



CM Computer
True Military COTS Products



CM-ATR-3U/PENTAHEX-HP Series Ultra High Power VPX Military Chassis



FIVE HEAT EXCHANGERS

DIRECT & REVERSE AIRFLOW

MULTI SLOT HEAT PIPES

INTEGRATED IN CARD-CAGE

100G GEN 4 BACKPLANES

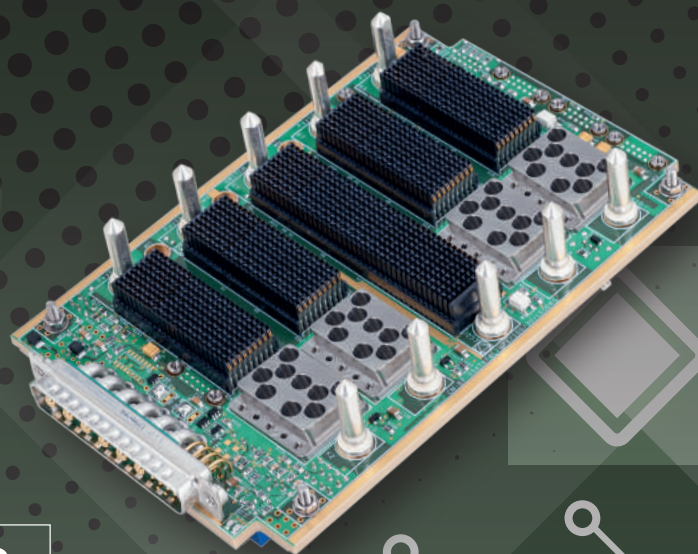
PCIe GEN 4 100GBASE-KR4 SPEED PERFORMANCE

INTERNAL AIR RECIRCULATION

OVERHEAD FORCED DRY-AIR

SEALED FIVE HEAT EXCHANGER + MULTI SLOT HEAT PIPES 3U ENCLOSURE

- » Designed expressly for Gen-4 ultra high wattage military VPX systems
- » Progressive, 3, 5, 7 & 9 slot versions for 1" pitch conduction-cooled 3U modules
- » Dry air contaminant-free SWaP applications up to 750 watts payload dissipation
- » No risk, hermetically sealed externally integrated heat pipes (12, 16, 20 & 28)
- » Accepts latest generation FPGA, SBC, DSP, GPU payloads up to 150 watts per slot
- » Five forced-air heat exchangers in sidewalls, top cover, bottom cover & rear panel
- » 1075W PSU with MIL-STD-461G EMI/EMC Lab matched filter installed
- » High airflow dual redundant military PX3 rear fan pack (200-400 CFM)
- » Top and bottom internal forced-air recirculation for reduced payload hot spots
- » Optionally delivered fully wired with Backplane & I/O automatically tested



**SCALABLE TO SYSTEM REQUIREMENTS
EXTREME PERFORMANCE APPLICATIONS
SUITED FOR GEN 4/5 VPX PROGRAMS**

9

7

5

3



PENTAHX-HP

+ MULTI INTEGRATED SLOT HEAT PIPES

↑ 750W
PAYLOAD POWER DISSIPATION



PENTAHEX-HP 3U CHASSIS

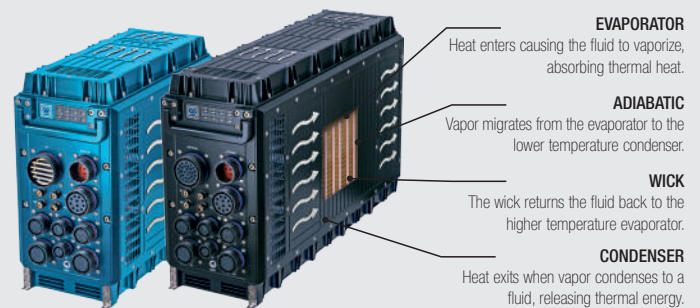
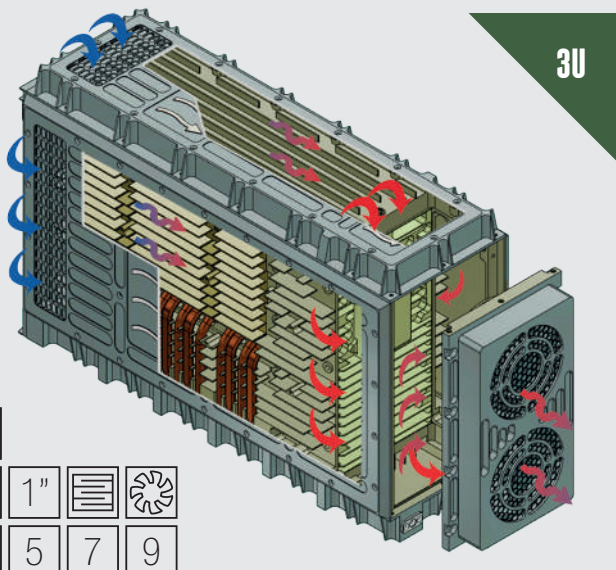
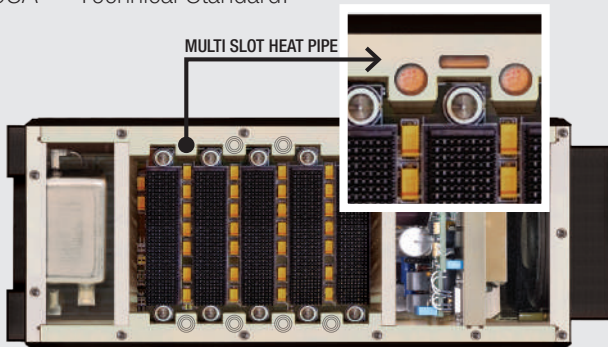


Five Heat Exchangers + Multi Slot Heat Pipes - Contaminant-free suitable for extremely high wattage VPX applications with 1" pitch 3U eurocards

Our COTS PENTAHEX *Five Heat Exchangers + Multi Slot Heat Pipes* chassis series have been designed for latest generation SWaP military systems that require extreme power dissipation. Extensive implementation of phase transition heat pipes greatly extend payload MTBF. These chassis are ideal for operation in hostile or harmful air environments.

AVAILABILITY

CM 3U PENTAHEX-HP enclosures are available in 3, 5, 7 & 9 slot versions, supporting Gen-3/4 military VPX backplanes fitted with VITA 46.30 MULTIGIG-RT3 connectors and high power military Power Supply Unit developed in alignment with the SOSA™ Technical Standard.



LAYOUT & DESIGN

Internal layout is divided into 4 independent metallic partitions: I/O section at the front, card-cage, PSU section, and 2 exhaust PX3 fans at the rear. This isolates card-cage, improves EMI/EMC and reduces PSU heat and electrical noise on system electronics.

DISSIPATION & COOLING

Payload heat is conducted to multi-integrated slot heat pipes fitted in heat exchanger sidewalls. Top, bottom and rear panel heat exchangers are also incorporated. Internal cross-flow fans in card-cage top and bottom areas recirculate dry air across cards, minimizing hot-spots and dissipating heat homogeneously.

RECOMMENDED PAYLOAD POWER RATINGS

(SELF DISSIPATING @ 55°C AMBIENT; NO EXTERNAL AIRFLOW OR COLD PLATE PROVIDED)

CM-ATR-3U/PENTAHEX9-HP (9 SLOT) ≤ 750 watts

CM-ATR-3U/PENTAHEX7-HP (7 SLOT) ≤ 650 watts

CM-ATR-3U/PENTAHEX5-HP (5 SLOT) ≤ 550 watts

CM-ATR-3U/PENTAHEX3-HP (3 SLOT) ≤ 420 watts



EXTENDED AIR INTAKES



PENTAHEX-HP - FRONT TO BACK LOADED 3U CHASSIS

Enclosure Specifications

	CM-ATR-3U/ PENTAHEX3-HP	CM-ATR-3U/ PENTAHEX5-HP	CM-ATR-3U/ PENTAHEX7-HP	CM-ATR-3U/ PENTAHEX9-HP
SLOTS HEAT PIPES	3 12-HP	5 16-HP	7 20-HP	9 28-HP
WIDTH	155 mm	155 mm	155 mm	155 mm
HEIGHT	280 mm	280 mm	280 mm	280 mm
DEPTH	310 mm	361 mm	412 mm	463 mm
WEIGHT	6.2 Kg	7.4 Kg	8.2 Kg	9.0 Kg
CGTR THERMAL RES.	$\Delta T/W = 0.071^{\circ}\text{C}$	$\Delta T/W = 0.054^{\circ}\text{C}$	$\Delta T/W = 0.046^{\circ}\text{C}$	$\Delta T/W = 0.04^{\circ}\text{C}$
PSU INPUT ($\pm 30\%$)	28 VDC, 48 VDC, 72 VDC, 270 VDC - MIL-STD-704F & MIL-STD-1275E			
PSU OUTPUT (SOSA™)	S-575W : +12 VDC @ 42A, +3.3 VDC @ 23A S-1075W : +12 VDC @ 84A, +3.3 VDC @ 23A			
EMI/EMC FILTER	Dual-stage MIL-STD-461G Lab Certified DC in-line input filter (fitted as standard)			
VPX BACKPLANE	3U 1" pitch (3, 5, 7 & 9 slot) - MULTIGIG RT 3 - PCIe 16 Gbaud & 100 GBASE-KR4 (25.78125 Gbaud)			
INTERNAL FAN	40.5 CFM	54 CFM	67.5 CFM	81 CFM
REAR FAN	200 CFM (2 x 100 CFM) Rotron PX3 Standard 400 CFM (2 x 200 CFM) Rotron PX3 Optional			
MIL-STD-461G/810H	CE101, CE102, RE101, RE102, CS101, CS114, CS116, RS101, RS103 / 501.4, 502.4, 507.4, 508.5, 509.4, 515.5, 516.5			
I/O SUPPORTED	VITA 46 65 66 67 68 - check with factory for high speed I/O customized solutions HDMI/DVI/DP USB 2.0 & 3.0 SATA 600 1-100GbE Optical RF Serial/Discrete GPIO SAS PCIe 1553 etc			
TEMPERATURE/CSS	-40 °C to +85 °C Operating, -55 °C to 100 °C Storage Chassis Supervisory System fitted as standard			
MTBF	25° GB 86,000 Hours, 65° AIC 28,000 Hours			
MOUNTING TRAY	CM-TR-3U/PENTAHEX3-HP	CM-TR-3U/PENTAHEX5-HP	CM-TR-3U/PENTAHEX7-HP	CM-TR-3U/PENTAHEX9-HP

PENTAHEX-HP MILITARY PSU

High performance military PSU designed for CM 3U VPX chassis applications. 3-slot and 5-slot chassis versions install the S-575W PSU model. 7 and 9 slot chassis versions fit the larger PSU S-1075W delivering double output power in +12VDC.

	Vin Options		DC Options		Chassis Model PENTAHEX -HP
	28VDC	OTHER	+3.3VDC	+12VDC	
S-575W	•	•	23A	42A	3-SLOT 5-SLOT
S-1075W	•	•	23A	84A	7-SLOT 9-SLOT

PART NUMBER EXAMPLE:

CM-ATR-3U/PENTAHEX9-HP/VPX-G4/28VDC/S-1075W/UDP/HETC/HEBC/F115-400/BLU

- 9 slot, 3U Avionics Enclosure, Gen-4 VPX Backplane 1" pitch.
- Sealed Five Heat Exchanger Enclosure + 28 Heat Pipes.
- 28VDC Power Supply Unit with 1075W (+12VDC @ 84A, +3.3VDC @ 23A).
- Integrated Chassis Supervisory System (standard).
- Custom - User Defined Front Panel.
- Heat Exchanger Top Cover (standard).
- Heat Exchanger Bottom Cover (standard + 50mm wiring clearance).
- 2x Rotron PX3 military AC fans (200 CFM) + EMI shielded finger-guard (Standard).
- Enclosure color: Dark Blue.

MIL PSUs

84A^{+12VDC}



Military Chassis Features

providing quality power and control to your valuable payload



PENTAHEX-HP 3^{GEN} military PSUs provide very high power to +12VDC backplane main rail and moderate power to auxiliary +3.3VDC. The PSU series has been developed in alignment with the SOSA™ Technical Standard, incorporating a 30 Amp in-rush current limiter, extended hold-up capacitor bank, input protection against permanent over voltage, transient protection against spike voltages up to 400V @ 0.5ms, DC power fail monitor, 30 Amp on-board in-line EMI/EMC filter, reverse polarity input protection, private PSU for Chassis Supervisory System, rear fans fuse and EMI filter, backplane DC remote voltage sensing and output voltage trim-up, galvanically isolated DC/DC converters with time delay fuses, DC/DC converter over voltage, over current and thermal protection, full military parts and power connectors, etc.

PSU MILITARY COMPLIANCE

PENTAHEX-HP high performance PSUs comply with MIL-STD-704F and MIL-STD-1275E operational steady state input voltage range, ripple, surges, spikes and transients, etc. All military DC input voltages are supported.

PSU DC OUTPUTS

The CM SOSA™ PSUs are oversized, delivering up to 84 Amps in the +12VDC main rail and 23 Amps the +3.3VDC auxiliary rail. Power outputs comply with VITA 65 specifications.

PSU INPUT PROTECTION

The S-575W and S-1075W DC PSU versions fit a front end device to withstand sustained input voltage up to 150VDC without damage. A CM dual stage in-line MIL-STD-461G filter is fitted on chassis front panel to increase system protection and overall EMI/EMC performance.

CARD-CAGE RECIRCULATION FANS

This series installs two packs of internal air recirculation fans. One pack is fitted within the chassis top cover. A second pack is located beneath the backplane and provides reverse airflow against the bottom cover heat exchanger. All fans are wired in redundant configuration to ensure minimum airflow in the event of failure.

CHASSIS SUPERVISORY SYSTEM

A Chassis Supervisory System (CSS) is fitted as standard in PENTAHEX-HP backplanes. This unit provides indispensable services to protect enclosed card-cage electronics. The CSS fits two independent Temperature Supervisory Units, two voltage-in-range monitoring devices, a fan and heater manager, a remote chassis controller, etc.

PSU HOLD UP CAPACITORS

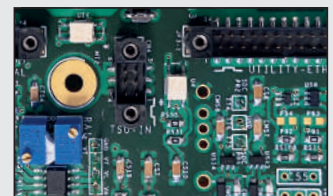
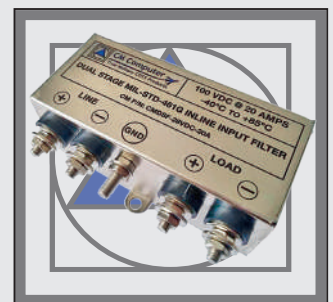
PENTAHEX-HP PSU modules incorporate a large capacitor bank of 88,000µF to comply with MIL-STD-704F hold-up requirements. This ensures uninterrupted operation during short power input failures. A reverse current blocking device avoids discharging the PSU capacitors across the platform DC power rail.

USER FREE I/O WIRING SPACE

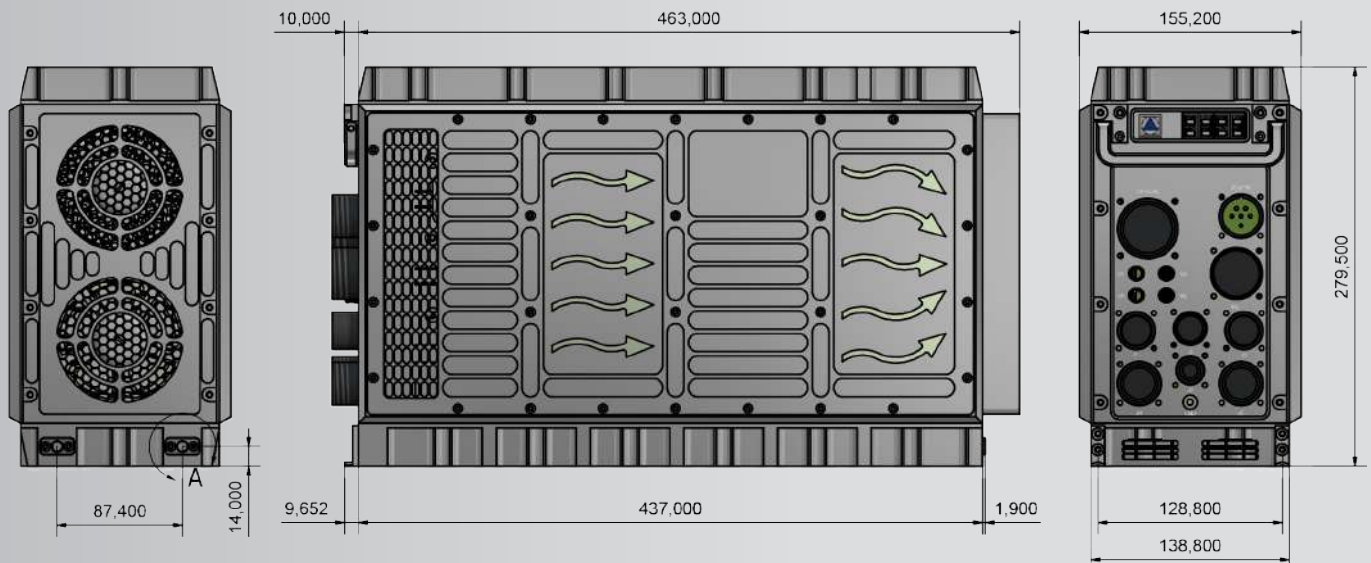
PENTAHEX-HP chassis have a bottom cover user free cavity of 50mm dedicated to user I/O wiring. A space of 48mm behind the front panel houses chassis connectors and I/O cables.

REAR FAN DC/AC CONVERTER UNIT

Chassis AC PX3 fans are powered by a military DC/AC inverter box installed on the PSU heat sink. The inverter supplies 115VAC @ 400Hz to the dual rear fan pack.



Enclosure Dimensions



9 SLOT CM-ATR-3U/PENTAHEX9-HP

Contact CM for drawing information concerning 3-5-7 slot models of this chassis series.

All chassis sizes share the same width and height dimensions. Chassis depth changes according to number of slots.

PENTAHEX-HP chassis front panel user free area is 107mm x 150mm.

*Specifications given in this product datasheet concern to 28VDC chassis versions.

Ordering Information

CHASSIS GENERIC PART NUMBER:

CM-ATR-3U /CT /B /I /W /FP /F /G /C

/CT Enclosure Cooling Technique

PENTAHEX(3-5-7-9)-HP: Sealed five Heat Exchangers + Heat Pipes 3U Enclosure

/B Backplane Type

VPX-G3: VITA 65 Gen3 Military VPX Backplane (3-5-6-7-9 Slot 1" Pitch) with RT2

VPX-G4: VITA 65 Gen4 Military VPX Backplane (3-5-6-7-9 Slot 1" Pitch) with RT3

/I PSU Input Power Voltage

28VDC: 28 VDC Input

48VDC: 48 VDC Input

72VDC: 72 VDC Input

270VDC: 270 VDC Input

/W Power Supply Unit Watts

S-575W: 28 VDC (+3.3VDC @ 23A, +12 VDC @ 42A)*

S-1075W: 28 VDC (+3.3VDC @ 23A, +12 VDC @ 84A)*

All PSUs = All PSUs except 28 VDC input | 28 VDC = 28 VDC input only

* Power supply has been developed in alignment with the SOSA™ Technical Standard

/FP Front Panel Layout

CMP: Standard CM front panel fitted with MIL-DTL-38999 connectors

UDP: User-defined front panel layout (requires customer drawing)

/F Rear-Mounted Fan Assembly

F115-400: 2x100 CFM PX3 Military fans (standard for PENTAHEX).

F200-400: 2x200 CFM 200 VAC 3PH @ 400Hz PX3 Military (optional for PENTAHEX).

- Full military Rotron PX3 AC fans. Operating range: -54°C to +125°C

/G Fan Finger Guards

EMIG: Optional EMI shielding finger guards with honeycomb filter

ANF: Optional finger guards with acoustic noise filter

/C Chassis Color

B: Black, G: Navy Grey, E: Army Dark Earth, W: White, R: Red, PT: Platinum, YW: Yellow, GN: Green, BLU: Dark Blue, CR: Chromate MIL-C-5541 or O: Other

PART NUMBER EXAMPLE:

CM-ATR-3U/PENTAHEX5-HP/VPX-3/28VDC/S-575W/UDP/F115-400/B

- 5 slot, 3U Avionics Enclosure, Gen-3 VPX Backplane 1" pitch.
- Sealed Five Heat Exchanger Enclosure + 16 Heat Pipes.
- 28VDC Power Supply Unit with 575W (+12VDC @ 42A, +3.3VDC @ 23A).
- Integrated Chassis Supervisory System (standard).
- Custom - User Defined Front Panel.
- Heat Exchanger Top Cover (standard).
- Heat Exchanger Bottom Cover (standard + 50mm wiring clearance).
- 2x Rotron PX3 military AC fans (200 CFM)
- EMI shielded finger-guard (Standard).
- Enclosure color: Black.

MOUNTING TRAY GENERIC PART NUMBER:

CM-TR-3U /PENTAHEX(3-5-7-9)-HP

The Mounting Tray for the CM-ATR-3U/HES-FBL3-HP enclosure incorporates two hold-down devices & four mounting platforms for installing shock absorbers and a set of chassis stainless steel hook plates.

LEARN MORE: WWW.CMCOMPUTER.COM

OR CALL : +34 954 253 116 | +34 954 253 119

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2
3
4



1



5-SLOT ↑80W
PAYLOAD POWER DISSIPATION

5-SLOT ↑120W
7-SLOT ↑160W
12-SLOT ↑180W
PAYLOAD POWER DISSIPATION

5-SLOT ↑200W
7-SLOT ↑300W
12-SLOT ↑400W
PAYLOAD POWER DISSIPATION

5-SLOT ↑100W
7-SLOT ↑130W
12-SLOT ↑180W
PAYLOAD POWER DISSIPATION

6U
0.8" PITCH

3U
1" PITCH

NATURAL AIR CONVECTION, LOW COST & WEIGHT, SILENT NO EXTERNAL FANS, INTERNAL FORCED-AIR

CONTAMINANT FREE, NATURAL AIR CONVECTION, LOW COST & WEIGHT, SILENT NO EXTERNAL FANS, INTERNAL FORCED-AIR, SUPPORTS CONDUCTION & AIR-COOLED MODULES

5
6
7



SEF

6U
0.8" PITCH

INCREASED NATURAL FREE-AIR CONVECTION, LOW COST & WEIGHT, DRY AIR CONTAMINANT FREE APPLICATIONS, SILENT NO EXTERNAL FANS, INTERNAL FORCED-AIR RECIRCULATION, SUPPORTS CONDUCTION & AIR-COOLED BOARDS



13
14
15

6U
0.8" PITCH

HES

CONTAMINANT FREE, FOUR FORCED-AIR HEAT EXCHANGERS, COST EFFECTIVE PERFORMANCE, INTERNAL FORCED-AIR RECIRCULATION, WIDE

SEF SEALED WITH EXTENDED FINS

S SEALED

INCREASED NATURAL FREE-AIR CONVECTION + 18/20 HEAT PIPES, ALL BOARD FORMATS, SILENT NO EXTERNAL FANS, INTERNAL FORCED-AIR RECIRCULATION, CONTAMINANT FREE

INCREASED AIR CONVECTION + 18 HEAT PIPES, SILENT NO EXTERNAL FANS, INTERNAL FORCED-AIR

0.8" PITCH
6U

SEF-18HP

1" PITCH
3U

SEF-HP SEALED WITH EXTENDED FINS + 18 HEAT PIPES

VPX CONDUCTION-COOLED APPLICATIONS, FOUR FORCED-AIR HEAT EXCHANGERS, LOW AIRFLOW RESISTANCE, DRY-AIR CONTAMINANT FREE, HIGH AIRFLOW REAR EXHAUST FANS, IMPROVED INTERNAL FORCED-AIR RECIRCULATION

1" PITCH
6U

HES

HES

SEALED WITH FOUR HEAT EXCHANGERS

HES-FBL-HP

H
W
P



8



VPX CONDUCTION-COOLED APPLICATIONS, SIX FORCED-AIR HEAT EXCHANGERS, LOW AIRFLOW RESISTANCE, DRY-AIR CONTAMINANT FREE, HIGH AIRFLOW REAR EXHAUST FANS, EXTREME INTERNAL FORCED-AIR RECIRCULATION

SIXHEX

1" PITCH
6U

SIXHEX

VPX CONDUCTION-COOLED APPLICATIONS, SIX FORCED-AIR HEAT EXCHANGERS, LOW AIRFLOW RESISTANCE, DRY-AIR CONTAMINANT FREE, HIGH AIRFLOW REAR EXHAUST FANS, EXTREME INTERNAL FORCED-AIR RECIRCULATION, DRY-AIR CONTAMINANT FREE

SIXHEX-20HP

5-SLOT ↑180W
7-SLOT ↑220W
12-SLOT ↑300W
PAYLOAD POWER DISSIPATION

9
10
11

5-SLOT ↑150W
PAYLOAD POWER DISSIPATION

16
17

5-SLOT ↑400W
7-SLOT ↑450W
PAYLOAD POWER DISSIPATION

29
30



5-SLOT ↑500W
7-SLOT ↑600W
PAYLOAD POWER DISSIPATION

34
35



5-SLOT ↑600W
7-SLOT ↑700W
PAYLOAD POWER DISSIPATION

CM Computer
VME CPCI & VPX READY

CM Computer
True Military COTS Products

46 MODELS

CM CHASSIS PRODUCT LINE

MILITARY ATP CHASSIS

5-SLOT ↑250W
PAYLOAD POWER DISSIPATION



3-SLOT ↑200W
5-SLOT ↑250W
7-SLOT ↑270W
9-SLOT ↑300W
PAYLOAD POWER DISSIPATION
HES-FBL

- 18
- 19
- 20
- 21

3-SLOT ↑320W
5-SLOT ↑400W
7-SLOT ↑450W
9-SLOT ↑500W
PAYLOAD POWER DISSIPATION
HES-FBL-HP

- 22
- 23
- 24
- 25

5-SLOT ↑450W
7-SLOT ↑500W
12-SLOT ↑600W
PAYLOAD POWER DISSIPATION

- 26
- 27
- 28

3U
1" PITCH

WIDE RANGE OF APPLICATIONS
HEAT EXCHANGERS

ES, FOUR FORCED-AIR HEAT
E, MEDIUM SIZE AND WEIGHT,
RANGE OF APPLICATIONS

NGERS

ES + WITH OR
WITHOUT HEAT
PIPES

SEALED WITH SIX HEAT
EXCHANGERS

ICATIONS, SIX
+ 20 HEAT
RESISTANCE,
L FORCED-AIR
MINANT FREE

1" PITCH
6U



HES-FBL
HES-FBL-HP

3U
1" PITCH

CONVENTIONAL LAYOUT, DRY-AIR
CONTAMINANT FREE FOR CONDUCTION
COOLED MODULES, FOUR FORCED-AIR
HEAT EXCHANGERS, INTERNAL AIR
RECIRCULATION



SIXHEX

6U
0.8" PITCH

DRY-AIR CONTAMINANT FREE, SUPPORTS
CONDUCTION & AIR-COOLED MODULES, SIX
FORCED-AIR HEAT EXCHANGERS, LOW AIRFLOW
RESISTANCE, HIGH AIRFLOW REAR EXHAUST
FANS, IMPROVED INTERNAL AIR RECIRCULATION

SEALED WITH SIX
HEAT EXCHANGERS
+ 16 OR 20 HEAT PIPES



SIXHEX-16HP

6U
0.8" PITCH

DRY-AIR CONTAMINANT FREE, SUPPORTS
CONDUCTION & AIR-COOLED MODULES, SIX HEAT
EXCHANGERS + 16 HEAT PIPES, EXTREME LOW
AIRFLOW RESISTANCE, EXHAUST AIRFLOW &
INTERNAL FORCED-AIR RECIRCULATION

SEALED WITH SEVEN HEAT
EXCHANGERS + 32, 36 OR
46 CROSS HEAT PIPES



SEVENHEX-CHP

6U
1" PITCH

DRY-AIR CONTAMINANT FREE, SUPPORTS
CONDUCTION MODULES ONLY, SEVEN HEAT
EXCHANGERS + CROSS FLOW HEAT PIPES,
ULTRA LOW THERMAL RESISTANCE,
INTERNAL FORCED-AIR RECIRCULATION &
HIGH PERFORMANCE MILITARY REAR FANS

SIXHEX-HP

SEVENHEX-CHP

PENTAHEX-HP

SEALED FIVE HEAT
EXCHANGERS + HEAT PIPES

VPX CONDUCTION-COOLED APPLICATIONS, FIVE
FORCED-AIR HEAT EXCHANGERS + HEAT PIPES,
VERY HIGH DISSIPATION CAPACITY, MILITARY
REAR FANS & INTERNAL FORCED-AIR
RECIRCULATION, DRY-AIR CONTAMINANT FREE

1" PITCH
3U

PENTAHEX-HP

FAC

OPEN FLOWTHROUGH
AIR COOLED

OPEN, NON-SEALED APPLICATIONS, HIGH COOLING EFFICIENCY, SUPPORTS
CONDUCTION & AIR-COOLED MODULES, LOW COST & WEIGHT, LOW AIRFLOW
RESISTANCE

OPEN, NON-SEALED, SUPPORTS CONDUCTION &
AIR-COOLED MODULES, LOW COST & WEIGHT

0.8" PITCH
6U

FAC

1" PITCH
3U

- 36
- 37
- 38
- 39



3-SLOT ↑450W
5-SLOT ↑550W
7-SLOT ↑650W
9-SLOT ↑750W
PAYLOAD POWER DISSIPATION

- 43
- 44
- 45

5-SLOT ↑400W
7-SLOT ↑450W
12-SLOT ↑700W
PAYLOAD POWER DISSIPATION



- 46

5-SLOT ↑300W
PAYLOAD POWER DISSIPATION

