



Report No: FCC 1607065-02 File reference No: 2016-07-20

Applicant: Shenzhen Jingwah Information Technology Co., Ltd.

Product: Tablet PC

Model No: W109GA, 1081, 1016, 1016s, 1032

Trademark: N/A

Test Standards: FCC Part 15.247

Test result:

It is herewith confirmed and found to comply with the

requirements set up by ANSI C63.10, FCC Part 15 Subpart C,

Paragraph 15.247 regulations for the evaluation of

electromagnetic compatibility

Approved By

# Jack Chung

Jack Chung

Manager

Dated: July 20, 2016

Results appearing herein relate only to the sample tested

The technical reports is issued errors and omissions exempt and is subject to withdrawal at

# SHENZHEN TIMEWAY TESTING LABORATORIES

Room 512-519, 5/F., East Tower, Building 4, Anhua Industrial Zone, Futian District, Shenzhen, Guangdong, China

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# **Special Statement:**

The testing quality ability of our laboratory meet with "Quality Law of People's Republic of China" Clause 19.

The testing quality system of our laboratory meets with ISO/IEC-17025 requirements, which is approved by CNAS. This approval result is accepted by MRA of APLAC.

Our test facility is recognized, certified, or accredited by the following organizations:

# **CNAS-LAB Code: L2292**

The EMC Laboratory has been assessed and in compliance with CNAS-CL01 accreditation criteria for testing Laboratories (identical to ISO/IEC 17025:2005 General Requirements) for the Competence of testing Laboratories.

# FCC-Registration No.: 899988

The EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications commission. The acceptance letter from the FCC is maintained in our files. Registration No.:899988.

# IC-Registration No.: IC5205A-02

The EMC Laboratory has been registered and fully described in a report filed with the (IC) Industry Canada. The acceptance letter from the IC is maintained in our files. Registration No.: IC 5205A-02.

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#### 1.0 General Details

#### Test Lab Details 1.1

Name: SHENZHEN TIMEWAY TESTING LABORATORIES.

Address: Room 512-519,5/F., East Tower, Building 4, Anhua Industrial Zone, Futian District, Shenzhen,

Guangdong China

Telephone: (755) 83448688 Fax: (755) 83442996

Site on File with the Federal Communications Commission – United Sates

Registration Number: 899988

For 3m & 10 m OATS

Site Listed with Industry Canada of Ottawa, Canada

Registration Number: IC: 5205A-02

For 3m & 10 m OATS

#### 1.2 Applicant Details

Applicant: Shenzhen Jingwah Information Technology Co., Ltd.

Address: 4F, Bldg 4, Jinghua Square, No.1 Huafa North Road, Futian District, Shenzhen, China

Telephone: Fax:

### 1.3 Description of EUT

Product: Tablet PC

Manufacturer: Shenzhen Jingwah Information Technology Co., Ltd.

Address: 4F, Bldg 4, Jinghua Square, No.1 Huafa North Road, Futian District,

Shenzhen, China

Brand Name: N/A

Model Number: W109GA

Additional Model Number: 1081, 1016, 1016s, 1032 Power Adapter Model No.: DNS-050200E

Input: 100-240V, 50/60Hz, 0.35A; Output: DC5V, 2000mA

GFSK, JI/4DQPSK, 8DPSK for Bluetooth Type of Modulation

Frequency range 2402-2480MHz for Bluetooth

**Channel Spacing** 1MHz for Bluetooth

Frequency Selection By software

Channel Number 79 channel for Bluetooth

Antenna: Integral Antenna and the maximum Gain of this antenna is 2.0dBi;

# 1.4 Submitted Sample: 2 Samples

The report refers only to the sample tested and does not apply to the bulk.

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1.5 Test Duration 2016-07-08 to 2016-07-20

1.6 Test Uncertainty Conducted Emissions Uncertainty =3.6dB Radiated Emissions Uncertainty =4.7dB

Test Engineer 1.7

The sample tested by

Print Name: Terry Tang

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2.0 Test Equipments					
Instrument Type	Manufacturer	Model	Serial No.	Date of Cal.	Due Date
ESPI Test Receiver	R&S	ESPI 3	100379	2015-08-22	2016-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100294	2015-08-22	2016-08-21
TWO Line-V-NETW	R&S	EZH3-Z5	100253	2015-08-22	2016-08-21
Ultra Broadband ANT	R&S	HL562	100157	2015-08-23	2016-08-22
ESDV Test Receiver	R&S	ESDV	100008	2015-08-22	2016-08-21
Impuls-Begrenzer	R&S	ESH3-Z2	100281	2015-08-22	2016-08-21
System Controller	CT	SC100	-		
Printer	EPSON	РНОТО ЕХЗ	CFNH234850		
Computer	IBM	8434	1S8434KCE99BLXLO*	-	-
Loop Antenna	EMCO	6502	00042960	2015-08-23	2016-08-22
ESPI Test Receiver	R&S	ESI26	838786/013	2015-08-22	2016-08-21
3m OATS			N/A	2015-08-24	2016-08-23
Horn Antenna	R&S	BBHA 9170	BBHA9170265	2015-08-24	2016-08-23
Horn Antenna	R&S	BBHA 9120D	9120D-631	2015-08-24	2016-08-23
Power meter	Anritsu	ML2487A	6K00003613	2015-08-22	2016-08-21
Power sensor	Anritsu	MA2491A	32263	2015-08-22	2016-08-21
Bilog Antenna	Schwarebeck	VULB9163	9163/340	2015-08-23	2016-08-21
LISN	AFJ	LS16C	10010947251	2015-08-22	2016-08-21
LISN (Three Phase)	Schwarebeck	NSLK 8126	8126453	2015-08-23	2016-08-22
9*6*6 Anechoic			N/A	2015-08-24	2016-08-23
EMI Test Receiver	RS	ESCS30	100139	2015-08-22	2016-08-21

#### 2.1 **Auxiliary Equipment**

Name	Model No.	Rating	Manufacturer	FCC ID/DOC
Passive				
Earphone				

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#### 3.0 **Technical Details**

#### 3.1 **Summary of test results**

The EUT has been tested according to the following specifications:

Requirement	CFR 47 Section	Result	Notes
Antenna Requirement	15.203, 15.247(b)(4)	PASS	Complies
Maximum Peak Out Power	15.247 (b)(1), (4)	PASS	Complies
Carrier Frequency Separation	15.247(a)(1)	PASS	Complies
20dB Channel Bandwidth	15.247 (a)(1)	PASS	Complies
Number of Hopping Channels	15.247(a)(iii), 15.247(b)(1)	PASS	Complies
Time of Occupancy (Dwell Time)	15.247(a)(iii)	PASS	Complies
Spurious Emission, Band Edge, and Restricted bands	15.247(d),15.205(a), 15.209 (a),15.109	PASS	Complies
Conducted Emissions	15.207(a), 15.107	PASS	Complies
RF Exposure	15.247(i), 1.1307(b)(1)	PASS	Complies

#### 3.2 **Test Standards**

FCC Part 15 Subpart & Subpart C, Paragraph 15.247 and ANSI C63.4:2014 AND ANSI C63.10:2013

#### 4.0 **EUT Modification**

No modification by SHENZHEN TIMEWAY TESTING LABORATORIES.

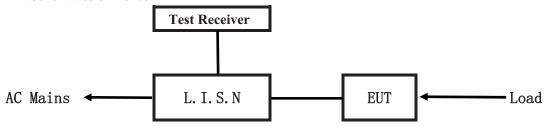
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#### 5. **Power Line Conducted Emission Test**

#### 5.1 Schematics of the test

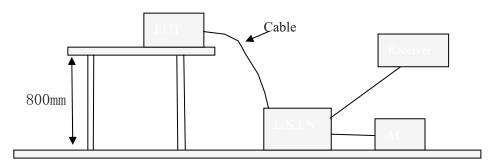


**EUT: Equipment Under Test** 

#### 5.2 Test Method and test Procedure

The EUT was tested according to ANSI C63.4-2014. The Frequency spectrum From 0.15MHz to 30MHz was investigated. The LISN used was 50ohm/50uH as specified by section 5.1 of ANSI C63.4 -2014.

Test Voltage: 120V~60Hz Block diagram of Test setup



#### 5.3 Configuration of The EUT

The EUT was configured according to ANSI C63.4-2014. All interface ports were connected to the appropriate peripherals. All peripherals and cables are listed below.

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#### A. EUT

Device	Manufacturer	Model	FCC ID
Tablet PC	Shenzhen Jingwah Information	W109GA, 1081, 1016,	RBD-W109GA
Tablet PC	Technology Co., Ltd.	1016s, 1032	KDD-W109GA

#### B. Internal Device

Device	Manufacturer	Model	Rating

#### C. Peripherals

Device	Manufacturer	Model	FCC ID/DOC	Cable
				1

#### 5.4 **EUT Operating Condition**

Operating condition is according to ANSI C63.4 -2014.

- A Setup the EUT and simulators as shown on follow
- В Enable AF signal and confirm EUT active to normal condition

#### 5.5 Power line conducted Emission Limit according to Paragraph 15.107,15.207

Frequency	Class A Lim	its (dB µ V)	Class B Limits (dB µ V)		
(MHz)	Quasi-peak Level	Average Level	Quasi-peak Level	Average Level	
$0.15 \sim 0.50$	79.0	66.0	66.0~56.0*	56.0~46.0*	
$0.50 \sim 5.00$	73.0	60.0	56.0	46.0	
5.00 ~ 30.00	73.0	60.0	60.0	50.0	

Notes:

- 1. \*Decreasing linearly with logarithm of frequency.
- 2. The tighter limit shall apply at the transition frequencies

#### 5.6 Test Results

The frequency spectrum from 0.15MHz to 30MHz was investigated. All reading are quasi-peak values with a resolution bandwidth of 9kHz.

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# A: Conducted Emission on Live Terminal (150kHz to 30MHz)

**EUT Operating Environment** 

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

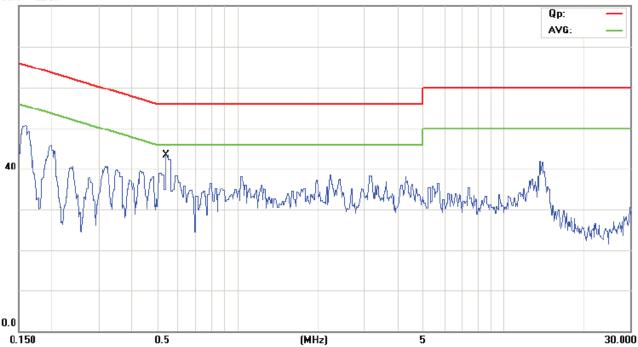
**EUT set Condition: Keep Bluetooth Transmitting** 

**Equipment Level: Class B** 

**Results: PASS** 

Please refer to following diagram for individual

### 80.0 dBuV



No. Mk.	Freq.	Reading Level	Correct Factor	Measure- ment	Limit	Over		
	MHz	dBuV	dB	dBuV	dBuV.	dB	Detector	Comment
1 *	0.5393	27.80	11.41	39.21	56.00	-16.79	QP	
2	0.5393	17.50	11.41	28.91	46.00	-17.09	AVG	

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# B: Conducted Emission on Neutral Terminal (150kHz to 30MHz)

**EUT Operating Environment** 

Temperature: 26°C Humidity: 65%RH Atmospheric Pressure: 101 KPa

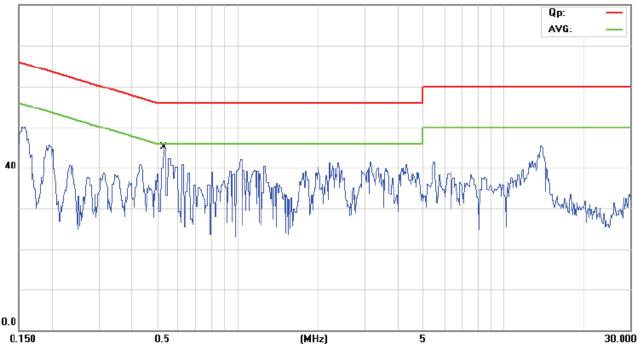
**EUT set Condition: Keep Bluetooth Transmitting** 

**Equipment Level: Class B** 

**Results: Pass** 

Please refer to following diagram for individual

# 80.0 dBuV



No. Mk.	Freq.	Reading Level		Measure- ment		Over		
	MHz	dBuV.	dB	dBuV	dBuV	dB	Detector	Comment
1 *	0.5304	19.70	11.40	31.10	56.00	-24.90	QP	
2	0.5304	-3.00	11.40	8.40	46.00	-37.60	AVG	

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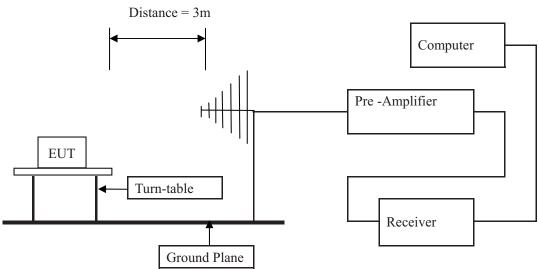
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#### **6** Radiated Emission Test

- 6.1 Test Method and test Procedure:
- (1) The EUT was tested according to ANSI C63.10–2013. The radiated test was performed at Timeway Laboratory. This site is on file with the FCC laboratory division, Registration No.899988
- (2) The EUT, peripherals were put on the turntable which table size is 1m x 1.5 m, table high 0.8 m. All set up is according to ANSI C63.10–2013.
- (3) The frequency spectrum from 30 MHz to 25GHz was investigated. All readings from 30 MHz to 1 GHz are quasi-peak values with a resolution bandwidth of 120 kHz. For measurement above 1GHz, peak values with RBW=VBW=1MHz and PK detector. AV value with RBW=1MHz, VBW=10Hz and PK detector. Measurements were made at 3 meters.
- (4) The antenna high is varied from 1 m to 4 m high to find the maximum emission for each frequency.
- (5) Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "**QP**" in the data table.
- (6) The antenna polarization: Vertical polarization and Horizontal polarization.

# **Block diagram of Test setup**



- 6.2 Configuration of The EUT
  Same as section 5.3 of this report
- 6.3 EUT Operating Condition
  Same as section 5.4 of this report.

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#### 6.4 Radiated Emission Limit

All emission from a digital device, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strength specified below:

### Frequencies in restricted band are complied to limit on Paragraph 15.209 and 15.109

	-	<u> </u>
Frequency Range (MHz)	Distance (m)	Field strength (dB µ V/m)
30-88	3	40.0
88-216	3	43.5
216-960	3	46.0
Above 960	3	54.0

Note:

- 1. RF Voltage  $(dBuV) = 20 \log RF \text{ Voltage } (uV)$
- 2. In the Above Table, the higher limit applies at the band edges.
- 3. Distance refers to the distance in meters between the measuring instrument antenna and the EUT
- 4. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
- 5. All modulation have been tested ,GFSK was found as the worst case and only reported

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#### Test result

#### General Radiated Emission Data and Harmonics Radiated Emission Data

### Radiated Emission In Horizontal/Vertical (30MHz----1000MHz)

EUT set Condition: Keep Bluetooth Transmitting

**Results:** Pass

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \( \mu \)V/m)
81.400	32.72	Н	40.00
147.160	36.32	Н	43.50
239.920	42.95	Н	46.00
104.880	36.18	Н	43.50
48.800	33.35	V	40.00
79.960	31.99	V	40.00
125.040	37.68	V	43.50
800.000	44.89	V	46.00

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# Test Figure:

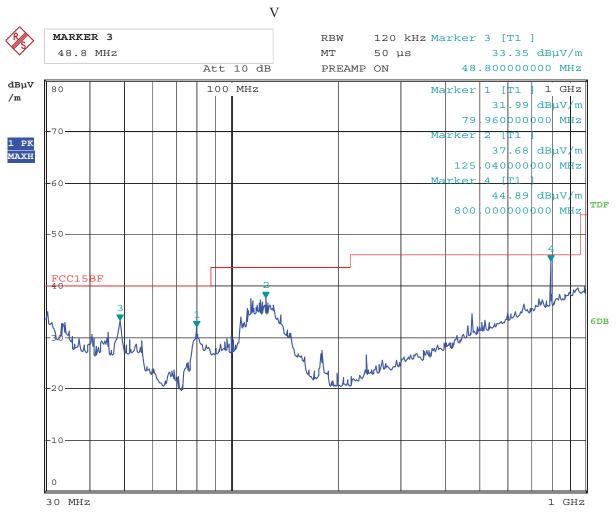
H MARKER 4 RBW 120 kHz Marker 4 [T1] 32.71 dBµV/m 81.4 MHz MT50 µs Att 10 dB PREAMP ON 81.400000000 MHz  $d B \mu V \\$ 80 100 MHz Marker 1 [T1 /m 36.32 dBµV/m 147 160000000 M 1 PK MAXH 95 dВ 239 920000000 M 36 18 dВ TDF 104 880000000 M FCC15BF 6DB 30 MHz 1 GHz

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# Test Figure:



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# Operation Mode: Transmitting under Low Channel (2402MHz)

Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \u03b4 V/m)
4804		Н	74(Peak)/ 54(AV)
4804		V	74(Peak)/ 54(AV)
7206		H/V	74(Peak)/ 54(AV)
9608		H/V	74(Peak)/ 54(AV)
12010		H/V	74(Peak)/ 54(AV)
14412		H/V	74(Peak)/ 54(AV)
16814		H/V	74(Peak)/ 54(AV)
19216		H/V	74(Peak)/ 54(AV)
21618		H/V	74(Peak)/ 54(AV)
24020		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark "---" means that the emissions level is too low to be measured

#### Operation Mode: Transmitting g under Middle Channel (2441MHz)

Frequency (MHz)	Level@3m (dB \u03ba V/m)	Antenna Polarity	Limit@3m (dB \u03b4 V/m)
4882	-	Н	74(Peak)/ 54(AV)
4882		V	74(Peak)/ 54(AV)
7323		H/V	74(Peak)/ 54(AV)
9764		H/V	74(Peak)/ 54(AV)
12205		H/V	74(Peak)/ 54(AV)
14646		H/V	74(Peak)/ 54(AV)
17087		H/V	74(Peak)/ 54(AV)
19528		H/V	74(Peak)/ 54(AV)
21969		H/V	74(Peak)/ 54(AV)
24410		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

2. Remark "---" means that the emissions level is too low to be measured

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# Operation Mode: Transmitting under High Channel (2480MHz)

1	0 0	,	
Frequency (MHz)	Level@3m (dB \u03b4 V/m)	Antenna Polarity	Limit@3m (dB \u03b4 V/m)
4960		Н	74(Peak)/ 54(AV)
4960		V	74(Peak)/ 54(AV)
7440		H/V	74(Peak)/ 54(AV)
9920		H/V	74(Peak)/ 54(AV)
12400		H/V	74(Peak)/ 54(AV)
14880		H/V	74(Peak)/ 54(AV)
17360		H/V	74(Peak)/ 54(AV)
19840		H/V	74(Peak)/ 54(AV)
22320		H/V	74(Peak)/ 54(AV)
24800		H/V	74(Peak)/ 54(AV)

Note: 1. Level = Reading + AF + Cable - Preamp + Filter - Dist, Margin = Level - Limit

<sup>2.</sup> Remark "---" means that the emissions level is too low to be measured

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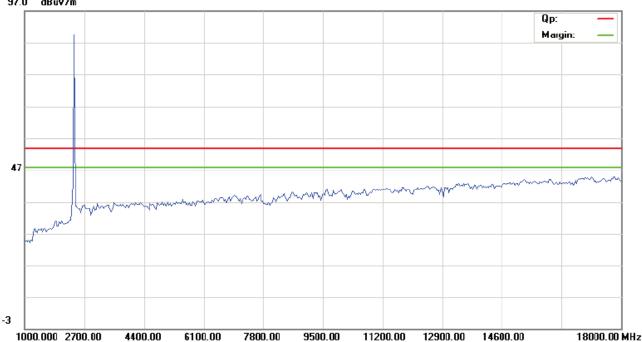
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Please refer to the following test plots for details:

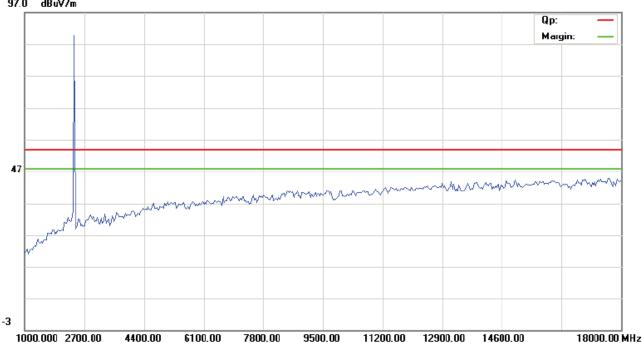
#### Low Channel: Horizontal





### Low Channel: Vertical

### 97.0 dBuV/m



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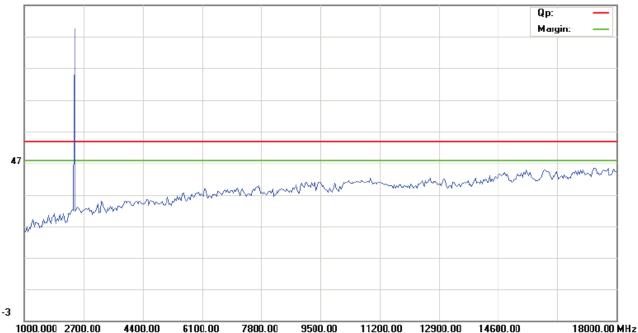
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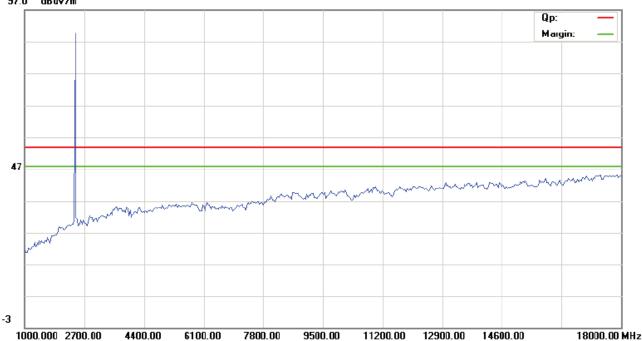
### Middle Channel: Horizontal





#### Middle Channel: Vertical

#### 97.0 dBuV/m



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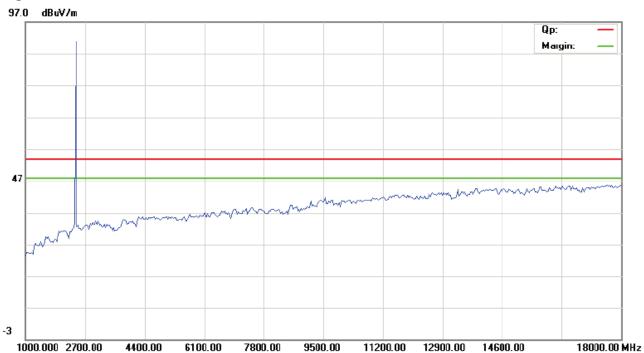
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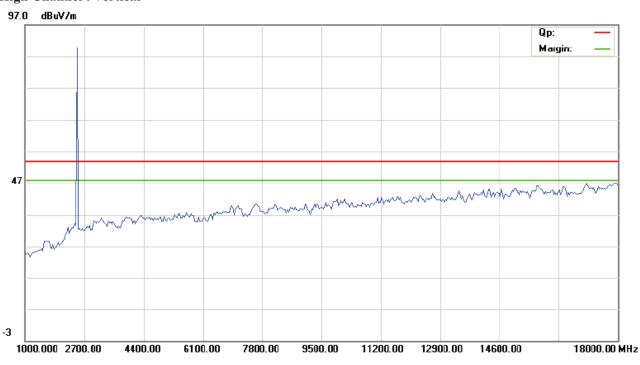
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### **High Channel: Horizontal**



#### **High Channel: Vertical**



## Note: for the radiated emissions above 18G, it is the floor noise.

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#### 7.0 20dB Bandwidth Measurement

### 7.1 Regulation

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§ 15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated.

#### 7.2 Limits of 20dB Bandwidth Measurement

N/A

#### 7.3 Test Procedure.

- 1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span =3MHz, RBW =30 kHz, VBW=100 kHz, Sweep = auto Detector function = peak, Trace = max hold
- 3. Measure the highest amplitude appearing on spectral display and record the level to calculate results. 6. Repeat above procedures until all frequencies measured were complete.

#### 7.4 Test Result

Type of Modulation: GFSK

Type of Modulation. G1 513							
EUT	UT Tablet PC		Model		W109GA		
Mode	9	Keep Trai	nsmitting	Input Voltage			DC3.7V
Tempera	ture	24 de	g. C,	Hum	Humidity		56% RH
Channel	Cha	nnel Frequency (MHz)	20 dB Bar (kH:		Maximum Limit (kHz)		Pass/ Fail
Low		2402	2402 890				Pass
Middle		2441	890	)			Pass
High		2480	890	)			Pass

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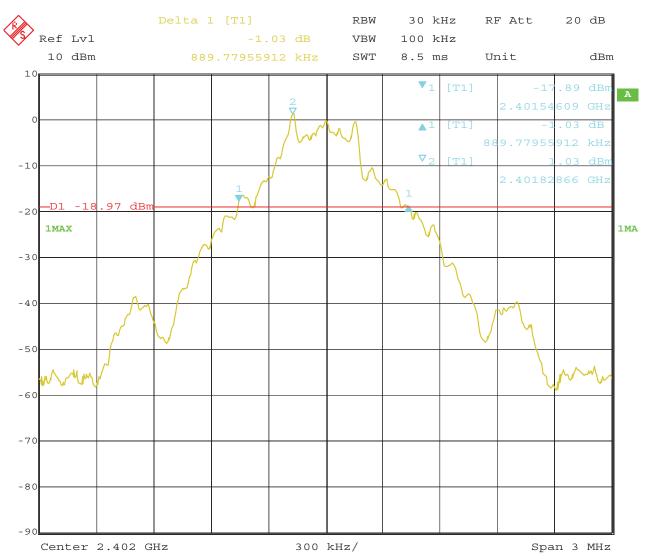
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### Test Figure:

# 1. Condition: Low Channel

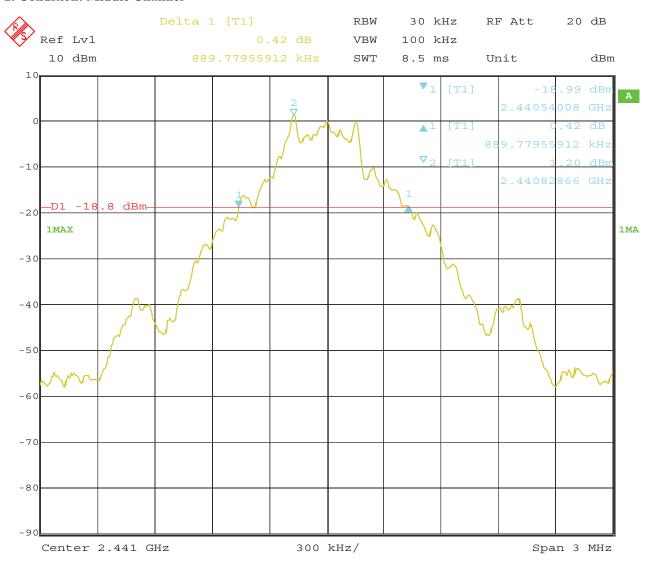


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#### 2. Condition: Middle Channel

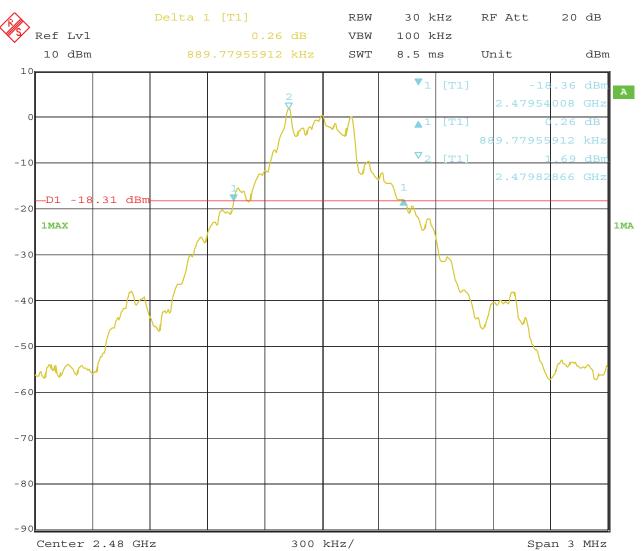


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# 3. High Channel



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### **Test Result**

Type of Modulation:  $\sqrt{J}/4DQPSK$ 

EUT		Tablet PC Model				W109GA			
Mode	;	Keep Tra	ansmitting Input Voltage DC3.7V		Input Voltage		age		DC3.7V
Tempera	ture	24 de	eg. C,	Humidit	Humidity		56% RH		
Channel	Cha	nnel Frequency (MHz)	20 dB Bai	1,10,11		num Limit kHz)	Pass/ Fail		
Low		2402	2402 113		5		Pass		
Middle	·	2441	113	66			Pass		
High	·	2480	113	66			Pass		

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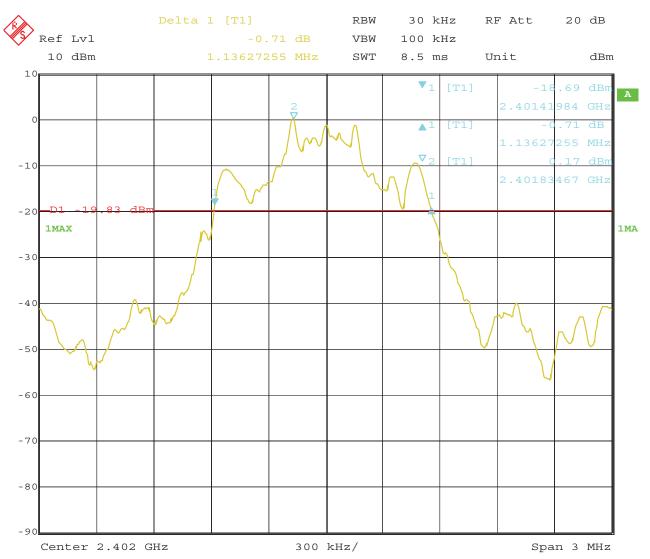
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### Test Figure:

### 1. Condition: Low Channel

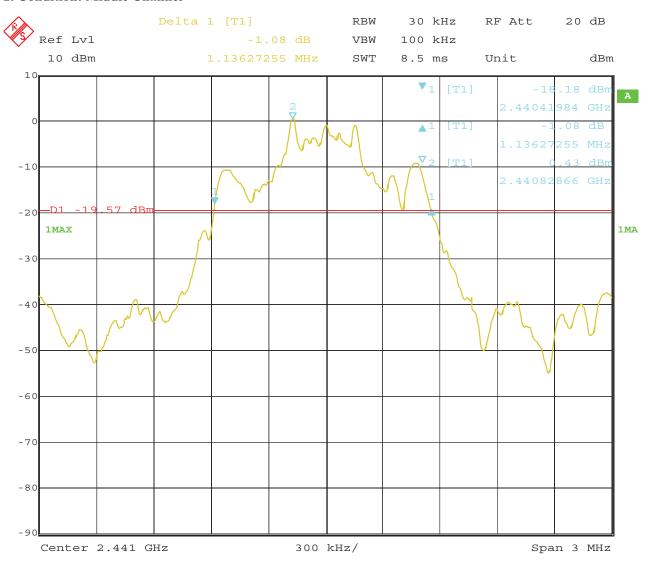


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#### 2. Condition: Middle Channel

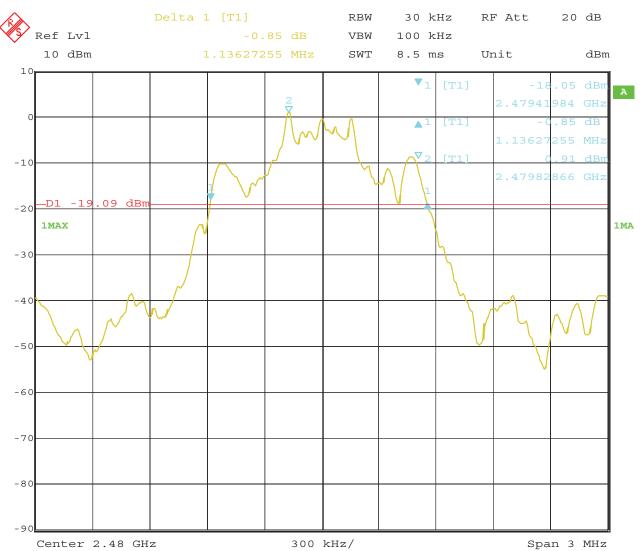


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# 3. High Channel



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#### **Test Result**

**Type of Modulation: 8DPSK** 

EUT	1	Table	et PC	Model		,	W109GA		
Mode	Э	Keep Tra	nsmitting Input Voltage DC3.7V		Input Voltage		DC3.7V		
Tempera	ture	24 de	eg. C,	Humidity 56% RH		56% RH			
Channel	Cha	nnel Frequency (MHz)		andwidth Maxi		mum Limit (kHz)	Pass/ Fail		
Low		2402	11	1160		1160			Pass
Middle		2441	11	1160			Pass		
High		2480	1166				Pass		

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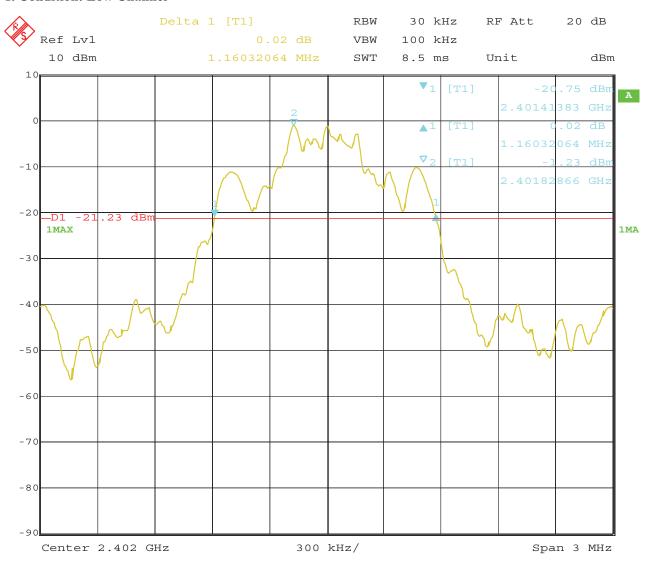
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### Test Figure:

# 1. Condition: Low Channel

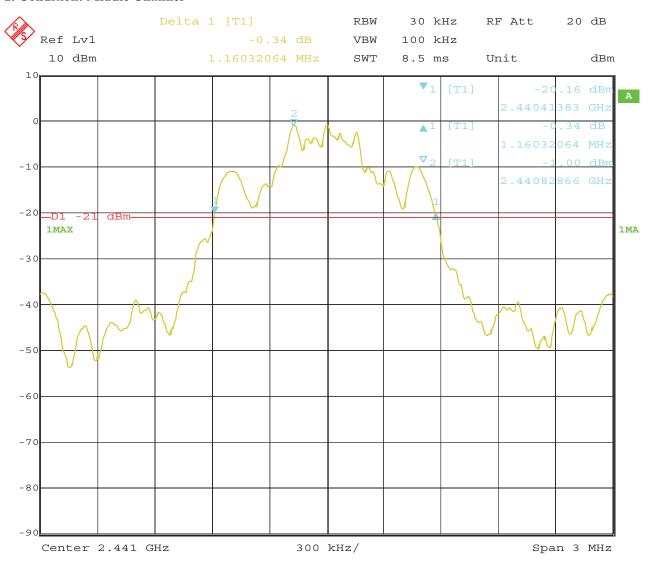


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#### 2. Condition: Middle Channel

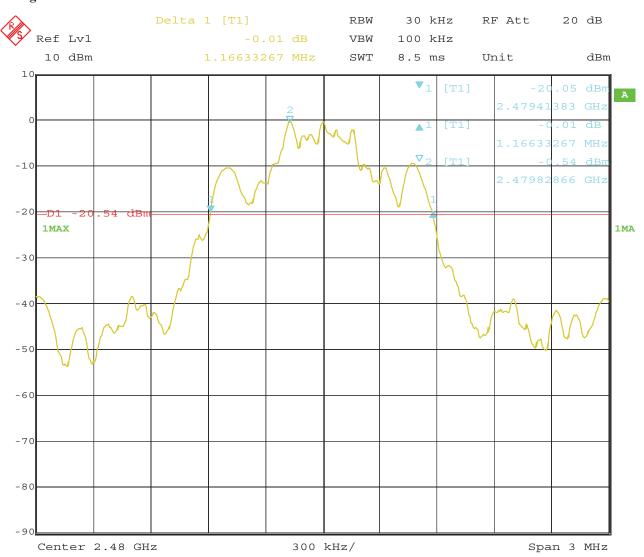


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### 3. High Channel



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### 8. Maximum Output Power

#### 8.1 Regulation

According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5MHz band:0.125 watts. According to §15.247(b)(4), the conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

### 8.2 Limits of Maximum Output Power

The Maximum Output Power Measurement is 30dBm.

#### **8.3 Test Procedure**

- 1. Check the calibration of the measuring instrument (spectrum analyzer) using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = approximately 5 times the 20 dB bandwidth, centered on a hopping channel; RBW > the 20 dB bandwidth of the emission being measured; VBW = 10MHz, RBW=3MHz; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Measure the highest amplitude appearing on spectral display and record the level to calculate results.
- 4. Repeat above procedures until all frequencies measured were complete.

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#### **8.4Test Results**

### Type of Modulation: GFSK

EUT		Tablet PC Model		W109GA			
Mode		Keep Tran	smitting	Input Vo	Voltage		DC3.7V
Temperature	e	24 deg	. C,	Humidity	7		56% RH
Channel	Cł	nannel Frequency (MHz)	Max. Power (dBm)		Power Limit (dBm)		Pass/ Fail
Low		2402	2.40			30	Pass
Middle		2441	2.54	·		30	Pass
High		2480	3.09			30	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

2. The worse case was recorded

#### Type of Modulation: $\pi/4DQPSK$

EUT		Table	t PC	Model			W109GA
Mode		Keep Tran	nsmitting	Input Vo	nput Voltage		DC3.7V
Temperature	e	24 de <sub>8</sub>	g. C,	Humidit	у		56% RH
Channel	Ch	nannel Frequency (MHz)	Max. Power (dBm)	-	Peak Power Limit (dBm)		Pass/ Fail
Low		2402	2.32		3	30	Pass
Middle		2441	2.54	·		30	Pass
High		2480	2.89			30	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

2. The worse case was recorded

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# **Type of Modulation: 8DPSK**

EUT		Table	t PC	Model			W109GA
Mode		Keep Tran	smitting	Input V	oltage		DC3.7V
Temperature	e	24 deş	g. C,	Humid	ity		56% RH
Channel	Ch	nannel Frequency (MHz)	Max. Power C (dBm)	Output	Peak Power Limit (dBm)		Pass/ Fail
Low		2402	2.30		30		Pass
Middle		2441	2.46		30		Pass
High		2480	2.85	2.85		0	Pass

Note: 1. the result basic equation calculation as follow:

Max. Power Output = Power Reading + Cable loss + Attenuator

2. The worse case was recorded

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## 9. Carrier Frequency Separation

### 9.1 Regulation

According to §15.247(a)(1), frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW.

## 9.2 Limits of Carrier Frequency Separation

The Maximum Power Spectral Density Measurement is 25kHz or two-thirds of the 20dB bandwidth of the hopping Channel which is great.

### 9.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = wide enough to capture the peaks of two adjacent channels: Resolution (or IF) Bandwidth (RBW)  $\geq$  1% of the span; Video (or Average) Bandwidth (VBW)  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Measure the separation between the peaks of the adjacent channels using the marker-delta function.
- 4. Repeat above procedures until all frequencies measured were complete.

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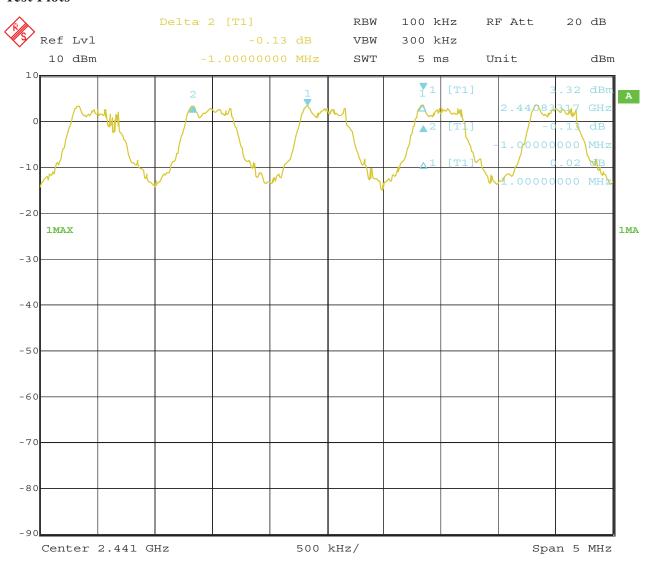


### 9.4Test Result

### **Type of Modulation: GFSK**

JPC OT INTOGRATION	011/ 01/012				
EUT	Tablet PC		Model	W109GA	
Mode	Hopping On		Input Voltage	DC3.7V	
Temperature	24 deg. C,		Humidity	56% RH	
Carrier Frequency Separation			Limit		Pass/ Fail
1.000MHz		≥ 2	25 kHz or 2/3 of the 2	Pass	

## **Test Plots**



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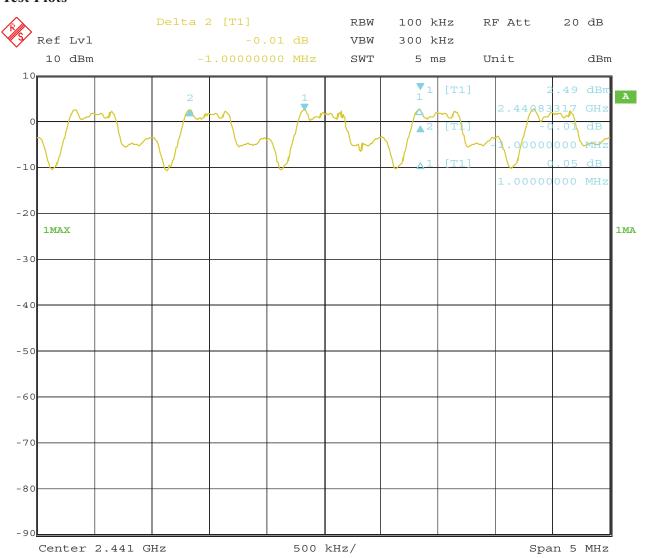
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## Type of Modulation: JI/4DQPSK

EUT	Tablet PC		Model	W109GA	
Mode	Hopping On		Input Voltage	DC3.7V	
Temperature	24 deg. C,		Humidity	56% RH	
Carrier Frequency Separation		Limit		Pass/ Fail	
1.000MHz		≥	25 kHz or 2/3 of 2	Pass	

## **Test Plots**



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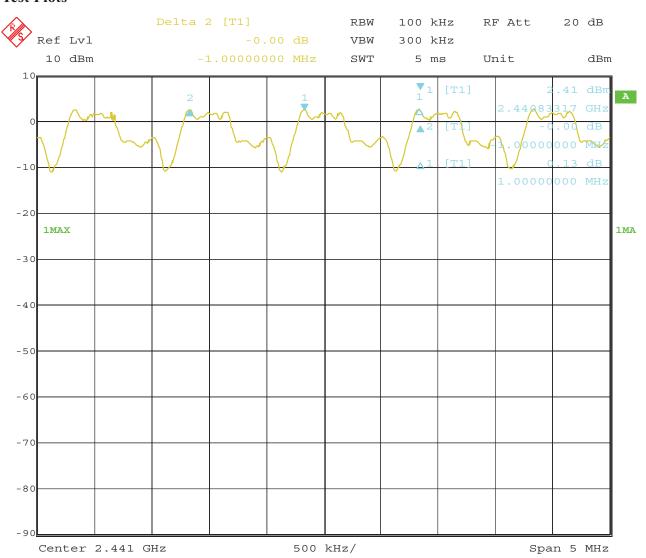
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## **Type of Modulation: 8DPSK**

EUT	Tablet PC	Model	W109GA		
Mode	Hopping On		Input Voltage	DC3.7V	
Temperature	24 deg. C,		Humidity	56% RH	
Carrier Frequency Separation			Limit		Pass/ Fail
	≥ 2	5 kHz or 2/3 of 2	0 dB bandwidth	Pass	

## **Test Plots**



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## 10. Number of Hopping Channels

### 10.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used. According to §15.247(b)(1), for frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

## 10.2 Limits of Number of Hopping Channels

The frequency hopping systems in the 2400-2483.5MHz band shall use at least 15 channels.

### **10.3 Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = the frequency band of operation; RBW=100 kHz, VBW=300 kHz; Sweep = auto; Detector function = peak; Trace = max hold
- 3. Record the number of hopping channels.

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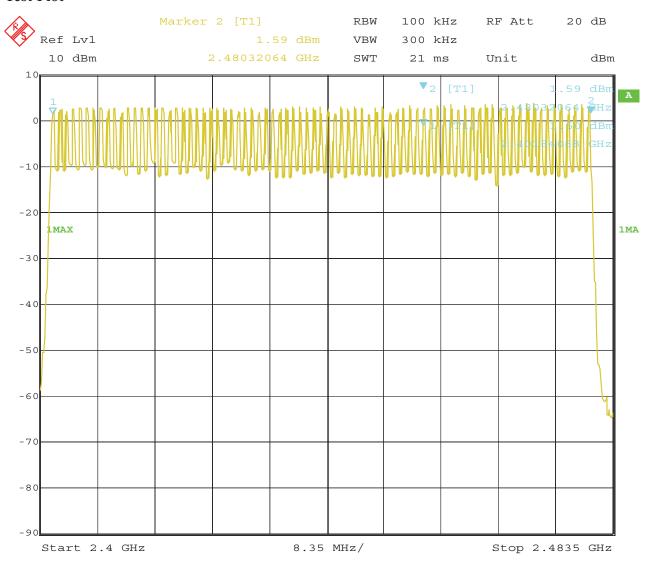


### 10.4Test Result

## Type of Modulation: GFSK

EUT	Tablet PC		Model	W109GA	
Mode		Hopping On	Input Voltage	DC3.7V	
Temperature	24 deg. C,		Humidity	56% RH	
Operating Frequen	Operating Frequency Number of hopping channels		oing channels	Limit	Pass/ Fail
2402-2480MHz	480MHz 79			≥ 15	Pass

## **Test Plot**



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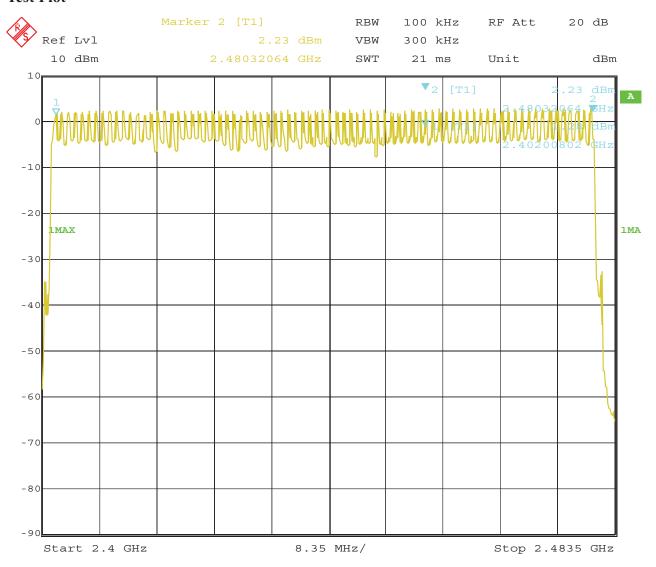
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## Type of Modulation: $\sqrt{1/4}$ DQPSK

EUT	Tablet PC		Model		W109GA	
Mode	Hopping On		Input V	oltage	nge DC3.7V	
Temperature	24 deg. C,		Humidi	ity 56		56% RH
Operating Frequer	Number of hopp channels		oing	Liı	mit	Pass/ Fail
2402-2480MHz	Iz 79			≥ 15		Pass

## **Test Plot**



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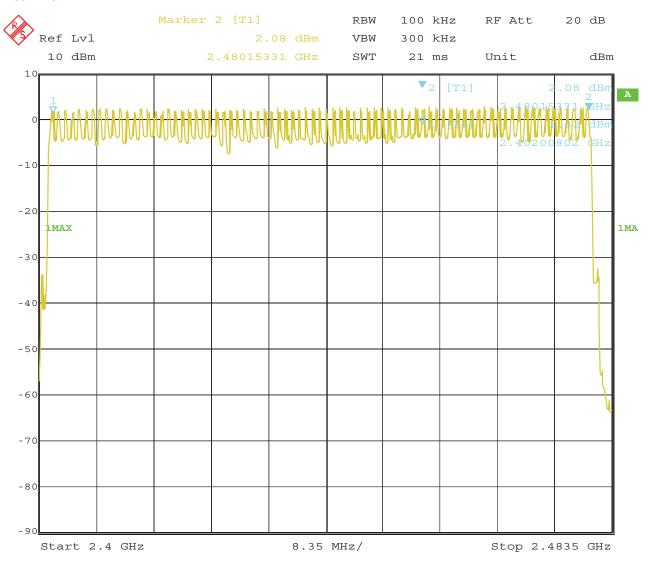
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## **Type of Modulation: 8DPSK**

EUT	Tablet PC		Model		W109GA	
Mode	Hopping On		Input V	oltage		DC3.7V
Temperature	24 deg. C,		Humidi	ty	56% RH	
Operating Frequency  Number of hoperating channels		oing	Liı	nit	Pass/ Fail	
2402-2480MHz 79			2	≥ 15 Pass		

## **Test Plot**



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## 11. Time of Occupancy (Dwell Time)

### 11.1 Regulation

According to §15.247(a)(1)(iii), frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

## 11.2 Limits of Carrier Frequency Separation

The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed

### 11.3 Test Procedure

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Set the spectrum analyzer as follows: Span = zero span, centered on a hopping channel; RBW = 1 MHz; VBW
- ≥ RBW; Sweep = as necessary to capture the entire dwell time per hopping channel; Detector function = peak; Trace = max hold
- 3. Measure the dwell time using the marker-delta function.
- 4. Repeat above procedures until all frequencies measured were complete.
- 5. Repeat this test for different modes of operation (e.g., data rate, modulation format, etc.), if applicable.

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### 11.4 Test Result

Type of Modulation: GFSK

EUT	Tab	Tablet PC		V	V109GA			
Mode	Keep Tr	ansmitting	Input Voltage	I	DC3.7V			
Temperature	24 d	leg. C,	Humidity	56% RH				
Channel	Reading	Hoping	g Rate	Actual	Limit			
	DH5							
Middle	0.220ms	266.66	7 hop/s	0.0235s	0.4s			
			DH3					
Middle	0.261ms	400 hop/s		0.0418s	0.4s			
DH1								
Middle	0.240ms	800 1	nop/s	0.0768s	0.4s			

Actual = Reading × (Hopping rate / Number of channels) × Test period, Test period = 0.4 [seconds / channel] × 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

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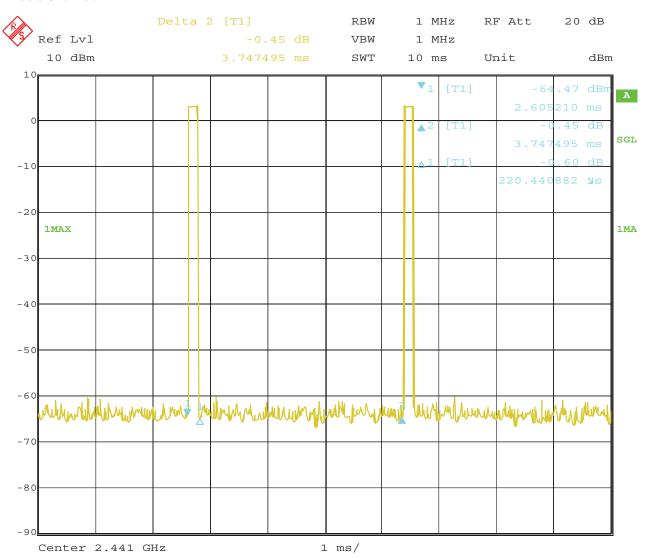
Date: 2016-07-20



Test Plots:

### DH<sub>5</sub>

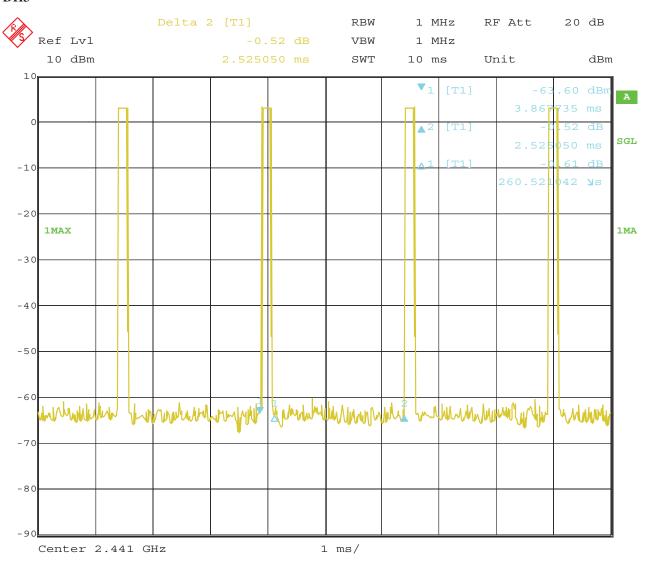
Middle Channel:



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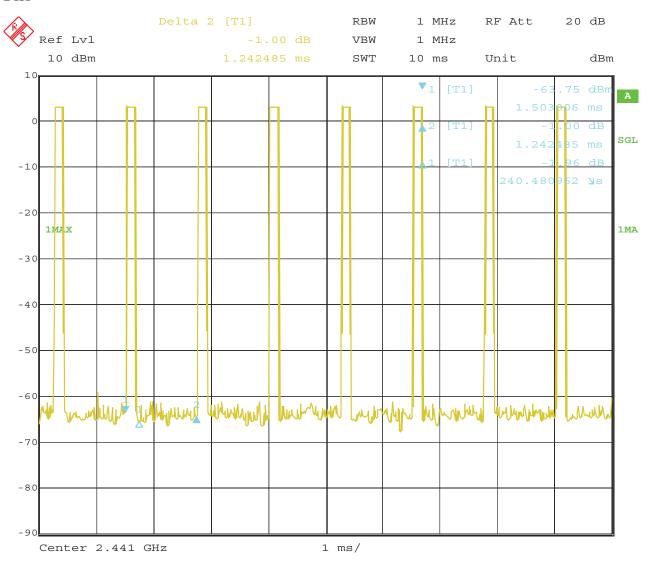




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## **Test Result**

Type of Modulation: Л/4DQPSK

EUT	Tab	Tablet PC		V	/109GA			
Mode	Keep Tra	ansmitting	Input Voltage	Ι	OC3.7V			
Temperature	24 d	eg. C,	Humidity	56% RH				
Channel	Reading	Hoping	g Rate	Actual	Limit			
	DH5							
Middle	0.200ms	266.66	7 hop/s	0.0213s	0.4s			
			DH3					
Middle	0.261ms	400 hop/s		0.0418s	0.4s			
DH1								
Middle	0.240ms	800 1	nop/s	0.0768s	0.4s			

Actual = Reading × (Hopping rate / Number of channels) × Test period, Test period = 0.4 [seconds / channel] × 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

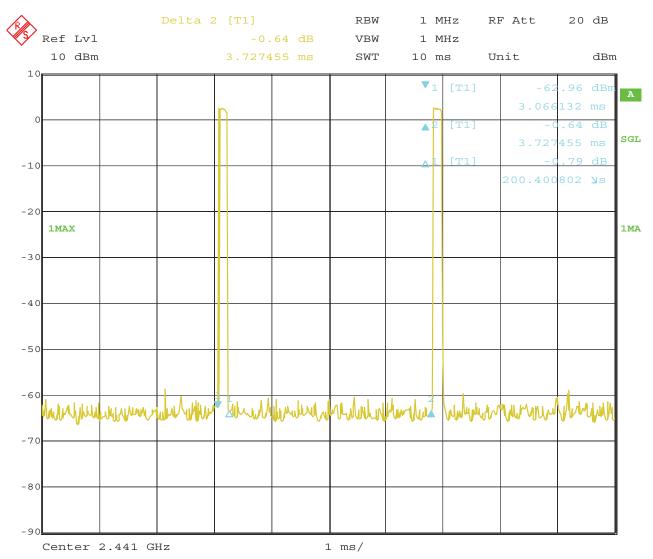
A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

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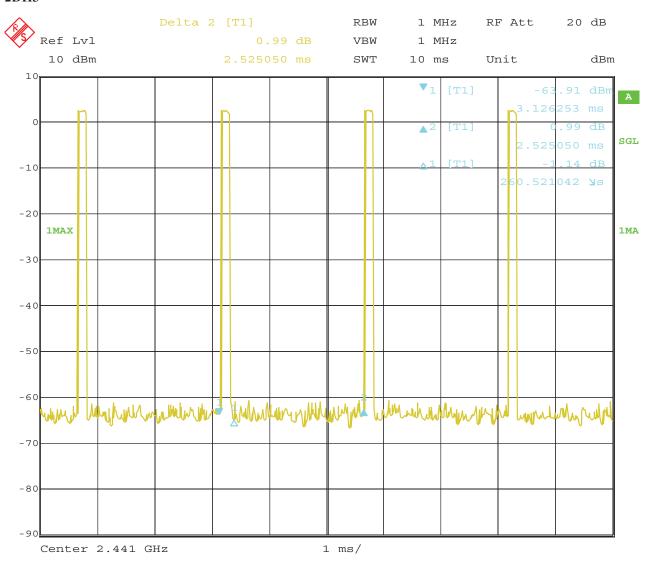
### Test Plots:



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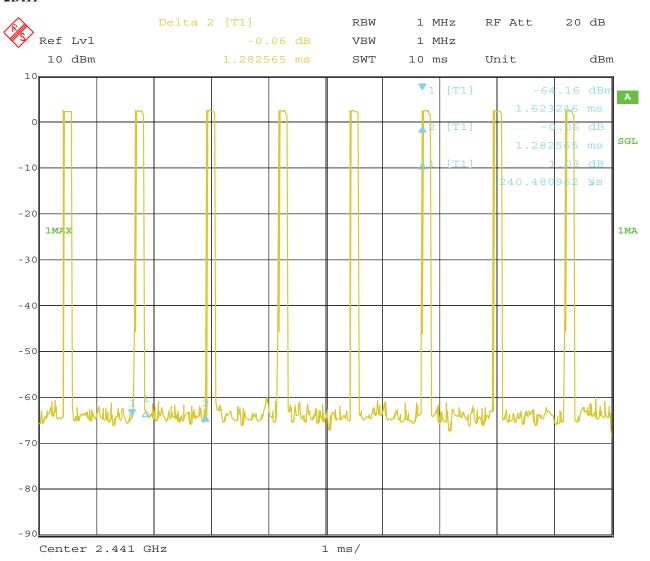




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## **Type of Modulation: 8DPSK**

-3 P	Type of Modulation of Six							
EUT	Tab	Tablet PC		V	V109GA			
Mode	Keep Tr	ansmitting	Input Voltage	I	DC3.7V			
Temperature	e 24 d	leg. C,	Humidity	5	56% RH			
Channel	Reading	Hoping	Hoping Rate		Limit			
	DH5							
Middle	0.220ms	266.66	7 hop/s	0.0235s	0.4s			
			DH3					
Middle	0.200ms	400 hop/s		0.0320s	0.4s			
DH1								
Middle	0.200ms	800 1	nop/s	0.0640s	0.4s			

Actual = Reading × (Hopping rate / Number of channels) × Test period, Test period = 0.4 [seconds / channel] × 79 [channel] = 31.6 [seconds] NOTE: The EUT makes worst case 1600 hops per second or 1 time slot has a length of 625µs with 79 channels.

A DH5 Packet needs 5 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 266.667 hops per second with 79 channels.

A DH3 Packet needs 3 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 400 hops per second with 79 channels.

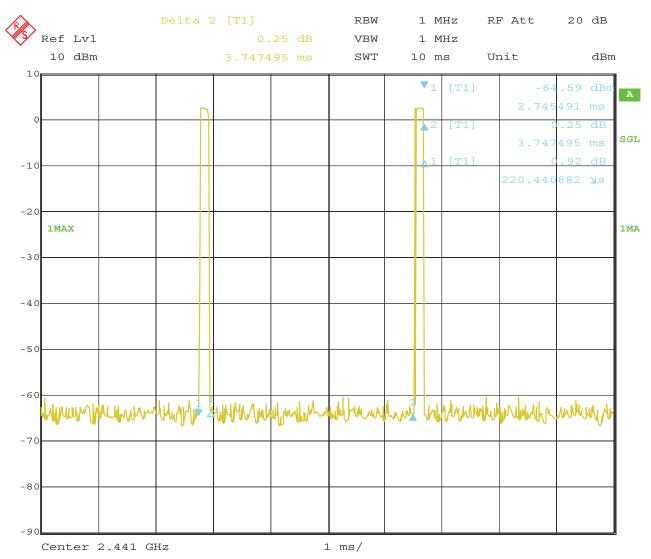
A DH1 Packet needs 1 time slot for transmitting and 1 time slot for receiving. Then the EUT makes worst case 800 hops per second with 79 channels.

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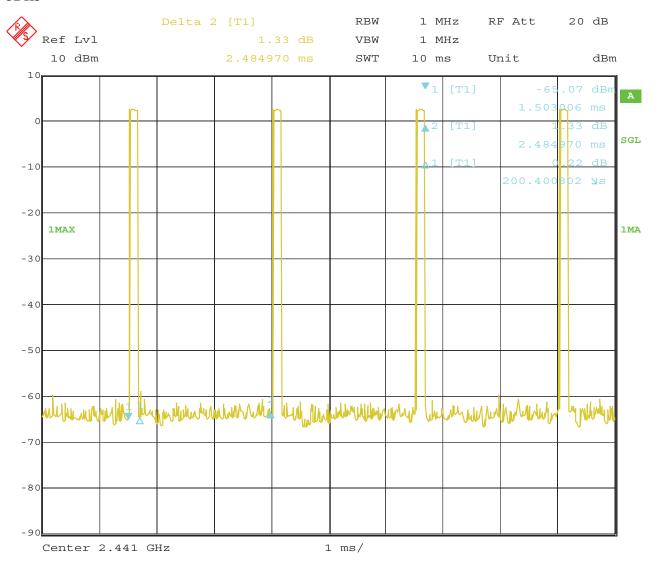
### Test Plots:



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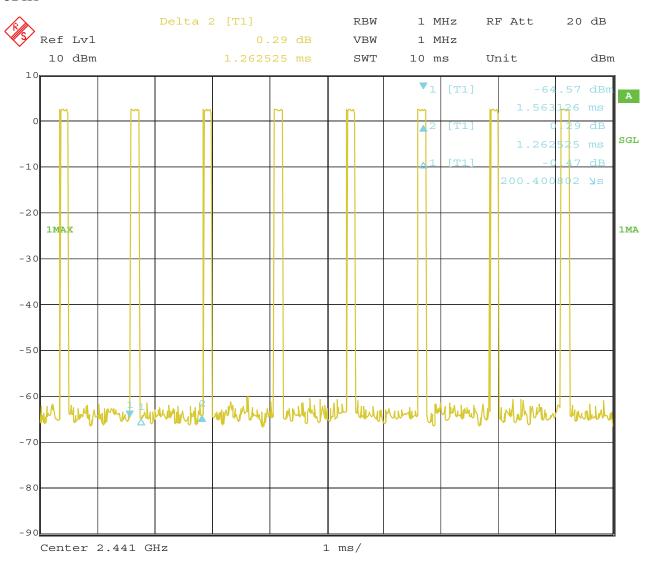




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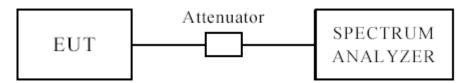
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# 12 Out of Band Measurement

### 12.1 Test Setup



The restricted band requirement based on radiated emission test; please see the clause 6 for the test setup

## 12.2 Limits of Out of Band Emissions Measurement

- 1. Below –20dB of the highest emission level of operating band (in 100kHz Resolution Bandwidth).
- 2. Fall in the restricted bands listed in section 15.205. The maximum permitted average field strength is listed in section 15.209.

### 12.3 Test Procedure

For signals in the restricted bands above and below the 2.4-2.483GHz allocated band a measurement was made of radiated emission test. Peak values with RBW=VBW=1MHz and PK detector.

For bandage test, the spectrum set as follows: RBW=100, VBW=300 kHz. A conducted measurement used

- Note: 1. For band-edge measurement, the frequency from 30MHz-25GHz was tested. And It met the FCC rule.
- 2. This is a handhold device. The radiated emissions should be tested under 3-axes position (Lying, Side, and Stand), After pre-test. It was found that the worse radiated emission was get at the lying position.
- 3. Horizontal and Vertical Polarity were invested and only worse case was recorded.

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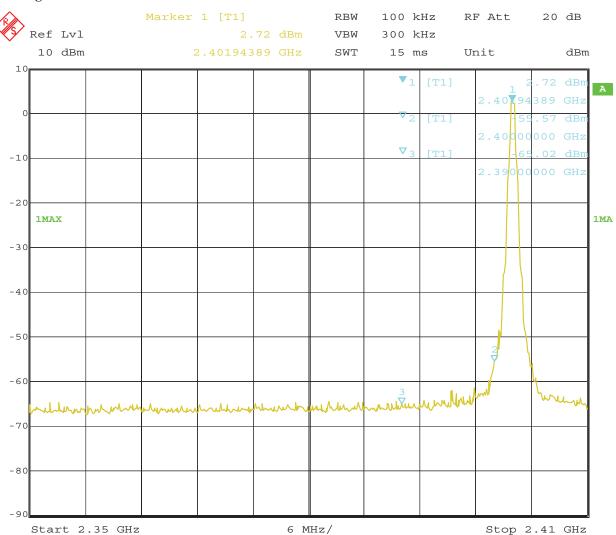


## Type of Modulation: GFSK

#### 12.4 Out of Band Test Result

Product:		Tablet PC	Test Mode:	Low Channel
Mode	Kee	ping Transmitting	Input Voltage	DC3.7V
Temperature		24 deg. C		56% RH
Test Result:		Pass		PK
The Max. FS in	PK (dBµV/m)	46.9		74(dBμV/m)
Restrict Band	AV(dBμV/m)	V(dBμV/m)		54(dBμV/m)
2390MHz				

## **Test Figure:**



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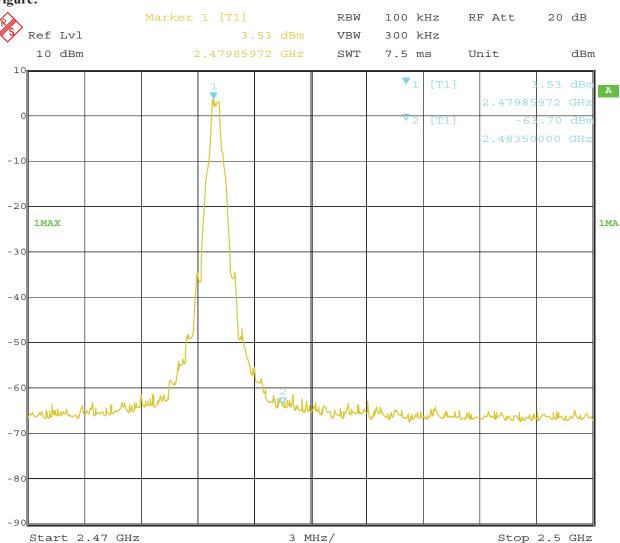


# Type of Modulation: GFSK

#### 12.4 Out of Band Test Result

Product:	Tablet PC		Test Mode:	High Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	43.4		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)	AV(dBμV/m)		54(dBµV/m)
2483.5MHz				

## **Test Figure:**



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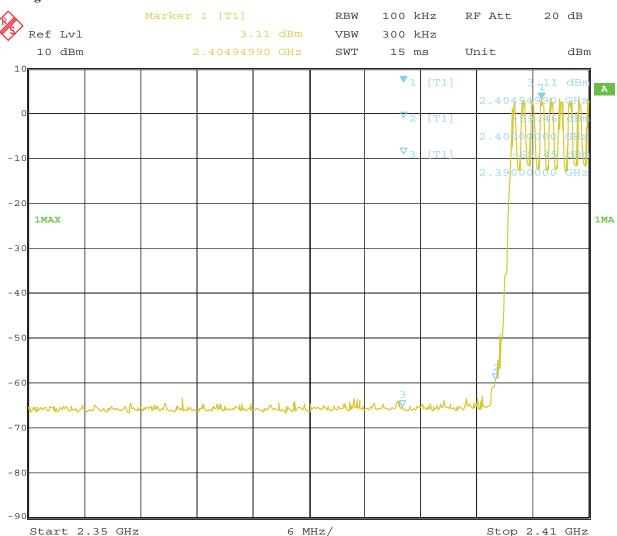


## Type of Modulation: GFSK

### Out of Band Test Result

Product:		Tablet PC	Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:		Pass		PK
The Max. FS in	PK (dBμV/m)	44.7		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	$54(dB\mu V/m)$
2390MHz				

## **Test Figure:**



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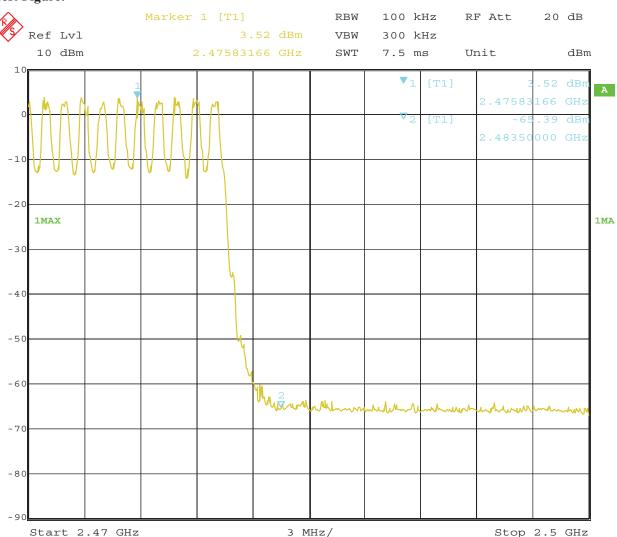


## Type of Modulation: GFSK

### Out of Band Test Result

Product:	Tablet PC		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	42.5		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2483.5MHz				

## **Test Figure:**



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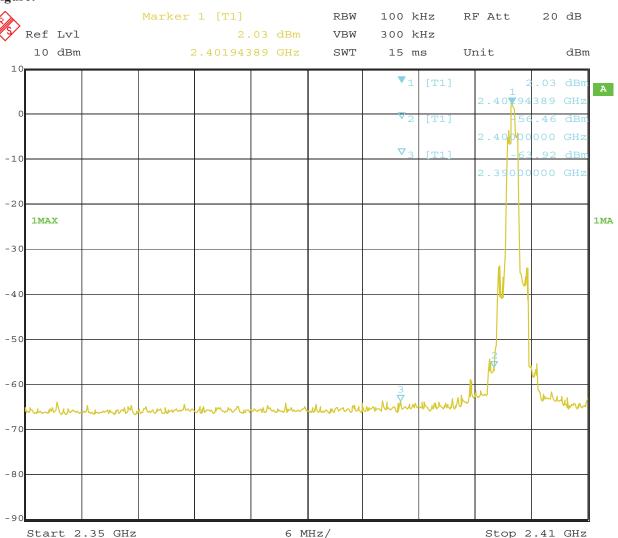


## Type of Modulation: $\sqrt{1/4}$ DQPSK

#### Out of Band Test Result 12.4

Product:	Tablet PC		Test Mode:	Low Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 46.1			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBµV/m)
2390MHz				

## **Test Figure:**



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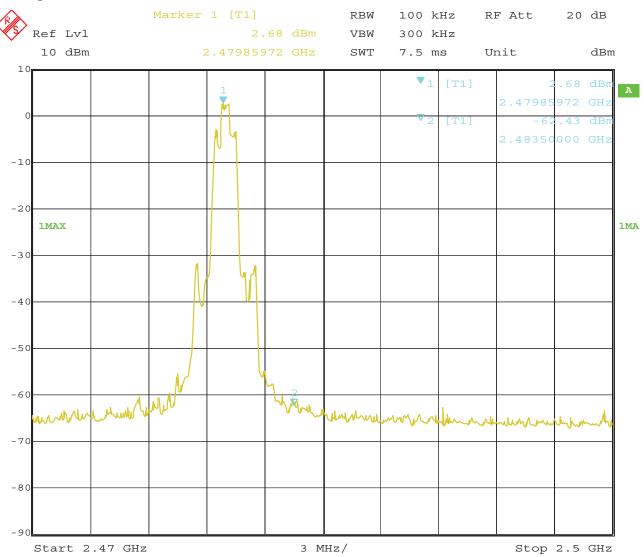


# Type of Modulation: $\sqrt{1/4}$ DQPSK

### 12.4 Out of Band Test Result

Product:	Tablet PC		Test Mode:	High Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 42.2			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	$54(dB\mu V/m)$
2483.5MHz				

## **Test Figure:**



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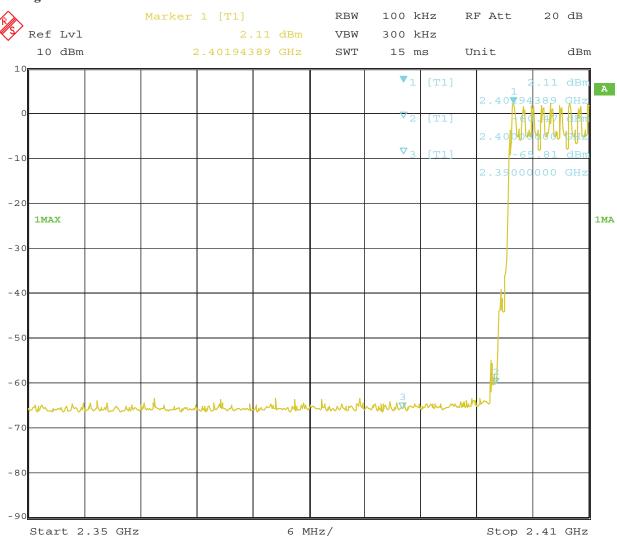


# Type of Modulation: $\sqrt{1/4}$ DQPSK

## Out of Band Test Result

Product:	Tablet PC		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	43.6		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2390MHz				

## **Test Figure:**



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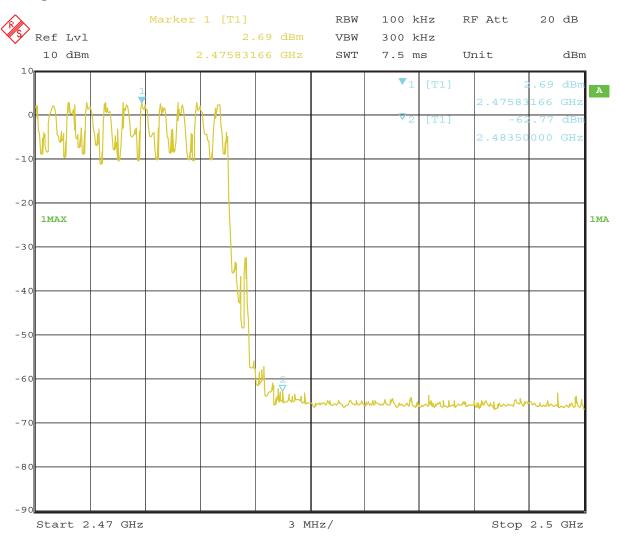


# Type of Modulation: II/4DQPSK

## 12.4 Out of Band Test Result

Product:	Tablet PC		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	41.7		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2483.5MHz				

## **Test Figure:**



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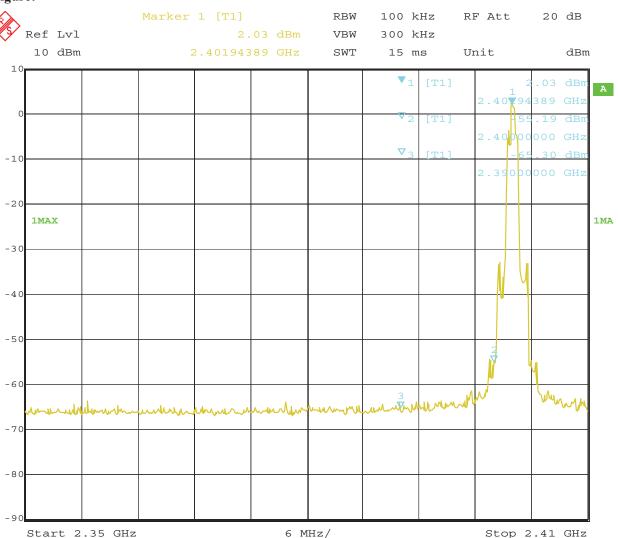


## **Type of Modulation: 8DPSK**

#### 12.4 Out of Band Test Result

Product:	Tablet PC		Test Mode:	Low Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 45.4			74(dBµV/m)
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2390MHz				

## **Test Figure:**



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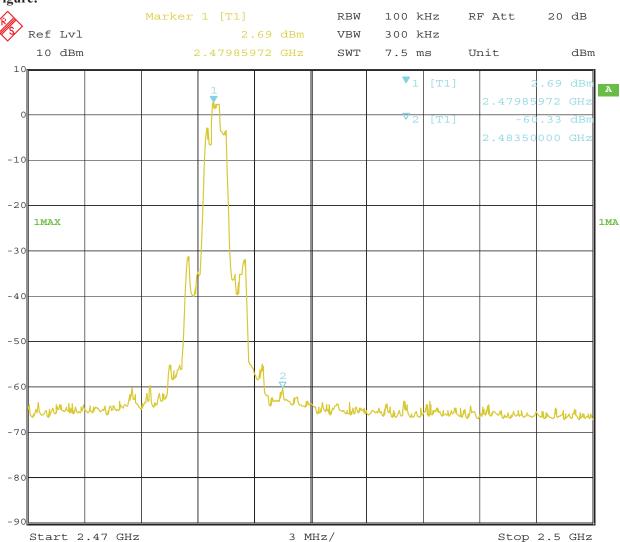


## **Type of Modulation: 8DPSK**

#### 12.4 Out of Band Test Result

Product:	Tablet PC		Test Mode:	High Channel
Mode	Keeping Transmitting		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m) 42.3			$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBµV/m)
2483.5MHz				

## **Test Figure:**



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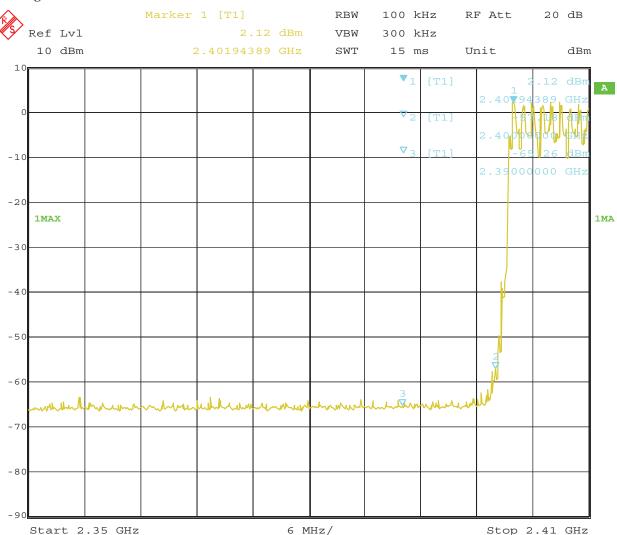


## Type of Modulation: 8DPSK

### Out of Band Test Result

Product:	Tablet PC		Test Mode:	Hopping mode
Mode	Hopping On		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	43.6		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2390MHz				

## **Test Figure:**



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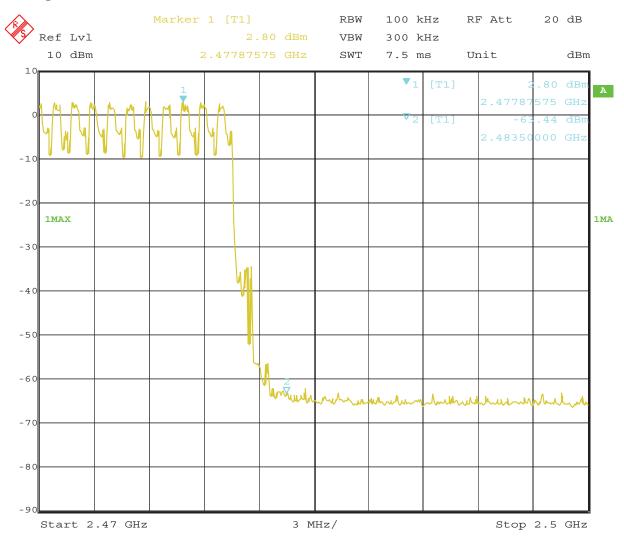


## **Type of Modulation: 8DPSK**

### 12.4 Out of Band Test Result

Product:	Tablet PC		Test Mode:	Hopping mode
Mode	Hopping On I		Input Voltage	DC3.7V
Temperature	24 deg. C,		Humidity	56% RH
Test Result:	Pass		Detector	PK
The Max. FS in	PK (dBμV/m)	42.0		$74(dB\mu V/m)$
Restrict Band	AV(dBμV/m)		Limit	54(dBμV/m)
2483.5MHz				

## **Test Figure:**



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## 13.0 Antenna Requirement

## 13.1 Standard Applicable

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

And according to FCC 47 CFR Section 15.247 (b), if transmitter antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the mount in dB that the directional gain of the antenna exceeds 6 dBi.

## 13.2 Antenna Connected constructions

Integral antenna used. The maximum Gain of the antennas is 2.0dBi.

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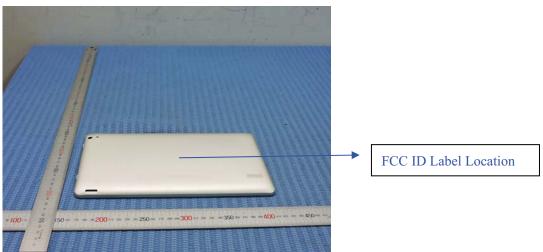
### 14.0 FCC ID/IC Label

## FCC ID: RBD-W109GA

This device complies with part 15 of the FCC rules. Operation is subject to the following two conditions (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The label must not be a stick-on paper label. The label on these products must be permanently affixed to the product and readily visible at the time of purchase and must last the expected lifetime of the equipment not be readily detachable.

### **Mark Location:**



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#### 15.0 Photo of testing

Conducted Emission Test Setup:



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## Radiated Emission Test Setup:





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# Photographs - EUT

Outside view





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Outside view





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Outside view





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Outside view





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Outside view





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Inside view





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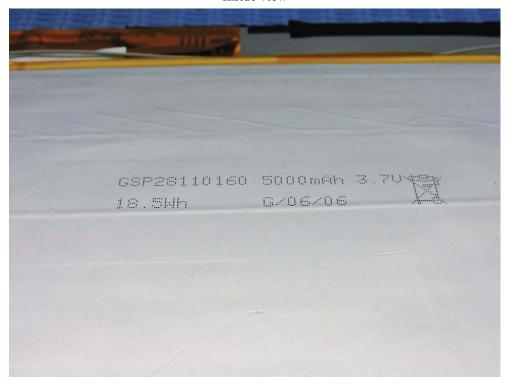
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Inside view





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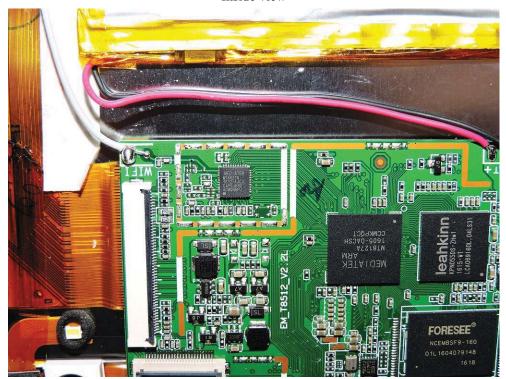
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Inside view





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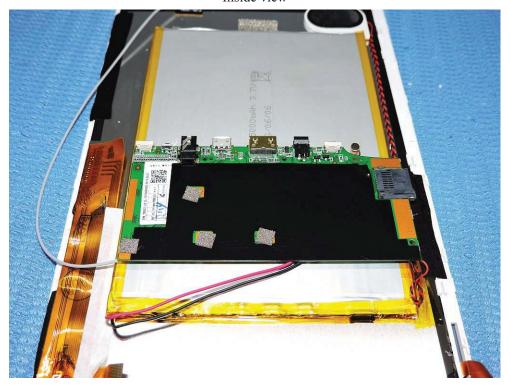
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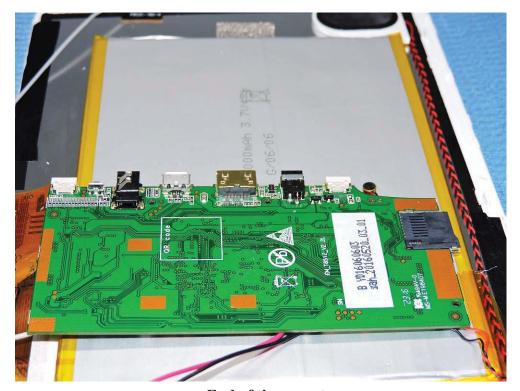
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