



CM Computer 
True Military COTS Products

CM-ATR-25/35/45/SixHex Series VPX/VME/cPCI Military ATR Chassis



Expand your horizons

TO THE MOST ADVANCED MILITARY ELECTRONIC SYSTEMS

This outstanding series of sealed contaminant-free military chassis are fitted with six heat exchangers to meet the demand for true high power COTS solutions

Perfectly suited for either forthcoming technologies or for high performance military self contained upgrades, retrofits and legacy systems



1 ATR SixHex - 2 x 750W Dual Redundant PSU (1500 Watts)

The SixHex completes CM Computers fourth generation high performance ATR chassis family, available in traditional 5, 7 and 12 slot sizes for versatility and conformity with VME, VPX & cPCI open COTS architecture.

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

SixHex enclosures offer an outstanding set of practical functionalities combined with exceptional environmental, electrical and mechanical characteristics. This series has been designed to meet the complete spectrum of military applications. The criteria during development was to accomplish a superior end product, featuring all technical specifications individually optimized to provide revolutionary capabilities.



CM SixHex chassis are maintenance free and do not require air intake dust filters. This stand alone single pack ATR solution incorporates a versatile and universal "floating" card cage capable of accommodating and freely inter-mixing all standard conduction-cooled and air-cooled Eurocard formats.

Performance assured

PUSHING THE LIMITS OF SEALED AIR-COOLED ATR DESIGN

CM has developed a stand alone single pack ATR with optimum trade-offs between size/weight and heat dissipation capability. VME, VPX and cPCI architecture performance of up to 150+ Watt per slot and 1.6kW per system can be cooled to 85°C (at card edge) using a complex combination of cross-flow forced air convection and conduction.

This solution goes beyond any previous ATR design, thus setting a new benchmark in dry-air cooling standards.

The excellent thermal performance of this series is attributed to its oversized cross-flow heat exchangers that surround the floating card cage and have up to 3.6 m² of machined aluminum thermo-active interface surface (5 times a conventional chassis area).

Special techniques have been employed to decrease the issues imposed by thermal contact resistance between conduction card-edge and card-cage rail, a key limitation found in conduction cooled chassis.

As a result, high power VPX boards (up to 150 W per slot) can be utilized provided that total chassis power capacity is not saturated.



Increase your payload MTBF

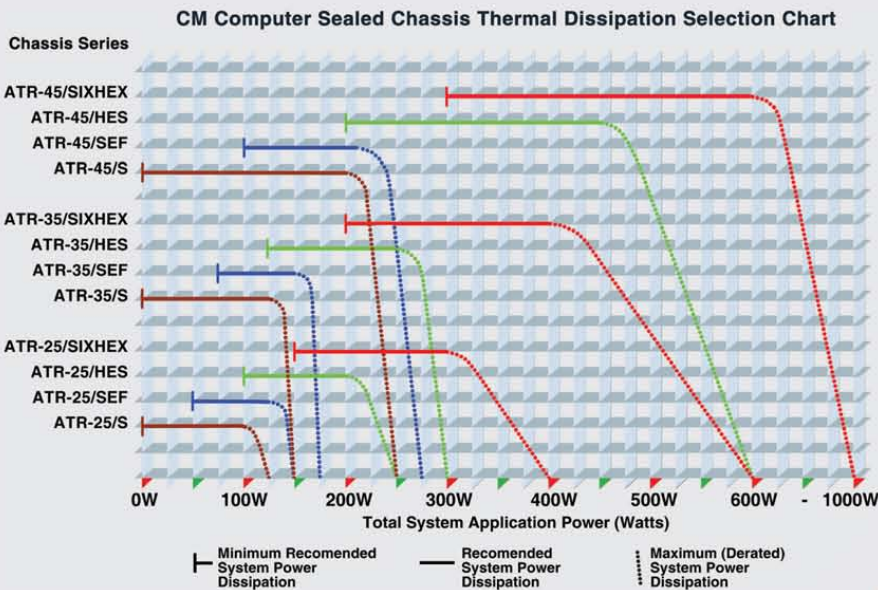
OPERATING UNDER A REDUCED INTERNAL THERMAL PROFILE

Without doubt, chassis cooling performance plays a crucial role in the long term reliability of your system. It is commonly understood that for every 10°C you drop on the enclosed payload electronics, your MTBF will double.

Regardless of your application power requirements, the CM SixHex will provide longer life to your valuable electronics. This new release achieves up to 40°C less than a conventional sealed ATR, thus dramatically increasing MTBF by 8 times.

CM SixHex flagship chassis have been engineered to provide the highest level of cooling capacity within our ATR range. Internal recirculation airflow is significantly improved with respect to its popular predecessor HES (Heat Exchanger Sidewalls), resulting in approximately 15°C lower card rail temperature for the same payload.

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 (3/4 ATR) and provides significant technological advantages



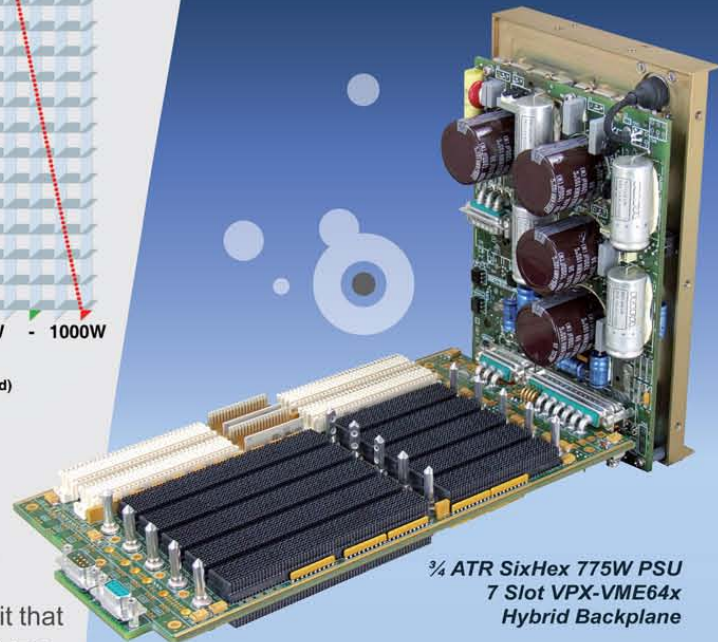
Maximize your potential

WITH THE MOST VERSATILE & CAPABLE RANGE OF PSUs

All SixHex enclosures incorporate a full military Power Supply Unit that is customized to match the chassis mechanics and supply +5VDC, +3.3VDC and ± 12 VDC standard outputs to the Backplane payload.

PSUs accept all military standard DC & AC input voltages, both single and 3-phase, to facilitate worldwide operation as per MIL-STD-704 & MIL-STD-1275. The top performance PSU is capable of developing over 1.6kW and generating upwards of 160A @ +5VDC, an unmatched first in the ATR industry.

The SixHex PSU incorporates EMI front-end filters, isolated DC/DC converters and oversized hold-up capacitors to ensure proper operation during short power failures. All DC outputs are protected against short circuits and over voltages.



¾ ATR SixHex 775W PSU
7 Slot VPX-VME64x
Hybrid Backplane



SixHex Series Backplanes

MORE CAPABILITIES FOR EASY INTEGRATION

SixHex true military monolithic VPX, VME and cPCI Backplanes are low noise and incorporate all standard bus functionalities that are additionally complemented by active auxiliary electronics. Several custom Dual Redundant and Hybrid Backplanes are also available, or can be designed upon customer request.

Backplanes support up to two 100W power sockets for micro-size DC/DC military converters for user defined output voltages. These converters are available for increasing the +5VDC or +3.3VDC, or for generating additional isolated positive, negative or bipolar DC.

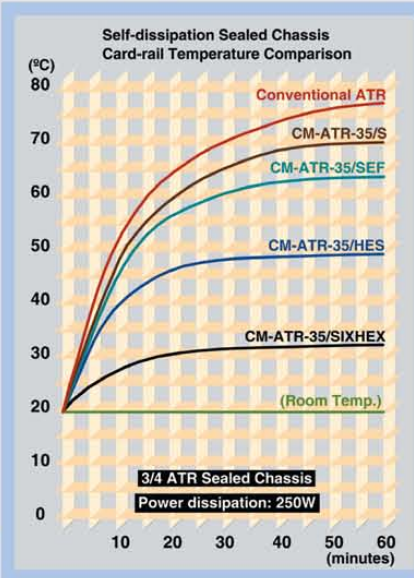
All CM Backplanes incorporate specific TTL logic circuitry for driving front panel LED indicators. Reset start circuitry has been integrated via a dedicated chip that generates a 200ms low pulse after power-up.



Backplane Class 1 military power connectors provide shock and vibration reliability whilst allowing high DC current rates with low voltage drops and minimum contact heating.

All Backplane slots permit the intermixing of conduction-cooled IEEE-1101.2 & air-cooled IEC-297/IEEE.1101.1 Eurocard modules.

SixHex Backplanes are fitted with Power Fail Monitor, DC remote voltage sensing, output voltage trim-up, time-delayed protection fuses and DC/DC converter remote shutdown.



TEMPERATURE SUPERVISORY UNIT (TSU)

The integrated TSU protects and aids in the longevity of your system within all environments to prevent overheating of chassis PSU & card-cage payload. In addition it provides control of card-cage heaters during cold startups.

Temperature trip point boundaries can be easily established by the user to regulate and optimize the internal enclosure temperature. The status of the TSU is monitored via a panel LED indicator in real time.

A delayed shut-down function is incorporated to advise the CPU when power failure is imminent, allowing hard drives, relays and critical data to be shut down in an orderly manner.

TSU individual functions are optionally enabled/disabled by means of jumpers.

The integrated remote control operation allows the user to manually set the system to low power "stand-by mode".

This feature is advised in applications where the system is only required for a few hours but remains available on demand. The TSU can also be disabled during emergency situations by means of a remote operated "battle-switch". This function removes the temperature protection limits and allows the system to remain operational despite the risk of temperature over-stress.



MORE BACKPLANE VARIETY TO SUIT YOUR SYSTEM ARCHITECTURE

Compact PCI Backplanes are designed according to IEC 1076/PCI 1101.10/IEC 48D/118/CD standards. Supported specs include PICMG 2.0 R3.0 CompactPCI, Hot Swap PICMG 2.10 R2.0, System Management Bus PICMG 2.9 & Keying PICMG 2.10 R1.0.

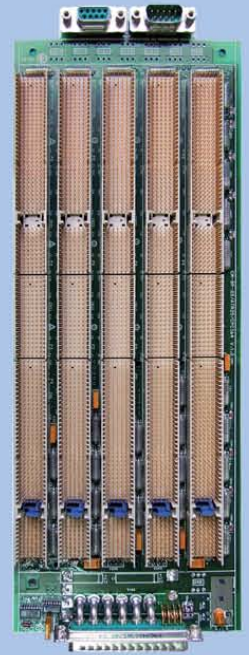
All cPCI monolithic Backplane slots are fitted with 7 row standard 2 mm P1/P2/P3/P4/P5 metric connectors. Long pin P3/P4/P5 connectors allow the user to connect or hand-wire all system I/O lines.

VPX Backplanes conform to VITA 46.0/1/10/3/4/7 providing 0.8" pitch slots. Connectors J3 thru J6 are free for customer I/O. J1 incorporates high-speed switched serial fabrics (up to 10 Gbps), full mesh topology, interconnects Rapid I/O, PCI-Express and 10 Gigabit Ethernet.

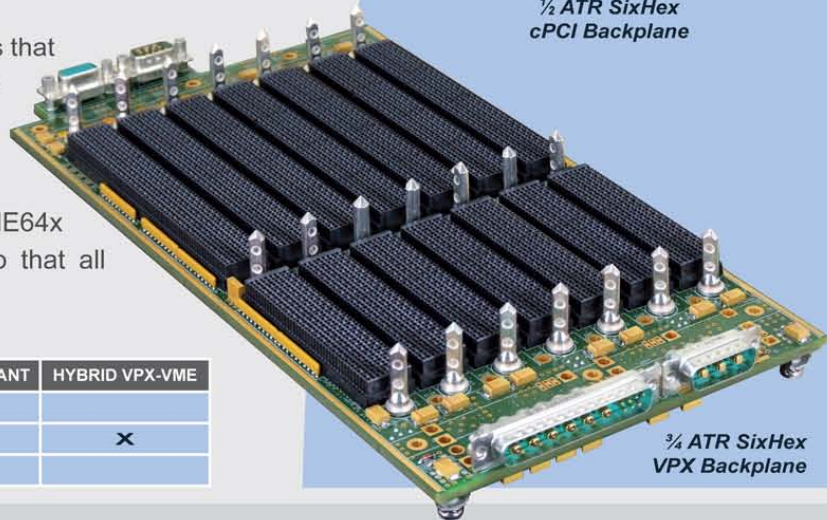
CM VPX Backplanes support MultiGig mesh switched fabric connectors that provide significantly greater bandwidth capability with higher throughput and performance. Systems supported include digital signal processing applications, FPGA and mass storage interconnects.

VPX-VME64x Hybrid Backplanes feature mesh-fabric slots that support both VITA46 (VPX) & legacy VME64x slots. Hybrid Backplanes support custom cross combinations of split VPX-VME64 compatibility for both standard & custom ranges.

VMEbus Backplanes are fitted with Class I MIL-C-55302 VME64x connectors. J2 & J0 connectors incorporate long pins so that all signals are available for system I/O wiring.

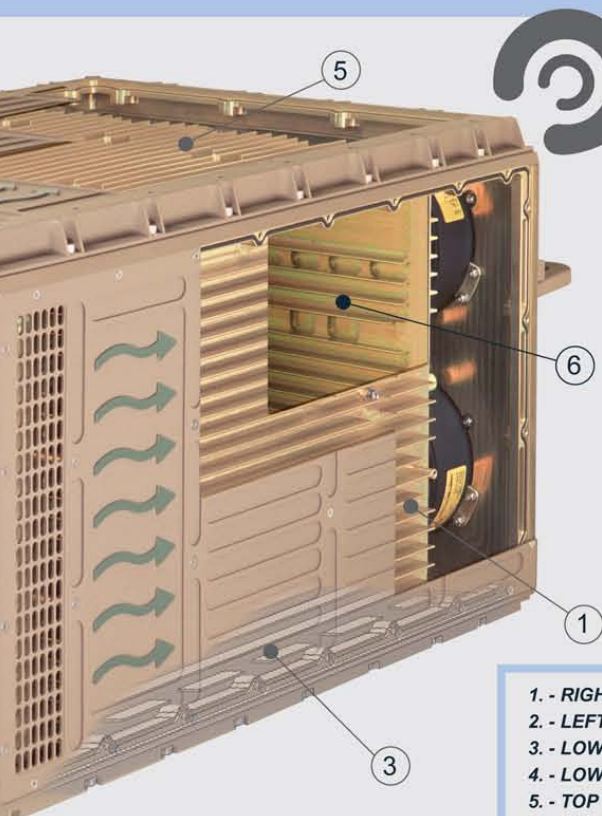


1/4 ATR SixHex
cPCI Backplane



3/4 ATR SixHex
VPX Backplane

BP Selection Chart	CM-BP-VPX	CM-BP-VME	CM-BP-cPCI	DUAL REDUNDANT	HYBRID VPX-VME
1 ATR - 12 Slot	✗	✗	✗	✗	
3/4 ATR - 7 Slot	✗	✗	✗	✗	✗
1/2 ATR - 5 Slot	✗	✗	✗		



CM-ATR-45/SixHex - Cutaway View

1. - RIGHT SIDEWALL HEAT EXCHANGER
2. - LEFT SIDEWALL HEAT EXCHANGER
3. - LOWER RIGHT HEAT EXCHANGER
4. - LOWER LEFT HEAT EXCHANGER
5. - TOP COVER HEAT EXCHANGER
6. - REAR HEAT EXCHANGER
- B. - VME, VPX or cPCI BACKPLANE
- F. - Built-in MIL-STD-461E EMI FILTER

CHASSIS SUPERVISORY UNIT (CSU)

Performance of the SixHex can be optimized by an optional uP based Chassis Supervisory Unit (CSU). This unit monitors in real time all relevant operational parameters such as PSU and Backplane voltages, currents, efficiency, temperatures, fan rotation, etc. in order to maintain cutting edge performance and provide enhanced connectivity for remote diagnostics, maintenance and chassis operations.

Powered by an independent power supply the CSU 16-bit microcontroller supervises electrical & environmental chassis parameters and continuously transmits data via two RS-232/422 or isolated RS-485 serial output ports to the onboard chassis CPU and to one external data-link.

Chassis hardware diagnostics capabilities (Built-In-Test) are also included.



Chassis ordering information

PN: CM-ATR-**S5** /**SIX**HEX /**B** /**I** /**W** /**D1** /**D2** /**R** /**T** /**S** /**FP** /**TC** /**BC** /**F** /**G** /**C**



S5 » Enclosure Model Size

- CM-ATR-25: 1/2 ATR Long size. 5 slots 6U full military enclosure.
- CM-ATR-35: 3/4 ATR Long size. 7 slots 6U full military enclosure.
- CM-ATR-45: 1 ATR Long size. 12 slots 6U full military enclosure.

/B » Backplane Type

- VME64x: Military VME64x Backplane.
- VME64xK: Military VME64x Backplane with Key-slot J0.
- cPCI: Military Compact PCI Backplane.
- VPX: VITA 46 Military VPX Backplane.
- VPX/VME64: Military Hybrid Backplane.

/I » PSU Input Power Voltage

- 28VDC: 28 VDC Input.
- 48VDC: 48 VDC Input.
- 270VDC: 270 VDC Input.
- 90-264VAC: Autorange 90-264 VAC @ 47-880 Hz Input.
- 200VAC-3Ph: 200 VAC 3 Phase @ 47-880 Hz Input.

/W » Power Supply Unit Watts

● PSUs available for CM-ATR-25/SIXHEX

- 475W: 28 VDC input only.
- 575W: All PSUs except 28 VDC input.
- 450W: 28 VDC input only.
- 550W: All PSUs except 28 VDC input.

● PSUs available for CM-ATR-35/SIXHEX

- 675W: 28 VDC input only.
- 775W: All PSUs except 28 VDC input.
- 565W: 28 VDC input only.
- 665W: All PSUs except 28 VDC input.

● PSUs available for CM-ATR-45/SIXHEX

- 950W: 28 VDC input only.
- 1050W: All PSUs except 28 VDC input.
- 1065W: 28 VDC input only.
- 1165W: All PSUs except 28 VDC input.
- 1225W: 28 VDC input only.
- 1425W: All PSUs except 28 VDC input.
- 1350W: 28 VDC input only.
- 1550W: All PSUs except 28 VDC input.
- 2x 650W: 28 VDC input only.
- 2x 750W: All PSUs except 28 VDC input.

/D1 » Backplane DC/DC AUX1

Optional user defined auxiliary output DC/DC Converter on Backplane according to DC/DC mnemonics.

/D2 » DC/DC AUX2 (CM-ATR-35/SIXHEX & CM-ATR-45/SIXHEX)

Optional user defined auxiliary output DC/DC Converter on Backplane according to DC/DC mnemonics.

Auxiliary DC/DC Converter output options mnemonics:

+2VDC 50W (+2V-50W), -2VDC 50W (-2V-50W), +3.3VDC 75W (+3.3V-75W), -3.3VDC 75W (-3.3V-75W), +5VDC 100W (+5V-100W), -5VDC 100W (-5V-100W), +12VDC 100W (+12V-100W), -12VDC 100W (-12V-100W), +15VDC 100W (+15V-100W), -15VDC 100W (-15V-100W), +28VDC 100W (+28V-100W), -28VDC 100W (-28V-100W), +48VDC 100W (+48V-100W), -48VDC 100W (-48V-100W).

/R » Redundant PSU

● 1 Slot plug-in optional RPSUs available for CM-ATR-25/35/SIXHEX

- R475W: 28 VDC input only.
- R575W: All PSUs except 28 VDC input.
- R450W: 28 VDC input only.
- R550W: All PSUs except 28 VDC input.

/T » Temperature Supervisory Unit

TSU: Temperature Supervisory Unit (fitted as standard).

/S » Optional Chassis Supervisory Unit

CSU: Microcontroller chassis Supervisory Unit
Note: Leave this field blank when no CSU is required.

/FP » Front Panel Layout

CMP: Standard CM Computer front panel fitted with MIL-C-38999 connectors.
UDP: User defined front panel layout (requires customer drawings).

/TC » Chassis Top Cover

HETC: Standard, low-profile Heat Exchange Top Cover (vertical wiring clearance 20mm).
EHETC: Extended, high-profile Heat Exchange Top Cover with 15mm extra wiring clearance (35mm total).

/BC » Chassis Bottom Cover

SBC: Standard, low-profile Bottom Cover. Chassis vertical wiring clearance below backplane is 50 mm.
HBC: High-profile Bottom Cover with 65 mm chassis vertical wiring clearance below backplane.

/F » Rear-mounted Fan Pack assembly

● Rotron Fans available for CM-ATR-25/SIXHEX & CM-ATR-35/SIXHEX

F115-400: 2x PX3 Military fan for 115 VAC @ 400 Hz (100 CFM each).
F200-400: 2x PX3 Military fan for 200 VAC @ 400 Hz 3-Ph (140 CFM each).
F28: 2x PX3 Military fan for 28 VDC (110 CFM each).
F115-60: 2x PX3 Rugged fan for 115 VAC @ 60 Hz (100 CFM each).
F220-50: 2x PX3 Rugged fan for 220 VAC @ 50 Hz (100 CFM each).

● Rotron Fans available for CM-ATR-45/SIXHEX

F115-400: 4x PX3 Military fan for 115 VAC @ 400 Hz (100 CFM each).
F200-400: 4x PX3 Military fan for 200 VAC @ 400 Hz 3-Ph (140 CFM each).
F28: 4x PX3 Military fan for 28 VDC (110 CFM each).
F115-60: 4x Rugged fan for 115 VAC @ 60 Hz (100 CFM each).
F220-50: 4x Rugged fan for 220 VAC @ 50 Hz (100 CFM each).
VAP: Vehicle air-plenum (according to customer platform specifications).

/G » Fan Finger Guards

STDG: Standard Rotron PX3 finger guards.
EMIG: Optional EMI Shielded finger guards fitted with honeycomb filter.
GNF: Optional finger guards fitted with acoustic noise filter.

/C » Chassis Color

- B: Black.
- G: Navy Gray.
- E: Army Dark Earth.
- W: White.
- R: Red.
- PT: Platinum.
- YW: Yellow.
- GN: Green.
- BLU: Dark Blue.
- CR: Chromate MIL-C-5541.
- O: Other (user defined)*.

* Custom paint to be applied upon request.
Arrows painted to complement chassis color.



SixHex specifications & 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 stand-alone 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



	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	288 mm	288 mm	288 mm
DEPTH	510 mm	510 mm	510 mm
TOTAL WEIGHT	9 Kg	13 Kg	17 Kg
EXT. SURFACE	5180 cm²	5767 cm²	7800 cm²
HEX. SURFACE	25,675 cm²	27,686 cm²	36,185 cm²
MAX INPUT PWR	650 Watts	1000 Watts	1800 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 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 25 CFM (100 CFM)	8x 25 CFM (200 CFM)
FP USER AREA	138 mm x 200 mm	178 mm x 200 mm	280 mm x 200 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	25° GB 80,000 Hours, 65° AIC 25,000 Hours	25° GB 78,000 Hours, 65° AIC 23,000 Hours	25° GB 60,000 Hours, 65° AIC 19,000 Hours
OPERATING TEMP	-40°C to +80°C Operating temperature, -55°C to 100°C Storage temperature		
MOUNTING TRAY	CM-TR-25-SIXHEX	CM-TR-35-SIXHEX	CM-TR-45-SIXHEX

MILITARY COMPONENTS

- **MIL-STD-461E** Power Supply Front-end Modules.
- **MIL-STD-704F & MIL-STD-1275D** Power Supply.
- **MIL-C-7438 EMI/EMC** Honeycomb Filters.
- **MIL-R-6130 EMI/EMC** Gaskets.
- **MIL-STD-883 & MIL-PRF-38535** TTL Chips.
- **MIL-S-13949** Class V Printed Wiring Boards.
- **MIL-C-24308 & MIL-C-55302** Backplane Connectors.
- **MIL-C-24308** PSU & BP Class I Power Connectors.
- **MIL-C-38999** Circular Connectors on Front Panel.
- **MIL-F-85731** Mounting Tray Clamps.
- **MIL-C-1291** Front Panel Bonding Point.
- **AISI-316** Screws, Inserts & Chassis Accessories.
- **MIL-STD-810C, MIL-B-23071 & MIL-B-28873** Fans.
- **AW6082-T651** Aeronautical Aluminium.
- **MIL-I-45208 & MIL-STD-105** NAS-622 Hooks.
- **MIL-I-45208 & MIL-STD-810F** DC/DC Converters.
- **MIL-STD-1547B** Corrosion Resistant Coating.
- **MIL-C-83286** External Surface Painting.

CM chassis are designed using an advanced 3D CAD facility. Product design includes thermal modelling and environmental testing. **CM-ATR-SixHex** chassis materials & electronic parts are fully compliant to manned space flight requirements. All CM products have a 2 year warranty.

MILITARY CERTIFICATES



All our chassis products are delivered Tested and Certified by independent authorized Labs per **MIL-STD-461E & MIL-STD-810F** for immediate deployment in US Navy & US Air Force military Fighters, Unmanned Aerial Vehicles and Helicopters.

ENVIRONMENTAL SPECIFICATIONS

- **MIL-STD-810F Temperature** (Methods 501.4 & 502.4)
 - -55 to +80 °C Operating.
 - -55 to +100 °C Storage.
- **MIL-STD-810F Humidity & Salt Fog** (Methods 507.4 & 509.4)
 - Relative humidity 0-95% 10 cycles 240 h.
 - Test 96 hours 5% NaCl salt (PH = 7).
- **MIL-STD-810F Altitude** (Method 500.4)
 - Up to 65,000 ft Operating.
- **MIL-STD-810F Vibration** (Method 514.5)
 - Category 12 for Jet Aircraft.
 - 15 to 2000 Hz at 12 g RMS.
- **MIL-STD-810F Shock** (Method 516.5)
 - Sawtooth pulse 40 g 11 ms.
- **MIL-STD-810F Acceleration** (Method 513.5)
 - Up to 12 g, 3 axes.
- **MIL-STD-461E EMI & EMC** (Electromagnetic compatibility)
 - CE101, CE102, CS101, CS114, CS115, CS116, RE102, RE103, RS103.
- **MIL-E-5400T** for avionics class 1

CM Computer SixHex:

Pure Power - Pure Dissipation - Pure Thermodynamics



CM Computer
True Military COTS Products

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