Product Information

SV2-MOVIE

Rev. 2

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 for MXM modules >60W
- Option +12V power connector 3.5mm Eurostyle for attachment of a 12V DC fan
- Heat spreader available for CoolConduct® technology heat exchanger systems (option)

Sample MXM Modules

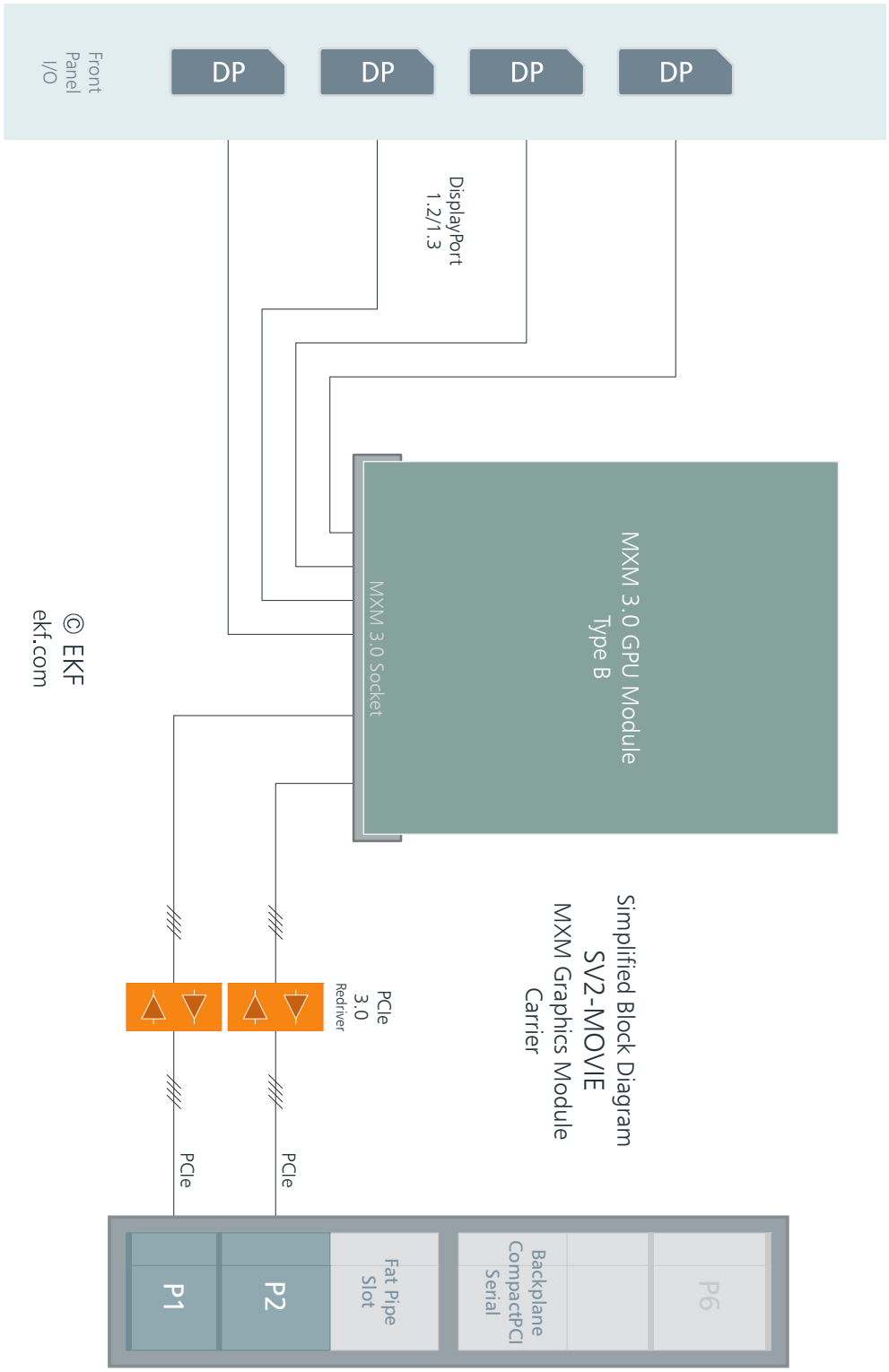
- Aetina M3N1060-MN (NVIDIA GTX 1060 Pascal)
- Aetina M3N1070-MN (NVIDIA GTX 1070 Pascal, for CUDA operation only, no front I/O DisplayPort connectors available due to extended module dimensions)
- NVIDIA® QUADRO® P3000 (1280 CUDA cores, 3.9TFLOPS)
- NVIDIA® QUADRO® P5000 (2048 CUDA cores, 6.4TFLOPS)

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

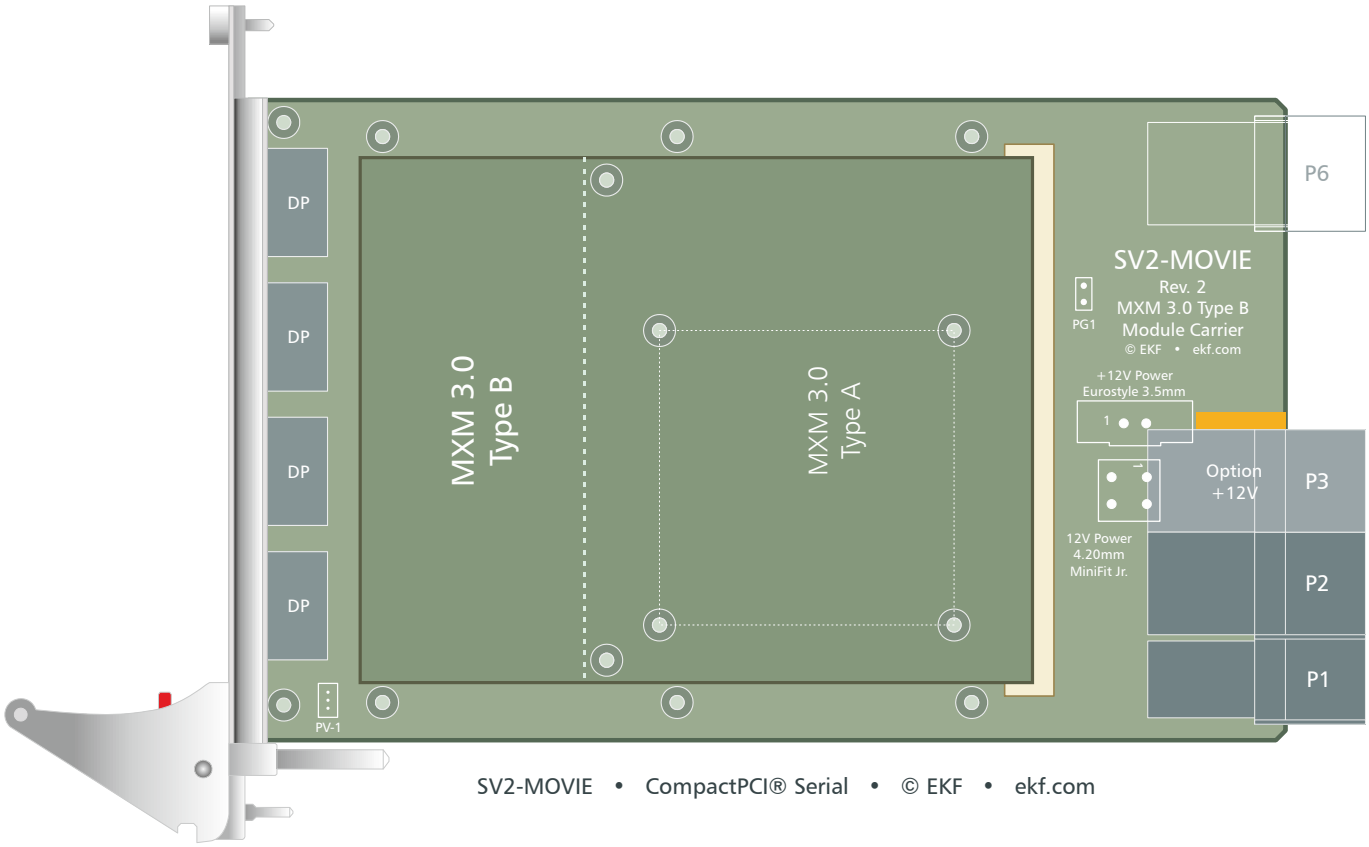
Regulatory

- 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 Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

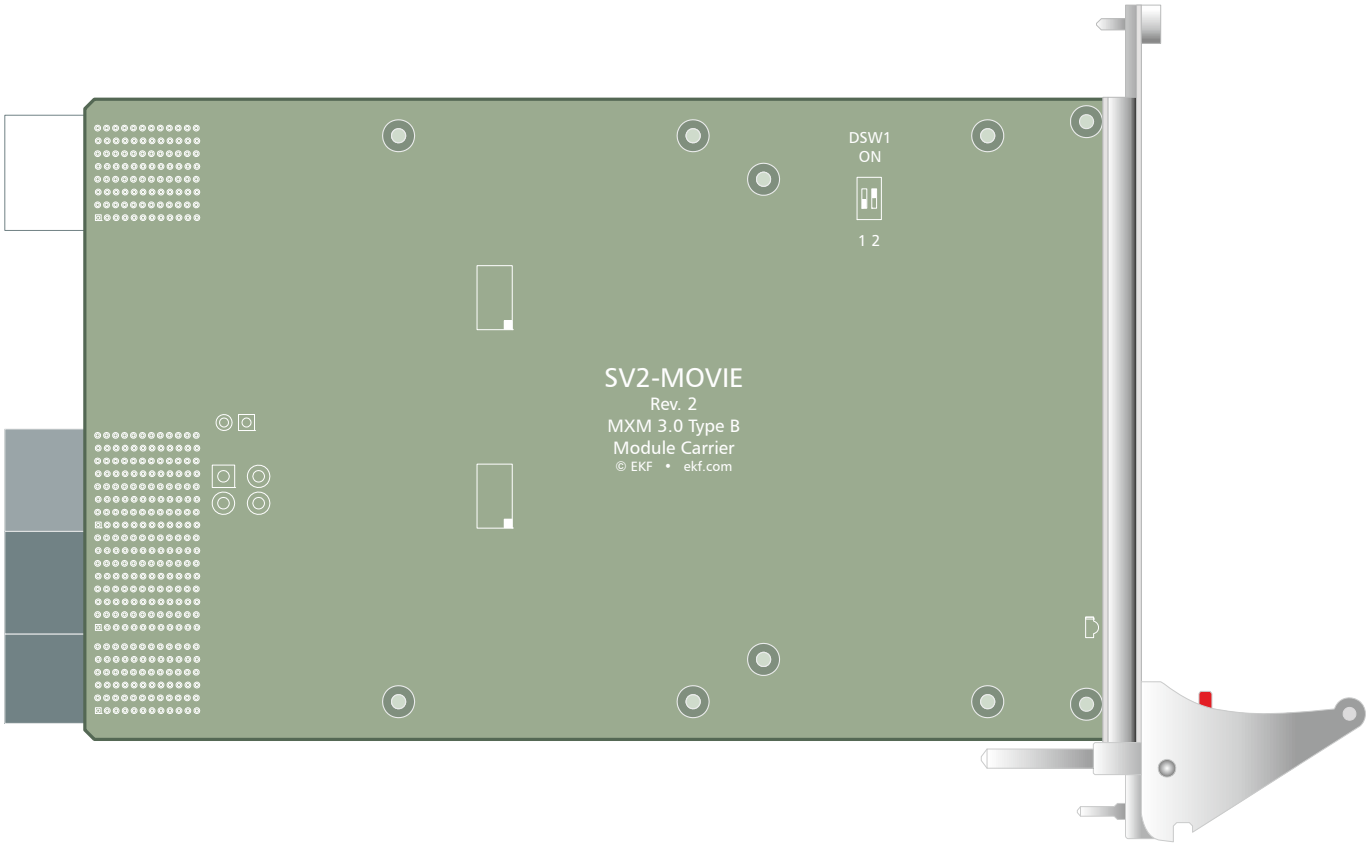
Block Diagram

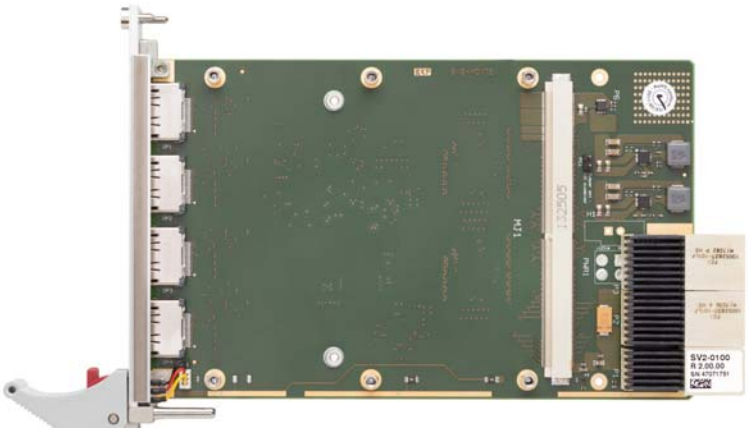


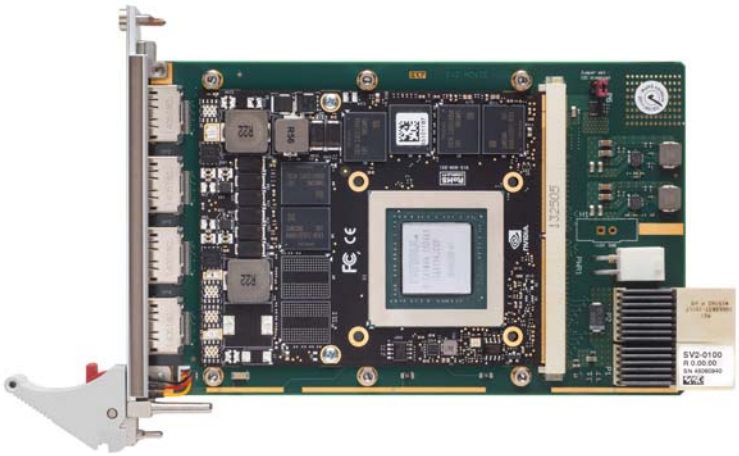
Component Assembly

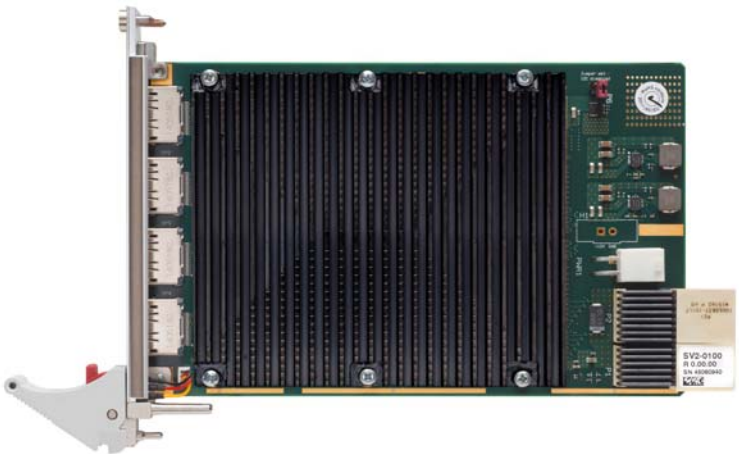


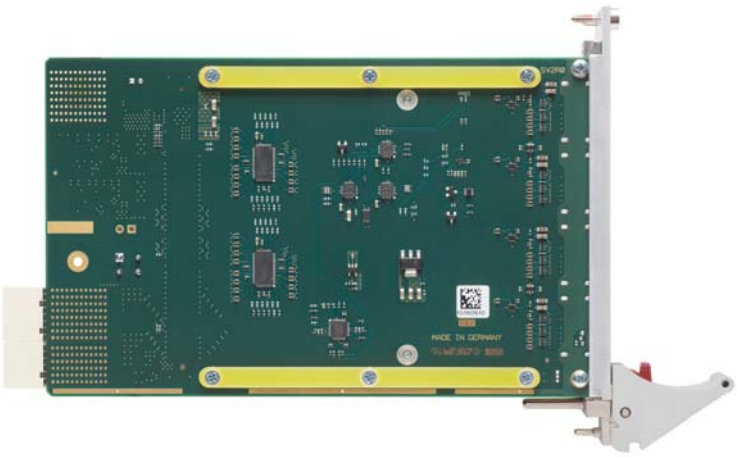
SV2-MOVIE • CompactPCI® Serial • © EKF • ekf.com



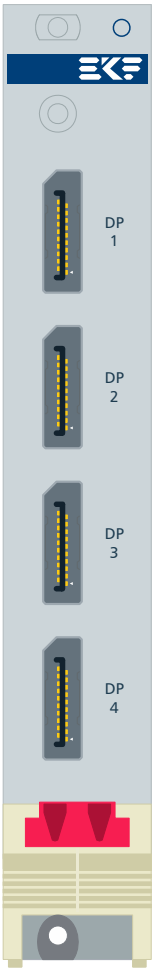






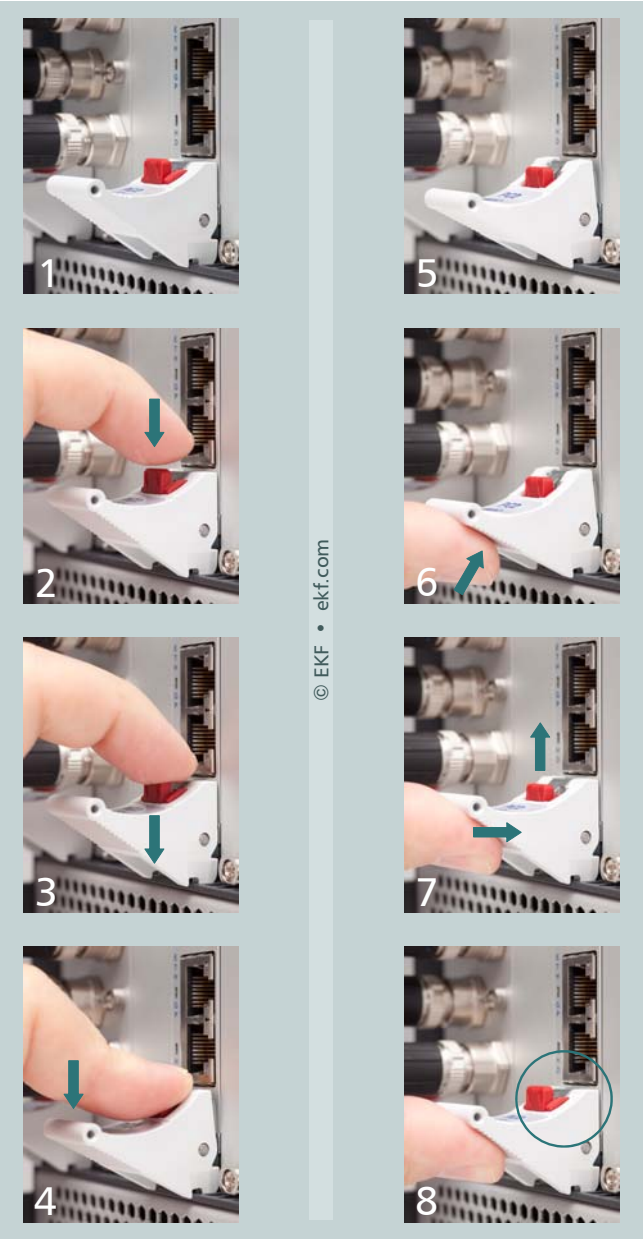


Front Panel 4HP



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


DP 1
DP 2
DP 3
DP 4
SV2

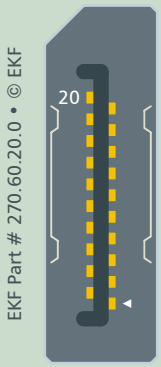
DisplayPort Connectors

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

to be continued on next page

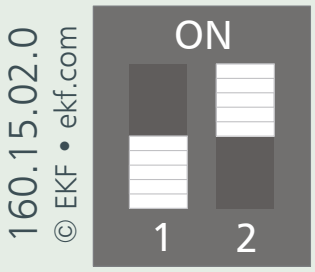
MXM 3.0 Connector Part #255.8.1.314.10			
71	GND	*PEX_TX11#*	72
73	*PEX_RX11#*	*PEX_TX11*	74
75	*PEX_RX11*	GND	76
77	GND	*PEX_TX10#*	78
79	*PEX_RX10#*	*PEX_TX10*	80
81	*PEX_RX10*	GND	82
83	GND	*PEX_TX9#*	84
85	*PEX_RX9#*	*PEX_TX9*	86
87	*PEX_RX9*	GND	88
89	GND	*PEX_TX8#*	90
91	*PEX_RX8#*	*PEX_TX8*	92
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

to be continued on next page

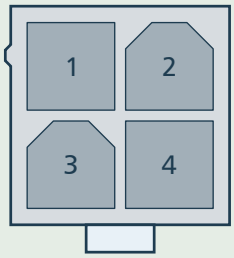
MXM 3.0 Connector Part #255.8.1.314.10			
215	GND	GND	216
217	DP_C_L3#	DP_D_L2#	218
219	DP_C_L3	DP_D_L2	220
221	GND	GND	222
223	DP_C_AUX#	DP_D_L3#	224
225	DP_C_AUX	DP_D_L3	226
227	*RSVD*	GND	228
229	*RSVD*	DP_D_AUX#	230
231	*RSVD*	DP_D_AUX	232
233	*RSVD*	DP_C_HPD	234
235	*RSVD*	DP_D_HPD	236
237	*RSVD*	*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			
	1 = OFF	PEX_STD_SW# MXM Pin 19 I²C GPIO P4	By default this switch is set to OFF, to select PCI Express low swing level.
	1 = ON		If the switch is set to ON, PCI Express full swing level will be selected.
	2 = OFF	VGA_DISABLE# MXM Pin 21 I²C 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.

Please note, that both signals can be controlled optionally via an on-board I²C PCA9554A GPIO. In order to avoid a short circuit condition, both switches must be set to off (open) if the GPIO ports are intended to be used as controlling outputs.

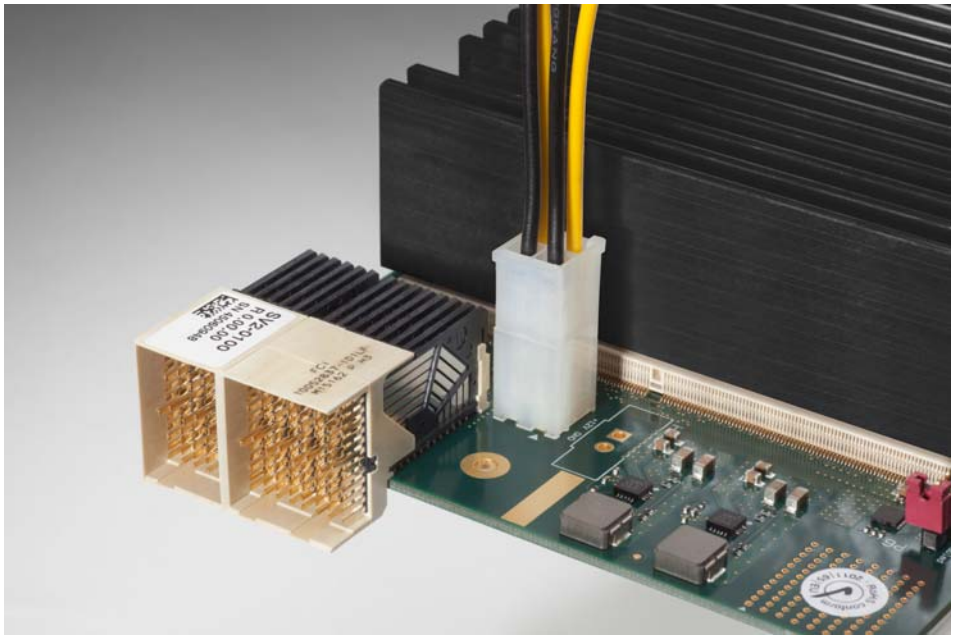
Option 4.20mm Power Connector +12V

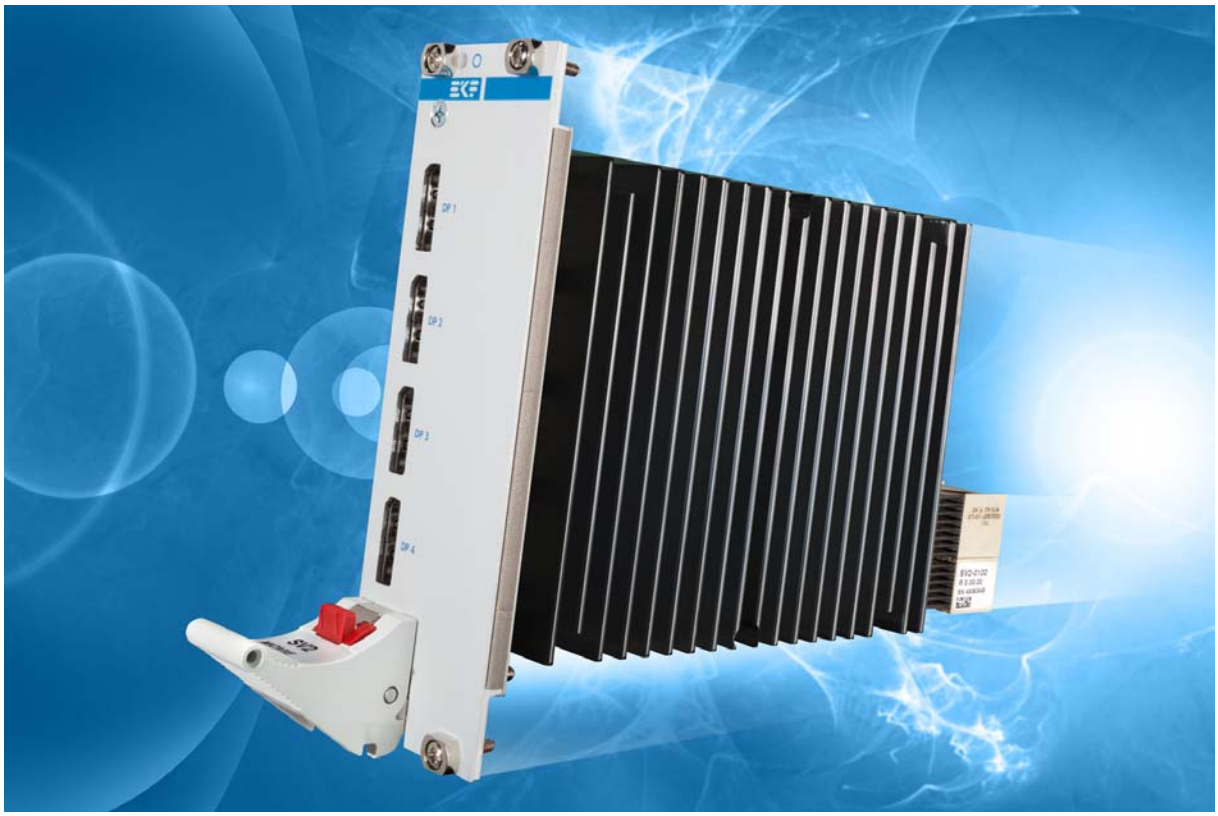
The SV2-MOVIE carrier card derives +12V power via the P1 backplane connector. For an MXM module with a power consumption >60W, usage of an additional power connector in parallel is highly recommended. The SV2-MOVIE is equipped with a 2x2 pin 4.2mm pitch dual row wire to board vertical header, for attachment of a suitable cable assembly between power supply and the SV2.

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).

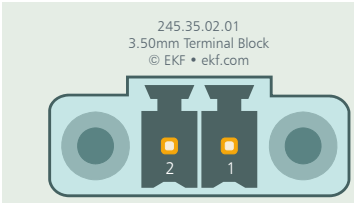




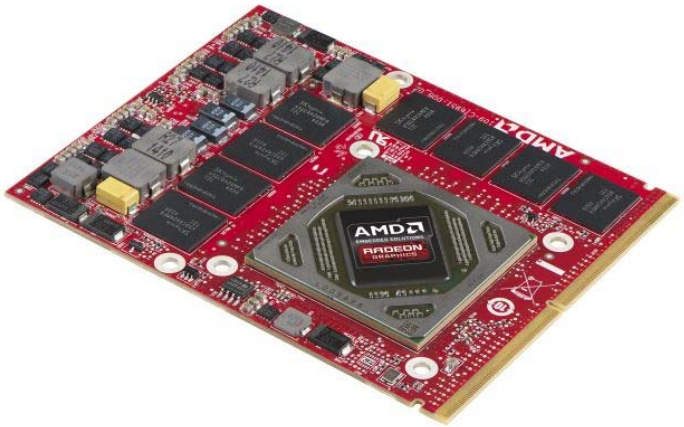
SV2-MOVIE (8HP Assembly)

Option 3.50mm Power Connector +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 WtB 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

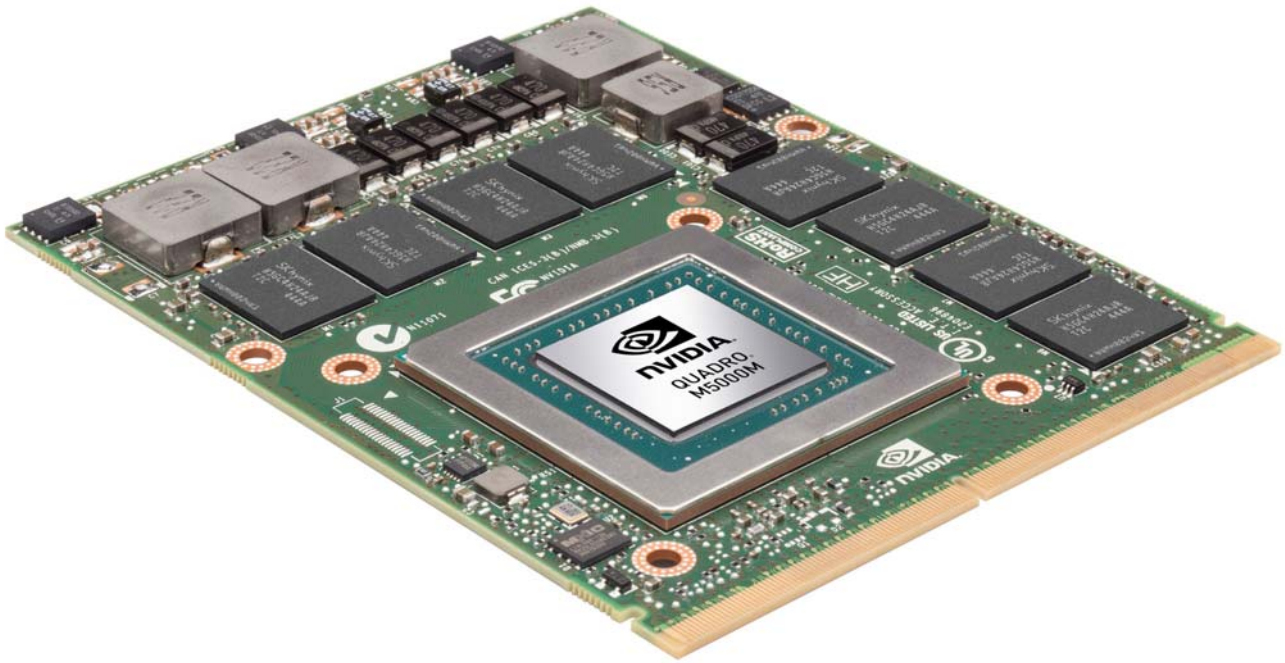
PCB Revision 2 Modification
P3 CompactPCI ® Serial Backplane Connector (+12V Enforced)

P3 CompactPCI ® Serial Peripheral Slot Backplane Connector (Option) EKF Part #250.3.1208.20.00 • 96 pos. 12x8, 16mm Width												
P3	A	B	C	D	E	F	G	H	I	J	K	L
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/object/cuda_home_new.html.



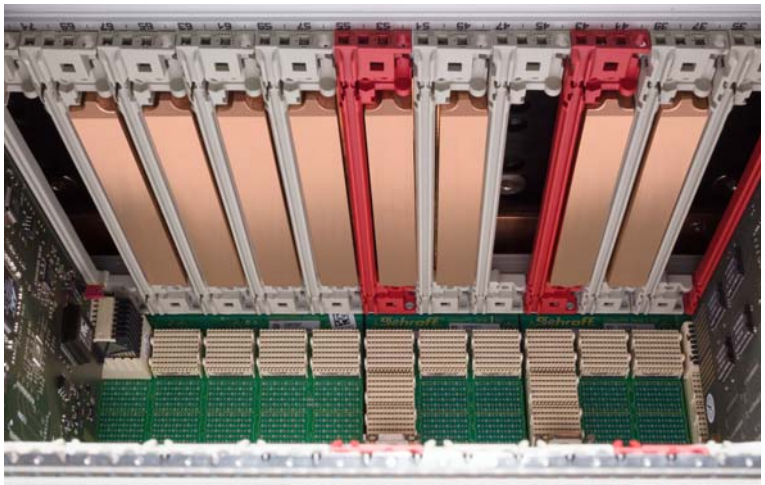
Nvidia MXM Module

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)

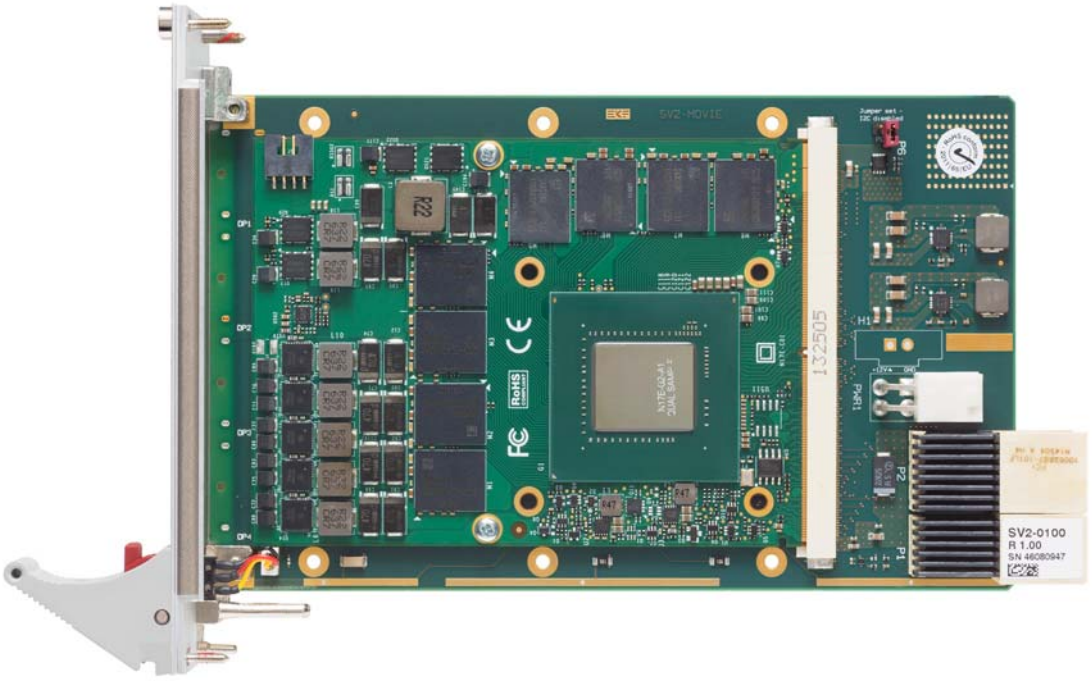
CoolConduct® Heat Spreader



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

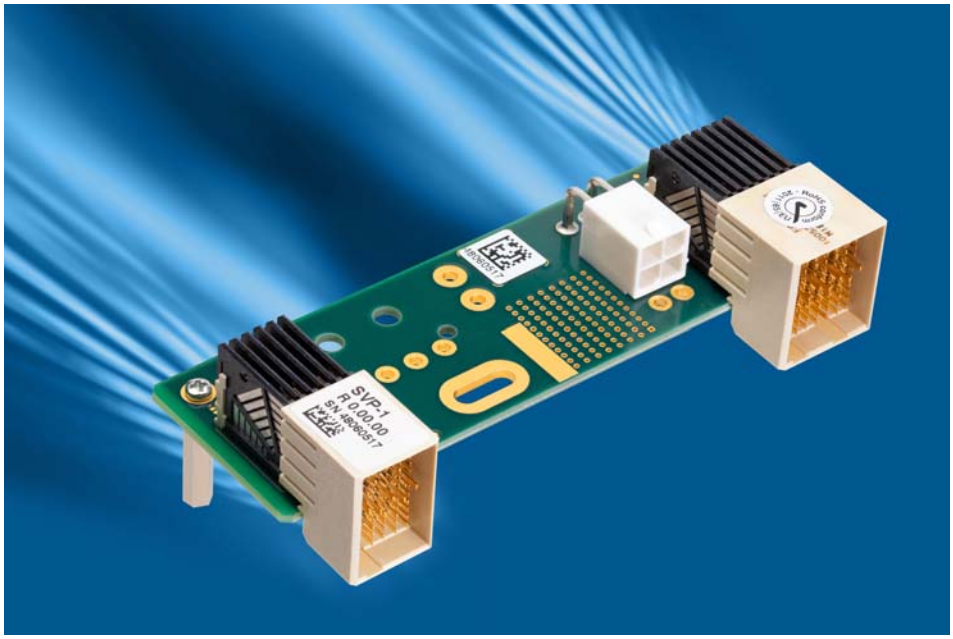
CUDA (w/o Front I/O)

CUDA (w/o Front I/O)

Option SVP-POWER Connector +12V

The CompactPCI® Serial specification defines five pins of the backplane connector P1 as +12V power source, for a maximum of 60W available for a 3U card slot. This may be not sufficient for some GPU modules, however. In order to enhance the maximum power, a small connector PCB can be optinally useful, available as an assembly with the SV2-MOVIE.

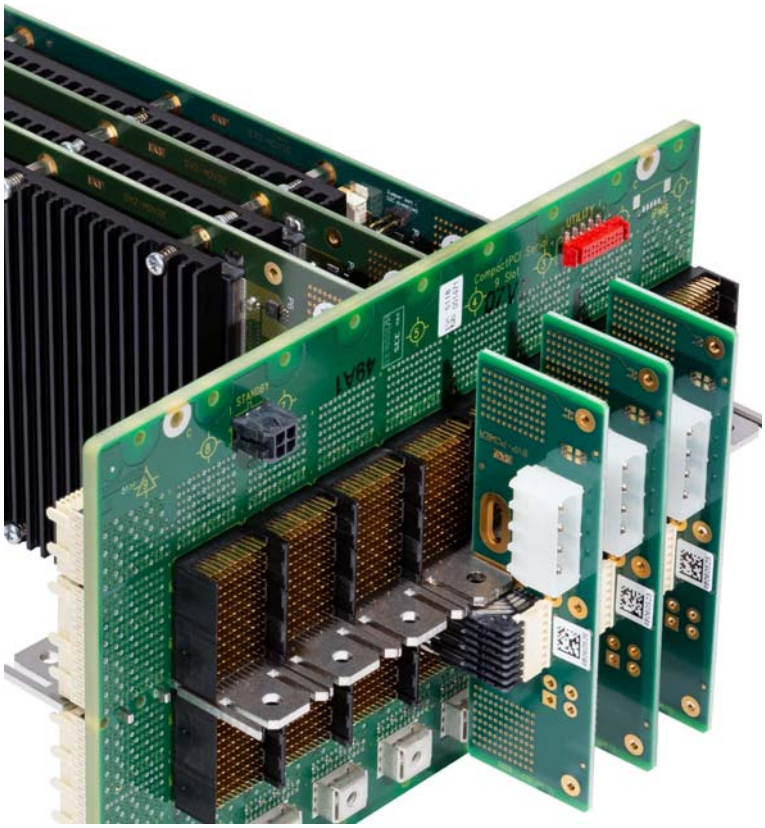
When the SV2-MOVIE is provided with an 8HP heatsink, the SVP-1-POWER can be assembled as a mezzanine module, populated with an additional backplane connector P1, and a 12V MiniFit Jr. cable harness to the carrier board. This solution would double the maximum power consumption to 120W, delivered via the backplane.



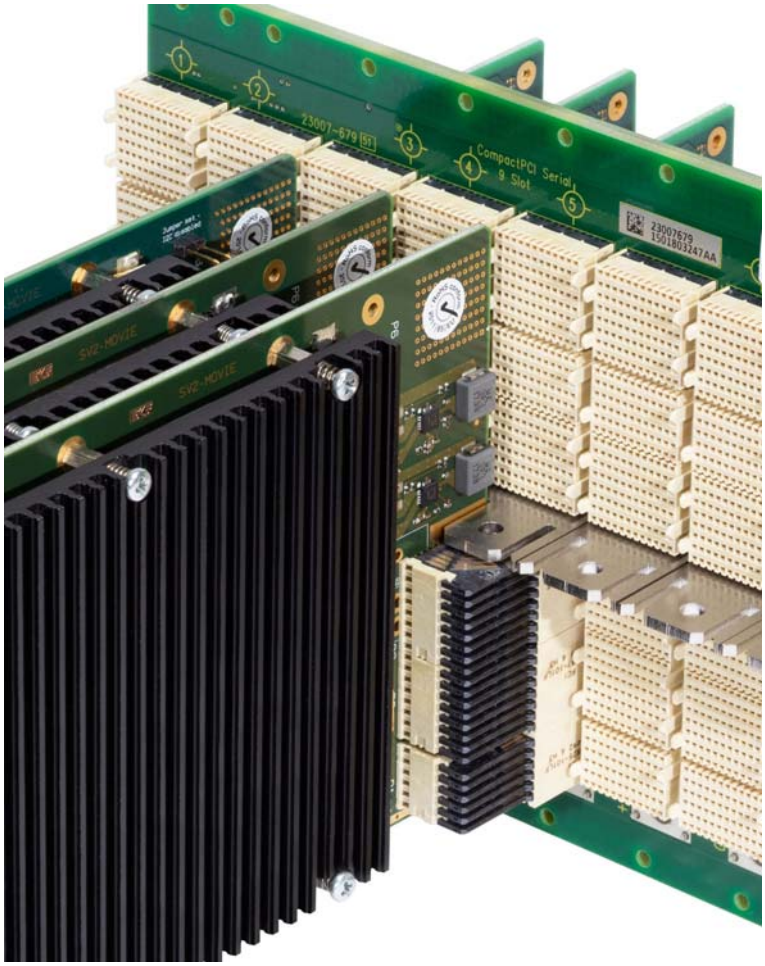
SVP-1-POWER

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



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