



TEST REPORT

Applicant Name : Franklin Technology Inc.
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South Korea
Report Number : RA221101-50847E-RF-00D
FCC ID: XHG-RG2102

Test Standard (s)

FCC PART 27; FCC PART 22H; FCC PART 24E

Sample Description

Product Type: Mobile Hotspot
Model No.: RG2102
Multiple Model(s) No.: N/A
Trade Mark: N/A
Date Received: 2022/11/01
Report Date: 2023/01/31

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

Prepared and Checked By:

Approved By:

Andy Yu
EMC Engineer

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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Version 2: 2021-11-09 Page 1 of 24FCC -2G,3G,4G

REVISION HISTORY

Revision Number	Report Number	Description of Revision	Date of Revision
0	RA221101-50847E-RF-00D	Original Report	2022/12/29
1	RA221101-50847E-RF-00D	Updated the summary table	2023/01/31

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GENERAL INFORMATION

Product Description for Equipment under Test (EUT)

Frequency Range	5G NR n2: 1850-1910MHz(TX); 1930-1990MHz(RX) 5G NR n5: 824-849 MHz(TX); 869-894MHz(RX) 5G NR n66: 1710-1780MHz(TX); 2110-2180MHz(RX) 5G NR n77: 3450-3550MHz&3700-3980MHz(TX/RX)					
EN-DC possible combinations	DC_2A_n5A, DC_5A_n66A, DC_5A_n2A, DC_2A_n66A, DC_66A_n2A					
Carrier aggregation	None Carrier aggregation					
Modulation Technique	DFT-s-OFDM: PI/2 BPSK, QPSK, 16QAM, 64QAM, 256QAM CP-OFDM: QPSK, 16QAM, 64QAM, 256QAM					
Antenna Specification*	ANT 0: n2: -1.66dBi; n5: -0.66dBi; n66: -1.56dBi; ANT 2: n2: -1.54dBi; n66: -1.19dBi; ANT 4: N77: -1.49(provided by the applicant)					
	ANT Location: SA mode: ANT 0(n2/n5), ANT 2(n66), ANT 4(n77)					
	NSA mode:	LTE	NR		LTE	NR
	DC_2A_n5A	ANT 0	ANT 0	DC_5A_n66A	ANT 0	ANT 0
	DC_2A_n66A	ANT 0	ANT 2	DC_5A_n2A	ANT 0	ANT 0
	DC_66A_n2A	ANT 0	ANT 2			
Voltage Range	DC 3.8V from battery or DC 5V from adapter					
Sample serial number	1OJ3-1 for Radiated Emissions 1OJ4-2 for RF Conducted Test (Assigned by ATC)					
Sample/EUT Status	Good condition					
Extreme condition*	VL: Low Voltage 3.6V VN: Normal Voltage 3.8V VH: High Voltage 4.2V TN: Normal Temperature: 20°C T1~T8: -30°C, -20°C, -10°C, 0°C, 10°C, 30°C, 40°C, 50°C (provided by the applicant)					
Adapter Information	Model: PD018W-G Input: 100-240V,50/60Hz,0.5A Max Output:5.0V,3.0A;9.0V,2.0A;12V,1.5A					

Remark:

- 5G NR bands supports SA Bands 2/5/66/77 and NSA DC_2A_n5A/ DC_2A_n66A/ DC_5A_n66A/ DC_5A_n2A/ DC_66A_n2A mode. 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, Part 22-Subpart H, Part 24-Subpart E and Part 27 of the Federal Communication Commission's rules.

The objective is to determine the compliance of the EUT with FCC rules 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 Code of Federal Regulations Title 47 Part 2-Subpart J as well as the following parts:

Part 22 Subpart H - Public Mobile Services
Part 24 Subpart E - Personal Communication Services
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.

Each test item follows test standards and with no deviation.

Measurement Uncertainty

Parameter		Uncertainty
Occupied Channel Bandwidth		5%
RF Frequency		0.082×10^{-7}
RF output power, conducted		0.73dB
Unwanted Emission, conducted		1.6dB
AC Power Lines Conducted Emissions		2.72dB
Audio Frequency Response		0.1dB
Low Pass Filter Response		1.2dB
Modulation Limiting		1%
Emissions, Radiated	9kHz - 30MHz	2.66dB
	30MHz - 1GHz	4.28dB
	1GHz - 18GHz	4.98dB
	18GHz - 26.5GHz	5.06dB
	26.5GHz - 40GHz	4.72dB
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 2	5.0 MHz	1852.5MHz, 1880MHz, 1907.5MHz
	10.0 MHz	1855MHz, 1880MHz, 1905MHz
	15.0 MHz	1857.5MHz, 1880MHz, 1902.5MHz
	20.0 MHz	1860MHz, 1880MHz, 1900MHz
NR Band 5	5.0 MHz	826.5MHz, 836.5MHz, 846.5MHz
	10.0 MHz	829MHz, 836.5MHz, 844MHz
	15.0 MHz	831.5MHz, 836.5MHz, 841.5MHz
	20.0 MHz	834MHz, 836.5MHz, 839MHz
NR Band 66	5.0 MHz	1712.5MHz, 1745MHz, 1777.5MHz
	10.0 MHz	1715MHz, 1745MHz, 1775MHz
	15.0 MHz	1717.5MHz, 1745MHz, 1772.5MHz
	20.0 MHz	1720MHz, 1745MHz, 1770MHz
	25.0 MHz	1722.5MHz, 1745MHz, 1767.5MHz
	30.0 MHz	1725MHz, 1745MHz, 1765MHz
	40.0 MHz	1730MHz, 1745MHz, 1760MHz
NR Band 77 (3450-3550MHz)	10.0 MHz	3455.01MHz, 3500.01MHz, 3544.98MHz
	15.0 MHz	3457.5MHz, 3500.01MHz, 3542.49MHz
	20.0 MHz	3460.02MHz, 3500.01MHz, 3540MHz
	30.0 MHz	3465MHz, 3500.01MHz, 3534.99MHz
	40.0 MHz	3470.01MHz, 3500.01MHz, 3529.98MHz
	50.0 MHz	3475.02MHz, 3500.01MHz, 3525MHz
	60.0 MHz	3480MHz, 3500.01MHz, 3519.99MHz
	70.0 MHz	3485.01MHz, 3500.01MHz, 3514.98MHz
	80.0 MHz	3490.02MHz, 3500.01MHz, 3510MHz
	90.0 MHz	3495MHz, 3500.01MHz, 3504.99MHz
	100.0 MHz	3500.01MHz
NR Band 77 (3700-3980MHz)	10.0 MHz	3705MHz, 3840MHz, 3975MHz
	15.0 MHz	3707.52MHz, 3840MHz, 3972.48MHz
	20.0 MHz	3710.01MHz, 3840MHz, 3969.99MHz
	30.0 MHz	3715.02MHz, 3840MHz, 3964.98MHz
	40.0 MHz	3720MHz, 3840MHz, 3960MHz
	50.0 MHz	3725.01MHz, 3840MHz, 3954.99MHz
	60.0 MHz	3730.02MHz, 3840MHz, 3949.98MHz
	70.0 MHz	3735MHz, 3840MHz, 3945MHz
	80.0 MHz	3740.01MHz, 3840MHz, 3939.99MHz
	90.0 MHz	3745.02MHz, 3840MHz, 3934.98MHz
	100.0 MHz	3750MHz, 3840MHz, 3930MHz

Equipment Modifications

No modification was made to the EUT.

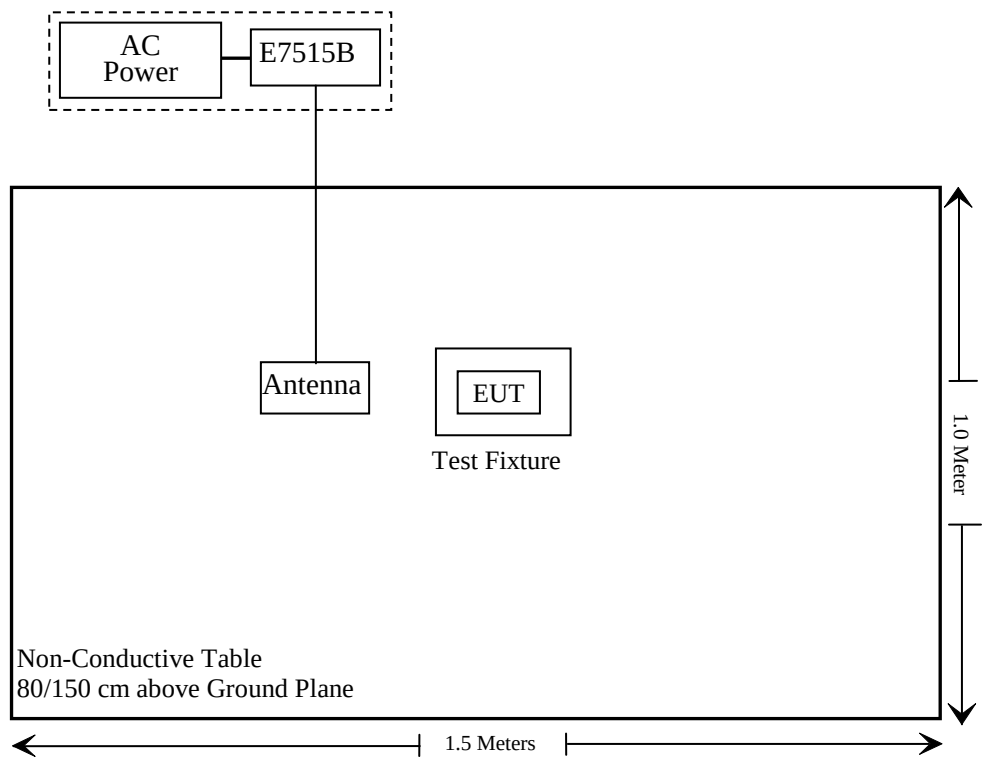
Support Equipment List and Details

Manufacturer	Description	Model	Serial Number
Rohde&Schwarz	Wideband Radio Communication Tester	E7515B	154606
Franklin Technology Inc.	Test Fixture	RG2102	Unknown

Support Cable Description

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

Block Diagram of Test Setup



SUMMARY OF TEST RESULTS

Rules	Description of Test	Result	Remark
§1.1310, §2.1093	RF EXPOSURE	Compliant	/
§2.1046; § 22.913 (a); § 24.232 (c); §27.50 (c) (d) (h)	RF Output Power	Reporting only	-
§ 2.1047	Modulation Characteristics	Not Applicable	-
§ 2.1049; § 22.905; § 22.917; § 24.238; §27.53	Occupied Bandwidth	-	See Note
§ 2.1051; §22.917 (a); § 24.238 (a); §27.53;	Spurious Emissions at Antenna Terminal	-	See Note
§ 2.1053; § 22.917 (a); § 24.238 (a); §27.53	Field Strength of Spurious Radiation	Compliant	-
§ 22.917 (a); § 24.238 (a); §27.53(c)(g) (h) (m)	Band Edge	-	See Note
§ 2.1055; § 22.355; § 24.235; §27.54;	Frequency stability	-	See Note

Note:

- 1: The manufacturer declared the WWAN module installed in EUT is identical to the certified module (FCC ID: XHG-M2500), which granted on 08/30/2022 and 01/09/2023.
- 2: The RF output power was spot checked and it's consistently with the module report.
- 3: The ATC is responsible for all the information provided in this report, except when information is provided by the customer as identified in this report.

TEST EQUIPMENT LIST

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Radiated Emission Test					
Rohde& Schwarz	Test Receiver	ESR	102725	2022/11/25	2023/11/24
Rohde&Schwarz	Spectrum Analyzer	FSV40	101949	2022/11/25	2023/11/24
SONOMA INSTRUMENT	Amplifier	310 N	186131	2022/11/08	2023/11/07
A.H. Systems, inc.	Preamplifier	PAM-0118P	135	2022/11/08	2023/11/07
Quinstar	Amplifier	QLW-184055 36-J0	15964001002	2022/11/08	2023/11/07
Unknown	RF Coaxial Cable	No.10	N050	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.11	N1000	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.12	N040	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.13	N300	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.14	N800	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.15	N600	2022/11/25	2023/11/24
Unknown	RF Coaxial Cable	No.16	N650	2022/11/25	2023/11/24
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
PASTERNAK	Horn Antenna	PE9852/2F-20	1120 (ATC-BA-024-1)	2020/01/05	2023/01/04
PASTERNAK	Horn Antenna	PE9852/2F-20	1120 (ATC-BA-025-1)	2020/01/05	2023/01/04
PASTERNAK	Horn Antenn	PE9850/2F-20	720 (ATC-BA-024)	2020/01/05	2023/01/04
PASTERNAK	Horn Antenn	PE9850/2F-20	720 (ATC-BA-025)	2020/01/05	2023/01/04
Unknown	RFCoaxialCable	No.16	N200	2022/11/25	2023/11/24
Agilent	Signal Generator	N5183A	MY51040755	2022/11/25	2023/11/24

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
RF Conducted Test					
WEINSCHTEL	10dB Attenuator	5324	AU 3842	2022/11/25	2023/11/24
Keysight	UXM 5G Wireless Test Platform	E7515B	MY58120284	2022-07-15	2023-07-14
Unknown	RF Coaxial Cable	No.31	RF-01	Each time	

* 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& §2.1093 - RF EXPOSURE

Applicable Standard

FCC§1.1310 and §2.1093.

Test Result

Compliance, please refer to the SAR report: RA221101-50847E-SA.

FCC §2.1047 - MODULATION CHARACTERISTIC

According to FCC §2.1047(d), Part 22H, Part 24E and Part 27, there is no specific requirement for digital modulation, therefore modulation characteristic is not presented.

FCC § 2.1046, § 22.913 (a)& § 24.232(c); §27.50(d)(k) - RF OUTPUT POWER**Applicable Standard**

According to FCC §2.1046 and §22.913 (a), the ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

According to FCC §2.1046 and §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.

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

According to §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.

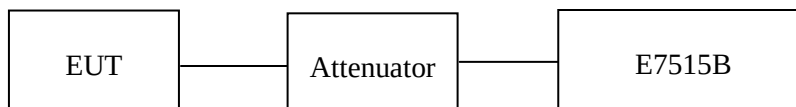
According to §27.50(j), Mobile devices are limited to 1Watt (30 dBm) EIRP for 3700-3980 MHz band. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications

According to §27.50(k), Mobile devices are limited to 1Watt (30 dBm) EIRP for 3450-3550 MHz band. Mobile devices operating in these bands must employ a means for limiting power to the minimum necessary for successful communications

Test Procedure

Conducted method:

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

**Test Data****Environmental Conditions**

Temperature:	24 °C
Relative Humidity:	54%
ATM Pressure:	101.0 kPa

The testing was performed by Andy Yu on 2022-12-18.

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

Frequency Band	Mode	Value (dbm)	EIRP/ERP (dbm)
n66	5MHz_15kHz_1745MHz_DFT-s-OFDM QPSK_RB1@1	22.97	21.78
	10MHz_15kHz_1775MHz_DFT-s-OFDM QPSK_RB1@1	23.01	21.82
	15MHz_15kHz_1772.5MHz_DFT-s-OFDM QPSK_RB1@1	23.01	21.82
	20MHz_15kHz_1770MHz_DFT-s-OFDM QPSK_RB1@1	23.12	21.93
	30MHz_15kHz_1765MHz_DFT-s-OFDM QPSK_RB1@1	23.04	21.85
	40MHz_15kHz_1745MHz_DFT-s-OFDM QPSK_RB1@214	23.65	22.46
n77 (3450-3550MHz)	10MHz_30kHz_3455.01MHz_DFT-s-OFDM QPSK_RB1@1	24.01	22.52
	15MHz_30kHz_3457.5MHz_DFT-s-OFDM QPSK_RB1@1	24.11	22.62
	20MHz_30kHz_3460.02MHz_DFT-s-OFDM QPSK_RB1@1	24.14	22.65
	30MHz_30kHz_3465MHz_DFT-s-OFDM QPSK_RB1@1	24.61	23.12
	40MHz_30kHz_3470.01MHz_DFT-s-OFDM QPSK_RB1@1	24.61	23.12
	50MHz_30kHz_3525MHz_DFT-s-OFDM QPSK_RB1@1	24.6	23.11
	60MHz_30kHz_3519.99MHz_DFT-s-OFDM QPSK_RB1@1	24.14	22.65
	70MHz_30kHz_3514.98MHz_DFT-s-OFDM QPSK_RB1@1	24.02	22.53
	80MHz_30kHz_3510MHz_DFT-s-OFDM QPSK_RB1@1	24.06	22.57
	90MHz_30kHz_3504.99MHz_DFT-s-OFDM QPSK_RB1@1	23.91	22.42
	100MHz_30kHz_3500.01MHz_DFT-s-OFDM QPSK_RB135@67	23.71	22.22
n77 (3700-3980MHz)	10MHz_30kHz_3975MHz_DFT-s-OFDM QPSK_RB1@1	24.31	22.82
	15MHz_30kHz_3972.48MHz_DFT-s-OFDM QPSK_RB1@1	24.1	22.61
	20MHz_30kHz_3969.99MHz_DFT-s-OFDM QPSK_RB1@1	24.2	22.71
	30MHz_30kHz_3964.98MHz_DFT-s-OFDM QPSK_RB1@1	24.1	22.61
	40MHz_30kHz_3960MHz_DFT-s-OFDM QPSK_RB1@1	24.21	22.72
	50MHz_30kHz_3954.99MHz_DFT-s-OFDM QPSK_RB1@1	24.11	22.62
	60MHz_30kHz_3949.98MHz_DFT-s-OFDM QPSK_RB1@1	24.23	22.74
	70MHz_30kHz_3945MHz_DFT-s-OFDM QPSK_RB1@1	24.31	22.82
	80MHz_30kHz_3939.99MHz_DFT-s-OFDM QPSK_RB1@1	24.3	22.81
	90MHz_30kHz_3934.98MHz_DFT-s-OFDM QPSK_RB1@1	24.31	22.82
	100MHz_30kHz_3930MHz_DFT-s-OFDM-QPSK_RB135@67	24.01	22.52
n2	n2_5MHz_15kHz_1852.5MHz_DFT-s-OFDM PI/2 BPSK_RB12@6	22.97	21.31
	n2_10MHz_15kHz_1855MHz_CP-OFDM QPSK_RB26@13	23	21.34
	n2_15MHz_15kHz_1857.5MHz_CP-OFDM QPSK_RB39@19	23.02	21.36
	n2_20MHz_15kHz_1860MHz_DFT-s-OFDM PI/2 BPSK_RB1@1	23.1	21.44
n5	n5_5MHz_15kHz_846.5MHz_CP-OFDM QPSK_RB1@1	23.1	20.29
	n5_10MHz_15kHz_844MHz_CP-OFDM QPSK_RB1@1	23.54	20.73
	n5_15MHz_15kHz_831.5MHz_CP-OFDM QPSK_RB39@19	23.67	20.86
	n5_20MHz_15kHz_834MHz_CP-OFDM QPSK_RB1@104	23.14	20.33

Frequency Band	Mode	Value (dbm)	EIRP /ERP (dbm)
DC_2A_n5A	DC_2A_n5A_10MHz 5MHz_15kHz_1880MHz 836.5MHz_QPSK DFT-s-OFDM 64 QAM_RB12@0 RB12@6	23.22 (20.01 20.4)	19.96
	DC_2A_n5A_10MHz 10MHz_15kHz_1855MHz 829MHz_QPSK DFT-s-OFDM 64 QAM_RB12@0 RB25@12	23.31 (20.1 20.5)	20.06
	DC_2A_n5A_10MHz 15MHz_15kHz_1855MHz 831.5MHz_QPSK DFT-s-OFDM 16 QAM_RB12@0 RB36@18	23.26 (20.09 20.4)	20.00
	DC_2A_n5A_10MHz 20MHz_15kHz_1855MHz 834MHz_QPSK DFT-s-OFDM PI/2 BPSK_RB1@0 RB1@0	23.94 (21.4 20.41)	20.61
DC_5A_n66A	DC_5A_n66A_10MHz 5MHz_15kHz_836.5MHz 1745MHz_QPSK DFT-s-OFDM 64 QAM_RB12@0 RB12@6	23.07 (20.01 20.1)	21.97
	DC_5A_n66A_10MHz 10MHz_15kHz_829MHz 1715MHz_QPSK DFT-s-OFDM 64 QAM_RB12@0 RB25@12	23.12 (20.21 20.01)	22.05
	DC_5A_n66A_10MHz 15MHz_15kHz_829MHz 1717.5MHz_QPSK CP-OFDM 64 QAM_RB12@0 RB39@19	23.09 (20.14 20.01)	22.01
	DC_5A_n66A_10MHz 20MHz_15kHz_829MHz 1720MHz_QPSK DFT-s-OFDM 16 QAM_RB12@0 RB50@25	23.33 (20.01 20.61)	22.21
	DC_5A_n66A_10MHz 30MHz_15kHz_829MHz 1725MHz_QPSK DFT-s-OFDM PI/2 BPSK_RB1@0 RB1@0	23.28 (21.01 19.37)	22.27
	DC_5A_n66A_10MHz 40MHz_15kHz_836.5MHz 1745MHz_QPSK CP-OFDM 16 QAM_RB12@0 RB108@54	23.28 (20.31 20.23)	22.20
DC_2A_n66A	DC_2A_n66A_10MHz 5MHz_15kHz_1855MHz 1712.5MHz_QPSK DFT-s-OFDM PI/2 BPSK_RB12@0 RB12@6	23.34 (20.1 20.541)	21.93
	DC_2A_n66A_10MHz 10MHz_15kHz_1855MHz 1715MHz_QPSK CP-OFDM QPSK_RB1@0 RB1@0	23.61 (21.1 20.04)	22.17
	DC_2A_n66A_10MHz 15MHz_15kHz_1855MHz 1717.5MHz_QPSK DFT-s-OFDM PI/2 BPSK_RB1@0 RB1@0	23.64 (21.1 20.1)	22.19
	DC_2A_n66A_10MHz 20MHz_15kHz_1855MHz 1720MHz_QPSK CP-OFDM QPSK_RB12@0 RB53@26	23.17 (20.21 20.1)	21.74
	DC_2A_n66A_10MHz 30MHz_15kHz_1905MHz 1765MHz_QPSK CP-OFDM QPSK_RB1@49 RB1@159	23.18 (20.12 20.21)	21.76
	DC_2A_n66A_10MHz 40MHz_15kHz_1855MHz 1730MHz_QPSK DFT-s-OFDM PI/2 BPSK_RB1@0 RB1@0	23.59 (21.01 20.1)	22.15
DC_5A_n2A	DC_5A_n2A_10MHz 5MHz_15kHz_844MHz 1907.5MHz_QPSK DFT-s-OFDM QPSK_RB1@49 RB1@24	23.83 (21.71 19.71)	22.81
	DC_5A_n2A_10MHz 10MHz_15kHz_829MHz 1855MHz_QPSK CP-OFDM QPSK_RB12@0 RB26@13	23.27 (20.4 20.12)	22.16
	DC_5A_n2A_10MHz 15MHz_15kHz_844MHz 1902.5MHz_QPSK DFT-s-OFDM QPSK_RB1@49 RB1@78	23.95 (22.23 19.11)	22.99
	DC_5A_n2A_10MHz 20MHz_15kHz_844MHz 1900MHz_QPSK DFT-s-OFDM QPSK_RB1@49 RB1@105	23.29 (21.01 19.41)	22.25
DC_66A_n2A	DC_66A_n2A_10MHz 10MHz_15kHz_1745MHz 1880MHz_QPSK DFT-s-OFDM QPSK_RB12@0 RB25@12	23.51 (21.11 19.78)	21.95
	DC_66A_n2A_10MHz 10MHz_15kHz_1745MHz 1880MHz_QPSK DFT-s-OFDM QPSK_RB12@0 RB25@12	23.89 (21.53 20.11)	22.34
	DC_66A_n2A_10MHz 15MHz_15kHz_1775MHz 1902.5MHz_QPSK CP-OFDM 16 QAM_RB12@38 RB39@19	23.77 (21.1 20.4)	22.22
	DC_66A_n2A_10MHz 20MHz_15kHz_1745MHz 1880MHz_QPSK DFT-s-OFDM 16 QAM_RB12@0 RB50@25	23.88 (21.5 20.14)	22.33

Note:

ERP is for below 1GHz, EIRP is for above 1GHz

$ERP(dBm) = \text{Conducted Power}(dBm) + \text{Antenna Gain}(dBd)$

$EIRP(dBm) = \text{Conducted Power}(dBm) + \text{Antenna Gain}(dBi)$

For n5, Antenna Gain = -0.66dBi = -2.81dBd (0dBd=2.15dBi), Limit: $ERP \leq 38.45dBm$

For n2, Antenna Gain = -1.66dBi, Limit: $EIRP \leq 33dBm$

For n66, Antenna Gain = -1.19dBi, Limit: $EIRP \leq 30dBm$

For n77, Antenna Gain = -1.49dBi, Limit: $EIRP \leq 30dBm$

For DC_2A_n5A:

Antenna Gain(n5A)= -0.66dBi = -2.81dBd (0dBd=2.15dBi)

Antenna Gain(2A)= -1.66dBi = -3.81dBd (0dBd=2.15dBi)

Limit: $ERP \leq 38.45dBm$

For DC_5A_n66A:

Antenna Gain(n66A)= -1.56dBi, Antenna Gain(5A)= -0.66dBi

Limit: $EIRP \leq 30dBm$

For DC_2A_n66A:

Antenna Gain(n66A)= -1.19dBi, Antenna Gain(2A)= -1.66dBi

Limit: $EIRP \leq 30dBm$

For DC_5A_n2A:

Antenna Gain(n2A)= -1.66dBi, Antenna Gain(5A)= -0.66dBi

Limit: $EIRP \leq 33dBm$

For DC_66A_n2A:

Antenna Gain(n2A)= -1.54dBi, Antenna Gain(66A)= -1.56dBi

Limit: $EIRP \leq 33dBm$

FCC § 2.1053; § 22.917 (a); § 24.238 (a); § 27.53- SPURIOUS RADIATED EMISSIONS

Applicable Standard

FCC § 2.1053, § 22.917(a) & § 24.238(a) & § 27.53

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

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:	24~26℃
Relative Humidity:	54~58%
ATM Pressure:	100.8~101.0kPa

The testing was performed by Jimi from 2022-12-05 to 2022-12-13.

EUT operation mode: Transmitting (Scan with X-AXIS, Y-AXIS, Z-AXIS, the worst case Y-AXIS was recorded)

The worst case is as below:

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/Ave		Height (m)	Polar (H/V)				
Test frequency range: 30MHz-20GHz									
5G N2, Low Channel, 5MHz									
239.7	-53.01	PK	209	2.2	H	7.44	-45.57	-13	-32.57
634.5	-49.80	PK	66	2.1	V	6.69	-43.11	-13	-30.11
3720	-57.46	PK	98	1.7	H	8.42	-49.04	-13	-36.04
3720	-56.73	PK	268	1.5	V	7.76	-48.97	-13	-35.97
5G N2, Middle Channel, 5MHz									
239.7	-54.01	PK	209	2.2	H	7.44	-46.57	-13	-33.57
634.5	-48.85	PK	66	2.1	V	6.69	-42.16	-13	-29.16
3760	-57.99	PK	98	1.7	H	8.84	-49.15	-13	-36.15
3760	-57.54	PK	268	1.5	V	7.96	-49.58	-13	-36.58
5G N2, High Channel, 5MHz									
239.7	-53.11	PK	179	2.0	H	7.44	-45.67	-13	-32.67
634.5	-49.53	PK	209	1.7	V	6.69	-42.84	-13	-29.84
3800	-58.70	PK	92	1.1	H	8.6	-50.10	-13	-37.10
3800	-56.92	PK	177	1.4	V	7.8	-49.12	-13	-36.12
Test frequency range: 30MHz-10GHz									
5G N5, Low Channel, 5MHz									
239.7	-51.10	PK	209	2.2	H	7.44	-43.66	-13	-30.66
634.5	-49.10	PK	66	2.1	V	6.69	-42.41	-13	-29.41
1658	-62.32	PK	98	1.7	H	3.6	-58.72	-13	-45.72
1658	-60.67	PK	268	1.5	V	3.1	-57.57	-13	-44.57
5G N5, Middle Channel, 5MHz									
239.7	-51.46	PK	179	2.0	H	7.44	-44.02	-13	-31.02
634.5	-48.18	PK	209	1.7	V	6.69	-41.49	-13	-28.49
1673	-61.70	PK	92	1.1	H	3.78	-57.92	-13	-44.92
1673	-59.95	PK	177	1.4	V	3.1	-56.85	-13	-43.85
5G N5, High Channel, 5MHz									
239.7	-50.92	PK	271	1.1	H	7.44	-43.48	-13	-30.48
634.5	-48.23	PK	185	1.1	V	6.69	-41.54	-13	-28.54
1688	-63.59	PK	210	1.2	H	3.78	-59.81	-13	-46.81
1688	29.33	PK	255	1.9	V	3.96	33.29	-13	46.29
Test frequency range: 30MHz-20GHz									
5G N66, Low Channel, 5MHz									
239.7	-51.46	PK	209	2.2	H	7.44	-44.02	-13	-31.02
634.5	-48.12	PK	66	2.1	V	6.69	-41.43	-13	-28.43
3425	-54.41	PK	98	1.7	H	6.4	-48.01	-13	-35.01
3425	-55.52	PK	268	1.5	V	5.75	-49.77	-13	-36.77
5G N66, Middle Channel, 5MHz									
239.7	-51.21	PK	179	2.0	H	7.44	-43.77	-13	-30.77
634.5	-47.54	PK	209	1.7	V	6.69	-40.85	-13	-27.85
3490	-55.10	PK	92	1.1	H	7.56	-47.54	-13	-34.54
3490	-56.55	PK	177	1.4	V	6.42	-50.13	-13	-37.13
5G N66, High Channel, 5MHz									
239.7	-50.59	PK	271	1.1	H	7.44	-43.15	-13	-30.15
634.5	-48.70	PK	185	1.1	V	6.69	-42.01	-13	-29.01
3555	-54.34	PK	210	1.2	H	7.75	-46.59	-13	-33.59
3555	-57.97	PK	255	1.9	V	6.94	-51.03	-13	-38.03

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/Ave		Height (m)	Polar (H/V)				
Test frequency range: 30MHz-36GHz									
5G N77(3450MHz-3550MHz), Low Channel, 10MHz									
239.7	-50.91	PK	203	1.4	H	7.44	-43.47	-13	-30.47
634.5	-47.86	PK	42	2.0	V	6.69	-41.17	-13	-28.17
6910.02	-53.88	PK	212	1.3	H	14.94	-38.94	-13	-25.94
6910.02	-53.63	PK	179	2.0	V	14.26	-39.37	-13	-26.37
5G N77(3450MHz-3550MHz), Middle Channel, 10MHz									
239.7	-51.69	PK	110	2.1	H	7.44	-44.25	-13	-31.25
634.5	-47.15	PK	162	1.7	V	6.69	-40.46	-13	-27.46
7000.02	-55.92	PK	139	1.2	H	16.3	-39.62	-13	-26.62
7000.02	-55.32	PK	271	1.1	V	15.6	-39.72	-13	-26.72
5G N77(3450MHz-3550MHz) , High Channel, 10MHz									
239.7	-51.47	PK	209	2.2	H	7.44	-44.03	-13	-31.03
634.5	-49.43	PK	66	2.1	V	6.69	-42.74	-13	-29.74
7089.96	-56.17	PK	98	1.7	H	16.68	-39.49	-13	-26.49
7089.96	-55.44	PK	268	1.5	V	16.6	-38.84	-13	-25.84
Test frequency range: 30MHz-40GHz									
5G N77(3700MHz-3980MHz), Low Channel, 10MHz									
239.7	-50.55	PK	179	2.0	H	7.44	-43.11	-13	-30.11
634.5	-47.35	PK	209	1.7	V	6.69	-40.66	-13	-27.66
7410	-58.18	PK	92	1.1	H	19.7	-38.48	-13	-25.48
7410	-58.55	PK	177	1.4	V	19.24	-39.31	-13	-26.31
5G N77(3700MHz-3980MHz), Middle Channel, 10MHz									
239.7	-50.67	PK	271	1.1	H	7.44	-43.23	-13	-30.23
634.5	-46.38	PK	185	1.1	V	6.69	-39.69	-13	-26.69
7680	-59.87	PK	210	1.2	H	21.26	-38.61	-13	-25.61
7680	-60.71	PK	255	1.9	V	20.94	-39.77	-13	-26.77
5G N77(3700MHz-3980MHz), High Channel, 10MHz									
239.7	-50.57	PK	268	1.5	H	7.44	-43.13	-13	-30.13
634.5	-49.36	PK	260	1.2	V	6.69	-42.67	-13	-29.67
7950	-58.21	PK	331	1.5	H	18.9	-39.31	-13	-26.31
7950	-55.82	PK	340	1.7	V	18.5	-37.32	-13	-24.32

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/Ave		Height (m)	Polar (H/V)				
Test frequency range: 30MHz-20GHz									
DC_2A_n66A Low Channel, 5MHz									
239.7	-52.85	PK	177	1.4	H	7.44	-45.41	-13	-32.41
634.5	-47.84	PK	91	1.9	V	6.69	-41.15	-13	-28.15
3425	-59.64	PK	148	1.0	H	6.4	-53.24	-13	-40.24
3425	-59.80	PK	256	2.1	V	5.75	-54.05	-13	-41.05
DC_2A_n66A Middle Channel, 5MHz									
239.7	-51.98	PK	255	1.9	H	7.44	-44.54	-13	-31.54
634.5	-45.84	PK	283	1.7	V	6.69	-39.15	-13	-26.15
3490	-59.34	PK	169	1.9	H	7.57	-51.77	-13	-38.77
3490	-59.00	PK	245	1.1	V	6.42	-52.58	-13	-39.58
DC_2A_n66A High Channel, 5MHz									
239.7	-52.47	PK	340	1.7	H	7.44	-45.03	-13	-32.03
634.5	-46.28	PK	268	1.0	V	6.69	-39.59	-13	-26.59
3555	-61.76	PK	103	1.8	H	7.75	-54.01	-13	-41.01
3555	-60.49	PK	199	1.3	V	6.94	-53.55	-13	-40.55
Test frequency range: 30MHz-10GHz									
DC_2A_n5A Low Channel, 5MHz									
239.7	-56.56	PK	152	1.6	H	7.44	-49.12	-13	-36.12
634.5	-46.84	PK	174	1.2	V	6.69	-40.15	-13	-27.15
1653	-63.13	PK	152	1.6	H	3.54	-59.59	-13	-46.59
1653	-62.15	PK	174	1.2	V	3.1	-59.05	-13	-46.05
DC_2A_n5A Middle Channel, 5MHz									
239.7	-52.58	PK	117	1.4	H	7.44	-45.14	-13	-32.14
634.5	-46.73	PK	49	1.8	V	6.69	-40.04	-13	-27.04
1673	-60.04	PK	209	2.0	H	3.78	-56.26	-13	-43.26
1673	-58.69	PK	237	2.1	V	3.1	-55.59	-13	-42.59
DC_2A_n5A High Channel, 5MHz									
239.7	-54.01	PK	87	1.7	H	7.44	-46.57	-13	-33.57
634.5	-47.74	PK	242	1.7	V	6.69	-41.05	-13	-28.05
1693	-62.28	PK	107	1.7	H	4.02	-58.26	-13	-45.26
1693	-62.69	PK	94	2.0	V	3.1	-59.59	-13	-46.59

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/Ave		Height (m)	Polar (H/V)				
Test frequency range: 30MHz-20GHz									
DC_5A_n2A Low Channel, 5MHz									
239.7	-52.72	PK	87	1.7	H	7.44	-45.28	-13	-32.28
634.5	-46.83	PK	242	1.7	V	6.69	-40.14	-13	-27.14
3705	-58.13	PK	87	1.7	H	8.18	-49.95	-13	-36.95
3705	-59.38	PK	242	1.7	V	7.64	-51.74	-13	-38.74
DC_5A_n2A Middle Channel, 5MHz									
239.7	-52.45	PK	303	1.1	H	7.44	-45.01	-13	-32.01
634.5	-45.83	PK	238	1.4	V	6.69	-39.14	-13	-26.14
3760	-60.31	PK	114	1.6	H	8.84	-51.47	-13	-38.47
3760	-60.40	PK	56	2.1	V	7.96	-52.44	-13	-39.44
DC_5A_n2A High Channel, 5MHz									
239.7	-52.01	PK	237	2.1	H	7.44	-44.57	-13	-31.57
634.5	-48.14	PK	252	1.3	V	6.69	-41.45	-13	-28.45
3815	-60.71	PK	336	1.5	H	8.66	-52.05	-13	-39.05
3815	-59.93	PK	132	1.1	V	7.92	-52.01	-13	-39.01
Test frequency range: 30MHz-20GHz									
DC_5A_n66A Low Channel, 5MHz									
239.7	-53.70	PK	208	1.8	H	7.44	-46.26	-13	-33.26
634.5	-46.18	PK	264	1.3	V	6.69	-39.49	-13	-26.49
3425	-58.88	PK	148	1.5	H	6.4	-52.48	-13	-39.48
3425	-59.31	PK	87	1.7	V	5.75	-53.56	-13	-40.56
DC_5A_n66A Middle Channel, 5MHz									
239.7	-52.58	PK	152	1.6	H	7.44	-45.14	-13	-32.14
634.5	-46.73	PK	174	1.2	V	6.69	-40.04	-13	-27.04
3490	-58.69	PK	257	1.2	H	7.57	-51.12	-13	-38.12
3490	-59.57	PK	303	1.1	V	6.42	-53.15	-13	-40.15
DC_5A_n66A High Channel, 5MHz									
239.7	-53.45	PK	117	1.4	H	7.44	-46.01	-13	-33.01
634.5	-47.12	PK	49	1.8	V	6.69	-40.43	-13	-27.43
3555	-60.26	PK	209	2.0	H	7.75	-52.51	-13	-39.51
3555	-60.71	PK	237	2.1	V	6.94	-53.77	-13	-40.77

Frequency (MHz)	Receiver		Turntable Angle Degree	Rx Antenna		Factor (dB/m)	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
	Reading (dBm)	PK/Ave		Height (m)	Polar (H/V)				
Test frequency range: 30MHz-20GHz									
DC_66A_n2A Low Channel, 5MHz									
239.7	-52.60	PK	87	1.7	H	7.44	-45.16	-13	-32.16
634.5	-48.09	PK	242	1.7	V	6.69	-41.40	-13	-28.40
3705	-56.67	PK	107	1.7	H	8.18	-48.49	-13	-35.49
3705	-57.81	PK	94	2.0	V	7.64	-50.17	-13	-37.17
DC_66A_n2A Middle Channel, 5MHz									
239.7	-54.01	PK	303	1.1	H	7.44	-46.57	-13	-33.57
634.5	-47.85	PK	238	1.4	V	6.69	-41.16	-13	-28.16
3760	-58.78	PK	114	1.6	H	8.84	-49.94	-13	-36.94
3760	-58.07	PK	56	2.1	V	7.96	-50.11	-13	-37.11
DC_66A_n2A High Channel, 5MHz									
239.7	-51.18	PK	237	2.1	H	7.44	-43.74	-13	-30.74
634.5	-45.83	PK	252	1.3	V	6.69	-39.14	-13	-26.14
3815	-59.69	PK	336	1.5	H	8.66	-51.03	-13	-38.03
3815	-60.64	PK	132	1.1	V	7.92	-52.72	-13	-39.72

Note:

Absolute Level = Reading Level + Substituted Factor

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

Margin = Absolute Level - Limit

For WWAN and WLAN transmit simultaneously condition, please refer to DTS report.

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