

# 8 SPURIOUS RADIATED EMISSIONS

**Applicable Standard:** FCC CFR 47 §2.1053

## Test Equipment List and Details

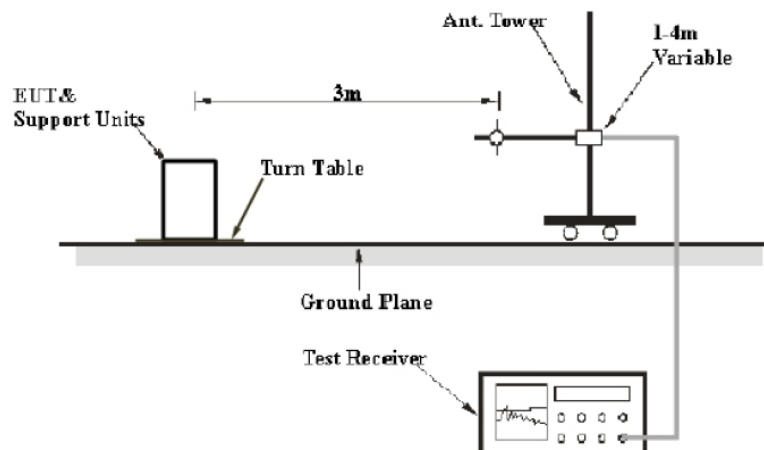
Manufacturer	Equipment	Model	Last Cal.	Cal. Interval
R&S	EMI Test receiver	ES126	2014-10-13	1 year
R&S	Log periodic Antenna	SAS-521-4	2014-7-14	1 year
R&S	Horn Antenna	HF906	2014-7-14	1 year

### Measurement Uncertainty

All measurements involve certain levels of uncertainties, especially in field of EMC. The factors contributing to uncertainties are spectrum analyzer, cable loss, antenna factor calibration, antenna directivity, antenna factor variation with height, antenna phase center variation, antenna factor frequency interpolation, measurement distance variation, site imperfections, mismatch (average), and system repeatability.

Based on NIS 81, The Treatment of Uncertainty in EMC Measurements, the best estimate of the uncertainty of a radiated emissions measurement at the EMC lab. is 3.6dB.

### EUT Setup



The radiated emission tests were performed in the 3-meter Chamber, using the setup accordance with the FCC part 2.1053. The specification used was the FCC 2.1053 limits.

## Test Procedure

The transmitter was placed on a wooden turntable, and it was transmitting into a non-radiating load, which was also placed on the turntable.

The measurement antenna was placed at a distance of 3 meters from the EUT. During the tests, the antenna height and polarization as well as EUT azimuth were varied in order to identify the maximum level of emissions from the EUT. The test was performed by placing the EUT on 3-orthogonal axis.

The frequency range up to teeth harmonic of the fundamental frequency was investigated.

Remove the EUT and replace it with substitution antenna. A signal generator was connected to the substitution antenna by a non-radiating cable. The absolute levels of the spurious emissions were measured by the substitution.

Spurious emissions in dB =  $10 \lg(\text{TX pwr in Watts}/0.001)$  - the absolute level

Spurious attenuation limit in dB =  $43 + 10 \lg P$  (power out in Watts)

The resolution bandwidth of the spectrum analyzer was set at 1 percent as specified for 30MHz to 1GHz scanning, set at 1MHz for 1GHz to 20GHz scanning.

## Test Results Summary: PASS

## Environmental Conditions

Temperature:	26°C
Relative Humidity:	60 %
ATM Pressure:	1009 mbar

## Test data

Indicated		Test Antenna	Substituted		Cable Loss(dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dB $\mu$ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
33.887776	32.93	V	-59.3	-42.03	0.3	-103.78	2.15	-105.93	-13	92.93
138.857715	35.01	V	-62.57	-8.42	1	-74.14	2.15	-76.29	-13	63.29
164.128257	36.96	V	-59.73	-3.84	1.1	-66.82	2.15	-68.97	-13	55.97
552.905812	41.1	V	-55	-1.46	2	-60.61	2.15	-62.76	-13	49.76
832.825651	55.4	V	-53.43	-1.11	2.4	-59.09	2.15	-61.24	-13	48.24
2551.1022	84.83	V	-25.25	7.95	4.3	-23.75	2.15	-25.9	-13	12.9
115.531062	35.04	H	-51.12	-12.48	0.8	-66.55	2.15	-68.7	-13	55.7
140.801603	36.56	H	-55.48	-7.29	1	-65.92	2.15	-68.07	-13	55.07
267.154309	37.27	H	-61.86	1.26	1.3	-64.05	2.15	-66.2	-13	53.2
624.829659	42.24	H	-58.65	-1.39	2.1	-64.29	2.15	-66.44	-13	53.44
832.825651	51.15	H	-36.64	-1.11	2.4	-42.3	2.15	-44.45	-13	31.45
2567.13427	84.73	H	-20.49	7.95	4.3	-18.99	2.15	-21.14	-13	8.14

Radiation emission spurious below 3GHz

Indicated		Test Antenna	Substituted		Cable Loss(dB)	Effective radiated power (dBm)	Dipole Antenna	Absolute Level (dBm)	Limit (dBm)	Margin (dB)
Frequency (MHz)	Amp. (dB $\mu$ V)	Polar H/V	Level (dBm)	Antenna Gain Correction						
3977.95591	39.33	V	-52.9	7.75	5.3	-52.6	2.15	-54.75	-13	41.75
5348.6974	41.03	V	-56.55	8.55	6.2	-56.35	2.15	-58.5	-13	45.5
6983.96794	43.89	V	-52.8	9.25	7.3	-53	2.15	-55.15	-13	42.15
9849.6994	47.87	V	-48.23	9.95	8.9	-49.33	2.15	-51.48	-13	38.48
12915.8317	48.35	V	-60.48	12.15	10.1	-60.58	2.15	-62.73	-13	49.73
17929.8597	61.16	V	-48.92	8.95	12.2	-54.32	2.15	-56.47	-13	43.47
5388.77756	41.67	H	-44.49	8.55	6.3	-44.39	2.15	-46.54	-13	33.54
6935.87174	44.4	H	-47.64	9.25	7.3	-47.84	2.15	-49.99	-13	36.99
9837.67535	47.13	H	-52	9.95	8.9	-53.1	2.15	-55.25	-13	42.25
12891.7836	47.9	H	-52.99	12.15	10.1	-53.09	2.15	-55.24	-13	42.24
13270.5411	48.2	H	-39.59	11.85	10.2	-40.09	2.15	-42.24	-13	29.24
17919.8397	60.63	H	-44.59	8.95	12.2	-49.99	2.15	-52.14	-13	39.14

Radiation emission spurious above 3GHz

# 9 SPURIOUS EMISSIONS AT PORTENNA TERMINALS

**Applicable Standard:** FCC§2.1051, §27.53

For digital base stations, the attenuation shall be not less than  $43+10\log(P)$  dB, unless a documented interference complaint is received from an adjacent channel licensee with an overlapping Geographic Service Area. Mobile Satellite Service licensees operating on frequencies below 2495MHz may also submit a documented interference complaint against BRS licensees operating on channel BRS No.1 on the same terms and conditions as adjacent channel BRS or EBS licensees. Provided applicable deadline, then the following additional attenuation requirements shall apply.

The spectrum was to be investigated to the tenth harmonics of the highest fundamental frequency as specified in §2.1051.

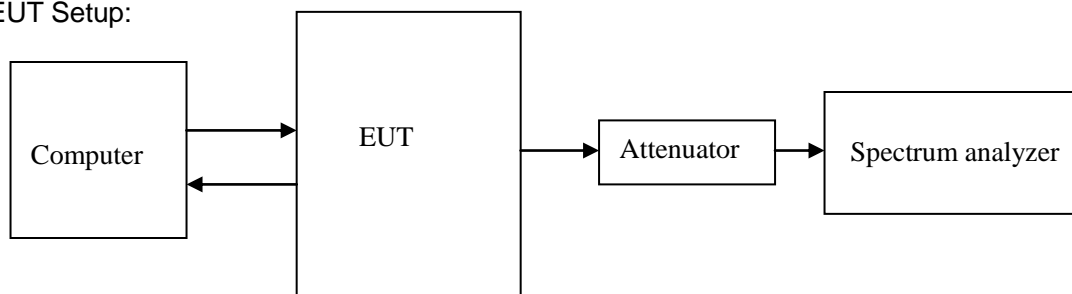
## Test Equipment List and Details

Manufacturer	Description	Model	Serial Number	Calibration Date	Calibration Due Date
Agilent	MXA Series Spectrum Analyzer	N9020A	MY51240300	2013.12.10	2014.12.10
Agilent	MXA Series Spectrum Analyze	N9030A	MY53310566	2014.06.28	2015.06.28
DTS	DTS 40dB Attenuator	DTS100-40-3-1	09112005	2014.06.13	2015.06.13

**\*statement of traceability:** ZTE Corporation Reliability Testing Center attest that all calibration have been performed per the NVLAP requirements, traceable to NIST.

## Test Procedure

EUT Setup:





The RF output of the transceiver was connected to a spectrum analyzer through appropriate attenuation. Compliance with these rules is based on the use of measurement instrumentation employing a resolution bandwidth of 1 MHz or greater. However, in the 1 MHz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least one percent of the emission bandwidth of the fundamental emission of the transmitter may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 MHz or 1 percent of emission bandwidth, as specified). The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 dB below the transmitter power. With respect to television operations, measurements must be made of the separate visual and aural operating powers at sufficiently frequent intervals to ensure compliance with the rules.

Sufficient scans were taken to show any out of band emissions up to 10th harmonic.

## Test Data Environmental Conditions

Temperature:	20 °C
Relative Humidity:	53 %
ATM Pressure:	1009 mbar

**Test Result:** Pass

**Test Mode:** Transmitting LTE

## Test Data:

Channel Bandwidth: 20M+20M

Port	Carrier Freq. c1+c2(MHz)	Spurious Emissions								
		QPSK			16QAM			64QAM		
		9k-10G	10G-26.5G	Band Edge	9k-10G	10G-26.5G	Band Edge	9k-10G	10G-26.5G	Band Edge
0	2506+2526	-36.05	-40.04	-21.37	-35.78	-40.3	-21.24	-35.55	-40.19	-19.07
1		-36.15	-40.01	-20.17	-36.12	-39.91	-23	-35.8	-39.93	-19.89
2		-36.13	-39.31	-20.62	-35.84	-39.51	-20.49	-35.9	-40.12	-20.53
3		-35.52	-39.92	-19.73	-35.63	-39.86	-20.84	-35.92	-39.98	-19.85
4		-36.05	-39.73	-20.15	-36	-40.03	-20.5	-36.13	-40.2	-20.64
5		-35.84	-40.06	-20.4	-35.9	-40.11	-18.05	-35.61	-39.6	-20.62

Port	Carrier Freq. c1+c2(MHz)	Spurious Emissions								
		QPSK			16QAM			64QAM		
		9k-10G	10G-26.5G	Band Edge	9k-10G	10G-26.5G	Band Edge	9k-10G	10G-26.5G	Band Edge
6		35.58	-40.24	-18.81	-35.89	-39.85	-21.91	-35.67	-40.06	-20.13
7		-35.48	-40.17	-20.07	-35.56	-39.69	-18.98	-35.79	-39.99	-22.73
0	2536+2556	-35.52	-40.04	-16.52	-35.92	-39.9	-23.19	-35.69	-40.24	-15.07
1		-35.47	-40.01	-19.42	-35.82	-39.95	-23.94	-36.04	-40.29	-18.85
2		-35.98	-39.31	-22.44	-35.64	-39.8	-24.57	-36.15	-39.55	-20.37
3		-35.9	-39.92	-21.21	-35.79	-40.31	-23.47	-35.93	-39.67	-21.03
4		-35.42	-39.73	-20.42	-35.74	-40.15	-23.74	-36.31	-40.08	-20.59
5		-35.86	-40.06	-20.86	-36.17	-39.95	-16.58	-36.25	-40.13	-19.48
6		-35.94	-40.24	-19.41	-35.89	-40.13	-21.47	-36.1	-39.61	-19.01
7		-36.18	-40.17	-18.83	-36.35	-39.94	-20.68	-35.76	-39.78	-18.76
0	2566+2586	-35.72	-40.04	-24.51	-35.34	-39.95	-19.23	-35.58	-39.94	-19.877
1		-35.75	-40.01	-21.25	-35.98	-39.4	-20.29	-36.5	-39.85	-19.83
2		-35.64	-39.31	-21.72	-35.8	-40.08	-21.51	-35.59	-39.91	-21.4
3		-35.98	-39.92	-20.29	-36.16	-39.97	-21.15	-35.84	-39.81	-20.83
4		-36.07	-39.73	-21.83	-36.35	-39.9	-20.6	-36.13	-40.2	-21.33
5		-35.72	-40.06	-21.96	-35.74	-39.86	-20.5	-36.07	-39.31	-23.44
6		-36.09	-40.24	-21.06	-35.65	-39.77	-20.42	-35.96	-39.53	-20.58
7		-35.76	-40.17	-20.51	-36.09	-39.91	-22.82	-35.74	-39.92	-21.07

