CONNECT AND PROTECT

System Solutions

Networked with the technologies of the future

nVent

SCHROFF

Your Partner

FOR SINGLE-SOURCE MECHANICAL AND ELECTRONIC SYSTEMS

nVent, with SCHROFF brand products, has been one of the worldwide leading developers and manufacturers of components and systems for over 50 years. Together we can solve any technical challenge. Throughout this process innovation, cost optimization, component standardization as well as short development times are our focus.

Whether they are system solutions that conform to standards, modified standard components or even custom developments, we offer our expertise in mechanical and electronic systems. Our development capabilities extend to backplanes, power supplies and system management solutions. We provide fully-equipped and tested systems from a single source with design, project management, prototypes, model construction, testing, certification, pre-production and series production all under one roof. We can provide you with the best possible on-site guidance through our subsidiaries throughout the world.

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New Technologies

CONFIDENCE IN THE RIGHT PARTNER

WHAT IS A SYSTEM?

At nVent we believe a system should be the complete infrastructure for your application. Our components are primarily developed and produced in-house. All individual components designed to function together and are internally tested, ensuring seamless operation.

INFRASTRUCTURE INCLUDES:

- Backplanes
- Mechanics
- Cooling
- Power supply
- Hardware Platform Management

ALWAYS ON THE CUTTING EDGE

As a pioneer and trendsetter, the SCHROFF name is synonymous with expertise in the areas of mechanics, electronics, climate control and system management and has been for over 50 years. Accordingly, we have been an active member of global standards committees such as IEC, IEEE, VITA and PICMG and taken a leading role in setting new standards for decades. As an international enterprise with globally active customers, we take responsibility for the rapid and efficient implementation of technological advances and product innovations for our customers' benefit.

WE INCORPORATE OUR EXPERTISE INTO THE FOLLOWING STANDARDS COMMITTEES:

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

Our skills and knowledge as experts in system solutions have contributed to forming and updating the European "Mechanical structures for electronic equipment" standard for 30 years. Many of these standards have been based on proposals by nVent and we have played a decisive role in their implementation.

INSTITUTE FOR ELECTRICAL AND ELECTRONICS ENGINEERS (IEEE)

Committees of this US-based institute deal with the standardization of technologies, hardware and software. For example, nVent engineers played a leading role in the development of the IEEE standard 11101.1.

VMEBUS INTERNATIONAL TRADE ASSOCIATION (VITA)

For over 20 years we have also been an active member of VITA, whose focus is the specification of modular embedded real-time systems. nVent has been a source of formative influence in drafting such standards as VITA 46.11 (system management for VPX).

PCI INDUSTRIAL COMPUTER MANUFACTURERS GROUP (PICMG)

We are at the forefront in the specification of telecommunications and industrial applications. Accordingly, we were and remain involved to a high degree in the development of the AdvancedTCA and AdvancedMC standards and are directly responsible for the mechanical component of the MicroTCA standards.

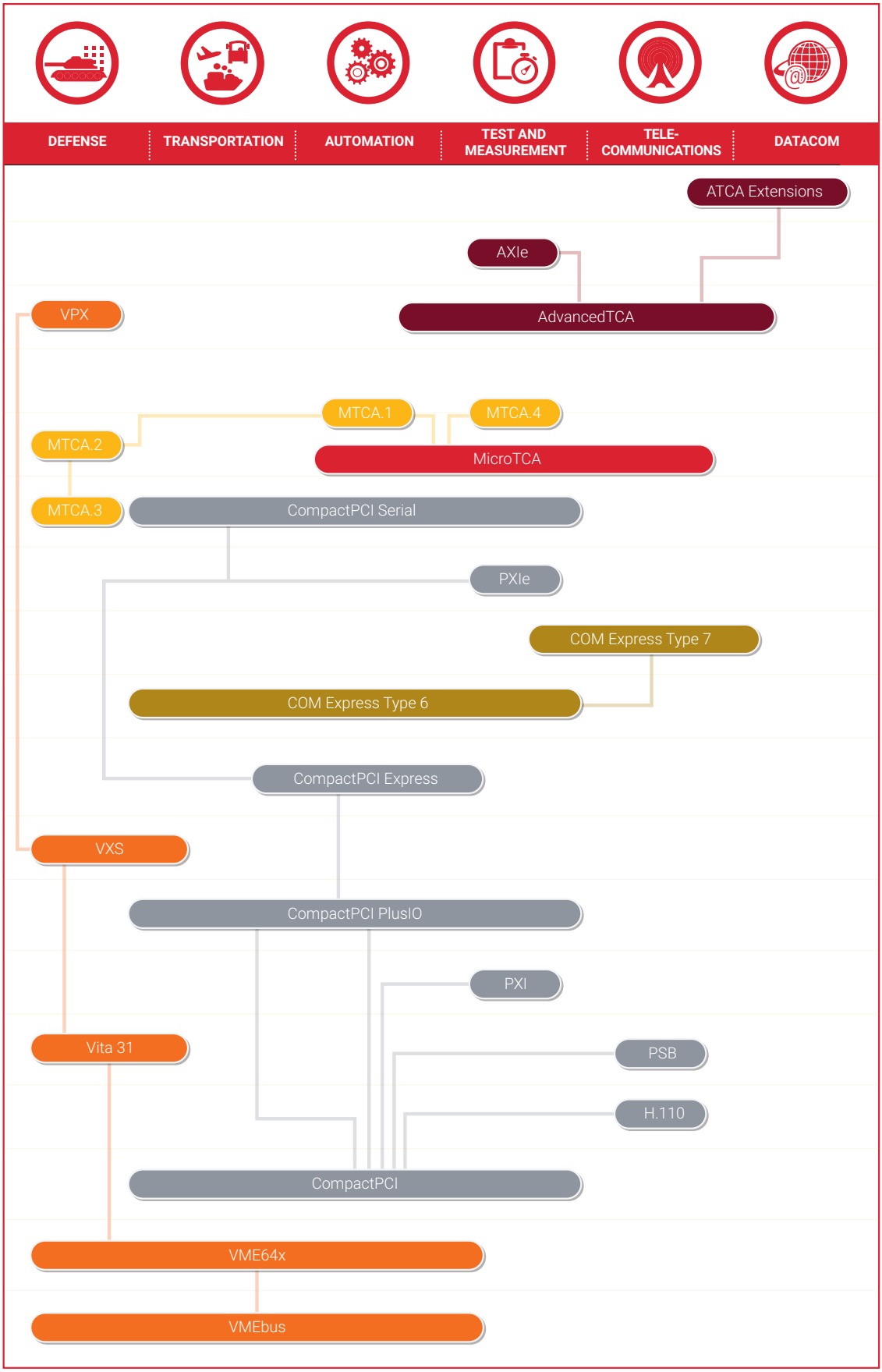
PXI SYSTEMS ALLIANCE

The PCI eXtensions for Instrumentation (PXI) standard is specified by the PXI Systems Alliance Group and continuously updated to be state of the art. PXIe defines the architecture for robust systems specifically for test and measurement, instrumentation, and automation. As an associate member, nVent supports this standard.

For Every Level of Performance

THE APPROPRIATE SOLUTION

WE ARE ABLE TO SHORTEN YOUR PRODUCT DEVELOPMENT TIME AND ESTABLISH GLOBAL MARKET ACCESS DUE TO OUR ACTIVE PARTICIPATION IN STANDARDS COMMITTEES



Markets

THE CORRECT STANDARD FOR EACH APPLICATION

TELECOMMUNICATIONS AND DATACOM

nVent uses SCHROFF systems in areas such as Telecom Core, Edge/ Access networks or in computing and data centers. Our systems help you by implementing your applications such as remote server management, base stations, deep packet inspection, cloud-computing, firewall-server, router and data transmission systems. Our products meet requirements in accordance with NEBS and UL, regardless of whether it is ATCA, MTCA or CPCI. We offer high-performance systems featuring high availability with excellent shelf management, state of the art cooling and outstanding signal integrity.

TEST AND MEASUREMENT

Our systems are ideal in a 19" control cabinet or as a scalable and flexible system that can be adapted to specific aesthetic concepts. The CPCI, MTCA and VME technologies are well suited to measuring and control engineering. In addition, we support systems in accordance with PXI, PXIe, AXIe or MTCA.4.

RAILWAY AND TRANSPORTATION

Our systems, whether VME, CPCI or CPCI Serial, are based on the EuropacPro subracks and already meet a wide variety of rail standards such as EN 50155 part 12.2.11. Our systems are also suited for applications exposed to increased requirements for shock and vibration, extended temperature ranges, the highest level of EMC protection or conduction cooling for IP protection up to IP67. In addition, the COM Express standard is suitable as a mobile communications system, IoT gateway or general small form factor computing device.

SECURITY AND DEFENSE

nVent offers a wide assortment of rugged systems built upon a durable mechanical chassis using either a subrack or a conduction-cooled solution. Whether based on VME, VPX, CPCI, MTCA or ATCA, our products can be upgraded to meet MIL-S 901D, MIL-STD 167, MIL-STD 810 and Vita 47 standards. Experienced engineers, testing laboratories for EMC, shock/vibration and cooling as well as comprehensive hardware platform management are available to you at any time.

INDUSTRIAL AND AUTOMATION

A wide variety of technologies like COM Express, PXI Express, VME, CPCI, MTCA or ATCA are suitable for controlling and monitoring complex automation lines or machines such as lithography. The modular design with hot-swap and hardware management minimizes machine downtime and service times. We offer 19" systems suited for control cabinets as well as small system cases that can be mounted directly into the application.

MEDICAL AND LABORATORY ENVIRONMENTS

Medical applications such as CT scan or X-ray image processing require high computing power. Standards such as CPCI, CPCI Serial , PXI Express or MTCA offer a solution in these environments. Additionally, our systems meet the required standards for power supply units according to EN60601-1.

AdvancedTCA

HIGH-SPEED DATA TRANSMISSION AND EXCEPTIONAL COOLING

AdvancedTCA stands for Advanced Telecommunications Computing Architecture and is the first open standard for very high data traffic and new services in the telecommunications sector. This specification has been adopted by PICMG (PCI Industrial Computers Manufacturing Group).

AdvancedTCA boards are capable of transporting, processing and analyzing large volumes of data in real time. The LVDS (Low Voltage Differential Signal) standard used is responsible for high-speed data transmission and supports different transmission protocols such as Ethernet, Serial Rapid I/O, PCI Express and Infiniband.

Dual Star, Dual-Dual Star and Full Mesh are defined as backplane topologies. Furthermore, AdvancedTCA is characterized by extremely powerful and comprehensive shelf management.

SPECIAL FEATURES OF SCHROFF ATCA SYSTEMS

- Data transmission up to 100 Gbps (300 Gbps redundant possible with Quad Star)
- Cooling capacity up to 500 watts per board at ΔT 10 Kelvin
- Standard product range with all common slot configurations (2, 6 or 14 slots)
- AC, DC or combined AC/DC power supply
- UL approvals and extensive validation tests
- High availability platform (99.999% availability)
- Redundant power supply design, cooling and switches (hot-swap) ensure uninterrupted operation
- Backplanes with Dual Star, Dual-Dual Star and Full Mesh topologies
- Powerful shelf management
- Extensive range of accessories with front panels, air baffles, carriers and replacement parts

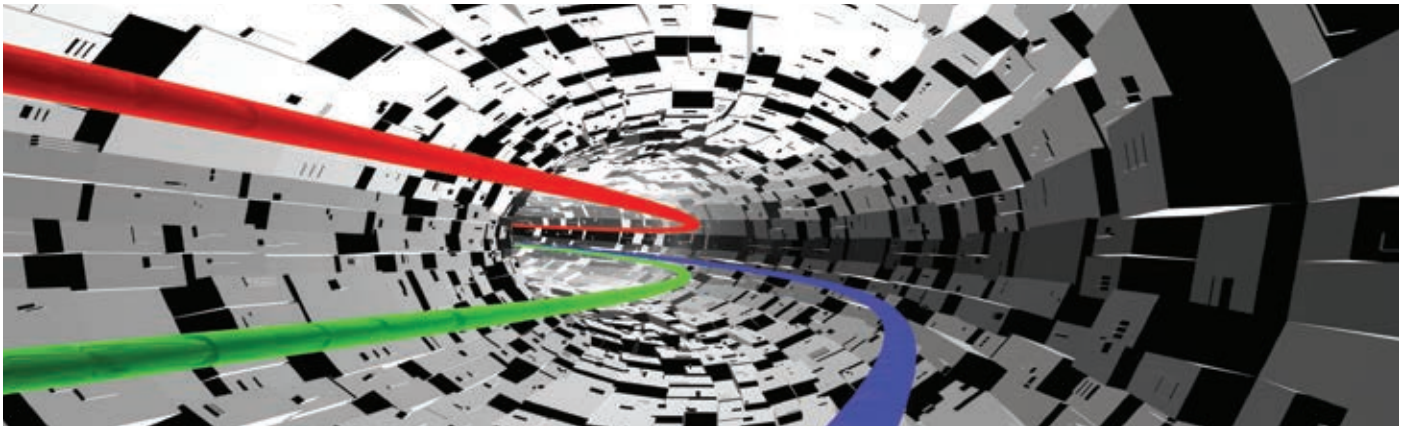
IMPORTANT INFORMATION ABOUT AMC MODULES

The AdvancedMC specification is an important element of the AdvancedTCA platform. AdvancedMC modules are the smallest interchangeable units in an AdvancedTCA system.

Functional modules are installed in an AdvancedTCA system with suitable adapters, AdvancedMC carriers and expand the system's functionality in a simple and flexible manner.

MicroTCA

HIGH PERFORMANCE AND AVAILABILITY IN A SMALL PACKAGE



SPECIAL FEATURES OF SCHROFF MTCA SYSTEMS

- Data transmission up to 40 Gbps
- Conforms to standards in accordance with PICMG MTCA.0, MTCA.1 and MTCA.4
- Wide range of accessories including front panels, filler panels, module covers and power supply units
- Systems with a redundant power supply design, cooling and switches (hotswap) ensure uninterrupted operation and high availability (99.999%)
- Chassis for single and double size AMCs
- Reference designs and firmware for management controllers

IMPORTANT INFORMATION ABOUT AMC MODULES FOR MTCA

AdvancedMC modules are also suitable for MicroTCA use with their six standard sizes, hot-swap capability and support for very fast serial protocols and intelligent module management. AdvancedMC modules can be plugged directly into MicroTCA systems in this modular platform due to its small dimensions.

MicroTCA stands for Micro Telecommunications Telecom Computing Architecture and is a modular standard for small, flexible system solutions. Its high scalability means that the application can be perfectly adapted to given requirements. MicroTCA is increasingly being used more in telecommunications and all other areas of application like industrial automation, image processing and medical technology. MicroTCA was adopted by the PICMG in 2006.

The standard uses Advanced Mezzanine Cards (AdvancedMCs) that are specified for their use as functional units on carrier boards in an AdvancedTCA chassis.

MTCA.0 TO MTCA.4

- **MTCA.0:** Original telecommunications use
- **MTCA.1:** Increased shock and vibration resistance and expanded temperature ranges
- **MTCA.2** and **MTCA.3:** Conduction and air flow cooling for extremely harsh environments
- **MTCA.4:** The newest MicroTCA standard for even more complex test and measurement systems

CompactPCI and CompactPCI Serial

FROM ESTABLISHED TO HIGH-SPEED SYSTEMS

THE ORIGINAL - COMPACTPCI:

Introduced in the 1990s based on the bus structure and architecture of desktop computers of the time. Application of the widely used PCI bus with a bus width of 32 or 64 bits that can be expanded using the PCI-to-PCI bridge up to 21 slots.

THE FUTURE - COMPACTPCI SERIAL:

Based on the same mechanical system as CompactPCI but using the current and future PCIe protocols or Serial Rapid I/O, Ethernet, USB and S-ATA/SAS. Star and full mesh topologies are possible with Ethernet while PCIe, USB and S-ATA are connected to the system slot in a star-shaped pattern by up to 8 peripheral slots for peripheral devices. Connector pins can also be used for direct connection to the RTM card instead of Ethernet connections.

THE HYBRID - COMPACTPCI PLUSIO:

Represents the link between CompactPCI and CompactPCI Serial and defines a certain assignment of the CompactPCI 32 Bit system slot P2 connector that addresses up to four CompactPCI Serial slots. This makes it possible to combine the older CompactPCI technology with the advanced CompactPCI Serial standard.

SPECIAL FEATURES OF SCHROFF CPCI AND CPCI SERIAL SYSTEMS

- Extensive assortment of CompactPCI-based products for 3U and 6U boards
- Products in the CompactPCI Serial family support PCIe Gen3, S-ATA Rev. 3.0, USB 3.0 and Ethernet 10GBase-T
- Systems are available with power supply units that can be plugged in redundantly as well as with ATX or Open Frame power supply units
- Systems are also available with PSB (Packet Switching Backplanes), H.110 (computer telephony) or PXI bus
- A wide range of accessories such as standard or customized front panels, filler panels, fan controls and power supply units
- Detailed user manuals are available on our website

PXI & PXI Express

PRECISION TEST SYSTEM WITH DIVERSE APPLICATIONS

SPECIAL FEATURES OF THE SCHROFF PXI EXPRESS SYSTEM

- Comprehensive range of desktop PXI and PXIe systems with different slot counts
- Switches, bridges, and clock modules (PXIe) designed as mezzanine modules quick & easy adaptation of the system architecture to application requirements
- The modular design makes it easy to replace system components on site
- Optimized air cooling concept for exceptional thermal performance with low noise emissions
- Supports PCIe Gen3 and system bandwidth of up to 16 GB/s

PXI stands for PCI eXtensions for Instrumentation and serves as a robust platform for test and measurement applications as well as automation systems. Defined by the PXI Systems Alliance, it is based on CompactPCI and includes the 32- or 64-bit PCI bus. For precision measurement applications, additional synchronization extensions are available.

FOR A HIGHER CLOCK FREQUENCY

PXI Express is based on the newer CompactPCI Express specification and includes the high-speed PCIe bus with a PXIe clock speed of 100 MHz. Backward compatibility is ensured by hybrid peripheral slots that are compatible with older CPCI or PXI cards or newer CPCI Express and PXIe cards.

VME, VXS and VPX

DURABLE TECHNOLOGY FOR APPLICATIONS IN HARSH ENVIRONMENTS

SPECIAL FEATURES OF SCHROFF VME, VXS AND VPX SYSTEM

- Wide portfolio of VITA systems for 3U and 6U boards
- All possible chassis solutions, e. g. systems based on subracks as well as metal, desktop and tower case configurations
- VMEbus, VME64x, VXS and VPX systems are available
- Special, rugged system families for the highest shock, vibration and EMC requirements
- A wide range of accessories such as front panels, filler panels, drive units and power supply units
- Detailed user manuals are available on our website
- VPX chassis manager solution, available as a reference design or mezzanine module
- VPX module IPMC solutions
- Both Chassis Manager and IPMC solutions are designed to be compliant with ANSI/VITA 46.11-2015
- VPX Baseboard Management Reference (BMR) available for different controllers / FPGAs

VME – ORIGINS OF THE STANDARD

VMEbus is a standard that was defined in the 1980's by the VMEbus manufacturers group (VITA). It is intended for industrial automation systems and connects 3U, 6U and 9U boards which have 4HP width and 160, 220 or 280 mm depth. VMEbus systems can be equipped with up to 21 slots.

VME64X – EXTENSION FOR HIGHER DATA TRANSMISSION RATES

The VME64x extension specifies a backward compatible plug connector with five rows of pins, which enables the higher data transmission speeds, and supplements VME with Rear-I/O boards.

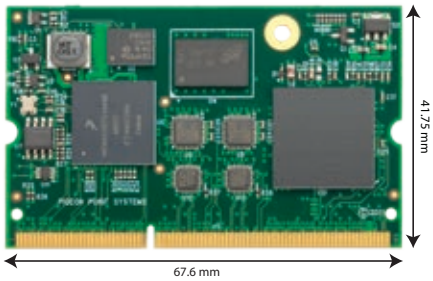
VXS AND VPX – THE NEWEST VITA SPECIFICATIONS

VXS is based on VME64x with 6U and adds another serial data transmission with up to 10 Gbit/s to the VMEbus. VXS supports single as well as dual star topologies. The newest VITA specification is VPX. This refers to an entire row of basic, environmental, mechanical and lower-level specifications that define different functions – mainly rugged functions.

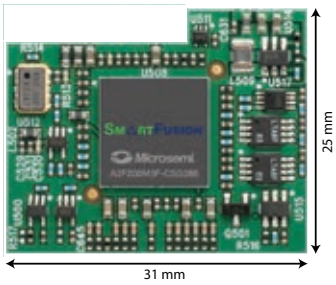
Hardware Platform Management

MANAGEMENT SOLUTIONS FOR OPEN STANDARD PLATFORMS

nVent's Pigeon Point management solutions for open standard platforms like AdvancedTCA, MicroTCA and VPX are used by leading companies all across the world. The integration of these solutions in system platforms enables a reliable, cost-effective management system that conforms to all common standards. In addition, they are suited for platforms developed in-house that build upon or expand these standards.



SCHROFF Pigeon Point Mezzanine modules for ATCA systems (ShMM-700R) and VPX chassis (ChMM-700R)



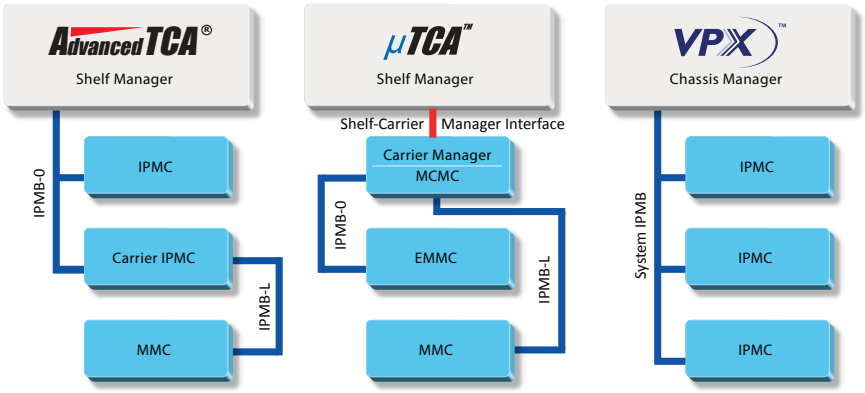
SCHROFF Pigeon Point reference IPMC for ATCA or VPX

WHAT IS HARDWARE PLATFORM MANAGEMENT?

Numerous applications in a variety of industries such as telecommunications, IT infrastructure and defense technology require high system availability and/or continuous monitoring and control of all hardware functions. Hardware platform management includes the monitoring of hardware inventory data (which boards are located in the enclosure?) and hardware-relevant parameters such as temperature, amperage and voltage (in what state are these boards?). This ensures that abnormal or other particular characteristics are identified, which enables countermeasures to be taken – increasing the fan speed to prevent the system from overheating, for example. As a rule, each board in a managed system is monitored by a local controller on the board which can then transmit events to a higher-level controller on the shelf or system level. These shelf or system controllers then allow an external system manager to view and check the data.

SPECIAL FEATURES OF SCHROFF PIGEON POINT MANAGEMENT SOLUTIONS

- AdvancedTCA shelf manager (e. g. ShMM-700R) and VPX VITA 46.11 chassis manager (ChMM-700R), ready-to-install for carriers.
- Management solutions for ATCA, MTCA and VPX boards and modules. Delivery as a reference design including firmware, ready to integrate into your board or module.
- Reference designs that conform to the standards, are compatible and based on years of experience with compatibility tests and in applications in demanding environments throughout the world.
- Bench top implementations enable quick ramp up on the technology and provide a known-good comparison when custom boards are brought up.
- Extensive documentation and technical support for one year with the option of extending the support.



ATCA Shelf Manager include reliable, optional, support for the Hardware Platform Interface (HPI) of the Service Availability Forum (SAF). HPI is used by communication service providers and other companies around the globe as the preferred, abstracted programming interface for managing platforms.

COM Express System

MODULAR SYSTEM CONCEPT FROM A SINGLE SOURCE

SPECIAL FEATURES OF THE SCHROFF COM EXPRESS SYSTEM

- The height, width, and depth of the small form factor enclosure can be adjusted
- Enclosure with IP 30 protection (optionally up to IP 67)
- Extension with additional modules such as fieldbus modules, Mini PCI Express, XMC, etc. is possible
- Flexible cooling design for forced air cooling or passive cooling applications
- Efficient, low-interference power supply
- Integrated, tested, verified, and certified on request
- Choice of integration level, from enclosure with cooling and power supply to the complete solution including COM module, hard drive & other peripherals

COM Express is a specification from PICMG and stands for Computer-on-Module (COM). The modules integrate the core functions of a computer such as CPU, RAM, graphics processor and standard interfaces. The module is then plugged via connectors to an application-specific carrier board.

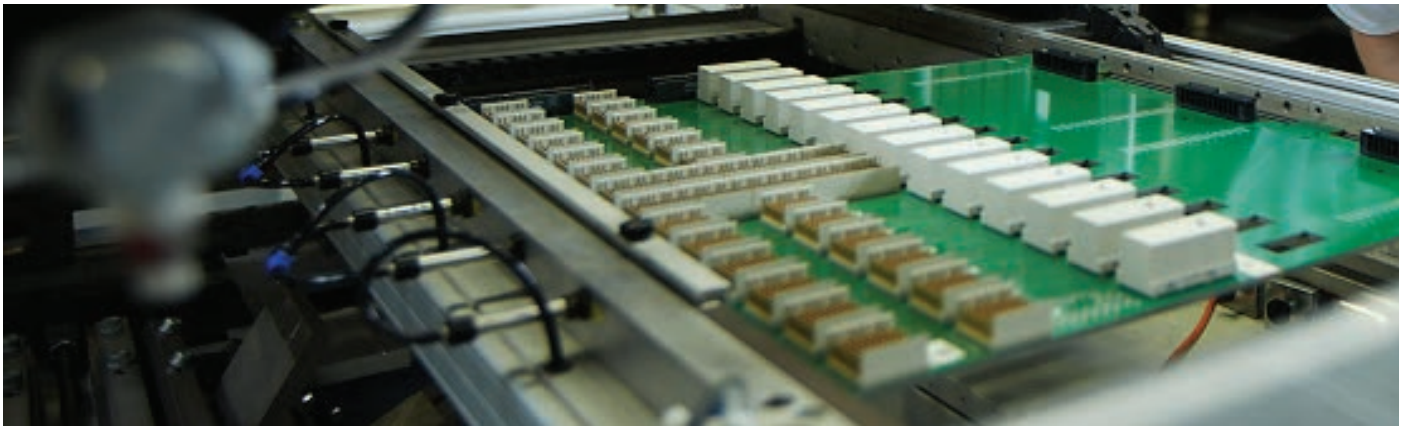
SHORTENED DEVELOPMENT PROCESS

In development, using a COM module with modular carrier board pays off. A standardized COM module is used and the carrier board is quickly and cost-effectively modified. This makes it easy for additional interfaces to be added or expanded using expansion boards.

Examples of expansion boards include a postcode module for debugging hardware and software, a prototype module for integrating additional functions using the GPIOs of the COM module, or fieldbus modules for connecting to an industry fieldbus.

Backplanes

OUTSTANDING SIGNAL INTEGRITY FOR MAXIMUM DATA TRANSMISSION RATES



nVent offers standard backplane families in accordance with the VITA and PICMG standards like CompactPCI, CompactPCI Serial, VME and VPX. SCHROFF backplanes exhibit outstanding signal integrity and are designed for the highest data transmission rates. CompactPCI Serial backplanes support PCIe Gen 3 and VPX backplanes Rapid I/O up to 6.25 Gbaud. Our backplanes can be delivered with a protective coating (conformal coating) upon request. nVent also offers customized backplanes based on the standard product portfolio.

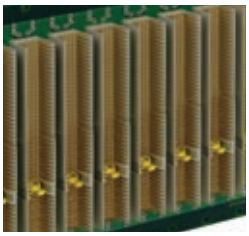
SPECIAL FEATURES OF SCHROFF BACKPLANES

- The new CompactPCI Serial, 32 and 64-bit CompactPCI backplanes, as well as combinations of CPCI Serial and CPCI, are available with different numbers of slots for 3U and 6U boards
- PSB and H.110 versions for communication applications
- CompactPCI bridges and secondary CompactPCI backplanes for applications with more than 8 slots
- PXI backplane family with bridges for measurement and control technology
- A wide range of VME and VME64x backplanes with different numbers of slots and in different versions for 3U and 6U boards
- VPX and VXS backplanes for applications according to the newest VITA specifications
- Universal and power backplanes for diverse applications

IMPORTANT INFORMATION ABOUT BACKPLANES

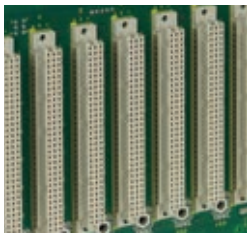
A backplane is the electrical interface in a modular system. The individual boards of a system are connected to the backplane, which in turn includes the data bus. In older technologies like VMEbus or CompactPCI, this was a parallel bus structure with a bus width of 32 or 64 bits. New technologies like CompactPCI Serial or VPX use point-to-point connections according to the LVDS (Low Voltage Differential Signaling) standard instead. The backplane also supplies the boards with current from the power supply.

CPCI Serial

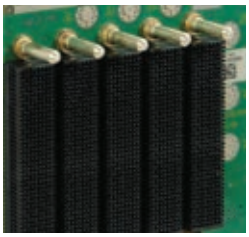


CPCI

VME64x



VME



VPX

Power Supply

FULL POWER FOR EACH AREA OF APPLICATION

nVent has an extensive range of pluggable power supply units and a variety of open frame power supply units for open standards. Our extensive range of products also includes pluggable power supply units with H15 connectors for fanless applications.

SPECIAL FEATURES OF SCHROFF POWER SUPPLY UNITS

- A wide variety of power supply products for highly efficient power solutions
- Pluggable 19" power supply units with one to three outputs for convection cooling up to 180 W (AC/DC) or 100 W (DC/DC)
- Three switching power supply unit families: The Maxpower family, together with the Slimpower devices with AC wide-range input and the Coolpower family with wide range DC input
- Low-interference linear regulator product families for sensitive measuring systems and medical applications
- Pluggable power supply units and open frame power supply units for CompactPCI Serial, VME/VME64x and MicroTCA systems

AC/DC switch regulator

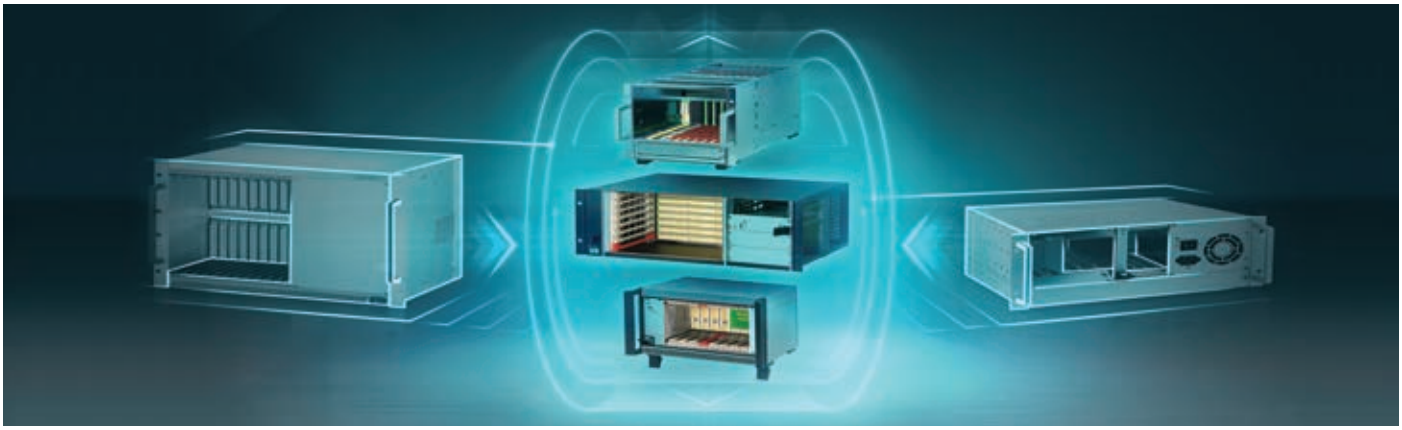
AC/DC linear regulator

IMPORTANT INFORMATION ABOUT POWER SUPPLY UNITS

A power supply unit (PSU) converts primary AC or DC voltage into one or more secondary voltages. nVent provides a large number of pluggable 3U power supply units (PSUs) with H15 connectors for a wide variety of application purposes. The linear regulators are used for applications whose outputs can only have a very low noise level. Our Maxpower and Slimpower product series are equipped with AC wide range inputs and enable 1 to 3 output voltages in the area of 40 to 180 watts. The products in the Coolpower series have a DC wide range input. None of these power supply units require forced-air cooling. Open standards require special power supply units with output voltages compliant with specifications, dimensions, and in some cases, even connectors that are compliant with specifications. nVent offers pluggable and open-frame power supply units for VMEbus, VME64x, CompactPCI, CompactPCI Serial and MicroTCA.

Standard Products Adapted to Your Application

PUT YOUR TRUST IN OUR EXPERTISE FOR YOUR INDIVIDUAL SOLUTION



nVent offers you support in all phases of your planning and development process, no matter how far you have progressed with your project. Our engineers are ready to help you as early as the phase of selecting the suitable technology. You can stay informed and put together your own standard system depending on the requirement using our online configurator for VITA and PICMG systems. Whether it is a standard product or an individualized custom solution - nVent supports you as a qualified partner.

OUR EXPERTISE AT A GLANCE

- A wide variety of off-the-shelf products available from stock
- Online configurators for numerous modifications
- Consultation from our experienced engineers from the beginning
- Customized new developments
- Project management
- Design verification
- Production
- Quality management
- After-sales service

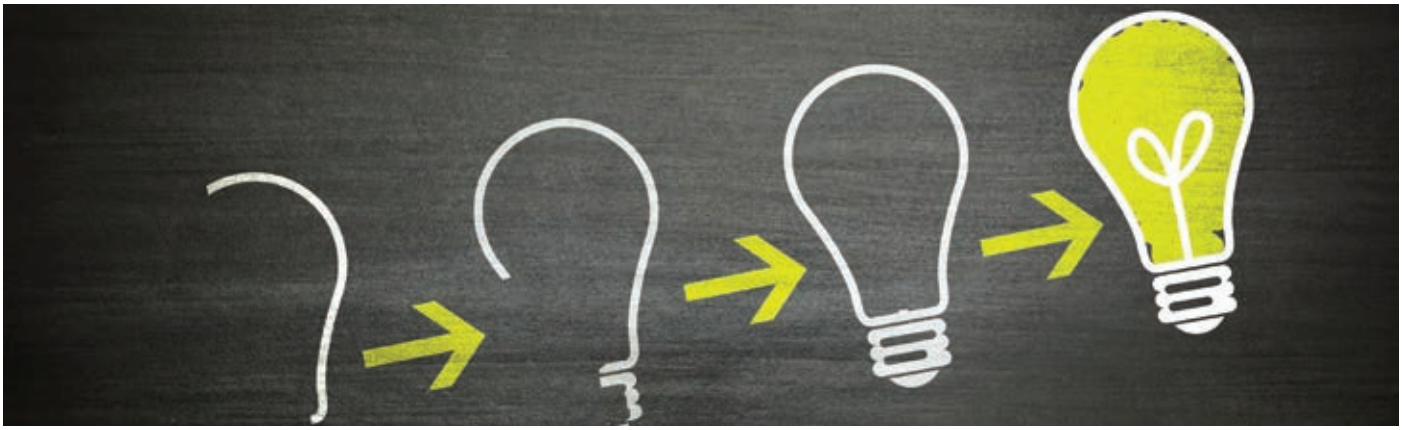
DO YOU HAVE A CUSTOMIZED REQUEST?

Whether small adjustments to create a suitable solution from a standard product or a customized new development – we are ready to assist you in any way possible. Upon request, we are ready to make modifications according to your individualized specifications or will find a made-to-order solution with the help of our experienced and qualified team. We combine all of the necessary development and manufacturing expertise under one roof. As a result, our processes are fast and efficient. Visit us at **schroff.nvent.com/en/schroff**

THE FIRST STEP: ONLINE CONFIGURATION TOOLS

Our extensive and highly developed standard range offers mechanical, electronic and thermal components in an unlimited variety of dimensions and specifications. Simply select a finished complete system or use our system selection tool and configure your system for your specific application. Select your specific backplane configuration, the enclosure type, special mechanical features, the thermal configuration as well as the appropriate power supply.

schroff.nvent.com/en/schroff/all-configurators



Project Management – Our Strengths

CUSTOMIZED SOLUTIONS IMPLEMENTED QUICKLY AND RELIABLY

IN YOUR PROJECT, WE ARE WITH YOU EVERY STEP OF THE WAY

Meeting our customers' requirements is our main priority and we ensure an individual team of experts is there to assist you throughout all phases of your project. Our experienced design and development department provides support and assistance in preparing a quotation right from the start. Experienced specialists guide and coordinate the project during the design engineering and production stages and up to final delivery. This allows you, as our customer, to have an expert contact person during the entire development process. Even after the product is delivered to your facility, a project manager will be there to advise you on any questions and provide assistance during your project cycle.

DEVELOPMENT AND LAYOUT: DOUBLE THE EXPERTISE

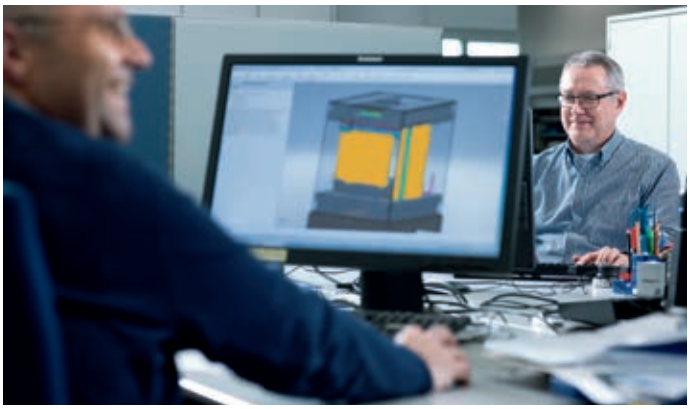
Developing mechanical and electronic components in parallel ensures that they work harmoniously and shortens development times – the key to creating an overall system that functions flawlessly. For this reason, we have combined all our resources under one roof. Our experienced developers and modern design tools guarantee a high standard of quality. Our engineers continuously research areas including signal integrity, EMC, cooling, shock and vibration resistance, and surface finishes, while maintaining a leadership position in those standards. In turn, we participate in and share our expertise with IEC, IEEE, PICMG, and VITA standards committees, helping define higher quality, user-friendly standards.

ADDITIONAL SOFTWARE AND FIRMWARE SUPPORT

As is the case with mechanical and electrical components, we specifically adjust the development of our software or firmware elements to the requirements of the entire project and guarantee you an equivalent quality standard. Furthermore, we are actively involved in a leading role in the relevant standards committees, particularly in PICMG and VITA to ensure the standards that pertain to our software and firmware are tailored to the needs of our customers.

OUR PROJECT EXPERTISE AT A GLANCE

- One contact person for your project
- Design recommendations and technical collaboration with our specialists
- Engineers provide support during the inquiry phase and bid preparation
- Project coordination during the design engineering, production and delivery phases of the project
- Lifecycle support program
- After-sales service



Our Expertise – Design Verification

FOR RAPID DEVELOPMENT PROCESSES AND HIGH LEVELS OF SAFETY

These always have priority at each stage of development: continuously ensuring one hundred percent quality. Our engineers use the most up-to-date modeling and simulation tools as well as measuring instruments and adapters. This allows us to optimize the development process and ensure that we are offering our customer the best and most efficient products. The completed systems are subjected to our extensive in-house design verification tests. We collaborate with certified testing and certification institutes on follow-up tests.

IN THE QUOTATION PHASE

- Feasibility studies for the mechanical design and platform architecture
- Thermal simulation
- Creating system concepts

DURING DEVELOPMENT

- Circuit simulation for active circuits such as fan controllers
- Design review of electronic components
- Backplane signal integrity simulation
- Thermal simulation
- Thermal measurements on a mechanical sample

DESIGN VERIFICATION TESTS

- Mechanical tolerance inspection
- Functional tests
- EMC/ESD tests
- Thermal test (airflow per defined zone in each slot)
- Climate chamber
- Acoustic noise test
- IP protection test
- Package drop test
- Signal integrity measurement
- UL ratification / certification
- MTBF calculation
- CB report

Shock and vibration test

Shielding effectiveness

Thermal simulations

Climate chamber

Wind tunnel testing

Salt spray testing

Acoustic noise test

Our Expertise – Production

THE HIGHEST QUALITY AND COST-EFFECTIVENESS

PROTOTYPE PRODUCTION: QUICK AND TESTED

We proceed directly to the production of prototypes following successful completion and verification of the development work. The advantage: these prototypes are usually produced using the same machines that will later produce your products in series production. This prevents deviations and protects against possible weak points in individual components that would otherwise be discovered later and thus be far more costly to remedy.

SERIES PRODUCTION: FAST AND EFFICIENT

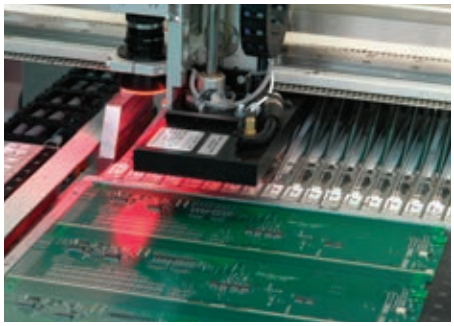
The successfully tested prototypes pave the way for series production. The large manufacturing depth and multiple configuration options for both mechanical and electronic components allows us to control and monitor the production process at any point in time. Cutting-edge technology and qualified specialists reliably ensure consistently high quality.

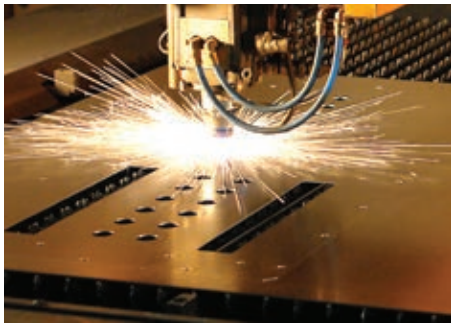
MECHANICAL PRODUCTION

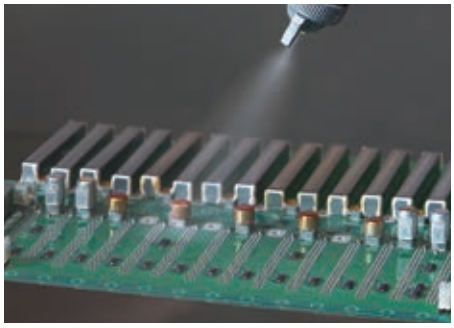
- High-precision laser punching machines
- Fully automated horizontal rail mounting including printing
- Fully automated subrack side panel, top cover and base plate production from coil-base material
- Five-axis milling machines
- Powder coating, electroplating, screen and digital printing

ELECTRONICS PRODUCTION

- Solder paste printing enables the greatest possible degree of flexibility
- Automatic SMD placement
- Vapor phase soldering protects against the overheating of components using low temperatures and homogeneous temperature distribution
- Selective wave soldering system for wired and SMD components
- Automated press fit tool with force / path monitoring
- In-house conformal coating of backplanes and power supply units
- Nitrogen storage of electronic components







Our Expertise – Quality Management

OUR MISSION FOR PROVIDING 100% RELIABILITY

QUALITY MANAGEMENT AND QUALITY CONTROL

An extensive quality check takes place after the component production. This ensures that no product leaves our premises without a 100% inspection.

FMEA

- Analysis of potential weak points during the design and development phase
- Implementing measures for systematic error prevention in the production phase

IN-CIRCUIT TEST

- Identifying errors in the assembled printed circuit boards such as short circuits or interruptions
- Detection of soldering defects and component faults
- Testing individual circuit blocks

ENDURANCE/BURN-IN

- Endurance testing of power supply units under operating conditions
- Early-failure detection

AUTOMATIC OPTICAL INSPECTION

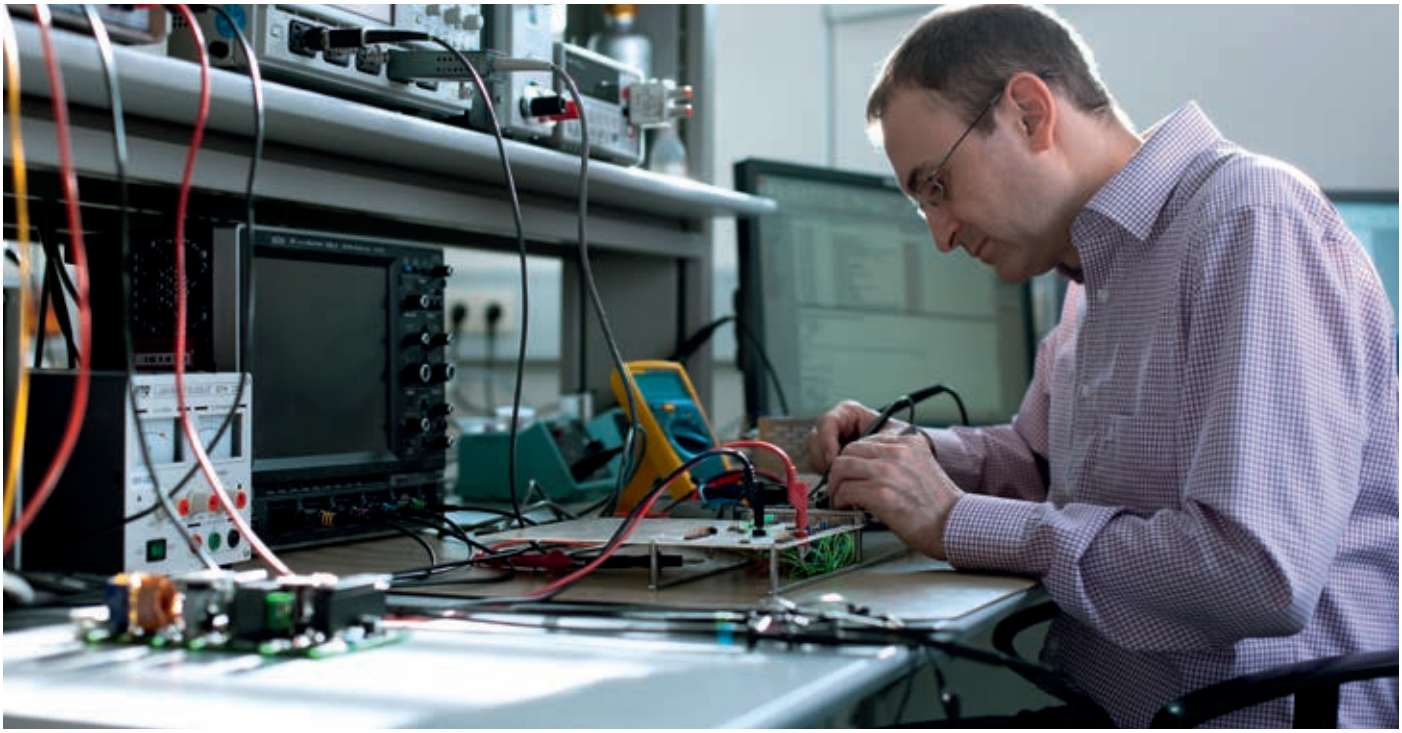
- Testing electronic assemblies for production defects such as:
  - Poor solder joints
  - Incorrectly positioned or missing components

FUNCTION AND SAFETY TESTING

- System functions of all installed components
- Ground-wire test
- Insulation test (high-voltage test)

PRODUCT TRACEABILITY

- Documentation of the respective testing stations
- Traceability of the production date and components used based on serial numbers



References

OUR EXPERTISE, OUR PRODUCTS, OUR SERVICES

SYSTEM BASED ON A SUBRACK (COTS) FOR HARSH ENVIRONMENTS

THE SOLUTION:

- Product: Rugged System VME64x
- Industry: Security and defense
- Application: Mobile radar control system

REQUIREMENTS:

This system has been specifically developed for mobile radar system requirements. The requirement for high shock and vibration resistance is met due to the use of our robust

EuropacPro subracks. The enclosure consists of a 3mm thick plate and meets the requirement for MIL-STD 710F and MIL-STD 167. The different interfaces require a board cage with a 12-slot VME64x backplane and an RTM. Specific EMC shielding according to MIL-STD 461 ensures seamless system function. The system can be integrated into the corresponding MIL cabinets due to the optional front-to-back cooling.

2 SLOTS WITH FRONT-TO-BACK ATCA SYSTEMS FOR 450-WATT BLADES

THE SOLUTION:

- Product: 2-slot ATCA 450/40
- Industry: Telecom/IP communication
- Application: Switch

REQUIREMENTS:

Applications in telecommunications require systems that guarantee high availability and a high data rate. Effective and reliable cooling is an important factor. nVent integrates front-toback cooling to use the cold air in the cabinets in the front area and is thus able to achieve effective ventilation. The use of special fans that provide a very high air pressure and a sophisticated airflow in the chassis makes this possible.

References

OUR EXPERTISE, OUR PRODUCTS, OUR SERVICES

RUGGEDIZED AND CONDUCTION-COOLED MTCA SYSTEM

THE SOLUTION:

- Product: Conduction-cooled MTCA system
- Industry: Security and defense
- Application: Satellite communication for vehicles in disaster areas

REQUIREMENTS:

The system is used in disaster areas to establish a mobile communication system. In such a grueling environment, the system is exposed to extreme contamination levels and temperature fluctuations and meeting requirements in accordance with IP65 is mandatory. In addition, the seamless function of the system must be ensured so that the communication of high data rates do not stand in the way.

PROPRIETARY TEST SYSTEM BASED ON IEEE STANDARDS

THE SOLUTION:

- Product: Proprietary system based on 6U boards
- Industry: Test and measurement
- Application: Network test system

REQUIREMENTS:

The system was developed for testing and verifying high-speed network elements and is used as a standalone system. This requires a touchscreen as an input and output unit. The unit and the controller board is integrated by nVent. The backplane with CompactPCI connectors enables versatile system configurations. The exchangeable fan unit ensures adequate cooling. The enclosure from the RatiopacPRO family offers many design options. Through simple modifications, nVent developed a one-of-a-kind customer solution from standard components.

References

OUR EXPERTISE, OUR PRODUCTS, OUR SERVICES

MISSION COMPUTER FOR AIRCRAFT

THE SOLUTION:

- Product: 5-slot CPCI system
- Industry: On-board electronics for aircraft
- Application: Data acquisition system

REQUIREMENT:

This system is used in a civil unmanned vehicle for acquiring geographic data. Because the system is on the outside of the vehicle, the enclosure must be completely enclosed and fulfill the requirements of protection class IP 65. A conduction-cooled system was chosen for the solution. The requirements for weight and heating demand an advanced mechanical concept. CompactPCI was selected for the system architecture so that the necessary computing power could be packaged in the Conduction Cooled Assemblies.

CONDUCTION-COOLED CHASSIS WITH IP 67 PROTECTION

THE SOLUTION:

- Product: Conduction-cooled chassis
- Industry: Construction
- Application: Excavator

REQUIREMENT:

Today, even construction machines cannot go without high-performance electronics. This system is installed on the underside of an excavator and could be exposed to harsh environments or even submerged in water. For this reason, IP 67 was required. This means that the system must be able to withstand being immersed in water for 30 minutes. A conduction-cooled system was selected for this application.

A Flotherm analysis simulated the heat development and determined the required cooling power. Because the solution is proprietary, special clamshells were developed that ensure adequate thermal conduction between the installed cards and the chassis. The backplane was designed in accordance with customer requirements.

References

OUR EXPERTISE, OUR PRODUCTS, OUR SERVICES

10-SLOT MTCA SYSTEM FOR FULL-SIZE MODULES

THE SOLUTION:

- Product: MTCA.0 system with integrated TFT
- Industry: Telecommunications
- Application: Teleconferencing systems

REQUIREMENT:

Based on the MTCA.0 standard, this scalable solution gives the end user the ability to expand the capacity and even the scope of function of the test system. The application uses 500 to 1,000 ports when used exclusively for audio conferences, but can be expanded to up to 20,000 ports. Usually, the AMC modules are plugged into the front side of the enclosure. However, this application needed a TFT display in front to monitor the system status. In this design, the system configuration was reversed and the 19-inch brackets and slots for the AMC modules were relocated to the rear.

PXI EXPRESS EMBEDDED CONTROLLER

THE SOLUTION:

- Product: PXI Express Embedded Controller with COM module
- Industry: Measurement and control technology
- Application: Various production tests

REQUIREMENT:

The embedded controller was developed for use in a test chassis to operate a PXI system without external PC, saving space in the application. With a 3U height and width of 4 HP, the embedded controller with COM module is a complete single-board computer with a seventh-generation Intel® Core™ i7 processor, 16 GB DDR4 RAM and an 250 GB m.2 NVMe SSD. In addition to the 4 PCIe Gen3 links to the backplane, it provides 2 GB Ethernet ports, 3 USB 3.0 interfaces and a Version 1.2 display port on the front panel. By using a COM module as controller, later adaptations are easier and the selection of functions and interfaces can be adapted. In the previous solution, a system slot was consumed by a PXIe card that distributes the PCIe signals to the peripheral slots and creates a PCIe x4 connection to the Industrial PC via the front panel. To save space and reduce costs, this modular embedded controller was developed to take over the tasks of the external Industrial PC. This change saved 3U of space in the test cabinet.

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