7.5 Spurious Emission at Antenna Terminal

Test Requirement:	Part 2.1051/Part 2.1057
Test Method:	TIA-603-E-2016 Clause 2.2.13
Test Setup:	Refer to section 4 for details
Measurement Procedure:	The transmitter output was connected to a calibrated coaxial cable, attenuator and Spectrum analyzer, the other end of which was connected to a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel).the equipment operates below 10GHz: to the tenth harmonic of the highest fundamental frequency or to 40GHz.whichever is lower, the resolution bandwidth of the spectrum analyzer was set at 100kHz for spurious emissions below 1 GHz, and 1 MHz for spurious emissions above 1GHz.the video bandwidth of the spectrum analyzer was set at thrice the resolution bandwidth. Detector Mode was set to mean or average power.
Instruments Used:	Refer to section 6 for details
Limit:	Attenuated at least 43+10log(P)
Test Results:	Refer to Appendix A

7.6 Frequency Stability

Test Requirement:	Part 2.1055
Test Method:	TIA-603-E-2016 Clause 2.2.2
Test Setup:	Refer to section 4 for details
Measurement Procedure:	The transmitter output was connected to a calibrated coaxial cable and a Base Station Simulator. The Base Station Simulator was set to force the EUT to its maximum power setting. The tests were performed at three frequencies (low channel and high channel).The EUT was place in the temperature chamber, the DC leads and RF output cable exited the chamber though an opening made for that purpose. After Operate the equipment in standby conditions for 15 minutes before proceeding. The temperature was varied from -30°C to +55°C at intervals of not more than 10°C The frequency stability was read from the base station.Since the EUT is hand carried,battery powered equipment,at 25°C the input voltage was reduced from 3.8V(primary supply voltage) to 3.5V(end point voltage), the frequency stability and input voltage was record.
Instruments Used:	Refer to section 6 for details
Limit:	Operation Band: Frequency stability Limit(ppm) GSM/GPRS 850: ±2.5ppm GSM/GPRS 1900: ---
Test Results:	Refer to Appendix A

7.7 Effective Radiated Power of Transmitter (ERP/EIRP)

Test Requirement:	Part 2.1046(a)/Part 22.913(a)/Part 24.232(c)
Test Method:	TIA-603-E-2016 Clause 2.2.1/ KDB 971168 D01v03r01
Test Setup:	Refer to section 4 for details
Limit:	Mode: GSM/GPRS 850 / GSM/GPRS 1900 Frequency: 824 – 849MHz / 1850 – 1910MHz Limit: 38.45dBm（ERP） / 33.01dBm（EIRP）
Measurement Procedure:	Calculate power in dBm by the following formula: ERP(dBm) = Conducted output powe(dBm) + antenna gain (dBd) EIRP(dBm) = Conducted output powe(dBm) + antenna gain (dBi) EIRP=ERP+2.15dB
Instruments Used:	Refer to section 6 for details
Test Results:	Refer to Appendix A

7.8 Field strength of spurious radiation

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
0.009MHz-30MHz	Peak	10kHz	30kHz	Peak
30MHz-1GHz	Peak	120kHz	300kHz	Peak
Above 1GHz	Peak	1MHz	3MHz	Peak

Measurement Procedure:

1. Scan up to 10th harmonic, find the maximum radiation frequency to measure.
2. The technique used to find the Spurious Emissions of the transmitter was the antenna substitution method. Substitution method was performed to determine the actual ERP/EIRP emission levels of the EUT.

Test procedure as below:

The EUT was powered ON and placed on a 1.5m hight table at a 3 meter fully Anechoic Chamber. The antenna of the transmitter was extended to its maximum length. modulation mode and the measuring receiver shall be tuned to the frequency of the transmitter under test.

The EUT was set 3 meters(above 18GHz the distance is 1 meter) away from the interference-receiving antenna, which was mounted on the top of a variable-height antenna tower.

The disturbance of the transmitter was maximized on the test receiver display by raising and lowering from 1m to 4m the receive antenna and by rotating through 360° the turntable. After the fundamental emission was maximized, a field strength measurement was made.

Steps 1) to 3) were performed with the EUT and the receive antenna in both vertical and horizontal polarization.

The transmitter was then removed and replaced with another antenna. The center of the antenna was approximately at the same location as the center of the transmitter.

A signal at the disturbance was fed to the substitution antenna by means of a non-radiating cable. With both the substitution and the receive antennas horizontally polarized, the receive antenna was raised and lowered to obtain a maximum reading at the test receiver. The level of the signal generator was adjusted until the measured field strength level in step 3) is obtained for this set of conditions.

The output power into the substitution antenna was then measured.

Steps 6) and 7)were repeated with both antennas polarized.

Calculate power in dBm by the following formula:

ERP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBd)

EIRP(dBm) = Pg(dBm) – cable loss (dB) + antenna gain (dBi)

EIRP=ERP+2.15dB

where:

Pg is the generator output power into the substitution antenna.

) Test the EUT in the lowest channel, the middle channel the Highest channel

) The radiation measurements are performed in X, Y, Z axis positioning for EUT operation mode,And found the X axis positioning which it is worse case.

) Repeat above procedures until all frequencies measured was complete.

Limit: Attenuated at least 43+10log(P)

Measurement Data

Remark: Only the worst case was recorded in the report.

Mode:	GSM Traffic							
Band:	850			Channel:		128		
NO.	Freq. [MHz]	Height [cm]	Azimuth [deg]	Level [dBm]	Limit [dBm]	Margin [dB]	Result	Polarity
1	40.0900	150	102	-73.99	-13.00	60.99	Pass	Horizontal
2	120.0340	150	357	-75.26	-13.00	62.26	Pass	Horizontal
3	184.2609	150	126	-78.54	-13.00	65.54	Pass	Horizontal
4	270.0260	150	151	-74.73	-13.00	61.73	Pass	Horizontal
5	367.2394	150	134	-77.51	-13.00	64.51	Pass	Horizontal
6	619.4899	150	61	-75.02	-13.00	62.02	Pass	Horizontal
7	1673.0673	150	208	-40.07	-13.00	27.07	Pass	Horizontal
8	2510.1510	150	313	-56.26	-13.00	43.26	Pass	Horizontal
9	5020.6010	150	185	-53.66	-13.00	40.66	Pass	Horizontal
10	7665.9833	150	175	-51.14	-13.00	38.14	Pass	Horizontal
11	11869.1935	150	45	-47.45	-13.00	34.45	Pass	Horizontal
12	14369.8185	150	121	-43.62	-13.00	30.62	Pass	Horizontal

Mode:	GSM Traffic							
Band:	850			Channel:		128		
NO.	Freq. [MHz]	Height [cm]	Azimuth [deg]	Level [dBm]	Limit [dBm]	Margin [dB]	Result	Polarity
1	42.0304	150	26	-67.55	-13.00	54.55	Pass	Vertical
2	62.5985	150	235	-68.89	-13.00	55.89	Pass	Vertical
3	184.2609	150	202	-71.89	-13.00	58.89	Pass	Vertical
4	239.9500	150	357	-72.95	-13.00	59.95	Pass	Vertical
5	411.4803	150	62	-71.95	-13.00	58.95	Pass	Vertical
6	730.0920	150	357	-69.11	-13.00	56.11	Pass	Vertical
7	1673.4673	150	9	-55.93	-13.00	42.93	Pass	Vertical
8	2685.5686	150	202	-58.04	-13.00	45.04	Pass	Vertical
9	5029.6015	150	325	-53.23	-13.00	40.23	Pass	Vertical
10	7500.2250	150	272	-51.38	-13.00	38.38	Pass	Vertical
11	9923.5962	150	260	-48.34	-13.00	35.34	Pass	Vertical
12	14372.0686	150	3	-44.04	-13.00	31.04	Pass	Vertical

Mode:	GSM Traffic							
Band:		850		Channel:		190		
NO.	Freq. [MHz]	Height [cm]	Azimuth [deg]	Level [dBm]	Limit [dBm]	Margin [dB]	Result	Polarity
1	40.0900	150	199	-76.13	-13.00	63.13	Pass	Horizontal
2	62.4045	150	322	-74.89	-13.00	61.89	Pass	Horizontal
3	80.0620	150	357	-73.24	-13.00	60.24	Pass	Horizontal
4	166.0212	150	248	-77.32	-13.00	64.32	Pass	Horizontal
5	270.0260	150	199	-73.38	-13.00	60.38	Pass	Horizontal
6	612.1164	150	19	-74.37	-13.00	61.37	Pass	Horizontal
7	1672.8673	150	182	-41.30	-13.00	28.30	Pass	Horizontal
8	2509.9510	150	289	-56.73	-13.00	43.73	Pass	Horizontal
9	4655.3328	150	283	-55.10	-13.00	42.10	Pass	Horizontal
10	7019.4510	150	56	-52.04	-13.00	39.04	Pass	Horizontal
11	9703.0852	150	240	-47.85	-13.00	34.85	Pass	Horizontal
12	14361.5681	150	283	-44.09	-13.00	31.09	Pass	Horizontal

Mode:	GSM Traffic							
Band:		850		Channel:		190		
NO.	Freq. [MHz]	Height [cm]	Azimuth [deg]	Level [dBm]	Limit [dBm]	Margin [dB]	Result	Polarity
1	41.8364	150	151	-67.80	-13.00	54.80	Pass	Vertical
2	62.4045	150	151	-69.77	-13.00	56.77	Pass	Vertical
3	129.9300	150	12	-75.55	-13.00	62.55	Pass	Vertical
4	184.2609	150	40	-72.12	-13.00	59.12	Pass	Vertical
5	284.9670	150	0	-72.44	-13.00	59.44	Pass	Vertical
6	411.4803	150	357	-72.22	-13.00	59.22	Pass	Vertical
7	1673.0673	150	357	-49.71	-13.00	36.71	Pass	Vertical
8	3029.2515	150	259	-57.06	-13.00	44.06	Pass	Vertical
9	5008.6004	150	195	-54.60	-13.00	41.60	Pass	Vertical
10	6930.1965	150	227	-52.58	-13.00	39.58	Pass	Vertical
11	11420.6710	150	347	-46.73	-13.00	33.73	Pass	Vertical
12	14394.5697	150	78	-44.27	-13.00	31.27	Pass	Vertical

Mode:	GSM Traffic							
Band:		850		Channel:		251		
NO.	Freq. [MHz]	Height [cm]	Azimuth [deg]	Level [dBm]	Limit [dBm]	Margin [dB]	Result	Polarity
1	40.2841	150	297	-73.92	-13.00	60.92	Pass	Horizontal
2	80.0620	150	357	-74.99	-13.00	61.99	Pass	Horizontal
3	137.1094	150	188	-75.45	-13.00	62.45	Pass	Horizontal
4	270.0260	150	357	-73.55	-13.00	60.55	Pass	Horizontal
5	436.1232	150	122	-76.66	-13.00	63.66	Pass	Horizontal
6	659.4619	150	286	-75.22	-13.00	62.22	Pass	Horizontal
7	1672.8673	150	40	-39.30	-13.00	26.30	Pass	Horizontal
8	2509.5510	150	297	-57.48	-13.00	44.48	Pass	Horizontal
9	5027.3514	150	273	-54.29	-13.00	41.29	Pass	Horizontal
10	7360.7180	150	13	-51.71	-13.00	38.71	Pass	Horizontal
11	10282.8641	150	306	-47.75	-13.00	34.75	Pass	Horizontal
12	12448.9724	150	273	-46.84	-13.00	33.84	Pass	Horizontal

Mode:	GSM Traffic							
Band:		850		Channel:		251		
NO.	Freq. [MHz]	Height [cm]	Azimuth [deg]	Level [dBm]	Limit [dBm]	Margin [dB]	Result	Polarity
1	41.6423	150	51	-69.05	-13.00	56.05	Pass	Vertical
2	62.5985	150	297	-68.83	-13.00	55.83	Pass	Vertical
3	129.9300	150	357	-75.47	-13.00	62.47	Pass	Vertical
4	184.2609	150	62	-71.35	-13.00	58.35	Pass	Vertical
5	411.4803	150	161	-71.36	-13.00	58.36	Pass	Vertical
6	750.0780	150	42	-69.05	-13.00	56.05	Pass	Vertical
7	1673.0673	150	305	-51.97	-13.00	38.97	Pass	Vertical
8	2787.9788	150	6	-58.10	-13.00	45.10	Pass	Vertical
9	5009.3505	150	178	-54.65	-13.00	41.65	Pass	Vertical
10	7569.2285	150	270	-51.49	-13.00	38.49	Pass	Vertical
11	11176.1588	150	99	-46.93	-13.00	33.93	Pass	Vertical
12	14419.3210	150	78	-44.79	-13.00	31.79	Pass	Vertical

Mode:	GSM Traffic							
Band:		1900		Channel:		512		
NO.	Freq. [MHz]	Height [cm]	Azimuth [deg]	Level [dBm]	Limit [dBm]	Margin [dB]	Result	Polarity
1	40.2841	150	96	-74.55	-13.00	61.55	Pass	Horizontal
2	80.0620	150	357	-75.52	-13.00	62.52	Pass	Horizontal
3	137.1094	150	238	-74.70	-13.00	61.70	Pass	Horizontal
4	258.7718	150	80	-72.54	-13.00	59.54	Pass	Horizontal
5	375.0010	150	238	-77.45	-13.00	64.45	Pass	Horizontal
6	750.0780	150	61	-71.28	-13.00	58.28	Pass	Horizontal
7	1257.4257	150	1	-46.34	-13.00	33.34	Pass	Horizontal
8	3759.7880	150	45	-43.38	-13.00	30.38	Pass	Horizontal
9	5640.1320	150	110	-44.87	-13.00	31.87	Pass	Horizontal
10	9207.3104	150	325	-49.41	-13.00	36.41	Pass	Horizontal
11	13160.0080	150	348	-43.78	-13.00	30.78	Pass	Horizontal
12	21777.3511	150	202	-53.21	-13.00	40.21	Pass	Horizontal

Mode:	GSM Traffic							
Band:		1900		Channel:		512		
NO.	Freq. [MHz]	Height [cm]	Azimuth [deg]	Level [dBm]	Limit [dBm]	Margin [dB]	Result	Polarity
1	42.0304	150	26	-66.25	-13.00	53.25	Pass	Vertical
2	62.5985	150	132	-68.20	-13.00	55.20	Pass	Vertical
3	184.2609	150	291	-71.39	-13.00	58.39	Pass	Vertical
4	239.9500	150	357	-70.39	-13.00	57.39	Pass	Vertical
5	411.4803	150	1	-72.52	-13.00	59.52	Pass	Vertical
6	730.6741	150	357	-49.76	-13.00	36.76	Pass	Vertical
7	1283.2283	150	238	-45.97	-13.00	32.97	Pass	Vertical
8	3759.7880	150	13	-46.92	-13.00	33.92	Pass	Vertical
9	5640.1320	150	294	-37.60	-13.00	24.60	Pass	Vertical
10	9400.0700	150	208	-47.17	-13.00	34.17	Pass	Vertical
11	13160.7580	150	306	-41.49	-13.00	28.49	Pass	Vertical
12	21521.7009	150	62	-54.11	-13.00	41.11	Pass	Vertical