MPL Product Guide

Think Long-Term
Think MPL

- Embedded Server
- Industrial Ethernet
- Rugged Embedded Computer
- Rugged HMI/Panel PCs
- Housing
- Custom/OEM Solutions
- Standard Compliance
- Long-term available
- Wide temperature
- Low power
- High-speed
- Long-term available
- Fanless
- Smallest footprint
- Wide temperature range
- Optional touch screen
- Aluminium up to IP 65
- Different LCD sizes
- Customization OEM solutions
- Long-term partnership
- Complete systems
- Custom development
- Marine (IEC60945)
- Railway (IEC61373)
- Defence MIL-STD-810D
- Several add-ons PCIe, XMC, mPCle...
- Small form factor
- Wide temperature
- Low power
- Fanless
- Smallest footprint
- Wide temp. range
- Many add-ons
- UPS, WLAN, GPS...
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Continuity
Since 1985, MPL has been the industry leader in developing and manufacturing rugged, fanless electronics, and embedded systems for customers demanding best quality. MPL’s commitment to design, high reliability, low power consumption, extended temperature, and longevity products are the cornerstones of our success.

Reliable Partnership
MPL offers its customers and business partners a long-term, cooperative engagement. Our financial strength and independence is important to sustain MPL’s growth and future.

Innovation
MPL products differ clearly from any other products on the market. Most other products are cost optimized but neglect the quality, life cycle management, low power consumption, and MTBF optimization found in each MPL product. MPL maintains special agreements and relationships with the major chip suppliers who offer MPL early access to the latest technology developments.

Closeness
Our distributors are near you! To serve our customers the best: we maintain a global distributor network which will handle your local pre and post sales support.

MPLcare
MPLcare is a system which is maintained by design engineers, management, and the MPL administration team. MPLcare is provided to each customer free of charge. Technical support questions are answered within 24 hours by the product design engineering team.

Worldwide more than 1000 companies use MPL products on a daily basis.
Maintaining a close customer partnership is our goal for successful collaboration.
We support and monitor our products for full life-cycle management.

MPL – The Company You Can Trust!
Our low power Designs – increase MTBF
We only design products and solutions that have the lowest possible power consumption in the industry. It generates less heat, less stress, and therefore a higher MTBF value and better reliability rate is the result.

Unparalleled Quality
MPL products are designed from inception to insure high reliability when operating in rugged and tough environments. A further development focus is to produce a consistent, stable, long-term available product, which will lower your TCO (Total Cost of Ownership).

Extended Temperature Range (-40°C up to +75/85°C)
Each standard MPL product withstands environment temperatures of -20°C to +60°C. Products with the extended temperature option receive additional specific product tests and test cycles in our environmental chambers.

Long-term available Solutions
Our main target is long-term availability, as this is a major cost reduction factor for the customer. Whenever possible, MPL uses products out of the embedded road map from various suppliers. MPL maintains end-of-life stock to ensure longevity of supply and repair.

High Ruggedization
MPL products are specifically designed to withstand harsh environmental operations. In numerous applications MPL standard and custom products prove their ability to withstand extreme temperatures, thermal cycling stress, high shock, and vibration conditions.

Think Long-Term – Think MPL
Wide Temperature Computers from -40°C up to +85°C

MPL's Embedded Computers have been designed to operate in an environment temperature range from -40°C up to +75/85°C. The special rugged design of the products, combined with the best industrial grade components, offer high reliability and long-term performance.

Each product sold with the extended temperature option, receives an additional test cycle. Testing 5°C below and 5°C above the specified temperature in our environmental chambers, verifies and insures the capability of the products under extended temperature. This quality assurance ensures the system’s reliability in extreme operating environments.

Embedded Systems designed for Maritime Applications

All MPL Embedded Computers meet or even exceed the IEC 60945 maritime standard and are the ideal choice for longevity offshore applications. Several of our solutions already are IEC 60945 certified. If your choice is not listed, talk to us about it. We will be happy to do the testing according to your needs and requirements. The systems are also tested to withstand environmental disturbances, like vibration, shock, and extreme temperature.
Embedded Systems designed for Railway Applications
MPL’s Railway Computers are EN50155 certified and all units undergo severe environmental testing to ensure reliable performance under a variety of power supply conditions, such as voltage variations, power interruptions, and supply changeover. The systems are also tested to withstand environmental disturbances, like vibration, shock, and extreme temperature.

Embedded Systems for Military & Aerospace Application
MPL’s Embedded Computers have been designed to withstand harsh environments and extreme temperature conditions to meet the various standards, including MIL-STD-810. The special design rules and rugged design, combined with the best industrial-grade components, offer high reliability and long-term performance.

Also, several MPL products have been used in space, despite the products not specifically designed for it. The first product was launched into space May 1995. Since then we regularly have been supplying products for specific space applications.

Various Certifications
Most products are already tested and certified for different applications. For test results, please contact MPL AG.
Why buy an MPL embedded computer? MPL embedded computers are based on common PC technology without the known limitations of normal PC platforms. MPL computers have long life-cycle management, they are ruggedized by design, they have extended temperature capabilities and they are based on more than 37 years of MPL embedded design experience. MPL embedded computers represent the most unique and clever designs in the industry.

Specialties
- Low power consumption -> less stress & higher MTBF
- Fanless operation under all conditions
- Customized and/or locked BIOS versions
- Operation temperature -40°C up to +75°C / +85°C
- Long-term availability guarantee, (Typically 10+ years, 20+ years repair support)
- Easy expansion, e.g. PMC, XMC, PC/104 or PCIe modules
- Designed for rugged & tough environments

Standards
The MPL embedded computers are deployed in many applications as listed below. For many of these applications, MPL products have been certified in various tests including: maritime certification (IEC 60945), railways certification (EN50155), defense certifications (MIL-STD-810), EMI certification, UL, CE, FCC just to name a few. In each case, MPL embedded computers have successfully passed all required tests.

Application Areas
MPL embedded computers have been successfully in operation for years in application areas such as
- Automotive – Avionics & Space
- Communication – Defense
- Maritime – Railways
- Traffic – Industrie
as well as in other areas where reliable long-term available computers are needed.
MPL Embedded Computer Characteristics

Since 1998 the MPL Embedded Computer Family (PIP) has been offering:
- Same footprint / same size
- All connectors remain over the years on the same side
- Graphics, Ethernet, USB on board
- 4 serial lines on board
- Wide input voltage range
- Various internal expansion buses
- Use of standard connectors
- Fanless design, even in extended temperature range

We constantly invest in new and innovative technologies for our products. Our close partnerships with the world leaders in chip technologies guarantee state-of-the-art hardware and software solutions with long-term availability.
The advantage of the MPL expansion products is in the variety of options to meet the various requirements of different applications (Industry, Defense, Railways, Medicine...). MPL expansion products are designed to meet both, the specific customer function, as well as maintaining operations in extended temperature and shock/vibration environments.

The list of expansion modules is constantly increasing, due to the various requirements of our customers. If you have a need, but are not able to find the solution, please talk to MPL. We are open to develop and create your custom option to meet your specific application needs.

**Special Features**
- Up to 64GB ECC DDR4 memory (extended temperature)
- Specific interface for vehicle operation
- Space for mSATA/m.2 and/or SATA 2.5” disks
- Up to 6 slots mPCIe expansion
- Extended temperature option (-40°C to +85°C)
- Coated and bonded versions
- Marine certified versions (IEC 60945)
- Railway certified versions (EN50155)
- Defense certified versions (MIL-STD-810)

**Applications Areas**
MPL embedded expansion options have been in use for many years across a wide array of applications and markets. Like our embedded computers, MPL expansion options maintain the same demand for long-term availability and ruggedness.
A selection of available expansion options

Power options
- SM BATT: UPS 0°C to 60°C / -40 to 75°C (smart battery)
- PIPVIN: 9-36V/18-72V/43-160V input
- REDPI: Redundant power input

Mass storage options
- HSRAID: Hot swap RAID expansion
- SATA-REMOVE: External mass storage access

Expansion options
- PIPPCIe: PCIe x16 slot expansion
- PIPPMC: PMC expansion
- PIPXMC: XMC/PMC expansion
- FINE: mPCIe expansion (GPS, WLAN, CAN, ...)
- GRIP: MXM/GPGPU graphic exp. with mPCIe slots
- ICC: Customized interconnect board

Networking options
- UNIGET: Gigabit Ethernet controller with PoE+
- MAGBES: 5-port managed Gbit switch
- μMAGBES: 10-port managed Gbit switch
- MAXBES: 10-port managed switch with 2x 10Gbit SFP+
- TX2FX: Fiber optical converter / unmanaged switch
- μTX2FX: Media converter (copper to fiber)
- UNIGET: 10Gbit Ethernet controller board
- uEPI: PoE for PIP
- IEBY: LAN bypass solution
- PIP4x-LAN-x: LAN expansion, up to 4 ports

Various add-on
- DP2DVI: Dual Display expansion
- SERIF: RS232/422/485 module
- HDSound: Sound module

Universal 3U 19" rack solution with PIP39 used as passenger information server
The customer can choose between:

- Use of MPL’s standard industrial proven rugged housing, either with DIN-rail, or flange mount option. Various heights are offered to create the most compact system according to your I/O requirements. OEM versions are readily available with customer logo and colors.

- For the harshest environments use our fully IP67 protected military or outdoor housing. Feel free to select the required interface and external connectors (standard, M12, MIL38999, or headers) according to your requirements and standards. The housings can be adapted according to the customer requirements.

- Design your own housing/chassis and integrate our reliable MPL embedded computer board, which is delivered on an aluminum cooling plate that offers the best conductive cooling concept.

### Quality / Finish

All housings are chromated to provide best EMI protection. Each chassis is external powder coated to provide a more industrial and long lasting exterior finish.

### Colors

MPL offers as the standard color for the PIP housing

- MPL blue (RAL 5024)
- Anthracite gray (RAL 7016)

In case of special needs any RAL color can be used for your OEM case. The MIL Outdoor housing comes in mat black (RAL 9005) but other RAL colors are possible as well.
**PIP Standard Housings**

<table>
<thead>
<tr>
<th>Version</th>
<th>Footprint</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard DIN-Rail</td>
<td>270 x 162mm</td>
<td>62 / 83 / 120mm</td>
</tr>
<tr>
<td>Standard Flange</td>
<td>290 x 162mm</td>
<td>62 / 83 / 120mm</td>
</tr>
</tbody>
</table>

**Case characteristics:** robust, rugged aluminum, internally chromated, externally powder coated.

**Version** | **Footprint** | **Height** |
<table>
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<tbody>
<tr>
<td>MIL / Outdoor</td>
<td>324 x 220mm</td>
<td>min. 66mm</td>
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</tbody>
</table>

**Case characteristics:** for harshest environment, up to IP67 protected, connectors according requirement.

**Version** | **Footprint** | **Height** |
<table>
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<tbody>
<tr>
<td>Open Frame</td>
<td>288/242 x 178mm</td>
<td>min. 33mm</td>
</tr>
</tbody>
</table>

**Case characteristics:** mounted on cooling plate with passive cooling concept, adaptable to customer case. Cooling plate can be adjusted to your needs.

**19” Rack Solution**

MPL also offers 1U, 2U, and 3U 19” slot solutions. The beauty of this unique solution is the modularity and expansion capability with the add-on MPL offers, like:

- Hot swappable RAID
- Integrated UPS for extended temperature (-40°C to 75°C)
- Redundant power input
- Managed Switch solution
Specialties

• Ultra compact embedded Box-PC without any internal wiring
• Fanless solutions for extended temperature -40°C to +85°C
• Customized and/or locked BIOS versions
• Low power embedded designs
• Designed for rugged & tough environments
• Long-term availability guarantee, typically 10+ years, 20+ years repair support
• Customized design and functionality

Standards

The MPL in embedded computers are deployed in many applications as listed below. For many of these applications MPL products have been designed to meet various tests including: marine certification (IEC 60945), railways certifications (EN 50155), defense certifications (MIL-STD-810), EMI certification, UL, CE, FCC, just to name a few. In each case MPL embedded computers have successfully passed all required tests.

Application Areas

MPL CEC compact embedded computers have been designed for reliable and rugged industrial use:
- Automation
- Communication
- Maritime
- Transportation
- Food Industry
- Railways
- Medical & Healthcare
- Traffic

as well as other applications where reliable, rugged, long-term available computers are needed.
MPL Compact Embedded Computer Characteristics

- Extreme low power consumption
- Compactness and modularity
- Graphics, Ethernet, USB on board
- 9-36 VDC input power
- Load dump and reverse polarity protection
- Serial ports (RS232/422/485)
- All status LEDs and user buttons on the front
- Fanless design, even in extended temperature range
- Same footprint / same size since 2010

We constantly invest in new and innovative technologies for our products. Our close partnership with the world leaders in chip technologies guarantee state-of-the-art hardware and software solutions with long-term availability.

Please talk to us about your specific needs and we will provide the best solution!
Special Features
• ECC DDR3 memory (extended temperature)
• Specific interface for vehicle operation
• On-board soldered flash
• Space for mSATA and/or SATA 2.5” disks
• Up to 7 slots mPCIe expansion
• Extended temperature option (-40°C to +85°C)
• Coated and bonded versions
• Marine certified versions (IEC 60945)
• Railway certified versions (EN50155)

MPL embedded expansion options are specifically designed and produced to withstand the high quality expectation in MPL embedded computers. These option products are tested inside the complete system with all relevant drivers. For highest flexibility most options are offered in different versions for best possible fit.

A selection of available expansion options

<table>
<thead>
<tr>
<th>Power Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SM BATT</td>
<td>UPS 0°C - 60°C / -40°C - 75°C (smart battery)</td>
</tr>
<tr>
<td>Pipvin</td>
<td>9-36V/18-72V/43-160V input</td>
</tr>
<tr>
<td>REDPI</td>
<td>Redundant power input</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Expansion Options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FIME mPCIe exp. 3 slots, DVI, VGA, 2x 2.5Gbit LAN</td>
<td></td>
</tr>
<tr>
<td>ICC</td>
<td>Customized interconnect board</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Networking options</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>μMAGBES</td>
<td>10-port managed Gbit switch</td>
</tr>
<tr>
<td>μTX2FX</td>
<td>Media converter (copper to fiber)</td>
</tr>
<tr>
<td>uEPI</td>
<td>PoE (Power over Ethernet)</td>
</tr>
<tr>
<td>IEBY</td>
<td>LAN bypass solution</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Various Add-on</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SERIF</td>
<td>RS232 / isolated RS232/422/485 module</td>
</tr>
<tr>
<td>HDSound</td>
<td>Sound module</td>
</tr>
<tr>
<td>DUALDP-1</td>
<td>Second display port module</td>
</tr>
<tr>
<td>FLEXIO</td>
<td>DIO/AIO add-on card, up to 64 channel</td>
</tr>
</tbody>
</table>
MPL offers various rugged and flexible housing options for its compact embedded computers to give customers the best possible solution for their specific application. All housings can be adapted according to the customer requirements.

**CEC Standard Housings**

<table>
<thead>
<tr>
<th>Version</th>
<th>Footprint</th>
<th>Height</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard DIN-Rail</td>
<td>62 x 120mm</td>
<td>162mm</td>
</tr>
<tr>
<td>Standard Flange</td>
<td>62 x 123mm</td>
<td>198mm</td>
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</table>

**Case characteristics:** robust, rugged aluminum, internally chromated, externally powder coated.

<table>
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<th>Version</th>
<th>Footprint</th>
<th>Height</th>
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<tbody>
<tr>
<td>MIL / Outdoor</td>
<td>238 x 188mm</td>
<td>min. 86mm</td>
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**Case characteristics:** for harshest environment, up to IP67 protected, connectors according requirement.

<table>
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<tr>
<th>Version</th>
<th>Footprint</th>
<th>Height</th>
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<tbody>
<tr>
<td>Open Frame</td>
<td>102 x 153mm</td>
<td>min. 23mm</td>
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</tbody>
</table>

**Case characteristics:** mounted on cooling plate with passive cooling concept, adaptable to customer case. Cooling plate can be adjusted to your needs.

**Quality / Finish**

All housings are chromated to provide best EMI protection. Each chassis is external powder coated to provide a more industrial and long lasting exterior finish.

For the harshest environments use our fully IP67 protected MIL Outdoor housing. Feel free to select the required interface and external connectors (standard, M12, MIL38999, or headers) according to your requirements and standards.
MPL provides numerous solutions for IP based industrial-grade networking with devices such as firewalls, routers, switches, and media converters. Like all other MPL products, they are designed to work in harsh environments with extreme temperature, humidity, and vibration. Low power, reliability, and long-term availability are key, and make them ideal for the industrial environment.

Networking Solutions for the Rugged Environment

Specialties
- Easy to integrate
- Robust, industrial products
- Extended temperature available
- Long-term availability guarantee
- Customized design and functionality

Gigabit Firewall and VPN Router/Switch
The μGUARD product series are the ideal solution for all rugged applications, where security, quality, reliability, low power consumption, and long-term availability are key. The μGUARD comes in various versions as firewall/router or with integrated switch, with or without fiber optic. The system is supplied with the well-known OpenWRT OS, and is also available in extended temperature from -40°C up to +85°C.

Gigabit Ethernet Media Converter
The TX2FX and μTX2FX converts copper (header or RJ45) to fiber (SFP) and allows to expand data transmission distance beyond the 100 meter limitation of copper wire, to over 10 kilometers by using fiber optic cable. The TX2FX product series are available as standalone version or built into any PIP product. The TX2Fx product series can be ordered in extended temperature from -40°C up to +85°C. The TX2FX can also be used as 3-port unmanaged switch.

Managed Gigabit Switch
The MAGBES and μMAGBES product family are manageable Gigabit Ethernet switches from 5 up to 28 ports. The μMAGBES is the 4th generation of MPL switches. The products allow configuration settings like: Quality of Service, VLAN, Rapid Spanning Tree, etc. Different interface configurations with RJ45, 2mm header, or SFP fiber optic are available. The robust design, low power consumption, and the various mechanical configurations make the MPL switches ideal for any application that needs a rugged and reliable solution. The MAGBES and μMAGBES are also available in extended temperature from -40°C up to +85°C.
UNIGET - Universal Gigabit Ethernet Controller
The UNIGET expansion module is based on the PCIe/104 standard. With a single UNIGET module, a system can be expanded with up to four Gigabit Ethernet controllers. It supports several interfaces like RJ45, 2mm lockable header, and SFP cages. The UNIGET is also available in extended temperature from -40°C up to +85°C and can support PoE+ requirements.

10-port Gigabit Switch with 2 SFP+ 10Gb port
The manageable MAXBES and μMAXBES come with 8-ports 1Gbit and 2-ports 10Gbit speed. The 1Gbit ports are either available on headers or on RJ45. Various configurations are possible. The μMAXBES 2th generation of MPL 10Gbit switches. The 10Gbit port can be equipped with SFP+ or as copper port.

The MAXBES and μMAXBES solutions are extremely compact and can be used as open frame solution or in a MIL housing with connectors of your choice. Supply power is 5–36VDC and uses as less than 6W. The product is also available in extended temperature from -40°C up to +85°C.

Power over Ethernet module
The μEPI is an ultra small form factor Ethernet Power Injector. Its main purpose is to upgrade products without PoE port to a PSE solution (Power Sourcing Equipment). The μEPI comes with either lockable headers and RJ45 or with lockable headers only.
The MXCS is a high performance, low power and highly integrated rugged Embedded Server, built in various special designed aluminum housings. The MXCS can be integrated in any environment, regardless if moderate or harsh.

The design integrates standard connectors for easy connection or lockable headers, depending on requirement.

The special rugged design, combined with the best industrial-grade components, offers high reliability and long-term performance.

**Specialties**
- Wide temperature range
- ECC DDR4 up to 512GB
- Up to six 1Gbit Ethernet, up to 4x 10Gbit Ethernet (fiber)
- Long term availability (typically 10 years after introduction)
- PCIe x16 expansion
- Expandable with PCIe, mPCIe, M.2, XMC & PMC
- Fanless operation possible

**Options**
- DVD drive
- RAID up to 8 drives
- 19" housing, open frame, flange mounting, MIL-housing
- Customization possible

Particular precautions in the design have been taken that the entire system EMC is within the CE and FCC limits and capable to meet the MIL-STD810F as well as standards like IEC60945 or EN50155.

**Application Areas**
MPL solutions have been successfully operating for many years in the following application areas:
- Automotive  –  Food Industry
- Communication  –  Defense
- Maritime  –  Railways
- Traffic  –  Medical & Healthcare

as well as other applications where reliable, rugged, long-term available computers are needed.
The MPL Embedded Open Frame CPU boards represent a distinguished solution for today’s demanding industrial needs. The products are easily expandable over the on-board expansion buses. These embedded CPU boards are designed from inception to operate under both, extreme and normal conditions, as standalone units with no fans, or CPU derating/throttling. For easy installation, the solutions come with a cooling plate or on request can be customized for the perfect fit in your product.

Specialties
- Extended temperature solutions
- Fanless and noiseless
- Housings in stainless steel and aluminum
- Up to IP65 / NEMA4 protection level from all directions
- Long-term availability – same form, fit, function
- Space saving, slim and compact All-in-One solutions
- Various mounting and installation options possible

Options
- Touch screen
- Wide DC input voltage range
- Integration of expansion cards
- Integration of mass storage
- Extended temperature solution
- EN50155 and IEC 60945 approved solutions

Application Areas
MPL embedded computers have been successfully operating for many years in the following application areas:
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- Defense
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- Railways
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- Medical & Healthcare
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- Long-term availability – same form, fit, function
- Space saving, slim and compact All-in-One solutions
- Various mounting / installation options possible

Options
- Touch screen
- Wide DC input voltage range
- UPS for safe shut down or autonomous operation
- WLAN integration
- Integration of additional cards
- HDD / SSD
- Extended temperature -30°C up to +70°C

Application Areas
MPL embedded computers have been successfully operating for many years in the following application areas:
- Automotive
- Food Industry
- Communication
- Defense
- Maritime
- Railways
- Traffic
- Medical & Healthcare

as well as other applications where reliable, rugged, long-term available computers are needed.
OEM Products

All MPL products are available even in small quantities as individual OEM products or as custom/semi-custom products. Talk to us if you would like to add your brand or OEM logo on one of our products. MPL’s broad range of customers and references underline the trust, reputation, and capability of MPL AG. Just tell us what you need and MPL will deliver the right solution for you.

Full customized Products

A customized product designed my MPL is a success due to the broad know-how in various technologies (Intel, PowerPC, ARM, FPGA...). MPL is capable to design your product fast and cost optimized. Bring your specifications as early as possible to help us evaluate the ideal solution for your needs.

Selection of References

<table>
<thead>
<tr>
<th>Abbe</th>
<th>Northrop Grumman</th>
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<td>Alstom</td>
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<td>Krohne Oil &amp; Gasa</td>
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MUPS75 Support of 20ms power cut (MIL-STD-1275 standard)

Medical: modification of a 20 year old product without SW change

Customized 10-port Gigabit switch with cooling block

Avionics: UAV flight control systems, Pentium M 1.4 GHz

Communication: IP67 protected Fiber optic switch

Vision: High Speed Camera with 32'000fps, up to 100G shock

Vehicle: Customized PIP for mine trucks
Local sales support
Our distributors are near you! To serve our customers best, we have a worldwide distributor network which will handle your local pre and post sales support.

Technical support from the engineer
Our customers get direct access to our design engineers to assist with initial product function and operation. We do not work with call centers or large support teams, but we rather rely upon our prompt and courteous service, while giving customers direct access to our design engineers to resolve any support issues.

MPLcare
is provided to each customer free of charge and includes technical support questions answered in less than 24 hours by the design engineering team.

MPL – The Company You Can Trust