

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 -30°C to +50°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 -30°C to +50°C. Allow at least 1.5 hours at each temperature, un-powered, before making measurements.

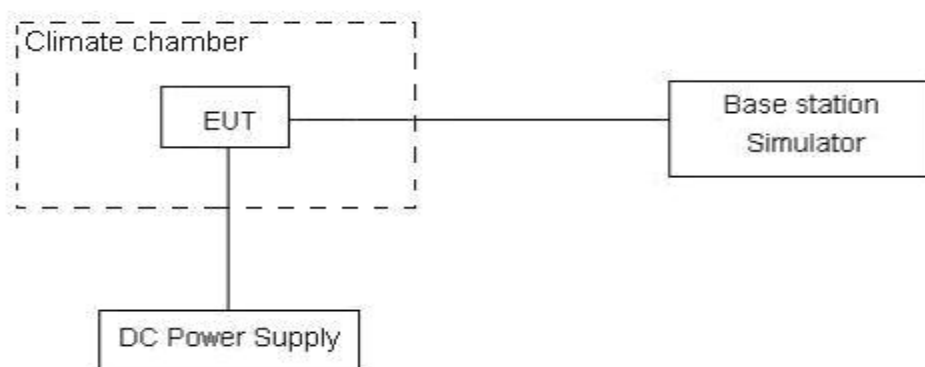
Frequency Stability (Voltage Variation)

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

Primary Supply Voltage: The primary supply voltage is varied from 85% to 115% of the nominal value for non hand-carried battery and AC powered equipment. For hand-carried, battery-powered equipment, primary supply voltage is reduced 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 3.23 V and 4.37 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 38								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	4.04	12.66	13.58	0.00215	0.00673	0.00722	PASS
Extreme (50°C)		8.45	8.65	15.74	0.00449	0.00460	0.00837	PASS
Extreme (40°C)		12.48	10.33	17.12	0.00664	0.00550	0.00910	PASS
Extreme (30°C)		16.56	2.40	1.31	0.00881	0.00128	0.00069	PASS
Extreme (20°C)		15.33	13.93	9.13	0.00815	0.00741	0.00486	PASS
Extreme (10°C)		17.50	11.91	15.52	0.00931	0.00634	0.00826	PASS
Extreme (0°C)		8.88	17.13	7.90	0.00472	0.00911	0.00420	PASS
Extreme (-10°C)		7.03	12.64	14.30	0.00374	0.00672	0.00761	PASS
Extreme (-20°C)		13.50	7.64	9.58	0.00718	0.00406	0.00510	PASS
Extreme (-30°C)		12.94	9.87	5.04	0.00688	0.00525	0.00268	PASS
25°C	LV	13.48	7.67	8.28	0.00717	0.00408	0.00441	PASS
	HV	2.52	14.78	11.64	0.00134	0.00786	0.00619	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	12.05	2.48	12.32	0.00641	0.00132	0.00655	PASS
Extreme (50°C)		8.91	12.52	14.59	0.00474	0.00666	0.00776	PASS
Extreme (40°C)		3.93	14.07	17.15	0.00209	0.00748	0.00912	PASS
Extreme (30°C)		9.25	17.54	4.32	0.00492	0.00933	0.00230	PASS
Extreme (20°C)		4.71	13.82	10.24	0.00251	0.00735	0.00545	PASS
Extreme (10°C)		4.72	11.70	9.61	0.00251	0.00622	0.00511	PASS
Extreme (0°C)		2.32	13.84	4.95	0.00123	0.00736	0.00263	PASS
Extreme (-10°C)		13.34	16.75	7.88	0.00710	0.00891	0.00419	PASS
Extreme (-20°C)		3.15	12.54	1.67	0.00168	0.00667	0.00089	PASS
Extreme (-30°C)		13.81	15.41	15.76	0.00735	0.00820	0.00838	PASS
25°C	LV	9.21	7.58	10.35	0.00490	0.00403	0.00551	PASS
	HV	8.47	14.50	13.54	0.00450	0.00772	0.00720	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	15MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	9.58	17.14	10.98	0.00510	0.00912	0.00584	PASS
Extreme (50°C)		4.43	3.37	5.60	0.00236	0.00179	0.00298	PASS



Extreme (40°C)		5.91	9.85	3.77	0.00314	0.00524	0.00201	PASS
Extreme (30°C)		16.37	17.82	9.90	0.00871	0.00948	0.00527	PASS
Extreme (20°C)		9.91	13.05	5.63	0.00527	0.00694	0.00300	PASS
Extreme (10°C)		12.09	13.55	13.45	0.00643	0.00721	0.00716	PASS
Extreme (0°C)		9.65	11.94	9.72	0.00513	0.00635	0.00517	PASS
Extreme (-10°C)		17.94	4.26	3.84	0.00954	0.00226	0.00204	PASS
Extreme (-20°C)		12.47	8.88	5.08	0.00663	0.00472	0.00270	PASS
Extreme (-30°C)		12.01	9.08	15.89	0.00639	0.00483	0.00845	PASS
25°C	LV	2.19	7.61	2.16	0.00116	0.00405	0.00115	PASS
	HV	9.48	10.43	15.78	0.00504	0.00555	0.00840	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	1.76	8.39	10.95	0.00094	0.00446	0.00582	PASS
Extreme (50°C)		9.48	6.89	1.78	0.00504	0.00366	0.00095	PASS
Extreme (40°C)		8.04	14.83	2.52	0.00428	0.00789	0.00134	PASS
Extreme (30°C)		13.12	1.23	8.24	0.00698	0.00066	0.00438	PASS
Extreme (20°C)		10.37	16.18	12.50	0.00551	0.00860	0.00665	PASS
Extreme (10°C)		4.67	1.92	1.09	0.00248	0.00102	0.00058	PASS
Extreme (0°C)		4.38	13.76	7.10	0.00233	0.00732	0.00377	PASS
Extreme (-10°C)		3.71	7.34	7.63	0.00197	0.00390	0.00406	PASS
Extreme (-20°C)		2.43	4.27	7.02	0.00129	0.00227	0.00374	PASS
Extreme (-30°C)		5.05	8.55	14.66	0.00269	0.00455	0.00780	PASS
25°C	LV	1.76	7.28	11.34	0.00093	0.00387	0.00603	PASS
	HV	8.25	5.70	1.77	0.00439	0.00303	0.00094	PASS

LTE Band 40(2305MHz -2315MHz)								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	12.65	7.08	11.89	0.00673	0.00376	0.00633	PASS
Extreme (50°C)		1.69	12.90	8.71	0.00090	0.00686	0.00464	PASS
Extreme (40°C)		2.76	16.96	8.05	0.00147	0.00902	0.00428	PASS
Extreme (30°C)		7.79	4.61	11.78	0.00414	0.00245	0.00627	PASS
Extreme (20°C)		10.62	17.65	4.67	0.00565	0.00939	0.00248	PASS
Extreme (10°C)		13.06	12.26	10.19	0.00695	0.00652	0.00542	PASS
Extreme (0°C)		8.14	8.55	3.55	0.00433	0.00455	0.00189	PASS
Extreme (-10°C)		10.17	7.34	8.68	0.00541	0.00391	0.00462	PASS
Extreme (-20°C)		8.19	15.61	13.92	0.00436	0.00830	0.00740	PASS



Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Extreme (-30℃)		9.39	11.72	12.93	0.00500	0.00623	0.00688	PASS
25℃	LV	8.86	6.96	9.36	0.00471	0.00370	0.00498	PASS
	HV	1.49	14.31	10.30	0.00079	0.00761	0.00548	PASS
Normal (25℃)	Normal	7.70	9.35	13.74	0.00410	0.00497	0.00731	PASS
Extreme (50℃)		11.12	8.92	17.39	0.00591	0.00475	0.00925	PASS
Extreme (40℃)		17.14	13.52	5.17	0.00911	0.00719	0.00275	PASS
Extreme (30℃)		2.12	5.73	3.29	0.00113	0.00305	0.00175	PASS
Extreme (20℃)		2.31	2.33	3.50	0.00123	0.00124	0.00186	PASS
Extreme (10℃)		17.32	6.34	7.20	0.00921	0.00337	0.00383	PASS
Extreme (0℃)		16.17	3.76	6.36	0.00860	0.00200	0.00338	PASS
Extreme (-10℃)		12.39	1.71	17.97	0.00659	0.00091	0.00956	PASS
Extreme (-20℃)		16.44	17.00	4.37	0.00875	0.00904	0.00232	PASS
Extreme (-30℃)		2.03	3.02	15.86	0.00108	0.00160	0.00844	PASS
25℃		LV	16.40	13.27	6.66	0.00873	0.00706	0.00354
	HV	11.04	11.58	16.42	0.00587	0.00616	0.00873	PASS

LTE Band 40(2350MHz - 2360MHz)								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	13.57	11.00	8.00	0.00722	0.00585	0.00426	PASS
Extreme (50℃)		9.55	16.00	11.00	0.00508	0.00851	0.00585	PASS
Extreme (40℃)		9.43	13.00	13.00	0.00501	0.00691	0.00691	PASS
Extreme (30℃)		3.56	17.00	17.00	0.00189	0.00904	0.00904	PASS
Extreme (20℃)		3.33	2.00	15.00	0.00177	0.00106	0.00798	PASS
Extreme (10℃)		8.62	1.00	13.00	0.00459	0.00053	0.00691	PASS
Extreme (0℃)		10.78	14.00	16.00	0.00574	0.00745	0.00851	PASS
Extreme (-10℃)		15.33	8.00	1.00	0.00815	0.00426	0.00053	PASS
Extreme (-20℃)		4.93	2.00	9.00	0.00262	0.00106	0.00479	PASS
Extreme (-30℃)		5.73	11.00	11.00	0.00305	0.00585	0.00585	PASS
25℃		LV	3.61	6.00	4.00	0.00192	0.00319	0.00213
	HV	13.16	15.00	17.00	0.00700	0.00798	0.00904	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	



Normal (25°C)	Normal	8.06	9.00	17.00	0.00429	0.00479	0.00904	PASS
Extreme (50°C)		14.26	11.00	4.00	0.00759	0.00585	0.00213	PASS
Extreme (40°C)		13.69	13.00	8.00	0.00728	0.00691	0.00426	PASS
Extreme (30°C)		5.88	16.00	13.00	0.00313	0.00851	0.00691	PASS
Extreme (20°C)		7.09	8.00	15.00	0.00377	0.00426	0.00798	PASS
Extreme (10°C)		7.31	3.00	11.00	0.00389	0.00160	0.00585	PASS
Extreme (0°C)		7.70	9.00	8.00	0.00409	0.00479	0.00426	PASS
Extreme (-10°C)		13.64	2.00	1.00	0.00725	0.00106	0.00053	PASS
Extreme (-20°C)		1.88	3.00	13.00	0.00100	0.00160	0.00691	PASS
Extreme (-30°C)		3.00	10.00	10.00	0.00160	0.00532	0.00532	PASS
25°C		LV	1.45	12.00	13.00	0.00077	0.00638	0.00691
	HV	5.97	17.00	4.00	0.00318	0.00904	0.00213	PASS

LTE Band 41								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	5MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	12.12	1.24	9.19	0.00645	0.00066	0.00489	PASS
Extreme (50°C)		10.08	3.99	12.23	0.00536	0.00212	0.00650	PASS
Extreme (40°C)		3.28	13.49	12.63	0.00174	0.00717	0.00672	PASS
Extreme (30°C)		12.48	1.63	5.91	0.00664	0.00087	0.00314	PASS
Extreme (20°C)		14.00	7.52	14.22	0.00744	0.00400	0.00756	PASS
Extreme (10°C)		10.87	2.62	11.38	0.00578	0.00140	0.00605	PASS
Extreme (0°C)		3.93	11.79	15.96	0.00209	0.00627	0.00849	PASS
Extreme (-10°C)		10.91	4.94	16.65	0.00580	0.00263	0.00885	PASS
Extreme (-20°C)		13.86	14.41	6.23	0.00737	0.00766	0.00331	PASS
Extreme (-30°C)		4.51	16.75	7.07	0.00240	0.00891	0.00376	PASS
25°C		LV	12.21	5.78	7.45	0.00650	0.00307	0.00396
	HV	17.37	7.32	17.32	0.00924	0.00390	0.00921	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	10MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25°C)	Normal	10.90	8.96	11.91	0.00580	0.00476	0.00634	PASS
Extreme (50°C)		10.91	14.72	7.27	0.00580	0.00783	0.00387	PASS
Extreme (40°C)		13.87	5.99	8.15	0.00738	0.00319	0.00434	PASS
Extreme (30°C)		17.92	4.46	6.80	0.00953	0.00237	0.00362	PASS
Extreme (20°C)		14.93	3.56	10.22	0.00794	0.00190	0.00544	PASS
Extreme (10°C)		8.32	8.08	14.32	0.00443	0.00430	0.00761	PASS
Extreme (0°C)		5.80	13.11	17.63	0.00308	0.00697	0.00938	PASS



Extreme (-10℃)		3.41	15.18	8.44	0.00181	0.00807	0.00449	PASS
Extreme (-20℃)		3.31	2.34	6.73	0.00176	0.00124	0.00358	PASS
Extreme (-30℃)		9.26	6.62	2.88	0.00493	0.00352	0.00153	PASS
25℃	LV	17.86	7.30	6.17	0.00950	0.00388	0.00328	PASS
	HV	14.90	5.24	8.68	0.00793	0.00279	0.00462	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	15MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	15.75	12.55	10.20	0.00838	0.00667	0.00543	PASS
Extreme (50℃)		17.98	3.66	15.53	0.00956	0.00195	0.00826	PASS
Extreme (40℃)		17.63	16.87	2.05	0.00938	0.00897	0.00109	PASS
Extreme (30℃)		3.46	15.04	12.41	0.00184	0.00800	0.00660	PASS
Extreme (20℃)		4.52	9.24	14.32	0.00240	0.00491	0.00762	PASS
Extreme (10℃)		6.33	11.37	5.76	0.00337	0.00605	0.00307	PASS
Extreme (0℃)		14.39	9.11	17.04	0.00766	0.00485	0.00906	PASS
Extreme (-10℃)		13.14	13.07	2.88	0.00699	0.00695	0.00153	PASS
Extreme (-20℃)		8.99	14.33	11.48	0.00478	0.00762	0.00611	PASS
Extreme (-30℃)		15.08	15.20	12.00	0.00802	0.00808	0.00638	PASS
25℃		LV	16.04	13.54	12.01	0.00853	0.00720	0.00639
	HV	17.49	16.08	9.30	0.00930	0.00856	0.00494	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	20MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	3.25	2.47	5.89	0.00173	0.00131	0.00313	PASS
Extreme (50℃)		14.52	8.17	3.50	0.00772	0.00434	0.00186	PASS
Extreme (40℃)		16.45	12.16	3.57	0.00875	0.00647	0.00190	PASS
Extreme (30℃)		11.54	7.14	8.67	0.00614	0.00380	0.00461	PASS
Extreme (20℃)		14.51	2.76	8.41	0.00772	0.00147	0.00447	PASS
Extreme (10℃)		8.80	4.24	11.73	0.00468	0.00226	0.00624	PASS
Extreme (0℃)		1.88	8.13	6.98	0.00100	0.00432	0.00371	PASS
Extreme (-10℃)		17.58	4.51	14.27	0.00935	0.00240	0.00759	PASS
Extreme (-20℃)		1.93	3.60	4.04	0.00103	0.00191	0.00215	PASS
Extreme (-30℃)		16.72	8.83	15.96	0.00889	0.00470	0.00849	PASS
25℃		LV	3.72	10.72	7.31	0.00198	0.00570	0.00389
	HV	7.94	15.46	4.77	0.00422	0.00823	0.00254	PASS

5.6 Spurious Emissions at Antenna Terminals

Ambient condition

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

Method of Measurement

The EUT was connected to Spectrum Analyzer and Base Station Simulator via power Splitter. The measurement is carried out using a spectrum analyzer. The spectrum analyzer scans from 9kHz to the 10th harmonic of the carrier. The peak detector is used.

RBW is set to 1 kHz (0.009MHz~ 0.15MHz),

RBW is set to 10 kHz (0.15 MHz~ 30 MHz)

RBW is set to 100 kHz (30MHz~1000 MHz)

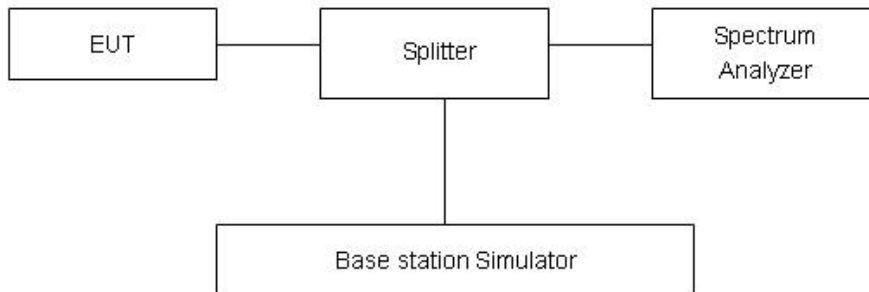
RBW is set to 1000 kHz (above 1000MHz)

Sweep is set to ATUO.

Of those disturbances below (limit – 20 dB), the mark is not required for the EUT.

The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup



Limits

Rule Part 27.53(m) $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(4) of this section.

Part 27.53(m) Limit	-25 dBm
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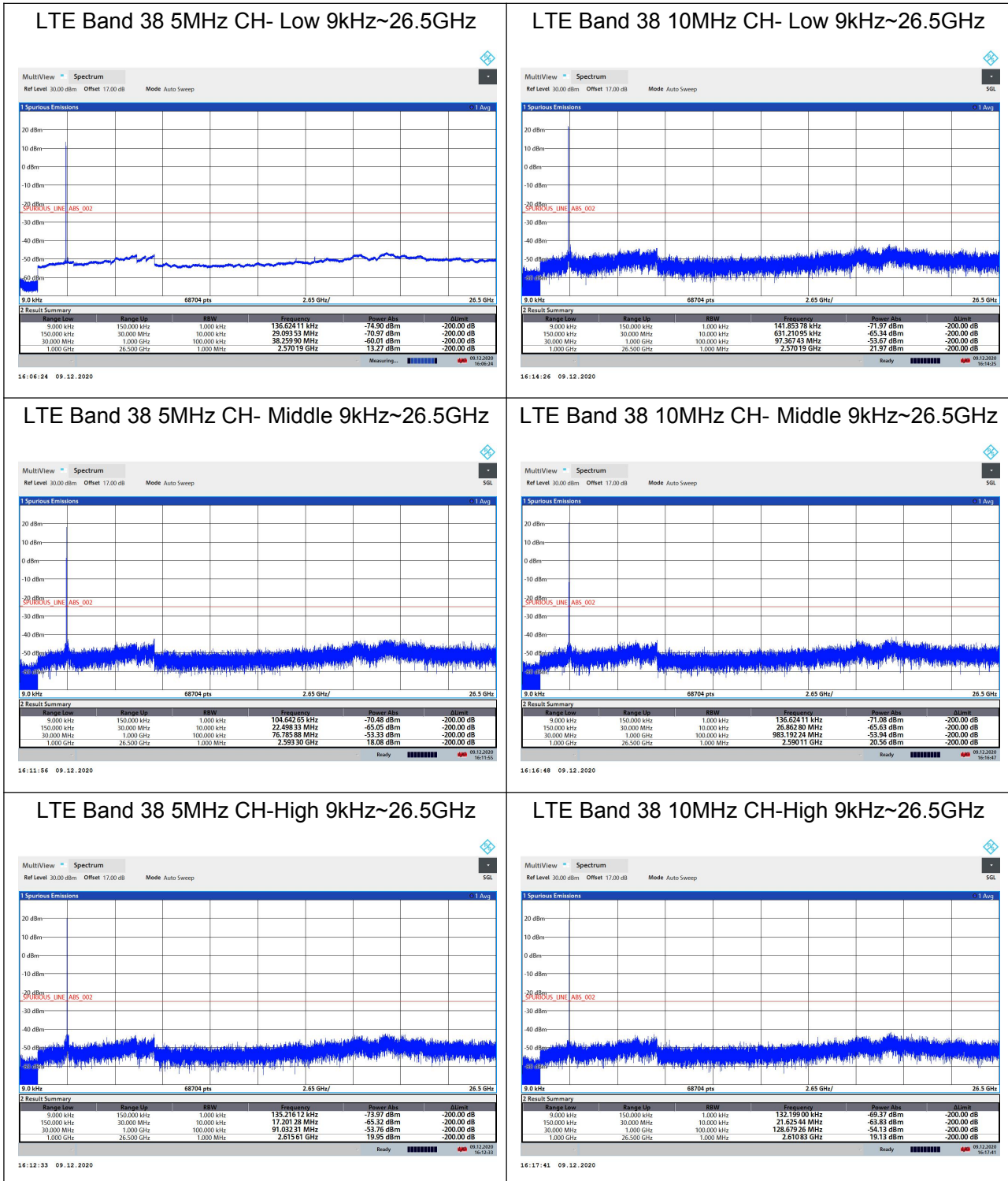
Measurement Uncertainty

The assessed measurement uncertainty to ensure 99.75% confidence level for the normal distribution is with the coverage factor $k = 1.96$.

Frequency	Uncertainty
9kHz-1GHz	0.684 dB
1GHz-27GHz	1.407 dB

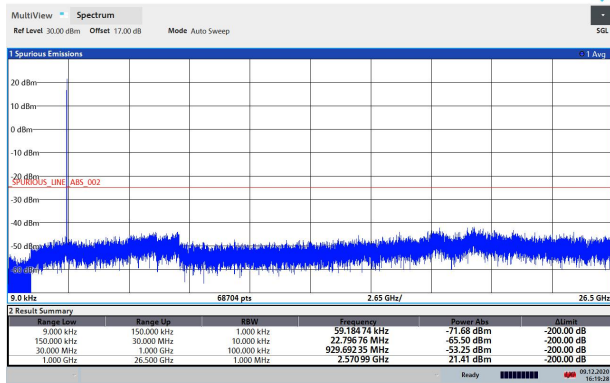
Test Result

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions more than 20 dB below the limit are not reported. The signal beyond the limit is carrier.



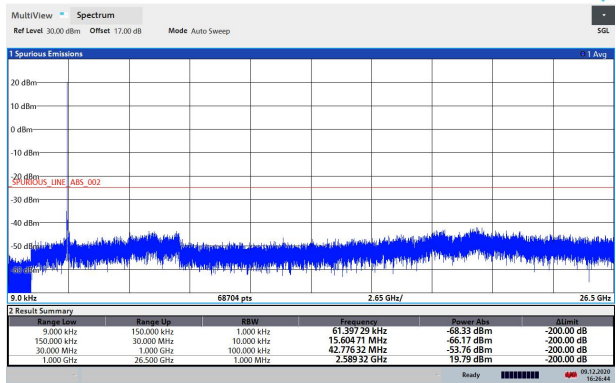


LTE Band 38 15MHz CH- Low 9kHz~26.5GHz



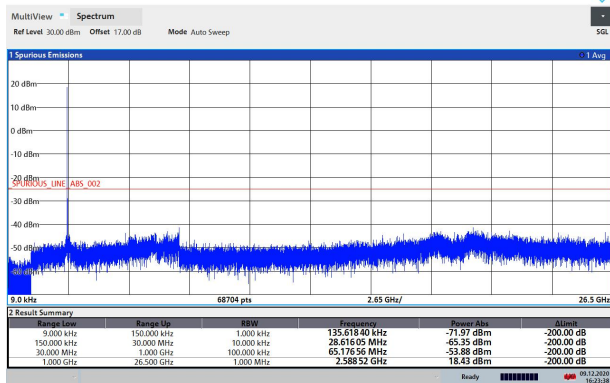
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LTE Band 38 20MHz CH-Low 9kHz~26.5GHz



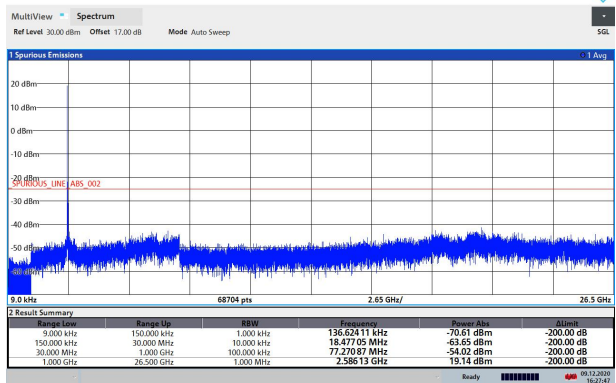
16:26:44 09.12.2020

LTE Band 38 15MHz CH- Middle 9kHz~26.5GHz



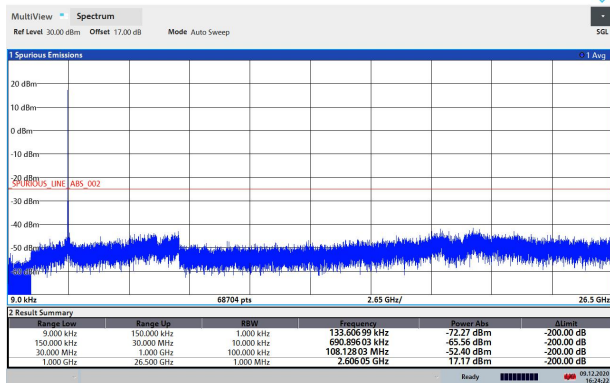
16:23:39 09.12.2020

LTE Band 38 20MHz CH- Middle 9kHz~26.5GHz



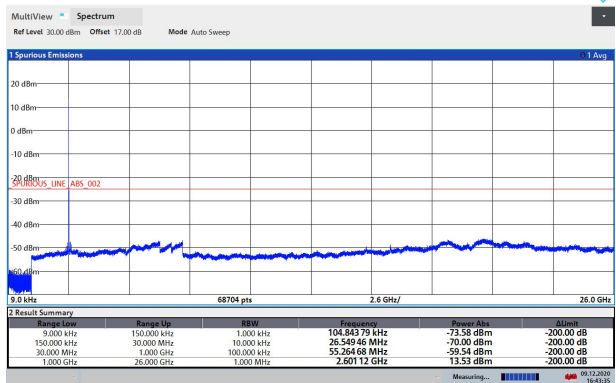
16:27:48 09.12.2020

LTE Band 38 15MHz CH-High 9kHz~26.5GHz



16:24:23 09.12.2020

LTE Band 38 20MHz CH- High 9kHz~26.5GHz

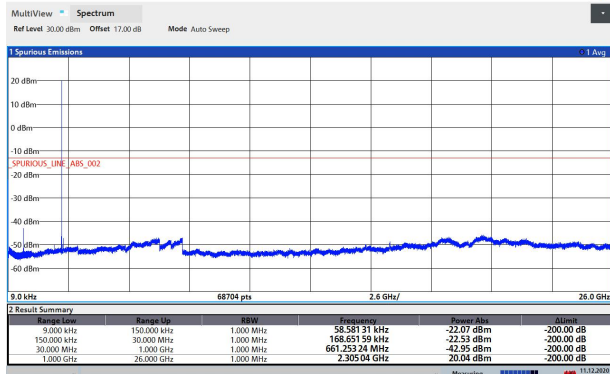


16:43:36 09.12.2020



LTE Band 40(2305MHz-2315MHz)

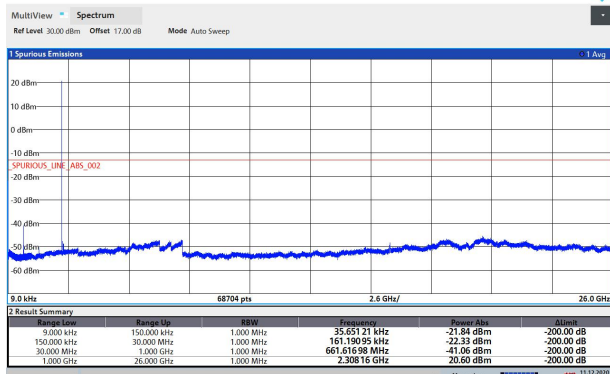
LTE Band 40 5MHz CH- Low 9kHz~26GHz



14:31:13 11.12.2020

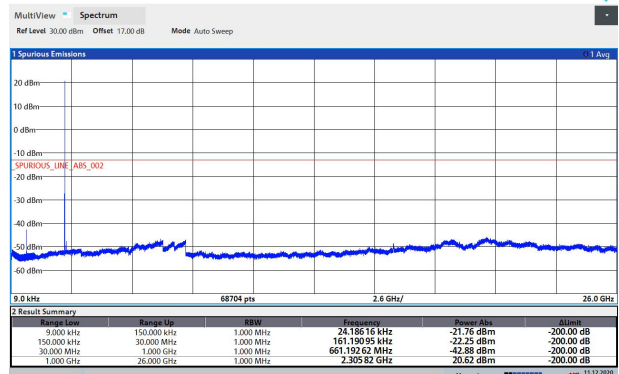
/

LTE Band 40 5MHz CH- Middle 9kHz~26GHz



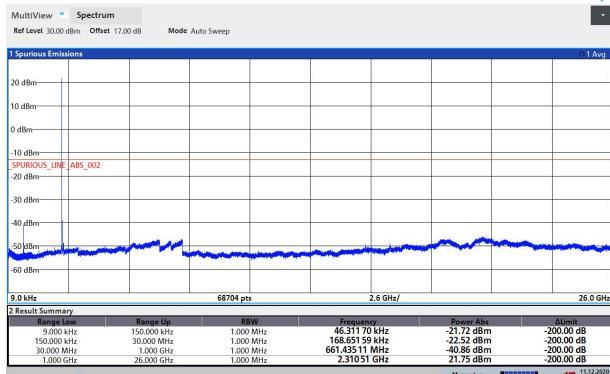
14:31:59 11.12.2020

LTE Band 40 10MHz CH- Middle 9kHz~26GHz



14:34:14 11.12.2020

LTE Band 40 5MHz CH-High 9kHz~26GHz



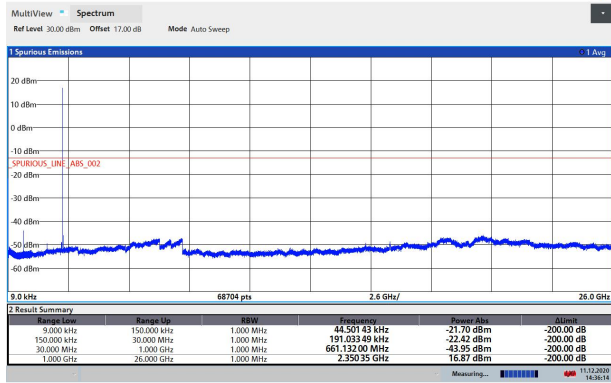
14:32:36 11.12.2020

/



LTE Band 40(2350MHz-2360MHz)

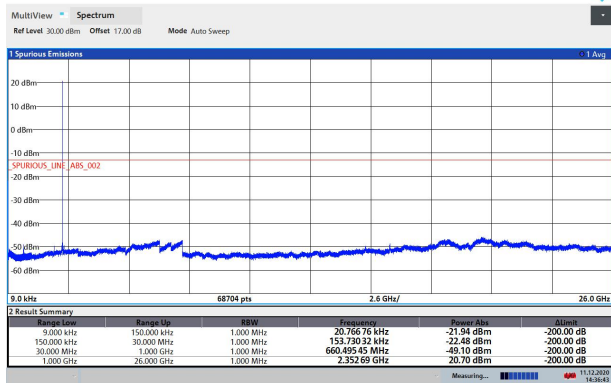
LTE Band 40 5MHz CH- Low 9kHz~26GHz



14:36:14 11.12.2020

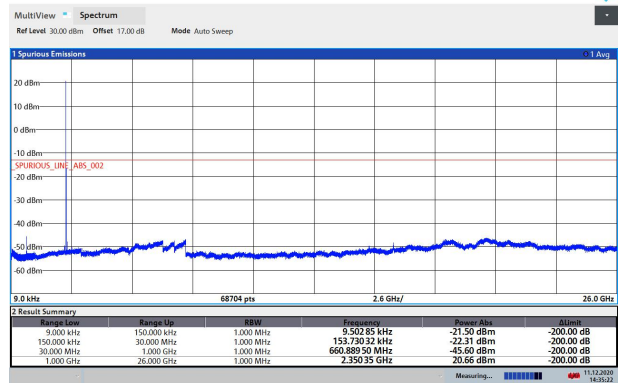
/

LTE Band 40 5MHz CH- Middle 9kHz~26GHz



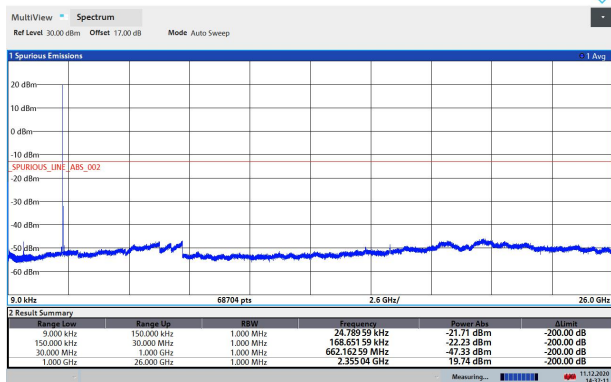
14:36:43 11.12.2020

LTE Band 40 10MHz CH- Middle 9kHz~26GHz



14:35:23 11.12.2020

LTE Band 40 5MHz CH-High 9kHz~26GHz

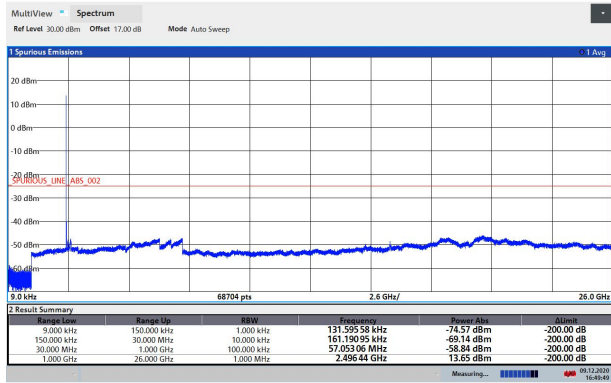


14:37:12 11.12.2020

/

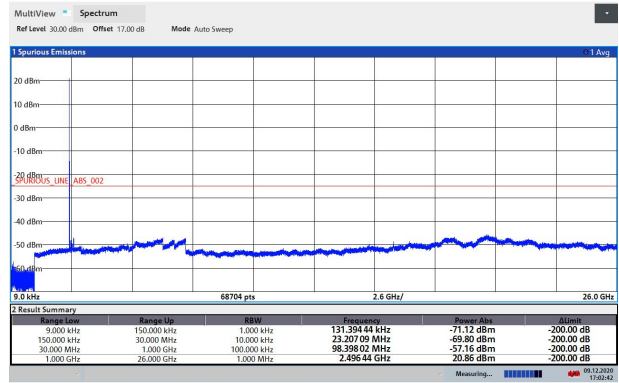


LTE Band 41 5MHz CH- Low 9kHz~26GHz



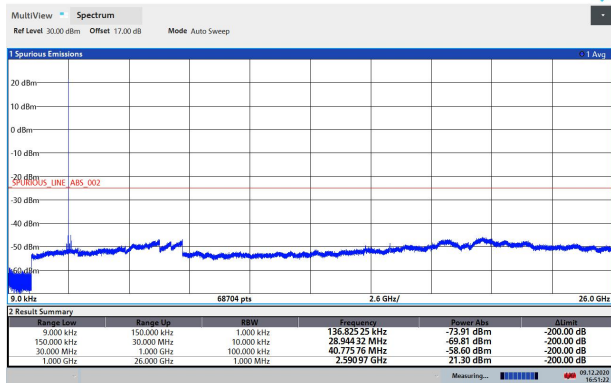
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LTE Band 41 10MHz CH- Low 9kHz~26GHz



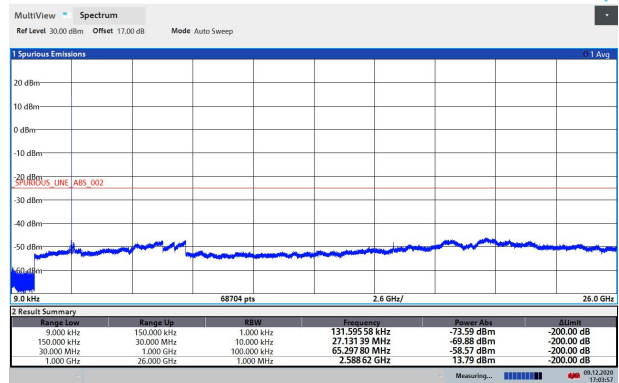
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LTE Band 41 5MHz CH- Middle 9kHz~26GHz



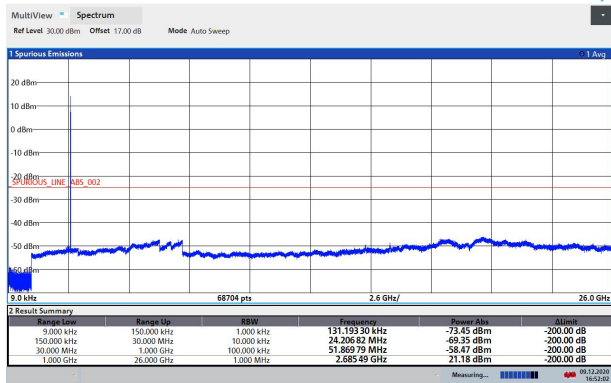
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LTE Band 41 10MHz CH- Middle 9kHz~26GHz



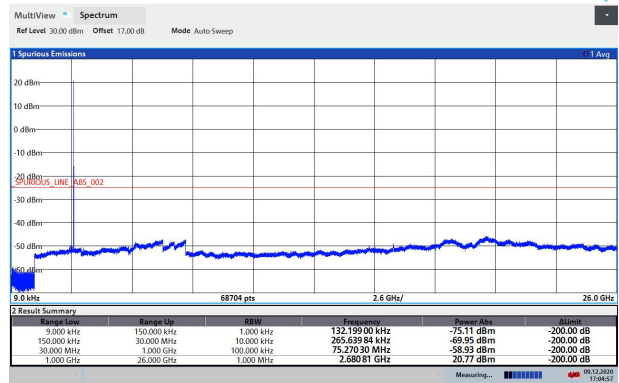
17:03:57 09.12.2020

LTE Band 41 5MHz CH-High 9kHz~26GHz



16:52:03 09.12.2020

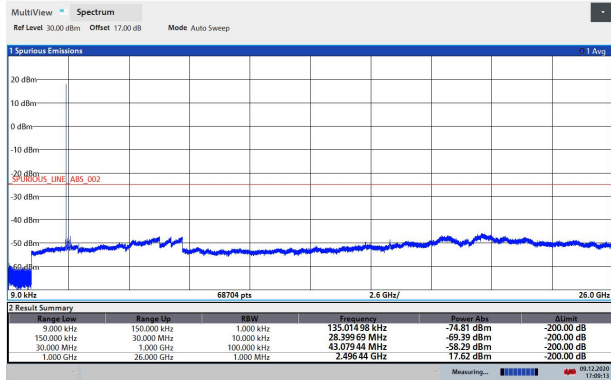
LTE Band 41 10MHz CH-High 9kHz~26GHz



17:04:58 09.12.2020

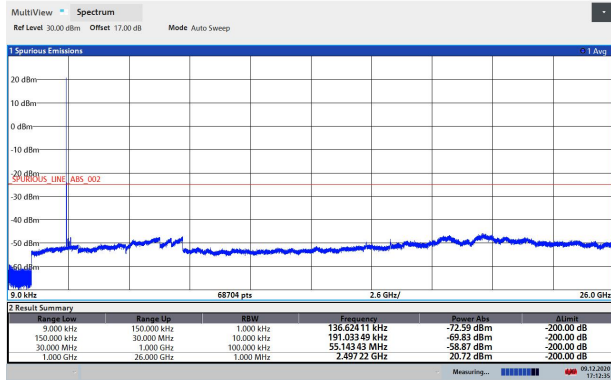


LTE Band 41 15MHz CH- Low 9kHz~26GHz



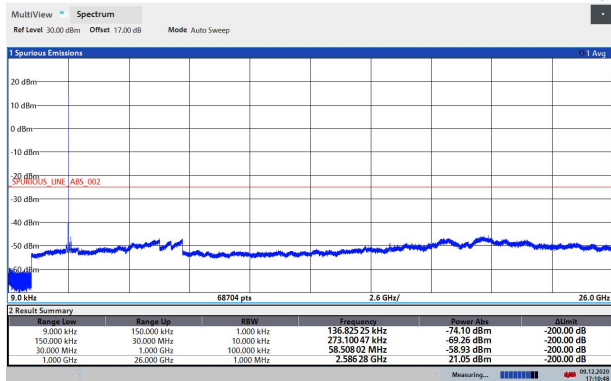
17:09:14 09.12.2020

LTE Band 41 20MHz CH-Low 9kHz~26GHz



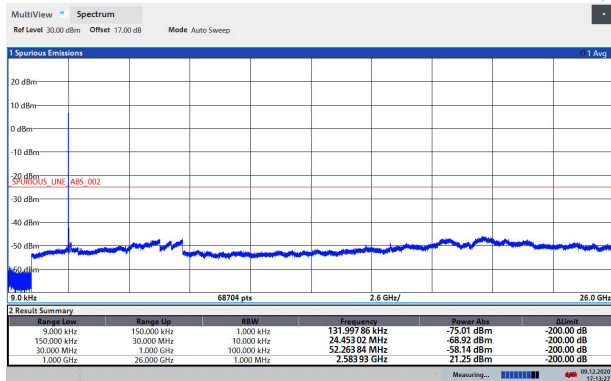
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LTE Band 41 15MHz CH- Middle 9kHz~26GHz



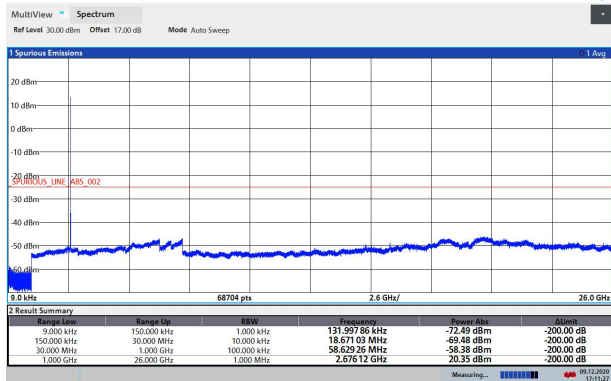
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LTE Band 41 20MHz CH- Middle 9kHz~26GHz



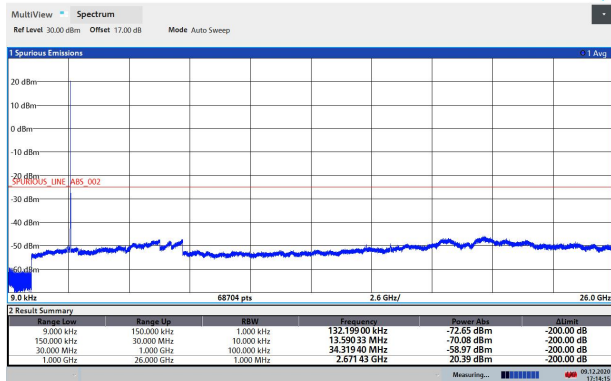
17:13:28 09.12.2020

LTE Band 41 15MHz CH-High 9kHz~26GHz



17:11:27 09.12.2020

LTE Band 41 20MHz CH- High 9kHz~26GHz



17:14:16 09.12.2020

5.7 Radiates Spurious Emission

Ambient condition

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

Method of Measurement

1. The testing follows FCC KDB 971168 D01 v03r01 Section 5.8 and ANSI C63.26 (2015).
2. Below 1GHz: The EUT is placed on a turntable 0.8 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H). Above 1GHz: (Note: the FCC's permission to use 1.5m as an alternative per TCBC Conf call of Dec. 2, 2014.) The EUT is placed on a turntable 1.5 meters above the ground in the chamber, 3 meter away from the antenna. The maximal emission value is acquired by adjusting the antenna height, polarisation and turntable azimuth. Normally, the height range of antenna is 1 m to 4 m, the azimuth range of turntable is 0° to 360°, and the receive antenna has two polarizations Vertical (V) and Horizontal (H).
3. A loop antenna, A log-periodic antenna or horn antenna shall be substituted in place of the EUT. The log-periodic antenna will be driven by a signal generator and the level will be adjusted till the same power value on the spectrum analyzer or receiver. The level of the spurious emissions can be calculated through the level of the signal generator, cable loss, the gain of the substitution antenna and the reading of the spectrum analyzer or receiver.
4. The EUT is then put into continuously transmitting mode at its maximum power level during the test. Set Test Receiver or Spectrum RBW=200Hz,VBW=600Hz for 9kHz-150kHz , RBW=10kHz, VBW=30kHz 150kHz-30MHz ,RBW=100kHz,VBW=300kHz for 30MHz to 1GHz and RBW=1MHz, VBW=3MHz for above 1GHz And the maximum value of the receiver should be recorded as (Pr).
5. The EUT shall be replaced by a substitution antenna. In the chamber, an substitution antenna for the frequency band of interest is placed at the reference point of the chamber. An RF Signal source for the frequency band of interest is connected to the substitution antenna with a cable that has been constructed to not interfere with the radiation pattern of the antenna. A power (PMea) is applied to the input of the substitution antenna, and adjust the level of the signal generator output until the value of the receiver reach the previously recorded (Pr). The power of signal source (PMea) is recorded. The test should be performed by rotating the test item and adjusting the receiving antenna polarization.
6. A amplifier should be connected to the Signal Source output port. And the cable should be connect between the Amplifier and the Substitution Antenna. The cable loss (Pcl) ,the Substitution Antenna Gain (Ga) and the Amplifier Gain (PAg) should be recorded after test.
7. The measurement results are obtained as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{PAg} - \text{Pcl} + \text{Ga}$$

The measurement results are amend as described below:

$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$

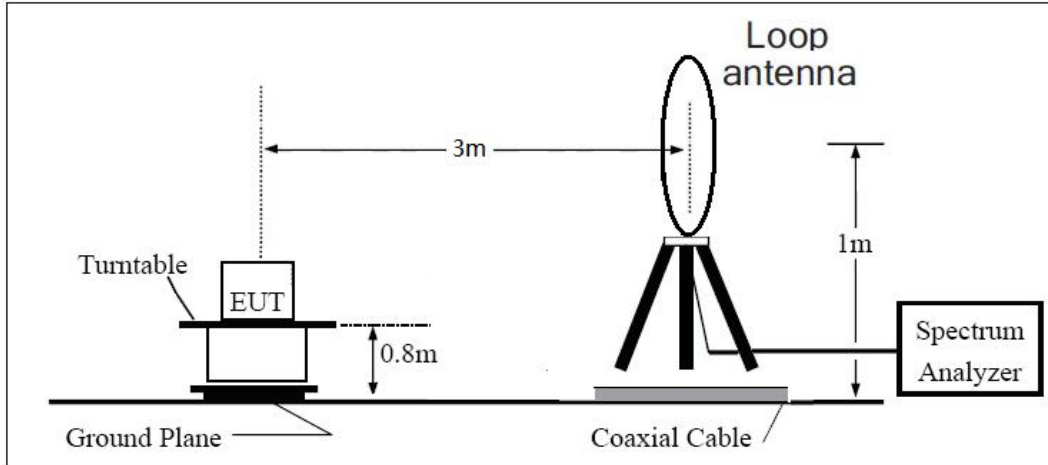
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP

= EIRP-2.15dBi.

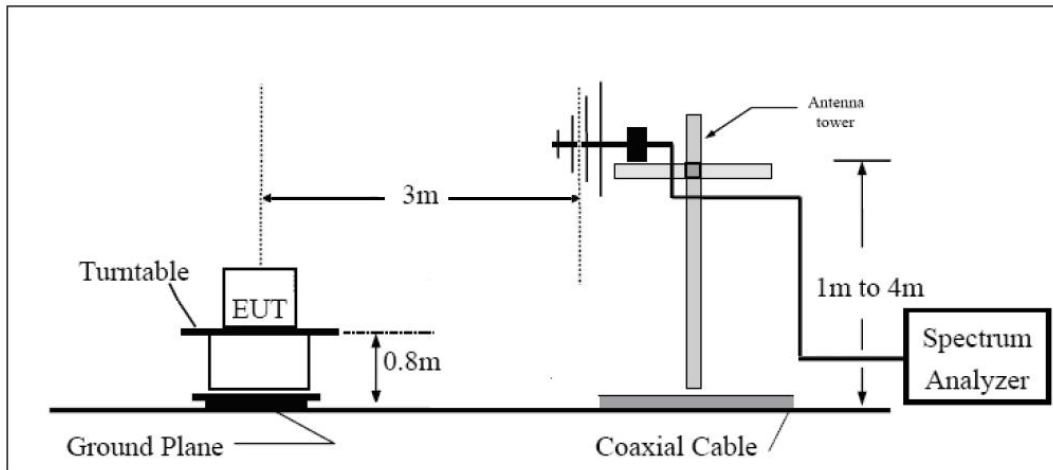
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

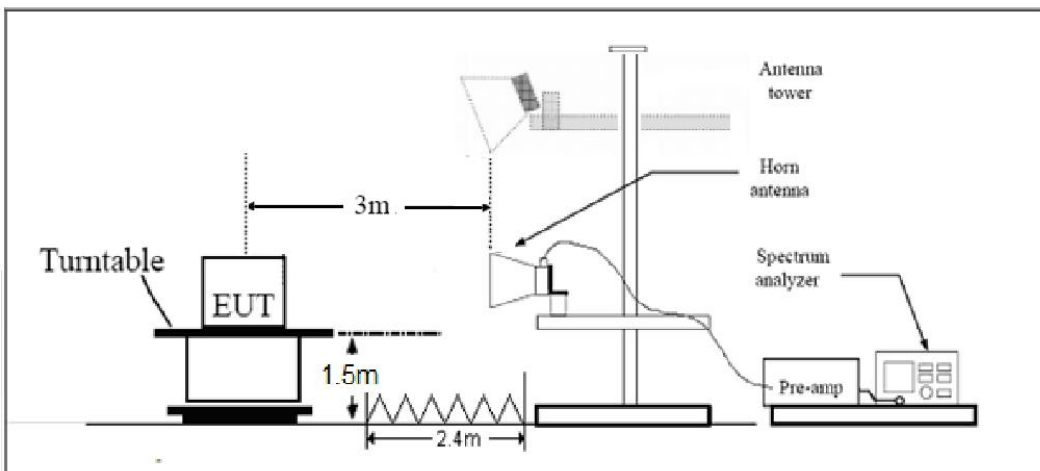
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

**Limits**

Rule Part 27.53(m) $55 + 10 \log (P)$ dB on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(4) of this section.

Part 27.53(m) Limit	-25 dBm
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Measurement Uncertainty

The assessed measurement uncertainty to ensure 95% confidence level for the normal distribution is with the coverage factor $k = \pm 1.96$, $U = \pm 3.55$ dB.

**Test Result**

Sweep the whole frequency band through the range from 9kHz to the 10th harmonic of the carrier, the emissions below the noise floor will not be recorded in the report.

LTE Band 38 QPSK 5MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5185.50	-49.34	2.00	9.15	Horizontal	-42.19	-25.00	17.19	45
3	7778.25	-55.50	2.50	11.35	Horizontal	-46.65	-25.00	21.65	315
4	10371.00	-53.79	4.20	12.05	Horizontal	-45.94	-25.00	20.94	0
5	12963.75	-51.83	5.20	12.85	Horizontal	-44.18	-25.00	19.18	90
6	15556.50	-54.32	5.50	14.23	Horizontal	-45.59	-25.00	20.59	225
7	18149.25	--	--	--	--	--	--	--	--
8	20742.00	--	--	--	--	--	--	--	--
9	23334.75	--	--	--	--	--	--	--	--
10	25927.50	--	--	--	--	--	--	--	--

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

LTE Band 38 QPSK 20MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5172.00	-48.19	2.00	10.15	Horizontal	-40.04	-25.00	15.04	0
3	7758.00	-57.08	2.50	11.35	Horizontal	-48.23	-25.00	23.23	270
4	10344.00	-54.04	4.20	12.05	Horizontal	-46.19	-25.00	21.19	90
5	12930.00	-52.63	5.20	14.85	Horizontal	-42.98	-25.00	17.98	315
6	15516.00	-54.37	5.50	13.23	Horizontal	-46.64	-25.00	21.64	225
7	18102.00	--	--	--	--	--	--	--	--
8	20688.00	--	--	--	--	--	--	--	--
9	23274.00	--	--	--	--	--	--	--	--
10	25860.00	--	--	--	--	--	--	--	--

Note: 1.The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.



LTE Band 40 QPSK 5MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	4695.50	-62.54	2.00	9.15	Horizontal	-55.39	-25.00	30.39	45
3	7043.25	-54.99	2.50	11.35	Horizontal	-46.14	-25.00	21.14	315
4	9391.00	-39.44	4.20	12.05	Horizontal	-31.59	-25.00	6.59	315
5	11738.75	-51.22	5.20	12.85	Horizontal	-43.57	-25.00	18.57	90
6	14086.50	-51.77	5.50	14.23	Horizontal	-43.04	-25.00	18.04	45
7	16434.25	-51.52	5.70	14.15	Horizontal	-43.07	-25.00	18.07	225
8	18782.00	--	--	--	--	--	--	--	--
9	21129.75	--	--	--	--	--	--	--	--
10	23477.50	--	--	--	--	--	--	--	--

Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

LTE Band 40 QPSK 10MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	4686.50	-60.74	2.00	10.15	Horizontal	-52.59	-25.00	27.59	225
3	7029.75	-51.50	2.50	11.35	Horizontal	-42.65	-25.00	17.65	180
4	9373.50	-43.46	4.20	12.05	Horizontal	-35.61	-25.00	10.61	135
5	11717.25	-51.90	5.20	14.85	Horizontal	-42.25	-25.00	17.25	90
6	14061.00	-49.50	5.50	13.23	Horizontal	-41.77	-25.00	16.77	270
7	16404.75	-49.60	5.70	14.15	Horizontal	-41.15	-25.00	16.15	45
8	18748.50	--	--	--	--	--	--	--	--
9	21092.25	--	--	--	--	--	--	--	--
10	23436.00	--	--	--	--	--	--	--	--

Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.



LTE Band 41 QPSK 5MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5181.00	-49.56	2.00	9.15	Horizontal	-42.41	-25.00	17.41	315
3	7771.50	-56.67	2.50	11.35	Horizontal	-47.82	-25.00	22.82	0
4	10362.00	-54.61	4.20	12.05	Horizontal	-46.76	-25.00	21.76	45
5	12952.50	-52.30	5.20	12.85	Horizontal	-44.65	-25.00	19.65	315
6	15543.00	-55.57	5.50	14.23	Horizontal	-46.84	-25.00	21.84	90
7	18133.50	--	--	--	--	--	--	--	--
8	20724.00	--	--	--	--	--	--	--	--
9	23314.50	--	--	--	--	--	--	--	--
10	25905.00	--	--	--	--	--	--	--	--

Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

LTE Band 41 QPSK 20MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	5168.00	-48.58	2.00	10.15	Horizontal	-40.43	-25.00	15.43	0
3	7752.00	-56.12	2.50	11.35	Horizontal	-47.27	-25.00	22.27	45
4	10336.00	-56.19	4.20	12.05	Horizontal	-48.34	-25.00	23.34	315
5	12920.00	-54.32	5.20	14.85	Horizontal	-44.67	-25.00	19.67	90
6	15504.00	-54.79	5.50	13.23	Horizontal	-47.06	-25.00	22.06	225
7	18088.00	--	--	--	--	--	--	--	--
8	20672.00	--	--	--	--	--	--	--	--
9	23256.00	--	--	--	--	--	--	--	--
10	25840.00	--	--	--	--	--	--	--	--

Note: 1. The other Spurious RF Radiated emissions level is no more than noise floor.
2. The worst emission was found in the antenna is Horizontal position.

6 Main Test Instruments

Name	Manufacturer	Type	Serial Number	Calibration Date	Expiration Date
Base Station Simulator	R&S	CMW500	113824	2020-05-18	2021-05-17
Power Splitter	Hua Xiang	SHX-GF2-2-13	10120101	/	/
Spectrum Analyzer	Key sight	N9010A	MY50210259	2020-05-18	2021-05-17
Signal Analyzer	R&S	FSV30	100815	2019-12-15	2020-12-14
				2020-12-13	2021-12-12
Loop Antenna	SCHWARZBECK	FMZB1519	1519-047	2020-04-02	2023-04-01
TRILOG Broadband Antenna	SCHWARZBECK	VULB 9163	391	2019-12-16	2021-12-15
Horn Antenna	R&S	HF907	102723	2018-08-11	2021-08-10
Horn Antenna	ETS-Lindgren	3160-09	00102643	2018-06-20	2021-06-19
Signal generator	R&S	SMB 100A	102594	2020-05-18	2021-05-17
Climatic Chamber	ESPEC	SU-242	93000506	2017-12-17	2020-12-16
				2020-12-13	2021-12-12
Preamplifier	R&S	SCU18	102327	2020-05-18	2021-05-17
MOB COMMS DC SUPPLY	Keysight	66319D	MY43004105	2020-05-18	2021-05-17
RF Cable	Agilent	SMA 15cm	0001	2020-06-12	2020-12-11
				2020-12-10	2021-06-09
Software	R&S	EMC32	9.26.0	/	/

*****END OF REPORT *****



ANNEX A: The EUT Appearance

The EUT Appearance are submitted separately.



ANNEX B: Test Setup Photos

The Test Setup Photos are submitted separately.