



**High-performance embedded computing with minimum SWaP  
(Size, Weight and Power)**



*elincom*

**ELMA**  
Your Solution Partner



Aksel Saltuklar  
CTO Elma Electronic GmbH  
[aksel.saltuklar@elma.de](mailto:aksel.saltuklar@elma.de)  
[www.elma.de](http://www.elma.de)

## Introduction:



- Specialized component distributor serving machine- & equipment manufacturers

*Power - EMC - Energy - Housing - Connectivity - Auto-ID - Thermal management - LED*



- Specialized distributor in EMC shielding and T&M equipment

*Conductive compounds – EMC components – Shielding materials – Thermal interfacing – EMC chambers – T&M equipment*



## Introduction:

*elincom*

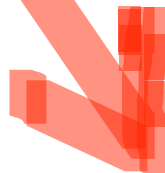
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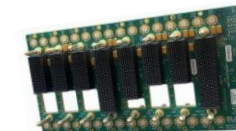
*Conductive compounds – EMC components – Shielding materials – Thermal interfacing – EMC chambers – T&M equipment*



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German site:

*System Platforms  
Embedded Computing Systems  
Backplanes  
Rugged Cabinets*



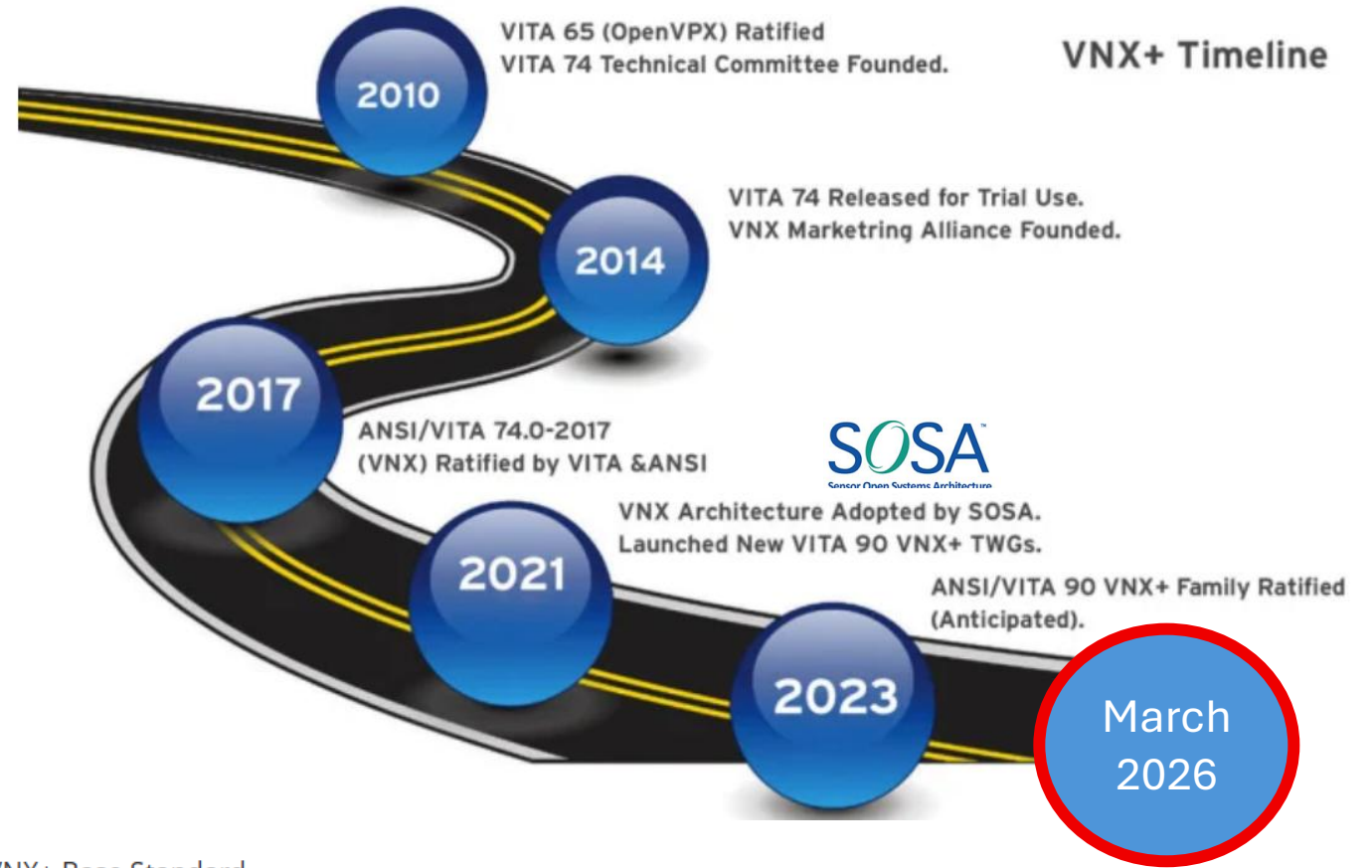


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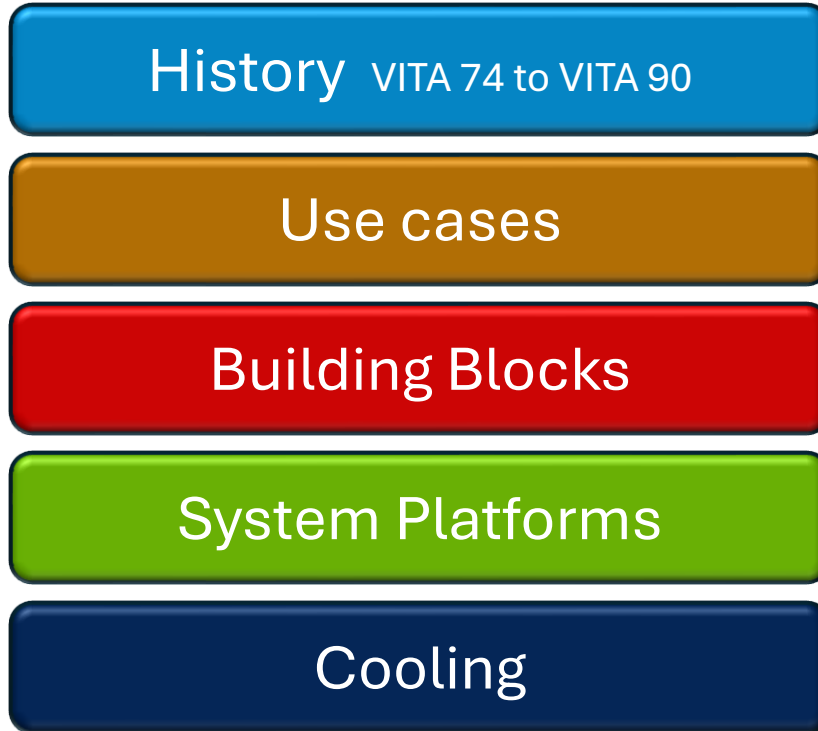


Figure 4: Cheetah Tactical Router in rugged VNX+ format (Figure: Sundance)

www.elma.com



- VITA 90.0: VNX+ Base Standard
- VITA 90.1: VNX+ Profile Tables
- VITA 90.2: VNX+ Optical and Coax Apertures
- VITA 90.3: VNX+ Power Supply and Storage Modules
- VITA 90.4: VNX+ Cooling and Mounting Systems
- VITA 90.5: Space VNX+
- VITA 90.7: VNX+ Optical and NanoRF Coax Apertures Standard



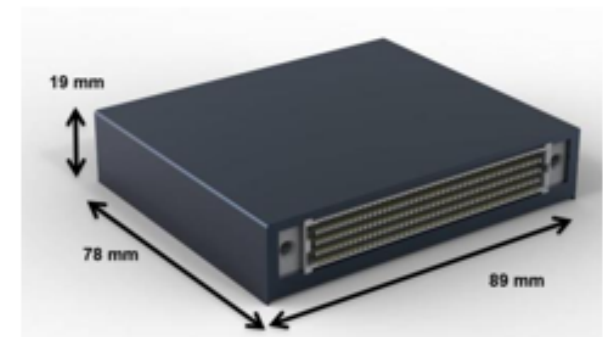
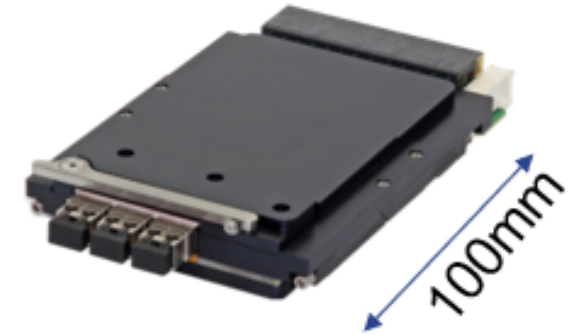


- **Launched in late 2019**


- Charter: to explore options for hardware “physically smaller than 3U VPX” and to draft standards language for inclusion into the SOSA Technical Standard

- **Two form factors chosen:**

- Short VPX: Same as normal VPX but shortened to 100mm
- VNX: But significant enhancements were needed to make it suitable for the SOSA Technical Standard



### Why Nano-ETXexpress ??

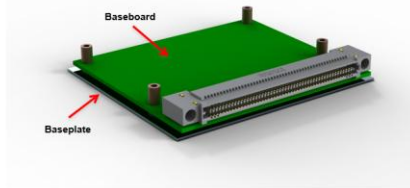


- Small Formfactor => 84mm x 55mm
- Com Express Interface
- Enough Board Area for a Low Power CPU (Atom, ARM)
- Supports Legacy Interconnects => PCI, ATA, VGA, Audio, USB
- Supports New Fabrics => PCI-E, SATA, Gbit Enet

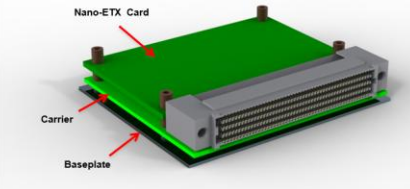
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### Module Internal Board Stackup

12.5mm Module



19mm Module



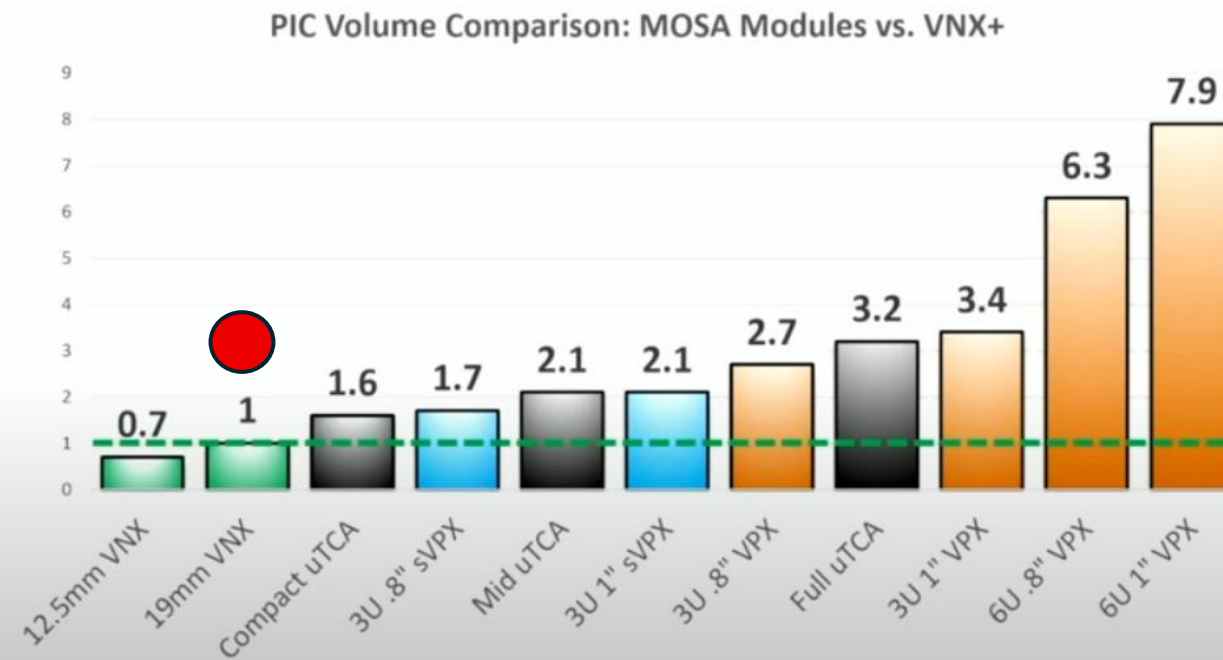
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### Base Modules

- 12.5mm Module
  - I/O, Storage
  - 4 Row Connector (200 pins)
- 19mm Module
  - CPU, FPGA, DSP
  - 8 Row Connector (400 pins)




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19 mm x 89 mm x 78 mm



## What Changed Between VNX and VITA 90 VNX+ ??

### VNX (VITA 74)

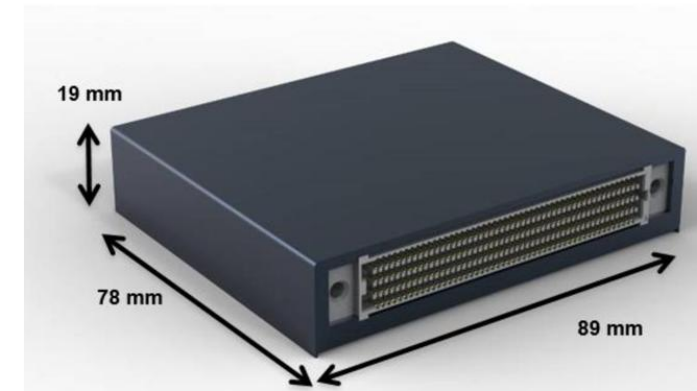
- Originally Based on VITA 46
- Modules Only
- Optimized for Ease of Implementation
- PCIe Gen 1 to Gen 3 Speeds
- 19mm, 12.5mm
- Copper Only. No Coax/Optical Aperture
- Simple I<sup>2</sup>C Sys Mgt
- 20 Watts/Module (19mm)

### VNX+ (VITA 90)

- Based on VITA 65
- Module Centric + System Considerations
- Optimized for Max Signal Integrity
- PCIe Gen3 to Beyond PCIe Gen 4 Speeds
- 1x, 2x Multiples of 19mm, 12.5mm
- Apertures for Optical MT, Coaxial
- VITA 46.11 Sys Mgt or Legacy VNX
- Expanded Thermals → 80 Watts or More



- **Modular form factor standard**
- **Two module sizes**
  - 79mm x 89mm x 12.5mm
  - 79mm x 89mm x 19mm <<< Selected by SOSA
  - 39mm is also part of the new spec <<< Selected by SOSA
  - 19mm is ~30% of the size of 3U VPX per-slot
- **Backplane based**
  - Follows Data Plane / Control Plane / Expansion Plane model
- **High-speed connectors: Support up to 56 Gbps PAM4**
- **Sized so that SBCs can be constructed using COMe mini**
- **Supports blind-mate Coax and Optical**
- **Naturally rugged construction**
  - Can support 25-30W modules at 70°C in the configuration shown
  - Can support more (perhaps 55-60W) with more advanced cooling structures



**They all got together.....**



**\* Participating committee members**  
Chair

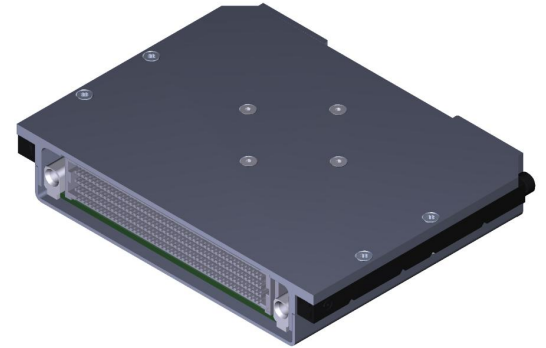
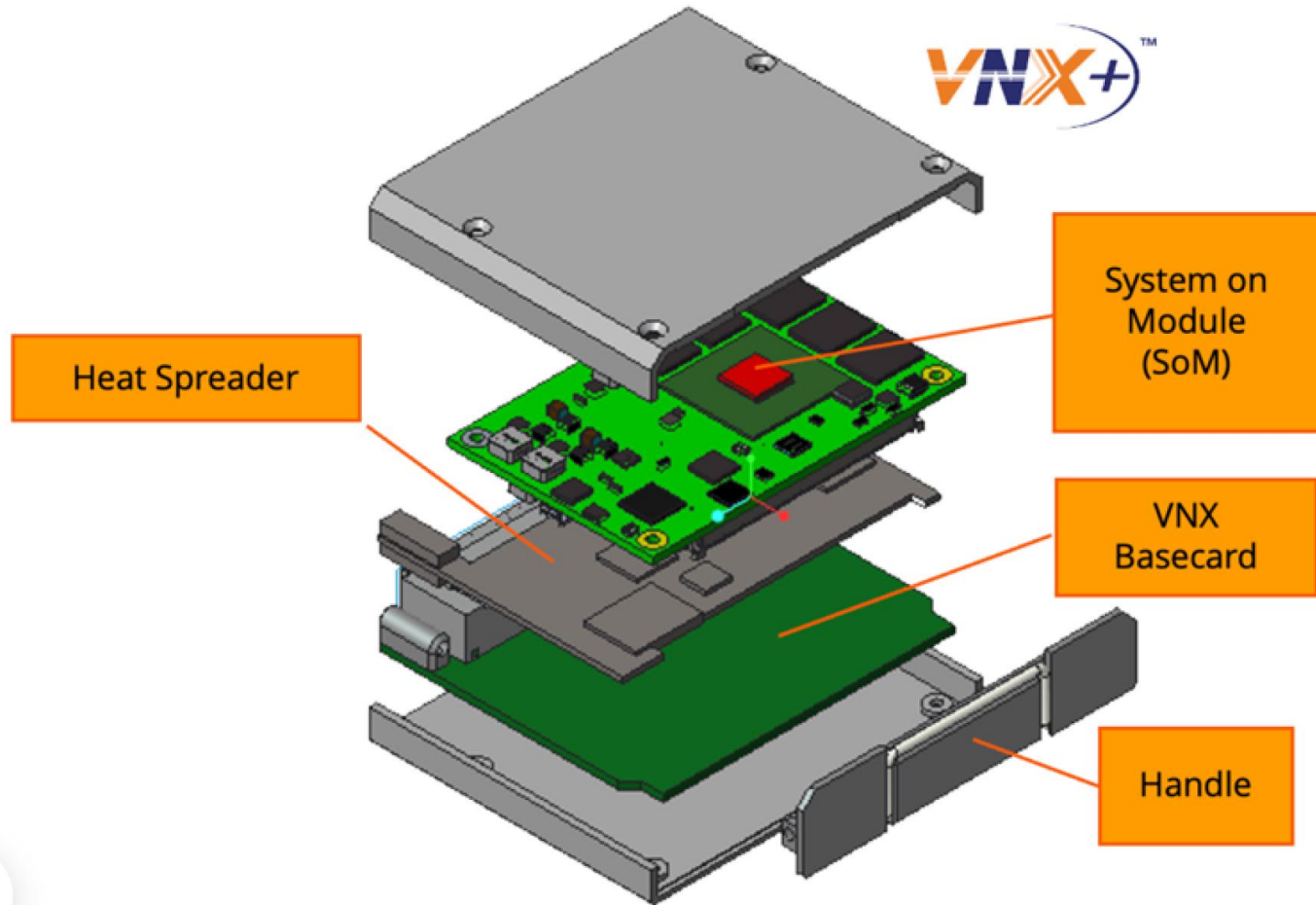


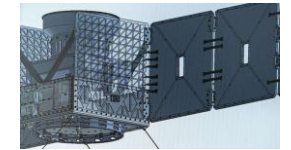
**Observing committee members**



**Other companies involved**







SpaceVNX use cases

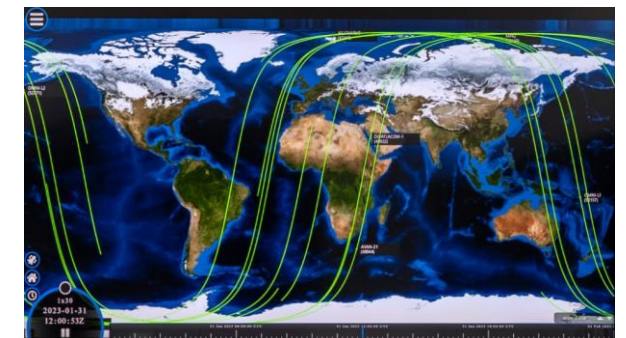
Obvious use cases for SpaceVNX include single standalone 1U CubeSat satellites requiring high performance data collection and analysis at a lower cost. A larger variant with networked high-performance computers with a scalable data-collection and processing capability is possible by expanding the card cage to a 1.5U or 2U configuration. The small satellites may also be used as a disaggregated cluster of networked satellites designed for a variety of data collection and analysis applications with a single sensor. The next step would be to use the same network of LEO satellites with multiple sensors, where the networked cluster fuses the data from all active sensors. Figure 2 shows an example of an existing rugged VNX system.



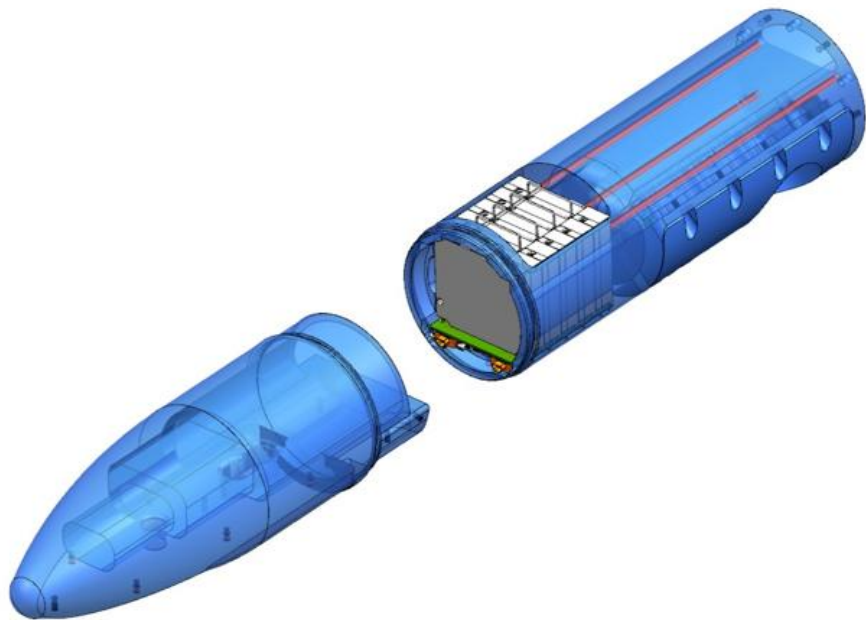
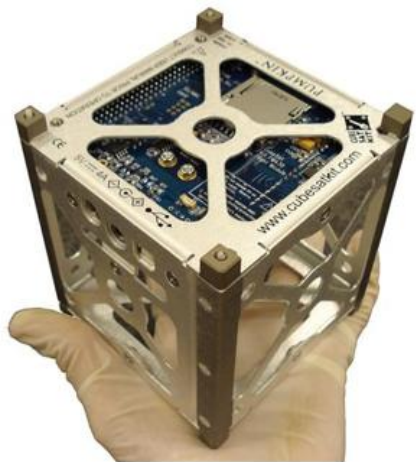
[Figure 7 | Pictured is a 1U CubeSat with SpaceVNX modules. Photos: Trident-Infosol, Ideas-Tek, Antara Teknik.]



Figure 6.5: C3S 3U CubeSat Structure. Credit: Complex Systems & Small Satellites.



Use cases

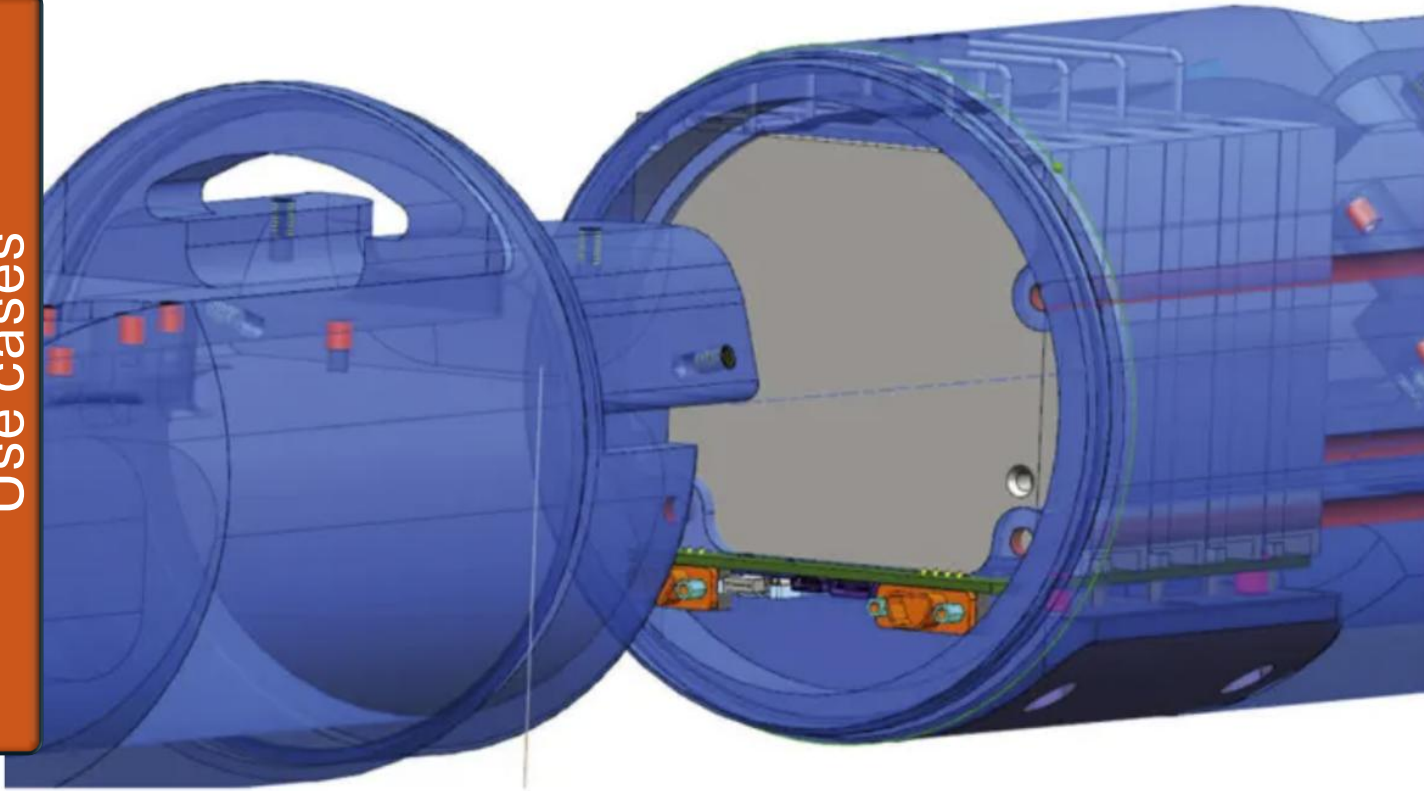


## Enables systems not possible with VPX

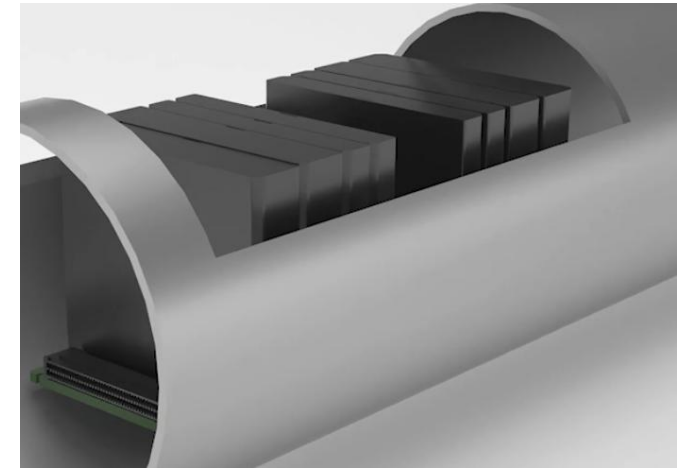
- Common Launch Tube applications
- Missile-bodies
- Cubesats
- Small unmanned vehicles
- Potentially very attractive to non-defense applications

VNX+ DEPLOYMENTS IN TYPICAL UAV PLATFORMS

Use cases



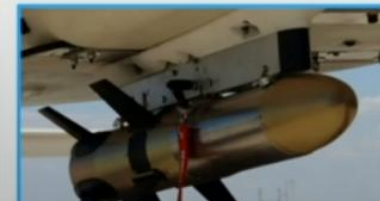
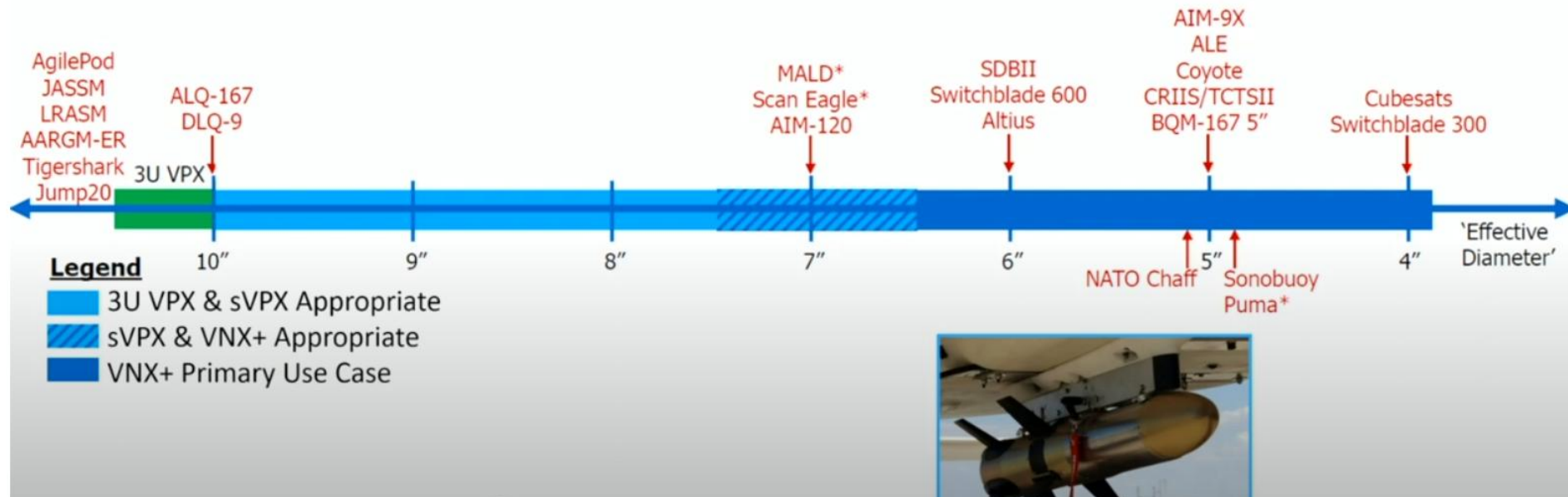
A VITA 90 system mounted inside of a 5-inch AIM-9-sized pod. (Image: Collins Aerospace)





### SFF Target Platforms and Sizes

Use cases





Why should we use a modular system in a missile?

The rocket is built in the 90 ies and will be used now, you can easily change modules and a newer software .....



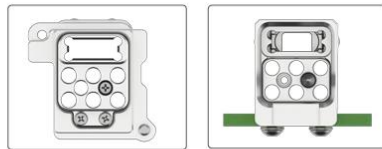
Connector/Aperture Combination	Config Class	Connector Type	Aperture Fill Config	Image
<b>VNX+ Connector Only</b>	1	400-pin	None	
<b>VNX+ w/ Small Aperture</b>	2	320-pin	2x MT	
<b>VNX+ w/ Small Aperture</b>	3	320-pin	1x MT 6x RF	
<b>VNX+ w/ Large Aperture</b>	4	240-pin	2x MT 20x RF	



# VITA™ 90.2 CONNECTOR MODULE (CM)

## VITA™ 90.2 Block

- Plug-in contacts, cables to form a full CM solution for both PIM and backplane
- Precision machined aluminum
- 500 mating cycles
- Reliable mating, repeatable performance
- Environmental qualification: VITA 47, DO-160, MIL-STD-810



## VITA™ 90.2 RF Contacts & Cable

- 110 GHz, 50 Ω high-density size 20 contacts ([GPCC-20](#))
- 75 Ω size 16 contacts ([GPCC-16](#))
- Shrouded to protect from FOD
- Radio Frequency or video signals
- RF047-A Series Cable
- End options: -20VP/-20VS, -16VP/-16VS

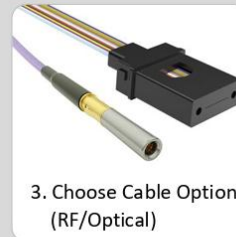


## VITA™ 90.2 Rugged Optics

- MT ferrule slot pluggable with FireFly™ or FireHawk™ optics assemblies
- FireFly™ mid-board optical transceivers support up to 28 Gbps per lane in x4 and x12 configurations
- FireHawk™ ruggedized mid-board optical transceivers support 10 Gbps per lane in a x4 configuration
- Visit [samtec.com/optics](http://samtec.com/optics) for details



## Steps for Building a Connector Module Solution



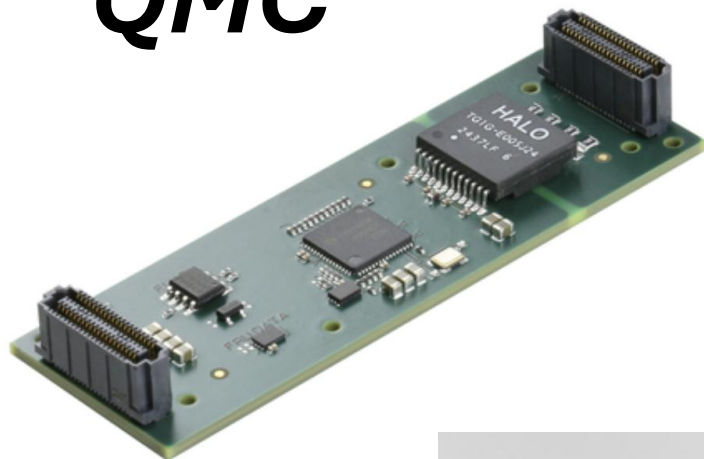
Part numbers & ordering information: [samtec.com/VNX-plus](http://samtec.com/VNX-plus)

Samtec Confidential

VITA 90

VITA 93

# QMC

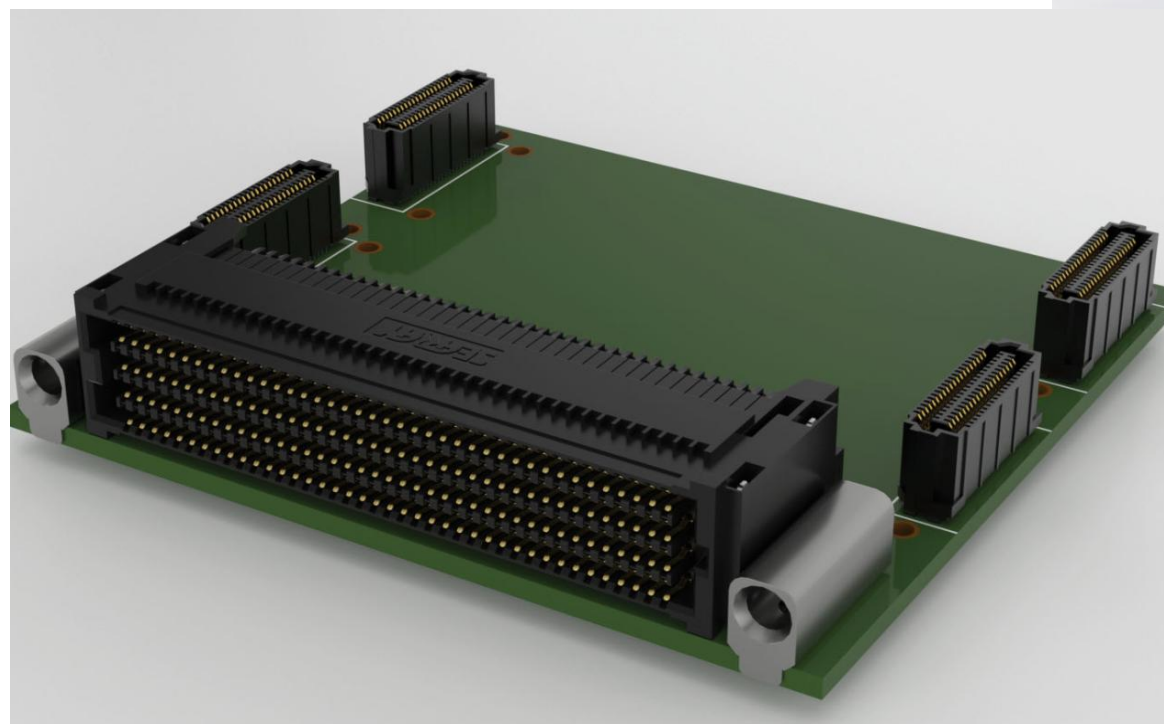


RS232, RS422, RS485  
MILbus 1553  
ADC, DAC  
FPGA  
Shelf Manager  
Switches



AI accelerators  
Digital I/O  
ARINC 429  
Media converter

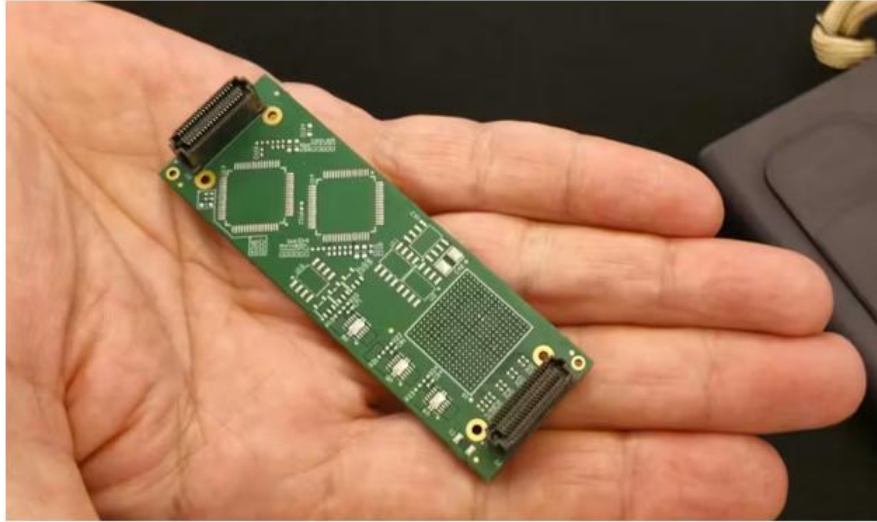
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Building Blocks

## VITA 93-Small Form Factor Mezzanine

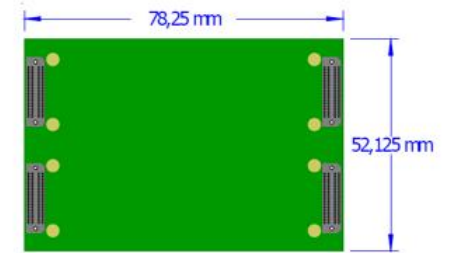
Building Blocks



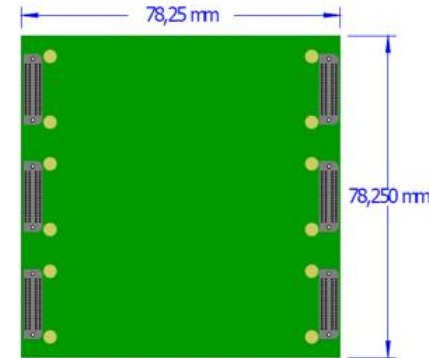
Single QMC



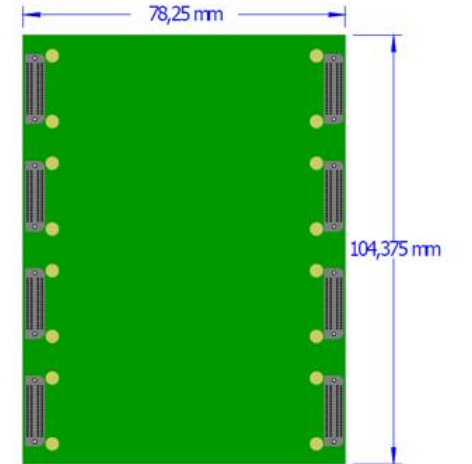
Double QMC



Triple QMC



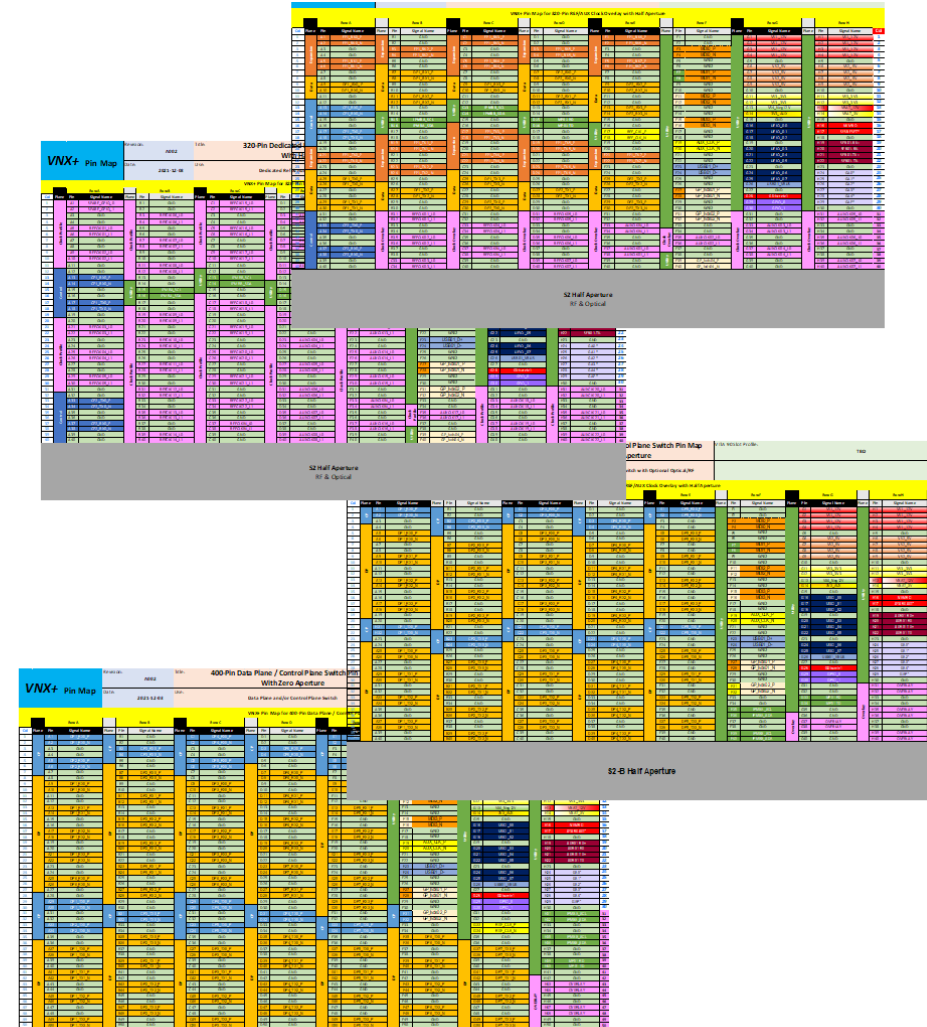
Quad QMC



The standard scaling options of VITA 93 (QMC) include:

	PCIe	I/Os
<b>Single QMC</b>	x4	40
<b>Double QMC</b>	x8	80
<b>Triple QMC</b>	x12	120
<b>Quad QMC</b>	x16	160

- **240 Pin Payload**
  - Although this may be removed from the SOSA standard
- **400 Pin Switch**
  - 7x Data Plane, 7x Control Plane
- **320 Pin Switch**
  - 5x Data Plane, 5x Control Plane
  - Dual MT Optical
- **7-Slot Radial Clock**
  - Based on the Payload Template
  - 7x REF\_CLK/AUX\_CLK pairs
- **High-density 320 pin Radial Clock**
  - Not based on the template
  - 22x REF\_CLK/AUX\_CLK pairs
- **400-pin and 320-pin payloads will be in the next SOSA snapshot release (including special space profiles)**



VITA 90

Building Blocks

240-Pin Connector with Full-Aperture Pin Assignments																									
Col	Row A			Row B			Row C			Row D			Row E			Row F			Row G			Row H			Col
	Plane	Pin	Signal Name	Plane	Pin	Signal Name	Plane	Pin	Signal Name	Plane	Pin	Signal Name	Plane	Pin	Signal Name	Plane	Pin	Signal Name	Plane	Pin	Signal Name	Plane	Pin	Signal Name	
1		A1			B1			C1			D1			E1			F1			G1			H1		1
2		A2			B2	GND		C2			D2	GND		E2			F2			G2	VS1		H2	VS1	2
3		A3	GND		B3			C3	GND		D3			E3	GND		F3	GBE1_MDIO_P		G3			H3		3
4		A4			B4			C4	GND		D4			E4			F4	GBE1_MDIO_N		G4			H4		4
5		A5			B5	GND		C5			D5	GND		E5			F5	GND		G5	GND		H5	GND	5
6		A6			B6			C6			D6			E6			F6			G6			H6		6
7		A7	GND		B7			C7	GND		D7			E7	GND		F7	GBE1_MD11_P		G7	VS2		H7	VS2	7
8		A8			B8			C8			D8			E8			F8	GBE1_MD11_N		G8			H8		8
9		A9			B9	GND		C9			D9	GND		E9			F9	GND		G9			H9		9
10		A10			B10			C10			D10			E10			F10			G10	GND		H10	GND	10
11		A11	GND		B11			C11	GND		D11			E11	GND		F11	GBE1_MD12_P		G11	VS3		H11	VS3	11
12		A12			B12			C12			D12			E12			F12	GBE1_MD12_N		G12			H12		12
13		A13			B13	GND		C13	SM_B_SCL	Utility	D13	GND		E13			F13			G13	VS4		H13	VBAT_12V	13
14		A14			B14			C14	SM_B_SDA	Utility	D14			E14			F14	GND		G14	VALUX		H14	VBAT_3V	14
15		A15	GND	Utility	B15	SM_A_SCL		C15		Utility	D15	MP01-RD		E15	GND		F15	GBE1_MD13_P		G15	GND		H15	GND	15
16		A16			B16	SM_A_SDA		C16	GND		D16	MP01-TD		E16			F16	GBE1_MD13_N		G16	UEIO_00		H16	NVMRO	16
17		A17			B17			C17			D17		Utility	E17	REF_CLK_P		F17	GND		G17	UEIO_01		H17	SYSRESET*	17
18		A18			B18	GND		C18			D18	GND		E18	REF_CLK_N		F18			G18	UEIO_02		H18	GND	18
19		A19	GND		B19			C19	GND		D19			E19			F19	AUX_CLK_P		G19	GND		H19	SER01_RX_P	19
20		A20			B20			C20			D20			E20	GND		F20	AUX_CLK_N		G20	UEIO_03		H20	SER01_RX_N	20
21		A21			B21	GND		C21			D21	GND		E21			F21			G21	UEIO_04		H21	SER01_TX_P	21
22		A22			B22			C22			D22			E22			F22	GND		G22	UEIO_05		H22	SER01_TX_N	22
23		A23	GND		B23			C23	GND		D23			E23			F23	USB01_D_P		G23	GND		H23	GND	23
24		A24			B24			C24	GND		D24			E24			F24	USB01_D_N		G24	UEIO_06		H24	GA0*	24
25		A25			B25	GND		C25			D25	GND		E25			F25			G25	UEIO_07		H25	GA1*	25
26		A26			B26			C26			D26	GND		E26			F26	GND		G26	USB01_VBUS		H26	GA2*	26
27		A27	GND		B27			C27	GND		D27			E27			F27	GP_LVDS*		G27	GND		H27	GA3*	27
28		A28			B28			C28			D28			E28			F28	GP_LVDS*_N		G28	GDiscrete1		H28	GA4*	28
29		A29			B29	GND		C29			D29	GND		E29			F29			G29	GPIO_0		H29	GAP*	29
30		A30			B30			C30			D30			E30			F30	GND		G30	GPIO_1		H30	GND	30

Dual IPMI

Maintenance Port

GigE MDI (add magnetics)

Power Planes

VPX Common Signals

USB

UEIO

GPIO

Serial



Building Blocks

8x Expansion Plane Lanes

2x FP Data Planes

2x UTP Control Planes

320-Pin VNX+ Connector with Half-Aperture Pin Assignments																									
Col	Plane	Row A		Plane	Row B		Plane	Row C		Plane	Row D		Plane	Row E		Plane	Row F		Plane	Row G		Plane	Row H		Col
		Pin	Signal Name		Pin	Signal Name		Pin	Signal Name		Pin	Signal Name		Pin	Signal Name		Pin	Signal Name		Pin	Signal Name		Pin	Signal Name	
1	Expansion	A1	EP1_RX0_P	Expansion	B1	GND	Expansion	C1	EP1_RX3_P	Expansion	D1	GND	Expansion	E1	EP1_RX6_P	Expansion	F1	GND	Expansion	G1	VS1	Expansion	H1	VS1	1
2	Expansion	A2	EP1_RX0_N	Expansion	B2	GND	Expansion	C2	EP1_RX3_N	Expansion	D2	GND	Expansion	E2	EP1_RX6_N	Expansion	F2	GND	Expansion	G2	VS1	Expansion	H2	VS1	2
3	Expansion	A3	GND	Expansion	B3	EP1_RX2_P	Expansion	C3	GND	Expansion	D3	EP1_RX5_P	Expansion	E3	GND	Expansion	F3	GBE1_MDIO_P	Expansion	G3	GND	Expansion	H3	GND	3
4	Expansion	A4	EP1_RX2_N	Expansion	B4	EP1_RX2_N	Expansion	C4	GND	Expansion	D4	EP1_RX5_N	Expansion	E4	GND	Expansion	F4	GBE1_MDIO_N	Expansion	G4	GND	Expansion	H4	GND	4
5	Expansion	A5	EP1_RX1_P	Expansion	B5	GND	Expansion	C5	EP1_RX4_P	Expansion	D5	GND	Expansion	E5	EP1_RX7_P	Expansion	F5	GND	Expansion	G5	GND	Expansion	H5	GND	5
6	Expansion	A6	EP1_RX1_N	Expansion	B6	GND	Expansion	C6	EP1_RX4_N	Expansion	D6	GND	Expansion	E6	EP1_RX7_N	Expansion	F6	GND	Expansion	G6	GND	Expansion	H6	GND	6
7	Expansion	A7	GND	Expansion	B7	DP1_RX1_P	Expansion	C7	GND	Expansion	D7	DP2_RX0_P	Expansion	E7	GND	Expansion	F7	GBE1_MDII_P	Expansion	G7	VS2	Expansion	H7	VS2	7
8	Expansion	A8	GND	Expansion	B8	DP1_RX1_N	Expansion	C8	GND	Expansion	D8	DP2_RX0_N	Expansion	E8	GND	Expansion	F8	GBE1_MDII_N	Expansion	G8	VS2	Expansion	H8	VS2	8
9	Data	A9	DP1_RX0_P	Data	B9	GND	Data	C9	DP1_RX3_P	Data	D9	DP2_RX1_P	Data	E9	DP2_RX2_P	Data	F9	GND	Data	G9	VS3	Data	H9	VS3	9
10	Data	A10	DP1_RX0_N	Data	B10	GND	Data	C10	DP1_RX3_N	Data	D10	GND	Data	E10	DP2_RX2_N	Data	F10	GND	Data	G10	VS3	Data	H10	VS3	10
11	Data	A11	GND	Data	B11	DP1_RX2_P	Data	C11	GND	Data	D11	DP2_RX1_P	Data	E11	GND	Data	F11	GBE1_MDII_P	Data	G11	VS4	Data	H11	VS4	11
12	Data	A12	GND	Data	B12	DP1_RX2_N	Data	C12	GND	Data	D12	DP2_RX1_N	Data	E12	GND	Data	F12	GBE1_MDII_N	Data	G12	VAUX	Data	H12	VAUX	12
13	Control	A13	CP1_RX0_P	Control	B13	GND	Control	C13	SM_B_SCL	Control	D13	GND	Control	E13	DP2_RX3_P	Control	F13	GND	Control	G13	VBAT_12V	Control	H13	VBAT_12V	13
14	Control	A14	CP1_RX0_N	Control	B14	GND	Control	C14	SM_B_SDA	Control	D14	GND	Control	E14	DP2_RX3_N	Control	F14	GND	Control	G14	VBAT_3V	Control	H14	VBAT_3V	14
15	Control	A15	GND	Control	B15	SM_A_SCL	Control	C15	GND	Control	D15	MP01-RD	Control	E15	GND	Control	F15	GBE1_MDII3_P	Control	G15	GND	Control	H15	GND	15
16	Control	A16	GND	Control	B16	SM_A_SDA	Control	C16	GND	Control	D16	MP01-TD	Control	E16	GND	Control	F16	GBE1_MDII3_N	Control	G16	UEIO_00	Control	H16	NVMRO	16
17	Expansion	A17	CP1_TX0_P	Expansion	B17	GND	Expansion	C17	EP1_TX3_P	Expansion	D17	GND	Expansion	E17	REF_CLK_P	Expansion	F17	GND	Expansion	G17	UEIO_01	Expansion	H17	SYSRESET*	17
18	Expansion	A18	CP1_TX0_N	Expansion	B18	GND	Expansion	C18	EP1_TX3_N	Expansion	D18	GND	Expansion	E18	REF_CLK_N	Expansion	F18	GND	Expansion	G18	UEIO_02	Expansion	H18	GND	18
19	Expansion	A19	GND	Expansion	B19	EP1_TX1_P	Expansion	C19	GND	Expansion	D19	EP1_TX5_P	Expansion	E19	GND	Expansion	F19	AUX_CLK_P	Expansion	G19	GND	Expansion	H19	SER01_RX_P	19
20	Expansion	A20	GND	Expansion	B20	EP1_TX1_N	Expansion	C20	GND	Expansion	D20	EP1_TX5_N	Expansion	E20	GND	Expansion	F20	AUX_CLK_N	Expansion	G20	UEIO_03	Expansion	H20	SER01_RX_N	20
21	Expansion	A21	EP1_TX0_P	Expansion	B21	GND	Expansion	C21	EP1_TX4_P	Expansion	D21	GND	Expansion	E21	EP1_TX7_P	Expansion	F21	GND	Expansion	G21	UEIO_04	Expansion	H21	SER01_TX_P	21
22	Expansion	A22	EP1_TX0_N	Expansion	B22	GND	Expansion	C22	EP1_TX4_N	Expansion	D22	GND	Expansion	E22	EP1_TX7_N	Expansion	F22	GND	Expansion	G22	UEIO_05	Expansion	H22	SER01_TX_N	22
23	Expansion	A23	GND	Expansion	B23	EP1_TX2_P	Expansion	C23	GND	Expansion	D23	EP1_TX6_N	Expansion	E23	GND	Expansion	F23	USB01_D_P	Expansion	G23	GND	Expansion	H23	GND	23
24	Expansion	A24	GND	Expansion	B24	EP1_TX2_N	Expansion	C24	GND	Expansion	D24	EP1_TX6_P	Expansion	E24	GND	Expansion	F24	USB01_D_N	Expansion	G24	UEIO_06	Expansion	H24	GA0*	24
25	Expansion	A25	DP1_TX0_P	Expansion	B25	GND	Expansion	C25	DP1_TX3_P	Expansion	D25	DP2_TX2_P	Expansion	E25	DP2_TX2_P	Expansion	F25	GND	Expansion	G25	UEIO_07	Expansion	H25	GA1*	25
26	Expansion	A26	DP1_TX0_N	Expansion	B26	GND	Expansion	C26	DP1_TX3_N	Expansion	D26	GND	Expansion	E26	DP2_TX2_N	Expansion	F26	GND	Expansion	G26	USB01_VBUS	Expansion	H26	GA2*	26
27	Expansion	A27	GND	Expansion	B27	DP1_TX2_P	Expansion	C27	GND	Expansion	D27	DP2_TX1_P	Expansion	E27	GND	Expansion	F27	GP_LVDS01_P	Expansion	G27	GND	Expansion	H27	GA3*	27
28	Expansion	A28	GND	Expansion	B28	DP1_TX2_N	Expansion	C28	GND	Expansion	D28	DP2_TX1_N	Expansion	E28	GND	Expansion	F28	GP_LVDS01_N	Expansion	G28	GDiscrete1	Expansion	H28	GA4*	28
29	Expansion	A29	DP1_TX1_P	Expansion	B29	GND	Expansion	C29	DP2_TX0_P	Expansion	D29	GND	Expansion	E29	DP2_TX3_P	Expansion	F29	GND	Expansion	G29	GPIO_0	Expansion	H29	GAP*	29
30	Expansion	A30	DP1_TX1_N	Expansion	B30	GND	Expansion	C30	DP2_TX0_N	Expansion	D30	GND	Expansion	E30	DP2_TX3_N	Expansion	F30	GND	Expansion	G30	GPIO_1	Expansion	H30	GND	30
31	Overlay	A31	GND	Overlay	B31	OVERLAY	Overlay	C31	GND	Overlay	D31	OVERLAY	Overlay	E31	GND	Overlay	F31	GP_lvds03_P	Overlay	G31	GND	Overlay	H31	OVERLAY	31
32	Overlay	A32	GND	Overlay	B32	OVERLAY	Overlay	C32	GND	Overlay	D32	OVERLAY	Overlay	E32	GND	Overlay	F32	GP_lvds03_N	Overlay	G32	GND	Overlay	H32	OVERLAY	32
33	Overlay	A33	CP2_TX0_P	Overlay	B33	GND	Overlay	C33	OVERLAY	Overlay	D33	GND	Overlay	E33	OVERLAY	Overlay	F33	GND	Overlay	G33	OVERLAY	Overlay	H33	GND	33
34	Overlay	A34	CP2_TX0_N	Overlay	B34	GND	Overlay	C34	OVERLAY	Overlay	D34	GND	Overlay	E34	OVERLAY	Overlay	F34	GND	Overlay	G34	OVERLAY	Overlay	H34	GND	34
35	Overlay	A35	GND	Overlay	B35	OVERLAY	Overlay	C35	OVERLAY	Overlay	D35	OVERLAY	Overlay	E35	OVERLAY	Overlay	F35	OVERLAY	Overlay	G35	OVERLAY	Overlay	H35	OVERLAY	35
36	Overlay	A36	GND	Overlay	B36	OVERLAY	Overlay	C36	GND	Overlay	D36	OVERLAY	Overlay	E36	GND	Overlay	F36	OVERLAY	Overlay	G36	GND	Overlay	H36	OVERLAY	36
37	Overlay	A37	CP2_RX0_P	Overlay	B37	GND	Overlay	C37	OVERLAY	Overlay	D37	GND	Overlay	E37	OVERLAY	Overlay	F37	GND	Overlay	G37	OVERLAY	Overlay	H37	GND	37
38	Overlay	A38	CP2_RX0_N	Overlay	B38	GND	Overlay	C38	OVERLAY	Overlay	D38	GND	Overlay	E38	OVERLAY	Overlay	F38	GND	Overlay	G38	OVERLAY	Overlay	H38	GND	38
39	Overlay	A39	GND	Overlay	B39	OVERLAY	Overlay	C39	GND	Overlay	D39	OVERLAY	Overlay	E39	GND	Overlay	F39	GP_lvds04_P	Overlay	G39	GND	Overlay	H39	OVERLAY	39
40	Overlay	A40	GND	Overlay	B40	OVERLAY	Overlay	C40	GND	Overlay	D40	OVERLAY	Overlay	E40	GND	Overlay	F40	GP_lvds04_N	Overlay	G40	GND	Overlay	H40	OVERLAY	40

Copper and Aperture Overlay Region

S2-B Half Aperture RF & Optical



Natural convection cooling

Forced air cooling

Test systems



FlexNX+  
**ELMA**  
Your Solution Partner

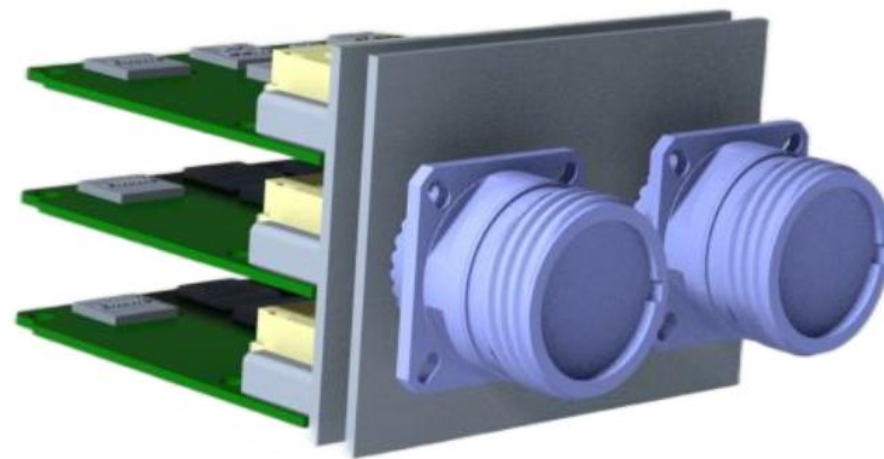


We know that program requirements are not one-size-fits-all. Therefore, we offer a range of precision solutions tailored to meet specific performance and SWaP-C targets.

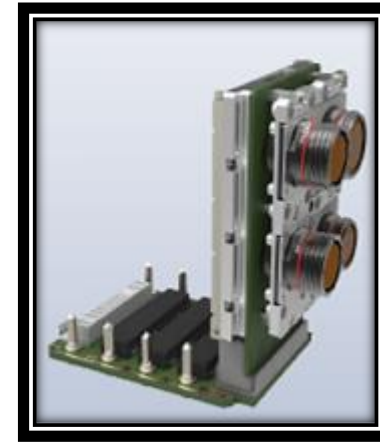
**Certus Evo:**

# Rear loader

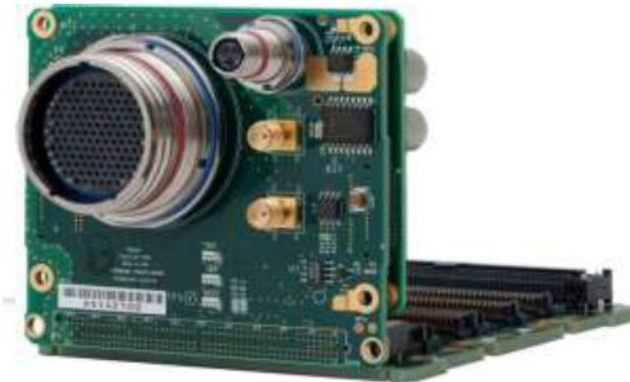
Pros | Cons

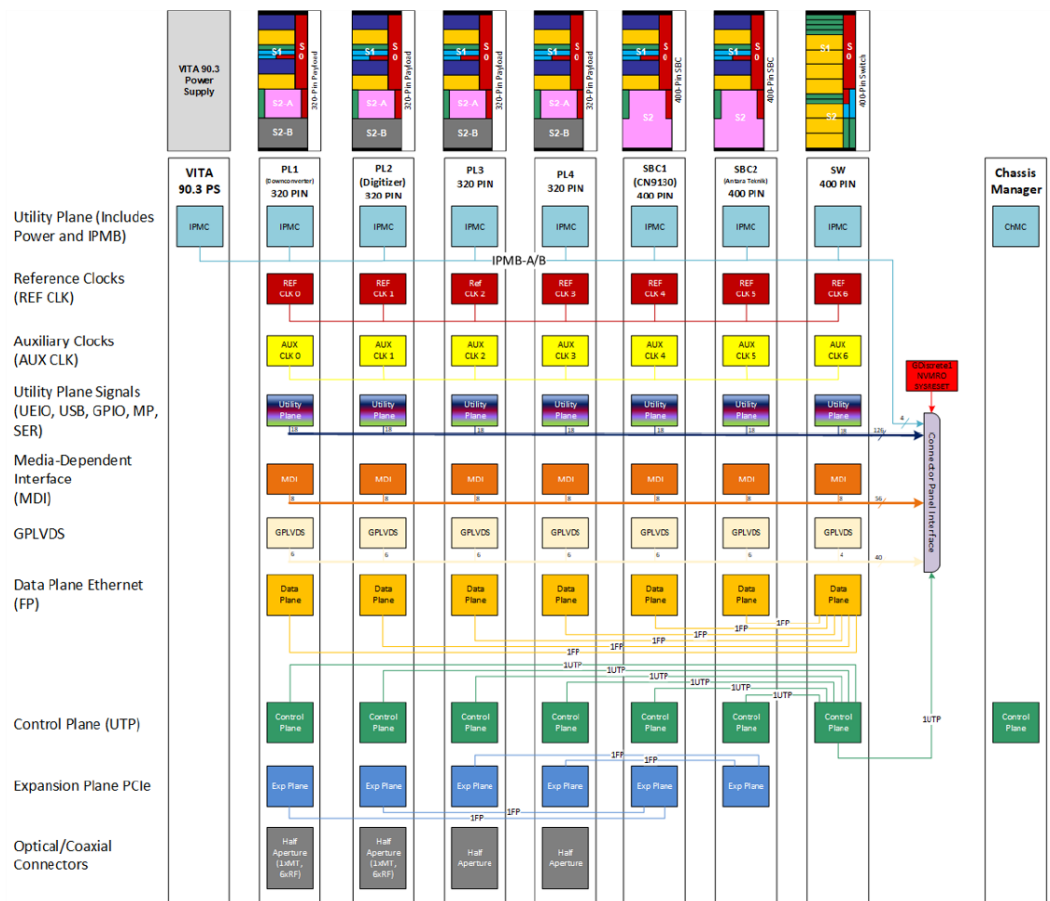


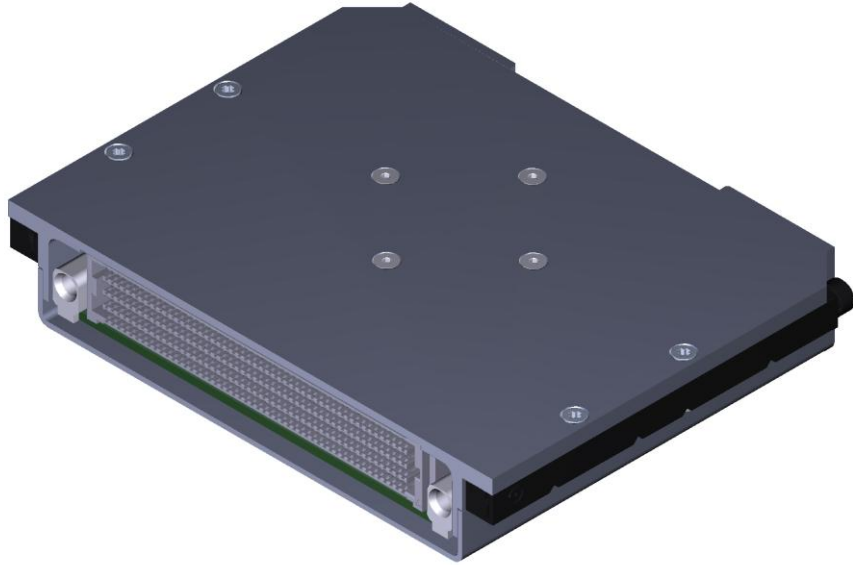
Top loader  
I/O board connected either  
with a 90° connector or  
straight



Pros | Cons

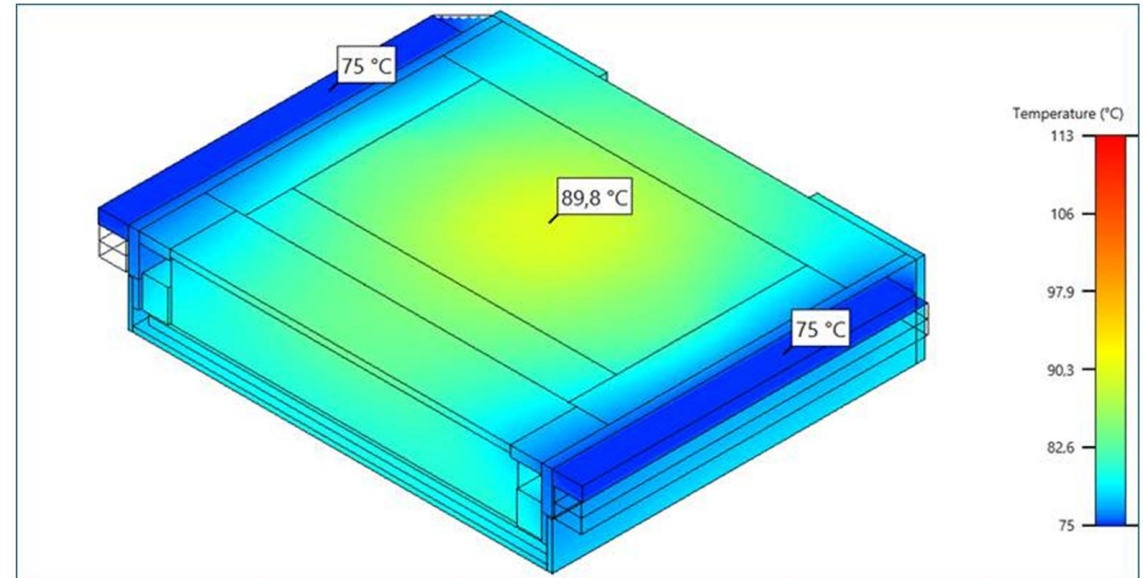
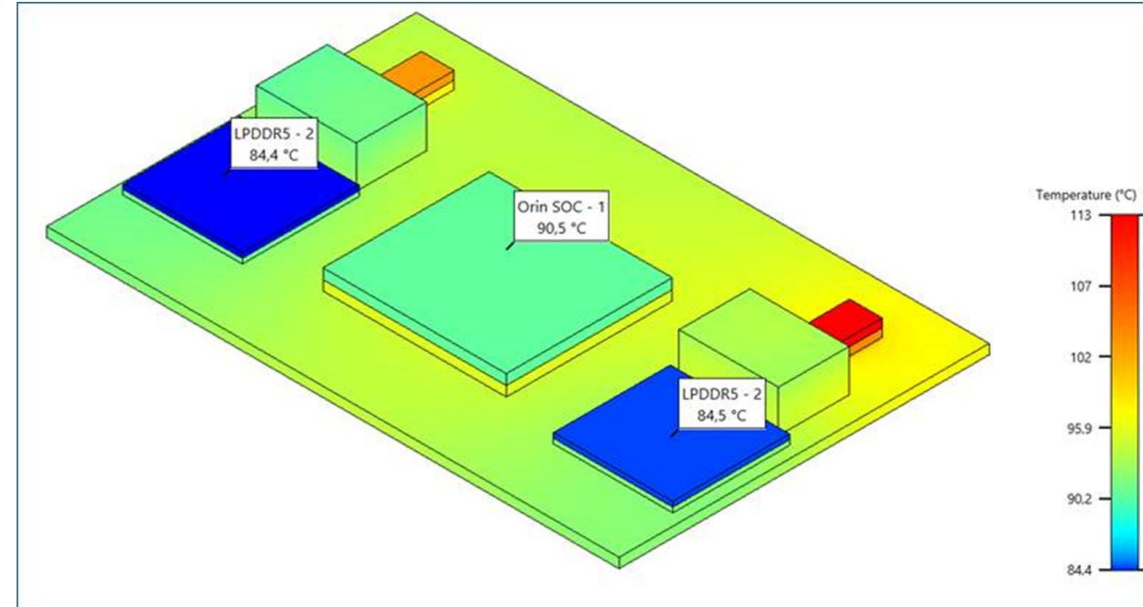






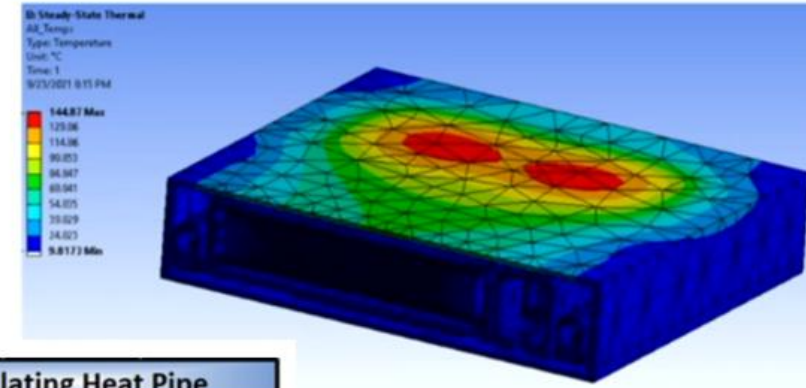
Jetson Orin NX 16GB Thermal Performance for 25 W Operational Mode

D&E event

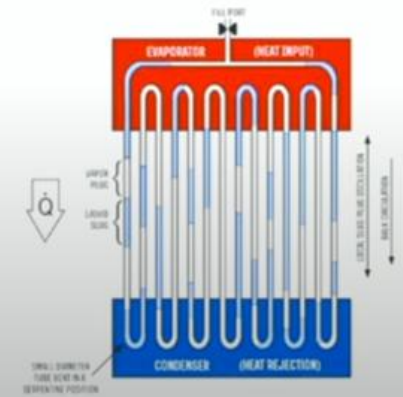




- VNX power initially pegged at 20W, but in practice increased to 25W to 30W or more.
- Recent studies show VNX+ allows power > 95 W/Module using advanced materials.



VITA 90 VNX+ Module Shell Material Thermal Study			Aluminum			Copper			Oscillating Heat Pipe		
Power	Component	Watts	Rise °C	Ambient °C		Rise °C	Ambient °C		Rise °C	Ambient °C	
			+55 C	+71 C	+55 C	+71 C	+55 C	+71 C	+55 C	+71 C	
High 95W	FPGA	80	145	200	216	68	123	139	49	104	120
	Optical CODEC	7	132	187	203	71	126	142	39	94	110
	NVM	5.2	125	180	196	60	115	131	39	94	110
Med 55W	FPGA	40	86	141	157	49	104	120	38	93	109
	Optical CODEC	8	88	143	159	52	107	123	39	94	110
	NVM	5.2	78	133	149	40	95	111	28	83	99
Low 35W	FPGA	20	63	118	134	40	95	111	32	87	103
	Optical CODEC	10	66	121	137	43	98	114	35	90	106
	NVM	5.2	55	110	126	30	85	101	22	77	93
Legacy VNX (est.) 25W	CPU 4C Atom	15	54	109	125	38	93	109	30	85	101
	Support Logic	5	40	95	111	35	90	106	32	87	103
	NVM	5	40	95	111	27	82	98	21	76	92



Cooling

## Summary

To take with

VNX+

- is an edge computer
- Is very tiny
- Is low to high performance computer-  
depending on the cooling
- Part of SOSA
- Has already a big community

D&E event

## Where to Apply VNX+?

MODULAR OPEN  
SYSTEMS APPROACH

Answer: most SWaP-constrained environments requiring high-performance computing and I/O – i.e. SOSA-type systems

- Autonomous ground vehicles
- 360° situational awareness systems
- Active protection systems
- SIGINT/EW
- Software defined radios
- Network processors





D&E event

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Aksel Saltuklar  
CTO Elma Electronic GmbH  
[aksel.saltuklar@elma.de](mailto:aksel.saltuklar@elma.de)  
[www.elma.de](http://www.elma.de)

**elincom**



Hans Zijlstra  
CCO Elincom Electronics B.V.  
[h.zijlstra@elincom.nl](mailto:h.zijlstra@elincom.nl)  
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