



Hong Kong

FCC – Test report

Report Number	:	60/790.14.014.02	Date of Issue:	<u>June 24, 2014</u>
Model	:	<u>Interchange Combo</u>		
Product Type	:	<u>Bike speed and cadence transmitter</u>		
Applicant	:	<u>Dayton Industrial Co., Ltd</u>		
Address	:	<u>2-12 Kwai Fat Road, 11-A Kwai Chung, New Territories, Hong Kong</u>		
Production Facility	:	<u>Kendy Electronics (Dongguan) Co.Ltd,</u>		
Address	:	<u>2-12 Kwai Fat Road, 11-A Kwai Chung, New Territories, Hong Kong</u>		
Test Result	:	<input checked="" type="checkbox"/> Positive	<input type="checkbox"/> Negative	
Total pages including Appendices	:	<u>17</u>		

TÜV SÜD Hong Kong Ltd. is a subcontractor to TÜV Product Service, GmbH according to the principles outlined in ISO 17025.

TÜV SÜD Hong Kong Ltd. reports apply only to the specific samples tested under stated test conditions. Construction of the actual test samples has been documented. It is the manufacturer's responsibility to assure that additional production units of this model are manufactured with identical electrical and mechanical components. The manufacturer/importer is responsible to the Competent Authorities in Europe for any modifications made to the production units which result in non-compliance to the relevant regulations. TÜV SÜD Hong Kong Ltd. shall have no liability for any deductions, inferences or generalizations drawn by the client or others from TÜV SÜD Hong Kong Ltd. issued reports.

This report is the confidential property of the client. As a mutual protection to our clients, the public and ourselves, extracts from the test report shall not be reproduced except in full without our written approval.

1. Table of Contents

1. Table of Contents	2
2. Details about the Test Laboratory	3
3. Description of the Equipment Under Test	4
4. Summary of Test Standards	5
5. Summary of Test Standards and Results	6
6. General Remarks	7
7. Emission Test Results	8
7.1 Radiated Emission Test	8
7.2 20dB & 99% bandwidth measurement	12
7.3 Bandedge measurement	14
8. System Measurement Uncertainty	17

2. Details about the Test Laboratory

Details about the Test Laboratory

Test site 1

Company name: TÜV SÜD HONG KONG LTD.
3/F, West Wing, Lakeside 2,
10 Science Park West Avenue,
Science Park, Shatin
HK.

Telephone: 852 2776 1323
Fax: 852 2776 1372

Test site 2

Company name: Shenzhen Zhongjian Nanfang Testing Co.,Ltd
1st Floor, Block No.2, Laodong Industrial Zone,
Xixiang Road Baoan District, Shenzhen, China
Test Firm FCC Registration number:817957

3. Description of the Equipment Under Test

Description of the Equipment Under Test

Product: Bike speed and cadence transmitter

Model no.: Interchange Combo

Serial number: NIL

Options and accessories: NIL

FCC ID: O4GINTCOM

Rated Voltage: 3 VDC

Rated Current: NIL

Rated Power: NIL

Frequency: 2457MHz

RF Transmission Frequency: 2457MHz

Antenna gain: 0 dBi

No. of Operated Channel: 1

Modulation: GFSK

Description of the EUT: Battery operated – 1x 3.0V CR2032 battery

4. Summary of Test Standards

Test Standards	
FCC Part 15 Subpart C, Intentional Radiators, 10-1-12 Edition	PART 15 – RADIO FREQUENCY DEVICES Subpart C – Intentional Radiators

5. Summary of Test Standards and Results

Emission Tests					
Test Condition	Pages	Test site	Test Result		
			Pass	Fail	N/A
Conducted Emission (47 CFR 15.207, 15.209)	NIL	/	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Radiated Emission (47 CFR 15.249, 15.209)	8	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
20dB Bandwidth (47 CFR 15.215)	12	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Bandedge Emission (47 CFR 15.249)	14	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

Remark: 1. Battery operate only.

2. For Radiated Emissions test, three set-up directions(X,Y,Z) were pretested, but only direction Z test data was recorded in this report for it is the worst case.

6. General Remarks

Remarks

This submittal(s) (test report) is intended for FCC ID: O4GINTCOM complies with the FCC Part 15, Subpart C Rules.

All the configurations of the product were tested and only the worst test results are listed in the report.

SUMMARY:

All tests according to the regulations cited on page 6 were

- Performed
- Not Performed

The Equipment Under Test

- **Fulfills** the general approval requirements.
- **Does not** fulfill the general approval requirements.

Sample Received Date: June 2, 2014

Testing Start Date: June 3, 2014

Testing End Date: June 12, 2014

- TÜV SÜD HONG KONG LTD. -

Reviewed by:

Edmond FUNG



Prepared by:

CHAN Kwong Ngai

7. Emission Test Results

7.1 Radiated Emission Test

Date of test : June 5, 2014
 Test requirement : FCC Part 15
 Test method : ANSI C63.4:2009
 Operating mode : Transmit mode
 Frequency channel : 2457MHz
 Remarks : Fundamental

Test Result
 Passed
 Not Passed

Frequency (MHz)	Polarity (H/V)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
2457.000	H	87.4	114	-26.6	Peak
2457.000	H	86.1	94	-7.9	Average
2457.000	V	89.2	114	-24.8	Peak
2457.000	V	87.7	94	-6.3	Average

Remark: 1.The EUT was placed on the top of the turntable in test site area.
 The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
 For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable. The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
 Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
 Adjust the emission and slightly height of the antenna to locate the position with maximum reading.

Radiated Emission Test

Date of test : June 5, 2014
 Test requirement : FCC Part 15
 Test method : ANSI C63.4:2009
 Operating mode : Transmit mode
 Frequency channel : 2457MHz
 Remarks : 9kHz-25GHz

Test Result
 Passed
 Not Passed

Frequency (MHz)	Polarity (H/V)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
44.901	H	16.22	40.00	-23.78	Quasi Peak
58.819	H	14.29	40.00	-25.71	Quasi Peak
99.180	H	14.41	43.60	-29.19	Quasi Peak
221.392	H	17.46	46.00	-28.54	Quasi Peak
3515.957	H	42.68	74.00	-31.32	Peak
3515.957	H	33.01	54.00	-20.99	Average
7390.070	H	55.54	74.00	-18.46	Peak
7390.070	H	46.17	54.00	-7.83	Average

Remark: 1.The EUT was placed on the top of the turntable in test site area.
 The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
 For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable.
 The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
 Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
 Adjust the emission and slightly height of the antenna to locate the position with maximum reading.

Radiated Emission Test

Date of test : June 5, 2014
Test requirement : FCC Part 15
Test method : ANSI C63.4:2009
Operating mode : Transmit mode
Frequency channel : 2457MHz
Remarks : 9kHz-25GHz

Test Result
 Passed
 Not Passed

Frequency (MHz)	Polarity (H/V)	Result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
40.559	V	23.65	40.00	-16.35	Quasi Peak
52.208	V	16.26	40.00	-23.74	Quasi Peak
65.343	V	14.46	40.00	-25.54	Quasi Peak
111.386	V	16.14	43.60	-27.46	Quasi Peak
3495.691	V	44.24	74.00	-29.76	Peak
3495.691	V	34.39	54.00	-19.61	Average
9205.540	V	57.93	74.00	-16.07	Peak
9205.540	V	48.08	54.00	-5.92	Average

Remark: 1.The EUT was placed on the top of the turntable in test site area.
The test shall be made in the operation mode. The turntable was rotated by 360 degrees to determine the position of the highest radiation.
For emissions measurement, the receiving antenna was placed 3 meters far away from the turntable.
The antenna was fixed on the same height with the EUT to find each suspected emissions of both horizontal and vertical polarization.
Adjust the emission and slightly rotate the turntable to locate the position with maximum reading.
Adjust the emission and slightly height of the antenna to locate the position with maximum reading.

Test Equipment List

Radiated Emission Test

DESCRIPTION	Type No.	Serial No.	Calibrated date	Calibrated until
Antenna	VULB9163	9163 330	2014.02.25	2015.02.24
Antenna	3117	00066577	2014.04.02	2015.04.01
Antenna	3160-09	00118388	2013.09.06	2014.09.05
Loop Antenna	6512	29604	2013.09.25	2014.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.23	2014.12.22
EMI Test Receiver	ESCI	100701	2013.08.04	2014.08.03
Spectrum Analyzer	FSV40	100903	2014.01.27	2015.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.18	2015.02.17
Amplifier	150A250	326446	2014.03.19	2015.03.17
Temp. & Humid. Chamber	FACT5-2.0	4166	2013.11.22	2014.11.21

7.2 20dB

Date of test : June 9, 2014
 Test requirement : FCC Part 15
 Test method : ANSI C63.4:2009
 Operating mode : Transmit mode
 Frequency channel : 2457MHz
 Remarks : NIL

Test Result
 Passed
 Not Passed

20 dB Bandwidth	99% OBW	Result
kHz	kHz	
843.0	827.0	Pass



Test Equipment List

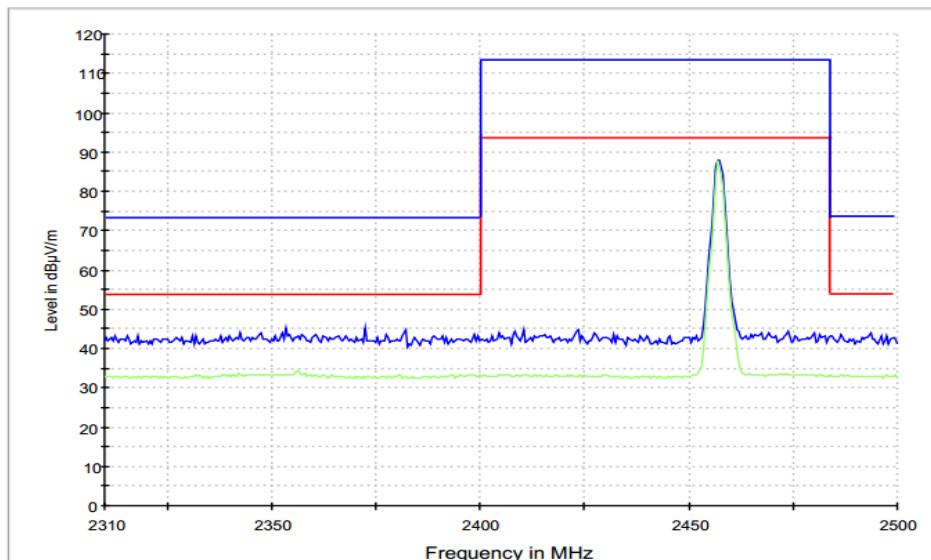
20dB & 99% bandwidth measurement

DESCRIPTION	Type No.	Serial No.	Calibrated date	Calibrated until
Agilent	E4445A	MY46181814	2013.12.11	2014.12.10

7.3 Bandedge measurement

Date of test : June 9, 2014
 Test requirement : FCC Part 15
 Test method : ANSI C63.4:2009
 Operating mode : Transmit mode
 Frequency channel : 2457MHz
 Remarks : NIL

Test Result
 Passed
 Not Passed

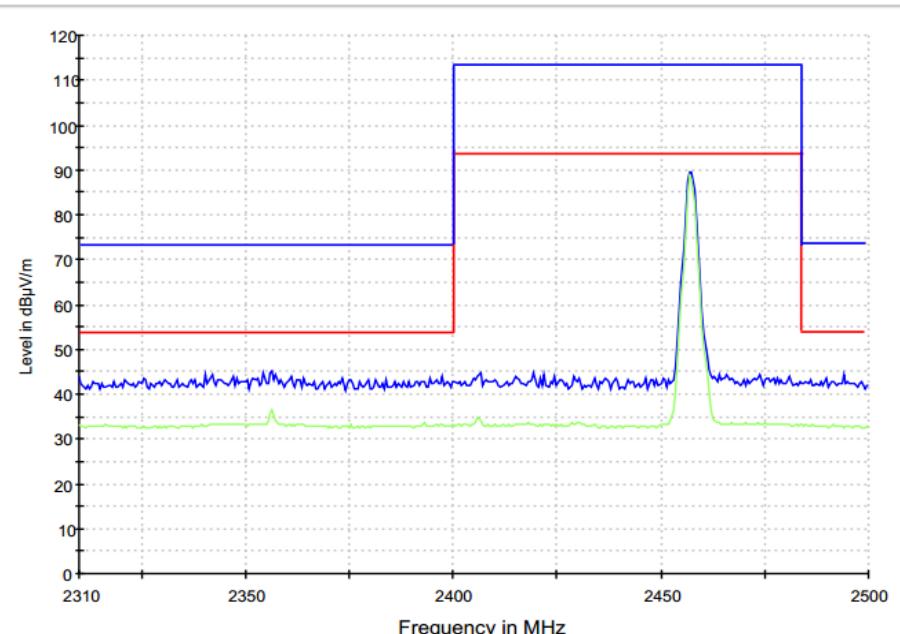


Band	Frequency (MHz)	Polarity (H/V)	Test result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
Low	2398.000	H	44.1	74.0	-29.9	Peak
	2398.000	H	33.2	54.0	-20.8	Average
High	2487.000	H	44.5	74.0	-29.5	Peak
	2487.000	H	33.0	54.0	-21.0	Average

Remark:
 1. Use the following spectrum analyzer settings:
 Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation
 RBW \geq 1% of the span
 VBW \geq RBW
 Sweep = auto
 Detector function = peak

Date of test : June 9, 2014
 Test requirement : FCC Part 15
 Test method : ANSI C63.4:2009
 Operating mode : Transmit mode
 Frequency channel : 2457MHz
 Remarks : NIL

Test Result
 Passed
 Not Passed



Band	Frequency (MHz)	Polarity (H/V)	Test result (dB μ V/m)	Limit (dB μ V/m)	Margin (dB)	Detector
Low	2397.000	V	44.6	74.0	-29.4	Peak
	2397.000	V	33.5	54.0	-20.5	Average
High	2491.000	V	45.1	74.0	-28.9	Peak
	2491.000	V	33.3	54.0	-20.7	Average

Remark:

1. Use the following spectrum analyzer settings:
 Span = wide enough to capture the peak level of the emission operating on the channel closest to the bandedge, as well as any modulation products which fall outside of the authorized band of operation
 RBW \geq 1% of the span
 VBW \geq RBW
 Sweep = auto
 Detector function = peak

Test Equipment List

Bandedge measurement

DESCRIPTION	Type No.	Serial No.	Calibrated date	Calibrated until
Antenna	VULB9163	9163 330	2014.02.25	2015.02.24
Antenna	3117	00066577	2014.04.02	2015.04.01
Antenna	3160-09	00118388	2013.09.06	2014.09.05
Loop Antenna	6512	29604	2013.09.25	2014.09.24
Spectrum Analyzer	FSP 40	100378	2013.12.23	2014.12.22
EMI Test Receiver	ESCI	100701	2013.08.04	2014.08.03
Spectrum Analyzer	FSV40	100903	2014.01.27	2015.01.26
Test Cable	SUCOFLEX 104	MY2320/4	2014.02.18	2015.02.17
Amplifier	150A250	326446	2014.03.19	2015.03.17
Temp. & Humid. Chamber	FACT5-2.0	4166	2013.11.22	2014.11.21

8. System Measurement Uncertainty

For a 95% confidence level, the measurement expanded uncertainties for defined systems, in accordance with the recommendations of ISO 17025 were:

System Measurement Uncertainty

Items		Extended Uncertainty
RE	Field strength (dB μ V/m)	U=3.59dB (9kHz-30MHz) U=5.08dB (30MHz-1GHz) U=4.56dB (1GHz-18GHz) U=4.42dB (18GHz-25GHz)
CE	Disturbance Voltage (dB μ V)	U=2.7dB