# ANTS MVB
AM01M Series

The AM01M Series is a PC/104 type interface product that conforms to international standards IEC 61375-3-1 MVB.

This product supports a physical transmission media called EMD(Electrical Middle Distance) and uses its own developed control technology. This product is applicable to the MVB system through the Logic Bombardier TCMS level 1 MVB Conformance Test and physical layer.

- Possible to operate with a simple setting and designed for making it easy for the user to know MVB Line status and Frame information.
- You can use Process Data, Message Data, Device Status, Bus Manager through the Function options.
- It is designed for the railway industry and can operate in harsh environments.
- Suitable for humidity through coating of 30~60㎛.
- Improved EMI and vibration robustness.
- Operating temperature is −40 to +85℃.
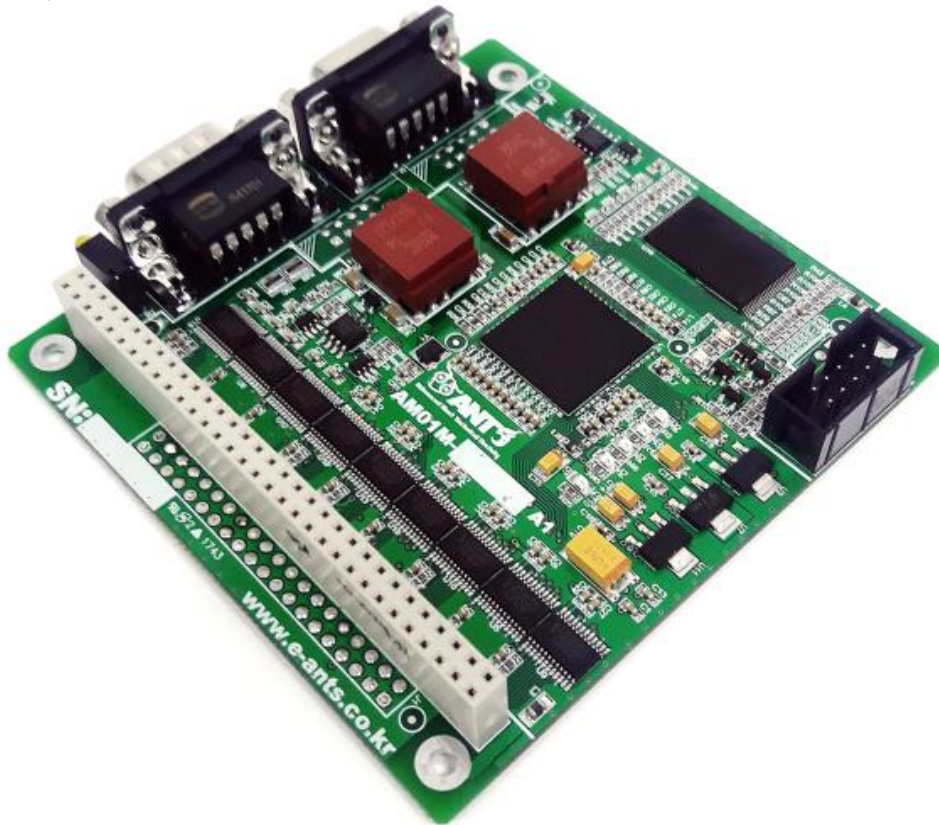
AM01M Series

Data sheet Preamble

1. Customer Rights

As you purchase the product described in this Data Sheet, the purchaser has the right to use it based on the specified purpose and operation of the product, service and maintenance instructions of the product. However, ANTS has other rights including intangible assets.

2. Product Validity

The properties of the product are described in the Data Sheet and are valid until the warranty period on the basis of the order date.

3. Customer Obligations

Buyers must verify that the product is suitable for their purchase intent. Designing systems and applications within supply coverage of ANTS is guaranteed in normal operation, but if the system is configured with other products, malfunctions may occur and be required corresponding action.

4. Quality Assurance

The product warranty is according to ANTS discretion and is subject to repair or replacement at the ANTS factory. The warranty covers of the products that are stocked due to defects in spite of the proper handling. Does not warrant the defects and loss caused by negligence or misuse against property of the products presented by ANTS. The warranty period of the product is 36 months and managed as a serial number from the date of shipment. The warranty does not cover products with defects and warranties due to connection with other products.

5. Other

You must bear the cost of any indirect loss incurred due to non-delivery of the product or warranty. Basically, it is not possible to cancel after order, and the cost of the loss should be defrayed by the buyer.

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AM01M Series

1. Introduction

The AM01M series was developed for the control of railway vehicle MVB systems and has been verified in real vehicles through numerous projects and work at home and abroad.

It has been verified as functional conformity through IEC 61375-3-2 IEC Standard for Train Communication network and Part 3-2: MVB(multifunction vehicle bus) conformance testing according to TCN standard IEC 61375-3-1. Logic used in this product has been verified by Bombardier TCMS level 1 MVB conformance test.

The AM01M Series is designed to make it easy to set EMD MVB through PC/104 standard interface and checking to easy user's information such as MVB Line status and Frame information.
Process Data, Message Data, Device Status, Bus manager Functions can be selected and used according to the user's application according to the Mount Option.

To meet railway environmental conditions, it consists of industrial devices with a working range of -40 to $+85℃$. Suitable to humidity through 30 to 60μm coatings and robust against EMI design and vibration.
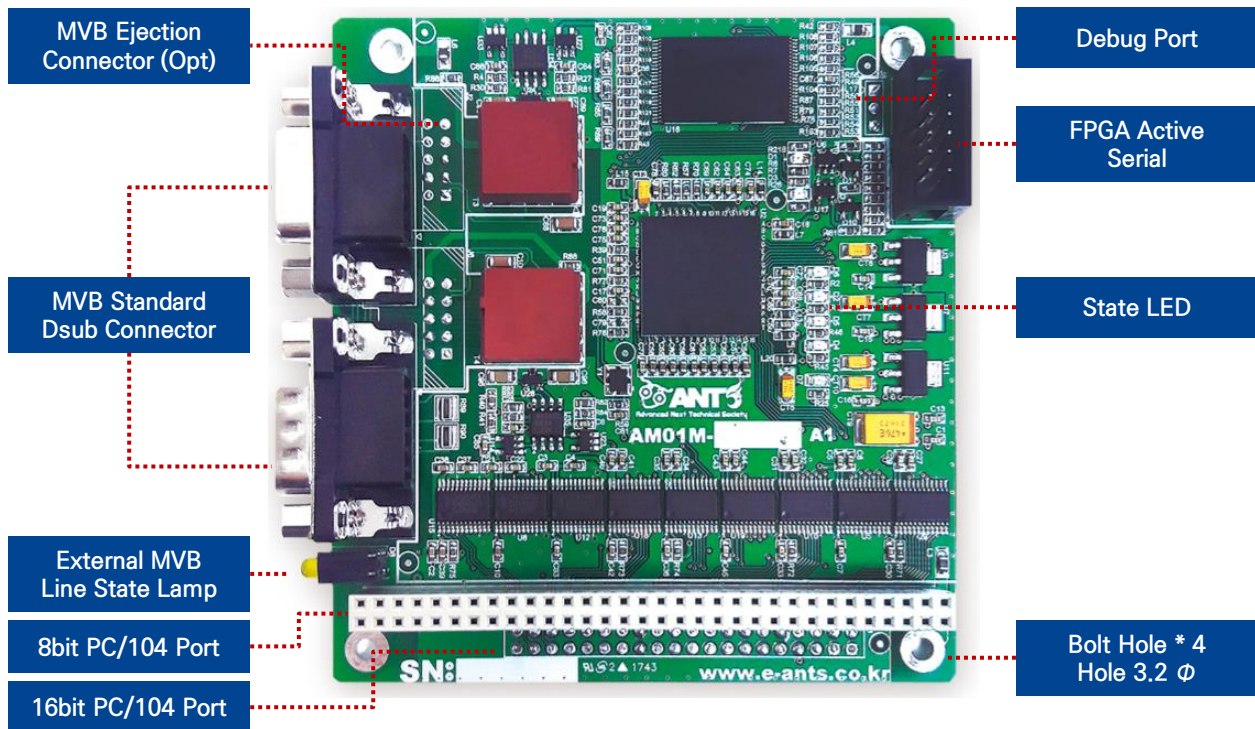
SUPPORT

· You can get new products, latest data sheets and program source materials by visiting our website.

· Supports meetings and demonstrations from sales person if you place large orders.

· You can easily purchase demo or development boards from the online marketplace.

· This product specification is also available in PDF format at www.e-ants.co.kr

2-1. Hardware Structure

It is representative model of AM01M Series equipped with Dsub and PC/104.

MVB Ejection Connector (Opt)

MVB Standard Dsub Connector

External MVB Line State Lamp

8bit PC/104 Port

16bit PC/104 Port

Debug Port

FPGA Active Serial

State LED

Bolt Hole * 4 Hole 3.2 Φ

⟨Figure 1-1. Hardware Image⟩

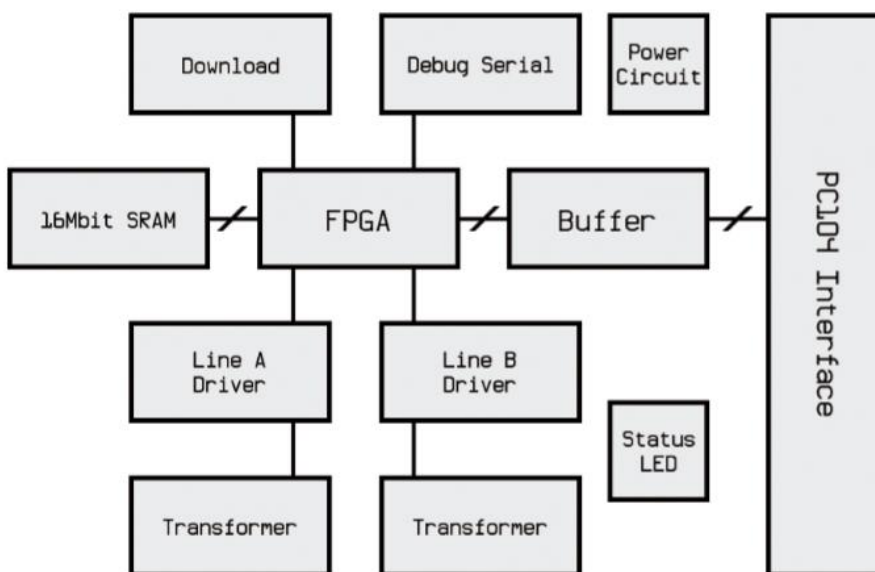| Item	Spec
FPGA	Up to 16K Logic / Up to 54 Kb Memory / Embedded Flash
Traffic Memory	1M * 16bit SRAM, 10ns Speed
MVB Interface	EMD – Transformer Isolation
MVB Function	Class 1, 2, 3 (Optional 4)
MVB Connector	Dsub 9pin Male/Female or 2.54mm Header 10pin
Host Interface	PC/104, SRAM Communication
Dimension	90 * 96 * 25mm, PC/104 Form factor
Operation Temperature	−40 ~ +85℃
Power	5VDC ±0.25V, 5V

⟨Figure 1-2. Hardware Spec⟩

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2. Block Diagram

2-1. Hardware Structure

This Figure is basic hardware configuration diagram of the AM01M Series.

〈Figure 1-3. Hardware Structure〉

Item	Spec
MVB Controller	MVB Interface and Traffic Memory management
PC/104 Interface	Host System and Data Communication Interface, depending on the operating Mode, connect the input and output signals
Traffic Memory	Memory that shares Data transmitted and received by MVB and Data transmitted and received by PC/104
MVB Interface	MVB driver and transformer, EMD interface supported by transformer isolation
Debug Serial	Frame Counter status information of Master and Slave can be checked with 3.3V Serial
State Lamp	MVB Line status and internal Board status can be checked

〈Figure 1-4. Hardware Spec〉

2. Block Diagram

2-2. Logic Structure
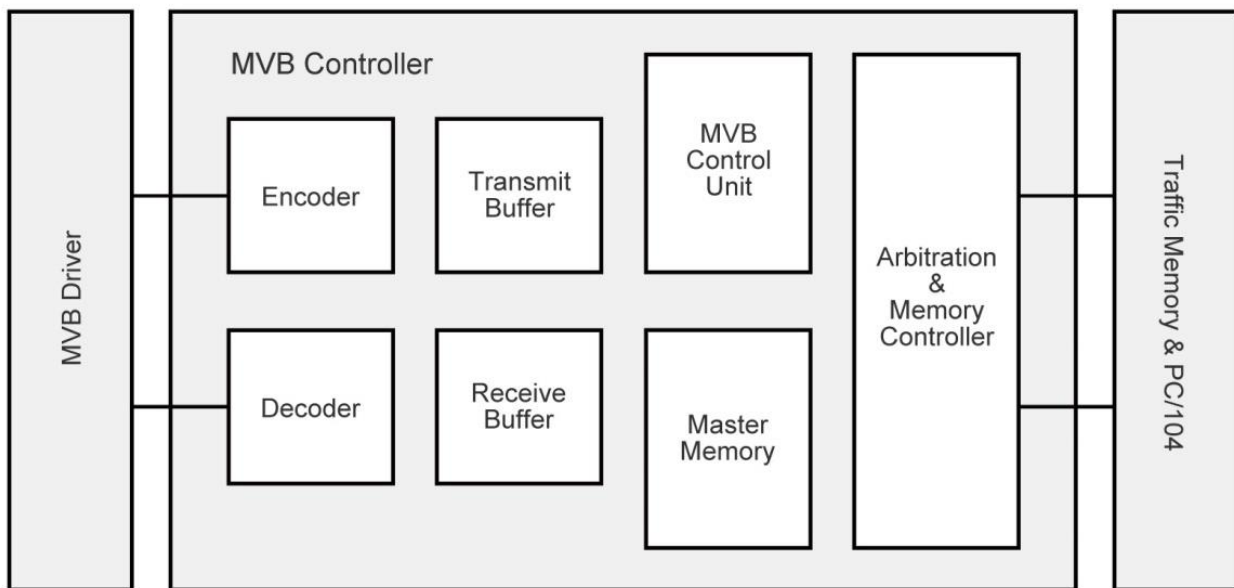
⟨Figure 2-1. MVB Logic Structure⟩

Item	Spec
Encoder/Decoder	Create MSD/SSD/ED, Data Encoding and Decoding, Calculate Check Sequence
Transmit Buffer	Data Buffer to transfer
Receive Buffer	Received Data Buffer
MVB Control Unit	Switchover, Mastership Transfer, Master/Slave transmission and reception
Master Memory	When Master function is executed, it is saved in Master List
Arbitration/Memory Controller	Interfacing between PC/104 and Master Memory and Traffic Memory

⟨Figure 2-2. MVB Logic Spec⟩

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3. MVB Interface

3-1. Pin Assignment for the EMD Connector

EMD(Electrical Middle Distance) MVB connector should check the Option information of ordering information before ordering.

※ MVB Connector : Dsub (J2, J6) / Ejection (J1-B, J1-C)

Dsub	Ejection	Pin Name	Pin Description
1	1	A. Data P	Positive Wire of Line A
2	3	A. Data N	Negative Wire of Line A
3	5	NC	No Connected
4	7	B. Data P	Positive Wire of Line B
5	9	B. Data N	Negative Wire of Line B
6	2	A. Term	Pole of Terminator Line A
7	4		Pole of Terminator Line A
8	6	B. Term	Pole of Terminator Line B
9	8		Pole of Terminator Line B
Shield	10	Shield	Housing Shield

〈Figure 3-1. MVB Connector Spec〉

3-2. MVB Connector Option

You can freely choose and order Connector Type according to MVB Board mounting structure. Please check the Option information of Ordering Information and place an order.

〈Option A〉

Right Female/Male Dsub
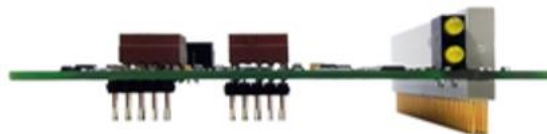

〈Option G〉

Right Header with Long Ejection

〈Option H〉

Right Header with Short Ejection

〈Option K〉

Straight Top Socket

〈Option L〉

Straight Bottom Header

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4. PC/104 Interface

4-1. Pin Assignment for the PC/104 Connector

It complies with PC/104 standard and produces 8bit operation as basic specification. If you need 16bit operation, please check the Ordering Information Option.

Row A											
A1	IOCHCHK#	A27	SA4	B21	IRQ7	C14	SD11
A2	SD7	A28	SA3	B22	IRQ6	C15	SD12
A3	SD6	A29	SA2	B23	IRQ5	C16	SD13
A4	SD5	A30	SA1	B24	IRQ4	C17	SD14
A5	SD4	A31	SA0	B25	IRQ3	C18	SD15
A6	SD3	A32	GND	B26	NC(DACK2#)	C19	NC(KEY)
A7	SD2	**Row B**		B27	NC(TC)	**Row D**	
A8	SD1	B1	GND	B28	BLAE	D0	GND
A9	SD0	B2	RESETDRV	B29	+5V	D1	MEMCS16#
A10	IOCHRDY	B3	+5V	B30	NC(OSC)	D2	IOCS16#
A11	AEN	B4	IRQ9	B31	GND	D3	IRQ10
A12	SA19	B5	NC(−5V)	B32	GNC	D4	IRQ11
A13	SA18	B6	NC(DRQ2)	**Row C**		D5	IRQ12
A14	SA17	B7	NC(−12V)	C0	GND	D6	IRQ15
A15	SA16	B8	NC(SRDY#)	C1	NC(SBHE#)	D7	IRQ14
A16	SA15	B9	NC(+12V)	C2	LA23	D8	NC(DACK0#)
A17	SA14	B10	NC(KEY)	C3	LA22	D9	NC(DRQ0)
A18	SA13	B11	SMEMW#	C4	LA21	D10	NC(DACK5#)
A19	SA12	B12	SMEMR#	C5	LA20	D11	NC(DRQ5)
A20	SA11	B13	IOW#	C6	NC(LA19)	D12	NC(DACK6#)
A21	SA10	B14	IOR#	C7	NC(LA18)	D13	NC(DRQ6)
A22	SA9	B15	NC(DACK3#)	C8	NC(LA17)	D14	NC(DACK7#)
A23	SA8	B16	NC(DRQ3)	C9	MEMR#	D15	NC(DRQ7)
A24	SA7	B17	NC(DACK1#)	C10	MEMW#	D16	+5V
A25	SA6	B18	NC(DRQ1)	C11	SD8	D17	NC(MASTER#)
A26	SA5	B19	REFRESH#	C12	SD9	D18	GND
		B20	NC(BCLK)	C13	SD10	D19	GND

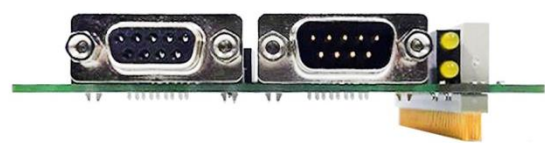※ When the signal is Active Low, it is indicated by #

4-2. PC/104 Connector Option

You can freely choose and order PC/104 Connector Type according to MVB Board mounting structure.
Please check the option information of ordering information and place an order.
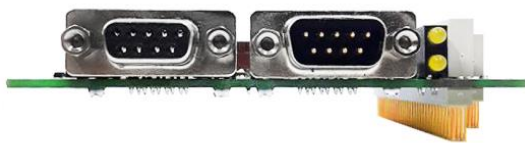
〈Option A〉

PC/104 Standard Press Fit 104pin

〈Option B〉

PC/104 Standard Press Fit 64pin

〈Option C〉
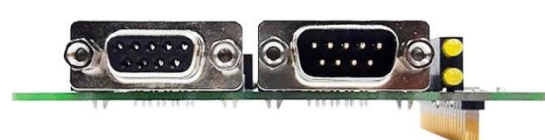
PC/104 Standard Top Socket 104pin

〈Option D〉

PC/104 Standard Top Socket 64pin

〈Option E〉

Standard Bottom Header 104pin

〈Option F〉

Standard Bottom Header 64pin

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5. Debug Interface

The debug Serial Interface uses a Serial 3.3V level signal and can identify Master and Slave Frame/Error Counter in line A and B.

Number	Pin Name	Property
1	RXD	3.3V Serial Receiver Data
2	TXD	3.3V Serial Transmitter Data
3	GND	Serial GND

6-1. Component Layout

〈Top Component Layout〉

〈Bottom Component Layout〉

6-2. Dimensional Data

〈MVB Dsub Type〉

〈MVB Ejection Type〉
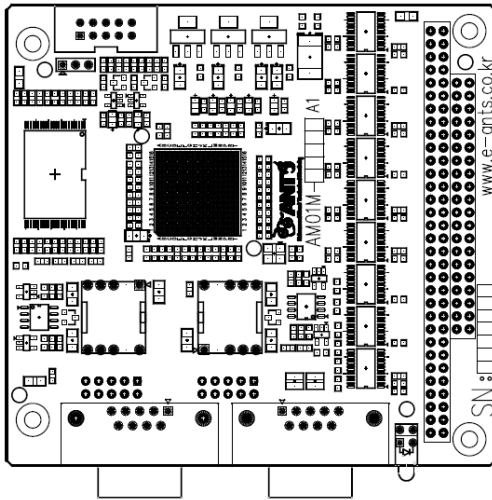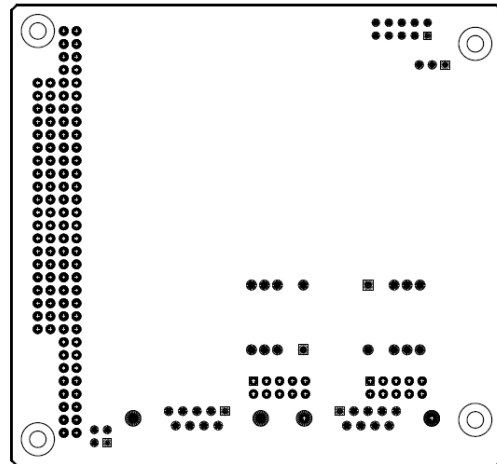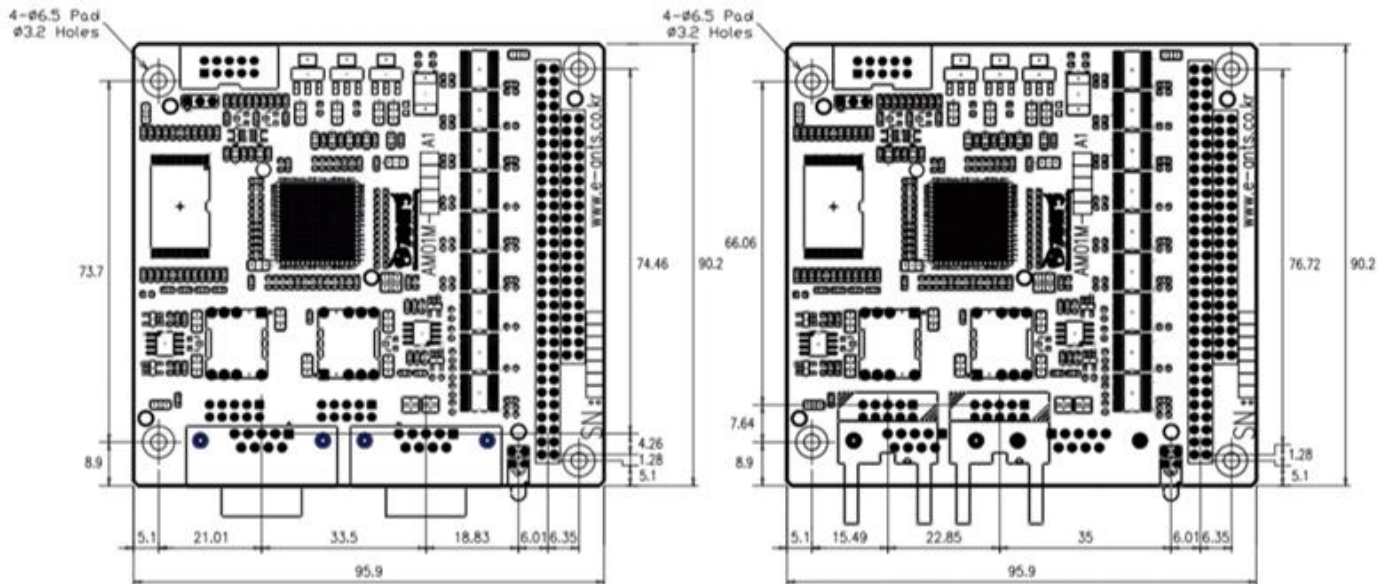
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6. Mechanical Data

The Debug Serial Interface uses a Serial 3.3V Level signal and can identify Master and Slave Frame/Error Counters in line A and B.


⟨Max Connection Data⟩

⟨PC/104 Module Stack Configuration⟩
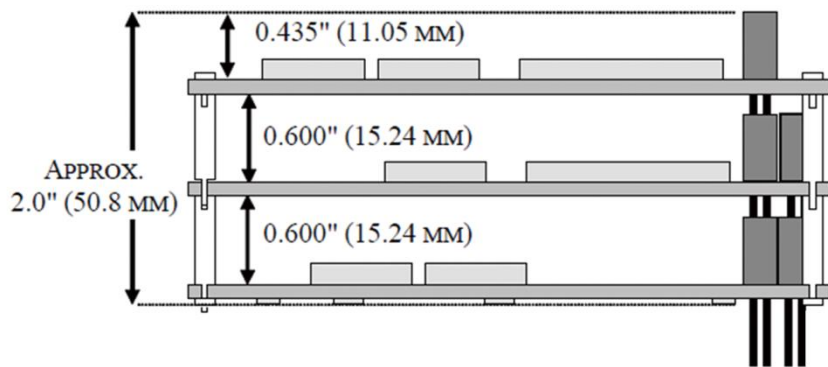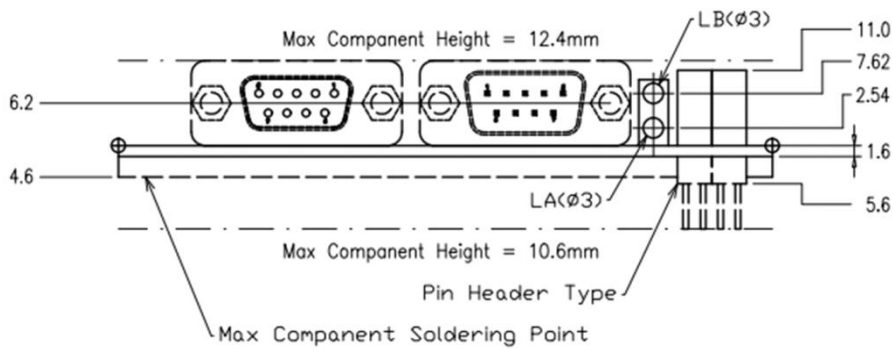
7. Technical Note

7-1. State LED

Number	Pin Name	Property
D1	TXD	Debug Serial TX Flickering on transmission
D2	Master	Lights On when Master is set in Class 4
D3	RXD	Debug Flashing on receiving Serial RX
D4	Class	Class 1 to 3 Lamp off, Class 4 Lamp on
D5	FPGA	Flashing during FPGA operation
D6	Start	Lights On when Start is set
D7	Power	Lights On when power is on
D8	Line A/B	Lights On when occupying MVB Line A or B

7-2. PC/104 Timing Diagram
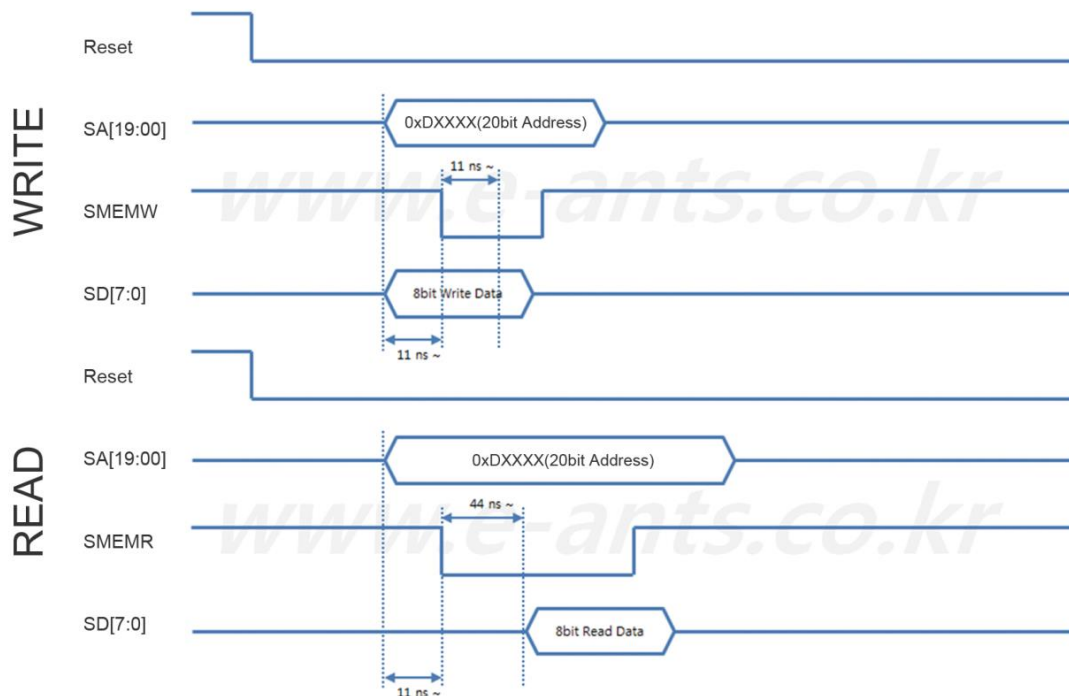
7-3. Power Up and Reset Sequence

It takes about 2 seconds to set up the FPGA and Traffic Memory at power-on and after can be used via PC/104 later.

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8. Standard and Certification

8-1. IEC 61375-3-1, IEC 61375-3-2 Standard Reference

8-2. PC/104 Specification Reference

8-3. Environment Test Standard Reference

Data/No	Subject
IEC 61373:2010	Railway applications-Rolling stock equipment-Shock and Vibration tests(Category 1/Class B)
IEC 60571:2012	Railway applications-Electronic equipment used on Rolling stock
IEC 60068-2-1:2007	Environmental testing-Part 2-1: Tests A: Cold, Test Ad
IEC 60068-2-2:2007	Environmental testing-Part 2-2: Tests B: Dry heat
IEC 60068-2-14:2009	Environmental testing-Part 2-14: Tests N: Change of Temperature
IEC 60068-2-30:2005	Environmental testing-Part 2-30: Tests Db: Damp heat(12h+12h Cycle)
IEC 61000-4-5:2014	Electromagnetic compatibility(EMC)-Part 4-5: Testing and Measurement techniques-Surge immunity test
IEC 61000-4-2:2008	Electromagnetic compatibility(EMC)-Part 4-2: Testing and Measurement techniques-Electrostatic discharge immunity test
IEC 61000-4-4:2012	Electromagnetic compatibility(EMC)-Part 4-4: Testing and Measurement techniques-Electrical fast transient/Burst immunity test
IEC 61000-4-3: 2006+A2:2010	Electromagnetic compatibility(EMC)-Part 4-3: Testing and Measurement techniques-Radiated, Radio-Frequency, Electromagnetic field immunity test
IEC 61000-4-6:2013	Electromagnetic compatibility(EMC)-Part 4-6: Testing and Measurement techniques-Immunity to Conducted disturbances, Induced by Radio-Frequency fields
CISPR 11:2015	Industrial, Scientific and Medical equipment-Radio-Frequency disturbance characteristics-Limits and Methods of Measurement

8-4. MVB Conformance Test

We have passed the Bombardier TCN Level 1 MVB Conformance Test to verify the reliability of our MVB products.

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9. Ordering Information

Please refer to Ordering Information when ordering the product.

ORDERING INFORMATION

AM01M _ _ _ _ 1 Series

Class

1 – Class 1 (Process Data)
2 – Class 2 (Message Data)
3 – Class 3 (Message Data)
4 – Class 4 (Bus Administration, Master)

MVB Connector Option

A – Right Female/Male Dsub
G – Right Header with Long Ejection
H – Right Header with Short Ejection
K – Straight Top Socket
L – Straight Bottom Header

Mount Connector Option

A – PC/104 Standard Press Fit 104pin
B – PC/104 Standard Press Fit 64pin
C – PC/104 Standard Top Socket 104pin
D – PC/104 Standard Top Socket 64pin
E – PC/104 Standard Bot Header 104pin
F – PC/104 Standard Bot Header 64pin

Dsub Screw Option

3 – M 3 Screw Locks
4 – UNC 4-40 Screw Locks
0 – No Assembly