



Test Report No.: W7L-221220W001RF03



FCC TEST REPORT (PART 27)

Applicant:	Continental Automotive Systems, Inc.
Address:	21440 W Lake Cook Rd., Deer Park, IL 60010, USA

Manufacturer or Supplier:	Continental Automotive Systems, Inc.
Address:	21440 W Lake Cook Rd., Deer Park, IL 60010, USA
Product:	HM28NA-001
Brand Name:	Continental Automotive Systems, Inc.
Model Name:	HM28NA-001
FCC ID:	LHJ-HM28NA001
Date of tests:	Dec. 20, 2022 ~ Apr. 10, 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: Apr. 10, 2023	Date: Apr. 10, 2023

This report is governed by, and incorporates by reference, the Conditions of Testing as posted at the date of issuance of this report at <http://www.bureauveritas.com/home/about-us/our-business/cps/about-us/terms-conditions/> and is intended for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. Measurement uncertainty is only provided upon request for accredited tests. Statements of conformity are based on simple acceptance criteria without taking measurement uncertainty into account, unless otherwise requested in writing. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence or if you require measurement uncertainty; provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents.



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WCDMA IV 92

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LTE BAND 12 143

LTE BAND 13 182



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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-221220W001RF03	Original release	Apr. 10, 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 TYPE AND LIMIT	RESULT	TEST LAB*
§2.1046	Conducted Output Power	Compliance	A
§27.50(b)(10) §27.50(c)(10)	Effective Radiated Power (Band 12) (Band 13) (Band 17)	Compliance	A
§27.50(d)(4) §27.50(h)(2)	Equivalent Isotropically Radiated Power (WCMDA Band 4)(Band 7)	Compliance	A
§2.1055 §27.54	Frequency Stability	Compliance	A
§2.1049	Occupied Bandwidth	Compliance	A
§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 7) (Band 12) (Band 13)	Compliance	A
§2.1051 §27.53(c)(2)(4) §27.53(f) §27.53(g) §27.53(h) §27.53(m)(4)(6)	Conducted Spurious Emissions (WCMDA Band 4)(Band 7) (Band 12) (Band 13) (Band 17)	Compliance	A
§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 7) (Band 12) (Band 13) (Band 17)	Compliance	A
§27.50(d)(5)	Peak to average ratio	Compliance	A



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***Test Lab Information Reference**

Lab A:

BV 7Layers Communications Technology (Shenzhen) Co., Ltd

Lab Address:

No.B102, Dazu Chuangxin Mansion, North of Beihuan Avenue, North Area, Hi-Tech Industrial Park,
Nanshan District, Shenzhen, Guangdong, China

Accredited Test Lab Cert 3939.01

The FCC Site Registration No. : 525120; Designation No. : CN1171;

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	±76.97Hz
Radiated emissions (9KHz~30MHz)	±2.68dB
Radiated emissions & Radiated Power (30MHz~1GHz)	±4.98dB
Radiated emissions & Radiated Power (1GHz ~6GHz)	±4.70dB
Radiated emissions (6GHz ~18GHz)	±4.60dB
Radiated emissions (18GHz ~40GHz)	±4.12dB
Conducted emissions	±4.01dB
Occupied Channel Bandwidth	±43.58KHz
Conducted Output power	±2.06dB
Band Edge Measurements	±4.70dB

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	Feb. 18,22	Feb. 17,23
MXE EMI Receiver	KEYSIGHT	N9038A-544	MY54450026	Feb. 17,23	Feb. 16,24
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.14,22	May.13,23
Loop Antenna	Schwarzbeck	FMZB 1519B	00173	Sep.03,22	Sep.02,23
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Mar. 06,22	Mar. 05,23
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Mar. 05,23	Mar. 04,24
Horn Antenna	ETS-LINDGREN	3117	00168692	Mar. 06,22	Mar. 05,23
Horn Antenna	ETS-LINDGREN	3117	00168692	Mar. 05,23	Mar. 04,24
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40- K-SG/QMS-003 61	15433	Sep.04, 22	Sep.03, 23
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 15,22	Feb. 14,23
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 14,23	Feb. 13,24
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May.12,22	May.11,23
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.12,22	May.11,23
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Feb. 18,22	Feb. 17,23
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Feb. 17,23	Feb.16,24
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn- CT0001143-121 6	May. 19,20	May. 18,23
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	N/A	May. 12,22	May. 11,23
Power Meter	Anritsu	ML2495A	1506002	Feb. 15,22	Feb. 14,23
Power Meter	Anritsu	ML2495A	1506002	Feb. 14,23	Feb. 13,24
Power Sensor	Anritsu	MA2411B	1339352	Feb. 15,22	Feb. 14,23
Power Sensor	Anritsu	MA2411B	1339352	Feb. 14,23	Feb. 13,24
Temperature Chamber	ESPEC	SH-242	93000855	May. 12,22	May. 11,23
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Feb. 15,22	Feb. 14,23
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Feb. 14,23	Feb. 13,24
Base station R&S CMW500	Rohde&Schwarz	CMW500	153085	May.12,22	May.11,23
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	HM28NA-001	
BRAND NAME	Continental Automotive Systems, Inc.	
MODEL NAME	HM28NA-001	
NOMINAL VOLTAGE	EUT 4.0V	
MODULATION TECHNOLOGY	WCDMA IV	BPSK, QPSK
	LTE	QPSK, 16QAM
FREQUENCY RANGE	WCDMA IV	1712.4MHz ~ 1752.6MHz
	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
	LTE Band 17 Channel Bandwidth: 5MHz	706.5MHz ~ 713.5MHz
	LTE Band 17 Channel Bandwidth: 10MHz	709MHz ~ 711 MHz

MAX. EIRP POWER	WCDMA IV	258.82mW
	LTE Band 7 Channel Bandwidth: 5MHz	484.17mW
	LTE Band 7 Channel Bandwidth: 10MHz	476.43mW
	LTE Band 7 Channel Bandwidth: 15MHz	476.43mW
	LTE Band 7 Channel Bandwidth: 20MHz	485.29mW
	LTE Band 12 Channel Bandwidth: 1.4MHz	150.31mW
	LTE Band 12 Channel Bandwidth: 3MHz	150.31mW
	LTE Band 12 Channel Bandwidth: 5MHz	150.31mW
	LTE Band 12 Channel Bandwidth: 10MHz	151.01mW
	LTE Band 13 Channel Bandwidth: 5MHz	154.17mW
	LTE Band 13 Channel Bandwidth: 10MHz	154.53mW
	LTE Band 17 Channel Bandwidth: 5MHz	123.88mW
	LTE Band 17 Channel Bandwidth: 10MHz	125.89mW
	EMISSION DESIGNATOR	WCDMA IV
LTE Band 7 Channel Bandwidth: 5MHz		QPSK: 4M51G7D
		16QAM: 4M50W7D
LTE Band 7 Channel Bandwidth: 10MHz		QPSK: 8M97G7D
		16QAM: 8M96W7D
LTE Band 7 Channel Bandwidth: 15MHz		QPSK: 13M4G7D
		16QAM: 13M4W7D
LTE Band 7 Channel Bandwidth: 20MHz		QPSK: 17M9G7D
		16QAM: 17M9W7D
LTE Band 12 Channel Bandwidth: 1.4MHz		QPSK: 1M09G7D
		16QAM: 1M09W7D
LTE Band 12 Channel Bandwidth: 3MHz		QPSK: 2M70G7D
		16QAM: 2M70W7D
LTE Band 12		QPSK: 4M50G7D



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	Channel Bandwidth: 5MHz	16QAM: 4M50W7D
	LTE Band 12 Channel Bandwidth: 10MHz	QPSK: 8M99G7D
		16QAM: 8M99W7D
	LTE Band 13 Channel Bandwidth: 5MHz	QPSK: 4M50G7D
		16QAM: 4M51W7D
	LTE Band 13 Channel Bandwidth: 10MHz	QPSK: 8M97G7D
		16QAM: 8M97W7D
	ANTENNA TYPE	Dipole Antenna with 0.68dBi gain for WCDMA IV Dipole Antenna with 3.35dBi gain for LTE7 Dipole Antenna with 0.62dBi gain for LTE12 Dipole Antenna with 0.82dBi gain for LTE13 Dipole Antenna with 0.62dBi gain for LTE17
HW VERSION	P4	
SW VERSION	MODEM9x28_64.01.20	
I/O PORTS	Refer to user's manual	
CABLE SUPPLIED	N/A	
EXTREME TEMPERATURE	-30 - 75 °C	
EXTREME VOLTAGE	3.8V – 4.2V	

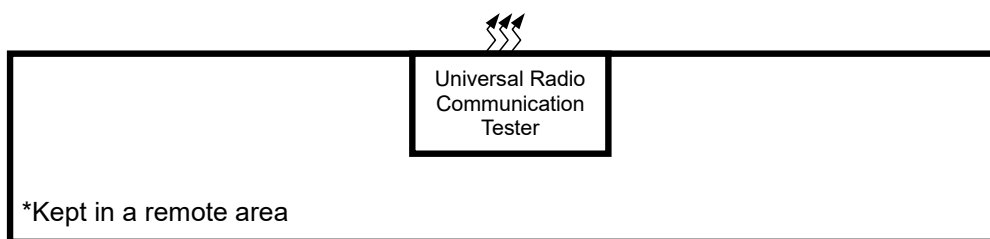
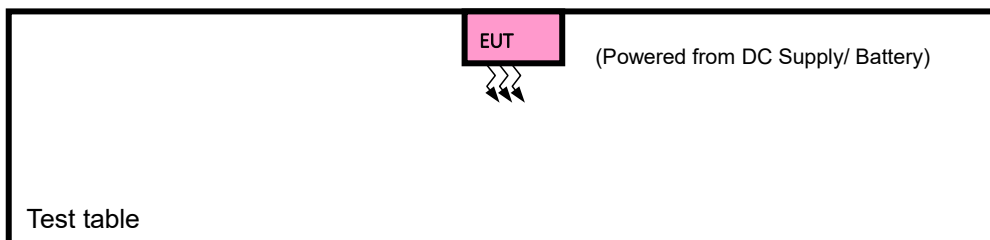
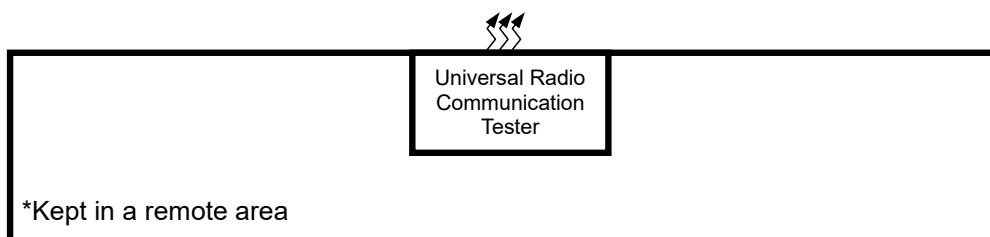
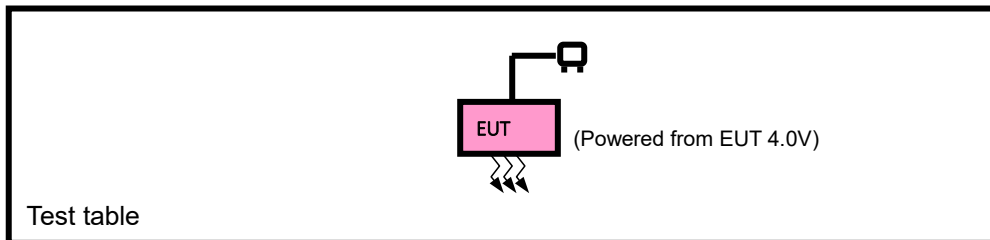
NOTE:

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

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

3. 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 source with GSM or 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	CONDCUDED EMISSION	1312 to 1513	1312, 1413, 1513	WCDMA
A	RADIATED EMISSION	1312 to 1513	1312, 1413, 1513	WCDMA

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	100 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	CONDCUDED 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 to 23165	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		
		A	CONDCUDED EMISSION	23017 to 23173	23017, 23095 , 23173	1.4MHz	QPSK	1 RB / 0 RB Offset
				23025 to 23165	23025, 23095 ,23165	3MHz	QPSK	1 RB / 0 RB Offset
				23035 to 23155	23035, 23095 ,23155	5MHz	QPSK	1 RB / 0 RB Offset
				23060 to 23130	23060, 23095 ,23130	10MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	23017 to 23173	23095	1.4MHz	QPSK	1 RB / 0 RB Offset		
		23025 to 23165	23025, 23095 ,23165	3MHz	QPSK	1 RB / 0 RB Offset		
		23035 to 23155	23095	5MHz	QPSK	1 RB / 0 RB Offset		
		23060 to 23130	23095	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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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
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.

LTE BAND 17 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	23755 to 23825	23755, 23790, 23825	5MHz	QPSK, 16QAM	1 RB / 0 RB Offset
		23780 to 23800	23780, 23790, 23800	10MHz	QPSK, 16QAM	1 RB / 0 RB Offset

Note: 1. This device was tested under all bandwidths, RB configurations and modulations. The worst case was found in QPSK modulation.

2. LTE Band 17 are covered by LTE Band 12, Because it is a subset of LTE Band 12 with the same output power and supported bandwidths, So the conducted test data and RSE test data please refer to LTE Band 12



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TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
ERP&EIRP	23deg. C, 70%RH	EUT 4.0V	Jace Hu
FREQUENCY STABILITY	23deg. C, 70%RH	DC 3.8/4.0/4.2 V By DC Source	James Fu
OCCUPIED BANDWIDTH	23deg. C, 70%RH	EUT 4.0V	James Fu
BAND EDGE	23deg. C, 70%RH	EUT 4.0V	James Fu
CONDCUDED EMISSION	23deg. C, 70%RH	EUT 4.0V	James Fu
RADIATED EMISSION	23deg. C, 70%RH	EUT 4.0V	Jace Hu
PEAK TO AVERAGE RATIO	23deg. C, 70%RH	EUT 4.0V	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:

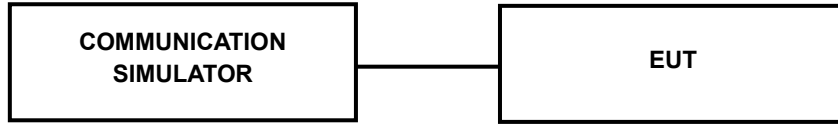
- a. The EUT was set up for the maximum power with LTE link data modulation and link up with simulator.
- b. Set the EUT to transmit under low, middle and high channel and record the power level shown on simulator.



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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).



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3.1.4 TEST RESULTS

AVERAGE CONDUCTED OUTPUT POWER (dBm)

Band	WCDMA IV		
	1312	1413	1513
Channel	1712.4	1732.6	1752.6
Frequency (MHz)	1712.4	1732.6	1752.6
RMC 12.2K	23.36	23.45	23.28
HSDPA Subtest-1	22.30	22.37	22.26
HSDPA Subtest-2	22.35	22.43	22.20
HSDPA Subtest-3	21.81	21.87	21.72
HSDPA Subtest-4	21.85	21.89	21.76
DC-HSDPA Subtest-1	22.31	22.43	22.21
DC-HSDPA Subtest-2	22.34	22.37	22.27
DC-HSDPA Subtest-3	21.78	21.91	21.73
DC-HSDPA Subtest-4	21.84	21.87	21.77
HSUPA Subtest-1	22.28	22.41	22.23
HSUPA Subtest-2	20.34	20.37	20.27
HSUPA Subtest-3	21.36	21.45	21.28
HSUPA Subtest-4	20.28	20.43	20.23
HSUPA Subtest-5	22.34	22.37	22.26

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	23.04	23.13	22.88
		1	12	23.33	23.50	23.29
		1	24	22.89	22.96	22.85
		12	0	21.89	21.99	21.79
		12	6	21.78	21.89	21.79
		12	13	21.74	21.85	21.70
	16QAM	25	0	21.76	21.85	21.71
		1	0	21.52	21.59	21.45
		1	12	21.69	21.88	21.64
		1	24	21.50	21.60	21.48
		12	0	20.64	20.69	20.54
		12	6	20.65	20.76	20.66
		12	13	20.67	20.83	20.54
		25	0	20.66	20.81	20.63

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	23.02	23.10	22.91
		1	24	23.39	23.43	23.33
		1	49	22.85	22.97	22.81
		25	0	21.93	21.93	21.83
		25	12	21.77	21.90	21.76
		25	25	21.79	21.81	21.73
		50	0	21.76	21.86	21.68
	16QAM	1	0	21.54	21.57	21.51
		1	24	21.74	21.88	21.62
		1	49	21.52	21.57	21.44
		25	0	20.69	20.70	20.57
		25	12	20.70	20.73	20.67
		25	25	20.67	20.81	20.55
		50	0	20.72	20.74	20.64



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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	23.07	23.16	22.85
		1	37	23.34	23.43	23.28
		1	74	22.90	22.95	22.84
		36	0	21.93	21.94	21.79
		36	19	21.79	21.86	21.79
		36	39	21.80	21.79	21.74
		75	0	21.70	21.89	21.68
	16QAM	1	0	21.58	21.57	21.52
		1	37	21.67	21.86	21.65
		1	74	21.54	21.59	21.48
		36	0	20.68	20.69	20.54
		36	19	20.66	20.73	20.66
		36	39	20.74	20.83	20.52
		75	0	20.69	20.74	20.59

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	23.08	23.18	22.93
		1	50	23.41	23.51	23.34
		1	99	22.93	23.01	22.86
		50	0	21.95	22.01	21.84
		50	25	21.85	21.94	21.81
		50	50	21.82	21.87	21.75
		100	0	21.78	21.93	21.73
	16QAM	1	0	21.60	21.65	21.53
		1	50	21.75	21.90	21.70
		1	99	21.57	21.65	21.50
		50	0	20.70	20.76	20.59
		50	25	20.72	20.81	20.68
		50	50	20.75	20.85	20.60
		100	0	20.74	20.82	20.65



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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	22.55	22.52	22.70
		1	2	23.17	23.03	23.30
		1	5	22.69	22.56	22.82
		3	0	22.72	22.64	22.87
		3	1	22.76	22.77	22.84
		3	3	22.78	22.69	22.92
		6	0	21.76	21.70	21.88
	16QAM	1	0	21.39	21.34	21.56
		1	2	21.64	21.59	21.79
		1	5	21.60	21.46	21.76
		3	0	21.75	21.71	21.86
		3	1	21.55	21.61	21.70
		3	3	21.73	21.69	21.93
		6	0	20.48	20.46	20.62

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	22.57	22.54	22.69
		1	7	23.13	23.04	23.30
		1	14	22.65	22.56	22.82
		8	0	21.71	21.67	21.87
		8	3	21.69	21.77	21.86
		8	7	21.75	21.76	21.96
		15	0	21.73	21.71	21.82
	16QAM	1	0	21.36	21.40	21.59
		1	7	21.61	21.62	21.77
		1	14	21.63	21.46	21.76
		8	0	20.71	20.72	20.86
		8	3	20.60	20.56	20.73
		8	7	20.75	20.67	20.89
		15	0	20.48	20.40	20.65

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	22.58	22.49	22.70
		1	12	23.18	23.01	23.30
		1	24	22.66	22.55	22.86
		12	0	21.74	21.67	21.84
		12	6	21.69	21.78	21.87
		12	13	21.79	21.72	21.97
		25	0	21.71	21.74	21.85
	16QAM	1	0	21.37	21.36	21.59
		1	12	21.58	21.65	21.76
		1	24	21.63	21.46	21.75
		12	0	20.71	20.70	20.83
		12	6	20.57	20.60	20.69
		12	13	20.70	20.69	20.92
		25	0	20.48	20.41	20.62

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	22.63	22.56	22.75
		1	24	23.20	23.09	23.32
		1	49	22.71	22.63	22.87
		25	0	21.78	21.72	21.89
		25	12	21.77	21.79	21.92
		25	25	21.83	21.77	21.98
		50	0	21.77	21.76	21.90
	16QAM	1	0	21.44	21.41	21.61
		1	24	21.66	21.67	21.81
		1	49	21.65	21.54	21.77
		25	0	20.79	20.76	20.91
		25	12	20.63	20.62	20.75
		25	25	20.77	20.74	20.94
		50	0	20.54	20.48	20.67



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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	23.03	23.07	23.06
		1	12	23.20	23.14	23.21
		1	24	22.79	22.83	22.82
		12	0	21.93	21.90	21.94
		12	6	21.98	21.93	21.95
		12	13	21.82	21.80	21.86
		25	0	21.92	21.91	21.85
	16QAM	1	0	21.73	21.72	21.74
		1	12	21.83	21.80	21.84
		1	24	21.63	21.58	21.60
		12	0	20.81	20.79	20.85
		12	6	20.80	20.74	20.81
		12	13	20.71	20.75	20.74
		25	0	20.91	20.85	20.92

Band/BW	Modulation	RB Size	RB Offset	/	Mid CH 23230	/
				/	Frequency 782.0 MHz	/
13/ 10	QPSK	1	0	/	23.11	/
		1	24	/	23.22	/
		1	49	/	22.87	/
		25	0	/	21.96	/
		25	12	/	22.00	/
		25	25	/	21.88	/
		50	0	/	21.93	/
	16QAM	1	0	/	21.80	/
		1	24	/	21.86	/
		1	49	/	21.65	/
		25	0	/	20.87	/
		25	12	/	20.82	/
		25	25	/	20.79	/
		50	0	/	20.93	/



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LTE Band 17

Band/BW	Modulation	RB Size	RB Offset	Low CH 23755	Mid CH 23790	High CH 23825
				Frequency 706.5 MHz	Frequency 710 MHz	Frequency 713.5 MHz
17/ 5	QPSK	1	0	22.45	22.27	22.42
		1	12	22.36	22.28	22.29
		1	24	22.46	22.29	22.42
		12	0	21.25	21.21	21.22
		12	6	21.21	20.93	21.12
		12	13	21.29	21.17	21.20
		25	0	21.31	21.23	21.22
	16QAM	1	0	21.03	20.91	21.04
		1	12	20.99	20.81	20.92
		1	24	20.51	20.39	20.52
		12	0	20.31	20.27	20.26
		12	6	20.14	20.12	20.17
		12	13	20.42	20.24	20.25
		25	0	20.29	20.27	20.32

Band/BW	Modulation	RB Size	RB Offset	Low CH 23780	Mid CH 23790	High CH 23800
				Frequency 709 MHz	Frequency 710 MHz	Frequency 711 MHz
17/ 10	QPSK	1	0	22.49	22.32	22.43
		1	24	22.42	22.30	22.34
		1	49	22.53	22.34	22.44
		25	0	21.33	21.23	21.27
		25	12	21.23	21.01	21.14
		25	25	21.37	21.23	21.28
		50	0	21.37	21.25	21.28
	16QAM	1	0	21.10	20.96	21.06
		1	24	21.05	20.88	20.97
		1	49	20.58	20.44	20.54
		25	0	20.39	20.29	20.32
		25	12	20.22	20.13	20.19
		25	25	20.46	20.29	20.33
		50	0	20.37	20.28	20.34

EIRP

WCDMA IV

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
1312	1712.4	23.36	0.68	24.04	253.51	1
1413	1732.6	23.45	0.68	24.13	258.82	1
1513	1752.6	23.28	0.68	23.96	248.89	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	23.33	3.35	26.68	465.59	2
21100	2535.0	23.5	3.35	26.85	484.17	2
21425	2567.5	23.29	3.35	26.64	461.32	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	21.69	3.35	25.04	319.15	2
21100	2535.0	21.88	3.35	25.23	333.43	2
21425	2567.5	21.64	3.35	24.99	315.5	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	23.39	3.35	26.74	472.06	2
21100	2535.0	23.43	3.35	26.78	476.43	2
21400	2565.0	23.33	3.35	26.68	465.59	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	21.74	3.35	25.09	322.85	2
21100	2535.0	21.88	3.35	25.23	333.43	2
21400	2565.0	21.62	3.35	24.97	314.05	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	23.34	3.35	26.69	466.66	2
21100	2535.0	23.43	3.35	26.78	476.43	2
21375	2562.5	23.28	3.35	26.63	460.26	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	21.67	3.35	25.02	317.69	2
21100	2535.0	21.86	3.35	25.21	331.89	2
21375	2562.5	21.65	3.35	25	316.23	2



**BUREAU
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CHANNEL BANDWIDTH: 20MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	EIRP (dBm)	EIRP (mW)	Limit (W)
20850	2510.0	23.41	3.35	26.76	474.24	2
21100	2535.0	23.51	3.35	26.86	485.29	2
21350	2560.0	23.34	3.35	26.69	466.66	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	21.75	3.35	25.1	323.59	2
21100	2535.0	21.9	3.35	25.25	334.97	2
21350	2560.0	21.7	3.35	25.05	319.89	2

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



**BUREAU
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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	23.17	0.62	21.64	145.88	3
23095	707.5	23.03	0.62	21.5	141.25	3
23173	715.3	23.3	0.62	21.77	150.31	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	21.75	0.62	20.22	105.2	3
23095	707.5	21.71	0.62	20.18	104.23	3
23173	715.3	21.93	0.62	20.4	109.65	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	23.13	0.62	21.6	144.54	3
23095	707.5	23.04	0.62	21.51	141.58	3
23165	714.5	23.3	0.62	21.77	150.31	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	21.63	0.62	20.1	102.33	3
23095	707.5	21.62	0.62	20.09	102.09	3
23165	714.5	21.77	0.62	20.24	105.68	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	23.18	0.62	21.65	146.22	3
23095	707.5	23.01	0.62	21.48	140.6	3
23155	713.5	23.3	0.62	21.77	150.31	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	21.63	0.62	20.1	102.33	3
23095	707.5	21.65	0.62	20.12	102.8	3
23155	713.5	21.76	0.62	20.23	105.44	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23060	704	23.2	0.62	21.67	146.89	3
23095	707.5	23.09	0.62	21.56	143.22	3
23130	711	23.32	0.62	21.79	151.01	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23060	704	21.66	0.62	20.13	103.04	3
23095	707.5	21.67	0.62	20.14	103.28	3
23130	711	21.81	0.62	20.28	106.66	3

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



BUREAU
VERITAS

Test Report No.: W7L-221220W001RF03

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	23.2	0.82	21.87	153.82	3
23230	782	23.14	0.82	21.81	151.71	3
23255	784.5	23.21	0.82	21.88	154.17	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	21.83	0.82	20.5	112.2	3
23230	782	21.8	0.82	20.47	111.43	3
23255	784.5	21.84	0.82	20.51	112.46	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
-	-	-	-	-	-	-
23230	782	23.22	0.82	21.89	154.53	3
-	-	-	-	-	-	-

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
-	-	-	-	-	-	-
23230	782	21.86	0.82	20.53	112.98	3
-	-	-	-	-	-	-

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



**BUREAU
VERITAS**

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LTE BAND 17

CHANNEL BANDWIDTH: 5MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23755	706.5	22.46	0.62	20.93	123.88	3
23790	710	22.29	0.62	20.76	119.12	3
23825	713.5	22.42	0.62	20.89	122.74	3

CHANNEL BANDWIDTH: 5MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23755	706.5	21.03	0.62	19.5	89.13	3
23790	710	20.91	0.62	19.38	86.7	3
23825	713.5	21.04	0.62	19.51	89.33	3

CHANNEL BANDWIDTH: 10MHz QPSK

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23780	709	22.53	0.62	21	125.89	3
23790	710	22.34	0.62	20.81	120.5	3
23800	711	22.44	0.62	20.91	123.31	3

CHANNEL BANDWIDTH: 10MHz 16QAM

Channel	Frequency (MHz)	Conducted Power (dBm)	G _T -L _c (dB)	ERP (dBm)	ERP (mW)	Limit (W)
23780	709	21.1	0.62	19.57	90.57	3
23790	710	20.96	0.62	19.43	87.7	3
23800	711	21.06	0.62	19.53	89.74	3

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

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILITY MEASUREMENT

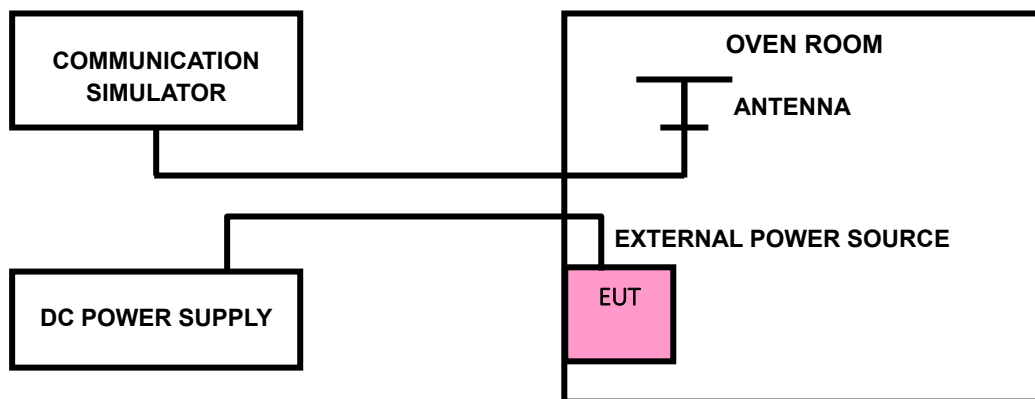
The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

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 (3.8V); VN/NV = Normal voltage(4V); VH = High voltage(4.2V);

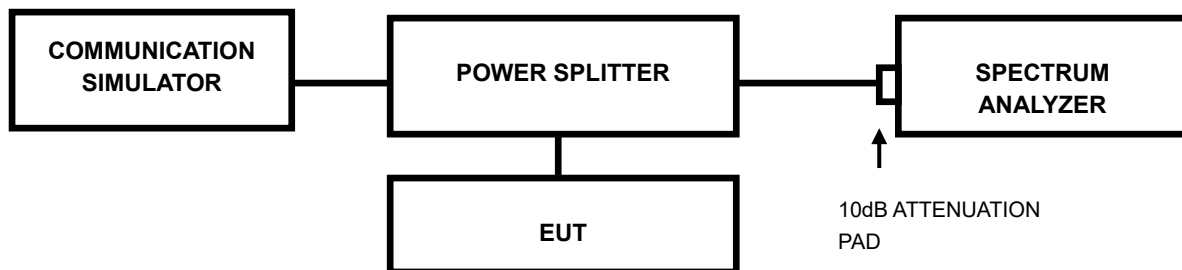
NT = Normal temperature (25°C)

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.



Test Report No.: W7L-221220W001RF03

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

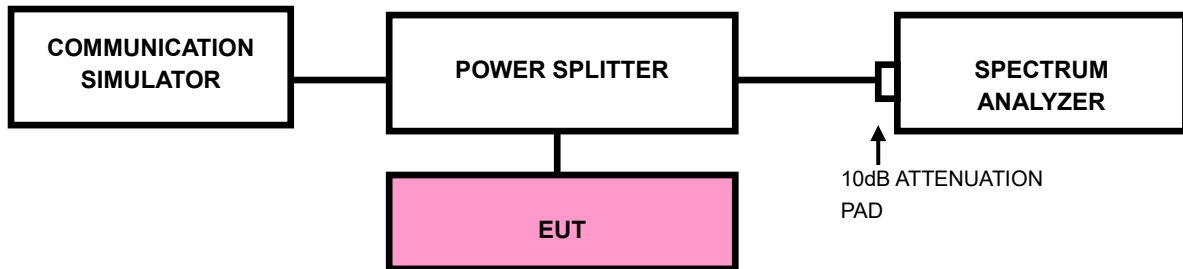
According to FCC 27.53(c) specified that For operations in the 746-758 MHz band and the 776-788 MHz band , the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least $43 + 10 \log (P)$ dB. However, in the 100 kilohertz bands immediately outside and adjacent 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, $P(\text{dBW})$, by at least $65 + 10 \log_{10} P(\text{dB})$, 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





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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 30/100KHz.
- l) Record the max trace plot into the test report.



Test Report No.: W7L-221220W001RF03

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 .

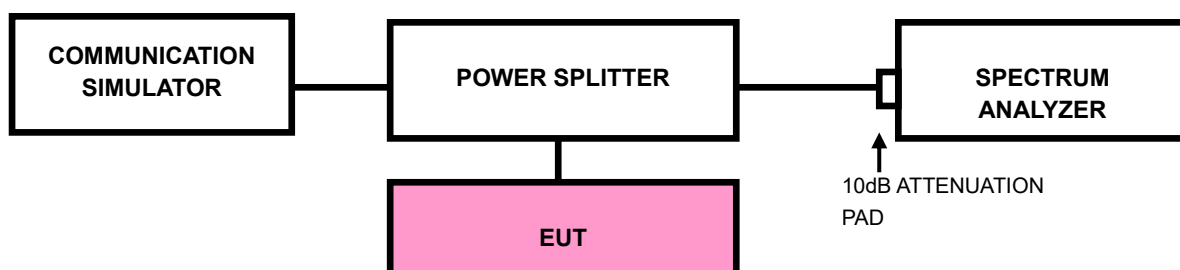
For: LTE Band7

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.



Test Report No.: W7L-221220W001RF03

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 .

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, $\text{E.R.P power} = \text{E.I.P.R power} - 2.15\text{dBi}$.

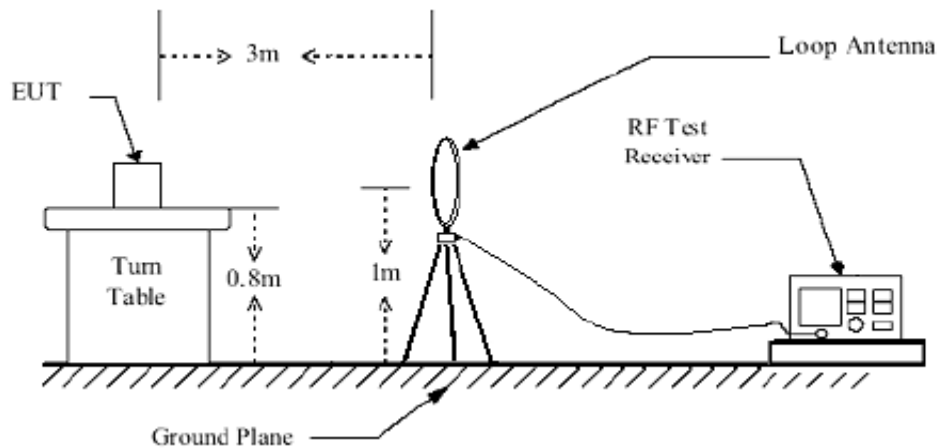
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.6.3 DEVIATION FROM TEST STANDARD

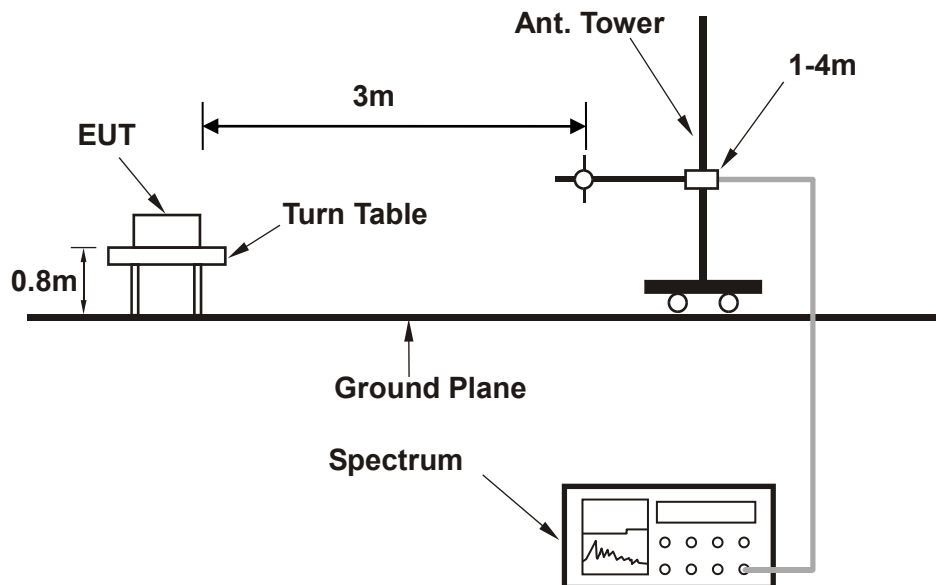
No deviation

3.6.4 TEST SETUP

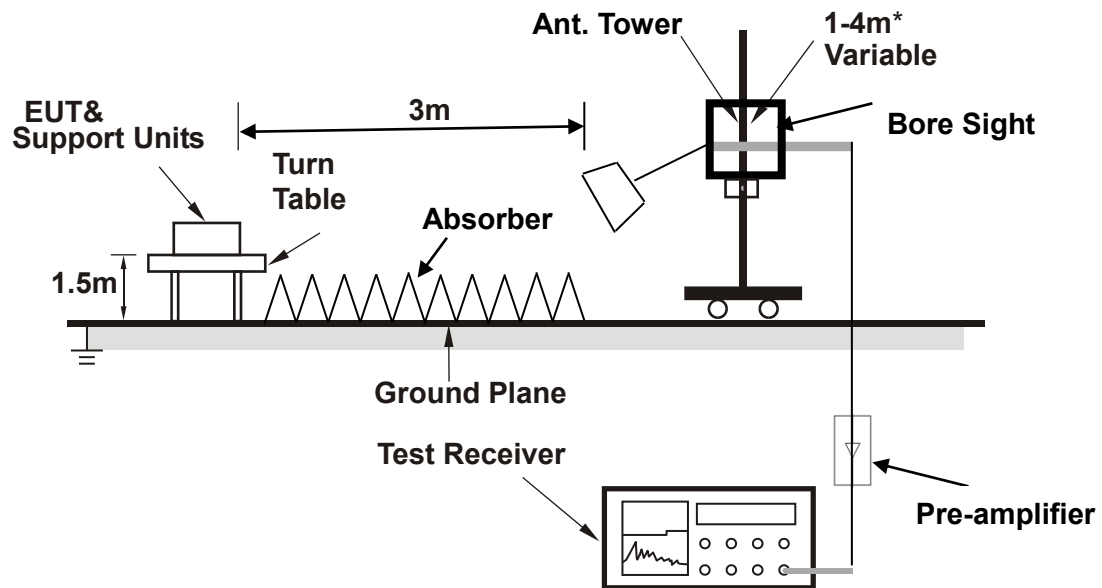
< Frequency Range below 30MHz >



< 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

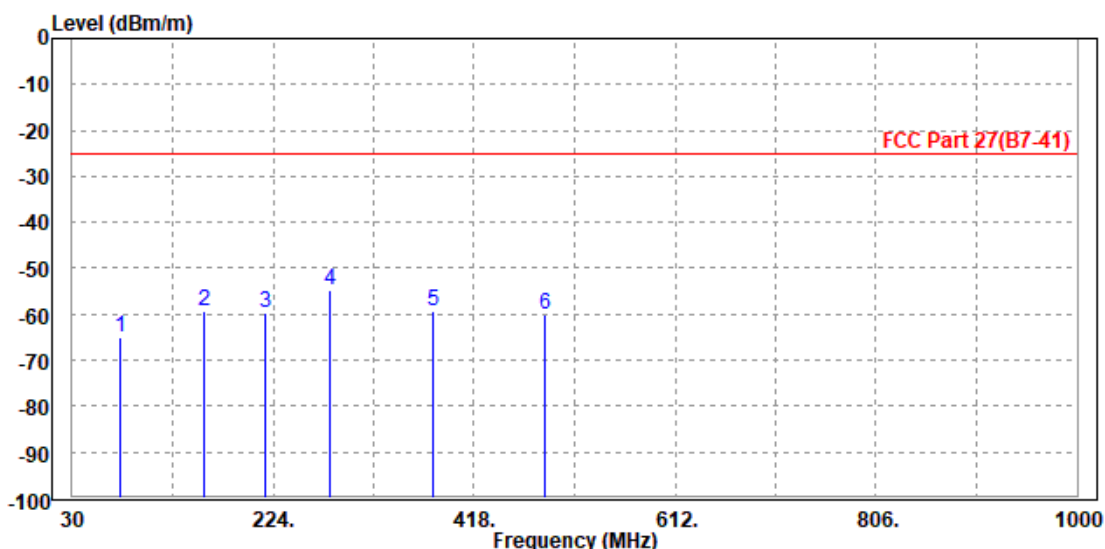
30 MHz – 1GHz data:

LTE Band 7

CHANNEL BANDWIDTH: 10MHz / QPSK

MODE	TX channel 21100	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	EUT 4.0V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	76.560	-65.19	-43.77	-25.00	-40.19	-21.42	Peak	Horizontal
2	158.040	-59.34	-42.86	-25.00	-34.34	-16.48	Peak	Horizontal
3	216.240	-59.61	-44.13	-25.00	-34.61	-15.48	Peak	Horizontal
4 PP	279.290	-54.85	-42.81	-25.00	-29.85	-12.04	Peak	Horizontal
5	378.230	-59.17	-48.61	-25.00	-34.17	-10.56	Peak	Horizontal
6	485.900	-60.03	-51.53	-25.00	-35.03	-8.50	Peak	Horizontal

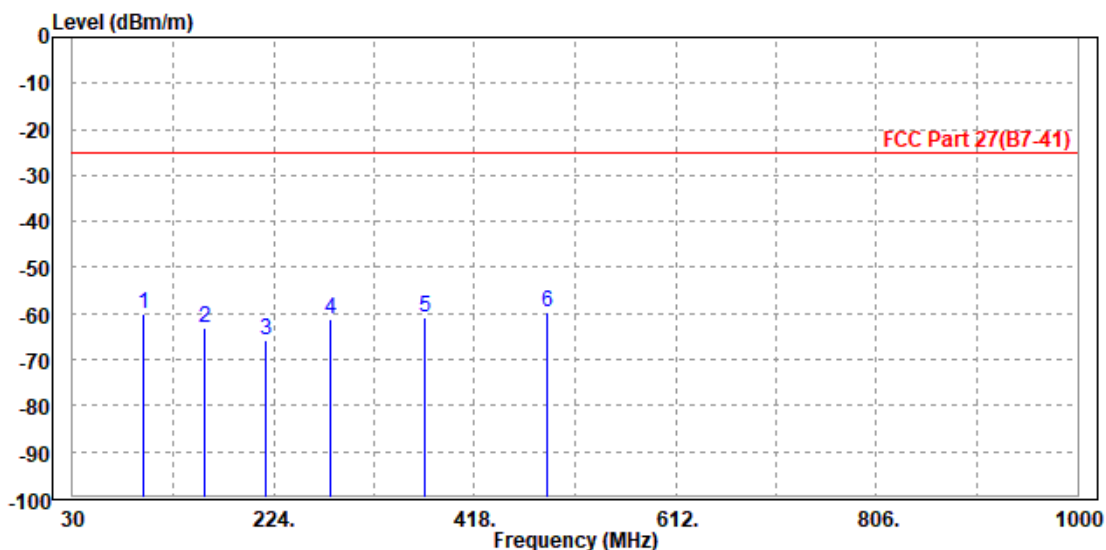




Test Report No.: W7L-221220W001RF03

MODE	TX channel 21100	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	EUT 4.0V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	97.900	-60.25	-51.91	-25.00	-35.25	-8.34	Peak	Vertical
2	158.040	-63.22	-46.14	-25.00	-38.22	-17.08	Peak	Vertical
3	217.210	-65.95	-49.45	-25.00	-40.95	-16.50	Peak	Vertical
4	279.290	-61.39	-49.42	-25.00	-36.39	-11.97	Peak	Vertical
5	369.500	-60.94	-51.39	-25.00	-35.94	-9.55	Peak	Vertical
6 PP	487.840	-59.63	-51.44	-25.00	-34.63	-8.19	Peak	Vertical





BUREAU VERITAS

Test Report No.: W7L-221220W001RF03

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	EUT 4.0V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	3431.000	-51.86	-59.09	-13.00	-38.86	7.23	Peak	Horizontal
2 PP	5137.200	-49.39	-59.29	-13.00	-36.39	9.90	Peak	Horizontal

