



Hong Kong

## FCC – Test report

Report Number : **60/790.14.014.01** Date of Issue: 24<sup>th</sup> June 2014

Model : **Interchange Combo**

Product Type : **Bike speed and cadence transmitter**

Applicant : **DAYTON INDUSTRIAL CO.,LTD**

Address : **2-12 Kwai Fat Road,11-A Kwai Chung,New Territories,Hong Kong**

Production Facility : **KENDY ENTERPISE LTD**

Address : **2-12 Kwai Fat Road,11-A Kwai Chung,New Territories,Hong Kong**

Test Result :  **Positive**     **Negative**

Total pages including Appendices : **28**

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## 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:	2402-2480MHz
RF Transmission Frequency:	2402-2480MHz
Antenna gain:	0 dBi
No. of Operated Channel:	40
Modulation:	GFSK
Description of the EUT:	Battery operated – 1x 3V battery



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#### 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
AC Line Conducted Emissions FCC §15.207(a)	NIL	/	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Spurious Emissions at Antenna Terminals FCC §2.1051 & §15.247(d)	8	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Spurious Radiated Emissions FCC §15.205, §15.209 & §15.247(d)	11	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6 dB Bandwidth & 99%OBW FCC §15.247(a)(2)	15	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Peak Output Power FCC §15.247(b)	18	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
100 kHz Bandwidth of Band Edges FCC §15.247(d)	21	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Power Spectral Density FCC §15.247(e)	23	Site 2	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Antenna Requirements FCC §15.203	26	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: 02<sup>nd</sup> June 2014

Testing Start Date: 03<sup>th</sup> June 2014

Testing End Date: 12<sup>th</sup> June 2014

- TÜV SÜD HONG KONG LTD. -

Reviewed by:



Edmond FUNG



Prepared by:

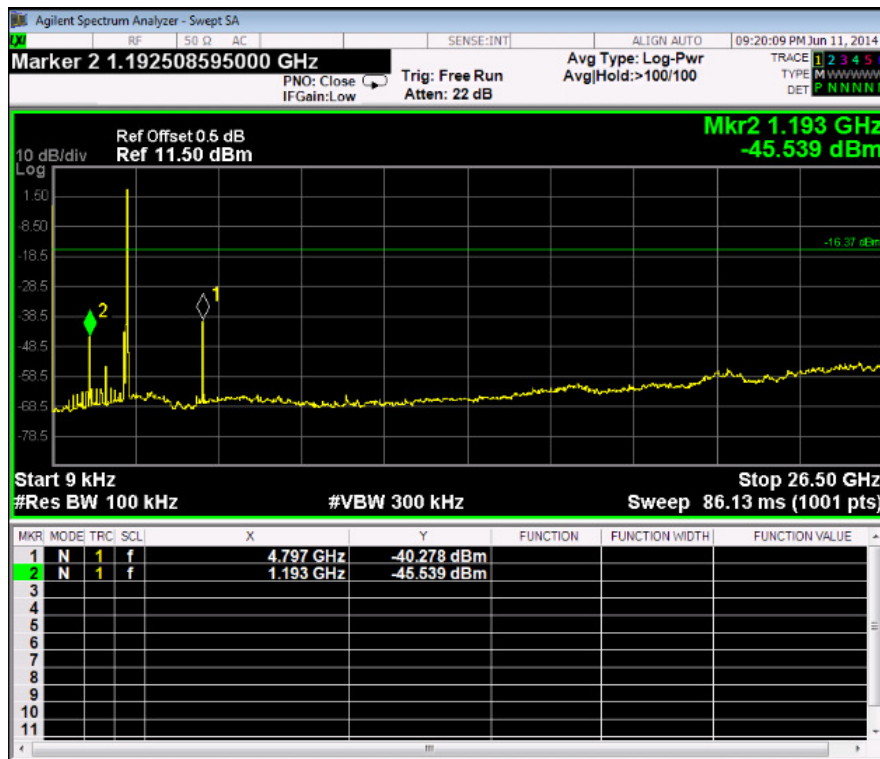


CHAN Kwong Ngai

## 7. Emission Test Results

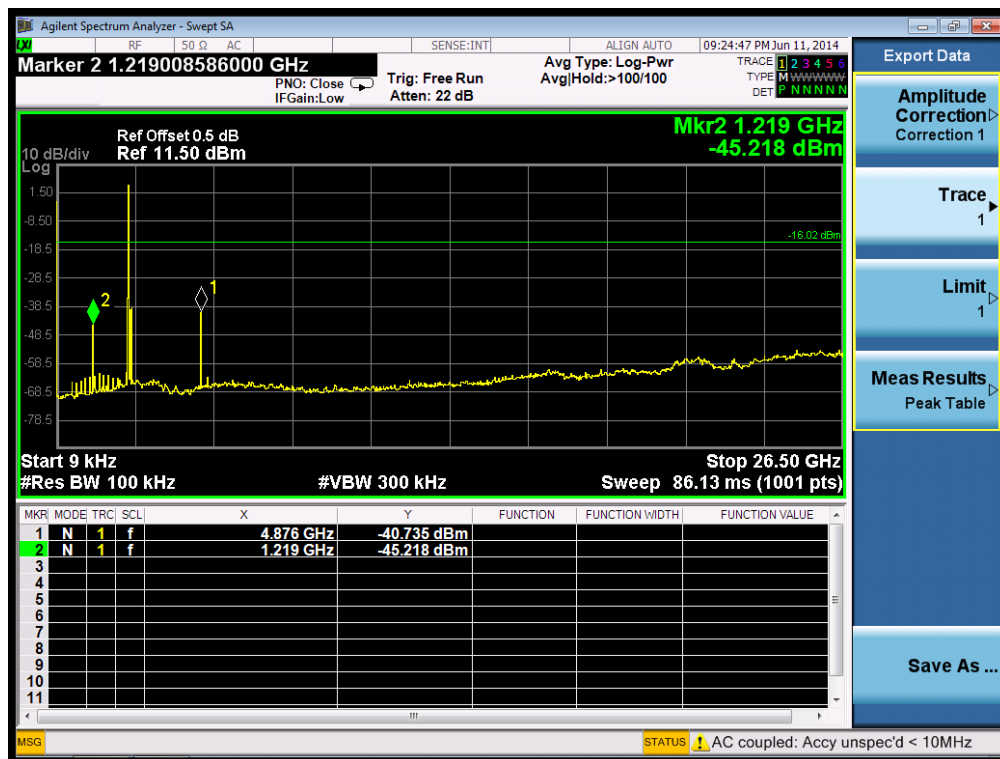
### 7.1 Spurious Emissions at Antenna Terminals

Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §2.1051 & §15.247(d)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2402MHz  
 Remarks : 9KHz-25GHz

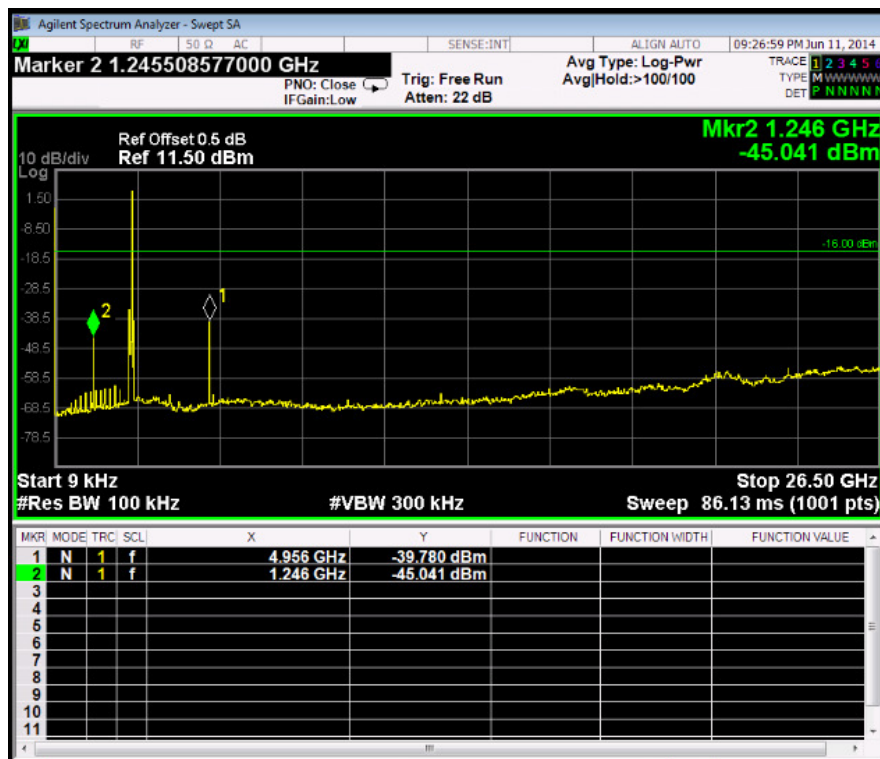




Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §2.1051 & §15.247(d)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2440MHz  
 Remarks : 9KHz-25GHz



Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §2.1051 & §15.247(d)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2480MHz  
 Remarks : 9KHz-25GHz



## 7.2 Spurious Radiated Emissions

Date of test : 5<sup>th</sup> June 2014

Test requirement : FCC §15.205, §15.209 & §15.247(d)

Test method : Radiated

Operating mode : Transmit mode

Frequency channel : 2402MHz(worst case)

Remarks : 9kHz-1GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
41.26	40.57	-33.4	7.17	40.0	-32.83	QP	H
297.12	50.63	-35.7	14.93	43.5	-28.57	QP	H
381.19	47.81	-31.3	16.51	46.0	-29.49	QP	H
491.21	54.51	-28.9	25.61	46.0	-20.39	QP	H
755.43	46.67	-24.2	22.47	46.0	-23.53	QP	H
998.21	46.27	-21.0	25.27	54.0	-28.73	QP	H
63.56	50.42	-35.2	15.22	40	-24.78	QP	V
86.98	55.28	-38.0	17.28	43.5	-26.22	QP	V
184.92	44.88	-37.3	7.58	43.5	-35.92	QP	V
230.24	52.5	-35.0	17.5	46	-28.50	QP	V
491.92	51.37	-28.9	22.47	46	-23.53	QP	V
662.76	53.1	-25.6	27.5	46	-18.50	QP	V

Remark: All three frequencies (2042MHz, 2440MHz and 2480MHz) were performed test, and the 2480MHz was the worst case.

Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.205, §15.209 & §15.247(d)  
 Test method : Radiated  
 Operating mode : Transmit mode  
 Frequency channel : 2402MHz  
 Remarks : 1GHz-25GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2402	85.7	1.8	87.5	/	/	/	H
2402	73.6	1.8	75.4	/	/	/	H
4804	55.4	0.2	55.6	74.0	-18.4	peak	H
4804	45.5	0.2	45.7	54.0	-8.3	Average	H
2402	86.8	1.8	88.6	/	/	/	V
2402	74.4	1.8	76.2	/	/	/	V
4804	56.9	0.2	57.1	74.0	-16.9	peak	V
4804	46.4	0.2	46.8	54.0	-7.2	Average	V

Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.205, §15.209 & §15.247(d)  
 Test method : Radiated  
 Operating mode : Transmit mode  
 Frequency channel : 2440MHz  
 Remarks : 1GHz-25GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2440	86.3	1.8	88.1	/	/	/	H
2440	74.4	1.8	76.2	/	/	/	H
4880	55.2	0.4	55.6	74.0	-18.4	peak	H
4880	45.2	0.4	45.6	54.0	-8.4	Average	H
2440	85.8	1.8	87.6	/	/	/	V
2440	76.0	1.8	77.8	/	/	/	V
4880	53.9	5.9	54.3	74.0	-19.7	peak	V
4880	43.6	5.9	44.0	54.0	-10.0	Average	V

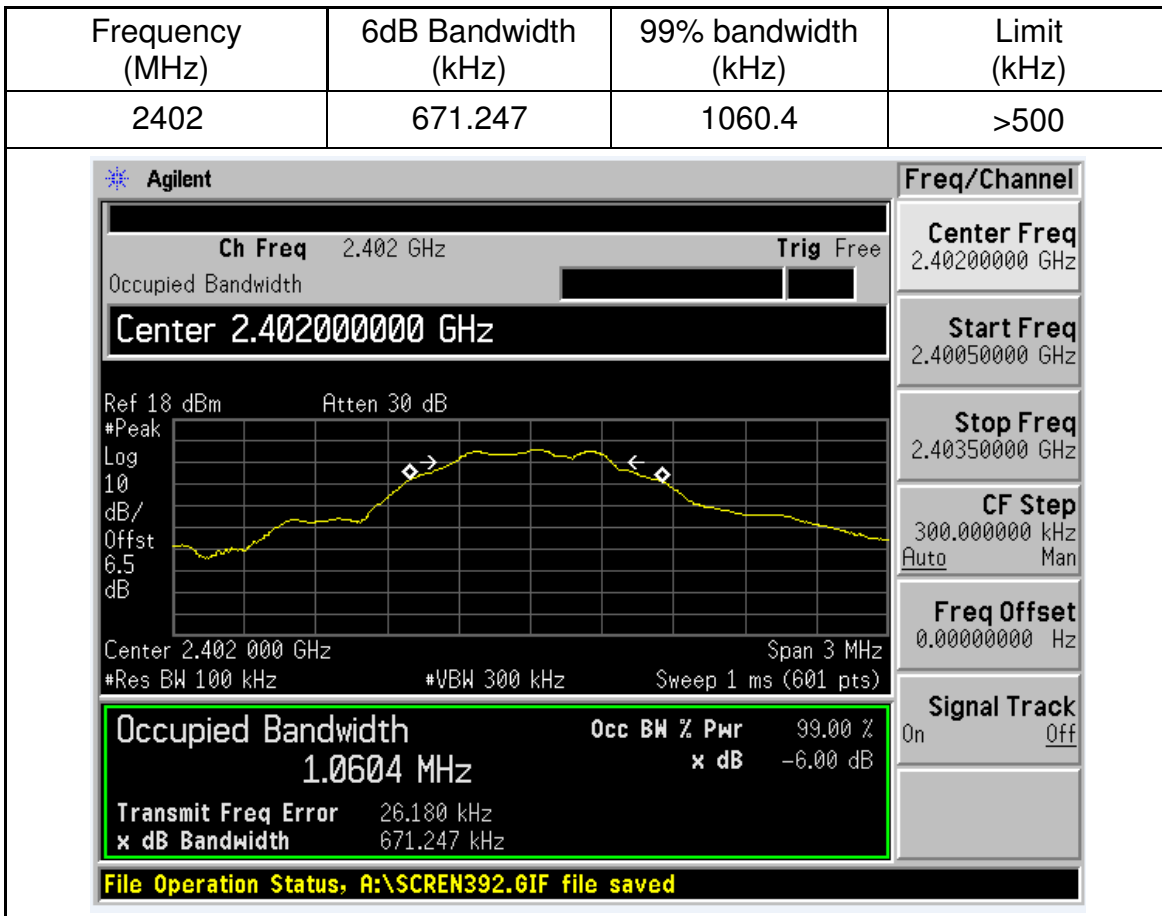
Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.205, §15.209 & §15.247(d)  
 Test method : Radiated  
 Operating mode : Transmit mode  
 Frequency channel : 2480MHz  
 Remarks : 1GHz-25GHz

Frequency (MHz)	Reading (dBuV)	Correct Factor (dB/m)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Remark	Ant.Polar. H / V
2480	85.6	1.9	87.5	/	/	/	H
2480	73.4	1.9	75.3	/	/	/	H
4960	57.5	0.8	58.3	74	-15.7	peak	H
4960	37.6	0.8	38.4	54	-15.6	Average	H
2480	86.7	1.9	88.6	/	/	/	V
2480	74.9	1.9	76.8	/	/	/	V
4960	59.5	0.8	60.3	74	-13.7	peak	V
4960	39.4	0.8	40.2	54	-13.8	Average	V

### 7.3 6dB & 99% Bandwidth

Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(a)(2)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2402MHz  
 Remarks : NIL

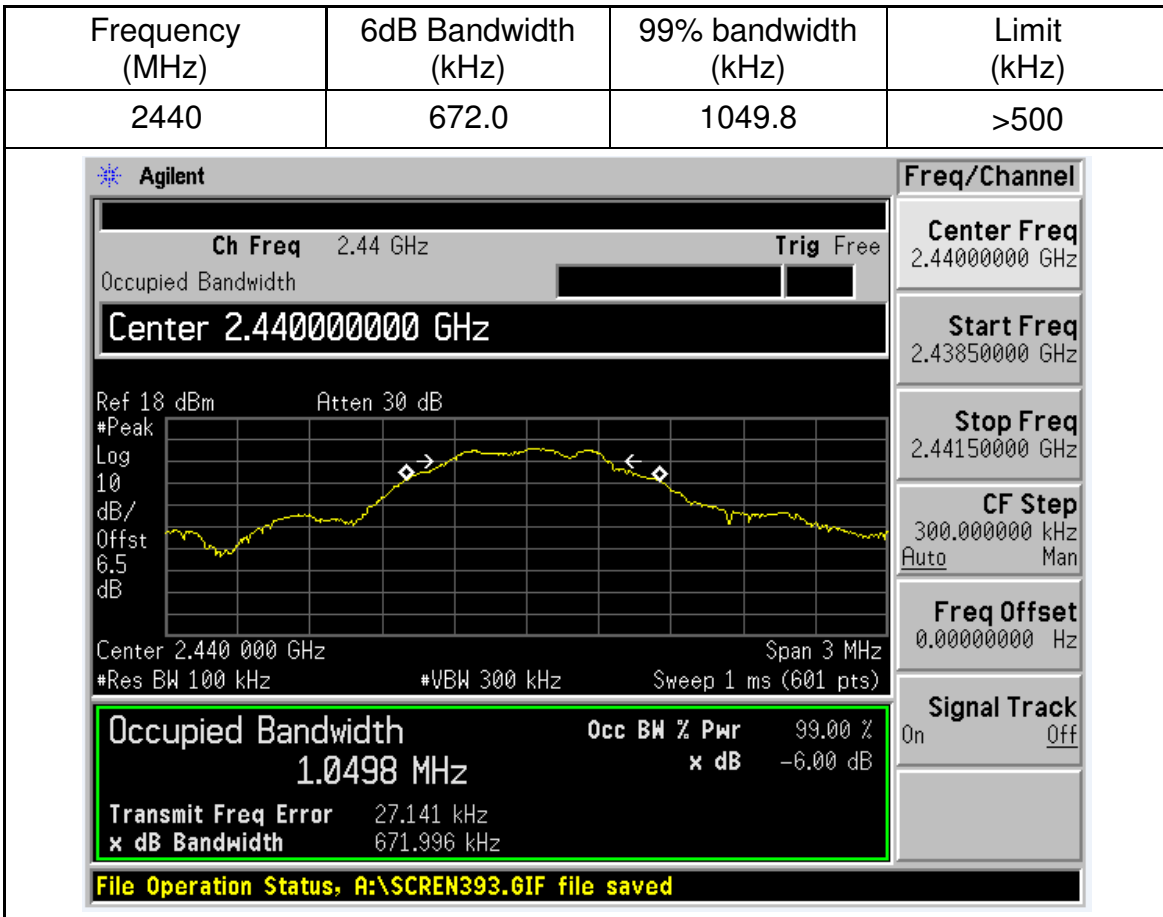
Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed





Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(a)(2)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2440MHz  
 Remarks : NIL

<b>Test Result</b>	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed



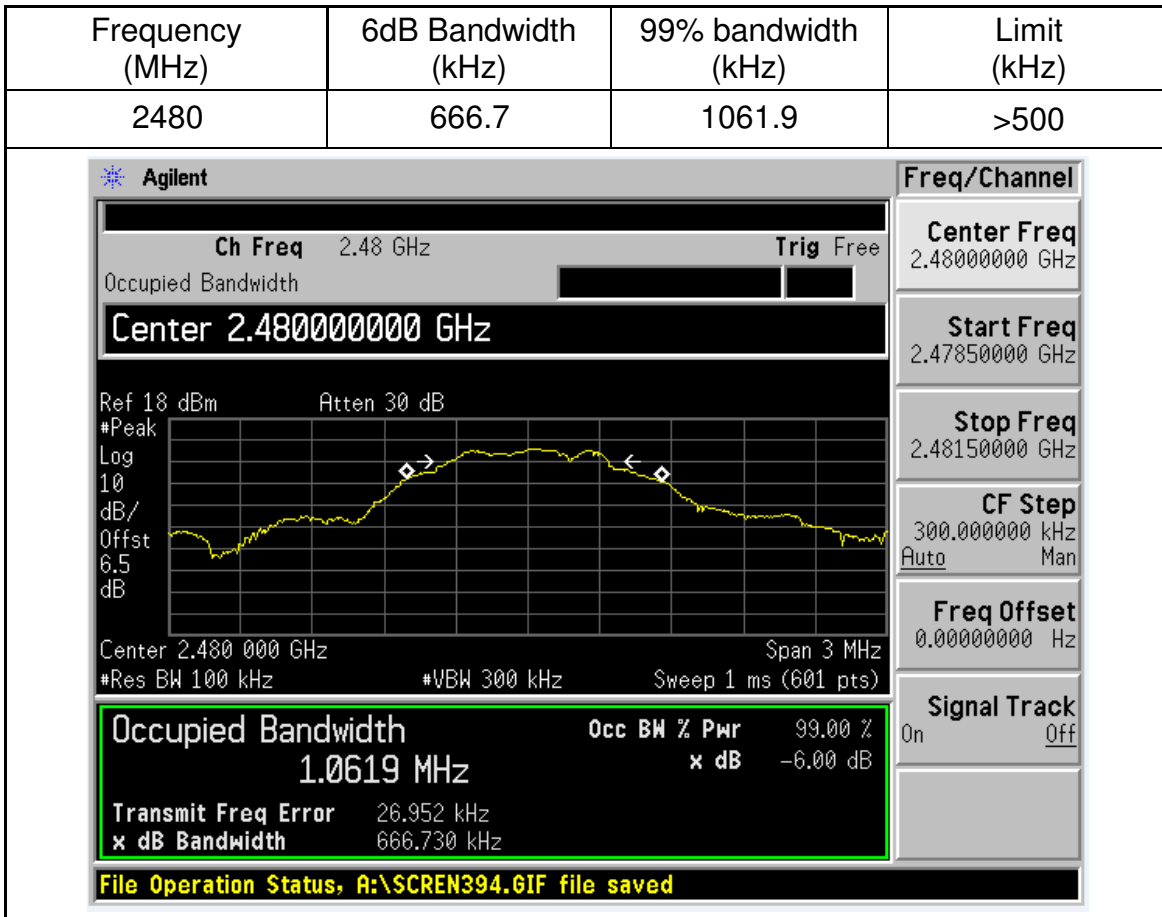




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Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(a)(2)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2480MHz  
 Remarks : NIL

<b>Test Result</b>	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

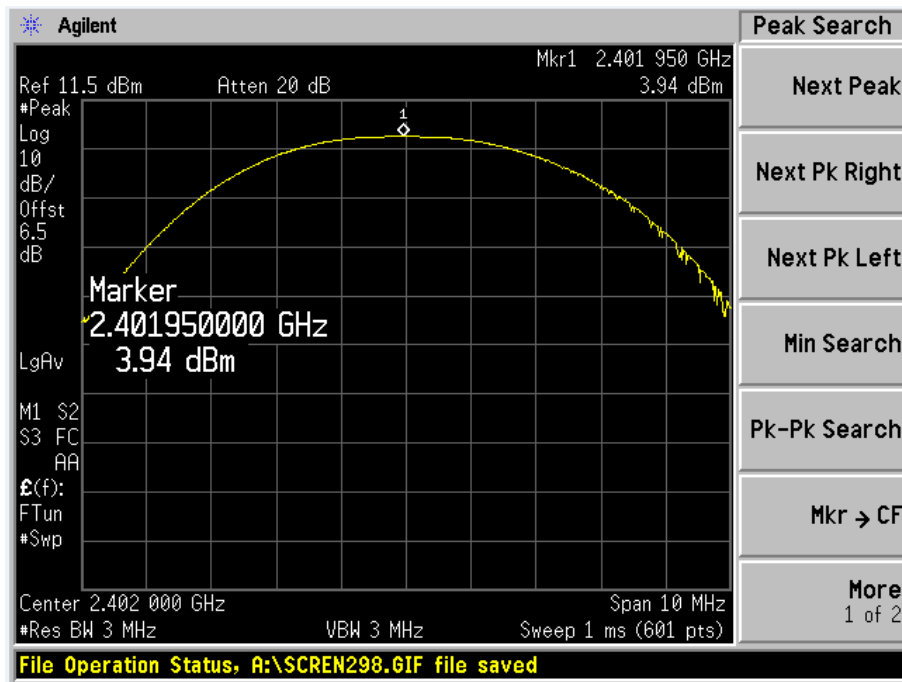


### 7.4 Peak Output Power Measurements

Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(b)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2402MHz  
 Remarks :

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

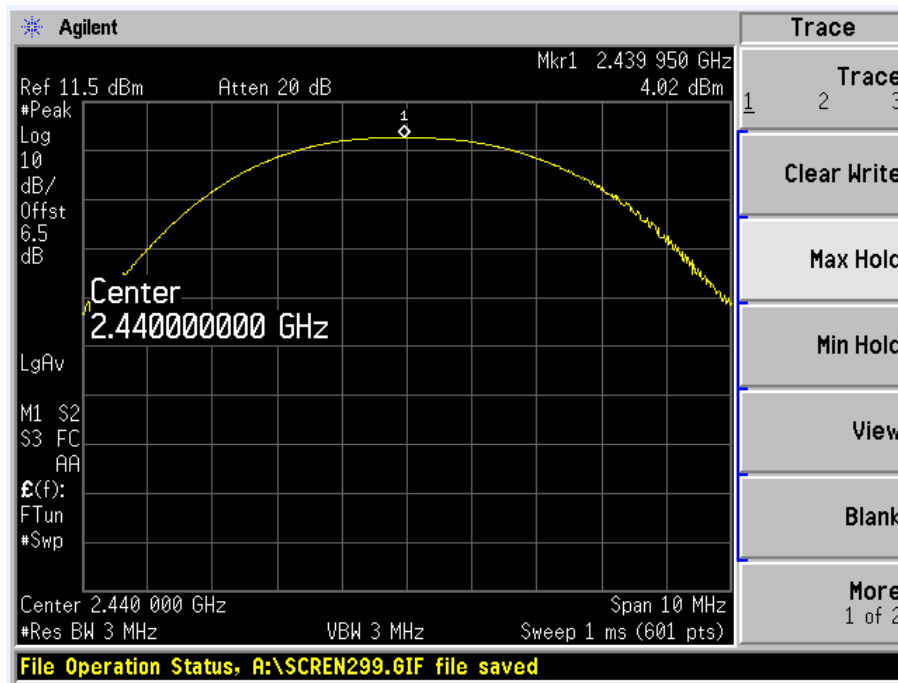
Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
2402	3.94	30



Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(b)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2440MHz  
 Remarks :

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

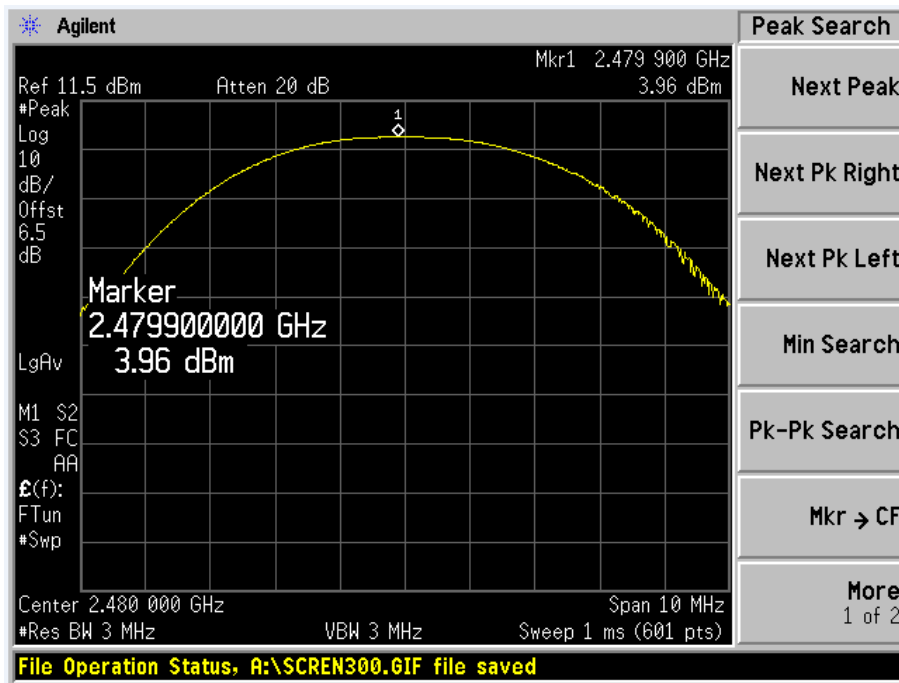
Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
2440	4.02	30



Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(b)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2480MHz  
 Remarks :

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	Conducted Output Power (dBm)	Limit (dBm)
2480	3.96	30

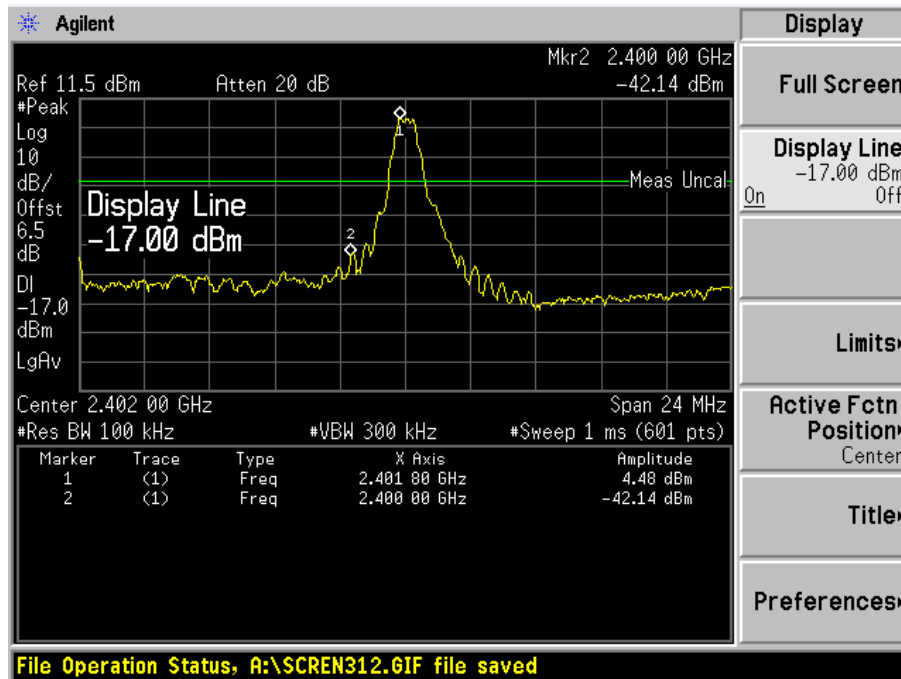


### 7.5 100 kHz Bandwidth of Band Edges

Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(d)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2402MHz  
 Remarks :

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

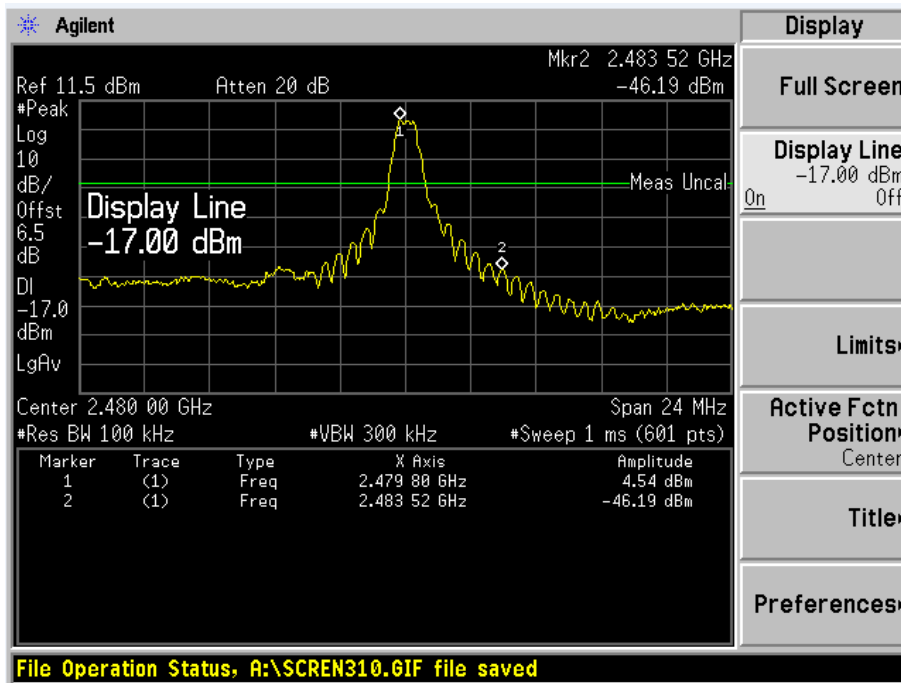
Frequency (MHz)	Delta Peak to Band Emission (dB)	Limit (dB)
2402	46.62	>20



Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(d)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2480MHz  
 Remarks :

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	Delta Peak to Band Emission (dB)	Limit (dB)
2480	50.73	>20

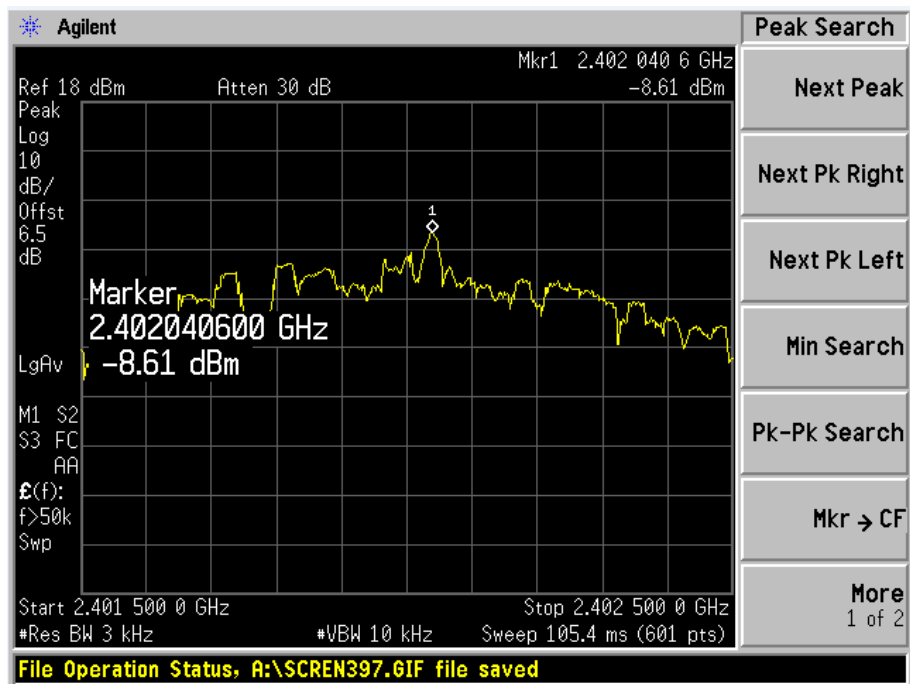


## 7.6 Power Spectral Density

Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(e)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2402MHz  
 Remarks :

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
2402	-8.61	<8



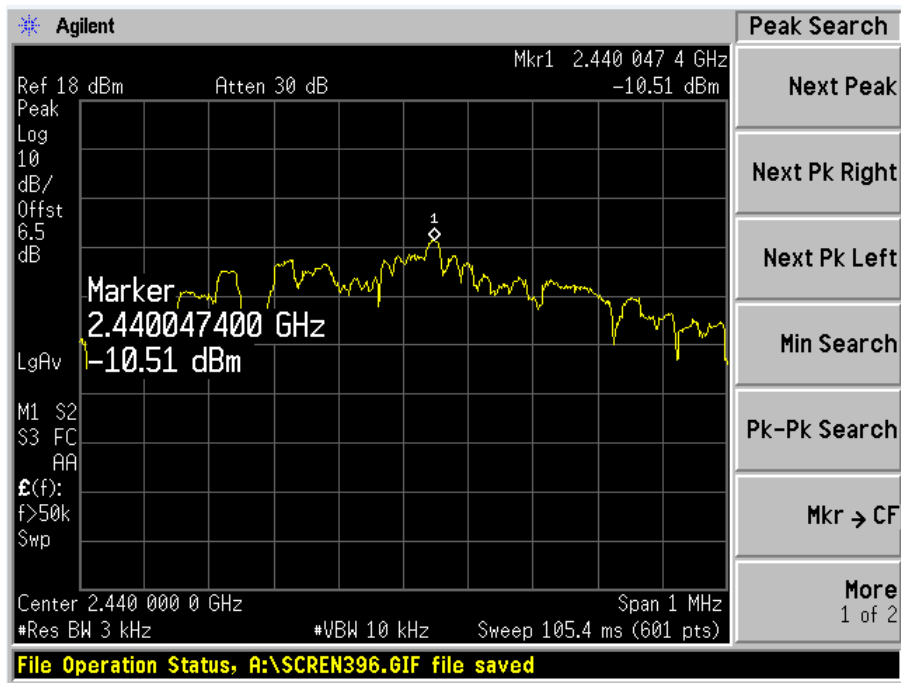


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Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(e)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2440MHz  
 Remarks :

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
2440	-10.51	<8

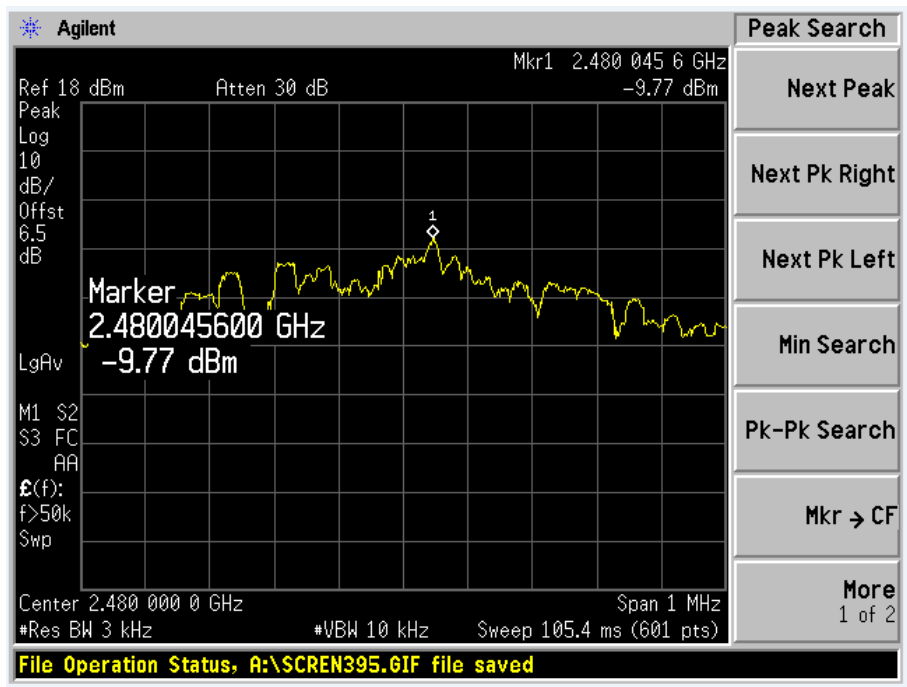




Date of test : 5<sup>th</sup> June 2014  
 Test requirement : FCC §15.247(e)  
 Test method : Conducted  
 Operating mode : Transmit mode  
 Frequency channel : 2480MHz  
 Remarks :

Test Result	
<input checked="" type="checkbox"/>	Passed
<input type="checkbox"/>	Not Passed

Frequency (MHz)	PSD (dBm/3kHz)	Limit (dBm/3kHz)
2480	-9.77	<8





## 7.7 Antenna Requirement

### Limit

For intentional device, according to 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. And According to 15.247 (b), if transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

### Antenna Connector Construction

The antenna used in this product is PCB antenna. And the maximum Gain of this antenna is 0.0 dBi.

## 8. 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	E4440A	US42220815	2013.06.14	2014.06.13
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
Agilent	E4445A	MY46181814	2013.12.11	2014.12.10
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

## 9. 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 $\mu$ 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 $\mu$ V)	U=2.7dB