TEST REPORT

Your Ref :

Date : 23 Oct 1998

Our Ref : EMC/R/00855
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DID : 7729721

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PSB SINGAPORE

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NAMAS
TESTING
No. 1372

FORMAL REPORT ON TESTING IN ACCORDANCE WITH
FCC PART 15B : 1996 CLASS B

OF A

TV SURF
[MODEL : P702W]
[FCC ID : JUK0798GES702]

TEST FACILITY PSB Electrical & Electronics Test Centre
1 Science Park Drive
Singapore 118221

FCC FILING 31040/SIT 1300B3

ACCREDITATION The EETC (EMC) is accredited under UKAS to carry out the above-mentioned test(s). The results reported herein have been performed in accordance with the laboratory's terms of accreditation.

UKAS Cert No : 1372

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TEST JOB NO. 980174900

TEST PERIOD 15 Oct 98 – 16 Oct 98

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TEST SUMMARY

The tests were carried out in accordance with the customer's specifications. From the results obtained, **TV Surf [model : P702W]** with **FCC ID : JUK0798GES702**, was found to comply with FCC Part 15B : 1996 Class B requirements for personal computers and peripherals.

Modifications

No modification was made.

Note

1. The measured radiated emission results at 84.9964MHz, 132.1838MHz and 257.7588MHz are below the specification limit by a margin of 3.05dB, 3.91dB and 3.60dB respectively, which is less than the measurement uncertainty. Hence, it is not possible to determine compliance at a confidence level of 95%. However, the measured result indicates a higher probability that the EUT complies with the specification limit.

PRODUCT DESCRIPTION

EUT Description	:	The Equipment Under Test (EUT) is a **TV Surf P702W.** The TV Surf is a set top Internet box and is a low priced, stripped down PC. This box provides a convenient access to the Internet, and it gives the option to display web page on television screen. The TV Surf contains a modem that connects to telephone line. Through the TV Surf, you can dial up to any ISP and surf the internet on your television and to guide you through the internet. A remote controller is provided with the TV Surf.
EUT Manufacturer	:	GES Singapore Pte Ltd
EUT Model Number	:	P702W
EUT Serial Number	:	Nil
Microprocessor	:	PA-RISC Embedded Processor
Operating Frequency	:	66MHz
Clock/Oscillator Frequency	:	33MHz
Port/Connectors	:	DC power jack, Phone port, Line port, S-Video port, Video Out port, Audio (L) port, Audio (R) port.
A.C. Input Power	:	115V a.c., 60Hz
Modifications	:	No modification was made.

TEST CONFIGURATION DESCRIPTION

Supporting Equipment Description

The EUT and the following supporting equipment formed the required test system :

Description & Model	FCC ID & Serial No	Cable description
GES TV Surf (EUT) Model P702W	FCC ID JUK0798GES702 S/No 88GT0000019	1.15m unshielded video cable 1.15m unshielded audio cable
Remote Keyboard (Optional) Model MKB975	FCC ID KFJMKB975 S/No Nil	Nil
PROTON Power Adapter Model SPR-218F-05	FCC ID N.A. S/No 828218F5LC1089	2.0m unshielded power adapter cable
Sony Colour TV Model KVT21MN81	FCC ID N.A. S/No 8000267	1.8m unshielded power cable

Test Configuration

The various ports of the system were loaded, representative of normal usage, as follows :

1. The video cable of EUT was connected to the video port of TV
2. The audio cable (L & R) of EUT was connected to the audio port of TV
3. The phone port of EUT was loaded with a 600Ω phone load
4. A S-Video cable was connected to the S-Video port of EUT.
5. The EUT was connected to the public network via a phone line.

The whole system was powered from 115V a.c., 60Hz mains supply.

TEST OPERATING CONDITIONS

Conducted and Radiated Emissions

The EUT was exercised in the following manner during the conducted and radiated emissions tests:

1. Connect the EUT to the Sony TV via a video cable and two audio cables.
2. Connect the EUT to public network via a phone line.
3. Dial up and connect to an internet web site
4. Continuously surfing the internet while making the conducted and radiated emission measurements.

TEST INSTRUMENTATION

The following test instrumentation were used :

Conducted Emissions Test Instrumentation

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver	ESPC	848553/005	28 Nov 1998
HP EMC Analyzer (9kHz~1.8GHz)	8591EM	3536A00316	5 Jun 1999
EMCO LISN (for EUT)	3816/2BR	9602-1036	30 Mar 2000
EMCO LISN (for others)	3825/2	9309-2127	N.A.

Radiated Emissions Test Instrumentation (10m OATS)

Instrument	Model	S/No	Cal Due Date
R&S Test Receiver	ESPC	848553/005	28 Nov 1998
HP Spectrum Analyzer	8593E	3325A00702	13 Aug 1999
EMCO Biconical Antenna	3109	9310-2759	22 Oct 1998
EMCO Log-periodic Antenna	3146	9110-3240	22 Oct 1998

CONDUCTED EMISSIONS TEST DESCRIPTION

Test Setup

1. The test setup was in accordance with ANSI C63.4:1992.
2. The EUT and other supporting equipment were arranged on top of a 1.5m x 1m x 0.8m high table, as shown in Appendix B.
3. The 50Ω/50μH EUT LISN was connected to filtered mains.
4. The a.c. power supply for the EUT was tapped from the EUT LISN.
5. The RF OUT of the EUT LISN was connected to the EMI test receiver via a low-loss coaxial cable.
6. All other supporting equipment were powered seperately from another LISN.

Test Method

The test was performed in the following manner:

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. A quick scan, from 450kHz to 30MHz, was made on the NEUTRAL line.
3. High peaks, relative to the limit line, over the frequency range were then selected.
4. The EMI test receiver was then tuned to the selected frequencies. CISPR quasi-peak measurements with a receiver bandwidth setting of 10kHz, were taken.
5. Steps 2 to 4 were then repeated for the LIVE line.

RADIATED EMISSIONS TEST DESCRIPTION

EUT Charaterisation

EUT characterisation, over the frequency range 30MHz to 1GHz, was done in order to minimise radiated emission testing time while still maintaining high confidence in the test results.

The EUT was placed in a shield room, at a height of about 1m on a turntable, and its radiated emissions frequency profile was observed, using a spectrum analyzer with the appropriate broadband antenna placed 1m away from the EUT. Radiated emissions from the EUT were maximised by rotating the turntable manually, changing the antenna polarisation and manipulating the EUT cables while observing the frequency profile on the spectrum analyzer. Frequency points at which maximum emissions occurred, clock frequencies and operating frequencies were then noted for the formal radiated emissions test at PSB's Open Area Test Site (OATS).

Test Setup

1. The test setup was in accordance with ANSI C63.4:1992.
2. The EUT and other supporting equipment were setup on a 1.5m X 1.0m X 0.8m high table placed on top of a turntable as shown in Appendix B.
3. The filtered power supply for the EUT and supporting equipment were tapped from the appropriate power sockets located on the ground plane.
4. The relevant broadband antenna was set at the required test distance away from the EUT and supporting equipment boundary.

Test Method

The test was performed in the following manner:

1. The EUT was switched on and allowed to warm up to its normal operating condition.
2. The test was carried out at the selected frequency points obtained from the EUT characterisation. Emission maximization was carried out by varying the antenna polarization, antenna height and turntable direction in the following manner:
    a. Vertical or horizontal polarisation (whichever gave the higher emission level) was chosen.
    b. The turntable was rotated to the direction that gave maximum emissions.
    c. The antenna height was adjusted to the height that gave maximum emissions.
3. A quasi-peak measurement was then made at the frequency point.
4. Steps 2 and 3 were then repeated for the next frequency point.
5. The frequency range covered was from 30MHz to 1GHz, using the biconical antenna for frequencies up to 200MHz, and the log-periodic antenna for frequencies above 200MHz.

TEST RESULTS

FCC Part 15B:1996 Class B Conducted Emissions Results

FREQUENCY (MHz)	Q-P VALUE (dBµV)	Q-P MARGIN (dB)	LINE
0.6786	41.3	-6.6	NEUTRAL
1.4429	40.7	-7.2	LIVE
2.8900	44.8	-3.1	LIVE
3.3300	37.8	-10.1	NEUTRAL
4.4180	36.1	-11.8	LIVE
28.0013	34.5	-13.4	LIVE

NOTES

1. All possible modes of operation were investigated, and only the 6 worst case emissions measured, using a CISPR quasi-peak detector, are reported. All other emissions were insignificant.
2. The Conducted Emissions FCC Part 15B:1996 Class B limit is 250µV(47.9dBµV) from 450kHz to 30MHz.
3. A "-ve" Q-P indicates a PASS as it refers to the margin present below the limit line at the particular frequency.
4. All measuring equipment are calibrated with traceability to NPL (UK) or NIST (USA).

MEASUREMENT UNCERTAINTIES

All test measurements carried out are traceable to UK National Standards where obtainable. The uncertainty of the measurement is ±2.4dB at a confidence level of approximately 95%, with a coverage factor of 2.

Conducted emissions (Voltage)

9 kHz - 30 MHz (Average and Quasi-peak) ±2. 4dB

FCC Part 15B:1996 Class B Radiated Emissions Results

FREQUENCY (MHz)	Q-P VALUE (dBμV/m)	Q-P MARGIN (dB)	POL (h/v)	HEIGHT (m)	AZIMUTH (Degrees)
42.9985	32.45	-7.55	v	1.10	181
79.9968	33.71	-6.29	v	1.10	196
84.9964	36.95	-3.05	v	1.10	216
132.1838	39.59	-3.91	v	1.10	61
231.3230	38.37	-7.63	h	1.00	246
257.7588	42.40	-3.60	v	1.10	210

NOTES

1. All possible modes of operation were investigated, and only the 6 worst case emissions, measured, using a CISPR quasi-peak detector, are reported. All other emissions were insignificant.

2. The above Q-P values were measured at a 3m test distance.

3. The Radiated Emissions FCC Part 15B:1996 Class B limit (@ 3m) is:

100μV/m (40.0dBμV/m)	from	30MHz to 88MHz
150μV/m (43.5dBμV/m)	from	88MHz to 216MHz
200μV/m (46.0dBμV/m)	from	216MHz to 960MHz
500μV/m (54.0dBμV/m)	above	960MHz

4. A "-ve" Q-P margin indicates a PASS as it refers to the margin present below the limit line at the particular frequency.

5. All measuring equipment are calibrated with traceability to NPL (UK) or NIST (USA).

MEASUREMENT UNCERTAINTIES

All test measurements carried out are traceable to UK National Standards where obtainable. The uncertainty of the measurement is ±4. 3dB at a confidence level of approximately 95%, with a coverage factor of 2.

Radiated emissions (OATS)

30 MHz - 1 GHz (QP only @ 3m and 10 m) ±4. 3dB (For EUT not bigger than 0.5m X 0.5m X 0.5m)

SAMPLE CALCULATIONS

$$dB\mu V = 20 \log (\mu V)$$

$$dB\mu V/m = 20 \log (\mu V/m)$$

Example 1 - For Conducted Emissions

At 20 MHz Class B limit = 250 μV = 47.96 dBμV

Transducer factor of LISN, pulse limiter & cable loss at 20 MHz = 11.2 dB

Q-P reading obtained directly from EMI Receiver = 40 dBμV
(Calibrated for system losses)

Therefore, Q-P margin = 40 - 47.96 = -7.96

i.e. **7.96 dB below limit**

Example 2 - For Radiated Emissions

At 300 MHz Class B limit = 200 μV/m = 46 dBμV/m

Log periodic antenna factor & cable loss at 300 MHz = 18.511 dB

Q-P reading obtained directly from EMI Receiver = 40 dBμV/m
(Calibrated level including antenna factors & cable losses)

Therefore, Q-P margin = 40 - 46 = -6

i.e. **6 dB below limit**