nanoETXexpress

Specification

Revision 1.0

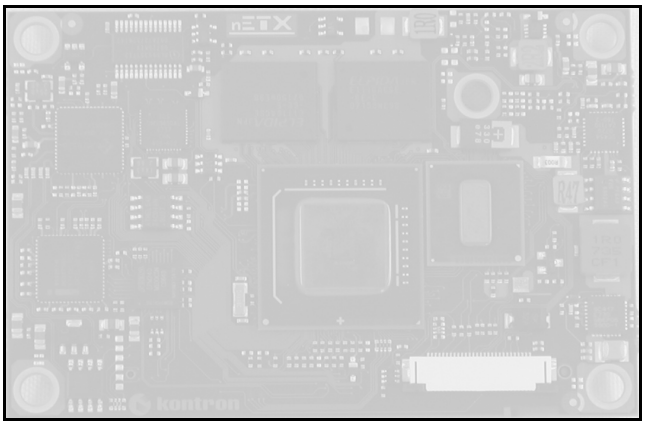


Figure 1 nanoETXexpress board

Contents

1. Introduction

1.1 nanoETXexpress Specification and COM Express™ Design Guide

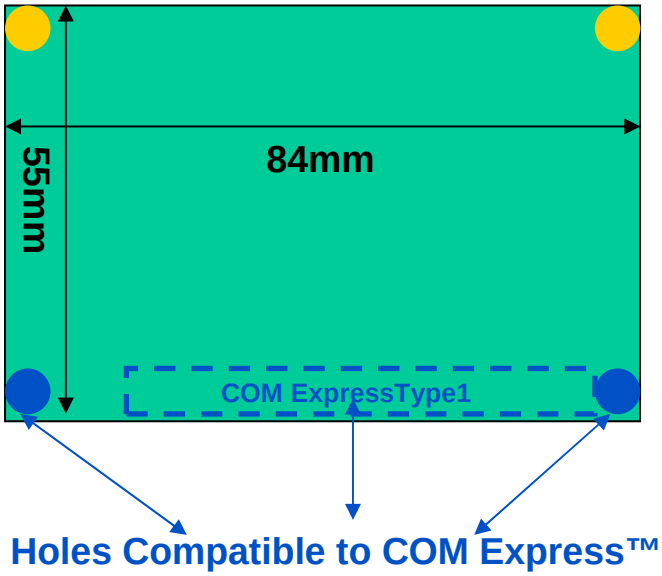
The nanoETXexpress specification is an additional document to the open PICMG® industry standard adopted for Computer-On-Modules. All specification defined in the COM Express™ COM.0 specification are valid for nanoETXexpress. All differences are defined in this document.

COM Express™ design guide provides recommendations on designing COM Express™ baseboards to support various features of COM Express™ modules. The COM Express™ Design Guide, based upon the COM Express™ COM.0 specification, discusses capabilities defined in the specification with schematic examples where applicable and offers ideas to consider for maximum flexibility in designing baseboards.

2. Module Configuration

Beside the standard module sizes the basic module and the extended module two more module sizes are defined. The established compact module and the nano form factor based on COM Express™ COM.0 interface specification. The primary difference between the nano module, the compact module, the basic module and the extended module is the over-all physical size and the performance envelope supported by each. The extended module is larger and can support more powerful processor and memory solutions in terms of power supply and heat dissipation. The nano module, the compact module, basic module and extended module use the same connectors and pin-outs and utilize several common mounting-hole positions.
Up to 440 pins of connectivity are available between COM Express™ modules and the carrier board. Legacy buses such as PCI, parallel ATA, LPC, HD Audio (or AC'97) can be supported as well as new high speed serial interconnects such as PCI Express, Serial ATA or SAS and Gigabit Ethernet. To enhance interoperability between COM Express™ modules and carrier boards, five common signalling configurations (Pin-out Types) have been defined to ease system integration.
Some pin-out type definitions like the Type I require only a single 220-pin connector and others require both 220-pin connectors to supply all the defined signalling.

Figure 2 – Type I nanoETXexpress
top view (X1 is on bottom side, seen through pcb), all coordinates in mm



3. Module Pin-out Type Definitions

nanoETXexpress defines COM Express™ COM.0 Type 1 connector.
Pin-out Type 1 modules have a single 220-pin connector, pin row A-B. See PIGMG® COM.O COM Express™ Module Base Specification for detailed

Type 1 modules allow for a minimal possible feature set using two of the four available connector rows. Type 1 represents a basic feature set with the benefit of simplified routing of the carrier board to allow a lower layer count board.

COM Express™ required and optional features are summarized in the following table. The features identified as minimum (Min.) shall be implemented by all modules. Features identified up to maximum (Max) may be additionally implemented by a module.

3.1 Module Pin-out Type 1 – Required and Optional Features

	COMexpress COM.0 Type 1 (Single connector) Min / Max	**nanoETXexpress (Single connector) Min / Max**	**Note**
System I/O			
PCI Express Lanes 0 - 5	2/6	1/6	
LVDS Channels	0/2	0/2	
VGA Port	0/1	0/1	
TV-Out	0/1	0/1	
SATA / SAS Ports	0/4	0/4	
HD Audio	0/1	0/1	
USB 2.0 Ports	4/8	4/8	Including client Port 7
USB client Port	--	0/1	USB Port 7
LAN 0 (10/100Base-T min)	1/1	1/1	
Express Card Support	1/2	1/2	
LPC Bus	1/1	1/1	
System Management			
General Purpose Inputs	4/4	4/4	
General Purpose Outputs	4/4	4/4	
SDIO optional to GPIO	NA	0/1	Shared with GPIO
SMBus	1/1	1/1	
I²C	1/1	1/1	
Watch Dog Timer	0/1	0/1	
Speaker Out	1/1	1/1	
External BIOS ROM support	0/1	0/1	
Reset Functions	1/1	1/1	
Power Management			
Thermal Protection	0/1	0/1	
Battery Low Alarm	0/1	0/1	
Suspend	0/1	0/1	
Wake	0/2	0/2	
Power Button Support	1/1	1/1	
Power Good	1/1	1/1	

3.2 Alternative Pin description for SDIO interfaces Secure Digital Input Output.

Pin	GPIO	SDIO	Pin	GPIO	SDIO
A54	GPI0	DATA0	B54	GPO1	CMD
A63	GPI1	DATA1	B57	GPO2	WP
A67	GPI2	DATA2	B63	GPO3	CD#
A85	GPI3	DATA3			
A93	GPO0	CLK			

3.3 SDIO Pin description

Signal	Type	Description
SD_DATA[3:0]	I/O CMOS3.3	**SDIO Controller 0/1/2 Data:** These signals operate in push-pull mode. The SD card includes internal pull-up resistors for all data lines. By default, after power-up, only SDn_DATA0 is used for data transfer. Wider data bus widths can be configured for data transfer.
SD_CMD	I/O CMOS3.3	**SDIO Controller 0/1/2 Command:** This signal is used for card initialization and transfer of commands. It has two operating modes: open-drain for initialization mode, and push-pull for fast command transfer.
SD1_CLK	O CMOS3.3	**SDIO Controller 0/1/2 Clock:** With each cycle of this signal a one-bit ransfer on the command and each data line occurs. This signal is generated by Intel SCH at a maximum frequency of: 24 Mhz for SD and SDIO. 48 Mhz for MMC.
SD0_WP	I CMOS3.3	**SDIO Controller 0/1/2 Write Protect**: These signals denote the state of the write-protect tab on SD cards.
SD1_CD#	I CMOS3.3	**SDIO Controller 0/1/2 Card Detect:** Indicates when a card is present in an external slot.

3.4 USB Client Port

nanoETXexpress defines one USB port for USB client possibilities. COM Express™ USB Port7 is defined for client operation; it can be used either as a USB host or USB client. Please refer to nanoETXexpress board manual for supporting USB client functionality

Intel® SCH US15W Platform specific USB routing (only for reference)

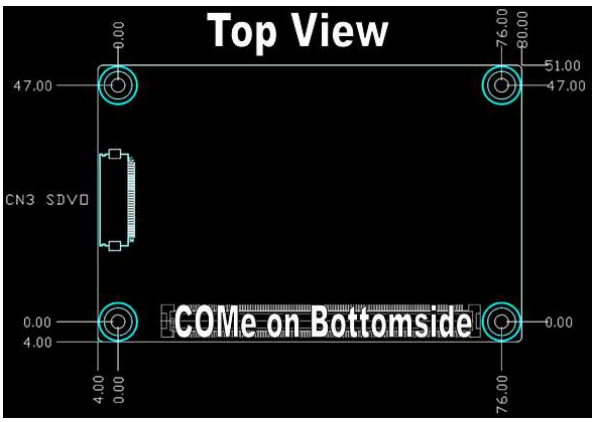
Onboard routing			recommended Use
Poulsbo	**Description**	**COMexpress**	
USB3 **USB2**	USB 2.0 compliant, **USB 2.0 can be set as client**	USB6 **USB7**	Xpress Card **USB client port**
USB6 USB7	Not USB compliant, no UHCI controller	USB4 USB5	Internal use
USB4 USB5	USB 2.0 compliant	USB2 USB3	USB Standard connector
USB0 USB1	USB 2.0 compliant	USB0 USB1	USB Standard connector

4. SDVO on FFC/FPC connector

nanoETXexpress defines an optional FFC/FPC for SDVO signals

SDVO on FFC/FPC

Hirose FH12-30S-0.5SH(55), 30-pin FFC/FPC Connector or compatible
Position of FFC/FPC connector



Pin Out Description

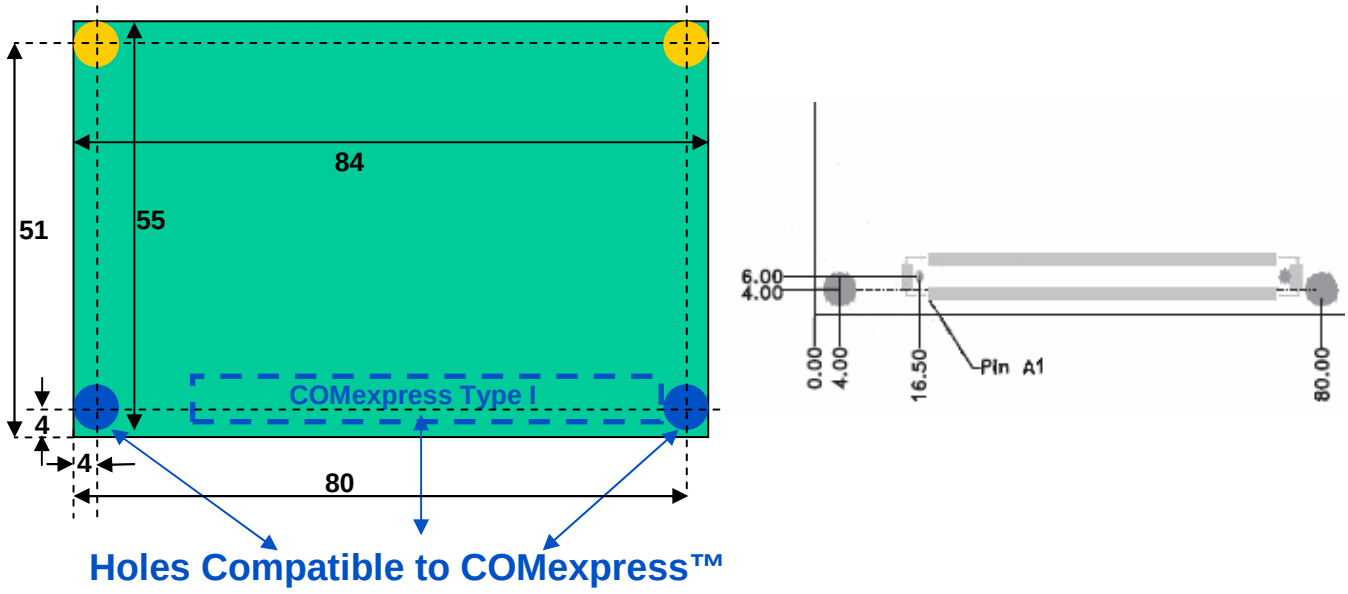
Pin	Signal	Description	I/O
1	GND	Ground	
2	SDVOB_CK-	Serial Digital Video B clock complement.	O
3	SDVOB_CK+	Serial Digital Video B clock .	O
4	GND	Ground	
5	SDVOB_GREEN-	Serial Digital Video B green complement.	O
6	SDVOB_GREEN+	Serial Digital Video B green .	O
7	GND	Ground	
8	SDVOB_INT-	Serial Digital Video input interrupt complement.	I
9	SDVOB_INT+	Serial Digital Video input interrupt.	I
10	GND	Ground	
11	SDVOB_BLU-	Serial Digital Video B blue complement .	O
12	SDVOB_BLU+	Serial Digital Video B blue .	O
13	GND	Ground	
14	SDVOB_RED-	Serial Digital Video B red complement .	O
15	SDVOB_RED+	Serial Digital Video B red.	O
16	GND	Ground	
17	SDVO_FLDSTALL-	Serial Digital Video Field Stall Complement.	I
18	SDVO_FLDSTALL+	Serial Digital Video Field Stall.	I
19	GND	Ground	
20	SDVO_I2C_CK	I2C based control signal (Clock) for SDVO device.	I/O
21	SDVO_I2C_DAT	I2C based control signal (Data) for SDVO device.	I/O
22	RESET#	RESET signal	O
23	+3.3V	Power supply +3.3V	
24	+2.5V	Power supply +2.5V	
25	+5V	Power supply +5V	
26	GND	Ground	
27	SDVO_TVCLKIN-	Serial Digital Video TV-OUT Synchronization Clock	I
28	SDVO_TVCLKIN+	Serial Digital Video TV-OUT Synchronization Clock	I
29	+3.3V	Power supply +3.3V	
30	+5V	Power supply +5V	

5. Mechanical Specification

5.1 Module Size - nanoETXexpress

The PCB size for the nanoETXexpress module is defined as 55mm x 84mm.
The holes shown in this drawing are intended for mounting the module / heat-spreader combination to the carrier board. An independent, implementation specific set of holes and spacers shall be used to attach the heat-spreader to the module.

Figure 3 – nanoETXexpress Form Factor

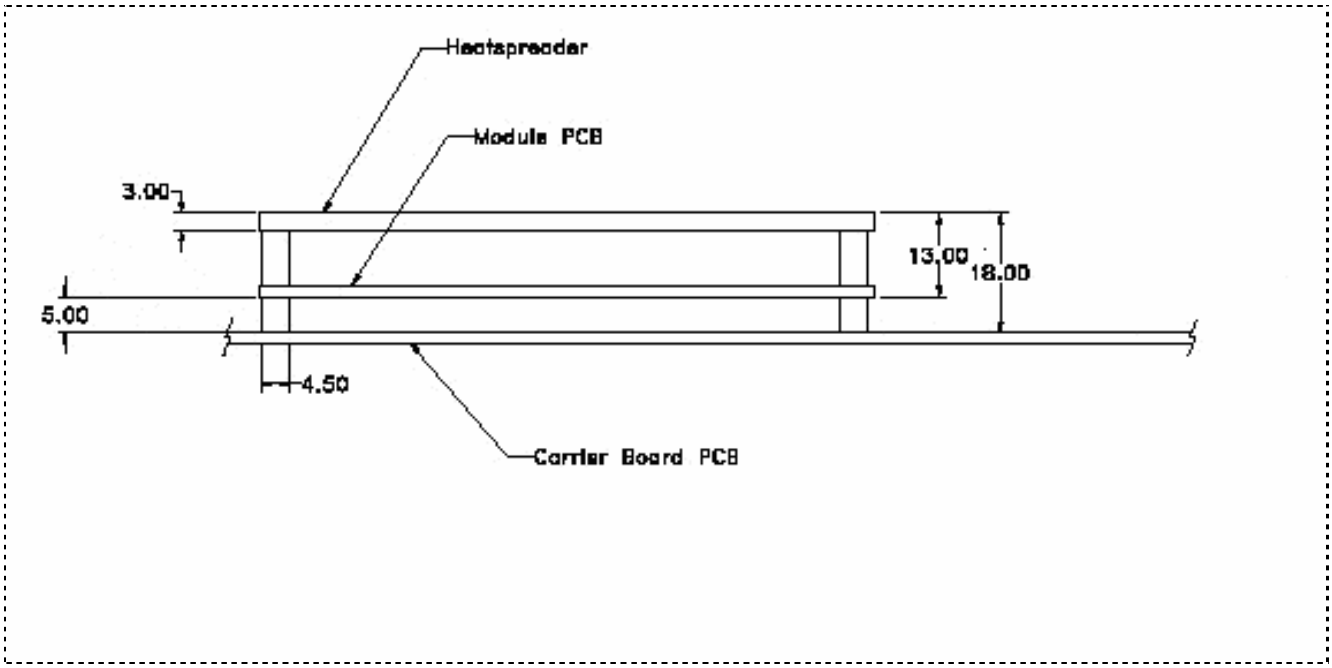


All dimensions are shown in millimetres. Tolerances should be ± 0.25mm [±0.010"], unless noted otherwise. The tolerances on the module connector locating peg holes (dimensions [16.50, 6.00]) should be ± 0.10mm [±0.004"].
The 220 pin connector shall be mounted on the backside of the PCB and is seen “through” the board in this view. The X mounting holes shown should use 6mm diameter pads and should have 2.7mm plated holes, for use with 2.5mm hardware. The pads should be tied to the PCB ground plane.

5.2 Heat-Spreader

Modules should be equipped with a heat-spreader. This heat-spreader by it self does not constitute the complete thermal solution for a module but provides a common interface between modules and implementation-specific thermal solutions. The overall module height from the bottom surface of the module board to the heat-spreader top surface should be 13mm for the nanoETXexpress modules. The module PCB and heat spreader plate thickness are vendor implementation specific **A 2mm PCB with a 3mm heat-spreader should be used which allows use of readily available standoffs and to be mechanical compatible to COM Express™ COM.0 heat spreader solutions.**

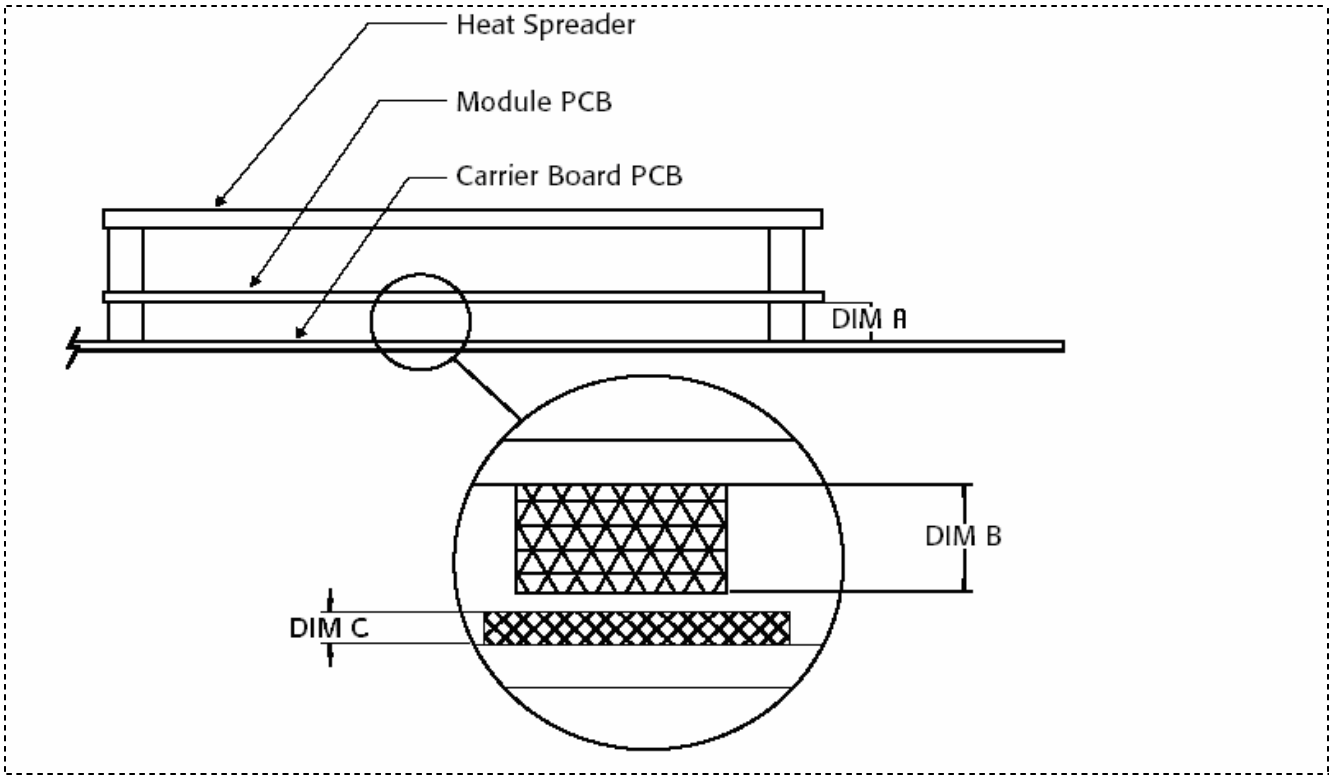
Figure 4 - Overall Height for in nanoETXexpress modules including Heat-Spreader, compatible to COM Express™COM.0.



5.3 Component Height - Module Back and Carrier Board Top

Parts mounted on the backside of the module (in the space between the bottom surface of the module PCB and the carrier board) should have a maximum height of 3.8mm (dimension 'B' in Figure 5).
With the 5mm stack option, the clearance between the carrier board and the bottom surface of the module's PCB is 5mm (dimension 'A' in Figure 5). Using the 5mm stack option, components placed on carrier board topside under the module envelope should be limited to a maximum height of 1mm (dimension 'C' in Figure 5), with the exception of the mating connectors. Using carrier board topside components up to 1mm allows a gap of 0.2mm between carrier board module bottom side components. This may not be sufficient in some situations. In carrier board applications in which vibration or board flex is a concern, then the carrier board component height should be restricted to a value less than 1mm that yields a clearance that is sufficient for the application.
If the carrier board uses the 8mm stack option (dimension 'A' in Figure 5), then the carrier board topside components within the module envelope shall be limited to a height of 4mm (dimension 'C' in Figure 5), with the exception of the mating connectors. Using carrier board topside components up to 4mm allows a gap of 0.2mm between carrier board topside components and module bottom side components. This may not be sufficient in some situations. In carrier board applications in which vibration or board flex is a concern, then the carrier board component height should be restricted to a value less than 4mm that yields a clearance that is sufficient for the application.

Figure 5 - Component Clearances underneath Module



6 Electrical Specifications

6.1 Input Power - General Considerations

The nanoETXexpress modules should follow the COM Express™ COM.0 Power supply specification to use a single main power rail with nominal 12V. Optionally a wide range power supply of 5V to +14V+/-5% (4,75V to 14,7V) can be supported.

Two additional rails are specified, a +5V standby power rail and a +3V battery input to power the module real-time clock (RTC) circuit in the absence of other power sources. The +5V standby rail could be left unconnected on the carrier board if the standby functions are not required by the application. Likewise, the +3V battery input may be left open if the application does not require the RTC to keep time in the absence of the main and standby sources. There may be module specific concerns regarding storage of system setup parameters that may be affected by the absence of the +5V standby and / or the +3V battery.

The rationale for this power-delivery scheme is:

- Module pins are scarce. It is more pin-efficient to bring power in on a higher voltage rail.

- Single supply operation is attractive to many users.

- Lithium ion battery packs for mobile systems are most prevalent with a +14.7V output. This is well suited for the +12V main power rail.

- Contemporary chipsets have no power requirements for +5V other than to provide a reference voltage for +5V tolerant inputs. No COM Express™ module pins are allocated to accept +5V except for the +5V standby pins. In the case of an ATX supply, the switched (non standby) +5V line would not be used for the COM Express™ module, but it might be used elsewhere on the carrier board.

7 Revision History

1.0	26.02.2009	First official revision	VGG