2 Power Line Conducted Emission Measurement

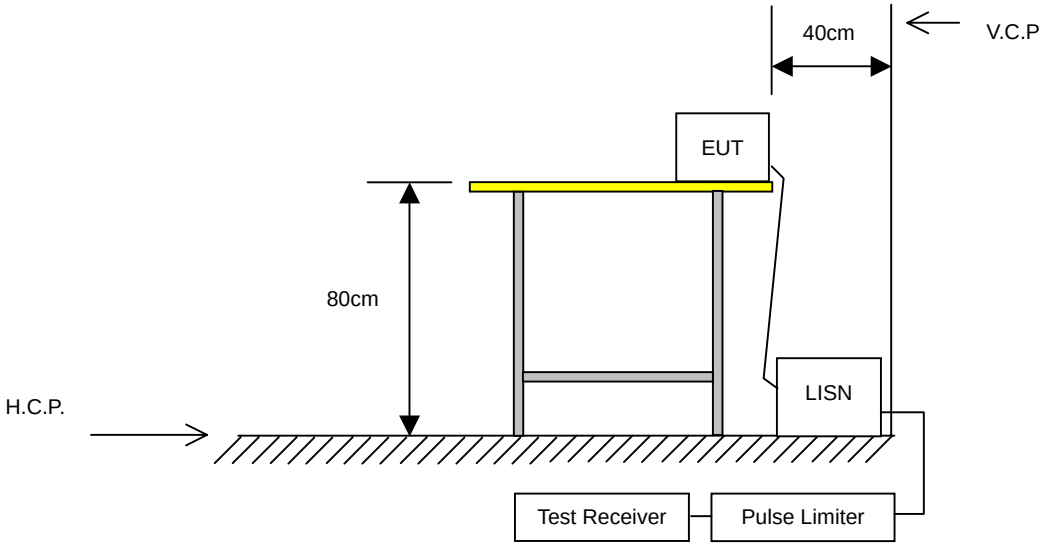
2.1 Instrument

Instrument	Manufacturer	Model	Serial No.	Last Calibration
EMI Test Receiver	Rohde & Schwarz	ESCS 30	830245/027	2000/07/26
L.I.S.N.	Schwarzbeck	NNLK8121	8121417	2000/09/08
L.I.S.N.	Rohde & Schwarz	ESH3-Z5	829996/016	2000/06/16
Pulse Limiter	Rohde & Schwarz	ESH3-Z2	830836/026	2000/07/29
RF Cable	IETC	CBL04	N/A	2000/10/11

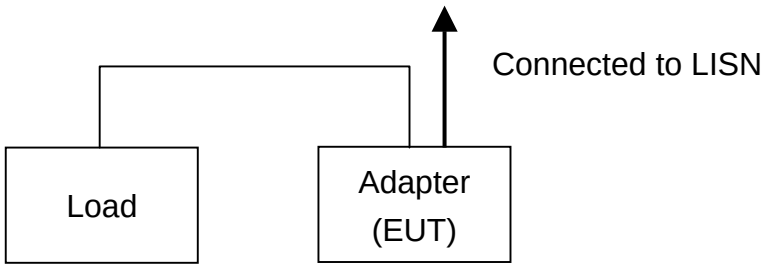
Note: All instrument upon which need to calibrated are with calibration period of 1 year.

2.2 Block Diagram of Test Configuration

Configuration of Testing Setup



Configuration of EUT Setup



2.3 Conducted Limit

☐ FCC Part 15

Frequency (MHz)	☐ Class A		☐ Class B	
	uV	dBuV	uV	dBuV
0.45 ~ 1.705	1000	60.0	250	48
1.705 ~ 30	3000	69.5	250	48

☒ CISPR 22

Frequency (MHz)	☐ Class A		☒ Class B	
	Q.P. (Quasi-Peak)	A.V. (Average)	Q.P. (Quasi-Peak)	A.V. (Average)
0.15 ~ 0.50	79	66	66 to 56	56 to 46
0.50 ~ 5.0	73	60	56	46
5.0 ~ 30	73	60	60	50

2.4 Instrument configuration

2.4.1 The EMI test receiver frequency range set from 150 KHz to 30 MHz.

2.4.2 The EMI test receiver bandwidth set at 9kHz.

2.4.3 The EMI test receiver detector set as Quasi-Peak (Q.P.) and Average (AV).

2.5 Measured Mode

2.5.1 The test mode for preliminary test as following:

- Mode 1: TR501 (FULL LOAD)
- Mode 2: TR501 (HALF LOAD)
- Mode 3: TR503 (FULL LOAD)
- Mode 4: TR503 (HALF LOAD)
- Mode 5: TR507 (FULL LOAD)
- Mode 6: TR507 (HALF LOAD)
- Mode 7: TR511-1 (FULL LOAD)
- Mode 8: TR511-1 (HALF LOAD)
- Mode 9: TR513-1 (FULL LOAD)
- Mode 10: TR513-1 (HALF LOAD)

2.5.2 Selected the worst case mode when after preliminary test for final test, the mode as following:

Mode 1: TR501 (FULL LOAD)
Mode 3: TR503 (FULL LOAD)
Mode 5: TR507 (FULL LOAD)
Mode 7: TR511-1 (FULL LOAD)
Mode 9: TR513-1 (FULL LOAD)

2.6 Configuration of Measurement

2.6.1 The EUT was place on a non-conductive table whose total height equaled 80cm and vertical conducting plane located 40cm to the rear of the EUT.

2.6.2 The EUT was connected to the main power through Line Impedance Stabilization Networks (LISN). This setup provided a 50ohm/50μH coupling impedance for the measuring equipment. The auxiliary equipment was also connected to the main power through a LISN that provided a 50ohm/50μH coupling impedance with 50ohm termination. (Refer to the block diagram of the test setup and photographs.)

2.6.3 The conducted disturbance was measured between the phase lead and the reference ground, and between the neutral lead and reference ground. The initial testing identified the frequency that has the highest disturbance relative to the limit while operating the EUT in typical modes of operation and cable positions in a test setup representative of typical system configuration.

2.6.4 The identification of the frequency of highest disturbance with respect to the limit was found by investigating disturbances at a number of significant frequencies. The probable frequency of maximum disturbance had been found and that the associated cable and EUT configuration and mode of operation had been identified.

2.7 Configuration of EUT

2.7.1 Setup the EUT and simulators as shown section 2.2.

2.7.2 Connected the EUT with full load mode.

2.7.3 Turn on the power of all equipment.

2.7.4 Measured the Line phase and record value.

2.7.5 Changed into Neutral phase and record value.

2.7.6 Changed the EUT load to half load and repeated step 2.7.3 to 2.7.5.

2.8 Test Result

PASS

The final tests data as shown on following page. It is test waveform as shown on Appendix 1.

Power Line Conducted Test Data

Date of Tested : Apr. 23, 2001 Power Line : Line

Temperature : 25℃ Humidity : 58%

Tested Mode : TR511-1 (FULL LOAD)

Frequency (MHz)	Factor (dB)	Meter Reading (dBuV)		Emission Level (dBuV)		Limits (dBuV/m)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.486	0.67	45.70	32.80	46.37	33.47	56.40	46.40	-10.03	-12.93
0.670	0.70	44.90	29.50	45.60	30.20	56.00	46.00	-10.40	-15.80
0.783	0.73	45.10	28.90	45.83	29.63	56.00	46.00	-10.17	-16.37
1.002	0.80	41.20	23.60	42.00	24.40	56.00	46.00	-14.00	-21.60
1.599	0.64	47.10	30.60	47.74	31.24	56.00	46.00	-8.26	-14.76
1.755	0.69	46.90	28.10	47.59	28.79	56.00	46.00	-8.41	-17.21
2.451	0.66	41.30	24.50	41.96	25.16	56.00	46.00	-14.04	-20.84

Remark：

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss
3. “*” Means emission level un-detectable.
4. “--“ Means do not need detect.

Power Line Conducted Test Data

Date of Tested : Apr. 23, 2001 Power Line : Neutral

Temperature : 25℃ Humidity : 58%

Tested Mode : TR511-1 (FULL LOAD)

Frequency (MHz)	Factor (dB)	Meter Reading (dBuV)		Emission Level (dBuV)		Limits (dBuV/m)		Margin (dB)	
		Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average	Quasi-Peak	Average
0.177	1.59	45.34	28.11	46.93	29.70	65.22	55.22	-18.29	-25.52
0.255	1.27	42.99	32.89	44.26	34.16	62.99	52.99	-18.73	-18.83
0.380	1.01	40.41	27.46	41.42	28.47	59.42	49.42	-18.00	-20.95
0.478	0.68	38.24	18.35	38.92	19.03	56.62	46.62	-17.70	-27.59
0.904	0.80	37.29	20.61	38.09	21.41	56.00	46.00	-17.91	-24.59
1.638	0.59	43.10	31.50	43.69	32.09	56.00	46.00	-12.31	-13.91
4.248	1.12	31.14	15.25	32.26	16.37	56.00	46.00	-23.74	-29.63

Remark：

1. All readings are Quasi-Peak and Average values.
2. Factor = Insertion Loss + Cable Loss
3. “*” Means emission level un-detectable.
4. “--“ Means do not need detect.