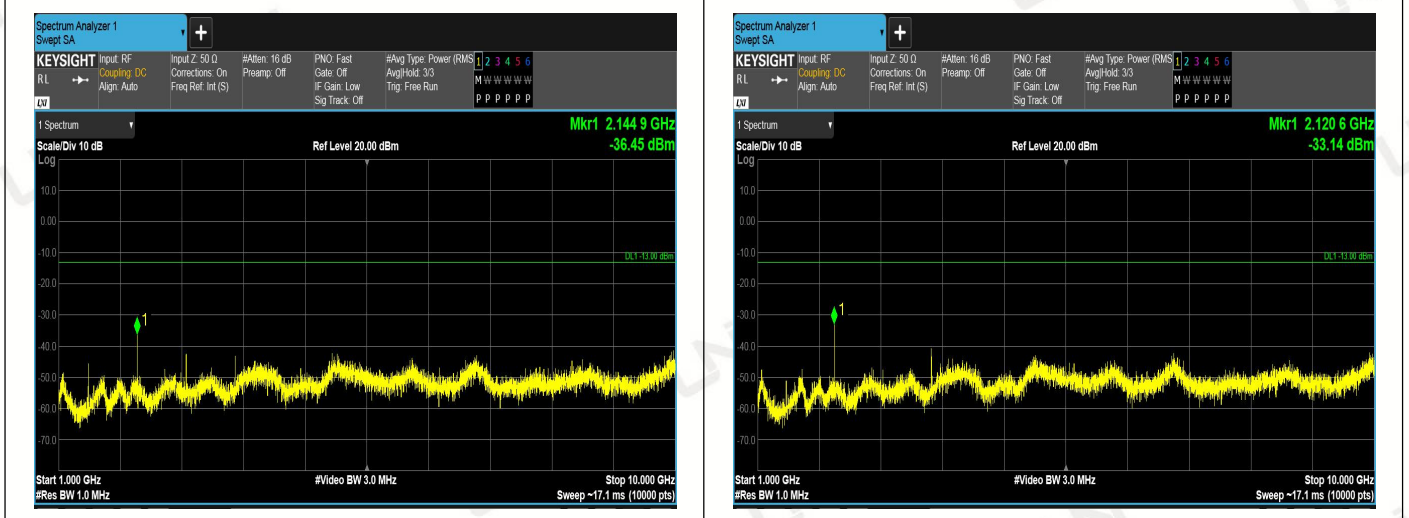
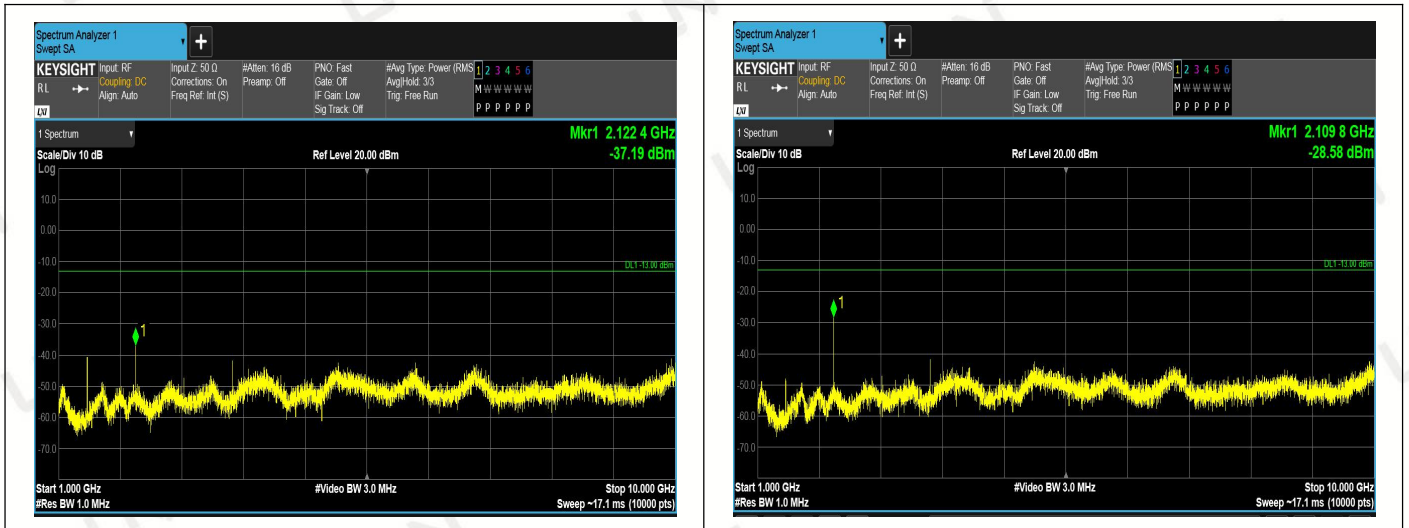
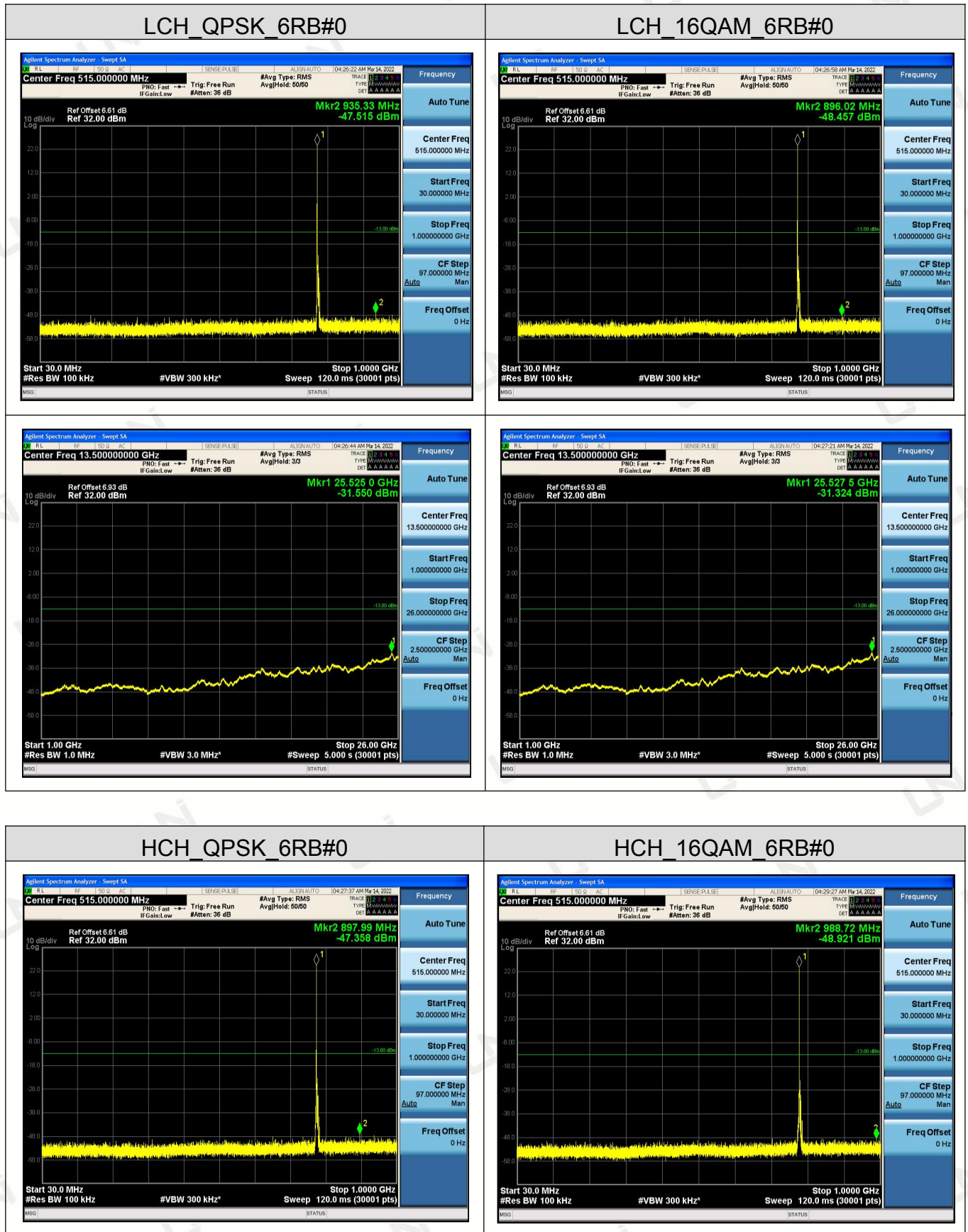
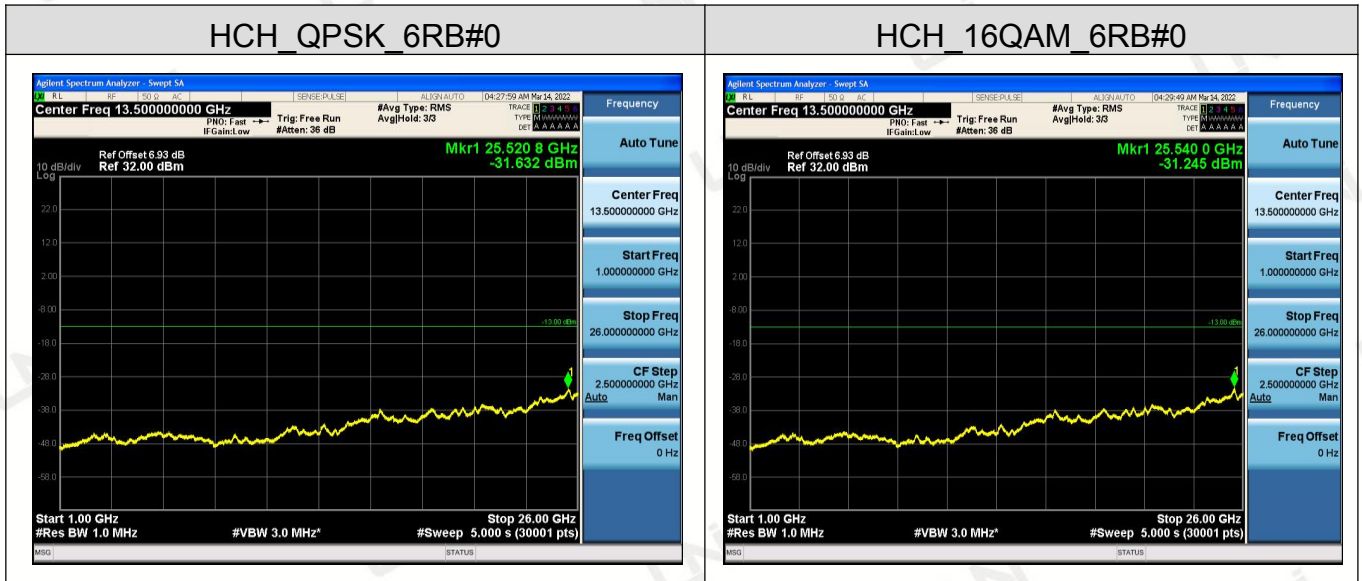




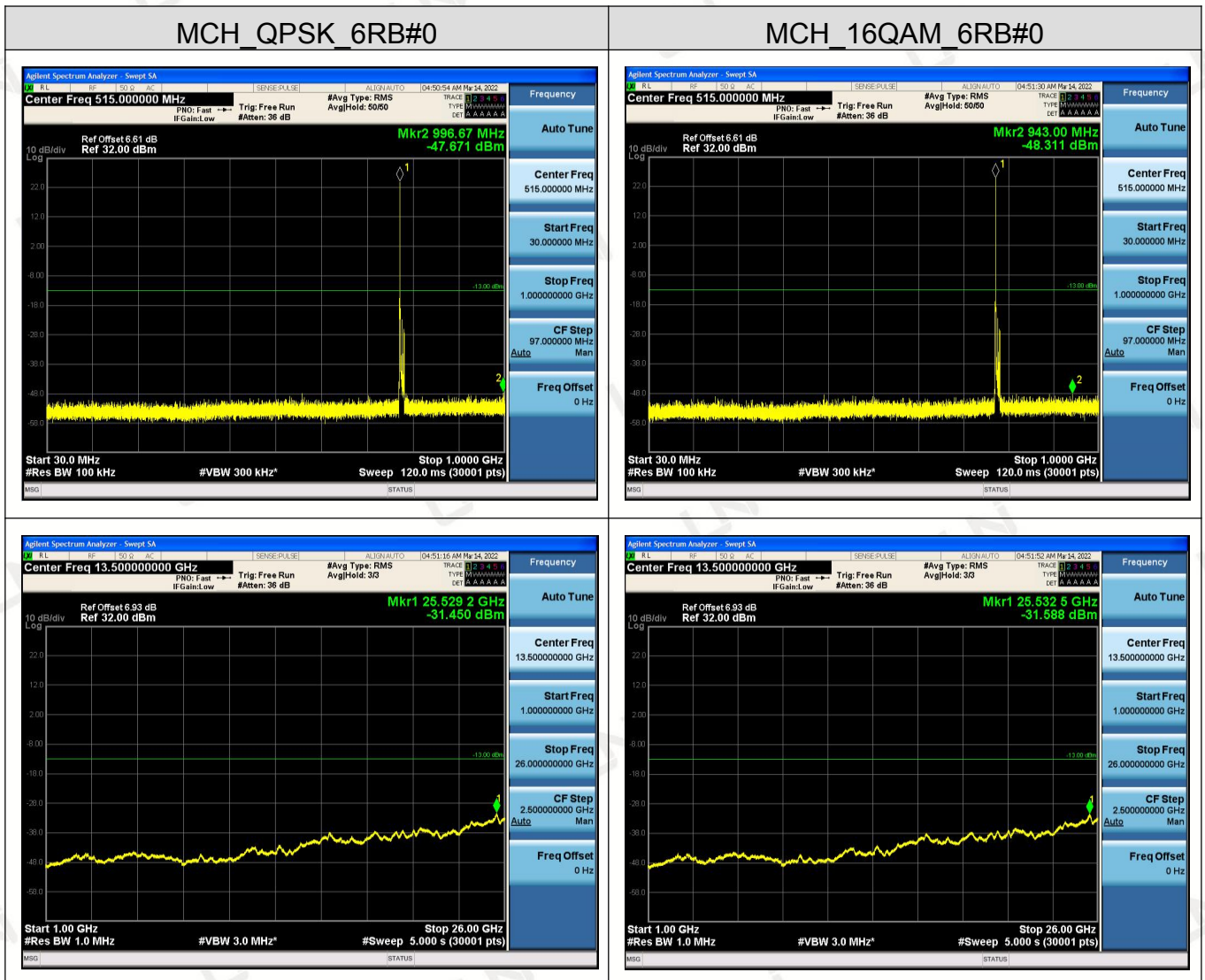
LTE BAND 13

Channel Bandwidth: 5 MHz



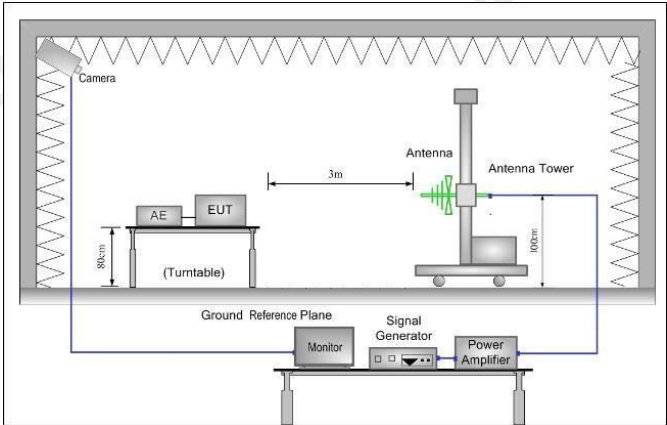
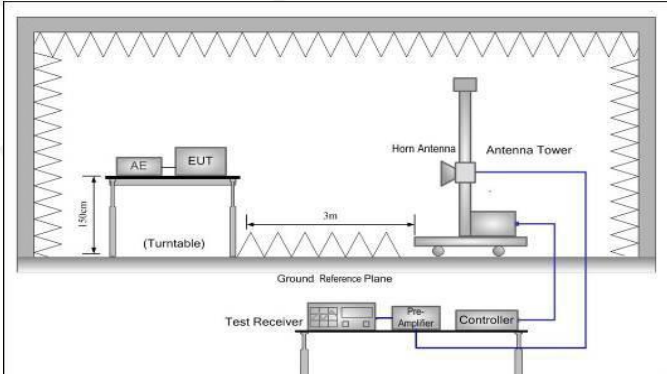


Channel Bandwidth: 10 MHz



Note: All modes have been tested and only the worst mode test data recorded in the test report.

8 FIELD STRENGTH OF SPURIOUS RADIATION MEASUREMENT

Test Requirement:	Part 22.917(a), Part 24.238 (a), Part 27.53(g), Part 27.53(m), Part 27.53(h)
Limit:	§22.917(a), §24.238(a), §27.53 (g), (h), §90.691 The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB. §27.53 (Band 13) (c) The power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least $43 + 10 \log (P)$ dB. (f) Emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power (EIRP) for wideband signals. (-70 dBW/MHz = -40 dBm/MHz). §27.53 (m) (Band 7) At least $55 + 10 \log (P)$ 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)(6) of this section.
Test setup:	Below 1GHz  Above 1GHz 

Test Procedure:	1. The EUT was placed on the top of a rotating table 0.8m(below 1GHz)/1.5m(above 1GHz) above the ground at a 3 meter camber. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. 2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. This maximization process was repeated with the EUT positioned in each of its three orthogonal orientations. 3. The frequency range up to tenth harmonic was investigated for each of three fundamental frequency (low, middle and high channels). Once spurious emission was identified, the power of the emission was determined using the substitution method.
-----------------	--

Test Procedure:	4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. $ERP / EIRP = S.G. \text{ output (dBm) } + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed

8.1 Test Result

LTE Band 2 part: Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5580	V	-40.12	-13	-27.12
3720	V	-39.25	-13	-26.25
695.5	V	-47.55	-13	-34.55
412.1	V	-49.12	-13	-36.12
5580	H	-38.67	-13	-25.67
3720	H	-41.30	-13	-28.30
678.3	H	-47.65	-13	-34.65
452.1	H	-48.08	-13	-35.08

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5640	V	-40.13	-13	-27.13
3760	V	-38.79	-13	-25.79
885.1	V	-47.73	-13	-34.73
618.7	V	-48.42	-13	-35.42
5640	H	-47.58	-13	-34.58
3760	H	-41.85	-13	-28.85
851.3	H	-44.79	-13	-31.79
732.5	H	-47.03	-13	-34.03

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5700	V	-40.05	-13	-27.05
3800	V	-41.00	-13	-28.00
664.5	V	-46.93	-13	-33.93
525.8	V	-45.80	-13	-32.80
5700	H	-38.38	-13	-25.38
3800	H	-38.98	-13	-25.98
669.8	H	-47.86	-13	-34.86
574.4	H	-46.76	-13	-33.76

LTE Band 4 part: Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5160	V	-38.14	-13	-25.14
3440	V	-38.45	-13	-25.45
745.5	V	-44.40	-13	-31.40
528.1	V	-47.05	-13	-34.05
5160	H	-38.43	-13	-25.43
3440	H	-40.16	-13	-27.16
520.5	H	-46.40	-13	-33.40
395.8	H	-42.98	-13	-29.98

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5197.5	V	-38.04	-13	-25.04
3465	V	-37.78	-13	-24.78
669.4	V	-45.94	-13	-32.94
512.5	V	-47.90	-13	-34.90
5197.5	H	-37.98	-13	-24.98
3465	H	-39.38	-13	-26.38
569.4	H	-46.62	-13	-33.62
469.3	H	-45.04	-13	-32.04

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
5235	V	-37.62	-13	-24.62
3490	V	-39.07	-13	-26.07
711.1	V	-47.89	-13	-34.89
528.7	V	-47.21	-13	-34.21
5235	H	-37.82	-13	-24.82
3490	H	-38.06	-13	-25.06
612.5	H	-45.52	-13	-32.52
553.9	H	-44.73	-13	-31.73

LTE Band 5 part:
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2487	V	-40.00	-13	-27.00
1658	V	-41.05	-13	-28.05
512.2	V	-46.50	-13	-33.50
365.5	V	-46.50	-13	-33.50
2487	H	-39.29	-13	-26.29
1658	H	-40.14	-13	-27.14
521.1	H	-44.40	-13	-31.40
336.5	H	-43.42	-13	-30.42

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2509.5	V	-41.55	-13	-28.55
1673	V	-41.96	-13	-28.96
725.8	V	-46.16	-13	-33.16
616.6	V	-46.70	-13	-33.70
2509.5	H	-40.18	-13	-27.18
1673	H	-41.98	-13	-28.98
705.5	H	-45.58	-13	-32.58
558.9	H	-44.22	-13	-31.22

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2532	V	-39.09	-13	-26.09
1688	V	-39.02	-13	-26.02
648.3	V	-46.05	-13	-33.05
482.7	V	-46.17	-13	-33.17
2532	H	-39.69	-13	-26.69
1688	H	-40.71	-13	-27.71
785.6	H	-45.82	-13	-32.82
615.7	H	-47.17	-13	-34.17

LTE Band 7 part:
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
7507.5	V	-40.09	-13	-27.09
5005	V	-39.83	-13	-26.83
925.7	V	-47.96	-13	-34.96
678.9	V	-49.60	-13	-36.60
7507.5	H	-38.19	-13	-25.19
5005	H	-39.66	-13	-26.66
873.6	H	-47.82	-13	-34.82
662.7	H	-47.22	-13	-34.22

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBc)	Margin (dB)
7605	V	-41.78	-13	-28.78
5070	V	-40.07	-13	-27.07
833.7	V	-48.98	-13	-35.98
521.2	V	-48.62	-13	-35.62
7605	H	-38.07	-13	-25.07
5070	H	-39.60	-13	-26.60
819.6	H	-46.82	-13	-33.82
520.5	H	-46.36	-13	-33.36

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
7702.5	V	-40.12	-13	-27.12
5135	V	-41.25	-13	-28.25
752.6	V	-49.20	-13	-36.20
511.4	V	-48.90	-13	-35.90
7702.5	H	-38.91	-13	-25.91
5135	H	-40.95	-13	-27.95
701.1	H	-45.81	-13	-32.81
507.1	H	-45.86	-13	-32.86

LTE Band 12 part:
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
512.4	V	-35.55	-13	-22.55
816.4	V	-36.68	-13	-23.68
1408	V	-27.15	-13	-14.15
2112	V	-36.67	-13	-23.67
2122	H	-35.17	-13	-22.17
2830	H	-36.34	-13	-23.34
415.3	H	-26.85	-13	-13.85
622.5	H	-36.23	-13	-23.23

Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBc)	Margin (dB)
2133	V	-34.75	-13	-21.75
2844	V	-35.77	-13	-22.77
1422	V	-26.29	-13	-13.29
2133	V	-35.88	-13	-22.88
2104.5	H	-37.11	-13	-24.11
2806	H	-38.33	-13	-25.33
1403	H	-28.68	-13	-15.68
2104.5	H	-38.24	-13	-25.24

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2122.5	V	-36.58	-13	-23.58
2830	V	-37.78	-13	-24.78
1415	V	-28.22	-13	-15.22
2122.5	V	-37.53	-13	-24.53
2140.5	H	-35.91	-13	-22.91
2854	H	-36.88	-13	-23.88
1427	H	-27.31	-13	-14.31
2140.5	H	-37.67	-13	-24.67

LTE Band 13 part:
Low channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2338.5	V	-37.61	-13	-24.61
3118	V	-40.31	-13	-27.31
559	V	-34.94	-13	-21.94
638.5	V	-41.71	-13	-28.71
2346	H	-37.18	-13	-24.18
3128	H	-40.07	-13	-27.07
564.8	H	-34.71	-13	-21.71
546.4	H	-41.33	-13	-28.33

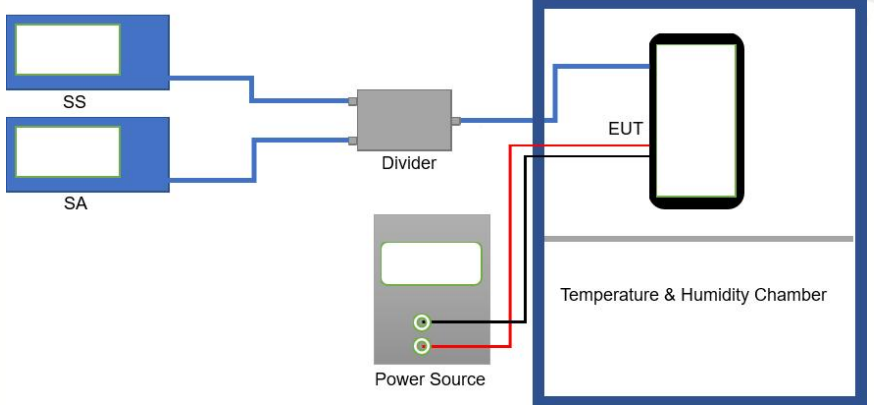
Middle channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBc)	Margin (dB)
2353.5	V	-36.64	-13	-23.64
3138	V	-39.76	-13	-26.76
569.5	V	-34.49	-13	-21.49
453.3	V	-40.61	-13	-27.61
564	H	-30.25	-13	-17.25
2346	H	-36.37	-13	-23.37
3128	H	-39.48	-13	-26.48
464.7	H	-34.25	-13	-21.25

High channel

Frequency (MHz)	Polarity (H/V)	Emission Level (dBm)	Limit (dBm)	Margin (dB)
2112	V	-35.51	-13	-22.51
2816	V	-36.68	-13	-23.68
508.7	V	-27.15	-13	-14.15
2112	V	-36.67	-13	-23.67
2830	H	-35.17	-13	-22.17
515.8	H	-36.34	-13	-23.34
622.9	H	-26.85	-13	-13.85
2830	H	-36.22	-13	-23.22

9 FREQUENCY STABILITY V.S. TEMPERATURE MEASUREMENT

Test Requirement:	Part 22.355, Part 24.235, Part 27.54, Part 2.1055(a)(1)(b)
Limit:	Cellular Band: $\pm 2.5\text{ppm}$ PCS Band: Within the authorized frequency block
Test setup:	
Test procedure:	1. The equipment under test was connected to an external DC power supply and input rated voltage. 2. RF output was connected to a frequency counter or spectrum analyzer via feed through attenuators. 3. The EUT was placed inside the temperature chamber. 4. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and measure EUT 25°C operating frequency as reference frequency. 5. Turn EUT off and set the chamber temperature to -30°C. After the temperature stabilized for approximately 30 minutes recorded the frequency. 6. Repeat step measure with 10°C increased per stage until the highest temperature of +50°C reached
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed

9.1 Test Result

LTE Band 2 part:

Reference Frequency: LTE Band 2 (10MHz) Middle channel=18900 Frequency=1880.0MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.7	-30	-6.97	-0.003766	Within authorized band for Band 2	Pass
	-20	-7.67	-0.004144		
	-10	-7.37	-0.003982		
	0	-7.91	-0.004207		
	10	-6.98	-0.003713		
	20	-6.58	-0.003500		
	30	-6.47	-0.003389		
	40	-4.23	-0.002215		
	50	-4.72	-0.002472		
16QAM					
3.7	-30	-7.90	-0.00427	Within authorized band for Band 2	Pass
	-20	-5.44	-0.00294		
	-10	-7.10	-0.00378		
	0	-7.81	-0.00415		
	10	-7.94	-0.00422		
	20	-4.92	-0.00258		
	30	4.42	0.00231		
	40	-4.92	-0.00258		
	50	-7.52	-0.00406		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.33	-8.67	-0.00468	Within authorized band for Band 2	Pass
	3.70	-7.77	-0.00413		
	4.07	-8.2	-0.00436		
16QAM					
25	3.33	4.51	0.002363	Within authorized band for Band 2	Pass
	3.70	4.98	0.002609		
	4.07	4.11	0.002154		
Note: Only the worst case shown in the report.					

LTE Band 4 part:

Reference Frequency: LTE Band 4(10MHz) Middle channel=20175 Frequency=1732.5MHz					
Temperature					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.7	-30	4.33	0.00250	Within authorized band for Band 4	Pass
	-20	4.29	0.00248		
	-10	-5.42	-0.00310		
	0	5.34	0.00305		
	10	5.15	0.00294		
	20	3.91	0.00228		
	30	3.96	0.00231		
	40	3.83	0.00223		
	50	-9.37	-0.00541		

16QAM					
3.7	-30	-8.25	-0.00476	Within authorized band for Band 4	Pass
	-20	4.36	0.00252		
	-10	-7.85	-0.00453		
	0	4.69	0.00268		
	10	-6.85	-0.00391		
	20	5.24	0.00299		
	30	-6.69	-0.00390		
	40	-6.15	-0.00359		
	50	-6.38	-0.00372		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.33	-4.35	-0.00253	Within authorized band for Band 4	Pass
	3.70	3.88	0.00226		
	4.07	-5.97	-0.00348		
16QAM					
25	3.33	4.41	0.00252	Within authorized band for Band 4	Pass
	3.70	4.98	0.00285		
	4.07	4.72	0.00270		
Note: Only the worst case shown in the report.					

LTE Band 5 part:

Reference Frequency: LTE Band 5(10MHz) Middle channel=20525 Frequency=836.5MHz					
Temperature					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.7	-30	-2.89	-0.00349	Within authorized band for Band 5	Pass
	-20	3.26	0.00393		
	-10	-4.05	-0.00489		
	0	2.69	0.00322		
	10	-2.78	-0.00332		
	20	-2.71	-0.00323		
	30	-4.76	-0.00564		
	40	-4.62	-0.00547		
	50	-4.45	-0.00527		

16QAM					
3.7	-30	-2.99	-0.00361	Within authorized band for Band 5	Pass
	-20	-3.22	-0.00388		
	-10	-3.11	-0.00371		
	0	-3.96	-0.00473		
	10	-3.36	-0.00402		
	20	-5.49	-0.00651		
	30	-5.76	-0.00683		
	40	-2.78	-0.00332		
	50	3.26	0.00393		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.33	-4.35	-0.00526	Within authorized band for Band 5	Pass
	3.70	-4.45	-0.00538		
	4.07	-4.95	-0.00599		
16QAM					
25	3.33	-2.79	-0.00334	Within authorized band for Band 5	Pass
	3.70	2.88	0.00344		
	4.07	-2.93	-0.00350		
Note: Only the worst case shown in the report.					

LTE Band 7 part:

Reference Frequency: LTE Band 7(10MHz) Middle channel=21100 Frequency=2535MHz					
Temperature					
Power supplied (Vdc)	Temperature (℃)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.7	-30	-35.59	-0.01421	Within authorized band for Band 7	Pass
	-20	-36.88	-0.01472		
	-10	28.91	0.01154		
	0	-35.72	-0.01409		
	10	32.26	0.01273		
	20	-30.54	-0.01205		
	30	32.80	0.01279		
	40	-37.77	-0.01473		
	50	-36.88	-0.01438		

16QAM					
3.7	-30	-31.10	-0.01242	Within authorized band for Band 7	Pass
	-20	17.87	0.00713		
	-10	-43.22	-0.01705		
	0	-26.79	-0.01057		
	10	-42.03	-0.01658		
	20	-31.44	-0.01226		
	30	-36.59	-0.01427		
	40	-34.50	-0.01345		
	50	-35.41	-0.01412		
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.33	-29.41	-0.01160	Within authorized band for Band 7	Pass
	3.70	-30.81	-0.01215		
	4.07	30.86	0.01217		
16QAM					
25	3.33	-29.44	-0.01149	Within authorized band for Band 7	Pass
	3.70	-36.85	-0.01470		
	4.07	-37.32	-0.01488		
Note: Only the worst case shown in the report.					

LTE Band 12 part:

Reference Frequency: LTE Band 12(10MHz) Middle channel=23095 Frequency=707.5MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.7	-30	-4.36	-0.00619	Within authorized band for Band 12	Pass
	-20	-3.52	-0.00500		
	-10	-4.66	-0.00662		
	0	-2.79	-0.00394		
	10	-3.08	-0.00435		
	20	-3.3	-0.00466		
	30	5.72	0.00805		
	40	-3.45	-0.00485		
	50	5.21	0.00733		
16QAM					
3.7	-30	4.66	0.00662	Within authorized band for Band 12	Pass
	-20	3.22	0.00457		
	-10	-2.4	-0.00339		
	0	-1.77	-0.00250		
	10	-2.62	-0.00370		
	20	-3.98	-0.00560		
	30	5.92	0.00833		
	40	-3.09	-0.00437		
	50	-2.50	-0.00353		

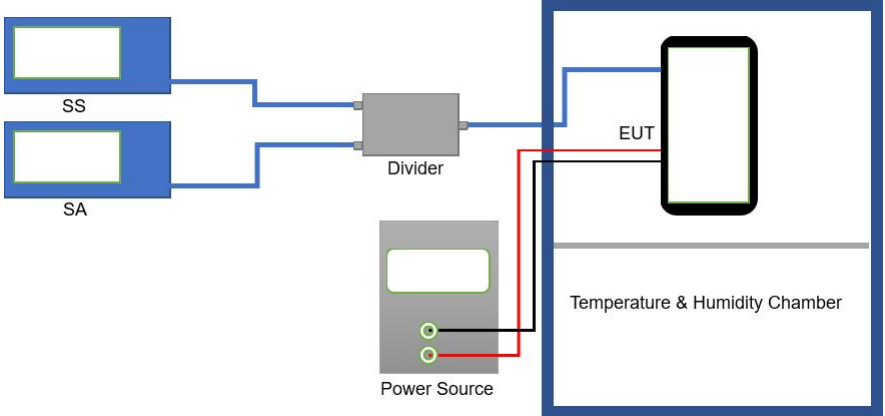
Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.33	-2.78	-0.00393	Within authorized band for Band 12	Pass
	3.70	-3.81	-0.00534		
	4.07	-5.92	-0.00830		
16QAM					
25	3.33	-2.99	-0.00426	Within authorized band for Band 12	Pass
	3.70	-3.03	-0.00432		
	4.07	3.68	0.00520		
Note: Only the worst case shown in the report.					

LTE Band 13 part:

Reference Frequency: LTE Band 13(10MHz) Middle channel=23230 Frequency=782MHz					
Temperature					
Power supplied (Vdc)	Temperature (°C)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
3.7	-30	-6.32	-0.00811	Within authorized band for Band 13	Pass
	-20	-3.62	-0.00464		
	-10	-5.08	-0.00652		
	0	-3.95	-0.00505		
	10	-5.16	-0.00660		
	20	4.42	0.00565		
	30	3.39	0.00432		
	40	-2.83	-0.00361		
	50	3.18	0.00405		
16QAM					
3.7	-30	-4.95	-0.00635	Within authorized band for Band 13	Pass
	-20	-6.19	-0.00794		
	-10	4.84	0.00619		
	0	4.69	0.00600		
	10	6.29	0.00804		
	20	3.12	0.00398		
	30	-3.63	-0.00463		
	40	2.81	0.00357		
	50	-4.68	-0.00599		

Voltage					
Temperature (°C)	Power supplied (Vdc)	Frequency error		Limit (ppm)	Result
		Hz	ppm		
QPSK					
25	3.33	5.49	0.00702	Within authorized band for Band 13	Pass
	3.70	4.86	0.00622		
	4.07	6.95	0.00889		
16QAM					
25	3.33	4.68	0.00600	Within authorized band for Band 13	Pass
	3.70	-3.61	-0.00464		
	4.07	6.27	0.00804		
Note: Only the worst case shown in the report.					

10 FREQUENCY STABILITY V.S. VOLTAGE MEASUREMENT

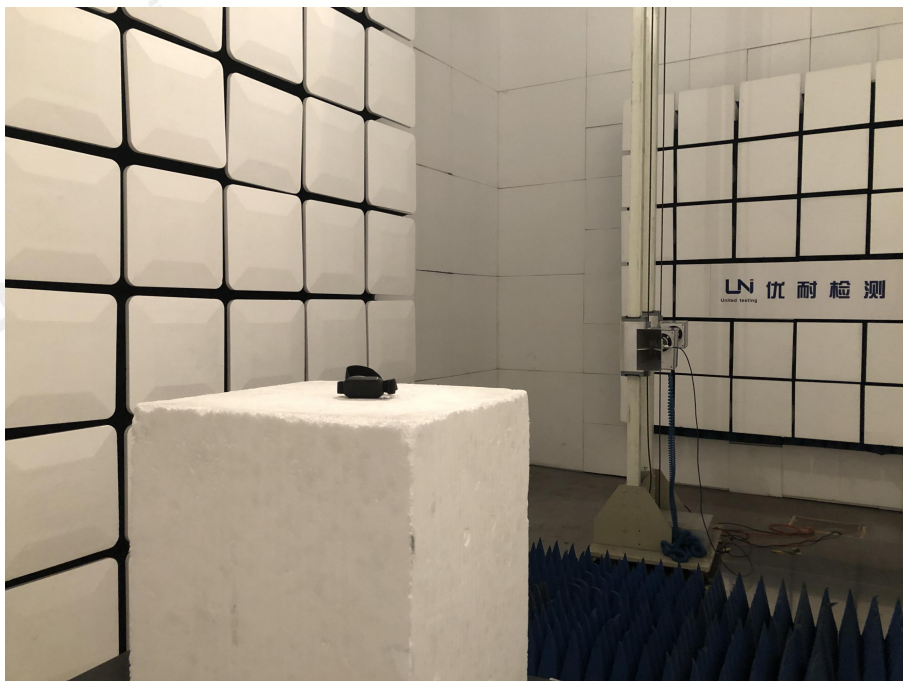
Test Requirement:	Part 22.355, Part 24.235, Part 27.54, Part 2.1055(d)(2)
Limit:	Cellular Band: $\pm 2.5\text{ppm}$ PCS Band: Within the authorized frequency block
Test setup:	
Test procedure:	1. Set chamber temperature to 25°C. Use a variable DC power source to power the EUT and set the voltage to rated voltage. 2. Set the spectrum analyzer RBW low enough to obtain the desired frequency resolution and recorded the frequency. 3. Reduce the input voltage to specify extreme voltage variation ($\pm 15\%$) and endpoint, record the maximum frequency change.
Test Instruments:	Refer to section 2.5 for details
Test mode:	Refer to section 2.3 for details
Test results:	Passed

10.1 Test Result

Refer to 9.1

11 PHOTO OF TEST

11.1 RADIATED EMISSION



End of Report