



6.3 Field strength of spurious radiation measurement

6.3.1 Limit

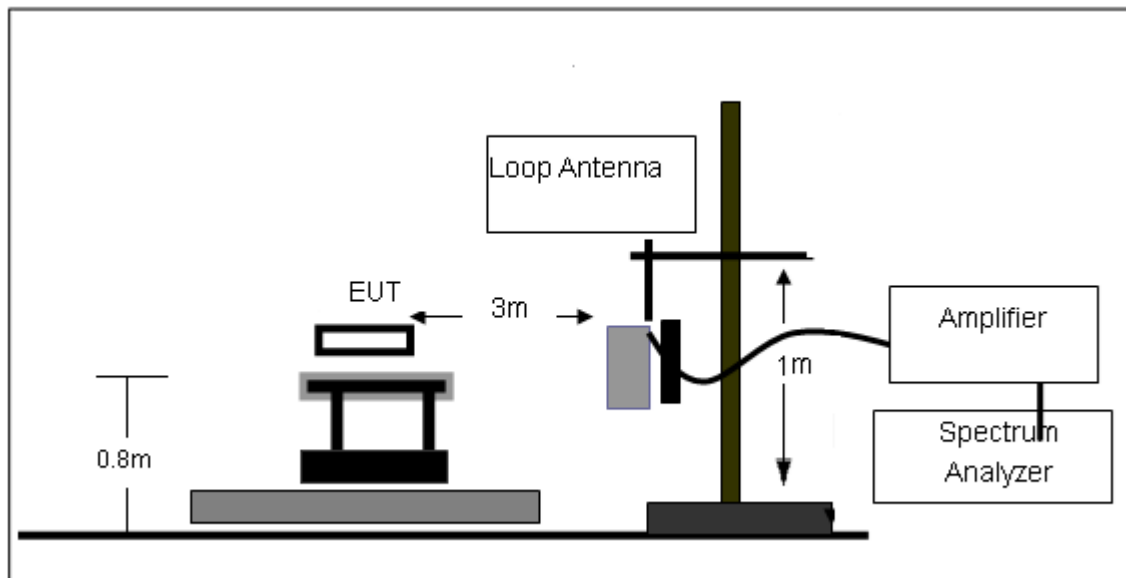
LTE Band 2, LTE Band 4, LTE Band 12: -13dBm

6.3.2 Test procedure

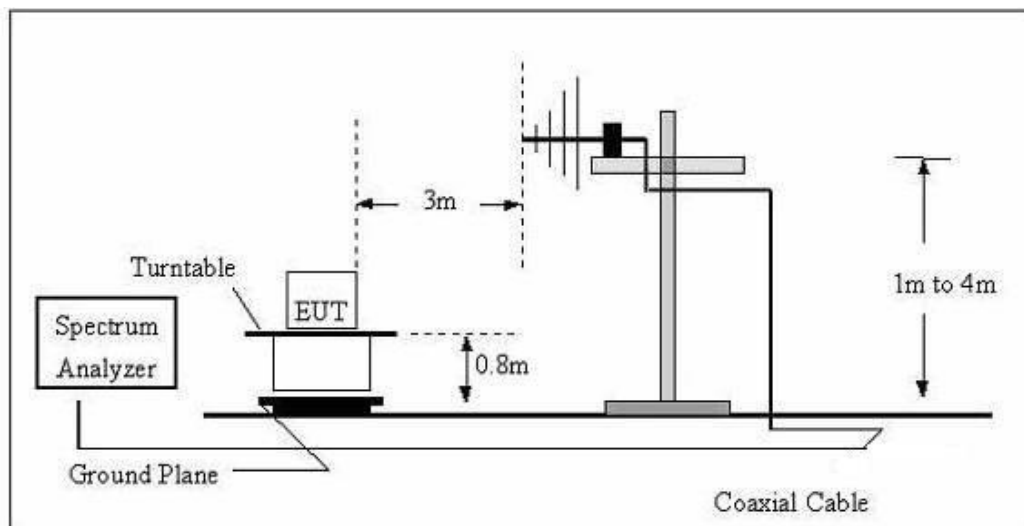
1. The EUT was placed on a non-conductive turntable using a nonconductive support. The radiated emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer.
2. During the tests, the antenna height and the EUT azimuth were varied in order to identify the maximum 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.
4. The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency. $ERP / EIRP = S.G. \text{ output (dBm)} + \text{Antenna Gain(dB/dBi)} - \text{Cable Loss (dB)}$.

6.3.3 Test setup

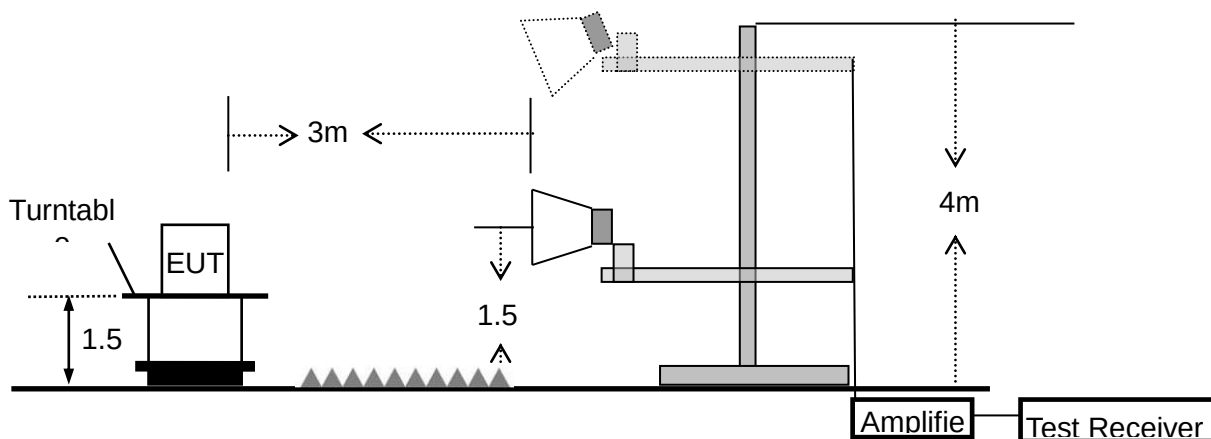
Radiated emission test-up frequency below 30MHz



Radiated emission test-up frequency 30MHz~1GHz



Radiated emission test-up frequency above 1GHz





6.3.4 Test results

Note: All the configuration was tested and only the worse case was reported band 2 20MHz Bandwidth CH18900
LTE Band 2 (30MHz – 19GHz)

No	Frequency (MHz)	Reading Level(dBm)	Correct Factor(dB)	Measurement (dBm)	Limit (dBm)	Margin	Polarization	Result
1	277.0935	-64.71	16.13	-48.58	-13	-35.58	H	Pass
2	410.3824	-64.32	19.5	-44.82	-13	-31.82	H	Pass
3	603.5392	-63.44	21.6	-41.84	-13	-28.84	H	Pass
4	12404.81	-64.73	13.15	-51.58	-13	-38.58	H	Pass
5	14905.81	-58.19	16.21	-41.98	-13	-28.98	H	Pass
6	15851.7	-60.55	4.08	-56.47	-13	-43.47	H	Pass

No.	Frequency (MHz)	Reading Level(dBm)	Correct Factor(dB)	Measurement (dBm)	Limit (dBm)	Margin	Polarization	Result
1	100.2286	-64.10	14.67	-49.43	-13	-36.43	V	Pass
2	148.441	-64.58	12.37	-52.21	-13	-39.21	V	Pass
3	478.8455	-61.86	20.86	-41.00	-13	-28.00	V	Pass
4	11282.57	-59.85	9.96	-49.89	-13	-36.89	V	Pass
5	12340.68	-62.14	11.01	-51.13	-13	-38.13	V	Pass
6	12965.93	-62.26	12.01	-50.25	-13	-37.25	V	Pass
7	17965.3	-61.19	10.36	-50.83	-13	-37.83	V	Pass
8	17984.9	-58.49	11.52	-46.97	-13	-33.97	V	Pass



LTE Band 4 (30MHz – 18GHz)

No.	Frequency (MHz)	Reading Level(dBm)	Correct Factor(dB)	Measurement (dBm)	Limit (dBm)	Margin	Polarization	Result
1	369.4045	-63.85	18.49	-45.36	-13	-32.36	H	Pass
2	459.1143	-63.20	20.47	-42.73	-13	-29.73	H	Pass
3	656.53	-61.71	22.16	-39.55	-13	-26.55	H	Pass
4	12741.48	-62.68	11.68	-51.00	-13	-38.00	H	Pass
5	14008.02	-59.82	17.12	-42.70	-13	-29.70	H	Pass
6	14505.01	-57.60	16.65	-40.95	-13	-27.95	H	Pass
7	17521.14	-58.75	15.98	-42.77	-13	-29.77	H	Pass
8	17634.09	-59.13	17.32	-41.81	-13	-28.81	H	Pass

No.	Frequency (MHz)	Reading Level(dBm)	Correct Factor(dB)	Measurement (dBm)	Limit (dBm)	Margin	Polarization	Result
1	212.2694	-63.46	14.34	-49.12	-13	-36.12	V	Pass
2	325.5957	-64.27	17.34	-46.93	-13	-33.93	V	Pass
3	431.0316	-62.94	19.91	-43.03	-13	-30.03	V	Pass
4	13783.57	-60.81	16.67	-44.14	-13	-31.14	V	Pass
5	14232.47	-59.26	17.11	-42.15	-13	-29.15	V	Pass
6	14905.81	-58.28	16.21	-42.07	-13	-29.07	V	Pass
7	17102.02	-58.11	16.34	-41.77	-13	-28.77	V	Pass
8	17235.61	-53.50	17.42	-36.08	-13	-23.08	V	Pass



LTE Band 5 (30MHz – 18G)

No.	Frequency (MHz)	Reading Level(dBm)	Correct Factor(dB)	Measurement (dBm)	Limit (dBm)	Margin	Polarization	Result
1	293.0842	-62.66	16.51	-46.15	-13	-33.15	H	Pass
2	810.2653	-61.34	24.15	-37.19	-13	-24.19	H	Pass
3	958.7943	-61.99	25.98	-36.01	-13	-23.01	H	Pass
4	11298.6	-63.98	12.03	-51.95	-13	-38.95	H	Pass
5	12693.39	-64.68	13.48	-51.20	-13	-38.20	H	Pass
6	12869.74	-64.93	13.64	-51.29	-13	-38.29	H	Pass

No.	Frequency (MHz)	Reading Level(dBm)	Correct Factor(dB)	Measurement (dBm)	Limit (dBm)	Margin	Polarization	Result
1	325.5957	-64.67	17.34	-47.33	-13	-34.33	V	Pass
2	478.8455	-64.57	20.86	-43.71	-13	-30.71	V	Pass
3	919.2866	-62.01	25.64	-36.37	-13	-23.37	V	Pass
4	14232.47	-58.53	17.11	-41.42	-13	-28.42	V	Pass
5	14905.81	-58.44	16.21	-42.23	-13	-29.23	V	Pass
6	15274.55	-55.15	4.15	-51.00	-13	-38.00	V	Pass



6.4 Frequency Stability

6.4.1 Limit

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block. As this transceiver is considered "Hand carried, battery powered equipment" Section 2.1055(d) (2) applies. This requires that the lower voltage for frequency stability testing be specified by the manufacturer. This transceiver is specified to operate with an input voltage of between 3.5VDC and 4.4VDC, with a nominal voltage of 3.85VDC. Operation above or below these voltage limits is prohibited by transceiver software in order to prevent improper operation as well as to protect components from over stress. These voltages represent a tolerance from -5.4% to 10.8%. For the purposes of measuring frequency stability these voltage limits are to be used.

6.4.2 Test procedure

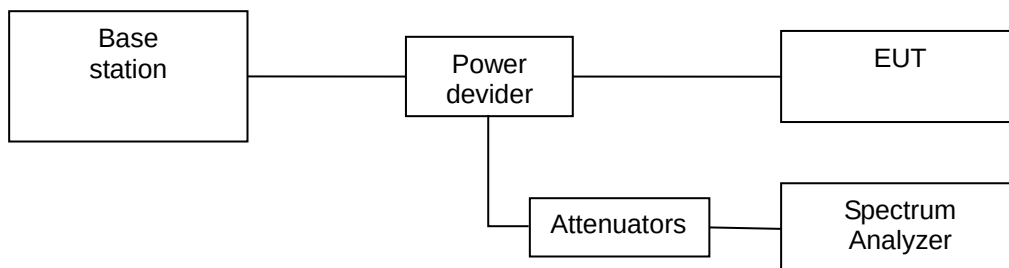
Test Procedures for Temperature Variation:

1. The EUT was set up in the thermal chamber and connected with the system simulator.
2. With power OFF, the temperature was decreased to -30°C and the EUT was stabilized before testing. Power was applied and the maximum change in frequency was recorded within one minute.
3. With power OFF, the temperature was raised in 10°C step up to 50°C. The EUT was stabilized at each step for at least half an hour. Power was applied and the maximum frequency change was recorded within one minute.

Test Procedures for Voltage Variation

1. The testing follows FCC KDB 971168 v02r02 Section 9.0.
2. The EUT was placed in a temperature chamber at 25±5° C and connected with the system simulator.
3. The power supply voltage to the EUT was varied from 85% to 115% of the nominal value measured at the input to the EUT.
4. The variation in frequency was measured for the worst case.

6.4.3 Test setup





6.4.4 Test results

Voltage										
Band	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band2	1.4MHz	QPSK	18900	6RB#0	VL	NT	-18.32	-0.009745	±2.5	PASS
Band2	1.4MHz	QPSK	18900	6RB#0	VN	NT	-13.78	-0.007330	±2.5	PASS
Band2	1.4MHz	QPSK	18900	6RB#0	VH	NT	-17.74	-0.009436	±2.5	PASS
Band2	1.4MHz	16QAM	18900	6RB#0	VL	NT	-13.25	-0.007048	±2.5	PASS
Band2	1.4MHz	16QAM	18900	6RB#0	VN	NT	-23.29	-0.012388	±2.5	PASS
Band2	1.4MHz	16QAM	18900	6RB#0	VH	NT	-18.12	-0.009638	±2.5	PASS
Band2	3MHz	QPSK	18900	15RB#0	VL	NT	23.65	0.012580	±2.5	PASS
Band2	3MHz	QPSK	18900	15RB#0	VN	NT	26.02	0.013840	±2.5	PASS
Band2	3MHz	QPSK	18900	15RB#0	VH	NT	-18.14	-0.009649	±2.5	PASS
Band2	3MHz	16QAM	18900	15RB#0	VL	NT	-17.44	-0.009277	±2.5	PASS
Band2	3MHz	16QAM	18900	15RB#0	VN	NT	9.23	0.004910	±2.5	PASS
Band2	3MHz	16QAM	18900	15RB#0	VH	NT	-16.91	-0.008995	±2.5	PASS
Band2	5MHz	QPSK	18900	25RB#0	VL	NT	8.34	0.004436	±2.5	PASS
Band2	5MHz	QPSK	18900	25RB#0	VN	NT	9.41	0.005005	±2.5	PASS
Band2	5MHz	QPSK	18900	25RB#0	VH	NT	-11.63	-0.006186	±2.5	PASS
Band2	5MHz	16QAM	18900	25RB#0	VL	NT	-11.22	-0.005968	±2.5	PASS
Band2	5MHz	16QAM	18900	25RB#0	VN	NT	12.46	0.006628	±2.5	PASS
Band2	5MHz	16QAM	18900	25RB#0	VH	NT	-14.26	-0.007585	±2.5	PASS
Band2	10MHz	QPSK	18900	50RB#0	VL	NT	-11.44	-0.006085	±2.5	PASS
Band2	10MHz	QPSK	18900	50RB#0	VN	NT	-18.35	-0.009761	±2.5	PASS
Band2	10MHz	QPSK	18900	50RB#0	VH	NT	-10.46	-0.005564	±2.5	PASS
Band2	10MHz	16QAM	18900	50RB#0	VL	NT	-15.98	-0.008500	±2.5	PASS
Band2	10MHz	16QAM	18900	50RB#0	VN	NT	-22.19	-0.011803	±2.5	PASS
Band2	10MHz	16QAM	18900	50RB#0	VH	NT	14.00	0.007447	±2.5	PASS
Band2	15MHz	QPSK	18900	75RB#0	VL	NT	24.12	0.012830	±2.5	PASS
Band2	15MHz	QPSK	18900	75RB#0	VN	NT	21.79	0.011590	±2.5	PASS
Band2	15MHz	QPSK	18900	75RB#0	VH	NT	37.06	0.019713	±2.5	PASS
Band2	15MHz	16QAM	18900	75RB#0	VL	NT	40.60	0.021596	±2.5	PASS
Band2	15MHz	16QAM	18900	75RB#0	VN	NT	28.34	0.015074	±2.5	PASS
Band2	15MHz	16QAM	18900	75RB#0	VH	NT	50.20	0.026702	±2.5	PASS
Band2	20MHz	QPSK	18900	100RB#0	VL	NT	-42.43	-0.022569	±2.5	PASS
Band2	20MHz	QPSK	18900	100RB#0	VN	NT	-36.64	-0.019489	±2.5	PASS
Band2	20MHz	QPSK	18900	100RB#0	VH	NT	-42.83	-0.022782	±2.5	PASS
Band2	20MHz	16QAM	18900	100RB#0	VL	NT	-28.27	-0.015037	±2.5	PASS
Band2	20MHz	16QAM	18900	100RB#0	VN	NT	-30.33	-0.016133	±2.5	PASS
Band2	20MHz	16QAM	18900	100RB#0	VH	NT	-27.94	-0.014862	±2.5	PASS



Voltage										
Band	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band4	1.4MHz	QPSK	20175	6RB#0	VL	NT	-34.66	-0.020006	±2.5	PASS
Band4	1.4MHz	QPSK	20175	6RB#0	VN	NT	-33.77	-0.019492	±2.5	PASS
Band4	1.4MHz	QPSK	20175	6RB#0	VH	NT	-33.30	-0.019221	±2.5	PASS
Band4	1.4MHz	16QAM	20175	6RB#0	VL	NT	-13.02	-0.007515	±2.5	PASS
Band4	1.4MHz	16QAM	20175	6RB#0	VN	NT	-11.89	-0.006863	±2.5	PASS
Band4	1.4MHz	16QAM	20175	6RB#0	VH	NT	-15.46	-0.008924	±2.5	PASS
Band4	3MHz	QPSK	20175	15RB#0	VL	NT	24.03	0.013870	±2.5	PASS
Band4	3MHz	QPSK	20175	15RB#0	VN	NT	26.34	0.015203	±2.5	PASS
Band4	3MHz	QPSK	20175	15RB#0	VH	NT	-15.66	-0.009039	±2.5	PASS
Band4	3MHz	16QAM	20175	15RB#0	VL	NT	-23.10	-0.013333	±2.5	PASS
Band4	3MHz	16QAM	20175	15RB#0	VN	NT	-27.65	-0.015960	±2.5	PASS
Band4	3MHz	16QAM	20175	15RB#0	VH	NT	-26.52	-0.015307	±2.5	PASS
Band4	5MHz	QPSK	20175	25RB#0	VL	NT	-29.57	-0.017068	±2.5	PASS
Band4	5MHz	QPSK	20175	25RB#0	VN	NT	-33.55	-0.019365	±2.5	PASS
Band4	5MHz	QPSK	20175	25RB#0	VH	NT	-32.49	-0.018753	±2.5	PASS
Band4	5MHz	16QAM	20175	25RB#0	VL	NT	-25.59	-0.014771	±2.5	PASS
Band4	5MHz	16QAM	20175	25RB#0	VN	NT	-40.07	-0.023128	±2.5	PASS
Band4	5MHz	16QAM	20175	25RB#0	VH	NT	-18.78	-0.010840	±2.5	PASS
Band4	10MHz	QPSK	20175	50RB#0	VL	NT	-15.19	-0.008768	±2.5	PASS
Band4	10MHz	QPSK	20175	50RB#0	VN	NT	-16.25	-0.009380	±2.5	PASS
Band4	10MHz	QPSK	20175	50RB#0	VH	NT	-25.39	-0.014655	±2.5	PASS
Band4	10MHz	16QAM	20175	50RB#0	VL	NT	-23.42	-0.013518	±2.5	PASS
Band4	10MHz	16QAM	20175	50RB#0	VN	NT	-19.27	-0.011123	±2.5	PASS
Band4	10MHz	16QAM	20175	50RB#0	VH	NT	-24.55	-0.014170	±2.5	PASS
Band4	15MHz	QPSK	20175	75RB#0	VL	NT	-20.24	-0.011683	±2.5	PASS
Band4	15MHz	QPSK	20175	75RB#0	VN	NT	-20.91	-0.012069	±2.5	PASS
Band4	15MHz	QPSK	20175	75RB#0	VH	NT	-21.86	-0.012618	±2.5	PASS
Band4	15MHz	16QAM	20175	75RB#0	VL	NT	-20.13	-0.011619	±2.5	PASS
Band4	15MHz	16QAM	20175	75RB#0	VN	NT	-16.85	-0.009726	±2.5	PASS
Band4	15MHz	16QAM	20175	75RB#0	VH	NT	-19.13	-0.011042	±2.5	PASS
Band4	20MHz	QPSK	20175	100RB#0	VL	NT	31.31	0.018072	±2.5	PASS
Band4	20MHz	QPSK	20175	100RB#0	VN	NT	31.90	0.018413	±2.5	PASS
Band4	20MHz	QPSK	20175	100RB#0	VH	NT	22.02	0.012710	±2.5	PASS
Band4	20MHz	16QAM	20175	100RB#0	VL	NT	-16.05	-0.009264	±2.5	PASS
Band4	20MHz	16QAM	20175	100RB#0	VN	NT	-13.13	-0.007579	±2.5	PASS
Band4	20MHz	16QAM	20175	100RB#0	VH	NT	-19.30	-0.011140	±2.5	PASS

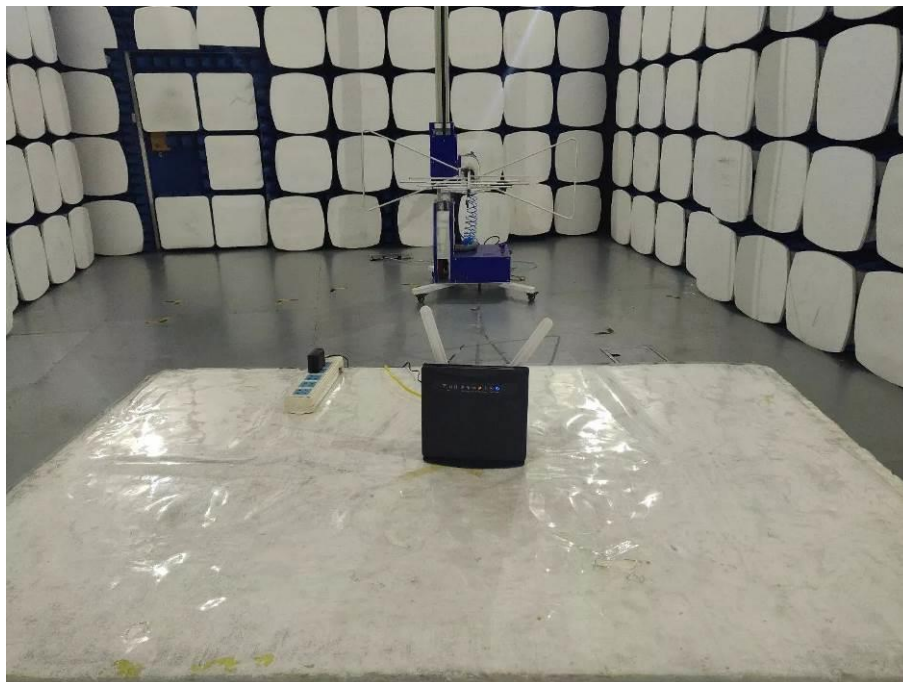


Voltage										
Band	Bandwidth	Modulation	Channel	RB Configure	Voltage [Vdc]	Temperature (°C)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Verdict
Band5	1.4MHz	QPSK	20525	6RB#0	VL	NT	4.18	0.004997	±2.5	PASS
Band5	1.4MHz	QPSK	20525	6RB#0	VN	NT	-26.32	-0.031464	±2.5	PASS
Band5	1.4MHz	QPSK	20525	6RB#0	VH	NT	4.92	0.005882	±2.5	PASS
Band5	1.4MHz	16QAM	20525	6RB#0	VL	NT	7.28	0.008703	±2.5	PASS
Band5	1.4MHz	16QAM	20525	6RB#0	VN	NT	10.37	0.012397	±2.5	PASS
Band5	1.4MHz	16QAM	20525	6RB#0	VH	NT	8.71	0.010412	±2.5	PASS
Band5	3MHz	QPSK	20525	15RB#0	VL	NT	11.82	0.014130	±2.5	PASS
Band5	3MHz	QPSK	20525	15RB#0	VN	NT	11.47	0.013712	±2.5	PASS
Band5	3MHz	QPSK	20525	15RB#0	VH	NT	11.36	0.013580	±2.5	PASS
Band5	3MHz	16QAM	20525	15RB#0	VL	NT	14.99	0.017920	±2.5	PASS
Band5	3MHz	16QAM	20525	15RB#0	VN	NT	14.76	0.017645	±2.5	PASS
Band5	3MHz	16QAM	20525	15RB#0	VH	NT	14.05	0.016796	±2.5	PASS
Band5	5MHz	QPSK	20525	25RB#0	VL	NT	-9.14	-0.010926	±2.5	PASS
Band5	5MHz	QPSK	20525	25RB#0	VN	NT	-6.64	-0.007938	±2.5	PASS
Band5	5MHz	QPSK	20525	25RB#0	VH	NT	-7.50	-0.008966	±2.5	PASS
Band5	5MHz	16QAM	20525	25RB#0	VL	NT	13.99	0.016724	±2.5	PASS
Band5	5MHz	16QAM	20525	25RB#0	VN	NT	14.12	0.016880	±2.5	PASS
Band5	5MHz	16QAM	20525	25RB#0	VH	NT	13.43	0.016055	±2.5	PASS
Band5	10MHz	QPSK	20525	50RB#0	VL	NT	6.28	0.007507	±2.5	PASS
Band5	10MHz	QPSK	20525	50RB#0	VN	NT	-5.06	-0.006049	±2.5	PASS
Band5	10MHz	QPSK	20525	50RB#0	VH	NT	8.57	0.010245	±2.5	PASS
Band5	10MHz	16QAM	20525	50RB#0	VL	NT	-10.96	-0.013102	±2.5	PASS
Band5	10MHz	16QAM	20525	50RB#0	VN	NT	-12.02	-0.014369	±2.5	PASS
Band5	10MHz	16QAM	20525	50RB#0	VH	NT	-9.66	-0.011548	±2.5	PASS



Photographs of the Test Setup

Radiated emission





Photographs of the EUT

See the APPENDIX 1: EUT PHOTO in the report No.: MTi19071025-1E1-1.

----END OF REPORT----