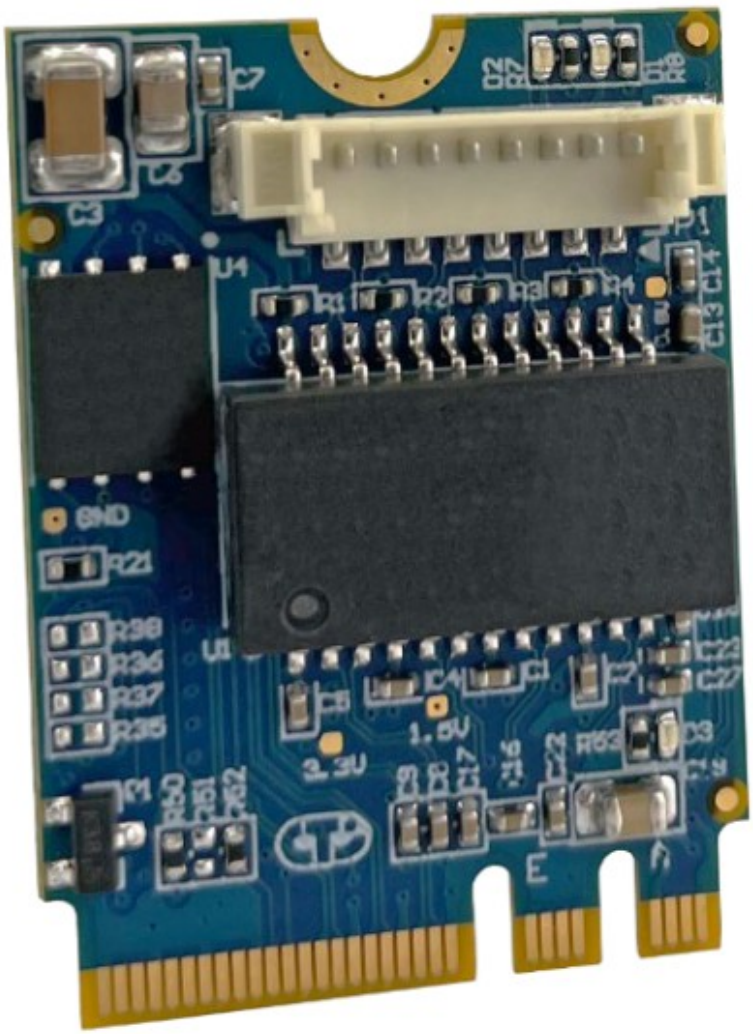
1CM2G101 Connect Tech M.2 GbE Expansion Board User Guide

Connect Tech Inc.

Embedded Computing Experts

USERS GUIDE

Revision: 0.00



M.2 GbE
CTIM-00055 Revision 0.00 2021-02-25

NVIDIA ELITE PARTNER

Contents

PREFACE

Disclaimer

The information contained within this user's guide, including but not limited to any product specification, is subject to change without notice.
Connect Tech assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the user's guide.

Customer Support Overview

If you experience difficulties after reading the manual and/or using the product, contact the Connect Tech reseller from which you purchased the product. In most cases the reseller can help you with product installation and difficulties.
In the event that the reseller is unable to resolve your problem, our highly qualified support staff can assist you. Our support section is available 24 hours a day, 7 days a week on our website at: https://connecttech.com/support/resource-center/. See the contact information section below for more information on how to contact us directly. Our technical support is always free.

Contact Information

Mail/Courier	Connect Tech Inc. Technical Support 42 Arrow Road Guelph, Ontario Canada N1K 1S6
Contact Information	**sales@connecttech.com** **support@connecttech.com** **https://www.connecttech.com** Toll Free: 800-426-8979 (North America only) Telephone: +1-519-836-1291 Facsimile: 519-836-4878 (on-line 24 hours)
Support	Please go to the Connect Tech Resource Center for product manuals, installation guides, device drivers, BSPs and technical tips. Submit your technical support questions to our support engineers. Technical Support representatives are available Monday through Friday, from 8:30 a.m. to 5:00 p.m. Eastern Standard Time.

Limited Product Warranty

Connect Tech Inc. provides a 2-year Warranty for this product. Should this product, in Connect Tech Inc.'s opinion, fail to be in good working order during the warranty period, Connect Tech Inc. will, at its option, repair or replace this product at no charge, provided that the product has not been subjected to abuse, misuse, accident, disaster or non-Connect Tech Inc. authorized modification or repair.
You may obtain warranty service by delivering this product to an authorized Connect Tech Inc. business partner or to Connect Tech Inc. along with proof of purchase. Product returned to Connect Tech Inc. must be pre-authorized by Connect Tech Inc. with an RMA (Return Material Authorization) number marked on the outside of the package and sent prepaid, insured and packaged for safe shipment. Connect Tech Inc. will return this product by prepaid ground shipment service.
The Connect Tech Inc. Limited Warranty is only valid over the serviceable life of the product. This is defined as the period during which all components are available. Should the product prove to be irreparable, Connect Tech Inc. reserves the right to substitute an equivalent product if available or to retract the Warranty if no replacement is available.
The above warranty is the only warranty authorized by Connect Tech Inc. Under no circumstances will Connect Tech Inc. be liable in any way for any damages, including any lost profits, lost savings or other incidental or consequential damages arising out of the use of, or inability to use, such product.

Copyright Notice

Trademark Acknowledgment

ESD Warning

Electronic components and circuits are sensitive to ElectroStatic Discharge (ESD). When handling any circuit board assemblies including Connect Tech COM Express carrier assemblies, it is recommended that ESD safety precautions be observed. ESD safe best practices include, but are not limited to:

- Leaving circuit boards in their antistatic packaging until they are ready to be installed.
- Using a grounded wrist strap when handling circuit boards, at a minimum you should touch a grounded metal object to dissipate any static charge that may be present on you.
- Only handling circuit boards in ESD safe areas, which may include ESD floor and table mats, wrist strap stations and ESD safe lab coats.
- Avoiding handling circuit boards in carpeted areas.
- Try to handle the board by the edges, avoiding contact with components.

REVISION HISTORY

Revision	Date	Changes
0	25-02-21	Initial Release

INTRODUCTION

The M.2 GbE expansion board adds an additional ethernet connection to any existing carrier board through the M.2 A or E key expansion slot. Ideal for customers needing to add wired network connections within space-constrained applications, this industrial grade expansion board utilizes an Intel I210 controller for optimized performance and trusted reliability.

Product Features and Specifications

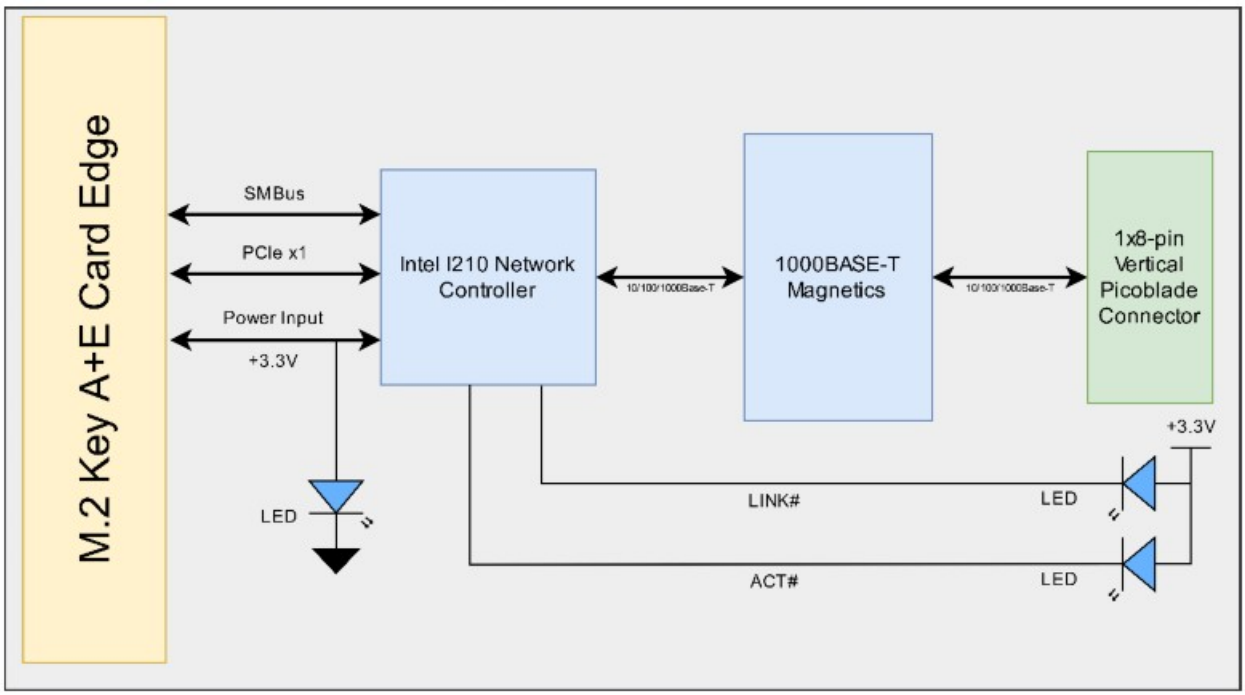
Form Factor	M.2 2230 Key A+E
Ports	1x 10/100/1000BASE-T
Controller	Intel® Ethernet Controller I210-AT
Host Interface Bus	x1 PCIe v2.1, SMBus
Dimensions	22mm x 30mm (M.2 Type-2230-D3-A-E) * (0.87” x 1.18”) *exceeds M.2 max topside height spec
Cable (Optional, not included)	CBG383 (RJ-45 Female, 8-pin Picoblade)
LEDs	Activity, Link, Power
Operating Temperature*	-40º C to +85º C *A minimum air-flow rate of 125CFM is recommended to operate reliably at ambient temperatures over 65ºC
Weight	3g (0.11oz)
Warranty	2 Year Warranty and Free Technical Support

Part Numbers / Ordering Information

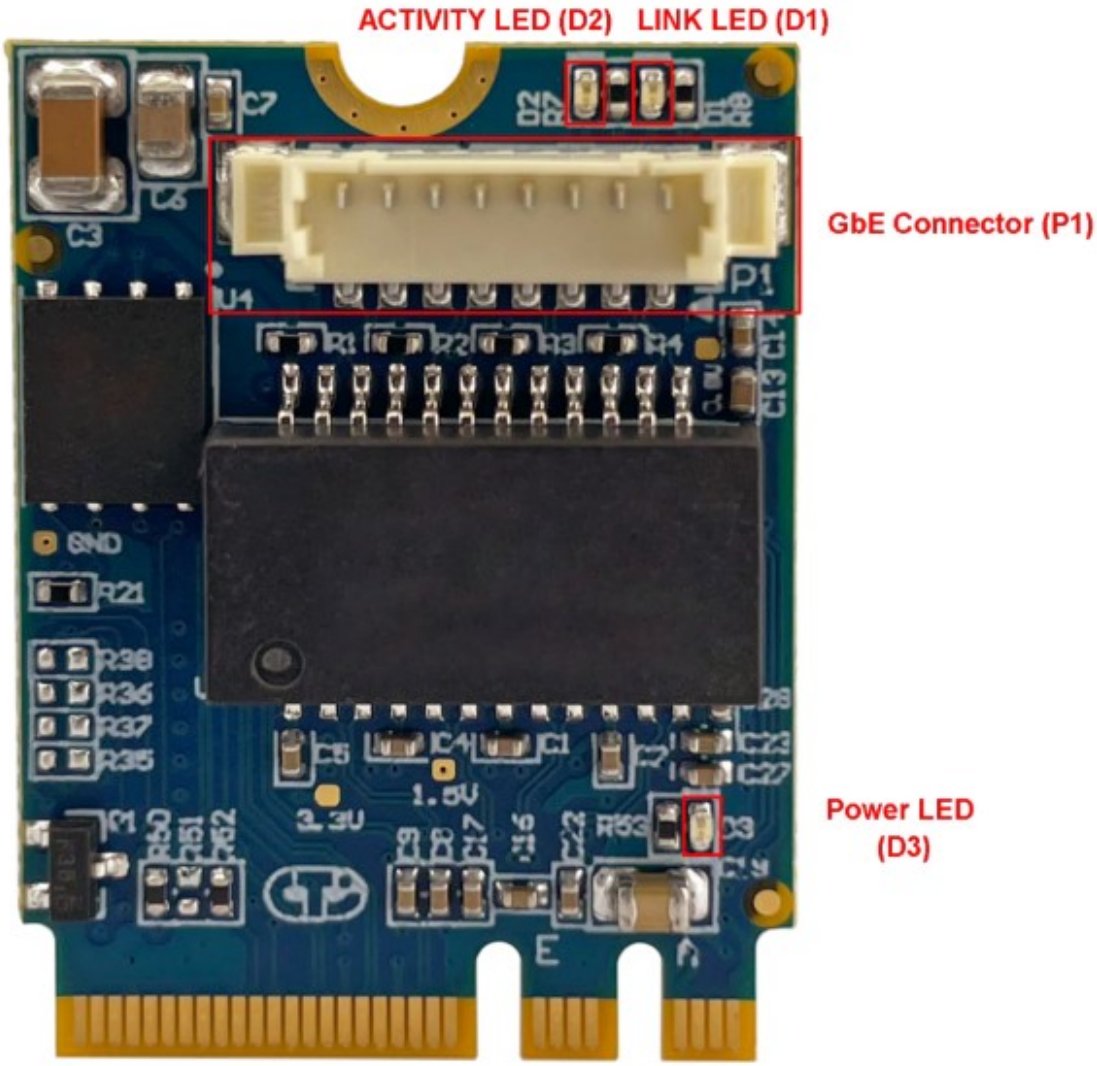
Part Number	
M2G101	10/100/1000BASE-T, M.2 GbE 2230 Key A+E, -40ºC to 85ºC, ROHS

PRODUCT OVERVIEW

Block Diagram



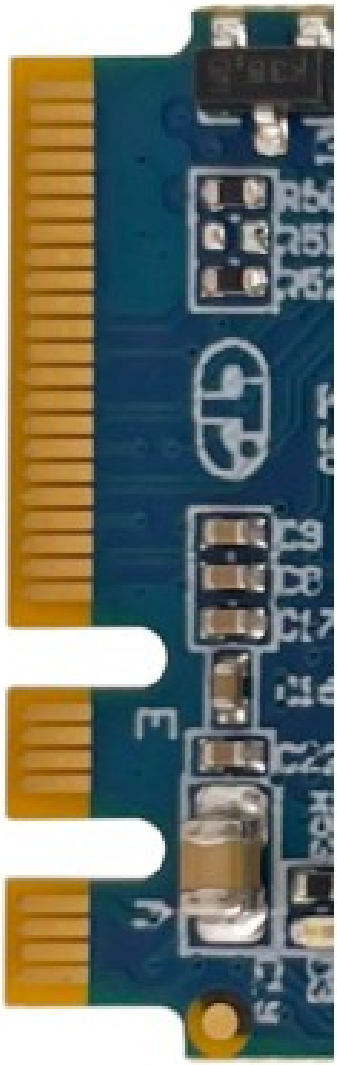
Connector Summary & Locations



Designator	Description
P1	Gigabit Ethernet Connector
D1	Activity Indicator
D2	Link Indicator
D3	Power OK Indicator

DETAILED FEATURE DESCRIPTION

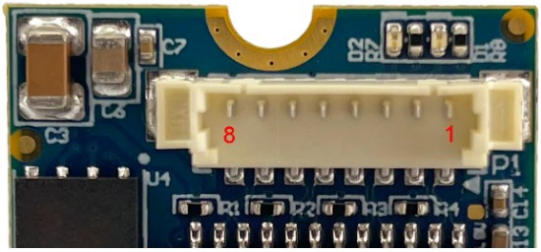
M.2 Edge Connector



Function	**M.2 Card Edge Connector**			
Location	P2			
	Signal	Pin	Pin	Signal
	GND	1	2	+3.3V
	NC	3	4	+3.3V
	NC	5	6	NC
	GND	7	8	Connector Key
	Connector Key	9	10	Connector Key
	Connector Key	11	12	Connector Key
	Connector Key	13	14	Connector Key
	Connector Key	15	16	NC
	NC	17	18	GND
	NC	19	20	NC
	NC	21	22	NC
	NC	23	24	Connector Key

Pinout	Connector Key	25	26	Connector Key
	Connector Key	27	28	Connector Key
	Connector Key	29	30	Connector Key
	Connector Key	31	32	NC
	GND	33	34	NC
	PERO+	35	36	NC
	PERO-	37	38	NC
	GND	39	40	NC
	PETO+	41	42	NC
	PETO-	43	44	NC
	GND	45	46	NC
	REFCLKO+	47	48	NC
	REFCLKO-	49	50	NC
	NC	51	52	PERSTO#
	CLKRECtO#	53	54	NC
	PEWAKEO#	55	56	NC
	GND	57	58	12C _DATA
	NC	59	60	I2C_CLK
	NC	61	62	ALERTS#
	GND	63	64	NC
	NC	65	66	NC
	NC	67	68	NC
	GND	69	70	NC
	NC	71	72	+3.3V
	NC	73	74	+3.3V
	GND	75		

10/100/1000 Ethernet (GbE)

Function	Gigabit Ethernet Connector		
Location	P1		
Type	Molex Moblade 1×8 Vertical		
Connector	533980871		
Mating	510210800		
Cable	CBG383		
Pinout	Pin	Description	
	1	MX3-	
	2	MX3+	
	3	MX2-	
	4	MX2+	
	5	MX1-	
	6	MX1+	
	7	MX0-	
	8	MXO+	

On-board Indicator LEDs

LED	Location	Description
ACT	D1	Activity Indicator
LINK	D2	Link Indicator
PWR OK	D3	Power OK Indicator. When illuminated indicates power is provided to M.2 GbE board.

TYPICAL INSTALLATION

1. Ensure the host system is powered off.
2. Insert the M.2 GbE into a 2230 Key A or E card slot; secure the card down with a screw.
3. Attach a CBG383 (RJ-45 to Picoblade) cable or custom cabling solution to P1.
4. Attach a network RJ46 Cat -5e or Cat 6 cable connected to your network to the CBG383 cable
5. Power on the system.
6. Under Linux, use lspci to verify the presence on the M.2 GbE, then using ifconfig to verify the M.2 GbE Card is enumerated as a network interface.

THERMAL DETIALS

The M.2 GbE card has an operating temperature range on -40°C to +85°C, however, it is important that's adequate cooling is provided to ensure reliable operation. It is the customer's responsibility to design their system

such that the ambient temperature and airflow is within specifications for the Intel® Ethernet Controller I210-AT. The table below illustrates simulation data from Intel®, this is just a guideline but should be taken into account by system designers. The table lists Tcase as a function of airflow and ambient temperature. This table can be used as an aid in determining a starting point for the optimum airflow for the I210.
Note that Connect Tech does not recommend use with zero airflow at ambient temperatures over 65°C. From internal testing, it was found that at a full 1Gbps load as the ambient temperatures approach ~70°C the Tcase will exceed 100°C.

Table 13-14. Thermal Simulation Results for Various Environmental Conditions

Airflow (LFM)

Ambient Temperature (°C) / T_C	0	50	100	150	200	250	300	350	400	
45	68.49	65.06	65.06	65.06	65.06	65.06	65.06	65.06	65.06	
50	73.33	69.98	69.24	69.24	69.24	69.24	69.24	69.24	69.24	
55	78.16	74.89	74.18	73.74	73.42	73.17	72.97	72.79	72.64	
60	83	79.82	79.13	78.7	78.38	78.14	77.94	77.77	77.61	0.74W
65	87.74	84.74	84.07	83.65	83.35	83.11	82.91	82.74	82.59	
70	92.68	89.66	89.02	88.61	88.31	88.08	87.88	87.71	87.56	
75	99.3	96.17	95.5	95.07	94.76	94.51	94.3	94.12	93.96	
80	104.1	101.1	100.4	100	99.72	99.47	99.27	99.09	98.93	0.80W
85	109	106	105.4	105	104.7	104.4	104.2	104.1	103.9	

No Heat Sink

Note: The red value(s) indicate airflow/ambient combinations that exceed the allowable case temperature.

SOFTWARE

Driver Support for Intel I210
Additional drivers may be needed to properly operate the GbE Port. These drivers can be downloaded directly from Intel website at the below link:
https://downloadcenter.intel.com/product/64399/Intel-Ethernet-Controller-I210-Series

CABLES

The following table shows the available cables

Part Number	Drawing Number	Description
CBG383	CTIC-00320	RJ-45 panel mount to 8-pin Picoblade

Document: CTIM-00055
Date: 2021-02-25

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Documents / Resources

	Connect Tech 1CM2G101 Connect Tech M.2 GbE Expansion Board [pdf] User Guide 1CM2G101, Connect Tech M.2 GbE Expansion Board

References

- Connect Tech Inc., Embedded Computing Experts
- Resource Center - Connect Tech Inc.
- Intel® Ethernet Controller I210 - Product Info, Docs, Support and...
- Connect Tech Inc., Embedded Computing Experts