

TEST REPORT

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Report Number : SZNS211130-61697E-RFC
FCC ID: 2ATZ4-BG2P5G
IC: 26074-BG2P5G

Test Standard (s)

FCC PART 27; RSS-139 ISSUE 3, JULY 2015


Sample Description

Product: RP02
Trademark: UMIDIGI
Tested Model: BISON GT2 5G
Multiple Model: BISON GT2 PRO 5G (Please refer to DOS for Model difference)
Date Received: 2021-11-30
Date of Test: 2021-12-19 to 2022-01-24
Report Date: 2022-01-24

Test Result:	Pass*
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* In the configuration tested, the EUT complied with the standards above.

Prepared and Checked By:



Black Ding
EMC Engineer

Approved By:



Candy Li
EMC Engineer

Note: This report may contain data that are not covered by the A2LA accreditation and are marked with an asterisk "★".

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Product	UMIDIGI
Tested Model	BISON GT2 5G
Multiple Model	BISON GT2 PRO 5G
Model difference	Please refer to the DoS letter
HVIN	N900_MB_V2
Frequency Range	5G NR Band 66: 1710-1780 MHz(TX); 2110-2200 MHz(RX)
Maximum Output Power (Conducted power)	24.17dBm
Modulation Technique	DFT-s-OFDM: PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM
Antenna Specification*	Internal Antenna (provided by the applicant) ANT0: 0.56dBi
Voltage Range	DC 3.87V from battery or DC 5V/7.0V/9.0V/12.0V from adapter
Sample serial number	SZNS211130-61697E-RF-S1
Sample/EUT Status	Good condition
Adapter information	Model: HJ-FC017K7-US Input: 100-240V~, 50/60Hz, 0.6A Output: DC 5V, 2A OR 7V, 2A OR 9V, 2A OR 12V, 1.5A 18W
Normal/Extreme Condition*	VN.: Normal Voltage: 3.87V _{DC} VL.: Low Temperature 3.29V _{DC} VH.: High Temperature 4.45V _{DC} TN: Normal Temperature: 25°C T1~T9: -30°C, -20°C, -10°C, 0°C, 10°C, 20°C, 30°C, 40°C, 50°C (They are provided by the manufacturer)

Remark:

- 5G NR bands supports SA Band66 and NSA DC_12A_n66A mode only. For SA and NSA mode of all 5G NR, we only show the combination of the maximum power among all SA and NSA combinations in the report.
- For modulation of CP-OFDM and DFT-s-OFDM, the maximum power of CP-OFDM is lower than DFT-s-OFDM modulation, therefore, we chose higher power (DFT-s-OFDM modulation) to perform all tests and show in the report.

Objective

This test report is in accordance with Part 2-Subpart J and Subpart 27 of the Federal Communication Commission's rules, and RSS-139 Issue 3 July 2015 of the Innovation, science and Economic Development Canada

The objective is to determine the compliance of the EUT with FCC rules and RSS-139 Issue 3 for output power, modulation characteristic, occupied bandwidth, and spurious emission at antenna terminal, spurious radiated emission, frequency stability and band edge.

Test Methodology

All tests and measurements indicated in this document were performed in accordance with the RSS-139 Issue 3 July 2015 and Code of Federal Regulations Title 47 Part 2-Subpart J as well as the following parts:

Part 27 - Miscellaneous Wireless Communications Services

ANSI C63.26-2015: American National Standard for Compliance Testing of Transmitters Used in Licensed Radio Services

All emissions measurement was performed at Shenzhen Accurate Technology Co., Ltd. The radiated testing was performed at an antenna-to-EUT distance of 3 meters.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
RF Frequency		0.082×10^{-7}
Emissions, Radiated	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
Temperature		1°C
Humidity		6%
Supply voltages		0.4%

Note: The extended uncertainty given in this report is obtained by combining the standard uncertainty times the coverage factor K with the 95% confidence interval. Otherwise required by the applicant or Product Regulations, Decision Rule in this report did not consider the uncertainty.

Test Facility

The Test site used by Shenzhen Accurate Technology Co., Ltd. to collect test data is located on the 1/F., Building A, Changyuan New Material Port, Science & Industry Park, Nanshan District, Shenzhen, Guangdong, P.R. China.

The test site has been approved by the FCC under the KDB 974614 D01 and is listed in the FCC Public Access Link (PAL) database, FCC Registration No.: 708358, the FCC Designation No.: CN1189. Accredited by American Association for Laboratory Accreditation (A2LA) The Certificate Number is 429 7.01.

The lab has been recognized by Innovation, Science and Economic Development Canada to test to Canadian radio equipment requirements, the CAB identifier: CN0016. The Registration Number is 5077A.

SYSTEM TEST CONFIGURATION

Description of Test Configuration

The final qualification test was performed with the EUT operating at normal mode.

The test items were performed with the EUT operating at testing mode. Test was performed with channels as below table:

Band	Channel Bandwidth	Frequency
NR Band 66	5.0 MHz	1712.5MHz, 1745.0MHz, 1777.5MHz
	10.0 MHz	1715.0MHz, 1745.0MHz, 1775.0MHz
	15.0 MHz	1717.5MHz, 1745.0MHz, 1772.5MHz
	20.0 MHz	1720.0MHz, 1745.0MHz, 1770.0MHz
	25.0 MHz	1722.5MHz, 1745.0MHz, 1767.5MHz
	30.0 MHz	1725.0MHz, 1745.0MHz, 1765.0MHz
	40.0 MHz	1730.0MHz, 1745.0MHz, 1760.0MHz

Equipment Modifications

No modification was made to the EUT.

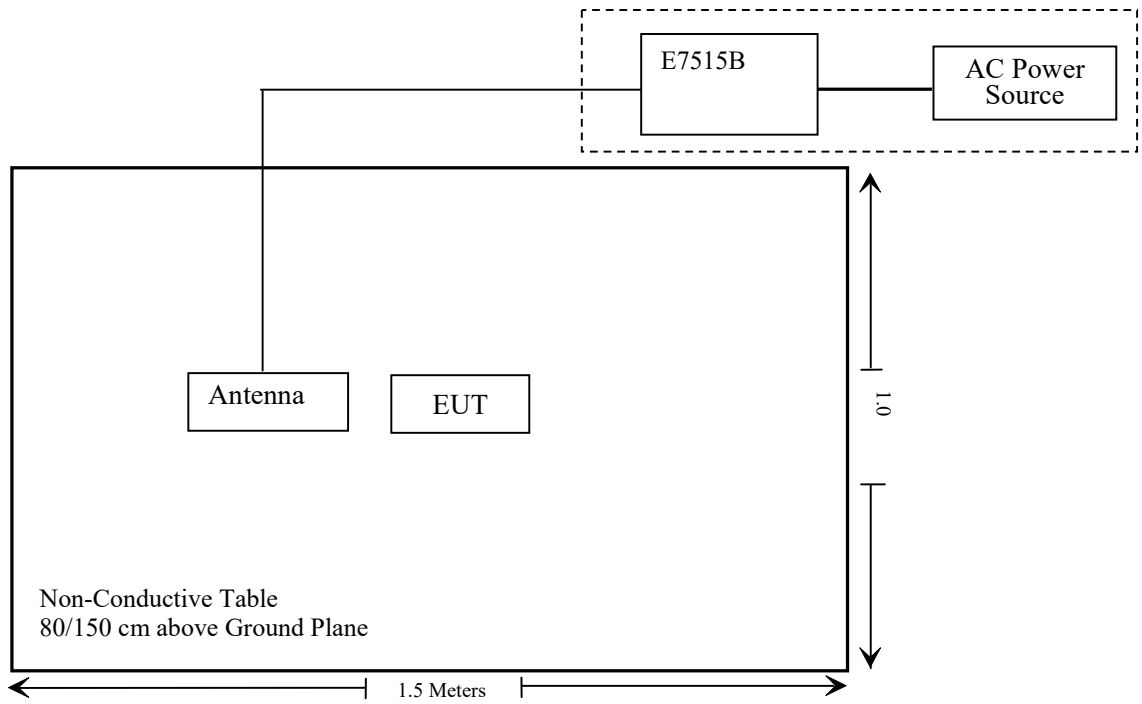
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde & Schwarz	Wideband Radio Communication Tester	E7515B	154606

Support Cable Description

Cable Description	Length (m)	From / Port	To
Un-shielded Un-detachable AC cable	1.2	AC Power Source	E7515B

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result
FCC §1.1310, FCC§2.1093 RSS-102	RF Exposure (SAR)	Compliant*
FCC §2.1046, FCC §27.50 (d) RSS-139 §6.5, RSS-Gen §6.12	RF Output Power	Compliant
FCC § 2.1047	Modulation Characteristics	Not Applicable
RSS-139 §6.1	Channeling Arrangements Frequency Plan	Compliant
RSS-139 §6.2	Types of Modulation	Compliant
FCC § 2.1049, FCC §27.53, RSS-Gen §6.7	Occupied Bandwidth	Compliant
FCC § 2.1051, FCC§27.53 RSS-139 §6.6, RSS-Gen §6.13	Spurious Emissions at Antenna Terminal	Compliant
FCC§ 2.1053, FCC §27.53 RSS-139 §6.6, RSS-Gen §6.13	Field Strength of Spurious Radiation	Compliant
FCC §27.53 (h) (m) RSS-139 §6.6, RSS-Gen §6.13	Band Edge	Compliant
FCC§ 2.1055, FCC §27.54 RSS-139 §6.4, RSS-Gen §6.11	Frequency stability	Compliant

Note: Compliant*: Please refer to SAR report number: SZNS211130-61697E-20.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde & Schwarz	Spectrum Analyzer	FSV-40	101949	2021/12/13	2022/12/12
Keysight	UXM 5G Wireless Test Platform	E7515B	MY58120284	2021-07-21	2022-07-20
Agilent	Signal Generator	N5183A	MY51040755	2021/12/13	2022/12/12
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2021/11/09	2022/11/08
Rohde& Schwarz	Test Receiver	ESR	102725	2021/12/13	2022/12/12
SONOMA INSTRUMENT	Amplifier	310 N	186131	2021/11/09	2022/11/08
Schwarzbeck	Bilog Antenna	VULB9163	9163-194	2020/01/05	2023/01/04
Schwarzbeck	Bilog Antenna	VULB9163	9163-323	2021/07/06	2024/07/05
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-655	2020/01/05	2023/01/04
Schwarzbeck	Horn Antenna	BBHA9120D	9120D-1067	2020/01/05	2023/01/04
Unknown	RF Coaxial Cable	No.10	N050	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.11	N1000	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.12	N040	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.13	N300	2021/12/14	2022/12/13
Unknown	RF Coaxial Cable	No.14	N800	2021/12/14	2022/12/13
Radiated Emission Test Software: e3 19821b(V9)					

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Unknown	Band Reject Filter	MSF1710-178 SMS-1150	201706003	2021/12/14	2022/12/13
RF Conducted Test					
Keysight	PXA Signal Analyzer	N9030B	MY59431409	2021-05-28	2022-05-27
Keysight	UXM 5G Wireless Test Platform	E7515B	MY58120284	2021-07-21	2022-07-20
Fluke	Desktop Multi Meter	45	7664009	2021/12/13	2022/12/12
Mini-Circuits	Power Splitter	DC-18000MHz	SF10944151S	2021/12/13	2022/12/12
UNI-T	DC Power Supply	UTP8305B	10584	NCR	NCR
Gongwen	Temp. & Humid. Chamber	HSD-500	109	2021/12/13	2022/12/12
WEINSCHL	10dB Attenuator	5324	AU 3842	2021/12/14	2022/12/13

* Statement of Traceability: Shenzhen Accurate Technology Co., Ltd. attests that all calibrations have been performed in accordance to requirements that traceable to National Primary Standards and International System of Units (SI).

FCC §1.1310 & FCC §2.1093 & RSS-102 - RF EXPOSURE

Applicable Standard

FCC§1.1310, FCC§2.1093 and RSS-102.

According to FCC§1.1310, FCC§2.1093 and RSS-102, systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guideline

Test Result

Compliant, please refer to the SAR report: SZNS211130-61697E-20

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC § 2.1047(d), Part 27 there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

RSS-139 §6.1 - CHANNELLING ARRANGEMENTS & FREQUENCY PLAN

Applicable Standard

According to RSS-139 §6.1, the frequency plan is described in SRSP-513.

Test Result

Channeling arrangement meets all relevant conditions specified in SRSP-513.

RSS-139 §6.2 - TYPES OF MODULATION

Applicable Standard

According to RSS-139 §6.2, the devices may employ any type of modulation techniques. The type of modulation used must be reported.

Test Result

The EUT uses DFT-s-OFDM PI/2 BPSK & DFT-s-OFDM QPSK & DFT-s-OFDM 16QAM & DFT-s-OFDM 64QAM & DFT-s-OFDM 256QAM & CP-OFDM QPSK & CP -OFDM 16QAM & CP -OFDM 64QAM & CP -OFDM 256QAM modulation.

FCC § 2.1046 & FCC §27.50 (d) & RSS-139 §6.5 - RF OUTPUT POWER

Applicable Standard

The peak-to-average power ratio (PAPR) of the transmitter output power must not exceed 13 dB.

According to FCC §2.1046 and §27.50(d), 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.

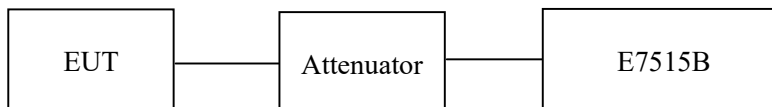
According to RSS-139 §6.5

The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1710-1780 MHz shall not exceed one watt. Consult SRSP-513 for e.i.r.p. limits on fixed and base stations operating in the band 2110-2180 MHz. In addition, the peak to average power ratio (PAPR) of the equipment shall not exceed 13 dB for more than 0.1% of the time, using a signal that corresponds to the highest PAPR during periods of continuous transmission.

Test Procedure

Conducted method:

The RF output of the transmitter was connected to the E7515B through sufficient attenuation.



Radiated method:

ANSI C63.26-2015 Section 5.5 & TIA 603-D section 2.2.17.

Test Data**Environmental Conditions**

Temperature:	23 °C
Relative Humidity:	49 %
ATM Pressure:	101.0 kPa

The testing was performed by Key Pei on 2022-01-20.

EUT operation mode: Transmitting

Scan with SCS 15kHz and SCS 30kHz, the worst case was recorded as below:

Conducted Power

Test data refer to the Appendix D

Peak-to-average ratio (PAR)

Test data refer to the Appendix E1 & E2

FCC §2.1049 & FCC §27.53 & RSS-GEN §6.7 - OCCUPIED BANDWIDTH

Applicable Standard

FCC 47 §2.1049, FCC §27.53.

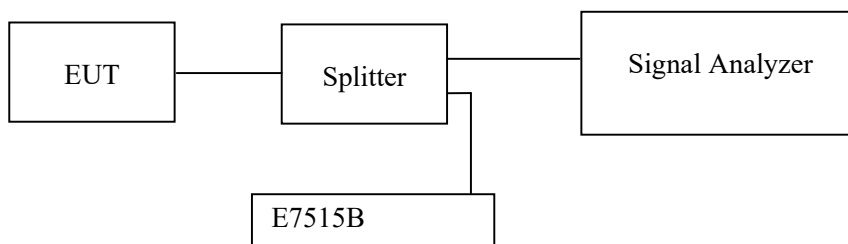
The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained. The occupied bandwidth shall be reported for all equipment in addition to the specified bandwidth required in the applicable RSSs.

In some cases, the “26 dB bandwidth” is required, which is defined as the frequency range between two points, one at the lowest frequency below and one at the highest frequency above the carrier frequency, at which the maximum power level of the transmitted emission is attenuated 26 dB below the maximum in-band power level of the modulated signal, where the two points are on the outskirts of the in-band emission.

Test Procedure

The RF output of the transmitter was connected to the simulator and the spectrum analyzer through sufficient attenuation.

The resolution bandwidth of the spectrum analyzer was set at 1% to 5% of the anticipated emission bandwidth and the 26 dB & 99% bandwidth was recorded.



Test Data

Environmental Conditions

Temperature:	20~25°C
Relative Humidity:	43~63 %
ATM Pressure:	100.9~101.5 kPa

The testing was performed by Key Pei on 2021-12-19 to 2022-01-22

EUT operation mode: Transmitting

Scan with SCS 15kHz and SCS 30kHz, the worst case was recorded as below:

Test Result: Pass

Test plots refer to the Appendix F1 & F2

FCC §2.1051 & FCC §27.53 & RSS-139 §6.6 & RSS-GEN §6.13 - SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Applicable Standard

FCC §2.1051, FCC §27.53.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in § 2.1051.

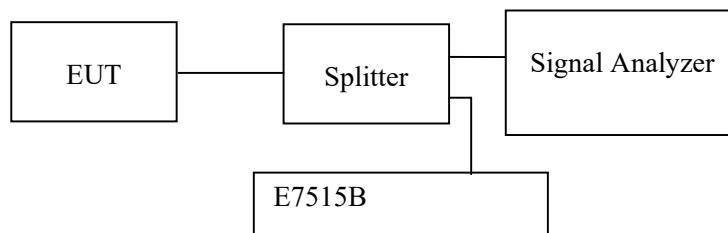
According to RSS-139 §6.6

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

Test Procedure

The RF output of the transceiver was connected to a spectrum analyzer and simulator through appropriate attenuation. The resolution bandwidth of the spectrum analyzer was set at 1MHz. Sufficient scans were taken to show any out of band emissions up to 10th harmonic.



Test Data

Environmental Conditions

Temperature:	22~24°C
Relative Humidity:	48~52 %
ATM Pressure:	100.9~101.1 kPa

The testing was performed by Key Pei on 2022-01-20 and 2022-01-21.

EUT operation mode: Transmitting

Scan with SCS 15kHz and SCS 30kHz, the worst case was recorded as below:

Test result: Pass

Test plots refer to the Appendix G1 & G2 & G3 & G4 & G5 & G6 & G7 & G8 & G9 & G10 & G11 & G12 & G13

FCC § 2.1053 & FCC §27.53 & RSS-139 §6.6 & RSS-GEN §6.13 - SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, FCC § 27.53

According to RSS-139 §6.6

(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the receiving 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.

The frequency range up to tenth harmonic of the fundamental frequency was investigated.

Test Data

Environmental Conditions

Temperature:	21°C
Relative Humidity:	62 %
ATM Pressure:	101.3 kPa

The testing was performed by Chao Mo on 2022-01-07.

EUT operation mode: Transmitting (Worst case record in the reports)

The worst case is as below:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/Ave		Height (m)	Polar (H/V)				
NR BAND66 Low Channel									
45.118	-77.84	PK	170	1.6	H	6.58	-71.26	-13	58.26
40.276	-63.29	PK	245	1.8	V	2.06	-61.23	-13	48.23
3421.40	-66.17	PK	184	1.9	H	6.37	-59.80	-13	46.80
3421.40	-67.10	PK	223	2	V	5.70	-61.40	-13	48.40
NR BAND66 Middle Channel									
45.118	-77.70	PK	9	1.5	H	6.58	-71.12	-13	58.12
40.276	-63.62	PK	136	2.1	V	2.06	-61.56	-13	48.56
3510.00	-69.18	PK	121	2.1	H	7.78	-61.40	-13	48.40
3510.00	-68.38	PK	303	1.6	V	6.58	-61.80	-13	48.80
NR BAND66 High Channel									
45.118	-78.04	PK	17	1.8	H	6.58	-71.46	-13	58.46
40.276	-63.32	PK	317	1.1	V	2.06	-61.26	-13	48.26
3558.60	-64.29	PK	152	1.1	H	7.79	-56.50	-13	43.50
3558.60	-66.07	PK	251	2.4	V	6.97	-59.10	-13	46.10
NR DC_BAND12_BAND66 , Low Channel									
45.118	-78.30	PK	311	1.1	H	6.58	-71.72	-13	58.72
40.276	-63.18	PK	205	1.8	V	2.06	-61.12	-13	48.12
3421.40	-65.71	PK	284	1.5	H	6.37	-59.34	-13	46.34
3421.40	-65.82	PK	221	2.0	V	5.70	-60.12	-13	47.12
NR DC_BAND12_BAND66 Middle Channel									
45.118	-78.34	PK	250	1.8	H	6.58	-71.76	-13	58.76
40.276	-63.45	PK	65	1.5	V	2.06	-61.39	-13	48.39
3510.00	-67.81	PK	128	1.8	H	7.78	-60.03	-13	47.03
3510.00	-66.06	PK	41	1.6	V	6.58	-59.48	-13	46.48
NR DC_BAND12_BAND66 High Channel									
45.118	-78.23	PK	93	2.0	H	6.58	-71.65	-13	58.65
40.276	-63.32	PK	48	1.8	V	2.06	-61.26	-13	48.26
3558.60	-64.45	PK	126	1.7	H	7.79	-56.66	-13	43.66
3558.60	-65.01	PK	91	2.1	V	6.97	-58.04	-13	45.04

Note:

Absolute Level = Reading Level + Substituted Factor

Substituted Factor contains: SG Level - Cable loss+ Antenna Gain

Margin = Level Limit – Absolute

FCC §27.53(h)(m) & RSS-139 §6.6 & RSS-GEN §6.13 - BAND EDGES

Applicable Standard

According to FCC §27.53 (h)(m), 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 RSS-139 §6.6

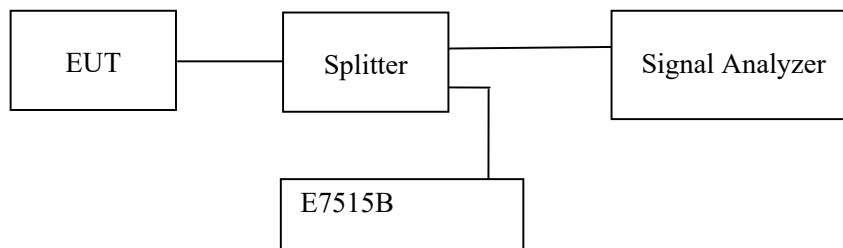
(i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

(ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least $43 + 10 \log_{10} p$ (watts) dB.

Test Procedure

The RF output of the transmitter was connected to the input of the spectrum analyzer through sufficient attenuation.

The center of the spectrum analyzer was set to block edge frequency



Test Data**Environmental Conditions**

Temperature:	20~25°C
Relative Humidity:	43~63 %
ATM Pressure:	100.9~101.5 kPa

The testing was performed by Key Pei on 2021-12-24 to 2022-01-21.

EUT operation mode: Transmitting

Scan with SCS 15kHz and SCS 30kHz, the worst case was recorded as below:

Test Result: Pass

Test plots refer to the Appendix H1 & H2 & H3 & H4 & H5

FCC § 2.1055 & FCC §27.54 & RSS-139 §6.4 & RSS-GEN §6.11 - FREQUENCY STABILITY

Applicable Standard

FCC § 2.1055, FCC §27.54, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

According to RSS-139 §6.4

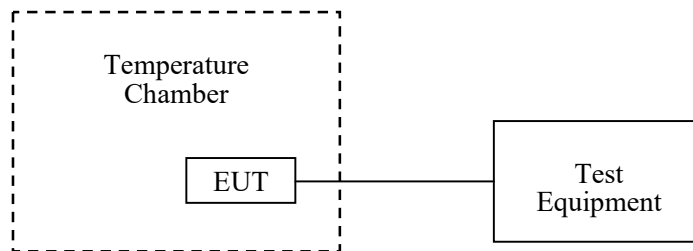
The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen

Test Procedure

Frequency Stability vs. Temperature: The equipment under test was connected to an external AC power supply and the RF output was connected to communication test set via feed-through attenuators. The EUT was placed inside the temperature chamber. The AC leads and RF output cable exited the chamber through an opening made for the purpose.

After the temperature stabilized for approximately 20 minutes, the frequency output was recorded from the communication test set.

Frequency Stability vs. Voltage: For hand carried, battery powered equipment; reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.



Test Data

Environmental Conditions

Temperature:	24°C
Relative Humidity:	52 %
ATM Pressure:	101.0 kPa

The testing was performed by Key Pei on 2022-01-24.

EUT operation mode: Transmitting

Test Result: Pass

Test plots refer to the Appendix I

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