



Product Information

DX5-ANT

XMC Module

M.2 SATA 6G RAID

Document No. 7698 • 9 November 2016



The DX5-ANT is a XMC style mezzanine card, equipped with a quad-channel PCI Express® to SATA 6Gbps controller, and three on-board sockets for SATA based M.2 module solid state drives (SSD). M.2 (formerly known as NGFF) is a fast growing storage module form factor, with scalable dimensions, typically 22x42mm² up to 22x80mm². The Marvell® SATA 3.0 on-board controller allows RAID or non RAID operation. A front bezel eSATA connector is provided for attachment of an external SATA storage device.

The DX5-ANT connects up to four SATA III (6G) devices to a PCIe 2.0 host, delivering up to 1 Gigabyte-per-second (GBps) bandwidth when a two-lane 5.0 Gbps interface is available. In addition, hardware RAID level 0/1/10 operation is supported, enabled by an integrated ARM-based processor to offload the host CPU. With multiple M.2 SSD modules populated on the DX5-ANT, a fast and reliable Terabyte RAID or JBOD system can be configured, suitable e.g. for industrial mass storage applications.



DX5-ANT Shown w. M.2 SATA SSD Modules

Feature Summary

General

- ▶ 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 or x 2 PCI Express® 2.0 (5.0 Gbps), single or dual lane

SATA RAID Controller

- ▶ Marvell® PCI Express® 2.0 to SATA III host controller
- ▶ Four SATA 6Gbps interface ports (backward support 3Gbps and 1.5Gbps)
- ▶ Native Command Queuing
- ▶ Hardware RAID Level 0/1/10 option
- ▶ On-the-fly AES encryption 128/256-bit
- ▶ AHCI driver support
- ▶ Marvell HyperDuo technology for automated SSD/HDD tiering

Front I/O

- ▶ Front bezel eSATA connector for attachment of an external device
- ▶ eSATA is limited to 3Gbps by SATA specification
- ▶ eSATA is limited to 2m external cable length by SATA specification
- ▶ 6Gbps data rate and/or 5m eSATA cable length with suitable peripheral eSATA devices

M.2 SATA Module Sockets

- ▶ Up to three on-board M.2 SSD modules, SATA based
- ▶ 2230 - 2242 - 2260 - 2280 module size, single- or double-sided, B-key
- ▶ Various brands of M.2 SSDs available (e.g. Intel®, Micron, Samsung)
- ▶ RAID option for dual or triple device configuration

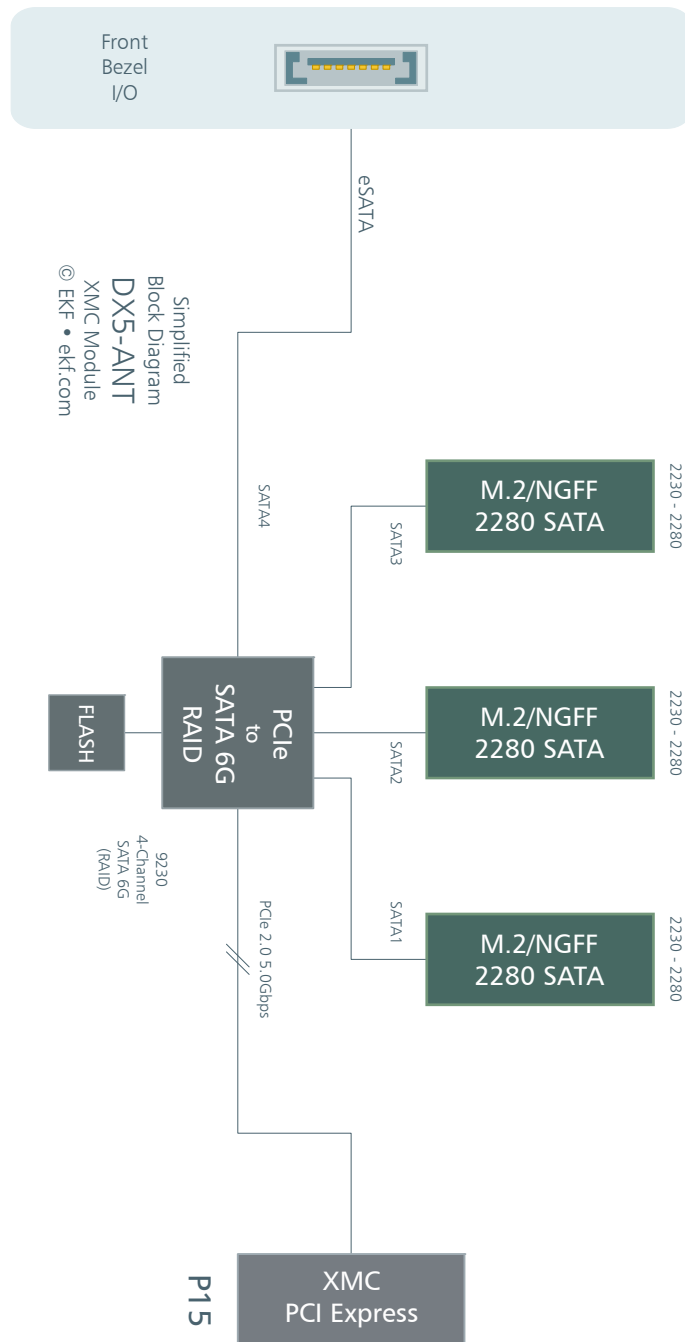
Environmental, Regulatory

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

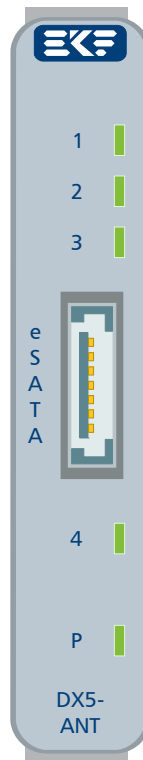
items are subject to changes

Related Information	
Ordering Information	www.ekf.com/liste/liste_22.html#DX5
DX5-ANT Home	www.ekf.com/d/dide/dx5/dx5.html

Block Diagram



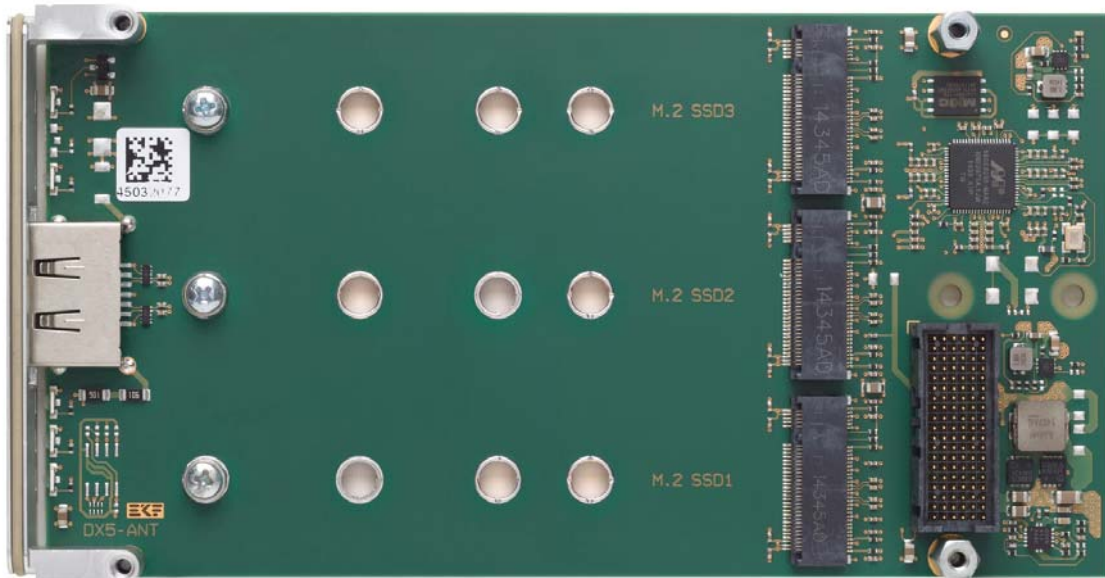
Front Bezel Options



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SATA activity LEDs 1-4 assigned to M.2 1-3 and eSATA 4
P = module power good

Component Position



The DX5-ANT is suitable for M.2 SATA modules, single or double sided, size 2230 to 2280



M.2 Host Connectors

The DX5-ANT is provided with three M.2 module host connectors Type B. After inserted, each M.2 module must be locked manually by a screw, in order to withstand shock and vibration. With two or three identical M.2 solid-state drives engaged, the DX5-ANT can be used for RAID level 0/1 operation.

M.2 1-3 • 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 *

* 10k pull-down to GND

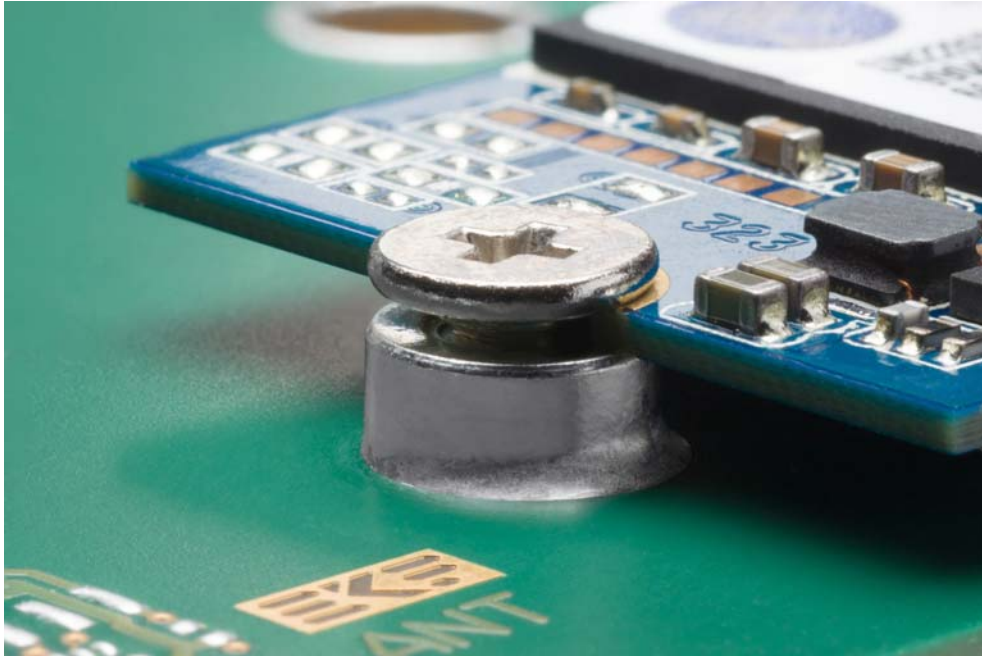
M.2 1-3 • Pin 39 - 75			
GND	39	40	NC
SATA B+ (SSD OUT)	41	42	NC
SATA B- (SSD OUT)	43	44	NC
GND	45	46	NC
SATA A- (SSD IN)	47	48	NC
SATA A+ (SSD IN)	49	50	NC
GND	51	52	NC
NC	53	54	NC
NC	55	56	NC
GND	57	58	NC
NC M-Key	59	60	NC M-Key
NC M-Key	61	62	NC M-Key
NC M-Key	63	64	NC M-Key
NC M-Key	65	66	NC M-Key
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-down to GND



DX5-ANT M.2 Connectors

The 4.2mm height host connectors on the DX5-ANT provide suitable standoff for M.2 modules with components populated on both sides (D5 type). After insertion, modules must be properly fixed for electrical and mechanical stabilization..



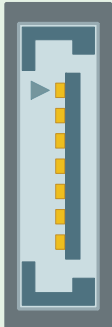
M.2 Module Fixation (Picture Similar)

Mounting Parts for M.2 SSD Modules

710.9.M_2.5	2 x Wafer-Head Style Phillips Drive Screw M3 x 3.2mm, top and bottom mount (supplied together with board)
710.9.M_2.1	M3 Stand-Off Nut (supplied together with board)

Front Bezel eSATA Connector

The DX5-ANT front bezel is provided with an eSATA receptacle for attachment of an external SATA device. TX/RX designation of signals are shown with respect to the SATA controller. High quality shielded SATA cable assemblies are recommended for optimum performance and reliable industrial usage. By specification, eSATA is limited to 3Gbps and 2m cable length. However, there are cable assemblies available up to 5m. For testing, suitable peripheral eSATA devices may be operated at 6Gbps and/or cable length >2m.

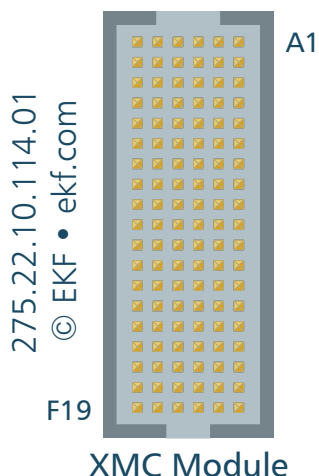
Front Bezel eSATA #256.007.10.10		
	1	GND
	2	SATA_TX+
	3	SATA_TX-
	4	GND
	5	SATA_RX-
	6	SATA_RX+
	7	GND

The typical external cable length should not exceed 2m. Remember that SATA is a high speed data link. Choose the minimum distance possible for locating the external SATA device, and use high quality cable assemblies for reliable industrial operation. Compared to internal SATA cabling, the eSATA front bezel connectors offer superior shielding and provide EMI protection. eSATA cable harnesses used must adhere to the design specifications recommended by the Serial ATA International Organization (SATA-IO).

The eSATA connector provided on the DX5-ANT does not comprise eSATAp (Power over eSATA) pins. Hence, attached eSATA(p) devices must be self powered, or may optionally +5V powered from an additional USB port by means of a suitable splitter cable.

P15 Mezzanine Connector

The DX5-ANT 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 DX5-ANT is organized as single-lane single-link PCI Express® device.



As an option, the DX5-ANT 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.

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

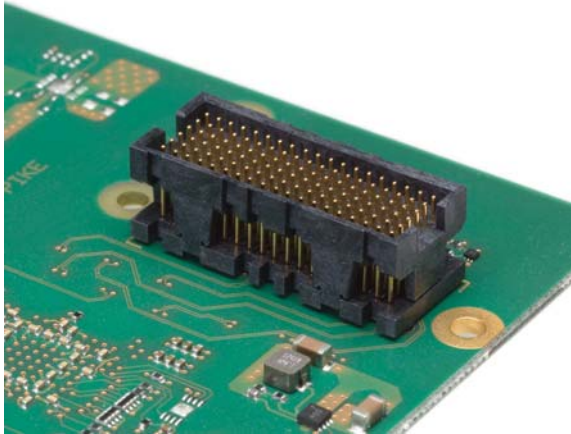


XMC Connectors J15/P15

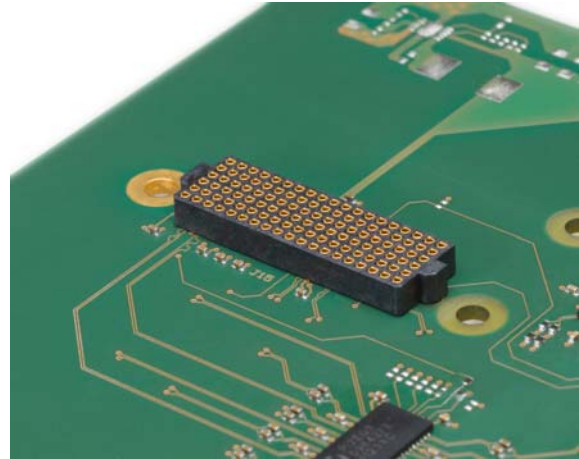


DX5-ANT Mounted on a XMC Carrier Card

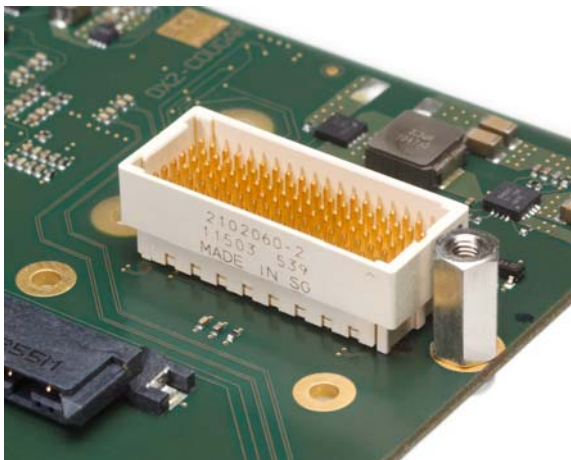
Black = VITA 42 XMC
Off-white = VITA 61 XMC 2.0



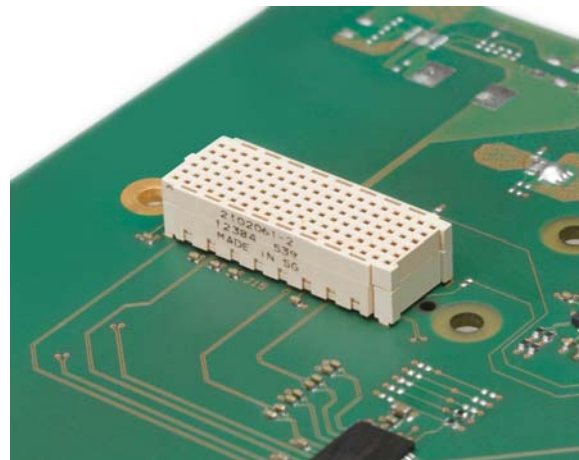
XMC Connector P15



XMC Connector J15



XMC 2.0 Connector P15



XMC 2.0 Connector J15

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# ¹⁾	GND	GND	MRSTI#
3	<i>PETOP2</i>	<i>PETON2</i>	+3.3V	<i>PETOP3</i>	<i>PETON3</i>	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	<i>PEROP2</i>	<i>PERON2</i>	+3.3V_AUX	<i>PEROP3</i>	<i>PERON3</i>	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#	<i>ROOT0#</i>	<i>RFU</i>

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

- 1) Serial EEPROM not populated by default (no IPMI)
- 2) VPWR +12V or +5V

BIOS Flash

The DX5-ANT is equipped with a 4Mb SPI Flash memory, which contains the 88SE9230 BIOS and RAID firmware, as required for system boot and for hardware RAID operation, enabled by an integrated ARM processor subsystem.

Since being AHCI compatible, there is no need for installation of proprietary drivers for the 88SE9230. As an option however, Marvell® SATA drivers can be downloaded from the DX5-ANT home at www.ekf.com/d/dide/dx5/dx5.html. In addition, RAID management support is available here.

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