

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT

Test Report No. : OT-187-RWD-031

AGR No. : A182A-066

Applicant : TAEHA MECHATRONICS Co., Ltd.

Address : 421, Bakdal-ro, Manan-gu, Anyang-si, Gyeonggi-do, Republic of Korea

Manufacturer : TAEHA MECHATRONICS Co., Ltd.

Address : 421, Bakdal-ro, Manan-gu, Anyang-si, Gyeonggi-do, Republic of Korea

Type of Equipment : RMCU - Class A digital devices, peripherals & external

Model Name : RMCU Dual 3G

Multiple Model Name : N/A

Serial number : N/A

Total page of Report : 13 pages (including this page)

Date of Incoming : March 06, 2018

Date of Issuing : July 26, 2018


SUMMARY

The equipment complies with the requirement of *FCC CFR 47 PART 15 SUBPART B Class A, Section 15.101*.

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.

Reviewed by: 
Jae-Ho, Lee / Chief Engineer
ONETECH Corp.

Approved by: 
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ONETECH Corp.

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APPENDIX III - PHOTOGRAPHS REPORT	오류! 책갈피가 정의되어 있지 않습니다.

Revision History

Rev. No.	Issued Report No.	Issued Date	Revisions	Effect Section
0	OT-187-RWD-031	July 26, 2018	Initial Issue	All

1. Certification OF COMPLIANCE

Applicant : TAEHA MECHATRONICS Co., Ltd.
 Address : 421, Bakdal-ro, Manan-gu, Anyang-si, Gyeonggi-do, Republic of Korea

Manufacturer : TAEHA MECHATRONICS Co., Ltd.
 Address : 421, Bakdal-ro, Manan-gu, Anyang-si, Gyeonggi-do, Republic of Korea

Model Name : RMCU Dual 3G
 Brand Name : N/A
 Date : July 26, 2018

DEVICE TYPE	CLASS A DIGITAL DEVICES, PERIPHERALS & EXTERNAL - UNINTENTIONAL RADIATOR
E.U.T. DESCRIPTION	RMCU
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 (CLASS A)
MODIFICATIONS ON THE EQUIPMENT TO ACHIEVE COMPLIANCE	None
FINAL TEST WAS CONDUCTED ON	10 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.

Note 1: The RF test items are substituted with the test results of the granted GSM/GPRS Module (Contains FCC ID: RI7HE910) and Satellite Module(Contains FCC ID : PB596XXCS). The test reports No. is (1112FR12-02) and (TRA-005709-00-W-US-1). Refer to the test reports for the detailed results.

2. GENERAL INFORMATION

2.1 Product Description

The TAEHA MECHATRONICS Co., Ltd., Model RMCU Dual 3G (referred to as the EUT in this report) is a RMCU. Product specification described herein was obtained from product data sheet or user's manual.

CHASSIS TYPE	Plastic & Metal
LIST OF EACH OSC. OR CRY. FREQ.(FREQ.>=1 MHz)	26 MHz
ELECTRICAL RATING	DC 24 V
NUMBER OF PCB LAYERS (P. C. BOARD NAME)	2 Layers
EXTERNAL CONNECTOR	DUT DC IN, DUT MTS, DUT LOG, DUT CAN, CAN LAN PORT, Antenna Port 1, Antenna Port 2, Antenna Port 3, USB 2.0 Multifunction, CAN DC IN

2.2 Model Differences

-. None.

2.3 Related Submittal(s) / Grant(s)

Original submittal only

2.4 Test System Details

The model numbers for all the equipments, which were used in the tested system, is:

Model	Manufacturer	Description	Connected to
RMCU Dual 3G	TAEHA MECHATRONICS Co., Ltd.	RMCU (EUT)	-
IDEAPAD 320	LENOVO	Notebook PC	EUT
CAN_Analyzer	ECS TAEHA	CAN	EUT
NEXT-UH103LAN	YCN	USB 2.0 Multifunction	EUT
N/A	N/A	Antenna	EUT
N/A	N/A	Antenna	EUT
BATTERY	N/A	N/A	EUT

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 10 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:

- 1) 43-14, Jinsaegol-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea
- 2) 12-5, Jinsaegol-gil 75 beon-gil, Chowol-eup, Gwangju-si, Gyeonggi-do, 12735, Korea

-. Site Filing:

VCCI (Voluntary Control Council for Interference) - Registration No. R-4112/ C-14617/ G-10666/ T-1842

IC (Industry 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

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	N/A	N/A	N/A

3.2 Mode of operation during the test

- The EUT was connected Antenna and notebook pc and then checked the CAN, LOG, MST communication during the test.
- Input power condition during the measurements was DC 24 V.

3.3 Cable Description

Ports Name	Shielded	Ferrite Bead	Metal Shell	Length (m)	Connected to
DUT DC IN	N	N	N	0.9	BATTERY
DUT MTS	Y	N	N	1.7	USB 2.0 Multifunction
DUT LOG	Y	N	N	1.7	USB 2.0 Multifunction
DUT CAN	N	N	N	-	CAN
CAN LAN PORT	N	N	N	1.0	USB 2.0 Multifunction
Antenna Port 1	Y	N	N	2.8	Antenna
Antenna Port 2	Y	N	N	2.8	Antenna
Antenna Port 3	Y	N	N	2.8	Antenna
USB 2.0 Multifunction	N	N	N	0.3	Notebook PC
CAN DC IN	N	N	N	1.1	Notebook PC

3.4 Equipment Modifications

- None.

3.5 Configuration of Test System

Radiated Emission Test: Preliminary radiated emission test was conducted using the procedure in ANSI C63.4: 2014 8.3.1.1 to determine the worse operating conditions. Final radiated emission test was conducted at 10 m semi anechoic chamber.

4. PRELIMINARY TEST

4.1 Radiated Emission Test

During Preliminary Test, the following operating mode was investigated.

Operation Mode	The Worst operating condition (Please check one only)
Normal Operating Mode	X

4.2 AC Conducted Emission Test

As This product is only using DC power, AC conducted emission test has not been performed.

5. FINAL RESULT OF MEASUREMENT

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

5.1 Radiated Emission Test

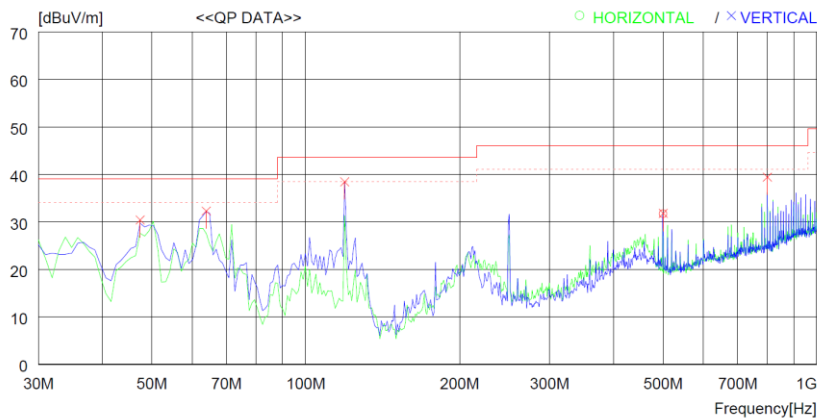
The following table shows the highest levels of radiated emission on both polarizations of horizontal and vertical.

5.1.1 Test data for below 1 GHz

5.1.1.1 Test data

Humidity Level : 48.3 % R.H. Temperature: 24.1 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109 (g)
 Type of Test : CLASS A
 Result : PASSED BY 5.1 dB at 119.240 MHz

EUT : RMCU Date: March 13, 2018
 Frequency Range : 30 MHz ~ 1 000 MHz
 Detector : Q.P (6 dB Bandwidth: 120 kHz)
 Distance : 10 m



No.	FREQ [MHz]	READING QP [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
---- Horizontal ----										
1	500.451	40.8	17.6	6.6	33.3	31.7	46.0	14.3	300	359
---- Vertical ----										
2	47.460	47.8	13.8	1.9	33.1	30.4	39.1	8.7	200	126
3	63.950	51.2	11.9	2.3	33.1	32.3	39.1	6.8	100	139
4	119.240	58.0	10.2	3.2	33.0	38.4	43.5	5.1	100	0
5	500.451	40.9	17.6	6.6	33.3	31.8	46.0	14.2	100	0
6	800.172	43.2	21.1	8.4	33.3	39.4	46.0	6.6	200	303

Remark: Margin (dB) = Limit – Result and Result = Reading Quasi-Peak + Antenna Factor + Loss – Gain
 Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

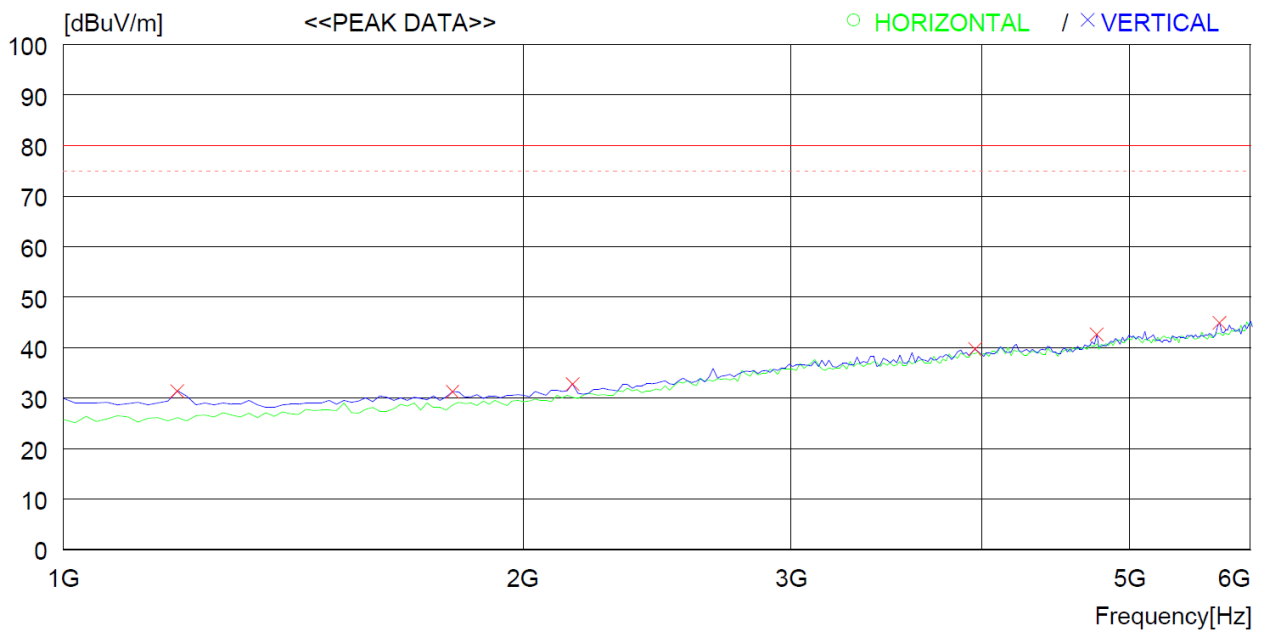
Tested by: Min-Gu Ji / Assistant Manager

5.1.2 Test data for above 1 GHz

5.1.2.1 Test data

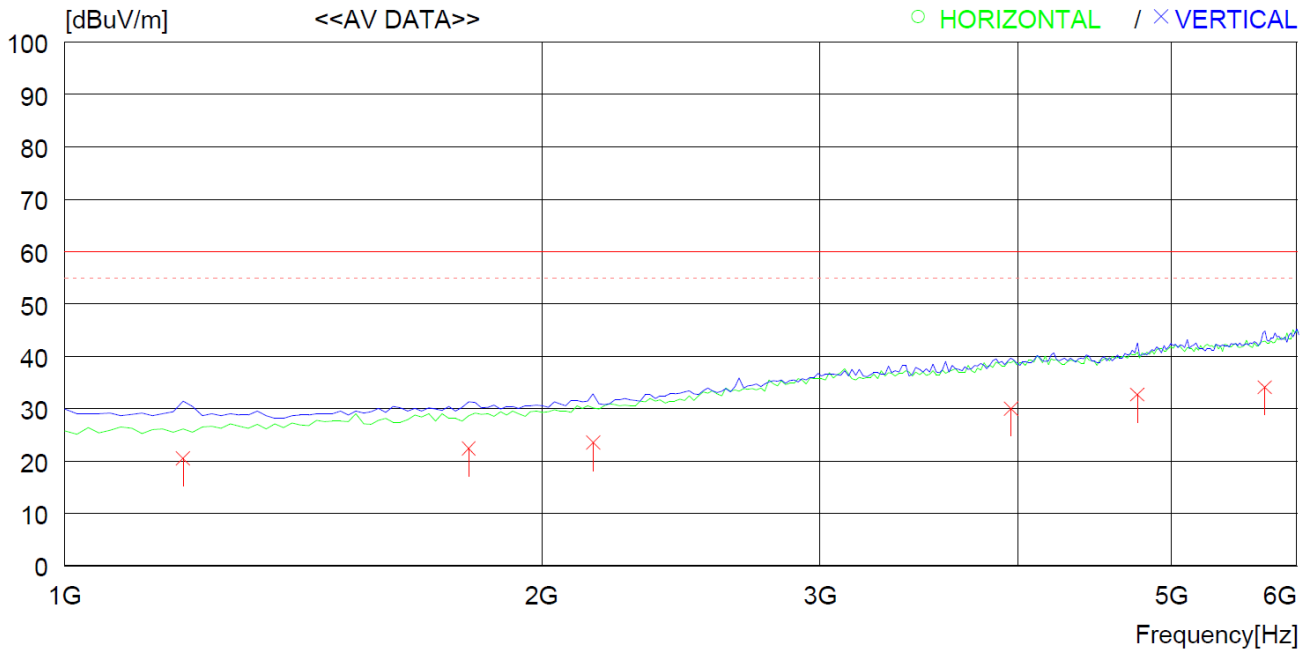
Humidity Level : 48.3 % R.H. Temperature: 24.1 °C
 Limits apply to : FCC CFR 47, PART 15, SUBPART B, SECTION 15.109 (g)
 Type of Test : CLASS A
 Result : PASSED BY 19.4 dB at 4 875.000 MHz under CISPR-Average mode

EUT : RMCU Date: March 13, 2018
 Frequency Range : 1 000 MHz ~ 6 000 MHz
 Detector : Peak and CISPR Average (6 dB Bandwidth: 1 MHz)
 Distance : 3 m



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]
----- Vertical -----										
1	1187.000	39.5	25.0	6.9	40.0	31.4	80.0	48.6	100	359
2	1799.000	37.7	25.4	8.4	40.2	31.3	80.0	48.7	100	283
3	2156.000	37.7	26.2	9.1	40.2	32.8	80.0	47.2	100	359
4	3958.000	38.7	29.5	12.1	40.6	39.7	80.0	40.3	100	359
5	4757.000	40.1	30.8	12.3	40.6	42.6	80.0	37.4	100	359
6	5726.000	42.0	31.9	12.0	41.0	44.9	80.0	35.1	100	359

Remark: Margin (dB) = Limit – Result and Result = Reading Peak + Antenna Factor + Loss – Gain
 Loss and Gain in above table means Cable Loss and Pre-amplifier gain.



No.	FREQ [MHz]	READING AV [dBuV]	ANT FACTOR [dB]	LOSS [dB]	GAIN [dB]	RESULT [dBuV/m]	LIMIT [dBuV/m]	MARGIN [dB]	ANTENNA [cm]	TABLE [DEG]
----- Vertical -----										
1	1187.000	28.6	25.0	6.9	40.0	20.5	60.0	39.5	100	359
2	1799.000	28.8	25.4	8.4	40.2	22.4	60.0	37.6	100	283
3	2156.000	28.4	26.2	9.1	40.2	23.5	60.0	36.5	100	359
4	3958.000	29.0	29.5	12.1	40.6	30.0	60.0	30.0	100	359
5	4757.000	30.2	30.8	12.3	40.6	32.7	60.0	27.3	100	359
6	5726.000	31.2	31.9	12.0	41.0	34.1	60.0	25.9	100	359

Remark: Margin (dB) = Limit – Result and Result = Reading CISPR Average + Antenna Factor + Loss – Gain
 Loss and Gain in above table means Cable Loss and Pre-amplifier gain.

Tested by: Min-Gu Ji / Assistant Manager

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	(dB/m)
<hr/>		
=	Corrected Reading	(dB μ V/m)

Margin (dB)

	Specification Limit	(dB μ V/m)
-	Corrected Reading	(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	101012	Oct. 27, 2017	One Year	<input type="checkbox"/>
2.			ESCI	101013	Mar. 28, 2018	One Year	<input type="checkbox"/>
3.			ESR	101470	Oct. 27, 2017	One Year	<input checked="" type="checkbox"/>
4.	Pulse Limiter	ROHDE & SCHWARZ	ESH3Z2	357.8810.52	Mar. 30, 2018	One Year	<input type="checkbox"/>
5.	Amplifier	Sonoma	310N	312544	Mar. 28, 2018	One Year	<input checked="" type="checkbox"/>
6.		Instrument	310N	312545	Mar. 28, 2018	One Year	<input type="checkbox"/>
7.		Schwarzbeck	BBV 9718 B	009	Mar. 16, 2018	One Year	<input checked="" type="checkbox"/>
8.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	9163-419	Aug. 05, 2016	Two Years	<input type="checkbox"/>
9.			VULB9163	9163-255	June 05, 2018	Two Years	<input checked="" type="checkbox"/>
10.	Horn Antenna	Schwarzbeck	BBHA9120D	BBHA9120D295	Aug 16, 2017	Two Years	<input checked="" type="checkbox"/>
11.	Amplifier	Schwarzbeck	BBV9716	310	Sep 01, 2017	One Year	<input type="checkbox"/>
12.	Controller	Innco System	CO3000	CO3000/904 /37211215/L	N/A	N/A	<input checked="" type="checkbox"/>
13.			CO2000	CO2000/619	N/A	N/A	<input type="checkbox"/>
14.	Turn Table	Innco System	DT3000	930611	N/A	N/A	<input checked="" type="checkbox"/>
15.			DT5000-3t-Teagplatten	N/A	N/A	N/A	<input type="checkbox"/>
16.	Antenna Master	Innco System	MA-4000XP-ET	MA4000/509 /37211215/L	N/A	N/A	<input checked="" type="checkbox"/>
17.			MA4000-EP	MA4000/332 /27030611/L	N/A	N/A	<input type="checkbox"/>

Remark: Mark mean used equipment.