



Certificate Number: 5055.02

# **TEST REPORT FOR BLE TESTING**

Report No.: SRTC2022-9004(F)-22060802(E)

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

Product Model: ZTE A7040

Applicant: ZTE Corporation

Manufacturer: ZTE Corporation

Specification: FCC Part 15 Subpart C (2021)

FCC ID: SRQ-ZTEA7040M

The State Radio\_monitoring\_center Testing Center (SRTC) 15th Building, No.30 Shixing Street, Shijingshan District, Beijing, P.R.China Tel: 86-10-57996183 Fax: 86-10-57996388



# CONTENTS

1. GENERAL INFORMATION	2
2 DESCRIPTION OF THE DEVICE UNDER TEST	3
3 REFERENCE SPECIFICATION	7
4 KEY TO NOTES AND RESULT CODES	7
5 RESULT SUMMARY	8
6 TEST RESULT	9
7 MEASUREMENT UNCERTAINTIES	
8 TEST EQUIPMENTS	
APPENDIX A – TEST DATA OF CONDUCTED EMISSION	23
APPENDIX B – TEST DATA OF RADIATED EMISSION	



# **1. GENERAL INFORMATION**

#### **1.1 Notes of the test report**

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#### **1.2 Information about the testing laboratory**

Company:	The State Radio_monitoring_center Testing Center (SRTC)
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#### 1.3 Applicant's details

Company:	ZTE Corporation
Address:	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park,
Address.	Nanshan District, Shenzhen, Guangdong, 518057, P.R.China

#### 1.4 Manufacturer's details

Company:	ZTE Corporation
Address.	ZTE Plaza, #55 Keji Road South, Hi-Tech, Industrial Park,
	Nanshan District, Shenzhen, Guangdong, 518057, P.R.China



# 1.5 Test Environment

Date of Receipt of test sample at SRTC:	2022-04-07				
Testing Start Date:	2022-04-09				
Testing End Date:	2022-04-25				
Environmental Data:	Temperature (°C)	Humidity (%)			
Ambient:	25 40				
Normal Supply Voltage (V d.c.):	3.8				

# 2 DESCRIPTION OF THE DEVICE UNDER TEST

### 2.1 Final Equipment Build Status

Frequency Range:	2.402GHz~2.480GHz
Number of Channel:	40
Modulation Type:	GFSK
Equipment Class:	DTS
Channel Spacing:	2MHz
Data Rate:	LE 1Mbps LE Coded 125kbps/500kbps
Power Supply:	Charger
Software Revision:	MyOS11.0.0_A7040_ATT_MX
Hardware Revision:	ZTE A7040HW1.0
IMEI:	864341060000976 864341060000901 864488060001304
Antenna type:	Refer to Note
Antenna connector:	Refer to Note



Note: The modified product and the variant product, is different on

#### SOFTWARE MODIFICATIONS:

Protocol Stack changes: NO MMS/STK changes: NO JAVA changes: NO Other changes detailed: YES , disable the WCDMA B1, LTE B3/B12/17/B38. enable LTE B26

#### HARDWARE MODIFICATION:

Band changes: deleted the WCDMA B1, LTE B3/B12/17/B38 ,added the LTEB26. Power Amplifier changes: NO Antenna changes: NO PCB Layout changes: NO Components on PCB changes: Yes. LCD changes: NO Speaker changes: NO Camera changes: NO Vibrator changes: NO Bluetooth changes: NO FM changes: NO Other changes: NO

#### MECHANICAL MODIFICATIONS:

Use new metal front/back cover or keypad: NO

Mechanical shell changes: NO Other changes detailed: NO

#### ACCESSORY MODIFICATIONS:

Battery changes: added the CosMX Battery AC Adaptor changes:NO Earphone changes:NO

Note: The test results of variant product derive from original product Report No.: SRTC2022-9004(F)-22040701(E).



### Antenna requirement (FCC part 15.203)

An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

- •The antenna(s) of the EUT are permanently attached.
- •There are no provisions for connection to an external antenna.

Note: The antenna provide to the EUT, please refer to the following table:

Brand	Model	Antenna gain	Frequency range(GHz)	Antenna type	Connecter Type
N/A	N/A	2.5dBi	2.402GHz~2.480GHz	IFA + Monopole	N/A

Manufacturers ensure that their designs will not be modified by the user or third parties arbitrary antenna parameters and performance. The EUT complies with the requirement of §15.203.

### 2.2 Description of Test Modes

40 channels are provided to this EUT:

CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)	CHANNEL	FREQ. (MHz)
0	2402	10	2422	20	2442	30	2462
1	2404	11	2424	21	2444	31	2464
2	2406	12	2426	22	2446	32	2466
3	2408	13	2428	23	2448	33	2468
4	2410	14	2430	24	2450	34	2470
5	2412	15	2432	25	2452	35	2472
6	2414	16	2434	26	2454	36	2474
7	2416	17	2436	27	2456	37	2476
8	2418	18	2438	28	2458	38	2478
9	2420	19	2440	29	2460	39	2480

# 2.2.1 Test Mode Applicability and Tested Channel Detail

EUT CONFIGURE MODE	APPLICABLE TO			DESCRIPTION	
EUT CONFIGURE MODE	RE ≥ 1G	RE<1G	PLC	APCM	-
GFSK	$\checkmark$	$\checkmark$	$\checkmark$	$\checkmark$	-

Where

 $RE \ge 1G$ : Radiated Emission above 1GHz

RE<1G: Radiated Emission below 1GHz

PLC: Power Line Conducted Emission

APCM: Antenna Port Conducted Measurement



Radiated Emission Test (Above 1GHz):

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	19	GFSK	1

Radiated Emission Test (Below 1GHz):

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	19	GFSK	1

Power Line Conducted Emission Test:

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	19	GFSK	1

Antenna Port Conducted Measurement:

This item includes all test value of each mode, but only includes spectrum plot of worst value of each mode.

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates and antenna ports (if EUT with antenna diversity architecture).

Following channel(s) was (were) selected for the final test as listed below.

AVAILABLE CHANNEL	TESTED CHANNEL	MODULATION TYPE	DATA RATE (Mbps)
0 to 39	0, 19, 39	GFSK	1



# 2.3 Duty Cycle of Test Signal

Duty cycle of test signal is < 98 %, duty factor shall be considered.

Modulation Type	Duty Cycle	Correction factor(dB)
GFSK (LE 1Mbps)	89.50%	0.48
GFSK (LE Coded 125kbps)	96.60%	0.15
GFSK (LE Coded 500kbps)	84.20%	0.75

#### 2.4 EUT Operating conditions

The software provided by client to enable the EUT under transmission condition continuously at lowest, middle and highest channel frequencies individually.

#### 2.5 Support Equipment

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

# **<u>3 REFERENCE SPECIFICATION</u>**

Specification	Version	Title
FCC part15 Subpart C	2021	Intentional radiators
ANSI C63.10	2013	Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
KDB 558074D01 V05R02r02	April 2, 2019	Guidance for compliance measurements on Digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules

# **4 KEY TO NOTES AND RESULT CODES**

Code	Meaning	
PASS	Test result shows that the requirements of the relevant specification have been met.	
FAIL	FAIL Test result shows that the requirements of the relevant specification have not been met.	
N/T	Test case is not tested.	



# **5 RESULT SUMMARY**

No.	Test case	Reference	Verdict
1	6dB Bandwidth	15.247(a)(2)	Pass
2	Transmitter Output Power	15.247(b)(3) )	Pass
3	Transmitter Power Spectral Density	15.247(e) )	Pass
4	Conducted Out of band emission measurement	15.247(d)	Pass
5	Band-edge	15.247(d)	Pass
6	Spurious Radiated Emissions	15.205/15.209/15.247(d)	Pass
7	AC Power line Conducted Emission	15.207	Pass
8	Antenna requirement	15.203	Pass(refer to section 2.1)

This Test Report Is Issued by: Mr. Peng Zhen 主义 抗	Checked by: Mr. Li Bin
Tested by:	Issued date:
Mr. Du Wei	20220623



# 6 TEST RESULT

### 6.1 6dB Bandwidth

#### 6.1.1 Test limit

Part15.247 (a) (2) The minimum permissible 6dB bandwidth is 500 kHz

#### 6.1.2 Test Procedure Used

ANSI C63.10-2013 – Section 11.8.2 Option 2 KDB 558074 D01 v05r02 – Section 8.2

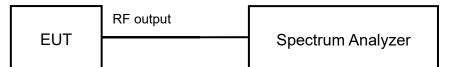
#### 6.1.3 Test Settings

1. The signal analyzers' automatic bandwidth measurement capability of the spectrum analyzer was used to perform the 6dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 6. The bandwidth measurement was not influenced by any intermediate power nulls in the fundamental emission.

- 2. RBW = 100 kHz
- 3. VBW  $\geq$  3 x RBW
- 4. Detector = Peak
- 5. Trace mode = max hold
- 6. Sweep = auto couple
- 7. The trace was allowed to stabilize

#### 6.1.4 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



#### 6.1.5 Test result

The test results are shown in Appendix A.



### 6.2 Transmitter Output Power

### 6.2.1 Test limit

Part15.247 (b) (3) The maximum permissible conducted output power is 1 Watt.

#### 6.2.2 Test Procedure Used

ANSI C63.10-2013 – Section 11.9.1.3 ANSI C63.10-2013 – Section 11.9.2.3.2 KDB 558074 D01 v05r02 – Section 8.3.1.3

#### 6.2.3 Test Settings

Peak Power Measurement

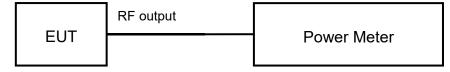
The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall utilize a fast-responding diode detector.

Average Power Measurement

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

#### 6.2.4 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



### 6.2.5 Test result

The test results are shown in Appendix A.



# 6.3 Transmitter Power Spectral Density

# 6.3.1 Test limit

Part15.247 (e) The maximum permissible power spectral density is 8.0dBm in any 3 kHz band.

#### 6.3.2 Test Procedure Used

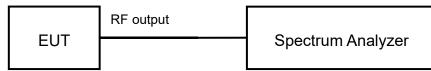
ANSI C63.10-2013 – Section 11.10.2 Method PKPSD KDB 558074 D01 v05r02 – Section 8.4

#### 6.3.3 Test Settings

- 1. Analyzer was set to the center frequency of the DTS channel under investigation
- 2. Span = 1.5 times the DTS channel bandwidth
- 3. RBW = 3 kHz
- 4. VBW = 10 kHz
- 5. Detector = peak
- 6. Sweep time = auto couple
- 7. Trace mode = max hold
- 8. Trace was allowed to stabilize

#### 6.3.4 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



#### 6.3.5 Test result

The test results are shown in Appendix A.



#### 6.4 Conducted Out of band emission measurement

#### 6.4.1 Test limit

Part 15.247(d): The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth.

#### 6.4.2 Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.5

#### 6.4.3 Reference level measurement Settings

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to  $\geq$  1.5 MHz
- c) Set the RBW = 100 kHz.
- d) Set the VBW  $\geq$  300 kHz.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

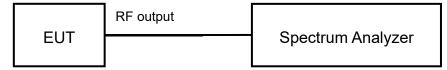
#### 6.4.4 Test Settings

a) Set the center frequency and span to encompass frequency range to be measured.

- b) Set the RBW = 100 kHz.
- c) Set the VBW  $\geq$  300 kHz.
- d) Detector = peak.
- e) Set span to encompass the spectrum to be examined
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level.

### 6.4.5 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.



#### 6.4.6 Test result

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement. The test results are shown in Appendix A.



#### 6.5 Band-edge measurement

#### 6.5.1 Test limit

Part 15.247(d): The limit for out-of-band spurious emissions at the band edge is 20dB below the fundamental emission level, as determined from the in-band power measurement of the DTS channel performed in a 100 kHz bandwidth.

#### 6.5.2 Test Procedure Used

ANSI C63.10-2013 – Section 11.11.3 KDB 558074 D01 v05r02 – Section 8.7.2

#### 6.5.3 Reference level measurement Settings

Establish a reference level by using the following procedure:

- a) Set instrument center frequency to DTS channel center frequency.
- b) Set the span to  $\geq$  1.5 MHz
- c) Set the RBW = 100 kHz.
- d) Set the VBW  $\geq$  300 kHz.
- e) Detector = peak.
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum PSD level.

#### 6.5.4 Test Settings

a) Set the center frequency and span to encompass frequency range to be measured.

- b) Set the RBW = 100 kHz.
- c) Set the VBW  $\geq$  300 kHz.
- d) Detector = peak.
- e) Set span to encompass the spectrum to be examined
- f) Sweep time = auto couple.
- g) Trace mode = max hold.
- h) Allow trace to fully stabilize.
- i) Use the peak marker function to determine the maximum amplitude level.

### 6.5.5 Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

EUT	
-----	--

RF output	

Spectrum Analyzer

### 6.5.6 Test result

The spectrum plots are attached on the following pages. D1 line indicates the highest level, and D2 line indicates the 20dB offset below D1. It shows compliance with the requirement. The test results are shown in Appendix A.



#### 6.6 Spurious Radiated Emissions

#### 6.6.1 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.

#### 6.6.2 Test limit

#### Part15.205, 15.209, 15.247(d)

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. The spectrum shall be investigated from the lowest radio frequency signal generated in the device

Frequency [MHz]	Field strength [ µV/m ]	Measured Distance [meters]
0.009~0.490	2400/F(kHz)	300
0.490~1.705	24000/F(kHz)	30
1.705~30.0	30	30
30~88	100	3
88~216	150	3
216~960	200	3
Above 960	500	3

Part15.35(b):

#### **Radiated Limits**

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 ( $dB\mu V/m$ ) = 20 log (Limit ( $\mu V/m$ )/1 $\mu V/m$ )

Frequency [MHz]	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 $\sim$ 5th harmonic of the highest frequency	Average	54.0
or 40GHz, whichever is lower	Peak	74.0

**Conversion Radiated limits** 



# 6.6.3 Test Procedure Used

KDB 558074 D01 DTS Meas Guidance v05r02– Section 12.2.7

### For Radiated emission below 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at chamber room. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. Both X and Y axes of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to Quasi-Peak Detect Function and recorded the reading with Maximum Hold Mode.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer complied the following setting:

Frequency	RBW
9-150kHz	200-300Hz
0.15-30MHz	9-10kHz

2. Signals below 30MHz are not recorded in the report because they are lower than the limits by more than 20dB.

### For Radiated emission above 30MHz

a. The EUT was placed on the top of a rotating table 0.8 meters (for  $30MHz \sim 1GHz$ ) / 1.5 meters (for above 1GHz) above the ground in chamber room for test. The table was rotated 360 degrees to determine the position of the highest radiation.

b. The EUT was set 3 meters away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

c. The height of antenna is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.

d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the rotatable table was turned from 0 degrees to 360 degrees to find the maximum reading.

e. The test-receiver system was set to quasi-peak detect function and recorded the reading with Maximum Hold Mode when the test frequency is below 1 GHz.

f. The test-receiver system was set to peak and average detector and recorded the reading with Maximum Hold Mode when the test frequency is above 1 GHz. If the peak reading value also meets average limit, measurement with the average detector is unnecessary.



#### For the radiated emission test above 1GHz:

Place the measurement antenna away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT, depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane.

NOTE:

1. The resolution bandwidth and video bandwidth of test receiver/spectrum analyzer is 120 kHz for Quasi-peak detection (QP) at frequency below 1GHz.

2. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Peak detection (PK) at frequency above 1GHz.

3. The resolution bandwidth of test receiver/spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz for Average detection (AV) at frequency above 1GHz. If duty cycle of test signal is < 98%, the duty factor need added to measured value.

4. All modes of operation were investigated and the worst-case emissions are reported.

### 6.6.4 Test Settings

#### Average Field Strength Measurements per Section 12.2.7 of KDB 558074 (Part 15.35)

Frequency	Detector
<1000MHz	Quasi-peak
>1000MHz	Peak and average

#### Peak Field Strength Measurements per Section 12.2.7of KDB 558074 (Part 15.35)

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest

2. RBW is set depending on measurement frequency, as specified in following table

Frequency	RBW
9-150kHz	200-300Hz
0.15-30MHz	9-10kHz
30-1000MHz	100-120kHz
>1000MHz	1MHz

3. VBW = 3MHz

4. Detector = peak

5. Sweep time = auto couple

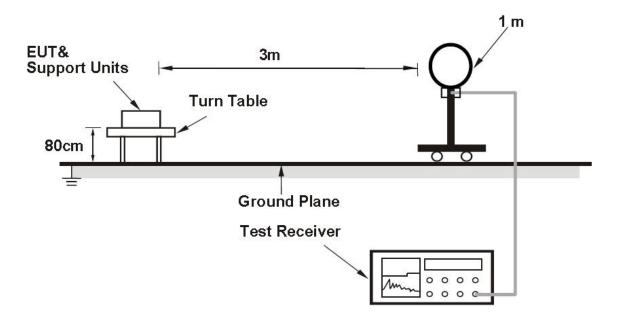
6. Trace mode = max hold

7. Trace was allowed to stabilize

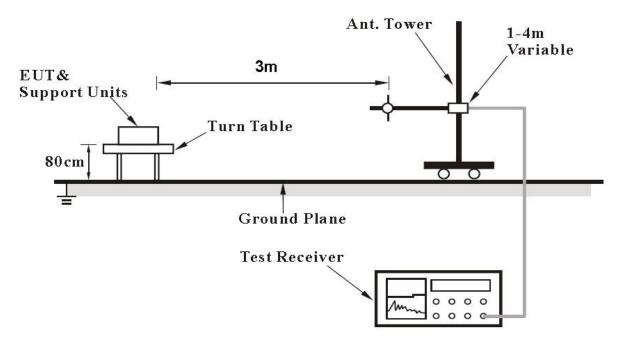


### 6.6.5 Test Setup

### For Radiated emission below 30MHz

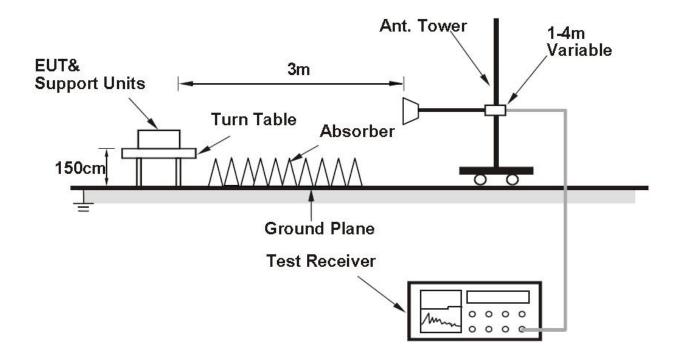


# For Radiated emission 30MHz to 1GHz





#### For Radiated emission above 1GHz



### 6.6.6 Test result

The test results are shown in Appendix B.



# 6.7 AC Power line Conducted Emission

### 6.7.1 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 C63.10-2013

#### 6.7.2 Test Procedures

a. The EUT was placed 0.4 meters from the conducting wall of the shielded room with EUT being connected to the power mains through a line impedance stabilization network (LISN). Other support units were connected to the power mains through another LISN. The two LISNs provide 50 ohm/ 50uH of coupling impedance for the measuring instrument.

b. Both lines of the power mains connected to the EUT were checked for maximum conducted interference.

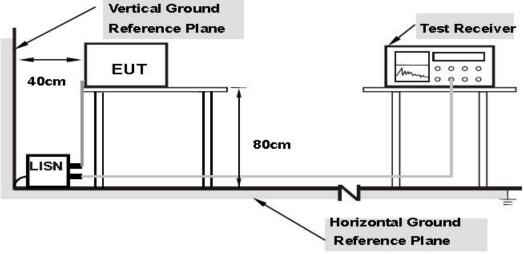
c. The frequency range from 150kHz to 30MHz was searched. Emission levels under (Limit - 20dB) were not recorded.

**NOTE:** The resolution bandwidth and video bandwidth of test receiver is 9kHz for quasi-peak detection (QP) and average detection (AV) at frequency 0.15MHz-30MHz.

The EUT shall test under the power AC120V/60Hz.



# 6.7.3 Test Setup



For the actual test configuration, please refer to the attached file (Test Setup Photo).

# 6.7.4 Test result

The test results are shown in Appendix B.



# **7 MEASUREMENT UNCERTAINTIES**

Items	Uncer	tainty	
6dB Bandwidth	3kHz		
Peak power output	0.67	′dB	
Transmitter Power Spectral Density	0.75	idB	
Band edge compliance	1.20	)dB	
	$30$ MHz $\sim$ 1GHz	2.83dB	
Conducted Out of band emission measurement	1GHz $\sim$ 12.75GHz	2.50dB	
medediement	12.75GHz $\sim$ 25GHz	2.75dB	
	$30$ MHz $\sim$ $200$ MHz	4.88dB	
Spurious Radiated Emissions	200MHz $\sim$ 1GHz	4.87dB	
Spurious Radiated Emissions	1GHz $\sim$ 18GHz	4.58dB	
	18GHz~40GHz	4.35dB	
AC Power line Conducted Emission	3.92	dB	



# **8 TEST EQUIPMENTS**

No.	Name/ Model	Manufacturer	S/N	Cal date	Cal Due date
1.	Spectrum Analyzer / FSV	ROHDE & SCHWARZ	101065	2022.06.21	2023.06.20
2.	Signal Analyzer / N9020A	Agilent	MY48010771	2022.05.18	2023.05.17
3.	Bluetooth Test Set / MT8852B	Anritsu	1329003	2022.06.21	2023.06.20
4.	Power Divider / 11667A	HP	19632	2022.06.21	2023.06.20
5.	Power Meter E4416A	Agilent	MY52370013	2022.04.13	2023.04.12
6.	Power Sensor E9323A	Agilent	MY52150008	2022.04.13	2023.04.12
7.	Signal Generator / SMBV100A	R&S	260910	2022.06.21	2023.06.20
8.	Temperature chamber / SH241	ESPEC	92013758	2022.06.21	2023.06.20
9.	Fully-Anechoic Chamber / 12.65m×8.03m×7.50m	FRANKONIA			
10.	Semi-Anechoic/Chamber / 23.18m×16.88m×9.60m	FRANKONIA			
11.	Turn table Diameter:1m	FRANKONIA			
12.	Turn table Diameter:5m	FRANKONIA			
13.	Antenna master FAC(MA4.0)	MATURO			
14.	Antenna master SAC(MA4.0)	MATURO			
15.	Shielding room / 9.080m×5.255m×3.525m	FRANKONIA			
16.	Double-Ridged Waveguide Horn Antenna / HF 907	R&S	100512	2022.06.21	2023.06.20
17.	Double-Ridged Waveguide Horn Antenna / HF 907	R&S	100513	2022.06.21	2023.06.20
18.	Ultra log antenna / HL562	R&S	100016	2022.06.21	2023.06.20
19.	Receive antenna /3160-09	SCHWARZ-BECK	002058-002	2022.06.21	2023.06.20
20.	EMI test receiver / ESI 40	R&S	100015	2022.06.21	2023.06.20
21.	EMI test receiver / ESCS30	R&S	100029	2022.06.21	2023.06.20
22.	Receive antenna / HL562	R&S	100167	2022.06.21	2023.06.20
23.	AMN / ENV216	R&S	3560.6550.12	2022.06.21	2023.06.20
24.	WLAN AP WIA3300-20	SKSpruce	8152017060700339		
25.	Notebook E470c	Lenovo	PF10UZW7		

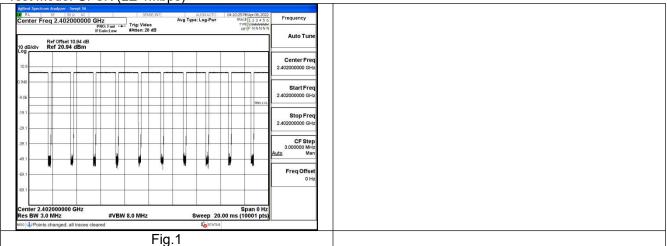


# **APPENDIX A – TEST DATA OF CONDUCTED EMISSION**

Offset 1.2dB = Attenuator + Temporary antenna connector loss + Cable loss **BLE** 

#### **Duty Cycle and Antenna Gain** 1 Correction Frequency Antenna Plot Test Mode **Duty Cycle** (MHz) Factor(dB) Gain(dBi) GFSK (LE 1Mbps) 2402 89.50% 0.48 2.50 Fig.1 Note:Correction Factor=10\*log(1/Duty Cycle) Correction Antenna Frequency Test Mode Plot **Duty Cycle** (MHz) Factor(dB) Gain(dBi) Coded 125K 2402 96.60% 0.15 2.50 Fig.2 Note:Correction Factor=10\*log(1/Duty Cycle) Correction Antenna Frequency Test Mode Plot **Duty Cycle** (MHz) Factor(dB) Gain(dBi) Coded 500K 2402 84.20% 0.75 2.50 Fig.3

Note:Correction Factor=10\*log(1/Duty Cycle) Test Mode: GFSK (LE 1Mbps)



#### Test Mode: Coded 125K

r	nter F	req 2	50 G	AC 00000 0	GHZ PNO: Fast	Trig: \	ideo : 20 dB	Avg Type	ALIGNAUTO E: Log-Pwr	09:25:19 AM Ap TRACE 1 TYPE W DET P	x 12, 2022 2 3 4 5 6 NNNNN	Frequency
	Ref Offset 10.94 dBm							Auto Tune				
10.9												Center Freq 2.402000000 GHz
0.940 -9.06												Start Freq 2.402000000 GHz
-19.1	-										TRIG LVL	Stop Freq
-29.1												2.402000000 GHz
-49.1												3.000000 MHz <u>Auto</u> Man
-59.1	-	-				_						Freq Offset 0 Hz
-69.1	ter 2	40200	0000	247						Sna	D 0 H7	
Res	enter 2.402000000 GHz Span 0 Hz es BW 3.0 MHz Sweep 20.00 ms (10001 pts) (3)Points changed, all traces cleared Control of the state of											
	Fig.2											



enter F	req 2.4	50 R AC 02000000 GH PI IF6	IZ 10: Fast ↔ Trig: Vide Sain:Low #Atten: 20	eo 0 dB	ALIGNA Avg Type: Log-	Pwr	DDAM Apr 12, 2022 RACE 1 2 3 4 5 6 TYPE WWWWWWW DET P NNNNN	Frequency Auto Tune
	Ref Offset 10.94 dB							
10.9				L			_	Center Freq 2.402000000 GHz
.940								Start Freq
9.06							TRIG LVL	2.402000000 GHz
19.1								Stop Freq
29.1								
39.1		ulu.	ية الله العام ال					CF Step 3.000000 MHz <u>Auto</u> Man
-49.1		M	14		la general de la companya de la comp			Freq Offset
69.1								0 Hz
	402000	200 CH2					Span 0 Hz	
tes BW 3.0 MHz #VBW 8.0 MHz Sweep 20.00 ms (10001 pts)								
Fig.3								

#### 2 EIRP

#### **Conducted Power**

Madulation type	Conducted Peak Power(dBm)					
Modulation type	2402MHz	2440MHz	2480MHz			
GFSK (LE 1Mbps)	9.66	9.55	9.08			
Coded 125K	10.44	9.83	9.92			
Coded 500K	10.12	9.87	10.08			

Modulation two	Conducted Average Power(dBm)					
Modulation type	2402MHz	2440MHz	2480MHz			
GFSK (LE 1Mbps)	8.00	7.82	7.40			
Coded 125K	7.08	6.17	6.47			
Coded 500K	6.29	5.86	6.45			

#### EIRP

Madulation type	Peak EIRP(dBm)				
Modulation type	2402MHz	2440MHz	2480MHz		
GFSK (LE 1Mbps)	12.16	12.05	11.58		
Coded 125K	12.94	12.33	12.42		
Coded 500K	12.62	12.37	12.58		

Modulation type	Average EIRP(dBm)				
Modulation type	2402MHz	2440MHz	2480MHz		
GFSK (LE 1Mbps)	10.50	10.32	9.90		
Coded 125K	9.58	8.67	8.97		
Coded 500K	8.79	8.36	8.95		

EIRP (dBm)=Conducted Power(dBm)+Antenna Gain(dBi)



#### 3 Occupied Bandwidth 6dB Bandwidth

Test Mode	Carrier frequency (MHz)	6dB Bandwidth(KHz)
GFSK (LE 1Mbps)	2402	719.4
GFSK (LE 1Mbps)	2440	726.8
GFSK (LE 1Mbps)	2480	718.9

Test Mode	Carrier frequency (MHz)	6dB Bandwidth(KHz)
Coded 125K	2402	644.3
Coded 125K	2440	647.3
Coded 125K	2480	642.3

Test Mode	Carrier frequency (MHz)	6dB Bandwidth(KHz)
Coded 500K	2402	714.3
Coded 500K	2440	714.9
Coded 500K	2480	720.9

#### Test Mode: GFSK (LE 1Mbps)

RL         RF         50 Q         AC           Center Freq 2.402000000 GHz         #IFGain:t	Center Freq: 2.402000000 GHz	LIGNAUTO 03:55:00 PM Apr 08, 2022 Radio Std: None 10/10 Radio Device: BTS	Frequency	000 RL RF 50.0 AC Center Freq 2.440000000	GHz #IFGain:Low Center #IFGain:Low #Atten:	r Freq: 2.440000000 GHz ree Run Avg Hold:	ALIGNAUTO 03:57:17 PMApr 08, 2022 Radio Std: None 10/10 Radio Device: BTS	Frequency
Ref Offset 10 54 dB 0 dB/div 99 00 00 00 00 00 00 00 00 00			Center Freq 2.40200000 GHz	Ref offset 1034 ult         Ref offset 1034 ult           10 dB/div         Ref 10.00 dBm           00	8			Center Free 2.440000000 GH
20 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	#VBW 300 kHz	Span 2 MHz #Sweep 600 ms	CF Step 200.000 kHz <u>Auto</u> Man	400 400 400 400 400 400 400 400 400 400	#	VBW 300 kHz	Span 2 MHz #Sweep 600 ms	CF Stej 200.000 kH Auto Mai
The state of the second st	678 kHz OBW Power	6.39 dBm 99.00 % -6.00 dB	Freq Offset 0 Hz	Occupied Bandwidth 1.0 Transmit Freq Error x dB Bandwidth	0 394 MHz -6.427 kHz 726.8 kHz	Total Power OBW Power x dB	6.88 dBm 99.00 % -6.00 dB	Freq Offse 0 H
X ub banawidan 71	19.4 kHz x dB	-0.00 ub		A db buriamaan		A GD		
9G	de:GFSK (LE 1	<b>K</b> STATUS	2	MSG	Mode:GF		Mbps) MH2	 Z
Test Moo Boot Spectrum Analyzer Occupied BW RL BF 300 AC enter Freq 2.4800000000 GHz #FGaint Refo@fset10.034 dB 0 dB/dW		IMbps) MHz	Z	MSG	Mode:GF		•	<u></u>
Image: Second State         Second State           Second State         Second State         Second State           Reconsect 0.94 dis         Second State         Second State		LIONAUTO 10100 Radio Std: None 1010		MSG	Mode:GF		•	Z
ss Test Moor State Systems Analyse - Occade and State Systems Analyse - Occade and State Systems - Occade and		LIONAUTO 10100 Radio Std: None 1010	Frequency Center Freq 2.46000000 GHz	MSG	Mode:GF		•	z
ss State State St	de:GFSK (LE 1	Contracts 1000 Radio Std: Norte Radio Device: BTS 0010 Span 2 MHz #Sweep 600 ms 5.97 dBm	Frequency Center Freq 2.46000000 GHz	MSG	Mode:GF		•	z
so State of the sector of the	de:GFSK (LE 1	EDITATUS 11Mbps) MHz Sado Device: BTS Span 2 MHz #Sweep 600 ms	Frequency Center Freq 2.48000000 GHz 20.000 KHz Auto Man Freq Offset	MSG	Mode:GF		•	z



Center Freq 2.402000000 GHz	Center Freq: 2.402000000 GHz Trig: Freq Run Avg Hold: 10/	04:36:16 PMApr 08, 2022 Radio Std: None M0 Radio Device: BTS	Frequency	00 RL RF 30 Q AC Center Freq 2.440000000 G	Hz FGain:Low HZ FGain:Low FGain:Low FGain:Low FGain:Low FGain:Low	440000000 GHz Avg Hold: 10/10	O4:37:55 PM Apr 08, 2022     Radio Std: None     Radio Device: BTS	Frequency
Ref Offset 10.94 dB 0 dB/div Ref 10.00 dBm				Ref Offset 10.94 dB 10 dB/div Ref 10.00 dBm				
			Center Freq 2.40200000 GHz					Center Fre 2.440000000 GH
000 000 000 000 000 000 000 000 000 00	#VBW 300 kHz	Span 6 MHz # #Sweep 600 ms	CF Step 600.000 KHz Auto Man	60.0 -70.0 -80.0 Center 2.44 GHz #Res BW 100 kHz	#VBW 3	00 kHz	Span 6 MHz #Sweep 600 ms	CF Ste 600.000 kH Auto Ma
Occupied Bandwidth	Total Power 4 MHz	6.75 dBm	Freq Offset 0 Hz	Occupied Bandwidth 1.04	Tota 411 MHz	al Power 7.2	25 dBm	Freq Offse 0 H
in the second seco	6.180 kHz OBW Power 644.3 kHz x dB	99.00 % -6.00 dB		Transmit Freq Error x dB Bandwidth	-6.510 kHz OBV 647.3 kHz x dB		99.00 % 6.00 dB	
		STATUS				<b>K</b> ostat	TUS	
RL         RF         S0.9         AC           enter Freq 2.480000000 GHz		25K MHz 804:39:25 PM Apr 08, 2022 Radio Std: None 10	Frequency	Tes	st Mode:Co	-		
altert System         Austyrer         Occupied BW           RL         W         200 arX           enter Freq 2.480000000 GHz         arGain           b dB/div         Ref offset 10.94 dB           0         B           0         B           0         B           0         B           0         B           0         B           0         B           0         B           0         B           0         B           0         B		25K MHz	Frequency Center Freq 2.480000000 GHz		st Mode:Co	-		
glient Spectrum Analyzer - Occupied BW RL RF 50 Q AC Center Freq 2.480000000 GHz #IFGair		25K MHz 804:39:25 PM Apr 08, 2022 Radio Std: None 10	Center Freq 2.48000000 GHz		st Mode:Co	-		
enter Freq 2.480000000 GHz reference freq 2.4800000000 GHz reference freq 2.4800000000 GHz reference freq 2.4800000000 GHz reference formet 10.94 dB o dB/div Green formet 10.94 dB o dB/div G	Mode:Coded 12	25K MHz	Center Freq 2.48000000 GHz		st Mode:Co	-		
enter Freq 2.480000000 GHz enter Freq 2.480000000 GHz #FGalt 0 dB/div Ref Offset 10.94 dB 0 dB/div Ref 0.00 dB/div 0 dB/div Ref 0.00 dB/div 0 dB/di	Mode: Coded 12	25K MHz	Center Freq 2.480000000 GHz 2.480000000 GHz 600.000 Hz 600.000 Hz 400 Man Freq Offset		st Mode:Co	-		

Center Fre	eq 2.40200	00000 GH2	z ain:Low	Center Fr Trig: Free #Atten: 30	25E:001 req: 2.40200 9 Run 0 dB	10000 GHz Avg Hold:	10/10	09:19:27 AM Apr 12, 2022 Radio Std: None Radio Device: BTS	Frequency	Cent		E 50 Q 2.440000	000 GH	Z ain:Low		NSE:INT req: 2.44000 e Run 0 dB	00000 GHz Avg Hold	ALIGN AUTO #: 10/10	Radio Device: BTS	Freque	ncy
10 dB/div Log	Ref Offset Ref 10.0			المجاريكو	TTYME.				Center Freq	10 de Log		Ref Offset 10 Ref 10.00			الارمر	manu				Cent	er Fred
-10.0			Į	A A A A A A A A A A A A A A A A A A A	N				2.40200000 GHz	-10.0 -					North Martin	- NA	1			2.440000	000 GH
-30.0 -40.0 -50.0			and for the second			June				-30.0 - -40.0 - -50.0 -				a front			wing				
-60.0							*****			-60.0 -70.0										-	
-80.0 Center 2.40 #Res BW 1				#VB	W 300 k	Hz		Span 6 MHz #Sweep 600 ms	CF Step 600.000 kHz <u>Auto</u> Man		er 2.44 BW 10				#VE	3W 300 H	kHz		Span 6 Mł #Sweep 600 m	Z Auto 600.	F Step 000 kH Mar
Occupi	ed Band		25 MH		Total P	ower	7.07	dBm	Freq Offset 0 Hz	0	ccupie	d Bandw	/idth 1.041	19 MH		Total P	ower	7.32	dBm	Frec	Offse 0 H
Transmi x dB Bar	it Freq Err ndwidth		108 714.3 k		OBW P x dB	ower		00 % 0 dB				Freq Erroi dwidth		-1.011 k 714.9 k		OBW P x dB	ower		.00 % 00 dB		
vsg 🧼 Alignm	ent Complete	ed					<b>K</b> STATUS		L	MSG								<b>Ko</b> status	8	16	
		Test	Мо	de:(	Cod	ed 5	00K	MHz				-	Test	t Mo	de:	Cod	led {	500k	K MHz		



Agilent Spect	trum Analyzer - Occupied I	w						
CM RL	RF 50.9 AC			NSE:INT	A	LIGNAUTO	09:23:51 AM Apr 12, 202	-
Center F	req 2.48000000	) GHz	Center F	req: 2.48000	Avg Hold:	10/10	idio Std: None	Frequency
	1	#IFGain:Low	#Atten: 3	0 dB	Avginola.	R	dio Device: BTS	
10 dB/div	Ref Offset 10.94 Ref 10.00 dBr	dB						
Log	Kei 10.00 dbi		11	<u> </u>				
0.00			abr/C	anne.				Center Freq
-10.0			A A A A A A A A A A A A A A A A A A A	- many				2.480000000 GHz
			X	1				
-20.0			1		١			
-30.0					1			
-40.0		pred			www			
-50.0					1			
-00.0								
-70.0		-					_	
-80.0								CE Stop
								CF Step 600.000 kHz
Center 2 #Res BW	2.48 GHz / 100 kHz		#V	BW 300 H	Hz	#	Span 6 MHz Sweep 600 ms	<u>Auto</u> Man
				Total P		6.60 d	3	Freq Offset
Occu	pied Bandwidt			TOTAL	ower	0.00 a	5111	0 Hz
	1.	0380 M	Hz					0112
Transe	mit Freq Error	18	5 Hz	OBW P	ower	99.00	) %	
хаве	Bandwidth	720.9	KHZ	x dB		-6.00	ав	
MSG						<b>K</b> STATUS		
		1 8 4		~ .	1.5	0017		
	16	est Mo	ode:	Cod	ed 5	UUK	MHZ	
					-			

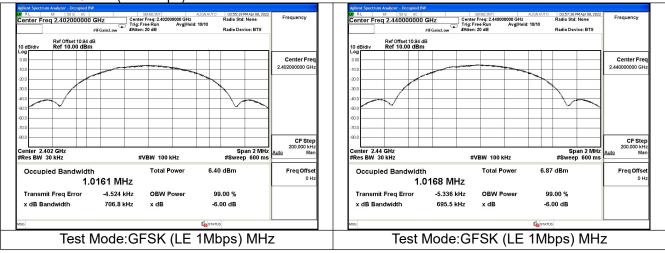
#### 99% Bandwidth

Test Mode	Carrier frequency (MHz)	99% Bandwidth(kHz)
GFSK (LE 1Mbps)	2402	1016.1
GFSK (LE 1Mbps)	2440	1016.8
GFSK (LE 1Mbps)	2480	1019.2

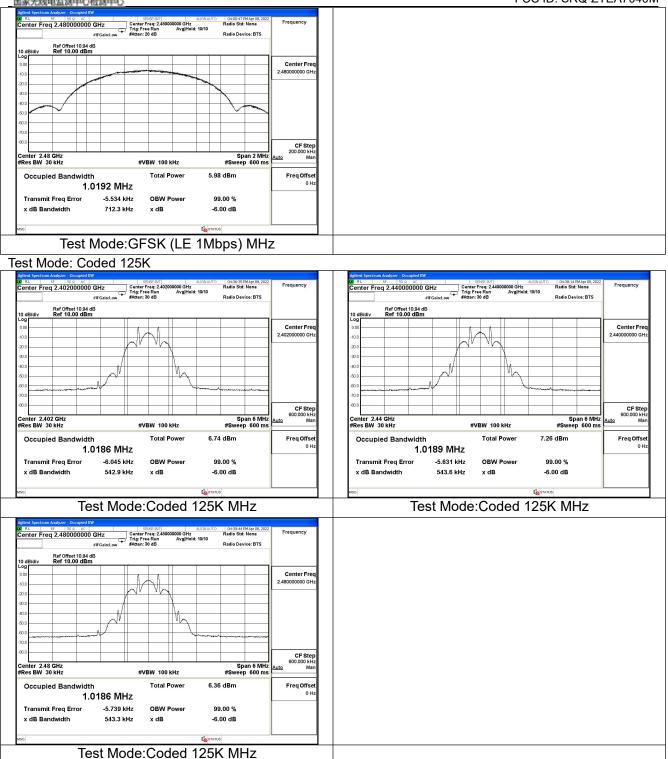
Test Mode	Carrier frequency (MHz)	99% Bandwidth(kHz)
Coded 125K	2402	1018.6
Coded 125K	2440	1018.9
Coded 125K	2480	1018.6

Test Mode	Carrier frequency (MHz)	99% Bandwidth(kHz)
Coded 500K	2402	1019.8
Coded 500K	2440	1018.3
Coded 500K	2480	1014.4

#### Test Mode: GFSK (LE 1Mbps)









#IF	Gain:Low #Atten: 30 dB							
Ref Offset 10.94 dB 0 dB/div Ref 10.00 dBm				Ref Offset 10. 10 dB/div Ref 10.00 d	94 dB IBm			
			Center Freq 2.402000000 GHz	Log				Center Fr 2.44000000 G
0.0			CF Step	-70.0				CF Ste
Center 2.402 GHz Res BW 30 kHz	#VBW 100 kHz	Span 6 MHz #Sweep 600 ms	<u>Auto</u> Man	Center 2.44 GHz #Res BW 30 kHz	#	VBW 100 kHz	Span #Sweep 6	6 MHz Auto Ma
Occupied Bandwidth 1.01 Transmit Freq Error	Total Power 98 MHz 1.067 kHz OBW Power	7.10 dBm 99.00 %	Freq Offset 0 Hz	Occupied Bandwi	1.0183 MHz	Total Power	7.32 dBm 99.00 %	Freq Offs 0 F
10-10-10-10-10-10-10-10-10-10-10-10-10-1								
X dB Bandwidth	663.0 kHz x dB	-6.00 dB		x dB Bandwidth	658.2 kHz	x dB	-6.00 dB	
		-6.00 dB		x dB Bandwidth	658.2 kHz	x dB		
Bient Spectrum Analyzer Occupied BW RL FF 200 AC enter Freq 2.480000000 GH	t Mode:Coded 50	STATUS     OOK MHz     MHz     Radio Std: None	Frequency	MSG	658.2 kHz		<b>STATUS</b>	Z
Bits         Spectrum Analyzer         Decapied BV           IkL         IP         300         AC           enter Freq 2.480000000 CF         IF         IF         IF           od/Sdvir         Ref 0ffset 0.04 dB         IF         IF         IF           00         IF	t Mode:Coded 50	Branue DOK MHz	Center Freq 2.48000000 GHz	MSG			<b>STATUS</b>	z
Control Section And/or Octavated PM Control Freq 2.480000000 GF Control Freq 2.480000000 GF Control Freq 2.480000000 GF Control Freq 0.480000000 GF Control Freq 0.4800000000 GF Control Freq 0.4800000000 GF Control Freq 0.4800000000 GF Control Freq 0.4800000000 GF Control Freq 0.48000000000 GF Control Freq 0.48000000000 GF Control Freq 0.48000000000 GF Control Freq 0.48000000000 GF Control Freq 0.480000000000 GF Control Freq 0.4800000000000000000000000000000000000	t Mode:Coded 50	STATUS     OOK MHz     MHz     Radio Std: None	Center Freq 2.48000000 GHz	MSG			<b>STATUS</b>	z

#### 4 Transmitter PowerSpectral Density

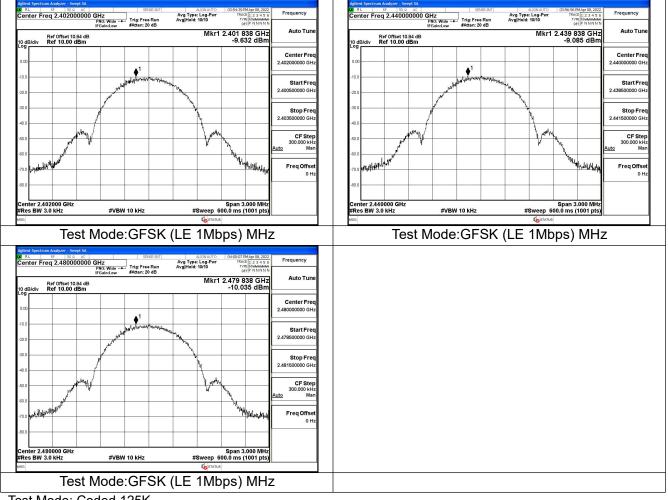
Test Mode	Carrier frequency (MHz)	Channel No.	Power Density (dBm/3kHz)
GFSK (LE 1Mbps)	2402	0	-9.6
GFSK (LE 1Mbps)	2440	19	-9.1
GFSK (LE 1Mbps)	2480	39	-10.0

Test Mode	Carrier frequency (MHz)	Channel No.	Power Density (dBm/3kHz)
Coded 125K	2402	0	0.8
Coded 125K	2440	19	1.3
Coded 125K	2480	39	0.4

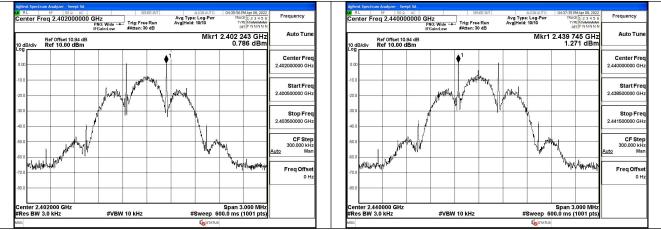


Test Mode	Carrier frequency (MHz)	Channel No.	Power Density (dBm/3kHz)
Coded 500K	2402	0	1.7
Coded 500K	2440	19	1.9
Coded 500K	2480	39	0.6

#### Test Mode: GFSK (LE 1Mbps)





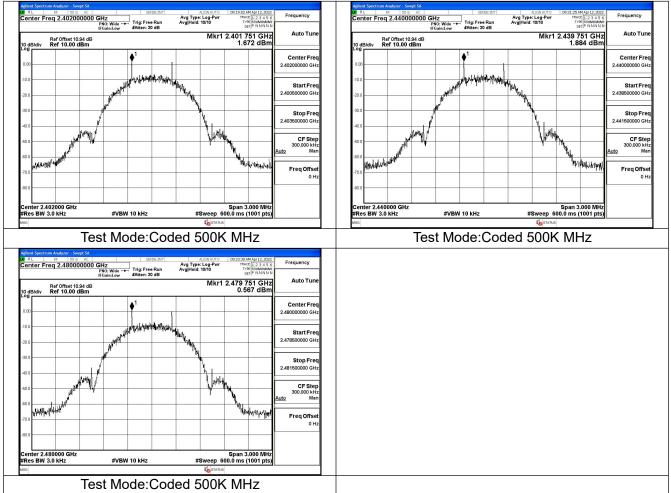


The State Radio\_monitoring\_center Testing Center (SRTC) Tel: 86-10-57996183 Fax: 86-10-57996388 Page number: 30 of 40



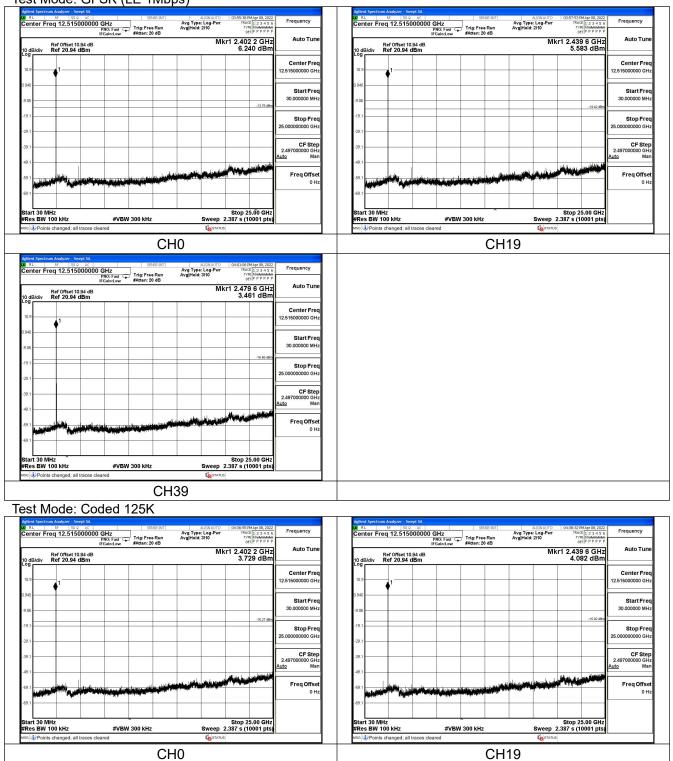
Test Mode: Coded 125K MHz	家元後电量減中し位減中し	
B         H	Test Mode:Coded 125K MHz	Test Mode:Coded 125K MHz
Test Mode:Coded 125K MHz	NL         III         ADDALTO         Description         Frequency           PROVIDE         PROVIDE         The Freq Rain Medicing 23 as provided to the provided to	

#### Test Mode: Coded 500K





#### 5 Conducted Out of band emission measurement Test Mode: GFSK (LE 1Mbps)





<b>XU</b> F	nt Spectrum RL   nter Frec	RF 50 9	AC	SHz NO: Fast G Gain:Low	Trig: Free #Atten: 20	Run dB		ALIGNAUTO e: Log-Pwr : 2/10	04:40:02 PM Apr 08, 200 TRACE 1 2 3 4 5 TYPE M WWWWW DET P P P P	6 Frequency
10 d	B/div R	ef Offset 10 ef 20.94	94 dB					Mk	r1 2.479 6 GH 2.720 dBn	z Auto Tune
10.9		<b>↓</b> <sup>1</sup>								Center Freq 12.515000000 GHz
0.940 -9.06										Start Freq 30.000000 MHz
-19.1									-17.28 d9	Stop Freq 25.00000000 GHz
-39.1										CF Step 2.497000000 GHz Auto Man
-49.1		International	in the second				ini yi Ma			Freq Offset 0 Hz
-69.1	1	1.00								-
#Re	es BW 10	0 kHz	traces clear		V 300 kHz	^		Sweep 2	Stop 25.00 GH 2.387 s (10001 pts	z 5)
	wr unta c	nangeu, an				СНЗ	39	No Info		

