

## Intel® Core™ 2 Duo Processor 3U Single Board Computer



### APPLICATIONS

The TP 402/35x is a PC-compatible high performance, high functionality 3U CompactPCI® board supporting the Intel® Core™ 2 Duo processor, 1.5 GHz or 1.06 GHz. It utilizes the Intel 3100 embedded server chipset to support up to 4 Gbytes of soldered DDR2 ECC SDRAM. This single slot board features a variety of interfaces including dual Serial ATA150, dual Gigabit Ethernet, RS232/422 and USB. The TP 402/35x is capable of

operating in temperatures ranging from -40°C to +85°C where it is suitable for a range of demanding applications within the defense, industrial control, telecomms, telemetry, scientific and aerospace markets. Ruggedized conduction-cooled and ruggedized air-cooled versions are available. To simplify the board's integration many popular industry standard operating systems are supported.

### HIGHLIGHTS

- 1.06 GHz or 1.5 GHz Intel® Core™ 2 Duo processor:
  - 64 Kbytes L1 cache
  - 4 Mbytes L2 cache
  - Intel® 64 Technology (64-bit computing support)
  - low power processor
- 2 or 4 Gbytes of soldered DDR2-400 registered ECC SDRAM
- 2 x 10/100/1000Mbps Ethernet interfaces accessed via J2
- 5 x Serial ATA150 channels:
  - 2 x channels accessed via J2
  - 1 x channel for on-board Flash disk
  - 2 x channels routed to optional dual flash disk module
- 2 serial channel interfaces accessed via J2
- 2 x USB 2.0 interfaces accessed via J2
- CompactPCI controller:
  - operates in the system slot or in a peripheral slot
  - 32-bit at 33/66 MHz CompactPCI interface
- Option to bypass CompactPCI bus (Satellite Mode)
- Watchdog and long duration timer
- Option for graphics on separate PMC card:
  - graphics PMC card mounted on single slot 3U PMC carrier
  - analog and digital graphics via front panel and via PMC rear I/O
  - ruggedized or non-ruggedized versions
- Ruggedized air-cooled version (RA-Series):
  - -40°C to +75°C
  - conformally coated
  - see separate TP 402/35x-RA datasheet
- Ruggedized conduction-cooled version (RC-Series):
  - conduction-cooled to ANSI/VITA 30.1-2002
  - -40°C to +85°C
  - conformally coated
  - see separate TP 402/35x-RC datasheet
- Support for Linux®, Windows® XP, Windows® XP Embedded, Windows® Server 2003, Windows® 2000, QNX®, LynxOS® and VxWorks®

## Central Processor

- 1.06 GHz Intel® Core™ 2 Duo Processor U7500 or 1.5 GHz Intel Core 2 Duo processor L7400:-
  - using a FC-BGA 478 (micro Flip-Chip Ball Grid Array) package
  - 64 Kbytes of primary (L1) on-die cache
  - 4 Mbytes of shared secondary (L2) on-die cache
  - 667 MHz Front Side Bus (FSB)
  - Intel® 64 Technology (64-bit computing)
- utilizes 64-bit Intel® 3100 server chipset:-
  - single chip chipset with integrated memory and I/O controllers
- provision for ITP debug port

## DRAM

- 2 or 4 Gbytes soldered DDR2-400 registered ECC SDRAM using:-
  - single channel memory
  - single-bit error correction
  - peak bandwidth of up to 3.2 Gbytes/s
- accessible from processor or CompactPCI® bus

## Hard/Flash Disk Interfaces

- Serial ATA150 interfaces:-
  - transfer rate up to 150 Mbytes/s
- 2 x channels accessible via J2
- 1 x channel routed to on-board 512 Mbytes Flash disk
- 2 x channels routed to optional Flash Disk Module:-
  - one or two Flash disk drives
  - appear as one or two hard disk drives
  - uses XMC connectors (see Note 1)

## Ethernet Interfaces

- 2 x channels supporting:-
  - 10 Base-T, 100 Base-TX, 1000 Base-T
- implemented by Intel® 82571EB via x4 PCI Express® port
- both channels accessed via J2

## Optional Graphics Interface

- optional PMC card mounted on 3U CompactPCI PMC carrier:-
  - see separate IO PMC/722 and TP CRx/PMC datasheets
- for IO PMC/722:-
  - implemented by Silicon Motion SM722
  - analog and digital graphics accessed via front panel DVI-I connector or PMC rear I/O
  - 8 Mbytes video memory
  - resolutions up to 1280 x 1024; supporting up to 16M colors

## Serial Interfaces

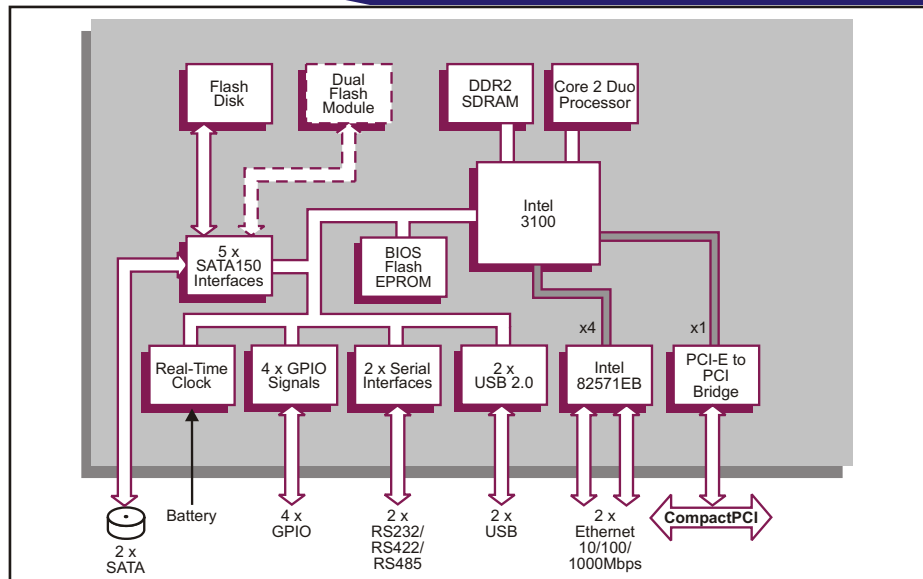
- 2 serial interfaces accessible via J2
- 1 x RS232 interface supporting Tx and Rx
- 1 x RS232 interface supporting Tx, Rx, RI, CTS, RTS, DSR, DTR and DCD or 1 x RS422/485 supporting Tx and Rx
- 16550 compatible UARTs

## Flash EPROM

- 1 Mbyte of BIOS Flash EPROM
- hardware write protect provided

## Firmware Support

- Phoenix™ TrustedCore BIOS
- Trusted Platform Module (TPM) support
- comprehensive Power-On Self-Test (POST)
- LAN boot firmware included



## Software Support

- supports Linux®, Windows® XP, Windows® XP Embedded, Windows® 2000, Windows® Server 2003, QNX®, LynxOS® and VxWorks®

## Other Peripheral Interfaces

- PC-compatible Real Time Clock (Year 2000 compliant)
- long duration timer
- watchdog timer
- legacy speaker interface
- 2 x USB 2.0 interfaces:-
  - both accessed via J2
- external battery supply for RTC and BIOS data
- 4 x GPIO signals via J2
- on-board I<sup>2</sup>C bus used for local temperature and power supply sensors, accessible via J1

## CompactPCI Interface

- universal signaling support, compliant with PICMG 2.0 R3.0; 3.3V or 5V signaling levels
- 33/66 MHz; 32-bit interface accessed via J1
- utilizing a PCI Express-PCI bridge for off-board accesses
- operates as a System Slot controller (supporting up to 7 Peripheral Slots) or operates in a Peripheral Slot:-
  - supports hot-swapping peripheral boards
  - PICMG 2.1 R2.0 Hot Swap Specification
- option to disable CompactPCI interface (Satellite Mode):-
  - receives power from CompactPCI bus
  - board can be hot swapped

## Electrical Specification

- +5V@3.1A (typical 1.5 GHz with 1Gbyte DRAM)
- +3.3V@3.7A (typical with 1Gbyte DRAM)
- +12V and -12V not required
- all voltages are tolerant to ±5%

## Safety

- PCB (PWB) manufactured with flammability rating of 94V-0

## Environmental Specification

- operating temperatures:-
  - 0°C to +55°C (N-Series)
  - -25°C to +70°C (E-Series)
  - -40°C to +85°C (K-Series)
- storage temperature: -40°C to +85°C
- 5% to 95% Relative Humidity, non condensing (operating or storage):-
  - K-Series includes humidity sealant
- ruggedized air-cooled version:-
  - rear plug compatible
  - see TP 402/35x-RA datasheet
- ruggedized conduction-cooled version:-
  - rear plug compatible
  - see TP 402/35x-RC datasheet

## Mechanical Specification

- 3U form-factor: 3.9 inches x 6.3 inches (100mm x 160mm)
- single slot
- connectors: IEC-1076-4-101 for J1-J2
- shock: 20G, 11ms, ½ sine
- vibration: 5Hz-2000Hz at 2g, 0.38mm peak displacement

**Note 1:** The XMC connectors are provided for the SATA Flash Disk Module only. The CPU heatsink for air-cooled boards does not allow an XMC module. The conduction-cooled board does support an optional XMC module (see the TP 402/35x-RC datasheet).

## ORDERING INFORMATION

Order Number      Product Description (Hardware)

TP 402/350-1y      1.06 GHz Core 2 Duo Processor U7500  
 TP 402/351-1y      1.5 GHz Core 2 Duo processor L7400

For the order number suffix (y) option please contact your local sales office:  
 where y = SDRAM size

y - up to 4 Gbytes SDRAM

For accessories please contact your local sales office.  
 For extended temperature or ruggedized versions please contact your local sales office.