innodisk

Total Solution For
Embedded Peripherals

EMPC-B2S1

mPCIe to dual isolated CANbus 2.0B/J1939/CANopen

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	Sep, 2022

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1. Product Introduction

1.1. Overview

Innodisk EMPC-B2S1 is designed with standard Mini PCI Express form factor; EMPC-B2S1 supports PCIe to dual independent CAN bus 2.0B, optimized for higher performance and lower power, which brings you a flexible expansion solution for embedded systems.

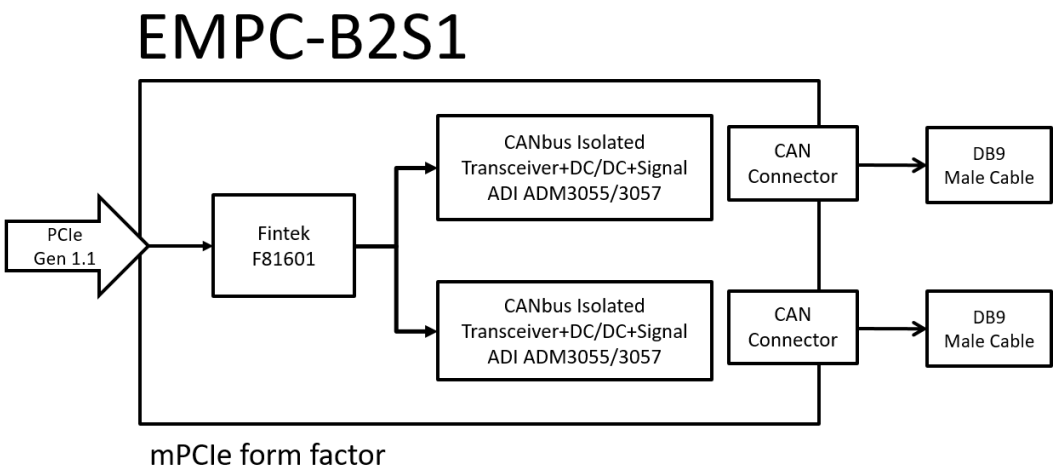

Figure 1: Block Diagram

1.2. Features

- Compliant with PCI Express 1.1
- Meet the Requirements of the ISO 11898-1
- CAN bus 2.0B backward compatible with 2.0A
- Support baud rate 10/20/50/100/250/500/800/1000K
- Support CAN message acceptance filter
- Support Linux SocketCAN
- Support SAE J1939/CANopen high layer protocol (Optional)
- Compliant with IEC 60950-1:2005 + A1: 2009 + A2:2013 2.5kV HiPOT protection
- Compliant with EN61000-4-2 (ESD) Air-15kV, Contact-8kV
- Termination resistor enabled/disabled by jumper
- 30μ" golden finger, 3-year warranty
- Industrial Temperature (-40˚C to +85˚C) support
- Industrial design, manufactured in Innodisk Taiwan

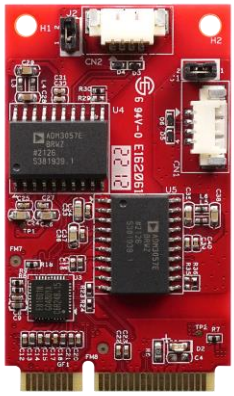

Figure 2: Picture

2. Product Specifications

2.1. Device Parameters

Table 1: Device Parameters

Form Factor	mPCIe
Input I/F	PCI Express 1.1
Output I/F	CANbus 2.0B
Output Connector	DB-9 x 2
Dimension (WxLxH)	30 x 50.9 x 8.25 mm

2.2. Performance

In performance test, we use our own stress test tool to verify the receiving performance.

Table 2: One Card Loopback

ID Type	Bytes	TX (frames/sec)	RX (frames/sec)
SID	0	11965	11947
	1	9439	9416
	2	9134	9115
	3	8264	8241
	4	7583	7569
	5	7045	7035

	6	6506	6493
	7	6008	5998
	8	5552	5540
EID	0	8933	8920
	1	8126	8107
	2	7382	7369
	3	6829	6818
	4	6250	6239
	5	5797	5787
	6	5349	5335
	7	3873	3867
	8	3597	3592

Table 3: Two Cards TX/RX

ID Type	Bytes	TX (frames/sec)	RX (frames/sec)
SID	0	12149	12122
	1	10622	10594
	2	9571	9557
	3	8512	8499
	4	7460	7443
	5	6580	6568
	6	6300	6290
	7	5742	5728
	8	5440	5430
EID	0	9056	9033
	1	7698	7684
	2	6946	6929
	3	6596	6577
	4	6206	6190
	5	5555	5541
	6	5392	5377
	7	5067	5057
	8	4548	4539

2.3. Electrical Specifications

2.3.1. Power Requirement

Table 4: Power Requirement

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

2.3.2. Power Consumption

Table 5: Power Consumption

Voltage(V)	RMS(mA)	Max (mA)
3.3	330	859

2.4. Environmental Specifications

2.4.1. Temperature Ranges

Table 6: 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 7: 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 8: Mean Time between Failure (MTBF)

Product	Condition	MTBF (Hours)
EMPC-B2S1-W1	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	23,279,105
EMPC-B2S1-W2	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	23,016,315

2.5. CE and FCC Compatibility

EMPC-B2S1 conforms to CE and FCC requirements.

2.6. RoHS Compliance

EMPC-B2S1 is fully compliant with RoHS directive.

2.7. Hardware

2.7.1. Layout

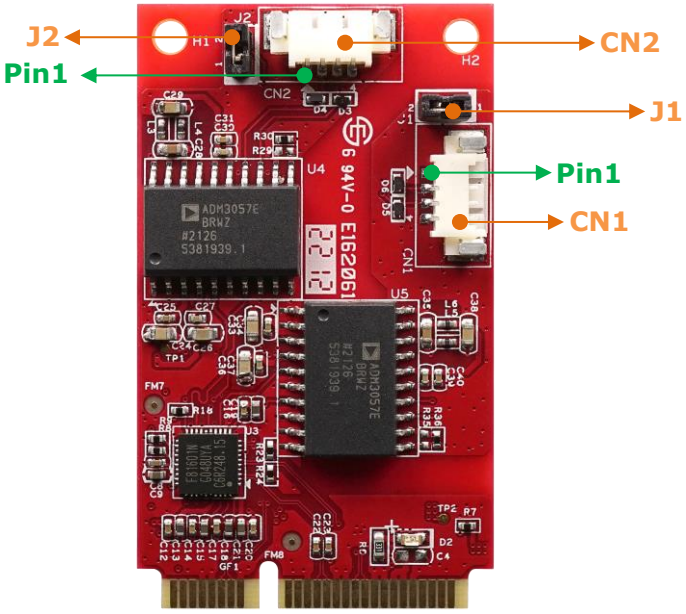

Table 9: PCB Layout Legend

Label	Connector Type	Function
CN1-CN2	Wire to board SMD 1*4P 90° P:1.25mm	CAN bus Port 1-2
J1-J2	Pin Header DIP 1*2P 180° P:2.0mm	Enable Termination Resistor of Port 1

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
RX+	**33**	**34**	GND
RX-	**31**	**32**	NC
GND	**29**	**30**	NC
GND	**27**	**28**	NC
TX+	**25**	**26**	GND
TX-	**23**	**24**	3.3V AUX
GND	**21**	**22**	PERST#
NC	**19**	**20**	NC
NC	**17**	**18**	GND
GND	**15**	**16**	NC
CLK+	**13**	**14**	NC
CLK-	**11**	**12**	NC
GND	**9**	**10**	NC
CLKREQ# (GND)	**7**	**8**	NC
NC	**5**	**6**	NC
NC	**3**	**4**	GND
PE_WAKE_N	**1**	**2**	3.3V AUX

2.7.3. I/O Connector Mechanical Drawing & Pin Defines

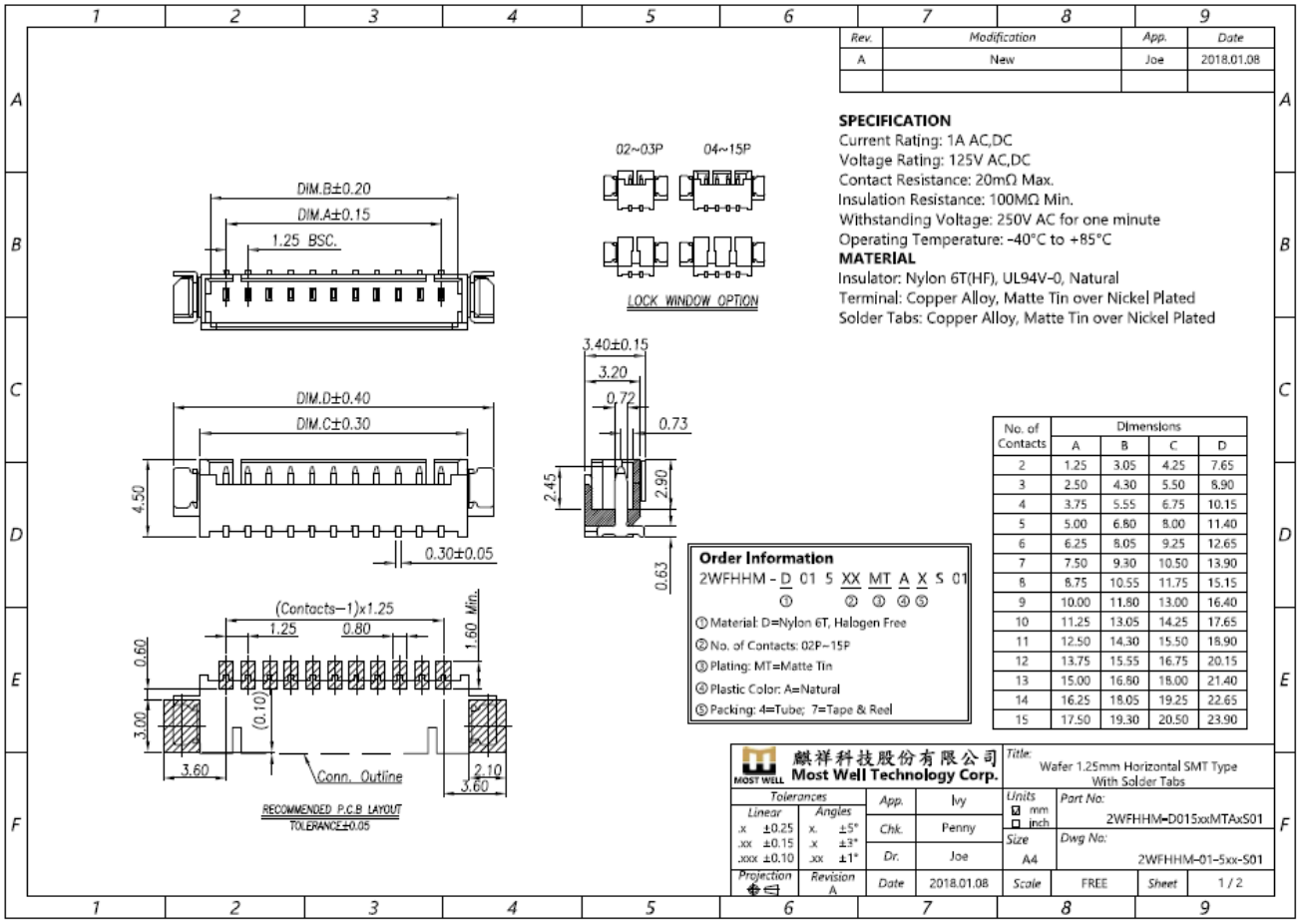

Figure 3: Wire to Board SMD 1*4P Connector Drawing (CN1/CN2)

Table 11: Wire to Board SMD 1*4P Connector Pin Define (CN1/CN2)

Pin #	1	2	3	4
Signal Name	NC	CAN-H	CAN-L	GND

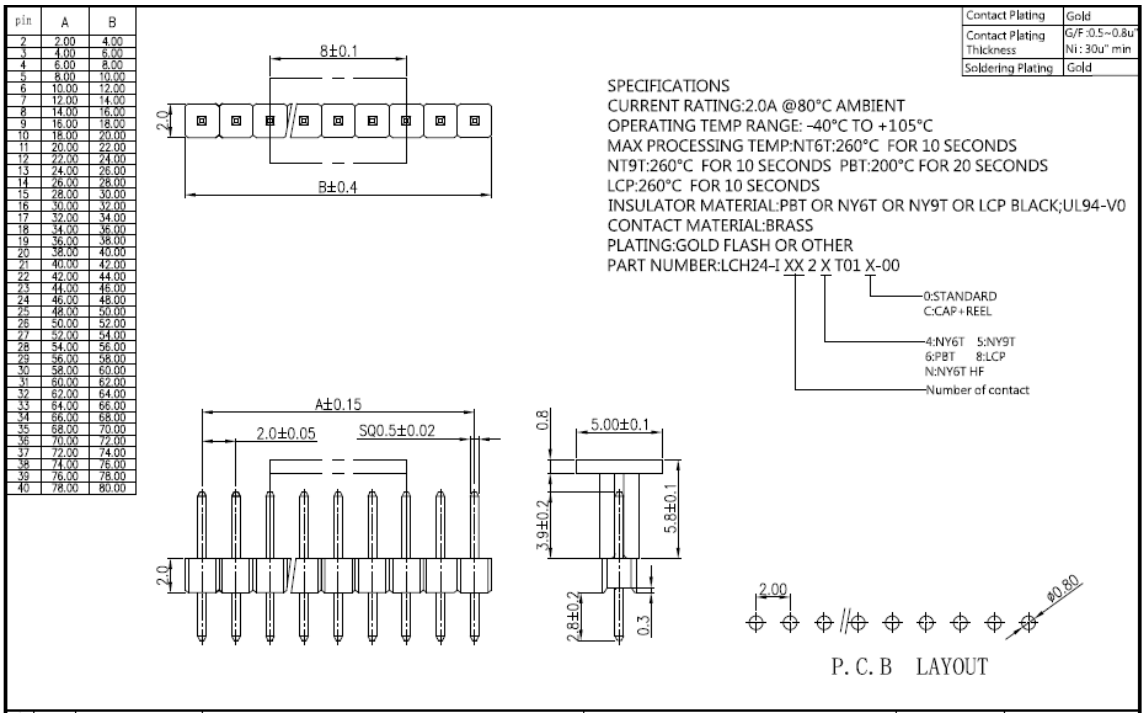

Figure 4: Pin Header DIP 1*2P Drawing (J1/J2)

Table 12: Pin Header DIP 1*2P Jumper Setting (J1/J2)

Jumper is set	Enable Termination Resistor
Jumper is NOT set	Disable Termination Resistor

2.7.4. EMPC-B2S1 Mechanical Drawing

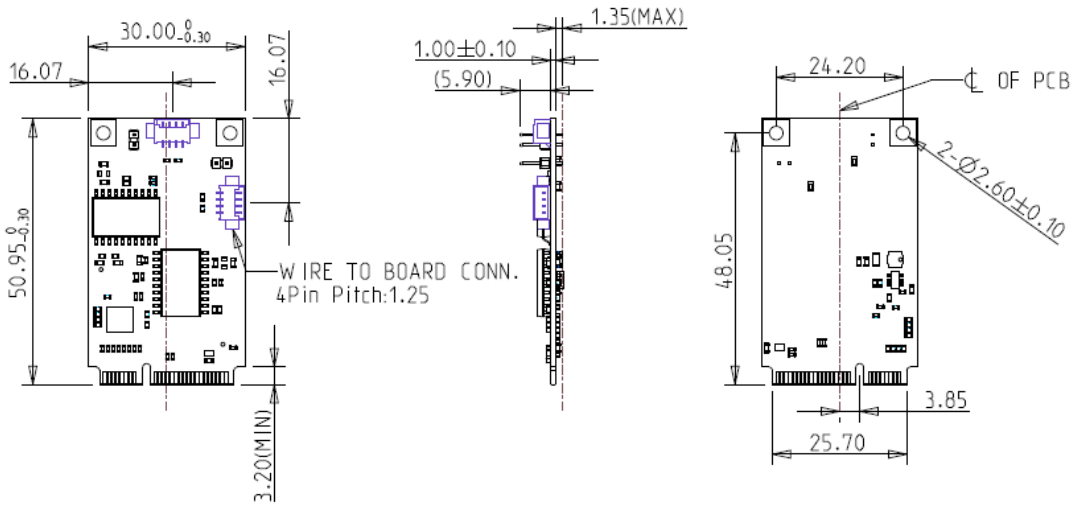

Figure 5: EMPC-B2S1 Drawing

2.7.5. Cable Mechanical Drawing & Pin Defines

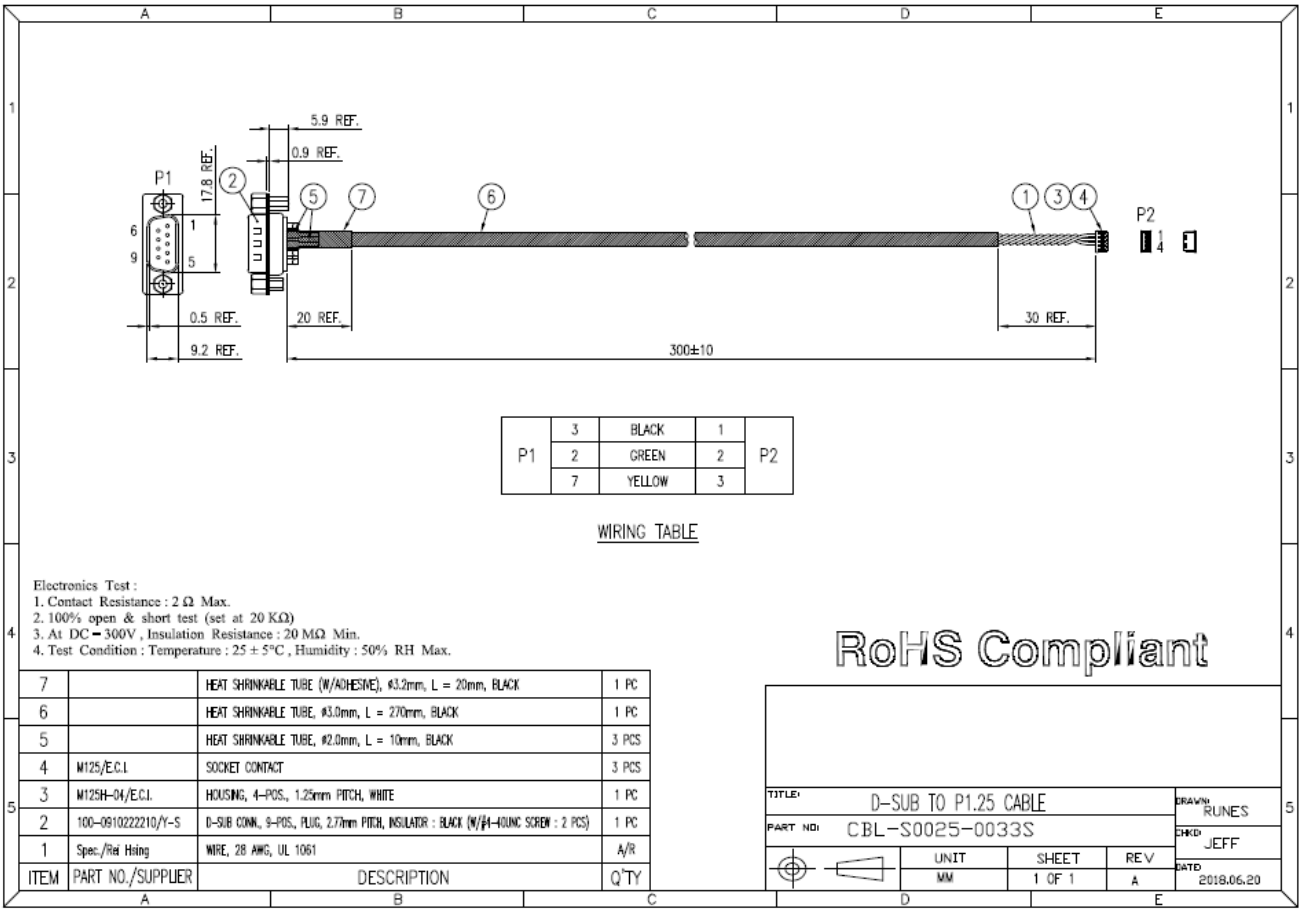

Figure 6: DB9 Cable Drawing

Table 13: DB9 Cable Pin Define

Pin #	1	2	3	4	5	6	7	8	9
Signal Name	NC	CAN-L	GND	NC	NC	NC	CAN-H	NC	NC

2.7.6. Packing List

- EMPC-B2S1 x1
- DB9 Cable x2

2.8. Software Support

Windows	7(32/64bit), 8/8.1(32/64bit), 10(32/64bit)
Linux (SocketCAN driver)	Kernel 2.6.38 and above, 32/64bit

3. Installation Guide

Please download driver, software API 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 224 substances and shown on the ECHA website. (http://echa.europa.eu/de/candidate-list-table).

■ The standard products listed in the ***Appendix2*** 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： 陳怡全

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

Date 日期： 2022 / 06 / 14

1

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 7(a)、7(c)-I、6(c)允許豁免。
We declare, our products permitted by the following exemptions specified in the Annex of the RoHS directive.

※ 7(a) Lead in high melting temperature type solders(i.e. lead-based alloys containing 85% by weight or more lead).

※ 7(c)-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.

※ 6(c) Copper alloy containing up to 4% lead by weight.
(This exemption applies to products that use antennas)

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

宜鼎國際股份有限公司
Innodisk Corporation

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： 2021 / 06 / 09

CERTIFICATE OF CONFORMITY

Product	:	mPCIe to Dual CAN Bus 2.0B
Brand	:	Innodisk
Model No.	:	EMPC-B#S1 #: Output items: (1: 1Port, 2: 2Ports)
Applicant	:	Innodisk Corporation
Report No.	:	CEBDBO-WTW-P22070603

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 +A11:2020, Class B
EN 61000-3-2:2014 (Not Applicable)
EN IEC 61000-3-2:2019+A1:2021 (Not Applicable)
EN 61000-3-3:2013+A2:2021 (Not Applicable)
EN 55035:2017 +A11:2020
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 IEC 61000-4-3:2020 / IEC 61000-4-3:2020 ED. 4.0
EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0 (Not Applicable)
EN 61000-4-5:2014 +A1:2017 / IEC 61000-4-5:2017 ED. 3.1 (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 61000-4-11:2017 ED. 2.1 (Not Applicable)
EN IEC 61000-4-11:2020 / IEC 61000-4-11:2020 ED. 3.0 (Not Applicable)

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

Jim Hsiang / Associate Technical Manager
2022/8/15

No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Tel: 886-2-26052180 Fax: 886-2-26051924
http://www.bureauveritas-adt.com E-Mail: service.adt@tw.bureauveritas.com

CERTIFICATE OF CONFORMITY

Product	:	mPCIe to Dual CAN Bus 2.0B
Brand	:	Innodisk
Model No.	:	EMPC-B#S1 #: Output items: (1: 1Port, 2: 2Ports)
Applicant	:	Innodisk Corporation
Report No.	:	CEBDBO-WTW-P22070603

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 Electromagnetic Compatibility Regulations 2016 (S.I. 2016/1091). The test record, data evaluation and Equipment Under Test (EUT) configurations represented herein are true and accurate under the standards herein specified.

BS EN 55032:2015 +A11:2020, Class B
BS EN 61000-3-2:2014 (Not Applicable)
BS EN IEC 61000-3-2:2019+A1:2021 (Not Applicable)
BS EN 61000-3-3:2013+A2:2021 (Not Applicable)
BS EN 55035:2017 +A11:2020
BS EN 61000-4-2:2009 / IEC 61000-4-2:2008 ED. 2.0
BS EN 61000-4-3:2006 +A1:2008 +A2:2010 / IEC 61000-4-3:2010 ED. 3.2
BS EN IEC 61000-4-3:2020 / IEC 61000-4-3:2020 ED. 4.0
BS EN 61000-4-4:2012 / IEC 61000-4-4:2012 ED. 3.0 (Not Applicable)
BS EN 61000-4-5:2014 +A1:2017 / IEC 61000-4-5:2017 ED. 3.1 (Not Applicable)
BS EN 61000-4-6:2014+AC:2015 / IEC 61000-4-6:2013 ED. 4.0 (Not Applicable)
BS EN 61000-4-8:2010 / IEC 61000-4-8:2009 ED. 2.0
BS EN 61000-4-11:2004 +A1: 2017 / IEC 61000-4-11:2017 ED. 2.1 (Not Applicable)
BS EN IEC 61000-4-11:2020 / IEC 61000-4-11:2020 ED. 3.0 (Not Applicable)

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

Jim Hsiang / Associate Technical Manager
2022/8/15

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CERTIFICATE OF CONFORMITY

Standard: **ICES-003:2020 Issue 7, Class B**
ICES-Gen:2018 Issue 1 +A1:2021
ANSI C63.4-2014 amended as per ANSI C63.4a-2017

Report No.: CIBDBO-WTW-P22070603

Model No.: EMPC-B#S1
#: Output items: (1: 1Port, 2: 2Ports)

Received Date: 2022/7/20

Test Date: 2022/7/27 ~ 2022/7/28

Issued Date: 2022/8/15

Applicant: Innodisk Corporation

Address: 5F., No. 237, Sec. 1, Datong Rd., Xizhi Dist., New Taipei City 221005, Taiwan (R.O.C.)

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories

Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Test Location: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan

Approved by: Jim Hsiang , **Date:** 2022/8/15

Jim Hsiang / Associate Technical Manager

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Prepared by : Ivy Lin / Specialist

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CERTIFICATE OF CONFORMITY

Standard: **47 CFR FCC Part 15, Subpart B, Class B**
ANSI C63.4:2014
Report No.: FDBDBO-WTW-P22070603
Model No.: EMPC-B#S1
#: Output items: (1: 1Port, 2: 2Ports)
Received Date: 2022/7/20
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Applicant: Innodisk Corporation
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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Lin Kou Laboratories
Lab Address: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
Test Location: No. 47-2, 14th Ling, Chia Pau Vil., Lin Kou Dist., New Taipei City, Taiwan
FCC Registration / Designation Number: 418586 / TW1078

Approved by: Jim Hsiang , **Date:** 2022/8/15
Jim Hsiang / Associate Technical Manager

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Prepared by : Ivy Lin / Specialist

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September 20, 2022