

LTE Band 14						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		23305	23330	23355
		Frequency (MHz)		790.5	793	795.5
5M	QPSK	1	0	22.99	22.87	22.82
		1	12	23.32	23.15	23.18
		1	24	23.03	22.99	22.81
		12	0	22.20	22.48	22.43
		12	6	22.25	22.54	22.48
		12	13	22.19	22.21	22.01
		25	0	22.17	22.20	22.18
5M	16QAM	1	0	22.21	21.93	22.25
		1	12	22.55	22.44	22.69
		1	24	22.37	22.41	22.09
		12	0	21.25	21.52	21.04
		12	6	21.23	20.99	21.26
		12	13	21.22	21.26	21.27
		25	0	21.12	21.26	21.06
5M	64QAM	1	0	21.18	21.12	21.40
		1	12	21.66	21.66	21.85
		1	24	21.21	21.00	21.50
		12	0	20.20	20.40	20.05
		12	6	20.21	19.92	20.29
		12	13	20.09	20.24	19.83
		25	0	20.14	20.10	19.86

*ERP = Conducted + antenna gain (2.02dBi) - 2.15

LTE Band 26				
BW	MCS Index	RB Size	RB Offset	Mid
		Channel		26740
		Frequency (MHz)		819
10M	QPSK	1	0	23.12
		1	24	23.25
		1	49	22.97
		25	0	22.04
		25	12	22.06
		25	25	21.83
		50	0	21.98
10M	16QAM	1	0	22.07
		1	24	22.61
		1	49	22.02
		25	0	21.10
		25	12	20.71
		25	25	20.65
		50	0	21.07
10M	64QAM	1	0	20.93
		1	24	21.05
		1	49	21.29
		25	0	19.68
		25	12	20.14
		25	25	19.67
		50	0	20.00

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26715	26740	26765
		Frequency (MHz)		816.5	819	821.5
5M	QPSK	1	0	23.04	22.93	22.90
		1	12	23.04	22.90	23.07
		1	24	23.01	22.74	22.75
		12	0	22.13	22.05	21.71
		12	6	21.94	21.91	21.83
		12	13	21.77	21.80	21.67
		25	0	22.10	22.18	22.02
5M	16QAM	1	0	22.44	21.98	22.32
		1	12	22.59	22.55	22.42
		1	24	22.26	22.09	22.03
		12	0	20.97	20.70	21.16
		12	6	21.24	20.79	21.12
		12	13	20.73	21.15	21.03
		25	0	20.98	20.70	20.82
5M	64QAM	1	0	21.21	20.78	20.84
		1	12	21.10	21.10	21.08
		1	24	20.90	21.12	20.88
		12	0	20.18	20.10	19.77
		12	6	19.83	19.95	19.86
		12	13	20.05	20.04	19.95
		25	0	19.95	19.98	20.03

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26705	26740	26775
		Frequency (MHz)		815.5	819	822.5
3M	QPSK	1	0	23.12	22.57	22.60
		1	7	23.12	23.23	22.76
		1	14	22.58	22.66	22.83
		8	0	21.71	22.25	21.72
		8	3	22.10	21.92	22.02
		8	7	21.92	22.11	22.15
		15	0	21.67	22.17	21.68
3M	16QAM	1	0	21.94	22.35	21.86
		1	7	22.59	22.49	22.12
		1	14	22.24	22.09	22.33
		8	0	21.03	20.96	20.96
		8	3	20.91	21.07	20.86
		8	7	20.71	20.71	20.74
		15	0	20.75	20.94	21.03
3M	64QAM	1	0	20.95	21.15	21.05
		1	7	21.16	21.14	21.08
		1	14	20.86	20.74	21.29
		8	0	20.26	19.93	20.18
		8	3	19.63	19.89	20.02
		8	7	19.97	20.01	19.96
		15	0	19.75	19.77	19.69

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

LTE Band 26						
BW	MCS Index	RB Size	RB Offset	Low	Mid	High
		Channel		26697	26740	26783
		Frequency (MHz)		814.7	819	823.3
1.4M	QPSK	1	0	22.76	22.96	23.08
		1	2	22.81	23.12	22.79
		1	5	22.43	22.80	22.98
		3	0	21.75	22.16	21.71
		3	1	22.19	22.26	21.86
		3	3	21.88	21.74	21.99
		6	0	21.99	21.82	21.95
1.4M	16QAM	1	0	22.44	22.37	22.05
		1	2	22.35	22.41	22.13
		1	5	22.17	22.30	22.13
		3	0	20.85	20.84	20.77
		3	1	21.02	21.01	20.96
		3	3	20.79	21.01	20.70
		6	0	20.69	21.15	20.97
1.4M	64QAM	1	0	20.80	20.82	21.12
		1	2	21.31	21.36	21.25
		1	5	21.00	21.12	21.01
		3	0	19.91	20.26	20.16
		3	1	20.19	19.63	20.08
		3	3	19.82	19.77	19.89
		6	0	19.91	20.17	19.96

*ERP = Conducted + antenna gain (1.82dBi) - 2.15

4.2 Modulation Characteristics Measurement

4.2.1 Limits of Modulation Characteristics

N/A

4.2.2 Test Procedure

Connect the EUT to Communication Simulator via the antenna connector, The frequency band is set as EUT supported Modulation and Channels, the EUT output is matched with 50 ohm load, the waveform quality and constellation of the EUT was tested.

4.2.3 Test Setup



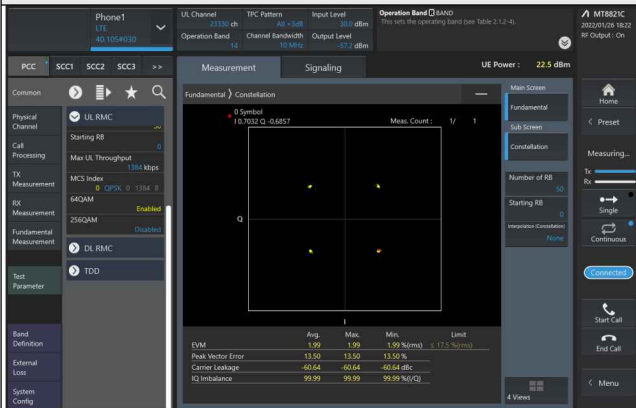
4.2.4 Test Results

LTE Band 14

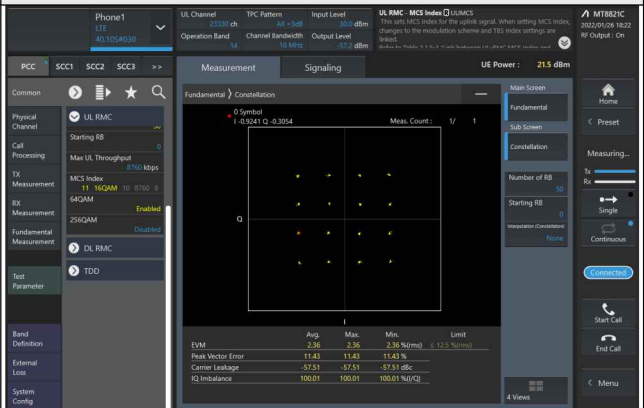
Spectrum Plot of Measurement Value

Channel: 23330 / Frequency (MHz): 793.0MHz

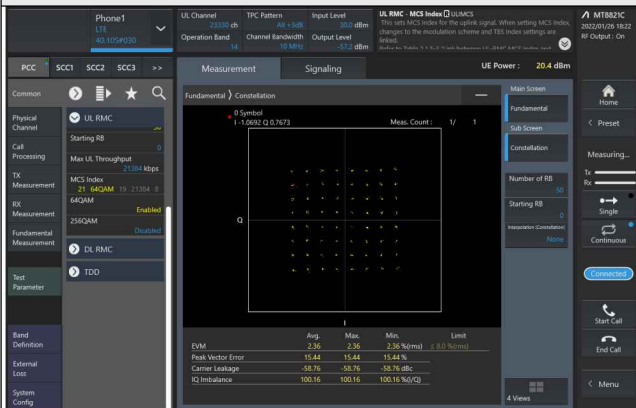
QPSK



16QAM



64QAM

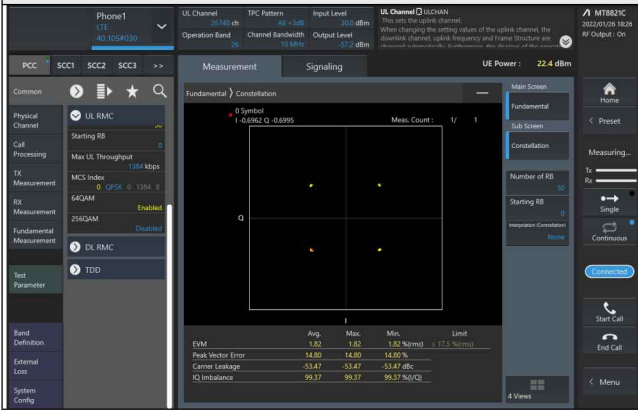


LTE Band 26

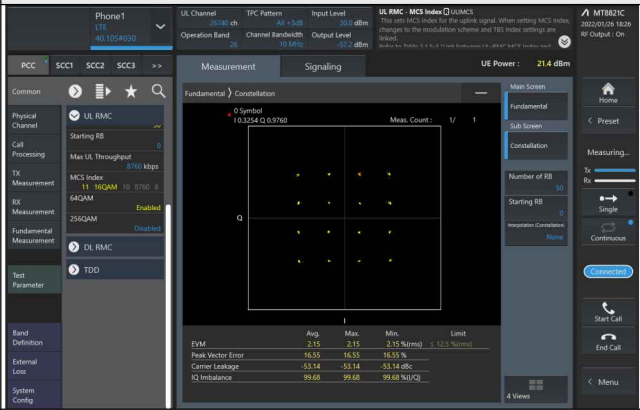
Spectrum Plot of Measurement Value

Channel: 26740 / Frequency (MHz): 819.0MHz

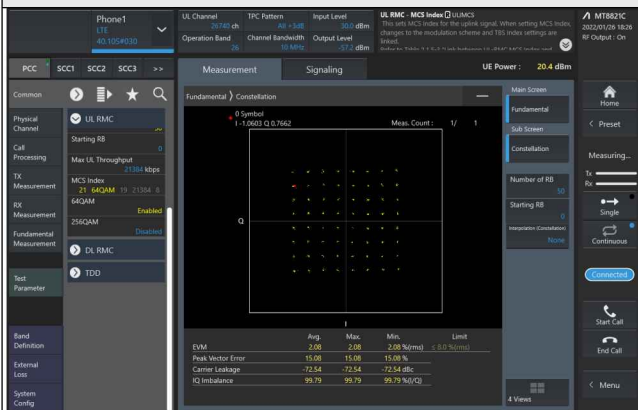
QPSK



16QAM



64QAM



4.3 Frequency Stability Measurement

4.3.1 Limits of Frequency Stability Measurement

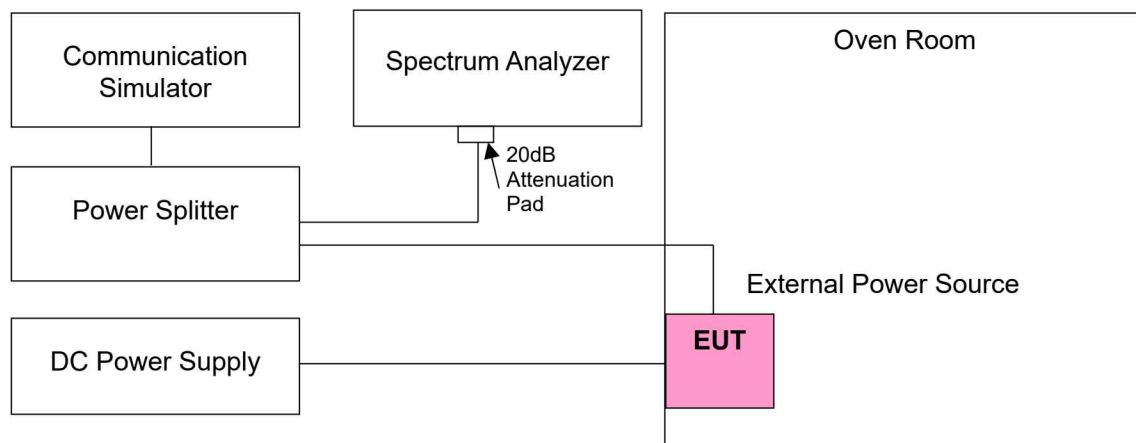
1.5 ppm is for base and fixed station. 2.5 ppm is for mobile station.

4.3.2 Test Procedure

- Device is placed at the oven room. The oven room could control the temperatures and humidity. Power warm up is at least 15 min and power applied should perform before recording frequency error.
- EUT is connected the external power supply to control the DC input power. The test voltage range is from minimum to maximum working voltage. Each step shall be record the frequency error rate.
- The temperature range step is 10 degrees in this test items. All temperature levels shall be hold the ± 0.5 °C during the measurement testing. The each temperature step shall be at least 0.5 hours, consider the EUT could be test under the stability condition.

Note: The frequency error was recorded frequency error from the communication simulator.

4.3.3 Test Setup



4.3.4 Test Results

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 14			
	Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	790.500003	0.004	795.500001	0.001
3.4	790.500003	0.004	795.500004	0.005
4.6	790.500001	0.001	795.500004	0.005

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 14			
	Channel Bandwidth: 5 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	790.500003	0.004	795.500001	0.001
-30	790.500004	0.005	795.500003	0.004
-20	790.500002	0.003	795.500002	0.003
-10	790.500003	0.004	795.500004	0.005
0	790.500002	0.003	795.500001	0.001
10	790.500001	0.001	795.500003	0.004
20	790.499997	-0.004	795.499999	-0.001
30	790.499998	-0.003	795.499996	-0.005
40	790.499997	-0.004	795.499996	-0.005
50	790.499997	-0.004	795.499999	-0.001
60	790.499997	-0.004	795.499996	-0.005
70	790.499999	-0.001	795.499997	-0.004
80	790.499996	-0.005	795.499996	-0.005
85	790.499998	-0.003	795.499999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 14	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
4.0	793.000003	0.004
3.4	793.000002	0.003
4.6	793.000002	0.003

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 14	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-40	793.000001	0.001
-30	793.000004	0.005
-20	793.000001	0.001
-10	793.000001	0.001
0	793.000002	0.003
10	793.000001	0.001
20	792.999998	-0.003
30	792.999996	-0.005
40	792.999997	-0.004
50	792.999997	-0.004
60	792.999996	-0.005
70	792.999998	-0.003
80	792.999996	-0.005
85	792.999996	-0.005

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	814.700003	0.004	823.300001	0.001
3.4	814.700003	0.004	823.300003	0.004
4.6	814.700004	0.005	823.300002	0.002

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 1.4 MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	814.700003	0.004	823.300003	0.004
-30	814.700001	0.001	823.300002	0.002
-20	814.700001	0.001	823.300003	0.004
-10	814.700001	0.001	823.300003	0.004
0	814.700004	0.005	823.300001	0.001
10	814.700002	0.002	823.300004	0.005
20	814.699996	-0.005	823.299997	-0.004
30	814.699997	-0.004	823.299996	-0.005
40	814.699997	-0.004	823.299997	-0.004
50	814.699999	-0.001	823.299999	-0.001
60	814.699998	-0.002	823.299997	-0.004
70	814.699998	-0.002	823.299997	-0.004
80	814.699999	-0.001	823.299997	-0.004
85	814.699996	-0.005	823.299996	-0.005

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 3MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	815.500001	0.001	822.500003	0.004
3.4	815.500004	0.005	822.500001	0.001
4.6	815.500003	0.004	822.500001	0.001

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 3MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	815.500004	0.005	822.500004	0.005
-30	815.500003	0.004	822.500001	0.001
-20	815.500002	0.002	822.500004	0.005
-10	815.500001	0.001	822.500001	0.001
0	815.500002	0.002	822.500001	0.001
10	815.500003	0.004	822.500003	0.004
20	815.499999	-0.001	822.499999	-0.001
30	815.499999	-0.001	822.499996	-0.005
40	815.499996	-0.005	822.499999	-0.001
50	815.499996	-0.005	822.499999	-0.001
60	815.499997	-0.004	822.499998	-0.002
70	815.499999	-0.001	822.499999	-0.001
80	815.499997	-0.004	822.499998	-0.002
85	815.499997	-0.004	822.499997	-0.004

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26			
	Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
4.0	816.500004	0.005	821.500004	0.005
3.4	816.500003	0.004	821.500002	0.002
4.6	816.500001	0.001	821.500001	0.001

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26			
	Channel Bandwidth: 5MHz			
	Low Channel		High Channel	
	Frequency (MHz)	Frequency Error (ppm)	Frequency (MHz)	Frequency Error (ppm)
-40	816.500002	0.002	821.500003	0.004
-30	816.500004	0.005	821.500003	0.004
-20	816.500002	0.002	821.500001	0.001
-10	816.500004	0.005	821.500003	0.004
0	816.500003	0.004	821.500001	0.001
10	816.500003	0.004	821.500001	0.001
20	816.499997	-0.004	821.499996	-0.005
30	816.499997	-0.004	821.499999	-0.001
40	816.499999	-0.001	821.499997	-0.004
50	816.499997	-0.004	821.499998	-0.002
60	816.499996	-0.005	821.499996	-0.005
70	816.499998	-0.002	821.499996	-0.005
80	816.499996	-0.005	821.499999	-0.001
85	816.499996	-0.005	821.499999	-0.001

Frequency Error vs. Voltage

Voltage (Vdc)	LTE Band 26	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
4.0	819.000004	0.005
3.4	819.000004	0.005
4.6	819.000004	0.005

Note: The applicant defined the normal working voltage is from 3.4Vdc to 4.6Vdc.

Frequency Error vs. Temperature

Temp. (°C)	LTE Band 26	
	Channel Bandwidth: 10 MHz	
	Frequency (MHz)	Frequency Error (ppm)
-40	819.000004	0.005
-30	819.000003	0.004
-20	819.000003	0.004
-10	819.000004	0.005
0	819.000004	0.005
10	819.000004	0.005
20	818.999996	-0.005
30	818.999997	-0.004
40	818.999997	-0.004
50	818.999997	-0.004
60	818.999999	-0.001
70	818.999998	-0.002
80	818.999997	-0.004
85	818.999999	-0.001

4.4 Occupied Bandwidth Measurement

4.4.1 Limits of Occupied Bandwidth Measurement

The width of a frequency band such that, below the lower and above the upper frequency limits, the mean powers emitted are each equal to a specified percentage 0.5 % of the total mean power of a given emission.

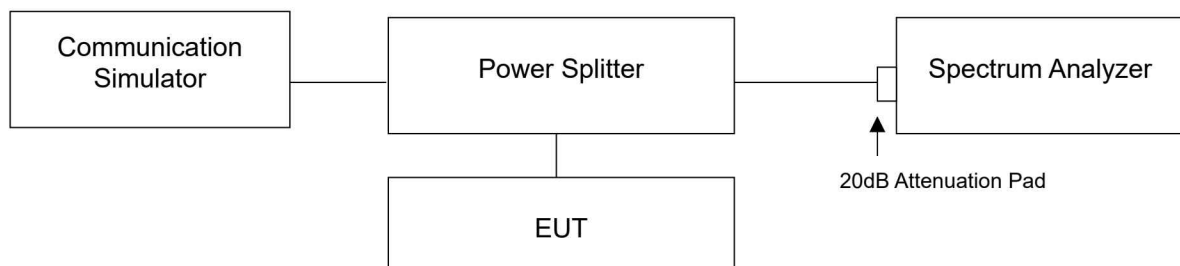
4.4.2 Test Procedure

For the 26dBc bandwidth measurement method, please refer to section 5.4.3 of ANSI C63.26.

- a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.
- b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set $\geq 3 \times$ RBW.
- c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.
- d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target “-X dB” requirement, i.e., if the requirement calls for measuring the -26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.
- e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.
- f) Determine the following reference values: Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
- g) Determine the “-X dB amplitude” as equal to (Reference Value - X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.
- h) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the “-X dB amplitude” determined in step f). If a marker is below this “-X dB amplitude” value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.
- i) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

For the occupied bandwidth measurement method, please refer to section 5.4.4 of ANSI C63.26.

4.4.3 Test Setup



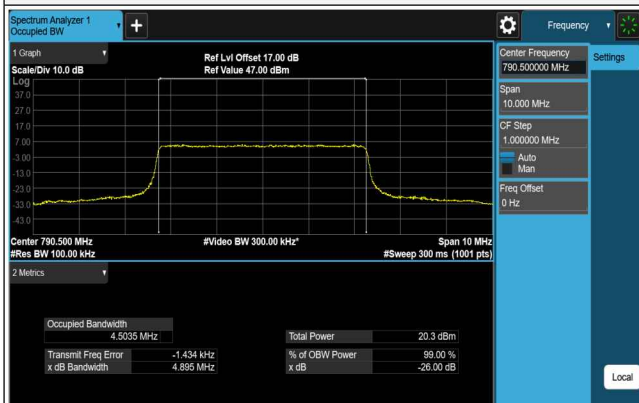
4.4.4 Test Result

LTE Band 14 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	23305	790.5	4.4971	4.941
QPSK	23330	793	4.5003	4.897
QPSK	23355	795.5	4.4950	4.875
16QAM	23305	790.5	4.4977	4.884
16QAM	23330	793	4.4945	4.877
16QAM	23355	795.5	4.4905	4.868
64QAM	23305	790.5	4.5035	4.895
64QAM	23330	793	4.4963	4.868
64QAM	23355	795.5	4.4952	4.892

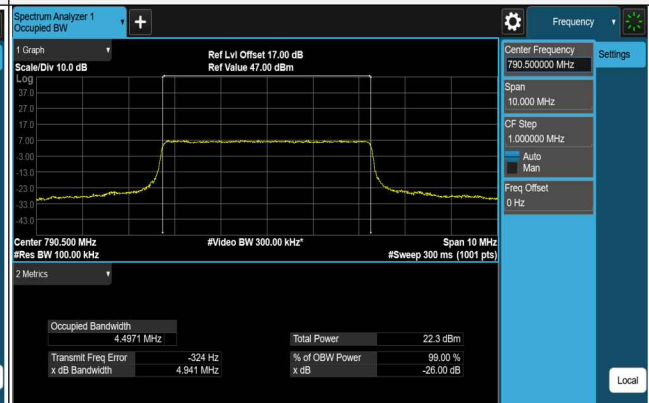
Spectrum Plot of Worst Value

Occupied bandwidth



64QAM CH 23305 (790.5MHz)

26dB Bandwidth

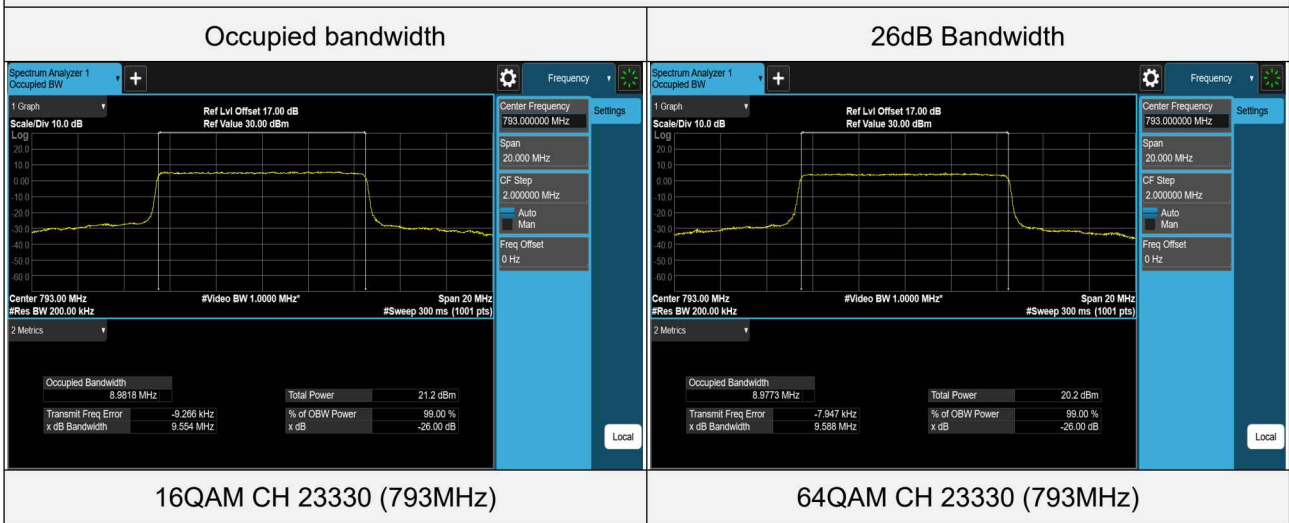


QPSK CH 23305 (790.5MHz)

LTE Band 14 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	23330	793	8.9815	9.566
16QAM	23330	793	8.9818	9.554
64QAM	23330	793	8.9773	9.588

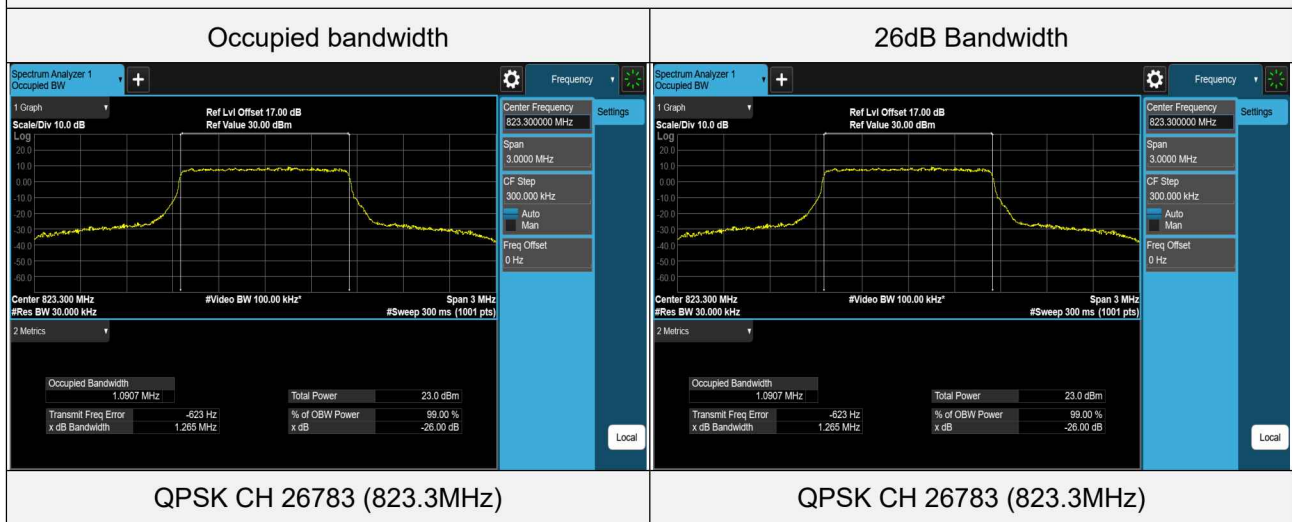
Spectrum Plot of Worst Value



LTE Band 26 (Channel Bandwidth 1.4MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26697	814.7	1.0871	1.252
QPSK	26740	819	1.0902	1.258
QPSK	26783	823.3	1.0907	1.265
16QAM	26697	814.7	1.0880	1.261
16QAM	26740	819	1.0871	1.250
16QAM	26783	823.3	1.0872	1.250
64QAM	26697	814.7	1.0854	1.257
64QAM	26740	819	1.0881	1.255
64QAM	26783	823.3	1.0866	1.253

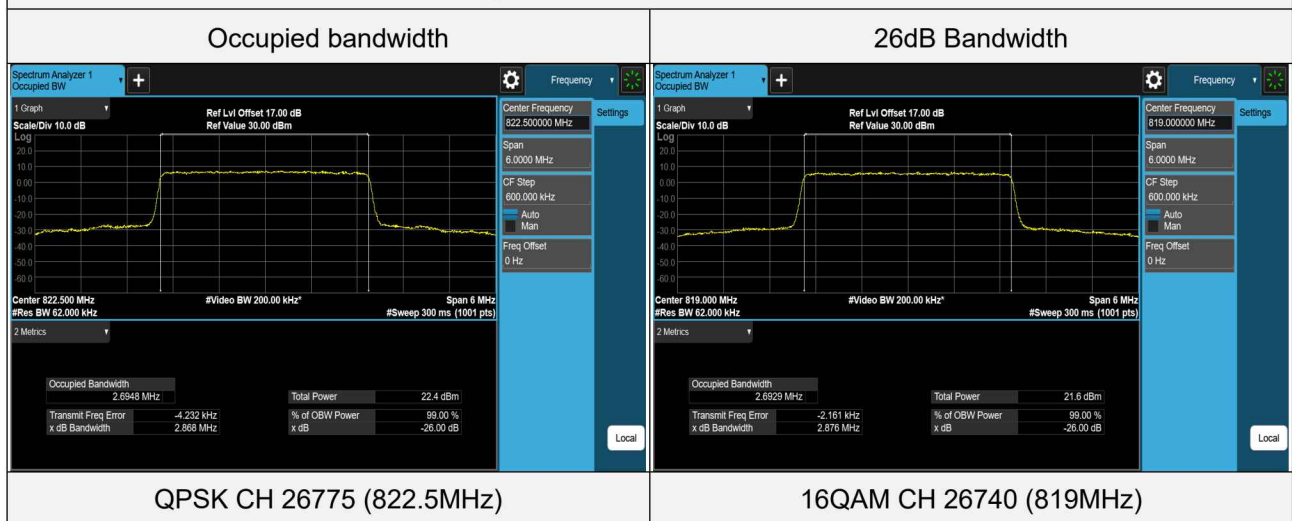
Spectrum Plot of Worst Value



LTE Band 26 (Channel Bandwidth 3MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26705	815.5	2.6913	2.873
QPSK	26740	819	2.6931	2.873
QPSK	26775	822.5	2.6948	2.868
16QAM	26705	815.5	2.6916	2.872
16QAM	26740	819	2.6929	2.876
16QAM	26775	822.5	2.6908	2.874
64QAM	26705	815.5	2.6923	2.860
64QAM	26740	819	2.6901	2.859
64QAM	26775	822.5	2.6916	2.857

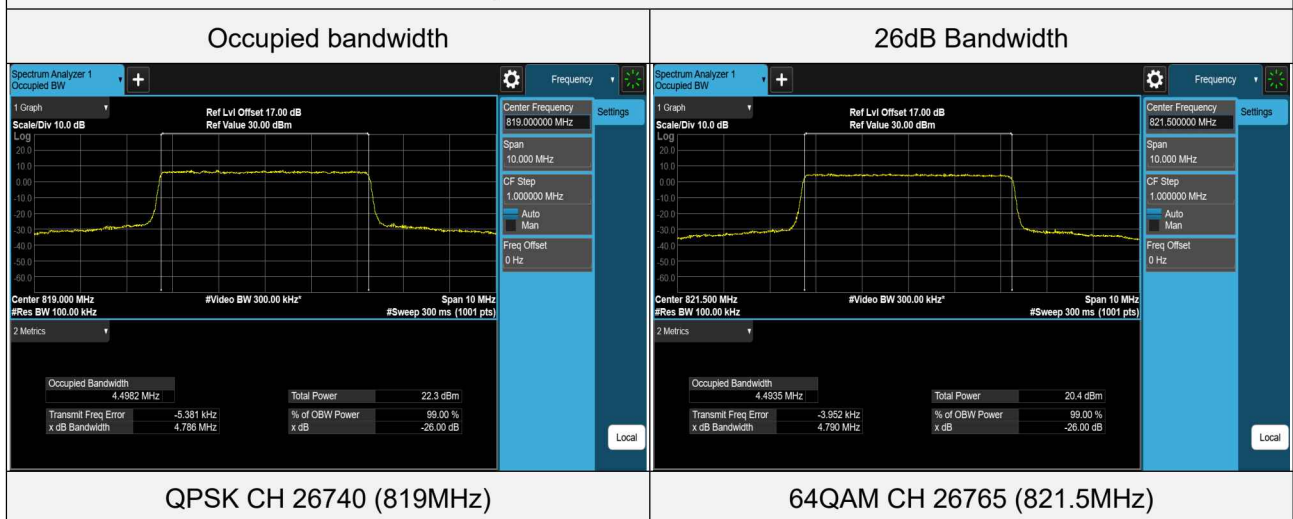
Spectrum Plot of Worst Value



LTE Band 26 (Channel Bandwidth 5MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26715	816.5	4.4903	4.783
QPSK	26740	819	4.4982	4.786
QPSK	26765	821.5	4.4915	4.787
16QAM	26715	816.5	4.4893	4.765
16QAM	26740	819	4.4934	4.777
16QAM	26765	821.5	4.4912	4.774
64QAM	26715	816.5	4.4928	4.777
64QAM	26740	819	4.4943	4.771
64QAM	26765	821.5	4.4935	4.790

Spectrum Plot of Worst Value



LTE Band 26 (Channel Bandwidth 10MHz)

Test Condition	Channel	Frequency (MHz)	Occupied bandwidth (MHz)	26dB Bandwidth (MHz)
QPSK	26740	819	8.9746	9.503
16QAM	26740	819	8.9738	9.505
64QAM	26740	819	8.9745	9.514

Spectrum Plot of Worst Value

