

# TEST REPORT

<b>FCC ID.</b> .....	2A8MC-NOVAT
<b>Test Report No.</b> .....	TCT220819E036
<b>Date of issue</b> .....	Oct. 12, 2022
<b>Testing laboratory</b> .....	SHENZHEN TONGCE TESTING LAB
<b>Testing location/ address:</b>	2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China
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<b>Address</b> .....	Jr. Lampa 216, Int. 131 segundo piso, Cercado de Lima, Lima, Peru
<b>Manufacturer's name</b> .....	Shenzhen Ployer Electronics Co., Ltd
<b>Address</b> .....	6F and 7F, Building 8, Rundongsheng Industrial Area, LongTeng Community, Xixiang Street, Bao'an District, Shenzhen, China
<b>Standard(s)</b> .....	FCC CFR Title 47 Part 2 FCC CFR Title 47 Part22 FCC CFR Title 47 Part24 FCC CFR Title 47 Part27
<b>Product Name</b> .....	Tablet PC
<b>Trade Mark</b> .....	NOVATAB
<b>Model/Type reference</b> .....	NOVAT-15, A1027, P20 HD, TAB10 4G
<b>Rating(s)</b> .....	Refer to EUT description of page 3
<b>Date of receipt of test item</b> .....	Aug. 19, 2022
<b>Date (s) of performance of test</b> .....	Aug. 19, 2022 - Oct. 12, 2022
<b>Tested by (+signature)</b> .....	Brews XU
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**Appendix B: Photographs of Test Setup****Appendix C: Photographs of EUT****Test Data: Refer to Appendix For LTE Band 2, Appendix For LTE Band 4  
and Appendix For LTE Band 7**

## 1. General Product Information

### 1.1. EUT description

<b>Product Name</b> .....	Tablet PC
<b>Model/Type reference</b> .....	NOVAT-15
<b>Sample Number</b> .....	TCT220819E010-0101
<b>Tx Frequency</b> .....	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 7: 2500 MHz ~ 2570 MHz
<b>Rx Frequency</b> .....	LTE Band 2: 1930 MHz ~ 1990 MHz LTE Band 4: 2110 MHz ~ 2155 MHz LTE Band 7: 2620 MHz ~ 2690 MHz
<b>Bandwidth</b> .....	LTE Band 2: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 4: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 7: 5MHz /10MHz/15MHz /20MHz
<b>Maximum Output Power to Antenna</b> .....	LTE Band 2: 21.65dBm LTE Band 4: 22.09dBm LTE Band 7: 19.02dBm
<b>99% Occupied Bandwidth</b> .....	LTE Band 2: 18M0G7D LTE Band 4: 18M0G7D LTE Band 7: 18M0G7D
<b>Type of Modulation</b> .....	QPSK/16QAM
<b>Antenna Type</b> .....	Internal Antenna
<b>Antenna Gain</b> .....	LTE Band 2: 1.2dBi LTE Band 4: 1.1dBi LTE Band 7: 1.4dBi
<b>Rating(s)</b> .....	Adapter Information: Model: EE-0502000UZ Input: AC 100-240V, 50/60Hz, 0.5A Output: DC 5.0V, 2000mA Rechargeable Li-ion Battery DC 3.8V

Note: The antenna gain listed in this report is provided by applicant, and the test laboratory is not responsible for this parameter.

### 1.2. Model(s) list

No.	Model No.	Tested with
1	NOVAT-15	<input checked="" type="checkbox"/>
Other models	A1027, P20 HD, TAB10 4G	<input type="checkbox"/>

Note: NOVAT-15 is tested model, other models are derivative models. The models are identical in circuit and PCB layout, only different on the model names. So the test data of NOVAT-15 can represent the remaining models.

### 1.3. Emission Designator

LTE Band 2		QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	
1.4	1M09G7D	0.193	1M09W7D	0.158	
3	2M69G7D	0.188	2M69W7D	0.157	
5	4M50G7D	0.188	4M50W7D	0.150	
10	8M98G7D	0.187	8M98W7D	0.157	
15	13M5G7D	0.183	13M5W7D	0.152	
20	18M0G7D	0.188	18M0W7D	0.152	
<hr/>					
LTE Band 4		QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	
1.4	1M09G7D	0.208	1M09W7D	0.177	
3	2M69G7D	0.188	2M69W7D	0.153	
5	4M50G7D	0.182	4M50W7D	0.144	
10	9M00G7D	0.195	9M00W7D	0.152	
15	13M5G7D	0.176	13M5W7D	0.145	
20	18M0G7D	0.181	18M1W7D	0.144	
<hr/>					
LTE Band 7		QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	
5	4M50G7D	0.110	4M50W7D	0.091	
10	9M00G7D	0.108	8M99W7D	0.090	
15	13M5G7D	0.105	13M5W7D	0.086	
20	18M0G7D	0.104	18M0W7D	0.083	

## 1.4. Test Frequency

LTE Band 2(1.4MHz)		LTE Band 2(3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
18607	1850.7	18615	1851.5
18900	1880	18900	1880
19193	1909.3	19185	1908.5
LTE Band 2(5MHz)		LTE Band 2(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
18625	1852.5	18650	1855
18900	1880	18900	1880
19175	1907.5	19150	1905
LTE Band 2(15MHz)		LTE Band 2(20MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
18675	1857.5	18700	1860
18900	1880	18900	1880
19125	1902.5	19100	1900

LTE Band 4(1.4MHz)		LTE Band 4(3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
19957	1710.7	19965	1711.5
20175	1732.5	20175	1732.5
20393	1754.3	20385	1753.5
LTE Band 4(5MHz)		LTE Band 4(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
19975	1712.5	20000	1715
20175	1732.5	20175	1732.5
20375	1752.5	20350	1750
LTE Band 4(15MHz)		LTE Band 4(20MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20025	1717.5	20050	1720
20175	1732.5	20175	1732.5
20325	1747.5	20300	1745

LTE Band 7(5MHz)		LTE Band 7(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20775	2502.5	20800	2505.0
21100	2535	21100	2535
21425	2567.5	21400	2565.0
LTE Band 7(15MHz)		LTE Band 7(20MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20825	2507.5	20850	2510.0
21100	2535	21100	2535
21375	2562.5	21350	2560.0

## 2. Test Result Summary

Requirement	CFR 47 Section	Result
Conducted Output Power	§2.1046; §22.913; §24.232(c); §27.50(d); §27.50(c); §27.50(b)	PASS
Peak-to-Average Ratio	§2.1046; §24.232(d) §27.50(d); §27.50(c); §27.50(b);	PASS
Effective Radiated Power	§2.1046; §22.913; §24.232(c); §27.50(d); §27.50(c); §27.50(b)	PASS
Equivalent Isotropic Radiated Power	§2.1046; §22.913; §24.232(c); §27.50(d); §27.50(c); §27.50(b)	PASS
Occupied Bandwidth	§2.1049; §24.238(b); §27.53	PASS
Band Edge	§2.1051; §22.917(a); §27.53(h); §27.53(c); §27.53(g); §24.238(a)	PASS
Conducted Spurious Emission	§2.1051; §22.917(a); §27.53(h); §27.53(g); §27.53(c); §24.238(a)	PASS
Field Strength of Spurious Radiation	§2.1053; §22.917(a); §27.53(g); §27.53(c); §27.53(h); §24.238(a)	PASS
Frequency Stability for Temperature & Voltage	§2.1055; §22.355; §27.54; §24.235	PASS

**Note:**

1. PASS: Test item meets the requirement.
2. Fail: Test item does not meet the requirement.
3. N/A: Test case does not apply to the test object.
4. The test result judgment is decided by the limit of test standard.
5. After pre-testing of two samples with different memory chip, we found that the one with ISOCOM memory chip is the worst case, so the results are recorded in this report.

### 3. General Information

#### 3.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Remark: This product has a built-in rechargeable battery, so in an independent test, the EUT battery was fully-charged.	

Keep the EUT in communication with CMW500 and select channel with modulation All modes and data rates and positions were investigated. Test modes are chosen to be reported as the worst case configuration below:		
<b>Test Mode</b>		
Band	Radiated TCs	Conducted TCs
LTE Band 2	QPSK Link (1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz)	16QAM Link (1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz)
LTE Band 4	QPSK Link (1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz)	16QAM Link (1.4MHz / 3MHz / 5MHz / 10MHz / 15MHz / 20MHz)
LTE Band 7	QPSK Link (5MHz / 10MHz / 15MHz / 20MHz)	16QAM Link (5MHz / 10MHz / 15MHz / 20MHz)

Antenna port conducted and radiated test items were performed according to KDB 971168 D01 Power Meas License Digital Systems v03 with maximum output power. Radiated measurements were performed with rotating EUT in different three orthogonal test planes to find the maximum emission. The sample was placed 0.8m/1.5m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting cables, rotating the turntable, varying antenna height from 1m to 4m in both horizontal and vertical polarization. The emissions worst-case are shown in Test Results of the following pages.

Test Items	Band	Bandwidth (MHz)						Modulation		RB #			Test Channel		
		1.4	3	5	10	15	20	QPSK	16QAM	1	Half	Full	L	M	H
Max. Output Power	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	7	-	-	v	v	v	v	v	v	v	v	v	v	v	v
Peak-to-Average Ratio	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	7	-	-	v	v	v	v	v	v	v	v	v	v	v	v
26dB and 99% Bandwidth	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	7	-	-	v	v	v	v	v	v	v	v	v	v	v	v
Conducted Band Edge	2	v	v	v	v	v	v	v	v	v	v	v	v	v	-v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	-v
	7	-	-	v	v	v	v	v	v	v	v	v	v	v	-v
Conducted Spurious Emission	2	v	v	v	v	v	v	v	v	v	v	-	-v	v	v
	4	v	v	v	v	v	v	v	v	v	v	-	-v	v	v
	7	-	-	v	v	v	v	v	v	v	v	-	-v	v	v
Frequency Stability	2	v	-	-	-	-	-	v	v	v	v	-	-v	v	v
	4	v	-	-	-	-	-	v	v	v	v	-	-v	v	v
	7	-	-	v	-	-	-	v	v	v	v	-	-v	v	v
E.R.P./ E.I.R.P.	2	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	4	v	v	v	v	v	v	v	v	v	v	v	v	v	v
	7	-	-	v	v	v	v	v	v	v	v	v	v	v	v
Radiated Spurious Emission	2	v	-	-	-	-	-	v	v	v	v	-	-v	v	v
	4	v	-	-	-	-	-	v	v	v	v	-	-v	v	v
	7	-	-	v	-	-	-	v	v	v	v	-	-v	v	v
Note	1. The mark "v" means that this configuration is chosen for testing 2. The mark "-" means that this bandwidth is not supported.														

### 3.2. Description of Support Units

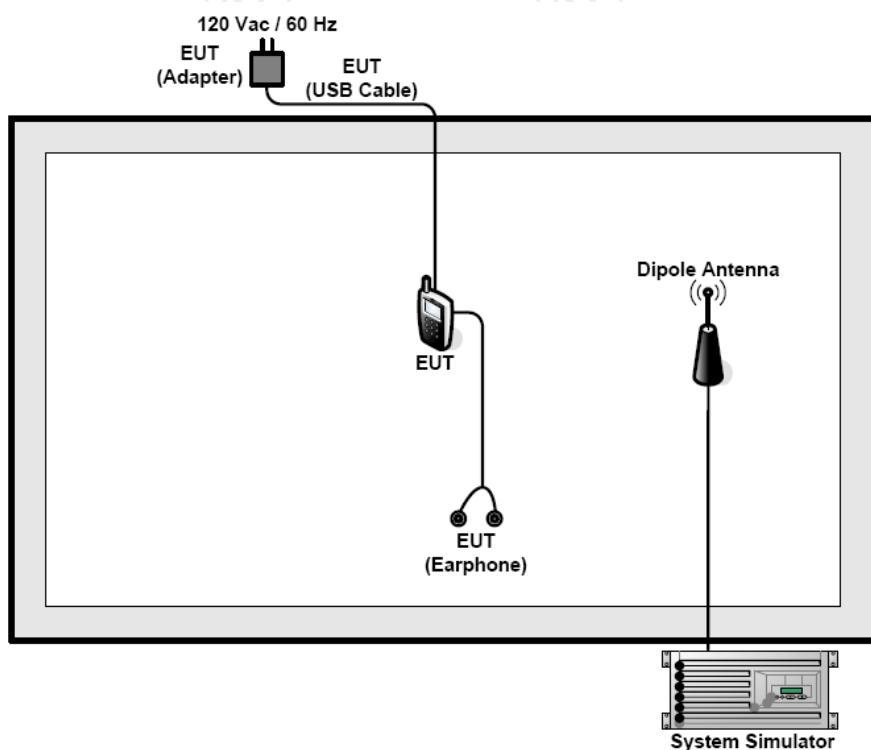
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

**Note:**

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.

### 3.3. Configuration of Tested System



### 3.4. Measurement Results Explanation Example

**For all conducted test items:**

The offset level is set in the spectrum analyzer to compensate the RF cable loss and attenuator factor between RF conducted output port and spectrum analyzer. With the offset compensation, the spectrum analyzer reading level will be exactly the RF output level. The spectrum analyzer offset is derived from RF cable loss and attenuator factor.  

$$\text{Offset} = \text{RF cable loss} + \text{attenuator factor.}$$

## 4. Facilities and Accreditations

### 4.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 645098  
SHENZHEN TONGCE TESTING LAB  
Designation Number: CN1205

The testing lab has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

- IC - Registration No.: 10668A-1  
SHENZHEN TONGCE TESTING LAB  
CAB identifier: CN0031

The testing lab has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing.

### 4.2. Location

SHENZHEN TONGCE TESTING LAB

Address: 2101 & 2201, Zhenchang Factory Renshan Industrial Zone, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

### 4.3. Measurement Uncertainty

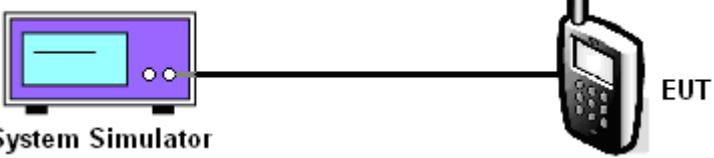
The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	$\pm 3.10$ dB
2	RF power, conducted	$\pm 0.12$ dB
3	Spurious emissions, conducted	$\pm 0.11$ dB
4	All emissions, radiated(<1 GHz)	$\pm 4.56$ dB
5	All emissions, radiated(1 GHz - 18 GHz)	$\pm 4.22$ dB
6	All emissions, radiated(18 GHz- 40 GHz)	$\pm 4.36$ dB

## 5. Test Results and Measurement Data

### 5.1. Effective Radiated Power and Effective Isotropic Radiated Power Measurement

#### 5.1.1. Test Specification

<b>Test Requirement:</b>	Refer to section 2
<b>Test Method:</b>	FCC part 2.1046
<b>Limit:</b>	LTE Band 2: 2W LTE Band 4: 1W LTE Band 7: 2W
<b>Test Setup:</b>	 <p><b>System Simulator</b>      <b>EUT</b></p>
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The transmitter output port was connected to the system simulator.</li> <li>2. Set EUT at maximum power through system simulator.</li> <li>3. Select lowest, middle, highest channels for each band and different modulation.</li> <li>4. Measure and record the power level from the system simulator.</li> <li>5. Calculate the ERP and EIRP</li> </ol> <p>The relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:</p> $\text{ERP or EIRP} = P_{\text{Meas}} + G_T - L_C$ <p>where:</p> <p>ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively (expressed in the same units as <math>P_{\text{Meas}}</math>, typically dBW or dBm);</p> <p><math>P_{\text{Meas}}</math> = measured transmitter output power or PSD, in dBm or dBW;</p> <p><math>G_T</math> = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);</p> <p><math>L_C</math> = signal attenuation in the connecting cable between the transmitter and antenna, in dB.</p> <p><i>Note: For personal/portable radios utilizing an integral antenna, the factor <math>L_C</math> is typically negligible. However, in a fixed station transmit system that utilizes a long cable run</i></p>

	<i>between the transmitter and the transmitting antenna, this factor can be significant.</i>
<b>Test Result:</b>	PASS

### 5.1.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Wideband Radio Communication Tester	R&S	CMW500	114220	Jul. 03, 2023
Combiner Box	Ascentest	AT890-RFB	/	/

## 5.2. Peak to Average Ratio

### 5.2.1. Test Specification

<b>Test Requirement:</b>	Refer to section 2
<b>Test Method:</b>	FCC KDB 971168 D01v03
<b>Limit:</b>	The peak-to-average ratio (PAR) of the transmission may not exceed 13 dB.
<b>Test Setup:</b>	<p>The diagram illustrates the test setup. A 'System Simulator' (represented by a purple box with a screen and buttons) is connected to a 'Power Divider' (represented by a black rectangular block). The 'Power Divider' is also connected to a 'Spectrum Analyzer' (represented by a green box with a screen and buttons) and an 'EUT' (Equipment Under Test, represented by a black mobile phone icon).</p>
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 D01v03 Section 5.7.1.</li> <li>2. The EUT was connected to spectrum analyzer and system simulator via a power divider.</li> <li>3. Set EUT to transmit at maximum output power.</li> <li>4. Set the CCDF (Complementary Cumulative Distribution Function) option of the spectrum analyzer.</li> </ol> <p>Record the maximum PAPR level associated with a probability of 0.1%.</p>
<b>Test Result:</b>	PASS

### 5.2.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Wideband Radio Communication Tester	R&S	CMW500	114220	Jul. 03, 2023
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 04, 2023
Combiner Box	Ascentest	AT890-RFB	/	/

### 5.3. 99% Occupied Bandwidth and 26dB Bandwidth Measurement

#### 5.3.1. Test Specification

<b>Test Requirement:</b>	Refer to section 2
<b>Test Method:</b>	FCC part 2.1049
<b>Limit:</b>	N/A
<b>Test Setup:</b>	<p>System Simulator</p> <p>Spectrum Analyzer</p> <p>Power Divider</p> <p>EUT</p>
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 D01v03 Section 4.2.</li> <li>2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.</li> <li>3. The RF output of the EUT was connected to the spectrum analyzer by RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>4. The 99% occupied bandwidth were measured, set RBW= 1% of OBW, VBW= 3*RBW, sample detector, trace maximum hold.</li> <li>5. The 26dB bandwidth were measured, set RBW= 1% of EBW, VBW= 3*RBW, peak detector, trace maximum hold.</li> </ol>
<b>Test Result:</b>	PASS

#### 5.3.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Wideband Radio Communication Tester	R&S	CMW500	114220	Jul. 03, 2023
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 04, 2023
Combiner Box	Ascentest	AT890-RFB	/	/

## 5.4. Band Edge and Conducted Spurious Emission Measurement

### 5.4.1. Test Specification

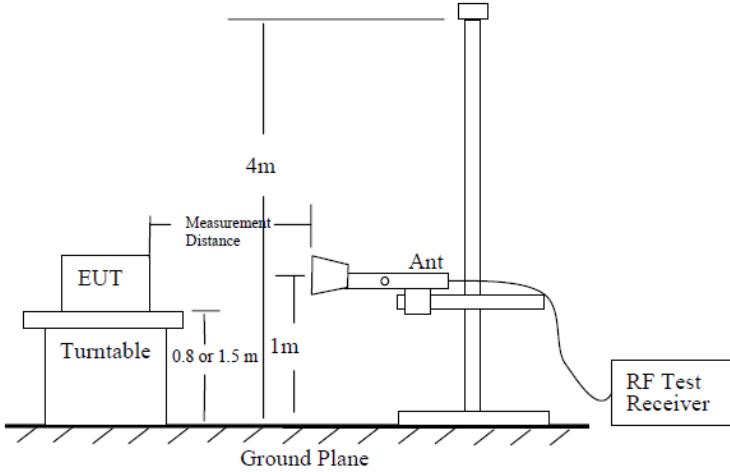
<b>Test Requirement:</b>	Refer to section 2
<b>Test Method:</b>	FCC part2.1051
<b>Limit:</b>	-13dBm
<b>Test Setup:</b>	
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 D01v03 Section 6.0.</li> <li>2. The EUT was connected to the spectrum analyzer and system simulator via a power divider.</li> <li>3. The RF output of EUT was connected to the spectrum analyzer by an RF cable and attenuator. The path loss was compensated to the results for each measurement.</li> <li>4. The band edges of low and high channels for the highest RF powers were measured.</li> <li>5. The conducted spurious emission for the whole frequency range was taken.</li> <li>6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</li> <li>7. The limit line is derived from <math>43 + 10\log(P)</math> dB below the transmitter power  <math display="block">P(\text{Watts}) = P(\text{W}) - [43 + 10\log(P)] \text{ (dB)} = [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)} = -13\text{dBm}.</math> For Band 17, the limit line is derived from <math>55 + 10\log(P)</math> dB below the transmitter power </li> </ol>
<b>Test Result:</b>	PASS

**5.4.2. Test Instruments**

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Wideband Radio Communication Tester	R&S	CMW500	114220	Jul. 03, 2023
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 04, 2023
Combiner Box	Ascentest	AT890-RFB	/	/

## 5.5. Field Strength of Spurious Radiation Measurement

### 5.5.1. Test Specification

<b>Test Requirement:</b>	Refer to section 2
<b>Test Method:</b>	FCC part 2.1053
<b>Limit:</b>	30MHz~20GHz -13dBm
<b>Test setup:</b>	
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 D01v03 Section 5.8 and ANSI / TIA-603-D-2010Section 2.2.12.</li> <li>2. The EUT was placed on a rotatable wooden table 0.8 meters above the ground.</li> <li>3. The EUT was set 3 meters from the receiving antenna, which was mounted on the antenna tower.</li> <li>4. The table was rotated 360 degrees to determine the position of the highest spurious emission.</li> <li>5. The height of the receiving antenna is varied between one meter and four meters to search for the maximum spurious emission for both horizontal and vertical</li> </ol>

	<p>polarizations.</p> <p>6. Make the measurement with the spectrum analyzer's RBW = 1MHz, VBW = 3MHz, taking record of maximum spurious emission.</p> <p>7. A horn antenna was substituted in place of the EUT and was driven by a signal generator.</p> <p>8. Tune the output power of signal generator to the same emission level with EUT maximum spurious emission.</p> <p>9. Taking the record of output power at antenna port.</p> <p>10. Repeat step 7 to step 8 for another polarization.</p> <p>11. EIRP (dBm) = S.G. Power – Tx Cable Loss + Tx Antenna Gain</p> <p>12. ERP (dBm) = EIRP - 2.15</p> <p>13. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.</p> <p>14. The limit line is derived from <math>43 + 10\log(P)</math> dB below the transmitter power P(Watts)</p> $= P(W) - [43 + 10\log(P)] \text{ (dB)}$ $= [30 + 10\log(P)] \text{ (dBm)} - [43 + 10\log(P)] \text{ (dB)}$ $= -13 \text{ dBm.}$
<b>Test results:</b>	PASS
<b>Remark:</b>	All modulations have been tested, but only the worst modulation show in this test item.

### 5.5.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	Manufacturer	Model	Serial Number	Calibration Due
Universal Radio Communication Tester	R&S	CMU200	110188	Jul. 04, 2023
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 03, 2023
Signal Generator	HP	83623B	3614A00396	Feb. 24, 2023
Broadband Antenna	Schwarzbeck	VULB9163	340	Jul. 05, 2024
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Jul. 05, 2024
Broadband Antenna	Schwarzbeck	VULB9163	412	Jul. 05, 2024
Horn Antenna	Schwarzbeck	BBHA 9120D	1201	Jul. 05, 2024
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Apr. 10, 2023
Coaxial cable	SKET	RC-18G-N-M	/	Feb. 24, 2024
Coaxial cable	SKET	RC_40G-K-M	/	Feb. 24, 2024
Antenna Mast	Keleto	RE-AM	/	/
EMI Test Software	Shurple Technology	EZ-EMC	/	/

### 5.5.3. Test Data

#### Frequency Range (9 kHz-30MHz)

Frequency (MHz)	Level@3m (dB $\mu$ V/m)	Limit@3m (dB $\mu$ V/m)
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**Note:** 1. Emission Level=Reading+ Cable loss+Antenna factor-Amp factor

2. The emission levels are 20 dB below the limit value, which are not reported. It is deemed to comply with the requirement

Band	Band 2(QPSK, 20MHz)			Test channel:	Lowest
Test mode:				Temperature :	25°C
				Relative Humidity:	56%

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3720.00	Vertical	-60.41	23.54	-36.87	-13.00	PASS
5580.00	V	-65.85	23.81	-42.04		
7440.00	V	-81.55	23.96	-57.59		
3720.00	Horizontal	-57.37	23.54	-33.83		
5580.00	H	-64.56	23.81	-40.75		
7440.00	H	-77.15	23.96	-53.19		

Band	Band 2(QPSK, 20MHz)				Test channel:	Middle
Test mode:					Temperature :	25°C
					Relative Humidity:	56%

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3760.00	Vertical	-70.69	23.58	-47.11	-13.00	PASS
5640.00	V	-77.75	23.85	-53.90		
7520.00	V	-58.64	23.99	-34.65		
3760.00	Horizontal	-63.58	23.58	-40.00		
5640.00	H	-79.19	23.85	-55.34		
7520.00	H	-70.69	23.99	-46.70		

Band	Band 2(QPSK, 20MHz)				Test channel:	Highest
Test mode:					Temperature :	25°C
					Relative Humidity:	56%

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3800.00	Vertical	-62.30	23.60	-38.70	-13.00	PASS
5700.00	V	-70.50	23.88	-46.62		
7600.00	V	-78.17	24.02	-54.15		
3800.00	Horizontal	-57.25	23.60	-33.65		
5700.00	H	-66.95	23.88	-43.07		
7600.00	H	-81.06	24.02	-57.04		

<b>Band</b>	<b>Band 2(16QAM, 20MHz)</b>			<b>Test channel:</b>	<b>Lowest</b>
<b>Test mode:</b>				<b>Temperature :</b>	<b>25°C</b>
				<b>Relative Humidity:</b>	<b>56%</b>

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarizati on	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3720.00	Vertical	-58.41	23.54	-34.87	-13.00	PASS
5580.00	V	-65.72	23.81	-41.91		
7440.00	V	-78.85	23.96	-54.89		
3720.00	Horizontal	-57.58	23.54	-34.04		
5580.00	H	-64.51	23.81	-40.70		
7440.00	H	-76.49	23.96	-52.53		

<b>Band</b>	<b>Band 2(16QAM, 20MHz)</b>			<b>Test channel:</b>	<b>Middle</b>
<b>Test mode:</b>				<b>Temperature :</b>	<b>25°C</b>
				<b>Relative Humidity:</b>	<b>56%</b>

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarizati on	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3760.00	Vertical	-59.36	23.58	-35.78	-13.00	PASS
5640.00	V	-69.73	23.85	-45.88		
7520.00	V	-78.34	23.99	-54.35		
3760.00	Horizontal	-58.30	23.58	-34.72		
5640.00	H	-65.41	23.85	-41.56		
7520.00	H	-79.25	23.99	-55.26		

<b>Band</b>	<b>Band 2(16QAM, 20MHz)</b>			<b>Test channel:</b>	<b>Highest</b>
<b>Test mode:</b>				<b>Temperature :</b>	<b>25°C</b>
				<b>Relative Humidity:</b>	<b>56%</b>

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarizati on	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3800.00	Vertical	-60.72	23.60	-37.12	-13.00	PASS
5700.00	V	-71.04	23.88	-47.16		
7600.00	V	-79.54	24.02	-55.52		
3800.00	Horizontal	-57.45	23.60	-33.85		
5700.00	H	-66.48	23.88	-42.60		
7600.00	H	-81.06	24.02	-57.04		

<b>Band</b>	<b>Band 4(QPSK, 20MHz)</b>			<b>Test channel:</b>	<b>Lowest</b>
<b>Test mode:</b>				<b>Temperature :</b>	<b>25°C</b>
				<b>Relative Humidity:</b>	<b>56%</b>

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3440.00	Vertical	-59.96	23.40	-36.56	-13.00	PASS
5160.00	V	-63.56	23.69	-39.87		
6880.00	V	-78.87	23.75	-55.12		
3440.00	Horizontal	-58.33	23.40	-34.93		
5160.00	H	-64.18	23.69	-40.49		
6880.00	H	-76.75	23.75	-53.00		
<b>Band</b>	<b>Band 4(QPSK, 20MHz)</b>			<b>Test channel:</b>	<b>Middle</b>	
<b>Test mode:</b>				<b>Temperature :</b>	<b>25°C</b>	
				<b>Relative Humidity:</b>	<b>56%</b>	

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3465.00	Vertical	-59.48	23.42	-36.06	-13.00	PASS
5197.50	V	-69.51	23.73	-45.78		
6930.00	V	-78.20	23.79	-54.41		
3465.00	Horizontal	-56.80	23.42	-33.38		
5197.50	H	-64.46	23.73	-40.73		
6930.00	H	-78.11	23.79	-54.32		
<b>Band</b>	<b>Band 4(QPSK, 20MHz)</b>			<b>Test channel:</b>	<b>Highest</b>	
<b>Test mode:</b>				<b>Temperature :</b>	<b>25°C</b>	
				<b>Relative Humidity:</b>	<b>56%</b>	

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3490.00	Vertical	-61.26	23.46	-37.80	-13.00	PASS
5235.00	V	-70.34	23.77	-46.57		
6980.00	V	-77.25	23.81	-53.44		
3490.00	Horizontal	-57.13	23.46	-33.67		
5235.00	H	-66.34	23.77	-42.57		
6980.00	H	-80.23	23.81	-56.42		

<b>Band</b>	<b>Band 4(16QAM, 20MHz)</b>			<b>Test channel:</b>	<b>Lowest</b>
<b>Test mode:</b>				<b>Temperature :</b>	<b>25°C</b>
				<b>Relative Humidity:</b>	<b>56%</b>

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3440.00	Vertical	-60.42	23.40	-37.02	-13.00	PASS
5160.00	V	-66.85	23.69	-43.16		
6880.00	V	-78.84	23.75	-55.09		
3440.00	Horizontal	-58.97	23.40	-35.57		
5160.00	H	-65.21	23.69	-41.52		
6880.00	H	-77.92	23.75	-54.17		
<b>Band</b>	<b>Band 4(16QAM, 20MHz)</b>				<b>Test channel:</b>	<b>Middle</b>
<b>Test mode:</b>					<b>Temperature :</b>	<b>25°C</b>
					<b>Relative Humidity:</b>	<b>56%</b>

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3465.00	Vertical	-59.40	23.42	-35.98	-13.00	PASS
5197.50	V	-70.27	23.73	-46.54		
6930.00	V	-79.12	23.79	-55.33		
3465.00	Horizontal	-57.65	23.42	-34.23		
5197.50	H	-66.37	23.73	-42.64		
6930.00	H	-79.86	23.79	-56.07		
<b>Band</b>	<b>Band 4(16QAM, 20MHz)</b>				<b>Test channel:</b>	<b>Highest</b>
<b>Test mode:</b>					<b>Temperature :</b>	<b>25°C</b>
					<b>Relative Humidity:</b>	<b>56%</b>

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
3490.00	Vertical	-62.22	23.46	-38.76	-13.00	PASS
5235.00	V	-70.50	23.77	-46.73		
6980.00	V	-79.62	23.81	-55.81		
3490.00	Horizontal	-57.26	23.46	-33.80		
5235.00	H	-68.18	23.77	-44.41		
6980.00	H	-80.37	23.81	-56.56		

Band	Band 7(QPSK, 20MHz)			Test channel:	Lowest
Test mode:				Temperature :	25°C
				Relative Humidity:	56%

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
5020.00	Vertical	-61.28	23.11	-38.17	-25.00	PASS
7530.00	V	-65.18	23.25	-41.93		
10040.00	V	-80.72	23.38	-57.34		
5020.00	Horizontal	-60.14	23.11	-37.03		
7530.00	H	-62.61	23.25	-39.36		
10040.00	H	-76.99	23.38	-53.61		

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Test channel:	Middle
					Temperature :	25°C
					Relative Humidity:	56%

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
5070.00	Vertical	-59.21	23.14	-36.07	-25.00	PASS
7605.00	V	-70.65	23.23	-47.42		
10140.00	V	-79.80	23.34	-56.46		
5070.00	Horizontal	-57.37	23.14	-34.23		
7605.00	H	-65.28	23.23	-42.05		
10140.00	H	-78.47	23.34	-55.13		

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
5120.00	Vertical	-61.79	23.17	-38.62	-25.00	PASS
7680.00	V	-71.46	23.25	-48.21		
10240.00	V	-84.62	23.40	-61.22		
5120.00	Horizontal	-58.37	23.17	-35.20		
7680.00	H	-67.47	23.25	-44.22		
10240.00	H	-81.15	23.40	-57.75		

Band	Band 7(16QAM, 20MHz)			Test channel:	Lowest
Test mode:				Temperature :	25°C
				Relative Humidity:	56%

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
5020.00	Vertical	-59.15	23.11	-36.04	-25.00	PASS
7530.00	V	-64.02	23.25	-40.77		
10040.00	V	-81.50	23.38	-58.12		
5020.00	Horizontal	-59.72	23.11	-36.61		
7530.00	H	-64.39	23.25	-41.14		
10040.00	H	-78.17	23.38	-54.79		

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
5070.00	Vertical	-59.11	23.14	-35.97	-25.00	PASS
7605.00	V	-70.62	23.23	-47.39		
10140.00	V	-80.26	23.34	-56.92		
5070.00	Horizontal	-57.18	23.14	-34.04		
7605.00	H	-65.94	23.23	-42.71		
10140.00	H	-79.49	23.34	-56.15		

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Test mode:	Band 7(16QAM, 20MHz)				Test channel:	Highest
					Temperature :	25°C
					Relative Humidity:	56%

**Note:** Spurious emissions within 30-1000MHz were found more than 20dB below limit line.

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
5120.00	Vertical	-62.31	23.17	-39.14	-25.00	PASS
7680.00	V	-69.97	23.25	-46.72		
10240.00	V	-79.11	23.40	-55.71		
5120.00	Horizontal	-57.89	23.17	-34.72		
7680.00	H	-67.47	23.25	-44.22		
10240.00	H	-80.29	23.40	-56.89		

## 5.6. Frequency Stability Measurement

### 5.6.1. Test Specification

<b>Test Requirement:</b>	FCC part 27.54, FCC part 22.355, 24.235
<b>Test Method:</b>	FCC Part 2.1055
<b>Limit:</b>	$\pm 2.5$ ppm
<b>Test Setup:</b>	
<b>Test Procedure:</b>	<p><b>Test Procedures for Temperature Variation</b></p> <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 D01v03 Section 9.0.</li> <li>2. The EUT was set up in the thermal chamber and connected with the system simulator.</li> <li>3. With power OFF, the temperature was decreased to <math>-30^{\circ}\text{C}</math> and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.</li> <li>4. With power OFF, the temperature was raised in <math>10^{\circ}\text{C}</math> steps up to <math>50^{\circ}\text{C}</math>. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.</li> </ol> <p><b>Test Procedures for Voltage Variation</b></p> <ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 D01v03 Section 9.0.</li> <li>2. The EUT was placed in a temperature chamber at <math>25\pm 5^{\circ}\text{C}</math> and connected with the system simulator.</li> <li>3. The power supply voltage to the EUT was varied from BEP to 115% of the nominal value measured at the input to the EUT.</li> <li>4. The variation in frequency was measured for the worst case.</li> <li>5. The worst case(worst bandwidth) for frequency stability reported in the Test Data. The worst bandwidth is as follow: 1.4M is for LTE Band 2, 1.4M is for LTE Band 4, 5M is for LTE Band 7</li> </ol>
<b>Test Result:</b>	PASS

**5.6.2. Test Instruments**

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Wideband Radio Communication Tester	R&S	CMW500	114220	Jul. 03, 2023
Programable temprature and humidity chamber	JQ	JQ-2000	/	Jul. 04, 2023
DC power supply	Kingrang	KR3005K	/	Jul. 04, 2023
Combiner Box	AT890-RFB	Ascentest	/	/

## Appendix B: Photographs of Test Setup

Refer to the test report No. TCT220819E010

## Appendix C: Photographs of EUT

Refer to the test report No. TCT220819E010

## Test Data for Appendix For LTE Band 2, Appendix For LTE Band 4 and Appendix For LTE Band 7

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