

Date: 2016-05-04 Page 1 of 34

No.: MH192586

**Applicant:** Ewig Industries Macao Commercial Offshore Limited

Avenida Da Praia Grande No.619, EDF. Comercial Si Toi

L6, Macau

Manufacturer: Dong Guan Q&S Electronic Manufacturing Company

Limited

Yin Shan Industrial District, Fu Gang Village, Xiang Mang West Road, Qing Xi Town, Dongguan City, Guang Dong

Province, China

**Description of Sample(s):** Submitted sample(s) said to be

Product: Temperature and Humidity Sensor

Brand Name: EWIG
Model Number: GRP008
FCC ID: N9ZGRP008

**Date Sample(s) Received:** 2016-04-13

**Date Tested:** 2016-04-26 to 2016-05-03

**Investigation Requested:** Perform ElectroMagnetic Interference measurement in

accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 and ANSI C63.10:2013 for FCC Certification.

**Conclusion(s):** The submitted product <u>COMPLIED</u> with the requirements of

Federal Communications Commission [FCC] Rules and Regulations Part 15. The tests were performed in accordance with the standards described above and on Section 2.2 in this

Test Report.

Remark(s): --

Dr. LEE Kam Chuen
Authorized Signatory
ElectroMagnetic Compatibility Department

For and on behalf of The Hong Kong Standards and Testing Centre Ltd.



Date:	2016-05-04	Page 2 of 34
No.: N	MH192586	
CONT	TENT: Cover Content	Page 1 of 34 Page 2 of 34
<u>1.0</u>	<b>General Details</b>	
1.1	Test Laboratory	Page 3 of 34
1.2	Equipment Under Test [EUT] Description of EUT operation	Page 3 of 34
1.3	Date of Order	Page 3 of 34
1.4	Submitted Sample(s)	Page 3 of 34
1.5	Test Duration	Page 3 of 34
1.6	Country of Origin	Page 3 of 34
<u>2.0</u>	Technical Details	
2.1	Investigations Requested	Page 4 of 34
2.2	Test Standards and Results Summary	Page 4 of 34
<u>3.0</u>	<u>Test Results</u>	
3.1	Emission	Page 5-30 of 34
	Appendix A	
	List of Measurement Equipment	Page 31 of 34
	Appendix B	
	Photographs of EUT	Page 32-34 of 34



Date: 2016-05-04 Page 3 of 34

No.: MH192586

#### 1.0 General Details

#### 1.1 Test Laboratory

The Hong Kong Standards and Testing Centre Ltd.

**EMC Laboratory** 

10 Dai Wang Street, Taipo Industrial Estate, New Territories, Hong Kong

Telephone: 852 2666 1888 Fax: 852 2664 4353

# 1.2 Equipment Under Test [EUT] Description of Sample(s)

Product: Temperature and Humidity Sensor

Manufacturer: Dong Guan Q&S Electronic Manufacturing Company Limited

Yin Shan Industrial District, Fu Gang Village, Xiang Mang West Road, Qing Xi Town, Dongguan City, Guang Dong

Province, China

Brand Name: EWIG
Model Number: GRP008

Rating: 3.0Vd.c. (CR2032 battery x 1)

#### 1.2.1 Description of EUT Operation

The Equipment Under Test (EUT) is a Temperature and Humidity Sensor of Ewig Industries Macao Commercial Offshore Limited. the transmission signal is digital modulated with channel frequency range 2405-2475MHz.

#### 1.3 Date of Order

2016-04-13

#### 1.4 Submitted Sample(s):

1 Sample

#### 1.5 Test Duration

2016-04-26 to 2016-05-03

#### 1.6 Country of Origin

China



Date: 2016-05-04 Page 4 of 34

No.: MH192586

#### **Technical Details** 2.0

#### 2.1 **Investigations Requested**

Perform Electromagnetic Interference measurements in accordance with FCC 47CFR [Codes of Federal Regulations] Part 15: 2015 Regulations and ANSI C63.10:2013 for FCC Certification. The device was realized by test software.

#### 2.2 **Test Standards and Results Summary Tables**

EMISSION Results Summary											
Test Condition	Test Requirement	Test Method	Class /	Т	est Resi	ılt					
			Severity	Pass	Fail	N/A					
Output Power of Fundamental Emissions	FCC 47CFR 15.247(b)(3)	ANSI C63.10:2013	N/A								
Radiated Emissions	FCC 47CFR 15.209	ANSI C63.10:2013	N/A								
Conducted Emissions	FCC 47CFR 15.207	ANSI C63.10:2013	N/A			$\boxtimes$					
Power Spectral Density	FCC 47CFR 15.247(e)	ANSI C63.10:2013	N/A								
6dB Bandwidth	FCC 47CFR 15.247(a)(2)	ANSI C63.10:2013	N/A								
Band Edge Emissions	FCC 47CFR 15.247(d)	ANSI C63.10:2013	N/A	$\boxtimes$							
RF Exposure	FCC 47CFR 15.247(i)	N/A	N/A	$\boxtimes$							

Note: N/A - Not Applicable



Date: 2016-05-04 Page 5 of 34

No.: MH192586

#### 3.0 Test Results

#### 3.1 Emission

#### 3.1.1 Maximum Peak Output Power

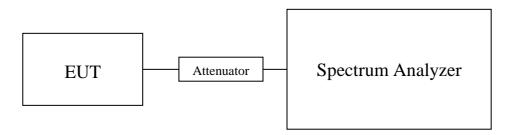
Test Requirement: FCC 47CFR 15.247(b)(3)

Test Method: N/A
Test Date: 2016-04-27
Mode of Operation: TX mode

#### **Test Method:**

The RF output of the EUT was connected to the peak power meter. All the attenuation or cable loss will be added to the measured maximum output power. The results are recorded in mW.

#### **Test Setup:**



Note: a temporary antenna connector was soldered to the RF output.



Date: 2016-05-04 Page 6 of 34

No.: MH192586

#### Limits for Peak Output Power of Fundamental & Harmonics Emissions [FCC 47CFR 15.247]:

For Digital Transmission systems in 2400-2483.5 MHz Band: 1 Watt (30dBm)

Results of Tx Mode pi/4 QPSK (2405MHz to 2475MHz) : Pass (TX Unit) Maximum conducted output power									
Channel	Frequency(MHz)	Output Power(Watt)							
Low	2405	0.076384							
Middle	2440	0.070146							
High	2475	0.068234							

Calculated measurement uncertainty : 30MHz to 1GHz 1.7dB

1GHz to 26GHz 1.7dB

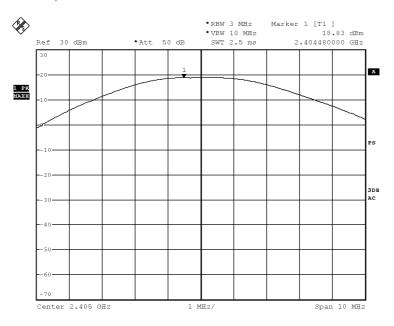


Date: 2016-05-04 Page 7 of 34

No.: MH192586

#### Test plot of Maximum Peak Conducted Output Power:

#### TX mode (2405MHz)



BMP

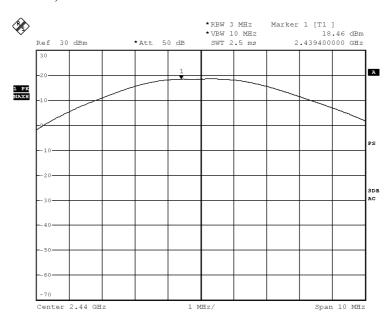
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Date: 2016-05-04 Page 8 of 34

No.: MH192586

#### TX mode (2440MHz)



BMP

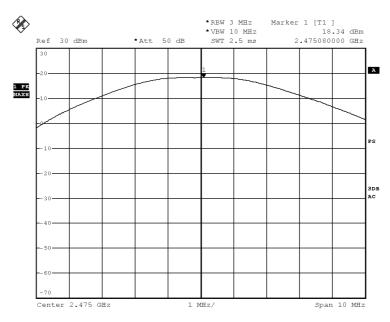
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Date: 2016-05-04 Page 9 of 34

No.: MH192586

#### TX mode (2475MHz)



BMP

Date: 27.APR.2016 11:07:51



Date: 2016-05-04 Page 10 of 34

No.: MH192586

#### 3.1.2 Radiated Emissions

Test Requirement: FCC 47CFR 15.209 Test Method: ANSI C63.10:2013

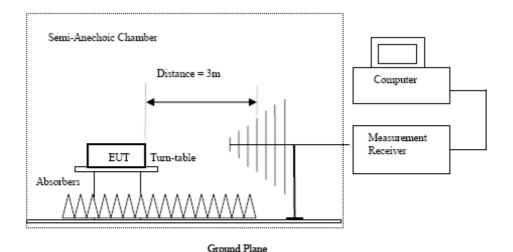
Test Date: 2016-04-28 Mode of Operation: Tx mode

#### **Test Method:**

For emission measurements at or below 1 GHz, the sample was placed 0.8m above the ground plane of semi-anechoic Chamber\*. For emission measurements above 1 GHz, the sample was placed 1.5m above the ground plane of semi-anechoic Chamber\*. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarizations. The emissions worst-case are shown in Test Results of the following pages.

\* Semi-Anechoic chamber located on the G/F of The Hong Kong Standards and Testing Centre Ltd. with a metal ground plane filed with the FCC pursuant to section 2.948 of the FCC rules, with Registration Number: 568301

#### **Test Setup:**



- Absorbers placed on top of the ground plane are for measurements above 1000MHz only.
- Measurements between 30MHz to 1000MHz made with Bi-log antennas, above 1000MHz hom antennas are used, 9kHz to 30MHz loop antennas are used.



Date: 2016-05-04 Page 11 of 34

No.: MH192586

Limits for Radiated Emissions [FCC 47 CFR 15.247 Class B]:

Emilits for Radiated Emissions [Fee 47 ef R 13.2	i, emp Di
Frequency Range	Quasi-Peak Limits
[MHz]	$[\mu V/m]$
0.009-0.490	2400/F (kHz)
0.490-1.705	24000/F (kHz)
1.705-30	30
30-88	100
88-216	150
216-960	200
Above960	500

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

#### Result of Tx mode (2405.0 MHz) (pi/4 QPSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions									
Average Value									
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	dΒμV	dB/m	dBμV/m	dBμV/m	dBμV/m				
	Emissions	detected are 1	nore than 20	dB below the	FCC Limits				

Result of Tx mode (2405.0 MHz) (pi/4 OPSK) (1GHz-26GHz): Pass

Result of Tx IIIo	Field Strength of Spurious Emissions										
	Peak Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field					
	Level @3m	Factor	Strength	@3m		Polarity					
MHz	dΒμV	dB/m	$dB\muV/m$	$dB\mu V/m$	dBμV/m						
4810.0	14.0	41.5	55.5	74.0	18.5	Vertical					
4810.0	15.4	42.4	57.8	74.0	16.2	Horizontal					
7215.0	10.9	45.1	56.0	74.0	18.0	Vertical					
7215.0	11.2	46.2	57.4	74.0	16.6	Horizontal					
9620.0	6.7	48	54.7	74.0	19.3	Vertical					
9620.0	8.0	48.8	56.8	74.0	17.2	Horizontal					
12025.0	0.9	51.8	52.7	74.0	21.3	Vertical					
12025.0	2.9	52.4	55.3	74.0	18.7	Horizontal					



Date: 2016-05-04 Page 12 of 34

No.: MH192586

#### Result of Tx mode (2405.0 MHz) (pi/4 QPSK) ((1GHz-26GHz): Pass

	Field Strength of Spurious Emissions Average Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field					
	Level @3m	Factor	Strength	@3m	_	Polarity					
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m						
4810.0	-1.2	41.5	40.3	54.0	13.7	Vertical					
4810.0	0.2	42.4	42.6	54.0	11.4	Horizontal					
7215.0	-4.4	45.1	40.7	54.0	13.3	Vertical					
7215.0	-3.9	46.2	42.3	54.0	11.7	Horizontal					
9620.0	-8.4	48	39.6	54.0	14.4	Vertical					
9620.0	-7.3	48.8	41.5	54.0	12.5	Horizontal					
12025.0	-14.4	51.8	37.4	54.0	16.6	Vertical					
12025.0	-12.2	52.4	40.2	54.0	13.8	Horizontal					

#### Result of Tx mode (2440.0 MHz) (pi/4 QPSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions									
Average Value									
Frequency	Measured	Correction	Field	Field	Limit	E-Field			
	Level	Factor	Strength	Strength		Polarity			
MHz	dΒμV	dB/m	dBµV/m	dBμV/m	dBμV/m				
	Emissions	detected are 1	nore than 20	dB below the	FCC Limits				

#### Result of Tx mode (2440.0 MHz) (pi/4 QPSK) ((1GHz-26GHz): Pass

Field Strength of Spurious Emissions Peak Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field				
	Level @3m	Factor	Strength	@3m		Polarity				
MHz	dΒμV	dB/m	dBμV/m	dBμV/m	dBμV/m					
4880.0	12.8	41.6	54.4	74.0	19.6	Vertical				
4880.0	15.0	42.5	57.5	74.0	16.5	Horizontal				
7320.0	2.4	53.2	55.6	74.0	18.4	Vertical				
7320.0	10.1	46.3	56.4	74.0	17.6	Horizontal				
9760.0	5.7	48.1	53.8	74.0	20.2	Vertical				
9760.0	6.9	48.9	55.8	74.0	18.2	Horizontal				
12200.0	2.6	51.6	54.2	74.0	19.8	Vertical				
12200.0	3.0	52.5	55.5	74.0	18.5	Horizontal				



Date: 2016-05-04 Page 13 of 34

No.: MH192586

## Result of Tx mode (2440.0 MHz) (pi/4 QPSK) ((1GHz-26GHz): Pass

	Field Strength of Spurious Emissions Average Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field					
	Level @3m	Factor	Strength	@3m	_	Polarity					
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m						
4880.0	-2.4	41.6	39.2	54.0	14.8	Vertical					
4880.0	-0.2	42.5	42.3	54.0	11.7	Horizontal					
7320.0	-4.9	45.2	40.3	54.0	13.7	Vertical					
7320.0	-5.0	46.3	41.3	54.0	12.7	Horizontal					
9760.0	-9.4	48.1	38.7	54.0	15.3	Vertical					
9760.0	-8.3	48.9	40.6	54.0	13.4	Horizontal					
12200.0	-12.6	51.6	39.0	54.0	15.0	Vertical					
12200.0	-12.2	52.5	40.3	54.0	13.7	Horizontal					

#### Result of Tx mode (2475.0 MHz) (pi/4 QPSK) (9kHz - 30MHz): Pass

Field Strength of Spurious Emissions										
	Average Value									
Frequency	Measured	Correction	Field	Field	Limit	E-Field				
	Level	Factor	Strength	Strength		Polarity				
MHz	dΒμV	dB/m	$dB\mu V/m$	dBμV/m	dBμV/m					
	Emissions	detected are 1	nore than 20	dB below the	FCC Limits					

#### Result of Tx mode (2475.0 MHz) (pi/4 QPSK) ((1GHz-26GHz): Pass

	Field Strength of Spurious Emissions Peak Value										
Frequency	Measured	Correction	Field	Limit	Margin	E-Field					
	Level @3m	Factor	Strength	@3m		Polarity					
MHz	dΒμV	dB/m	dBμV/m	dBμV/m	dBμV/m						
4950.0	12.3	41.4	53.7	74.0	20.3	Vertical					
4950.0	15.2	42.7	57.9	74.0	16.1	Horizontal					
7425.0	7.5	45.6	53.1	74.0	20.9	Vertical					
7425.0	9.8	46.5	56.3	74.0	17.7	Horizontal					
9900.0	3.8	48.6	52.4	74.0	21.6	Vertical					
9900.0	5.1	49.7	54.8	74.0	19.2	Horizontal					
12375.0	1.5	51.7	53.2	74.0	20.8	Vertical					
12375.0	3.7	52.7	56.4	74.0	17.6	Horizontal					



Date: 2016-05-04 Page 14 of 34

No.: MH192586

## Result of Tx mode (2475.0 MHz) (pi/4 QPSK) (1GHz-26GHz): Pass

	Field Strength of Spurious Emissions							
	Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field		
	Level @3m	Factor	Strength	@3m		Polarity		
MHz	dBuV	dB/m	dBuV/m	dBuV/m	dBuV/m			
4950.0	-2.8	41.4	38.6	54.0	15.4	Vertical		
4950.0	0.0	42.7	42.7	54.0	11.3	Horizontal		
7425.0	-7.8	45.6	37.8	54.0	16.2	Vertical		
7425.0	-5.3	46.5	41.2	54.0	12.8	Horizontal		
9900.0	-11.3	48.6	37.3	54.0	16.7	Vertical		
9900.0	-10.2	49.7	39.5	54.0	14.5	Horizontal		
12375.0	-13.9	51.7	37.8	54.0	16.2	Vertical		
12375.0	-11.4	52.7	41.3	54.0	12.7	Horizontal		

#### Remarks:

No additional spurious emissions found between lowest internal used/generated frequency and 30 MHz

\* Denotes restricted band of operation.

Measurements were made using a peak detector. Any emission less than 1000MHz and falling within the restricted bands of FCC Rules Part 15 Section 15.205 and the limits of FCC Rules Part 15 Section 15.209 were applied.

Correction Factor included Antenna Factor and Cable Attenuation.

Calculated measurement uncertainty : (9kHz-30MHz): 2.0dB

(30MHz -1GHz): 4.9dB (1GHz -6GHz): 4.02dB (6GHz -26.5GHz): 4.03dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.



Date: 2016-05-04 Page 15 of 34

No.: MH192586

Limits for Radiated Emissions [FCC 47 CFR 15,209 Class B]:

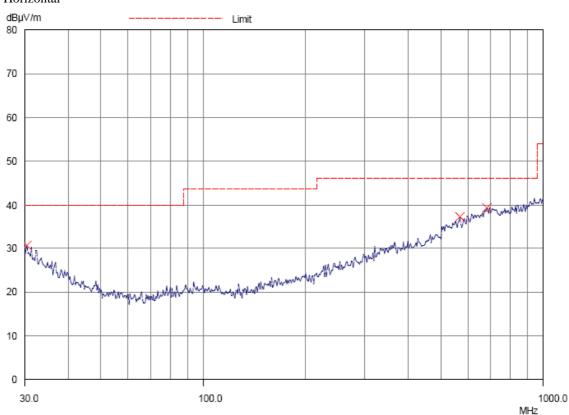
mints for Radiated Emissions [Fee 47 CFR 13.207 Class D].				
Quasi-Peak Limits				
$[\mu V/m]$				
2400/F (kHz)				
24000/F (kHz)				
30				
100				
150				
200				
500				

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

#### Result of TX mode(2405.0 MHz) (30MHz - 1GHz): Pass

Please refer to the following table for result details

#### Horizontal



10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



Date: 2016-05-04 Page 16 of 34

No.: MH192586

Result of TX mode (2405.0 MHz) (30MHz - 1GHz): Pass

Radiated Emissions							
Quasi-Peak							
Emission	E-Field	Level	Limit	Level	Limit		
Frequency	Polarity @3m @3m @3m @3						
MHz $dB\mu V/m$ $dB\mu V/m$ $dB\mu V/m$ $dB\mu V/m$							
30.2	Horizontal	30.7	40.0	34.3	100		
566.2	Horizontal	37.2	46.0	72.4	200		
680.0	Horizontal	37.3	46.0	73.3	200		



Date: 2016-05-04 Page 17 of 34

No.: MH192586

## Limits for Radiated Emissions [FCC 47 CFR 15.209 Class B]:

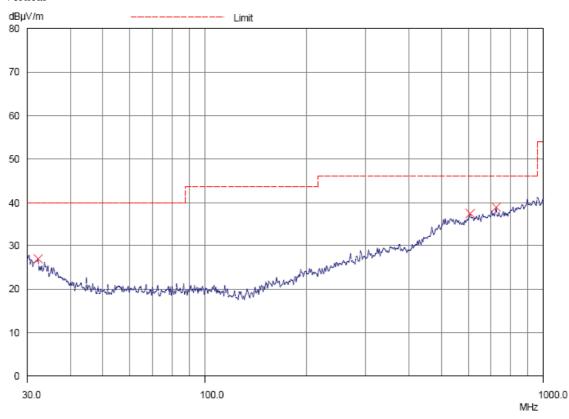
mints for Radiated Emissions [1 CC 47 CTR 15:20) Class B].			
Frequency Range	Quasi-Peak Limits		
[MHz]	$[\mu V/m]$		
0.009-0.490	2400/F (kHz)		
0.490-1.705	24000/F (kHz)		
1.705-30	30		
30-88	100		
88-216	150		
216-960	200		
Above960	500		

The emission limits shown in the above table are based on measurement employing a CISPR quasi-peak detector and above 1000MHz are based on measurements employing an average detector.

#### Result of TX mode(2405.0 MHz) (30MHz - 1GHz): Pass

Please refer to the following table for result details

#### Vertical



10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



Date: 2016-05-04 Page 18 of 34

No.: MH192586

#### Result of TX mode (2405.0 MHz) (30MHz - 1GHz): Pass

Radiated Emissions Quasi-Peak								
		Quasi	-Peak					
Emission E-Field Level Limit Level Limit								
Frequency	Polarity	@3m	@3m	@3m	@3m			
MHz		dBμV/m	$dB\muV/m$	$dB\mu V/m$	dBμV/m			
32.1	Vertical	27.1	40.0	22.6	100			
605.1	Vertical	37.4	46.0	74.1	200			
722.3	Vertical	37.9	46.0	78.5	200			

#### Remarks:

Calculated measurement uncertainty (30MHz - 1GHz): 4.9dB

Emissions in the vertical and horizontal polarizations have been investigated and the worst-case test results are recorded in this report.



Date: 2016-05-04 Page 19 of 34

No.: MH192586

#### 3.1.3 Power Spectral Density

Test Requirement: FCC 47CFR 15.247(e)
Test Method: ANSI C63.10:2013

Test Date: 2016-04-27 Mode of Operation: TX mode

#### **Test Method:**

The RF output of the EUT was connected to the spectrum analyzer. Set the fundamental frequency as the center frequency of the spectral analyzer. Use RBW=3kHz , VBW= 10 KHz , Set the span to 1.5 times the DTS channel bandwidth. Detector = peak, Sweep time = auto couple , Trace mode = max hold. Measure the Power Spectral Density (PSD) and record the results in dBm.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

#### **Test Limit:**

The maximum power spectral density (PSD) shall not exceeded 8dBm in any 3kHz band.

Scale the observed power level to an equivalent value in 3 kHz by adjusting (reducing) the measured power by a bandwidth correction factor (BWCF) where BWCF=10log (3 kHz/100 kHz=-15.2dB)

# Results of TX Mode pi/4 QPSK (Tx:2405MHz to 2475MHz) : Pass (TX Unit) Maximum power spectral density

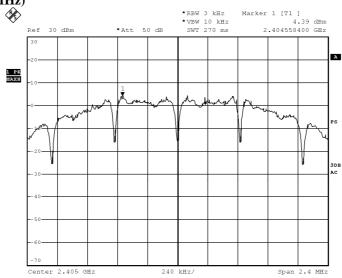
Transmitter Frequency	Maximum Power spectral density	Maximum Power spectral density
(MHz)	level / 3kHz band (dBm)	/ 3kHz band limit
2405.0	4.39	8dBm
2440.0	4.72	8dBm
2475.0	4.07	8dBm



Date: 2016-05-04 Page 20 of 34

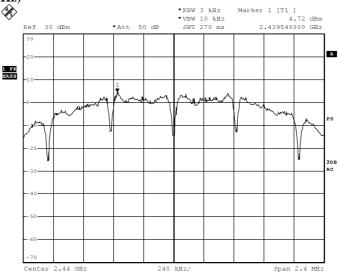
No.: MH192586

#### TX mode pi/4 QPSK (Tx:2405MHz to 2475MHz) CH 1 (2405.0 MHz)



Date: 27.APR.2016 11:33:17

#### CH 6 (2440.0 MHz)



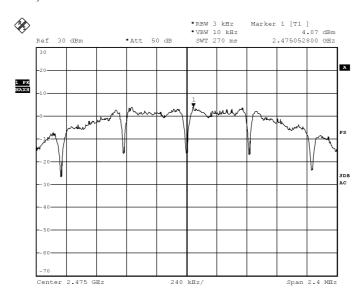
Date: 27.APR.2016 11:56:00



Date: 2016-05-04 Page 21 of 34

No.: MH192586

# CH 11 (2475.0 MHz)



Date: 27.APR.2016 11:49:19



Date: 2016-05-04 Page 22 of 34

No.: MH192586

#### 3.1.4 6dB Spectrum Bandwidth Measurement

Test Requirement: FCC 47CFR 15.247(a)(2)
Test Method: ANSI C63.10:2013

Test Date: 2016-04-27 Mode of Operation: TX mode

#### **Test Method:**

The bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. Once the reference level is established, the equipment is conditioned with typical modulating signal to produce the worst-case (i.e. the widest) bandwidth.

#### **Test Setup:**

As Test Setup of clause 3.1.1 in this test report.

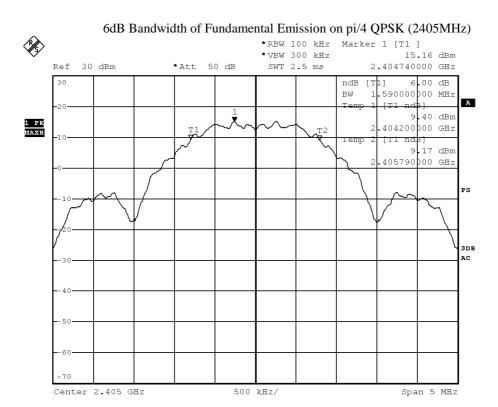


Date: 2016-05-04 Page 23 of 34

No.: MH192586

#### Limits for 6dB Spectrum Bandwidth Measurement:

Center Frequency	6dB Bandwidth	FCC Limits
[MHz]	[MHz]	[kHz]
2405.0	1.59	> 500



BMP

Date: 27.APR.2016 11:16:12

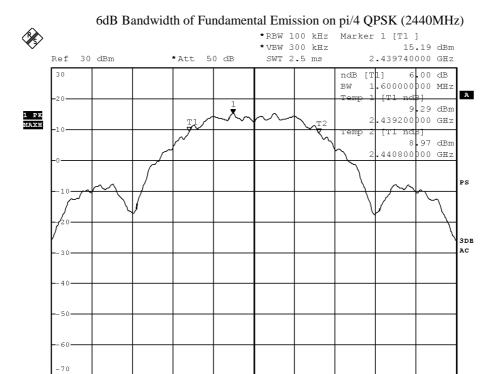


Date: 2016-05-04 Page 24 of 34

No.: MH192586

#### **Limits for 6dB Spectrum Bandwidth Measurement:**

Frequency Range	6dB Bandwidth	FCC Limits
[MHz]	[MHz]	[kHz]
2440.0	1.60	> 500



500 kHz/

Span 5 MHz

 ${\rm BMP}$ 

Date: 27.APR.2016 11:13:16

Center 2.44 GHz

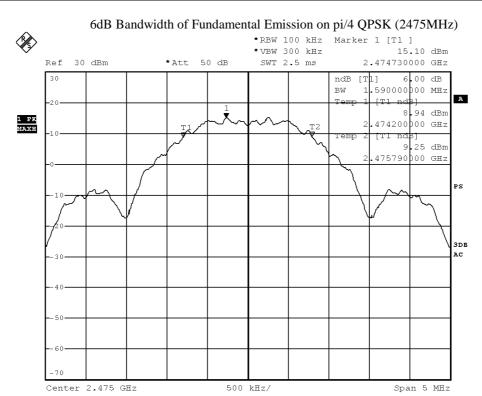


Date: 2016-05-04 Page 25 of 34

No.: MH192586

#### Limits for 6dB Spectrum Bandwidth Measurement:

Frequency Range	6dB Bandwidth	FCC Limits
[MHz]	[MHz]	[kHz]
2475.0	1.59	> 500



BMP

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Date: 2016-05-04 Page 26 of 34

No.: MH192586

#### 3.1.5 Band Edges Measurement

Test Requirement: FCC 47CFR 15.247
Test Method: ANSI C63.10:2013

Test Date: 2016-04-27 Mode of Operation: TX mode

#### **Test Method:**

The band edge is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency. The RBW art set to 100kHz and VBW are set to 300kHz for this measurement.

#### **Test Setup:**

As Test Setup of clause 3.1.2 in this test report.



Date: 2016-05-04 Page 27 of 34

No.: MH192586

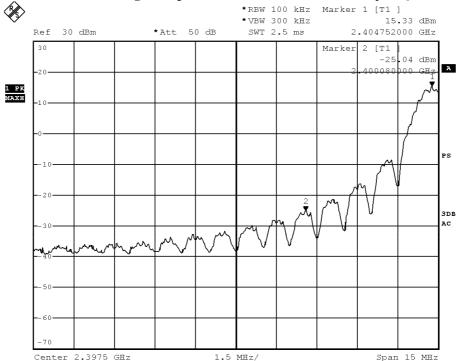
#### **Band-edge Compliance of RF Conducted Emissions Measurement:**

#### Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Frequency Range	Radiated Emission Attenuated below the
	Fundamental
[MHz]	[dB]
2400 – Lowest Fundamental (2405)	40.37

#### Band-edge Compliance of RF Emissions – Lowest (pi/4 QPSK)



BMP

Date: 27.APR.2016 12:09:01

10 Dai Wang Street, Taipo Industrial Estate, N.T., Hong Kong Tel: (852) 2666 1888 Fax: (852) 2664 4353 Homepage: www.hkstc.org E-mail: hkstc@hkstc.org



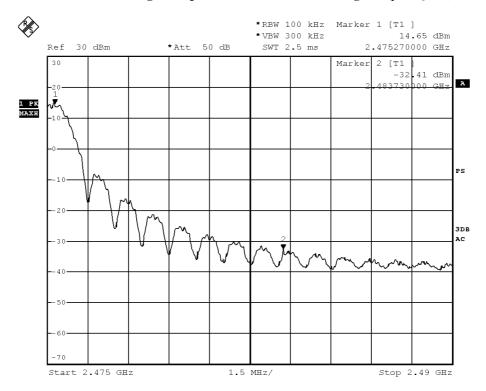
Date: 2016-05-04 Page 28 of 34

No.: MH192586

## **Band-edge Compliance of RF Conducted Emissions Measurement:**

Frequency Range	Radiated Emission Attenuated below the
	Fundamental
[MHz]	[dB]
2483.5 - Highest Fundamental (2475)	47.06

#### Band-edge Compliance of RF Emissions – Highest (pi/4 QPSK)



BMP

Date: 27.APR.2016 12:16:08



Date: 2016-05-04 Page 29 of 34

No.: MH192586

#### **Band-edge Compliance of RF Radiated Emissions Measurement:**

#### Limit:

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 5.205(c)).

Result: Band-edge Compliance of RF Radiated Emissions (Lowest)- pi/4 QPSK

	result. Build edge compliance of the remainded Emissions (Edwest) print of six						
Field Strength of Band-edge Compliance							
Peak Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m		Polarity	
MHz	dΒμV	dB/m	$dB\mu V/m$	$dB\mu V/m$	dBμV/m		
2390.0	20.0	36.8	56.8	74.0	17.2	Vertical	
2390.0	26.0	36.4	62.4	74.0	11.7	Horizontal	

Field Strength of Band-edge Compliance							
Average Value							
Frequency	Measured	Correction	Field	Limit	Margin	E-Field	
	Level @3m	Factor	Strength	@3m		Polarity	
MHz	dΒμV	dB/m	$dB\muV/m$	dBμV/m	dBμV/m		
2390.0	9.6	36.8	46.4	54.0	7.6	Vertical	
2390.0	15.5	36.4	51.9	54.0	2.1	Horizontal	

Result: Band-edge Compliance of RF Radiated Emissions (Highest) - pi/4 QPSK

Field Strength of Band-edge Compliance						
Peak Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dΒμV	dB/m	$dB\mu V/m$	dBμV/m	dBμV/m	
2483.5	17.4	36.8	54.2	74.0	19.8	Vertical
2483.5	22.1	36.4	58.5	74.0	15.5	Horizontal

Field Strength of Band-edge Compliance Average Value						
Frequency	Measured	Correction	Field	Limit	Margin	E-Field
	Level @3m	Factor	Strength	@3m		Polarity
MHz	dΒμV	dB/m	dBμV/m	dBμV/m	dBμV/m	
2483.5	7.2	36.8	44.0	54.0	10.0	Vertical
2483.5	11.8	36.4	48.2	54.0	5.8	Horizontal



Date: 2016-05-04 Page 30 of 34

No.: MH192586

#### 3.1.6 RF Exposure

Test Requirement: FCC 47CFR 15.247(i)

Test Date: 2016-04-29 Mode of Operation: **TX** mode

#### **Test Method:**

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

#### **Test Results:**

The EUT complied with the requirement(s) of this section. EUT meets the requirements of these sections as proven through MPE calculation The MPE calculation for EUT @ 20cm Based on the highest P = 76.384 mW

```
Pd = PG/4pi*R<sup>2</sup> = (76.384 x 1.07)/12.566* (20)<sup>2</sup>
= (81.73088)/12.566x 400= 81.73088 /5026.4
= 0.01626mW/cm<sup>2</sup>
```

#### where:

- \*Pd = power density in mW/cm2
- \* G = Antenna numeric gain (1.07); Log G = g/10 (g = 0.28dBi).
- \* P = Conducted RF power to antenna (76.384mW).
- \* R = Minimum allowable distance.(20 cm)
- \*The power density  $Pd = 0.01626 \text{ mW/cm}^2$  is less than 1 mW/cm<sup>2</sup> (listed MPE limit)
- \*The SAR evaluation is not needed (this is a desk top device, R> 20 cm)
- \* The EUT( antenna ) must be 0.2 meters away from the General Population.



Date: 2016-05-04 Page 31 of 34

No.: MH192586

## Appendix A

#### List of Measurement Equipment

#### **Radiated Emission**

EQP NO.	DESCRIPTION	MANUFACTURER	MODEL NO.	SERIAL NO.	LAST CAL	DUE CAL
EM299	DOUBLE-RIDGED WAVEGUIDE HORN ANTENNA	ETS-LINDGREN	3115	00114120	2014/11/15	2016/11/25
EM300	PYRAMIDAL STANDARD GAIN HORN ANTENNA	ETS-LINDGREN	3160-09	00130130	2016/06/27	2017/06/27
EM215	MULTIDEVICE CONTROLLER	EMCO	2090	00024676	N/A	N/A
EM216	MINI MAST SYSTEM	EMCO	2075	00026842	N/A	N/A
EM217	ELECTRIC POWERED TURNTABLE	EMCO	2088	00029144	N/A	N/A
EM218	ANECHOIC CHAMBER	ETS-LINDGREN	FACT-3		2015/09/25	2016/09/25
EM320	BICONILOG ANTENNA	ETS-LINDGREN	3142D	00094856	2014/08/06	2016/08/06
EM022	LOOP ANTENNA	EMCO	6502	1189-2424	2014/04/28	2016/04/28
EM229	EMI TEST RECEIVER	R&S	ESIB40	100248	2015/06/01	2016/06/01
EM529	MICROWAVE FREQUENCY CABLE	SUHNER	SUCOFLEX 104	238296	2014/07/24	2016/07/24

Remarks:-

N/A Not Applicable or Not Available



Date: 2016-05-04 Page 32 of 34

No.: MH192586

#### Appendix B

#### **Photographs of EUT**

Front View of the product



Inside View of the product



**Inner Circuit Top View** 



Rear View of the product



Inside View of the product



**Inner Circuit Bottom View** 

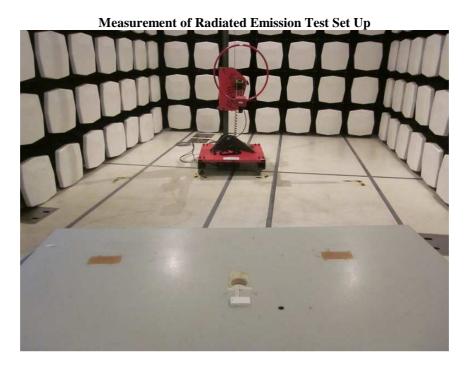


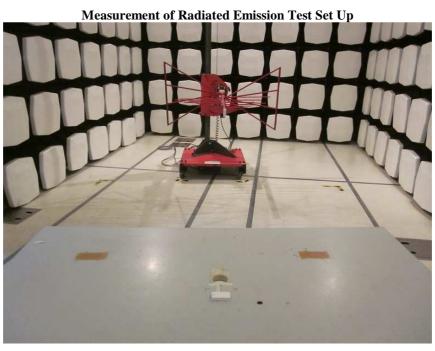


Date: 2016-05-04 Page 33 of 34

No.: MH192586

## Photographs of EUT







Date: 2016-05-04 Page 34 of 34

No.: MH192586

#### **Photographs of EUT**



\*\*\*\*\* End of Test Report \*\*\*\*\*