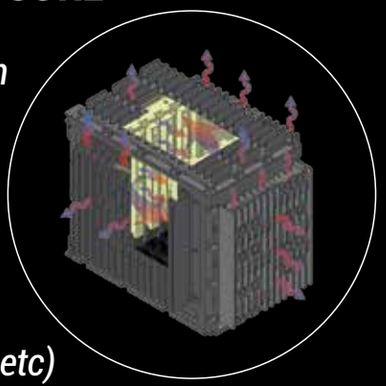
SEALED EXTENDED FINS + 18 HEAT PIPES 3U ATR ENCLOSURE

- *Extreme free-air performance, doubles conventional heat dissipation*
- *Exceptionally rugged, deploy and forget*
- *No risk, hermetically sealed 18 integrated heat pipes*
- *Double wall floating heat sinks with multiple airflow tunnels*
- *Maintenance free operation in harsh environments*
- *5 slot conduction-cooled 1" pitch or 6 slot 0.85" pitch modules*
- *Silent, no external fans (ideal for submarines, proximity to operators, etc)*
- *Dry air contaminant-free SWaP applications up to 150W payload power*
- *Internal forced-air recirculation to reduce payload module hot-spots*



1" 5

SEF-18HP

SEF + 18 HEAT PIPES

↑150W
PAYLOAD POWER DISSIPATION

SEF-18HP 3U ATR CHASSIS

Sealed Extended Fins + 18 Heat Pipes 3U ATR - Contaminant-free

suitable for high passive cooling VME, VPX & cPCI-S applications with 0.8, 0.85 & 1" pitch 3U eurocards

Our 3U *Sealed Extended Fins + 18 Heat Pipes* enclosure has been designed for SWaP applications that require superior passive cooling, extending natural-air convection to the limit of todays technology. Eighteen heat pipes are integrated to extend payload MTBF. This zero maintenance chassis has no external fans and is ideal for extremely harsh environments.

AVAILABILITY

The 3U CM Sealed Extended Fins + 18 Heat Pipes ATR is available in a 5 slot 1" or 6 slot 0.85" pitch version. This chassis fits our 3U military VME, cPCI-S or VPX compact backplanes and CM's most current Power Supply Units (up to 825 watts).

CHASSIS COOLING & COLD PLATE MOUNTING

Heat is dissipated by free-air convection to the surrounding environment. Internal recirculation fans ensure dry air is forced across conduction or air-cooled payload modules to double finned chassis walls. Cold plate can increase dissipation by 15%.

CM-ATR-3U/SEF-18HP Specifications

DIMENSIONS	W 214 mm I H 230 mm I D 266 mm	**SLOTS**	5 or 6
WEIGHT	8 Kg	**FRONT PANEL AREA**	125 mm x 140 mm
CGTR THERMAL RES.	ΔT/W = 0.214°C	**CM FRONT PANEL**	6 Power Pins (13 Amp) & 382 I/O Pins (5 Amp)
INTERNAL FAN	54 CFM	**TEMPERATURE SPEC**	-40°C to 85°C Op., -55°C to 100°C Stg.
MAX. PSU MODEL	C-825W	**MTBF**	25° GB 82,000 Hours, 65° AIC 27,000 Hours
PSU POWER	450 to 825 watts	**MOUNTING TRAY**	CM-TR-3U/SEF-18HP
STD BACKPLANE	VME64X or cPCI-S or VPX 5 slot 1" pitch 3U backplanes (0.85" 6 slot VPX also available)		
PSU V-INPUT	28 VDC ±30%, 48 VDC ±30%, 72 VDC ±30%, 270 VDC ±30%, Autorange 90-132 VAC RMS & 180-264 VAC RMS @ 47-880 Hz, 3-Phase 200 VAC @ 47-880 Hz ±30%		
SLOT/BOARD FORMAT	CCS: Conduction-cooled slots only or MCS: Slot-by-slot user configured card-cage allows intermixing conduction-cooled ANSI-VITA 48.2 & air-cooled ANSI-VITA 48.1 boards		

COMPLEMENTARY INFORMATION

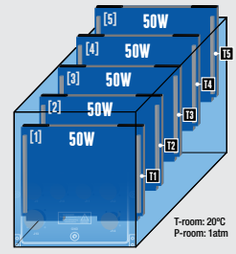
- CM ATR Common Features
- CM ATR Backplanes
- CM ATR Power Supplies

PART NUMBER EXAMPLE:

CM-ATR-3U/SEF-18HP/VPX/28VDC/B-450W/CMP/FTC/SBC/CCS/G

For ordering information see page last page of this datasheet.

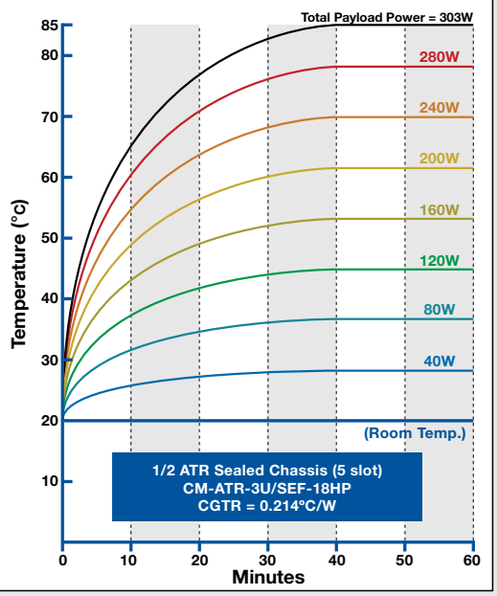
CM ATR CHASSIS THERMAL TESTING



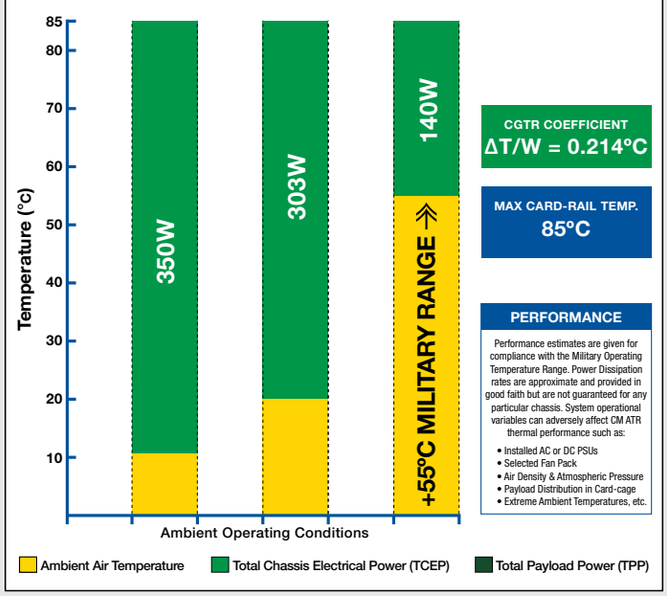
3U SEF-18HP Military ATR Chassis Performance

designed for high wattage, 1" pitch - sealed applications

Self-dissipation Military Chassis Figures
Total Payoad Power vs Board Card-rail Temperature



CM-ATR-3U/SEF-18HP (5 Slot - 3U ATR - 1" Pitch)
Power Dissipation vs Ambient Temperature

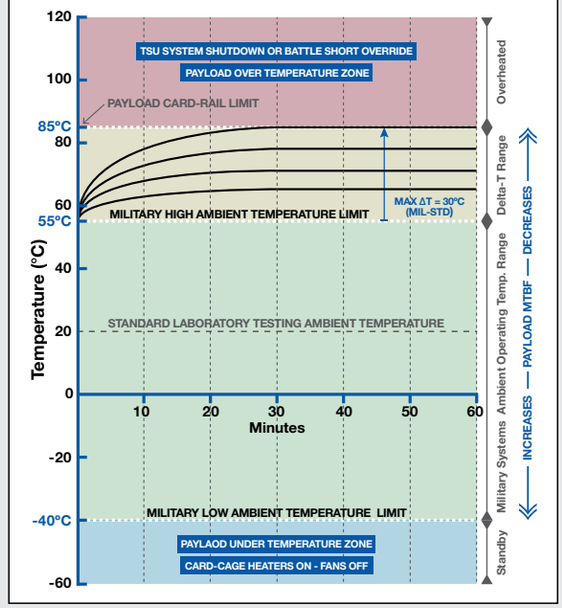


MAXIMUM MILITARY SYSTEM DELTA-T

Maximum conduction-cooled payload card-rail temperature is typically 85ºC. To comply with MIL-STD-810, systems must be operational up to 55ºC ambient (worst case scenario).

In theory, this restricts payload maximum ΔT to 85ºC - 55ºC (ΔTmax = 30ºC). Temperatures in excess of 85ºC dramatically increase the risk of module failure and reduce component MTBF. Military limits may be relaxed for systems serving in 'indoor environments' (e.g. to 40ºC ambient). Under these conditions ΔT margin can be increased to 85ºC - 40ºC = 45ºC ΔTmax.

Chassis Delta-T vs Payload Power &
Military Ambient Temperature Range



CM ATR ORDERING INFORMATION

3U Military ATR Chassis Ordering

SWaP military aerospace enclosure part number configuration

Please carefully follow our chassis ordering guide for configuring your 3U ATR part number. Note that all CM 3U Backplanes integrate a functional Temperature Supervisory Unit (TSU) that controls Power Supply and Fan operation. Remote optoisolated control switches for 'Battle-short' and chassis PSU 'on/standby' are also fitted as standard.

CHASSIS GENERIC PART NUMBER:

CM-ATR-3U /CT /B /I /W /FP /TC /BC /CS /F /C

/CT Enclosure Cooling Technique

S: Standard Sealed 3U Enclosure
SEF-18HP: Sealed with Extended Fins + 18 Heat Pipes 3U Enclosure
HES: Sealed with Heat Exchangers 3U Enclosure
HES-FBL(3-5-7-9): Sealed with Heat Exchangers 3U Enclosure
FAC: Flowthrough Air Cooled 3U Enclosure (open, non-sealed)

/B Backplane Type

VME64x: Military VME64x Backplane (5 Slot 3U 1" Pitch)
cPCI: Military Compact PCI Backplane (5 Slot 3U 1" Pitch)
cPCI-S: Military Compact PCI Serial R.2.0 Backplane (3-5-7-9 Slot 3U 1" Pitch)
VPX: VITA 46 Military VPX Backplane (3-5-7-9 Slot 3U 1" Pitch)
VPX-6: VITA 46 Military VPX Backplane (6 Slot 3U 0.85" Pitch)

/I PSU Input Power Voltage

28VDC: 28 VDC Input
48VDC: 48 VDC Input
72VDC: 72 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

A-475W: 28 VDC (+5 VDC @ 40A, +3.3 VDC @ 22A, ±12 VDC @ 8A)
A-575W: All PSUs (+5 VDC @ 40A, +3.3 VDC @ 22A, ±12 VDC @ 12A)
A-675W: 28 VDC (+5 VDC @ 80A, +3.3 VDC @ 22A, ±12 VDC @ 8A)▲
A-775W: All PSUs (+5 VDC @ 80A, +3.3 VDC @ 22A, ±12 VDC @ 12A)▲

B-450W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 45A, ±12 VDC @ 8A)
B-550W: All PS Us (+5 VDC @ 20A, +3.3 VDC @ 45A, ±12 VDC @ 12A)
B-564W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 80A, ±12 VDC @ 8A)▲
B-664W: All PSUs (+5 VDC @ 20A, +3.3 VDC @ 80A, ±12 VDC @ 12A)▲

C-475W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 22A, +12 VDC @ 16A,-12 VDC @ 8A)
C-575W: All PSUs (+5 VDC @ 20A, +3.3 VDC @ 22A, +12 VDC @ 21A, -12 VDC @ 12A)
C-775W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 22A, +12 VDC @ 41A, -12 VDC @ 8A)▲
C-825W: All PSUs (+5 VDC @ 20A, +3.3 VDC @ 22A, +12 VDC @ 41A, -12 VDC @ 12A)▲

D-550W: 28 VDC (+5 VDC @ 40A, +3.3 VDC @ 45A, ±12 VDC @ 8A)▲
D-650W: All PSUs (+5 VDC @ 40A, +3.3 VDC @ 45A, ±12 VDC @ 12A)▲

E-550W: 28 VDC (+5 VDC @ 20A, +3.3 VDC @ 45A, +12 VDC @ 16A, -12 VDC @ 8A)▲
E-650W: All PSUs (+5 VDC @ 20A, +3.3 VDC @ 45A, +12 VDC @ 21A, -12 VDC @ 12A)▲

F-575W: 28 VDC (+5 VDC @ 40A, +3.3 VDC @ 22A, +12 VDC @ 16A,-12 VDC @ 8A)▲
F-675W: All PSUs (+5 VDC @ 40A, +3.3 VDC @ 22A, +12 VDC @ 21A, -12 VDC @ 12A)▲

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

▲PSU not available for CM-ATR-3U/FAC & CM-ATR-3U/HES-FBL chassis models

MOUNTING TRAY GENERIC PART NUMBER:

CM-TR-3U /CT

/FP Front Panel Layout

CMP: Standard CM front panel fitted with MIL-DTL-38999 connectors
UDP: User-defined front panel layout (requires customer drawing)

/TC Chassis Top Cover

STC: Standard Top Cover. Wiring clearance 13mm
FTC: Standard Top Cover. Wiring clearance 13mm. (Std. on SEF-18HP)
HTC: High profile Top Cover. Wiring clearance 35mm
HETC: Heat Exchanger Top Cover. Wiring clearance 13mm (Std. on HES & HES-FBL)

/BC Chassis Bottom Cover

SBC: Standard Bottom Cover. Wiring clearance below backplane 25mm
HBC: High profile Bottom Cover. Wiring clearance below backplane 40mm

/CS Chassis Card-Cage Slot

MCS: Mixed Card-cage Slots (mixed conduction-cooled & air-cooled boards)
CCS: Conduction-cooled Card-cage Slots (conduction-cooled boards only)
- MCS is not available for CM-ATR-3U/HES-FBL chassis models

/F Rear-Mounted Fan Assembly

STDF-DC: 2x42 CFM DC Rugged fans (HES & HES-FBL) or 1x27 CFM DC Rugged fan (FAC)

STDF-AC: 2x47 CFM 115 VAC @ 400Hz Rugged fans (HES & HES-FBL) or 1x27 CFM DC Rugged fan (FAC)

F115-400: 2x65 CFM 115 VAC @ 400Hz Rotron PX2 Military fans (HES & HES-FBL) or 1x65 CFM Rotron PX2 Military fan (FAC)

F200-400: 2x120 CFM 200 VAC 3PH @ 400Hz Rotron PX2 fans (HES & HES-FBL) or 1x120 CFM Rotron PX2 Military fan (FAC)

- No rear fan required for CM-ATR-3U/S & /SEF-HP, omit option from part number.
- Rugged fans are fitted with aluminum housing. Operating range: -10ºC to +70ºC
- Full military Rotron PX2 AC fans. Operating range: -54ºC to +125ºC

/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:

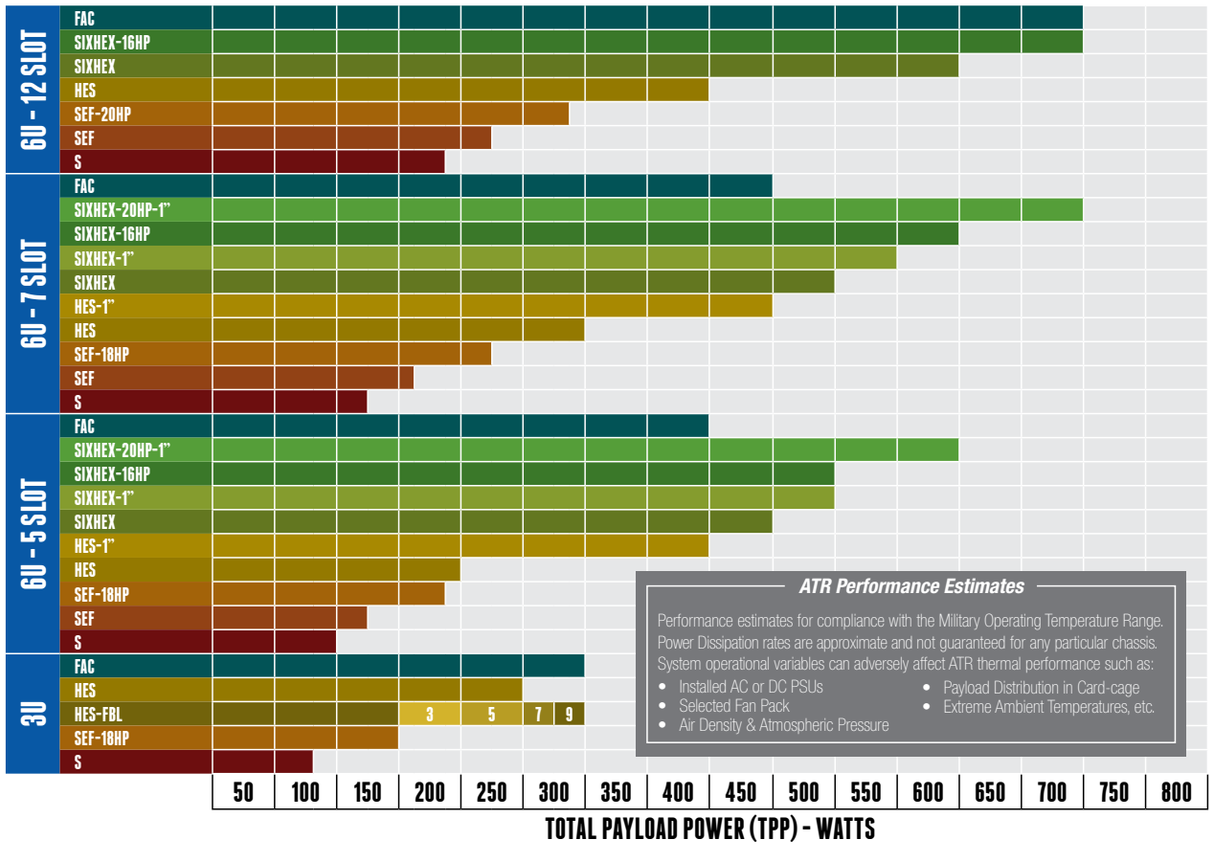
CM-ATR-3U/SEF-18HP/VPX/28VDC/A-475W/UDP/FTC/SBC/CCS/E

- 5 slot, Sealed with Extended Fins + 18 Heat Pipes 3U Avionics Enclosure.
- 5 slot, 3U VPX 1" Pitch backplane. 28VDC input power supply.
- A-475W power supply (+5 VDC @ 40A, +3.3 VDC @ 22A, ±12 VDC @ 8A).
- User-defined front panel layout (requires drawing).
- Finned Top Cover (↕13mm). Standard Bottom Cover (backplane ↕25mm).
- Conduction-cooled Card-cage Slots (conduction-cooled boards only).
- Enclosure color: Army Dark Earth.

CM ATR CHASSIS THERMAL TESTING

CM ATR Chassis Selection Chart

based on system total payload power dissipation



Glossary of Technical Terms

establishing new chassis engineering terminology

LT : Chassis Linear Thermal Test (Linear Test)
PT : Chassis Peak Slot Thermal Test (Peak Test)
MT : Chassis Mixed Linear & Peak Slot Thermal Test (Mixed Test)
LT-AV : Linear Test Payload Average Temperature
PT-AV : Peak Test Payload Average Temperature
MT-T1 : Mixed Test Slot 1 Payload Temperature
MT-AV : Mixed Test Payload Average Temperature (excluding Slot 1)
ΔT : Chassis Payload Delta-T with respect to Ambient Temperature
TPP : Total Payload Power
TCEP : Total Chassis Electrical Power
CPTR : Chassis Payload Thermal Resistance
CGTR : Chassis Global Thermal Resistance

CHMPF : Chassis Half MTBF Power Factor
CPMDC : Chassis Payload MTBF Degradation Coefficient
CIA : Chassis Installed Airflow
CEA : Chassis Effective Airflow
ADDT : Ambient Airflow Delta-T
CSAOP : Chassis Stable Airflow Operating Point
CIARC : Chassis Impedance Airflow Reduction Coefficient
MFARC : Multiple Fan Airflow Reduction Coefficient
OARC : Overall Airflow Reduction Coefficient
SCIDPC : Sealed Chassis Indirect Delta-T Power Coefficient
PEADT : Payload to Exhaust Airflow Delta-T
CCAAT : Chassis Cooling Airflow Average Temperature