Product Information

SV2-MOVIE

Rev. 4

CompactPCI® Serial

Carrier for MXM 3.1 Type A/B Graphics Module

General

The SV2-MOVIE is a peripheral slot board for PICMG® CompactPCI® Serial systems and acts as carrier for an MXM 3.0/3.1 graphics module. The SV2-MOVIE is provided with four DisplayPort front panel connectors and can accommodate either a type A (82x70mm^2) or type B (82x105mm^2) MXM graphics module.

MXM (Mobile PCI Express Module) is an interconnect standard for GPUs created by MXM-SIG. MXM cards are mostly equipped with an AMD or Nvidia GPU core. With respect to a reasonable thermal management, a low power GPU is recommended for industrial applications together with the SV2-MOVIE.

SV2-MOVIE (8HP Assembly)

Theory of Operation

For best performance, the SV2-MOVIE should be operated in a CompactPCI® Serial fat pipe slot, which provides a PCI Express® x8 host interface. The SV2-MOVIE is equipped with a PCIe® Gen3 redriver for optimum signal integrity.

For use with suitable MXM graphics modules, low profile passive heat spreaders are available, for either 4HP or 8HP front panel width. In addition, the CompactPCI® Serial rack must provide suitable forced airflow (e.g. by fans).

SV2-MOVIE w. Nvidia GTX 970 MXM

Feature Summary

General

▸ PICMG® CompactPCI® Serial (CPCI-S.0) fat pipe slot card

▸ Single size Eurocard 3U 4HP/8HP 100x160mm^2

▸ CompactPCI® Serial backplane connectors P1/P2, for PCIe® x8 fat pipe slot

▸ Four DisplayPort front panel receptacles

MXM Host I/F

▸ Carrier board for type A or type B MXM 3.0/3.1 graphics module

▸ Maximum module dimensions 105mm x 82mm x 7mm (type B)

▸ Maximum module dimensions 113mm x 82mm x 7mm (w/o front panel connectors)

▸ MXM 3.0 edge card connector 314/281 pins

▸ PCI Express® Gen3 (8GT/s) redriver on-board, PCIe x8

▸ Custom cooler plate design (4HP/8HP envelope)

▸ CUDA (Compute Unified Device Architecture) capable with NVIDIA MXM GPU

▸ Option +12V external power connector 4.20mm ATX for MXM modules >60W

▸ Option +12V terminal block 3.5mm Eurostyle for attachment of a 12V DC fan

▸ Heat spreader available for CoolConduct® technology heat exchanger systems (option)
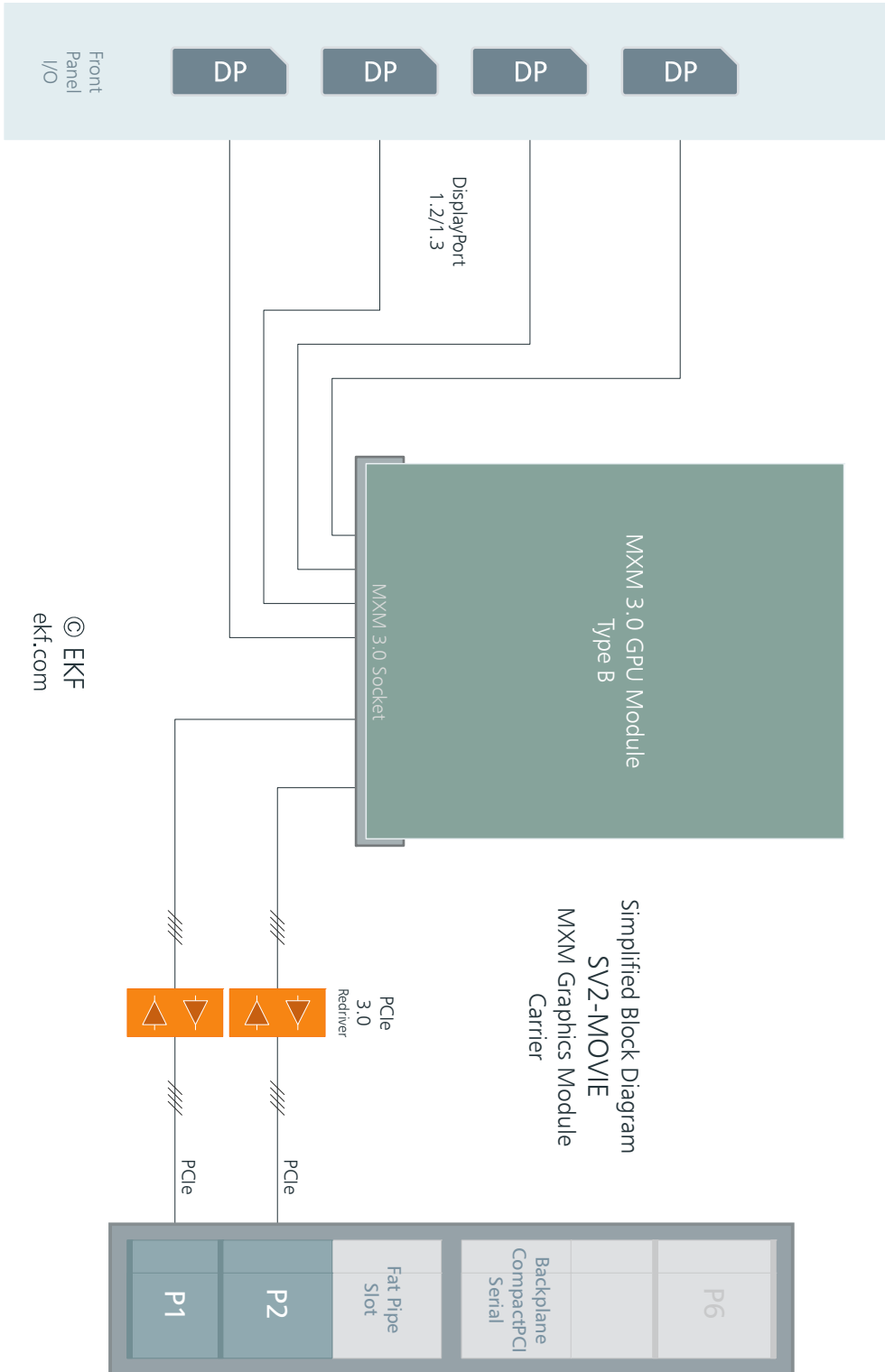
Sample MXM Modules

▸ Aetina M3N1060-MN (NVIDIA GTX 1060 Pascal)

▸ Aetina M3N1070-MN (NVIDIA GTX 1070 Pascal, for CUDA operation only, no front I/O DisplayPort connectors available due to extended module dimensions)

▸ NVIDIA® QUADRO® P3000 (1280 CUDA cores, 3.9TFLOPS)

▸ NVIDIA® QUADRO® P5000 (2048 CUDA cores, 6.4TFLOPS)

For drivers and other software please refer to the MXM module manufacturers website, e.g. Aetina, AMD, Nvidia
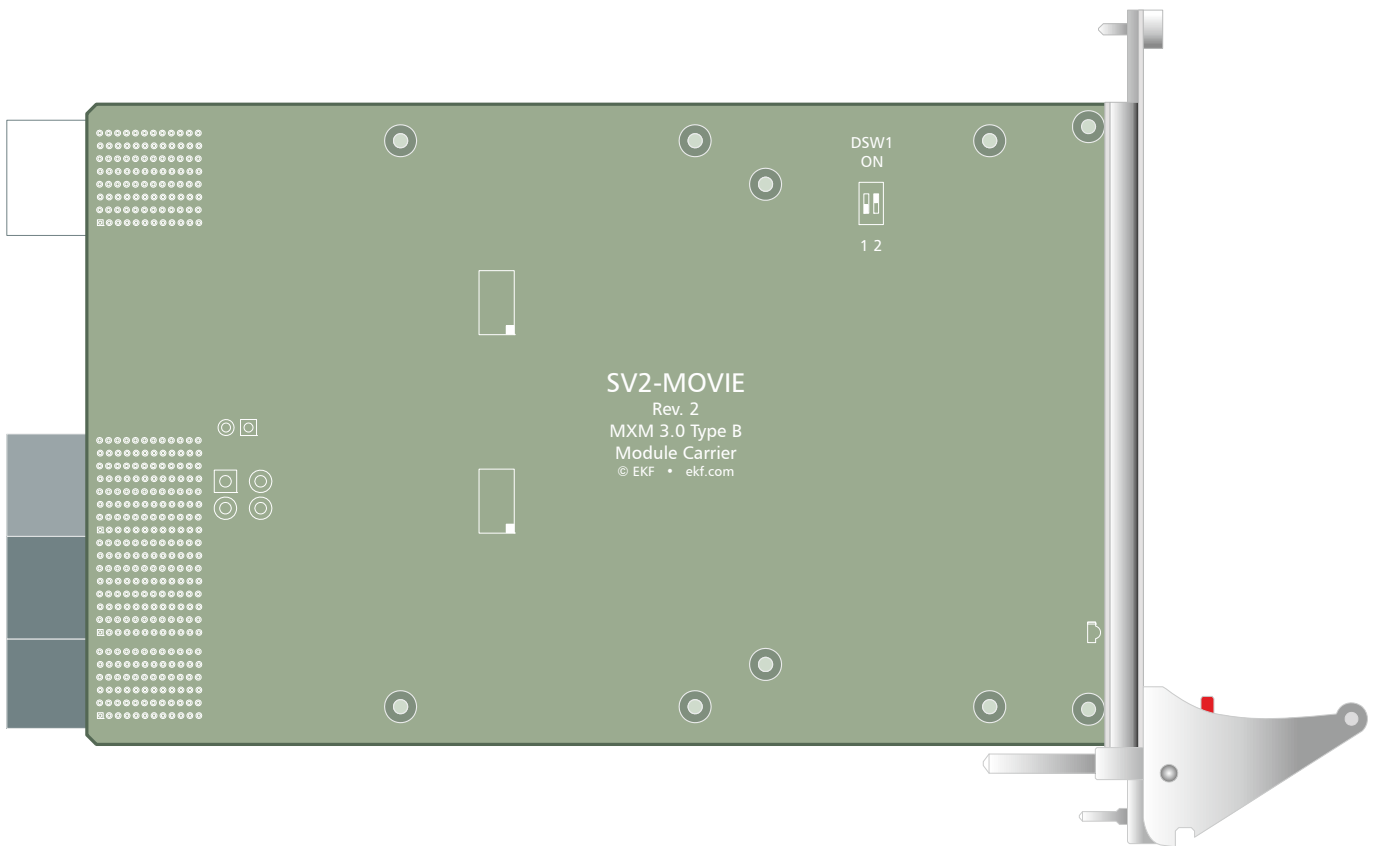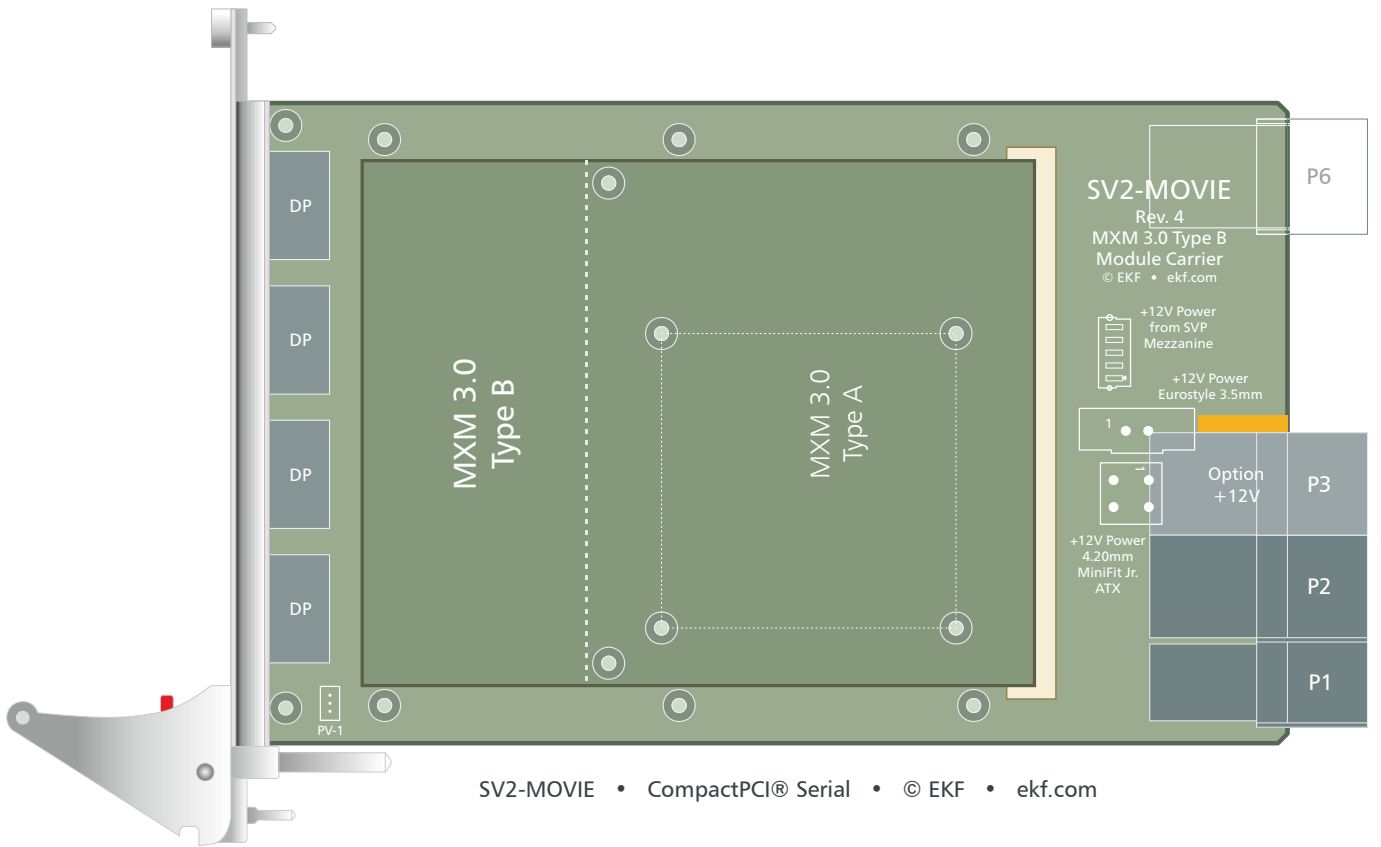
Regulatory

▸ Designed & manufactured in Germany

▸ ISO 9001 certified quality management

▸ Long term availability

▸ Rugged solution (coating/sealing available on request)

▸ RoHS compliant

▸ Commercial and industrial temperature range (depends on MXM module loaded and thermal solution)

▸ Humidity 5% ... 95% RH non condensing

▸ Altitude -300m ... +3000m

▸ Shock 15g 0.33ms, 6g 6ms

▸ Vibration 1g 5-2000Hz

▸ MTBF 45.1 years

▸ EC Regulatory EN55024, EN55032, EN62368-1

Block Diagram

Front Panel I/O

DP   DP   DP   DP

DisplayPort 1.2/1.3

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ekf.com

MXM 3.0 GPU Module
Type B

MXM 3.0 Socket

PCIe 3.0 Redriver

PCIe

PCIe

Simplified Block Diagram
SV2-MOVIE
MXM Graphics Module
Carrier

P1 P2 Fat Pipe Slot

Backplane CompactPCI Serial

P6

Component Assembly

DP

DP

DP

DP

MXM 3.0
Type B

MXM 3.0
Type A

PV-1

SV2-MOVIE
Rev. 4
MXM 3.0 Type B
Module Carrier
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P6

+12V Power
from SVP
Mezzanine

+12V Power
Eurostyle 3.5mm

1

Option
+12V

P3

+12V Power
4.20mm
MiniFit Jr.
ATX

P2

P1

SV2-MOVIE • CompactPCI® Serial • © EKF • ekf.com

DSW1
ON

1 2

SV2-MOVIE
Rev. 2
MXM 3.0 Type B
Module Carrier
© EKF • ekf.com

Front Panel 4HP

DP
1

DP
2

DP
3

DP
4

© EKF • draft - do not scale • ekf.com

SV2-MOVIE
MXM GPU

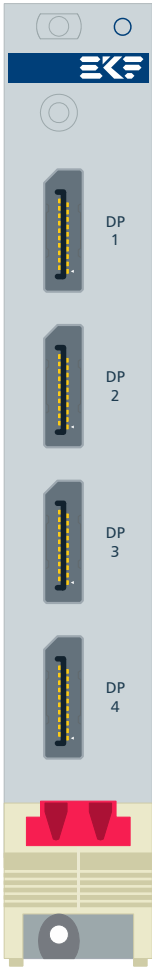Please note: The front handle is provided with a built-in microswitch, which is used to disable the on-board power circuit when released. Vice versa, the *on-board devices are enabled not before the handle gets locked*. Please refer to the illustration below and make sure that the eject lever has reached its final position for proper board operation, as shown in picture 8. A gentle click should be audible, when the red actuator pin moves into its raised position, indicating that the board is locked and ready for use.
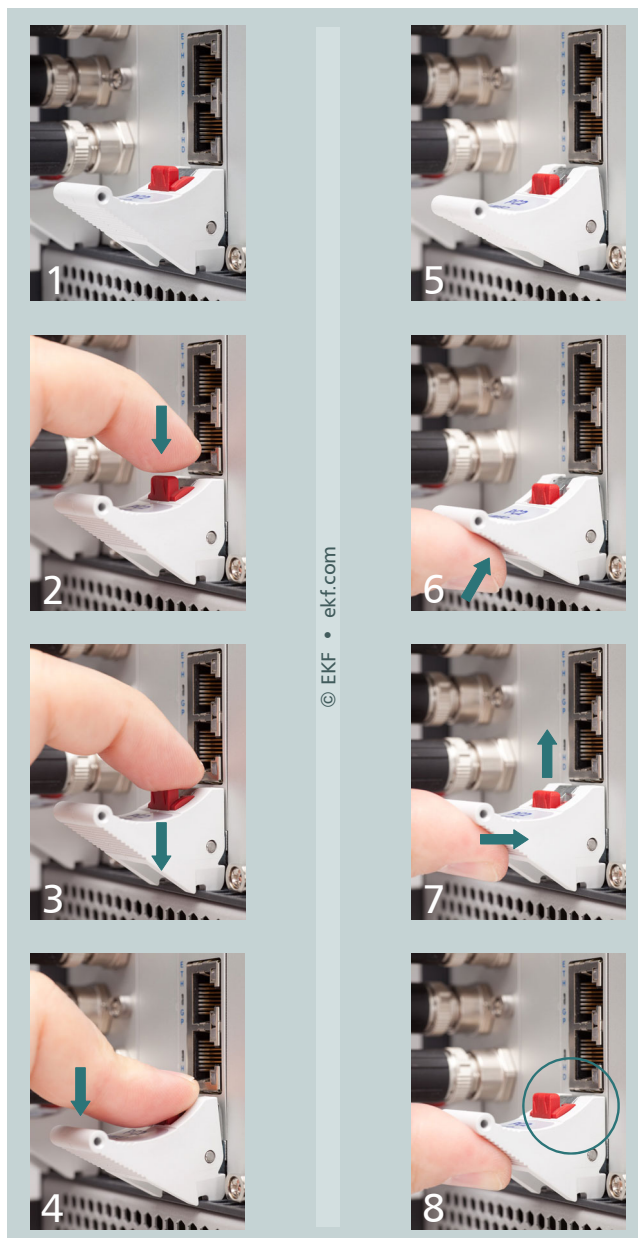
1 - 4: remove board
5 - 8: install board

1 & 8: on-board power enabled
2-7: on-board power disabled

DisplayPort Connectors

The SV2-MOVIE supports up to four independent displays, attached to the front panel display connectors 1-4. DisplayPort serves as the state of the art interface for computer monitors, replacing legacy VGA and DVI video connectors since integrated in all main-stream GPUs and chipsets. The latest specification DisplayPort 1.2 adds multi-stream transport (MST), allowing up to 63 separate A/V streams across a single DisplayPort connection. Please refer to the MXM Graphics Module actually in use on the SV2-MOVIE for the number of DP video outputs available, resolution and other parameters.

For attachment of either a classic style analog RGB monitor or DVI type display to any DP front panel receptacle, there are both adapters and also adapter cables available, from DisplayPort to the VGA or DVI connector.

Cable Adapter DP to DVI

Cable Adapter DP to VGA

DP • DisplayPort Video
Standard DisplayPort Receptacle, 20-lead (270.60.20.0)

20	Power +3.3V 0.5A	19	Return
18	Hot Plug Detect	17	AUX(N)
16	GND	15	AUX(P)
14	CONFIG2	13	CONFIG1
12	LANE3(N)	11	GND
10	LANE3(P)	9	LANE2(N)
8	GND	7	LANE2(P)
6	LANE1(N)	5	GND
4	LANE1(P)	3	LANE0(N)
2	GND	1	LANE0(P)

Specified by the VESA DisplayPort connector standard is a dedicated power pin 20 (+3.3V 0.5A). Both the GPU (source side) and a DP monitor (sink side) must provide power via this pin. A VESA specified DisplayPort cable however must not connect the pins 20 of both cable ends, in order to avoid a back driving conflict. Unfortunately there are cable assemblies available with pin 20 passed through, with unpredictable results on the system behaviour. Before ordering DP cable assemblies, verify the associated wiring diagram.

Sample VESA Compliant DisplayPort Cable Assemblies 2.0m Plug to Plug, w. Latches • EKF Part. #270.66.1.02.0	
Manhattan	307116, 391931
Molex	68783-0007
TE (Tyco)	2040687-2, 2040638-2

MXM Module Connector

The SV2-MOVIE is provided with a right angled edge card connector for MXM 3.0/3.1 graphics modules. If the SV2-MOVIE has been installed into a fat pipe peripheral slot of the CompactPCI® Serial backplane, a PCI Express® x 8 link is available at the MXM connector. The SV2-MOVIE is equipped with PCIe Gen3 redrivers (8GT/s) for high performance MXM graphics cards.

The SV2-MOVIE is equipped with 4 DisplayPort front panel connectors 1-4, which are related to the MXM module DP outputs A, B, C, and D. Please note, that there are MXM modules available with propriatary (deviant with respect to the MXM specification) output mapping - please refer to the particular MXM module datasheet for details.

+3.3V is sourced from an on-board regulator. The current should not exceed 3A. +5V is sourced from an on-board regulator. The current should not exceed 3A. +12V is the main power rail, passed through from the CompacPCI® Serial backplane connector P1. If the current across the 12V rail is expected to exceed significantly >5A (>60W MXM module power consumption), the optional 4.20mm +12V power connector should be employed in addition (in parallel to the backplane slot P1/J1 12V power pins). All power rails will be disabled if the front panel handle built-in microswitch has been activated.

External Documents	
MXM Graphics Module Mobile PCI Express Module Electromechanical Specification Version 3.1 Rev. 1.0 March 1, 2012	www.mxm-sig.org
Nvidia MXM Graphics Modules MXM 3.0 Type B Module GTX 970M, GTX 980M, GTX 1060	www.aetina.com.tw

MXM 3.0 Connector Part #255.8.1.314.10			
E1	PWR (+12V)	PWR (+12V)	E2
E3	GND	GND	E4
1	+5V	PRSNT_R#	2
3	+5V	WAKE#	4
5	+5V	PWR_GOOD	6
7	+5V	PWR_EN	8
9	+5V	27MHz	10
11	GND	GND	12
13	GND	LVDS_U_HPD	14
15	GND	JTAG_TESTEN	16
17	GND	PWR_LEVEL	18
19	PEX_STD_SW# see DSW1	TH_OVERT#	20
21	VGA_DISABLE# see DSW1	TH_ALERT#	22
23	PNL_PWR_EN	TH_PWM	24
25	PNL_BL_EN	GPIO0	26
27	PNL_BL_PWM	GPIO1	28
29	HDMI_CEC	GPIO2	30
31	LVDS_L_HPD	SMB_DAT	32
33	LVDS_DDC_DAT	SMB_CLK	34
35	LVDS_DDC_CLK	GND	36
37	GND	OEM0	38
39	OEM1	OEM2	40
41	OEM3	OEM4	42
43	OEM5	OEM6	44
45	OEM7	GND	46
47	GND	PEX_TX15#	48
49	PEX_RX15#	PEX_TX15	50
51	PEX_RX15	GND	52
53	GND	PEX_TX14#	54
55	PEX_RX14#	PEX_TX14	56
57	PEX_RX14	GND	58
59	GND	PEX_TX14#	60
61	PEX_RX13#	PEX_TX14	62
63	PEX_RX13	GND	64
65	GND	PEX_TX14#	66
67	PEX_RX12#	PEX_TX14	68
69	PEX_RX12	GND	70

MXM 3.0 Connector Part #255.8.1.314.10			
71	GND	PEX_TX11#	72
73	PEX_RX11#	PEX_TX11	74
75	PEX_RX11	GND	76
77	GND	PEX_TX10#	78
79	PEX_RX10#	PEX_TX10	80
81	PEX_RX10	GND	82
83	GND	PEX_TX9#	84
85	PEX_RX9#	PEX_TX9	86
87	PEX_RX9	GND	88
89	GND	PEX_TX8#	90
91	PEX_RX8#	PEX_TX8	92
93	PEX_RX8	GND	94
95	GND	PEX_TX7#	96
97	PEX_RX7#	PEX_TX7	98
99	PEX_RX7	GND	100
101	GND	PEX_TX6#	102
103	PEX_RX6#	PEX_TX6	104
105	PEX_RX6	GND	106
107	GND	PEX_TX5#	108
109	PEX_RX5#	PEX_TX5	110
111	PEX_RX5	GND	112
113	GND	PEX_TX4#	114
115	PEX_RX4#	PEX_TX4	116
117	PEX_RX4	GND	118
119	GND	PEX_TX3#	120
121	PEX_RX3#	PEX_TX3	122
123	PEX_RX3	GND	124
125	GND		
133	GND	GND	134
135	PEX_RX2#	PEX_TX2#	136
137	PEX_RX2	PEX_TX2	138
139	GND	GND	140
141	PEX_RX1#	PEX_TX1#	142
143	PEX_RX1	PEX_TX1	144

to be continued on next page
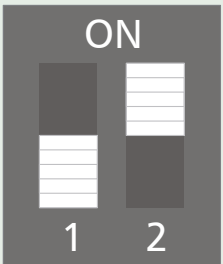
MXM 3.0 Connector			
Part #255.8.1.314.10			
145	GND	GND	146
147	PEX_RX0#	PEX_TX0#	148
149	PEX_RX0	PEX_TX0	150
151	GND	GND	152
153	PEX_REFCLK#	PEX_CLK_REQ#	154
155	PEX_REFCLK	PEX_RST#	156
157	GND	VGA_DDC_DAT	158
159	JTAG_TDO	VGA_DDC_CLK	160
161	JTAG_TDI	VGA_VSYNC	162
163	JTAG_TCLK	VGA_HSYNC	164
165	JTAG_TMS	GND	166
167	JTAG_TRST#	VGA_RED	168
169	LVDS_UCLK#	VGA_GREEN	170
171	LVDS_UCLK	VGA_BLUE	172
173	GND	GND	174
175	LVDS_UTX3#	LVDS_LCLK#	176
177	LVDS_UTX3	LVDS_LCLK	178
179	GND	GND	180
181	LVDS_UTX2#	LVDS_LTX3#	182
183	LVDS_UTX2	LVDS_LTX3	184
185	GND	GND	186
187	LVDS_UTX1#	LVDS_LTX2#	188
189	LVDS_UTX1	LVDS_LTX2	190
191	GND	GND	192
193	LVDS_UTX0#	LVDS_LTX1#	194
195	LVDS_UTX0	LVDS_LTX1	196
197	GND	GND	198
199	DP_C_L0#	LVDS_LTX0#	200
201	DP_C_L0	LVDS_LTX0	202
203	GND	GND	204
205	DP_C_L1#	DP_D_L0#	206
207	DP_C_L1	DP_D_L0	208
209	GND	GND	210
211	DP_C_L2#	DP_D_L1#	212
213	DP_C_L2	DP_D_L1	214

	MXM 3.0 Connector		
	Part #255.8.1.314.10		
215	GND	GND	216
217	DP_C_L3#	DP_D_L2#	218
219	DP_C_L3	DP_D_L2	220
221	GND	GND	222
223	DP_C_AUX#	DP_D_L3#	224
225	DP_C_AUX	DP_D_L3	226
227	RSVD	GND	228
229	RSVD	DP_D_AUX#	230
231	RSVD	DP_D_AUX	232
233	RSVD	DP_C_HPD	234
235	RSVD	DP_D_HPD	236
237	RSVD	RSVD	238
239	RSVD	RSVD / +3.3V	240
241	RSVD	RSVD / +3.3V	242
243	RSVD	GND	244
245	RSVD	DP_B_L0#	246
247	RSVD	DP_B_L0	248
249	RSVD	GND	250
251	GND	DP_B_L1#	252
253	DP_A_L0#	DP_B_L1	254
255	DP_A_L0	GND	256
257	GND	DP_B_L2#	258
259	DP_A_L1#	DP_B_L2	260
261	DP_A_L1	GND	262
263	GND	DP_B_L3#	264
265	DP_A_L2#	DP_B_L3	266
267	DP_A_L2	GND	268
269	GND	DP_B_AUX#	270
271	DP_A_L3#	DP_B_AUX	272
273	DP_A_L3	DP_B_HPD	274
275	GND	DP_A_HPD	276
277	DP_A_AUX#	+3.3V	278
279	DP_A_AUX	+3.3V	280
281	PRSNT_L#		

DSW1 Part #245.35.02.01			
160.15.02.0 © EKF • ekf.com ON 1 2	1 = OFF	Disable I2C GA *	By default this switch is set to OFF (I2C circuitry is enabled and follows geographical addressing schema GA0-GA2)
	1 = ON		If the switch is set to ON, I2C circuitry is disabled
	2 = OFF	VGA_DISABLE# MXM Pin 21 I^2C GPIO P3	If this switch is set to OFF the MXM graphics module is the primary boot display device.
	2 = ON		If this switch is set to ON, the VGA functionality of the MXM module will be disabled to prevent it from being used as a boot display device. This feature is optional and maybe not supported by the MXM module. By default this switch is set to ON since the CPU is the primary boot display device.

* valid from PCB rev. 3 off

The VGA_DISABLE# signal can be controlled optionally via an on-board I^2C PCA9554A GPIO. In order to avoid a short circuit condition, slider #2 must be set to off (open) if the GPIO port is intended to be used as controlling output.

Option Mezzanine Power +12V

The SV2-MOVIE carrier card derives +12V power via the P1 backplane connector. For an MXM module with a power consumption >60W, usage of an additional power connector in parallel is highly recommended. The SV2-MOVIE can be equipped with a 5-pin mezzanine connector, for attachment of the SVP-POWER mezzanine module as an 8HP assembly. The secondary CompactPCI® Serial P1 backplane connector doubles the maximum power available up to 120W in total.

Option Rear I/O Power +12V

As an alternate, the SVP-POWER can be used as rear I/O module for the SV2-MOVIE, using the rJ3 backplane connector for additional +12V support. This requires a backplane slot configured for RIO (J3 backplane connector). The additional current is derived from an AMP MATE-N-LOK series connector, rated at 12A. A suitable power cable harness to the power supply is required in addition. The SVP-POWER rear I/O solution can be used along with both 4HP and 8HP versions of the SV2-MOVIE.
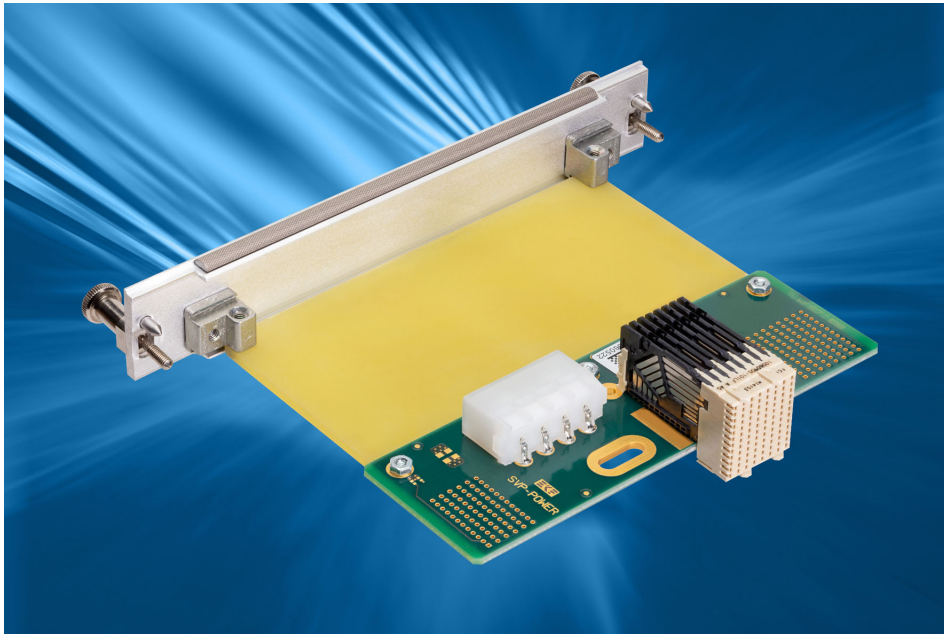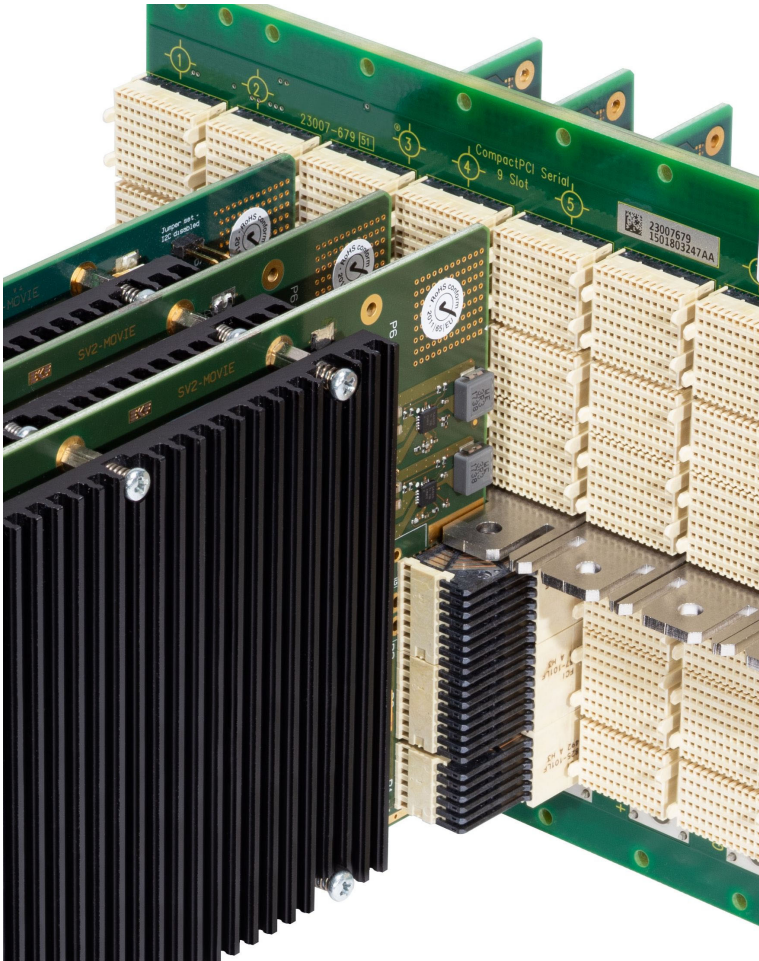

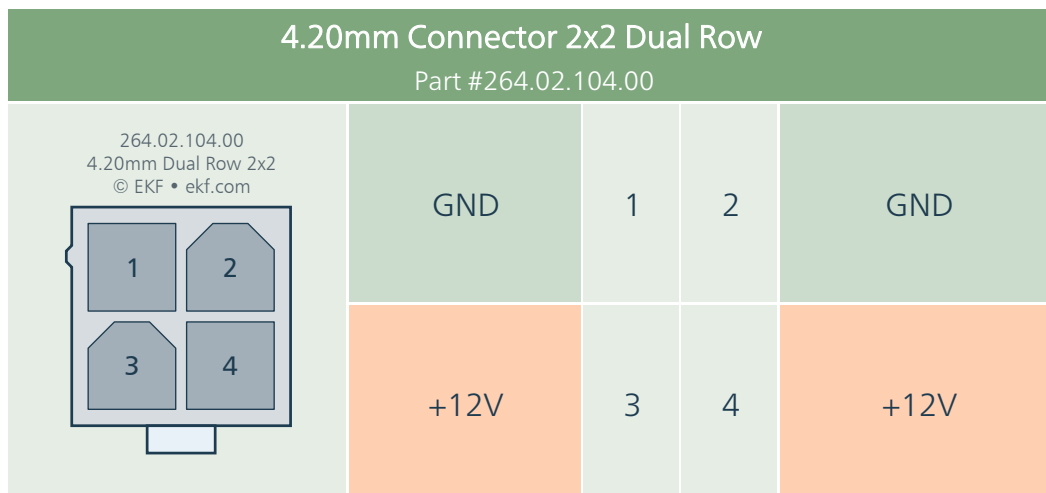SVP-2-POWER (w/o Panel) • SVP-3-POWER (w. Rear Panel)
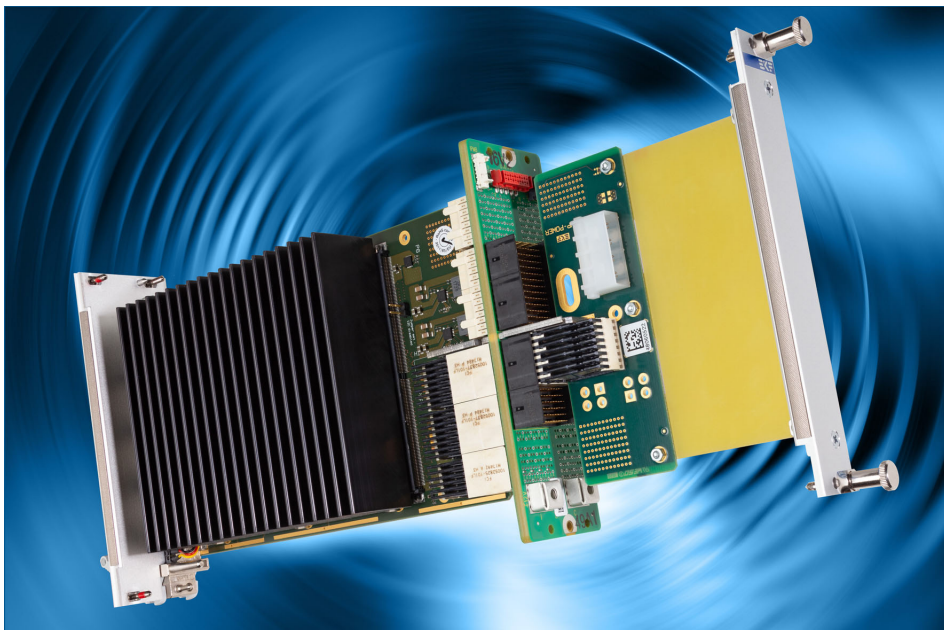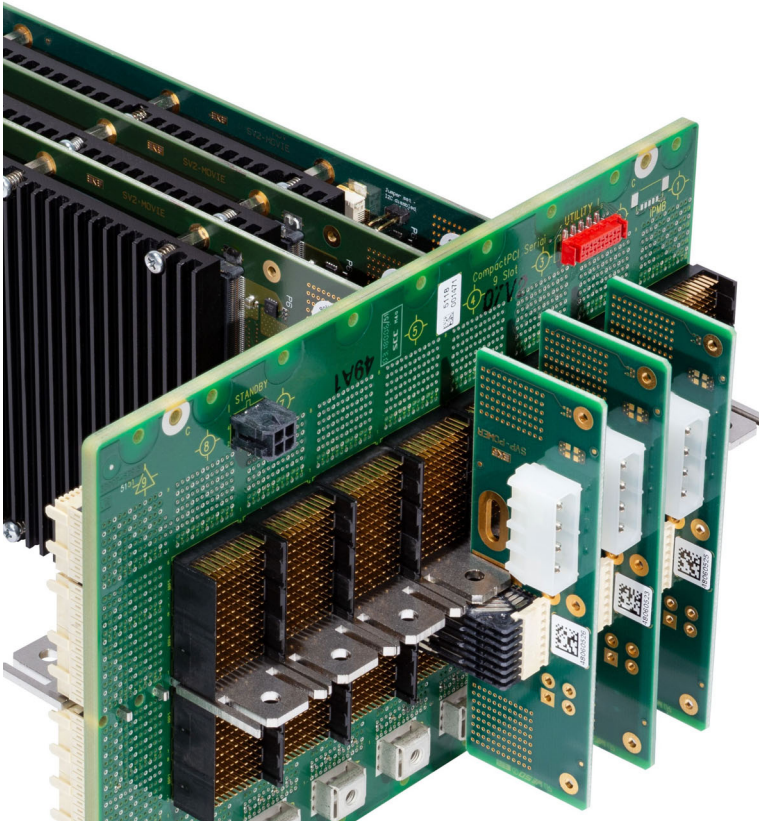
SVP-2-POWER • 12V Support RIO Modules

Option ATX Power +12V

As an alternate, the SV2-MOVIE can be equipped with a 2x2 pin 4.2mm pitch dual row wire to board vertical header (ATX 12V 4-pin), for attachment of a suitable cable assembly between power supply and the SV2. This would allow up to additional 192W power feeding theoretically.

4.20mm Connector 2x2 Dual Row Part #264.02.104.00				
264.02.104.00 4.20mm Dual Row 2x2 © EKF • ekf.com	GND	1	2	GND
	+12V	3	4	+12V

Each connector pin is rated at 8A. Mating cable connectors are available e.g. from Molex, under the Mini-Fit® Jr.™ brand. A suitable housing would be e.g. the Molex part #0039013042, to be used with crimp terminals e.g. Molex part #0039000060 (18-24 AWG). Other manufacturers for 4.20mm style connectors are e.g. Würth and TE.

The SV2-Movie is available as 4HP or 8HP (or custom size) front panel width assembly, depending on the heat spreader required for the particular application. The 8HP version would allow for a straight Mini-Fit® power connector (see picture below).
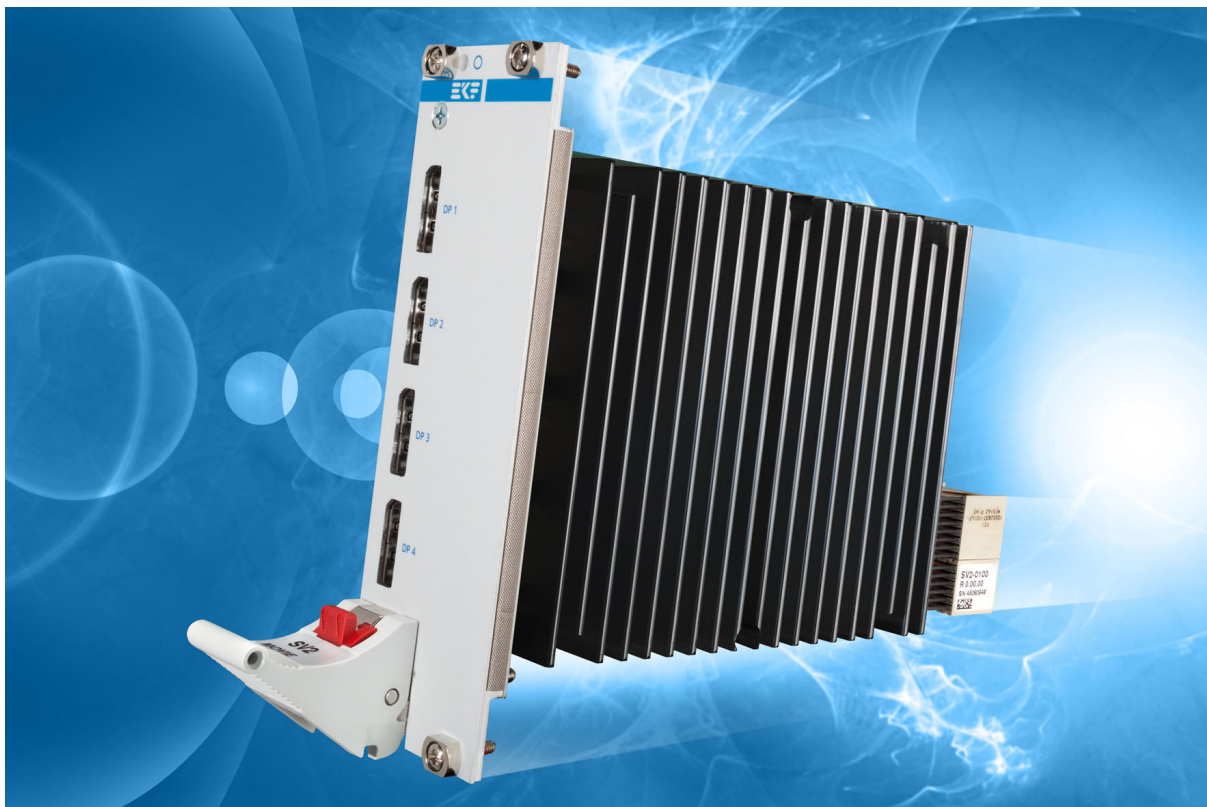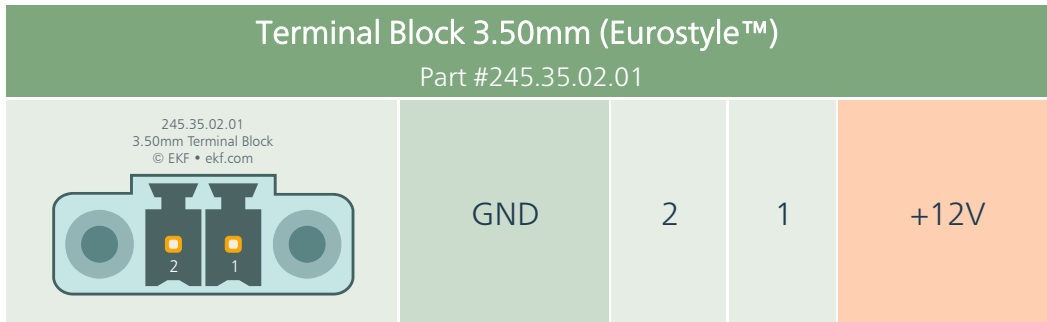

SV2-MOVIE (8HP Assembly)

Option Terminal Block +12V

Another power connector may be provided on the SV2-MOVIE as an option, for attachment of a 12V DC compact fan mounted above the MXM cooling plate (typically 8HP SV2-MOVIE front panel width assembly).

Terminal Block 3.50mm (Eurostyle™) Part #245.35.02.01					
	GND	2	1	+12V

The 3.50mm pitch vertical header mates with a suitable plug e.g. Molex part #0395073002. Other Eurostyle compatible terminal block suppliers are e.g. Phoenix Contact, Weidmüller, Würth, TE, or FCI. As an alternate, the pig tail wires of the cooling fan can be soldered directly to the SV2-MOVIE PCB, using the 3.50mm connector terminal pads. Since both connectors, the 4.20mm ATX and the 3.50mm terminal block are wired in parallel on-board to +12V (in addition to the power pins of the backplane connector P1), the terminal block can also be used for external power supply up to 8A, as an alternate.
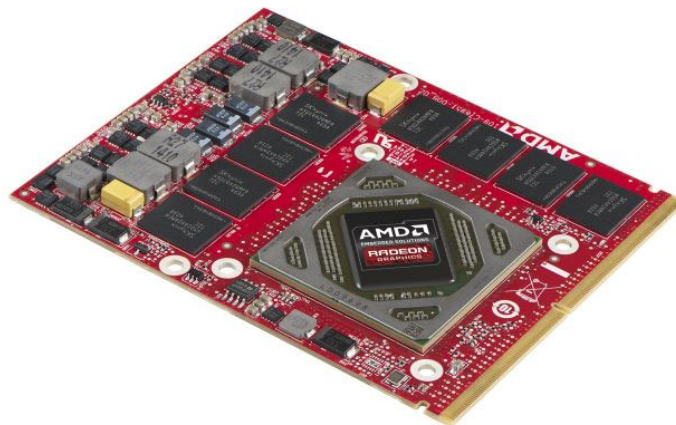
P1/P2 CompactPCI® Serial Backplane Connectors

P2 CompactPCI® Serial Peripheral Slot Backplane Connector
EKF Part #250.3.1208.20.00 • 96 pos. 12x8, 16mm Width

P2	A	B	C	D	E	F	G	H	I	J	K	L
8	GND			GND			GND			GND		
7			GND			GND			GND			GND
6	GND			GND			GND			GND		
5			GND			GND			GND			GND
4	GND			GND			GND			GND		
3			GND			GND			GND			GND
2	GND	PE TX06+	PE TX06-	GND	PE RX06+	PE RX06-	GND	PE TX07+	PE TX07-	GND	PE RX07+	PE RX07-
1	PE TX04+	PE TX04-	GND	PE RX04+	PE RX04-	GND	PE TX05+	PE TX05-	GND	PE RX05+	PE RX05-	GND

P1 CompactPCI® Serial Peripheral Slot Backplane Connector
EKF Part #250.3.1206.20.02 • 72 pos. 12x6, 14mm Width

P1	A	B	C	D	E	F	G	H	I	J	K	L
6	GND	PE TX02+	PE TX02-	GND	PE RX02+	PE RX02-	GND	PE TX03+	PE TX03-	GND	PE RX03+	PE RX03-
5	PE TX00+	PE TX00-	GND	PE RX00+	PE RX00-	GND	PE TX01+	PE TX01-	GND	PE RX01+	PE RX01-	GND
4	GND	USB2+	USB2-	GND	PE CLK+	PE CLK-	GND	SATA TX+	SATA TX-	GND	SATA RX+	SATA RX-
3	USB3 TX+	USB3 TX-	GA0	USB3 RX+	USB3 RX-	GA1	SATA SDI	SATA SDO	GA2	SATA SCL	SATA SL	GA3
2	GND	I2C SCL	I2C SDA	GND	RSV	RSV	GND	RST#	WAKE#	GND	PE EN#	SYS EN#
1	+12V	STBY	GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND

pin positions printed gray: not connected

PCB Revision 2 Modification
## P3 CompactPCI ˚ Serial Backplane Connector (+12V Enforced)

P3	A	B	C	D	E	F	G	H	I	J	K	L
P3 CompactPCI ˚ Serial Peripheral Slot Backplane Connector (Option) EKF Part #250.3.1208.20.00 • 96 pos. 12x8, 16mm Width												
8	GND			GND			GND			GND		
7	+12V		GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND
6	GND			GND			GND			GND		
5	+12V		GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND
4	GND			GND			GND			GND		
3	+12V		GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND
2	GND			GND			GND			GND		
1	+12V		GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND

From Rev. 2 PCB off, additional +12V power can be supplied via P3 by means of a custom specific backplane. Please note, that the SV2-MOVIE must not be inserted into a backplane slot which is wired for propriatary rear I/O on these pins, due to backdriving +12V power from P1 to P3.

CUDA (Compute Unified Device Architecture)

The SV2-MOVIE is suitable for modest parallel computing when equipped with a CUDA capable graphics module (NVIDIA). For details please refer to www.nvidia.com.
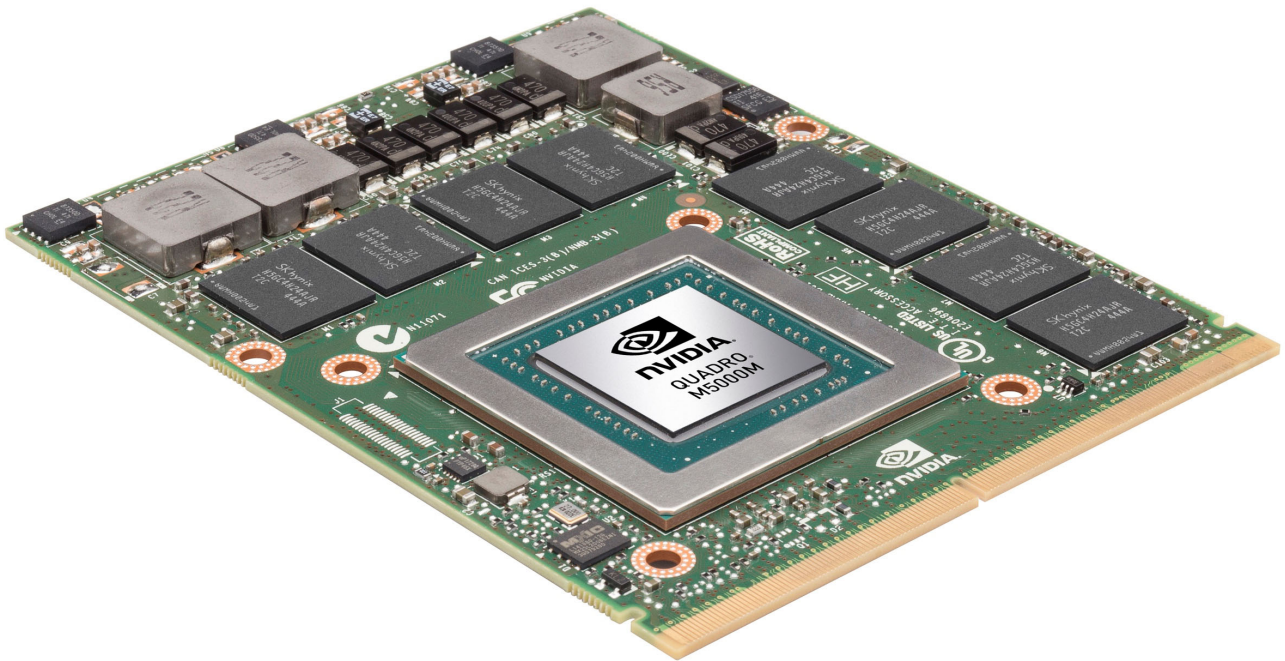
Nvidia MXM Module

SV2-MOVIE Links	
SV2-MOVIE Home	www.ekf.com/s/sv2/sv2.html
CompactPCI® Serial Overview	www.ekf.com/s/smart_solution.pdf

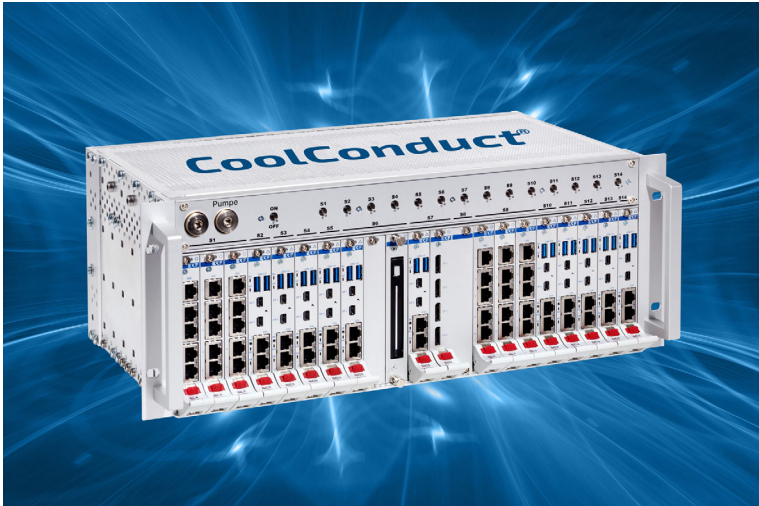| Ordering Information |
| --- |
| For popular SV2-MOVIE SKUs please refer to www.ekf.com/liste/liste_21.html#SV2 |

CoolConduct® Heat Exchange Technology (Option)

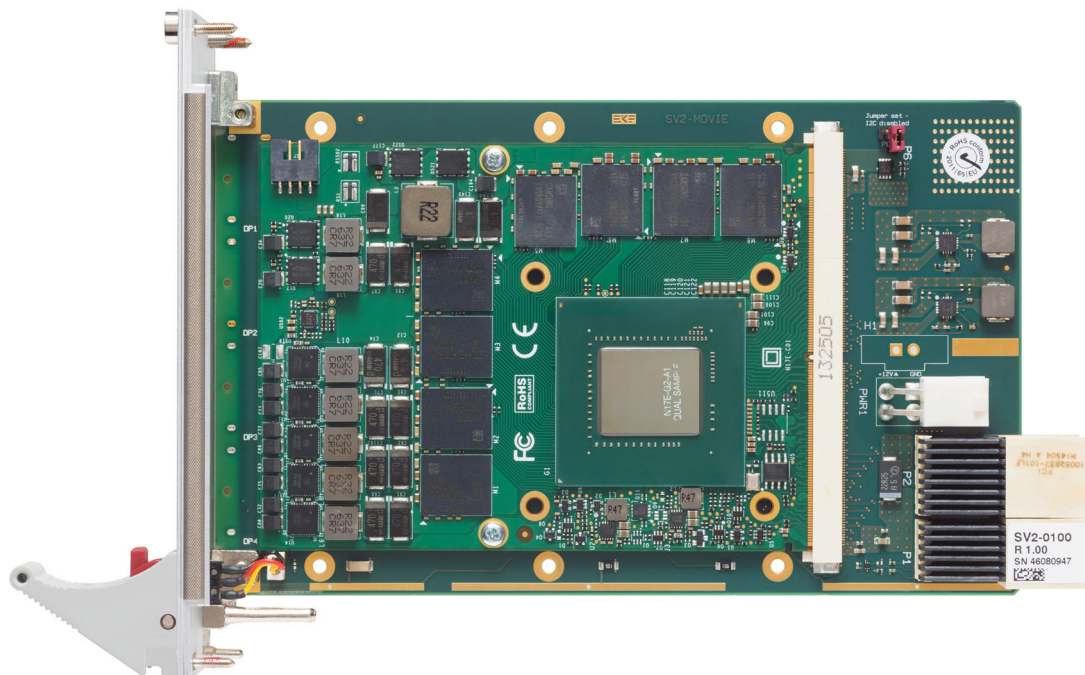CoolConduct® Heat Spreader
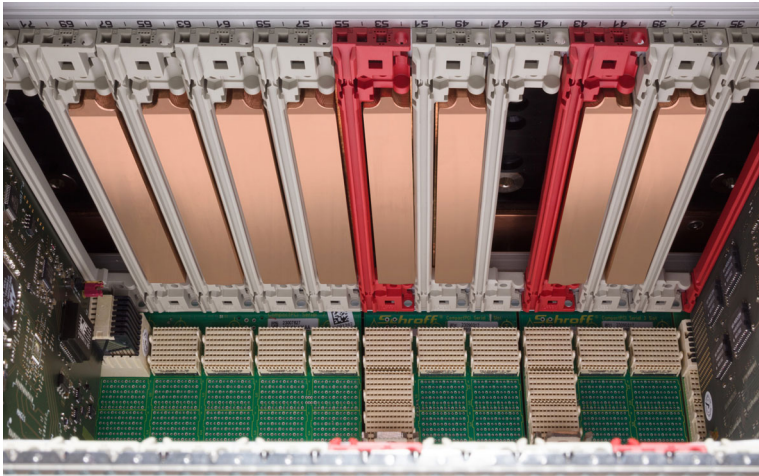
CoolConduct® Skids

CoolConduct® System

Proprietary Size MXM Module Option

SV2-MOVIE w/o DP Connectors for Extended Size MXM Module

GTX1070 Extended Size Module (Aetina) for CUDA Operation

CUDA (w/o Front I/O)

CUDA (w/o Front I/O)

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