



FCC EMI TEST REPORT

FCC ID : LHJ-WT50NA02
Equipment : WT50NA02
Brand Name : Continental
Model Name : WT50NA02
Applicant : Continental Automotive Systems, Inc.
21440 W Lake Cook Rd.
Manufacturer : Continental Automotive Systems, Inc.
21440 W Lake Cook Rd.
Standard : FCC 47 CFR FCC Part 15 Subpart B Class B

The product was received on Nov. 05, 2020 and testing was started from Nov. 17, 2020 and completed on Nov. 17, 2020. We, SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, would like to declare that the tested sample has been evaluated in accordance with the test procedures given in ANSI C63.4-2014 and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory, the test report shall not be reproduced except in full.

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FC042447-01	01	Initial issue of report	Dec. 09, 2020



Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)	Remark
-	15.107	AC Conducted Emission	Not Required	-
3.1	15.109	Radiated Emission	Pass	Under limit 3.05 dB at 243.400 MHz

Note: Not required means after assessing, test items are not necessary to carry out.

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Dara Chiu

Report Producer: Ruby Zou



1. General Description

1.1. Product Feature of Equipment Under Test

Product Feature	
Installed into Host	Brand Name: Continental Model Name: HNA11_00
Equipment	WT50NA02
Brand Name	Continental
Model Name	WT50NA02
FCC ID	LHJ-WT50NA02
EUT supports Radios application	GSM/WCDMA/EGPRS/LTE/GNSS
EUT Stage	Production Unit

Remark: The above EUT's information was declared by manufacturer.

1.2. Product Specification of Equipment Under Test

Product Specification subjective to this standard	
Tx Frequency	GSM850: 824.2 MHz ~ 848.8 MHz GSM1900: 1850.2 MHz ~ 1909.8 MHz WCDMA Band V: 826.4 MHz ~ 846.6 MHz WCDMA Band IV : 1712.4 MHz ~ 1752.6 MHz WCDMA Band II: 1852.4 MHz ~ 1907.6 MHz LTE Band 2 : 1850.7 MHz ~ 1909.3 MHz LTE Band 4 : 1710.7 MHz ~ 1754.3 MHz LTE Band 5 : 824.7 MHz ~ 848.3 MHz LTE Band 7 : 2502.5 MHz ~ 2567.5 MHz LTE Band 12 : 699.7 MHz ~ 715.3 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz
Rx Frequency	GSM850: 869.2 MHz ~ 893.8 MHz GSM1900: 1930.2 MHz ~ 1989.8 MHz WCDMA Band V: 871.4 MHz ~ 891.6 MHz WCDMA Band IV: 2112.4 MHz ~ 2152.6 MHz WCDMA Band II: 1932.4 MHz ~ 1987.6 MHz LTE Band 2 : 1930.7 MHz ~ 1989.3 MHz LTE Band 4 : 2110.7 MHz ~ 2154.3 MHz LTE Band 5 : 869.7 MHz ~ 893.3 MHz LTE Band 7 : 2622.5 MHz ~ 2687.5 MHz LTE Band 12 : 729.7 MHz ~ 745.3 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 29 : 718.5 MHz ~ 726.5 MHz LTE Band 66: 2110.7 MHz ~ 2199.3 MHz GNSS : 1.57542 GHz; 1176.45 MHz (GPS / Glonass / BDS / Galileo / SBAS)



Product Specification subjective to this standard	
Antenna Type	WWAN: Fixed External Antenna GPS / Glonass / BDS / Galileo / SBAS: Fixed External Antenna
Antenna Gain	GSM850: 1.0 dBi GSM1900: 4.4 dBi WCDMA Band V: 1.0 dBi WCDMA Band IV : 3.4 dBi WCDMA Band II: 4.4 dBi LTE Band 2 : 4.4 dBi LTE Band 4 : 3.4 dBi LTE Band 5 : 1.0 dBi LTE Band 7 : 5.6 dBi LTE Band 12 : 1.7 dBi LTE Band 13 : 2.2 dBi LTE Band 66: 3.4 dBi
Type of Modulation	GSM / GPRS: GMSK EDGE: GMSK for MCS 0 ~ 4 & 8PSK for MCS5 ~9 WCDMA: QPSK (Uplink) HSDPA: 64QAM (Downlink) HSUPA : QPSK (Uplink) LTE: QPSK / 16QAM / 64QAM GNSS: BPSK

Remark: The above EUT's information was declared by manufacturer. Please refer to Comments and Explanations in report summary.

1.3. Modification of EUT

No modifications are made to the EUT during all test items.



1.4. Test Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd, Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	Sporton Site No.
	03CH10-HY

FCC designation No.: TW1098

1.5. Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- ♦ FCC 47 CFR FCC Part 15 Subpart B Class B
- ♦ ANSI C63.4-2014

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2. Test Configuration of Equipment Under Test

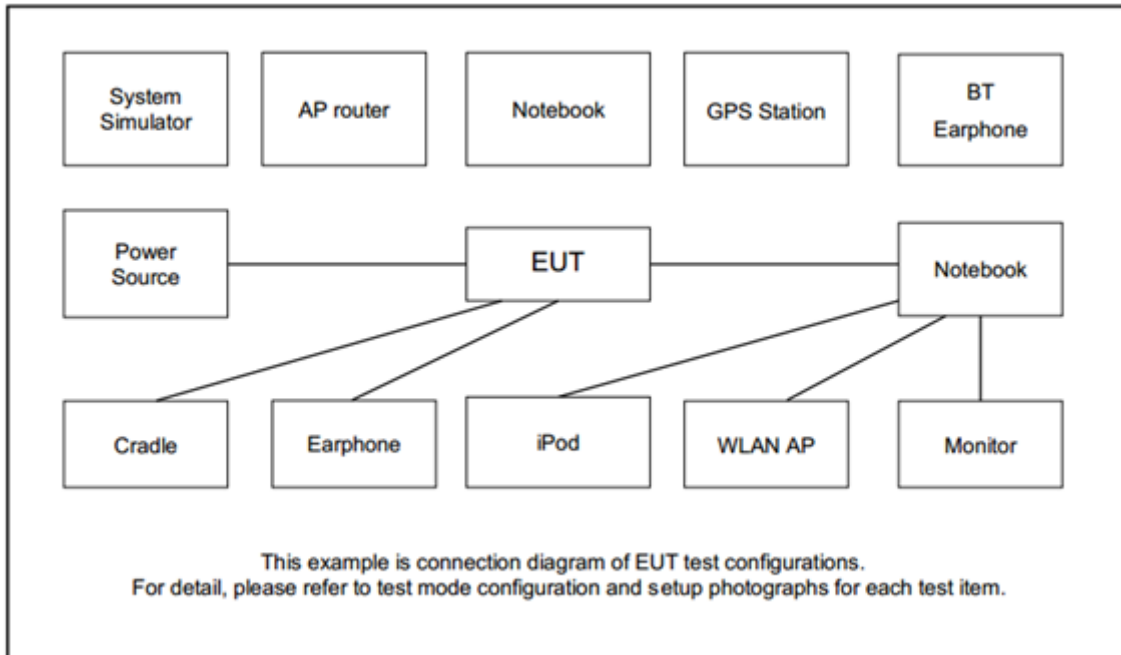
2.1. Test Mode

The EUT has been associated with peripherals pursuant to ANSI C63.4-2014 and configuration operated in a manner tended to maximize its emission characteristics in a typical application.

Frequency range investigated: radiation emission (30MHz to the 5th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Function Type
Radiated Emissions	Mode 1 : GSM850 (GPRS Class 8) Idle + MRA2 Antenna (HAF) + GPS Rx + Car Battery (DC 12V)
	Mode 2 : WCDMA Band V Idle + MRA2 Antenna (HAF) + GPS Rx + Car Battery (DC 12V)
	Mode 3 : LTE Band 12 Idle + MRA2 Antenna (HAF) + GPS Rx + Car Battery (DC 12V)
	Mode 4 : GSM850 (GPRS Class 8) Idle + MRA2 Antenna (Non-HAF) + GPS Rx + Car Battery (DC 12V)
Remark:	
1. The worst case of RE is mode 4; only the test data of this mode was reported.	
2. For radiation emission after pre-scanned the cellular band between 30MHz ~ 960MHz (GSM850/WCDMA Band V/LTE Band 12); only the worst case for cellular band test data of this mode was reported.	

2.2. Connection Diagram of Test System



2.3. Support Unit used in test configuration and system

Item	Equipment	Brand Name	Model Name	FCC ID	Data Cable	Power Cord
1.	System Simulator	Anritsu	MT8820C	N/A	N/A	Unshielded, 1.8 m
2.	GPS Station	Pendulum	GSG-54	N/A	N/A	Unshielded, 1.8 m
3.	WLAN AP	ASUS	RT-AC66U	MSQ-RTAC66U	N/A	Unshielded, 1.8 m
4.	Notebook	Dell	Latitude3480	FCC DoC	N/A	AC I/P : Unshielded, 1.2m DC O/P : Shielded, 1.8m
5.	iPod	Apple	A1285	FCC DoC	Shielded, 1.0 m	N/A
6.	GPS Antenna	Taoglas	Magma AA.170	N/A	N/A	NA
7.	MRA2 Antenna (HAF)	Contiental	A-MID HAF US	N/A	N/A	N/A
8.	MRA2 Antenna (Non-HAF)	Contiental	USA A-MID	N/A	N/A	N/A
9.	Car battery	GS	65B24LS MF-PLUS	N/A	N/A	N/A

2.4. EUT Operation Test Setup

The EUT was in GSM or WCDMA or LTE idle mode during the testing. The EUT was synchronized with the BCCH, and had been continuous receiving mode by setting paging reorganization of the system simulator.

1. Execute "Tool" to make the EUT receive continuous signals from GPS station.



3. Test Result

3.1. Test of Radiated Emission Measurement

3.1.1. Limit of Radiated Emission

The emissions from an unintentional radiator shall not exceed the field strength levels specified in the following table:

<Class B>

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meters)
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

3.1.2. Measuring Instruments

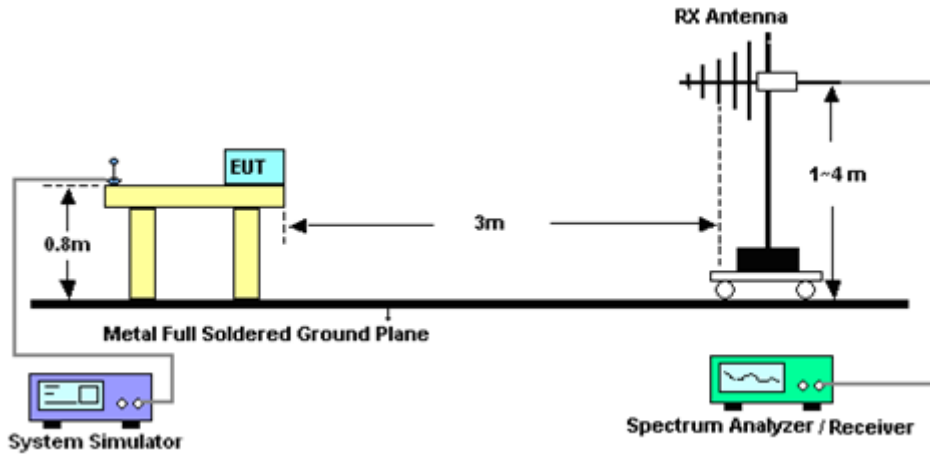
Refer a test equipment and calibration data table in this test report.

3.1.3. Test Procedures

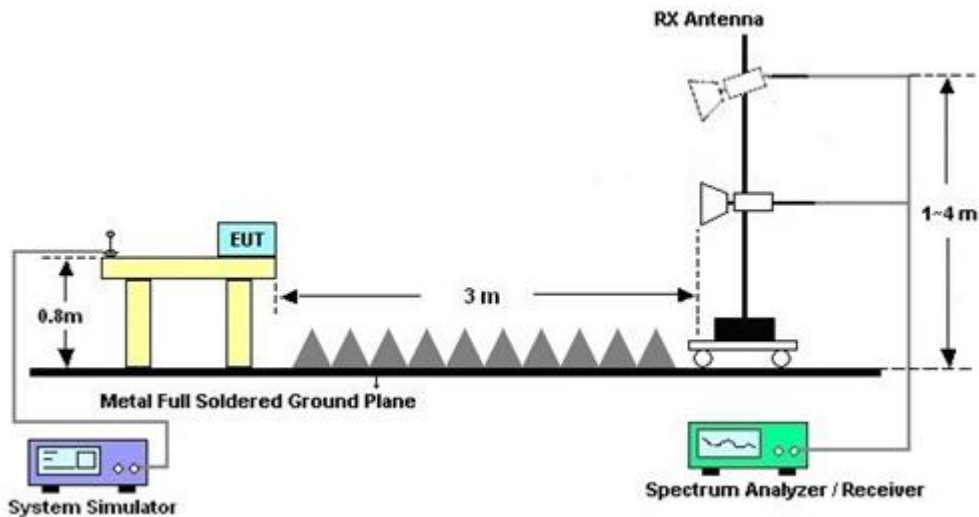
1. The EUT was placed on a turntable with 0.8 meter above ground.
2. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variable height antenna tower.
3. The table was rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is a Bi-Log antenna and its height is adjusted between one to four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. Set the test-receiver system to Peak Detect Function and specified bandwidth with Maximum Hold Mode (RBW=120kHz/VBW=300kHz for frequency below 1GHz; RBW=1MHz VBW=3MHz (Peak), RBW=1MHz/VBW=10Hz (Average) for frequency above 1GHz).
7. If the emission level of the EUT in peak mode was 3 dB lower than the limit specified, peak values of EUT will be reported. Otherwise, the emission will be repeated by using the quasi-peak method and reported.
8. Emission level (dBµV/m) = 20 log Emission level (µV/m)
9. Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level

3.1.4. Test Setup of Radiated Emission

For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5. Test Result of Radiated Emission

Please refer to Appendix B.



4. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	187311	9kHz~1GHz	Oct. 21, 2020	Nov. 17, 2020	Oct. 20, 2021	Radiation (03CH10-HY)
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01N -06	35413 & 02	30MHz~1GHz	Feb. 11, 2020	Nov. 17, 2020	Feb. 10, 2021	Radiation (03CH10-HY)
Horn Antenna	SCHWARZBE CK	BBHA 9120 D	9120D-02114	1GHz~18GHz	Aug. 04, 2020	Nov. 17, 2020	Aug. 03, 2021	Radiation (03CH10-HY)
Preamplifier	Jet-Power	JAP00101800- 30-10P	160118550004	1GHz~18GHz	Mar. 02, 2020	Nov. 17, 2020	Mar. 01, 2021	Radiation (03CH10-HY)
Spectrum Analyzer	Keysight	N9010A	MY54200485	10Hz~44GHz	Feb. 10, 2020	Nov. 17, 2020	Feb. 09, 2021	Radiation (03CH10-HY)
Controller	EMEC	EM 1000	N/A	Control Turn table & Ant Mast	N/A	Nov. 17, 2020	N/A	Radiation (03CH10-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Nov. 17, 2020	N/A	Radiation (03CH10-HY)
Turn Table	EMEC	TT 2200	N/A	0~360 Degree	N/A	Nov. 17, 2020	N/A	Radiation (03CH10-HY)
Software	Audix	E3 6.2009-8-24	RK-001042	N/A	N/A	Nov. 17, 2020	N/A	Radiation (03CH10-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290045	20MHz~8.4GHz	Jan. 18, 2020	Nov. 17, 2020	Jan. 17, 2021	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	30MHz~1GHz	Nov. 06, 2020	Nov. 17, 2020	Nov. 05, 2021	Radiation (03CH10-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104 / 102	MY11692/4PE, MY11693/4PE, MY2855/2	1GHz~18GHz	Nov. 06, 2020	Nov. 17, 2020	Nov. 05, 2021	Radiation (03CH10-HY)



5. Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.7
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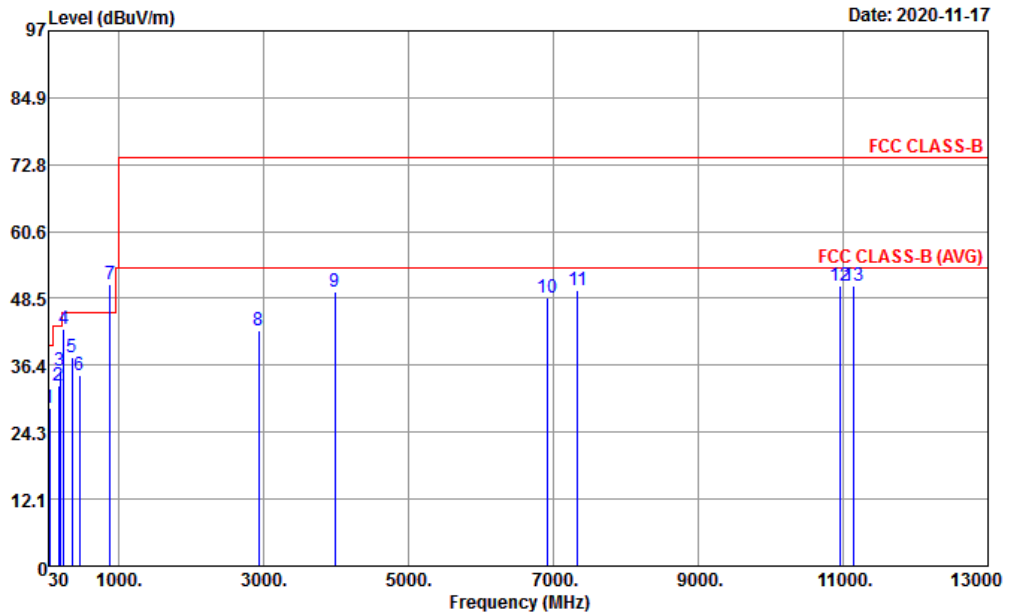
Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.1
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Appendix A. Radiated Emission Test Result

Test Engineer :	Johnny Hsieh	Temperature :	23~24°C
		Relative Humidity :	60~61%
Test Distance :	3m	Polarization :	Horizontal
Remark :	#7 is system simulator signal which can be ignored.		

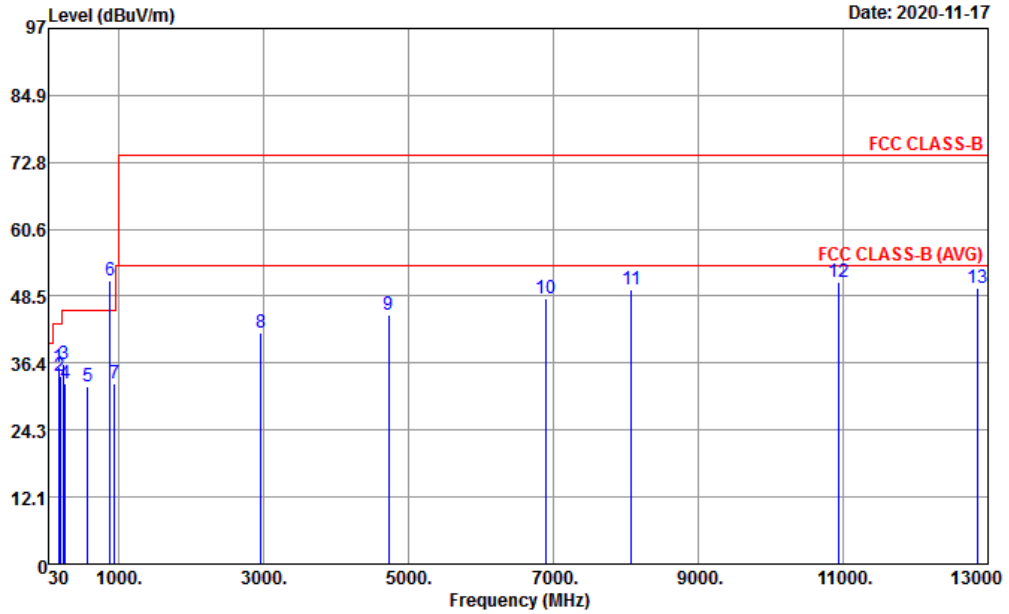


Site : 03CH10-HY
 Condition : FCC CLASS-B 3m HORN 9120D-HF HORIZONTAL
 Project : 042447-01
 Power : DC 12V
 Mode : 4

	Freq	Level	Over Limit	Limit	Antenna Line Factor	Read Level	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dBuV	dB	dB	cm	deg	
1	49.40	28.69	-11.31	40.00	14.73	45.78	0.81	32.63	---	---	Peak
2	167.74	32.79	-10.71	43.50	15.89	47.97	1.46	32.53	---	---	Peak
3	191.99	35.46	-8.04	43.50	14.84	51.57	1.56	32.51	---	---	Peak
4	243.40	42.95	-3.05	46.00	17.61	56.06	1.75	32.47	100	0	Peak
5	359.80	37.71	-8.29	46.00	20.75	47.24	2.12	32.40	---	---	Peak
6	455.83	34.64	-11.36	46.00	23.34	41.35	2.37	32.42	---	---	Peak
7 *	881.40	51.17				28.99	3.33	31.86	---	---	Peak
8	2932.00	42.82	-31.18	74.00	28.23	66.20	6.45	58.06	---	---	Peak
9	3986.00	49.82	-24.18	74.00	29.43	70.95	7.97	58.53	---	---	Peak
10	6908.00	48.72	-25.28	74.00	34.92	62.51	10.88	59.59	---	---	Peak
11	7332.00	50.05	-23.95	74.00	36.24	61.66	11.65	59.50	---	---	Peak
12	10958.00	50.78	-23.22	74.00	40.04	56.30	13.48	59.04	100	0	Peak
13	11134.00	50.76	-23.24	74.00	39.53	56.55	13.62	58.94	---	---	Peak



Test Engineer :	Johnny Hsieh	Temperature :	23~24°C
		Relative Humidity :	60~61%
Test Distance :	3m	Polarization :	Vertical
Remark :	#6 is system simulator signal which can be ignored.		



Site : 03CH10-HY
 Condition : FCC CLASS-B 3m HORN 9120D-HF VERTICAL
 Project : 042447-01
 Power : DC 12V
 Mode : 4

	Freq	Level	Over Limit	Limit	Antenna Line	Read Level	Cable Loss	Preamp Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dB/m	dBuV	dB	dB	cm	deg	
1	167.74	35.75	-7.75	43.50	15.89	50.93	1.46	32.53	100	0	Peak
2	191.99	34.03	-9.47	43.50	14.84	50.14	1.56	32.51	---	---	Peak
3	243.40	36.30	-9.70	46.00	17.61	49.41	1.75	32.47	---	---	Peak
4	260.86	32.77	-13.23	46.00	19.85	43.56	1.81	32.45	---	---	Peak
5	576.11	32.15	-13.85	46.00	25.91	36.07	2.68	32.51	---	---	Peak
6 *	881.40	51.26			28.99	50.80	3.33	31.86	---	---	Peak
7	943.74	32.78	-13.22	46.00	30.27	30.34	3.47	31.30	---	---	Peak
8	2966.00	41.99	-32.01	74.00	28.33	65.25	6.49	58.08	---	---	Peak
9	4728.00	45.02	-28.98	74.00	31.04	64.00	8.46	58.48	---	---	Peak
10	6906.00	48.01	-25.99	74.00	34.91	61.82	10.87	59.59	---	---	Peak
11	8076.00	49.79	-24.21	74.00	37.00	61.05	11.53	59.79	---	---	Peak
12	10936.00	50.98	-23.02	74.00	40.06	56.55	13.46	59.09	100	0	Peak
13	12848.00	50.05	-23.95	74.00	38.85	54.45	15.07	58.32	---	---	Peak