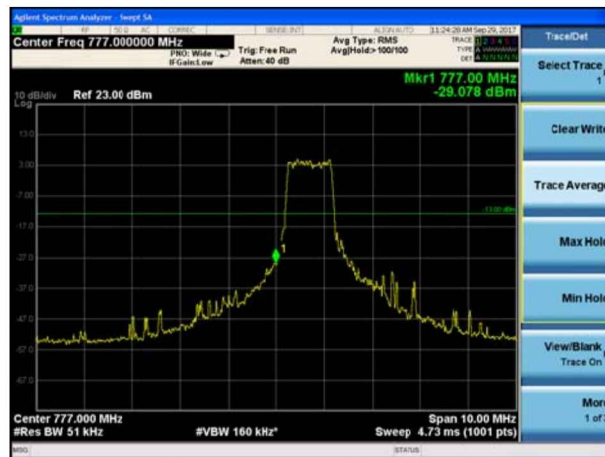
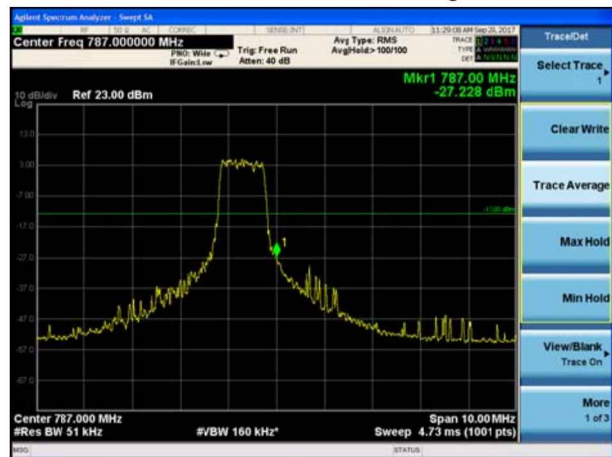




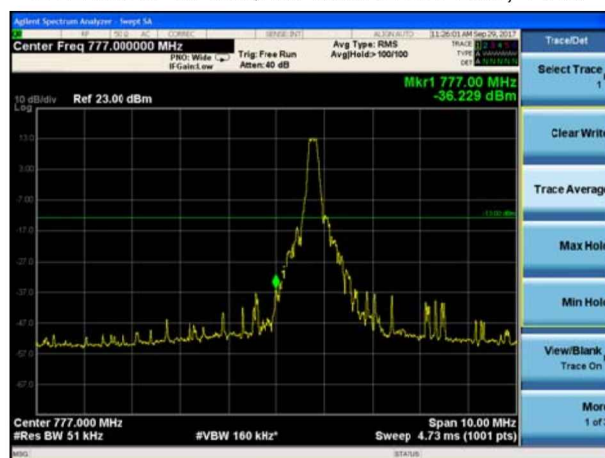
LTE Band 13 16QAM 5MHz CH-Low, 100%RB



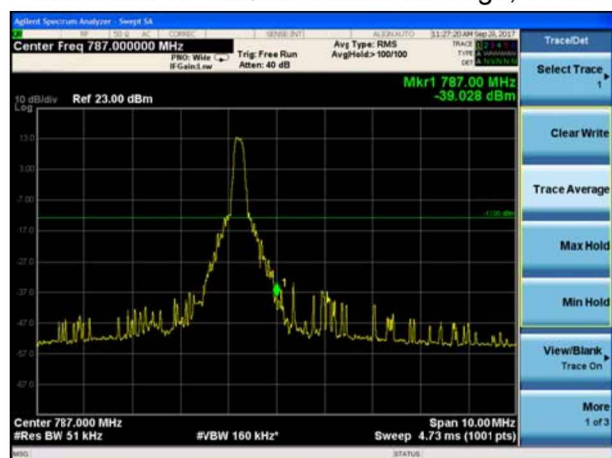
LTE Band 13 16QAM 5MHz CH-High, 100%RB



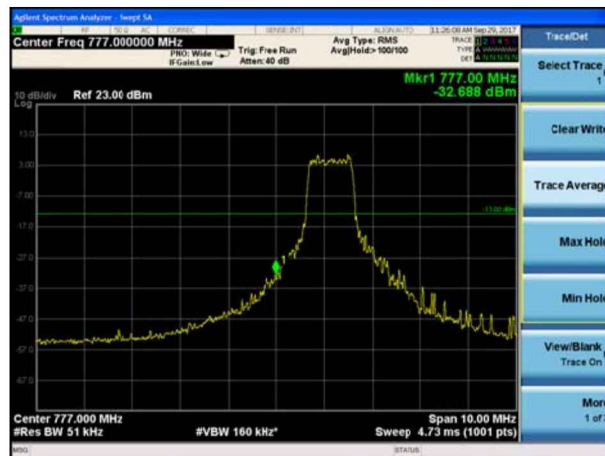
LTE Band 13 16QAM 10MHz CH-Low, 1 RB



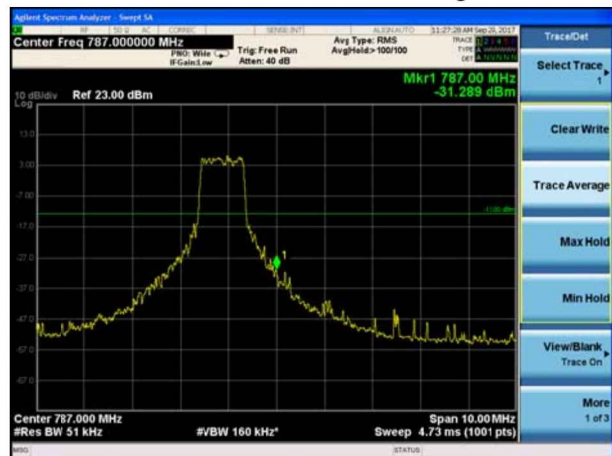
LTE Band 13 16QAM 10MHz CH-High, 1 RB



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



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



5.5 Peak-to-Average Power Ratio (PAPR)

Ambient condition

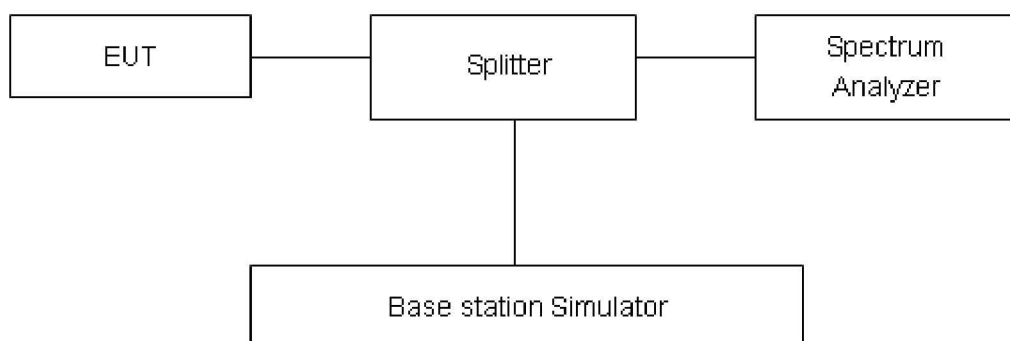
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band4	1.4MHz	QPSK	20175/1732.5	33.37	22.09	11.28
		16QAM	20175/1732.5	34.13	22.03	12.10
	3MHz	QPSK	20175/1732.5	33.56	22.13	11.43
		16QAM	20175/1732.5	33.94	22.07	11.87
	5MHz	QPSK	20175/1732.5	32.06	22.12	9.94
		16QAM	20175/1732.5	32.62	22.03	10.59
	10MHz	QPSK	20175/1732.5	31.69	22.14	9.55
		16QAM	20175/1732.5	32.14	22.08	10.06
	15MHz	QPSK	20175/1732.5	30.77	22.10	8.67
		16QAM	20175/1732.5	30.68	22.03	8.65
	20MHz	QPSK	20175/1732.5	30.92	22.05	8.87
		16QAM	20175/1732.5	31.17	21.99	9.18

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band12	1.4MHz	QPSK	23095/707.5	32.63	22.66	9.97
		16QAM	23095/707.5	34.21	22.90	11.31
	3MHz	QPSK	23095/707.5	32.56	22.68	9.88
		16QAM	23095/707.5	33.51	22.95	10.56
	5MHz	QPSK	23095/707.5	32.27	22.64	9.63
		16QAM	23095/707.5	33.75	22.90	10.85
	10MHz	QPSK	23095/707.5	31.88	22.59	9.29
		16QAM	23095/707.5	32.03	22.86	9.17

Mode	Bandwidth	Modulation	Channel/ Frequency(MHz)	Peak-to-Average Power Ratio (PAPR)		
				Peak(dBm)	Avg(dBm)	PAPR(dB)
Band13	5MHz	QPSK	23230/782	32.64	22.68	9.96
		16QAM	23230/782	32.23	22.19	10.04
	10MHz	QPSK	23230/782	32.46	22.77	9.69
		16QAM	23230/782	32.68	22.95	9.73

5.6 Frequency Stability

Ambient condition

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

Method of Measurement

1. 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.

2. Frequency Stability (Voltage Variation)

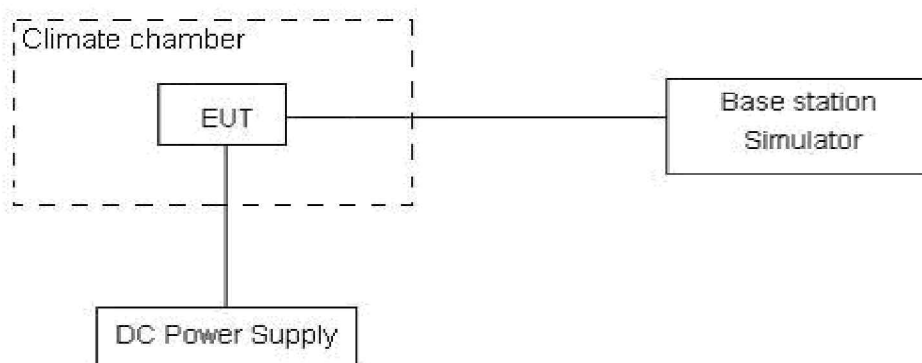
The frequency stability shall be measured with variation of primary supply voltage as follows:

(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

Bandwidth	Test status	LTE Band 4 Channel 20175 Test Results (ppm)	
		QPSK	16QAM
1.4MHz	-40°C/Normal Voltage	-0.00444	-0.01766
	-30°C/Normal Voltage	-0.00386	-0.01513
	-20°C/Normal Voltage	-0.00514	-0.02027
	-10°C/Normal Voltage	-0.00174	-0.01773
	0°C/Normal Voltage	-0.00164	-0.01986
	10°C/Normal Voltage	-0.00239	-0.00601
	20°C/Normal Voltage	0.00020	-0.00454
	30°C/Normal Voltage	-0.00166	-0.00570
	40°C/Normal Voltage	-0.00035	-0.00673
	50°C/Normal Voltage	0.00115	-0.01853
	60°C/Normal Voltage	-0.00061	-0.00405
	70°C/Normal Voltage	-0.00411	-0.01242
	80°C/Normal Voltage	-0.00212	-0.02252
	85°C/Normal Voltage	-0.00124	-0.00496
	20°C/Min Voltage	-0.00300	-0.00576
	20°C/Max Voltage	-0.00315	-0.00454
3MHz	-40°C/Normal Voltage	-0.00127	-0.00275
	-30°C/Normal Voltage	-0.00184	-0.00448
	-20°C/Normal Voltage	0.00117	0.01527
	-10°C/Normal Voltage	0.00008	0.01465
	0°C/Normal Voltage	-0.00119	-0.00583
	10°C/Normal Voltage	-0.00255	-0.01694
	20°C/Normal Voltage	-0.00071	-0.00506
	30°C/Normal Voltage	-0.00063	-0.00412
	40°C/Normal Voltage	-0.00178	-0.00533
	50°C/Normal Voltage	-0.00078	-0.00294
	60°C/Normal Voltage	-0.00163	-0.01732
	70°C/Normal Voltage	-0.00091	0.01451
	80°C/Normal Voltage	-0.00111	-0.00443
	85°C/Normal Voltage	0.00137	-0.00253
	20°C/Min Voltage	0.00068	-0.00301
	20°C/Max Voltage	-0.00234	-0.00293
5MHz	-40°C/Normal Voltage	0.00119	-0.00739
	-30°C/Normal Voltage	0.00248	-0.00478
	-20°C/Normal Voltage	0.00018	-0.00477
	-10°C/Normal Voltage	-0.00357	0.00540



	0°C/Normal Voltage	0.00002	-0.00554
	10°C/Normal Voltage	0.00259	-0.00377
	20°C/Normal Voltage	-0.00129	-0.00622
	30°C/Normal Voltage	-0.00012	-0.00676
	40°C/Normal Voltage	0.00036	0.00380
	50°C/Normal Voltage	-0.00119	-0.00579
	60°C/Normal Voltage	-0.00008	-0.00890
	70°C/Normal Voltage	-0.00115	-0.00618
	80°C/Normal Voltage	-0.00023	-0.00478
	85°C/Normal Voltage	-0.00179	-0.00302
	20°C/Min Voltage	-0.00188	0.00584
	20°C/Max Voltage	-0.00266	0.00141
10MHz	-40°C/Normal Voltage	0.00069	0.00372
	-30°C/Normal Voltage	0.00066	0.00297
	-20°C/Normal Voltage	-0.00119	0.01093
	-10°C/Normal Voltage	-0.00178	0.00982
	0°C/Normal Voltage	0.00127	0.00394
	10°C/Normal Voltage	0.00330	0.00301
	20°C/Normal Voltage	0.00152	0.01114
	30°C/Normal Voltage	0.00156	0.00070
	40°C/Normal Voltage	0.00224	0.01124
	50°C/Normal Voltage	0.00122	0.00386
	60°C/Normal Voltage	-0.00124	0.00870
	70°C/Normal Voltage	-0.00087	0.01063
	80°C/Normal Voltage	-0.00141	0.00606
	85°C/Normal Voltage	-0.00106	0.00305
	20°C/Min Voltage	-0.00190	0.00424
	20°C/Max Voltage	-0.00160	0.01408
15MHz	-40°C/Normal Voltage	0.00057	-0.00057
	-30°C/Normal Voltage	-0.00003	0.00023
	-20°C/Normal Voltage	0.00023	0.00077
	-10°C/Normal Voltage	-0.00110	-0.00147
	0°C/Normal Voltage	0.00182	-0.00067
	10°C/Normal Voltage	-0.00091	0.00086
	20°C/Normal Voltage	0.00169	-0.00042
	30°C/Normal Voltage	0.00042	-0.00301
	40°C/Normal Voltage	-0.00143	-0.00330
	50°C/Normal Voltage	0.00126	-0.00059
	60°C/Normal Voltage	0.00121	-0.00017
	70°C/Normal Voltage	-0.00056	-0.00046



	80°C/Normal Voltage	0.00105	0.00106
	85°C/Normal Voltage	0.00025	-0.00055
	20°C/Min Voltage	-0.00002	-0.00061
	20°C/Max Voltage	0.00123	-0.00216
20MHz	-40°C/Normal Voltage	-0.00081	-0.02835
	-30°C/Normal Voltage	-0.00053	-0.02789
	-20°C/Normal Voltage	-0.00130	-0.02891
	-10°C/Normal Voltage	0.00002	-0.02948
	0°C/Normal Voltage	-0.00100	-0.02863
	10°C/Normal Voltage	0.00290	-0.02879
	20°C/Normal Voltage	-0.00079	-0.02917
	30°C/Normal Voltage	-0.00088	-0.03142
	40°C/Normal Voltage	-0.00241	-0.03015
	50°C/Normal Voltage	0.00066	-0.02809
	60°C/Normal Voltage	0.00032	-0.02992
	70°C/Normal Voltage	-0.00111	-0.02986
	80°C/Normal Voltage	0.00077	-0.02887
	85°C/Normal Voltage	-0.00151	-0.03063
	20°C/Min Voltage	-0.00136	-0.02918
	20°C/Max Voltage	0.00297	-0.02678

Bandwidth	Test status	LTE Band 12 Channel 23095 Test Results (ppm)	
		QPSK	16QAM
1.4M	-40°C/Normal Voltage	-0.00582	-0.00338
	-30°C/Normal Voltage	-0.00315	-0.01134
	-20°C/Normal Voltage	-0.00743	-0.00290
	-10°C/Normal Voltage	-0.01025	-0.00325
	0°C/Normal Voltage	-0.00144	-0.00519
	10°C/Normal Voltage	-0.00079	-0.00345
	20°C/Normal Voltage	-0.00287	-0.00647
	30°C/Normal Voltage	-0.00308	-0.00445
	40°C/Normal Voltage	-0.00445	-0.00366
	50°C/Normal Voltage	-0.00411	0.00037
	60°C/Normal Voltage	-0.00223	0.00114
	70°C/Normal Voltage	-0.00192	0.00225
	80°C/Normal Voltage	-0.00257	-0.00076
	85°C/Normal Voltage	-0.00143	-0.00016
	20°C/Min Voltage	0.00037	0.00018
	20°C/Max Voltage	-0.00075	-0.00814
3M	-40°C/Normal Voltage	-0.00160	-0.02580
	-30°C/Normal Voltage	-0.00225	-0.02440
	-20°C/Normal Voltage	-0.00334	-0.02595
	-10°C/Normal Voltage	-0.00411	-0.02786
	0°C/Normal Voltage	-0.00343	-0.02806
	10°C/Normal Voltage	-0.00035	-0.02717
	20°C/Normal Voltage	-0.00117	-0.03013
	30°C/Normal Voltage	-0.00107	-0.02297
	40°C/Normal Voltage	-0.00177	-0.02185
	50°C/Normal Voltage	0.00148	-0.03153
	60°C/Normal Voltage	-0.00040	-0.02669
	70°C/Normal Voltage	0.00119	-0.02451
	80°C/Normal Voltage	-0.00037	-0.02336
	85°C/Normal Voltage	-0.00083	-0.02500
	20°C/Min Voltage	-0.00392	-0.02601
	20°C/Max Voltage	-0.00034	-0.02301
5MHz	-40°C/Normal Voltage	-0.00300	-0.03608
	-30°C/Normal Voltage	-0.00358	-0.03801
	-20°C/Normal Voltage	-0.00165	-0.04188
	-10°C/Normal Voltage	-0.00182	-0.03238
	0°C/Normal Voltage	-0.00225	-0.02841



	10°C/Normal Voltage	-0.00376	-0.04006
	20°C/Normal Voltage	-0.00023	-0.02157
	30°C/Normal Voltage	-0.00059	-0.01495
	40°C/Normal Voltage	-0.00177	-0.01673
	50°C/Normal Voltage	-0.00110	-0.02314
	60°C/Normal Voltage	-0.00414	-0.02293
	70°C/Normal Voltage	0.00170	-0.02475
	80°C/Normal Voltage	0.00024	-0.01739
	85°C/Normal Voltage	-0.00040	-0.02205
	20°C/Min Voltage	0.00365	-0.03228
	20°C/Max Voltage	-0.00274	-0.03902
10MHz	-40°C/Normal Voltage	-0.00411	0.00379
	-30°C/Normal Voltage	-0.00327	0.00582
	-20°C/Normal Voltage	-0.00362	-0.00310
	-10°C/Normal Voltage	-0.00174	-0.00280
	0°C/Normal Voltage	-0.00083	-0.00351
	10°C/Normal Voltage	-0.00202	0.00114
	20°C/Normal Voltage	-0.00194	0.00220
	30°C/Normal Voltage	-0.00016	-0.00488
	40°C/Normal Voltage	-0.00100	-0.00423
	50°C/Normal Voltage	-0.00232	0.00377
	60°C/Normal Voltage	-0.00271	-0.00411
	70°C/Normal Voltage	-0.00400	-0.00150
	80°C/Normal Voltage	0.00120	0.00522
	85°C/Normal Voltage	-0.00137	0.00083
	20°C/Min Voltage	0.00259	-0.00408
	20°C/Max Voltage	-0.00250	0.00533