



Product Information

DS1-LEOPARD

XMC Module

6G SAS Controller

Document No. 7627 • 17 August 2015

6G SAS Controller

Document No. 7627 • 8 May 2015



The DS1-LEOPARD is an XMC style mezzanine card, equipped with a PCI Express® to 6Gbps SAS/SATA host controller. The front bezel Mini SAS 4x connector (SFF-8088) is suitable for attachment of up to four external SAS or SATA storage devices, such as hard disk drives, solid state drives, or streamer tapes. The on-board Marvell® controller can be used with a PCIe x1, x2 or x4 lane interface up to 5GT/s. All I/O ports are compliant to Serial Attached SCSI (SAS-2.0), and in addition to Serial ATA (SATA 3.0).

The DS1-LEOPARD brings a high-performance, low cost 6Gbps per port combined SAS and SATA HBA solution to embedded systems and industrial computers. The wide (4x) SAS port provides a high-performance interconnect to SAS storage systems and high-capacity SATA JBOD applications. A 4MB on-board SPI Flash memory is provided for boot code. Marvell® non-RAID software is available for download. A PCIe x4 enabled XMC carrier card is recommended for optimum data throughput.



Feature Summary

- ▶ Form factor XMC single-width mezzanine card 139mm x 74mm
- ▶ Stack height 10mm XMC to host
- ▶ Host I/F Connector P15 XMC (Option XMC 2.0)
- ▶ x 1, x 2 or x 4 lane PCI Express® 2.0 (5.0 Gbps) host interface
- ▶ +3.3V only operated (VPWR not in use)

- ▶ Marvell® PCI Express® 2.0 to SAS-2.0 and SATA-3.0 host controller 88SE9445
- ▶ Four SAS/SATA 6Gbps interface ports (backward support 3Gbps and 1.5Gbps)
- ▶ Native Command Queuing
- ▶ Marvell® drivers available

- ▶ Front bezel Mini SAS connector 4X (SFF-8088) for attachment of external devices
- ▶ Shielded connector, universal key 6, 4, 2 (SAS)
- ▶ Suitable for popular Mini Multilane 4X (SFF-8088) cable assemblies 26-conductors
- ▶ Splitter cable assemblies available from Mini SAS to 4 x SATA (Y-cable Xover/Fanout)
- ▶ Mini SAS 4X cable length 1m, 2m typically, up to 5m on request

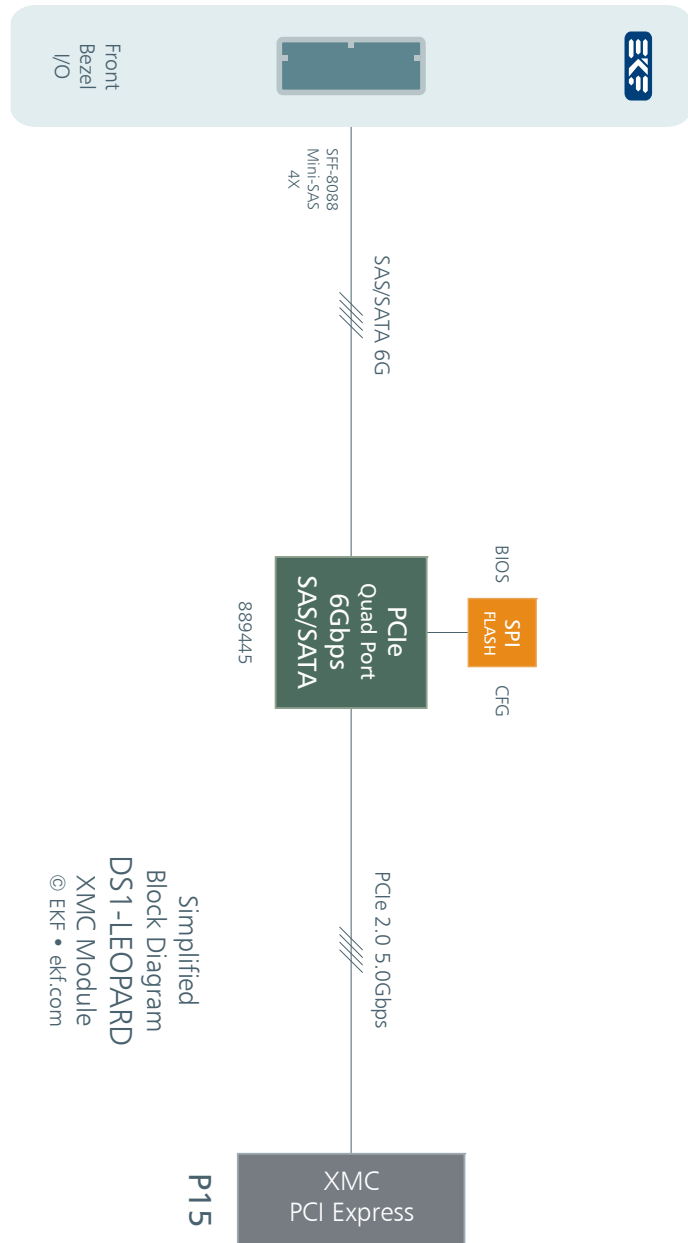
- ▶ Designed & manufactured in Germany
- ▶ ISO 9001 certified quality management system
- ▶ Long term availability
- ▶ Coating, sealing, underfilling on request
- ▶ RoHS compliant
- ▶ Operating temperature 0°C to +70°C (commercial temperature range)
- ▶ Operating temperature -40°C to +85°C on request (industrial temperature range)
- ▶ Storage temperature -40°C to +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
- ▶ MTBF 73.1 years
- ▶ EC Regulatory EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

items are subject to changes

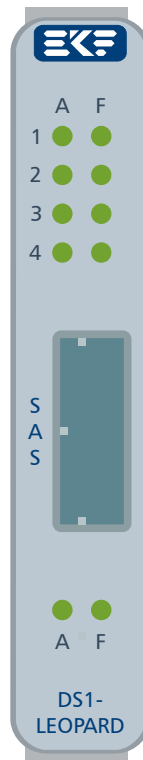
Related Information

Related Information	
Ordering Information	www.ekf.com/liste/liste_22.html#DS1
DS1-LEOPARD Home	www.ekf.com/d/dsas/ds1/ds1.html

Block Diagram



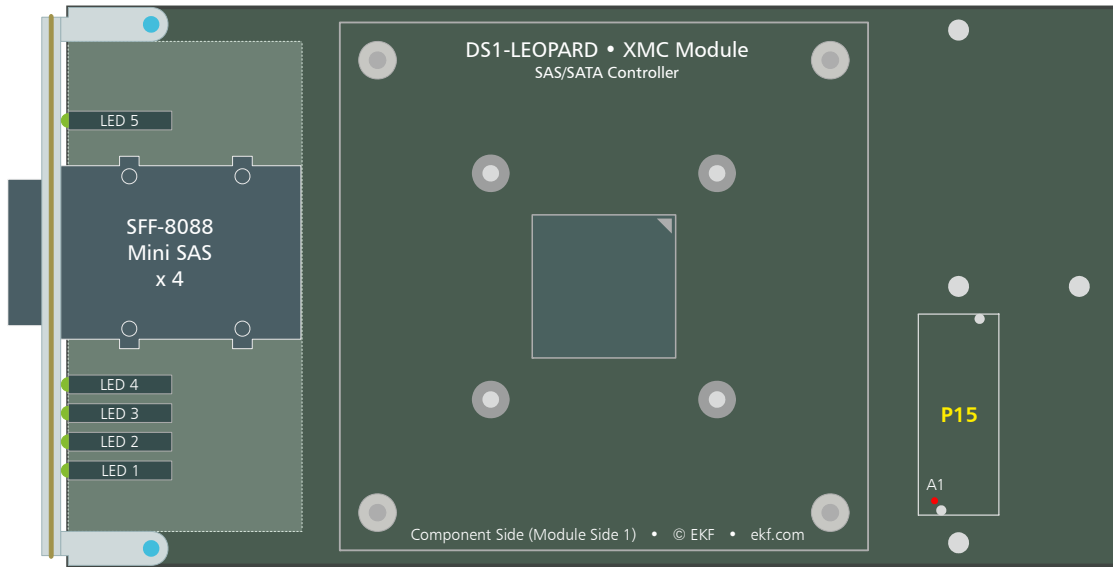
Front Bezel Options



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


A = SAS activity
F = SAS fault

Component Assembly



Mini SAS Connector

The DS1-LEOPARD is provided with a 26-lead Mini SAS front bezel receptacle, as defined by SFF-8088 for external 4X multi-lane SAS. This connector stands for high-bandwidth, low skew, and excellent crosstalk performance. Suitable copper cable assemblies are available up to 5m length and beyond, either Mini SAS to Mini SAS, and also adapter cables to other SAS and SATA style connectors.

Front Bezel Connector Mini SAS 4X				
EKF Parts #256.8088.241.0 (Receptacle) & 256.8088.249.0 (Guide Frame)				
<p>SFF-8088 • Mini SAS 4X</p>  <p>XMC - Front View</p> <p>Part #256.8088.241.0 & 256.8088.249.0 draft - do not scale • © EKF • www.ekf.com</p>	GND	A1	B1	GND
	RX0+	A2	B2	TX0+
	RX0-	A3	B3	TX0-
	GND	A4	B4	GND
	RX1+	A5	B5	TX1+
	RX1-	A6	B6	TX1-
	GND	A7	B7	GND
	RX2+	A8	B8	TX2+
	RX2-	A9	B9	TX2-
	GND	A10	B10	GND
	RX3+	A11	B11	TX3+
	RX3-	A12	B12	TX3-
	GND	A13	B13	GND

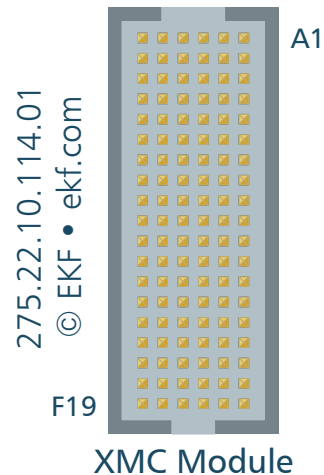
SFF-8088 Mini SAS 4X Cable Assemblies	
256.8088.000.1	Mini SAS to Mini SAS cable assembly, 26-circuit, key slot 2-4-6, 1m
256.8088.000.2	Mini SAS to Mini SAS cable assembly, 26-circuit, key slot 2-4-6, 2m
256.8088.104.1	Mini SAS to 4 x SATA 7-pin fanout cable assembly, 0.75m
other configurations on request	

BIOS Flash

The DS1-LEOPARD is equipped with a 4Mb SPI Flash memory, which contains the 88SE9445 BIOS firmware, as required for system boot. Marvell® SAS drivers can be downloaded from the DS1-LEOPARD home at www.ekf.com/d/dsas/ds1/ds1.html. In addition, the SPI stores configuration parameters for 88SE9445 initialization.

P15 Mezzanine Connector

The DS1-LEOPARD is equipped with a high speed XMC mezzanine connector P15, mating with the host board J15 and establishing the data path (PCI Express®) and power link to the carrier. The pin assignment of P15/J15 is specified by VITA 42.3. The DS1-LEOPARD is organized as 4-lane single-link PCI Express® device (also PCIe x2 and x1 compatible).



As an option, the DS1-LEOPARD can be equipped with a P15 connector according to the XMC 2.0 style, as defined by VITA 61.0. Carrier card and module connectors J15/P15 must match - VITA 61 and VITA 42 XMC connectors are not intermateable. Both connector styles can be easily distinguished from each other by the connector body colour as visual key.

Black = VITA 42 XMC
Off-white = VITA 61 XMC 2.0

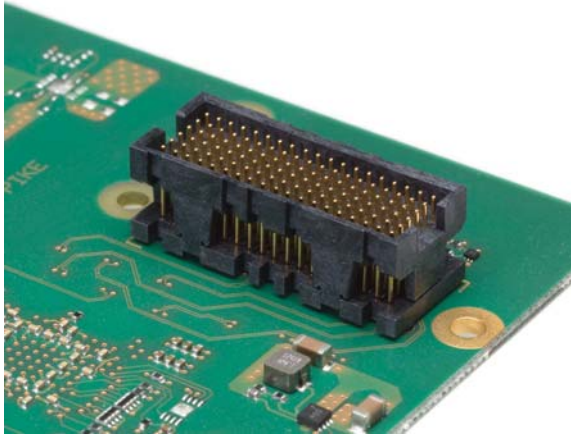
Suitable carrier cards are available from EKF, e.g. the SK2-SESSION CompactPCI® Serial XMC module carrier board, or the CK2-SESSION, a carrier for CompactPCI® Classic systems.

XMC Connector P15 - PCIe Fabric • EKF Part No. 275.22.10.114.01						
	A	B	C	D	E	F
1	PETOP0	PETON0	+3.3V	PETOP1	PETON1	VPWR ²⁾
2	GND	GND	TRST#	GND	GND	MRSTI#
3	PETOP2	PETON2	+3.3V	PETOP3	PETON3	VPWR ²⁾
4	GND	GND	TCK	GND	GND	MRSTO#
5	<i>PETOP4</i>	<i>PETON4</i>	+3.3V	<i>PETOP5</i>	<i>PETON5</i>	VPWR ²⁾
6	GND	GND	TMS	GND	GND	+12V
7	<i>PETOP6</i>	<i>PETON6</i>	+3.3V	<i>PETOP7</i>	<i>PETON7</i>	VPWR ²⁾
8	GND	GND	TDI	GND	GND	-12V
9	<i>RFU</i>	<i>RFU</i>	<i>RFU</i>	<i>RFU</i>	<i>RFU</i>	VPWR ²⁾
10	GND	GND	TDO	GND	GND	GA0 ¹⁾
11	PEROP0	PERON0	MBIST#	PEROP1	PERON1	VPWR ²⁾
12	GND	GND	GA1 ¹⁾	GND	GND	MPRESENT#
13	PEROP2	PERON2	+3.3V_AUX	PEROP3	PERON3	VPWR ²⁾
14	GND	GND	GA2 ¹⁾	GND	GND	MSDA ¹⁾
15	<i>PEROP4</i>	<i>PERON4</i>	<i>RFU</i>	<i>PEROP5</i>	<i>PERON5</i>	VPWR ²⁾
16	GND	GND	MVMRO	GND	GND	MSCL ¹⁾
17	<i>PEROP6</i>	<i>PERON6</i>	<i>RFU</i>	<i>PEROP7</i>	<i>PERON7</i>	<i>RFU</i>
18	GND	GND	<i>RFU</i>	GND	GND	<i>RFU</i>
19	CLKP_XMC	CLKN_XMC	<i>RFU</i>	WAKE#	ROOT0#	<i>RFU</i>

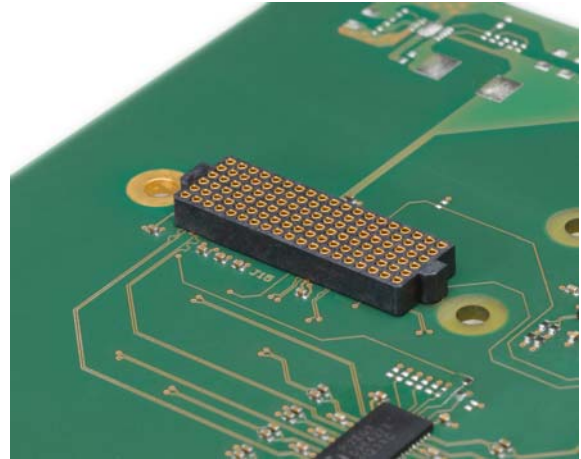
pin positions printed italic/gray: reserved by specification / not connected

- 1) Serial EEPROM not populated by default (no IPMI)
- 2) VPWR is not required - both the SAS controller and the SSDs are sourced from +3.3V

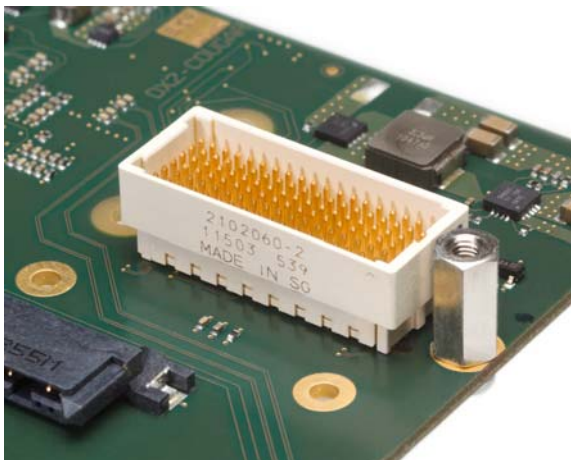
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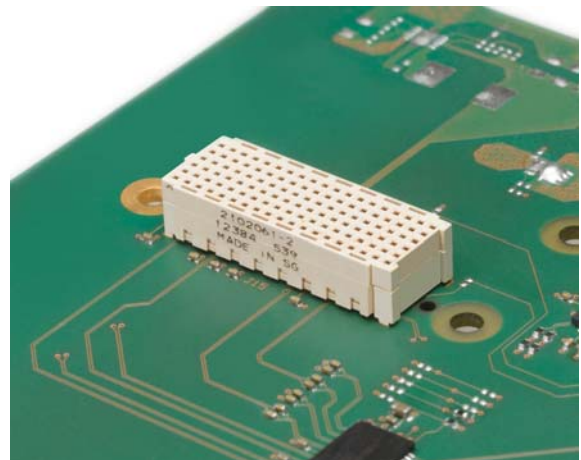
XMC Connector P15



XMC Connector J15



XMC 2.0 Connector P15



XMC 2.0 Connector J15



Related XMC Carrier Cards

SK2-SESSION CompactPCI® Serial

www.ekf.com/s/sk2/sk2.html

CK2-SESSION CompactPCI®

www.ekf.com/c/cpcc/ck2/ck2.html



DS1-LEOPARD on XMC Carrier Board



Industrial Computers Made in Germany
boards. systems. solutions.

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