FCC Class_B Report

for

HTEC

IPC486P8 CARD

FCCID: MTMIPC486P8

HTEC Limited
Marketing Approval

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Approval Signatory

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Contents

1.0 INTRODUCTION

This application is made for the IPC486P8 PC Card manufactured by HTEC Limited, Southampton, Hampshire UK. See PRODUCT DESCRIPTION on page 5 for further information.

1.1 Notes

CISPR 22 Limits

The IPC486P8 adapter card was tested to CISPR 22 limits using 230Vac at 50Hz for radiated emissions, and also at 110Vac 60 Hz.

1. Emissions at 230Vac 50Hz were considered to be the worst case.
2. Conducted emissions were measured to CISPR 22 limits using 110Vac at 60 Hz.

2.0 PRODUCT TEST CONFIGURATION

The IPC486P8 card is a full length PC adaptor card with three daughter card plug-on options. These optons are

1. 8 channel RS232 card using RS232 transceivers and 80 pin SCSI-2 connector
2. 8 channel RS422 card using RS422 transceivers and 100 pin SCSI-2 connector
3. 2 channel using RS232 and RS422 transceivers and two 15 way (DB-15) connectors

All three daughter cards were profiled in the test chamber to verify which combination represented the worst case combination. It was found that the worst daughter card combination was the

8 channel RS422 card with 100 pin SCSI connector and associated cables.

All testing detailed in this report is related to this card.

3.0 TECHNICAL REPORT

3.1 Name of Grantee

HTEC Limited
303-305 Portswood Road
Southampton
Hampshire
SO17 2LD
UK

3.2 Name of Manufacturer

HTEC Limited
303-305 Portswood Road
Southampton
Hampshire
SO17 2LD
UK

3.3 Trade Name

IPC 486 P8 Card

3.4 FCC ID

MTMIPC486P8

3.5 Installation and Operating Instructions

Attached.

4.0 EXPOSITORY STATEMENT

4.1 Product description

The IPC486P8 supplied by HTEC is the Data Communication Co-processor card for servers and personal computers. The card is based on the Intel 80486DX4 microprocessor. The card is fitted with 1M bytes of triple ported SRAM on board. This memory is used to hold applications software and also as a buffer to pass data to and from the host PC. The memory can be accessed by the local CPU processor, local DMA controller and the host PC. The card contains up to eight high-speed RS232/RS423, RS422, RS845 or X.21 serial ports. Serial ports are implemented using the Zilog Z85230 SCC sync/async controller. There are up to four local DMA controllers providing sixteen high-speed DMA channels between SCC's and share memory. Other devices onboard include a timer counter and a programmable interrupt controller.

The IPC486P8 hardware contains six major parts as follows:

- CPU
- Memory System
- DMA Controllers
- Serial Ports
- System Peripherals
- Host Interface

4.2 System clocks

The following clocks are used on the card:

Clock Signal	Relation/Function	Clock Rate
SCLK	CPU and System Clock	32 MHz
PCLK	SCC Clock	14.74 MHz
TCLK	Timer Clock	460.8 kHz
DCLK	DMA Controller Clock	8 MHz

The support PC main Intel Pentium II CPU clock speed was 266MHz, so for this reason the radiated emission range was extended to 2000 MHz.

8.0 TEST DATA

8.1 Radiated Emissions

Initial Scan

A radiated profile scan was taken at a 3-metre distance on eight azimuths of the system under test in both vertical and horizontal polarities of the antenna in a semi-anechoic chamber. Instrumentation used in the chamber as below:

Computer	Grace P166 / Mopoke APL
Spectrum Analyser	Hewlett Packard 8568B, 30-1000 MHz range in peak hold mode Hewlett Packard 70001/4A, 1-8GHz range in peak hold mode
Pre-Amplifier	Chase CPA9231, 30-1000 MHz
Antennae	Chase Bilog CBL6112, 30-2000 MHz WatkinsJohnson, 0.5-12.4GHz

The data obtained from the profile scan was used as a guide for the final Open Area Test Site (OATS) measurements.

Final Measurements

The system under test was transferred to the OATS from the semi-anechoic chamber. The data obtained from the chamber profile-scan was used to guide the test engineer. Each emission from the system was maximised by revolving the system on the turntable and moving the antennae in height and azimuth. Cable and system component positions had been investigated for maximum emissions, and the system under test represents the worst case configuration. The worst case data is presented in this report. Test instrumentation used in the OAT's measurements was as follows:

Computer	IBM Aptiva 486 / Mopoke APL
Receiver	Rohde & Schwarz Model ESVP 30-1000MHz set to CISPR Quasi-Peak
Antenna	Chase CBL6112 Bilog, 30-2000MHz

8.2 Conducted Emissions

A filtered 120V/60Hz mains supply was fed to the equipment under test via a Line Impedance Stabilisation Network (LISN). The LISN was directly bonded to the conductive ground plane.

Initial Scan

The worst case emissions were identified on both the Line and Neutral Phases using a Rohde & Schwarz ESS receiver swept from 0.45MHz to 30.0MHz with a 10kHz resolution whilst set on peak hold.

Final Measurement

The worst case emissions identified from the initial scan results would normally be measured using the Rohde & Schwarz ESS Receiver set to quasi-peak detection. However, for this report, there were no peaks identified requiring final quasi-peak measurement. Test instrumentation used in the conducted test was as follows:

LISN	Chase Electrics type 2050
Mains Filter	Filtron
Receiver	Rohde & Schwarz type ESS

The worst case results are presented in this report.

8.2.1 EN55022 Conducted Emission Measurement

The conducted emissions were measured in a screened room in order to eliminate ambient noise. A filtered 110 volt / 60Hz supply was fed to the EUT via a 50Ω/50uH Line Impedance Stabilisation Network (LISN). The LISN was bonded to a conductive ground plane. Line and neutral phases were measured separately.

A receiver was set to scan between 0.15MHz and 30MHz to record the peak emission profiles. The worst case peaks were then measured using an average and/or quasi-peak receiver and compared to the EN55022 Class B limits. Emissions that meet the Average limit on a Quasi-Peak measurement are deemed to meet both the Average and Quasi-peak specification. The worst case results are shown here.

MAINS - NEUTRAL

Frequency (MHz)	Quasi-peak value (dBµV)		Average value (dBµV)		Status
	Measured	Class B Specified	Measured	Class B Specified	
0.150	23.8	66	-	-	Pass
0.220	43.8	62.9	-	-	Pass
0.765	34.6	56	24.4	46	Pass
1.750	33.8	56	32.8	46	Pass
3.280	31.8	56	30.6	46	Pass
7.410	12.0	60	33.0	50	Pass
9.380	44.1	60	41.2	50	Pass
11.330	45.2	60	41.6	50	Pass
15.820	19.8	60	-	-	Pass
23.840	13.2	60	-	-	Pass

MAINS - LINE

Frequency (MHz)	Quasi-peak value (dBµV)		Average value (dBµV)		Status
	Measured	Class B Specified	Measured	Class B Specified	
0.200	33.8	63.6	33.4	53.6	Pass
0.220	44.4	62.9	44.3	52.9	Pass
0.545	28.6	56	28.0	46	Pass
0.655	28.5	56	27.1	46	Pass
0.980	27.0	56	-	-	Pass
1.420	31.0	56	29.2	50	Pass
1.860	28.6	56	-	-	Pass
3.930	27.3	56	-	-	
18.570	32.0	60	29.3	50	
29.050	23.4	60	-	-	

Note: A search was made of the frequency spectrum from 0.15MHz to 30MHz and the measurements reported are the highest emissions relative to the CISPR Class B Computing Device Limits.

Procedure: In accordance with ANSI C63.4 1992. **TEST ENGINEER: Julian Jones**

8.2.2 EN55022 Radiated Emissions

A profile scan was taken at a distance of three metres on eight azimuths of the test product in both the vertical and horizontal polarities of the antenna in a semi-anechoic chamber.

Using the data obtained from the chamber profile-scan as an engineering guide, the test product was then transferred onto the turntable in the Open Area Test Site. The antenna was positioned at a distance of ten metres from the periphery of the test product. Radiated emissions were then systematically maximised by revolving the test product and adjusting the antenna in polarity and height. The highest emissions are presented here.

Frequency MHz	Receiver Amplitude dBuV	Antenna Factor dB	Cable Loss dB	Actual QP Value @ 10m		Specified QP Limit @ 10m	
				dBuV/m	uV/m	dBuV/m	uV/m
32.004	1.3	17.1	1.3	19.7	9.7	30.0	31.6
38.321	6.3	14.1	1.4	21.8	12.3	30.0	31.6
75.205	6.3	6.1	1.8	14.2	5.1	30.0	31.6
199.962	13.3	8.5	3.1	24.9	17.6	30.0	31.6
224.084	13.6	9.0	3.4	26.0	20.0	30.0	31.6
266.616	4.7	12.2	3.7	20.6	10.7	37.0	70.8
288.001	10.2	12.9	3.8	26.9	22.1	37.0	70.8
338.432	11.2	14.1	4.1	29.4	29.5	37.0	70.8
372.275	14.0	14.8	4.4	33.2	45.7	37.0	70.8
399.924	-0.5	16.0	4.8	20.3	10.4	37.0	70.8
502.929	6.4	18.0	5.4	29.8	30.9	37.0	70.8
667.682	3.5	20.4	6.4	30.3	32.7	37.0	70.8

Note: A search was made of the frequency spectrum from 30MHz to 2000MHz and the measurements reported are the highest emissions relative to the CISPR Class B Computing Device Limits.

TEST ENGINEER: Julian Jones

9.0 DETAILS OF SUPPORTING SYSTEM

Unit under test: IPC486P8 PC adapter Communications card FCCID:MTMIPC486P8

See "product description

The system included a parallel printer, mouse, keyboard, plotter, USB camera, speakers, External Modem and desk microphone

Peripherals (unshielded mains cables)

Personal computer: Intel "Rockaway"

Serial Number 98002 FCCID (DoC process) Model # NLXNX

Monitor IBM HL5854B

Serial Number MGNOU806114734 FCCID: CKLHL-5854B

Keyboard: ORTEK PS/2

Serial Number 7167239 FCCID:KJXMCK701W

Mouse : Microsoft Intellimouse 1.1A

Serial Number 1023573-1000 FCCID:C3KKMP5

Parallel device #1: Printer Lexmark 2380

Serial Number 0076 FCCID: BJI2380-001

Serial device #1: IBM Plotter 6180

Serial Number A2508 FCCID: ANO8537370

Continued over page

Audio output device #1: Genius Speakers SP718

Serial Number 980024583 FCCID: N/A

USB Device #1: USB Device Connectix VC Cam

Serial Number VU13J9L5 FCCID: LDK5

Audio input device # 1:Desk Microphone

Serial Number 002 FCCID:N/A

Serial device #2: External 14,400 Modem Racal MXF1432

Serial Number 0072 FCCID:N/A European model only (this was a European model not sold in USA)

10.0 EUT OPERATING CONDITIONS

Both conducted and radiated testing were performed according to the procedures in ANSI C63.4-1992. Radiated testing was performed at EUT to antenna distance of 10 metres.

The DOS based EMC exerciser software used during the radiated and conducted emission tests, exercises each of the various system internal and external components, sending a repeating 'H' pattern to the serial, parallel and Video ports. Also an HTEC Hardware exerciser program was used to exercise the IPC486P8 adapter card.

The user controls were set to produce maximum emissions, contrast to maximum and brightnesss to raster extinction.

10.1 Worst case configuration

The EUT was tested with the Monitor set in the following mode:

Pels/Line	Vertical Pels	Refresh Rate	Video Clock
640	480	60	25.6