

ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Visit our website - *Click HERE*

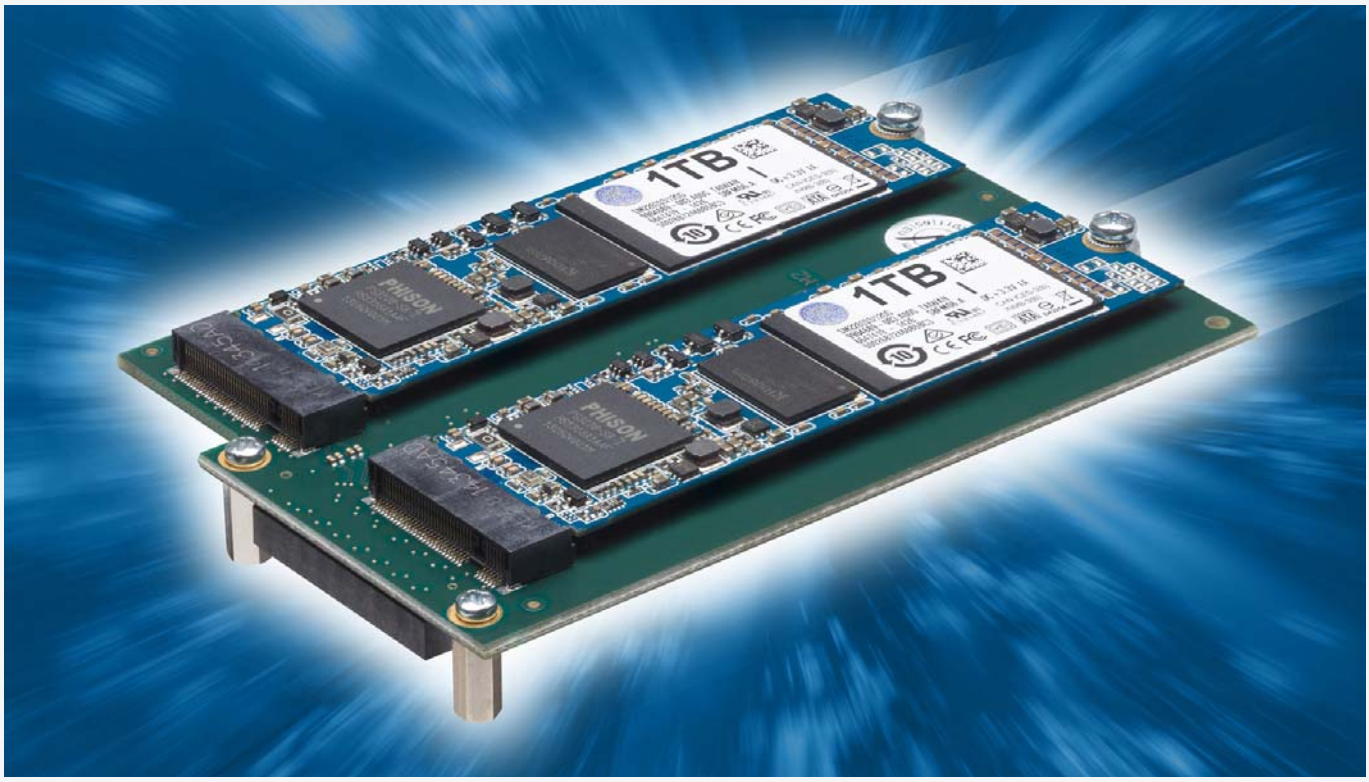
SYSTEM

Technical Information

C48-M2

Dual M.2 Card SSD Storage Mezzanine Module

Document No. 7777 • Ed. 9 • 25 February 2019



Contents

About this Manual . . . 3
Edition History . . . 3
Related Documents . . . 3
Nomenclature . . . 4
Trade Marks . . . 4
Legal Disclaimer - Liability Exclusion . . . 4
Standards . . . 4

Feature Summary . . . 5
Overview . . . 6
Block Diagram . . . 8
Top View Component Assembly . . . 9

Technical Reference - Connectors . . . 11
M.2 Host Connectors . . . 11
P-MEZ . . . 14

Schematics . . . 15

Ordering Information . . . 15

Alternate Products . . . 15

About this Manual

This manual is a short form description of the technical aspects of the C48-M2, required for installation and system integration. It is intended for the advanced user only.

Edition History

Ed.	Contents/*Changes*	Author	Date
1	Technical Information C48-M2, English, preliminary edition Text #7777, File: c48_ti.wpd	jj	23 January 2015
2	Updated table 'M.2 Mounting Parts'	jj	26 February 2015
3	Added photos	jj	19 May 2015
4	MTBF added	jj	21 May 2015
5	Added more photos	jj	27 May 2015
6	Updated table 'M.2 Mounting Parts'	jj	14 January 2016
7	Added photo PC4 with C48	jj	13 May 2016
8	Added link to SC4 carrier card	jj	13 June 2016
9	Links added to newer carrier boards (some mature CPU removed)	jj	25 February 2019

Related Documents

For a description of CPU cards which may act as carrier board with respect to the C48-M2, please refer to the correspondent CPU user guide, available by download (change URL accordingly for other potential carrier cards).

Download C48-M2 Carrier Card User Guides	
PC4-PRESTO	www.ekf.com/p/pc4/pc4.html
PC5-LARGO	www.ekf.com/p/pc5/pc5.html
PC6-TANGO	www.ekf.com/p/pc6/pc6.html
PCS-BALLET	www.ekf.com/p/pcs/pcs.html
SC3-LARGO	www.ekf.com/s/sc3/sc3.html
SC4-CONCERTO	www.ekf.com/s/sc4/sc4.html
SC5-FESTIVAL	www.ekf.com/s/sc5/sc5.html
SC6-TANGO	www.ekf.com/s/sc6/sc6.html
SCS-TRUMPET	www.ekf.com/s/scs/scs.html

Nomenclature

Signal names used herein with an attached '#' designate active low lines.

Trade Marks

Some terms used herein are property of their respective owners, e.g.

- Intel, Core™: ® Intel
- CompactPCI, CompactPCI PlusIO, CompactPCI Serial: ® PICMG
- Windows: ® Microsoft
- EKF, ekf system: ® EKF

EKF does not claim this list to be complete.

Legal Disclaimer - Liability Exclusion

This document has been edited as carefully as possible. We apologize for any potential mistake. Information provided herein is designated exclusively to the proficient user (system integrator, engineer). EKF can accept no responsibility for any damage caused by the use of this manual.

Standards

Reference Documents		
Term	Document	Origin
M.2	PCI Express M.2 Specification Revision 3.0	www.pcisig.com
SATA	Serial ATA Specification	www.sata-io.org

Feature Summary

Feature Summary	
Form Factor	▸ Proprietary size mezzanine module 66mm x 95mm ▸ Fits basically into the 4HP (20.3mm) envelope of the CPU carrier board ▸ Typically delivered as a ready to use assembly unit (including PC3/SC1-ALLEGRO, PC4/SC2-PRESTO or successor CPU card) ▸ Mounting position right (on top of a CPU board or CPU side card)
Host I/F Connector (Bottom Mount to CPU Carrier) P-MEZ	▸ High Speed mezzanine connector suitable for several EKF CPU carrier boards and side cards ▸ Connects to the carrier card connector HSE (High Speed Expansion) ▸ Up to 4 x SATA 6G channels (two channels in use on C48-M2) ▸ 4 x USB 2.0 ports (not in use on C48-M2, denoted here for reference only) ▸ Power sourcing 1.5 A maximum continuous current via 3.3V rail (2 pins) ▸ Power sourcing 1.5 A maximum continuous current via 5V rail (2 pins) ▸ SATA1 channel wired to the M.2-1 host connector 1 ▸ SATA2 channel wired to the M.2-2 host connector 2 ▸ SATA1/2 controller devices: please refer to particular carrier card description ▸ SATA3 - SATA4 not in use on the C48-M2 module
M.2 Module Connectors M.2-1 M.2-2	▸ 2 x M.2 module sockets (M.2-1, M.2-2) ▸ PCI Express® M.2 Specification Socket 2 (SSD/Other) ▸ M.2 Type B host connector style ▸ Suitable for M.2 SATA SSD modules either B-key or M-key (B-M) ▸ Up to SATA 6G operation (depends on CPU carrier card capability) ▸ Single- and double-sided M.2 modules accepted S1-S3 & D1-D5 ▸ Variable size 2230, 2242, 2260, 2280 ▸ M.2 socket power 3.3V/1.5 A maximum continuous current ▸ M.2-1 socket sourced directly by CPU card host connector +3.3V rail ▸ M.2-2 socket sourced via voltage regulator from host connector +5V rail ▸ Electronic power switches for overcurrent protection and undervoltage lockout ▸ Maximum M.2 module power consumption 4750mW
Thermal Conditions Environmental Conditions Specials	▸ Operating temperature: -40°C ... +85°C (depends on M.2 module(s) in use) ▸ Storage temperature: -40°C ... +85°C, max. gradient 5°C/min ▸ Humidity 5% ... 95% RH non condensing ▸ Altitude -300m ... +3000m ▸ Shock 15g 0.33ms, 6g 6ms ▸ Vibration 1g 5-2000Hz ▸ RoHS compliant ▸ Coating, sealing, underfilling on request ▸ Long term availability ▸ Designed and manufactured in Germany ▸ ISO 9001 certified quality management ▸ Custom specific development on request
EC Regulations	▸ EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1) ▸ 2002/95/EC (RoHS)
MTBF	▸ 196.9 years

Custom specific modifications or development on request

Overview

Available as a mezzanine add-on expansion board e.g. to the PC6- or SC6-TANGO and other CPU carrier cards, the main purpose of the C48-M2 is to provide dual host connectors for mounting of two M.2 SATA SSD modules, as a rugged and fast mass storage media. Both sockets can be used individually, for up to 6G (SATA 3) data transfer rate.

M.2 is a popular standard for small size mezzanine modules, defined by the PCI-SIG®. The C48-M2 is suitable for SATA style M.2 SSDs, which are referred to as 'Socket 2 SSD/Other' in the M.2 specification (connector key B, module key B+M).

The C48-M2 accommodates M.2 SATA SSD modules starting from 22mm x 30mm (2230) up to 22mm x 80mm (2280), to be fixed by screw lock. Both single- and double sided M.2 modules can be populated. M.2 SATA SSD modules are available with a maximum capacity of 2TB as of current.

The C48-M2 connects to the mezzanine expansion connector HSE of the CompactPCI® CPU carrier. The C48-M2 is designed to fit into the 4HP (20.32mm) envelope of the CPU carrier board, but can also be used on some mezzanine side cards, for a 8HP or 12HP total front panel width assembly.



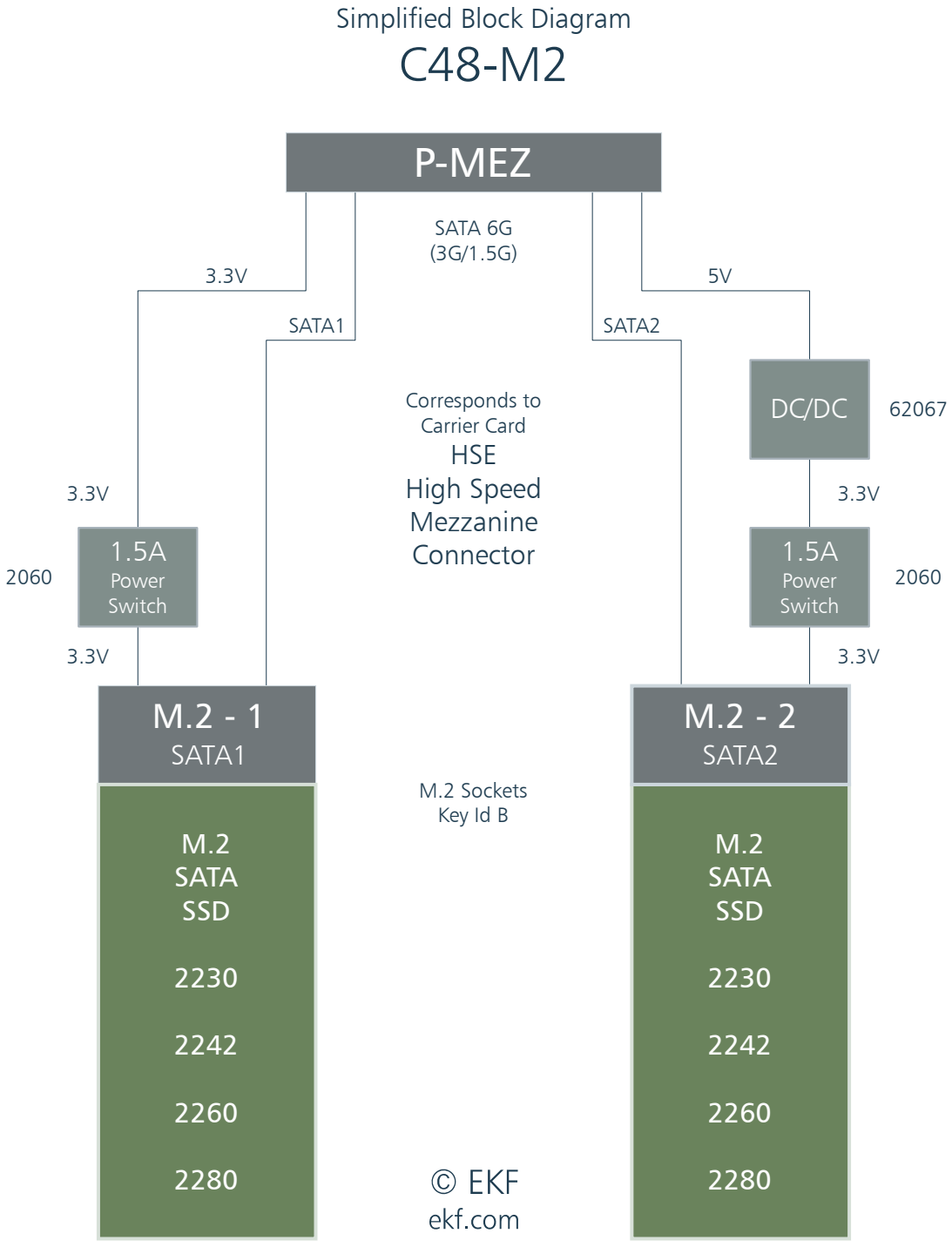
C48-M2 over CPU Carrier Card (4HP Assembly)



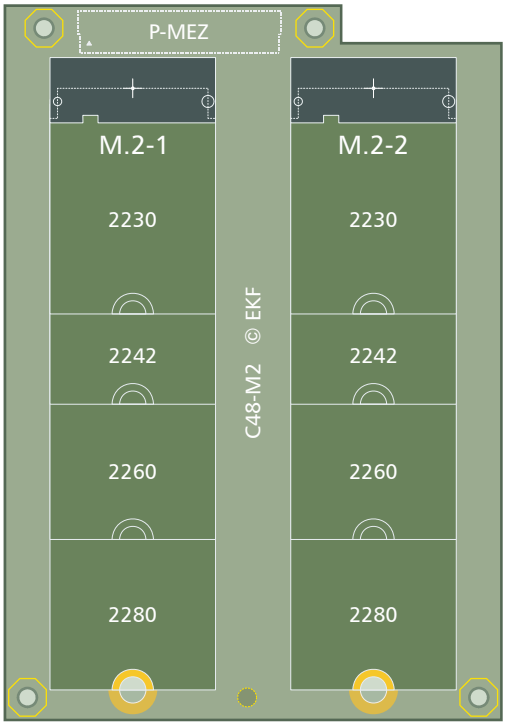
C48-M2 Mounted on a CPU Carrier Board (4HP Assembly)



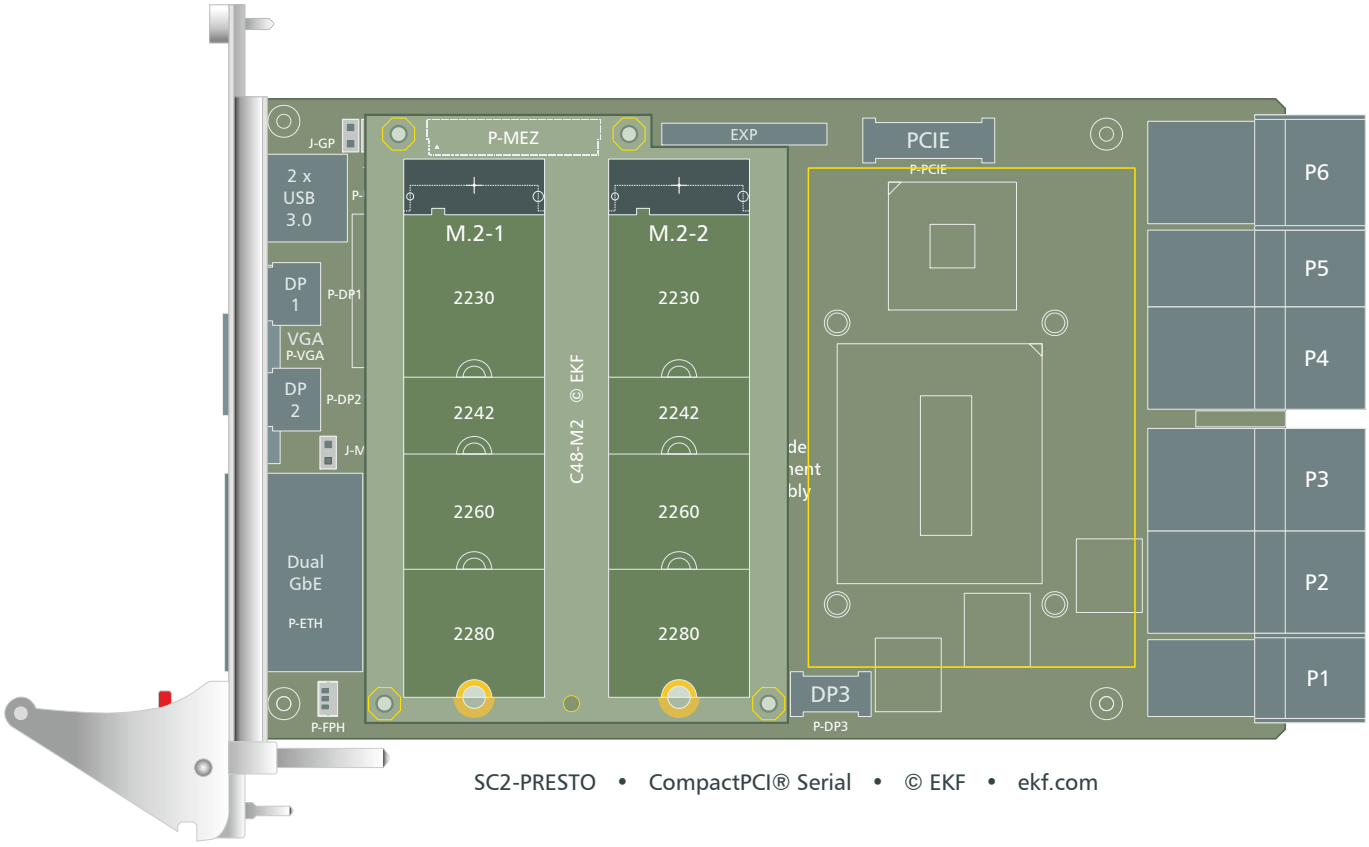
Block Diagram



Top View Component Assembly

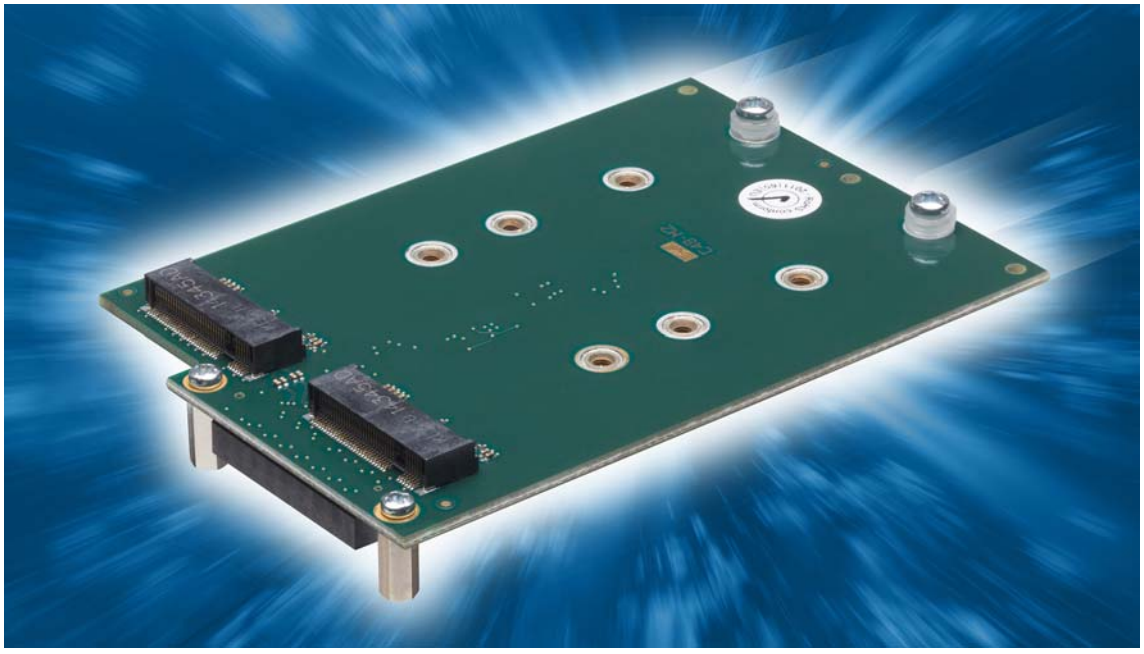


C48-M2 © EKF



SC2-PRESTO • CompactPCI® Serial • © EKF • ekf.com


1TB
1TB
C48-M2



Technical Reference - Connectors

M.2 Host Connectors

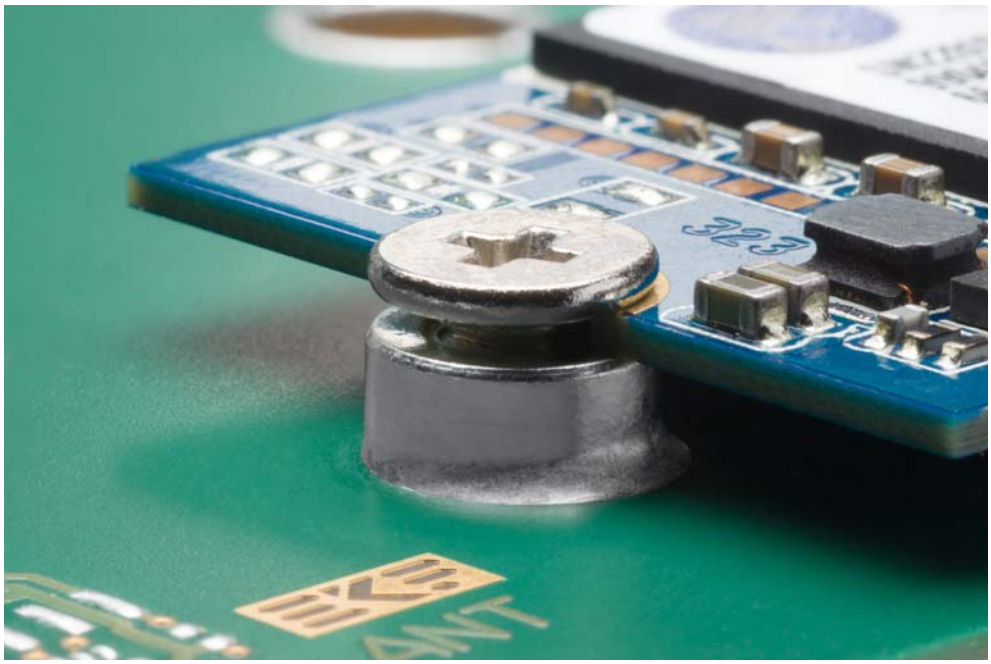
The C48-M2 is provided with two M.2 module host connectors (B keyed). After inserted, the M.2 module must be locked manually by a screw (M2.5 threaded inserts provided on the PCB), in order to withstand shock and vibration. With two M.2 solid-state drives engaged, the C48-M2 allows for software RAID level 0/1 operation.

M.2 1-2 • Pin 1 - 38 EKF Part #255.50.1.2242.10			
CFG-3 *	1	2	+3.3V
GND	3	4	+3.3V
GND	5	6	NC
NC	7	8	NC
NC	9	10	DA/DSS
GND	11	12	B Key
B Key	13	14	B Key
B Key	15	16	B Key
B Key	17	18	B Key
B Key	19	20	NC
CFG-0 *	21	22	NC
NC	23	24	NC
NC	25	26	NC
GND	27	28	NC
NC	29	30	NC
NC	31	32	NC
GND	33	34	NC
NC	35	36	NC
NC	37	38	DEVSLP

M.2 1-2 • Pin 39 - 75			
GND	39	40	NC
SATA B+ (SSD OUT)	41	42	NC
SATA B- (SSD OUT)	43	44	NC
GND	45	46	NC
SATA A- (SSD IN)	47	48	NC
SATA A+ (SSD IN)	49	50	NC
GND	51	52	NC
NC	53	54	NC
NC	55	56	NC
GND	57	58	NC
NC M-Key	59	60	NC M-Key
NC M-Key	61	62	NC M-Key
NC M-Key	63	64	NC M-Key
NC M-Key	65	66	NC M-Key
NC	67	68	NC
CFG-1 *	69	70	+3.3V
GND	71	72	+3.3V
GND	73	74	+3.3V
CFG-2 *	75		

* 10k pull-up +3.3V

The maximum continuous current via the +3.3V supply pins is limited to 1.5A by power switches and other design constraints. EKF cannot ensure clean operation of M.2 SSD modules which require more maximum power than 4800mW. Please consult the manufacturers datasheet (as a rule of thumb, the larger the SSD capacity the higher the worst case maximum current).



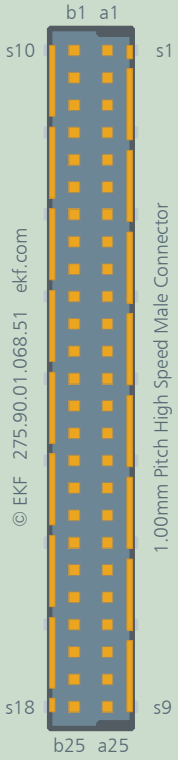
M.2 Module Fixation (Picture Similar)

Mounting Parts for M.2 SSD Modules	
440.08.025.006	Screw M2.5 x 6mm (supplied together with board)
442.0.02502.5	Spacer sleeve M2.5 x 2.5mm (supplied together with board)
440.45.025.015	M2.5 PCB nut, bottom mount threaded inserts (populated on-board by default)

P-MEZ

The connector P-MEZ is a 1mm height shielded male pin header. Its counterpart on the CPU carrier board is J-HSE (or J-HSE1), an 8mm height receptacle, for a nominal headroom of >=9.0mm between the boards (actual board-to-board spacers are 9.5mm).

P-MEZ SATA & USB Mezzanine Interface
1.00mm Pitch Male Connector 1mm Height (275.90.01.068.51)



GND	b1	a1	GND
SATA3_TXP	b2	a2	SATA1_TXP
SATA3_TXN	b3	a3	SATA1_TXN
GND	b4	a4	GND
SATA3_RXN	b5	a5	SATA1_RXN
SATA3_RXP	b6	a6	SATA1_RXP
GND	b7	a7	GND
SATA4_TXP	b8	a8	SATA2_TXP
SATA4_TXN	b9	a9	SATA2_TXN
GND	b10	a10	GND
SATA4_RXN	b11	a11	SATA2_RXN
SATA4_RXP	b12	a12	SATA2_RXP
GND	b13	a13	GND
USB3_P	b14	a14	*USB1_P*
USB3_N	b15	a15	*USB1_N*
GND	b16	a16	GND
USB4_P	b17	a17	*USB2_P*
USB4_N	b18	a18	*USB2_P*
GND	b19	a19	GND
USB3_OC#	b20	a20	*USB1_OC#*
USB4_OC#	b21	a21	*USB2_OC#*
+5VS 2)	b22	a22	+3.3VS 1)
+5VS 2)	b23	a23	+3.3VS 1)
+5V	b24	a24	*+3.3V*
RSVD	b25	a25	*+12V*

1) These power pins are in use to supply the M.2-1 socket via TPS2060 power switch
2) These power pins are in use to supply the M.2-2 socket via DC/DC switched voltage regulator and TPS2060 power switch
1) 2) Switched voltages from carrier board, according to CPU sleep state S0, 0.8A continuous current per pin @70°C

Notes:
- All s# connector pins (shield) are tied to GND
- All TX/RX designations with respect to SATA controller (TX controller = RX drive, RX controller = TX drive)

Schematics

Complete circuit diagrams for this product are available for customers on request. Signing of a non-disclosure agreement would be needed. Please contact sales@ekf.de for details.

EKF reserves the right to refuse distribution of confidential information material for any reason that EKF may consider substantial.

Ordering Information

Please note that the C48-M2 is a carrier card which typically comes without M.2 module(s) populated, if not ordered otherwise. Photos shown within this document and at other places are equipped with M.2 modules just for application demonstration. If you need a turnkey solution with M.2 SATA storage modules populated, please contact sales@ekf.com before ordering.

Ordering Information
For popular C48-M2 SKUs please refer to www.ekf.com/liste/liste_20.html#C48

Alternate Products

Low Profile CPU Card Mezzanine Storage Modules 1)		
C41-CFAST	CFast™	www.ekf.com/c/ccpu/c41/c41.html
C42-SATA	Micro SATA	www.ekf.com/c/ccpu/c42/c42.html
C47-MSATA	mSATA	www.ekf.com/c/ccpu/c47/c47.html

1) Due to different SATA channel ordering (wiring) schemes (optimized for particular carrier cards) direct exchange of these modules may be not possible in any application - please contact support@ekf.de.



C48-M2 Mounted on a Mezzanine Side Card (8HP Assembly)

High Performance Embedded



EKF Elektronik GmbH
Philipp-Reis-Str. 4 (Haus 1)
Lilienthalstr. 2 (Haus 2)
59065 HAMM
Germany





Phone +49 (0)2381/6890-0
Fax +49 (0)2381/6890-90
Internet www.ekf.com
E-Mail sales@ekf.com

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP