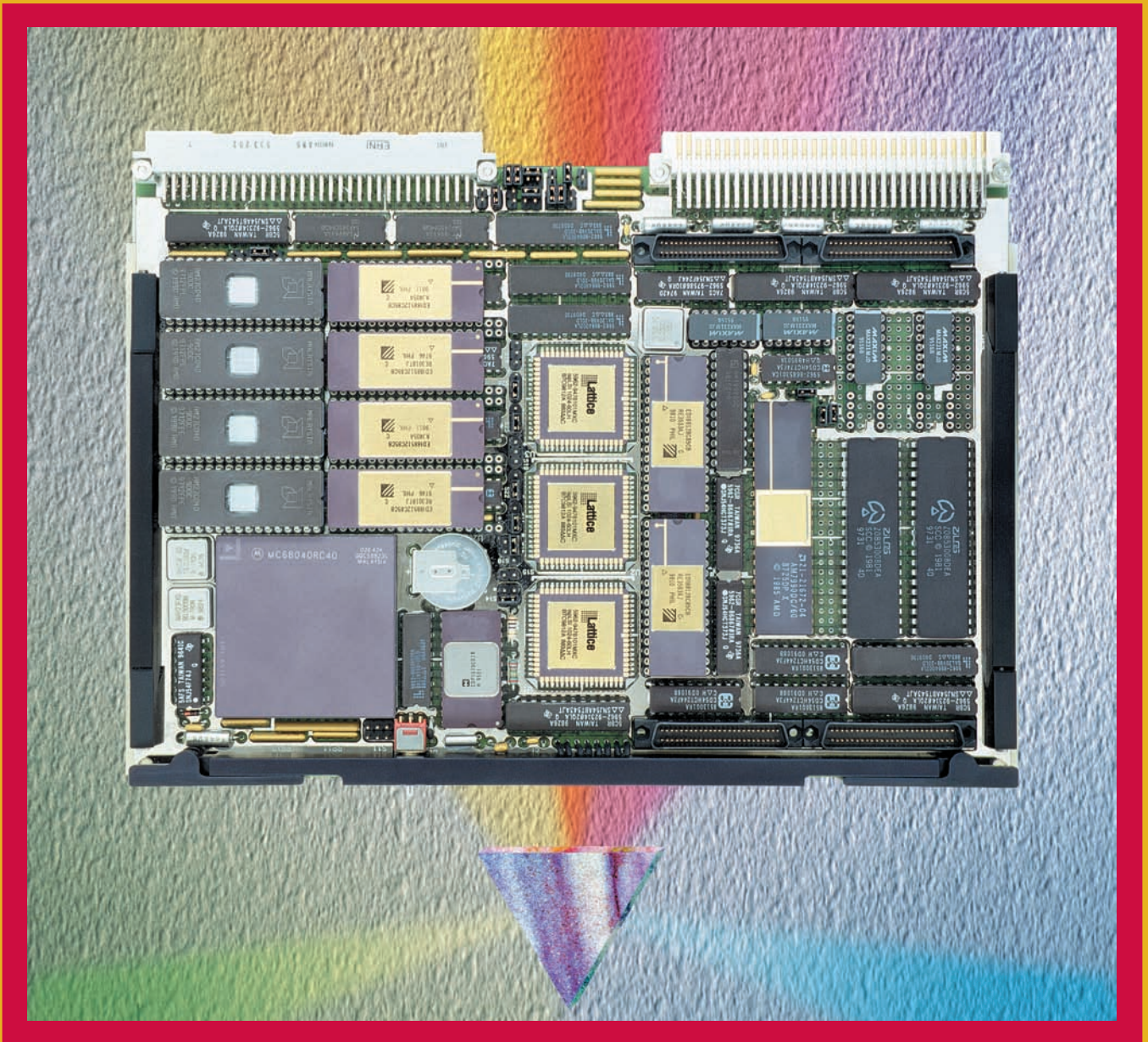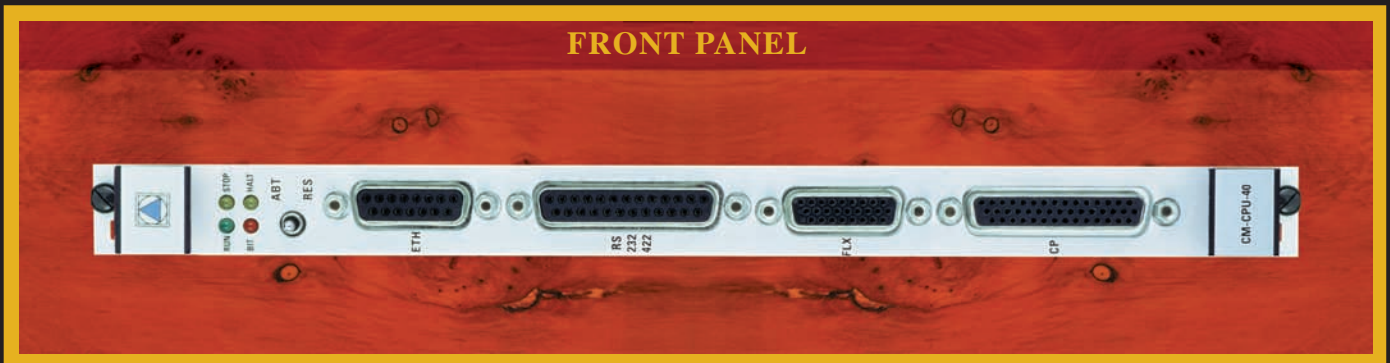# CM-CPU-40/60

MC-68040/60 Single Board Computer

Commercial, Industrial, MIL-Rugged & MIL-STD-883 Versions

DESCRIPTION

☐ The **CM-CPU-40/60** is a general purpose 32 bit VMEbus computer which incorporates all features and peripherals most demanded in today´s first class military and industrial applications.

☐ This high performance board has an efficient and comprehensive design, implementing most chips in classic DIL packages, wich improves reliability, testability and maintenance.

☐ The powerful 32 bit mezzanine interface increases memory or complements the existing full set of on-board peripherals and does not require additional slot.

☐ The **CM-CPU-40/60** offers a highly flexible I/O cabling solution using both the front panel and P2.

☐ Extensive software support offers BSPs for the leading real-time operating systems and Built-In-Test drivers for most functional modules and peripherals.

☐ Military versions, fitted with 100% ceramics parts and conduction cooled thermal overlay PCB, greatly improve capability to withstand shock and vibration.

☐ ☐The PCB metallic layer benefits heat dissipation increasing component longevity and module MTBF.

☐ This true military computer is fitted with popular industry-standard parts supplied by leading vendors. This insures long term availability in the market.

☐ All **CM-CPU-40/60** temperature and mechanical versions are 100% compatible at the functional level.

FRONT PANEL

TECHNICAL SPECIFICATIONS

|			
Microprocessor:	MC-68040/60 @ 33-40/50-66 MHz.	**Interrupt Handler:**	Manages the 7 VMEbus IRQ lines + 11 IRQs from local peripherals.
32 bit local SRAM:	2-4-8 MB. Battery backup.	**VMEbus Interrupter:**	I(3-7). Vector generation capability.
32 bit local PROM:	2-4 MB EPROM, E²PROM, PROM or onboard programmable FLASH.	**Arbiter & Requester:**	A PRI Arbiter and bus Requester are intended for multiprocessing.
Serial Ports: (Z8530)	2 sync-async. high speed RS-232/422 ports (optionally optoisolated).	**Watchdog (MAX690):**	Supervises Battery, VCC and MPU.
Ethernet Port: (AM7990)	IEEE 802.3 port with LANCE and up to 1MB of dedicated SRAM.	**CM-Pack Interface:**	A25/D32 mezzanine port allows up to 32 MB of memory or additional I/O devices without extra VME slot.
Real Time Clock: (CDP-1879)	Calendar, user Timer & Alarm. 100 mA/h rechargeable battery.	**Power consumption:**	+5 VDC @ 2,3 Amp.
CM-Flexiport: (Z8536/53C80/Z8530)	Option of 16 bit Parallel with 3 Timers, or SCSI-I, or 2 RS-232.	**Board Weight:**	
Registers:	Control & Status Registers. BIT pass/fail indicator on front panel.	**Military R+ & 883**	810 grams.
Two Mailboxes:	Assert interrupts to the MPU on specific VMEbus SRAM accesses.	**Commercial & Industrial**	605 grams.
VMEbus Interface:	A32/D32 Extended/Standard/Short IEEE 1014 rev. C master interface. A24/D32 SRAM slave interface. System Controller capability.	**Mechanical format:**	
		CM-CPU-40/60/A	Classic IEC-297 mechanics for 19" racks with I/O on front panel.
		CM-CPU-40/60/B	Military IEEE P1101 wedgelocks mechanics for ATR enclosures.
		Humidity:	Up to 95% RH non-condensing.
		Altitude:	Sea level up to 15 Km (50,000 ft.).

FEATURES

- MC-68040/60 @ 40/66 MHz with MMU, Math coprocesor & dual cache RAM.
- Up to 8 MB of 32 bit SRAM with battery backup.
- Up to 2-4 MB of 32 bit EPROM-FLASH-PROM.
- Two RS-232/422 serial ports based on Z8530.
- Ethernet port with LANCE & 1 MB SRAM.
- RTC Calendar with Timer, Alarm & Battery.
- CM-Flexiport with: 16 bit Parallel + 3 Timers (Z8536), or SCSI (53C80), or 2 RS-232 (Z8530).
- A32/D32 multiprocessing VMEbus master interface. A24/D32 local SRAM slave interface. System Controller Unit. VMEbus Interrupter.
- Two Mailboxes in dual port SRAM.

- 32 bit CM-Pack mezzanine interface supports 1553, ARINC-429, Graphics, Serial, FLASH, etc.
- Commercial, Industrial, Rugged & 883 versions.
- IEC-297 mechanics with I/O via front panel and military P1101.2 mechanics with wedge-locks.
- VME64x 160 pin P2 connector in P1101.2 version.
- Conduction cooled PCB with thermal overlay in MIL-Rugged and MIL-883 versions.
- Low power CMOS design (12 watts).
- Extensive software support.
- Extremely simple programming.
- Excellent price/performance ratio.
- Two year guarantee.
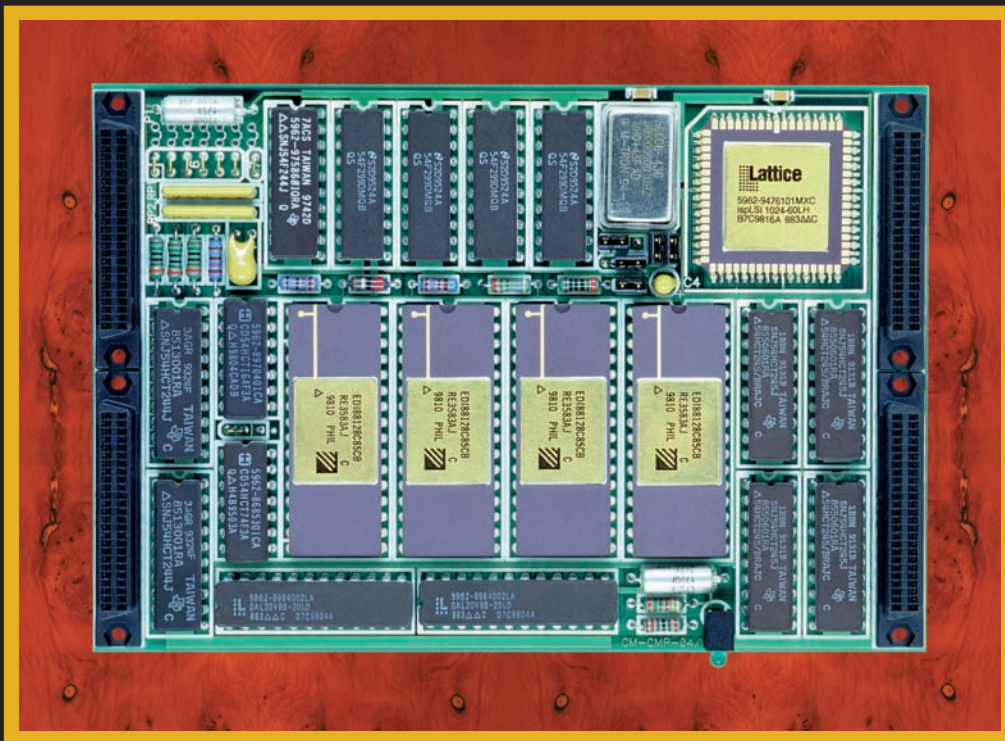
# MILITARY DESIGN

- -55 to +125 ºC ceramic military ICs.
- MIL-STD-883 TTL chips & FPGAs.
- High stability MIL-STD-883 SRAMs.
- MIL-C-55302 Class I Connectors.
- No PCB tracks in external layers.
- MIL-E-5400 for avionics equipment class 1B (Temperature and Altitude).

- MIL-STD-810 D Temperature (Methods 501.2 & 502.2).
- MIL-STD-810 D Shock and Vibrations (Methods 514 & 516).
- MIL-STD-810 D Saline Fog and Dust (Methods 507 & 509).
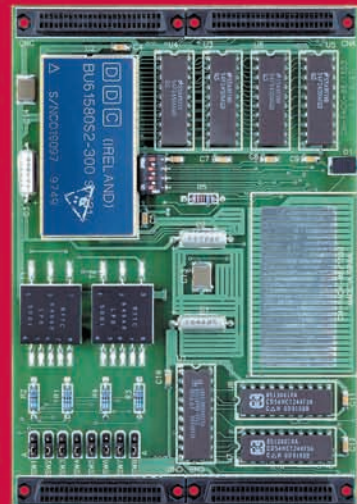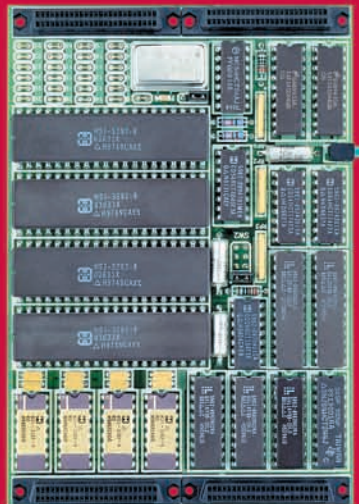- Military Class V Printed Circuit Board.
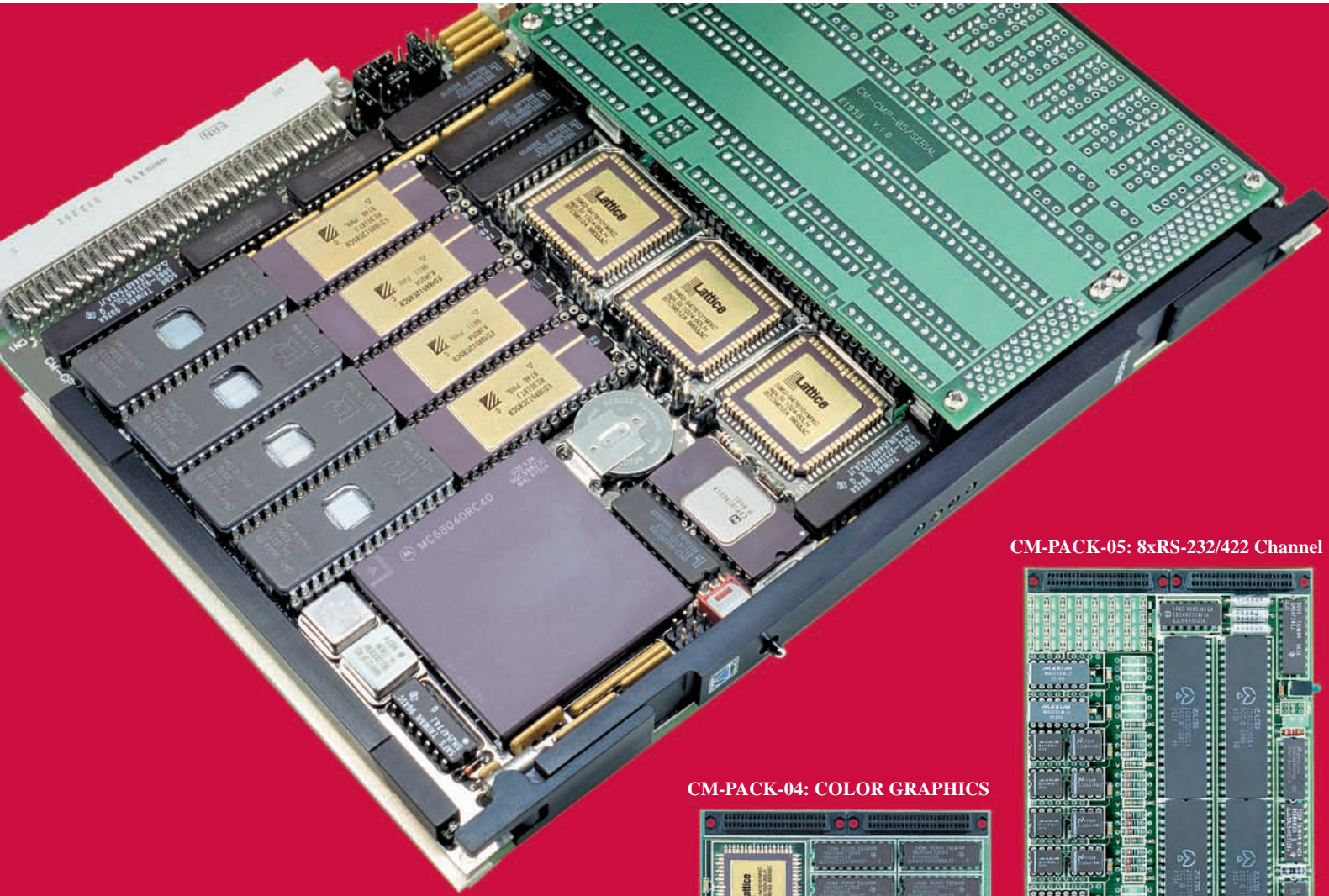
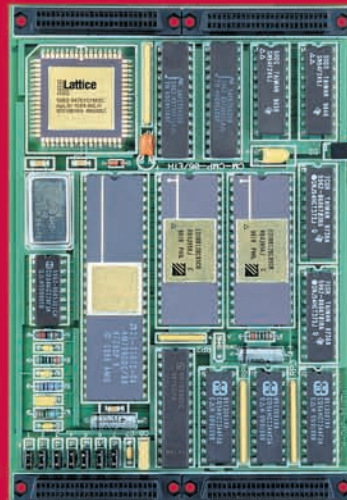CM-PACK-05: 8xRS-232/422 Channel
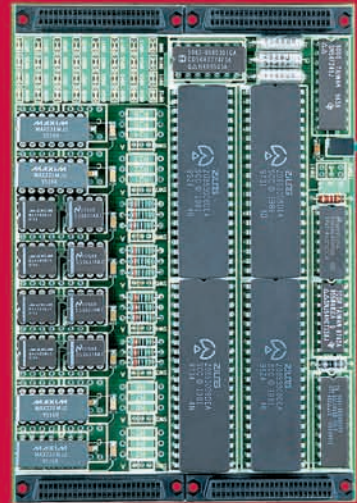
CM-PACK-04: COLOR GRAPHICS
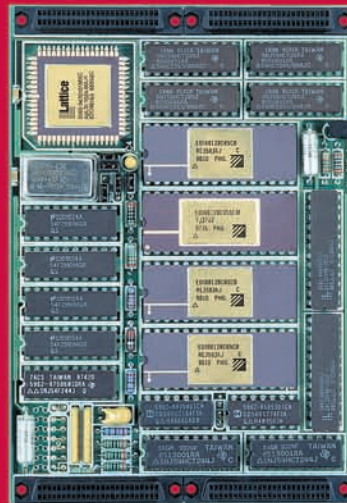
CM-PACK-08: DUAL 1553 PORT

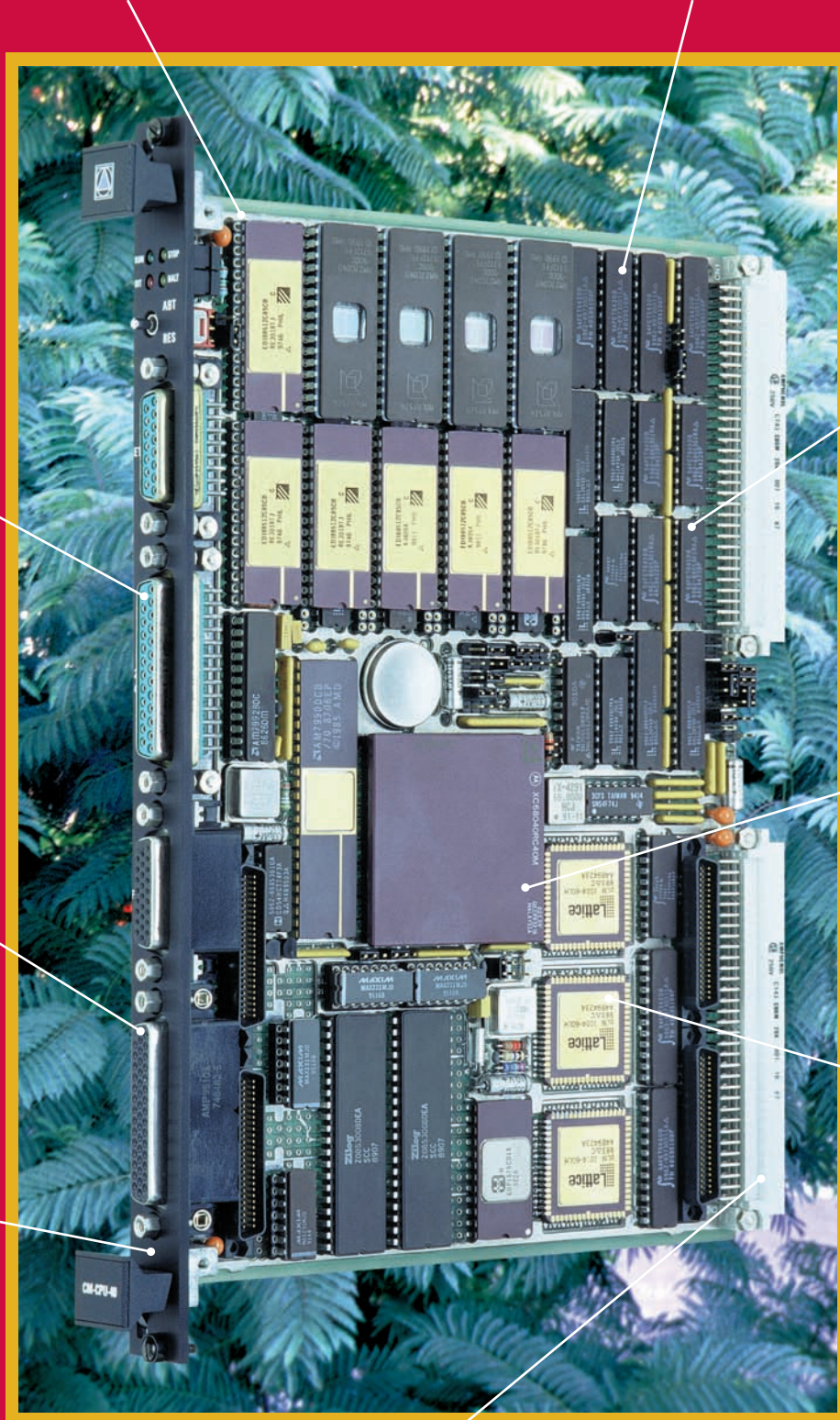CM-PACK-07: 8xARINC-429 Channel

CM-PACK-02: FLASH MEMORY

CM-PACK-06: ETHERNET PORT
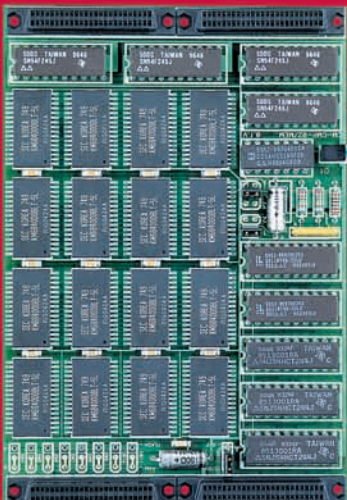
CM-CPU-40/60 CM-PACK MEZZANINE MODULES

CONDUCTION COOLED
thermal overlay PCB

CERAMIC MILITARY ICs
are rated for -55 to +125 ºC

A24/D32 VMEbus slave
interface accesses the
local SRAM

DUAL RS-232/422
port is fitted on a 25
pin cannon connector

MC68040 or MC68060
MPU is installed in
CM-CPU-40 or CM-
CPU-60 to optimize
cost or performance

CM-PACK MODULES
use a 44 pin cannon on
front panel for I/O

IEC-297 MECHANICS
allows module insertion
in 19'' 6U VME racks

MIL-STD-883 FPGAs
in LCC package
integrate a high
degree of glue logic

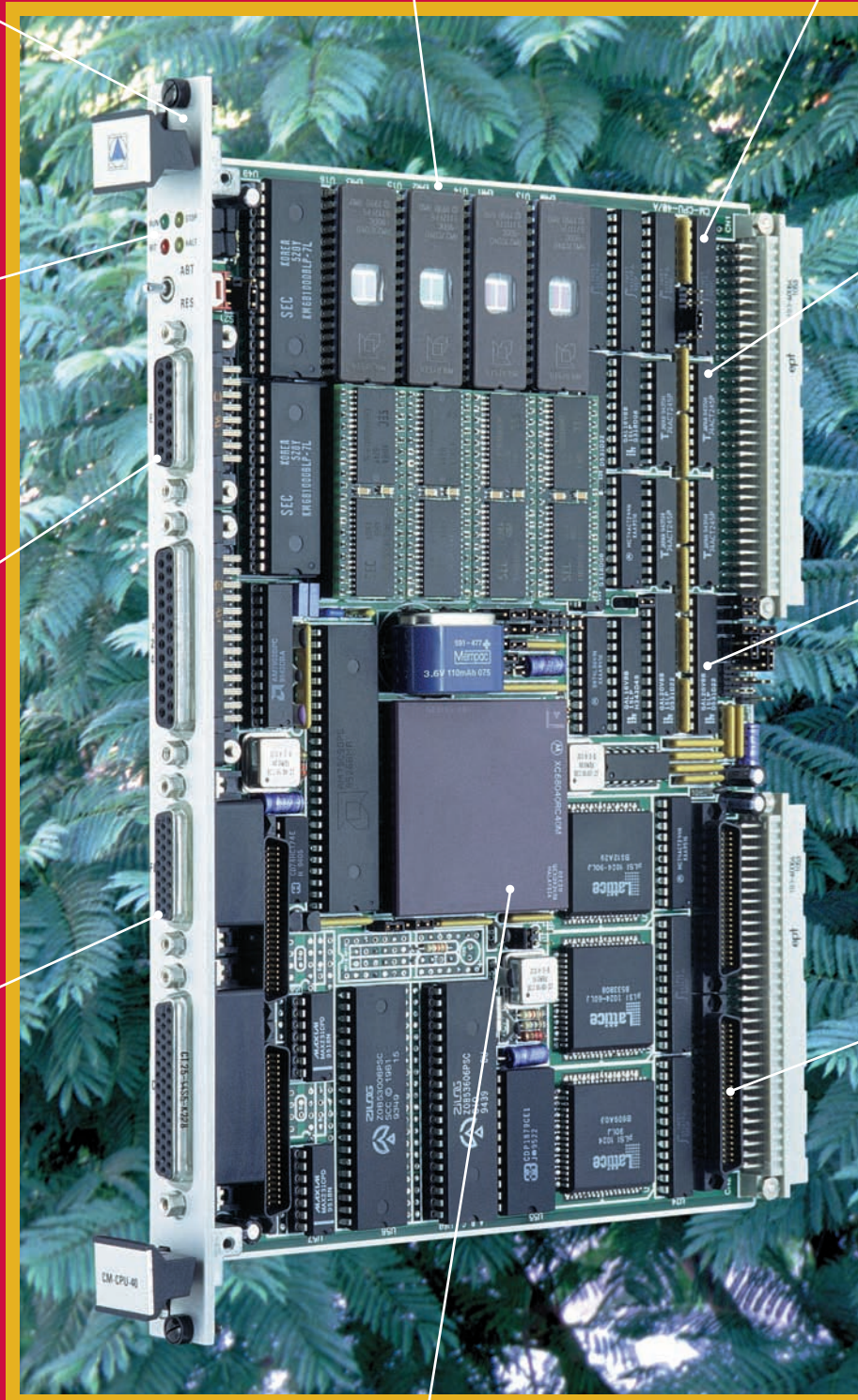**CLASS I MIL C-55302 & MIL C-24308 CONNECTORS**
withstand > 500 insertion cycles

CM-CPU-40/60/R+/A MILITARY RUGGED+ VERSION

IEC-297 6U MECHANICS
fitted with I/O connectors
on front panel

FIBERGLASS PCB
in Commercial and
Industrial version

LOW POWER CMOS IC's
improve power consumption
and increases module MTBF

A32/D32 VMEbus
master interface

FRONT PANEL LEDs
indicate Built-In-Test
report and MPU status

COMMERCIAL ICs
in plastic package and
0 to +70 °C range

ETHERNET PORT
uses a standard 15 pin
cannon on front panel

A25/D32 CM-PACK
interface has 200 I/O
pins offering capacity
similar to a 3U size
VMEbus board

CM-FLEXIPORT
connector wires
2xRS-232, or 16 bit
parallel, or SCSI-I

MPU in PGA PACKAGE
allows use of In-Circuit-Emulators
for software development

CM-CPU-40/60/C COMMERCIAL VERSION

P1101.2 6U MECHANICS fitted with wedge-locks for insertion in ATR enclosures

68040/60 MPU IN PGA SOCKET supports logic analyzer pods and improves module testability and maintenance

QUALIFIED MIL-STD-883 ICs in ceramic package and -55 to +125 ºC range

FAST STATIC RAMs require no parity control insuring data stability in the full temperature range

THERMAL PASTE behind ICs improves heat dissipation with the thermal overlay

FRONT PANEL with extraction handles improves mechanical performance

160 PIN VME64x P2 connector wires all peripherals & CM-Pack module I/O signals
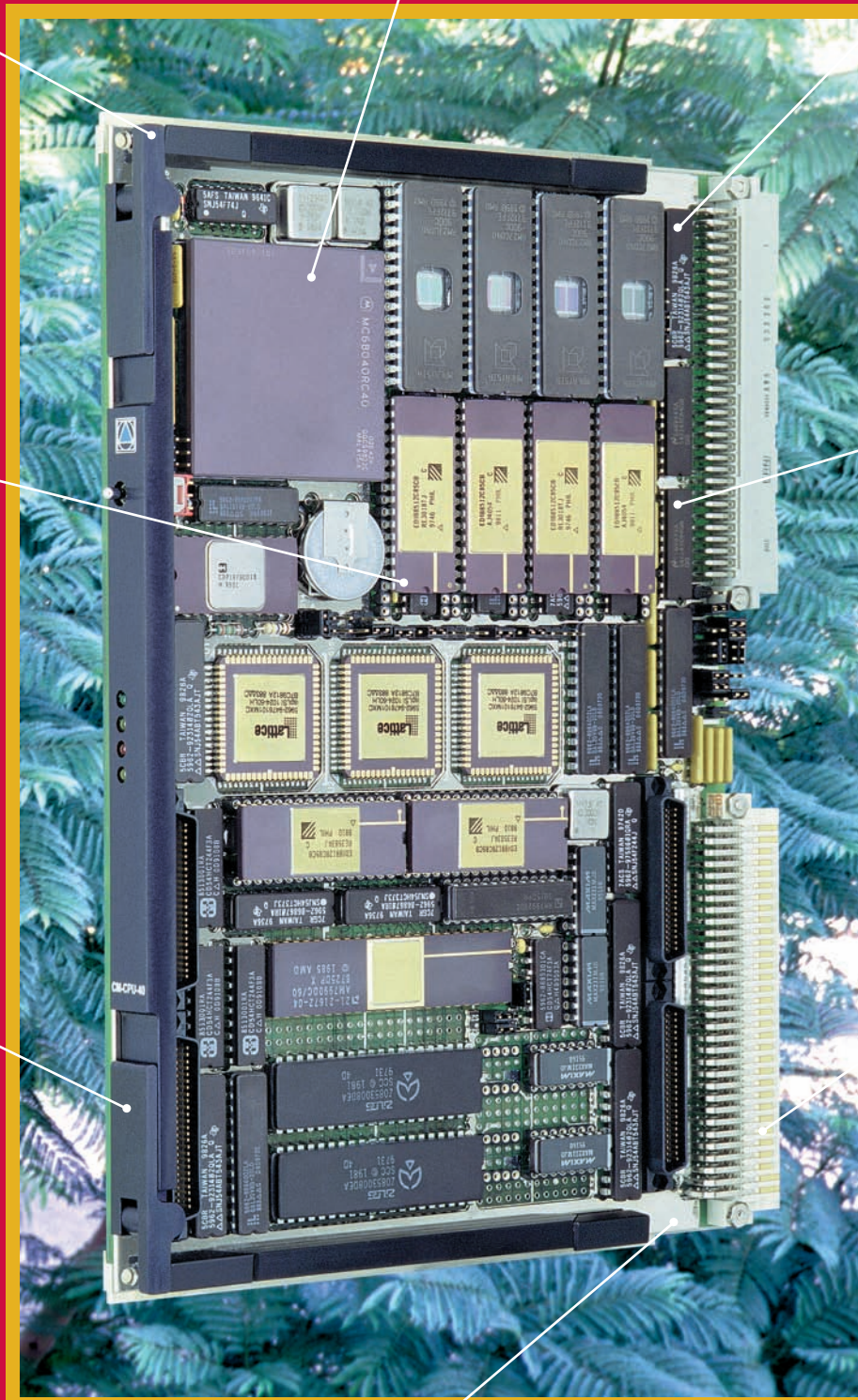
CONDUCTION COOLED thermal overlay PCB

CM-CPU-40/60/883/B MILITARY 883 VERSION

▲ BOARD RANGE

COMMERCIAL (C):
Implements low cost Commercial plastic IC's rated for 0 to +70 ºC. Continuous board operation from 0 to +55 ºC. Class II industrial quality connectors.

INDUSTRIAL (I):
Manufactured with Industrial range plastic or ceramic IC's rated for -40 (-25) to +85 ºC. Continuous module operation from -20 to +75 ºC. Class II industrial quality connectors.

MILITARY-RUGGED (R+):
Implements ceramic IC's rated from -55 to +125 ºC. Class I MIL-C-55302 connectors. MPU 68040/60RC in PGA ceramic package. Conduction cooled PCB with thermal overlay. Board operation from -40 to +85 ºC. Storage from -55 to +125 ºC.

MILITARY-STD-883 (883):
Manufactured with conduction cooled PCB and MIL-STD-883 B/C military ceramic IC's (-55 to +125 ºC). Class I MIL-C-55302 connectors. Continuous board operation range from -50 to +90 ºC. Storage from -55 to +125 ºC.

▲ SOFTWARE SUPPORT

Wind River Systems VxWorks Tornado
The CM-CPU-40/60 is fully supported by VxWorks Tornado. This leading Real Time Operating System is ideal for UNIX environments using a Sun-4 or PC as host.

CM-PC-Monitor & CM-PC-Supervisor
Low cost & easy to use CM proprietary development tool based on PC as host. User programs are compiled using the popular Microtec Research MCC68K cross tools.

Built-In-Test Package CM-CPU-40/60-BIT
Source code BIT drivers intended to test all onboard devices and peripherals.

Note: Drivers for other leading operating systems can be optionally supplied under request.

▲ DOCUMENTATION

LEVEL 1, CM-CPU-40/60 MAP: User´s manual. Module hardware functional description oriented toward software development.
LEVEL 2, CM-CPU-40/60 MMT: Maintenance manual. Extended description intended for failure location in the module.

▲ ORDERING INFORMATION

CM-CPU-40/60 /V /T /M

PCB Mechanical Version
  A: IEC-297 Standard mechanics with front panel I/O connectors.
  B: P1101.2 Military mechanics with dummy front panel & wedge-locks.

Board Temperature Range
  C: Commercial range. Available only with fiberglass PCB.
  I: Industrial range. Available only with fiberglass PCB.
  R+: Military Rugged+ range. Available only with conduction cooled PCB.
  883: Military 883 range. Available only with conduction cooled PCB.

Board Version
  1: 68040 @ 33 MHz, 2 MB SRAM, 2 RS-232/422, Ethernet + 256 KB SRAM, Flexiport, CM-Pack.
  2: 68040 @ 40 MHz, 2 MB SRAM, 2 RS-232/422, Ethernet + 256 KB SRAM, Flexiport, CM-Pack.
  3: 68040 @ 40 MHz, 4 MB SRAM, 2 RS-232/422, Ethernet + 256 KB SRAM, Flexiport, CM-Pack.
  4: 68040 @ 40 MHz, 8 MB SRAM, 2 RS-232/422, Ethernet + 1 MB SRAM, Flexiport, CM-Pack.
  1: 68060 @ 50 MHz, 8 MB SRAM, 2 RS-232/422, Ethernet + 256 KB SRAM, Flexiport, CM-Pack.
  2: 68060 @ 66 MHz, 8 MB SRAM, 2 RS-232/422, Ethernet + 1 MB SRAM, Flexiport, CM-Pack.

Mezzanine CM-Pack modules:
Memory, Color Graphics, Serial I/O, Ethernet, ARINC-429, BUS 1553, A/D, D/A, S/D, D/S, Isolated Outputs, Isolated Inputs, etc.

 Computer

Your local representative:

For more extensive information, contact CM Computer or your representative.