# FCC TEST REPORT

# For

# WORLD MEDIA AND TECHNOLOGY Corp

# Smartband

# Test Model: Helo

Prepared for	:	WORLD MEDIA AND TECHNOLOGY Corp
Address	: 600 Brickell World Plaza, Suite 1775, Miami, F.	
		33132, Florida, United States

Prepared by	: Shenzhen LCS Compliance Testing Laboratory Ltd.	
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: May 13, 2016
: 1
: Prototype
: May 13, 2016~June 13, 2016
: June 13, 2016

	FCC TEST REPORT
	FCC CFR 47 PART 15 C(15.247): 2015
Report Reference No	
Date of Issue	
Testing Laboratory Name	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	: 1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing Location/ Procedure	<ul> <li> : Full application of Harmonised standards</li> <li>Partial application of Harmonised standards</li> <li>Other standard testing method</li> </ul>
Applicant's Name	: WORLD MEDIA AND TECHNOLOGY Corp
Address	: 600 Brickell World Plaza,Suite 1775,Miami,FL 33132,Florida,United States
Test Specification	
Standard	: FCC CFR 47 PART 15 C(15.247): 2014 / ANSI C63.10: 2013
Test Report Form No	: LCSEMC-1.0
TRF Originator	: Shenzhen LCS Compliance Testing Laboratory Ltd.
Master TRF	: Dated 2011-03
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Test Item Description	
Trade Mark	∶wor(l)d <sup>∞</sup>
Test Model	
Ratings	: DC 3.7V by Li-ion Battery(120mAh) Recharged by DC 5V/1A
C	

Calvin Weng

Calvin Weng/ Administrators

Glin Lu/ Technique principal

Gavin Liang/ Manager

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# FCC -- TEST REPORT

# Test Report No. : LCS1605120926E

June 13, 2016 Date of issue

Test Model	: Helo
EUT	: Smartband
Applicant	: WORLD MEDIA AND TECHNOLOGY Corp
Address	: 1492 Marshwood Place, Mississauga, Ontario, Canada, L5J 4J6
Telephone	: /
Fax	: /
Manufacturer	: Quality Technology Industrial Co.,Ltd
Address	: Room 201~203, 2/F, Block B3, Ming You Industrial Products, Procurement Center, #168 Bao Yuan Road, Bao'an District, Shenzhen, China
Telephone	: /
Fax	: /
Factory	: Quality Technology Industrial Co.,Ltd
Address	: Room 201~203, 2/F, Block B3, Ming You Industrial Products, Procurement Center, #168 Bao Yuan Road, Bao'an District, Shenzhen, China
Telephone	: /
Fax	: /

Test Result Positive
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The test report merely corresponds to the test sample.

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# **Revision History**

Revision	Issue Date	Revisions	Revised By
00	2016-06-13	Initial Issue	Gavin Liang

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# **1. GENERAL INFORMATION**

# 1.1. Description of Device (EUT)

EUT	: Smartband	
Test Model	: Helo	
Power Supply	: DC 3.7V by Li-ion Battery(120mAh)	
	Recharged by DC 5V/1A	
Hardware Version	: XMW22_V2.0	
Software Version	: V1.0	
Bluetooth	:	
Frequency Range	: 2402.00-2480.00MHz	
Channel Spacing	: 2MHz	
Channel Number	: 40 channels	
Modulation Type	: GFSK	
Bluetooth Version	: V4.0 (BLE only)	
Antenna Description	: SMD Antenna, 0dBi (Max.)	

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## 1.2. Support equipment List

Manufacturer	Description	Model	Serial Number	Certificate
Lenovo	AC/DC ADAPTER	ADP-90DD B	36001941	VOC
Lenovo	Notebook	B470	WB05067151	DOC

## 1.3. External I/O

I/O Port Description	Quantity	Cable
USB Port	1	0.5m, unshielded

# 1.4. Description of Test Facility

CNAS Registration Number. is L4595.

FCC Registration Number. is 899208.

Industry Canada Registration Number. is 9642A-1.

VCCI Registration Number. is C-4260 and R-3804.

ESMD Registration Number. is ARCB0108.

UL Registration Number. is 100571-492.

TUV SUD Registration Number. is SCN1081.

TUV RH Registration Number. is UA 50296516-001

The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Cal Date	Due Date
EMC Receiver	R&S	ESCS 30	100174	9kHz – 2.75GHz	June 18,2015	June 17,2016
Signal analyzer	Agilent	E4448A(External mixers to 40GHz)	US44300469	9kHz~40GHz	July 16,2015	July 15,2016
LISN	MESS Tec	NNB-2/16Z	99079	9KHz-30MHz	June 18,2015	June 17,2016
LISN (Support Unit)	EMCO	3819/2NM	9703-1839	9KHz-30MHz	June 18,2015	June 17,2016
RF Cable-CON	UTIFLEX	3102-26886-4	CB049	9KHz-30MHz	June 18,2015	June 17,2016
ISN	SCHAFFNER	ISN ST08	21653	9KHz-30MHz	June 18,2015	June 17,2016
3m Semi Anechoic Chamber	SIDT FRANKONIA	SAC-3M	03CH03-HY	30M-1GHz 3m	June 18,2015	June 17,2016
Amplifier	SCHAFFNER	COA9231A	18667	9kHz-2GHzz	June 18,2015	June 17,2016
Amplifier	Agilent	8449B	3008A02120	1GHz-26.5GHz	July 16,2015	July 15,2016
Amplifier	MITEQ	AMF-6F-260400	9121372	26.5GHz-40GHz	July 16,2015	July 15,2016
Spectrum Analyzer	Agilent	E4407B	MY41440292	9k-26.5GHz	July 16,2015	July 15,2016
MAX Signal Analyzer	Agilent	N9020A	MY50510140	20Hz~26.5GHz	Oct. 27, 2015	Oct. 26, 2016
Loop Antenna	R&S	HFH2-Z2	860004/001	9k-30MHz	June 18,2015	June 17,2016
By-log Antenna	SCHWARZBECK	VULB9163	9163-470	30MHz-1GHz	June 10,2016	June 09,2017
Horn Antenna	EMCO	3115	6741	1GHz-18GHz	June 10,2016	June 09,2017
Horn Antenna	SCHWARZBECK	BBHA9170	BBHA9170154	15GHz-40GHz	June 10,2016	June 09,2017
RF Cable-R03m	Jye Bao	RG142	CB021	30MHz-1GHz	June 18,2015	June 17,2016
RF Cable-HIGH	SUHNER	SUCOFLEX 106	03CH03-HY	1GHz-40GHz	June 18,2015	June 17,2016
Spectrum Meter	R&S	FSP 30	100023	9kHz-30GHz	July 16,2015	July 15,2016
Power Meter	R&S	NRVS	100444	DC-40GHz	June 18,2015	June 17,2016
Power Sensor	R&S	NRV-Z51	100458	DC-30GHz	June 18,2015	June 17,2016
Power Sensor	R&S	NRV-Z32	10057	30MHz-6GHz	June 18,2015	June 17,2016
RF CABLE-1m	JYE Bao	RG142	CB034-1m	20MHz-7GHz	June 18,2015	June 17,2016
RF CABLE-2m	JYE Bao	RG142	CB035-2m	20MHz-1GHz	June 18,2015	June 17,2016
EMI Test Software	AUDIX	E3	/	/	June 18,2015	June 17,2016

1.6. Statement of The Measurement Uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. To CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the LCS quality system acc. To DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

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## 1.7. Measurement Uncertainty

Test Item		Frequency Range	Uncertainty	Note
		9KHz~30MHz	3.10dB	(1)
	ſ	30MHz~200MHz	2.96dB	(1)
Radiation Uncertainty		200MHz~1000MHz	3.10dB	(1)
		1GHz~26.5GHz	3.80dB	(1)
		26.5GHz~40GHz	3.90dB	(1)
Conduction Uncertainty	:	150kHz~30MHz	1.63dB	(1)
Power disturbance	:	30MHz~300MHz	1.60dB	(1)

(1). This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

# 1.8. Description Of Test Modes

Bluetooth operates in the unlicensed ISM Band at 2.4GHz. The EUT was set to transmit at 100% duty cycle. The following operating modes were applied for the related test items. All test modes were tested, only the result of the worst case was recorded in the report.

Mode of Operations	Frequency Range	Data Rate
	(MHz)	(Mbps)
	2402	1
GFSK	2440	1
	2480	1
	For Conducted Emission	
Test Mode		TX Mode
	For Radiated Emission	
Test Mode		TX Mode

Note: The EUT is designed to use DC 3.7V by Li-ion batteries for power supply, and the EUT has interface used to connect to the AC power system indirectly, so conducted emission testing is applicable.

Worst-case mode and channel used for 9kHz-1000 MHz radiated emissions was the mode and channel with the highest output power, that was determined to be TX-High Channel(2480MHz, GFSK).

\*\*\*Note: Using a temporary antenna connector for the EUT when the conducted measurements are performed.

For AC conducted emission pre-testing, the input Voltage/Frequency AC 120V/60Hz and AC 240V/60Hz powered for PC power adapter were used. Only recorded the worst case in this report.

# 2. TEST METHODOLOGY

All measurements contained in this report were conducted with ANSI C63.10: 2013, American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices.

The radiated testing was performed at an antenna-to-EUT distance of 3 meters. All radiated and conducted emissions measurement was performed at Shenzhen LCS Compliance Testing Laboratory Ltd.

## 2.1. EUT Configuration

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

## 2.2. EUT Exercise

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements.

According to FCC's request, Test Procedure KDB558074 D01 DTS Meas Guidance v03r05 is required to be used for this kind of FCC 15.247 digital modulation device.

According to its specifications, the EUT must comply with the requirements of the Section 15.203, 15.205, 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

## 2.3. General Test Procedures

#### 2.3.1 Conducted Emissions

According to the requirements in Section 6.2 of ANSI C63.10: 2013, AC power-line conducted emissions shall be measured in the frequency range between 0.15 MHz and 30MHz using Quasi-peak and average detector modes.

#### 2.3.2 Radiated Emissions

The EUT is placed on a turn table and the turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 6.3 of ANSI C63.10: 2013

# **3. SYSTEM TEST CONFIGURATION**

# 3.1. Justification

The system was configured for testing in a continuous transmits condition.

# 3.2. EUT Exercise Software

N/A

# 3.3. Special Accessories

N/A

# 3.4. Block Diagram/Schematics

Please refer to the related document

# 3.5. Equipment Modifications

Shenzhen LCS Compliance Testing Laboratory Ltd. has not done any modification on the EUT.

# 3.6. Test Setup

Please refer to the test setup photo.

# 4. SUMMARY OF TEST RESULTS

A	Applied Standard: FCC Part 15 Subpart C						
FCC Rules	Description of Test	Result					
§15.247(b)(3)	Maximum Conducted Output Power	Compliant					
§15.247(e)	Power Spectral Density	Compliant					
§15.247(a)(2)	6dB Bandwidth	Compliant					
§15.209, §15.247(d)	Radiated and Conducted Spurious Emissions	Compliant					
§15.205	Emissions at Restricted Band	Compliant					
§15.207(a)	Line Conducted Emissions	Compliant					
§15.203	Antenna Requirements	Compliant					

# **5. TEST RESULT**

## 5.1. Maximum Conducted Output Power Measurement

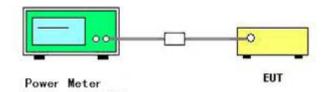
## 5.1.1. Standard Applicable

According to §15.247(b)(3), For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850MHz bands: 1 Watt.

## 5.1.2. Test Procedures

The transmitter output (antenna port) was connected to the power meter.

## 5.1.3. Test Setup Layout



5.1.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.1.5. Test Result of Maximum Conducted Output Power

Modulation	Frequency (MHz)	Output Power (dBm, Peak)	Output Power (mW)	Limit (mW)	Result
	2402	-5.44	0.25	1000	Pass
GFSK	2440	-5.06	0.31	1000	Pass
	2480	-4.94	0.32	1000	Pass

## 5.2. Power Spectral Density Measurement

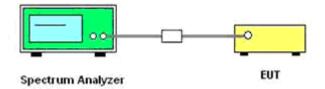
## 5.2.1. Standard Applicable

According to §15.247(e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

### 5.2.2. Test Procedures

- 1) The transmitter was connected directly to a Spectrum Analyzer through a directional couple.
- 2) The power was monitored at the coupler port with a Spectrum Analyzer. The power level was set to the maximum level.
- 3) Set the RBW = 3 kHz.
- 4) Set the VBW  $\geq$  3\*RBW
- 5) Set the span to 1.5 times the DTS channel bandwidth.
- 6) Detector = peak.
- 7) Sweep time = auto couple.
- 8) Trace mode = max hold.
- 9) Allow trace to fully stabilize.
- 10) Use the peak marker function to determine the maximum power level in any 3 kHz band segment within the fundamental EBW.

## 5.2.3. Test Setup Layout



## 5.2.4. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.2.5. Test Result of Power Spectral Density

Modulation	Frequency (MHz)	Reading Level (dBm/3KHz)	Max. Limit (dBm/3KHz)	Result
	2402	-23.904	8	Pass
GFSK	2440	-20.845	8	Pass
	2480	-21.643	8	Pass

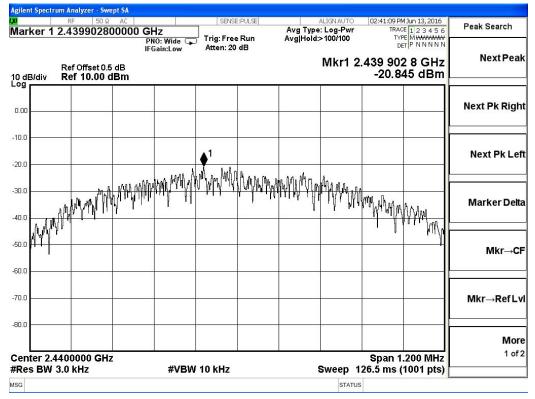
The test data refer to the following page.

Low Channel, 2402MHz

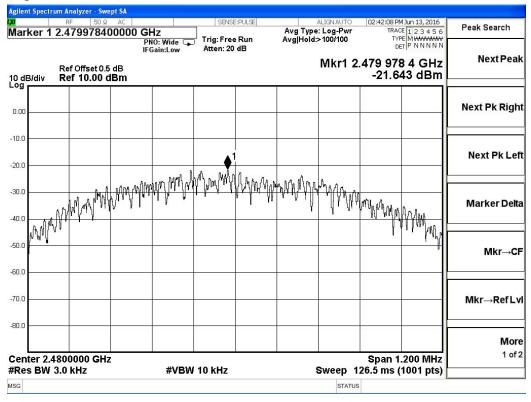
Agilent Spectrum Analyzer - Swep	ot SA						
Marker 1 2.401979600	AC 0000 GHz PN0: Wide	SENSE:PULSE	Avg Type Avg Hold>		TRAC	1Jun 13, 2016 E 1 2 3 4 5 6 E MWWWWW	Peak Search
Ref Offset 0.5 c 10 dB/div Ref 10.00 dB	IFGain:Low	Atten: 20 dB			.401 979	9 6 GHz 04 dBm	Next Peak
0.00							Next Pk Right
-10.0		1					Next Pk Left
-30.0 -40.0 -50.0	Murannaparta		un and a second and	ANT ANY		A A Ann	Marker Delta
-50.0						) {} {} {} {} {} {} {} {} {} {} {} {} {}	Mkr→CF
70.0							Mkr→RefLv
-80.0 Center 2.4020000 GHz					Span 1	.200 MHz	More 1 of 2
#Res BW 3.0 kHz	#VBW	10 kHz	ę	Sweep 1	26.5 ms (	1001 pts)	

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#### Middle Channel, 2440MHz



#### High Channel, 2480MHz



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# 5.3. 6 dB Spectrum Bandwidth Measurement

## 5.3.1. Standard Applicable

According to §15.247(a)(2): Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

### 5.3.2. Instruments Setting

The following table is the setting of the Spectrum Analyzer.

Spectrum Parameter	Setting
Attenuation	Auto
Span Frequency	> RBW
Detector	Peak
Trace	Max Hold
Sweep Time	100ms

#### 5.3.3. Test Procedures

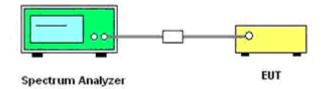
- 1) The transmitter output (antenna port) was connected to the spectrum analyzer in peak hold mode.
- 2) Set RBW/VBW = 100 KHz/300KHz (for 6dB bandwidth measurement)

Set RBW = 1%~5% OBW; VBW≥3\*RBW (for occupied bandwidth measurement)

3) Measured the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6dB relative to the maximum level measured in the fundamental emission.

4) Measured the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 20dB relative to the maximum level measured in the fundamental emission.

## 5.3.4. Test Setup Layout



## 5.3.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

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Modulation	Frequency (MHz)	6dB Bandwidth (KHz)	Min. Limit (KHz)	Result
	2402	672.4	500	Complies
GFSK	2440	699.3	500	Complies
	2480	696.7	500	Complies

#### 5.3.6. Test Result of Spectrum Bandwidth

## **Test Plots for 6dB Bandwidth:**

## Low Channel, 2402MHz

RF 50 Ω AC		SENSE:PULSE		ALIGN AUTO		M Jun 13, 2016	Trac	e/Detector
dB -6.00 dB	Trig:	er Freq: 2.4020 Free Run en: 20 dB	00000 GHz Avg Holo	d:>10/10	Radio Std Radio Dev	505,0000	That	elbelector
dB/div Ref 10.00 dBm								
00							C	Clear Write
1.0								
0.0				har	the second secon			Average
.0						a server and a server		Max Hole
0.0								Max Hok
enter 2.402 GHz Res BW 100 kHz	1	#VBW 300	kHz			an 3 MHz ep 1 ms		Min Hold
Occupied Bandwidth		Total F	ower	-2.62	2 dBm			
1.C Transmit Freq Error	6.778 kHz	OBW I	Jouvor	00	9.00 %		Auto	Detector Peak
x dB Bandwidth	672.4 kHz	x dB	ower		00 dB		Auto	<u>Mar</u>
3				STATUS	5		0	

## Middle Channel, 2440MHz

RF 50 Ω AC		SENSE:PULSE		ALIGN AUTO		4 Jun 13, 2016	Frequency
nter Freq 2.440000000 (		enter Freq: 2.4400 rig: Free Run Atten: 20 dB	00000 GHz Avg Hold	>10/10	Radio Std: Radio Dev		Frequency
dB/div Ref 10.00 dBm							
9 10			-				Center Fre
0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~					2.440000000 G
0							
0				$\searrow$			
0 mm		0		سكسكر	- A		
D manner					<u> </u>	a monor	
0							
nter 2.44 GHz es BW 100 kHz		#VBW 3001	kHz			an 3 MHz ep 1 ms	CF Sto 300.000 k
Occupied Bandwidth		Total P	ower	-6.17	' dBm		<u>Auto</u> M
1.0	300 MHz						Freq Offs
Transmit Freq Error	4.877 kHz	OBW F	ower	99	0.00 %		0
x dB Bandwidth	699.3 kHz	x dB		-6.	00 dB		
				STATUS			

# High Channel, 2480MHz

RF 50 Ω AC		INSE:PULSE	ALIGN AUTO	03:19:26 PM Jur		-
enter Freq 2.480000000 (	Trig: F	r Freq: 2.480000000 GH ree Run Avg H : 20 dB	z old:>10/10	Radio Std: No Radio Device:		Frequency
OdB/div Ref 10.00 dBm						Contor Fre
0.0						Center Fre 2.480000000 GH
0.0						
0.0				man and a second		
0.0 mmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmmm				- M	m	
enter 2.48 GHz				Snan	3 MHz	
Res BW 100 kHz	#	VBW 300 kHz		Sweep		CF Ste 300.000 ki
Occupied Bandwidth		Total Power	-6.58	dBm	É	Auto Ma
1.0	285 MHz					<b>Freq Offs</b>
Transmit Freq Error	934 Hz	OBW Power	99	0.00 %		0
x dB Bandwidth	696.7 kHz	x dB	-6.	00 dB		
G			STATUS	1		

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Modulation	Frequency	99% Bandwidth (MHz)	20dB Bandwidth (MHz)	Limit
	2402	1.023	1.124	
GFSK	2440	1.023	1.123	Non-specified
ľ	2480	1.021	1.120	

### **Test Plots for 20dB Bandwidth:**

Low Channel, 2402MHz

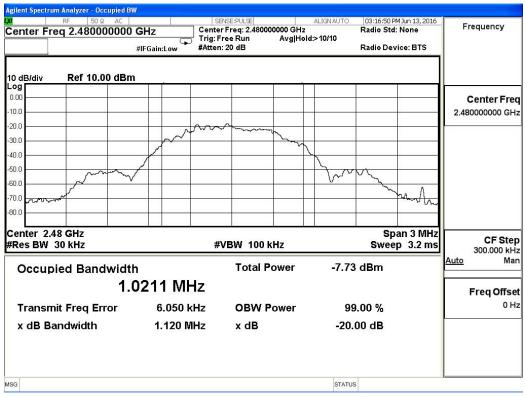
Agilent Spectrum Analyzer - Occupied	BW				
24 RF 50 Ω AC Ref Value 10.00 dBm	Trig	SENSE:PULSE Inter Freq: 2.402000000 g: Free Run Avg ten: 20 dB	ALIGNAUTO 3Hz g Hold:>10/10	03:10:14 PMJun 13, 2016 Radio Std: None Radio Device: BTS	Trace/Detector
10 dB/div Ref 10.00 dB Log 0.00 -10.0	m				Clear Write
20.0 30.0 40.0 50.0				M	Average
					Max Hold
Center 2.402 GHz #Res BW 30 kHz		#VBW 100 kHz		Span 3 MHz Sweep 3.2 ms	
Occupied Bandwid 1 Transmit Freq Error	th .0231 MHz 9.966 kHz	Total Powe OBW Powe		4 dBm 9.00 %	Detecto Peak Auto <u>Mar</u>
x dB Bandwidth	1.124 MHz	x dB	-20.	00 dB	
ISG			STATU	s	

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#### Middle Channel, 2440MHz

RF 50 Ω AC		SENSE:PULSE			Jun 13, 2016	Frequency
nter Freq 2.44000000	) GHz #IFGain:Low	Center Freq: 2.4400 Trig: Free Run #Atten: 20 dB	00000 GHz Avg Hold:>10/	Radio Std:   10 Radio Devi		Пециенсу
dB/div Ref 10.00 dBr	n .					Center Fre
0		~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	m			2.440000000 GH
0				~~~		
				V	Mark	
nter 2.44 GHz						
es BW 30 kHz		#VBW 100	kHz		un 3 MHz 3.2 ms	CF Ste 300.000 ki
Occupied Bandwidt	<sup>.h</sup> 0230 M⊢	Total F	ower	0.15 dBm	<u>/</u>	Auto Ma
۰۰ Transmit Freq Error	9.416 k		Power	99.00 %		Freq Offs 01
x dB Bandwidth	1.123 M	Hz xdB		-20.00 dB		

### High Channel, 2480MHz



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# 5.4. Radiated Emissions Measurement

## 5.4.1. Standard Applicable

According to §15.247 (d): 20dBc in any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a), then the 15.209(a) limit in the table below has to be followed.

Frequencies(MHz)	Field Strength(microvolts/meter)	Measurement Distance(meters)
0.009~0.490	2400/F(KHz)	300
0.490~1.705	24000/F(KHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

## 5.4.2. Instruments Setting

The following table is the setting of spectrum analyzer and receiver.

Spectrum Parameter	Setting
Attenuation	Auto
Start Frequency	1000 MHz
Stop Frequency	10th carrier harmonic
RB / VB (Emission in restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average
RB / VB (Emission in non-restricted band)	1MHz / 1MHz for Peak, 1 MHz / 10Hz for Average

Receiver Parameter	Setting
Attenuation	Auto
Start ~ Stop Frequency	9kHz~150kHz / RB/VB 200Hz/1KHz for QP/Average
Start ~ Stop Frequency	150kHz~30MHz / RB/VB 9kHz/30KHz for QP/Average
Start ~ Stop Frequency	30MHz~1000MHz / RB /VB 120kHz/1MHz for QP

#### 5.4.3. Test Procedures

### 1) Sequence of testing 9 kHz to 30 MHz

#### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 0.8 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions.

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

#### **Premeasurement:**

--- The turntable rotates from  $0^{\circ}$  to  $315^{\circ}$  using  $45^{\circ}$  steps.

--- The antenna height is 0.8 meter.

--- At each turntable position the analyzer sweeps with peak detection to find the maximum of all emissions

#### **Final measurement:**

--- Identified emissions during the premeasurement the software maximizes by rotating the turntable position ( $0^{\circ}$  to  $360^{\circ}$ ) and by rotating the elevation axes ( $0^{\circ}$  to  $360^{\circ}$ ).

--- The final measurement will be done in the position (turntable and elevation) causing the highest emissions with QPK detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

#### 2) Sequence of testing 30 MHz to 1 GHz

#### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a table with 0.8 m height is used, which is placed on the ground plane.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

- --- The measurement distance is 3 meter.
- --- The EUT was set into operation.

#### **Premeasurement:**

- --- The turntable rotates from 0° to 315° using 45° steps.
- --- The antenna is polarized vertical and horizontal.
- --- The antenna height changes from 1 to 3 meter.

--- At each turntable position, antenna polarization and height the analyzer sweeps three times in peak to find the maximum of all emissions.

#### **Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position  $(\pm 45^\circ)$  and antenna movement between 1 and 4 meter.

--- The final measurement will be done with QP detector with an EMI receiver.

--- The final levels, frequency, measuring time, bandwidth, antenna height, antenna polarization, turntable angle, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

#### 3) Sequence of testing 1 GHz to 18 GHz

#### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 3 meter.

--- The EUT was set into operation.

#### **Premeasurement:**

--- The turntable rotates from 0° to 315° using 45° steps.

--- The antenna is polarized vertical and horizontal.

--- The antenna height scan range is 1 meter to 2.5 meter.

--- At each turntable position and antenna polarization the analyzer sweeps with peak detection to find the maximum of all emissions.

#### **Final measurement:**

--- The final measurement will be performed with minimum the six highest peaks.

--- According to the maximum antenna and turntable positions of premeasurement the software maximize the peaks by changing turntable position  $(\pm 45^\circ)$  and antenna movement between 1 and 4 meter. This procedure is repeated for both antenna polarizations.

--- The final measurement will be done in the position (turntable, EUT-table and antenna polarization) causing the highest emissions with Peak and Average detector.

--- The final levels, frequency, measuring time, bandwidth, turntable position, EUT-table position, antenna polarization, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement with marked maximum final measurements and the limit will be stored.

#### 4) Sequence of testing above 18 GHz

#### Setup:

--- The equipment was set up to simulate a typical usage like described in the user manual or described by manufacturer.

--- If the EUT is a tabletop system, a rotatable table with 1.5 m height is used.

--- If the EUT is a floor standing device, it is placed on the ground plane with insulation between both.

--- Auxiliary equipment and cables were positioned to simulate normal operation conditions

--- The AC power port of the EUT (if available) is connected to a power outlet below the turntable.

--- The measurement distance is 1 meter.

--- The EUT was set into operation.

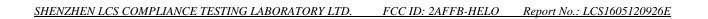
#### **Premeasurement:**

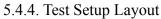
--- The antenna is moved spherical over the EUT in different polarizations of the antenna.

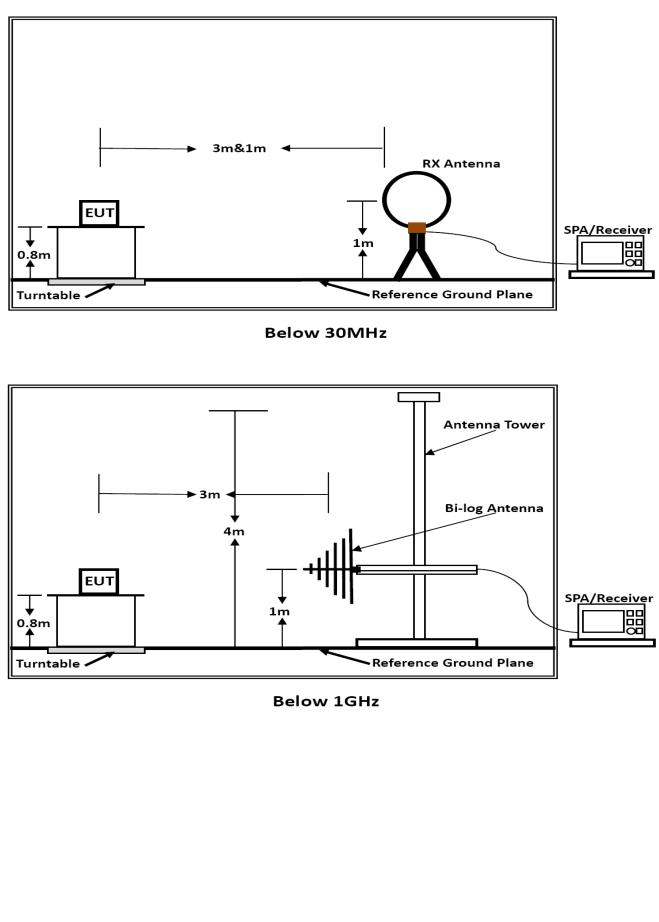
#### **Final measurement:**

--- The final measurement will be performed at the position and antenna orientation for all detected emissions that were found during the premeasurements with Peak and Average detector.

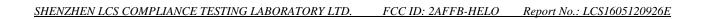
--- The final levels, frequency, measuring time, bandwidth, correction factor, margin to the limit and limit will be recorded. Also a plot with the graph of the premeasurement and the limit will be stored.

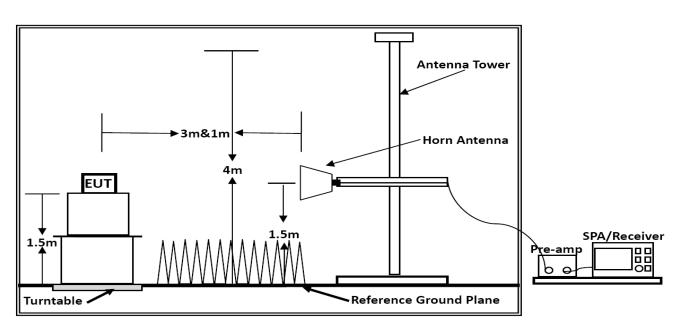






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Above 1GHz

5.4.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

5.4.6. Results of Radiated Emissions (9 kH	Iz~30MHz)
--	-----------

Temperature	25°C	Humidity	60%
Test Engineer	Chaz	Configurations	BLE V4.0

Freq.	Level	Over Limit	Over Limit	Remark
(MHz)	(dBuV)	(dB)	(dBuV)	
-	-	-	-	See Note

Note:

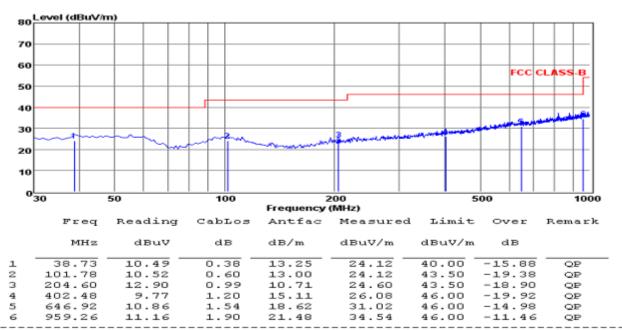
The radiated emissions from 9 kHz to 30MHz are at least 20dB below the official limit and no need to report.

Distance extrapolation factor = 40 log (specific distance / test distance) (dB);

Limit line = specific limits (dBuV) + distance extrapolation factor.

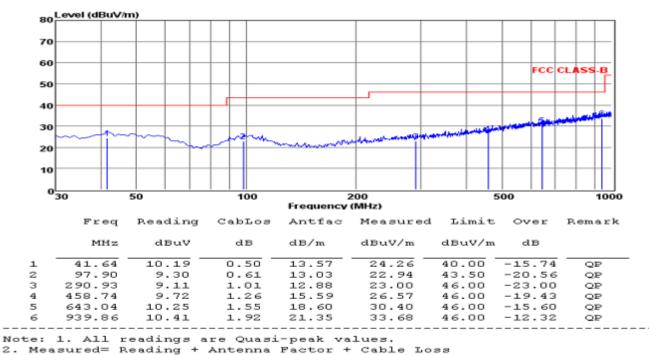
5.4.7. Results of Radiated Emissions (30MHz~1GHz)

Temperature	25°C	Humidity	60%
Test Engineer	Chaz	Configurations	TX-High Channel
Pol	Horizontal		



Note: 1. All readings are Quasi-peak values. 2. Measured= Reading + Antenna Factor + Cable Loss 3. The emission that ate 20db blow the offficial limit are not reported

Temperature	25°C	Humidity	60%
Test Engineer	Chaz	Configurations	TX-High Channel
Pol	Vertical		



2. з.

The emission that ate 20db blow the offficial limit are not reported

#### Note:

Pre-scan all modes and recorded the worst case results in this report (TX-High Channel (2480MHz)). Emission level  $(dBuV/m) = 20 \log Emission level (uV/m)$ .

Corrected Reading: Antenna Factor + Cable Loss + Read Level - Preamp Factor = Level.

5.4.8. Results for Radiated Emissions (Above 1GHz)

#### TX Mode

Channel 1

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4804.13	43.54	33.06	35.04	3.94	45.50	74	-28.50	Peak	Horizontal
4804.15	33.73	33.06	35.04	3.94	35.69	54	-18.31	Average	Horizontal
4804.13	45.61	33.06	35.04	3.94	47.57	74	-26.43	Peak	Vertical
4804.15	35.87	33.06	35.04	3.94	37.83	54	-16.17	Average	Vertical

#### Channel 20

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4880.27	44.11	33.16	35.15	3.96	46.08	74	-27.92	Peak	Horizontal
4880.30	34.57	33.16	35.15	3.96	36.54	54	-17.46	Average	Horizontal
4880.27	45.86	33.16	35.15	3.96	47.83	74	-26.17	Peak	Vertical
4880.30	36.04	33.16	35.15	3.96	38.01	54	-15.99	Average	Vertical

#### Channel 40

Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
4960.14	44.37	33.26	35.14	3.98	46.47	74	-27.53	Peak	Horizontal
4960.17	34.69	33.26	35.14	3.98	36.79	54	-17.21	Average	Horizontal
4960.14	46.35	33.26	35.14	3.98	48.45	74	-25.55	Peak	Vertical
4960.17	36.77	33.26	35.14	3.98	38.87	54	-15.13	Average	Vertical

#### Notes:

- 1. Measuring frequencies from 9k~10th harmonic (ex. 26GHz), No emission found between lowest internal used/generated frequency to 30MHz.
- 2. Radiated emissions measured in frequency range from 9k~10th harmonic (ex. 26GHz) were made with an instrument using Peak detector mode.
- 3. Data of measurement within this frequency range shown "---" in the table above means the reading of emissions are attenuated more than 20dB below the permissible limits or the field strength is too small to be measured.

## 5.4.9. Results of Band Edges Test (Radiated)

## TX Mode

	Tx-2402	1 7							
Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
2377.53	43.11	32.89	35.16	3.51	44.35	74	-29.65	Peak	Horizontal
2377.56	33.46	32.90	35.16	3.51	34.71	54	-19.29	Average	Horizontal
2390.00	45.71	32.92	35.16	3.54	47.01	74	-26.99	Peak	Horizontal
2389.97	36.13	32.92	35.16	3.54	37.43	54	-16.57	Average	Horizontal
2377.53	44.27	32.89	35.16	3.51	45.51	74	-28.49	Peak	Vertical
2377.56	34.88	32.90	35.16	3.51	36.13	54	-17.87	Average	Vertical
2390.00	46.66	32.92	35.16	3.54	47.96	74	-26.04	Peak	Vertical
2389.97	36.81	32.92	35.16	3.54	38.11	54	-15.89	Average	Vertical

#### Tx-2480

	1X-2400								
Freq. MHz	Reading Level dBuV	Ant. Fac. dB/m	Pre. Fac. dB	Cab. Loss dB	Measured dBuV/m	Limit dBuV/m	Margin dB	Remark	Pol.
2483.50	45.37	33.06	35.18	3.60	46.85	74	-27.15	Peak	Horizontal
2483.51	35.65	33.08	35.18	3.60	37.15	54	-16.85	Average	Horizontal
2486.71	44.78	33.08	35.18	3.62	46.30	74	-27.70	Peak	Horizontal
2486.74	35.06	33.08	35.18	3.62	36.58	54	-17.42	Average	Horizontal
2483.50	46.11	33.06	35.18	3.60	47.59	74	-26.41	Peak	Vertical
2483.51	36.64	33.08	35.18	3.60	38.14	54	-15.86	Average	Vertical
2486.71	44.83	33.08	35.18	3.62	46.35	74	-27.65	Peak	Vertical
2486.74	35.16	33.08	35.18	3.62	36.68	54	-17.32	Average	Vertical

# 5.5. Conducted Spurious Emissions and Band Edges Test

## 5.5.1. Standard Applicable

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, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in \$15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in\$15.205(a), must also comply with the radiated emission limits specified in \$15.209(a) (see\$15.205(c)).

## 5.5.2. Instruments Setting

The following table is the setting of the spectrum analyzer.

Spectrum Parameter	Setting
Detector	Peak
Attenuation	Auto
RB / VB (Emission in restricted band)	100KHz/300KHz
RB / VB (Emission in non-restricted band)	100KHz/300KHz

#### 5.5.3. Test Procedures

The transmitter output is connected to a spectrum analyzer. The resolution bandwidth is set to 100 kHz. The video bandwidth is set to 300 kHz

The spectrum from 9 kHz to 26.5GHz is investigated with the transmitter set to the lowest, middle, and highest channels.

#### 5.5.4. Test Setup Layout

This test setup layout is the same as that shown in section 5.3.4.

## 5.5.5. EUT Operation during Test

The EUT was programmed to be in continuously transmitting mode.

## 5.5.6. Test Results of Conducted Spurious Emissions

#### Test Result of Low Channel:

Agilent Spectru	um Analyzer - Sw									
Start Free	RF 50 ຊ <b>30.00000</b>			SENSE:F	PULSE		ALIGNAUTO E: Log-Pwr	TRAC	MJun 13, 2016	Frequency
10 dB/div	Ref Offset 0. Ref 10.00	PN IFG: 5 dB	0: Fast 😱 ain:Low	∫ Trig: Free F Atten: 20 d		Avg Hold		r2 1.810	6 GHz 62 dBm	Auto Tune
-10.0										Center Freq 12.515000000 GHz
-30.0 -40.0 -50.0	2.								31.80 dBm	Start Freq 30.000000 MHz
-60.0 -70.0 -80.0										<b>Stop Freq</b> 25.000000000 GHz
Start 9 kH #Res BW	100 kHz	×	#VBW	× 300 kHz	FUNCT			2.387 s (4	5.00 GHz 0001 pts)	<b>CF Step</b> 2.497000000 GHz <u>Auto</u> Man
1 N 2 N 3 4 5 6 7 8	f	2.402 2 1.816 6	GHz GHz	<u>-11.798 dBr</u> -61.062 dBr	n					Freq Offset 0 Hz
9 10 11 <				Ш			STATUS		×	

## Test Result of Middle Channel:

									nalyzer - Sw		ilent S
	4Jun 13, 2016 E 1 2 3 4 5 6 E MWWWWW	TRAC	ALIGNAUTO e: Log-Pwr I: 49/100	Avg T AvgIH		SENSE:PU	0: Fast 🕞		ιF 50 Ω 0.00000		tart
Auto Tu	5 1 GHz 98 dBm	r2 3.286			3	Atten: 20 dE	ain:Low	iF(	ef Offset 0. ef 10.00		0 dB/
Center Fr 12.515000000 G									1	<	<b>og</b> 0.00 -
Start Fr 30.000000 M	-27.84 dBm										io.o = io.o - io.o -
<b>Stop Fr</b> 25.00000000 G	يەلەر بەلەلەن بەلەر بەلەر بەلەر بەلەر بەر								2		60.0 10.0 pm 80.0
	5.00 GHz 0001 pts)	2.387 s (4	Sweep 2	CTION		300 kHz		×	CL.	KHZ SW 10	Res
Freq Offs 0						<u>-7.841 dBm</u> -65.998 dBm		2.440 3.286			1 N 3 4 5 6 7 8 9 0
	~										1

This report shall not be reproduced except in full, without the written approval of Shenzhen LCS Compliance Testing Laboratory Ltd. Page 34 of 40 Test Result of High Channel:

								um Analyzer -	lent Spect
Frequency	M Jun 13, 2016 CE 1 2 3 4 5 6 PE M WWWWWW	TRA	ALIGNAUTO Type: Log-Pwr Hold:>100/100	Avg	SENSE:PULS	PNO: Fast	ο Ω AC 000 MHz	RF 50 q 30.0000	art Fre
Auto Tur	5.9 MHz 83 dBm	1kr2 82	N		Atten: 20 dB	IFGain:Low	t0.5 dB	Ref Offset Ref 10.0	dB/div
Center Fre 12.515000000 G⊦								1	
Start Fre 30.000000 M⊦	-29.49 dBm								
<b>Stop Fre</b> 25.00000000 GH	ت الني الوالية العالمي ال								1.0 <b>(1.0</b> )
CF Ste 2.497000000 GI Auto Mi	5.00 GHz 0001 pts)	2.387 s (4	Sweep 2	FUNCTION	300 kHz	#VB		100 kHz	es BW
FreqOffs 0⊦		FONCTION	PONCTION WIDTH	FORCHON	-9.485 dBm -62.783 dBm	80 2 GHz 25.9 MHz	2.48	f	
	~				aul				7 B 9 0 1
с. С.		5	STATUS						3

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# 5.5.7. Test Results of Band Edges Test

	rum Analyzer									
Start Fre		50 Ω AC 000000 GHz		SENSE:PU			LIGNAUTO	TRA	MJun 13, 2016 E 1 2 3 4 5 6 PE MWWWWW	Frequency
10 dB/div	Ref Offse Ref 10.0	IFGair t 0.5 dB	Fast 😱 n:Low	Atten: 20 dE			s <u>o</u> 1980-1986	□ 000 000	00 GHz 83 dBm	Auto Tune
-10.0										Center Freq 2.357000000 GHz
-30.0 -40.0 -50.0									-30.17 dEm	<b>Start Freq</b> 2.310000000 GHz
-60.0 -70.0	and the a building.		ور فه دواسو روی	<u>tijke or opis aktradategi</u>	willdenig of be	<u>ati, ini de ana ita i</u>	ing the state of the	2 	3	<b>Stop Freq</b> 2.404000000 GHz
#Res BW	RC SCL	×		300 kHz	FUNCTI			.67 ms (4	0400 GHz 0001 pts)	<b>CF Step</b> 9.400000 MHz <u>Auto</u> Man
1 N 2 N 3 N 4 5 6 7 8 9 9 9 10 11		2.401 758 10 G 2.390 000 00 G 2.400 000 00 G	Hz	-10.169 dBm -69.348 dBm -69.083 dBm						Freq Offset 0 Hz
MSG				Ш			STATUS		>	

Agilent Spect	trum Analyzer -								
💴 Start Fre		50 Ω AC 000000 GHz		NSE:PULSE		ALIGNAUTO Type: Log-Pwr Hold:>100/100	TRA	M Jun 13, 2016 CE 1 2 3 4 5 6 PE M <del>WWWWW</del>	Frequency
10 dB/div	Ref Offse Ref 10.0	IFGain t 0.5 dB		20 dB	1810		.485 48	et P NNNNN 8 0 GHz 96 dBm	Auto Tune
-10.0 -1 -20.0 -1									Center Freq 2.514000000 GHz
-30.0								-27.38 dBm	Start Freq 2.478000000 GHz
-60.0 -70.0 -80.0	2	****	<u>entiperationalista antiperational</u>	i in se dina kat da g			ali ketel - i kerite ali	and the second	<b>Stop Freq</b> 2.550000000 GHz
#Res BW	7800 GHz / 100 kHz		#VBW 300 k		FUNCTION	Sweep 8.0	000 ms (4		CF Step 7.200000 MHz Auto Man
MKR         MODE         1           1         N         2         N           2         N         4         5         5           3         N         4         5         5           6         7         7         8         9         10         11         11         11         1		× 2.479 765 8 G 2.483 500 0 G 2.485 488 0 G	Hz -7.384 Hz -68.865	dBm dBm	FUNCTION		FUNCTI		Freq Offset 0 Hz
MSG						STATUS	3		

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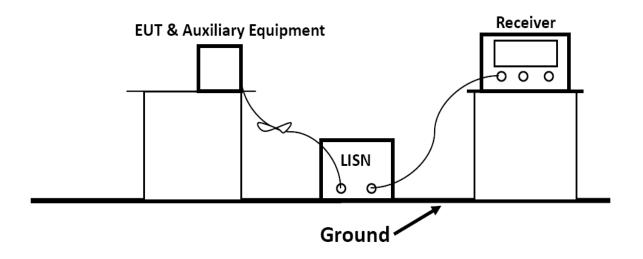
## 5.6. line conducted emissions

## 5.6.1 Standard Applicable

According to §15.207 (a): For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed 250 microvolt (The limit decreases linearly with the logarithm of the frequency in the range 0.15 MHz to 0.50 MHz). The limits at specific frequency range are listed as follows:

Eroquanay Danga(MHz)	Limits (dBµV)						
Frequency Range(MHz)	Quasi-peak	Average					
0.15 to 0.50	66 to 56	56 to 46					
0.50 to 5	56	46					
5 to 30	60	50					

## 5.6.2 Block Diagram of Test Setup



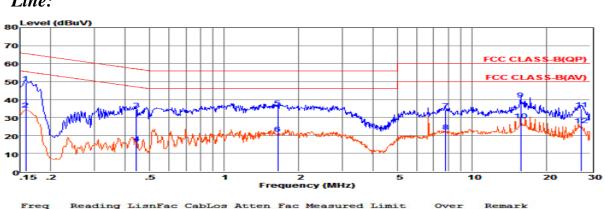
5.6.3 Test Results

PASS.

The test data please refer to following page.

Note: only the worst test data was recorded (at AC120V/60Hz).

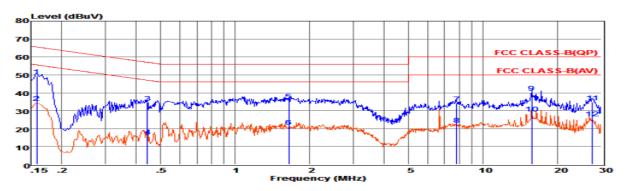




MHz	dBuV	dB	dB	dB	dBuV	dBuV	dB	
1 0.15816	29.65	9.58	0.02	10.00	49.25	65.56	-16.31	QP
2 0.15826	15.00	9.58	0.02	10.00	34.60	55.55	-20.95	Average
3 0.44208	14.69	9.62	0.04	10.00	34.35	57.02	-22.67	QP
4 0.44218	-3.93	9.62	0.04	10.00	15.73	47.02	-31.29	Average
5 1.64497	16.04	9.64	0.05	10.00	35.73	56.00	-20.27	QP
6 1.64597	1.57	9.64	0.05	10.00	21.26	46.00	-24.74	Average
7 7.81016	14.56	9.68	0.07	10.00	34.31	60.00	-25.69	QP
8 7.81116	2.61	9.68	0.07	10.00	22.36	50.00	-27.64	Average
915.71794	20.19	9.72	0.10	10.00	40.01	60.00	-19.99	QP
1015.71894	8.83	9.72	0.10	10.00	28.65	50.00	-21.35	Average
1127.56162	14.92	9.71	0.14	10.00	34.77	60.00	-25.23	QP
1227.56262	5.88	9.71	0.14	10.00	25.73	50.00	-24.27	Average

Remarks: 1. Measured = Reading + Lisn Factor +Cable Loss+Atten\_Fac. 2. The emission levels that are 20dB below the official limit are not reported.

Neutral:



Freq Reading LisnFac CabLos Atten\_Fac Measured Limit Over Remark

	dB	dBuV	dBuV	dB	dB	dB	dBuV	MHz
QP	-16.31	65.56	49.25	10.00	0.02	9.58	29.65	0.15816
Average	-20.95	55.55	34.60	10.00	0.02	9.58	15.00	0.15826
QP	-22.67	57.02	34.35	10.00	0.04	9.62	14.69	0.44208
Average	-31.29	47.02	15.73	10.00	0.04	9.62	-3.93	0.44218
QP	-20.27	56.00	35.73	10.00	0.05	9.64	16.04	1.64497
Average	-24.74	46.00	21.26	10.00	0.05	9.64	1.57	1.64597
QP	-25.69	60.00	34.31	10.00	0.07	9.68	14.56	7.81016
Average	-27.64	50.00	22.36	10.00	0.07	9.68	2.61	7.81116
QP	-19.99	60.00	40.01	10.00	0.10	9.72	20.19	15.71794
Average	-21.35	50.00	28.65	10.00	0.10	9.72	8.83	15.71894
QP	-25.23	60.00	34.77	10.00	0.14	9.71	14.92	27.56162
Average	-24.27	50.00	25.73	10.00	0.14	9.71	5.88	27.56262

 2. The emission levels that are 20dB below the official limit are not reported.

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## 5.7. Antenna Requirements

## 5.7.1. Standard Applicable

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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be re-placed by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of Sections 15.211, 15.213, 15.217, 15.219, or 15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with Section 15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded.

And according to §15.247(4)(1), system operating in the 2400-2483.5MHz bands that are used exclusively for fixed, point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.

## 5.7.2 Antenna Connected Construction

## 5.7.2.1 Standard Applicable

According to § 15.203 & RSS-Gen, 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.

5.7.2.2. Antenna Connector Construction

The directional gains of antenna used for transmitting is 0dBi, and the antenna is connect to PCB board and no consideration of replacement. Please see EUT photo for details.

5.7.2.3. Results: Compliance.

## Measurement

The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

Conducted power refers ANSI C63.10:2013 Output power test procedure for DTS devices. Radiated power refers to ANSI C63.10:2013 Radiated emission.

Measurement parameter					
Detector:	Peak				
Sweep Time:	Auto				
Resolution bandwidth:	1MHz				
Video bandwidth:	3MHz				
Trace-Mode:	Max hold				

#### Limits

FCC	IC					
Antenna Gain						
6 dBi						

Note: The antenna gain of the complete system is calculated by the difference of radiated power in EIRP and the conducted power of the module.

# Limits:

FCC	IC					
Antenna Gain						
6dBi						

T <sub>nom</sub>	V <sub>nom</sub>	Lowest Channel 2402 MHz	Middle Channel 2440 MHz	Highest Channel 2480 MHz	
Conducted power [dBm] Measured with GFSK modulation		-5.38	-5.11	-4.92	
Radiated power [dBm] Measured with GFSK modulation		-7.02	-5.86	-6.78	
Gain [dBi] Calculated		-1.64	-0.75	-1.86	
Measurement uncertainty			± 1.6 dB (cond.) / ± 3.8 dB (rad.)		

Result: -/-

-----THE END OF REPORT------