

CA_7C 16QAM 20MHz+10MHz CH-Low,
100%RBCA_7C 16QAM 20MHz+10MHz CH- High,
100%RB

CA_7C 64QAM 20MHz+10MHz CH-Low, RB 1



CA_7C 64QAM 20MHz+10MHz CH- High, RB 1

CA_7C 64QAM 20MHz+10MHz CH-Low,
100%RBCA_7C 64QAM 20MHz+10MHz CH- High,
100%RB



CA_7C QPSK 20MHz+20MHz CH-Low, RB 1



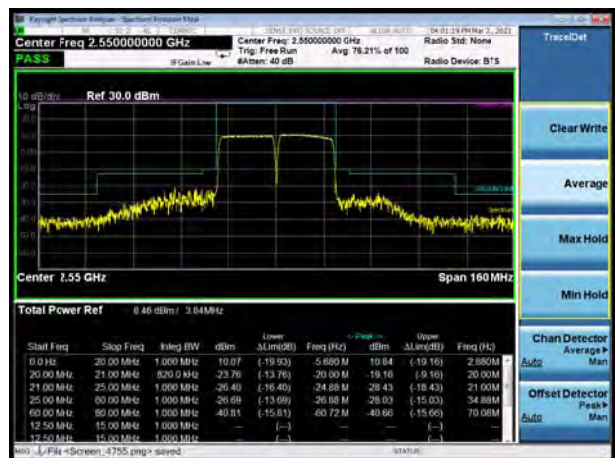
CA_7C QPSK 20MHz+20MHz CH- High, RB 1



CA_7C QPSK 20MHz+20MHz CH-Low, 100%RB



CA_7C QPSK 20MHz+20MHz CH- High, 100%RB



CA_7C 16QAM 20MHz+20MHz CH-Low, RB 1



CA_7C 16QAM 20MHz+20MHz CH- High, RB 1

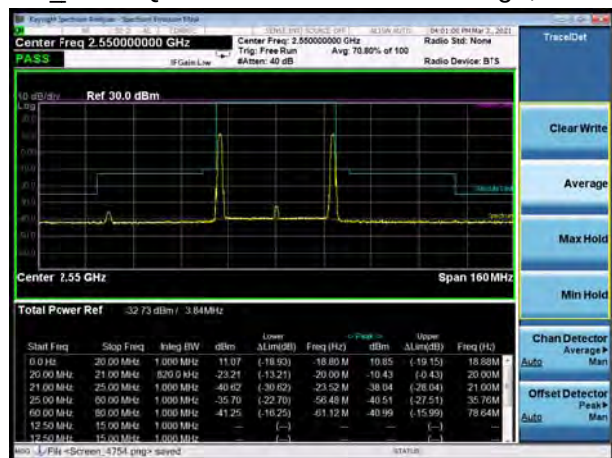


CA_7C 16QAM 20MHz+20MHz CH-Low,
100%RBCA_7C 16QAM 20MHz+20MHz CH- High,
100%RB

CA_7C 64QAM 20MHz+20MHz CH-Low, RB 1



CA_7C 64QAM 20MHz+20MHz CH- High, RB 1

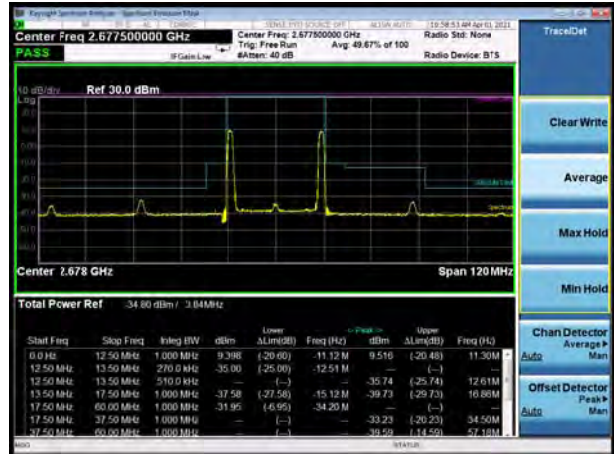
CA_7C 64QAM 20MHz+20MHz CH-Low,
100%RBCA_7C 64QAM 20MHz+20MHz CH- High,
100%RB



CA_41C QPSK 20MHz+5MHz CH-Low, RB 1



CA_41C QPSK 20MHz+5MHz CH- High, RB 1



CA_41C QPSK 20MHz+5MHz CH-Low, 100%RB



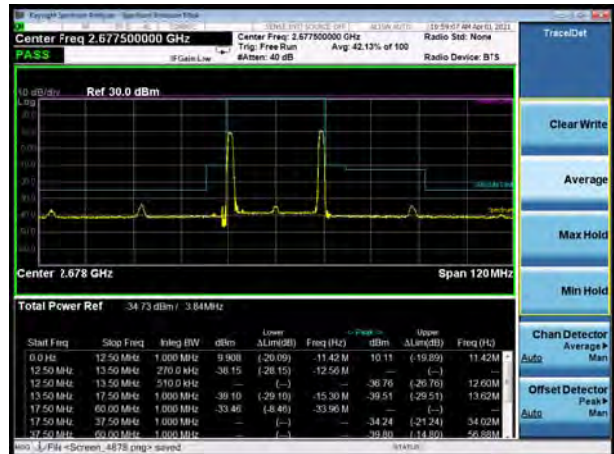
CA_41C QPSK 20MHz+5MHz CH- High, 100%RB



CA_41C 16QAM 20MHz+5MHz CH-Low, RB 1



CA_41C 16QAM 20MHz+5MHz CH- High, RB 1

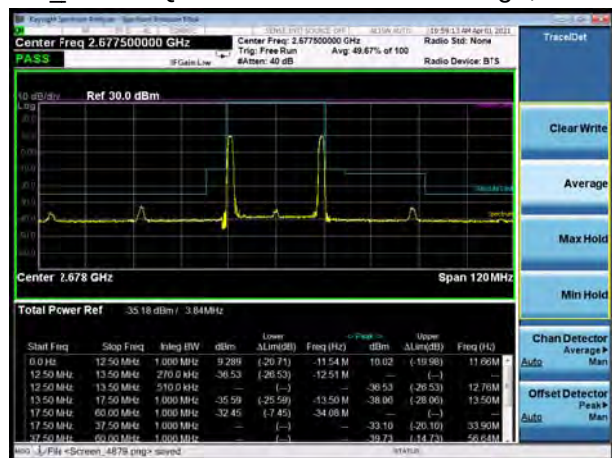


CA_41C 16QAM 20MHz+5MHz CH-Low,
100%RBCA_41C 16QAM 20MHz+5MHz CH- High,
100%RB

CA_41C 64QAM 20MHz+5MHz CH-Low, RB 1



CA_41C 64QAM 20MHz+5MHz CH- High, RB 1

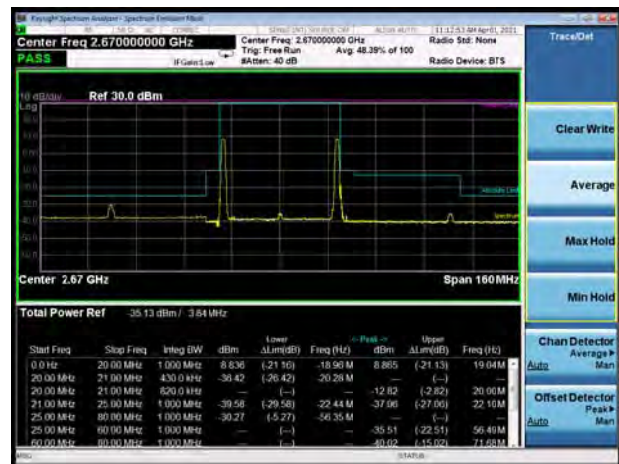
CA_41C 64QAM 20MHz+5MHz CH-Low,
100%RBCA_41C 64QAM 20MHz+5MHz CH- High,
100%RB



CA_41C QPSK 20MHz+20MHz CH-Low, RB 1



CA_41C QPSK 20MHz+20MHz CH- High, RB 1



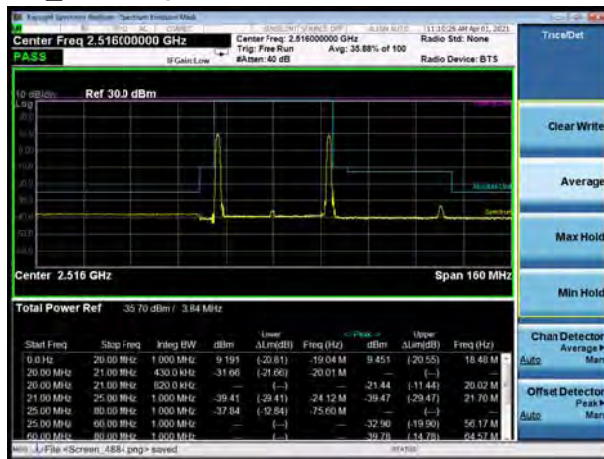
CA_41C QPSK 20MHz+20MHz CH-Low, 100%RB



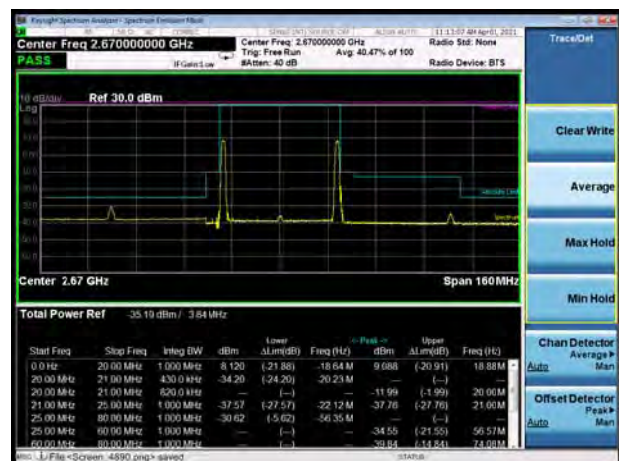
CA_41C QPSK 20MHz+20MHz CH- High, 100%RB



CA_41C 16QAM 20MHz+20MHz CH-Low, RB 1



CA_41C 16QAM 20MHz+20MHz CH- High, RB 1



CA_41C 16QAM 20MHz+20MHz CH-Low,
100%RB



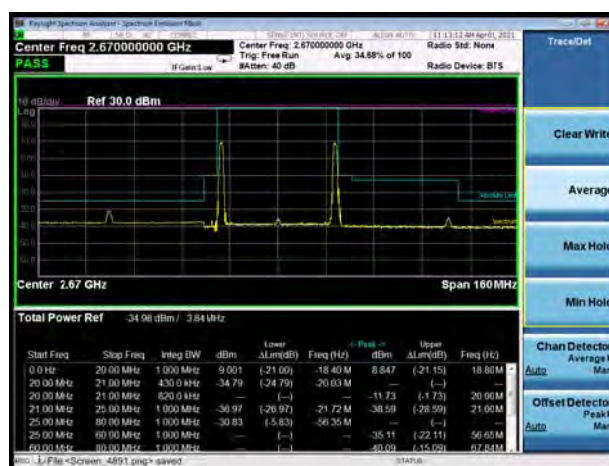
CA_41C 16QAM 20MHz+20MHz CH- High,
100%RB



CA 41C 64OAM 20MHz+20MHz CH-Low, RB 1



CA 41C 64OAM 20MHz+20MHz CH- High, RB 1



CA_41C 64QAM 20MHz+20MHz CH-Low,
100%RB



CA_41C 64QAM 20MHz+20MHz CH- High,
100%RB



5.4 Peak-to-Average Power Ratio (PAPR)

Ambient condition

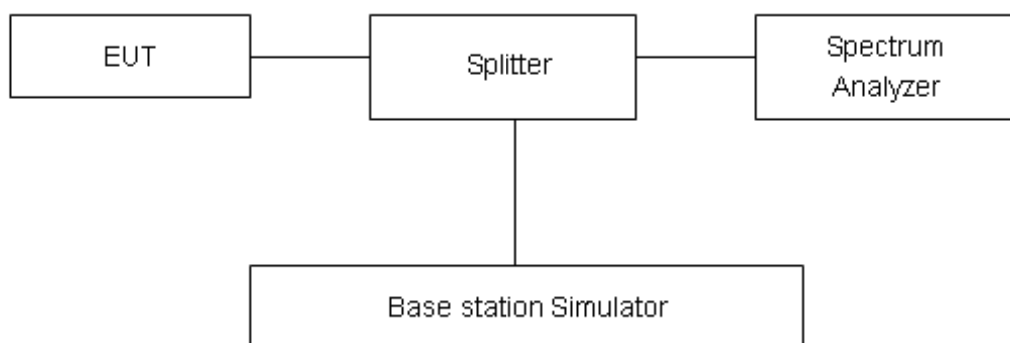
Temperature	Relative humidity	Pressure
23°C ~25°C	45%~50%	101.5kPa

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

WCDMA Band IV	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
RMC	1312	1712.4	25.52	22.70	2.82	≤13	PASS
	1413	1732.6	26.40	23.50	2.90	≤13	PASS
	1513	1752.6	26.35	23.44	2.91	≤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	26.53	22.24	4.29	≤13	PASS
		20175	1732.5	28.22	22.91	5.31	≤13	PASS
		20393	1754.3	28.22	22.89	5.33	≤13	PASS
	3	19965	1711.5	26.38	22.13	4.25	≤13	PASS
		20175	1732.5	28.13	22.96	5.17	≤13	PASS
		20385	1753.5	28.12	22.93	5.19	≤13	PASS
	5	19975	1712.5	26.34	22.08	4.26	≤13	PASS
		20175	1732.5	28.22	23.00	5.22	≤13	PASS
		20375	1752.5	28.15	22.93	5.22	≤13	PASS
	10	20000	1715	26.96	22.54	4.42	≤13	PASS
		20175	1732.5	28.10	22.98	5.12	≤13	PASS
		20350	1750	28.09	22.99	5.10	≤13	PASS
	15	20025	1717.5	28.18	23.05	5.13	≤13	PASS
		20175	1732.5	28.36	23.04	5.32	≤13	PASS
		20325	1747.5	28.43	22.98	5.45	≤13	PASS
	20	20050	1720	28.25	23.13	5.12	≤13	PASS
		20175	1732.5	28.18	23.07	5.11	≤13	PASS
		20300	1745	28.33	23.05	5.28	≤13	PASS
16QAM	1.4	19957	1710.7	26.52	21.22	5.30	≤13	PASS
		20175	1732.5	27.86	21.95	5.91	≤13	PASS
		20393	1754.3	27.98	21.87	6.11	≤13	PASS
	3	19965	1711.5	26.41	21.20	5.21	≤13	PASS
		20175	1732.5	28.04	22.01	6.03	≤13	PASS
		20385	1753.5	27.98	21.98	6.00	≤13	PASS
	5	19975	1712.5	26.38	21.17	5.21	≤13	PASS
		20175	1732.5	28.02	22.03	5.99	≤13	PASS
		20375	1752.5	27.87	21.96	5.91	≤13	PASS
	10	20000	1715	26.98	21.63	5.35	≤13	PASS
		20175	1732.5	27.95	22.03	5.92	≤13	PASS



	15	20350	1750	27.88	21.99	5.89	≤13	PASS
		20025	1717.5	27.99	22.07	5.92	≤13	PASS
		20175	1732.5	28.06	22.05	6.01	≤13	PASS
		20325	1747.5	28.13	22.03	6.10	≤13	PASS
	20	20050	1720	28.14	22.08	6.06	≤13	PASS
		20175	1732.5	27.97	22.05	5.92	≤13	PASS
		20300	1745	28.09	22.04	6.05	≤13	PASS
64QAM	1.4	19957	1710.7	25.90	20.58	5.32	≤13	PASS
		20175	1732.5	27.46	21.38	6.08	≤13	PASS
		20393	1754.3	27.44	21.33	6.11	≤13	PASS
	3	19965	1711.5	25.80	20.58	5.22	≤13	PASS
		20175	1732.5	27.46	21.46	6.00	≤13	PASS
		20385	1753.5	27.43	21.44	5.99	≤13	PASS
	5	19975	1712.5	25.79	20.57	5.22	≤13	PASS
		20175	1732.5	27.49	21.46	6.03	≤13	PASS
		20375	1752.5	27.33	21.41	5.92	≤13	PASS
	10	20000	1715	26.41	21.08	5.33	≤13	PASS
		20175	1732.5	27.39	21.46	5.93	≤13	PASS
		20350	1750	27.32	21.44	5.88	≤13	PASS
	15	20025	1717.5	27.43	21.50	5.93	≤13	PASS
		20175	1732.5	27.52	21.49	6.03	≤13	PASS
		20325	1747.5	27.56	21.48	6.08	≤13	PASS
	20	20050	1720	27.56	21.55	6.01	≤13	PASS
		20175	1732.5	27.43	21.50	5.93	≤13	PASS
		20300	1745	27.54	21.50	6.04	≤13	PASS

LTE Band 7								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	5	20775	2502.5	27.55	23.11	4.44	≤13	PASS
		21100	2535	27.89	22.90	4.99	≤13	PASS
		21425	2567.5	27.78	22.83	4.95	≤13	PASS
	10	20800	2505	27.97	23.11	4.86	≤13	PASS
		21100	2535	27.93	22.88	5.05	≤13	PASS
		21400	2565	27.91	22.76	5.15	≤13	PASS
	15	20825	2507.5	28.35	23.06	5.29	≤13	PASS



		21100	2535	28.20	22.90	5.30	≤13	PASS
		21375	2562.5	28.24	22.86	5.38	≤13	PASS
	20	20850	2510	28.23	23.09	5.14	≤13	PASS
		21100	2535	28.14	22.92	5.22	≤13	PASS
		21350	2560	27.99	22.81	5.18	≤13	PASS
16QAM	5	20775	2502.5	27.53	22.15	5.38	≤13	PASS
		21100	2535	27.87	21.93	5.94	≤13	PASS
		21425	2567.5	27.76	21.87	5.89	≤13	PASS
	10	20800	2505	27.91	22.08	5.83	≤13	PASS
		21100	2535	27.87	21.90	5.97	≤13	PASS
		21400	2565	27.76	21.79	5.97	≤13	PASS
	15	20825	2507.5	28.18	22.11	6.07	≤13	PASS
		21100	2535	28.03	21.92	6.11	≤13	PASS
		21375	2562.5	27.94	21.88	6.06	≤13	PASS
	20	20850	2510	28.05	22.11	5.94	≤13	PASS
		21100	2535	27.89	21.90	5.99	≤13	PASS
		21350	2560	27.74	21.81	5.93	≤13	PASS
64QAM	5	20775	2502.5	27.04	21.57	5.47	≤13	PASS
		21100	2535	27.30	21.34	5.96	≤13	PASS
		21425	2567.5	27.22	21.31	5.91	≤13	PASS
	10	20800	2505	27.35	21.55	5.80	≤13	PASS
		21100	2535	27.28	21.36	5.92	≤13	PASS
		21400	2565	27.21	21.26	5.95	≤13	PASS
	15	20825	2507.5	27.61	21.54	6.07	≤13	PASS
		21100	2535	27.45	21.35	6.10	≤13	PASS
		21375	2562.5	27.42	21.34	6.08	≤13	PASS
	20	20850	2510	27.49	21.42	6.07	≤13	PASS
		21100	2535	27.36	21.36	6.00	≤13	PASS
		21350	2560	27.29	21.31	5.98	≤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	27.96	23.37	4.59	≤13	PASS
		23095	707.5	28.62	23.31	5.31	≤13	PASS
		23173	715.3	28.52	23.30	5.22	≤13	PASS



	3	23025	700.5	28.18	23.46	4.72	≤13	PASS
		23095	707.5	28.54	23.39	5.15	≤13	PASS
		23165	714.5	28.20	23.32	4.88	≤13	PASS
	5	23035	701.5	28.25	23.48	4.77	≤13	PASS
		23095	707.5	28.58	23.43	5.15	≤13	PASS
		23155	713.5	27.91	23.40	4.51	≤13	PASS
	10	23060	704	28.50	23.50	5.00	≤13	PASS
		23095	707.5	28.40	23.43	4.97	≤13	PASS
		23130	711	28.31	23.40	4.91	≤13	PASS
16QAM	1.4	23017	699.7	28.17	22.35	5.82	≤13	PASS
		23095	707.5	28.38	22.28	6.10	≤13	PASS
		23173	715.3	28.46	22.32	6.14	≤13	PASS
	3	23025	700.5	28.17	22.51	5.66	≤13	PASS
		23095	707.5	28.45	22.41	6.04	≤13	PASS
		23165	714.5	28.19	22.38	5.81	≤13	PASS
	5	23035	701.5	28.26	22.47	5.79	≤13	PASS
		23095	707.5	28.43	22.46	5.97	≤13	PASS
		23155	713.5	27.92	22.41	5.51	≤13	PASS
	10	23060	704	28.40	22.51	5.89	≤13	PASS
		23095	707.5	28.33	22.42	5.91	≤13	PASS
		23130	711	28.17	22.39	5.78	≤13	PASS
64QAM	1.4	23017	699.7	27.65	21.81	5.84	≤13	PASS
		23095	707.5	27.89	21.77	6.12	≤13	PASS
		23173	715.3	27.90	21.77	6.13	≤13	PASS
	3	23025	700.5	27.67	21.85	5.82	≤13	PASS
		23095	707.5	27.87	21.89	5.98	≤13	PASS
		23165	714.5	27.60	21.80	5.80	≤13	PASS
	5	23035	701.5	27.72	21.93	5.79	≤13	PASS
		23095	707.5	27.83	21.89	5.94	≤13	PASS
		23155	713.5	27.41	21.90	5.51	≤13	PASS
	10	23060	704	27.86	21.98	5.88	≤13	PASS
		23095	707.5	27.77	21.93	5.84	≤13	PASS
		23130	711	27.66	21.88	5.78	≤13	PASS

LTE Band 17								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	5	23755	779.5	28.78	23.50	5.28	≤13	PASS
		23790	782	28.49	23.41	5.08	≤13	PASS
		23825	784.5	28.40	23.36	5.04	≤13	PASS



16QAM	10	23780	782	28.57	23.48	5.09	≤13	PASS
		23790	782	28.54	23.38	5.16	≤13	PASS
		23800	782	28.52	23.34	5.18	≤13	PASS
	5	23755	779.5	28.49	22.48	6.01	≤13	PASS
		23790	782	28.35	22.44	5.91	≤13	PASS
		23825	784.5	28.35	22.38	5.97	≤13	PASS
	10	23780	782	28.37	22.44	5.93	≤13	PASS
		23790	782	28.32	22.39	5.93	≤13	PASS
		23800	782	28.39	22.39	6.00	≤13	PASS
64QAM	5	23755	779.5	27.90	21.92	5.98	≤13	PASS
		23790	782	27.78	21.85	5.93	≤13	PASS
		23825	784.5	27.77	21.79	5.98	≤13	PASS
	10	23780	782	27.84	21.91	5.93	≤13	PASS
		23790	782	27.83	21.87	5.96	≤13	PASS
		23800	782	27.79	21.82	5.97	≤13	PASS

LTE Band 38								
Modulation	Bandwidth (MHz)	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	5	37775	2572.5	28.02	20.01	8.01	≤13	PASS
		38000	2595	27.75	18.21	9.54	≤13	PASS
		38225	2617.5	27.79	18.32	9.47	≤13	PASS
	10	37800	2575	27.75	18.20	9.55	≤13	PASS
		38000	2595	27.76	18.48	9.28	≤13	PASS
		38200	2615	27.71	18.03	9.68	≤13	PASS
	15	37825	2577.5	28.12	19.45	8.67	≤13	PASS
		38000	2595	28.10	19.24	8.86	≤13	PASS
		38175	2612.5	28.14	18.98	9.16	≤13	PASS
	20	37850	2580	27.71	18.09	9.62	≤13	PASS
		38000	2595	27.80	18.97	8.83	≤13	PASS
		38150	2610	27.91	18.81	9.10	≤13	PASS
16QAM	5	37775	2572.5	27.56	18.27	9.29	≤13	PASS
		38000	2595	27.60	18.14	9.46	≤13	PASS
		38225	2617.5	27.64	18.65	8.99	≤13	PASS
	10	37800	2575	27.59	17.82	9.77	≤13	PASS
		38000	2595	27.48	17.98	9.50	≤13	PASS
		38200	2615	27.51	17.19	10.32	≤13	PASS



64QAM	15	37825	2577.5	27.67	17.06	10.61	≤13	PASS
		38000	2595	27.74	18.22	9.52	≤13	PASS
		38175	2612.5	27.77	18.04	9.73	≤13	PASS
	20	37850	2580	27.62	18.59	9.03	≤13	PASS
		38000	2595	27.60	18.10	9.50	≤13	PASS
		38150	2610	27.69	17.90	9.79	≤13	PASS
	5	37775	2572.5	26.84	16.25	10.59	≤13	PASS
		38000	2595	27.05	18.11	8.94	≤13	PASS
		38225	2617.5	27.03	18.01	9.02	≤13	PASS
	10	37800	2575	26.98	17.49	9.49	≤13	PASS
		38000	2595	26.84	16.15	10.69	≤13	PASS
		38200	2615	26.88	16.37	10.51	≤13	PASS
	15	37825	2577.5	27.20	18.05	9.15	≤13	PASS
		38000	2595	27.03	16.69	10.34	≤13	PASS
		38175	2612.5	27.20	17.98	9.22	≤13	PASS
	20	37850	2580	27.05	18.22	8.83	≤13	PASS
		38000	2595	26.89	16.41	10.48	≤13	PASS
		38150	2610	27.14	18.38	8.76	≤13	PASS

LTE Band 41								
Modulation	Bandwidth ((MHz))	Channel	Frequency (MHz)	Peak (dBm)	Avg (dBm)	PAPR (dB)	Limit (dB)	Conclusion
QPSK	5	39675	2498.5	29.36	21.33	8.03	≤13	PASS
		40620	2593	29.19	20.01	9.18	≤13	PASS
		41565	2687.5	29.17	19.80	9.37	≤13	PASS
	10	39700	2501	29.20	20.26	8.94	≤13	PASS
		40620	2593	29.13	21.03	8.10	≤13	PASS
		41540	2685	29.02	19.86	9.16	≤13	PASS
	15	39725	2503.5	29.57	21.61	7.96	≤13	PASS
		40620	2593	29.46	21.27	8.19	≤13	PASS
		41515	2682.5	29.30	19.99	9.31	≤13	PASS
	20	39750	2506	29.09	19.76	9.33	≤13	PASS
		40620	2593	29.07	20.34	8.73	≤13	PASS
		41490	2680	29.18	20.40	8.78	≤13	PASS
16QAM	5	39675	2498.5	30.02	19.67	10.35	≤13	PASS



64QAM		40620	2593	29.80	19.95	9.85	≤13	PASS
		41565	2687.5	29.92	19.91	10.01	≤13	PASS
		39700	2501	29.89	18.74	11.15	≤13	PASS
	10	40620	2593	29.80	19.64	10.16	≤13	PASS
		41540	2685	29.84	20.17	9.67	≤13	PASS
		39725	2503.5	30.14	20.68	9.46	≤13	PASS
	15	40620	2593	29.97	19.97	10.00	≤13	PASS
		41515	2682.5	30.09	21.04	9.05	≤13	PASS
		39750	2506	29.97	20.43	9.54	≤13	PASS
	20	40620	2593	29.84	20.64	9.20	≤13	PASS
		41490	2680	29.90	20.33	9.57	≤13	PASS
		39675	2498.5	29.41	19.56	9.85	≤13	PASS
	5	40620	2593	29.15	19.11	10.04	≤13	PASS
		41565	2687.5	29.31	19.80	9.51	≤13	PASS
		39700	2501	29.42	20.12	9.30	≤13	PASS

64QAM

Bandwidth	PCC		SCC1		Modulation	Peak-to-Average Power Ratio (PAPR)		
	Channel	Frequency (MHz)	Channel	Frequency (MHz)		Peak (dBm)	Avg (dBm)	PAPR (dB)
CA_7C_10MHz+20MHz_QPSK	21006	2525.6	21150	2540	QPSK	26.93	20.93	6.00
CA_7C_10MHz+20MHz_16QAM	21006	2525.6	21150	2540	16QAM	26.67	19.83	6.84
CA_7C_10MHz+20MHz_64QAM	21006	2525.6	21150	2540	64QAM	26.62	19.81	6.81
CA_7C_20MHz+10MHz_QPSK	21051	2530.1	21195	2544.5	QPSK	27.25	21.23	6.02
CA_7C_20MHz+10MHz_16QAM	21051	2530.1	21195	2544.5	16QAM	26.93	20.15	6.78
CA_7C_20MHz+10MHz_64QAM	21051	2530.1	21195	2544.5	64QAM	26.91	20.15	6.76
CA_7C_15MHz+10MHz_QPSK	21051	2530.1	21171	2542.1	QPSK	27.68	21.77	5.91
CA_7C_15MHz+10MHz_16QAM	21051	2530.1	21171	2542.1	16QAM	27.30	20.64	6.66
CA_7C_15MHz+10MHz_64QAM	21051	2530.1	21171	2542.1	64QAM	27.33	20.66	6.67
CA_7C_15MHz+15MHz_QPSK	21025	2527.5	21175	2542.5	QPSK	26.92	20.74	6.18



CA_7C_15MHz+15MHz_16QAM	21025	2527.5	21175	2542.5	16QAM	26.88	19.97	6.91
CA_7C_15MHz+15MHz_64QAM	21025	2527.5	21175	2542.5	64QAM	29.82	19.91	9.91
CA_7C_15MHz+20MHz_QPSK	21003	2525.3	21174	2542.4	QPSK	26.78	20.44	6.34
CA_7C_15MHz+20MHz_16QAM	21003	2525.3	21174	2542.4	16QAM	26.38	19.28	7.10
CA_7C_15MHz+20MHz_64QAM	21003	2525.3	21174	2542.4	64QAM	26.42	19.37	7.05
CA_7C_20MHz+15MHz_QPSK	21026	2527.6	21197	2544.7	QPSK	26.96	20.65	6.31
CA_7C_20MHz+15MHz_16QAM	21026	2527.6	21197	2544.7	16QAM	26.55	19.49	7.06
CA_7C_20MHz+15MHz_64QAM	21026	2527.6	21197	2544.7	64QAM	26.50	19.42	7.08
CA_7C_20MHz+20MHz_QPSK	21001	2525.1	21199	2544.9	QPSK	26.69	20.15	6.54
CA_7C_20MHz+20MHz_16QAM	21001	2525.1	21199	2544.9	16QAM	26.15	18.96	7.19
CA_7C_20MHz+20MHz_64QAM	21001	2525.1	21199	2544.9	64QAM	26.19	19.02	7.17

Bandwidth	PCC		SCC1		Modulation	Peak-to-Average Power Ratio (PAPR)		
	Channel	Frequency (MHz)	Channel	Frequency (MHz)		Peak (dBm)	Avg (dBm)	PAPR (dB)
CA_41C_5MHz+20MHz_QPSK	40528	2583.8	40645	2595.5	QPSK	26.79	16.28	10.51
CA_41C_5MHz+20MHz_16QAM	40528	2583.8	40645	2595.5	16QAM	26.44	15.90	10.54
CA_41C_5MHz+20MHz_64QAM	40528	2583.8	40645	2595.5	64QAM	26.44	15.94	10.50
CA_41C_20MHz+5MHz_QPSK	40595	2590.5	40712	2602.2	QPSK	26.87	16.47	10.40
CA_41C_20MHz+5MHz_16QAM	40595	2590.5	40712	2602.2	16QAM	26.43	15.86	10.57
CA_41C_20MHz+5MHz_64QAM	40595	2590.5	40712	2602.2	64QAM	26.48	15.88	10.60
CA_41C_10MHz+20MHz_QPSK	40526	2583.6	40670	2598	QPSK	26.20	15.86	10.34
CA_41C_10MHz+20MHz_16QAM	40526	2583.6	40670	2598	16QAM	26.03	15.53	10.50
CA_41C_10MHz+20MHz_64QAM	40526	2583.6	40670	2598	64QAM	25.99	15.26	10.73
CA_41C_20MHz+10MHz_QPSK	40571	2588.1	40715	2602.5	QPSK	26.40	16.97	9.43
CA_41C_20MHz+10MHz_16QAM	40571	2588.1	40715	2602.5	16QAM	25.97	15.45	10.52
CA_41C_20MHz+10MHz_64QAM	40571	2588.1	40715	2602.5	64QAM	25.96	15.45	10.51
CA_41C_15MHz+15MHz_QPSK	40545	2585.5	40695	2600.5	QPSK	26.46	15.93	10.53
CA_41C_15MHz+15MHz_16QAM	40545	2585.5	40695	2600.5	16QAM	26.18	15.73	10.45
CA_41C_15MHz+15MHz_64QAM	40545	2585.5	40695	2600.5	64QAM	26.06	15.54	10.52
CA_41C_15MHz+20MHz_QPSK	40523	2583.3	40694	2600.4	QPSK	25.93	16.40	9.53
CA_41C_15MHz+20MHz_16QAM	40523	2583.3	40694	2600.4	16QAM	25.51	15.16	10.35
CA_41C_15MHz+20MHz_64QAM	40523	2583.3	40694	2600.4	64QAM	25.54	14.97	10.57
CA_41C_20MHz+15MHz_QPSK	40546	2585.6	40717	2602.7	QPSK	25.96	15.53	10.43
CA_41C_20MHz+15MHz_16QAM	40546	2585.6	40717	2602.7	16QAM	25.61	14.98	10.63
CA_41C_20MHz+15MHz_64QAM	40546	2585.6	40717	2602.7	64QAM	25.63	15.02	10.61
CA_41C_20MHz+20MHz_QPSK	40521	2583.1	40719	2602.9	QPSK	25.68	15.22	10.46
CA_41C_20MHz+20MHz_16QAM	40521	2583.1	40719	2602.9	16QAM	25.16	14.36	10.80
CA_41C_20MHz+20MHz_64QAM	40521	2583.1	40719	2602.9	64QAM	25.13	14.21	10.92

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.

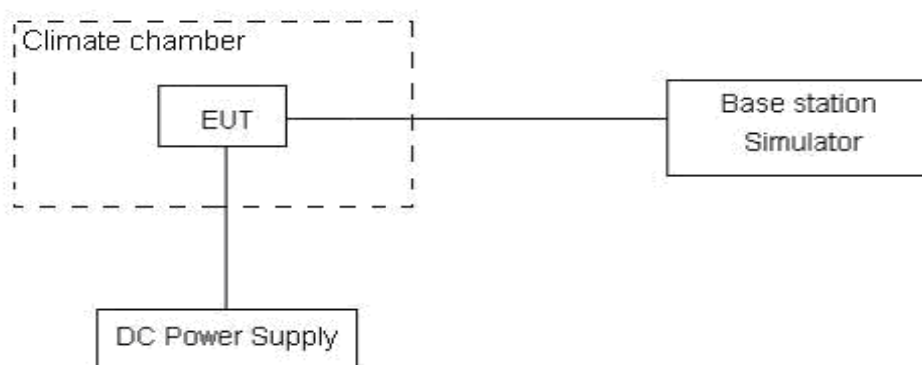
Frequency Stability (Voltage Variation)

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 3.4 V and 4.2 V, with a nominal voltage of 3.85V.

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

WCDMA Band IV						
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
Temperature	Voltage	BPSK	QPSK	BPSK	QPSK	
Normal (25℃)	Normal	4.37	16.58	0.00233	0.00882	PASS
Extreme (50℃)		12.92	13.00	0.00687	0.00692	PASS
Extreme (40℃)		9.07	11.23	0.00482	0.00597	PASS
Extreme (30℃)		10.66	4.51	0.00567	0.00240	PASS
Extreme (20℃)		4.67	10.62	0.00248	0.00565	PASS
Extreme (10℃)		3.73	2.44	0.00198	0.00130	PASS
Extreme (0℃)		14.76	4.29	0.00785	0.00228	PASS
Extreme (-10℃)		6.14	9.23	0.00327	0.00491	PASS
Extreme (-20℃)		17.69	10.35	0.00941	0.00551	PASS
Extreme (-30℃)		12.83	9.86	0.00682	0.00524	PASS
25℃	LV	8.60	11.48	0.00457	0.00611	PASS
	HV	2.14	12.82	0.00114	0.00682	PASS

LTE Band 4								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	17.51	6.10	4.47	0.00931	0.00325	0.00238	PASS
Extreme (50℃)		10.53	8.59	10.20	0.00560	0.00457	0.00542	PASS
Extreme (40℃)		4.15	6.45	9.59	0.00221	0.00343	0.00510	PASS
Extreme (30℃)		15.62	10.68	10.27	0.00831	0.00568	0.00546	PASS
Extreme (20℃)		10.49	4.76	17.88	0.00558	0.00253	0.00951	PASS
Extreme (10℃)		3.20	14.94	5.94	0.00170	0.00795	0.00316	PASS
Extreme (0℃)		1.65	14.90	4.57	0.00088	0.00793	0.00243	PASS
Extreme (-10℃)		7.54	3.18	7.76	0.00401	0.00169	0.00413	PASS
Extreme (-20℃)		14.94	17.24	4.36	0.00794	0.00917	0.00232	PASS
Extreme (-30℃)		2.98	15.72	6.24	0.00159	0.00836	0.00332	PASS
25℃	LV	8.82	15.92	10.95	0.00469	0.00847	0.00582	PASS
	HV	4.76	14.62	17.62	0.00253	0.00778	0.00937	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	16.55	8.94	3.60	0.00881	0.00475	0.00192	PASS



Extreme (50℃)		17.13	1.28	17.57	0.00911	0.00068	0.00935	PASS
Extreme (40℃)		10.35	10.85	3.74	0.00550	0.00577	0.00199	PASS
Extreme (30℃)		5.04	9.37	12.84	0.00268	0.00498	0.00683	PASS
Extreme (20℃)		1.53	1.54	3.74	0.00082	0.00082	0.00199	PASS
Extreme (10℃)		9.07	14.90	14.41	0.00482	0.00792	0.00767	PASS
Extreme (0℃)		4.47	3.74	11.33	0.00238	0.00199	0.00603	PASS
Extreme (-10℃)		7.02	8.67	11.67	0.00373	0.00461	0.00621	PASS
Extreme (-20℃)		15.63	14.59	6.14	0.00831	0.00776	0.00326	PASS
Extreme (-30℃)		8.34	1.64	15.34	0.00444	0.00087	0.00816	PASS
25℃	LV	10.55	17.86	10.58	0.00561	0.00950	0.00563	PASS
	HV	6.13	10.30	15.57	0.00326	0.00548	0.00828	PASS
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	12.40	13.19	11.10	0.00659	0.00701	0.00590	PASS
Extreme (50℃)		1.79	15.65	16.10	0.00095	0.00832	0.00856	PASS
Extreme (40℃)		17.97	17.21	17.02	0.00956	0.00915	0.00905	PASS
Extreme (30℃)		12.38	11.33	7.63	0.00659	0.00603	0.00406	PASS
Extreme (20℃)		13.32	16.30	9.04	0.00709	0.00867	0.00481	PASS
Extreme (10℃)		3.27	5.64	5.43	0.00174	0.00300	0.00289	PASS
Extreme (0℃)		2.68	16.73	13.10	0.00142	0.00890	0.00697	PASS
Extreme (-10℃)		13.59	13.79	3.96	0.00723	0.00733	0.00211	PASS
Extreme (-20℃)		3.25	17.92	9.45	0.00173	0.00953	0.00503	PASS
Extreme (-30℃)		18.00	8.80	11.36	0.00957	0.00468	0.00604	PASS
25℃	LV	4.76	9.65	13.25	0.00253	0.00513	0.00705	PASS
	HV	1.38	1.75	5.69	0.00073	0.00093	0.00303	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℃)	Normal	2.01	13.15	1.64	0.00107	0.00700	0.00087	PASS
Extreme (50℃)		3.32	4.37	2.80	0.00177	0.00233	0.00149	PASS
Extreme (40℃)		8.76	9.93	12.70	0.00466	0.00528	0.00675	PASS
Extreme (30℃)		7.95	12.46	9.17	0.00423	0.00663	0.00488	PASS
Extreme (20℃)		2.75	14.90	4.71	0.00146	0.00792	0.00251	PASS
Extreme (10℃)		5.17	3.58	3.48	0.00275	0.00190	0.00185	PASS
Extreme (0℃)		4.67	8.86	8.81	0.00248	0.00471	0.00468	PASS
Extreme (-10℃)		10.00	15.81	15.60	0.00532	0.00841	0.00830	PASS
Extreme (-20℃)		4.64	16.93	16.95	0.00247	0.00901	0.00902	PASS
Extreme (-30℃)		5.59	14.59	6.53	0.00298	0.00776	0.00348	PASS



25℃	LV	9.25	1.00	7.15	0.00492	0.00053	0.00380	PASS
	HV	6.44	9.27	5.62	0.00342	0.00493	0.00299	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	6.52	3.70	12.08	0.00347	0.00197	0.00642	PASS
Extreme (50℃)		7.43	5.95	11.48	0.00395	0.00316	0.00611	PASS
Extreme (40℃)		16.13	14.16	3.20	0.00858	0.00753	0.00170	PASS
Extreme (30℃)		14.45	5.06	9.88	0.00768	0.00269	0.00525	PASS
Extreme (20℃)		16.88	8.75	11.98	0.00898	0.00466	0.00637	PASS
Extreme (10℃)		16.64	17.47	6.61	0.00885	0.00929	0.00351	PASS
Extreme (0℃)		8.39	12.72	17.61	0.00446	0.00677	0.00937	PASS
Extreme (-10℃)		5.73	13.59	5.08	0.00305	0.00723	0.00270	PASS
Extreme (-20℃)		11.98	12.65	15.94	0.00637	0.00673	0.00848	PASS
Extreme (-30℃)		6.02	17.10	1.88	0.00320	0.00909	0.00100	PASS
25℃	LV	9.41	1.78	9.85	0.00501	0.00095	0.00524	PASS
	HV	10.54	12.52	9.27	0.00560	0.00666	0.00493	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	5.83	15.69	2.54	0.00310	0.00834	0.00135	PASS
Extreme (50℃)		2.06	8.19	7.75	0.00110	0.00436	0.00412	PASS
Extreme (40℃)		3.79	16.73	13.27	0.00202	0.00890	0.00706	PASS
Extreme (30℃)		3.44	3.55	15.75	0.00183	0.00189	0.00838	PASS
Extreme (20℃)		11.02	4.94	10.03	0.00586	0.00263	0.00533	PASS
Extreme (10℃)		17.72	2.70	15.13	0.00943	0.00144	0.00805	PASS
Extreme (0℃)		12.61	17.55	3.01	0.00671	0.00934	0.00160	PASS
Extreme (-10℃)		2.13	7.04	8.11	0.00113	0.00374	0.00432	PASS
Extreme (-20℃)		12.55	2.30	6.96	0.00667	0.00122	0.00370	PASS
Extreme (-30℃)		14.19	10.27	1.31	0.00755	0.00546	0.00070	PASS
25℃	LV	5.92	7.22	11.81	0.00315	0.00384	0.00628	PASS
	HV	15.19	5.55	13.51	0.00808	0.00295	0.00718	PASS

LTE Band 7								
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	6.94	8.65	10.23	0.00369	0.00460	0.00544	PASS
Extreme (50℃)		9.71	15.59	11.84	0.00516	0.00829	0.00630	PASS
Extreme (40℃)		10.15	2.06	12.83	0.00540	0.00110	0.00683	PASS
Extreme (30℃)		8.10	6.72	11.55	0.00431	0.00357	0.00615	PASS
Extreme (20℃)		7.49	7.29	15.78	0.00399	0.00388	0.00840	PASS
Extreme (10℃)		6.19	3.71	9.43	0.00329	0.00197	0.00501	PASS
Extreme (0℃)		10.41	1.61	6.48	0.00554	0.00086	0.00344	PASS
Extreme (-10℃)		6.19	11.08	10.12	0.00329	0.00590	0.00538	PASS
Extreme (-20℃)		10.15	9.85	14.70	0.00540	0.00524	0.00782	PASS
Extreme (-30℃)		3.13	17.86	14.82	0.00167	0.00950	0.00788	PASS
25℃	LV	6.47	7.36	16.08	0.00344	0.00392	0.00855	PASS
	HV	17.73	3.81	14.38	0.00943	0.00202	0.00765	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℃)	Normal	12.12	7.00	1.11	0.00644	0.00372	0.00059	PASS
Extreme (50℃)		15.96	6.43	7.11	0.00849	0.00342	0.00378	PASS
Extreme (40℃)		1.50	1.93	11.23	0.00080	0.00103	0.00597	PASS
Extreme (30℃)		11.11	12.31	1.13	0.00591	0.00655	0.00060	PASS
Extreme (20℃)		17.47	8.59	13.95	0.00929	0.00457	0.00742	PASS
Extreme (10℃)		7.04	14.73	7.06	0.00375	0.00784	0.00376	PASS
Extreme (0℃)		11.15	5.39	6.69	0.00593	0.00287	0.00356	PASS
Extreme (-10℃)		8.52	9.87	17.05	0.00453	0.00525	0.00907	PASS
Extreme (-20℃)		7.70	2.49	3.12	0.00410	0.00132	0.00166	PASS
Extreme (-30℃)		17.29	11.69	6.28	0.00920	0.00622	0.00334	PASS
25℃	LV	4.53	13.94	3.30	0.00241	0.00742	0.00175	PASS
	HV	9.63	1.22	5.92	0.00512	0.00065	0.00315	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	5.57	12.99	13.75	0.00296	0.00691	0.00731	PASS
Extreme (50℃)		14.08	16.17	14.68	0.00749	0.00860	0.00781	PASS
Extreme (40℃)		6.95	5.48	14.54	0.00370	0.00292	0.00774	PASS
Extreme (30℃)		14.21	17.98	3.66	0.00756	0.00957	0.00195	PASS
Extreme (20℃)		15.77	7.02	1.55	0.00839	0.00373	0.00082	PASS
Extreme (10℃)		9.79	17.98	14.53	0.00521	0.00956	0.00773	PASS
Extreme (0℃)		11.53	1.86	7.17	0.00613	0.00099	0.00382	PASS
Extreme (-10℃)		14.54	12.60	12.21	0.00773	0.00670	0.00649	PASS
Extreme (-20℃)		10.01	10.26	17.55	0.00532	0.00546	0.00934	PASS



Extreme (-30℃)		17.00	6.39	10.31	0.00904	0.00340	0.00548	PASS
25℃	LV	10.21	9.45	15.48	0.00543	0.00502	0.00824	PASS
	HV	6.12	11.16	14.25	0.00326	0.00594	0.00758	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	15.08	1.74	8.13	0.00802	0.00093	0.00432	PASS
Extreme (50℃)		2.85	4.98	11.38	0.00151	0.00265	0.00605	PASS
Extreme (40℃)		13.04	9.92	11.90	0.00693	0.00528	0.00633	PASS
Extreme (30℃)		6.36	2.46	13.08	0.00338	0.00131	0.00696	PASS
Extreme (20℃)		8.70	9.71	2.25	0.00463	0.00516	0.00120	PASS
Extreme (10℃)		4.55	2.30	11.72	0.00242	0.00122	0.00623	PASS
Extreme (0℃)		14.76	5.94	10.17	0.00785	0.00316	0.00541	PASS
Extreme (-10℃)		11.21	6.59	6.85	0.00596	0.00351	0.00364	PASS
Extreme (-20℃)		3.75	17.71	11.35	0.00199	0.00942	0.00604	PASS
Extreme (-30℃)		8.24	7.18	15.15	0.00438	0.00382	0.00806	PASS
25℃	LV	3.84	16.04	12.74	0.00204	0.00853	0.00678	PASS
	HV	14.56	12.46	7.42	0.00774	0.00663	0.00395	PASS

LTE Band 12								
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	1.4MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	6.70	5.72	8.04	0.00356	0.00304	0.00428	PASS
Extreme (50℃)		2.92	15.58	14.90	0.00155	0.00829	0.00792	PASS
Extreme (40℃)		11.68	5.38	11.80	0.00621	0.00286	0.00628	PASS
Extreme (30℃)		7.86	1.21	16.10	0.00418	0.00065	0.00856	PASS
Extreme (20℃)		5.58	5.81	10.73	0.00297	0.00309	0.00571	PASS
Extreme (10℃)		13.44	10.11	11.44	0.00715	0.00538	0.00609	PASS
Extreme (0℃)		11.22	2.25	7.61	0.00597	0.00120	0.00405	PASS
Extreme (-10℃)		5.17	10.26	13.50	0.00275	0.00546	0.00718	PASS
Extreme (-20℃)		1.88	9.29	16.94	0.00100	0.00494	0.00901	PASS
Extreme (-30℃)		5.45	3.81	6.56	0.00290	0.00202	0.00349	PASS
25℃	LV	16.54	11.07	11.65	0.00880	0.00589	0.00620	PASS
	HV	9.33	13.63	6.32	0.00496	0.00725	0.00336	PASS
Condition		Freq.Error (Hz)	Freq.Error (Hz)	Freq.Error (Hz)	Frequency Stability (ppm)	Frequency Stability (ppm)	Frequency Stability (ppm)	Verdict
BANDWIDTH	3MHz							



Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	11.26	8.03	10.56	0.00599	0.00427	0.00562	PASS
Extreme (50℃)		17.52	16.84	14.01	0.00932	0.00896	0.00745	PASS
Extreme (40℃)		15.35	9.40	13.32	0.00817	0.00500	0.00709	PASS
Extreme (30℃)		15.75	4.05	10.13	0.00838	0.00215	0.00539	PASS
Extreme (20℃)		10.17	1.19	12.19	0.00541	0.00063	0.00648	PASS
Extreme (10℃)		9.75	6.57	7.44	0.00519	0.00350	0.00396	PASS
Extreme (0℃)		8.62	1.28	7.93	0.00459	0.00068	0.00422	PASS
Extreme (-10℃)		5.41	5.81	4.23	0.00288	0.00309	0.00225	PASS
Extreme (-20℃)		11.36	4.08	11.83	0.00604	0.00217	0.00629	PASS
Extreme (-30℃)		4.38	11.69	4.75	0.00233	0.00622	0.00253	PASS
25℃	LV	3.30	13.07	16.44	0.00176	0.00695	0.00875	PASS
	HV	12.64	16.87	12.70	0.00672	0.00897	0.00676	PASS
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	16.19	8.09	7.65	0.00861	0.00431	0.00407	PASS
Extreme (50℃)		17.22	5.54	5.79	0.00916	0.00295	0.00308	PASS
Extreme (40℃)		15.55	4.62	11.14	0.00827	0.00246	0.00593	PASS
Extreme (30℃)		13.14	4.29	12.13	0.00699	0.00228	0.00645	PASS
Extreme (20℃)		13.36	16.42	17.69	0.00710	0.00873	0.00941	PASS
Extreme (10℃)		1.81	1.29	2.57	0.00096	0.00069	0.00137	PASS
Extreme (0℃)		17.63	4.61	4.34	0.00938	0.00245	0.00231	PASS
Extreme (-10℃)		6.89	3.98	3.85	0.00366	0.00212	0.00205	PASS
Extreme (-20℃)		5.74	4.53	5.37	0.00305	0.00241	0.00286	PASS
Extreme (-30℃)		11.09	7.76	6.44	0.00590	0.00413	0.00342	PASS
25℃	LV	10.57	3.92	14.01	0.00562	0.00209	0.00745	PASS
	HV	4.51	10.63	17.73	0.00240	0.00566	0.00943	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℃)	Normal	13.34	11.25	16.85	0.00709	0.00598	0.00896	PASS
Extreme (50℃)		14.44	7.96	6.02	0.00768	0.00424	0.00320	PASS
Extreme (40℃)		2.80	5.12	14.18	0.00149	0.00272	0.00754	PASS
Extreme (30℃)		15.04	14.18	2.30	0.00800	0.00755	0.00122	PASS
Extreme (20℃)		6.48	7.40	17.49	0.00344	0.00394	0.00930	PASS
Extreme (10℃)		12.72	7.99	6.12	0.00677	0.00425	0.00325	PASS
Extreme (0℃)		5.18	17.06	16.01	0.00275	0.00907	0.00852	PASS
Extreme (-10℃)		11.14	1.99	8.84	0.00593	0.00106	0.00470	PASS



Extreme (-20℃)		16.31	9.12	14.54	0.00868	0.00485	0.00774	PASS
Extreme (-30℃)		2.05	16.70	14.28	0.00109	0.00888	0.00759	PASS
25℃	LV	9.68	8.54	15.88	0.00515	0.00454	0.00844	PASS
	HV	2.12	2.85	11.08	0.00113	0.00151	0.00589	PASS

LTE Band 17								
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	11.11	10.23	14.45	0.00591	0.00544	0.00769	PASS
Extreme (50℃)		10.36	3.67	17.46	0.00551	0.00195	0.00929	PASS
Extreme (40℃)		16.68	7.07	9.21	0.00887	0.00376	0.00490	PASS
Extreme (30℃)		15.43	11.92	3.48	0.00821	0.00634	0.00185	PASS
Extreme (20℃)		17.48	14.79	9.28	0.00930	0.00787	0.00493	PASS
Extreme (10℃)		15.13	2.82	7.46	0.00805	0.00150	0.00397	PASS
Extreme (0℃)		16.85	5.75	8.41	0.00896	0.00306	0.00447	PASS
Extreme (-10℃)		16.72	14.68	17.45	0.00890	0.00781	0.00928	PASS
Extreme (-20℃)		13.77	7.60	7.26	0.00733	0.00404	0.00386	PASS
Extreme (-30℃)		3.31	12.06	4.52	0.00176	0.00641	0.00240	PASS
25℃	LV	13.68	11.83	13.89	0.00728	0.00629	0.00739	PASS
	HV	3.57	12.28	17.44	0.00190	0.00653	0.00928	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℃)	Normal	2.94	6.31	16.39	0.00156	0.00336	0.00872	PASS
Extreme (50℃)		10.41	17.91	15.32	0.00554	0.00953	0.00815	PASS
Extreme (40℃)		6.39	11.28	15.32	0.00340	0.00600	0.00815	PASS
Extreme (30℃)		11.93	16.79	5.77	0.00635	0.00893	0.00307	PASS
Extreme (20℃)		14.21	11.89	10.08	0.00756	0.00633	0.00536	PASS
Extreme (10℃)		11.52	3.85	14.96	0.00613	0.00205	0.00796	PASS
Extreme (0℃)		3.77	4.29	12.78	0.00200	0.00228	0.00680	PASS
Extreme (-10℃)		3.45	11.84	11.49	0.00184	0.00630	0.00611	PASS
Extreme (-20℃)		11.78	17.17	4.55	0.00626	0.00914	0.00242	PASS
Extreme (-30℃)		13.11	7.74	16.00	0.00697	0.00412	0.00851	PASS
25℃	LV	4.43	15.64	12.71	0.00236	0.00832	0.00676	PASS
	HV	8.52	11.02	17.00	0.00453	0.00586	0.00904	PASS

LTE Band 38							
Condition	Freq.Error	Freq.Error	Freq.Error	Frequency	Frequency	Frequency	Verdict



		(Hz)	(Hz)	(Hz)	Stability (ppm)	Stability (ppm)	Stability (ppm)	
BANDWIDTH	5MHz							
Temperature	Voltage	64QAM	16QAM	QPSK	64QAM	16QAM	QPSK	
Normal (25℃)	Normal	10.49	10.35	8.84	0.00558	0.00551	0.00470	PASS
Extreme (50℃)		17.55	13.71	17.23	0.00933	0.00729	0.00916	PASS
Extreme (40℃)		14.15	10.78	12.13	0.00752	0.00573	0.00645	PASS
Extreme (30℃)		5.81	9.06	11.27	0.00309	0.00482	0.00599	PASS
Extreme (20℃)		17.81	5.70	13.78	0.00947	0.00303	0.00733	PASS
Extreme (10℃)		7.66	15.62	3.69	0.00408	0.00831	0.00196	PASS
Extreme (0℃)		11.49	14.74	12.03	0.00611	0.00784	0.00640	PASS
Extreme (-10℃)		10.88	9.69	14.04	0.00579	0.00515	0.00747	PASS
Extreme (-20℃)		12.82	12.89	2.04	0.00682	0.00686	0.00109	PASS
Extreme (-30℃)		10.22	10.97	9.50	0.00544	0.00584	0.00505	PASS
25℃	LV	17.38	13.36	1.30	0.00925	0.00711	0.00069	PASS
	HV	13.57	6.13	12.66	0.00722	0.00326	0.00673	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℃)	Normal	6.34	4.31	15.09	0.00337	0.00229	0.00802	PASS
Extreme (50℃)		13.39	17.04	17.26	0.00712	0.00906	0.00918	PASS
Extreme (40℃)		11.32	15.31	14.34	0.00602	0.00814	0.00763	PASS
Extreme (30℃)		17.11	12.93	11.01	0.00910	0.00688	0.00586	PASS
Extreme (20℃)		8.76	2.12	8.66	0.00466	0.00113	0.00461	PASS
Extreme (10℃)		15.65	12.73	11.75	0.00833	0.00677	0.00625	PASS
Extreme (0℃)		13.89	13.74	7.55	0.00739	0.00731	0.00402	PASS
Extreme (-10℃)		11.42	13.01	9.06	0.00608	0.00692	0.00482	PASS
Extreme (-20℃)		5.40	7.57	8.54	0.00287	0.00403	0.00455	PASS
Extreme (-30℃)		6.08	15.59	3.06	0.00323	0.00829	0.00163	PASS
25℃	LV	3.21	3.44	10.09	0.00171	0.00183	0.00537	PASS
	HV	5.23	3.71	12.42	0.00278	0.00197	0.00661	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	5.79	9.34	1.25	0.00308	0.00497	0.00067	PASS
Extreme (50℃)		17.40	5.72	3.43	0.00926	0.00304	0.00182	PASS
Extreme (40℃)		7.77	12.01	6.20	0.00414	0.00639	0.00330	PASS
Extreme (30℃)		4.10	10.52	4.22	0.00218	0.00559	0.00225	PASS
Extreme (20℃)		16.01	7.78	8.32	0.00852	0.00414	0.00443	PASS



Extreme (10℃)		10.25	7.17	10.52	0.00545	0.00382	0.00560	PASS
Extreme (0℃)		13.43	11.60	10.95	0.00714	0.00617	0.00582	PASS
Extreme (-10℃)		17.14	1.19	4.64	0.00912	0.00063	0.00247	PASS
Extreme (-20℃)		4.62	14.20	3.65	0.00246	0.00755	0.00194	PASS
Extreme (-30℃)		1.25	7.64	13.03	0.00066	0.00406	0.00693	PASS
25℃	LV	7.00	4.14	3.71	0.00372	0.00220	0.00197	PASS
	HV	14.01	13.76	4.11	0.00745	0.00732	0.00219	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	12.92	16.87	15.13	0.00687	0.00897	0.00805	PASS
Extreme (50℃)		1.02	17.99	3.16	0.00054	0.00957	0.00168	PASS
Extreme (40℃)		2.99	15.02	7.48	0.00159	0.00799	0.00398	PASS
Extreme (30℃)		3.27	12.88	6.06	0.00174	0.00685	0.00323	PASS
Extreme (20℃)		12.34	17.56	13.34	0.00657	0.00934	0.00710	PASS
Extreme (10℃)		13.51	8.99	15.60	0.00718	0.00478	0.00830	PASS
Extreme (0℃)		13.16	12.94	6.41	0.00700	0.00688	0.00341	PASS
Extreme (-10℃)		5.93	9.45	17.02	0.00315	0.00503	0.00905	PASS
Extreme (-20℃)		1.64	17.60	7.46	0.00087	0.00936	0.00397	PASS
Extreme (-30℃)		3.44	5.22	17.40	0.00183	0.00278	0.00926	PASS
25℃	LV	8.39	7.33	1.63	0.00446	0.00390	0.00087	PASS
	HV	15.35	17.84	11.39	0.00816	0.00949	0.00606	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℃)	Normal	1.91	2.80	8.22	0.00102	0.00149	0.00437	PASS
Extreme (50℃)		4.93	9.16	3.22	0.00262	0.00487	0.00171	PASS
Extreme (40℃)		4.25	5.76	9.98	0.00226	0.00306	0.00531	PASS
Extreme (30℃)		2.88	18.00	5.28	0.00153	0.00957	0.00281	PASS
Extreme (20℃)		17.97	8.51	12.71	0.00956	0.00453	0.00676	PASS
Extreme (10℃)		14.67	10.59	2.36	0.00780	0.00564	0.00125	PASS
Extreme (0℃)		11.03	11.19	2.13	0.00587	0.00595	0.00114	PASS
Extreme (-10℃)		17.59	12.24	7.54	0.00935	0.00651	0.00401	PASS
Extreme (-20℃)		1.47	13.72	6.75	0.00078	0.00730	0.00359	PASS
Extreme (-30℃)		13.66	7.26	5.83	0.00727	0.00386	0.00310	PASS
25℃	LV	16.65	2.43	8.78	0.00886	0.00129	0.00467	PASS
	HV	17.67	5.39	9.75	0.00940	0.00287	0.00519	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℃)	Normal	17.65	15.59	5.41	0.00939	0.00829	0.00288	PASS
Extreme (50℃)		4.94	13.77	5.77	0.00263	0.00732	0.00307	PASS
Extreme (40℃)		17.15	16.28	13.05	0.00912	0.00866	0.00694	PASS
Extreme (30℃)		8.01	12.37	8.01	0.00426	0.00658	0.00426	PASS
Extreme (20℃)		4.02	15.11	16.02	0.00214	0.00804	0.00852	PASS
Extreme (10℃)		3.13	17.16	15.68	0.00166	0.00913	0.00834	PASS
Extreme (0℃)		5.11	16.56	10.31	0.00272	0.00881	0.00548	PASS
Extreme (-10℃)		11.47	16.63	10.56	0.00610	0.00885	0.00562	PASS
Extreme (-20℃)		7.71	3.15	7.73	0.00410	0.00168	0.00411	PASS
Extreme (-30℃)		14.40	1.65	5.28	0.00766	0.00088	0.00281	PASS
25℃	LV	6.35	3.40	14.30	0.00338	0.00181	0.00761	PASS
	HV	10.80	3.62	16.28	0.00574	0.00192	0.00866	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	2.44	1.23	17.46	0.00130	0.00065	0.00929	PASS
Extreme (50℃)		16.89	12.50	5.49	0.00899	0.00665	0.00292	PASS
Extreme (40℃)		2.57	9.08	15.60	0.00137	0.00483	0.00830	PASS
Extreme (30℃)		7.88	5.64	9.59	0.00419	0.00300	0.00510	PASS
Extreme (20℃)		4.39	2.34	16.04	0.00233	0.00124	0.00853	PASS
Extreme (10℃)		13.85	8.38	1.72	0.00737	0.00446	0.00091	PASS
Extreme (0℃)		1.64	12.79	13.97	0.00087	0.00680	0.00743	PASS
Extreme (-10℃)		5.62	1.30	13.95	0.00299	0.00069	0.00742	PASS
Extreme (-20℃)		3.16	12.00	8.95	0.00168	0.00638	0.00476	PASS
Extreme (-30℃)		5.88	11.51	13.00	0.00313	0.00612	0.00691	PASS
25℃	LV	1.82	17.89	13.11	0.00097	0.00952	0.00698	PASS
	HV	2.34	11.73	16.50	0.00125	0.00624	0.00878	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	13.59	1.39	8.60	0.00723	0.00074	0.00458	PASS
Extreme (50℃)		9.89	14.31	8.57	0.00526	0.00761	0.00456	PASS
Extreme (40℃)		14.32	1.17	17.90	0.00761	0.00062	0.00952	PASS
Extreme (30℃)		9.75	3.10	12.18	0.00519	0.00165	0.00648	PASS



Extreme (20℃)		1.48	4.11	7.70	0.00079	0.00218	0.00409	PASS
Extreme (10℃)		12.15	5.50	7.75	0.00646	0.00292	0.00412	PASS
Extreme (0℃)		3.31	11.59	4.10	0.00176	0.00616	0.00218	PASS
Extreme (-10℃)		17.34	10.83	10.93	0.00922	0.00576	0.00581	PASS
Extreme (-20℃)		9.27	16.96	1.67	0.00493	0.00902	0.00089	PASS
Extreme (-30℃)		2.57	7.58	14.61	0.00137	0.00403	0.00777	PASS
25℃	LV	14.95	17.89	3.49	0.00795	0.00952	0.00186	PASS
	HV	13.53	8.43	5.17	0.00720	0.00449	0.00275	PASS

CA_7C_QPSK		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25℃)	Normal	7.12	0.00378	16.49	0.00877	PASS
Extreme (50℃)		8.73	0.00465	9.30	0.00495	PASS
Extreme (40℃)		15.53	0.00826	13.14	0.00699	PASS
Extreme (30℃)		7.85	0.00418	6.58	0.00350	PASS
Extreme (20℃)		16.26	0.00865	11.40	0.00606	PASS
Extreme (10℃)		1.84	0.00098	12.34	0.00656	PASS
Extreme (0℃)		11.67	0.00621	13.45	0.00715	PASS
Extreme (-10℃)		14.71	0.00782	11.55	0.00614	PASS
Extreme (-20℃)		5.61	0.00299	1.61	0.00086	PASS
Extreme (-30℃)		12.94	0.00688	4.97	0.00264	PASS
25℃	LV	13.32	0.00709	9.25	0.00492	PASS
	HV	13.90	0.00739	8.27	0.00440	PASS
CA_7C_16QAM		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25℃)	Normal	11.70	0.00622	7.52	0.00400	PASS
Extreme (50℃)		1.15	0.00061	16.39	0.00872	PASS
Extreme (40℃)		11.72	0.00623	12.88	0.00685	PASS
Extreme (30℃)		13.78	0.00733	12.03	0.00640	PASS
Extreme (20℃)		5.78	0.00308	13.12	0.00698	PASS
Extreme (10℃)		6.68	0.00355	10.14	0.00540	PASS
Extreme (0℃)		2.51	0.00133	13.51	0.00719	PASS
Extreme (-10℃)		17.08	0.00909	4.58	0.00244	PASS
Extreme (-20℃)		5.96	0.00317	5.73	0.00305	PASS
Extreme (-30℃)		17.18	0.00914	5.58	0.00297	PASS
25℃	LV	8.74	0.00465	1.13	0.00060	PASS
	HV	16.22	0.00863	5.04	0.00268	PASS



CA_7C_64QAM		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25℃)	Normal	12.76	0.00679	6.52	0.00347	PASS
Extreme (50℃)		3.83	0.00204	14.69	0.00782	PASS
Extreme (40℃)		12.11	0.00644	3.39	0.00181	PASS
Extreme (30℃)		16.37	0.00871	2.60	0.00138	PASS
Extreme (20℃)		12.41	0.00660	11.46	0.00609	PASS
Extreme (10℃)		12.03	0.00640	8.10	0.00431	PASS
Extreme (0℃)		5.85	0.00311	13.43	0.00714	PASS
Extreme (-10℃)		1.49	0.00079	16.89	0.00899	PASS
Extreme (-20℃)		3.22	0.00171	9.26	0.00493	PASS
Extreme (-30℃)		5.70	0.00303	13.27	0.00706	PASS
25℃	LV	4.91	0.00261	9.60	0.00511	PASS
	HV	15.20	0.00809	16.66	0.00886	PASS

CA_41C_QPSK		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25℃)	Normal	9.68	0.00515	12.95	0.00689	PASS
Extreme (50℃)		5.91	0.00315	7.66	0.00408	PASS
Extreme (40℃)		17.81	0.00947	10.45	0.00556	PASS
Extreme (30℃)		17.44	0.00928	17.41	0.00926	PASS
Extreme (20℃)		8.13	0.00433	6.39	0.00340	PASS
Extreme (10℃)		15.82	0.00841	7.66	0.00407	PASS
Extreme (0℃)		4.76	0.00253	6.49	0.00345	PASS
Extreme (-10℃)		8.91	0.00474	2.55	0.00136	PASS
Extreme (-20℃)		6.54	0.00348	7.39	0.00393	PASS
Extreme (-30℃)		10.39	0.00552	7.21	0.00384	PASS
25℃	LV	11.08	0.00589	3.29	0.00175	PASS
	HV	10.52	0.00560	10.76	0.00572	PASS
CA_41C_16QAM		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25℃)	Normal	9.67	0.00515	13.61	0.00724	PASS
Extreme (50℃)		2.17	0.00115	10.97	0.00584	PASS
Extreme (40℃)		4.31	0.00229	1.74	0.00093	PASS



RF Test Report			Report No.: RZ103A0263-R			
Extreme (30℃)		5.55	0.00295	4.45	0.00237	PASS
Extreme (20℃)		14.82	0.00788	5.15	0.00274	PASS
Extreme (10℃)		4.62	0.00246	13.03	0.00693	PASS
Extreme (0℃)		1.71	0.00091	16.69	0.00888	PASS
Extreme (-10℃)		9.36	0.00498	17.02	0.00905	PASS
Extreme (-20℃)		3.82	0.00203	7.23	0.00385	PASS
Extreme (-30℃)		12.27	0.00653	9.64	0.00513	PASS
25℃	LV	3.79	0.00202	15.58	0.00829	PASS
	HV	15.78	0.00839	15.49	0.00824	PASS
CA_41C_64QAM		20MHz+10MHz (Bandwidth)		20MHz+20MHz (Bandwidth)		Verdict
Condition		Delta (Hz)	Frequency Stability (ppm)	Delta (Hz)	Frequency Stability (ppm)	
Temperature	Voltage					
Normal (25℃)	Normal	6.47	0.00344	14.03	0.00746	PASS
Extreme (50℃)		11.93	0.00634	9.76	0.00519	PASS
Extreme (40℃)		4.98	0.00265	12.44	0.00662	PASS
Extreme (30℃)		5.35	0.00285	12.47	0.00664	PASS
Extreme (20℃)		12.47	0.00663	13.53	0.00719	PASS
Extreme (10℃)		1.23	0.00066	13.33	0.00709	PASS
Extreme (0℃)		8.10	0.00431	4.45	0.00237	PASS
Extreme (-10℃)		13.80	0.00734	14.96	0.00796	PASS
Extreme (-20℃)		13.24	0.00704	10.18	0.00542	PASS
Extreme (-30℃)		15.87	0.00844	13.80	0.00734	PASS
25℃	LV	16.44	0.00874	2.63	0.00140	PASS
	HV	2.07	0.00110	10.33	0.00550	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 100kHz, VBW is set to 300kHz for 30MHz~1GHz

RBW is set to 1MHz, VBW is set to 3MHz for above 1GHz, Sweep is set to ATUO.

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

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

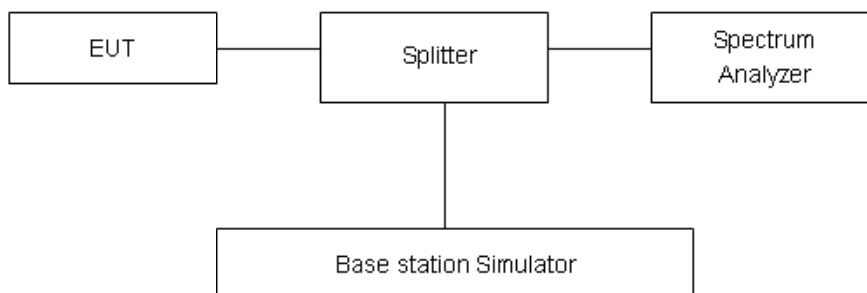
RBW is set to 100 kHz (30MHz~1000 MHz)

RBW is set to 1000 kHz (above 1000MHz)

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(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10} (P)$ dB..”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least



30 kHz may be employed.

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(a)/(h)/(g) Limit	-13 dBm
Part 27.53(m) Limit	-25 dBm

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.

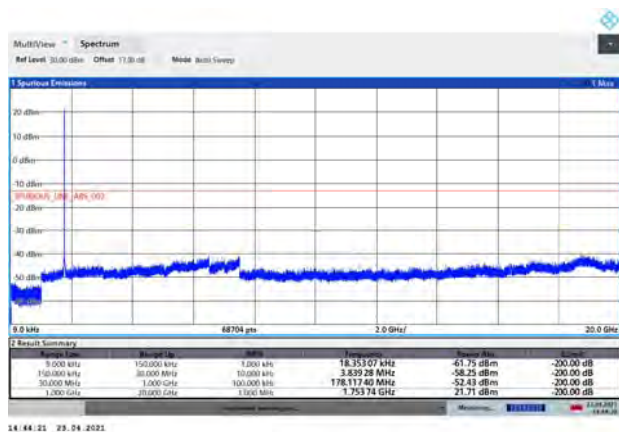
WCDMA Band IV CH-Low 9kHz~20GHz



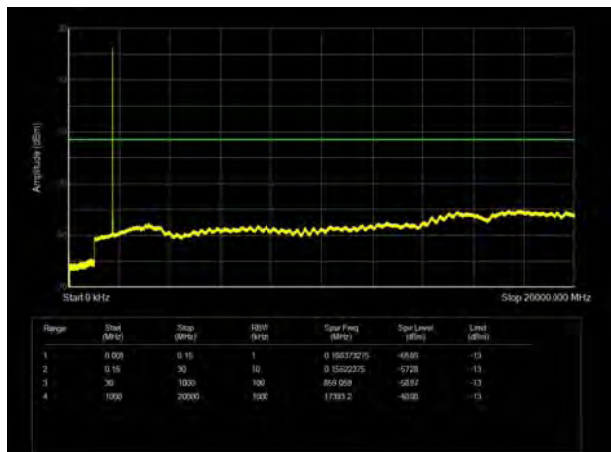
WCDMA Band IV CH-Middle 9kHz~20GHz



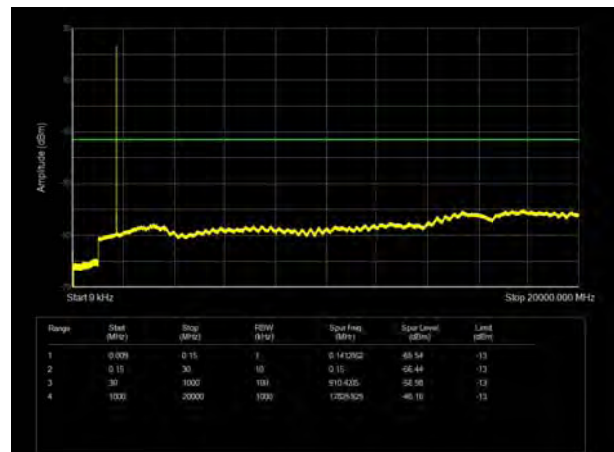
WCDMA Band IV CH-High 9kHz~20GHz



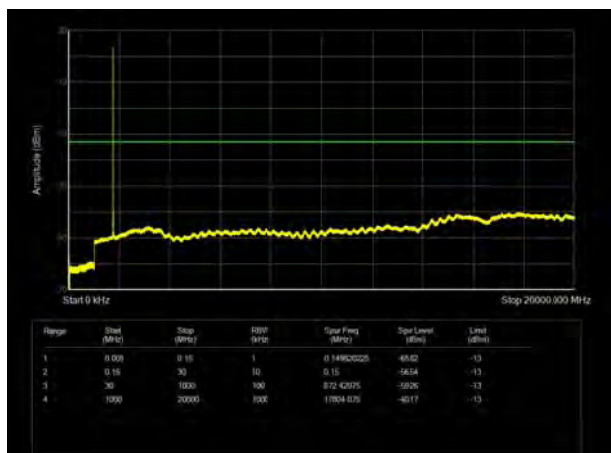
LTE Band 4 1.4MHz CH-Low 9kHz~20GHz



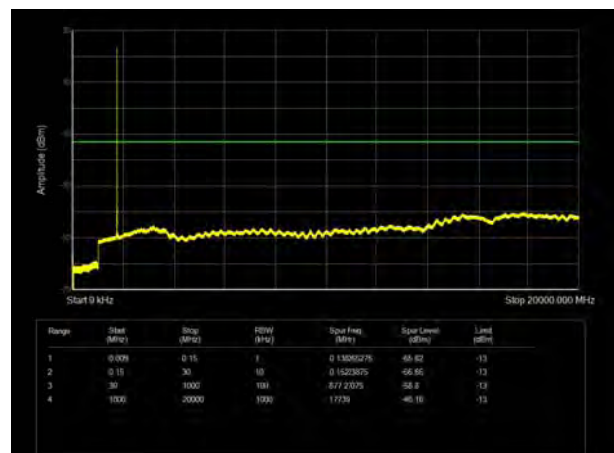
LTE Band 4 3MHz CH- Low 9kHz~20GHz



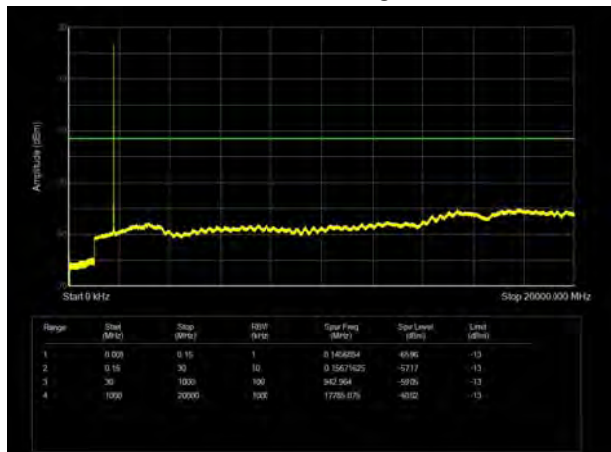
LTE Band 4 1.4MHz CH- Middle 9kHz~20GHz



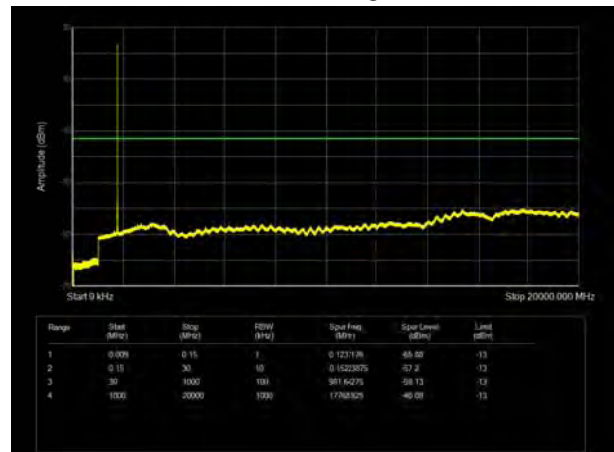
LTE Band 4 3MHz CH- Middle 9kHz~20GHz



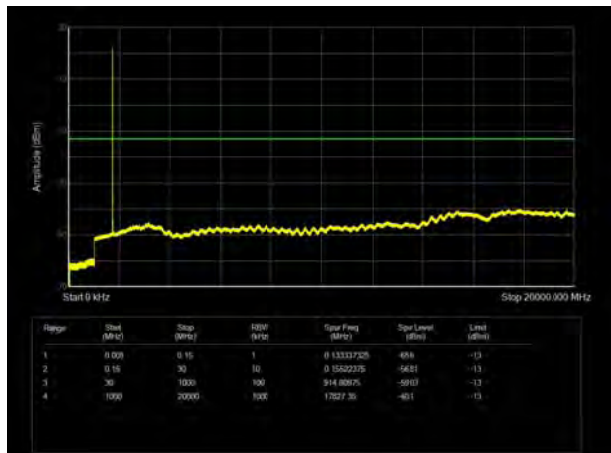
LTE Band 4 1.4MHz CH- High 9kHz~20GHz



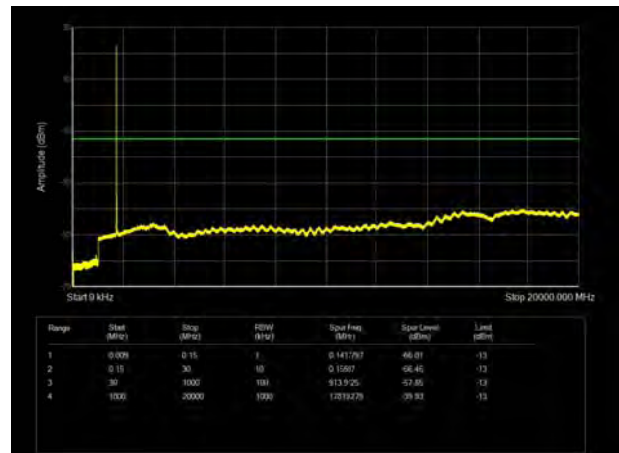
LTE Band 4 3MHz CH-High 9kHz~20GHz



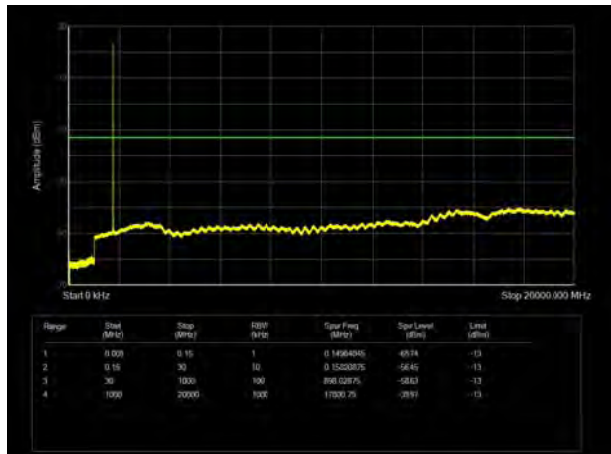
LTE Band 4 5MHz CH-Low 9kHz~20GHz



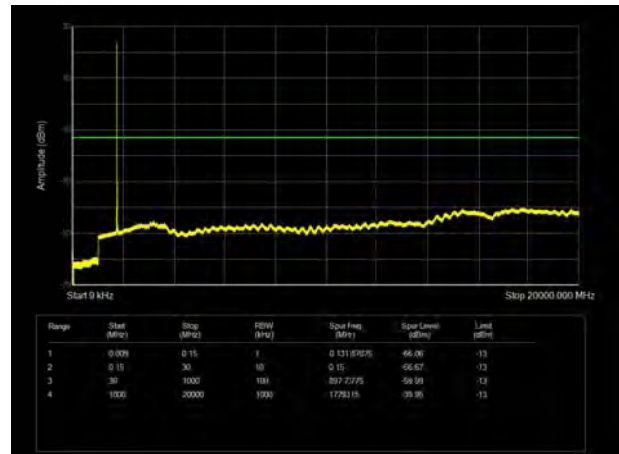
LTE Band 4 10MHz CH- Low 9kHz~20GHz



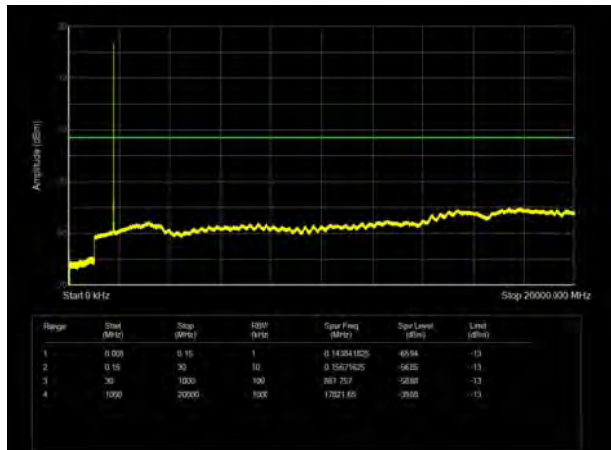
LTE Band 4 5MHz CH- Middle 9kHz~20GHz



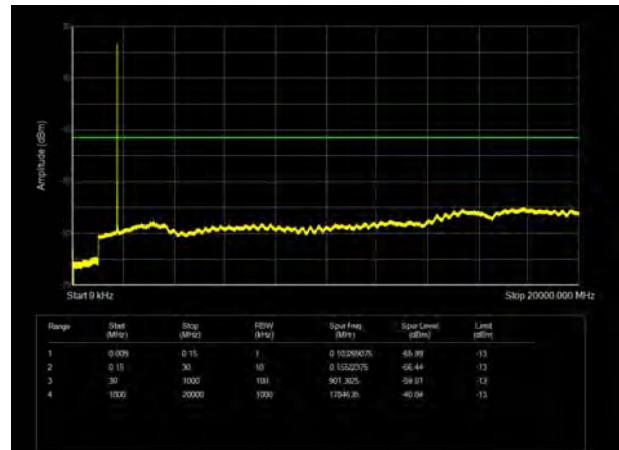
LTE Band 4 10MHz CH- Middle 9kHz~20GHz



LTE Band 4 5MHz CH- High 9kHz~20GHz

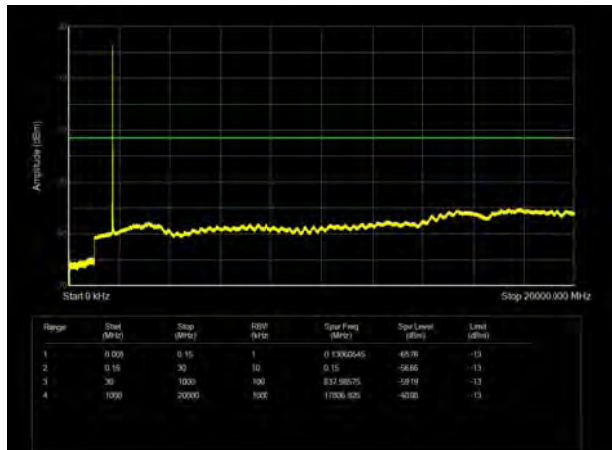


LTE Band 4 10MHz CH-High 9kHz~20GHz

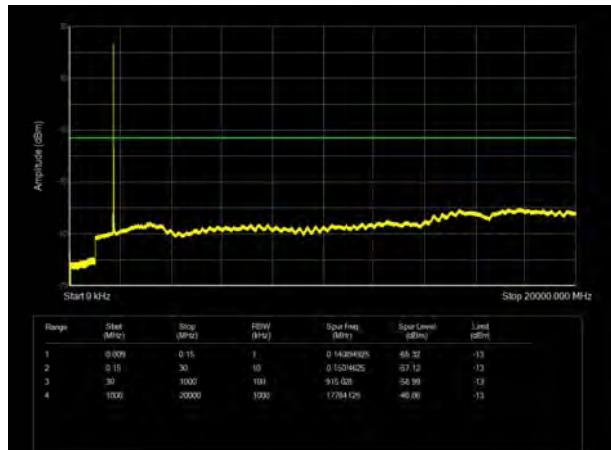




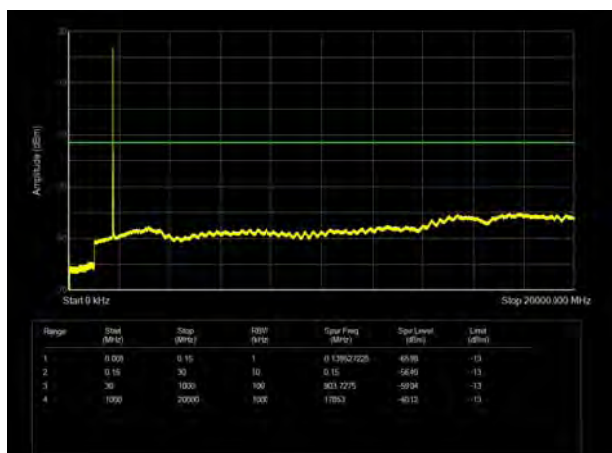
LTE Band 4 15MHz CH- Low 9kHz~20GHz



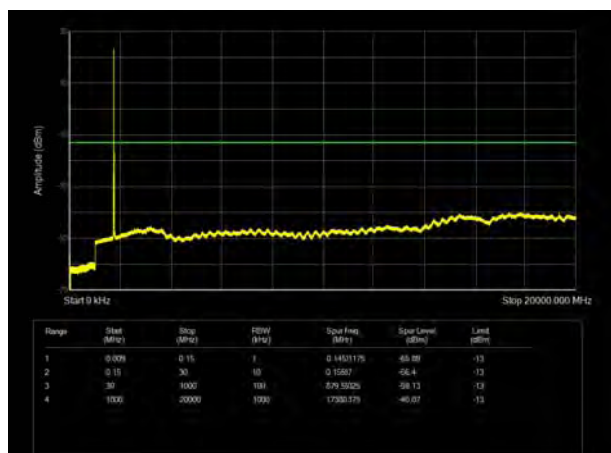
LTE Band 4 20MHz CH-Low 9kHz~20GHz



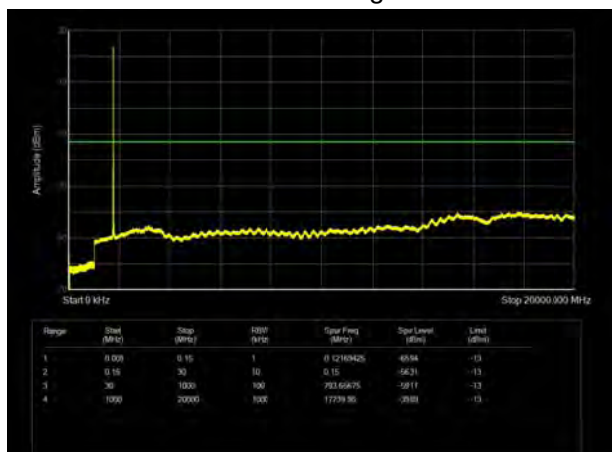
LTE Band 4 15MHz CH- Middle 9kHz~20GHz



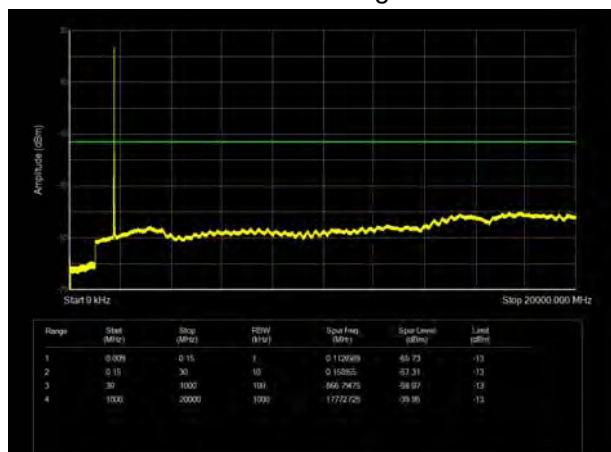
LTE Band 4 20MHz CH- Middle 9kHz~20GHz



LTE Band 4 15MHz CH-High 9kHz~20GHz

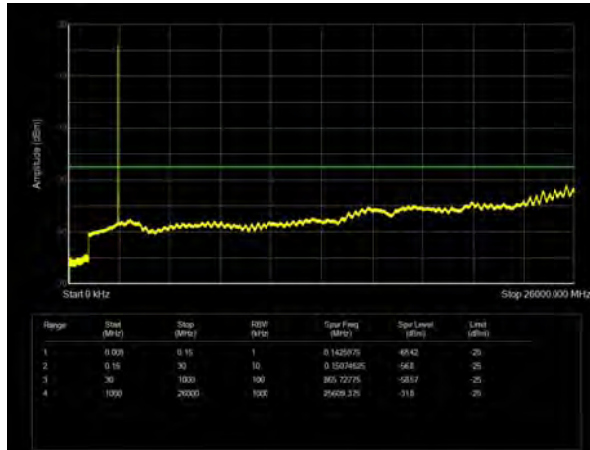


LTE Band 4 20MHz CH- High 9kHz~20GHz

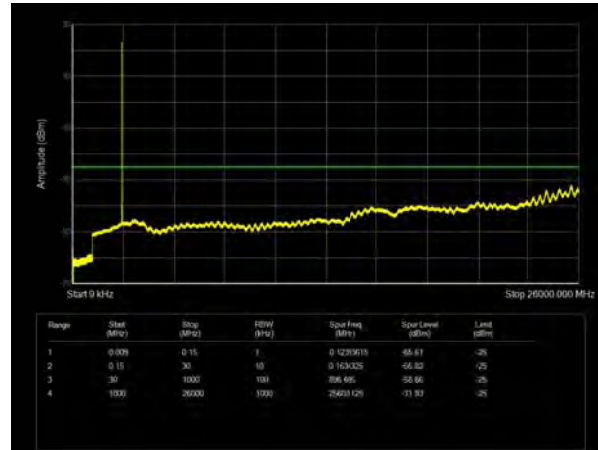




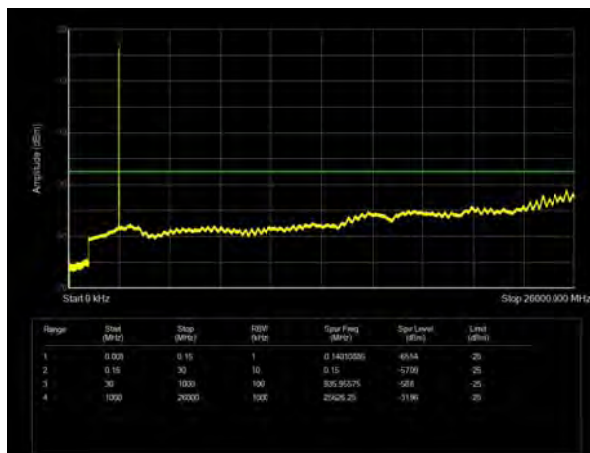
LTE Band 7 5MHz CH-Low 9kHz~26GHz



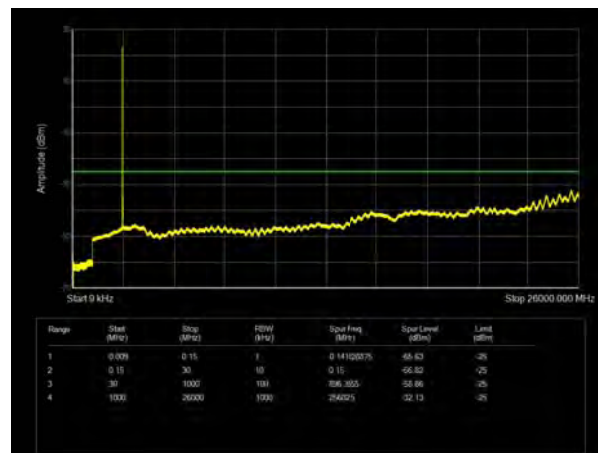
LTE Band 7 10MHz CH- Low 9kHz~26GHz



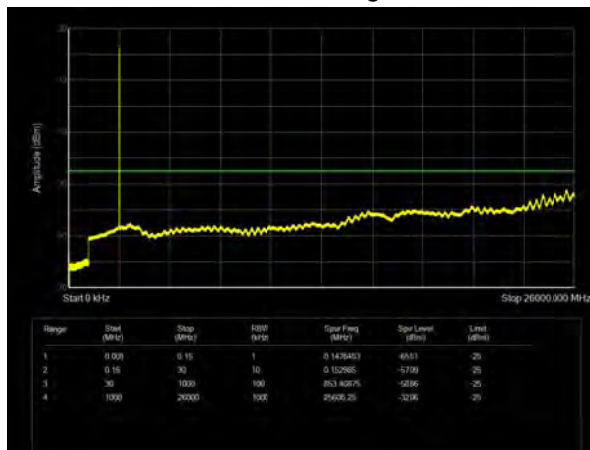
LTE Band 7 5MHz CH- Middle 9kHz~26GHz



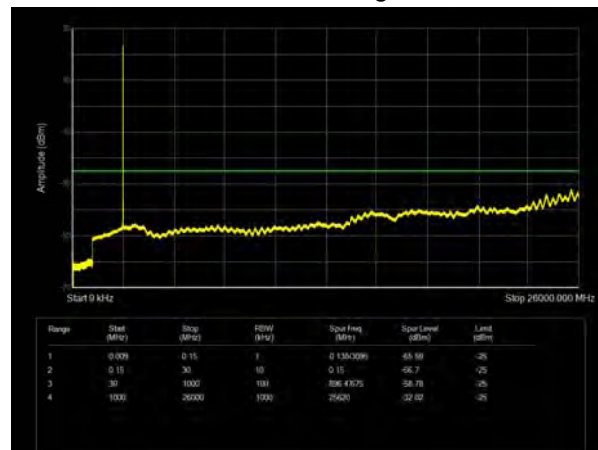
LTE Band 7 10MHz CH- Middle 9kHz~26GHz



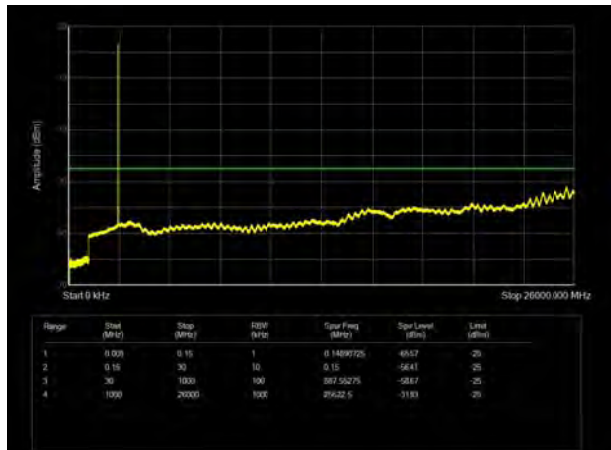
LTE Band 7 5MHz CH- High 9kHz~20GHz



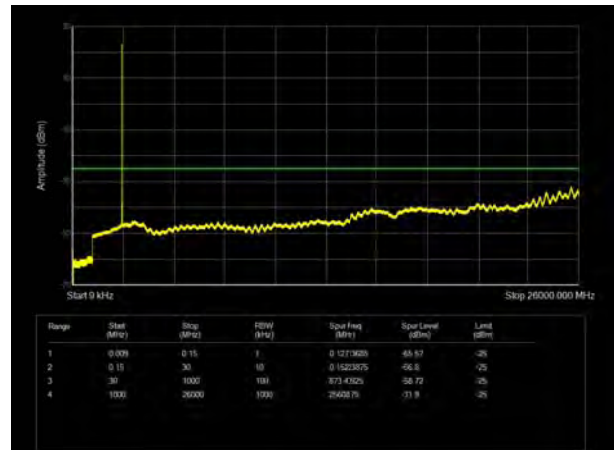
LTE Band 7 10MHz CH-High 9kHz~20GHz



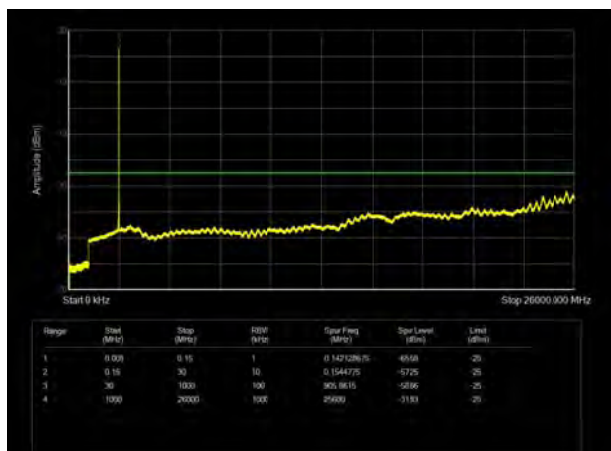
LTE Band 7 15MHz CH- Low 9kHz~26GHz



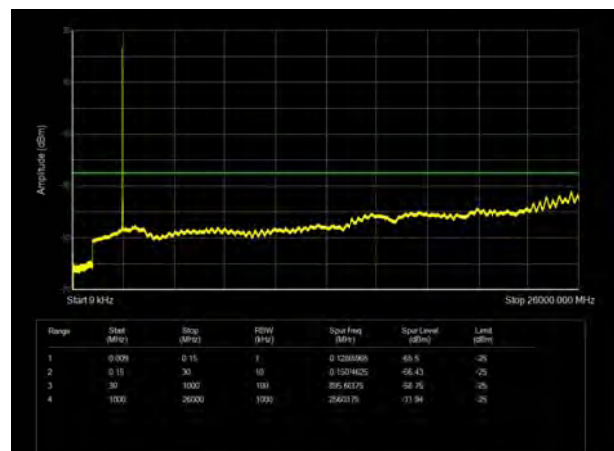
LTE Band 7 20MHz CH-Low 9kHz~26GHz



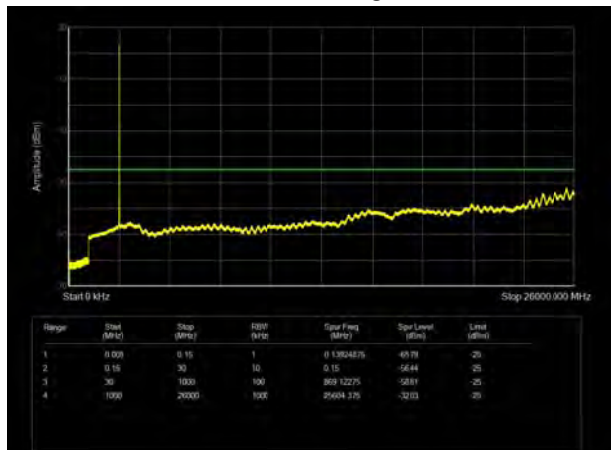
LTE Band 7 15MHz CH- Middle 9kHz~26GHz



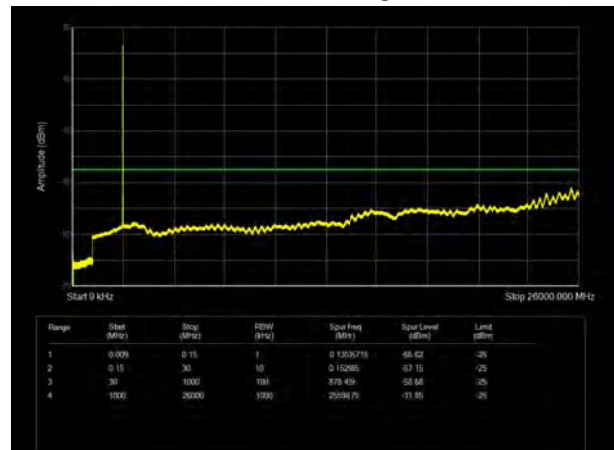
LTE Band 7 20MHz CH- Middle 9kHz~26GHz



LTE Band 7 15MHz CH-High 9kHz~26GHz

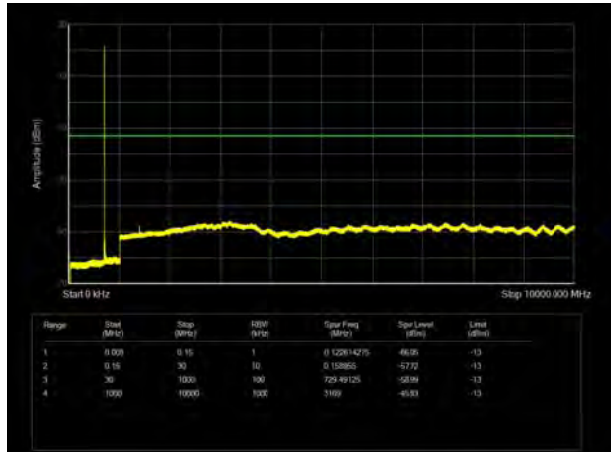


LTE Band 7 20MHz CH- High 9kHz~26GHz

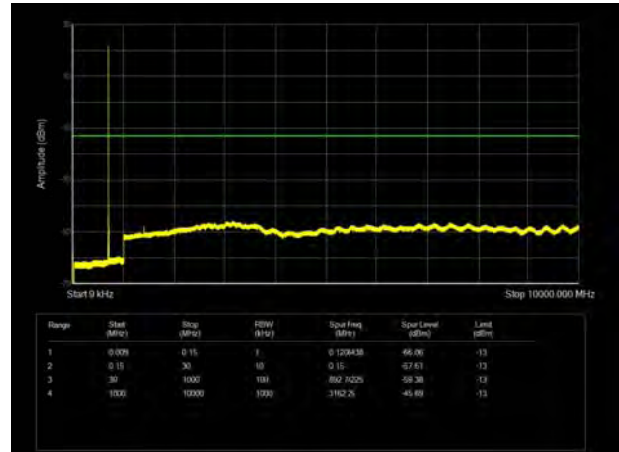




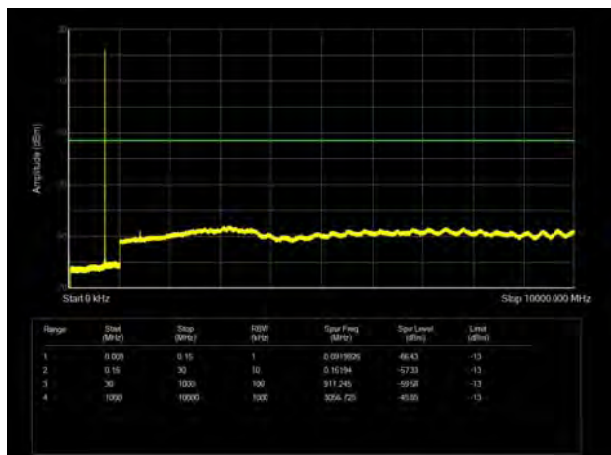
LTE Band 12 1.4MHz CH-Low 9kHz~10GHz



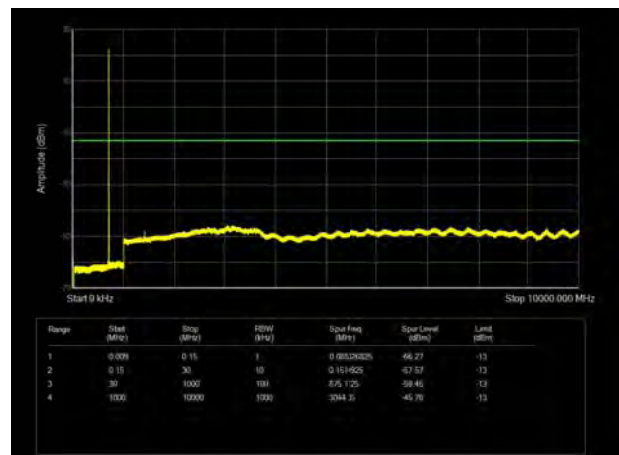
LTE Band 12 3MHz CH- Low 9kHz~10GHz



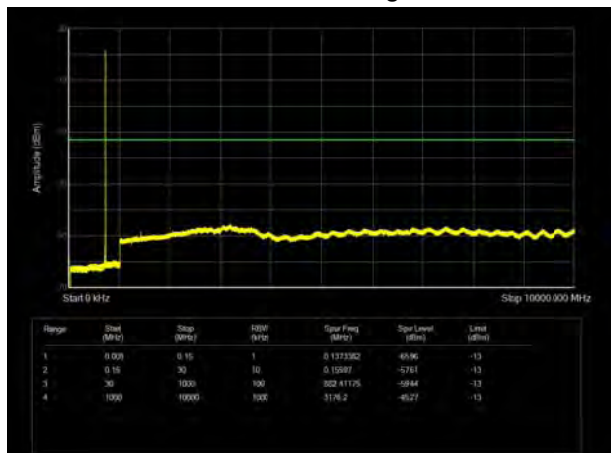
LTE Band 12 1.4MHz CH- Middle 9kHz~10GHz



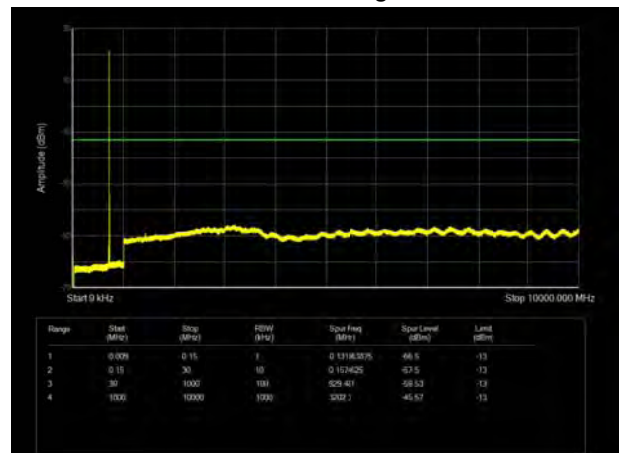
LTE Band 12 3MHz CH- Middle 9kHz~10GHz



LTE Band 12 1.4MHz CH- High 9kHz~10GHz

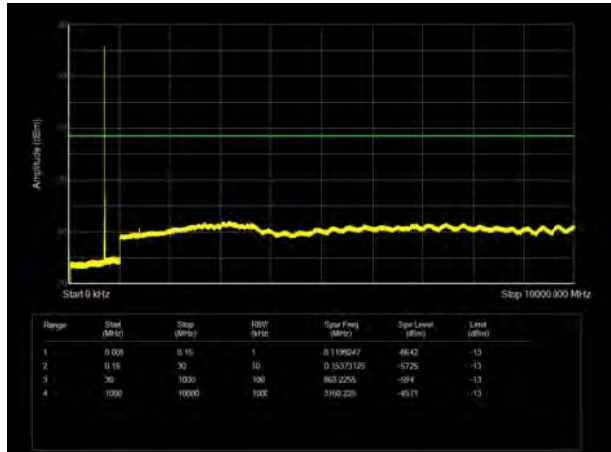


LTE Band 12 3MHz CH-High 9kHz~10GHz

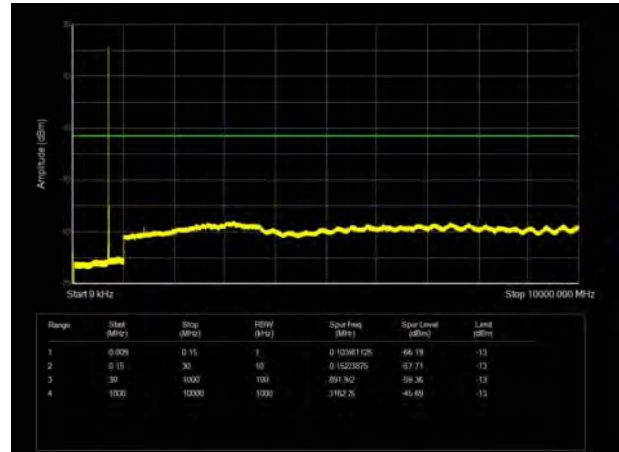




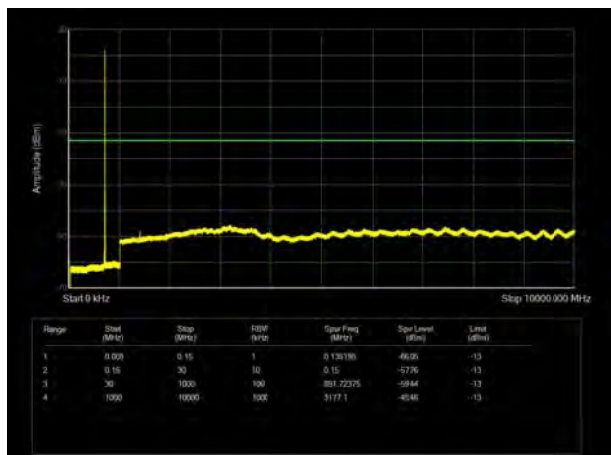
LTE Band 12 5MHz CH-Low 9kHz~10GHz



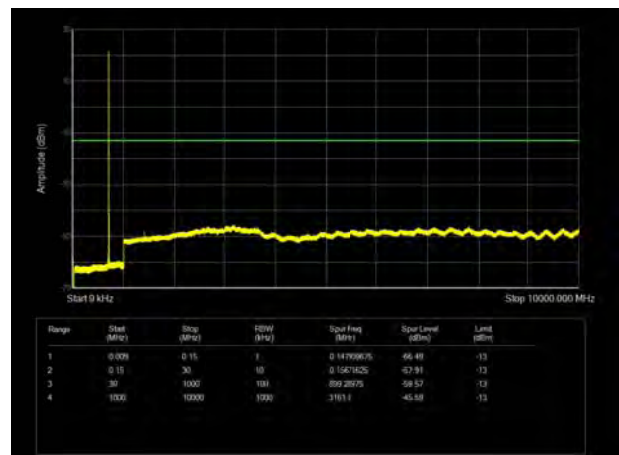
LTE Band 12 10MHz CH- Low 9kHz~10GHz



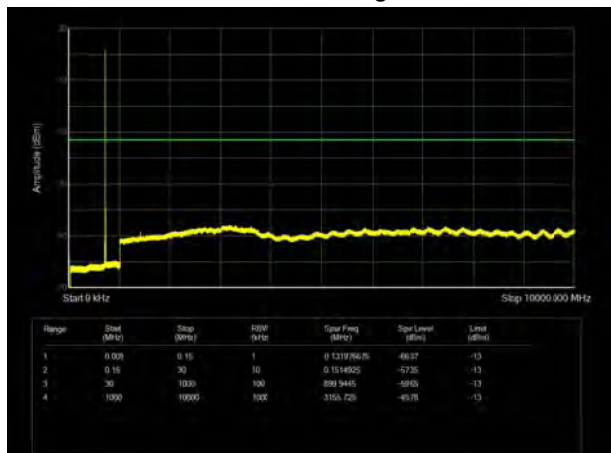
LTE Band 7 12 5MHz CH- Middle 9kHz~10GHz



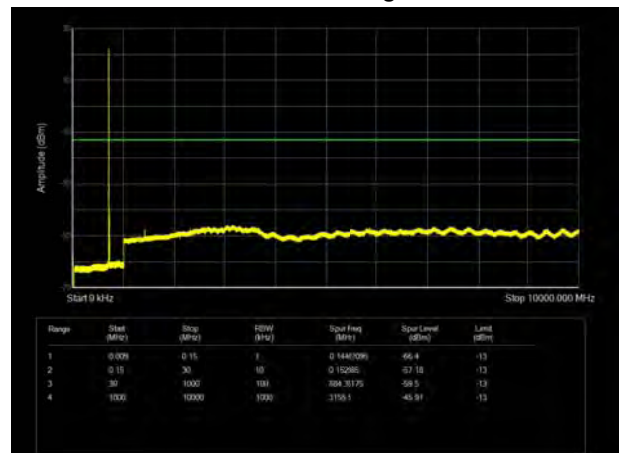
LTE Band 12 10MHz CH- Middle 9kHz~10GHz



LTE Band 12 5MHz CH- High 9kHz~10GHz

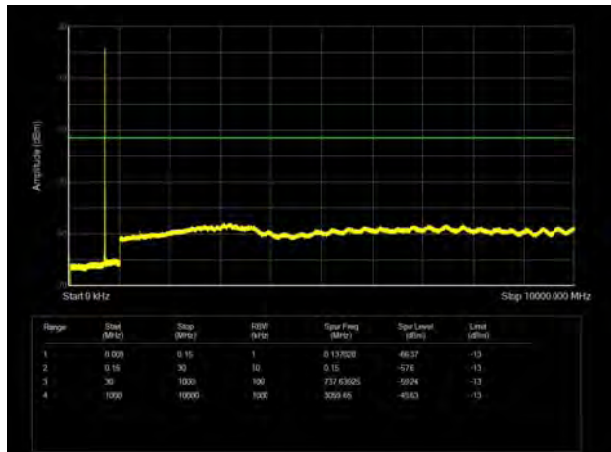


LTE Band 12 10MHz CH-High 9kHz~10GHz

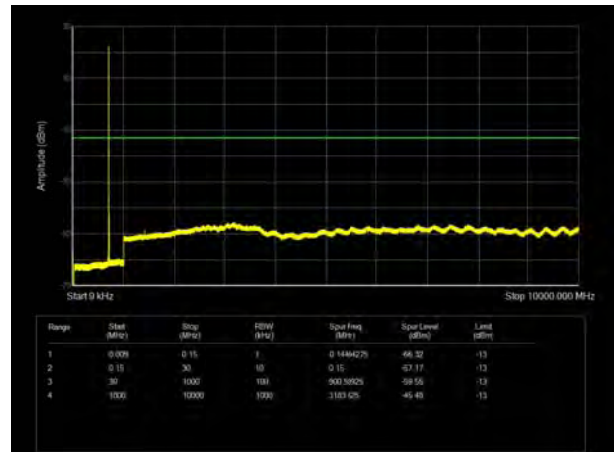




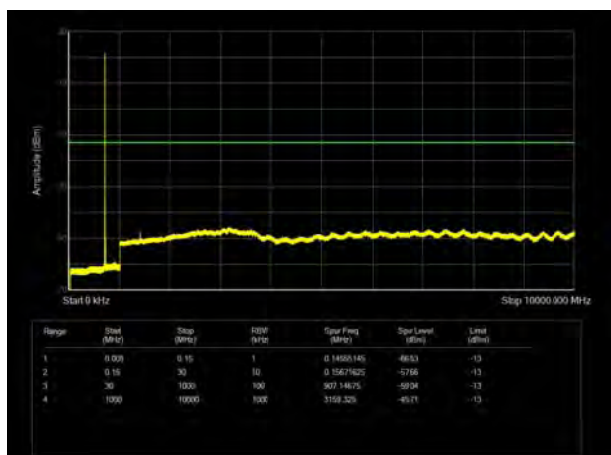
LTE Band 17 5MHz CH-Low 9kHz~10GHz



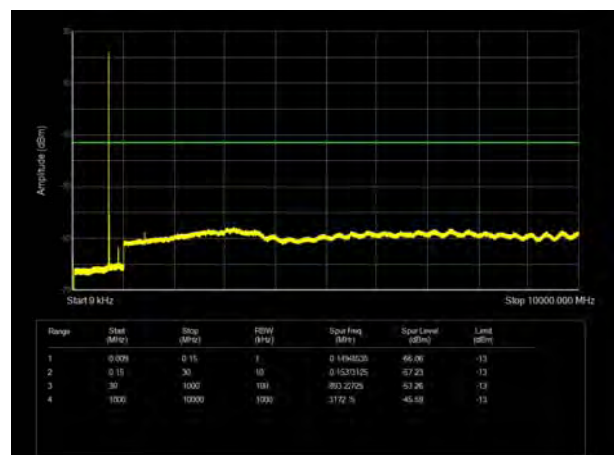
LTE Band 17 10MHz CH- Low 9kHz~10GHz



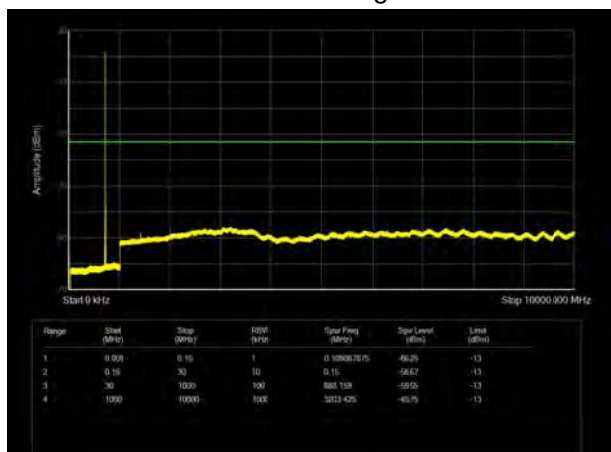
LTE Band 7 17 5MHz CH- Middle 9kHz~10GHz



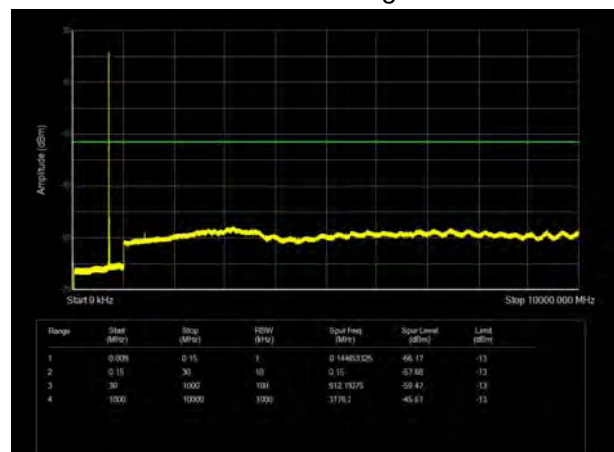
LTE Band 17 10MHz CH- Middle 9kHz~10GHz



LTE Band 17 5MHz CH- High 9kHz~10GHz

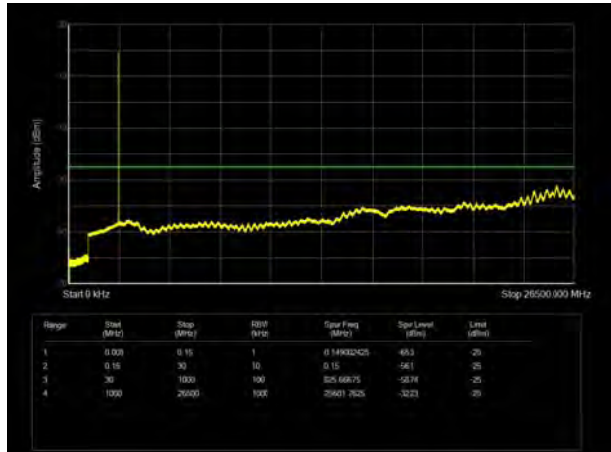


LTE Band 17 10MHz CH-High 9kHz~10GHz

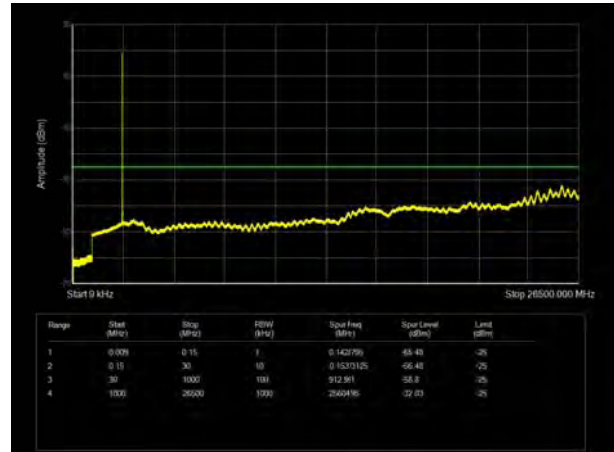




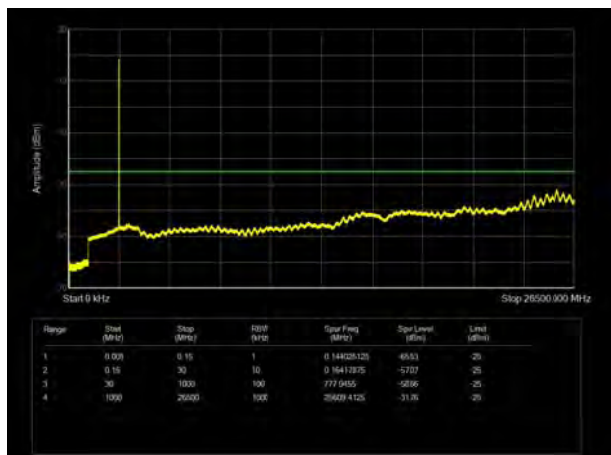
LTE Band 38 5MHz CH-Low 9kHz~26.5GHz



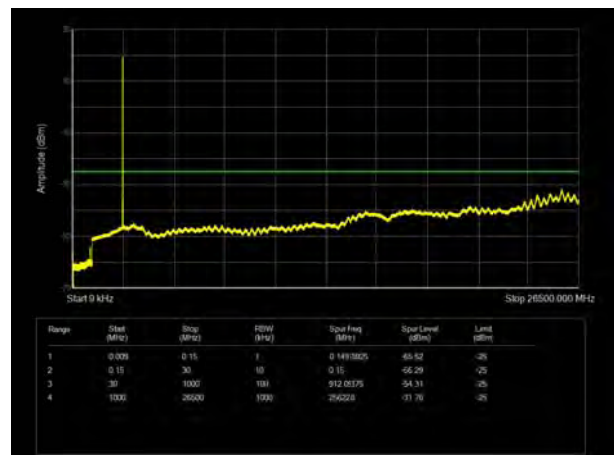
LTE Band 38 10MHz CH- Low 9kHz~26.5GHz



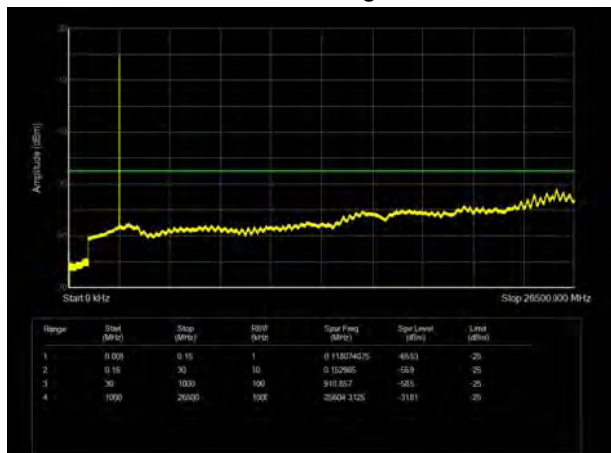
LTE Band 38 5MHz CH- Middle 9kHz~26.5GHz



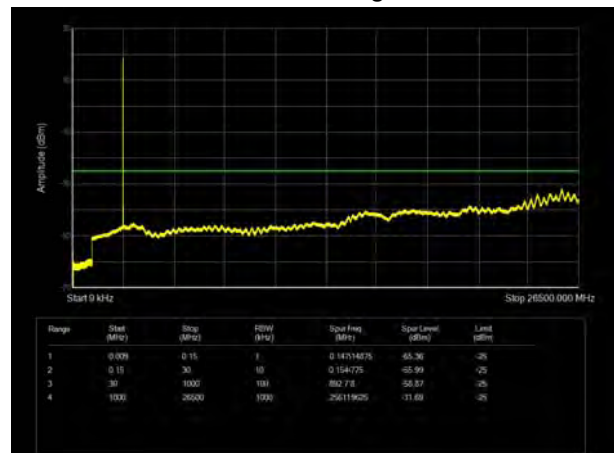
LTE Band 38 10MHz CH- Middle 9kHz~26.5GHz



LTE Band 38 5MHz CH- High 9kHz~26.5GHz

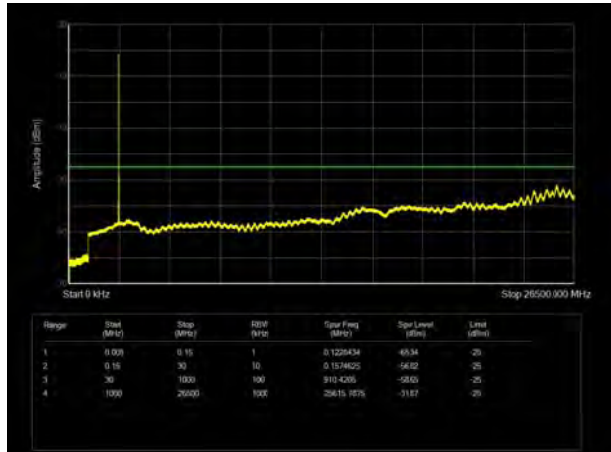


LTE Band 38 10MHz CH-High 9kHz~26.5GHz

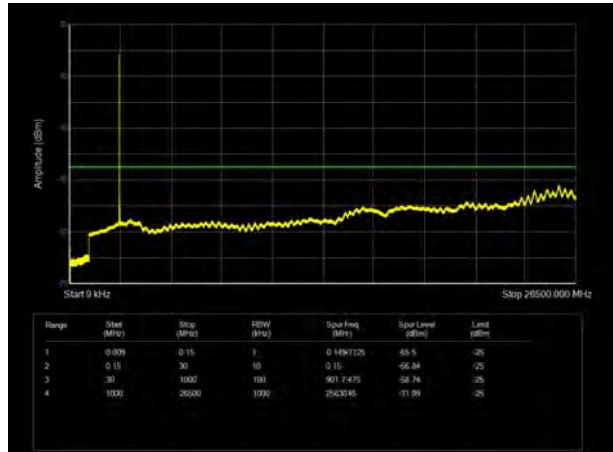




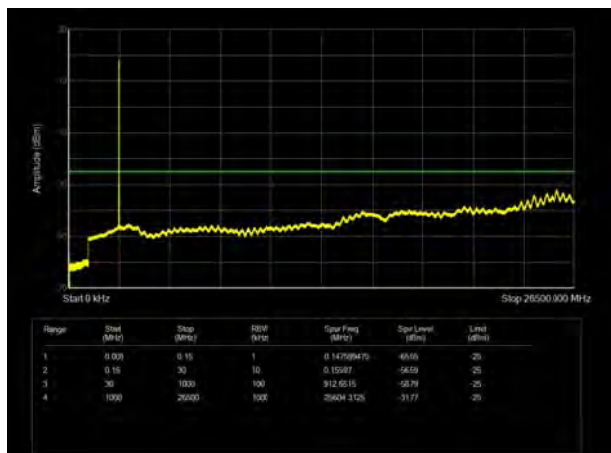
LTE Band 38 15MHz CH- Low 9kHz~26.5GHz



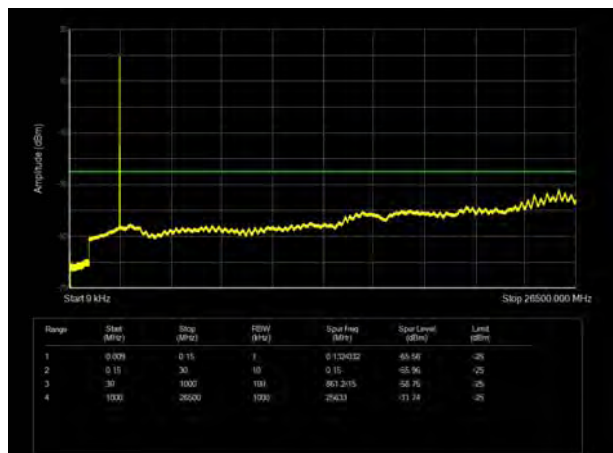
LTE Band 38 20MHz CH-Low 9kHz~26.5GHz



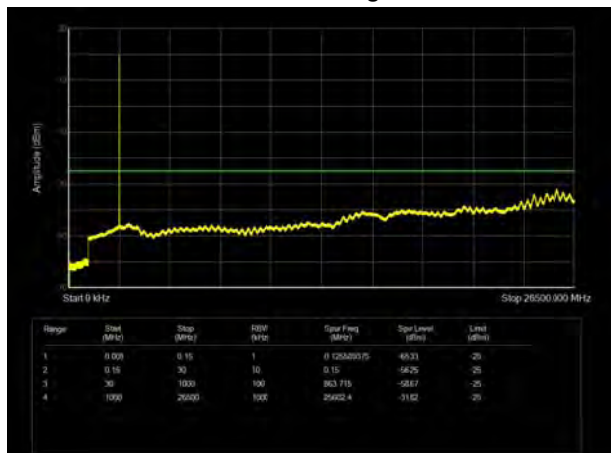
LTE Band 38 15MHz CH- Middle 9kHz~26.5GHz



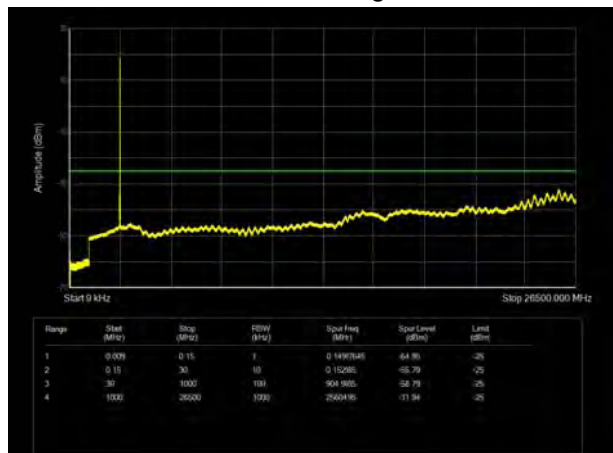
LTE Band 38 20MHz CH- Middle 9kHz~26.5GHz



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

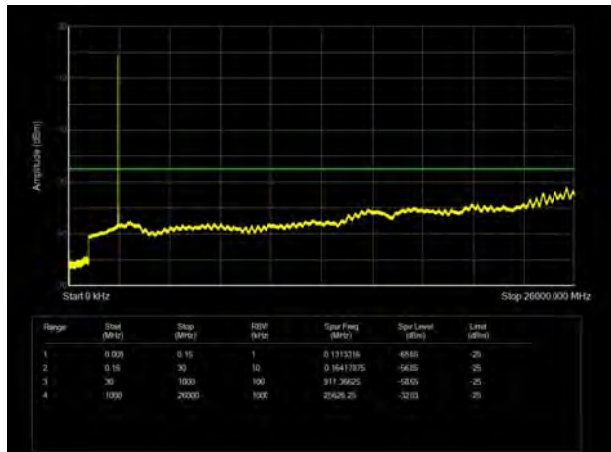


LTE Band 38 20MHz CH- High 9kHz~26.5GHz

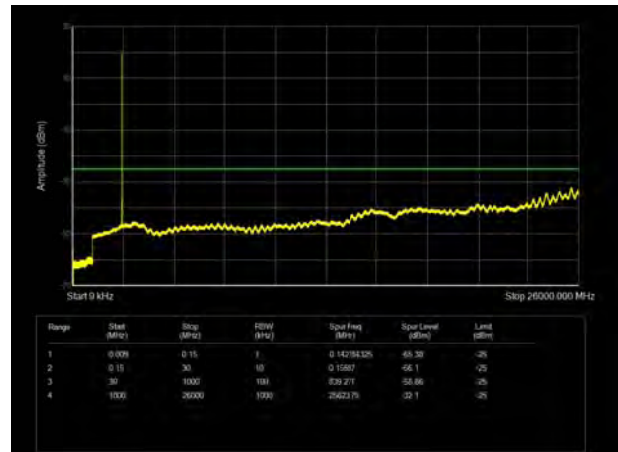




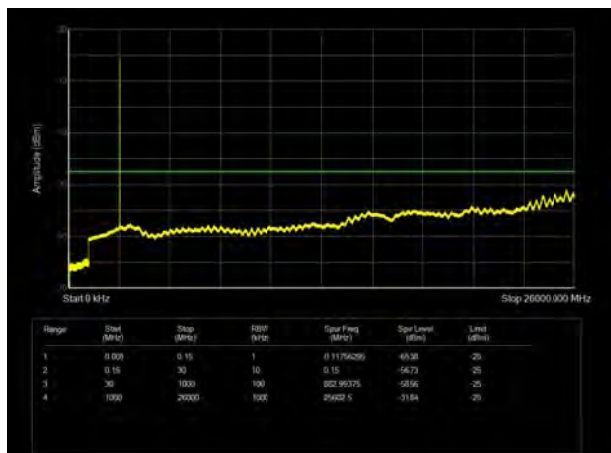
LTE Band 41 5MHz CH-Low 9kHz~26GHz



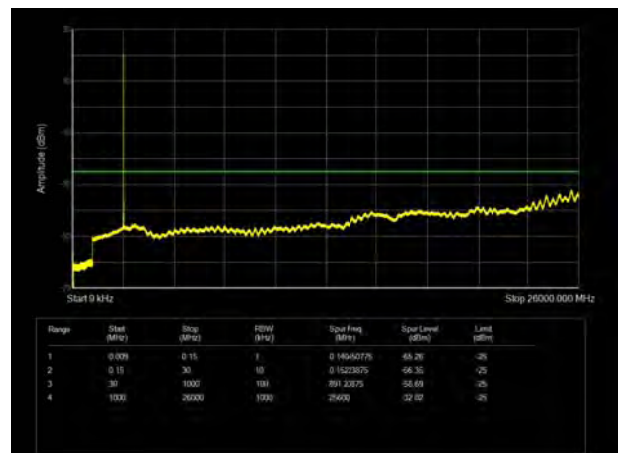
LTE Band 41 10MHz CH- Low 9kHz~26GHz



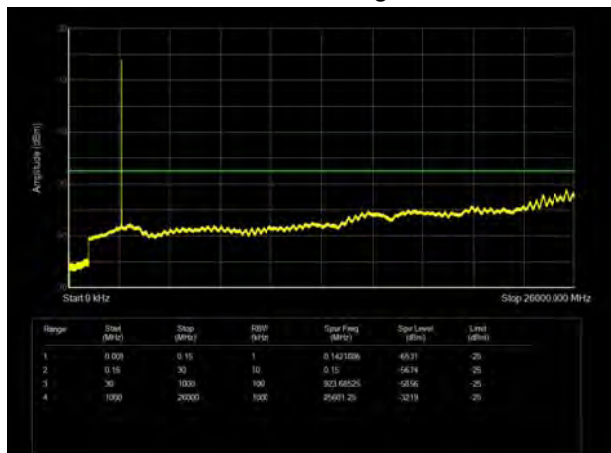
LTE Band 41 5MHz CH- Middle 9kHz~26GHz



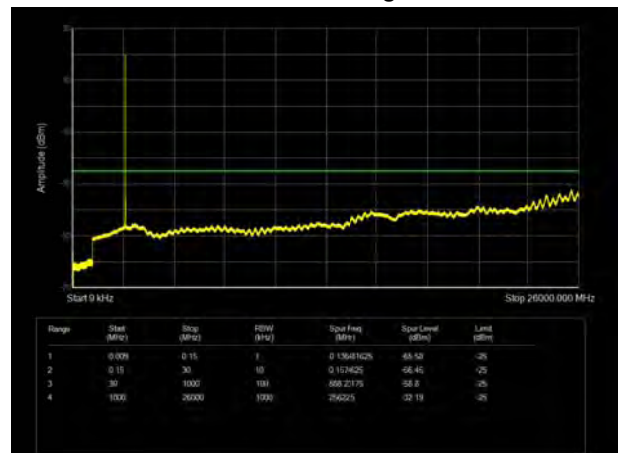
LTE Band 41 10MHz CH- Middle 9kHz~26GHz



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

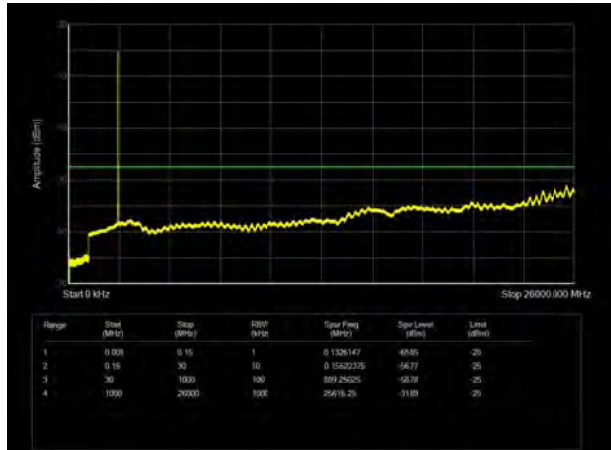


LTE Band 41 10MHz CH-High 9kHz~26GHz

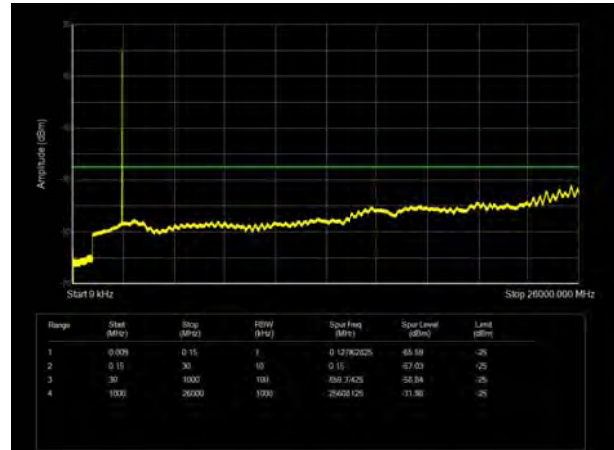




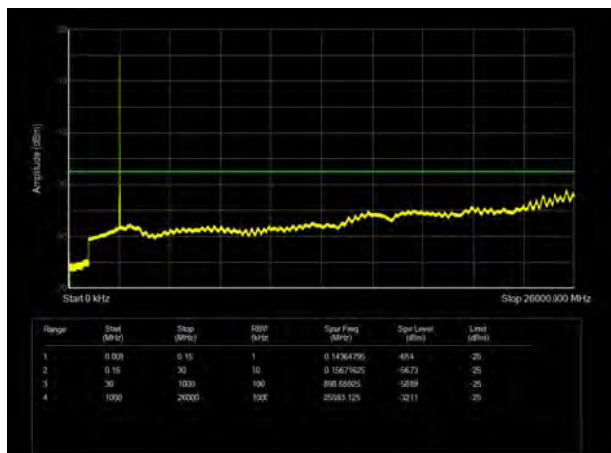
LTE Band 41 15MHz CH- Low 9kHz~26GHz



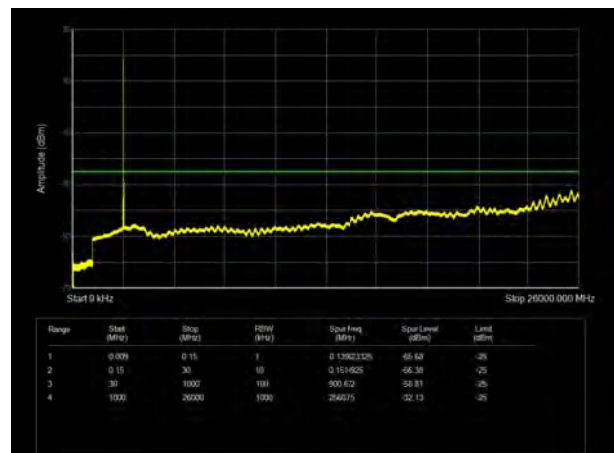
LTE Band 41 20MHz CH-Low 9kHz~26GHz



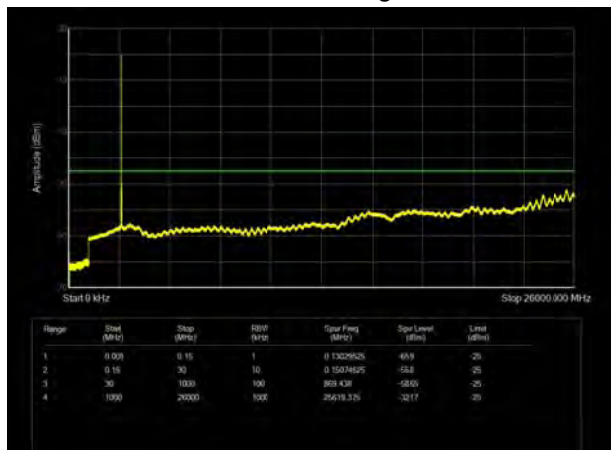
LTE Band 41 15MHz CH- Middle 9kHz~26GHz



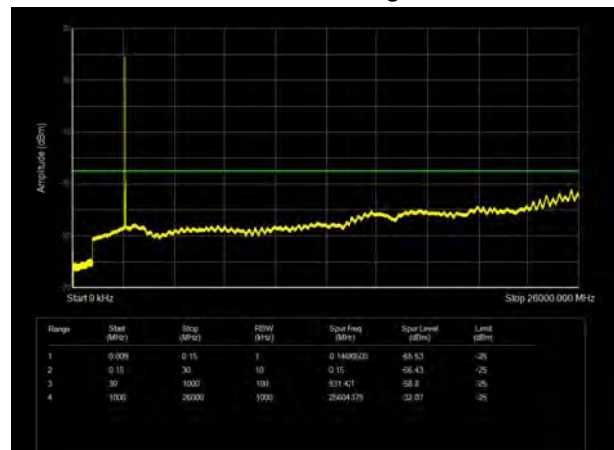
LTE Band 41 20MHz CH- Middle 9kHz~26GHz

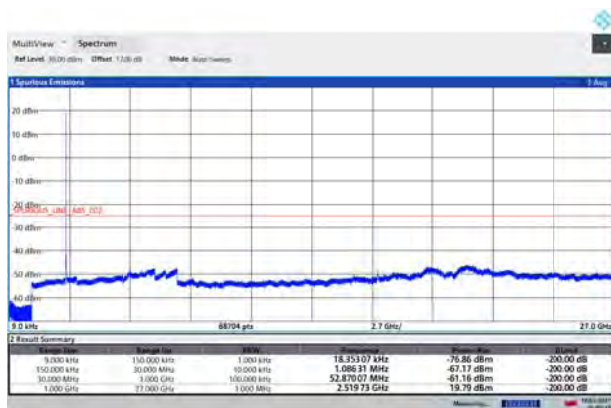


LTE Band 41 15MHz CH-High 9kHz~26GHz

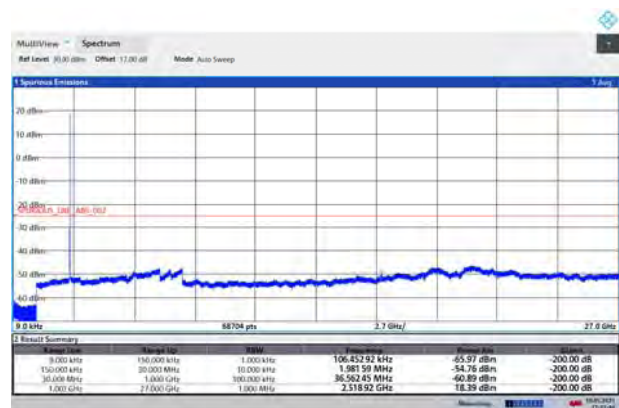


LTE Band 41 20MHz CH- High 9kHz~26GHz



CA_7C QPSK 20MHz+10MHz CH- Low
9kHz~27GHz

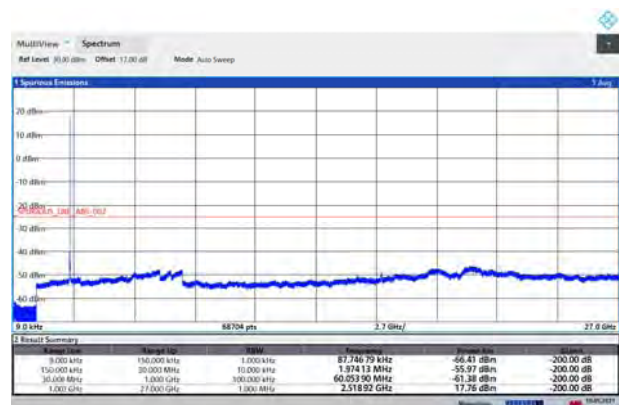
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CA_7C QPSK 20MHz+20MHz CH- Low
9kHz~27GHz

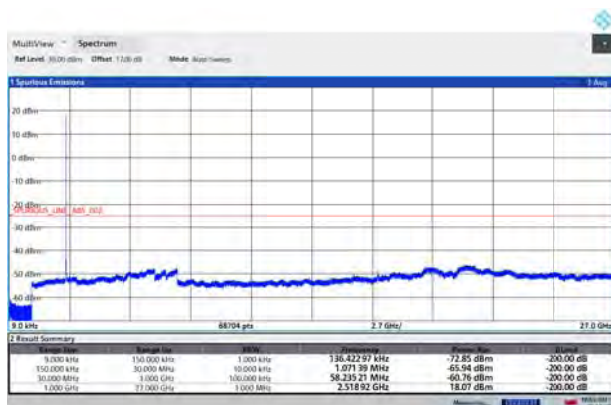
17:27:48 10:06:2021

CA_7C 16QAM 20MHz+10MHz CH- Low
9kHz~27GHz

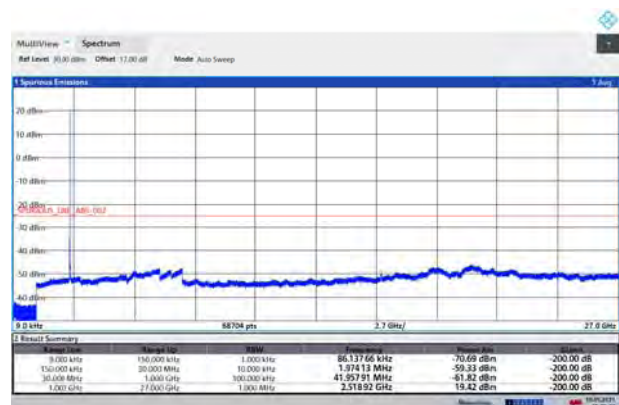
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CA_7C 16QAM 20MHz+20MHz CH- Low
9kHz~27GHz

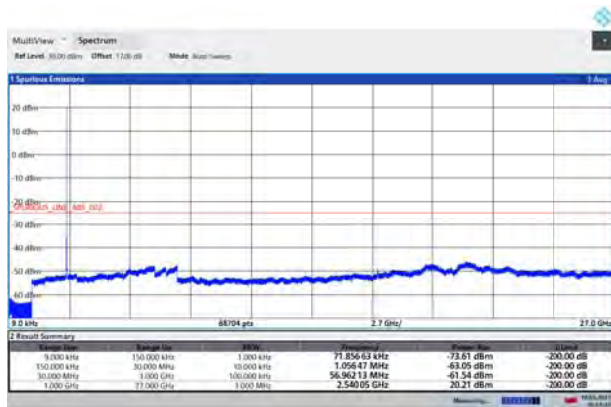
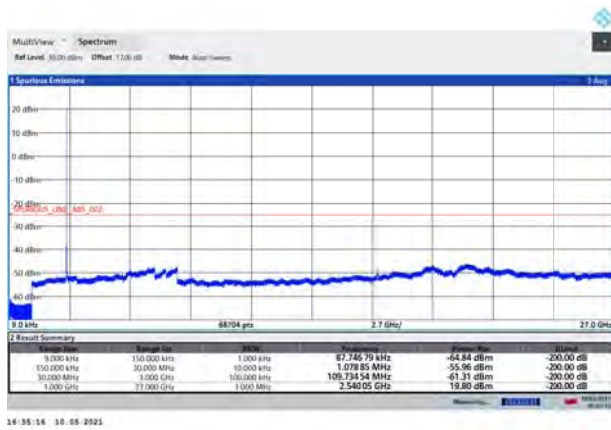
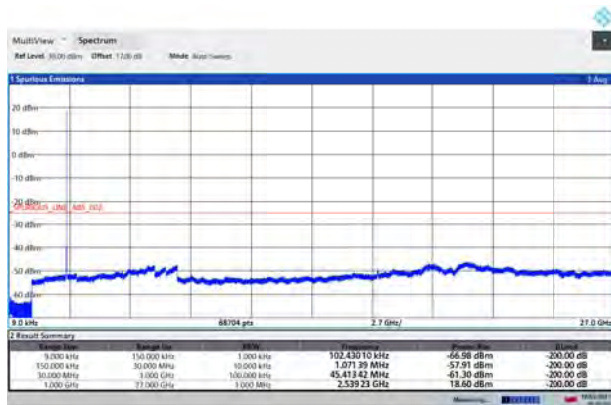
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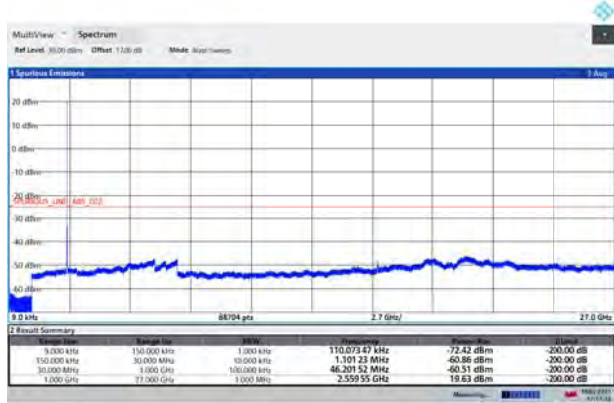
CA_7C 64QAM 20MHz+10MHz CH- Low
9kHz~27GHz

16:51:39 10:05:2021

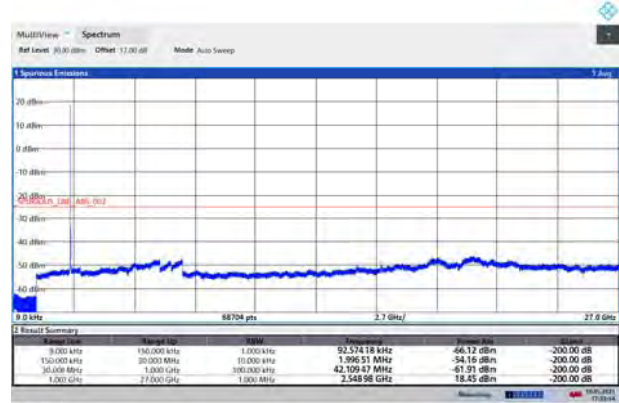
CA_7C 64QAM 20MHz+20MHz CH- Low
9kHz~27GHz

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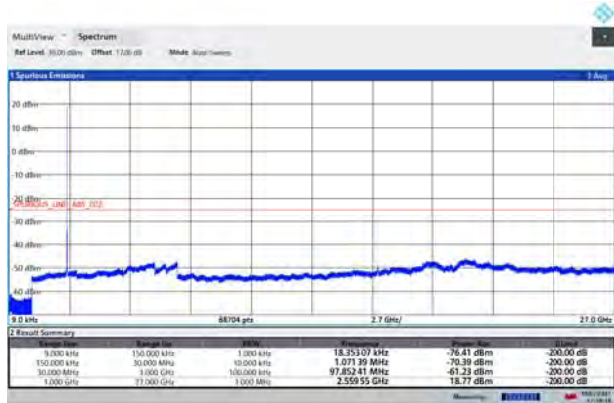
CA_7C QPSK 20MHz+10MHz CH-Middle
9kHz~27GHzCA_7C QPSK 20MHz+20MHz CH-Middle
9kHz~27GHzCA_7C 16QAM 20MHz+10MHz CH-Middle
9kHz~27GHzCA_7C 16QAM 20MHz+20MHz CH-Middle
9kHz~27GHzCA_7C 64QAM 20MHz+10MHz CH-Middle
9kHz~27GHzCA_7C 64QAM 20MHz+20MHz CH-Middle
9kHz~27GHz

CA_7C QPSK 20MHz+10MHz CH-High
9kHz~27GHz

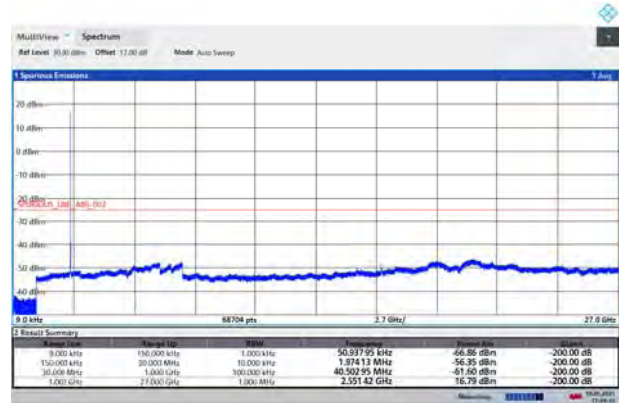
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CA_7C QPSK 20MHz+20MHz CH-High
9kHz~27GHz

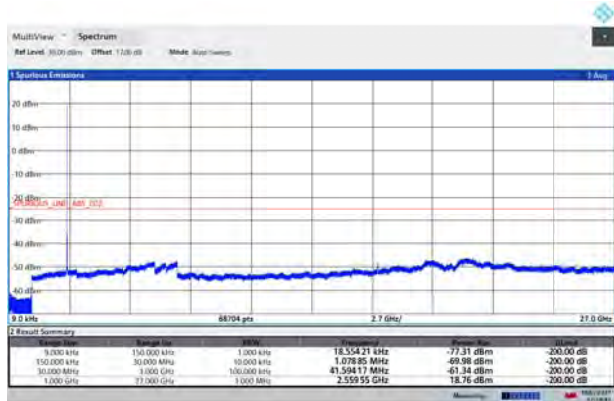
17:18:14 10-05-2021

CA_7C 16QAM 20MHz+10MHz CH-High
9kHz~27GHz

17:18:19 10-05-2021

CA_7C 16QAM 20MHz+20MHz CH-High
9kHz~27GHz

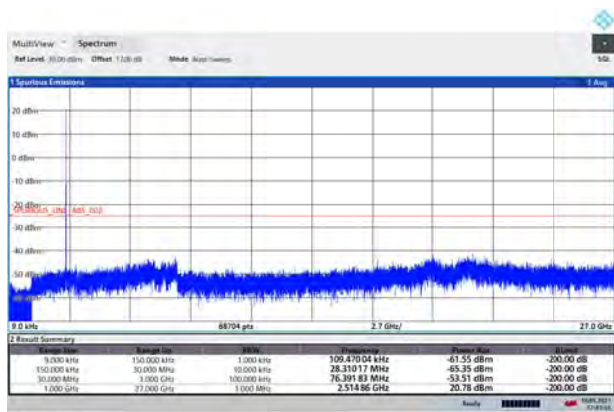
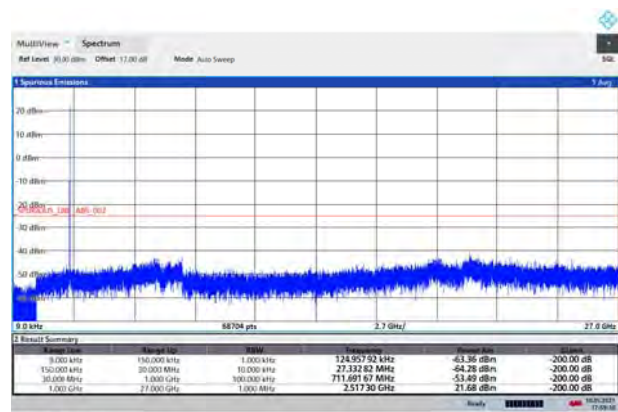
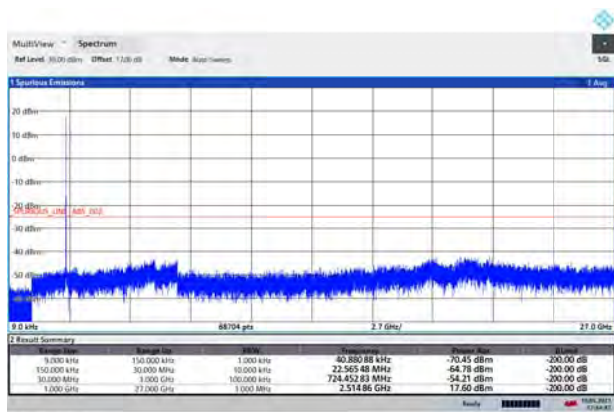
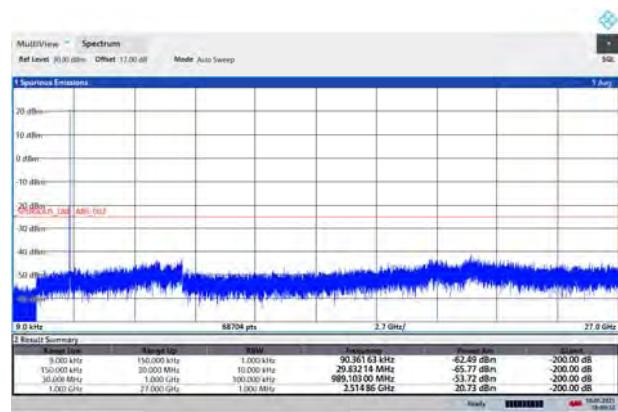
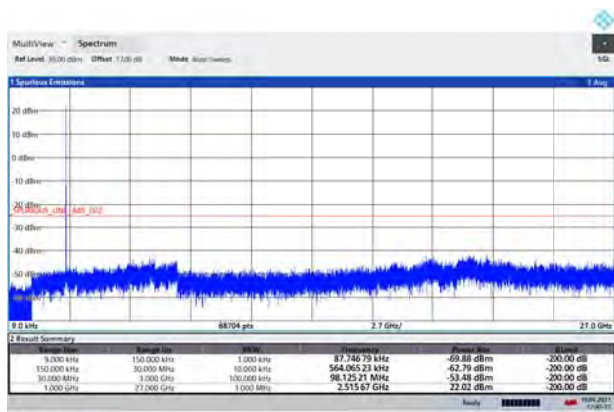
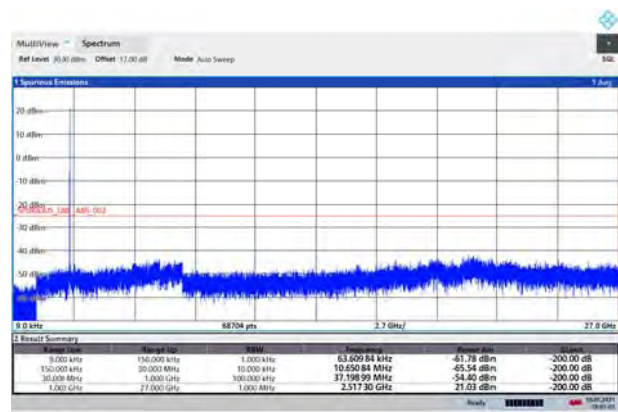
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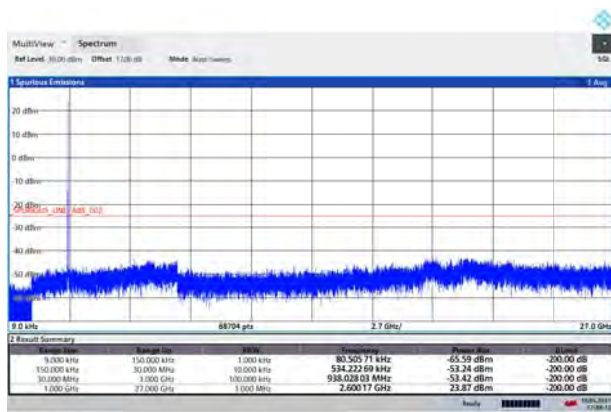
CA_7C 64QAM 20MHz+10MHz CH-High
9kHz~27GHz

17:18:43 10-05-2021

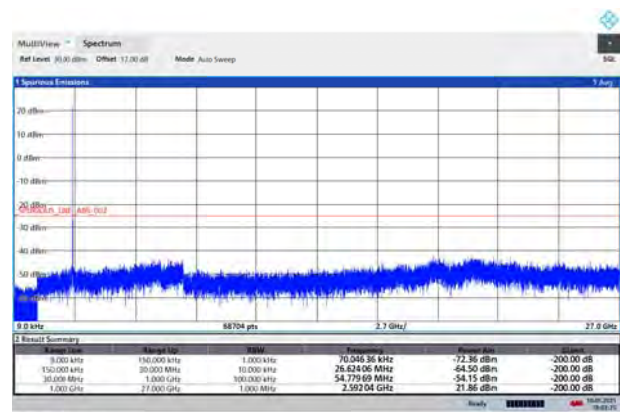
CA_7C 64QAM 20MHz+20MHz CH-High
9kHz~27GHz

17:18:16 10-05-2021

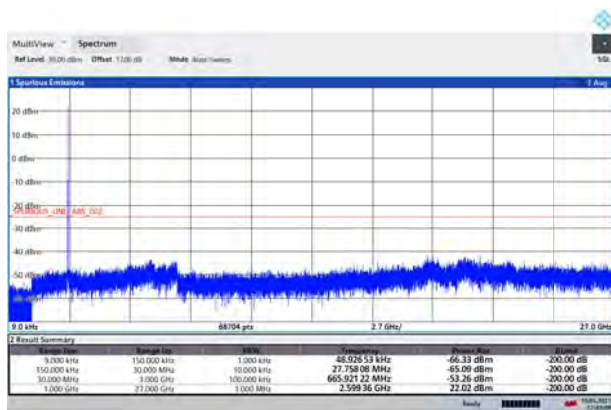
CA_41C QPSK 20MHz+5MHz CH- Low
9kHz~27GHzCA_41C QPSK 20MHz+20MHz CH- Low
9kHz~27GHzCA_41C 16QAM 20MHz+5MHz CH- Low
9kHz~27GHzCA_41C 16QAM 20MHz+20MHz CH- Low
9kHz~27GHzCA_41C 64QAM 20MHz+5MHz CH- Low
9kHz~27GHzCA_41C 64QAM 20MHz+20MHz CH- Low
9kHz~27GHz

CA_41C QPSK 20MHz+5MHz CH- Middle
9kHz~27GHz

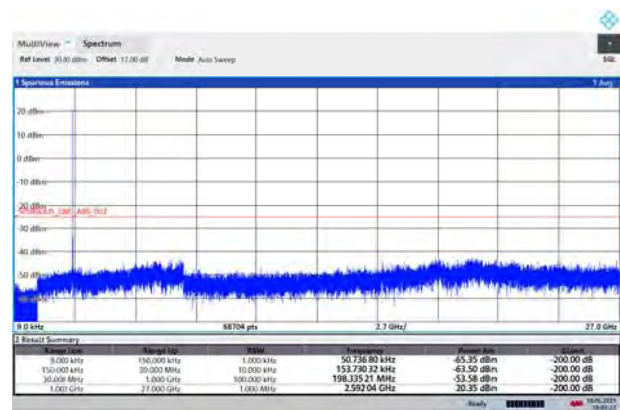
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CA_41C QPSK 20MHz+20MHz CH- Middle
9kHz~27GHz

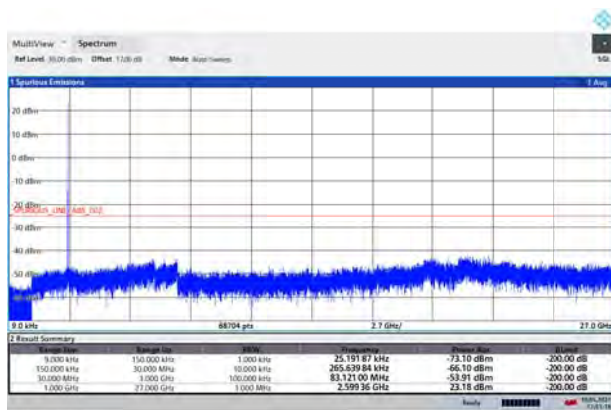
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CA_41C 16QAM 20MHz+5MHz CH- Middle
9kHz~27GHz

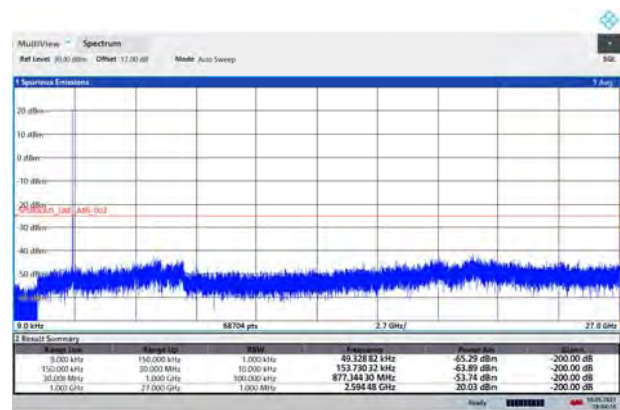
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CA_41C 16QAM 20MHz+20MHz CH- Middle
9kHz~27GHz

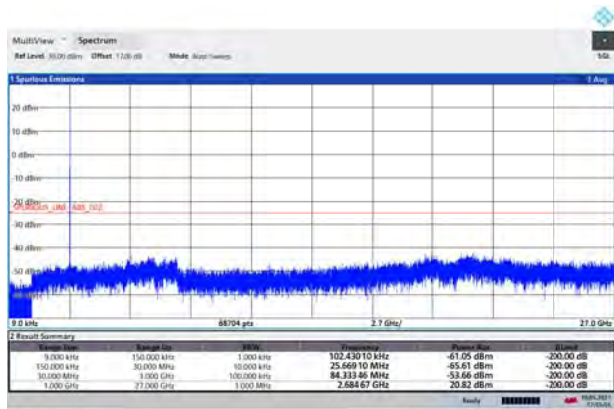
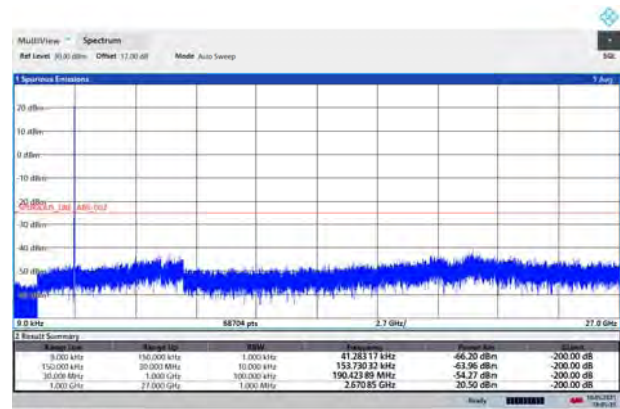
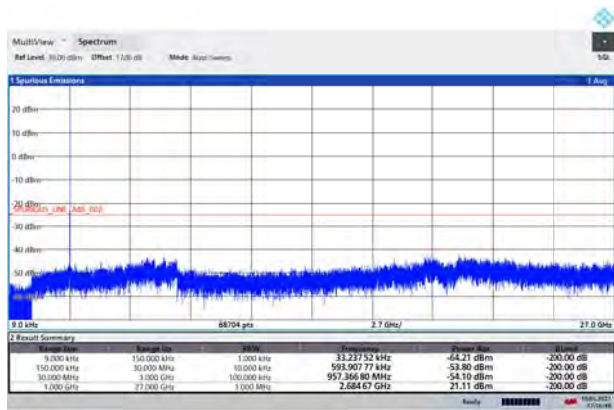
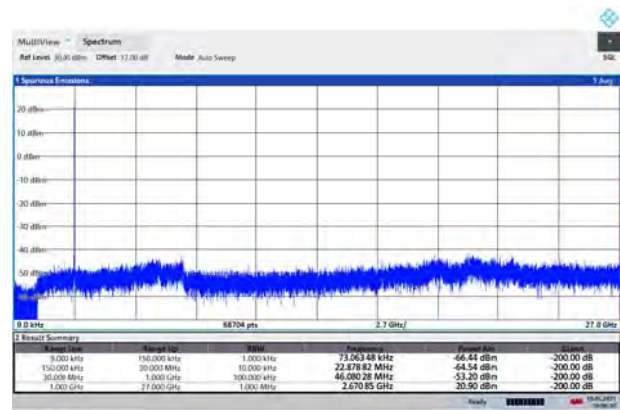
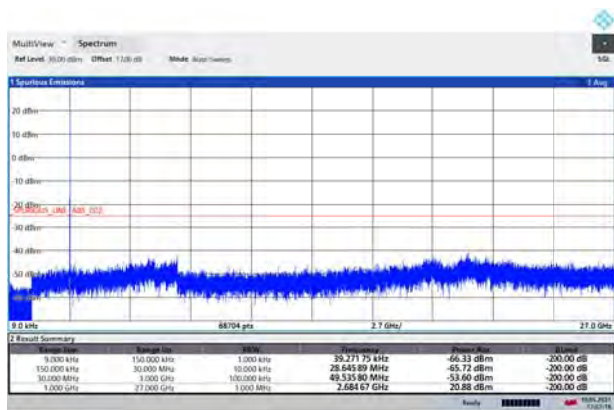
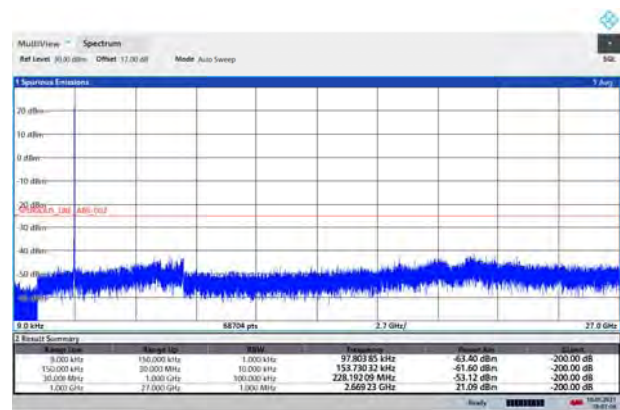
18:03:08 10-05-2021

CA_41C 64QAM 20MHz+5MHz CH- Middle
9kHz~27GHz

17:51:14 10-05-2021

CA_41C 64QAM 20MHz+20MHz CH- Middle
9kHz~27GHz

18:04:16 10-05-2021

CA_41C QPSK 20MHz+5MHz CH- High
9kHz~27GHzCA_41C QPSK 20MHz+20MHz CH- High
9kHz~27GHzCA_41C 16QAM 20MHz+5MHz CH- High
9kHz~27GHzCA_41C 16QAM 20MHz+20MHz CH- High
9kHz~27GHzCA_41C 64QAM 20MHz+5MHz CH- High
9kHz~27GHzCA_41C 64QAM 20MHz+20MHz CH- High
9kHz~27GHz



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

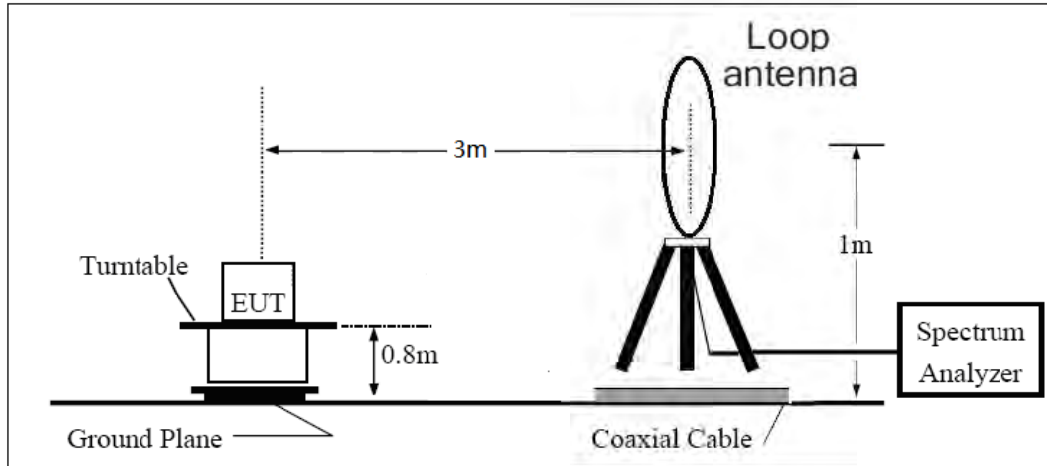
The measurement results are amend as described below:
$$\text{Power(EIRP)} = \text{PMea} - \text{Pcl} + \text{Ga}$$
8. This value is EIRP since the measurement is calibrated using an antenna of known gain (2.15 dBi) and known input power. ERP can be calculated from EIRP by subtracting the gain of the dipole, ERP

= EIRP-2.15dBi.

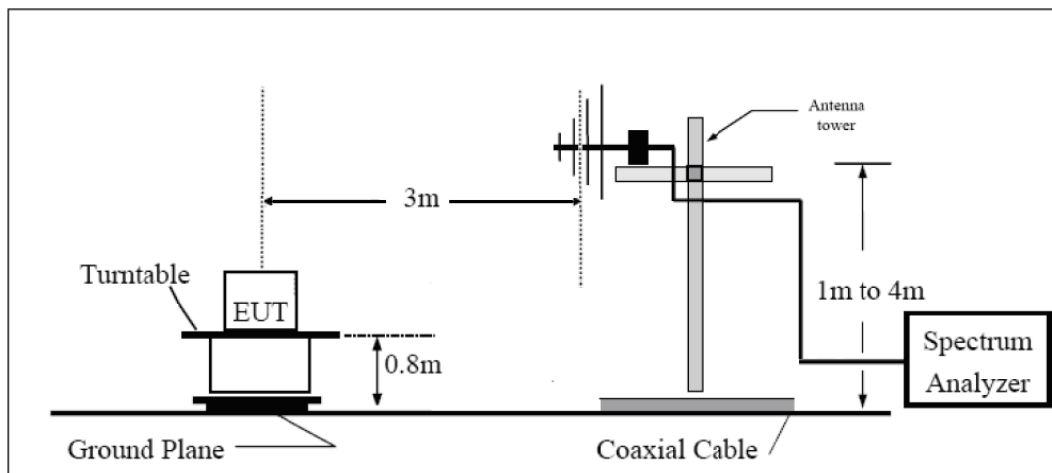
The modulation mode and RB allocation refer to section 5.1, using the maximum output power configuration.

Test setup

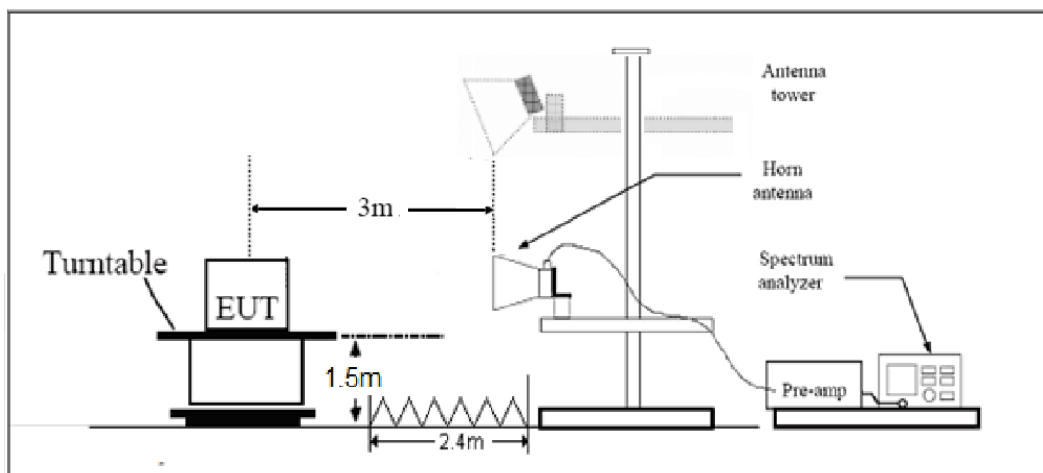
9KHz ~ 30MHz



30MHz ~ 1GHz



Above 1GHz



Note: Area side:2.4mX3.6m

Limits

Rule Part 27.53(h) specifies that “for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least $43 + 10 \log_{10}(P)$ dB.”

Rule Part 27.53 (g) For operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log(P)$ dB. Compliance with this provision is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kilohertz or greater. However, in the 100 kilohertz bands immediately outside and adjacent to a licensee's frequency block, a resolution bandwidth of at least 30 kHz may be employed.

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(a)/(h)/(g) Limit	-13 dBm
Part 27.53(m) Limit	-25 dBm

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.

WCDMA Band IV CH-Middle

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	EIRP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	3465.20	-63.24	2.70	12.70	Horizontal	-53.24	-13.00	40.24	0
3	5197.80	-56.59	3.20	12.50	Horizontal	-47.29	-13.00	34.29	0
4	6930.40	-60.93	4.20	11.80	Horizontal	-53.33	-13.00	40.33	45
5	8663.00	-54.31	4.40	12.50	Horizontal	-46.21	-13.00	33.21	225
6	10395.60	-44.85	4.70	11.30	Horizontal	-38.25	-13.00	25.25	90
7	12128.20	-51.27	5.20	13.80	Horizontal	-42.67	-13.00	29.67	0
8	13860.80	-46.74	5.70	11.30	Horizontal	-41.14	-13.00	28.14	45
9	15593.40	-52.83	6.10	16.80	Horizontal	-42.13	-13.00	29.13	315
10	17326.00	-48.58	6.10	14.20	Horizontal	-40.48	-13.00	27.48	90

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 4 QPSK 1.4MHz 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	3464.25	-52.58	2.70	12.70	Horizontal	-44.73	-13.00	31.73	45
3	5197.50	-47.79	3.20	12.50	Horizontal	-40.64	-13.00	27.64	225
4	6930.75	-57.01	4.20	11.80	Horizontal	-51.56	-13.00	38.56	45
5	8664.00	-45.20	4.40	12.50	Horizontal	-39.25	-13.00	26.25	90
6	10397.25	-33.82	4.70	11.30	Horizontal	-29.37	-13.00	16.37	0
7	12130.50	-50.40	5.20	13.80	Horizontal	-43.95	-13.00	30.95	90
8	13863.75	-45.04	5.70	11.30	Horizontal	-41.59	-13.00	28.59	45
9	15597.00	-47.73	6.10	16.80	Horizontal	-39.18	-13.00	26.18	315
10	17330.25	-45.00	6.10	14.20	Horizontal	-39.05	-13.00	26.05	180

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 4 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	3460.50	-52.26	2.70	12.70	Horizontal	-44.41	-13.00	31.41	45
3	5191.50	-47.69	3.20	12.50	Horizontal	-40.54	-13.00	27.54	315
4	6922.50	-56.66	4.20	11.80	Horizontal	-51.21	-13.00	38.21	90
5	8653.50	-47.97	4.40	12.50	Horizontal	-42.02	-13.00	29.02	45
6	10384.50	-36.86	4.70	11.30	Horizontal	-32.41	-13.00	19.41	270
7	12115.50	-48.76	5.20	13.80	Horizontal	-42.31	-13.00	29.31	180
8	13846.50	-44.27	5.70	11.30	Horizontal	-40.82	-13.00	27.82	90
9	15577.50	-52.77	6.10	16.80	Horizontal	-44.22	-13.00	31.22	45
10	17308.50	-47.98	6.10	14.20	Horizontal	-42.03	-13.00	29.03	315
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 4 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	3447.00	-51.38	2.70	12.70	Horizontal	-43.53	-13.00	30.53	90
3	5170.88	-48.53	3.20	12.50	Horizontal	-41.38	-13.00	28.38	0
4	6894.75	-56.85	4.20	11.80	Horizontal	-51.40	-13.00	38.40	45
5	8618.63	-47.19	4.40	12.50	Horizontal	-41.24	-13.00	28.24	225
6	10342.50	-34.66	4.70	11.30	Horizontal	-30.21	-13.00	17.21	45
7	12066.38	-49.97	5.20	13.80	Horizontal	-43.52	-13.00	30.52	315
8	13790.25	-44.67	5.70	11.30	Horizontal	-41.22	-13.00	28.22	90
9	15514.13	-49.33	6.10	16.80	Horizontal	-40.78	-13.00	27.78	45
10	17238.00	-45.76	6.10	14.20	Horizontal	-39.81	-13.00	26.81	270
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 7 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	5065.80	-56.93	3.40	12.50	Horizontal	-49.98	-25.00	24.98	0
3	7598.60	-53.61	4.40	12.20	Horizontal	-47.96	-25.00	22.96	315
4	10130.63	-38.81	4.70	11.30	Horizontal	-34.36	-25.00	9.36	45
5	12675.00	-45.99	5.40	13.20	Horizontal	-40.34	-25.00	15.34	90
6	15210.00	-47.42	6.10	13.10	Horizontal	-42.57	-25.00	17.57	180
7	17745.00	-44.43	6.10	14.20	Horizontal	-38.48	-25.00	13.48	135
8	20280.00	--	--	--	--	--	--	--	--
9	22815.00	--	--	--	--	--	--	--	--
10	25350.00	--	--	--	--	--	--	--	--

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 7 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	5052.38	-56.85	3.40	12.50	Horizontal	-49.90	-25.00	24.90	180
3	7605.00	-54.13	4.40	12.20	Horizontal	-48.48	-25.00	23.48	45
4	10140.00	-37.50	4.70	11.30	Horizontal	-33.05	-25.00	8.05	90
5	12675.00	-45.25	5.40	13.20	Horizontal	-39.60	-25.00	14.60	270
6	15210.00	-47.41	6.10	13.10	Horizontal	-42.56	-25.00	17.56	135
7	17745.00	-45.54	6.10	14.20	Horizontal	-39.59	-25.00	14.59	45
8	20280.00	--	--	--	--	--	--	--	--
9	22815.00	--	--	--	--	--	--	--	--
10	25350.00	--	--	--	--	--	--	--	--

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 12 QPSK 1.4MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1415.00	-63.66	1.70	8.70	Horizontal	-58.81	-13.00	45.81	0
3	2122.50	-54.03	2.10	11.10	Horizontal	-47.18	-13.00	34.18	45
4	2830.00	-65.27	2.30	13.10	Horizontal	-56.62	-13.00	43.62	45
5	3537.50	-65.14	2.60	12.70	Horizontal	-57.19	-13.00	44.19	90
6	4245.00	-61.80	3.30	12.50	Horizontal	-54.75	-13.00	41.75	45
7	4952.50	-59.55	3.40	12.50	Horizontal	-52.60	-13.00	39.60	135
8	5660.00	-59.69	3.30	12.50	Horizontal	-52.64	-13.00	39.64	45
9	6367.50	-58.98	3.80	11.50	Horizontal	-53.43	-13.00	40.43	0
10	7075.00	-54.97	4.20	11.80	Horizontal	-49.52	-13.00	36.52	90

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 12 QPSK 5MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1410.60	-63.03	1.70	8.70	Horizontal	-58.18	-13.00	45.18	315
3	2115.90	-53.20	2.10	11.10	Horizontal	-46.35	-13.00	33.35	180
4	2821.20	-64.74	2.30	13.10	Horizontal	-56.09	-13.00	43.09	90
5	3537.50	-63.82	2.60	12.70	Horizontal	-55.87	-13.00	42.87	45
6	4245.00	-62.34	3.30	12.50	Horizontal	-55.29	-13.00	42.29	0
7	4952.50	-59.35	3.40	12.50	Horizontal	-52.40	-13.00	39.40	315
8	5660.00	-59.29	3.30	12.50	Horizontal	-52.24	-13.00	39.24	90
9	6367.50	-57.40	3.80	11.50	Horizontal	-51.85	-13.00	38.85	90
10	7075.00	-53.78	4.20	11.80	Horizontal	-48.33	-13.00	35.33	135

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 12 QPSK 10MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1406.40	-62.53	1.70	8.70	Horizontal	-57.68	-13.00	44.68	135
3	2109.60	-53.46	2.10	11.10	Horizontal	-46.61	-13.00	33.61	135
4	2812.80	-66.47	2.30	13.10	Horizontal	-57.82	-13.00	44.82	0
5	3537.50	-63.43	2.60	12.70	Horizontal	-55.48	-13.00	42.48	90
6	4245.00	-60.76	3.30	12.50	Horizontal	-53.71	-13.00	40.71	0
7	4952.50	-59.23	3.40	12.50	Horizontal	-52.28	-13.00	39.28	0
8	5660.00	-59.56	3.30	12.50	Horizontal	-52.51	-13.00	39.51	45
9	6367.50	-57.42	3.80	11.50	Horizontal	-51.87	-13.00	38.87	315
10	7075.00	-53.04	4.20	11.80	Horizontal	-47.59	-13.00	34.59	90

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 17 QPSK 5MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1420.00	-64.06	1.70	8.70	Horizontal	-59.21	-13.00	46.21	90
3	2130.00	-55.06	2.10	11.10	Horizontal	-48.21	-13.00	35.21	0
4	2840.00	-65.84	2.50	13.10	Horizontal	-57.39	-13.00	44.39	0
5	3550.00	-65.18	2.60	12.70	Horizontal	-57.23	-13.00	44.23	315
6	4260.00	-62.18	3.30	12.50	Horizontal	-55.13	-13.00	42.13	135
7	4970.00	-59.14	3.40	12.50	Horizontal	-52.19	-13.00	39.19	0
8	5680.00	-59.73	3.40	12.80	Horizontal	-52.48	-13.00	39.48	90
9	6390.00	-57.84	4.10	11.50	Horizontal	-52.59	-13.00	39.59	90
10	7100.00	-55.06	4.20	12.20	Horizontal	-49.21	-13.00	36.21	45

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 17 QPSK 10MHz CH-Middle, RB 1

Harmonic	Frequency (MHz)	SG (dBm)	Cable Loss (dB)	Gain (dBi)	Antenna Polarization	ERP Level (dBm)	Limit (dBm)	Margin (dB)	Azimuth (deg)
2	1420.00	-66.80	1.70	8.70	Horizontal	-61.95	-13.00	48.95	135
3	2130.00	-54.39	2.10	11.10	Horizontal	-47.54	-13.00	34.54	135
4	2840.00	-64.58	2.50	13.10	Horizontal	-56.13	-13.00	43.13	45
5	3550.00	-64.12	2.60	12.70	Horizontal	-56.17	-13.00	43.17	45
6	4260.00	-62.01	3.30	12.50	Horizontal	-54.96	-13.00	41.96	0
7	4970.00	-58.66	3.40	12.50	Horizontal	-51.71	-13.00	38.71	0
8	5680.00	-59.84	3.40	12.80	Horizontal	-52.59	-13.00	39.59	135
9	6390.00	-58.77	4.10	11.50	Horizontal	-53.52	-13.00	40.52	135
10	7100.00	-54.89	4.20	12.20	Horizontal	-49.04	-13.00	36.04	0

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 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	5190.00	-58.41	3.20	12.50	Horizontal	-51.26	-25.00	26.26	0
3	7785.00	-55.34	4.40	12.30	Horizontal	-49.59	-25.00	24.59	0
4	10380.00	-45.69	4.70	11.80	Horizontal	-40.74	-25.00	15.74	90
5	12975.00	-47.51	5.40	14.00	Horizontal	-41.06	-25.00	16.06	45
6	15570.00	-53.29	6.10	16.80	Horizontal	-44.74	-25.00	19.74	45
7	18165.00	--	--	--	--	--	--	--	--
8	20760.00	--	--	--	--	--	--	--	--
9	23355.00	--	--	--	--	--	--	--	--
10	25950.00	--	--	--	--	--	--	--	--

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 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	5190.00	-57.89	3.20	12.50	Horizontal	-50.74	-25.00	25.74	0
3	7785.00	-51.54	4.40	12.30	Horizontal	-45.79	-25.00	20.79	225
4	10380.00	-44.11	4.70	11.80	Horizontal	-39.16	-25.00	14.16	225
5	12975.00	-48.12	5.40	14.00	Horizontal	-41.67	-25.00	16.67	315
6	15570.00	-50.31	6.10	16.80	Horizontal	-41.76	-25.00	16.76	90
7	18165.00	--	--	--	--	--	--	--	--
8	20760.00	--	--	--	--	--	--	--	--
9	23355.00	--	--	--	--	--	--	--	--
10	25950.00	--	--	--	--	--	--	--	--
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	5186.00	-56.06	3.20	12.50	Horizontal	-48.91	-25.00	23.91	45
3	7779.00	-49.97	4.40	12.30	Horizontal	-44.22	-25.00	19.22	225
4	10372.00	-45.59	4.70	11.80	Horizontal	-40.64	-25.00	15.64	0
5	12965.00	-49.01	5.40	14.00	Horizontal	-42.56	-25.00	17.56	90
6	15558.00	-51.42	6.10	16.80	Horizontal	-42.87	-25.00	17.87	90
7	18151.00	--	--	--	--	--	--	--	--
8	20744.00	--	--	--	--	--	--	--	--
9	23337.00	--	--	--	--	--	--	--	--
10	25930.00	--	--	--	--	--	--	--	--
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	5186.00	-58.53	3.20	12.50	Horizontal	-51.38	-25.00	26.38	225
3	7779.00	-45.89	4.40	12.30	Horizontal	-40.14	-25.00	15.14	90
4	10372.00	-48.66	4.70	11.80	Horizontal	-43.71	-25.00	18.71	90
5	12965.00	-48.68	5.40	14.00	Horizontal	-42.23	-25.00	17.23	135
6	15558.00	-53.45	6.10	16.80	Horizontal	-44.90	-25.00	19.90	135
7	18151.00	--	--	--	--	--	--	--	--
8	20744.00	--	--	--	--	--	--	--	--
9	23337.00	--	--	--	--	--	--	--	--
10	25930.00	--	--	--	--	--	--	--	--

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.

CA_7C QPSK 10MHz+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	5042.00	-59.74	3.40	12.50	Horizontal	-50.64	-25.00	25.64	90
3	7563.00	-55.68	4.20	12.20	Horizontal	-47.68	-25.00	22.68	270
4	10084.00	-49.86	4.70	11.30	Horizontal	-43.26	-25.00	18.26	315
5	12605.00	-49.59	5.40	13.20	Horizontal	-41.79	-25.00	16.79	225
6	15126.00	-48.99	6.10	13.10	Horizontal	-41.99	-25.00	16.99	180
7	17647.00	-47.52	6.10	14.20	Horizontal	-39.42	-25.00	14.42	45
8	20168.00	--	--	--	--	--	--	--	--
9	22689.00	--	--	--	--	--	--	--	--
10	25210.00	--	--	--	--	--	--	--	--

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.



CA_7C QPSK 20MHz+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	5055.00	-59.42	3.40	12.50	Horizontal	-50.32	-25.00	25.32	315
3	7582.50	-55.40	4.20	12.20	Horizontal	-47.40	-25.00	22.40	135
4	10110.00	-49.24	4.70	11.30	Horizontal	-42.64	-25.00	17.64	0
5	12637.50	-50.83	5.40	13.20	Horizontal	-43.03	-25.00	18.03	270
6	15165.00	-49.11	6.10	13.10	Horizontal	-42.11	-25.00	17.11	225
7	17692.50	-46.47	6.10	14.20	Horizontal	-38.37	-25.00	13.37	90
8	20220.00	--	--	--	--	--	--	--	--
9	22747.50	--	--	--	--	--	--	--	--
10	25275.00	--	--	--	--	--	--	--	--

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.

CA_7C QPSK 15MHz+15MHz 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	5041.50	-59.91	3.40	12.50	Horizontal	-50.81	-25.00	25.81	90
3	7562.25	-56.00	4.20	12.20	Horizontal	-48.00	-25.00	23.00	135
4	10083.00	-49.86	4.70	11.30	Horizontal	-43.26	-25.00	18.26	135
5	12603.75	-48.14	5.40	13.20	Horizontal	-40.34	-25.00	15.34	45
6	15124.50	-48.34	6.10	13.10	Horizontal	-41.34	-25.00	16.34	225
7	17645.25	-48.05	6.10	14.20	Horizontal	-39.95	-25.00	14.95	180
8	20166.00	--	--	--	--	--	--	--	--
9	22686.75	--	--	--	--	--	--	--	--
10	25207.50	--	--	--	--	--	--	--	--

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.



CA_7C QPSK 20MHz+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	5032.00	-59.47	3.40	12.50	Horizontal	-50.37	-25.00	25.37	0
3	7548.00	-55.48	4.20	12.20	Horizontal	-47.48	-25.00	22.48	90
4	10064.00	-51.32	4.70	11.30	Horizontal	-44.72	-25.00	19.72	135
5	12580.00	-48.96	5.40	13.20	Horizontal	-41.16	-25.00	16.16	270
6	15096.00	-48.93	6.10	13.10	Horizontal	-41.93	-25.00	16.93	45
7	17612.00	-47.47	6.10	14.20	Horizontal	-39.37	-25.00	14.37	225
8	20128.00	--	--	--	--	--	--	--	--
9	22644.00	--	--	--	--	--	--	--	--
10	25160.00	--	--	--	--	--	--	--	--

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.

CA_41C QPSK 5MHz+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	5167.60	-60.04	3.20	12.50	Horizontal	-50.74	-25.00	25.74	135
3	7754.40	-56.69	4.40	12.20	Horizontal	-48.89	-25.00	23.89	90
4	10343.20	-48.84	4.70	11.30	Horizontal	-42.24	-25.00	17.24	0
5	12934.00	-50.06	5.40	14.00	Horizontal	-41.46	-25.00	16.46	225
6	15526.80	-53.87	6.10	16.80	Horizontal	-43.17	-25.00	18.17	45
7	18121.60		--	--	--	--	--	--	--
8	20718.40	--	--	--	--	--	--	--	--
9	23317.20	--	--	--	--	--	--	--	--
10	25918.00	--	--	--	--	--	--	--	--

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.



CA_41C QPSK 20MHz+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	-60.28	3.20	12.50	Horizontal	-50.98	-25.00	25.98	0
3	7774.50	-48.15	4.40	12.20	Horizontal	-40.35	-25.00	15.35	90
4	10370.00	-47.89	4.70	11.30	Horizontal	-41.29	-25.00	16.29	270
5	12967.50	-48.76	5.40	14.00	Horizontal	-40.16	-25.00	15.16	45
6	15567.00	-53.62	6.10	16.80	Horizontal	-42.92	-25.00	17.92	135
7	18168.50	--	--	--	--	--	--	--	--
8	20772.00	--	--	--	--	--	--	--	--
9	23377.50	--	--	--	--	--	--	--	--
10	25985.00	--	--	--	--	--	--	--	--

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.

CA_41C QPSK 15MHz+15MHz 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	5171.00	-60.41	3.20	12.50	Horizontal	-51.11	-25.00	26.11	45
3	7759.50	-57.54	4.40	12.20	Horizontal	-49.74	-25.00	24.74	225
4	10350.00	-48.03	4.70	11.30	Horizontal	-41.43	-25.00	16.43	315
5	12942.50	-49.72	5.40	14.00	Horizontal	-41.12	-25.00	16.12	270
6	15537.00	-53.01	6.10	16.80	Horizontal	-42.31	-25.00	17.31	135
7	18133.50	--	--	--	--	--	--	--	--
8	20732.00	--	--	--	--	--	--	--	--
9	23332.50	--	--	--	--	--	--	--	--
10	25935.00	--	--	--	--	--	--	--	--

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.



CA_41C QPSK 20MHz+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	5166.20	-60.50	3.20	12.50	Horizontal	-51.20	-25.00	26.20	270
3	7752.30	-56.95	4.40	12.20	Horizontal	-49.15	-25.00	24.15	45
4	10340.40	-49.02	4.70	11.30	Horizontal	-42.42	-25.00	17.42	180
5	12930.50	-50.55	5.40	14.00	Horizontal	-41.95	-25.00	16.95	225
6	15522.60	-52.99	6.10	16.80	Horizontal	-42.29	-25.00	17.29	315
7	18116.70	--	--	--	--	--	--	--	--
8	20712.80	--	--	--	--	--	--	--	--
9	23310.90	--	--	--	--	--	--	--	--
10	25911.00	--	--	--	--	--	--	--	--

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	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	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	2020-12-12	2021-06-11
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.