Registration
No.910917

TEST REPORT FOR BLUETOOTH TESTING

Report No.: SRTC2017-9004(F)-0032

Product Name: LTE/WCDMA/GSM (GPRS) Multi-Mode Digital Mobile Phone

Product Model: 602ZT

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: FCC Part 15, Subpart C (October, 2016 edition)

FCC ID: SRQ-602ZT

The State Radio_monitoring_center Testing Center (SRTC)

No.80 Beilishi Road Xicheng District Beijing, China

Tel: 86-10-57996181 Fax: 86-10-57996288

CONTENTS

1. GENERAL INFORMATION

1.1 Notes of the test report

The test report may only be reproduced or published in full. Reproduction or publication of extracts from the report requires the prior written permission of The State Radio_monitoring_center Testing Center (SRTC).
The test results relate only to individual items of the samples which have been tested.

1.2 Information about the testing laboratory

Company:	The State Radio_monitoring_center Testing Center (SRTC)
Address:	No.80 Beilishi Road, Xicheng District
City:	Beijing
Country or Region:	P.R.China
Contacted person:	Liujia
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1.3 Applicant's details

Company:	ZTE Corporation
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City:	Shenzhen
Country or Region:	P.R.China
Grantee Code:	SRQ
Contacted person:	Min Zhang
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Email:	zhang.min13@zte.com.cn

1.4 Manufacturer's details

Company:	ZTE Corporation
Address:	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park, Nanshan District,Guangdong
City:	Shenzhen
Country or Region:	P.R.China
Contacted person:	Min Zhang
Tel:	021-68897867
Fax:	021-50801070
Email:	zhang.min13@zte.com.cn

1.5 Test Environment

Date of Receipt of test sample at SRTC:	2017.04.11
Testing Start Date:	2017.04.18
Testing End Date:	2017.04.26

Environmental Data:	Temperature (°C)	Humidity (%)
Ambient	25	38
Maximum Extreme	55	40
Minimum Extreme	-10	---

Normal Supply Voltage (V d.c.):	3.85
Maximum Extreme Supply Voltage (V d.c.):	4.24
Minimum Extreme Supply Voltage (V d.c.):	3.47

2 DESCRIPTION OF THE DEVICE UNDER TEST

2.1 Final Equipment Build Status

Frequency Range	2.4GHz~2.4835GHz
Number of Channel	79
Modulation Type	GFSK, π/4DQPSK, 8DPSK
Duplex Mode	TDD
Channel Spacing	1MHz
Data Rate	1Mbps, 2 Mbps, 3 Mbps
Antenna Type	Fixed Internal
Power Supply	Battery or Charger
Rated Power Supply Voltage	3.85V
HW Version	csrB
SW Version	602ZT a0.1
IMEI	863720030003387

2.2 Support Equipment

The following support equipment was used to exercise the DUT during testing:

Battery 1

Equipment	Battery
Manufacturer	BYD
Model Number	Li3824T44P4h716043
Serial Number	-----

Equipment	Headset
Manufacturer	Dongle Guan Kan Tsang Industrial Co., LTD
Model Number	QZESDM1532001A00
Serial Number	---

NOTE: Accessories(Charger/USB Cable/Headset)are provided by testlab.

3 REFERENCE SPECIFICATION

Specification	Version	Title
15.35	Mar. 6, 2014	Measurement detector functions and bandwidths.
15.209	Oct. 30, 1997	Radiated emission limits; general requirements.
15.247	May 1, 2014	Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz.

4 KEY TO NOTES AND RESULT CODES

Code	Meaning
PASS	Test result shows that the requirements of the relevant specification have been met.
FAIL	Test result shows that the requirements of the relevant specification have not been met.
N/T	Test case is not tested.
NTC	Nominal voltage, Normal Temperature
HV	High voltage, Normal Temperature
LV	Low voltage, Normal Temperature
HTHV	high voltage, High Temperature
LTHV	High voltage, Low Temperature
HTLV	Low voltage, High Temperature
LTLV	Low voltage, Low Temperature

5 RESULT SUMMARY

No.	Test case	FCC reference	Verdict
1	Occupied Bandwidth	15.247(a)(1)	Pass
2	Channel Separation	15.247(a)(1)	Pass
3	Peak Power Output	15.247(b)(1)	Pass
4	Dwell Time	15.247(a)(1)(iii)	Pass
5	Number of Hopping Frequencies	15.247(a)(1)(iii)	Pass
6	Conducted out of band emission measurement	15.247(d)	Pass
7	Spurious Radiated Emissions	15.247(d)/15.35(b)/15.209	Pass
8	AC Power line Conducted Emission	15.207	Pass

This Test Report Is Issued by: Mr. Peng Zhen	Checked by: Ms. Liu Jia
Tested by: Mr. He Dengshun	Issued date: 20170426

6 TEST RESULT

6.1 Occupied Bandwidth

6.1.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

6.1.2 Test Description

The bandwidth at 20dB down from the highest in-band spectral density is measured with a spectrum analyzer and Bluetooth test set via a power splitter with a known loss which connected to the transmitter antenna terminal of the EUT while the EUT is operating at maximum power and at the appropriate frequencies. All modes of operation were investigated and the worst case configuration results are reported in this section.

6.1.3 Test limit

FCC Part15.247 (a)(1)

For frequency hopping system operating in the 2400-2483.5MHz, If the 20dB bandwidth of hopping channel is greater than 25kHz, two-thirds 20dB bandwidth of hopping channel shell be a minimum limit for the hopping channel separation.

6.1.4 Test settings

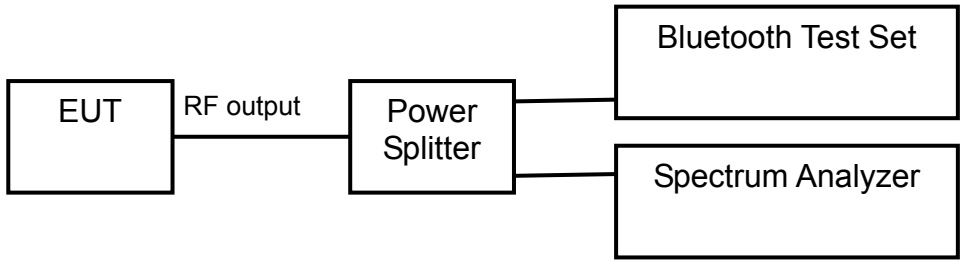
a. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.

b. Turn on the EUT and connect it to measurement instrument. Then set it to any one convenient frequency within its operating range. Set a reference level on the measuring instrument equal to the highest peak value.

c. Measure the frequency difference of two frequencies that were attenuated 30dB from the reference level. Record the frequency difference as the emission bandwidth.

d. Repeat above procedures until all frequencies measured were complete.

6.1.5 Test Setup



6.1.6 Test result

The test results are shown in Appendix A .

6.2 Channel Separation

6.2.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

6.2.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the channel separation measurements. The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

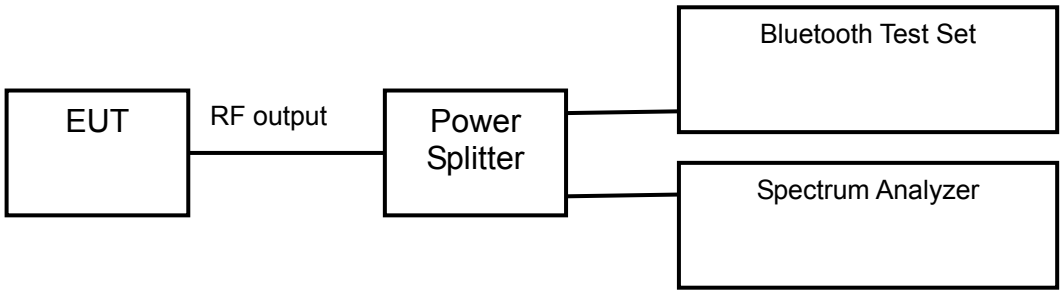
6.2.3 Test limit

FCC Part15.247 (a)(1)
Measurement is made with EUT operating in hopping mode. The minimum permissible channel separation for this system is 2/3 the value of the 20dB BW.

6.2.4 Test Settings

a) Detector: Peak-Max hold
b) Span: 3 MHz
c) Centre Frequency: 2441 MHz
d) Resolution Bandwidth (RBW): 30 kHz
e) Video Bandwidth (VBW): 1 MHz
f) Sweep Time: Coupled

6.2.5 Test Setup



6.2.6 Test result

The test results are shown in Appendix A .

6.3 Peak Power Output

6.3.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

6.3.2 Test Description

Measurement is made while the EUT is operating in non-hopping transmission mode. The powers shown below were measured using a spectrum analyzer with a Bluetooth signaling test set used only to maintain a Bluetooth link with the EUT.

6.3.3 Test limit

FCC Part15.247(b)(1):
For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW) ➔

Modulation type	GFSK	π/4DQPSK	8DPSK
Maximum Output Power	30.0dBm	30.0dBm	30.0dBm

For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

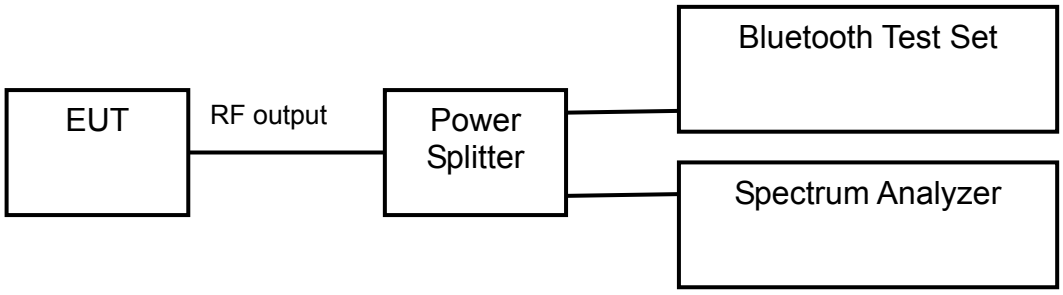
Used conversion factor: Limit (dBm) = 10 log (Limit (W)/1mW) ➔

Modulation type	GFSK	π/4DQPSK	8DPSK
Maximum Output Power	21.0dBm	21.0dBm	21.0dBm

6.3.4 Test Settings

Hopping Mode	Modulation type	RBW	VBW	Span	Sweep time
Hopping OFF	GFSK	2MHz	3MHz	8MHz	1ms
Hopping OFF	π/4DQPSK	2MHz	3MHz	8MHz	1ms
Hopping OFF	8DPSK	2MHz	3MHz	8MHz	1ms

6.3.5 Test Setup



6.3.6 Test result

The test results are shown in Appendix A .

6.4 Dwell Time

6.4.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

6.4.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the dwell time measurements.
The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.
The time slot length is measured of three different packet types which are available in the Bluetooth technology. Those are DH1, DH3 and DH5 packets. The dwell time is calculated by:
Dwell time = time slot length * hop rate * 31.6/ number of hopping channels with:
- hop rate=1600/2 * 1/s for DH1 packets =800
- hop rate=1600/4 * 1/s for DH3 packets =400
- hop rate=1600/6 * 1/s for DH5 packets =266.67
- number of hopping channels=79
- 31.6 s=0.4 seconds multiplied by the number of hopping channels=0.4s * 79

6.4.3 Test limit

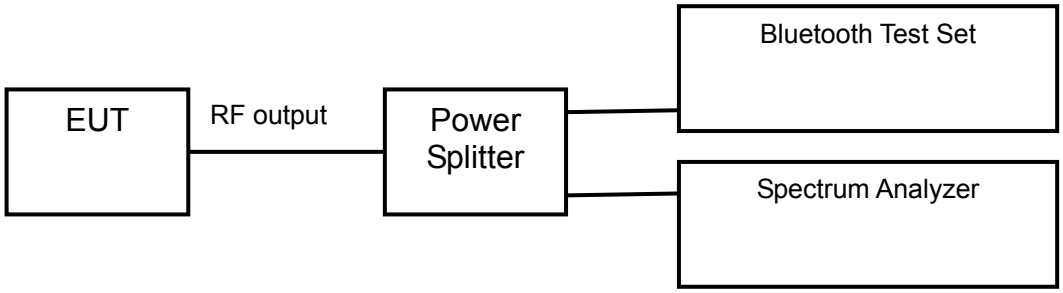
FCC Part15.247(a)(1)(iii)
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels. The average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

6.4.4 Test Test Settings

a. Check the calibration of the measuring instrument (SA) using either an internal calibrator or a known signal from an external generator.
b. Turn on the EUT and connect its antenna terminal to measurement via a low loss cable. Then set it to any one measured frequency within its operating range and make sure the instrument is operated

in its linear range.
c. Adjust the center frequency of SA on any frequency be measured and set SA to zero span mode. And then, set RBW and VBW of spectrum analyzer to proper value.
d. Measure the time duration of one transmission on the measured frequency.
And then plot the result with time difference of this time duration.
e. Repeat above procedures until all different time-slot modes have been completed.

6.4.5 Test Setup



6.4.6 Test result

The test results are shown in Appendix A .

6.5 Number of Hopping Frequencies

6.5.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

6.5.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the number of hopping frequencies measurement.The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

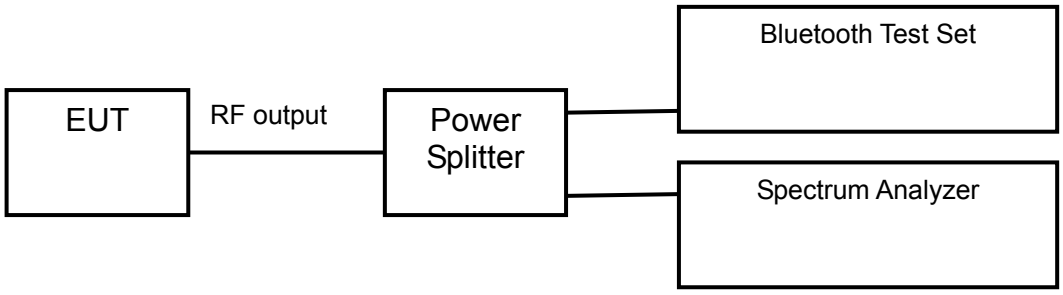
6.5.3 Test limit

FCC Part15.247(a)(1)(iii)
Frequency hopping systems in the 2400-2483.5 MHz band shall use at least 15 channels.

6.5.4 Test Settings

a) Detector: Peak-Maxhold
b) Start frequency: 2400 MHz
c) Stop frequency: 2483.5 MHz
d) Resolution Bandwidth (RBW): 30 kHz
e) Video Bandwidth (VBW): 1 MHz
f) Sweep Time: Coupled

6.5.5 Test Setup



6.5.6 Test result

The test results are shown in Appendix A.

6.6 Conducted out of band emission measurement

6.6.1 Ambient condition

Temperature	Relative humidity	Pressure
22°C	40%	101.5kPa

6.6.2 Test Description

The Equipment Under Test (EUT) was set up in a shielded room to perform the spurious emissions measurements. The EUT was connected to the spectrum analyzer and Bluetooth test set via a power splitter with a known loss.

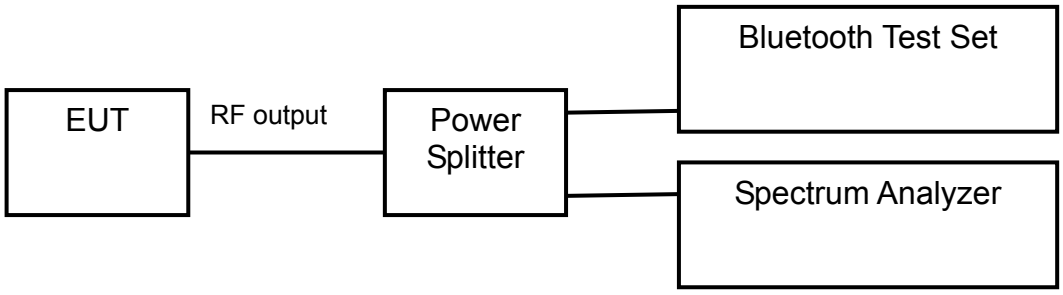
6.6.3 Test limit

FCC Part15.247(d):
In any 100 kHz bandwidth outside the frequency band in which the spread spectrum 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.

6.6.4 Test Settings

a) Set RBW = 100 kHz.
b) Set VBW =300 kHz.
c) Set span to encompass the spectrum to be examined
d) Detector = peak.
e) Trace Mode = max hold.
f) Sweep = auto couple. Detector: Peak-Maxhold
g) Frequency range: 30 ~25000 MHz

6.6.5 Test Setup



6.6.6 Test result

The test results are shown in Appendix A .

The spectrum plots are attached on the following images. D1 line indicates the highest level, D2 line indicates the 20dB offset below D1. It shows compliance with the requirement.

6.7 Spurious Radiated Emissions

6.7.1 Ambient condition

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

6.7.2 Test Description

All out of band radiated spurious emissions are measured with a spectrum analyzer connected to a receive antenna while the EUT is operating at maximum power and at the appropriate frequencies. Only the radiated emissions of the configuration that produced the worst case emissions are reported in this section.

6.7.3 Test limit

FCC Part15.247(d):
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)).All out of band emissions appearing in a restricted band as specified in Section 15.205 of the Title 47 CFR must not exceed the limits shown in below Table per Section 15.209.

Frequency [MHz]	Field strength [μV/m]	Measured Distance [meters]
30～88	100	3
88～216	150	3
216～960	200	3
Above 960	500	3

Radiated Limits

FCC Part15.35(b):
there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above

the maximum permitted average limit
Used conversion factor: Limit (dBμV/m) = 20 log (Limit (μV/m)/1μV/m)

Frequency of Emission(MHz)	Limits	
	Detector	Unit (dBμV/m)
30～88	Quasi-peak	40.0
88～216	Quasi-peak	43.5
216～960	Quasi-peak	46.0
960～1000	Quasi-peak	54.0
1000～5th harmonic of the highest frequency or 40GHz, whichever is lower	Average	54.0
	Peak	74.0

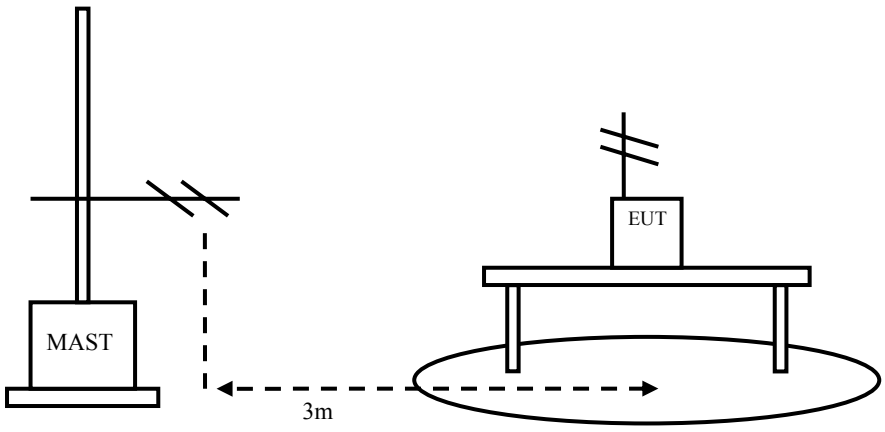
Conversion Radiated limits

6.7.4 Test Settings

The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration. During the test, the antenna height and EUT azimuth were varied in order to identify the maximum level of emission from the EUT. The height of receive antenna shall be moved from 1 to 4 meters, and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees.
The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

6.7.5 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below
The Equipment Under Test (EUT) was set up on a non-conductive table in the semi-anechoic



chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna. The radiated emissions measurements were made in a typical installation configuration. Then start the test software ES-K1. Sweep the whole frequency band through the range from 30MHz to 1GHz or above, using receive log period antenna HL562 or Ridge horn antenna HF906.
During the test, the antenna height and EUT azimuth were varied in order to identify the maximum level of emission from the EUT. The height of receive antenna shall be moved from 1 to 4 meters,

and the antenna shall be performed under horizontal and vertical polarization. The turn table shall be rotated from 0 to 360 degrees. The measurements shall be repeated with orthogonal polarization of the test antenna. The results shall be showed the worst case of the three orthogonal axes.
The data of cable loss and antenna factor has been calibrated in full testing frequency range before the testing.

6.7.6 Test result

The test results are shown in Appendix B.

6.8 AC Power line Conducted Emission

6.8.1 Ambient condition

Temperature	Relative humidity	Pressure
20.8°C	36.5%	100.9kPa

6.8.2 Test limit

FCC Part15.207

Frequency of Emission (MHz)	Conducted Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency.

The measurement is made according to ANSI C63.4-2014

6.8.3 Test result

The test results are shown in Appendix B .

7 MEASUREMENT UNCERTAINTIES

Items	Uncertainty	
Occupied Bandwidth	3kHz	
Peak power output	0.67dB	
Band edge compliance	1.20dB	
Spurious emissions	30MHz～1GHz	2.83dB
	1GHz～12.75GHz	2.50dB
	12.75GHz～25GHz	2.75dB

8 TEST EQUIPMENTS

No.	Name/ Model	Manufacturer	S/N	Cal Due date
1.	Spectrum Analyzer FSV	ROHDE&SCHWARZ	101065	2017.08.20
2.	Bluetooth Test Set MT8852B	Anritsu	1142010	2018.03.01
3.	Cable 104EA	SUCOFLEX	9272/4EA	2018.03.01
4.	Cable 104EA	SUCOFLEX	9266/4EA	2018.03.01
5.	Power Splitter 11850C	Agilent	026057	2017.08.20
6.	12.65m×8.03m×7.50m Fully-Anechoic Chamber	FRANKONIA	-----	-----
7.	23.18m×16.88m×9.60m Semi-Anechoic Chamber	FRANKONIA	---	-----
8.	Turn table Diameter:1m	HD	-----	-----
9.	Turn table Diameter:5m	HD	-----	-----
10.	Antenna master FAC(MA4.0)	MATURO	-----	-----
11.	Antenna master SAC(MA4.0)	MATURO	-----	-----
12.	9.080m×5.255m×3.525m Shielding room	FRANKONIA	-----	-----
13.	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100030	2017.08.20
14.	HF 906 Double-Ridged Waveguide Horn Antenna	R&S	100029	2017.08.20
15.	HL562 Ultra log antenna	R&S	100016	2017.08.20
16.	3160-09 Receive antenna	SCHWARZ-BECK	002058-002	2017.08.20
17.	ESI 40 EMI test receiver	R&S	100015	2017.08.20
18.	Radio tester	CMU 200	114667	2017.08.20
19.	ESCS30 EMI test receiver	R&S	100029	2017.08.20
20.	HL562 Receive antenna	R&S	100167	2017.08.20
21.	ESH3-Z5 LISN	R&S	100020	2017.08.20

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Please refer to the attachment.

APPENDIX B – TEST DATA OF RADIATED EMISSION

Please refer to the attachment.

APPENDIX C – TEST SETUP

Please refer to the attachment.

APPENDIX A – TEST DATA OF CONDUCTED EMISSION

Occupied Bandwidth

Modulation type: GFSK

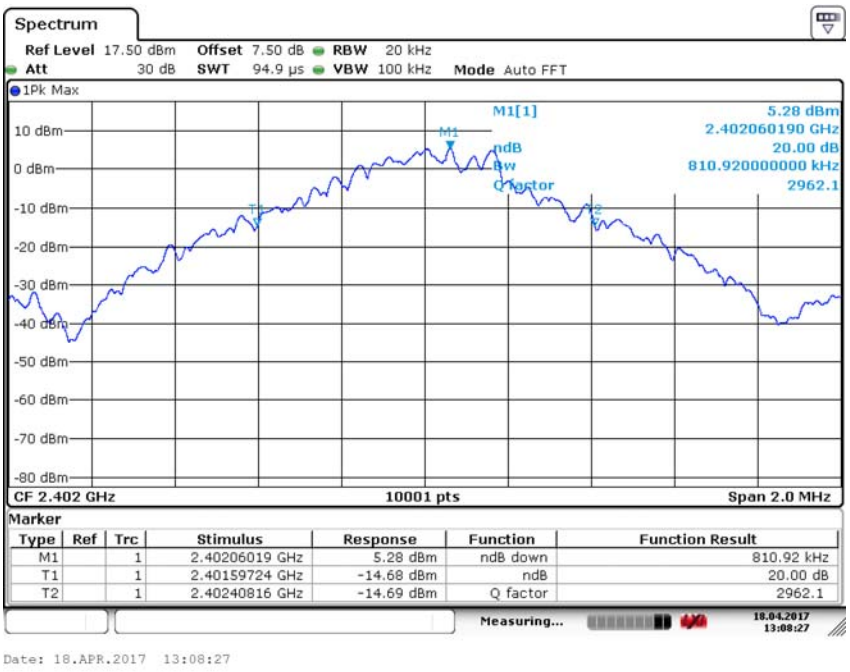
Carrier frequency (MHz)	Channel No.	20 dB bandwidth(kHz)
2402	0	810.9
2441	39	810.5
2480	78	811.5

Modulation type: π/4DQPSK

Carrier frequency (MHz)	Channel No.	20 dB bandwidth(kHz)
2402	0	1258.3
2441	39	1242.5
2480	78	1237.5

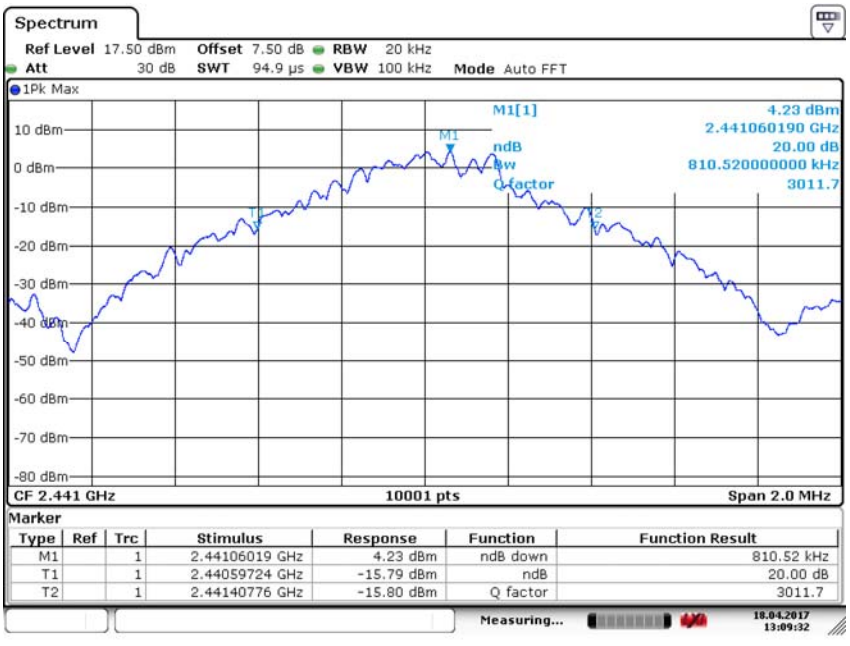
Modulation type: 8DPSK

Carrier frequency (MHz)	Channel No.	20 dB bandwidth(kHz)
2402	0	1262.9
2441	39	1262.3
2480	78	1260.5



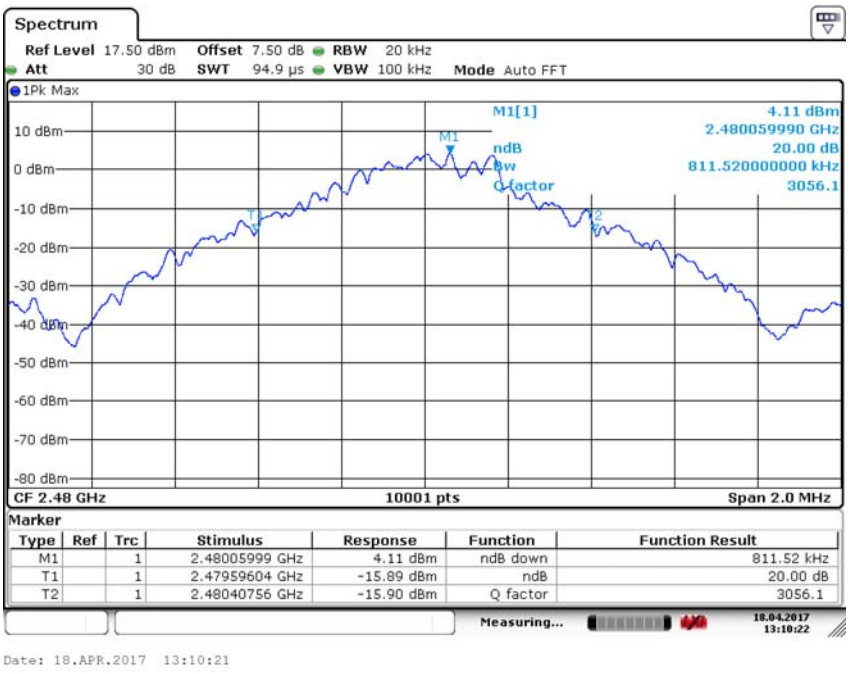
Date: 18.APR.2017 13:08:27

Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: GFSK

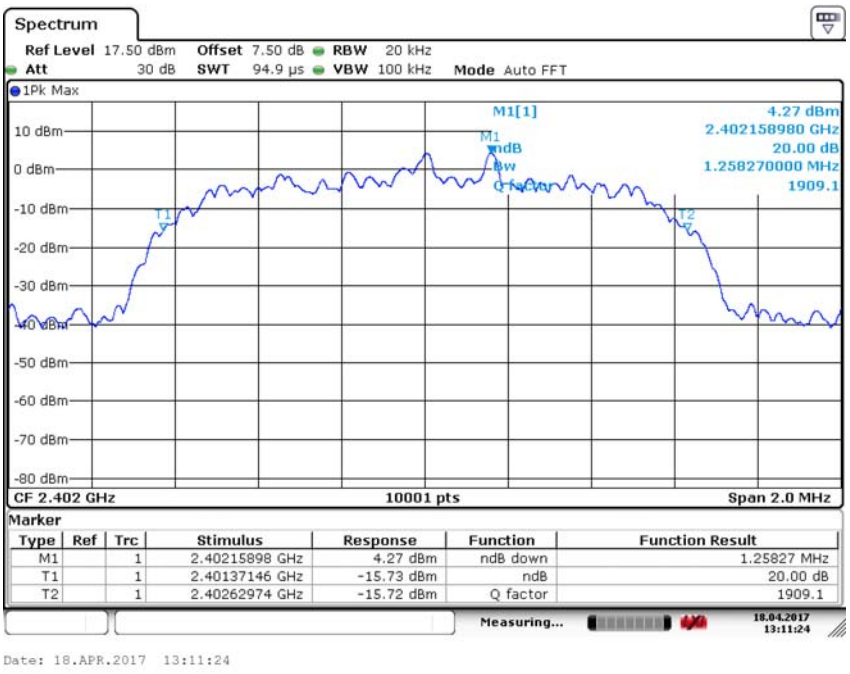


Date: 18.APR.2017 13:09:32

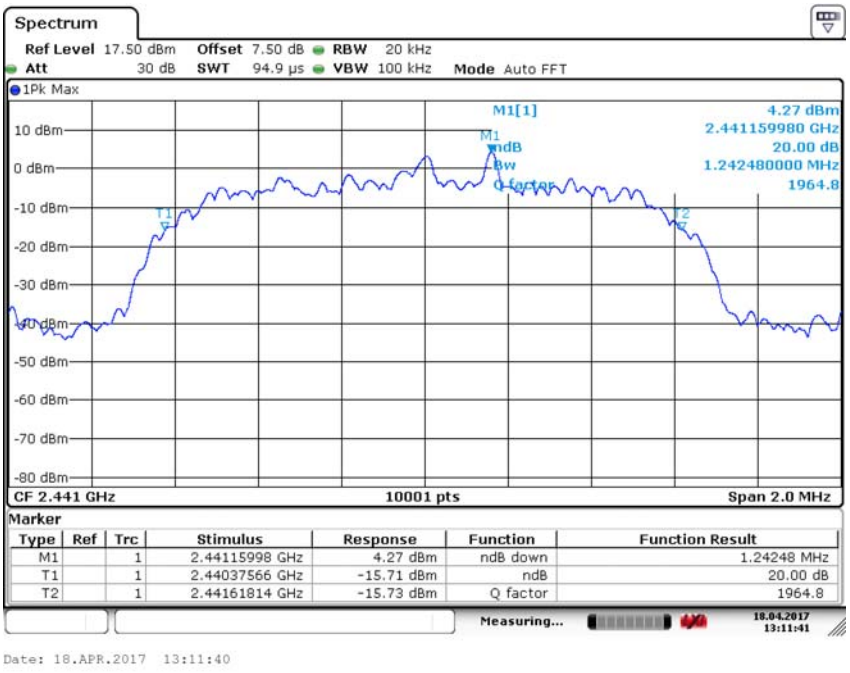
Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: GFSK



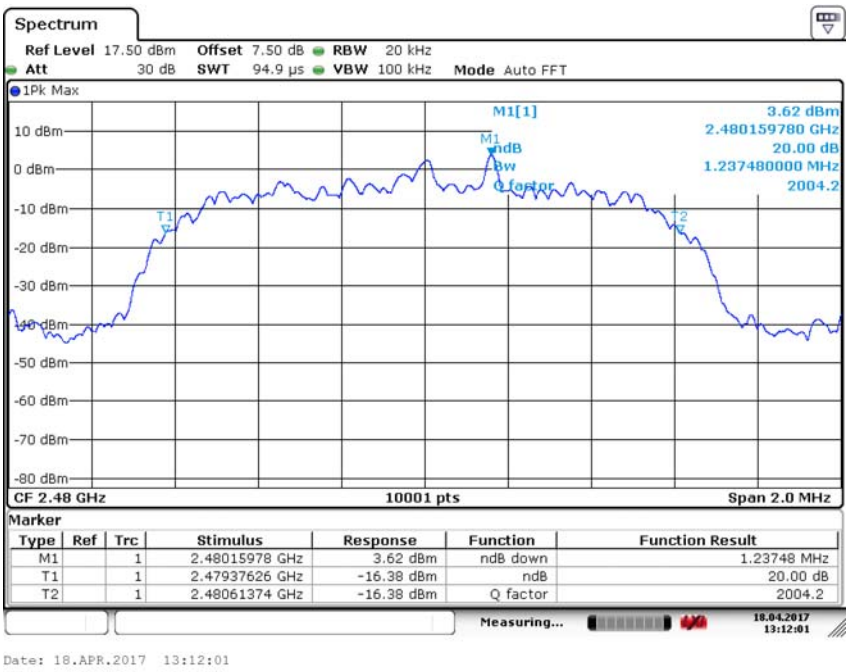
Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: GFSK



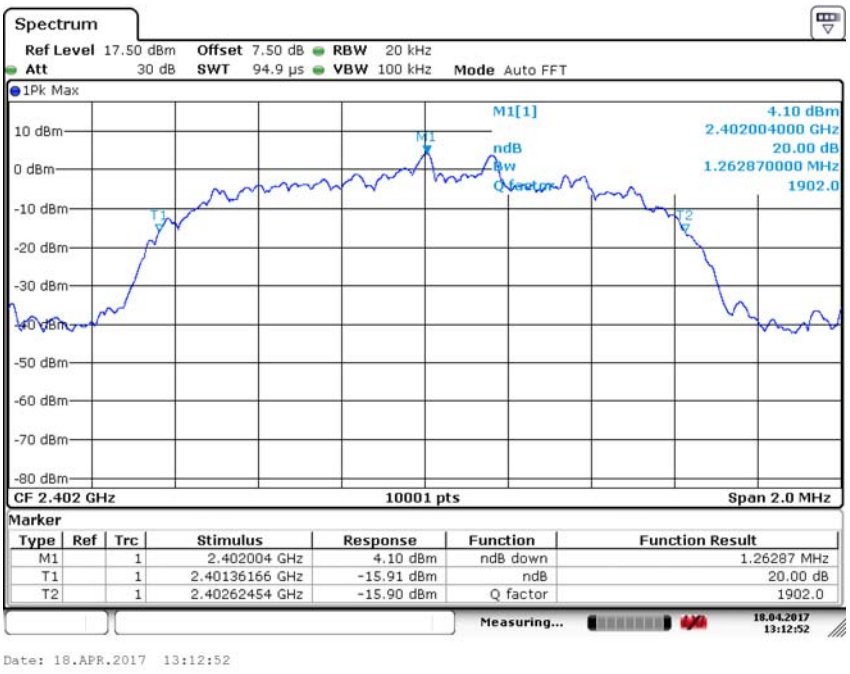
Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: π/4DQPSK



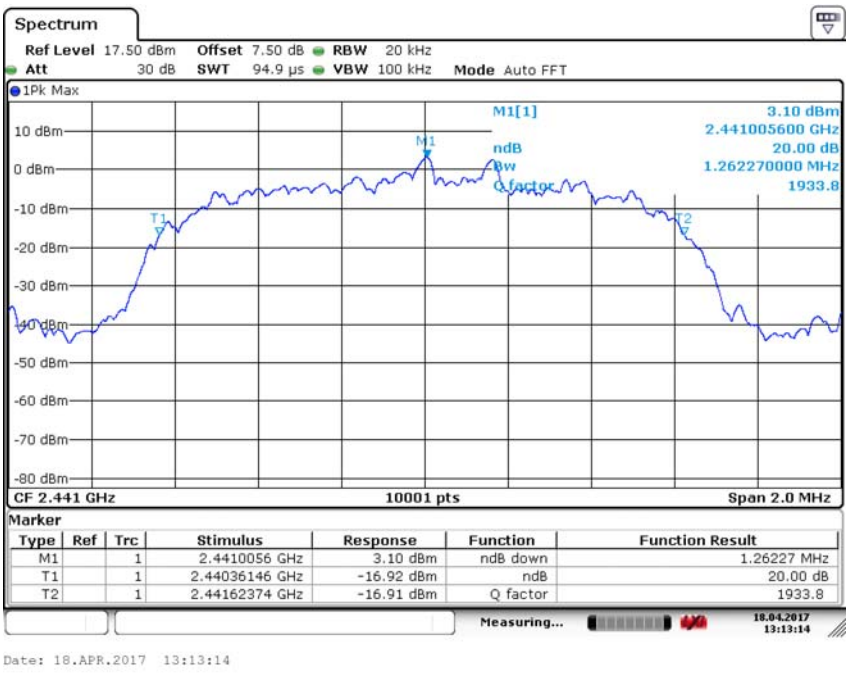
Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: π/4DQPSK



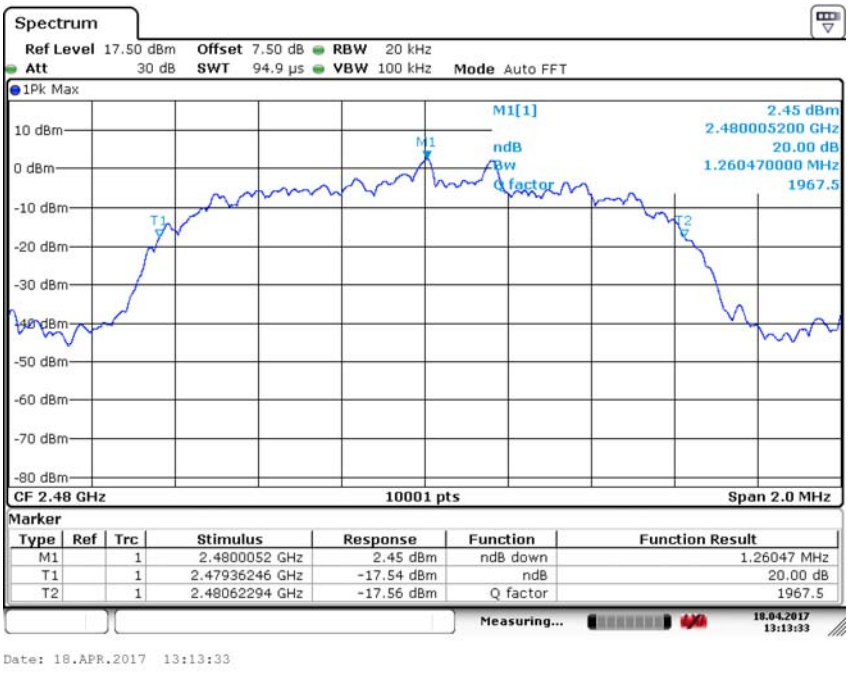
Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: π/4DQPSK



Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: 8DPSK



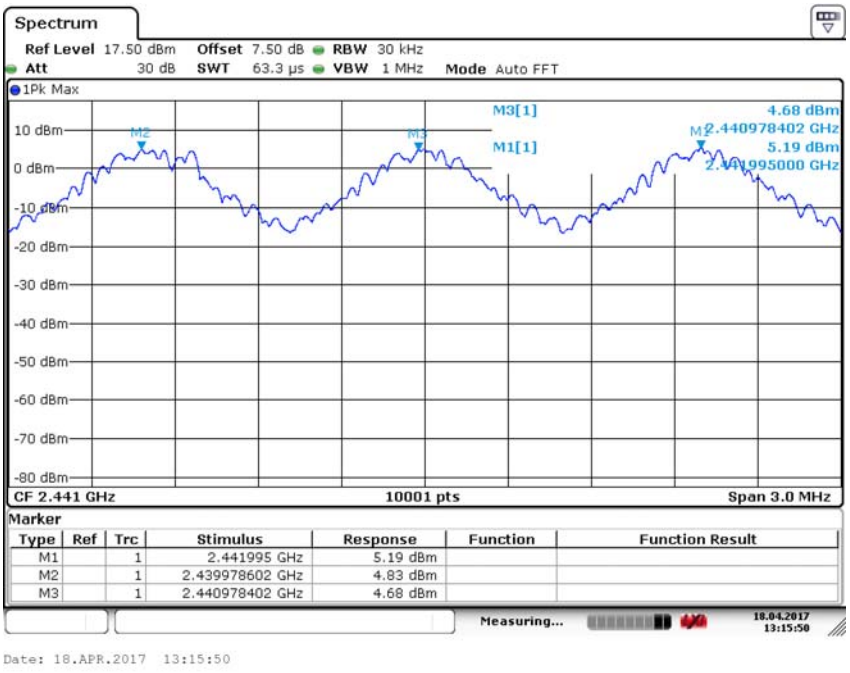
Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: 8DPSK



Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: 8DPSK

Channel Separation

Op-mode	Channel separation MHz
Hopping mode	1



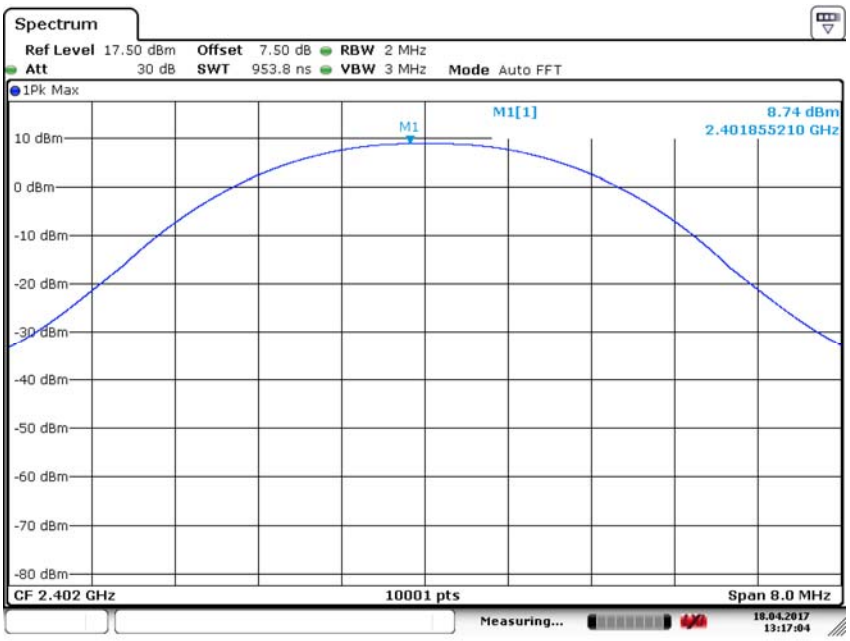
Op-mode: Hopping mode

Peak Power Output

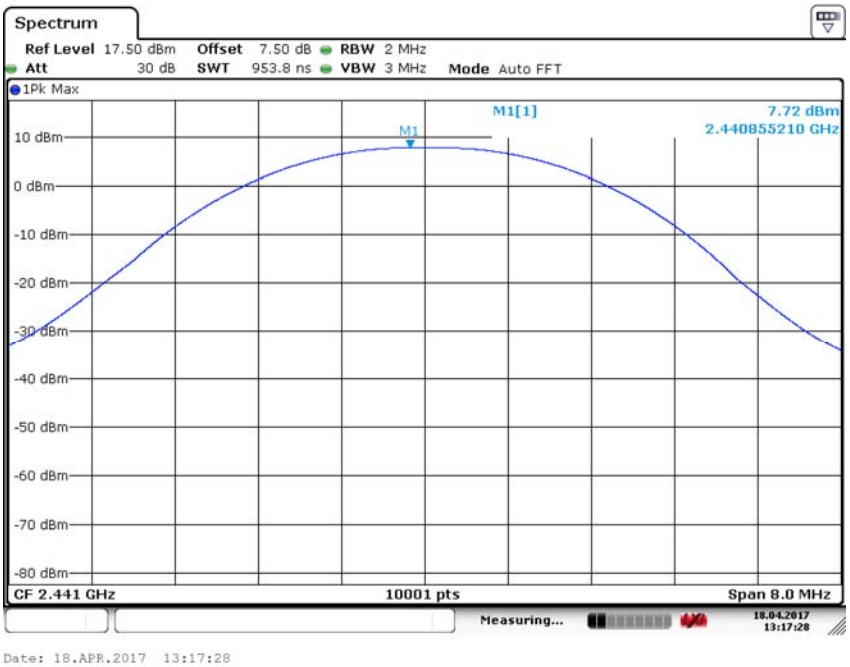
Modulation type	Average Power Output (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	5.74	5.33	5.11
π/4DQPSK	6.53	6.14	6.15
8DPSK	6.56	7.03	6.77

Average power data is provided to determine the need for Bluetooth SAR testing according to KDB 447498 D01 v05r01.

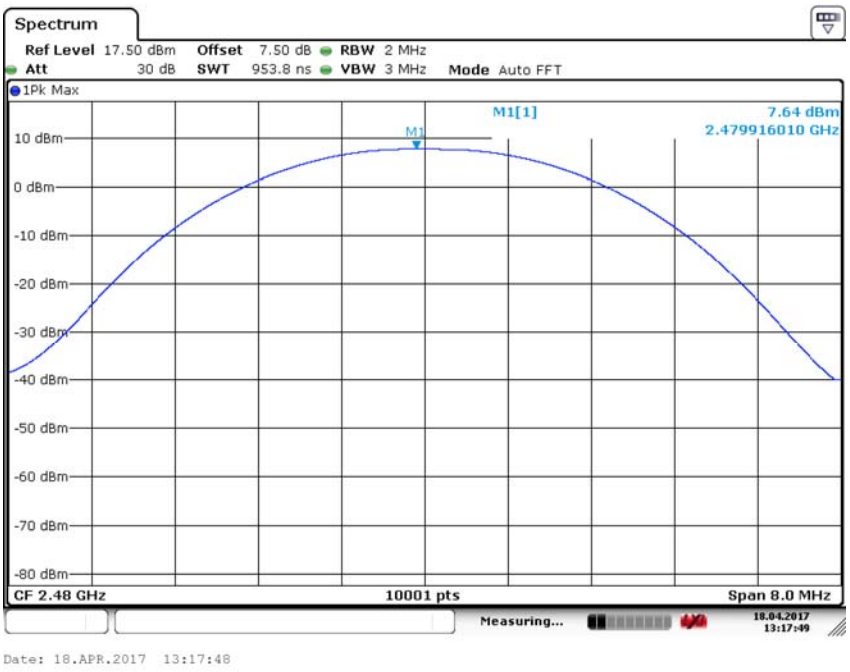
Modulation type	Peak Power Output (dBm)		
	2402MHz (Ch0)	2441MHz (Ch39)	2480MHz (Ch78)
GFSK	8.74	7.72	7.64
π/4DQPSK	9.76	8.75	8.11
8DPSK	10.14	8.97	8.18



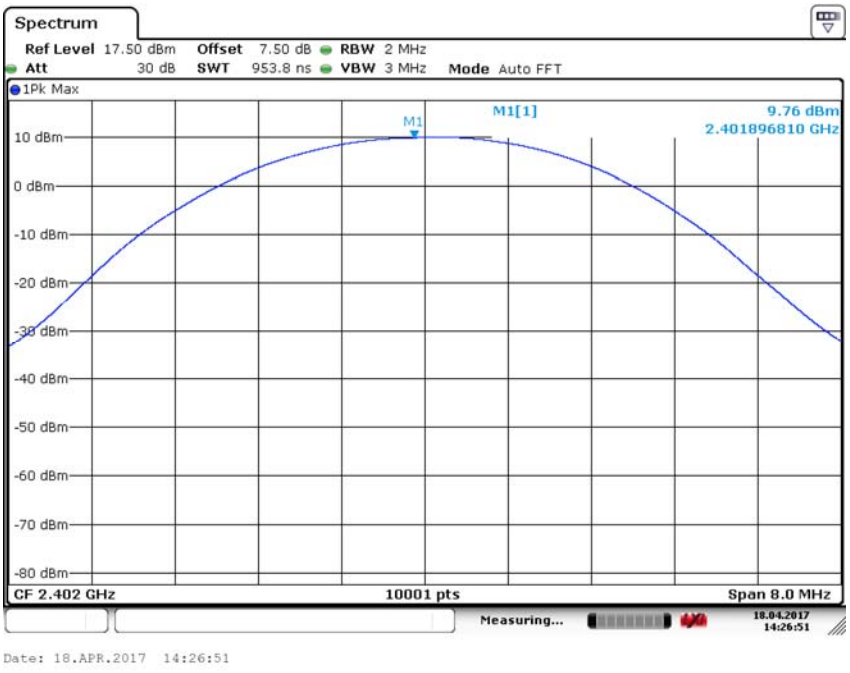
Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: GFSK



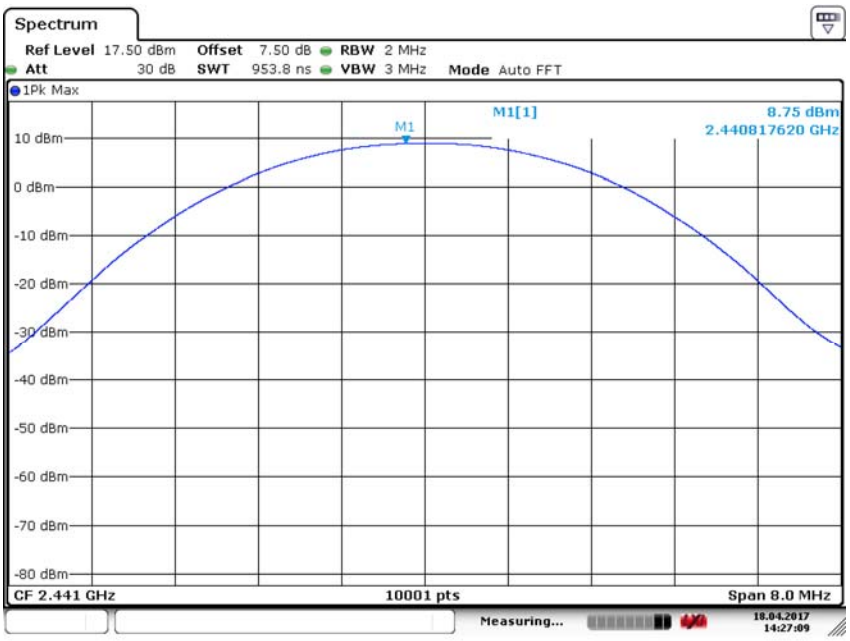
Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: GFSK



Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: GFSK

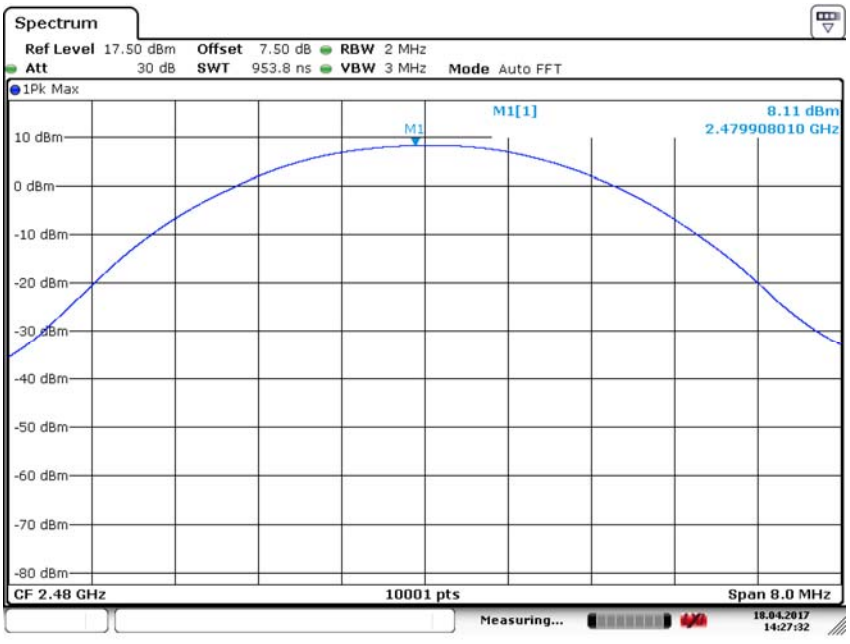


Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: π/4DQPSK



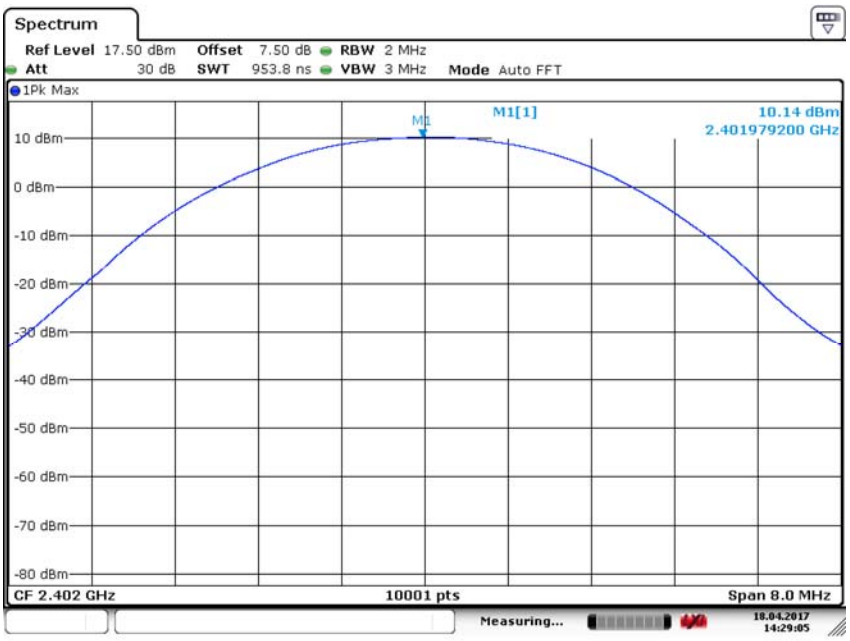
Date: 18.APR.2017 14:27:09

Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: π/4DQPSK

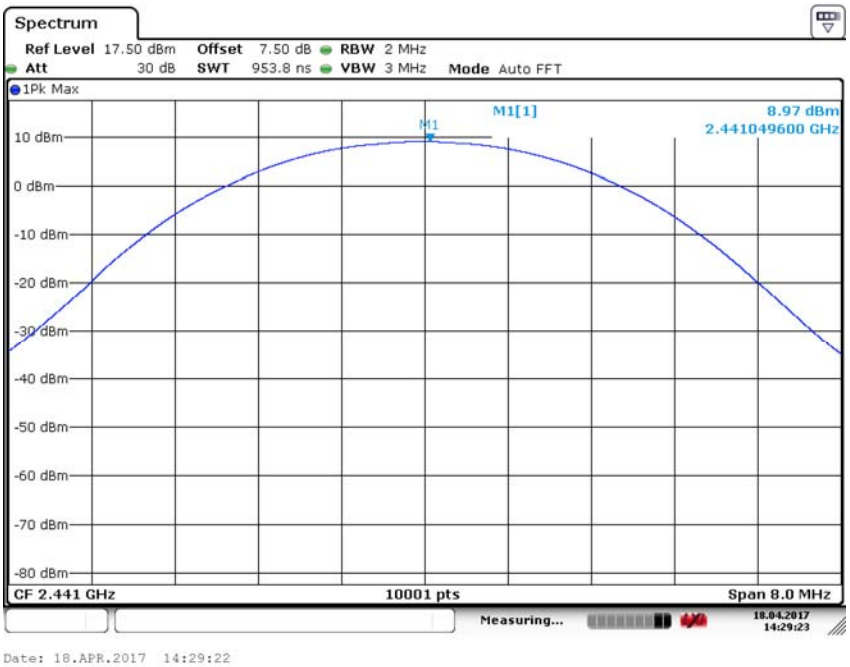


Date: 18.APR.2017 14:27:32

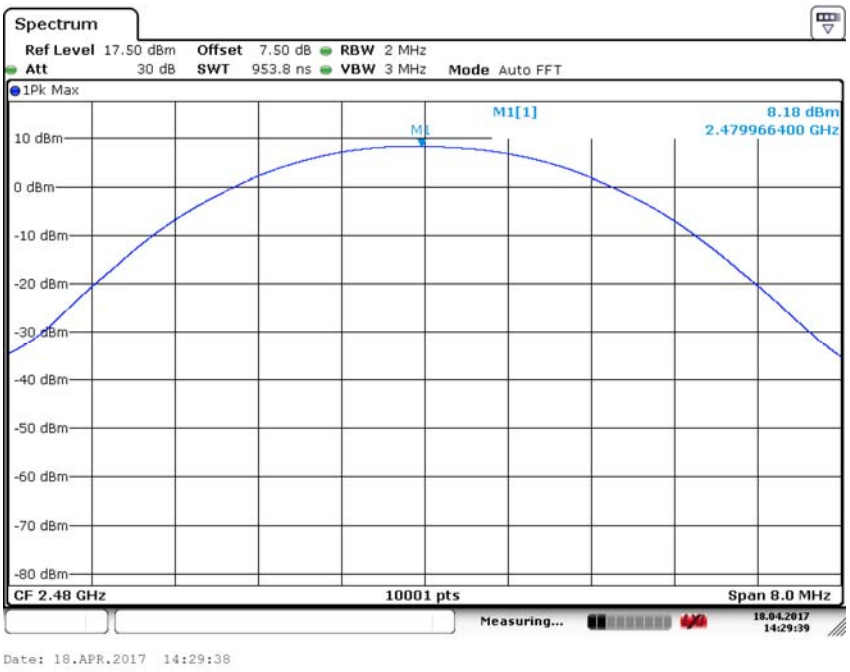
Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: π/4DQPSK



Carrier frequency (MHz): 2402
Channel No.:0
Modulation type: 8DPSK



Carrier frequency (MHz): 2441
Channel No.:39
Modulation type: 8DPSK

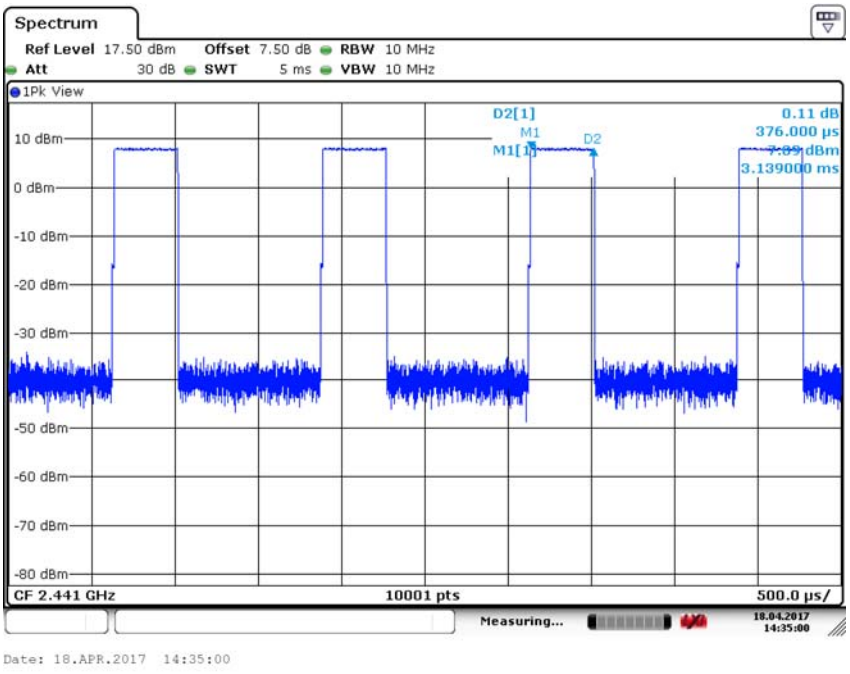


Carrier frequency (MHz): 2480
Channel No.:78
Modulation type: 8DPSK

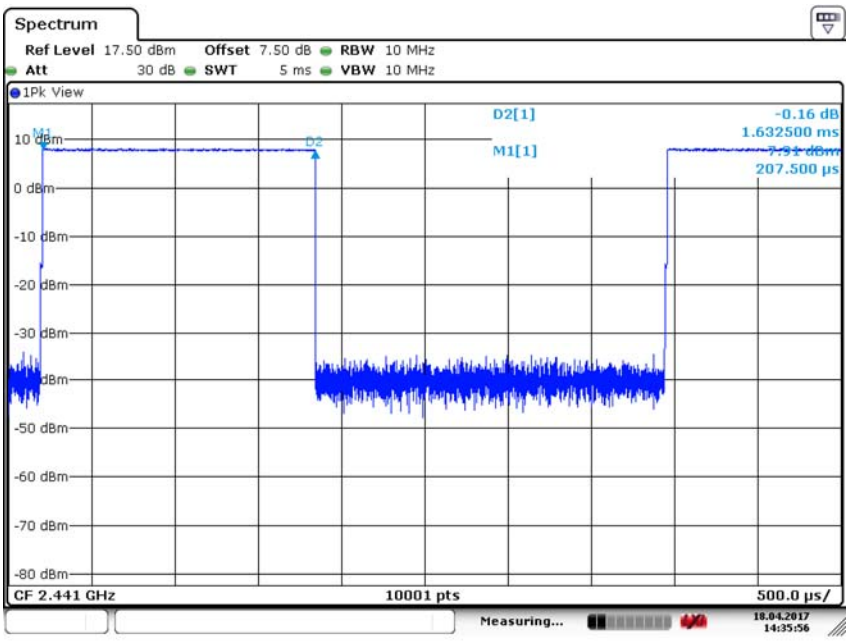
Dwell Time

Modulation type: GFSK

Packet type	Time slot length μs	Dwell time	Dwell time ms
DH1	376	time slot length *31.6 *1600/2 /79	120
DH3	1633	time slot length * 31.6 *1600/4 /79	261
DH5	2851	time slot length * 31.6 *1600/6 /79	304

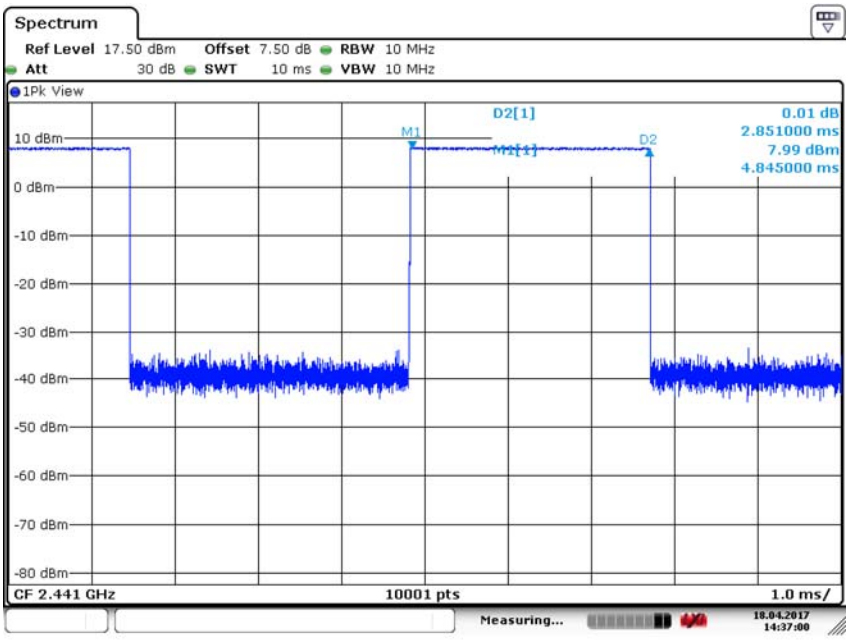


Carrier frequency (MHz): 2441
Packet type: DH1
Modulation type: GFSK



Date: 18.APR.2017 14:35:55

Carrier frequency (MHz): 2441
Packet type: DH3
Modulation type: GFSK

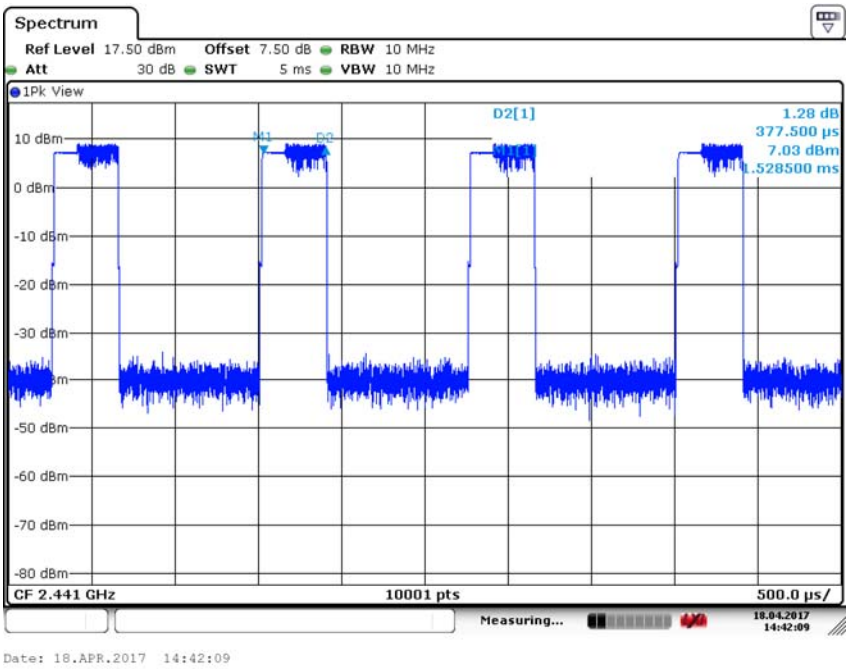


Date: 18.APR.2017 14:37:00

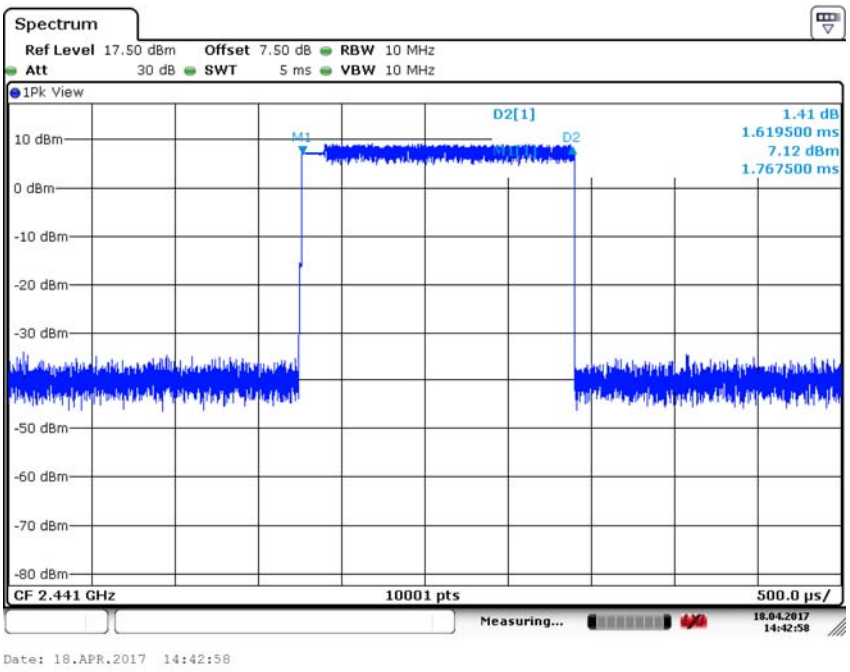
Carrier frequency (MHz): 2441
Packet type: DH5
Modulation type: GFSK

Modulation type: π/4DQPSK

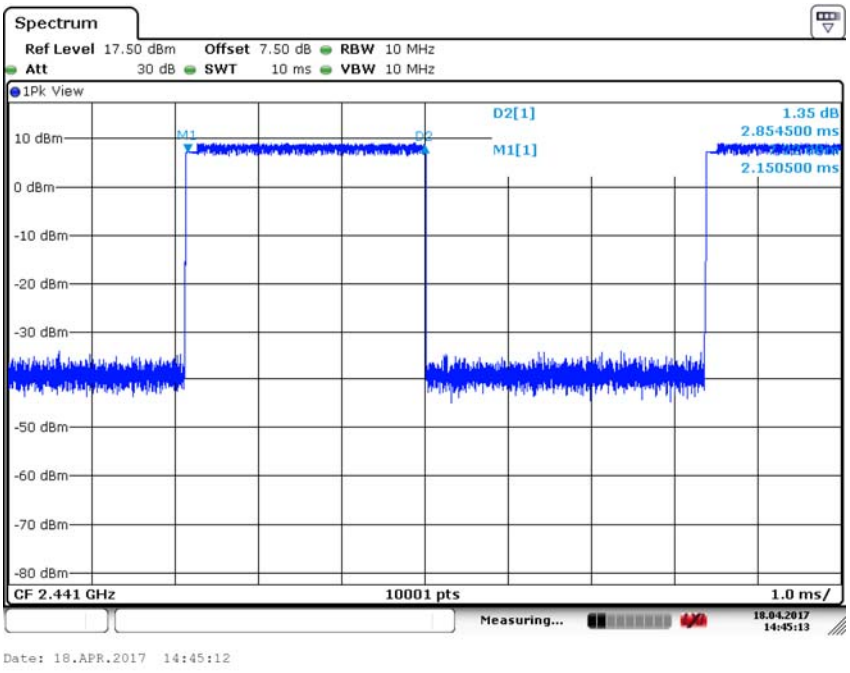
Packet type	Time slot length μs	Dwell time	Dwell time ms
DH1	378	time slot length *31.6 *1600/2 /79	121
DH3	1620	time slot length * 31.6 *1600/4 /79	259
DH5	2855	time slot length * 31.6 *1600/6 /79	305



Carrier frequency (MHz): 2441
Packet type: DH1
Modulation type: π/4DQPSK



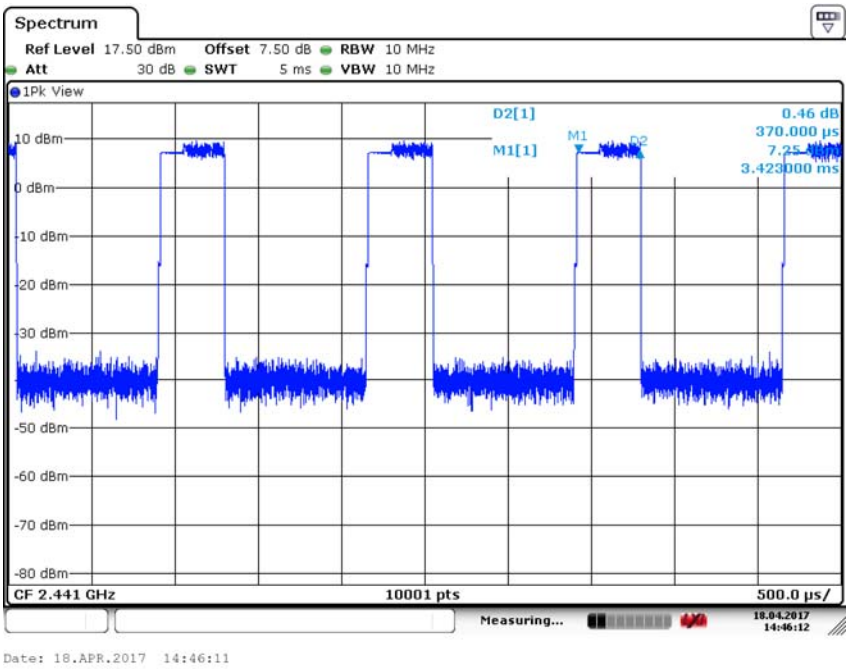
Carrier frequency (MHz): 2441
Packet type: DH3
Modulation type: π/4DQPSK



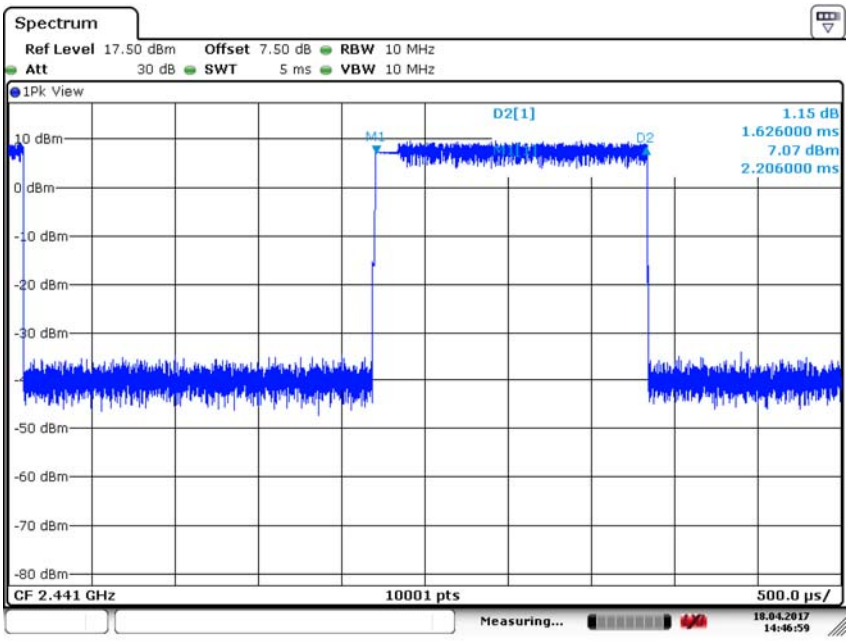
Carrier frequency (MHz): 2441
Packet type: DH5
Modulation type: π/4DQPSK

Modulation type: 8DPSK

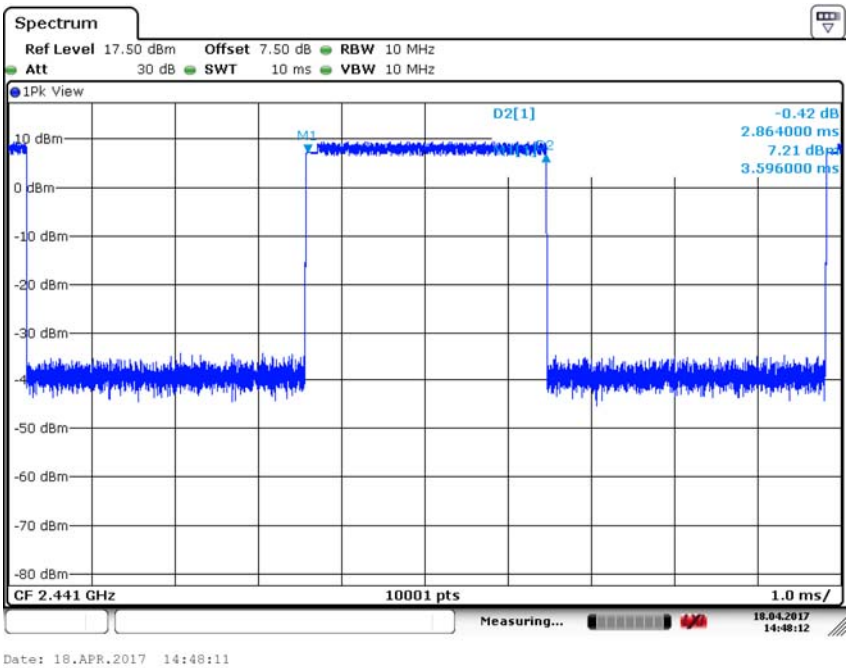
Packet type	Time slot length μs	Dwell time	Dwell time ms
DH1	370	time slot length *31.6 *1600/2 /79	118
DH3	1626	time slot length * 31.6 *1600/4 /79	260
DH5	2864	time slot length * 31.6 *1600/6 /79	305



Carrier frequency (MHz): 2441
Packet type:DH1
Modulation type: 8DPSK



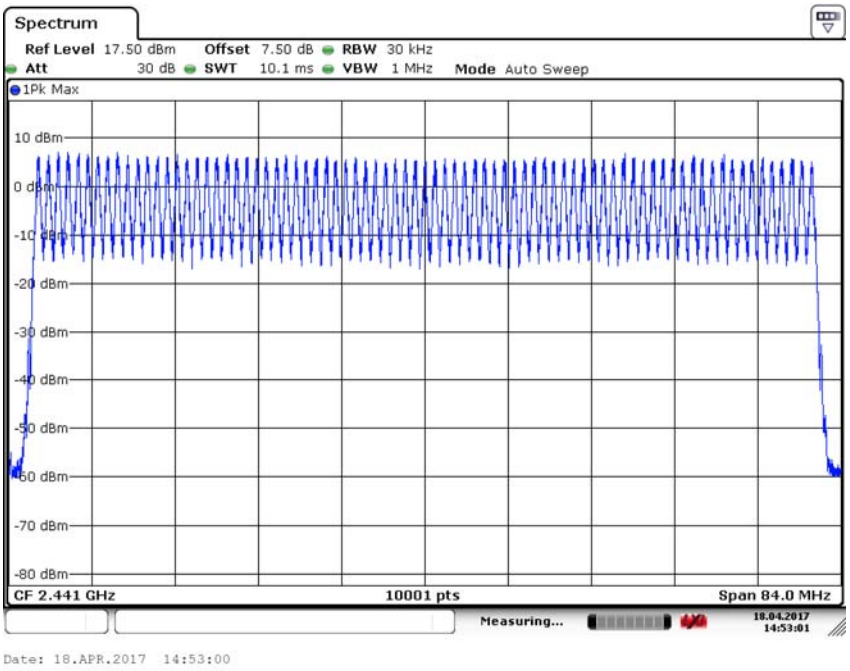
Carrier frequency (MHz): 2441
Packet type:DH3
Modulation type: 8DPSK



Carrier frequency (MHz): 2441
Packet type:DH5
Modulation type: 8DPSK

Number of Hopping Frequencies

Op-mode	Result
Hopping mode	79

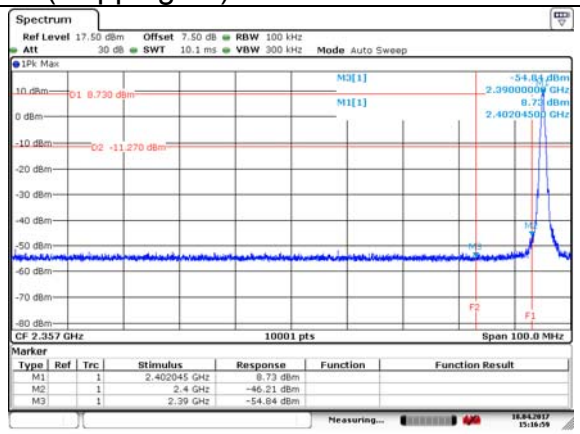


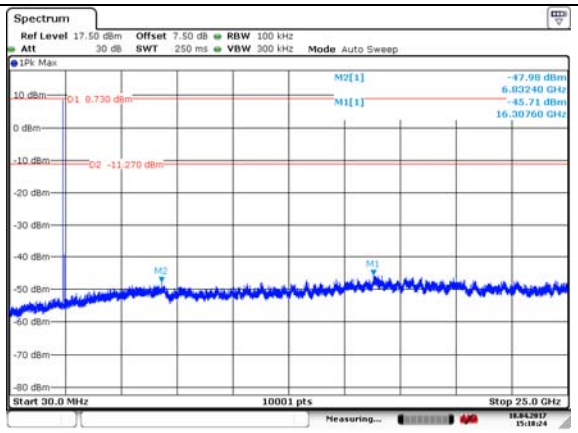
Op-mode: Hopping mode

Conducted out of band emission measurement

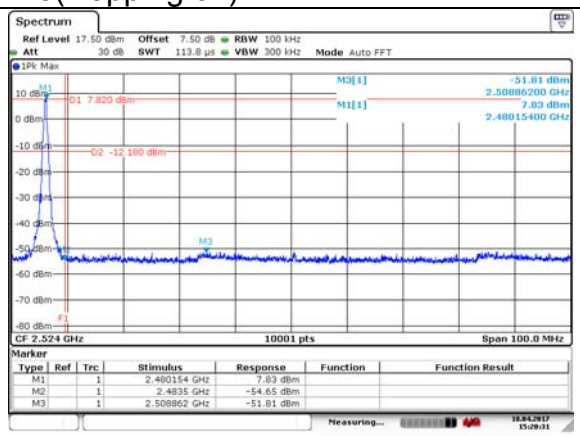
GFSK

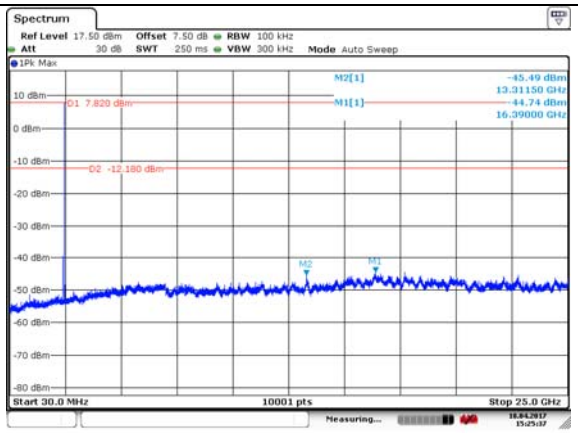
CH0 (Hopping off)



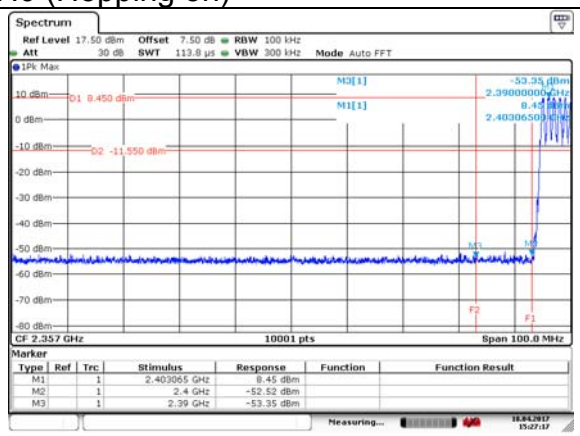


CH78(Hopping off)

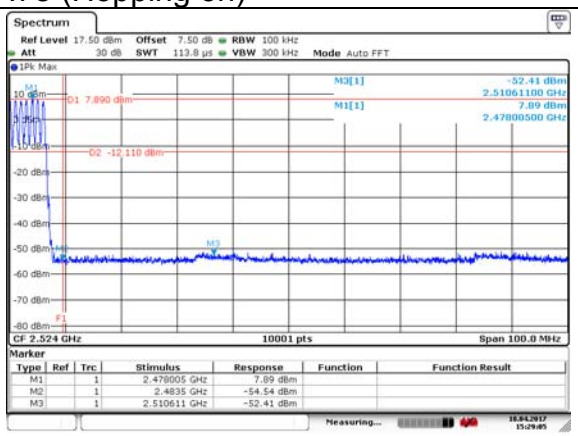




CH0 (Hopping on)

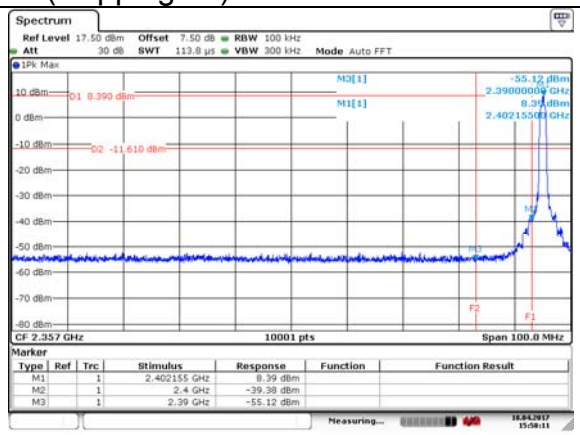


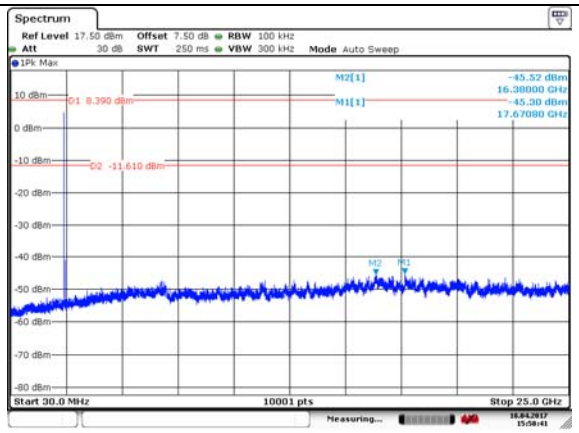
CH78 (Hopping on)



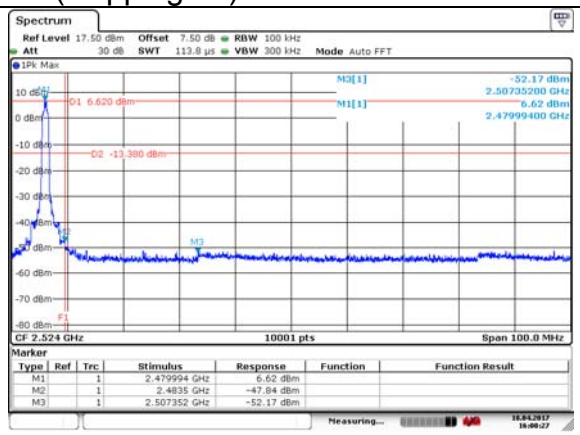
π/4DQPSK

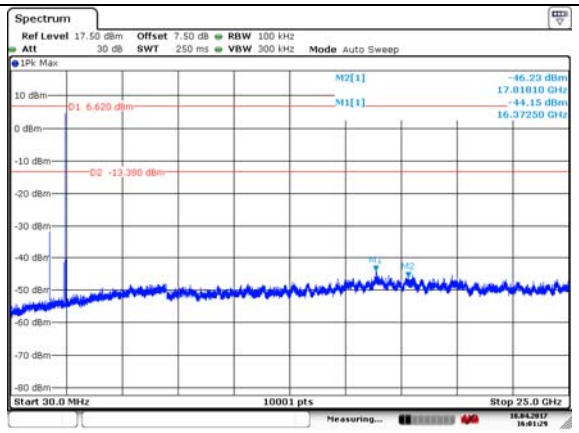
CH0 (Hopping off)



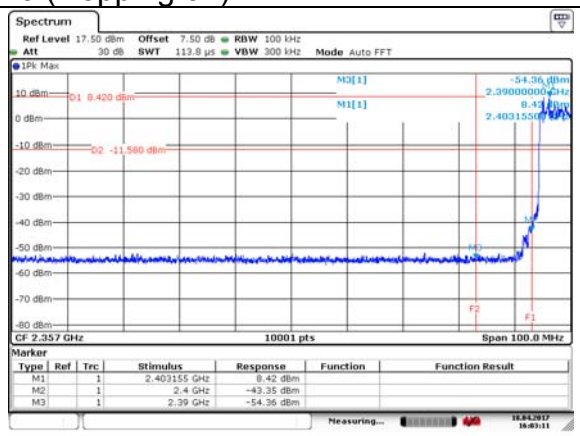


CH78(Hopping off)

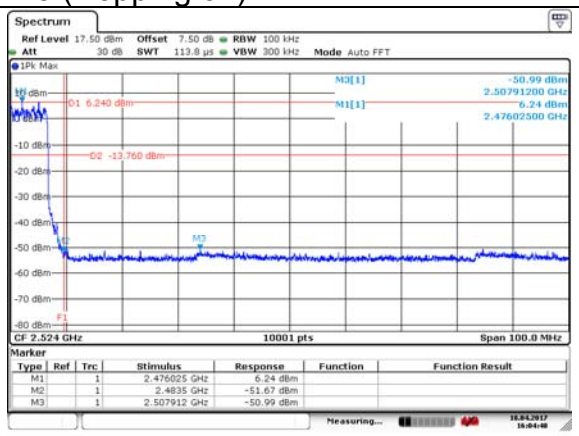




CH0 (Hopping on)

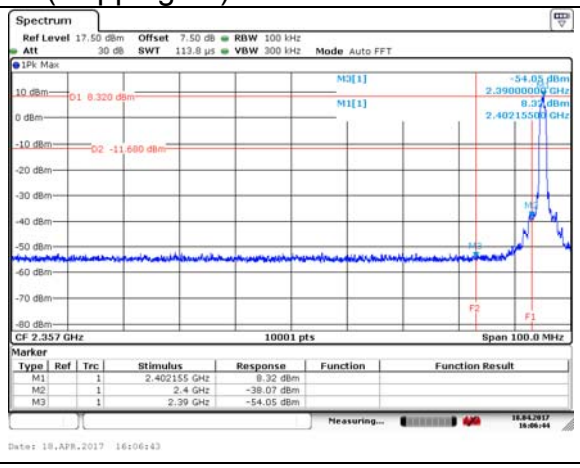


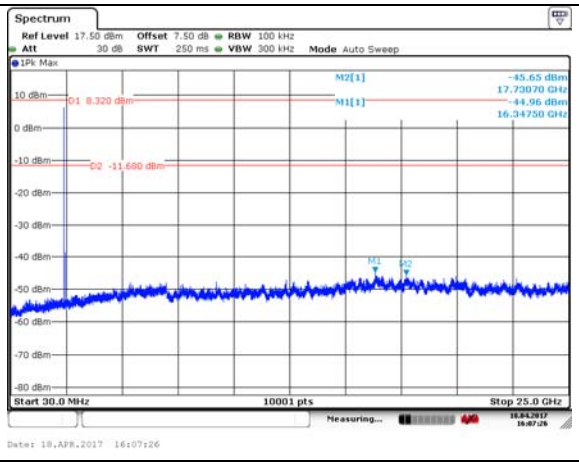
CH78 (Hopping on)



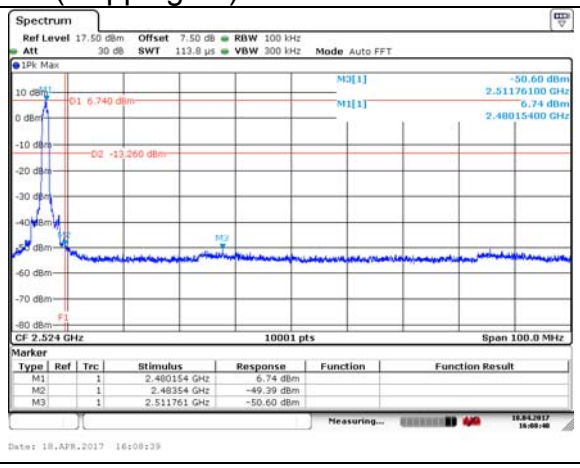
8DPSK

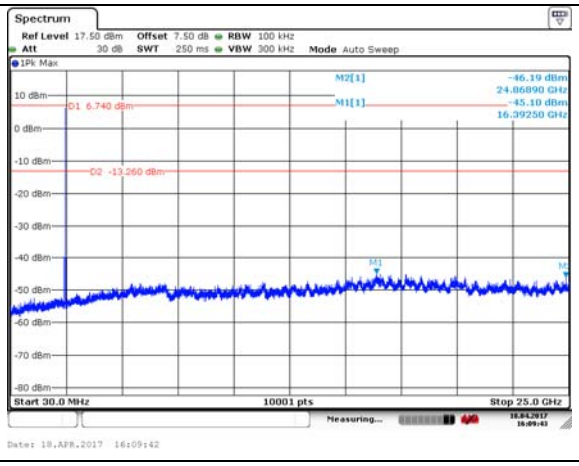
CH0 (Hopping off)



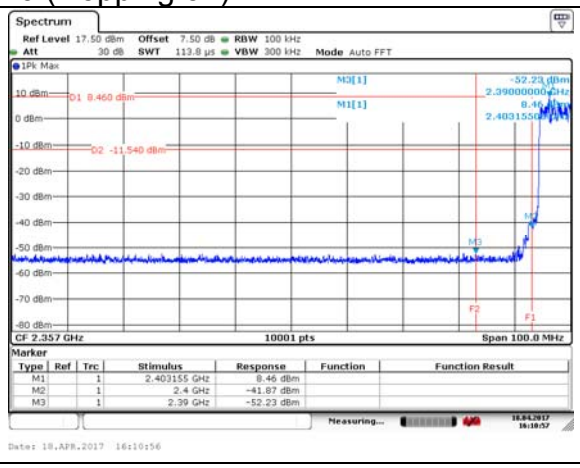


CH78(Hopping off)

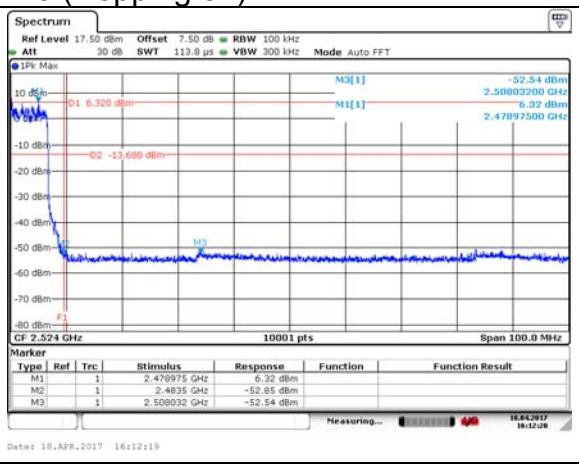




CH0 (Hopping on)



CH78 (Hopping on)



APPENDIX B – TEST DATA OF RADIATED EMISSION

Spurious Radiated Emissions

The worst case attitude: The mobile lay down.

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	99.21	65.21	N/A	N/A	8.90	25.10
2	2390	51.51	17.51	-22.49	74.00	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	93.97	59.97	N/A	N/A	8.90	25.10
2	2390	49.75	15.75	-24.25	74.00	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	91.25	57.25	N/A	N/A	8.90	25.10
2	2390	47.34	13.34	-6.66	54.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: GFSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	87.65	53.65	N/A	N/A	8.90	25.10
2	2390	47.29	13.29	-6.71	54.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: GFSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	94.56	60.56	N/A	N/A	8.90	25.10
2	2483.5	53.43	19.43	-20.57	74.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: GFSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	91.22	57.22	N/A	N/A	8.90	25.10
2	2483.5	49.53	15.53	-24.47	74.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: GFSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	85.81	51.81	N/A	N/A	8.90	25.10
2	2483.5	47.52	13.52	-6.48	54.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: GFSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	81.59	47.59	N/A	N/A	8.90	25.10
2	2483.5	47.17	13.17	-6.83	54.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	95.22	61.22	N/A	N/A	8.90	25.10
2	2390	54.42	20.42	-19.58	74.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	89.24	55.24	N/A	N/A	8.90	25.10
2	2390	47.04	13.04	-26.96	74.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	84.20	50.20	N/A	N/A	8.90	25.10
2	2390	46.61	12.61	-7.39	54.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	82.08	48.08	N/A	N/A	8.90	25.10
2	2390	46.23	12.23	-7.77	54.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	96.12	62.12	N/A	N/A	8.90	25.10
2	2483.5	52.65	18.65	-21.35	74.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	88.79	54.79	N/A	N/A	8.90	25.10
2	2483.5	49.31	15.31	-24.69	74.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	85.31	51.31	N/A	N/A	8.90	25.10
2	2483.5	46.31	12.31	-7.69	54.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: π/4DQPSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	82.50	48.50	N/A	N/A	8.90	25.10
2	2483.5	45.90	11.90	-8.10	54.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	97.70	63.70	N/A	N/A	8.90	25.10
2	2390	54.49	20.49	-19.51	74.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	88.05	54.05	N/A	N/A	8.90	25.10
2	2390	47.59	13.59	-26.41	74.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	83.52	49.52	N/A	N/A	8.90	25.10
2	2390	47.64	13.64	-6.36	54.0	8.90	25.10

Carrier frequency (MHz): 2402
Channel No.:0
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2402	79.43	45.43	N/A	N/A	8.90	25.10
2	2390	46.80	12.80	-7.20	54.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Vertical
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	96.40	62.40	N/A	N/A	8.90	25.10
2	2483.5	51.88	17.88	-22.12	74.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Peak

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	88.58	54.58	N/A	N/A	8.90	25.10
2	2483.5	48.49	14.49	-25.51	74.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Vertical
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	86.55	52.55	N/A	N/A	8.90	25.10
2	2483.5	45.06	11.06	-8.94	54.0	8.90	25.10

Carrier frequency (MHz): 2480
Channel No.:78
Test Mode: 8DPSK
Polarity: Horizontal
Detector: Average

No	Frequency (MHz)	Measure Level (dBuV/m)	Reading Level (dBuV)	Over Limit (dB)	Limit (dBuV/m)	cable loss (dB)	antenna factor (dB)
1	2480	82.41	48.41	N/A	N/A	8.90	25.10
2	2483.5	44.83	10.83	-9.17	54.0	8.90	25.10

Sample Calculations

Determining Spurious Emissions Levels

A “reference path loss” is established and the A_{Rpl} is the attenuation of “reference path loss”, and including the gain of receive antenna, the gain of the preamplifier, the cable loss.

The measurement results are obtained as described below:

Result= P_{mea} + A_{Rpl}

Channel No.:39

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)
30.00	21.10	21.0	0.10	Vertical	40.0
107.75	12.70	12.5	0.20	Vertical	43.5
168.01	11.80	10.6	1.20	Vertical	43.5
183.56	10.70	11.0	-0.30	Vertical	43.5
556.79	21.70	22.4	-0.70	Vertical	46.0
885.31	28.10	28.0	0.10	Vertical	46.0

For π/4DQPSK

Channel No.:39

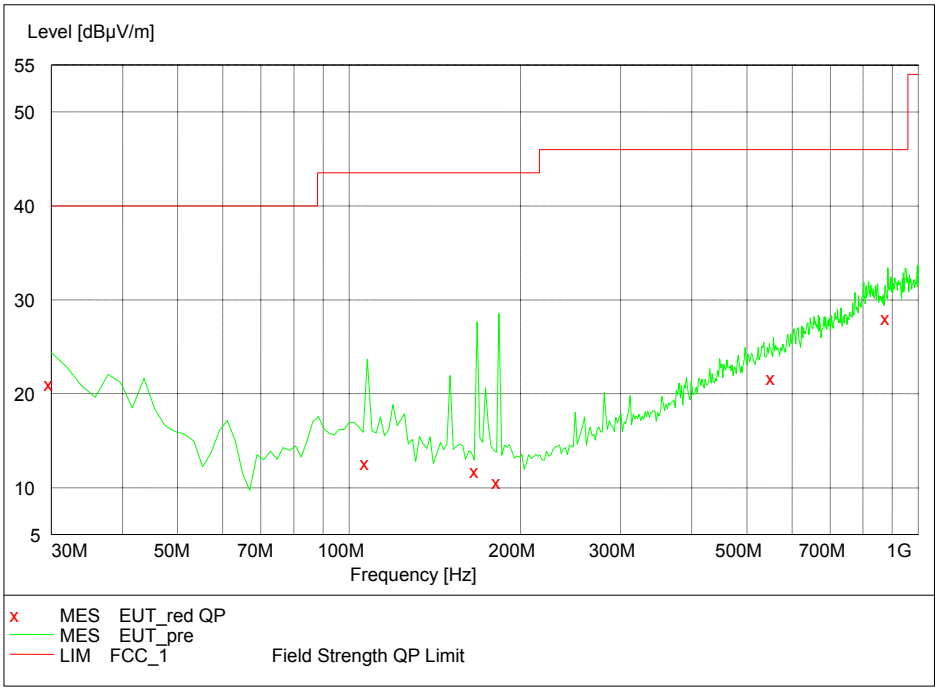
Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)
31.94	21.00	20.0	1.00	Vertical	40.0
107.75	12.00	12.5	-0.50	Vertical	43.5
168.01	10.60	10.6	0.00	Horizontal	43.5
183.56	10.40	11.0	-0.60	Vertical	43.5
556.79	21.60	22.4	-0.80	Vertical	46.0
910.58	28.30	28.3	0.00	Vertical	46.0

For 8DPSK

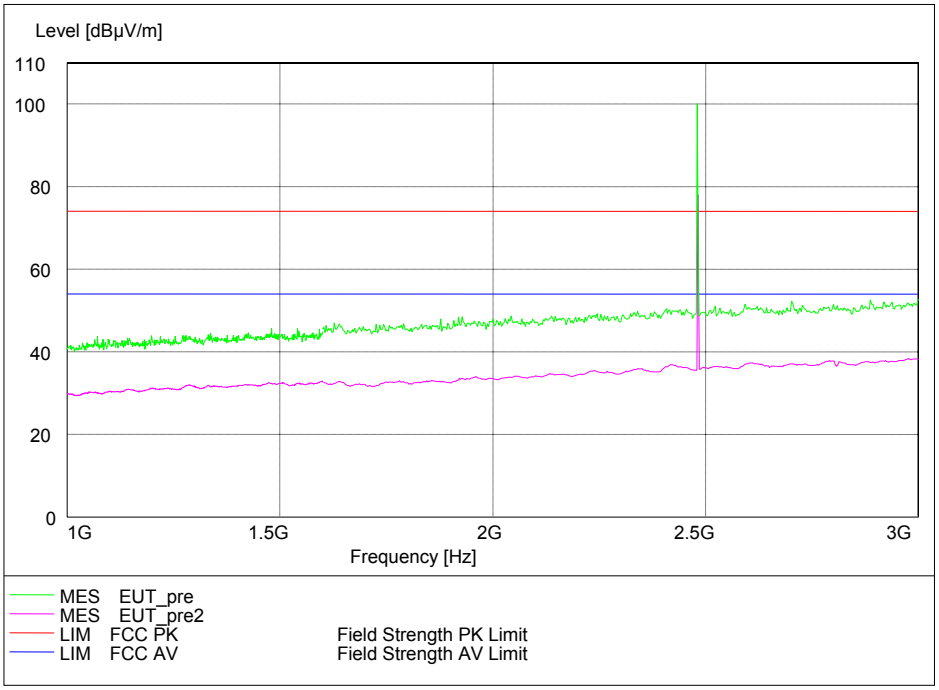
Channel No.:39

Frequency (MHz)	Result (dBuV/m)	ARpl (dB)	Pmea (dBuV/m)	Polarity	Limit (dBuV/m)
31.94	21.00	20.0	1.00	Vertical	40.0
107.76	12.50	12.5	0.00	Horizontal	43.5
169.02	10.40	10.6	-0.20	Horizontal	43.5
185.74	10.40	11.0	-0.60	Vertical	43.5
535.41	21.30	21.9	-0.60	Vertical	46.0
957.23	28.90	28.6	0.30	Vertical	46.0

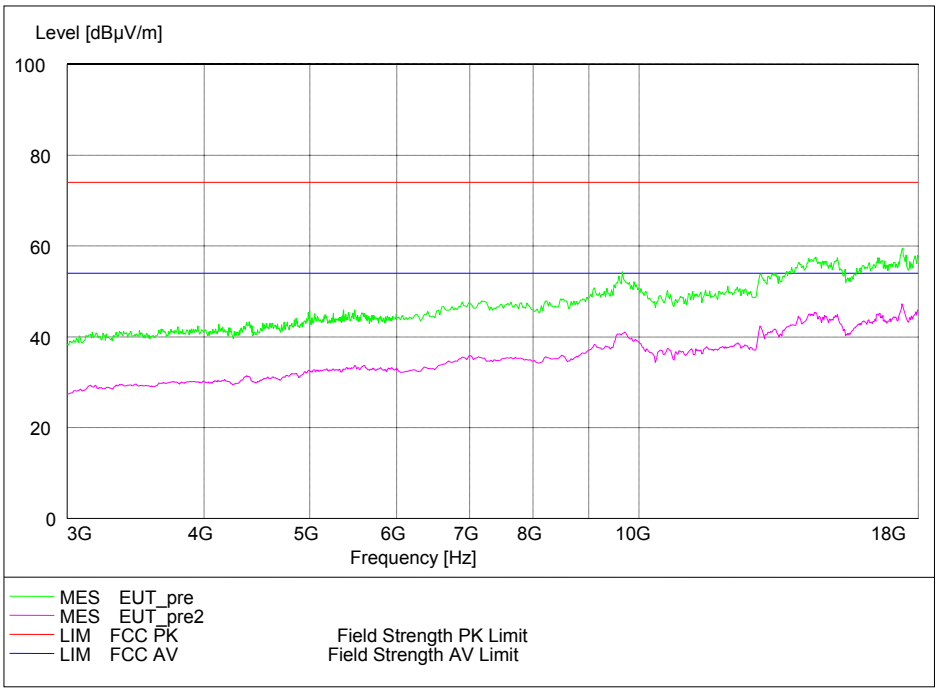
Carrier frequency (MHz): 2441
Channel No.:39



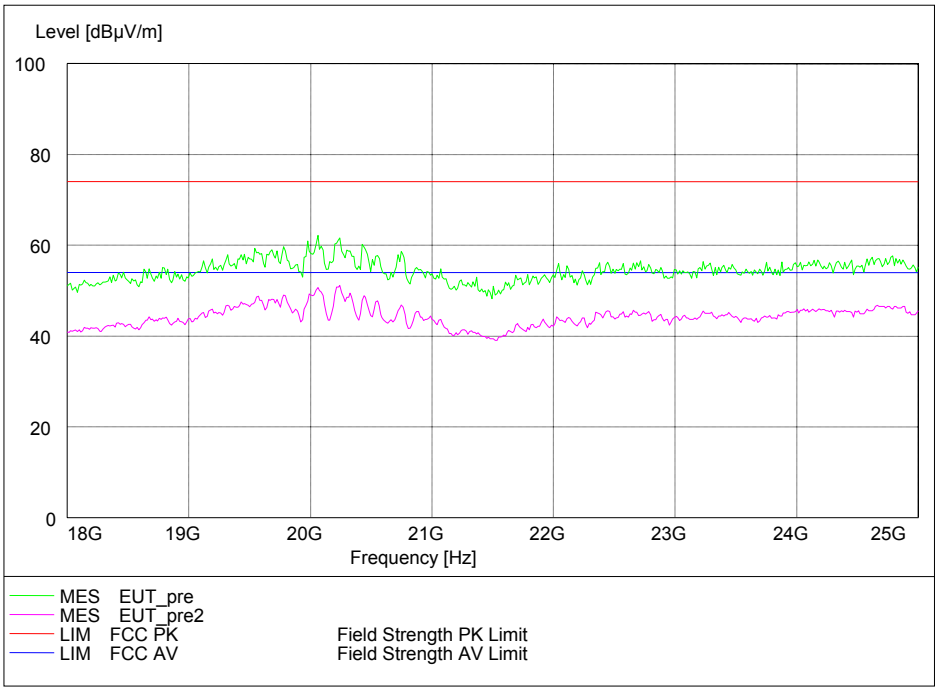
Frequency Range: 30MHz-1000MHz
Detector: QP mode
Modulation type: GFSK



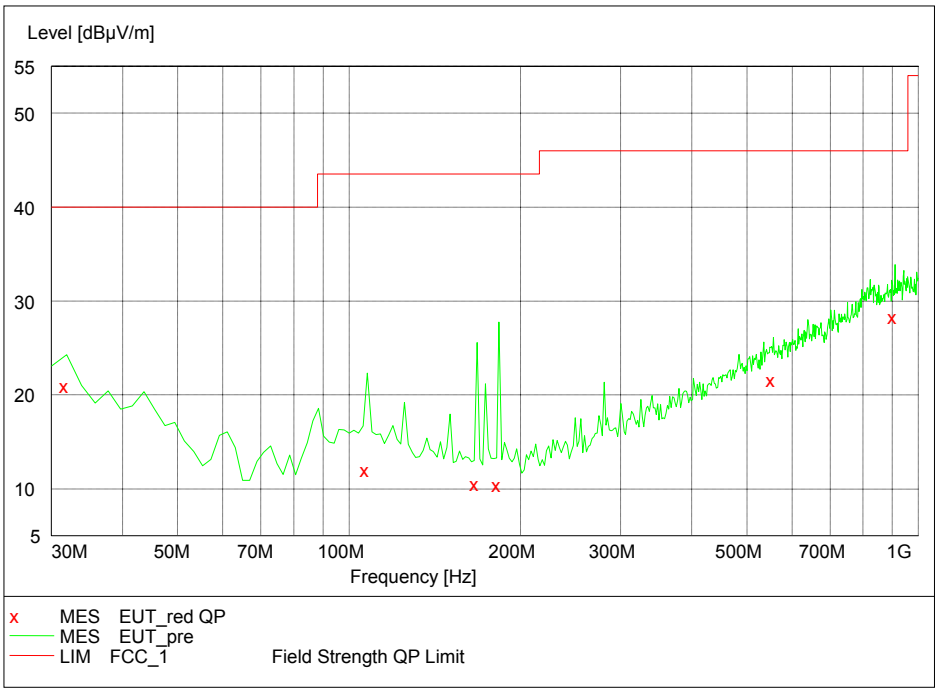
Frequency Range: 1GHz-3GHz
Detector: Av mode and PK mode
Modulation type: GFSK



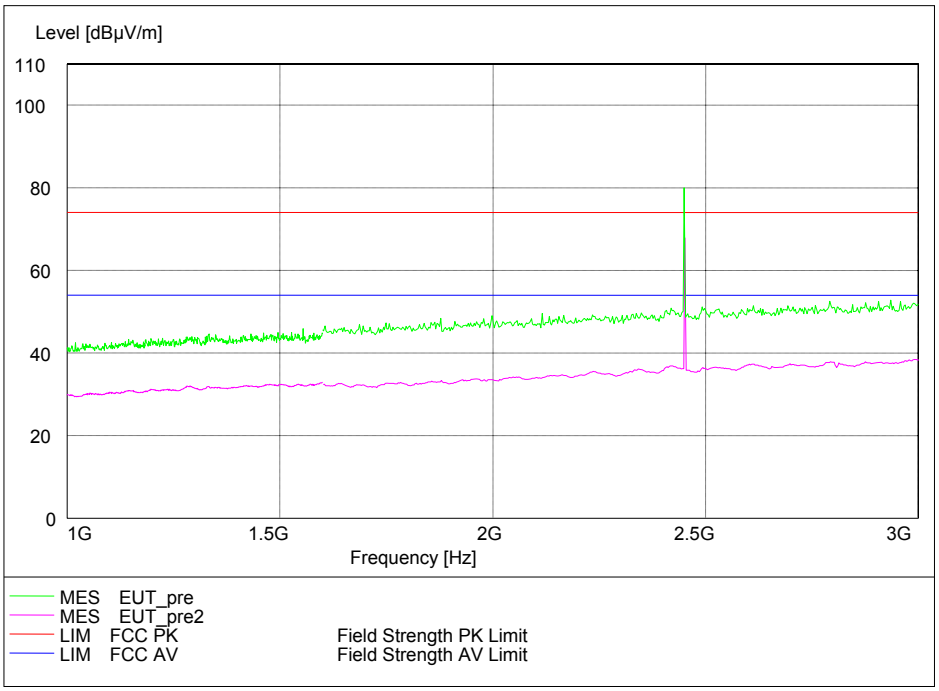
Frequency Range: 3GHz-18GHz
Detector: Av mode and PK mode
Modulation type: GFSK



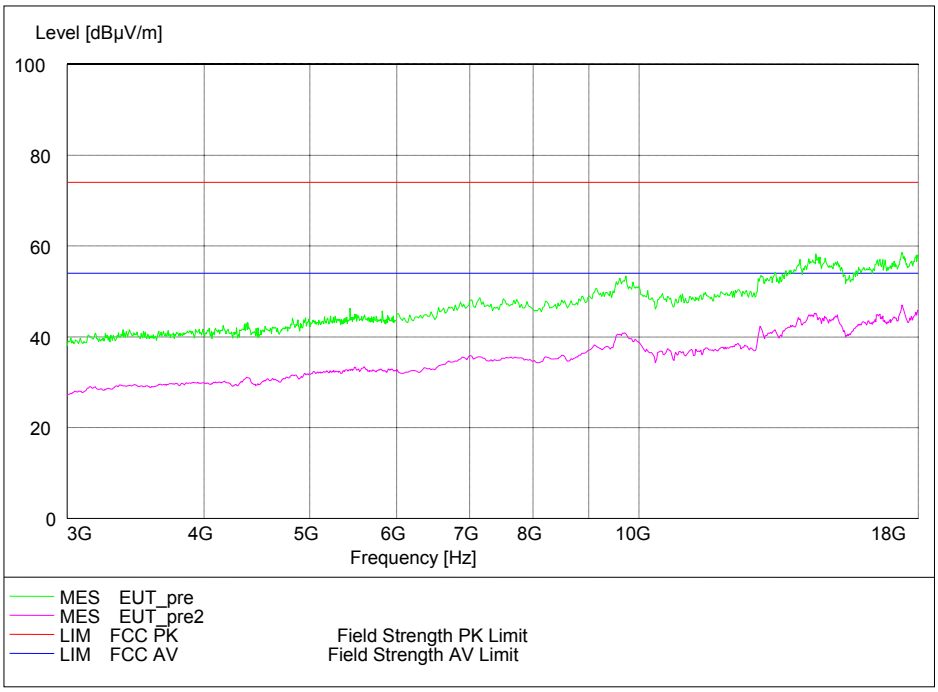
Frequency Range: 18GHz-25GHz
Detector: Av mode and PK mode
Modulation type: GFSK



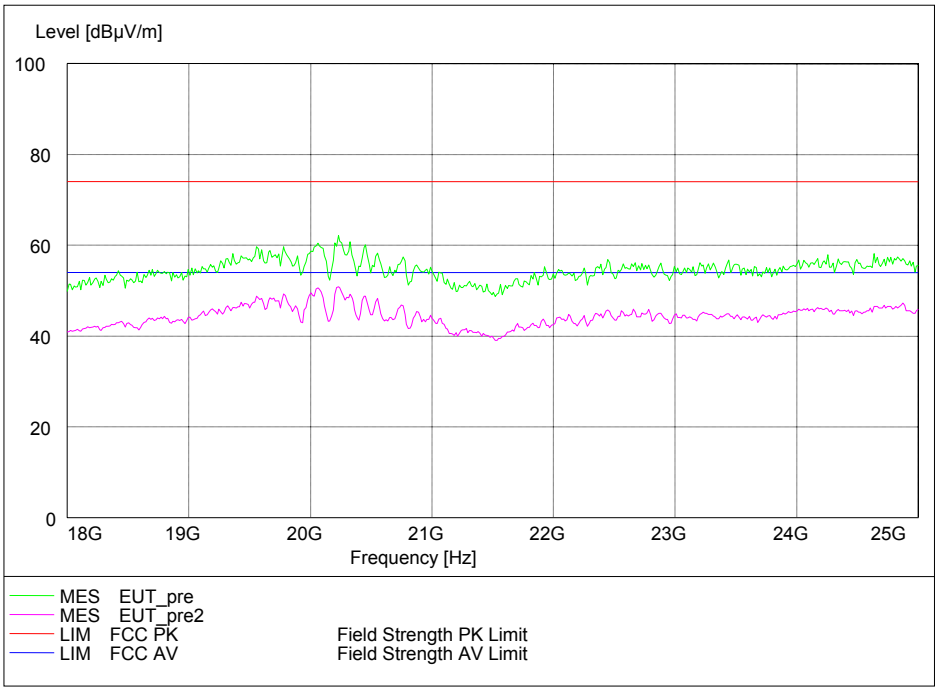
Frequency Range: 30MHz-1000 MHz
Detector: QP mode
Modulation type: π/4DQPSK



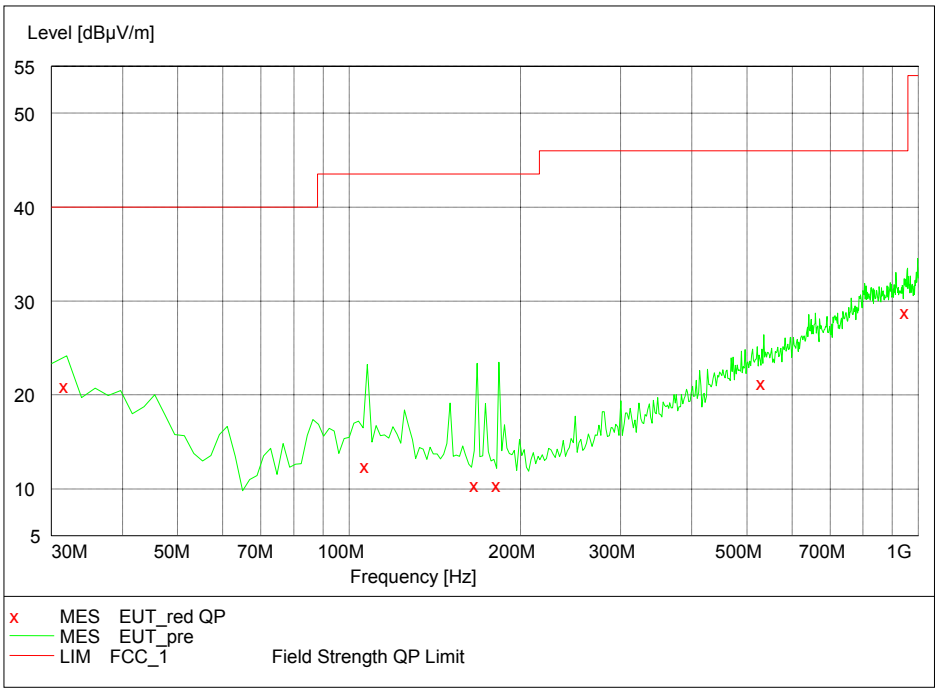
Frequency Range: 1GHz-3GHz
Detector: Av mode and PK mode
Modulation type: π/4DQPSK



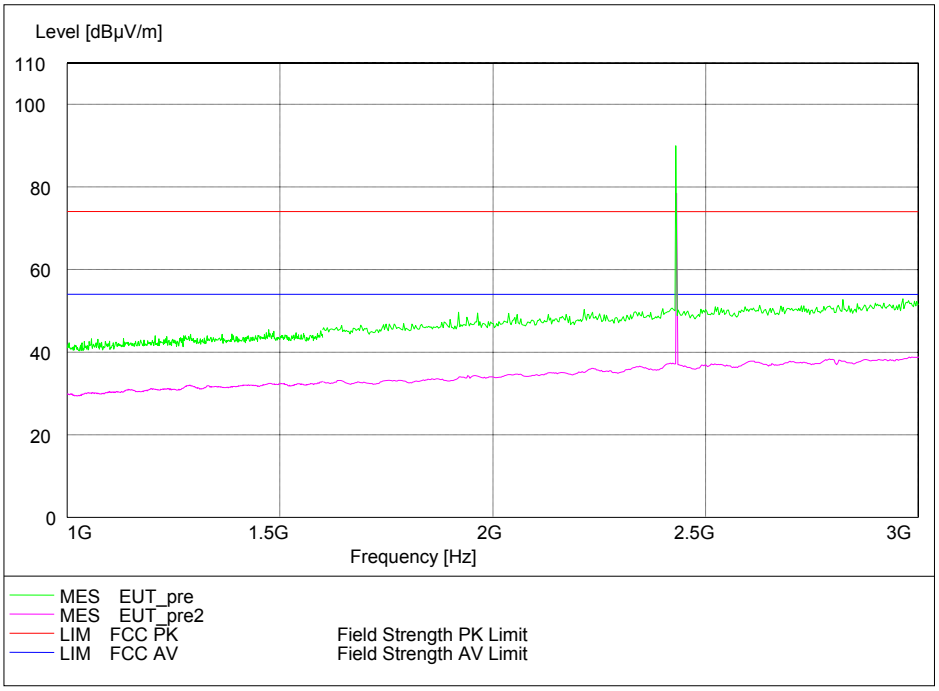
Frequency Range: 3GHz-18GHz
Detector: Av mode and PK mode
Modulation type: π/4DQPSK



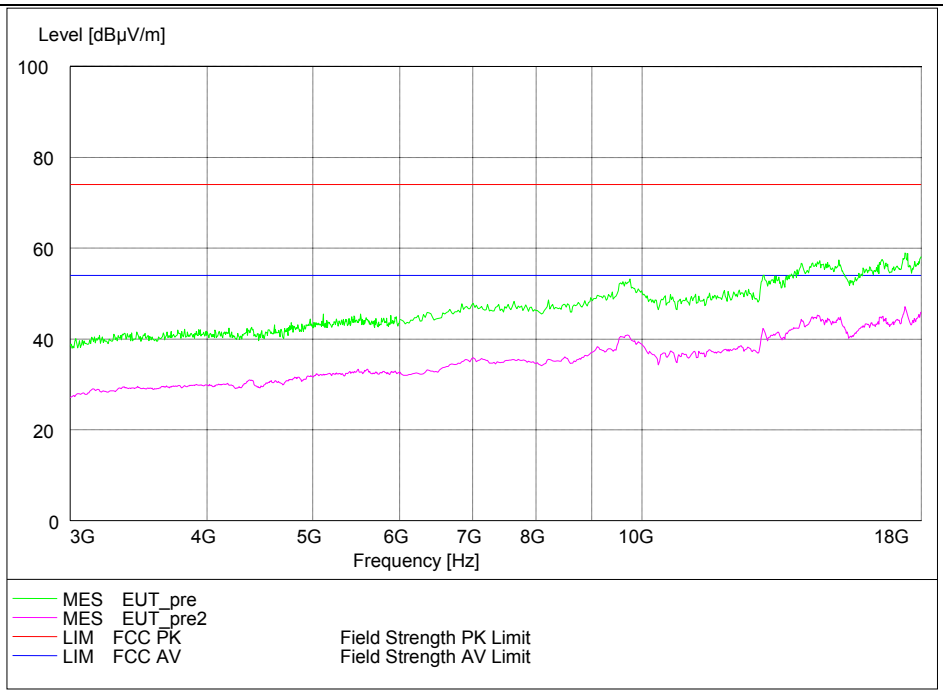
Frequency Range: 18GHz-25GHz
Detector: Av mode and PK mode
Modulation type: π/4DQPSK



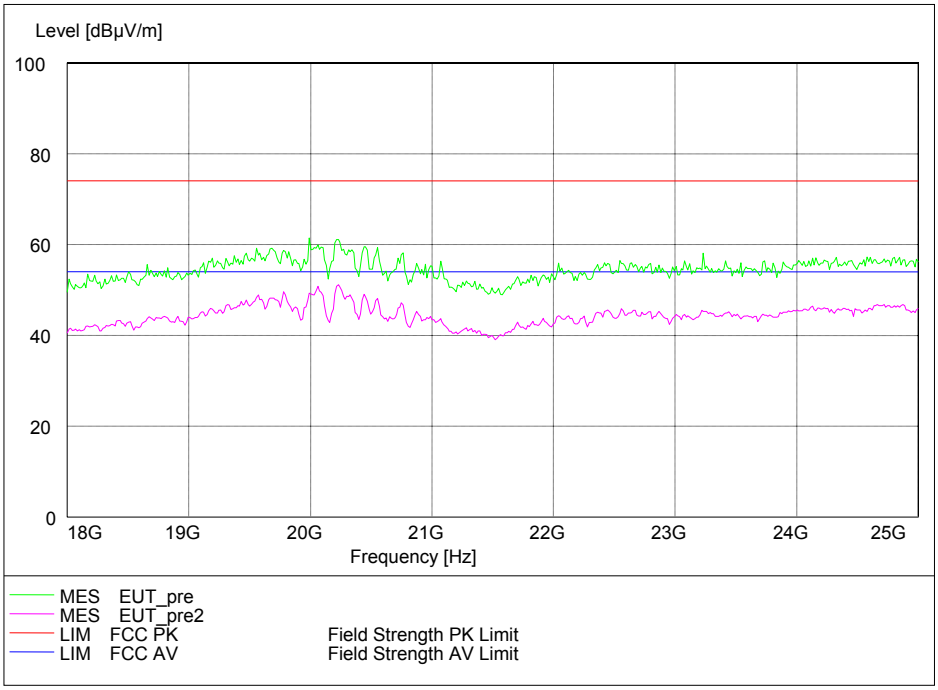
Frequency Range: 30MHz-1000 MHz
Detector: QP mode
Modulation type: 8DPSK



Frequency Range: 1GHz-3GHz
Detector: Av mode and PK mode
Modulation type: 8DPSK



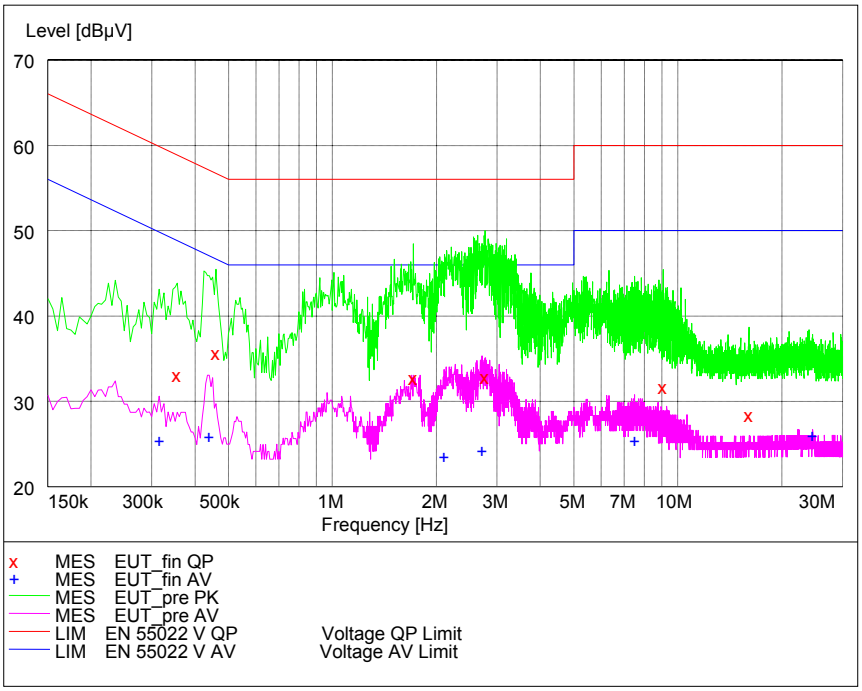
Frequency Range: 3GHz-18GHz
Detector: Av mode and PK mode
Modulation type: 8DPSK



Frequency Range: 18GHz-25GHz
Detector: Av mode and PK mode
Modulation type: 8DPSK

AC Power line Conducted Emission

Noise Level of the Measuring Instrument



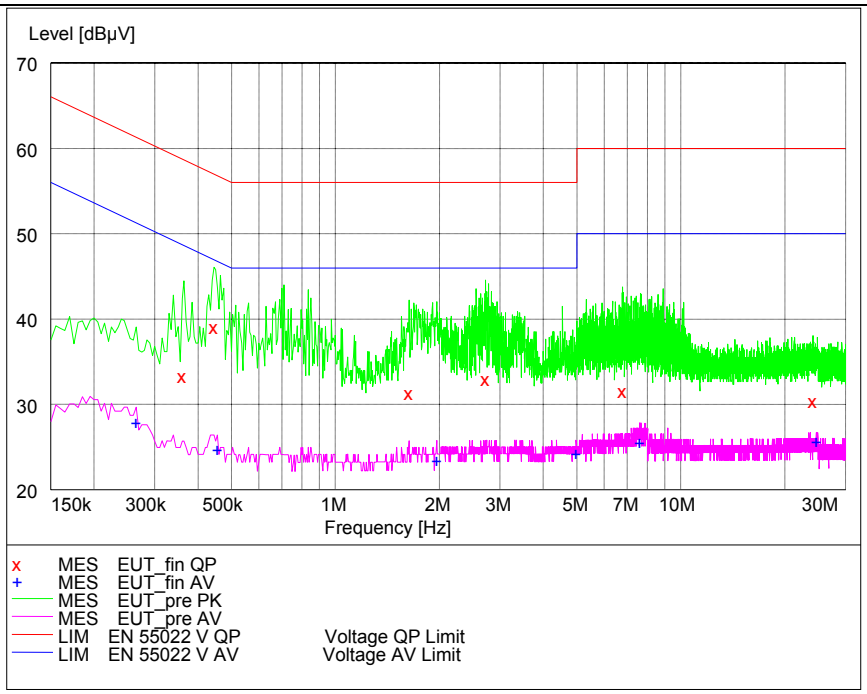
L Line

MEASUREMENT RESULT: "EUT_fin QP"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.355000	33.20	29.6	59	25.6	---	---
0.460000	35.80	29.5	57	20.9	---	---
1.715000	32.90	29.5	56	23.1	---	---
2.765000	33.00	29.6	56	23.0	---	---
9.065000	31.80	29.8	60	28.2	---	---
16.095000	28.60	30.1	60	31.4	---	---

MEASUREMENT RESULT: "EUT_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.315000	25.50	29.6	50	24.3	---	---
0.440000	26.00	29.5	47	21.1	---	---
2.105000	23.60	29.5	46	22.4	---	---
2.710000	24.40	29.6	46	21.6	---	---
7.505000	25.50	29.7	50	24.5	---	---
24.570000	26.10	31.1	50	23.9	---	---



N Line

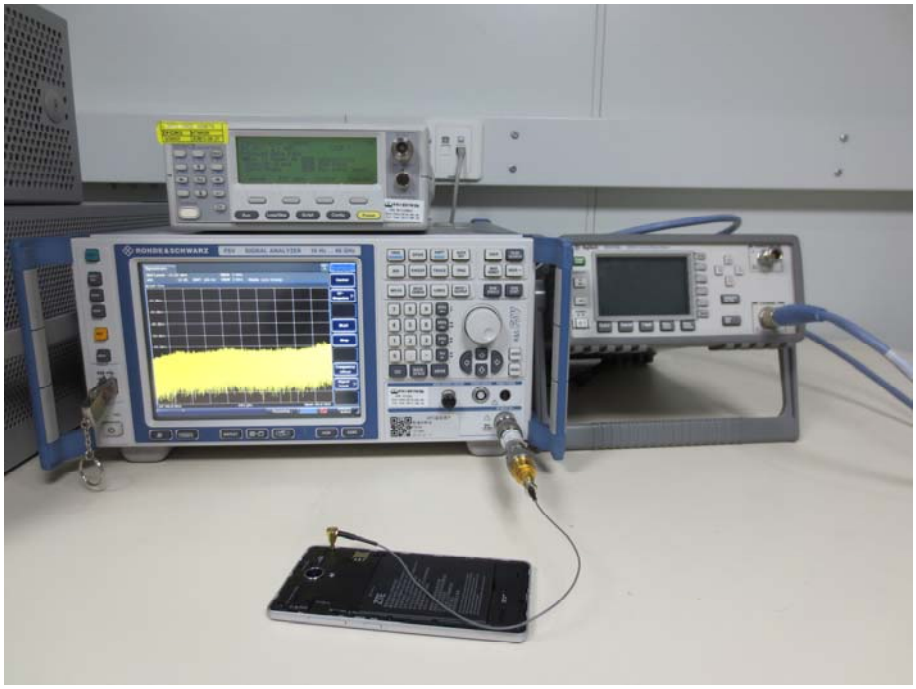
MEASUREMENT RESULT: "EUT_fin QP"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.360000	33.50	29.5	59	25.2	---	---
0.445000	39.20	29.5	57	17.7	---	---
1.635000	31.50	29.5	56	24.5	---	---
2.725000	33.20	29.6	56	22.8	---	---
6.785000	31.70	29.7	60	28.3	---	---
24.180000	30.60	31.0	60	29.4	---	---

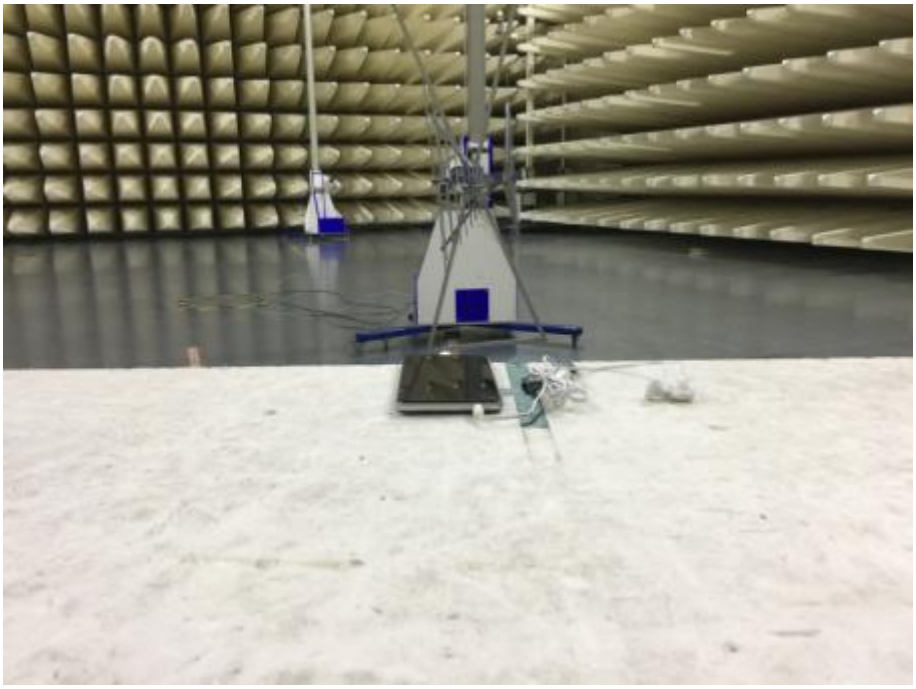
MEASUREMENT RESULT: "EUT_fin AV"

Frequency MHz	Level dBµV	Transd dB	Limit dBµV	Margin dB	Line	PE
0.265000	28.00	29.6	51	23.2	---	---
0.455000	24.80	29.5	47	22.0	---	---
1.965000	23.50	29.5	46	22.5	---	---
4.975000	24.40	29.6	46	21.6	---	---
7.615000	25.60	29.7	50	24.4	---	---
24.685000	25.80	31.1	50	24.2	---	---

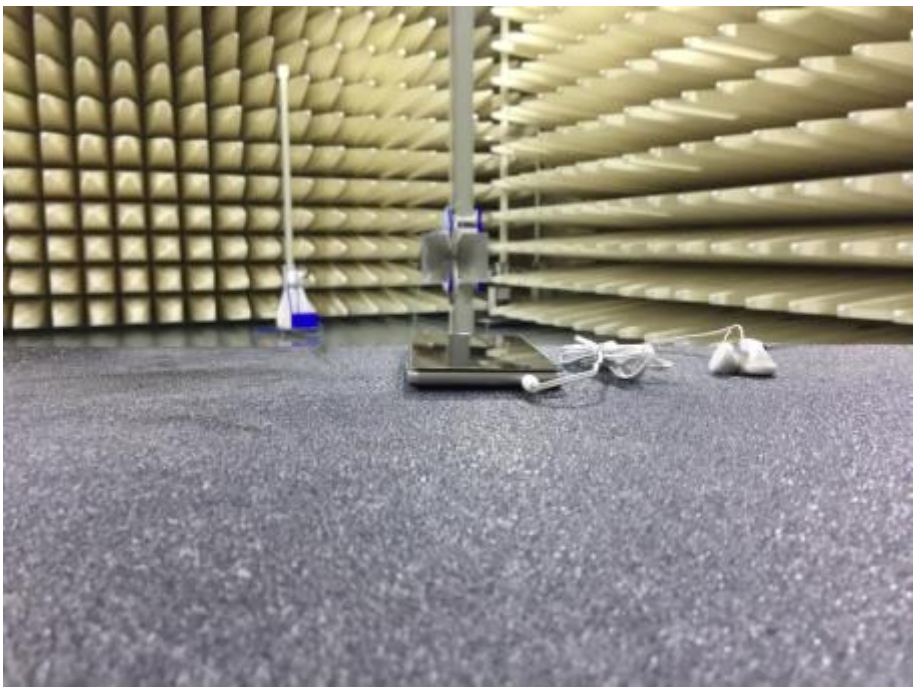
APPENDIX C – TEST SETUP



Spurious RF Conducted Emissions Test setup



Spurious Radiated Emissions Test setup (30MHz~1GHz)



Spurious Radiated Emissions Test setup (1GHz~25GHz)

---End of Test Report---