



FCC EMI TEST REPORT

FCC ID : LHJ-FE4NA0210
Equipment : FE4NA0210
Brand Name : Continental
Model Name : FE4NA0210
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. 30, 2021 and testing was performed from Dec. 14, 2021 to Dec. 14, 2021. 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 variant report apply exclusively to the tested model / sample. Without written approval from 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 333, Taiwan (R.O.C.)



Table of Contents

History of this test report	3
Summary of Test Result	4
1. General Description	5
1.1. Product Feature of Equipment Under Test	5
1.2. Product Specification of Equipment Under Test	5
1.3. Modification of EUT.....	6
1.4. Test Location.....	6
1.5. Applicable Standards	6
2. Test Configuration of Equipment Under Test	7
2.1. Test Mode	7
2.2. Connection Diagram of Test System	7
2.3. Support Unit used in test configuration and system	8
2.4. EUT Operation Test Setup	8
3. Test Result.....	9
3.1. Test of Radiated Emission Measurement	9
4. List of Measuring Equipment	11
5. Uncertainty of Evaluation	12
Appendix A. Radiated Emission Test Result	
Appendix B. Setup Photographs	



History of this test report

Report No.	Version	Description	Issue Date
FC1N3040	01	Initial issue of report	Jan. 17, 2022
FC1N3040	02	Revise Antenna type, Test mode and Support Unit	Jan. 19, 2022



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	7.12 dB under the limit at 320.300 MHz

Note:

1. Not required means after assessing, test items are not necessary to carry out.
2. This is a variant report by adding host information. All the test cases were performed on original report which can be referred to Sporton Report Number FC031205-02. Based on the original report, the test cases were verified.

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 product specifications of the EUT presented in the report are declared by the manufacturer who shall take full responsibility for the authenticity.

Reviewed by: Yun Huang**Report Producer: Clio Lo**



1. General Description

1.1. Product Feature of Equipment Under Test

Product Feature	
Equipment	FE4NA0210
Brand Name	Continental
Model Name	FE4NA0210
FCC ID	LHJ-FE4NA0210
Installed into the Host	Equipment name: G12N410G1, G12N410M1 Brand name: Continental Model name: G12N410G1, G12N410M1
EUT supports Radios application	WCDMA/HSPA/LTE/GNSS
HW Version	P4
EUT Stage	Identical Prototype

1.2. Product Specification of Equipment Under Test

Product Specification is subject to this standard	
Tx Frequency	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 12 : 699.7 MHz ~ 715.3 MHz LTE Band 13 : 779.5 MHz ~ 784.5 MHz LTE Band 14 : 790.5 MHz ~ 795.5 MHz LTE Band 66: 1710.7 MHz ~ 1779.3 MHz
Rx Frequency	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 12 : 729.7 MHz ~ 745.3 MHz LTE Band 13 : 748.5 MHz ~ 753.5 MHz LTE Band 14 : 760.5 MHz ~ 765.5 MHz LTE Band 29 : 718.5 MHz ~ 726.5 MHz LTE Band 30 : 2352.5 MHz ~ 2357.5 MHz LTE Band 66: 2110.7 MHz ~ 2199.3 MHz GNSS : 1.57542 GHz; 1176.45 MHz (GPS / Glonass / BDS / Galileo / SBAS)

Product Specification is subject to this standard	
Antenna Type	WWAN: <External >: Cell Antenna <Internal >: TCP Antenna GNSS: Cell Antenna
Type of Modulation	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 made to the EUT during the testing.

1.4. Test Location

Test Site	Sporton International Inc. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No. 03CH06-HY

FCC designation No.: TW1093

1.5. Applicable Standards

According to the specifications declared by 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.

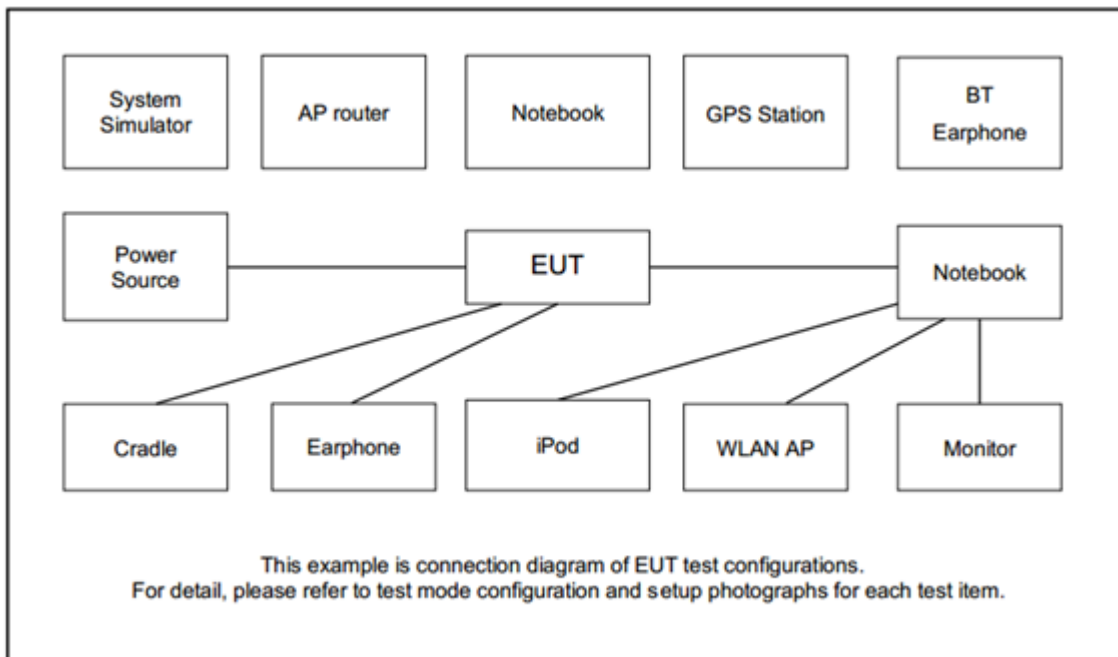
2. Test Configuration of Equipment Under Test

2.1. Test Mode

The EUT is tested along with the peripherals, operating under possible configurations in compliant with normal operation. The maximum emissions can be identified by a pre-scan carried out in different orientations of placement pursuant to ANSI C63.4-2014. Frequency range covered: Radiation Emission (30 MHz to the 5th harmonics of the highest fundamental frequency or to 40 GHz, whichever is lower).

Test Items	Functions Enabled
Radiated Emissions	Mode 1 : WCDMA Band II Idle (with Internal Antenna) + TC Mode 2 : LTE Band 5 Idle (with External Antenna) + GPS Rx + TC + DC 12V
Remark: <ol style="list-style-type: none"> The worst case of RE is mode 1; only the test data of this mode was reported. For Radiation Emission after pre-scanned the cellular band between 30MHz ~ 960MHz (LTE Band 5); only the worst case for cellular band test data of this mode was reported. The test configuration was designated by the manufacturer based on input from the Automotive OEM. TC stands for test configuration, and consists of EUT + "Teddy Jr Load Box (X1 + X2) + Sharkfin Antenna with metal plate (X3) + Ethernet connector cable (X7) + Battery". 	

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, 1.8m
3.	Shark fin antenna	Continental	84650406	N/A	N/A	N/A
4.	Teddy Jr Load Box	Continental	N/A	N/A	N/A	N/A
5.	Adapter	TePoo	PT-WC-03	N/A	N/A	N/A
6.	Metal Plate	N/A	N/A	N/A	N/A	N/A
7.	Ethernet connector cable	N/A	N/A	N/A	N/A	N/A
8.	Power supply	GW Instek	GEU810960	N/A	N/A	Unshielded, 1.8m
9.	Battery	TWS TECHNOLOGY (GUANGZHOU) LIMITED	2C0457640000	N/A	N/A	N/A

2.4. EUT Operation Test Setup

The EUT is in WCDMA or LTE idle mode during the test. The EUT is synchronized with the BCCH, and has been continuous receiving mode by setting paging reorganization of the system simulator.

The following programs installed in the EUT are programmed during the test:

1. Execute "lte_x24_hwtool_0.6.24.exe" 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

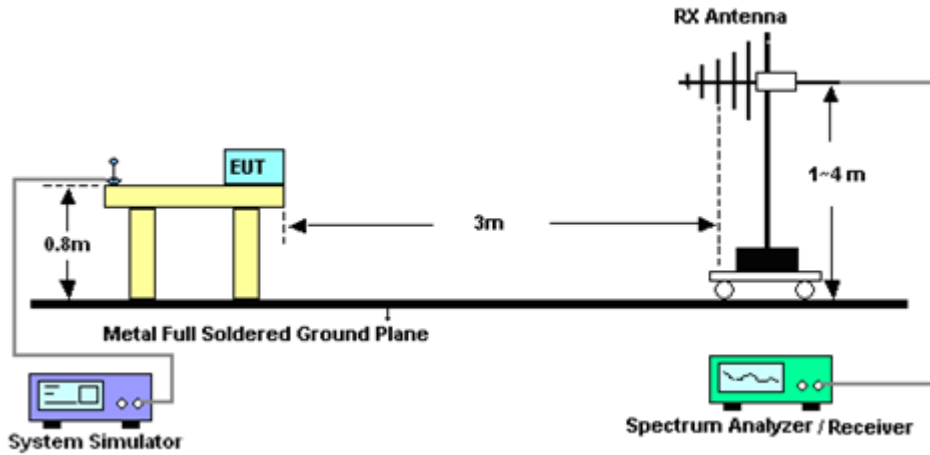
Please refer to the measuring equipment list in this test report.

3.1.3. Test Procedures

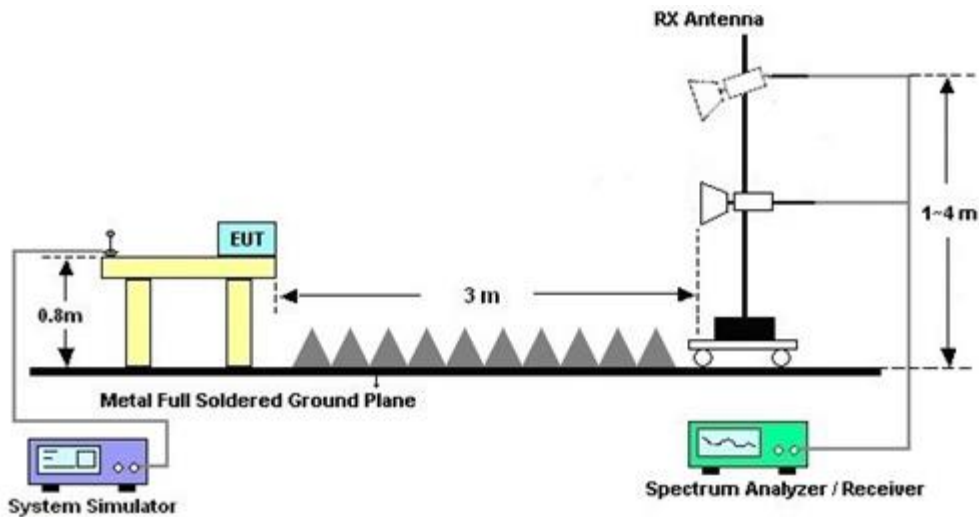
1. The EUT is placed on a turntable with 0.8 meter above ground.
2. The EUT is set 3 meters from the interference receiving antenna, which is mounted on the top of a variable height antenna tower.
3. The table is rotated 360 degrees to determine the position of the highest radiation.
4. The antenna is 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 is 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=120 kHz/VBW=300 kHz for frequency below 1 GHz; RBW=1 MHz VBW=3 MHz (Peak), RBW=1 MHz/VBW=10 Hz (Average) for frequency above 1 GHz).
7. If the emission level of the EUT in peak mode is 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 30 MHz to 1 GHz



For Radiated Emissions above 1 GHz



3.1.5. Test Result of Radiated Emission

Please refer to Appendix A.



4. List of Measuring Equipment

Instrument	Brand Name	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Amplifier	SONOMA	310N	186713	9kHz~1GHz	Apr. 29, 2021	Dec. 14, 2021	Apr. 28, 2022	Radiation (03CH06-HY)
Bilog Antenna	Schaffner	CBL 6111C & N-6-06	2725 & AT-N0601	30MHz~1GHz	Nov. 11, 2021	Dec. 14, 2021	Nov. 10, 2022	Radiation (03CH06-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Feb. 03, 2021	Dec. 14, 2021	Feb. 02, 2022	Radiation (03CH06-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1156	1GHz~18GHz	Sep. 27, 2021	Dec. 14, 2021	Sep. 26, 2022	Radiation (03CH06-HY)
Preamplifier	Jet-Power	JPA00101800-30-10P	1601180001	1GHz~18GHz	Jul. 19, 2021	Dec. 14, 2021	Jul. 18, 2022	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SF102_7000mm	532299/2	30MHz to 40GHz	Jul. 05, 2021	Dec. 14, 2021	Jul. 04, 2022	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SF102_3000mm	532422/2	30MHz to 40GHz	Jul. 05, 2021	Dec. 14, 2021	Jul. 04, 2022	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SF102_2000mm	532421/2	30MHz to 40GHz	Jul. 05, 2021	Dec. 14, 2021	Jul. 04, 2022	Radiation (03CH06-HY)
RF Cable	HUBER + SUHNER	SF104	802433/4	30Mhz to 18Ghz	Aug. 19, 2021	Dec. 14, 2021	Aug. 18, 2022	Radiation (03CH06-HY)
Controller	INN-CO	EM1000	060782	Control Turn table & Ant Mast	N/A	Dec. 14, 2021	N/A	Radiation (03CH06-HY)
Antenna Mast	MF	MF-7802	MF780208212	1m~4m	N/A	Dec. 14, 2021	N/A	Radiation (03CH06-HY)
Turn Table	INN-CO	DS2000	420/650/00	0-360 degree	N/A	Dec. 14, 2021	N/A	Radiation (03CH06-HY)
Software	Audix	E3 6.2009-8-24(k5)	N/A	N/A	N/A	Dec. 14, 2021	N/A	Radiation (03CH06-HY)



5. Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2 dB
---	--------

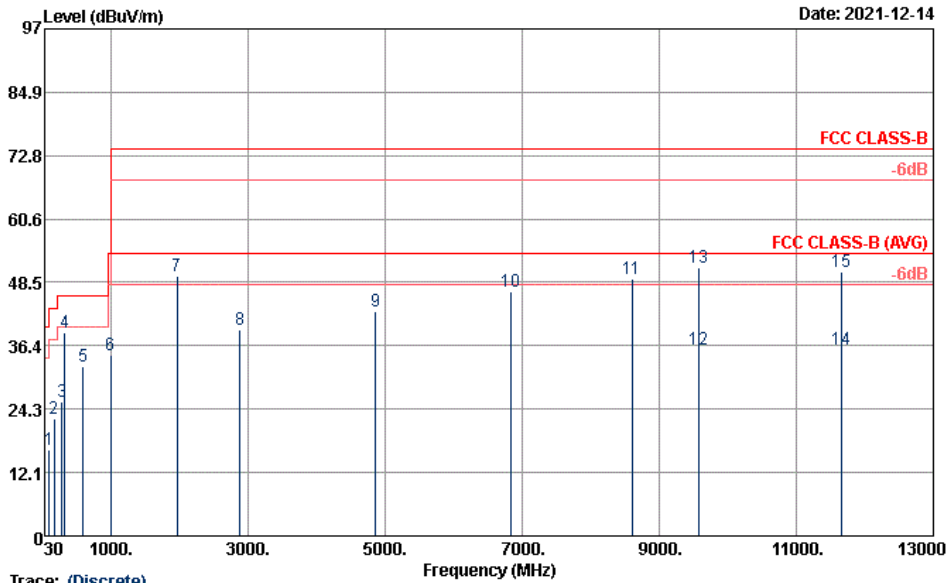
Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.4 dB
---	--------



Appendix A. Radiated Emission Test Result

Test Engineer :	Howard Huang	Temperature :	20~25°C
		Relative Humidity :	50~55%
Test Distance :	3m	Polarization :	Horizontal
Remark :	#7 is system simulator signal which can be ignored.		



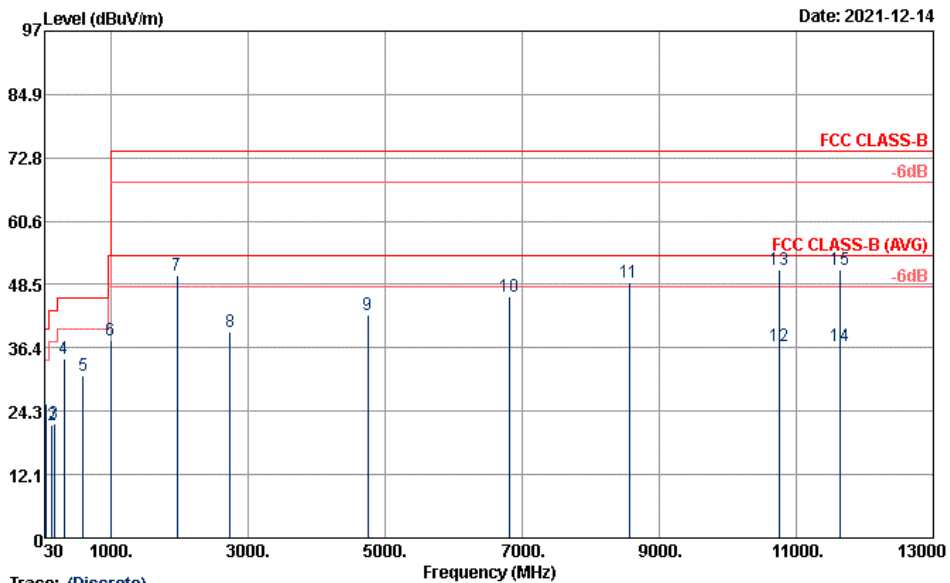
Trace: (Discrete)

Site : 03CH06-HY
 Condition : FCC CLASS-B 3m 9120B_1156 HORIZONTAL
 Project : 1N3040

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	cm	deg	
1	96.15	16.61	-26.89	43.50	30.81	-14.20	---	---	Peak
2	169.32	22.49	-21.01	43.50	36.18	-13.69	---	---	Peak
3	283.26	25.79	-20.21	46.00	35.50	-9.71	---	---	Peak
4	320.30	38.88	-7.12	46.00	47.89	-9.01	---	---	Peak
5	594.00	32.53	-13.47	46.00	34.41	-1.88	---	---	Peak
6	990.20	34.66	-19.34	54.00	29.43	5.23	---	---	Peak
7	1960.00	49.61			79.19	-29.58	---	---	Peak
8	2878.00	39.41	-34.59	74.00	64.73	-25.32	---	---	Peak
9	4860.00	43.08	-30.92	74.00	61.96	-18.88	---	---	Peak
10	6842.00	46.69	-27.31	74.00	61.21	-14.52	---	---	Peak
11	8606.00	49.24	-24.76	74.00	59.39	-10.15	---	---	Peak
12	9574.00	35.74	-18.26	54.00	43.31	-7.57	---	---	Average
13	9574.00	51.22	-22.78	74.00	58.79	-7.57	---	---	Peak
14	11652.00	35.58	-18.42	54.00	40.70	-5.12	---	---	Average
15	11652.00	50.58	-23.42	74.00	55.70	-5.12	---	---	Peak



Test Engineer :	Howard Huang	Temperature :	20~25°C
		Relative Humidity :	50~55%
Test Distance :	3m	Polarization :	Vertical
Remark :	#7 is system simulator signal which can be ignored.		



Trace: (Discrete)
 Site : 03CHO6-HY
 Condition : FCC CLASS-B 3m 9120B_1156 VERTICAL
 Project : 1N3040

	Freq	Level	Over Limit	Limit Line	Read Level	Factor	A/Pos	T/Pos	Remark
	MHz	dBuV/m	dB	dBuV/m	dBuV	dB/m	cm	deg	
1	40.53	25.63	-14.37	40.00	37.14	-11.51	---	---	Peak
2	137.19	21.49	-22.01	43.50	33.36	-11.87	---	---	Peak
3	167.43	21.88	-21.62	43.50	35.50	-13.62	---	---	Peak
4	318.20	34.41	-11.59	46.00	43.45	-9.04	---	---	Peak
5	594.00	31.00	-15.00	46.00	32.88	-1.88	---	---	Peak
6	990.20	37.76	-16.24	54.00	32.53	5.23	---	---	Peak
7	1960.00	50.37			79.95	-29.58	---	---	Peak
8	2734.00	39.44	-34.56	74.00	65.61	-26.17	---	---	Peak
9	4748.00	42.80	-31.20	74.00	62.10	-19.30	---	---	Peak
10	6808.00	46.30	-27.70	74.00	60.88	-14.58	---	---	Peak
11	8566.00	48.99	-25.01	74.00	59.42	-10.43	---	---	Peak
12	10744.00	36.82	-17.18	54.00	42.40	-5.58	---	---	Average
13	10744.00	51.39	-22.61	74.00	56.97	-5.58	---	---	Peak
14	11638.00	36.83	-17.17	54.00	41.89	-5.06	---	---	Average
15	11638.00	51.23	-22.77	74.00	56.29	-5.06	---	---	Peak