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# FCC Part 15C Test Report

Product Name : GSM/GPRS Wireless Data Module Model Name : SIM800H

Prepared for: Shanghai Simcom Ltd. Building A, SIM Technology Building, No.633, Jinzhong Road, Changning District, Shanghai P.R. China

Prepared by:

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 Report Number
 :
 UL15820130723FCC24-2

 Date of Report
 :
 2013-07-30

 Date of Test
 :
 2013-07-23~2013-07-29

Notes :

The test results only relate to these samples which have been tested. Partly using this report will not be admitted unless been allowed by Unilab. Unilab is only responsible for the complete report with the reported stamp of Unilab.

Report No. : UL15820130723FCC24-2

Applicant:	Shanghai Simcom Ltd.
	Building A, SIM Technology Building, No.633, Jinzhong Road, Changning District, Shanghai P.R. China
Manufacturer:	Shanghai Simcom Ltd.
	Building A, SIM Technology Building, No.633, Jinzhong Road, Changning District, Shanghai P.R. China
Product Name:	GSM/GPRS Wireless Data Module
Brand Name:	SIMCom
Model Name:	SIM800H
FCC ID:	UDV-2013072401
Serial Number:	N/A
Technical Data:	AC input: AC 100~240V 50/60Hz Rated voltage: 3.6V~4.2V
Date of Receipt:	2013-07-23
Test Standard:	FCC CFR Tile 47 Part 15: 2010 ANSI C 63.4: 2009 DA 00705
Test Result:	Complied
Date of Test	2013-07-23~2013-07-29

Prepared by :

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Reviewed by :

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# **1. GENERAL INFORMATION**

## 1.1 EUT DESCRIPTION

Product Name:	GSM/GPRS Wireless Data Module
Model Name:	SIM800H
Hardware Version:	V1.02
Software Version:	SIM800 R13.08
RF Exposure Environment:	Uncontrolled
Bluetooth	
Frequency Range:	2400MHz~2483.5MHz
Type of Modulation:	GFSK(1 Mbps), π /4-DQPSK(2 Mbps) 8-DPSK(3 Mbps)
Channel Separation:	1MHz
Channel Number:	79
Antenna Type:	External
Antenna Peak Gain:	2dBi

## 1.2 TEST MODE

Unilab has verified the construction and function in typical operation. All the test modes were carried out with the EUT in normal operation, which was shown in this test report and defined as:

43.	
Test Mode	
Mode 1: GFSK Bluetooth CH0	
Mode 2: GFSK Bluetooth CH39	
Mode 3: GFSK Bluetooth CH78	
Mode 4: 8-DPSK Bluetooth CH0	
Mode 5: 8-DPSK Bluetooth CH39	
Mode 6: 8-DPSK Bluetooth CH78	

Note:

1. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

2. For the ERP/EIRP and radiated emission test, every axis (X, Y, Z) was verified, and show the worst result on this report.

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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4: 2009 and FCC CFR 47 2.1046, 2.1047, 2.1049, 2.1051, 2.1053, 2.1055, 2.1057, 15.207, 15.209 and 15.247.

## 2.1 EUT CONFIGURATION

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

#### 2.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

## 2.3 GENERAL TEST PROCEDURES

#### **Conducted Emissions**

The EUT is placed on the turntable, which is 0.8 m above ground plane. According to the requirements in Section 13.1.4.1 of ANSI C63.4: 2009 Conducted emissions from the EUT measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and average detector modes.

#### **Radiated Emissions**

The EUT is placed on a turn table, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3m away from the receiving antenna, which varied from 1m to 4m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the maximum emissions, exploratory radiated emission measurements were made according to the requirements in Section 13.1.4.1 of ANSI C63.4: 2009

## 2.4 FCC PART 15.205 RESTRICTED BANDS OF OPERATIONS

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
MHz 0.090 - 0.110 <sup>1</sup> 0.495 - 0.505 2.1735 - 2.1905 4.125 - 4.128 4.17725 - 4.17775 4.20725 - 4.20775 6.215 - 6.218 6.26775 - 6.26825 6.31175 - 6.31225 8.291 - 8.294 8.362 - 8.366 8.37625 - 8.38675 8.41425 - 8.41475	MHz 16.42 - 16.423 16.69475 - 16.69525 16.80425 - 16.80475 25.5 - 25.67 37.5 - 38.25 73 - 74.6 74.8 - 75.2 108 - 121.94 123 - 138 149.9 - 150.05 156.52475 - 156.52525 156.7 - 156.9 162.0125 - 167.17	MHz 399.9 - 410 608 - 614 960 - 1240 1300 - 1427 1435 - 1626.5 1645.5 - 1646.5 1660 - 1710 1718.8 - 1722.2 2200 - 2300 2310 - 2390 2483.5 - 2500 2655 - 2900 3260 - 3267	GHz 4.5 - 5.15 5.35 - 5.46 7.25 - 7.75 8.025 - 8.5 9.0 - 9.2 9.3 - 9.5 10.6 - 12.7 13.25 - 13.4 14.47 - 14.5 15.35 - 16.2 17.7 - 21.4 22.01 - 23.12 23.6 - 24.0

1 Until February 1, 1999, this restricted band shall be 0.490-0.510 MHz. 2 Above 38.6

(b) Except as provided in paragraphs (d) and (e), the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in Section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in Section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in Section 15.35 apply to these measurements.

# 2.5 DESCRIPTION OF TEST MODES

The EUT has been tested under operating condition.

After verification, all tests were carried out with the worst case test modes as shown below GFSK(1Mbps) and 8-DPSK(3 Mbps) Channel Low (2402MHz)  $\cdot$  Mid (2441MHz) and High (2480MHz), these were chosen for full testing.



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# 3. TECHNIACL SUMMARY

# 3.1 SUMMARY OF STANDARDS AND TEST RESULTS

The EUT have been tested according to the applicable standards as referenced below:

Test Item	FCC Rule	Result
Channel Separation	§15.247 (a)	Р
Minimum Hopping Channel	§15.247 (a)	Р
Occupied Bandwidth	§15.247 (a)	Р
Dwell Time	§15.247 (a)	Р
Peak Output Power (Conduction)	§15.247 (b)	Р
Spurious Emissions (Conduction)	§15.247 (d)	Р
Band edge measurement	§15.247 (d)	Р
Spurious Emissions (Radiation)	§15.247 (d) §15.35 (b) §15.209 (a)	Р
AC Power Line Conducted Emissions	§15.207 (a)	Р

Note: P means pass, F means failure, N/A means not applicable

# 3.2 TEST UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

Test item	Value (dB)
Conducted disturbance	3.4
Radiated disturbance	4.2

#### 3.3 TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	Serial No.	Due Date
Receiver	Agilent	N9038A	MY51210142	2013/09/28
LISN	R&S	ENV216	100069	2014/06/23
3m Chamber & Accessory Equipment	ETS-LINDGREN	FACT-3	CT-0000336	2013/11/27
Microwave Preamplifier	EM Electronics	EM30180	3008A02425	2014/03/01
Power Splitter	Agilent	11667C/ 52401	MY53806148	2014/03/01
Cold-heat climate test chamber	Weiss-Voetsch Environmental Testing Instrunments(Taica	C, 180, -40	546860026200 10	2013.12.4

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DC Power Supply	Agilent	6612C	MY43002989	2014.01.16
Bilog Antenna	Schwarzbeck	VULB9160	9160-3316	2013.10.17
VHF-UHF-Biconical Antenna	Schwarzbeck	VUBA9117	9117-263	2013.10.17
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-942	2013.10.17
Broad-Band Horn Antenna	Schwarzbeck	BBHA9120D	9120D-943	2013.10.17

The measuring equipment utilized to perform the tests documented in this report has been calibrated once a year or in accordance with the manufacturer's recommendations, and has been calibrated by accredited calibration laboratories.

#### 3.4 TEST FACILITY

All test facilities used to collect the test data are located at No. 1350, Lianxi Rd. Pudong New District, Shanghai, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4: 2009, CISPR 16-1-1 and other equivalent standards. The laboratory is compliance with the requirements of the ISO/IEC/E 17025.

# 3.5 TEST SETUP CONFIGURATION

The information contained within this report is intended to show verification of compliance of the EUT to the requirements of CFR 47 FCC Part 15.247. The test photographs attached in Appendix 1 for the actual connections between EUT and support equipment.

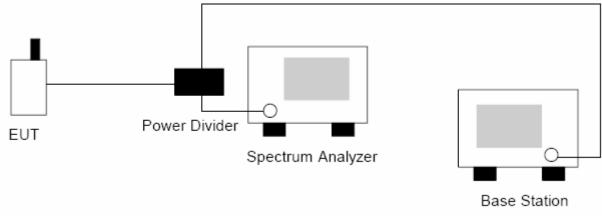
#### Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

# 4. CHANNEL SEPARATION

# 4.1 TEST SETUP



# 4.2 LIMITS

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.

# 4.3 TEST PROCEDURE

The EUT have its hopping function enabled. Use the following spectrum analyzer settings: 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 Allow the trace to stabilize. Use the marker-delta function to determine the separation

between the peaks of the adjacent channels.

Mkr3 2.439 818 GHz 5.066 dBm 10 dB/div Log Ref 20.00 dBm **∂**<sup>1</sup> {}<sup>2</sup> 3 cond Center 2.441000 GHz #Res BW (CISPR) 120 kHz Span 3.000 MHz Sweep 1.00 ms (1001 pts) #VBW 120 kHz FUNCTION VALUE FUNCTION FUNCTION WIDTH MKR MODE TRC SCL 2.440 826 GHz 2.441 834 GHz 2.439 818 GHz 5.292 dBm 5.410 dBm 5.066 dBm Ν 1 f 1 f 1 f N N

# 4.4 TEST RESULT

1

2

3

4567

GFSK Channel Separation: 1.000MHz

# 8-DPSK Channel Separation: 1.000MHz

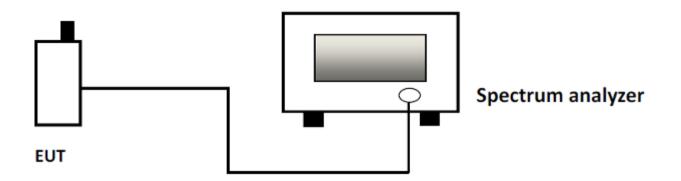
10 dB/div Ref 20.0	0 dBm			Mkr3 2	.439 836 GHz 2.964 dBm
Log 10.0 -10.0 -20.0	mm My My y	2 ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~	w.M.M.w	Mar A	
-30.0 -40.0 -50.0 -60.0					
Center 2.441000 GH #Res BW (CISPR) 1		W 120 kHz	FUNCTION	Sweep 1.	Span 3.000 MHz 00 ms (1001 pts) FUNCTION VALUE
1 N 1 f 2 N 1 f 3 N 1 f 4 5 6 6 6 7 7 8	2.441 798 GHz 2.440 832 GHz 2.439 836 GHz	1.906 dBm 3.294 dBm 2.964 dBm			
9 10 11 12					



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# 5. MINIMUM HOPPING CHANNELS

# 5.1 TEST SETUP



# 5.2 LIMITS

According to 15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands shall use at least 15 hopping frequencies.

## 5.3 TEST PROCEDURE

The EUT have its hopping function enabled. Use the following spectrum analyzer settings: Span = the frequency band of operation RBW  $\geq$  1% of the span VBW  $\geq$  RBW Sweep = auto Detector function = peak Trace = max hold Allow the trace to stabilize. It may prove necessary to break the span up to sections, in order to clearly show all of the hopping frequencies.

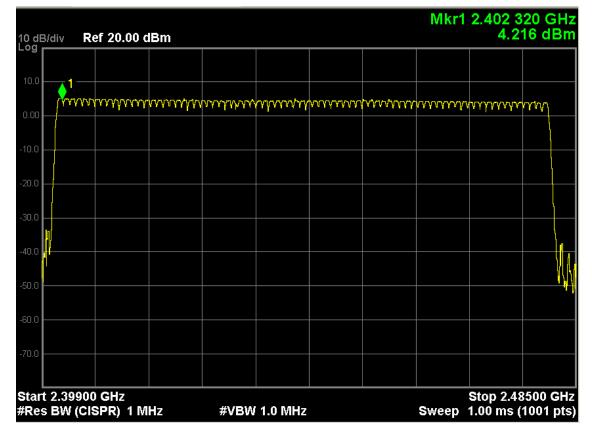
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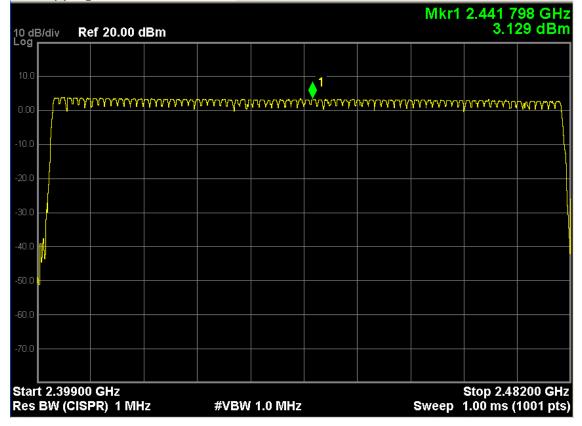
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# 5.4 TEST RESULT

#### **GFSK** Hopping Channel: 79 channels



#### 8-DPSK Hopping Channel: 79 channels

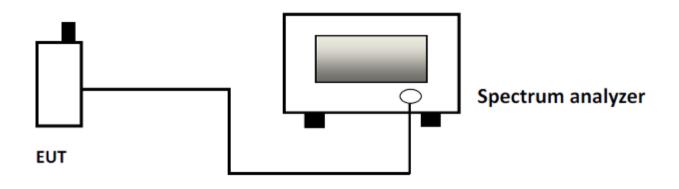


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# 6. OCCUPIED BANDWIDTH

# 6.1 TEST SETUP



## 6.2 LIMITS

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.

# 6.3 TEST PROCEDURE

Use the following spectrum analyzer settings: Span = approximately 2 to 3 times the 6 dB or 20 dB bandwidth, centered on a channel RBW  $\geq$  1% of the 6 dB or 20 dB bandwidth VBW  $\geq$  RBW Sweep = auto Detector function = peak Trace = max hold The EUT should be transmitting at its maximum data rate. Allow the trace to stabilize. Use the marker-to-peak function to set the marker to the peak of the emission. Use the marker-delta function to measure 6 dB or 20 dB down one side of the emission. Reset the marker-delta function, and move the marker to the other side of the emission, until it is (as close as possible to) even with the reference marker level. The marker-delta reading at this point is the 6 dB or 20 dB bandwidth of the emission. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

#### **TEST RESULTS**

Channel	20dB bandwidth (MHz)	99% bandwidth (MHz)
GFSK		
BT CH0	0.6181	0.80695
BT CH39	0.6661	0.80928
BT CH79	0.6649	0.81044
8-DPSK		
BT CH0	1.121	1.0825
BT CH39	1.122	1.0848
BT CH79	1.119	1.0817

#### GFSK Bluetooth Channel 0



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#### GFSK Bluetooth Channel 39



#### GFSK Bluetooth Channel 78



### 8-DPSK Bluetooth Channel 0



#### 8-DPSK Bluetooth Channel 39



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## 8-DPSK Bluetooth Channel 78



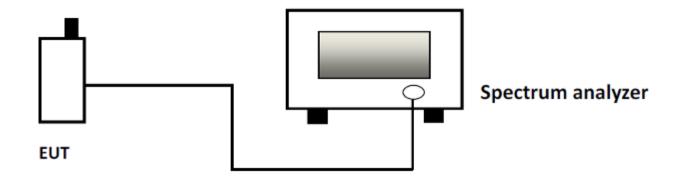


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# 7. DWELL TIME

7.1 TEST SETUP



# 7.2 LIMITS

According to §15.247(a)(1)(iii), Frequency hopping systems operating in the 2400MHz-2483.5 MHz bands. The average time of occupancy on any channels shall not greater than 0.4 seconds within a period 0.4 seconds multiplied by the number of hopping channels employed.

# 7.3 TEST PROCEDURE

The EUT must have its hopping function enabled.

Use the following spectrum analyzer settings:

Span = zero span, centered on a hopping channel

 $RBW \leq Channel Separation$ 

RBW≤VBW

Sweep = as necessary to capture the entire dwell time per hopping channel

Detector function = peak

Trace = max hold

If possible, use the marker-delta function to determine the dwell time. If this value varies with different modes of operation (e.g., data rate, modulation format, etc.), repeat this test for each variation.

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# 7.4 TEST RESULTS

			GFSK	
Packet	Ν	x(ms)	Calculation formula	Result(T)(ms)
DH1	2	0.366	$T = \frac{1600}{79 \times N} \times x \times (0.4 \times 79) = \frac{1600}{79 \times N} \times x \times 31.6$	117.12
DH3	4	1.624	DH1, N=2;	259.84
DH5	6	2.876	DH3, N=4; DH5, N=6	306.77

### 8-DPSK

Packet	Ν	x(ms)	Calculation formula	Result(T)(ms)
DH1	2	0.376	$T = \frac{1600}{79 \times N} \times x \times (0.4 \times 79) = \frac{1600}{79 \times N} \times x \times 31.6$	120.32
DH3	4	1.630	DH1, N=2;	260.80
DH5	6	2.881	DH3, N=4; DH5, N=6	307.31

### GFSK Single Channel-DH1 packet

10 dB/div R	ef 20.00 dBn	n				Μ	الا 12 994.0 kr2 3.68 dBn
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20.0							
30.0 <b></b> 40.0 <b></b>							
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## GFSK Single Channel-DH3 packet

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nter 2. s BW (	480000 CISPR	0000 GH	× 2	#VI 2.508 ms 884.0 µs	ү 3.53 dB	m	CTION			00 ms (	(1001
nter 2. s BW ( MODE TI	480000 CISPR) RC SCL	0000 GH	× 2	.508 ms	Y	m	CTION			00 ms (	(1001
nter 2. s BW (	480000 CISPR) RC SCL	0000 GH	× 2	.508 ms	ү 3.53 dB	m	CTION			00 ms (	(1001
nter 2. s BW (	480000 CISPR) RC SCL	0000 GH	× 2	.508 ms	ү 3.53 dB	m	CTION			00 ms (	(1001
enter 2. es BW ( R MODE TI	480000 CISPR) RC SCL	0000 GH	× 2	.508 ms	ү 3.53 dB	m				00 ms (	(1001

#### **GFSK** Single Channel-DH5 packet

11 12

10 dB/d	liv	Ref	20.00 (	dBm							Mkr2 5 3.4	i94.0 με 55 dBr
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3												
5												
6												
8												
10												

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## 8-DPSK Single Channel-DH1 packet

dB/div	Re	ef 20.00 d	dBm						Mkr2 7 1.	67 dB
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es BW	(CISI	000000 G PR) 1 MH		#VI	BW 1.0 MHz			Sweep 2	s .000 ms (	span 0 1001 p
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R MODE	(CISI	PR) 1 MH	<b>iz</b> × 39	#VI 00.0 μs 66.0 μs		n	CTION		.000 ms (	1001 pt
R MODE N N N N N N N N N N	(CISI	PR) 1 MH	<b>iz</b> × 39	)0.0 µs	۲ 1.82 dBr	n	CTION		.000 ms (	1001 pt
ES BW	(CISI	PR) 1 MH	<b>iz</b> × 39	)0.0 µs	۲ 1.82 dBr	n	CTION		.000 ms (	1001 pt
CR MODE 1 N 2 N 3 4 5 7	(CISI	PR) 1 MH	<b>iz</b> × 39	)0.0 µs	۲ 1.82 dBr	n	CTION		.000 ms (	1001 pt
es BW R Mode 1 N 2 N 3 4 5 5 6 7 8 9 9	(CISI	PR) 1 MH	<b>iz</b> × 39	)0.0 µs	۲ 1.82 dBr	n	CTION		.000 ms (	1001 pt
es BW (R моде 1 N 2 N 3 4 5 5 5 6 7 8 8	(CISI	PR) 1 MH	<b>iz</b> × 39	)0.0 µs	۲ 1.82 dBr	n	CTION		.000 ms (	

### 8-DPSK Single Channel-DH3 packet

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	0000000 G SPR) 1 MH			#VBW	1.0 MHz	Ś	Swe	eep 4.	s 000 ms (	pan 0 1001 p

MKR	MODE	TRC	SCL	×	Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALUE
1	N	1	t	1.286 ms	2.16 dBm			
2	N	1	t	2.916 ms	1.46 dBm			
3								
4								
5								
6								
7								
8								
9								
10								
11								
12								



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### 8-DPSK Single Channel-DH5 packet

10 dB/div _og <b>r</b>	v	Ref	20.00	dBm											1.1	316 m 1 dBr
10.0		$^{1}$									¢ <sup>2-</sup>					
-10.0																
20.0 —— 30.0 ——																
40.0																
60.0 <mark>444</mark> 70.0	Mahan										Y	hvalladir ta	ing li	Lajjozether]	r./14	ndaharana Ang ang ang ang ang ang ang ang ang ang a
			00000 ( R) 1 MH		#V	/BW	1.0 MHz				ļ	Sweep	5.	000 m	S  15 (1	pan 0 H 1001 pt:
IKR MODE	I (CI	SPI					Y		FUNC	CTION		Sweep			<b>is (</b> 1	pan 0 H 1001 pts N VALUE
es BW	I (CI	SPI		lz	#V 5.0 μs 6 ms			3m 3m	FUNC	CTION					<b>is (</b> 1	001 pt
KR MODE	I (CI	SPI		lz	.0 µs		۲ 2.53 dE	3m 3m	FUNC	CTION					<b>is (</b> 1	001 pt
KR MODE	I (CI	SPI		lz	.0 µs		۲ 2.53 dE	3m 3m	FUNC	CTION					<b>is (</b> 1	001 pt
Res         BW           1         N           2         N           3         -           4         -           5         -           6         -	I (CI	SPI		lz	.0 µs		۲ 2.53 dE	3m 3m	FUNC	CTION					<b>is (</b> 1	001 pt
Kes         BW           1         N           2         N           3         4           5	I (CI	SPI		lz	.0 µs		۲ 2.53 dE	3m 3m 	FUNC	CTION					<b>is (</b> 1	001 pt
Kes         BW           1         N           1         N           2         N           3         4           5         6           7         8           9         9	I (CI	SPI		lz	.0 µs		۲ 2.53 dE	3m 3m	FUNC	CTION					<b>is (</b> 1	001 pt
Res BW MKR Mode 1 N 2 N 3 4 5 5 6 7 8	I (CI	SPI		lz	.0 µs		۲ 2.53 dE	3m 3m 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	FUNC	CTION					<b>is (</b> 1	001 pt

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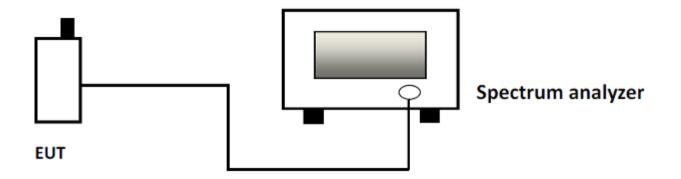
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# 8. PEAK OUTPUT POWER (CONDUCTION)

# 8.1 TEST SETUP



## 8.2 LIMITS

The maximum peak output power of the intentional radiator shall not exceed the following:

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

# 8.3 TEST PROCEDURE

After a radio link has been established between EUT and Base station, the output power of the cell signal of the testing equipment will be decreased until the output power of the EUT reach a maximum value. Then the test data can be read at the tester screen. The loss between RF output port of the EUT and the input port of the tester will be taken into consideration.

The measurement will be conducted at three channels:

Bluetooth: Low(0), middle(39) and High (78),

Set the spectrum analyzer as RBW = 3MHz, VBW =3MHz, Span = 10MHz, Sweep=auto Detector = Peak, Trace mode = max hold

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# 8.4 RESULTS & PERFORMANCE

		GFSK		
Channel	Peak power (dBm)	Peak power (mW)	Limit (mW)	Result
0 (2402MHz)	5.935	3.92		Pass
39 (2441MHz)	5.887	3.88	125	Pass
78 (2480MHz)	5.628	3.65		Pass
		8-DPSK		
Channel	Peak power (dBm)	Peak power (mW)	Limit (dBm)	Result
0 (2402MHz)	5.929	3.92		Pass
39 (2441MHz)	4.639	2.91	125	Pass
78 (2480MHz)	4.399	2.75		Pass

## Bluetooth GFSK Channel 0

eference Level 10.00		Trig: Free Run Atten: 20 dB	Avg Type: Voltage Avg Hold>100/100	09:45:43 AM Jul 30, 2 TRACE 23.4 TYPE MINANA DET PAINN
dB/div Ref 10.00 dBr	n		Mkr	1 2.402 00 GH 5.935 dB
C	~			and the second
0				
0				
0			-	
0				
nter 2.402000 GHz es BW (-6dB) 3 MHz		3.0 MHz	Sweep	Span 10.00 Mi 1.00 ms (1001 pi



#### Bluetooth GFSK Channel 78



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Bluetooth 8-DPSK Channel 0



#### Bluetooth 8-DPSK Channel 39





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#### Bluetooth 8-DPSK Channel 78

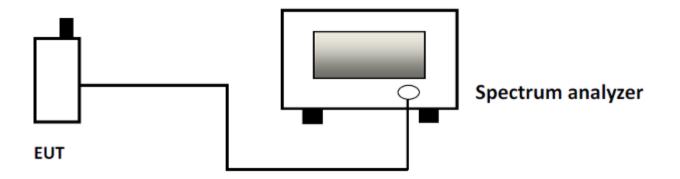


Report No. : UL15820130723FCC24-2

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# 9. SPURIOUS EMISSIONS (CONDUCTION)

# 9.1 TEST SETUP



#### 9.2 LIMITS

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. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

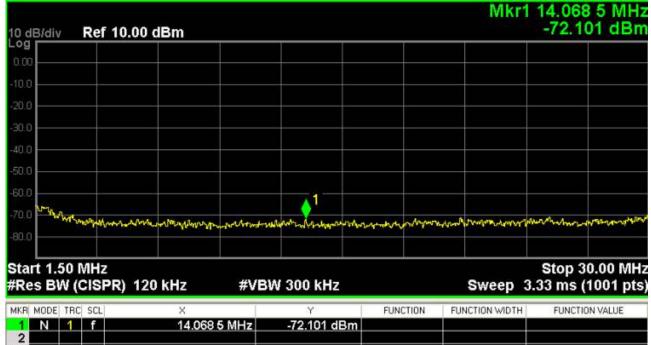
#### 9.3 TEST PROCEDURE

The EUT was connected to Spectrum Analyzer and Base Station via power divider. Use the following spectrum analyzer settings:

Span = wide enough to capture the peak level of the in-band emission and all spurious emissions (e.g., harmonics) from the lowest frequency generated in the EUT up through the 10th harmonic. Typically, several plots are required to cover this entire span. RBW = 100 kHz;VBW  $\geq$  RBW; Sweep = auto; Detector function = peak; Trace = max hold Allow the trace to stabilize. Set the marker on the peak of any spurious emission recorded. The level displayed must comply with the limit specified in this Section.

# 9.4 RESULTS & PERFORMANCE

Bluetooth GFSK Channel 0: Below 30 MHz



Note: There is not any harmonic but for background noise below 30 MHz.

#### Bluetooth GFSK Channel 0: (30~1000) MHz

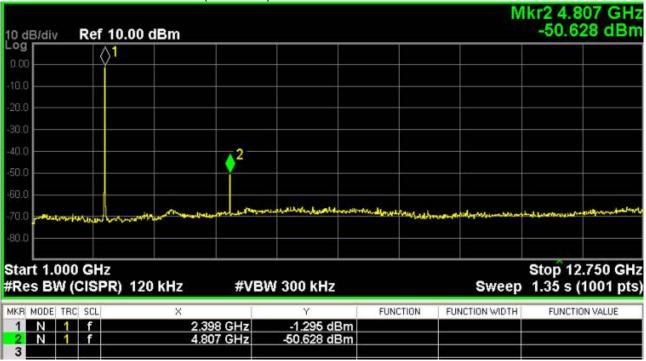
10 4	B/div	Dof 1	10.00 d	Bm					MI		51 MHz
Log		Kei	10.00 0	Bill							
0.00						_					
-10.0						_					
-20.0											
-30.0									-		
-40.0					-						
-50.0											
-60.0											
-70.0	a second to	hours	where a start	-	and - Alexandrian	- Stanson Barrows	-	ant the second	- same and a stand of a stand of a	Mr. U. C. Margaret	W- month allerter
-80.0											
		MHz (CISPF	R) 120	kHz	#VB	W 300 kHz			Sweep		0000 GHz (1001 pts)
MKR I	MODE TR	RC SCL		×	1	Y	FUN	CTION   FL	INCTION WIDTH	FUNCTI	ON VALUE

 MKR
 MODE
 TRC
 SCL
 X
 Y
 FUNCTION
 FUNCTION WIDTH
 FUNCTION VALUE

 1
 N
 1
 f
 304.51 MHz
 -72.706 dBm
 -72.7

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#### Bluetooth GFSK Channel 0: (1~12.75) GHz



Note: The Mark1 point is carrier.

2

#### Bluetooth GFSK Channel 0: (12.75~25) GHz

10 dB/div <b>Ref</b>	10.00 dBm				Mk	r1 18.6	91 GHz 46 dBm
-10.0							
-20.0							
-30.0							
40.0							
-50.0			<u>1</u>				
60.0	and the second s	m	menerationer	mar work and a second	(Marting Barlin All Articles and a fill and a starting and a starting and a starting and a starting and a start	معلجوست والمتحادثين	al and a start of the start of
-80.0							
Start 12.750 Gł #Res BW (CISP		#VB\	W 300 kHz		Sweep	Stop 25 1.40 s (	.000 GH 1001 pts
MKR MODE TRC SCL	×		Y	FUNCTION	FUNCTION WIDTH	FUNCTIO	N VALUE
1 N 1 f	18.69	1 GHz	-60.346 dBm				

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#### Bluetooth 8-DPSK Channel 0: Below 30 MHz

dB/div Ref 21	.00 dBm				Mkr1	24.927 0 M -58.006 d
g						
0						
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man 1					ward and the manager	
	an and the first of the starts	and and a liter of the start	an nation that and	and the second second second		an Bill Affer Bill and Affer Bill
rt 1.50 MHz	120 647	#\/B\	( 200 kHz		Swoon 2	Stop 30.00
es BW (CISPR)	120 KHZ	#VBV	/ 300 kHz		Sweep 3	.33 ms (1001
MODE TRC SCL	× 24.927		Y	FUNCTION	FUNCTION WIDTH	FUNCTION VALU

2 Note: There is not any harmonic but for background noise below 30 MHz.

#### Bluetooth 8-DPSK Channel 0: (30~1000) MHz

10 dB/div Ref 2	1.00 dBm					MI	-57.4	29 MHz 96 dBm
Log								
11.00								
9.00								
-19.0								
-29.0								
-39.0		-						
-49.0						<u>1</u> -		
59.0 martin Surveyor	made the state of the second	and many and a line out	signateristic franksion	Martin Martin	hashers religinging	and the second sec	يونيور ، درماندهم	withereare
-69.0								
Start 30.0 MHz								0000 GH
#Res BW (CISPR	) 120 kHz	#VBV	V 300 kHz			Sweep	111 ms (	1001 pts
MKR MODE TRC SCL	×		Y	FUNC	TION FL	JNCTION WIDTH	FUNCTI	ON VALUE
2	764.2	9 MHz	-57.496 dE	sm				



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Unilab

#### Bluetooth 8-DPSK Channel 0: (1~12.75)GHz



Note: The Mark1 point is carrier.

2

#### Bluetooth 8-DPSK Channel 0: (12.75~25)GHz

Log 11.0 10.0 9.00 9	10 dB/div	Ref 21.00	0 dBm					Mk		09 GHz 79 dBm
.9.00										
19.0 -29.0 -39.0 -49.0 -69.0 -69.0 -59.0 -	1.00									
29.0 39.0 49.0 50.0 50.0	9.00									
-39.0 -49.0 -59.0 -69.0 Start 12.750 GHz Stop 25.000 (	19.0						-	-		
-49.0 -59.0 -69.0 Start 12.750 GHz Stop 25.000	29.0				-					
-59.0 -59.0 -59.0 Start 12.750 GHz Stop 25.000					11100		<b>1</b>			
Start 12.750 GHz Stop 25.000		nen manager calling	nga ang dipaten pipatentin	write has a for the seals	an mar and a starting	-l-lagebook outers of the	and make and	Londay on My Constant	طونيوق اليري الدوامق ال	
	-69,0									
			20 kHz	#VB\	₩ 300 kHz			Sweep	Stop 25 1.40 s (	.000 GH 1001 pts
MKR MODE TRC SCL X Y FUNCTION FUNCTION WIDTH FUNCTION VALUE	MKR MODE	TRC SCL		1	Y		TION FU	NCTION WIDTH	FUNCTIO	DN VALUE

# Bluetooth GFSK Channel 39: Below 30 MHz

10 di	3/div	Re	ef 10.00 (	dBm					Mkr	13.270 -72.03	) 5 MHz 30 dBm
Log 0.00											
-10.0											
-20.0											
-30.0											
-40.0											
-50.0											
-60.0						<u> </u>					
-70.0	-ANG					<b>\</b>					
-80.0		" (navyly	برر به ما <sup>رو</sup> میراند. مرد به مارو میراند. مرد به مارو میراند. مرد میراند میراند. مرد میراند میراند. مرد میراند میراند. مرد میراند میراند. مرد میراند میراند. مرد میراند میراند. مرد میراند. مرم میراند. مرم میراند. مرد میراند. مرد میراند. مرد میراند. مرد میراند. مرد میراند. مرد میراند. مرد میراند. مرد می میراند. مرد میراند. مرد میراند. مرد میراند. مرد میراند. مرد میراند. مرم میراند. مرم می میراند. مرد میراند. مرد میراند. مرد میراند. مرد می میراند. مرد میراند. مرد میراند. مرد می میراند. مرد میراند. مرم میراند. مرم میراند. مرم میراند. مرم می میراند. مرم میراند. مرم میراند. مرم میراند. مرم میراند. مرم می میراند. مرم می میراند. مرم میراند. مرم میراند. مرم میراند. مرم میراند. مرم می میراند. مرم میراند. مرم میراند. مرم میراند. مرم می میراند. مرم میراند. مرم میراند. مرم میراند. مرم میراند. مرم می میراند. مرم میراند. مرم میراند. مرم میراند. مرم میراند. مرم میراند. مرم می میراند. مرم میراند. مرم میراند. مرم میراند. مرم میراند. مرم می میراند. مرم میراند. مرم میراند. مرم می میراند. مرم میراند. مرم می میراند. مرم میراند. مرم میراند. مرم می می می میراند. مرم میراند. مرم میراند. مرم می میراند. مرم میراند. مرم میراند. مرم میراند. مرم میراند. مرم می می میراند. مرم می می می می می میراند. مرم می می میراند. مرم می می میراند. مرم می می می میراند. مرم میراند. مرم می می میراند. مرم می می میراند. مرم می	where a start	ՠֈՠՠ֍ՠ	allerman	mahalan	(pero) <sup>d</sup> ulphun	wardown	ſŕŧſſ <sup>Ĺ⋽ġĸ</sup> Ŧ <mark>Ŀ</mark> ╼⋟₼ <sub>ſ</sub> ŢŢ	เป็นจะเริ่มการการทำ
	t 1.5 BIA		iz SPR) 120	kHz	#\/R	W 300 kHz			Sween	Stop 3 3.33 ms (	0.00 MHz
			SPRJ 120		#VD						
MKR I	MODE		L	×		Y		CTION	FUNCTION WIDTH	FUNCTIO	IN VALUE
1	N			13.270	5 MHZ	-72.030 d	Bm				

Note: There is not any harmonic but for background noise below 30 MHz.

### Bluetooth GFSK Channel 39: (30~1000) MHz

10 dB/div Ref	10.00 dBm			MI		51 MHz 06 dBm
Log						
0.00						
-10.0						
-20.0						
-30.0						
-40.0						
-50.0						
-60.0						
-70.0	Arudariana Asadda and Arabana Aruda	na _ showlder but have a second from	warner and services of the same	water frank the start	the manuter of	Workson had seened
-80.0						
Start 30.0 MHz #Res BW (CISP	R) 120 kHz	#VBW 300 kHz		Sweep	Stop 1.0 111 ms (	0000 GH2 1001 pts
MKR MODE TRC SCL	×	Y	FUNCTION	FUNCTION WIDTH	FUNCTION	ON VALUE
1 N 1 f	304.5	1 MHz -72.706 d	Bm			
2	304.5	1 WHZ -72.706 d	Bm			



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#### Bluetooth GFSK Channel 39: (1~12.75) GHz



Note: The Mark1 point is carrier.

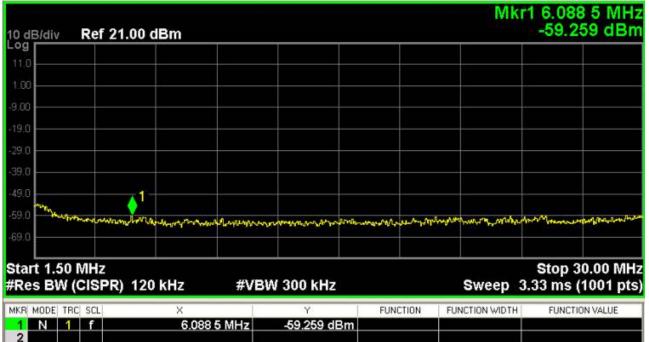
#### Bluetooth GFSK Channel 39: (12.75~25) GHz



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#### Bluetooth 8-DPSK Channel 39: Below 30 MHz



Note: There is not any harmonic but for background noise below 30 MHz.

#### Bluetooth 8-DPSK Channel 39: (30~1000) MHz

10 dB	unio B	ef 21.00	dBm					MI		32 MH 28 dBn
Log		ei 21.00	ивш							
11.0										
1.00										
9,00										
19.0			-							
-29.0								-		
39.0										
49.0								1-		
59.0	والمطيول المعالية ال	Mary and and a start	history	a man man and a solo	بالمحاجر مارالا ويوجو وأعا	without and	where of courses	up an and a day of the	in marine strangly	and the stand of
69.0										
	30.0 MI BW (CI	Hz SPR) 120	) kHz	#VBV	V 300 kHz			Sweep	Stop 1. 111 ms (	0000 GH (1001 pts
MKR M	IODE TRC S	CL	×		Y	FUNC	TION F	FUNCTION WIDTH	FUNCTI	ON VALUE
1	N 1 1	2	763.3	32 MHz	-57.628 dE	3m				



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### Bluetooth 8-DPSK Channel 39: (1~12.75)GHz



Note: The Mark2 point is carrier.

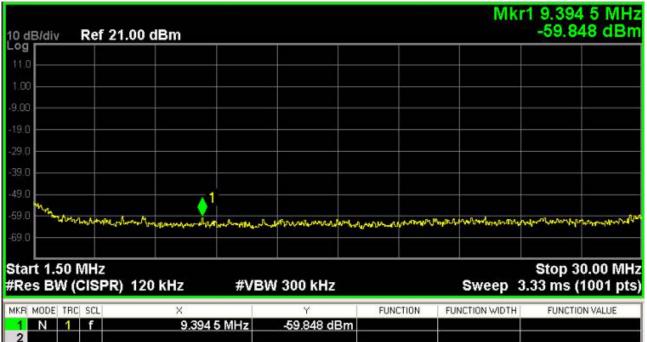
### Bluetooth 8-DPSK Channel 39: (12.75~25)GHz



# Unilab

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#### Bluetooth GFSK Channel 78: Below 30 MHz



Note: There is not any harmonic but for background noise below 30 MHz.

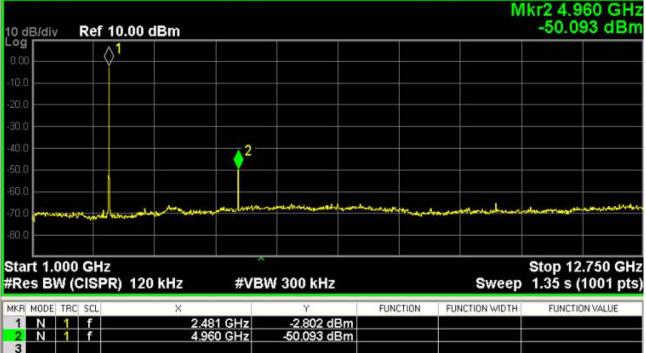
### Bluetooth GFSK Channel 78: (30~1000) MHz

10 dE		Ref 10.00	dBm				M	-72.7	51 MH: 06 dBn
Log			JUDIII					1	
0.00		_							
10.0					_				
20.0									
30.0					_				
40.0									
50.0									
60.0				-					
70.0			للاور وروالية المخالي ال	<b>\</b>			hand hard and the stand of the		
80.0	ang-mellen fra	Circles		and the second second	h to the construction of the second	or for the second second second			¥**************
00,0									
	t 30.0 M								0000 GH
#Re	s BW (C	ISPR) 1	20 kHz	#VB	W 300 kHz		Sweep	111 ms	1001 pts
MKR 1	MODE TRC	SCL	×		Y	FUNCTION	FUNCTION WIDTH	FUNCTI	DN VALUE
1	N 1	f	304	4.51 MHz	-72.706 dBi	m			

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#### Bluetooth GFSK Channel 78: (1~12.75) GHz



Note: The Mark1 point is carrier.

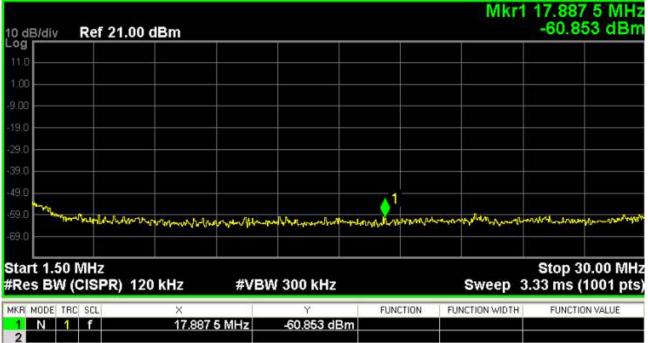
### Bluetooth GFSK Channel 78: (12.75~25) GHz



# Unilab

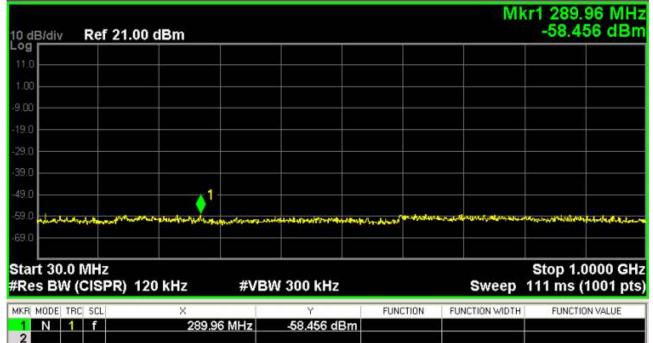
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#### Bluetooth 8-DPSK Channel 78: Below 30 MHz



Note: There is not any harmonic but for background noise below 30 MHz.

### Bluetooth 8-DPSK Channel 78: (30~1000) MHz





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### Bluetooth 8-DPSK Channel 78: (1~12.75 )GHz



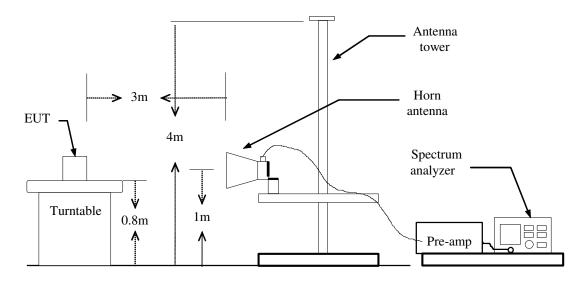
Note: The Mark1 point is carrier.

### Bluetooth 8-DPSK Channel 78: (12.75~25)GHz

0 dB/div Ref 21.0	00 dBm				-46.503 c	IBI
11.0						
.00		_				
.00						
9.0						
9.0						
9.0				<b>♦</b> <sup>1</sup>		
9.0	warden and and the area been been been been been been been be	al of a second stand of a second stand	Marty Later and a start	Alm chiptings and star Alage	and a star star and the start of the start o	
3.0						
art 12.750 GHz Res BW (CISPR)	120 kHz #\/B	W 300 kHz		Sween	Stop 25.000 1.40 s (1001	G
		NY 300 KH2	FUNCTION			_
KR MODE TRC SCL	× 21.007 GHz	-46.503 dBm	FUNCTION	FUNCTION WIDTH	FUNCTION VALU	JE.

## **10. BAND EDGE MEASUREMENT**

## **10.1 TEST SETUP**



## 10.2 LIMITS

According to §15.247(c), in any 100 kHz bandwidth outside the frequency bands in which the spread spectrum intentional radiator in operating, the radio frequency power that is produced by the intentional radiator shall be at least 20dB below that in the 100kHz bandwidth within the band that contains the highest level of the desired power, 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 in15.209(a).

## **10.3 TEST PROCEDURE**

The EUT is placed on a turntable, which is 0.8m above the ground plane.

The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.

EUT is set 3m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emission.

Set the spectrum analyzer in the following setting in order to capture the lower and upper band-edges of the emission:

PEAK: RBW=VBW=1MHz / Sweep=AUTO

AVERAGE: RBW=1MHz / VBW=10Hz / Sweep=AUTO

Repeat the procedures until all the PEAK and AVERAGE versus POLARIZATION are measured.

**10.4 RESULTS & PERFORMANCE** 

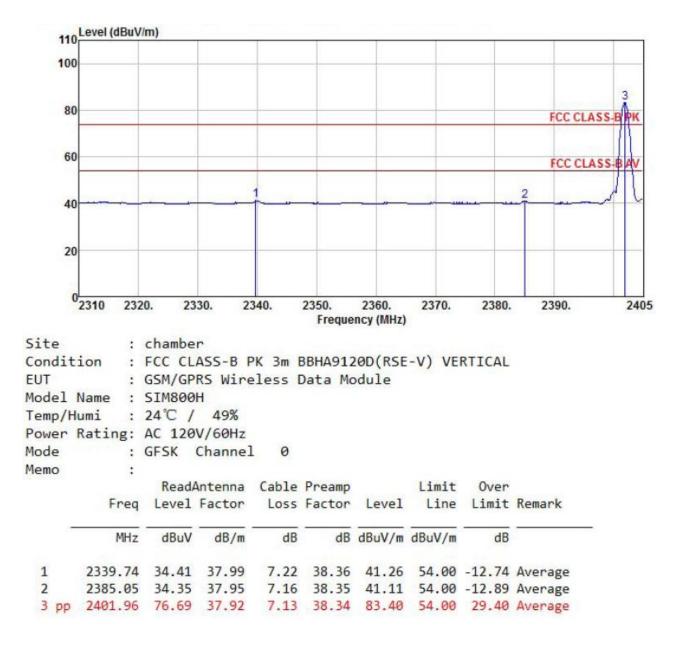
3 pp 2402.06 95.77 37.92

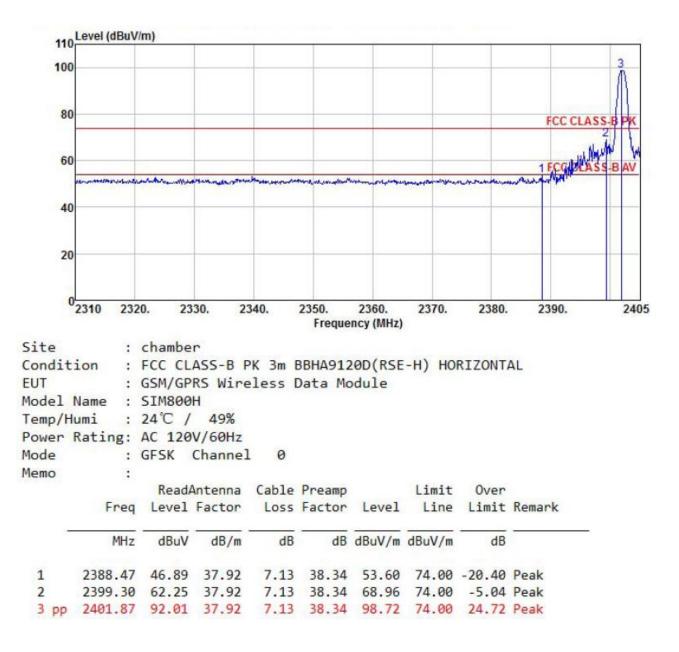
#### 110 Level (dBuV/m) 3 100 80 FCC CLASS FOC CLASS 60 B 40 20 0 2310 2320. 2330. 2340. 2350. 2360. 2370. 2380. 2390. 2405 Frequency (MHz) Site : chamber Condition : FCC CLASS-B PK 3m BBHA9120D(RSE-V) VERTICAL EUT : GSM/GPRS Wireless Data Module Model Name : SIM800H Temp/Humi : 24°C / 49% Power Rating: AC 120V/60Hz Mode : GFSK Channel 0 Memo : ReadAntenna Cable Preamp Limit Over Freq Level Factor Loss Factor Level Line Limit Remark MHz dBuV dB/m dB dB dBuV/m dBuV/m dB 1 2388.76 51.12 37.92 7.13 38.34 57.83 74.00 -16.17 Peak 2 2399.11 65.63 37.92 7.13 38.34 72.34 74.00 -1.66 Peak 7.13 38.34 102.48 74.00 28.48 Peak

## **BT GFSK (Low Channel)**

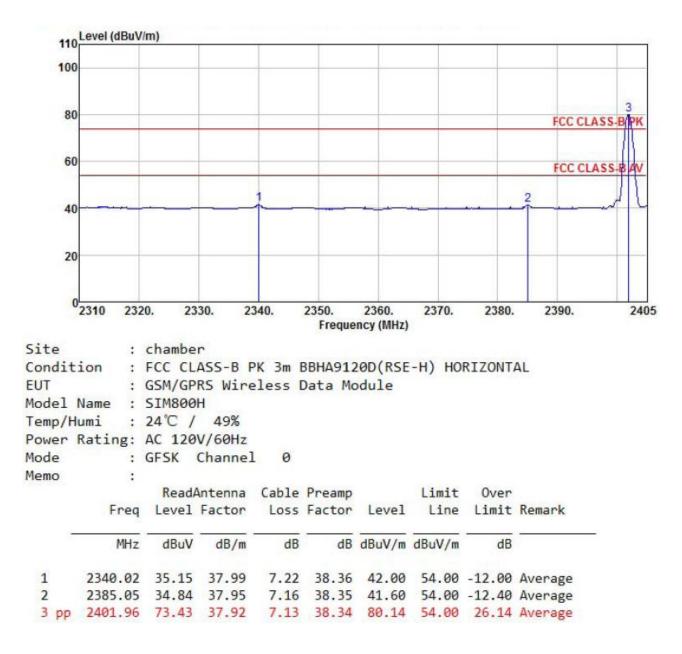
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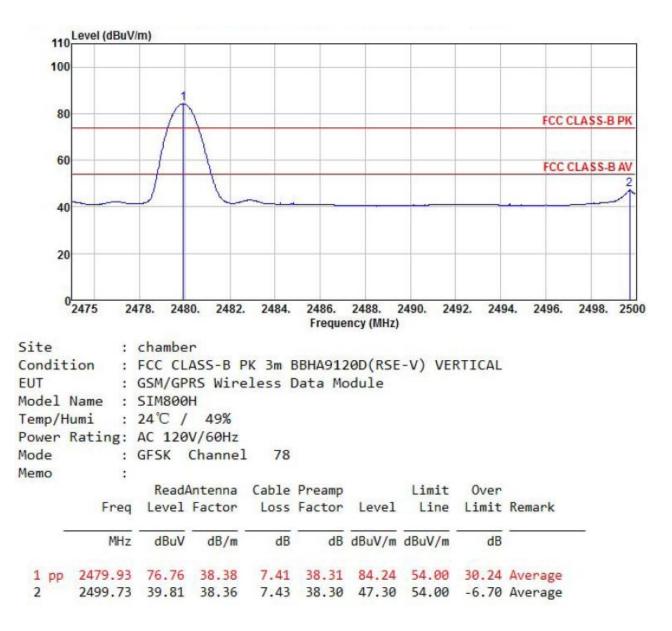


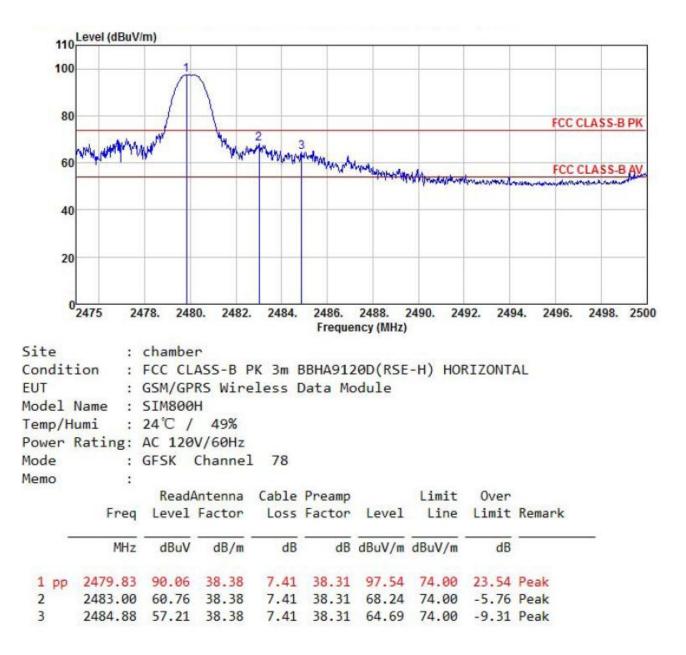


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	2410 2	+/0. 240	2402.	2404.	2400.	2400.	2490. 24	32. 243	2430.	2490. 20
	2415 2	+/0. 240	2402.	2404.		ncy (MHz)		32. 243	2430.	2450. 25
ite				2404.				52. <b>2</b> 43	<b>4.</b> 2430.	2490. 25
	:	chambe	r		Freque	ncy (MHz)				2450. 25
ondit	: ion :	chambe FCC CL	n ASS-B F	PK 3m I	Freque	ency (MHz) 20D (RSE				2430. 23
ondit JT	: ion :	chambe FCC CL GSM/GP	r ASS-B F RS Wire	PK 3m I	Freque	ency (MHz) 20D (RSE				2430. 23
ondit JT odel	: ion : : Name :	chambe FCC CL GSM/GP	r ASS-B F RS Wire	PK 3m I	Freque	ency (MHz) 20D (RSE				2430. 23
ondit UT odel emp/H	: ion : Name : Numi :	chambe FCC CL GSM/GP SIM800 24°C /	r ASS-B F RS Wire H 49%	PK 3m I	Freque	ency (MHz) 20D (RSE				2430. 23
ondit JT odel emp/H	ion : : Name : Numi : Rating:	chambe FCC CL GSM/GP SIM800 24°C / AC 120	r ASS-B F RS Wire H 49%	PK 3m I eless I	Freque	ency (MHz) 20D (RSE				2430. 23
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ondit UT odel emp/H ower ode emo	ion : Name : Aumi : Rating: : Freq MHz	chambe FCC CL GSM/GP SIM800 24°C / AC 120 GFSK Read/ Level dBuV 94.60	ASS-B F RS Wire 49% V/60Hz Channel Antenna Factor dB/m 38.38	PK 3m H eless H 78 Cable Loss dB	Freque BBHA912 Data Mc Preamp Factor dB 38.31	Level dBuV/m 102.08	Limit Line dBuV/m	Over Limit dB 28.08	Remark Peak	

## BT GFSK (High Channel)





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ito				2484.		2488. ency (MHz)		92. 249	9 <mark>4. 2496.</mark>	2498.	25
ondit	: ion :	chambe FCC CL	r ASS-B F	PK 3m I	Freque	ency (MHz) 20D (RSE				2498.	25
ondit UT	ion :	chambe FCC CL GSM/GP	r ASS-B F RS Wire	PK 3m I	Freque	ency (MHz) 20D (RSE				2498.	25
ondit UT odel	: ion : : Name :	chambe FCC CL GSM/GP SIM800	r ASS-B F RS Wire H	PK 3m I	Freque	ency (MHz) 20D (RSE				2498.	25
ondit UT odel emp/H	: ion : : Name :	chambe FCC CL GSM/GP SIM800 24°C /	r ASS-B F RS Wire H 49%	PK 3m I	Freque	ency (MHz) 20D (RSE				2498.	25
ondit UT odel emp/H ower	ion : : Name : Numi : Rating:	chambe FCC CL GSM/GP SIM800 24°C / AC 120	r ASS-B F RS Wire H 49%	PK 3m ∣ ⊇less I	Freque	ency (MHz) 20D (RSE				2498.	25
ondit UT lodel emp/H ower lode	ion : : Name : Numi : Rating:	chambe FCC CL GSM/GP SIM800 24°C / AC 120 GFSK	r ASS-B F RS Wire H 49% V/60Hz Channe]	PK 3m ∣ ≧less I L 78	Freque BBHA912 Data Mo	ency(MHz) 20D(RSE odule	-H) HOI	RIZONTA		2498.	25
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ondit UT lodel emp/H ower lode	: ion : Name : Numi : Rating: :	chambe FCC CL GSM/GP SIM800 24°C / AC 120 GFSK Read/	r ASS-B F RS Wire H 49% V/60Hz Channe]	PK 3m   eless   L 78 Cable	Freque BBHA912 Data Mo Preamp	ency(MHz) 20D(RSE odule	-H) HO	Over	AL	2498.	25
ondit UT lodel emp/H ower lode	ion : Name : Numi : Rating: :	chambe FCC CL GSM/GP SIM800 24°C / AC 120 GFSK Read/ Level	r ASS-B F RS Wire H 49% V/60Hz Channel Channel Antenna Factor	PK 3m   eless   L 78 Cable	Freque BBHA912 Data Mo Preamp Factor	ency(MHz) 20D(RSE odule	Limit	Over	AL		25
Condit UT Nodel Temp/H	ion : Name : Numi : Rating: : Freq MHz	chambe FCC CL GSM/GP SIM800 24°C / AC 120 GFSK Read/ Level dBuV	r ASS-B F RS Wire H 49% V/60Hz Channel Channel Antenna Factor dB/m	PK 3m 1 eless 1 L 78 Cable Loss dB	Freque BBHA912 Data Mo Preamp Factor dB	20D(RSE codule Level	Limit Line dBuV/m	Over Limit	AL		250

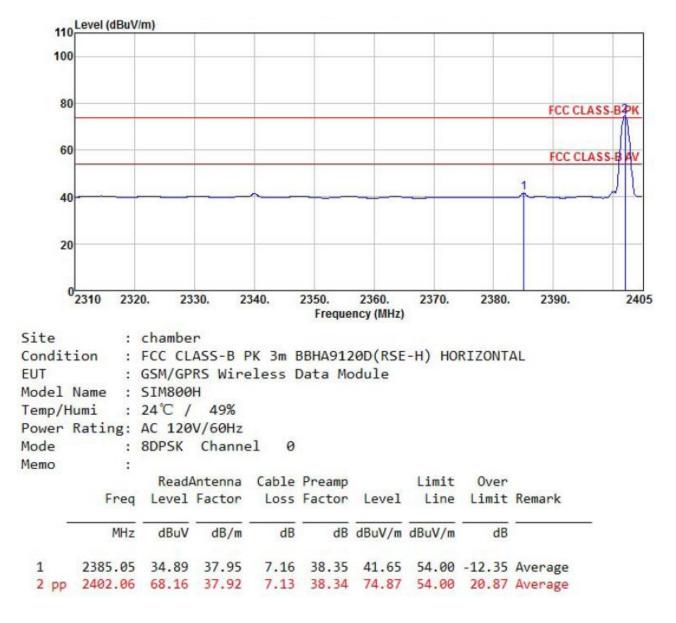
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#### 110 Level (dBuV/m) 100 80 FCC CLASS 60 40 20 0 2310 2320. 2330. 2340. 2350. 2360. 2370. 2380. 2390. 2405 Frequency (MHz) Site : chamber : FCC CLASS-B PK 3m BBHA9120D(RSE-H) HORIZONTAL Condition : GSM/GPRS Wireless Data Module EUT Model Name : SIM800H : 24°C / 49% Temp/Humi Power Rating: AC 120V/60Hz Mode : 8DPSK Channel 0 Memo : ReadAntenna Cable Preamp Limit Over Freq Level Factor Loss Factor Level Line Limit Remark dB/m dB dBuV/m dBuV/m MHz dBuV dB dB 1 2385.15 46.70 37.95 7.16 38.35 53.46 74.00 -20.54 Peak 7.13 38.34 67.91 74.00 -6.09 Peak 2 2399.59 61.20 37.92

3 pp 2402.25 90.65 37.92 7.13 38.34 97.36 74.00 23.36 Peak

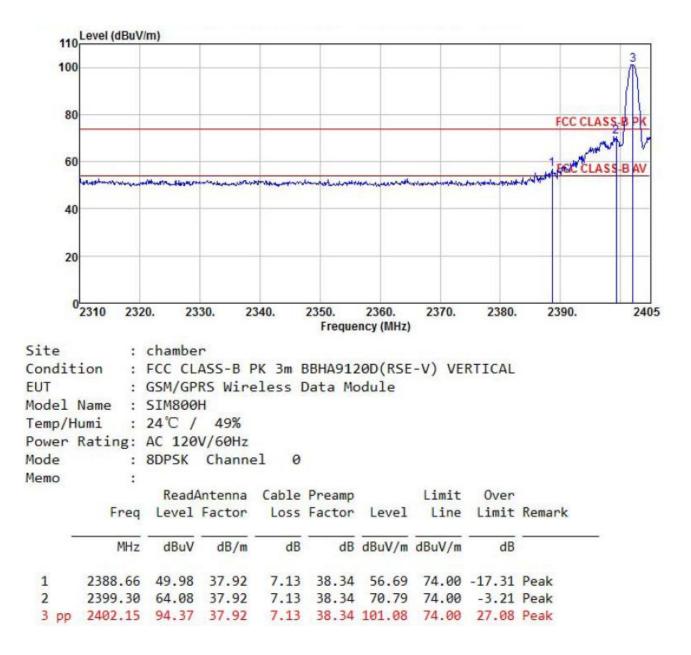
## BT 8-DPSK (Low Channel)



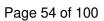


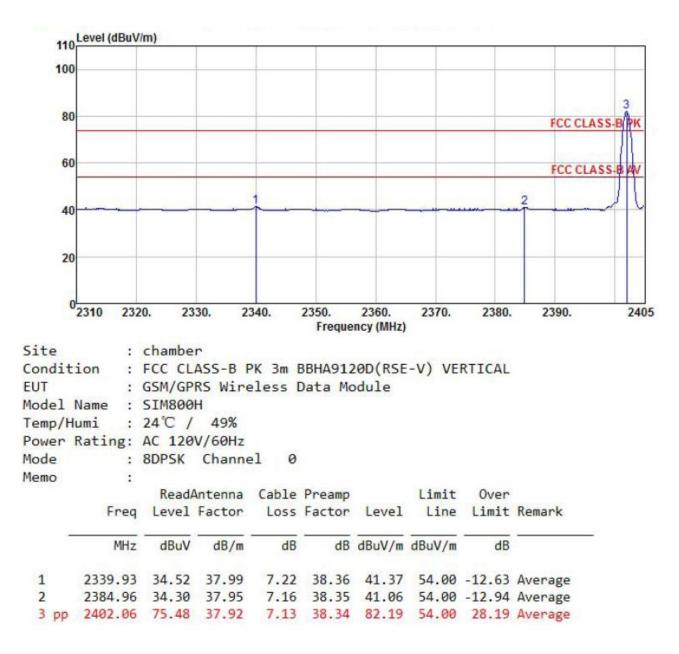
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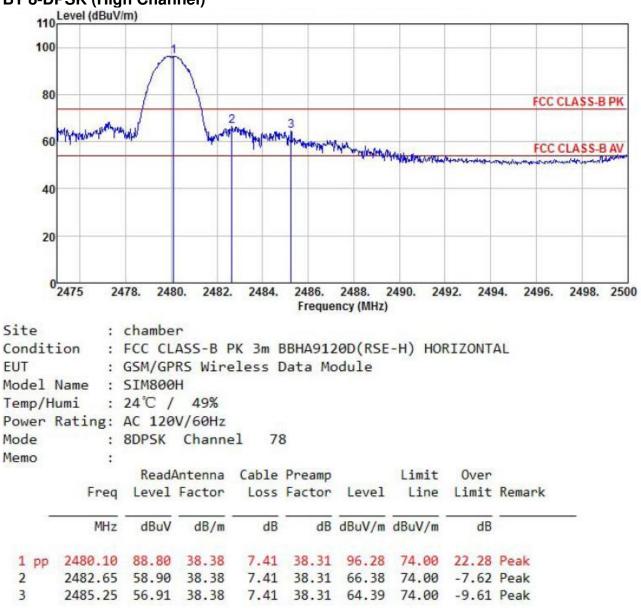
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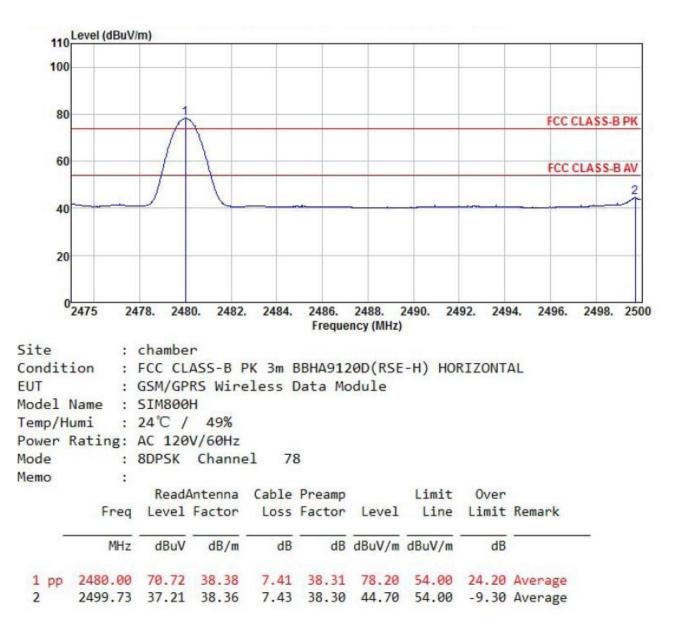




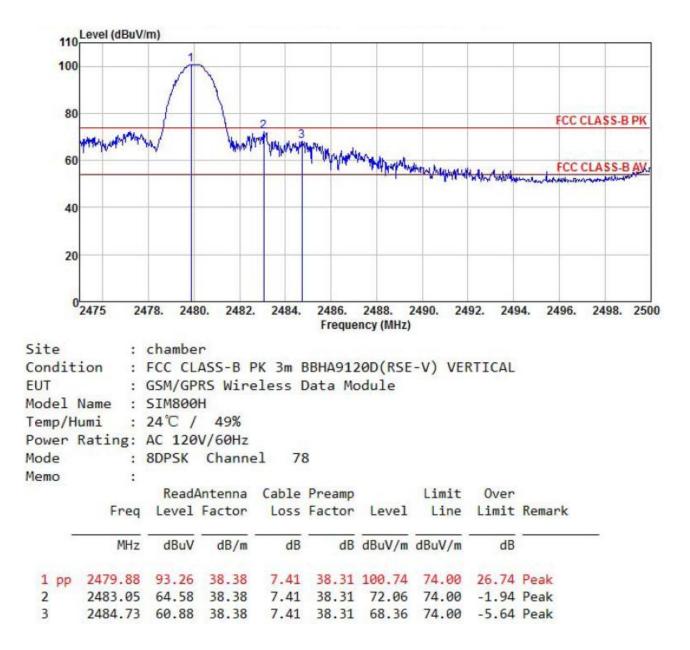
### **BT 8-DPSK (High Channel)**

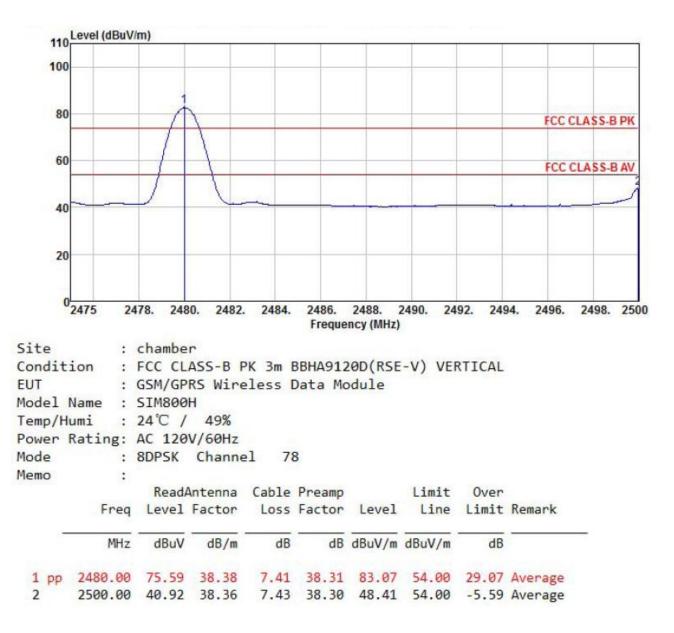


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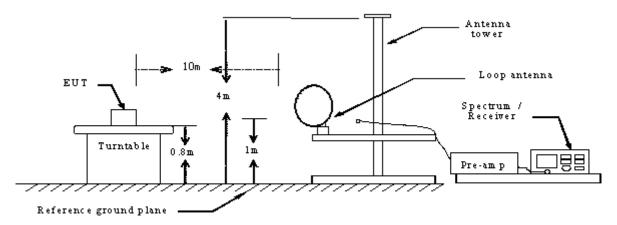




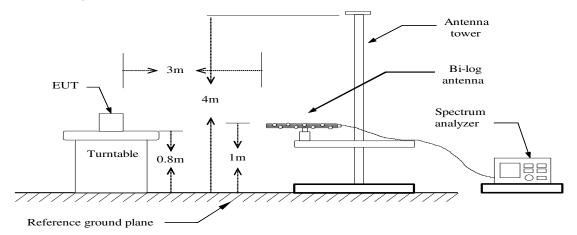
## 11. SPURIOUS EMISSIONS(RADIATION)

## **11.1 TEST SETUP**

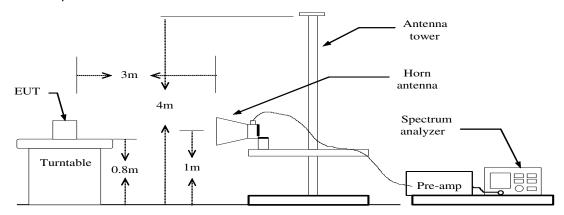
Radiated Spurious Measurement: below 30MHz



#### Radiated Spurious Measurement: below 1GHz



#### Radiated Spurious Measurement: above 1GHz



Frequency (MHz)	Limits (dBuV/m)	Measured distance (m)
0.009-0.490	107.6-72.9	
0.490-1.705	52.8-42.1	10
1.705-30.0	49	
30~88	40	
88~216	43.5	3
216-960	46	3
Above 960	54	

## 11.2 LIMITS

Notes: the calculate formula for below 30MHz

L2 = 20lg (L1) + 40lg (d1/d2)

L2: is the specified limit in dB microvolts per metre at distance d2.

L1: is the specified limit in microvolts per metre at distance d1. For example:

 $L1 = 2400/9 (\mu V/m)$ , d1 = 300 (m), d2 = 10 (m), so L2 as follows:

 $20 \log (2400/9) + 40 \log (300/10) = 107.6 (dB\mu V/m)$ 

## 11.3 TEST PROCEDURE

### Radiated Emission (9 kHz - 30 MHz) :

Spurious emissions from the EUT are measured in the frequency range of 9 kHz to 30 MHz using a tuned receiver and a shielded loop antenna. The antenna was positioned 10 meters horizontally from the EUT. Measurements have been made in all three orthogonal axes and the shielded loop antenna was rotated to locate the maximum of the emissions. The emission limits are based on measurements employing a CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz.

### Radiated Emission (30 MHz – 1000 MHz) :

According to description of ANSI C63.4: 2009 sec.13.4, the preliminary radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT. The EUT configuration (in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements. The measurement is carried out using a spectrum analyzer or receiver. The Quasi-peak detector is used and RBW is set to 120kHz. The antenna height and turn table rotation is adjusted until the maximum power value is founded on spectrum analyzer or receiver.

## Radiated Emission (Above 1 GHz) :

According to description of ANSI C63.4: 2009 sec.13.4, the preliminary radiated emissions measurement were carried out. The preliminary radiated measurements were performed at the measurement distance that specified for compliance to determine the emission characteristics of the EUT. The EUT configuration (in X, Y and Z axis), cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for the final radiated emissions measurements. The measurement is carried out using a spectrum analyzer or receiver. The spectrum analyzer scans from 1GHz to 25GHz (higher than the 10<sup>th</sup> harmonic of the carrier). The peak detector is used for Peak limit and RBW is set to 1MHz ,VBW  $\geq$  3RBW. The peak detector is used for Average limit and RBW is set to 1MHz ,VBW is not smaller than 1/T, T = to the shortest pulse width. The antenna height and turn table rotation is adjusted until the maximum power value is founded on spectrum analyzer or receiver.

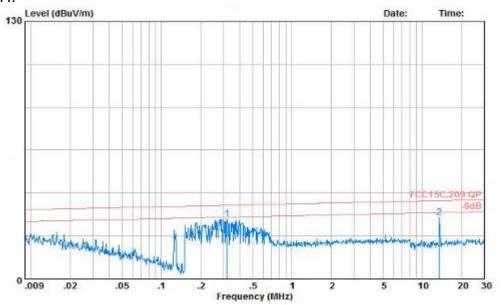
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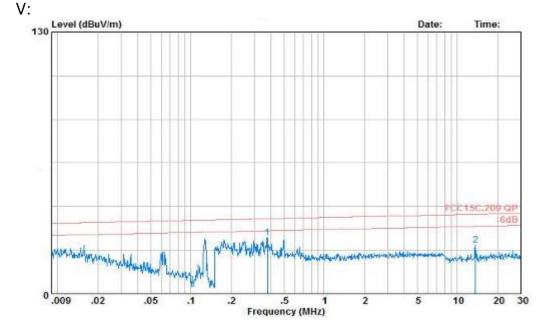
## **11.4 RESULTS & PERFORMANCE**

## From 9KHz to 30MHz:

Bluetooth GFSK, traffic mode; Channel 0







Frequency (MHz)	Polarization (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
0.31	Н	10.58	19.53	24.95	76.8	-46.69	Peak
0.37	V	8.16	19.66	28.87	75.3	-46.43	Peak
13.54	Н	10.76	18.14	24.2	49.0	-20.1	Peak
13.65	V	4.65	18.43	26.47	49.0	-25.92	Peak

H: Horizontal V: Vertical

Measure Level(dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)



130 Level (dBuV/m) Date: Time: IN WIN multiplimatiched 0 .009 .02 .05 .1 .2 .5 2 5 10 20 30 Frequency (MHz) V: 130 Level (dBuV/m) Date: Time: **A A POINT WA** semanth han the holder and he 0.009 .5 1 Frequency (MHz) 2 .02 .05 .2 10 30 .1 20 5 Correction Measure Over Reading Frequency Polarization Limit Detector Factor Level Limit (MHz) (H/V)(dBuV) (dBuV/m) (dB/m)(dBuV/m) (dB) 0.30 Н 10.37 77.1 16.89 24.95 -49.84 0.30 ٧ 10.37 16.34 28.87 77.1 -50.39 13.54 Н 3.52 18.53 24.2 49.0 -26.95

#### Bluetooth GFSK, traffic mode; Channel 78 H:

Measure Level(dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)

13.21

26.47

49.0

13.26

٧

H: Horizontal V: Vertical

5.2

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Peak

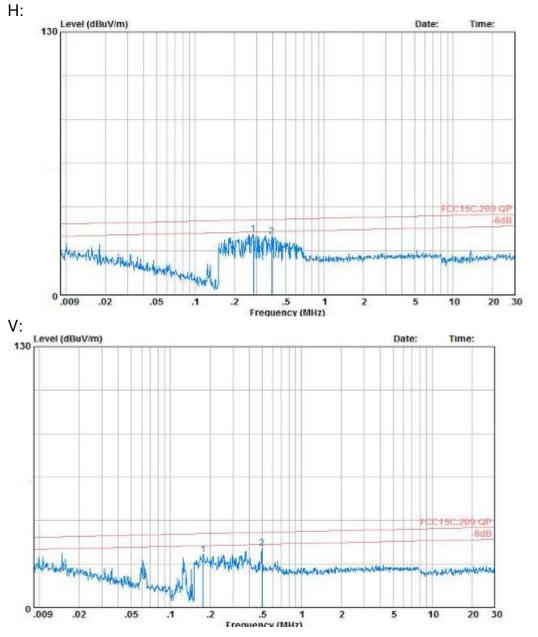
Peak

Peak

Peak

-22.53

## Bluetooth 8-DPSK, traffic mode; Channel 0



Frequency (MHz)	Polarization (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
0.28	Н	10.24	18.85	29.09	77.2	-48.2	Peak
0.17	V	6.89	17.92	24.81	76.5	-51.69	Peak
0.39	Н	9.22	19.44	28.66	75.3	-46.34	Peak
0.49	V	9.98	18.21	28.19	72.3	-44.11	Peak

H: Horizontal V: Vertical

Measure Level(dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)

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#### H: Level (dBuV/m) Date: Time: 130 0 6dB MULTINA 0 .02 .05 .5 1 Frequency (MHz) 2 5 10 20 30 .009 .1 .2 V: 130 Level (dBuV/m) Date: Time: 15C.209 QF 6dB White Minale bi 0.009 .5 1 Frequency (MHz) .02 .05 .2 2 5 10 20 30 .1

Bluetooth	8-DPSK.	traffic mode:	Channel 78
Diaotootii	0 01 013,	traine meae,	

Frequency (MHz)	Polarization (H/V)	Reading (dBuV)	Correction Factor (dB/m)	Measure Level (dBuV/m)	Limit (dBuV/m)	Over Limit (dB)	Detector
0.49	Н	12.04	12.91	24.95	72.3	-47.8	Peak
0.24	V	17.39	11.48	28.87	78.2	-49.33	Peak
0.65	Н	10.76	13.44	24.2	63.5	-38.8	Peak
4.24	V	13.26	13.21	26.47	49.0	-22.47	Peak

H: Horizontal V: Vertical

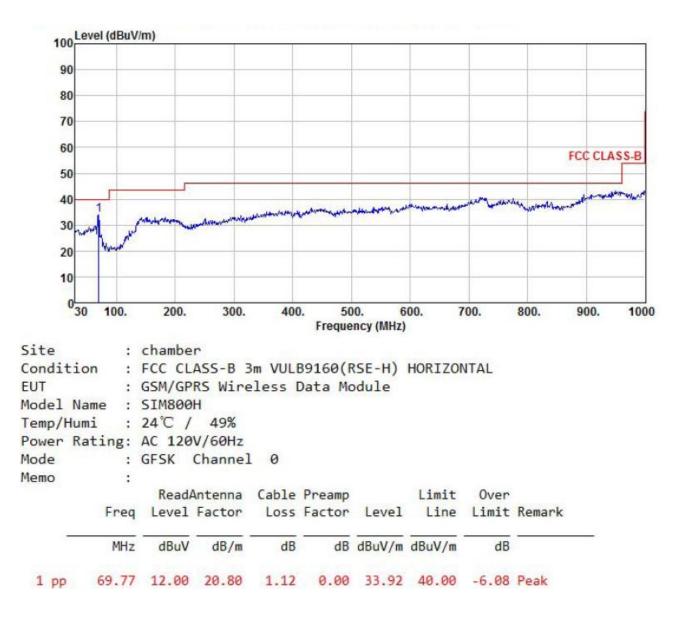
Measure Level(dBuV/m) = Reading (dBuV) + Correction Factor (dB/m)

#### 100 Level (dBuV/m) 90 80 70 60 FCC CLASS-B 50 40 then about 30 20 10 0<sup>L</sup>30 100. 200. 300. 400. 600. 700. 900. 500. 800. 1000 Frequency (MHz) Site : chamber Condition : FCC CLASS-B 3m VULB9160(RSE-V) VERTICAL EUT : GSM/GPRS Wireless Data Module Model Name : SIM800H : 24°C / 49% Temp/Humi Power Rating: AC 120V/60Hz Mode : GFSK Channel 0 Memo : ReadAntenna Cable Preamp Limit Over Freq Level Factor Loss Factor Level Line Limit Remark MHz dB/m dB dB dBuV/m dBuV/m dB dBuV 66.86 9.04 25.62 1.10 0.00 35.76 40.00 -4.24 Peak 1 pp

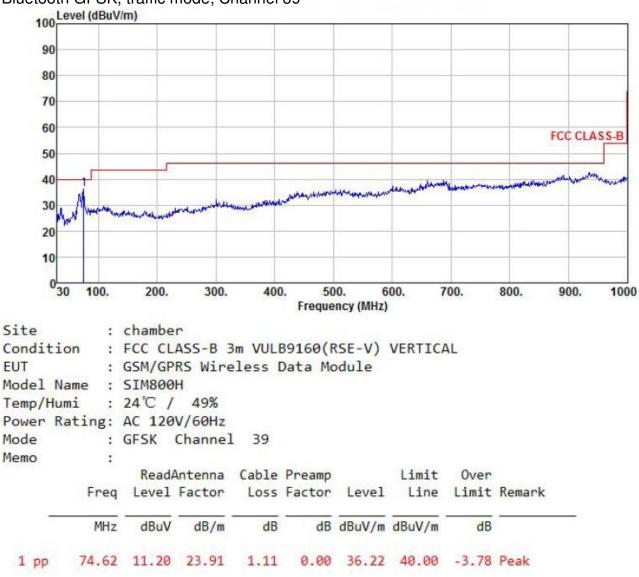
### From 30MHz to 1GHz:

Bluetooth GFSK, traffic mode; Channel 0



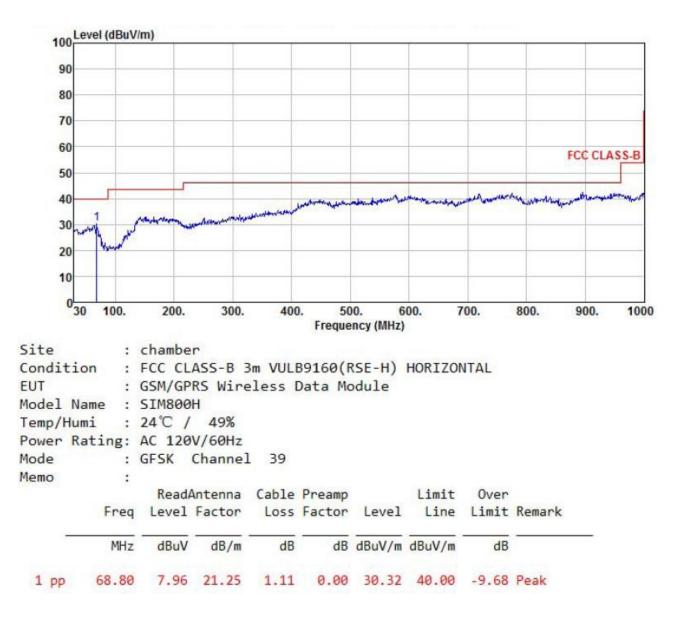




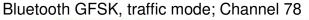


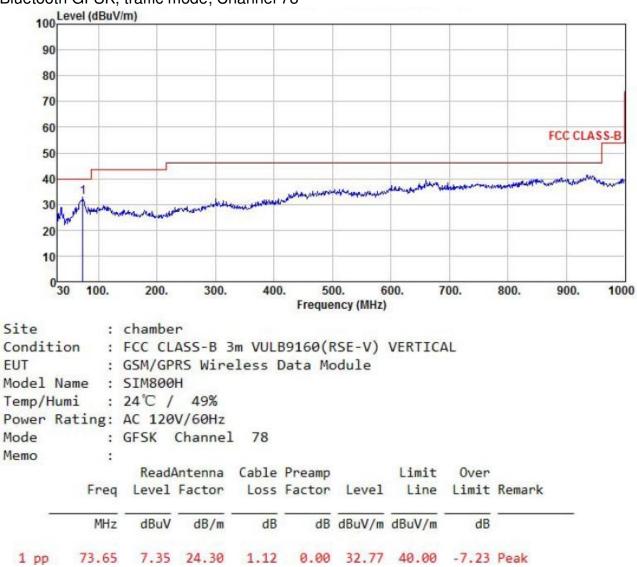
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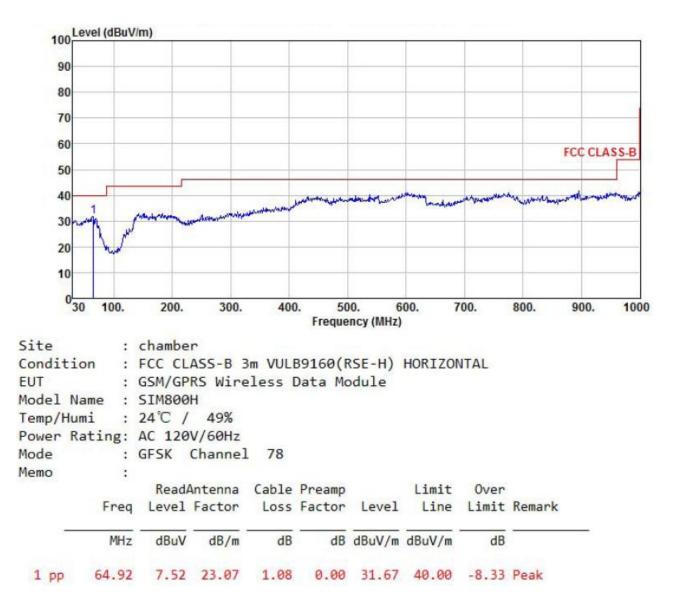


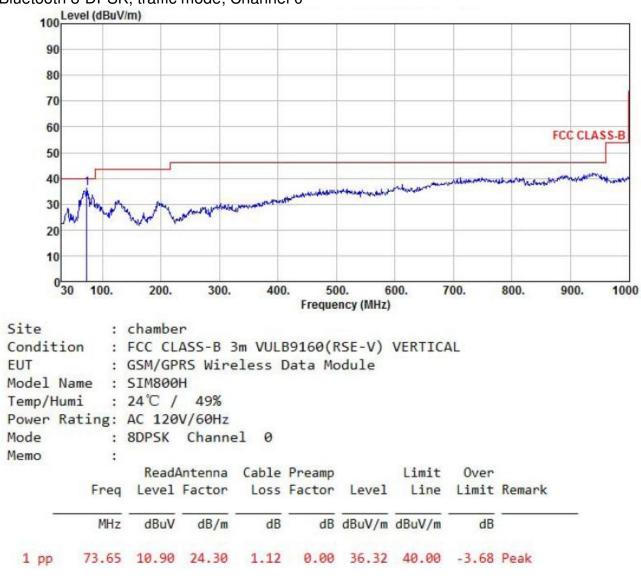












### Bluetooth 8-DPSK, traffic mode; Channel 0

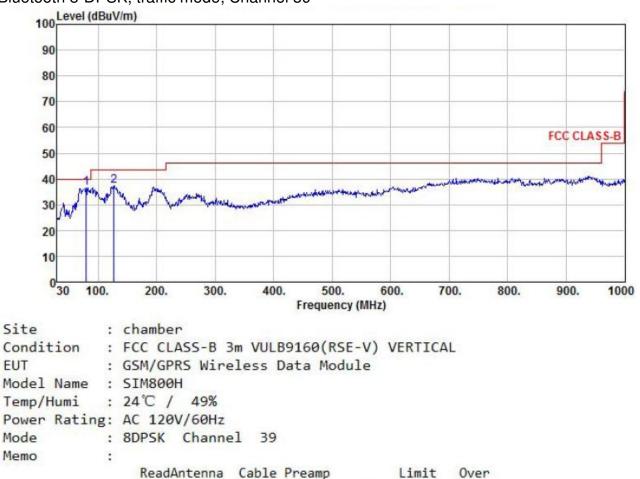


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### Page 73 of 100

	Level (dBuV										
90											
80										_	
70									-	_	
60										FCC CLA	ee D
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0	30 100.	200.	300.	400		0. 6 ncy (MHz)		700.	800.	900.	10
		200. chambe		400				700.	800.	900.	10
ite		chambe	r		Freque	ncy (MHz)			800.	900.	10
ite ondit UT	: ion : :	chambe FCC CL GSM/GP	r ASS-B 3 RS Wire	3m VULI	Freque	ency (MHz) RSE-H)			800.	900.	10
ite ondit UT	: ion : :	chambe FCC CL	r ASS-B 3 RS Wire	3m VULI	Freque	ency (MHz) RSE-H)			800.	900.	10
ite ondit UT odel	: ion : :	chambe FCC CL GSM/GP SIM800	r ASS-B 3 RS Wire H	3m VULI	Freque	ency (MHz) RSE-H)			800.	900.	10
ite ondit UT odel emp/H	ion : : Name :	chambe FCC CL GSM/GP SIM800 24°C /	r ASS-B RS Wire H 49%	3m VULI	Freque	ency (MHz) RSE-H)			800.	900.	100
ite ondit UT odel emp/H ower	: ion : : Name : umi : Rating:	chambe FCC CL GSM/GP SIM800 24°C / AC 120	r ASS-B RS Wire H 49%	3m VULI eless I	Freque	ency (MHz) RSE-H)			800.	900.	10
ite ondit UT odel emp/H ower ode	: ion : : Name : umi : Rating:	chambe FCC CL GSM/GP SIM800 24°C / AC 120	r ASS-B 3 RS Wire H 49% V/60Hz	3m VULI eless I	Freque	ency (MHz) RSE-H)			800.	900.	10
ite ondit UT odel emp/H ower ode	ion : : Name : umi : Rating: :	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/	r ASS-B 3 RS Wire H 49% V/60Hz Channe	3m VULI eless I el 0 Cable	Freque B9160(F Data Mc	ncy(MHz) RSE-H) odule	HORIZO	NTAL Over		900.	10
ite ondit UT odel emp/H ower ode	ion : : Name : umi : Rating: :	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/	r ASS-B RS Wire H 49% V/60Hz Channe	3m VULI eless I el 0 Cable	Freque B9160(F Data Mc	ncy(MHz) RSE-H) odule	HORIZO	NTAL Over		900.	10
ite ondit UT odel emp/H ower ode	ion : Name : umi : Rating: :	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level	r ASS-B RS Wire H 49% V/60Hz Channe Antenna Factor	3m VULI eless I el 0 Cable	Freque B9160(F Data Mc Preamp Factor	ncy(MHz) RSE-H) odule	HORIZO	NTAL Over		900.	10
ite ondit UT lodel emp/H	ion : Name : umi : Rating: : Freq	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level dBuV	r ASS-B RS Wire H 49% V/60Hz Channe Antenna Factor	Sm VULI eless I el 0 Cable Loss	Freque B9160(F Data Mo Preamp Factor dB	RSE-H) odule Level	HORIZO	Over Limit dB	Remark	900.	10





Loss Factor Level Line Limit Remark

36.51 40.00

dB

-3.49 Peak

-6.05 Peak

dB dBuV/m dBuV/m

0.00 37.45 43.50

### Bluetooth 8-DPSK, traffic mode; Channel 39

Level Factor

dB/m

21.95

23.00

dB

0.00

1.09

1.56

dBuV

13.47

Freq

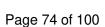
MHz

79.47

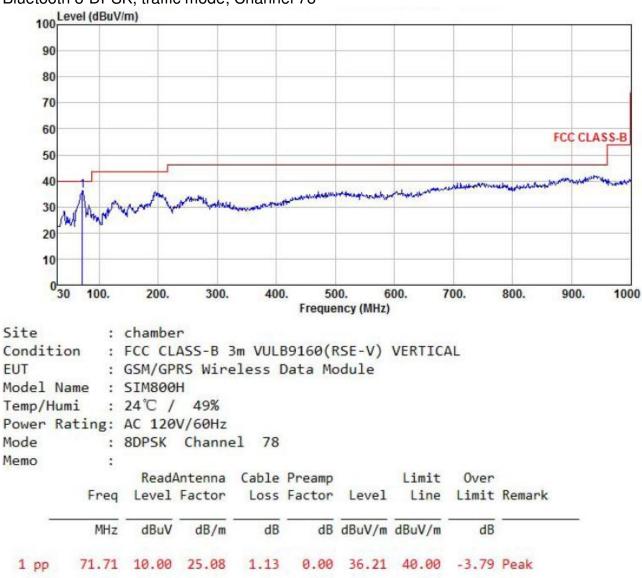
127.00 12.89

1 pp

2



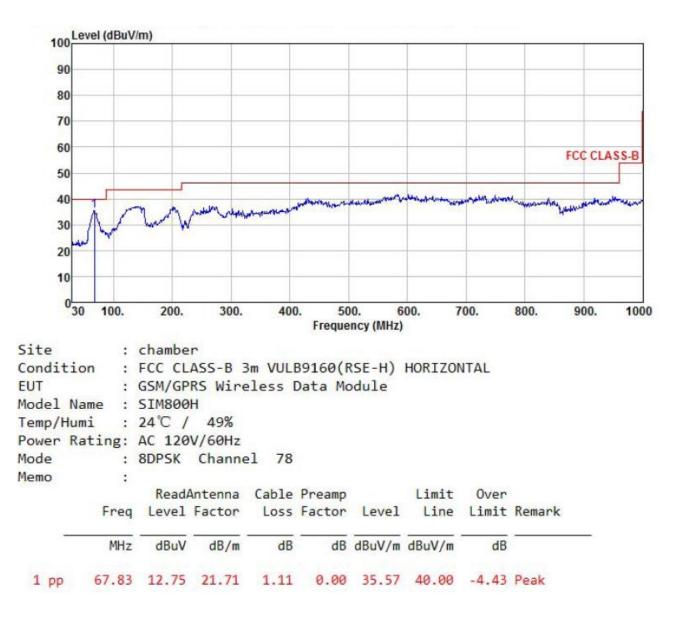
	Level (dBuV	/m)						1		-	
90									_		
80									_	_	
70										_	
60									-		
50						_				FCC C	LASS-B
40		2			a strain		Mar Andres	ulunduna	K L Au		Charles and
	A. J	mont	mother really	manness	strates and service	describeration for	and a second		AND ACHARACTER AND		
30	and war										
20						1					
10											
0											
	30 100.	200.	300.	400		0. 6 ency (MHz)		700.	800.	900.	10
ite ondit: JT	: ion : :	chambe FCC CL GSM/GP	er ASS-B B RS Wire	3m VULI	Freque	ency (MHz) RSE-H)			800.	900.	10
ite ondit: JT odel	: ion : : Name :	chambe FCC CL GSM/GP SIM800	ASS-B RS Wire	3m VULI	Freque	ency (MHz) RSE-H)			800.	900.	10
ite ondit: JT odel I emp/Hu	ion : : Name : umi :	chambe FCC CL GSM/GP SIM800 24°C /	er ASS-B PRS Wire H 49%	3m VULI	Freque	ency (MHz) RSE-H)			800.	900.	10
ite ondit: JT odel I emp/Hu ower I	ion : : Name : umi : Rating:	chambe FCC CL GSM/GP SIM800 24°C / AC 120	er ASS-B PRS Wire H 49%	3m VULI eless I	Freque B9160(F Data Mo	ency (MHz) RSE-H)			800.	900.	10
ite ondit: UT odel I emp/Hu ower I ower I	ion : : Name : umi : Rating:	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK	er ASS-B PRS Wire H 49% V/60Hz Channe	3m VULI eless I el 39	Freque B9160(F Data Mo	ncy(MHz) RSE-H) odule			800.	900.	10
ite ondit: JT odel I emp/Hu ower I ower I	ion : Name : umi : Rating: :	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/	ASS-B RS Wire H 49% V/60Hz Channe Antenna	3m VULI eless I el 39 Cable	Freque B9160(F Data Mo Preamp	ncy(MHz) RSE-H) odule	HORIZO	NTAL Over		900.	10
ite ondit: JT odel I emp/Hu ower I ower I	ion : Name : umi : Rating: :	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/	er ASS-B PRS Wire H 49% V/60Hz Channe	3m VULI eless I el 39 Cable	Freque B9160(F Data Mo	ncy(MHz) RSE-H) odule	HORIZO	NTAL Over	800. Remark	900.	10
ite ondit: JT odel M omp/Hu ower M ower M	ion : Name : umi : Rating: :	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level	ASS-B RS Wire H 49% V/60Hz Channe Antenna Factor	3m VULI eless I el 39 Cable	Freque B9160(F Data Mo Preamp Factor	ncy(MHz) RSE-H) odule	HORIZO	NTAL Over		900.	10
ite ondit: JT odel I emp/Hu ower I ower I	ion : Name : umi : Rating: : Freq	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level dBuV	ASS-B RS Wire 49% V/60Hz Channe Antenna Factor dB/m	Bm VULI eless I el 39 Cable Loss	Freque B9160(F Data Mo Preamp Factor dB	RSE-H) odule Level	HORIZO	Over Limit dB	Remark	900.	10
ite ondit: UT odel I emp/Hu ower I ode emo	ion : Name : umi : Rating: : Freq MHz	chambe FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level dBuV 13.75	ASS-B RS Wire 49% V/60Hz Channe Antenna Factor dB/m 21.71	3m VULI eless I el 39 Cable Loss dB	Freque B9160(F Data Mo Preamp Factor dB 0.00	RSE-H) odule Level dBuV/m 36.57	HORIZO Limit Line dBuV/m	Over Limit dB -3.43	Remark	900.	10



### Bluetooth 8-DPSK, traffic mode; Channel 78

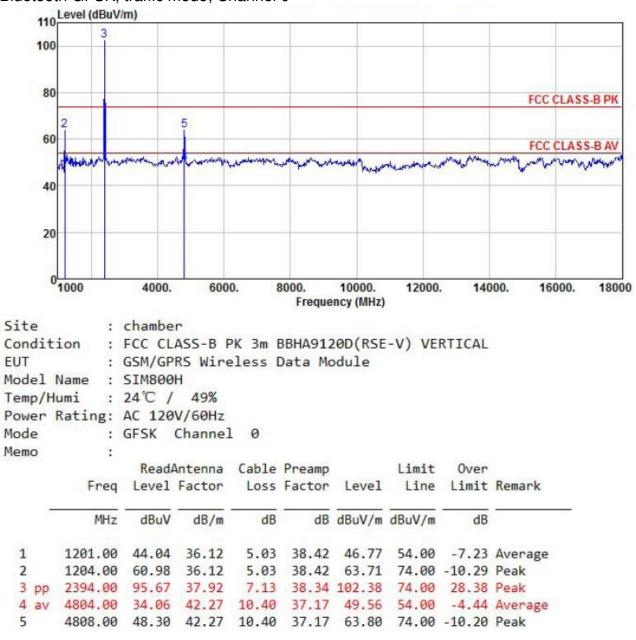


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### Above 1GHz:

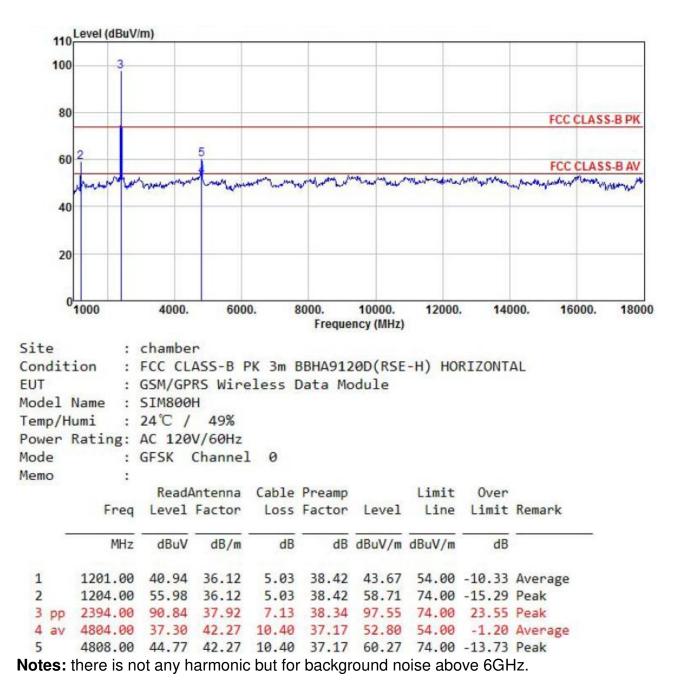
Bluetooth GFSK, traffic mode; Channel 0



**Notes:** there is not any harmonic but for background noise above 6GHz.

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EUT

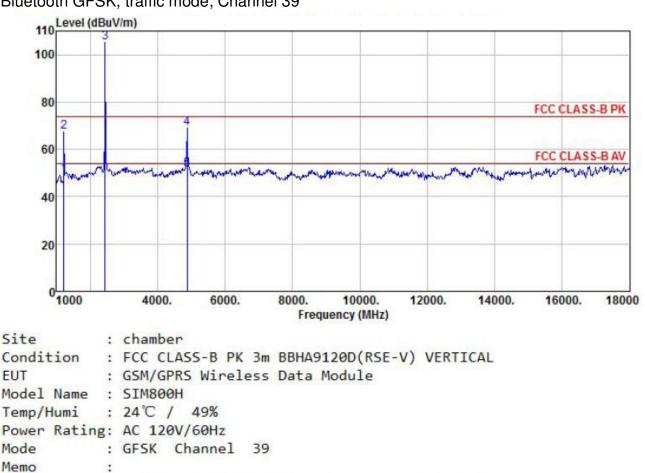
1

2

4

5 av

### Report No. : UL15820130723FCC24-2



Loss Factor Level

Limit

dB dBuV/m dBuV/m

7.37 38.32 104.96 74.00 30.96 Peak

5.05 38.42 49.22 54.00

5.05 38.42 67.22 74.00

Over

dB

-4.78 Average

-2.44 Average

-6.78 Peak

-5.16 Peak

Line Limit Remark

Bluetooth GFSK, traffic mode; Channel 39

**Notes:** there is not any harmonic but for background noise above 6GHz.

4876.00 54.00 41.63 10.36 37.15 68.84 74.00

4882.00 36.72 41.63 10.36 37.15 51.56 54.00

dB

ReadAntenna Cable Preamp

dB/m

Freq Level Factor

dBuV

1220.00 45.40 37.19

1221.00 63.40 37.19

3 pp 2445.00 97.66 38.25

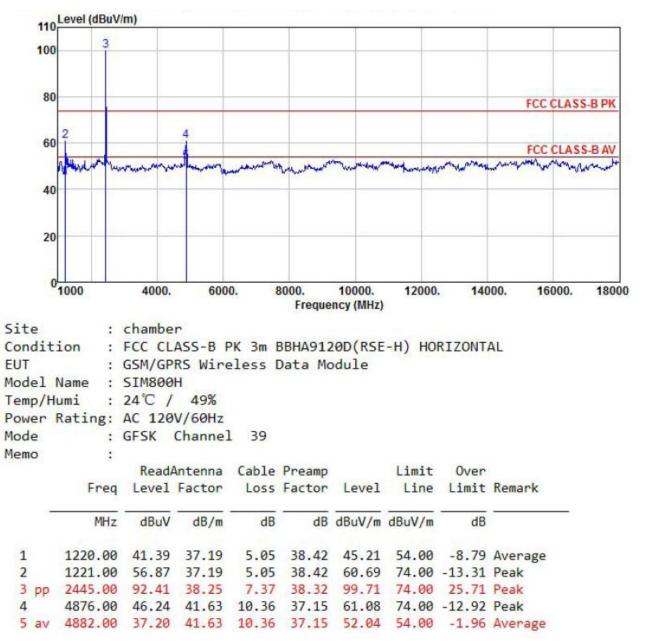
MHz

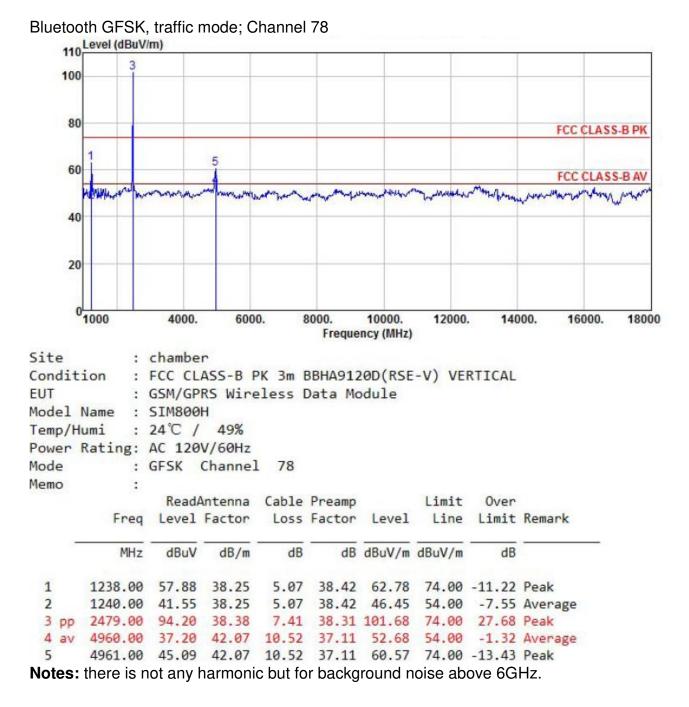


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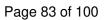
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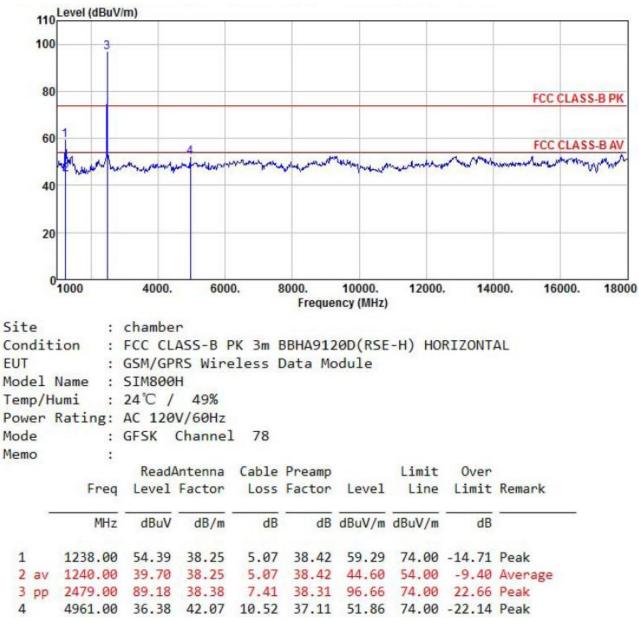


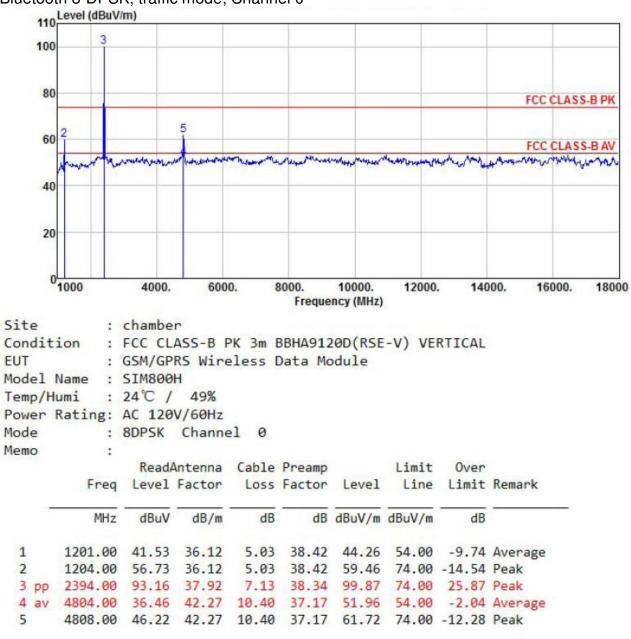


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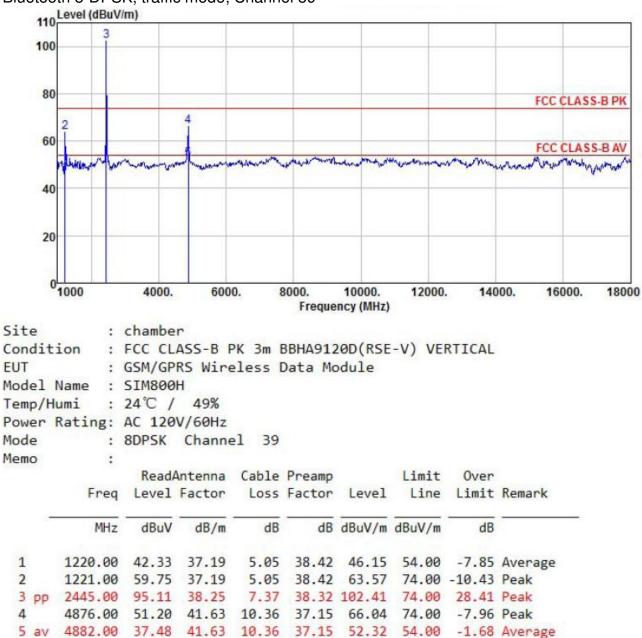


### Bluetooth 8-DPSK, traffic mode; Channel 0



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80										
00									FCC	CLASS-B PH
60	2		5						FCC	CLASS-BA
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te		chambe	er.			, , , , , , , , , , , , , , , , , , , ,				
		chambe FCC CL		PK 3m I				RIZONT	AL	
ondit	ion :	FCC CL	ASS-B		BBHA912	20D(RSE		RIZONT	AL	
ondit NT	ion :	FCC CL	ASS-B R RS Wire		BBHA912	20D(RSE		RIZONT	AL	
ondit JT odel	ion : : Name :	FCC CL GSM/GP	ASS-B P RS Wire		BBHA912	20D(RSE		RIZONT	AL	
ondit JT odel emp/H	ion : Name : Numi :	FCC CL GSM/GP SIM800 24°C /	ASS-B RS Wire H 49%		BBHA912	20D(RSE		RIZONT	AL	
ondit JT odel emp/H	ion : : Name :	FCC CL GSM/GP SIM800 24°C / AC 120	ASS-B F RS Wire H 49% V/60Hz	eless (	BBHA912	20D(RSE		RIZONT	AL	
ondit JT odel emp/H ower ode	ion : Name : Numi : Rating:	FCC CL GSM/GP SIM800 24°C / AC 120	ASS-B F RS Wire H 49% V/60Hz	eless (	BBHA912	20D(RSE		RIZONT	AL	
ondit JT odel emp/H ower ode	ion : Name : Iumi : Rating: :	FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK	ASS-B F RS Wire H 49% V/60Hz	eless ( el 0	BBHA912	20D(RSE odule		RIZONT	AL	
ondit JT odel emp/H ower ode	ion : Name : Iumi : Rating: :	FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/	ASS-B F RS Wire H 49% V/60Hz Channe	eless I el Ø Cable	BBHA912 Data Mo	20D(RSE odule	-H) HO Limit	Over	AL Remark	
ondit JT odel emp/H ower ode	ion : Name : Humi : Rating: :	FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level	ASS-B F RS Wire H 49% V/60Hz Channe Antenna Factor	eless I el Ø Cable	BBHA912 Data Mo Preamp Factor	20D(RSE odule	-H) HO Limit Line	Over	Remark	
ondit JT odel emp/H ower ode emo	ion : Name : Jumi : Rating: : Freq	FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level dBuV	ASS-B F RS Wire 49% V/60Hz Channe Antenna Factor dB/m	eless   el 0 Cable Loss	BBHA912 Data Mo Preamp Factor	20D(RSE odule Level dBuV/m	Limit Line dBuV/m	Over Limit dB	Remark	
ondit JT odel emp/H ower ode emo	ion : Name : Jumi : Rating: : Freq MHz	FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level dBuV 42.73	ASS-B F RS Wire 49% V/60Hz Channe Antenna Factor dB/m 36.12 36.12	eless I Cable Loss dB 5.03 5.03	Preamp Factor 38.42 38.42	20D(RSE odule Level dBuV/m 45.46 55.85	Limit Line dBuV/m 54.00	Over Limit dB	Remark	
ondit JT odel emp/H ower ode emo	ion : Name : lumi : Rating: : : Freq MHz 1201.00 1204.00	FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level dBuV 42.73 53.12	ASS-B F RS Wire 49% V/60Hz Channe Antenna Factor dB/m 36.12 36.12 37.92	eless I el 0 Cable Loss dB 5.03 5.03 7.13	Preamp Factor 38.42 38.42	20D(RSE odule Level dBuV/m 45.46 55.85	Limit Line dBuV/m 54.00	Over Limit dB -8.54	Remark Average Peak	
JT odel emp/H ower ode emo -	tion : Name : Humi : Rating: : : Freq MHz 1201.00 1204.00 2394.00	FCC CL GSM/GP SIM800 24°C / AC 120 8DPSK Read/ Level dBuV 42.73 53.12 90.97 32.50	ASS-B F RS Wire 49% V/60Hz Channe Antenna Factor dB/m 36.12 36.12 37.92 42.27	eless I Cable Loss dB 5.03 5.03	Preamp Factor 38.42 38.42	20D(RSE odule Level dBuV/m 45.46 55.85 97.68 48.00	Limit Line dBuV/m 54.00 74.00 54.00	Over Limit dB -8.54 -18.15 23.68	Remark Average Peak Peak Average	



### Bluetooth 8-DPSK, traffic mode; Channel 39

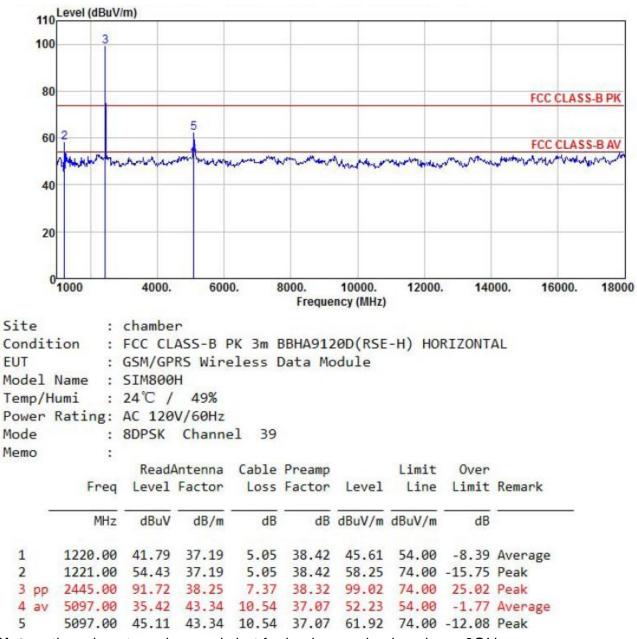
Notes: there is not any harmonic but for background noise above 6GHz.



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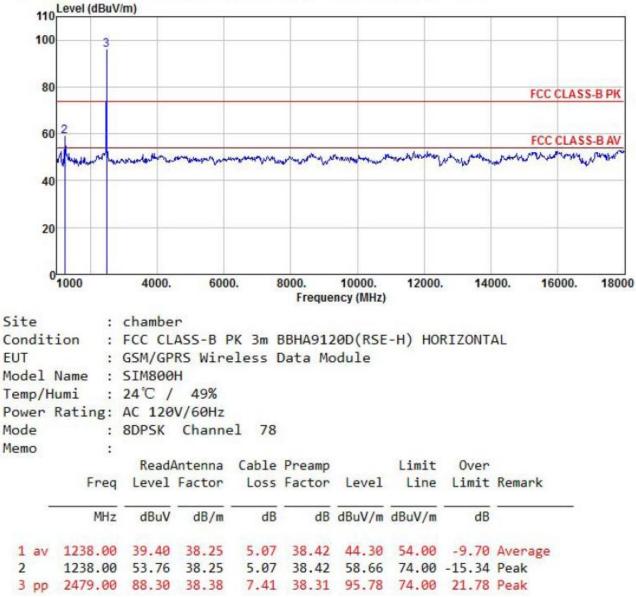
### Bluetooth 8-DPSK, traffic mode; Channel 78

**Notes:** there is not any harmonic but for background noise above 6GHz.



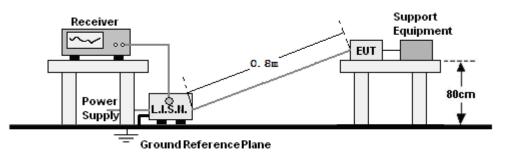
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# **12. AC POWER LINE CONDUCTED EMISSIONS**

# 12.1 TEST SETUP



### 12.2 LIMITS

Frequency range	Limits dB(µV)				
(MHz)	Quasi-peak	Average			
0,15 to 0,50	66 to 56	56 to 46			
0,50 to 5	56	46			
5 to 30	60	50			

**NOTE:** 1. The lower limit shall apply at the transition frequencies.

2. The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz.

# **12.3 TEST PROCEDURE**

According to description of ANSI C63.4: 2009 sec.13.3, the AC power line preliminary conducted emissions measurements were carried out. The preliminary conducted measurements were performed using the spectrum analyzer to observe the emission characteristics of the EUT. The EUT configuration, cable configuration and mode of operation were determined for producing the maximum level of emissions. These configurations were used for final AC power line conducted emissions measurements. The EUT is placed on a non-metallic table 0.8m above the horizontal metal reference ground plane. The EUT is connected to LISN and LISN is connected to the reference ground. All other supplemental devices are connected with EUT through other LISN. The distance between EUT and LISN is 80cm. A radio link is established between EUT and the tester. The output power of the EUT is controlled by the tester and driven to maximum value. An initial pre-scan was performed on the live L line and neutral line with peak detector (9kHz RBW ). Both average detector and qausi-peak detector are performed at the frequencies with maximized peak emission.

Conducted emissions were invested over the frequency range from 0.15MHz to 30MHz using a receiver bandwidth of 9kHz.

### **12.4 RESULTS & PERFORMANCE**

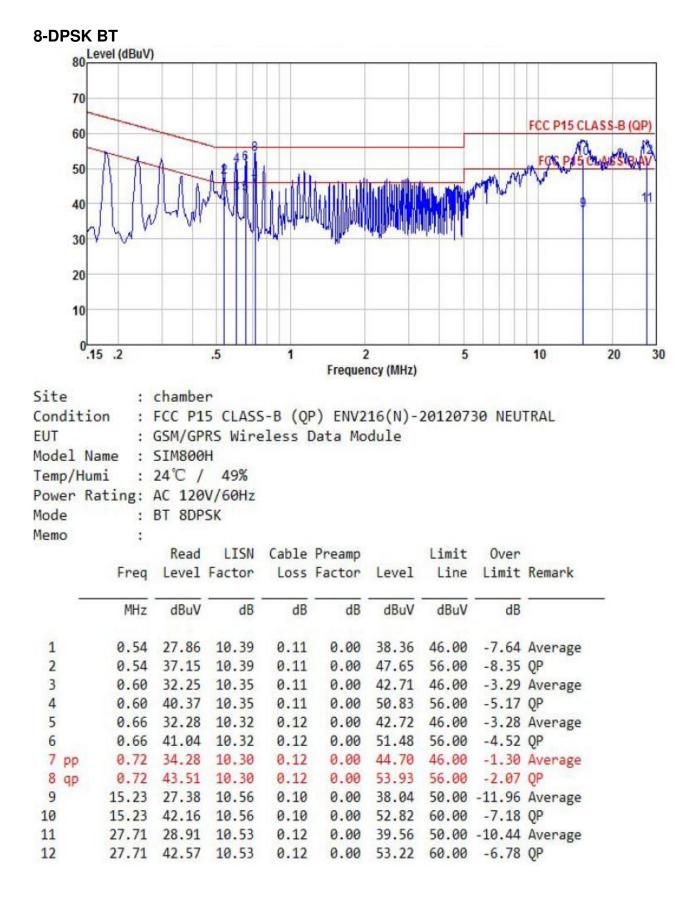
#### **GFSK BT** 80 Level (dBuV) 70 FCC P15 ASS-B (OP 60 50 40 30 20 10 0 .5 5 .15 .2 1 2 10 20 30 Frequency (MHz) Site : chamber Condition : FCC P15 CLASS-B (QP) ENV216(L)-20120730 LINE EUT : GSM/GPRS Wireless Data Module Model Name : SIM800H Temp/Humi : 24°C / 49% Power Rating: AC 120V/60Hz Mode : BT GFSK Memo : LISN Cable Preamp Limit Over Read Limit Remark Freq Level Factor Loss Factor Level Line MHz dBuV dB dB dB dBuV dBuV dB 0.11 34.14 46.00 -11.86 Average 1 0.60 23.56 10.47 0.00 2 0.60 33.83 10.47 0.11 0.00 44.41 56.00 -11.59 QP 3 av 0.72 26.79 10.39 37.30 46.00 -8.70 Average 0.12 0.00 4 0.72 37.46 10.39 0.12 0.00 47.97 56.00 -8.03 OP 5 0.78 23.72 10.43 0.13 0.00 34.28 46.00 -11.72 Average 6 0.78 34.20 10.43 0.13 0.00 44.76 56.00 -11.24 OP 7 15.65 27.18 10.52 37.81 50.00 -12.19 Average 0.11 0.00 15.65 43.55 10.52 54.18 60.00 -5.82 QP 8 pp 0.11 0.00 9 22.77 23.83 10.50 0.11 0.00 34.44 50.00 -15.56 Average 10 22.77 39.54 10.50 0.11 0.00 50.15 60.00 -9.85 QP 26.98 25.71 10.48 0.12 36.31 50.00 -13.69 Average 11 0.00 12 26.98 38.49 10.48 0.12 0.00 49.09 60.00 -10.91 QP



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70								_			_
60									FCC P15 CL	ASS-B	(QP)
-	_								A		M
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odel N emp/Hu ower R ode	lame : mi : ating: :	SIM800 24°C /	H 49% V/60Hz	eless I	Data Mo			50 1120	TRAL		
odel N emp/Hu ower R	lame : mi : ating:	SIM800 24°C / AC 120 BT GFS	H 49% V/60Hz K			dule			TRAL		
odel N emp/Hu ower R ode	lame : mi : ating: :	SIM800 24°C / AC 120 BT GFS Read	H 49% V/60Hz K LISN	Cable	Preamp Factor	dule	Limit	Over			
odel N emp/Hu ower R ode	lame : mi : ating: :	SIM800 24°C / AC 120 BT GFS Read	H 49% V/60Hz K LISN Factor	Cable	Preamp	dule	Limit	Over			
odel N emp/Hu ower R ode	lame : mi : ating: : Freq	SIM800 24°C / AC 120 BT GFS Read Level dBuV	H 49% V/60Hz K LISN Factor dB	Cable Loss	Preamp Factor dB	Level	Limit Line dBuV	Over Limit dB			
odel N emp/Hu ower R ode emo 1 2	lame : mi : ating: : Freq MHz	SIM800 24°C / AC 120 BT GFS Read Level dBuV	H 49% V/60Hz K LISN Factor dB 10.35	Cable Loss dB	Preamp Factor dB 0.00	dule Level dBuV	Limit Line dBuV 46.00	Over Limit dB -5.34	Remark Average	_	
odel N emp/Hu ower R ode emo 1 2 3	lame : mi : ating: Freq MHz 0.60	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57	H 49% V/60Hz K LISN Factor dB 10.35 10.35	Cable Loss dB 0.11	Preamp Factor dB 0.00 0.00	dule Level dBuV 40.66 49.03	Limit Line dBuV 46.00 56.00	Over Limit 	Remark Average		
odel N emp/Hu ower R ode emo 1 2	lame : mi : ating: : Freq MHz 0.60 0.60 0.66	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57	H 49% V/60Hz K LISN Factor dB 10.35 10.35 10.32	Cable Loss dB 0.11 0.11	Preamp Factor dB 0.00 0.00 0.00 0.00	dule Level dBuV 40.66 49.03 41.43 50.55	Limit Line dBuV 46.00 56.00 46.00 56.00	Over Limit dB -5.34 -6.97 -4.57 -5.45	Remark Average QP Average QP	_	
odel N emp/Hu ower R ode emo 1 2 3 4 5 pp	lame : : mi : : ating: : Freq MHz 0.60 0.66 0.66 0.66 0.66 0.72	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57 30.99 40.11 32.78	H 49% V/60Hz K LISN Factor dB 10.35 10.35 10.32 10.32 10.30	Cable Loss dB 0.11 0.12 0.12 0.12 0.12	Preamp Factor dB 0.00 0.00 0.00 0.00 0.00	dule Level dBuV 40.66 49.03 41.43 50.55 43.20	Limit Line dBuV 46.00 56.00 46.00 56.00 46.00	Over Limit dB -5.34 -6.97 -4.57 -5.45 -2.80	Remark Average QP Average QP Average		
odel N emp/Hu ower R ode emo 1 2 3 4 5 pp 6 qp	lame : mi : ating: : Freq MHz 0.60 0.60 0.66 0.66 0.66 0.72 0.72	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57 30.99 40.11 32.78 41.41	H 49% V/60Hz K LISN Factor dB 10.35 10.35 10.32 10.32 10.30 10.30	Cable Loss dB 0.11 0.12 0.12 0.12 0.12 0.12	Preamp Factor dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00	dule Level dBuV 40.66 49.03 41.43 50.55 43.20 51.83	Limit Line dBuV 46.00 56.00 46.00 56.00 56.00	Over Limit dB -5.34 -6.97 -4.57 -5.45 -2.80 -4.17	Remark Average QP Average QP Average QP		
odel N emp/Hu ower R ode emo 1 2 3 4 5 pp 6 qp 7	lame : : mi : : ating: : : Freq MHz 0.60 0.60 0.66 0.66 0.66 0.66 0.72 0.72 15.39	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57 30.99 40.11 32.78 41.41 23.17	H 49% V/60Hz K LISN Factor dB 10.35 10.35 10.32 10.32 10.30 10.30 10.55	Cable Loss dB 0.11 0.12 0.12 0.12 0.12 0.12 0.10	Preamp Factor dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	dule Level dBuV 40.66 49.03 41.43 50.55 43.20 51.83 33.82	Limit Line dBuV 46.00 56.00 46.00 56.00 56.00 50.00	Over Limit dB -5.34 -6.97 -4.57 -5.45 -2.80 -4.17 -16.18	Remark Average QP Average QP Average QP Average		
odel N emp/Hu ower R ode emo 1 2 3 4 5 pp 6 qp 7 8	lame : : mi : : ating: : Freq MHz 0.60 0.66 0.66 0.66 0.66 0.66 0.72 0.72 15.39 15.39	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57 30.99 40.11 32.78 41.41 23.17 37.91	H 49% V/60Hz K LISN Factor dB 10.35 10.35 10.32 10.32 10.32 10.30 10.55 10.55	Cable Loss dB 0.11 0.12 0.12 0.12 0.12 0.12 0.10 0.10	Preamp Factor dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	dule Level dBuV 40.66 49.03 41.43 50.55 43.20 51.83 33.82 48.56	Limit Line dBuV 46.00 56.00 46.00 56.00 56.00 50.00 60.00	Over Limit dB -5.34 -6.97 -4.57 -5.45 -2.80 -4.17 -16.18 -11.44	Remark Average QP Average QP Average QP Average QP		
odel N emp/Hu ower R ode emo 1 2 3 4 5 pp 6 qp 7 8 9	lame : mi : ating: : Freq MHz 0.60 0.60 0.66 0.66 0.66 0.66 0.72 0.72 15.39 15.39 15.39 21.26	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57 30.99 40.11 32.78 41.41 23.17 37.91 21.19	H 49% V/60Hz K LISN Factor dB 10.35 10.35 10.32 10.32 10.30 10.55 10.55 10.41	Cable Loss dB 0.11 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.10	Preamp Factor dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	dule Level dBuV 40.66 49.03 41.43 50.55 43.20 51.83 33.82 48.56 31.71	Limit Line dBuV 46.00 56.00 46.00 56.00 56.00 56.00 50.00 50.00	0ver Limit dB -5.34 -6.97 -4.57 -5.45 -2.80 -4.17 -16.18 -11.44 -18.29	Remark Average QP Average QP Average QP Average QP Average		
odel N emp/Hu ower R ode emo 1 2 3 4 5 pp 6 qp 7 8 9 10	lame : mi : ating: Freq MHz 0.60 0.60 0.66 0.66 0.66 0.66 0.66 0.6	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57 30.99 40.11 32.78 41.41 23.17 37.91 21.19 37.52	H 49% V/60Hz K LISN Factor dB 10.35 10.35 10.32 10.32 10.30 10.30 10.55 10.55 10.41 10.41	Cable Loss dB 0.11 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.10	Preamp Factor dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	dule Level dBuV 40.66 49.03 41.43 50.55 43.20 51.83 33.82 48.56 31.71 48.04	Limit Line dBuV 46.00 56.00 46.00 56.00 50.00 50.00 50.00 60.00	Over Limit dB -5.34 -6.97 -4.57 -5.45 -2.80 -4.17 -16.18 -11.44 -18.29 -11.96	Remark Average QP Average QP Average QP Average QP Average QP		
odel N emp/Hu ower R ode emo 1 2 3 4 5 pp 6 qp 7 8	lame : mi : ating: : Freq MHz 0.60 0.60 0.66 0.66 0.66 0.66 0.72 0.72 15.39 15.39 15.39 21.26	SIM800 24°C / AC 120 BT GFS Read Level dBuV 30.20 38.57 30.99 40.11 32.78 41.41 23.17 37.91 21.19 37.52	H 49% V/60Hz K LISN Factor dB 10.35 10.35 10.32 10.32 10.32 10.30 10.55 10.55 10.55 10.41 10.41 10.53	Cable Loss dB 0.11 0.12 0.12 0.12 0.12 0.12 0.12 0.10 0.10	Preamp Factor dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	dule Level dBuV 40.66 49.03 41.43 50.55 43.20 51.83 33.82 48.56 31.71 48.04	Limit Line dBuV 46.00 56.00 46.00 56.00 50.00 60.00 50.00 50.00	Over Limit dB -5.34 -6.97 -4.57 -5.45 -2.80 -4.17 -16.18 -11.44 -18.29 -11.96	Remark Average QP Average QP Average QP Average QP Average QP Average		



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	Level (dBuV)			111						
70							_			
60									FCC P15 g	ASS-B (QP)
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	MHz	dBuV	dB	dB	Factor dB				Remark	_
1	MHz 0.60	dBuV 25.43				Level	Line dBuV	Limit dB	Remark Average	
2			10.47	dB	dB 0.00	Level dBuV	Line dBuV 46.00	Limit dB -9.99	Average	
2 3 av	0.60	25.43 38.19	10.47	dB 0.11	dB 0.00 0.00	Level dBuV 36.01 48.77	Line dBuV 46.00 56.00	Limit dB -9.99 -7.23	Average	
2 3 av 4	0.60 0.60 0.72 0.72	25.43 38.19 28.82 39.47	10.47 10.47 10.39 10.39	dB 0.11 0.11 0.12 0.12	dB 0.00 0.00 0.00 0.00	Level dBuV 36.01 48.77 39.33 49.98	Line dBuV 46.00 56.00 46.00 56.00	Limit dB -9.99 -7.23 -6.67 -6.02	Average QP Average QP	
2 3 av 4 5	0.60 0.60 0.72 0.72 0.78	25.43 38.19 28.82 39.47 27.64	10.47 10.47 10.39 10.39 10.42	dB 0.11 0.11 0.12 0.12 0.13	dB 0.00 0.00 0.00 0.00 0.00	Level dBuV 36.01 48.77 39.33 49.98 38.19	Line dBuV 46.00 56.00 46.00 56.00 46.00	Limit dB -9.99 -7.23 -6.67 -6.02 -7.81	Average QP Average QP Average	
2 3 av 4 5 6	0.60 0.60 0.72 0.72 0.78 0.78	25.43 38.19 28.82 39.47 27.64 37.81	10.47 10.47 10.39 10.39 10.42 10.42	dB 0.11 0.12 0.12 0.13 0.13	dB 0.00 0.00 0.00 0.00 0.00 0.00	Level dBuV 36.01 48.77 39.33 49.98 38.19 48.36	Line dBuV 46.00 56.00 46.00 56.00 46.00 56.00	Limit dB -9.99 -7.23 -6.67 -6.02 -7.81 -7.64	Average QP Average QP Average QP	
2 3 av 4 5 6 7	0.60 0.60 0.72 0.72 0.78 0.78 15.15	25.43 38.19 28.82 39.47 27.64 37.81 28.52	10.47 10.47 10.39 10.39 10.42 10.42 10.42	dB 0.11 0.12 0.12 0.13 0.13 0.10	dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00	Level dBuV 36.01 48.77 39.33 49.98 38.19 48.36 39.14	Line dBuV 46.00 56.00 46.00 56.00 46.00 56.00 50.00	Limit dB -9.99 -7.23 -6.67 -6.02 -7.81 -7.64 -10.86	Average QP Average QP Average QP Average	
2 3 av 4 5 6 7 8 pp	0.60 0.60 0.72 0.72 0.78 0.78 15.15 15.15	25.43 38.19 28.82 39.47 27.64 37.81 28.52 46.64	10.47 10.47 10.39 10.39 10.42 10.42 10.52 10.52	dB 0.11 0.12 0.12 0.13 0.13 0.10 0.10	dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Level dBuV 36.01 48.77 39.33 49.98 38.19 48.36 39.14 57.26	Line dBuV 46.00 56.00 46.00 56.00 46.00 56.00 50.00 60.00	Limit dB -9.99 -7.23 -6.67 -6.02 -7.81 -7.64 -10.86 -2.74	Average QP Average QP Average QP Average QP	
2 3 av 4 5 6 7 8 pp 9	0.60 0.72 0.72 0.78 0.78 15.15 15.15 20.71	25.43 38.19 28.82 39.47 27.64 37.81 28.52 46.64 25.75	10.47 10.47 10.39 10.39 10.42 10.42 10.52 10.52 10.52	dB 0.11 0.12 0.12 0.13 0.13 0.10 0.10 0.10	dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Level dBuV 36.01 48.77 39.33 49.98 38.19 48.36 39.14 57.26 36.37	Line dBuV 46.00 56.00 46.00 56.00 56.00 50.00 50.00	Limit dB -9.99 -7.23 -6.67 -6.02 -7.81 -7.64 -10.86 -2.74 -13.63	Average QP Average QP Average QP Average QP Average	
2 3 av 4 5 6 7 8 pp	0.60 0.72 0.72 0.78 0.78 15.15 15.15 20.71	25.43 38.19 28.82 39.47 27.64 37.81 28.52 46.64 25.75 41.58	10.47 10.47 10.39 10.39 10.42 10.42 10.52 10.52 10.52 10.52	dB 0.11 0.12 0.12 0.13 0.13 0.10 0.10	dB 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	Level dBuV 36.01 48.77 39.33 49.98 38.19 48.36 39.14 57.26	Line dBuV 46.00 56.00 46.00 56.00 56.00 50.00 50.00 50.00 60.00	Limit dB -9.99 -7.23 -6.67 -6.02 -7.81 -7.64 -10.86 -2.74 -13.63 -7.80	Average QP Average QP Average QP Average QP Average	



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# APPENDIX 1 PHOTOGRAPHS OF TEST SETUP Minimum hopping channels, Channel separation, Occupied bandwidth, Dwell time, Peak output power, Spurious emission(conducted) Test Setup Photos



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### Report No. : UL15820130723FCC24-2



Description: Radiated Spurious Measurement Setup (From 30MHz to 1GHz)





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AC power line conducted emission Test Setup Photos



# APPENDIX 2 PHOTOGRAPHS OF EUT



View of EUT-1

View of EUT-2



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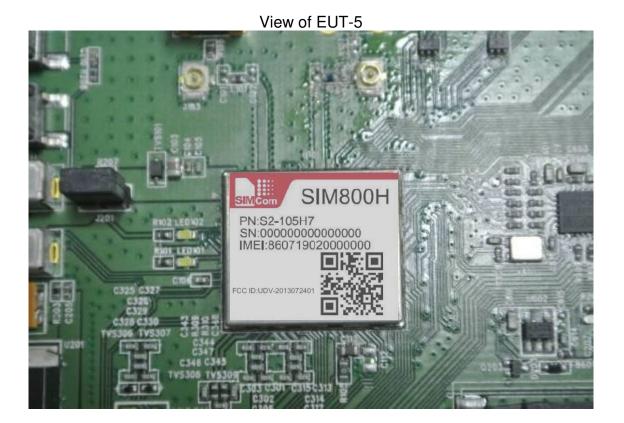


View of EUT-4

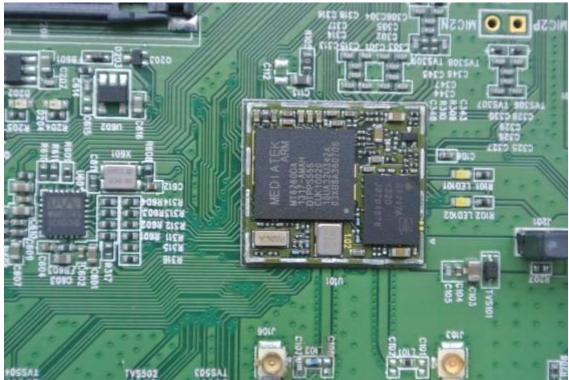


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# View of EUT-6



----End of the report----