

4 - RADIATED EMISSION DATA

4.1 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 radiation emissions measurement at BACL is ± 4.0 dB.

4.2 EUT Setup

The radiated emission tests were performed in the open area 3-meter test site, using the setup in accordance with the ANSI C63.4 - 1992. The specification used was the FCC 15 Subpart C limits.

The EUT was connected to 110Vac/60Hz power source and it was placed center and the back edge of the test table.

The spacing between the peripherals was 10 centimeters.

The external I/O cables were draped over edge of the test table and bundle when necessary.

4.3 Spectrum Analyzer Setup

According to FCC Rules, 47 CFR 15.33 (a) (1), the system was tested to 25GHz.

During the radiated emission test, the spectrum analyzer was set with the following configurations:

<i>Frequency Range</i>	<i>RBW</i>	<i>Video B/W</i>
Below 30MHz	10kHz	10kHz
30 – 1000MHz	100kHz	100kHz
Above 1000MHz	1MHz	1MHz

4.4 Test Procedure

For the radiated emissions test, both the EUT and all support equipment power cords were connected to the AC floor outlet since the power supply used in the EUT did not provide an accessory power outlet.

Maximizing procedure was performed on the six (6) highest emissions to ensure EUT compliance is with all installation combinations. All data was recorded in the peak detection mode. Quasi-peak readings was performed only when an emission was found to be marginal (within -4 dB of specification limit), and are distinguished with a "Qp" in the data table.

4.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

$$\text{Corr. Ampl.} = \text{Indicated Reading} + \text{Antenna Factor} + \text{Cable Factor} - \text{Amplifier Gain}$$

The "**Margin**" column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dBμV means the emission is 7dBμV below the maximum limit for applicable limits. The equation for margin calculation is as follows:

$$\text{Margin} = \text{Corr. Ampl.} - \text{Applicable Limit}$$

4.6 Summary of Test Results

According to the data in section 4.7, the EUT complied with the FCC Title 47, Part 15, Subpart C, section 15.205, 15.207, and 15.249 after tested to 10th harmonics as required by FCC and had the worst margin of:

Handset, 30MHz to 10GHz, 3 Meters:

-1.1 dB 2398.85 MHz in the Horizontal polarization at Low Frequency

-1.3 dB at 2406.10 MHz in the Horizontal polarization at High Frequency

Unintentional Emission:

-23.0 dB at 192.70 MHz in the Horizontal polarization

4.7 Radiated Emissions Test Result Data

4.7.1 Handset Unit, 30 MHz to 10GHz, 3 meters

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
Low Frequency											
2398.85	51.3	AVE.	150	1.5	H	28.1	3.4	30.0	52.8	54.0	-1.1
2398.85	51.1	AVE.	130	1.5	V	28.1	3.4	30.0	52.6	54.0	-1.4
912.75	89.2	/	0	1.5	V	23.2	3.9	25.0	91.3	94.0	-2.7
1825.50	49.6	AVE.	210	1.5	V	25.3	2.6	30.0	47.5	54.0	-6.5
912.75	84.7	/	330	1.2	H	23.2	3.9	25.0	86.8	94.0	-7.2
1825.50	48.7	AVE.	230	1.8	H	25.3	2.6	30.0	46.6	54.0	-7.4
2738.25	39.9	AVE.	60	1.5	V	29.0	3.7	30.0	42.6	54.0	-11.4
2738.25	38.4	AVE.	90	1.2	H	29.0	3.7	30.0	41.1	54.0	-12.9
2398.85	59.1	PEAK	150	1.5	H	28.1	3.4	30.0	60.6	74.0	-13.5
2398.85	58.7	PEAK	130	1.5	V	28.1	3.4	30.0	60.2	74.0	-13.9
3651.00	33.7	AVE.	0	1.5	V	30.3	4.3	30.0	38.3	54.0	-15.7
4563.75	29.5	AVE.	270	1.2	V	32.5	4.9	30.0	36.9	54.0	-17.1
4563.75	28.4	AVE.	290	1.2	H	32.5	4.9	30.0	35.8	54.0	-18.2
3651.00	30.6	AVE.	45	1.5	H	30.3	4.3	30.0	35.2	54.0	-18.8
1825.50	55.6	PEAK	210	1.5	V	25.3	2.6	30.0	53.5	74.0	-20.5
1825.50	54.2	PEAK	230	1.8	H	25.3	2.6	30.0	52.1	74.0	-21.9
2738.25	46.7	PEAK	60	1.5	V	29.0	3.7	30.0	49.4	74.0	-24.6
2738.25	45.2	PEAK	90	1.2	H	29.0	3.7	30.0	47.9	74.0	-26.1
3651.00	39.1	PEAK	0	1.5	V	30.3	4.3	30.0	43.7	74.0	-30.3
4563.75	34.5	PEAK	270	1.2	V	32.5	4.9	30.0	41.9	74.0	-32.1
3651.00	36.3	PEAK	45	1.5	H	30.3	4.3	30.0	40.9	74.0	-33.1
4563.75	32.2	PEAK	290	1.2	H	32.5	4.9	30.0	39.6	74.0	-34.4

INDICATED			TABLE	ANTENNA		CORRECTION FACTOR			CORRECTED AMPLITUDE	FCC 15 Subpart C	
Frequency MHz	Ampl. dBμV/m	Comments	Angle Degree	Height Meter	Polar H/ V	Antenna dBμV/m	Cable DB	Amp. dB	Corr. Ampl. dBμV/m	Limit dBμV/m	Margin dB
High Frequency											
2406.10	51.1	AVE.	190	1.5	H	28.1	3.4	30.0	52.6	54.0	-1.3
2406.10	50.1	AVE.	220	1.5	V	28.1	3.4	30.0	51.6	54.0	-2.3
917.10	88.6	/	0	1.2	V	23.2	3.9	25.0	90.7	94.0	-3.3
1834.20	49.7	AVE.	130	1.5	H	25.3	2.6	30.0	47.6	54.0	-6.4
917.10	84.9	/	30	1.5	H	23.2	3.9	25.0	87.0	94.0	-7.0
1834.20	48.5	AVE.	110	1.5	V	25.3	2.6	30.0	46.4	54.0	-7.6
2751.30	41.6	AVE.	280	1.2	H	29.0	3.7	30.0	44.3	54.0	-9.7
2751.30	39.8	AVE.	260	1.2	V	29.0	3.7	30.0	42.5	54.0	-11.5
2406.10	58.7	PEAK	190	1.5	H	28.1	3.4	30.0	60.2	74.0	-13.9
2406.10	58.1	PEAK	220	1.5	V	28.1	3.4	30.0	59.6	74.0	-14.5
3668.40	32.2	AVE.	310	1.5	V	30.3	4.3	30.0	36.8	54.0	-17.2
4585.50	27.7	AVE.	270	1.2	V	32.5	4.9	30.0	35.1	54.0	-18.9
3668.40	29.8	AVE.	0	1.5	H	30.3	4.3	30.0	34.4	54.0	-19.6
4585.50	26.5	AVE.	240	1.2	H	32.5	4.9	30.0	33.9	54.0	-20.1
1834.20	55.1	PEAK	110	1.5	V	25.3	2.6	30.0	53.0	74.0	-21.0
1834.20	54.7	PEAK	130	1.5	H	25.3	2.6	30.0	52.6	74.0	-21.4
2751.30	48.2	PEAK	280	1.2	H	29.0	3.7	30.0	50.9	74.0	-23.1
2751.30	46.8	PEAK	260	1.2	V	29.0	3.7	30.0	49.5	74.0	-24.5
3668.40	37.8	PEAK	310	1.5	V	30.3	4.3	30.0	42.4	74.0	-31.6
3668.40	35.4	PEAK	0	1.5	H	30.3	4.3	30.0	40.0	74.0	-34.0
4585.50	32.5	PEAK	270	1.2	V	32.5	4.9	30.0	39.9	74.0	-34.1
4585.50	31.2	PEAK	240	1.2	H	32.5	4.9	30.0	38.6	74.0	-35.4
Unintentional Emission, 30MHz to 1000MHz											
192.70	29.7	/	330	1.2	H	13.7	2.1	25.0	20.5	43.5	-23.0
81.54	30.9	/	270	1.5	H	9.5	1.2	25.0	16.6	40.0	-23.4
244.76	31.2	/	120	1.5	V	13.8	2.2	25.0	22.2	46.0	-23.8
153.66	30.2	/	0	1.5	V	12.7	1.7	25.0	19.6	43.5	-23.9
146.50	29.6	/	45	1.2	H	12.6	1.7	25.0	18.8	43.5	-24.7

Fund. : Fundamental

Ave.: Average

Handset Radiated Emission Front View



Handset Radiated Emission Rear View

