

IEST REPORT					
	FCC Rules Part 27				
Report Reference No	MTWG2207179-R4				
FCC ID :	2AUA5-PD01-PLUS				
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Date of issue	August 11, 2022	1			
Representative Laboratory Name .:	Shenzhen Most Technology Se	ervice Co., Ltd.			
Address	No.5, 2nd Langshan Road, North Nanshan, Shenzhen, Guangdon	n District, Hi-tech Industrial Park, g, China.			
Applicant's name	IMachine (Xiamen) Intelligent	Devices Co.,Ltd.			
Address	Unit 1502-2,No.3 Jinzhong Road	,Huli District,Xiamen,China			
Test specification/ Standard:	FCC Rules Part 27				
TRF Originator	Shenzhen Most Technology Service	vice Co., Ltd.			
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Test item description	PDA				
Trade Mark	N/A				
Manufacturer	Rongta Technology (Xiamen) (	Group Co., Ltd.			
Model/Type reference	PD01 PLUS				
Listed Models	i1, i1 PLUS, i2, i2 PLUS, i3 TK01, TK02, TK03, TK05, PLUS, UHF i1, UHF i2, UHF	,i3 PLUS,i5,i5 PLUS,i6, TK01 PLUS,TK02 PLUS,TK03 <sup>-</sup> i3			
Modulation Type	QPSK,16QAM				
Operation Frequency	From 1710MHz to 1755MHz				
Hardware Version	M293Y				
Software Version	M293Y-YB44C.GMS.MMI.GMS	3			
Rating:	DC 3.7V by Battery Input:100-240V~,50Hz/60Hz,0.3	A			
	Output:5V-2A				
Result:	PASS				

## TEST REPORT

Equipment under Test	:	PDA
Model /Type	:	PD01 PLUS
Listed Models	:	i1, i1 PLUS, i2, i2 PLUS, i3, i3 PLUS, i5, i5 PLUS, i6, TK01, TK02, TK03, TK05, TK01 PLUS, TK02 PLUS, TK03 PLUS, UHF i1, UHF i2, UHF i3
Remark		Only the product name, model name and appearance color are different among models, and the others are the same. The differences do not affect the safety and electromagnetic compatibility of products.
Applicant	:	IMachine (Xiamen) Intelligent Devices Co.,Ltd.
Address	:	Unit 1502-2,No.3 Jinzhong Road,Huli District,Xiamen,China
Manufacturer	:	Rongta Technology (Xiamen) Group Co., Ltd.
Address	:	No.88, Tonghui South Road, Tongan, Xiamen,China.

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The test report merely corresponds to the test sample. It is not permitted to copy extracts of these test result without the written permission of the test laboratory.

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# 1 Revision History

Revision	Issue Date	Revisions	Revised By
00	2022.08.11	Initial Issue	Alisa Luo

## 2 TEST STANDARDS

The tests were performed according to following standards:

FCC Part 27 : MISCELLANEOUS WIRELESS COMMUNICATIONS SERVICES

ANSI/TIA-603-E-2016: Land Mobile FM or PM Communications Equipment Measurement and Performance Standards.

47 CFR FCC Part 15 Subpart B: - Unintentional Radiators

FCC Part 2: FREQUENCY ALLOCA-TIONS AND RADIO TREATY MAT-TERS; GENERAL RULES AND REG-ULATIONS

KDB971168 D01: v02r02 MEASUREMENT GUIDANCE FOR CERTIFICATION OF LICENSED DIGITAL TRANSMITTERS

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

## <u>3</u> SUMMARY

### 3.1 General Remarks

Date of receipt of test sample	:	2022.07.21
Testing commenced on	• •	2022.07.22
Testing concluded on	:	2022.08.10

### 3.2 **Product Description**

Product Name:	PDA
Model/Type reference:	PD01 PLUS
Power Supply:	DC 3.7V by Battery Input:100-240V~,50Hz/60Hz,0.3A Output:5V–2A
Testing sample ID:	MT22070068 /070
LTE	
Operation Band:	E-UTRA Band 4
Support Bandwidth:	Band 4: 1.4MHz, 3MHz, 5MHz,10MHz, 15MHz, 20MHz
TX/RXFrequency Range:	Band 4: 1710MHz-1755MHz/2110MHz-2155MHz
Modulation Type:	QPSK, 16QAM
Category:	Cat 4
Antenna type:	External Antenna
Antenna gain:	2dBi

### 3.3 Equipment Under Test

### Power supply system utilised

Power supply voltage	:	0	230V / 50 Hz	Ο	120V / 60Hz
		0	12 V DC	0	24 V DC
		•	Other (specified in blank below)		

#### DC 3.7V by Battery Input:100-240V~,50Hz/60Hz,0.3A Output:5V-2A

### 3.4 Short description of the Equipment under Test (EUT)

This is a PDA For more details, refer to the user's manual of the EUT.

### 3.5 EUT operation mode

**3.6** The EUT has been tested under typical operating condition. The CMW500 used to control the EUT staying in continuous transmitting and receiving mode for testing. Regards to the frequency band operation: the lowest, middle and highest frequency of channel were selected to perform the test, then shown on this report.

### 3.7 Block Diagram of Test Setup



### 3.8 Test Item (Equipment Under Test) Description\*

Short designation	EUT Name	EUT Description	Serial number	Hardware status	Software status
EUT A					
EUT B					

\*: declared by the applicant. According to customers information EUTs A and B are the same devices.

### 3.9 Auxiliary Equipment (AE) Description

AE short designation	EUT Name (if available)	EUT Description	Serial number (if available)	Software (if used)
AE 1				
AE 2	-			

### 3.10 Antenna Information\*

Short designation	Antenna Name	Antenna Type	Frequency Range	Serial number	Antenna Peak Gain
Antenna 1		External Antenna	1710MHz to 1755MHz		2dBi
Antenna 2					

\*: declared by the applicant.

### 3.11 Modifications

No modifications were implemented to meet testing criteria.

## 4 TEST ENVIRONMENT

#### 4.1 Address of the test laboratory

#### Shenzhen Most Technology Service Co., Ltd.

No.5, 2nd Langshan Road, North District, Hi-tech Industrial Park, Nanshan, Shenzhen, Guangdong, China. The 3m-Semi anechoic test site fulfils CISPR 16-1-4 according to ANSI C63.4:2014 and CISPR 16-1-4:2010 SVSWR requirement for radiated emission above 1GHz.

#### **Test Facility**

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

### FCC-Designation No.: CN1315

Shenzhen Most Technology Service Co., Ltd. EMC Laboratory has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

#### A2LA-Lab Cert. No.: 6343.01

Shenzhen Most Technology Service Co., Ltd. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

### 4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Radiated Emission:

Temperatur	e:	23 ° C
Humidity:		48 %
Atmospheri	c pressure:	950-1050mbar

#### AC Main Conducted testing:

Temperature:	24 ° C
Humidity:	45 %
Atmospheric pressure:	950-1050mbar

Conducted testing:

Temperature:	24 ° C
Humidity:	45 %
Atmospheric pressure:	950-1050mbar

### 4.3 Summary of measurement results

Test Specification clause	Test case	Test result
Part 2.1046 Part 27.50(d)(4)	RF Output Power	PASS
Part 27.50(d)(4)	Peak-to-Average Ratio	PASS
Part 2.1049/Part 27.53(h)	99% & -26 dB Occupied Bandwidth	PASS
Part 2.1051/Part 27.53(h)	Spurious Emissions at Antenna Terminal	PASS
Part 2.1053/Part 27.53(h)	Field Strength of Spurious Radiation	PASS
Part 2.1051/Part 27.53(h)	Out of band emission, Band Edge	PASS
Part 2.1055/Part 27.54	Frequency stability	PASS

Remark:

- 1. The measurement uncertainty is not included in the test result.
- 2. We tested all test mode and recorded worst case in report

### 4.4 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader is cautioned that there may be errors within the calibration limits of the equipment and facilities. The measurement uncertainty was calculated for all measurements listed in this test report acc. to CISPR 16 - 4 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4: Uncertainty in EMC Measurements" and is documented in the Shenzhen Most Technology Service Co., Ltd. quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component and process variability of devices similar to that tested may result in additional deviation. The manufacturer has the sole responsibility of continued compliance of the device.

Hereafter the best measurement capability for Shenzhen Most Technology Service Co., Ltd. is reported:

Test	Range	Measurement Uncertainty	Notes
Radiated Emission	30~1000MHz	4.10 dB	(1)
Radiated Emission	1~18GHz	4.32 dB	(1)
Radiated Emission	18-40GHz	5.54 dB	(1)
Conducted Disturbance	0.15~30MHz	3.12 dB	(1)

(1) This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

## 4.5 Equipments Used during the Test

Item	Equipment	Manufacturer	Model No.	Serial No.	Firmware versions	Last Cal.	Cal. Interval
1.	L.I.S.N.	R&S	ENV216	100093	/	2022/04/18	1 Year
2	Three-phase artificial power network	Schwarzback Mess	NNLK8129	8129178	/	2022/04/18	1 Year
3.	Receiver	R&S	ESCI	100492	V3.0-10-2	2022/04/06	1 Year
4	Receiver	R&S	ESPI	101202	V3.0-10-2	2022/04/06	1 Year
5	Spectrum analyzer	Agilent	9020A	MT-E306	A14.16	2022/04/06	1 Year
6	Bilong Antenna	Sunol Sciences	JB3	A121206	/	2022/03/13	1 Year
7	Horn antenna	HF Antenna	HF Antenna	MT-E158	/	2022/04/06	1 Year
8	Loop antenna	Beijing Daze	ZN30900B	/	/	2022/04/17	1 Year
9	Horn antenna	R&S	OBH100400	26999002	/	2022/04/17	1 Year
10	Wireless Communication Test Set	R&S	CMW500	1	CMW-BASE- 3.7.21	2022/04/17	1 Year
11	Spectrum analyzer	R&S	FSP	100019	V4.40 SP2	2022/04/16	1 Year
12	High gain antenna	Schwarzbeck	LB-180400KF	MT-E389	/	2022/03/13	1 Year
13	Preamplifier	Schwarzbeck	BBV 9743	MT-E390	/	2022/03/13	1 Year
14	Pre-amplifier	EMCI	EMC051845S E	MT-E391	/	2022/03/13	1 Year
15	Pre-amplifier	Agilent	83051A	MT-E392	/	2022/03/13	1 Year
16	High pass filter unit	Tonscend	JS0806-F	MT-E393	/	2022/03/13	1 Year
17	RF Cable(below1GHz)	Times	9kHz-1GHz	MT-E394	/	2022/03/13	1 Year
18	RF Cable(above 1GHz)	Times	1-40G	MT-E395	/	2022/03/13	1 Year
19	RF Cable (9KHz-40GHz)	Tonscend	170660	N/A	/	2022/03/13	1 Year

Note: The Cal.Interval was one year.

## 5 TEST CONDITIONS AND RESULTS

### 5.1 Output Power

#### 5.1.1 Coducted Output Power

#### **TEST APPLICABLE**

During the process of testing, the EUT was controlled via R&S Digital Radio Communication tester (CMW500) to ensure max power transmission and proper modulation. This result contains output power and EIRP measurements for the EUT. In all cases, output power is within the specified limits.

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

#### **Conducted Power Measurement:**

- a) Place the EUT on a bench and set it in transmitting mode.
- b) Connect a low loss RF cable from the antenna port to a CMW500 by an Att.
- c) EUT Communicate with CMW500 then selects a channel for testing.
- d) Add a correction factor to the display CMW500, and then test.

### TEST RESULTS compliance \*

LTE FDD Band 4								
TX Channel	Frequency	PB Size/Offect	Burst Averag	je Power [dBm]				
Bandwidth	(MHz)	RB Size/Oliset	QPSK	16QAM				
		1 RB low	22.68	21.83				
		1 RB mid	22.97	21.84				
		1 RB high	23.04	21.95				
	1710.7	50% RB low	22.68	21.68				
		50% RB mid	22.99	21.96				
		50% RB high	22.76	21.62				
		100% RB	23.27	22.36				
		1 RB low	22.57	21.58				
		1 RB mid	22.71	21.77				
		1 RB high	22.37	21.52				
1 4 MHz	1732 5	50% RB low	22 72	21.76				
1.1.1.12	1102.0	50% RB mid	22.72	21.70				
		50% RB high	22.70	21.72				
		100% RB	22.11	21.02				
			22.00	21.00				
		1 PB mid	22.40	21.40				
		1 PB bigh	22.30	21.32				
	1754 3	50% PR low	22.20	21.32				
	1754.5	50% RB low	22.37	21.24				
		50% RB IIIu	22.02	21.10				
			22.40	21.47				
			22.39	21.30				
			23.27	22.19				
			22.71	21.74				
			23.22	22.33				
	1711.5	50% RB IOW	23.05	22.00				
		50% RB mid	23.25	22.10				
		50% RB high	22.68	21.54				
		100% RB	22.55	21.64				
		1 RB low	23.16	22.10				
		1 RB mid	22.61	21.56				
		1 RB high	23.00	22.13				
3 MHz	1732.5	50% RB low	22.44	21.57				
		50% RB mid	22.87	21.94				
		50% RB high	22.73	21.82				
		100% RB	22.99	21.96				
		1 RB low	22.38	21.37				
		1 RB mid	22.21	21.16				
		1 RB high	22.90	21.90				
	1753.5	50% RB low	22.28	21.41				
		50% RB mid	22.70	21.84				
		50% RB high	22.15	21.11				
		100% RB	22.59	21.52				
		1 RB low	22.57	21.53				
		1 RB mid	22.62	21.59				
		1 RB high	22.77	21.90				
	1712.5	50% RB low	23.29	22.14				
		50% RB mid	23.12	22.26				
		50% RB high	23.18	22.04				
		100% RB	23.13	22.10				
	1732.5	1 RB low	22.73	21.62				

		1 RB mid	22.60	21.70
		1 RB high	22.27	21.17
		50% RB low	22.27	21.30
		50% RB mid	22.45	21.32
		50% RB high	22.97	21.93
		100% RB	22.87	21.99
		1 RB low	22.91	21.94
		1 RB mid	22.84	21.71
		1 RB high	22.41	21.30
	1752.5	50% RB low	22.32	21.44
		50% RB mid	22.01	21.11
		50% RB high	21.96	21.08
		100% RB	22.16	21.04
		1 RB low	22.68	21.66
		1 RB mid	23.21	22.27
		1 RB high	23.19	22.21
	1715.0	50% RB low	22.84	21.85
		50% RB mid	22.92	22.01
		50% RB high	23.12	22.03
		100% RB	22.50	21.40
		1 RB low	23.17	22.24
		1 RB mid	23.22	22.16
		1 RB high	22.40	21.50
10 MHz	1732.5	50% RB low	22.88	22.02
		50% RB mid	22.91	21.80
		50% RB high	22.51	21.41
		100% RB	22.63	21.57
		1 RB low	22.83	21.78
		1 RB mid	22.24	21.29
		1 RB high	22.90	21.84
	1750	50% RB low	22.90	21.98
		50% RB mid	22.15	21.08
		50% RB high	22.58	21.45
		100% RB	22.61	21.74
			23.04	21.98
		1 RB mid	22.66	21.69
	4747 5		22.70	21.82
	1/1/.5	50% RB IOW	23.17	22.21
		50% RB mid	22.08	21.55
		50% RB High	23.29	22.43
		100% RB	22.70	21.72
		1 RB IOW	22.90	22.01
			23.10	22.10
15MH-	1732.5		22.70	21.00
1 JIVIT IZ	1752.5	50% RB iow	22.30	21.20
		50% RB high	22.43	21.40
		100% RB	22.00	21.70
			22.33	21.24
		1 RB mid	22.34	22.07
		1 RB high	22.00	21.20
	1747 5	50% BB low	22.00	21.00
		50% RB mid	22.39	21.62
		50% RB high	22.00	21.13
		100% RB	22.14	21.04
		1 RB low	23.27	22.25
20 MHz	1720.0	1 RB mid	23.00	21.91

		1 RB high	23.46	22.38
		50% RB low	23.50	22.52
		50% RB mid	22.51	21.41
		50% RB high	22.91	22.04
		100% RB	23.39	22.39
		1 RB low	22.77	21.91
		1 RB mid	22.78	21.71
		1 RB high	22.96	21.94
	1732.5	50% RB low	22.73	21.68
		50% RB mid	23.19	22.18
		50% RB high	23.22	22.37
		100% RB	22.24	21.22
		1 RB low	22.59	21.64
		1 RB mid	23.14	21.99
	1745.0	1 RB high	22.44	21.46
		50% RB low	22.43	21.41
		50% RB mid	22.66	21.74
		50% RB high	22.42	21.35
		100% RB	22.91	21.78

### 5.1.2. Radiated Output Power

### <u>LIMIT</u>

This is the test for the maximum radiated power from the EUT. Rule Part 22H.232(b) specifies, "Mobile/portable stations are limited to 7 watts e.i.r.p.

### **TEST CONFIGURATION**



### TEST PROCEDURE

- EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
- 2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
- The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz, And the maximum value of the receiver should be recorded as (P<sub>r</sub>).
- 4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest isconnected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P<sub>Mea</sub>) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P<sub>r</sub>). The power of signal source (P<sub>Mea</sub>) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.

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 A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P<sub>cl</sub>), the Substitution Antenna Gain (G<sub>a</sub>) and the Amplifier Gain (P<sub>Ag</sub>) should be recorded after test.

The measurement results are obtained as described below: Power(EIRP)= $P_{Mea^-}P_{Ag} - P_{cl} + G_a$ We used SMF100A micowave signal generator which signal level can up to 33dBm,so we not used power Amplifier for substituation test; The measurement results are amend as described below: Power(EIRP)= $P_{Mea^-}P_{cl} + G_a$ 

- 6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
- 7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP-2.15dBi.

#### **TEST RESULTS**

### **Radiated Measurement:**

Remark:

- 1.  $EIRP=P_{Mea}(dBm)-P_{cl}(dB)+P_{Ag}(dB)+G_{a}(dBi)$
- 2. We measured both Horizontal and Vertical direction, recorded worst case direction.

#### LTE FDD Band 4\_Channel Bandwidth 1.4MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.7	-20.71	3.41	10.24	33.60	19.72	33.01	13.29	V
1732.5	-21.67	3.49	10.24	33.60	18.68	33.01	14.33	V
1754.3	-21.32	3.55	10.23	33.60	18.96	33.01	14.05	V

### LTE FDD Band 4\_Channel Bandwidth 3MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.5	-21.23	3.41	10.24	33.60	19.2	33.01	13.81	V
1732.5	-22.13	3.49	10.24	33.60	18.22	33.01	14.79	V
1753.5	-21.09	3.55	10.23	33.60	19.19	33.01	13.82	V

### LTE FDD Band 4\_Channel Bandwidth 5MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.5	-20.95	3.41	10.24	33.60	19.48	33.01	13.53	V
1732.5	-21.62	3.49	10.24	33.60	18.73	33.01	14.28	V
1753.5	-21.22	3.55	10.23	33.60	19.06	33.01	13.95	V

### LTE FDD Band 4\_Channel Bandwidth 10MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.0	-21.19	3.41	10.24	33.60	19.24	33.01	13.77	V
1732.5	-22.06	3.49	10.24	33.60	18.29	33.01	14.72	V
1750.0	-21.42	3.55	10.23	33.60	18.86	33.01	14.15	V

#### LTE FDD Band 4\_Channel Bandwidth 15MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.5	-21.08	3.41	10.24	33.6	19.35	33.01	13.66	V
1732.5	-22.12	3.49	10.24	33.6	18.23	33.01	14.78	V
1747.5	-21.57	3.55	10.23	33.6	18.71	33.01	14.3	V

#### LTE FDD Band 4\_Channel Bandwidth 20MHz\_QPSK

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.0	-21.02	3.41	10.24	33.6	19.41	33.01	13.6	V
1732.5	-22.15	3.49	10.24	33.6	18.2	33.01	14.81	V
1745.0	-21.55	3.55	10.23	33.6	18.73	33.01	14.28	V

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LTE FDD Band 5\_Channel Bandwidth 1.4MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1710.7	-20.34	3.41	10.24	33.6	20.09	38.45	18.36	V
1732.5	-21.22	3.49	10.24	33.6	19.13	38.45	19.32	V
1754.3	-21.76	3.55	10.23	33.6	18.52	38.45	19.93	V

LTE FDD Band 5\_Channel Bandwidth 3MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>ci</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Aq</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1711.5	-21.34	3.41	10.24	33.6	19.09	38.45	19.36	V
1732.5	-22.48	3.49	10.24	33.6	17.87	38.45	20.58	V
1753.5	-20.96	3.55	10.23	33.6	19.32	38.45	19.13	V

LTE FDD Band 5\_Channel Bandwidth 5MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1712.5	-21.04	3.41	10.24	33.6	19.39	38.45	19.06	V
1732.5	-21.88	3.49	10.24	33.6	18.47	38.45	19.98	V
1753.5	-21.28	3.55	10.23	33.6	19	38.45	19.45	V

LTE FDD Band 5\_Channel Bandwidth 10MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1715.0	-21.11	3.41	10.24	33.6	19.32	38.45	19.13	V
1732.5	-21.67	3.49	10.24	33.6	18.68	38.45	19.77	V
1750.0	-21.67	3.55	10.23	33.6	18.61	38.45	19.84	V

### LTE FDD Band 4\_Channel Bandwidth 15MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>ci</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1717.5	-21.26	3.41	10.24	33.6	19.17	33.01	13.84	V
1732.5	-22.15	3.49	10.24	33.6	18.2	33.01	14.81	V
1747.5	-21.05	3.55	10.23	33.6	19.23	33.01	13.78	V

LTE FDD Band 4\_Channel Bandwidth 20MHz\_16QAM

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	G <sub>a</sub> Antenna Gain(dB)	P <sub>Ag</sub> (dB)	Burst Average EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1720.0	-21.42	3.41	10.24	33.6	19.01	33.01	14	V
1732.5	-22.32	3.49	10.24	33.6	18.03	33.01	14.98	V
1745.0	-21.06	3.55	10.23	33.6	19.22	33.01	13.79	V

### 5.2 Peak-to-Average Ratio (PAR)

#### <u>LIMIT</u>

The Peak-to-Average Ratio (PAR) of the transmission may not exceed 13 dB.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. Refer to instrument's analyzer instruction manual for details on how to use the power statistics/CCDF function;
- 2. Set resolution/measurement bandwidth  $\geq$  signal's occupied bandwidth;
- 3. Set the number of counts to a value that stabilizes the measured CCDF curve;
- 4. Set the measurement interval as follows:
  - 1). for continuous transmissions, set to 1 ms,

2). for burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize and set the measurement interval to a time that is less than or equal to the burst duration.

5. Record the maximum PAPR level associated with a probability of 0.1%.

#### TEST RESULTS

Please refer to the appendix test data (Appendix B)

### 5.3 Occupied Bandwidth and Emission Bandwidth

LIMIT N/A

#### **TEST CONFIGURATION**



#### **TEST PROCEDURE**

The transmitter output was connected to a calibrated coaxial cable and coupler, the other end of which was connected to a spectrum analyzer. The occupied bandwidth was measured with the spectrum analyzer at low, middle and high channel in each band. The -26dBc Emission bandwidth was also measured and recorded. Set RBWwas set to about 1% of emission BW, VBW≥3 times RBW.

-26dBc display line was placed on the screen (or 99% bandwidth), the occupied bandwidth is the delta frequency between the two points where the display line intersects the signal trace.

#### TEST RESULTS

Please refer to the appendix test data (Appendix C)

### 5.4 Band Edge compliance

#### <u>LIMIT</u>

Per FCC §24.238 the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- 1. The transmitter output port was connected to base station.
- 2. The RF output of EUT was connected to the power meter by RF cable and attenuator, the path loss was compensated to the results for each measurement.
- 3. Set EUT at maximum power through base station.
- 4. Select lowestand highest channels for each band and different modulation.
- 5. Measure Band edge using RMS (Average) detector by spectrum

#### TEST RESULTS

Please refer to the appendix test data (Appendix D)

### 5.5 Spurious Emssion on Antenna Port

#### <u>LIMIT</u>

Per FCC §24.238, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

- a. Place the EUT on a bench and set it in transmitting mode.
- b. Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
- c. EUT Communicate with CMW500, then select a channel for testing.
- d. Add a correction factor to the display of spectrum, and then test.
- e. The resolution bandwidth of the spectrum analyzer was setsufficient scans were taken to show the out of band Emission if any up to10<sup>th</sup> harmonic.
- f. Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 4	0.01~20	1 MHz	3 MHz	Auto

#### TEST RESULTS

Please refer to the appendix test data (Appendix E)

### 5.6 Radiated Spurious Emssion

#### TEST APPLICABLE

Per FCC §24.238, the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log(P) dB.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

- EUT was placed on a 1.50 meter high non-conductive stand at a 3 meter test distance from the receive antenna. A receiving antenna was placed on the antenna mast 3 meters from the EUT for emission measurements. The height of receiving antenna is 1.50m. Detected emissions were maximized at each frequency by rotating the EUT through 360° and adjusting the receiving antenna polarization. The radiated emission measurements of all transmit frequencies in three channels (High, Middle, Low) were measured with peak detector.
- 2. A log-periodic antenna or double-ridged waveguide horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
- The EUT is then put into continuously transmitting mode at its maximum power level during the test.Set Test Receiver or Spectrum RBW=1MHz,VBW=3MHz, And the maximum value of the receiver should be recorded as (P<sub>r</sub>).

- 4. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest isconnected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (P<sub>Mea</sub>) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (P<sub>r</sub>). The power of signal source (P<sub>Mea</sub>) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
- A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (P<sub>cl</sub>) ,the Substitution Antenna Gain (G<sub>a</sub>) and the Amplifier Gain (P<sub>Ag</sub>) should be recorded after test. The measurement results are obtained as described below: Power(EIRP)=P<sub>Mea</sub>- P<sub>Ag</sub> - P<sub>cl</sub>+ G<sub>a</sub>
- 6. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power.
- 7. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP = EIRP -2.15dBi.
- 8. In order to make sure test results more clearly, we set frequency range and sweep time for difference frequency range as follows table:

Working Frequency	Working Subrange Frequency (GHz)		VBW	Sweep time (s)
	0.03~1	100KHz	300KHz	10
LIE DAND 3	1~20	1 MHz	3 MHz	2

### TEST LIMITS

According to 24.238 specify that the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10 log(P) dB. The specification that emissions shall be attenuated below the transmitter power (P) by at least 43 + 10 log (P) dB, translates in the relevant power range (1 to 0.001 W) to -13 dBm. At 1 W the specified minimum attenuation becomes 43 dB and relative to a 30 dBm (1 W) carrier becomes a limit of -13 dBm. At 0.001 W (0 dBm) the minimum attenuation is 13 dB, which again yields a limit of -13 dBm. In this way a translation of the specification from relative to absolute terms is carried out.

Frequency	Channel	Frequency Range	Verdict
	Low	30MHz -20GHz	PASS
LTE BAND 5	Middle	30MHz -20GHz	PASS
	High	30MHz -20GHz	PASS

### Radiated Measurement:

Remark:

- 1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 4; recorded worst case for each Channel Bandwidth of LTE FDD Band 4 @ QPSK
- 2. EIRP=PMea(dBm)-Pcl(dB) +Ga(dBi)
- 3. We were not recorded other points as values lower than limits.
- 4. Margin = Limit EIRP

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3421.4	-34.16	4.02	3.00	12.50	-25.68	-13.00	12.68	Н
5132.1	-31.19	5.11	3.00	13.38	-22.92	-13.00	9.92	Н
3421.4	-32.43	4.02	3.00	12.50	-23.95	-13.00	10.95	V
5132.1	-29.46	5.11	3.00	13.38	-21.19	-13.00	8.19	V

LTE FDD Band 4\_Channel Bandwidth 1.4MHz\_QPSK\_ Low Channel

LTE FDD Band 4\_Channel Bandwidth 1.4MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.0	-32.34	4.02	3.00	12.45	-23.91	-13.00	10.91	Н
5197.5	-30.20	5.11	3.00	13.38	-21.93	-13.00	8.93	Н
3465.0	-30.72	4.02	3.00	12.45	-22.29	-13.00	9.29	V
5197.5	-27.49	5.11	3.00	13.38	-19.22	-13.00	6.22	V

LTE FDD Band 4\_Channel Bandwidth 1.4MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3508.6	-31.97	4.02	3.00	12.21	-23.78	-13.00	10.78	Н
5262.9	-29.01	5.11	3.00	13.26	-20.86	-13.00	7.86	Н
3508.6	-30.08	4.02	3.00	12.21	-21.89	-13.00	8.89	V
5262.9	-27.11	5.11	3.00	13.26	-18.96	-13.00	5.96	V

LTE FDD Band 4\_Channel Bandwidth 3MHz\_QPSK\_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3423.0	-33.91	4.02	3.00	12.50	-25.43	-13.00	12.43	Н
5134.5	-28.81	5.11	3.00	13.38	-20.54	-13.00	7.54	Н
3423.0	-32.15	4.02	3.00	12.50	-23.67	-13.00	10.67	V
5134.5	-26.87	5.11	3.00	13.38	-18.60	-13.00	5.60	V

LTE FDD Band 4\_Channel Bandwidth 3MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.0	-36.87	4.02	3.00	12.45	-28.44	-13.00	15.44	Н
5197.5	-29.63	5.11	3.00	13.38	-21.36	-13.00	8.36	Н
3465.0	-35.00	4.02	3.00	12.45	-26.57	-13.00	13.57	V
5197.5	-27.89	5.11	3.00	13.38	-19.62	-13.00	6.62	V

### LTE FDD Band 4\_Channel Bandwidth 3MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3507.0	-33.19	4.02	3.00	12.21	-25.00	-13.00	12.00	Н
5260.5	-30.76	5.11	3.00	13.26	-22.61	-13.00	9.61	Н
3507.0	-31.52	4.02	3.00	12.21	-23.33	-13.00	10.33	V
5260.5	-28.48	5.11	3.00	13.26	-20.33	-13.00	7.33	V

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization			
3425.0	-32.81	4.02	3.00	12.50	-24.33	-13.00	11.33	Н			
5137.5	-29.88	5.11	3.00	13.38	-21.61	-13.00	8.61	Н			
3425.0	-31.09	4.02	3.00	12.50	-22.61	-13.00	9.61	V			
5137.5	-27.92	5.11	3.00	13.38	-19.65	-13.00	6.65	V			

LTE FDD Band 5\_Channel Bandwidth 5MHz\_QPSK\_ Low Channel

LTE FDD Band 4\_Channel Bandwidth 5MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.0	-32.38	4.02	3.00	12.45	-23.95	-13.00	10.95	Н
5197.5	-29.90	5.11	3.00	13.38	-21.63	-13.00	8.63	Н
3465.0	-29.80	4.02	3.00	12.45	-21.37	-13.00	8.37	V
5197.5	-27.26	5.11	3.00	13.38	-18.99	-13.00	5.99	V

LTE FDD Band 4\_Channel Bandwidth 5MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3505.0	-33.22	4.02	3.00	12.21	-25.03	-13.00	12.03	Н
5257.5	-30.05	5.11	3.00	13.26	-21.90	-13.00	8.90	Н
3505.0	-31.28	4.02	3.00	12.21	-23.09	-13.00	10.09	V
5257.5	-27.33	5.11	3.00	13.26	-19.18	-13.00	6.18	V

LTE FDD Band 4\_Channel Bandwidth 10MHz\_QPSK\_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3430.0	-36.09	4.02	3.00	12.50	-27.61	-13.00	14.61	Н
5145.0	-30.90	5.11	3.00	13.38	-22.63	-13.00	9.63	Н
3430.0	-33.35	4.02	3.00	12.50	-24.87	-13.00	11.87	V
5145.0	-28.30	5.11	3.00	13.38	-20.03	-13.00	7.03	V

LTE FDD Band 4\_Channel Bandwidth 10MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.0	-33.41	4.02	3.00	12.45	-24.98	-13.00	11.98	Н
5197.5	-29.79	5.11	3.00	13.38	-21.52	-13.00	8.52	Н
3465.0	-31.48	4.02	3.00	12.45	-23.05	-13.00	10.05	V
5197.5	-27.11	5.11	3.00	13.38	-18.84	-13.00	5.84	V

### LTE FDD Band 4\_Channel Bandwidth 10MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3500.0	-37.10	4.02	3.00	12.21	-28.91	-13.00	15.91	Н
5250.0	-29.17	5.11	3.00	13.26	-21.02	-13.00	8.02	Н
3500.0	-34.89	4.02	3.00	12.21	-26.70	-13.00	13.70	V
5250.0	-26.80	5.11	3.00	13.26	-18.65	-13.00	5.65	V

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3435.0	-33.79	4.02	3.00	12.50	-25.31	-13.00	12.31	Н
5152.5	-29.58	5.11	3.00	13.38	-21.31	-13.00	8.31	Н
3435.0	-31.46	4.02	3.00	12.50	-22.98	-13.00	9.98	V
5152.5	-27.97	5.11	3.00	13.38	-19.70	-13.00	6.70	V

LTE FDD Band 4\_Channel Bandwidth 15MHz\_QPSK\_ Low Channel

### LTE FDD Band 4\_Channel Bandwidth 15MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.0	-33.28	4.02	3.00	12.45	-24.85	-13.00	11.85	Н
5197.5	-30.93	5.11	3.00	13.38	-22.66	-13.00	9.66	Н
3465.0	-30.54	4.02	3.00	12.45	-22.11	-13.00	9.11	V
5197.5	-28.67	5.11	3.00	13.38	-20.40	-13.00	7.40	V

### LTE FDD Band 4\_Channel Bandwidth 15MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3495.0	-28.05	4.02	3.00	12.21	-19.86	-13.00	6.86	Н
5242.5	-27.44	5.11	3.00	13.26	-19.29	-13.00	6.29	Н
3495.0	-26.06	4.02	3.00	12.21	-17.87	-13.00	4.87	V
5242.5	-25.40	5.11	3.00	13.26	-17.25	-13.00	4.25	V

### LTE FDD Band 4\_Channel Bandwidth 20MHz\_QPSK\_ Low Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3440.0	-36.92	4.02	3.00	12.50	-28.44	-13.00	15.44	Н
5160.0	-29.41	5.11	3.00	13.38	-21.14	-13.00	8.14	Н
3440.0	-34.16	4.02	3.00	12.50	-25.68	-13.00	12.68	V
5160.0	-26.82	5.11	3.00	13.38	-18.55	-13.00	5.55	V

### LTE FDD Band 4\_Channel Bandwidth 20MHz\_QPSK\_ Middle Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3465.0	-31.79	4.02	3.00	12.45	-23.36	-13.00	10.36	Н
5197.5	-29.89	5.11	3.00	13.38	-21.62	-13.00	8.62	Н
3465.0	-29.58	4.02	3.00	12.45	-21.15	-13.00	8.15	V
5197.5	-27.15	5.11	3.00	13.38	-18.88	-13.00	5.88	V

### LTE FDD Band 4\_Channel Bandwidth 20MHz\_QPSK\_ High Channel

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Diatance	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
3490.0	-37.16	4.02	3.00	12.21	-28.97	-13.00	15.97	Н
5235.0	-29.73	5.11	3.00	13.26	-21.58	-13.00	8.58	Н
3490.0	-35.08	4.02	3.00	12.21	-26.89	-13.00	13.89	V
5235.0	-27.15	5.11	3.00	13.26	-19.00	-13.00	6.00	V

### 5.7 Frequency Stability

### <u>LIMIT</u>

According to §24.235, §2.1055 requirement, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation and should not exceed 2.5ppm.

#### **TEST CONFIGURATION**



#### TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D

#### Frequency Stability Under Temperature Variations:

In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.

1. Measure the carrier frequency at room temperature.

2. Subject the EUT to overnight soak at -30  $^\circ \! \mathbb{C}$  .

3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE Band 5, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

4. Repeat the above measurements at  $10^{\circ}$  increments from  $-30^{\circ}$  to  $+50^{\circ}$ . Allow at least 1.5 hours at each temperature, unpowered, before making measurements.

5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing. 6. Subject the EUT to overnight soak at +50 ℃.

7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.

8. Repeat the above measurements at 10  $^{\circ}$ C increments from +50  $^{\circ}$ C to -30  $^{\circ}$ C. Allow at least 1.5 hours at each temperature, unpowered, before making measurements

9. At all temperature levels hold the temperature to +/- 0.5  $^\circ \!\! \mathbb C$  during the measurement procedure.

### Frequency Stability Under Voltage Variations:

Set chamber temperature to 20  $^{\circ}$ C. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.

Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

### TEST RESULTS

Please refer to the appendix test data (Appendix F)

# 6 Test Setup Photos of the EUT





# 7 External and Internal Photos of the EUT

See photo report.