FCC Co-Location Test Report

FCC ID	:	**NKRDNXA-GO1**
Equipment	:	**802.11 b/g/n 3*3 PCIe module**
Model No.	:	**DNXA-GO1**
Brand Name	:	**WNC**
Applicant	:	**Wistron NeWeb Corporation**
Address	:	**20 Park Avenue II, Hsinchu Science Park, Hsinchu 308,Taiwan,R.O.C.**
Standard	:	**47 CFR FCC Part 15.247 47 CFR FCC Part 15.407**
Received Date	:	**Jun. 20, 2014**
Tested Date	:	**Jun. 20, 2014**

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Approved & Reviewed by:

Gary Chang / Manager

Testing Laboratory
2732

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Release Record

Report No.	Version	Description	Issued Date
FR421101-03	Rev. 01	Initial issue	Jun. 24, 2014

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.407(b) 15.209	Radiated Emissions	[dBuV/m at 3m]: 125.10MHz 40.29 (Margin -3.21dB) – QP	Pass

1 General Description

1.1 Information

1.1.1 Specification of the Equipment under Test (EUT)

RF General Information					
Frequency Range (MHz)	IEEE Std. 802.11	Ch. Freq. (MHz)	Channel Number	Transmit Chains (N_{TX})	Data Rate / MCS
2400-2483.5	b	2412-2462	1-11 [11]	3	1-11 Mbps
2400-2483.5	g	2412-2462	1-11 [11]	3	6-54 Mbps
2400-2483.5	n (HT20)	2412-2462	1-11 [11]	3	MCS 0-23
2400-2483.5	n (HT40)	2422-2452	3-9 [7]	3	MCS 0-23
Note 1: RF output power specifies that Maximum Conducted (Average) Output Power. Note 2: 802.11b uses a combination of DSSS-DBPSK, DQPSK, CCK modulation. Note 3: 802.11g/n uses a combination of OFDM-BPSK, QPSK, 16QAM, 64QAM modulation.					

1.1.2 Specific platform Information

Brand Name	Model Name	Product Name	Description
Google	GFRG200	Platform	The platform contains 2 certified wireless modules. One is FCCID: NKRDNXA-GO1, the other is FCC ID: U2M-PCE4553AH

Note: The platform supports simultaneous transmission and separation distance of simultaneous transmitting antennas is less than 20 cm thus evaluation of co-location is required.

1.1.3 Antenna Details

2.4G

Brand	Ant. No.	Model	Type	Gain (dBi)	Connector
ethertronics	1	1002302	Printed	2.19	UFL
	2	1002303	Printed	3.33	UFL
	3	1002304	Printed	4.21	UFL

Note: Above antennas are certified with wireless modules, FCC ID: NKRDNXA-GO1

5G

Ant. No.	Model	Type	Gain (dBi)	Connector
1	Ant 2 (1002299)	PCB Dipole	3.875	UFL
2	Ant 4 (1002300)	PCB Dipole	2.6248	UFL
3	Ant 6 (1002301)	PCB Dipole	4.1618	UFL

Note: Above antennas are certified with wireless modules, FCC ID: U2M-PCE4553AH

1.1.4 Accessories of Specific platform

Accessories		
No.	**Equipment**	**Description**
1	AC adapter	Brand Name: Google Model Name: PB-1600-29 Power Rating: I/P: 100-120Vac, 50-60Hz, 2.0A O/P: 12Vdc, 5A DC 1.75m non-shielded cable w/o core
2	AC adapter	Brand Name: Google Model Name: OTD018 Power Rating: I/P: 100-120Vac, 50-60Hz, 2.0A O/P: 12Vdc, 5A DC 1.75m non-shielded cable w/o core

1.2 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber1 / (03CH01-WS)				
Instrument	**Manufacturer**	**Model No.**	**Serial No.**	**Calibration Date**	**Calibration Until**
Spectrum Analyzer	R&S	FSV40	101498	Jan. 25, 2014	Jan. 24, 2015
Receiver	R&S	ESR3	101658	Jan. 10, 2014	Jan. 09, 2015
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-522	Jan. 02, 2014	Jan. 01, 2015
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1096	Feb. 13, 2014	Feb. 12, 2015
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Dec. 27, 2013	Dec. 26, 2014
Preamplifier	Burgeon	BPA-530	SN:100219	Nov. 28, 2013	Nov. 27, 2014
Preamplifier	Agilent	83017A	MY39501308	Dec. 16, 2013	Dec. 15, 2014
Preamplifier	WM	TF-130N-R1	923365	Oct. 23, 2013	Oct. 22, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16014/4	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16019/4	Dec. 16, 2013	Dec. 15, 2014
RF Cable	HUBER+SUHNER	SUCOFLEX104	MY16139/4	Dec. 16, 2013	Dec. 15, 2014
LF cable 3M	Woken	CFD400NL-LW	CFD400NL-001	Dec. 16, 2013	Dec. 15, 2014
LF cable 10M	Woken	CFD400NL-LW	CFD400NL-002	Dec. 16, 2013	Dec. 15, 2014
Note: Calibration Interval of instruments listed above is one year.					

Loop Antenna	R&S	HFH2-Z2	100330	Nov. 15, 2012	Nov. 14, 2014
Note: Calibration Interval of instruments listed above is two year.					

1.3 Test Standards

According to the specification of EUT, the EUT must comply with following standards and KDB documents.

47 CFR FCC Part 15.247
47 CFR FCC Part 15.407
ANSI C63.10-2009
FCC KDB 789033 D01 General UNII Test Procedures Old Rules v01r04
FCC KDB 558074 D01 DTS Meas Guidance v03r02

1.4 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor (k=2)

Measurement Uncertainty	
Parameters	**Uncertainty**
Radiated emission < 1GHz	±3.26 dB
Radiated emission > 1GHz	±4.94 dB

2 Test Configuration

2.1 Testing Condition

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH01-WS	24-25°C / 63-65%	Haru Yang

- FCC site registration No.: 657002
- IC site registration No.: 10807A-1

2.2 The Worst Test Modes and Channel Details

Test item	Modulation Mode	Test Channel	Data rate (Mbps) / MCS	Test Configuration
Radiated Emissions	2.4G 11n 20 + 5G 11ac VHT40	CH6 + CH159	MCS 0 + MCS 0	---

Note:
1) 2 AC adapters are used for this device,and both had been covered during the pretest in the original report. The worst adapter is **AC adapter 2**.
2) The selected channel is the maximum power channel of each Wi-Fi module.

3 Transmitter Test Results

3.1 Unwanted Emissions into Restricted Frequency Bands

3.1.1 Limit of Unwanted Emissions into Restricted Frequency Bands

Restricted Band Emissions Limit			
Frequency Range (MHz)	**Field Strength (uV/m)**	**Field Strength (dBuV/m)**	**Measure Distance (m)**
0.009~0.490	2400/F(kHz)	48.5 - 13.8	300
0.490~1.705	24000/F(kHz)	33.8 - 23	30
1.705~30.0	30	29	30
30~88	100	40	3
88~216	150	43.5	3
216~960	200	46	3
Above 960	500	54	3

Note 1:
Qusai-Peak value is measured for frequency below 1GHz except for 9–90 kHz, 110–490 kHz frequency band. Peak and average value are measured for frequency above 1GHz. The limit on average radio frequency emission is as above table. The limit on peak radio frequency emissions is 20 dB above the maximum permitted average emission limit
Note 2:
Measurements may be performed at a distance other than what is specified provided. When performing measurements at a distance other than that specified, the results shall be extrapolated to the specified distance using an extrapolation factor as below, Frequency at or above 30 MHz: 20 dB/decade Frequency below 30 MHz: 40 dB/decade.

3.1.2 Test Procedures

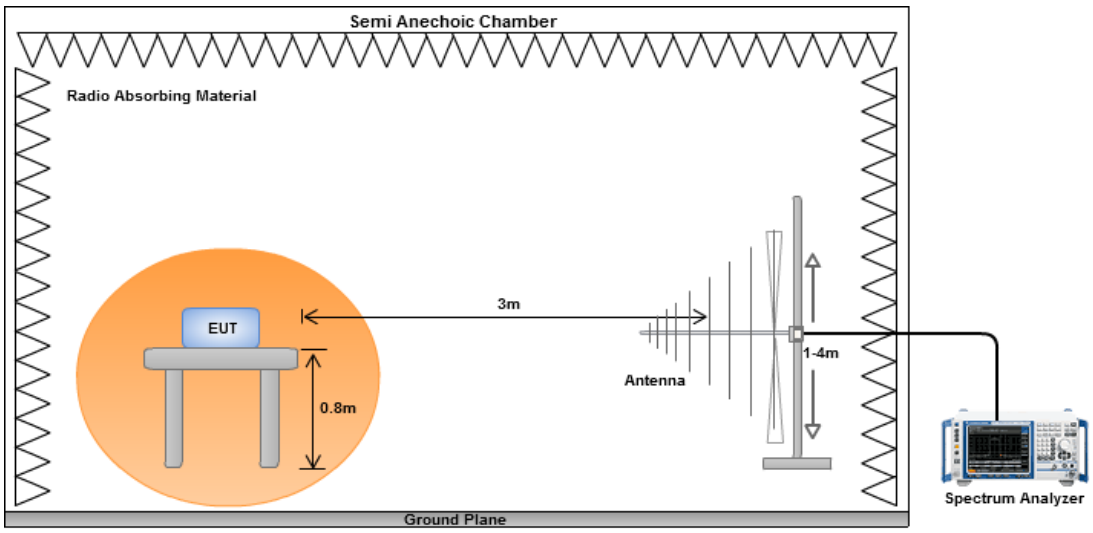
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at a height of 0.8 m test table above the ground plane.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.

Note:

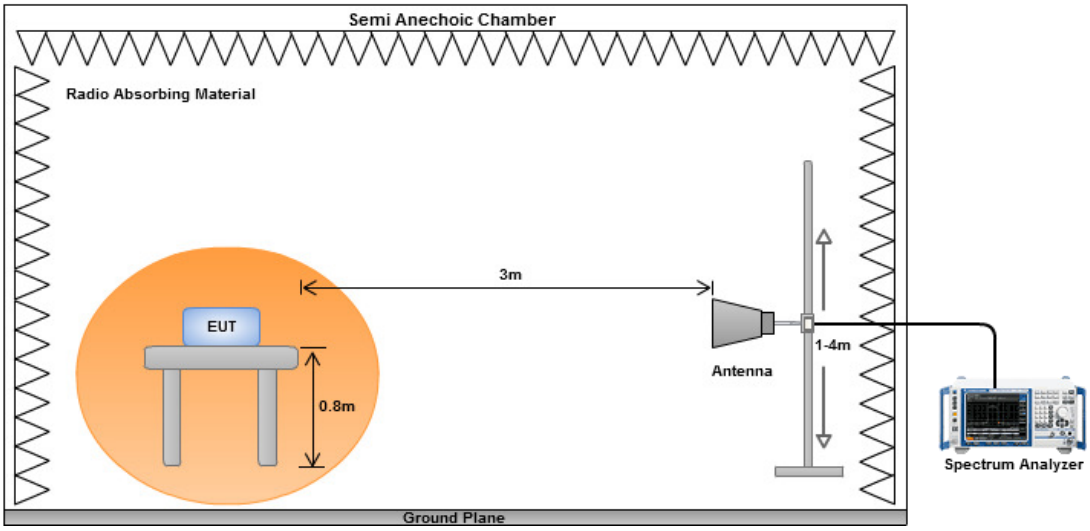
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above 1GHz.

3.1.3 Test Setup

Radiated Emissions below 1 GHz

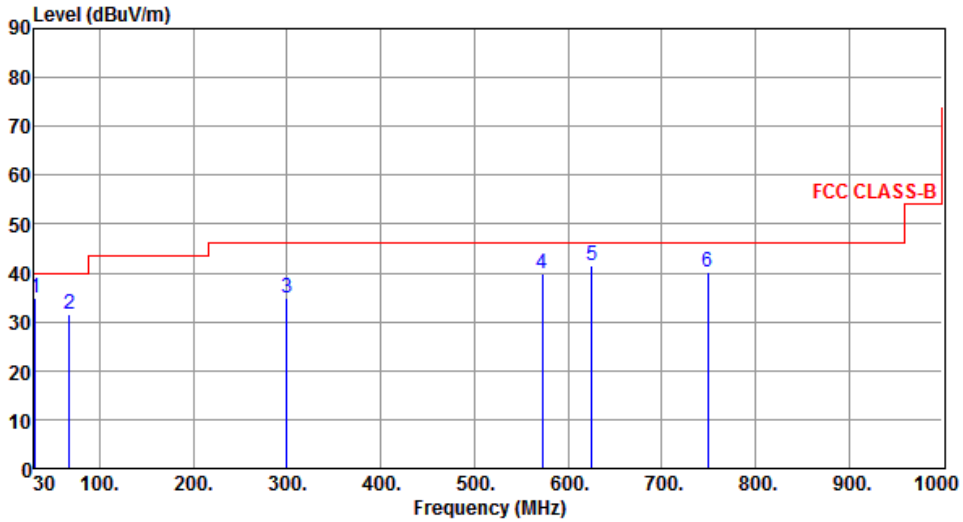


Radiated Emissions above 1 GHz



3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

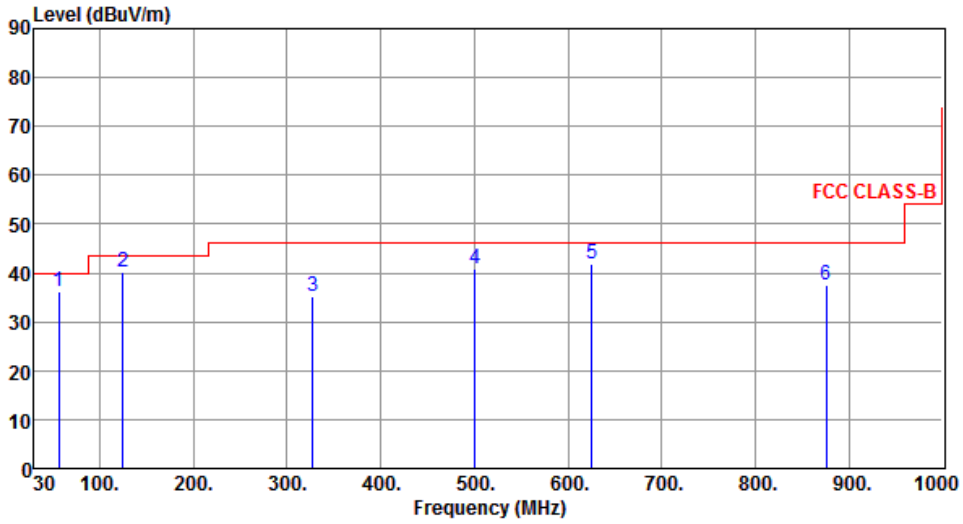
Modulation	2.4G 11n 20 + 5G 11ac VHT40	**Test Channel**	CH6 + CH159
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	30.97	35.03	40.00	-4.97	52.67	-17.64	Peak	---	---
2	67.83	31.55	40.00	-8.45	50.46	-18.91	Peak	---	---
3	299.66	34.75	46.00	-11.25	50.91	-16.16	Peak	---	---
4	572.23	39.97	46.00	-6.03	50.15	-10.18	Peak	---	---
5	625.24	41.44	46.00	-4.56	50.63	-9.19	Peak	---	---
6	749.35	40.15	46.00	-5.85	47.40	-7.25	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	2.4G 11n 20 + 5G 11ac VHT40	Test Channel	CH6 + CH159
Polarization	Vertical		

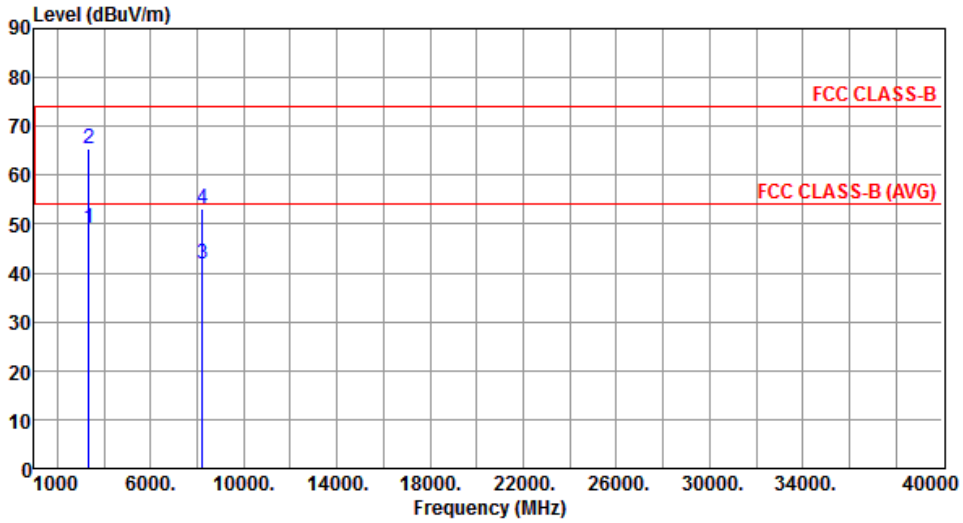


	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	56.19	36.31	40.00	-3.69	53.22	-16.91	QP	---	---
2	125.10	40.29	43.50	-3.21	59.00	-18.71	QP	---	---
3	327.79	35.21	46.00	-10.79	50.75	-15.54	Peak	---	---
4	500.45	41.00	46.00	-5.00	52.54	-11.54	Peak	---	---
5	625.58	42.01	46.00	-3.99	51.19	-9.18	Peak	---	---
6	875.84	37.44	46.00	-8.56	43.25	-5.81	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

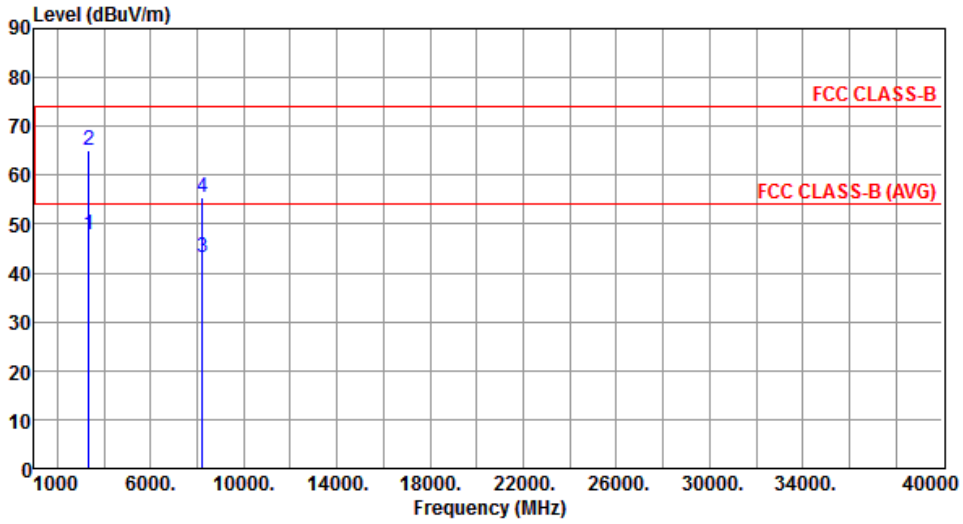
Modulation	2.4G 11n 20 + 5G 11ac VHT40	**Test Channel**	CH6 + CH159
Polarization	Horizontal		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3358.00	49.23	54.00	-4.77	49.77	-0.54	Average	---	---
2	3358.00	65.38	74.00	-8.62	65.92	-0.54	Peak	---	---
3	8232.00	41.75	54.00	-12.25	31.26	10.49	Average	---	---
4	8232.00	53.04	74.00	-20.96	42.55	10.49	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

Modulation	2.4G 11n 20 + 5G 11ac VHT40	Test Channel	CH6 + CH159
Polarization	Vertical		



	Freq. MHz	Emission level dBuV/m	Limit dBuV/m	Margin dB	SA reading dBuV	Factor dB	Remark	ANT High cm	Turn Table deg
1	3358.00	47.69	54.00	-6.31	48.23	-0.54	Average	---	---
2	3358.00	64.98	74.00	-9.02	65.52	-0.54	Peak	---	---
3	8232.00	43.17	54.00	-10.83	32.68	10.49	Average	---	---
4	8232.00	55.33	74.00	-18.67	44.84	10.49	Peak	---	---

Note 1: Emission Level (dBuV/m) = SA Reading (dBuV/m) + Factor* (dB)
*Factor includes antenna factor , cable loss and amplifier gain
Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).

4 Test laboratory information

Established in 2012, ICC provides foremost EMC & RF Testing and advisory consultation services by our skilled engineers and technicians. Our services employ a wide variety of advanced edge test equipment and one of the widest certification extents in the business.

International Certification Corp, it is our definitive objective is to institute long term, trust-based associations with our clients. The expectation we set up with our clients is based on outstanding service, practical expertise and devotion to a certified value structure. Our passion is to grant our clients with best EMC / RF services by oriented knowledgeable and accommodating staff.

Our Test sites are located at Linkou District and Kwei Shan Hsiang. Location map can be found on our website http://www.icertifi.com.tw.

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If you have any suggestion, please feel free to contact us as below information

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