

# FCC PART 15.247 TEST REPORT

For

# **Bluesky Samoa**

Maluafou Headquarters, Apia Samoa

FCC ID: 2AKGQFD118I

**Report Type: Product Name:** Mobile Phone Original Report Tom Tong **Test Engineer:** Tom Tang Report Number: RDG170330004B **Report Date: 2017-04-28 Henry Ding EMC Leader** Reviewed By: **Test Laboratory:** Bay Area Compliance Laboratories Corp. (Chengdu) No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China Tel: 028-65523123, Fax: 028-65525125 www.baclcorp.com

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# **TABLE OF CONTENTS**

GENERAL INFORMATION	4
PRODUCT DESCRIPTION FOR EQUIPMENT UNDER TEST (EUT)	
RELATED SUBMITTAL(S)/GRANT(S)	
TEST METHODOLOGY	
TEST FACILITY	5
SYSTEM TEST CONFIGURATION	6
DESCRIPTION OF TEST CONFIGURATION	6
EUT Exercise Software	
EQUIPMENT MODIFICATIONS	
EXTERNAL CABLE	
BLOCK DIAGRAM OF TEST SETUP	
SUMMARY OF TEST RESULTS	
FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE	
APPLICABLE STANDARD	
FCC §15.203 - ANTENNA REQUIREMENT	
APPLICABLE STANDARD	9
Antenna Connector Construction	
FCC §15.207 (a) – AC LINE CONDUCTED EMISSIONS	
APPLICABLE STANDARD	
EUT SETUP	
EMI TEST RECEIVER SETUP	
TEST PROCEDURE	
TEST EQUIPMENT LIST AND DETAILS	
TEST DATA	
FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS	
APPLICABLE STANDARD	
EUT SETUP	15
EMI TEST RECEIVER & SPECTRUM ANALYZER SETUP	
TEST PROCEDURE	
TEST EQUIPMENT LIST AND DETAILS	
CORRECTED AMPLITUDE & MARGIN CALCULATIONTEST DATA	
FCC §15.247(a) (1) - CHANNEL SEPARATION TEST	
APPLICABLE STANDARD	
TEST EQUIPMENT LIST AND DETAILS	
TEST PROCEDURE TEST DATA	
FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING	
APPLICABLE STANDARDTEST PROCEDURE	
TEST PROCEDURETEST EQUIPMENT LIST AND DETAILS	
TEST DATA	
FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST	
Report No.: RDG170330004B	Page 2 of 63

# Bay Area Compliance Laboratories Corp. (Chengdu)

APPLICABLE STANDARD	33
TEST PROCEDURE	33
TEST EQUIPMENT LIST AND DETAILS	33
TEST DATA	33
FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)	37
APPLICABLE STANDARD	
TEST PROCEDURE	
TEST EQUIPMENT LIST AND DETAILS	37
TEST DATA	
FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT	53
APPLICABLE STANDARD	
TEST PROCEDURE	53
TEST EQUIPMENT LIST AND DETAILS	53
TEST DATA	53
FCC §15.247(d) - BAND EDGES TESTING	59
APPLICABLE STANDARD	
APPLICABLE STANDARD	59
TEST PROCEDURE	
TEST EQUIPMENT LIST AND DETAILS	
TEST DATA	60

### **GENERAL INFORMATION**

### **Product Description for Equipment under Test (EUT)**

The **Bluesky Samoa** 's product, model number: **FD118i** (**FCC ID: 2AKGQFD118I**) (the "EUT") in this report was a **Mobile Phone**, which was measured approximately:  $12.2 \text{ cm (L)} \times 6.1 \text{ cm (W)} \times 0.8 \text{ cm (H)}$ , rated input voltage: DC3.7V from battery or DC5V from adapter.

Adapter Information: MODEL: FD118i

Input: AC100-240V 50/60Hz 150mA

Output: DC5V 700mA

\*All measurement and test data in this report was gathered from final production sample, serial number: 170330004 (assigned by the BACL, Chengdu). It may have deviation from any other sample. The EUT supplied by the applicant was received on 2017-03-31, and EUT conformed to test requirement.

### **Objective**

This report is prepared on behalf of *Bluesky Samoa* in accordance with Part 2, Subpart J, Part 15, Subparts A, and C of the Federal Communications Commission's rules

The tests were performed in order to determine the Bluetooth BDR and EDR mode of EUT compliance with FCC Rules Part 15, Subpart C, and section 15.203, 15.205, 15.207, 15.209 and 15.247 rules.

#### Related Submittal(s)/Grant(s)

FCC Part 15B JBP submissions with FCC ID: 2AKGQFD118I.

FCC Part 22H, 24E, 27 PCE submissions with FCC ID: 2AKGQFD118I.

FCC Part 15C DTS submissions with FCC ID: 2AKGQFD118I.

Report No.: RDG170330004B Page 4 of 63

#### **Test Methodology**

All measurements detailed in this Test Report were performed in accordance with ANSI C63.10-2013 "American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices".

All of the measurements detailed in this Test Report were performed by Bay Area Compliance Laboratories Corp. (Chengdu).

The Bay Area Compliance Laboratories Corp. Chengdu's measurement Uncertainties (calculated for a k=2 Coverage Factor corresponding to approximately 95% Coverage) were as follows:

- -For all of the AC Line Conducted Emissions Tests reported herein: ±3.17 dB.
- -For of all of the Direct Antenna Conducted Emissions Tests reported herein: ±0.56 dB.
- -For of all of the direct Radiated Emissions Tests reported herein are:

30 MHz to 200 MHz: ±4.7 dB; 200 MHz to 1 GHz: ±6.0 dB; 1 GHz to 6 GHz: ±5.13dB; and, 6 GHz to 40 GHz: ±5.47dB.

And the uncertainty will not be taken into consideration for all test data recorded in the report.

### **Test Facility**

The test site used by BACL to collect test data is located in the No.5040, Huilongwan Plaza, No.1, Shawan Road, Jinniu District, Chengdu, Sichuan, China.

Test site at BACL has been fully described in reports submitted to the Federal Communication Commission (FCC). The details of these reports have been found to be in compliance with the requirements of Section 2.948 of the FCC Rules on April 24, 2015. The facility also complies with the radiated and AC line conducted test site criteria set forth in ANSI C63.4-2014.

The Federal Communications Commission has the reports on file and is listed under FCC Registration No.: 560332. The test site has been approved by the FCC for public use and is listed in the FCC Public Access Link (PAL) database.

Report No.: RDG170330004B Page 5 of 63

# **SYSTEM TEST CONFIGURATION**

### **Description of Test Configuration**

The system was configured for testing in engineering mode.

### **EUT Exercise Software**

The engineering mode configured the maximum power as default setting.

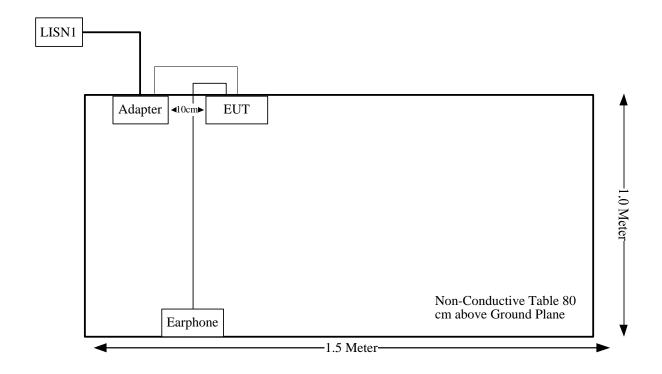
# **Equipment Modifications**

No modification was made to the EUT.

### **External Cable**

Cable Description	Shielding Type	Ferrite Core	Length (m)	From Port	То
USB Cable	Yes	No	0.8	USB Port of Adapter	EUT
Earphone Cable	No	No	1.45	EUT	Earphone

# **Block Diagram of Test Setup**



Report No.: RDG170330004B Page 6 of 63

# **SUMMARY OF TEST RESULTS**

FCC Rules	Description of Test	Result
FCC §15.247 (i) & §1.1310 & §2.1093	RF Exposure	Compliance
§15.203	Antenna Requirement	Compliance
§15.207 (a)	Conducted Emissions	Compliance
§15.205, §15.209, §15.247(d)	Spurious Emissions	Compliance
§15.247 (a)(1)	20 dB Bandwidth	Compliance
§15.247(a)(1)	Channel Separation Test	Compliance
§15.247(a)(1)(iii)	Time of Occupancy (Dwell Time)	Compliance
§15.247(a)(1)(iii)	Quantity of hopping channel Test	Compliance
§15.247(b)(1)	Peak Output Power Measurement	Compliance
§15.247(d)	Band Edges	Compliance

Report No.: RDG170330004B Page 7 of 63

# FCC §15.247 (i) & §1.1310 & §2.1093- RF EXPOSURE

### **Applicable Standard**

According to §15.247(i) and §1.1310, systems operating under the provisions of this section shall be operated in a manner that ensure that the public is not exposed to radio frequency energy level in excess of the Commission's guideline.

According to KDB447498 D01 General RF Exposure Guidance v06:

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance,

- mm)]  $[\sqrt{f(GHz)}] \le 3.0$  for 1-g SAR and  $\le 7.5$  for 10-g extremity SAR, where
  - f(GHz) is the RF channel transmit frequency in GHz
  - Power and distance are rounded to the nearest mW and mm before calculation
  - The result is rounded to one decimal place for comparison
  - 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is  $\leq$  50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is  $\leq$  5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

#### **Measurement Result**

For bluetooth mode

The max tune-up conducted power is 3.6 dBm (2.29 mW). [(max. power of channel, mW)/(min. test separation distance, mm)][ $\sqrt{f(GHz)}$ ] = 2.29/5\*( $\sqrt{2.48}$ ) = 0.7 < 3.0

So the stand-alone SAR evaluation is not necessary.

Report No.: RDG170330004B Page 8 of 63

# FCC §15.203 - ANTENNA REQUIREMENT

### **Applicable Standard**

According to FCC § 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited.

#### **Antenna Connector Construction**

The EUT has one internal antenna arrangement for Wifi/BT, and the antenna gain is 2.1 dBi, fulfill the requirement of this section. Please refer to the EUT photos.

Result: Compliance.

Report No.: RDG170330004B Page 9 of 63

# FCC §15.207 (a) - AC LINE CONDUCTED EMISSIONS

### **Applicable Standard**

FCC§15.207

### **EUT Setup**



Note: 1. Support units were connected to second LISN.

2. Both of LISNs (AMN) 80 cm from EUT and at the least 80 cm from other units and other metal planes support units.

The setup of EUT is according with per ANSI C63.10-2013 measurement procedure. The specification used was with the FCC Part 15.207 limits.

The spacing between the peripherals was 10 cm.

The adapter was connected to a 120 V/60 Hz AC power source.

### **EMI Test Receiver Setup**

The EMI test receiver was set to investigate the spectrum from 150 kHz to 30 MHz.

During the conducted emission test, the EMI test receiver was set with the following configurations:

Frequency Range	IF B/W
150 kHz – 30 MHz	9 kHz

Report No.: RDG170330004B Page 10 of 63

#### **Test Procedure**

During the conducted emission test, the adapter was connected to the outlet of the first LISN.

Maximizing procedure was performed on the six (6) highest emissions of the EUT.

All data was recorded in the Quasi-peak and average detection mode.

### **Corrected Amplitude & Margin Calculation**

The basic equation is as follows:

$$V_C = V_R + A_C + VDF$$

Herein,

V<sub>C</sub>: corrected voltage amplitude V<sub>R</sub>: reading voltage amplitude A<sub>C</sub>: attenuation caused by cable loss

VDF: voltage division factor of AMN or ISN

The "**Margin**" column of the following data tables indicates the degree of compliance within the applicable limit. For example, a margin of 7dB means the emission is 7dB below the maximum limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

Report No.: RDG170330004B Page 11 of 63

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	EMI Test Receiver	ESCS 30	836858/0016	2016-12-02	2017-12-01
Rohde & Schwarz	L.I.S.N.	ENV216	3560.6550.06	2016-12-02	2017-12-01
Rohde & Schwarz	PULSE LIMITER	ESH3Z2	357.8810.52	2016-10-31	2017-10-30
Unknown	Conducted Cable	Unknown	NO.5	2016-11-10	2017-11-09
R&S	Test Software	EMC32	Version8.53.0	N/A	N/A

<sup>\*</sup> Statement of Traceability: BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

### **Test Data**

### **Environmental Conditions**

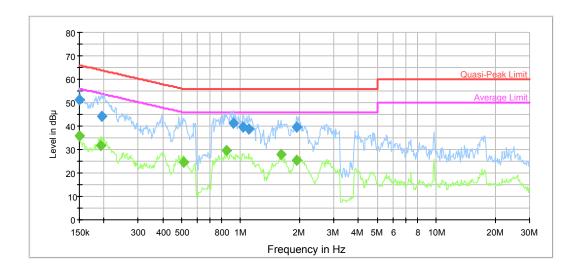
Temperature:	24.9 °C
Relative Humidity:	50%
ATM Pressure:	101 kPa

The testing was performed by Tom Tang on 2017-04-06.

Report No.: RDG170330004B Page 12 of 63

Test Mode: Transmitting

# AC120 V, 60 Hz, Line:

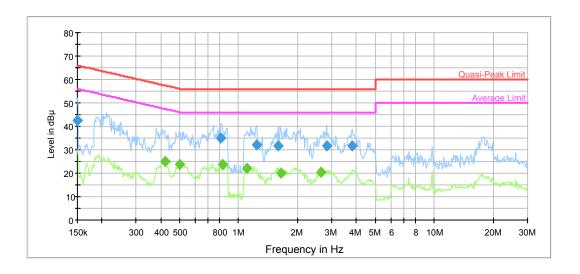


Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	51.1	9.000	L1	19.7	14.9	66.0	Compliance
0.195114	44.1	9.000	L1	19.7	19.7	63.8	Compliance
0.922769	41.2	9.000	L1	19.7	14.8	56.0	Compliance
1.031669	39.6	9.000	L1	19.7	16.4	56.0	Compliance
1.108371	38.9	9.000	L1	19.7	17.1	56.0	Compliance
1.936076	39.6	9.000	L1	19.8	16.4	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	35.9	9.000	L1	19.7	20.1	56.0	Compliance
0.192030	31.7	9.000	L1	19.7	22.2	53.9	Compliance
0.511698	24.8	9.000	L1	19.7	21.2	46.0	Compliance
0.852094	29.6	9.000	L1	19.7	16.4	46.0	Compliance
1.611870	27.8	9.000	L1	19.7	18.2	46.0	Compliance
1.936076	25.4	9.000	L1	19.8	20.6	46.0	Compliance

Report No.: RDG170330004B Page 13 of 63

# AC120 V, 60 Hz, Neutral:



Frequency (MHz)	QuasiPeak (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.150000	42.7	9.000	N	19.7	23.3	66.0	Compliance
0.812315	34.8	9.000	N	19.6	21.2	56.0	Compliance
1.239175	32.3	9.000	N	19.6	23.7	56.0	Compliance
1.599078	31.8	9.000	N	19.7	24.2	56.0	Compliance
2.815577	31.5	9.000	N	19.7	24.5	56.0	Compliance
3.811251	31.7	9.000	N	19.7	24.3	56.0	Compliance

Frequency (MHz)	Average (dBµV)	Bandwidth (kHz)	Line	Corr. (dB)	Margin (dB)	Limit (dBµV)	Comment
0.419276	25.1	9.000	N	19.6	22.4	47.5	Compliance
0.499611	23.9	9.000	N	19.6	22.1	46.0	Compliance
0.831967	23.8	9.000	N	19.6	22.2	46.0	Compliance
1.099574	22.0	9.000	N	19.7	24.0	46.0	Compliance
1.650866	20.1	9.000	N	19.7	25.9	46.0	Compliance
2.641698	20.3	9.000	N	19.7	25.7	46.0	Compliance

Report No.: RDG170330004B Page 14 of 63

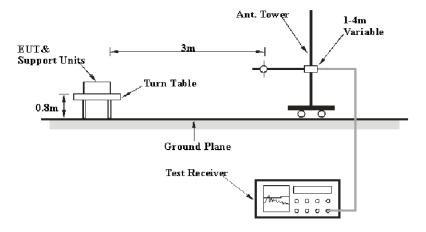
# FCC §15.209, §15.205 & §15.247(d) - SPURIOUS EMISSIONS

### **Applicable Standard**

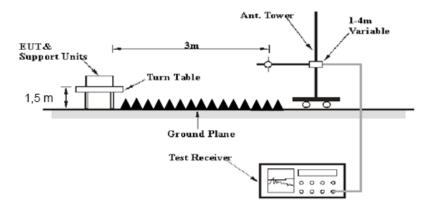
FCC §15.247 (d); §15.209; §15.205;

### **EUT Setup**

#### **Below 1GHz:**



### **Above 1GHz:**



The radiated emission tests were performed in the 3 meters test site, using the setup accordance with the ANSI C63.10-2013. The specification used was the FCC 15.209, and FCC 15.247 limits.

The external I/O cables were draped along the test table and formed a bundle 30 to 40 cm long in the middle.

The spacing between the peripherals was 10 cm.

Report No.: RDG170330004B Page 15 of 63

### **EMI Test Receiver & Spectrum Analyzer Setup**

The system was investigated from 30 MHz to 25 GHz.

During the radiated emission test, the EMI test receiver & Spectrum Analyzer Setup were set with the following configurations:

Frequency Range	RBW	Video B/W	IF B/W	Detector
30 MHz – 1000 MHz	120 kHz	300 kHz	120 kHz	QP
Above 1 GHz	1MHz	3 MHz	/	PK
Above 1 GHZ	1MHz	10 Hz	/	AV

#### **Test Procedure**

Maximizing procedure was performed on the highest emissions to ensure that the EUT complied with all installation combinations.

Data was recorded in Quasi-peak detection mode for frequency range of 30 MHz - 1 GHz, peak and average detection modes for frequencies above 1 GHz.

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	Amplifier	8447D	2944A10442	2016-12-02	2017-12-01
Rohde & Schwarz	EMI Test Receiver	ESCI	100028	2016-12-02	2017-12-01
Sunol Sciences	Broadband Antenna	JB3	A121808	2016-04-10	2019-04-09
Rohde & Schwarz	Spectrum Analyzer	FSEM30	100018	2016-12-02	2017-12-01
ETS	Horn Antenna	3115	003-6076	2016-12-02	2017-12-01
Ducommun Technologies	Horn Antenna	ARH-4223-02	1007726- 0113024	2014-06-16	2017-06-15
Mini-circuits	Amplifier	ZVA-183-S+	771001215	2016-05-20	2017-05-19
HP	Amplifier	8449B	3008A00277	2016-12-02	2017-12-01
EMCT	Semi-Anechoic Chamber	966	966-1	2015-04-24	2018-04-23
Unknown	RF Cable (below 1GHz)	Unknown	NO.1	2016-11-10	2017-11-09
Unknown	RF Cable (below 1GHz)	Unknown	NO.4	2016-11-10	2017-11-09
Unknown	RF Cable (above 1GHz)	Unknown	NO.2	2016-11-10	2017-11-09

<sup>\*</sup> Statement of Traceability: BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Report No.: RDG170330004B Page 16 of 63

### **Corrected Amplitude & Margin Calculation**

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Loss, and subtracting the Amplifier Gain from the Meter Reading. The basic equation is as follows:

Corrected Amplitude = Meter Reading + Antenna Factor + Cable Loss - Amplifier Gain

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of 7dB means the emission is 7dB below the limit. The equation for margin calculation is as follows:

Margin = Limit – Corrected Amplitude

### **Test Data**

### **Environmental Conditions**

Temperature:	23.3 °C
Relative Humidity:	49 %
ATM Pressure:	98.2kPa

<sup>\*</sup> The testing was performed by Tom Tang on 2017-03-31.

Test Mode: Transmitting

Report No.: RDG170330004B Page 17 of 63

# 30 MHz-25GHz:

BDR Mode (GFSK):

F	Rece	eiver	Rx A	ntenna	Cable	Amplifier	Corrected	FCC 1	5.247
Frequency (MHz)	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB)	loss (dB)	Gain (dB)	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
				Low Chani					
2402	68.97	PK	Ι	23.53	3.00	0.00	95.5	N/A	N/A
2402	58.28	AV	Н	23.53	3.00	0.00	84.81	N/A	N/A
2402	63.40	PK	V	23.53	3.00	0.00	89.93	N/A	N/A
2402	53.05	AV	V	23.53	3.00	0.00	79.58	N/A	N/A
2390	28.73	PK	Н	23.57	3.00	0.00	55.3	74	18.7
2390	15.38	AV	Н	23.57	3.00	0.00	41.95	54	12.05
4804	35.25	PK	Н	30.77	5.12	26.87	44.27	74	29.73
4804	23.70	AV	Η	30.77	5.12	26.87	32.72	54	21.28
7206	33.37	PK	Н	34.71	6.16	26.35	47.89	74	26.11
7206	22.81	AV	Н	34.71	6.16	26.35	37.33	54	16.67
1337	29.65	PK	Н	23.68	2.45	26.49	29.29	74	44.71
1337	18.81	AV	Н	23.68	2.45	26.49	18.45	54	35.55
290.93	52.36	QP	Н	14.01	1.10	27.53	39.94	46.00	6.06
325.85	49.52	QP	Н	14.66	1.20	27.64	37.74	46.00	8.26
0444	07.00	DIA		liddle Chai			00.40		N1/A
2441	67.03	PK	H	23.40	3.00	0.00	93.43	N/A	N/A
2441	56.10	AV	H	23.40	3.00	0.00	82.5	N/A	N/A
2441	61.25	PK	V	23.40	3.00	0.00	87.65	N/A	N/A
2441	50.89	AV	V	23.40	3.00	0.00	77.29	N/A	N/A
4882	35.37	PK	Η:	31.02	5.09	26.87	44.61	74	29.39
4882	23.55	AV	Н	31.02	5.09	26.87	32.79	54	21.21
7323	33.46	PK	Ξ Ξ	34.95	6.22	26.40	48.23	74	25.77
7323 3131	23.02 38.83	AV PK	H	34.95 24.93	6.22 3.63	26.40 26.46	37.79 40.93	54 74	16.21 33.07
3131	28.39	AV	Н	24.93	3.63	26.46	30.49	54	23.51
3190	40.04	PK	H	25.26	3.72	26.48	42.54	74	31.46
3190	29.30	AV	H	25.26	3.72	26.48	31.8	54	22.2
290.93	52.63	QP	H	14.01	1.10	27.53	40.21	46.00	5.79
325.85	49.66	QP QP	H	14.66	1.10	27.64	37.88	46.00	8.12
323.03	49.00	QF		High Chan			37.00	40.00	0.12
2480	65.20	PK	Н	23.27	2.99	0.00	91.46	N/A	N/A
2480	55.01	AV	H	23.27	2.99	0.00	81.27	N/A	N/A
2480	59.83	PK	V	23.27	2.99	0.00	86.09	N/A	N/A
2480	49.45	AV	V	23.27	2.99	0.00	75.71	N/A	N/A
2483.5	29.30	PK	H	23.26	2.99	0.00	55.55	74	18.45
2483.5	16.05	AV	H	23.26	2.99	0.00	42.3	54	11.7
4960	36.14	PK	H	31.27	5.05	26.88	45.58	74	28.42
4960	23.77	AV	H	31.27	5.05	26.88	33.21	54	20.79
7440	34.61	PK	H	35.18	6.27	26.45	49.61	74	24.39
7440	23.12	AV	H	35.18	6.27	26.45	38.12	54	15.88
3131	39.19	PK	Н	24.93	3.63	26.46	41.29	74	32.71
3131	28.01	AV	H	24.93	3.63	26.46	30.11	54	23.89
290.93	53.47	QP	H	14.01	1.10	27.53	41.05	46.00	4.95
325.85	50.08	QP	H	14.66	1.20	27.64	38.30	46.00	7.70

Report No.: RDG170330004B Page 18 of 63

EDR Mode ( $\pi/4$ -DQPSK):

	Rece	eiver	Rx A	ntenna	Cable	Amplifier	Corrected	FCC 1	5.247
Frequency (MHz)	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB)	loss (dB)	Gain (dB)	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
				Low Chan	nel: 2402	MHz			
2402	67.65	PK	Н	23.53	3.00	0.00	94.18	N/A	N/A
2402	54.88	AV	Н	23.53	3.00	0.00	81.41	N/A	N/A
2402	61.96	PK	V	23.53	3.00	0.00	88.49	N/A	N/A
2402	48.47	AV	V	23.53	3.00	0.00	75	N/A	N/A
2390	28.99	PK	Н	23.57	3.00	0.00	55.56	74	18.44
2390	15.76	AV	Н	23.57	3.00	0.00	42.33	54	11.67
4804	35.45	PK	Н	30.77	5.12	26.87	44.47	74	29.53
4804	23.57	AV	Н	30.77	5.12	26.87	32.59	54	21.41
7206	33.17	PK	Н	34.71	6.16	26.35	47.69	74	26.31
7206	21.48	AV	Н	34.71	6.16	26.35	36	54	18
2950	37.47	PK	Н	24.10	3.39	26.46	38.5	74	35.5
2950	25.71	AV	Н	24.10	3.39	26.46	26.74	54	27.26
290.93	53	QP	Н	14.01	1.10	27.53	40.58	46.00	5.42
325.85	50.52	QP	Н	14.66	1.20	27.64	38.74	46.00	7.26
				liddle Cha					
2441	66.98	PK	Н	23.40	3.00	0.00	93.38	N/A	N/A
2441	56.55	AV	H	23.40	3.00	0.00	82.95	N/A	N/A
2441	61.47	PK	V	23.40	3.00	0.00	87.87	N/A	N/A
2441	51.09	AV	V	23.40	3.00	0.00	77.49	N/A	N/A
4882	35.53	PK	Н	31.02	5.09	26.87	44.77	74	29.23
4882	23.78	AV	H	31.02	5.09	26.87	33.02	54	20.98
7323	33.11	PK	H	34.95	6.22	26.40	47.88	74	26.12
7323	21.82	AV PK	H	34.95 24.10	6.22 3.39	26.40	36.59	54 74	17.41 35.5
2950	37.47		Н			26.46	38.5		
2950 3610	25.81 36.01	AV PK	H	24.10 27.44	3.39 4.34	26.46 26.58	26.84 41.21	54 74	27.16 32.79
3610	24.94	AV	H	27.44	4.34	26.58	30.14	54	23.86
290.93	52.53	QP	H	14.01	1.10	27.53	40.11	46.00	5.89
325.85	50.96	QP	H	14.66	1.20	27.64	39.18	46.00	6.82
323.03	50.50	Qi		High Chan			39.10	+0.00	0.02
2480	65.02	PK	Н	23.27	2.99	0.00	91.28	N/A	N/A
2480	52.38	AV	H	23.27	2.99	0.00	78.64	N/A	N/A
2480	59.53	PK	V	23.27	2.99	0.00	85.79	N/A	N/A
2480	46.21	AV	V	23.27	2.99	0.00	72.47	N/A	N/A
2483.5	28.93	PK	H	23.26	2.99	0.00	55.18	74	18.82
2483.5	16.08	AV	Н	23.26	2.99	0.00	42.33	54	11.67
4960	36.21	PK	Н	31.27	5.05	26.88	45.65	74	28.35
4960	23.84	AV	Н	31.27	5.05	26.88	33.28	54	20.72
7440	33.80	PK	Н	35.18	6.27	26.45	48.8	74	25.2
7440	21.58	AV	Н	35.18	6.27	26.45	36.58	54	17.42
2950	37.46	PK	Н	24.10	3.39	26.46	38.49	74	35.51
2950	25.98	AV	Н	24.10	3.39	26.46	27.01	54	26.99
290.93	51.25	QP	Н	14.01	1.10	27.53	38.83	46	7.17
325.85	48.96	QP	Н	14.66	1.20	27.64	37.18	46	8.82

Report No.: RDG170330004B Page 19 of 63

EDR Mode (8-DPSK):

F	Rec	eiver	Rx A	ntenna	Cable	Amplifier	Corrected	FCC 1	5.247
Frequency (MHz)	Reading (dBµV)	Detector	Polar (H/V)	Factor (dB)	loss (dB)	Gain (dB)	Amplitude (dBµV/m)	Limit (dBµV/m)	Margin (dB)
				Low Chan	nel: 2402	MHz			
2402	68.02	PK	Н	23.53	3.00	0.00	94.55	N/A	N/A
2402	54.63	AV	Н	23.53	3.00	0.00	91.16	N/A	N/A
2402	61.58	PK	V	23.53	3.00	0.00	88.11	N/A	N/A
2402	48.77	AV	V	23.53	3.00	0.00	75.3	N/A	N/A
2390	28.83	PK	Н	23.57	3.00	0.00	55.4	74	18.6
2390	15.70	AV	Н	23.57	3.00	0.00	42.27	54	11.73
4804	35.57	PK	Н	30.77	5.12	26.87	44.59	74	29.41
4804	23.44	AV	Н	30.77	5.12	26.87	32.46	54	21.54
7206	33.19	PK	Н	34.71	6.16	26.35	47.71	74	26.29
7206	21.35	AV	Н	34.71	6.16	26.35	35.87	54	18.13
2950	37.54	PK	Н	24.10	3.39	26.46	38.57	74	35.43
2950	25.68	AV	Н	24.10	3.39	26.46	26.71	54	27.29
290.93	51.41	QP	Н	14.01	1.10	27.53	38.99	46.00	7.01
325.85	48.73	QP	Н	14.66	1.20	27.64	36.95	46.00	9.05
				liddle Cha					
2441	66.95	PK	Н	23.40	3.00	0.00	93.35	N/A	N/A
2441	55.24	AV	Н	23.40	3.00	0.00	81.64	N/A	N/A
2441	61.11	PK	V	23.40	3.00	0.00	87.51	N/A	N/A
2441	48.77	AV	V	23.40	3.00	0.00	75.17	N/A	N/A
4882	35.22	PK	Н	31.02	5.09	26.87	44.46	74	29.54
4882	23.93	AV	Н	31.02	5.09	26.87	33.17	54	20.83
7323	33.10	PK	Н	34.95	6.22	26.40	47.87	74	26.13
7323	22.13	AV	Н	34.95	6.22	26.40	36.9	54	17.1
2950	37.16	PK	Н	24.10	3.39	26.46	38.19	74	35.81
2950	26.12	AV	Н	24.10	3.39	26.46	27.15	54	26.85
3610	35.64 25.36	PK	H	27.44	4.34	26.58	40.84	74 54	33.16
3610		AV QP		27.44	4.34 1.10	26.58 27.53	30.56		23.44 6.74
290.93	51.68 48.87	QP QP	H	14.01 14.66	1.10	27.64	39.26 37.09	46.00	
325.85	40.07	QP .		ligh Chan			37.09	46.00	8.91
2480	65.14	PK	Н.	23.27	2.99	0.00	91.4	N/A	N/A
2480	52.33	AV	H	23.27	2.99	0.00	78.59	N/A	N/A
2480	59.94	PK	V	23.27	2.99	0.00	86.2	N/A	N/A
2480	46.71	AV	V	23.27	2.99	0.00	72.97	N/A	N/A
2483.5	29.23	PK	H	23.26	2.99	0.00	55.48	74	18.52
2483.5	16.37	AV	H	23.26	2.99	0.00	42.62	54	11.38
4960	36.53	PK	Н	31.27	5.05	26.88	45.97	74	28.03
4960	24.00	AV	Н	31.27	5.05	26.88	33.44	54	20.56
7440	33.68	PK	Н	35.18	6.27	26.45	48.68	74	25.32
7440	21.97	AV	Н	35.18	6.27	26.45	36.97	54	17.03
2950	37.69	PK	Н	24.10	3.39	26.46	38.72	74	35.28
2950	25.42	AV	Н	24.10	3.39	26.46	26.45	54	27.55
290.93	52.52	QP	Н	14.01	1.10	27.53	40.10	46.00	5.90
325.85	49.29	QP	Н	14.66	1.20	27.64	37.51	46.00	8.49

Report No.: RDG170330004B Page 20 of 63

# FCC §15.247(a) (1) - CHANNEL SEPARATION TEST

### **Applicable Standard**

Frequency hopping systems shall have hoping channel carrier frequencies separated by a minimum of 25 kHz or the 20dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400-2483.50 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20dB bandwidth of the hopping channel, whichever is greater provided the systems operate with an output power no greater than 125 mW.

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	NO.3	Each Time	1

<sup>\*</sup> Statement of Traceability: BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

### **Test Procedure**

- 1. Set the EUT in transmitting mode, spectrum Bandwidth was set at 30 kHz, maxhold the channel.
- 2. Set the adjacent channel of the EUT maxhold another trace.
- 3. Measure the channel separation.

#### **Test Data**

### **Environmental Conditions**

Temperature:	26.6 °C
Relative Humidity:	40%
ATM Pressure:	97.8kPa

<sup>\*</sup> The testing was performed by Tom Tang on 2017-04-14.

Test Result: Compliance.

Please refer to following tables and plots

Report No.: RDG170330004B Page 21 of 63

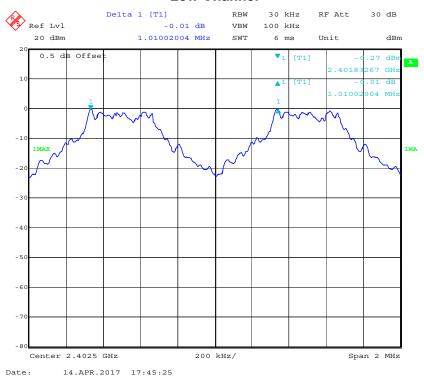
Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	Channel Separation (MHz)	Limit (MHz)
BDD	Low	2402	1.010	0.63
BDR (GFSK)	Middle	2441	1.002	0.62
(GFSK)	High	2480	1.002	0.63
EDD	Low	2402	1.002	0.84
EDR (π/4-DQPSK)	Middle	2441	1.002	0.84
(II/4-DQF SK)	High	2480	1.002	0.84
EDR (8DPSK)	Low	2402	1.002	0.84
	Middle	2441	1.002	0.85
(001 311)	High	2480	1.002	0.85

Note: Limit= (2/3)× 20dB bandwidth

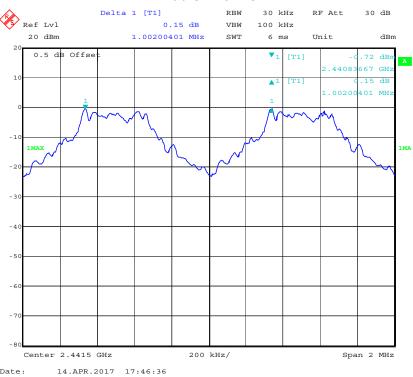
# BDR Mode (GFSK):

#### **Low Channel**



Report No.: RDG170330004B Page 22 of 63

### **Middle Channel**

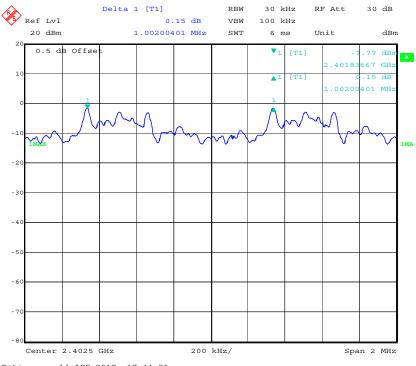


### High Channel



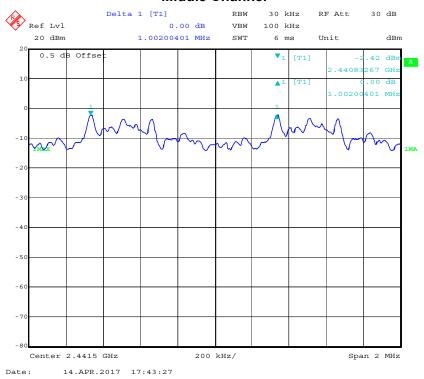
### EDR Mode ( $\pi/4$ -DQPSK):

#### **Low Channel**



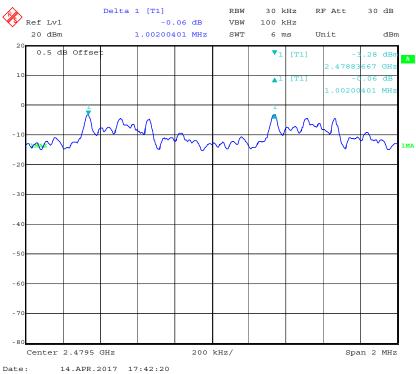
Date: 14.APR.2017 17:44:23

#### **Middle Channel**



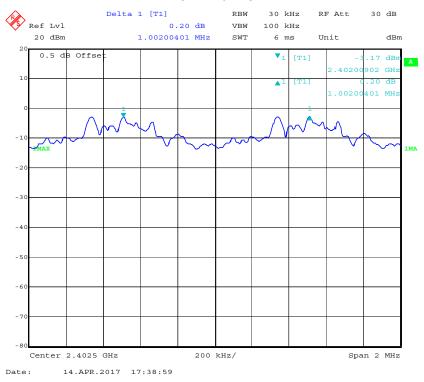
Report No.: RDG170330004B Page 24 of 63

### **High Channel**



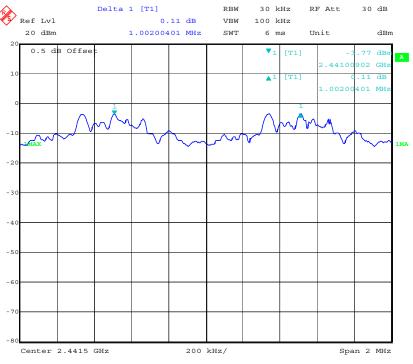
### EDR Mode (8-DPSK):

#### **Low Channel**



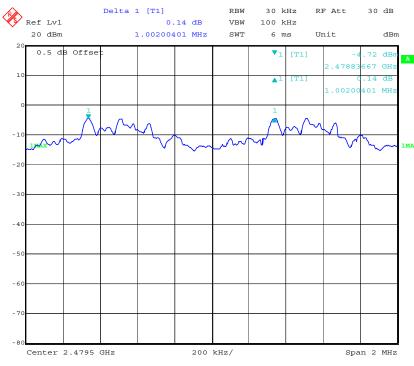
Report No.: RDG170330004B Page 25 of 63

### **Middle Channel**



ate: 14.APR.2017 17:40:08

### High Channel



Date: 14.APR.2017 17:41:05

# FCC §15.247(a) (1) – 20 dB BANDWIDTH TESTING

### **Applicable Standard**

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.

#### **Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Position the EUT on the test table without connection to measurement instrument. Turn on the EUT. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.
- 3. Measure the frequency difference of two frequencies that were attenuated 20 dB from the reference level. Record the frequency difference as the emission bandwidth.
- 4. Repeat above procedures until all frequencies measured were complete.

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	NO.3	Each Time	1

<sup>\*</sup> Statement of Traceability: BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

#### **Test Data**

#### **Environmental Conditions**

Temperature:	26.6 °C
Relative Humidity:	40%
ATM Pressure:	97.8kPa

<sup>\*</sup> The testing was performed by Tom Tang on 2017-04-14.

Test Result: Compliance.

Please refer to following tables and plots

Report No.: RDG170330004B Page 27 of 63

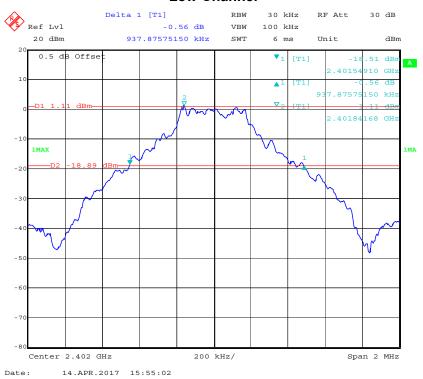
# Bay Area Compliance Laboratories Corp. (Chengdu)

Test Mode: Transmitting

Mode	Channel	Frequency (MHz)	20 dB Bandwidth (MHz)
DDD M. J.	Low	2402	0.94
BDR Mode (GFSK)	Middle	2441	0.93
(Of Oit)	High	2480	0.94
EDD M. J.	Low	2402	1.26
EDR Mode (π/4-DQPSK)	Middle	2441	1.26
(III + DQI OIV)	High	2480	1.26
	Low	2402	1.26
EDR Mode (8-DPSK)	Middle	2441	1.27
(0 51 011)	High	2480	1.27

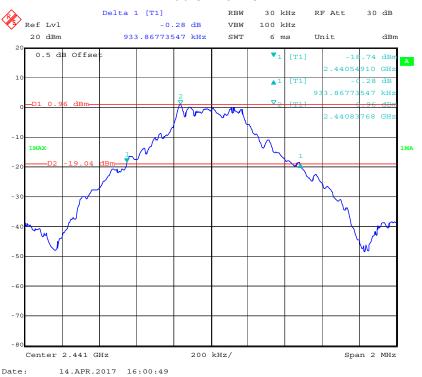
# BDR Mode (GFSK):

### **Low Channel**

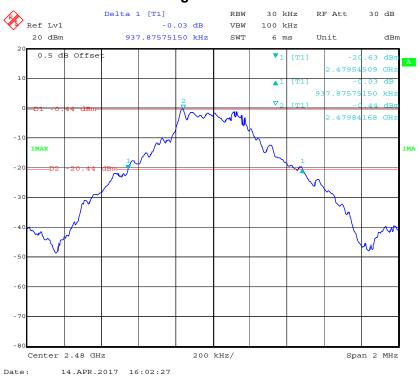


Report No.: RDG170330004B Page 28 of 63

### **Middle Channel**

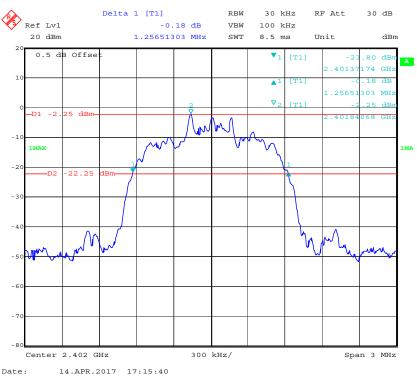


### High Channel



### EDR Mode (π/4-DQPSK):



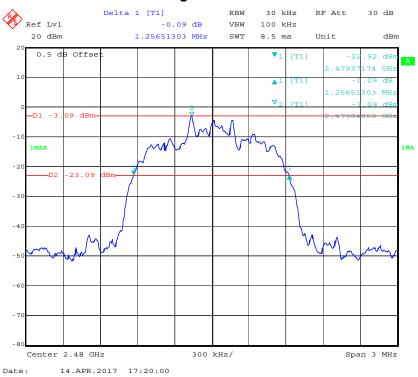


### **Middle Channel**



Report No.: RDG170330004B Page 30 of 63

### **High Channel**



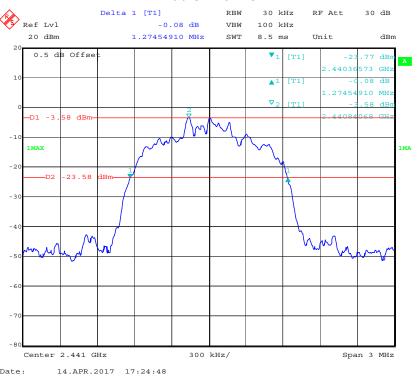
### EDR Mode (8-DPSK):

#### **Low Channel**



Report No.: RDG170330004B Page 31 of 63

### **Middle Channel**



#### III ada Ola ana

## High Channel



# FCC §15.247(a) (1) (iii) - QUANTITY OF HOPPING CHANNEL TEST

### **Applicable Standard**

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.

#### **Test Procedure**

- 1. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
- 2. Set the EUT in hopping mode from first channel to last.
- 3. By using the Max-Hold function record the Quantity of the channel.

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	NO.3	Each Time	1

<sup>\*</sup> Statement of Traceability: BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

#### **Test Data**

### **Environmental Conditions**

Temperature:	26.6 °C	
Relative Humidity:	40%	
ATM Pressure:	97.8kPa	

<sup>\*</sup> The testing was performed by Tom Tang on 2017-04-14.

Test Result: Compliance.

Please refer to following tables and plots

Report No.: RDG170330004B Page 33 of 63

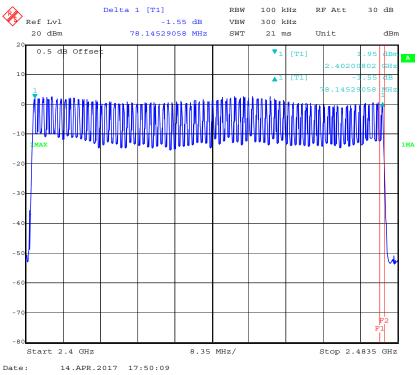
### Bay Area Compliance Laboratories Corp. (Chengdu)

Test Mode: Transmitting

BDR Mode (GFSK):

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

# **Number of Hopping Channels**

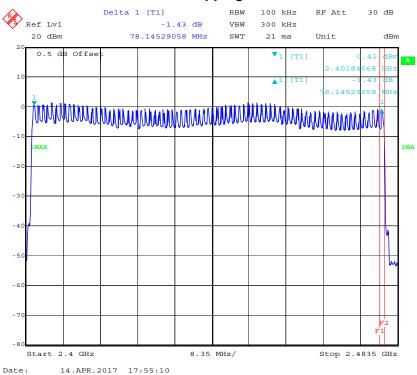


Report No.: RDG170330004B Page 34 of 63

### EDR Mode ( $\pi/4$ -DQPSK):

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

# **Number of Hopping Channels**

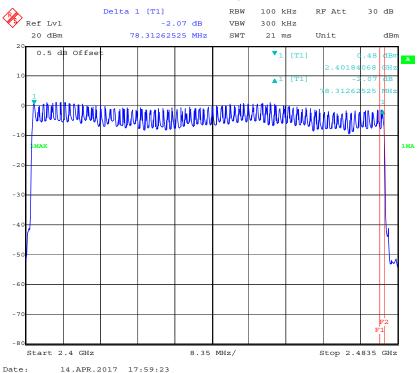


Report No.: RDG170330004B Page 35 of 63

### EDR Mode (8-DPSK):

Frequency Range (MHz)	Number of Hopping Channel	Limit
2400-2483.5	79	≥15

### **Number of Hopping Channels**



Report No.: RDG170330004B Page 36 of 63

# FCC §15.247(a) (1) (iii) - TIME OF OCCUPANCY (DWELL TIME)

# **Applicable Standard**

Frequency hopping systems in the 2400-2483.5 MHz 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.

#### **Test Procedure**

The EUT was worked in channel hopping; Spectrum SPAN was set as 0. the time of single pulses was tested.

## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	NO.3	Each Time	1

<sup>\*</sup> Statement of Traceability: BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

#### **Test Data**

### **Environmental Conditions**

Temperature:	26.6 °C
Relative Humidity:	41%
ATM Pressure:	97.5kPa

<sup>\*</sup> The testing was performed by Tom Tang on 2017-04-15.

Test Result: Compliance.

Please refer to following tables and plots

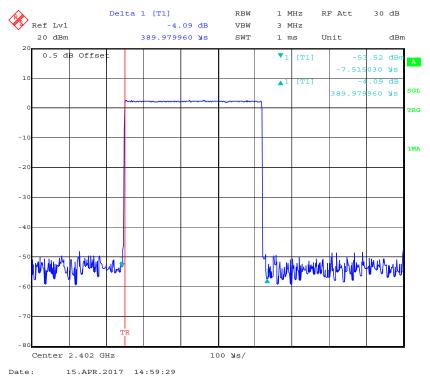
Report No.: RDG170330004B Page 37 of 63

Test Mode: Transmitting

BDR Mode (GFSK):

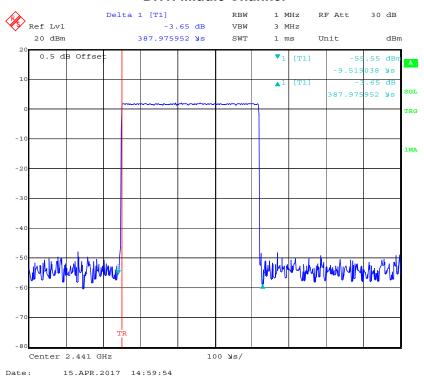
Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result
	Low	0.39	0.125	0.4	Compliance
DH1	Middle	0.388	0.124	0.4	Compliance
DIII	High	0.39	0.125	0.4	Compliance
Note: Dwell time=Pulse time (ms) × (1600/2		0/2/79) ×3	79)×31.6 s		
	Low	1.658	0.265	0.4	Compliance
DH3	Middle	1.664	0.266	0.4	Compliance
Diis	High	1.658	0.265	0.4	Compliance
Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6			31.6 s		
	Low	2.927	0.312	0.4	Compliance
DH5	Middle	2.927	0.312	0.4	Compliance
	High	2.937	0.313	0.4	Compliance
	Note: Dwell time	e=Pulse time	(ms) × (160	0/6/79) ×3	31.6 s

## **DH1: Low Channel**

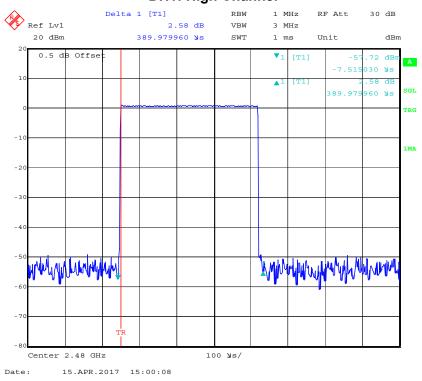


Report No.: RDG170330004B Page 38 of 63

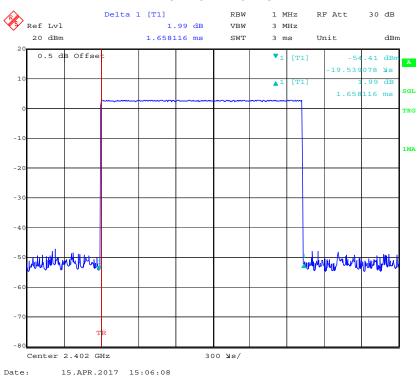
### **DH1: Middle Channel**



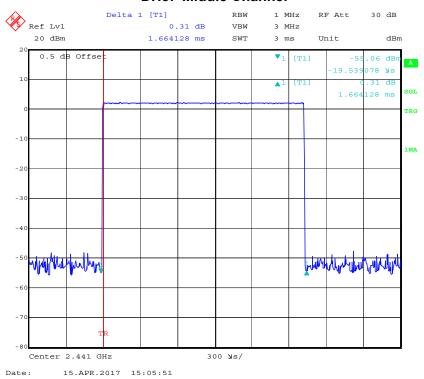
# **DH1: High Channel**



## **DH3: Low Channel**

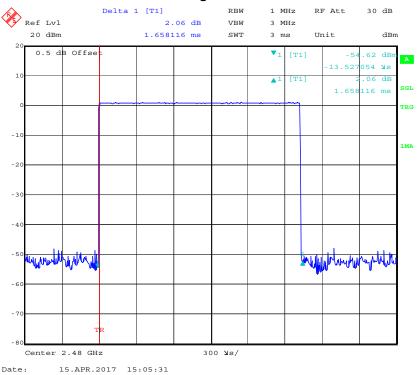


## **DH3: Middle Channel**

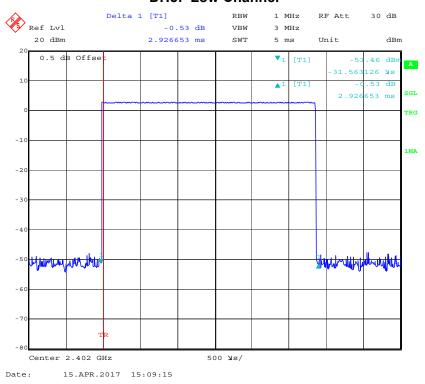


Report No.: RDG170330004B Page 40 of 63

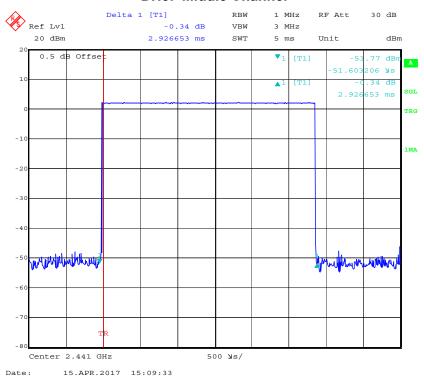
## **DH3: High Channel**



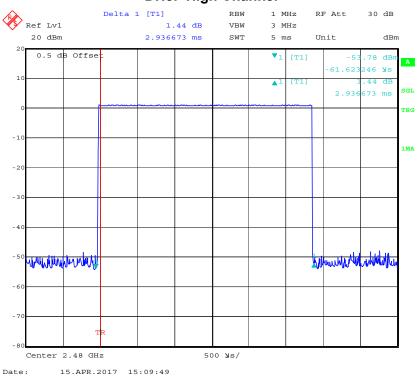
### **DH5: Low Channel**



## **DH5: Middle Channel**



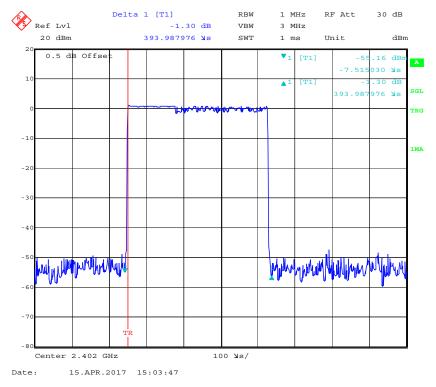
# **DH5: High Channel**



# EDR Mode ( $\pi/4$ -DQPSK):

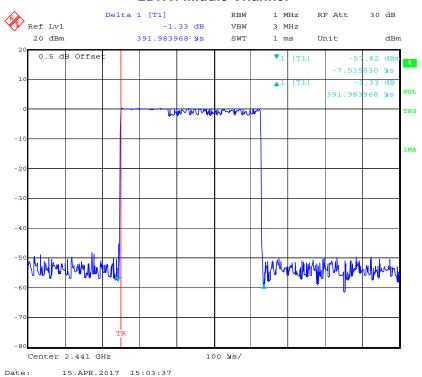
Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result	
	Low	0.394	0.126	0.4	Compliance	
2DH1	Middle	0.392	0.125	0.4	Compliance	
20111	High	0.394	0.126	0.4	Compliance	
	Note: Dwell time=Pulse time (ms) × (1600/2/79 ) ×31.6 s					
	Low	1.664	0.266	0.4	Compliance	
2DH3	Middle	1.67	0.267	0.4	Compliance	
20113	High	1.67	0.267	0.4	Compliance	
	Note: Dwell time=Pulse time (ms) × (1600/4/79) ×31.6 s					
	Low	2.917	0.311	0.4	Compliance	
2DH5	Middle	2.917	0.311	0.4	Compliance	
20113	High	2.947	0.314	0.4	Compliance	
	Note: Dwell time	e=Pulse time	(ms) × (160	0/6/79) ×:	31.6 s	

## 2DH1: Low Channel

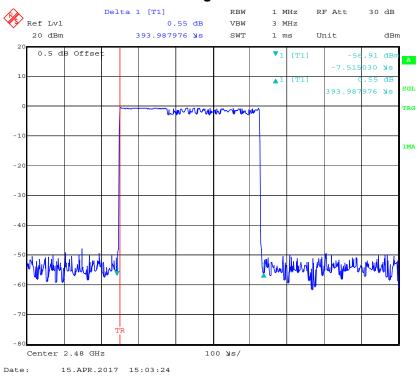


Report No.: RDG170330004B Page 43 of 63

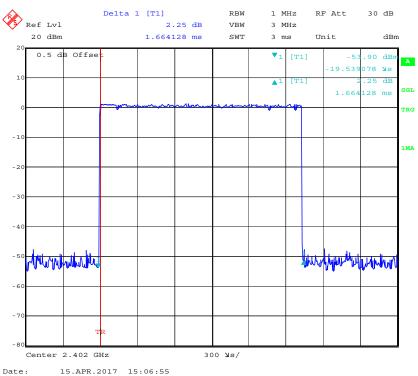
### 2DH1: Middle Channel



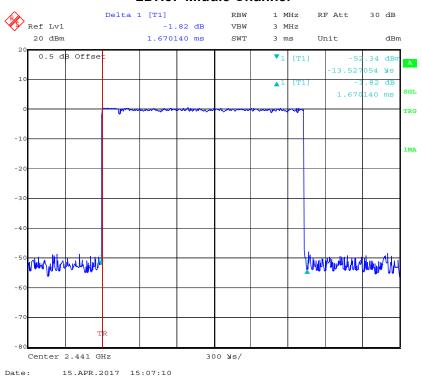
## 2DH1: High Channel



## 2DH3: Low Channel

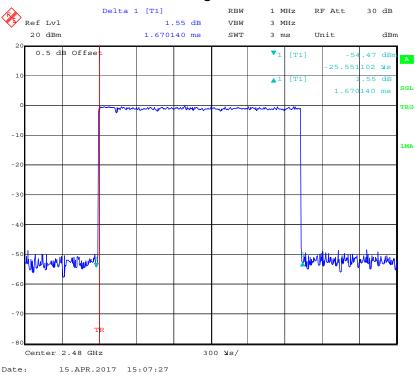


## 2DH3: Middle Channel

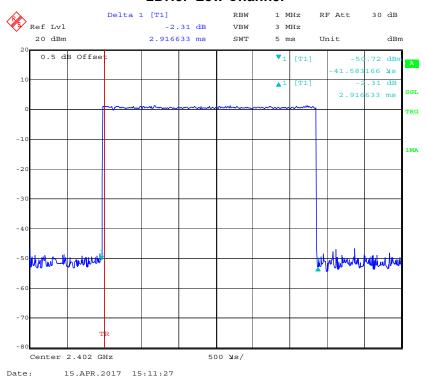


Report No.: RDG170330004B Page 45 of 63

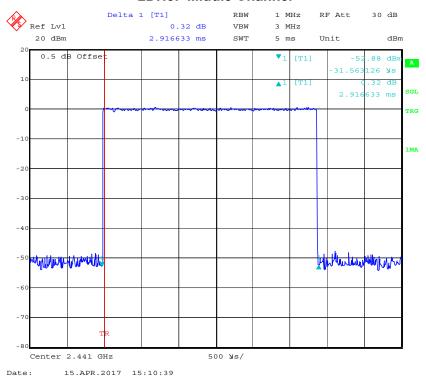
## 2DH3: High Channel



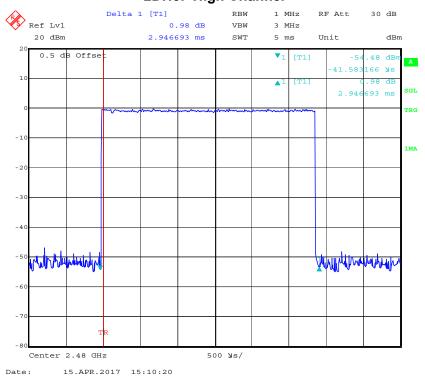
### 2DH5: Low Channel



## 2DH5: Middle Channel



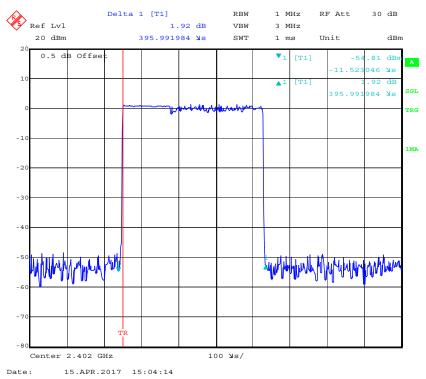
# 2DH5: High Channel



# EDR Mode (8-DPSK):

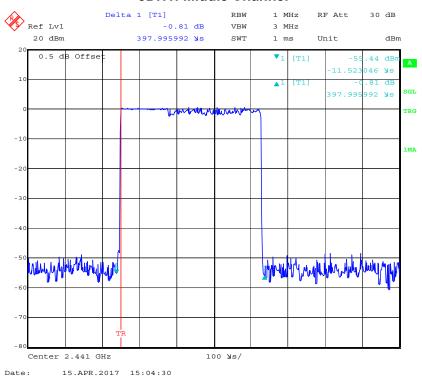
Mode	Channel	Pulse Width (ms)	Dwell Time (s)	Limit (s)	Result	
	Low	0.396	0.127	0.4	Compliance	
3DH1	Middle	0.398	0.127	0.4	Compliance	
30111	High	0.398	0.127	0.4	Compliance	
	Note: Dwell time=Pulse time (ms) × (1600/2/79 ) ×31.6 s					
	Low	1.676	0.268	0.4	Compliance	
3DH3	Middle	1.67	0.267	0.4	Compliance	
30113	High	1.67	0.267	0.4	Compliance	
	e=Pulse time (	ms) × (1600	)/4/79) ×3	1.6 s		
	Low	2.917	0.311	0.4	Compliance	
3DH5	Middle	2.977	0.318	0.4	Compliance	
งบทง	High	2.917	0.311	0.4	Compliance	
	Note: Dwell time	e=Pulse time (	(ms) × (1600	)/6/79) ×3	1.6 s	

## 3DH1: Low Channel

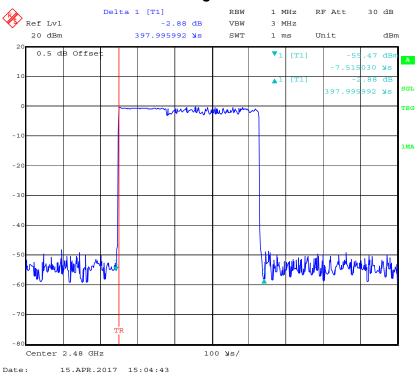


Report No.: RDG170330004B Page 48 of 63

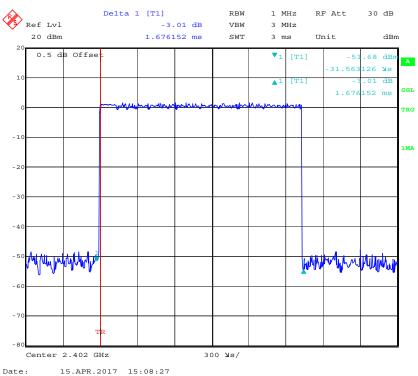
### **3DH1: Middle Channel**



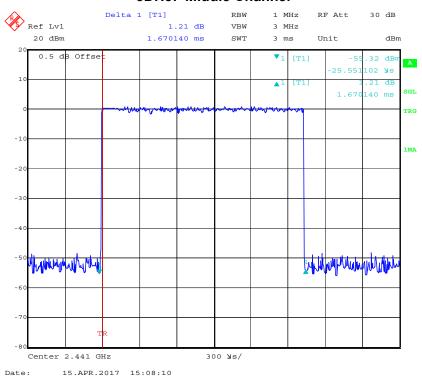
## 3DH1: High Channel



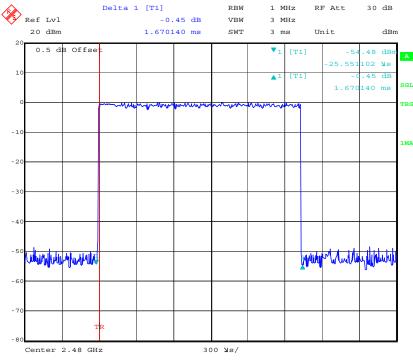
## 3DH3: Low Channel



## 3DH3: Middle Channel

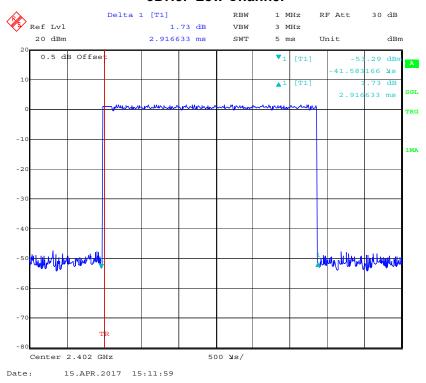


## 3DH3: High Channel

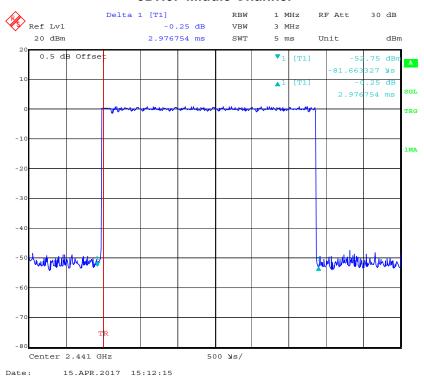


#### ate: 15.APR.2017 15:07:59

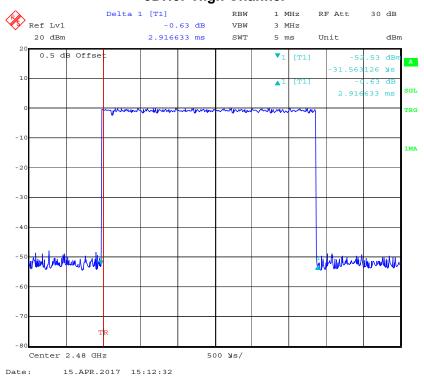
### 3DH5: Low Channel



## 3DH5: Middle Channel



# 3DH5: High Channel



# FCC §15.247(b) (1) - PEAK OUTPUT POWER MEASUREMENT

## **Applicable Standard**

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

### **Test Procedure**

- 1. Place the EUT on a bench and set in transmitting mode.
- 2. Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to one test equipment.
- 3. Add a correction factor to the display.

## **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	NO.3	Each Time	1

<sup>\*</sup> Statement of Traceability: BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

#### **Test Data**

#### **Environmental Conditions**

Temperature:	26.6 °C
Relative Humidity:	40%
ATM Pressure:	97.8kPa

<sup>\*</sup> The testing was performed by Tom Tang on 2017-04-14.

Test Result: Compliance.

Report No.: RDG170330004B Page 53 of 63

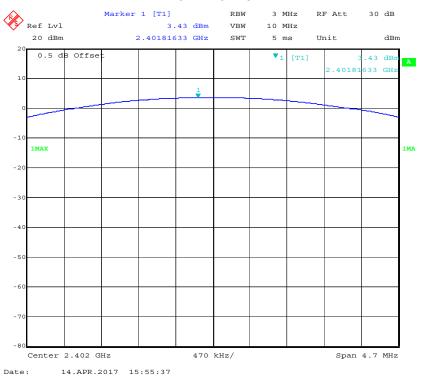
Test Mode: Transmitting

Mode	Frequency (MHz)	Peak Output power (dBm)	Limit (dBm)
2224	2402	3.43	30
BDR Mode (GFSK)	2441	2.93	30
(Gr Ort)	2480	1.68	30
	2402	0.45	30
EDR Mode (π/4-DQPSK)	2441	0.33	30
	2480	-0.61	30
EDR Mode (8-DPSK)	2402	1.18	30
	2441	0.93	30
	2480	-0.14	30

Note: The data above was tested in conducted mode.

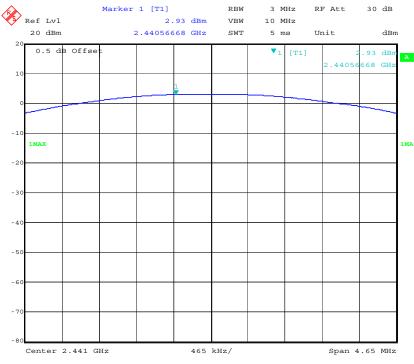
# BDR Mode (GFSK):

### **Low Channel**



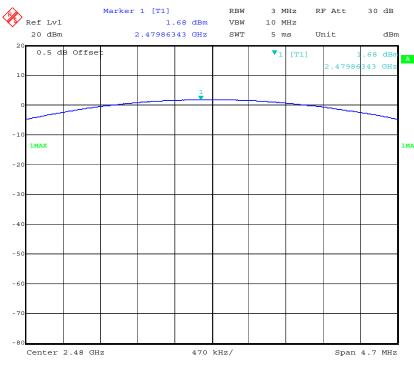
Report No.: RDG170330004B Page 54 of 63

## **Middle Channel**



Date: 14.APR.2017 16:01:21

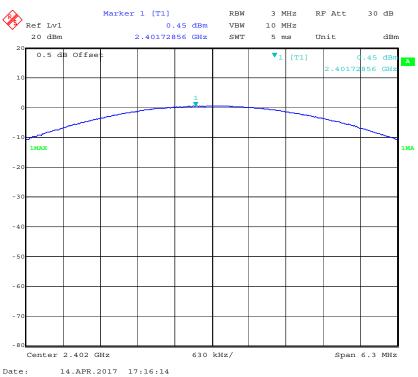
## **High Channel**



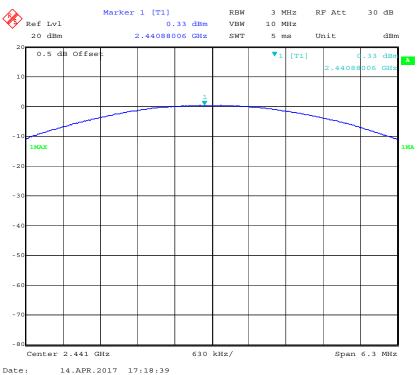
Date: 14.APR.2017 16:02:59

# EDR Mode ( $\pi/4$ -DQPSK):



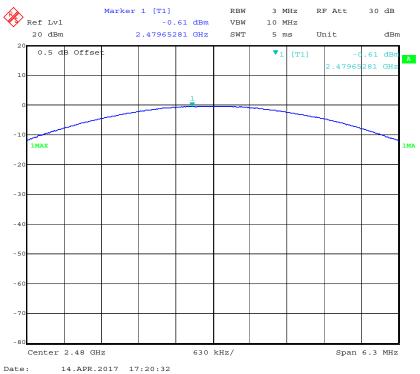


## **Middle Channel**



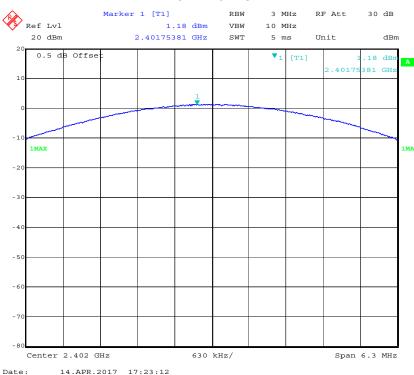
Report No.: RDG170330004B Page 56 of 63

# **High Channel**



# EDR Mode (8-DPSK):

### **Low Channel**

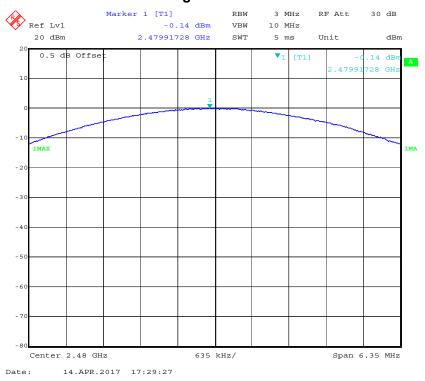


Report No.: RDG170330004B Page 57 of 63

## **Middle Channel**



## **High Channel**



# FCC §15.247(d) - BAND EDGES TESTING

## **Applicable Standard**

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).

#### **Test Procedure**

- 1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
- 2. Remove the antenna from the EUT and then connect to a low loss RF cable from the antenna port to a EMI test receiver, then turn on the EUT and make it operate in transmitting mode. Then set it to Low Channel and High Channel within its operating range, and make sure the instrument is operated in its linear range.
- 3. Set both RBW and VBW of spectrum analyzer to 100 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
- 4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
- 5. Repeat above procedures until all measured frequencies were complete.

### **Test Equipment List and Details**

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Rohde & Schwarz	Signal Analyzer	FSIQ26	831929/005	2016-09-21	2017-09-20
Unknown	RF Cable	Unknown	NO.3	Each Time	1

<sup>\*</sup> Statement of Traceability: BACL(Chengdu) attests that all of the calibrations on the equipment items listed above were traceable to NIM or to another internationally recognized National Metrology Institute (NMI), and were compliant with the NIST HB 150-2016 Normative Annex B "Implementation of traceability policy in accredited laboratories".

Report No.: RDG170330004B Page 59 of 63

## **Test Data**

## **Environmental Conditions**

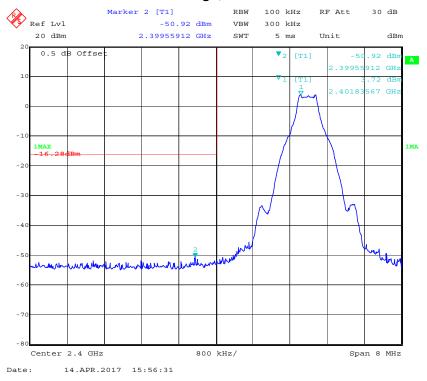
Temperature:	26.6 °C
Relative Humidity:	40%
ATM Pressure:	97.8kPa

<sup>\*</sup> The testing was performed by Tom Tang on 2017-04-14.

Test Result: Compliance

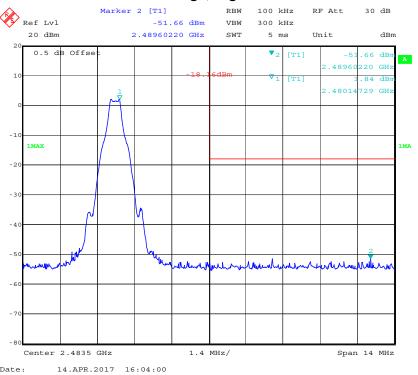
BDR Mode (GFSK):

## Band Edge, Left Side



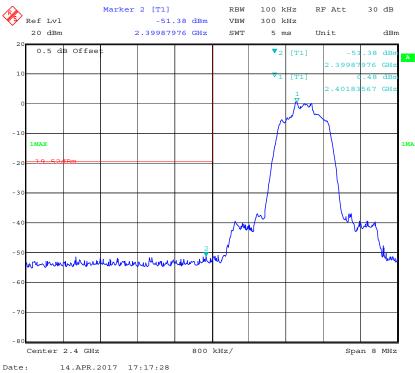
Report No.: RDG170330004B Page 60 of 63

## Band Edge, Right Side



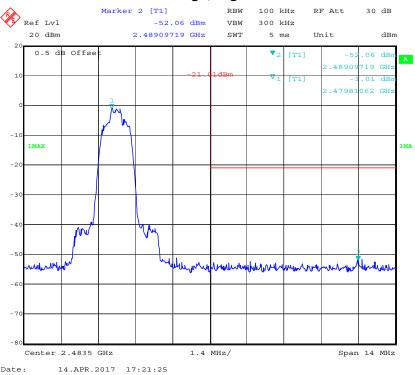
## EDR Mode (π/4-DQPSK):

# Band Edge, Left Side



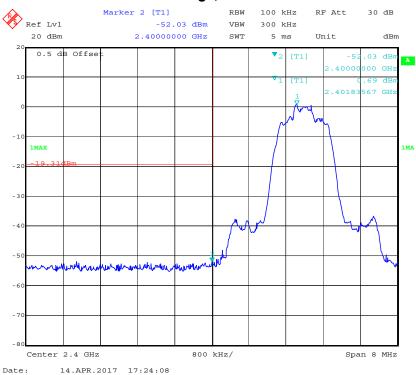
Report No.: RDG170330004B Page 61 of 63

## Band Edge, Right Side



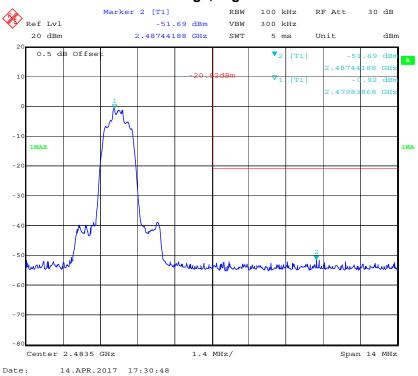
## EDR Mode (8-DPSK):

# Band Edge, Left Side



Report No.: RDG170330004B Page 62 of 63

# Band Edge, Right Side



\*\*\*\*\* END OF REPORT \*\*\*\*\*

Report No.: RDG170330004B Page 63 of 63