Produkte
Products

TÜVRheinland®

Prüfbericht-Nr.: *Test Report No.* :	**50276000 001**	**Auftrags-Nr.:** *Order No.* :	238104924	Seite 1 von 70 *Page 1 of 70*
Kunden-Referenz-Nr.: *Client Reference No.* :	N/A	**Auftragsdatum:** *Order date* :	07-May-2019	
Auftraggeber: *Client*:	VENCER CO., LTD. 14F-12, No.79, Sec.1, Hsin Tai Wu Rd., Hsi-Chih, New Taipei City, Taiwan 22101			
Prüfgegenstand: *Test item*:	Bluetooth True Wireless Earbud			
Bezeichnung / Typ-Nr.: *Identification / Type No.*:	VS-3xxx (X= 0-9, A-Z, indication difference of market purpose, case color and product appearance.)			
Auftrags-Inhalt: *Order content*:	FCC Part15C Test report (BT)			
Prüfgrundlage: *Test specification*:	FCC 47 CFR Part 15: Subpart C Section 15.247(FHSS)			

Wareneingangsdatum: *Date of receipt*:	14-May-2019
Prüfmuster-Nr.: *Test sample No.* :	A000922115-001 to 004
Prüfzeitraum: *Testing period*:	24-May-2019 – 19-Jul-2019
Ort der Prüfung: *Place of testing*:	EMC/RF Laboratory Taipei
Prüflaboratorium: *Testing laboratory*:	TUV Rheinland Taiwan Ltd.
Prüfergebnis*: *Test result**:	Pass

Report Date / *tested by*:

31-Jul-2019	Jack Chang/Project Manager	
Datum *Date(Report Date)*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

kontrolliert von / *reviewed by*:

31-Jul-2019	Arvin Ho/Vice General Manager	
Datum *Date*	**Name / Stellung** *Name / Position*	**Unterschrift** *Signature*

Sonstiges / *Other*:

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

V04

TEST SUMMARY

5.1.1 ANTENNA REQUIREMENT
RESULT: Passed

5.1.2 MAXIMUM CONDUCTED OUTPUT POWER
RESULT: Passed

5.1.3 20DB BANDWIDTH
RESULT: N/A

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

5.1.5 SPURIOUS EMISSION
RESULT: Passed

5.1.6 FREQUENCY SEPARATION
RESULT: Passed

5.1.7 NUMBER OF HOPPING FREQUENCY
RESULT: Passed

5.1.8 TIME OF OCCUPANCY
RESULT: Passed

5.2.1 MAINS CONDUCTED EMISSIONS
RESULT: Passed

6.1.1 ELECTROMAGNETIC FIELDS
RESULT: Passed

Contents

1. General Remarks

1.1 Complementary Materials

The following attachments are integral parts of this test report:

Appendix P: Photo Documentation
(File Name: 50276000 001 APPENDIXP)
Appendix D: Test Result of Radiated Emissions
(File Name: 50276000 001 APPENDIXD)

Test Specifications

The following standards were applied.

Table 1: Applied Standard and Test Levels

Radio
FCC 47CFR Part 15: Subpart C Section 15.247
FCC 47CFR Part 2: Subpart J Section 2.1091
ANSI C63.10:2013
KDB558074 D01 DTS Meas Guidance v05r02
KDB447498 D01 General RF Exposure Guidance v06

1.2 Decision Rule of conformity

The decision rule of conformity of this test report is following the requirements of the requested standard in the quotation, and agreed among testing laboratory and manufacturer (applicant) to exclude the consideration of Measurement Uncertainty, unless it is required by the specific standard.

2. Test Sites

2.1 Test Laboratory

TUV Rheinland Taiwan Ltd.
Taichung Branch Office

No.9, Lane 36, Minsheng Rd., Sec. 3, Daya District,
Taichung City 428
Taiwan (R.O.C.)

2.2 Test Facility

TUV Rheinland Taiwan Ltd.

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

TAF Accredited NCC Test Lab. No.:3567
TAF ISO17025 Certification effective period: 6 th-May-2019 to 05 th-May-2022

2.3 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manu-facturer	Type	S/N	Last Calibration	Next Calibration
Test Software	Farad	EZ_EMC	Ver. TUV3A1	N/A	N/A
EMI Test Receiver	R&S	ESR 7	101062	2018/10/01	2019/10/01
Spectrum Analyzer	R&S	FSV 40	101514	2019/02/07	2020/02/07
EXA Signal Analyzer	KEYSIGHT	N9010A	MY52221334	2019/02/15	2020/02/15
Preamplifier (30MHz -1GHz)	HP	8447F	2805A03335	2018/08/22	2019/08/22
Pre-Amplifier (1GHz~18GHz)	EM Electronics	EM01G18G	060558	2018/11/30	2019/11/30
Bilog Antenna	TESEQ	CBL 6111D	29802	2018/08/22	2019/08/22
Horn Antenna	ETS-Lindgren	3117	00218931	2018/12/27	2019/12/27
Horn Antenna (18GHz~40GHz)	COM-POWER	AH-840	101029	2018/12/22	2019/12/22
Loop Antenna	Schwarzbeck	FMZB 1513**	1513-076	2018/06/21	2019/06/21
EMI Test Receiver	Rohde & Schwarz	ESCI 7*	100797	2019/01/16	2020/01/16
Two-Line V-Network	Rohde & Schwarz	ENV216*	101262	2018/07/10	2019/07/10

*ESCI 7 and ENV216 are using for AC mains testing, and the tested date is 24 th May 2019.

**FMZB 1513 is using for 9KHz to 1GHz of radiated testing, and the tested date is 10 th Jun 2019 and 12th Jun 2019.

2.4 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.

2.5 Calibration

Equipment requiring calibration is calibrated periodically by the manufacturer or according to manufacturer's specifications. Additionally all equipment is verified for proper performance on a regular basics using in house standards or comparisons.

2.6 Measurement Uncertainty

The estimated combined standard uncertainty for radiated emissions and conducted emissions measurements are ±3dB.

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 True Wireless Earbud. It contains a Bluetooth 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	Bluetooth True Wireless Earbud
Type Identification	VS-3xxx (X= 0-9, A-Z, indication difference of market purpose, case color and product appearance.)
FCC ID	VHVBTVS3000

Table 5: Technical Specification of EUT

Technical Specification	Value
Operating Frequency	2402 MHz ~ 2480 MHz
Channel Spacing	1 MHz
Channel number	79
Operation Voltage	4Vdc
Modulation	GFSK, π/4 DQPSK, 8DPSK
Antenna gain	-6.23dBi

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 v5.0 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

B. Hopping

3.4 Noise Generating and Noise Suppressing Parts

Refer to the Circuit Diagram.

3.5 Submitted Documents

- Photo Document
- Technical Description
- Rating Label
- Circuit Diagram
- Block Diagram

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

Setup for testing: The Test samples are provided with a USB interface which makes it possible to control the module through the test software installed on a notebook computer.

This software was running on the laptop computer connected to the EUT. It was used to enable the operation modes listed in section 3.3 as appropriate.

The samples were used as follows:
Conducted sample (Left Ear): A000922115-003
Conducted sample (Right Ear): A000922115-004
Radiation sample (Left Ear): A000922115-001
Radiation sample (Right Ear): A000922115-002

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:

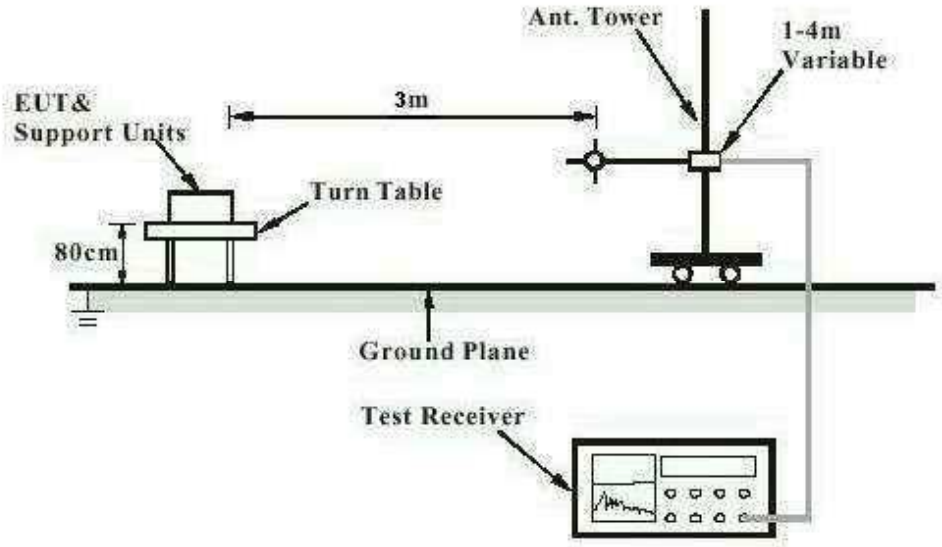
Description	Manufacturer	Model No.	Serial No.
Notebook(EMC-06)	Lenovo	TP00048A	PB-0F8B2
Bluetooth Tester	R&S	CMW270	-
Test tool	Qualcomm	QTIL	3.2.0
Adapter for AC mains	Apple	A1401	-

4.4 Countermeasures to achieve EMC Compliance

The test sample which has been tested contained the noise suppression parts as described in the Constructional Data Form or the Technical Construction File. 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

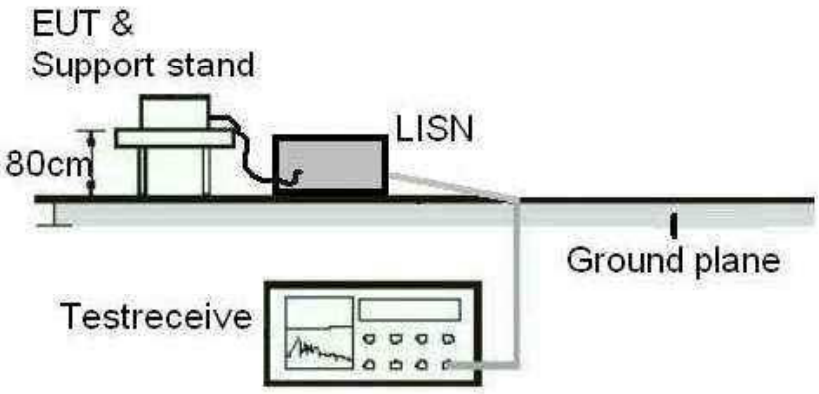
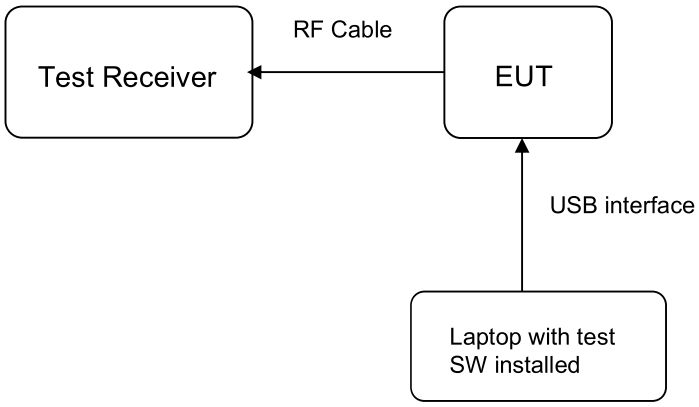


Diagram of Measurement Equipment Configuration for Conducted Transmitter Measurement



5. Test Results

5.1 Transmitter Requirement & Test Suites

5.1.1 Antenna Requirement

RESULT: **Passed**

Test standard	:	FCC Part 15.247(b)(4), Part 15.203
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 Max directional gain of -6.23dBi. The antenna is a Metal Stamping Antenna 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 Maximum conducted output power

RESULT: **Passed**

Test standard : FCC Part 15.247(b)(1)
Basic standard : ANSI C63.10:2013
Kind of test site : Conducted room

Test setup

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

Ambient temperature : 18-25 °C
Relative humidity : 50-65 %
Atmospheric pressure : 100-103kPa

Table 7: Test result of Maximum conducted output power, GFSK modulation – Left Ear

Channel	Channel Frequency	Peak Output Power		Limit	Power Setting
	(MHz)	(dBm)	(W)	(W)	
Low Channel	2402	0.98	0.00125	0.125	0,-3,0
Middle Channel	2441	1.32	0.00136	0.125	0,-3,0
High Channel	2480	-0.69	0.00085	0.125	0,-6,0

Table 8: Test result of Maximum conducted output power, 8DPSK modulation – Left Ear

Channel	Channel Frequency	Peak Output Power		Limit	Power Setting
	(MHz)	(dBm)	(W)	(W)	
Low Channel	2402	1.42	0.00139	0.125	0,-6,0
Middle Channel	2441	0.10	0.00102	0.125	0,-8,0
High Channel	2480	0.32	0.00108	0.125	0,-8,0

Maximum Output power: 1.39mW

Table 9: Test result of Maximum conducted output power, GFSK modulation – Right Ear

Channel	Channel Frequency	Peak Output Power		Limit	Power Setting
	(MHz)	(dBm)	(W)	(W)	
Low Channel	2402	7.96	0.00625	0.125	0,0,0
Middle Channel	2441	7.53	0.00566	0.125	0,0,0
High Channel	2480	4.79	0.00301	0.125	0,0,0

Table 10: Test result of Maximum conducted output power, 8DPSK modulation – Right Ear

Channel	Channel Frequency	Peak Output Power		Limit	Power Setting
	(MHz)	(dBm)	(W)	(W)	
Low Channel	2402	7.95	0.00624	0.125	0,-5,0
Middle Channel	2441	7.49	0.00561	0.125	0,-5,0
High Channel	2480	7.72	0.00592	0.125	0,-5,0

Maximum Output power: 6.25mW

5.1.3 20dB Bandwidth

RESULT: **N/A**

Test standard	:	FCC Part 15.247(a)(1)
Basic standard	:	ANSI C63.10:2013
Kind of test site	:	Shielded room

Test setup

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

Ambient temperature	:	18-25°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103kPa

Table 11: Test result of 20dB Bandwidth, GFSK modulation – Left Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
Low Channel	2402	0.9617
Mid Channel	2441	0.9600
High Channel	2480	0.9604

Note: For reporting purposes only.

Table 12: Test result of 20dB Bandwidth, 8DPSK modulation – Left Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
Low Channel	2402	1.310
Mid Channel	2441	1.309
High Channel	2480	1.308

Note: For reporting purposes only.

Test Plot of 20dB Bandwidth, GFSK modulation

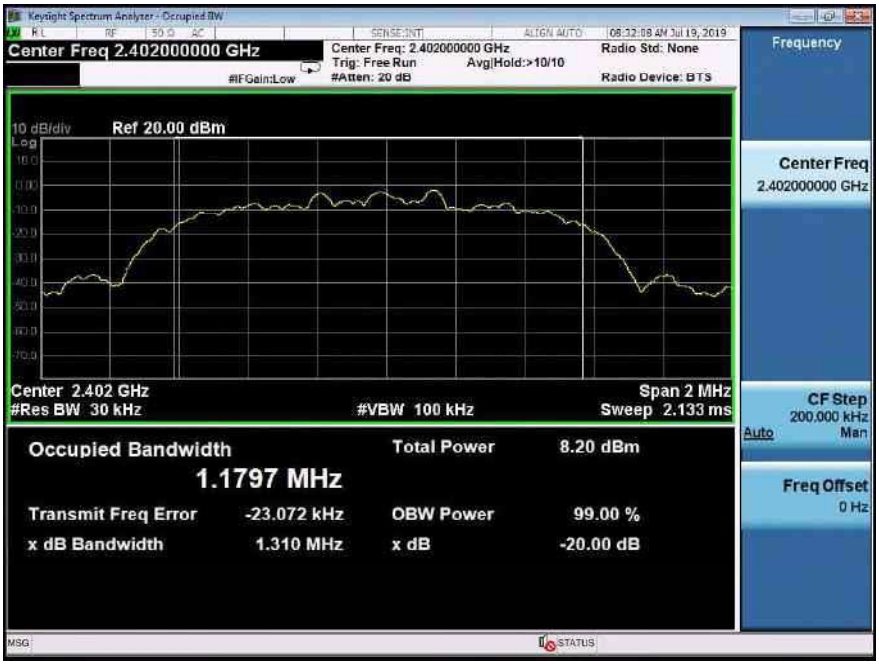
Low Channel

Middle Channel

High Channel

Test Plot of 20dB Bandwidth, 8DPSK modulation

Low Channel



Middle Channel

High Channel

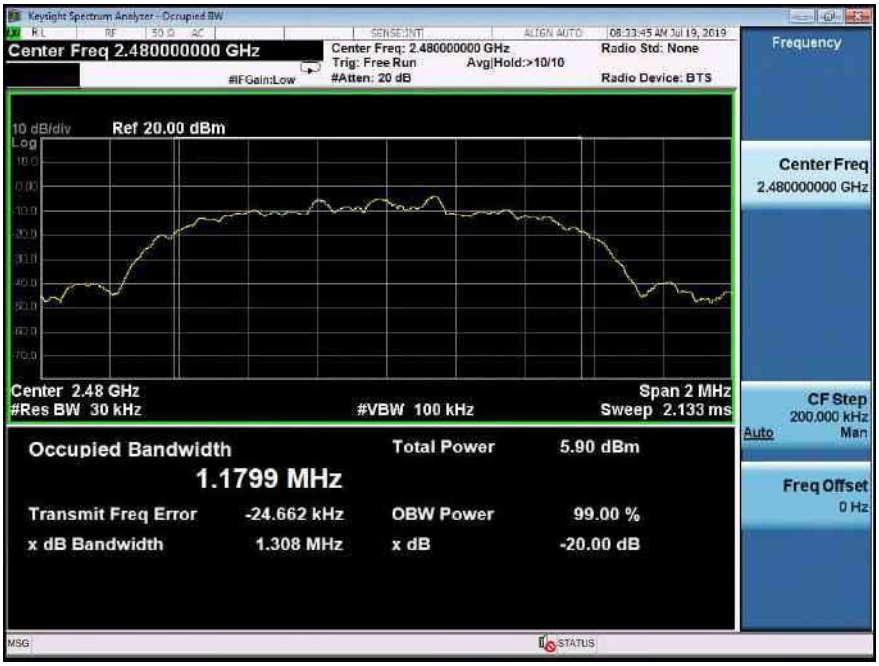


Table 13: Test result of 20dB Bandwidth, GFSK modulation – Right Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
Low Channel	2402	0.9621
Mid Channel	2441	0.9628
High Channel	2480	0.9609

Note: For reporting purposes only.

Table 14: Test result of 20dB Bandwidth, 8DPSK modulation – Right Ear

Channel	Channel Frequency (MHz)	20dB Bandwidth (MHz)
Low Channel	2402	1.308
Mid Channel	2441	1.311
High Channel	2480	1.311

Note: For reporting purposes only.

Test Plot of 20dB Bandwidth, GFSK modulation

Low Channel

Middle Channel

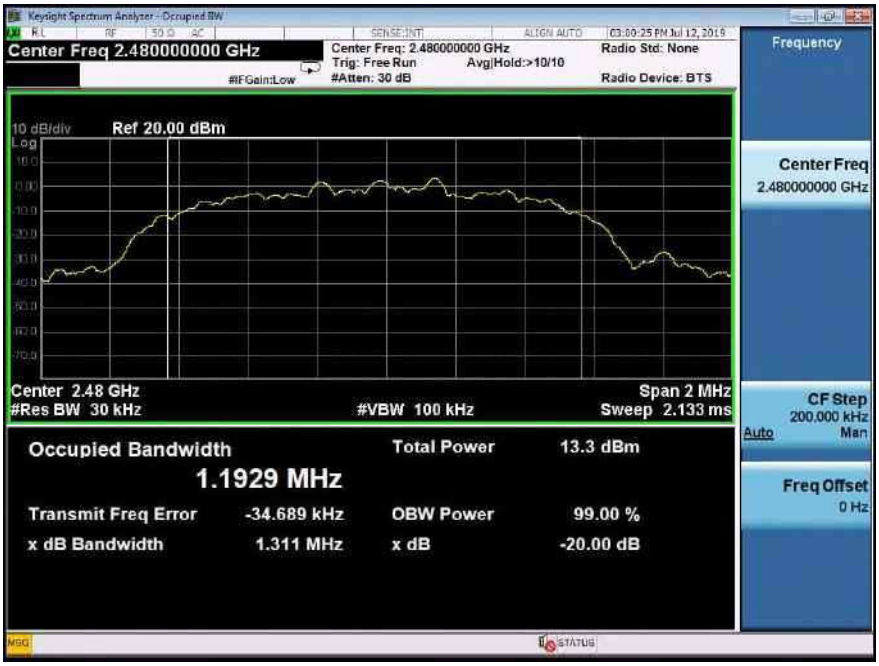
High Channel

Test Plot of 20dB Bandwidth, 8DPSK modulation

Low Channel

Middle Channel

High Channel



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

RESULT: **Passed**

Test standard	:	FCC part 15.247(d)
Basic standard	:	ANSI C63.10:2013, KDB558074
Limit	:	20dB (below that in the 100kHz bandwidth within the band that contains the highest level of the desired power)
Kind of test site	:	Conducted room

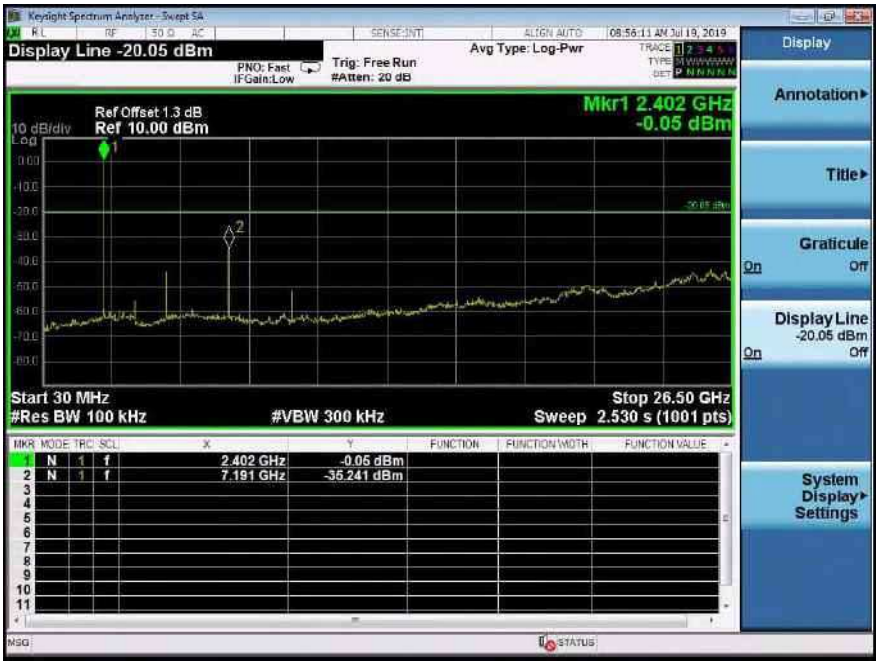
Test setup

Test Channel	:	Low/ Mid/ High for spurious, Low/ High for Band Edge
Operation Mode	:	A
Ambient temperature	:	18-25°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103kPa

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.

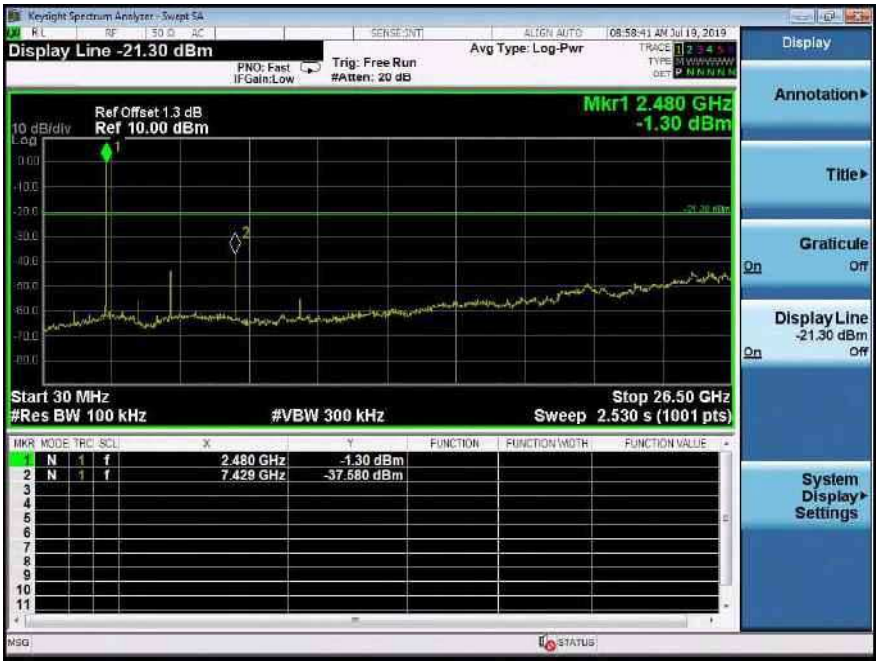
Test Plot of 100kHz Conducted Emissions, GFSK modulation – Left Ear

Low Channel



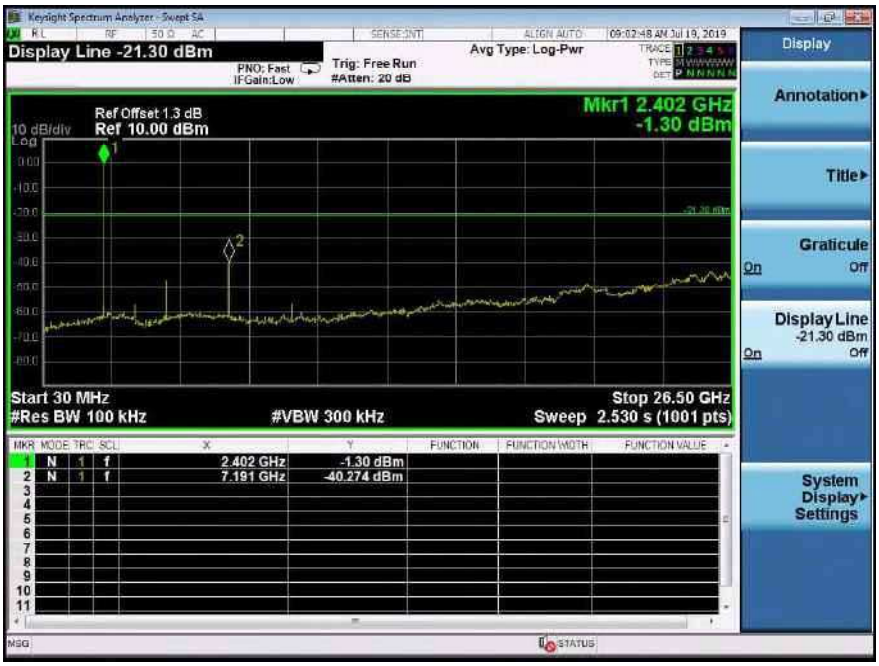
Middle Channel

High Channel



Test Plot of 100kHz Conducted Emissions, 8DPSK modulation – Left Ear

Low Channel



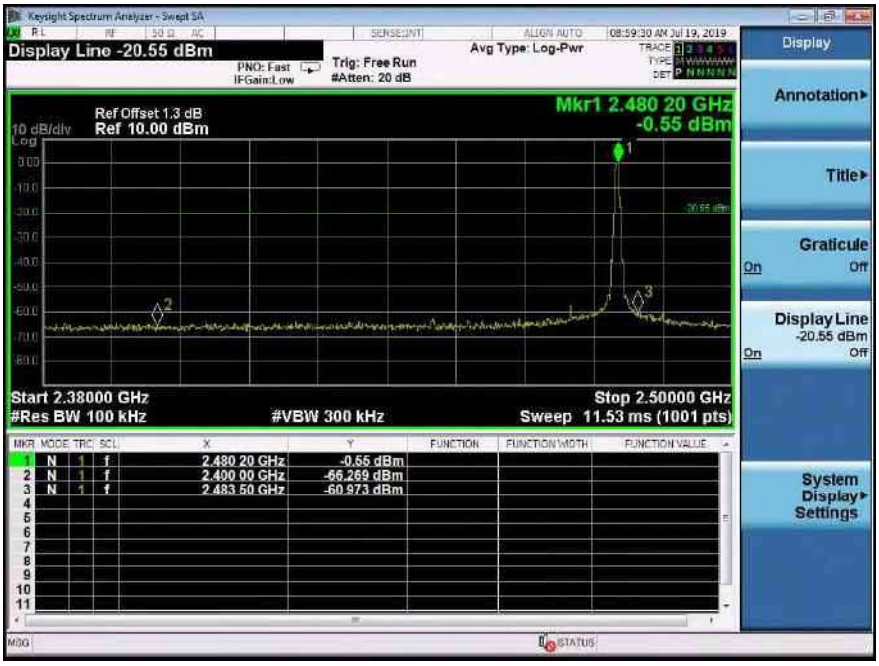
Middle Channel

High Channel

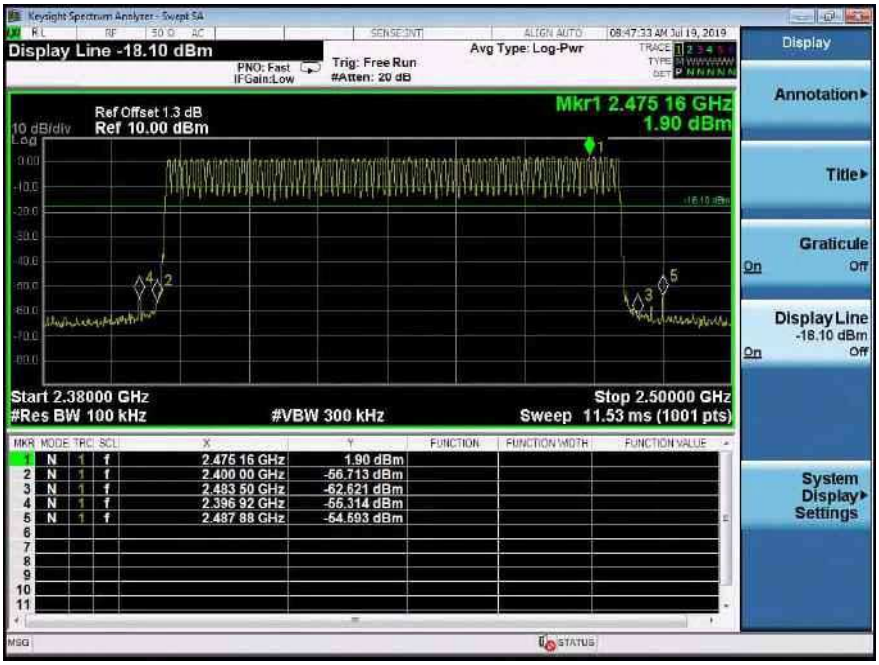
Test Plot of 100kHz Bandwidth of Frequency Band Edge, GFSK modulation – Left Ear

Low Channel

High Channel



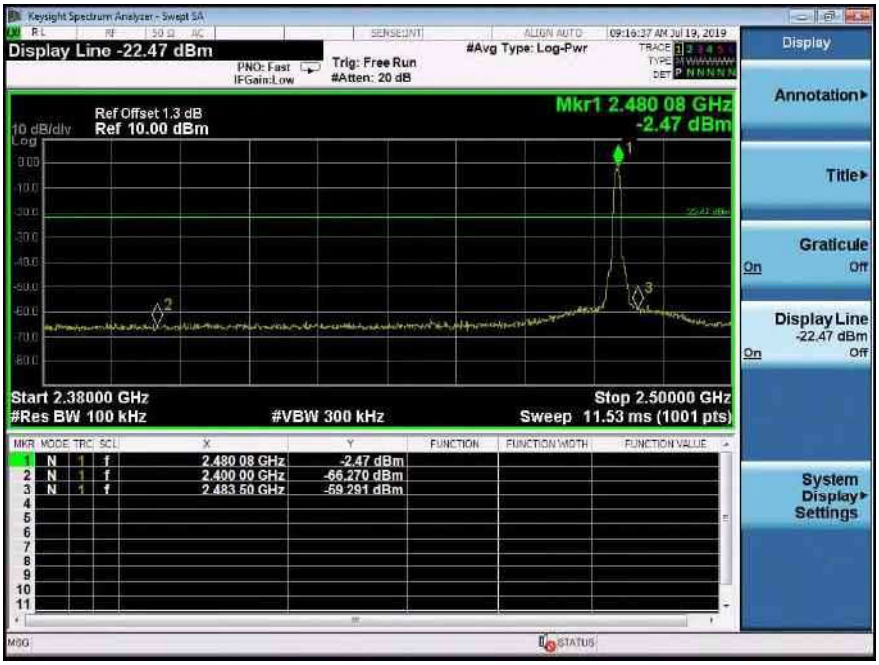
Hopping ON


Keysight Spectrum Analyzer - Swept SA
Display Line -18.10 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
08:47:33 AM Jul 19, 2019
Ref Offset 1.3 dB
10 dB/div
Ref 10.00 dBm
Mkr1 2.475 16 GHz
1.90 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 2.475 16 GHz 1.90 dBm
2 N 1 f 2.400 00 GHz -56.713 dBm
3 N 1 f 2.483 50 GHz -62.621 dBm
4 N 1 f 2.396 92 GHz -55.314 dBm
5 N 1 f 2.487 88 GHz -54.693 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-18.10 dBm
On Off
System
Display
Settings
MSG
STATUS

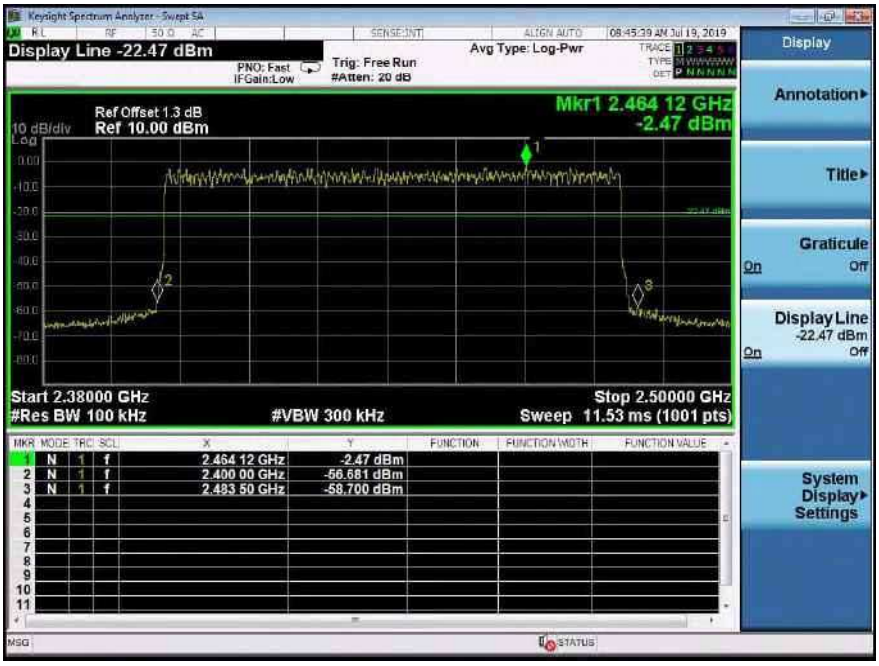
Test Plot of 100kHz Bandwidth of Frequency Band Edge, 8DPSK modulation – Left Ear

Low Channel

High Channel

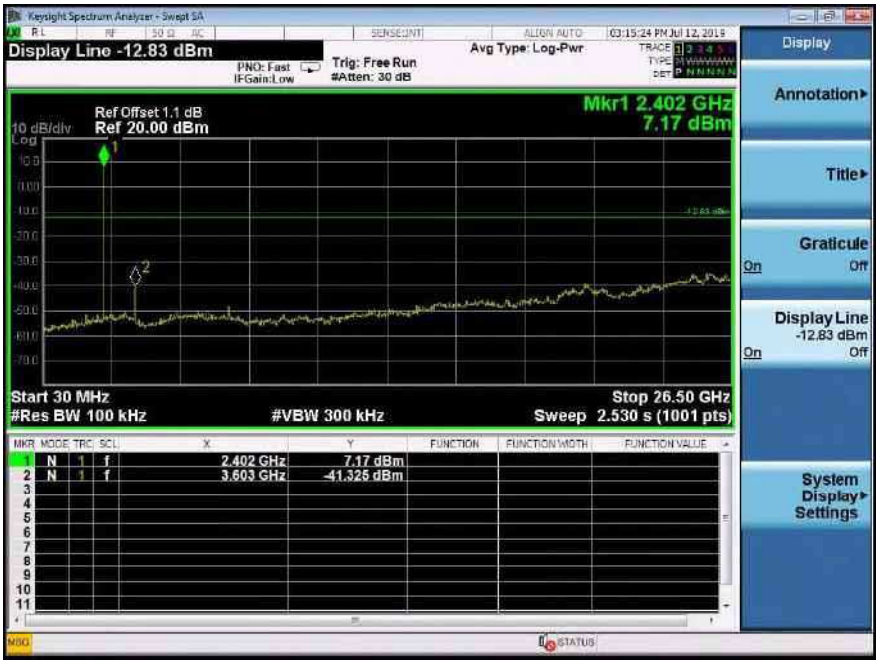


Hopping ON



Test Plot of 100kHz Conducted Emissions, GFSK modulation – Right Ear

Low Channel



Middle Channel

High Channel

Test Plot of 100kHz Conducted Emissions, 8DPSK modulation – Right Ear

Low Channel

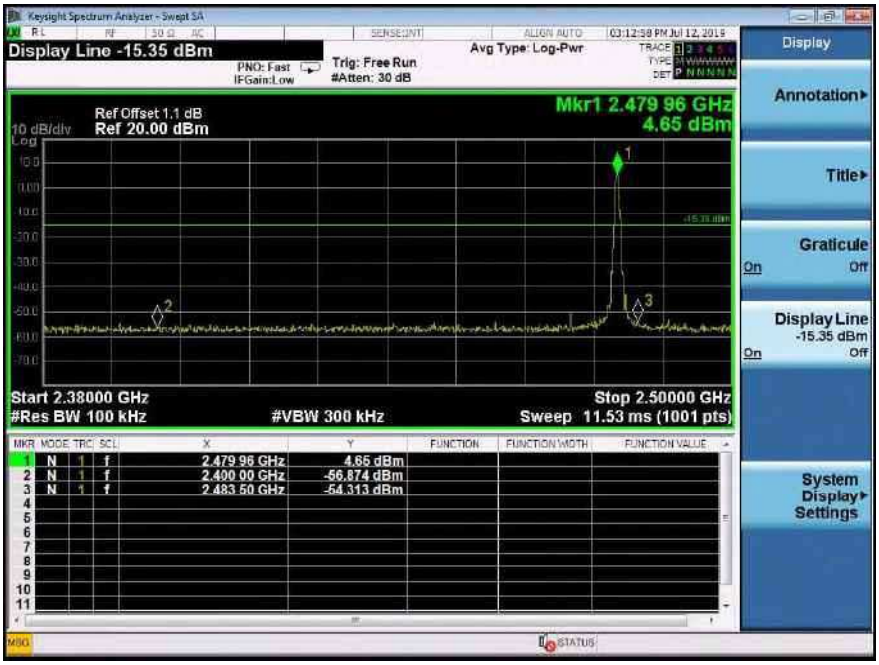
Middle Channel

High Channel

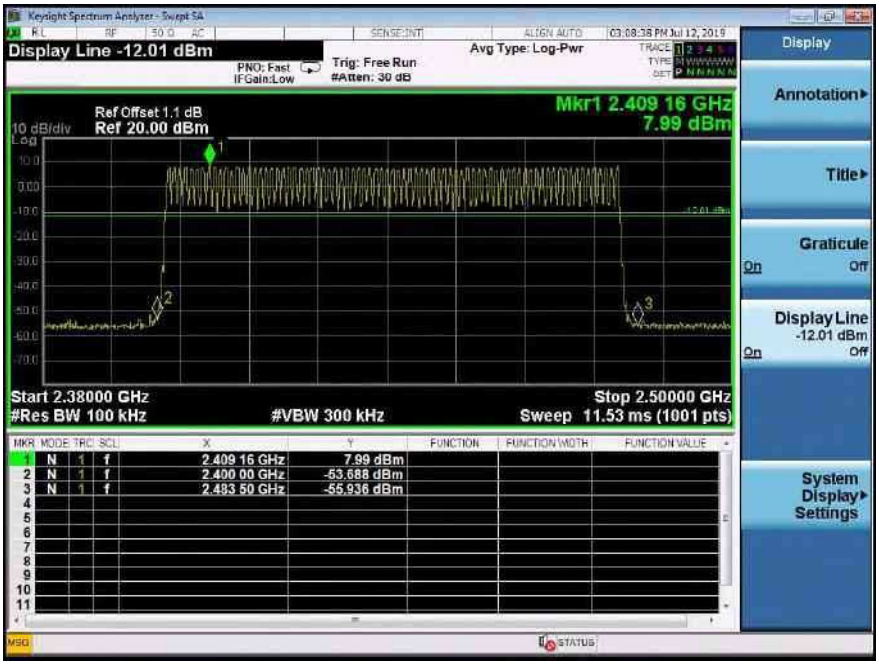
Test Plot of 100kHz Bandwidth of Frequency Band Edge, GFSK modulation – Right Ear

Low Channel

High Channel

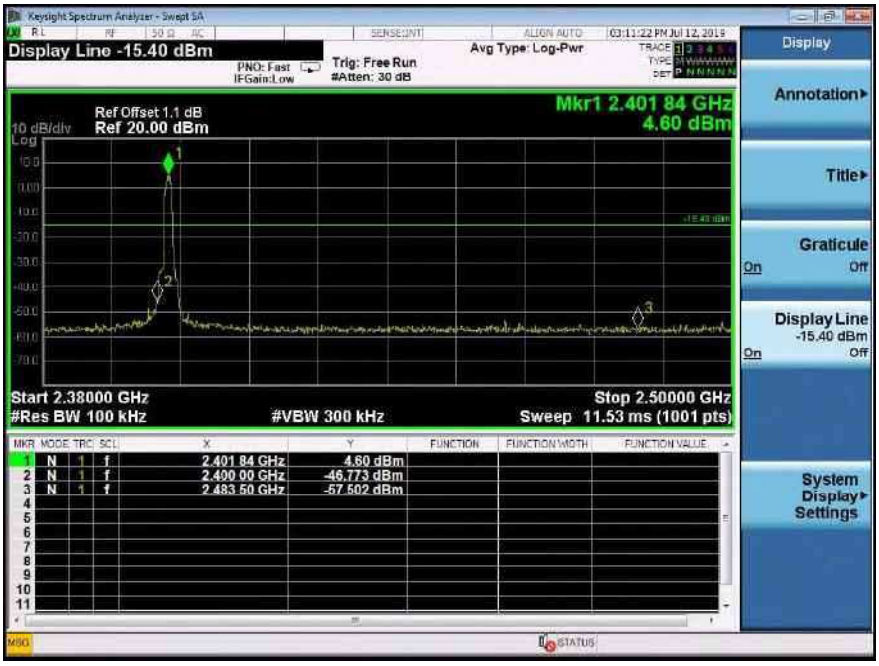


Hopping ON

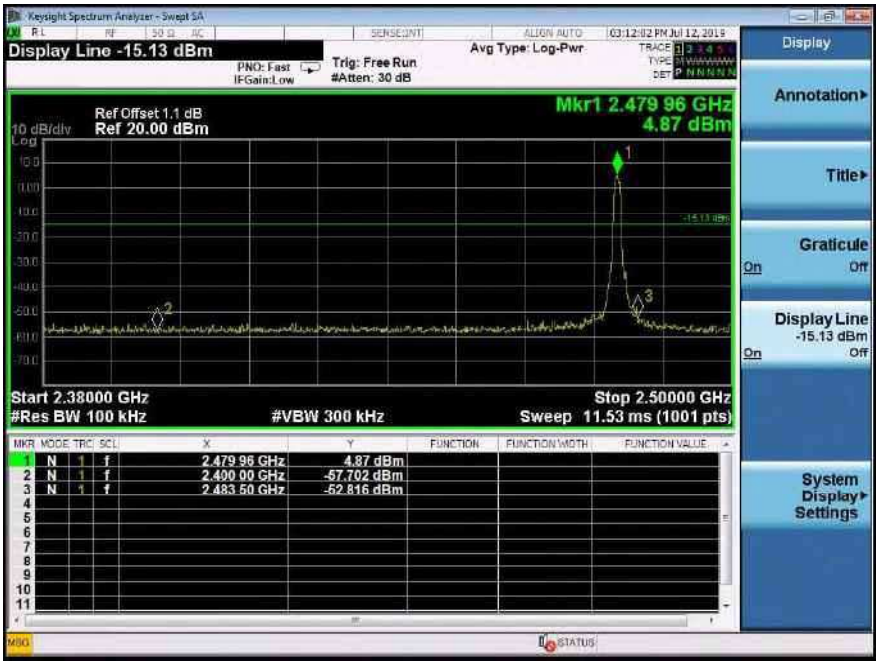

Keysight Spectrum Analyzer - Swept SA
Display Line -12.01 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
03:08:38 PM Jul 12, 2019
Ref Offset 1.1 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.409 16 GHz
7.99 dBm
Start 2.38000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 2.50000 GHz
Sweep 11.53 ms (1001 pts)
1 N 1 f 2.409 16 GHz 7.99 dBm
2 N 1 f 2.400 00 GHz -53.688 dBm
3 N 1 f 2.483 50 GHz -55.936 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-12.01 dBm
On Off
System
Display
Settings
STATUS

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

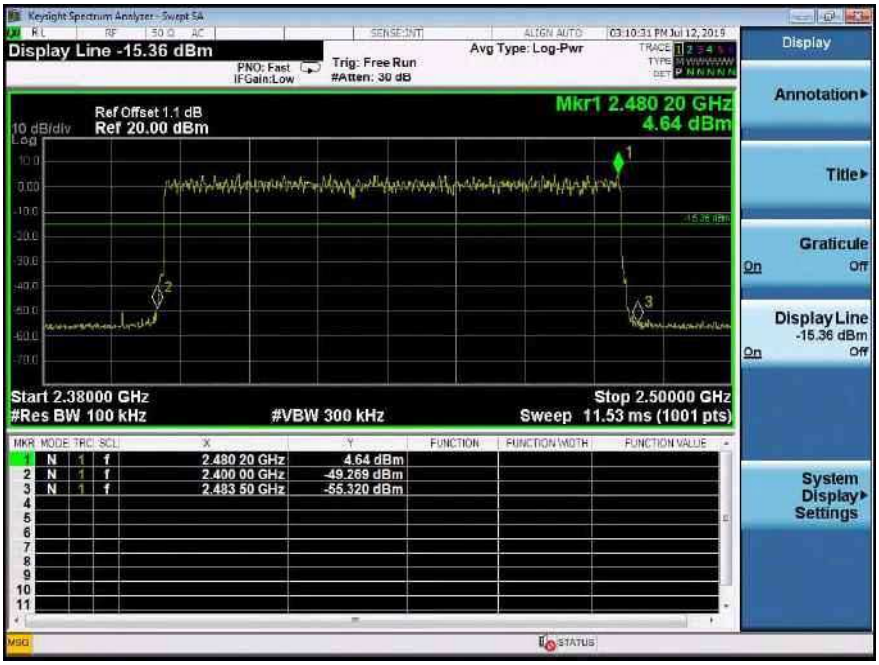
Low Channel



High Channel



Hopping ON


Keysight Spectrum Analyzer - Swept SA
Display Line -15.36 dBm
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Avg Type: Log-Pwr
03:10:31 PM Jul 12, 2019
Ref Offset 1.1 dB
10 dB/div
Ref 20.00 dBm
Mkr1 2.480 20 GHz
4.64 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 2.480 20 GHz 4.64 dBm
2 N 1 f 2.400 00 GHz -49.269 dBm
3 N 1 f 2.483 50 GHz -55.320 dBm
Display
Annotation
Title
Graticule
On Off
Display Line
-15.36 dBm
On Off
System
Display
Settings
STATUS

5.1.5 Spurious Emission

RESULT: **Passed**

Test standard	:	FCC part 15.247(d), FCC 15.205, FCC 15.209
Basic standard	:	ANSI C63.10
Limits	:	Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a), must comply with the radiated emission limits specified in FCC 15.209(a). Emission radiated outside the specified frequency bands must comply with the radiated emission limits specified in FCC 15.209(a).
Kind of test site	:	3m Semi-Anechoic Chamber

Test setup

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

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.

Factor (dB/m)=Antenna Factor(dB/m)+Cable loss (dB)

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

5.1.6 Frequency Separation

RESULT: **Passed**

Test standard	:	FCC part 15.247(a)(1)
Basic standard	:	ANSI C63.10:2013
Limit	:	≥ 25kHz or 2/3 of 20dB bandwidth, whichever is greater

Test setup

Operation Mode	:	B
Ambient temperature	:	18-25°C
Relative humidity	:	50-65%

Table 15: Test result of Frequency Separation (GFSK) – Left Ear

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			

Table 16: Test result of Frequency Separation (8DPSK) – Left Ear

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, Left Ear

GFSK

8DPSK

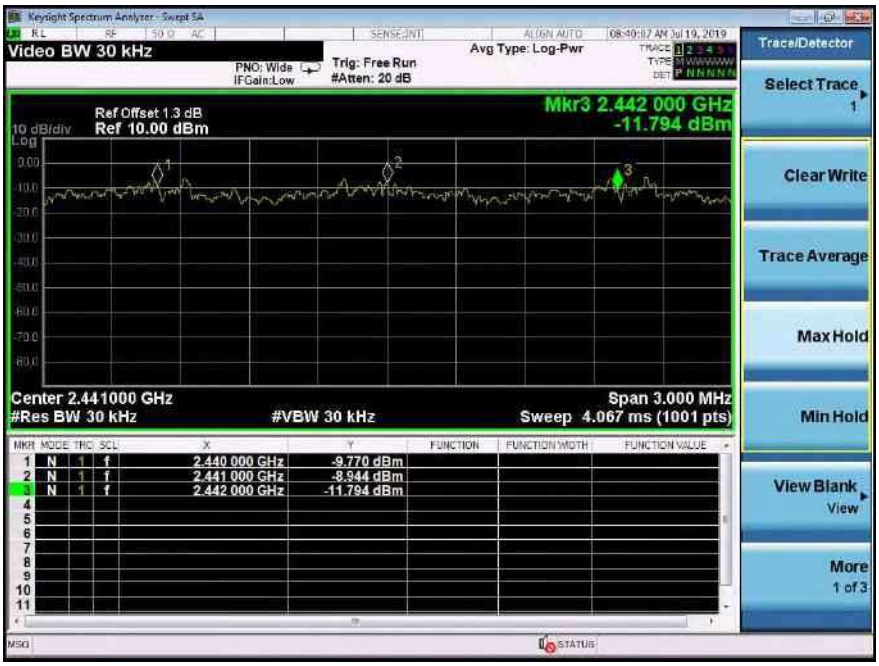


Table 17: Test result of Frequency Separation (GFSK) – Right Ear

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			

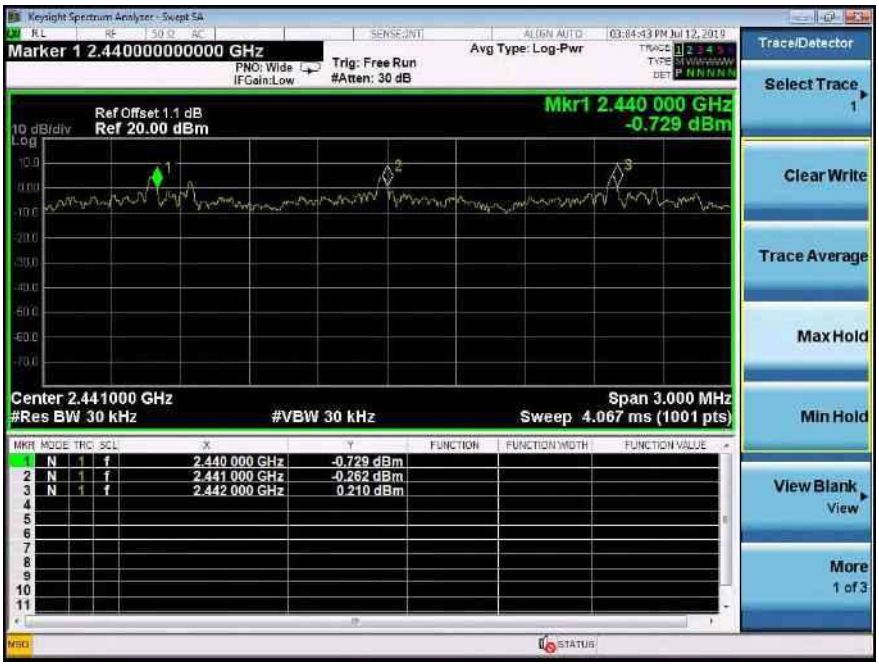
Table 18: Test result of Frequency Separation (8DPSK) – Right Ear

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, Right Ear

GFSK

8DPSK



5.1.7 Number of hopping frequency

RESULT: **Passed**

Test standard	:	FCC part 15.247(a)(1)(iii)
Basic standard	:	ANSI C63.10:2013
Limits	:	≥ 15 non-overlapping channels
Kind of test site	:	Shield room

Test setup

Test Channel	:	Hopping On

Ambient temperature	:	18-25°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103kPa

Table 19: Test result of Number of hopping frequency – Left Ear

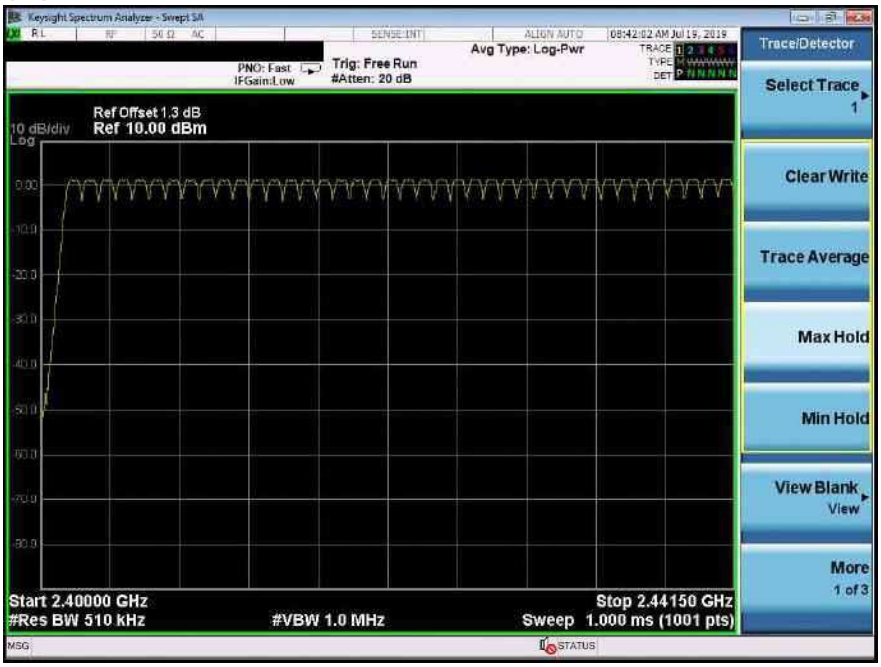
Frequency Range	Measured Quantity of Hopping Channel	Limit	Result
2400 to 2483.5 MHz	79	≥15	Pass

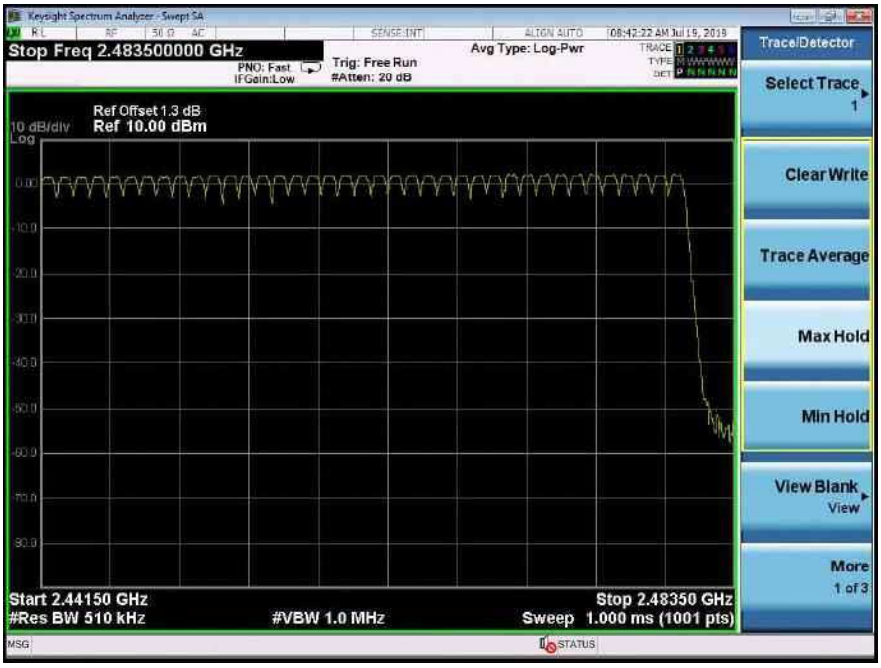
Table 20: Test result of Number of hopping frequency – Right Ear

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

Test Plot of Number of hopping frequencies – Left Ear

GFSK





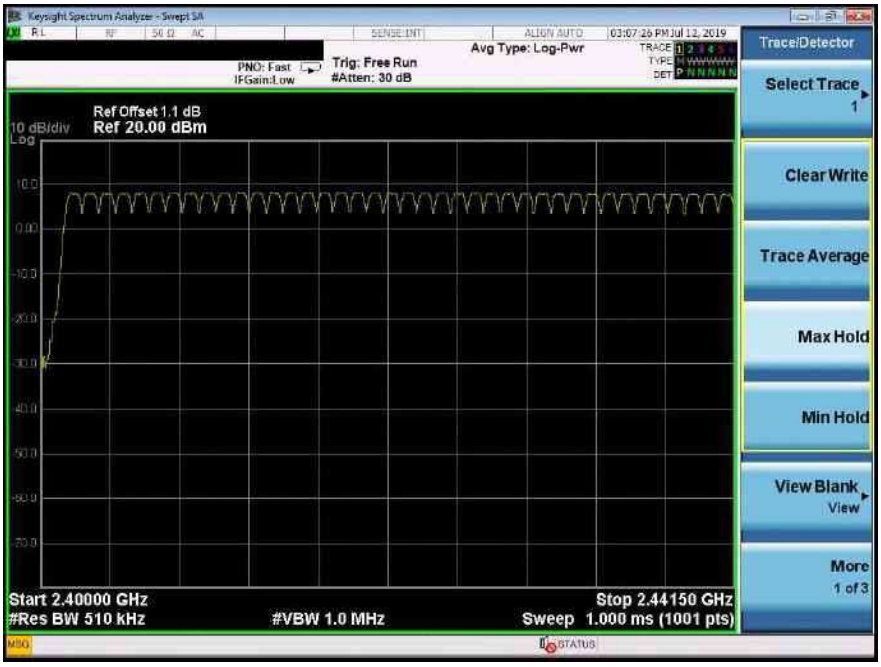
8DPSK

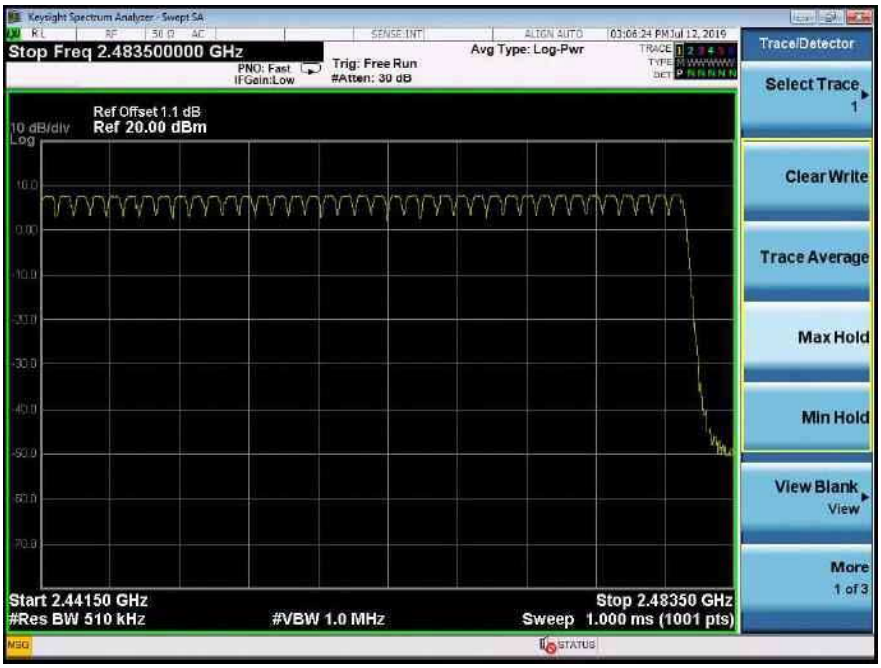

Keysight Spectrum Analyzer - Swept SA
Stop Freq 2.441500000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Ref Offset 1.3 dB
10 dB/div
Ref 10.00 dBm
Log
Start 2.40000 GHz
#Res BW 510 kHz
#VBW 1.0 MHz
Stop 2.44150 GHz
Sweep 1.000 ms (1001 pts)
Trace/Detector
Select Trace 1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank View
More 1 of 3


Keysight Spectrum Analyzer - Swept SA
Stop Freq 2.483500000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 20 dB
Avg Type: Log-Pwr
Ref Offset 1.3 dB
10 dB/div
Ref 10.00 dBm
Log
Start 2.44150 GHz
#Res BW 510 kHz
#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 View
More 1 of 3

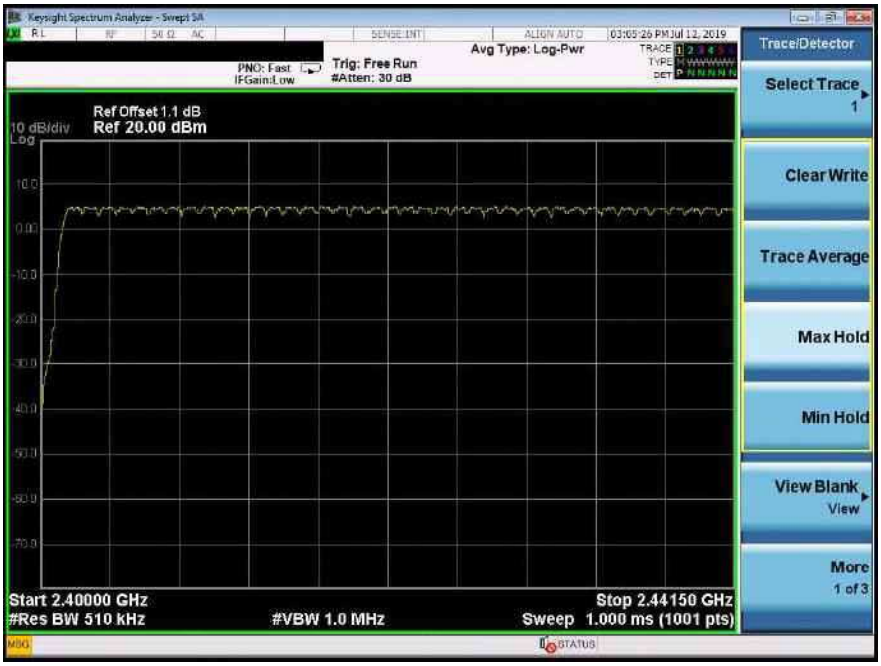
Test Plot of Number of hopping frequencies – Right Ear

GFSK





8DPSK


Keysight Spectrum Analyzer - Swept SA
Avg Type: Log-Pwr
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Ref Offset 1.1 dB
10 dB/div
Ref 20.00 dBm
Log
Start 2.40000 GHz
#Res BW 510 kHz
#VBW 1.0 MHz
Stop 2.44150 GHz
Sweep 1.000 ms (1001 pts)
Trace/Detector
Select Trace
1
Clear Write
Trace Average
Max Hold
Min Hold
View Blank
View
More
1 of 3


Keysight Spectrum Analyzer - Swept SA
Stop Freq 2.483500000 GHz
Avg Type: Log-Pwr
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 30 dB
Ref Offset 1.1 dB
10 dB/div
Ref 20.00 dBm
Log
Start 2.44150 GHz
#Res BW 510 kHz
#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
View
More
1 of 3

5.1.8 Time of Occupancy

RESULT: **Passed**

Test standard	:	FCC part 15.247(a)(1)(iii)
Basic standard	:	ANSI C63.10:2013
Limits	:	0.4s
Kind of test site	:	Conducted room

Test setup

Test Channel	:	Low
Operation Mode	:	A

Ambient temperature	:	18-25°C
Relative humidity	:	50-65%
Atmospheric pressure	:	100-103kPa

Table 21: Test result of Time of Occupancy – Left Ear

Data Mode	Captured Burst (s)	Dwell time (s)	On+Off time (s)	Limit (s)	Result
DH5	0.00290	0.3093	0.00375	0.4	Pass
3DH5	0.00290	0.3102	0.00374	0.4	Pass

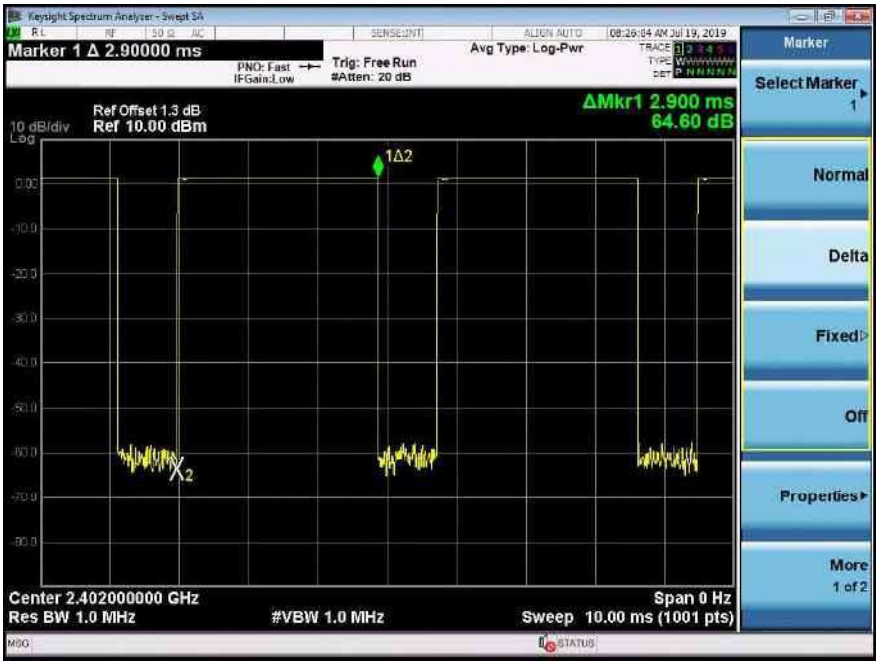
Note:
Dwell time = Pulse width x (Hopping rate / Number of channels) x Period

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

Hopping rate = 1 / (On+Off time)

Hopping Rate for DH5 = 266 Hz
Hopping Rate for 3DH5 = 268 Hz

Test Plot of Time of Occupancy, GFSK modulation



Test Plot of Time of Occupancy, 8DPSK modulation

Table 22: Test result of Time of Occupancy – Right Ear

Data Mode	Captured Burst (s)	Dwell time (s)	On+Off time (s)	Limit (s)	Result
DH5	0.00286	0.3051	0.00375	0.4	Pass
3DH5	0.00289	0.3083	0.00375	0.4	Pass

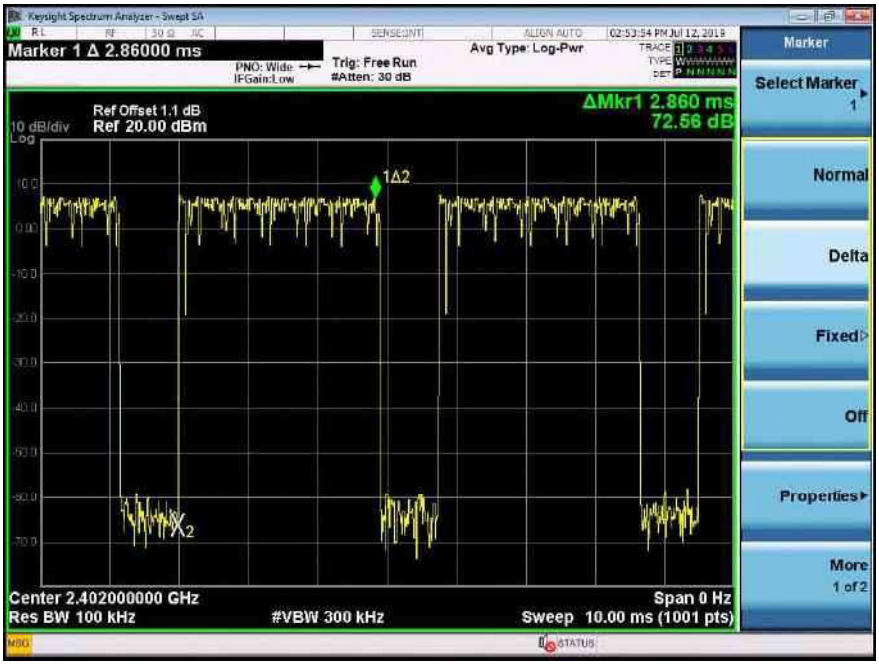
Note:
Dwell time = Pulse width x (Hopping rate / Number of channels) x Period

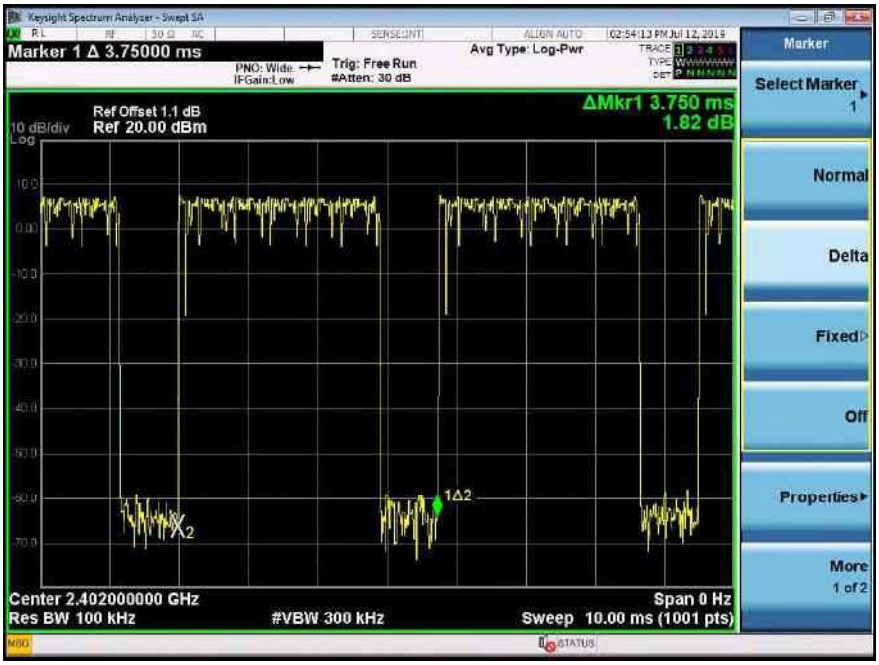
Period = 0.4 (seconds/ channel) x 79 (channel) = 31.6 seconds.

Hopping rate = 1 / (On+Off time)

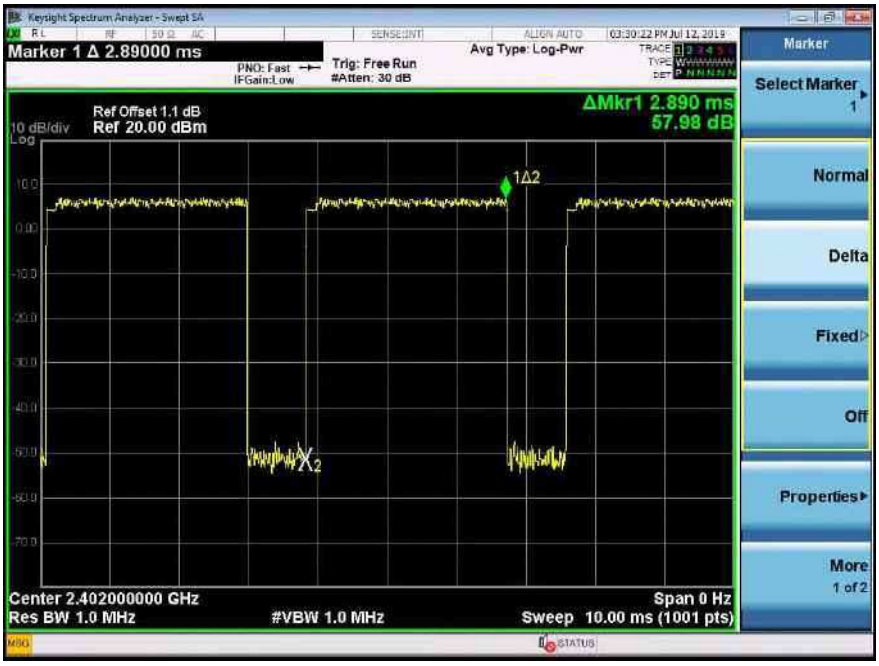
Hopping Rate for DH5 = 266 Hz
Hopping Rate for 3DH5 = 268 Hz

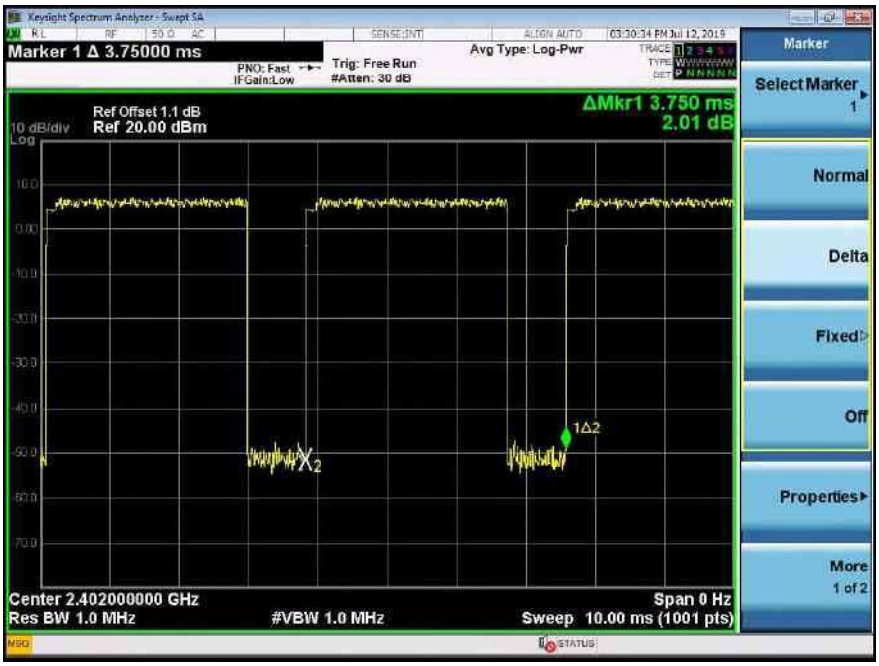
Test Plot of Time of Occupancy, GFSK modulation





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
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 v06
47CFR 1.1310
47CFR 2.1091

Left Ear:

Therefore the maximum output power of the transmitter is 1.39mW < 10mW(Distance: 5mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

Right Ear:

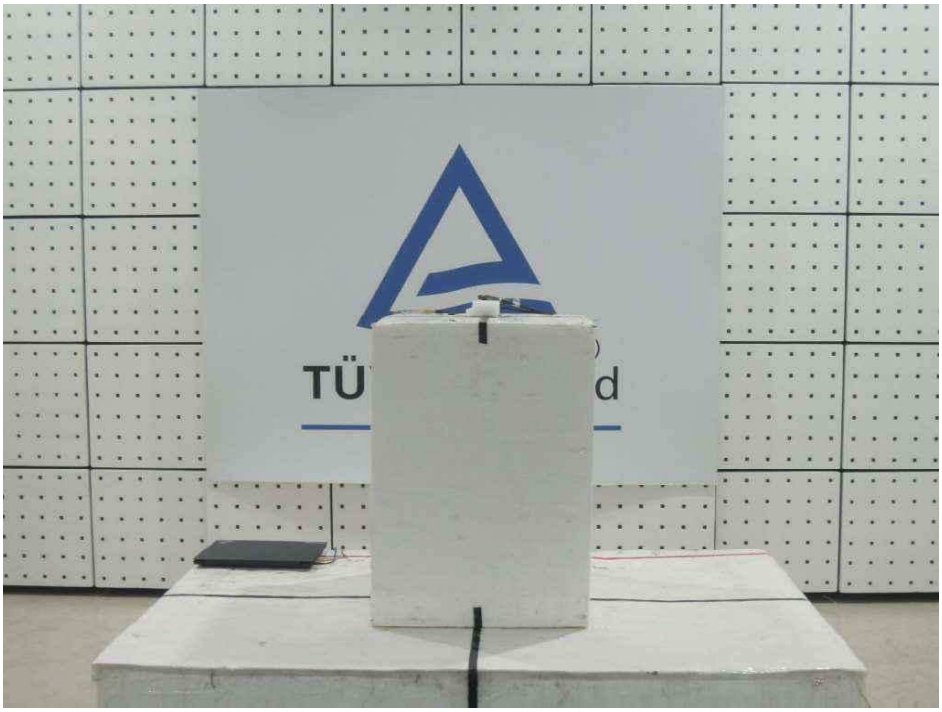
Therefore the maximum output power of the transmitter is 6.25mW < 10mW(Distance: 5mm), hence the EUT is excluded from SAR evaluation according to FCC KDB publication 447498 D01: Mobile Portable RF Exposure.

---End---

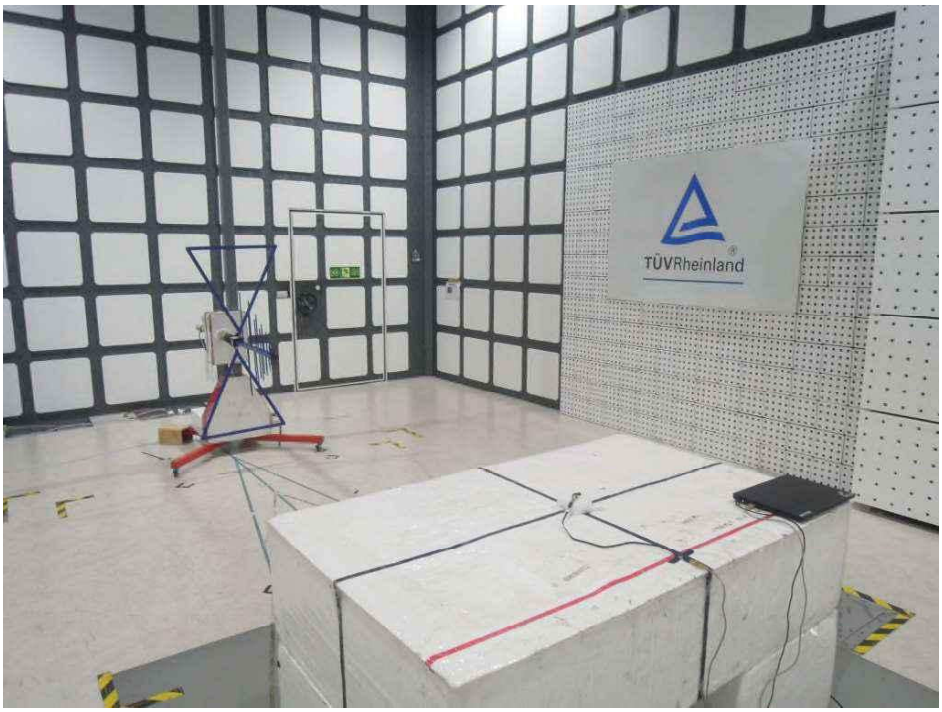
7. Photographs of the Test Set-Up

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

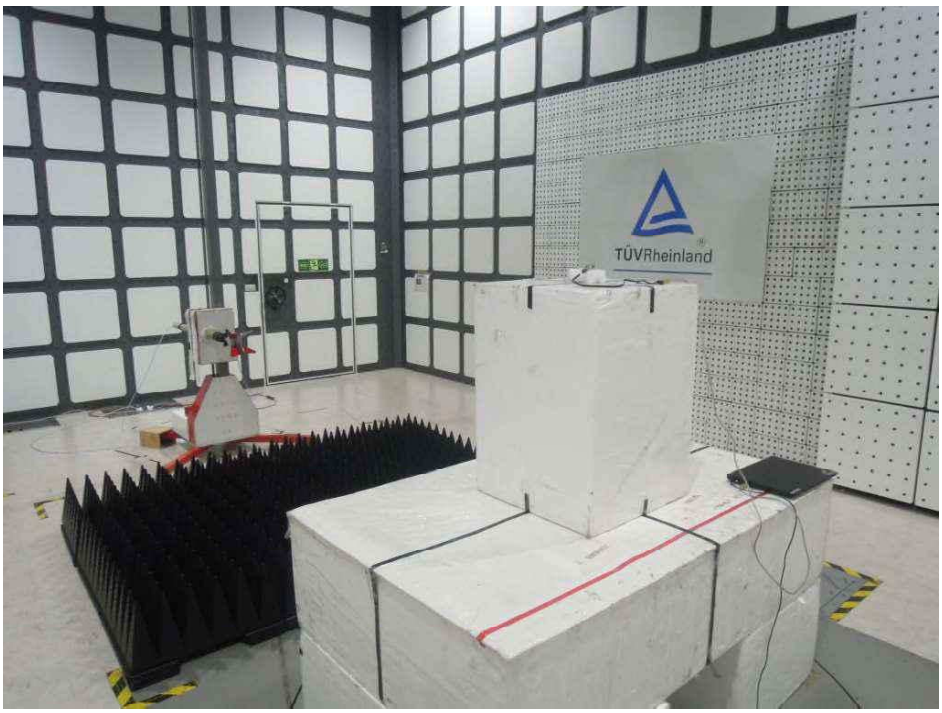
Photograph 2: Set-up for Spurious Emissions (Front View 2) – Left Ear



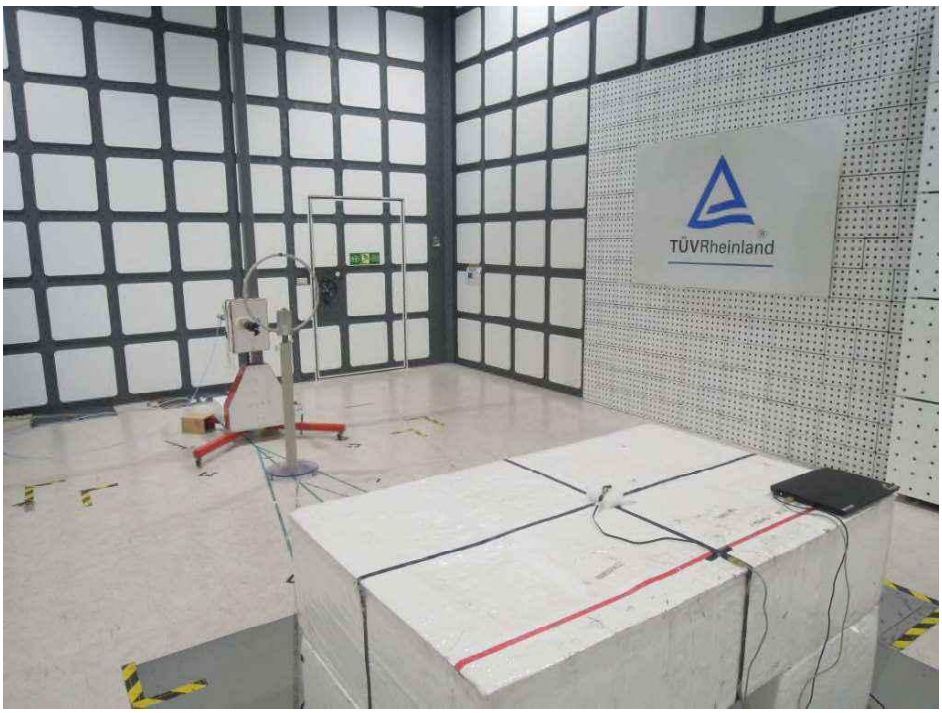
Photograph 3: Set-up for Spurious Emissions (Back View 1) – Left Ear



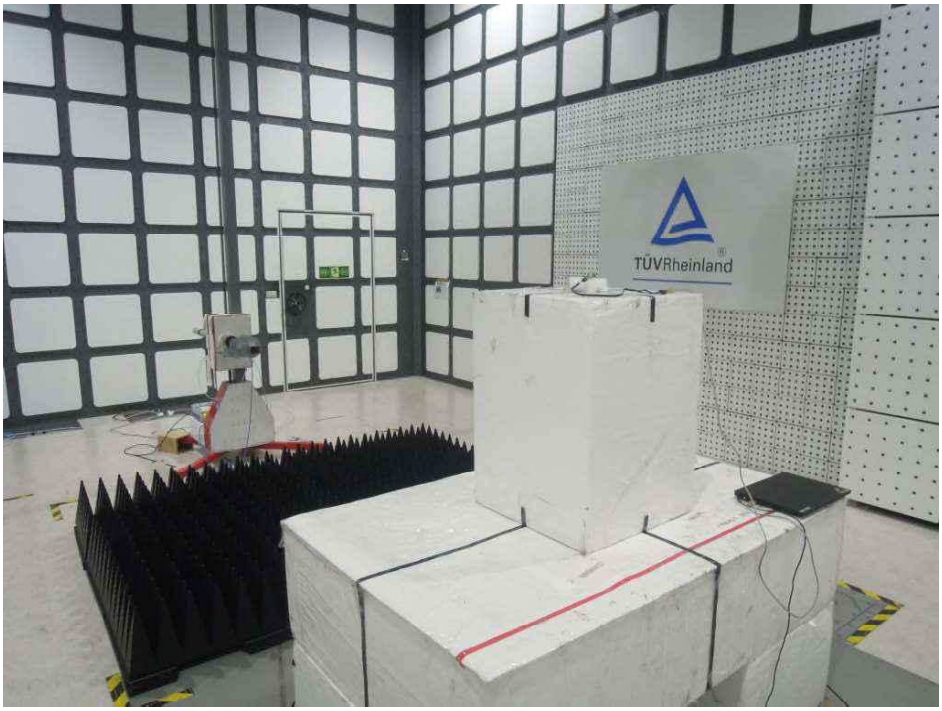
Photograph 4: Set-up for Spurious Emissions (Back View 2) – Left Ear



Photograph 5: Set-up for Spurious Emissions (Back View 3) – Left Ear

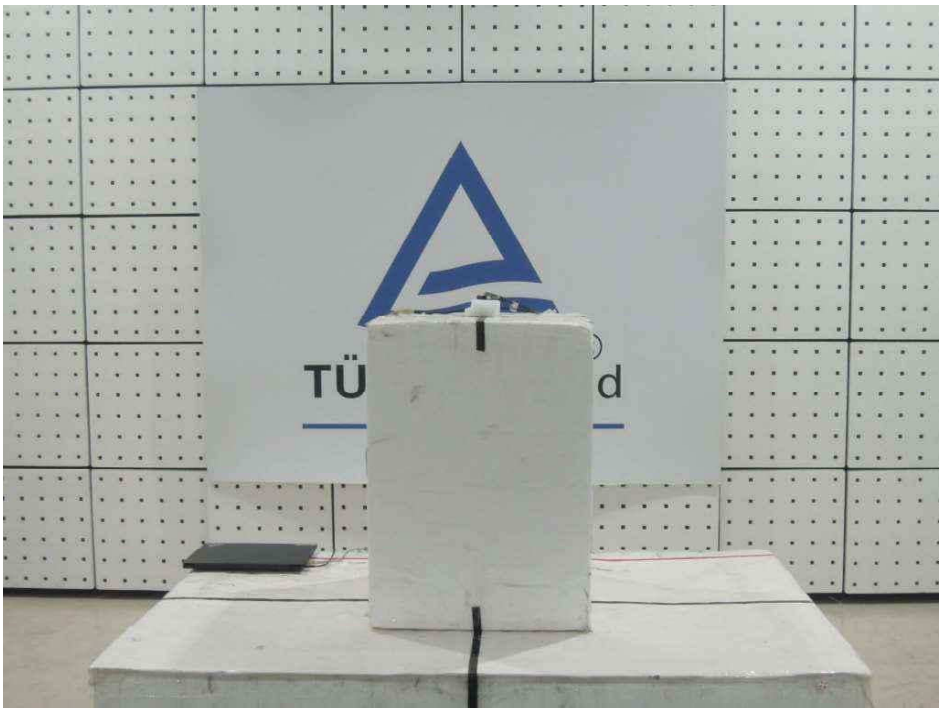


Photograph 6: Set-up for Spurious Emissions (Back View 4) – Left Ear

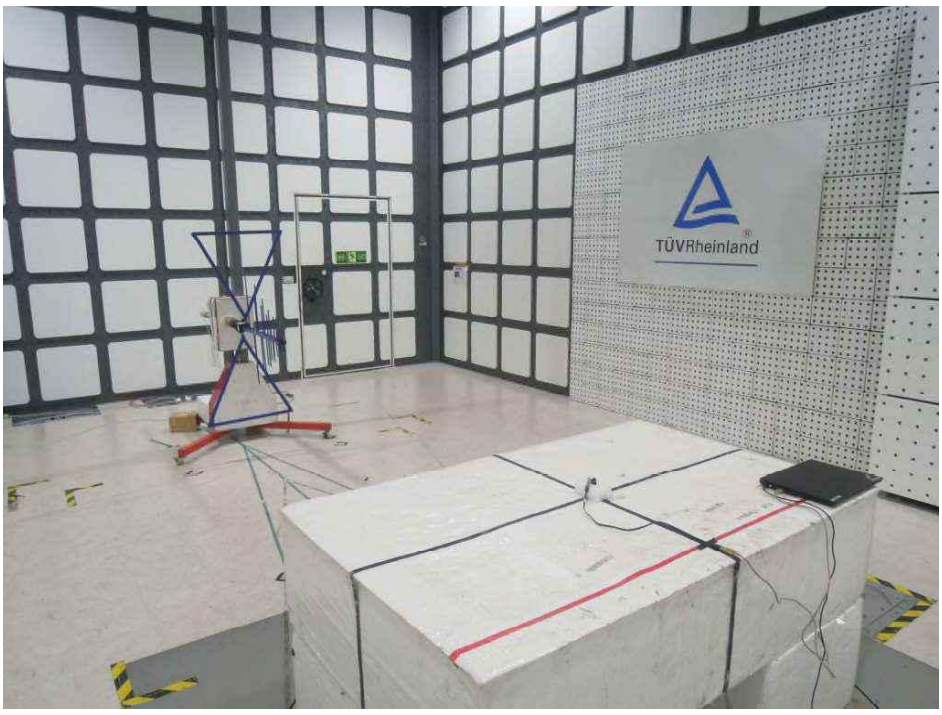


Photograph 7: Set-up for Spurious Emissions (Front View 1) – Right Ear

Photograph 8: Set-up for Spurious Emissions (Front View 2) – Right Ear

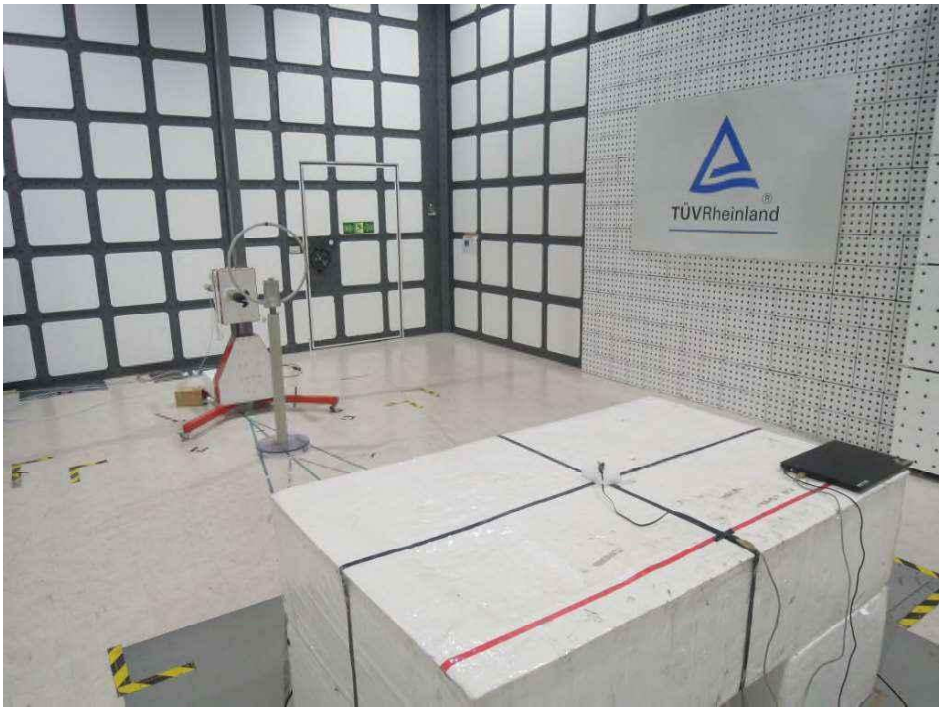


Photograph 9: Set-up for Spurious Emissions (Back View 1) – Right Ear

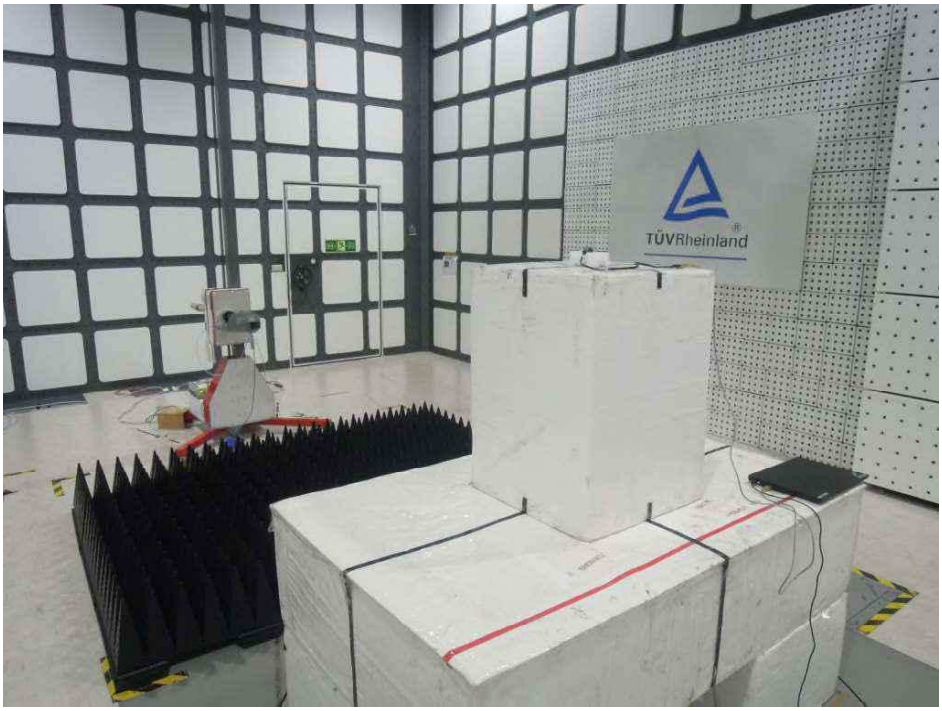


Photograph 10: Set-up for Spurious Emissions (Back View 2) – Right Ear

Photograph 11: Set-up for Spurious Emissions (Back View 3) – Right Ear

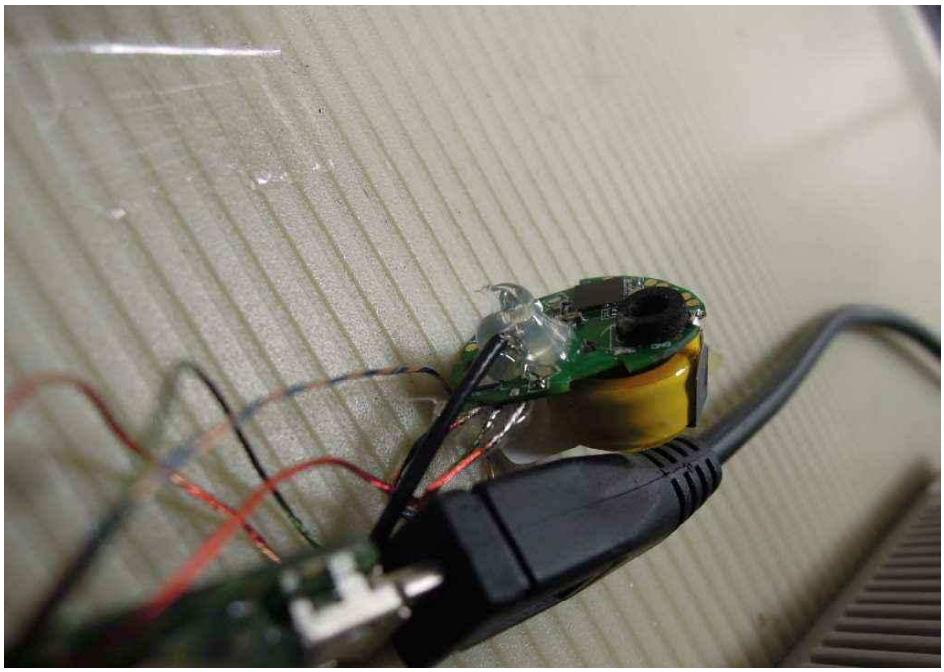


Photograph 12: Set-up for Spurious Emissions (Back View 4) – Right Ear

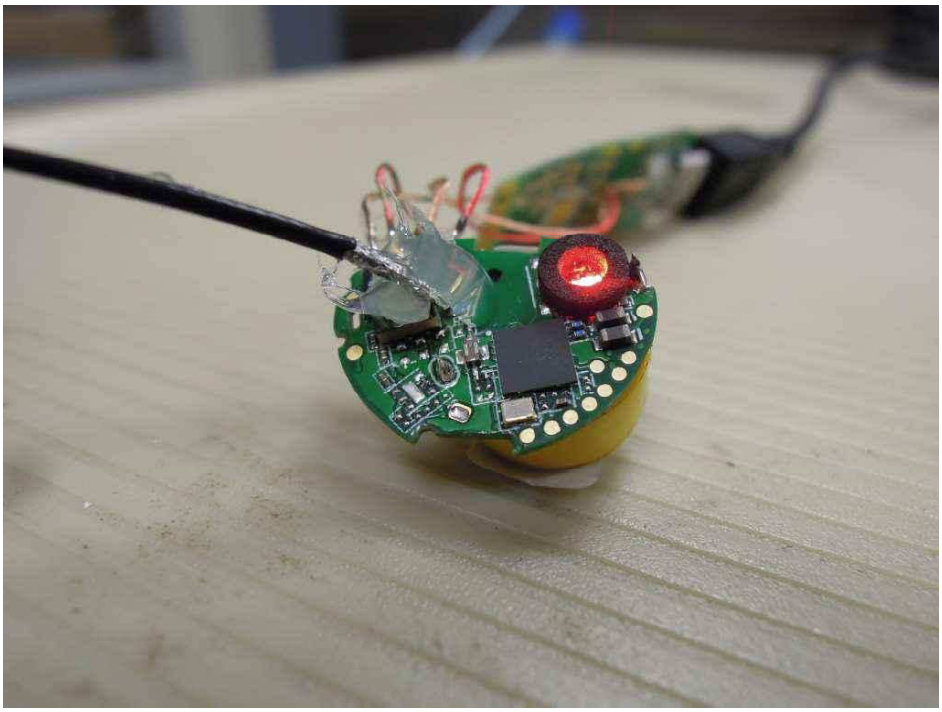


Photograph 13: Set-up for Conducted testing

Photograph 14: Set-up for Conducted testing – Left Ear



Photograph 15: Set-up for Conducted testing – Right Ear



Photograph 16: Set-up for Mains Conducted testing (Back View)

Photograph 17: Set-up for Mains Conducted testing (Front View)

8. List of Tables

9. List of Photographs