CM Computer

True Military COTS Products

# True Military ATR Chassis & VMEbus Modules


# Short Form Catalogue 2010

CM Computer

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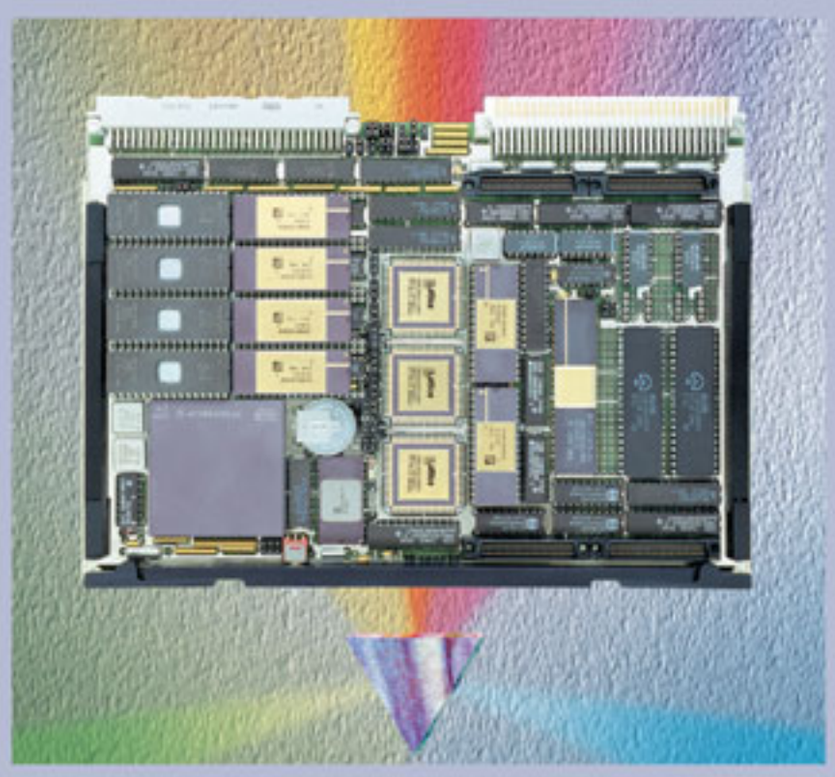
*Since its establishment in 1987, CM Computer has designed and manufactured the highest performance VPX, VME & cPCI ATR Chassis & VMEbus modules, balancing proven old-school military hardware design with the advantages of current COTS open architectures*



# The Leader in ATR Chassis & VMEbus I/O

At CM Computer, we believe that every system built with our products must guarantee immediate flawless operation even after spending a winter night on the freezing deck of an aircraft carrier in the North Sea or after withstanding suffocating midday summer heat on an aircraft runway located on a North African dessert.

CM Computer maintains the classic theory that each component employed within our products is specifically selected from the start in accordance with rigorous quality criteria: outstanding performance over the full temperature range, optimum-size heat dissipation, premium quality, solid mechanical assembly and minimum thermal path to the cooling frame.

Broad experience in electromechanical design, component selection, extensive testing and certified quality manufacturing are key factors in our success.

During the 90´s CM Computer began as a Military VME board manufacturer within the COTS industry. At this time the company established technological partnerships with leading US COTS companies, such as VISTA Controls Curtiss Wright (Santa Clarita, CA) and Matrix Corporation (Raleigh, NC).

Extraordinary efforts have been made by CM senior designers during the last 10 years to release the most complete range of military chassis on the market. Our outstanding ATR products are unique off-the-shelf, MIL-STD-810F and MIL-STD-461E qualified by independent laboratories.

Look inside this Short Form Catalogue to learn about our three different generations of ATR Enclosures, expressly designed for optimum thermal dissipation, maximum versatility and easy system integration.

A section in this brochure covers the CM set of VME64 boards that are available in four distinct temperature grades, from commercial class to full military conduction-cooled versions.

## TRADITION & EXPERIENCE

For over 22 years, prime contractors have selected CM Computer to be their ATR Chassis or VMEbus supplier for more than two hundred first class industrial and military programs worldwide.

From its establishment, the original CM engineering team has remained on the current board of directors as senior designers. This continued experience has been reinforced with the incorporation of talented young designers.

CM Computer remains a private company that continues to build on a long tradition in electrical and mechanical COTS design.

Our experience enhances product innovation and competitiveness. The current series of products is based on well proven technology that only accepts solutions that have been field demonstrated to be most efficient.

CM designers also take great care to personally generate the most extensive technical manuals and comprehensive product data-sheets.

*Year after year CM Computer continues to offer cost-effective products of extreme quality and operational reliability, earning CM a solid reputation as a leading military ATR Chassis & VMEbus manufacturer in Europe and the USA*

## PRODUCT FUNCTIONALITY

CM products are expressly designed for the most demanding customers who appreciate uncompromising quality and require true military performance in their applications.

CM has introduced multiple innovations and unmatched firsts in the ATR industry by offering its customers a truly organized and universal chassis product range that is able to meet the complete spectrum of military applications.

The entire VMEbus line of modules support a broad set of practical features and functionalities. Our boards offer Built-In-Test capabilities, increased I/O channel density, full overload protection, galvanic isolation, diverse I/O voltage levels, dual I/O wiring methods, multiple board mechanics, reduced power consumption and much more.

## NEXT GENERATION SYSTEMS

Our complete range of military ATR enclosures serves general purpose Avionics, Navy or Ground based first rate applications dimensioned for 5, 7 or 12 slots.

CM ATR chassis deliver full VPX, VME64 and cPCI compatibility in combination with payload protection levels unachievable with traditional avionics chassis.

Whatever your application, whatever board mechanics you use, I/O wiring solution, specific sub-buses or transition I/O modules you need, CM enclosures provide the right solution.

# CM-ATR-X5/SixHex Series

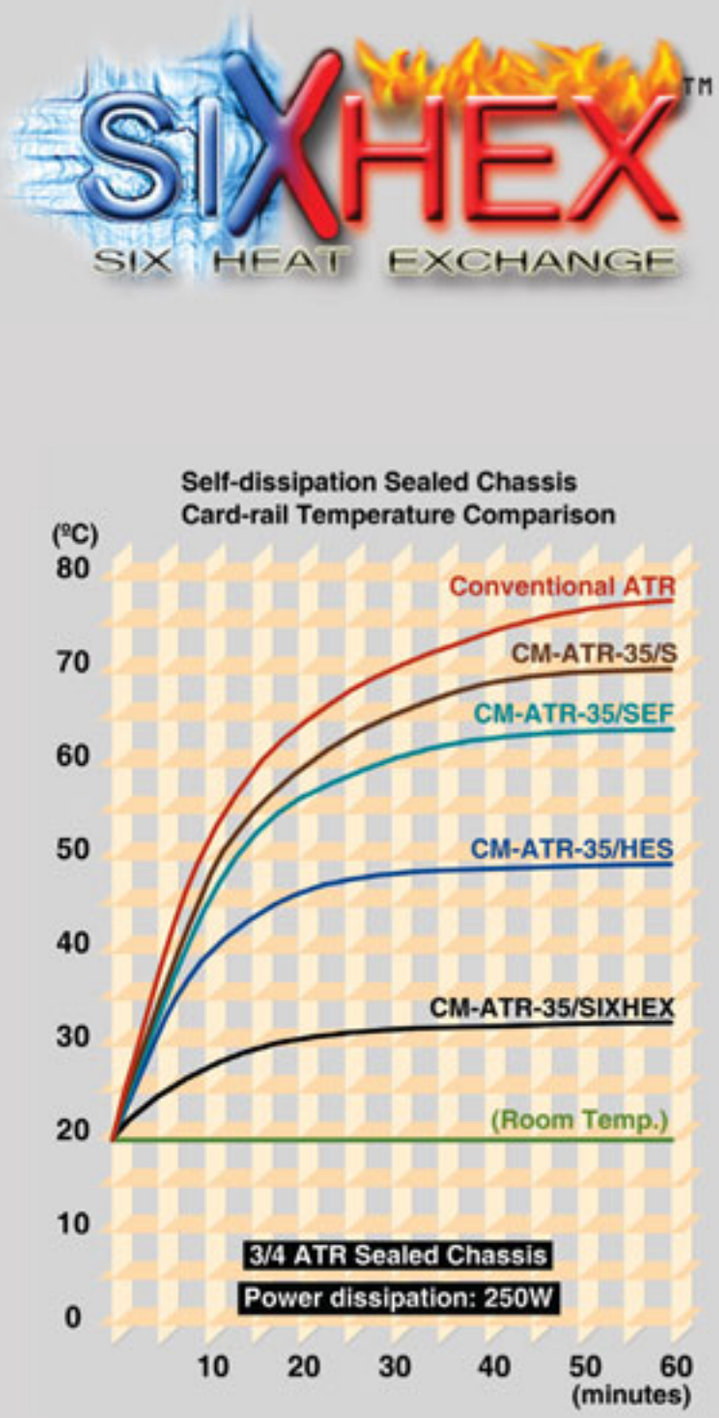
## THE FOURTH GENERATION

SixHex from CM Computer pushes the limits of sealed air-cooled ATR design to meet the demand for true high power COTS solutions which require greater speed and outstanding capabilities in the latest most advanced military electronic systems.

VPX, VME & cPCI architecture performance of up to 150+ Watt per slot and 1.6kW per system can be cooled to 85ºC (at card edge) using a complex combination of cross-flow forced air convection and conduction.

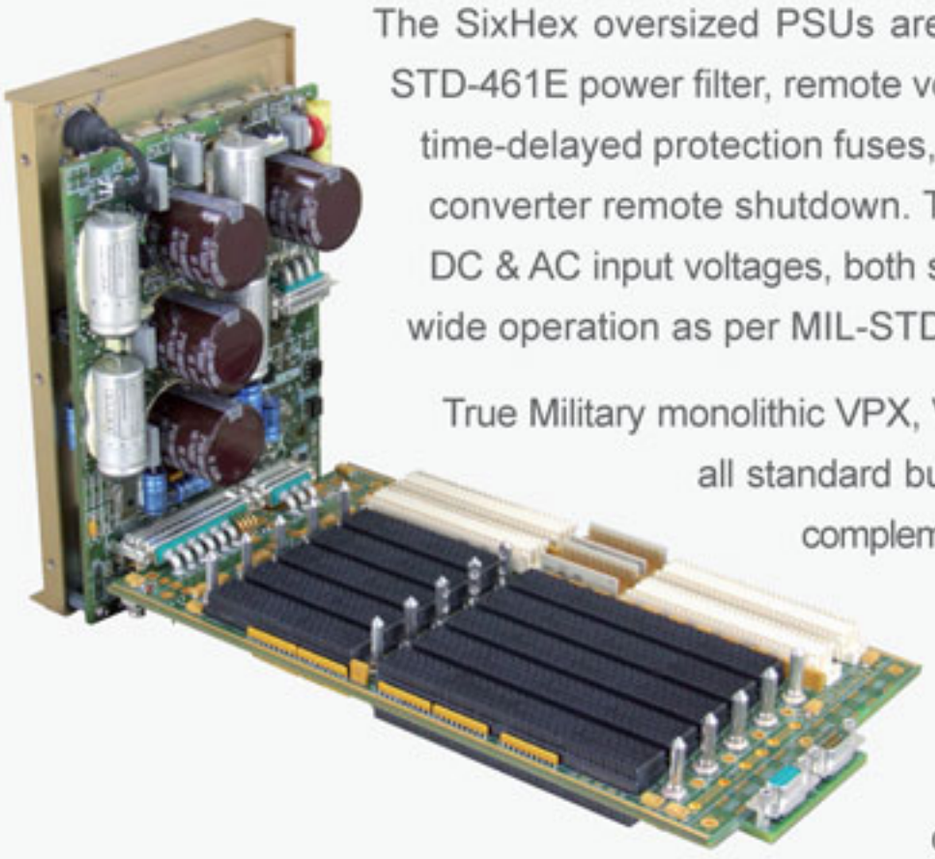
This latest release enclosure incorporates all standard features available in previous CM series, but offers greater internal space and significantly improved power & performance.

Expressly designed to compete against unpractical liquid cooled alternatives, this step forward in forced air-cooled dynamics delivers a single package ATR enclosure that weighs less than 13kg (¾ ATR) and provides significant advantages.




## POWER SUPPLY & BACKPLANE

All Six Heat Exchanger chassis series incorporate a full military Backplane and Power Supply Unit (PSU) that are custom made to match the enclosure mechanics.



The SixHex oversized PSUs are fitted with Power Fail Monitor, MIL-STD-461E power filter, remote voltage sensing, output voltage trim-up, time-delayed protection fuses, rear fan EMI-filter & fuse and DC/DC converter remote shutdown. The PSU accepts all military standard DC & AC input voltages, both single and 3-phase, to facilitate world-wide operation as per MIL-STD-704 & MIL-STD-1275.

True Military monolithic VPX, VME & cPCI Backplanes incorporate all standard bus functionalities that are additionally complemented by a Temperature Supervisory Unit (TSU), a Power-up reset chip, Front Panel LED indicator circuitry, extra DC/DC converters with user-defined output voltage, and other active auxiliary electronics.

**Ultimate**
state of the art ATR

**Designed**
for performance

## THERMAL CHARACTERISTICS

This series excellent thermal performance is attributed to six oversized cross flow Heat Exchangers that surround the floating card-cage. The 3.6m² surface of machined aluminum acts as a thermo-active interface material (5 times a conventional chassis area).

Payloads operate under a reduced internal thermal profile (approx. 40ºC less than a conventional ATR) thus significantly increasing MTBF by 10 times. High power VPX boards (up to 150W per slot) can be fully realized provided that total chassis power capacity is not saturated.

Internal recirculation airflow has been improved with regard to its predecessor HES (Heat Exchanger Side-walls). All these enhancements result in approximately 15ºC lower card rail temperature for the same payload, thus achieving three times greater MTBF.

## CHASSIS FEATURES

- Six Internal Heat Exchangers
- Sealed contaminant-free enclosure
- VPX, VME & cPCI ready
- ½, ¾ & 1 ATR versions with 5, 7 & 12 slots
- Accepts Conduction & Air-cooled 6Us
- Integrated Temperature Control Unit
- Optional Chassis Supervisory Unit
- Low weight, single standalone solution
- Up to 1.6kW total Power Dissipation
- Up to 150 Watts per slot
- 2 User defined PSU DC outputs
- 15°C less than heat exchanger ATRs
- 40°C less than conventional ATRs
- Flexible top & bottom I/O wiring
- Rotron PROPIMAX 3 exhaust fans
- In-line EMI/EMC MIL-STD-461E Filters

## SIXHEX CHASSIS SPECIFICATION GUIDE

| | CM-ATR-25 SIXHEX | CM-ATR-35 SIXHEX | CM-ATR-45 SIXHEX |
|---|---|---|---|
| SIZE / SLOTS | ½ ATR - Long / 5 Slots 6U | ¾ ATR - Long / 7 Slots 6U | 1 ATR - Long / 12 Slots 6U |
| WIDTH | 180 mm | 220 mm | 321 mm |
| HEIGHT | 228 mm | 228 mm | 228 mm |
| DEPTH | 510 mm | 510 mm | 510 mm |
| TOTAL WEIGHT | 9 Kg | 13 Kg | 17 Kg |
| PSU V-INPUT | 28 VDC ±30%, 48 VDC ±30%, 270 VDC ±30%, Autorange 90-132 VAC RMS & 180-264 VAC RMS 47-880 Hz, 3-Phase 200 VAC ±30% 47-880 Hz | | |
| PSU 1 WATTS | 575 Watts (28 VDC 475 Watts) | 775 Watts (28 VDC 675 Watts) | 1050 Watts (28 VDC 950 Watts) |
| PSU 1 OUTPUTS | +5 VDC@40A, ±12 VDC@12A, 3.3 VDC@22A | +5 VDC@80A, ±12 VDC@12A, 3.3 VDC@22A | +5 VDC@80A, ±12 VDC@20A, 3.3 VDC@45A |
| PSU 2 WATTS | 550 Watts (28 VDC 450 Watts) | 665 Watts (28 VDC 565 Watts) | 1165 Watts (28 VDC 1065 Watts) |
| PSU 2 OUTPUTS | +5 VDC@20A, ±12 VDC@12A, 3.3 VDC@45A | +5 VDC@20A, ±12 VDC@12A, 3.3 VDC@80A | +5 VDC@80A, ±12 VDC@20A, 3.3 VDC@80A |
| PSU 3 WATTS | --- | --- | 1425 Watts (28 VDC 1225 Watts) |
| PSU 3 OUTPUTS | --- | --- | +5 VDC@80A, ±12 VDC@20A, 3.3 VDC@160A |
| PSU 4 WATTS | --- | --- | 1550 Watts (28 VDC 1350 Watts) |
| PSU 4 OUTPUTS | --- | --- | +5 VDC@160A, ±12 VDC@20A, 3.3 VDC@80A |
| PSU 5 WATTS | --- | --- | Dual RPSU 2x750 Watts (28 VDC 2x650 Watts) |
| PSU 5 OUTPUTS | Two independent PSU sections (any combination of AC or DC input) delivering each +5 VDC@40A, ±12 VDC@8A, 3.3 VDC@45A & +28VDC@7A | | |
| BP DC/DC AUX | One 100 Watts Backplane AUX converter | Two 100 Watts each Backplane AUX converters | Two 100 Watts each Backplane AUX converters |
| BP DC/DC AUX VOLTS/WATTS | Optional Backplane Auxiliary DC/DC output options: +2VDC 50W, -2VDC 50W, +3,3VDC 75W, -3,3VDC 75W, +5VDC 100W, -5VDC 100W, +12VDC, 100W, -12VDC, 100W +15VDC 100W, -15VDC 100W, +28VDC 100W, -28VDC 100W, +48VDC 100W, -48VDC 100W | | |
| STD BACKPLANE | 6U, 5-Slot VME64x or cPCI or VPX | 6U, 7-Slot VME64x or cPCI or VPX | 6U, 12-Slot VME64x or cPCI or VPX |
| BOARD FORMAT | Slot-by-slot user configured card-cage allows intermixing conduction-cooled IEEE-1101.2/ANSI-VITA 30.1 & air-cooled IEC-297/IEEE-1101.1 boards | | |
| CUSTOM BACKP. | --- | 6U, 7-Slot Hybrid 3VME64x & 4VPX | 6U, 12-Slot Dual-Split 9VME64x & 3VME64x |
| EXT. REAR FAN | 2 Rotron PX3 | 2 Rotron PX3 | 4 Rotron PX3 |
| *F115-400 (AC)* | 200 CFM | 200 CFM | 400 CFM |
| *F200-400 3Ph (AC)* | 280 CFM | 280 CFM | 560 CFM |
| *F28 (DC)* | 220 CFM | 220 CFM | 440 CFM |
| *F115-60 (AC)* | 200 CFM | 200 CFM | 400 CFM |
| *F220-50 (AC)* | 200 CFM | 200 CFM | 400 CFM |
| INTERNAL FAN | 4x 17 CFM (68 CFM) | 4x 23 CFM (92 CFM) | 8x 23 CFM (184 CFM) |
| FP USER AREA | 137 mm x 201 mm | 177.5 mm x 201 mm | 279 mm x 201 mm |
| CM F. PANEL I/O | 6 Power Pins (23 Amp) & 601 I/O Pins (5 Amp) | 6 Power Pins (23 Amp) & 832 I/O Pins (5 Amp) | 6 Power Pins (23Amp) & 1226 I/O Pins (5 Amp) |
| MTBF | 25º GB 80,000 Hours, 65º AIC 25,000 Hours | 25º GB 78,000 Hours, 65º AIC 23,000 Hours | 25º GB 60,000 Hours, 65º AIC 19,000 Hours |
| OPERATING TEMP | -40ºC to +80ºC Operating temperature, -55ºC to 100ºC Storage temperature | | |
| MOUNTING TRAY | CM-TR-25-SIXHEX | CM-TR-35-SIXHEX | CM-TR-45-SIXHEX |

# CM-ATR-X5 Series

## THE THIRD GENERATION

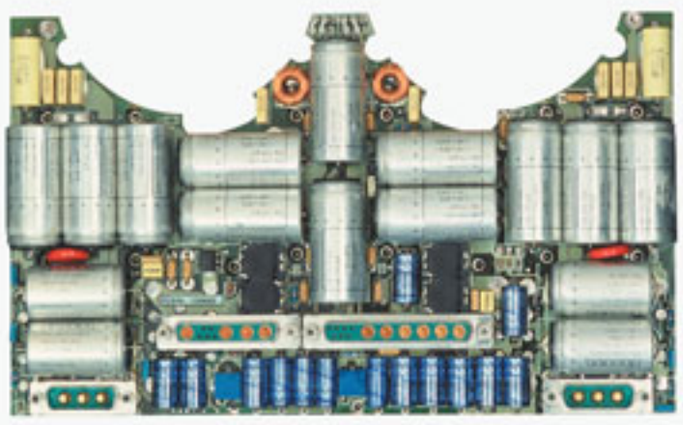
The CM-ATR-25/35/45 is our most popular range of chassis, being delivered to more than 40 prime contractors worldwide. The CM-ATR-X5/S/SEF/FAC/HES introduce the concept of Universal Military ATR Enclosures capable of accommodating and freely intermixing all standard conduction-cooled and air-cooled Eurocard formats. This series features more than 1kW of PSU power, integrates four heat exchangers in the chassis structure, improves temperature of enclosed boards by up to 15ºC in respect to conventional ATR chassis, offers unlimited I/O interconnection capability and accepts all standard power voltages.

## FOUR OFF-THE-SHELF COOLING OPTIONS

Our customers can select their optimum type of CM-ATR-25/35/45 enclosure depending on the predominant cooling technique and internal power dissipation. Available options are:

- **Standard Sealed (/S):** Low cost standard dry-air enclosure with inner fans for internal air re-circulation.
- **Sealed with Extended Fins (/SEF):** Ultimate self-dissipation sealed enclosure that also incorporates internal air re-circulation fans.
- **Flowthrough Air Cooled (/FAC):** Non-sealed chassis in which ambient air is directly forced over the electronic modules using rear mounted exhaust fans.
- **Heat Exchanger Sidewalls (/HES):** High performance dry-air chassis incorporating four heat exchangers & air re-circulation fans inside.

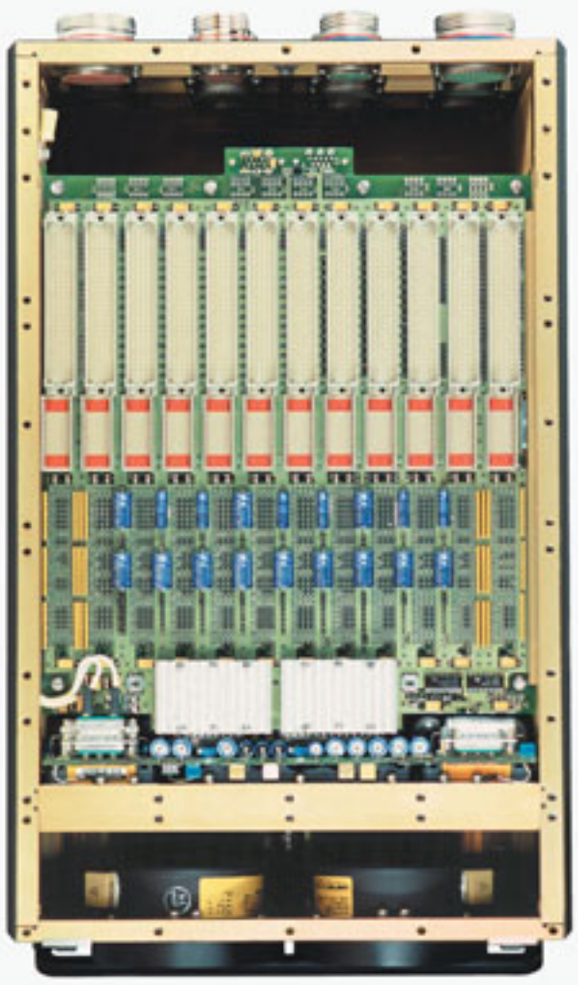
## POWER SUPPLIES & BACKPLANES



The CM-ATR-25/35/45 series have been fitted with an oversized total output power of 400W (5 slot), 500W (7 slot) and 1050W (12 slot) to satisfy the full range of applications regardless of card-cage power needs.

All PSU models incorporate VICOR second generation DC/DC converters, Power Fail Monitor, MIL-STD-461E power filter, remote voltage sensing, output voltage trim-up, time-delayed protection fuses, fan EMI-filter & fuse and DC/DC converter remote shutdown.

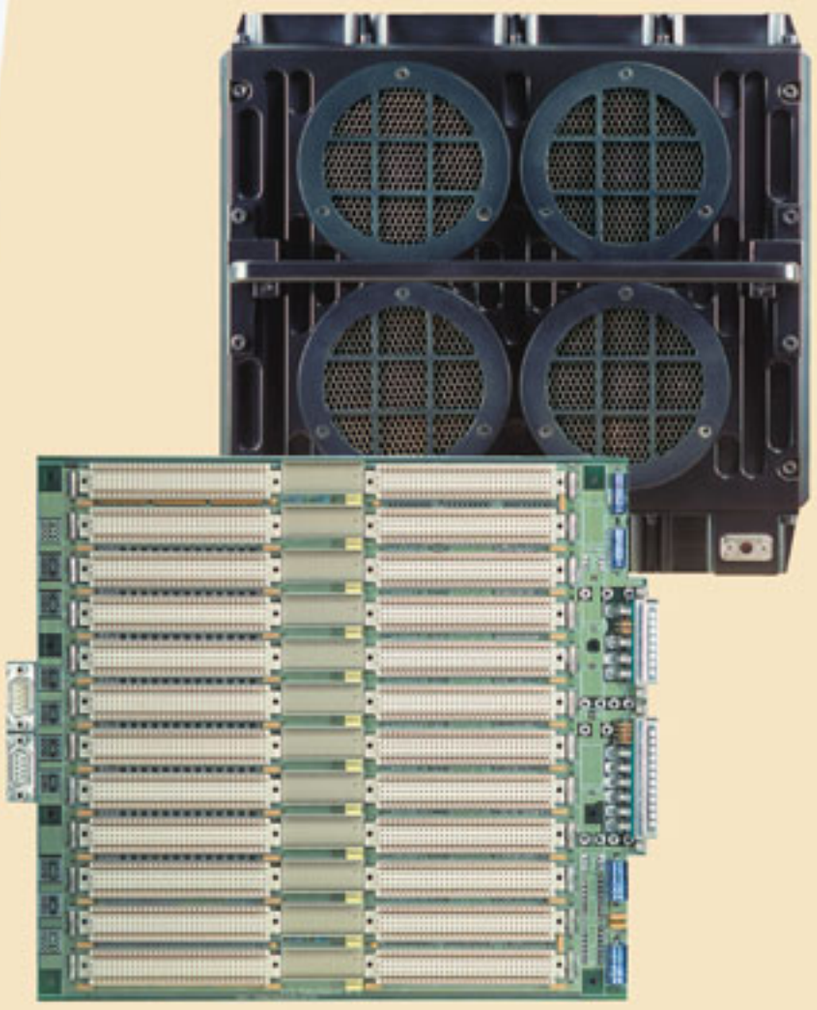
The CM-ATR-X5 chassis integrated Backplanes are low noise, full military VPX, VMEbus or cPCI compatible. They have been designed to improve card-cage mechanical performance and offer additional electronic capabilities.



Backplanes support one or two 100W power sockets for optional micro-size DC/DC military converters with user defined output voltage.

The last slot of our Backplanes allows for bus functionality, but also contains power and control provisions to accept a Eurocard-size metallically caged Redundant PSU. This single slot RPSU has the same capacity as the main PSU and both operate on a load-sharing basis to minimize component stress. An optional Temperature Supervisory Unit can be fitted for the protection of card cage electronics against fan failure or extreme climatic conditions.

**experience**
the difference



## THIRD GENERATION SPECIFICATIONS GUIDE

| | CM-ATR-25 | | | | CM-ATR-35 | | | | CM-ATR-45 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *FAC* | *S* | *SEF* | *HES* | *FAC* | *S* | *SEF* | *HES* | *FAC* | *S* | *SEF* | *HES* |
| **SIZE / SLOTS** | ½ ATR - Long / 5 Slots 6U | | | | ¾ ATR - Long / 7 Slots 6U | | | | 1 ATR - Long / 12 Slots 6U | | | |
| **WIDTH** | 130 mm | 130 mm | 155 mm | 140 mm | 170 mm | 170 mm | 195 mm | 180 mm | 271 mm | 271 mm | 296 mm | 281 mm |
| **HEIGHT** | 236 mm | 236 mm | 246 mm | 236 mm | 236 mm | 236 mm | 246 mm | 236 mm | 236 mm | 236 mm | 246 mm | 236 mm |
| **DEPTH** | 390 mm | 390 mm | 405 mm | 455 mm | 390 mm | 390 mm | 405 mm | 455 mm | 390 mm | 390 mm | 405 mm | 455 mm |
| **EXT. SURFACE** | 5,100 cm² | 5,450 cm² | 9,850 cm² | 5,050 cm² | 5,600 cm² | 5,980 cm² | 10,400 cm² | 5,300 cm² | 7,660 cm² | 8,400 cm² | 14,100 cm² | 6,500 cm² |
| **TOTAL WEIGHT** | 5.7 Kg | 5.2 Kg | 6.3 Kg | 7.5 Kg | 7.2 Kg | 6.6 Kg | 7.7 Kg | 8.9 Kg | 10.8 Kg | 10 Kg | 11.2 Kg | 12.5 Kg |
| **PSU WATTS** | 400 Watts (28 VDC PSU 300 Watts) | | | | 500 Watts (28 VDC PSU 400 Watts) | | | | 1050 Watts (28 VDC PSU 950 Watts) | | | |
| **+5 VDC** | 20 Amp | | | | 40 Amp | | | | 80 Amp | | | |
| **+12 VDC/-12 VDC** | 12 Amp each | | | | 12 Amp each | | | | 20 Amp each | | | |
| **+3.3 VDC (STD)** | 5 Amp | | | | 5 Amp | | | | 45 Amp | | | |
| **+3.3 VDC (OPT)** | 22 Amp (AUX0) | | | | 22 Amp (AUX0) | | | | --- | | | |
| **RPSU WATTS** | 475 Watts (28 VDC RPSU 375 Watts) | | | | 575 Watts (28 VDC RPSU 475 Watts) | | | | 1050 Watts (28 VDC RPSU 950 Watts) | | | |
| **PSU V-INPUT** | 28 VDC ±30%, 48 VDC ±30%, 270 VDC ±30%, Autorange 90-132 VAC RMS & 180-264 VAC RMS 47-880 Hz, 3-Phase 200 VAC ±30% 47-880 Hz | | | | | | | | | | | |
| **PSU I-INPUT** | 28VDC@15A, 115VAC@5A, 3Ph-200VAC@1.5A | | | | 28VDC@20A, 115VAC@6A, 3Ph-200VAC@2A | | | | 28VDC@50A, 115VAC@14A, 3Ph-200VAC@5A | | | |
| **BP DC/DC AUX1** | Auxiliary DC/DC output options: +2VDC 50W, -2VDC 50W, +3,3VDC 75W, -3,3VDC 75W, +5VDC 100W, -5VDC 100W, +12VDC 100W, -12VDC 100W | | | | | | | | | | | |
| **BP DC/DC AUX2** | --- | | | | +15VDC 100W, -15VDC 100W, +28VDC 100W, -28VDC 100W, +48VDC 100W, -48VDC 100W | | | | | | | |
| **REAR FAN** | 1 x PX2 | --- | --- | 2 x PX2 | 1 x PX2 | --- | --- | 2 x PX2 | 2 x PX3 | --- | --- | 4 x PX2 |
| ***F115-400*** | 65 CFM | --- | --- | 130 CFM | 65 CFM | --- | --- | 130 CFM | 200 CFM | --- | --- | 260 CFM |
| ***F200-400 3Ph*** | 120 CFM | --- | --- | 240 CFM | 120 CFM | --- | --- | 240 CFM | 280 CFM | --- | --- | 480 CFM |
| ***F28*** | 55 CFM | --- | --- | 110 CFM | 55 CFM | --- | --- | 110 CFM | 220 CFM | --- | --- | 220 CFM |
| ***F115-60*** | 20 CFM | --- | --- | 40 CFM | 20 CFM | --- | --- | 40 CFM | 70 CFM | --- | --- | 80 CFM |
| ***F220-50*** | 20 CFM | --- | --- | 40 CFM | 20 CFM | --- | --- | 40 CFM | 70 CFM | --- | --- | 80 CFM |
| **INTERNAL FAN** | --- | 18 CFM | 18 CFM | 18 CFM | --- | 36 CFM | 36 CFM | 36 CFM | --- | 72 CFM | 72 CFM | 72 CFM |
| **FP USER AREA** | 101 mm x 172.5 mm | | | | 141.5 mm x 172.5 mm | | | | 243 mm x 172.5 mm | | | |
| **CM F. PANEL I/O** | 6 Power Pins (23 Amp) & 365 I/O Pins (5 Amp) | | | | 6 Power Pins (23 Amp) & 822 I/O Pins (5 Amp) | | | | 6 Power Pins (23Amp) & 1057 I/O Pins (5Amp) | | | |
| **MTBF** | 25º GB 86,000 Hours, 65º AIC 28,000 Hours | | | | 25º GB 82,000 Hours, 65º AIC 26,000 Hours | | | | 25º GB 63,000 Hours, 65º AIC 21,000 Hours | | | |
| **MOUNT. TRAY** | CM-TR-25 | | | | CM-TR-35 | | | | CM-TR-45 | | | |

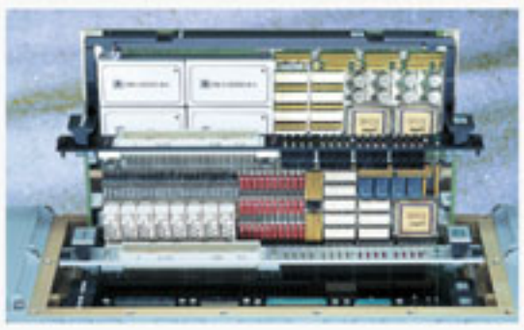
# CM-RA-X0 Series

## THE SECOND GENERATION

The second generation legacy RA series remains in production but is not recommended for new applications. This historic line of enclosures exceed the requirements of MIL-STD-5400 & MIL-STD-16400 aerospace, airborne, ground-mobile or naval applications.

This complete chassis range offers 8 different sizes and versions covering VME 6U applications of ½, ¾ or 1 ATR of capacity. The 3U version is ideal for cost-effective systems up to 10 slots.

The RA series are manufactured in two chassis heights. Low Profile VME32 versions feature minimum size and weight. High Profile VME64 versions offer extended I/O capacity due to the additional 50 mm of free space below the Backplane.



These chassis card-cages can be user configured to accept any combination of VME conduction-cooled IEEE 1101.2 or air-cooled IEC-297 modules. A practical wiring corridor interconnects air-cooled boards with the enclosure panel circular application connectors.

## 2ND GENERATION CHASSIS SPECIFICATION GUIDE

| | CM-RA-20 3U VME32 | CM-RA-20 3U VME64 | CM-RA-20 6U VME32 | CM-RA-20 6U VME64 | CM-RA-30 6U VME32 | CM-RA-30 6U VME64 | CM-RA-40 6U VME32 | CM-RA-40 6U VME64 |
|---|---|---|---|---|---|---|---|---|
| **Size** | ½ ATR Long | ½ ATR Long | ½ ATR Long | ½ ATR Long | ¾ ATR Long | ¾ ATR Long | 1 ATR Long | 1 ATR Long |
| **Slots** | 10 | 10 | 5 | 5 | 7 | 7 | 12 | 12 |
| **Backplane** | BP10L | BP10H | BP32L | BP64H | BP32L | BP64H | BP32L | BP64H |
| **Width** | 137,5 mm | 137,5 mm | 137,5 mm | 137,5 mm | 190,5 mm | 190,5 mm | 285 mm | 285 mm |
| **Height** | 227 mm | 277 mm | 227 mm | 277 mm | 227 mm | 277 mm | 227 mm | 277 mm |
| **Depth** | 450 mm | 450 mm | 450 mm | 450 mm | 465 mm | 465 mm | 495 mm | 495 mm |
| **Weight** | 6,1 Kg | 7 Kg | 5,8 Kg | 6,7 Kg | 6,5 Kg | 7,9 Kg | 10 Kg | 12 Kg |
| **Power Sup.** | ① ② | ① ② ③ ④ | ① ② | ① ② ③ ④ | ② ③ ④ | ② ③ ④ | ④ ⑤ ⑥ | ④ ⑤ ⑥ ⑦ ⑧ |
| **Sealed** | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| **Fans (CFM)** | 1 (>50) | 1 (>50) | 1 (>50) | 1 (>50) | 1 (>50) | 1 (>50) | 2 (>200) | 2 (>200) |
| **I/O def. (†)** | 163 + 5 | 273 + 5 | 163 + 5 | 273 + 5 | 264 + 5 | 378 + 5 | 408 + 5 | 568 + 5 |

(†) *CM default panel I/O + power pins. Custom front panel configurations are available upon request.*

## CHASSIS FEATURES

The CM RA line of enclosures offer a cost effective solution, incorporating a wide range of practical functionalities, innovations, details and options. All mechanical parts have been computer aided designed and optimized in order to decrease weight without sacrificing mechanical performance, and in-house precision machined.

Functional details include a retractable handle for transport, rear panel fan finger guards, front panel LED indicators, reserved space for chassis identification plate, etc.

The removable front panel, top and bottom covers simplify maintenance of circuit cards, power supply and Backplane I/O wiring.

A set of integrated cooling fins throughout the outer sidewalls and rear panel greatly improves the chassis natural convection cooling effectiveness.

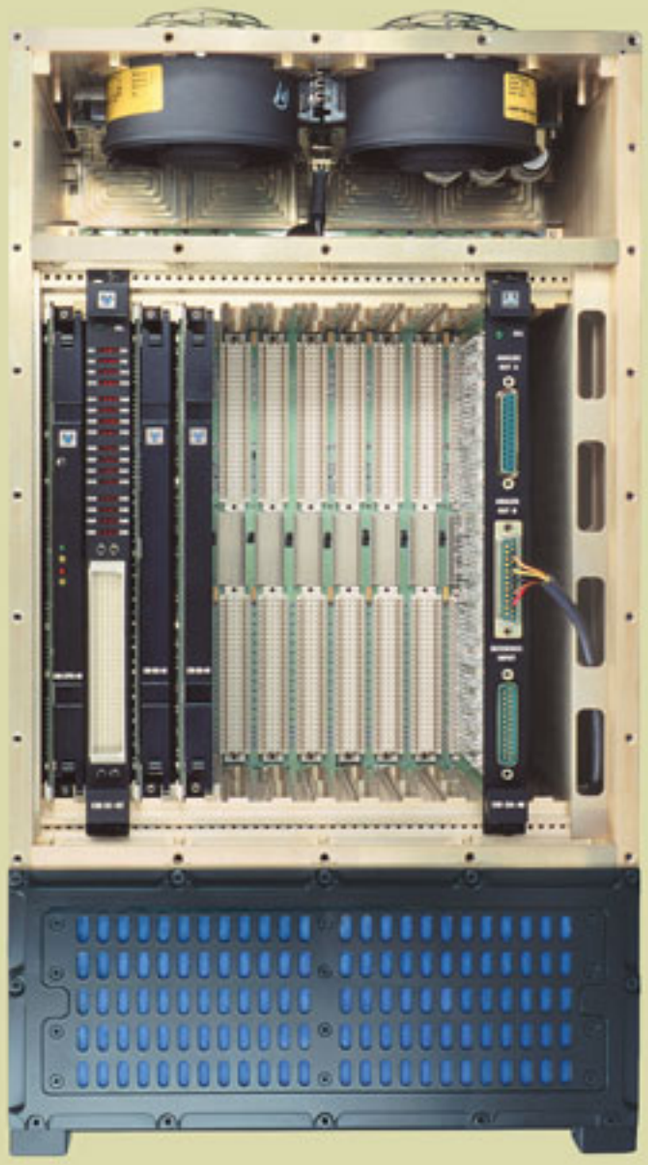
Fan assisted versions have 2 or 3 oversized air-intakes. VMEbus cards are oriented in parallel with the chassis sidewalls. This forces air to flow around both sides of the module and maintain a homogeneous flow rate per slot. A set of removable cover plates allow optimum slot-by-slot airflow regulation.

## CM-RA-X0 CHASSIS FEATURES

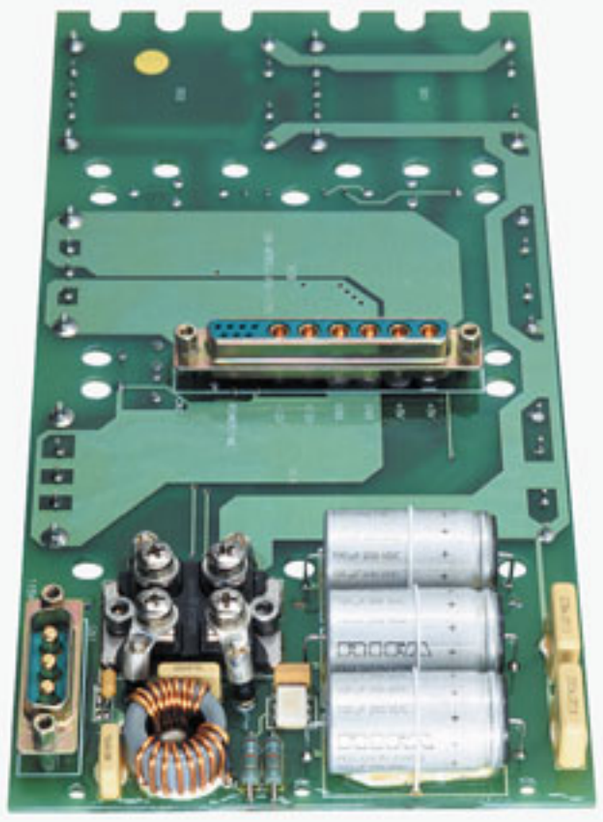
The CM chassis offer up to 3 independent I/O wiring solutions and are capable of accommodating any type of standard form factor VMEbus module on a slot-by-slot basis. These features allow easy design of your application without limitations regarding board mechanics or I/O.

The High Profile chassis with its free space below the VME64 Backplane is ideal for housing I/O transition cards, complementary sub-buses or any type of user defined J0 and J2 I/O wire-wrapping.

Cooling of sealed dry air versions is based on the combination of conduction to the cool baseplate and enhanced natural convection.



## POWER SUPPLY



- The RA series power supplies are full military class and incorporate VICOR first generation DC/DC converters with up to 90% efficiency. Nominal input voltages are 115VAC and 28VDC according to MIL-STD-704.
- Galvanically isolated output voltages are standard (> 500 VRMS). Outputs are also overvoltage and overcurrent protected, including thermal shutdown.
- High dissipation devices are integrated on the chassis rear panel structure for optimum cooling and superior MTBF.
- All units incorporate Power Fail Monitor and a dual line input voltage filter.

**integrate**
with intelligence

### *Power Supply Watts* (†)

***Power Supply*** *①150 W (+5 VDC @ 10 A // ±12 VDC @ 4 A)*
***Power Supply*** *②175 W (+5 VDC @ 15 A // ±12 VDC @ 4 A)*
***Power Supply*** *③200 W (+5 VDC @ 20 A // ±12 VDC @ 4 A)*
***Power Supply*** *④250 W (+5 VDC @ 30 A // ±12 VDC @ 4 A)*
***Power Supply*** *⑤300 W (+5 VDC @ 40 A // ±12 VDC @ 4 A)*
***Power Supply*** *⑥400 W (+5 VDC @ 60 A // ±12 VDC @ 4 A)*
***Power Supply*** *⑦450 W (+5 VDC @ 60 A // ±12 VDC @ 6 A)*
***Power Supply*** *⑧500 W (+5 VDC @ 60 A // ±12 VDC @ 8 A)*

*(†) 3.3 VDC @ 5 A available on all models*

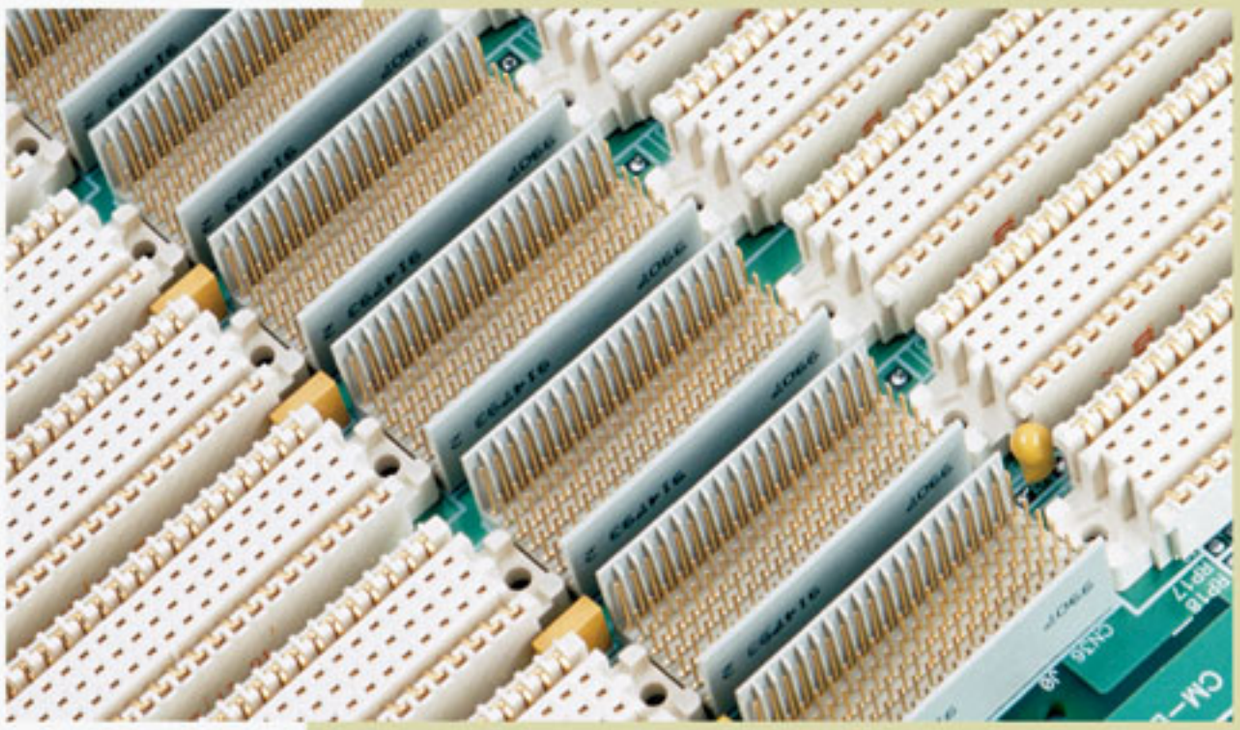
## VMEbus BACKPLANE

The CM-RA enclosures are supplied with leading-edge fully VMEbus compatible Backplanes. Backplane PCBs are monolithic, low noise, with two dedicated ground shielding layers and standard passive resistive terminators.

The J0, J1 and J2 connectors are military class I according to MIL-C-55302. VME64 Backplanes fitted with 5 row connectors are installed in High Profile chassis.

The VME32 Backplanes fitted with 3 row connectors are installed in Low Profile chassis. They incorporate integrated J2 user I/O routing across the PCB to a set of intermediate D type Cannons.

Additional TTL circuitry is implemented on Backplanes for Power Fail Monitor functions and for driving the chassis front panel LED indicators.



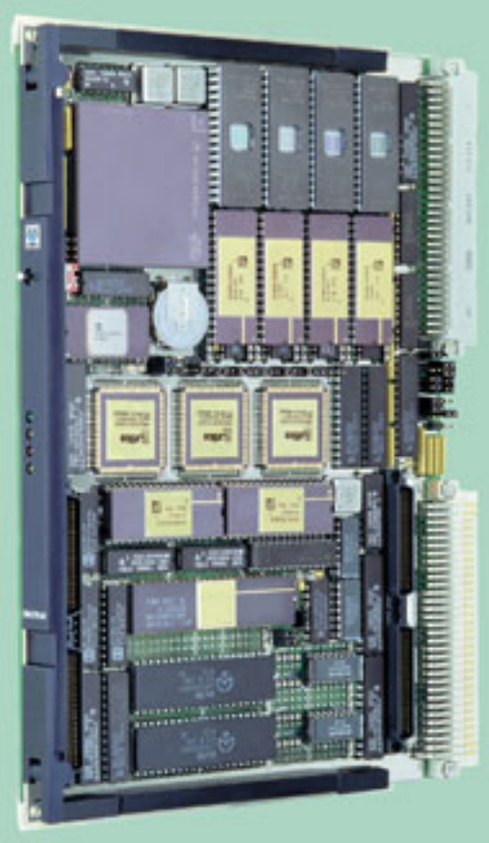
# CM Military VMEbus Boards

COMPLETE RANGE OF MODULES

## PROCESSOR BOARDS

The CM-CPU-40/60 is a general purpose 32-bit true military computer that has been extensively used in many military applications. This legacy module remains in production but is not recommended for new programs. The classic CM-CPU-40/60 incorporates features and peripherals most demanded in military and industrial systems.

The 32-bit mezzanine interface increases memory or supplements the existing full set of on-board peripherals.



| | CM-CPU-40 | CM-CPU-60 |
|---|---|---|
| **Description** | Low cost Single Board Computer | Low cost Single Board Computer |
| **Processor** | MC-68040 @ 40 MHz | MC-68060 @ 66 MHz |
| **SRAM Memory** | 8 MB | 8 MB |
| **Eprom/Flash** | 4 MB | 4 MB |
| **RTC** | Calendar + Timer + Alarm | Calendar + Timer + Alarm |
| **Serial Port** | 2 x RS-232/422 | 2 x RS-232/422 |
| **Ethernet Port** | Am7990 Controller | Am7990 Controller |
| **Additional I/O** | 2xRS-232, SCSI, Parallel + 3 Timers | 2xRS-232, SCSI, Parallel + 3 Timers |
| **Mezzanine** | 1553, ARINC-429, Graphics, Eth., etc. | 1553, ARINC-429, Graphics, Eth., etc. |
| **Power Dissipation** | 11 Watts | 11 Watts |
| **Board Range** | C+I+R+883 | C+I+R+883 |

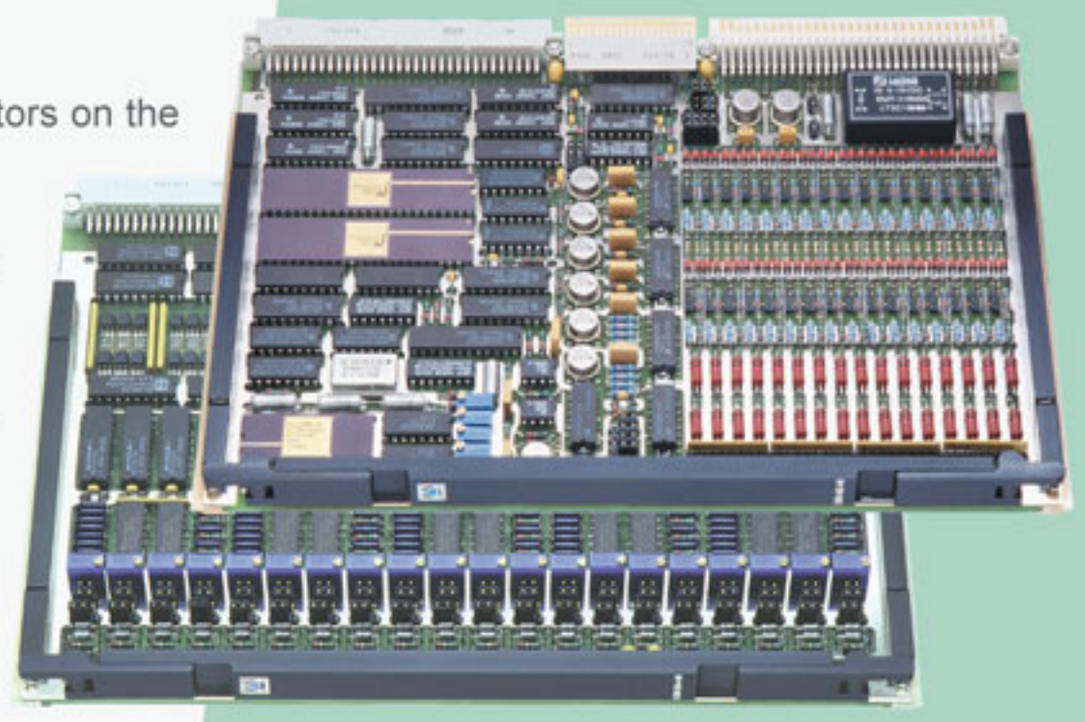
## ANALOG I/O

CM analog boards offer a highly flexible I/O cabling solution using connectors on the Front Panel and on P2.

A wide variety of unipolar/bipolar I/O voltage ranges is available covering all industry standard levels.

Extensive Built-In-Test is based on a wraparound loop that disconnects external analog I/O signals and connects internal test signals in order to verify correct module operation.

All versions are built with low power CMOS devices, featuring average power consumption of 3 Watts per board.

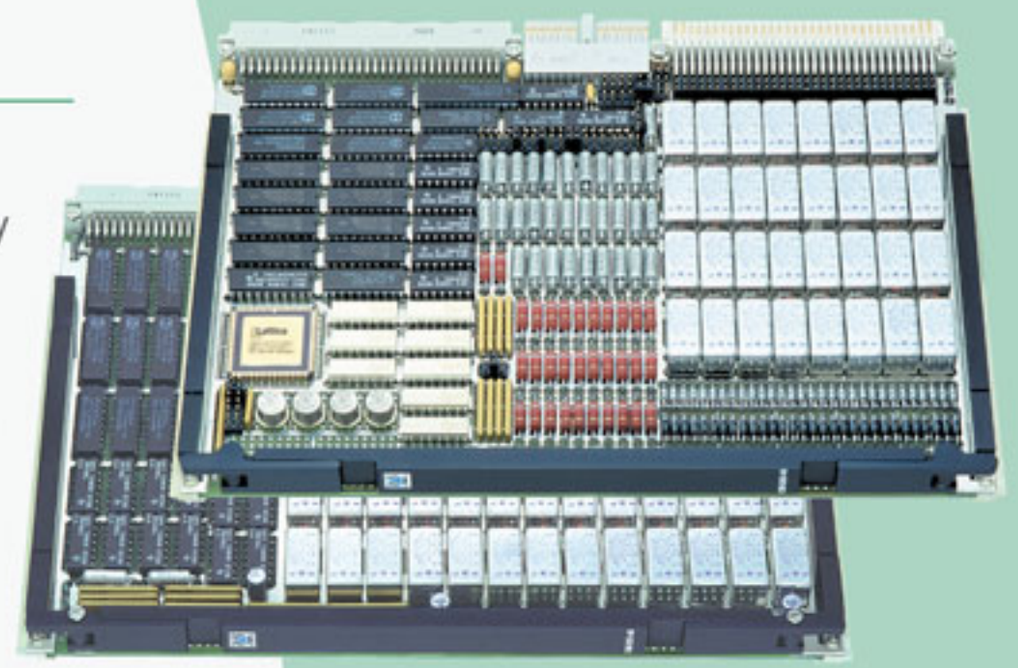


| | CM-AD-45 | CM-DA-40 | CM-DA-50 |
|---|---|---|---|
| **Description** | 32 Channel A/D Input Module | 24 Channel D/A Output Module | 24 Channel D/A Output Module |
| **Channels** | 32 Single-ended or 16 Differential | 24 Single-ended | 24 Single-ended |
| **Resolution** | 12-bit AD-1674 Converter | 12-bit DA-7545 Converter | 14-bit DA-7538 Converter |
| **VIN/OUT Unipolar** | 0-5, 0-10, 0-50 & 0-100 Volts | 0-5, 0-10 VDC or External Vref. | 0-5, 0-10 VDC or External Vref. |
| **VIN/OUT Bipolar** | ±2.5, ±5, ±10, ±25, ±50 & ±100 Volts | ±5 or ±10 VDC or External Vref. | ±5 or ±10 VDC or External Vref. |
| **Overload Protection** | Up to 120 VDC Input | Up to 20 mA or Short circuit | Up to 20 mA or Short circuit |
| **Isolation** | --- | Full Galvanic Isolation >800V | Full Galvanic Isolation >800V |
| **Built-In-Test** | 100% Board Coverage | --- | 100% Board Coverage |
| **Other Features** | Dual Port SRAM, Interrupter | Input Vref. per Channel | Input Vref. per Channel |
| **VMEbus Interface** | A24/D16 Standard Slave | A24/D16 Standard Slave | A24/D16 Standard Slave |
| **Board Range** | C+I+R+883 | C+I+R+883 | C+I+R+883 |

## DISCRETE I/O

Discrete Output boards have a flexible stage per channel that can be factory fitted to support a choice of eleven different output devices (Relays, Opto-couplers, FETs, SSR, TTL, etc.).

Discrete Input sections incorporate an Input Change Detector that samples and compares all input channels and asserts interrupts on any change. Additionally, the CM-DI-42 does not require power from the application and accepts any generic external DC switching device.



| | CM-DO-40 | CM-DI-40 | CM-DI-42 | CM-DIO-40 |
|---|---|---|---|---|
| **Description** | Discrete Output Module | Discrete Input Module | Discrete Input Module | Discrete I/O Module |
| **Channels** | 64 | 64 | 64 | 32+32 |
| **VIN/OUT** | Up to 400 VDC/AC @ 1 A | 3 to 300 VDC/AC RMS | Any DC switching device | 3 to 300 VIN / 400 VOUT |
| **Input Protection** | --- | 30% Nominal, 300% Peak | 100% Nominal | 30% Nominal, 300% Peak |
| **Isolation** | Galvanic Isolation >800V | Galvanic Isolation >800V | Galvanic Isolation >800V | Galvanic Isolation >800V |
| **Built-In-Test** | 100% Board Coverage | 100% Board Coverage | 100% Board Coverage | 100% Board Coverage |
| **Other Features** | Supports 11 Output Devices | Channel Change Detector | Channel Change Detector | Supports 11 Output Devices |
| **Board Range** | I+R+883 | I+R+883 | I+R+883 | I+R+883 |

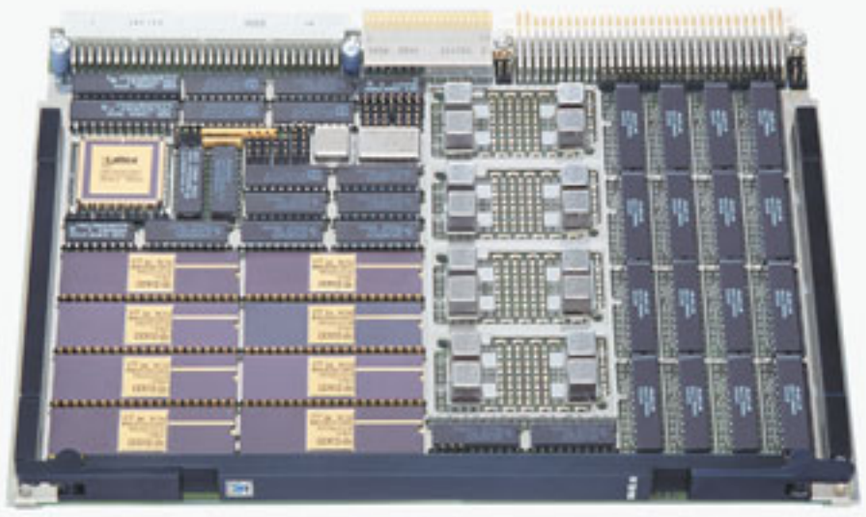
## SYNCHRO / RESOLVER I/O

All Synchro/Resolver modules offer 16-bit resolution and independent high accuracy I/O transformers per channel. Built-In-Test wraparound is achieved by incorporating supervisory input S/R converters in output modules and vice versa.

| | CM-SD-40 | CM-DS-40 | CM-SDS-40 |
|---|---|---|---|
| **Description** | S/R Input Module | S/R Output Module | S/R I/O Module |
| **Channels** | 16 | 8 | 4+4 |
| **VIN / VOUT** | 11,8/26/90 VRMS | 11,8/26/90 VRMS | 11,8/26/90 VRMS |
| **Built-In-Test** | 100% Board Coverage | 100% Board Coverage | 100% Board Coverage |
| **Isolation** | Gal. Isolation >800V | Gal. Isolation >800V | Gal. Isolation >800V |
| **Board Range** | I+R+883 | I+R+883 | I+R+883 |

## SERIAL I/O

This universal serial module supports standard communication protocols up to 5Mbps. Built-In-Test capabilities allows testing of on-board transceivers.



| | CM-IOC-40 |
|---|---|
| **Description** | 16 Channel Serial I/O Module |
| **Serial Ports** | 16 Full Duplex Ports RS-232/422/423/485 |
| **Serial Controller** | Z8530 or Z-85230 up to 20 MHz |
| **Isolation** | Galvanic Isolated Transceivers > 1000 Vp |
| **Built-In-Test** | 100% Board Coverage |
| **Board Range** | C+I+R+883 |

## BOARD ENVIRONMENTAL SPECIFICATIONS

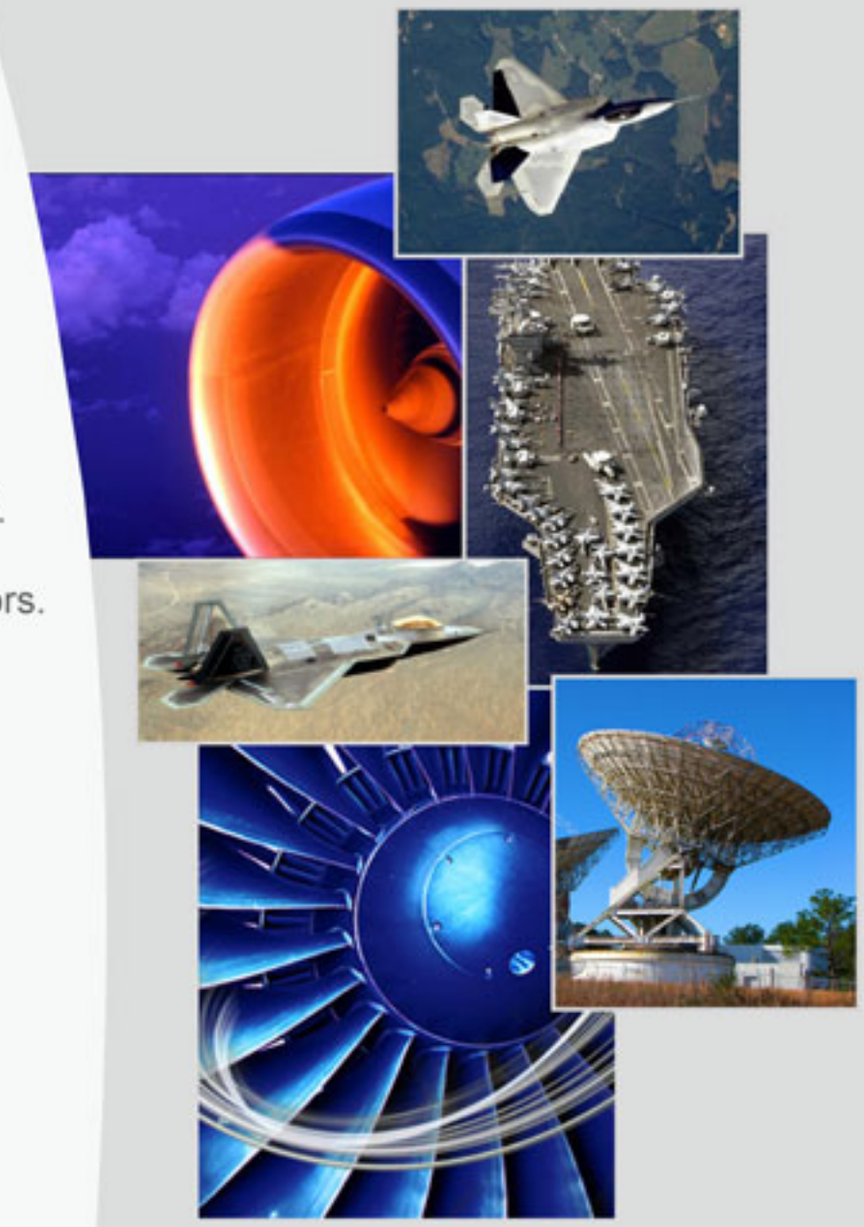
CM Computer boards are manufactured in four distinct build standards that are 100% hardware & software compatible. All modules share the same electrical circuitry but differ in component grade and mechanical format.

**Commercial (C):** Implements low cost IC's. Continuous board operation 0 to +55ºC.

**Industrial (I):** Built with industrial range IC's. Continuous board operation -20 to +70ºC.

**Military-Rugged (R+):** Manufactured with ceramic IC's. Class I MIL-C-55302 connectors. Conduction-cooled PCB. Continuous operation -40 to +85ºC. Storage –50 to +120ºC. Boards meet MIL-STD-810E & MIL-E-5400.

**Military-STD-883 (883):** Features conduction-cooled PCB and MIL-STD-883 ceramic IC's. Class I MIL-C-55302 connectors. Continuous board operation from -55 to +90ºC. Storage –60 to +130ºC. Boards exceed MIL-STD-810E & MIL-E-5400.



## ATR CHASSIS MILITARY CERTIFICATES

CM Computer chassis products are delivered tested, qualified and certified per Military Standards in order to guarantee immediate fault free operation in the most severe Military and Aerospace environments. Offering a crucial and complete testing program differentiates us from our competitors, eliminates our customers' program risk and demonstrates the ultimate quality of our ATR products.

- **MIL-STD-810F Temperature (Methods 501.4 & 502.4)**
  - -55 to +80°C Operating
  - -55 to +100°C Storage
- **MIL-STD-810F Altitude (Method 500.4)**
  - Up to 65,000 ft operating
- **MIL-STD-810F Shock (Method 516.5)**
  - Sawtooth pulse 40g 11ms
- **MIL-STD-810F Acceleration (Method 513.5)**
  - Up to 12g, 3 axes
- **MIL-STD-810F Humidity & Salt Fog (Methods 507.4 & 509.4)**
  - Relative humidity 0-95% 10 cycles 240h
  - Test 96 hours 5% NaCl salt (PH = 7)
- **MIL-STD-810F Vibration (Method 514.5)**
  - Category 12 for Jet Aircraft
  - 15 to 2000 Hz at 12g RMS
- **MIL-STD-461E EMI & EMC (Electromagnetic compatibility)**
  CE101, CE102, CS101, CS114, CS116, RE101, RE102, RS101, RS103
- **MIL-E-5400T for avionics class 1**

## CERTIFICATION

CE MARKED
ISO 9001 CERTIFICATION
NATO SUPPLIER Nº 7684B
DGAM SUPPLIER Nº 9015
NCAGE CODE REGISTERED
VITA REGISTERED MEMBER
D&B D-U-N-S REGISTERED
VXWORKS APPROVED PARTNER
CENTRAL CONTRACTOR CERTIFICATION
US DEPARTMENT OF DEFENCE APPROVED

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Your local representative:

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