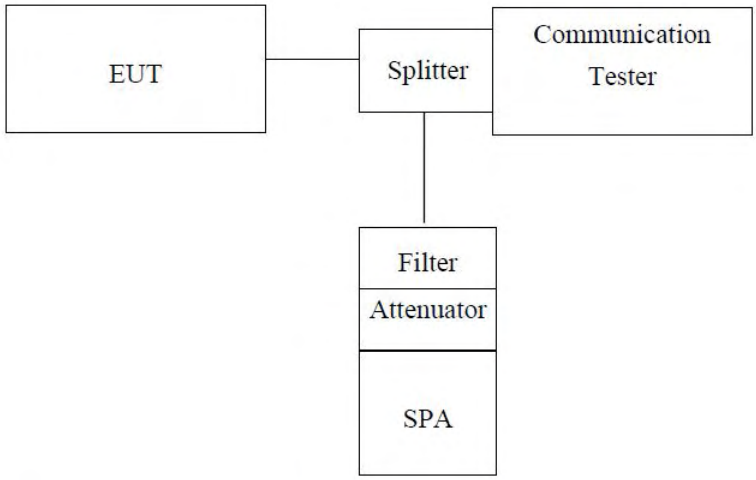
5.6. Conducted Out of Band Emissions

5.6.1. Limit

According to FCC section 22.917(b) and FCC section 24.238(b), 27.53(g)(h) in the 1MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth (26dB emission bandwidth) of the fundamental emission of the transmitter may be employed.

5.6.2. Test Setup



Note: *Measurement setup for testing on Antenna connector*

5.6.3. Measurement Procedure

The EUT, which is powered by the adapter, is coupled to the Spectrum Analyzer and the System Simulator with Attenuators through the Power Splitter; the RF load attached to the EUT antenna terminal is 50Ohm; the path loss as the factor is calibrated to correct the reading. The EUT is commanded by the System Simulator to operate at the maximum output power i.e. Power Control Level (PCL) = 5 and Power Class = 4. A call is established between the EUT and the System Simulator.

5.6.4. Test Result

The measurement frequency range is from 30MHz to the 10th harmonic of the fundamental frequency. The lowest, middle and highest channels are tested to verify the out of band emissions.

Test plot as follows:

GSM 850MHz Lowest channel

Note: Offset=Cable loss (4.0) + 10log(3.21/3)=4.0+0.3=4.3dB

GSM 850MHz Highest channel

Note: Offset=Cable loss (4.0) + 10log(3.22/3)=4.0+0.3=4.3dB

EGPRS 850MHz Lowest channel

Note: Offset=Cable loss (4.0) + 10log(3.20/3)=4.0+0.3=4.3dB

EGPRS 850MHz Highest channel

Note: Offset=Cable loss (4.0) + 10log(3.23/3)=4.0+0.3=4.3dB

GSM 1900MHz Lowest channel

Note: Offset=Cable loss (4.5) + 10log (3.22/3)=4.5+0.3=4.8dB

GSM 1900MHz Highest channel

Note: Offset=Cable loss (4.5) + 10log (3.13/3)=4.5+0.3=4.8dB

EGPRS 1900MHz Lowest channel

Note: Offset=Cable loss (4.5) + 10log (3.24/3)=4.5+0.3=4.8dB

EGPRS 1900MHz Highest channel

Note: Offset=Cable loss (4.5) + 10log (3.22/3)=4.5+0.3=4.8dB

WCDMA Band II Lowest channel

Note: Offset=Cable loss (4.5) + 10log (47.48/30)=4.5+2.0=6.5dB

WCDMA Band II Highest channel

Note: Offset=Cable loss (4.5) + 10log (47.43/30)=4.5+2.0=6.5dB

WCDMA Band V Lowest channel

Note: Offset=Cable loss (4.0) + 10log (47.48/30)=4.0+2.0=6.5dB

WCDMA Band V Highest channel

Note: Offset=Cable loss (4.0) + 10log (47.43/30)=4.0+2.0=6.0dB

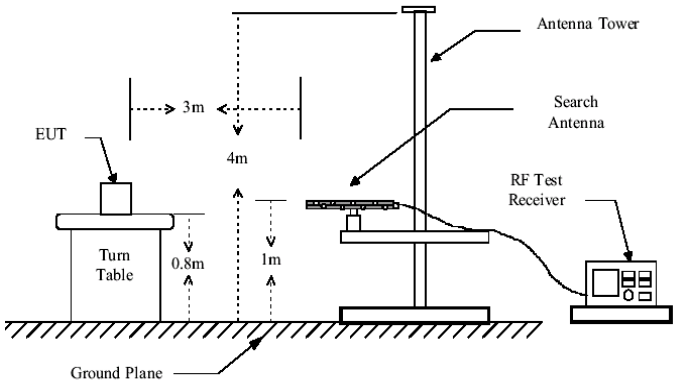
5.7. Transmitter Radiated Power (EIRP/ERP)

5.7.1. Limit

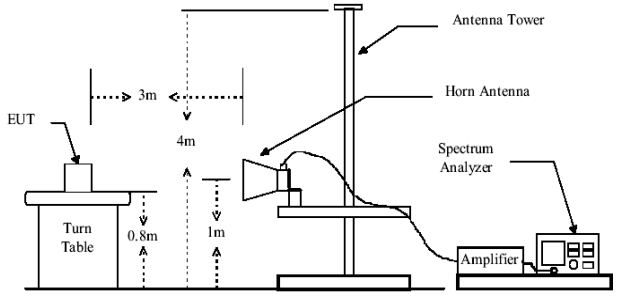
According to FCC section 22.913, the Effective Radiated Power (ERP) of mobile transmitters and auxiliary test transmitters must not exceed 7Watts, and FCC section 24.232, the broadband PCS mobile station is limited to 2 Watts e.i.r.p. peak power.

5.7.2. Test Setup

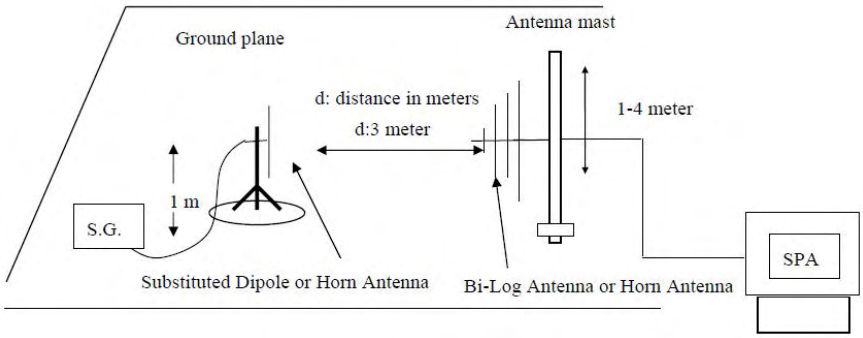
Below 1GHz



Above 1GHz



Substituted method:



5.7.3. Measurement Procedure

The EUT was placed on an non-conductive turntable using a non-conductive support. The radiated

emission at the fundamental frequency was measured at 3 m with a test antenna and EMI spectrum analyzer. all test in Full-Anechoic Chamber.

During the measurement, the EUT was communication with the station. The highest emission was recorded with the rotation of the turntable and the lowering of the test antenna from 4m to 1m. The reading was recorded and the field strength (E in dBuV/m) was calculated.

ERP in frequency band 824.2 –848.80.8MHz were measured using a substitution method. The EUT was replaced by dipole antenna connected, the S.G. output was recorded and ERP was calculated as follows:

EIRP in frequency band 1850.2 –1909.8MHz were measured using a substitution method. The EUT was replaced by or horn antenna connected, the S.G. output was recorded and EIRP was calculated as follows:

ERP = S.G. output (dBm) + Antenna Gain (dBd) – Cable Loss (dB)

EIRP = S.G. output (dBm) + Antenna Gain (dBi) – Cable Loss (dB)

5.7.4. Test Result

EUT mode	Channel	Antenna Pol.	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	ERP (dBm)	Limit (dBm)	Result
GSM850 (GSM link)	Lowest	V	17.01	15.68	1.65	31.04	38.45	Pass
		H	15.04	15.68	1.65	29.07		
	Middle	V	17.57	15.70	1.67	31.60	38.45	Pass
		H	15.45	15.70	1.67	29.48		
	Highest	V	**18.23**	**15.70**	**1.71**	**32.22**	38.45	Pass
		H	15.01	15.70	1.71	29.00		
GPRS850	Lowest	V	16.85	15.68	1.65	30.88	38.45	Pass
		H	14.90	15.68	1.65	28.93		
	Middle	V	17.40	15.70	1.67	31.43	38.45	Pass
		H	15.30	15.70	1.67	29.33		
	Highest	V	**18.06**	**15.70**	**1.71**	**32.05**	38.45	Pass
		H	14.87	15.70	1.71	28.86		
GSM850 (EGPRS 8 link)	Lowest	V	16.94	15.68	1.65	30.97	38.45	Pass
		H	14.98	15.68	1.65	29.01		
	Middle	V	17.50	15.70	1.67	31.53	38.45	Pass
		H	15.39	15.70	1.67	29.42		
	Highest	V	**18.15**	**15.70**	**1.71**	**32.14**	38.45	Pass
		H	16.95	15.70	1.71	30.94		

EUT mode	Channel	Antenna Pol.	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	ERP (dBm)	Limit (dBm)	Result
PCS1900 (GSM link)	Lowest	V	12.59	19.35	2.54	29.40	38.45	Pass
		H	10.67	19.35	2.54	27.48		
	Middle	V	**13.52**	**19.51**	**2.62**	**30.41**	38.45	Pass
		H	11.36	19.51	2.62	28.25		
	Highest	V	12.79	19.96	2.69	30.06	38.45	Pass
		H	10.75	19.96	2.69	28.02		
GPRS1900	Lowest	V	12.47	19.35	2.54	29.28	38.45	Pass
		H	10.57	19.35	2.54	27.38		
	Middle	V	**13.39**	**19.51**	**2.62**	**30.28**	38.45	Pass
		H	11.25	19.51	2.62	28.14		
	Highest	V	12.67	19.96	2.69	29.94	38.45	Pass
		H	10.66	19.96	2.69	27.93		
EGPRS1900 (EGPRS 8 link)	Lowest	V	12.57	19.35	2.54	29.38	38.45	Pass
		H	11.66	19.35	2.54	28.47		
	Middle	V	**13.50**	**19.51**	**2.62**	**30.39**	38.45	Pass
		H	11.35	19.51	2.62	28.24		
	Highest	V	12.77	19.96	2.69	30.04	38.45	Pass
		H	11.74	19.96	2.69	29.01		

EUT mode	Channel	Antenna Pol.	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	ERP (dBm)	Limit (dBm)	Result
WCDMA Band II	Lowest	V	7.15	19.33	2.52	23.96	38.45	Pass
		H	7.31	19.33	2.52	24.12		
	Middle	V	7.57	**19.50**	**2.60**	24.47	38.45	Pass
		H	7.40	19.50	2.60	24.30		
	Highest	V	6.85	19.94	2.71	24.08	38.45	Pass
		H	6.78	19.94	2.71	24.01		
WCDMA Band V	Lowest	V	6.86	15.68	1.65	20.89	38.45	Pass
		H	5.91	15.68	1.65	19.94		
	Middle	V	7.41	15.70	1.67	21.44	38.45	Pass
		H	6.31	15.70	1.67	20.34		
	Highest	V	**8.07**	**15.70**	**1.71**	**22.06**	38.45	Pass
		H	7.88	15.70	1.71	21.87		

5.8. Radiated Out of Band Emissions

5.8.1. Limit

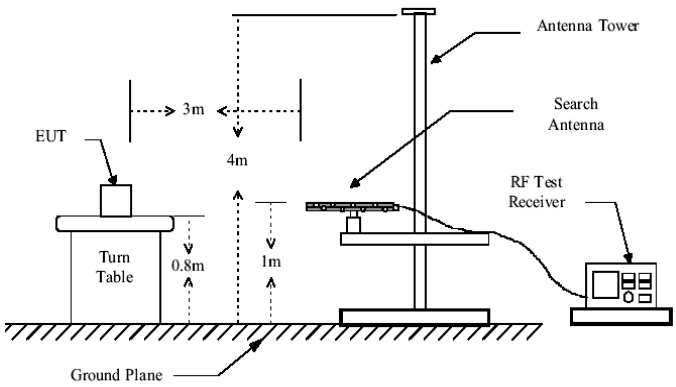
According to FCC section 22.917(a) and section 24.238(a), 27.53(g) the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power

(P) by a factor of at least 43+10*log(P)dB. This calculated to be -13dBm.

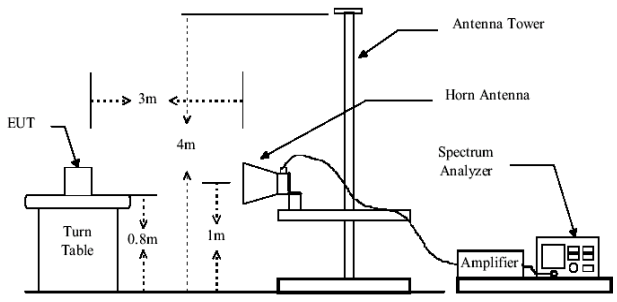
The spurious emission with frequency band 1900 according to FCC section 2.1057.

5.8.2. Test Setup

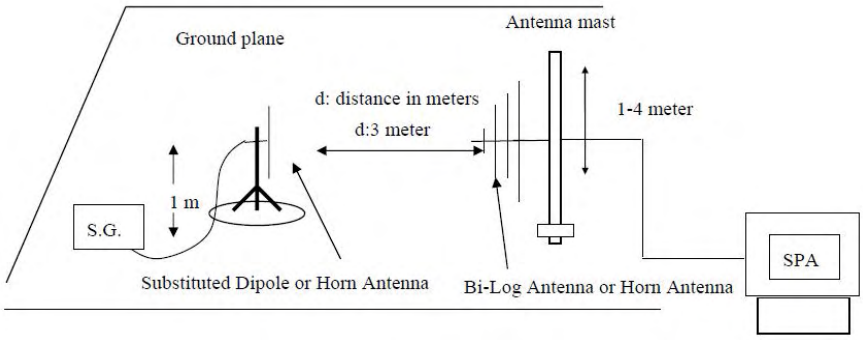
Below 1GHz



Above 1GHz



Substituted method:



5.8.3. Measurement Procedure

The EUT was placed on a non-conductive, The measurement antenna was placed at a distance of 3 meters from the EUT. 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. all test in Full-Anechoic Chamber.

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.

The spurious emissions attenuation was calculated as the difference between radiated power at the fundamental frequency and the spurious emissions frequency.

EIRP (Level)= S.G. output (dBm) + Antenna Gain(dBi) – Cable Loss (dB)

Note: Measurement Uncertainty: ±3.6 dB.

The data show only the worst results, and the other results are very low and not shown in the report.

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
GSM 850 Lowest	88.37	Vertical	-75.42	3.35	0.38	-72.45	-13	PASS
	1648.40	Vertical	-29.19	6.51	1.35	-24.03		
	2472.60	Vertical	-35.37	6.88	2.53	-31.02		
	3296.80	Vertical	-37.22	7.61	3.67	-33.28		
	4121.00	Vertical	-45.31	8.67	4.06	-40.70		
	4945.20	Vertical	-39.87	9.35	4.38	-34.90		
	138.26	Horizontal	-75.54	4.12	0.51	-71.93		
	2472.40	Horizontal	-33.92	6.51	1.35	-28.76		
	3296.80	Horizontal	-37.16	6.88	2.53	-32.81		
	4121.00	Horizontal	-45.76	7.61	3.67	-41.82		
	4945.20	Horizontal	-49.05	8.67	4.06	-44.44		
	5769.40	Horizontal	-43.29	9.35	4.38	-38.32		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
GSM 850 Middle	87.96	Vertical	-75.37	3.35	0.38	-72.40	-13	PASS
	1648.70	Vertical	-32.13	6.51	1.35	-26.97		
	2472.10	Vertical	-32.67	6.88	2.53	-28.32		
	3296.50	Vertical	-40.13	7.61	3.67	-36.19		
	4121.30	Vertical	-47.68	8.67	4.06	-43.07		
	4945.70	Vertical	-43.20	9.35	4.38	-38.23		
	137.69	Horizontal	-75.86	4.12	0.51	-72.25		
	2472.10	Horizontal	-29.46	6.51	1.35	-24.30		
	3296.20	Horizontal	-32.12	6.88	2.53	-27.77		
	4121.70	Horizontal	-48.37	7.61	3.67	-44.43		
	4945.00	Horizontal	-49.76	8.67	4.06	-45.15		
	5769.60	Horizontal	-39.80	9.35	4.38	-34.83		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
GSM 850 Highest	88.69	Vertical	-75.04	3.35	0.38	-72.07	-13	PASS
	1648.30	Vertical	-31.03	6.51	1.35	-25.87		
	2472.10	Vertical	-32.93	6.88	2.53	-28.58		
	3296.50	Vertical	-36.07	7.61	3.67	-32.13		
	4121.40	Vertical	-41.38	8.67	4.06	-36.77		
	4945.20	Vertical	-46.79	9.35	4.38	-41.82		
	138.22	Horizontal	-76.05	4.12	0.51	-72.44		
	2472.90	Horizontal	-29.85	6.51	1.35	-24.69		
	3296.30	Horizontal	-32.73	6.88	2.53	-28.38		
	4121.20	Horizontal	-38.44	7.61	3.67	-34.50		
	4945.70	Horizontal	-47.04	8.67	4.06	-42.43		
	5769.60	Horizontal	-53.27	9.35	4.38	-48.30		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
PCS1900 Lowest	89.03	Vertical	-75.26	3.35	0.38	-72.29	-13	PASS
	3700.40	Vertical	-46.06	7.76	3.75	-42.05		
	5550.60	Vertical	-47.17	9.84	4.94	-42.27		
	7400.80	Vertical	-39.63	10.21	5.32	-34.74		
	9251.00	Vertical	-43.00	11.36	6.02	-37.66		
	11101.20	Vertical	-44.53	14.52	6.68	-36.69		
	137.21	Horizontal	-75.38	4.12	0.51	-71.77		
	3700.40	Horizontal	-48.27	7.76	3.75	-44.26		
	5550.60	Horizontal	-47.54	9.84	4.94	-42.64		
	7400.80	Horizontal	-42.23	10.21	5.32	-37.34		
	9251.00	Horizontal	-47.43	11.36	6.02	-42.09		
	11101.20	Horizontal	-47.21	14.52	6.68	-39.37		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
PCS1900 Middle	88.14	Vertical	-75.26	3.35	0.38	-72.29	-13	PASS
	3760.00	Vertical	-47.38	7.76	3.75	-43.37		
	5640.00	Vertical	-46.98	9.84	4.94	-42.08		
	7520.00	Vertical	-42.61	10.21	5.32	-37.72		
	9400.00	Vertical	-42.02	11.36	6.02	-36.68		
	11280.00	Vertical	-45.96	14.52	6.68	-38.12		
	137.56	Horizontal	-75.38	4.12	0.51	-71.77		
	3760.00	Horizontal	-45.81	7.76	3.75	-41.80		
	5640.00	Horizontal	-46.54	9.84	4.94	-41.64		
	7520.00	Horizontal	-39.22	10.21	5.32	-34.33		
	9400.00	Horizontal	-43.10	11.36	6.02	-37.76		
	11280.00	Horizontal	-44.97	14.52	6.68	-37.13		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
PCS1900 Highest	89.06	Vertical	-75.30	3.35	0.38	-72.33	-13	PASS
	3819.60	Vertical	-47.03	7.79	3.53	-42.77		
	5729.40	Vertical	-41.49	9.88	5.02	-36.63		
	7639.20	Vertical	-37.71	10.25	5.54	-33.00		
	9549.00	Vertical	-44.55	11.38	6.16	-39.33		
	11458.80	Vertical	-46.98	14.56	6.72	-39.14		
	137.29	Horizontal	-75.42	4.12	0.51	-71.81		
	3819.60	Horizontal	-45.39	7.79	3.53	-41.13		
	5729.40	Horizontal	-41.40	9.88	5.02	-36.54		
	7639.20	Horizontal	-37.08	10.25	5.54	-32.37		
	9549.00	Horizontal	-42.65	11.38	6.16	-37.43		
	11458.80	Horizontal	-44.55	14.56	6.72	-36.71		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band II Lowest	87.21	Vertical	-75.26	3.35	0.38	-72.15	-13	PASS
	3700.40	Vertical	-46.06	7.76	3.75	-41.97		
	5550.60	Vertical	-47.17	9.84	4.94	-42.19		
	7400.80	Vertical	-39.63	10.21	5.32	-34.67		
	9251.00	Vertical	-43.00	11.36	6.02	-37.58		
	11101.20	Vertical	-44.53	14.52	6.68	-36.61		
	137.26	Horizontal	-75.38	4.12	0.51	-71.63		
	3700.40	Horizontal	-48.27	7.76	3.75	-44.17		
	5550.60	Horizontal	-47.54	9.84	4.94	-42.55		
	7400.80	Horizontal	-42.23	10.21	5.32	-37.26		
	9251.00	Horizontal	-47.43	11.36	6.02	-42.00		
	11101.20	Horizontal	-47.21	14.52	6.68	-39.29		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band II Middle	88.39	Vertical	-75.26	3.35	0.38	-72.29	-13	PASS
	3760.00	Vertical	-47.38	7.76	3.75	-43.37		
	5640.00	Vertical	-46.98	9.84	4.94	-42.08		
	7520.00	Vertical	-42.61	10.21	5.32	-37.72		
	9400.00	Vertical	-42.02	11.36	6.02	-36.68		
	11280.00	Vertical	-45.96	14.52	6.68	-38.12		
	137.43	Horizontal	-75.38	4.12	0.51	-71.77		
	3760.00	Horizontal	-45.81	7.76	3.75	-41.80		
	5640.00	Horizontal	-46.54	9.84	4.94	-41.64		
	7520.00	Horizontal	-39.22	10.21	5.32	-34.33		
	9400.00	Horizontal	-43.10	11.36	6.02	-37.76		
	11280.00	Horizontal	-44.97	14.52	6.68	-37.13		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBi)	Cable Loss (dB)	Level (dBm)		
WCDMA Band II Highest	88.24	Vertical	-75.22	3.35	0.38	-72.25	-13	PASS
	3819.60	Vertical	-46.98	7.79	3.53	-42.72		
	5729.40	Vertical	-41.45	9.88	5.02	-36.59		
	7639.20	Vertical	-37.66	10.25	5.54	-32.95		
	9549.00	Vertical	-44.50	11.38	6.16	-39.28		
	11458.80	Vertical	-46.93	14.56	6.72	-39.09		
	139.04	Horizontal	-75.34	4.12	0.51	-71.73		
	3819.60	Horizontal	-45.34	7.79	3.53	-41.08		
	5729.40	Horizontal	-41.36	9.88	5.02	-36.50		
	7639.20	Horizontal	-37.04	10.25	5.54	-32.33		
	9549.00	Horizontal	-42.61	11.38	6.16	-37.39		
	11458.80	Horizontal	-44.50	14.56	6.72	-36.66		

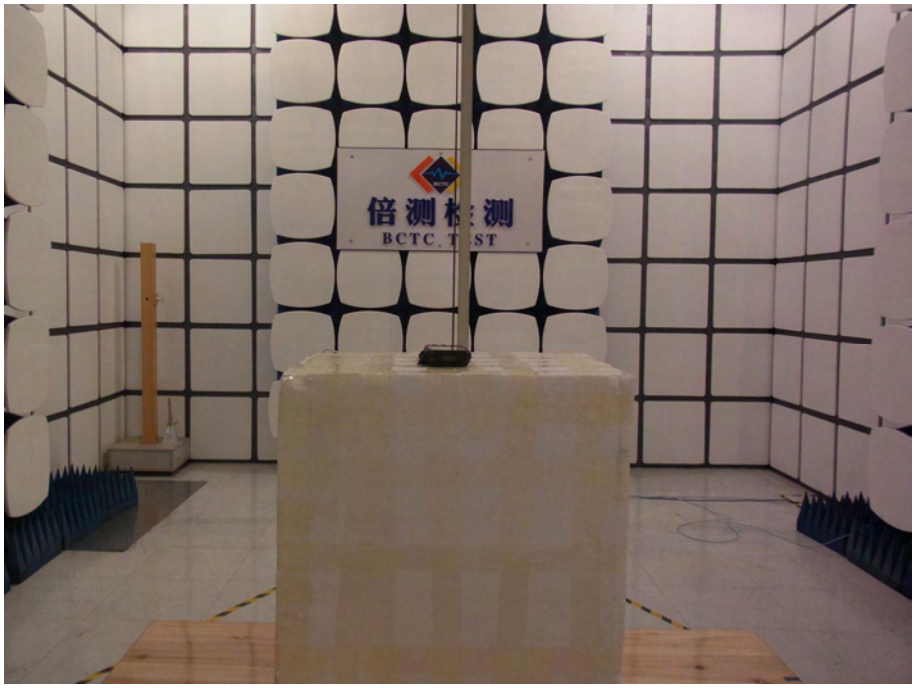
Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
WCDMA Band V Lowest	87.48	Vertical	-75.46	3.35	0.38	-72.49	-13	PASS
	1652.80	Vertical	-29.21	6.51	1.35	-24.05		
	2479.20	Vertical	-35.39	6.88	2.53	-31.04		
	3305.60	Vertical	-37.24	7.61	3.67	-33.30		
	4132.00	Vertical	-45.34	8.67	4.06	-40.73		
	4958.40	Vertical	-39.90	9.35	4.38	-34.93		
	138.21	Horizontal	-75.58	4.12	0.51	-71.97		
	1652.80	Horizontal	-33.94	6.51	1.35	-28.78		
	2479.20	Horizontal	-37.18	6.88	2.53	-32.83		
	3305.60	Horizontal	-45.79	7.61	3.67	-41.85		
	4132.00	Horizontal	-49.08	8.67	4.06	-44.47		
	4958.40	Horizontal	-43.31	9.35	4.38	-38.34		

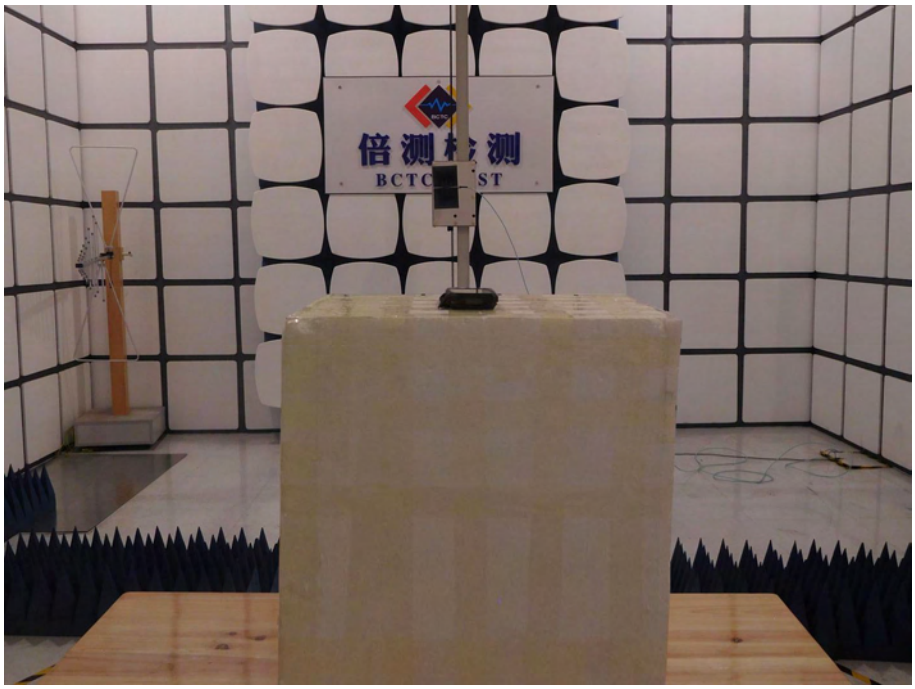
Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
WCDMA Band V Middle	87.69	Vertical	-75.41	3.35	0.38	-72.44	-13	PASS
	1670.00	Vertical	-32.15	6.58	1.38	-26.95		
	2505.00	Vertical	-32.69	6.92	2.57	-28.34		
	3340.00	Vertical	-40.16	7.67	3.72	-36.21		
	4175.00	Vertical	-47.70	8.75	4.19	-43.14		
	5010.00	Vertical	-43.22	9.48	4.45	-38.19		
	139.86	Horizontal	-75.90	4.12	0.51	-72.29		
	1670.00	Horizontal	-29.48	6.58	1.38	-24.28		
	2505.00	Horizontal	-32.14	6.92	2.57	-27.79		
	3340.00	Horizontal	-48.40	7.67	3.72	-44.45		
	4175.00	Horizontal	-49.79	8.75	4.19	-45.23		
	5010.00	Horizontal	-39.83	9.48	4.45	-34.80		

Band	Frequency (MHz)	Spurious Emission					Limit (dBm)	Result
		Polarization	S.G. output (dBm)	Antenna Gain (dBd)	Cable Loss (dB)	Level (dBm)		
WCDMA Band V Highest	88.26	Vertical	-75.09	3.35	0.38	-72.12	-13	PASS
	1693.20	Vertical	-31.04	6.57	1.48	-25.95		
	2539.80	Vertical	-32.95	6.96	2.67	-28.66		
	3386.40	Vertical	-36.10	7.68	3.78	-32.20		
	4233.00	Vertical	-41.41	8.76	4.24	-36.89		
	5079.60	Vertical	-46.82	9.47	4.63	-41.98		
	137.65	Horizontal	-76.09	4.12	0.51	-72.48		
	1693.20	Horizontal	-29.87	6.57	1.48	-24.78		
	2539.80	Horizontal	-32.75	6.96	2.67	-28.46		
	3386.40	Horizontal	-38.46	7.68	3.78	-34.56		
	4233.00	Horizontal	-47.07	8.76	4.24	-42.55		
	5079.60	Horizontal	-53.30	9.47	4.63	-48.46		

6. PHOTOGRAPHS OF TEST SET-UP

RE





7. PHOTOGRAPHS OF THE EUT

Mobile Data Terminal

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