RF PERFORMANCE TEST REPORT

Test Report No.	**: OT-20N-RWD-017**
Reception No.	**: 2010004162**
Applicant	**: Continental Automotive Systems Corporation**
Address	**: 45-29, Saeum-ro, Icheon-si, Gyeonggi-do, 17308, Korea**
Manufacturer	**: Continental Automotive Systems Corporation**
Address	**: 45-29, Saeum-ro, Icheon-si, Gyeonggi-do, 17308, Korea**
Type of Equipment	**: IBU(Integrated Body Control Unit)**
FCC ID.	**: SY5IBU21N**
Model Name	**: IBU21N**
Multiple Model Name	**: N/A**
Serial number	**: N/A**
Total page of Report	**: 16 pages (including this page)**
Date of Incoming	**: October 23, 2020**
Date of issue	**: November 06, 2020**

SUMMARY

The equipment complies with the regulation; **FCC CFR47 Part 15 Subpart C Section 15.207 and 15.209**

This test report only contains the result of a single test of the sample supplied for the examination.

It is not a generally valid assessment of the features of the respective products of the mass-production.

Tested by	Reviewed by	Approved by
/ Sieon Lee / Assistant Manager	/ Ha-Ram Lee / Manager	/ Ki-Hong, Nam / General Manager
ONETECH Corp.	ONETECH Corp.	ONETECH Corp.

ONETECH Corp.: 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea (TEL: 82-31-799-9500, FAX: 82-31-799-9599)

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Revision History

Issue Report No.	Issued Date	Revisions	Effect Section
OT-20N-RWD-017	November 06, 2020	Initial Release	All

1. VERIFICATION OF COMPLIANCE

APPLICANT	: Continental Automotive Systems Corporation
ADDRESS	: 45-29, Saeum-ro, Icheon-si, Gyeonggi-do, 17308, Korea
CONTACT PERSON	: S. M. Jang/ Representative
TELEPHONE NO	: 82-31-645-4864
FCC ID	: SY5IBU21N
MODEL NAME	: IBU21N
BRAND NAME	: N/A
SERIAL NUMBER	: N/A
DATE	: November 06, 2020

EQUIPMENT CLASS	**DCD – Part 15 Low Power Transmitter Below 1 705 kHz**
KIND OF EQUIPMENT	IBU(Integrated Body Control Unit)
THIS REPORT CONCERNS	Original Grant
MEASUREMENT PROCEDURES	ANSI C63.10: 2013
TYPE OF EQUIPMENT TESTED	Pre-Production
KIND OF EQUIPMENT AUTHORIZATION REQUESTED	Certification
EQUIPMENT WILL BE OPERATED UNDER FCC&IC RULES PART(S)	FCC CFR47 Part 15 Subpart C Section 15.207 and 15.209
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	No
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. The equipment in the configuration described in this report shows the maximum emission levels emanating from equipment are within the compliance requirements.

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2. TEST SUMMARY

2.1 Test items and results

SECTION	TEST ITEMS	RESULTS
15.209, 15.209(a)	Field Strength of Fundamental and Spurious Emission	Met the Limit / PASS
15.215	20 dB Bandwidth	Met the Limit / PASS
15.207	Transmitter AC Power Line Conducted Emission	N/A (See Note1)

Note 1: This EUT is only supplied by vehicle battery.

2.2 Additions, deviations, exclusions from standards

No additions, deviations or exclusions have been made from standard.

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 CFR47 Part 15 Subpart C Section 15.207 and 15.209, 15.215

2.5 Test Methodology

Radiated testing was performed according to the procedures in ANSI C63.10: 2013 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 301-14, Daessangnyeong-ri, Chowol-eup, Gwangju-si, Gyeonggi-do, 464-862 Korea.

-. Site Filing:

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

ISED (Innovation, Science and Economic Development Canada) – Registration No. Site# 3736A-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

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3. GENERAL INFORMATION

3.1 Product Description

The Continental Automotive Systems Corporation, Model: IBU21N (referred to as the EUT in this report) is a IBU(Integrated Body Control Unit). Product specification information described herein was obtained from product data sheet or user's manual.

DEVICE TYPE	IBU(Integrated Body Control Unit)
OPERATING FREQUENCY	TX: 125 kHz RX: 433.92 MHz
RATED RF OUTPUT POWER	66.4 dBμV/m
ANTENNA TYPE	Loop Coil Antenna
MODULATION	ASK
RATED SUPPLY VOLTAGE	DC 12.0 V

3.2 Alternative type(s)/model(s); also covered by this test report.

-. None

4. EUT MODIFICATIONS

-. None

5. SYSTEM TEST CONFIGURATION

5.1 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	N/A	N/A	N/A

5.2 Peripheral equipment

Model	Manufacturer	Description	Connected to
-	-	-	-

5.3 Mode of operation during the test

For the testing, software used to control the EUT for staying in continuous transmitting is programmed.

For final testing, the EUT was set at 125 kHz for 12.0 V.

To get a maximum emission levels from the EUT, the EUT was moved throughout the XY, XZ, and YZ planes and the worst case is “XZ” axis.

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5.4 Configuration of Test System

Line Conducted Test **:** As the EUT is operated by DC battery, this test item is not requirement to be performed.

Radiated Emission Test **:** Preliminary radiated emissions test were conducted using the procedure in ANSI C63.10: 2013 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.

5.5 Antenna Requirement

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

Antenna Construction:

The antenna of the EUT is a Loop Coil Antenna connected to the main board in the EUT, so no consideration of replacement by the user.

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6. PRELIMINARY TEST

6.1 AC Power line Conducted Emissions Tests

As the EUT is operated by DC battery, this test item is not requirement to be performed.

6.2 General Radiated Emissions Tests

During Preliminary Tests, the following operating modes were investigated

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

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7. 20 dB BANDWIDTH

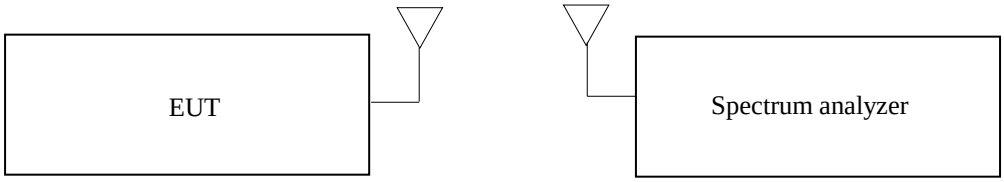
7.1 Operating environment

Temperature	:	23 °C
Relative humidity	:	52 % R.H.

7.2 Test set-up

a. Span = approximately 2 to 3 times the 20 dB bandwidth, RBW = greater than 1 % of the 20 dB bandwidth, VBW = RBW, Sweep = auto, Detector = peak, Trace = max hold.

b. The marker-to-peak function to set the mark to the peak of the emission. Use the marker-delta function to measure 20 dB down one side of the emission. Reset the 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.
The marker-delta reading at this point is 20 dB bandwidth of the emission.



7.3 Test date

October 28, 2020

7.4 Measurement uncertainty

The uncertainty for Occupied Bandwidth is ±4 709 Hz.

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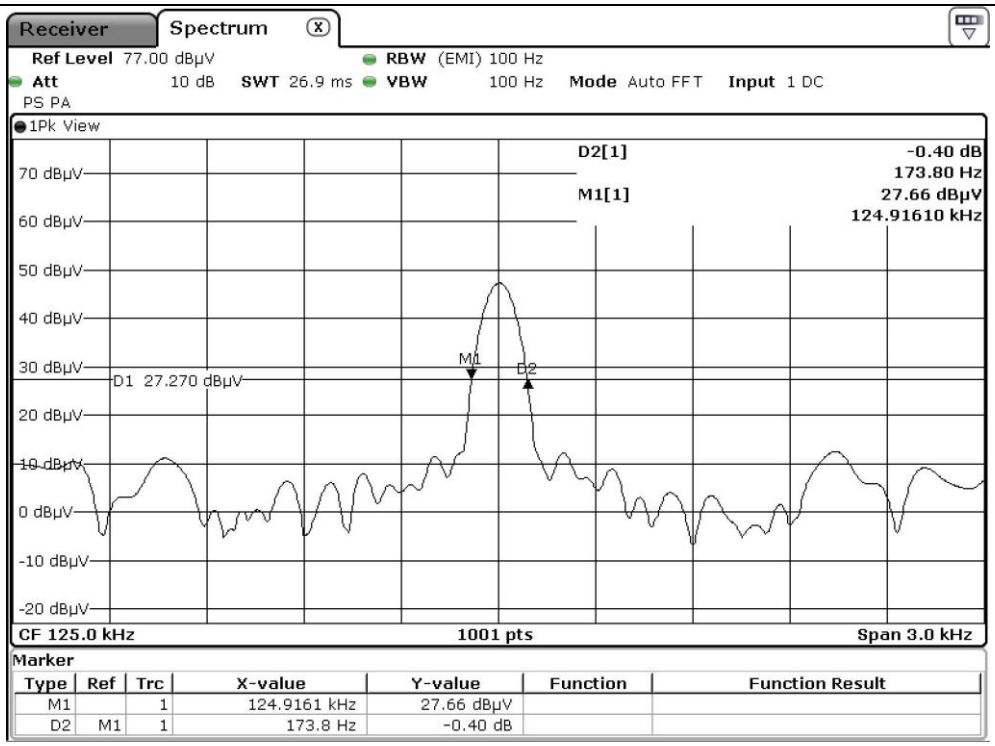
7.5 Test data

Frequency : 125.0 KHz

20 dB Bandwidth : 173.80 Hz



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8. Spurious Emission Test

8.1 Regulation

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

Frequency [MHz]	Field strength [μ V/m]	Field strength [dBμ V/m]	Measurement distance [m]
0.009 ~ 0.490	2 400 / F (kHz)	48.52 ~ 13.80	300
0.490 ~ 1.705	24 000 / F (kHz)	33.8 ~ 22.97	30
1.705 ~ 30	30	29.50	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

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

8.2 Test set-up

The radiated emissions measurements were on the 3 m semi anechoic chamber. The EUT and other support equipment were placed on a non-conductive turntable above the ground plane. The interconnecting cables from outside test site were inserted into ferrite clamps at the point where the cables reach the turntable.

The frequency spectrum from 30 kHz to 1 GHz was scanned and maximum emission levels at each frequency recorded. The system was rotated 360°, and the antenna was varied in the height between 1.0 m and 4.0 ms in order to determine the maximum emission levels. This procedure was performed for horizontal and vertical polarization of the receiving antenna.

8.3 Test date

October 28, 2020

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8.4 Test data

8.4.1 Spurious Radiated Emission Below 30 MHz

Humidity Level : 52 % R.H. Temperature: 23 ºC

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency Range : 9 kHz ~ 30 MHz

Result : PASSED

EUT : IBU(Integrated Body Control Unit)

Operating Condition : Transmitting Mode

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 300m (dBμV/m)	Limit at 300m (dBμV/m)	Margin (dB)
0.019	QP	H	25.0	18.7	0.1	43.8	-36.2	42.0	78.2
*0.125	QP	H	47.4	18.9	0.1	66.4	-13.6	25.7	39.3
0.359	QP	H	22.4	18.9	0.1	41.4	-38.6	16.5	55.1

Frequency (MHz)	Detector	Ant. Pol. (H/V)	Reading (dBμV)	Ant. Factor (dB/m)	Cable Loss	Emission Level at 3m (dBμV/m)	Emission Level at 30m (dBμV/m)	Limit at 30m (dBμV/m)	Margin (dB)
0.538	AV	H	18.0	18.8	0.1	36.9	-3.1	33.0	36.1
3.105	AV	H	16.7	18.9	0.1	35.7	-4.3	30.0	34.3
5.225	AV	H	14.8	19.1	0.2	34.1	-5.9	30.0	35.9

-. Remark: “H” Horizontal, “V” Vertical

-. “*” Means Fundamental frequency

-. Emission Level at 3m [dB μ V/m] = Reading [dBμV] + Ant. Factor [dB/m] + Cable Loss [dB]

-. Margin [dB] = Emission Level at 300m [dBμV/m] – Limit at 300m [dBμV/m]

= Emission Level at 300m [dBμV/m] – Limit at 30m [dBμV/m]

-. Emission Level at 300m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (300/3), 80 dB for up to 0.49 MHz

-. Emission Level at 30m [dBμV/m] = Emission Level at 3m [dBμV/m] - 40log (30/3), 40 dB for above 0.49 MHz, Below 30 MHz

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8.4.2 Spurious Radiated Emission below 1 GHz

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

Humidity Level : 52% R.H. Temperature: 23 ºC

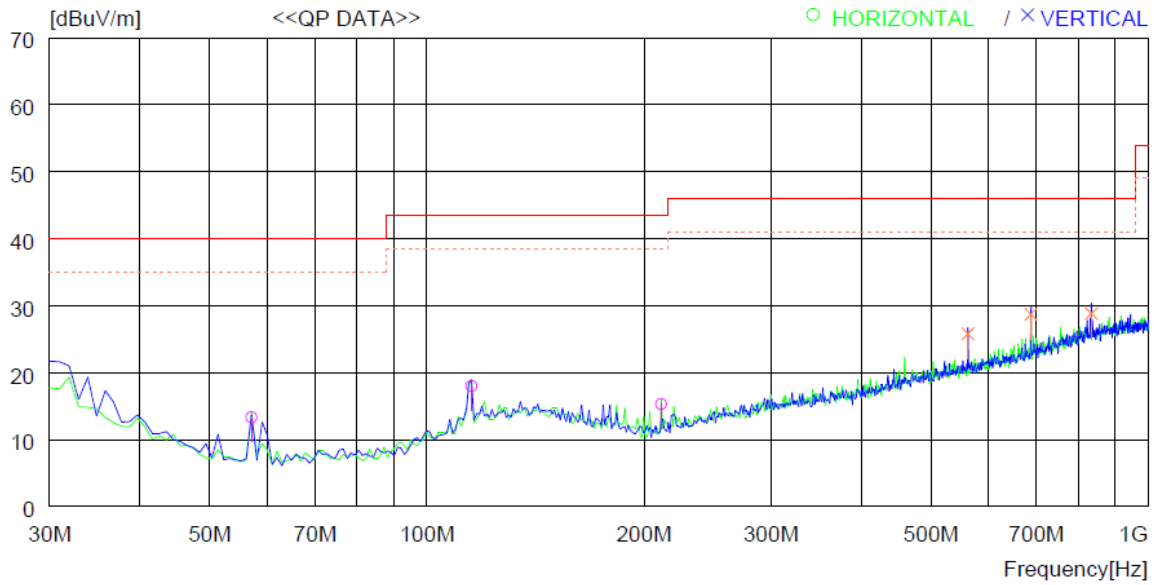
Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.209

Frequency range : 30 MHz ~ 1 000 MHz

Result : PASSED

EUT : IBU(Integrated Body Control Unit)

Operating Condition : Transmitting Mode



No.	FREQ	READING QP	ANT FACTOR	LOSS	GAIN	RESULT	LIMIT	MARGIN	ANTENNA	TABLE
	[MHz]	[dBuV]	[dB]	[dB]	[dB]	[dBuV/m]	[dBuV/m]	[dB]	[cm]	[DEG]
----- Horizontal ------										
1	57.160	32.7	12.4	0.9	32.7	13.3	40.0	26.7	100	307
2	115.360	31.5	17.8	1.4	32.7	18.0	43.5	25.5	400	75
3	211.390	30.0	16.1	1.8	32.6	15.3	43.5	28.2	200	0
----- Vertical ------										
4	562.529	32.1	23.8	2.9	33.0	25.8	46.0	20.2	200	156
5	687.655	32.8	25.4	3.4	32.9	28.7	46.0	17.3	100	345
6	834.121	29.8	27.2	4.2	32.4	28.8	46.0	17.2	300	0

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9. LIST OF TEST EQUIPMENT

Model Number	Manufacturer	Description	Serial Number	Last Cal. (Interval)
FSV30	R/S	Spectrum analyzer	101199	Feb. 20, 2020 (1Y)
ESR7	Rohde & Schwarz	EMI Test Receiver	102190	Oct. 14, 2020 (1Y)
HLP-2008	TDK	Hybrid Antenna	131316	Feb. 27, 2020 (2Y)
310N	Sonoma Instrument	AMPLIFIER	312545	Mar. 16, 2020 (1Y)
GP-4303D	LG Precision Co.,Ltd	DC POWER SUPPLY	5071069	Jan. 07, 2020 (1Y)
CO3000	Innco Systems GmbH	Controller	N/A	N/A
DT5000	Innco Systems GmbH	Turn Table	N/A	N/A
MA-4640-XPET	Innco Systems GmbH	Antenna Master	MA4640/652/43100318/P	N/A
FMZB 1513	Schwarzbeck	Loop Antenna	1513-235	Mar 24, 2020 (2Y)

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