Prüfbericht-Nr.: *Test Report No.:*	**50079522 001**	**Auftrags-Nr.:** *Order No.:*	**114062969**	Seite 1 von 46 *Page 1 of 46*
Kunden-Referenz-Nr.: *Client Reference No.:*	N/A	**Auftragsdatum:** *Order date:*	15-Mar-2017	
Auftraggeber: *Client:*	DAQI CONCEPT INC. 2F., No.23, Ln. 249, Zunxian St., Beitou Dist., 11275 Taipei City, Taiwan			
Prüfgegenstand: *Test item:*	MU01 Wireless Speaker			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	MG01			
Auftrags-Inhalt: *Order content:*	FCC Part 15C Test report (BDR/EDR)			
Prüfgrundlage: *Test specification:*	FCC 47CFR Part 15: Subpart C Section 15.247			

Wareneingangsdatum: *Date of receipt:*	11-Apr-2017
Prüfmuster-Nr.: *Test sample No.:*	A000526164-001
Prüfzeitraum: *Testing period:*	17-Apr-2017 – 18-Apr-2017
Ort der Prüfung: *Place of testing:*	EMC Laboratory Taipei
Prüflaboratorium: *Testing laboratory:*	TUV Rheinland Taiwan Ltd.
Prüfergebnis*: *Test result*:*	Pass

geprüft von / *tested by:*			**kontrolliert von** / *reviewed by:*		
10-May-2017	Sam C.J. KUO / Engineer	Sam	10-May-2017	Ryan Chen / Project Manager	Ryan
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*	**Datum** *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other:*

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the test item at delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	*1 = very good*	*2 = good*	*3 = satisfactory*	*4 = sufficient*	*5 = poor*
	P(ass) = passed a.m. test specification(s)		*F(ail) = failed a.m. test specification(s)*	*N/A = not applicable*	*N/T = not tested*

Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark.

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: *Passed*

5.1.2 PEAK OUTPUT POWER
RESULT: *Passed*

5.1.3 20DB BANDWIDTH
RESULT: *Passed*

5.1.4 99% BANDWIDTH
RESULT: *Passed*

5.1.5 CONDUCTED SPURIOUS EMISSIONS AND FREQUENCY BAND EDGE MEASURED IN 100KHZ BANDWIDTH
RESULT: *Passed*

5.1.6 SPURIOUS EMISSION
RESULT: *Passed*

5.1.7 FREQUENCY SEPARATION
RESULT: *Passed*

5.1.8 NUMBER OF HOPPING FREQUENCY
RESULT: *Passed*

5.1.9 TIME OF OCCUPANCY
RESULT: *Passed*

5.2.1 MAINS CONDUCTED EMISSIONS
RESULT: *Passed*

6.1.1 ELECTROMAGNETIC FIELDS
RESULT: *Passed*

Contents

1. GENERAL REMARKS 5
1.1 COMPLEMENTARY MATERIALS 5
2. TEST SITES 6
2.1 TEST FACILITY 6
2.2 LIST OF TEST AND MEASUREMENT INSTRUMENTS 7
2.3 TRACEABILITY 8
2.4 CALIBRATION 8
2.5 MEASUREMENT UNCERTAINTY 8
3. GENERAL PRODUCT INFORMATION 9
3.1 PRODUCT FUNCTION AND INTENDED USE 9
3.2 SYSTEM DETAILS AND RATINGS 9
3.3 INDEPENDENT OPERATION MODES 10
3.4 NOISE GENERATING AND NOISE SUPPRESSING PARTS 11
3.5 SUBMITTED DOCUMENTS 11
4. TEST SET-UP AND OPERATION MODES 12
4.1 PRINCIPLE OF CONFIGURATION SELECTION 12
4.2 TEST OPERATION AND TEST SOFTWARE 12
4.3 SPECIAL ACCESSORIES AND AUXILIARY EQUIPMENT 12
4.4 COUNTERMEASURES TO ACHIEVE EMC COMPLIANCE 13
4.5 TEST SETUP DIAGRAM 13
5. TEST RESULTS 15
5.1 TRANSMITTER REQUIREMENT & TEST SUITES 15
5.1.1 Antenna Requirement 15
5.1.2 Peak Output Power 16
5.1.3 20dB Bandwidth 17
5.1.4 99% Bandwidth 21
5.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth 23
5.1.6 Spurious Emission 31
5.1.7 Frequency Separation 32
5.1.8 Number of hopping frequency 34
5.1.9 Time of Occupancy 37
5.2 MAINS EMISSIONS 40
5.2.1 Mains Conducted Emissions 40
6. SAFETY HUMAN EXPOSURE 41

6.1 RADIO FREQUENCY EXPOSURE COMPLIANCE 41
6.1.1 Electromagnetic Fields 41

7. PHOTOGRAPHS OF THE TEST SET-UP 42

8. LIST OF TABLES 46

9. LIST OF PHOTOGRAPHS 46

1. General Remarks

1.1 Complementary Materials

The following attachments are integral parts of this test report:

Appendix P: Photo Documentation
(File Name: 50079522 APPENDIXP)
Appendix D: Test Result of Radiated Emissions
(File Name: 50079522 APPENDIXD)

Test Specifications

The following standards were applied

Table 1: Applied Standard and Test Levels

Radio
FCC CFR47 Part 15: Subpart C Section 15.247 ANSI C63.10:2013

2. Test Sites

2.1 Test Facility

TUV Rheinland Taiwan Ltd.
Taipei Office

11F. No.758, Sec. 4, Bade Rd., Songshan Dist.
Taipei City 105
Taiwan (R.O.C.)

FCC RegistrationNo.: 799772
IC Canada Registration No.: 9465A-1
TAF Accredited NCC Test Lab. No.:0759
TAF ISO17025 Certification effective periods: 2016-Jul-1st to 2019-Jun-30th

Testing Laboratory
0759

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Type	S/N	Calibrated until	Used for test items
Test Software	Farad	EZ_EMC	Ver. TUV3A1	N/A	N/A
EMI Test Receiver	R&S	ESR7	101062	2016/09/12	2017/09/12
Spectrum Analyzer	R&S	FSV 40	100921	2016/04/21	2017/04/21
Spectrum Analyzer	Agilent	N9010A	MY53470241	2016/04/25	2017/04/24
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	2016/07/29	2017/07/29
Preamplifier (18 GHz -40 GHz)	COM-POWER	PAM-840	461257	2016/12/01	2017/12/01
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM01G18G	060558	2016/11/17	2017/11/17
Bilog Antenna	TESEQ	CBL6111D	29804	2016/06/23	2017/06/23
Horn Antenna	ETS-Lindgren	3117	138160	2016/05/03	2017/05/03
Horn Antenna (18GHz~40GHz)	COM-POWER	AH840	101029	2016/10/11	2017/10/11
Loop Antenna	Schwarzbeck	FMZB 1513	1513-076	2016/05/11	2017/05/11
EMI Test Receiver	R&S	ESCI7	100797	2016/12/30	2017/12/30

2.3 Traceability

All measurement equipment calibrations are traceable to NML(Taiwan)/NIST(USA) or where calibration is performed outside Taiwan, to equivalent nationally recognized standards organizations.

2.4 Calibration

requiring calibration is calibrated periodically in a suitably accredited Calibration Lab. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.5 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements:.

Table 3: Emission Measurement Uncertainty

Parameter	Uncertainty
RF power, conducted	± 1.5 dB
Adjacent channel power	± 3 dB
Radiated emission of transmitter, valid up to 26 GHz	± 6 dB
Radiated emission of receiver, valid up to 26 GHz	± 6 dB
Temperature	± 2 ºC
Humidity	± 10 %

3. General Product Information

3.1 Product Function and Intended Use

The EUT is a Bluetooth Speaker. It contains a Bluetooth 4.1 compatible module enabling the user to communicate data through a Wireless interface.
For details refer to the User Guide, Data Sheet and Circuit Diagram.

3.2 System Details and Ratings

Table 4: Basic Information of EUT

Item	EUT information
Kind of Equipment/Test Item	MUG SPEAKER
Type Identification	MG01
Brand Name	MUG+
FCC ID	2AJL2-MG01

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequency	2402 MHz ~ 2480 MHz
Channel Spacing	1 MHz
Channel number	79
Operation Voltage	4.0V Li-Battery
Modulation	GFSK, π/4 DQPSK, 8DPSK
Antenna gain	1.927 dBi

Table 6: Frequency hopping information

Technical Specification	Description
Hopping Range	Hereby we declare that the maximum frequency of this device is: 2402-2480MHz. This is according the Bluetooth Core Specification V2.1+EDR for devices which will be operated in the USA. This was checked during the Bluetooth Qualification tests (Test Case: TRM/CA/04).
Hopping Sequence	Example of a 79 hopping sequence in data mode: 33,04,21,44,23,42,53,46,55,48,40,59,72,29,76,31,08,73, 07,75,09,45,60,39,58,13,47,11,77,52,35,50,65,54,67,56, 69,62,71,64, 7,25,27,66,57,70,74,61,78,63,10,41,05,43, 15,44,64,68,02,70,06,01,51,03,55,05,03,66,53,49,36,47,
Receiver input bandwidth	The input bandwidth of the receiver is 1MHz. In every connection one Bluetooth device is the master and the other one is the slave. The master determines the hopping sequence. The slave follows this sequence. Both devices shift between RX and TX time slot according to the clock of the master. Additionally the type of connection is set up at the beginning of the connection. The master adapts its hopping frequency and its TX/RX timing according to the packet type of the connection. Also the slave of the connection will use these settings. Repeating of a packer has no influence on the hopping sequence. The hopping sequence generated by the master of the connection will be followed in any case. That means a repeated packet will not be send on the same frequency, it is send on the next frequency of the hopping sequence.

3.3 Independent Operation Modes

The basic operation modes are:

A. Transmitting
   1. Low channel
   2. Middle channel
   3. High channel

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Circuit Diagram
- Instruction Manual
- Rating Label
- Technical Description

4. Test Set-up and Operation Modes

4.1 Principle of Configuration Selection

The equipment under test (EUT) was configured to measure its maximum power level. The test modes were adapted accordingly in reference to the instructions for use.

4.2 Test Operation and Test Software

Test operation refers to test setup in chapter 4. All testing were performed according to the procedures in ANSI C63.10: 2013

Full test was applied on all test modes, but only worst case was shown.

4.3 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

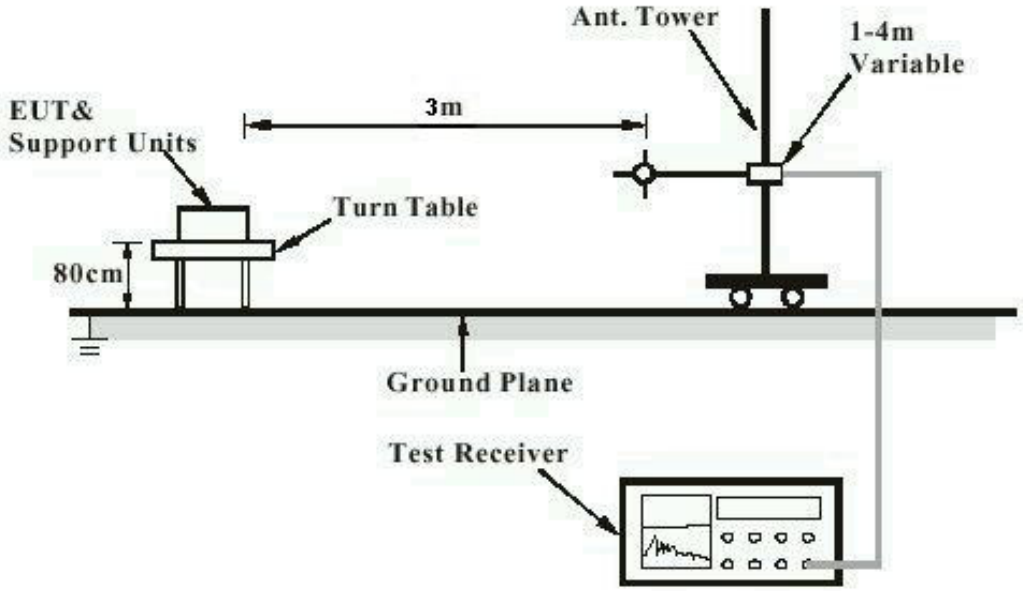
Description	Manufacturer	Model No.	Serial No.
Notebook(EMC-06)	Lenovo	TP00048A	PB-0F8B2

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested containing the noise suppression parts as in the Photo Appendix and the Test Setup Photos. No additional measures were employed to achieve compliance.

4.5 Test Setup Diagram

Diagram of Measurement Configuration for Radiation Test



Note: Measurements above 1 GHz are done with a table height of 1.5m

Diagram of Measurement Equipment Configuration for Mains Conduction Measurement

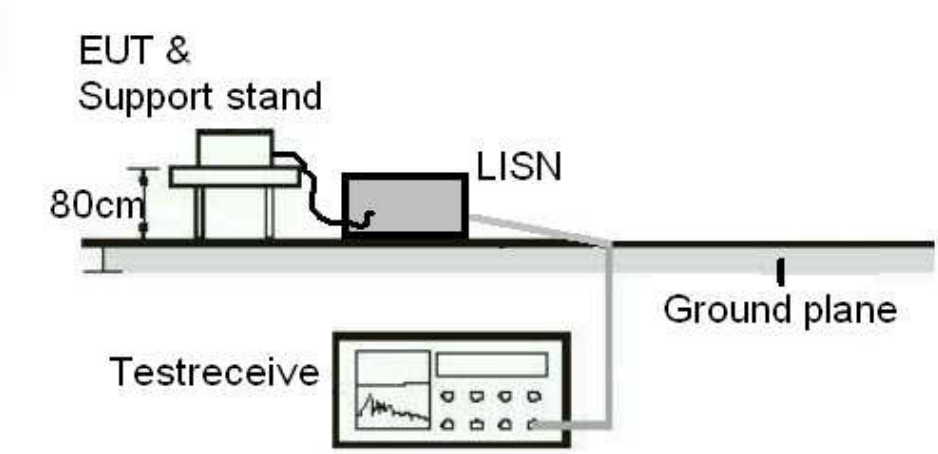
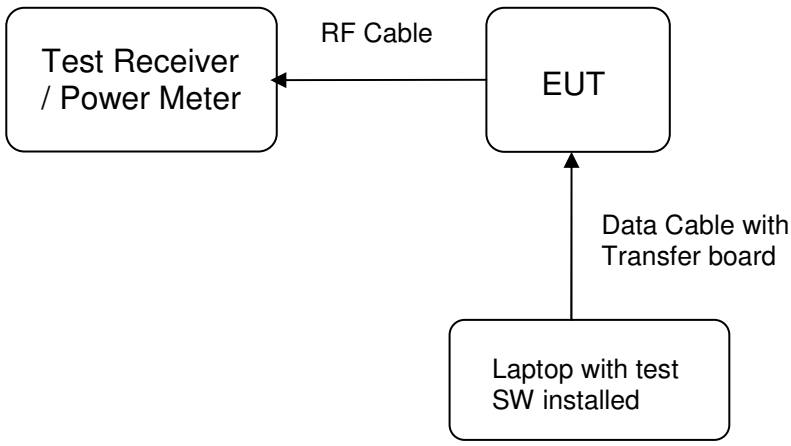


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Test standard	:	LP0002(2016): 2.2, 3.10.1, (3) FCC Part 15.247(b)(4), Part 15.203 and RSS-Gen 8.3
Requirement	:	use of approved antennas only with directional gains that do not exceed 6 dBi

According to the manufacturer declaration, the EUT has an antenna with a directional gain of 1.927 dBi. The antenna is a printed PCB trace with no possibility of replacement with a non-approved antenna by the end-user. Therefore, the EUT is considered to comply with this provision.

Refer to EUT photo for details.

5.1.2 Peak Output Power

RESULT: **Passed**

Test standard	:	FCC Part 15.247(b)(1), RSS-247 5.4(2) LP0002(2016): 3.10.1, (2)
Basic standard	:	ANSI C63.10:2013 LP0002(2016) Appendix II
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A

Ambient temperature	:	22-26 °C
Relative humidity	:	50-65 %
Atmospheric pressure	:	100-103 kPa

Table 7: Test result of Peak Output Power, GFSK modulation

Channel	Channel Frequency	Peak Output Power		Limit
	(MHz)	(dBm)	(W)	(W)
Low Channel	2402	3.49	0.00223	0.125
Middle Channel	2441	2.97	0.00198	0.125
High Channel	2480	3.69	0.00234	0.125

Table 8: Test result of Peak Output Power, 8DPSK modulation

Channel	Channel Frequency	Peak Output Power		Limit
	(MHz)	(dBm)	(W)	(W)
Low Channel	2402	4.03	0.00253	0.125
Middle Channel	2441	3.50	0.00224	0.125
High Channel	2480	4.20	0.00263	0.125

Pmax: 2.6278 mW

5.1.3 20dB Bandwidth

RESULT: **Passed**

Test standard	:	FCC Part 15.247(a)(1), RSS-247 5.1(1) LP0002(2016): 3.10.1, (6.1.1)
Basic standard	:	ANSI C63.10:2013 LP0002(2016) Appendix II

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22-26°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103kPa

Table 9: Test result of 20dB Bandwidth, GFSK modulation

Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Limit (MHz)	Result
Low Channel	2402	936	1.5	Pass
Mid Channel	2441	939.6	1.5	Pass
High Channel	2480	936.5	1.5	Pass

Note: Limit is for Channel Separation of 1 MHz and a power limit of 125 mW.

Table 10: Test result of 20dB Bandwidth, 8DPSK modulation

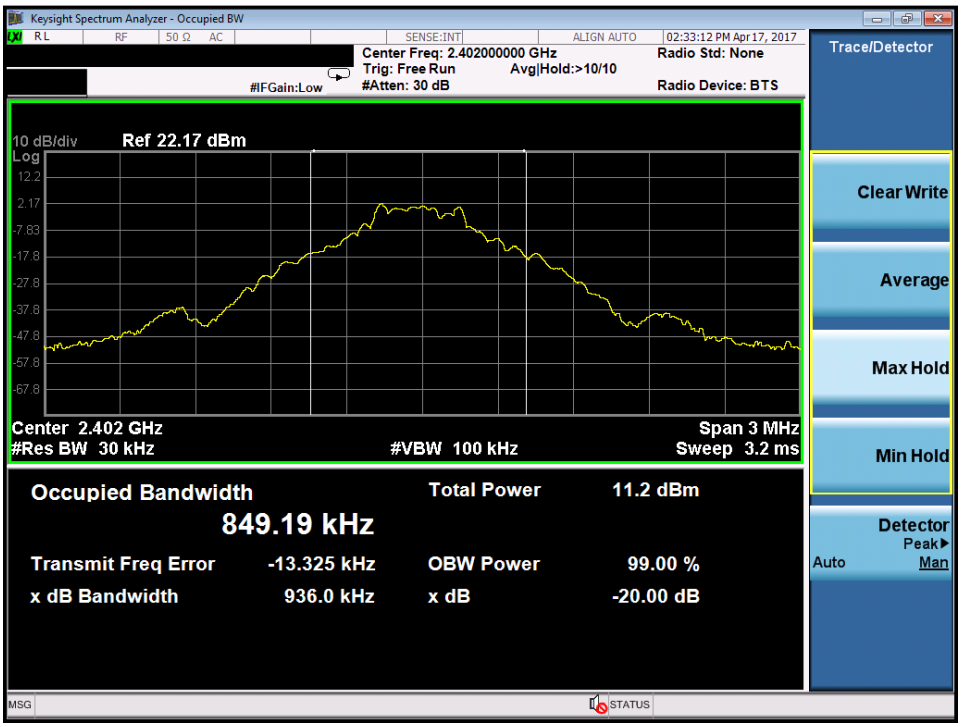
Channel	Channel Frequency (MHz)	20dB Bandwidth (kHz)	Limit (MHz)	Result
Low Channel	2402	1.277	1.5	Pass
Mid Channel	2441	1.276	1.5	Pass
High Channel	2480	1.279	1.5	Pass

Note: Limit is for Channel Separation of 1 MHz and a power limit of 125 mW.

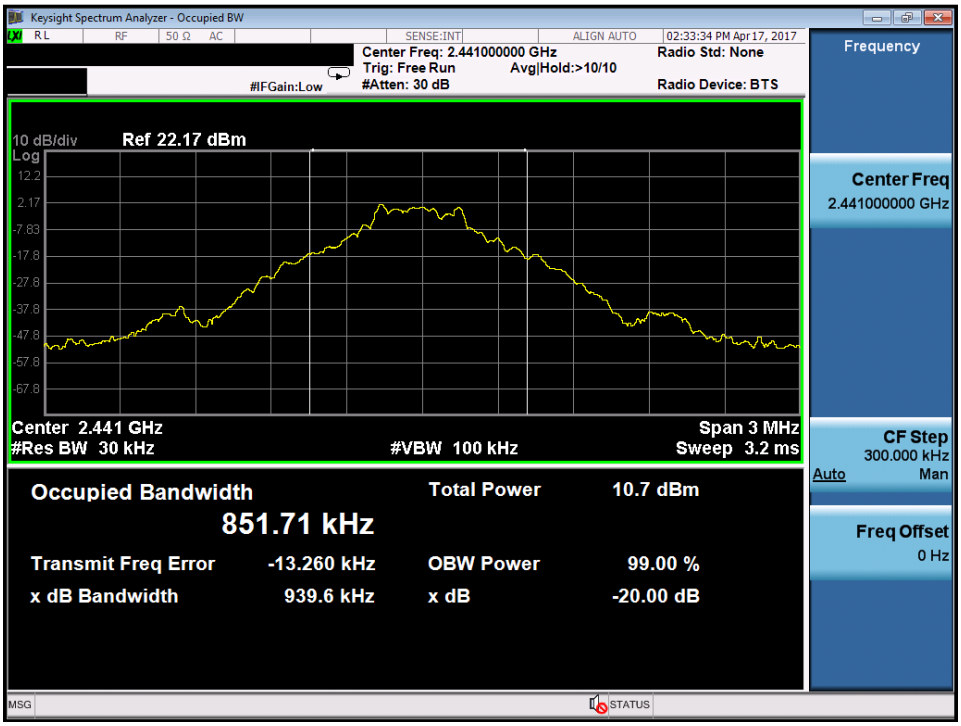
If the carrier separation frequency of a Bluetooth Device is set at 1 MHz due to the firmware setting and the Bluetooth Standard, then for power <125 mW the limit for the 20 dB Bandwidth, becomes 1 MHz / 0.66666 = 1.5 MHz.

Test Plot of 20dB Bandwidth, GFSK modulation

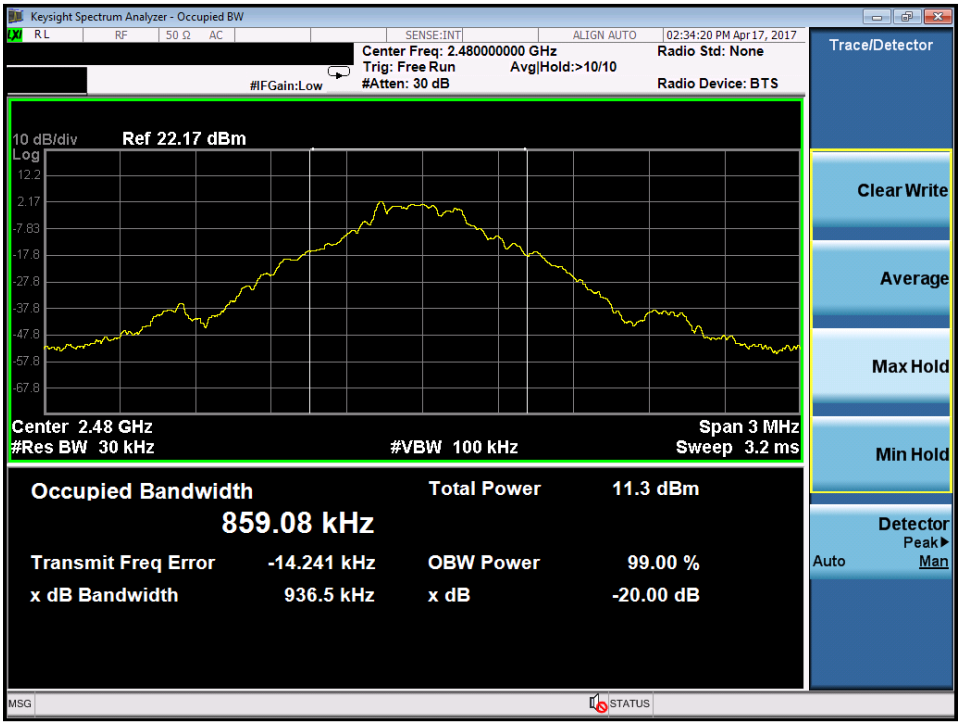
Low Channel



Middle Channel

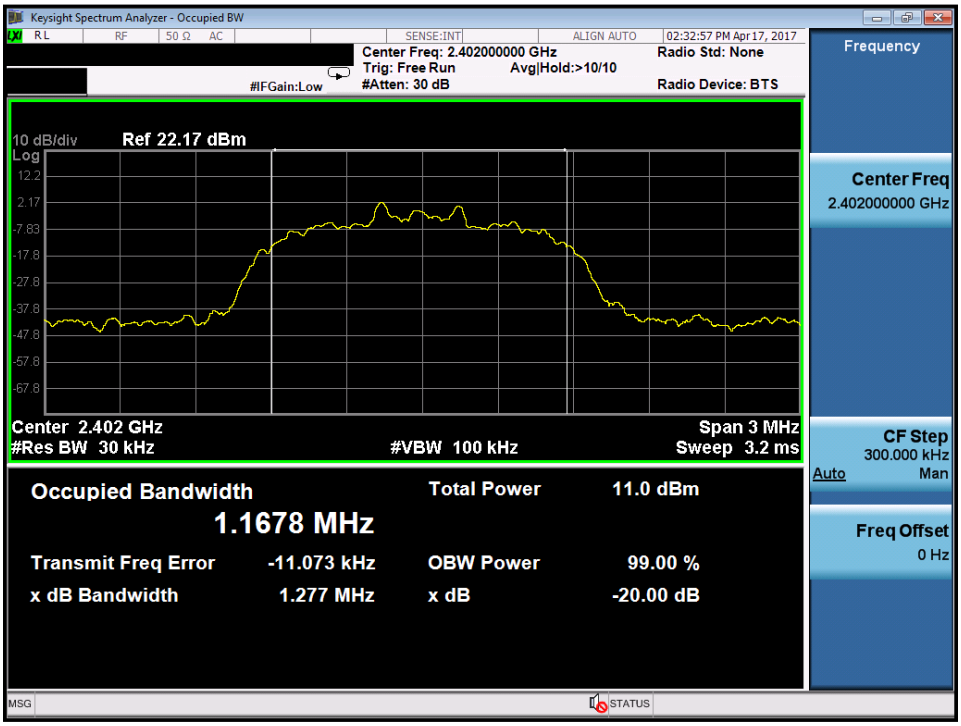


High Channel

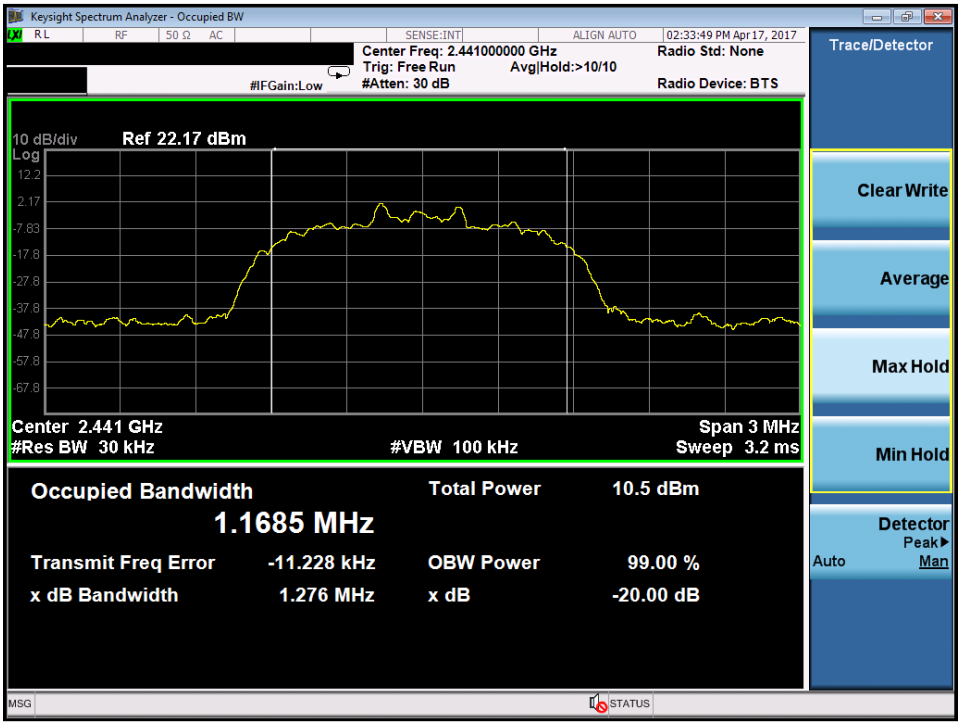


Test Plot of 20dB Bandwidth, 8DPSK modulation

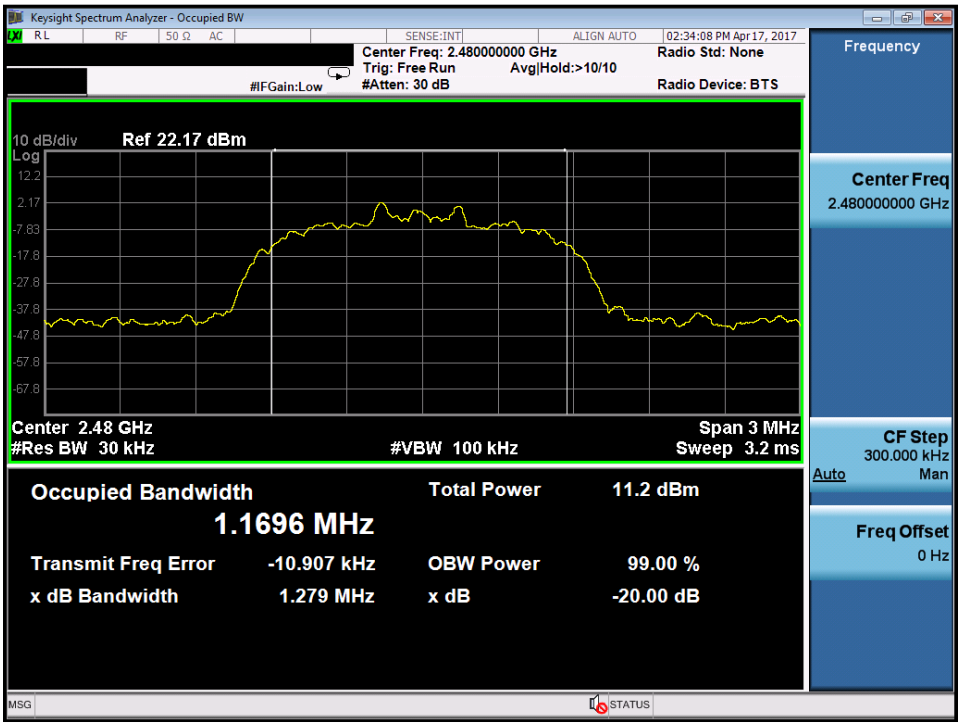
Low Channel



Middle Channel



High Channel



5.1.4 99% Bandwidth

RESULT: **Passed**

Test standard	:	RSS-Gen (Issue 4)
Basic standard	:	RSS-Gen (Issue 4)
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22-26°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103kPa

Table 11: Test result of 99% Bandwidth, GFSK modulation

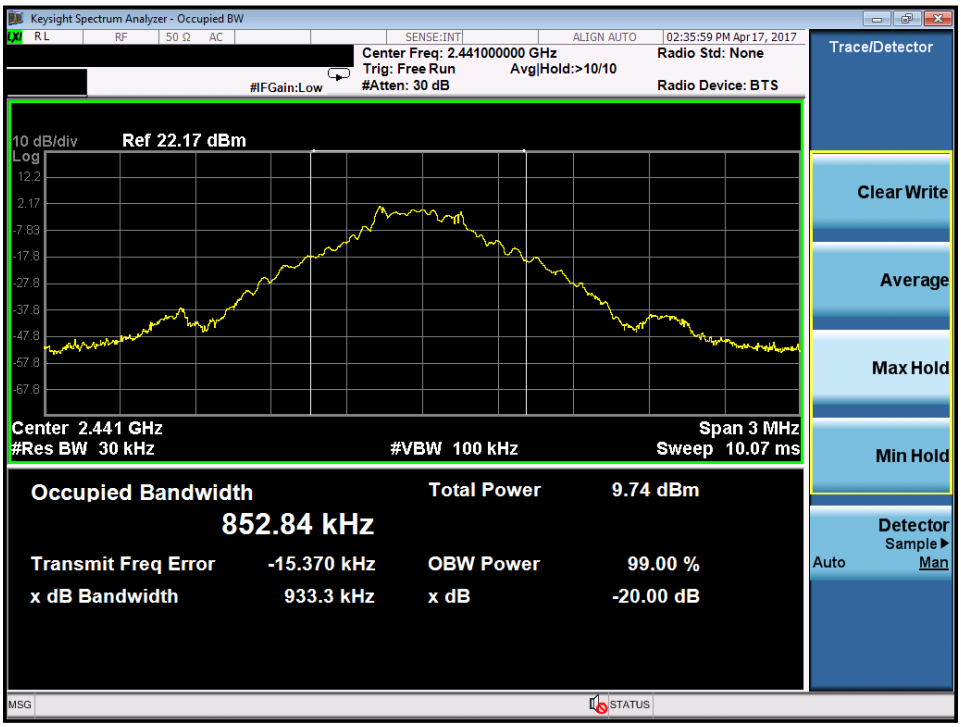
Channel	Channel Frequency (MHz)	99% Bandwidth (kHz)
Mid Channel	2441	852.84

Table 12: Test result of 99% Bandwidth, PSK modulation

Channel	Channel Frequency (MHz)	99% Bandwidth (kHz)
Mid Channel	2441	1.1676

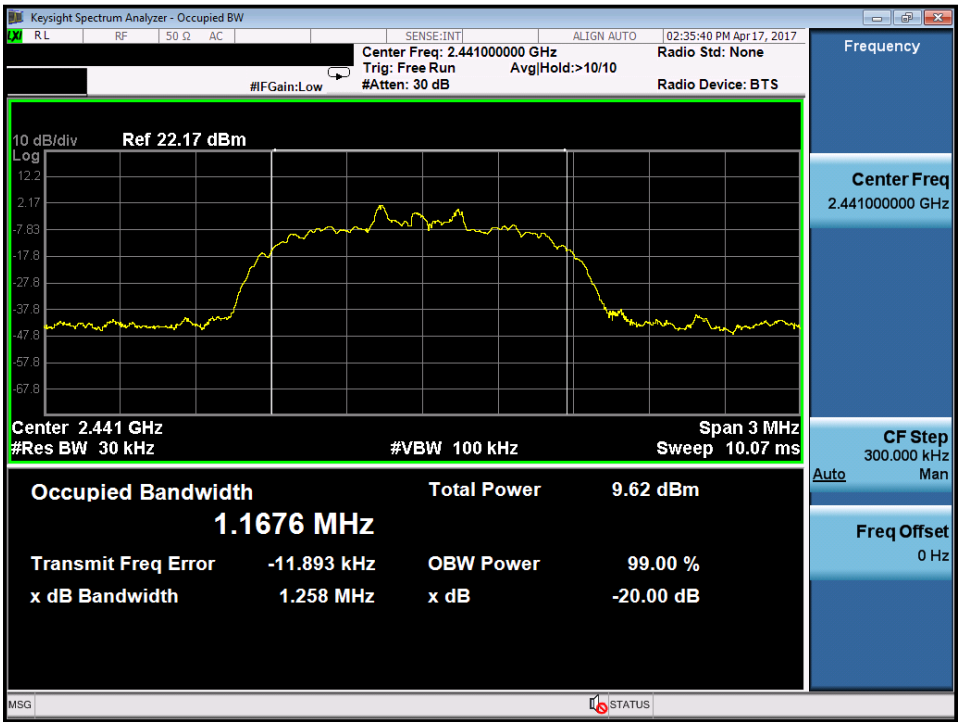
Test Plot of 99% Bandwidth, GFSK modulation

Middle Channel



Test Plot of 99% Bandwidth, 8DPSK modulation

Middle Channel



5.1.5 Conducted spurious emissions and Frequency Band Edge measured in 100kHz Bandwidth

RESULT: **Passed**

Test standard	:	FCC part 15.247(d), RSS-247 5.5 LP0002(2016): 3.10.1, (5)
Basic standard	:	ANSI C63.10:2013 LP0002(2016) Appendix II
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Shielded room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22-26°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103 kPa

All emissions are more than 20dB below fundamental, details refer to following test plot, and compliance is achieved as well.
Due to the small size of the product and that there are no inductive components of significant size ,9kHz to 30MHz frequency range is not tested based on technical judgment.

Test Plot of 100kHz Conducted Emissions, GFSK modulation

Low Channel

Middle Channel

High Channel

Test Plot of 100kHz Conducted Emissions, 8DPSK modulation

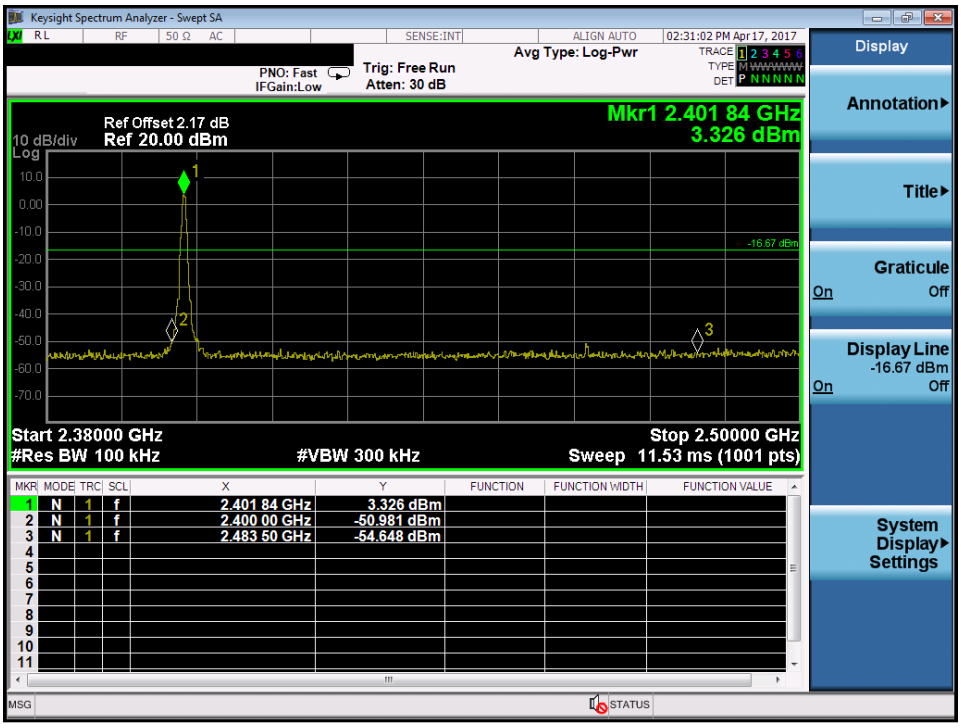
Low Channel

Middle Channel

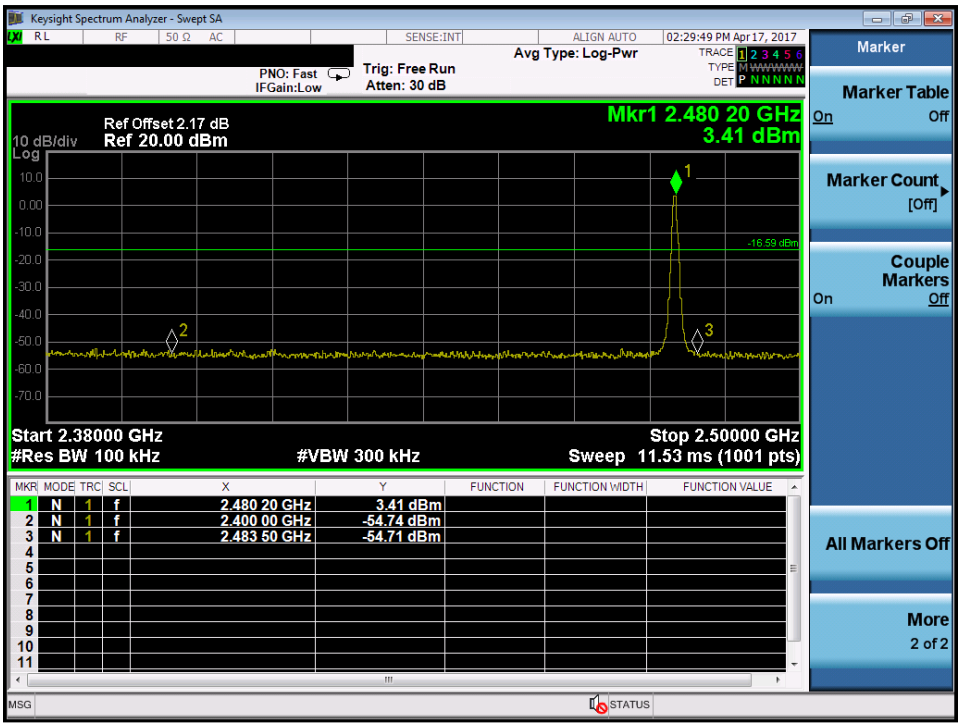
High Channel

Test Plot of 100kHz Bandwidth of Frequency Band Edge, GFSK modulation

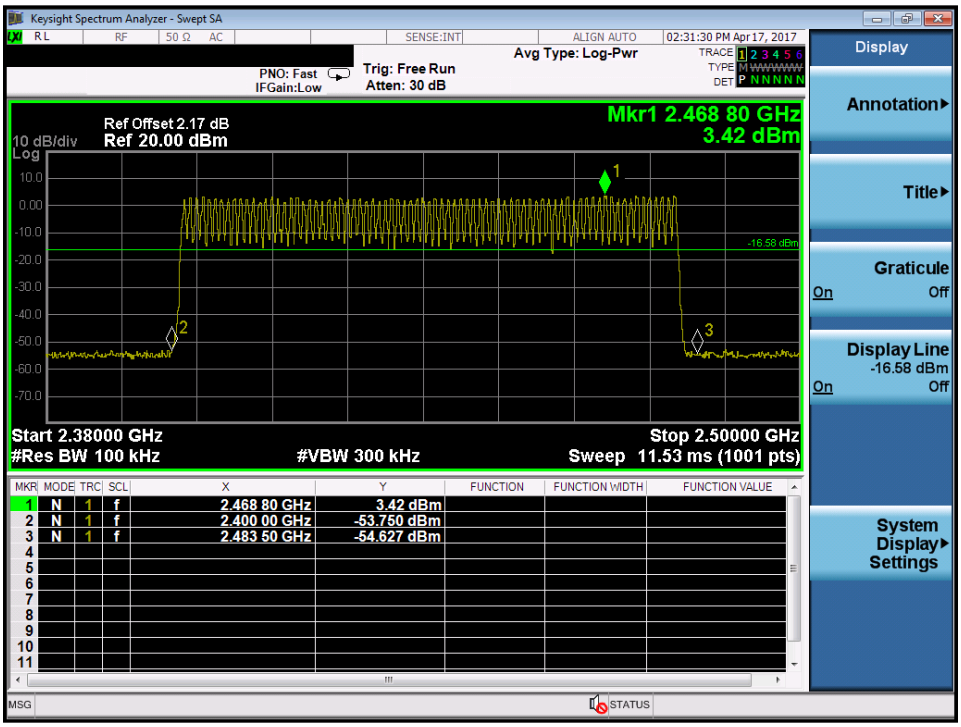
Low Channel



High Channel

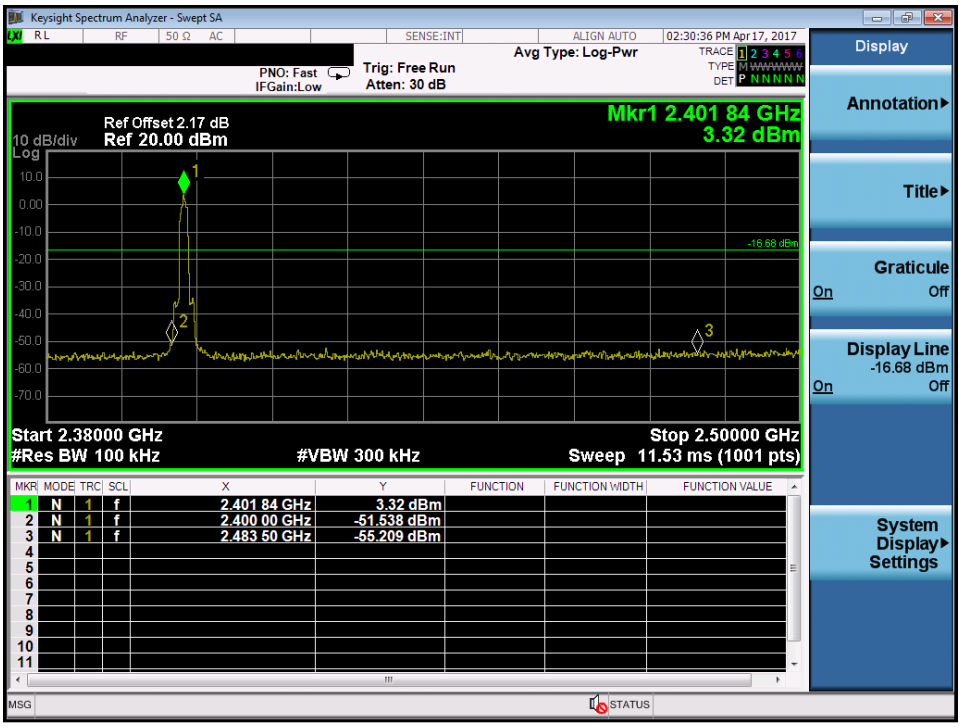


Hopping ON

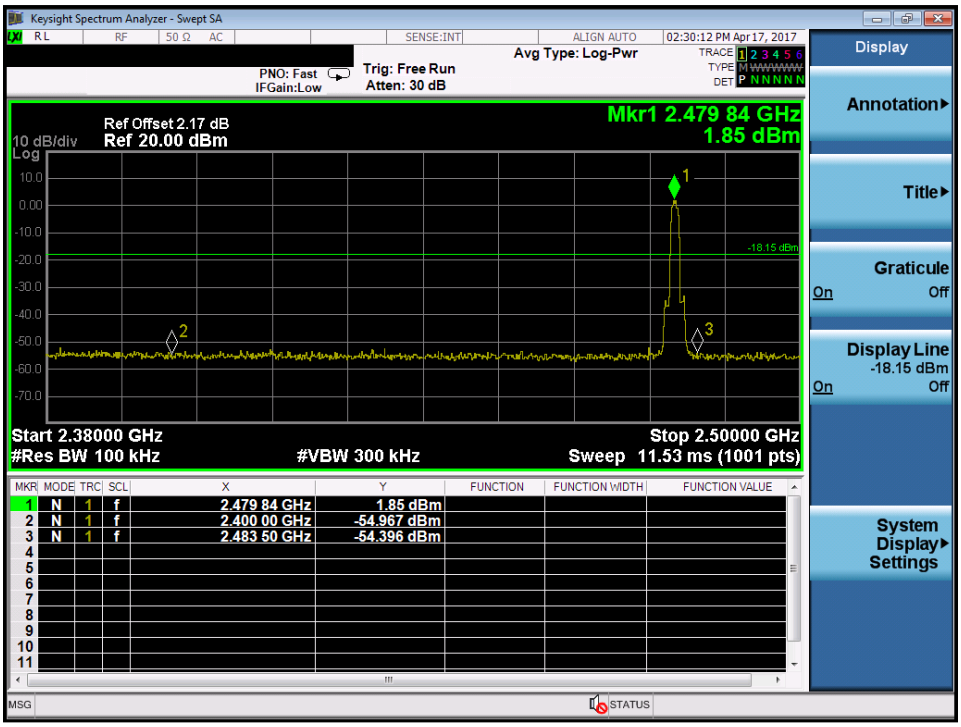

Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
02:31:30 PM Apr 17, 2017
Avg Type: Log-Pwr
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Ref Offset 2.17 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.468 80 GHz
3.42 dBm
-16.58 dBm
Start 2.38000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 11.53 ms (1001 pts)
1 N 1 f 2.468 80 GHz 3.42 dBm
2 N 1 f 2.400 00 GHz -53.750 dBm
3 N 1 f 2.483 50 GHz -54.627 dBm
Display
Annotation
Title
Graticule
Display Line
-16.58 dBm
System Display Settings
MSG
STATUS

Test Plot of 100kHz Bandwidth of Frequency Band Edge, 8DPSK modulation

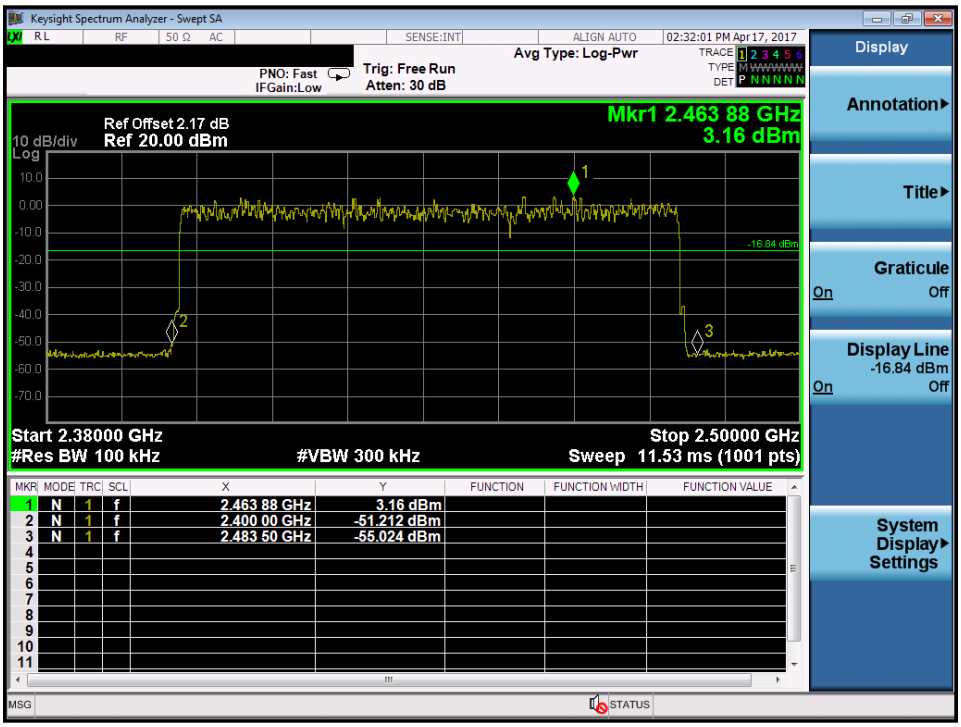
Low Channel



High Channel



Hopping ON


Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
02:32:01 PM Apr 17, 2017
Avg Type: Log-Pwr
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Ref Offset 2.17 dB
10 dB/div
Ref 20.00 dBm
Log
Mkr1 2.463 88 GHz
3.16 dBm
-16.84 dBm
Start 2.38000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 11.53 ms (1001 pts)
1 N 1 f 2.463 88 GHz 3.16 dBm
2 N 1 f 2.400 00 GHz -51.212 dBm
3 N 1 f 2.483 50 GHz -55.024 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-16.84 dBm
On Off
System Display Settings
MSG
STATUS

5.1.6 Spurious Emission

RESULT: **Passed**

Test standard	:	FCC part 15.247(d), FCC 15.205, FCC 15.209, RSS-210 2.2, RSS-247 5.5 and RSS-Gen 8.9 LP0002(2016): 3.10.1, (5)
Basic standard	:	ANSI C63.10
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) and RSS-Gen i4, 8.9 (Table 6), must comply with the radiated emission limits specified in FCC 15.209(a) and RSS-Gen i4, 8.9 (Table 4 and 5). Radiated emissions which fall in the restricted bands, as defined in LP0002(2016): 2.7 , must comply with the radiated emission limits specified in LP0002(2016): 2.8 Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a) and FCC 15.249(a), RSS-Gen i4, 8.9 (Table 4 and 5) and RSS-210 A2.9(a). Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in LP0002(2016): 2.8
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A, B

Remark: Testing was carried out within frequency range 30MHz to the tenth harmonic. For details refer to Appendix D. The Radiated Emissions testing was performed in the X, Y and Z axis orientation. The worst-case Axis orientation is recorded in this test report. Due to the small size of the product and that there are no inductive components of significant size, 9kHz to 30MHz frequency range is not tested based on technical judgment.

5.1.7 Frequency Separation

RESULT: **Passed**

Test standard	:	FCC part 15.247(a)(1) RSS-247 5.1 LP0002(2016): 3.10.1, (6.1.1)
Basic standard	:	ANSI C63.10:2013 LP0002(2016) Appendix II
Limit	:	≥ 25kHz or 2/3 of 20dB bandwidth, whichever is greater

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	24℃
Relative humidity	:	53%

Table 13: Test result of Frequency Separation

Channel	Channel Frequency (MHz)	Measured Channel Separation (MHz)	Limit (kHz)	Result
Record Channel	2440	1	≥ 25kHz or 2/3 of 20dB bandwidth	Pass
Record Channel adj 1	2441			
Record Channel adj 2	2442			

Test Plot of Frequency Separation

GFSK

5.1.8 Number of hopping frequency

RESULT: **Passed**

Test standard	:	FCC part 15.247(a)(1)(iii) RSS-247 5.1(5) LP0002(2016): 3.10.1, (6.1.2)
Basic standard	:	ANSI C63.10:2013 LP0002(2016) Appendix II

Test setup

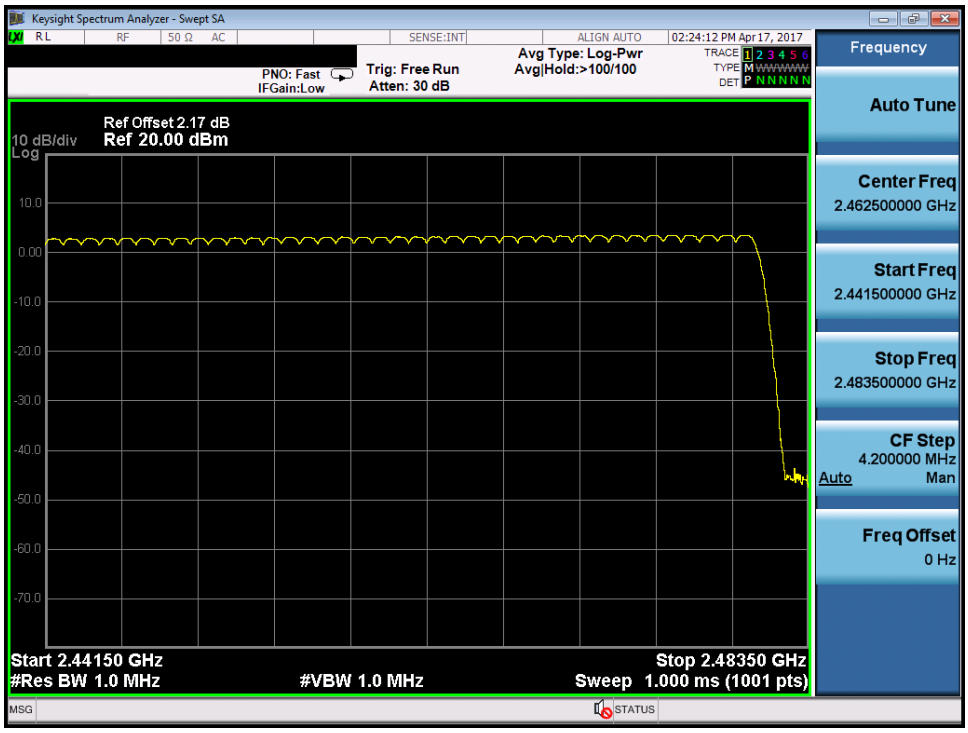
Test Channel	:	Hopping On

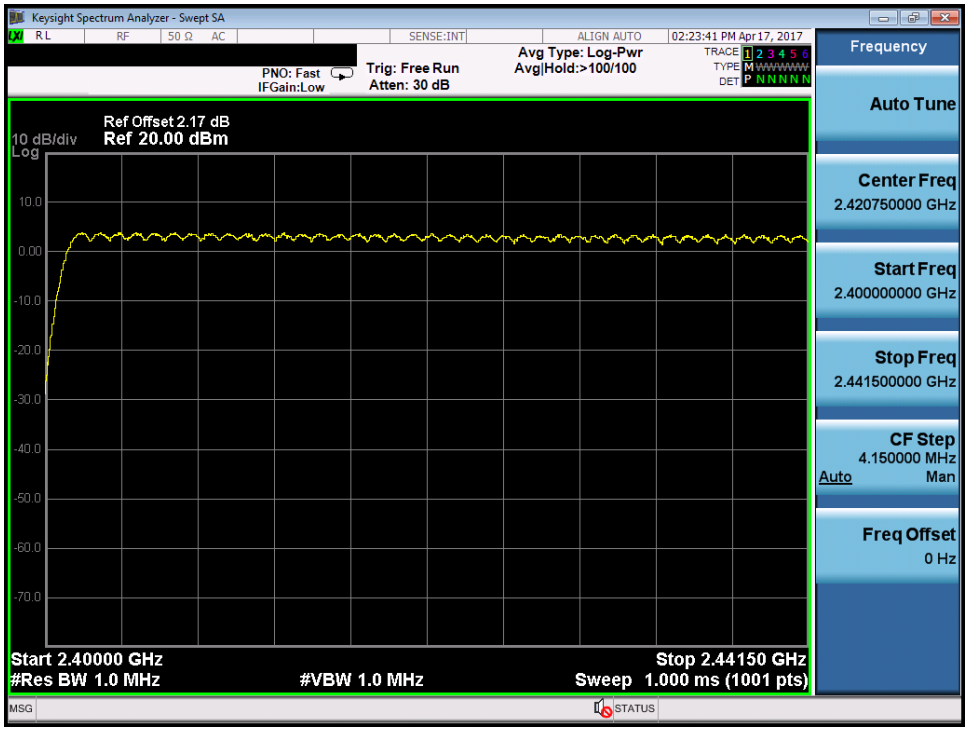
Ambient temperature	:	22-26°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103 kPa

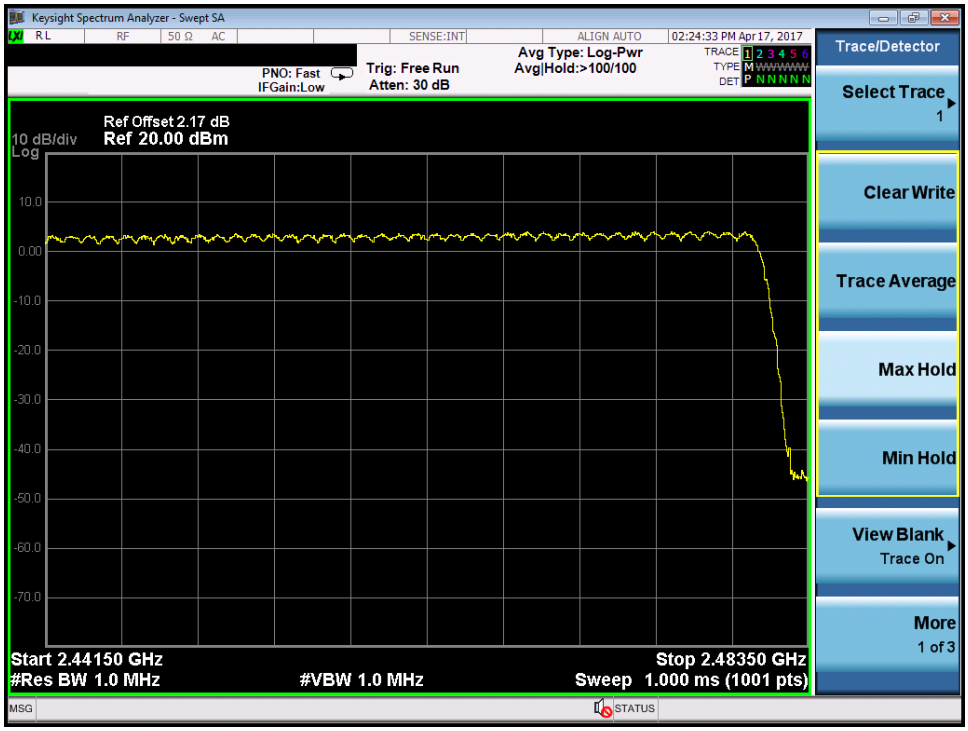
Table 14: Test result of Number of hopping frequency

Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
2400 to 2483.5 MHz	79	≥15	Pass

Test Plot of Number of hopping frequencies




Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
02:23:41 PM Apr 17, 2017
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Ref Offset 2.17 dB
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Start 2.40000 GHz
#Res BW 1.0 MHz
#VBW 1.0 MHz
Stop 2.44150 GHz
Sweep 1.000 ms (1001 pts)
Frequency
Auto Tune
Center Freq
2.420750000 GHz
Start Freq
2.400000000 GHz
Stop Freq
2.441500000 GHz
CF Step
4.150000 MHz
Auto
Man
Freq Offset
0 Hz
MSG
STATUS


Keysight Spectrum Analyzer - Swept SA
RL
RF
50 Ω AC
SENSE:INT
ALIGN AUTO
02:24:33 PM Apr 17, 2017
PNO: Fast
IFGain:Low
Trig: Free Run
Atten: 30 dB
Avg Type: Log-Pwr
Avg|Hold:>100/100
TRACE 1 2 3 4 5 6
TYPE M WWWWWW
DET P N N N N N
Ref Offset 2.17 dB
10 dB/div
Ref 20.00 dBm
Log
10.0
0.00
-10.0
-20.0
-30.0
-40.0
-50.0
-60.0
-70.0
Start 2.44150 GHz
#Res BW 1.0 MHz
#VBW 1.0 MHz
Stop 2.48350 GHz
Sweep 1.000 ms (1001 pts)
Trace/Detector
Select Trace
1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank
Trace On
More
1 of 3
MSG
STATUS

5.1.9 Time of Occupancy

RESULT: **Passed**

Test standard	:	FCC part 15.247(a)(1)(iii) RSS-247 5.1(5) LP0002(2016): 3.10.1, (6.1.2)
Basic standard	:	ANSI C63.10:2013 LP0002(2016) Appendix II
Limits	:	0.4s
Kind of test site	:	Shield room

Test setup

Test Channel	:	Low/ Middle/ High
Operation Mode	:	A
Ambient temperature	:	22-26°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103 kPa

Table 15: Test result of Time of Occupancy

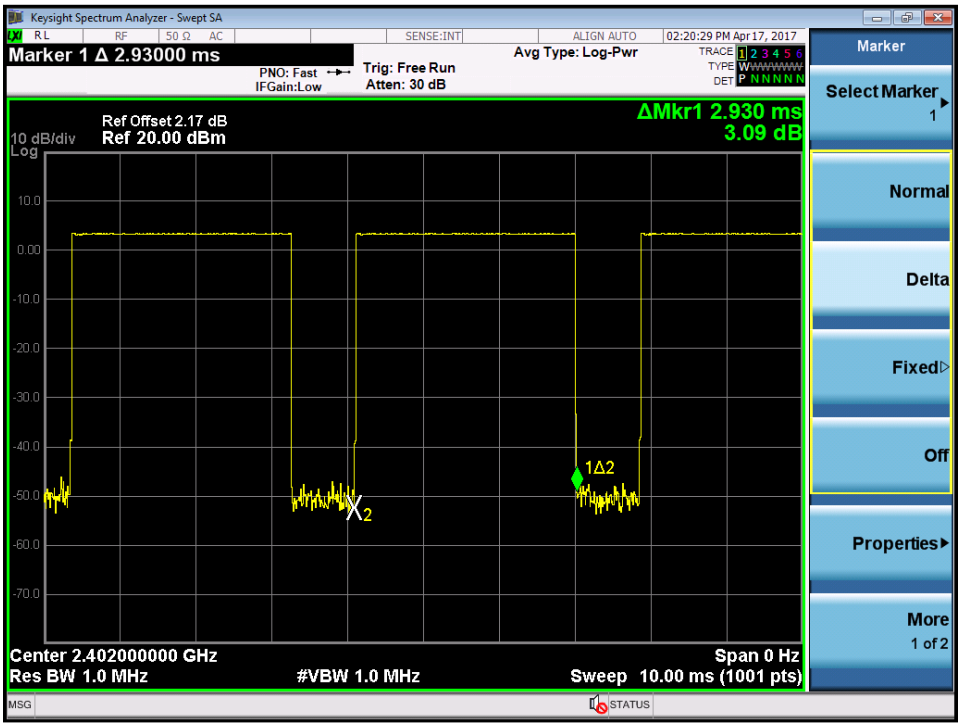
Data Mode	Captured Burst (s)	Dwell time (s)	On+Off time (s)	Limit (s)	Result
DH5	0.00293	0.3125	0.00375	0.4	Pass
3DH5	0.00298	0.3170	0.00376	0.4	Pass

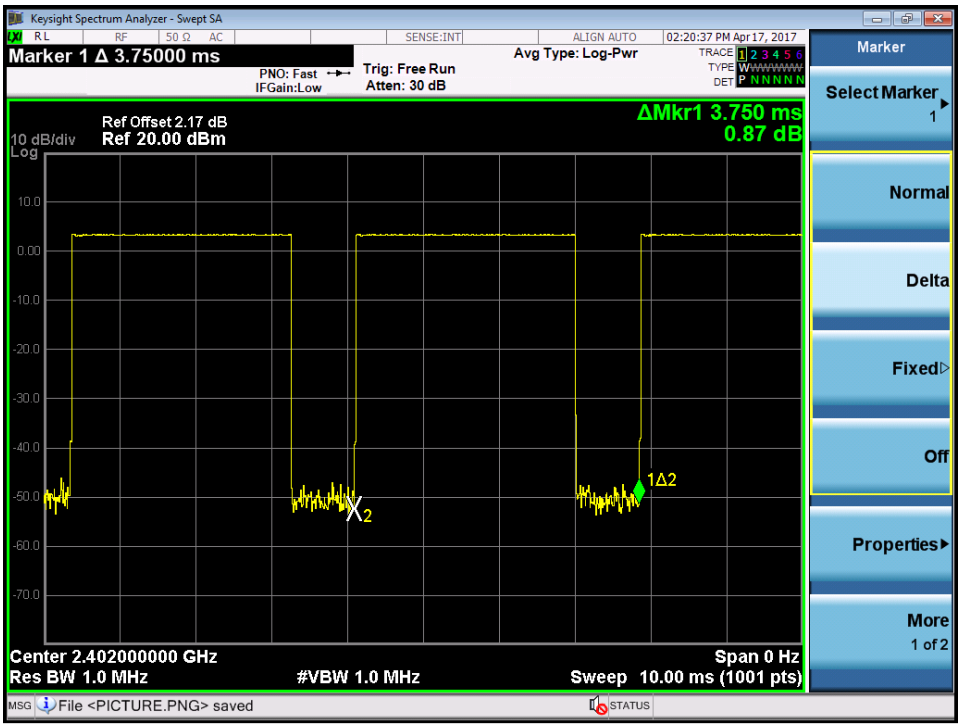
Note:
Dwell time = Pulse width x (Hopping rate / Number of channels) x Period

Period = 0.4 (seconds/ channel) x 79 (channel) = 31.6 seconds.

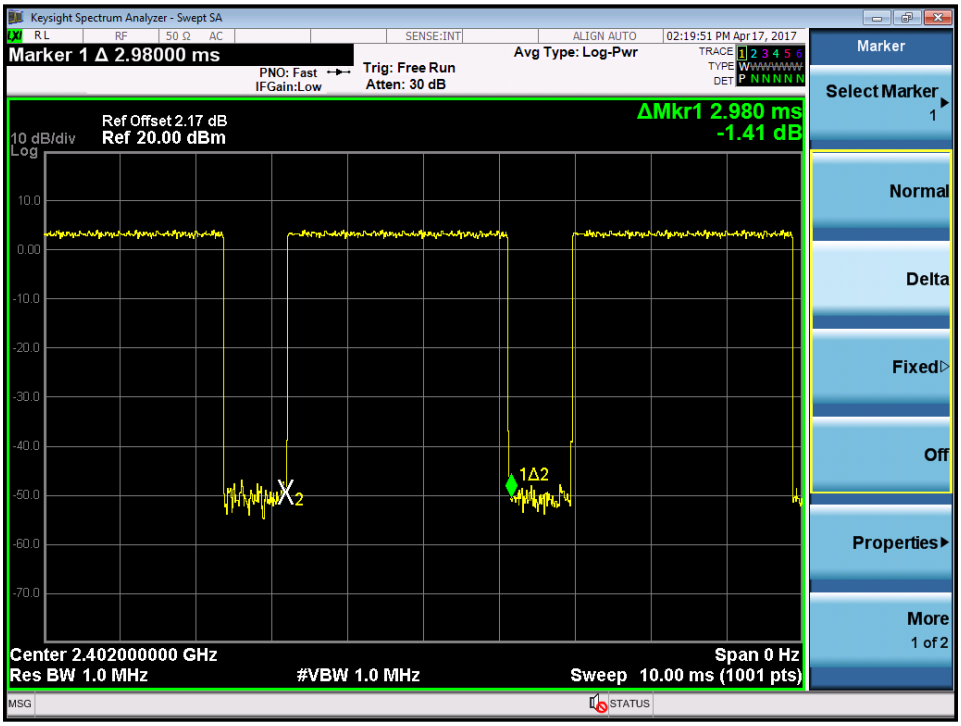
Hopping rate = 1 / (On+Off time) = 266 Hz

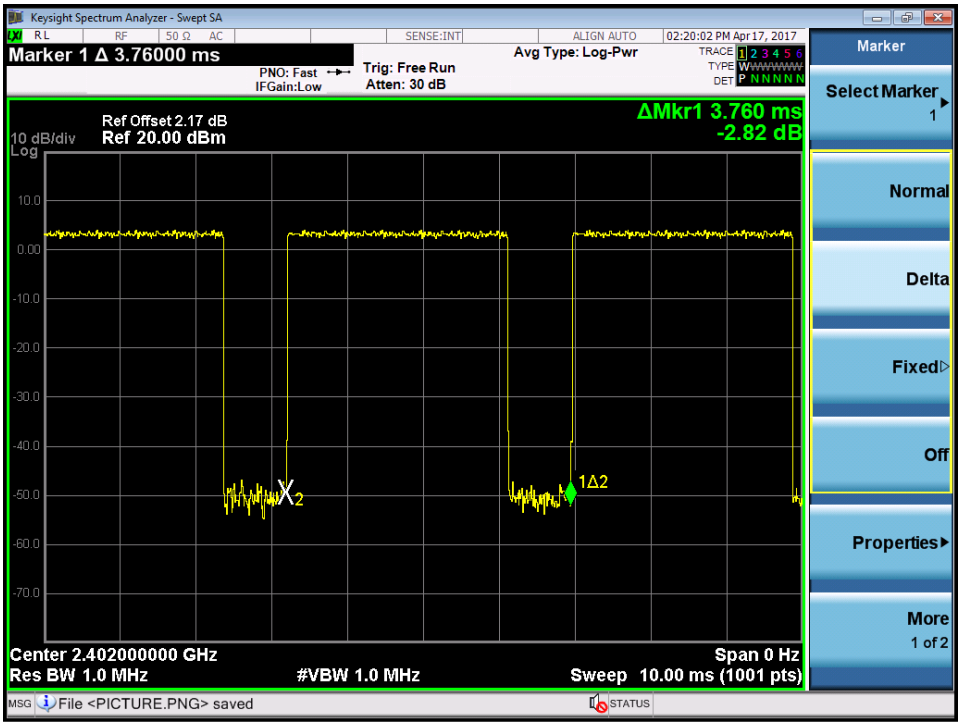
Test Plot of Time of Occupancy, GFSK modulation





Test Plot of Time of Occupancy, 8DPSK modulation





5.2 Mains Emissions

5.2.1 Mains Conducted Emissions

RESULT: **Passed**

Test standard	:	FCC Part 15.207 FCC Part 15.107 RSS-Gen 8.8 LP0002: 2.3
Limits	:	Mains Conducted emissions as defined in above test standards must comply with the mains conducted emission limits specified
Kind of test site	:	Shielded Room

Test setup

Test Channel	:	Middle
Operation mode	:	A

Remark: For details refer to Appendix D.

6. Safety Human exposure

6.1 Radio Frequency Exposure Compliance

6.1.1 Electromagnetic Fields

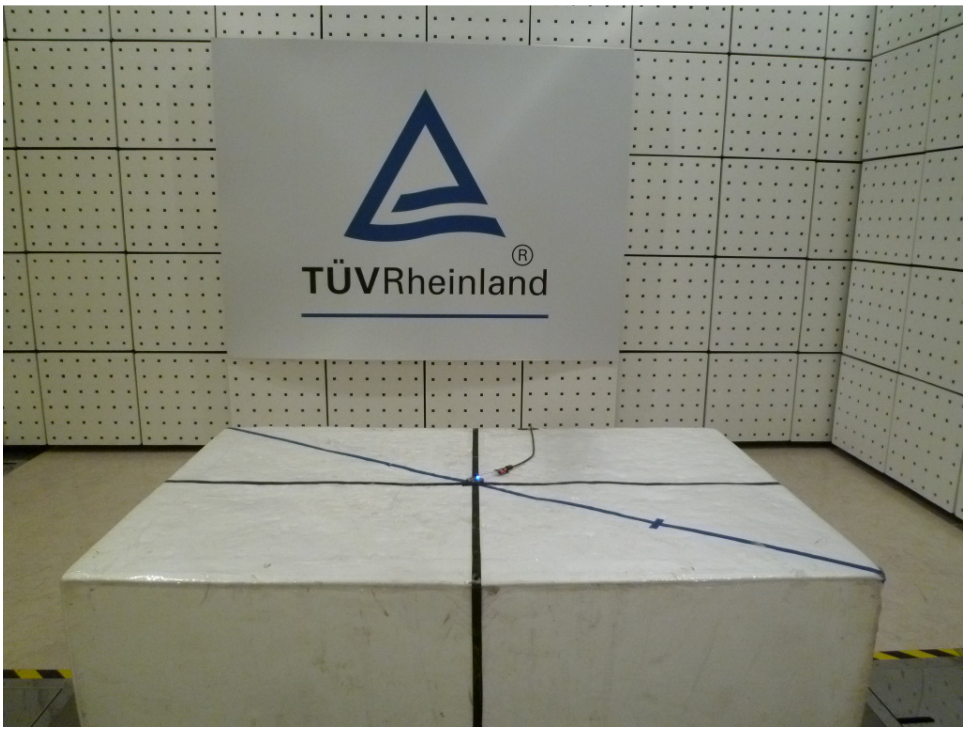
RESULT: **Passed**

Test standard : FCC KDB Publication 447498 D01

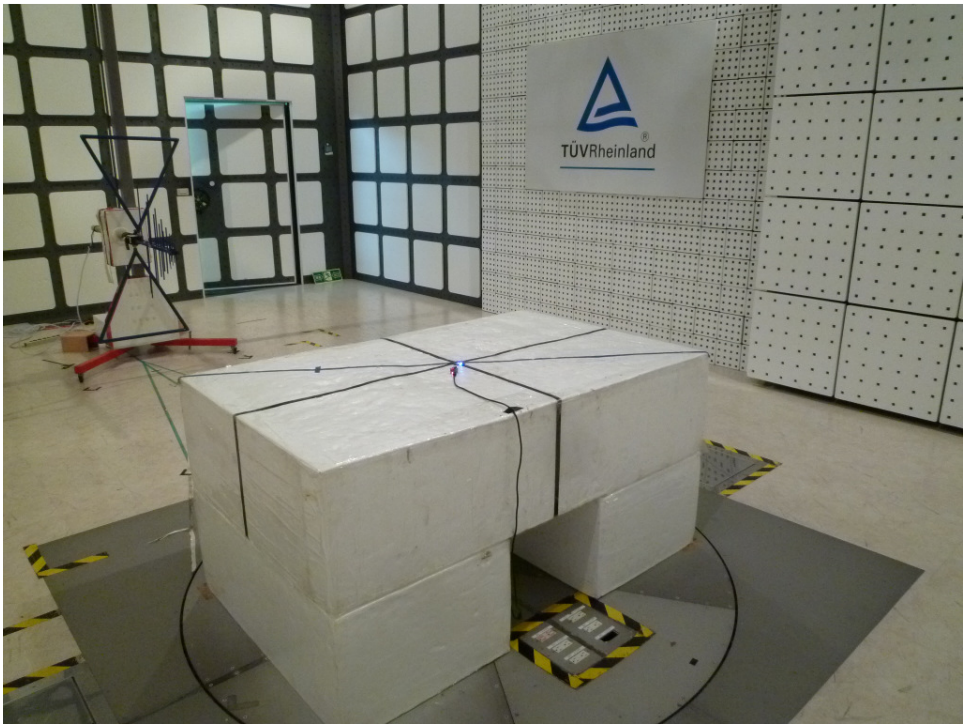
FCC:
Since maximum peak output power of the transmitter is 2.6278mW < 10mW, hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure

7. Photographs of the Test Set-Up

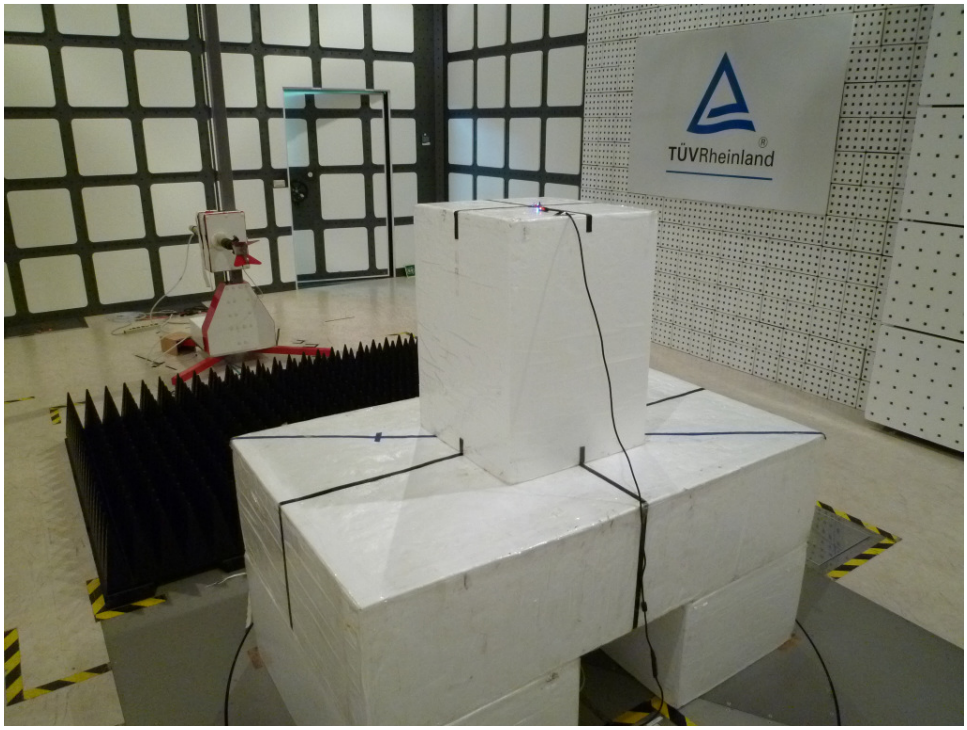
Photograph 1: Set-up for Spurious Emissions (Front View)



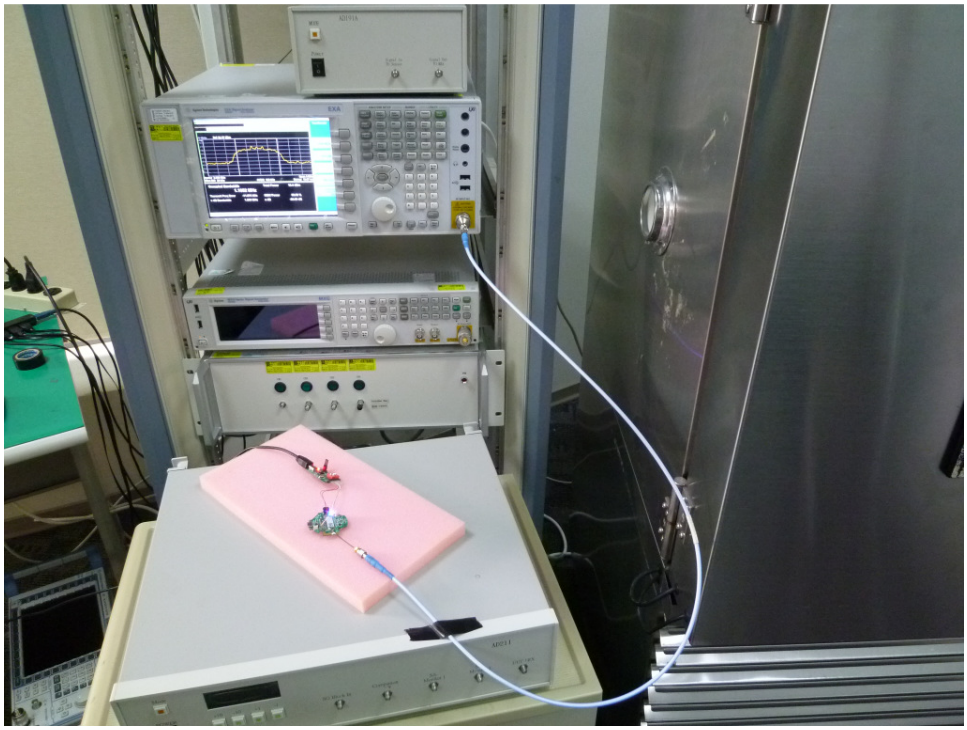
Photograph 2: Set-up for Spurious Emissions (Back View 1)



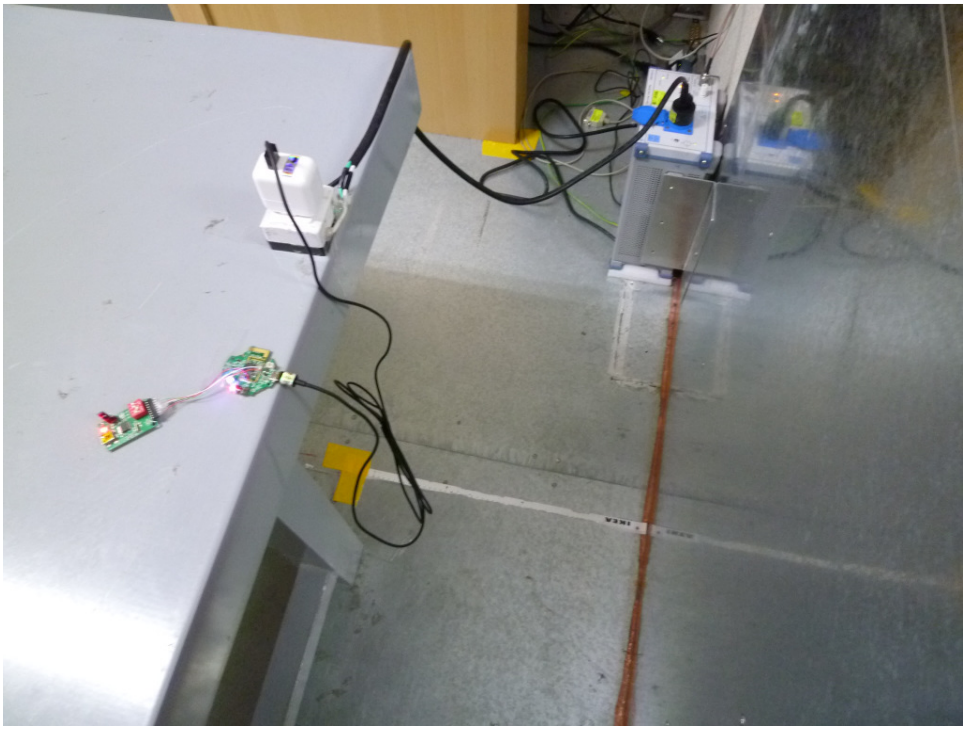
Photograph 3: Set-up for Spurious Emissions (Back View 2)



Photograph 4: Set-up for Conducted testing



Photograph 5: Set-up for Mains Conducted testing Back



Photograph 6: Set-up for Mains Conducted testing Front

8. List of Tables

Table 1: Applied Standard and Test Levels 5
Table 2: List of Test and Measurement Equipment 7
Table 3: Emission Measurement Uncertainty....8
Table 4: Basic Information of EUT 9
Table 5: Technical Specification of EUT 9
Table 6: Frequency hopping information....10
Table 7: Test result of Peak Output Power, GFSK modulation....16
Table 8: Test result of Peak Output Power, 8DPSK modulation....16
Table 9: Test result of 20dB Bandwidth, GFSK modulation....17
Table 10: Test result of 20dB Bandwidth, 8DPSK modulation....17
Table 11: Test result of 99% Bandwidth, GFSK modulation....21
Table 12: Test result of 99% Bandwidth, PSK modulation....21
Table 13: Test result of Frequency Separation 32
Table 14: Test result of Number of hopping frequency 34
Table 15: Test result of Time of Occupancy....37

9. List of Photographs

Photograph 1: Set-up for Spurious Emissions (Front View)....42
Photograph 2: Set-up for Spurious Emissions (Back View 1) 43
Photograph 3: Set-up for Spurious Emissions (Back View 2) 44
Photograph 4: Set-up for Conducted testing 44
Photograph 5: Set-up for Mains Conducted testing Back 45
Photograph 6: Set-up for Mains Conducted testing Front....45