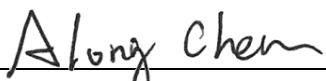


# FCC Test Report

**FCC ID** : 2AIHD2045  
**Equipment** : HW-AG45  
**Model No.** : 010-2045  
**Brand Name** : Samsara  
**Applicant** : Samsara Networks Inc.  
**Address** : 444 De Haro Street, San Francisco, CA 94107,  
U.S.A.  
**Standard** : 47 CFR FCC Part 27 Subpart L  
**Received Date** : Nov. 20, 2018  
**Tested Date** : Jan. 08 ~ Jan. 24, 2019

We, International Certification Corp., would like to declare that the tested sample has been evaluated and in compliance with the requirement of the above standards. The test results contained in this report refer exclusively to the product. It may be duplicated completely for legal use with the approval of the applicant. It shall not be reproduced except in full without the written approval of our laboratory.

Reviewed by:



Along Chen / Assistant Manager

Approved by:



Gary Chang / Manager



## Table of Contents

<b>1</b>	<b>GENERAL DESCRIPTION .....</b>	<b>5</b>
1.1	Information.....	5
1.2	Local Support Equipment List .....	7
1.3	Test Setup Chart .....	7
1.4	The Equipment List .....	8
1.5	Test Standards .....	9
1.6	Deviation from Test Standard and Measurement Procedure.....	9
1.7	Measurement Uncertainty .....	9
<b>2</b>	<b>TEST CONFIGURATION.....</b>	<b>10</b>
2.1	Testing Condition and Location Information.....	10
2.2	The Worst Test Modes and Channel Details .....	10
<b>3</b>	<b>TEST RESULTS.....</b>	<b>11</b>
3.1	Equivalent Isotropically Radiated Power .....	11
3.2	Radiated Emissions.....	23
3.3	Conducted Emissions & Band Edge .....	27
3.4	Occupied Bandwidth .....	53
3.5	Peak to Average Ratio .....	68
3.6	Frequency Stability .....	75
<b>4</b>	<b>TEST LABORATORY INFORMATION .....</b>	<b>77</b>

## Release Record

Report No.	Version	Description	Issued Date
FG8N2001-2	Rev. 01	Initial issue	Feb. 25, 2019

## Summary of Test Results

FCC Rules	Test Items	Measured	Result
2.1046 / 27.50(d)(4)	Equivalent Isotropically Radiated Power	Power[dBm]: 26.33	Pass
2.1053 / 27.53(h)	Radiated Emissions	Meet the requirement of limit	Pass
2.1051 / 27.53(h)	Conducted Emissions	Meet the requirement of limit	Pass
27.53(h)	Band Edge Measurement	Meet the requirement of limit	Pass
2.1049 / 27.53(h)	Occupied Bandwidth	Meet the requirement of limit	Pass
27.50(d)(5)	Peak to Average Ratio	Meet the requirement of limit	Pass
2.1055 / 27.54	Frequency Stability	Meet the requirement of limit	Pass

### Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

### Comments and Explanations:

The declared values of gain for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of the gain.

## 1 General Description

### 1.1 Information

#### 1.1.1 Specification of the Equipment under Test (EUT)

<b>Operating Frequency (MHz)</b>	<b>LTE Band 4:</b> Channel Bandwidth: 1.4MHz: 1710.7~1754.3 Channel Bandwidth: 3MHz: 1711.5~1753.5 Channel Bandwidth: 5MHz: 1712.5~1752.5 Channel Bandwidth: 10MHz: 1715~1750 Channel Bandwidth: 15MHz: 1717.5~1747.5 Channel Bandwidth: 20MHz: 1720~1745
<b>Modulation</b>	QPSK, 16QAM (Uplink)
<b>Release Version</b>	13 Cat M1
<b>Duplex Mode</b>	FDD
<b>H/W Version</b>	1.0
<b>S/W Version</b>	2019-01-25-0725-app594-NRF52840-r-310a6223b2-combined.hex

#### 1.1.2 Maximum EIRP and Emission Designator

Mode	Modulation	Maximum EIRP (W)	Emission Designator
LTE Band 25, CB: 1.4MHz	QPSK	0.406	1M09G7D
LTE Band 25, CB: 1.4MHz	16QAM	0.404	1M09W7D
LTE Band 25, CB: 3MHz	QPSK	0.413	1M10G7D
LTE Band 25, CB: 3MHz	16QAM	0.410	1M11W7D
LTE Band 25, CB: 5MHz	QPSK	0.422	1M10G7D
LTE Band 25, CB: 5MHz	16QAM	0.392	1M11W7D
LTE Band 25, CB: 10MHz	QPSK	0.428	1M11G7D
LTE Band 25, CB: 10MHz	16QAM	0.406	1M16W7D
LTE Band 25, CB: 15MHz	QPSK	0.430	1M13G7D
LTE Band 25, CB: 15MHz	16QAM	0.401	1M14W7D
LTE Band 25, CB: 20MHz	QPSK	0.427	1M13G7D
LTE Band 25, CB: 20MHz	16QAM	0.389	1M15W7D

#### 1.1.3 Antenna Details

Ant. No.	Type	Gain (dBi)	Connector	Remark
1	PIFA	2.28	No	---

### 1.1.4 EUT Operational Condition

<b>Supply Voltage</b>	3.6Vdc (AA battery x4)		
<b>Operational Voltage</b>	<input checked="" type="checkbox"/> Vnom (3.6 V)	<input checked="" type="checkbox"/> Vmax (3.7 V)	<input checked="" type="checkbox"/> Vmin (2.45 V)
<b>Operational Climatic</b>	<input checked="" type="checkbox"/> Tnom (20°C)	<input checked="" type="checkbox"/> Tmax (75°C)	<input checked="" type="checkbox"/> Tmin (-35°C)

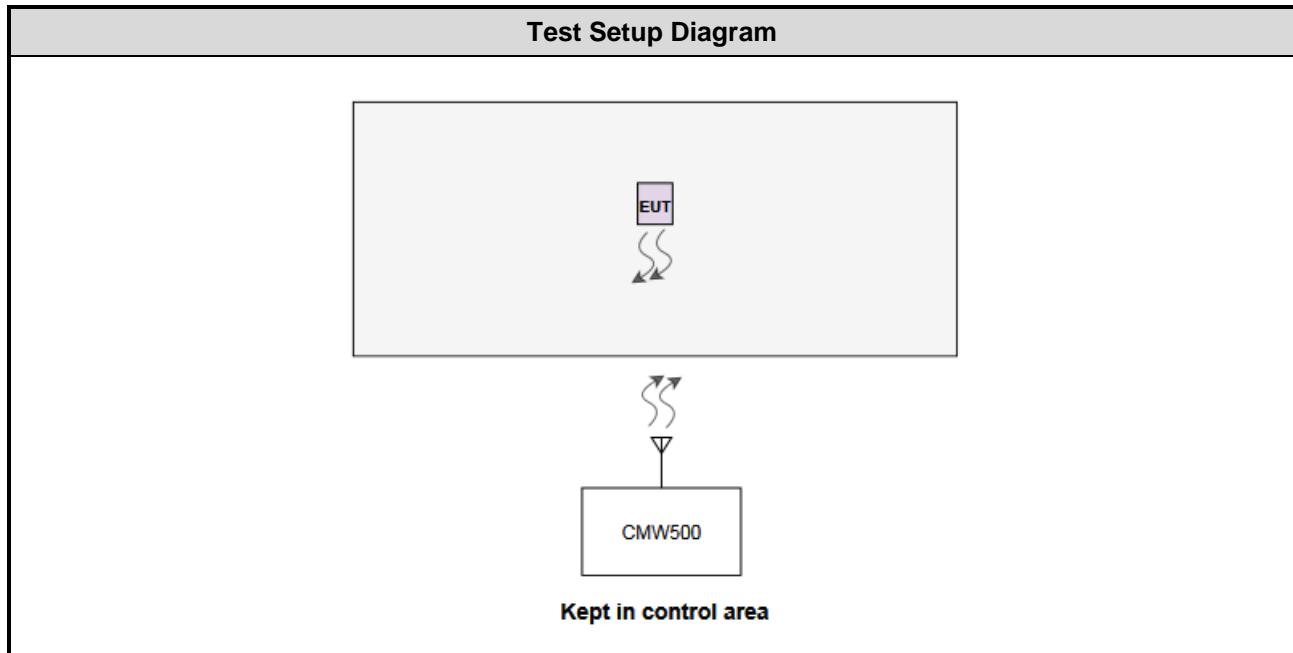
### 1.1.5 Operating Channel List

<b>LTE Band 4</b>		
<b>Channel Bandwidth (MHz)</b>	<b>Channel</b>	<b>Frequency (MHz)</b>
1.4	19957	1710.7
1.4	20175	1732.5
1.4	20393	1754.3
3	19965	1711.5
3	20175	1732.5
3	20385	1753.5
5	19975	1712.5
5	20175	1732.5
5	20375	1752.5
10	20000	1715.0
10	20175	1732.5
10	20350	1750.0
15	20025	1717.5
15	20175	1732.5
15	20325	1747.5
20	20050	1720.0
20	20175	1732.5
20	20300	1745.0

## 1.2 Local Support Equipment List

N/A

## 1.3 Test Setup Chart



## 1.4 The Equipment List

<b>Test Item</b>	Radiated Emission				
<b>Test Site</b>	966 chamber 3 / (03CH03-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Wideband Radio Communication Tester	R&S	CMW500	106070	Feb. 12, 2018	Feb. 11, 2019
Spectrum Analyzer	R&S	FSV40	101499	Jan. 07, 2019	Jan. 06, 2020
Receiver	R&S	ESR3	101658	Dec. 11, 2018	Dec. 10, 2019
Bilog Antenna	SCHWARZBECK	VULB9168	VULB9168-685	Apr. 19, 2018	Apr. 18, 2019
Horn Antenna 1G-18G	SCHWARZBECK	BBHA 9120 D	BBHA 9120 D 1206	Jan. 07, 2019	Jan. 06, 2020
Horn Antenna 18G-40G	SCHWARZBECK	BBHA 9170	BBHA 9170517	Nov. 15, 2018	Nov. 14, 2019
Loop Antenna	R&S	HFH2-Z2	100330	Nov. 09, 2018	Nov. 08, 2019
Loop Antenna Cable	KOAX KABEL	101354-BW	101354-BW	Oct. 08, 2018	Oct. 07, 2019
Preamplifier	EMC	EMC02325	980187	Aug. 24, 2018	Aug. 23, 2019
Preamplifier	Agilent	83017A	MY53270014	Aug. 09, 2018	Aug. 08, 2019
Preamplifier	EMC	EMC184045B	980192	Aug. 09, 2018	Aug. 08, 2019
RF cable-3M	HUBER+SUHNER	SUCOFLEX104	MY22620/4	Oct. 01, 2018	Sep. 30, 2019
RF cable-8M	EMC	EMC104-SM-SM-8000	181107	Oct. 01, 2018	Sep. 30, 2019
RF cable-1M	HUBER+SUHNER	SUCOFLEX104	MY22624/4	Oct. 01, 2018	Sep. 30, 2019
LF cable-0.8M	EMC	EMC8D-NM-NM-800	EMC8D-NM-NM-800-001	Oct. 01, 2018	Sep. 30, 2019
LF cable-3M	EMC	EMC8D-NM-NM-3000	131103	Oct. 01, 2018	Sep. 30, 2019
LF cable-13M	EMC	EMC8D-NM-NM-13000	131104	Oct. 01, 2018	Sep. 30, 2019
Measurement Software	AUDIX	e3	6.120210g	NA	NA

Note: Calibration Interval of instruments listed above is one year.

<b>Test Item</b>	RF Conducted				
<b>Test Site</b>	(TH01-WS)				
Instrument	Manufacturer	Model No.	Serial No.	Calibration Date	Calibration Until
Wideband Radio Communication Tester	R&S	CMW500	106070	Feb. 12, 2018	Feb. 11, 2019
Spectrum Analyzer	R&S	FSV40	101063	Apr. 16, 2018	Apr. 15, 2019
Spectrum Analyzer	Keysight	N9010A	MY54510374	Jun. 21, 2018	Jun. 20, 2019
TEMP&HUMIDITY CHAMBER	GIANT FORCE	GCT-225-40-SP-SD	MAF1212-002	Dec. 05, 2018	Dec. 04, 2019
Power Meter	Anritsu	ML2495A	1241002	Oct. 09, 2018	Oct. 08, 2019
Power Sensor	Anritsu	MA2411B	1207366	Oct. 09, 2018	Oct. 08, 2019
DC POWER SOURCE	GW INSTEK	GPC-6030D	EM892433	Oct. 25, 2018	Oct. 24, 2019
Measurement Software	Sporton	Sporton_1	1.3.30	NA	NA

Note: Calibration Interval of instruments listed above is one year.

## 1.5 Test Standards

According to the specification of EUT, the EUT must comply with following standards.

47 CFR FCC Part 27 Subpart L

ANSI C63.4-2014

ANSI C63.26-2015

FCC KDB 971168 D01 Power Meas License Digital Systems v03r01

FCC KDB 971168 D02 Misc Rev Approv License Devices v02r01

FCC KDB 412172 D01 Determining ERP and EIRP v01r01

## 1.6 Deviation from Test Standard and Measurement Procedure

None

## 1.7 Measurement Uncertainty

ISO/IEC 17025 requires that an estimate of the measurement uncertainties associated with the emissions test results be included in the report. The measurement uncertainties given below are based on a 95% confidence level (based on a coverage factor ( $k=2$ )).

Measurement Uncertainty	
Parameters	Uncertainty
Bandwidth	$\pm 34.134$ Hz
Conducted power	$\pm 0.808$ dB
Frequency error	$\pm 34.134$ Hz
Temperature	$\pm 0.6$ °C
Conducted emission	$\pm 2.670$ dB
Radiated emission $\leq 1\text{GHz}$	$\pm 3.66$ dB
Radiated emission $> 1\text{GHz}$	$\pm 5.37$ dB

## 2 Test Configuration

### 2.1 Testing Condition and Location Information

Test Item	Test Site	Ambient Condition	Tested By
Radiated Emissions	03CH03-WS	20°C / 67%	Roger Lu
RF conducted	TH01-WS	22°C / 64%	Roger Lu

- FCC Designation No.: TW0009
- FCC site registration No.: 207696
- IC site registration No.: 10807C-1

### 2.2 The Worst Test Modes and Channel Details

Test item	Channel Bandwidth	Modulation	Test channel
E.I.R.P	1.4 MHz	QPSK / 16QAM	19957 / 20175 / 20393
Conducted Emissions	3 MHz	QPSK / 16QAM	19965 / 20175 / 20385
Occupied Bandwidth	5 MHz	QPSK / 16QAM	19975 / 20175 / 20375
Peak to Average Ratio	10 MHz	QPSK / 16QAM	20000 / 20175 / 20350
	15 MHz	QPSK / 16QAM	20025 / 20175 / 20325
	20 MHz	QPSK / 16QAM	20050 / 20175 / 20300
Radiated Emission ≤ 1GHz	15 MHz	QPSK	20175
Radiated Emission > 1GHz	15 MHz	QPSK	20025 / 20175 / 20325
Band Edge	1.4 MHz 3 MHz 5 MHz 10 MHz 15 MHz 20 MHz	QPSK / 16QAM QPSK / 16QAM QPSK / 16QAM QPSK / 16QAM QPSK / 16QAM QPSK / 16QAM	19957 20393 19965 20385 19975 20375 20000 20350 20025 20325 20050 20300
Frequency Stability	1.4 MHz 3 MHz 5 MHz 10 MHz 15 MHz 20 MHz	QPSK QPSK QPSK QPSK QPSK QPSK	20175 20175 20175 20175 20175 20175

**Note:**

1. The EUT was pretested with 3 orientations placed on the table for the radiated emission measurement – X, Y, and Z-plane. The **Y-plane** results were found as the worst case and were shown in this report.
2. The selected bandwidth of Radiated Emission is the maximum power bandwidth.

## 3 Test Results

### 3.1 Equivalent Isotropically Radiated Power

#### 3.1.1 Limit of Equivalent Isotropically Radiated Power

Fixed, mobile, and portable (hand-held) stations operating in the 1710–1755 MHz band are limited to 1 Watt EIRP.

#### 3.1.2 Test Procedures

##### For Conducted power measurement:

1. The EUT links up with simulator and is set to maximum output power level at low / middle / high channel.
2. Measure the output power of low / middle / high channel of the EUT.

##### For EIRP measurement:

EIPR can be calculated by below formula from KDB 412172 D01.

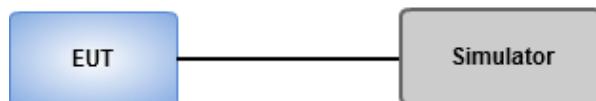
$$1. \text{ EIRP} = P_T + G_T - L_C$$

$P_T$  = transmitter output power, in dBm.

$G_T$  = gain of the transmitting antenna, in dBi (EIRP).

$L_C$  = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

#### 3.1.3 Test Setup



### 3.1.4 Test Result of Equivalent Isotropically Radiated Power (dBm)

Mode	LTE Band 4, CB: 1.4MHz								
Modulation	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
QPSK	19957	1710.7	1#0	0	23.69	2.28	25.97	0.395	1
			1#5	0	23.74	2.28	26.02	0.400	1
			6#0	0	23.62	2.28	25.90	0.389	1
	20175	1732.5	1#0	0	23.73	2.28	26.01	0.399	1
			1#5	0	<b>23.81</b>	<b>2.28</b>	<b>26.09</b>	<b>0.406</b>	1
			6#0	0	23.71	2.28	25.99	0.397	1
	20393	1754.3	1#0	0	23.67	2.28	25.95	0.394	1
			1#5	0	23.75	2.28	26.03	0.401	1
			6#0	0	23.65	2.28	25.93	0.392	1
16QAM	19957	1710.7	1#0	0	23.55	2.28	25.83	0.383	1
			1#5	0	23.66	2.28	25.94	0.393	1
			6#0	0	23.53	2.28	25.81	0.381	1
	20175	1732.5	1#0	0	23.52	2.28	25.80	0.380	1
			1#5	0	<b>23.78</b>	<b>2.28</b>	<b>26.06</b>	<b>0.404</b>	1
			6#0	0	23.64	2.28	25.92	0.391	1
	20393	1754.3	1#0	0	23.65	2.28	25.93	0.392	1
			1#5	0	23.71	2.28	25.99	0.397	1
			6#0	0	23.64	2.28	25.92	0.391	1

LTE Band 4, CB: 3MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
QPSK	19965	1711.5	1#0	0	23.67	2.28	25.95	0.394	1
			1#0	1	23.75	2.28	26.03	0.401	1
			1#5	0	23.68	2.28	25.96	0.394	1
			1#5	1	23.72	2.28	26.00	0.398	1
			3#0	0	23.61	2.28	25.89	0.388	1
			3#3	1	23.60	2.28	25.88	0.387	1
			6#0	0	23.67	2.28	25.95	0.394	1
			6#0	1	23.65	2.28	25.93	0.392	1
	20175	1732.5	1#0	0	23.83	2.28	26.11	0.408	1
			1#0	1	<b>23.88</b>	<b>2.28</b>	<b>26.16</b>	<b>0.413</b>	1
			1#5	0	23.81	2.28	26.09	0.406	1
			1#5	1	23.72	2.28	26.00	0.398	1
			3#0	0	23.86	2.28	26.14	0.411	1
			3#3	1	23.85	2.28	26.13	0.410	1
			6#0	0	23.76	2.28	26.04	0.402	1
			6#0	1	23.74	2.28	26.02	0.400	1
	20385	1753.5	1#0	0	23.72	2.28	26.00	0.398	1
			1#0	1	23.75	2.28	26.03	0.401	1
			1#5	0	23.71	2.28	25.99	0.397	1
			1#5	1	23.62	2.28	25.90	0.389	1
			3#0	0	23.66	2.28	25.94	0.393	1
			3#3	1	23.55	2.28	25.83	0.383	1
			6#0	0	23.65	2.28	25.93	0.392	1
			6#0	1	23.62	2.28	25.90	0.389	1

LTE Band 4, CB: 3MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
16QAM	19965	1711.5	1#0	0	23.52	2.28	25.80	0.380	1
			1#0	1	23.61	2.28	25.89	0.388	1
			1#5	0	23.65	2.28	25.93	0.392	1
			1#5	1	23.54	2.28	25.82	0.382	1
			3#0	0	23.71	2.28	25.99	0.397	1
			3#3	1	23.75	2.28	26.03	0.401	1
			6#0	0	23.55	2.28	25.83	0.383	1
			6#0	1	23.61	2.28	25.89	0.388	1
	20175	1732.5	1#0	0	23.47	2.28	25.75	0.376	1
			1#0	1	23.53	2.28	25.81	0.381	1
			1#5	0	23.59	2.28	25.87	0.386	1
			1#5	1	23.55	2.28	25.83	0.383	1
			3#0	0	<b>23.85</b>	<b>2.28</b>	<b>26.13</b>	<b>0.410</b>	1
			3#3	1	23.82	2.28	26.10	0.407	1
			6#0	0	23.77	2.28	26.05	0.403	1
			6#0	1	23.79	2.28	26.07	0.405	1
	20385	1753.5	1#0	0	23.61	2.28	25.89	0.388	1
			1#0	1	23.57	2.28	25.85	0.385	1
			1#5	0	23.62	2.28	25.90	0.389	1
			1#5	1	23.61	2.28	25.89	0.388	1
			3#0	0	23.82	2.28	26.10	0.407	1
			3#3	1	23.72	2.28	26.00	0.398	1
			6#0	0	23.68	2.28	25.96	0.394	1
			6#0	1	23.71	2.28	25.99	0.397	1

LTE Band 4, CB: 5MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
QPSK	19975	1712.5	1#0	0	23.78	2.28	26.06	0.404	1
			1#0	1	23.72	2.28	26.00	0.398	1
			1#5	1	23.81	2.28	26.09	0.406	1
			1#5	3	23.74	2.28	26.02	0.400	1
			3#0	0	23.75	2.28	26.03	0.401	1
			3#3	3	23.71	2.28	25.99	0.397	1
			6#0	0	23.72	2.28	26.00	0.398	1
			6#0	3	23.68	2.28	25.96	0.394	1
	20175	1732.5	1#0	0	23.87	2.28	26.15	0.412	1
			1#0	1	23.85	2.28	26.13	0.410	1
			1#5	1	23.93	2.28	26.21	0.418	1
			1#5	3	23.81	2.28	26.09	0.406	1
			3#0	0	23.86	2.28	26.14	0.411	1
			3#3	3	23.81	2.28	26.09	0.406	1
			6#0	0	23.79	2.28	26.07	0.405	1
			6#0	3	23.87	2.28	26.15	0.412	1
	20375	1752.5	1#0	0	23.83	2.28	26.11	0.408	1
			1#0	1	23.80	2.28	26.08	0.406	1
			1#5	1	23.82	2.28	26.10	0.407	1
			1#5	3	23.71	2.28	25.99	0.397	1
			3#0	0	23.95	2.28	26.23	0.420	1
			3#3	3	23.65	2.28	25.93	0.392	1
			6#0	0	<b>23.97</b>	<b>2.28</b>	<b>26.25</b>	<b>0.422</b>	1
			6#0	3	23.72	2.28	26.00	0.398	1

LTE Band 4, CB: 5MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
16QAM	19975	1712.5	1#0	0	23.28	2.28	25.56	0.360	1
			1#0	1	23.35	2.28	25.63	0.366	1
			1#5	1	23.21	2.28	25.49	0.354	1
			1#5	3	23.27	2.28	25.55	0.359	1
			3#0	0	23.48	2.28	25.76	0.377	1
			3#3	3	23.45	2.28	25.73	0.374	1
			6#0	0	23.50	2.28	25.78	0.378	1
			6#0	3	23.45	2.28	25.73	0.374	1
	20175	1732.5	1#0	0	23.45	2.28	25.73	0.374	1
			1#0	1	23.50	2.28	25.78	0.378	1
			1#5	1	23.59	2.28	25.87	0.386	1
			1#5	3	23.58	2.28	25.86	0.385	1
			3#0	0	23.47	2.28	25.75	0.376	1
			3#3	3	23.57	2.28	25.85	0.385	1
			6#0	0	23.45	2.28	25.73	0.374	1
			6#0	3	23.41	2.28	25.69	0.371	1
	20375	1752.5	1#0	0	23.55	2.28	25.83	0.383	1
			1#0	1	23.42	2.28	25.70	0.372	1
			1#5	1	23.51	2.28	25.79	0.379	1
			1#5	3	23.41	2.28	25.69	0.371	1
			3#0	0	<b>23.65</b>	<b>2.28</b>	<b>25.93</b>	<b>0.392</b>	1
			3#3	3	23.32	2.28	25.60	0.363	1
			6#0	0	23.61	2.28	25.89	0.388	1
			6#0	3	23.44	2.28	25.72	0.373	1

LTE Band 4, CB: 10MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
QPSK	20000	1715.0	1#0	0	23.75	2.28	26.03	0.401	1
			1#0	3	23.84	2.28	26.12	0.409	1
			1#5	3	23.86	2.28	26.14	0.411	1
			1#5	7	23.85	2.28	26.13	0.410	1
			3#0	0	23.61	2.28	25.89	0.388	1
			3#3	7	23.75	2.28	26.03	0.401	1
			6#0	0	23.57	2.28	25.85	0.385	1
			6#0	7	23.72	2.28	26.00	0.398	1
	20175	1732.5	1#0	0	23.85	2.28	26.13	0.410	1
			1#0	3	23.96	2.28	26.24	0.421	1
			1#5	3	<b>24.03</b>	<b>2.28</b>	<b>26.31</b>	<b>0.428</b>	1
			1#5	7	23.87	2.28	26.15	0.412	1
			3#0	0	23.85	2.28	26.13	0.410	1
			3#3	7	23.91	2.28	26.19	0.416	1
			6#0	0	23.71	2.28	25.99	0.397	1
			6#0	7	23.85	2.28	26.13	0.410	1
	20350	1750.0	1#0	0	23.95	2.28	26.23	0.420	1
			1#0	3	24.01	2.28	26.29	0.426	1
			1#5	3	23.98	2.28	26.26	0.423	1
			1#5	7	23.75	2.28	26.03	0.401	1
			3#0	0	23.97	2.28	26.25	0.422	1
			3#3	7	23.51	2.28	25.79	0.379	1
			6#0	0	23.78	2.28	26.06	0.404	1
			6#0	7	23.89	2.28	26.17	0.414	1

LTE Band 4, CB: 10MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
16QAM	20000	1715.0	1#0	0	23.35	2.28	25.63	0.366	1
			1#0	3	23.45	2.28	25.73	0.374	1
			1#5	3	23.48	2.28	25.76	0.377	1
			1#5	7	23.41	2.28	25.69	0.371	1
			3#0	0	23.61	2.28	25.89	0.388	1
			3#3	7	23.71	2.28	25.99	0.397	1
			6#0	0	23.62	2.28	25.90	0.389	1
			6#0	7	23.77	2.28	26.05	0.403	1
	20175	1732.5	1#0	0	23.42	2.28	25.70	0.372	1
			1#0	3	23.51	2.28	25.79	0.379	1
			1#5	3	23.62	2.28	25.90	0.389	1
			1#5	7	23.46	2.28	25.74	0.375	1
			3#0	0	23.51	2.28	25.79	0.379	1
			3#3	7	23.72	2.28	26.00	0.398	1
			6#0	0	23.75	2.28	26.03	0.401	1
			6#0	7	23.76	2.28	26.04	0.402	1
	20350	1750.0	1#0	0	23.61	2.28	25.89	0.388	1
			1#0	3	23.72	2.28	26.00	0.398	1
			1#5	3	23.75	2.28	26.03	0.401	1
			1#5	7	23.41	2.28	25.69	0.371	1
			3#0	0	<b>23.81</b>	<b>2.28</b>	<b>26.09</b>	<b>0.406</b>	1
			3#3	7	23.54	2.28	25.82	0.382	1
			6#0	0	23.71	2.28	25.99	0.397	1
			6#0	7	23.74	2.28	26.02	0.400	1

LTE Band 4, CB: 15MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
QPSK	20025	1717.5	1#0	0	23.76	2.28	26.04	0.402	1
			1#0	5	23.81	2.28	26.09	0.406	1
			1#5	5	23.82	2.28	26.10	0.407	1
			1#5	11	23.85	2.28	26.13	0.410	1
			3#0	0	23.75	2.28	26.03	0.401	1
			3#3	11	23.61	2.28	25.89	0.388	1
			6#0	0	23.76	2.28	26.04	0.402	1
			6#0	11	23.80	2.28	26.08	0.406	1
	20175	1732.5	1#0	0	23.81	2.28	26.09	0.406	1
			1#0	5	23.98	2.28	26.26	0.423	1
			1#5	5	<b>24.05</b>	<b>2.28</b>	<b>26.33</b>	<b>0.430</b>	1
			1#5	11	23.92	2.28	26.20	0.417	1
			3#0	0	23.84	2.28	26.12	0.409	1
			3#3	11	23.67	2.28	25.95	0.394	1
			6#0	0	23.85	2.28	26.13	0.410	1
			6#0	11	23.89	2.28	26.17	0.414	1
	20325	1747.5	1#0	0	23.82	2.28	26.10	0.407	1
			1#0	5	23.97	2.28	26.25	0.422	1
			1#5	5	24.01	2.28	26.29	0.426	1
			1#5	11	23.67	2.28	25.95	0.394	1
			3#0	0	23.56	2.28	25.84	0.384	1
			3#3	11	23.52	2.28	25.80	0.380	1
			6#0	0	23.71	2.28	25.99	0.397	1
			6#0	11	23.75	2.28	26.03	0.401	1

LTE Band 4, CB: 15MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
16QAM	20025	1717.5	1#0	0	23.31	2.28	25.59	0.362	1
			1#0	5	23.35	2.28	25.63	0.366	1
			1#5	5	23.52	2.28	25.80	0.380	1
			1#5	11	23.45	2.28	25.73	0.374	1
			3#0	0	23.61	2.28	25.89	0.388	1
			3#3	11	23.67	2.28	25.95	0.394	1
			6#0	0	23.54	2.28	25.82	0.382	1
			6#0	11	<b>23.75</b>	<b>2.28</b>	<b>26.03</b>	<b>0.401</b>	1
	20175	1732.5	1#0	0	23.46	2.28	25.74	0.375	1
			1#0	5	23.62	2.28	25.90	0.389	1
			1#5	5	23.65	2.28	25.93	0.392	1
			1#5	11	23.58	2.28	25.86	0.385	1
			3#0	0	23.70	2.28	25.98	0.396	1
			3#3	11	23.68	2.28	25.96	0.394	1
			6#0	0	23.57	2.28	25.85	0.385	1
			6#0	11	23.67	2.28	25.95	0.394	1
	20325	1747.5	1#0	0	23.51	2.28	25.79	0.379	1
			1#0	5	23.55	2.28	25.83	0.383	1
			1#5	5	23.61	2.28	25.89	0.388	1
			1#5	11	23.40	2.28	25.68	0.370	1
			3#0	0	23.46	2.28	25.74	0.375	1
			3#3	11	23.45	2.28	25.73	0.374	1
			6#0	0	23.62	2.28	25.90	0.389	1
			6#0	11	23.61	2.28	25.89	0.388	1

LTE Band 4, CB: 20MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
QPSK	20050	1720.0	1#0	0	23.76	2.28	26.04	0.402	1
			1#0	7	23.88	2.28	26.16	0.413	1
			1#5	7	23.89	2.28	26.17	0.414	1
			1#5	15	23.84	2.28	26.12	0.409	1
			3#0	0	23.82	2.28	26.10	0.407	1
			3#3	15	23.61	2.28	25.89	0.388	1
			6#0	0	23.75	2.28	26.03	0.401	1
			6#0	15	23.67	2.28	25.95	0.394	1
	20175	1732.5	1#0	0	23.77	2.28	26.05	0.403	1
			1#0	7	23.95	2.28	26.23	0.420	1
			1#5	7	<b>24.02</b>	<b>2.28</b>	<b>26.30</b>	<b>0.427</b>	1
			1#5	15	23.89	2.28	26.17	0.414	1
			3#0	0	23.86	2.28	26.14	0.411	1
			3#3	15	23.72	2.28	26.00	0.398	1
			6#0	0	23.79	2.28	26.07	0.405	1
			6#0	15	23.69	2.28	25.97	0.395	1
	20300	1745.0	1#0	0	23.85	2.28	26.13	0.410	1
			1#0	7	23.91	2.28	26.19	0.416	1
			1#5	7	23.95	2.28	26.23	0.420	1
			1#5	15	23.72	2.28	26.00	0.398	1
			3#0	0	23.55	2.28	25.83	0.383	1
			3#3	15	23.66	2.28	25.94	0.393	1
			6#0	0	23.67	2.28	25.95	0.394	1
			6#0	15	23.65	2.28	25.93	0.392	1

LTE Band 4, CB: 20MHz									
Mode	Channel	Frequency (MHz)	RB size #RB start	RB Index	Conducted Average Power (dBm)	Max Antenna Gain (dBi)	EIRP (dBm)	EIRP (W)	Limit (W)
16QAM	20050	1720.0	1#0	0	23.15	2.28	25.43	0.349	1
			1#0	7	23.42	2.28	25.70	0.372	1
			1#5	7	23.35	2.28	25.63	0.366	1
			1#5	15	23.43	2.28	25.71	0.372	1
			3#0	0	23.41	2.28	25.69	0.371	1
			3#3	15	23.32	2.28	25.60	0.363	1
			6#0	0	23.45	2.28	25.73	0.374	1
			6#0	15	23.47	2.28	25.75	0.376	1
	20175	1732.5	1#0	0	23.52	2.28	25.80	0.380	1
			1#0	7	23.55	2.28	25.83	0.383	1
			1#5	7	23.56	2.28	25.84	0.384	1
			1#5	15	23.47	2.28	25.75	0.376	1
			3#0	0	23.61	2.28	25.89	0.388	1
			3#3	15	23.56	2.28	25.84	0.384	1
			6#0	0	<b>23.62</b>	<b>2.28</b>	<b>25.90</b>	<b>0.389</b>	1
			6#0	15	23.51	2.28	25.79	0.379	1
	20300	1745.0	1#0	0	23.43	2.28	25.71	0.372	1
			1#0	7	23.48	2.28	25.76	0.377	1
			1#5	7	23.51	2.28	25.79	0.379	1
			1#5	15	23.45	2.28	25.73	0.374	1
			3#0	0	23.41	2.28	25.69	0.371	1
			3#3	15	23.37	2.28	25.65	0.367	1
			6#0	0	23.45	2.28	25.73	0.374	1
			6#0	15	23.46	2.28	25.74	0.375	1

## 3.2 Radiated Emissions

### 3.2.1 Limit of Radiated Emissions

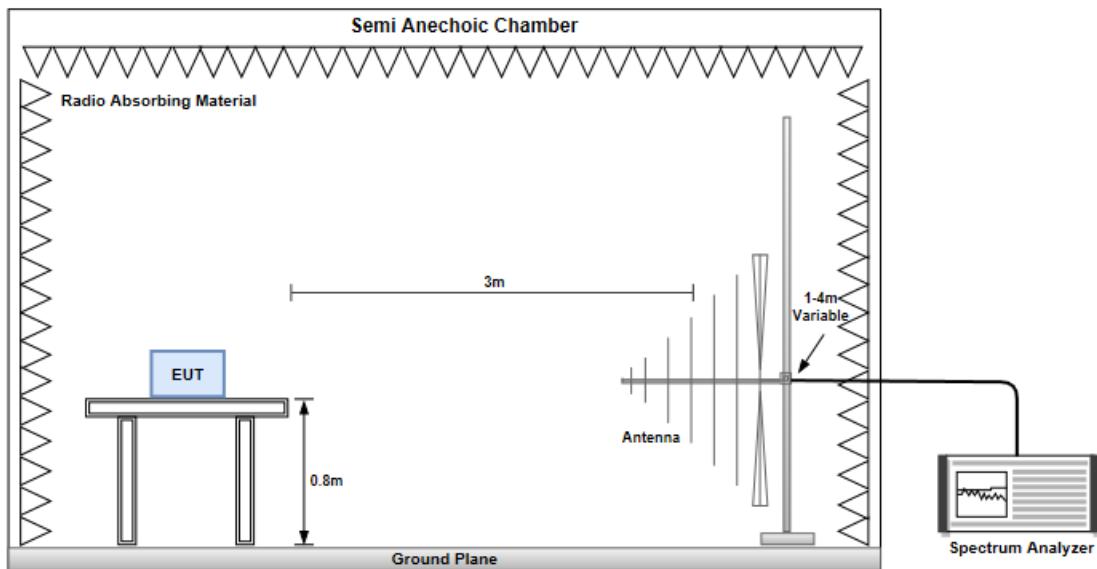
The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least  $43 + 10 \log(P)$  dB equal to -13 dBm.

### 3.2.2 Test Procedures

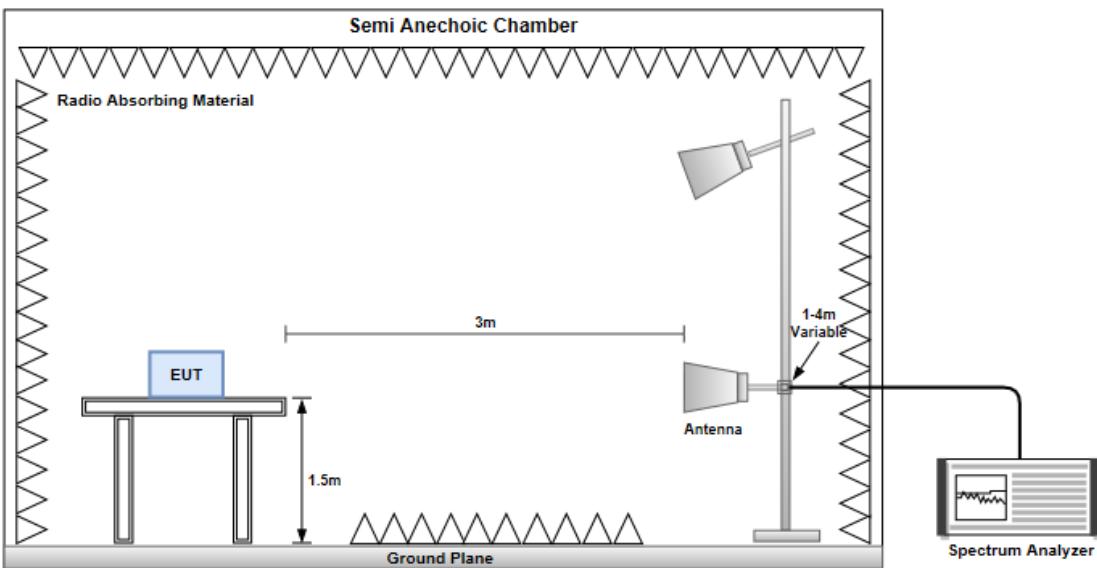
1. Measurement is made at a semi-anechoic chamber that incorporates a turntable allowing a EUT rotation of 360°. A continuously-rotating, remotely-controlled turntable is installed at the test site to support the EUT and facilitate determination of the direction of maximum radiation for each EUT emission frequency. For emissions testing at or below 1 GHz, the table height is 80 cm above the reference ground plane. For emission measurements above 1 GHz, the table height is 1.5 m.
2. Measurement is made with the antenna positioned in both the horizontal and vertical planes of polarization. The measurement antenna is varied in height (1m ~ 4m) above the reference ground plane to obtain the maximum signal strength. Distance between EUT and antenna is 3 m.
3. This investigation is performed with the EUT rotated 360°, the antenna height scanned between 1 m and 4 m, and the antenna rotated to repeat the measurements for both the horizontal and vertical antenna polarizations.
4. After finding the max radiated emission, substitution method will be used for getting effective radiated power. EUT will be removed and substitution antenna will be placed at same position. Signal generator will output CW signal to substitution antenna through a RF cable. Rotate turntable and move antenna to find maximum radiated emission. Adjust output power of signal generator to let the maximum radiated emission is same as step 3. Record the output power level.
5. E.I.R.P = output power of step 4 + gain of substitution antenna – cable loss of RF cable.

### 3.2.3 Test Setup

#### Radiated Emissions below 1 GHz



#### Radiated Emissions above 1 GHz



### 3.2.4 Test Result of Radiated Emissions below 1GHz

Mode	LTE Band 4, QPSK, CB: 15MHz, Channel: 20175						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
36.79	H	-65.72	-13.00	-52.72	-74.49	-47.57	-18.15
149.31	H	-72.90	-13.00	-59.90	-73.51	-65.97	-6.93
312.27	H	-72.37	-13.00	-59.37	-72.70	-71.03	-1.34
445.16	H	-69.80	-13.00	-56.80	-74.02	-68.66	-1.14
605.21	H	-67.15	-13.00	-54.15	-73.48	-65.14	-2.01
689.60	H	-64.87	-13.00	-51.87	-73.10	-62.97	-1.90
46.49	V	-70.58	-13.00	-57.58	-69.31	-53.78	-16.80
90.14	V	-71.81	-13.00	-58.81	-71.01	-66.70	-5.11
180.35	V	-66.20	-13.00	-53.20	-69.43	-61.82	-4.38
291.90	V	-70.11	-13.00	-57.11	-72.87	-68.71	-1.40
404.42	V	-69.68	-13.00	-56.68	-73.25	-68.39	-1.29
571.26	V	-64.71	-13.00	-51.71	-73.34	-63.14	-1.57

Note: EIRP = S.G Power value + Correction factor

### 3.2.5 Test Result of Radiated Emissions above 1GHz

Mode	LTE Band 4, QPSK, CB: 15MHz, Channel: 20025						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
3435.00	H	-39.64	-13.00	-26.64	-52.98	-47.10	7.46
5152.50	H	-44.13	-13.00	-31.13	-62.56	-50.49	6.36
6870.00	H	-43.43	-13.00	-30.43	-30.43	-48.42	4.99
3435.00	V	-42.93	-13.00	-29.93	-56.12	-50.39	7.46
5152.50	V	-46.15	-13.00	-33.15	-64.12	-52.51	6.36
6870.00	V	-43.98	-13.00	-30.98	-64.69	-48.97	4.99

Mode	LTE Band 4, QPSK, CB: 15MHz, Channel: 20175						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
3465.00	H	-39.21	-13.00	-26.21	-52.76	-46.60	7.39
5197.50	H	-43.92	-13.00	-30.92	-62.34	-50.61	6.69
6930.00	H	-43.12	-13.00	-30.12	-64.30	-47.91	4.79
3465.00	V	-42.57	-13.00	-29.57	-55.95	-49.96	7.39
5197.50	V	-45.89	-13.00	-32.89	-63.90	-52.58	6.69
6930.00	V	-43.45	-13.00	-30.45	-64.51	-48.24	4.79

Mode	LTE Band 4, QPSK, CB: 15MHz, Channel: 20325						
Frequency (MHz)	Antenna Polarity	E.I.R.P (dBm)	Limit (dBm)	Margin (dB)	S.A Reading (dBm)	S.G Power Value (dBm)	Correction Factor (dB)
3495.00	H	-39.25	-13.00	-26.25	-53.02	-46.51	7.26
5242.50	H	-44.25	-13.00	-31.25	-62.56	-51.17	6.92
6990.00	H	-43.13	-13.00	-30.13	-64.47	-47.75	4.62
3495.00	V	-42.39	-13.00	-29.39	-55.96	-49.65	7.26
5242.50	V	-45.96	-13.00	-32.96	-63.85	-52.88	6.92
6990.00	V	-43.00	-13.00	-30.00	-64.43	-47.62	4.62

Note: EIRP = S.G Power value + Correction factor

### 3.3 Conducted Emissions & Band Edge

#### 3.3.1 Limit of Conducted Emissions & Band Edge

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 equal to -13dBm.

#### 3.3.2 Test Procedures

Out of Band Emission

1. Lowest, middle and highest operating channels are tested for this item.
2. Scan frequency range is from 30 MHz ~ 20 GHz.
3. Set RBW = 1 MHz, VBW = 3 MHz, detector =Peak, sweep time = auto.
4. Record the max trace value and capture the test plot of each sub frequency band.

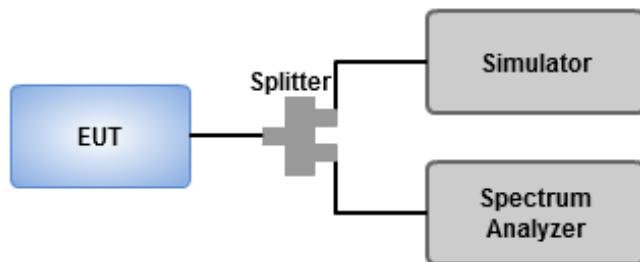
Band Edge - 1MHz band immediately outside the Frequency Band

- 1 Lowest and highest operating channels are tested for this item.
- 2 Set RBW = 22 kHz, VBW = 68 kHz, detector = RMS, sweep time = auto to measure trace.

Band Edge - Other frequency

- 1 Lowest and highest operating channels are tested for this item.
- 2 Set RBW = 22 kHz, VBW = 68 kHz, detector = RMS and use channel power measurement function of spectrum analyze to integrate power over 1MHz.

#### 3.3.3 Test Setup



### 3.3.4 Test Result of Conducted Emissions & Band Edge

#### Summary

Mode	Result	F-Start (Hz)	F-Stop (Hz)	RBW (Hz)	VBW (Hz)	Detector	Freq (Hz)	Level (dBm)	Limit (dBm)	Margin (dB)	Port	Remark	Ref.Limit (dB)
Band 4_LTE-M1_1.4MHz_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
1710.7MHz_16QAM_RB 6,#RB 0,NB 0	Pass	1.709G	1.71G	22k	68k	RMS	1.70993G	-14.76	-13	-1.76	1	-	-
Band 4_LTE-M1_3MHz_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
1711.5MHz_16QAM_RB 6,#RB 0,NB 0	Pass	1.709G	1.71G	22k	68k	RMS	1.70992G	-17.61	-13	-4.61	1	-	-
Band 4_LTE-M1_5MHz_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
1712.5MHz_16QAM_RB 6,#RB 0,NB 0	Pass	1.709G	1.71G	22k	68k	RMS	1.70993G	-16.61	-13	-3.61	1	-	-
Band 4_LTE-M1_10MHz_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
1715MHz_16QAM_RB 6,#RB 0,NB 0	Pass	1.69G	1.709G	22k	68k	RMS	1.7085G	-21.71	-13	-8.71	1	MBW 1M	-
Band 4_LTE-M1_15MHz_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
1717.5MHz_16QAM_RB 6,#RB 0,NB 0	Pass	1.709G	1.71G	22k	68k	RMS	1.71G	-23.45	-13	-10.45	1	-	-
Band 4_LTE-M1_20MHz_Nss1_1TX	-	-	-	-	-	-	-	-	-	-	-	-	-
1745MHz_16QAM_RB 6,#RB 0,NB 15	Pass	1.756G	1.795G	22k	68k	RMS	1.7565G	-28.62	-13	-15.62	1	MBW 1M	-

