



7 June, 2012

Huawei Technologies Co.,Ltd  
Bantian, Longgang District, Shenzhen, China  
Tel.: (86) 755- 89650288  
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Dear Mr. Zhang Xinghai,

Enclosed you will find your file copy of a Part 15 report (FCC ID: QISU8186-5).

For your reference, TCB will normally take another one week for reviewing the report. Approval will then be granted when no query is sorted.

Please contact me if you have any questions regarding the enclosed material.

Sincerely,

A handwritten signature in black ink, appearing to read "Shawn Xing", with a long horizontal stroke extending to the right.

Shawn Xing  
Manager

Enclosure



## Huawei Technologies Co.,Ltd

### Application For Certification (FCC ID: QISU8186-5)

HUAWEI Ascend Y 101; HSDPA/UMTS/GPRS/GSM/EDGE Mobile Phone  
with Bluetooth

Model: HUAWEI U8186-5/U8186-5

2.4GHz Transceiver

SZ12050427-3

Billy Li

7 June, 2012

- The test results reported in this test report shall refer only to the sample actually tested and shall not refer or be deemed to refer to bulk from which such a sample may be said to have been obtained.
- This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results referenced from this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.
- For Terms And Conditions of the services, it can be provided upon request.
- The evaluation data of the report will be kept for 3 years from the date of issuance.

TRF No.: FCC 15C\_TX\_b

FCC ID: QISU8186-5

**Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch**

6F, D Block, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China

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# INTERTEK TESTING SERVICES

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## LIST OF EXHIBITS

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**INTERTEK TESTING SERVICES**

**MEASUREMENT/TECHNICAL REPORT**

**Huawei Technologies Co.,Ltd**

**MODEL: HUAWEI U8186-5/U8186-5**

**FCC ID: QISU8186-5**

**7 June, 2012**

This report concerns (check one) Original Grant  Class II Change

Equipment Type: DSS - Part 15 Spread Spectrum Transmitter

Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? Yes  No

If yes, defer until: \_\_\_\_\_  
date

Company Name agrees to notify the Commission by: \_\_\_\_\_  
date

of the intended date of announcement of the product so that the grant can be issued on that date.

Transition Rules Request per 15.37? Yes  No

If no, assumed Part 15, Subpart C for intentional radiator – the new 47 CFR [10-1-11 Edition] provision.

Report prepared by:

Shawn Xing  
Intertek Testing Services Shenzhen Ltd.  
Kejiyuan Branch  
6F, Block D, Huahan Building, Langshan Road,  
Nanshan District, Shenzhen, P. R. China  
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# INTERTEK TESTING SERVICES

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## INTERTEK TESTING SERVICES

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List of attached file

Exhibit type	File Description	filename
Test Report	Test Report	report.pdf
Operational Description	Technical Description	descri.pdf
Test Setup Photo	Radiated Emission	radiated photos.pdf
Test Setup Photo	Conducted Emission	conducted photos.pdf
External Photos	External Photo	external photos.pdf
Internal Photos	Internal Photo	internal photos.pdf
ID Label/Location Info	Label Artwork and Location	label.pdf
Block Diagram	Block Diagram	block.pdf
Schematics	Circuit Diagram	circuit.pdf
Users Manual	User Manual	manual.pdf
Cover Letter	Letter of Agency	letter of agency.pdf
RF Exposure	RF Exposure	RF Exposure.pdf

**EXHIBIT 1**

**GENERAL DESCRIPTION**

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## INTERTEK TESTING SERVICES

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### 1.0 General Description

#### 1.1 Product Description

The Equipment under Test (EUT) is a middle and high end dual mode Mobile Phone with Bluetooth. It is powered by internal 3.7V rechargeable battery and charged by AC adapter with Input: 100-240VAC, 50~60Hz, 0.2A, Output: 5.0 VDC, 400mA. For more detailed features description, please refer to the user's manual.

EUT Accessory List:

Accessory	Model	Manufacturer
Battery	HB4J1	BYD
		GuangYu
Headset	125G#+3261# 3.5MM-2	QuanCheng
	MEMD1532A761A00	LianChuang
USB Cable	LSA00350	LianSheng
	H09-000167	PengYi
AC Adapter	HS-050040U6	BYD
		HangJia

Antenna Type: Integral antenna

For electronic filing, the brief circuit description is saved with filename: descri.pdf.

#### 1.2 Test Methodology

Both AC mains line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.4 (2009) and DA 00-705. Radiated emission measurement was performed in semi-anechoic chamber and conducted emission measurement was performed in shield room. For radiated emission measurement, preliminary scans were performed in the semi-anechoic chamber only to determine the worst case modes. All radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application.

#### 1.3 Test Facility

The Semi-Anechoic chamber and shield room used to collect the radiated data and conducted data is **Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch** and located at 6F, Block D, Huahan Building, Langshan Road, Nanshan District, Shenzhen, P. R. China. This test facility and site measurement data have been fully placed on file with the FCC (Registration Number: 242492).

**EXHIBIT 2**  
**SYSTEM TEST CONFIGURATION**

## INTERTEK TESTING SERVICES

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### 2.0 **System Test Configuration**

#### 2.1 Justification

The system was configured for testing in a typical fashion (as a customer would normally use it), and in the confines as outlined in ANSI C63.4 (2009).

The device is powered by the fully charged batteries and charged by AC adapter described in page 2 during the test. Only the worst case data was reported.

All packets DH1, DH3 & DH5 mode in all modulation types GFSK,  $\pi/4$  -DQPSK and 8-DPSK were tested.

For maximizing emissions, the EUT was rotated through 360°, the antenna height was varied from 1 meter to 4 meters above the ground plane, and the antenna polarization was changed. This step by step procedure for maximizing emissions led to the data reported in Exhibit 3.0.

The unit was placed in the center of the turntable when powered by internal rechargeable battery and the rear of unit shall be flushed with the rear of the table when powered by adapter.

The equipment under test (EUT) was configured for testing in a typical fashion (as a customer would normally use it). The EUT was placed on a turn table, which enabled the engineer to maximize emissions through its placement in the three orthogonal axes.

#### 2.2 EUT Exercising Software

No software is used.

#### 2.3 Special Accessories

N/A

#### 2.4 Equipment Modification

Any modifications installed previous to testing by Huawei Technologies Co.,Ltd will be incorporated in each production model sold / leased in the United States.

No modifications were installed by Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch.

## INTERTEK TESTING SERVICES

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### 2.5 Measurement Uncertainty

When determining the test conclusion, the Measurement Uncertainty of test has been considered.

### 2.6 Support Equipment List and Description

This product was tested in the following configuration:

Refer List:

Description	Manufacturer	Model No.
Headset	QuanCheng	125G#+3261# 3.5MM-2
Headset	LianChuang	MEMD1532A761A00
1.2m shielded USB Cable	LianSheng	LSA00350
1.2m shielded USB Cable	PengYi	H09-000167
Mini SD Card	SanDisk	2G
AC Adapter	BYD	HS-050040U6 Input: 100-240VAC, 50~60Hz, 0.2A Output: 5.0 VDC, 400mA
AC Adapter	HangJia	HS-050040U6 Input: 100-240VAC, 50~60Hz, 0.2A Output: 5.0 VDC, 400mA

All the items listed under section 2.0 of this report are

*Confirmed by:*

*Shawn Xing*  
*Manager*  
*Intertek Testing Services Shenzhen Ltd. Kejiyuan Branch*  
*Agent for Huawei Technologies Co.,Ltd*



Signature

7 June, 2012

Date

**EXHIBIT 3**  
**TEST RESULTS**

## INTERTEK TESTING SERVICES

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### 3.0 Test Results

Data is included worst-case configuration (the configuration which resulted in the highest emission levels). The simultaneous transmission has been considered when perform spurious radiation test.

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## INTERTEK TESTING SERVICES

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### 3.1 Radiated Test Results

A sample calculation, configuration photographs and data tables of the emissions are included.

#### 3.1.1 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

Where

- FS = Field Strength in dB $\mu$ V/m
- RA = Receiver Amplitude (including preamplifier) in dB $\mu$ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- PD = Pulse Desensitization in dB
- AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Assume a receiver reading of 62.0 dB $\mu$ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29 dB is subtracted. The pulse desensitization factor of the spectrum analyzer was 0 dB, and the resultant average factor was -10 dB. The net field strength for comparison to the appropriate emission limit is 32 dB $\mu$ V/m. This value in dB $\mu$ V/m was converted to its corresponding level in  $\mu$ V/m.

RA = 62.0 dB $\mu$ V  
AF = 7.4 dB  
CF = 1.6 dB  
AG = 29.0 dB  
PD = 0 dB

AV = -10 dB

$$FS = 62 + 7.4 + 1.6 - 29 + 0 + (-10) = 32 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

## INTERTEK TESTING SERVICES

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### 3.1.2 Radiated Emission Configuration Photograph

For electronic filing, the worst case radiated emission configuration photograph is saved with filename: radiated photos. pdf.

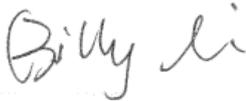
### 3.1.3 Radiated Emissions- FCC section 15.209

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission  
at  
245.825 MHz

Judgement: Passed by 10.4 dB

#### **TEST PERSONNEL:**



\_\_\_\_\_  
*Signature*

Billy Li, Team Leader  
*Typed/Printed Name*

7 June, 2012  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Huawei Technologies Co.,Ltd  
Model: HUAWEI U8186-5/U8186-5  
Sample: 2/2

Date of Test: 7 June, 2012

Table 1

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	245.825	33.9	20.0	12.6	26.5	46.0	-19.5
Horizontal	393.260	37.6	20.0	17.1	34.7	46.0	-11.3
Horizontal	737.615	29.8	20.0	23.6	33.4	46.0	-12.6
Vertical	245.825	43.0	20.0	12.6	35.6	46.0	-10.4
Vertical	393.265	31.6	20.0	17.1	28.7	46.0	-17.3
Vertical	442.280	36.3	20.0	18.3	34.6	46.0	-11.4

- NOTES: 1. Quasi-Peak detector is used except for others stated.
2. All measurements were made at 3 meters. Harmonic emissions not detected at the 3-meter distances were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other harmonic emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. All emissions are below the QP limit.

Test Engineer: Billy Li

## INTERTEK TESTING SERVICES

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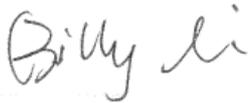
### 3.1.4 Transmitter Spurious Emissions (Radiated) - FCC section 15.209

The data on the following page lists the significant emission frequencies, the limit and the margin of compliance. Numbers with a minus sign are below the limit.

Worst Case Radiated Emission  
at  
7323 MHz

Judgement: Passed by 21.2 dB

#### **TEST PERSONNEL:**



\_\_\_\_\_  
*Signature*

Billy Li, Team Leader  
*Typed/Printed Name*

7 June, 2012  
*Date*

## INTERTEK TESTING SERVICES

Applicant: Huawei Technologies Co.,Ltd  
 Model: HUAWEI U8186-5/U8186-5  
 Sample: 2/2  
 Mode: TX-CH00 (2402MHz)

Date of Test: 7 June, 2012

Table 2

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	**2402.000	109.3	36.7	28.5	101.1	--	--
Vertical	*4804.000	47.7	36.1	33.1	44.7	74.0	-29.3

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	*4804.000	47.7	36.1	33.1	30.1	14.6	54.0	-39.4

- NOTES:
1. Peak detector is used except for others stated.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.
- \*\* Fundamental emission was measured for determining band-edge compliance of using delta measurement technique.

Test Engineer: Billy Li

TRF No.: FCC 15C\_Tx\_b  
 FCC ID: QISU8186-5

## INTERTEK TESTING SERVICES

Applicant: Huawei Technologies Co.,Ltd  
 Model: HUAWEI U8186-5/U8186-5  
 Sample: 2/2  
 Mode: TX-CH39 (2441MHz)

Date of Test: 7 June, 2012

Table 3

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	**2441.000	109.4	36.7	28.5	101.2	--	--
Vertical	*4882.000	47.7	36.1	33.3	44.9	74.0	-29.1
Vertical	*7323.000	51.1	36.2	37.9	52.8	74.0	-21.2

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	*4882.000	47.7	36.1	33.3	30.1	14.8	54.0	-39.2
Vertical	*7323.000	51.1	36.2	37.9	30.1	22.7	54.0	-31.3

- NOTES:
1. Peak detector is used except for others stated.
  2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
  3. Negative value in the margin column shows emission below limit.
  4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.

Test Engineer: Billy Li

## INTERTEK TESTING SERVICES

Applicant: Huawei Technologies Co.,Ltd  
 Model: HUAWEI U8186-5/U8186-5  
 Sample: 2/2  
 Mode: TX-CH78 (2480MHz)

Date of Test: 7 June, 2012

Table 4

### Radiated Emissions

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dB $\mu$ V/m)	Peak Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Horizontal	**2480.000	109.0	36.7	28.6	100.9	--	--
Vertical	*4960.000	47.2	36.1	33.4	44.5	74.0	-29.5
Vertical	*7440.000	50.3	36.2	38.2	52.3	74.0	-21.7

Polarization	Frequency (MHz)	Reading (dB $\mu$ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Average Factor (-dB)	Net at 3m (dB $\mu$ V/m)	Average Limit at 3m (dB $\mu$ V/m)	Margin (dB)
Vertical	*4960.000	47.2	36.1	33.4	30.1	14.4	54.0	-39.6
Vertical	*7440.000	50.3	36.2	38.2	30.1	22.2	54.0	-31.8

- NOTES: 1. Peak detector is used except for others stated.
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
3. Negative value in the margin column shows emission below limit.
4. Horn antenna used for the emission over 1000MHz.
- \* Emission within the restricted band meets the requirement of section 15.205. The corresponding limit as per 15.209 is based on Quasi peak limit for frequencies below 1000 MHz and average limit for frequencies over 1000 MHz. The radio frequency emissions above 1GHz also meet corresponding 20dB permitted peak limit with a peak detector function.
- \*\* Fundamental emission was measured for determining band-edge compliance of using delta measurement technique.

Test Engineer: Billy Li

TRF No.: FCC 15C\_Tx\_b  
 FCC ID: QISU8186-5

## INTERTEK TESTING SERVICES

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### 3.2 Conducted Emission at Mains Terminal

#### 3.2.1 Conducted Emissions Configuration Photograph

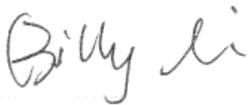
For electronic filing, the worst case conducted emission configuration photograph is saved with filename: conducted photos.pdf.

#### 3.2.2 Conducted Emissions

Worst Case Line-Conducted Configuration  
at  
2.111 MHz

Judgement: Passed by 6.6 dB margin

#### **TEST PERSONNEL:**



---

*Signature*

Billy Li, Team Leader  
*Typed/Printed Name*

7 June, 2012  
*Date*

# INTERTEK TESTING SERVICES

Company: Huawei Technologies Co.,Ltd

Date of Test: 7 June, 2012

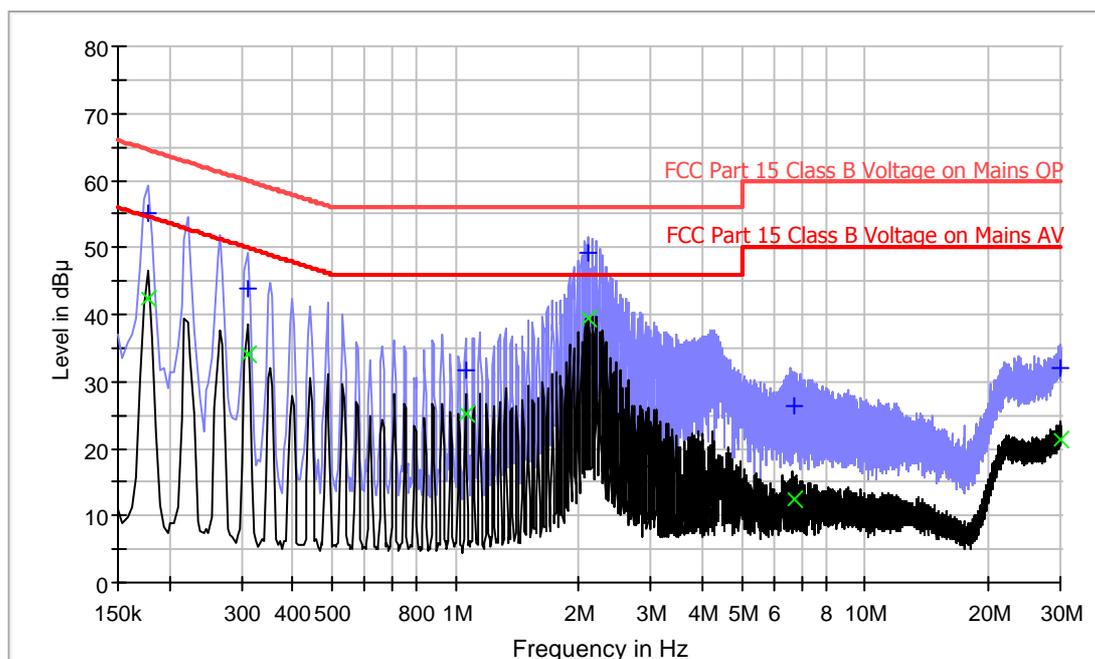
Model: HUAWEI U8186-5/U8186-5

Sample: 2/2

Worst Case Operating Mode: Transmitting at 2441MHz

## Conducted Emission Test – FCC

Pursuant to 15.207 Emissions Requirement



### Result Table-QP

Frequency (MHz)	QuasiPeak (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.178000	55.0	L1	9.6	9.6	64.6
0.310000	43.9	L1	9.6	16.1	60.0
1.058000	31.6	L1	9.7	24.4	56.0
2.111000	49.2	L1	9.8	6.8	56.0
6.698000	26.4	L1	9.8	33.6	60.0
29.900000	32.1	L1	9.9	27.9	60.0

### Result Table-AV

Frequency (MHz)	Average (dB μ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB μ V)
0.178000	42.3	L1	9.6	12.3	54.6
0.310000	34.0	L1	9.6	16.0	50.0
1.058000	25.3	L1	9.7	20.7	46.0
2.111000	39.4	L1	9.8	6.6	46.0
6.698000	12.4	L1	9.8	37.6	50.0
29.900000	21.2	L1	9.9	28.8	50.0

TRF No.: FCC 15C\_Tx\_b

FCC ID: QISU8186-5

# INTERTEK TESTING SERVICES

Company: Huawei Technologies Co.,Ltd

Date of Test: 7 June, 2012

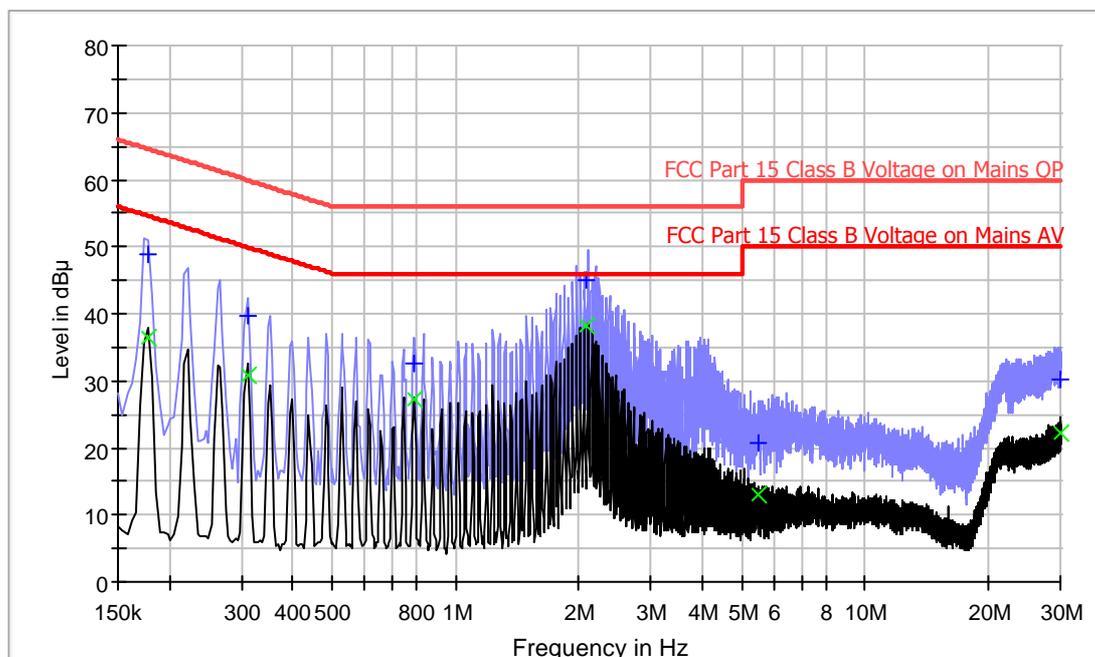
Model: HUAWEI U8186-5/U8186-5

Sample: 2/2

Worst Case Operating Mode: Transmitting at 2441MHz

## Conducted Emission Test – FCC

Pursuant to 15.207 Emissions Requirement



### Result Table-QP

Frequency (MHz)	QuasiPeak (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.178000	49.0	N	9.6	15.6	64.6
0.310000	39.8	N	9.6	20.2	60.0
0.794000	32.7	N	9.7	23.3	56.0
2.075000	44.9	N	9.7	11.1	56.0
5.470000	20.7	N	9.8	39.3	60.0
29.998000	30.4	N	10.7	29.6	60.0

### Result Table-AV

Frequency (MHz)	Average (dB µ V)	Line	Corr. (dB)	Margin (dB)	Limit (dB µ V)
0.178000	36.4	N	9.6	18.2	54.6
0.310000	30.7	N	9.6	19.3	50.0
0.794000	27.2	N	9.7	18.8	46.0
2.075000	38.2	N	9.7	7.8	46.0
5.470000	13.1	N	9.8	36.9	50.0
29.998000	22.3	N	10.7	27.7	50.0

TRF No.: FCC 15C\_Tx\_b

FCC ID: QISU8186-5

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## INTERTEK TESTING SERVICES

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### 3.3 Peak Power

Maximum Conducted Output Power at Antenna Terminals, FCC Rules 15.247(b)(1)

The antenna port of the EUT was connected to the input of a spectrum analyzer. The analyzer was set for RBW > 20dB bandwidth and power was read directly in dBm.

For antenna with gains of 6dBi or less, maximum allowed transmitter output 1 watt (+30dBm)

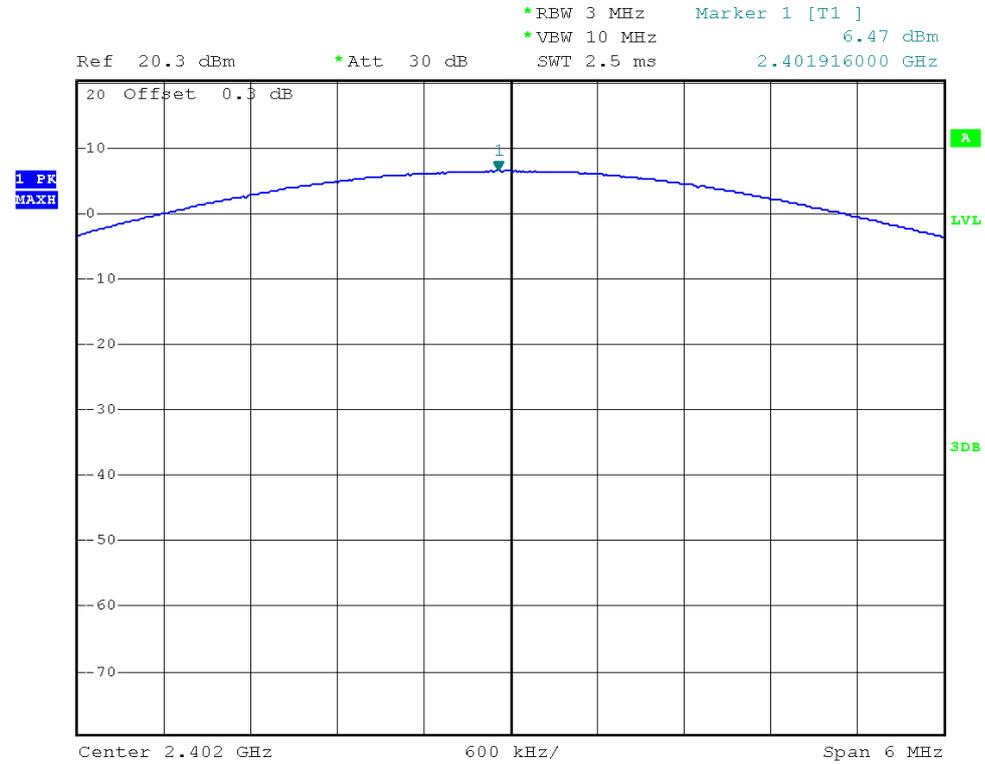
Worst Case Modulation:  $\pi/4$ -DQPSK

6dBi >Antenna Gain $\geq$ -1dBi			
Modulation Type	Frequency (MHz)	Output Power (dBm)	Output Power (mW)
$\pi/4$ -DQPSK	2402	6.47	4.44
	2441	6.54	4.51
	2480	6.57	4.54

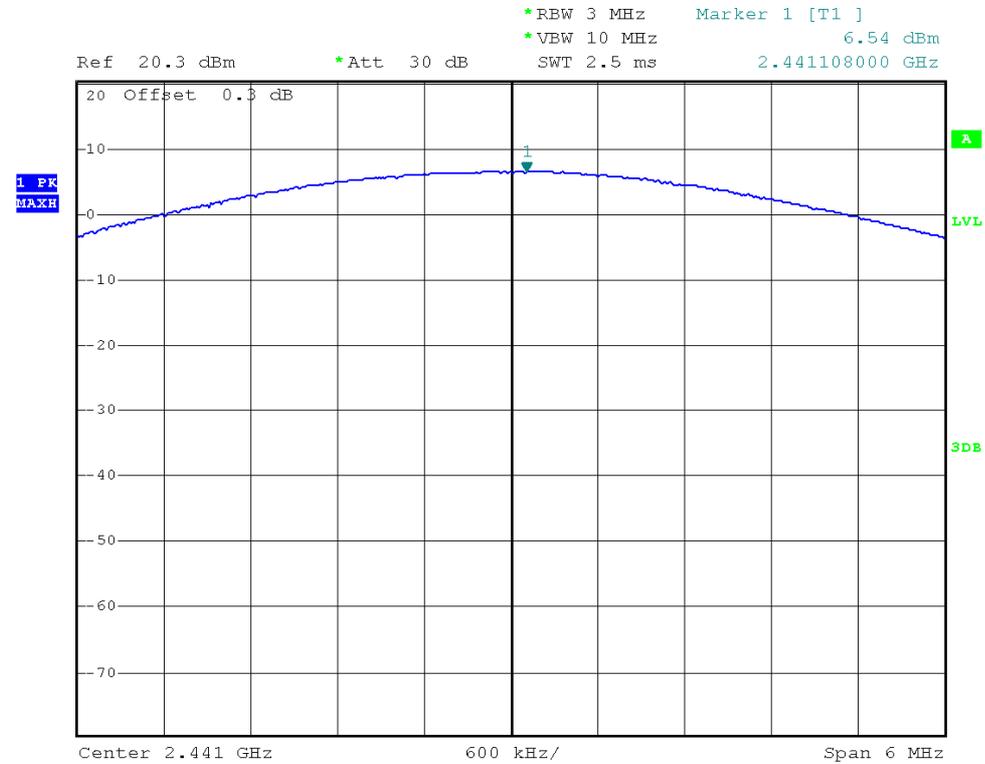
# INTERTEK TESTING SERVICES

Modulation Type:  $\pi/4$ -DQPSK

CH00

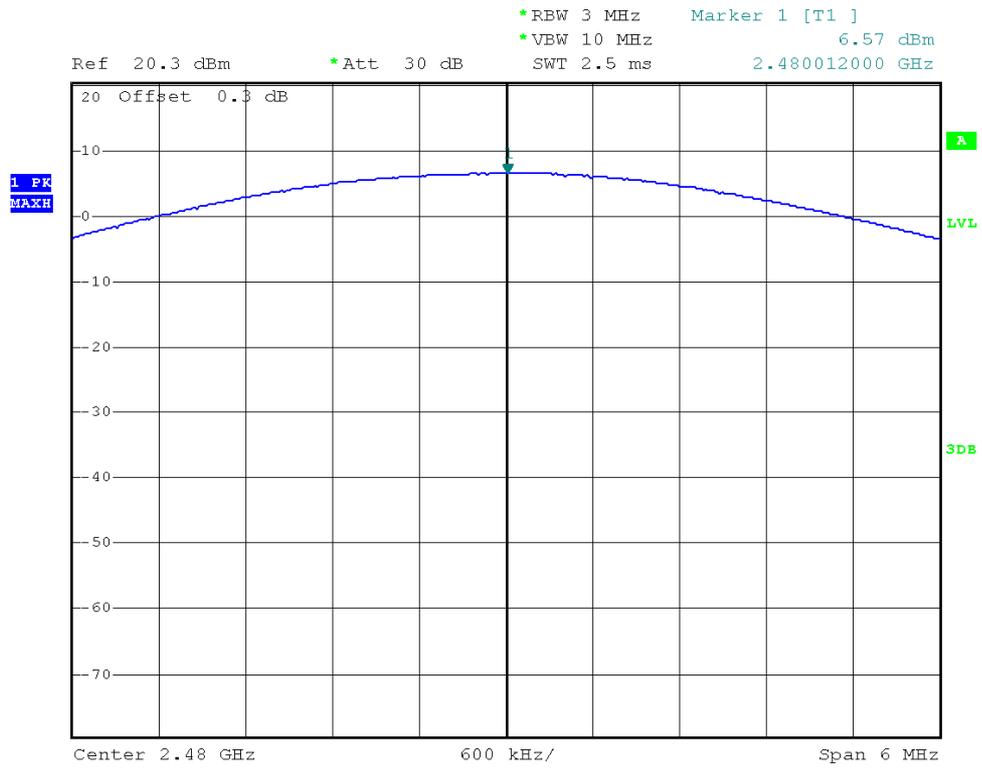


CH39



# INTERTEK TESTING SERVICES

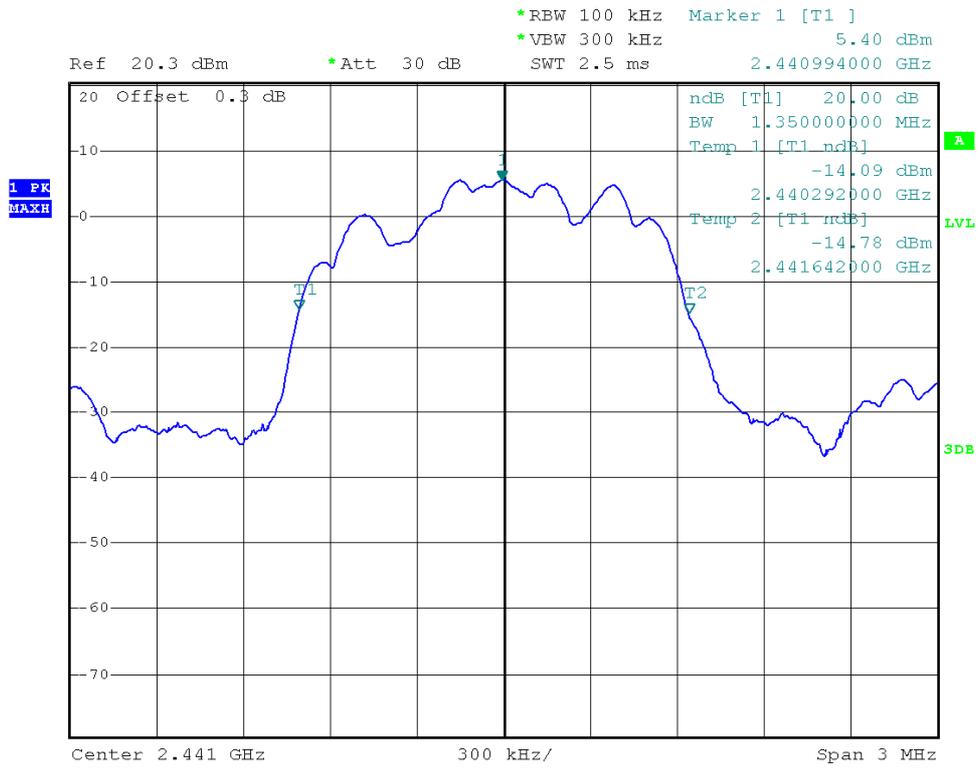
CH78



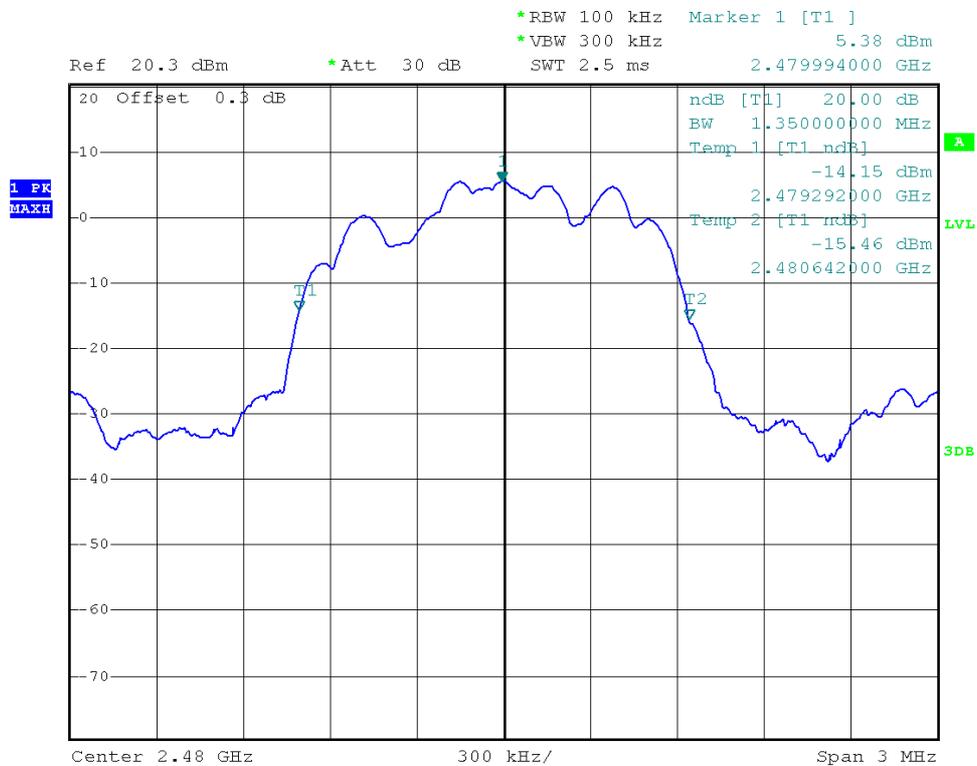


# INTERTEK TESTING SERVICES

## CH39



## CH78



# INTERTEK TESTING SERVICES

## 3.5 Channel Number (Number of Hopping Frequencies)

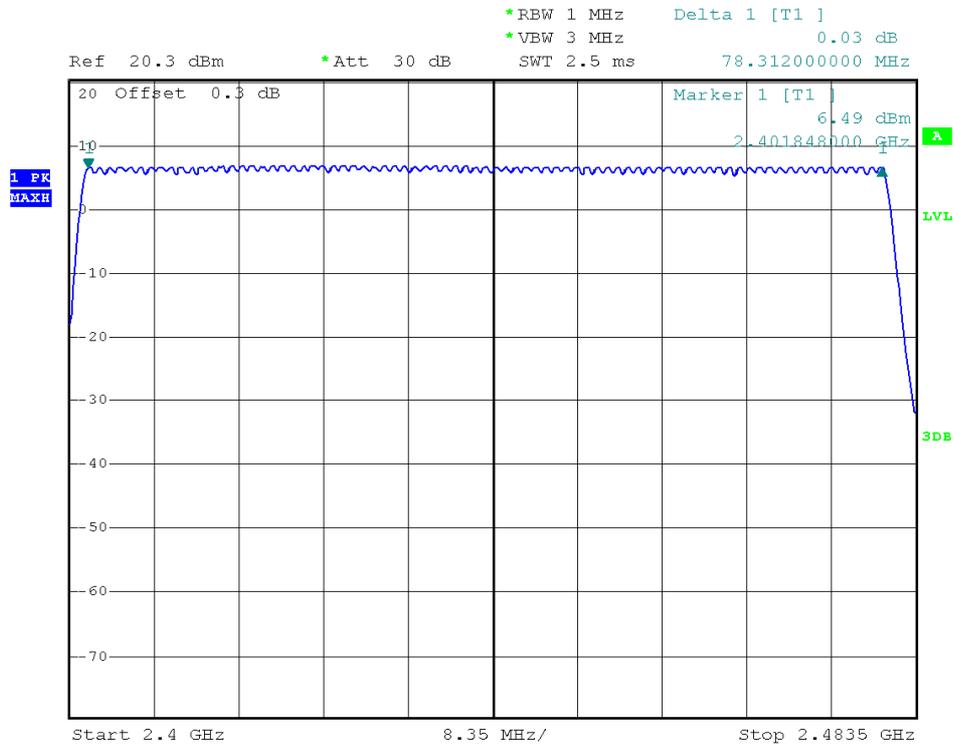
Minimum Number of Hopping Frequencies, FCC Rule 15.247(a) (1) (iii):

The RF passband of the EUT was divided into 3 approximately equal bands. With the analyzer set to MAX HOLD readings were taken for 2-3 minutes. The channel peaks so recorded were added together, and the total number compared to the minimum number of channels required in the regulation.

Number of hopping channels =	79
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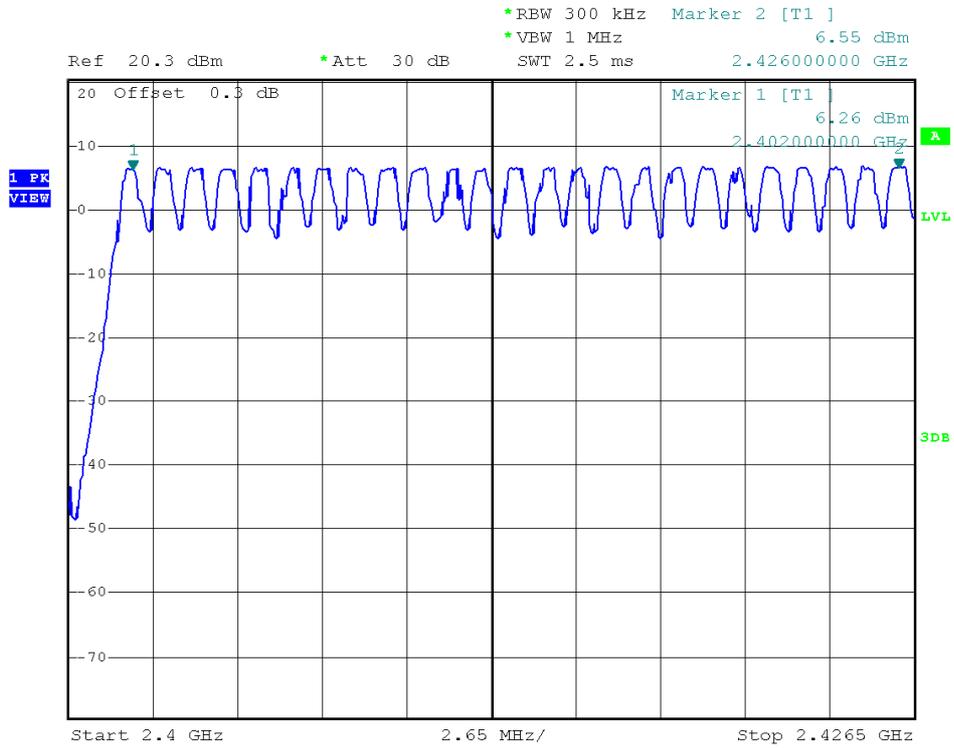
Modulation Type: GFSK

CH00-CH78

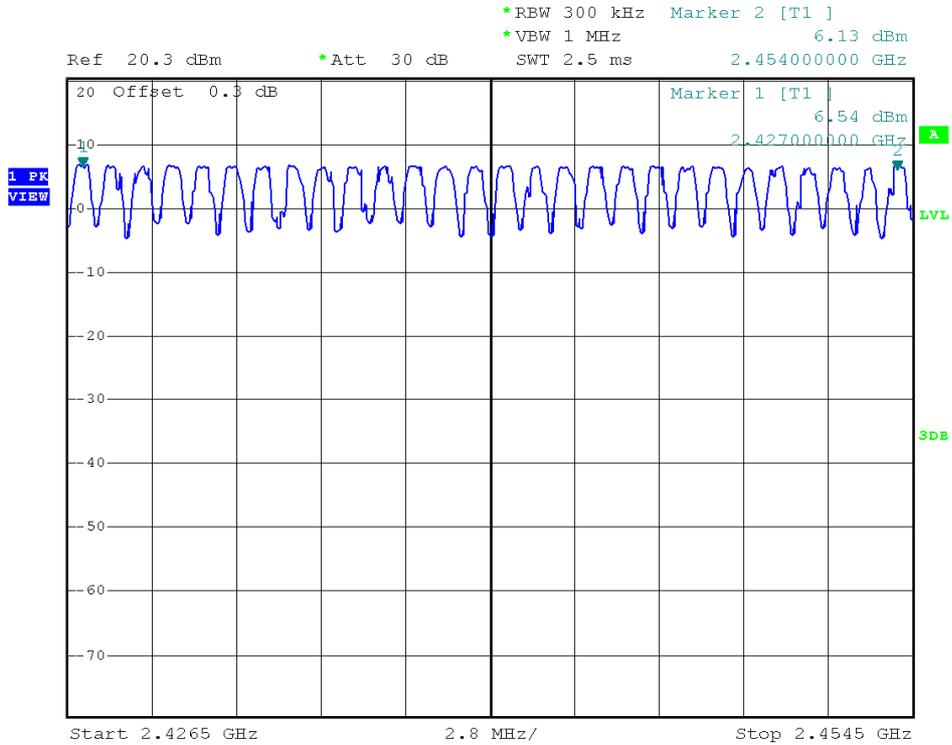


# INTERTEK TESTING SERVICES

## CH00-CH24

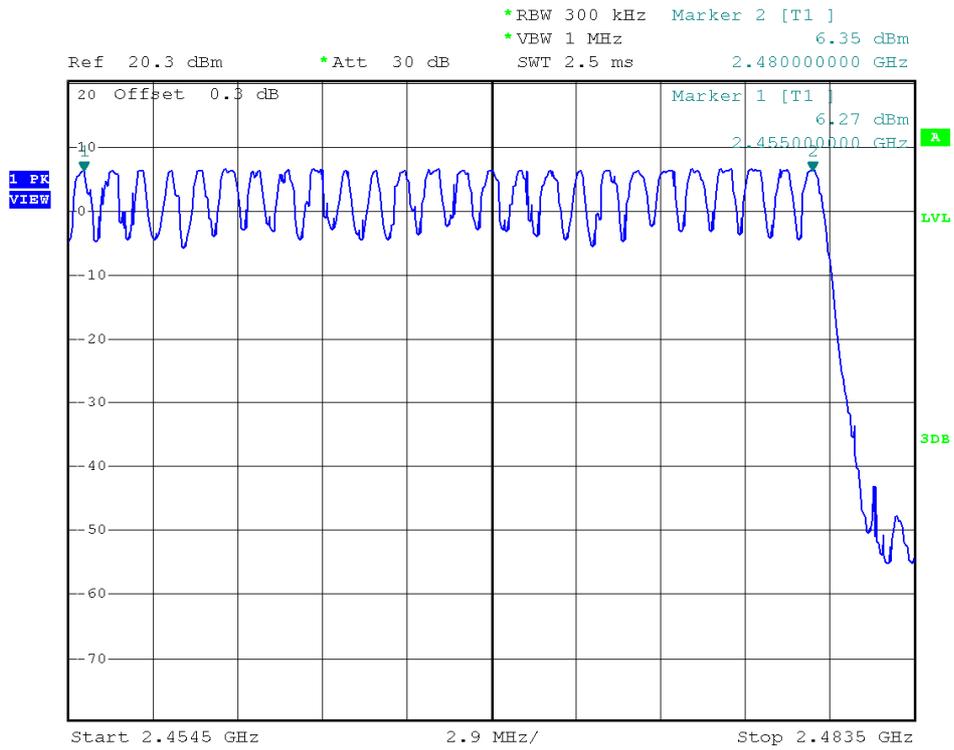


## CH25-CH52



# INTERTEK TESTING SERVICES

CH53-CH78



# INTERTEK TESTING SERVICES

## 3.6 Channel Separation (Carrier Frequency Separation)

Minimum Hopping Channel Carrier Frequency Separation, FCC Ref: 15.247(a)(1):

Using the DELTA MARKER function of the analyzer, the frequency separation between two adjacent channels was measured and compared against the limit:

Not less than 2/3 of 20dB bandwidth of hopping channel:  $1.350 \times 2/3 = 0.9$  MHz

Channel Separation	1.002MHz
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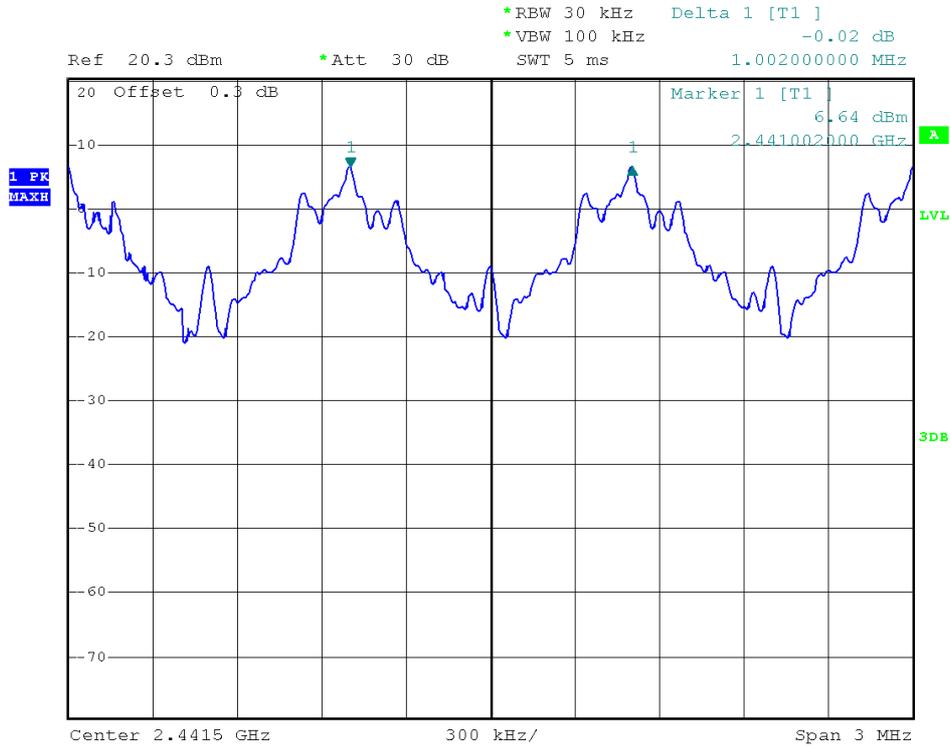
Modulation Type: GFSK

Low Channel

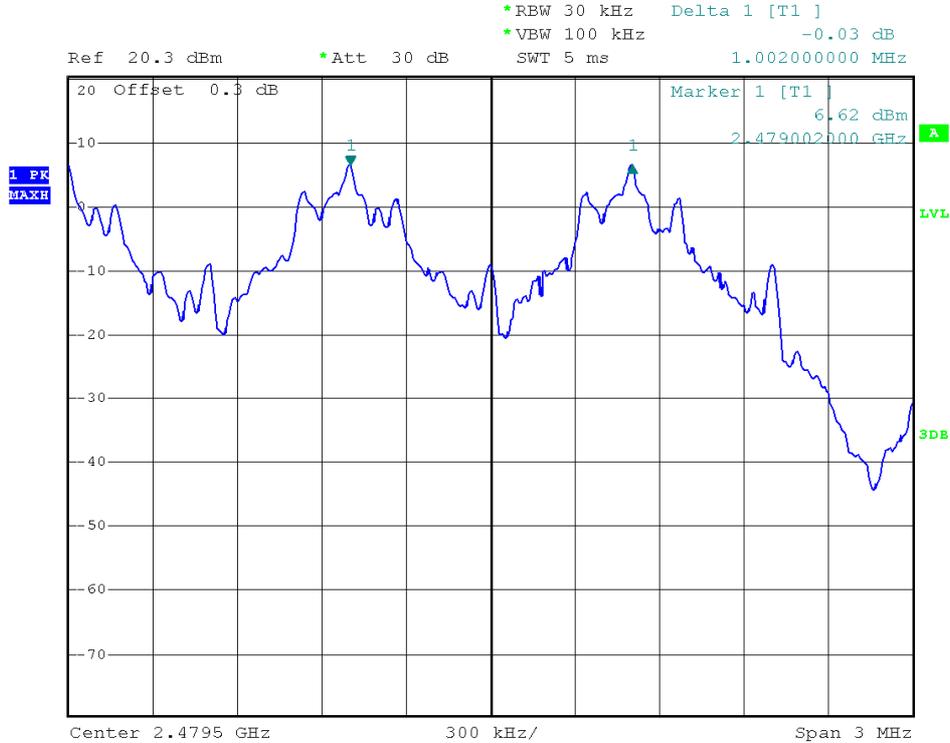


# INTERTEK TESTING SERVICES

## Middle Channel



## High Channel



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## INTERTEK TESTING SERVICES

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### 3.7 Dwell Time (Time of Occupancy)

Average Channel Occupancy Time, FCC Ref: 15.247(a)(1)(iii):

The spectrum analyzer center frequency was set to one of the known hopping channels. The SWEEP was set to 10ms, the SPAN was set to ZERO SPAN, and the TRIGGER was set to VIDEO. The time duration of the transmissions so captured was measured with the MARKER DELTA function.

The maximum number of hopping channels in 31.6s for DH1  
 $=1600 / 2 / 79 * 31.6=320$

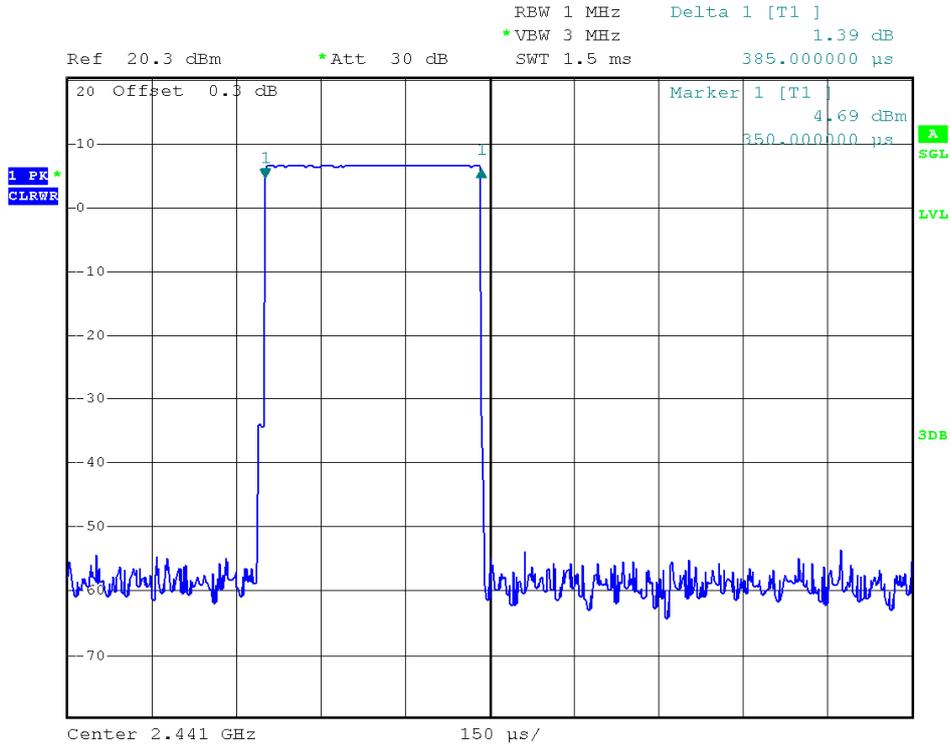
The maximum number of hopping channels in 31.6s for DH3  
 $=1600 / 4 / 79 * 31.6=160$

The maximum number of hopping channels in 31.6s for DH5  
 $=1600 / 6 / 79 * 31.6=107$

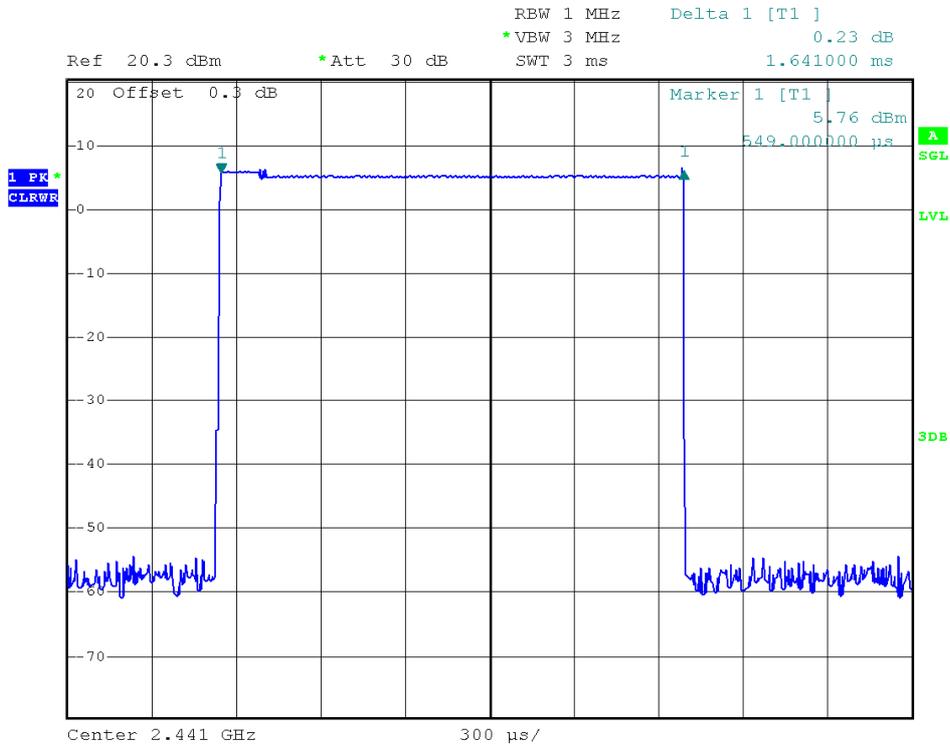
Modulation Type	Packet	Max Dwell Time	Limit (s)	Result
π/4-DQPSK	DH1	0.385 ms * 320= 123.20 ms	0.4	Pass
	DH3	1.641 ms * 160= 262.56 ms	0.4	Pass
	DH5	2.897 ms * 107= 309.98 ms	0.4	Pass

# INTERTEK TESTING SERVICES

Modulation Type:  $\pi/4$ -DQPSK  
Packet: DH1

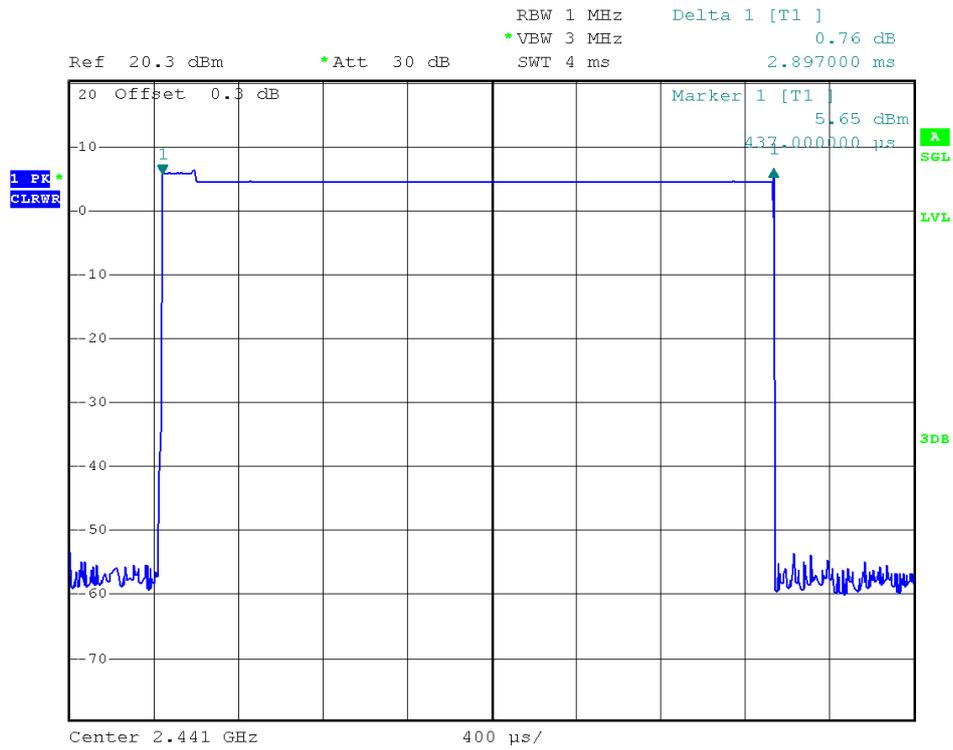


Packet: DH3



# INTERTEK TESTING SERVICES

Packet: DH5



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## INTERTEK TESTING SERVICES

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### 3.8 Band Edge

Out of Band Conducted Emissions, FCC Rule 15.247(d):

In any 100 KHz bandwidth outside the EUT passband, the RF power produced by the modulation products of the spreading sequence, the information sequence, and the carrier frequency shall be at least 20 dB below that of the maximum in-band 100 kHz emission, or else shall meet the general limits for radiated emissions at frequencies outside the passband, whichever results in lower attenuation.

Furthermore, delta measurement technique for measuring bandage emissions was shown as below:

**(i) Lower channel 2402MHz:**

Peak Resultant field strength = Fundamental emissions (peak value) – delta  
from the bandedge plot

$$= 101.1\text{dB}\mu\text{v}/\text{m}-51.9\text{dB}$$

$$= 49.2\text{dB}\mu\text{v}/\text{m}$$

**(ii) Upper channel 2480MHz:**

Peak Resultant field strength = Fundamental emissions (peak value) – delta  
from the bandedge plot

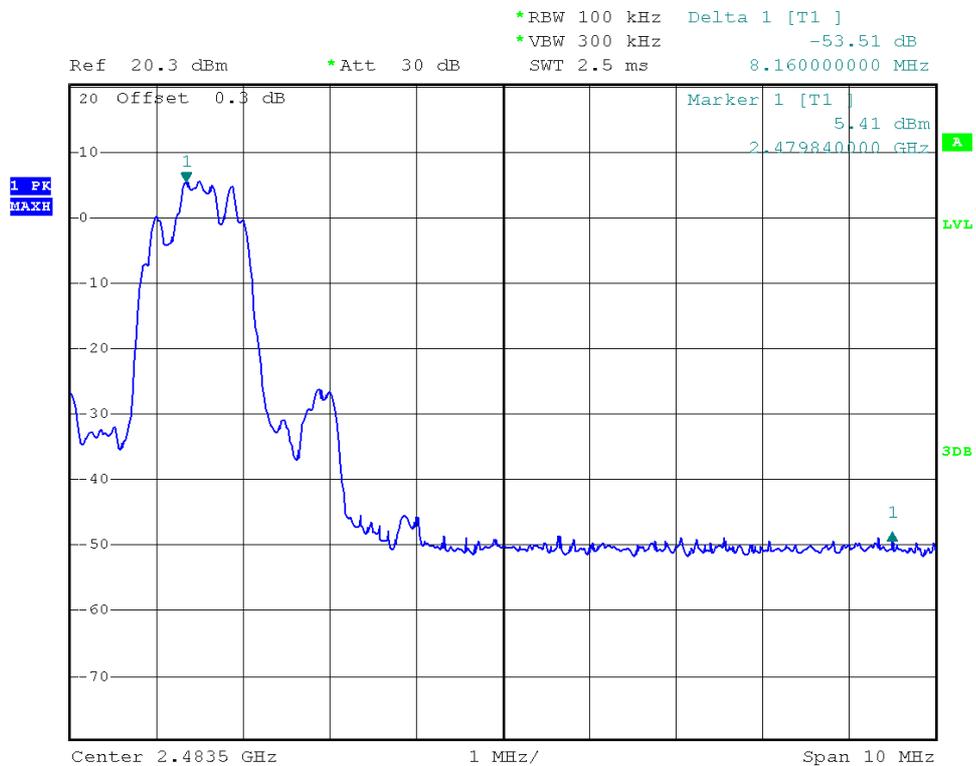
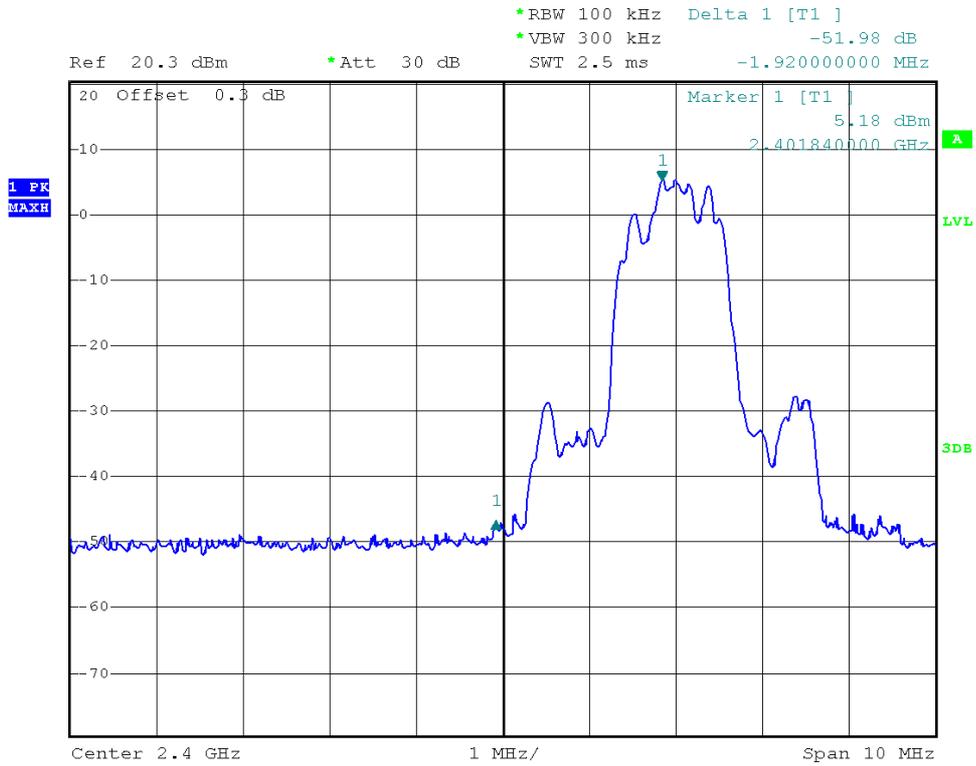
$$= 100.9\text{dB}\mu\text{v}/\text{m}-53.5\text{dB}$$

$$= 47.4\text{dB}\mu\text{v}/\text{m}$$

The resultant field strength meets the general radiated emission limit in section 15.209, which does not exceed 74 dB $\mu$ v/m (Peak Limit) and 54dB $\mu$ v/m (Average Limit).

# INTERTEK TESTING SERVICES

Modulation Type:  $\pi/4$ -DQPSK



TRF No.: FCC 15C\_Tx\_b  
FCC ID: QISU8186-5

## INTERTEK TESTING SERVICES

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### 3.9 Transmitter Spurious Emissions (Conducted)

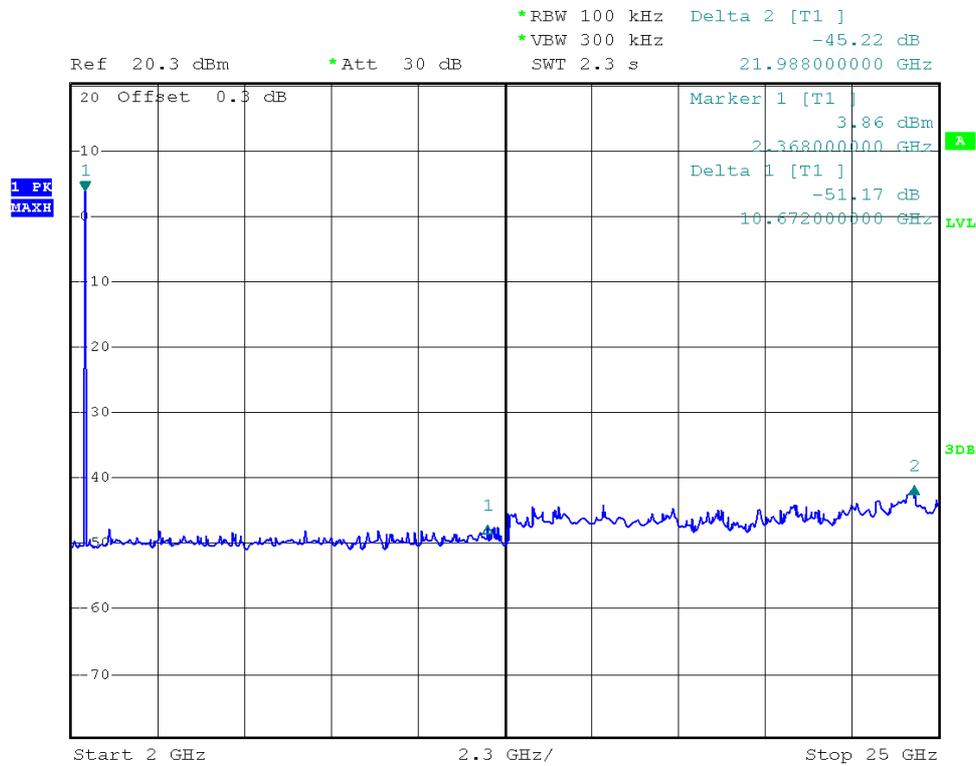
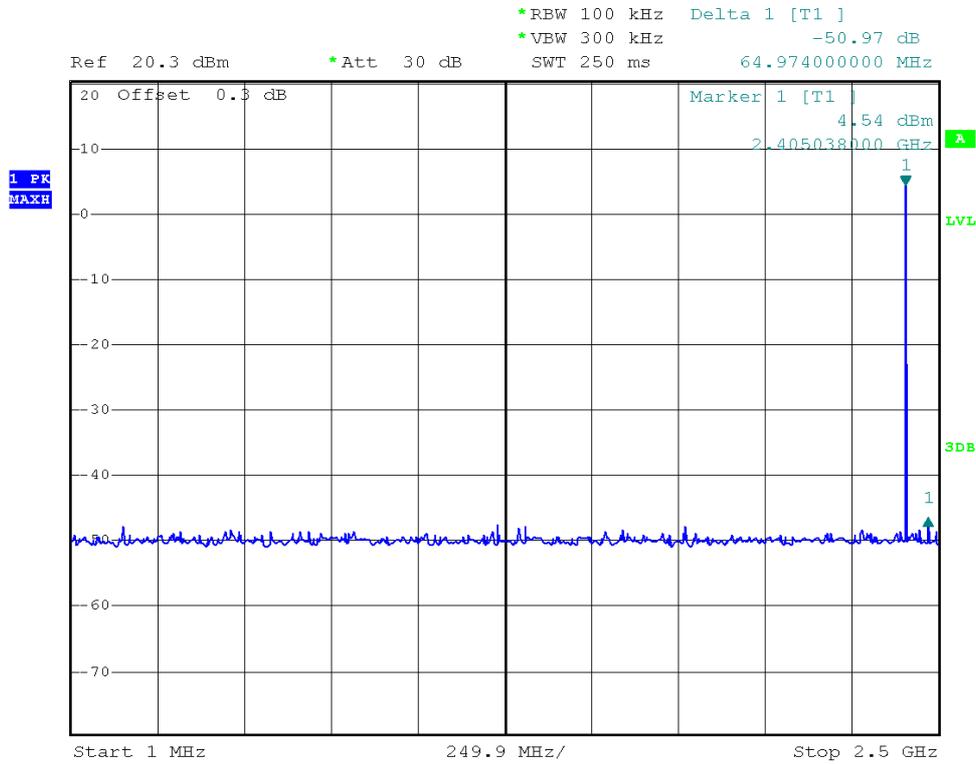
Out of Band Conducted Spurious Emissions, FCC Rule 15.247(d):

All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20 dB below the highest level of the desired power in the passband.

# INTERTEK TESTING SERVICES

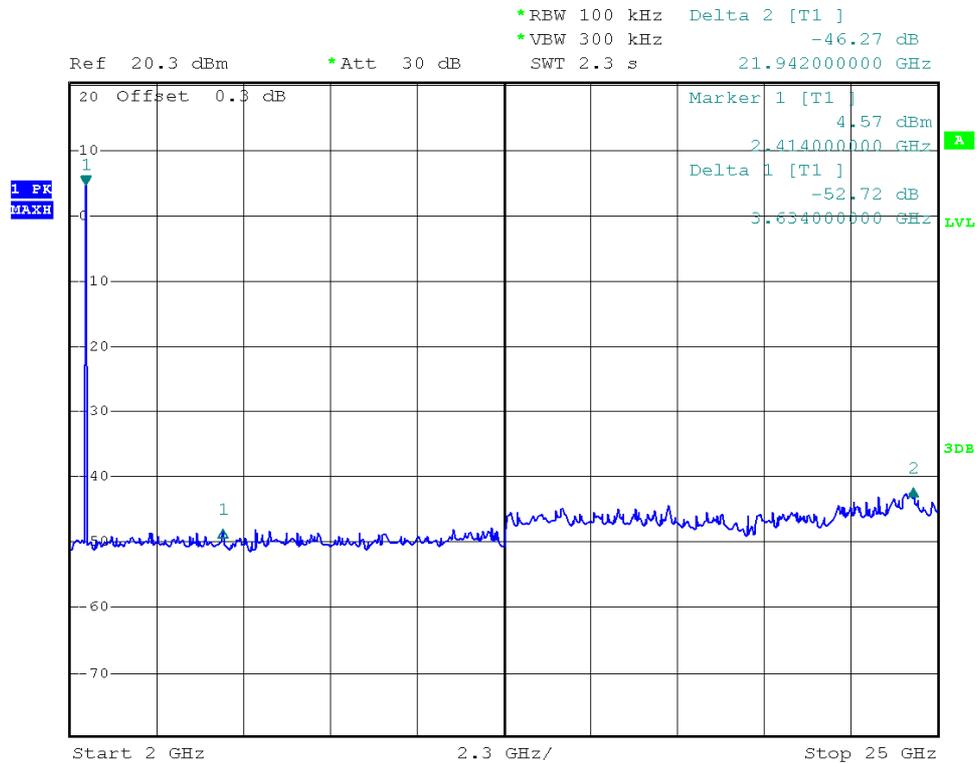
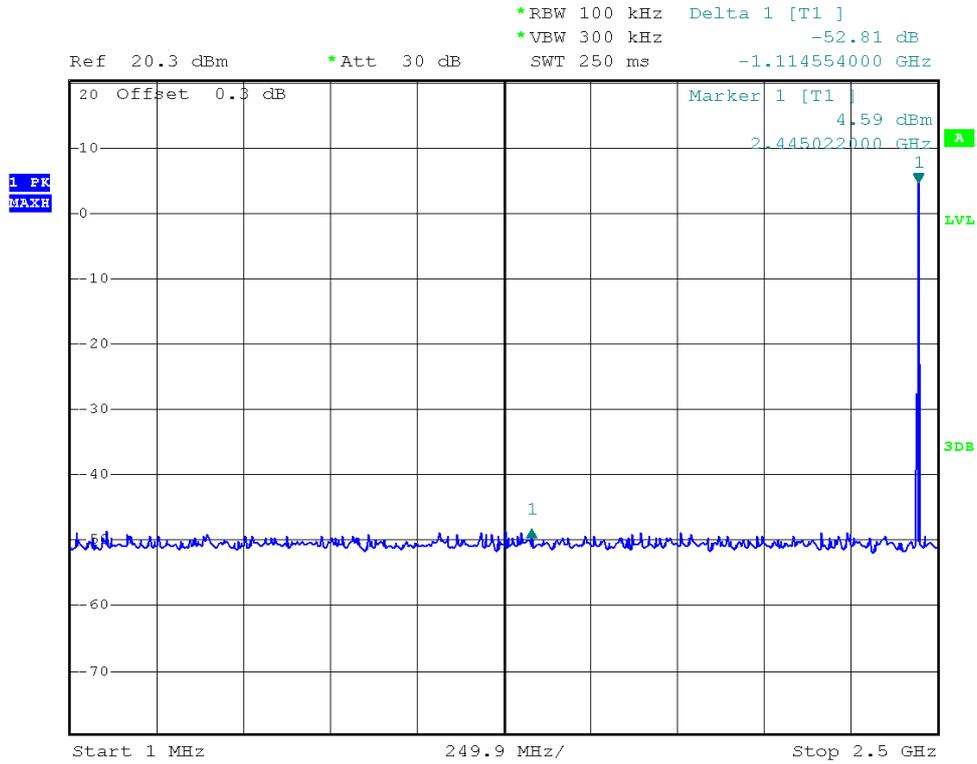
Modulation Type:  $\pi/4$ -DQPSK

CH00



# INTERTEK TESTING SERVICES

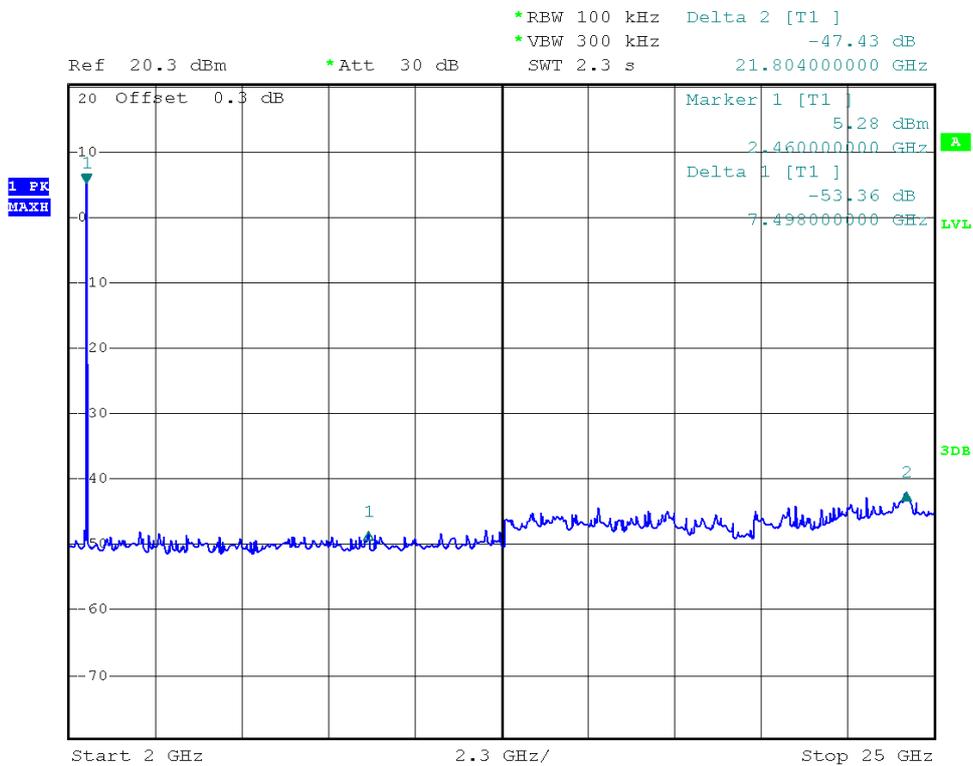
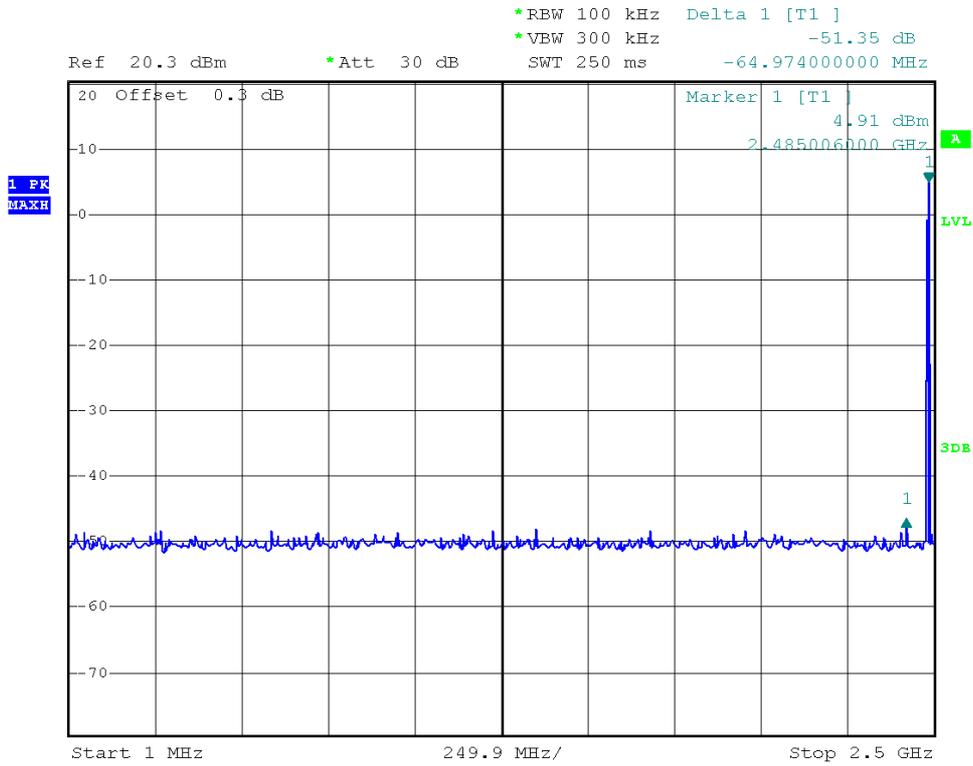
CH39



TRF No.: FCC 15C\_Tx\_b  
FCC ID: QISU8186-5

# INTERTEK TESTING SERVICES

CH78



TRF No.: FCC 15C\_Tx\_b  
FCC ID: QISU8186-5

**EXHIBIT 4**

**EQUIPMENT PHOTOGRAPHS**

## INTERTEK TESTING SERVICES

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### 4.0 **Equipment Photographs**

For electronic filing, the photographs of the tested EUT are saved with filename: external photos.pdf & internal photos.pdf.

**INTERTEK TESTING SERVICES**

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**EXHIBIT 5**  
**PRODUCT LABELLING**

## INTERTEK TESTING SERVICES

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### 5.0 **Product Labelling**

For electronic filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

**INTERTEK TESTING SERVICES**

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**EXHIBIT 6**

**TECHNICAL SPECIFICATIONS**

## INTERTEK TESTING SERVICES

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### 6.0 Technical Specifications

For electronic filing, the block diagram and schematics of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

**INTERTEK TESTING SERVICES**

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**EXHIBIT 7**  
**INSTRUCTION MANUAL**

## INTERTEK TESTING SERVICES

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### 7.0 **Instruction Manual**

For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

**INTERTEK TESTING SERVICES**

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**EXHIBIT 8**

**MISCELLANEOUS INFORMATION**

## INTERTEK TESTING SERVICES

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### 8.0 Miscellaneous Information

This miscellaneous information includes details of the measured bandedge, the test procedure and calculation of factor such as pulse desensitization.

## INTERTEK TESTING SERVICES

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### 8.1 Discussion of Pulse Desensitization

Pulse desensitivity is not applicable for this device. The effective period ( $T_{\text{eff}}$ ) is approximately 360 $\mu$ s for Bluetooth. With a resolution bandwidth (3dB) of 1MHz, so the pulse desensitivity factor is 0dB.

## INTERTEK TESTING SERVICES

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### 8.2 Transmitter Duty Cycle Calculation, FCC Rule 15.35(b, c)

Based on the Bluetooth Specification Version 2.1+ EDR, transmitter ON time is independent of packet type (DH1, DH3 and DH5) and packet length (single-slot and multi-slot). The maximum transmitter ON time for the Bluetooth is 625 $\mu$ s.

Each TX and RX time slot is 625 $\mu$ s in length. A TDD scheme is used where master and slave alternately transmit. For one period for a pseudo-random hopping through all 79 RF channels, for DH5:

Time of 1 hopset (5 TX slots + 1 RX slot) = 0.625 ms x 6 = 3.75 ms

Time of 1 cycle = 3.75 ms x 79 = 296.25 ms

Average factor = 20 log (3.125 / 100) = -30.1 dB

## INTERTEK TESTING SERVICES

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### 8.3 Emissions Test Procedures

The following is a description of the test procedure used by Intertek Testing Services in the measurements of transmitters operating under Part 15, Subpart C rules.

The test set-up and procedures described below are designed to meet the requirements of ANSI C63.4 - 2009.

The transmitting equipment under test (EUT) is placed on a wooden turntable which is four feet in diameter and approximately one meter in height above the ground plane. During the radiated emissions test, the turntable is rotated and any cables leaving the EUT are manipulated to find the configuration resulting in maximum emissions. The EUT is adjusted through all three orthogonal axes to obtain maximum emission levels. The antenna height and polarization are varied during the testing to search for maximum signal levels.

Detector function for radiated emissions is in peak mode. Average readings, when required, are taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings.

The frequency range scanned is from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or 40 GHz, whichever is lower. For line conducted emissions, the range scanned is 150 kHz to 30 MHz.

## INTERTEK TESTING SERVICES

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### 8.3 Emissions Test Procedures (cont'd)

The EUT is warmed up for 15 minutes prior to the test.

AC power to the unit is varied from 85% to 115% nominal and variation in the fundamental emission field strength is recorded. If battery powered, a new, fully charged battery is used.

Conducted measurements are made as described in ANSI C63.4 - 2009.

The IF bandwidth used for measurement of radiated signal strength was 10 kHz for emission below 30 MHz and 120 kHz for emission from 30 MHz to 1000 MHz. Where pulsed transmissions of short enough pulse duration warrant, a greater bandwidth is selected according to the recommendations of Hewlett Packard Application Note 150-2. Above 1000 MHz, a resolution bandwidth of 1 MHz is used.

Transmitter measurements are normally conducted at a measurement distance of three meters. However, to assure low enough noise floor in the restricted bands and above 1 GHz, signals are acquired at a distance of one meter or less. All measurements are extrapolated to three meters using inverse scaling, but those measurements taken at a closer distance are so marked.

**INTERTEK TESTING SERVICES**

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**EXHIBIT 9**  
**TEST EQUIPMENT LIST**

## INTERTEK TESTING SERVICES

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### 9.0 Test Equipment List

Equipment No.	Equipment	Manufacturer	Model No.	Serial No.	Cal. Date	Due Date
SZ061-03	BiConiLog Antenna	ETS	3142C	00066460	02-Jul-11	02-Jan-13
SZ185-01	EMI Receiver	R&S	ESCI	100547	11-Mar-12	11-Mar-13
SZ061-08	Horn Antenna	ETS	3115	00092346	15-Oct-11	15-Oct-12
SZ061-06	Active Loop Antenna	Electro-Metrics	EM-6876	217	11-Mar-12	11-Mar-13
SZ056-03	Spectrum Analyzer	R&S	FSP 30	101148	11-Mar-12	11-Mar-13
SZ065-03	Bluetooth Tester	R&S	CBT32	100074	11-Mar-12	11-Mar-13
SZ181-04	Preamplifier	Agilent	8449B	3008A02474	11-Mar-12	11-Mar-13
SZ188-01	Anechoic Chamber	ETS	RFD-F/A-100	4102	03-Mar-12	03-Mar-13
SZ062-02	RF Cable	RADIALL	RG 213U	--	17-Mar-12	17-Sep-12
SZ062-06	RF Cable	RADIALL	0.04-26.5GHz	--	01-Nov-11	01-Nov-12
SZ062-12	RF Cable	RADIALL	0.04-26.5GHz	--	25-Feb-12	25-Aug-12
SZ067-04	Notch Filter	Micro-Tronics	BRM5070 2-02	--	15-Jul-11	15-Jul-12
SZ185-02	EMI Test Receiver	R&S	ESCI	100692	05-Nov-11	05-Nov-12
SZ187-01	Two-Line V-Network	R&S	ENV216	100072	05-Nov-11	05-Nov-12
SZ187-02	Two-Line V-Network	R&S	ENV216	100073	05-Nov-11	05-Nov-12
SZ188-03	Shielding Room	ETS	RFD-100	4100	16-Sep-10	16-Sep-13