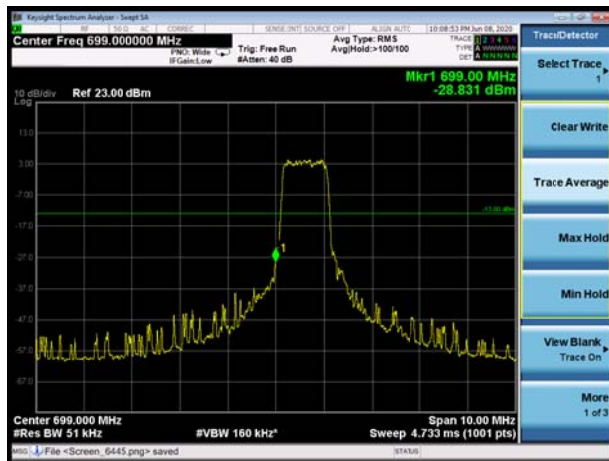
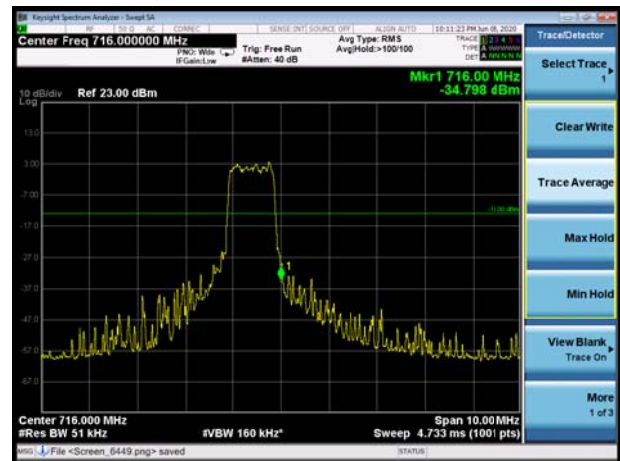




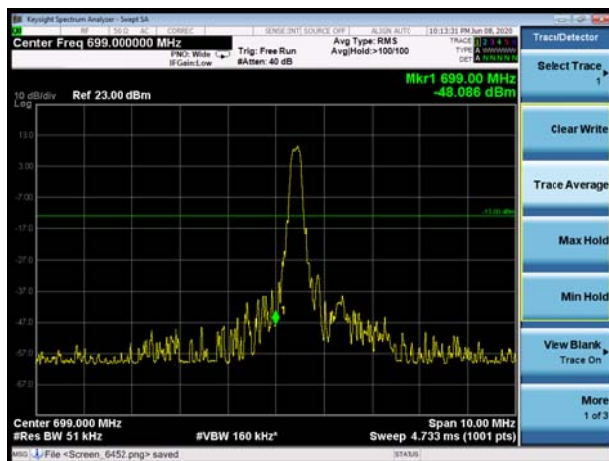
LTE Band 12 16QAM 1.4MHz CH-Low, 100%RB



LTE Band 12 16QAM 1.4MHz CH-High, 100%RB



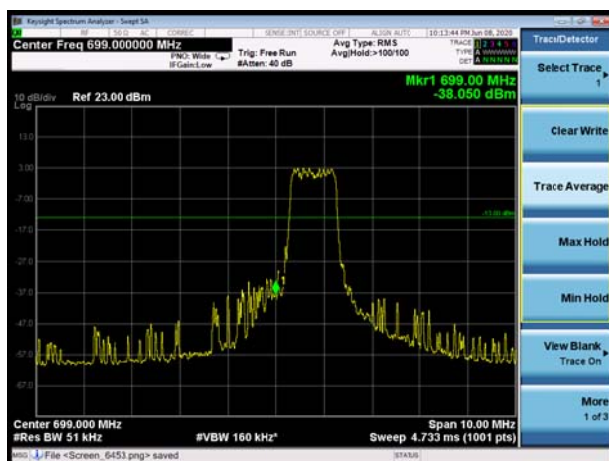
LTE Band 12 16QAM 3MHz CH-Low, 1 RB



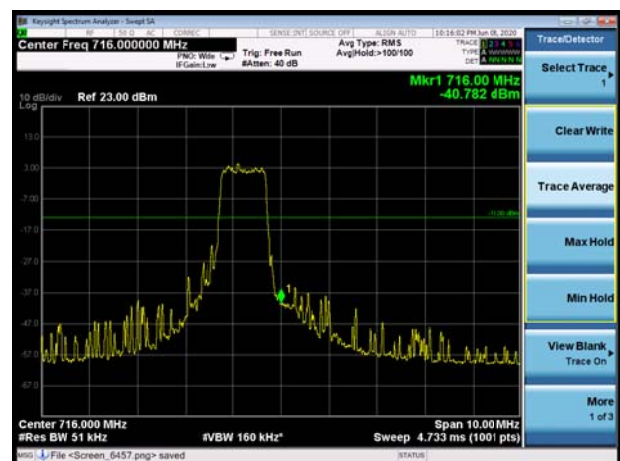
LTE Band 12 16QAM 3MHz CH-High, 1 RB



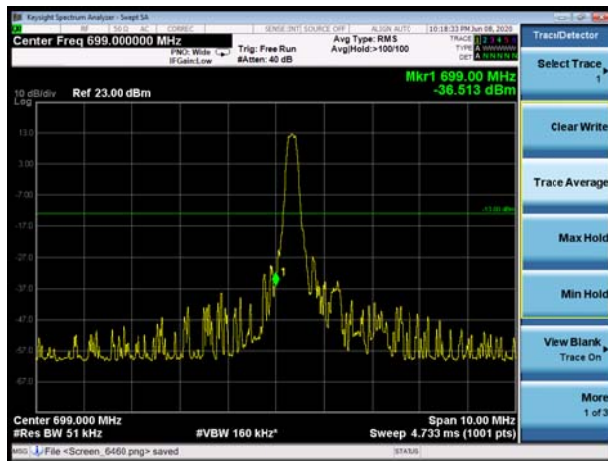
LTE Band 12 16QAM 3MHz CH-Low, 100%RB



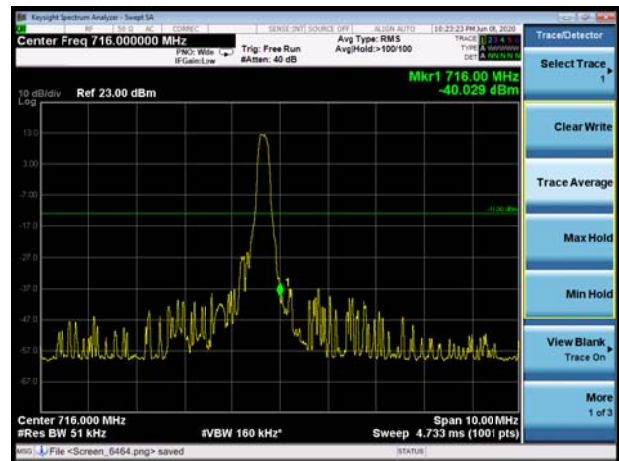
LTE Band 12 16QAM 3MHz CH-High, 100%RB



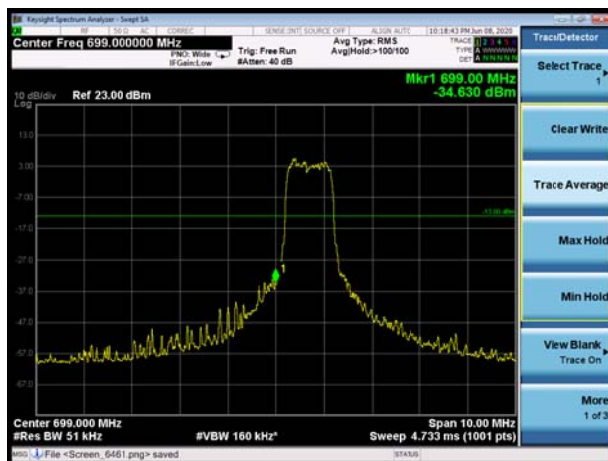
LTE Band 12 16QAM 5MHz CH-Low, 1 RB



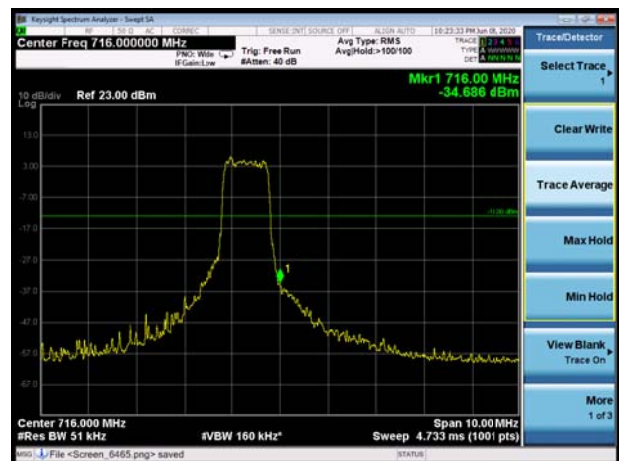
LTE Band 12 16QAM 5MHz CH-High, 1 RB



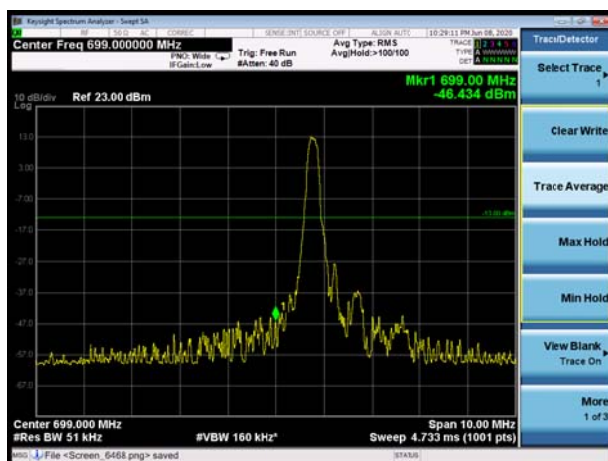
LTE Band 12 16QAM 5MHz CH-Low, 100%RB



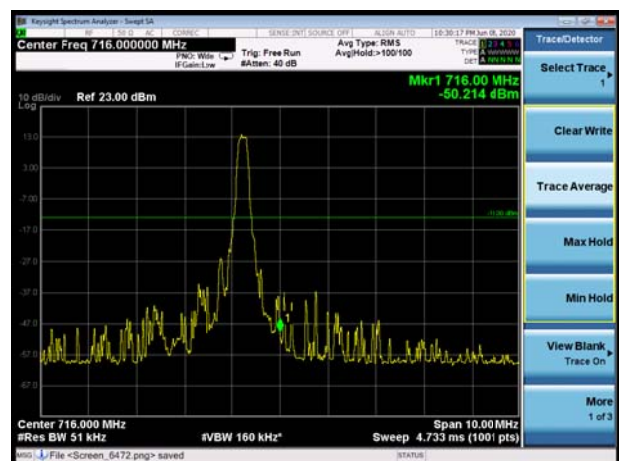
LTE Band 12 16QAM 5MHz CH-High, 100%RB



LTE Band 12 16QAM 10MHz CH-Low, 1 RB

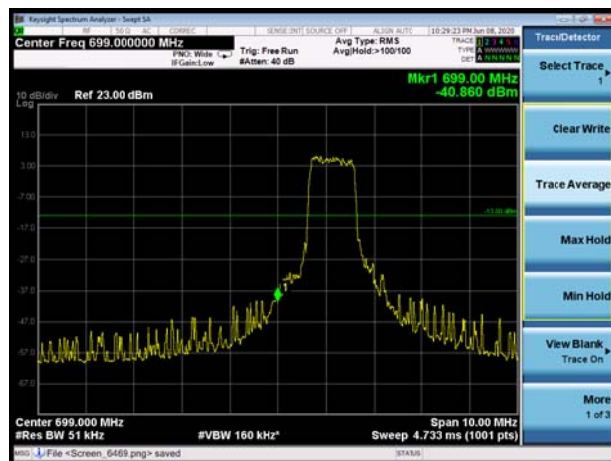


LTE Band 12 16QAM 10MHz CH-High, 1 RB

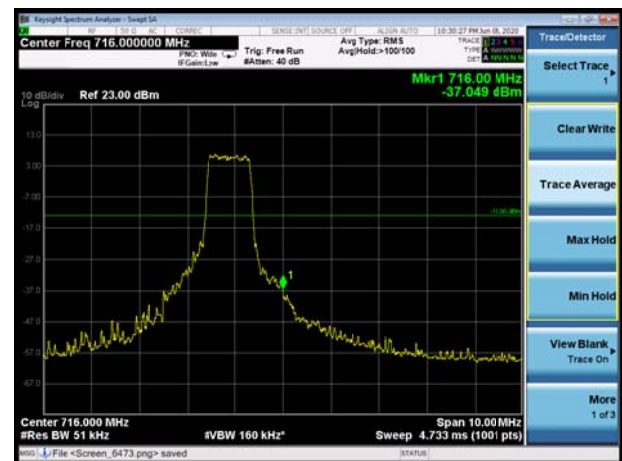




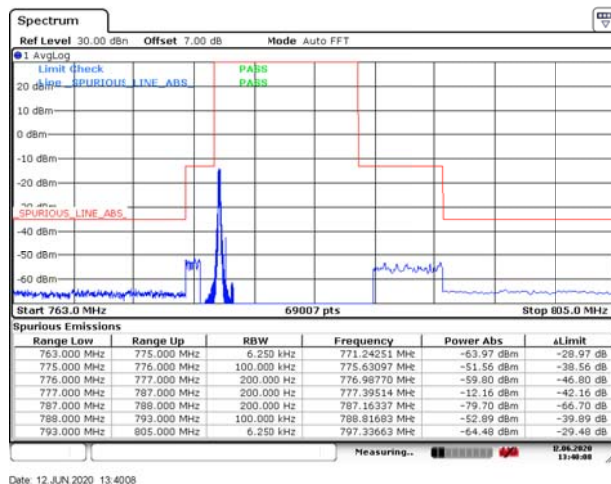
LTE Band 12 16QAM 10MHz CH-Low, 100%RB



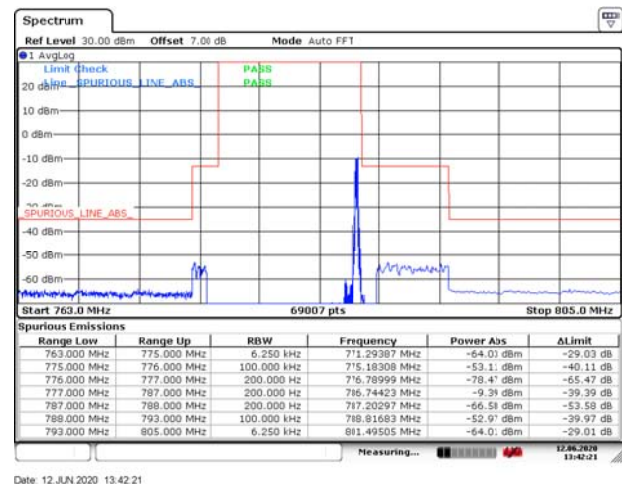
LTE Band 12 16QAM 10MHz CH-High, 100%RB



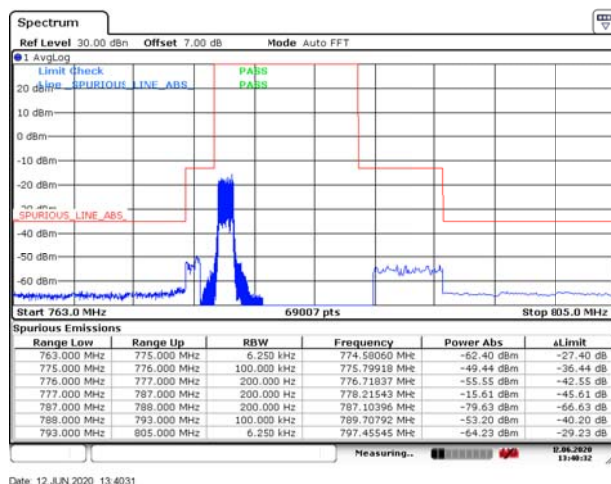
LTE Band 13 QPSK 5MHz CH-Low, 1 RB



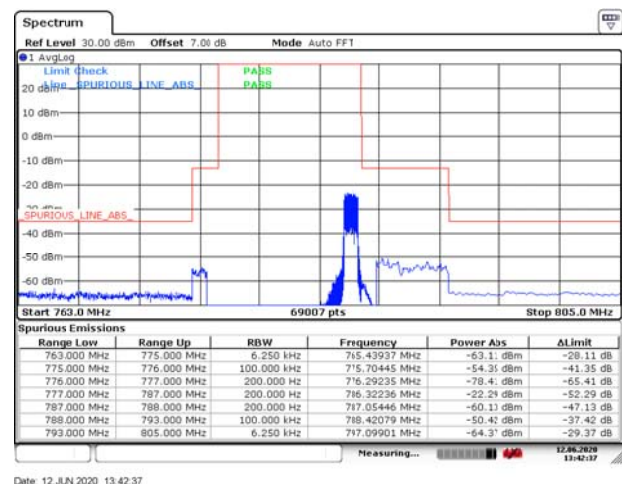
LTE Band 13 QPSK 5MHz CH-High, 1 RB



LTE Band 13 QPSK 5MHz CH-Low, 100%RB

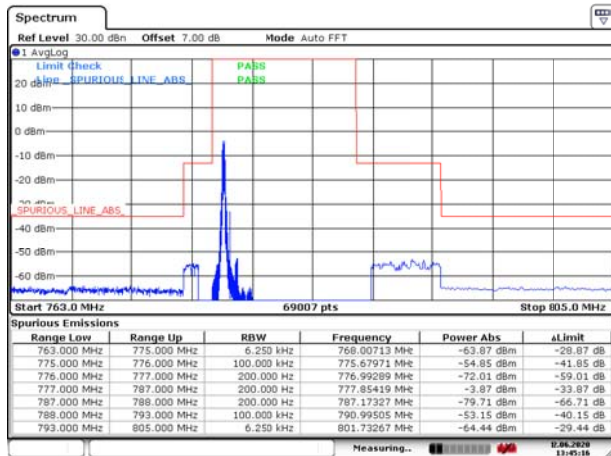


LTE Band 13 QPSK 5MHz CH- High, 100%RB



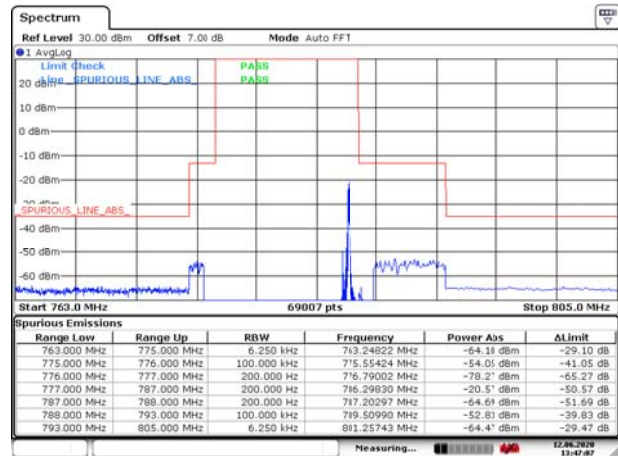


LTE Band 13 QPSK 10MHz CH-Low, 1 RB



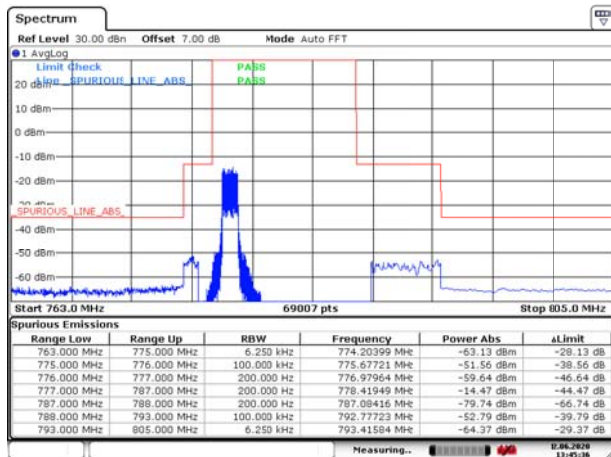
Date: 12 JUN 2020 13:45:16

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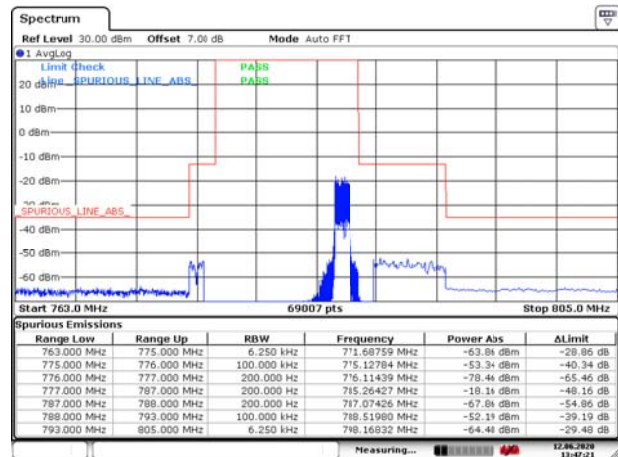
Date: 12 JUN 2020 13:47:07

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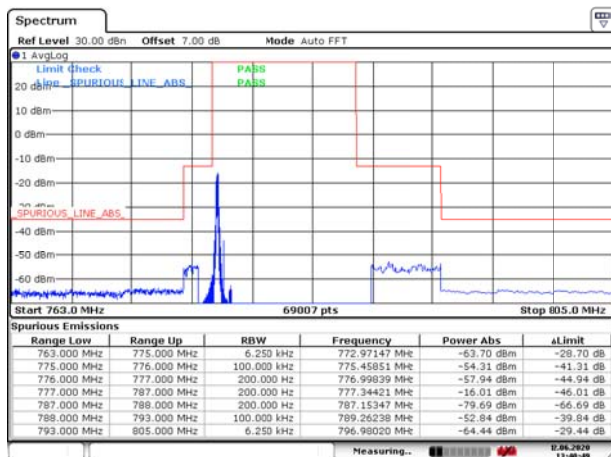
Date: 12 JUN 2020 13:45:36

LTE Band 13 QPSK 10MHz CH- High, 100%RB



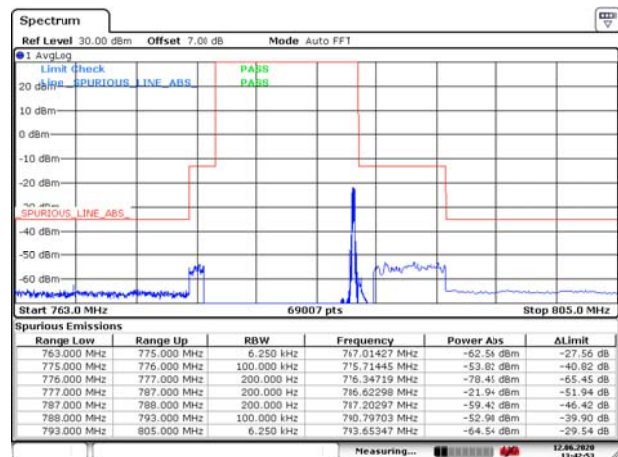
Date: 12 JUN 2020 13:47:20

LTE Band 13 16QAM 5MHz CH-Low, 1 RB



Date: 12 JUN 2020 13:40:49

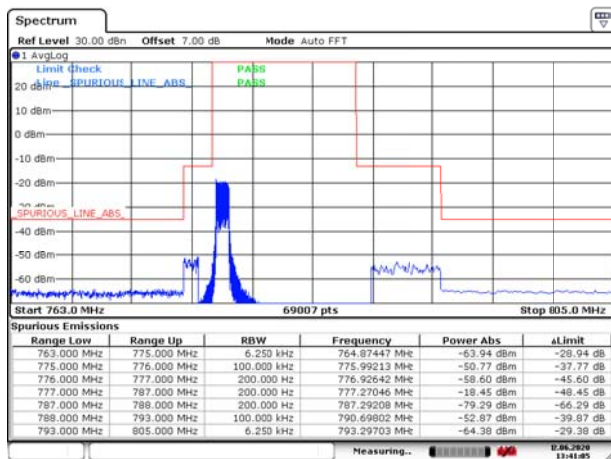
LTE Band 13 16QAM 5MHz CH-High, 1 RB



Date: 12 JUN 2020 13:42:53

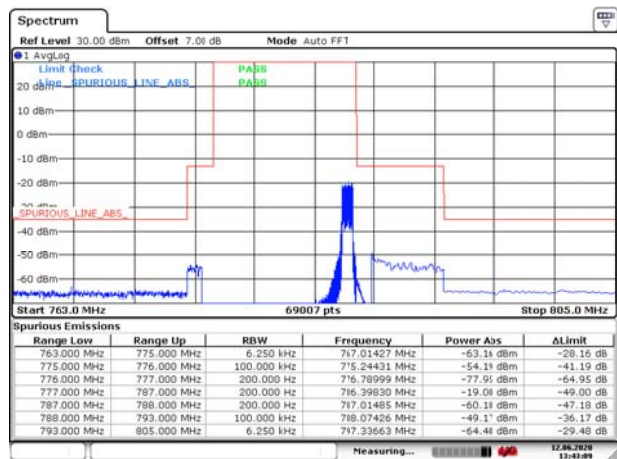


LTE Band 13 16QAM 5MHz CH-Low, 100%RB



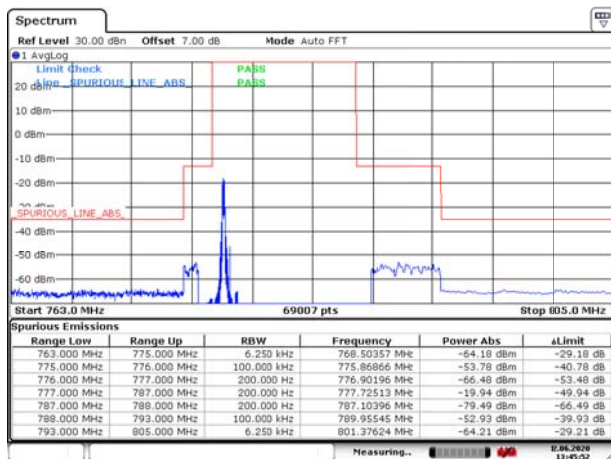
Date: 12 JUN 2020 13:41:04

LTE Band 13 16QAM 5MHz CH- High, 100%RB



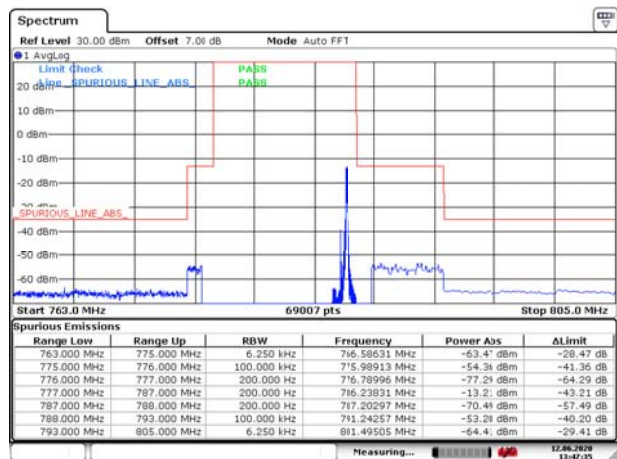
Date: 12 JUN 2020 13:43:09

LTE Band 13 16QAM 10MHz CH-Low, 1 RB



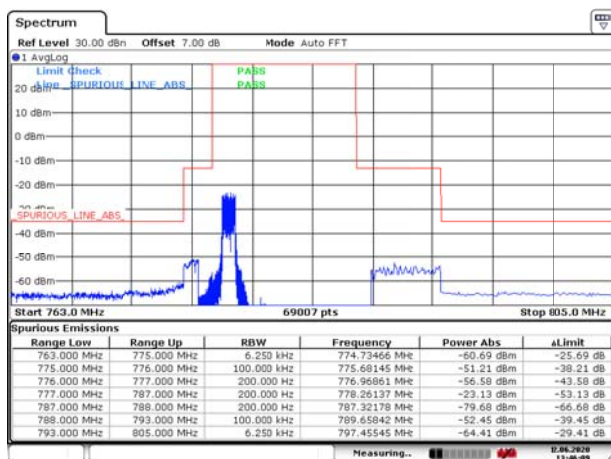
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LTE Band 13 16QAM 10MHz CH-High, 1 RB



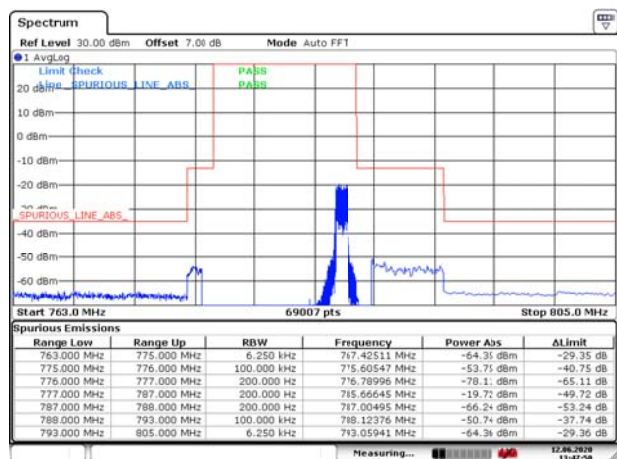
Date: 12 JUN 2020 13:47:35

LTE Band 13 16QAM 10MHz CH-Low, 100%RB



Date: 12 JUN 2020 13:46:09

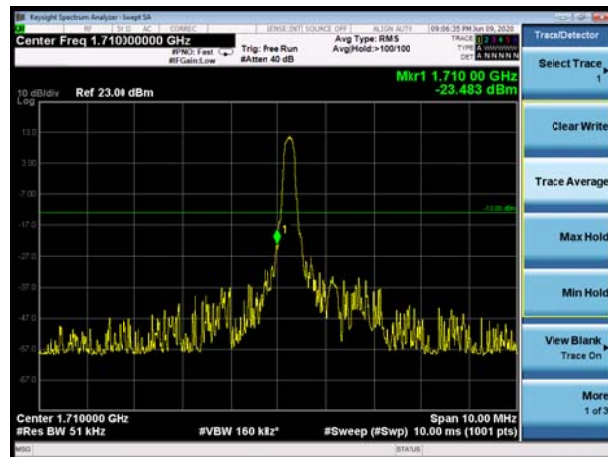
LTE Band 13 16QAM 10MHz CH- High, 100%RB



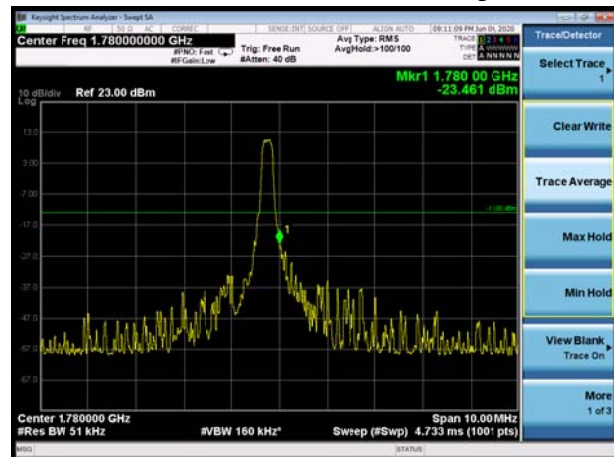
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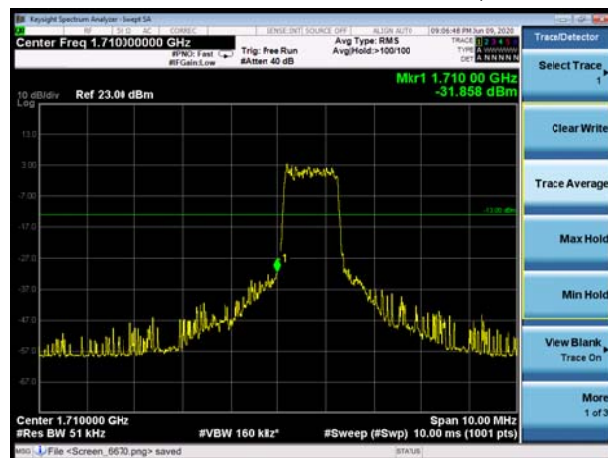
LTE Band 66 QPSK 1.4MHz CH-Low, 1 RB



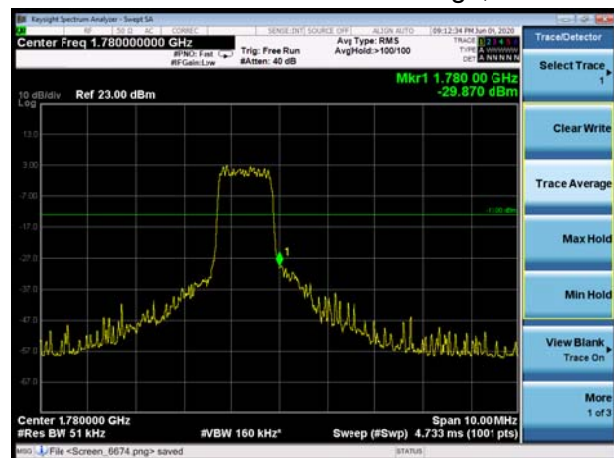
LTE Band 66 QPSK 1.4MHz CH-High, 1 RB



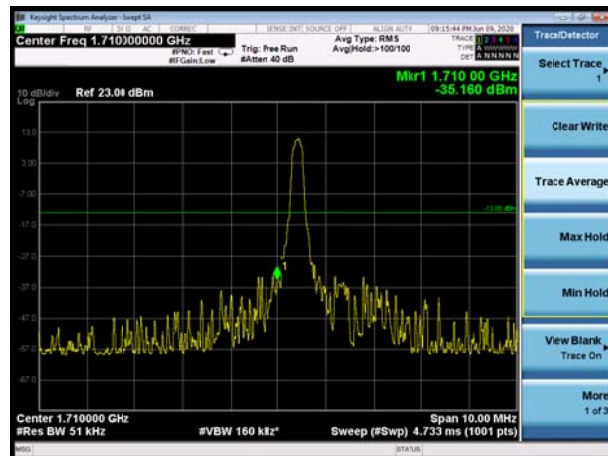
LTE Band 66 QPSK 1.4MHz CH-Low, 100%RB



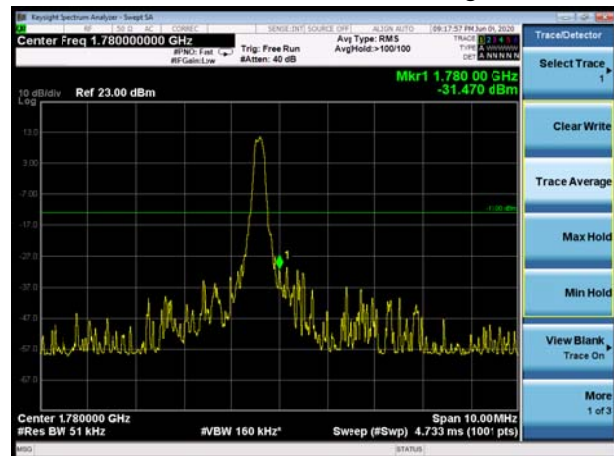
LTE Band 66 QPSK 1.4MHz CH-High, 100%RB



LTE Band 66 QPSK 3MHz CH-Low, 1 RB

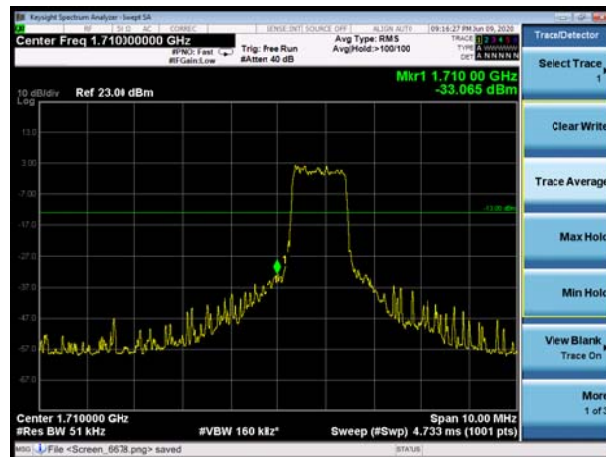


LTE Band 66 QPSK 3MHz CH-High, 1 RB





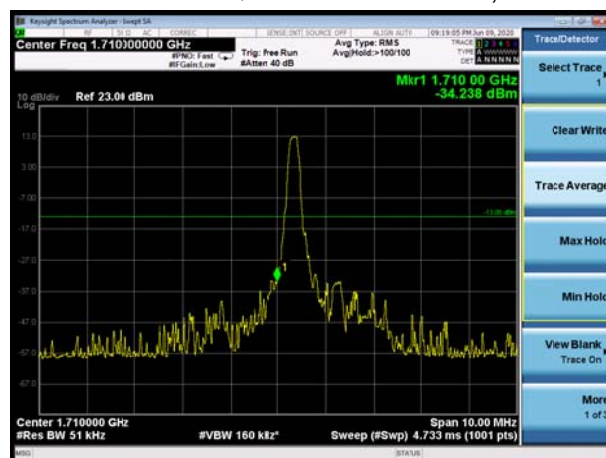
LTE Band 66 QPSK 3MHz CH-Low, 100%RB



LTE Band 66 QPSK 3MHz CH-High, 100%RB



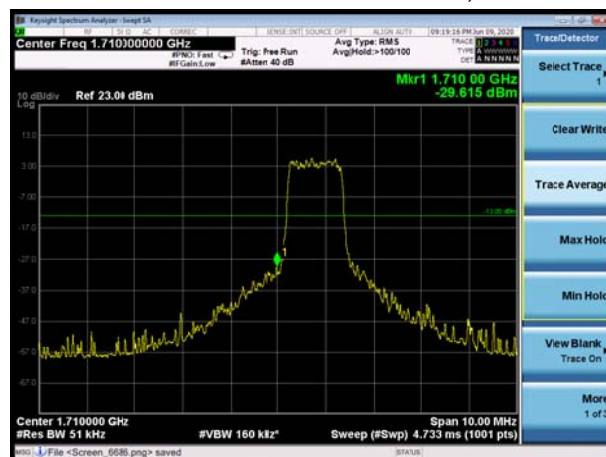
LTE Band 66 QPSK 5MHz CH-Low, 1 RB



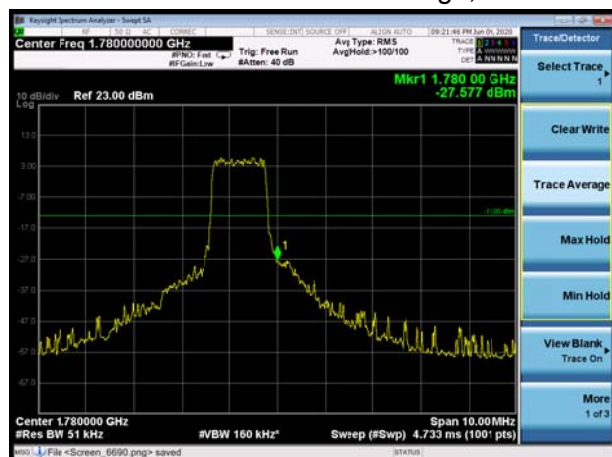
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LTE Band 66 QPSK 5MHz CH-Low, 100%RB

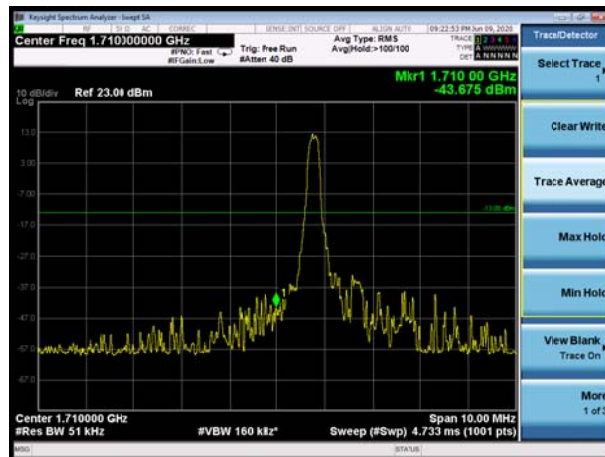


LTE Band 66 QPSK 5MHz CH-High, 100%RB

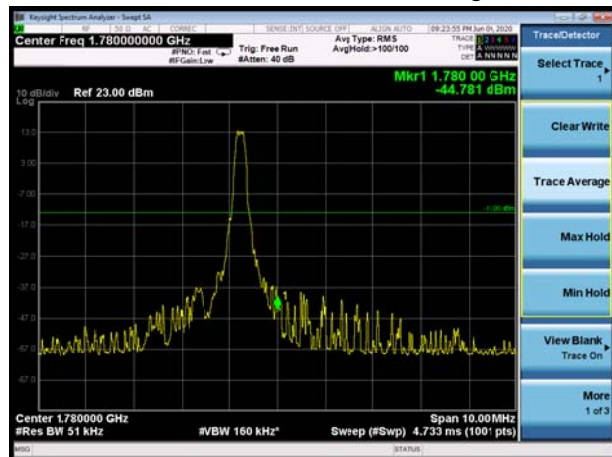




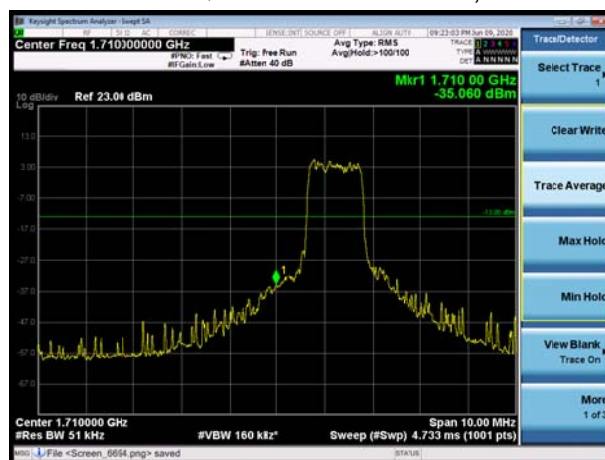
LTE Band 66 QPSK 10MHz CH-Low, 1 RB



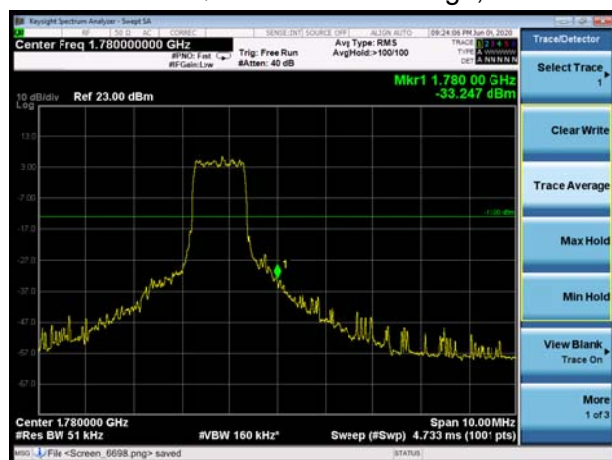
LTE Band 66 QPSK 10MHz CH-High, 1 RB



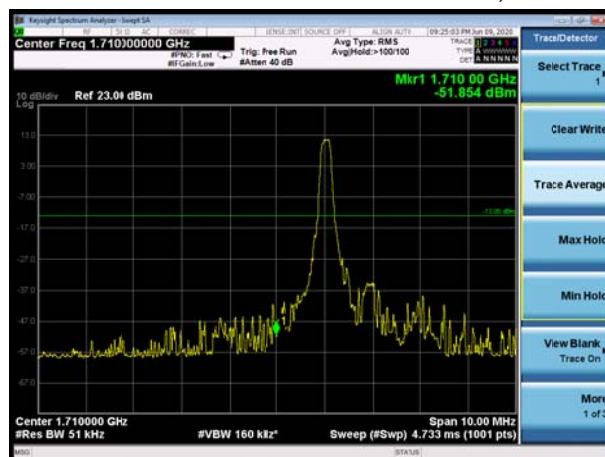
LTE Band 66 QPSK 10MHz CH-Low, 100%RB



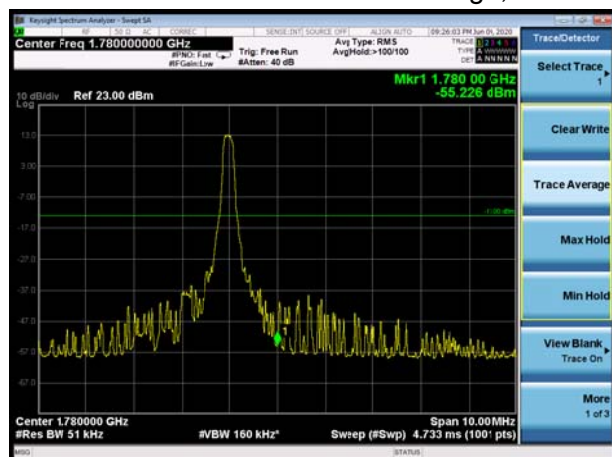
LTE Band 66 QPSK 10MHz CH-High, 100%RB



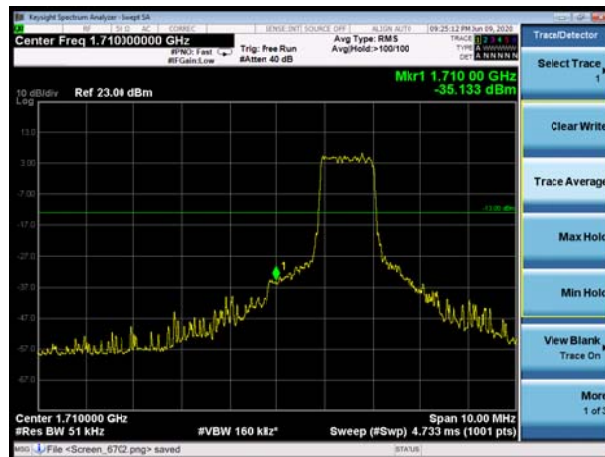
LTE Band 66 QPSK 15MHz CH-Low, 1 RB



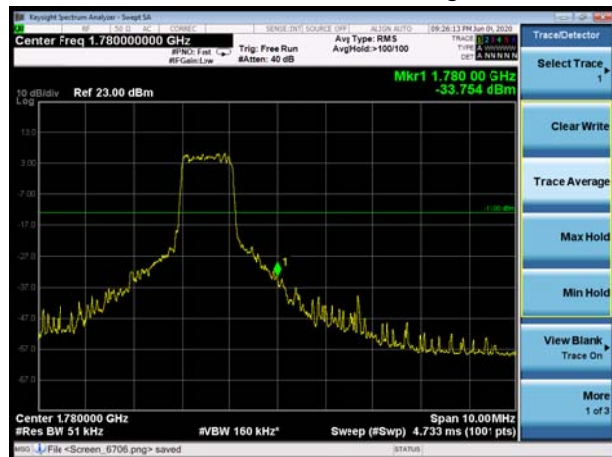
LTE Band 66 QPSK 15MHz CH-High, 1 RB



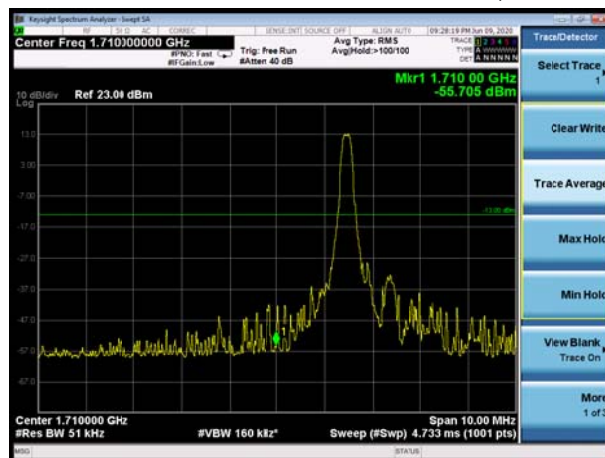
LTE Band 66 QPSK 15MHz CH-Low, 100%RB



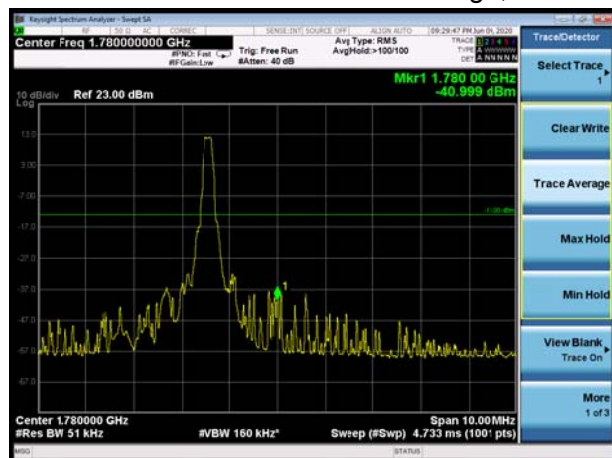
LTE Band 66 QPSK 15MHz CH-High, 100%RB



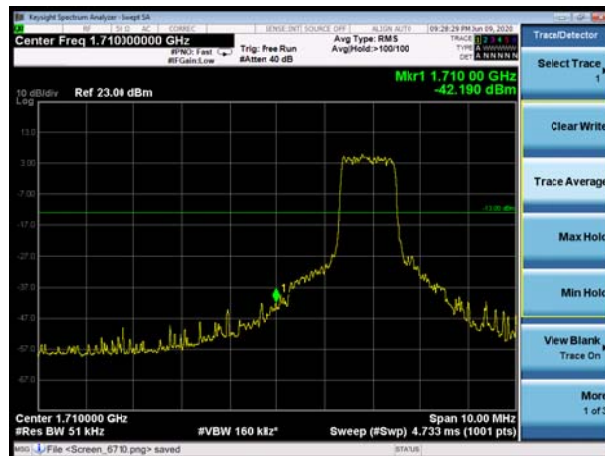
LTE Band 66 QPSK 20MHz CH-Low, 1 RB



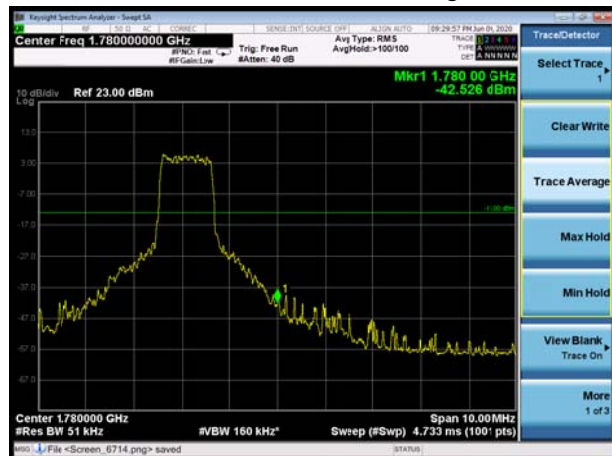
LTE Band 66 QPSK 20MHz CH-High, 1 RB



LTE Band 66 QPSK 20MHz CH-Low, 100%RB

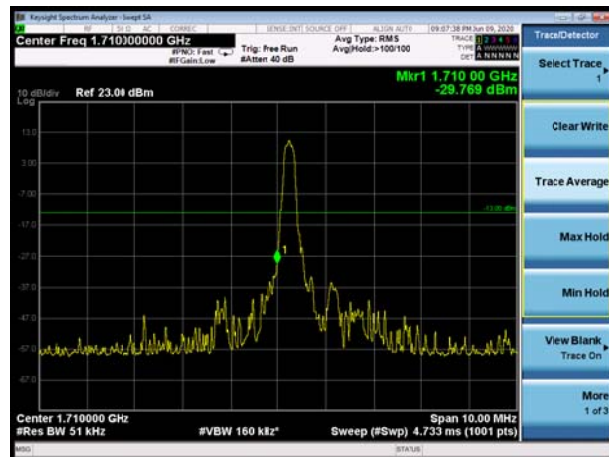


LTE Band 66 QPSK 20MHz CH-High, 100%RB

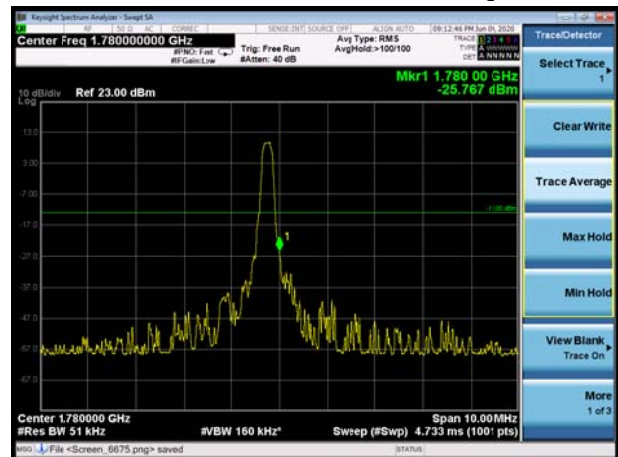




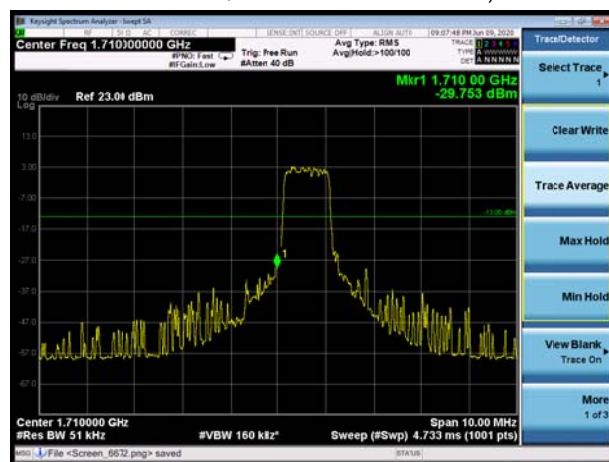
LTE Band 66 16QAM 1.4MHz CH-Low, 1 RB



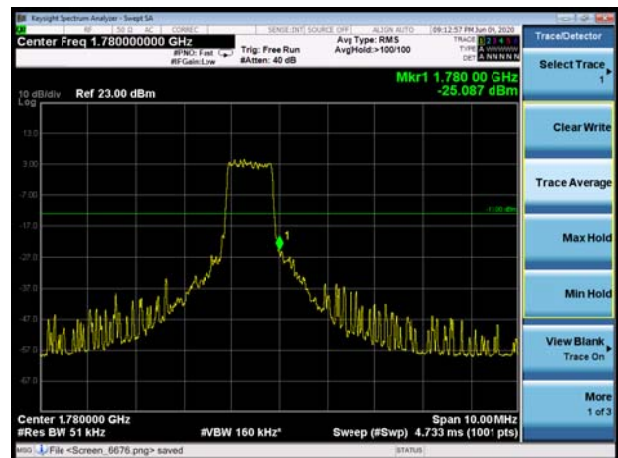
LTE Band 66 16QAM 1.4MHz CH-High, 1 RB



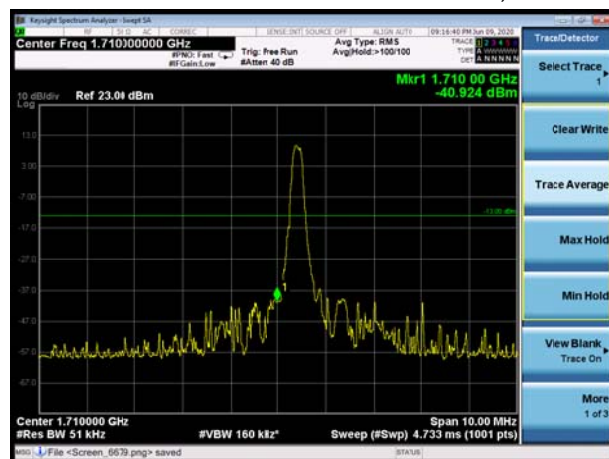
LTE Band 66 16QAM 1.4MHz CH-Low, 100%RB



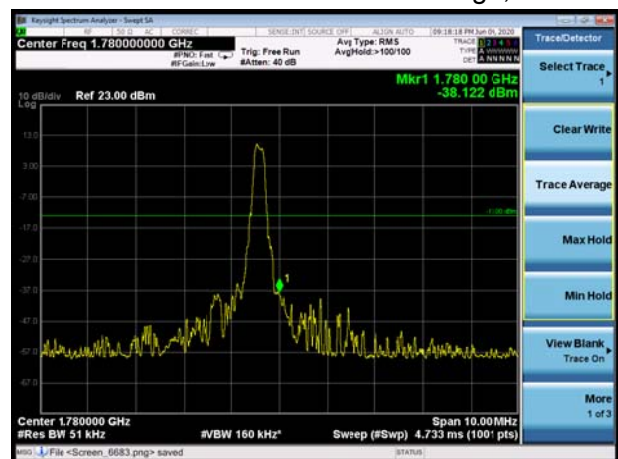
LTE Band 66 16QAM 1.4MHz CH-High, 100%RB



LTE Band 66 16QAM 3MHz CH-Low, 1 RB

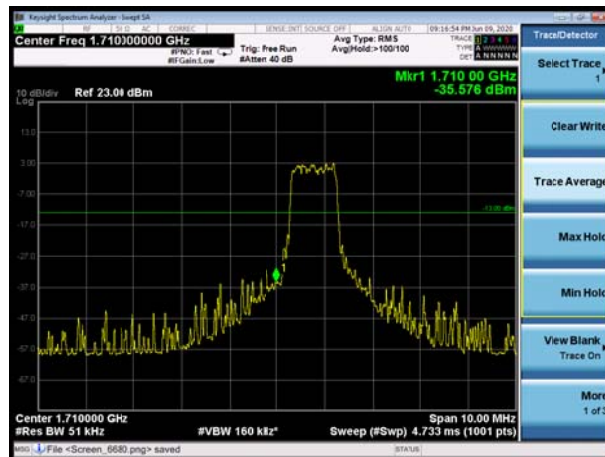


LTE Band 66 16QAM 3MHz CH-High, 1 RB

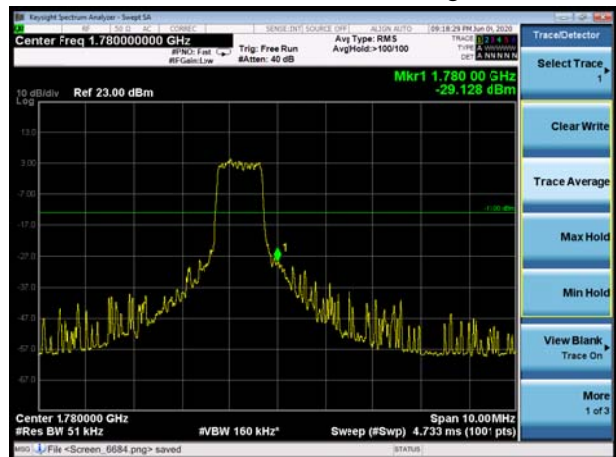




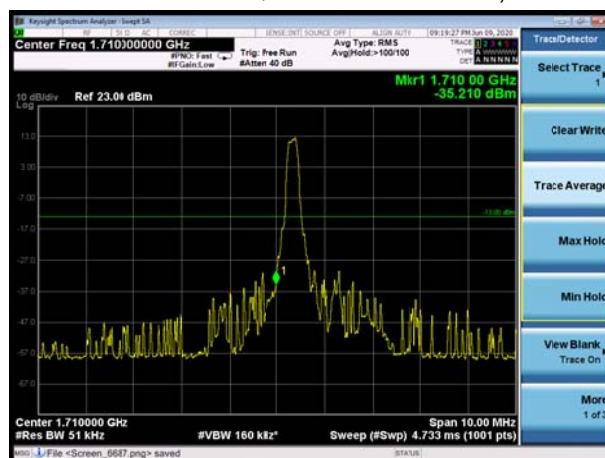
LTE Band 66 16QAM 3MHz CH-Low, 100%RB



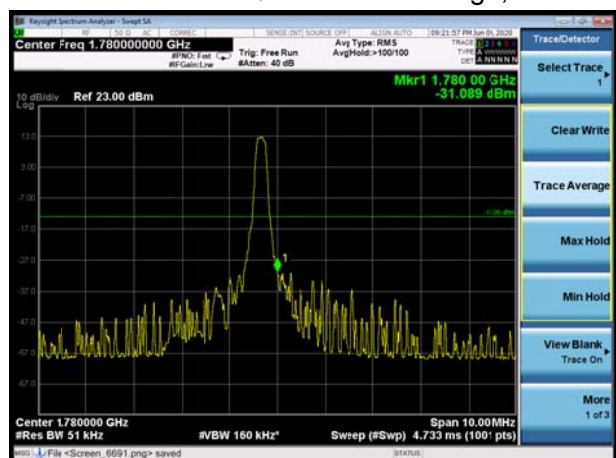
LTE Band 66 16QAM 3MHz CH-High, 100%RB



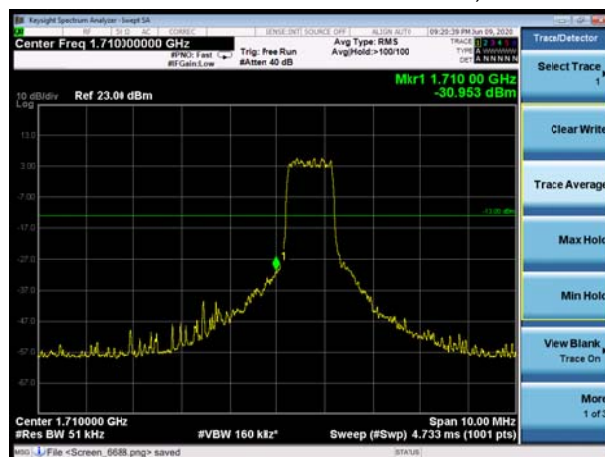
LTE Band 66 16QAM 5MHz CH-Low, 1 RB



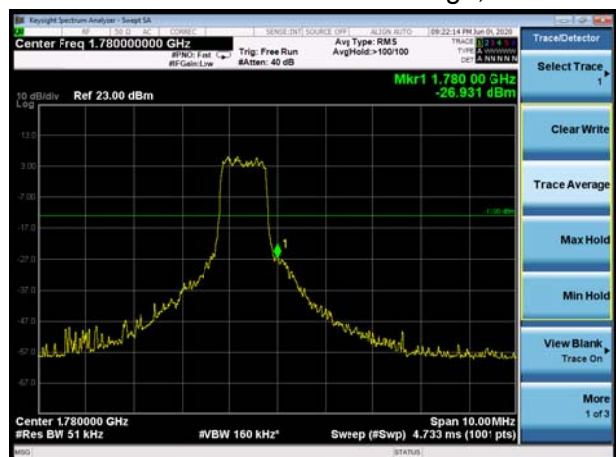
LTE Band 66 16QAM 5MHz CH-High, 1 RB



LTE Band 66 16QAM 5MHz CH-Low, 100%RB

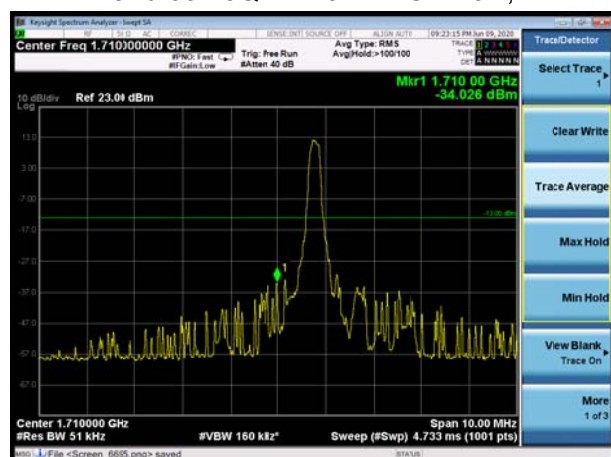


LTE Band 66 16QAM 5MHz CH-High, 100%RB

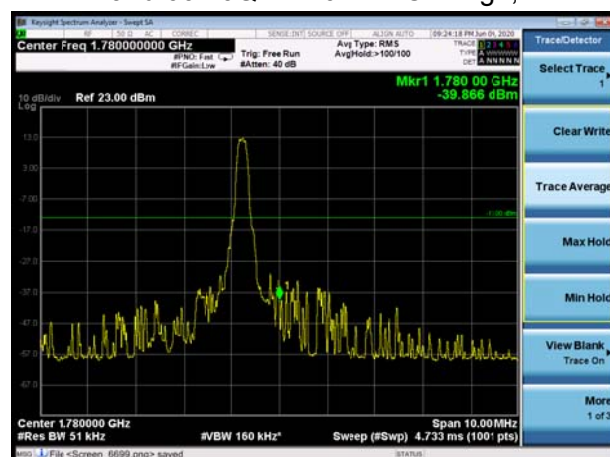




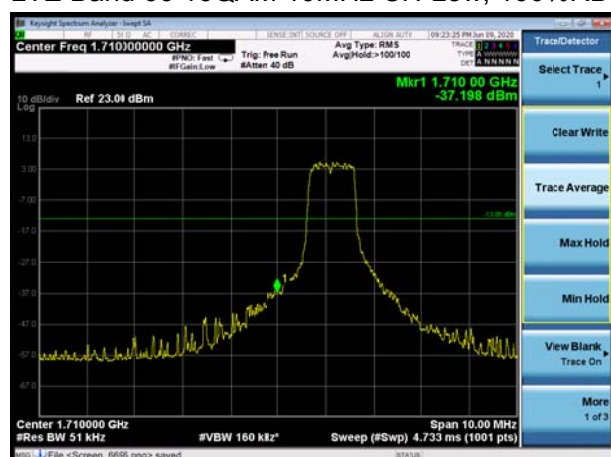
LTE Band 66 16QAM 10MHz CH-Low, 1 RB



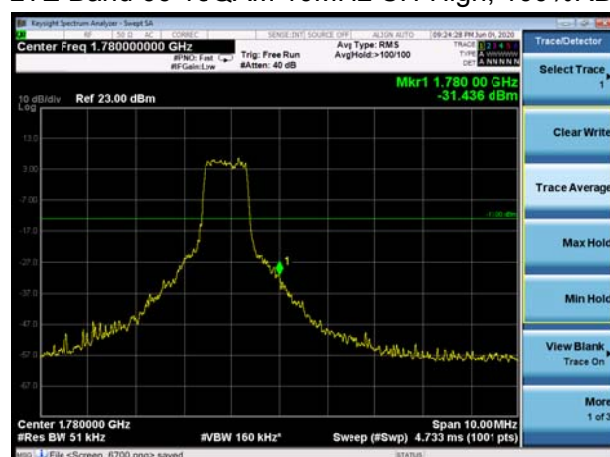
LTE Band 66 16QAM 10MHz CH-High, 1 RB



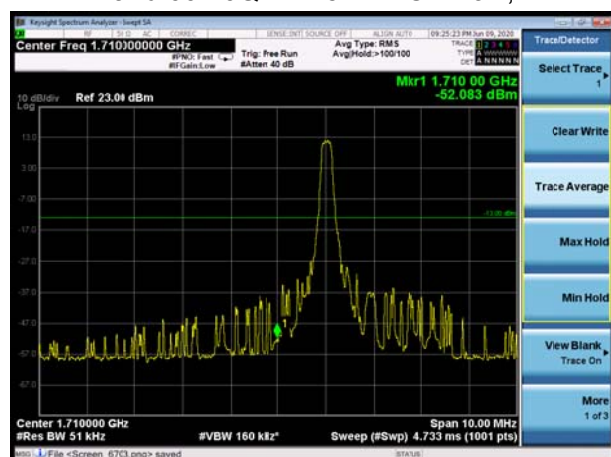
LTE Band 66 16QAM 10MHz CH-Low, 100%RB



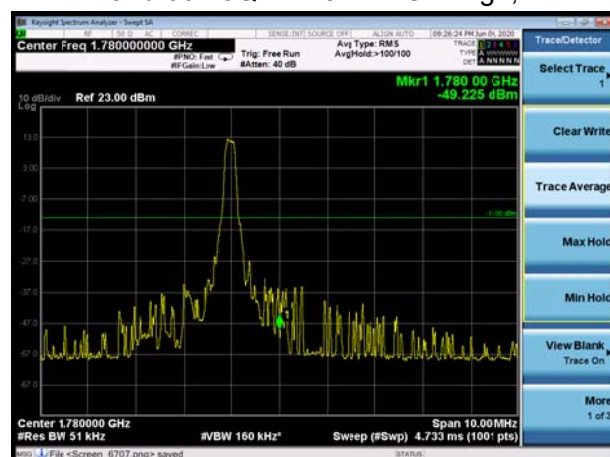
LTE Band 66 16QAM 10MHz CH-High, 100%RB



LTE Band 66 16QAM 15MHz CH-Low, 1 RB

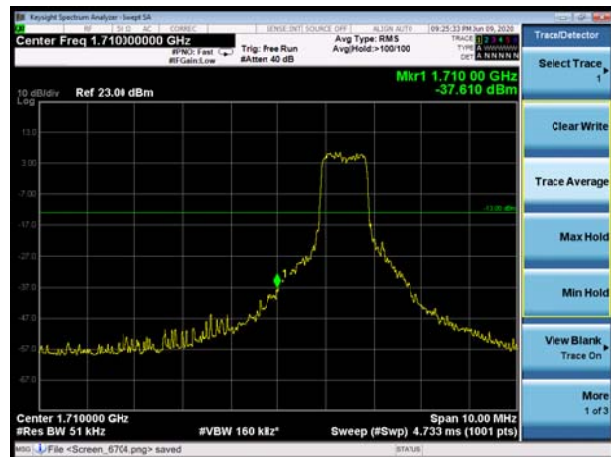


LTE Band 66 16QAM 15MHz CH-High, 1 RB

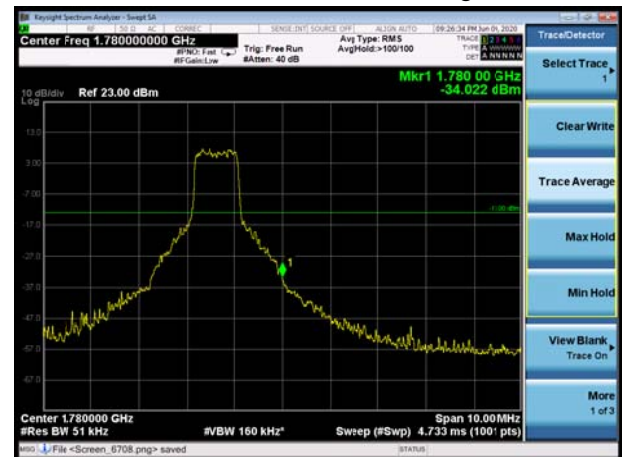




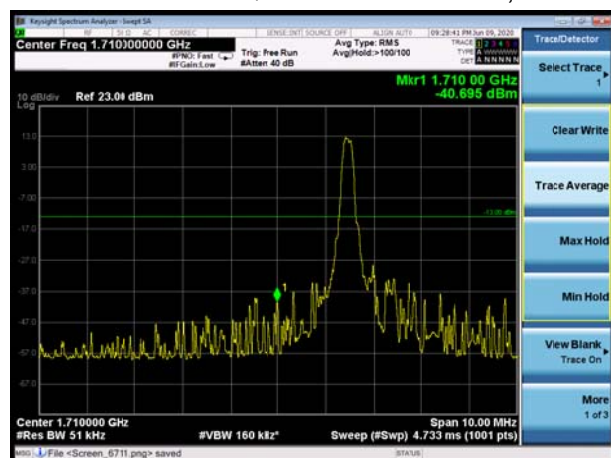
LTE Band 66 16QAM 15MHz CH-Low, 100%RB



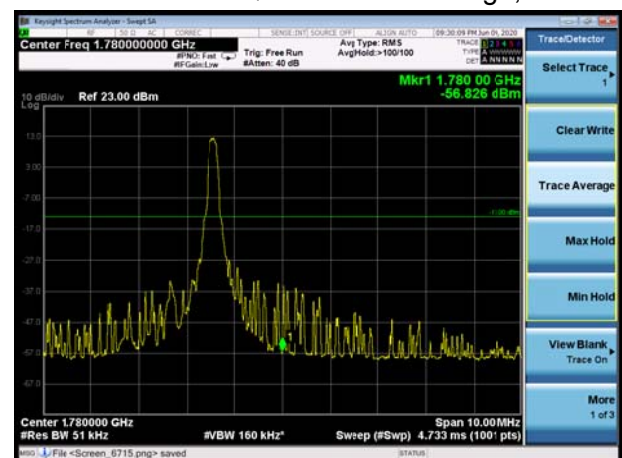
LTE Band 66 16QAM 15MHz CH-High, 100%RB



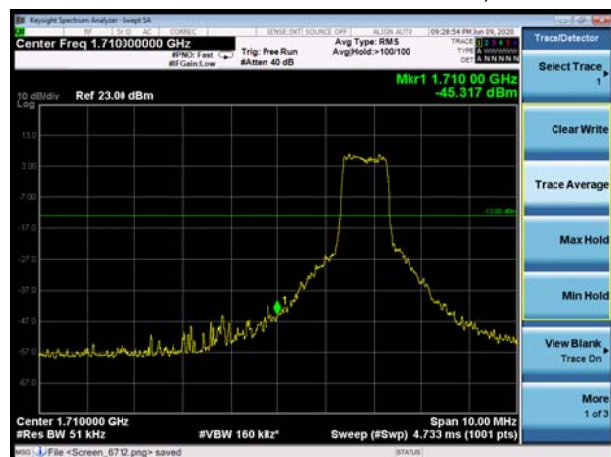
LTE Band 66 16QAM 20MHz CH-Low, 1 RB



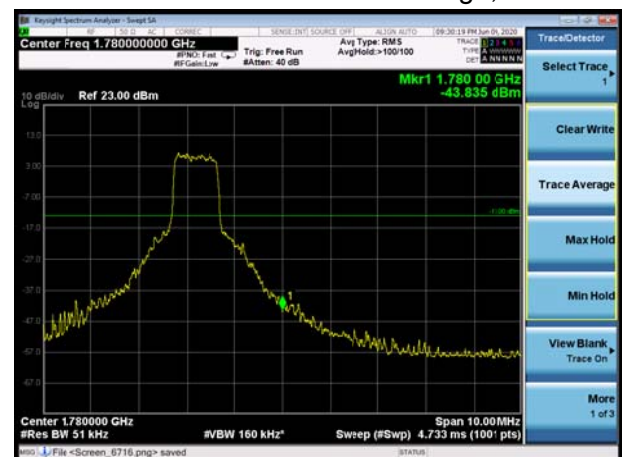
LTE Band 66 16QAM 20MHz CH-High, 1 RB



LTE Band 66 16QAM 20MHz CH-Low, 100%RB

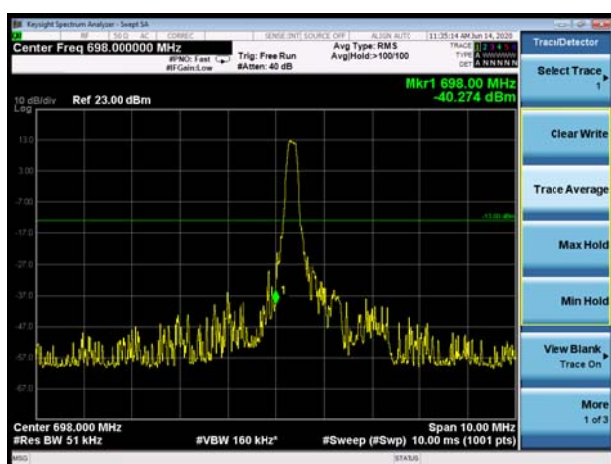


LTE Band 66 16QAM 20MHz CH-High, 100%RB

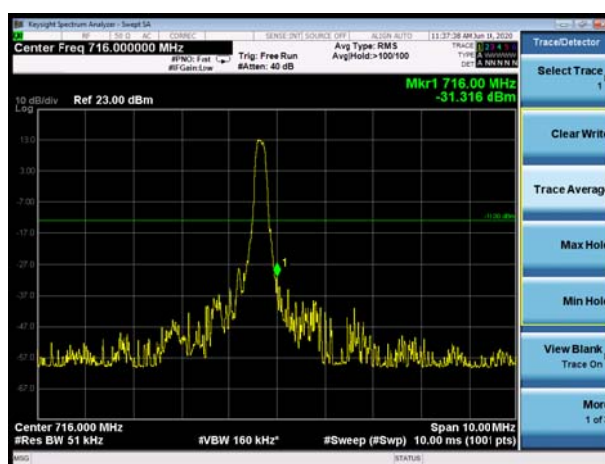




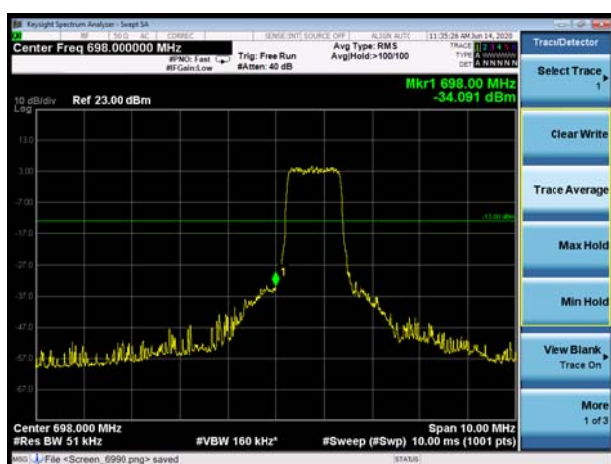
LTE Band 85 QPSK 5MHz CH-Low, 1 RB



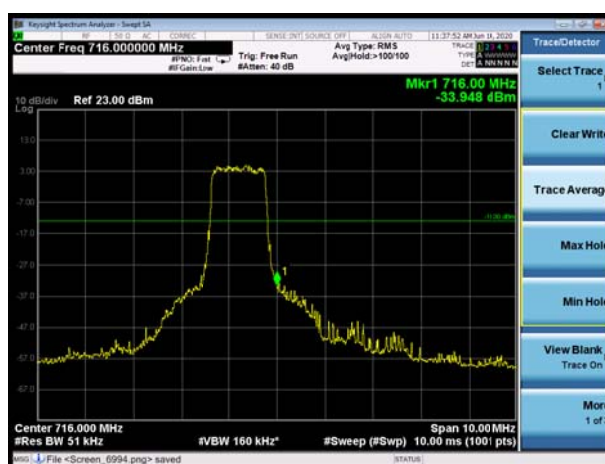
LTE Band 85 QPSK 5MHz CH-High, 1 RB



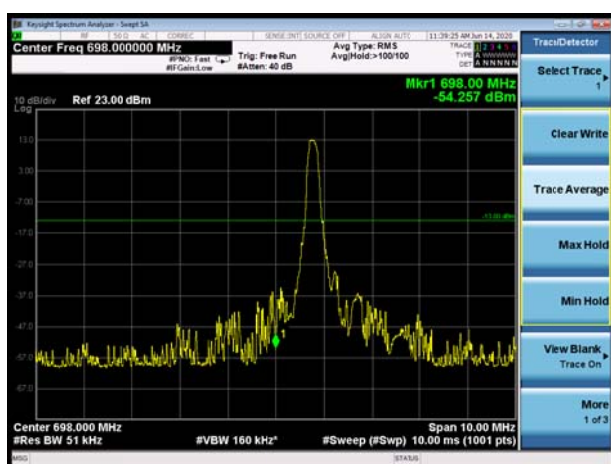
LTE Band 85 QPSK 5MHz CH-Low, 100%RB



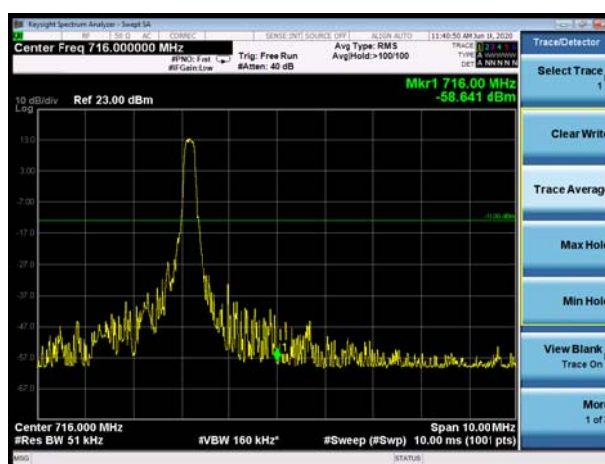
LTE Band 85 QPSK 5MHz CH-High, 100%RB



LTE Band 85 QPSK 10MHz CH-Low, 1 RB

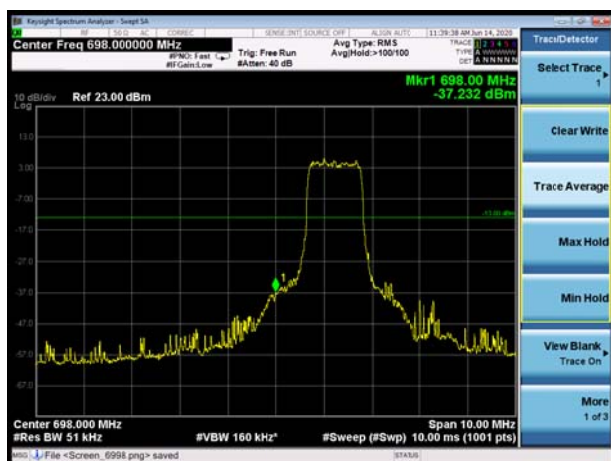


LTE Band 85 QPSK 10MHz CH-High, 1 RB

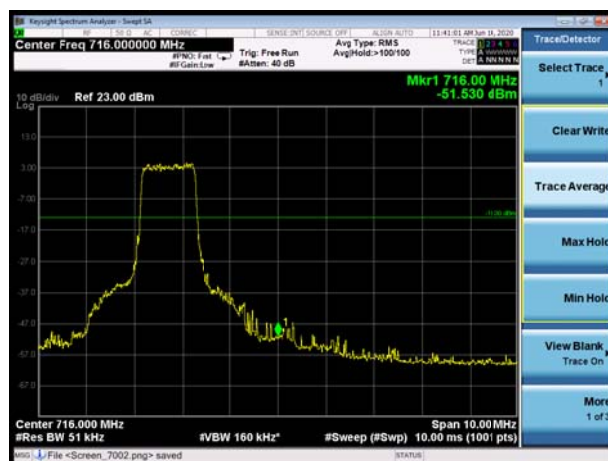




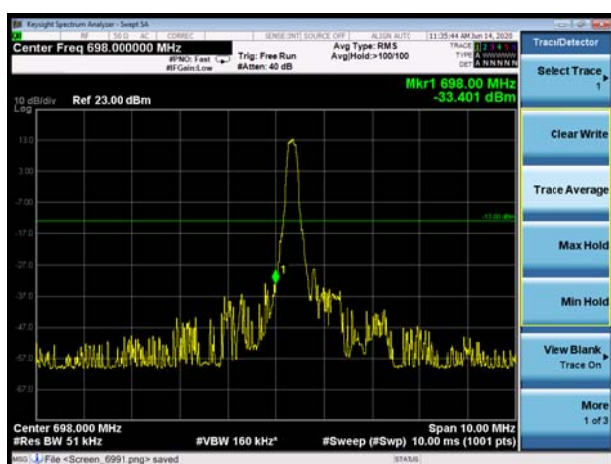
LTE Band 85 QPSK 10MHz CH-Low, 100%RB



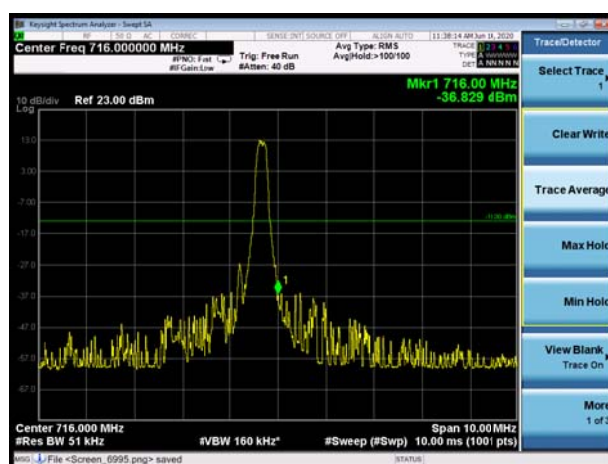
LTE Band 85 QPSK 10MHz CH-High, 100%RB



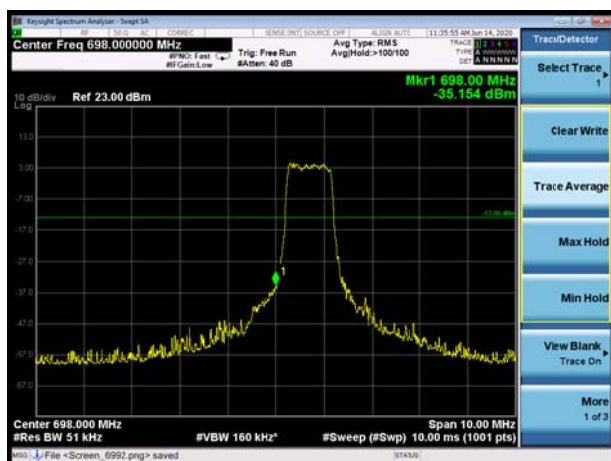
LTE Band 85 16QAM 5MHz CH-Low, 1 RB



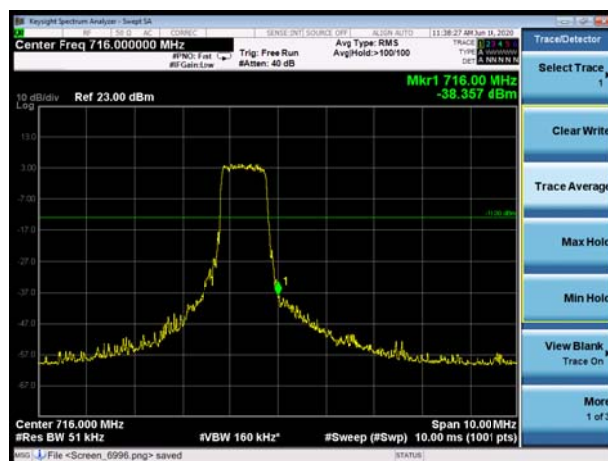
LTE Band 85 16QAM 5MHz CH-High, 1 RB



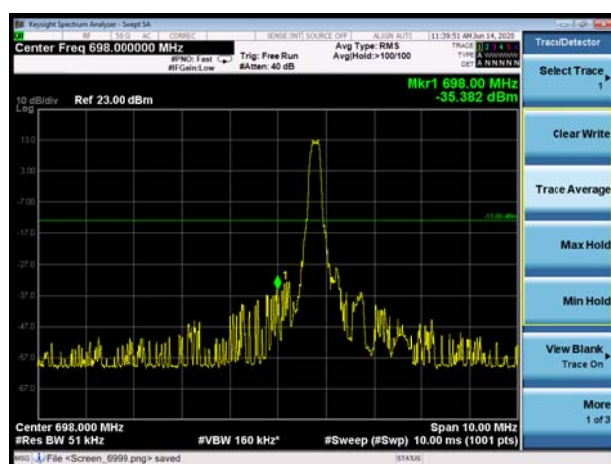
LTE Band 85 16QAM 5MHz CH-Low, 100%RB



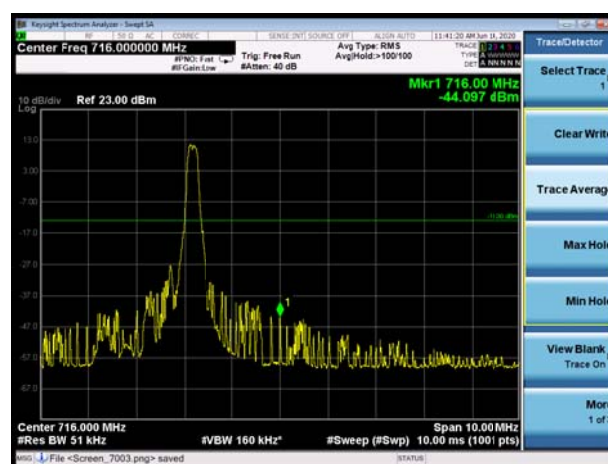
LTE Band 85 16QAM 5MHz CH-High, 100%RB



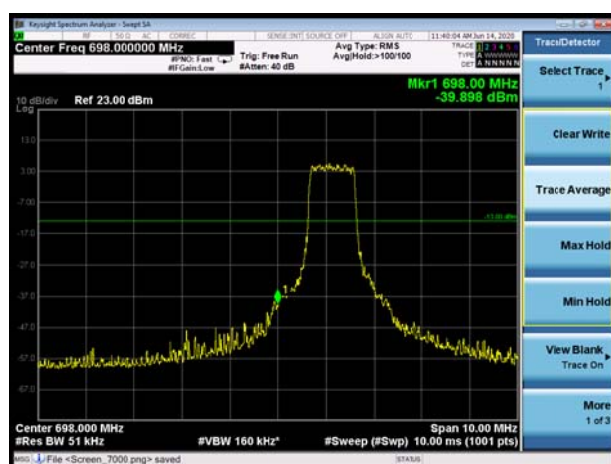
LTE Band 85 16QAM 10MHz CH-Low, 1 RB



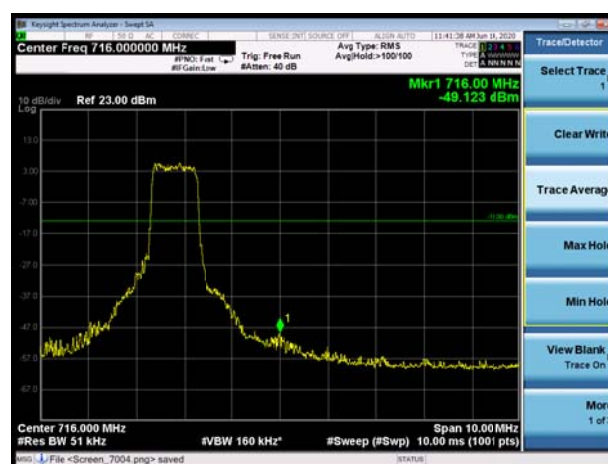
LTE Band 85 16QAM 10MHz CH-High, 1 RB



LTE Band 85 16QAM 10MHz CH-Low, 100%RB



LTE Band 85 16QAM 10MHz CH-High, 100%RB



5.4 Peak-to-Average Power Ratio (PAPR)

Ambient condition

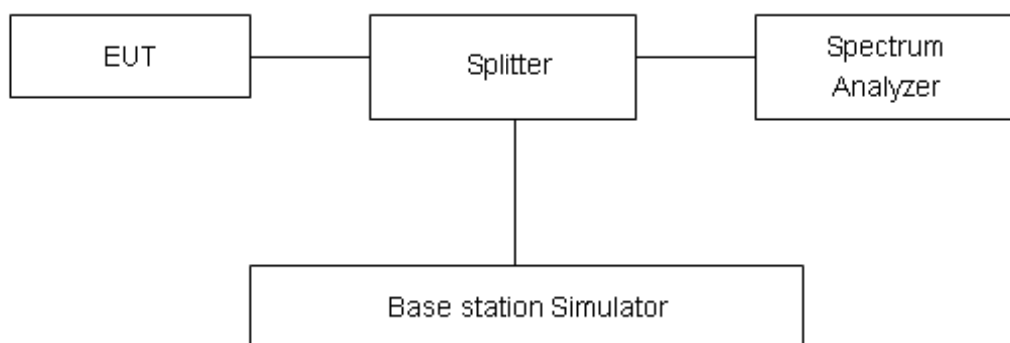
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Methods of Measurement

Measure the total peak power and record as PPK. And measure the total average power and record as PAvg. Both the peak and average power levels must be expressed in the same logarithmic units (e.g., dBm). Determine the PAPR from:

$$\text{PAPR (dB)} = \text{PPk (dBm)} - \text{PAvg (dBm)}.$$

Test Setup



Limits

Rule Part 27.50(d)(5) Equipment employed must be authorized in accordance with the provisions of 24.51. Power measurements for transmissions by stations authorized under this section may be made either in accordance with a Commission-approved average power technique or in compliance with paragraph (d)(6) of this section. 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.

Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = 2$, $U = 0.4$ dB.



Test Results

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
LTE Band 4	1.4MHz	QPSK	20175/1732.5	26.02	16.10	9.92	13	PASS
		16QAM	20175/1732.5	26.61	16.11	10.50	13	PASS
	3MHz	QPSK	20175/1732.5	26.00	16.06	9.94	13	PASS
		16QAM	20175/1732.5	26.59	16.06	10.53	13	PASS
	5MHz	QPSK	20175/1732.5	26.77	17.10	9.67	13	PASS
		16QAM	20175/1732.5	26.73	16.37	10.36	13	PASS
	10MHz	QPSK	20175/1732.5	26.63	16.77	9.86	13	PASS
		16QAM	20175/1732.5	27.25	17.31	9.94	13	PASS
	15MHz	QPSK	20175/1732.5	27.34	17.98	9.36	13	PASS
		16QAM	20175/1732.5	27.63	18.54	9.09	13	PASS
	20MHz	QPSK	20175/1732.5	27.29	17.56	9.73	13	PASS
		16QAM	20175/1732.5	27.62	18.64	8.98	13	PASS

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
LTE Band 12	1.4MHz	QPSK	23095/707.5	25.66	14.18	11.48	13	PASS
		16QAM	23095/707.5	26.76	14.66	12.10	13	PASS
	3MHz	QPSK	23095/707.5	25.60	15.68	9.92	13	PASS
		16QAM	23095/707.5	26.38	15.75	10.63	13	PASS
	5MHz	QPSK	23095/707.5	26.60	16.93	9.67	13	PASS
		16QAM	23095/707.5	26.53	16.08	10.45	13	PASS
	10MHz	QPSK	23095/707.5	26.55	16.84	9.71	13	PASS
		16QAM	23095/707.5	27.17	16.67	10.50	13	PASS

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
LTE Band 13	5MHz	QPSK	23230/782	26.39	16.90	9.49	13	PASS
		16QAM	23230/782	26.42	16.14	10.28	13	PASS
	10MHz	QPSK	23230/782	26.22	16.94	9.28	13	PASS
		16QAM	23230/782	26.72	16.86	9.86	13	PASS



Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
LTE Band 66	1.4MHz	QPSK	132322/1745	26.08	16.05	10.03	13	PASS
		16QAM	132322/1745	26.69	15.95	10.74	13	PASS
	3MHz	QPSK	132322/1745	26.06	15.97	10.09	13	PASS
		16QAM	132322/1745	26.69	15.97	10.72	13	PASS
	5MHz	QPSK	132322/1745	26.89	17.17	9.72	13	PASS
		16QAM	132322/1745	26.59	15.89	10.70	13	PASS
	10MHz	QPSK	132322/1745	26.78	17.17	9.61	13	PASS
		16QAM	132322/1745	27.42	16.98	10.44	13	PASS
	15MHz	QPSK	132322/1745	27.41	18.65	8.76	13	PASS
		16QAM	132322/1745	27.70	17.65	10.05	13	PASS
	20MHz	QPSK	132322/1745	27.42	17.94	9.48	13	PASS
		16QAM	132322/1745	27.75	18.43	9.32	13	PASS

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)			Limit (dB)	Conclusion
				Peak(dBm)	Avg(dBm)	PAPR(dB)		
LTE Band 85	5MHz	QPSK	134092/707	26.34	16.55	9.79	13	PASS
		16QAM	134092/707	25.98	15.75	10.23	13	PASS
	10MHz	QPSK	134092/707	26.38	16.13	10.25	13	PASS
		16QAM	134092/707	26.69	16.83	9.86	13	PASS

5.5 Frequency Stability

Ambient condition

Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

Method of Measurement

Frequency Stability (Temperature Variation)

The temperature inside the climate chamber is varied from -40°C to +85°C in 10°C step size.

(1) With all power removed, the temperature was decreased to -10°C and permitted to stabilize for three hours.

(2) Measure the carrier frequency with the test equipment in a “call mode”. These measurements should be made within 1 minute of powering up the mobile station, to prevent significant self warming.

(3) Repeat the above measurements at 10°C increments from -40°C to +85°C . Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

Frequency Stability (Voltage Variation)

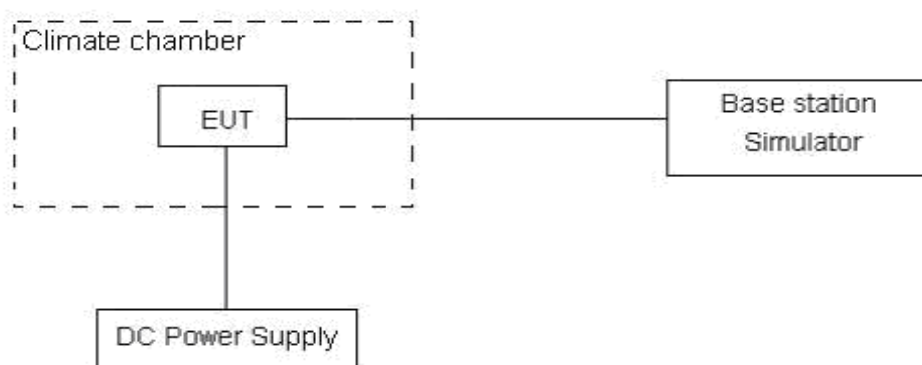
The frequency stability shall be measured with variation of primary supply voltage as follows:

(1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.

(2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery-operating end point which shall be specified by the manufacturer.

This transceiver is specified to operate with an input voltage of between 3.3 V and 4.3 V, with a nominal voltage of 3.8V.

.Test setup



Limits

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

Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 3$, $U=0.01\text{ppm}$.



Test Result

LTE Band 4						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	7.66	17.77	0.00407	0.00945	PASS
Extreme (85℃)		13.32	5.44	0.00709	0.00289	PASS
Extreme (80℃)		6.86	17.96	0.00365	0.00955	PASS
Extreme (70℃)		17.02	1.64	0.00906	0.00087	PASS
Extreme (60℃)		3.78	16.61	0.00201	0.00883	PASS
Extreme (50℃)		4.02	17.61	0.00214	0.00937	PASS
Extreme (40℃)		17.69	10.36	0.00941	0.00551	PASS
Extreme (30℃)		11.53	7.57	0.00613	0.00403	PASS
Extreme (20℃)		12.99	9.39	0.00691	0.00499	PASS
Extreme (10℃)		2.57	9.73	0.00137	0.00518	PASS
Extreme (0℃)		2.20	6.41	0.00117	0.00341	PASS
Extreme (-10℃)		5.77	13.11	0.00307	0.00697	PASS
Extreme (-20℃)		9.35	17.35	0.00498	0.00923	PASS
Extreme (-30℃)		9.81	6.34	0.00522	0.00337	PASS
Extreme (-40℃)		14.88	12.81	0.00791	0.00681	PASS
25℃	LV	4.47	14.75	0.00238	0.00785	PASS
	HV	5.59	1.29	0.00297	0.00068	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	10.11	1.41	0.00538	0.00075	PASS
Extreme (85℃)		2.05	17.79	0.00109	0.00946	PASS
Extreme (80℃)		15.14	10.74	0.00805	0.00571	PASS
Extreme (70℃)		11.61	15.69	0.00618	0.00835	PASS
Extreme (60℃)		15.82	14.29	0.00842	0.00760	PASS
Extreme (50℃)		2.01	17.80	0.00107	0.00947	PASS
Extreme (40℃)		10.10	15.85	0.00537	0.00843	PASS
Extreme (30℃)		8.58	17.86	0.00456	0.00950	PASS
Extreme (20℃)		3.61	9.46	0.00192	0.00503	PASS
Extreme (10℃)		2.08	14.15	0.00111	0.00753	PASS
Extreme (0℃)		13.99	16.77	0.00744	0.00892	PASS
Extreme (-10℃)		6.98	8.29	0.00371	0.00441	PASS
Extreme (-20℃)		14.10	15.36	0.00750	0.00817	PASS
Extreme (-30℃)		10.67	9.09	0.00567	0.00483	PASS



Extreme (-40℃)		7.30	16.72	0.00388	0.00889	PASS
25℃	LV	4.34	5.60	0.00231	0.00298	PASS
	HV	16.04	2.66	0.00853	0.00142	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	11.98	14.25	0.00637	0.00758	PASS
Extreme (85℃)		1.84	12.36	0.00098	0.00658	PASS
Extreme (80℃)		7.92	12.01	0.00421	0.00639	PASS
Extreme (70℃)		11.61	4.18	0.00618	0.00223	PASS
Extreme (60℃)		5.27	5.06	0.00280	0.00269	PASS
Extreme (50℃)		13.80	7.94	0.00734	0.00423	PASS
Extreme (40℃)		13.82	7.68	0.00735	0.00409	PASS
Extreme (30℃)		13.65	3.34	0.00726	0.00177	PASS
Extreme (20℃)		12.50	17.46	0.00665	0.00929	PASS
Extreme (10℃)		15.32	5.42	0.00815	0.00288	PASS
Extreme (0℃)		15.68	8.27	0.00834	0.00440	PASS
Extreme (-10℃)		16.15	9.05	0.00859	0.00481	PASS
Extreme (-20℃)		8.68	15.42	0.00462	0.00820	PASS
Extreme (-30℃)		6.54	8.50	0.00348	0.00452	PASS
Extreme (-40℃)		13.39	1.67	0.00712	0.00089	PASS
25℃	LV	14.25	12.41	0.00758	0.00660	PASS
	HV	5.93	5.91	0.00315	0.00314	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	11.62	9.58	0.00618	0.00510	PASS
Extreme (85℃)		7.64	15.96	0.00407	0.00849	PASS
Extreme (80℃)		9.03	2.28	0.00481	0.00121	PASS
Extreme (70℃)		8.76	16.43	0.00466	0.00874	PASS
Extreme (60℃)		2.38	16.58	0.00126	0.00882	PASS
Extreme (50℃)		8.34	7.08	0.00444	0.00377	PASS
Extreme (40℃)		15.08	11.63	0.00802	0.00618	PASS
Extreme (30℃)		11.15	17.65	0.00593	0.00939	PASS
Extreme (20℃)		12.30	8.17	0.00654	0.00435	PASS
Extreme (10℃)		1.59	12.17	0.00084	0.00648	PASS
Extreme (0℃)		6.01	3.19	0.00320	0.00170	PASS
Extreme (-10℃)		9.47	8.47	0.00503	0.00451	PASS
Extreme (-20℃)		7.14	2.95	0.00380	0.00157	PASS



Extreme (-30℃)		5.16	4.47	0.00274	0.00238	PASS
Extreme (-40℃)		5.50	5.64	0.00292	0.00300	PASS
25℃	LV	15.99	9.36	0.00851	0.00498	PASS
	HV	17.26	10.65	0.00918	0.00566	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	15MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	10.60	11.66	0.00564	0.00620	PASS
Extreme (85℃)		12.76	15.70	0.00679	0.00835	PASS
Extreme (80℃)		8.29	4.52	0.00441	0.00240	PASS
Extreme (70℃)		2.61	6.09	0.00139	0.00324	PASS
Extreme (60℃)		2.69	17.28	0.00143	0.00919	PASS
Extreme (50℃)		16.17	5.53	0.00860	0.00294	PASS
Extreme (40℃)		8.15	14.57	0.00434	0.00775	PASS
Extreme (30℃)		10.69	2.27	0.00569	0.00121	PASS
Extreme (20℃)		4.29	11.21	0.00228	0.00596	PASS
Extreme (10℃)		10.87	16.26	0.00578	0.00865	PASS
Extreme (0℃)		13.18	7.55	0.00701	0.00401	PASS
Extreme (-10℃)		5.23	7.05	0.00278	0.00375	PASS
Extreme (-20℃)		15.65	12.16	0.00833	0.00647	PASS
Extreme (-30℃)		5.78	14.40	0.00307	0.00766	PASS
Extreme (-40℃)		7.47	6.97	0.00397	0.00371	PASS
25℃	LV	14.46	5.56	0.00769	0.00296	PASS
	HV	13.99	2.75	0.00744	0.00146	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	1.49	7.61	0.00079	0.00405	PASS
Extreme (85℃)		15.62	5.32	0.00831	0.00283	PASS
Extreme (80℃)		15.30	15.02	0.00814	0.00799	PASS
Extreme (70℃)		7.02	12.24	0.00373	0.00651	PASS
Extreme (60℃)		7.17	8.61	0.00381	0.00458	PASS
Extreme (50℃)		15.48	17.73	0.00823	0.00943	PASS
Extreme (40℃)		10.69	9.45	0.00569	0.00503	PASS
Extreme (30℃)		13.13	6.75	0.00699	0.00359	PASS
Extreme (20℃)		8.53	5.49	0.00454	0.00292	PASS
Extreme (10℃)		15.96	14.88	0.00849	0.00791	PASS
Extreme (0℃)		8.67	4.32	0.00461	0.00230	PASS
Extreme (-10℃)		13.84	10.29	0.00736	0.00547	PASS



Extreme (-20℃)		15.40	4.85	0.00819	0.00258	PASS
Extreme (-30℃)		8.55	5.10	0.00455	0.00271	PASS
Extreme (-40℃)		1.16	12.53	0.00061	0.00667	PASS
25℃	LV	2.59	1.42	0.00138	0.00076	PASS
	HV	11.56	10.37	0.00615	0.00552	PASS

LTE Band 12						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	3.07	9.20	0.00163	0.00489	PASS
Extreme (85℃)		13.50	9.10	0.00718	0.00484	PASS
Extreme (80℃)		17.95	14.37	0.00955	0.00764	PASS
Extreme (70℃)		12.76	5.06	0.00679	0.00269	PASS
Extreme (60℃)		8.66	17.19	0.00461	0.00915	PASS
Extreme (50℃)		14.99	2.05	0.00797	0.00109	PASS
Extreme (40℃)		2.37	7.16	0.00126	0.00381	PASS
Extreme (30℃)		1.99	12.07	0.00106	0.00642	PASS
Extreme (20℃)		14.36	12.15	0.00764	0.00646	PASS
Extreme (10℃)		5.24	4.34	0.00278	0.00231	PASS
Extreme (0℃)		10.95	6.63	0.00582	0.00353	PASS
Extreme (-10℃)		16.53	16.49	0.00879	0.00877	PASS
Extreme (-20℃)		10.67	14.10	0.00568	0.00750	PASS
Extreme (-30℃)		10.28	16.66	0.00547	0.00886	PASS
Extreme (-40℃)	6.32	13.89	0.00336	0.00739	PASS	
25℃	LV	14.83	3.33	0.00789	0.00177	PASS
	HV	17.62	12.30	0.00937	0.00654	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	15.73	1.10	0.00836	0.00058	PASS
Extreme (85℃)		11.51	7.90	0.00612	0.00420	PASS
Extreme (80℃)		9.91	14.83	0.00527	0.00789	PASS
Extreme (70℃)		10.24	9.45	0.00545	0.00503	PASS
Extreme (60℃)		2.20	11.61	0.00117	0.00617	PASS
Extreme (50℃)		15.54	7.08	0.00826	0.00377	PASS
Extreme (40℃)		3.22	1.32	0.00171	0.00070	PASS
Extreme (30℃)		10.24	15.17	0.00545	0.00807	PASS
Extreme (20℃)		10.05	12.34	0.00535	0.00656	PASS



Extreme (10℃)		1.15	7.58	0.00061	0.00403	PASS
Extreme (0℃)		17.04	6.14	0.00906	0.00327	PASS
Extreme (-10℃)		3.55	13.34	0.00189	0.00709	PASS
Extreme (-20℃)		5.04	1.08	0.00268	0.00057	PASS
Extreme (-30℃)		4.84	1.31	0.00257	0.00070	PASS
Extreme (-40℃)		7.81	14.35	0.00415	0.00763	PASS
25℃	LV	15.04	10.69	0.00800	0.00569	PASS
	HV	5.13	12.17	0.00273	0.00647	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	2.34	13.95	0.00124	0.00742	PASS
Extreme (85℃)		16.66	8.67	0.00886	0.00461	PASS
Extreme (80℃)		7.79	12.31	0.00415	0.00655	PASS
Extreme (70℃)		16.53	13.36	0.00879	0.00710	PASS
Extreme (60℃)		14.76	3.15	0.00785	0.00167	PASS
Extreme (50℃)		7.46	6.45	0.00397	0.00343	PASS
Extreme (40℃)		4.33	12.60	0.00230	0.00670	PASS
Extreme (30℃)		8.88	17.61	0.00472	0.00937	PASS
Extreme (20℃)		4.23	6.51	0.00225	0.00346	PASS
Extreme (10℃)		16.89	10.55	0.00899	0.00561	PASS
Extreme (0℃)		6.14	12.69	0.00327	0.00675	PASS
Extreme (-10℃)		12.75	1.72	0.00678	0.00091	PASS
Extreme (-20℃)		11.79	17.39	0.00627	0.00925	PASS
Extreme (-30℃)		11.07	4.71	0.00589	0.00251	PASS
Extreme (-40℃)		17.73	3.82	0.00943	0.00203	PASS
25℃	LV	5.02	10.51	0.00267	0.00559	PASS
	HV	3.48	1.26	0.00185	0.00067	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	11.38	9.02	0.00605	0.00480	PASS
Extreme (85℃)		14.67	2.24	0.00780	0.00119	PASS
Extreme (80℃)		15.25	2.18	0.00811	0.00116	PASS
Extreme (70℃)		3.56	12.47	0.00189	0.00663	PASS
Extreme (60℃)		7.45	13.14	0.00396	0.00699	PASS
Extreme (50℃)		8.04	1.71	0.00428	0.00091	PASS
Extreme (40℃)		13.75	12.89	0.00731	0.00686	PASS
Extreme (30℃)		17.71	11.62	0.00942	0.00618	PASS



Extreme (20℃)		7.02	3.99	0.00374	0.00212	PASS
Extreme (10℃)		4.62	16.77	0.00246	0.00892	PASS
Extreme (0℃)		17.33	4.98	0.00922	0.00265	PASS
Extreme (-10℃)		7.02	2.62	0.00373	0.00140	PASS
Extreme (-20℃)		17.60	6.56	0.00936	0.00349	PASS
Extreme (-30℃)		16.02	16.77	0.00852	0.00892	PASS
Extreme (-40℃)		12.99	10.80	0.00691	0.00575	PASS
25℃	LV	8.53	9.81	0.00454	0.00522	PASS
	HV	5.36	12.49	0.00285	0.00664	PASS

LTE Band 13						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	4.30	15.41	0.00228	0.00820	PASS
Extreme (85℃)		15.78	11.34	0.00839	0.00603	PASS
Extreme (80℃)		3.47	1.18	0.00185	0.00063	PASS
Extreme (70℃)		7.97	14.08	0.00424	0.00749	PASS
Extreme (60℃)		17.81	7.32	0.00948	0.00389	PASS
Extreme (50℃)		2.11	16.35	0.00112	0.00870	PASS
Extreme (40℃)		17.66	9.45	0.00939	0.00502	PASS
Extreme (30℃)		2.20	8.81	0.00117	0.00469	PASS
Extreme (20℃)		4.66	17.21	0.00248	0.00915	PASS
Extreme (10℃)		17.64	14.81	0.00938	0.00788	PASS
Extreme (0℃)		9.94	14.25	0.00529	0.00758	PASS
Extreme (-10℃)		3.59	2.76	0.00191	0.00147	PASS
Extreme (-20℃)		12.01	6.78	0.00639	0.00361	PASS
Extreme (-30℃)		4.83	16.05	0.00257	0.00854	PASS
Extreme (-40℃)		8.23	5.53	0.00438	0.00294	PASS
25℃	LV	17.79	2.56	0.00946	0.00136	PASS
	HV	10.15	2.70	0.00540	0.00144	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	4.31	8.98	0.00229	0.00478	PASS
Extreme (85℃)		16.09	1.29	0.00856	0.00069	PASS
Extreme (80℃)		17.88	16.38	0.00951	0.00871	PASS
Extreme (70℃)		3.31	7.88	0.00176	0.00419	PASS



Extreme (60℃)		16.81	17.29	0.00894	0.00919	PASS
Extreme (50℃)		15.09	1.40	0.00802	0.00074	PASS
Extreme (40℃)		9.18	6.20	0.00488	0.00330	PASS
Extreme (30℃)		13.71	15.93	0.00729	0.00847	PASS
Extreme (20℃)		2.44	10.83	0.00130	0.00576	PASS
Extreme (10℃)		10.78	12.41	0.00573	0.00660	PASS
Extreme (0℃)		5.24	1.34	0.00279	0.00071	PASS
Extreme (-10℃)		12.56	7.05	0.00668	0.00375	PASS
Extreme (-20℃)		5.13	17.46	0.00273	0.00929	PASS
Extreme (-30℃)		13.62	2.28	0.00725	0.00121	PASS
Extreme (-40℃)		9.82	13.14	0.00522	0.00699	PASS
25℃	LV	13.94	4.48	0.00741	0.00238	PASS
	HV	15.47	10.65	0.00823	0.00567	PASS

LTE Band 66						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	12.04	17.23	0.00640	0.00917	PASS
Extreme (85℃)		3.83	12.48	0.00204	0.00664	PASS
Extreme (80℃)		11.00	5.37	0.00585	0.00285	PASS
Extreme (70℃)		2.13	13.01	0.00113	0.00692	PASS
Extreme (60℃)		6.10	11.60	0.00325	0.00617	PASS
Extreme (50℃)		17.79	15.40	0.00946	0.00819	PASS
Extreme (40℃)		11.51	14.99	0.00612	0.00797	PASS
Extreme (30℃)		9.55	8.35	0.00508	0.00444	PASS
Extreme (20℃)		5.04	17.40	0.00268	0.00926	PASS
Extreme (10℃)		11.77	5.78	0.00626	0.00308	PASS
Extreme (0℃)		13.46	8.34	0.00716	0.00444	PASS
Extreme (-10℃)		1.36	2.02	0.00072	0.00107	PASS
Extreme (-20℃)		5.99	16.75	0.00318	0.00891	PASS
Extreme (-30℃)		7.01	10.96	0.00373	0.00583	PASS
Extreme (-40℃)		1.84	12.43	0.00098	0.00661	PASS
25℃	LV	7.33	1.96	0.00390	0.00104	PASS
	HV	11.74	14.29	0.00625	0.00760	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	6.90	8.50	0.00367	0.00452	PASS



Extreme (85℃)		13.80	17.30	0.00734	0.00920	PASS
Extreme (80℃)		13.25	5.85	0.00705	0.00311	PASS
Extreme (70℃)		1.43	4.49	0.00076	0.00239	PASS
Extreme (60℃)		14.97	9.98	0.00796	0.00531	PASS
Extreme (50℃)		6.12	9.21	0.00326	0.00490	PASS
Extreme (40℃)		16.48	6.96	0.00877	0.00370	PASS
Extreme (30℃)		13.46	15.68	0.00716	0.00834	PASS
Extreme (20℃)		7.92	4.85	0.00421	0.00258	PASS
Extreme (10℃)		3.08	17.77	0.00164	0.00945	PASS
Extreme (0℃)		11.56	15.82	0.00615	0.00841	PASS
Extreme (-10℃)		1.41	8.04	0.00075	0.00428	PASS
Extreme (-20℃)		3.99	1.94	0.00212	0.00103	PASS
Extreme (-30℃)		8.04	17.01	0.00428	0.00905	PASS
Extreme (-40℃)		5.73	7.08	0.00305	0.00377	PASS
25℃	LV	3.50	14.91	0.00186	0.00793	PASS
	HV	11.00	3.98	0.00585	0.00212	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	11.33	16.83	0.00603	0.00895	PASS
Extreme (85℃)		7.91	8.04	0.00421	0.00428	PASS
Extreme (80℃)		9.79	10.47	0.00521	0.00557	PASS
Extreme (70℃)		4.62	6.47	0.00246	0.00344	PASS
Extreme (60℃)		12.47	7.79	0.00663	0.00414	PASS
Extreme (50℃)		3.61	15.31	0.00192	0.00814	PASS
Extreme (40℃)		3.26	3.82	0.00174	0.00203	PASS
Extreme (30℃)		17.94	2.26	0.00954	0.00120	PASS
Extreme (20℃)		14.71	5.51	0.00782	0.00293	PASS
Extreme (10℃)		10.80	14.17	0.00575	0.00754	PASS
Extreme (0℃)		5.00	4.98	0.00266	0.00265	PASS
Extreme (-10℃)		11.73	16.18	0.00624	0.00861	PASS
Extreme (-20℃)		11.73	8.39	0.00624	0.00446	PASS
Extreme (-30℃)		2.72	12.14	0.00145	0.00646	PASS
Extreme (-40℃)		4.65	8.15	0.00247	0.00433	PASS
25℃	LV	12.12	15.54	0.00645	0.00827	PASS
	HV	4.47	8.16	0.00238	0.00434	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	



Normal (25℃)	Normal	16.65	8.72	0.00886	0.00464	PASS
Extreme (85℃)		8.95	2.04	0.00476	0.00109	PASS
Extreme (80℃)		5.54	16.14	0.00295	0.00859	PASS
Extreme (70℃)		6.52	12.51	0.00347	0.00666	PASS
Extreme (60℃)		11.96	16.99	0.00636	0.00904	PASS
Extreme (50℃)		13.56	10.15	0.00721	0.00540	PASS
Extreme (40℃)		5.65	12.37	0.00301	0.00658	PASS
Extreme (30℃)		2.16	13.34	0.00115	0.00709	PASS
Extreme (20℃)		15.40	14.26	0.00819	0.00758	PASS
Extreme (10℃)		9.79	9.07	0.00521	0.00482	PASS
Extreme (0℃)		5.19	14.29	0.00276	0.00760	PASS
Extreme (-10℃)		6.42	4.82	0.00341	0.00257	PASS
Extreme (-20℃)		9.24	6.29	0.00491	0.00334	PASS
Extreme (-30℃)		13.04	5.59	0.00694	0.00298	PASS
Extreme (-40℃)		16.64	3.71	0.00885	0.00197	PASS
25℃	LV	3.38	7.46	0.00180	0.00397	PASS
	HV	16.13	9.08	0.00858	0.00483	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	15MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	5.15	11.13	0.00274	0.00592	PASS
Extreme (85℃)		8.10	15.37	0.00431	0.00818	PASS
Extreme (80℃)		4.96	5.73	0.00264	0.00305	PASS
Extreme (70℃)		8.16	3.23	0.00434	0.00172	PASS
Extreme (60℃)		2.08	1.06	0.00111	0.00056	PASS
Extreme (50℃)		5.96	8.95	0.00317	0.00476	PASS
Extreme (40℃)		12.48	5.07	0.00664	0.00270	PASS
Extreme (30℃)		3.28	4.03	0.00175	0.00214	PASS
Extreme (20℃)		5.06	12.43	0.00269	0.00661	PASS
Extreme (10℃)		3.56	13.14	0.00189	0.00699	PASS
Extreme (0℃)		15.64	8.37	0.00832	0.00445	PASS
Extreme (-10℃)		7.24	15.45	0.00385	0.00822	PASS
Extreme (-20℃)		16.35	5.57	0.00870	0.00296	PASS
Extreme (-30℃)		8.34	4.64	0.00443	0.00247	PASS
Extreme (-40℃)		5.07	2.10	0.00270	0.00112	PASS
25℃	LV	6.52	8.16	0.00347	0.00434	PASS
	HV	6.92	1.95	0.00368	0.00104	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz					



Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	17.87	6.15	0.00951	0.00327	PASS
Extreme (85℃)		13.66	10.95	0.00726	0.00582	PASS
Extreme (80℃)		5.39	1.25	0.00287	0.00067	PASS
Extreme (70℃)		11.88	10.32	0.00632	0.00549	PASS
Extreme (60℃)		3.04	1.33	0.00162	0.00071	PASS
Extreme (50℃)		1.14	7.31	0.00061	0.00389	PASS
Extreme (40℃)		3.09	17.41	0.00164	0.00926	PASS
Extreme (30℃)		9.11	7.25	0.00484	0.00386	PASS
Extreme (20℃)		14.47	4.64	0.00770	0.00247	PASS
Extreme (10℃)		17.76	3.78	0.00945	0.00201	PASS
Extreme (0℃)		17.61	16.26	0.00937	0.00865	PASS
Extreme (-10℃)		10.58	6.21	0.00563	0.00330	PASS
Extreme (-20℃)		13.93	16.44	0.00741	0.00875	PASS
Extreme (-30℃)		3.96	4.21	0.00211	0.00224	PASS
Extreme (-40℃)		10.80	3.18	0.00574	0.00169	PASS
25℃	LV	1.69	16.63	0.00090	0.00885	PASS
	HV	15.20	11.19	0.00809	0.00595	PASS

LTE Band 85						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz					
Temperature	Voltage	16QAM	QPSK	16QAM	QPSK	
Normal (25℃)	Normal	15.61	5.92	0.00830	0.00315	PASS
Extreme (85℃)		14.69	13.42	0.00781	0.00714	PASS
Extreme (80℃)		9.68	3.61	0.00515	0.00192	PASS
Extreme (70℃)		11.27	1.15	0.00599	0.00061	PASS
Extreme (60℃)		4.76	12.84	0.00253	0.00683	PASS
Extreme (50℃)		3.73	15.98	0.00198	0.00850	PASS
Extreme (40℃)		4.43	12.00	0.00236	0.00638	PASS
Extreme (30℃)		11.26	5.19	0.00599	0.00276	PASS
Extreme (20℃)		3.36	12.57	0.00179	0.00669	PASS
Extreme (10℃)		16.61	16.99	0.00884	0.00904	PASS
Extreme (0℃)		5.02	13.56	0.00267	0.00721	PASS
Extreme (-10℃)		2.54	6.51	0.00135	0.00346	PASS
Extreme (-20℃)		11.83	16.34	0.00629	0.00869	PASS
Extreme (-30℃)		3.32	15.73	0.00177	0.00836	PASS
Extreme (-40℃)		15.91	13.03	0.00846	0.00693	PASS
25℃	LV	4.12	17.06	0.00219	0.00907	PASS
	HV	6.04	7.40	0.00321	0.00394	PASS
Condition		Freq.Error	Freq.Error	Frequency	Frequency	Verdict