innodisk

Total Solution For
Embedded Peripherals

EMP2-X801

mPCIe to Eight
RS-232/422/485 Module

Customer: _____

Customer Part Number: _____

Innodisk Part Number: _____

Innodisk Model Name: _____

Date: _____

Innodisk Approver	Customer Approver

Table of Contents

REVISION HISTORY

Revision	Description	Date
1.0	First Released	May, 2021
1.1	Correct typos: Daughterboard CN3 Pin 6 : DTS0n -> RTS0n	Jul, 2021

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1. Product Introduction

1.1. Overview

Innodisk EMP2-X801 is designed with standard Mini PCI Express form factor, EMP2-X801 supports PCIe Gen 2.0 with a single lane to eight independent UARTs RS232/422/485, optimized for higher performance and lower power, which brings you a flexible expansion solution for embedded systems.

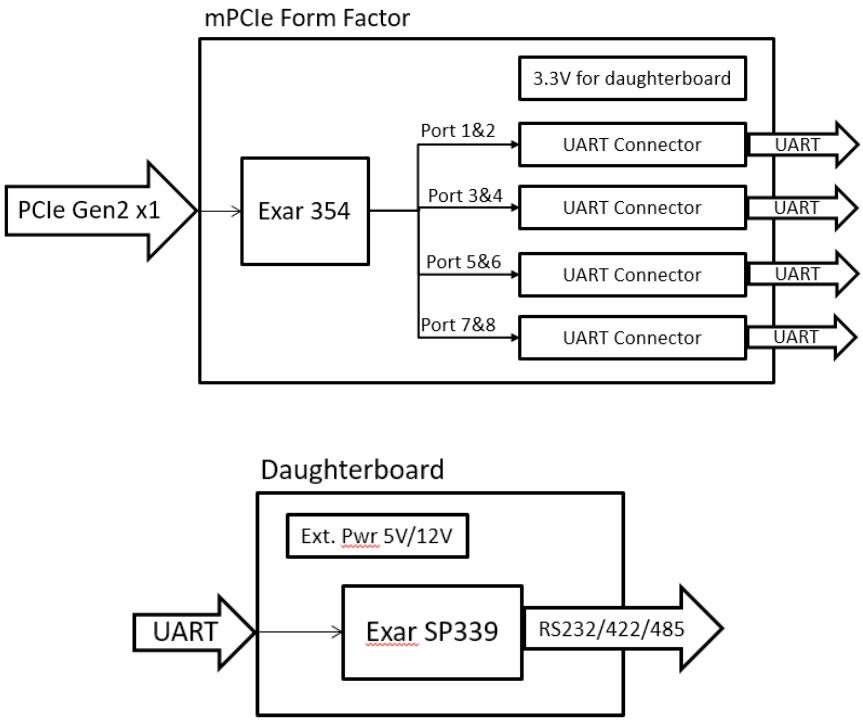


Figure 1: Block Diagram

1.2. Features

- PCIe 2.0 compliant. RS-232/422/485 mode configurable by software.
- 4800 to 3Mbps serial data rate (RS-232 921.6Kbps) serial data rate. 16C550 compatible. 256-byte FIFOs
- Industrial temperature (-40 ºC to 85 ºC) operation.
- Flexible design with cable and daughter board x 8 (DB-9 connectors).
- Termination Resistor and 5V/12V output by jumper setting on daughterboard.
- ESD(Electrostatic Discharge) protection circuit to prevent system damage.

- 30μ" golden finger, 3-year warranty.
- Industrial design, manufactured in innodisk Taiwan

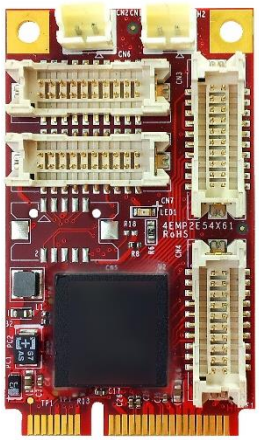


Figure 2: mPCIe Board Picture

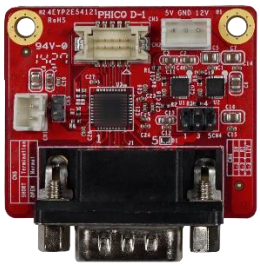


Figure 3: Daughterboard Picture

2. Product Specifications

2.1. Device Parameters

Table 1: Device Parameters

Form Factor	mPCIe
Input I/F	PCI Express 2.0 x 1
Output I/F	RS-232/422/485
Output Connector	DB-9 x 8
Dimension (WxLxH)	30 x 50.9 x 8.45 mm

2.2. Performance

Table 2: RS232/422/485 Performance (unit: second)

Baud Rate	Transmission Data Size	RS232	RS485 Half Duplex		RS485 Full Duplex (RS422)	
		10m	100m	200m	100m	200m
9600	5Kbyte	5	5	5	5	5
	1Mbyte	1,266	1,267	1,267	1,267	1,267
115200	1Mbyte	105	106	106	106	106
460800	1Mbyte	26	26	26	28	27
921600	1Mbyte	13	13	13	13	14

2.3. Electrical Specifications

2.3.1. Power Requirement

Table 3: Power Requirement

Item	Connector	Rating
Input voltage	mPCIe Golden Finger	+3.3 DC +-5%

2.3.2. Power Consumption

Table 4: Power Consumption

Full Load (mA)	Voltage (V)
145	3.3

2.4. Environmental Specifications

2.4.1. Temperature Ranges

Table 5: Temperature Ranges

Temperature	Range
Operating	Industrial Grade: -40°C to +85°
Storage	-55°C to +95°

2.4.2. Humidity

Relative Humidity: 10-95%, non-condensing

2.4.3. Shock and Vibration

Table 6: Shock and Vibration

Reliability	Test Conditions	Reference Standards
Vibration	7 Hz to 2K Hz, 20G, 3 axes	IEC 68-2-6
Mechanical Shock	Duration: 0.5ms, 1500 G, 3 axes	IEC 68-2-27

2.4.4. Mean Time between Failure (MTBF)

Reliability prediction methodology provides the basis for reliability evaluation and analysis. The purpose of the prediction is to predict the life time of the product in units of failure rate and MTBF.

Table 7: Mean Time between Failure (MTBF)

Product	Condition	MTBF (Hours)
EMP2-X801	The analysis is at 25°C ambient temperature by Telcordia SR-332, Issues 4, Method I, Case 3 under Ground Benign, Controlled environment, 50% operation stress	4,414,960

2.5. CE and FCC Compatibility

EMP2-X801 conforms to CE and FCC requirements.

2.6. RoHS Compliance

EMP2-X801 is fully compliant with RoHS directive.

2.7. Hardware

2.7.1. Layout

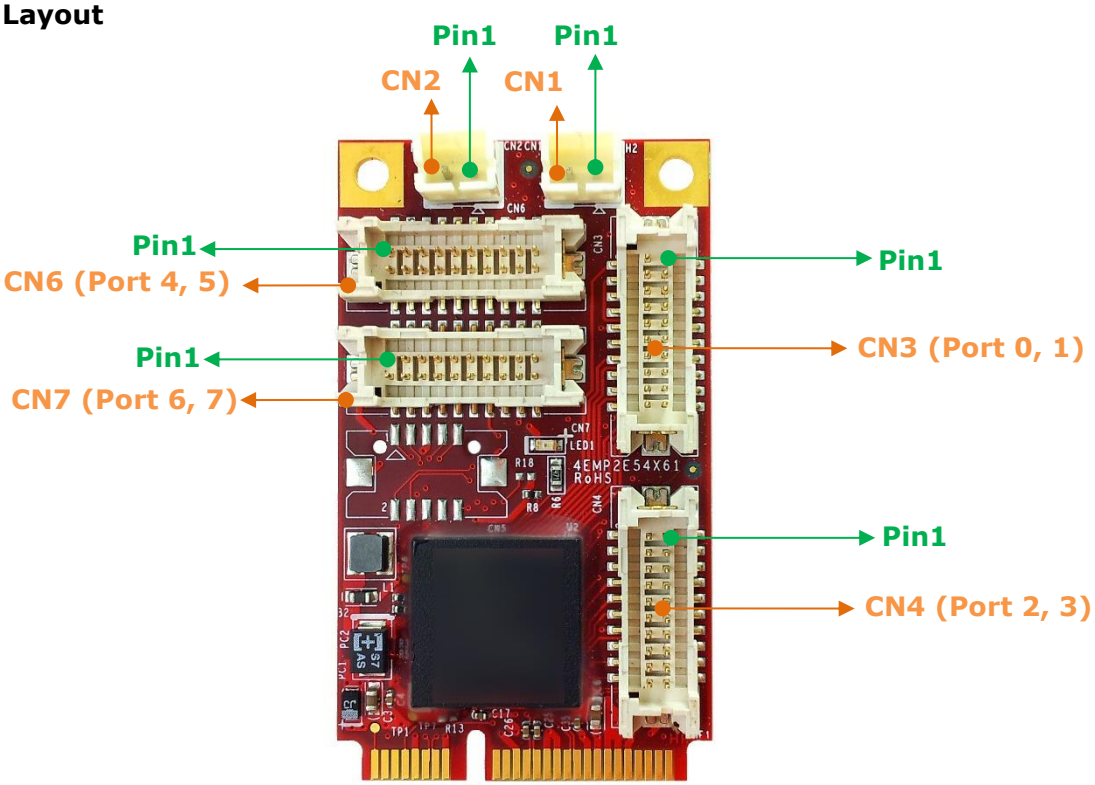


Table 8: mPCIe PCB Layout Legend

Label	Connector Type	Function
CN1	Wafer DIP 1*2P 180° P:2.0mm	Power for daughter board (3.3V)
CN2	Wafer DIP 1*2P 180° P:2.0mm	Power for daughter board (3.3V)
CN3	Wire to board SMD 2*10P 180° P:1.25mm H:4.8mm	RS232/422/485 Port 0(red), 1
CN4	Wire to board SMD 2*10P 180° P:1.25mm H:4.8mm	RS232/422/485 Port 2(red), 3
CN6	Wire to board SMD 2*10P 180° P:1.25mm H:4.8mm	RS232/422/485 Port 4(red), 5
CN7	Wire to board SMD 2*10P 180° P:1.25mm H:4.8mm	RS232/422/485 Port 6(red), 7

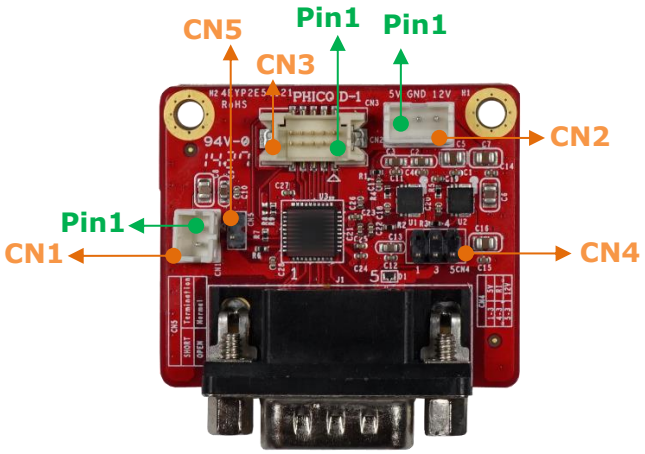


Table 9: Daughter Board PCB Layout Legend

Label	Connector Type	Function
CN1	Wafer DIP 1*2P 180° P:2.0mm	Power input for daughterboard (3.3V)
CN2	Wafer DIP 1*3P 180° P:2.0mm	Power input for DB9 pin9 (5V/12V)
CN3	Wire to board SMD 2*5P 180° P:1.25mm H:4.8mm	Cable connector
CN4	Pin header DIP 2*3P(w/o Pin2, 6) 180° P:2.0mm	DB9 pin9 5V/12V/RI selection
CN5	Pin header DIP 1*2P 180° P:2.0mm	Termination resistor

2.7.2. Pin Define

Table 10: mPCIe Pin Define

Signal Name	Pin #	Pin #	Signal Name
NC	**51**	**52**	3.3V AUX
NC	**49**	**50**	GND
NC	**47**	**48**	NC
NC	**45**	**46**	NC
GND	**43**	**44**	NC
3.3V AUX	**41**	**42**	NC
3.3V AUX	**39**	**40**	GND
GND	**37**	**38**	NC
GND	**35**	**36**	NC
PERXP	**33**	**34**	GND
PERXN	**31**	**32**	NC
GND	**29**	**30**	NC
GND	**27**	**28**	NC
PETXP	**25**	**26**	GND
PETXN	**23**	**24**	3.3V AUX
GND	**21**	**22**	PERST#
NC	**19**	**20**	NC
NC	**17**	**18**	GND
GND	**15**	**16**	NC
REFCLK+	**13**	**14**	NC
REFCLK-	**11**	**12**	NC
GND	**9**	**10**	NC
CLKREQ#	**7**	**8**	NC
NC	**5**	**6**	NC
NC	**3**	**4**	GND
WAKE #	**1**	**2**	3.3V AUX

2.7.3. I/O Connector Mechanical Drawing & Pin Defines

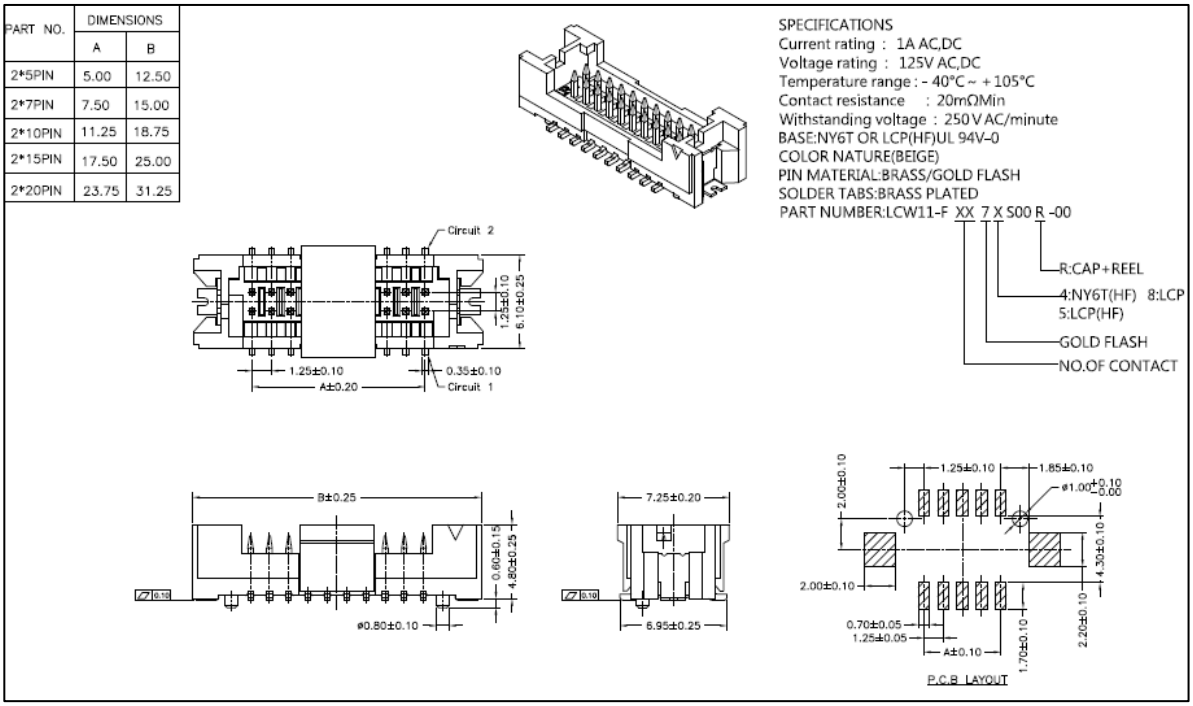
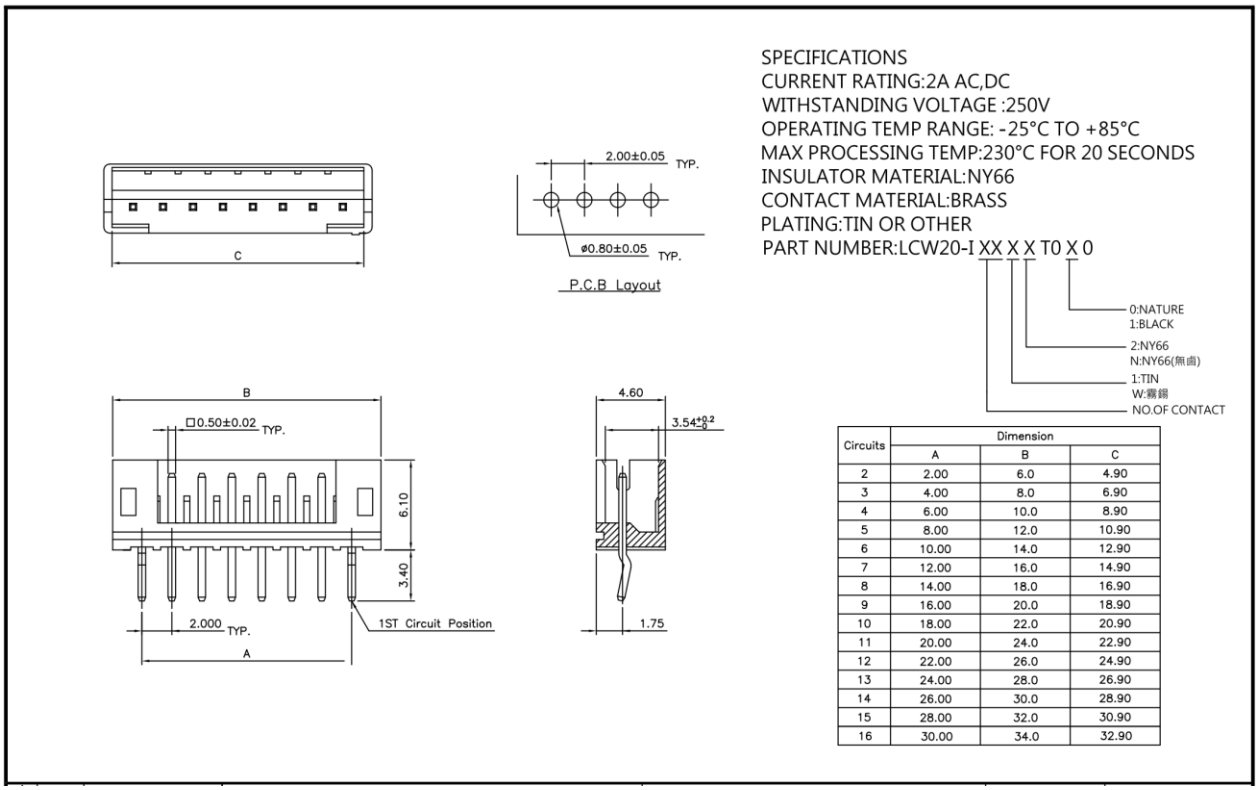


Figure 4: Wire to Board SMD 2*10P Connector Drawing (mPCIe Board CN3/CN4/CN6/CN7)

Table 11: Wire to Board SMD 2*10P Connector Pin Define (mPCIe Board CN3/CN4/CN6/CN7)

Signal Name	Pin #	Pin #	Signal Name
GPIO9	**19**	**20**	GPIO11
GPIO8	**17**	**18**	GPIO10
RI0n	**15**	**16**	RI1n
CTS0n	**13**	**14**	CTS1n
RTS0n	**11**	**12**	RTS1n
DSR0n	**9**	**10**	DSR1n
DTR0n	**7**	**8**	DTR1n
TX0	**5**	**6**	TX1
RX0	**3**	**4**	RX1
CD0n	**1**	**2**	CD1n



Circuits	Dimension		
	A	B	C
2	2.00	6.0	4.90
3	4.00	8.0	6.90
4	6.00	10.0	8.90
5	8.00	12.0	10.90
6	10.00	14.0	12.90
7	12.00	16.0	14.90
8	14.00	18.0	16.90
9	16.00	20.0	18.90
10	18.00	22.0	20.90
11	20.00	24.0	22.90
12	22.00	26.0	24.90
13	24.00	28.0	26.90
14	26.00	30.0	28.90
15	28.00	32.0	30.90
16	30.00	34.0	32.90

Figure 5: Wafer DIP 1*2P Connector Drawing (mPCIe Board CN1/CN2, Daughterboard CN1)

Table 12: Wafer DIP 1*2P Connector Pin Define (mPCIe Board CN1/CN2, Daughterboard CN1)

Pin #	1	2
Signal Name	3.3V	GND

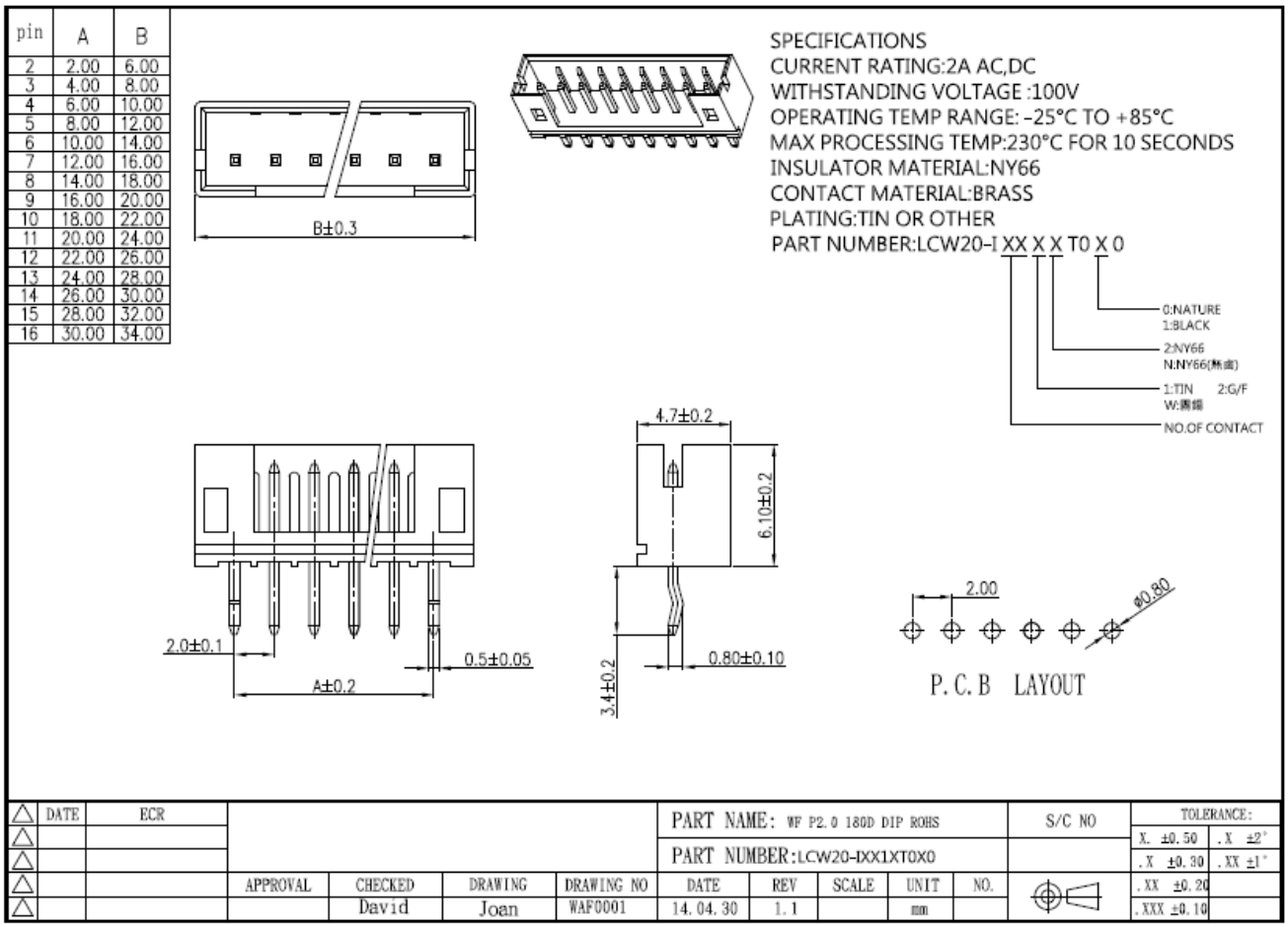


Figure 6: Wafer DIP 1*3P Connector Drawing (Daughterboard CN2)

Table 13: Wafer DIP 1*3P Connector Drawing (Daughterboard CN2)

Pin #	1	2	3
Signal Name	Ext_5V	GND	Ext_12V

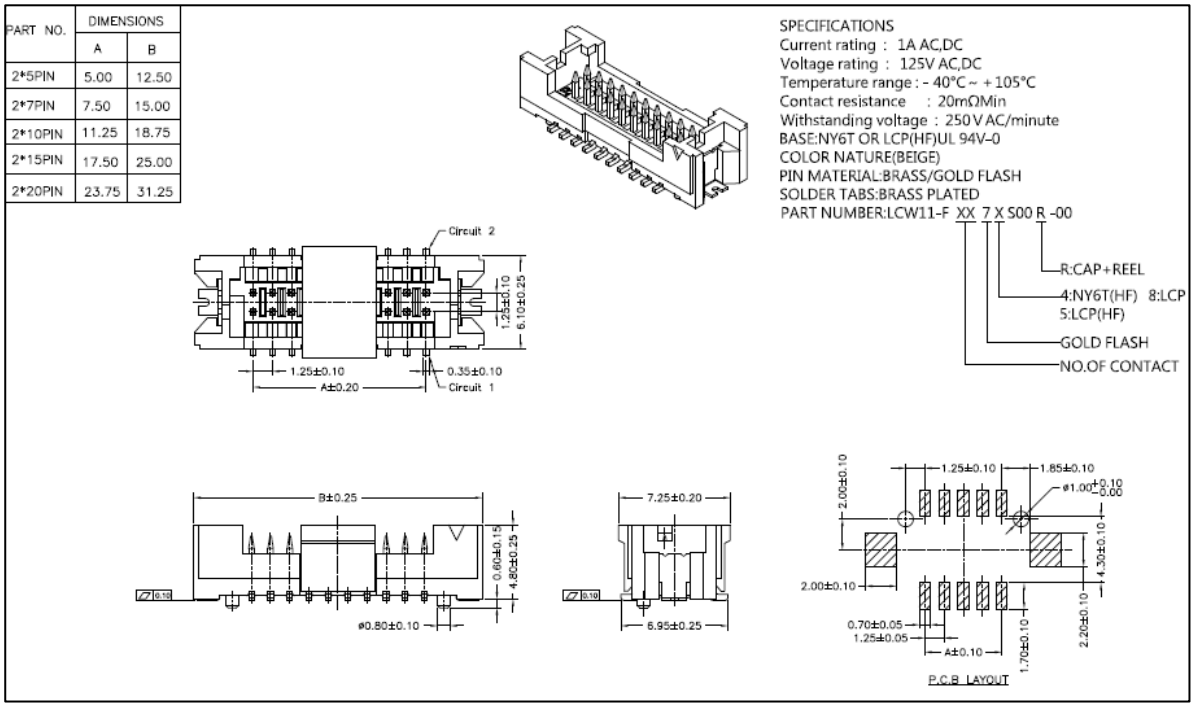


Figure 7: Wire to Board SMD 2*5P Connector Drawing (Daughterboard CN3)

Table 14: Wire to Board SMD 2*5P Connector Pin Define (Daughterboard CN3)

Signal Name	Pin #	Pin #	Signal Name
MODE0	**9**	**10**	MODE1
CTS0n	**7**	**8**	RI0n
DSR0n	**5**	**6**	RTS0n
TX0	**3**	**4**	DTR0n
CD0n	**1**	**2**	RX0

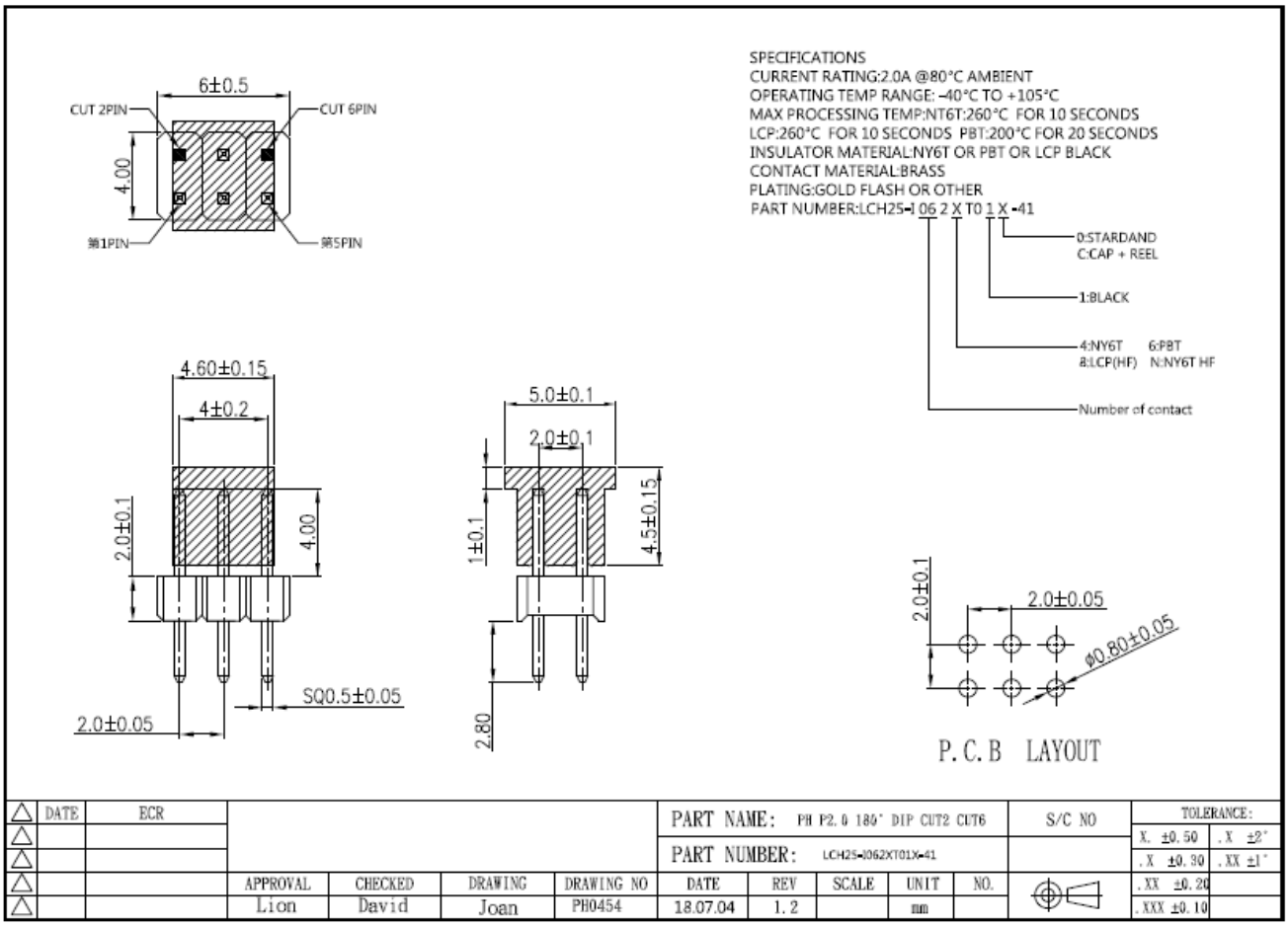
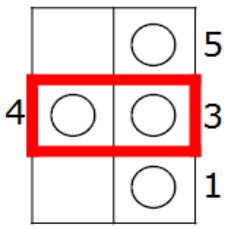
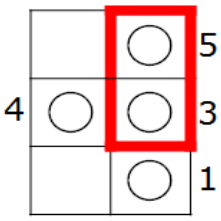
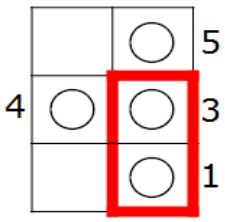


Figure 8: Pin Header DIP 2*3P(w/o Pin2,6) Drawing (Daughterboard CN4)

Table 15: Pin Header DIP 2*3P(w/o Pin2,6) Jumper Setting (Daughterboard CN4)

RI	12V	5V
		

2.7.4. EMP2-X801 Mechanical Drawing

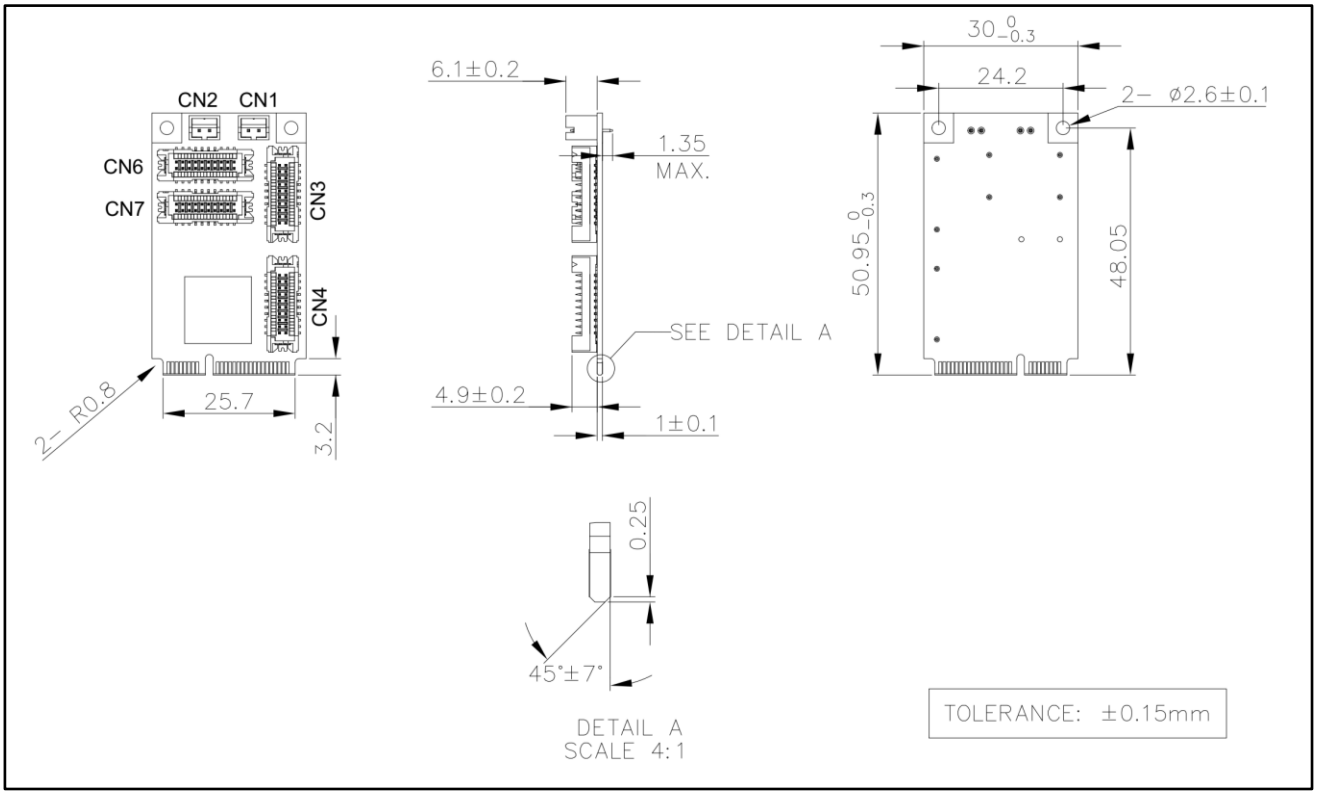


Figure 9: mCPIe Board Drawing

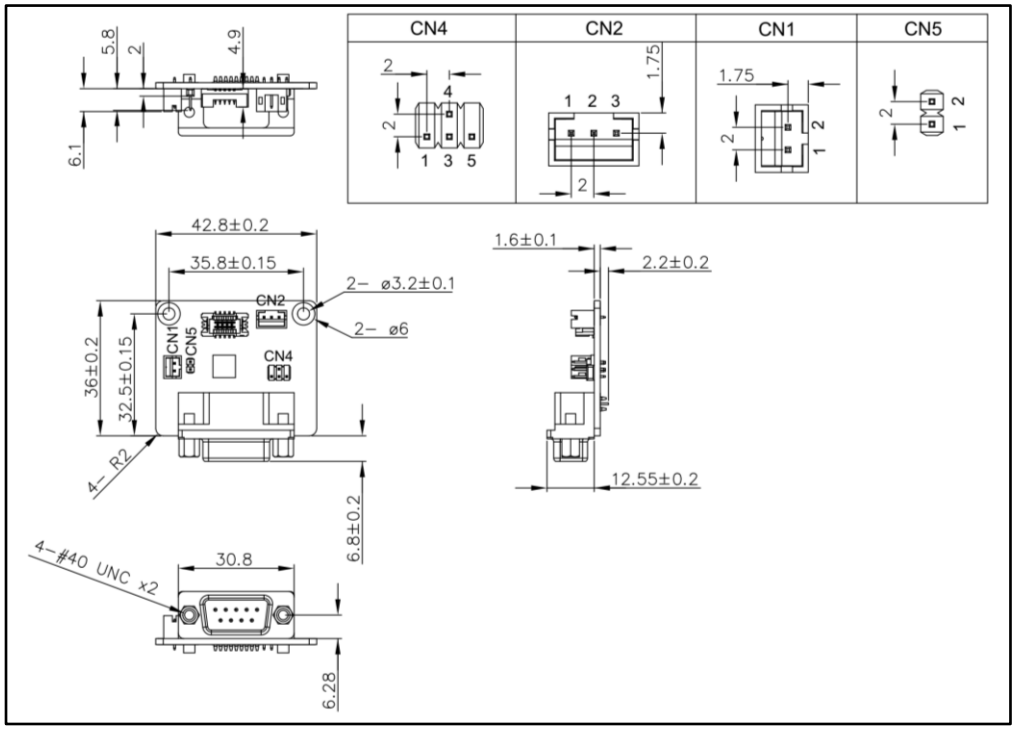
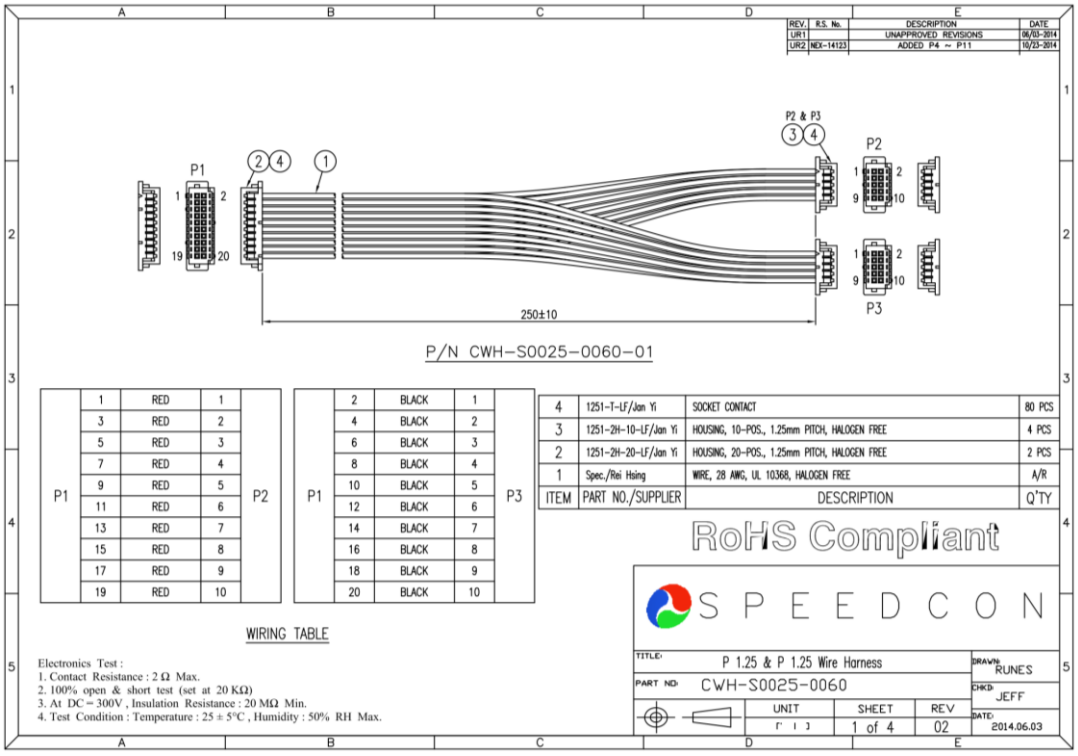
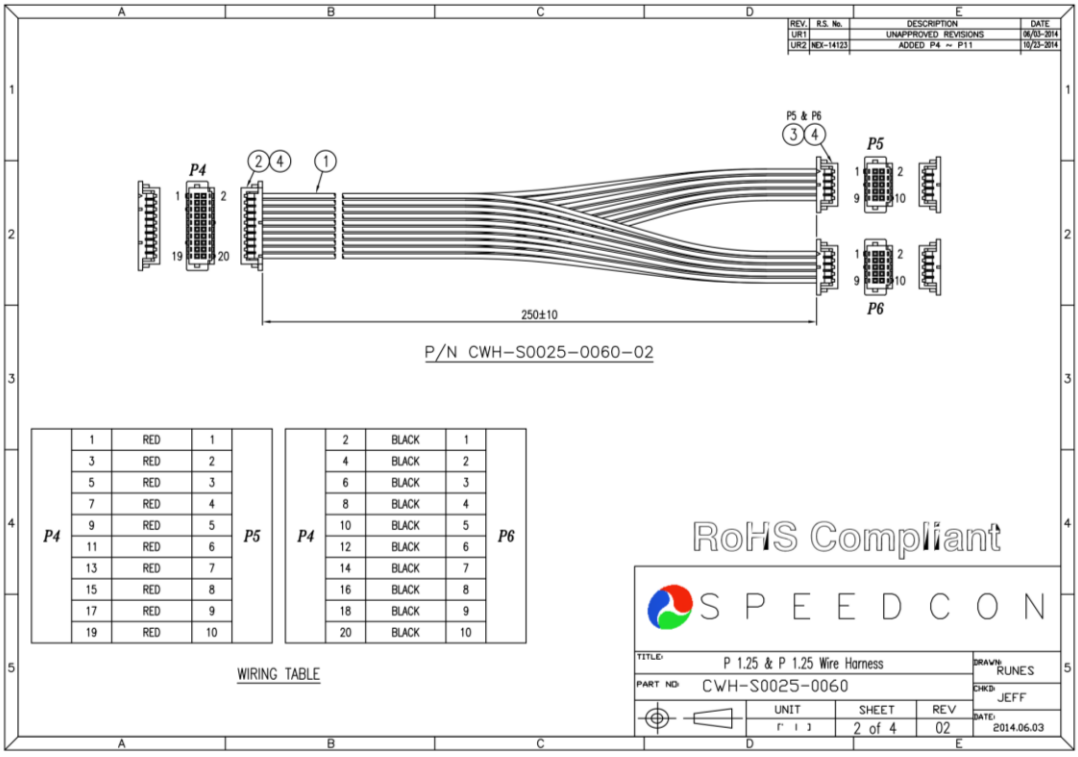
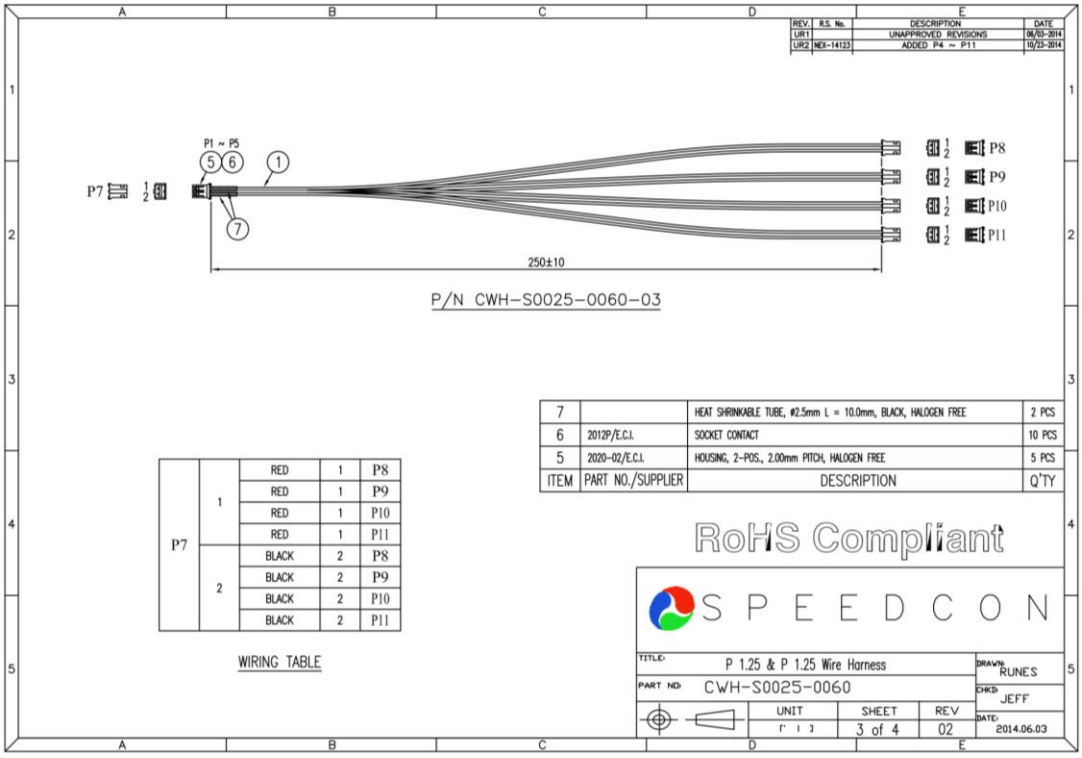


Figure 10: Daughterboard Drawing

2.7.5. Cable Mechanical Drawing & Pin defines







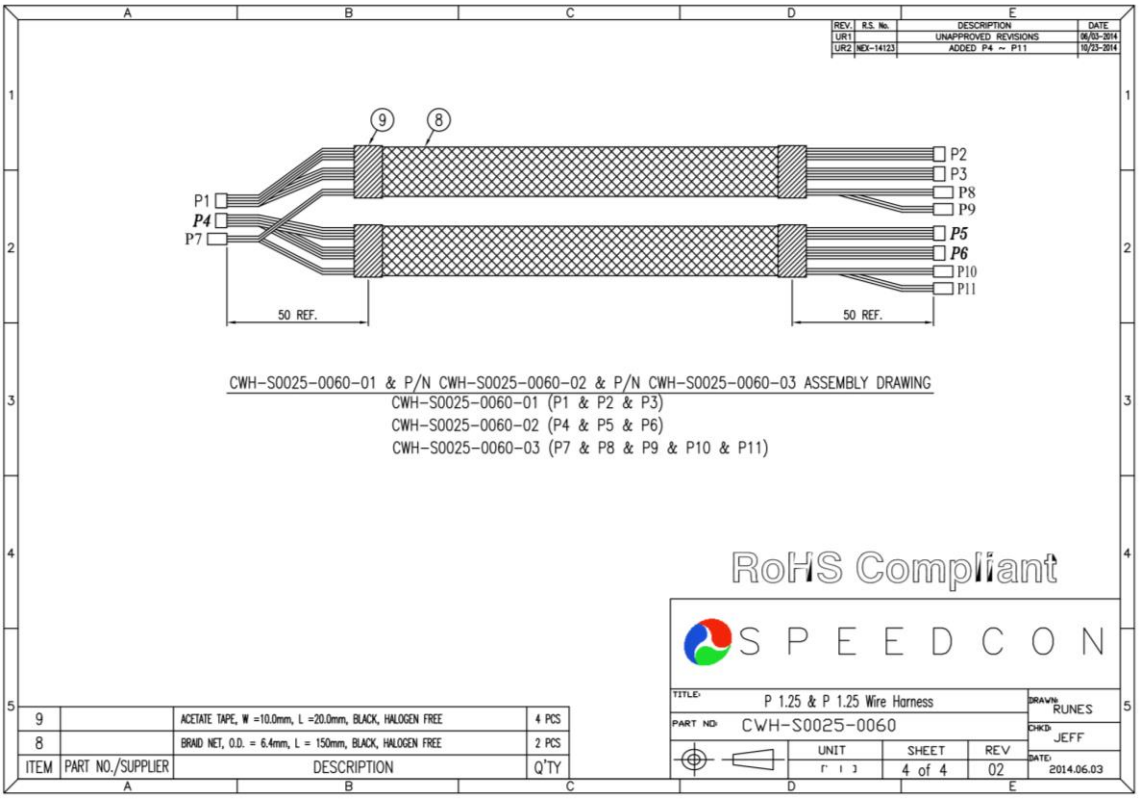


Figure 11: Cable Drawing

Table 16: DB9 Cable Pin Define

Pin #	1	2	3	4	5	6	7	8	9
RS-232	DCD	RX	TX	DTR	GND	DSR	RTS	CTS	RI/5V/12V
RS-422	TX-	TX+	RX+	RX-	GND				RI/5V/12V
RS-485	D-	D+			GND				RI/5V/12V

2.7.6. Packing List

- EMP2-X801 mPCIe Board x1
- Daughterboard x8
- Baord-to-Board Cable x2

2.8. Software Support

- Windows: XP, Windows 7, 8 , 8.1, 10, WES7, CE7.0
- Linux: Kernel 2.6.x and above.(Linux source code for modification)

3. Installation Guide

Please download driver and user manual from Myinnodisk web site.
https://myinnodisk.innodisk.com/myinnodisk/Login.aspx

4. Appedix

innodisk

宜鼎國際股份有限公司
Innodisk Corporation
REACH Declaration

Tel:(02)7703-3000 Fax:(02) 7703-3555 Internet: https://www.innodisk.com/

Innodisk Corporation pursues its social responsibility for global environmental preservation by committing to be compliant with REACH regulation (REGULATION (EC) No 1907/2006).
We hereby confirm that the product(s),
Scope: Flash Memory, DRAM module and Embedded peripherals products.

■ The standard products of not listed in the ***Appendix2*** meet the requirements of REACH SVHC regulations(SVHCs < 0.1% in Article), as described in the candidate list table currently including 211 substances and shown on the ECHA website. (http://echa.europa.eu/de/candidate-list-table).

■ Contain(s) one or more hazardous substances or constituents exceeding 0.1 % by weight in article if not otherwise specified in candidate list table.
Where the threshold value is exceeded, the substances in question are to be declared in accompanying. (SVHCs > 0.1% in Article).

■ Comply with REACH Annex XVII.

Guarantor

Company name 公司名稱： Innodisk Corporation 宜鼎國際股份有限公司

Company Representative 公司代表人：Yichuan Chen 陳怡全

Company Representative Title 公司代表人職稱： QA Manager 品保經理

Date 日期： 2021 / 03 / 03

innodisk

宜鼎國際股份有限公司
Innodisk Corporation

Tel:(02)7703-3000 Internet: https://www.innodisk.com/

RoHS 自我宣告書(RoHS Declaration of Conformity)

Manufacturer Products: All Innodisk EM FLASH, DRAM and EP products

一、 宜鼎國際股份有限公司（以下稱本公司）特此保證售予貴公司之所有產品，皆符合歐盟 2011/65/EU 及(EU) 2015/863 關於 RoHS 之規範要求。
Innodisk Corporation declares that all products sold to the company, are complied with European Union RoHS Directive (2011/65/EU) and (EU) 2015/863 requirement.

二、 本公司同意因本保證書或與本保證書相關事宜有所爭議時，雙方宜友好協商，達成協議。
Innodisk Corporation agrees that both parties shall settle any dispute arising from or in connection with this Declaration of Conformity by friendly negotiations.

三、 本公司聲明我們的產品符合 RoHS 指令的附件中(7a)、(7c-I)允許豁免。
We declare, our products permitted by the following exemptions specified in the Annex of the RoHS directive.
※ (7a) Lead in high melting temperature type solders(i.e. lead-based alloys containing 85% by weight or more lead).
※ (7C-I) Electrical and electronic components containing lead in a glass or ceramic other than dielectric ceramic in capacitors, e.g. piezoelectric devices, or in a glass or ceramic matrix compound.

Name of hazardous substance	Limited of RoHS ppm (mg/kg)
鉛 (Pb)	< 1000 ppm
汞 (Hg)	< 1000 ppm
鎘 (Cd)	< 100 ppm
六價鉻 (Cr 6+)	< 1000 ppm
多溴聯苯 (PBBs)	< 1000 ppm
多溴二苯醚 (PBDEs)	< 1000 ppm
鄰苯二甲酸二(2-乙基己基)酯 (DEHP)	< 1000 ppm
鄰苯二甲酸丁酯苯甲酯 (BBP)	< 1000 ppm
鄰苯二甲酸二丁酯 (DBP)	< 1000 ppm
鄰苯二甲酸二異丁酯 (DIBP)	< 1000 ppm

立 保 證 書 人 (Guarantor)

Company name 公司名稱： Innodisk Corporation 宜鼎國際股份有限公司

Company Representative 公司代表人： Randy Chien 簡川勝

Company Representative Title 公司代表人職稱： Chairman 董事長

Date 日期： 2020 / 03 / 03

CERTIFICATE OF CONFORMITY

Product	:	mPCIe to RS232/422/485 Module
Brand	:	Innodisk
Test Model	:	E%P2-X#01
Series Model	:	E%P2-X#01 %: Form factor: (2: 2.5"SSD, 3:DDR3 DIMM, D:Dongle, G:NGFF_M.2, H:mPCIe Half, L:PCIe Low profile, M:mPCIe, S:SATA, X:Multi, Z:Others) #: Output items: (1:1Port, 2:2Ports, 3:3Ports, 4:4Ports, 5:5Port, 6:6Ports, 7:7Ports, 8:8Ports, A~Z:TBD,X:Multi)
Applicant	:	Innodisk Corporation
Report No.	:	CE200218D07

We, **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, declare that the equipment above has been tested in our facility and found compliance with the requirement limits of applicable standards, in accordance with the Directive 2014/30/EU. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate under the standards herein specified.

EN 55032:2015 +AC:2016, Class B
EN 61000-3-2:2014 (Not applicable)
EN 61000-3-3:2013 (Not applicable)
EN 55035:2017
EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0
EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2
EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0 (Not applicable)
EN 61000-4-5:2014 +A1:2017 / IEC 61000-4-5:2014 +A1:2017 ED. 3.0 (Not applicable)
EN 61000-4-6:2014 +AC:2015 / IEC 61000-4-6:2013 ED. 4.0 (Not applicable)
EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0
EN 61000-4-11:2004 +A1:2017 / IEC 61000-4-11:2004 +A1:2017 ED. 2.0 (Not applicable)
Broadband impulse noise disturbances (Not applicable)

NOTE: The above IEC basic standards are applied with latest version if customer has no special requirement.

Kenny Meng / Assistant Manager
Feb. 27, 2020

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http://www.bureauveritas-adt.com E-Mail: service.adt@tw.bureauveritas.com

CERTIFICATE OF CONFORMITY

Product	:	mPCIe to RS232/422/485 Module
Brand	:	Innodisk
Test Model	:	E%P2-X#01
Series Model	:	E%P2-X#01 %: Form factor: (2: 2.5"SSD, 3:DDR3 DIMM, D:Dongle, G:NGFF_M.2, H:mPCIe Half, L:PCIe Low profile, M:mPCIe, S:SATA, X:Multi, Z:Others) #: Output items: (1:1Port, 2:2Ports, 3:3Ports, 4:4Ports, 5:5Port, 6:6Ports, 7:7Ports, 8:8Ports, A~Z:TBD,X:Multi)
Applicant	:	Innodisk Corporation
Report No.	:	FD200218D07

We, **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, declare that the equipment above has been tested in our facility and found compliance with the requirement limits of applicable standards. The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate under the standards herein specified.

47 CFR FCC Part 15, Subpart B, Class B

ICES-003: 2016 Issue 6, updated Apr. 2019 Class B

ANSI C63.4:2014

Jim Hsiang / Associate Technical Manager
Feb. 27, 2020

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