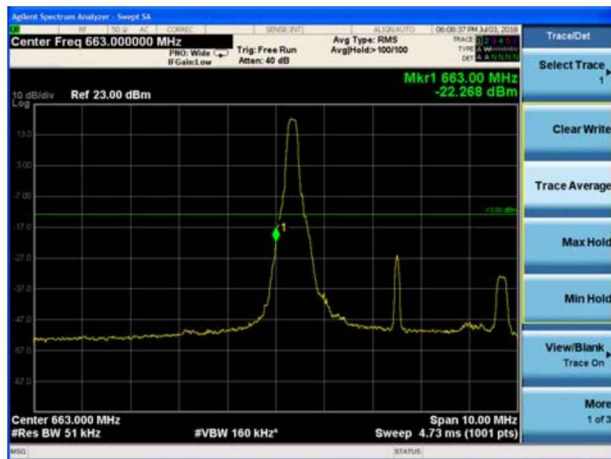
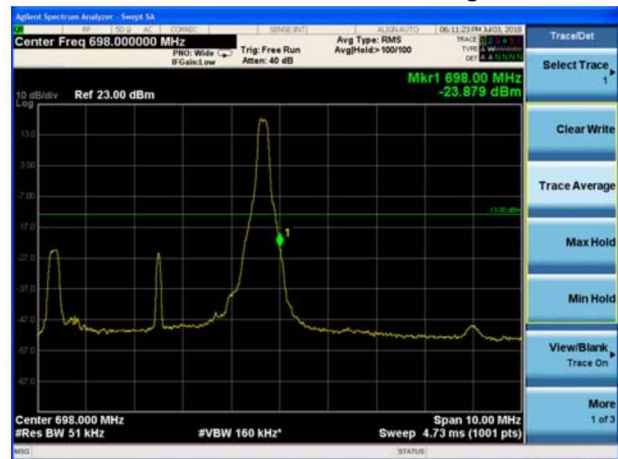




LTE Band 71 QPSK 5MHz CH-Low, 1 RB



LTE Band 71 QPSK 5MHz CH-High, 1 RB



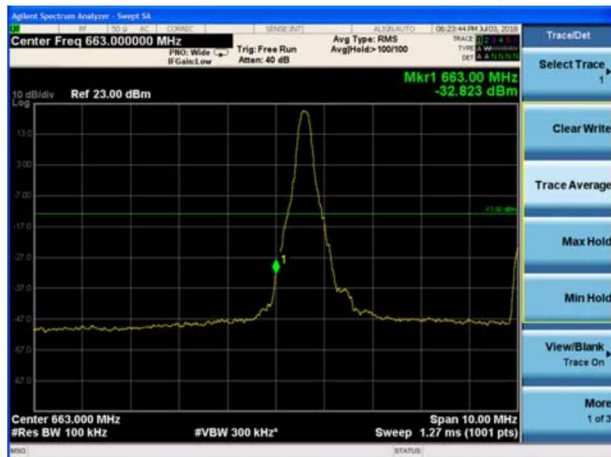
LTE Band 71 QPSK 5MHz CH-Low, 100%RB



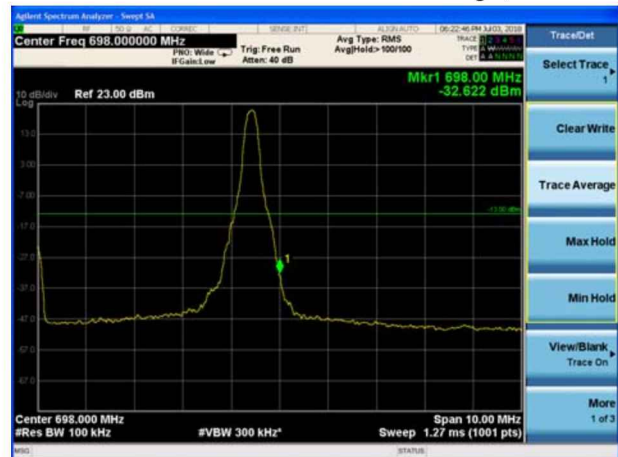
LTE Band 71 QPSK 5MHz CH-High, 100%RB



LTE Band 71 QPSK 10MHz CH-Low, 1 RB



LTE Band 71 QPSK 10MHz CH-High, 1 RB





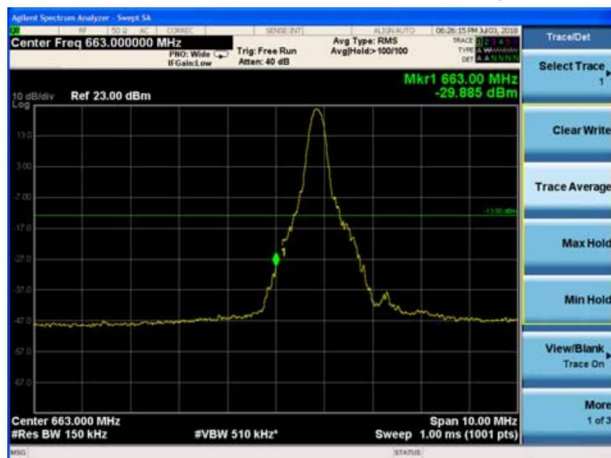
LTE Band 71 QPSK 10MHz CH-Low, 100%RB



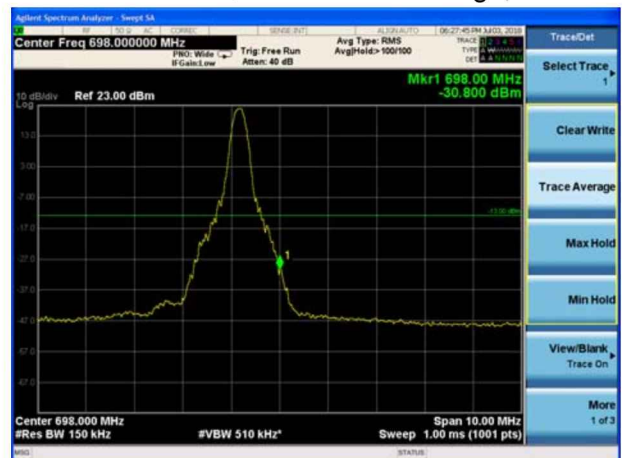
LTE Band 71 QPSK 10MHz CH-High, 100%RB



LTE Band 71 QPSK 15MHz CH-Low, 1 RB



LTE Band 71 QPSK 15MHz CH-High, 1 RB



LTE Band 71 QPSK 15MHz CH-Low, 100%RB

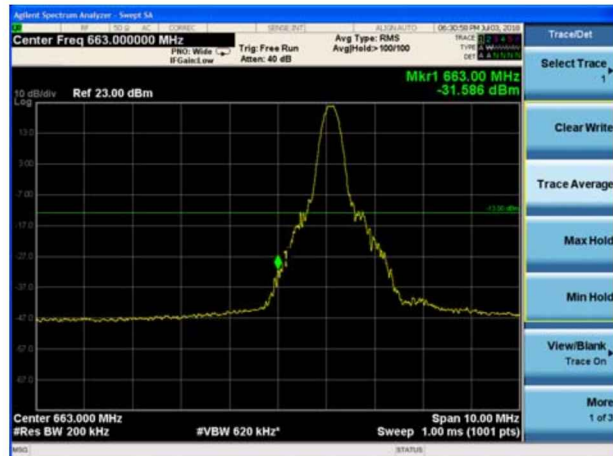


LTE Band 71 QPSK 15MHz CH-High, 100%RB

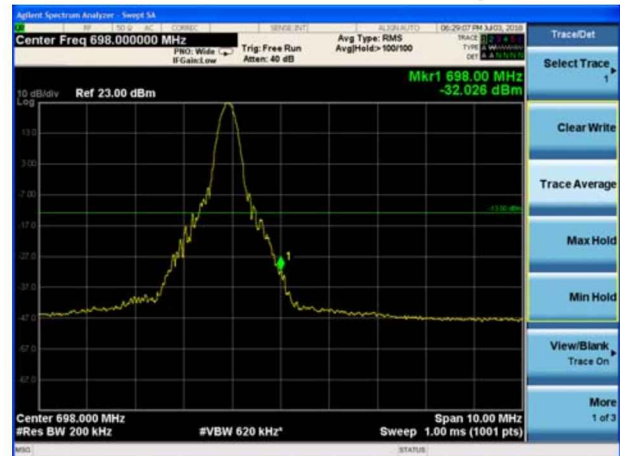




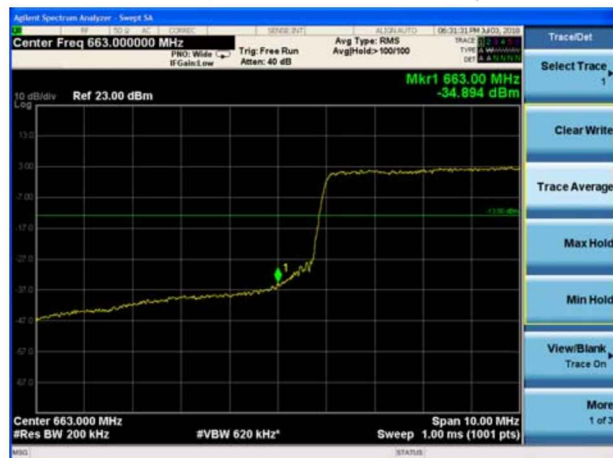
LTE Band 71 QPSK 20MHz CH-Low, 1 RB



LTE Band 71 QPSK 20MHz CH-High, 1 RB



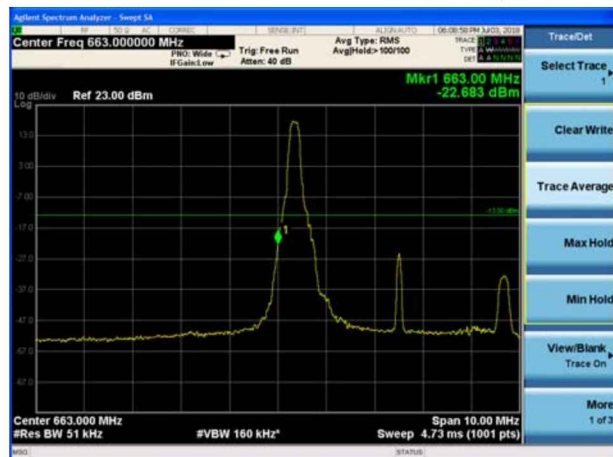
LTE Band 71 QPSK 20MHz CH-Low, 100%RB



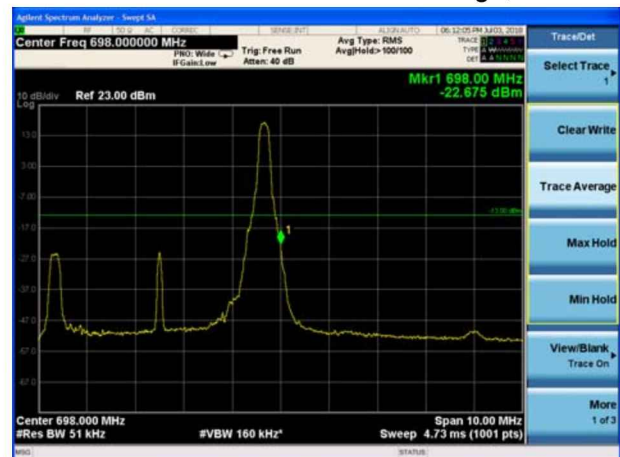
LTE Band 71 QPSK 20MHz CH-High, 100%RB



LTE Band 71 16QAM 5MHz CH-Low, 1 RB



LTE Band 71 16QAM 5MHz CH-High, 1 RB





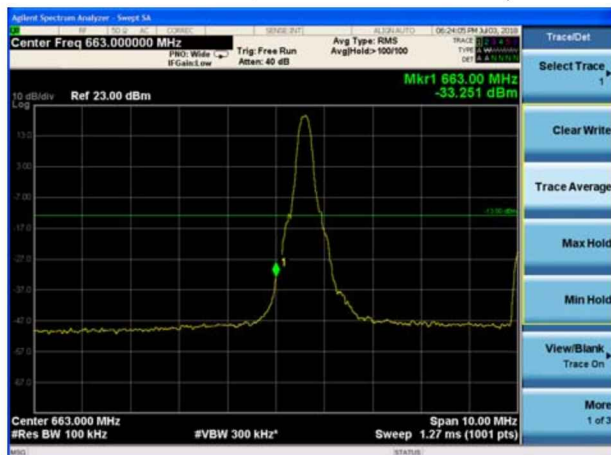
LTE Band 71 16QAM 5MHz CH-Low, 100%RB



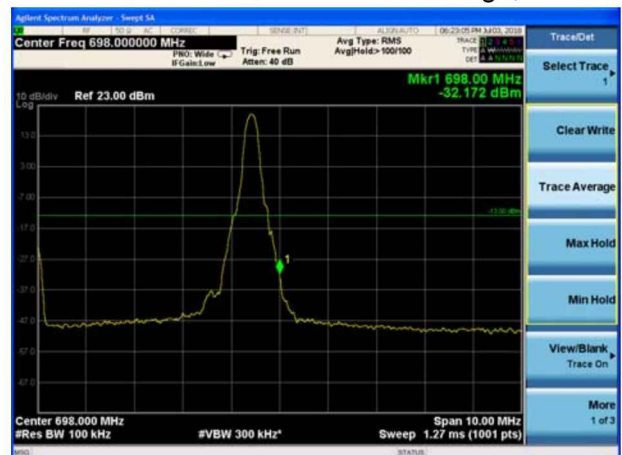
LTE Band 71 16QAM 5MHz CH-High, 100%RB



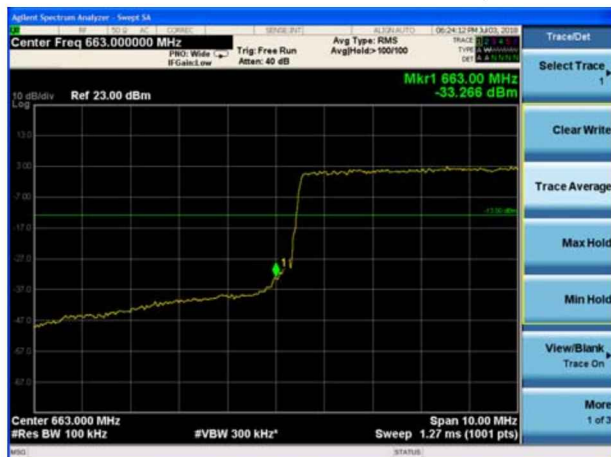
LTE Band 71 16QAM 10MHz CH-Low, 1 RB



LTE Band 71 16QAM 10MHz CH-High, 1 RB



LTE Band 71 16QAM 10MHz CH-Low, 100%RB

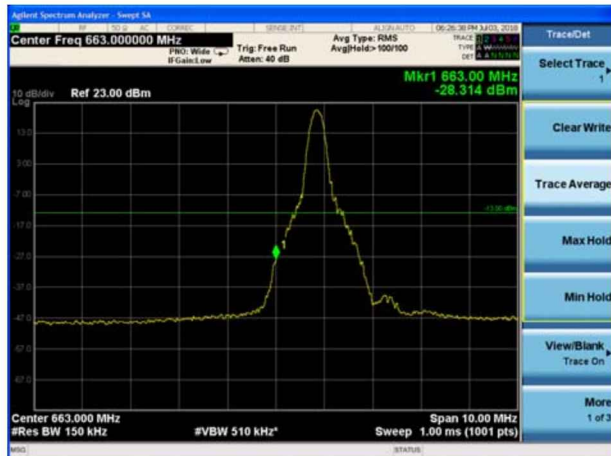


LTE Band 71 16QAM 10MHz CH-High, 100%RB

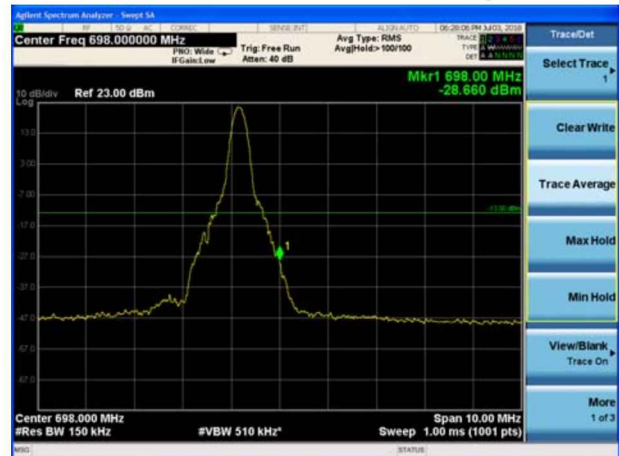




LTE Band 71 16QAM 15MHz CH-Low, 1 RB



LTE Band 71 16QAM 15MHz CH-High, 1 RB



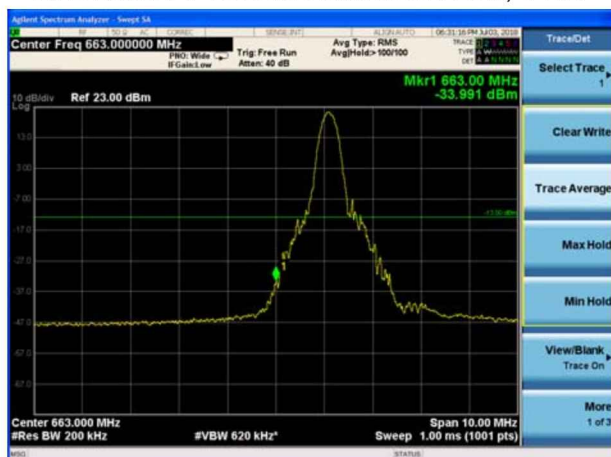
LTE Band 71 16QAM 15MHz CH-Low, 100%RB



LTE Band 71 16QAM 15MHz CH-High, 100%RB



LTE Band 71 16QAM 20MHz CH-Low, 1 RB



LTE Band 71 16QAM 20MHz CH-High, 1 RB





LTE Band 71 16QAM 20MHz CH-Low, 100%RB



LTE Band 71 16QAM 20MHz CH-High, 100%RB



5.5 Peak-to-Average Power Ratio (PAPR)

Ambient condition

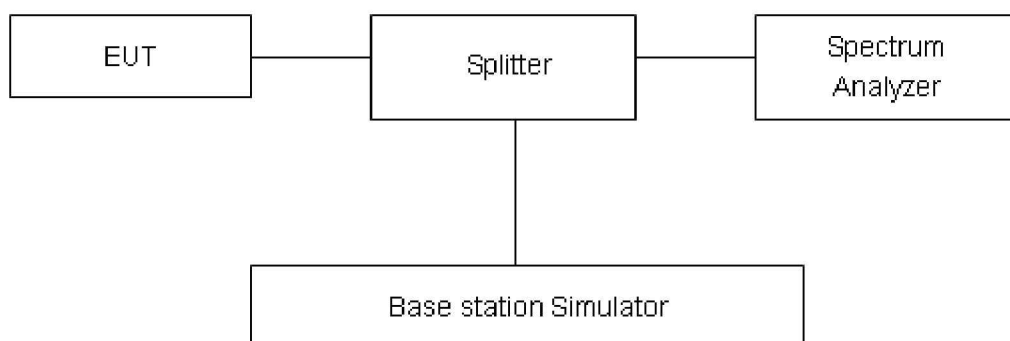
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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

WCDMA Band IV	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
RMC	1312	1712.4	26.51	23.46	3.05	≤13	PASS
	1413	1732.6	26.30	23.35	2.95	≤13	PASS
	1513	1752.6	26.19	23.37	2.82	≤13	PASS

LTE Band 4								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	1.4	19957	1710.7	27.15	22.30	4.85	≤13	PASS
		20175	1732.5	27.21	22.40	4.81	≤13	PASS
		20393	1754.3	27.12	22.64	4.48	≤13	PASS
	3	19965	1711.5	27.30	22.33	4.97	≤13	PASS
		20175	1732.5	27.37	22.44	4.93	≤13	PASS
		20385	1753.5	27.37	22.67	4.70	≤13	PASS
	5	19975	1712.5	27.31	22.31	5.00	≤13	PASS
		20175	1732.5	27.33	22.43	4.90	≤13	PASS
		20375	1752.5	27.29	22.65	4.64	≤13	PASS
	10	20000	1715	27.34	22.39	4.95	≤13	PASS
		20175	1732.5	27.28	22.45	4.83	≤13	PASS
		20350	1750	27.31	22.69	4.62	≤13	PASS
	15	20025	1717.5	27.40	22.37	5.03	≤13	PASS
		20175	1732.5	27.27	22.41	4.86	≤13	PASS
		20325	1747.5	27.20	22.64	4.56	≤13	PASS
	20	20050	1720	27.26	22.34	4.92	≤13	PASS
		20175	1732.5	27.14	22.36	4.78	≤13	PASS
		20300	1745	27.23	22.60	4.63	≤13	PASS
16QAM	1.4	19957	1710.7	27.03	21.34	5.69	≤13	PASS
		20175	1732.5	27.07	21.48	5.59	≤13	PASS
		20393	1754.3	26.99	21.68	5.31	≤13	PASS
	3	19965	1711.5	27.15	21.37	5.78	≤13	PASS
		20175	1732.5	27.21	21.52	5.69	≤13	PASS
		20385	1753.5	27.21	21.71	5.50	≤13	PASS
	5	19975	1712.5	27.11	21.35	5.76	≤13	PASS
		20175	1732.5	27.16	21.48	5.68	≤13	PASS
		20375	1752.5	27.05	21.66	5.39	≤13	PASS
	10	20000	1715	27.14	21.38	5.76	≤13	PASS
		20175	1732.5	27.18	21.53	5.65	≤13	PASS
		20350	1750	27.14	21.70	5.44	≤13	PASS



	15	20025	1717.5	27.12	21.35	5.77	≤13	PASS
		20175	1732.5	27.08	21.48	5.60	≤13	PASS
		20325	1747.5	26.95	21.66	5.29	≤13	PASS
	20	20050	1720	27.04	21.33	5.71	≤13	PASS
		20175	1732.5	27.03	21.44	5.59	≤13	PASS
		20300	1745	27.03	21.63	5.40	≤13	PASS

LTE Band 12								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	1.4	23017	699.7	27.71	22.61	5.10	≤13	PASS
		23095	707.5	27.72	22.57	5.15	≤13	PASS
		23173	715.3	27.70	22.65	5.05	≤13	PASS
	3	23025	700.5	27.83	22.64	5.19	≤13	PASS
		23095	707.5	27.82	22.61	5.21	≤13	PASS
		23165	714.5	27.87	22.68	5.19	≤13	PASS
	5	23035	701.5	27.87	22.68	5.19	≤13	PASS
		23095	707.5	27.75	22.58	5.17	≤13	PASS
		23155	713.5	27.86	22.65	5.21	≤13	PASS
	10	23060	704	27.83	22.65	5.18	≤13	PASS
		23095	707.5	27.60	22.53	5.07	≤13	PASS
		23130	711	27.76	22.61	5.15	≤13	PASS
16QAM	1.4	23017	699.7	27.73	21.71	6.02	≤13	PASS
		23095	707.5	27.57	21.63	5.94	≤13	PASS
		23173	715.3	27.73	21.84	5.89	≤13	PASS
	3	23025	700.5	27.78	21.74	6.04	≤13	PASS
		23095	707.5	27.71	21.67	6.04	≤13	PASS
		23165	714.5	27.89	21.87	6.02	≤13	PASS
	5	23035	701.5	27.70	21.72	5.98	≤13	PASS
		23095	707.5	27.59	21.63	5.96	≤13	PASS
		23155	713.5	27.81	21.82	5.99	≤13	PASS
	10	23060	704	27.68	21.70	5.98	≤13	PASS
		23095	707.5	27.50	21.59	5.91	≤13	PASS
		23130	711	27.76	21.79	5.97	≤13	PASS

LTE Band 13								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	5	23205	779.5	27.81	22.81	5.00	≤13	PASS



16QAM	10	23230	782	27.79	22.74	5.05	≤13	PASS
		23255	784.5	27.89	22.80	5.09	≤13	PASS
		23230	782	27.75	22.74	5.01	≤13	PASS
	5	23205	779.5	27.57	21.74	5.83	≤13	PASS
		23230	782	27.81	21.96	5.85	≤13	PASS
		23255	784.5	27.47	21.62	5.85	≤13	PASS
	10	23230	782	27.65	21.82	5.83	≤13	PASS

LTE Band 66								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	1.4	131979	1710.7	27.40	22.51	4.89	≤13	PASS
		132322	1745	27.22	22.73	4.49	≤13	PASS
		132665	1779.3	27.31	22.34	4.97	≤13	PASS
	3	131987	1711.5	27.51	22.54	4.97	≤13	PASS
		132322	1745	27.47	22.77	4.70	≤13	PASS
		132657	1778.5	27.48	22.37	5.11	≤13	PASS
	5	131997	1712.5	27.52	22.52	5.00	≤13	PASS
		132322	1745	27.40	22.76	4.64	≤13	PASS
		132647	1777.5	27.38	22.35	5.03	≤13	PASS
	10	132022	1715	27.54	22.60	4.94	≤13	PASS
		132322	1745	27.34	22.78	4.56	≤13	PASS
		132622	1775	27.37	22.39	4.98	≤13	PASS
	15	132047	1717.5	27.57	22.58	4.99	≤13	PASS
		132322	1745	27.25	22.74	4.51	≤13	PASS
		132597	1772.5	27.36	22.34	5.02	≤13	PASS
	20	132072	1720	27.46	22.55	4.91	≤13	PASS
		132322	1745	27.25	22.69	4.56	≤13	PASS
		132572	1770	27.21	22.30	4.91	≤13	PASS
16QAM	1.4	131979	1710.7	27.34	21.65	5.69	≤13	PASS
		132322	1745	27.08	21.84	5.24	≤13	PASS
		132665	1779.3	27.26	21.45	5.81	≤13	PASS
	3	131987	1711.5	27.44	21.68	5.76	≤13	PASS
		132322	1745	27.35	21.88	5.47	≤13	PASS
		132657	1778.5	27.37	21.48	5.89	≤13	PASS
	5	131997	1712.5	27.41	21.66	5.75	≤13	PASS
		132322	1745	27.20	21.84	5.36	≤13	PASS
		132647	1777.5	27.23	21.43	5.80	≤13	PASS



	10	132022	1715	27.48	21.69	5.79	≤13	PASS
		132322	1745	27.25	21.89	5.36	≤13	PASS
		132622	1775	27.28	21.47	5.81	≤13	PASS
	15	132047	1717.5	27.39	21.66	5.73	≤13	PASS
		132322	1745	27.08	21.84	5.24	≤13	PASS
		132597	1772.5	27.17	21.43	5.74	≤13	PASS
	20	132072	1720	27.33	21.64	5.69	≤13	PASS
		132322	1745	27.16	21.80	5.36	≤13	PASS
		132572	1770	27.10	21.40	5.70	≤13	PASS

LTE Band 71								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
	5	133147	665.5	27.25	22.17	5.08	≤13	PASS
		133297	680.5	27.48	22.40	5.08	≤13	PASS
		133447	695.5	27.35	22.20	5.15	≤13	PASS
	10	133172	668	27.33	22.25	5.08	≤13	PASS
		133297	680.5	27.47	22.42	5.05	≤13	PASS
		133422	693	27.31	22.24	5.07	≤13	PASS
	15	133197	670.5	27.45	22.23	5.22	≤13	PASS
		133297	680.5	27.28	22.11	5.17	≤13	PASS
		133397	690.5	27.40	22.19	5.21	≤13	PASS
	20	133222	673	27.24	22.20	5.04	≤13	PASS
		133322	683	27.36	22.33	5.03	≤13	PASS
		133372	688	27.23	22.15	5.08	≤13	PASS
	5	133147	665.5	27.14	21.32	5.82	≤13	PASS
		133297	680.5	27.36	21.50	5.86	≤13	PASS
		133447	695.5	27.22	21.31	5.91	≤13	PASS
	10	133172	668	27.22	21.35	5.87	≤13	PASS
		133297	680.5	27.37	21.55	5.82	≤13	PASS
		133422	693	27.24	21.35	5.89	≤13	PASS
	15	133197	670.5	27.25	21.32	5.93	≤13	PASS
		133297	680.5	26.98	21.11	5.87	≤13	PASS
		133397	690.5	27.25	21.31	5.94	≤13	PASS
	20	133222	673	27.16	21.30	5.86	≤13	PASS
		133322	683	27.29	21.46	5.83	≤13	PASS
		133372	688	27.16	21.28	5.88	≤13	PASS

5.6 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)

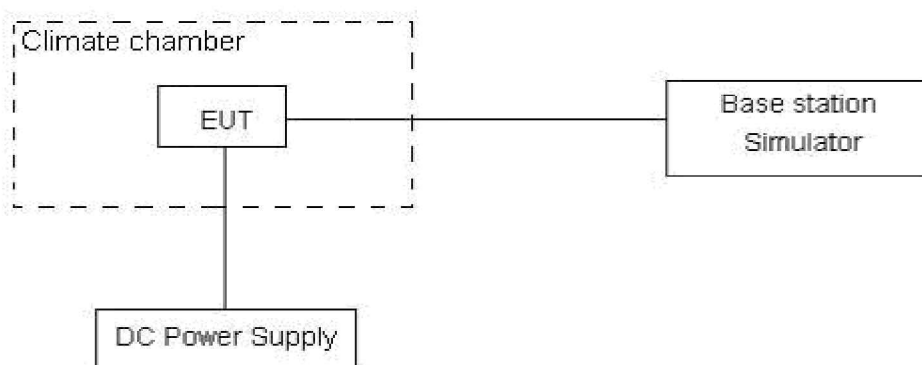
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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

No specific frequency stability requirements in part 27.54

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
WCDMA Band IV

WCDMA Band IV					
Condition		1710	1755	Delta(Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	1710.0279	1754.9113	2.13	0.00113
Extreme (85°C)		1710.0281	1754.9112	-3.16	-0.00168
Extreme (80°C)		1710.0276	1754.9116	0.59	0.00031
Extreme (70°C)		1710.0291	1754.9101	-5.54	-0.00295
Extreme (60°C)		1710.0272	1754.9122	-1.17	-0.00062
Extreme (50°C)		1710.0269	1754.9123	0.16	0.00009
Extreme (40°C)		1710.0284	1754.9108	-5.52	-0.00294
Extreme (30°C)		1710.0273	1754.9119	-3.36	-0.00179
Extreme (20°C)		1710.0271	1754.9122	0.69	0.00037
Extreme (10C)		1710.0286	1754.9106	0.89	0.00047
Extreme (0°C)		1710.0277	1754.9115	3.19	0.00170
Extreme (-10°C)		1710.0291	1754.9122	0.39	0.00021
Extreme (-20°C)		1710.0323	1754.9153	3.56	0.00189
Extreme (-30°C)		1710.0339	1754.9175	0.19	0.00010
Extreme (-40°C)		1710.0345	1754.9187	2.80	0.00149
25C	LV	1710.0316	1754.9147	2.96	0.00157
	HV	1710.0303	1754.9156	0.49	0.00026

LTE Band 4					
(QPSK, 20MHz BANDWIDTH)					
Condition		1710	1755	Delta(Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	1710.6538	1754.4302	1.44	0.00083
Extreme (85°C)		1710.6549	1754.4314	0.86	0.00050
Extreme (80°C)		1710.6516	1754.4275	-2.69	-0.00155
Extreme (70°C)		1710.6529	1754.4294	-1.82	-0.00105
Extreme (60°C)		1710.6515	1754.4285	2.10	0.00121
Extreme (50°C)		1710.6521	1754.4286	0.86	0.00050
Extreme (40°C)		1710.6534	1754.4299	-0.07	-0.00004
Extreme (30°C)		1710.6541	1754.4306	0.35	0.00020
Extreme (20°C)		1710.6523	1754.4285	-0.40	-0.00023
Extreme (10C)		1710.6532	1754.4297	-0.20	-0.00012
Extreme (0°C)		1710.6519	1754.4284	0.56	0.00032



Extreme (-10°C)		1710.6514	1754.4279	-2.60	-0.00150
Extreme (-20°C)		1710.6525	1754.4291	-0.42	-0.00024
Extreme (-30°C)		1710.6558	1754.4323	1.26	0.00073
Extreme (-40°C)		1710.6576	1754.4335	3.50	0.00202
25°C	LV	1710.6522	1754.4287	-1.15	-0.00066
	HV	1710.6528	1754.4293	0.97	0.00056
(16QAM, 20MHz BANDWIDTH)					
Condition		1710	1755	Delta(Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	1710.6387	1754.5105	-6.99	-0.00403
Extreme (85°C)		1710.6369	1754.5094	3.06	0.00177
Extreme (80°C)		1710.6408	1754.5133	-3.56	-0.00205
Extreme (70°C)		1710.6389	1754.5114	-5.22	-0.00301
Extreme (60°C)		1710.6403	1754.5128	-3.92	-0.00226
Extreme (50°C)		1710.6397	1754.5122	-2.16	-0.00125
Extreme (40°C)		1710.6384	1754.5109	-2.64	-0.00152
Extreme (30°C)		1710.6377	1754.5102	0.55	0.00032
Extreme (20°C)		1710.6398	1754.5123	0.33	0.00019
Extreme (10°C)		1710.6386	1754.5111	-2.00	-0.00115
Extreme (0°C)		1710.6399	1754.5124	0.06	0.00003
Extreme (-10°C)		1710.6404	1754.5129	4.07	0.00235
Extreme (-20°C)		1710.6393	1754.5118	-0.53	-0.00031
Extreme (-30°C)		1710.6363	1754.5085	2.99	0.00173
Extreme (-40°C)		1710.6348	1754.5073	0.55	0.00032
25°C	LV	1710.6396	1754.5121	0.15	0.00009
	HV	1710.6391	1754.5115	3.19	0.00184

LTE Band 12					
(QPSK, 10MHz BANDWIDTH)					
Condition		699	716	Delta(Hz)	Frequency Stability(ppm)
Temperature	Voltage	F low@-13dBm(MHz)	F high@-13dBm(MHz)		
Normal (25°C)	Normal	699.2572	715.7323	-0.91	-0.00109
Extreme (85°C)		699.2583	715.7311	-3.35	-0.00400
Extreme (80°C)		699.2544	715.7272	-3.47	-0.00415
Extreme (70°C)		699.2563	715.7291	-6.40	-0.00765
Extreme (60°C)		699.2549	715.7277	-5.64	-0.00674
Extreme (50°C)		699.2555	715.7283	-0.38	-0.00045
Extreme (40°C)		699.2568	715.7296	-1.02	-0.00122
Extreme (30°C)		699.2575	715.7303	-1.09	-0.00130