

COM EXPRESS

Compute Options

- ⦿ Motherboard
- ⦿ Grow your own
- ⦿ Computer on Module

Motherboard

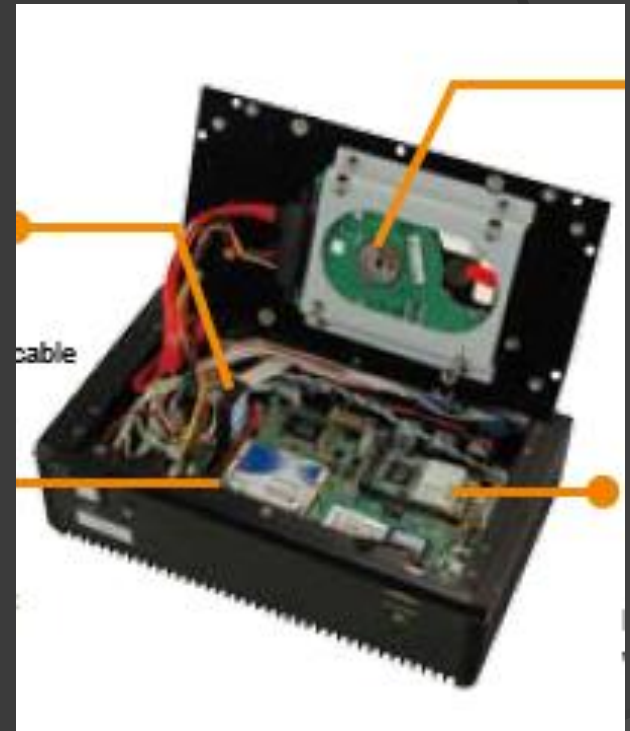
- ◎ FRY's special
 - Next week, it is a different special
- ◎ What are the product requirements for :
 - Ruggedization
 - Shock + Vib / Operating temperature
 - Life cycle
 - Customization
 - Splash screen



Motherboard

◉ Hidden costs

- Documentation updates are not free
- Motherboard of the month, different motherboard same part number
- PCI/PCIe plug in cards are a mechanical challenge
- Support
- Customization



Home Grown Board

- ◎ Silicon vendors are eager to enable designs
 - Schematics available
 - Layout files available
 - AVL available
- ◎ Just take the package to a contract manufacturer
- ◎ Hidden costs
 - Component EOL
 - The CM will need training on troubleshooting
- ◎ The one thing you can't get for free
 - And the one thing that results in the most problems
 - BIOS

Computer On Module (COM)

- ◎ CPU + chipset + memory on a module
 - High speed interfaces localized
- ◎ Carrier board contains relevant I/O connections and customizations
 - Ability to ruggedize off card connections
 - Add application specific I/O to the carrier board
- ◎ Focus on your core competency

What is COM Express



- COM Express, a computer-on-module (COM) form factor, is a highly integrated and compact PC that can be used in a design application much like an integrated circuit component.
- The [COM Express standard](#) is defined and owned by the [PICMG](#) (PCI Industrial Computer Manufacturers Group)

COM Express is based on Serial Differential Signaling

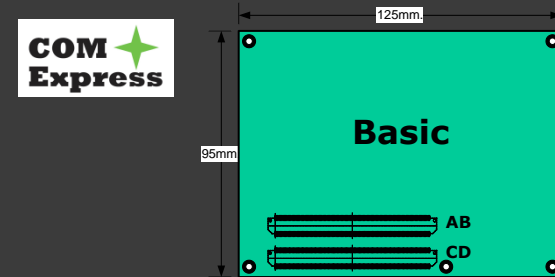
- PCI Express
- Serial ATA
- USB 2.0
- LVDS
- DVI/HDMI
- Express Card



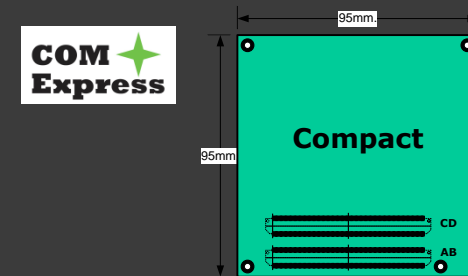
COM Express Sizes

Basic, and Compact

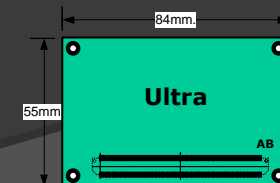
- **Basic** 125 x 95
Type 2/6 compatible pin out



- **Compact** 95 x 95
Type 2/6 compatible pin out



- **Mini** 84 x 55
Type 1/10 compatible pin out



COM.0 Types

Types	Connector Rows	PCI Express Lanes	PEG/SDVO	PCI	IDE Ports	SATA Ports	LAN Ports	USB 2.0 / USB 3.0	Display Interfaces
Type 1	A-B	Up to 6	- / -	-	-	4	1	8 / 0	VGA, LVDS
Type 2	A-B C-D	Up to 22	1 / 2	32 bit	1	4	1	8 / 0	VGA, LVDS, PEG/SDVO
Type 3	A-B C-D	Up to 22	1 / 2	32 bit	-	4	3	8 / 0	VGA, LVDS, PEG/SDVO
Type 4	A-B C-D	Up to 32	1 / 2	-	1	4	1	8 / 0	VGA, LVDS, PEG/SDVO
Type 5	A-B C-D	Up to 32	1 / 2	-	-	4	3	8 / 0	VGA, LVDS, PEG/SDVO
Type 6	A-B C-D	Up to 24	1 / -	-	-	4	1	8 / 4	3x DDI, PEG, VGA, LVDS
Type 10	A-B	Up to 4	- / 1	-	-	2	1	8 / 0	1xDDI, LVDS

Digital Display Interface

- Leverages VESA DisplayPort Interoperability Guideline
<http://www.vesa.org/Standards/free.htm>.

Module	Carrier / Cable Adapter Requirements	Destination
DP Only	None - Straight through to DP receptacle	DisplayPort
	N/A – not a valid combination	DVI/HDMI
DVI/HDMI	N/A – not a valid combination	DisplayPort
	None - Straight through to DVI/HDMI receptacle	DVI/HDMI
Dual Mode	None - Straight through to DP receptacle	DisplayPort
	Level shifters on data and DDC before DVI/HDMI connector	DVI/HDMI

COM Express Type 6 Interfaces

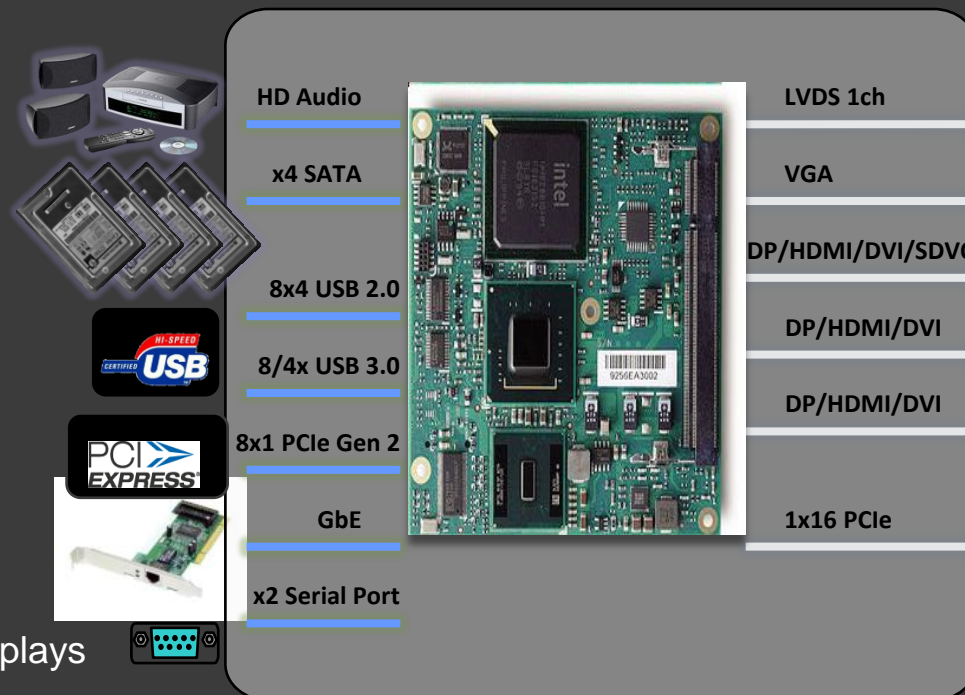
Type 6 Features

Video

- x3 DDI
 - Display Port
 - HDMI
 - DVI
 - SDVO (x1)
- VGA
- LVDS 1ch
- 1x16 PCI Express
- Drive 3 independent displays

I/O

- Audio
- 4 SATA
- 8 /4USB 2.0/3.0
- 8 x1 PCI Express Gen 2
- GbE
- 2 Serial Ports



Type 6 Carrier

COM Express Type 10 Interfaces

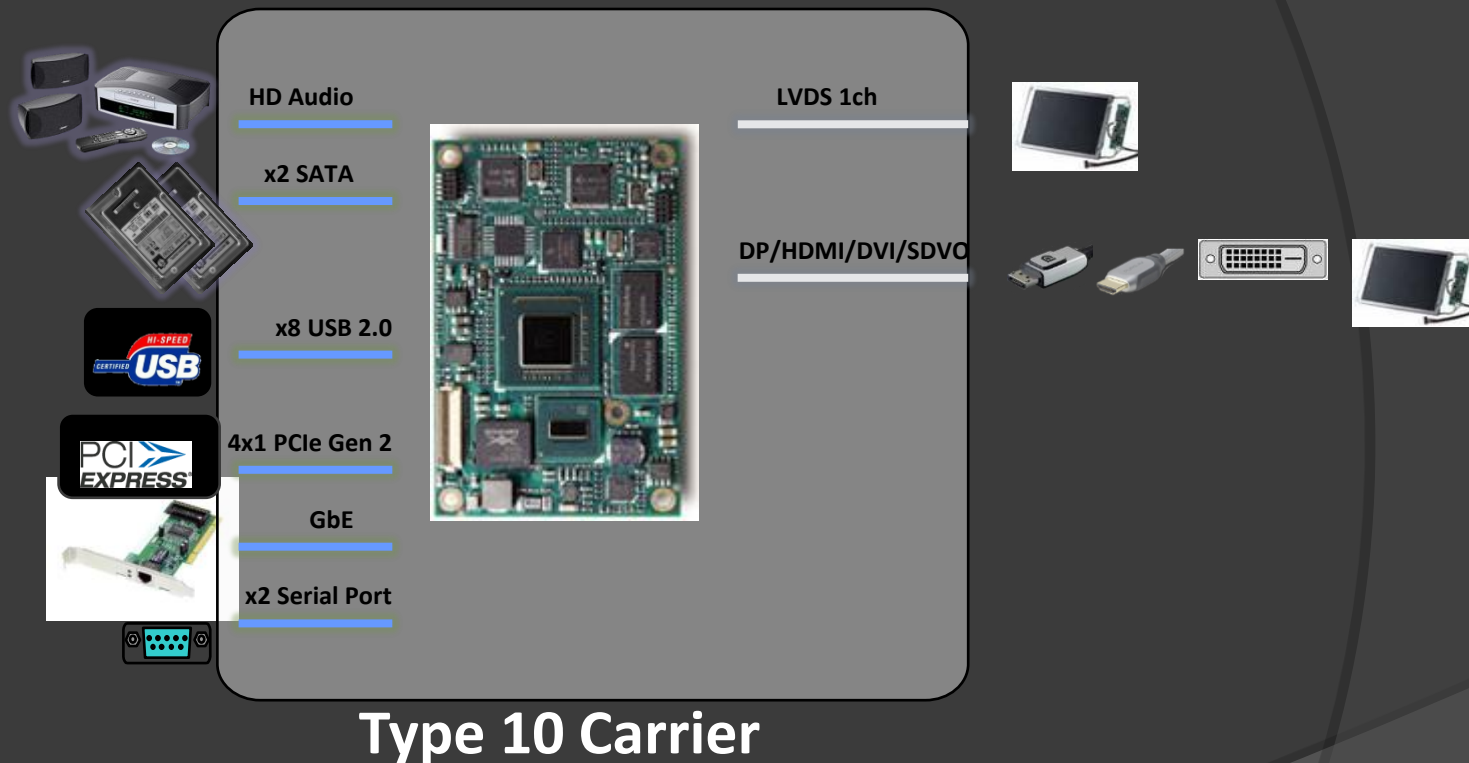
Type 10 Features

Video

- x1 DDI
 - Display Port
 - HDMI
 - DVI
 - SDVO (x1)
- LVDS 1ch

I/O

- Audio
- 2 SATA
- 8 USB 2.0
- 4 x1 PCI Express Gen 2
- GbE
- 2 Serial Ports



Embedded Application Programming Interface

- EAPI helps abstract vendor specific hardware
- Provides a set of APIs for
 - System information
 - Watchdog timer
 - I2C Bus
 - Flat panel brightness control
 - GPIO control
 - User data storage

```
uint32_t
EAPI_CALLTYPE
EApiVgaSetBacklightEnable(
    __IN uint32_t Id      , /* Backlight Id */
    __IN uint32_t Enable  /* Backlight Enable */
);
```

THANK YOU!