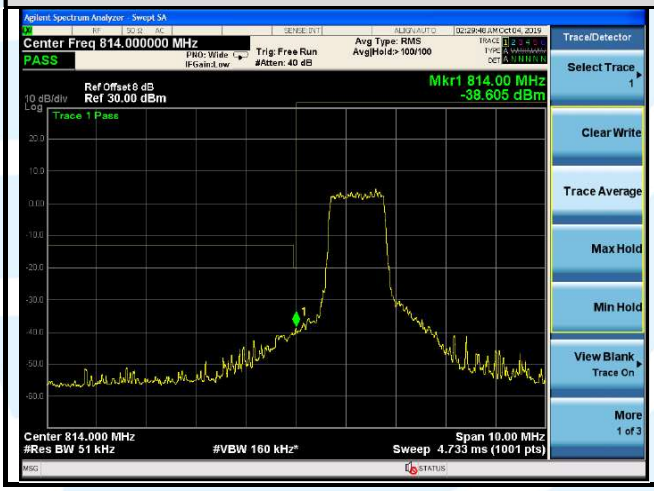
5.6.8 LTE Band 26 (Part 90S)

LTE Band 26 / 1.4 MHz / QPSK	
1#0-0	1#5-0
Lowest Channel	Highest Channel

LTE Band 26 / 10 MHz / QPSK	
6#0-0	6#0-7
Lowest Channel	Highest Channel
	

5.6.9 LTE Band 66

LTE Band 66 / 1.4 MHz / QPSK	
1#0-0	1#5-0
Lowest Channel	Highest Channel

LTE Band 26 / 20 MHz / QPSK	
6#0-0	6#0-15
Lowest Channel	Highest Channel

5.7 SPURIOUS EMISSIONS AT ANTENNA TERMINALS

Test Requirement: **LTE Band 2 & LTE Band 25:** FCC 47 CFR Part 24.238(a)
LTE Band 4 & LTE Band 66: FCC 47 CFR Part 27.53(h)
LTE Band 5 & LTE Band 26: FCC 47 CFR Part 22.917(a)
LTE Band 12: FCC 47 CFR Part 27.53(g)
LTE Band 13: FCC 47 CFR Part 27.53
LTE Band 26: FCC 47 CFR Part 90.691

LTE Band 2 & LTE Band 25: RSS-133 Issue 6, Section 6.5
LTE Band 4 & LTE Band 66: RSS-139 Issue 3, Section 6.6
LTE Band 5: RSS-132 Issue 3, Section 5.5
LTE Band 12 & LTE Band 13 : RSS-130 Issue 2, Section 4.7

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limit:

FCC 47 CFR Part 24.238(a), 27.53(h)(1), 22.917(a), 27.53(g), 27.53(c)(2), 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. The emission limit equal to -13 dBm.

RSS-132 Issue 3, Section 5.5, RSS-133 Issue 6, Section 6.6, RSS-139 Issue 3, Section 6.5, RSS-130 Issue 2, Section 4.7:
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. The emission limit equal to -13 dBm.

Test Procedure:
The EUT makes a phone call to the communication simulator. All measurements were done at low, middle and high operational frequency range. b. Measuring frequency range is from 30 MHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower. Set RBW & VBW to 100 kHz for the measurement below 1 GHz, and 1 MHz for the measurement above 1 GHz.

Note: The cable loss and attenuator loss were offset into measure device as an amplitude offset.

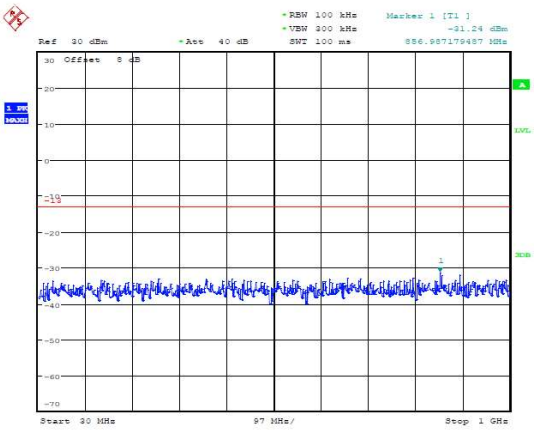
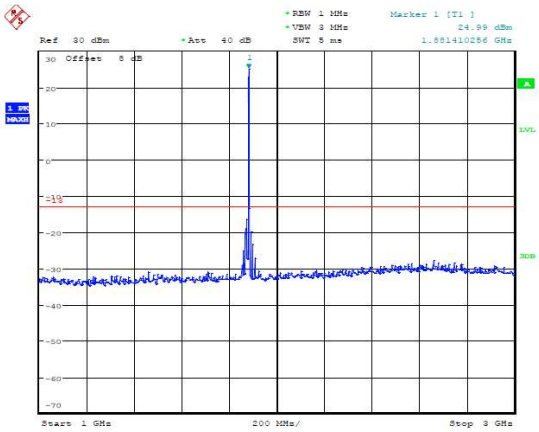
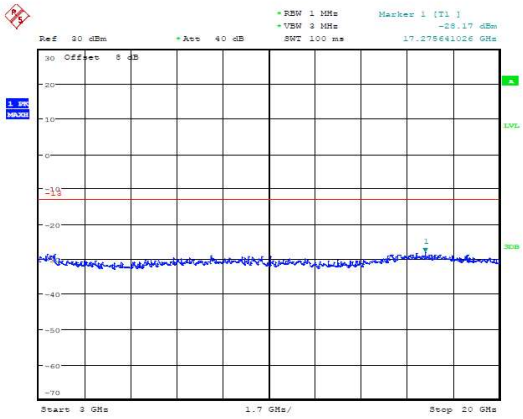
Test Setup: Refer to section 4.2.2 for details.

Instruments Used: Refer to section 3 for details

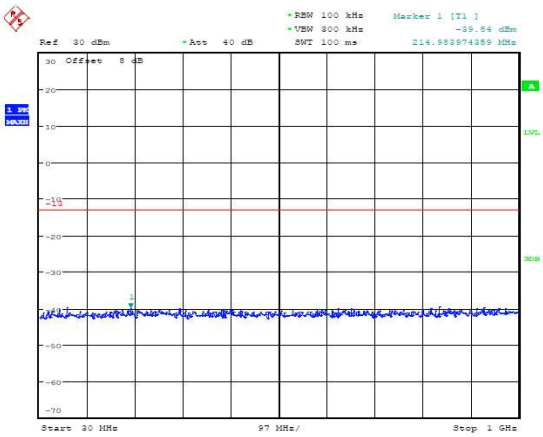
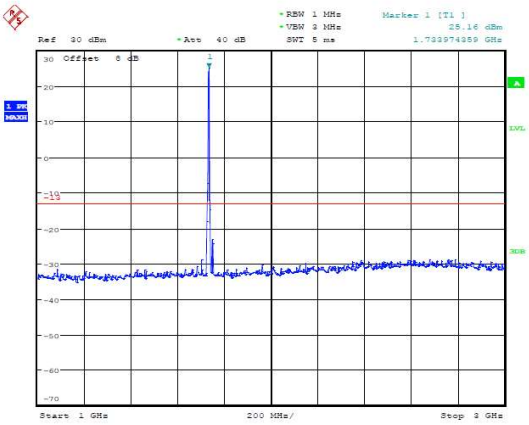
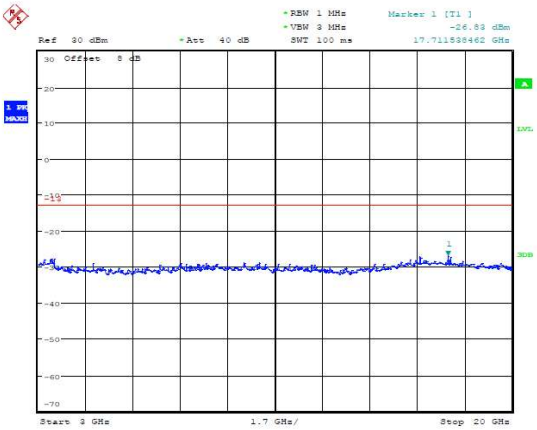
Test Mode: Link mode

Test Results: Pass

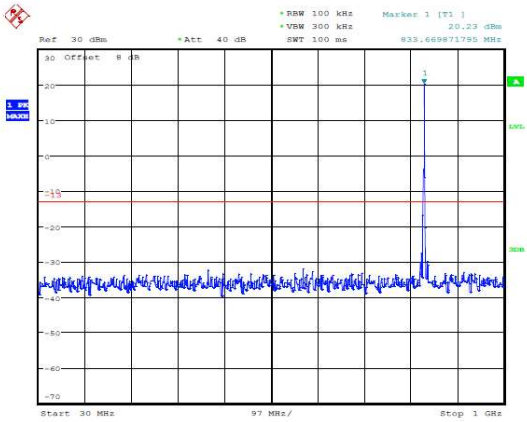
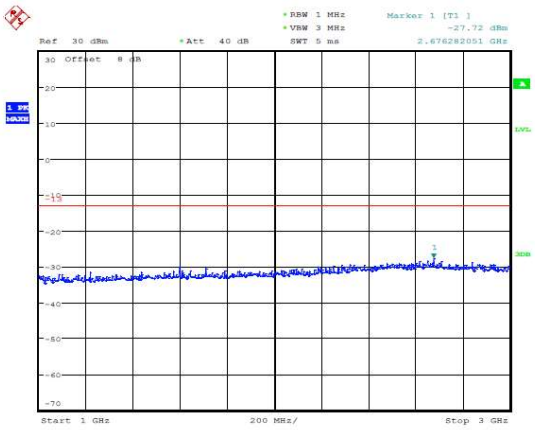
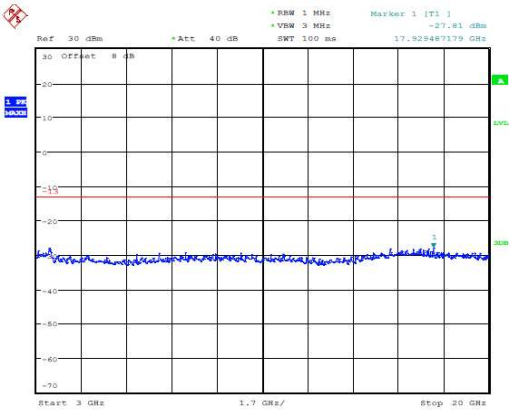
5.7.1 LTE Band 2

LTE Band 2
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


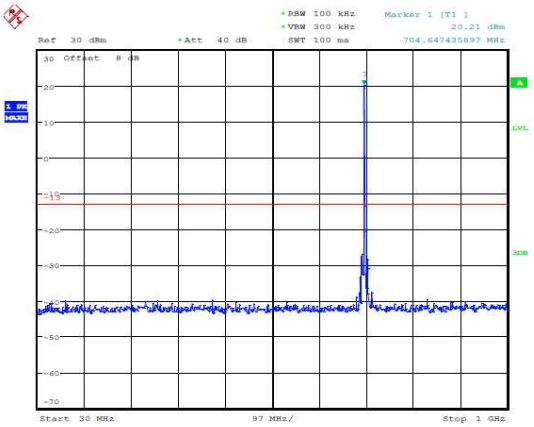
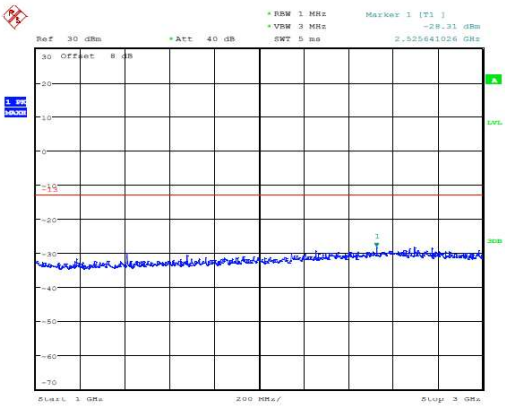
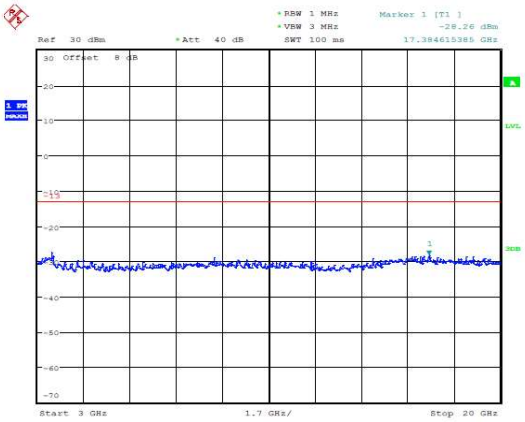
5.7.2 LTE Band 4

LTE Band 4
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


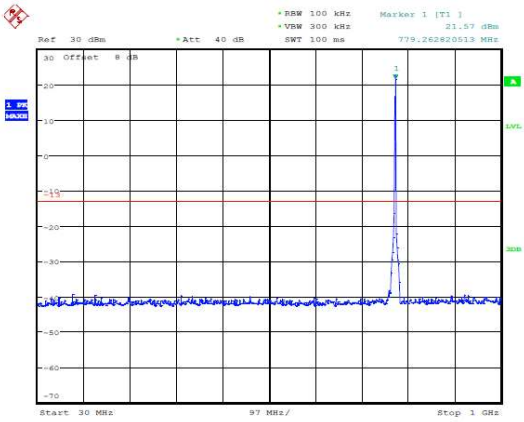
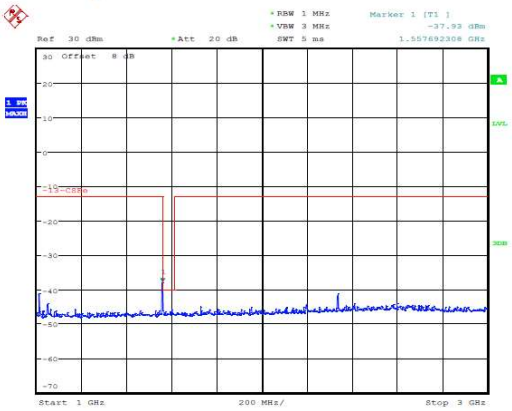
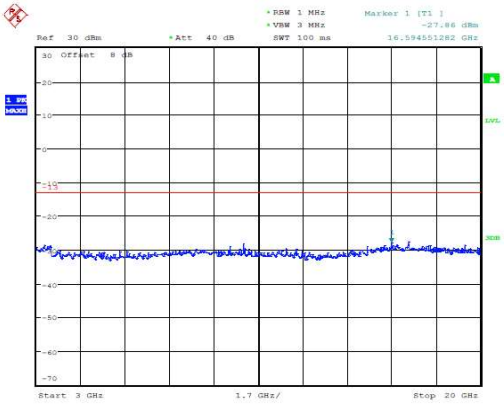
5.7.3 LTE Band 5

LTE Band 5
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


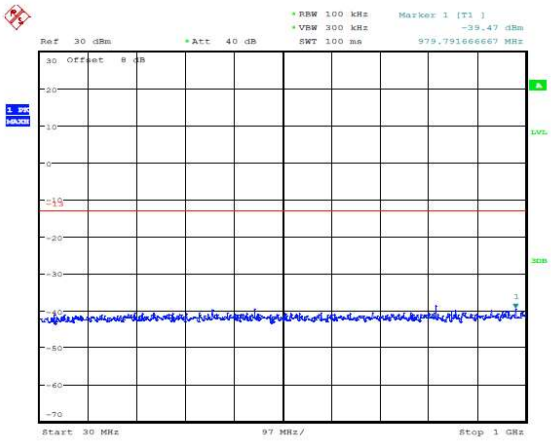
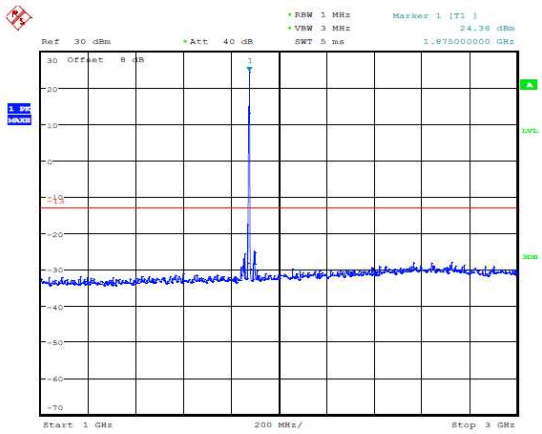
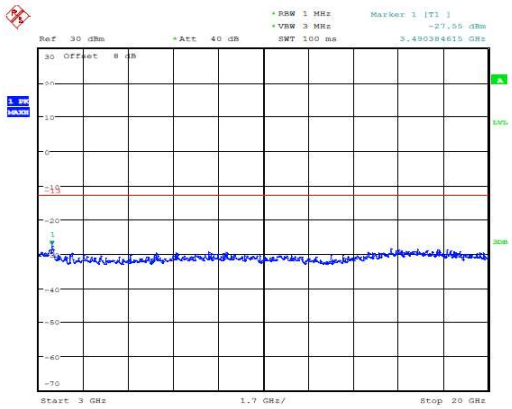
5.7.4 LTE Band 12

LTE Band 12
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


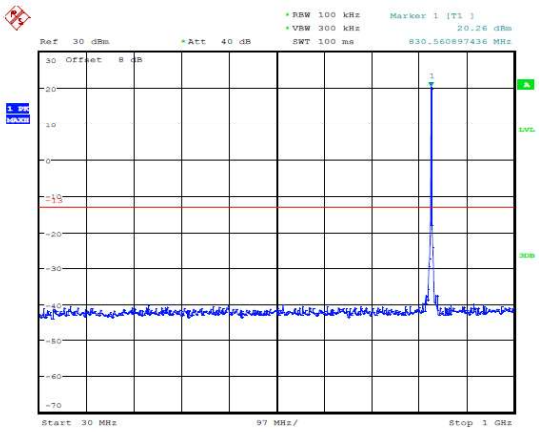
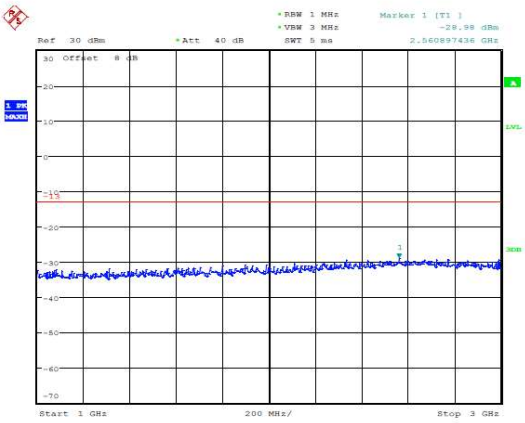
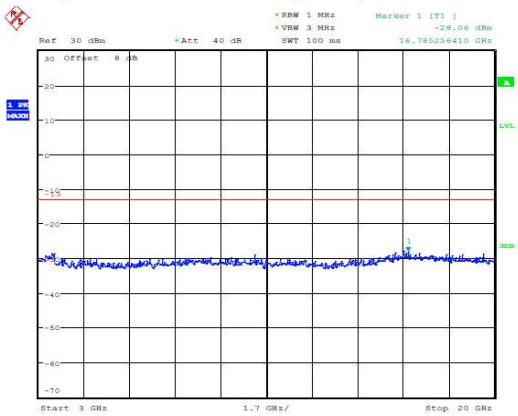
5.7.5 LTE Band 13

LTE Band 13
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


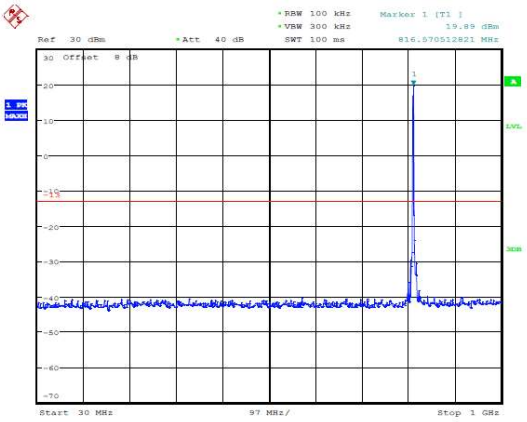
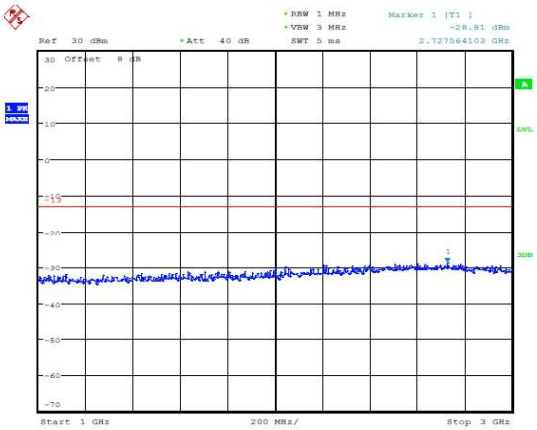
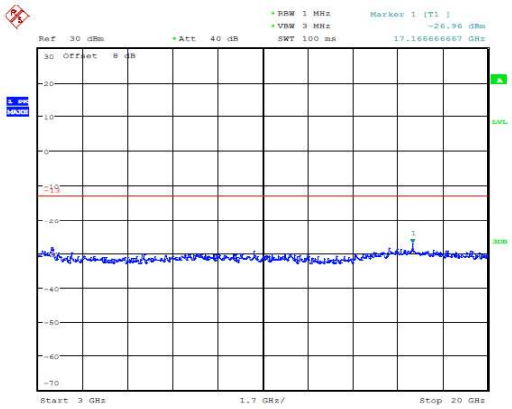
5.7.6 LTE Band 25

LTE Band 25
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


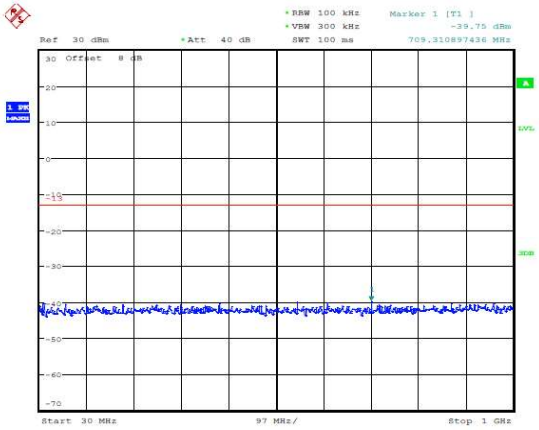
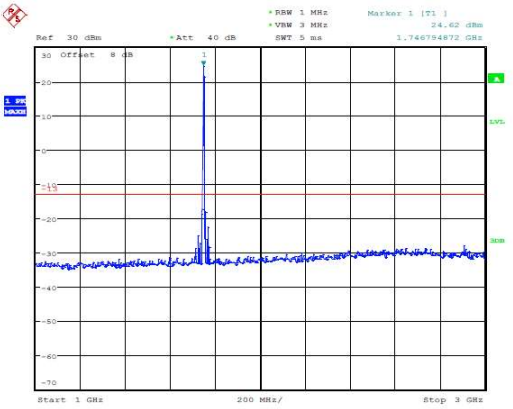
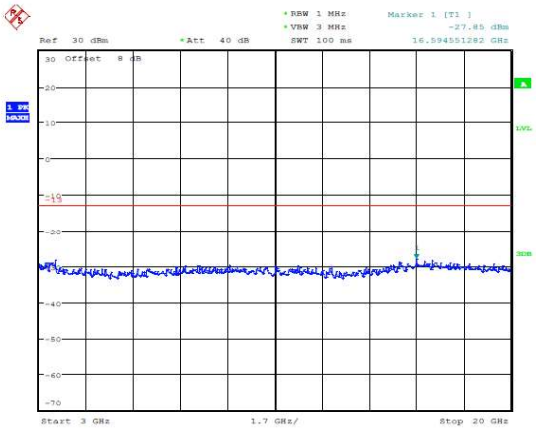
5.7.7 LTE Band 26

LTE Band 26
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


5.7.8 LTE Band 26 (Part 90S)

LTE Band 26(Part 90S)
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


5.7.9 LTE Band 66

LTE Band 66
30MHz – 1GHz

1GHz – 3GHz

3GHz – 20GHz


5.8 FIELD STRENGTH OF SPURIOUS RADIATION

Test Requirement: **LTE Band 2 & LTE Band 25:** FCC 47 CFR Part 24.238(a)
LTE Band 4 & LTE Band 66: FCC 47 CFR Part 27.53(h)
LTE Band 5 & LTE Band 26: FCC 47 CFR Part 22.917(a)
LTE Band 12 : FCC 47 CFR Part 27.53(g)
LTE Band 13: FCC 47 CFR Part 27.53
LTE Band 26: FCC 47 CFR Part 90.691

LTE Band 2 & LTE Band 25: RSS-133 Issue 6, Section 6.5
LTE Band 4 & LTE Band 66: RSS-139 Issue 3, Section 6.6
LTE Band 5: RSS-132 Issue 3, Section 5.5
LTE Band 12 & LTE Band 13: RSS-130 Issue 2, Section 4.7

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009 MHz-30 MHz	Peak	10 kHz	30 KHz	Peak
30 MHz-1 GHz	Quasi-peak	100 kHz	300 KHz	Peak
Above 1 GHz	Peak	1 MHz	3 MHz	Peak

Limits:

FCC 47 CFR Part 24.238(a), 27.53(h)(1), 22.917(a), 27.53(g), 27.53(c)(2), 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. The emission limit equal to -13 dBm.

FCC 47 CFR Part 27.53:
(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 = -40dBm/MHz).

RSS-132 Issue 3, Section 5.5, RSS-133 Issue 6, Section 6.6, RSS-139 Issue 3, Section 6.5, RSS-130 Issue 2, Section 4.7:
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. The emission limit equal to -13 dBm.

Test Setup: Refer to section 4.2.1 for details.

Test Procedures: KDB 971168 D01v03r01 Section 7

Equipment Used: Refer to section 3 for details.

Test Result: Pass

The measurement data as follows:

5.8.1 LTE Band 12

worst case of the bandwidth

No.	Frequency (MHz)	PMea (dBm)	Pcl (dBm)	Ga (dBi)	Peak EIRP (dBm)	Limit (dBm)	Polarization
Lowest Channel							
1	1411.9	-41.08	4.0	3.4	-41.68	-13	Vertical
2	2218.8	-40.68	5.0	3.3	-42.38	-13	Horizontal
3	3568.0	-50.31	6.4	4.7	-52.01	-13	Horizontal
4	4564.8	-50.46	7.4	7.3	-50.56	-13	Horizontal
5	5831.6	-53.61	8.4	10.5	-51.51	-13	Horizontal
6	7478.2	-54.03	9.7	14.6	-49.13	-13	Horizontal
Middle Channel							
1	1419.2	-40.79	4.0	3.4	-41.39	-13	Vertical
2	2128.8	-42.37	5.0	3.3	-44.07	-13	Vertical
3	2800.8	-37.38	5.7	4.1	-38.98	-13	Vertical
4	3573.6	-49.88	6.4	4.7	-51.58	-13	Horizontal
5	4286.4	-53.39	7.1	7.7	-52.79	-13	Vertical
6	5639.2	-54.21	8.3	10.5	-52.01	-13	Horizontal
Highest Channel							
1	1411.2	-41.04	4.0	3.4	-41.64	-13	Vertical
2	2125.8	-43	5.0	3.3	-44.7	-13	Vertical
3	2817.7	-37.72	5.7	4.1	-39.32	-13	Vertical
4	3506.0	-51.7	6.4	4.7	-53.4	-13	Horizontal
5	4211.6	-53.29	7.0	7.7	-52.59	-13	Horizontal
6	5618.4	-53.11	8.3	9.5	-51.91	-13	Vertical

5.9 FREQUENCY STABILITY

Test Requirement: FCC 47 CFR Part 2.1055 &
FCC 47 CFR Part 22.355 &
FCC 47 CFR Part 24.235 &
FCC 47 CFR Part 27.54,

LTE Band 2 & LTE Band 25: RSS-133 Issue 6, Section 6.3
LTE Band 4 & LTE Band 66: RSS-139 Issue 3, Section 6.4
LTE Band 5: RSS-132 Issue 3, Section 5.3
LTE Band 12 & LTE Band 13: RSS-130 Issue 2, Section 4.5

Test Method: ANSI C63.26-2015 & KDB 971168 D01v03r01

Limits:

FCC 47 CFR Part 22.355, FCC 47 CFR Par 90.213
The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations.

FCC 47 CFR Part 24.235, FCC 47 CFR Part 27.54
The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized frequency block.

RSS-132 Issue 3, Section 5.3:
The carrier frequency shall not depart from the reference frequency in excess of ±2.5 ppm for mobile stations and ±1.5 ppm for base stations

RSS-133 Issue 6, Section 6.3:
The carrier frequency shall not depart from the reference frequency, in excess of ±2.5 ppm for mobile stations and ±1.0 ppm for base stations.

RSS-139 Issue 3, Section 6.4, RSS-130 Issue 2, Section 4.5:
The frequency stability shall be sufficient to ensure that the occupied bandwidth stays within the operating frequency block when tested to the temperature and supply voltage variations specified in RSS-Gen.

Test Setup: Refer to section 4.2.2 for details.

Test Procedures:

1) Use CMW 500 or CMU 200 with Frequency Error measurement capability.
   a) Temp. = −30° to + 50°C
   b) Voltage =low voltage, 2.8 Vdc, Normal, 3.8 Vdc and High voltage, 4.6Vdc.
2) Frequency Stability vs Temperature:

The EUT is place inside a temperature chamber. The temperature is set to 20ºC and allowed to stabilize. After sufficient soak time, the transmitting frequency error is measured. The temperature is increased by 10 degrees, allowed to stabilize and soak, and then the measurement is repeated. This is repeated until +50ºC is reached.

3) Frequency Stability vs Voltage:

The peak frequency error is recorded (worst-case).

Equipment Used: Refer to section 3 for details.

Test Result: Pass

5.9.1 LTE Band 2

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 2 / 20MHz / Full RB							
QPSK	18900 / 1880.0	VL	TN	2.35	0.0013	N/A	Pass
		VN		5.12	0.0027		Pass
		VH		4.32	0.0023		Pass
		VN	50	4.31	0.0023		Pass
			40	4.23	0.0023		Pass
			30	2.45	0.0013		Pass
			20	6.47	0.0034		Pass
			10	7.32	0.0039		Pass
			0	4.39	0.0023		Pass
			-10	3.98	0.0021		Pass
			-20	4.09	0.0022		Pass
			-30	4.60	0.0024		Pass

5.9.2 LTE Band 4

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Pass/ Fail
LTE Band 4 / 20MHz / Full RB							
QPSK	20175 / 1732.5	VL	TN	3.21	0.0019	N/A	Pass
		VN		2.50	0.0014		Pass
		VH		2.76	0.0016		Pass
		VN	50	2.76	0.0016		Pass
			40	3.72	0.0021		Pass
			30	3.67	0.0021		Pass
			20	4.31	0.0025		Pass
			10	2.17	0.0013		Pass
			0	2.76	0.0016		Pass
			-10	3.51	0.0020		Pass
			-20	2.31	0.0013		Pass
			-30	1.12	0.0006		Pass

5.9.3 LTE Band 5

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 5 / 10MHz / Full RB							
QPSK	20525 / 836.5	VL	TN	0.09	0.0001	± 2.5	Pass
		VN		1.02	0.0012	± 2.5	Pass
		VH		-1.23	-0.0015	± 2.5	Pass
		VN	50	4.66	0.0056	± 2.5	Pass
			40	0.92	0.0011	± 2.5	Pass
			30	4.92	0.0059	± 2.5	Pass
			20	0.31	0.0004	± 2.5	Pass
			10	5.19	0.0062	± 2.5	Pass
			0	1.59	0.0019	± 2.5	Pass
			-10	-0.94	-0.0011	± 2.5	Pass
			-20	1.10	0.0013	± 2.5	Pass
			-30	1.60	0.0019	± 2.5	Pass

5.9.4 LTE Band 12

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 12 / 10MHz / Full RB							
QPSK	23095 / 707.5	VL	TN	-0.37	-0.0005	N/A	Pass
		VN		-4.06	-0.0057		Pass
		VH		-3.06	-0.0043		Pass
		VN	50	-5.45	-0.0077		Pass
			40	-2.96	-0.0042		Pass
			30	-6.02	-0.0085		Pass
			20	-1.44	-0.0020		Pass
			10	-5.12	-0.0072		Pass
			0	-1.62	-0.0023		Pass
			-10	-4.22	-0.0060		Pass
			-20	-3.36	-0.0047		Pass
			-30	-1.83	-0.0026		Pass

5.9.5 LTE Band 13

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 13 / 10MHz / Full RB							
QPSK	23230 / 782	VL	TN	-2.43	-0.0031	N/A	Pass
		VN		-4.12	-0.0053		Pass
		VH		-7.20	-0.0092		Pass
		VN	50	-2.56	-0.0033		Pass
			40	-1.87	-0.0024		Pass
			30	-2.59	-0.0033		Pass
			20	-0.89	-0.0011		Pass
			10	-4.75	-0.0061		Pass
			0	-2.55	-0.0033		Pass
			-10	-3.24	-0.0041		Pass
			-20	-2.46	-0.0031		Pass
			-30	-5.02	-0.0064		Pass

5.9.6 LTE Band 25

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 25 / 20MHz / Full RB							
QPSK	26340 / 1880.0	VL	TN	3.45	0.0018	N/A	Pass
		VN		5.82	0.0031		Pass
		VH		3.87	0.0021		Pass
		VN	50	0.79	0.0004		Pass
			40	0.14	0.0001		Pass
			30	-3.23	-0.0017		Pass
			20	-3.18	-0.0017		Pass
			10	1.81	0.0010		Pass
			0	2.8	0.0015		Pass
			-10	-3.72	-0.0020		Pass
			-20	-4.33	-0.0023		Pass
			-30	3.76	0.0020		Pass

5.9.7 LTE Band 26

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 26 / 15MHz / Full RB							
QPSK	26915 / 836.5	VL	TN	-4.59	-0.0055	± 2.5	Pass
		VN		0.28	0.0003	± 2.5	Pass
		VH		2.19	0.0026	± 2.5	Pass
		VN	50	-2.45	-0.0029	± 2.5	Pass
			40	-2.77	-0.0033	± 2.5	Pass
			30	-1.66	-0.0020	± 2.5	Pass
			20	0.98	0.0012	± 2.5	Pass
			10	2.78	0.0033	± 2.5	Pass
			0	-1.55	-0.0019	± 2.5	Pass
			-10	-1.54	-0.0018	± 2.5	Pass
			-20	0.34	0.0004	± 2.5	Pass
			-30	-2.23	-0.0027	± 2.5	Pass

5.9.8 LTE Band 26 (Part 90S)

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 26 / 10MHz / Full RB							
QPSK	26740 / 819	VL	TN	4.98	0.0061	± 2.5	Pass
		VN		-0.79	-0.0010	± 2.5	Pass
		VH		-3.70	-0.0045	± 2.5	Pass
		VN	50	-3.40	-0.0042	± 2.5	Pass
			40	-3.14	-0.0038	± 2.5	Pass
			30	-5.82	-0.0071	± 2.5	Pass
			20	0.66	0.0008	± 2.5	Pass
			10	-0.29	-0.0004	± 2.5	Pass
			0	4.45	0.0054	± 2.5	Pass
			-10	-5.37	-0.0066	± 2.5	Pass
			-20	-9.11	-0.0111	± 2.5	Pass
			-30	-11.34	-0.0138	± 2.5	Pass

5.9.9 LTE Band 66

Modulation	Channel/ Frequency (MHz)	Voltage (Vdc)	Temperature (℃)	Deviation (Hz)	Deviation (ppm)	Limit (ppm)	Result
LTE Band 66 / 20MHz / Full RB							
QPSK	132322 / 1745	VL	TN	-4.59	-0.0026	N/A	Pass
		VN		-4.26	-0.0024		Pass
		VH		-7.40	-0.0042		Pass
		VN	50	-6.84	-0.0039		Pass
			40	-7.79	-0.0045		Pass
			30	-5.79	-0.0033		Pass
			20	-4.35	-0.0025		Pass
			10	-5.55	-0.0032		Pass
			0	-3.22	-0.0018		Pass
			-10	-2.53	-0.0014		Pass
			-20	-6.59	-0.0038		Pass
			-30	-7.00	-0.0040		Pass

APPENDIX 1 PHOTOS OF TEST SETUP

See test photos attached in Appendix 1 for the actual connections between Product and support equipment.

APPENDIX 2 PHOTOS OF EUT CONSTRUCTIONAL DETAILS

Refer to Appendix 2 for EUT external and internal photos.

*** End of Report ***

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