

FCC Co-Location Test Report

FCC ID : P27-IG502L
Equipment : Monitor Gateway
Model No. : IG-502L
Brand Name : OxTech, LLC
Applicant : Sercomm Corporation
Address : 8F, No. 3-1, YuanQu St., NanKang, Taipei 115,
Taiwan, R.O.C.
Standard : 47 CFR FCC Part 15.247
Received Date : Apr. 12, 2022
Tested Date : Apr. 16, 2022

We, International Certification Corporation, 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 shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:

Approved by:



Along Chen / Assistant Manager



Gary Chang / Manager

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Release Record

Report No.	Version	Description	Issued Date
FR1D2104-01CO	Rev. 01	Initial issue	Apr. 27, 2022

Summary of Test Results

FCC Rules	Test Items	Measured	Result
15.247(d) 15.209	Radiated Emissions	[dBuV/m at 3m]: 2373.00MHz 52.75 (Margin -1.25dB) - AV	Pass

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.

1 General Description

1.1 Information

1.1.1 Specification

WiFi	
Operating Frequency	802.11b/g/n: 2412 MHz ~ 2462 MHz
Modulation Type	DSSS (DBPSK / DQPSK / CCK) OFDM (BPSK / QPSK / 16QAM / 64QAM)
Lora	
Operating Frequency	923.3 MHz ~ 927.5 MHz 903 MHz ~ 914.2 MHz 902.3 MHz ~ 914.9 MHz
Modulation Type	LoRa
BT	
Operating Frequency	2402 MHz ~ 2480 MHz
Modulation Type	Bluetooth 5.0 LE: GFSK Bluetooth BR(1Mbps): GFSK Bluetooth EDR (2Mbps): $\pi/4$ -DQPSK Bluetooth EDR (3Mbps): 8-DPSK
ZigBee	
Operating Frequency	2405 MHz ~ 2480 MHz
Modulation Type	O-QPSK

1.1.2 Antenna Details

WiFi

Ant. No.	Model	Type	Connector	Gain (dBi)
1	ANT1	PIFA	UFL	3.9
2	ANT2	PIFA	UFL	3.6

Zigbee

Ant. No.	Type	Connector	Gain (dBi)
1	PIFA	UFL	5.1

BT

Ant. No.	Type	Connector	Gain (dBi)
1	PIFA	NA	1.7

LoRa

Ant. No.	Type	Connector	Gain (dBi)
1	Dipole	R-SMA	2.1

1.1.3 Accessories

Accessories		
No.	Equipment	Description
1	AC Adapter	Brand: Leader Model: MU18D1120150-A1 Power Rating: I/P: 100-240Vac, 50/60Hz, 0.6A O/P:12Vdc, 1.5A Power Line: 1.45m non-shielded without core
2	AC Adapter	Brand: Sercomm Model: PU18W120ULB15-DPX-00 Power Rating: I/P: 100-240Vac, 50/60Hz, 0.7A O/P:12Vdc, 1.5A, 18.0W
3	RJ45	1.45m non-shielded without core

1.2 The Equipment List

Test Item	Radiated Emission				
Test Site	966 chamber3 / (03CH03-WS)				
Instrument	Brand	Model No.	Serial No.	Calibration Date	Calibration Until
Receiver	R&S	ESR3	101657	Mar. 15, 2022	Mar. 14, 2023
Spectrum Analyzer	R&S	FSV40	101499	Mar. 08, 2022	Mar. 07, 2023
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 08, 2021	Nov. 07, 2022
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	May 06, 2021	May 05, 2022
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Dec. 20, 2021	Dec. 19, 2022
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170508	Jan. 11, 2022	Jan. 10, 2023
Preamplifier	EMC	EMC02325	980187	Jul. 26, 2021	Jul. 25, 2022
Preamplifier	Agilent	83017A	MY39501309	Sep. 06, 2021	Sep. 05, 2022
Preamplifier	EMC	EMC184045B	980192	Jul. 14, 2021	Jul. 13, 2022
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 05, 2021	Oct. 04, 2022
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Sep. 24, 2021	Sep. 23, 2022
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Sep. 24, 2021	Sep. 23, 2022
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Sep. 24, 2021	Sep. 23, 2022
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Sep. 24, 2021	Sep. 23, 2022
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Sep. 24, 2021	Sep. 23, 2022
Measurement Software	AUDIX	e3	6.120210g	NA	NA

Note: Calibration Interval of instruments listed above is one year.

1.3 Test Standards

47 CFR FCC Part 15.247
ANSI C63.10-2013

1.4 Reference Guidance

FCC KDB 558074 D01 15.247 Meas Guidance v05r02
FCC KDB 662911 D01 Multiple Transmitter Output v02r01

1.5 Deviation from Test Standard and Measurement Procedure

None

1.6 Measurement Uncertainty

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 \leq 1GHz	± 3.96 dB
Radiated emission $>$ 1GHz	± 4.51 dB

2 Test Configuration

2.1 Testing Facility

Test Laboratory	International Certification Corporation
Test Site	03CH03-WS
Address of Test Site	No.14-1, Lane 19, Wen San 3rd St., Kwei Shan Dist., Tao Yuan City 333, Taiwan (R.O.C.)

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- ISED#: 10807C
- CAB identifier: TW2732

2.2 The Worst Test Modes and Channel Details

Test item	Test Mode	Test Configuration
Radiated Emissions	Lora 914.2 MHz + BLE CH39 + 2.4G 11G CH06 + Zigbee CH11	--
NOTE: Two adapters (Leader, Sercomm) had been covered during the pretest, and found that Leader adapter was the worst case and was selected for final test.		

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

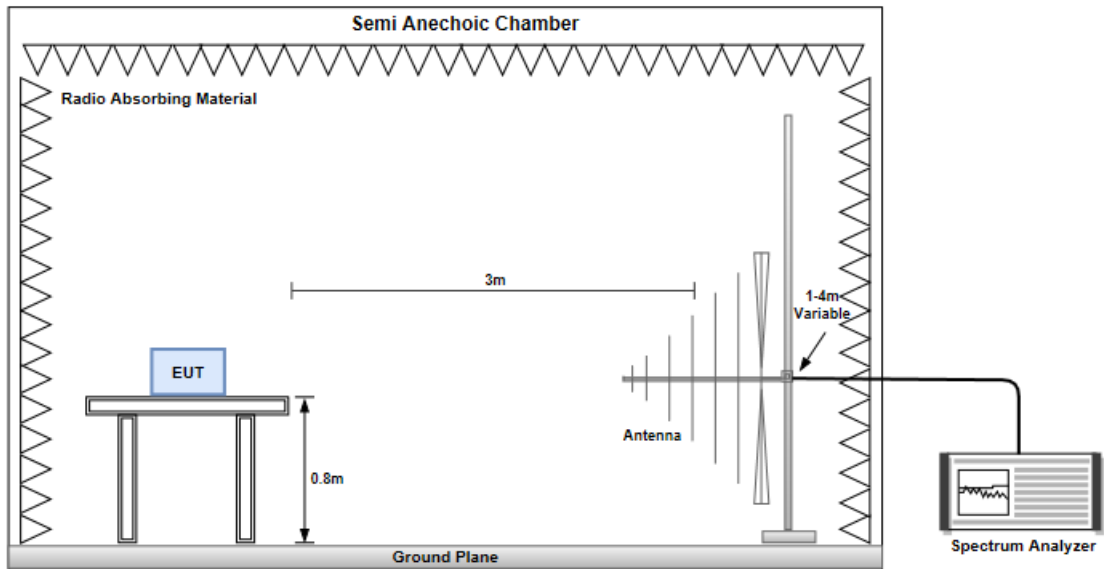
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. The EUT is placed at test table. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m.
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:

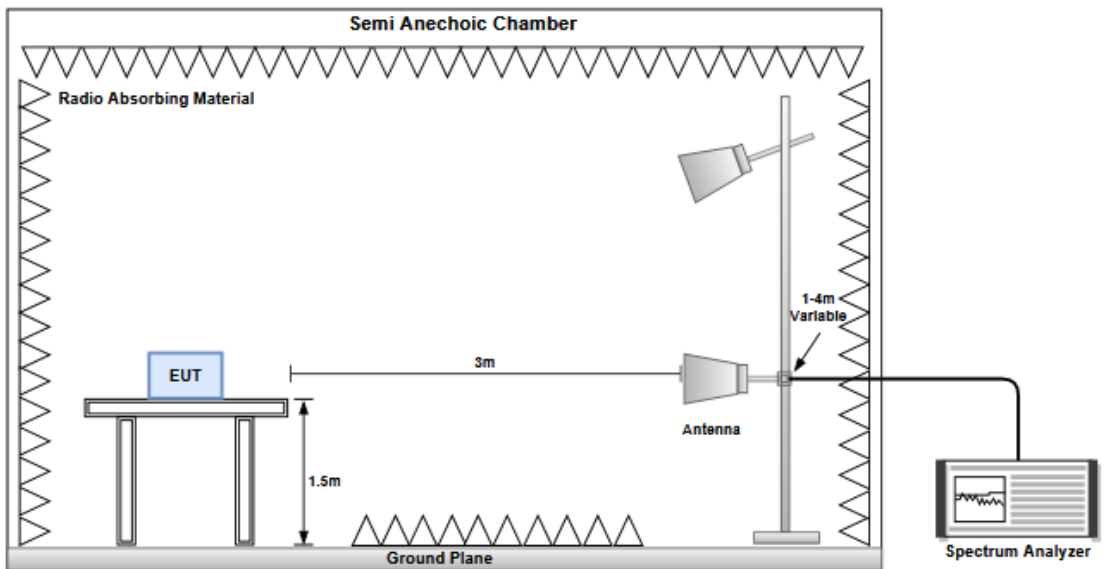
1. 120kHz measurement bandwidth of test receiver and Quasi-peak detector is for radiated emission below 1GHz.
2. RBW=1MHz, VBW=3MHz and Peak detector is for peak measured value of radiated emission above 1GHz.
3. RBW=1MHz, VBW=1/T and Peak detector is for average measured value of radiated emission above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

3.1.3 Test Setup

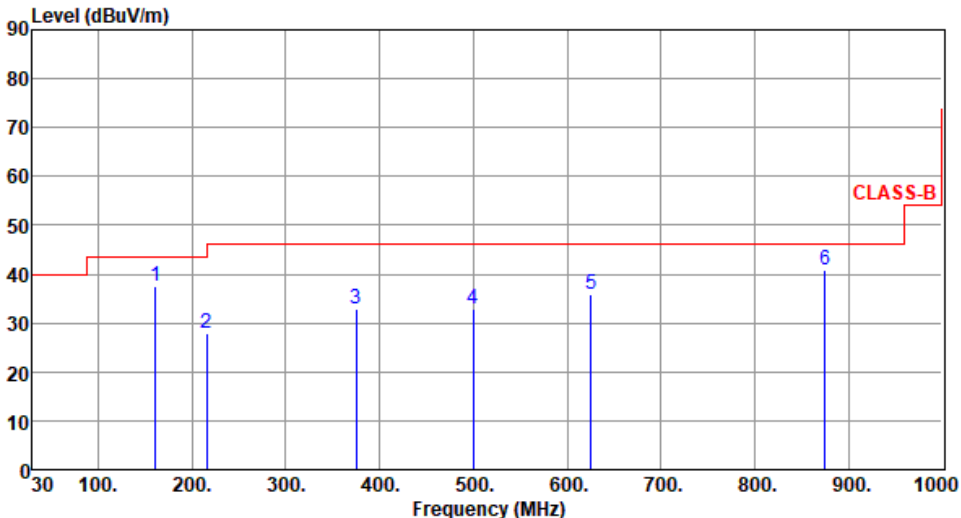
Radiated Emissions below 1 GHz

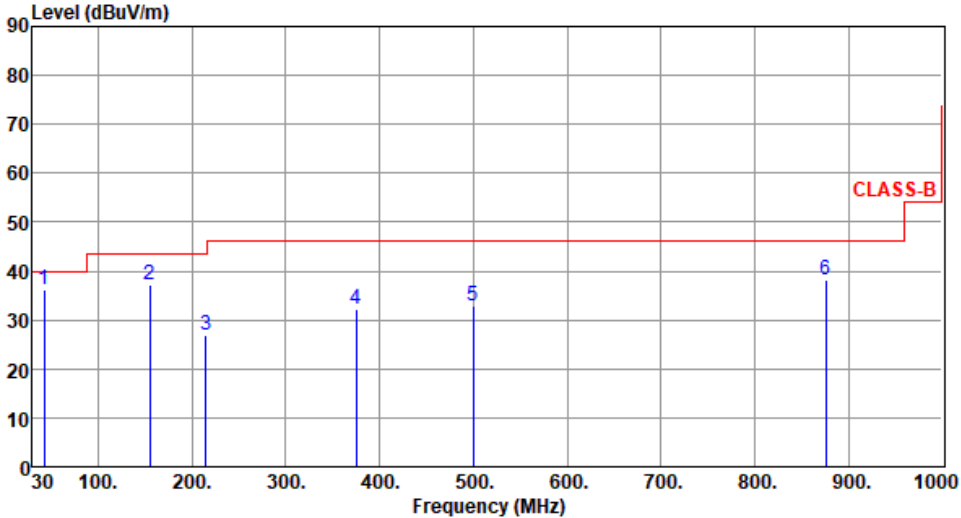


Radiated Emissions above 1 GHz

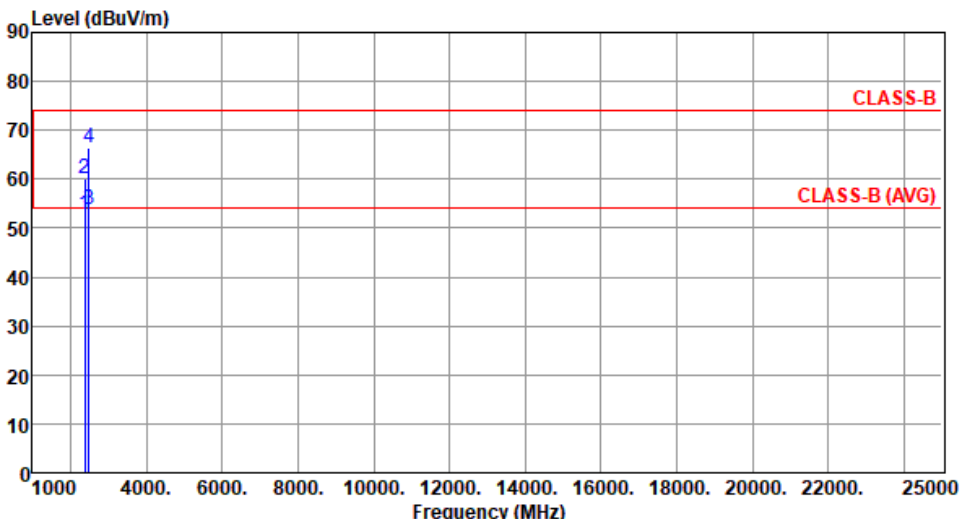


3.1.4 Transmitter Radiated Unwanted Emissions (Below 1GHz)

Test Mode	Lora 914.2 MHz + BLE CH39 + 2.4G 11G CH06 + Zigbee CH11									
Polarization	Horizontal									
Test By :Brad Wu			Temperature(°C):24			Humidity(%):63				
 <p>The graph plots Level (dBuV/m) on the y-axis (0 to 90) against Frequency (MHz) on the x-axis (30 to 1000). A red line represents the CLASS-B limit, which is constant at 46 dBuV/m from 100 MHz to 1000 MHz. Six peaks are identified with blue vertical lines and numbered 1 through 6. Peak 1 is at 160.92 MHz, peak 2 at 216.00 MHz, peak 3 at 375.20 MHz, peak 4 at 500.00 MHz, peak 5 at 625.60 MHz, and peak 6 at 875.21 MHz. All peaks are below the 46 dBuV/m limit.</p>										
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn	
	MHz	level	dBuV/m	dB	reading	dB/m		High	Table	
		dBuV/m			dBuV			cm	deg	
1	160.92	37.51	43.50	-5.99	46.08	-8.57	Peak	---	---	
2	216.00	27.97	43.50	-15.53	39.75	-11.78	Peak	---	---	
3	375.20	32.86	46.00	-13.14	39.05	-6.19	Peak	---	---	
4	500.00	33.00	46.00	-13.00	35.75	-2.75	Peak	---	---	
5	625.60	35.71	46.00	-10.29	35.46	0.25	Peak	---	---	
6	875.21	40.91	46.00	-5.09	36.41	4.50	Peak	---	---	
<p>Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m). Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.</p>										

Test Mode	Lora 914.2 MHz + BLE CH39 + 2.4G 11G CH06 + Zigbee CH11								
Polarization	Vertical								
Test By	:Brad Wu	Temperature(°C)	:24	Humidity(%)	:63				
 <p>The graph displays the emission spectrum with a red line representing the CLASS-B limit. The y-axis is Level (dBuV/m) from 0 to 90, and the x-axis is Frequency (MHz) from 30 to 1000. Six peaks are labeled 1 through 6, corresponding to the data in the table below.</p>									
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn
	MHz	level	dBuV/m	dB	reading	dB/m		High	Table
		dBuV/m			dBuV			cm	deg
1	42.46	36.24	40.00	-3.76	45.14	-8.90	Peak	---	---
2	155.48	37.21	43.50	-6.29	45.72	-8.51	Peak	---	---
3	215.20	26.81	43.50	-16.69	38.57	-11.76	Peak	---	---
4	375.20	32.26	46.00	-13.74	38.45	-6.19	Peak	---	---
5	500.00	32.93	46.00	-13.07	35.68	-2.75	Peak	---	---
6	875.42	38.06	46.00	-7.94	33.56	4.50	Peak	---	---
<p>Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m). Note 3: All spurious emissions below 30MHz are more than 20 dB below the limit.</p>									

3.1.5 Transmitter Radiated Unwanted Emissions (Above 1GHz)

Test Mode	Lora 914.2 MHz + BLE CH39 + 2.4G 11G CH06 + Zigbee CH11									
Polarization	Horizontal									
Test By :Brad Wu			Temperature(°C):24			Humidity(%):63				
										
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn	
	MHz	level	dBuV/m	dB	reading	dB/m		High	Table	
								cm	deg	
1	2373.00	52.75	54.00	-1.25	54.23	-1.48	Average	120	51	
2	2373.00	60.08	74.00	-13.92	61.56	-1.48	Peak	120	51	
3	2483.50	53.75	54.00	-0.25	55.33	-1.58	Average	122	66	
4	2483.50	66.52	74.00	-7.48	68.10	-1.58	Peak	122	66	
<p>Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).</p>										

Test Mode	Lora 914.2 MHz + BLE CH39 + 2.4G 11G CH06 + Zigbee CH11									
Polarization	Vertical									
Test By :Brad Wu			Temperature(°C):24			Humidity(%):63				
	Freq.	Emission	Limit	Margin	SA	Factor	Remark	ANT	Turn	
	MHz	level	dBuV/m	dB	reading	dB/m		High	Table	
		dBuV/m			dBuV			cm	deg	
1	2373.00	51.86	54.00	-2.14	53.34	-1.48	Average	281	336	
2	2373.00	58.65	74.00	-15.35	60.13	-1.48	Peak	281	336	
3	2483.50	51.46	54.00	-2.54	53.04	-1.58	Average	220	243	
4	2483.50	64.28	74.00	-9.72	65.86	-1.58	Peak	220	243	
<p>Note 1: Emission Level (dBuV/m) = SA Reading (dBuV) + Factor* (dB/m) *Factor includes antenna factor , cable loss and amplifier gain Note 2: Margin (dB) = Emission level (dBuV/m) – Limit (dBuV/m).</p>										

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 Corporation (EMC and Wireless Communication Laboratory), 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 District. Location map can be found on our website <http://www.icertifi.com.tw>.

Linkou

Tel: 886-2-2601-1640

No.30-2, Ding Fwu Tsuen, Lin Kou
District, New Taipei City, Taiwan
(R.O.C.)

Kwei Shan

Tel: 886-3-271-8666

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St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)
No.2-1, Lane 6, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 33381, Taiwan (R.O.C.)

Kwei Shan Site II

Tel: 886-3-271-8640

No.14-1, Lane 19, Wen San 3rd
St., Kwei Shan Dist., Tao Yuan
City 333, Taiwan (R.O.C.)

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

Tel: 886-3-271-8666

Fax: 886-3-318-0345

Email: ICC_Service@icertifi.com.tw

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