nanoETXexpress - *embedded line*

Introducing nanoETXexpress, based on ETXexpress® / COM Express™

Kontron, the leading embedded computer technology company and the inventor of the ETX® Computer-On-Module (COM) form factor, announced full support for the newly released nanoETXexpress module size “nano”, which is based on the ETXexpress® / COM Express™ interface standard (by PICMG®).

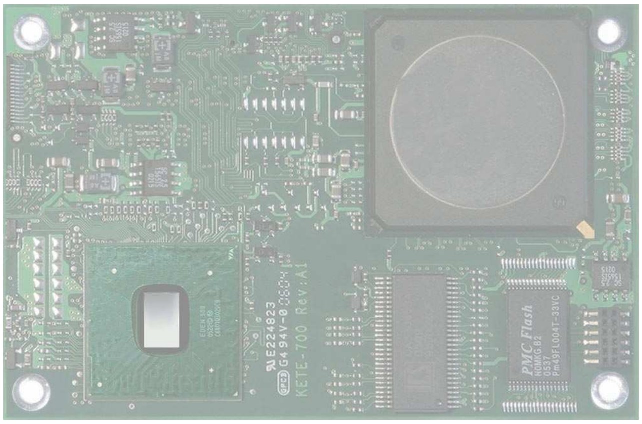


Figure 1 – nanoETXexpress

Minimize board size, maximize application potential

PCI-Express-based COMs for all kinds of applications, large and small footprint, has led Kontron to initiate a third round of COM Express™ standardization with the introduction of nanoETXexpress. The goal is to build PCI-Express-based COMs on the smallest possible form factor and being achieved by the new nanoETXexpress.

The embedded formats (nanoETXexpress and ETXexpress® (COM Express™)) can be supported by a single baseboard, if no PCI, PATA and PEG is needed, that way the system is completely scalable in terms of processors. The layout of baseboards with PCIexpress is facilitated because there are fewer conducting paths per bus segment; this is a real and cost saving advantage for developers.

The major advantages of nanoETXexpress

- **nanoETXexpress** – based on ETXexpress® / COM Express™
- **Latest interface technologies**
- **With PCIexpress bus**
- **Up to Gigabit Ethernet** - for fastest connectivity
- **Serial ATA** - for performing drives
- **ETXexpress® / COM Express™ connectors** validated for highest bandwidth
- **USB 2.0** - for fast third party standard peripherals
- **Smoothest entrance into future technologies**
  Smallest footprint
- **ETX® for future proof designs**

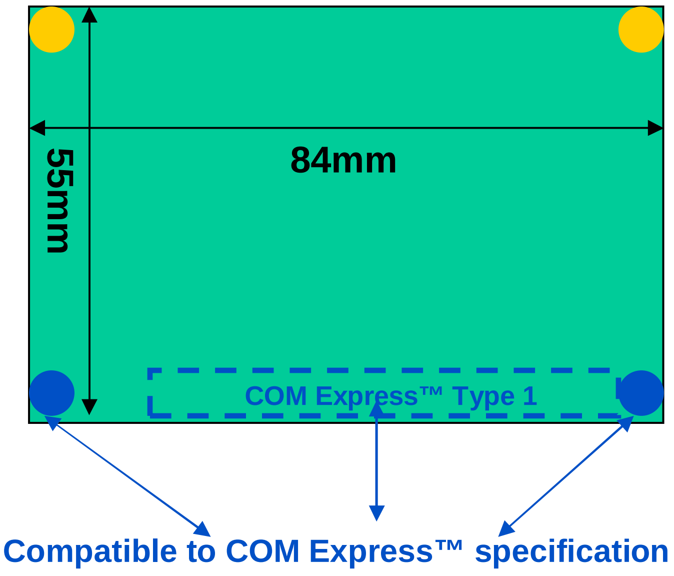
Module Overview

Module Configuration

Beside the standard module sizes the basic module and the extended module Kontron defined two more module sizes. The established compact (micro) module and now the nanoETXexpress based on COM Express™ interface specification. The primary difference between the nano module, the compact (micro) 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 larger processor and memory solutions. The nano module, the compact (micro) 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 ETXexpress® 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 ETXexpress® modules and carrier boards, five common signalling configurations (Pin-out Types) have been defined to ease system integration. Some p should in-out types definitions require only a single 220-pin connector and others require both 220-pin connectors to supply all the defined signalling.

Figure 2 – nano module size

top view (X1 is on bottom side, seen through pcb), all coordinates in mm



Module Pin-out Type Definitions

nanoETXexpress defines COM Express™ type 1 connector.
Pin-out Type 1 modules have a single 220-pin connector, pin row A-B.

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.

Module Pin-out Types 1 - Required and Optional Features

ETXexpress® 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.

Table 1: Module Pin-out Type 1 – Required and Optional Features

	Type 1 (Single connector) Min / Max	**Note**
System I/O		
PCI Express Lanes 0 - 5	0/6	
LVDS Channels	0/2	
VGA Port	0/1	
TV-Out	0/1	
SATA / SAS Ports	0/4	
AC'97 Digital Interface / HD Audio	0/1	
USB 2.0 Ports	4/8	
LAN 0 (10/100Base-T min)	1/1	
Express Card Support	0/2	
LPC Bus	1/1	
System Management		
General Purpose Inputs	4/4	
General Purpose Outputs	4/4	
SDIO optional to GPIO	0/1	Shared with GPIO
SMBus	1/1	
I²C	1/1	
Watch Dog Timer	0/1	
Speaker Out	1/1	
External BIOS ROM support	0/1	
Reset Functions	1/1	
Power Management		
Thermal Protection	0/1	
Battery Low Alarm	0/1	
Suspend	0/1	
Wake	0/2	
Power Button Support	1/1	
Power Good	1/1	

Alternative Pin description for SDIO interface

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	DADA3			
A93	GPO0	CLK			

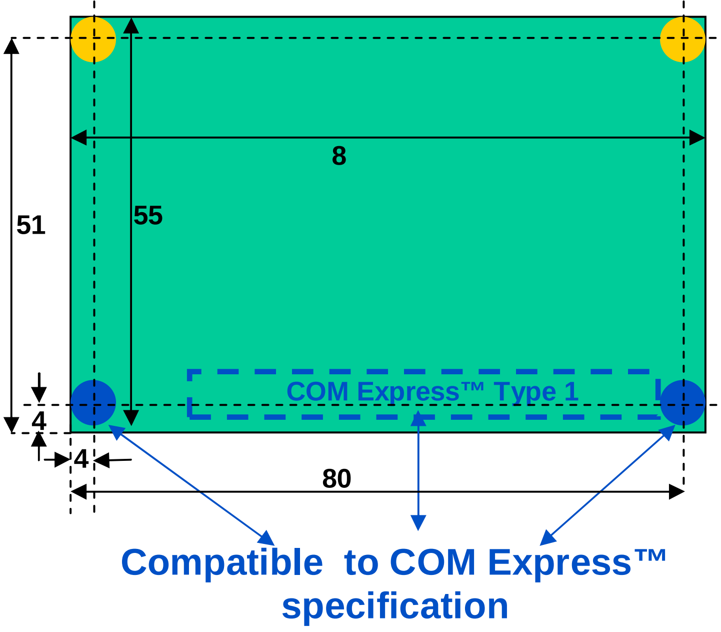
SDIO stands for Secure Digital Input Output.

Mechanical Specifications

Module Size - Nano Module

The PCB size for the nano module should be 55mm x 84mm. The PCB thickness should be 2mm to allow high layer count stack-ups and facilitate a standard ‘z’ dimension between the Carrier Board and the top of the heat-spreader. (see section Heat-Spreader). 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 – Nano Form Factor



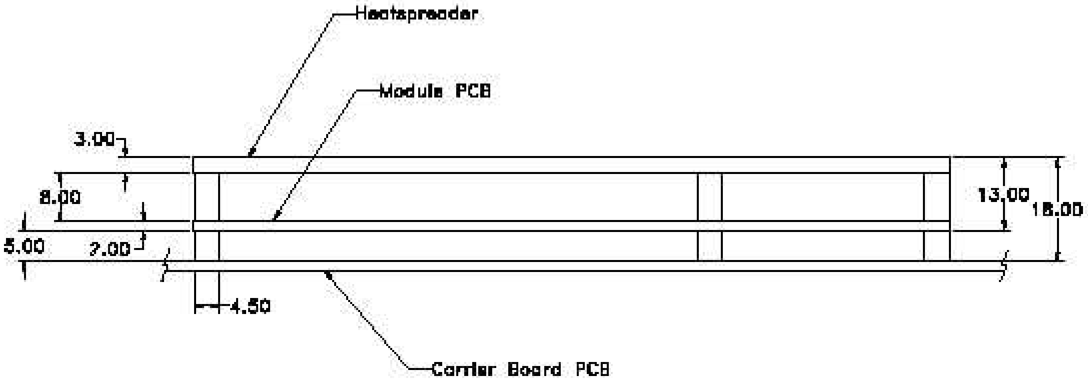
All dimensions are shown in millimetres. Tolerances should be ± 0.25mm [±0.010"], unless noted otherwise. The tolerances on the module connector locating peg holes (dimensions [16.50, 6.00] and [16.50, 18.00]) should be ± 0.10mm [±0.004"].

The 220 pin connector pair 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.

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 nano-, compact- (micro), the basic- and extended modules. The module PCB and heat spreader plate thickness are vendor implementation specific, however, a 2mm PCB with a 3mm heat-spreader should be used which allows use of readily available standoffs.

Figure 4 - Overall Height for Heat-Spreader in Nano, Compact (micro), ***Basic and Extended Modules***

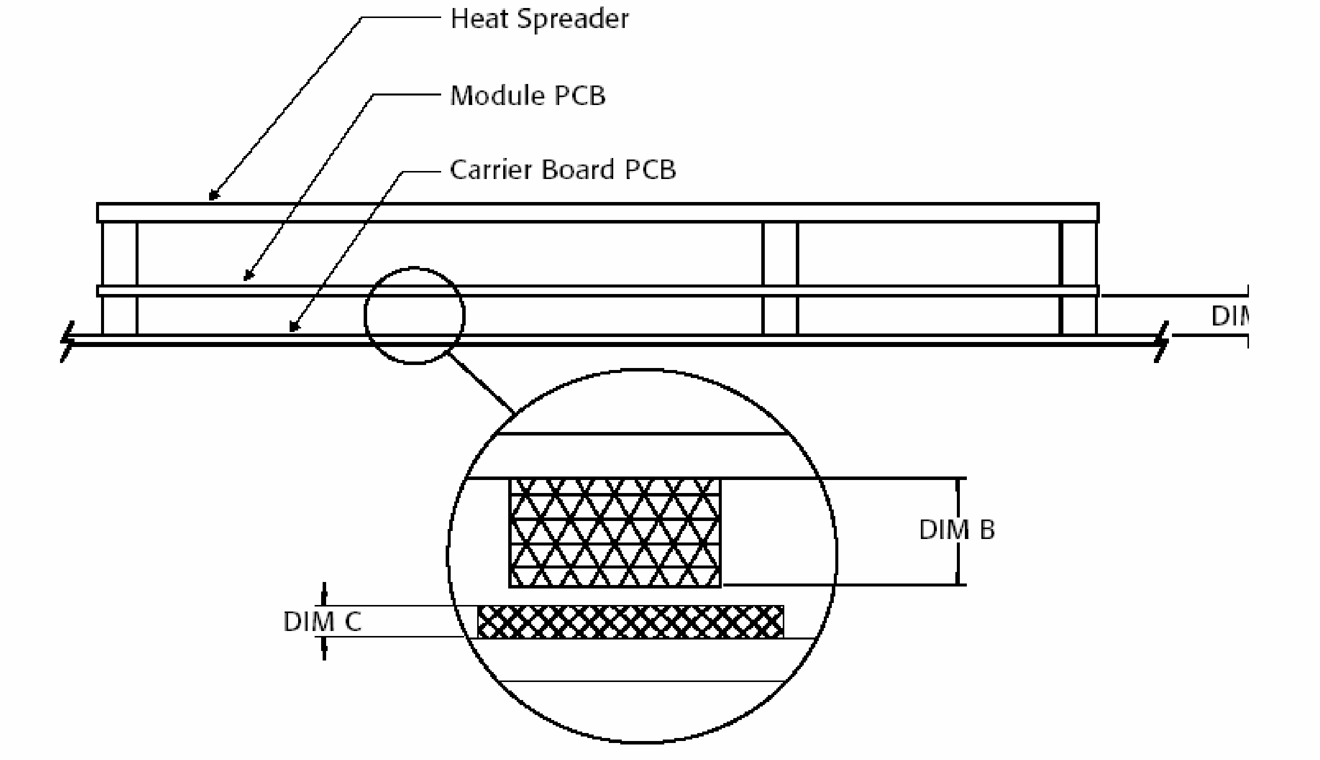


Component Height - Module Back and Carrier Board Top

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



Electrical Specifications

Input Power - General Considerations

The nano, compact- (micro), basic and extended modules should use a single main power rail with a nominal value of +12V.

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 +14.4V 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 ETXexpress® 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 ETXexpress® module, but it might be used elsewhere on the carrier board.

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1. Revision History

0.6	29.07.2008.	format modification	GSS
0.6.1	04.08.2008.	minor changes	GSS