

FCC TEST REPORT

(PART 27)

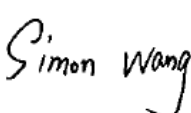
Applicant:	Nippon Audiotronix Pvt. Ltd.
Address:	Plot No. 446, B&C, Sector-8 IMT Manesar, Gurgaon Haryana-122050, India

Manufacturer or Supplier:	Nippon Audiotronix Pvt. Ltd.
Address:	Plot No. 446, B&C, Sector-8 IMT Manesar, Gurgaon Haryana-122050, India
Product:	CCU2.0 LOGGER
Brand Name:	NIPPON
Model Name:	130070010107
FCC ID:	2BBKGCCU10107
Date of tests:	Jun. 06, 2023 ~ Jun. 29, 2023

The tests have been carried out according to the requirements of the following standard:

- ☒ **FCC Part 27** ☒ **ANSI/TIA/EIA-603-D**
☒ **FCC Part 2** ☒ **ANSI/TIA/EIA-603-E** ☒ **ANSI C63.26-2015**

CONCLUSION: The submitted sample was found to COMPLY with the test requirement

Prepared by Simon Wang Engineer / Mobile Department	Approved by Luke Lu Manager / Mobile Department
 Date: Jun. 29, 2023	 Date: Jun. 29, 2023

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-P23060003RF04	Original release	Jun. 29, 2023

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC PART 27 & PART 2		
STANDARD SECTION	TEST ITEM	RESULT
§2.1046	Conducted Output Power	Compliance
§27.50(b)(10) §27.50(c)(10)	Effective Radiated Power (Band 12) (Band 13)	Compliance
§27.50(d)(4) §27.50(h)(2)	Equivalent Isotropically Radiated Power (WCMDA Band 4) (Band 4) (Band 7)	Compliance
§2.1055 §27.54	Frequency Stability	Compliance
§2.1049	Occupied Bandwidth	Compliance
§2.1051 §27.53(c)(2)(4) §27.53(g) §27.53(h) §27.53(m)(4)(6)	Conducted Band Edge Measurements (WCMDA Band 4) (Band 4) (Band 7) (Band 12) (Band 13)	Compliance
§2.1051 §27.53(c)(2)(4) §27.53(g) §27.53(h) §27.53(m)(4)(6)	Conducted Spurious Emissions (WCMDA Band 4) (Band 4) (Band 7) (Band 12) (Band 13)	Compliance
§2.1053 §27.53(c)(2)(4) §27.53(f) §27.53(g) §27.53(h) §27.53(m)(4)(6)	Radiated Spurious Emissions (WCMDA Band 4) (Band 4) (Band 7) (Band 12) (Band 13)	Compliance
NA	Peak to average ratio	Compliance

1.1 MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2:

MEASUREMENT	UNCERTAINTY
Frequency Stability	$\pm 76.97\text{Hz}$
Radiated emissions (9KHz~30MHz)	$\pm 2.68\text{dB}$
Radiated emissions & Radiated Power (30MHz~1GHz)	$\pm 4.98\text{dB}$
Radiated emissions & Radiated Power (1GHz ~6GHz)	$\pm 4.70\text{dB}$
Radiated emissions (6GHz ~18GHz)	$\pm 4.60\text{dB}$
Radiated emissions (18GHz ~40GHz)	$\pm 4.12\text{dB}$
Conducted emissions	$\pm 4.01\text{dB}$
Occupied Channel Bandwidth	$\pm 43.58\text{KHz}$
Conducted Output power	$\pm 2.06\text{dB}$
Band Edge Measurements	$\pm 4.70\text{dB}$

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

1.2 TEST SITE AND INSTRUMENTS

Equipment	Manufacturer	Model No.	Serial No.	Last Cal.	Next Cal.
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Mar. 28,23	Mar. 27,24
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.13,23	May.12,24
Loop Antenna	Schwarzbeck	FMZB 1519B	00173	Sep.03,22	Sep.02,23
Bilog Antenna	ETS-LINDGRE N	3143B	00161965	Feb. 18,23	Feb. 17,24
Horn Antenna	ETS-LINDGRE N	3117	00168692	Feb. 18,23	Feb. 17,24
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K- SG/QMS-00361	15433	Sep.04, 22	Sep.03, 23
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 14,23	Feb. 13,24
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May. 06,23	May. 05,24
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.11,23	May.10,24
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Feb. 17,23	Feb.16,24
3m Semi-anechoic Chamber	ETS-LINDGRE N	9m*6m*6m	Euroshieldpn- CT0001143-121 6	May. 18,23	May. 17,26
Test Software	E3	V 9.160323	N/A	N/A	N/A
Test Software	JS1120	3.1.36	N/A	N/A	N/A
10dB Attenuator	JFW/USA	50HF-010-SMA	50HF-010-SMA	May. 06,23	May. 05,24
Power Meter	Anritsu	ML2495A	1506002	Feb. 14,23	Feb. 13,24
Power Sensor	Anritsu	MA2411B	1339352	Feb. 14,23	Feb. 13,24
Temperature Chamber	ESPEC	SH-242	93000855	May. 06,23	May. 05,24
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Feb. 14,23	Feb. 13,24
Base station R&S CMW500	Rohde&Schwa rz	CMW500	153085	May.11,23	May.10,24
DC Source	Kikusui/JP	PMX18-5A	N/A	Aug. 12,22	Aug. 11,23

- NOTE:** 1. The calibration interval of the above test instruments is 12 months or 36 months and the calibrations are traceable to CEPREI/CHINA, GRGT/CHINA and NIM/CHINA.
2. The test was performed in 3m Semi-anechoic Chamber and RF Oven Room.
3. The horn antenna is used only for the measurement of emission frequency above 1GHz if tested.
4. The FCC Site Registration No. is 525120; The Designation No. is CN1171.

2 GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

PRODUCT	CCU2.0 LOGGER	
BRAND NAME	NIPPON	
MODEL NAME	130070010107	
NOMINAL VOLTAGE	DC12V	
MODULATION TECHNOLOGY	WCDMA IV	BPSK, QPSK
	LTE	QPSK, 16QAM
FREQUENCY RANGE	WCDMA IV	1712.4MHz ~ 1752.6MHz
	LTE Band 4 Channel Bandwidth: 1.4MHz	1710.7MHz ~ 1754.3MHz
	LTE Band 4 Channel Bandwidth: 3MHz	1711.5MHz ~ 1753.5MHz
	LTE Band 4 Channel Bandwidth: 5MHz	1712.5MHz ~ 1752.5MHz
	LTE Band 4 Channel Bandwidth: 10MHz	1715MHz ~ 1750MHz
	LTE Band 4 Channel Bandwidth: 15MHz	1717.5MHz ~ 1747.5 MHz
	LTE Band 4 Channel Bandwidth: 20MHz	1720MHz ~ 1745MHz
	LTE Band 7 Channel Bandwidth: 5MHz	2502.5MHz ~ 2567.5MHz
	LTE Band 7 Channel Bandwidth: 10MHz	2505MHz ~ 2565MHz
	LTE Band 7 Channel Bandwidth: 15MHz	2507.5MHz ~ 2562.5MHz
	LTE Band 7 Channel Bandwidth: 20MHz	2510MHz ~ 2560MHz
	LTE Band 12 Channel Bandwidth: 1.4MHz	699.7MHz ~ 715.3MHz
	LTE Band 12 Channel Bandwidth: 3MHz	700.5MHz ~ 714.5MHz
	LTE Band 12 Channel Bandwidth: 5MHz	701.5MHz ~ 713.5MHz
	LTE Band 12 Channel Bandwidth: 10MHz	704MHz ~ 711MHz
	LTE Band 13 Channel Bandwidth: 5MHz	779.5MHz ~ 784.5MHz
	LTE Band 13 Channel Bandwidth: 10MHz	782MHz
MAX. EIRP POWER	WCDMA IV	49.32mW

MAX. EIRP POWER	LTE Band 4 Channel Bandwidth: 1.4MHz	48.42mW
	LTE Band 4 Channel Bandwidth: 3MHz	48.08mW
	LTE Band 4 Channel Bandwidth: 5MHz	48.53mW
	LTE Band 4 Channel Bandwidth: 10MHz	48.08mW
	LTE Band 4 Channel Bandwidth: 15MHz	47.97mW
	LTE Band 4 Channel Bandwidth: 20MHz	48.64mW
	LTE Band 7 Channel Bandwidth: 5MHz	51.88mW
	LTE Band 7 Channel Bandwidth: 10MHz	51.64mW
	LTE Band 7 Channel Bandwidth: 15MHz	52.24mW
	LTE Band 7 Channel Bandwidth: 20MHz	52.36mW
	LTE Band 12 Channel Bandwidth: 1.4MHz	76.03mW
	LTE Band 12 Channel Bandwidth: 3MHz	75.86mW
	LTE Band 12 Channel Bandwidth: 5MHz	76.21mW
	LTE Band 12 Channel Bandwidth: 10MHz	75.56mW
	LTE Band 13 Channel Bandwidth: 5MHz	54.45mW
	LTE Band 13 Channel Bandwidth: 10MHz	54.95mW
EMISSION DESIGNATOR	WCDMA IV	4M14F9W
	LTE Band 4 Channel Bandwidth: 1.4MHz	QPSK: 1M10G7D
		16QAM: 1M09W7D
		64QAM: /
	LTE Band 4 Channel Bandwidth: 3MHz	QPSK: 2M70G7D
		16QAM: 2M70W7D
		64QAM: /



**BUREAU
VERITAS**

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EMISSION DESIGNATOR	LTE Band 4 Channel Bandwidth: 5MHz	QPSK: 4M51G7D
		16QAM: 4M51W7D
		64QAM: /
	LTE Band 4 Channel Bandwidth: 10MHz	QPSK: 8M97G7D
		16QAM: 8M98W7D
		64QAM: /
	LTE Band 4 Channel Bandwidth: 15MHz	QPSK: 13M5G7D
		16QAM: 13M5W7D
		64QAM: /
	LTE Band 4 Channel Bandwidth: 20MHz	QPSK: 17M9G7D
		16QAM: 17M9W7D
		64QAM: /
	LTE Band 7 Channel Bandwidth: 5MHz	QPSK: 4M50G7D
		16QAM: 4M51W7D
		64QAM: /
	LTE Band 7 Channel Bandwidth: 10MHz	QPSK: 8M96G7D
		16QAM: 8M98W7D
		64QAM: /
	LTE Band 7 Channel Bandwidth: 15MHz	QPSK: 13M5G7D
		16QAM: 13M5W7D
		64QAM: /
	LTE Band 7 Channel Bandwidth: 20MHz	QPSK: 17M9G7D
		16QAM: 18M0W7D
		64QAM: /
	LTE Band 12 Channel Bandwidth: 1.4MHz	QPSK: 1M09G7D
		16QAM: 1M09W7D
		64QAM: /
	LTE Band 12 Channel Bandwidth: 3MHz	QPSK: 2M70G7D
		16QAM: 2M70W7D
		64QAM: /
	LTE Band 12 Channel Bandwidth: 5MHz	QPSK: 4M50G7D
		16QAM: 4M50W7D

EMISSION DESIGNATOR		64QAM: /
	LTE Band 12 Channel Bandwidth: 10MHz	QPSK: 9M00G7D
		16QAM: 9M01W7D
		64QAM: /
	LTE Band 13 Channel Bandwidth: 5MHz	QPSK: 4M51G7D
		16QAM: 4M50W7D
		64QAM: /
	LTE Band 13 Channel Bandwidth: 10MHz	QPSK: 8M94G7D
		16QAM: 8M95W7D
		64QAM: /
ANTENNA TYPE	Fixed Internal Antenna with -2.98dBi gain for WCDMA IV Fixed Internal Antenna with -2.98dBi gain for LTE4 Fixed Internal Antenna with -1.96dBi gain for LTE7 Fixed Internal Antenna with -1.39dBi gain for LTE12 Fixed Internal Antenna with -2.91dBi gain for LTE13	
HW VERSION	1.4	
SW VERSION	D1.11.01.01	
I/O PORTS	Refer to user's manual	
CABLE SUPPLIED	N/A	
EXTREME TEMPERATURE	-40-85 °C	
EXTREME VOLTAGE	9V – 16V	

NOTE:

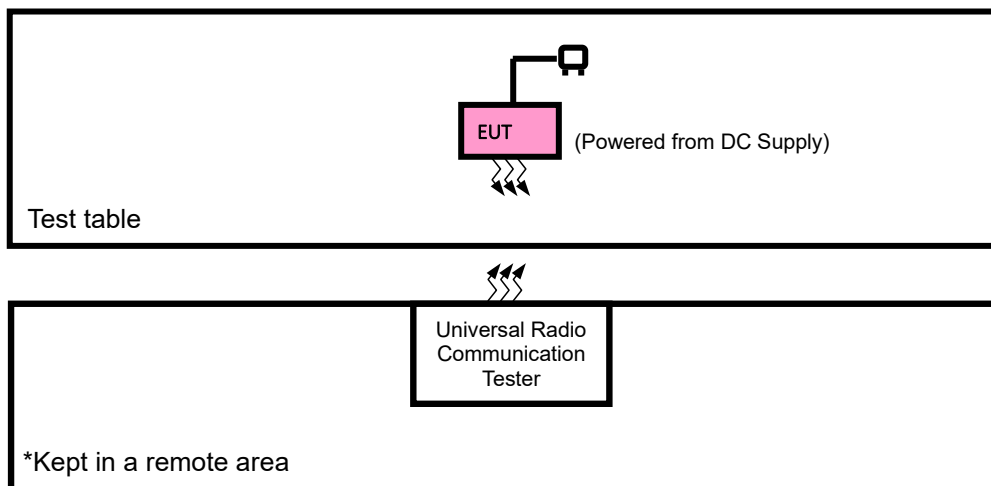
- For a more detailed features description, please refer to the manufacturer's specifications or the user's manual.
- The EUT incorporates a SISO function. Physically, the EUT provides one completed transmitter and one receiver.

MODULATION MODE	TX FUNCTION
WCDMA	1TX/1RX
LTE	1TX/1RX

- For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.

2.2 CONFIGURATION OF SYSTEM UNDER TEST

FOR RADIATION EMISSION TEST



2.3 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.

NO.	PRODUCT	BRAND	MODEL NO.	SERIAL NO.	FCC ID
1	DC source	LONG WEI	PS-6403D	010934269	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.8m

2.4 TEST ITEM AND TEST CONFIGURATION

Pre-Scan has been conducted to determine the worst-case mode from all possible combinations between available modulations, data rates, XYZ axis and antenna ports. The worst case was found when positioned on Y-plane for EIRP and X-axis for radiated emission. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	EUT + DC Supply with WCDMA or LTE link

WCDMA MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	MODE
A	EIRP	1312 to 1513	1312, 1413, 1513	WCDMA
A	FREQUENCY STABILITY	1312 to 1513	1312, 1413, 1513	WCDMA
A	OCCUPIED BANDWIDTH	1312 to 1513	1312, 1413, 1513	WCDMA
A	BAND EDGE	1312 to 1513	1312, 1513	WCDMA
A	PEAK TO AVERAGE RATIO	1312 to 1513	1312, 1413, 1513	WCDMA
A	CONDUCTED EMISSION	1312 to 1513	1312, 1413, 1513	WCDMA
A	RADIATED EMISSION	1312 to 1513	1312, 1413, 1513	WCDMA

LTE BAND4 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	EIRP	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK,16QAM	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK,16QAM	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15MHz	QPSK,16QAM	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK,16QAM	1 RB / 0 RB Offset
A	FREQUENCY STABILITY	20050 to 20300	20050, 20175, 20300	20MHz	QPSK	100 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK,16QAM	6 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK,16QAM	15 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15MHz	QPSK,16QAM	75 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK,16QAM	100 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	20050 to 20300	20050, 20175, 20300	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset 100 RB / 0 RB Offset
A	BAND EDGE	19957 to 20393	19957	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset 6 RB / 0 RB Offset
			20393	1.4MHz	QPSK, 16QAM	1 RB / 5 RB Offset 6 RB / 0 RB Offset
		19965 to 20385	19965	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset 15 RB / 0 RB Offset
			20385	3MHz	QPSK, 16QAM	1 RB / 14 RB Offset 15 RB / 0 RB Offset
		19975 to 20375	19975	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset 25 RB / 0 RB Offset
			20375	5MHz	QPSK, 16QAM	1 RB / 24 RB Offset 25 RB / 0 RB Offset
		20000 to 20350	20000	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset
			20350	10MHz	QPSK, 16QAM	1 RB / 49 RB Offset 50 RB / 0 RB Offset

A	BAND EDGE	20025 to 20325	20025	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
			20325	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		20050 to 20300	20050	20MHz	QPSK, 16QAM	1 RB / 74 RB Offset
			20300	20MHz	QPSK, 16QAM	75 RB / 0 RB Offset
						1 RB / 0 RB Offset
						100 RB / 0 RB Offset
A	CONDUCTED EMISSION	19957 to 20393	19957, 20175, 20393	1.4MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	19975, 20175, 20375	5MHz	QPSK	1 RB / 0 RB Offset
		20000 to 20350	20000, 20175, 20350	10MHz	QPSK	1 RB / 0 RB Offset
		20025 to 20325	20025, 20175, 20325	15MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20050, 20175, 20300	20MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	19957 to 20393	20175	1.4MHz	QPSK	1 RB / 0 RB Offset
		19965 to 20385	19965, 20175, 20385	3MHz	QPSK	1 RB / 0 RB Offset
		19975 to 20375	20175	5MHz	QPSK	1 RB / 0 RB Offset
		20000 to 20350	20175	10MHz	QPSK	1 RB / 0 RB Offset
		20025 to 20325	20175	15MHz	QPSK	1 RB / 0 RB Offset
		20050 to 20300	20175	20MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

LTE BAND 7 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDT H	MODULATION	MODE
A	EIRP	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	1 RB / 0RB Offset
		20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	FREQUENCY STABILITY	20850 to 21350	20850, 21100, 21350	20MHz	QPSK	25 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	20775 to 21425	20775, 21100, 21425	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
		20825 to 21375	20825, 21100, 21375	15MHz	QPSK, 16QAM	75 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	100 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	20850 to 21350	20850, 21100, 21350	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset 100 RB / 0 RB Offset
A	BAND EDGE	20775 to 21425	20775	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset 25 RB / 0 RB Offset
			21425	5MHz	QPSK, 16QAM	1 RB / 24 RB Offset 25 RB / 0 RB Offset
		20800 to 21400	20800	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset
			21400	10MHz	QPSK, 16QAM	1 RB / 49 RB Offset 50 RB / 0 RB Offset
		20825 to 21375	20825	15MHz	QPSK, 16QAM	1 RB / 0 RB Offset 75 RB / 0 RB Offset
			21375	15MHz	QPSK, 16QAM	1 RB / 74 RB Offset 75 RB / 0 RB Offset
		20850 to 21350	20850	20MHz	QPSK, 16QAM	1 RB / 0 RB Offset 100 RB / 0 RB Offset
			21350	20MHz	QPSK, 16QAM	1 RB / 99 RB Offset 100 RB / 0 RB Offset
A	CONDCUDE TED EMISSION	20775 to 21425	20775, 21100, 21425	5MHz	QPSK	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK	1 RB / 0RB Offset
		20825 to 21375	20825, 21100, 21375	15MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	20850, 21100, 21350	20MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	20775 to 21425	21100	5MHz	QPSK	1 RB / 0 RB Offset
		20800 to 21400	20800, 21100, 21400	10MHz	QPSK	1 RB / 0 RB Offset
		20825 to 21375	21100	15MHz	QPSK	1 RB / 0 RB Offset
		20850 to 21350	21100	20MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

LTE BAND 12 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	FREQUENCY STABILITY	23060 to 23130	23060, 23095, 23130	10MHz	QPSK	50 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK, 16QAM	6 RB / 0 RB Offset
		23025 to 23165	23025, 23095, 23165	3MHz	QPSK, 16QAM	15 RB / 0 RB Offset
		23035 to 23155	23035, 23095, 23155	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	23060 to 23130	23060, 23095, 23130	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset
A	BAND EDGE	23017 to 23173	23017	1.4MHz	QPSK, 16QAM	1 RB / 0 RB Offset 6 RB / 0 RB Offset
			23173	1.4MHz	QPSK, 16QAM	1 RB / 5 RB Offset 6 RB / 0 RB Offset
			23025	3MHz	QPSK, 16QAM	1 RB / 0 RB Offset 15 RB / 0 RB Offset
			23165	3MHz	QPSK, 16QAM	1 RB / 14 RB Offset 15 RB / 0 RB Offset
		23035 to 23155	23035	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset 25 RB / 0 RB Offset
			23155	5MHz	QPSK, 16QAM	1 RB / 24 RB Offset 25 RB / 0 RB Offset
		23060 to 23130	23060	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset
			23130	10MHz	QPSK, 16QAM	1 RB / 49 RB Offset 50 RB / 0 RB Offset
		23017 to 23173	23017, 23095, 23173	1.4MHz	QPSK	1 RB / 0 RB Offset
			23025, 23095, 23165	3MHz	QPSK	1 RB / 0 RB Offset
			23035, 23095, 23155	5MHz	QPSK	1 RB / 0 RB Offset
			23060, 23095, 23130	10MHz	QPSK	1 RB / 0 RB Offset
A	CONDCUDED EMISSION	23017 to 23173	23095	1.4MHz	QPSK	1 RB / 0 RB Offset
		23025 to 23165	23095	3MHz	QPSK	1 RB / 0 RB Offset
		23035 to 23155	23095	5MHz	QPSK	1 RB / 0 RB Offset
		23060 to 23130	23060, 23095, 23130	10MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

LTE BAND 13 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	23205 to 23255	23205, 20175, 23255	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset
A	FREQUENCY STABILITY	23230	23230	10MHz	QPSK	50 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	23205 to 23255	23205, 20175, 23255	5MHz	QPSK, 16QAM	25 RB / 0 RB Offset
		23230	23230	10MHz	QPSK, 16QAM	50 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	23230	23230	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset
A	BAND EDGE	23205 to 23255	23205	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset 25 RB / 0 RB Offset
			23255	5MHz	QPSK, 16QAM	1 RB / 24 RB Offset 25 RB / 0 RB Offset
		23230	23230	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset 1 RB / 49 RB Offset 50 RB / 0 RB Offset
A	CONDCUDED EMISSION	23205 to 23255	23205, 20175, 23255	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	23205 to 23255	23205, 20175, 23255	5MHz	QPSK	1 RB / 0 RB Offset
		23230	23230	10MHz	QPSK	1 RB / 0 RB Offset

Note: This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.



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TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP&EIRP	23deg. C, 70%RH	DC 12V By DC Supply	Jace Hu
FREQUENCY STABILITY	23deg. C, 70%RH	DC 9V/12V/16V By DC Supply	James Fu
OCCUPIED BANDWIDTH	23deg. C, 70%RH	DC 12V By DC Supply	James Fu
BAND EDGE	23deg. C, 70%RH	DC 12V By DC Supply	James Fu
CONDCUDED EMISSION	23deg. C, 70%RH	DC 12V By DC Supply	James Fu
RADIATED EMISSION	23deg. C, 70%RH	DC 12V By DC Supply	Jace Hu
PEAK TO AVERAGE RATIO	23deg. C, 70%RH	DC 12V By DC Supply	James Fu



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2.5 GENERAL DESCRIPTION OF APPLIED STANDARDS

The EUT is a RF product. According to the specifications of the manufacturer, it must comply with the requirements of the following standards:

FCC 47 CFR Part 2

FCC 47 CFR Part 27

KDB 971168 D01 Power Meas License Digital Systems v03r01

ANSI/TIA/EIA-603-D

ANSI/TIA/EIA-603-E

ANSI C63.26-2015

NOTE: All test items have been performed and recorded as per the above standards.

3 TEST TYPES AND RESULTS

3.1 OUTPUT POWER MEASUREMENT

3.1.1 LIMITS OF OUTPUT POWER MEASUREMENT

The radiated peak output power shall be according to the specific rule Part 27.50(h)(2) that “User stations are limited to 2 watts” and 27.50(i) specific that “Peak transmit power must be measure over any interval of continuous transmission using instrumentation calibration in terms of rms-equivalent voltage.”

Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP

According to the specific rule Part 27.50(b)(10) and 27.50(c)(10) Fixed, mobile, and Portable stations (hand-held devices) transmitting in the 698-746 MHz, 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP.

3.1.2 TEST PROCEDURES

EIRP MEASUREMENT:

Per KDB 971168 D01 Power Meas License Digital Systems v03r01 or subclause 5.2.5.5 of ANSI C63.26-2015, the relevant equation for determining the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

$$\text{ERP or EIRP} = P_{\text{Meas}} + G_{\text{T}} - L_{\text{C}}$$

Where:

ERP or EIRP = effective radiated power or equivalent isotropically radiated power, respectively

(Expressed in the same units as P_{Meas} , typically dBW or dBm);

P_{Meas} = measured transmitter output power or PSD, in dBm or dBW;

G_{T} = gain of the transmitting antenna, in dBd (ERP) or dBi (EIRP);

L_{C} = signal attenuation in the connecting cable between the transmitter and antenna, in dB.

CONDUCTED POWER MEASUREMENT:

- The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
- Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.



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3.1.3 TEST SETUP

CONDUCTED POWER MEASUREMENT:



For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.1.4 TEST RESULTS

AVERAGE CONDUCTED OUTPUT POWER (dBm)

Band	WCDMA IV		
Channel	1312	1413	1513
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	19.84	19.91	19.57
HSDPA Subtest-1	19.42	19.42	19.12
HSDPA Subtest-2	19.38	19.46	19.08
HSDPA Subtest-3	19.00	19.03	18.72
HSDPA Subtest-4	19.01	19.06	18.69
DC-HSDPA Subtest-1	19.42	19.43	19.12
DC-HSDPA Subtest-2	19.36	19.49	19.09
DC-HSDPA Subtest-3	18.92	18.97	18.65
DC-HSDPA Subtest-4	18.90	18.93	18.63
HSUPA Subtest-1	19.42	19.42	19.09
HSUPA Subtest-2	18.48	18.56	18.25
HSUPA Subtest-3	18.92	18.92	18.59
HSUPA Subtest-4	18.59	18.66	18.31
HSUPA Subtest-5	19.38	19.46	19.09

LTE Band 4

Band/BW	Modulation	RB Size	RB Offset	Low CH 19957	Mid CH 20175	High CH 20393
				Frequency 1710.7 MHz	Frequency 1732.5 MHz	Frequency 1754.3 MHz
4/ 1.4	QPSK	1	0	19.69	19.75	19.83
		1	2	19.00	19.08	19.16
		1	5	19.17	19.23	19.36
		3	0	19.39	19.46	19.56
		3	1	19.05	19.15	19.21
		3	3	18.98	19.02	19.12
		6	0	18.24	18.31	18.37
	16QAM	1	0	18.37	18.44	18.56
		1	2	18.04	18.12	18.24
		1	5	18.00	18.01	18.22
		3	0	18.22	18.35	18.41
		3	1	17.90	18.04	18.11
		3	3	18.03	18.08	18.16
		6	0	17.11	17.28	17.31

Band/BW	Modulation	RB Size	RB Offset	Low CH 19965	Mid CH 20175	High CH 20385
				Frequency 1711.5 MHz	Frequency 1732.5 MHz	Frequency 1753.5 MHz
4/ 3	QPSK	1	0	19.64	19.74	19.80
		1	7	18.96	19.09	19.16
		1	14	19.11	19.28	19.35
		8	0	18.37	18.53	18.56
		8	3	18.02	18.12	18.21
		8	7	17.95	18.09	18.16
		15	0	18.20	18.32	18.35
	16QAM	1	0	18.40	18.43	18.60
		1	7	17.98	18.16	18.21
		1	14	18.02	18.03	18.21
		8	0	17.24	17.33	17.41
		8	3	16.92	16.97	17.14
		8	7	17.06	17.11	17.09
		15	0	17.12	17.22	17.30

Band/BW	Modulation	RB Size	RB Offset	Low CH 19975	Mid CH 20175	High CH 20375
				Frequency 1712.5 MHz	Frequency 1732.5 MHz	Frequency 1752.5 MHz
4/ 5	QPSK	1	0	19.65	19.73	19.84
		1	12	18.99	19.09	19.13
		1	24	19.11	19.29	19.36
		12	0	18.41	18.49	18.57
		12	6	18.00	18.15	18.24
		12	13	17.96	18.05	18.16
		25	0	18.17	18.35	18.34
	16QAM	1	0	18.40	18.43	18.59
		1	12	17.98	18.14	18.18
		1	24	17.99	18.07	18.17
		12	0	17.19	17.35	17.44
		12	6	16.92	16.98	17.11
		12	13	17.00	17.08	17.15
		25	0	17.09	17.28	17.30

Band/BW	Modulation	RB Size	RB Offset	Low CH 20000	Mid CH 20175	High CH 20350
				Frequency 1715 MHz	Frequency 1732.5 MHz	Frequency 1750 MHz
4/ 10	QPSK	1	0	19.62	19.77	19.80
		1	24	19.00	19.08	19.16
		1	49	19.17	19.23	19.36
		25	0	18.39	18.46	18.56
		25	12	18.05	18.15	18.21
		25	25	17.96	18.02	18.12
		50	0	18.22	18.31	18.37
	16QAM	1	0	18.40	18.44	18.56
		1	24	18.00	18.12	18.24
		1	49	18.03	18.01	18.22
		25	0	17.18	17.36	17.41
		25	12	16.96	16.97	17.15
		25	25	16.99	17.09	17.12
		50	0	17.14	17.24	17.34

Band/BW	Modulation	RB Size	RB Offset	Low CH 20025	Mid CH 20175	High CH 20325
				Frequency 1717.5 MHz	Frequency 1732.5 MHz	Frequency 1747.5 MHz
4/ 15	QPSK	1	0	19.66	19.78	19.79
		1	37	19.01	19.13	19.14
		1	74	19.13	19.25	19.40
		36	0	18.44	18.52	18.53
		36	19	17.98	18.10	18.27
		36	39	18.02	18.06	18.15
		75	0	18.22	18.36	18.33
	16QAM	1	0	18.38	18.46	18.59
		1	37	18.00	18.18	18.23
		1	74	18.03	18.01	18.22
		36	0	17.18	17.36	17.41
		36	19	16.95	16.99	17.14
		36	39	17.06	17.08	17.09
		75	0	17.11	17.27	17.32

Band/BW	Modulation	RB Size	RB Offset	Low CH 20050	Mid CH 20175	High CH 20300
				Frequency 1720 MHz	Frequency 1732.5 MHz	Frequency 1745 MHz
4/ 20	QPSK	1	0	19.70	19.81	19.85
		1	50	19.03	19.14	19.18
		1	99	19.19	19.30	19.41
		50	0	18.45	18.54	18.58
		50	25	18.06	18.17	18.29
		50	50	18.03	18.10	18.18
		100	0	18.25	18.37	18.39
	16QAM	1	0	18.42	18.51	18.61
		1	50	18.06	18.20	18.26
		1	99	18.05	18.09	18.23
		50	0	17.26	17.40	17.46
		50	25	16.98	17.05	17.16
		50	50	17.07	17.13	17.17
		100	0	17.17	17.30	17.36



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LTE Band 7

Band/BW	Modulation	RB Size	RB Offset	Low CH 20775	Mid CH 21100	High CH 21425
				Frequency 2502.5 MHz	Frequency 2535 MHz	Frequency 2567.5 MHz
7/ 5	QPSK	1	0	19.11	18.93	18.97
		1	12	18.53	18.43	18.51
		1	24	18.96	18.76	18.94
		12	0	17.59	17.42	17.51
		12	6	17.74	17.58	17.77
		12	13	17.62	17.46	17.60
		25	0	17.94	17.76	17.91
	16QAM	1	0	17.58	17.38	17.53
		1	12	17.65	17.57	17.62
		1	24	17.70	17.53	17.70
		12	0	16.93	16.71	16.85
		12	6	16.75	16.59	16.78
		12	13	16.86	16.75	16.75
		25	0	16.87	16.75	16.86

Band/BW	Modulation	RB Size	RB Offset	Low CH 20800	Mid CH 21100	High CH 21400
				Frequency 2505 MHz	Frequency 2535 MHz	Frequency 2565 MHz
7/ 10	QPSK	1	0	19.09	18.90	19.00
		1	24	18.59	18.36	18.55
		1	49	18.92	18.77	18.90
		25	0	17.63	17.36	17.55
		25	12	17.73	17.59	17.74
		25	25	17.67	17.42	17.63
		50	0	17.94	17.77	17.88
	16QAM	1	0	17.60	17.36	17.59
		1	24	17.70	17.57	17.60
		1	49	17.72	17.50	17.66
		25	0	16.98	16.72	16.88
		25	12	16.80	16.56	16.79
		25	25	16.86	16.73	16.76
		50	0	16.93	16.68	16.87

Band/BW	Modulation	RB Size	RB Offset	Low CH 20825	Mid CH 21100	High CH 21375
				Frequency 2507.5 MHz	Frequency 2535 MHz	Frequency 2562.5 MHz
7/ 15	QPSK	1	0	19.14	18.96	18.94
		1	37	18.54	18.36	18.50
		1	74	18.97	18.75	18.93
		36	0	17.63	17.37	17.51
		36	19	17.75	17.55	17.77
		36	39	17.68	17.40	17.64
		75	0	17.88	17.80	17.88
	16QAM	1	0	17.64	17.36	17.60
		1	37	17.63	17.55	17.63
		1	74	17.74	17.52	17.70
		36	0	16.97	16.71	16.85
		36	19	16.76	16.56	16.78
		36	39	16.93	16.75	16.73
		75	0	16.90	16.68	16.82

Band/BW	Modulation	RB Size	RB Offset	Low CH 20850	Mid CH 21100	High CH 21350
				Frequency 2510 MHz	Frequency 2535 MHz	Frequency 2560 MHz
7/ 20	QPSK	1	0	19.15	18.98	19.02
		1	50	18.61	18.44	18.56
		1	99	19.00	18.81	18.95
		50	0	17.65	17.44	17.56
		50	25	17.81	17.63	17.79
		50	50	17.70	17.48	17.65
		100	0	17.96	17.84	17.93
	16QAM	1	0	17.66	17.44	17.61
		1	50	17.71	17.59	17.68
		1	99	17.77	17.58	17.72
		50	0	16.99	16.78	16.90
		50	25	16.82	16.64	16.80
		50	50	16.94	16.77	16.81
		100	0	16.95	16.76	16.88



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LTE Band 12

Band/BW	Modulation	RB Size	RB Offset	Low CH 23017	Mid CH 23095	High CH 23173
				Frequency 699.7 MHz	Frequency 707.5 MHz	Frequency 715.3 MHz
12/ 1.4	QPSK	1	0	22.20	22.03	22.21
		1	2	22.35	22.07	22.34
		1	5	22.18	21.91	22.17
		3	0	22.06	21.84	22.07
		3	1	22.19	22.06	22.13
		3	3	22.25	22.02	22.25
		6	0	21.22	21.02	21.20
	16QAM	1	0	20.88	20.69	20.91
		1	2	21.12	20.93	21.13
		1	5	20.95	20.67	20.97
		3	0	20.95	20.77	20.92
		3	1	21.09	21.01	21.10
		3	3	21.21	21.03	21.27
		6	0	20.16	20.00	20.16

Band/BW	Modulation	RB Size	RB Offset	Low CH 23025	Mid CH 23095	High CH 23165
				Frequency 700.5 MHz	Frequency 707.5 MHz	Frequency 714.5 MHz
12/ 3	QPSK	1	0	22.22	22.05	22.20
		1	7	22.31	22.08	22.34
		1	14	22.14	21.91	22.17
		8	0	21.05	20.87	21.07
		8	3	21.12	21.06	21.15
		8	7	21.22	21.09	21.29
		15	0	21.19	21.03	21.14
	16QAM	1	0	20.85	20.75	20.94
		1	7	21.09	20.96	21.11
		1	14	20.98	20.67	20.97
		8	0	19.91	19.78	19.92
		8	3	20.14	19.96	20.13
		8	7	20.23	20.01	20.23
		15	0	20.16	19.94	20.19

Band/BW	Modulation	RB Size	RB Offset	Low CH 23035	Mid CH 23095	High CH 23155
				Frequency 701.5 MHz	Frequency 707.5 MHz	Frequency 713.5 MHz
12/ 5	QPSK	1	0	22.23	22.00	22.21
		1	12	22.36	22.05	22.34
		1	24	22.15	21.90	22.21
		12	0	21.08	20.87	21.04
		12	6	21.12	21.07	21.16
		12	13	21.26	21.05	21.30
		25	0	21.17	21.06	21.17
	16QAM	1	0	20.86	20.71	20.94
		1	12	21.06	20.99	21.10
		1	24	20.98	20.67	20.96
		12	0	19.91	19.76	19.89
		12	6	20.11	20.00	20.09
		12	13	20.18	20.03	20.26
		25	0	20.16	19.95	20.16

Band/BW	Modulation	RB Size	RB Offset	Low CH 23060	Mid CH 23095	High CH 23130
				Frequency 704 MHz	Frequency 707.5 MHz	Frequency 711 MHz
12/ 10	QPSK	1	0	22.28	22.07	22.26
		1	24	22.38	22.13	22.36
		1	49	22.20	21.98	22.22
		25	0	21.12	20.92	21.09
		25	12	21.20	21.08	21.21
		25	25	21.30	21.10	21.31
		50	0	21.23	21.08	21.22
	16QAM	1	0	20.93	20.76	20.96
		1	24	21.14	21.01	21.15
		1	49	21.00	20.75	20.98
		25	0	19.99	19.82	19.97
		25	12	20.17	20.02	20.15
		25	25	20.25	20.08	20.28
		50	0	20.22	20.02	20.21



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LTE Band 13

Band/BW	Modulation	RB Size	RB Offset	Low CH 23205	Mid CH 23230	High CH 23255
				Frequency 779.5 MHz	Frequency 782.0 MHz	Frequency 784.5 MHz
13/ 5	QPSK	1	0	22.13	22.17	22.16
		1	12	22.24	22.18	22.25
		1	24	22.38	22.42	22.41
		12	0	20.91	20.88	20.92
		12	6	21.01	20.96	20.98
		12	13	20.96	20.94	21.00
		25	0	20.97	20.96	20.90
	16QAM	1	0	20.77	20.76	20.78
		1	12	21.21	21.18	21.22
		1	24	21.00	20.95	20.97
		12	0	19.80	19.78	19.84
		12	6	19.94	19.88	19.95
		12	13	19.84	19.88	19.87
		25	0	19.91	19.85	19.92

Band/BW	Modulation	RB Size	RB Offset	/	Mid CH 23230	/
				/	Frequency 782.0 MHz	/
13/ 10	QPSK	1	0	/	22.21	/
		1	24	/	22.26	/
		1	49	/	22.46	/
		25	0	/	20.94	/
		25	12	/	21.03	/
		25	25	/	21.02	/
		50	0	/	20.98	/
	16QAM	1	0	/	20.84	/
		1	24	/	21.24	/
		1	49	/	21.02	/
		25	0	/	19.86	/
		25	12	/	19.96	/
		25	25	/	19.92	/
		50	0	/	19.93	/

EIRP

WCDMA IV

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
1312	1712.4	19.84	-2.98	16.86	48.53	1
1413	1732.6	19.91	-2.98	16.93	49.32	1
1513	1752.6	19.57	-2.98	16.59	45.6	1

LTE BAND 4

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19957	1710.7	19.69	-2.98	16.71	46.88	1
20175	1732.5	19.75	-2.98	16.77	47.53	1
20393	1754.3	19.83	-2.98	16.85	48.42	1

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19957	1710.7	18.37	-2.98	15.39	34.59	1
20175	1732.5	18.44	-2.98	15.46	35.16	1
20393	1754.3	18.56	-2.98	15.58	36.14	1

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19965	1711.5	19.64	-2.98	16.66	46.34	1
20175	1732.5	19.74	-2.98	16.76	47.42	1
20385	1753.5	19.8	-2.98	16.82	48.08	1

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19965	1711.5	18.4	-2.98	15.42	34.83	1
20175	1732.5	18.02	-2.98	15.04	31.92	1
20385	1753.5	18.02	-2.98	15.04	31.92	1

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19975	1712.5	19.65	-2.98	16.67	46.45	1
20175	1732.5	19.73	-2.98	16.75	47.32	1
20375	1752.5	19.84	-2.98	16.86	48.53	1

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
19975	1712.5	18.4	-2.98	15.42	34.83	1
20175	1732.5	18.43	-2.98	15.45	35.08	1
20375	1752.5	18.59	-2.98	15.61	36.39	1

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20000	1715	19.62	-2.98	16.64	46.13	1
20175	1732.5	19.77	-2.98	16.79	47.75	1
20350	1750	19.8	-2.98	16.82	48.08	1

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20000	1715	18.4	-2.98	15.42	34.83	1
20175	1732.5	18.44	-2.98	15.46	35.16	1
20350	1750	18.56	-2.98	15.58	36.14	1

CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20025	1717.5	19.66	-2.98	16.68	46.56	1
20175	1732.5	19.78	-2.98	16.8	47.86	1
20325	1747.5	19.79	-2.98	16.81	47.97	1

CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20025	1717.5	18.38	-2.98	15.4	34.67	1
20175	1732.5	18.46	-2.98	15.48	35.32	1
20325	1747.5	18.59	-2.98	15.61	36.39	1

CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20050	1720	19.7	-2.98	16.72	46.99	1
20175	1732.5	19.81	-2.98	16.83	48.19	1
20300	1745	19.85	-2.98	16.87	48.64	1

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20050	1720	18.42	-2.98	15.44	34.99	1
20175	1732.5	18.51	-2.98	15.53	35.73	1
20300	1745	18.61	-2.98	15.63	36.56	1

LTE BAND 7

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20775	2502.5	19.11	-1.96	17.15	51.88	2
21100	2535.0	18.93	-1.96	16.97	49.77	2
21425	2567.5	18.97	-1.96	17.01	50.23	2

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20775	2502.5	17.7	-1.96	15.74	37.5	2
21100	2535.0	17.57	-1.96	15.61	36.39	2
21425	2567.5	17.7	-1.96	15.74	37.5	2

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20800	2505.0	19.09	-1.96	17.13	51.64	2
21100	2535.0	18.9	-1.96	16.94	49.43	2
21400	2565.0	19	-1.96	17.04	50.58	2

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20800	2505.0	17.72	-1.96	15.76	37.67	2
21100	2535.0	17.57	-1.96	15.61	36.39	2
21400	2565.0	17.66	-1.96	15.7	37.15	2

CHANNEL BANDWIDTH: 15MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20825	2507.5	19.14	-1.96	17.18	52.24	2
21100	2535.0	18.96	-1.96	17	50.12	2
21375	2562.5	18.94	-1.96	16.98	49.89	2

CHANNEL BANDWIDTH: 15MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20825	2507.5	17.74	-1.96	15.78	37.84	2
21100	2535.0	17.55	-1.96	15.59	36.22	2
21375	2562.5	17.7	-1.96	15.74	37.5	2

CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20850	2510.0	19.15	-1.96	17.19	52.36	2
21100	2535.0	18.98	-1.96	17.02	50.35	2
21350	2560.0	19.02	-1.96	17.06	50.82	2

CHANNEL BANDWIDTH: 20MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20850	2510.0	17.77	-1.96	15.81	38.11	2
21100	2535.0	17.59	-1.96	15.63	36.56	2
21350	2560.0	17.72	-1.96	15.76	37.67	2

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

LTE BAND 12

CHANNEL BANDWIDTH: 1.4MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23017	699.7	22.35	-1.39	18.81	76.03	3
23095	707.5	22.07	-1.39	18.53	71.29	3
23173	715.3	22.34	-1.39	18.8	75.86	3

CHANNEL BANDWIDTH: 1.4MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23017	699.7	21.21	-1.39	17.67	58.48	3
23095	707.5	21.03	-1.39	17.49	56.1	3
23173	715.3	21.27	-1.39	17.73	59.29	3

CHANNEL BANDWIDTH: 3MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23025	700.5	22.31	-1.39	18.77	75.34	3
23095	707.5	22.08	-1.39	18.54	71.45	3
23165	714.5	22.34	-1.39	18.8	75.86	3

CHANNEL BANDWIDTH: 3MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23025	700.5	21.09	-1.39	17.55	56.89	3
23095	707.5	20.96	-1.39	17.42	55.21	3
23165	714.5	21.11	-1.39	17.57	57.15	3

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23035	701.5	22.36	-1.39	18.82	76.21	3
23095	707.5	22.05	-1.39	18.51	70.96	3
23155	713.5	22.34	-1.39	18.8	75.86	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23035	701.5	21.06	-1.39	17.52	56.49	3
23095	707.5	20.99	-1.39	17.45	55.59	3
23155	713.5	21.1	-1.39	17.56	57.02	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23060	704	22.38	-1.39	18.84	76.56	3
23095	707.5	22.13	-1.39	18.59	72.28	3
23130	711	22.36	-1.39	18.82	76.21	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23060	704	21.14	-1.39	17.6	57.54	3
23095	707.5	21.01	-1.39	17.47	55.85	3
23130	711	21.15	-1.39	17.61	57.68	3

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).



**BUREAU
VERITAS**

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LTE BAND 13

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23205	779.5	22.38	-2.91	17.32	53.95	3
23230	782	22.42	-2.91	17.36	54.45	3
23255	784.5	22.41	-2.91	17.35	54.33	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23205	779.5	21.21	-2.91	16.15	41.21	3
23230	782	21.18	-2.91	16.12	40.93	3
23255	784.5	21.22	-2.91	16.16	41.3	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
-	-	-	-	-	-	-
23230	782	22.46	-2.91	17.4	54.95	3
-	-	-	-	-	-	-

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
-	-	-	-	-	-	-
23230	782	21.24	-2.91	16.18	41.5	3
-	-	-	-	-	-	-

REMARKS: ERP Output Power (dBm) = EIRP (dBm) -2.15(dB).

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

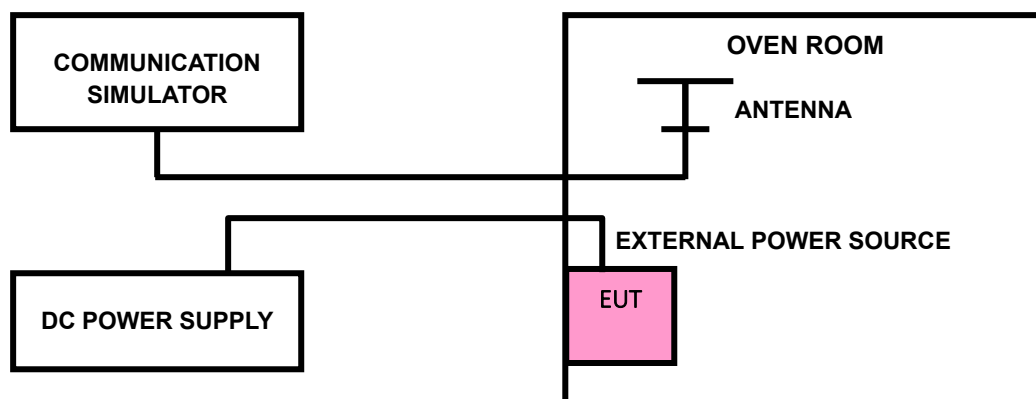
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

3.2.2 TEST PROCEDURE

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the $\pm 0.5^{\circ}\text{C}$ during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

NOTE: The frequency error was recorded frequency error from the communication simulator.

3.2.3 TEST SETUP





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3.2.4 TEST RESULTS

Please Refer to Appendix Of this test report.

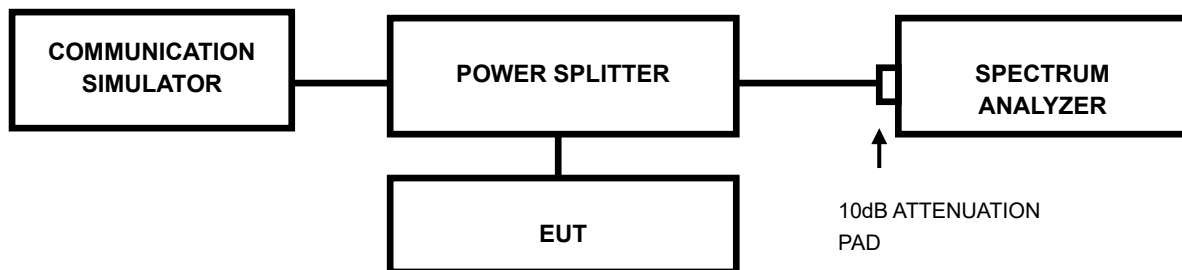
Note: VL = Low voltage(9V); VN/NV = Normal voltage(12V); VH = High voltage(16V);
NT = Normal temperature (25°C)

3.3 OCCUPIED BANDWIDTH MEASUREMENT

3.3.1 LIMITS OF OCCUPIED BANDWIDTH MEASUREMENT

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

3.3.2 TEST SETUP



3.3.3 TEST PROCEDURES

- The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.
- Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.



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3.3.4 TEST RESULTS

Please Refer to Appendix Of this test report.

3.4 BAND EDGE MEASUREMENT

3.4.1 LIMITS OF BAND EDGE MEASUREMENT

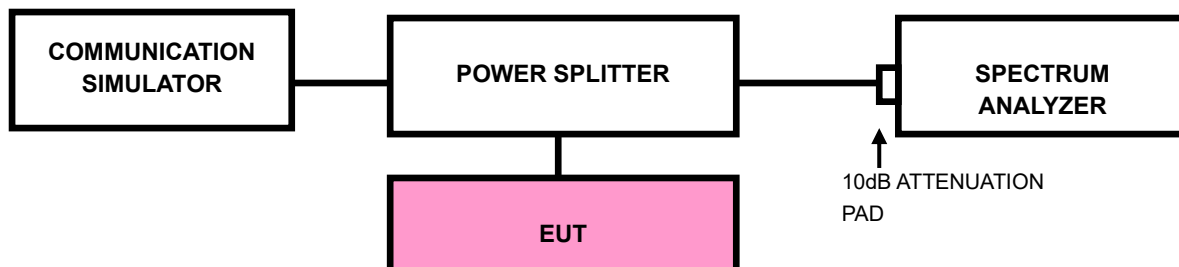
According to FCC 27.53(c) specified that For operations in the 746-758 MHz band and the 776-788 MHz band , the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed. In addition, the power of any unwanted emission in an 6.25kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P(dBW), by at least $65 + 10 \log 10p(P)$, dB, for mobile and portable equipment.

According to FCC 27.53(g) specified that For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

According to FCC 27.53(h) specified that For operations in the 1710-1755 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. However, in the 1 megahertz bands immediately outside and adjacent to the licensee's frequency block, a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed.

According to FCC 27.53(m)(4) specified that For mobile digital stations, the attenuation factor shall be not less than $40 + 10 \log (P)$ dB on all frequencies between the channel edge and 5 megahertz from the channel edge, $43 + 10 \log (P)$ dB on all frequencies between 5 megahertz and X megahertz from the channel edge, and $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that $43 + 10 \log (P)$ dB on all frequencies between 2490.5 MHz and 2496 MHz and $55 + 10 \log (P)$ dB at or below 2490.5 MHz. Mobile Satellite Service licensees operating on frequencies below 2495 MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS Channel 1 on the same terms and conditions as adjacent channel BRS or EBS licensees. For mobile digital stations, in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed.

3.4.2 TEST SETUP



3.4.3 TEST PROCEDURES

- a) All measurements were done at low and high operational frequency range
- b) Connect the transmitter to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.
- c) Tune the analyzer to the nominal center frequency of the emission bandwidth
(EBW)
- d) .Set the resolution bandwidth (RBW) $\geq 1\%$ EBW in the 1MHz band immediately outside and adjacent to the band edge.
- e) Beyond the 1MHz band from the band edge, RBW=1MHz was used.
- f) Set the video bandwidth (VBW) to $\geq 3 \times$ RBW.
- g) Select the average power (RMS) display detector.
- h) Set the number of measurement points to ≥ 1001 .
- i) Use auto-coupled sweep time.
- j) Perform the measurement over an interval of time when the transmission is continuous and at its maximum power level.
- k) The RF fundamental frequency should be excluded against the limit line in the operating frequency band and use RBW is 10KHz or 100KHz.
- l) Record the max trace plot into the test report.



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3.4.4 TEST RESULTS

Please Refer to Appendix Of this test report.

3.5 CONDUCTED SPURIOUS EMISSIONS

3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

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 emission limit equal to -13dBm .

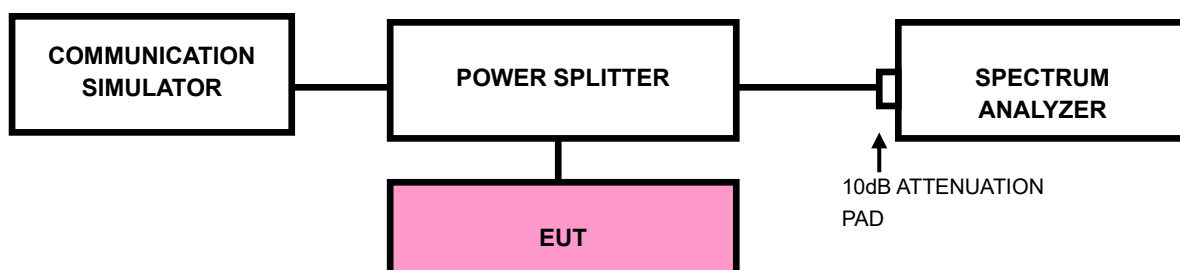
For: LTE Band7

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $55 + 10 \log_{10}(P)$ dB. The limit of emission is equal to -25dBm .

3.5.2 TEST PROCEDURE

- a. The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range.
- b. Measuring frequency range is from 9kHz up to a frequency including its 10th harmonic. 10dB attenuation pad is connected with spectrum. RBW=1MHz and VBW=3MHz is used for conducted emission measurement.

3.5.3 TEST SETUP





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3.5.4 TEST RESULTS

NOTE : The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

Please Refer to Appendix Of this test report.

3.6 RADIATED EMISSION MEASUREMENT

3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

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 emission limit equal to -13dBm .

For: LTE Band7

The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least $55 + 10 \log_{10}(P)$ dB. The limit of emission is equal to -25dBm .

For: LTE Band13

Emissions in the band 1559–1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

3.6.2 TEST PROCEDURES

- a. Substitution method is used for E.I.R.P measurement. In the semi-anechoic chamber, EUT placed on the 0.8m height of Turn Table, rotated the table around 360 degrees to search the maximum radiation power and receiver antenna shall be rotated vertical and horizontal polarization and moved height from 1m to 4m to find the maximum polar radiated power. The “Read Value” is the spectrum reading the maximum power value.
- b. The substitution horn antenna is substituted for EUT at the same position and signals generator export the CW signal to the substitution antenna via a TX cable. Rotated the Turn Table and moved receiving antenna to find the maximum radiation power. Adjust output power level of S.G to get a Value of spectrum reading equal to “Read Value “ of step a. Record the power level of S.G.
- c. $\text{EIRP} = \text{Output power level of S.G} - \text{TX cable loss} + \text{Antenna gain of substitution horn}$.
- d. E.R.P power can be calculated form E.I.R.P power by subtracting the gain of dipole, $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi}$.

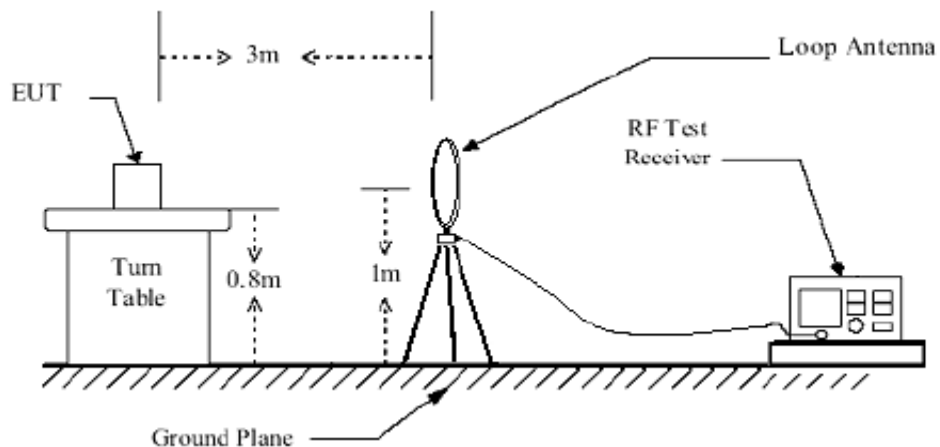
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.6.3 DEVIATION FROM TEST STANDARD

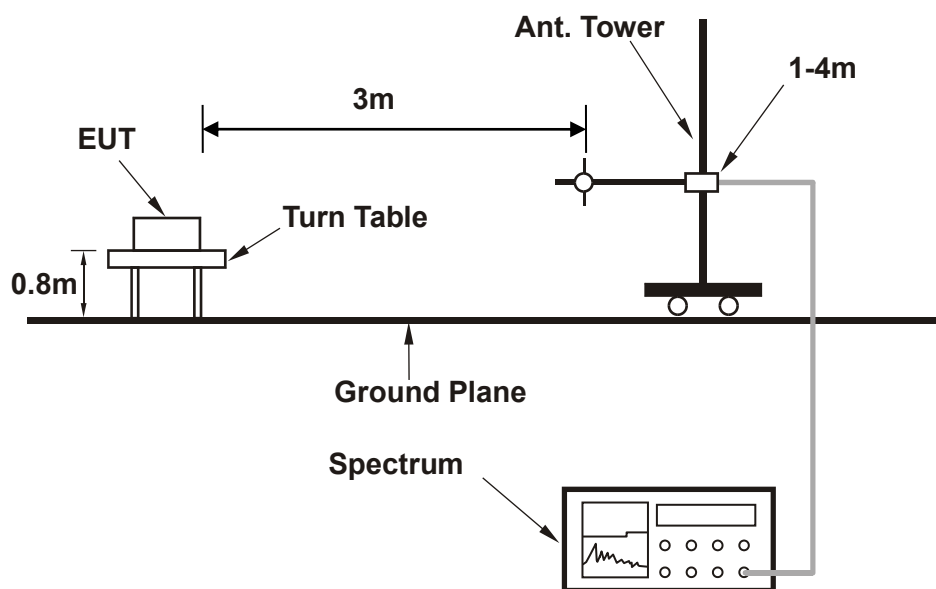
No deviation

3.6.4 TEST SETUP

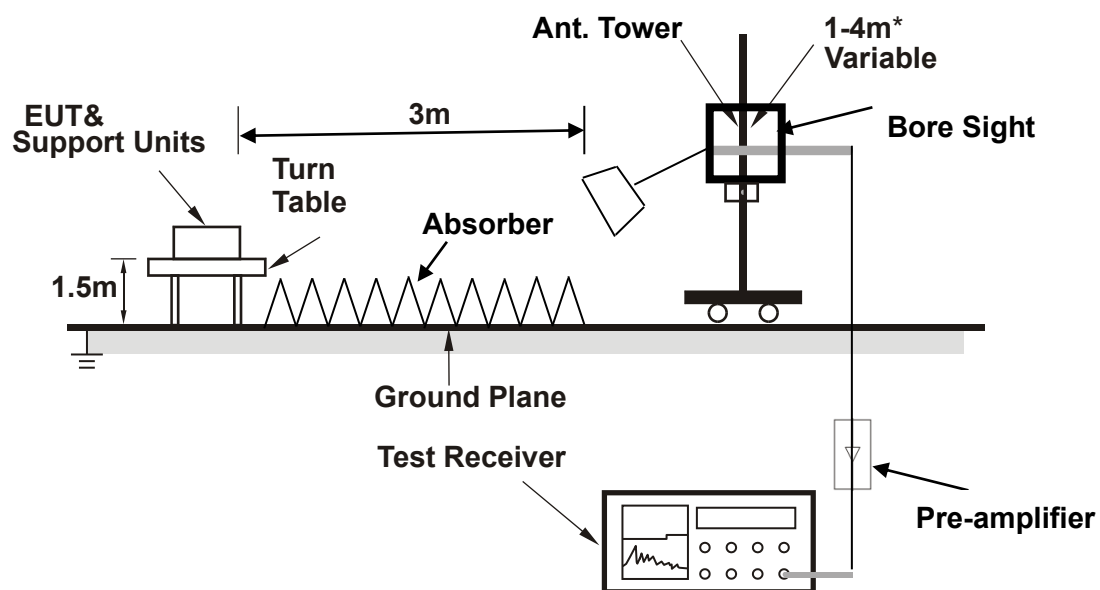
< Frequency Range below 30MHz >



< Frequency Range 30MHz~1GHz >



<Frequency Range above 1GHz>



Note: Above 1G is a directional antenna depends on the EUT height and the antenna 3dB beamwidth both, refer to section 7.3 of CISPR 16-2-3.

For the actual test configuration, please refer to the attached file (Test Setup Photo).

3.6.5 TEST RESULTS

NOTE : The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.

BELOW 1GHz WORST-CASE DATA

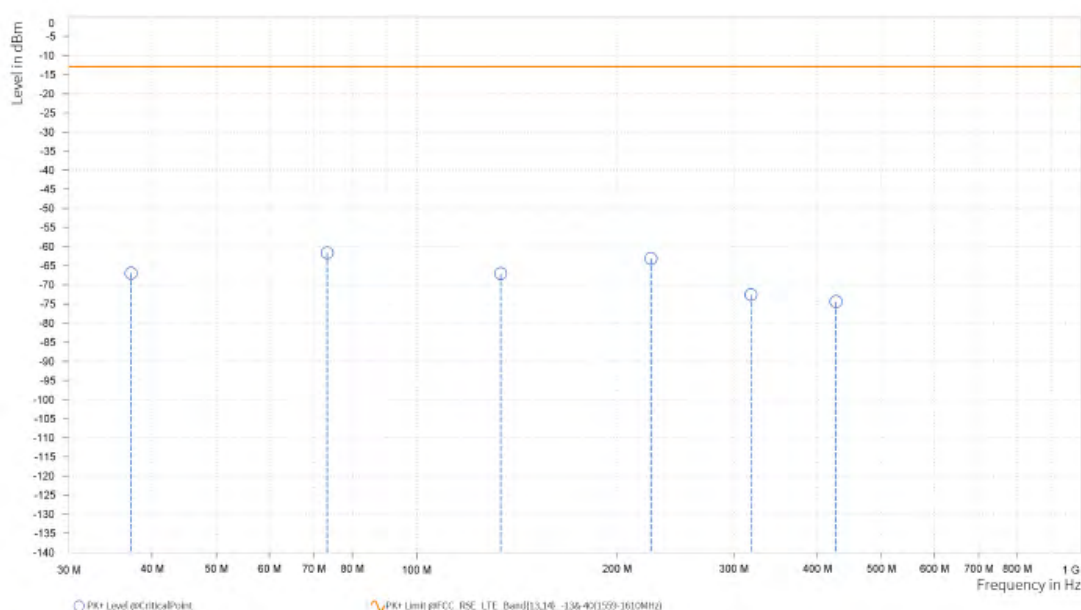
30 MHz – 1GHz data:

LTE Band 13

CHANNEL BANDWIDTH: 5MHz / QPSK

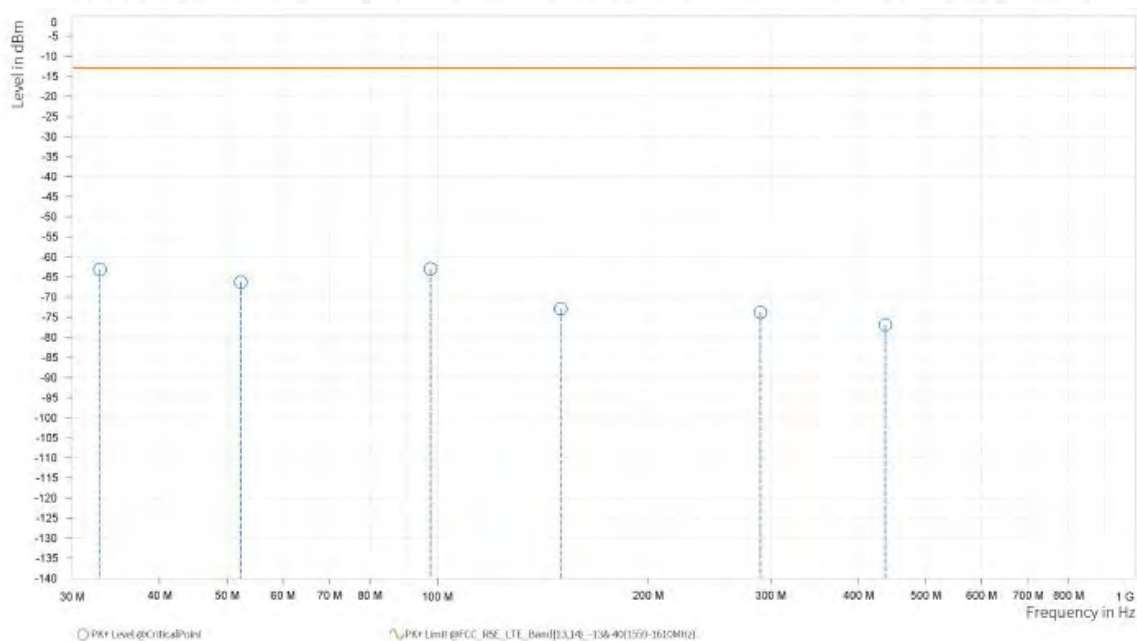
MODE	TX channel 20375	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC12V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	37.200	-66.93	-13.00	53.93	-0.50	H	297.3	2.00
1	73.350	-61.60	-13.00	48.60	-12.41	H	69	2.00
1	133.750	-67.05	-13.00	54.05	-14.22	H	102.4	2.00
1	225.050	-63.13	-13.00	50.13	-1.55	H	258.6	1.00
1	318.150	-72.60	-13.00	59.60	-4.73	H	291	1.00
1	427.000	-74.38	-13.00	61.38	2.09	H	1	1.00



MODE	TX channel 20375	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC12V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
1	32.850	-63.12	-13.00	50.12	-7.37	V	4.3	1.00
1	52.250	-66.22	-13.00	53.22	-7.27	V	4.3	1.00
1	97.700	-62.98	-13.00	49.98	2.06	V	1	1.00
1	149.950	-72.92	-13.00	59.92	-13.00	V	195.8	2.00
1	289.900	-73.75	-13.00	60.75	-1.62	V	229.2	2.00
1	437.400	-76.87	-13.00	63.87	1.51	V	92.6	1.00





**BUREAU
VERITAS**

Test Report No.: W7L-P23060003RF04

ABOVE 1GHz

Note: For higher frequency, the emission is too low to be detected.

WCDMA Band IV:

CH 1312

MODE	TX channel 1312	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC12V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

Rg	Frequency [MHz]	PK+ Level [dBm]	PK+ Limit [dBm]	PK+ Margin [dB]	Correction [dB]	Polarization	Azimuth [deg]	Antenna Height [m]
4	3,424.800	-47.76	-13.00	34.76	21.93	H	52.3	2
4	5,137.200	-48.71	-13.00	35.71	25.09	H	359.1	1

