



EMC

TEST REPORT

REPORT NO. : F87011413A

MODEL NO. : USB4000

DATE OF TEST : Nov. 16, 1998

FCC ID: HED4000 DEC 03 1998

PREPARED FOR : ACCTON TECHNOLOGY CORPORATION

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PREPARED BY: ADVANCE DATA TECHNOLOGY CORPORATION



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1. CERTIFICATION

Issue Date: Nov. 19, 1998

Reference No.: 87011413

Product : USB HUB
Trade Name : ACCTON
Model No. : USB4000
Applicant : ACCTON TECHNOLOGY CORPORATION
Standard : FCC Part 15, Subpart B, Class B
ANSI C63.4-1992
CISPR 22: 1993 +A1+A2

We hereby certify that one sample of the designation has been tested in our facility on Nov. 16, 1998. The test record, data evaluation and Equipment Under Test (EUT) configurations represent herein are true and accurate representation of the measurements of the sample's EMC characteristics under the conditions herein specified.

The test results show that the EUT as described in this report is in compliance with the Class B limits of conducted and radiated emission of applicable standards

PREPARED BY: Rita Yi, DATE: 11/19/98
(Rita Yi)

TESTED BY: Lance Tseng, DATE: 11/19/98
(Lance Tseng)

APPROVED BY: Stephen W.F. Chen, DATE: 11/19/98
(Stephen W.F. Chen)

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2. GENERAL INFORMATION

2.1 GENERAL DESCRIPTION OF EUT

Product	:	USB HUB
Model No.	:	USB4000
Power Supply	:	DC 5V (from adapter)
Power Cord	:	Nonshielded (1.8m)
USB Data Cable	:	Shielded (1.8m)

Note: The EUT is a standalone device that contains four downstream USB ports and one upstream USB port to a host or Hub. The EUT will consist of one USB Hub controller, USB port power management chips, and Line Suppressors. The device may be a bus powered HUB (draws power from USB host) or self powered with the use on an optional power supply brick.

This report is prepared for Class II Permissive Change. The main change is the followings:

1. Replace the spring finger between USB connector and PCB with EMI gasket.
2. Add following power adapter manufactured by SYN, their model names:
 - ◆ SYS1089-1305-W2
 - ◆ SYS1089-1305-W2E
 - ◆ SYS1089-1305-W3B

All added power adapters are same as each other except plug blade. So only SYS1089-1305-W2 was used to do final test.

For more detailed features, please refer to ATTACHMENT 1 - TECHNICAL DESCRIPTION OF EUT and User's Manual.



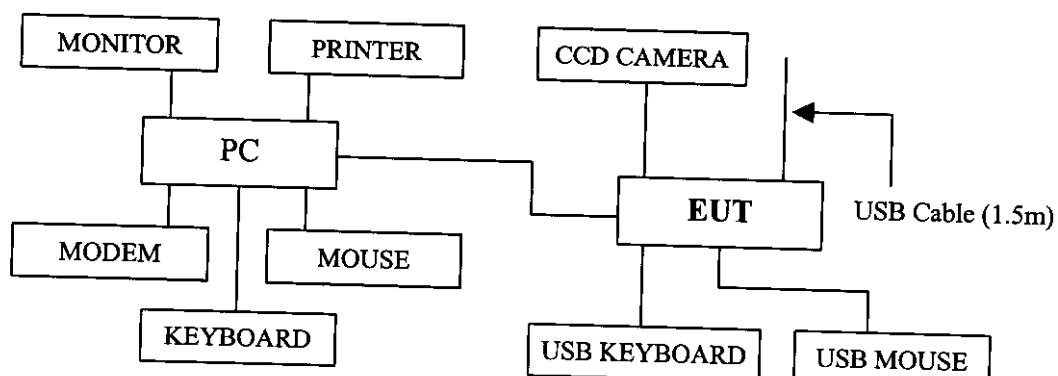
2.2 DESCRIPTION OF SUPPORT UNITS

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories are used to form representative test configuration during the tests.

No	Product	Brand	Model No.	FCC ID	I/O Cable
1	PERSONAL COMPUTER	HP	VECTRA VL 5/166 MMX SERIES 5MT	B94VECTRA500T	Nonshielded Power (1.8m)
2	PRINTER	HP	C2642A	NY7961C1FQ	Shielded Signal (1.2m) Nonshielded Power (1.8m)
3	COLOR MONITOR	ADI	937G	BR8937G	Shielded Signal (1.5m) Nonshielded Power (1.8m)
4	MODEM	ACCEX	1414	IFAXDM1414	Shielded Signal (1.2m) Nonshielded Power (2.4m)
5	MOUSE	LOGITECH	M-S35	DZL211029	Shielded Signal (1.8m)
6	KEYBOARD	FORWARD	FDA-104GA	F4ZDA-104G	Shielded Signal (1.4m)
7	USB KEYBOARD	BTC	7932	E5XKBUCP10410	Shielded Signal (1.5m)
8	USB MOUSE	DEXIN	S3U800A	NIYS3U800A	Shielded Signal (1.5m)
9	CCD CAMERA	COMPAQ	YC72-CPQ	EDUYC72-PQ	Shielded Signal (2.0m)

Note: Item 7&9 were connected to the USB ports of EUT individually and one shielded USB cable (1.8m) was connected to the last USB device port of EUT to form open loop connection.

2.3 TEST METHODOLOGY AND CONFIGURATION



Both conducted and radiated testing were performed according to the procedures in ANSI C63.4:1992. Radiated testing was performed at an antenna to EUT distance of 10m on an open area test site. Please refer to the photos of test configuration in Item 5.



3. TEST INSTRUMENTS

3.1 TEST INSTRUMENTS (EMISSION)

RADIATED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
HP Spectrum Analyzer	8594E	3710A04861	Sept. 14, 1999
CHASE RF Pre Amplifier	CPA92320	1001	June 01, 1999
ROHDE & SCHWARZ Test Receiver	ESVS 10	846285/012	Dec. 12, 1998
CHASE Broadband Antenna	CBL6112A	2343	June 24, 1999
ROHDE & SCHWARZ Precision Dipole	HZ-12 (30~300MHz)	846932/0003	June 06, 2000
ROHDE & SCHWARZ Precision Dipole	HZ-13 (300~1000MHz)	846556/0007	June 17, 2000
HP Signal Generator	8657A	3225A05037	Sep. 17, 1999
EMCO Antenna Tower	2075-2	9712-2124	N/A
EMCO Turn Table	2081-1.53	9712-2030	N/A
EMCO Controller	2090	9712-1283	N/A
CORCOM AC Filter	MRI2030	107/108	N/A
ANRITSU RF Switch	MP59B	M50867	N/A
BELDEN RF Signal Cable	9913 RG-8/U	N/A	N/A
Open Field Test Site	Site A	ADT-RA	July 08, 1999

Note: 1. The measurement uncertainty is less than +/- 3dB, which is calculated as per NAMA's document NIS81.
 2. The calibration interval of the above test instruments is 12 months.
 And the calibrations are traceable to NML/ROC and NIST/USA.

CONDUCTED EMISSION MEASUREMENT

Description & Manufacturer	Model No.	Serial No.	Calibrated Until
ROHDE & SCHWARZ Test Receiver	ESCS 30	847124/029	Dec. 18, 1998
ROHDE & SCHWARZ LISN	ESHS-Z5	848773/004	Nov. 25, 1998
KYORITSU LISN	KNW-407	8/1395/12	July 15, 1999
Shielded Room	Con A	ADT-CA	N/A

Note: 1. The measurement uncertainty is less than +/- 2.6dB, which is calculated as per NAMA's document NIS81.
 2. The calibration interval of the above test instruments is 12 months.
 And the calibrations are traceable to NML/ROC and NIST/USA.



3.2 LIMITS OF CONDUCTED AND RADIATED EMISSION

LIMIT OF RADIATED EMISSION OF CISPR 22

FREQUENCY (MHz)	Class A (at 10m)	Class B (at 10m)
	dBuV/m	dBuV/m
30 - 230	40	30
230 - 1000	47	37

LIMIT OF RADIATED EMISSION OF FCC PART 15, SUBPART B FOR FREQUENCY ABOVE 1000 MHz

FREQUENCY (MHz)	Class A (at 10m)		Class B (at 3m)	
	uV/m	dBuV/m	uV/m	dBuV/m
Above 1000	300	49.5	500	54.0

Note: (1) The lower limit shall apply at the transition frequencies.

(2) Emission level (dBuV/m) = $20 \log$ Emission level (uV/m).

(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.

LIMIT OF CONDUCTED EMISSION OF CISPR 22

FREQUENCY (MHz)	Class A (dBuV)		Class B (dBuV)	
	Quasi-peak	Average	Quasi-peak	Average
0.15 - 0.5	79	66	66 - 56	56 - 46
0.50 - 5.0	73	60	56	46
5.0 - 30.0	73	60	60	50

Note: (1) The lower limit shall apply at the transition frequencies.

(2) The limit decreases linearly with the logarithm of the frequency in the range 0.15 to 0.50 MHz

(3) All emanation from a class A/B digital device or system, including any network of conductors and apparatus connected thereto, shall not exceed the level of field strengths specified above.



4. TEST RESULTS (EMISSION)

4.1 RADIO DISTURBANCE

Frequency Range : 0.15 - 30 MHz (Conducted Emission)
30 - 1000 MHz (Radiated Emission)
Input Voltage : 120 Vac, 60 Hz
Temperature : 26 °C
Humidity : 61 %
Atmospheric Pressure : 987 mbar

TEST RESULT	Remarks
Pass	Minimum passing margin of conducted emission: -15.32 dB at 0.153 MHz
	Minimum passing margin of radiated emission: -2.1 dB at 192.01 MHz

4.1.1 EUT OPERATION CONDITION

1. Turn on the power of all equipments.
2. PC runs a test program to enable all functions.
3. PC reads and writes messages from FDD and HDD.
4. CCD camera captures images and sends image messages to PC via EUT.
5. PC sends image messages and "H" messages to monitor. Monitor displays image messages and "H" patterns simultaneously on screen.
6. PC sends "H" messages to modem.
7. PC sends "H" messages to printer, and the printer prints them on paper.
8. Repeat steps 3-8.



4.2 TEST DATA OF CONDUCTED EMISSION

EUT: USB HUBMODEL: USB40006 dB Bandwidth: 10 kHzTEST PERSONNEL: lance Tony

Freq. [MHz]	L Level		N Level		Limit		Margin [dB (μ V)]			
	[dB (μ V)]		[dB (μ V)]		[dB (μ V)]		L		N	
	QP	AV	QP	AV	QP	AV	QP	AV	QP	AV
0.153	50.50	-	46.20	-	65.82	55.82	-15.32	-	-19.62	-
0.307	42.60	-	37.90	-	60.04	50.04	-17.44	-	-22.14	-
0.611	39.40	-	36.50	-	56.00	46.00	-16.60	-	-19.50	-
0.769	39.40	-	38.10	-	56.00	46.00	-16.60	-	-17.90	-
0.942	35.80	-	36.40	-	56.00	46.00	-20.20	-	-19.60	-
2.460	36.60	-	35.30	-	56.00	46.00	-19.40	-	-20.70	-

Remarks: 1. **: Undetectable

2. Q.P. and AV. are abbreviations of quasi-peak and average individually.

3. -: The Quasi-peak reading value also meets average limit and measurement with the average detector is unnecessary.

4. The emission level of other frequencies were very low against the limit.

5. Margin value = Emission level - Limit value

ADT CORP. SHIELDED ROOM A
CISPR 22 CLASS B

EUT: USB4000
Test Spec: LISN : L
Comment: 120V AC / 60Hz
File name: EN_22CB.SPC
Date: 16. Nov 98 09:35

Report No.: F87011413A

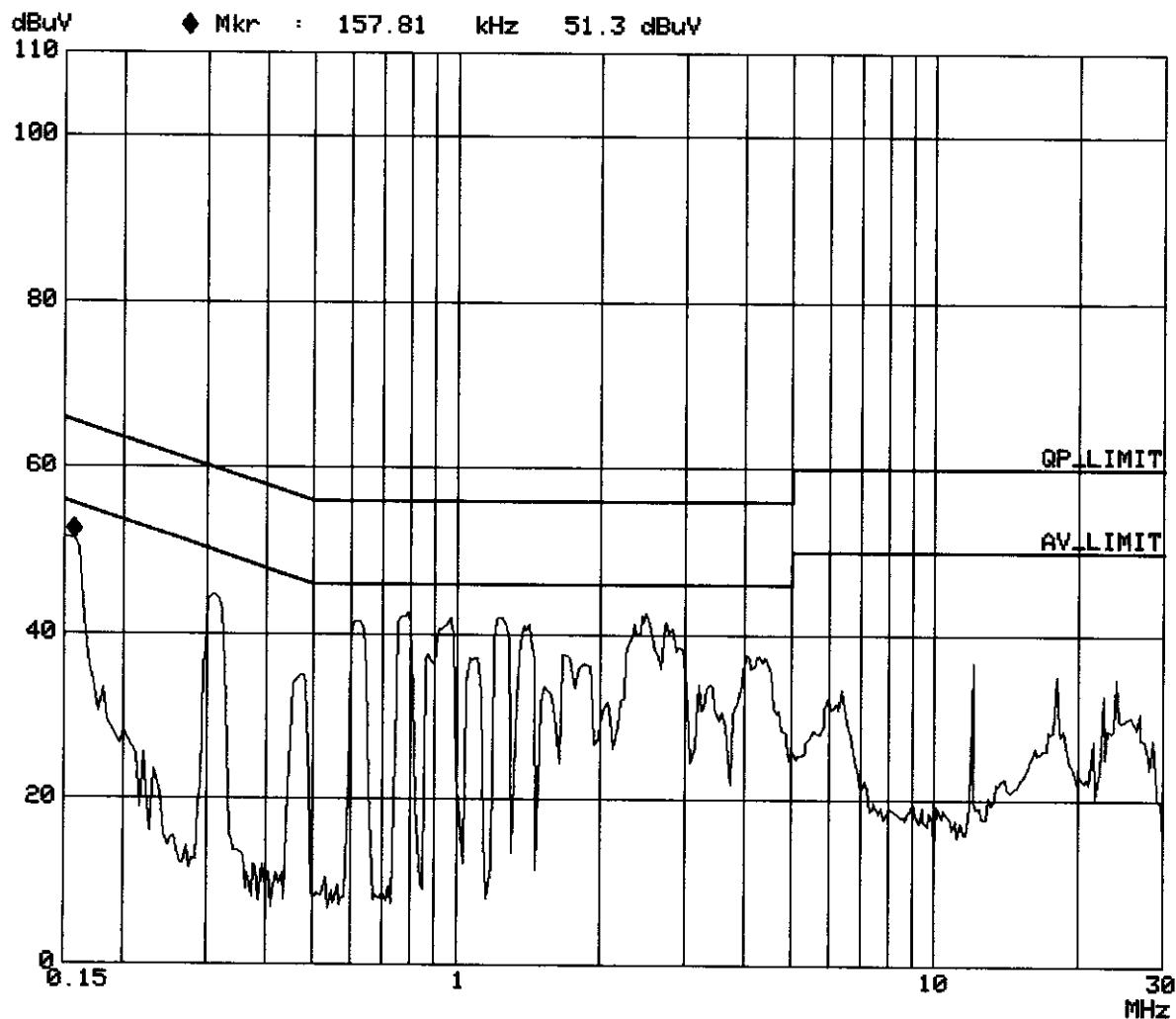
Page: 9-1

Test By: *Lance Tseng*

Overview Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	
150k	3M	3.90625k	9k	PK	10ms	10dBBLN	OFF	
3M	10M	3.90625k	9k	PK	0.05ms	10dBBLN	OFF	
10M	30M	3.90625k	9k	PK	0.05ms	10dBBLN	OFF	

Transducer No.	Start	Stop	Name
1	150k	30M	C_CA_01A



ADT CORP. SHIELDED ROOM A
CISPR 22 CLASS B

EUT: USB4000
Test Spec: LISN : N
Comment: 120V AC / 60Hz
File name: EN_22CB.SPC
Date: 16. Nov 98 09:56

Report No.: F87011413A

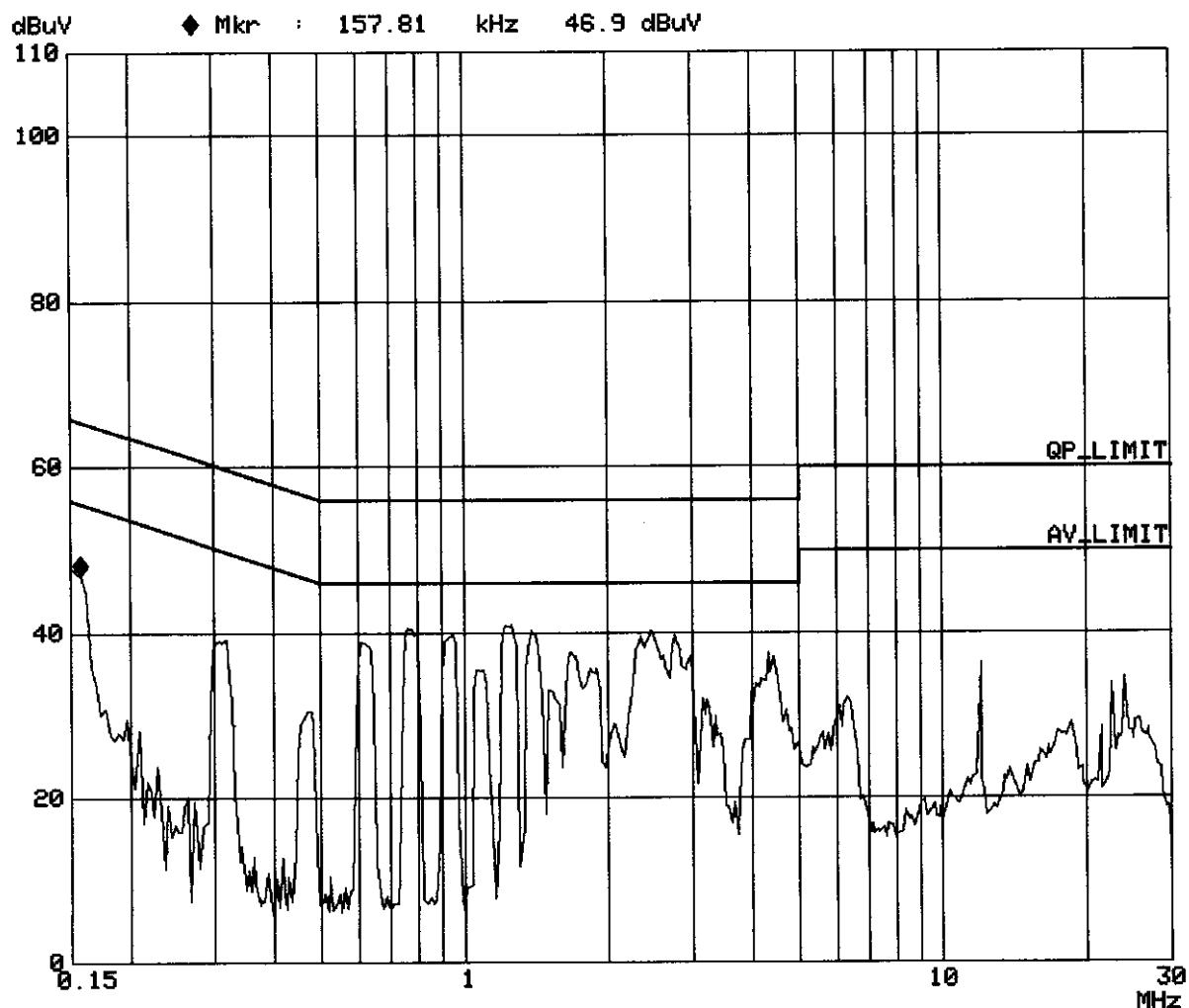
Page: 9-2

Test By: *Chen* *Tseng*

Overview Scan Settings (3 Ranges)

Frequencies			Receiver Settings				
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp
150k	3M	3.90625k	9k	PK	10ms	10dBBLN	OFF
3M	10M	3.90625k	9k	PK	0.10ms	10dBBLN	OFF
10M	30M	3.90625k	9k	PK	0.10ms	10dBBLN	OFF

Transducer No. Start Stop Name
1 150k 30M C_CA_01A





4.3 TEST DATA OF RADIATED EMISSION

EUT: USB HUBMODEL: USB4000ANTENNA: CHASE BILOG CBL6112APOLARITY: HorizontalDETECTOR FUNCTION: Quasi-peak6 dB BANDWIDTH: 120 kHzFREQUENCY RANGE: 30-1000 MHzMEASURED DISTANCE: 10 MTEST PERSONNEL: Lance Terry

Frequency (MHz)	Correction Factor (dB/m)	Reading Data (dBuV)	Emission Level (dBuV/m)	Limit (dBuV/m)	Margin (dB)
120.01	13.2	11.2	24.4	30.0	-5.6
137.47	12.0	9.9	21.9	30.0	-8.1
144.00	11.8	12.6	24.4	30.0	-5.6
144.63	11.8	11.7	23.5	30.0	-6.5
209.76	10.3	17.4	27.7	30.0	-2.3
216.02	10.0	15.1	25.1	30.0	-4.9

REMARKS : 1. Emission level (dBuV/m) = Correction Factor(dB/m) + Meter Reading (dBuV).
 2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
 3. The other emission levels were very low against the limit.
 4. Margin value = Emission level - Limit value



TEST DATA OF RADIATED EMISSION

EUT: USB HUB

MODEL: USB4000

ANTENNA: CHASE BILOG CBL6112A

POLARITY: Vertical

DETECTOR FUNCTION: Quasi-peak

6 dB BANDWIDTH: 120 kHz

FREQUENCY RANGE: 30-1000 MHz

MEASURED DISTANCE: 10 M

TEST PERSONNEL: Carrie Terry

Frequency (MHz)	Correction Factor (dB/m)	Reading Data dBuV	Emission Level dBuV/m	Limit dBuV/m	Margin (dB)
61.85	6.5	13.5	20.0	30.0	-10.0
71.38	6.6	20.5	27.1	30.0	-2.9
72.21	6.7	15.2	21.9	30.0	-8.1
192.01	11.3	16.6	27.9	30.0	-2.1
216.02	11.2	14.5	25.7	30.0	-4.3
217.26	11.2	16.0	27.2	30.0	-2.8

REMARKS :

1. Emission level (dBuV/m) = Correction Factor(dB/m) + Meter Reading (dBuV).
2. Correction Factor(dB/m) = Ant. Factor(dB/m)+Cable loss(dB)
3. The other emission levels were very low against the limit.
4. Margin value = Emission level - Limit value



6. ATTACHMENT 1 - TECHNICAL DESCRIPTION OF EUT

Specifications:

Cable Wiring * $90\Omega \pm 15\%$ Unshielded for low speed devices
* $90\Omega \pm 15\%$ Shielded for full speed devices
* **Wiring Topology:**
 Tiered star, point to point connection
* **Access Method:**
 Differential and bi-directional per USB spec 1.0
 12 Mbps full speed and 1.25Mbps low speed
 The hub supports both full and low speeds
 The hub is considered as a full speed device
* **Maximum Hubs in Daisy Chain:**
 5 Hubs (six cables end to end maximum)
* **Maximum Devices**
 127

Interfaces * 4 USB A Type connectors for device ports
* 1 USB B Type connector for uplink port

Dimensions * 120mm x 96mm x 28mm (4.74" x 3.78" x 1.10")

Hub Power Requirements

- * Bus-Powered
 2.5Watts, 5V@ $\frac{1}{2}$ amp. Via USB cable
- * Self-Powered
 11Watts, 5.25V@2.1 amps
 via Optional Power Supply
- * Hub Power usage
 0.5Watt, 5V@1/10 amp

Optional External 14 Watt Power Supply
+5.25VDC @ 2.5Amp
90-140VAC or 90-240VAC 50/60hz

Temperature
0° to 50° C operating
-20° to 75° C Storage

Humidity
5% to 95% Non-condensing