RF EXPOSURE EVALUTION REPORT

TESTING
CNAS L3572

Issued to

Stollmann E+V GmbH

For

Bluetooth Module mounted on different Test Jigs

Model Name	:	BlueMod+SR
Trade Name	:	BlueMod+SR
Brand Name	:	BlueMod+SR
FCC ID	:	RFRMSR
IC Number		4957A-MSR
Standard	:	FCC Oet65 Supplement C Jun.2001 47CFR 2.1091 KDB447498 D01 General RF Exposure Guidance v05
Test date	:	2013-4-27 to 2013-5-21
Issue date	:	2013-6-6

Shenzhen MORLAB Communication Technology Co., Ltd.

Tested by Peng Huarui	*Approved by* Zeng Dexin	*Review by* Nie Quan
Peng Huarui	*Zeng Dexin*	*Nie Quan*
(Test Engineer)	*(Department Manager)*	*(Project Manager)*
Date 2013.6.6	*Date* 2013.6.6	*Date* 2013.6.6

DIRECTORY

Change History		
Issue	Date	Reason for change
1.0	Jun 13, 2013	First edition

1. Testing Laboratory

1.1. Identification of the Responsible Testing Laboratory

Company Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Department:	Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101
Responsible Test Lab Manager:	Mr. Zeng Dexin
Telephone:	+86 755 36698525
Facsimile:	+86 755 36698525

1.2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd. Morlab Laboratory
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China 518101
FCC Registration Number:	695796

1.3. Accreditation Certificate

Accredited Testing Laboratory:	No. CNAS L3572

2. Technical Information

Note: the following data is based on the information by the applicant.

2.1. Identification of Applicant

Company Name:	Stollmann E+V GmbH
Address:	Mendelssohnstr, 15d, 22761 Hamburg, Germany

2.2. Identification of Manufacturer

Company Name:	Stollmann E+V GmbH
Address:	Mendelssohnstr, 15d, 22761 Hamburg, Germany

2.3. Equipment Under Test (EUT)

Model Name:	BlueMod+SR
Trade Name:	BlueMod+SR
Brand Name:	BlueMod+SR
Hardware Version:	V3.1
Software Version:	V1.02
Frequency Bands:	2402MHz - 2480MHz (79 channels, at intervals of 1MHz); 2402MHz - 2480MHz (40 channels, at intervals of 2MHz);
Modulation Mode:	FHSS (GFSK(1Mbps), ∏/4-DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps),BLE(GFSK);
Antenna Type:	Ceramic Antenna
Antenna Gain:	2.0 dBi

2.3.1. Photographs of the EUT

Please see for photographs of the EUT External and Internal Photos

2.3.2. Identification of all used EUT

The EUT identity consists of numerical and letter characters, the letter character indicates the test sample, and the following two numerical characters indicate the software version of the test sample.

EUT Identity	Hardware Version	Software Version
1#	V3.1	V1.02

2.4. Applied Reference Documents

Leading reference documents for testing:

No.	Identity	Document Title
1	**47 CFR§2.1091**	Radiofrequency Radiation Exposure Evaluation: Mobilee Devices
2	**FCC OET Bulletin 65 (Edition 97-01), Supplement C (Edition 01-01)**	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields
3	**KDB 447498 D01**	General RF Exposure Guidance v05r01

2.5. Test Environment and Conditions

Normal Temperature (NT):	20 ... 25 °C
Relative Humidity:	30 ... 75 %
Air Pressure:	980 ... 1020 hPa
Test frequency:	2402MHz - 2480MHz ISM band
Operation mode:	Signal transmitting
Power Level:	Maximum output power

During power measurement test, EUT is in Traffic Mode (Channel Allocated) at Normal Voltage Condition.

The Absolute Radio Frequency Channel Number (ARFCN) is allocated on 2402MHz, 2441MHz and 2480MHz. the BLE mode allocated on 2402MHz, 2440NHz and 2480MHz respectively in the test case. During test mode the EUT was commanded to operating at maximum transmitting power.

3. Device Category and RF Exposure Limit

Refer user manual this device is a Bluetooth Module mounted on different Test Jigs and this module was designed used in portable devices the minimum distance between human's body is **5mm.** Based on the FCC OET Bulleting 65 Supplement C and 47CFR 2.1093, this device belongs to portable device. The definition of the category as following:

Mobile Derives:

CFR Title 47 § 2.1093(b)

(b) For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

FCC KDB 447498 D01 General RF Exposure Guidance v05r01 Limit

Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition, listed below, is satisfied. These test exclusion conditions are based on source-based time-averaged maximum conducted output power of the RF channel requiring evaluation, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions. The minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.

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:

$$\left[\frac{\max.\ power\ of\ channel,\ including\ tune\text{-}up\ tolerrance,\ mW}{Min.\ test\ separation\ distance,\ mm}\right]\cdot\left[\sqrt{f\ (GHz)}\right]\leq 3.0 \text{ for 1-g SAR and} \leq 7.5 \text{ for 10-g extremity SAR}$$

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

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

IC RSS-102 2.5.1 and Safety Code 6

SAR evaluation is required if the separation distance between the user and the radiating element of the device is less than or equal to 20 cm, except when the device operates as follows:

1. from 3 kHz up to 1 GHz inclusively, and that is less than or equal to 200 mW for general public use and 1000 mW for controlled use;
2. above 1 GHz and up to 2.2 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 100 mW for general public use and 500 mW for controlled use;

3. above 2.2 GHz and up to 3 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 20 mW for general public use and 100 mW for controlled use; with output power (i.e. the higher of the conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power)
4. above 3 GHz and up to 6 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 10 mW for general public use and 50 mW for controlled use.

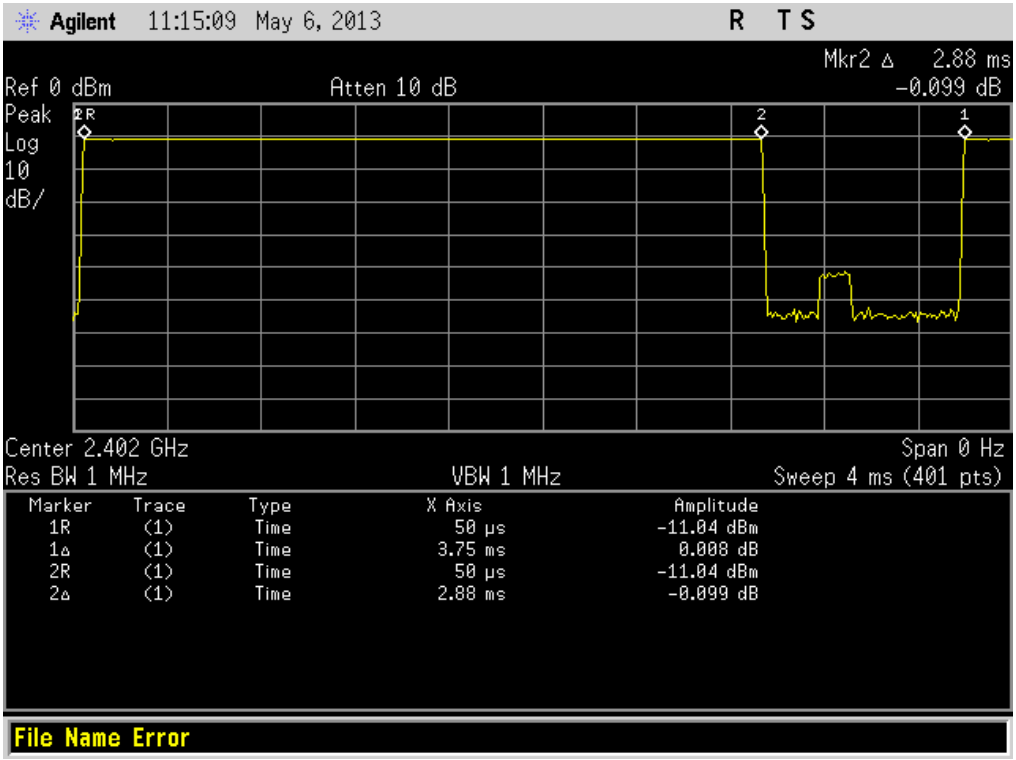
In these cases, the information contained in the RF exposure technical brief may be limited to information that demonstrates how the output power of the device was derived.

4. Measurement of conducted output power

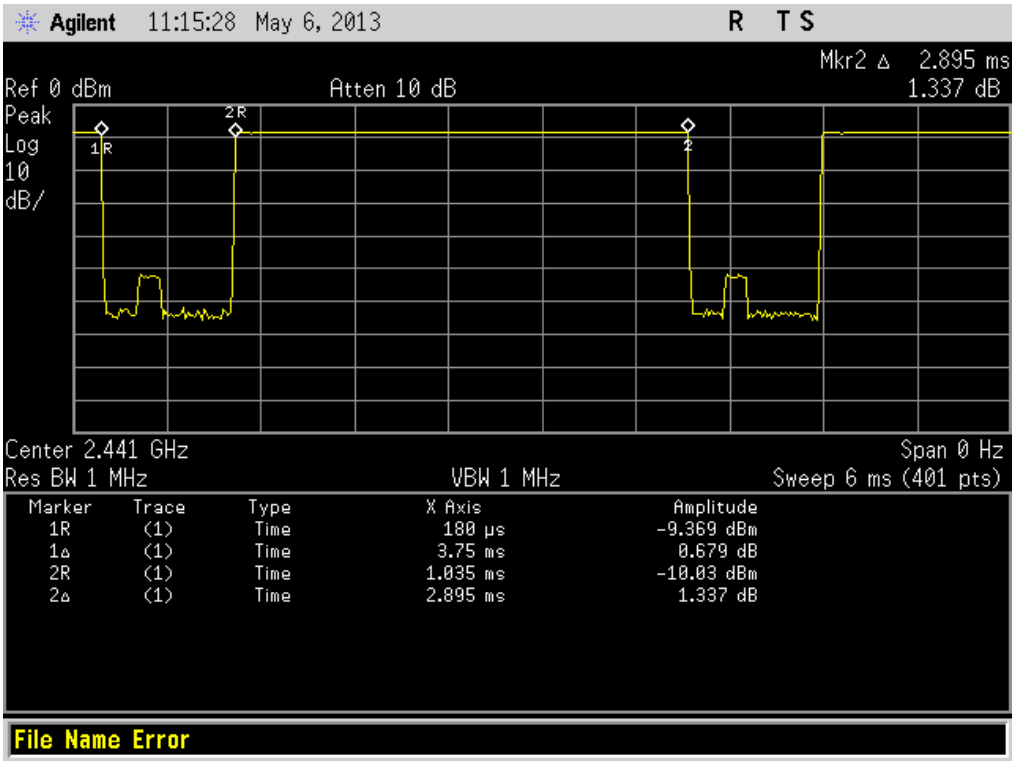
1. Conducted average output power in EDR GFSK mode data rate 1Mbps

GFSK Mode					
Channel	Frequency (MHz)	Paek Power		Average Power	
		dBm	W	dBm	W
0	2402	3.970	0.002495	2.840	0.00192
39	2441	6.718	0.004697	5.588	0.00362
78	2480	7.007	0.005020	5.877	0.00387

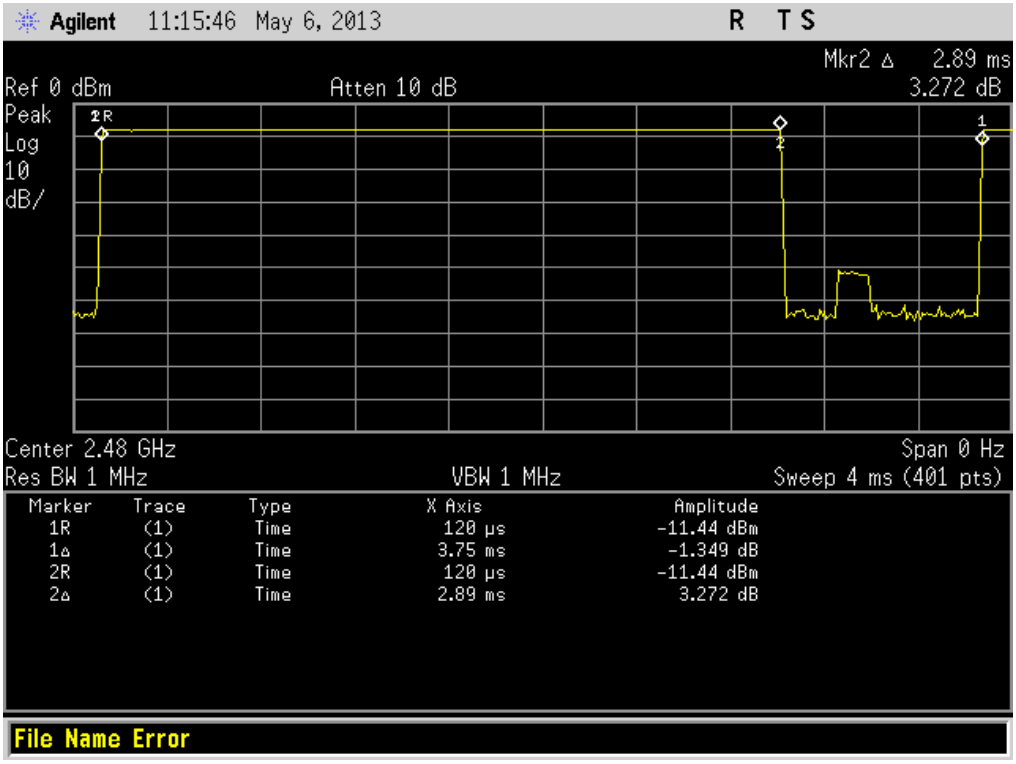
Duty Cycle



2402MHz



2441MHz

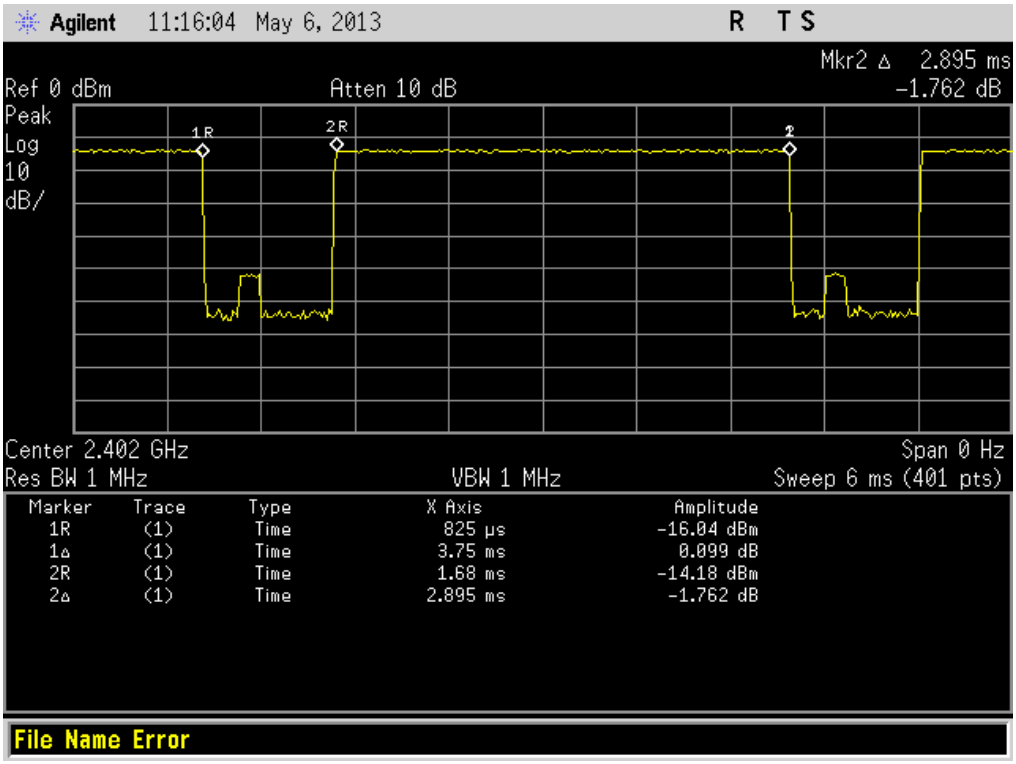


2480MHz

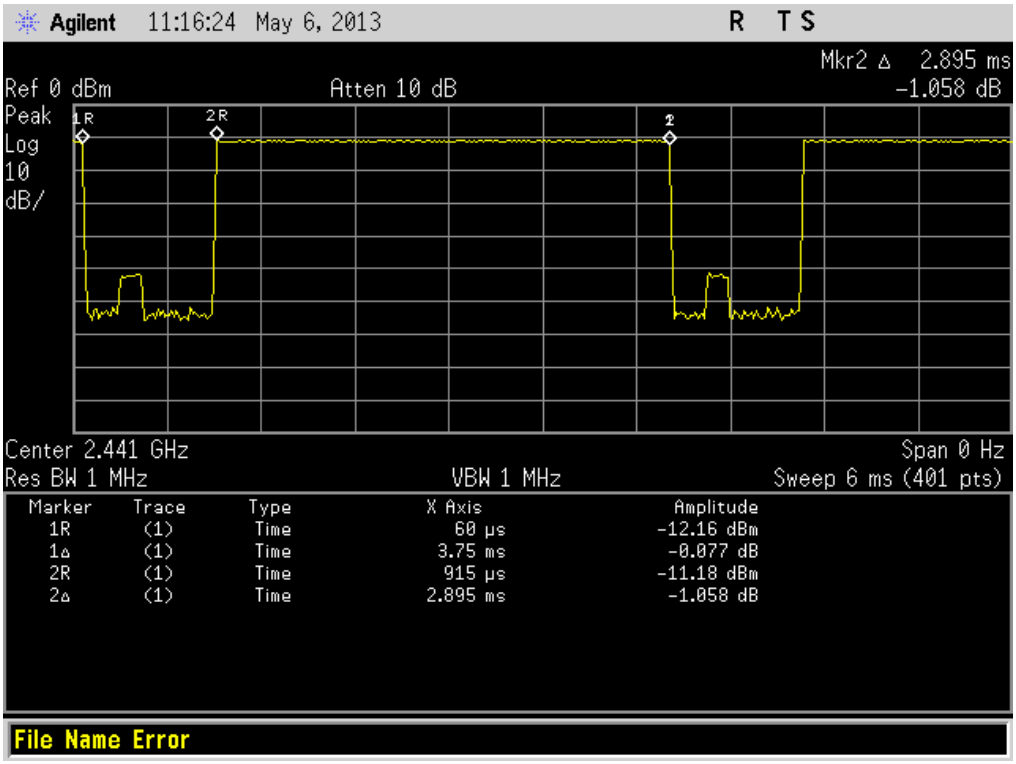
2. Conducted average output power in EDR ∏/4-DQPSK mode data rate 2Mbps

∏/4-DQPSK Mode					
Channel	Frequency (MHz)	Paek Power		Average Power	
		dBm	W	dBm	W
0	2402	1.487	0.001408	0.357	0.00109
39	2441	4.439	0.002779	3.309	0.00214
78	2480	4.394	0.002750	3.314	0.00215

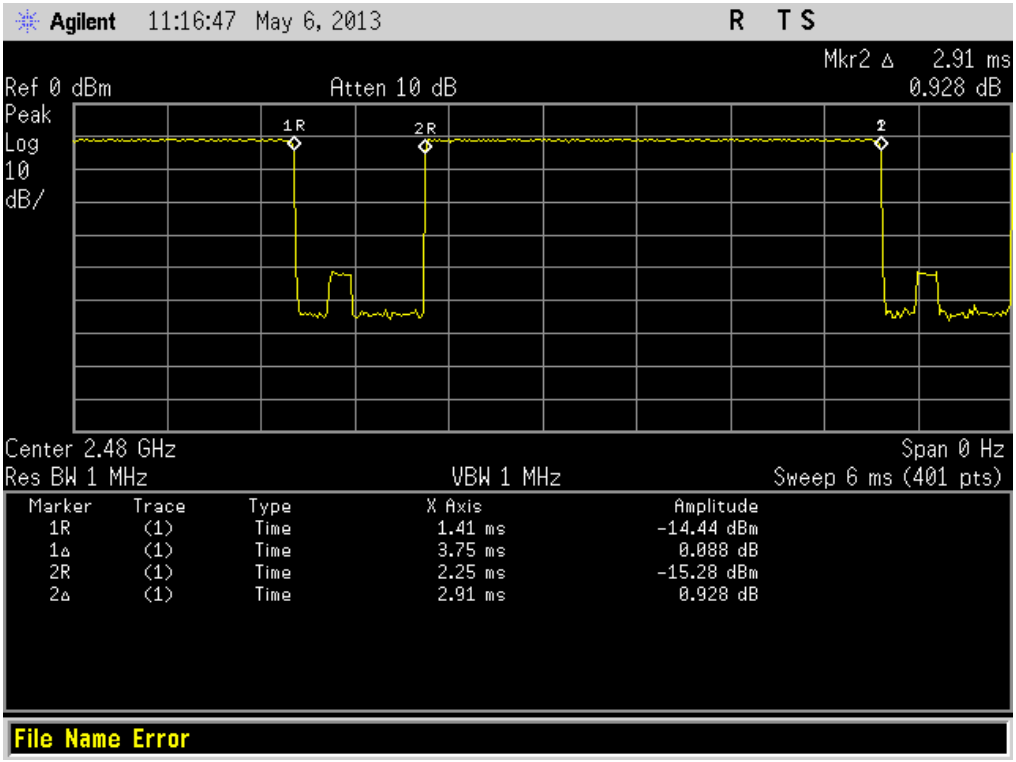
Duty Cycle



2402MHz



2441MHz

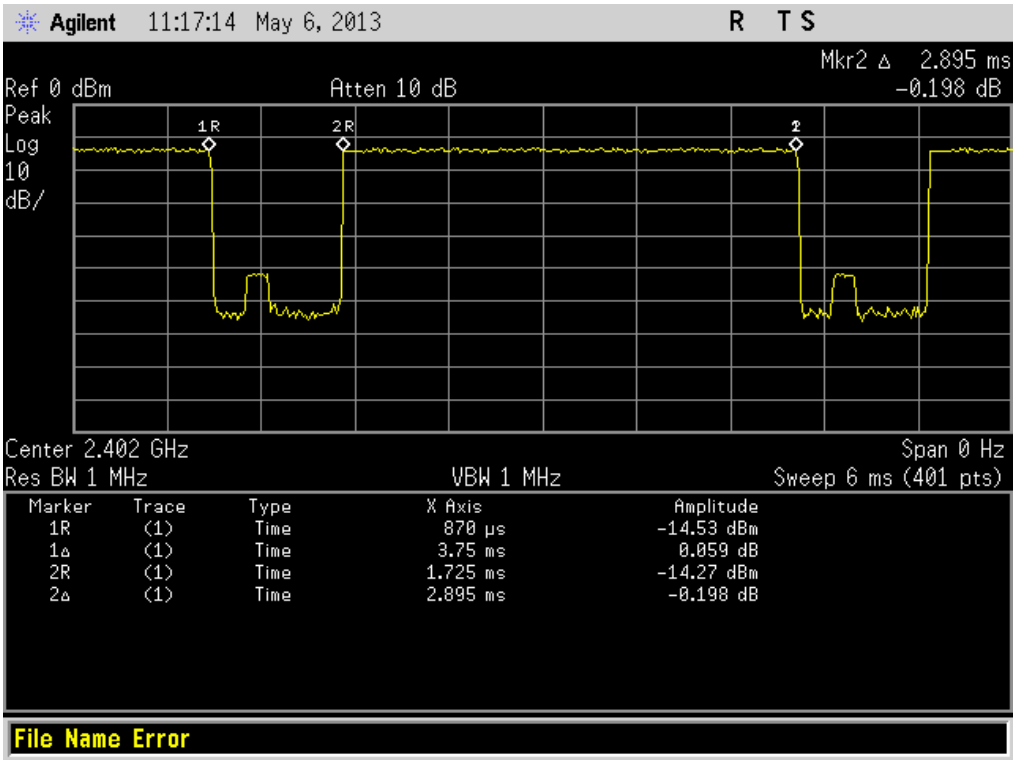


2480MHz

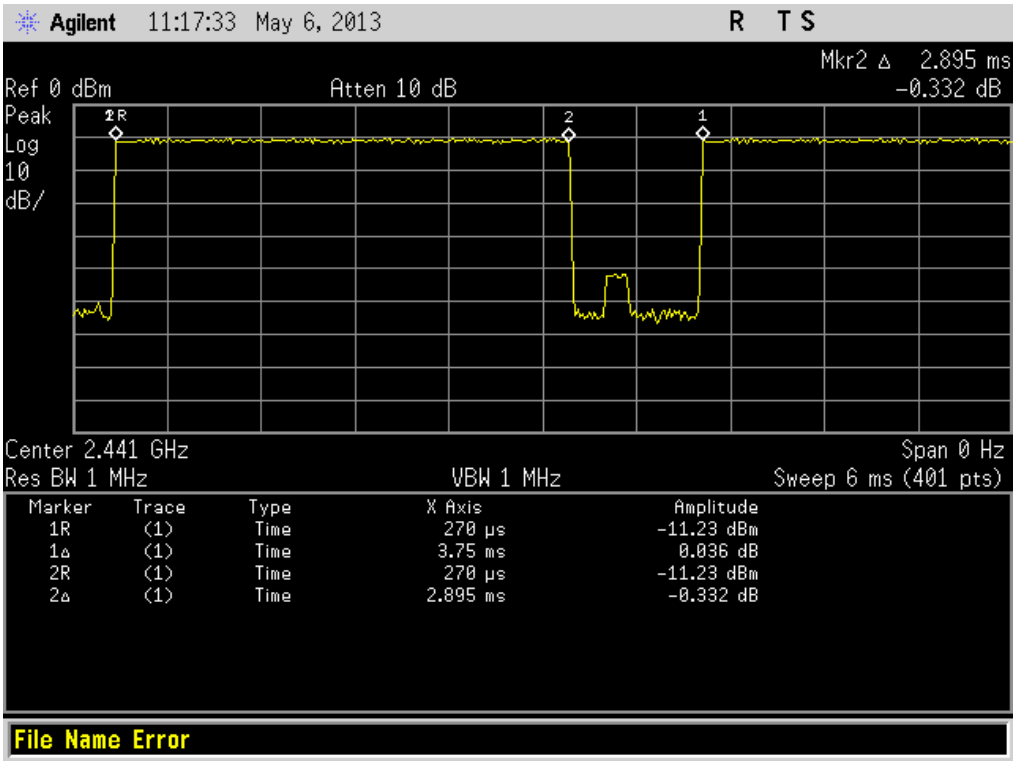
3. Conducted average output power in EDR 8-DPSK Mode mode data rate 2Mbps

8-DPSK Mode					
Channel	Frequency (MHz)	Paek Power		Average Power	
		dBm	W	dBm	W
0	2402	1.652	0.001463	0.522	0.00113
39	2441	4.562	0.002859	3.432	0.00220
78	2480	4.505	0.002822	3.425	0.00220

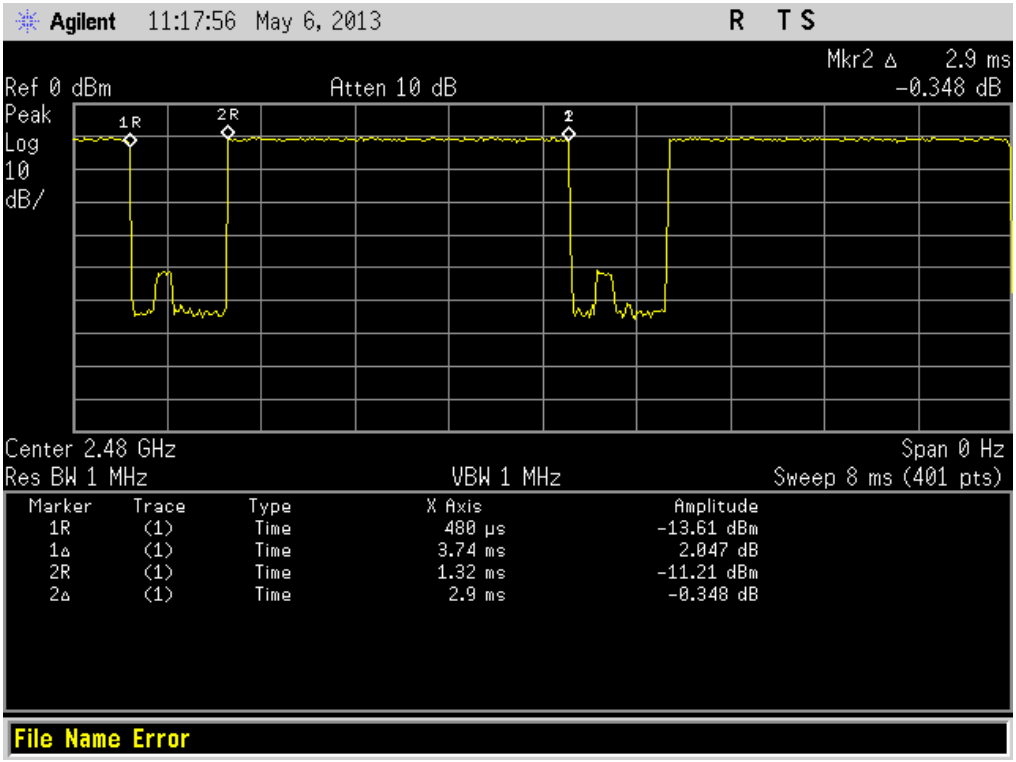
Duty Cycle



2402MHz



2441MHz

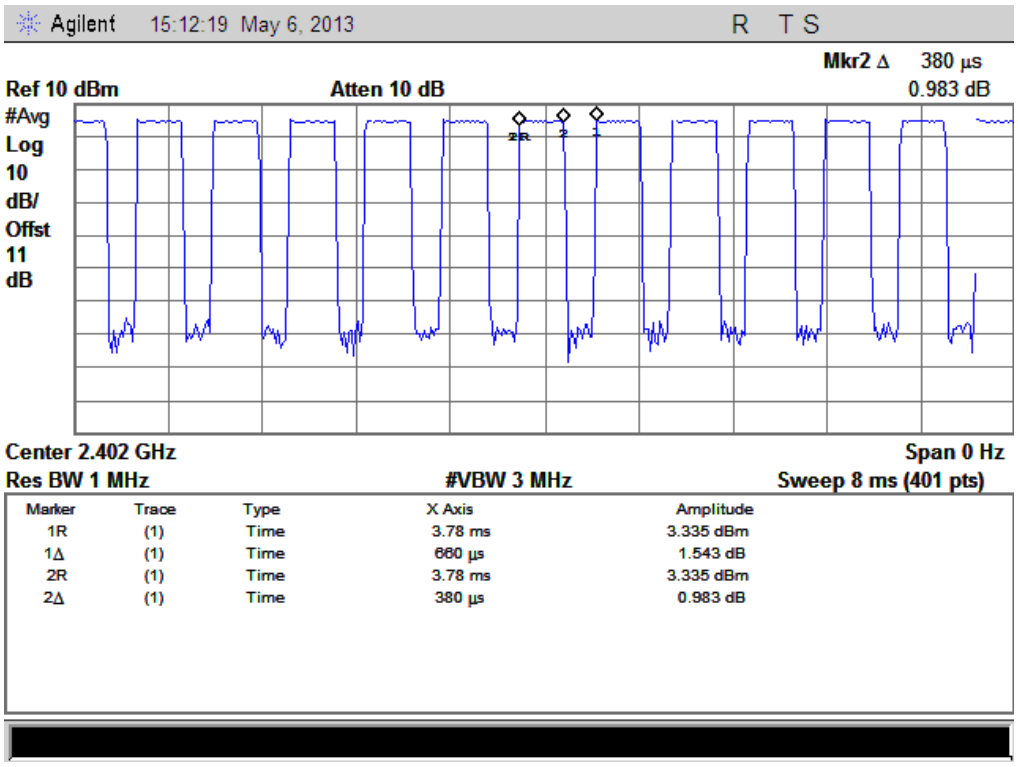


2480MHz

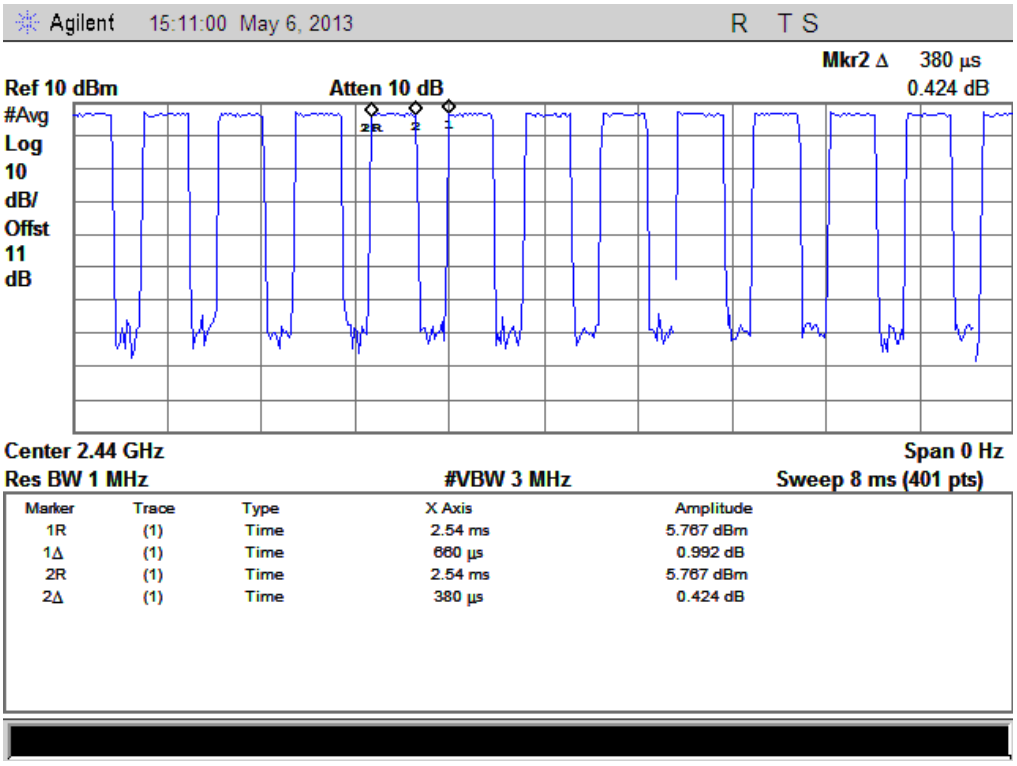
4. Conducted average output power in BLE GFSK mode

Channel	Frequency (MHz)	Peak Power		Average Power	
		dBm	W	dBm	W
0	2402	5.364	0.003439	2.999	0.00200
19	2440	7.144	0.005181	4.779	0.00301
39	2480	8.134	0.006507	5.769	0.00378

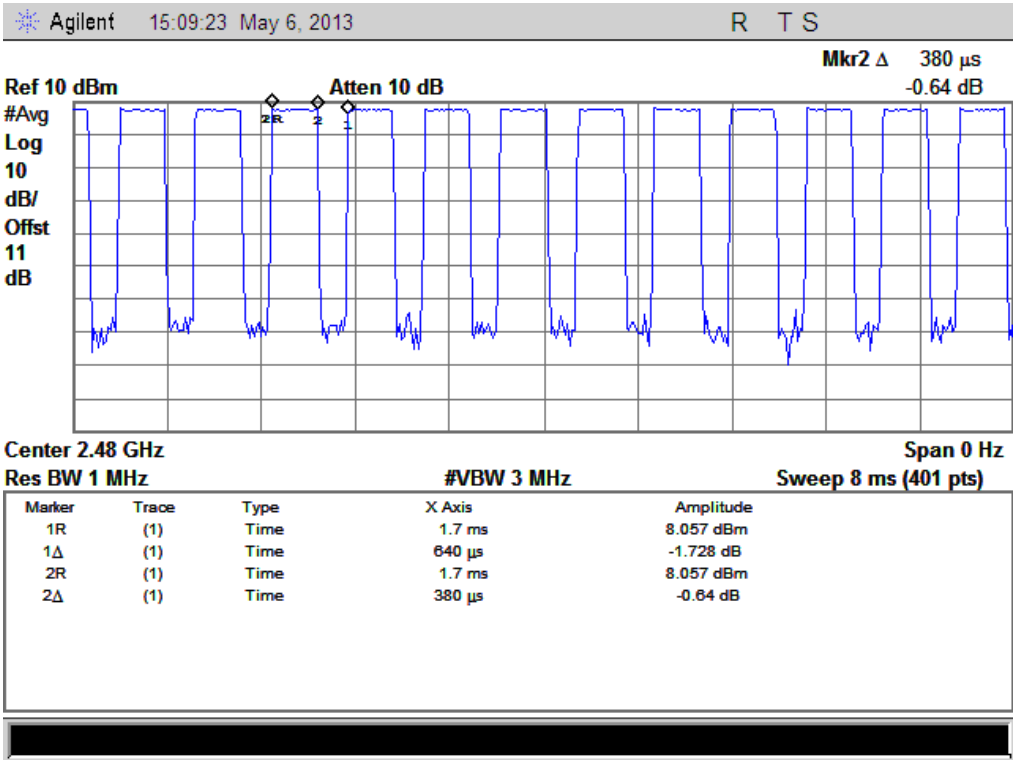
Duty Cycle



2402MHz



2440MHz



2480MHz

5. RF Exposure Evaluation Result

Bluetooth Mode

Evolution Mode	
Power condition	Max. power transmitting
Minimum separation distance (mm)	5mm
Evaluation Frequency(MHz)	2480MHz
Power range tolerance (dB)	±1.5
Peak Conducted power (dBm)	7.007
Time average power	
Average Conducted power (dBm)	5.877
Average Conducted power including tolerance (dBm)	7.377
Average Conducted power including tolerance (mW)	5.466
Average radiated power (e. i. r. p)	
Average Conducted power including tolerance (dBm)	7.377
Antenna Gain (dBi)	2.0
e. i. r. p (dBm)	9.377
e. i. r. p (mW)	8.664
RF Exposure evolution result	
FCC exclusion condition	$[\frac{5.466,mW}{5mm}] \cdot [\sqrt{2.48\,(GHz)}]=1.72<3.0$
IC exclusion condition	e. i. r. p =8.664mW＜20mW
Verdict	
FCC	**Pass**
IC	**Pass**

BLE Mode

Evolution Mode	
Power condition	Max. power transmitting
Minimum separation distance (mm)	5mm
Evaluation Frequency(MHz)	2480MHz
Power range tolerance (dB)	±1.5
Peak Conducted power (dBm)	8.134
Time average power	
Average Conducted power (dBm)	5.769
Average Conducted power including tolerance (dBm)	7.269
Average Conducted power including tolerance (mW)	5.332
Average radiated power (e. i. r. p)	
Average Conducted power including tolerance (dBm)	7.269
Antenna Gain (dBi)	2.0
e. i. r. p (dBm)	9.269
e. i. r. p (mW)	8.451
RF Exposure evolution result	
FCC exclusion condition	$[\frac{5.332mW}{5mm}] \cdot [\sqrt{2.48\,(GHz)}]=1.68<3.0$
IC exclusion condition	e. i. r. p =8.451mW＜20mW
Verdict	
FCC	**Pass**
IC	**Pass**

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