

# TEST REPORT

FCC ID .....	2A2TN-210868	
Test Report No. ....	TCT210721E025	
Date of issue .....	Aug. 16, 2021	
Testing laboratory .....	SHENZHEN TONGCE TESTING LAB	
Testing location/ address:	TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People's Republic of China	
Applicant's name.....	ShenZhen newpas Intelligent Technology Co., Ltd	
Address.....	A/3F building 1, Tianxing Dongzheng Industrial Park, No. 1514, GuangGuan Road, Longhua District, Shenzhen, China	
Manufacturer's name ...	ShenZhen newpas Intelligent Technology Co., Ltd	
Address.....	A/3F building 1, Tianxing Dongzheng Industrial Park, No. 1514, GuangGuan Road, Longhua District, Shenzhen, China	
Standard(s) .....	FCC CFR Title 47 Part 2 FCC CFR Title 47 Part22 FCC CFR Title 47 Part27	
Test item description .....	Handheld POS Terminal	
Trade Mark .....	JICAI, NEWPAS	
Model/Type reference.....	Q3PRO, Q1, Q2, Q3, Q4, Q5PRO, Q6, Q7, Q8, Q9, Q2i, Q2X, N01, N02, N03, N04, N05, N06, N07, N08, N09, N10, N11, N12, N13, N14, N15, N16, N17, N18, N19, N20	
Rating(s).....	Refer to EUT description of page 3	
Date of receipt of test item .....	Jul. 21, 2021	
Date (s) of performance of test.....	See dates for each test case	
Tested by (+signature) ...	Rleo	
Check by (+signature)....	Beryl Zhao	
Approved by (+signature):	Tomsin	

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**Appendix A: Photographs of Test Setup**

**Appendix B: Photographs of EUT**

**Test Data: Refer to Appendix For LTE Band 5, Appendix For LTE Band 7  
and Appendix For LTE Band 41**

## 1. General Product Information

### 1.1. EUT description

<b>Test item description</b> .....	Handheld POS Terminal
<b>Model/Type reference</b> .....	Q3PRO
<b>Sample Number</b> .....	TCT210721E008-0101
<b>Tx Frequency</b> .....	LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500 MHz ~ 2570 MHz LTE Band 41: 2496 MHz ~ 2690 MHz
<b>Rx Frequency</b> .....	LTE Band 5: 869 MHz ~ 894 MHz LTE Band 7: 2620 MHz ~ 2690 MHz LTE Band 41: 2496 MHz ~ 2690 MHz
<b>Bandwidth</b> .....	LTE Band 5: 1.4MHz /3MHz /5MHz /10MHz LTE Band 7: 5MHz /10MHz/15MHz /20MHz LTE Band 41: 5MHz /10MHz /15MHz / 20MHz
<b>Maximum Output Power to Antenna</b> .....	LTE Band 5: 19.26dBm LTE Band 7: 19.61dBm LTE Band 41: 22.71dBm
<b>99% Occupied Bandwidth</b> .....	LTE Band 5: 9M00G7D LTE Band 7: 18M0G7D LTE Band 41: 17M9G7D
<b>Type of Modulation</b> .....	QPSK/16QAM
<b>Antenna Type</b> .....	PIFA Antenna
<b>Antenna Gain</b> .....	LTE Band 5: -0.8dBi LTE Band 7: 0.1dBi LTE Band 41: 0.1dBi
<b>Rating(s)</b> .....	Adapter Information: Model: ADP-18H12 Input: AC 100-240V, 50/60Hz, 0.8A Output: DC 12V, 1.5A Rechargeable Li-ion Battery DC 7.2V

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	Q3PRO	<input checked="" type="checkbox"/>
Other models	Q1, Q2, Q3, Q4, Q5PRO, Q6, Q7, Q8, Q9, Q2i, Q2X, N01, N02, N03, N04, N05, N06, N07, N08, N09, N10, N11, N12, N13, N14, N15, N16, N17, N18, N19, N20	<input type="checkbox"/>

Note: Q3PRO 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 Q3PRO can represent the remaining models.

### 1.3. Emission Designator

LTE Band 5		QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum ERP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	
1.4	1M09G7D	0.043	1M09W7D	0.033	
3	2M69G7D	0.043	2M70W7D	0.034	
5	4M51G7D	0.041	4M51W7D	0.032	
10	9M00G7D	0.041	9M00W7D	0.033	
LTE Band 7		QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum ERP(W)	
5	4M51G7D	0.094	4M52W7D	0.072	
10	8M98G7D	0.093	8M97W7D	0.073	
15	13M5G7D	0.090	13M5W7D	0.072	
20	18M0G7D	0.090	18M0W7D	0.070	
LTE Band 41		QPSK		16QAM	
BW(MHz)	Emission Designator (99%OBW)	Maximum EIRP(W)	Emission Designator (99%OBW)	Maximum EIRP(W)	
5	4M50G7D	0.119	4M49W7D	0.090	
10	8M96G7D	0.121	8M96W7D	0.092	
15	13M4G7D	0.153	13M5W7D	0.122	
20	17M9G7D	0.191	17M9W7D	0.153	

## 1.4. Test Frequency

LTE Band 5(1.4MHz)		LTE Band 5(3MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20407	824.7	20415	825.5
20525	836.5	20525	836.5
20643	848.3	20635	847.5
LTE Band 5(5MHz)		LTE Band 5(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20425	826.5	20450	829.0
20525	836.5	20525	836.5
20625	846.5	20600	844.0

LTE Band 7(5MHz)		LTE Band 7(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20775	2502.5	20800	2505
21100	2535	21100	2535
21425	2567.5	21400	2565
LTE Band 7(15MHz)		LTE Band 7(20MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
20825	2507.5	20850	2510
21100	2535	21100	2535
21375	2562.5	21350	2560

LTE Band 41(5MHz)		LTE Band 41(10MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
39675	2498.5	39700	2501
40620	2593	40620	2593
41565	2687.5	41540	2685
LTE Band 41(15MHz)		LTE Band 41(20MHz)	
Channel	Frequency (MHz)	Channel	Frequency (MHz)
39725	2503.5	39750	2506
40620	2593	40620	2593
41515	2682.5	41490	2680

## 2. Test Result Summary

Requirement	CFR 47 Section	Result
Conducted Output Power	§2.1046; §22.913; §27.50(d); §27.50(c); §27.50(b);	PASS
Peak-to-Average Ratio	§2.1046; §27.50(d); §27.50(c); §27.50(b);	PASS
Effective Radiated Power	§2.1046; §22.913; §27.50(d); §27.50(c); §27.50(b);	PASS
Equivalent Isotropic Radiated Power	§2.1046; §22.913; §27.50(d); §27.50(c); §27.50(b);	PASS
Occupied Bandwidth	§2.1049; §27.53;	PASS
Band Edge	§2.1051; §22.917(a); §27.53(h); §27.53(c); §27.53(g);	PASS
Conducted Spurious Emission	§2.1051; §22.917(a); §27.53(h); §27.53(g); §27.53(c);	PASS
Field Strength of Spurious Radiation	§2.1053; §22.917(a); §27.53(g); §27.53(c); §27.53(h);	PASS
Frequency Stability for Temperature & Voltage	§2.1055; §22.355; §27.54;	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
Test Mode:	
Operation mode:	Keep the EUT in continuous transmitting with modulation
<p>The sample was placed 0.8m 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 &amp; 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 polarizations. The emissions worst-case are shown in Test Results of the following pages.</p>	

<p>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:</p>		
<b>Test Mode</b>		
Band	Radiated TCs	Conducted TCs
LTE Band 5	QPSK Link (1.4MHz / 3MHz / 5MHz / 10MHz)	16QAM Link (1.4MHz / 3MHz / 5MHz / 10MHz)
LTE Band 7	QPSK Link (5MHz / 10MHz / 15MHz / 20MHz)	16QAM Link (5MHz / 10MHz / 15MHz / 20MHz)
LTE Band 41	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	5	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
	41	-	-	v	v	v	v	v	v	v	v	v	v	v	v
Peak-to-Average Ratio	5	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
	41	-	-	v	v	v	v	v	v	v	v	v	v	v	v
26dB and 99% Bandwidth	5	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
	41	-	-	v	v	v	v	v	v	-	-	v	v	v	v
Conducted Band Edge	5	v	v	v	v	-	-	v	v	v	v	v	v	-	v
	7	-	-	v	v	v	v	v	v	v	v	v	v	-	v
	41	-	-	v	v	v	v	v	v	v	-	v	v	-	v
Conducted Spurious Emission	5	v	v	v	v	-	-	v	v	v	-	-	v	v	v
	7	-	-	v	v	v	v	v	v	v	-	-	v	v	v
	41	-	-	v	v	v	v	v	v	v	-	-	v	v	v
Frequency Stability	5	v	-	-	-	-	-	v	v	v	-	-	v	v	v
	7	-	-	v	-	-	-	v	v	v	-	-	v	v	v
	41	-	-	-	v	-	-	v	v	-	-	v	-	v	-
E.R.P./E.I.R.P.	5	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
	41	-	-	v	v	v	v	v	v	v	v	v	v	v	v
Radiated Spurious Emission	5	v	-	-	-	-	-	v	v	v	-	-	v	v	v
	7	-	-	v	-	-	-	v	v	v	-	-	v	v	v
	41	v	-	-	-	-	-	v	v	v	-	-	v	v	v
Note	<ol style="list-style-type: none"> <li>1. The mark "v" means that this configuration is chosen for testing</li> <li>2. The mark "-" means that this bandwidth is not supported.</li> </ol>														

### 3.2. Description of Support Units

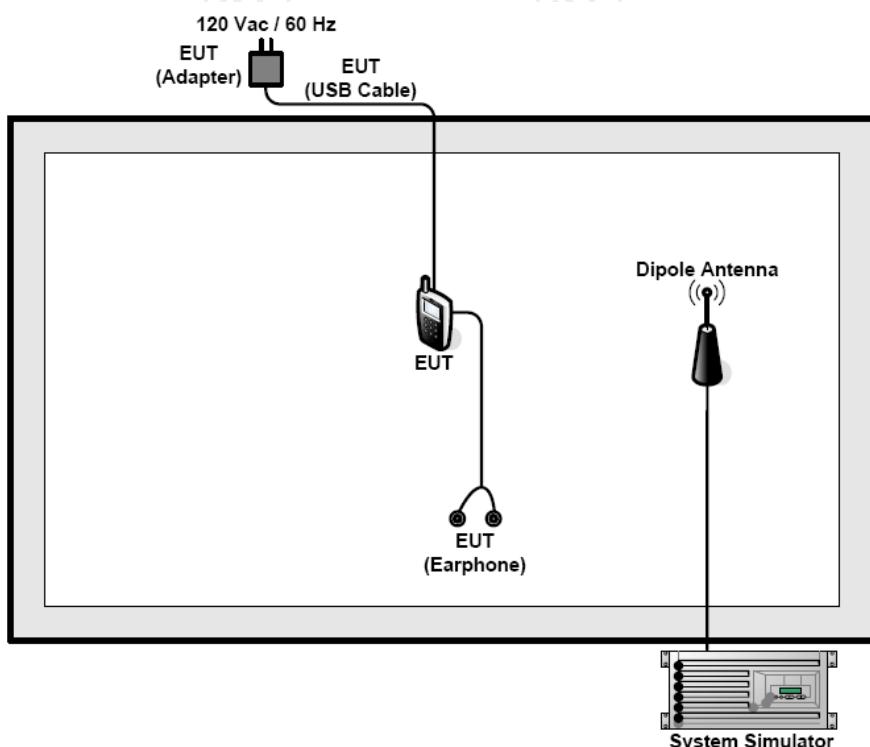
The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

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: TCT Testing Industrial Park Fuqiao 5th Industrial Zone, Fuhai Street, Bao'an District Shenzhen, Guangdong, 518103, People's Republic of China

TEL: +86-755-27673339

### 4.3. Measurement Uncertainty

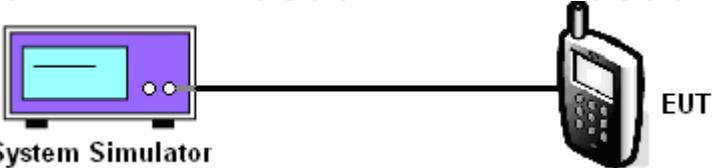
The reported uncertainty of measurement  $y \pm U$ , where expended uncertainty  $U$  is based on a standard uncertainty multiplied by a coverage factor of  $k=2$ , providing a level of confidence of approximately 95 %.

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>	FCC part 27.50(c), FCC part 27.50(d) and FCC part 27.50(h), FCC part 24.232(c), FCC part 22.913;
<b>Test Method:</b>	FCC part 2.1046
<b>Limit:</b>	LTE Band 5: 7W LTE Band 7: 2W LTE Band 41: 2W
<b>Test Setup:</b>	 <p>System Simulator      EUT</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</i></p>

	<i>fixed station transmit system that utilizes a long cable run 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. 07, 2022
RF cable (9kHz-40GHz)	TCT	RE-05	N/A	Jul. 07, 2022
Antenna Connector	TCT	RFC-02	N/A	Jul. 07, 2022

## 5.2. Peak to Average Ratio

### 5.2.1. Test Specification

<b>Test Requirement:</b>	FCC part 2.1046; 22.913; 24.232; 27.50(d); 27.50(c); 27.50(b)
<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>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 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. Record the maximum PAPR level associated with a probability of 0.1%.</li> </ol>
<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. 07, 2022
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
RF cable (9kHz-40GHz)	TCT	RE-05	N/A	Jul. 07, 2022
Antenna Connector	TCT	RFC-02	N/A	Jul. 07, 2022

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

#### 5.3.1. Test Specification

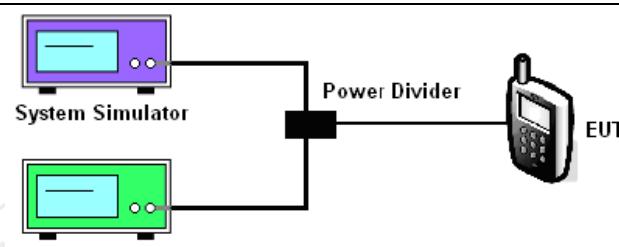
<b>Test Requirement:</b>	FCC part 27.53(h)(3) and FCC part 27.53(m)(6), FCC part 24.238(b)
<b>Test Method:</b>	FCC part 2.1049
<b>Limit:</b>	N/A
<b>Test Setup:</b>	<p>The diagram illustrates the test setup. A purple box labeled 'System Simulator' is connected to a black 'Power Divider' block. The 'Power Divider' block is connected to a green box labeled 'Spectrum Analyzer' and to a black 'EUT' (Equipment Under Test) device, which resembles a handheld radio.</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. 07, 2022
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
RF cable (9kHz-40GHz)	TCT	RE-05	N/A	Jul. 07, 2022
Antenna Connector	TCT	RFC-02	N/A	Jul. 07, 2022

## 5.4. Band Edge and Conducted Spurious Emission Measurement

### 5.4.1. Test Specification

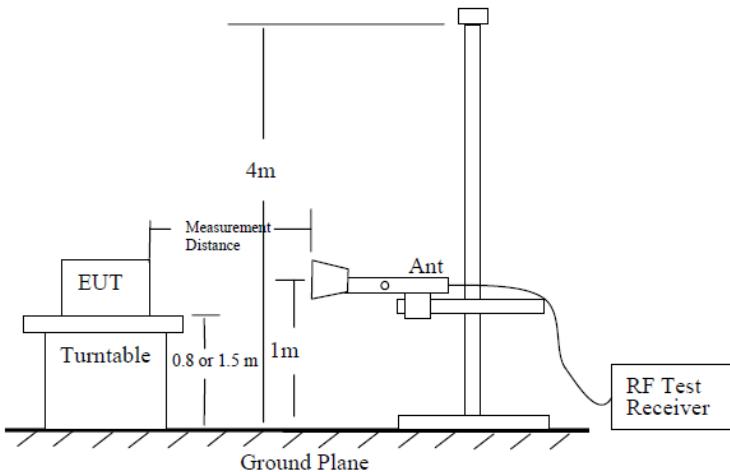
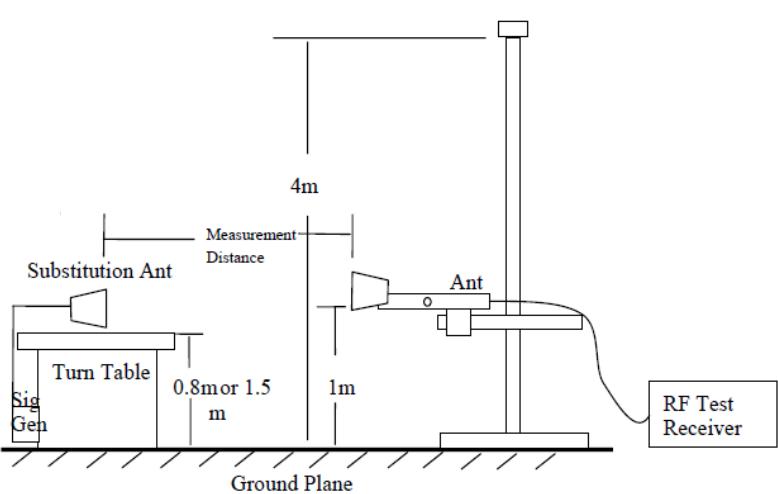
<b>Test Requirement:</b>	FCC part 27.53(h), FCC part 27.53(g) , FCC part 27.53(m)(4), FCC part 24.238(a), 22.917(a)
<b>Test Method:</b>	FCC part2.1051
<b>Limit:</b>	-13dBm
<b>Test Setup:</b>	
<b>Test Procedure:</b>	<ol style="list-style-type: none"> <li>1. The testing follows FCC KDB 971168 D01v03 Section 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. 07, 2022
Spectrum Analyzer	Agilent	N9020A	MY49100619	Jul. 18, 2022
RF cable (9kHz-40GHz)	TCT	RE-05	N/A	Jul. 07, 2022
Antenna Connector	TCT	RFC-02	N/A	Jul. 07, 2022

## 5.5. Field Strength of Spurious Radiation Measurement

### 5.5.1. Test Specification

<b>Test Requirement:</b>	FCC part 27.53(g) ,FCC part 27.53(h), FCC part 27.53(m)(4), FCC part 22.917(a), 24.238(b)
<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</li> </ol>

	<p>spurious emission for both horizontal and vertical 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. 07, 2022
Spectrum Analyzer	R&S	FSQ40	200061	Jul. 07, 2022
Signal Generator	HP	83623B	3614A00396	Jul. 18, 2022
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 04, 2022
Broadband Antenna	Schwarzbeck	VULB9163	412	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9120D	1201	Sep. 04, 2022
Horn Antenna	Schwarzbeck	BBHA 9170	00956	Apr. 10, 2023
Dipole Antenna	TCT	TCT-RF	N/A	Sep. 02, 2021
Coaxial cable	SKET	RC_DC18G-N	N/A	Apr. 08, 2022
Coaxial cable	SKET	RC-DC18G-N	N/A	Apr. 08, 2022
Coaxial cable	SKET	RC-DC40G-N	N/A	Jul. 07, 2022
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
EMI Test Software	Shurples Technology	EZ-EMC	N/A	N/A

### 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 5(QPSK, 10MHz)			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)		
1658.00	Vertical	-59.11	23.15	-35.96	-13.00	PASS
2487.00	V	-63.62	23.24	-40.38		
3316.00	V	-77.79	23.35	-54.44		
1658.00	Horizontal	-58.28	23.15	-35.13		
2487.00	H	-60.56	23.24	-37.32		
3316.00	H	-76.10	23.35	-52.75		

**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)		
1673.00	Vertical	-57.84	23.17	-34.67	-13.00	PASS
2509.50	V	-68.93	23.26	-45.67		
3346.00	V	-76.81	23.38	-53.43		
1673.00	Horizontal	-56.37	23.17	-33.20		
2509.50	H	-62.68	23.26	-39.42		
3346.00	H	-76.64	23.38	-53.26		

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

Test mode:	Band 5(QPSK, 10MHz)				Test channel:	Highest
					Temperature :	25°C
					Relative Humidity:	56%

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
1688.00	Vertical	-60.48	23.19	-37.29	-13.00	PASS
2532.00	V	-70.03	23.28	-46.75		
3376.00	V	-81.47	23.40	-58.07		
1688.00	Horizontal	-56.36	23.19	-33.17		
2532.00	H	-65.13	23.28	-41.85		
3376.00	H	-80.45	23.40	-57.05		

Band	Band 5(16QAM, 10MHz)			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)		
1658.00	Vertical	-57.44	23.15	-34.29	-13.00	PASS
2487.00	V	-62.91	23.24	-39.67		
3316.00	V	-78.60	23.35	-55.25		
1658.00	Horizontal	-56.95	23.15	-33.80		
2487.00	H	-62.29	23.24	-39.05		
3316.00	H	-76.98	23.35	-53.63		

**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
1673.00	Vertical	-58.11	23.17	-34.94	-13.00	PASS
2509.50	V	-68.71	23.26	-45.45		
3346.00	V	-76.19	23.38	-52.81		
1673.00	Horizontal	-54.93	23.17	-31.76		
2509.50	H	-63.60	23.26	-40.34		
3346.00	H	-77.05	23.38	-53.67		

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

Frequency (MHz)	Spurious Emission				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
1688.00	Vertical	-60.29	23.19	-37.10	-13.00	PASS
2532.00	V	-68.42	23.28	-45.14		
3376.00	V	-77.76	23.40	-54.36		
1688.00	Horizontal	-55.91	23.19	-32.72		
2532.00	H	-66.10	23.28	-42.82		
3376.00	H	-79.18	23.40	-55.78		

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	-58.92	23.11	-35.81	-25.00	PASS
7530.00	V	-63.67	23.25	-40.42		
10040.00	V	-77.76	23.38	-54.38		
5020.00	Horizontal	-58.36	23.11	-35.25		
7530.00	H	-60.17	23.25	-36.92		
10040.00	H	-76.50	23.38	-53.12		

**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	-57.02	23.14	-33.88	-25.00	PASS
7605.00	V	-68.79	23.23	-45.56		
10140.00	V	-76.87	23.34	-53.53		
5070.00	Horizontal	-56.24	23.14	-33.10		
7605.00	H	-63.13	23.23	-39.90		
10140.00	H	-76.81	23.34	-53.47		

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

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

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
5120.00	Vertical	-60.06	23.17	-36.89	-25.00	PASS
7680.00	V	-70.01	23.25	-46.76		
10240.00	V	-81.89	23.40	-58.49		
5120.00	Horizontal	-56.48	23.17	-33.31		
7680.00	H	-65.07	23.25	-41.82		
10240.00	H	-79.58	23.40	-56.18		

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	-58.22	23.11	-35.11	-25.00	PASS
7530.00	V	-61.47	23.25	-38.22		
10040.00	V	-79.67	23.38	-56.29		
5020.00	Horizontal	-57.34	23.11	-34.23		
7530.00	H	-62.83	23.25	-39.58		
10040.00	H	-76.31	23.38	-52.93		

**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	-57.20	23.14	-34.06	-25.00	PASS
7605.00	V	-68.76	23.23	-45.53		
10140.00	V	-77.38	23.34	-54.04		
5070.00	Horizontal	-55.37	23.14	-32.23		
7605.00	H	-62.79	23.23	-39.56		
10140.00	H	-77.62	23.34	-54.28		

**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%

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
	Polarization	Level (dBm)	Correction Factor (dB)	Spurious emissions (dBm)		
5120.00	Vertical	-60.66	23.17	-37.49	-25.00	PASS
7680.00	V	-68.64	23.25	-45.39		
10240.00	V	-77.85	23.40	-54.45		
5120.00	Horizontal	-55.91	23.17	-32.74		
7680.00	H	-65.09	23.25	-41.84		
10240.00	H	-78.80	23.40	-55.40		

Band	Band 41(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)		
5012.00	Vertical	-59.48	22.16	-37.32	-25.00	PASS
7518.00	V	-64.75	22.99	-41.76		
10024.00	V	-79.46	23.04	-56.42		
5012.00	Horizontal	-59.64	22.51	-37.13		
7518.00	H	-61.38	22.96	-38.42		
10024.00	H	-77.33	23.11	-54.22		

**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
5186.00	Vertical	-58.87	22.76	-36.11	-25.00	PASS
7779.00	V	-69.02	23.07	-45.95		
10372.00	V	-78.33	23.11	-55.22		
5186.00	Horizontal	-55.16	22.65	-32.51		
7779.00	H	-62.28	22.92	-39.36		
10372.00	H	-77.63	22.78	-54.85		

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

Frequency (MHz)	Spurious Emission				Limit (dBm)	Result
5360.00	Vertical	-61.35	22.42	-38.93	-25.00	PASS
8040.00	V	-70.65	22.33	-48.32		
10720.00	V	-81.34	23.00	-58.34		
5360.00	Horizontal	-56.17	22.75	-33.42		
8040.00	H	-64.39	22.68	-41.71		
10720.00	H	-80.73	22.45	-58.28		

Band	Band 41(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)		
5012.00	Vertical	-58.48	22.38	-36.10	-25.00	PASS
7518.00	V	-62.03	22.60	-39.43		
10024.00	V	-80.05	22.95	-57.10		
5012.00	Horizontal	-57.19	22.32	-34.87		
7518.00	H	-63.21	22.98	-40.23		
10024.00	H	-77.42	22.61	-54.81		

**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
5186.00	Vertical	-58.65	22.85	-35.80	-25.00	PASS
7779.00	V	-68.73	23.02	-45.71		
10372.00	V	-77.26	22.92	-54.34		
5186.00	Horizontal	-57.36	22.74	-34.62		
7779.00	H	-64.24	22.50	-41.74		
10372.00	H	-77.70	22.64	-55.06		

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

Frequency (MHz)	Spurious Emission				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
5360.00	Vertical	-59.65	22.19	-37.46	-25.00	PASS
8040.00	V	-69.42	22.71	-46.71		
10720.00	V	-77.30	22.49	-54.81		
5360.00	Horizontal	-56.25	22.85	-33.40		
8040.00	H	-65.40	22.45	-42.95		
10720.00	H	-79.33	23.12	-56.21		

## 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 5, 5M is for LTE Band 7, 5M is for LTE Band 41</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. 07, 2022
Programable temprature and humidity chamber	JQ	MHU-80L	N/A	Jul. 18, 2022
DC power supply	Kingrang	KR3005K	N/A	Jul. 18, 2022
RF cable (9kHz-40GHz)	TCT	RE-04	N/A	Jul. 18, 2022
Antenna Connector	TCT	RFC-03	N/A	Jul. 18, 2022

## Appendix A: Photographs of Test Setup

Refer to the test report No. TCT210721E008

## Appendix B: Photographs of EUT

Refer to the test report No. TCT210721E008

## Test Data for Appendix For LTE Band 5, Appendix For LTE Band 7 and Appendix For LTE Band 41

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