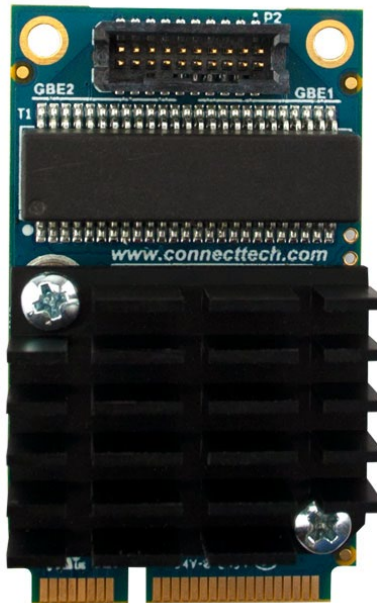




Connect Tech Inc.
Embedded Computing Experts

USERS GUIDE



Dual Port Mini PCIe GbE

CTIM-00074 Revision 0.00 2021-11-03

CONNECT TECH

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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: <http://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

Contact Information	
Mail/Courier	Connect Tech Inc. Technical Support 489 Clair Rd. W. Guelph, Ontario Canada N1L 0H7
Contact Information	sales@connecttech.com support@connecttech.com 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 1-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

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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
0.00	2021-11-03	Preliminary Release

INTRODUCTION

Connect Tech's MPG110 series board is a rugged, low-cost dual Gigabit Ethernet Mini PCIe module that is ideal for adding extra Ethernet capabilities to any system with minimal increase in overall system size and power consumption. The module utilizes PCIe signaling which allows it to be used in any Mini PCIe socket that supports PCIe. The wide operating temperature, latching Ethernet connector and cabling solution allows these modules to be used in harsh environments. Compatibility with Windows and Linux operating systems allows these boards to be easily integrated into a wide array of new and existing systems.

Product Features and Specifications

Specifications	
Dimensions	50.95 mm x 30 mm Mini PCIe "Full" Height above board: With CTI Thermals: 13mm Without Thermals: 8.5mm
10/100/1000 BASE-T Ports	2
PCIe	PCIe v2.0 (5.0 GT/s)
Connector	Samtec TFML 2x10, 1.27mm Vertical
Cables (Optional, not included)	CBG510
Environmental	-40°C to 85°C*** Humidity: 5 to 95%, non-condensing * 85°C using CTI Passive heatsink and minimum airflow of 50CFM **Pending Thermal Validation
Status LEDs	2x Link, 2x Activity, Power OK
Power Consumption	3W



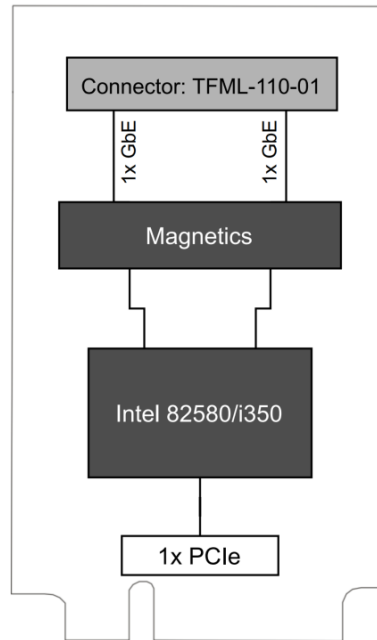
The MPG110 is pending thermal validation and this manual will be updated to reflect required airflow and thermal information at a later date

Part Numbers / Ordering Information

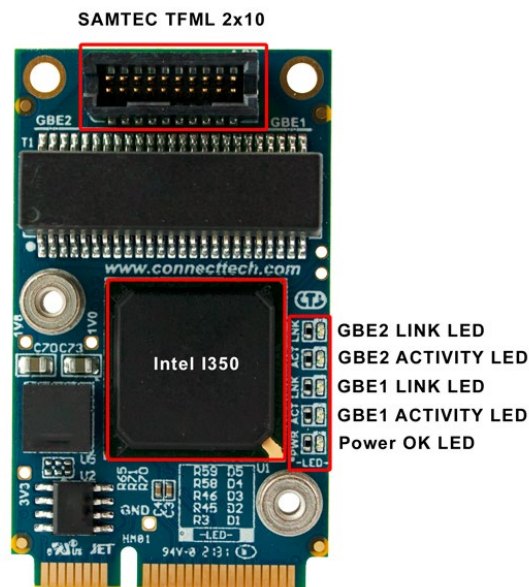
Part Number	
MPG110-01	MPG110 with CTI Passive Thermal installed

PRODUCT OVERVIEW

Block Diagram



Connector Summary & Locations



INTERFACE PIN-OUTS

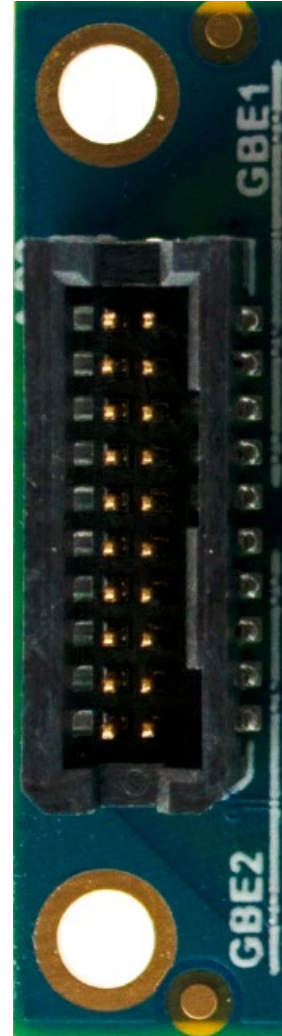
Mini PCIe Edge Connector

The Mini PCIe GbE pin-out is compliant to the PCI Express Mini Card Electromechanical Specification Rev. 2.0. Please note that this module does not require the +1.5V power provided to a standard Mini PCIe connector. This module uses only +3.3V for input power. This module does not connect the Display Port or USB pins on the Mini PCIe connector.

Function	Mini PCIe Card Edge Connector			
Location	P1			
Pinout	Signal	Pin	Pin	Signal
	WAKE#	1	2	+3.3V
	NC	3	4	GND
	NC	5	6	NC
	NC	7	8	NC
	GND	9	10	NC
	REFCLK-	11	12	NC
	REFCLK+	13	14	NC
	GND	15	16	NC
	NC	17	18	GND
	NC	19	20	NC
	GND	21	22	PEREST#
	PER- (from this module to system)	23	24	+3.3V
	PER+ (from this module to system)	25	26	GND
	GND	27	28	NC
	GND	29	30	SMBus_CLK
	PET- (from system to this module)	31	32	SMBus_DATA
	PET+ (from system to this module)	33	34	GND
	GND	35	36	NC
	GND	37	38	NC
	+3.3V	39	40	GND
	+3.3V	41	42	NC
	GND	43	44	NC
	NC	45	46	NC
	NC	47	48	NC
	NC	49	50	GND
	NC	51	52	+3.3V

Ethernet Connector Pinout

Function	Dual Ethernet Connector	
Location	P2	
Type	20 Pin TFML	
Connector	Part Number: TFML-110-02-L-D-A Manufacturer: Samtec	
Mating Connector	Part Number(s): SFML-110-01-L-D (Board-Board Mate) ISDF-10-D-L (Cable Housing), CC03 (Cable Contacts) Manufacturer: Samtec	
Pinout	Connector Pins	Function Description
	1	GBE_A_0_N
	2	GBE_A_0_P
	3	GBE_A_1_N
	4	GBE_A_1_P
	5	GBE_A_2_N
	6	GBE_A_2_P
	7	GBE_A_3_N
	8	GBE_A_3_P
	9	GBE_GND
	10	GBE_GND
	11	GBE_GND
	12	GBE_GND
	13	GBE_B_0_N
	14	GBE_B_0_P
	15	GBE_B_1_N
	16	GBE_B_1_P
	17	GBE_B_2_N
	18	GBE_B_2_P
	19	GBE_B_3_N
	20	GBE_B_3_P
Notes		





DETAILED FEATURE DESCRIPTION

PCI Express Interface

The Mini PCIe Gbe supports one PCIe Rev. 2.0 lane connecting between the Mini PCIe edge fingers and the Intel i350 GbE controller. This interface has sufficient bandwidth to support two 1000 Mb/s transfer rate and with 36 KB of on-board buffering per port, mitigates instantaneous receive bandwidth stresses and eliminates transmit delays by buffering the outgoing packet prior to transmission.

10/100/1000Base-T Port

The MPG110 two Ethernet interface ports supporting 1000BASE-T, 100BASE-TX, and 10BASE-T (IEEE 802.3, 802.3u, 802.3ab). This multi-speed port can operate in Half or Full duplex and includes flow control support compliant with IEEE 802.3X as well as VLAN support compliant with IEEE 802.3q. Note that half-duplex 1000 MB/s operation is not supported.

SMBus Management Port

The SMBus interface allows software-based network management by providing a mechanism by which network traffic can be routed to and from a Management Controller. The SMBus supports pass-through capabilities, with the following filtering options:

- RMCP/RMCP+ ports
- Flexible UDP/TCP port filters
- 128-byte flexible filters
- VLAN
- IPv4 address
- IPv6 address
- MAC address filters

Using the SMBus pass-through interface, a received packet can be discarded, sent to host memory, sent to an external management controller, or both host memory and external management controller. All manageability filters are controlled by the management controller, not the i350 drivers.

Software Support for the Intel i350

Additional drivers will be needed to properly operate the GBE Port.
These drivers can be downloaded directly from Intel website from the below link:

<https://downloadcenter.intel.com/product/52968/intel-ethernet-controller-i350am2>

On-board Indicator LEDs

The Dual Port Mini PCIe GbE has five (5) onboard LEDs that are clearly labeled on the PCB.

LED	Description
2x ACT	Activity Indicator; Illuminates when traffic is being transferred over the LAN port.
2x LINK	Link Indicator; When illuminated indicates 1000BASE-T channel bandwidth
PWR OK	Power OK Indicator; When illuminated indicates All power rails on the module are within specification

POWER CONSUMPTION & THERMALS

The Expected power consumption at full load is expected to be approximately 3W

The MPG110 has an Operating Temperature Range of -40°C to +85°C. **Pending thermal validation Intel States the the Tcase temperature of the I350 must remain below 110°C with use of a heatsink

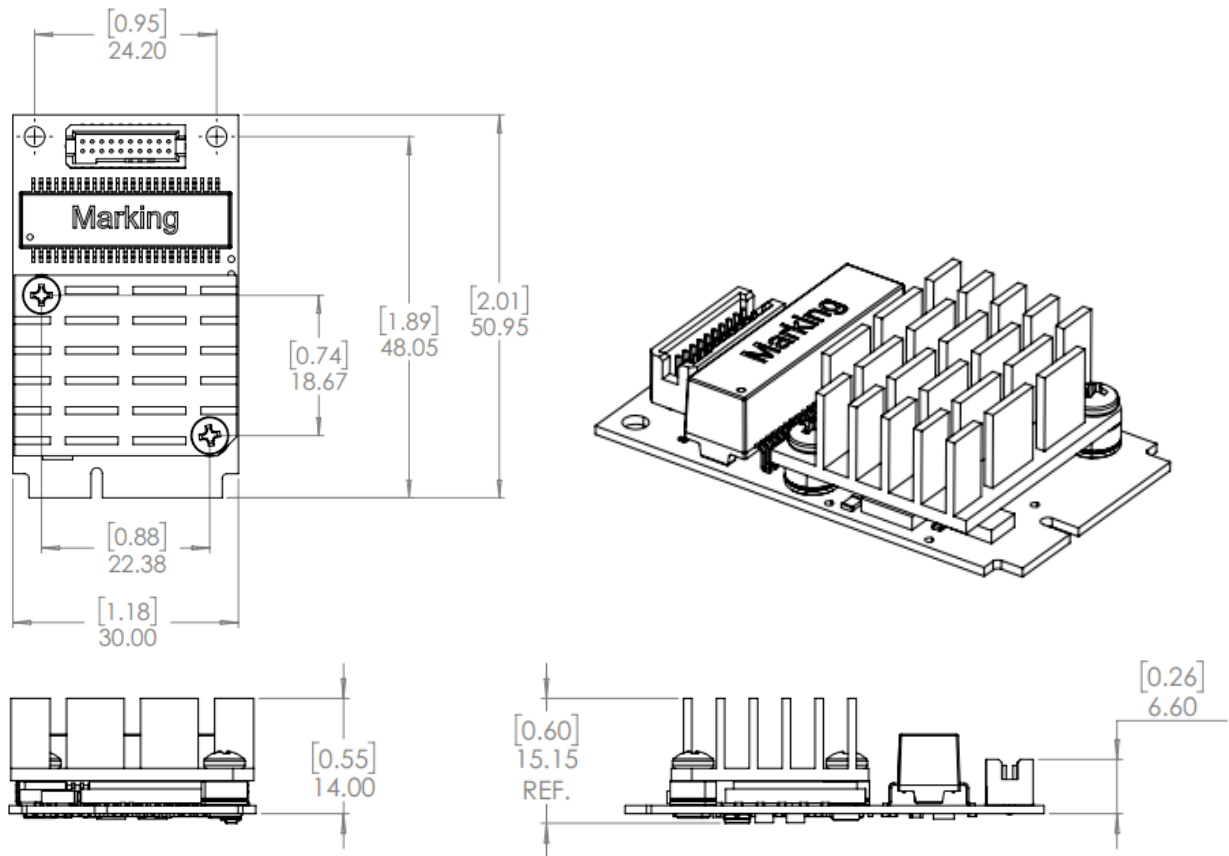
The MPG110 can be operated in natural convection using a CTI passive heatsink to 60°C and up to 85°C using a minimum airflow of 50CFM.

The upper limit was determined in the following manner.

Testing was done using Iperf tool in a loopback between ports with sustained 940Mbit/s.

The MPG110 was isolated from the test system with a breakout board and run in an approximately 21°C ambient temperature lab environment. Linear extrapolation was then used to achieve a case temperature of 110°C using the recorded temperature delta between the case and ambient.

MECHANICAL DRAWINGS & MODELS



CABLES

Available Cables

The following table shows the available cables for the Dual Port Mini PCIe GbE. Click below to view the drawing.

Drawing No.	Part No.	Description
CTIC-00717	CBG510	Dual RJ-45 to 20-pin TFML Cable