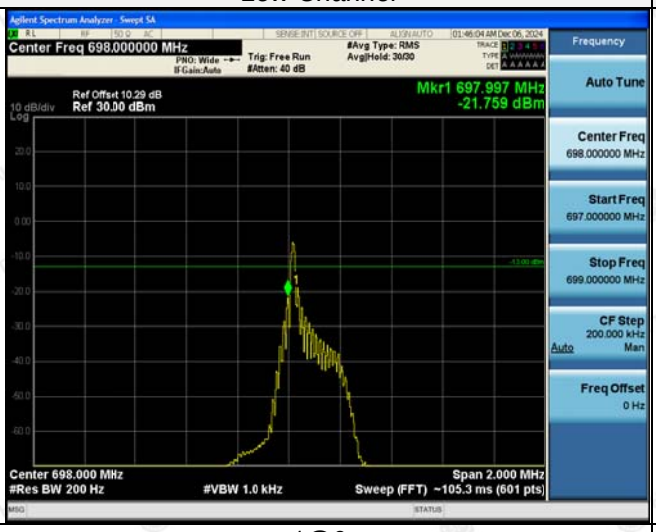
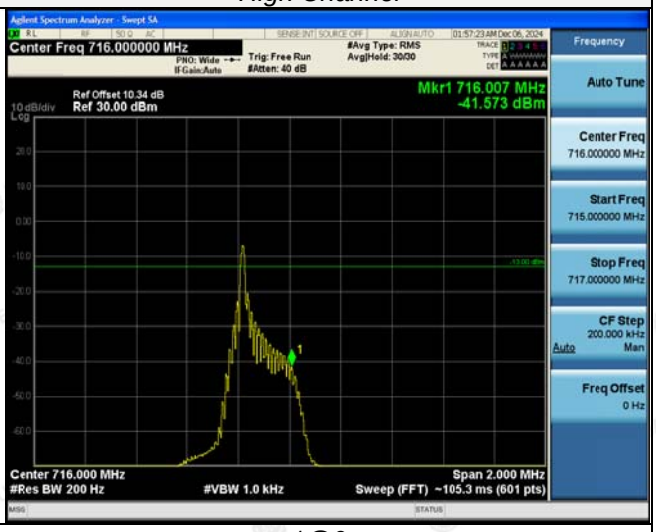
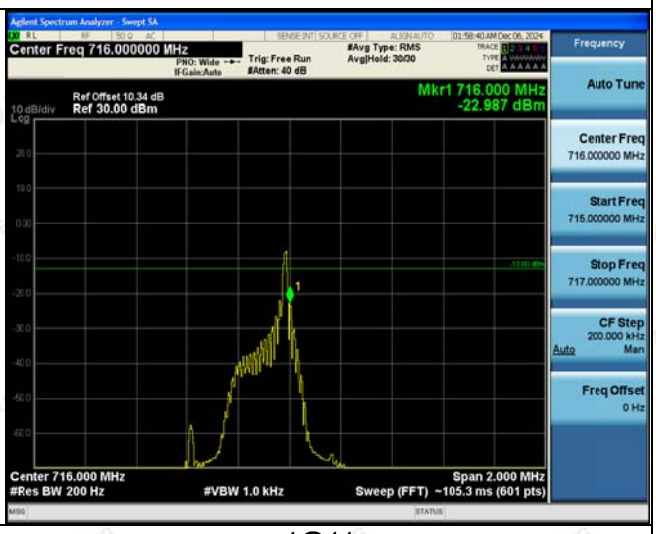
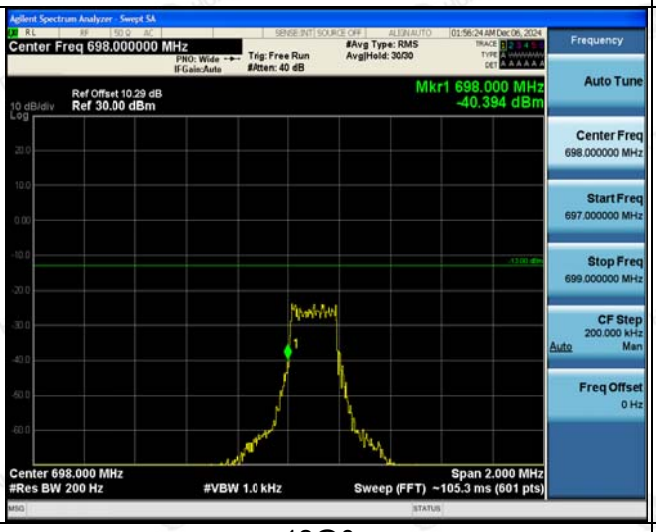
LTE FDD Band 85-QPSK- 15KHz	
Low Channel	High Channel
	
1@0	1@0
	
1@11	1@11
	
12@0	12@0

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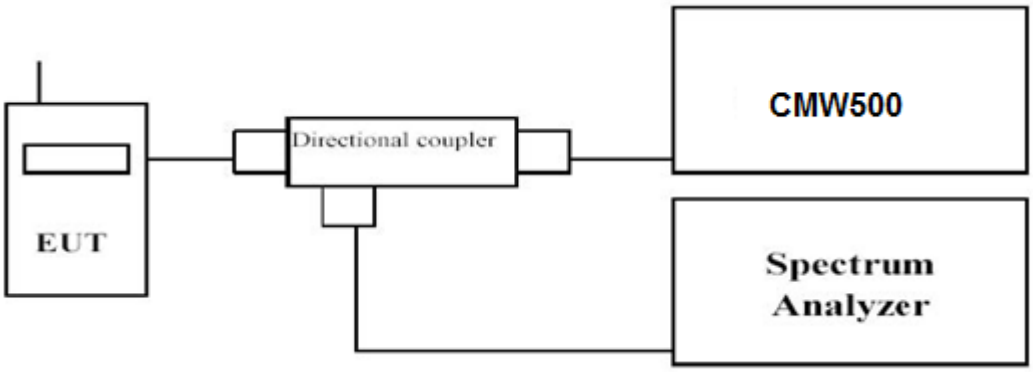
3.6 Spurious Emission

LIMIT

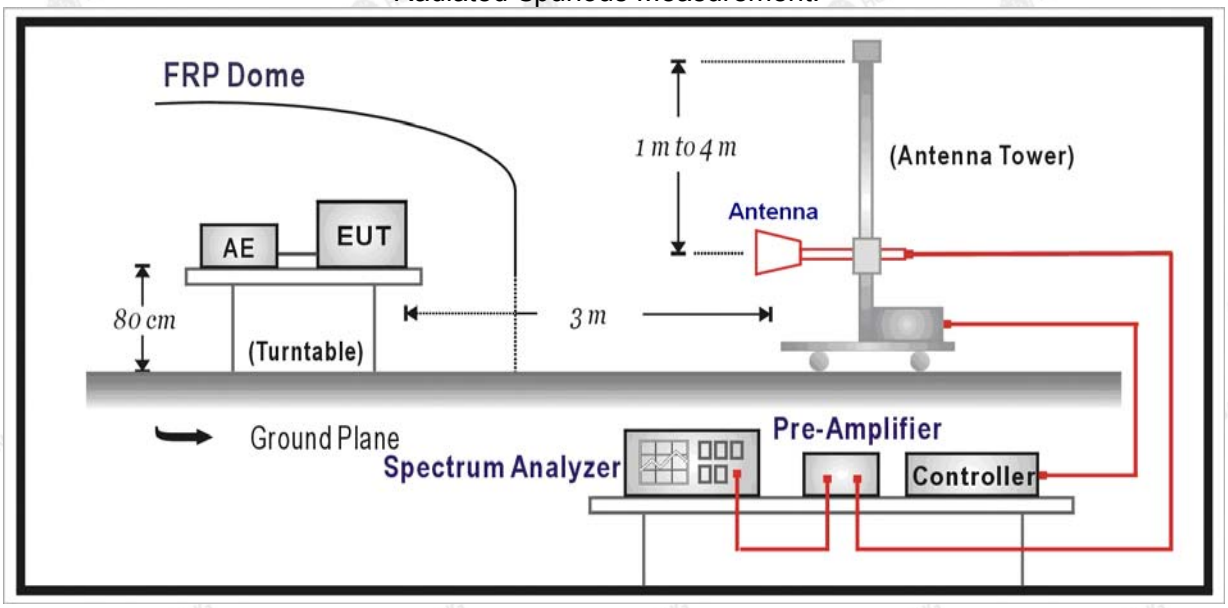
According to §27.53 (c): For operations in the 746-758 MHz band and the 776-788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following:
(1) On any frequency outside the 746-758 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;
(2) On any frequency outside 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;
(3) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 76 + 10 log (P) dB in a 6.25 kHz band segment, for base and fixed stations;
(4) On all frequencies between 763-775 MHz and 793-805 MHz, by a factor not less than 65 + 10 log (P) dB in a 6.25 kHz band segment, for mobile and portable stations;

TEST CONFIGURATION

Conducted Spurious Measurement:



Radiated Spurious Measurement:



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D.

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Conducted Spurious Measurement:

a. Place the EUT on a bench and set it in transmitting mode.
b. Connect a low loss RF cable from the antenna port to a spectrum analyzer and CMW500 by a Directional Couple.
c. EUT Communicate with CMW500, then select a channel for testing.
d. Add a correction factor to the display of spectrum, and then test.
e. The resolution bandwidth of the spectrum analyzer was set sufficient scans were taken to show the out of band Emission if any up to10th harmonic.
f. Please refer to following tables for test antenna conducted emissions.

Working Frequency	Sub range (GHz)	RBW	VBW	Sweep time (s)
LTE FDD Band 85	0.000009~0.000015	1KHz	3KHz	Auto
	0.000015~0.03	10KHz	30KHz	Auto
	0.03~26.5	1 MHz	3 MHz	Auto

Radiated Spurious Measurement:

a. The EUT shall be placed at the specified height on a support, and in the position closest to normal use as declared by provider.
b. The test antenna shall be oriented initially for vertical polarization and shall be chosen to correspond to the frequency of the transmitter.
c. The output of the test antenna shall be connected to the measuring receiver.
d. The transmitter shall be switched on and the measuring receiver shall be tuned to the frequency of the transmitter under test.
e. The test antenna shall be raised and lowered through the specified range of height until a maximum signal level is detected by the measuring receiver.
f. The transmitter shall then be rotated through 360° in the horizontal plane, until the maximum signal level is detected by the measuring receiver.
g. The test antenna shall be raised and lowered again through the specified range of height until a maximum signal level is detected by the measuring receiver.
h. The maximum signal level detected by the measuring receiver shall be noted.
i. The transmitter shall be replaced by a substitution antenna.
j. The substitution antenna shall be orientated for vertical polarization and the length of the substitution antenna shall be adjusted to correspond to the frequency of the transmitter.
k. The substitution antenna shall be connected to a calibrated signal generator.
l. If necessary, the input attenuator setting of the measuring receiver shall be adjusted in order to increase the sensitivity of the measuring receiver.
m. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
n. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring receiver, that is equal to the level noted while the transmitter radiated power was measured, corrected for the change of input attenuator setting of the measuring receiver.
o. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.
p. The measure of the effective radiated power is the larger of the two levels recorded at the input to the substitution antenna, corrected for gain of the substitution antenna if necessary.
q. The resolution bandwidth of the spectrum analyzer was set at 100 kHz for Part 22 and 1MHz for Part 24. The frequency range was checked up to 10th harmonic.
r. Test site anechoic chamber refer to ANSI C63.

TEST RESULTS

Remark:

1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 85; recorded worst case for each Channel Bandwidth of LTE Band 85.*

Conducted Measurement:

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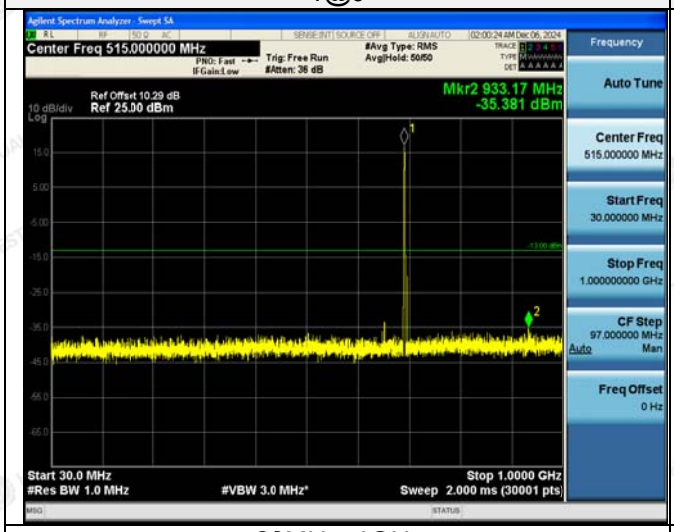
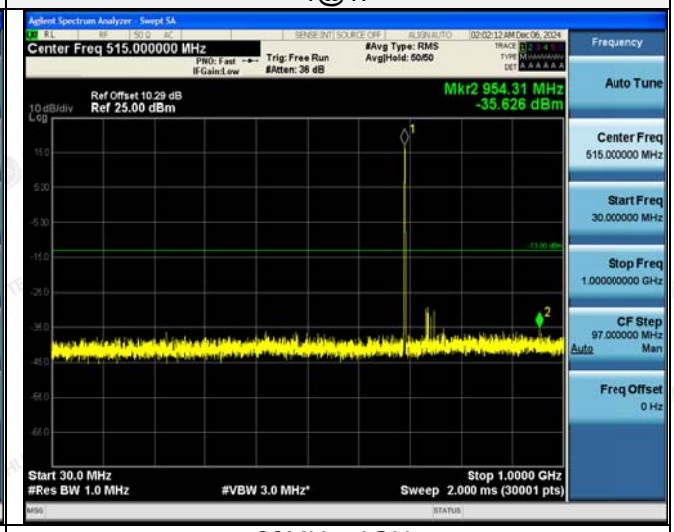
LTE FDD Band 85-QPSK-3.75KHz	
Low Channel	
1@0	1@47
	
30MHz~1GHz	30MHz~1GHz
1GHz ~5GHz	1GHz ~5GHz
5GHz ~12GHz	5GHz ~12GHz

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12GHz ~26.5GHz

12GHz ~26.5GHz

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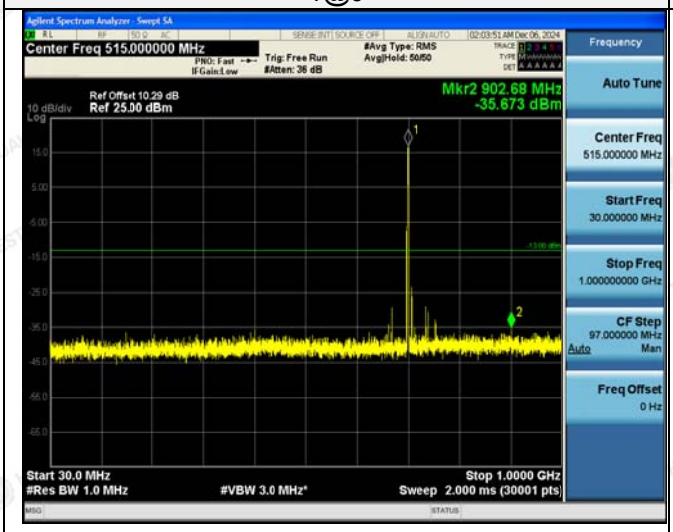
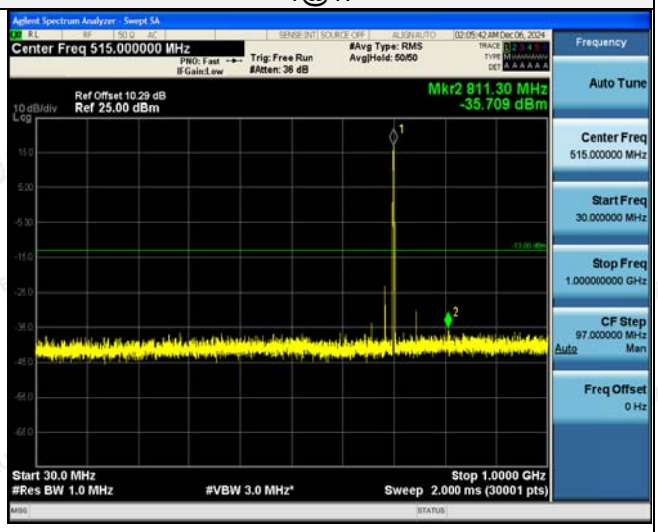
LTE FDD Band 85-QPSK-3.75KHz	
Middle Channel	
1@0	1@47
	
30MHz~1GHz	30MHz~1GHz
1GHz ~5GHz	1GHz ~5GHz
5GHz ~12GHz	5GHz ~12GHz

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12GHz ~26.5GHz

12GHz ~26.5GHz

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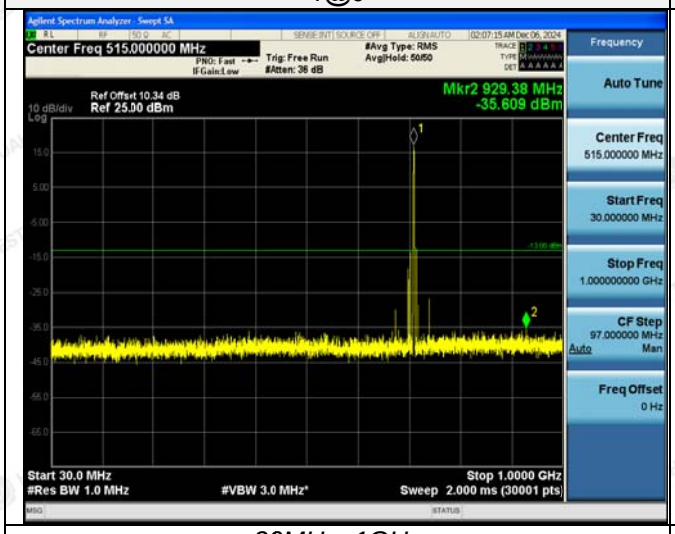
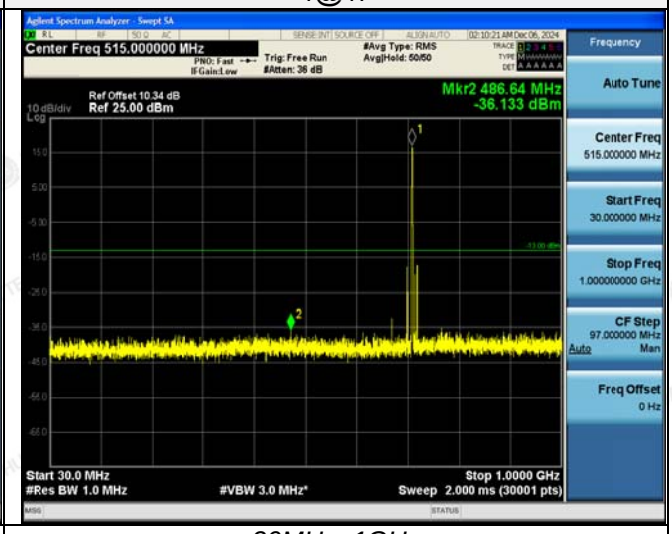
LTE FDD Band 85-QPSK-3.75KHz	
High Channel	
1@0	1@47
	
30MHz~1GHz	30MHz~1GHz
1GHz ~5GHz	1GHz ~5GHz
5GHz ~12GHz	5GHz ~12GHz

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12GHz ~26.5GHz

12GHz ~26.5GHz

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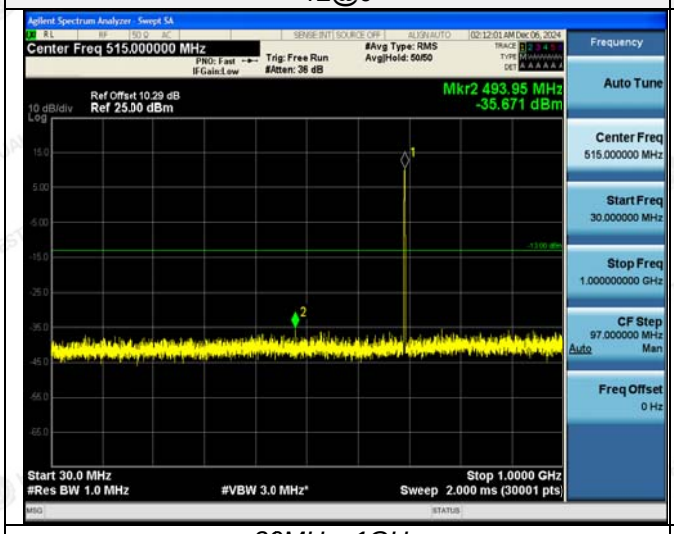
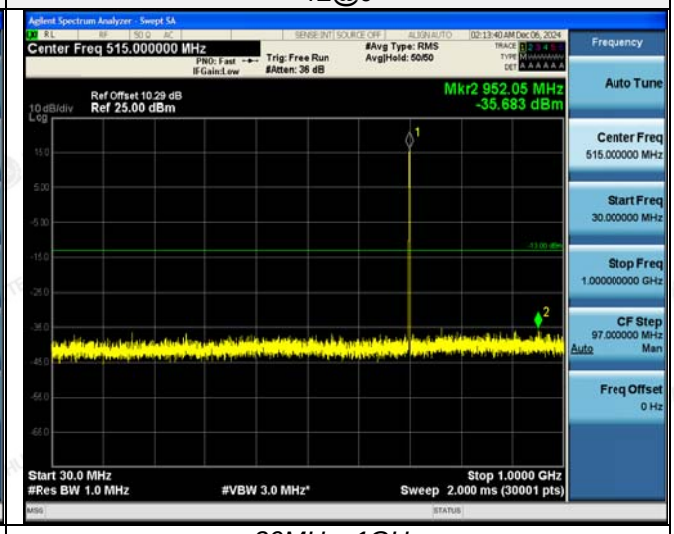
LTE FDD Band 85-QPSK-15KHz	
Low Channel	Middle Channel
12@0	12@0
	
30MHz~1GHz	30MHz~1GHz
1GHz ~5GHz	1GHz ~5GHz
5GHz ~12GHz	5GHz ~12GHz

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12GHz ~26.5GHz

12GHz ~26.5GHz

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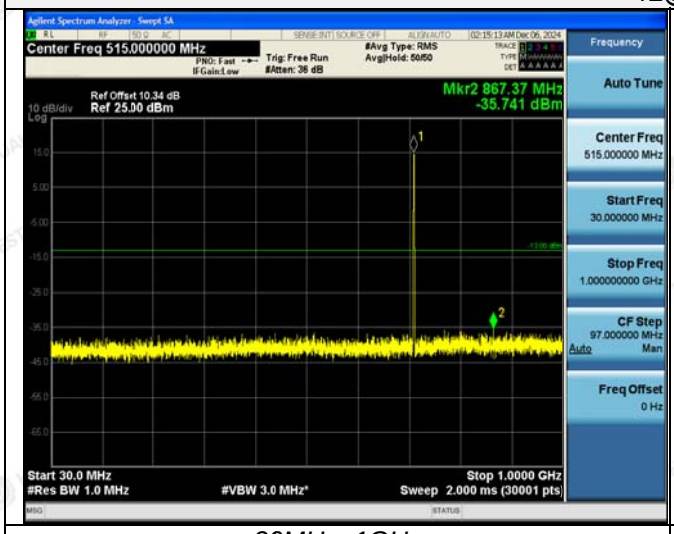
LTE FDD Band 85-QPSK-15KHz	
High Channel	
12@0	
	
30MHz~1GHz	1GHz ~5GHz
5GHz ~12GHz	12GHz ~26.5GHz

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Radiated Measurement:

Remark:
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 85; recorded worst case for each Channel Bandwidth of LTE FDD Band 85.*
2. *EIRP=P_{Mea}(dBm)-P_{cl}(dB) +G_a(dBi)*
3. *We were not recorded other points as values lower than limits.*
4. *Margin = Limit - EIRP*

Radiated Measurement:

Remark:
1. *We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 85; recorded worst case for each Channel Bandwidth of LTE FDD Band 85.*
2. *EIRP=P_{Mea}(dBm)-P_{cl}(dB) +G_a(dBi)*
3. *We were not recorded other points as values lower than limits.*
4. *Margin = Limit - EIRP*

LTE FDD Band 85-15KHz-BPSK-Low Channel

Frequency (MHz)	PMea (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1396.2	-53.97	4.02	3	12.21	-45.78	-13.00	32.78	H
2094.3	-48.15	5.11	3	13.26	-40	-13.00	27	H
1396.2	-59.04	4.02	3	12.21	-50.85	-13.00	37.85	V
2094.3	-54.91	5.11	3	13.26	-46.76	-13.00	33.76	V

LTE FDD Band 85-15KHz-BPSK-Middle Channel

Frequency (MHz)	PMea (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1414.0	-52.98	4.02	3	12.21	-44.79	-13.00	31.79	H
2121.0	-47.81	5.11	3	13.26	-39.66	-13.00	26.66	H
1414.0	-58.3	4.02	3	12.21	-50.11	-13.00	37.11	V
2121.0	-54.44	5.11	3	13.26	-46.29	-13.00	33.29	V

LTE FDD Band 85-15KHz-BPSK-High Channel

Frequency (MHz)	PMea (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1431.8	-54.18	4.02	3	12.21	-45.99	-13.00	32.99	H
2147.7	-47.98	5.11	3	13.26	-39.83	-13.00	26.83	H
1431.8	-59.81	4.02	3	12.21	-51.62	-13.00	38.62	V
2147.7	-54.21	5.11	3	13.26	-46.06	-13.00	33.06	V

LTE FDD Band 85-15KHz-QPSK-Low Channel

Frequency (MHz)	PMea (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1396.2	-54.92	4.02	3	12.21	-46.73	-13.00	33.73	H
2094.3	-48.19	5.11	3	13.26	-40.04	-13.00	27.04	H
1396.2	-59.02	4.02	3	12.21	-50.83	-13.00	37.83	V
2094.3	-54.33	5.11	3	13.26	-46.18	-13.00	33.18	V

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LTE FDD Band 85-15KHz-QPSK-Middle Channel

Frequency (MHz)	PMea (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1414.0	-54.71	4.02	3	12.21	-46.52	-13.00	33.52	H
2121.0	-45.16	5.11	3	13.26	-37.01	-13.00	24.01	H
1414.0	-58.92	4.02	3	12.21	-50.73	-13.00	37.73	V
2121.0	-53.77	5.11	3	13.26	-45.62	-13.00	32.62	V

LTE FDD Band 85-15KHz-QPSK-High Channel

Frequency (MHz)	PMea (dBm)	Pcl (dB)	Diatance	Ga Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1431.8	-54.17	4.02	3	12.21	-45.98	-13.00	32.98	H
2147.7	-46.88	5.11	3	13.26	-38.73	-13.00	25.73	H
1431.8	-59.12	4.02	3	12.21	-50.93	-13.00	37.93	V
2147.7	-53.67	5.11	3	13.26	-45.52	-13.00	32.52	V

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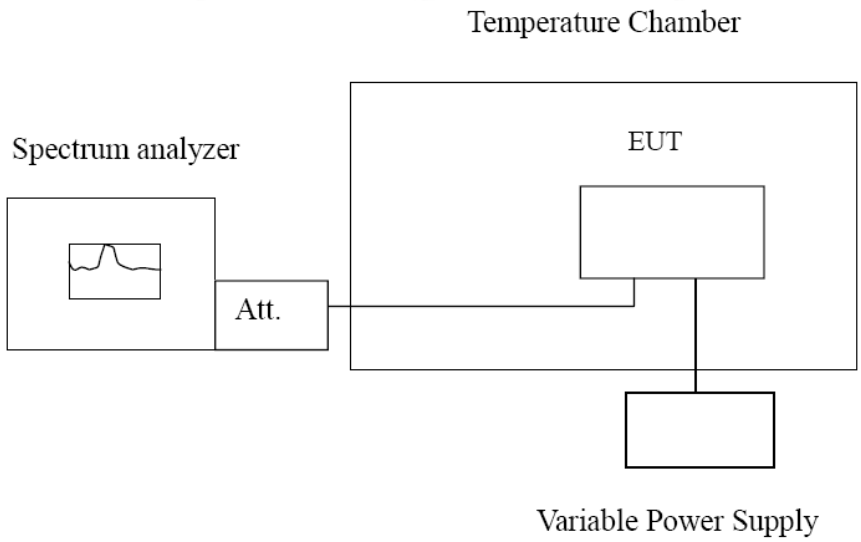
Add: 1-2F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

3.7 Frequency Stability Under Temperature & Voltage Variations

LIMIT

According to §27.54, §2.1055 requirement, the frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation and should not exceed 2.5ppm.

TEST CONFIGURATION



TEST PROCEDURE

The EUT was setup according to EIA/TIA 603D.

Frequency Stability Under Temperature Variations:
In order to measure the carrier frequency under the condition of AFC lock, it is necessary to make measurements with the EUT in a "call mode". This is accomplished with the use of R&S CMW500 DIGITAL RADIO COMMUNICATION TESTER.
1. Measure the carrier frequency at room temperature.
2. Subject the EUT to overnight soak at -30℃.
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE Band 85, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
4. Repeat the above measurements at 10℃ increments from -30℃ to +50℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
5. Re-measure carrier frequency at room temperature with nominal voltage. Vary supply voltage from minimum voltage to maximum voltage, in 0.1Volt increments re-measuring carrier frequency at each voltage. Pause at nominal voltage for 1.5 hours unpowered, to allow any self-heating to stabilize, before continuing.
6. Subject the EUT to overnight soak at +50℃.
7. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on the centre channel, measure the carrier frequency. These measurements should be made within 2 minutes of Powering up the EUT, to prevent significant self-warming.
8. Repeat the above measurements at 10 ℃ increments from +50℃ to -30℃. Allow at least 1.5 hours at each temperature, unpowered, before making measurements.
9. At all temperature levels hold the temperature to +/- 0.5℃ during the measurement procedure.

Frequency Stability Under Voltage Variations:
Set chamber temperature to 20℃. Use a variable AC power supply / DC power source to power the EUT and set the voltage to rated voltage. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency.
Reduce the input voltage to specify extreme voltage variation (±15%) and endpoint, record the maximum frequency change.

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TEST RESULTS

Remark:
1. We tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE Band 85; recorded worst case.

LTE Band 85, 15KHz (worst case of all bandwidths)

Frequency Error vs Voltage

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)	
	BPSK	QPSK	BPSK	QPSK
4.25V	-14.19	-10.23	-0.020327	-0.014654
5.0V	-12.13	-9.83	-0.017376	-0.014081
5.75V	-11.20	-9.50	-0.016044	-0.013608

Frequency Error vs Temperature

Temperature (℃)	Frequency error (Hz)		Frequency error (ppm)	
	BPSK	QPSK	BPSK	QPSK
-30°	-11.29	-11.34	-0.016172	-0.016244
-20°	-11.69	-8.73	-0.016745	-0.012505
-10°	-10.86	-8.14	-0.015557	-0.011660
0°	-7.24	6.14	-0.010240	0.008685
10°	-8.27	-6.07	-0.011697	-0.008586
20°	-11.46	5.64	-0.016209	0.007977
30°	-8.01	-6.78	-0.011330	-0.009590
40°	-8.91	6.29	-0.012603	0.008897
50°	-7.00	9.53	-0.009901	0.013479

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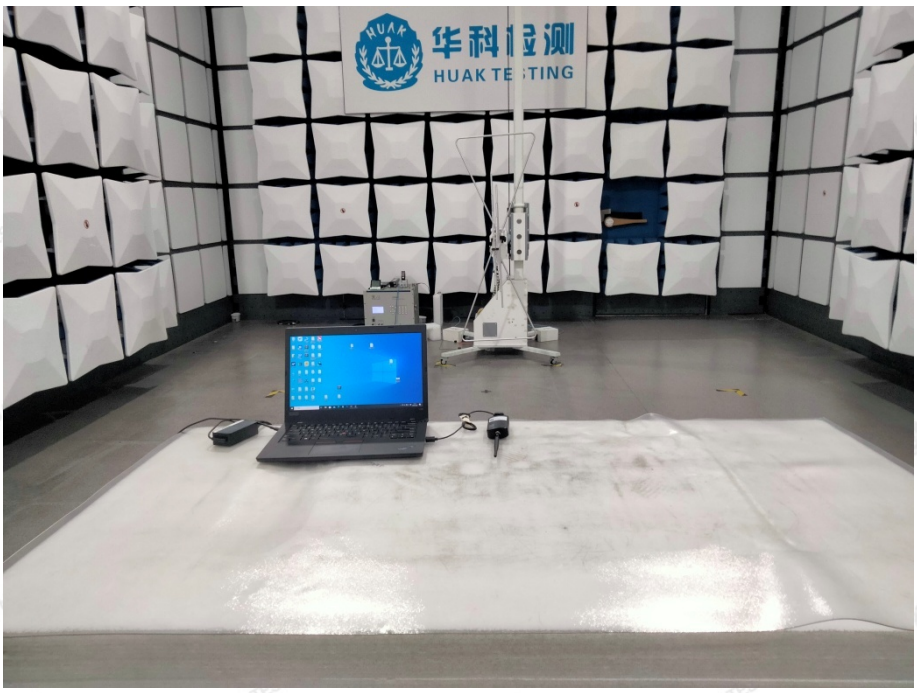
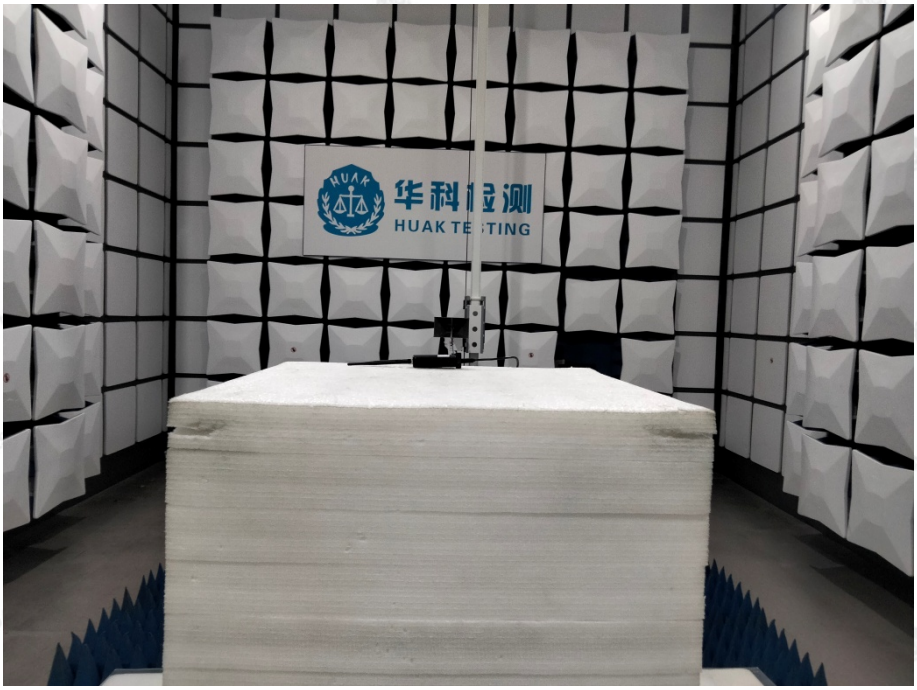
4 Test Setup Photos of the EUT





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5 Photos of the EUT

Reference to the report: ANNEX A of external photos and ANNEX B of internal photos.

.....End of Report.....

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