Power Lines Conducted Emissions

FCC Part 15.207

Of Direct Sequence Spread Spectrum System

UNIDEN America Corporation
Cordless Phone
TRU5885(xx)/UC789BH

Section a

APREL Project No.: UESB-TRU5885-cordless phone-3907

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Test: Power Lines Conducted Emissions

Reference: FCC Part 15.207

Criteria: For an intentional radiator, which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 450 kHz to 30 MHz shall not exceed 250 micro-volts (48 dbµV). Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

Condition: Conducted Test

Set-up: Test setup from Figure a1 was used.

Equipment: See Appendix A

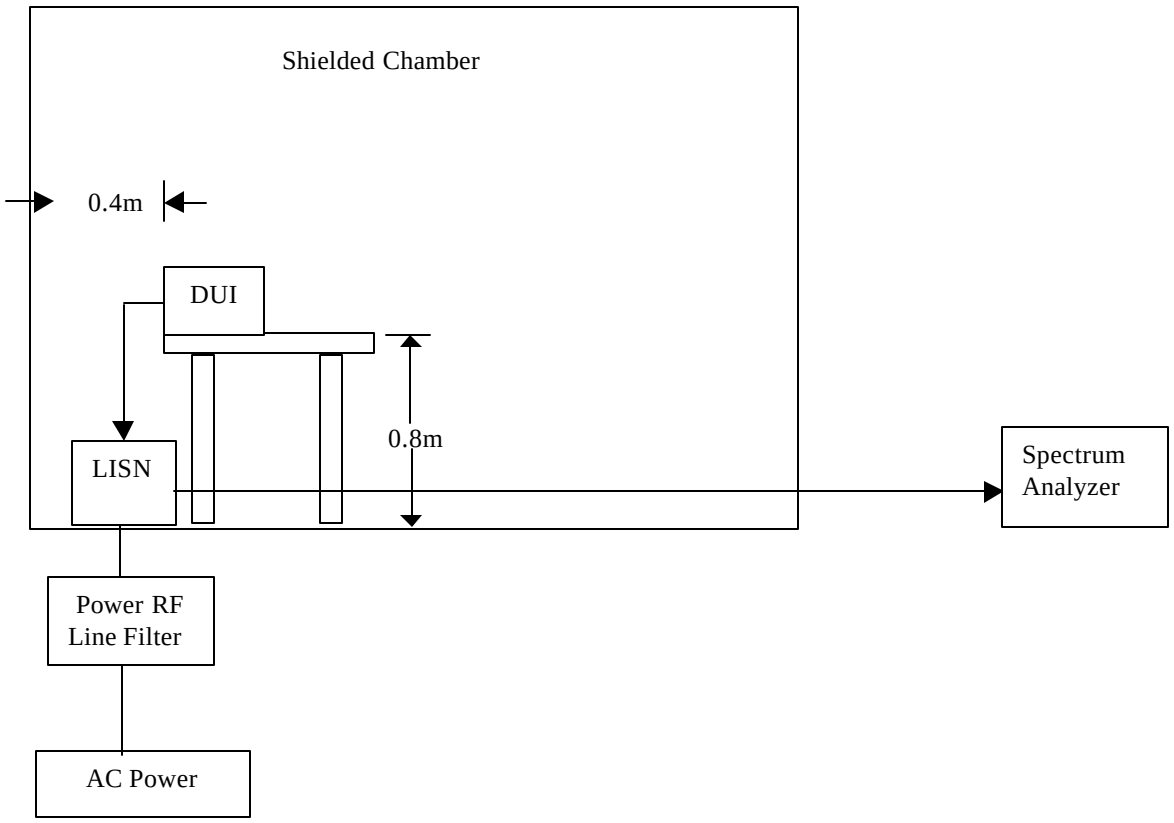

Figure a1: Conducted Emissions on Power Lines - Testing Setup

Methodology:

Measurement of conducted emissions was carried out according to the description of ANSI C63.4-1992 paragraph 7.2, Table Top Equipment, Sec. 6.2.1.

Conducted power-line measurements were made over the frequency range from 450 kHz to 30 MHz, to determine the line-to-ground radio noise voltage that is conducted from the unit power line-input terminals that are directly (or indirectly via separate transformers power supplies) connected to a public power network.

The power-input leads of the wall mount power supply were connected to the Line Impedance Stabilization Network (LISN) using the 50 ohms/50 micro henry CISPR network. The LISN and the Unit were connected and positioned as shown in Figure 1.

Measurements were performed using the spectrum analyzer with quasi-peak function and 9kHz resolution bandwidth. Specific peaks were measured from the continuous plots.

The rear of the unit and peripherals were aligned and flush with the rear of the table top. The rear of the table top was 40 cm removed from the vertical conducting (shielded room) wall.

In order to find out the maximum emission, the preliminary test and a final test were performed.

The preliminary investigation was performed through the whole specified frequency range of 450kHz – 30MHz in a single scan, to investigate the frequency of the emission that has the highest amplitude relative to the limits within normal operating modes, cable positions, and a typical system configuration.

The specified frequency range was then divided into four sub-divisions (450kHz – 3MHz, 3MHz – 6MHz, 6MHz - 15MHz, and 15MHz – 30MHz) having narrow span in which frequencies and the levels of the interfering signals could be observed more accurately. The maximum emission in the each sub-divided frequency band was maximized by changing the typical cable positions or cable manipulation under the typical system configuration. The level and the frequencies at the points, which were regarded as relatively high emission in the sub-band, was measured and recorded. This step was repeated until for all sub bands.

Based on the collected results, and the operation mode produced the maximum emission was selected and recorded in the report.

Test Results*:*

Test Data is tabulated in Tables a1, a2, a3 and a4. Only nine highest measured values are presented in each table. Plots are shown in Graphs a1 to a10.

Conclusion: The unit complies with the requirements

TABLE a1
CONDUCTED R.F. EMISSION LEVELS
Line: LIVE, Detection: Quasi-Peak
Resolution Band-with: 9 kHz

Frequency (MHz)	Measured Level				Margin t (dB) "C5"
	dBµV "C1"	µV	dBµV "C3"	µV	
0.823	39.1	90.2	48.0	250.0	8.9
1.854	21.6	12.0	48.0	250.0	26.4
2.145	22.9	13.9	48.0	250.0	25.1
18.420	23.0	14.2	48.0	250.0	25.0
23.040	26.8	21.8	48.0	250.0	21.2
23.370	27.9	24.9	48.0	250.0	20.1
23.550	27.5	23.7	48.0	250.0	20.5
23.730	28.1	25.3	48.0	250.0	19.9
29.910	26.3	20.6	48.0	250.0	21.7

Margin to (C5) = C3-C1 in dB
All the above measurements were performed in the shielded room.

TABLE a2
CONDUCTED R.F. EMISSION LEVELS
Line: NEUTRAL, Detection: Quasi-Peak
Resolution Band-with: 9 kHz

Frequency (MHz)	Measured Level				Margin (dB) "C5"
	dBµV "C1"	µV	dBµV "C3"	µV	
2.151	22.8	13.8	48.0	250.0	25.2
2.350	19.8	9.8	48.0	250.0	28.2
2.630	17.6	7.5	48.0	250.0	30.5
6.144	22.9	14.0	48.0	250.0	25.1
13.308	18.2	8.1	48.0	250.0	29.8
13.632	18.2	8.1	48.0	250.0	29.8
13.974	18.6	8.5	48.0	250.0	29.4
14.334	19.2	9.2	48.0	250.0	28.8
18.420	23.3	14.6	48.0	250.0	24.7

Margin to (C5) = C3-C1 in dB
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Test performed by: _____ **Date:** June 12, 2002

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Margin to (C5) = C3-C1 in dB
All the above measurements were performed in the shielded room.

Test performed by: _____ **Date:** June 12, 2002

TABLE a3
CONDUCTED R.F. EMISSION LEVELS
Line: LIVE, Detection: Average
Resolution Band-with: 10 kHz

Frequency (MHz)	Measured Level		Limit		Margin (dB) "C5"
	dBµV "C1"	µV	dBµV "C3"	µV	
0.766	16.92	7.01	48.00	250.00	40.99
0.880	16.28	6.52	48.00	250.00	41.48
1.205	16.34	6.56	48.00	250.00	41.44
1.535	15.36	5.86	48.00	250.00	42.14
1.643	13.50	4.73	48.00	250.00	43.27
1.752	13.74	4.86	48.00	250.00	43.14
1.860	12.94	4.44	48.00	250.00	43.56
2.151	17.88	7.83	48.00	250.00	40.17
6.144	19.89	9.87	48.00	250.00	38.13

Margin to (C5) = C3-C1 in dB
All the above measurements were performed in the shielded room.

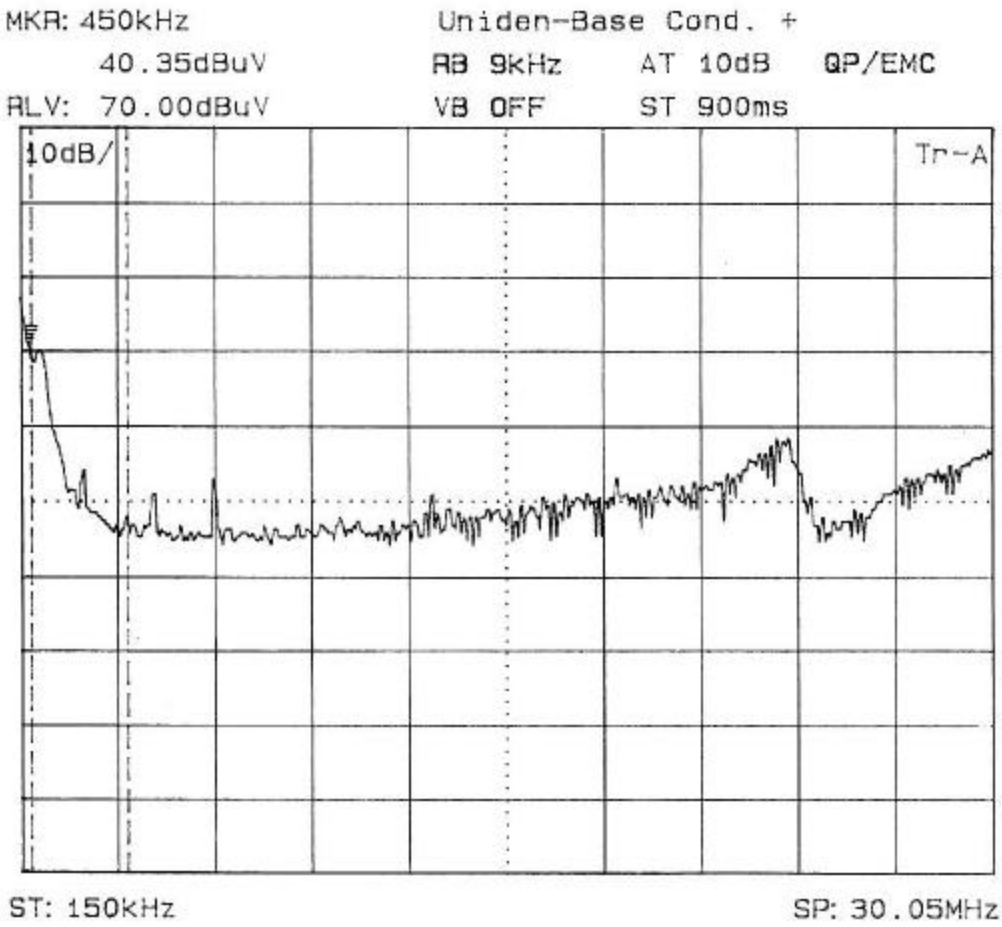
TABLE a4
CONDUCTED R.F. EMISSION LEVELS
Line: NEUTRAL, Detection: Average
Resolution Band-with: 10 kHz

Frequency (MHz)	Measured Level		Limit		Margin (dB) "C5"
	dBµV "C1"	µV	dBµV "C3"	µV	
0.452	13.72	4.85	48.00	250.00	43.15
0.549	17.20	7.24	48.00	250.00	40.76
1.273	15.84	6.19	48.00	250.00	41.81
2.151	16.52	6.70	48.00	250.00	41.30
6.144	20.49	10.58	48.00	250.00	37.42
13.308	13.28	4.61	48.00	250.00	43.39
14.676	13.67	4.83	48.00	250.00	43.17
18.450	20.25	10.29	48.00	250.00	37.71
22.830	24.15	16.13	48.00	250.00	31.87

Margin to (C5) = C3-C1 in dB
All the above measurements were performed in the shielded room.

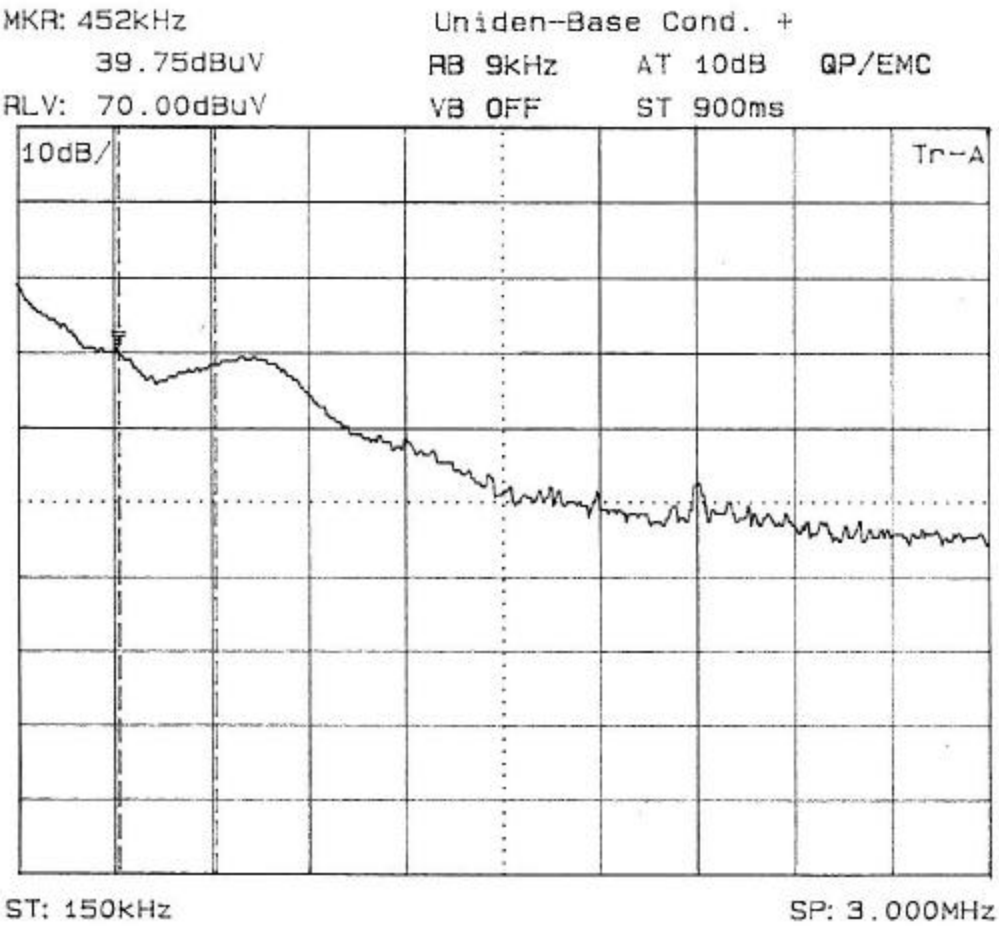
Test performed by: Ku Che Rowan **Date:** June 12, 2002

Graph a1



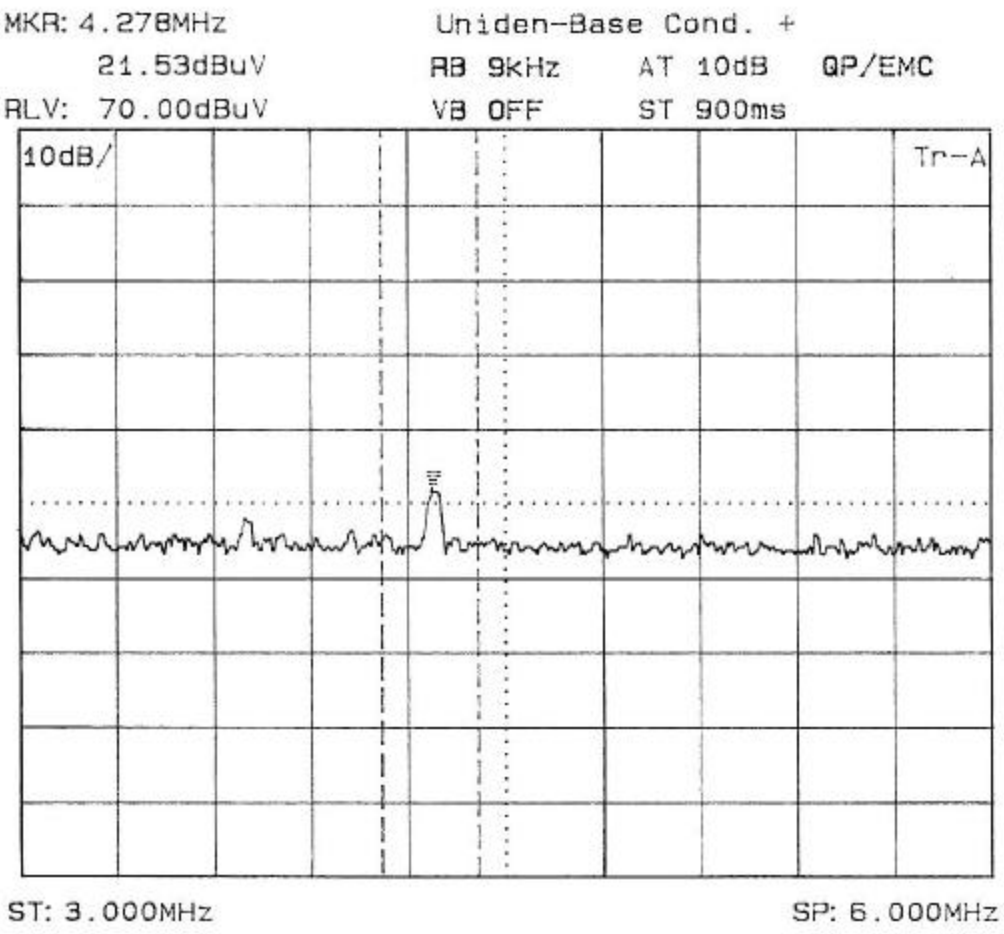
CONDUCTED R.F. EMISSION LEVELS
Line: LIVE, Detection: Quasi-Peak
Frequency Range: 150 kHz –30.0 MHz

Graph a2



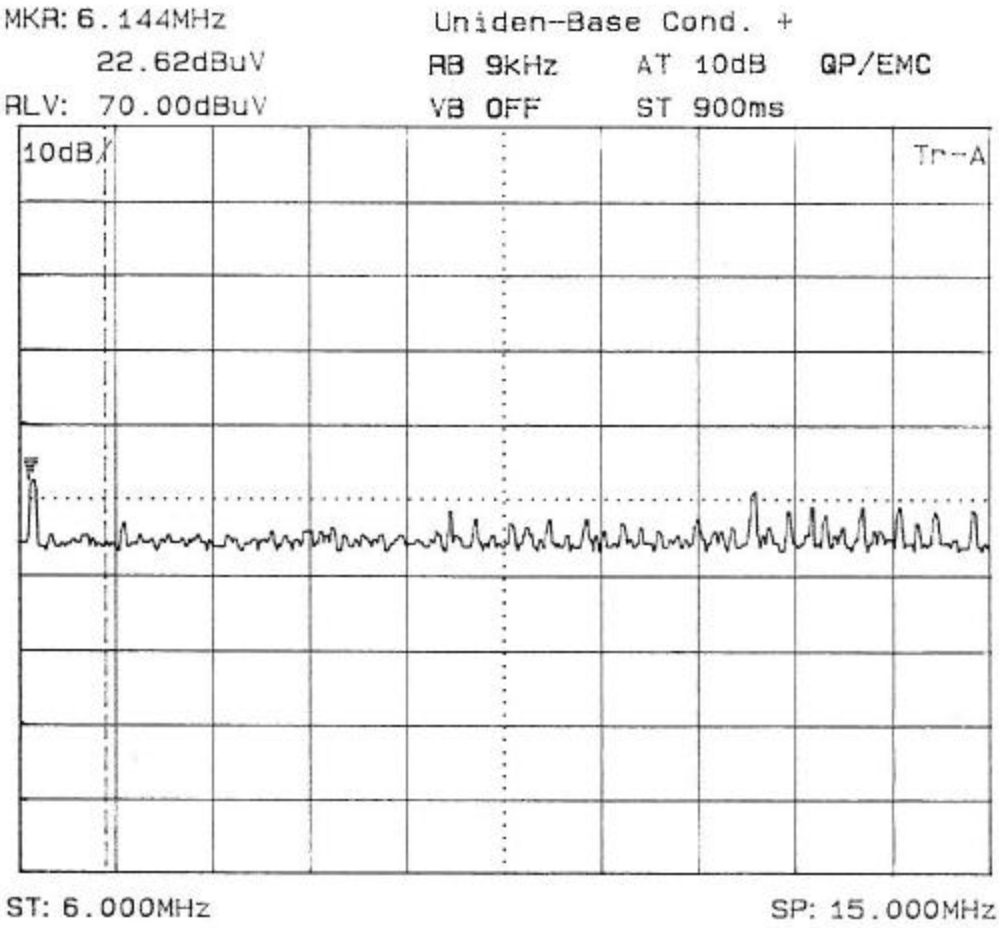
CONDUCTED R.F. EMISSION LEVELS
Line: LIVE, Detection: Quasi-Peak
Frequency Range: 150 kHz – 3.0 MHz

Graph a3



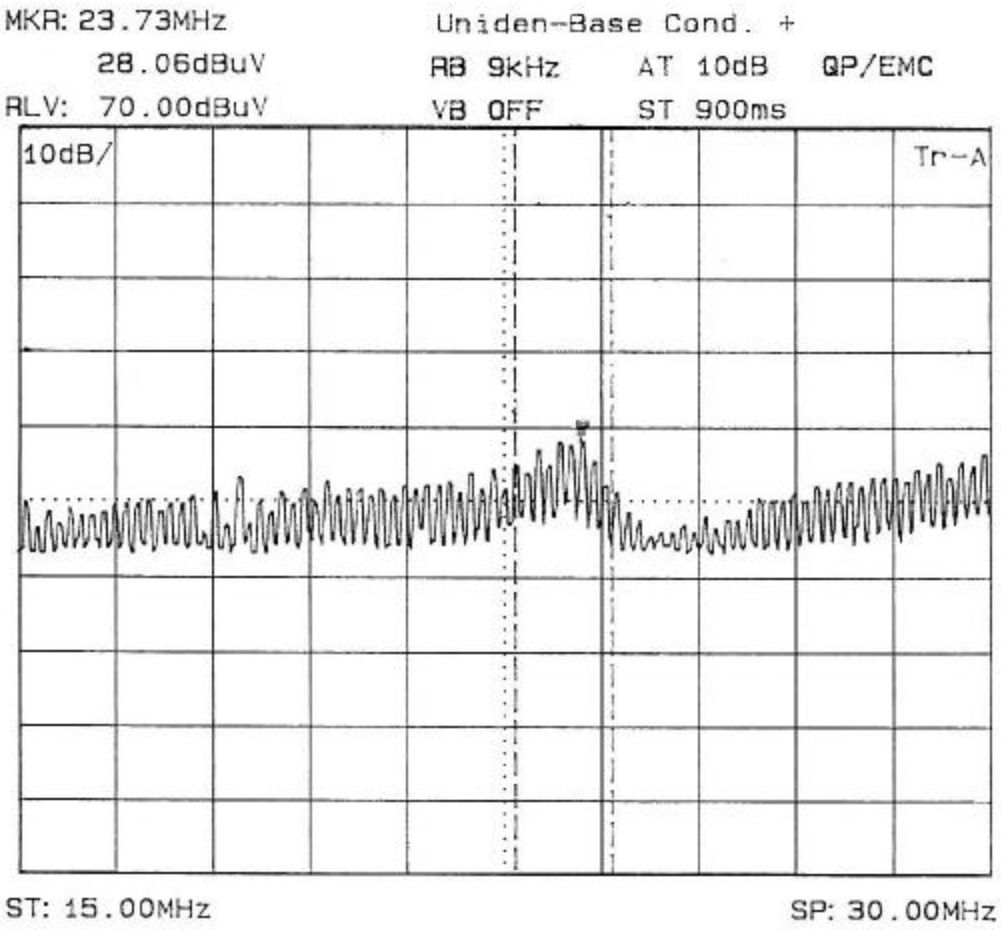
CONDUCTED R.F. EMISSION LEVELS
Line: LIVE, Detection: Quasi-Peak
Frequency Range: 3.0 MHz – 6.0 MHz

Graph a4



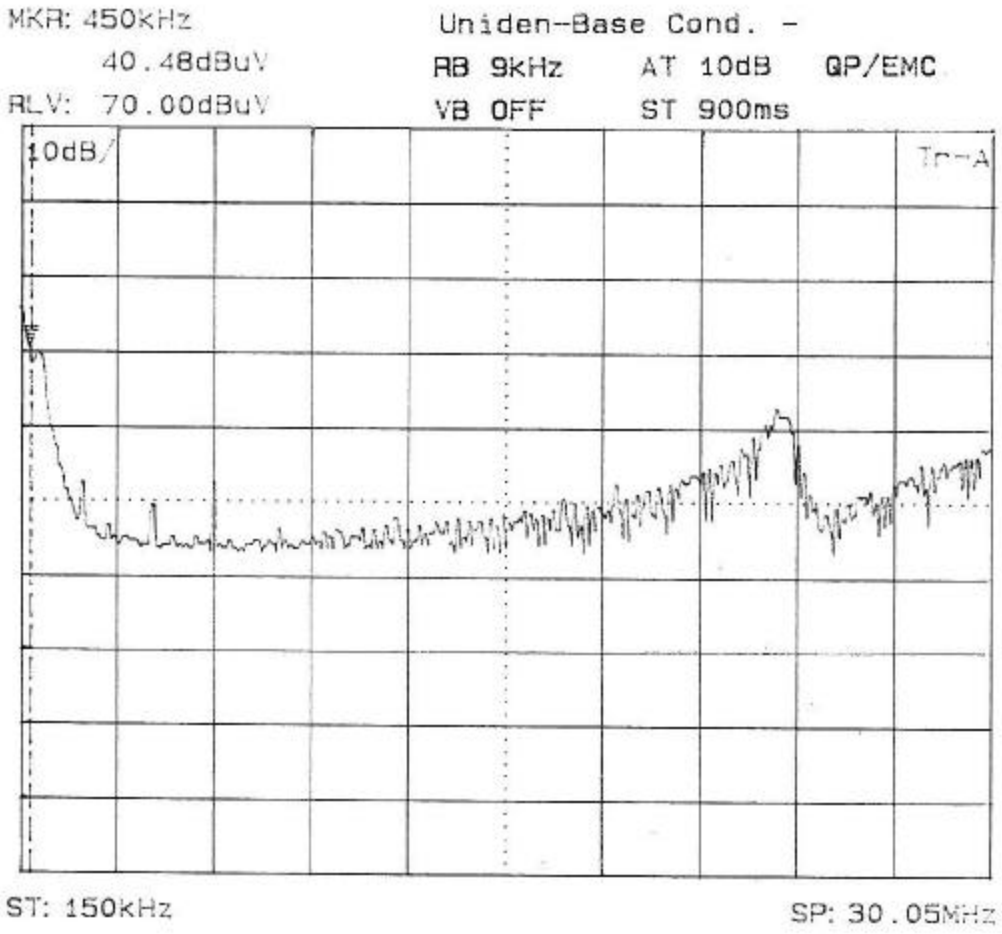
CONDUCTED R.F. EMISSION LEVELS
Line: LIVE, Detection: Quasi-Peak
Frequency Range: 6.0 MHz – 15.0 MHz

Graph a5



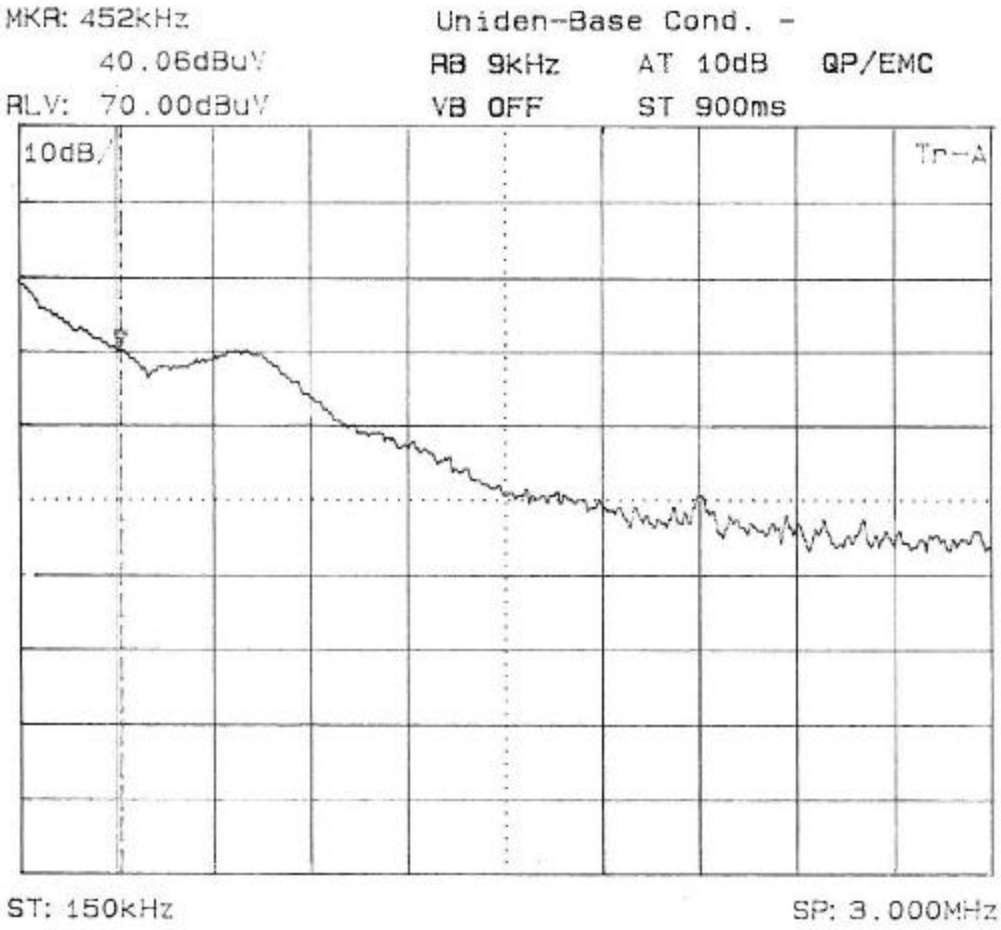
CONDUCTED R.F. EMISSION LEVELS
Line: LIVE, Detection: Quasi-Peak
Frequency Range: 15.0 MHz – 30.0 MHz

Graph a6



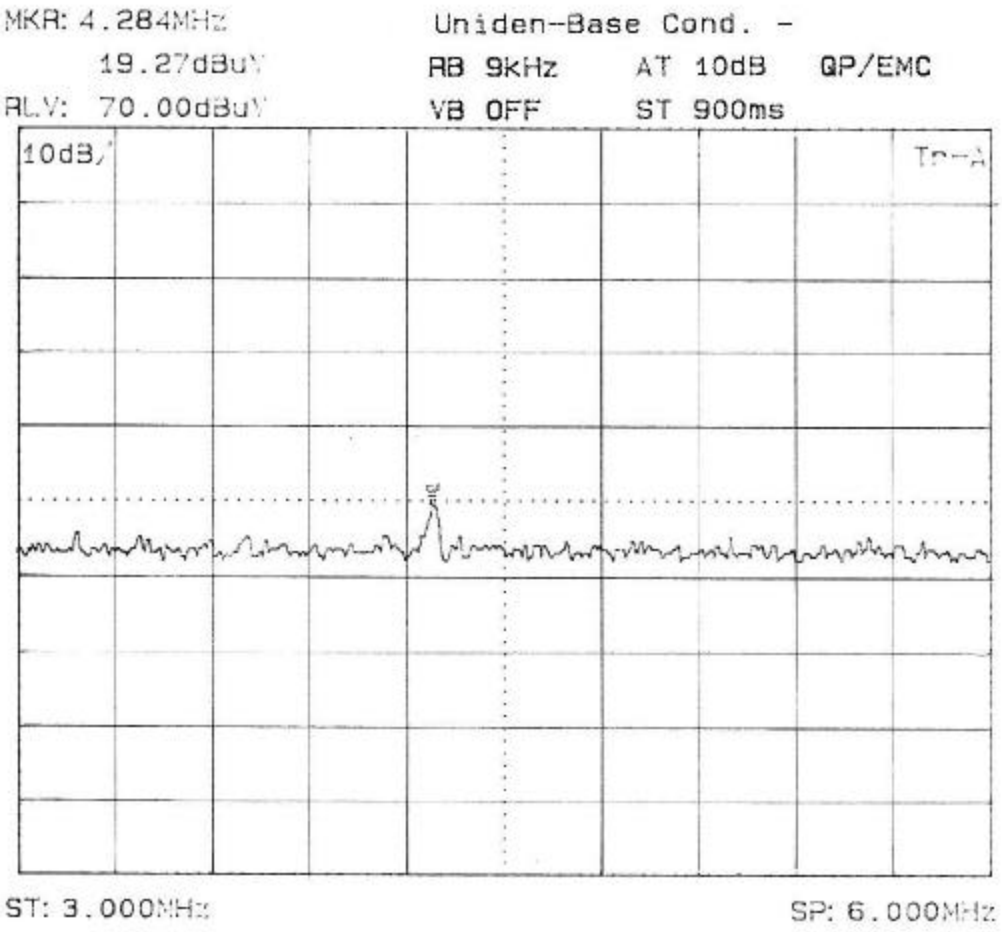
CONDUCTED R.F. EMISSION LEVELS
Line: NEUTRAL, Detection: Quasi-Peak
Frequency Range: 150 kHz – 30.0 MHz

Graph a7



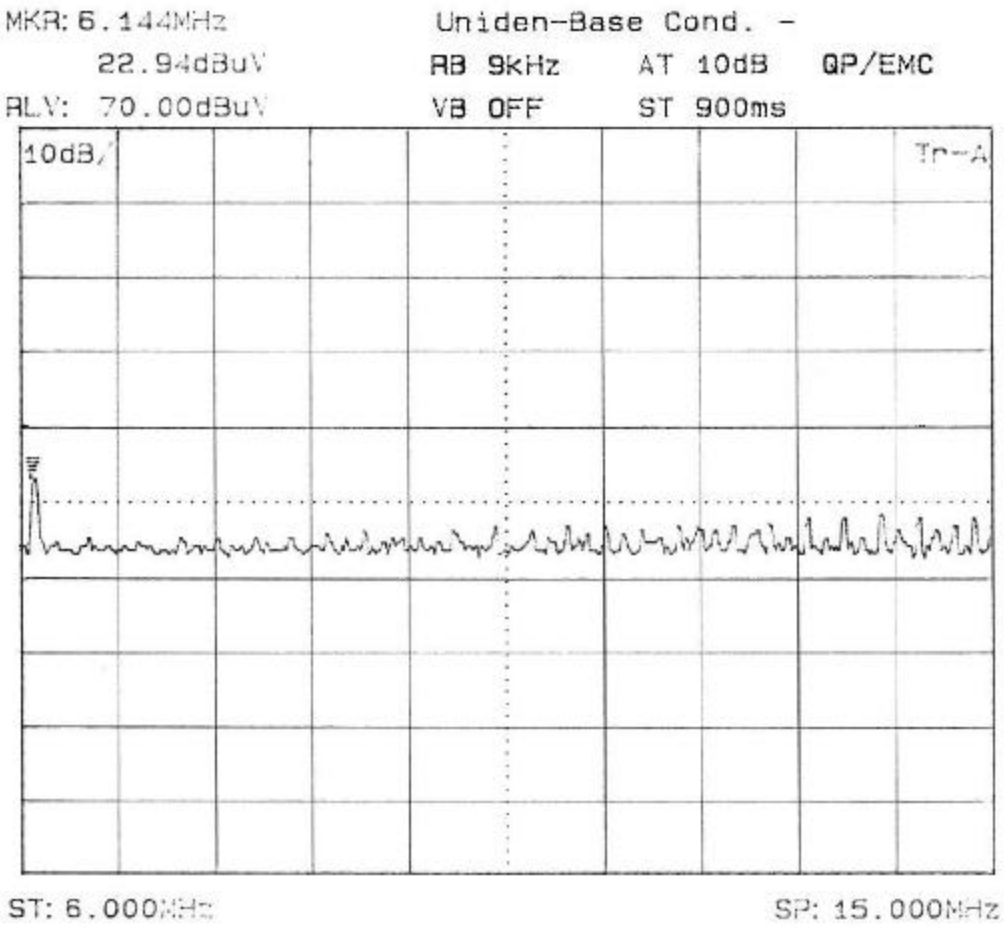
CONDUCTED R.F. EMISSION LEVELS
Line: NEUTRAL, Detection: Quasi-Peak
Frequency Range: 150 kHz – 3.0 MHz

Graph a8



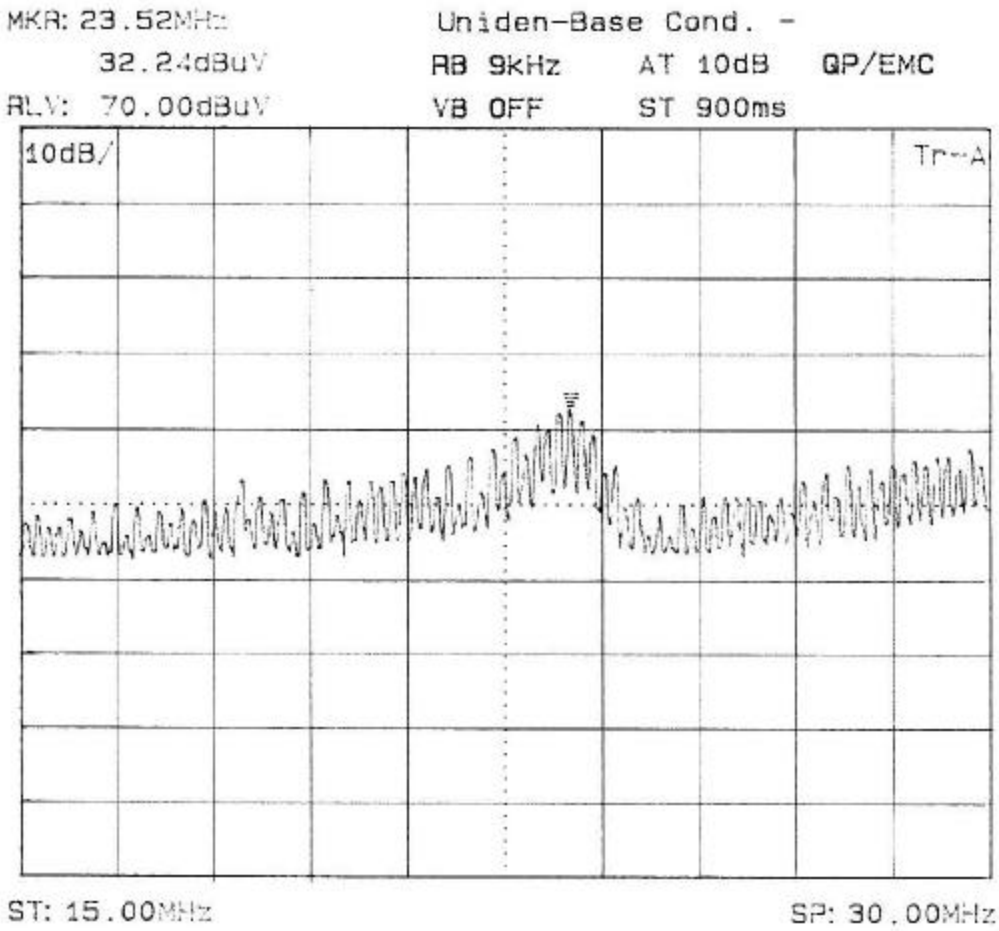
CONDUCTED R.F. EMISSION LEVELS
Line: NEUTRAL, Detection: Quasi-Peak
Frequency Range: 3.0 MHz – 6.0 MHz

Graph a9



CONDUCTED R.F. EMISSION LEVELS
Line: NEUTRAL, Detection: Quasi-Peak
Frequency Range: 6.0 MHz – 15.0 MHz

Graph a10



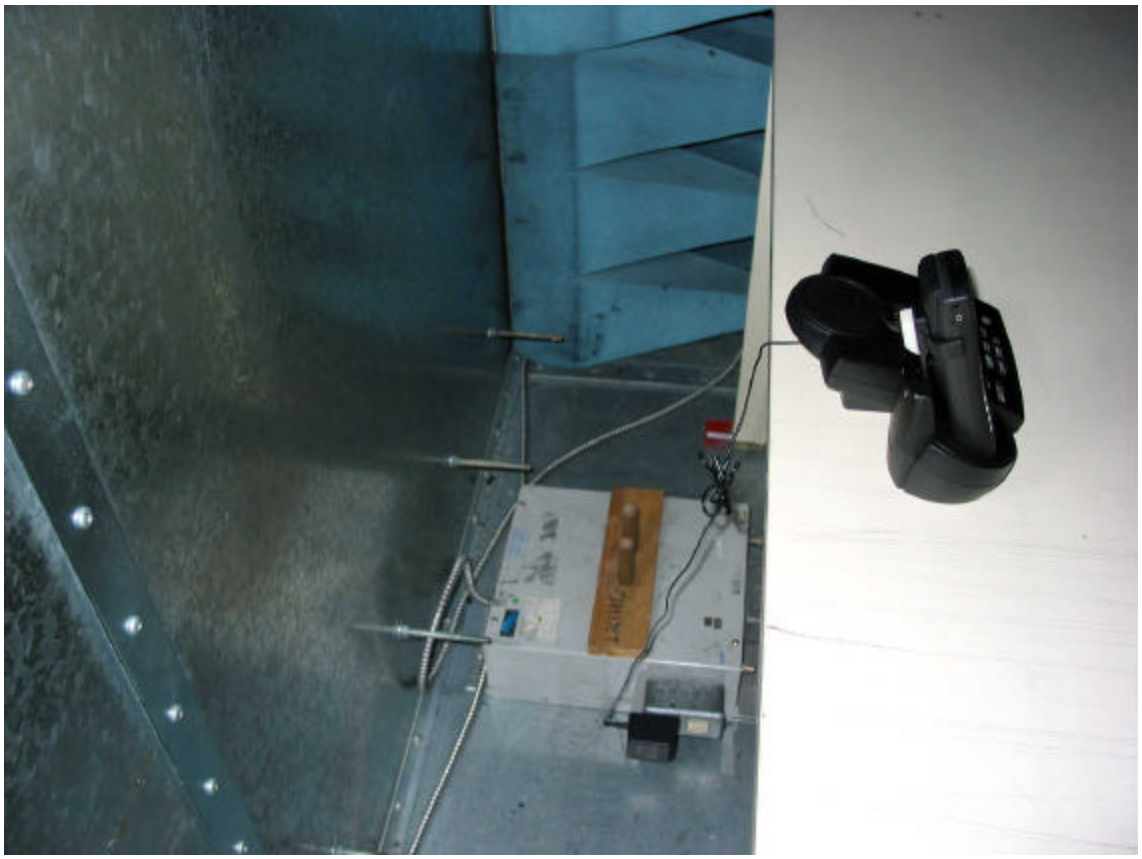
CONDUCTED R.F. EMISSION LEVELS
Line: NEUTRAL, Detection: Quasi-Peak
Frequency Range: 15.0 MHz – 30.0 MHz

Conclusion: The unit complies with requirements.

Pictures of the test set-up

Testing Conducted Emissions on Power Lines
Handset and Base unit connected to LISN
Frequency range: 450 kHz – 30 MHz

Testing Conducted Emissions on Power Lines
Handset and Base unit connected to LISN
Frequency range: 450 kHz – 30 MHz



Testing Conducted Emissions on Power Lines
Handset and Base unit connected to LISN
Frequency range: 450 kHz – 30 MHz

Testing Conducted Emissions on Power Lines
Base unit connected to LISN
Frequency range: 450 kHz – 30 MHz

Testing Conducted Emissions on Power Lines
Base unit connected to LISN
Frequency range: 450 kHz – 30 MHz

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