

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR SUPERHETRODYNE RECEIVER

Test Report No. : W169R-D014
AGR No. : A168A-278R
Applicant : SEOYON ELECTRONICS CO., LTD.
Address : 424, Sinwon-ro, Danwon-gu, Ansan-Si, Kyonggi-Do, South Korea
Manufacturer : SEOYON ELECTRONICS CO., LTD.
Address : 424, Sinwon-ro, Danwon-gu, Ansan-Si, Kyonggi-Do, South Korea
Type of Equipment : Unit Assy-BCM & Receiver
FCC ID : NYOSYECBCM1611
Model No. : SYECBCM1611
Serial number : N/A
Total page of Report : 13 pages (including this page)
Date of Incoming : September 12, 2016
Date of issuing : September 23, 2016

SUMMARY

The equipment complies with the regulation; **FCC PART 15 SUBPART B §15.101**

This test report contains only the result 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.

Reviewed by: 

 Ki-Hong, Nam / Asst, Chief Engineer
 ONETECH Corp.

Approved by: 

 Sung-Ik, Han/ Managing Director
 ONETECH Corp.

CONTENTS

	Page
1. VERIFICATION OF COMPLIANCE	4
2. GENERAL INFORMATION	5
2.1 PRODUCT DESCRIPTION.....	5
2.2 MODEL DIFFERENCES:	5
2.3 RELATED SUBMITTAL(S) / GRANT(S)	5
2.4 PURPOSE OF THE TEST	5
2.5 TEST METHODOLOGY.....	5
2.6 TEST FACILITY	6
3. SYSTEM TEST CONFIGURATION	7
3.1 JUSTIFICATION.....	7
3.2 PERIPHERAL EQUIPMENT	7
3.3 MODE OF OPERATION DURING THE TEST	7
3.4 EQUIPMENT MODIFICATIONS.....	7
3.5 CONFIGURATION OF TEST SYSTEM.....	7
4. PRELIMINARY TEST	8
4.1 AC POWER LINE CONDUCTED EMISSIONS TESTS.....	8
4.2 RADIATED EMISSIONS TESTS.....	8
5. FINAL RESULT OF MEASUREMENT	9
5.1 RADIATED EMISSION TEST	10
5.1.2 Test data for 30 MHz to 1 000 MHz.....	10
5.1.2 Test data for Blow 30 MHz.....	11
5.1.3 Test data for above 1 GHz	11
6. FIELD STRENGTH CALCULATION	12
7. LIST OF TEST EQUIPMENT	13

Revision History

Issued Report No.	Issued Date	Revisions	Effect Section
W167R-D061	July 19, 2016	Initial Issue	All
W169R-D014	September 23, 2016	Changing the Circuit of Main board (Before change Main PCB version: BCM_1G V4.1 After change Main PCB version: BCM_1G V5.0)	All

1. VERIFICATION OF COMPLIANCE

APPLICANT : SEOYON ELECTRONICS CO., LTD.
 ADDRESS : 424, Sinwon-ro, Danwon-gu, Ansan-Si, Kyonggi-Do, South Korea
 CONTACT PERSON : KEUNSU KIM / Assistant Manager
 TELEPHONE NO : +82-31-420-3489
 FCC ID : NYOSYECBCM1611
 MODEL NAME : SYECBCM1611
 BRAND NAME : HYUNDAI, KIA
 SERIAL NUMBER : N/A
 DATE : September 23, 2016

EQUIPMENT CLASS	CYY - Communications Receiver used w/ Pt 15 Tx
E.U.T. DESCRIPTION	Unit Assy-BCM & Receiver-SUPERHETRODYNE RECEIVER
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.4 (2014)
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC RULES PART(S)	FCC PART 15 § 15.101
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	3 m, Semi Anechoic Chamber

The above equipment was tested by ONETECH Corp. for compliance with the requirement set forth in the FCC Rules and Regulations. This said equipment in the configuration described in this report, shows the maximum emission levels emanating from equipment are within the compliance requirements.

2. GENERAL INFORMATION

2.1 Product Description

The SEOYON ELECTRONICS CO., LTD., Model SYECBCM1611 (referred to as the EUT in this report) is a receiver that is fixed inside the vehicle and receives the signal from the transmitter, Model: SYEC4FOB1611 has FCC ID: NYOSYEC4FOB1611, IC certification No.: 3109A-SYECFOB1611 which was manufactured by SEOYON ELECTRONICS CO., LTD., and then decided locking and unlocking the door of the vehicle. The product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic
RECEIVING FREQUENCY	433.92 MHz
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>= 1 MHz)	21.94 MHz
ANTENNA TYPE	Internal Antenna
RATED SUPPLY VOLTAGE	DC 12.0 V
OPERATING VOLTAGE	DC 9 V ~ DC 16 V
NUMBER OF LAYERS	2 Layers

2.2 Model Differences:

-. None

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Purpose of the test

To determine whether the equipment under test fulfills the requirements of the regulation stated in FCC PART 15 SUBPART B, section 15.101

2.5 Test Methodology

Both conducted and radiated testing was performed according to the procedures in ANSI C63.4: 2014. Radiated testing was performed at a distance of 3 m from EUT to the antenna.

2.6 Test Facility

The Onetech Corp. has been designated to perform equipment testing in compliance with ISO/IEC 17025.

The Electromagnetic compatibility measurement facilities are located at 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) – Registration No. R-4112/ C-4617/ G-666/ T-1842

IC (Industry Canada) – Registration No. Site# 3736-3

-. Site Accreditation:

KOLAS (Korea Laboratory Accreditation Scheme) - Accreditation NO. KT085

FCC (Federal Communications Commission) - Accreditation No. KR0013

RRA (Radio Research Agency) – Designation No. KR0013

3. SYSTEM TEST CONFIGURATION

3.1 Justification

This device was configured for testing in a typical way as a normal customer is supposed to be used. During the test, the following components were installed inside of the EUT.

DEVICE TYPE	MANUFACTURER	MODEL/PART NUMBER	FCC ID
Main Board	SEOYON ELECTRONICS CO., LTD.	BCM_1G V5.0	N/A

3.2 Peripheral equipment

-. None

3.3 Mode of operation during the test

-. The EUT was operated with receiving mode continuously during the test.

3.4 Equipment Modifications

-. None

3.5 Configuration of Test System

- Line Conducted Test:** It is not need to test this requirement, because the power of the EUT supplies from a car battery.
- Radiated Emission Test:** Preliminary radiated emissions tests were conducted using the procedure in ANSI C63.4: 2014 to determine the worse operating conditions. Final radiated emission tests were conducted at 3 m semi anechoic chamber
The turntable was rotated through 360 degrees and the EUT was tested by positioned three orthogonal planes to obtain the highest reading on the field strength meter. Once maximum reading was determined, the search antenna was raised and lowered in both vertical and horizontal polarization.
- Coherent Test:** During Radiated Emission Tests, the EUT was operated with standby mode of receiving condition.
- Antenna Power Conduction Test:** This equipment was only with a permanently attached antenna, so the radiated emission measurement was performed with this condition.

4. PRELIMINARY TEST

4.1 AC Power line Conducted Emissions Tests

During Preliminary Tests, the following operating mode was investigated

Operation Mode	The Worse operating condition (Please check one only)
It is not need to test this requirement, because the power of the EUT is supplied from a car battery.	

4.2 Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

Operation Mode	The Worse operating condition (Please check one only)
RX mode	X

5. FINAL RESULT OF MEASUREMENT

Preliminary test was done in normal operation mode. And the final measurement was selected for the maximized emission level.

Radiated emission electric field intensity, 30 MHz ~ 300 MHz : ± 4.43 dB

Radiated emission electric field intensity, 300 MHz ~ 1 000 MHz : ± 3.80 dB

Measurement uncertainty is calculated in accordance with CISPR 16-4-2. The measurement uncertainty is given with a confidence of 95 % with the coverage factor, $k = 2$.

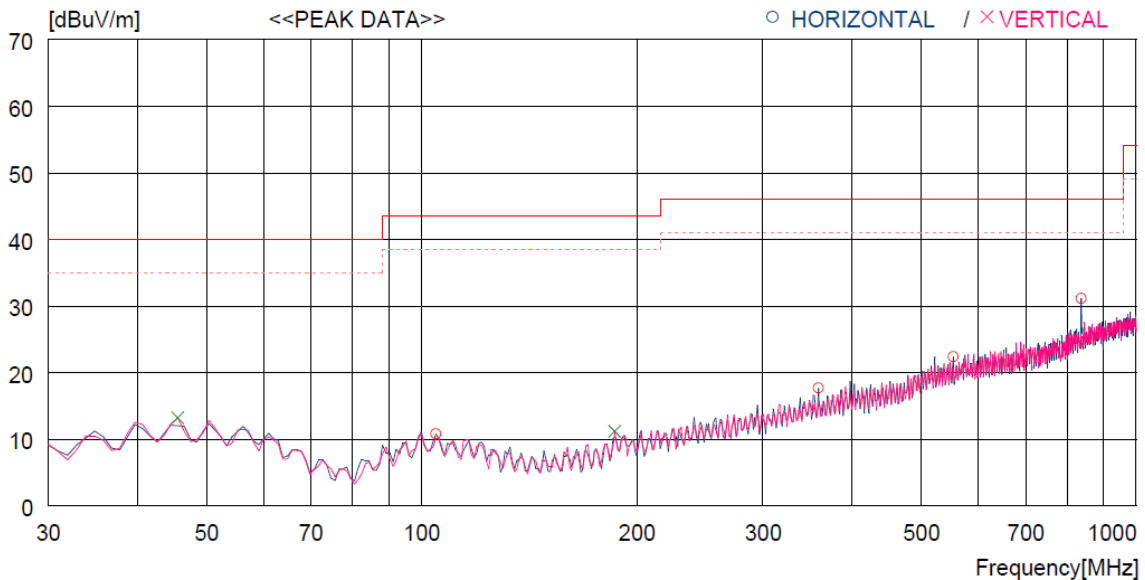
5.1 Radiated Emission Test

5.1.2 Test data for 30 MHz to 1 000 MHz

The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

Humidity Level : 47.9 % R.H. Temperature: 23.8 °C
 Limits apply to : FCC CFR 47, Part 15, Subpart B (Section: 15.109)
 Detector : CISPR Quasi-Peak (6 dB Bandwidth: 120 kHz)
 Type of Test : Unintentional Radiator
 Result : PASSED

EUT : Unit Assy-BCM & Receiver Date: September 14, 2016
 Operating Condition : RX mode
 Distance : 3 m
 Frequency Range : 30 MHz ~ 1 000 MHz
 Test was conducted on : 3 m semi anechoic chamber



No.	FREQ [MHz]	READING PEAK [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Horizontal -----										
1	104.690	29.4	11.9	2.8	33.3	10.8	43.5	32.7	200	0
2	358.830	30.2	15.0	5.1	32.6	17.7	46.0	28.3	200	345
3	554.769	30.4	18.3	6.8	33.1	22.4	46.0	23.6	200	0
4	838.001	35.0	21.3	8.2	33.4	31.1	46.0	14.9	100	359
----- Vertical -----										
5	45.520	29.6	14.5	2.0	32.9	13.2	40.0	26.8	300	113
6	186.170	30.0	10.5	3.6	32.9	11.2	43.5	32.3	400	359

(Signature)
Tested by: Seok-Jun, Lee / Engineer

5.1.2 Test data for Blow 30 MHz


- Test Date : September 14, 2016
- Resolution bandwidth : 200 Hz (from 9 kHz to 0.15 MHz), 9 kHz (from 0.15 MHz to 30 MHz)
- Frequency range : 9 kHz ~ 30 MHz
- Measurement distance : 10 m
- Test was conducted on : 3 m semi anechoic chamber

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Any emissions less than 20 dB below the limit were not observed.									

5.1.3 Test data for above 1 GHz

- Test Date : September 14, 2016
- Resolution bandwidth : 1 MHz
- Frequency range : 1 GHz ~ 2 GHz
- Measurement distance : 3 m
- Test was conducted on : 3 m semi anechoic chamber

Frequency (MHz)	Reading (dBμV)	Ant. Pol. (H/V)	Ant. Height (m)	Angle (°)	Ant. Factor (dB/m)	Cable Loss	Emission Level(dBμV/m)	Limits (dBμV/m)	Margin (dB)
Any emissions less than 20 dB below the limit were not observed.									



Tested by: Seok-Jun, Lee / Engineer

6. FIELD STRENGTH CALCULATION

Meter readings are compared to the specification limit correcting for antenna and cable losses

+	Meter reading	(dB μ V)
+	Cable Loss	(dB)
+	Antenna Factor (Loss)	(dB/m)
-	Amplifier Gain	(dB)
<hr/>		
=	Corrected Reading	(dB μ V/m)
-	Specification Limit	(dB μ V/m)
<hr/>		
=	dB Relative to Spec	(\pm dB)

7. LIST OF TEST EQUIPMENT

No.	EQUIPMENTS	MFR.	MODEL	SER. NO.	LAST CAL	DUE CAL	USE
1.	Test receiver	R/S	ESCI	101013	Apr. 05, 2016	12MONTH	■
2.	Test Receiver	R/S	ESU	100261	Apr. 06, 2016	12MONTH	■
3.	Amplifier	Sonoma Instrument	310N	312544	Apr. 05, 2016	12MONTH	■
4.	Amplifier	Sonoma Instrument	310N	312545	Apr. 05, 2016	12MONTH	■
5.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-255	May 20, 2016	24MONTH	■
6.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-421	Apr. 15, 2016	24MONTH	■
7.	Controller	Innco System	CO3000	CO3000/904/ 37211215/L	N/A	N/A	■
8.	Turn Table	Innco System	DT3000	930611	N/A	N/A	■
9.	Antenna Master	Innco System	MA-4000XPET	MA4000/509/ 37211215/L	N/A	N/A	■
10.	Antenna Master	Innco System	MA4000-EP	MA4000/332/ 27030611/L	N/A	N/A	■
11.	Pre-Amplifier	R/S	SCU-18	102209	May 31, 2016	12MONTH	■
12.	Horn Antenna	Schwarzbeck	BBHA9120D	BBHA9120D295	Aug. 31, 2015	24MONTH	■
13.	Loop Antenna	R/S	HFH2-Z2	879285/26	Dec. 09, 2014	24MONTH	■