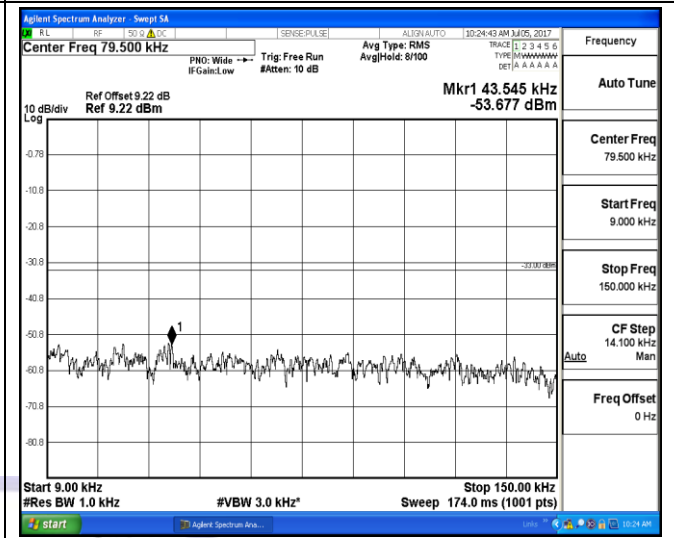
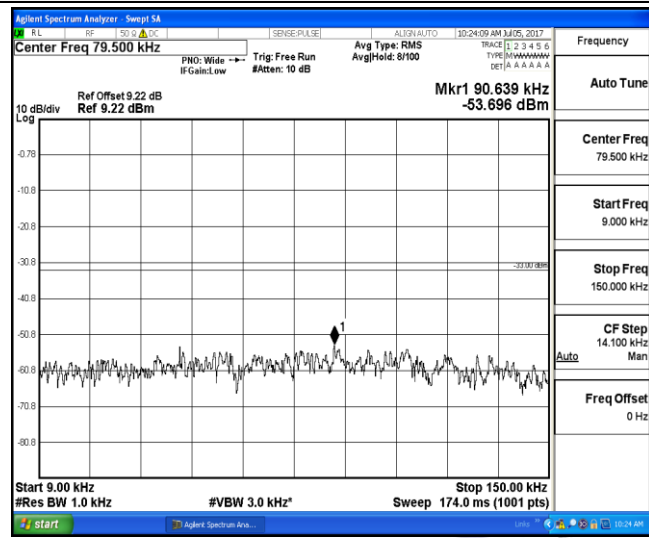


Conducted Measurement:

LTE FDD Band 12-1.4MHz Channel Bandwidth  
Low Channel

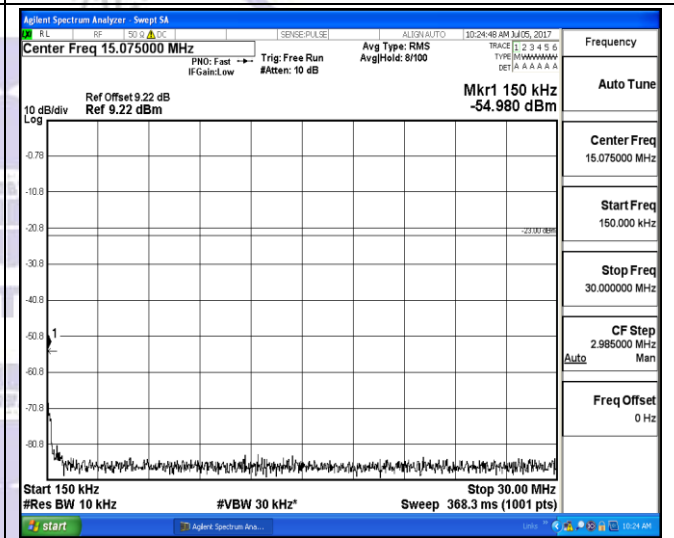
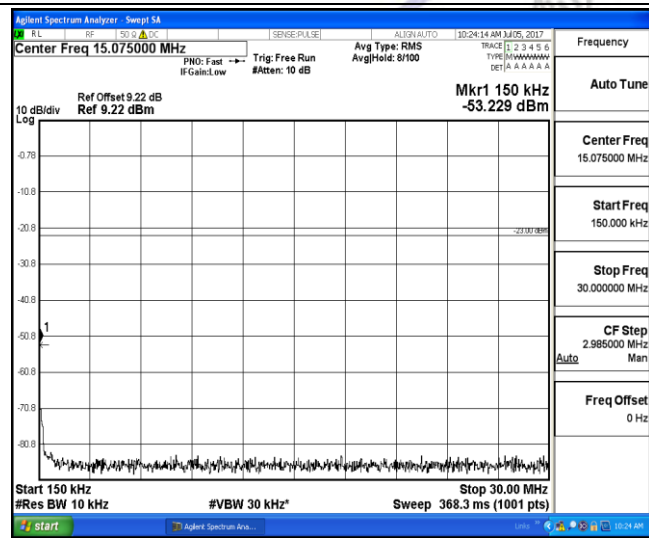
QPSK

16QAM



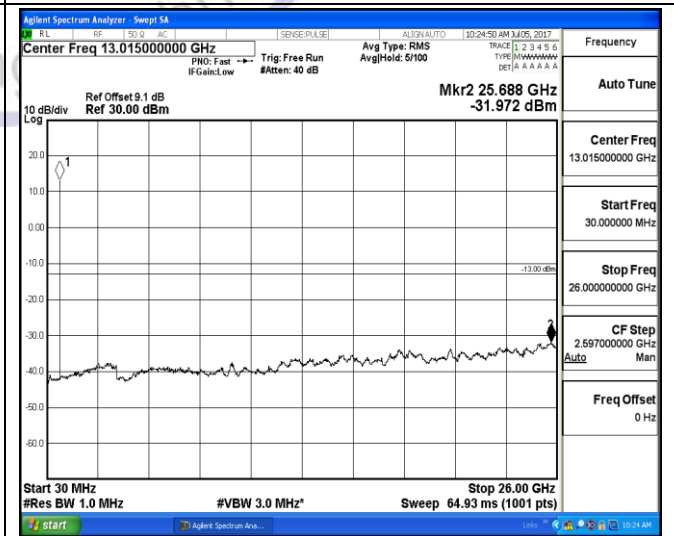
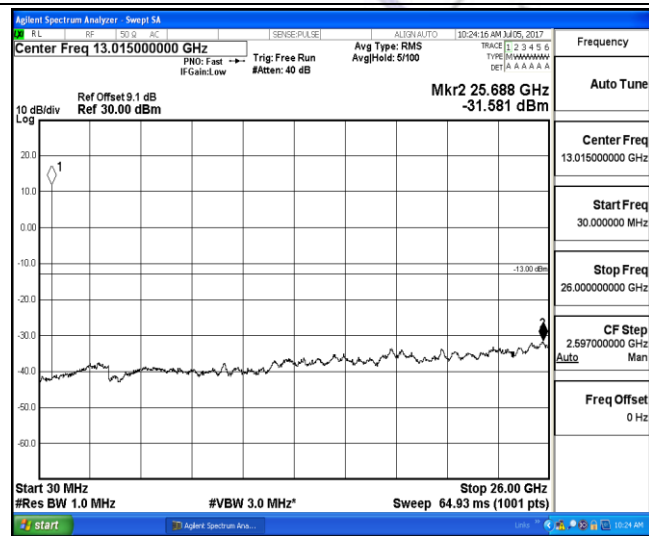
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

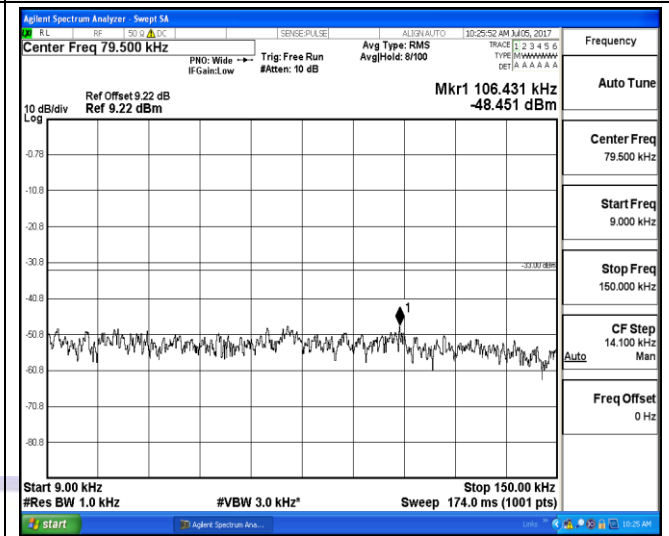
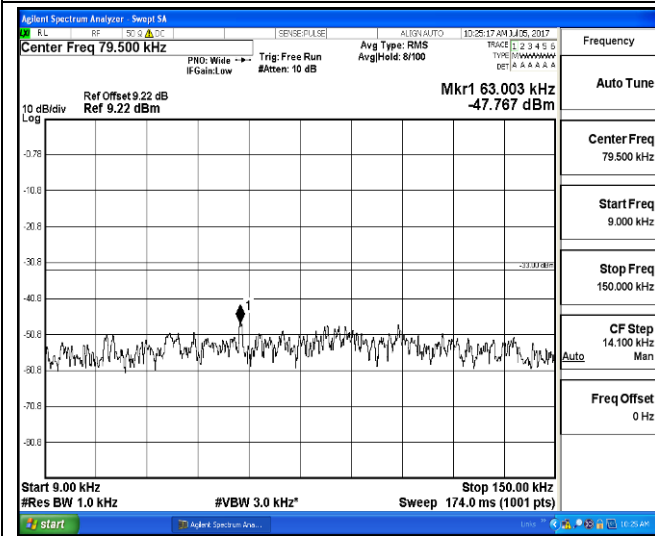
1RB#0

1RB#0

LTE FDD Band 12-1.4MHz Channel Bandwidth  
Middle Channel

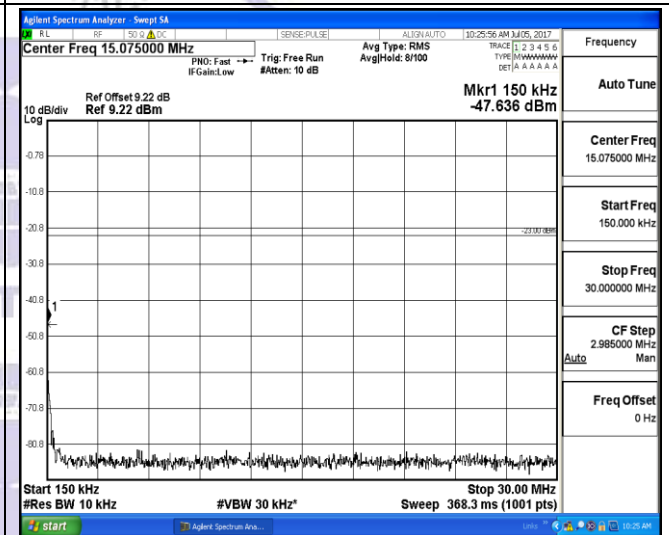
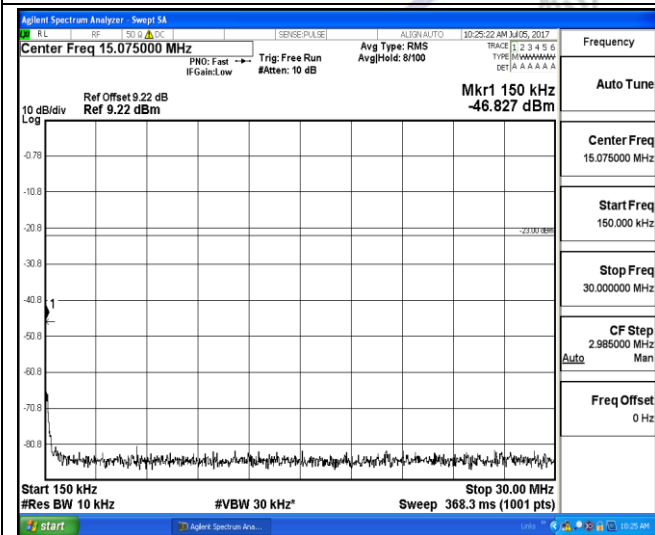
QPSK

16QAM



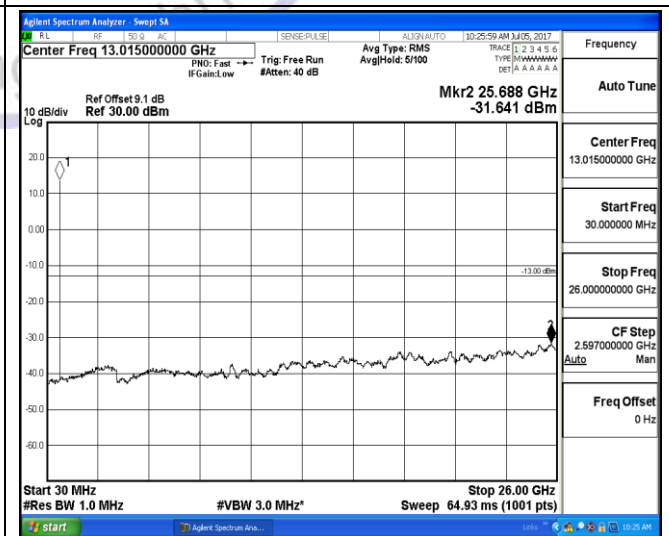
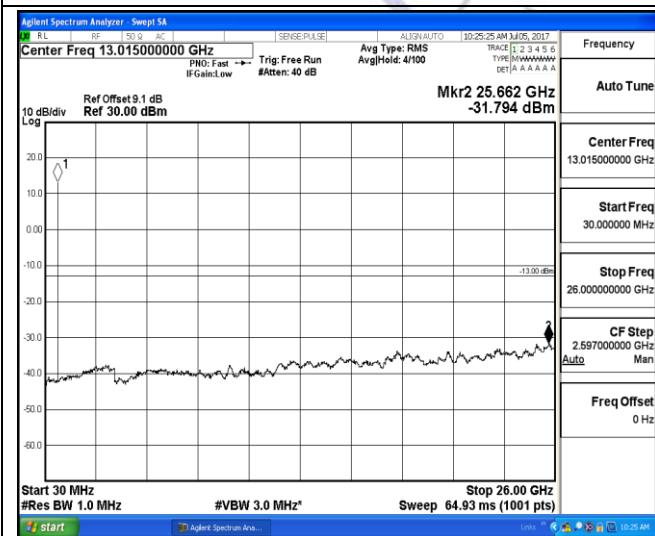
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

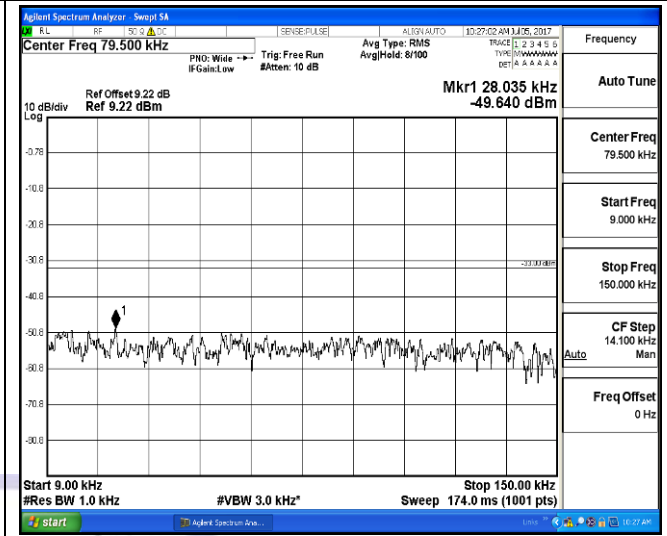
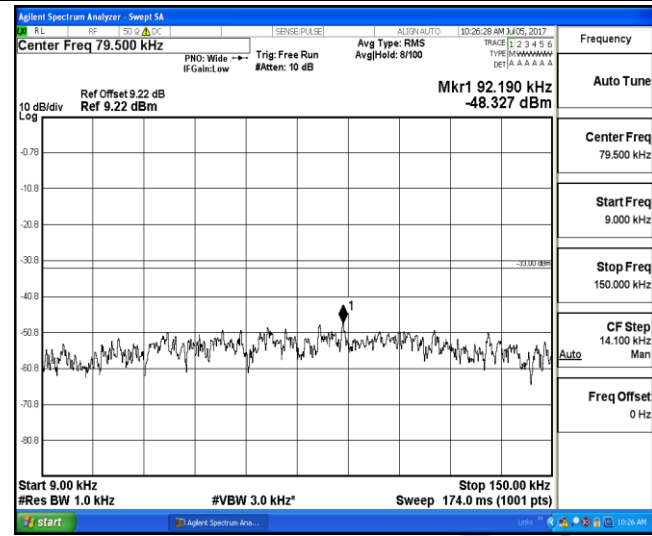
1RB#0

1RB#0

LTE FDD Band 12-1.4MHz Channel Bandwidth  
High Channel

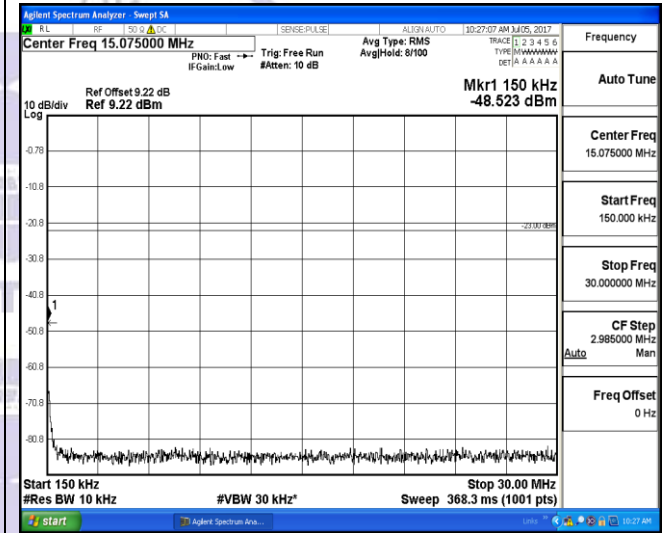
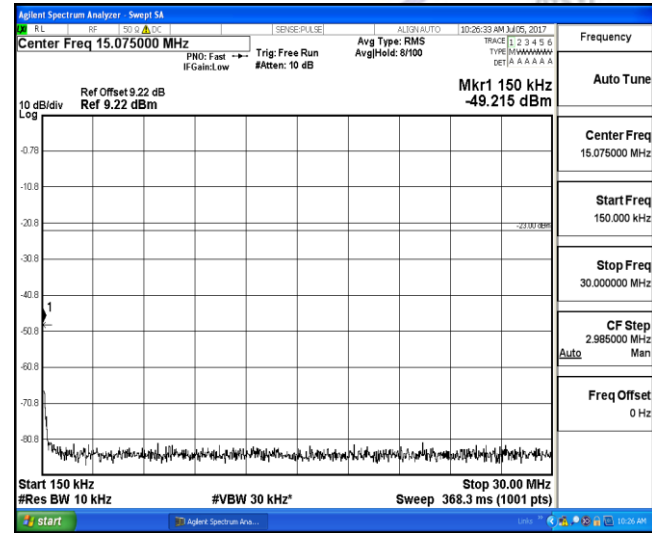
QPSK

16QAM



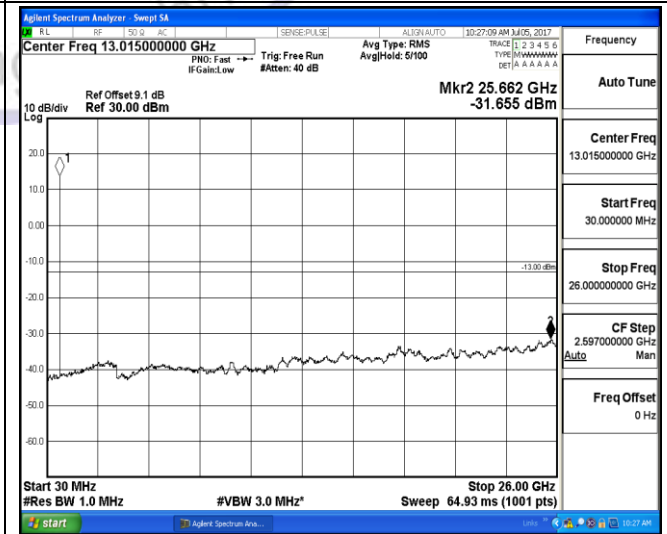
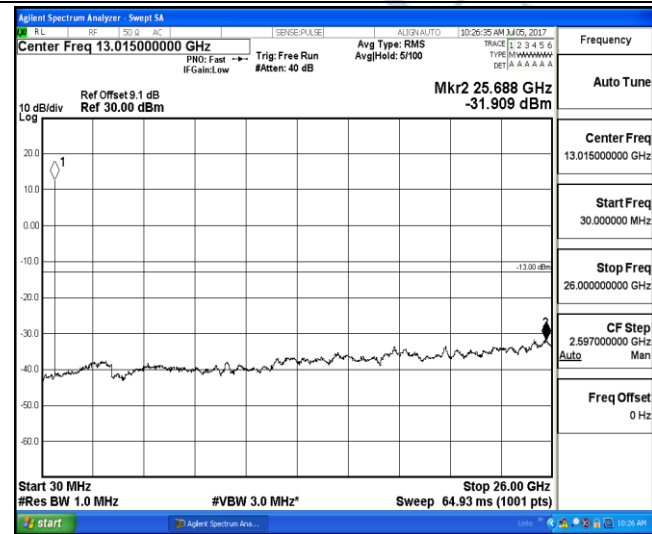
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



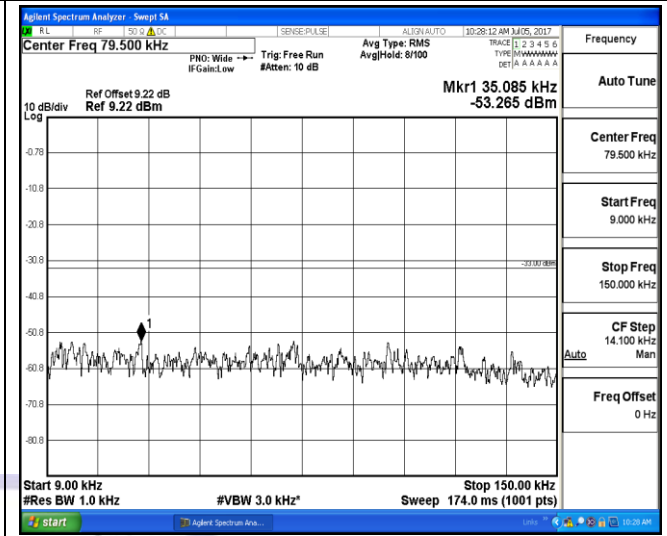
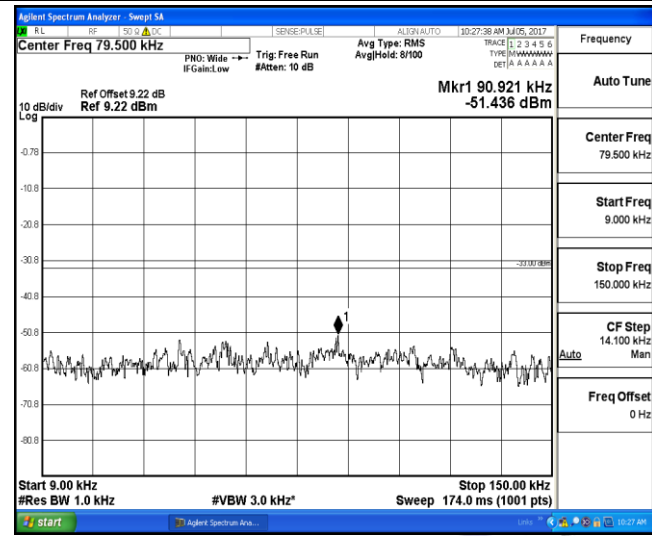
30MHz~26GHz  
1RB#0

30MHz~26GHz  
1RB#0

LTE FDD Band 12-3MHz Channel Bandwidth  
Low Channel

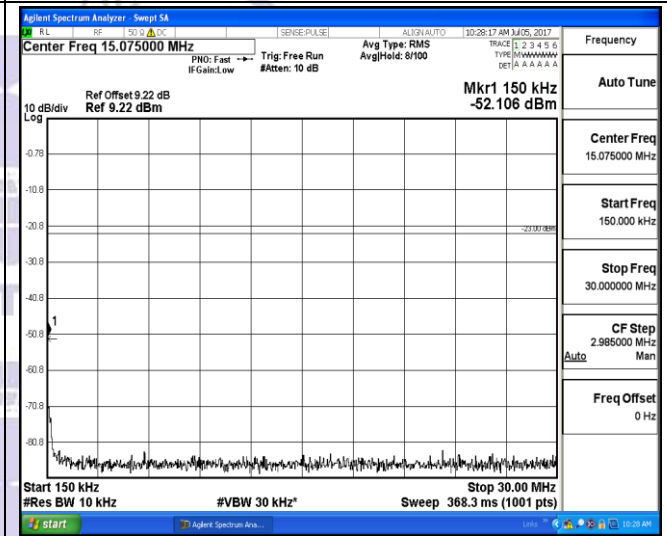
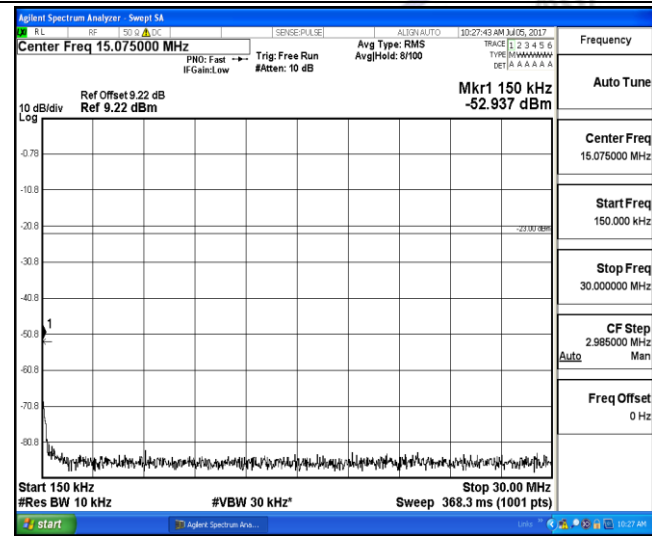
QPSK

16QAM



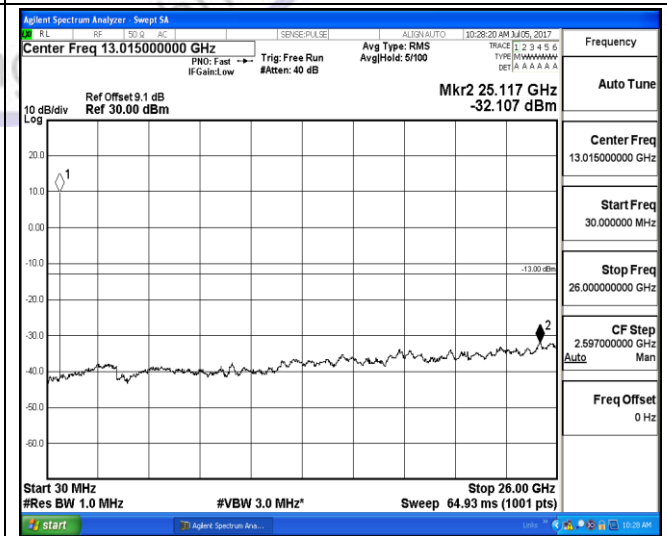
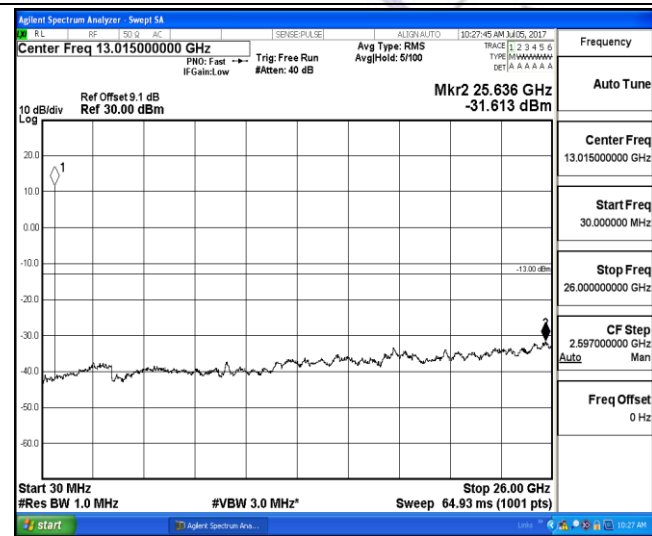
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



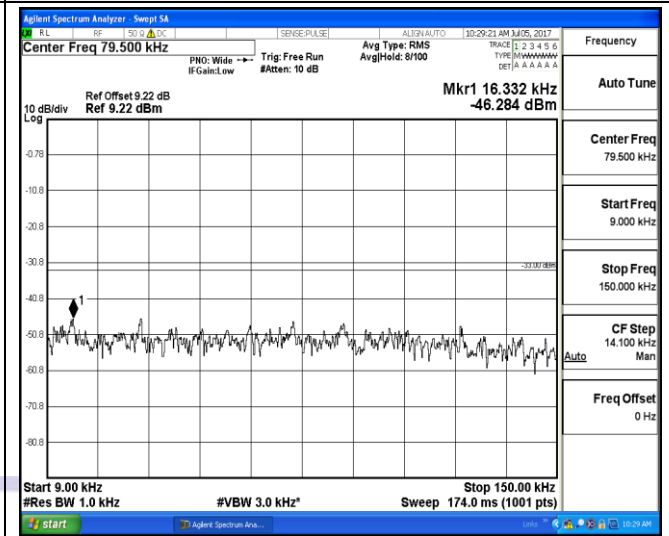
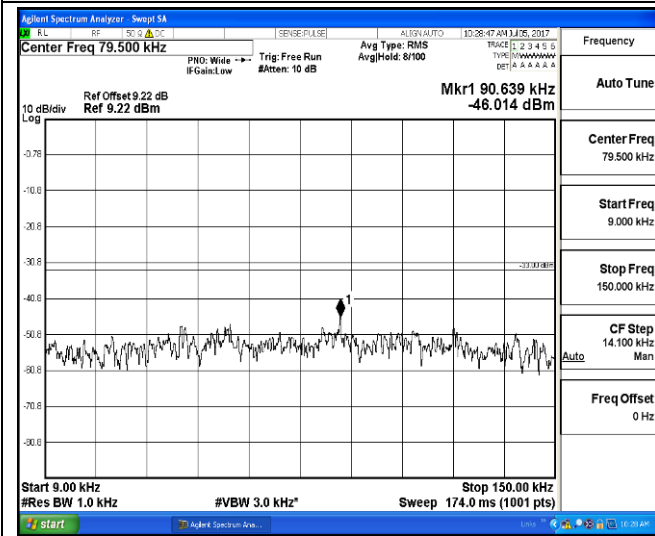
30MHz~26GHz  
1RB#0

30MHz~26GHz  
1RB#0

LTE FDD Band 12-3MHz Channel Bandwidth  
Middle Channel

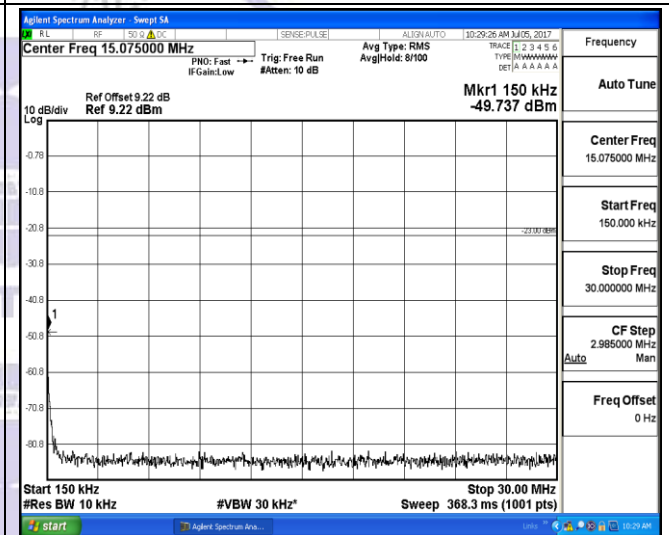
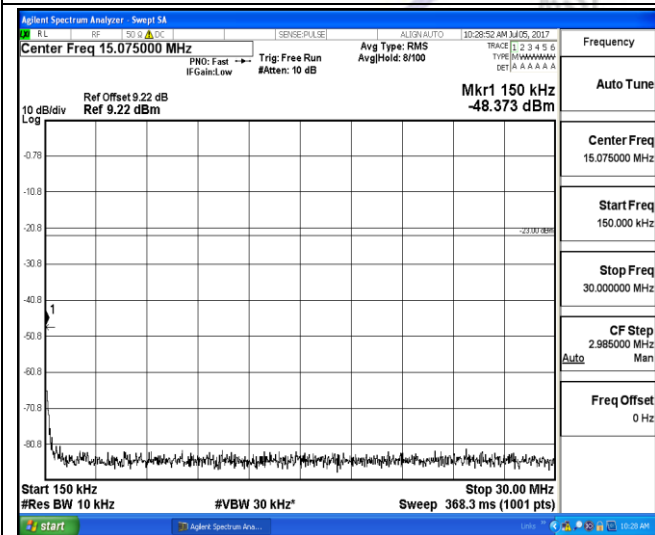
QPSK

16QAM



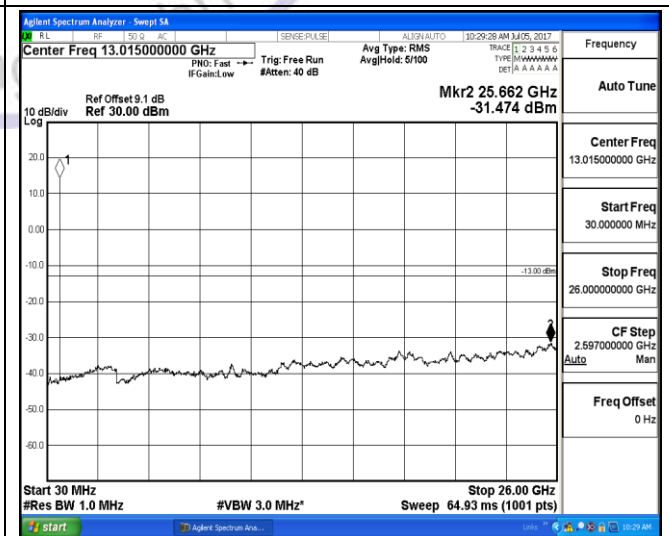
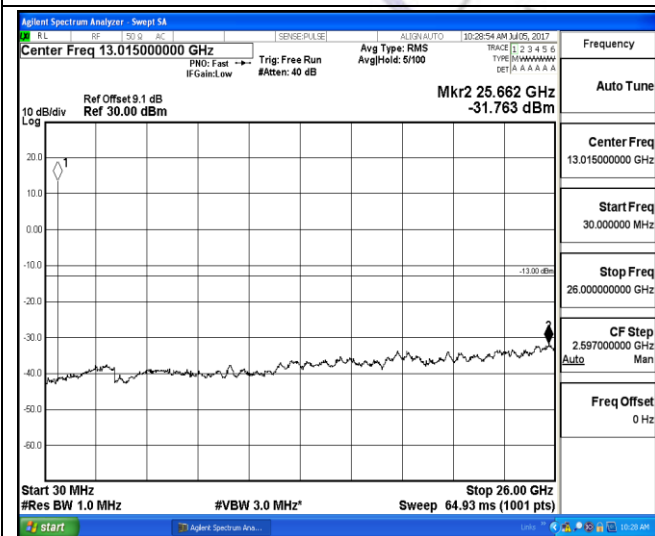
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

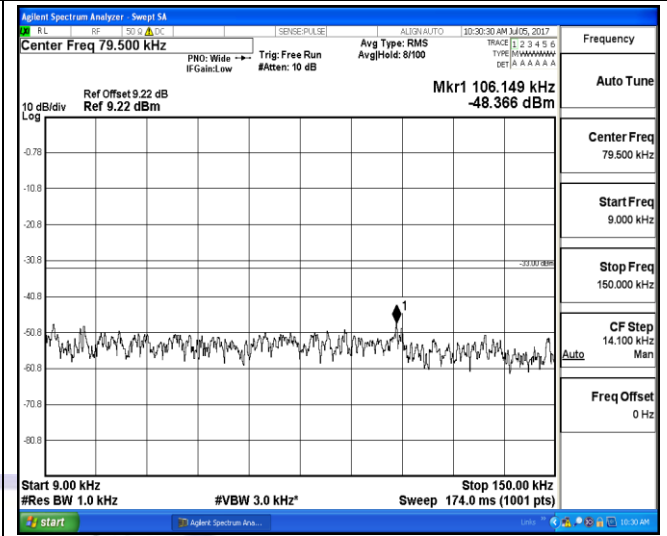
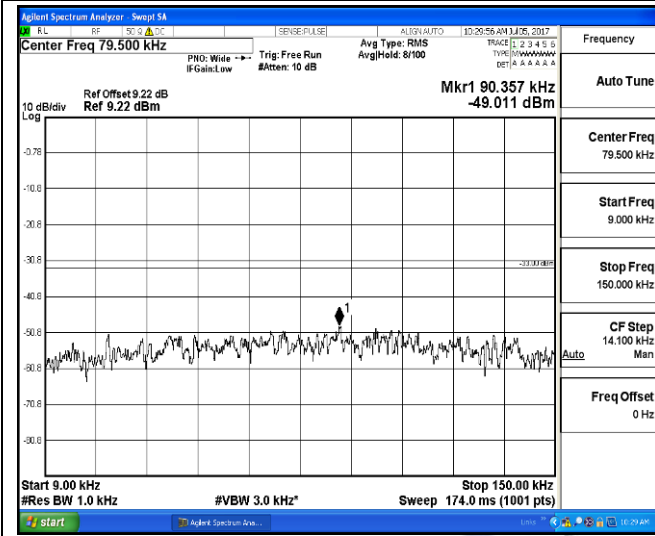
1RB#0

1RB#0

LTE FDD Band 12-3MHz Channel Bandwidth  
High Channel

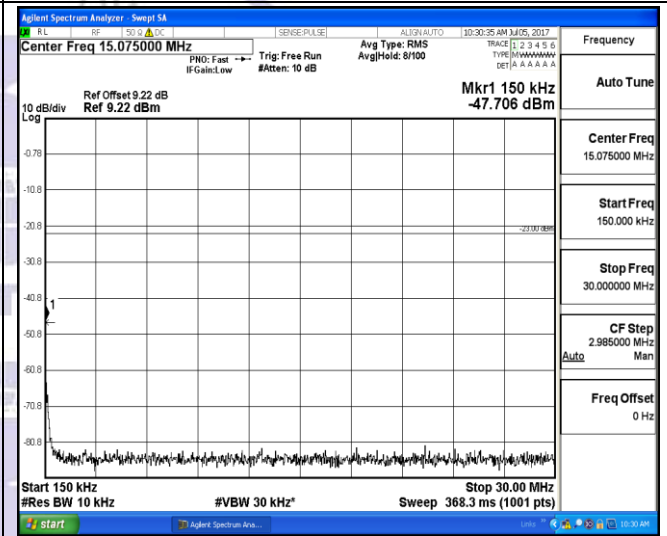
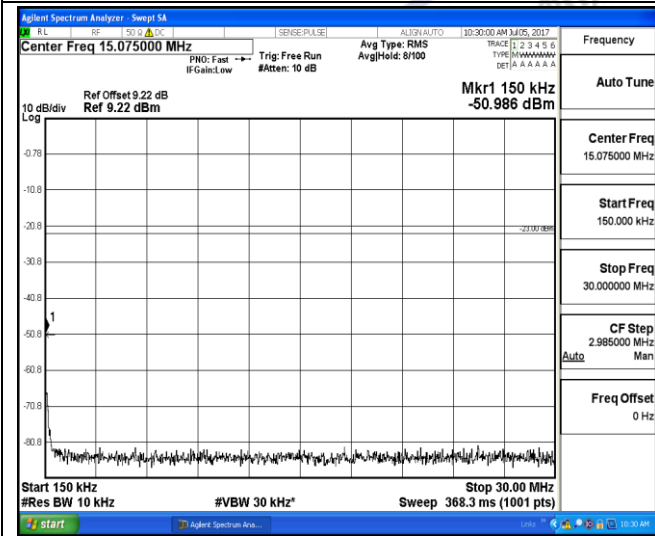
QPSK

16QAM



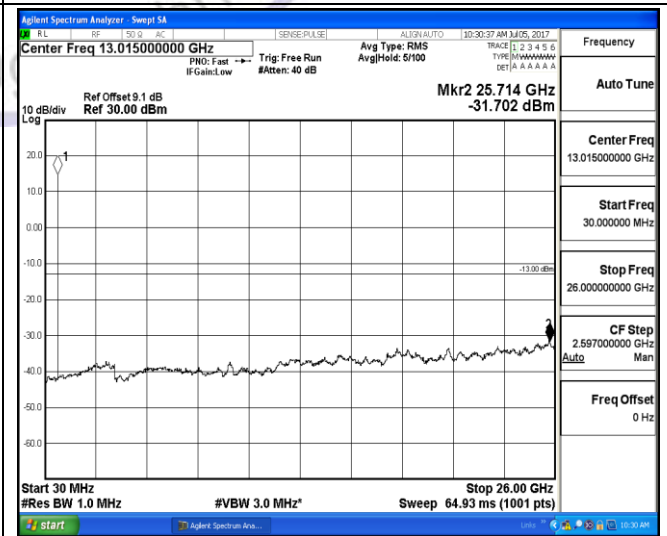
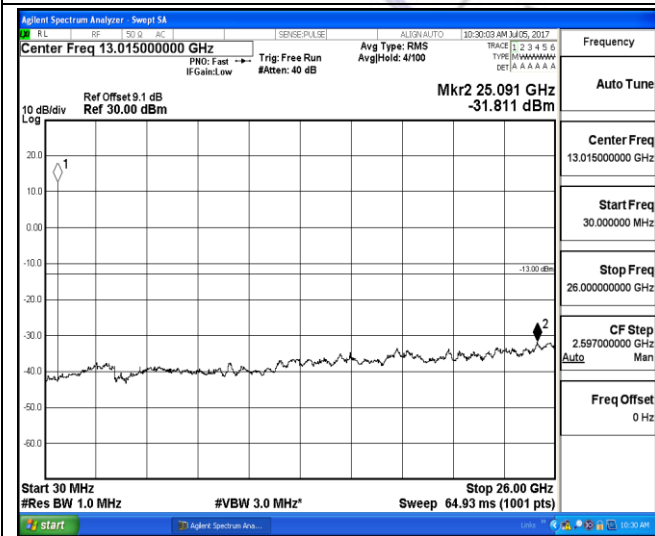
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

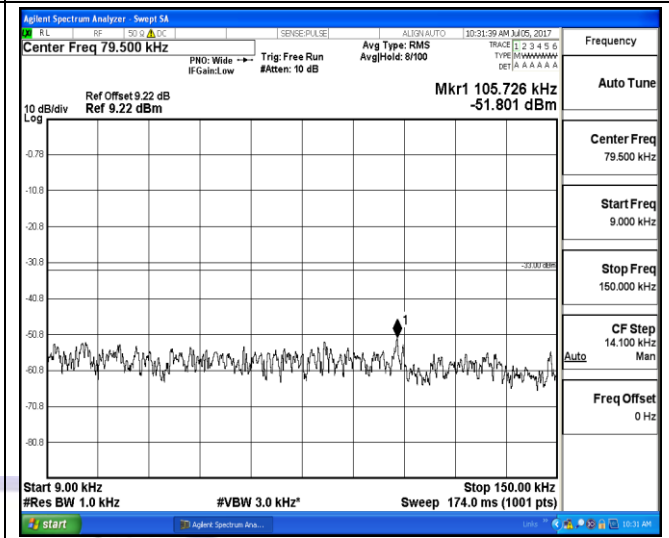
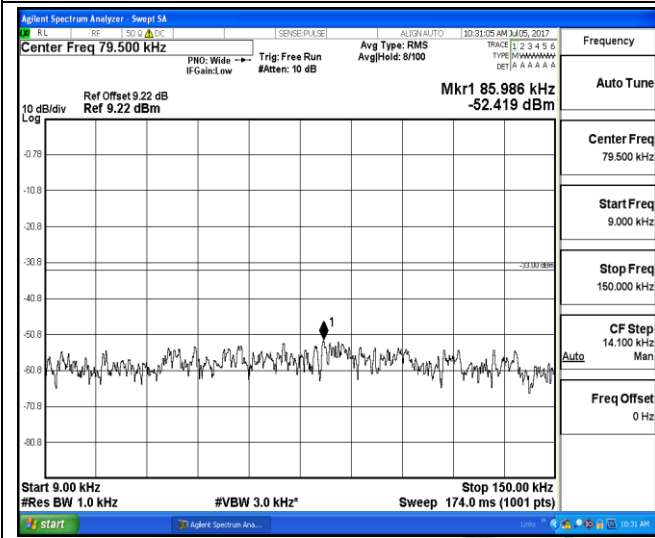
1RB#0

1RB#0

LTE FDD Band 12-5MHz Channel Bandwidth  
Low Channel

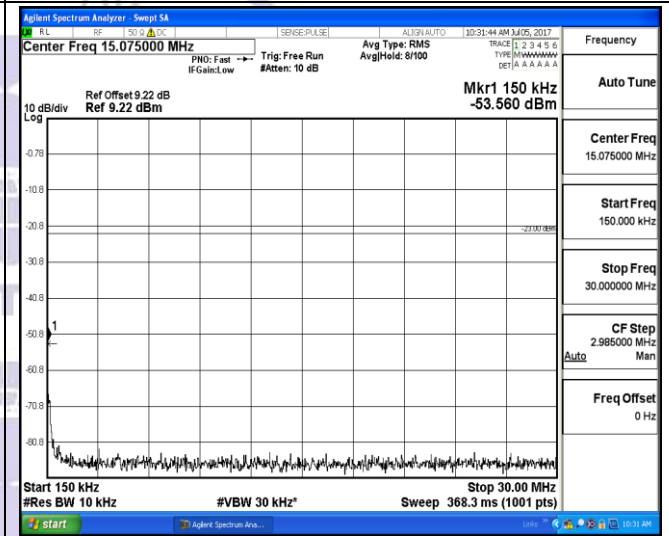
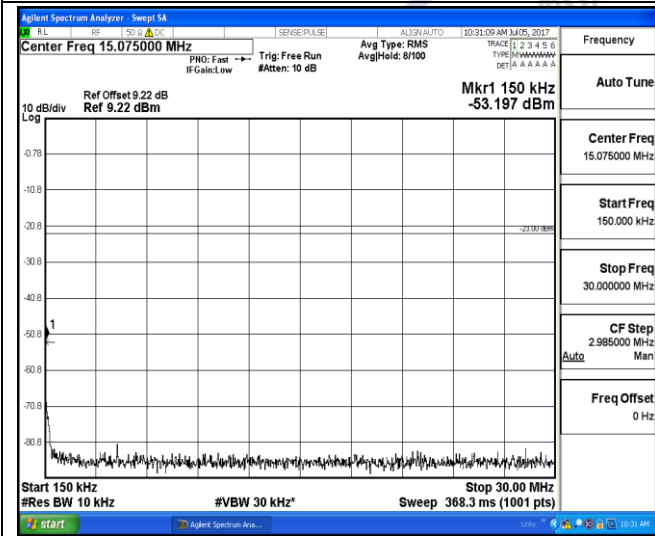
QPSK

16QAM



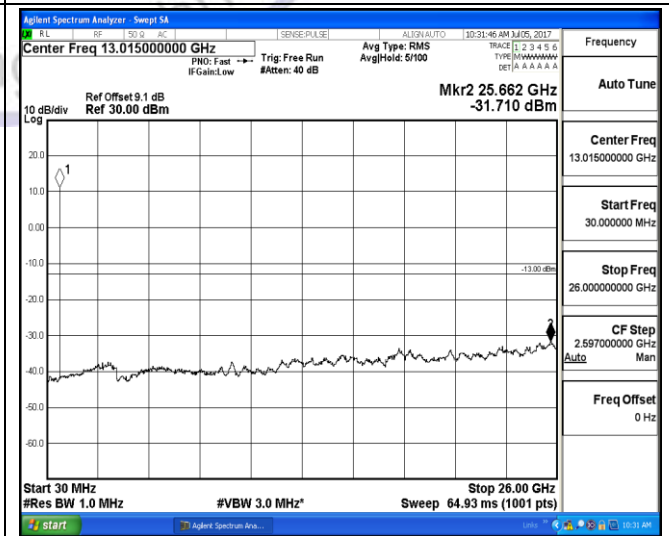
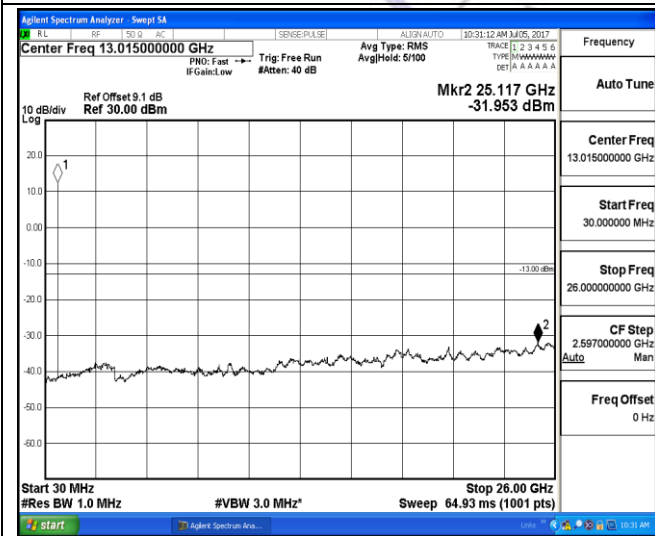
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

1RB#0

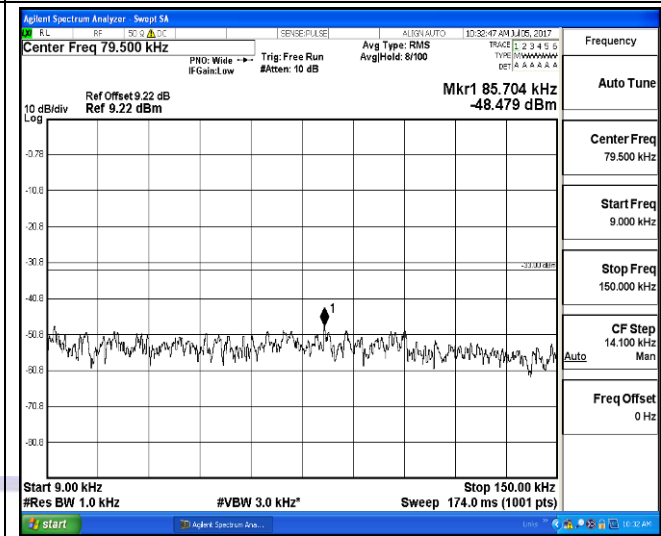
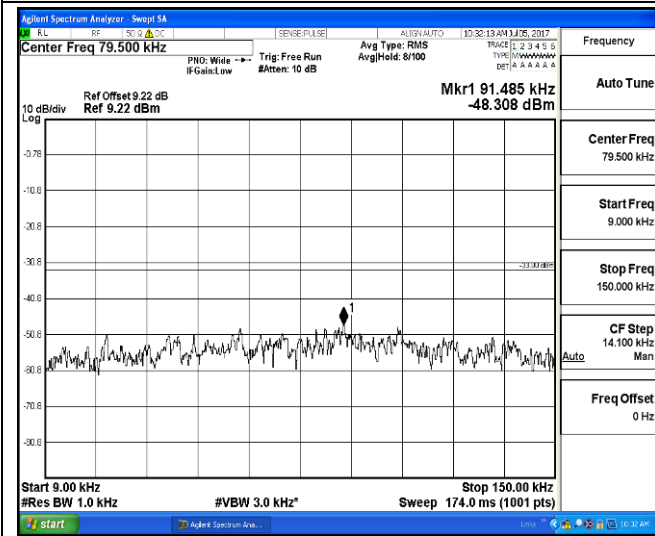
1RB#0



LTE FDD Band 12-5MHz Channel Bandwidth  
Middle Channel

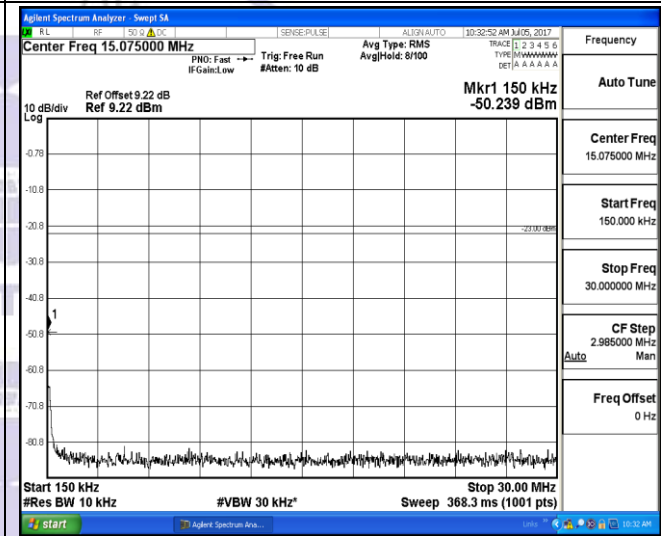
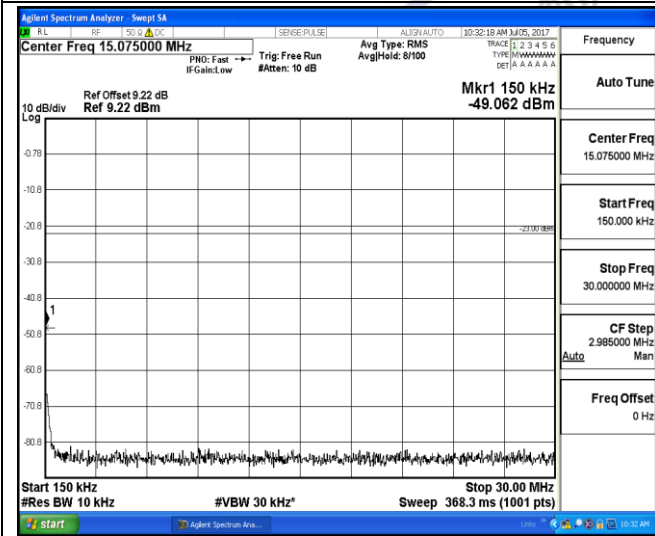
QPSK

16QAM



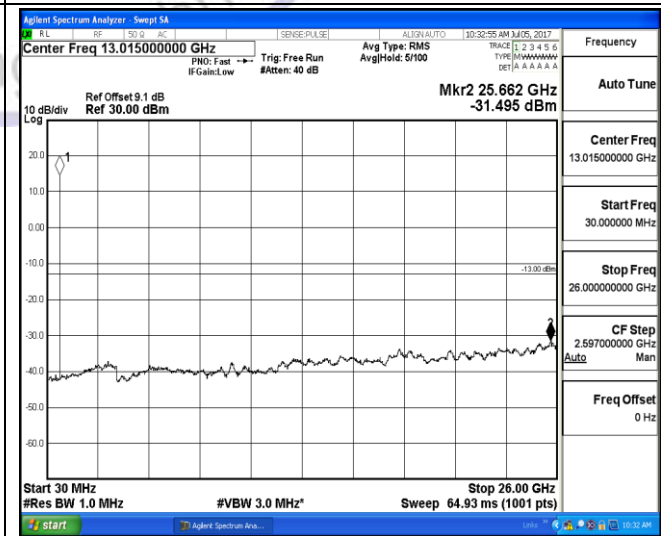
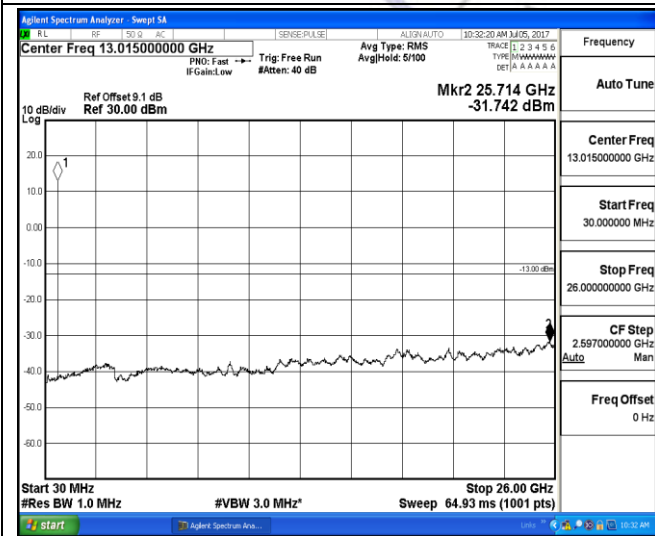
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

1RB#0

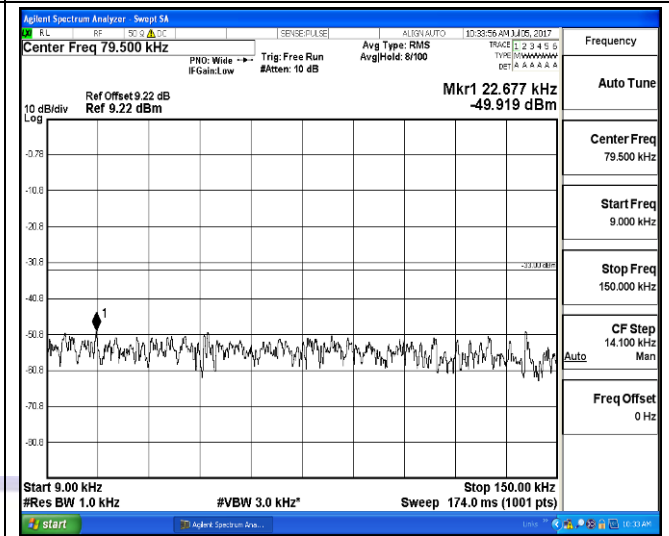
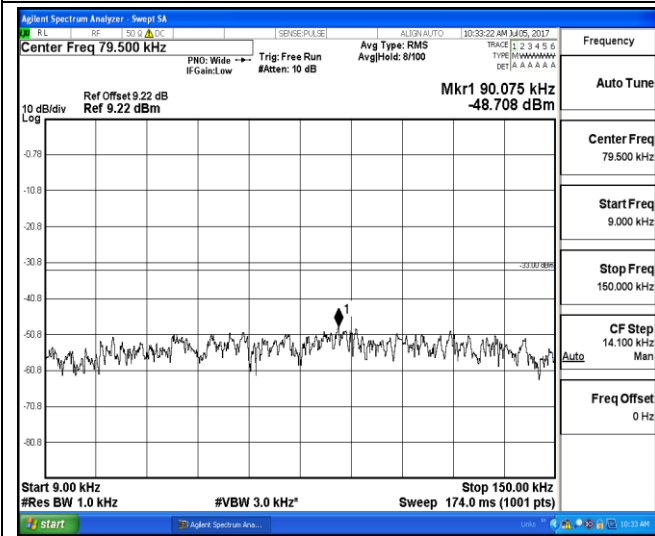
1RB#0



LTE FDD Band 12-5MHz Channel Bandwidth  
High Channel

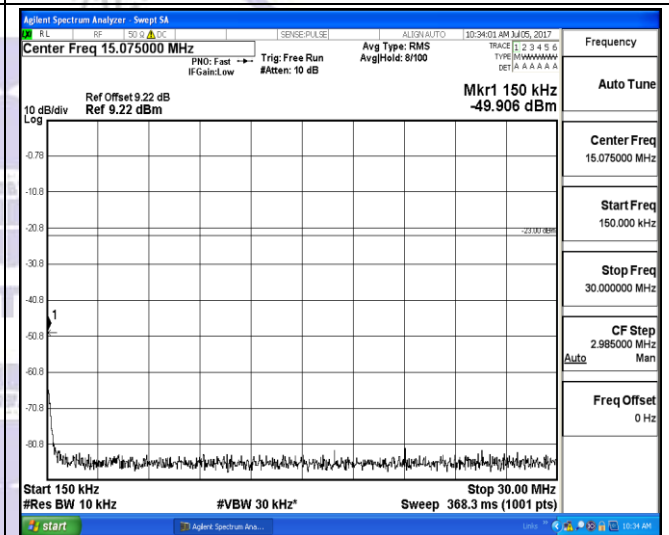
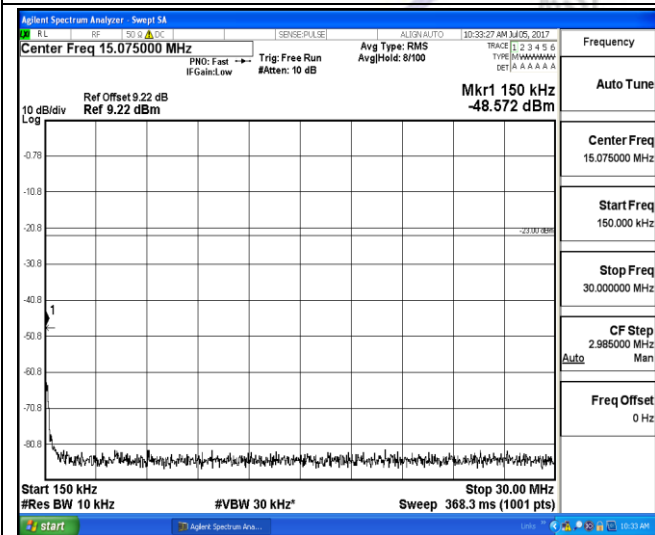
QPSK

16QAM



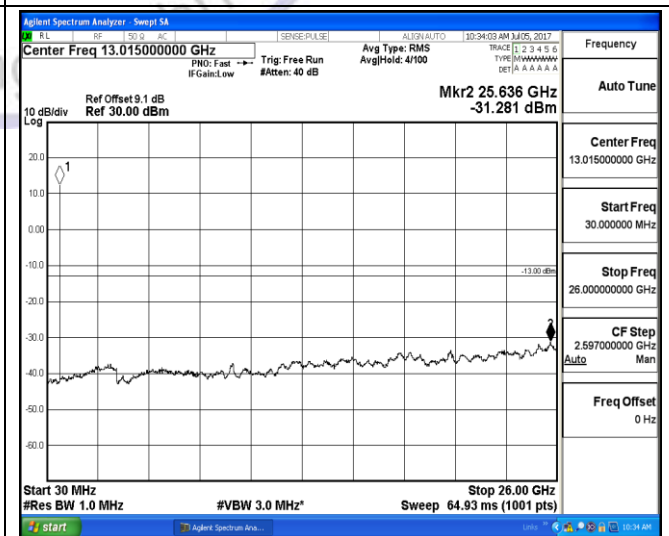
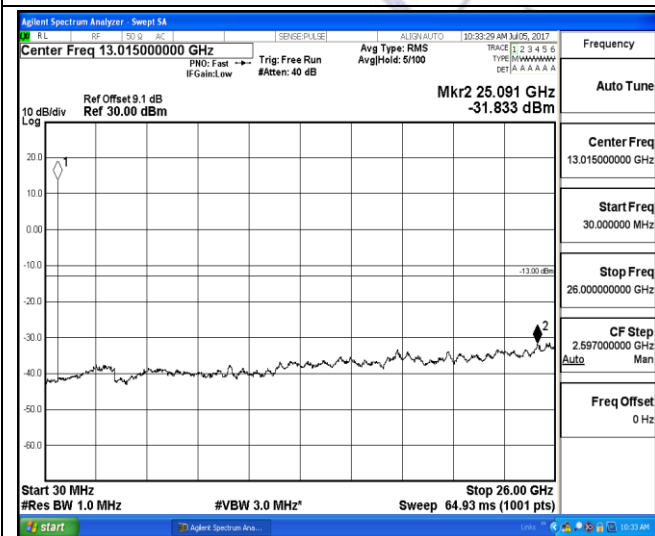
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

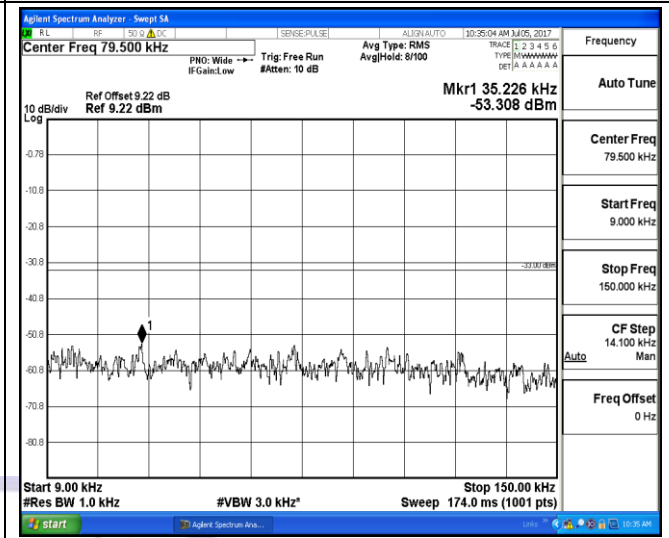
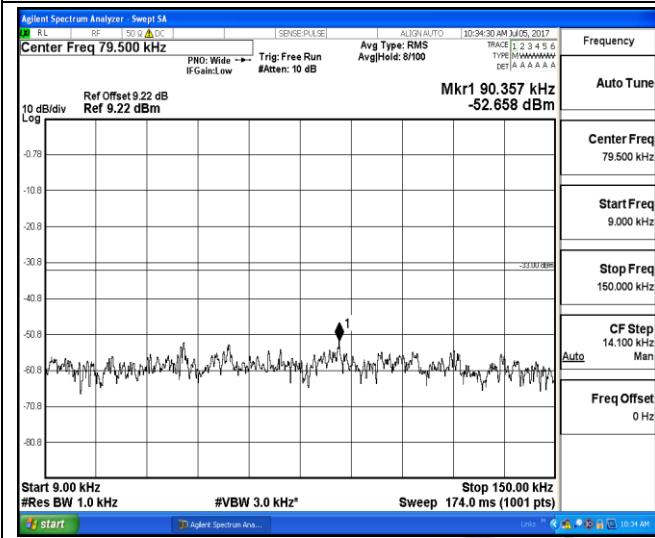
1RB#0

1RB#0

LTE FDD Band 12-10MHz Channel Bandwidth  
Low Channel

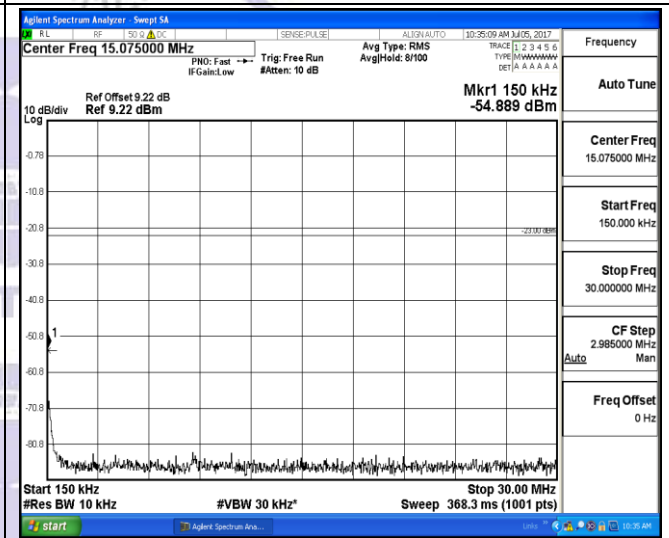
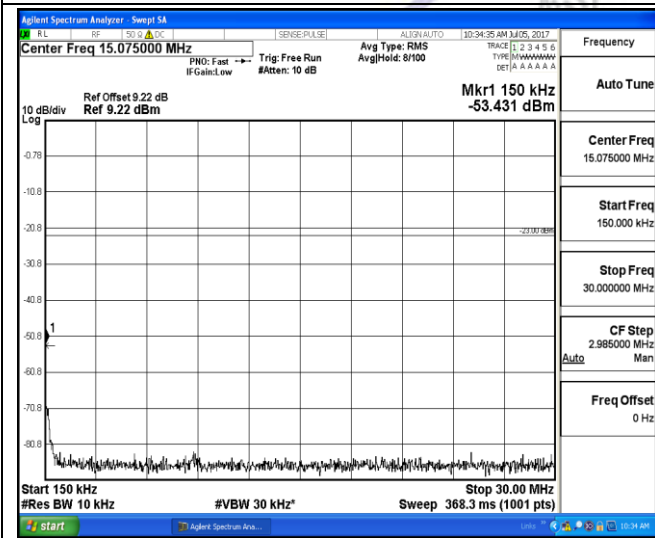
QPSK

16QAM



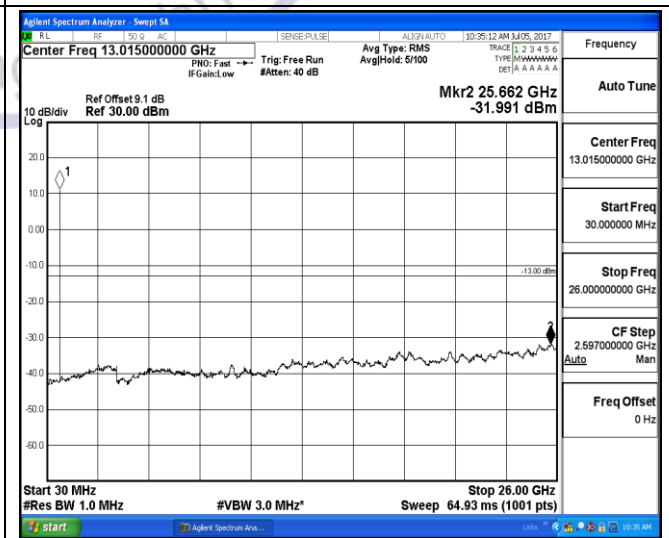
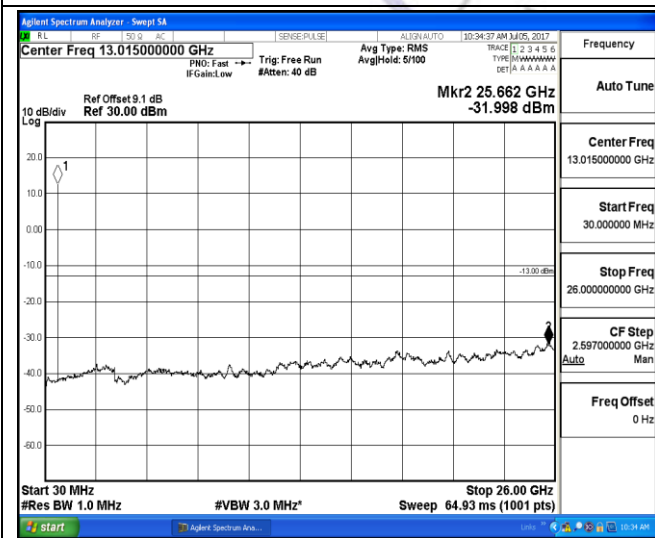
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

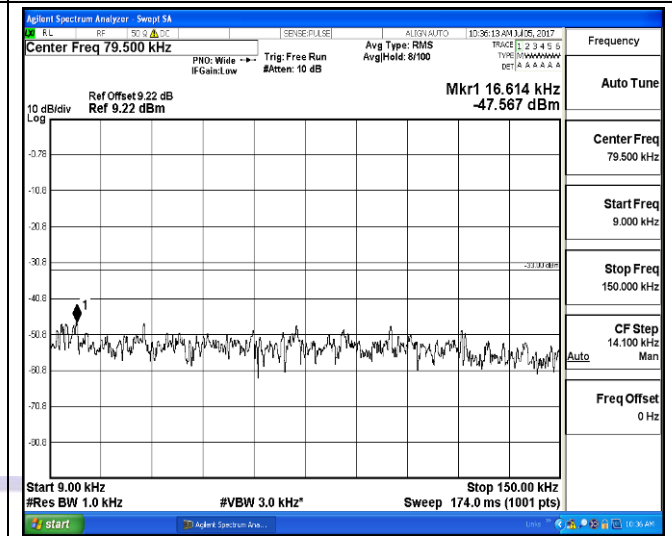
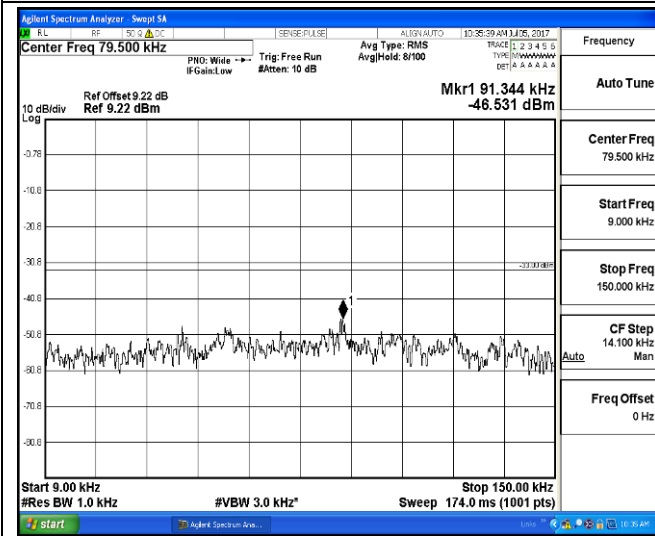
1RB#0

1RB#0

LTE FDD Band 12-10MHz Channel Bandwidth  
Middle Channel

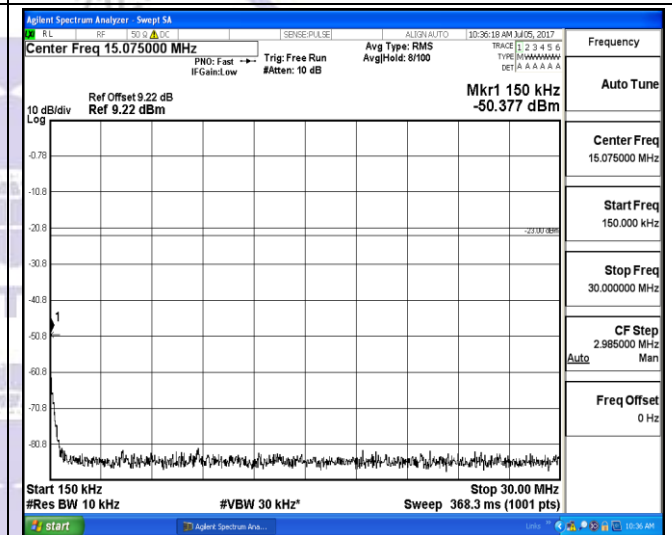
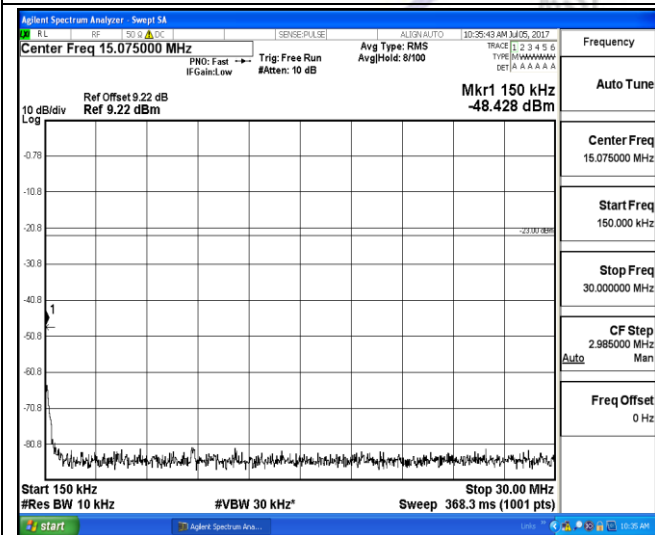
QPSK

16QAM



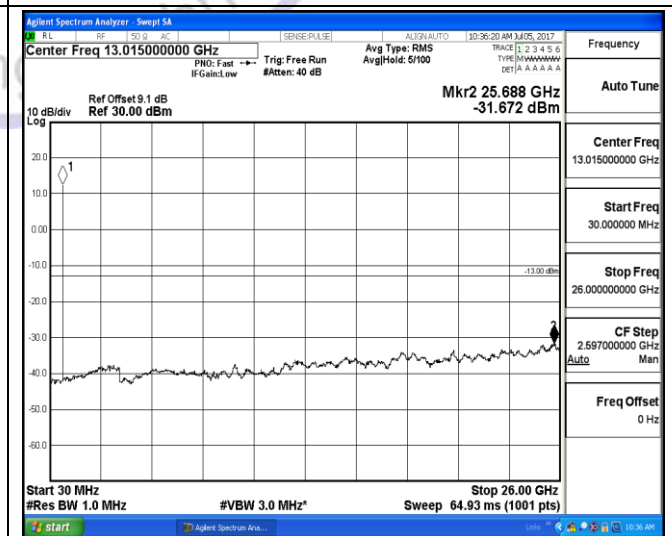
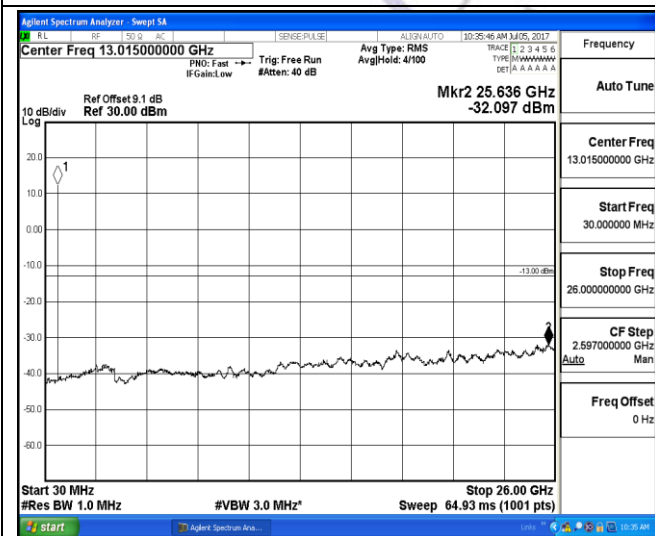
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

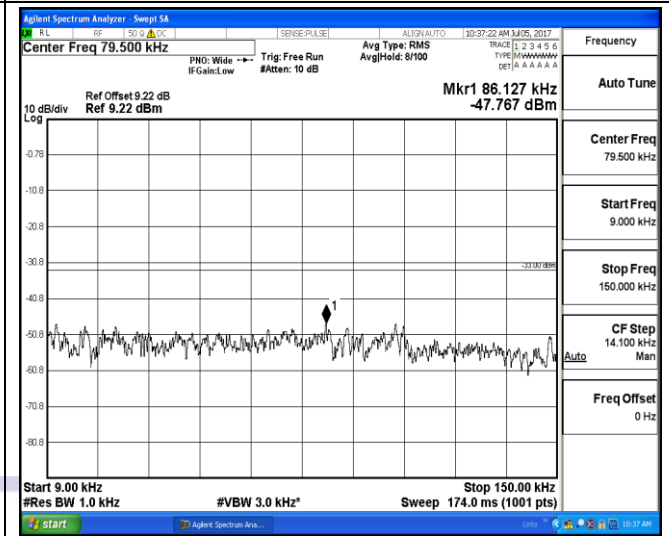
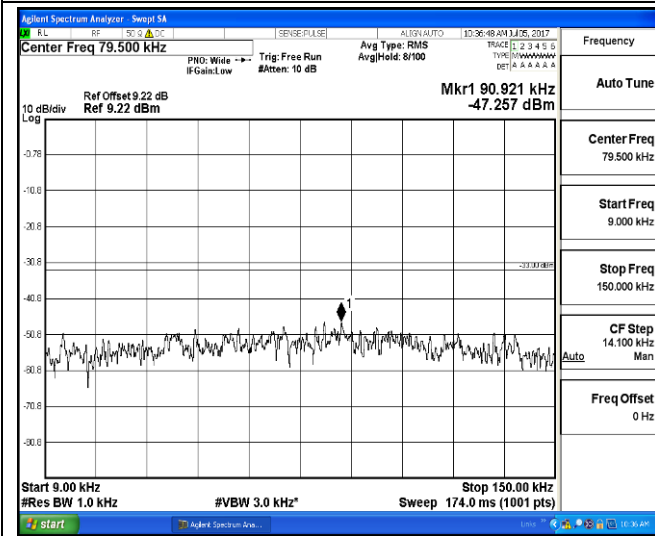
1RB#0

1RB#0

LTE FDD Band 12-10MHz Channel Bandwidth  
High Channel

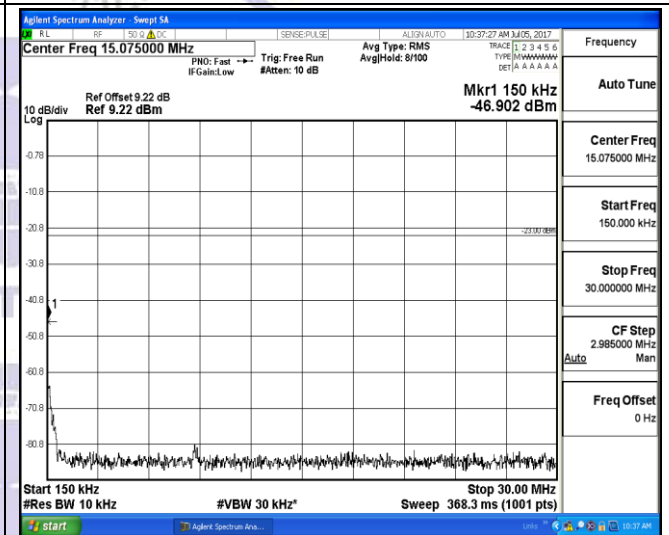
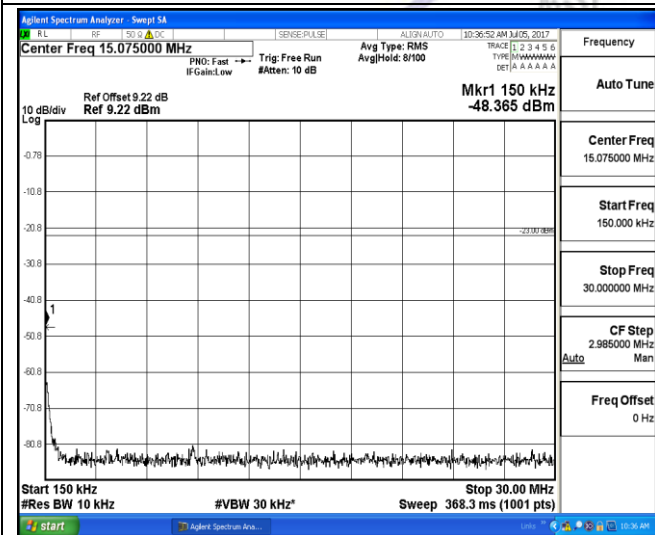
QPSK

16QAM



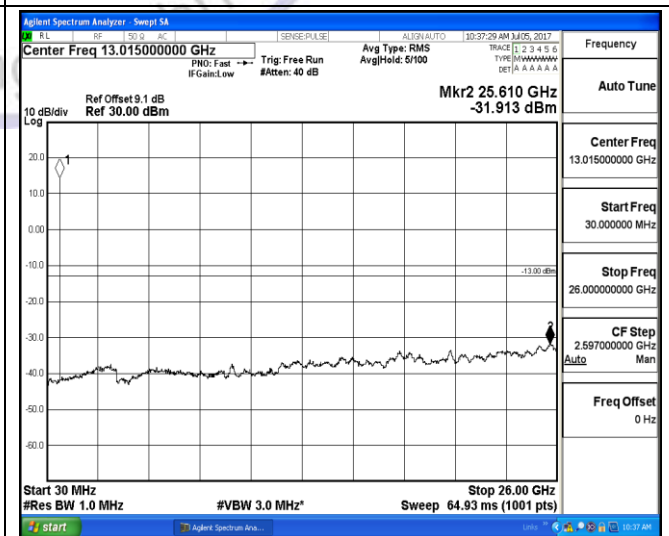
9KHz~150KHz

9KHz~150KHz



150KHz~30MHz

150KHz~30MHz



30MHz~26GHz

30MHz~26GHz

1RB#0

1RB#0

**Radiated Measurement:***Remark:*

1. We were tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 12; recorded worst case for each Channel Bandwidth of LTE FDD Band 12 @ QPSK modulation.
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 12\_Channel Bandwidth 1.4MHz\_QPSK\_Low Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1399.4	-32.89	2.86	3.00	7.25	-28.50	-13.00	15.50	H
2099.1	-43.25	2.94	3.00	9.53	-36.66	-13.00	23.66	H
1399.4	-31.83	2.86	3.00	7.25	-27.44	-13.00	14.44	V
2099.1	-42.00	2.94	3.00	9.53	-35.41	-13.00	22.41	V

*LTE FDD Band 12\_Channel Bandwidth 1.4MHz\_QPSK\_Middle Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.0	-34.02	2.88	3.00	7.31	-29.59	-13.00	16.59	H
2122.5	-44.29	2.97	3.00	9.55	-37.71	-13.00	24.71	H
1415.0	-31.89	2.88	3.00	7.31	-27.46	-13.00	14.46	V
2122.5	-42.12	2.97	3.00	9.55	-35.54	-13.00	22.54	V

*LTE FDD Band 12\_Channel Bandwidth 1.4MHz\_QPSK\_High Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1430.6	-33.32	2.91	3.00	7.82	-28.41	-13.00	15.41	H
2145.9	-43.13	3.05	3.00	9.66	-36.52	-13.00	23.52	H
1430.6	-31.60	2.91	3.00	7.82	-26.69	-13.00	13.69	V
2145.9	-41.48	3.05	3.00	9.66	-34.87	-13.00	21.87	V

*LTE FDD Band 12\_Channel Bandwidth 3MHz\_QPSK\_Low Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1401.0	-33.97	2.86	3.00	7.25	-29.58	-13.00	16.58	H
2101.5	-44.09	2.94	3.00	9.53	-37.50	-13.00	24.50	H
1401.0	-33.38	2.86	3.00	7.25	-28.99	-13.00	15.99	V
2101.5	-42.46	2.94	3.00	9.53	-35.87	-13.00	22.87	V

*LTE FDD Band 12\_Channel Bandwidth 3MHz\_QPSK\_Middle Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.0	-33.67	2.88	3.00	7.31	-29.24	-13.00	16.24	H
2122.5	-44.27	2.97	3.00	9.55	-37.69	-13.00	24.69	H
1415.0	-33.21	2.88	3.00	7.31	-28.78	-13.00	15.78	V
2122.5	-42.08	2.97	3.00	9.55	-35.50	-13.00	22.50	V



*LTE FDD Band 12\_Channel Bandwidth 3MHz\_QPSK\_High Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1429.0	-33.39	2.91	3.00	7.82	-28.48	-13.00	15.48	H
2143.5	-39.87	3.05	3.00	9.66	-33.26	-13.00	20.26	H
1429.0	-32.78	2.91	3.00	7.82	-27.87	-13.00	14.87	V
2143.5	-38.81	3.05	3.00	9.66	-32.20	-13.00	19.20	V

*LTE FDD Band 12\_Channel Bandwidth 5MHz\_QPSK\_Low Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1403.0	-33.64	2.86	3.00	7.25	-29.25	-13.00	16.25	H
2104.5	-40.84	2.94	3.00	9.53	-34.25	-13.00	21.25	H
1403.0	-32.68	2.86	3.00	7.25	-28.29	-13.00	15.29	V
2104.5	-40.07	2.94	3.00	9.53	-33.48	-13.00	20.48	V

*LTE FDD Band 12\_Channel Bandwidth 5MHz\_QPSK\_Middle Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.0	-33.30	2.88	3.00	7.31	-28.87	-13.00	15.87	H
2122.5	-40.84	2.97	3.00	9.55	-34.26	-13.00	21.26	H
1415.0	-32.15	2.88	3.00	7.31	-27.72	-13.00	14.72	V
2122.5	-39.88	2.97	3.00	9.55	-33.30	-13.00	20.30	V

*LTE FDD Band 12\_Channel Bandwidth 5MHz\_QPSK\_High Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1427.0	-34.16	2.91	3.00	7.82	-29.25	-13.00	16.25	H
2140.5	-41.16	3.05	3.00	9.66	-34.55	-13.00	21.55	H
1427.0	-33.89	2.91	3.00	7.82	-28.98	-13.00	15.98	V
2140.5	-39.95	3.05	3.00	9.66	-33.34	-13.00	20.34	V

*LTE FDD Band 12\_Channel Bandwidth 10MHz\_QPSK\_Low Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	Peak EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1408.0	-34.90	2.86	3.00	7.25	-30.51	-13.00	17.51	H
2112.0	-40.84	2.94	3.00	9.53	-34.25	-13.00	21.25	H
1408.0	-33.07	2.86	3.00	7.25	-28.68	-13.00	15.68	V
2112.0	-38.71	2.94	3.00	9.53	-32.12	-13.00	19.12	V

*LTE FDD Band 12\_Channel Bandwidth 10MHz\_QPSK\_Middle Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1415.0	-32.95	2.88	3.00	7.31	-28.52	-13.00	15.52	H
2122.5	-40.32	2.97	3.00	9.55	-33.74	-13.00	20.74	H
1415.0	-32.39	2.88	3.00	7.31	-27.96	-13.00	14.96	V
2122.5	-38.99	2.97	3.00	9.55	-32.41	-13.00	19.41	V

*LTE FDD Band 12\_Channel Bandwidth 10MHz\_QPSK\_High Channel*

Frequency (MHz)	P <sub>Mea</sub> (dBm)	P <sub>cl</sub> (dB)	Distance (m)	G <sub>a</sub> Antenna Gain(dB)	EIRP (dBm)	Limit (dBm)	Margin (dB)	Polarization
1422.0	-34.13	2.91	3.00	7.82	-29.22	-13.00	16.22	H
2133.0	-40.19	3.05	3.00	9.66	-33.58	-13.00	20.58	H
1422.0	-32.32	2.91	3.00	7.82	-27.41	-13.00	14.41	V
2133.0	-39.02	3.05	3.00	9.66	-32.41	-13.00	19.41	V



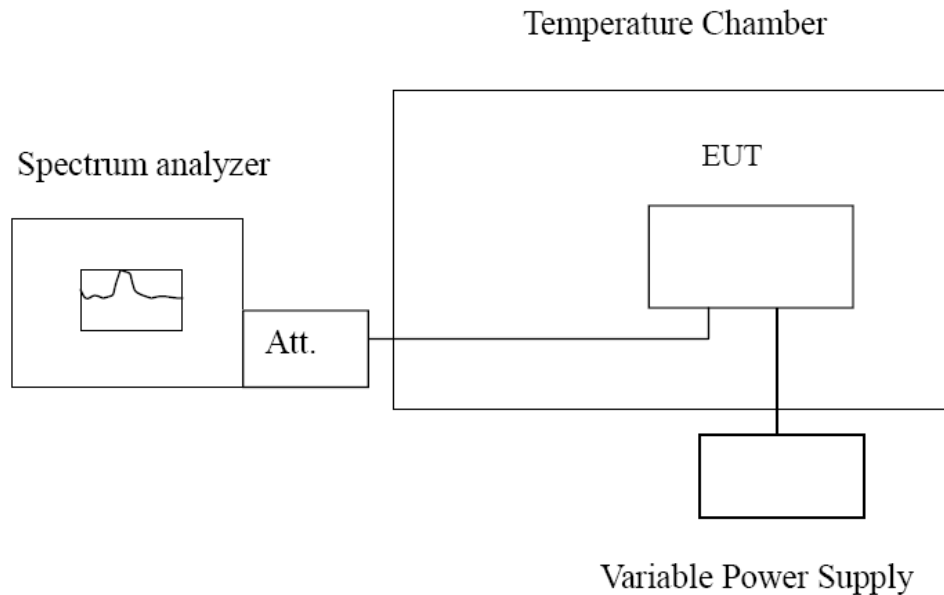


### 3.6. Frequency Stability under Temperature & Voltage Variations

#### 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  $-30^{\circ}\text{C}$ .
3. With the EUT, powered via nominal voltage, connected to the CMW500 and in a simulated call on middle channel for LTE band 12, 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  $10^{\circ}\text{C}$  increments from  $-30^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . 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  $+50^{\circ}\text{C}$ .
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  $10^{\circ}\text{C}$  increments from  $+50^{\circ}\text{C}$  to  $-30^{\circ}\text{C}$ . Allow at least 1.5 hours at each temperature, unpowered, before making measurements
9. At all temperature levels hold the temperature to  $\pm 0.5^{\circ}\text{C}$  during the measurement procedure.

##### **Frequency Stability under Voltage Variations:**

Set chamber temperature to  $20^{\circ}\text{C}$ . 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 ( $\pm 15\%$ ) and endpoint, record the maximum frequency change.

**TEST RESULTS**

*Remark:*

1. We tested all RB Configuration refer 3GPP TS136 521 for each Channel Bandwidth of LTE FDD Band 12; recorded worst case.

LTE Band 12, 1.4MHz bandwidth (worst case of all bandwidths)

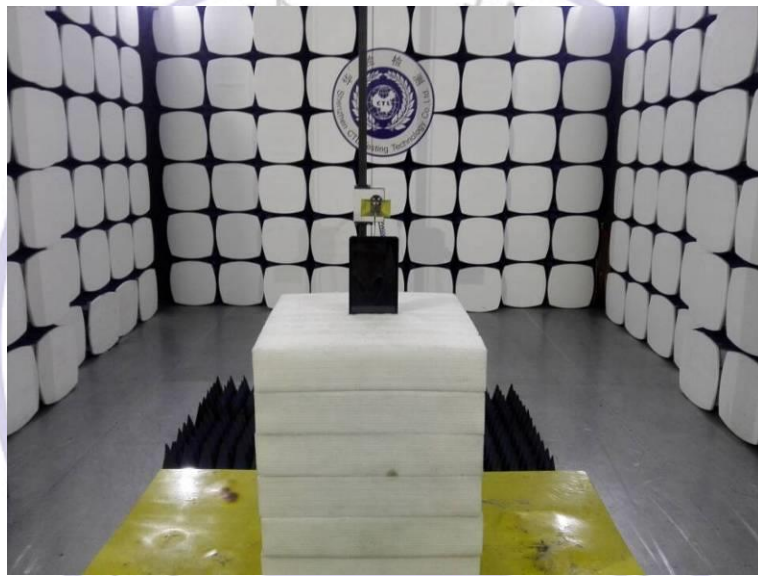
***Frequency Error vs Voltage***

Voltage (V)	Frequency error (Hz)		Frequency error (ppm)		Limit (ppm)
	QPSK	16QAM	QPSK	16QAM	
3.15	4.61	-0.40	0.00652	-0.00057	2.50
3.70	-9.50	4.64	-0.01343	0.00656	2.50
4.26	-4.54	6.85	-0.00642	0.00968	2.50

***Frequency Error vs Temperature***

Temperature (°C)	Frequency error (Hz)		Frequency error (ppm)		Limit (ppm)
	QPSK	16QAM	QPSK	16QAM	
-30°	4.50	-2.73	0.00636	-0.00386	2.50
-20°	4.78	7.78	0.00676	0.01100	2.50
-10°	-9.12	1.69	-0.01289	0.00239	2.50
0°	4.95	0.09	0.00700	0.00013	2.50
10°	-0.83	-9.37	-0.00117	-0.01324	2.50
20°	-5.08	-8.59	-0.00718	-0.01214	2.50
30°	-5.32	-2.38	-0.00752	-0.00336	2.50
40°	-0.56	1.86	-0.00079	0.00263	2.50
50°	1.01	-5.15	0.00143	-0.00728	2.50

#### 4. Test Setup Photos of the EUT



CTL Testing Techno

## 5. Photos of the EUT

Reference to the test report No. CTL1702156501-WF01

\*\*\*\*\* End of Report \*\*\*\*\*

