

TEST REPORT

Product Name: Lte-M and NBIOT Asset GPS Tracker
FCC ID: 2AUVX-NT53E
Trademark: N/A
Model Number: NT53E, NT53U, LT53
Prepared For: Shenzhen Kingwo IoT Co., Ltd.
Address: Room302, Comprehensive Building Tsinghua Information High-Tech Park,
Nanshan Shenzhen, Guangdong, China
Manufacturer: Shenzhen Kingwo IoT Co., Ltd.
Address: Room302, Comprehensive Building Tsinghua Information High-Tech Park,
Nanshan Shenzhen, Guangdong, China
Prepared By: Shenzhen CTB Testing Technology Co., Ltd.
Address: 1&2/F., Building A, No.26, Xinhe Road, Xinqiao, Xinqiao Street, Bao'an
District, Shenzhen, Guangdong, China
Sample Received Date: Dec. 19, 2023
Sample tested Date: Dec. 19, 2023 to Jan. 10, 2024
Issue Date: Jan. 10, 2024
Report No.: CTB231223014RF
Test Standards FCC Part 2, 22, 24E, 27
Test Results PASS
Remark: This is LTE radio test report.

Compiled by:

Zhou kui

Zhou Kui

Reviewed by:

Arron Liu

Arron Liu

Approved by:



Bin Mei / Director

Note: If there is any objection to the inspection results in this report, please submit a written report to the company within 15 days from the date of receiving the report. The test report is effective only with both signature and specialized stamp. This result(s) shown in this report refer only to the sample(s) tested. Without written approval of Shenzhen CTB Testing Technology Co., Ltd. this report can't be reproduced except in full. The tested sample(s) and the sample information are provided by the client. "*" indicates the testing items were fulfilled by subcontracted lab. "#" indicates the items are not in CNAS accreditation scope.

TABLE OF CONTENT

Test Report Declaration	Page
1. VERSION	3
2. TEST SUMMARY	4
3. MEASUREMENT UNCERTAINTY	5
4. PRODUCT INFORMATION AND TEST SETUP	6
4.1 Product Information	6
4.2 Test Setup Configuration	7
4.3 Support Equipment	7
4.4 Test Mode	7
4.5 Test Environment	9
5. TEST FACILITY AND TEST INSTRUMENT USED	10
5.1 Test Facility	10
5.2 Test Instrument Used	10
6. RF EXPOSURE	12
6.1 Standard Applicable	12
6.2 Test Result	12
7. RF OUTPUT POWER	13
7.1 Standard Applicable	13
7.2 Test Procedure	13
7.3 Summary of Test Results/Plots	14
8. PEAK-TO-AVERAGE RATIO (PAR) OF TRANSMITTER	23
8.1 Standard Applicable	23
8.2 Test Procedure	23
8.3 Summary of Test Results	23
9. EMISSION BANDWIDTH	24
9.1 Standard Applicable	24
9.2 Test Procedure	24
9.3 Summary of Test Results/Plots	24
10. OUT OF BAND EMISSIONS AT ANTENNA TERMINAL	25
10.1 Standard Applicable	25
10.2 Test Procedure	25
10.3 Summary of Test Results/Plots	26
11. SPURIOUS RADIATED EMISSIONS	27
11.1 Standard Applicable	27
11.2 Test Procedure	27
11.3 Summary of Test Results/Plots	28
12. FREQUENCY STABILITY	40
12.1 Standard Applicable	40
12.2 Test Procedure	40
12.3 Summary of Test Results/Plots	40

(Note: N/A means not applicable)



1. **VERSION**

Report No.	Issue Date	Description	Approved
CTB231223014RF	Jan. 10, 2024	Original	Valid

2. TEST SUMMARY

The Product has been tested according to the following specifications:

Test Item	Test Requirement	Test method	Result
Conducted output power	Part 2.1046(a)	TIA-603-E-2016 & KDB 971168 D01v02r02	PASS
Effective Radiated Power of Transmitter(EIRP)	Part 22.913(a)(5)/Part27.50(h)(2)	TIA-603-E-2016 & KDB 971168 D01v02r02	PASS
peak-to-average ratio	Part 27.50(d)	KDB 971168 D01v02r02	PASS
99% & 26dB Occupied Bandwidth	Part 2.1049(h)	KDB 971168 D01v02r02	PASS
Band Edge at antenna terminals	Part 2.1051/ Part 22.917(a)/Part 27.53(m) (4)	KDB 971168 D01v02r02	PASS
Spurious emissions at antenna terminals	Part 2.1051/ Part 22.917(a)/Part 27.53(m) (4)	TIA-603-E-2016 & KDB 971168 D01v02r02	PASS
Field strength of spurious radiation	Part 2.1053/ Part 22.917(a)/Part 27.53(m) (4)	TIA-603-E-2016 & KDB 971168 D01v02r02	PASS
Frequency stability	Part 2.1055/Part 27.54	TIA-603-E-2016 & KDB 971168 D01v02r02	PASS

3. MEASUREMENT UNCERTAINTY

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

Item	Uncertainty
Occupancy bandwidth	54.3kHz
Conducted output power Above 1G	0.9dB
Conducted output power below 1G	0.9dB
Power Spectral Density , Conduction	0.9dB
Conduction spurious emissions	2.0dB
Out of band emission	2.0dB
3m camber Radiated spurious emission(30MHz-1GHz)	4.6dB
3m chamber Radiated spurious emission(1GHz-18GHz)	5.1dB
3m chamber Radiated spurious emission(18GHz-40GHz)	3.4dB
Receiver Reference Sensitivity level	1.9dB
humidity uncertainty	5.5%
Temperature uncertainty	0.63℃
frequency	1×10 ⁻⁷

4. PRODUCT INFORMATION AND TEST SETUP

4.1 Product Information

Model(s):	NT53E, NT53U, LT53
Model Description:	All the model are the same circuit and RF module, only different for model name. Test sample model: NT53E
Hardware Version:	P10
Software Version:	NT53E-2.12
Operation Frequency:	FDD-LTE BAND 2: 1850-1910MHz FDD-LTE BAND 4: 1710-1755MHz FDD-LTE BAND 12: 699-716MHz FDD-LTE BAND 13: 777-787MHz
Max. RF output power:	FDD-LTE BAND 2: 20.86 dBm FDD-LTE BAND 4: 19.92 dBm FDD-LTE BAND 12: 18.38 dBm FDD-LTE BAND 13: 19.44 dBm
Type of Modulation:	QPSK, 16QAM
Antenna installation:	FPC antenna
Antenna Gain:	LTE BAND 2: 3.49dBi LTE BAND 4: 3.83dBi LTE BAND 12: -3.93dBi LTE BAND 13: -1.63dBi
Ratings:	Input: 5V DC 2A Battery capacity: 5200mAh/3.7V, 19.24V

4.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

4.3 Support Equipment

No.	Device Type	Brand	Model	Series No.	Note
1	Adapter	JIYIN	JY-05100C	/	/

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

4.4 Test Mode

Test Mode List		
Test Mode	Description	Remark
TM1	FDD-LTE BAND 2	Low, Middle, High Channels
TM2	FDD-LTE BAND 4	Low, Middle, High Channels
TM3	FDD-LTE BAND 12	Low, Middle, High Channels
TM4	FDD-LTE BAND 13	Low, Middle, High Channels

Test Mode	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink(MHz)
LTE band 2	Low Range	1.4	18607	1850.7
		3	18615	1851.5
		5	18625	1852.5
		10	18650	1855
		15	18675	1857.5
		20	18700	1860
	Mid Range	1.4/3/5/10/15/20	18900	1880
	High Range	1.4	19193	1909.3
		3	19185	1908.5
		5	19175	1907.5
		10	19150	1905
		15	19125	1902.5
		20	19100	1900

Test Mode	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink(MHz)
LTE band 4	Low Range	1.4	19957	1710.7
		3	19965	1711.5
		5	19975	1712.5
		10	20000	1715
		15	20025	1717.5
		20	20050	1720
	Mid Range	1.4/3/5/10/15/20	20175	1732.5
	High Range	1.4	20393	1754.3
		3	20385	1753.5
		5	20375	1752.5
		10	20350	1750
		15	20325	1747.5
		20	20300	1745

Test Mode	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink(MHz)
LTE band 12	Low Range	1.4	23017	699.7
		3	23025	700.5
		5	23035	701.5
		10	23060	704
	Mid Range	1.4/3/5/10	23095	707.5
	High Range	1.4	23173	715.3
		3	23165	714.5
		5	23155	713.5
		10	23130	711

Test Mode	Test Frequency ID	Bandwidth (MHz)	Number [UL]	Frequency of Uplink(MHz)
LTE band 13	Low Range	5	23205	779.5
		10	23230	782
	Mid Range	5/10	23230	782
	High Range	5	23255	784.5
		10	23230	782

4.5 Test Environment

Humidity(%):	54
Atmospheric Pressure(kPa):	101
Normal Voltage(DC):	12V
Normal Temperature(°C)	23
Low Temperature(°C)	0
High Temperature(°C)	40

5. TEST FACILITY AND TEST INSTRUMENT USED

5.1 Test Facility

All measurement facilities used to collect the measurement data are located at Floor 1&2, Building A, No. 26 of Xinhe Road, Xinqiao Street, Baoan District, Shenzhen China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

5.2 Test Instrument Used

Item	Equipment	Manufacturer	Type No.	Serial No.	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	2024.07.05
2	Power Sensor	Agilent	U2021XA	MY56120032	2024.07.05
3	Power Sensor	Agilent	U2021XA	MY56120034	2024.07.05
4	Communication test set	R&S	CMW500	108058	2024.07.05
5	Spectrum Analyzer	KEYSIGHT	N9020A	MY51289897	2024.07.05
6	Signal Generator	Agilent	N5181A	MY50140365	2024.07.05
7	Vector signal generator	Agilent	N5182A	MY47420195	2024.07.05
8	Communication test set	Agilent	E5515C	MY50102567	2024.07.06
9	2.4 GHz Filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	2024.07.05
10	5 GHz Filter	Shenxiang	MSF5150-5850 MS-1155	20181015001	2024.07.06
11	Filter	Xingbo	XBLBQ-DZA120	190821-1-1	2024.07.06
12	BT&WI-FI Automatic test software	Microwave	MTS8000	Ver. 2.0.0.0	/
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	2024.10.30
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	2024.07.05
15	234G Automatic test software	Microwave	MTS8200	Ver. 2.0.0.0	/
16	966 chamber	C.R.T.	966	/	2024.08.11
17	Receiver	R&S	ESPI	100362	2024.07.05
18	Amplifier	HP	8447E	2945A02747	2024.07.05
19	Amplifier	Agilent	8449B	3008A01838	2024.07.05
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	2024.07.08
21	Double Ridged Broadband Horn Antenna	Schwarzbeck	BBHA9120D	01911	2024.07.08
22	EMI test software	Fala	EZ-EMC	FA-03A2 RE	/



23	Loop Antenna	Schwarzbeck	FMZB 1519B	1519B-224	2024.07.08
24	loop antenna	ZHINAN	ZN30900A	GTS534	/
25	40G Horn antenna	A/H/System	SAS-574	588	2024.10.30
26	Amplifier	AEROFLEX	Aeroflex	097	2024.07.05

6. RF EXPOSURE

6.1 Standard Applicable

According to §1.1307 and §2.1091, §2.1093, the portable transmitter must comply the RF exposure requirements.

6.2 Test Result

This product complied with the requirement of the RF exposure, please see the RF Exposure report.

7. RF OUTPUT POWER

7.1 Standard Applicable

According to §22.913(a)(2), the ERP of mobile and portable stations transmitters and auxiliary test transmitters must not exceed 7 Watts.

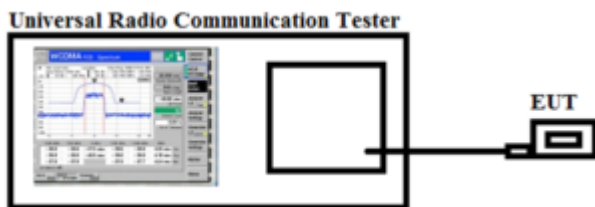
According to §24.232(c), mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(d)(4), fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP.

According to §27.50(c)(10), portable stations (hand-held devices) in the 698-746 MHz band are limited to 3 watts ERP.

7.2 Test Procedure

Conducted output power test method:



Radiated power test method:

1. The setup of EUT is according with per ANSI/TIA Standard 603E and ANSI C63.26 measurement procedure.
2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

7.3 Summary of Test Results/Plots

Max. Radiated Power:

FDD-LTE Band 2

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	17.66	<33.00	PASS
		H	18.02		
	MCH	V	18.23		PASS
		H	18.26		
	HCH	V	17.86		PASS
		H	18.81		
16QAM	LCH	V	17.95	<33.00	PASS
		H	17.75		
	MCH	V	17.69		PASS
		H	18.81		
	HCH	V	19.38		PASS
		H	17.74		
Channel Bandwidth: 3 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	20.28	<33.00	PASS
		H	20.02		
	MCH	V	18.50		PASS
		H	18.83		
	HCH	V	20.16		PASS
		H	20.15		
16QAM	LCH	V	19.11	<33.00	PASS
		H	19.42		
	MCH	V	18.84		PASS
		H	19.31		
	HCH	V	19.58		PASS
		H	18.70		

Channel Bandwidth: 5 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	18.93	<33.00	PASS
		H	19.53		
	MCH	V	20.32		PASS
		H	18.83		
	HCH	V	18.71		PASS
		H	19.57		
16QAM	LCH	V	18.86	<33.00	PASS
		H	19.09		
	MCH	V	19.71		PASS
		H	19.97		
	HCH	V	18.85		PASS
		H	20.57		
Channel Bandwidth: 10 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	20.19	<33.00	PASS
		H	20.54		
	MCH	V	19.55		PASS
		H	19.42		
	HCH	V	19.98		PASS
		H	19.97		
16QAM	LCH	V	19.74	<33.00	PASS
		H	20.32		
	MCH	V	19.39		PASS
		H	20.66		
	HCH	V	19.42		PASS
		H	20.08		

Channel Bandwidth: 15 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	20.32	<33.00	PASS
		H	20.55		
	MCH	V	20.12		PASS
		H	20.13		
	HCH	V	19.39		PASS
		H	20.61		
16QAM	LCH	V	19.88	<33.00	PASS
		H	20.35		
	MCH	V	20.63		PASS
		H	20.41		
	HCH	V	20.29		PASS
		H	20.67		
Channel Bandwidth: 20 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	20.96	<33.00	PASS
		H	20.86		
	MCH	V	20.34		PASS
		H	19.34		
	HCH	V	20.08		PASS
		H	20.51		
16QAM	LCH	V	20.81	<33.00	PASS
		H	19.87		
	MCH	V	19.59		PASS
		H	19.84		
	HCH	V	20.53		PASS
		H	19.27		

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	16.79	<30.00	PASS
		H	17.28		
	MCH	V	17.94		PASS
		H	17.43		
	HCH	V	18.25		PASS
		H	16.64		
16QAM	LCH	V	17.68	<30.00	PASS
		H	16.87		
	MCH	V	18.34		PASS
		H	17.11		
	HCH	V	16.67		PASS
		H	18.52		
Channel Bandwidth: 3 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	18.40	<30.00	PASS
		H	18.72		
	MCH	V	18.41		PASS
		H	18.46		
	HCH	V	19.02		PASS
		H	18.17		
16QAM	LCH	V	19.13	<30.00	PASS
		H	18.39		
	MCH	V	18.56		PASS
		H	18.08		
	HCH	V	18.35		PASS
		H	18.23		

Channel Bandwidth: 5 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	19.32	<30.00	PASS
		H	18.48		
	MCH	V	18.45		PASS
		H	19.24		
	HCH	V	18.84		PASS
		H	19.60		
16QAM	LCH	V	19.67	<30.00	PASS
		H	19.11		
	MCH	V	18.89		PASS
		H	18.49		
	HCH	V	19.46		PASS
		H	18.88		
Channel Bandwidth: 10 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	19.56	<30.00	PASS
		H	19.19		
	MCH	V	19.51		PASS
		H	19.50		
	HCH	V	19.17		PASS
		H	19.17		
16QAM	LCH	V	18.30	<30.00	PASS
		H	18.26		
	MCH	V	19.24		PASS
		H	19.77		
	HCH	V	19.29		PASS
		H	18.58		

Channel Bandwidth: 15 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	19.61	<30.00	PASS
		H	19.04		
	MCH	V	18.85		PASS
		H	19.38		
	HCH	V	19.03		PASS
		H	19.48		
16QAM	LCH	V	18.32	<30.00	PASS
		H	18.40		
	MCH	V	18.60		PASS
		H	18.73		
	HCH	V	19.65		PASS
		H	19.08		
Channel Bandwidth: 20 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	19.92	<30.00	PASS
		H	18.30		
	MCH	V	18.67		PASS
		H	19.02		
	HCH	V	19.23		PASS
		H	19.22		
16QAM	LCH	V	19.78	<30.00	PASS
		H	19.55		
	MCH	V	19.22		PASS
		H	18.51		
	HCH	V	19.27		PASS
		H	19.74		

FDD-LTE Band 12

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	16.09	<34.77	PASS
		H	16.59		
	MCH	V	16.58		PASS
		H	16.06		
	HCH	V	15.15		PASS
		H	15.42		
16QAM	LCH	V	16.22	<34.77	PASS
		H	15.52		
	MCH	V	15.25		PASS
		H	15.16		
	HCH	V	16.93		PASS
		H	16.65		
Channel Bandwidth: 3 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	16.68	<34.77	PASS
		H	16.97		
	MCH	V	16.51		PASS
		H	16.61		
	HCH	V	17.06		PASS
		H	16.85		
16QAM	LCH	V	15.31	<34.77	PASS
		H	16.62		
	MCH	V	16.40		PASS
		H	17.12		
	HCH	V	16.15		PASS
		H	15.91		

Channel Bandwidth: 5 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	16.60	<34.77	PASS
		H	17.73		
	MCH	V	16.27		PASS
		H	16.95		
	HCH	V	17.38		PASS
		H	17.83		
16QAM	LCH	V	17.61	<34.77	PASS
		H	17.75		
	MCH	V	17.37		PASS
		H	17.84		
	HCH	V	17.53		PASS
		H	18.09		
Channel Bandwidth: 10 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	18.38	<34.77	PASS
		H	16.82		
	MCH	V	17.94		PASS
		H	18.30		
	HCH	V	17.62		PASS
		H	18.01		
16QAM	LCH	V	18.28	<34.77	PASS
		H	18.20		
	MCH	V	17.42		PASS
		H	17.11		
	HCH	V	16.87		PASS
		H	17.57		

FDD-LTE Band 13

Channel Bandwidth: 5.0 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	18.15	<34.77	PASS
		H	18.57		
	MCH	V	18.62		PASS
		H	17.39		
	HCH	V	18.84		PASS
		H	18.85		
16QAM	LCH	V	17.72	<34.77	PASS
		H	18.63		
	MCH	V	18.89		PASS
		H	18.84		
	HCH	V	17.89		PASS
		H	17.81		
Channel Bandwidth: 10 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	19.44	<34.77	PASS
		H	19.18		
	MCH	V	18.48		PASS
		H	17.81		
	HCH	V	17.91		PASS
		H	18.44		
16QAM	LCH	V	19.30	<34.77	PASS
		H	18.73		
	MCH	V	19.25		PASS
		H	19.27		
	HCH	V	17.87		PASS
		H	18.03		

Max. Conducted Output Power

Please refer to Appendix A: Average Power Output Data

Test result: Pass

8. PEAK-TO-AVERAGE RATIO (PAR) OF TRANSMITTER

8.1 Standard Applicable

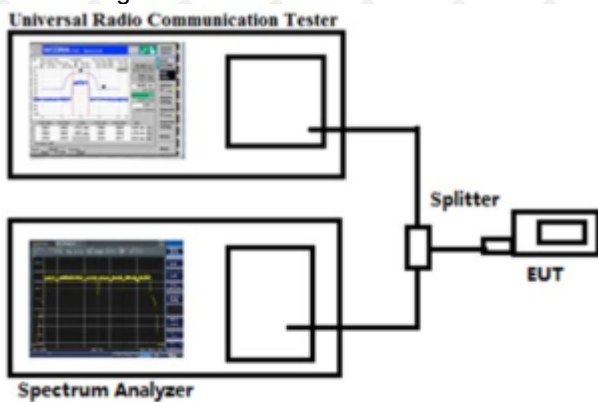
According to §24.232(d), power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (e) of this section. In both instances, equipment employed must be authorized in accordance with the provisions of §24.51, in measuring transmissions in this band using an average power technique, the peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.

According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for more than 0.1 percent of the time or other Commission approved procedure. The measurement must be performed using a signal corresponding to the highest PAPR expected during periods of continuous transmission.

8.2 Test Procedure

According with KDB 971168

1. The signal analyzer's CCDF measurement profile is enabled
 2. Frequency = carrier center frequency
 3. Measurement BW > Emission bandwidth of signal
 4. The signal analyzer was set to collect one million samples to generate the CCDF curve
 5. The measurement interval was set depending on the type of signal analyzed. For continuous signals (>98% duty cycle), the measurement interval was set to 1ms. For burst transmissions, the spectrum analyzer is set to use an internal "RF Burst" trigger that is synced with an incoming pulse and the measurement interval is set to less than the duration of the "on time" of one burst to ensure that energy is only captured during a time in which the transmitter is operating at maximum power
- Test Configuration for the emission bandwidth testing:



8.3 Summary of Test Results

Please refer to Appendix 3: Peak-to-Average Ratio

Test result: Pass

9. EMISSION BANDWIDTH

9.1 Standard Applicable

According to §22.917(b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

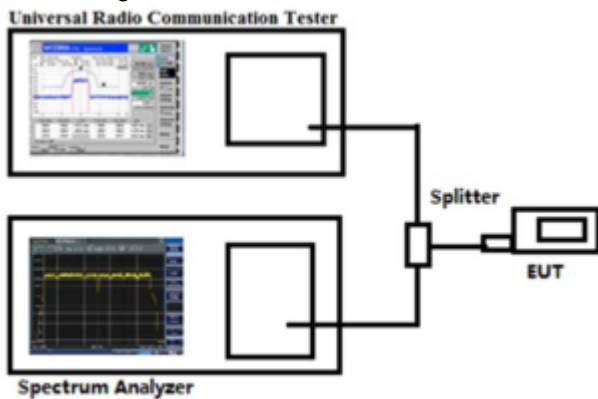
According to §24.238(b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

According to §27.53, the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

9.2 Test Procedure

According to § 22.917(b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

Test Configuration for the emission bandwidth testing:



9.3 Summary of Test Results/Plots

Please refer to Appendix 4: 26dB Bandwidth and Occupied Bandwidth
Test result: Pass

10. OUT OF BAND EMISSIONS AT ANTENNA TERMINAL

10.1 Standard Applicable

According to §22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to §27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

According to §27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

According to §27.53(h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

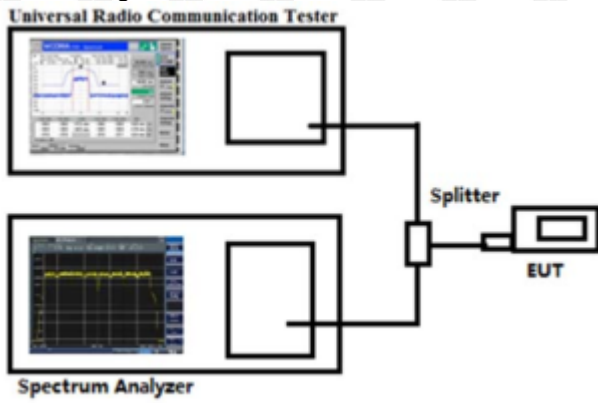
According to §27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB.

According to §27.53(m)(4), for mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log(P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log(P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log(P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less than $43 + 10 \log(P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log(P)$ dB at or below 2490.5 MHz.

10.2 Test Procedure

The RF output terminal of the transmitter was connected to the input of the spectrum analyzer via a suitable attenuation. The RBW of the spectrum analyzer was set to 100kHz and 1MHz for the scan frequency from 30MHz to 1GHz and the scan frequency from 1GHz to up to 10 th harmonic.

Test Configuration for the out of band emissions testing:



10.3 Summary of Test Results/Plots

Please refer to Appendix 5 & 6 Band Edge & Conducted Spurious Emission

Test result: Pass

11. SPURIOUS RADIATED EMISSIONS

11.1 Standard Applicable

According to § 22.917(a), the power of any emissions outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to § 24.238(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log(P)$ dB.

According to § 27.53 (c) For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:

- (1) On any frequency outside the 746-758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (2) On any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log(P)$ dB;
- (3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $76 + 10 \log(P)$ dB in a 6.25 kHz band segment, for base and fixed stations;
- (4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than $65 + 10 \log(P)$ dB in a 6.25 kHz band segment, for mobile and portable stations;
- (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
- (6) Compliance with the provisions of paragraphs (c)(3) and (c)(4) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

According to § 27.53 (f) For operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

According to § 27.53(h), the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.

According to § 27.53(g) the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB.

11.2 Test Procedure

1. The setup of EUT is according with per ANSI/TIA-603-E and ANSI C63.4-2014 measurement procedure.
 2. The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.
 3. The frequency range up to tenth harmonic of the fundamental frequency was investigated.
 4. Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.
- Spurious attenuation limit in dB $= 43 + 10 \log_{10}(\text{power out in Watts})$

11.3 Summary of Test Results/Plots

Note: 1. this EUT was tested in 3 orthogonal positions and the worst case position data was reported.
2. All test modes (different bandwidth and different modulation) are performed, but only the worst case is recorded in this report.

Test Data:

QPSK

Band 2 18607 channel/BW1.4(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1397.34	156	319	-54.85	-13	-41.85	Pass	H
1639.81	154	165	-49.14	-13	-36.14	Pass	H
3842.69	151	56	-48.90	-13	-35.90	Pass	H
5798.43	154	60	-43.55	-13	-30.55	Pass	H
6448.71	148	347	-46.05	-13	-33.05	Pass	H
7998.95	148	51	-50.49	-13	-37.49	Pass	H
1301.31	151	50	-56.71	-13	-43.71	Pass	V
1473.42	145	112	-58.49	-13	-45.49	Pass	V
3515.93	154	289	-54.34	-13	-41.34	Pass	V
3736.30	150	58	-47.00	-13	-34.00	Pass	V
5771.33	158	16	-47.81	-13	-34.81	Pass	V
6592.73	155	187	-51.00	-13	-38.00	Pass	V

Band 2 18900 channel/BW1.4(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1210.72	150	348	-56.08	-13	-43.08	Pass	H
1645.93	146	134	-49.27	-13	-36.27	Pass	H
3862.52	150	11	-49.52	-13	-36.52	Pass	H
5949.87	146	82	-44.78	-13	-31.78	Pass	H
6486.77	149	138	-48.93	-13	-35.93	Pass	H
8055.61	151	138	-48.48	-13	-35.48	Pass	H
1193.77	149	184	-55.39	-13	-42.39	Pass	V
1311.41	148	30	-60.28	-13	-47.28	Pass	V
3551.22	147	247	-56.37	-13	-43.37	Pass	V
3842.40	148	332	-51.59	-13	-38.59	Pass	V
5916.05	150	38	-49.87	-13	-36.87	Pass	V
6551.01	150	140	-48.67	-13	-35.67	Pass	V

Band 2 19193 channel/BW1.4(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1226.85	150	29	-53.50	-13	-40.50	Pass	H
1672.61	146	262	-50.10	-13	-37.10	Pass	H
3936.75	150	138	-48.90	-13	-35.90	Pass	H
5854.91	146	141	-48.01	-13	-35.01	Pass	H
6438.26	149	307	-49.52	-13	-36.52	Pass	H
7941.16	151	340	-47.65	-13	-34.65	Pass	H
1171.94	149	320	-53.18	-13	-40.18	Pass	V
1469.48	148	26	-56.56	-13	-43.56	Pass	V
3652.33	147	1	-52.21	-13	-39.21	Pass	V
3932.28	148	224	-50.12	-13	-37.12	Pass	V
5761.58	150	212	-50.00	-13	-37.00	Pass	V
6609.99	150	286	-50.35	-13	-37.35	Pass	V

16QAM

Band 2 18607 channel/BW1.4(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1270.78	150	174	-57.31	-13	-44.31	Pass	H
1684.87	146	166	-50.38	-13	-37.38	Pass	H
3793.76	150	99	-51.72	-13	-38.72	Pass	H
5815.90	146	42	-46.91	-13	-33.91	Pass	H
6498.41	149	51	-47.28	-13	-34.28	Pass	H
8038.80	151	231	-50.19	-13	-37.19	Pass	H
1207.35	149	334	-52.10	-13	-39.10	Pass	V
1407.53	148	254	-56.40	-13	-43.40	Pass	V
3673.80	147	257	-51.72	-13	-38.72	Pass	V
3997.84	148	122	-48.67	-13	-35.67	Pass	V
5826.22	150	211	-45.68	-13	-32.68	Pass	V
6564.06	150	152	-48.61	-13	-35.61	Pass	V

Band 2 18900 channel/BW1.4(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1383.27	150	211	-59.09	-13	-46.09	Pass	H
1677.63	146	158	-51.55	-13	-38.55	Pass	H
3808.47	150	114	-49.29	-13	-36.29	Pass	H
5884.50	146	321	-44.93	-13	-31.93	Pass	H
6460.92	149	23	-51.52	-13	-38.52	Pass	H
7941.36	151	85	-48.72	-13	-35.72	Pass	H
1186.40	149	50	-55.66	-13	-42.66	Pass	V
1304.23	148	105	-57.43	-13	-44.43	Pass	V
3585.19	147	132	-51.37	-13	-38.37	Pass	V
3818.62	148	248	-53.35	-13	-40.35	Pass	V
5879.30	150	132	-48.91	-13	-35.91	Pass	V
6467.60	150	282	-50.13	-13	-37.13	Pass	V

Band 2 19193 channel/BW1.4(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1235.78	150	263	-53.93	-13	-40.93	Pass	H
1796.27	146	165	-52.11	-13	-39.11	Pass	H
3810.92	150	155	-53.50	-13	-40.50	Pass	H
5821.29	146	128	-45.46	-13	-32.46	Pass	H
6417.17	149	209	-48.74	-13	-35.74	Pass	H
8047.89	151	290	-45.59	-13	-32.59	Pass	H
1151.27	149	229	-50.90	-13	-37.90	Pass	V
1433.30	148	259	-58.98	-13	-45.98	Pass	V
3606.65	147	305	-55.32	-13	-42.32	Pass	V
3816.26	148	25	-51.49	-13	-38.49	Pass	V
5849.65	150	225	-48.44	-13	-35.44	Pass	V
6430.16	150	292	-45.75	-13	-32.75	Pass	V

Note:

- 1) Scan from 9kHz to 40GHz, the disturbance above 13GHz and below 1GHz are attenuated more than 20 dB below the applicable limit and not required to be reported, the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.
- 2) Tested with all kind of bandwidth, RB Size and RB Offset, Found the 1.4MHz with full RB were the worst case; and then Only the worst case is recorded in the report.

QPSK

Band 4 19957 channel/BW1.4(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1341.62	150	5	-54.29	-13	-41.29	Pass	H
1654.94	146	13	-50.41	-13	-37.41	Pass	H
3808.05	150	124	-47.77	-13	-34.77	Pass	H
5837.30	146	178	-43.05	-13	-30.05	Pass	H
6376.66	149	278	-48.38	-13	-35.38	Pass	H
8025.36	151	298	-51.25	-13	-38.25	Pass	H
1160.27	149	87	-51.52	-13	-38.52	Pass	V
1375.71	148	183	-60.07	-13	-47.07	Pass	V
3658.64	147	86	-52.75	-13	-39.75	Pass	V
3973.56	148	23	-52.73	-13	-39.73	Pass	V
5924.11	150	335	-49.57	-13	-36.57	Pass	V
6540.93	150	244	-48.96	-13	-35.96	Pass	V

Band 4 20175 channel/BW1.4(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1306.22	151	223	-58.84	-13	-45.84	Pass	H
1670.94	155	115	-49.61	-13	-36.61	Pass	H
3858.30	147	315	-49.44	-13	-36.44	Pass	H
6005.56	151	193	-45.26	-13	-32.26	Pass	H
6574.19	149	275	-42.19	-13	-29.19	Pass	H
7934.65	154	263	-42.70	-13	-29.70	Pass	H
1252.26	154	303	-53.67	-13	-40.67	Pass	V
1506.20	150	118	-56.41	-13	-43.41	Pass	V
3555.70	151	159	-54.40	-13	-41.40	Pass	V
3805.09	146	6	-50.43	-13	-37.43	Pass	V
5856.23	153	81	-46.59	-13	-33.59	Pass	V
6657.75	149	339	-50.79	-13	-37.79	Pass	V

Band 4 20393 channel/BW1.4(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1242.74	151	311	-58.48	-13	-45.48	Pass	H
1726.70	154	138	-50.11	-13	-37.11	Pass	H
3891.40	153	62	-46.14	-13	-33.14	Pass	H
5987.97	153	94	-45.58	-13	-32.58	Pass	H
6646.20	150	168	-43.70	-13	-30.70	Pass	H
8087.15	148	81	-41.58	-13	-28.58	Pass	H
1271.29	149	357	-50.88	-13	-37.88	Pass	V
1452.75	151	99	-53.35	-13	-40.35	Pass	V
3549.41	152	123	-50.32	-13	-37.32	Pass	V
3878.19	152	357	-51.24	-13	-38.24	Pass	V
5942.49	149	13	-45.42	-13	-32.42	Pass	V
6567.09	148	328	-52.09	-13	-39.09	Pass	V

16QAM

Band 4 19957 channel/BW1.4(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1364.29	145	176	-60.89	-13	-47.89	Pass	H
1592.18	155	190	-46.42	-13	-33.42	Pass	H
3791.27	148	288	-49.29	-13	-36.29	Pass	H
6017.38	152	53	-47.94	-13	-34.94	Pass	H
6492.78	153	83	-46.22	-13	-33.22	Pass	H
8099.39	149	186	-42.35	-13	-29.35	Pass	H
1153.67	147	85	-54.15	-13	-41.15	Pass	V
1354.98	148	147	-56.02	-13	-43.02	Pass	V
3562.74	150	254	-54.11	-13	-41.11	Pass	V
3977.41	145	57	-51.05	-13	-38.05	Pass	V
5832.55	153	57	-43.31	-13	-30.31	Pass	V
6660.49	152	141	-51.59	-13	-38.59	Pass	V

Band 4 20175 channel/BW1.4(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1255.58	148	37	-56.66	-13	-43.66	Pass	H
1732.81	154	289	-47.56	-13	-34.56	Pass	H
3801.15	154	158	-49.15	-13	-36.15	Pass	H
5906.80	148	260	-45.82	-13	-32.82	Pass	H
6520.13	153	125	-42.91	-13	-29.91	Pass	H
7922.70	155	149	-43.41	-13	-30.41	Pass	H
1158.38	149	254	-54.92	-13	-41.92	Pass	V
1341.35	149	164	-58.45	-13	-45.45	Pass	V
3622.21	149	264	-51.78	-13	-38.78	Pass	V
3941.05	147	19	-50.02	-13	-37.02	Pass	V
5923.94	147	166	-47.47	-13	-34.47	Pass	V
6678.29	148	275	-48.55	-13	-35.55	Pass	V

Band 4 20393 channel/BW1.4(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1401.76	151	340	-52.83	-13	-39.83	Pass	H
1742.13	147	17	-52.47	-13	-39.47	Pass	H
3896.28	152	230	-42.45	-13	-29.45	Pass	H
5942.24	152	62	-41.71	-13	-28.71	Pass	H
6465.73	155	284	-40.86	-13	-27.86	Pass	H
8061.96	151	79	-48.12	-13	-35.12	Pass	H
1120.77	153	252	-57.37	-13	-44.37	Pass	V
1378.84	150	287	-57.09	-13	-44.09	Pass	V
3565.06	149	218	-46.27	-13	-33.27	Pass	V
3877.75	150	121	-52.94	-13	-39.94	Pass	V
5722.59	155	26	-49.15	-13	-36.15	Pass	V
6582.51	145	236	-44.77	-13	-31.77	Pass	V

Note:

3) Scan from 9kHz to 40GHz, the disturbance above 13GHz and below 1GHz are attenuated more than 20 dB below the applicable limit and not required to be reported, the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

4) Tested with all kind of bandwidth, RB Size and RB Offset, Found the 1.4MHz with full RB were the worst case; and then Only the worst case is recorded in the report.

QPSK

Band 12 23017 channel/BW1.4(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1300.43	148	175	-52.43	-13	-41.45	Pass	H
1738.54	153	337	-48.44	-13	-37.85	Pass	H
3820.17	146	326	-46.88	-13	-35.2	Pass	H
5898.55	153	164	-43.33	-13	-30.39	Pass	H
6508.60	153	251	-41.98	-13	-32.24	Pass	H
8036.60	152	324	-42.79	-13	-30.22	Pass	H
1101.43	145	169	-57.88	-13	-44.9	Pass	V
1473.21	152	96	-57.42	-13	-43.63	Pass	V
3608.75	152	164	-50.38	-13	-35.94	Pass	V
3929.78	148	176	-50.14	-13	-36.01	Pass	V
5806.57	149	145	-44.21	-13	-33.75	Pass	V
6422.69	155	106	-45.85	-13	-32.41	Pass	V

Band 12 23095 channel/BW1.4(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1243.76	146	84	-52.80	-13	-39.80	Pass	H
1784.96	153	73	-47.11	-13	-34.11	Pass	H
3865.65	155	211	-41.21	-13	-28.21	Pass	H
5884.98	154	220	-44.94	-13	-31.94	Pass	H
6538.11	150	29	-38.19	-13	-25.19	Pass	H
8147.91	154	151	-42.05	-13	-29.05	Pass	H
1229.62	153	303	-56.77	-13	-43.77	Pass	V
1384.73	151	59	-59.21	-13	-46.21	Pass	V
3635.03	146	128	-47.02	-13	-34.02	Pass	V
3900.62	145	141	-52.33	-13	-39.33	Pass	V
5895.02	152	341	-44.96	-13	-31.96	Pass	V
6526.17	152	253	-44.95	-13	-31.95	Pass	V

Band 12 23173 channel/BW1.4(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1362.55	147	20	-57.25	-13	-44.25	Pass	H
1634.81	151	215	-50.17	-13	-37.17	Pass	H
3862.20	151	107	-43.63	-13	-30.63	Pass	H
5890.10	151	3	-42.77	-13	-29.77	Pass	H
6594.30	151	285	-40.86	-13	-27.86	Pass	H
8166.38	150	132	-45.86	-13	-32.86	Pass	H
1238.88	152	193	-52.19	-13	-39.19	Pass	V
1558.52	153	138	-58.27	-13	-45.27	Pass	V
3477.53	153	224	-50.26	-13	-37.26	Pass	V
3882.55	152	128	-53.80	-13	-40.80	Pass	V
5863.95	146	119	-45.95	-13	-32.95	Pass	V
6463.15	146	276	-42.42	-13	-29.42	Pass	V

16QAM

Band 12 23017 channel/BW1.4(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1349.24	146	187	-53.52	-13	-41.45	Pass	H
1729.94	153	313	-52.18	-13	-37.85	Pass	H
3893.79	147	183	-46.70	-13	-35.2	Pass	H
5969.16	152	81	-42.14	-13	-30.39	Pass	H
6445.02	147	267	-41.90	-13	-32.24	Pass	H
8150.76	152	79	-40.11	-13	-30.22	Pass	H
1218.89	149	105	-54.83	-13	-44.9	Pass	V
1289.74	152	250	-58.78	-13	-43.63	Pass	V
3610.63	151	31	-45.89	-13	-35.94	Pass	V
3838.03	155	338	-46.20	-13	-36.01	Pass	V
5733.92	149	197	-43.71	-13	-33.75	Pass	V
6533.61	153	154	-47.59	-13	-32.41	Pass	V

Band 12 23095 channel/BW1.4(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1244.08	152	274	-55.95	-13	-42.95	Pass	H
1612.74	152	80	-45.87	-13	-32.87	Pass	H
3932.74	154	88	-48.00	-13	-35.00	Pass	H
5893.37	152	342	-44.19	-13	-31.19	Pass	H
6617.42	150	89	-47.19	-13	-34.19	Pass	H
7904.17	148	331	-44.16	-13	-31.16	Pass	H
1229.59	153	19	-49.80	-13	-36.80	Pass	V
1334.60	150	301	-57.08	-13	-44.08	Pass	V
3594.25	154	103	-51.65	-13	-38.65	Pass	V
3965.64	147	26	-53.79	-13	-40.79	Pass	V
5862.45	148	132	-44.09	-13	-31.09	Pass	V
6663.21	149	289	-49.02	-13	-36.02	Pass	V

Band 12 23173 channel/BW1.4(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1312.01	149	226	-58.69	-13	-45.69	Pass	H
1667.73	149	145	-50.52	-13	-37.52	Pass	H
3981.15	147	332	-45.31	-13	-32.31	Pass	H
5984.56	148	330	-40.75	-13	-27.75	Pass	H
6417.96	149	294	-40.31	-13	-27.31	Pass	H
8135.32	148	303	-43.95	-13	-30.95	Pass	H
1185.17	149	79	-52.84	-13	-39.84	Pass	V
1421.24	154	63	-59.11	-13	-46.11	Pass	V
3509.04	147	314	-47.91	-13	-34.91	Pass	V
3915.71	148	17	-53.73	-13	-40.73	Pass	V
5790.94	154	142	-45.23	-13	-32.23	Pass	V
6537.98	146	198	-47.15	-13	-34.15	Pass	V

Note:

5) Scan from 9kHz to 40GHz, the disturbance above 13GHz and below 1GHz are attenuated more than 20 dB below the applicable limit and not required to be reported, the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

6) Tested with all kind of bandwidth, RB Size and RB Offset, Found the 1.4MHz with full RB were the worst case; and then Only the worst case is recorded in the report.

QPSK

Band 13 23205 channel/BW 5(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1304.31	149	157	-60.13	-13	-44.67	Pass	H
1596.73	153	292	-49.47	-13	-34.41	Pass	H
3794.44	149	56	-49.31	-13	-36.9	Pass	H
5963.44	155	44	-46.61	-13	-33.07	Pass	H
6472.67	149	358	-43.72	-13	-31.79	Pass	H
7997.28	152	34	-40.75	-13	-28.84	Pass	H
1140.29	145	119	-56.07	-13	-41.24	Pass	V
1439.88	150	169	-58.44	-13	-43.57	Pass	V
3670.02	149	213	-47.72	-13	-37.85	Pass	V
3902.66	151	200	-52.94	-13	-38.46	Pass	V
5842.14	146	343	-45.15	-13	-32.52	Pass	V
6626.41	155	349	-48.48	-13	-35.32	Pass	V

Band 13 23230 channel/BW 5(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1324.25	150	270	-56.23	-13	-43.23	Pass	H
1717.63	148	323	-46.47	-13	-33.47	Pass	H
3859.42	146	218	-46.23	-13	-33.23	Pass	H
5916.31	147	67	-38.34	-13	-25.34	Pass	H
6452.54	148	325	-43.74	-13	-30.74	Pass	H
8119.94	146	265	-45.42	-13	-32.42	Pass	H
1193.48	150	46	-59.63	-13	-46.63	Pass	V
1409.27	150	324	-55.91	-13	-42.91	Pass	V
3520.85	147	320	-49.81	-13	-36.81	Pass	V
3906.28	146	351	-45.10	-13	-32.10	Pass	V
5895.69	152	162	-41.48	-13	-28.48	Pass	V
6483.63	153	76	-42.45	-13	-29.45	Pass	V

Band 13 23255 channel/BW 5(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1235.80	149	165	-52.57	-13	-39.57	Pass	H
1699.64	146	208	-48.36	-13	-35.36	Pass	H
3852.92	146	4	-40.30	-13	-27.30	Pass	H
5942.44	150	198	-42.70	-13	-29.70	Pass	H
6551.74	146	341	-46.55	-13	-33.55	Pass	H
8168.23	150	235	-40.63	-13	-27.63	Pass	H
1232.92	146	292	-51.04	-13	-38.04	Pass	V
1366.31	150	158	-55.13	-13	-42.13	Pass	V
3580.31	149	55	-48.51	-13	-35.51	Pass	V
3870.21	150	319	-44.57	-13	-31.57	Pass	V
5741.82	146	118	-44.20	-13	-31.20	Pass	V
6562.12	150	155	-47.58	-13	-34.58	Pass	V

16QAM

Band 13 23205 channel/BW 5(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1353.62	150	78	-59.32	-13	-46.32	Pass	H
1746.30	149	291	-54.63	-13	-41.63	Pass	H
3877.25	151	213	-48.28	-13	-35.28	Pass	H
5851.68	150	89	-43.21	-13	-30.21	Pass	H
6545.72	151	329	-47.44	-13	-34.44	Pass	H
7965.88	148	138	-44.32	-13	-31.32	Pass	H
1132.37	149	99	-59.92	-13	-46.92	Pass	V
1380.73	148	217	-56.10	-13	-43.10	Pass	V
3604.02	150	12	-49.79	-13	-36.79	Pass	V
3933.96	150	137	-49.14	-13	-36.14	Pass	V
5801.68	146	356	-43.85	-13	-30.85	Pass	V
6595.52	146	95	-49.04	-13	-36.04	Pass	V

Band 13 23230 channel/BW 5(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1260.05	150	142	-58.74	-13	-45.74	Pass	H
1690.57	146	280	-56.25	-13	-43.25	Pass	H
3922.19	150	330	-45.35	-13	-32.35	Pass	H
5946.56	146	194	-44.94	-13	-31.94	Pass	H
6437.23	149	260	-46.73	-13	-33.73	Pass	H
8017.78	151	31	-48.62	-13	-35.62	Pass	H
1189.18	149	4	-51.36	-13	-38.36	Pass	V
1300.75	148	257	-60.75	-13	-47.75	Pass	V
3525.96	147	55	-49.19	-13	-36.19	Pass	V
3935.81	148	273	-54.12	-13	-41.12	Pass	V
5842.23	150	136	-50.49	-13	-37.49	Pass	V
6508.83	150	16	-49.66	-13	-36.66	Pass	V

Band 13 23225 channel/BW 5(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1257.09	149	156	-54.82	-13	-41.82	Pass	H
1594.78	149	170	-50.93	-13	-37.93	Pass	H
3786.26	149	127	-46.16	-13	-33.16	Pass	H
5877.33	146	42	-44.84	-13	-31.84	Pass	H
6511.21	147	69	-44.72	-13	-31.72	Pass	H
7978.33	151	110	-45.24	-13	-32.24	Pass	H
1197.53	148	61	-53.24	-13	-40.24	Pass	V
1366.85	147	266	-56.64	-13	-43.64	Pass	V
3458.47	148	303	-49.83	-13	-36.83	Pass	V
3809.40	149	195	-48.41	-13	-35.41	Pass	V
5745.20	147	323	-44.31	-13	-31.31	Pass	V
6571.04	146	325	-47.93	-13	-34.93	Pass	V

Note:

7) 1)Scan from 9kHz to 40GHz, the disturbance above 13GHz and below 1GHz are attenuated more than 20 dB below the applicable limit and not required to be reported, the above harmonics were the highest point could be found when testing, so only the above harmonics had been displayed.

8) 2)Tested with all kind of bandwidth,RB Size and RB Offset, Found the 5.0MHz with full RB were the worst case; and then Only the worst case is recorded in the report.

12. FREQUENCY STABILITY

12.1 Standard Applicable

According to §22.355, §24.235, §27.54 the limit is 2.5ppm.

12.2 Test Procedure

According to §2.1055, the following test procedure was performed.

The Frequency Stability is measured directly with a Frequency Domain Analyzer. Frequency Deviation in ppm is calculated from the measured peak to peak value.

The Carrier Frequency Stability over Power Supply Voltage and over Temperature is measured with a Frequency Domain Analyzer in histogram mode

12.3 Summary of Test Results/Plots

Note: 1.Normal Voltage NV=DC3.7V; Low Voltage LV=DC3.33V; High Voltage HV=DC4.07V

Please refer to Appendix: Frequency Stability1&2

Test result: Pass

***** END OF REPORT *****