TEST REPORT

Product Name:	SINDAR Smart ControlPanel
FCC ID:	2AZT2-LWLIQ30001
Trademark:	N/A
Model Number:	LWLIQ30001
Prepared For:	Haier Digital Technology (Shanghai) Co., Ltd.
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Manufacturer:	Haier Digital Technology (Shanghai) Co., Ltd.
Address:	Room 202-77, No. 668, Xinzhuan Road, Songjiang Hi-tech Park, Caohejing Development Zone, Shanghai, China
Prepared By:	Shenzhen CTB Testing Technology Co., Ltd.
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Sample Received Date:	Apr. 8, 2021
Sample tested Date:	Apr. 8, 2021 to Apr. 22, 2021
Issue Date:	Apr. 22, 2021
Report No.:	CTB210408013RFX
Test Standards	FCC Part 2, 22H, 27
Test Results	PASS
Remark:	This is LTE radio test report.

Compiled by:	Reviewed by:	Approved by:
Arron Liu	Bin Mei	Rita Xiao / Director

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.

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(Note: N/A means not applicable)

1. VERSION

Report No.	Issue Date	Description	Approved
CTB210408013RFX	Apr. 22, 2021	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

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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):	LWLIQ30001
Model Description:	All model's the function, software and electric circuit are the same, only with the product size and model named different. Test sample model: LWLIQ30001
Hardware Version:	V1.0
Software Version:	V1.0
Operation Frequency:	FDD-LTE BAND 5:824-849MHz TDD-LTE BAND 41:2555-2655MHz
Max. RF output power:	FDD-LTE BAND 5: 23.47dBm FDD-LTE BAND 41: 18.92dBm
Type of Modulation:	QPSK, 16QAM
Antenna installation:	External antenna
Antenna Gain:	1dBi
Ratings:	DC 12.0V charging from Battery

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

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 5	Low, Middle, High Channels
TM2	FDD-LTE BAND 41	Low, Middle, High Channels

Test Mode	Test Frequency	Bandwidth (MHz)	Number [UL]	Frequency of Uplink(MHz)
FDD band 5	Low Range	1.4	20407	824.7
		3	20415	825.5
		5	20425	826.5
		10	20450	829
	Mid Range	1.4/3/5/100	20525	836.5
	High Range	1.4	20643	848.3
		3	20635	847.5
		5	20625	846.5
		10	20600	844

Test Mode	Test Frequency	Bandwidth (MHz)	Number [UL]	Frequency of Uplink(MHz)
FDD band 41	Low Range	5	40265	2557.5
		10	40290	2560
		15	40315	2562.5
		20	40340	2565
	Mid Range	5/10/15/20	40740	2605
	High Range	5	41215	2652.5
		10	41190	2650
		15	41165	2647.5
		20	41140	2645

4.5 Test Environment

Humidity(%):	55
Atmospheric Pressure(kPa):	101.1
Normal Voltage(DC):	12.0V
Normal Temperature(℃)	25
Low Temperature(℃)	0
High Temperature(℃)	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.	Last calibration	Calibrated until
1	Spectrum Analyzer	Agilent	N9020A	MY52090073	Sep. 28, 2020	Sep. 28, 2021
2	Power Sensor	Agilent	U2021XA	MY56120032	Sep. 28, 2020	Sep. 28, 2021
3	Power Sensor	Agilent	U2021XA	MY56120034	Sep. 28, 2020	Sep. 28, 2021
4	Communication test set	R&S	CMW500	108058	Sep. 28, 2020	Sep. 28, 2021
5	Spectrum Analyzer	R&S	FSP40	100550	Sep. 28, 2020	Sep. 28, 2021
6	Signal Generator	Agilent	N5181A	MY49060920	Sep. 28, 2020	Sep. 28, 2021
7	Signal Generator	Agilent	N5182A	MY47420195	Sep. 28, 2020	Sep. 28, 2021
8	Communication test set	Agilent	E5515C	MY50102567	Oct. 10, 2020	Oct. 10, 2021
9	band rejection filter	Shenxiang	MSF2400-2483.5MS-1154	20181015001	Sep. 28, 2020	Sep. 28, 2021
10	band rejection filter	Shenxiang	MSF5150-5850MS-1155	20181015001	Sep. 28, 2020	Sep. 28, 2021
11	band rejection filter	Xingbo	XBLBQ-DZA120	190821-1-1	Sep. 28, 2020	Sep. 28, 2021
12	BT&WI-FI Automatic test software	Micowave	MTS8310	Ver. 2.0.0.0	\	\
13	Rohde & Schwarz SFU Broadcast Test System	R&S	SFU	101017	Sep. 28, 2020	Sep. 28, 2021
14	Temperature humidity chamber	Hongjing	TH-80CH	DG-15174	Sep. 28, 2020	Sep. 28, 2021
15	234G Automatic test software	Micowave	MTS8200	Ver. 2.0.0.0	\	\
16	966 chamber	C.R.T.	966 Room	966	Nov. 9, 2019	Nov. 08, 2022
17	Receiver	R&S	ESPI	100362	Sep. 28, 2020	Sep. 28, 2021

18	Amplifier	HP	8447E	2945A02747	Sep. 28, 2020	Sep. 28, 2021
19	Amplifier	Agilent	8449B	3008A01838	Sep. 28, 2020	Sep. 28, 2021
20	TRILOG Broadband Antenna	Schwarzbeck	VULB 9168	00869	Nov. 02, 2020	Nov. 01, 2021
21	Horn Antenna	Schwarzbeck	BBHA9120D	1911	Nov. 02, 2020	Nov. 01, 2021
22	Software	Fala	EZ-EMC	FA-03A2 RE	\	\
23	3-Loop Antenna	Daze	ZN30401	17014	Sep. 28, 2020	Sep. 28, 2021
24	loop antenna	ZHINAN	ZN30900A	/	Sep. 28, 2020	Sep. 28, 2021
25	Horn antenna	A/H/System	SAS-574	588	Sep. 28, 2020	Sep. 28, 2021
26	Amplifier	AEROFLEX	/	S/N/ 097	Sep. 28, 2020	Sep. 28, 2021

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.

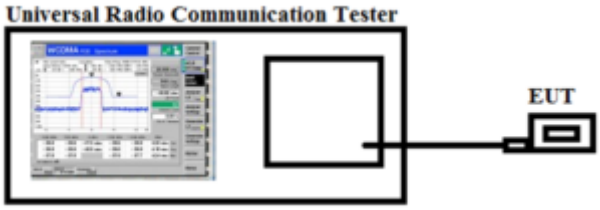
According to §27.50(c)(10), portable stations (hand-held devices) in the 698-746 MHz band are limited to 3 watts ERP.

According to §27.50(h)(2), Mobile and other user stations. Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

According to §27.50(A)(3), Mobile and portable stations. (i) For mobile and portable stations transmitting in the 2305-2315 MHz band or the 2350-2360 MHz band, the average EIRP must not exceed 50 milliwatts within any 1 megahertz of authorized bandwidth, except that for mobile and portable stations compliant with 3GPP LTE standards or another advanced mobile broadband protocol that avoids concentrating energy at the edge of the operating band the average EIRP must not exceed 250 milliwatts within any 5 megahertz of authorized bandwidth but may exceed 50 milliwatts within any 1 megahertz of authorized bandwidth. For mobile and portable stations using time division duplexing (TDD) technology, the duty cycle must not exceed 38 percent in the 2305-2315 MHz and 2350-2360 MHz bands. Mobile and portable stations using FDD technology are restricted to transmitting in the 2305-23

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 5

Channel Bandwidth: 1.4 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	21.55	<38.00	PASS
		H	21.46		
	MCH	V	21.16		PASS
		H	21.04		
	HCH	V	21.38		PASS
		H	21.33		
16QAM	LCH	V	20.34	<38.00	PASS
		H	20.20		
	MCH	V	20.19		PASS
		H	19.17		
	HCH	V	19.95		PASS
		H	19.94		
Channel Bandwidth: 3 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	21.30	<38.00	PASS
		H	21.24		
	MCH	V	21.07		PASS
		H	20.31		
	HCH	V	21.31		PASS
		H	21.32		
16QAM	LCH	V	20.38	<38.00	PASS
		H	21.97		
	MCH	V	19.35		PASS
		H	20.12		
	HCH	V	19.92		PASS

		H	19.94		
Channel Bandwidth: 5 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	21.35	<38.00	PASS
		H	21.31		
	MCH	V	21.32		PASS
		H	21.16		
	HCH	V	21.18		PASS
		H	20.16		
16QAM	LCH	V	20.40	<38.00	PASS
		H	19.30		
	MCH	V	20.20		PASS
		H	20.14		
	HCH	V	20.26		PASS
		H	20.24		
Channel Bandwidth: 10 MHz					
Modulation	Channel	Antenna Polar	ERP [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	20.28	<38.00	PASS
		H	20.22		
	MCH	V	20.20		PASS
		H	21.10		
	HCH	V	21.23		PASS
		H	21.20		
16QAM	LCH	V	20.41	<38.00	PASS
		H	20.23		
	MCH	V	20.22		PASS
		H	20.21		
	HCH	V	19.99		PASS
		H	19.94		

FDD-LTE Band 41

Channel Bandwidth: 5.0 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	16.63	<33.00	PASS
		H	16.55		
	MCH	V	15.55		PASS

		H	15.50		
	HCH	V	16.36		PASS
		H	15.65		
16QAM	LCH	V	15.63	<33.00	PASS
		H	15.36		
	MCH	V	15.10		PASS
		H	14.70		
	HCH	V	15.39		PASS
		H	15.38		
Channel Bandwidth: 10MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	15.53	<33.00	PASS
		H	16.14		
	MCH	V	15.73		PASS
		H	15.71		
	HCH	V	16.14		PASS
		H	15.80		
16QAM	LCH	V	16.55	<33.00	PASS
		H	15.03		
	MCH	V	15.13		PASS
		H	15.09		
	HCH	V	16.48		PASS
		H	15.48		
Channel Bandwidth: 15 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	15.86	<33.00	PASS
		H	16.20		
	MCH	V	15.25		PASS
		H	14.72		
	HCH	V	14.22		PASS
		H	16.36		
16QAM	LCH	V	15.04	<33.00	PASS
		H	16.35		
	MCH	V	15.07		PASS
		H	15.17		
	HCH	V	16.19		PASS

		H	16.49		
Channel Bandwidth: 20 MHz					
Modulation	Channel	Antenna Polar	E.i.r.p [dBm]	Limit (dBm)	Verdict
QPSK	LCH	V	15.93	<33.00	PASS
		H	16.06		
	MCH	V	15.68		PASS
		H	15.57		
	HCH	V	15.57		PASS
		H	16.06		
16QAM	LCH	V	15.27	<33.00	PASS
		H	15.42		
	MCH	V	14.75		PASS
		H	15.00		
	HCH	V	13.44		PASS
		H	16.30		

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.

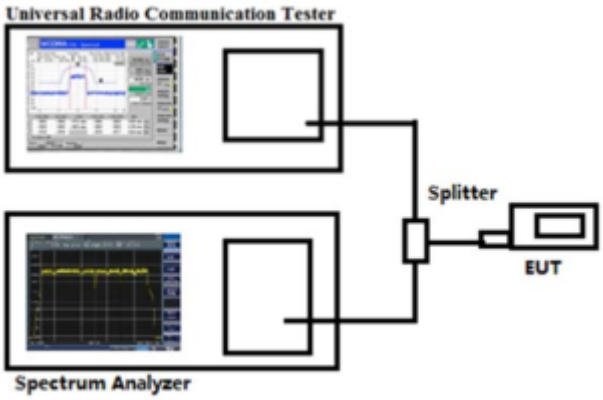
According to §27.50(B), the peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB. The PAPR measurements should be made using either an instrument with complementary cumulative distribution function (CCDF) capabilities to determine that PAPR will not exceed 13 dB for 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 B: 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.

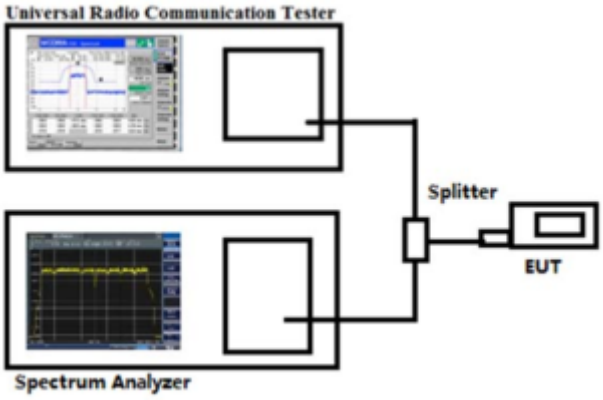
According to §24.238(b), the emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power.

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 C: 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 log10 (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

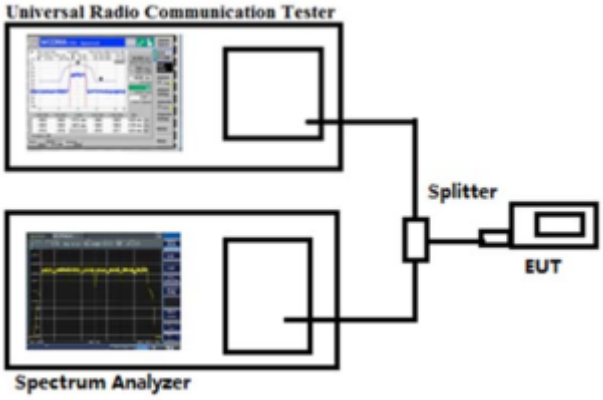
attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least 43 + 10 log (P) dB.

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 that 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 D & E: 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 log10 (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 (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 5 20407 channel/BW1.4(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1274.721	152	40	-60.68	-13.00	-47.68	Pass	H
1633.892	150	54	-51.97	-13.00	-38.97	Pass	H
3859.037	152	209	-50.32	-13.00	-37.32	Pass	H
5762.527	153	100	-47.32	-13.00	-34.32	Pass	H
6501.260	152	276	-46.04	-13.00	-33.04	Pass	H
7966.120	152	100	-46.46	-13.00	-33.46	Pass	H
1218.322	148	159	-58.06	-13.00	-45.06	Pass	V
1349.515	151	66	-59.48	-13.00	-46.48	Pass	V
3491.050	151	42	-54.52	-13.00	-41.52	Pass	V
3824.302	151	145	-52.47	-13.00	-39.47	Pass	V
5831.171	149	57	-48.67	-13.00	-35.67	Pass	V
6554.944	153	304	-48.22	-13.00	-35.22	Pass	V

Band 5 20525 channel/BW1.4(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1285.754	148	28	-58.44	-13.00	-45.44	Pass	H
1592.179	153	40	-52.71	-13.00	-39.71	Pass	H
3863.718	150	91	-50.18	-13.00	-37.18	Pass	H
5772.008	150	24	-47.41	-13.00	-34.41	Pass	H
6508.712	150	64	-46.74	-13.00	-33.74	Pass	H
7987.524	151	158	-48.53	-13.00	-35.53	Pass	H
1187.078	149	257	-58.30	-13.00	-45.30	Pass	V
1444.228	152	217	-58.50	-13.00	-45.50	Pass	V
3491.005	152	166	-52.75	-13.00	-39.75	Pass	V
3828.463	150	321	-50.01	-13.00	-37.01	Pass	V
5819.595	149	256	-48.91	-13.00	-35.91	Pass	V

6517.992	152	119	-49.78	-13.00	-36.78	Pass	V

Band 5 20643 channel/BW1.4(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1255.758	152	82	-59.10	-13.00	-46.10	Pass	H
1592.939	152	133	-53.93	-13.00	-40.93	Pass	H
3805.815	148	238	-52.28	-13.00	-39.28	Pass	H
5771.354	151	218	-45.76	-13.00	-32.76	Pass	H
6460.374	152	212	-46.76	-13.00	-33.76	Pass	H
7969.397	152	135	-46.17	-13.00	-33.17	Pass	H
1237.367	148	313	-58.65	-13.00	-45.65	Pass	V
1425.805	149	181	-60.49	-13.00	-47.49	Pass	V
3413.608	152	199	-54.46	-13.00	-41.46	Pass	V
3838.075	153	106	-50.97	-13.00	-37.97	Pass	V
5790.637	150	252	-47.67	-13.00	-34.67	Pass	V
6463.444	150	69	-47.33	-13.00	-34.33	Pass	V

16QAM

Band 5 20407 channel/BW1.4(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1274.414	150	316	-60.26	-13.00	-47.26	Pass	H
1586.496	150	311	-52.73	-13.00	-39.73	Pass	H
3785.222	150	261	-49.40	-13.00	-36.40	Pass	H
5785.566	152	349	-48.24	-13.00	-35.24	Pass	H
6508.923	149	55	-46.06	-13.00	-33.06	Pass	H
8037.229	153	230	-49.02	-13.00	-36.02	Pass	H
1204.199	150	170	-60.00	-13.00	-47.00	Pass	V
1393.910	149	104	-59.53	-13.00	-46.53	Pass	V
3453.009	153	134	-53.28	-13.00	-40.28	Pass	V
3832.912	150	325	-51.50	-13.00	-38.50	Pass	V
5766.325	148	319	-46.38	-13.00	-33.38	Pass	V
6476.194	150	13	-48.25	-13.00	-35.25	Pass	V

Band 5 20525 channel/BW1.4(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1280.766	149	13	-59.67	-13.00	-46.67	Pass	H
1623.596	148	27	-51.65	-13.00	-38.65	Pass	H
3825.338	151	290	-50.94	-13.00	-37.94	Pass	H
5852.068	149	241	-47.10	-13.00	-34.10	Pass	H
6500.431	149	72	-48.31	-13.00	-35.31	Pass	H
7960.070	151	192	-48.74	-13.00	-35.74	Pass	H
1235.840	152	310	-57.98	-13.00	-44.98	Pass	V
1363.961	150	155	-59.62	-13.00	-46.62	Pass	V
3443.031	153	298	-51.90	-13.00	-38.90	Pass	V
3878.058	150	279	-50.73	-13.00	-37.73	Pass	V
5775.252	150	80	-46.61	-13.00	-33.61	Pass	V
6526.687	153	148	-50.28	-13.00	-37.28	Pass	V

Band 5 20643 channel/BW1.4(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1199.624	148	173	-59.70	-13.00	-46.70	Pass	H
1595.673	150	184	-52.86	-13.00	-39.86	Pass	H
3774.401	150	26	-49.98	-13.00	-36.98	Pass	H
5776.211	151	176	-47.82	-13.00	-34.82	Pass	H
6510.263	149	8	-47.82	-13.00	-34.82	Pass	H
7955.124	149	77	-49.00	-13.00	-36.00	Pass	H
1169.030	151	170	-59.48	-13.00	-46.48	Pass	V
1446.031	153	21	-60.27	-13.00	-47.27	Pass	V
3442.499	152	317	-53.39	-13.00	-40.39	Pass	V
3908.846	151	58	-51.82	-13.00	-38.82	Pass	V
5819.102	153	111	-48.39	-13.00	-35.39	Pass	V
6548.387	150	264	-48.30	-13.00	-35.30	Pass	V

Note:

1) Scan from 9kHz to 25GHz, 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 41 40265 channel/BW 5(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1335.764	149	165	-56.170	-25	-31.17	Pass	H
1702.486	146	208	-50.323	-25	-25.32	Pass	H
3902.880	146	4	-44.082	-25	-19.08	Pass	H
5887.817	150	198	-44.877	-25	-19.88	Pass	H
6510.270	146	341	-41.279	-25	-16.28	Pass	H
8081.127	150	235	-43.247	-25	-18.25	Pass	H
1205.398	146	292	-55.474	-25	-30.47	Pass	V
1461.012	150	158	-58.480	-25	-33.48	Pass	V
3542.893	149	55	-52.431	-25	-27.43	Pass	V
3829.956	150	319	-49.261	-25	-24.26	Pass	V
5802.173	146	118	-46.294	-25	-21.29	Pass	V
6558.838	150	155	-46.120	-25	-21.12	Pass	V

Band 41 40740 channel/BW 5(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1333.856	149	165	-54.803	-25	-29.80	Pass	H
1702.168	146	208	-48.829	-25	-23.83	Pass	H
3901.477	146	4	-45.012	-25	-20.01	Pass	H
5890.242	150	198	-42.197	-25	-17.20	Pass	H
6510.948	146	341	-44.514	-25	-19.51	Pass	H
8078.397	150	235	-46.037	-25	-21.04	Pass	H
1205.922	146	292	-56.833	-25	-31.83	Pass	V
1462.025	150	158	-56.174	-25	-31.17	Pass	V
3541.831	149	55	-53.201	-25	-28.20	Pass	V
3830.853	150	319	-48.444	-25	-23.44	Pass	V
5802.430	146	118	-46.080	-25	-21.08	Pass	V
6556.267	150	155	-46.090	-25	-21.09	Pass	V

Band 41 41215 channel/BW 5(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1334.489	149	165	-56.803	-25	-31.80	Pass	H
1703.380	146	208	-46.679	-25	-21.68	Pass	H
3902.870	146	4	-46.616	-25	-21.62	Pass	H
5888.116	150	198	-41.186	-25	-16.19	Pass	H
6509.386	146	341	-42.255	-25	-17.25	Pass	H
8079.095	150	235	-44.141	-25	-19.14	Pass	H
1205.501	146	292	-54.153	-25	-29.15	Pass	V
1460.635	150	158	-59.259	-25	-34.26	Pass	V
3543.014	149	55	-50.204	-25	-25.20	Pass	V
3830.942	150	319	-49.377	-25	-24.38	Pass	V
5800.372	146	118	-48.247	-25	-23.25	Pass	V
6557.031	150	155	-48.270	-25	-23.27	Pass	V

16QAM

Band 41 40265 channel/BW 5(lowest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1335.765	149	165	-56.316	-25	-31.32	Pass	H
1702.440	146	208	-50.209	-25	-25.21	Pass	H
3900.924	146	4	-45.450	-25	-20.45	Pass	H
5887.886	150	198	-41.998	-25	-17.00	Pass	H
6510.129	146	341	-42.775	-25	-17.78	Pass	H
8080.915	150	235	-44.310	-25	-19.31	Pass	H
1206.596	146	292	-53.837	-25	-28.84	Pass	V
1460.278	150	158	-58.452	-25	-33.45	Pass	V
3542.864	149	55	-53.303	-25	-28.30	Pass	V
3831.008	150	319	-50.097	-25	-25.10	Pass	V
5802.358	146	118	-47.119	-25	-22.12	Pass	V
6558.502	150	155	-46.330	-25	-21.33	Pass	V

Band 41 40740 channel/BW 5(middle channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1333.836	149	165	-56.973	-25	-31.97	Pass	H
1703.990	146	208	-47.340	-25	-22.34	Pass	H
3901.584	146	4	-47.512	-25	-22.51	Pass	H
5889.547	150	198	-42.619	-25	-17.62	Pass	H
6509.054	146	341	-43.418	-25	-18.42	Pass	H
8078.916	150	235	-43.296	-25	-18.30	Pass	H
1207.059	146	292	-56.787	-25	-31.79	Pass	V
1462.165	150	158	-59.009	-25	-34.01	Pass	V
3544.068	149	55	-51.395	-25	-26.40	Pass	V
3830.434	150	319	-51.325	-25	-26.32	Pass	V
5802.595	146	118	-48.418	-25	-23.42	Pass	V
6556.342	150	155	-47.649	-25	-22.65	Pass	V

Band 41 41215 channel/BW 5(highest channel)							
Frequency (MHz)	Height (cm)	Azimuth (deg)	Spurious Emission Level (dBm)	Limit (dBm)	Over Limit (dB)	Result	Antenna Polaxis.
1334.877	149	165	-54.219	-25	-29.22	Pass	H
1703.341	146	208	-49.032	-25	-24.03	Pass	H
3901.572	146	4	-44.738	-25	-19.74	Pass	H
5890.345	150	198	-43.344	-25	-18.34	Pass	H
6509.547	146	341	-41.759	-25	-16.76	Pass	H
8080.299	150	235	-45.212	-25	-20.21	Pass	H
1206.911	146	292	-55.805	-25	-30.81	Pass	V
1460.494	150	158	-59.353	-25	-34.35	Pass	V
3543.976	149	55	-50.149	-25	-25.15	Pass	V
3829.234	150	319	-50.493	-25	-25.49	Pass	V
5800.518	146	118	-46.786	-25	-21.79	Pass	V
6557.804	150	155	-46.541	-25	-21.54	Pass	V

Note:

1)Scan from 9kHz to 25GHz, 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.

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=DC12.0V; Low Voltage LV=DC10.8V; High Voltage HV=DC13.2V

Please refer to Appendix F: Frequency Stability

Test result: Pass

※※※※※ END OF REPORT ※※※※※