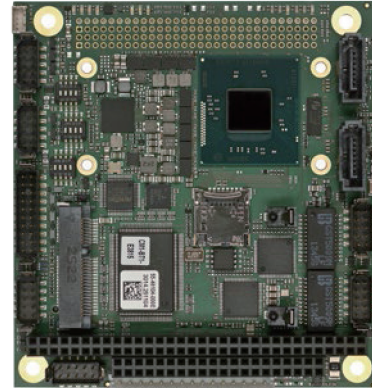# CM1-BT1

Extreme Rugged™ PC/104 Single Board Computer with Intel Atom® Processor System-on-Chip

Features

- Single-core Intel Atom® Processor System-on-Chip
- Up to 4GB DDR3L at 1333MHz
- Supports VGA and LVDS
- 2x GbE
- 1x SATA 3Gb/s (optional 2x SATA), 3x USB 2.0, 8x GPIO
- Extreme Rugged™ operating temperature: -40°C to +85°C
- Supports Smart Embedded Management Agent (SEMA) functions

PC/104

Specifications

● Core System

CPU
Single-core Intel Atom® Processor SoC Atom® E3815 (1C), 1.46 GHz, 400/- (No Turbo), 5W
Supports: single, Out-of-Order Execution (OOE) processor cores, Intel® VT-x, Intel® SSE4.1 and SSE4.2, Intel® 64 architecture, IA 32-bit, PCLMULQDQ Instruction DRNG, Intel® Thermal Monitor (TM1 & TM2)
Note: Availability of features may vary between processor SKUs

Memory
Up to 4GB DDR3L-1066/1333 MHz DDR3L SO-DIMM

Embedded BIOS
AMI EFI with CMOS backup in 8MB SPI BIOS

Cache
Primary 32 KiB, 8-way L1 instruction cache and 24 KiB, 6-way L1 write-back data cache

Expansion Busses
PC/104 (ISA)

SEMA Board Controller
Supports: Voltage/Current monitoring, Power Sequencing, Logistics and Forensic
Information, Flat Panel Control, I²C Bus Control, GPIO Control, User Flash, Failsafe
BIOS (dual BIOS), Watchdog Timer and Fan Control

Debug Headers
40-pin multipurpose flat cable connector
Note: Use in combination with DB-40 debug module providing BIOS POST code LED, BMC acces, SPI BIOS flashing, Power Testpoints, Debug LEDs

● Audio

Chipset
Intel® HD Audio integrated in SoC

Audio Codec
ALC888

● Ethernet

Intel® MAC/PHY
2x Intel® i210 (MAC/PHY) Ehternet controller

Interface
10/100/1000 GbE connection

● LPC

LPC
LPC UART NCT5104D (Nuvoton)

● Video

GPU Feature Support
7th generation Intel® graphics core architecture with four execution units
Supports two independent displays 3D graphics hardware acceleration
Supports for DirectX 11, OCL 1.1, OGL ES Halt/2.0/1.1, OGL 3.2
Video decode hardware acceleration including support for H.264, MPEG2, MVC, VC-1, WMV9 and VP8 formats
Video encode hardware acceleration including support for H.264, MPEG2 and MVC formats

LVDS
Single/dual channel 18/24-bit LVDS from eDP

VGA
Yes

Specifications

- **I/O Interfaces**

  USB
  3x USB 2.0 (1x on mSATA)

  SATA
  1x SATA 3Gb/s shared with mSATA (optional 2nd SATA 3GB/s port w/o mSATA support)

  GPIO
  8x

  Serial
  2x RS-232/422 (with full handshake) + 2x RS-232/422 (TX,RX,CTS,RTS only)

- **Power**

  Standard Input
  ATX = 5V±5% / 5Vsb ±5% or AT = 5V±5%

  Management
  ACPI 5.0 compliant

  Power States
  C1-C6, S0, S3, S4, S5 (Wake on USB S3/S4, Wake on LAN S3/S4/S5)

  ECO mode
  supports deep S5 for power saving

- **Operation System**

  Standard Support
  Windows 7/8 32/64-bit, Linux 32/64-bit

  Extended Support (BSP)
  WES7/8, WEC7, Linux, QNX, VxWorks

- **Mechanical and Environmental**

  Form Factor
  PC/104 Version 2.6

  Dimension
  90 mm x 96 mm

  Operating Temperature
  Standard: 0°C to +60°C
  Extreme Rugged: -40°C to +85°C

  Humidity
  5-90% RH operating, non-condensing
  5-95% RH storage (and operating with conformal coating)

  Shock and Vibration
  IEC 60068-2-64 and IEC-60068-2-27
  MIL-STD-202F, Method 213B, Table 213-I, Condition A and Method 214A, Table 214-I, Condition D

  HALT
  Thermal Stress, Vibration Stress, Thermal Shock and Combined

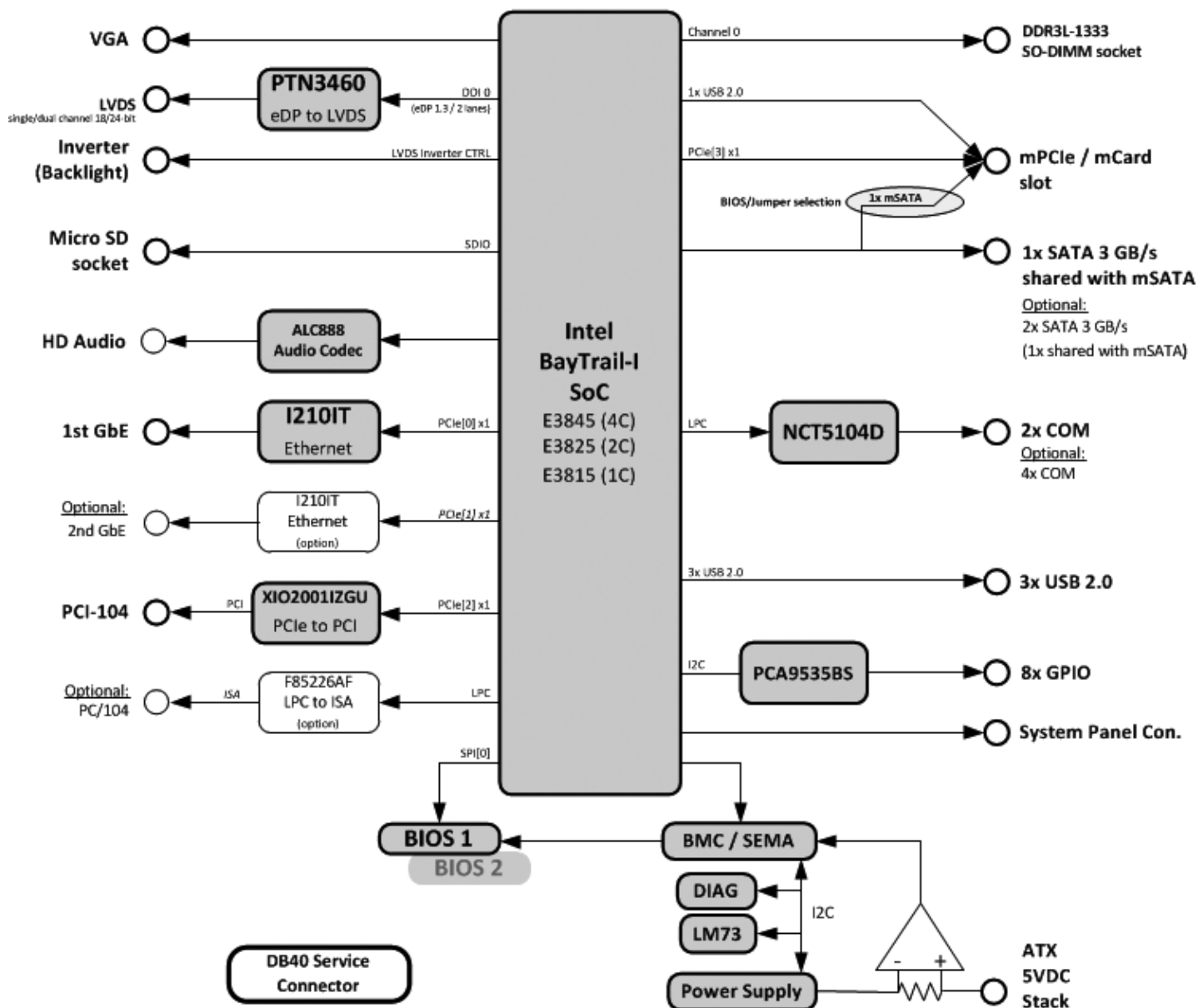- **Intelligent Middleware**

  SEMA®
  Local management, control of embedded computer systems
  Extended EAPI for monitoring, controlling and analytics applications
  Multiple OS support and across platforms (x86, ARM)

CM1-BT1

Functional Diagram

CMx-BTx

VGA

PTN3460
eDP to LVDS — DDI 0 (eDP 1.3 / 2 lanes)

LVDS
single/dual channel 18/24-bit

Inverter
(Backlight) — LVDS Inverter CTRL

Micro SD
socket — SDIO

HD Audio — ALC888
Audio Codec

1st GbE — I210IT
Ethernet — PCIe[0] x1

Optional:
2nd GbE — I210IT
Ethernet
(option) — PCIe[1] x1

PCI-104 — PCI — XIO2001IZGU
PCIe to PCI — PCIe[2] x1

Optional:
PC/104 — ISA — F85226AF
LPC to ISA
(option) — LPC

SPI[0]

Intel
BayTrail-I
SoC
E3845 (4C)
E3825 (2C)
E3815 (1C)

Channel 0 — DDR3L-1333
SO-DIMM socket

1x USB 2.0

PCIe[3] x1 — mPCle / mCard
slot

BIOS/Jumper selection — 1x mSATA

1x SATA 3 GB/s
shared with mSATA
Optional:
2x SATA 3 GB/s
(1x shared with mSATA)

LPC — NCT5104D — 2x COM
Optional:
4x COM

3x USB 2.0 — 3x USB 2.0

I2C — PCA9535BS — 8x GPIO

System Panel Con.

BIOS 1
BIOS 2

DB40 Service
Connector

BMC / SEMA

DIAG

LM73 — I2C

Power Supply

ATX
5VDC
Stack

CM1-BT1

Ordering Information

- **CM1-BT1-E3815**
  PC/104, Atom E3815, 1.46 GHz, single-core, incl. heat spreader, standard operating temperature: 0°C to +60°C

- **CM1-BT1-E3815/ETT**
  PC/104, Atom E3815, 1.46 GHz, single-core, incl. heat spreader, extended operating temperature: -40°C to +85°C (screening)

- **CMx-BTx-X-10**
  CMx-BTx cable kit

- **CMx-BTx-TM-10**
  Passive low profile heatsink for CMx-BTx

- **CMx-BTx-TM-20**
  Active low profile heatsink for CMx-BTx (with fan)

- **DDR3L memory**
  Verified 2GB, 4GB DDR3L SODIMM memory available

  *other configurations by request

CMx-BTx Standard Variant Comparison

Model Number	CM1-BT1-E3815		CM2-BT2-E3825		CM3-BT4-E3845		CM3-BT1-E3815	
Form factor	PC/104		PC/104-Plus		PCI-104		PCI-104	
PCI Bus (PCI-104)	No		Yes		Yes		Yes	
ISA Bus (PC/104)	Yes		Yes		No		No	
CPU	E3815		E3825		E3845		E3815	
CPU cores	1		2		4		1	
VGA	1x		1x		1x		1x	
LVDS	1x		1x		1x		1x	
	config 1	config 2	config 1	config 2	config 1	config 2	config 1	config 2
SATA	2	1	2	1	2	1	1	0
mSATA	0	1	0	1	0	1	0	1
mPCIe	1	0	1	0	1	0	1	0
MicroSD card slot	1x		1x		1x		0x	
GbE	2x		2x		2x		1x	
COM	4x		4x		4x		2x	
GPIO	8x		8x		8x		8x	
HD Audio	1x		1x		1x		1x	
USB 2.0	3x		3x		3x		3x	

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