measurement procedures specified in ANSI C 63.4-2003.

We attest to the accuracy of data and all measurements reported herein were performed by KOSTEC Co., Ltd. and were made under Chief Engineer's supervision. We assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

Tested by Mi Young, Lee

Approved by Gyeong Hyeon, Park

Signature



Signature



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1. GENERAL INFORMATION

1.1 Test Facility

Test laboratory and address

KOSTEC Co., Ltd.

180-254, Annyeong-dong, Hwaseong-si, Gyeonggi-do, South Korea

The open area field test site and conducted measurement facility are used for these testing. This site at was fully described in a reports submitted to the Federal Communications Commission (FCC).

The details of these reports have been found to be in complies with the requirements of Section 2.948 of the FCC Rules on November 14, 2002. The facility also complies with the radiated and conducted test site criteria set forth in ANSI C63.4-2003.

The Federal Communications Commission (FCC) has the reports on file and KOSTEC Co., Ltd. is listed under FCC Registration No.525762. The test site has been approved by the FCC for public use and is List in the FCC Public Access Link CORES (Commission Registration System)

Registration information

KCC (Korea Communications Commission) Number : KR0041

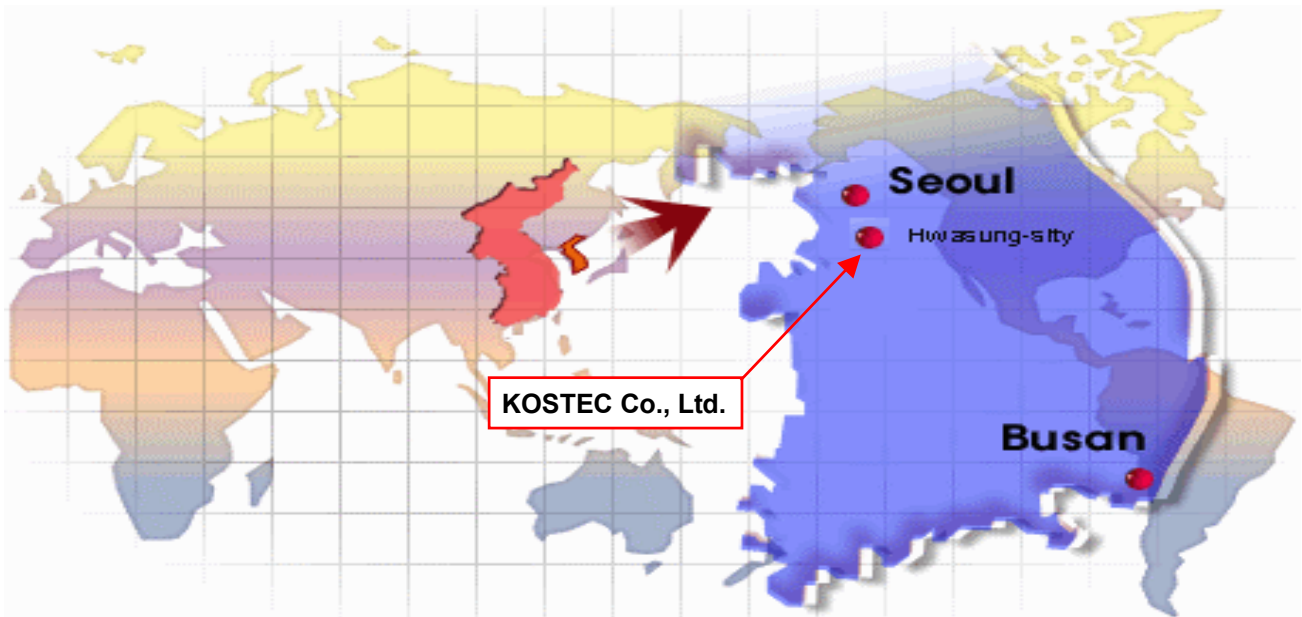
KOLAS(Korea laboratory accreditation Scheme) Number : 232

FCC Registration Number(FRN) : 525762

IC Company Number(C,N) : 8305A

VCCI Registration Number : R-1657 / C -1763

1.2 Location



2. EQUIPMENT DESCRIPTION

The product specification described herein was declared by manufacturer. And refer to user's manual for the details.

Equipment Class	Category I (according to RSS-Gen in CANADA Standard)
1) Equipment Name	On-Way AM Remote
2) Model No	1W900SHR-760
3) Usage	Remote Controller for Car System
4) Serial Number	None
5) Oscillation type	X-TAL
6) Data Sequence type	OOK(on-off Keying)
7) ITU emission type	Not required (because it is unlicensed devices)
8) Modulation type	ASK
9) Operated Frequency	915 MHz
10) Fundamental field strength	71.00 dB μ V/m @ 3m
11) Number of hopping channel	1 Ch
12) Communication type	Simplex (One-Way)
13) Microprocessor	PIC12F629-1/SN
14) Weight / Dimension	130g / 68(L) mm x 23(W) mm x 10(D) mm
15) Operation temperature	- 40 °C ~ + 80 °C
16) Power Source	6 Vdc / 90mAH (CR2016 x 2Ea, Coin type battery)
17) Antenna Description**	Type: Helical, Connection: Fixed, Length: 1.6 cm, Gain: 1.75 dBi

** it is declared by applicant

3. SYSTEM CONFIGURATION FOR TEST

3.1 Characteristics of equipment

This device is Car Remote controller for Car's Engine start/stop and door open/close, it is named One-Way AM Remote, and also it is design to only RF Part, Rated power source was supplied 6 Vdc from Coin type battery

Operation description is response short message by user's push button remote controller

For more than describe is written the user manual

3.2 Used peripherals list

Description	Model No.	Serial No.	Manufacture	Remark
One-Way Remote**	1W900SHR-760	-	SEGI LIMITED	stand-along type

**it is performed test without other peripherals

3.3 Product Modification

N/A

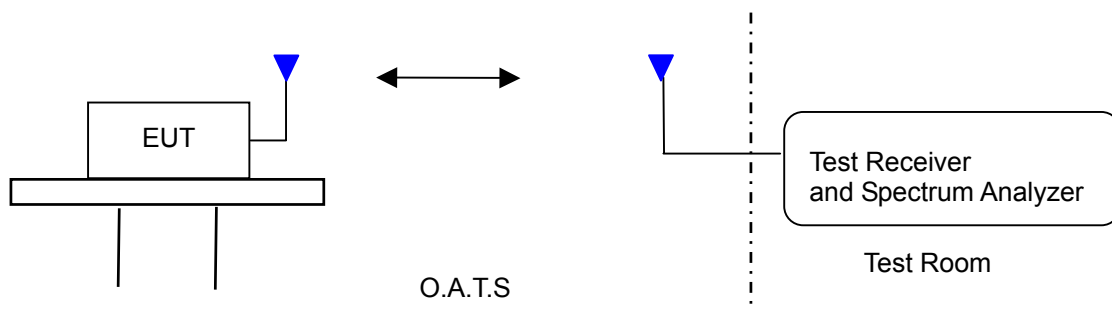
3.4 Operating Mode

All measurements were intended to emit maximum RF continuously signal from EUT

3.5 Test Setup of EUT

The measurements were taken in continuous transmit mode using the push button of EUT

For controlling the EUT, the test push button were provided by the applicant.



※ This configuration is RF Fundamental and harmonic, spurious radiated emission measurement

3.6 Used Test Equipment List

No.	Instrument	Model	Serial No.	Manufacturer	Due to Cal. Date	Used
1	Spectrum Analyzer	8563E	3846A10662	Agilent Technology	2010.05.20	<input checked="" type="checkbox"/>
2	Test Receiver	ESCS30	100111	Rohde & Schwarz	2010.03.07	<input checked="" type="checkbox"/>
3	Test Receiver	ESPI3	100109	Rohde & Schwarz	2010.03.03	<input type="checkbox"/>
4	LISN	ESH2-Z5	100044	Rohde & Schwarz	2010.03.16	<input type="checkbox"/>
5	LISN	ESH3-Z5	100147	Rohde & Schwarz	2010.06.25	<input type="checkbox"/>
6	Ultra broadband Antenna	HL562	100075	Rohde & Schwarz	2010.03.20	<input checked="" type="checkbox"/>
7	Ultra broadband Antenna	HL562	100076	Rohde & Schwarz	2010.04.14	<input type="checkbox"/>
8	Dipole Antenna	HZ-12	100005	Rohde & Schwarz	2010.04.03	<input type="checkbox"/>
9	Dipole Antenna	HZ-13	100007	Rohde & Schwarz	2010.04.03	<input type="checkbox"/>
10	Horn Antenna	3115	2996	EMCO	2010.06.13	<input checked="" type="checkbox"/>
11	Loop Antenna	6502	9203-0493	EMCO	2010.06.15	<input type="checkbox"/>
12	Digital Signal Generator	E4436B	US39260458	HP	2010.05.20	<input type="checkbox"/>
13	Tracking CW Signal Source	85645A	070521-A1	HP	2010.05.20	<input type="checkbox"/>
14	RF Power Amplifier	8347A	3307A01571	HP	2010.05.20	<input checked="" type="checkbox"/>
15	Microwave Amplifier	8349B	2627A01037	HP	2010.05.20	<input checked="" type="checkbox"/>
16	Attenuator	8498A	3318A09485	HP	2010.05.20	<input type="checkbox"/>
17	Temperature & Humidity Chamber	EY-101	90E14260	TABAI ESPEC	2010.03.16	<input type="checkbox"/>
18	EPM Series Power meter	E4418B	GB39512547	Agilent Technology	2010.05.20	<input type="checkbox"/>
19	RF Power Sensor	ECP-E18A	US37181768	Agilent Technology	2010.05.20	<input type="checkbox"/>
20	Microwave Frequency Counter	5352B	2908A00480	Agilent Technology	2010.05.20	<input type="checkbox"/>
21	Band rejection filter	WTR-BRF2442-84NM	09020001	WAVE TECH Co.,Ltd.	2010.03.03	<input checked="" type="checkbox"/>
22	SLIDAC	None	0207-4	Myoung-Sung Electronic Co., Ltd.	2010.05.20	<input type="checkbox"/>
23	DC Power supply	DRP-5030	9028029	Digital Electronic Co.,Ltd	2010.06.04	<input type="checkbox"/>
24	DC Power supply	UP-3005T	68	Unicon Co.,Ltd	2010.05.20	<input type="checkbox"/>
25	DC Power supply	E3610A	KR24104505	Agilent Technology	2010.05.20	<input type="checkbox"/>
26	Antenna Master	-	-	Daeil EMC	N/A	<input checked="" type="checkbox"/>
27	Turn Table	-	-	Daeil EMC	N/A	<input checked="" type="checkbox"/>

4. SUMMARY TEST RESULTS

Description of Test	FCC Rule	Reference Clause	Used	Test Result
20 dB Occupied bandwidth	15.215(c)	Clause 5.1	<input checked="" type="checkbox"/>	Compliance
Radiated emissions	15.249(a), 15.209	Clause 5.2	<input checked="" type="checkbox"/>	Compliance
General requirement	15.19, 15.203, 15.21	Clause 5.3	<input checked="" type="checkbox"/>	Compliance
Compliance : The EUT complies with the essential requirements in the standard. Not Compliance : The EUT does not comply with the essential requirements in the standard. N/A : The test was not applicable in the standard.				

Description of Test	IC Rule	Reference Clause	Used	Test Result
99% Occupied bandwidth	RSS-Gen 4.6.1	Clause 5.1	<input checked="" type="checkbox"/>	Compliance
Radiated emissions	RSS-210, A2.9 (a)	Clause 5.2	<input checked="" type="checkbox"/>	Compliance
General requirement	RSS-Gen 7.1.4, 7.1.5	Clause 5.3	<input checked="" type="checkbox"/>	Compliance
Compliance : The EUT complies with the essential requirements in the standard. Not Compliance : The EUT does not comply with the essential requirements in the standard. N/A : The test was not applicable in the standard.				

5. MEASUREMENT RESULTS

5.1 20 dB and 99% Occupied bandwidth

5.1.1 Standard Applicable [FCC §15.215(c) and IC RSS-Gen 4.6.1]

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in § 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulation it is recommended that the fundamental emission be kept within at least the central 80% of the permitted band in order to minimize the possibility of out-of band operation.

5.1.2 Measurement Procedure

Occupied bandwidth was measured with a spectrum analyzer connected to the antenna terminal while EUT had its modulation function enabled.

After the trace being stable, the reading value using the marker delta and self test function on spectrum analyzer.

The spectrum analyzer is set to the as follows :

- Span : approximately 2 to 3 times the 20 dB and 99% bandwidth
- Resolution (or IF) Bandwidth(RBW) : $\geq 1\%$ of the 20 dB and 99% bandwidth
- Video (or Average) Bandwidth(VBW) : \geq RBW
- Sweep : auto
- Detector function : peak
- Trace : max hold

5.1.3 Measurement Result

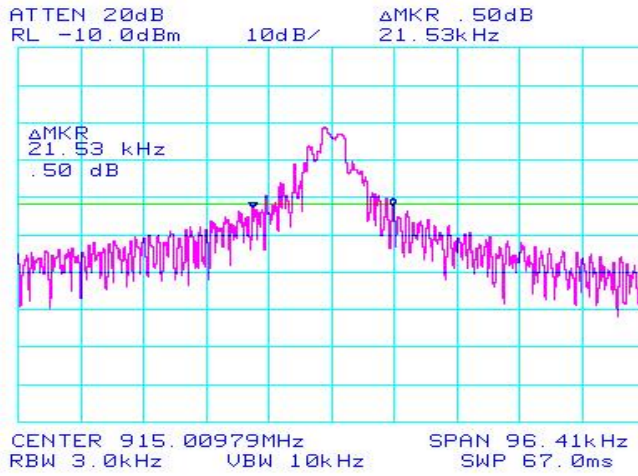
- Environmental Conditions :
 - Temperature : 23 °C, Relative Humidity : (55 ~ 56) % R.H.

Frequency (MHz)	Test Results			
	20 dB Occupied bandwidth(kHz)	99% Occupied bandwidth(kHz)	Requirement standare	Result
915.000	21.53	30.37	15.215 (c)	Complies

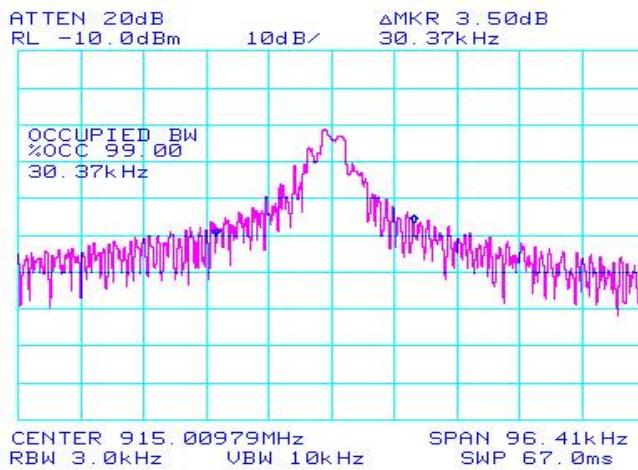
* please see plot in this next page 5.1.4

5.1.4 Test Plot (20 dB and 99% Occupied bandwidth)

⇒ 20 dB Occupied bandwidth



⇒ 99% Occupied bandwidth



5.2 Radiated emissions

5.2.1 Standard Applicable [FCC §15.249(a)] [RSS-210 , A2.9(a)]

Operation within the bands 902 ~ 928 MHz, 2 400 ~ 2 483.5 MHz, 5 725 ~ 5 875 MHz and 24.0 ~ 24.25 GHz.

(a) Except as provided in paragraph (b) of this section, the field strength of emissions from intentional radiators operated within these frequency bands shall comply with the following :

Fundamental Frequencies	Field strength of fundamental (millivolts/meter)	Field strength of harmonics (microvolts/meter)
902 ~ 928 MHz	50	500
2 400 ~ 2 483.5 MHz	50	500
5 725 ~ 5 875 MHz	50	500
24.0 ~ 24.25 GHz	250	2500

(c) Field strength limits are specified at a distance of 3 meters.

(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in Sec. 15.209, whichever is the lesser attenuation.

(e) As Shown in Sec. 15.35(b), for frequencies above 1 000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20 dB under any condition of modulation.

(f) Parties considering the manufacture, importation, marketing or operation of equipment under this section should also note the requirement in Sec. 15.37(d)

5.2.2 Measurement Procedure

① As below test setup figure, for frequencies measured below and above 1 GHz respectively. Turn on EUT and make sure that it is test mode function. Also was placed on a non-metallic table height of 0.8 m above the reference ground plane. If EUT is connected to cables, that were fixed to cause maximum emission. antenna was used to Horn antenna for above 1 GHz and Broadband antenna below 1GHz. it made with the antenna positioned in both the horizontal and vertical planes of polarization.

② For emission frequencies measured each below and above 1 GHz, a pre-scan is performed in a Shield chamber to determine the accurate frequencies before final test, after maximum emissions level will be checked on a open test site and measuring distance is 3 meter from EUT to receiver antenna.

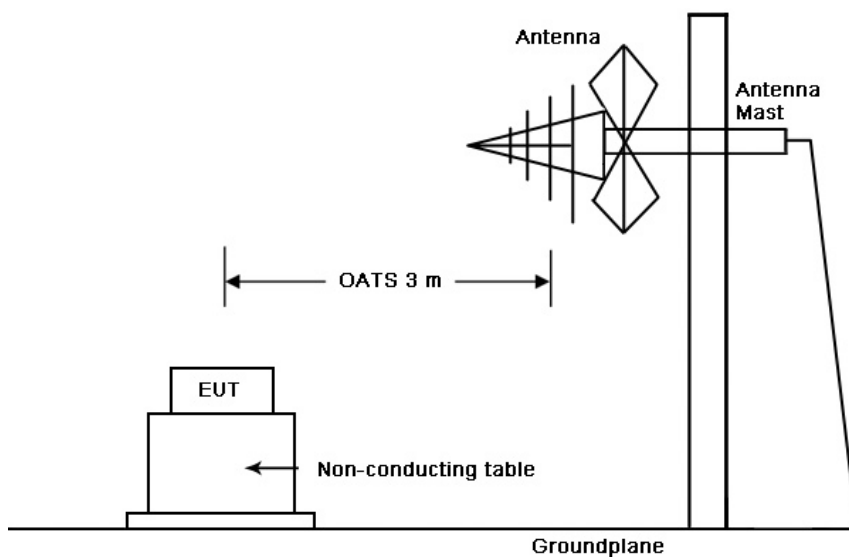
③ For emission frequencies measured below 1 GHz, set the Test Receiver on a 120KHz resolution bandwidth using measurement instrumentation employing a CISPR quasi-peak detector. and for above 1 GHz, set the

spectrum analyzer on a 1 MHz resolution bandwidth with average detector for each frequency measured in step ② and then EUT is located Position X,Y,Z on turn table

- ④ The search antenna is to be raised and lowered over a range from 1 to 4 meters in horizontally polarized orientation. Position the highness when the highest value is indicated on spectrum analyzer, then change the orientation of EUT on test table over a range from 0° to 360° with a speed as slow as possible, and keep the highest emission is indicated on the spectrum analyzer. Vary the antenna position again and record the highest value as a final reading.
- ⑤ Repeat step ④ until all frequencies to be measured were complete.
- ⑥ Repeat step ⑤ with search antenna in vertical polarized orientations.
- ⑦ Check the frequencies of highest emission with varying the placement of cables (if any) associated with EUT to obtain the worst case and record the result.

.The measurement results are obtained as described below:

$$\text{Result}(\text{dB}\mu\text{V}/\text{m}) = \text{Reading}(\text{dB}\mu\text{V}/\text{m}) + \text{Antenna factor}(\text{dB}/\text{m}) + \text{CL}(\text{dB}) + \text{other application factor}(\text{dB})$$



5.2.3 Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are test receiver, Cable loss, Antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, Antenna frequency interpolation, measurement distance variation, Site imperfection, mismatch, and system repeatability based on NIS 80,81, The measurement uncertainty level with a 95 % confidence level were apply to Uncertainty of a radiation emissions measurement at OATS(Open Area Test Site) of KOSTEC is ± 4.0 dB

§15.209 and RSS-210(2.7 Table 2) : limits for radiated emissions measurements (distance at 3m)			
Frequency Band	Limit [$\mu\text{V}/\text{m}$]	Limit [$\text{dB}\mu\text{V}/\text{m}$]	Detector
30 - 88	100 (3 nW)	40.0	Quasi peak
88 - 216	150 (6.8 nW)	43.5	Quasi peak
216 - 960	200 (12 nW)	46.0	Quasi peak
Above 960	500 (75 nW)	54.0	Average

§15.205 and RSS-210 (2.7 Table 1) : Restrict Band of Operation : Only spurious emissions are permitted in any of the frequency bands listed below ;			
[MHz]	[MHz]	[MHz]	[GHz]
0.090 - 0.110	16.42 - 16.423	399.9 - 410	4.5 - 5.15
0.495 - 0.505**	16.69475 - 16.69525	608 - 614	5.35 - 5.46
2.1735 - 2.1905	16.80425 - 16.80475	960 - 1240	7.25 - 7.75
4.125 - 4.128	25.5 - 25.67	1300 - 1427	8.025 - 8.
4.17725 - 4.17775	37.5 - 38.25	1435 - 1626.5	9.0 - 9.2
4.20725 - 4.20775	73 - 74.6	1645.5 - 1646.5	9.3 - 9.5
6.215 - 6.218	74.8 - 75.2	1660 - 1710	10.6 - 12.7
6.26775 - 6.26825	108 - 121.94	1718.8 - 1722.2	13.25 - 13.
6.31175 - 6.31225	123 - 138	2200 - 2300	14.47 - 14.5
8.291 - 8.294	149.9 - 150.05	2310 - 2390	15.35 - 16.2
8.362 - 8.366	156.52475 - 156.52525	2483.5 - 2500	17.7 - 21.4
8.37625 - 8.38675	156.7 - 156.9	2690 - 2900	22.01 - 23.12
8.41425 - 8.41475	162.0125 - 167.17	3260 - 3267	23.6 - 24.0
12.29 - 12.293	167.72 - 173.2	3332 - 3339	31.2 - 31.8
12.51975 - 12.52025	240 - 285	3345.8 - 3358	36.43 - 36.5
12.57675 - 12.57725	322 - 335.4	3600 - 4400	Above 38.6

** Until February 1, 1999, this restricted band shall be 0.490-0.510

5.2.4 Measurement Result

• Environmental Conditions :

- Temperature : 23 °C, Relative Humidity : (54 ~ 55) % R.H. Pressure : 100.2 kPa

■ Setting Channel_915.000 MHz

Below 1 GHz

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Pstn (axis)	Antenna			Cbl (dB)	Pre amp	Meas Result (dB μ V/m)	Limit (dB μ V/m)	Mgn (dB)	Resu
				Height (m)	Pol. (H/V)	Fctr. (dB/m)						
Below 915.000	Nil emission											
915.000*	39.00	105	Y	1.9	V	20.91	11.09	-	71.00**	93.98	22.98	Pass

*it is fundamental frequency and other signal is not detected

** the value that measured by quasi-peak detector and Limit is listed under FCC Part 15.249 and IC RSS-210

Above 1 GHz

Freq. (MHz)	Reading (dB μ V/m)	Table (Deg)	Pstn (axis)	Antenna			Cbl (dB)	Pre Am ϕ (dB)	Meas Result (dB μ V/ m)	Limit (dB μ V/m)	Mgn (dB)	Resu
				Height (m)	Pol. (H/V)	Fctr. (dB/m)						
1,830	42.67	92	Y	1.6	V	25.33	4.63	30	42.63	54.00*	11.37	Pass
1,830	57.52	92	Y	1.6	V	25.33	4.63	30	57.48	74.00**	16.52	Pass
Above 1,830	Nil emission											

* Limit is average value

**Limit is peak value

Note : Emission is second harmonic and is not falling in the restricted bands of 15.205

Freq.(MHz) : Measurement frequency, Reading(dB μ V/m) : Indicated value for test receiver,
Table (Deg) : Directional degree of Turn table, Pstn(axis) : Location axis of EUT
Antenna(Height, Pol, Fctr) : Antenna Height, Polarization and Factor
Cbl(dB) : Cable loss, Pre amp(dB) : Pre amplifier gain, Meas Result (dB μ V/m) : Reading(dB μ V/m)+ Antenna
factor.(dB/m) + CL(dB) - Pre-amp gain(dB)
Limit(dB μ V/m): Limit value specified with FCC Rule, Mgn(dB) : FCC Limit (dB μ V/m) – Meas Result(dB μ V/m),

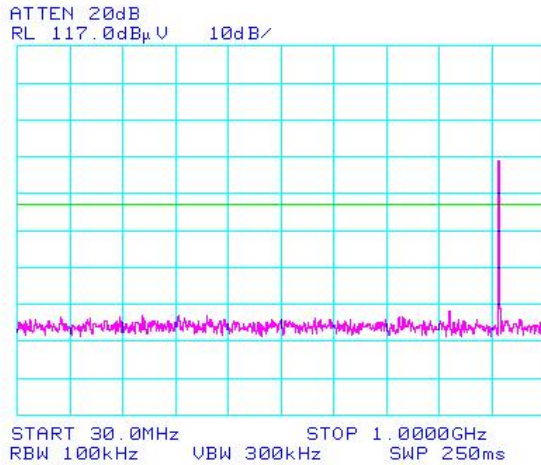
5.2.5 Test Plot_Fundamental frequency

⇒ Measured frequency 915.000 MHz

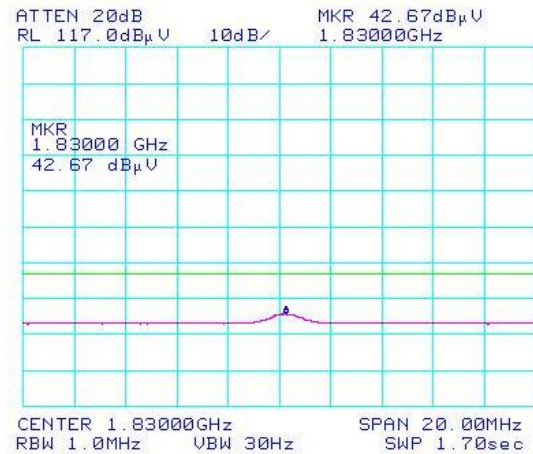
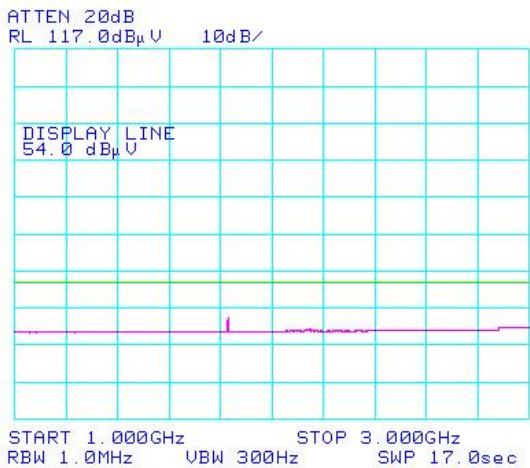


5.2.6 Test Plot_Harmonic & Spurious emission

⇒ Frequency range30 MHz ~ 1 000 MHz

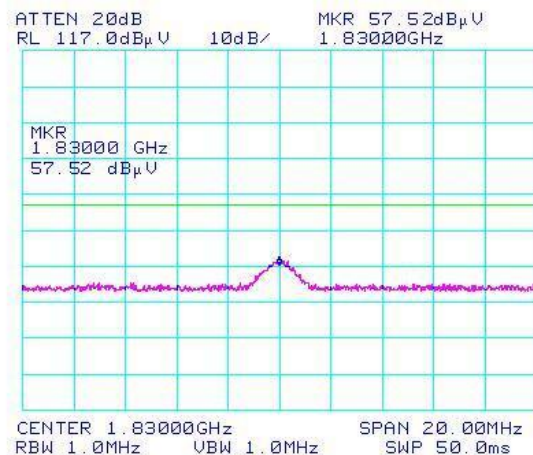
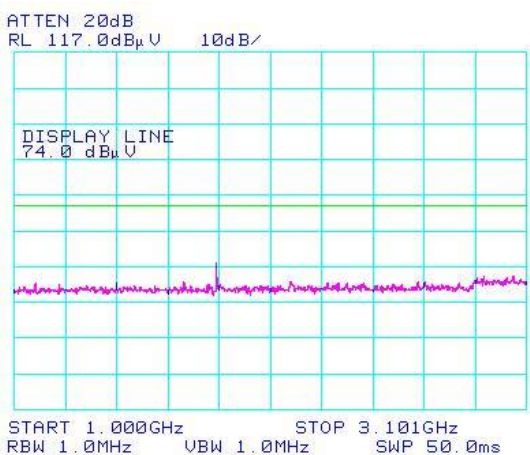


⇒ Frequency range.....1.0 GHz ~ 3.2 GHz (Average mode)



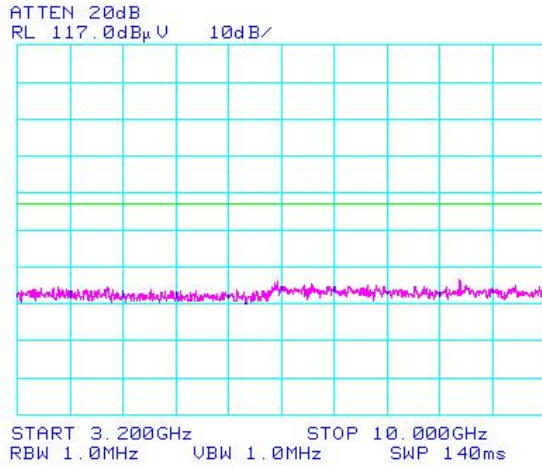
Note: this plot is second harmonic emission of fundamental frequency

⇒ Frequency range.....1.0 GHz ~ 3.2 GHz (Peak mode)



► Continuous

⇒ Frequency range.....3.2 GHz ~ 10 GHz



5.3 General requirement

5.3.1 Labelling requirement [FCC §15.19(3)(a)] [RSS-Gen 7.1.5]

(a) In addition to the requirements in part 2 of this chapter, a device subject to certification, or verification shall be labeled as follows ;

(3) All other devices shall bear the following statement in a conspicuous location on the device; user manuals for licence-exempt LPDAs shall contain the following or equivalent statements in a conspicuous position ;

operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

According to above requirement standards. This product is very small size, so above statement is described on user manual

5.3.2 Antenna requirement [FCC §15.203] [RSS-Gen 5.6 and 7.1.4]

For intentional device, according to §15.203, an intentional radiator shall be designed to ensure that no antenna other than furnished by responsible party shall be used with the device.

The use of a permanently attached antenna or of an antenna that user a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

The manufacturer may design the unit so that broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

Under section 5.6 of IC Rule(RSS-Gen), some equipment will require the use of an external antenna system and supporting structure. The Minister has established as a standard that all antennas, masts, towers or other antenna supporting structures are required to be compliant with the terms of CPC-2-03.

and also under section 7.1.4 of this Rule, a transmitter can only be sold or operated with antennas with which it was certified.

According to above requirement standards This product's antenna type is an helical and gain is 1.75dBi fixed between final transmitter part and antenna feeder line and also radiated emission field strength from EUT is meet requirement standard limit

5.3.3 User information [FCC §15.21 and IC Rule]

For intentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. In cases where the manual is provided only in a form other than paper, such as on a computer disk or over the internet, the information required by this section may be included in the manual in that alternative form, provided the user can reasonably be expected to have the capability to access information in that form.

According to above requirement standards. this warning statement is described on user manual

5.3.4 SAR and RF Exposure Evaluation information

This product is Car remote controller which operated in handy for person. and it's type is not contain mobile or portable according to 2.1093(c) of FCC Part 2, All other portable transmitting devices are categorically excluded from routine environmental evaluation for RF exposure prior to equipment authorization or use, except as specified in Sec. 1.1307(c) and 1.1307(d) and according to 2.5.1 of RSS-102, from 3 kHz up to 1 GHz inclusively and its output power is less than or equal to 200 mWeirp for general public use.

So, this product is except because a follows ;

- Maximum conducted peak power : 9.62mW (please see a below test plot)
- Duty Cycle factor : 100%
- Antenna gain: 1.75dBi (declared by applicant)

∴ E.I.R.P power is $9.62 \text{ mW} \times 1(\text{Correction factor}) \times 1.49(\text{Numerical ANT gain}) = \underline{14.33 \text{ mW.Eirp}}$

according to above calculated power is a smaller than requirement standard

Conducted power _ Test plot

