FCC TEST REPORT

(PART 90)

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	Module
Brand Name	Continental
Model Name	FE5NAR110, FE5NAR111
FCC ID	LHJ-FE5NAR110
Date of tests	May. 01, 2024 ~ Jun. 17, 2024

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

☒ **FCC Part 90, Subpart R, S** ☒ **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
Simon Wang Date: Jun. 17, 2024	Luke Lu Date: Jun. 17, 2024

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RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
W7L-240430W002RF07	Original release	Jun. 17, 2024

1 SUMMARY OF TEST RESULTS

The EUT has been tested according to the following specifications:

APPLIED STANDARD: FCC Part 90 & Part 2		
STANDARD SECTION	**TEST TYPE AND LIMIT**	**RESULT**
§90.542(a)(7)	Effective Radiated Power (Band14)	PASS
§2.1055 §90.213	Frequency Stability	PASS
§2.1049 §90.209	Occupied Bandwidth	PASS
§2.1051 §90.543(e)(f)	Emission Masks	PASS
§2.1051 §90.543(e)(f)	Conducted Spurious Emissions	PASS
§2.1053 §90.543(e)(f)	Radiated Spurious Emissions	PASS

NOTE:

1. The worst-case scenario for all measurements is based on an engineering evaluation made on different modulations. Then, QPSK and 16QAM were observed as the worst mode to LTE bands respectively and set for all conducted and radiated. Output power measurements were measured on QPSK, 16QAM, 64QAM modulations, and tests other than output power are performed only in worse-case QPSK and 16QAM modulations.

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
Maximum Peak Output Power	±2.06dB
Frequency Stability	±76.97Hz
Radiated emissions (9KHz~30MHz)	±2.68dB
Radiated emissions (30MHz~1GHz)	±4.98dB
Radiated emissions (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
Band Edge Measurements	±4.70dB
Peak to average ratio	±0.76dB

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. 28,24	Mar. 27,25
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.10,23	May.09,24
EXA Signal Analyzer	KEYSIGHT	N9010A-544	MY54510355	May.09,24	May.08,25
Loop Antenna	Schwarzbeck	FMZB 1519B	00173	Sep.03,23	Sep.02,24
Bilog Antenna	ETS-LINDGREN	3143B	00161965	Feb. 18,24	Feb. 17,25
Horn Antenna	ETS-LINDGREN	3117	00168692	Feb. 18,24	Feb. 17,25
Horn Antenna (18GHz-40GHz)	N/A	QWH-SL-18-40-K-SG/QMS-00361	15433	Sep.04, 23	Sep.03, 24
Radio Communication Analyzer	ANRITSU	MT8820C	6201465426	Feb. 14,24	Feb. 13,25
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May. 06,23	May. 05,24
Signal Pre-Amplifier	EMSI	EMC 9135	980249	May. 05,24	May. 04,25
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.10,23	May.09,24
Signal Pre-Amplifier	EMSI	EMC 012645B	980257	May.09,24	May.08,25
Signal Pre-Amplifier	EMSI	EMC 184045B	980259	Feb. 17,24	Feb.16,25
3m Semi-anechoic Chamber	ETS-LINDGREN	9m*6m*6m	Euroshieldpn-CT0001143-1216	Nov. 14,23	Nov. 13,26
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
10dB Attenuator	JFW/USA	50HF-010-SMA	50HF-010-SMA	May. 05,24	May. 04,25
Power Meter	Anritsu	ML2495A	1506002	Feb. 14,24	Feb. 13,25
Power Sensor	Anritsu	MA2411B	1339352	Feb. 14,24	Feb. 13,25
Temperature Chamber	ESPEC	SH-242	93000855	May. 06,23	May. 05,24
Temperature Chamber	ESPEC	SH-242	93000855	May. 05,24	May. 04,25
MXG Analog Microvave Signal Generator	KEYSIGHT	N5183A	MY50143024	Feb. 14,24	Feb. 13,25
Base station R&S CMW500	Rohde&Schwarz	CMW500	153085	May.10,23	May.09,24
Base station R&S CMW500	Rohde&Schwarz	CMW500	153085	May.09,24	May.08,25
DC Source	Kikusui/JP	PMX18-5A	N/A	Aug. 11,23	Aug. 10,24

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	Module	
BRAND NAME	Continental	
MODEL NAME	FE5NAR110, FE5NAR111	
NOMINAL VOLTAGE	DC4.0V	
MODULATION TECHNOLOGY	**LTE**	QPSK, 16QAM, 64QAM
FREQUENCY RANGE	**LTE Band 14 Channel Bandwidth: 5MHz**	790.5MHz ~ 795.5MHz
	LTE Band 14 Channel Bandwidth: 10MHz	793MHz
EMISSION DESIGNATOR	**LTE Band 14 Channel Bandwidth: 5MHz**	QPSK: 4M52G7D
		16QAM: 4M51W7D
	LTE Band 14 Channel Bandwidth: 10MHz	QPSK: 9M01G7D
		16QAM: 8M98W7D
MAX. EIRP POWER	**LTE Band 14 Channel Bandwidth: 5MHz**	118.85mW
	LTE Band 14 Channel Bandwidth: 10MHz	120.5mW
ANTENNA TYPE	Monopole Antenna with -0.32dBi gain for LTE B14	
HW VERSION	P2.0	
SW VERSION	MODEM_GM_C3_3.0.2.24	
I/O PORTS	Refer to user's manual	
DATA CABLE	N/A	
EXTREME TEMPERATURE	-40-85 ℃	
EXTREME VOLTAGE	3.8V - 4.2V	

NOTE:

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

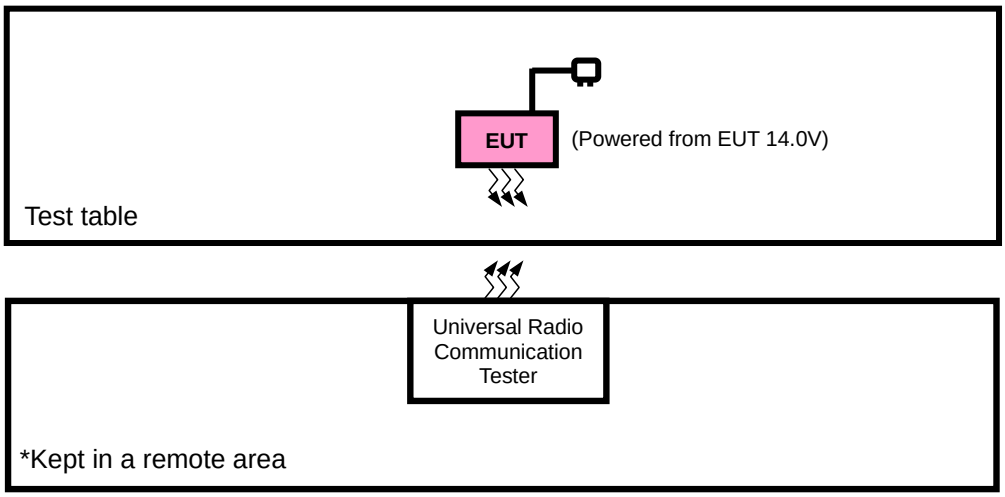
MODULATION MODE	TX FUNCTION
LTE	1TX

4. For the test results, the EUT had been tested with all conditions. But only the worst case was shown in test report.
5. Antenna gain and EUT conducted cable loss are provided by the customer, and the laboratory will record the results based on these items that involve these two parameters.
6. According to the information provided by the manufacturer, The difference between FE5NAR110, FE5NAR111 is as follows:

Sample	HVIN/PMN	5G Bands NSA	5G Bands SA	SA UL MIMO	LTE Bands	UMTS	GNSS
1	FE5NAR110	n2, n5, n66, n77	n25, n41, n66, n71, n77	n41, n77, n78	2, 4, 5, 7, 12, 13, 14, 28A, 28B, 29Rx, 30Rx, 66, 71	2, 4, 5	L1, L5
2	FE5NAR111	n2, n5, n66, n77	n25, n41, n66, n71, n77	n41, n77, n78	2, 4, 5, 7, 12, 13, 14, 28A, 28B, 29Rx, 30Rx, 66, 71	2, 4, 5	L1

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	Kikusui/JP	PMX18-5A	0000001	N/A

NO.	SIGNAL CABLE DESCRIPTION OF THE ABOVE SUPPORT UNITS
1	DC Line: Unshielded, Detachable 1.0m

2.4 DESCRIPTION OF TEST MODES

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 in ERP/EIRP and radiated emission was found when positioned on X-plane for LTE. Following channel(s) was (were) selected for the final test as listed below:

EUT CONFIGURE MODE	DESCRIPTION
A	**EUT + DC Source with LTE link**

LTE BAND 14 MODE

EUT CONFIGURE MODE	TEST ITEM	AVAILABLE CHANNEL	TESTED CHANNEL	CHANNEL BANDWIDTH	MODULATION	MODE
A	ERP	23305 to 23355	23305, 23330, 23355	5MHz	QPSK,16QAM,64QAM	1 RB / 0 RB Offset
		23330	23330	10MHz	QPSK,16QAM,64QAM	1 RB / 0 RB Offset
A	FREQUENCY STABILITY	23305 to 23355	23305, 23355	5MHz	QPSK	50 RB / 0 RB Offset
A	OCCUPIED BANDWIDTH	23305 to 23355	23305, 23330, 23355	5MHz	QPSK,16QAM	25 RB / 0 RB Offset
		23330	23330	10MHz	QPSK,16QAM	50 RB / 0 RB Offset
A	PEAK TO AVERAGE RATIO	23330	23330	10MHz	QPSK,16QAM	1 RB / 0 RB Offset 50 RB / 0 RB Offset
A	BAND EDGE	23305 to 23355	23305	5MHz	QPSK,16QAM	1 RB / 0 RB Offset
						25 RB / 0 RB Offset
			23355	5MHz	QPSK,16QAM	1 RB / 24 RB Offset
						25 RB / 0 RB Offset
		23300	23330	10MHz	QPSK,16QAM	1 RB / 0 RB Offset
						50 RB / 0 RB Offset
						1 RB / 49 RB Offset
						/
A	CONDUCTED EMISSION	23305 to 23355	23305, 23330, 23355	5MHz	QPSK	1 RB / 0 RB Offset
		23330	23330	10MHz	QPSK	1 RB / 0 RB Offset
A	RADIATED EMISSION	23305 to 23355	23305, 23330, 23355	5MHz	QPSK	1 RB / 0 RB Offset
		23330	23330	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.

TEST CONDITION:

TEST ITEM	ENVIRONMENTAL CONDITIONS	INPUT POWER	TESTED BY
EIRP(ERP)	24deg. C, 60%RH	DC 14.0V	Jace Hu
FREQUENCY STABILITY	24deg. C, 61%RH	DC 3.8V/4V/4.2V	James Fu
OCCUPIED BANDWIDTH	24deg. C, 61%RH	DC 4.0V	James Fu
BAND EDGE	24deg. C, 61%RH	DC 4.0V	James Fu
CONDUCTED EMISSION	24deg. C, 61%RH	DC 4.0V	James Fu
RADIATED EMISSION	23deg. C, 70%RH	DC 14.0V	Jace Hu

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 90

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

47 CFR 90.542(a)(7)
Portable stations (hand-held devices) transmitting in the 758–768 MHz band and the 788–798 MHz band are limited to 3 watts ERP.

3.1.2 TEST PROCEDURES

EIRP / ERP 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 determing the ERP or EIRP from the conducted RF output power measured using the guidance provided above is:

ERP or EIRP = $P_{Meas} + G_T – L_C$

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);

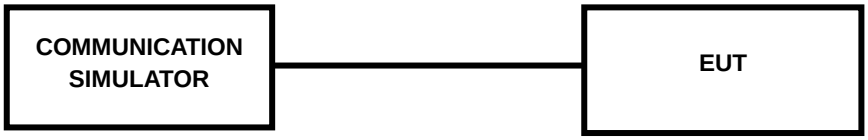
L_C = signal attenuation in the connecting cable between the transmitter and antenna, in dB

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.

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

CONDUCTED OUTPUT POWER (dBm)

LTE Band 14

LTE Band 14						
BW	Modulation	RB Size	RB Offset	Mid		
		Channel		23330		
		Frequency (MHz)		793		
10M	QPSK	1	0		23.26	
		1	24		**23.28**	
		1	49		23.23	
		25	0		22.24	
		25	12		22.31	
		25	25		22.23	
		50	0		22.21	
	16QAM	1	0		22.63	
		1	24		22.65	
		1	49		22.51	
		25	0		21.26	
		25	12		21.31	
		25	25		21.25	
		50	0		21.23	
	64QAM	1	0		21.52	
		1	24		21.54	
		1	49		21.49	
		25	0		20.32	
		25	12		20.38	
		25	25		20.26	
		50	0		20.25	

BW	Modulation	Channel		23305	23330	23355
		Frequency (MHz)		790.5	793	795.5
5M	QPSK	1	0	23.16	23.21	23.13
		1	12	23.20	23.19	23.22
		1	24	23.10	23.10	23.16
		12	0	22.17	22.20	22.14
		12	6	22.21	22.24	22.30
		12	13	22.15	22.08	22.17
		25	0	22.16	22.18	22.10
	16QAM	1	0	22.49	22.48	22.59
		1	12	22.64	22.62	22.64
		1	24	22.48	22.40	22.47
		12	0	21.18	21.18	21.16
		12	6	21.17	21.19	21.24
		12	13	21.23	21.15	21.21
		25	0	21.14	21.08	21.22
	64QAM	1	0	21.44	21.41	21.47
		1	12	21.42	21.48	21.52
		1	24	21.38	21.45	21.46
		12	0	20.29	20.24	20.28
		12	6	20.35	20.30	20.34
		12	13	20.17	20.24	20.19
		25	0	20.11	20.20	20.24

ERP

LTE BAND 14

LTE B14 5M QPSK						
Channel	Frequency (MHz)	Conducted Power (dBm)	Gain (dBi)	ERP (dBm)	ERP (mW)	Lmit (W)
23305	790.5	23.2	-0.32	20.73	118.3	3
23330	793	23.21	-0.32	20.74	118.58	3
23355	795.5	23.22	-0.32	20.75	118.85	3

LTE B14 5M 16QAM						
Channel	Frequency (MHz)	Conducted Power (dBm)	Gain (dBi)	ERP (dBm)	ERP (mW)	Lmit (W)
23305	790.5	22.64	-0.32	20.17	103.99	3
23330	793	22.62	-0.32	20.15	103.51	3
23355	795.5	22.64	-0.32	20.17	103.99	3

LTE B14 5M 64QAM						
Channel	Frequency (MHz)	Conducted Power (dBm)	Gain (dBi)	ERP (dBm)	ERP (mW)	Lmit (W)
23305	790.5	21.44	-0.32	18.97	78.89	3
23330	793	21.48	-0.32	19.01	79.62	3
23355	795.5	21.52	-0.32	19.05	80.35	3

LTE B14 10M QPSK						
Channel	Frequency (MHz)	Conducted Power (dBm)	Gain (dBi)	ERP (dBm)	ERP (mW)	Lmit (W)
23330	793	23.28	-0.32	20.81	120.5	3

LTE B14 10M 16QAM						
Channel	Frequency (MHz)	Conducted Power (dBm)	Gain (dBi)	ERP (dBm)	ERP (mW)	Lmit (W)
23330	793	22.65	-0.32	20.18	104.23	3

LTE B14 10M 64QAM						
Channel	Frequency (MHz)	Conducted Power (dBm)	Gain (dBi)	ERP (dBm)	ERP (mW)	Lmit (W)
23330	793	21.54	-0.32	19.07	80.72	3

3.2 FREQUENCY STABILITY MEASUREMENT

3.2.1 LIMITS OF FREQUENCY STABILIITY MEASUREMENT

The frequency stability of mobile, portable and control transmitters operating in the wideband segment must be 1.25 parts per million or better when AFC is locked to a base station, and 5 parts per million or better when AFC is not locked

3.2.2 TEST PROCEDURE

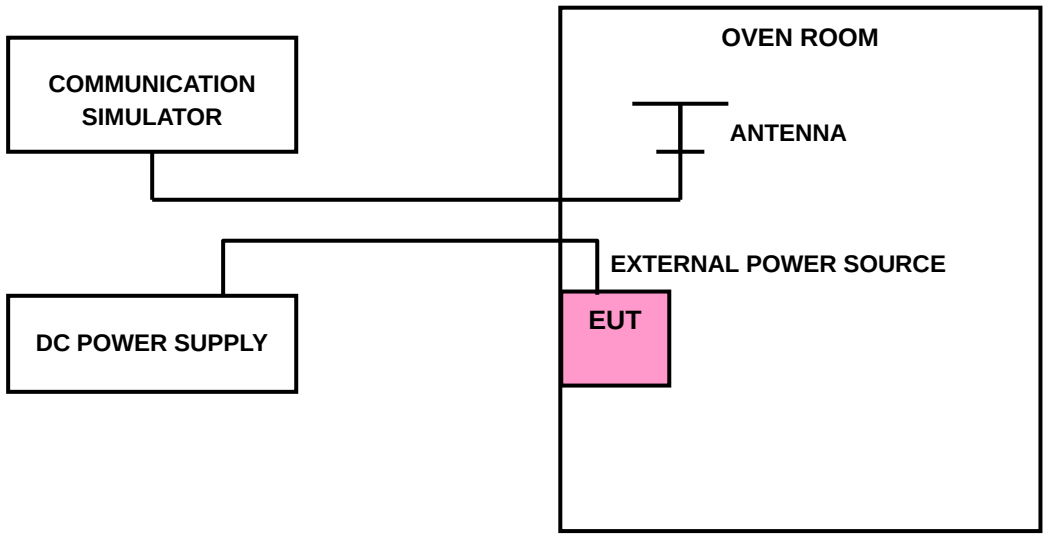
a. Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.

b. 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.

c. The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ±0.5℃ 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



3.2.4 TEST RESULTS

Please Refer to Appendix G Of this test report.

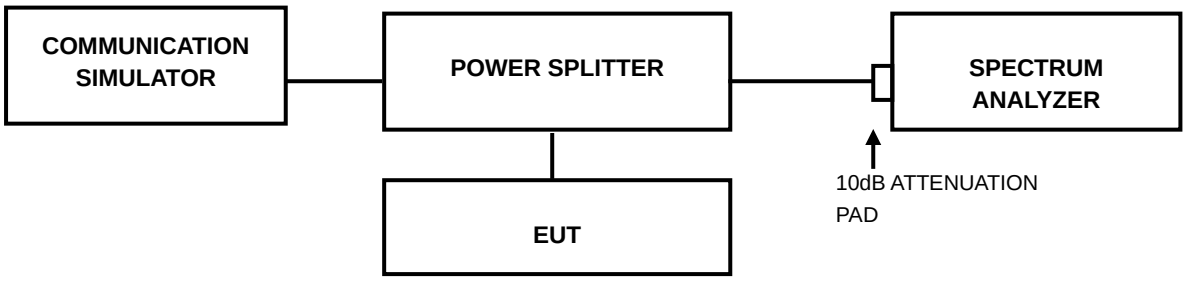
Note: VL = Low voltage(3.8V); VN/NV = Normal voltage(4V); VH = High voltage(4.2V);
NT = Normal temperature (25℃)

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

a. The conducted occupied bandwidth used the power splitter via EUT RF power connector between simulation base station and spectrum analyzer.

b. Use OBW measurement function of Spectrum analyzer to measure 99 % occupied bandwidth.

3.3.4 TEST RESULTS

Please Refer to Appendix G Of this test report.

3.4 EMISSION MASK MEASUREMENT

3.4.1 LIMITS OF EMISSION MASK MEASUREMENT

LTE Band14:
According to FCC part 90.543(e) shall be tested the emission mask.
(e) For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the 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, in accordance with the following:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

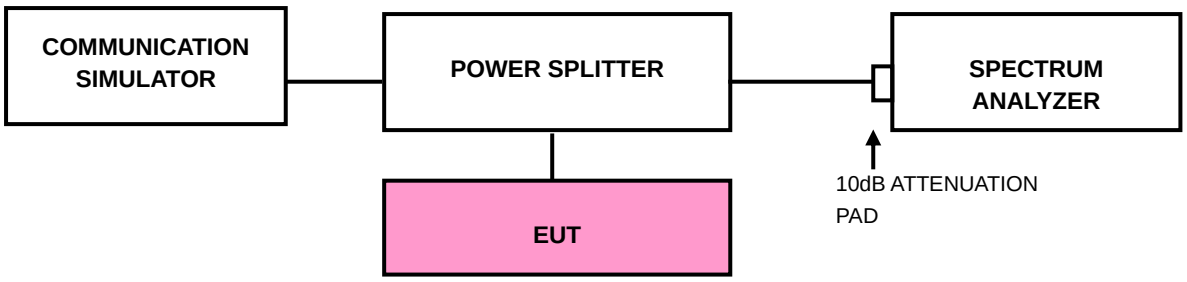
(2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

(4) Compliance with the provisions of paragraphs (e)(1) and (2) of this section is based on the use of measurement instrumentation such that the reading taken with any resolution bandwidth setting should be adjusted to indicate spectral energy in a 6.25 kHz segment.

(5) Compliance with the provisions of paragraph (e)(3) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of 30 kHz may be employed.

3.4.2 TEST SETUP



3.4.3 TEST PROCEDURES

a) Connect the transmitter to the spectrum analyzer via coaxial cable while ensuring proper impedance matching.

b) Tune the analyzer to the nominal center frequency of the emission bandwidth (EBW).

c) Set the resolution bandwidth (RBW) ≧ 1% EBW in the 1MHz band immediately outside and adjacent to the band edge.

d) Beyond the 1MHz band from the band edge, RBW=1MHz was used.

e) Set the video bandwidth (VBW) to ≧3 x RBW.

f) Select the average power (RMS) display detector.

g) Set the number of measurement points to ≧ 1001.

h) Use auto-coupled sweep time.

i) Perform the measurement over an interval of time when the transmission is continuous and at its maximum power level.

j) The RF fundamental frequency should be excluded against the limit line in the operating frequency band and use RBW is 10KHz or 100KHz.

k) Record the max trace plot into the test report.

3.4.4 TEST RESULTS

Please Refer to Appendix G Of this test report.

3.5 CONDUCTED SPURIOUS EMISSIONS

3.5.1 LIMITS OF CONDUCTED SPURIOUS EMISSIONS MEASUREMENT

(1)The power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) by at least 43 +10 log10(P) dB. The limit of emission equal to –13dBm

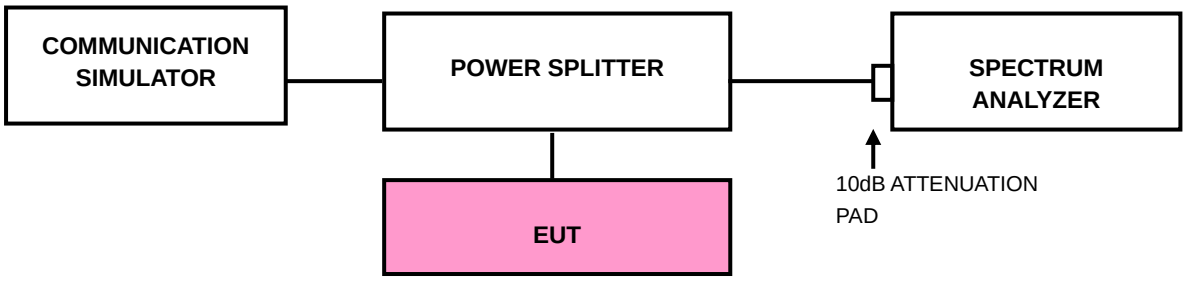
(2) For operations in the 763–775 MHz and 793–805 MHz bands, all emissions including harmonics in the band 1559– 1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the 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.

3.5.2 TEST PROCEDURE

a. The EUT makes a phone call to the communication simulator. All measurements were done at middle 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



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 G Of this test report.

3.6 RADIATED EMISSION MEASUREMENT

3.6.1 LIMITS OF RADIATED EMISSION MEASUREMENT

47 CFR 90.543(e)

For operations in the 758–768 MHz and the 788–798 MHz bands, the power of any emission outside the 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, in accordance with the following:

(1) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations.

(2) On all frequencies between 769–775 MHz and 799–805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations.

(3) On any frequency between 775–788 MHz, above 805 MHz, and below 758 MHz, by at least 43 + 10 log (P) dB.

47 CFR 90.543(f)

For operations in the 758–775 MHz and 788–805 MHz bands, all emissions including harmonics 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. EIRP = Output power level of S.G – TX cable loss + 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, E.R.P power = E.I.P.R power - 2.15dBi.

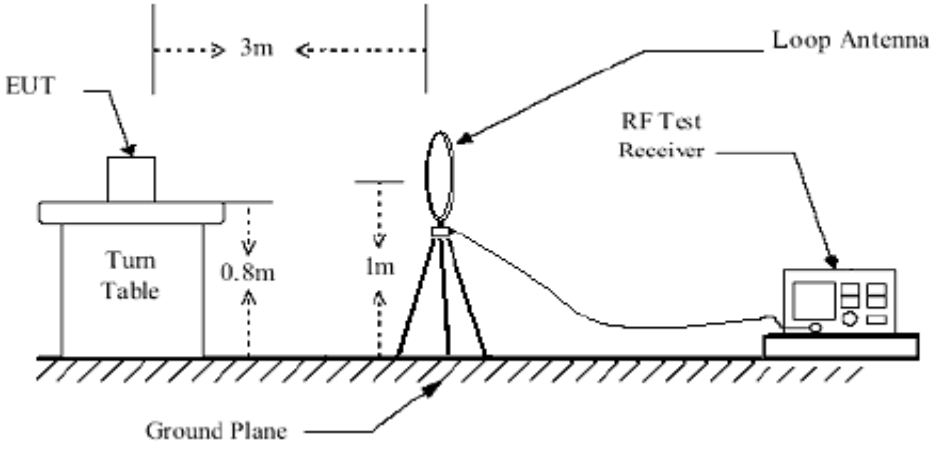
NOTE: The resolution bandwidth of spectrum analyzer is 1 MHz and the video bandwidth is 3 MHz.

3.6.3 DEVIATION FROM TEST STANDARD

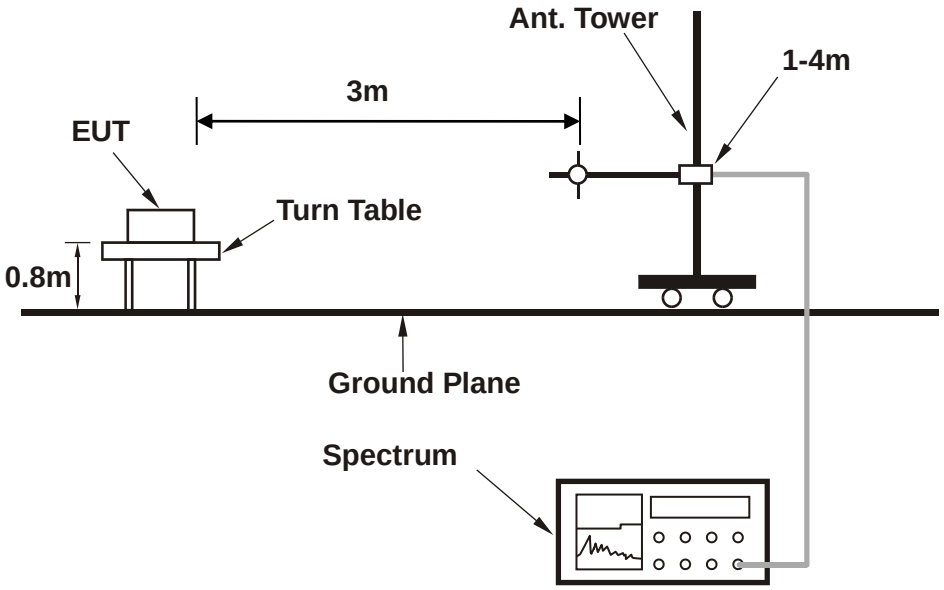
No deviation

3.6.4 TEST SETUP

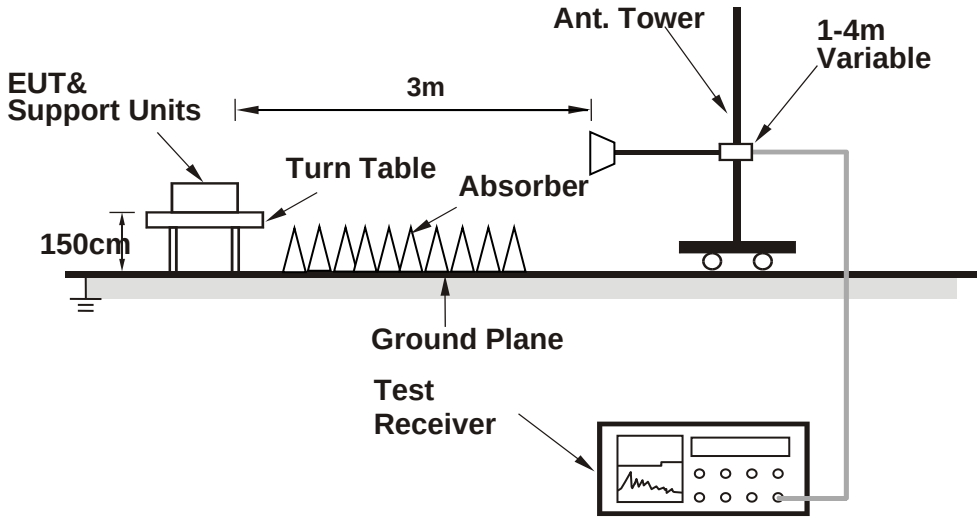
<Below 30MHz>



< Frequency Range 30MHz~1GHz >



< Frequency Range above 1GHz >



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

3.6.5 TEST RESULTS

NOTE ：

1. The 9K~30MHz amplitude of spurious emissions attenuated more than 20 dB below the permissible value is not required in the report.
2. For CA band, stricter limit is used for the results' evaluation.

BELOW 1GHz WORST-CASE DATA

30 MHz – 1GHz data:

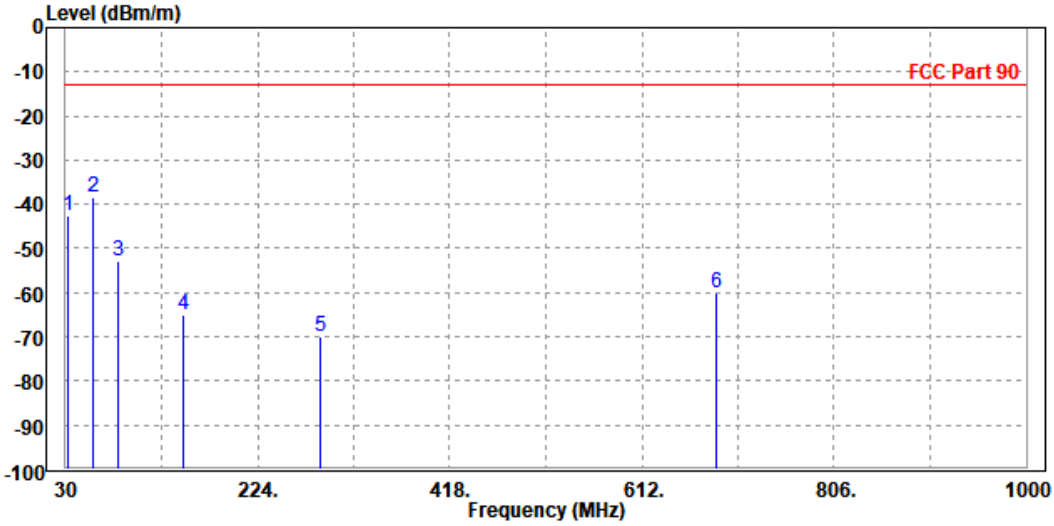
LTE Band 14:

CHANNEL BANDWIDTH: 5MHz / QPSK

CH23330

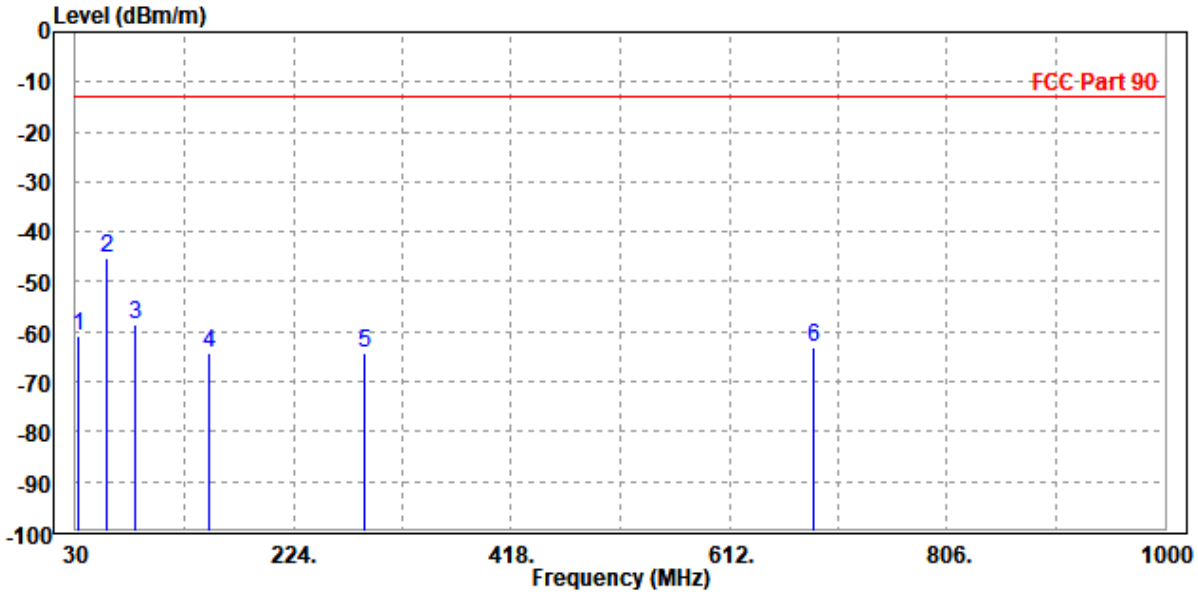
MODE	TX channel 23330	**FREQUENCY RANGE**	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 14V
TESTED BY	Jace HU		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	31.940	-42.42	-39.38	-13.00	-29.42	-3.04	Peak	Horizontal
2 PP	57.160	-38.44	-26.34	-13.00	-25.44	-12.10	Peak	Horizontal
3	83.350	-52.98	-40.26	-13.00	-39.98	-12.72	Peak	Horizontal
4	148.340	-65.16	-50.74	-13.00	-52.16	-14.42	Peak	Horizontal
5	288.020	-70.02	-60.65	-13.00	-57.02	-9.37	Peak	Horizontal
6	686.690	-60.09	-63.02	-13.00	-47.09	2.93	Peak	Horizontal



MODE	TX channel 23330	FREQUENCY RANGE	Below 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 14V
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	31.940	-60.79	-39.38	-13.00	-47.79	-21.41	Peak	Vertical
2 PP	57.160	-45.24	-26.34	-13.00	-32.24	-18.90	Peak	Vertical
3	83.350	-58.71	-40.27	-13.00	-45.71	-18.44	Peak	Vertical
4	148.340	-64.26	-50.73	-13.00	-51.26	-13.53	Peak	Vertical
5	288.020	-64.13	-60.64	-13.00	-51.13	-3.49	Peak	Vertical
6	686.690	-63.09	-63.02	-13.00	-50.09	-0.07	Peak	Vertical



ABOVE 1GHz

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

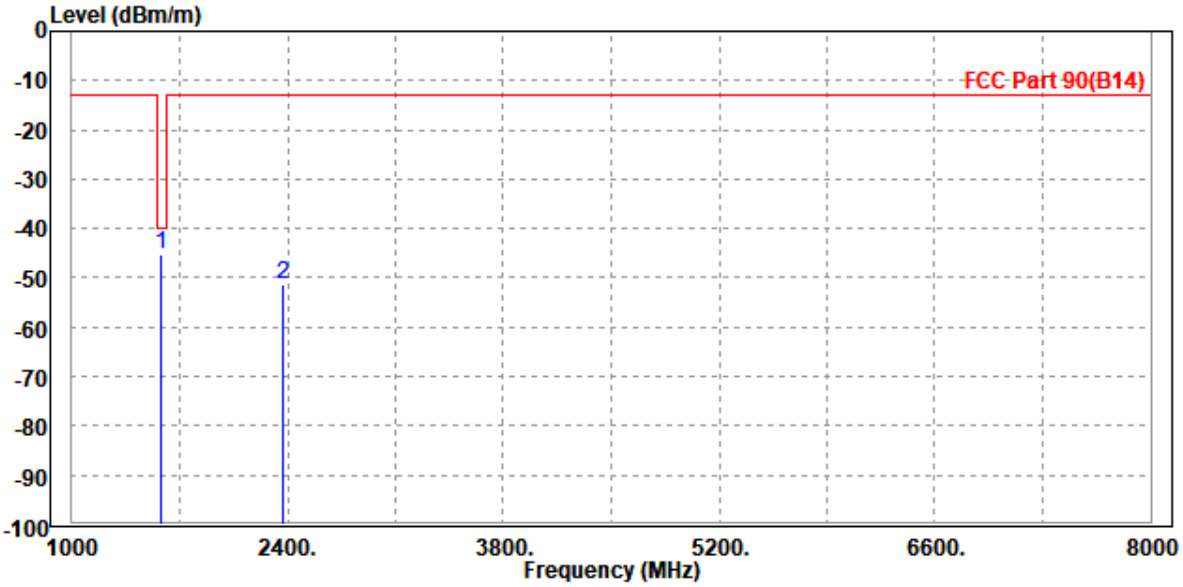
LTE B14

CHANNEL BANDWIDTH: 5MHz / QPSK

CH23305

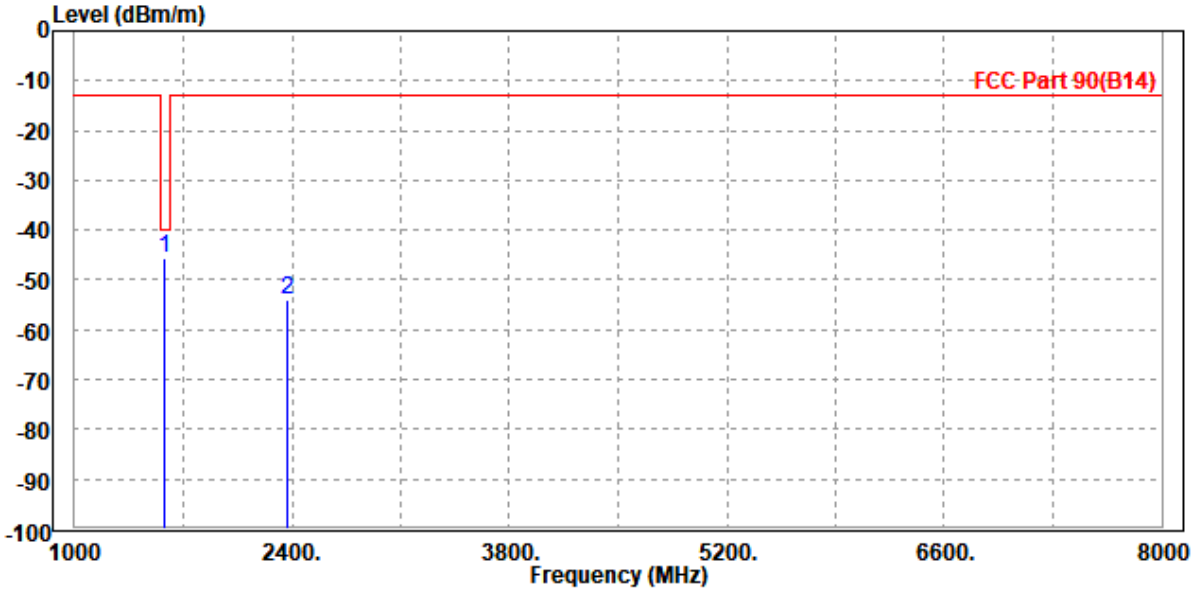
MODE	TX channel 23305	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 14V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1574.000	-45.38	-48.81	-40.00	-5.38	3.43	Peak	Horizontal
2	2372.000	-51.36	-57.11	-13.00	-38.36	5.75	Peak	Horizontal



MODE	TX channel 23305	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 14V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

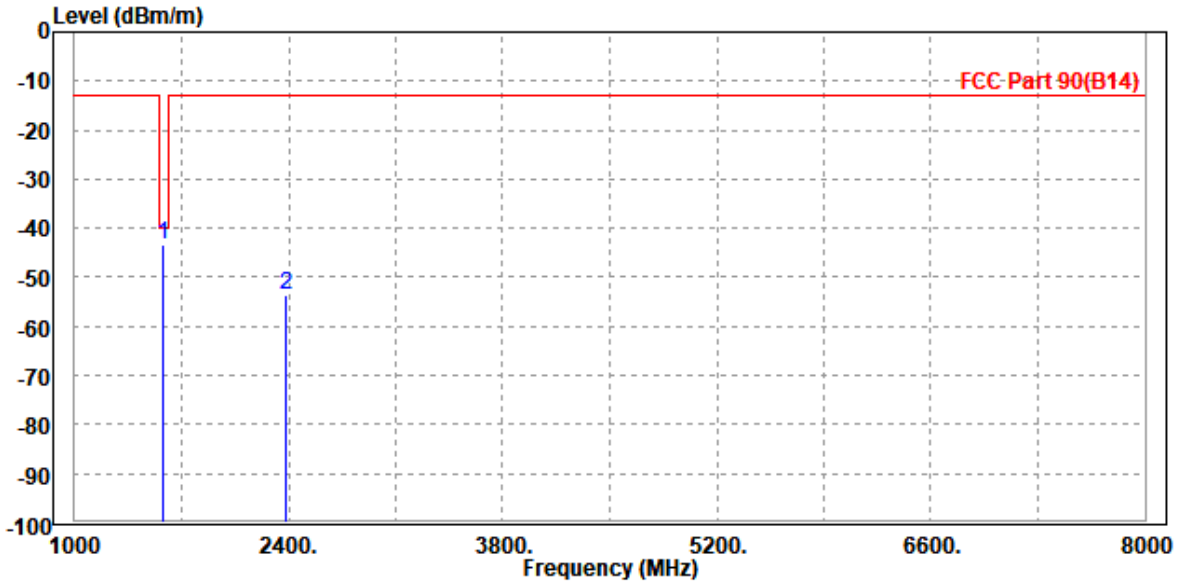
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1574.000	-45.53	-48.79	-40.00	-5.53	3.26	Peak	Vertical
2	2371.500	-54.01	-59.33	-13.00	-41.01	5.32	Peak	Vertical



CH23330

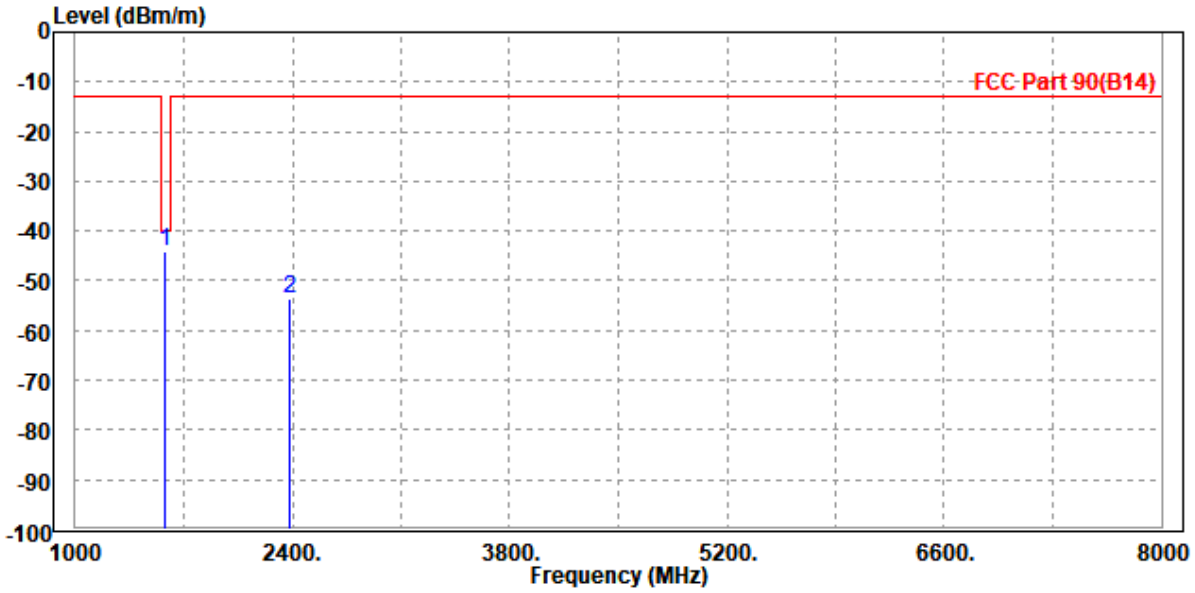
MODE	TX channel 23330	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 14V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1581.000	-43.52	-46.97	-40.00	-3.52	3.45	Peak	Horizontal
2	2379.000	-53.57	-59.34	-13.00	-40.57	5.77	Peak	Horizontal



MODE	TX channel 23330	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 14V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: VERTICAL AT 3 M			

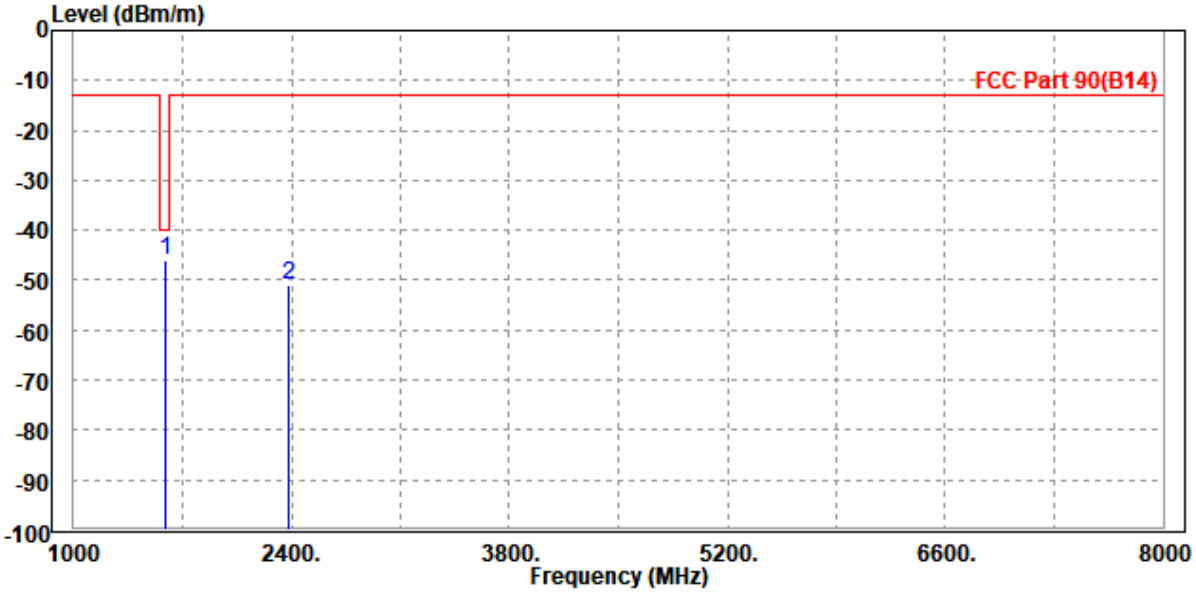
	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1581.000	-44.29	-47.56	-40.00	-4.29	3.27	Peak	Vertical
2	2379.000	-53.66	-59.01	-13.00	-40.66	5.35	Peak	Vertical



CH23355

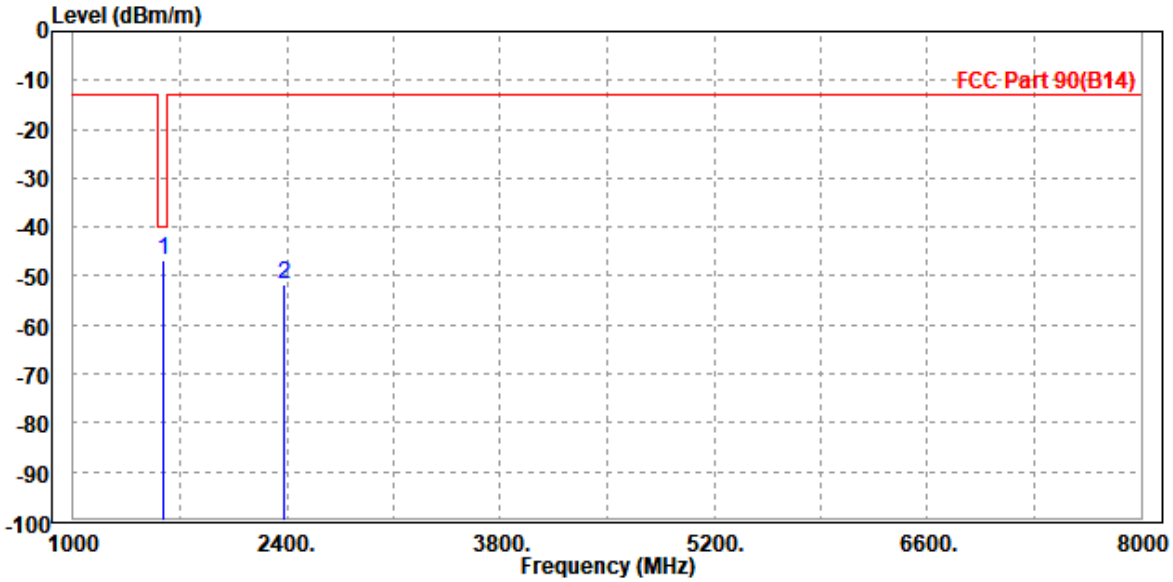
MODE	TX channel 23355	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 14V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1588.000	-45.96	-49.43	-40.00	-5.96	3.47	Peak	Horizontal
2	2386.500	-51.02	-56.81	-13.00	-38.02	5.79	Peak	Horizontal



MODE	TX channel 23355	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 14V
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	PP 1588.000	-46.69	-49.97	-40.00	-6.69	3.28	Peak	Vertical
2	2386.000	-51.81	-57.18	-13.00	-38.81	5.37	Peak	Vertical

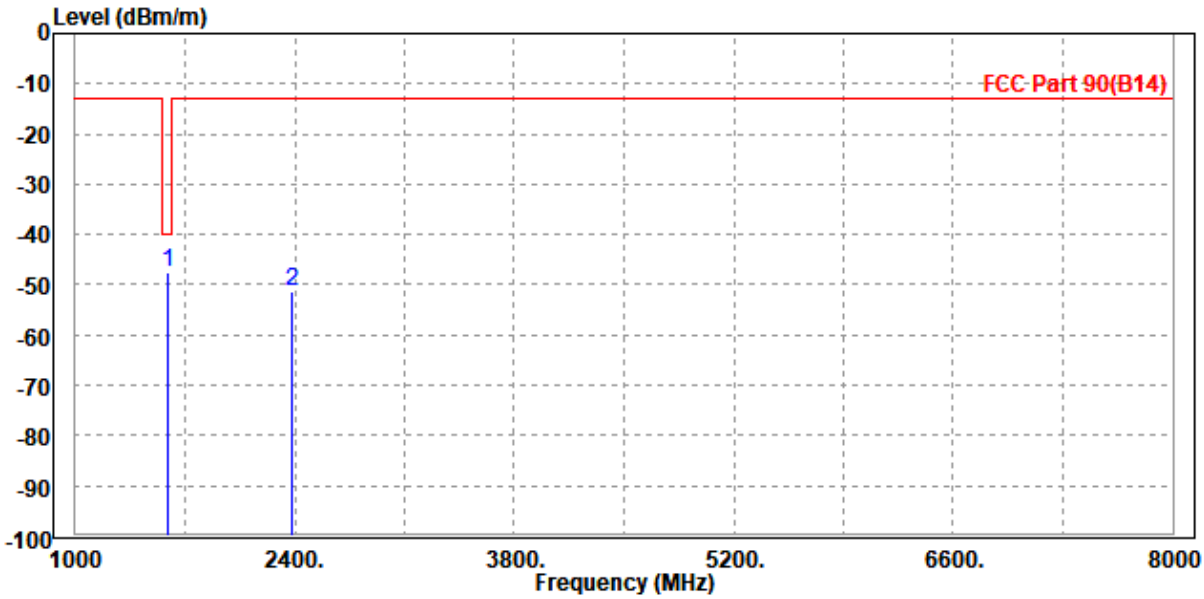


CHANNEL BANDWIDTH: 10MHz / QPSK

CH23330

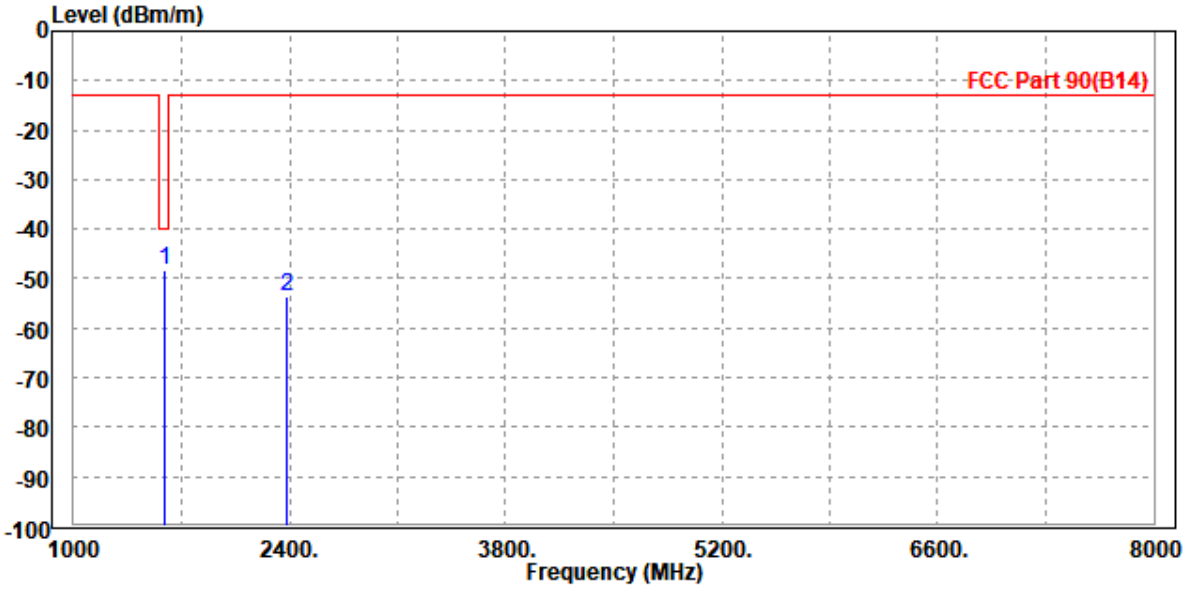
MODE	TX channel 23330	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 14V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1 PP	1586.000	-47.41	-50.88	-40.00	-7.41	3.47	Peak	Horizontal
2	2379.000	-51.28	-57.05	-13.00	-38.28	5.77	Peak	Horizontal



MODE	TX channel 23330	FREQUENCY RANGE	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	INPUT POWER	DC 14V
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	PP 1588.000	-48.20	-51.48	-40.00	-8.20	3.28	Peak	Vertical
2	2379.000	-53.62	-58.97	-13.00	-40.62	5.35	Peak	Vertical

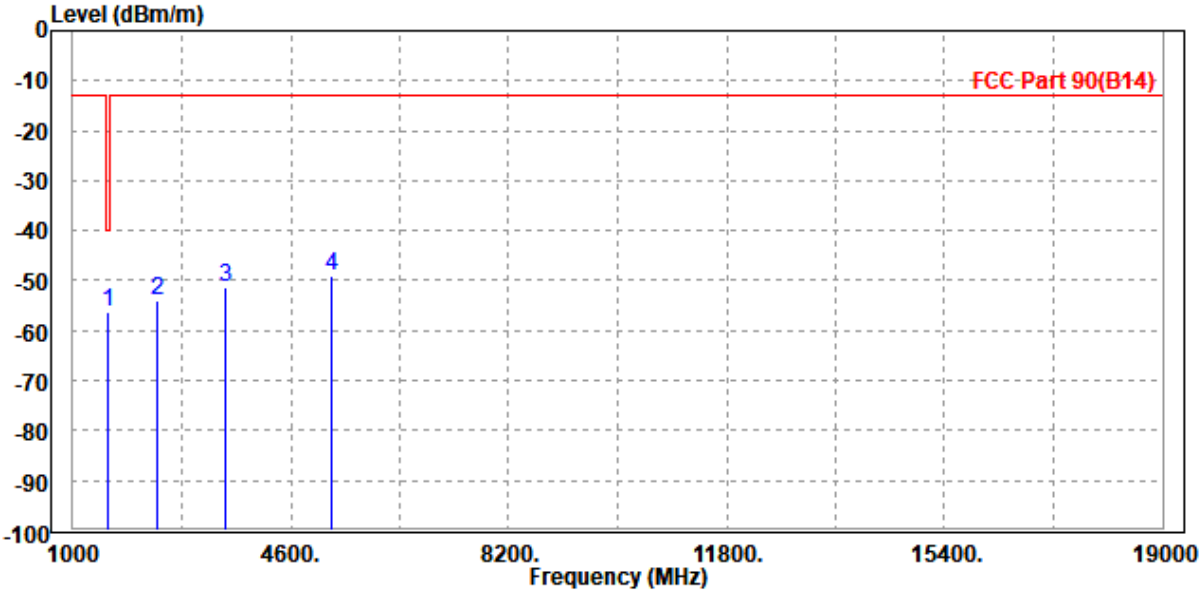


LTE 14A-66A

CHANNEL BANDWIDTH: (10+20) MHz / QPSK

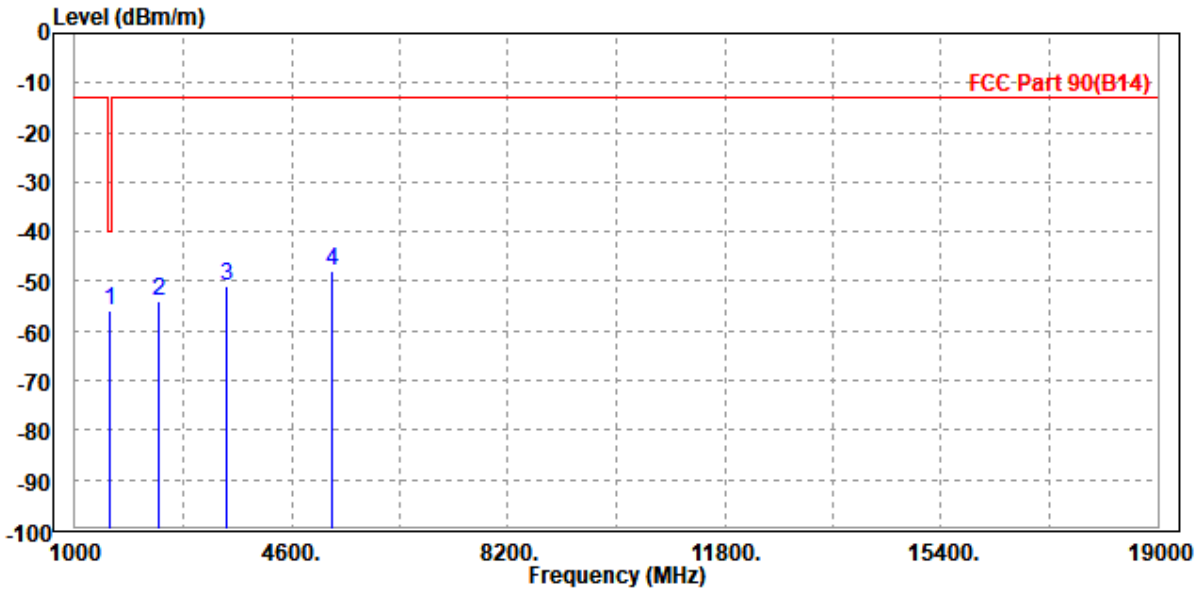
MODE	TX channel PCC 23330 TX channel SCC 132322	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 14V
TESTED BY	Jace Hu		
ANTENNA POLARITY & TEST DISTANCE: HORIZONTAL AT 3 M			

	Freq	Level	Read Level	Limit Line	Over Limit	Factor	Remark	Pol/Phase
	MHz	dBm/m	dBm	dBm/m	dB	dB/m		
1	PP 1586.000	-56.20	-59.67	-40.00	-16.20	3.47	Peak	Horizontal
2	2379.000	-53.86	-59.63	-13.00	-40.86	5.77	Peak	Horizontal
3	3510.000	-51.29	-59.84	-13.00	-38.29	8.55	Peak	Horizontal
4	5266.000	-48.92	-60.37	-13.00	-35.92	11.45	Peak	Horizontal



MODE	TX channel PCC 23330 TX channel SCC 132322	**FREQUENCY RANGE**	Above 1000MHz
ENVIRONMENTAL CONDITIONS	23deg. C, 70%RH	**INPUT POWER**	DC 14V
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	PP	1594.000	-55.73	-59.02	-40.00	-15.73	3.29	Peak	Vertical
2		2379.000	-53.82	-59.17	-13.00	-40.82	5.35	Peak	Vertical
3		3510.000	-50.86	-59.50	-13.00	-37.86	8.64	Peak	Vertical
4		5265.000	-47.85	-59.73	-13.00	-34.85	11.88	Peak	Vertical

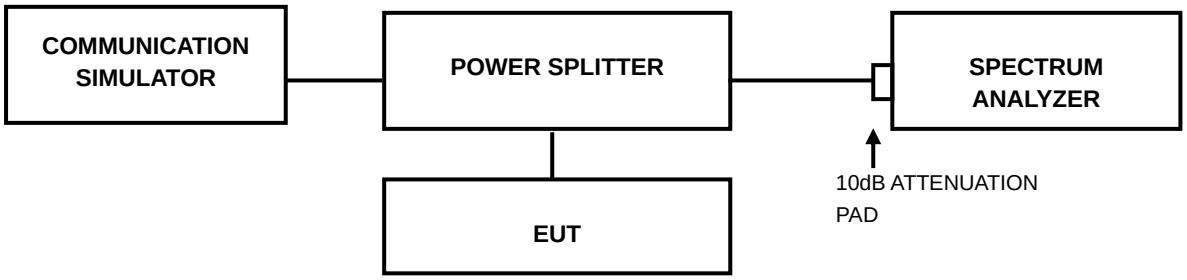


3.7 PEAK TO AVERAGE RATIO

3.7.1 LIMITS OF PEAK TO AVERAGE RATIO MEASUREMENT

In measuring transmissions in this band using an average power technique, the peak to-average ratio (PAR) of the transmission may not exceed 13 dB

3.7.2 TEST SETUP



3.7.3 TEST PROCEDURES

1. Set resolution/measurement bandwidth ≥ signal's occupied bandwidth;
2. Set the number of counts to a value that stabilizes the measured CCDF curve;
3. Record the maximum PAPR level associated with a probability of 0.1%.

3.7.4 TEST RESULTS

Please Refer to Appendix G Of this test report.

4 INFORMATION ON THE TESTING LABORATORIES

We, BV 7LAYERS COMMUNICATIONS TECHNOLOGY (SHENZHEN) CO. LTD., were founded in 2015 to provide our best service in EMC, Radio, Telecom and Safety consultation. Our laboratories are accredited and approved according to ISO/IEC 17025.

If you have any comments, please feel free to contact us at the following:

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Tel: +86-755-88696566
Fax: +86-755-88696577

Email: customerservice.sw@bureauveritas.com
Web Site: www.adt.com.tw

The address and road map of all our labs can be found in our web site also.

5 MODIFICATIONS RECORDERS FOR ENGINEERING CHANGES TO THE EUT BY THE LAB

No modifications were made to the EUT by the lab during the test.

---END---