innodisk

Total Solution For
Embedded Peripherals

EMUC-F2S3

mPCIe to dual isolated CAN FD

Customer: _____

Customer Part Number: _____

Innodisk Part Number: _____

Innodisk Model Name: _____

Date: _____

Innodisk Approver	Customer Approver

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REVISION HISTORY

Revision	Description	Date
1.0	First Released	Dec, 2024

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1. Product Introduction

1.1. Overview

Innodisk EMUC-F2S3 is designed with standard Mini PCI Express form factor; EMUC-F2S3 supports USB 2.0 to two independent CAN FD and can connect with either mPCIe slot or USB pin header, optimized for higher performance and lower power, which brings you a flexible expansion solution for embedded systems.

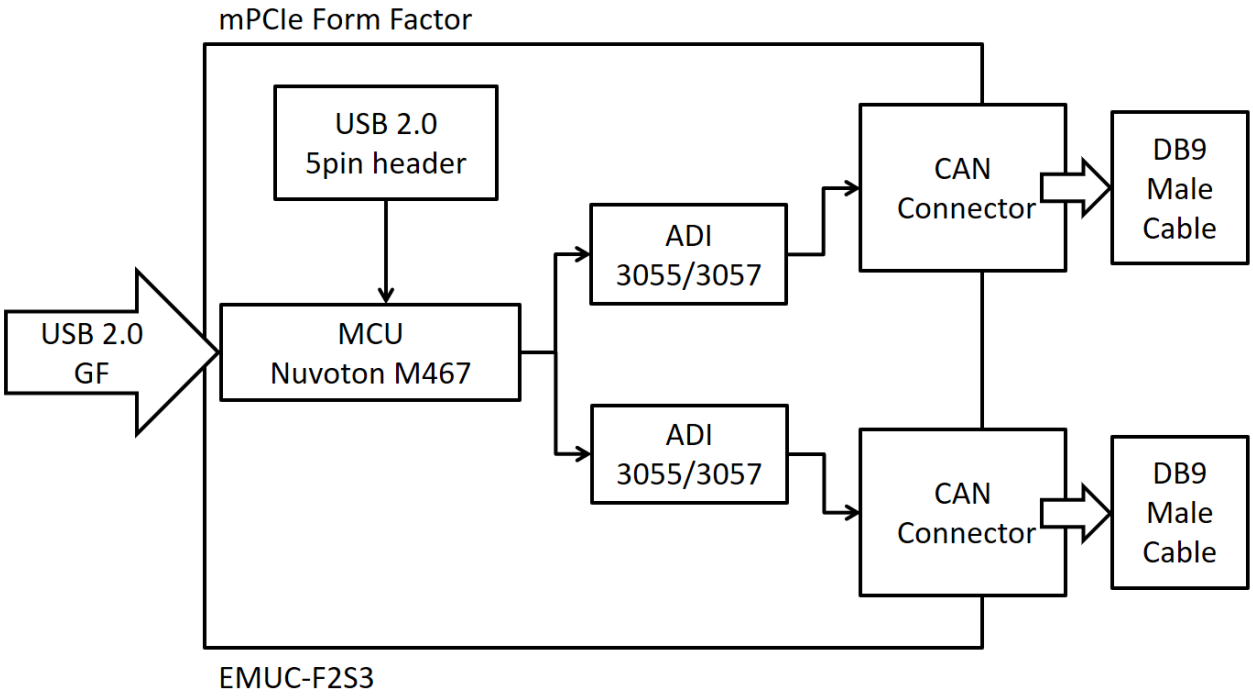


Figure 1: Block Diagram

1.2. Features

- ISO 11898-2:2016 compliant (CAN FD)
- Baud rate support 5/10/20/50/100/125/250/500(default)/800/1000K
- Data rate support 2/4/5Mbps
  - 2M support normal rate 100k and above
  - 4M/5M support normal rate 250K and above
- Support CAN message acceptance filter, listen-only mode
- Keep configuration after hardware reboot
- CAN2.0 Up to 7,800 frame/s (RX baud rate 1M, EID, 8byte data)

- CANFD Up to 6,000 frame/s (RX baud rate 1M, data rate 5M, EID, 64byte data)
- Additional driver to support Linux SocketCAN
- Termination resistor enabled/disabled by jumper
- Complies with IEC 60950-1:2005 + A1: 2009 + A2:2013 2.5kV HiPOT protection
- Complaint with EN61000-4-2 (ESD) Air-15kV, Contact-8kV
- Supports 3rd mounting hole and USB Pin header for out-of-minicard installation
- Industrial Temperature (-40°C to +85°C) support

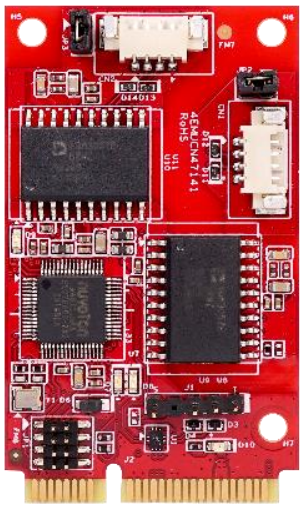


Figure 2: Picture

2. Product Specifications

2.1. Device Parameters

Table 1: Device Parameters

Form Factor	mPCIe
Input I/F	USB 2.0 High Speed (480Mbps)
Output I/F	CAN FD
Output Connector	DB-9 x 2
Dimension (WxLxH)	30 x 50.9 x 8.35 mm

2.2. Performance

2.2.1. CAN FD RX Performance (frame/per second)

EID, FDF, BRS, DLC64			
Normal rate/Data rate	Performance		
	single prot	dual port	
		CAN1	CAN2
1M/5M	6145	6145	6145

EID, FDF, BRS, DLC8			
Normal rate/Data rate	Performance		
	single prot	dual port	
		CAN1	CAN2
1M/5M	14478	14477	14477

EID, FDF, DLC8			
Normal rate/Data rate	Performance		
	single prot	dual port	
		CAN1	CAN2
1M/5M	6736	6736	6736

2.2.2. CAN FD TX Performance (frame/per second)

EID, FDF, BRS, DLC64			
Normal rate/Data rate	Performance		
	single prot	dual port	
		CAN1	CAN2
1M/5M	5587	N/A	N/A

EID, FDF, BRS, DLC8			
Normal rate/Data rate	Performance		
	single prot	dual port	
		CAN1	CAN2
1M/5M	12542	N/A	N/A

EID, FDF, DLC8			
Normal rate/Data rate	Performance		
	single prot	dual port	
		CAN1	CAN2
1M/5M	6354	N/A	N/A

2.3. Electrical Specifications

2.3.1. Power Requirement

EMUC-B2S3 can connect with either mPCIe slot or USB pin header.

Table 2: Power Requirement

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

2.3.2. Power Consumption

Table 3: Power Consumption

Voltage (V)	Idle (RMS)(mA)	Work (RMS)(mA)	Work (MAX)(mA)
5	141.5	163.3	462

2.4. Environmental Specifications

2.4.1. Temperature Ranges

Table 4: 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 5: 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 6: Mean Time between Failure (MTBF)

Product	Condition	MTBF (Hours)
EMUC-F2S3	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	**15,262,468**

2.5. CE and FCC Compatibility

EMUC-F2S3 conforms to CE and FCC requirements.

2.6. RoHS Compliance

EMUC-F2S3 is fully compliant with RoHS directive.

2.7. Hardware

2.7.1. Layout

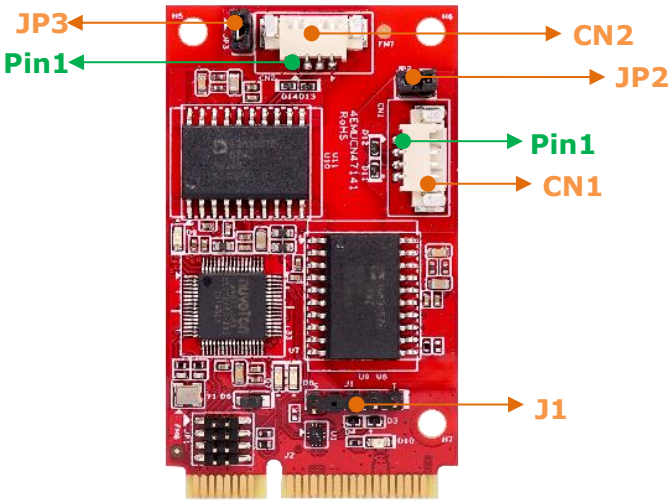


Table 7: PCB Layout Legend

Label	Connector Type	Function
CN1	Wire to board SMD 1*4P 90° P:1.25mm	CAN bus Port 1
CN2	Wire to board SMD 1*4P 90° P:1.25mm	CAN bus Port 2
J1	Pin Header DIP 1*5P(w/o pin4) 180° P:2.0mm L:4.0mm H:2.0mm	Alternative USB 2.0 input
JP2	Pin Header DIP 1*2P 180° P:2.0mm	Enable Termination Resistor of Port 1
JP3	Pin Header DIP 1*2P 180° P:2.0mm	Enable Termination Resistor of Port 2

2.7.2. Pin Define

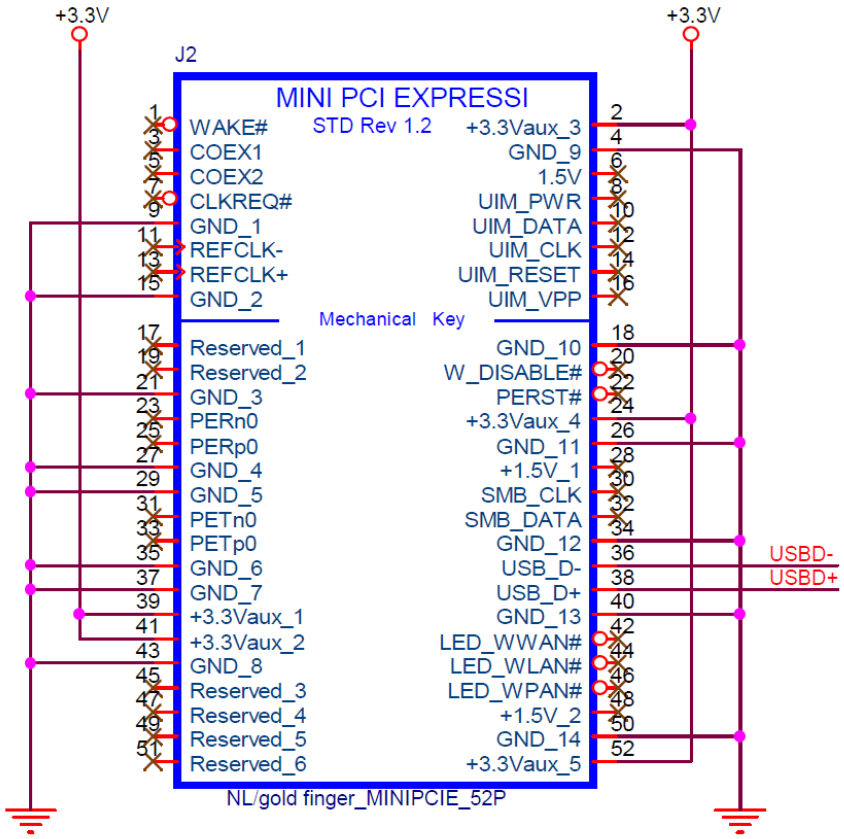
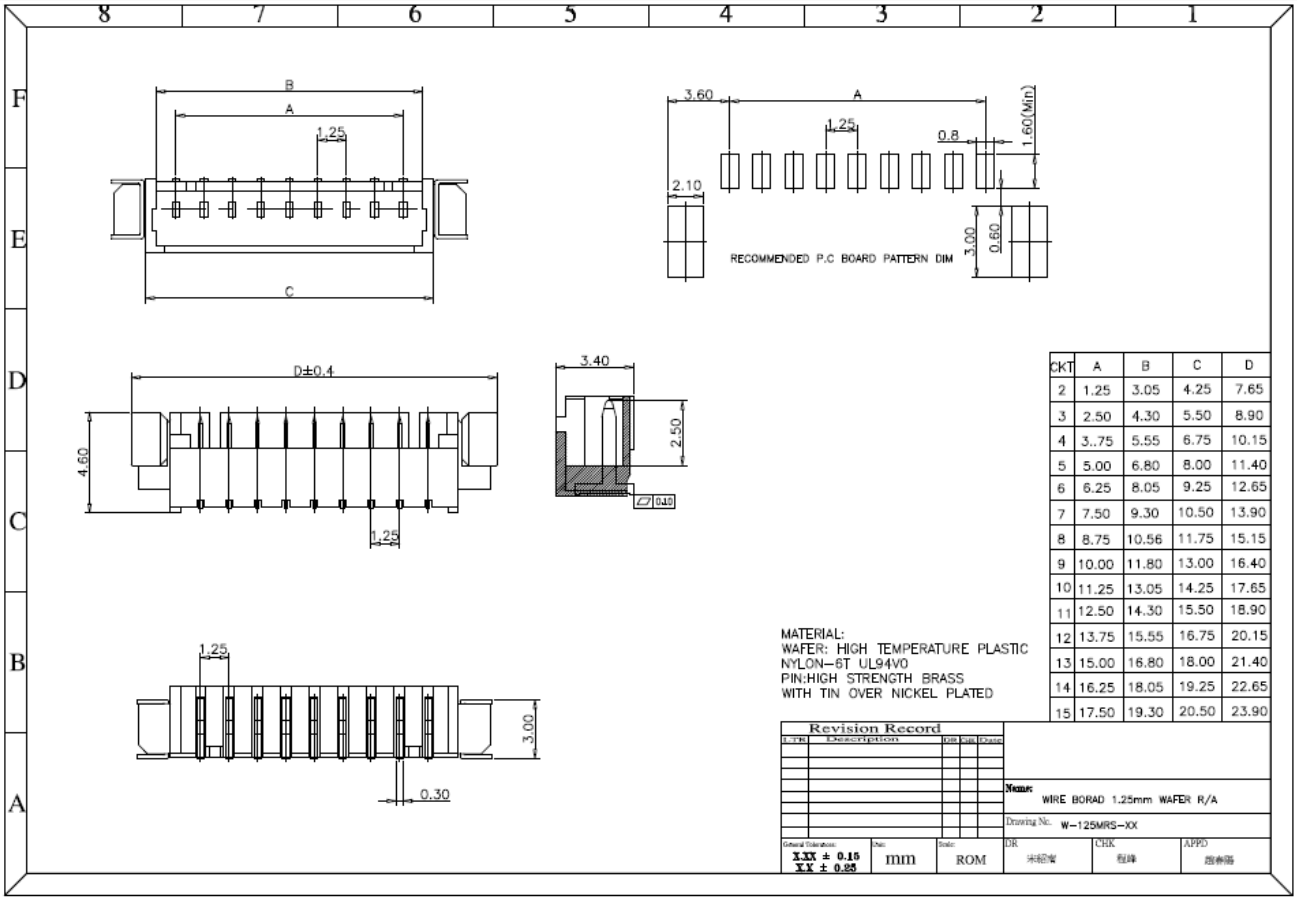


Figure 3 mPCIe Pin Define

2.7.3. I/O Connector Mechanical Drawing & Pin Defines



CKT	A	B	C	D
2	1.25	3.05	4.25	7.65
3	2.50	4.30	5.50	8.90
4	3..75	5.55	6.75	10.15
5	5.00	6.80	8.00	11.40
6	6.25	8.05	9.25	12.65
7	7.50	9.30	10.50	13.90
8	8.75	10.56	11.75	15.15
9	10.00	11.80	13.00	16.40
10	11.25	13.05	14.25	17.65
11	12.50	14.30	15.50	18.90
12	13.75	15.55	16.75	20.15
13	15.00	16.80	18.00	21.40
14	16.25	18.05	19.25	22.65
15	17.50	19.30	20.50	23.90

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

Table 8: Wire to Board SMD 1*4P Connector Pin Define (CN1/CN2)

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

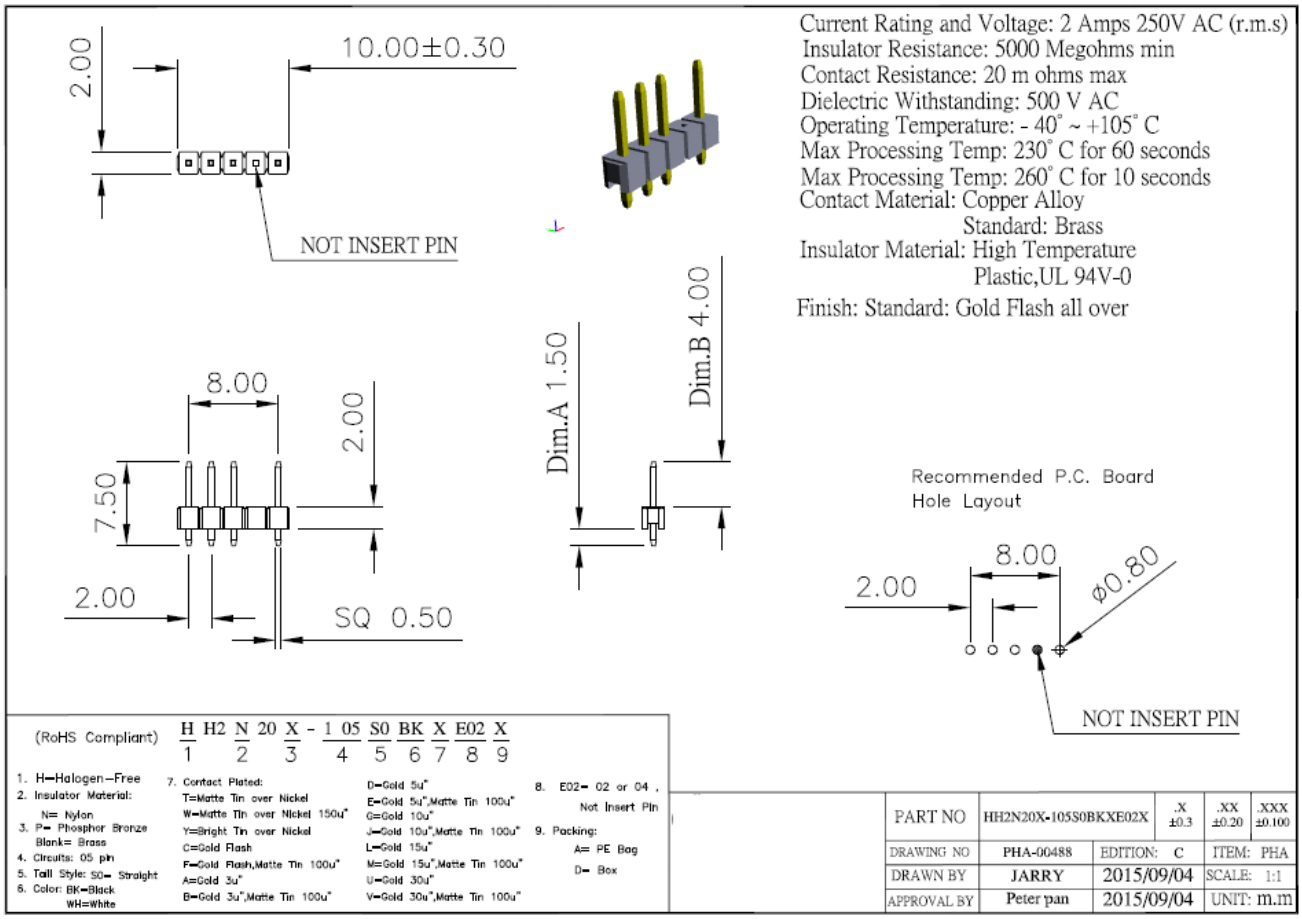


Figure 5: Pin Header DIP 1*5P Drawing (J1)

Table 9: USB Pin Header DIP 1*5P Pin Define (J1)

Pin #	1	2	3		4
Signal Name	5V	USB_D-	USB_D+		GND

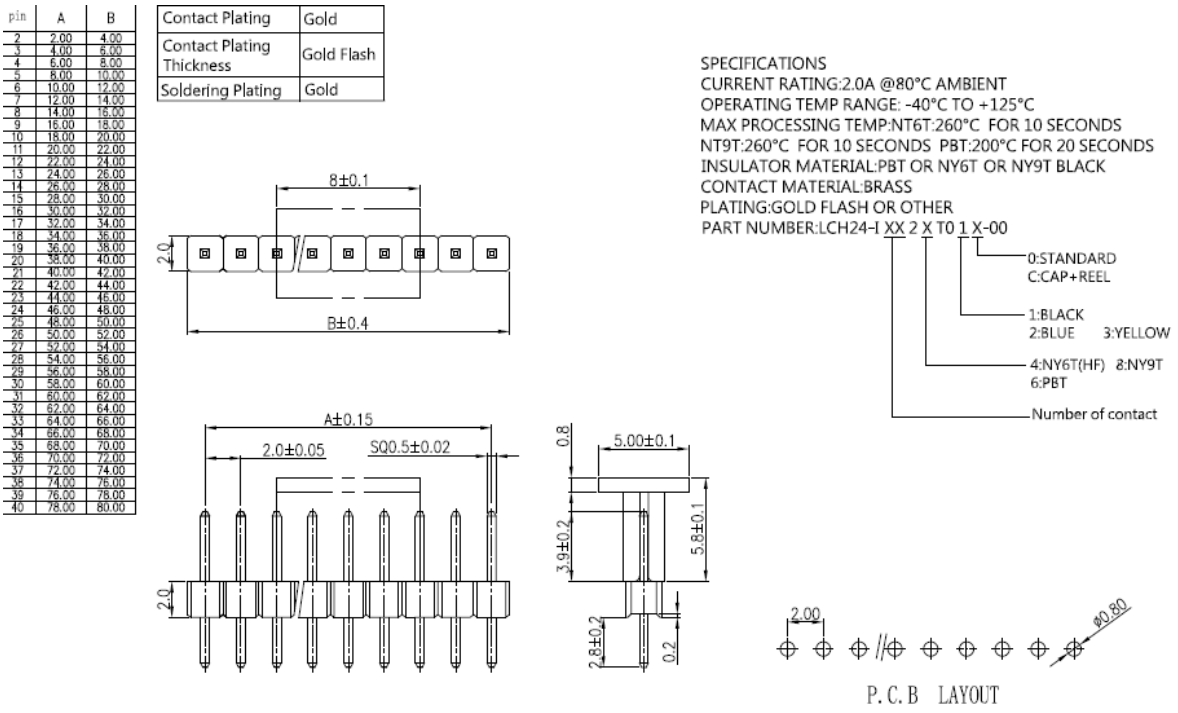


Figure 6: Pin Header DIP 1*2P Drawing (JP2/JP3)

Table 10: Pin Header DIP 1*2P Jumper Setting (JP2/JP3)

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

2.7.4. EMUC-F2S3 Mechanical Drawing

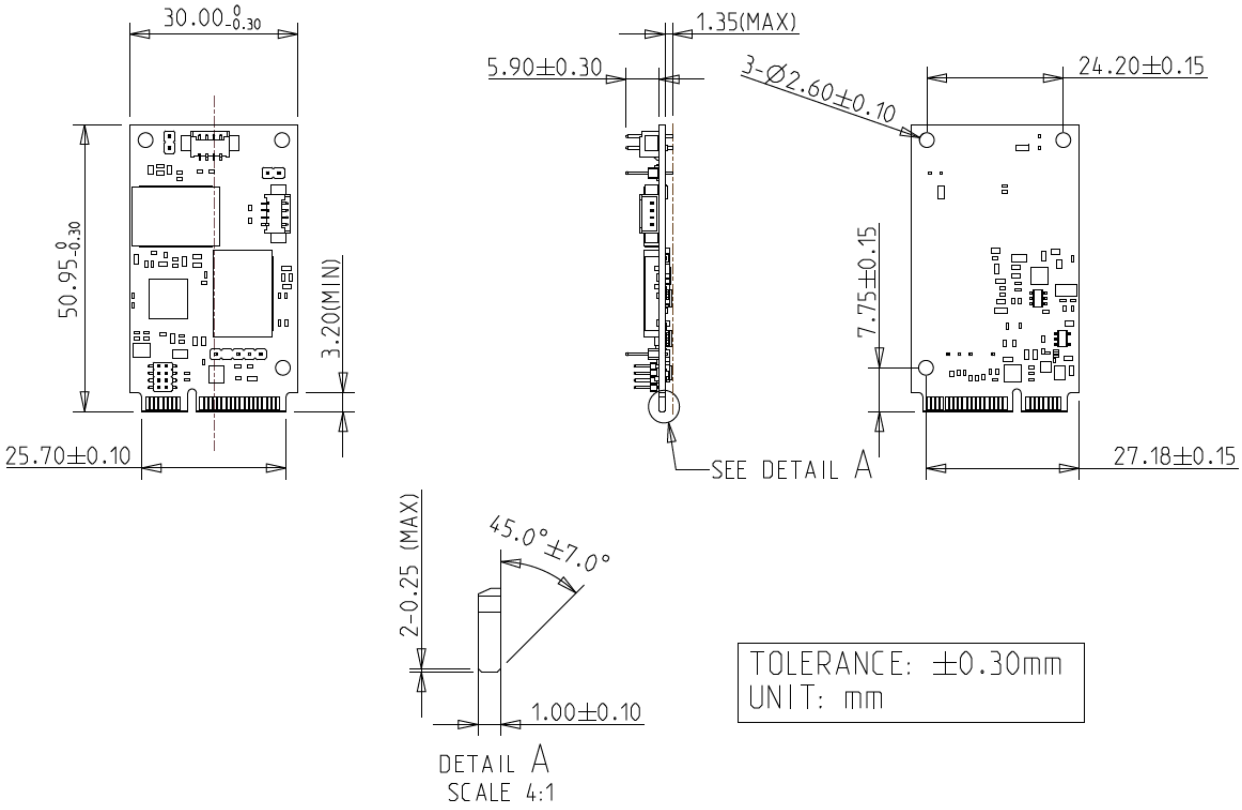


Figure 7: EMUC-F2S3 Drawing

2.7.5. Cable Mechanical Drawing & Pin Defines

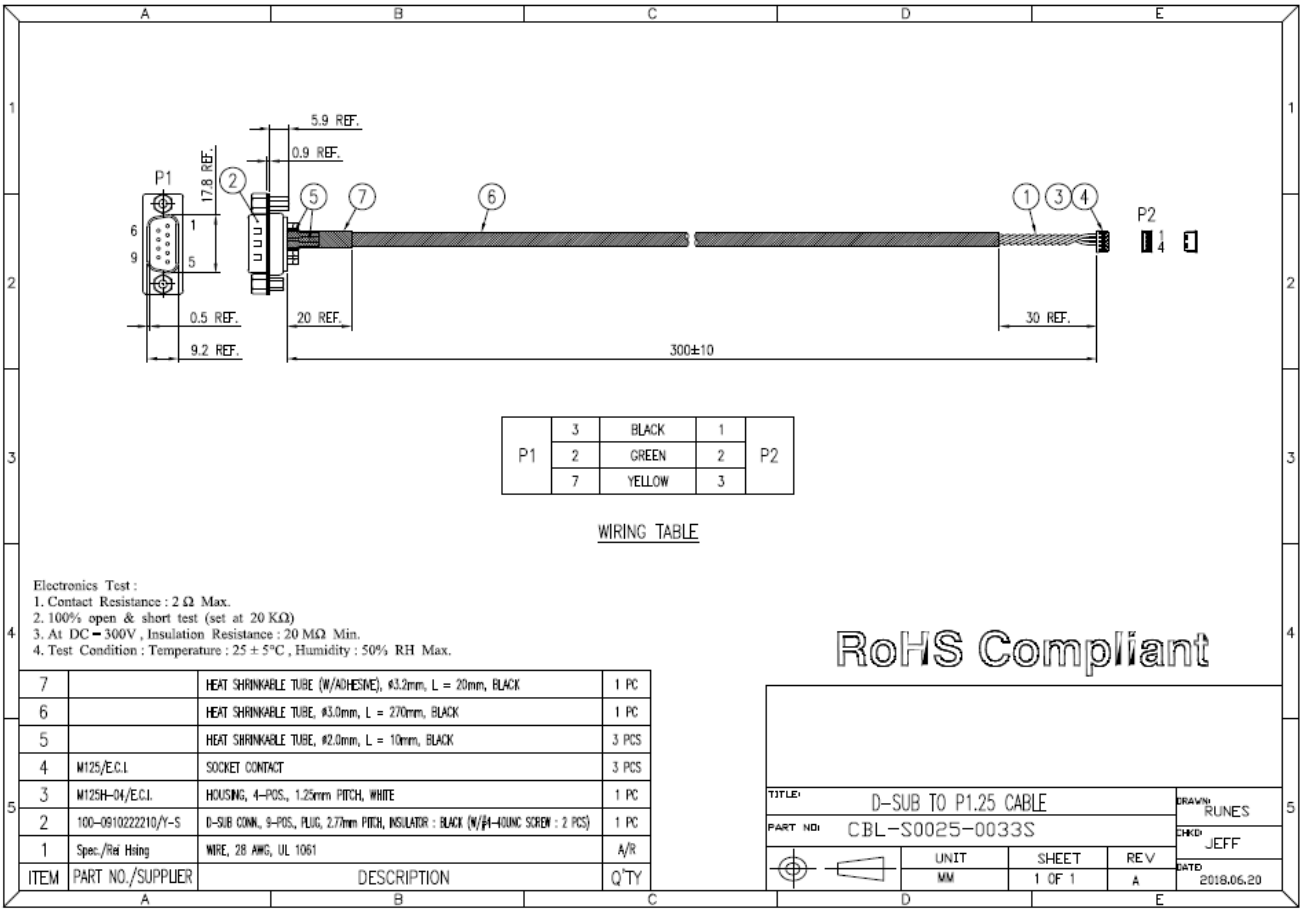


Figure 8: DB9 Cable Drawing

Table 11: 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

- EMUC-F2S3 x1
- DB9 Cable x2

2.8. Software Support

Windows	10(32/64bit), 11
Linux (cdc-acm driver)	Kernel 2.6 and above, 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

DEKRA

Statement of Conformity

Issued Date: Jan. 18, 2024
Report No. : 23C0747R-0E3012100115-A

This is to certify that the following designated product

Product	**: mPCIe to dual isolated CAN 2.0B Module**
Trademark	**: Innodisk**
Model Number	**: EMUC-%2S3 (%: Generation: B: CAN 2.0B, F: CANFD)**
Company Name	**: Innodisk Corporation**

This product, which has been issued the test report listed as above in DEKRA Testing and Certification Co., Ltd. Laboratory, is based on a single evaluation of one sample and confirmed to comply with the requirements of the following EMC standard.

EN 55032:2015/A1:2020, Class B

EN 55035:2017/A11:2020
IEC 61000-4-2 Ed. 2.0:2008
IEC 61000-4-3 Ed. 4.0:2020
IEC 61000-4-8 Ed. 2.0:2009

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Vincent Lin / Director

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TEL:+886-2-8601-3788 FAX:+886-2-8601-3789 Email: info.tw@dekra.com http://www.dekra.com.tw

DEKRA

Statement of Conformity

Issued Date: Jan. 18, 2024
Report No. : 23C0747R-0E3012110014-A

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FCC CFR Title 47 Part 15 Subpart B:2021, Class B

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Innodisk Corporation
REACH Declaration

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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 223 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 / 02 / 08

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
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

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December 16, 2024