

## MODULE COMPUTING SERVICE

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# About Portwell

Portwell Engine (PE) Building



Portwell, Inc. was founded in 1993 and entered the Industrial PC market in 1995 by developing single-board computers. Today, our continuous development of leading-edge products has resulted in strong growth in market shares and revenue, a firm place on the Taipei stock exchange (TAISDAQ), and has established Portwell as a major worldwide supplier of specialty computing application platforms and services.

Portwell, Inc. is not only a member of the selected group of Intel® Applied Computing Platform Providers (IACPP) but also a Premier Member of Intel® Intelligent Systems Alliance and an executive member of the PCI Industrial Computer Manufacturing Group (PICMG).

Portwell, Inc. has worldwide operations in the U.S.A., Taiwan, Japan, China, Netherlands, Germany, United Kingdom, and India. Whether you need a computer board or a turnkey system, Portwell is the perfect partner to help you deliver your products to market on time as well as maintain longevity of your product.

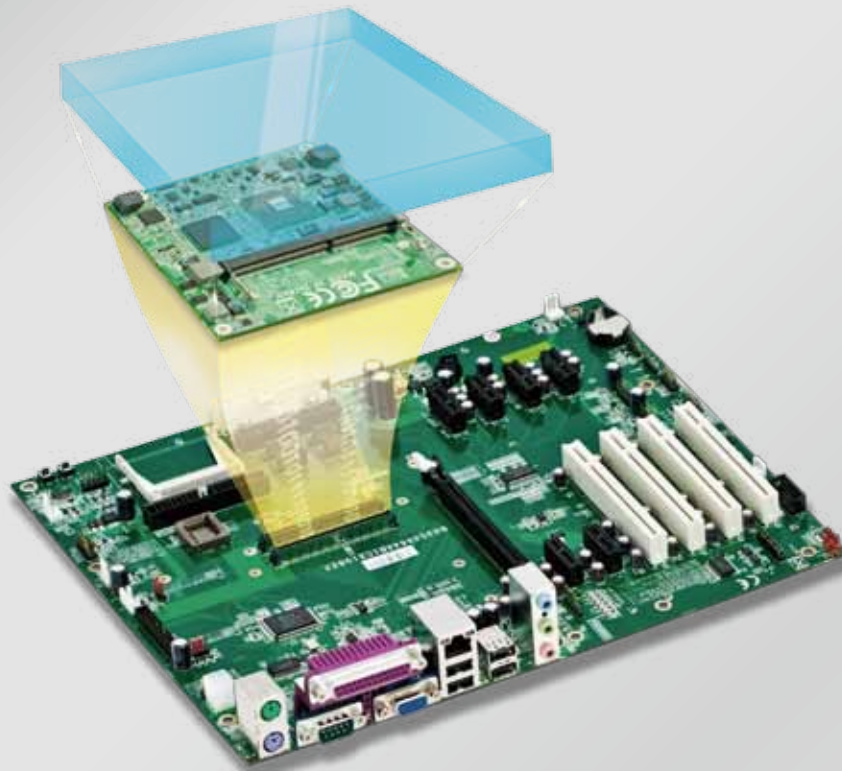
With 22 years experience in the design and manufacture of specialty computer boards and systems, Portwell not only provides a one-stop resource for off-the-shelf products, but also supplies custom-built solutions and a global logistics service to suit your needs.

Portwell EMS and DMS solutions can satisfy your needs in retail automation, medical equipment, industrial automation, infotainment, communication, and network security markets. Encouraged by our flexible business support, manufacturing excellence, and compliance with high quality and environmental standards such as ISO 9001 / 14000 / 13485, OHSAS and RoHS, customers have taken advantage of our dedicated and sophisticated engineering resources to satisfy their requirements for the design, manufacturing and logistics of application-specific computer boards, customized computer chassis, and specific computer system configurations. Whether you are working on a Medical Single Board Computer or Internet Security Appliance, Portwell is the perfect partner to help you deliver your products to market on time and stay one step ahead of the competition.

# Focus on your core competencies

## Design for Extreme Reliability

## Time To Market



### Module — Solutions That Grow With You

The CPU module delivers the core functionality while all of the application-specific features are designed into the baseboard creating a semi-custom embedded PC solution.

How to enable faster time-to-market and cost-effective customization alternatives? COM (Computer-On-Module) is the answer.

COMs are not only highly integrated component SBCs that support system expansion and application-specific customizations but also improving form, fit and function, minimizing current and future design risks. As well as providing lower product lifecycle costs through module scalability and interchangeability.

### Baseboard — SAFE, RELIABLE, SECURE

Portwell designs competence for your market! As a worldwide technology leader in the embedded industry and also a leading outsourcing partner for OEMs in different markets, Portwell's boards can give you the most dependable, powerful and economic basis to meet your carrier board design. You may take a big step forward into a successful future with our proactive project management and ISO 9001:2000 certificate. Portwell provides one-stop shopping so that you can get to the markets faster with complete assemblies including housings and keep your products available for many years with life cycle management.

# Module

**COM**   
**Express**



Q S E V E N





# Computer-On-Module

Various off-the-shelf core module with additional functionality that is required for specific applications

## COM-Express —

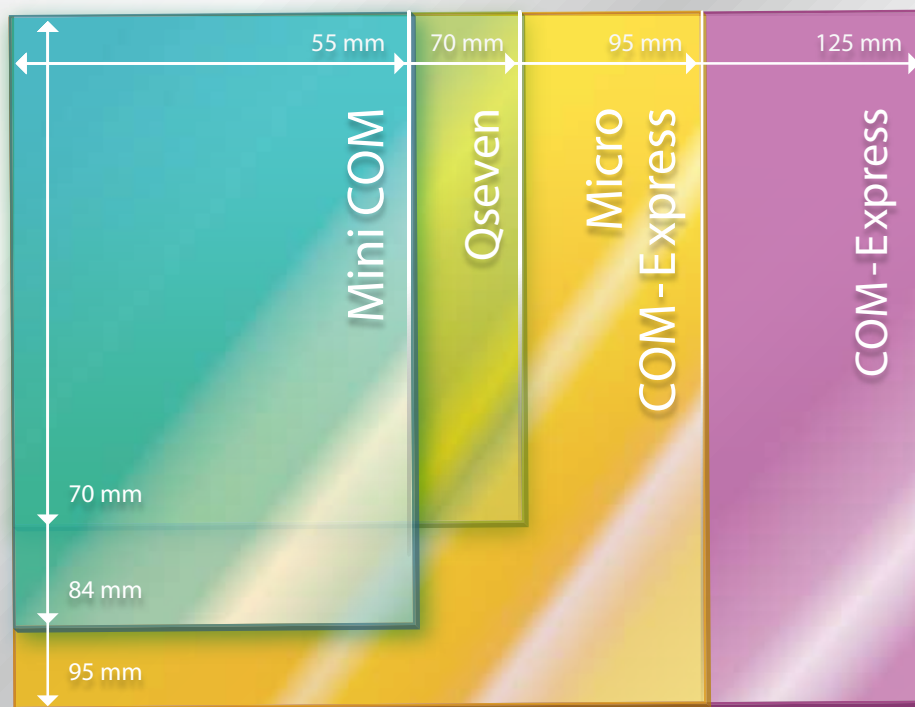
COM Express® defines standardized form factors and pin-outs for Computer-on-Modules. The standard includes the mini form factor (84 x 55mm), the compact form factor (95 x 95mm) and the basic form factor (125 x 95mm). To serve industry requirements, the Digital Display Interfaces (DisplayPort, HDMI) and super-fast USB 3.0 were recently added to the pin-out definitions for COM Express® modules.





## Qseven —

This new standard platform has been developed with performance and flexibility in mind, allowing various processor configurations to maximize passive cooling technology. With a maximum power consumption of around 12W specified in the standard, the new form factor is expected to appeal to manufacturers of applications that require fanless operation.

## PC/104 —

PC/104 is simply a repackaged, modular version of the PC architecture intended for embedded applications where space, power consumption and reliability are critical. These modules can serve as a mezzanine bus for an embedded SBC or it can become the entire computer and I/O system.



	<b>Mini COM-Express®</b> (84mm x 55mm)
	<b>Q7</b> (70mm x 70mm)
	<b>COM-Micro</b> (95mm x 95mm)
	<b>COM-Express®</b> (95mm x 125mm)



## **What Portwell Distributed Intelligence?**

Portwell provides remote technology to oversee the world. Portwell distributed intelligence is essential for increasing the capabilities – Remote diagnostic and repair , helping to increase equipment availability. Software reliability by isolating application code and helping to prevent dangerous interactions and security by preventing any node from executing malicious software.

## **Start-Up Intelligent Technology by Portwell Computer-On-Module Solution**

With energy demand growing, the smart grid provides opportunities for utility operators to transform their electrical networks. By using Portwell technologies, which provide higher levels of scalability, performance, energy-efficiency and serviceability, next-generation equipment can offer utilities improved energy management and lower operating costs.

# Intelligence



# Technology

## Flexible and Scalable Modular Platforms

Each element on the grid will demand a particular set of features; however, most elements can often be designed using a single-processor architecture with exceptional scalability, upgradeability and flexibility.

- Large processor selection: With a wide choice of processors, it's straightforward to scale designs to meet the right price-performance.
- Single code base: Equipment manufacturers can easily upgrade designs when the processor family is completely code compatible.
- I/O flexibility: Open modular systems, supporting multiple standard busses, allow designers to satisfy a wide range of I/O requirements.
- Reliable supplier: Chip manufacturers, with a reputation for delivering long life cycle products, help preserve equipment manufacturers' development investments.

## Easy to increase Embedded Computing Requirements

Regulatory and market realities are requiring a new way of thinking for utilities, and the use of standards-based building blocks to build out the grid will drive greater plant efficiency, higher renewable energy production and more advanced conservation programs.

***Versatile Modules,  
Instant Solution!***

**Intelligent  
Start!!**

# PCOM Interface

COM Express® specification adopted in July, 2005, redefined electrical, mechanical and thermal requirements for a highly integrated Computer On Module (COM) supporting rich combinations of high-speed I/O interfaces while keeping key legacy interface technologies enabling a smooth migration of interface technologies at once. The primary new technology behind COM Express® R2.1 is the support of a few new interfaces such as USB 3.0 and Digital Display Interfaces (DDI). The new technology also provides additional PCI Express lanes, high definition audio, and SPI for BIOS access. The new PCOM Interface has additional pin definitions such as Pulse Width Modulation (PWM) for fan control and TPM support for security and management. The evolution of the PCOM Module has adopted a Mini module of 84 x 55mm which is also more energy efficient under 12W.

## Naming Guide - Line of Portwell Com Express

PCOM Series	PCOM	Portwell COM Express
Carrier or Module	X <sub>1</sub>	B Module Board, Portwell Design
		C Carrier board, Portwell Design
		D Module Board, Out Sourcing
		E Carrier board, Out sourcing
COM Express Pin Type	X <sub>2</sub>	1 Type 1 Pin-Out
		2 Type 2 Pin-Out
		3 Type 3 Pin-Out
		4 Type 4 Pin-Out
		5 Type 5 Pin-Out
		6 Type 6 Pin-Out
		A Type 10 Pin-Out
Form Factor	X <sub>3</sub>	0 Others
		1 Basic Form Factor (125mm x 95mm)
		2 Extend Form Factor (155mm x 95mm)
		3 Micro Form Factor (95mm x 95mm)
		4 Nano Form Factor (55mm x 84mm)
		5-9 TBD
Serial Number	X <sub>4</sub>	0/1/2/3-9/A/B/C-Z
VGA support	Y <sub>5</sub>	V VGA support
		L LVDS support
Ethernet	Y <sub>6</sub>	G Gigabit Ethernet
		L Fast Ethernet
TPM support	Y <sub>7</sub>	T TPM support
Customized abbreviation	YY	

EX: PCOM-X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>X<sub>4</sub>Y<sub>5</sub>Y<sub>6</sub>Y<sub>7</sub>-YY

### System I/O

PCI-E Lanes	LVDS/VGA
Serial	TV-Out/DDI
SATA/SAS	Express Card
USB 2.0	HDA
LAN	LPC

### System Management

SDIO	Watchdog Timer
GPIO	Speaker Out
SMBUS	Reset
I2C	

### Power Management

Thermal Protection	Power Button
Low Battery Alarm	Sleep/Lid Input
Suspend/Wake Signals	Fan Control
Optimal Power	TPM
VCC_5V_SBY Contacts	

### Power

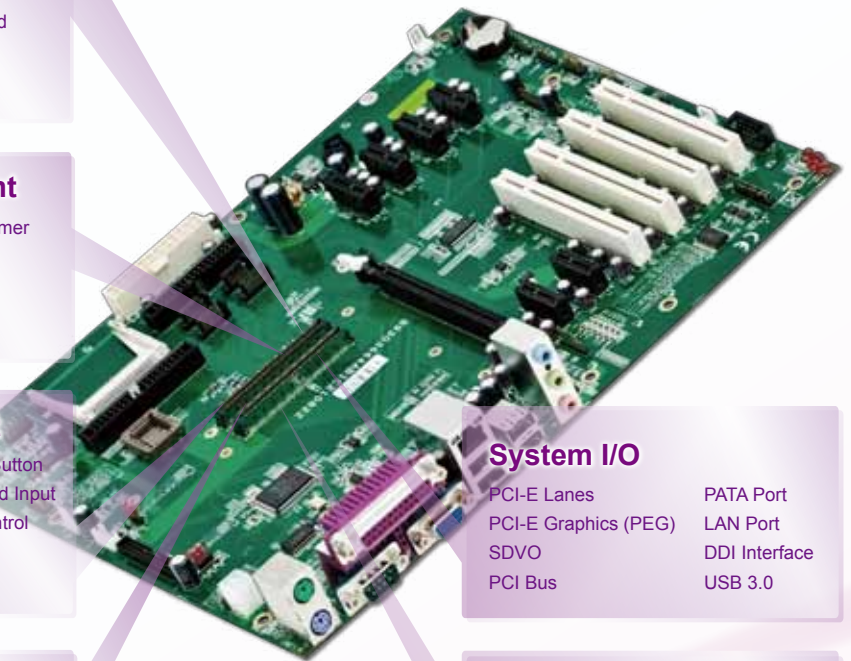
VCC\_12V Contacts

### System I/O

PCI-E Lanes	PATA Port
PCI-E Graphics (PEG)	LAN Port
SDVO	DDI Interface
PCI Bus	USB 3.0

### Power

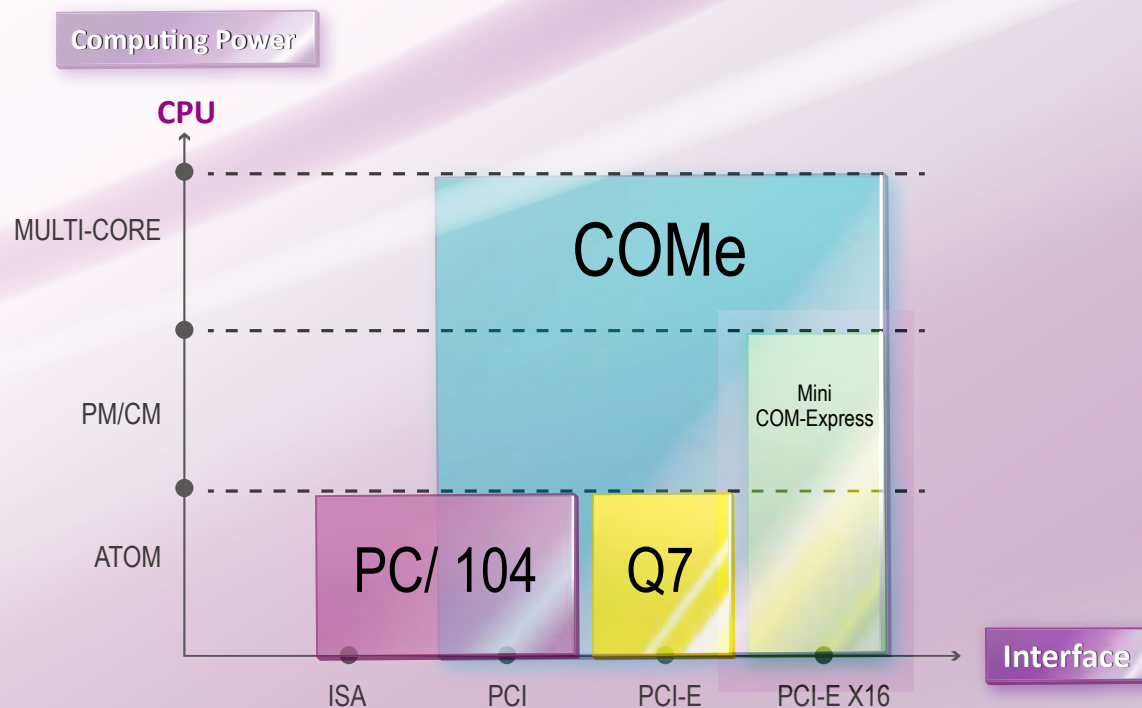
VCC\_12V Contacts





# COM Express Standard

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



# PCOM Solution Guide



	PCOM-B639VG	PCOM-B638VG	PCOM-B637VG	PCOM-B636VG	PCOM-B635VG	PCOM-B634VG
Form Factor (mm)	Basic (125 x 95mm)	Compact (95 x 95mm)	Basic (125 x 95mm)	Compact (95 x 95mm)	Basic (125 x 95mm)	Basic (125 x 95mm)
COM Type	Type 6	Type 6	Type 6	Type 6	Type 6	Type 6
CPU/ Clock/ Cache	<ul style="list-style-type: none"> <li>* Intel® 6<sup>th</sup> Generation Core™</li> <li>* i7-6820EQ/i7-6822EQ / i5-6440EQ/i5-6420EQ/ i3-6100E/i3-6102E/ G3900E/G3902E</li> <li>* Up to 4 Cores</li> <li>* Smart Cache 2MB to 8MB</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® 6<sup>th</sup> Generation Core™ ULT</li> <li>* Celeron 3955U/i3-6100U/ i5-6300U/i7-6600U</li> <li>* Up to 2 CPU Cores</li> <li>* Smart Cache 2MB to 4MB</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® 6<sup>th</sup> Generation Core™ 35W Desktop processor</li> <li>* i7-6700TE/i5-6500TE/i3-6100TE</li> <li>* Up to 4 CPU Cores</li> <li>* Smart Cache 4MB to 8MB</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® N3000/N3050/ N3150/N3700</li> <li>* 2.08GHz to 2.40GHz</li> <li>* 2M L2 Cache</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® 5<sup>th</sup> Generation Core™ i7-5850EQ/5700EQ processor</li> <li>* Up to 4 CPU Cores</li> <li>* 6M L2 Cache</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® Pentium® D Processor</li> <li>* D1577/D1548/D1539/ D1527/D1519/D1517/ D1508</li> <li>* Up to 16 CPU Cores</li> <li>* 12M L2 Cache</li> </ul>
Chipset	QM170/HM170/CM236	SoC	Q170/H110/C236	SoC	QM 87	SoC
Memory	<ul style="list-style-type: none"> <li>* DDR4-2133MT/s</li> <li>* Non-ECC/ ECC</li> <li>* 2 Memory Channel</li> </ul>	<ul style="list-style-type: none"> <li>* DDR4-2133MT/s</li> <li>* Non-ECC/ ECC</li> <li>* 1 Memory Channel</li> </ul>	<ul style="list-style-type: none"> <li>* DDR4-2133MT/s</li> <li>* Non-ECC/ ECC</li> <li>* 2 Memory channel</li> </ul>	<ul style="list-style-type: none"> <li>* DDR3L-1600MT/s</li> <li>* Non-ECC/ ECC</li> <li>* 1 Memory Channel</li> </ul>	<ul style="list-style-type: none"> <li>* DDR3L - 1600MT/s</li> <li>* Non-ECC</li> <li>* 2 Memory Channel</li> </ul>	<ul style="list-style-type: none"> <li>* DDR4-2400MT/s</li> <li>* Non-ECC/ ECC</li> <li>* 2 Memory Channel</li> </ul>
USB	<ul style="list-style-type: none"> <li>4 x USB 3.0</li> <li>8 x USB 2.0</li> </ul>	<ul style="list-style-type: none"> <li>3 x USB 3.0</li> <li>7 x USB 2.0</li> <li>1 x USB 3.0 / USB 2.0 / OTG</li> </ul>	<ul style="list-style-type: none"> <li>4 x USB 3.0</li> <li>8 x USB 2.0</li> </ul>	<ul style="list-style-type: none"> <li>4 x USB 3.0</li> <li>8 x USB 2.0</li> </ul>	<ul style="list-style-type: none"> <li>4 x USB 3.0</li> <li>8 x USB 2.0</li> </ul>	<ul style="list-style-type: none"> <li>4 x USB 3.0</li> <li>8 x USB 2.0</li> </ul>
PCI Express	<ul style="list-style-type: none"> <li>1 x PCIe x16</li> <li>8 x PCIe x1</li> </ul>	<ul style="list-style-type: none"> <li>1 x PCIe x4 (PEG)</li> <li>1 x PCIe x1</li> <li>1 x PCIe x4 / 4 x PCIe x1</li> </ul>	<ul style="list-style-type: none"> <li>1 x PCIe x16</li> <li>8 x PCIe x1</li> </ul>	<ul style="list-style-type: none"> <li>3 x PCIe x1 (Optional to 4 x1)</li> </ul>	<ul style="list-style-type: none"> <li>1 x PCIe x16</li> <li>8 x PCIe x1</li> </ul>	<ul style="list-style-type: none"> <li>1 x PCIe x16</li> <li>8 x PCIe x1</li> </ul>
Ethernet	Intel® I219LM	Intel® I219LM	Intel® HD Graphics 530	Intel® I210IT	Intel® I218LM	Intel® I210IT
Sound	Intel® High definition Audio	Intel® High definition Audio	Intel® High definition Audio	HD 5:1 Audio codec	Intel® High definition Audio	N/A
Graphic Controller	* Intel® HD Graphics 530	* Intel® HD Graphics 520	* Intel® HD Graphics Gen9	* Intel® HD Graphics Gen8	* Intel® Iris™ Pro Graphics 6200	* SM750
Carrier Board	PCOM-C605 (Type 6)	PCOM-C605 (Type 6)	PCOM-C605 (Type 6)	PCOM-C605 (Type 6)	PCOM-C605 (Type 6)	PCOM-C609(Type 6)
Diagnostic Card	✓	✓	✓	✓	✓	✓





	PCOM-B633VG	PCOM-B632VG	PCOM-B219VG	PCOM-B21A	PCOM-BA00
Form Factor (mm)	Compact (95 x 95mm)	Compact (95 x 95mm)	Compact (95 x 95mm)	Mini (84 x 55mm)	Mini (84 x 55mm)
COM Type	Type 6	Type 6	Type 6	Type 10	Type 10
CPU/ Clock/ Cache	<ul style="list-style-type: none"> <li>* Intel® 5650U/5350U/5010U</li> <li>* 1.8Ghz to 2.2Ghz</li> <li>* 3MB ~ 4MB L2 Cache</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® E3845/E3827/ E3826/E3825/E3815</li> <li>* 1.33GHz up to 1.91GHz</li> <li>* 1MB to 2MB cache</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® 3615QE/3612QE/3555L E/3517UE/3610ME/3120ME/3 217UE</li> <li>* 1.60 GHz up to 3.30GHz</li> <li>* x4 DMI</li> <li>* 3MB~6MB Shared Last Level Cache</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® N2600/N2800/D2550</li> <li>* 1.60GHz up to 1.86GHz</li> <li>* x2 DMI for Cedarview-M</li> <li>* 1MB, Shared Last Level Cache</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® E3845/ E3827/ E3825/ E3815</li> <li>* 1.33 GHz to 1.91GHz</li> <li>* 1MB to 2MB cache</li> </ul>
Chipset	N/A	N/A	Ivy Bridge + QM77	Cedarview + NM10	N/A
Memory	<ul style="list-style-type: none"> <li>* DDR3L-1600MT/s</li> <li>* Non-ECC</li> <li>* 1 Memory Channel</li> <li>* 25.6 GB/s Peak Memory Bandwidth</li> </ul>	<ul style="list-style-type: none"> <li>* DDR3L 1067/1333 MT/s</li> <li>* Non-ECC</li> <li>* 1 Channel</li> </ul>	<ul style="list-style-type: none"> <li>* DDR3-1067/1333/1600 MT/s</li> <li>* ECC</li> <li>* 2 Channels</li> <li>* 25.6 GB/s Peak Memory Bandwidth</li> </ul>	<ul style="list-style-type: none"> <li>* DDR3-1067MT/s</li> <li>* Non-ECC</li> <li>* 1 Memory Channel</li> <li>* 6.4GB/s Peak Memory Bandwidth</li> </ul>	<ul style="list-style-type: none"> <li>* DDRL-1067/1333MT/s</li> <li>* Non-ECC/ ECC</li> <li>* 1 Channel</li> </ul>
USB	2 x USB 3.0 8 x USB 2.0	1 x USB 3.0 7 x USB 2.0	8 x USB 2.0 4 x USB 3.0	8 x USB 2.0	1 x USB 3.0 4 x USB 2.0
PCI Express	1 x PCIe x4 3 x PCIe x1 (Optional to 4 x1)	3 x PCIe x1	1 x PCIe x16 7 x PCIe x1	4 x PCIe x1 (Optional with GbE controller)	3 x PCIe x1 (Optional to 4 x PCIe x1)
Ethernet	Intel® I218LM	LAN I210IT	LAN 82579LM	LAN 82583V	LAN I210
Sound	Intel® High definition Audio	Intel® High Definition Audio	Intel® High Definition Audio	Intel® High Definition Audio	Intel® High Definition Audio
Graphic Controller	<ul style="list-style-type: none"> <li>* Intel® HD Graphics 6000, Support DirectX 11.1, Graphic frequency up to 1Ghz</li> </ul>	* Intel® HD Graphic	<ul style="list-style-type: none"> <li>* Intel® HD Graphics 4000 supports DX11, OpenGL 3.0</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® Graphics Media Accelerator 3650/3600, supports DX9, graphic core frequency up to 640MHz.</li> </ul>	* Intel® HD Graphic
Carrier Board	PCOM-C605 (Type 6)	PCOM-C605 (Type 6)	PCOM-C605 (Type 6)	PCOM-CA00 (Type 10)	PCOM-CA00 (Type 10)
Diagnostic Card	✓	✓	✓	✓	✓

# PCOM-B639VG

Data protection is more and more important in real world since big data rising. Portwell adopts new Intel® platform to provide highest secure logic. It helps customer earn trust and business by securing important information anytime. The new generation of CPU and DDR4 support give customer higher performance and computing power



Intel® Skylake-H Core™ i7/i5/i3 processor based on Type VI COM Express module with DDR4 SDRAM, VGA, LVDS, Gigabit Ethernet, SATA 3.0 and USB

PCOM-B639VG brings three important factors, DDR 4 memory support, Gen 3 PCIe support, and good graphic performance. The DDR4 is trend and it supports both ECC and Non-ECC with the same pin definition. In other words, customer can use both ECC and Non-ECC memories depending their application and demand. In order to achieve that, all the PCH SKUs are considered in development stage to make sure that customer has various models to meet different requirements in cost, performance, and memory type. Gen3 PCIe provides fast speed and enable your PCIe expansion card consequently even better performance. It is suitable for Networking and Medical related applications. The enhanced graphic performance brings 4K support.

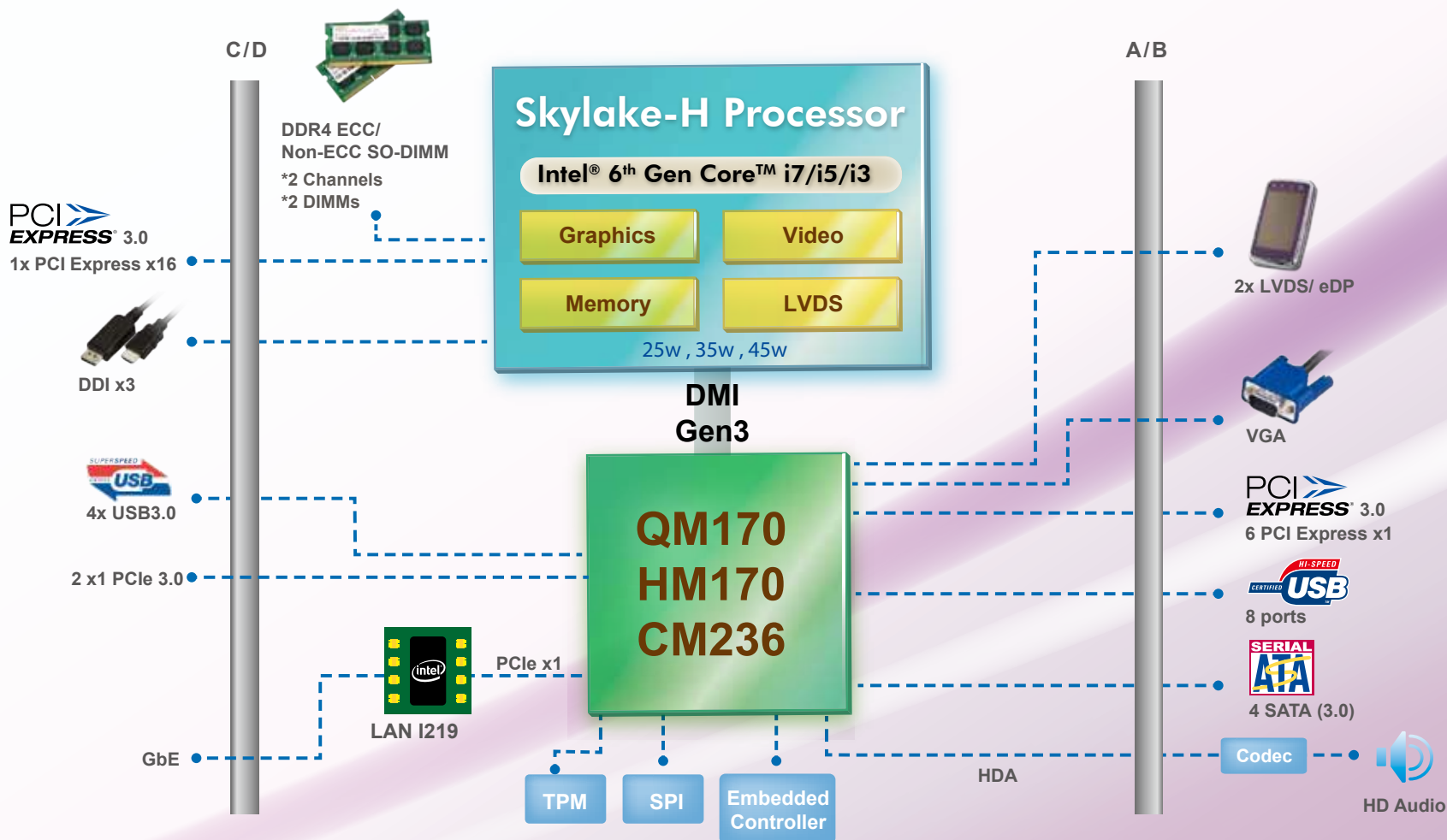
## FEATURES

- Intel® 6<sup>th</sup> Generation Core™ Skylake-H i7, i5 and i3 Processors
- Support DDR4-2133MT/s ECC/Non-ECC SDRAM on two SO-DIMM slots, up to 32GB
- One VGA, three Display-port and one embedded Display port.
- Support USB 2.0/ 3.0, SATA, 7 PCIE x1 and 1 PCIe x16
- Wide voltage support, from 6V to 18V.

## ORDERING GUIDE

AB1-3E31Z	PCOM-B639VG-6820EQ
AB1-3E30Z	PCOM-B639VG-6822EQ
AB1-3E29Z	PCOM-B639VG-6440EQ
AB1-3E28Z	PCOM-B639VG-6442EQ
AB1-3E27Z	PCOM-B639VG-6100E
AB1-3E26Z	PCOM-B639VG-6102E
AB1-3E25Z	PCOM-B639VG-G3900E
AB1-3E35Z	PCOM-B639VG-G3902E





### Processor Core

- ◆ Skylake-H is the 6<sup>th</sup> Generation Intel® Core™ Processor with 14nm
- ◆ Turbo mode
- ◆ SMT: 4~8 threads/core

### Highlights

- ◆ DDR 4 memory support
- ◆ Gen 3 PCIe support 1x 16, 2 x8, 1x4 configuration

### Memory

- ◆ DDR4-2133 MT/s
- ◆ 2 Channels
- ◆ up to 32GB/s in 2 SO-DIMM

### Platform Thermal Design Power

	i7- 25/35/45W	i5- 25/35/45W	i3- 25/35W
CPU			
PCH	QM170 5.8W	QM170 5.8W	QM170 5.8W
Watt	50.8W	50.8W	40.8W

# PCOM-B638VG

Comparing to the previous generation, the Skylake-U can provide not only flexible performance power with efficient energy usage and real time CPU computing, but also more powerful and longer battery life. The enhanced Graphic performance and High Speed I/O can give customers better PCIe and SATA speed. The DDR4 support brings more performance too.



Intel® Skylake-U Core™ i7/i5/i3 processor based on Type VI Compact-COM Express 2.0 module with DDR4 SDRAM on SO-DIMM slot, VGA, LVDS, Display-port, Gigabit Ethernet, PCIe, SATA, USB, OTG

PCOM-B638VG brings three important factors, DDR4 memory support, Gen3 PCIe support, and good graphic performance. Gen3 PCIe provides fast speed and enable your PCIe expansion card consequently even better performance. It is suitable for Networking and Medical related applications. The enhanced graphic performance brings 4K support. The OTG gives customer more flexibilities on developing new applications in different usages

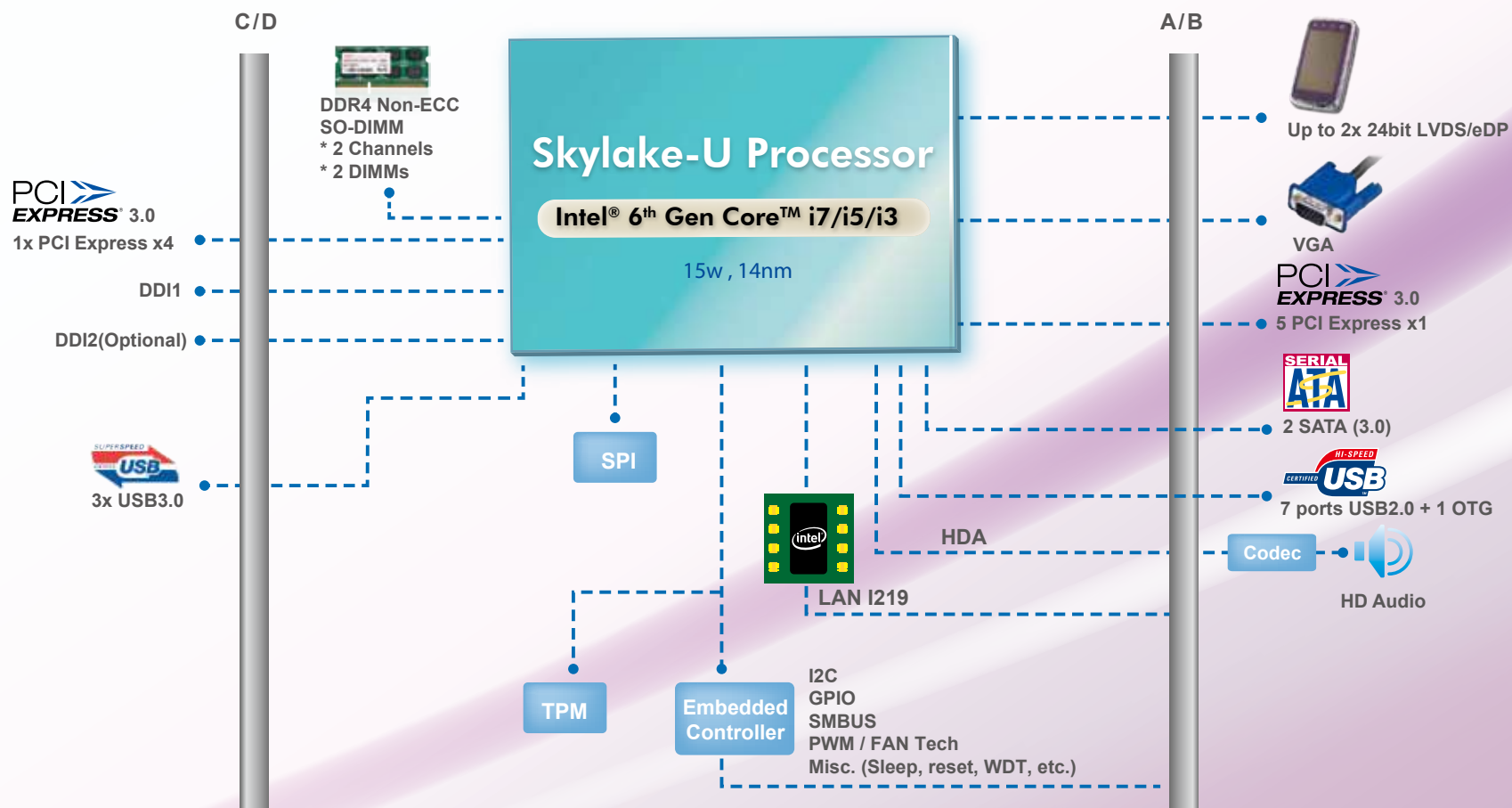
## FEATURES

- Intel® 6<sup>th</sup> generation Skylake-U series Core™ i7, i5 and i3 15W Processors
- Two SO-Dimm slots, up to 32GB
- Support DDR4-2133 MT/s Non-ECC SDRAM on one SO-DIMM slots, up to 16GB
- One VGA, two Displayport and LVDS
- Support USB 2.0/ 3.0, SATA, 5 PCIe x1 and 1 PCIe x4
- Wide voltage support, from 6V to 18V.

## ORDERING GUIDE

AB1-3E39Z	PCOM-B638VG-6600U
AB1-3E38Z	PCOM-B638VG-6300U
AB1-3E32Z	PCOM-B638VG-6100U





### Processor Core

- ◆ Skylake-U is the 6<sup>th</sup> Generation Intel® Core Processor with 14nm
- ◆ Turbo mode
- ◆ SMT: 2~4 threads/core

### Highlights

- ◆ DDR 4 memory support
- ◆ Gen 3 PCIe support
- ◆ OTG support

### Memory

- ◆ DDR4-2133 MT/s
- ◆ 2 Channels
- ◆ up to 32GB in 2 SO-DIMM

### Platform Thermal Design Power

CPU	i7-6600U	i5-6300U	i3-6100U
W <sub>att</sub>	15W	15W	15W

# PCOM-B637VG

The desktop CPU SKU on module is a brand new idea which has never been seen in the market. It's perfect for 1U network system. High-end server can handle more business and information. Multiple-Processors, Hardware-base Raid & Remote control functions are always in high-end server.



Intel® Skylake-S Core™ i7/i5/i3 processor based on Type VI COM Express module with DDR4 SDRAM, VGA, LVDS, Gigabit Ethernet, SATA 3.0 and USB



PCOM-B637VG brings three important factors, DDR4 memory support, Gen 3 PCIe support, and good graphic performance. The DDR4 is trend and it supports both ECC and Non-ECC with the same pin definition. In other words, customer can use both ECC and Non-ECC memories depending their application and demand. In order to achieve that, all the PCH SKUs are considered in development stage to make sure that customer has various models to meet different requirements in cost, performance, and memory type. Gen3 PCIe provides fast speed and enable your PCIe expansion card consequently even better performance. It is suitable for Networking and Medical related applications. The enhanced graphic performance brings 4K support.

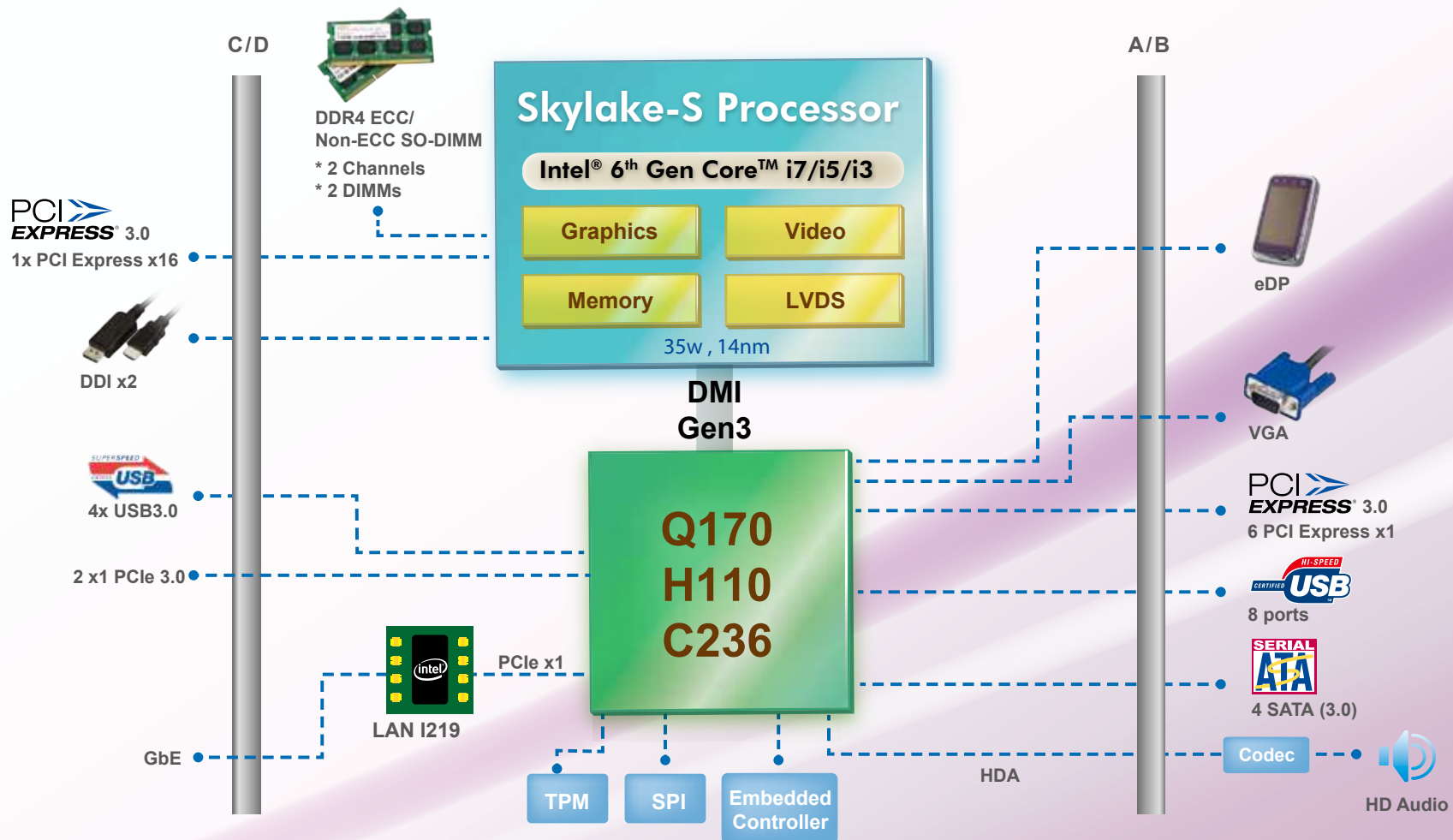
## FEATURES

- Intel® 6<sup>th</sup> generation Skylake-S series Core™ i7, i5 and i3 35W Processors
- Support DDR4-2133 MT/s ECC/Non-ECC SDRAM on one SO-DIMM slots, up to 16GB
- One VGA, three Displayport and VDS
- Support USB 2.0/ 3.0, SATA, 7 PCIE x1 and 1 PCIe x16
- Wide voltage support, from 6V to 18V

## ORDERING GUIDE

AB1-3E37Z	PCOM-B637VG-Q170
AB1-3E34Z	PCOM-B637VG-H110
AB1-3E36Z	PCOM-B637VG-C236





### Processor Core

- ◆ Skylake-S is the 6<sup>th</sup> Generation Intel® Core™ Processor with 14nm
- ◆ Turbo mode
- ◆ SMT: 4~8 threads/core

### Highlights

- ◆ DDR 4 memory support
- ◆ Gen 3 PCIe support 1x 16, 2 x8, 1x4 configuration

### Memory

- ◆ DDR4-2133 MT/s
- ◆ 2 Channels
- ◆ up to 16GB in 1 SO-DIMM

### Platform Thermal Design Power

CPU	i3/i5/i7 35W	i3/i5/i7 35W	i3/i5/i7 35W
PCH	C236 5.8W	Q170 5.8W	H110 5.8W
Watt	40.8W	40.8W	40.8W

# PCOM-B636VG

M2M business is growing up due to IoT and Indutrail 4.0 application. Portwell provides new COM Express product based on Intel® N3000 series to enable stable and real time function for communication and control system. With low power and EMC design of PCOM-B636, it help customer to develop fanless and reliability system.



Intel® ATOM N3000 series based TypeVI COM Express with DDR3L SDRAM, VGA, LVDS, USB 3.0, PCIE and surround design.

PCOM-B636VG COM Express® Type VI module with Intel Atom N300 series SoC. Implementation of applications used for national security and cyber warfare require high intelligence systems capable of operating in remote conditions and under stringent conditions, more so than industrial computers.

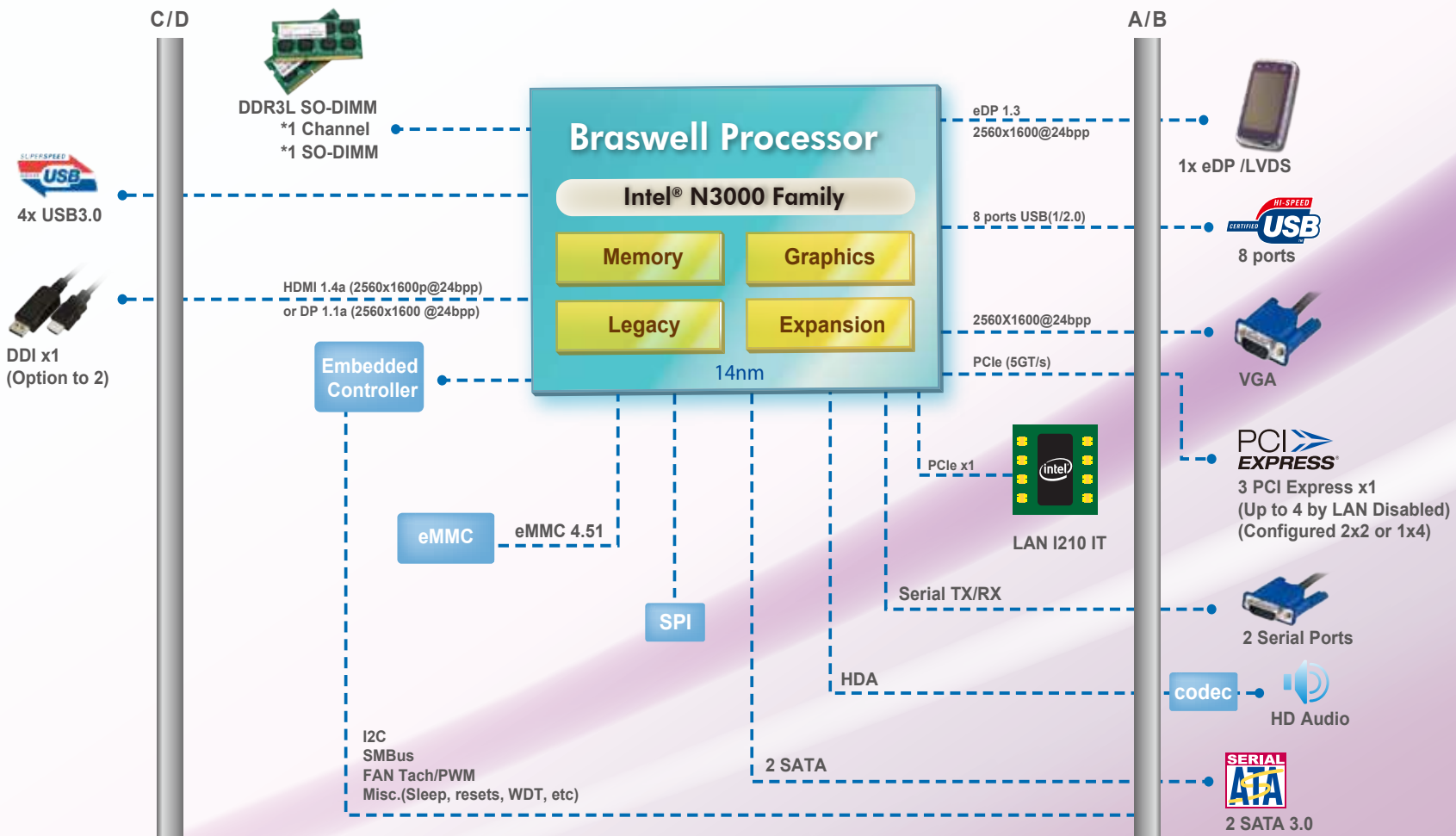
## FEATURES

- The latest Intel® Atom N3000 series embedded processor provides cost-effective solutions with low power and quad core processor technology
- Supports up to four PCIe lanes, four x 1 lanes can be configured to one x 4 lane
- Supports one DDR3L 1600/1333MT/s SDRAM, up to 4GB
- Supports four USB3.0
- Support eMMC storage

## ORDERING GUIDE

Contact us	PCOM-B636VG-N3700.TYPE VI. Atom N3700 Quad Core 1.6GHz.Compact Form Factor.COM Express Module/EC
Contact us	PCOM-B636VG-N3150.TYPE VI. Atom N3150 Quad Core 1.6Hz.Compact Form Factor.COM Express Module/EC/LVDS
Contact us	PCOM-B636VG-N3050.TYPE VI. Atom N3050 DualCore 1.6GHz.Compact Form Factor.COM Express Module/EC/LVDS
Contact us	PCOM-B636VG-N3000.TYPE VI. Atom N3000 DualCore 1.04GHz.Compact Form Factor.COM Express Module/EC/LVDS





## Processor Core

- ◆ Intel® N3000/N3050/N3150/N3700
- ◆ 2M L2 Cache

## Highlights

- ◆ Surround grounding design
- ◆ Integrated Native PCIe x1 and x4
- ◆ VGA/LVDS/DDI support
- ◆ eMMC storage support

## Memory

- ◆ DDR3L-1600 MT/s
- ◆ 1 Memory Channel
- ◆ up to 8GB

## Platform Thermal Design Power

CPU	N3700	N3150	N3050	N3000
W <sub>att</sub>	6W	6W	6W	4W

# PCOM-B635VG

Data protection is more and more important in real world since big data rising. Portwell adopt new Intel platform to provide highest secure logic. It help customer earn trust and business by securing important information anytime.



Intel® 5<sup>th</sup> Generation Core™ i7/i5/i3 processor based on Type VI Basic-COM Express 2.0 module with DDR3L ECC SDRAM on Dual SO-DIMM slots, VGA, Display-port, Gigabit Ethernet, SATA and USB



The basic PCOM-B635VG COM Express module supports up to 16GB ECC DDR3L 1333/1600 MT/s SDRAM on two 204-pin SO-DIMM sockets making it faster than its predecessor. Its expansion interface supports one PCI Express x16 Gen3 (8.0GT/s) with three controllers integrated into processor for enhanced video performance and enhance capabilities to be configurable to 2 x8-lane or 1 x8-lane and 2 x4-lane PCI Express ports.

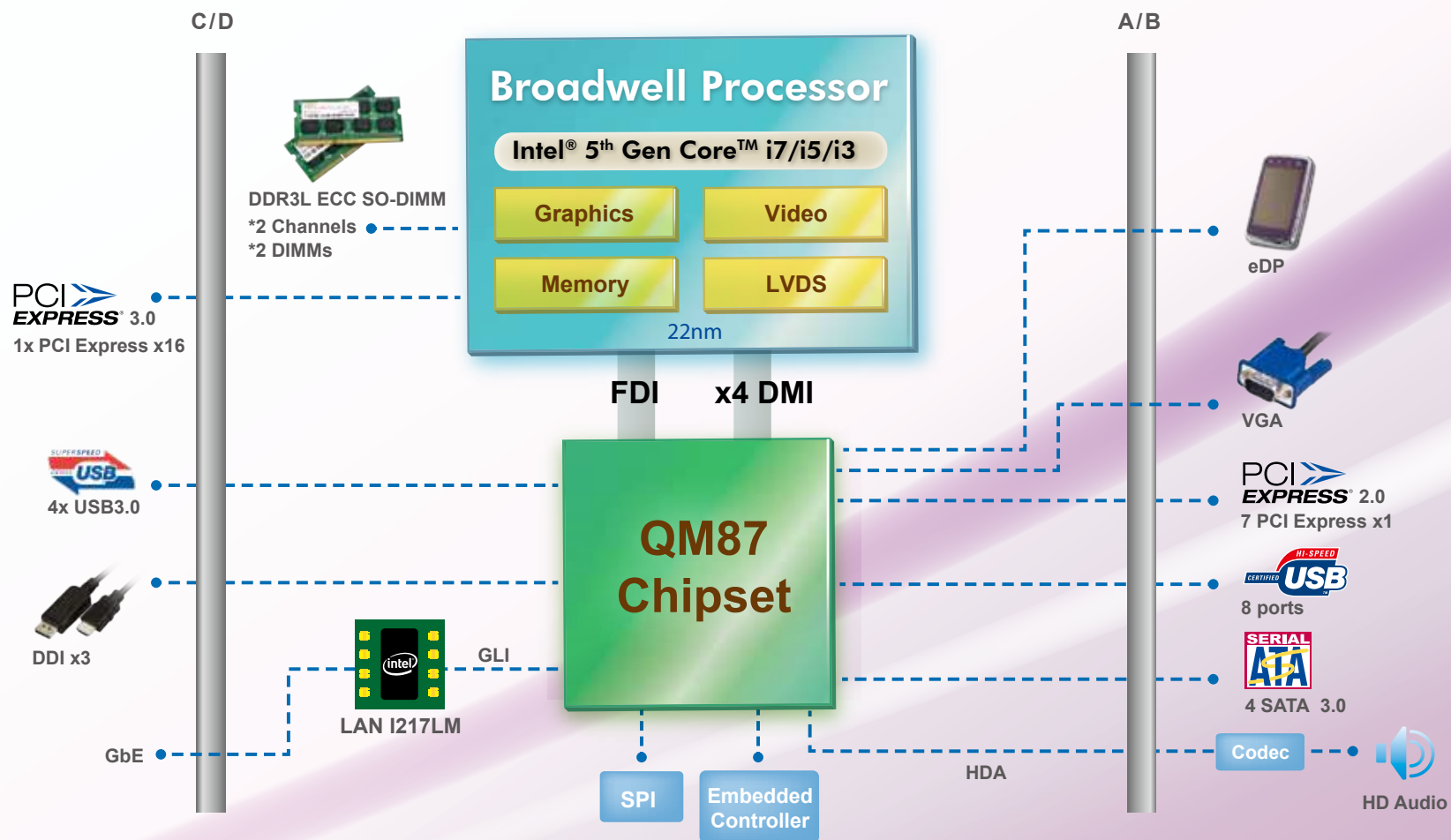
The module supports three independent displays, DP (Display Port), HDMI or DVI and VGA with up to double greater 3D performance compared to its previous generation.

## FEATURES

- Intel® 5<sup>th</sup> Generation Core™ i7, i5 and i3 Processors
- Support DDR3L-1600/1333 ECC SDRAM on two SO-DIMM slots, up to 16GB
- One VGA, three Display-port and one embedded Display port.
- Support USB 2.0/ 3.0, SATA, 7 PCIE x1 and 1 PCIE x16
- Wide voltage support, from 6V to 18V

## ORDERING GUIDE

AB1-3C53	PCOM-B635VG. TYPE VI. Basic Form Factor.COM Express Module.Broadwell/PCH
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### Processor Core

- ◆ Intel® 5<sup>th</sup> Generation Core™ i7/i5/i3 processor to 6MB Cache
- ◆ SMT: 4~8 threads/core
- ◆ Turbo Mode

### Highlights

- ◆ GT3 Graphic with eDRAM
- ◆ Integrated Native PCIe x16 Gen3
- ◆ 25% lower TDP than previous version

### Memory

- ◆ DDR3L - 1600 MT/s
- ◆ 2 Memory Channels

### Platform Thermal Design Power

	i7/GT3	i7/GT2
CPU	47W	47W
PCH	QM87 2.7W	QM87 2.7W
W <sub>att</sub>	49.7W	49.7W



# PCOM-B634VG

In the time of big data, the most important business is that data analysis. Portwell provide highest CPU computing power by Intel® new Xeon® on COM-Express module. By new thermal solution, the system can keep working 24x7 with PCOM-B634. It help customer get most important information in Big data.



**Intel® Pentium® D Series Processor based on Type VI Basic COM Express 2.0 module with DDR4 ECC SDRAM on Three SO-DIMM slots, VGA, HDMI, PCIe x16, 10GbE, SATA and USB**



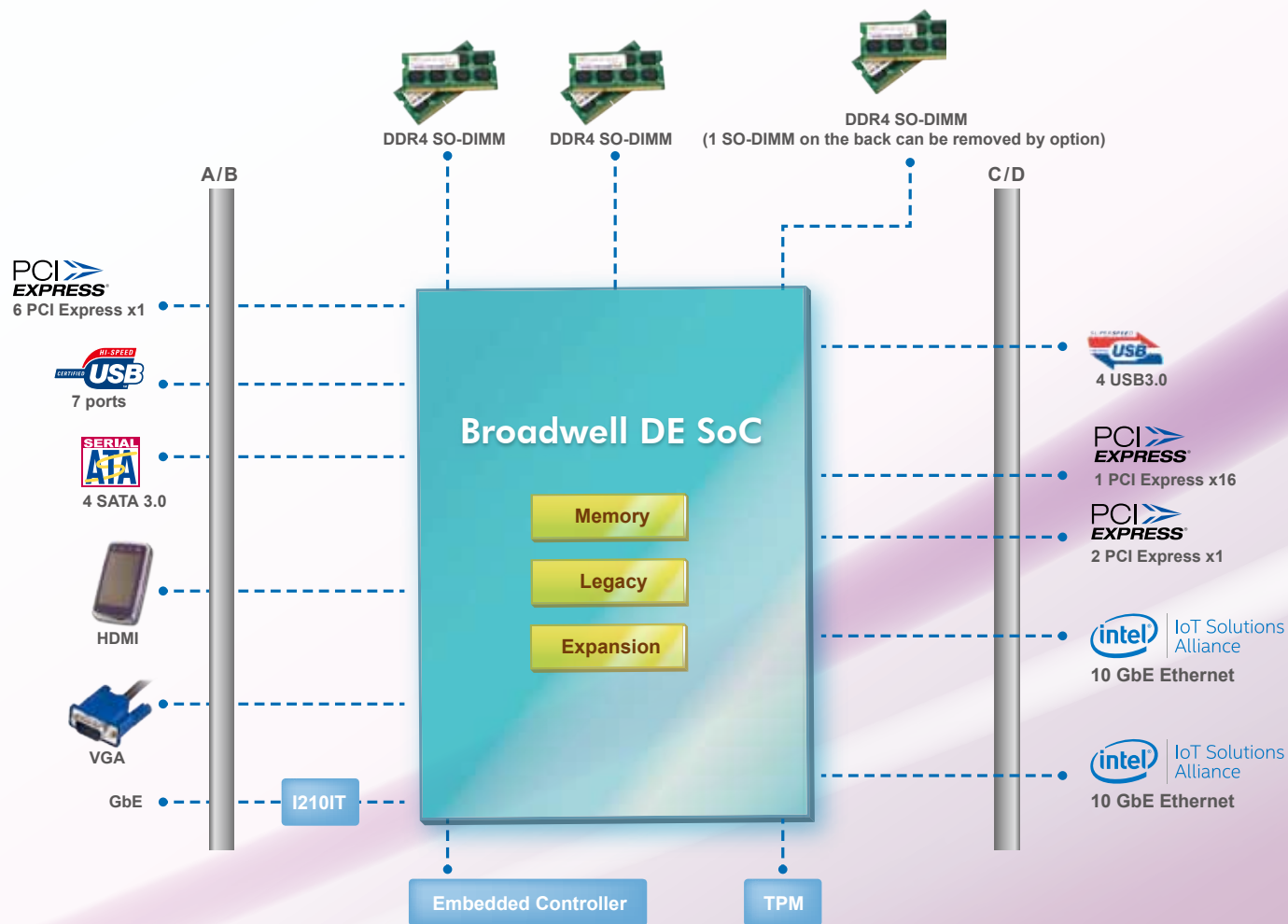
Portwell PCOM-B634VG is designed with Intel® new XEON processor with 16 CPU cores, 10GbE Ethernet KR/KR interface interface and DDR4 ECC SO-Dimm support which provide high CPU computing, excellent Ethernet performance. Extend PCIe Gen3 ports in PCOM-B634 can support high speed IO card for more application. With VGA and legacy interface support, customer can upgrade system fast and easily.

## FEATURES

- Intel® Pentium® D Series Processor on 14nm process
- Support DDR4-2400MT/s ECC/non-ECC SDRAM on three SO-DIMM slots, up to 48GB
- One VGA and HDMI, 10GbE interface
- Support 7 USB 2.0, 4 USB 3.0, 4 SATA 3.0, 8 PCIE x1 Gen 2.0 and 1 PCIe x16 Gen 3.0

## ORDERING GUIDE

AB1-3C91Z	PCOM-B634VG. TYPE VI. Basic Form Factor.COM ExpressModule Broadwell-DE/PCH
AB1-3E09Z	PCOM-B634VG-D1537.TYPE VI. Basic Form Factor. COM Express Module.Intel D1537/VGA/DDR4 SO-Dimm
AB1-3D98Z	PCOM-B634VG-D1517.TYPE VI. Basic Form Factor. COM Express Module.Intel D1517/VGA/DDR4 SO-Dimm
AB1-3D99Z	PCOM-B634VG-D1508.TYPE VI. Basic Form Factor. COM Express Module.Intel D1508/VGA/DDR4 SO-Dimm



### Processor Core

- ◆ Intel® New Xeon®
- ◆ Up to 16 CPU Cores
- ◆ Optional for Wide-temperature

### Highlights

- ◆ Support 10GbE XGMII
- ◆ Support VGA/HDMI Display
- ◆ Support 3 DDR4 ECC SO-Dimm slots

### Memory

- ◆ DDR4 2400 MT/s ECC/Non-ECC SO-Dimm
- ◆ 2 Memory Channels

### Platform Thermal Design Power

CPU	D1559	D1537	D1508
Watt	45W	35W	25W



# PCOM-B633VG

Flexible performance power can provide efficient energy usage and real time CPU computing. It can make portable more powerful and longer system life with battery. With excellent EMC and thermal design, the system can work anywhere.



Intel® Broadwell-ULT Core™ i7/i5/i3 processor based on Type VI Compact-COM Express 2.0 module with DDR3L SDRAM on SO-DIMM slots, VGA, LVDS, Display-port, Gigabit Ethernet, PCIe, SATA and USB

Portwell PCOM-B633VG is designed with Intel® Broadwell-ULT Core™ i7/i5/i3 ultra low power processor with turbo-boost, SOL, IDER, iAMT 10.0 remote control which offer high speed and accurate responses suitable for medical healthcare systems and military applications.

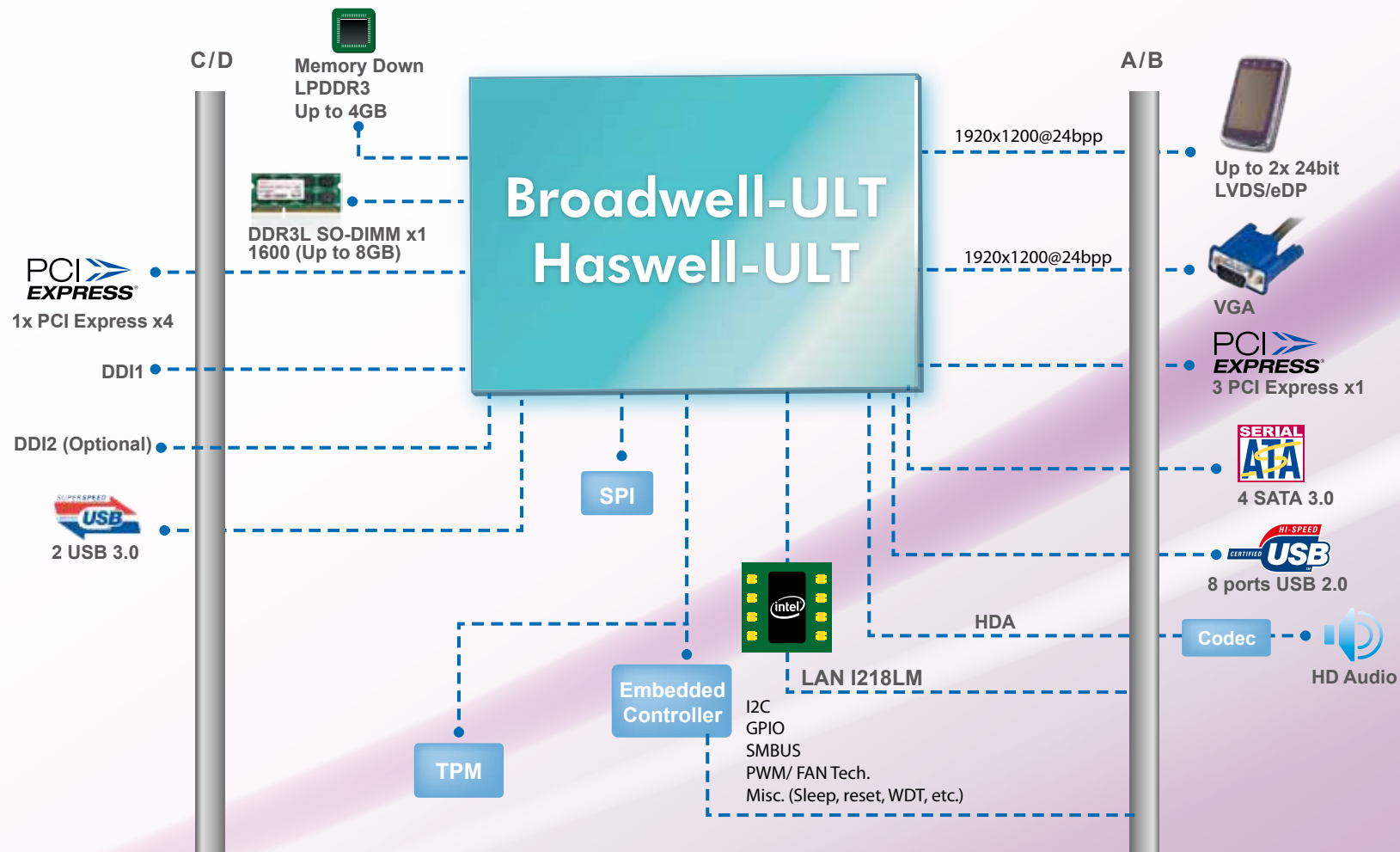
## FEATURES

- Intel® 5<sup>th</sup> Generation Core™ i7, i5 and i3 Processors ULT
- Support DDR3L-1600/1333MT/s SDRAM on SO-DIMM slots, up to 8GB
- Support DDR3L memory-down, up to 4GB
- Support VGA, LVDS and Display-port interface
- Support USB 2.0/ 3.0, SATA, 4 PCIe x1 and 1 PCIe x4

## ORDERING GUIDE

AB1-3C62	PCOM-B633VG-5650U.TYPE VI. Compact COM Express Module.i7- 5650U, VGA/LVDS/Display-ports
AB1-3C61	PCOM-B633VG-5350U.TYPE VI. Compact COM Express Module.i5- 5350U, VGA/LVDS/Display-ports
AB1-3C60	PCOM-B633VG-5010U.TYPE VI. Compact COM Express Module.i3- 5010U, VGA/LVDS/Display-ports
AB1-3C39	PCOM-B633VG-4650U.TYPE VI. Compact COM Express Module.i7-4650U, VGA/LVDS/Display-ports
AB1-3C58	PCOM-B633VG-4300U.TYPE VI. Compact COM Express Module. i5-4300U, VGA/LVDS/Display-ports
AB1-3C59	PCOM-B633VG-4010U.TYPE VI. Compact COM Express Module. i3-4010U, VGA/LVDS/Display-ports
AB1-3C38	PCOM-B633VG-2980U.TYPE VI. Compact COM Express Module. Celeron 2980U, VGA/LVDS/Display-ports





### Processor Core

- ◆ Intel® 5650U/5350U/5010U
- ◆ Dual Cores
- ◆ 3MB ~ 4MB L2 Cache
- ◆ SMT: w threads/core
- ◆ Turbo mode

### Highlights

- ◆ Surround grounding design
- ◆ Integrated Native PCIe x1 and x4
- ◆ VGA/LVDS/DDI support

### Memory

- ◆ DDR3L-1600Mhz
- ◆ 1 Memory Channel
- ◆ up to 8GB
- ◆ On-board LPDDR3 support
- ◆ up to 4GB

### Platform Thermal Design Power

CPU	i7-5650U 2C 2.2Ghz	i5-5350U 2C 1.8Ghz	i3-5010U 2C 2.1Ghz
Watt	15W	15W	15W

# PCOM-B632VG



Implementation of applications used for national security and cyber warfare require high intelligence systems capable of operating in remote conditions and under stringent conditions, more so than industrial computers.



Intel® ATOM E3800 series based Type VI COM Express module with DDR3L SDRAM, VGA, eDP, HDMI, Gigabit Ethernet and 3Gbps SATA.

PCOM-B632VG is designed to offer good EMC protection by latest mobile platform, SoC(System-On-Chip) integrated remote technology and embedded controller. Also PCOM-B632VG provides high performance for various display, eDP and HDMI.



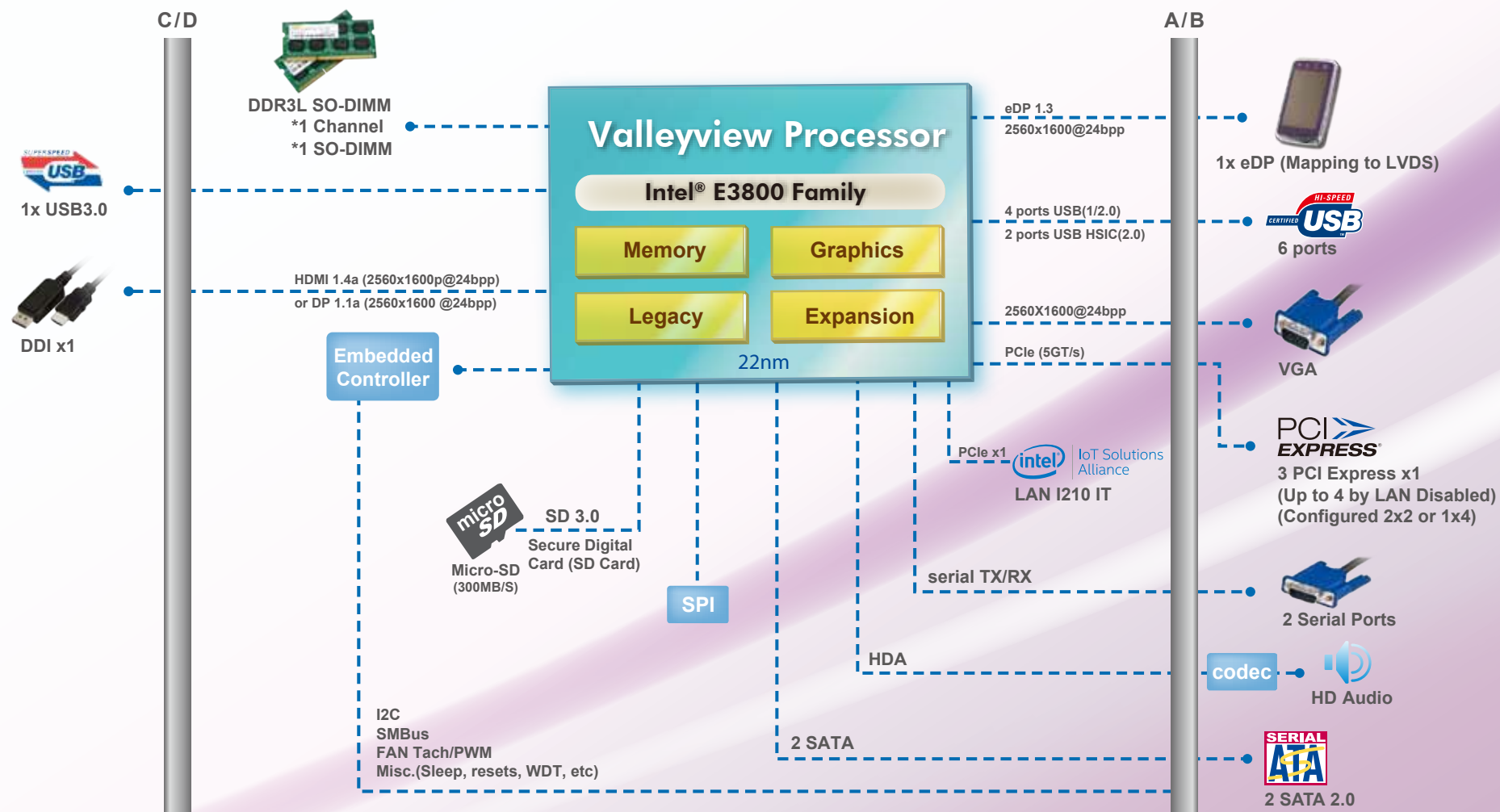
The PCOM-B632VG COM Express module has been enhanced by Portwell in response to market demand for an even lower power platform to take advantage of the Intel® Atom™ processor's already compact design. In fact, since its initial inception, Portwell's expanding Intel Atom processor-based COM Express product portfolio has now grown to include industrial temperature range support. Portwell's versatile COM Express modules adapt to these changes by enabling designers to partition commodity host-processors from proprietary baseboards, thereby minimizing current and future design risks during the initial phase of development.

## FEATURES

- Latest Intel® Valleyview embedded processor provides cost effective solutions with low power and quad core processor technology
- Supports up to four PCIe lanes, four x 1 lanes can be configured to one x 4 lane
- Supports one DDR3L 1066/1333MT/s SDRAM, up to 4GB
- Supports one USB3.0

## ORDERING GUIDE

AB1-3A35	PCOM-B632-E3825, ATOM E3825 Dual Core with MOQ
AB1-3A34	PCOM-B632-E3826, ATOM E3826 Dual Core with MOQ
AB1-3A33	PCOM-B632-E3827, ATOM E3827 Dual Core
AB1-3A36	PCOM-B632-E3845, ATOM E3845 QUAD Core
AB1-3A40	PCOM-B632-E3815, ATOM E3845 Uni Core



### Processor Core

- ◆ BayTrail-I Core™ (22nm) E3845, E3827, E3826 and E3825 for multi-core; E3815 for Uni-core SKUs
- ◆ Up to 2M, Shared Last Level Cache
- ◆ SMT: 4 threads/core

### Highlights

- ◆ Integrated micro-SD on module
- ◆ Integrated PET (Portwell Engineering Toolkit) GUI
- ◆ One USB3.0 port support
- ◆ Up to 4x PCI-Express x1 which support 1x4, 4x1 configurations

### Memory

- ◆ DDR3L-1067/1333MT/s
- ◆ 1 Memory Channel
- ◆ Up to 17GB/s for Industry SKU

### Platform Thermal Design Power

	E3845 4C 1.9GHz	E3827 2C 1.75GHz	E3815 1C 1.46GHz
<b>CPU</b>			
<b>Watt</b>	10W	8W	5W





# PCOM- B219VG

Military application computers face more stringent conditions than industrial computers which must withstand vibration, shock, humidity, and harsh environment. In addition, the performances is also required for high speed and accurate responses.



3<sup>rd</sup> generation Intel® Core™ processor family based Type VI Com Express with DDR3 SDRAM, VGA, LVDS, Gigabit Ethernet, 6Gbps SATA, and USB3.0

The Portwell PCOM-B219VG is designed with the Intel® QM77 express chipset which offers high computing power with the 3<sup>rd</sup> generation Intel core family. This provides turbo-boost, vPro, Hyper Threading, 3D Tri-gate Transistors, USB 3.0 and all the other materials necessary of withstanding wide temperature ranges necessary for harsh environment.

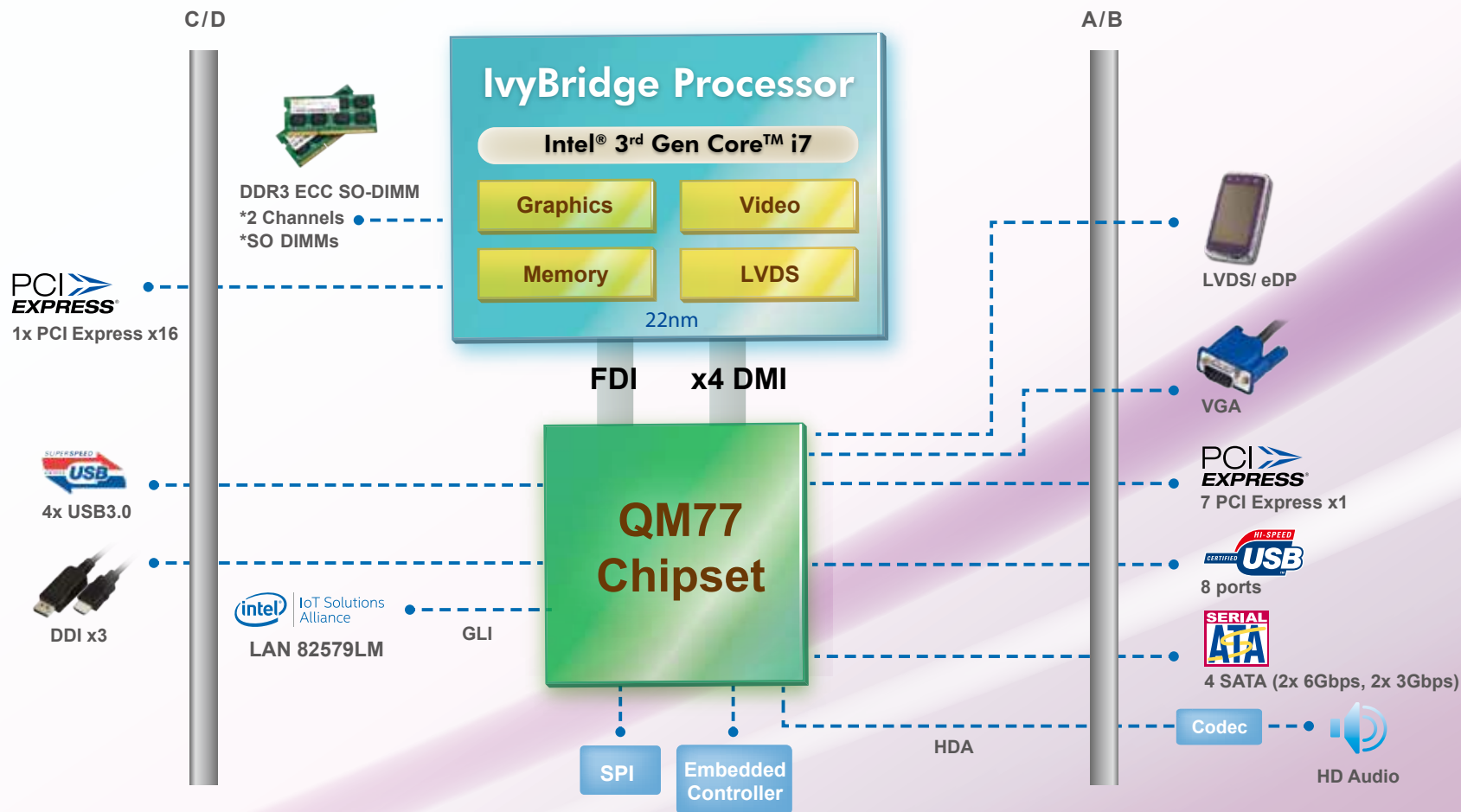
The new Intel® Ivy Bridge platform provides this flexibility of cross-platform CPU selection. Its compact size and rugged design can withstand a wide temperature range of -40 to 80 degree Celsius while providing high speed and accurate responses from command centers to remote stations such as missile launchers, radar stations, and unmanned vehicles.

## FEATURES

- 3<sup>rd</sup> generation Intel® Core™ processor family and mobile Intel® QM77 Express chipset provide more performance at same or lower TDP.
- Supports faster I/O interfaces on seven PCIe lanes (four x1 can be configured to one x4 lane)
- Supports four SATA ports include two 6Gbp ports and two 3Gbp ports
- Power sharing technology between CPU and Graphics engine to maximize performance.
- Display Port (DP), HDMI, DVI supported, up to 50% 3D performance increase, 1.8X HD to HD transcode performance.
- Four USB3.0 ports supported

## ORDERING GUIDE

AB1-3828	(R).PCOM-B219VG-VI-3615QE
AB1-3829	(R).PCOM-B219VG-VI-3612QE with MOQ
AB1-3830	(R).PCOM-B219VG-VI-3555LE
AB1-3831	(R).PCOM-B219VG-VI-3517UE with MOQ
AB1-3832	(R).PCOM-B219VG-VI-3610ME with MOQ
AB1-3833	(R).PCOM-B219VG-VI-3120ME
AB1-3834	(R).PCOM-B219VG-VI-3217UE with MOQ



### Processor Core

- ◆ IvyBridge Core (22nm) QC, DC & Uni-core SKUs
- ◆ 6MB, 4MB, 3MB Shared Last Level Cache
- ◆ SMT: 4~8 threads/core
- ◆ Turbo Mode

### Highlights

- ◆ Integrated Memory Controller: 2 Channels of Native DDR3 support ECC
- ◆ Integrated Native PCI-E Gen 3 supports 1x16, 2x8, 1x4, 6x1 configurations

### Memory

- ◆ DDR3-1067/1333/1600 MT/s, up to 16GB
- ◆ 2 Channels
- ◆ 25.6 GB/s Peak Memory Bandwidth

### Platform Thermal Design Power

	i7-3615QE	i7-3517UE	i5-3120ME
CPU	45W	17W	35W
PCH	QM77 4.1W	QM77 4.1W	QM77 4.1W
Watt	49.1W	21.1W	39.1W

# PCOM- B21A

Developments with height and size constraints require integrated processors with the flexibility of upgradable options such as with hand held mobile devices, industrial thin clients, industrial switches, small file/firewall servers, spam prevention and virus protection intelligence systems.



## Intel® Cedarview based Type 10 Mini-COM Express module with the PICMG COM.0 R2.1 specification

The new Cedar Trail on Mini-Com-Express® is the size of a business card (84mm x 55mm). Its compact size multi-core processor N2600/N2800 +NM10 provides rich I/O and expansions such as PCI-E, LAN, USB and multi-display features.



Portwell PCOM-B21A series are designed with Intel® N2600 / N2800 +NM10 with less than 12W low power consumption and cost effective dual core solution. This product features a fan-less system capable of withstanding -40 to 80 degree Celsius making it suitable for military and aerospace communications and the environments in which they operate.

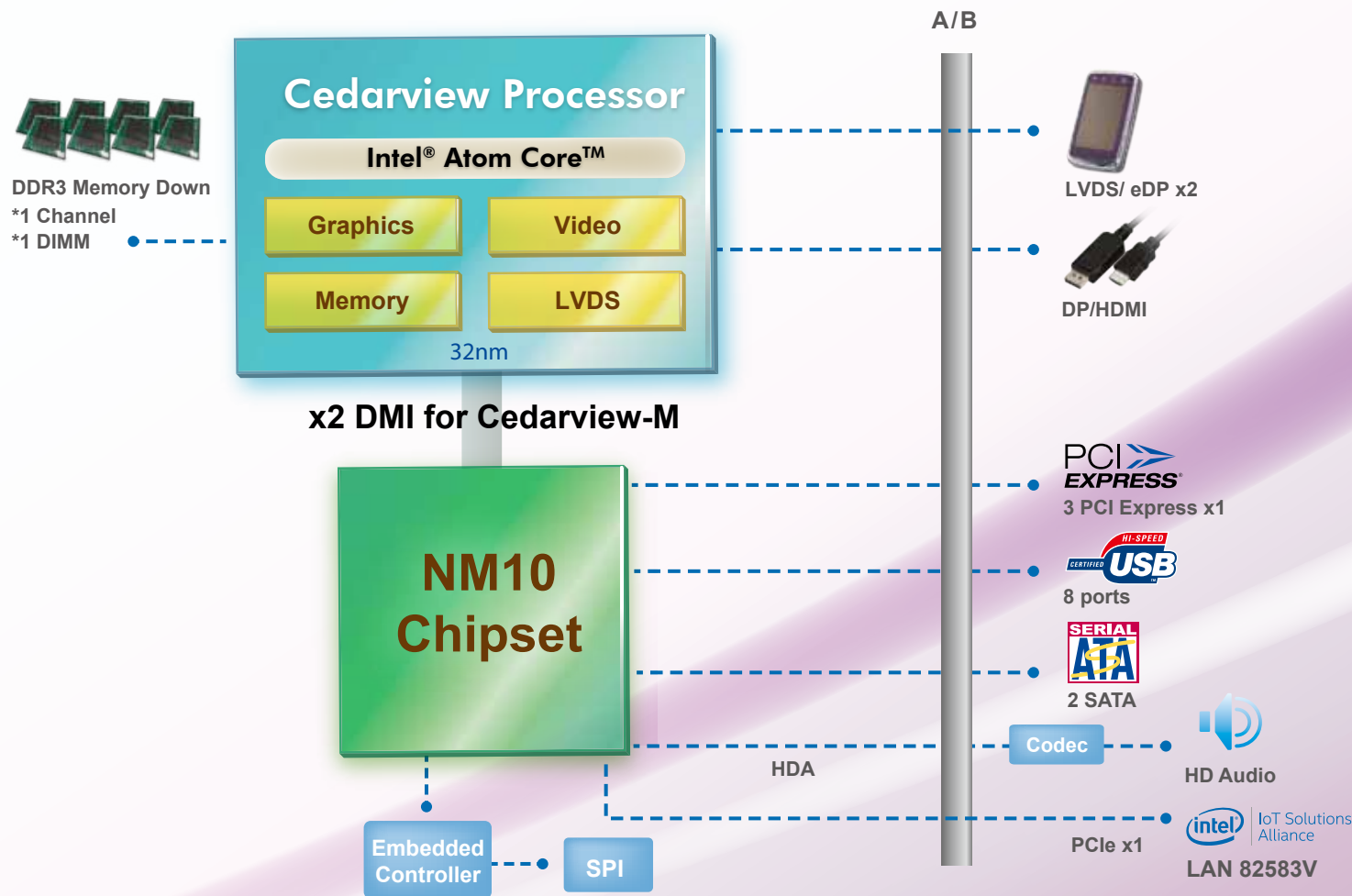
## FEATURES

- The Intel® Atom™ N2600/N2800 embedded processor and NM10 platform that provides cost effective solutions with low power and dual core processor technology
- Supports four PCI Express lanes, four x1 lanes can be configured to one x4 lane
- Supports one DDR3 1067MT/s SDRAM, UP to 2GB(N2600)/ 4GB(N2800)
- Supports eight USB2.0
- Supports dual independent displays of HDMI and DP

## ORDERING GUIDE

AB1-3875	(R).PCOM-B21A-N2800-2G. TYPE 10, Mini COM-Express
AB1-3A39	(R).PCOM-B21A-N2600-1G. TYPE 10, Mini COM-Express
AB1-3A38	(R).PCOM-B21A-N2800-1G. TYPE 10, Mini COM-Express
AB1-3956	(R).PCOM-B21A-N2600-I-1G. TYPE 10, Mini COM-Express





### Processor Core

- ◆ Cedarview Core™ (32nm)  
N2800, N2600 Dual Core SKUs
- ◆ 1MB, Shared Last Level Cache
- ◆ SMT: 4 threads/core
- ◆ Turbo Mode

### Highlights

- ◆ Wide range 4.75V~20V DC input support
- ◆ Onboard nano SSD, up to 32GB
- ◆ Integrated Native PCI-E Gen 1 supports 1x4, 4x1 configurations

### Memory

- ◆ DDR3-1067 MT/s
- ◆ 1 Memory Channel
- ◆ 6.4GB/s Peak Memory Bandwidth

### Platform Thermal Design Power

	N2800	N2600
CPU	6.5W	3.5W
PCH	NM10 2.1W	NM10 2.1W
Watt	8.6W	5.6W

# PCOM-BA00

Type 10 module based on COM Express 2.1 is designed as fan-less system solution (eg. tablet device, industrial thin client system, etc.), also as flexible embedded solution for versatile vehicle markets.



Intel® Atom™ E3800 series SoC based on type 10 Mini COM Express module with DDR3L SDRAM, NANDrive, LVDS/DDI support, USB3.0



PCOM-BA00 is the latest Mini COM Express by 84mm x 55mm with Intel® Bay Trail E3800 series SoC supports PCI Express, dual display, NANDrive storage features.

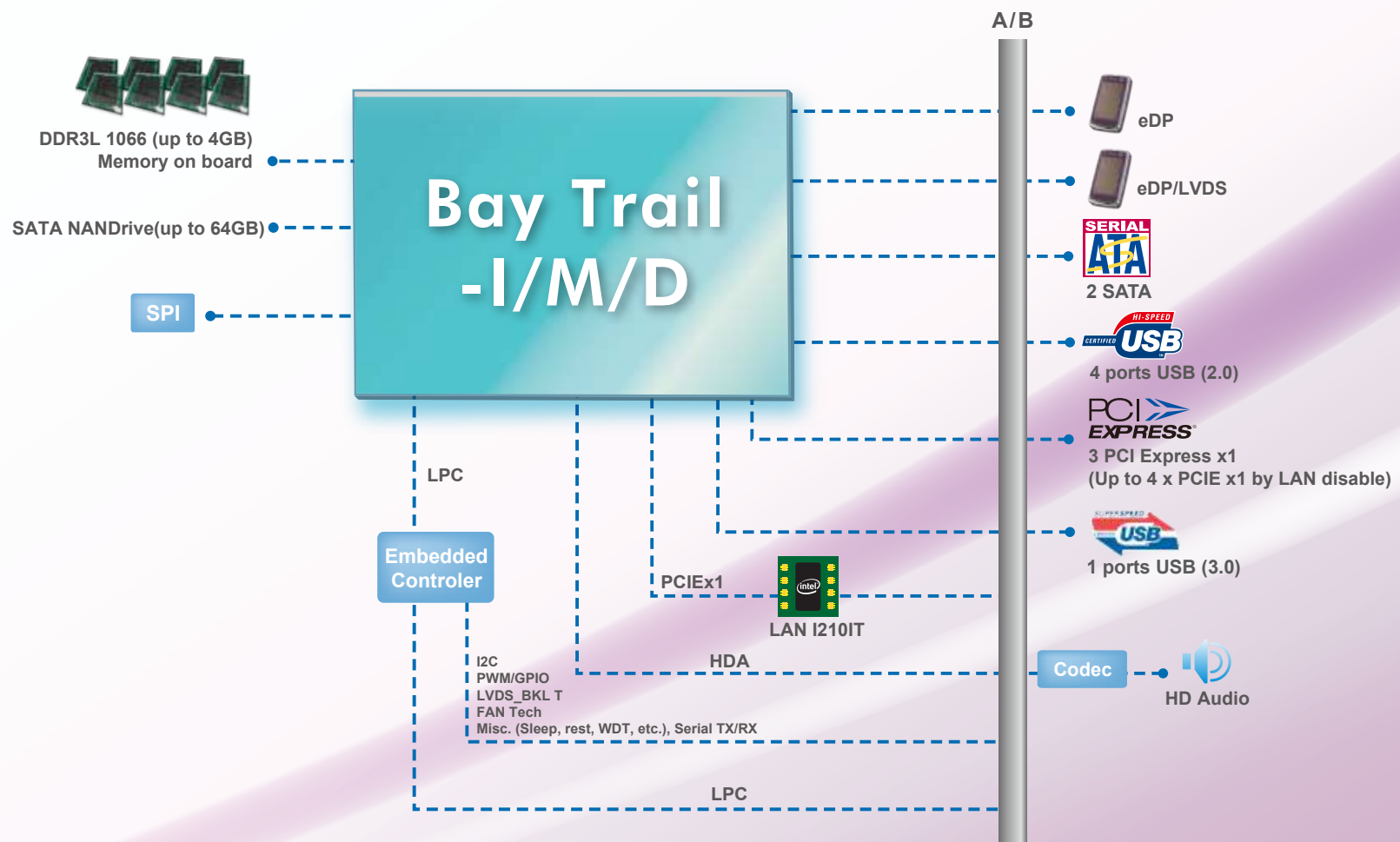
By low power consumption, wide-temp support, better computing, Portwell promotes with confidence PCOM-BA00 as vertical solution to aim at versatile applications, such as Automation, Military, Networking, Transportation, and so on.

## FEATURES

- Atom™ Bay Trail SoC E3800 series processor with industrial support.
- Up to 4GB DDR3L memory-down.
- Three PCIe lanes (optional to Four)
- Support one USB3.0, four USB2.0.
- Support NANDrive storage by SATA channel.

## ORDERING GUIDE

AB1-3B48	PCOM-BA00-E3845-4G with MOQ
AB1-3B51	PCOM-BA00-E3845-2G
AB1-3B50	PCOM-BA00-E3827-2G
AB1-3B47	PCOM-BA00-3825-2G with MOQ
AB1-3B49	PCOM-BA00-3815-2G



### Processor Core

- ◆ Atom Bay Trail (SoC) with QC, DC, & Uni core SKUs
- ◆ 512KB~2MB Shared Last Level Cache
- ◆ SMT: 1 threads/core

### Highlights

- ◆ Integrated Memory Controller: 1 Channels of Native DDR3L support
- ◆ Integrated Native PCI Express, option to 4
- ◆ USB 3.0 x1
- ◆ NANDDrive support
- ◆ Wild-temp support

### Memory

- ◆ DDR3L 1066/1333 MT/s
- ◆ Up to 4GB 512x8
- ◆ Memory on board

### Platform Thermal Design Power

	E3845	E3827	E3815
CPU	4C	2C	1C
Watt	10W	8W	5W



# PCOM-C640

PCOM-C640 is NANO-ITX carrier board with triple display, Gigabit Ethernet, Audio, USB 3.0, SATA. It's a powerful carrier which is suitable for system. Portwell can provide COM Express carrier design guide for your own carrier board development as a reference.



## NANO-ITX Form Factor Evaluation Carrier Board for Type VI module

Portwell PCOM-C640 is a NANO-ITX form factor carrier with COM Express Type VI row connectors. It's suitable for evaluation testing of Portwell's Type VI COM Express modules for 1U Server system. We also provide carrier board design guide for your own carrier board development as a reference.



With PCOM-C640 carrier board, Portwell now has various carriers in different form factors to help customers on developing new platform for both board and system perspectives. Customers can easily begin to develop on new application with Portwell's COM Express Type VI module.

### FEATURES

- COM Express carrier board is compatible with the Portwell Type VI COM Express modules.
- NANO-ITX form factor can meet most standard mounting spaces and provide more expansions and displays.
- Support Rear I/O, DP, RJ45, USB 2.0 & 3.0

### ORDERING GUIDE

AB1-3D18Z	(R).PCOM-C640.Support TYPE VI. NANO-ITX Form Factor.COM Express Carrier Board
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# PCOM-C609

PCOM-C609 carrier offers powerful and reliable solution to customer who has demand of high speed 10 Gigabit Ethernet. It is the first carrier with 10 Gigabit Ethernet with carrier board design guide which can be provided to customer.



## Micro-ATX Form Factor Evaluation Carrier Board for COM-Express Revision 2.0 Type VI Module.

Portwell PCOM-C609 is designed with Micro-ATX form factor with COM-Express Type IV row connectors; it's suitable for evaluation testing of Portwell's Type 6 COM Express modules with USB 3.0, PCI-E, HDMI, VGA, SATA, TPM and 10 Gigabit Ethernet support. Portwell is able to provide carrier board design guide for customer to design their carrier board as a reference.

PCOM-C609 is the first carrier board which can support 10 Gigabit Ethernet function. This can shorten customer's carrier board developing time and make the development quickly and easily. The PCOM-C609 provides COM Express Type 6 support in addition to suit wide range of device connectivity for prototype and flexibility.

### FEATURES

- COM Express carrier board is compatible with the Portwell Type VI COM Express modules.
- Micro-ATX form factor meets most standard mounting spaces and provides more expansions displays.
- Support 2x 10 Gigabit Ethernet & 1x Gigabit Ethernet.

### ORDERING GUIDE

ABI-3D19	(R).PCOM-C609.Support TYPE VI. Micro-ATX Form Factor.COM Express Carrier Board
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# PCOM-C605

Development of resource-saving technologies, which are used in the today's production, dictates a necessity to use instrumentation, which would provide a reliable real-time estimate of technical condition of operating equipment.



## Mini-ITX Form Factor Evaluation Carrier Board for both Type VI Module

Portwell PCOM-C605 is designed with Mini-ITX form factor with COM Express Type VI row connectors, suitable for evaluation testing of Portwell's Type VI COM Express modules on PCI-E, PEG, VGA/LVDS, USB, SATA, and CFEX with SATA and SPI interface. We also provide carrier board design guides for your own carrier board development reference.

This new version of the PCOM-C605 Reference Carrier Board is 100% compatible with the recently released PICMG COM Express Carrier Design Guide and provides a full complement of I/O interfaces, debugging tools, and peripheral devices such as Super I/O and audio code that may be required on the custom carrier board. The full schematics and mechanical drawings of the PCOM-C605 are available for testing to allow customers to immediately begin their own carrier board design effort. A complete Starter Kit is also available, which includes the COM Express module of choice, the PCOM-C605 reference carrier board, thermal solution, documentation.

### FEATURES

- COM Express carrier board is compatible with the Portwell Type VI COM Express modules
- Mini-ITX form factor meets most standard mounting spaces and provides more expansions slots

### ORDERING GUIDE

AB1-3998

(R).PCOM-C605. Support TYPE VI.  
Mini-ITX Form Factor.COM Express Carrier Board





# PCOM-C600

The demand for using renewable energy is constantly growing and wind energy is an increasingly popular choice. With Portwell modules and PCOM-C600 carrier boards for industrial PCs, Portwell modules offer a powerful and reliable control solution that is now being used by suppliers of wind turbines.



## Micro-ATX Form Factor Evaluation Carrier Board For COM-Express® Revision 2.0 Type VI Module.

Portwell PCOM-C600 is designed with Micro-ATX form factor with COM Express Type VI row connectors, suitable for evaluation testing of Portwell's Type 6 COM Express modules on USB3.0, PCI-E (x16, x4, x1, ADD2) Mini-PCI-E, mSATA, PEG/SDVO, HDMI, DVI, LVDS, DP, SATA, LAN, AUDIO etc. We also provide carrier board design guides for your own carrier board development reference.

The Portwell micro-ATX carrier boards are development platforms that enable customers to begin development on an application specific design with Portwell COM Express modules quickly and easily. The PCOM-C600 provides COM Express Type 6 support in addition to a wide range of device connectivity for prototype and development ease and flexibility.

### FEATURES

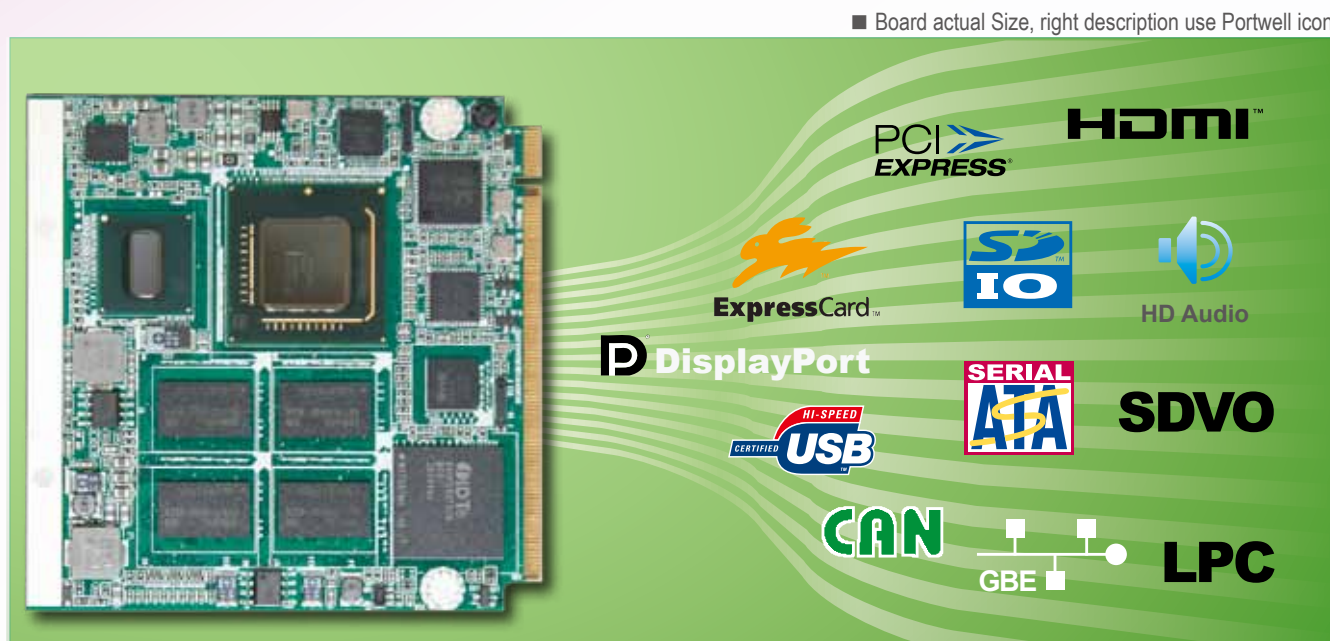
- COM Express carrier board is compatible with the Portwell Type VI COM Express® modules
- Micro-ATX form factor meets most standard mounting spaces and provides more expansions displays
- On-board power and reset switches benefit engineering testing or evaluation without a chassis
- One DVI-I, one HDMI, one Display Port, one PCI-E x1, one PCI-E x4, one PCI-E x4 slot for SDVO, one PCI-E x16 and two USB 3.0 Ports
- One Mini-PCI-E with mSATA feature
- Allows user to select master BIOS on board or from CPU module

### ORDERING GUIDE

AB1-3761	(R).PCOM-C600.Support TYPE VI. Mirco-ATX Form Factor.COM Express Carrier Board
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# PQ7 Interface



## Naming Guide- Line of Portwell QSEVEN

PQ7 Series	PQ7	Portwell Q7
Carrier or Module	X <sub>1</sub>	C Carrier board
		M Module Board
For Carrier/Module board	X <sub>2</sub>	For Module
		1 Standard Mechanical size (70mm x 70mm)
		2-9 TBD
Form Factor	X <sub>3</sub>	0 Portwell
Serial Number	X <sub>4</sub>	0/1/2/3-9/A/B/C-Z
VGA support	Y <sub>5</sub>	V VGA support
		I Industry
Ethernet	Y <sub>6</sub>	G Gigabit Ethernet
		L FAST Ethernet
		T Temperature

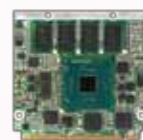
EX: PQ7-X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>X<sub>4</sub>Y<sub>5</sub>Y<sub>6</sub> (Module)

EX: PQ7-X<sub>1</sub>X<sub>2</sub>X<sub>3</sub>X<sub>4</sub>Y<sub>5</sub>Y<sub>6</sub> (Carrier)

The name Qseven™ (Q7) is derived from “quadratic” as noted by the Q and seven refers to the 7 x 7 cm<sup>2</sup> (70 x 70mm) size of the module. With evolution technology built upon a smaller size footprint mobile processor and chipset. The Q7 standard provides high performance and low power consumption interfaces for mobile and battery operated applications with standard power consumption equal to or less than 12W which matches application requirements for fan-less operations by way of heat spreader mechanical interfaces.

Unlike other module standards, Q7 does not require an expensive board-to-board connector. It utilizes a very affordable MXM card slot with 230 pins in a 0.5 mm configuration. This slot is already being used for graphics cards in laptop computers, so it is capable of high speed PEG (PCI Express Graphics) data transfers.

# PQ7 Solution Guide



	PQ7-M105IT	PQ7-M106IE	PQ7-M107	PQ7-M640F
Form Factor (mm)	Qseven 70 x 70 mm	Qseven 70 x 70 mm	Qseven 70 x 70 mm	Qseven 70 x 70 mm
CPU/ Clock/ Cache	<ul style="list-style-type: none"> <li>* Intel® E680T/E660T/E640T</li> <li>* 1.00 GHz up to 1.60GHz</li> <li>* 2500 MHz PCI-E</li> <li>* 512KB Shared Last Level Cache</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® E3845/ E3827/ E3825/ E3815</li> <li>* 1.33GHz to 1.91GHz</li> <li>* 1MB to 2MB Cache</li> </ul>	<ul style="list-style-type: none"> <li>* Intel® N3000/N3050/N3150/ N3700</li> <li>* 2.08GHz to 2.40GHz</li> <li>* 2M L2 Cache</li> </ul>	<ul style="list-style-type: none"> <li>* Freescale™ i.MX6 Family, ARM™ Cortex-A9, single/dual/quad core processor</li> <li>* 1MB L2 cache (dual/quad core)</li> <li>* 512KB L2 cache (single core)</li> <li>* 1GHz up to 1.2GHz</li> </ul>
Chipset	EG20T Chipset	N/A	N/A	N/A
Memory	<ul style="list-style-type: none"> <li>* DDR2-800 MT/s</li> <li>* 1 Memory Channel</li> <li>* 6.4GB/s Peak Memory Bandwidth</li> </ul>	<ul style="list-style-type: none"> <li>* DDR3L-1067/1333</li> <li>* 1 Memory Channel</li> </ul>	<ul style="list-style-type: none"> <li>* DDR3L-1600MHz</li> <li>* 2 Memory Channel</li> </ul>	* On board DDR3 up to 2GB
USB	7 x USB 2.0	1 x USB 3.0 6 x USB 2.0	2 x USB 3.0 4 x USB 2.0	4 x USB 2.0 Host 1 x USB OTG
PCI Express	4x PCI Express x 1	3x PCIe x 1 (Option to 4)	3x PCIe x 1 (Option to 4)	1x PCIe x 1
Ethernet	LAN 82574IT	LAN I210IT	Realtek RTL8111G	1x Gigabit Ethernet Interface
Sound	Intel® High Definition Audio	Intel® High Definition Audio	HD 5:1 Audio codec	AC'97 Audio interface
Graphic Controller	* Intel® Atom™ Processor E6xx integrated Graphic Media Accelerator 600, up to 400MHz	* Intel® HD Graphic	* Intel® HD Graphics Gen8	<ul style="list-style-type: none"> <li>* Integrated graphics accelerators for 2D, OpenGL® ES2.0 3D and OpenVG™</li> <li>* Supports up to 4 independent displays</li> </ul>
Carrier Board	PQ7-C100XL	PQ7-C201	PQ7-C201	PQ7-C100ARM
Extend Temperate (-40~85 Celsius)	Yes	Yes	N/A	Yes



# PQ7 Solution Guide



	PSMC-M640F	PSMC-M310IT	PQ7-C100ARM
Form Factor (mm)	SMARC 82 x 50 mm	SMARC 82 x 50 mm	Mini-ITX 170 x 170 mm
CPU/ Clock/ Cache	<ul style="list-style-type: none"> <li>* Freescale™ i.MX6 Family,</li> <li>* ARM™ Cortex-A9, single/dual/quad core processor</li> <li>* 1MB L2 cache (dual/quad core)</li> <li>* 512KB L2 cache (single core)</li> <li>* 1GHz up to 1.2GHz</li> </ul>	<ul style="list-style-type: none"> <li>* TI™ AM3354,</li> <li>* ARM™ Cortex-A8, single core processor</li> <li>* 800MHz up to 1GHz</li> <li>* 64KB L1 cache (single core)</li> <li>* 256KB L2 cache (single core)</li> </ul>	N/A
Chipset	N/A	N/A	N/A
Memory	* on board DDR3 up to 2GB	* on board DDR3 512MB	N/A
USB	4 x USB 2.0 Host 1 x USB OTG	2 x USB 2.0 Host 1 x USB OTG	4 x USB 2.0 Host 1 x USB OTG
PCI Express	1x PCI-e x1 lane	N/A	1x Mini-Card
Ethernet	1x Gigabit Ethernet Interface	1x Gigabit Ethernet Interface	1x RJ45
Sound	AC'97 Audio interface	I2S Audio Interface	1x MIC-In 1x Line-Out
Graphic Controller	<ul style="list-style-type: none"> <li>* Integrated graphics accelerators for 2D, OpenGL® ES2.0 3D and OpenVG™</li> <li>* Supports up to 4 independent displays</li> </ul>	<ul style="list-style-type: none"> <li>* SGX530 3D Graphics Engine</li> <li>* Direct3D Mobile, OpenGL® ES1.1 &amp; 2.0 3D and OpenVG™, OpenMax</li> </ul>	N/A
Carrier Board	PSMRC-C300ARM	PSMRC-C300ARM	PQ7-C100ARM
Extend Temperate (-40~85 Celsius)	Yes	N/A	N/A

# PQ7 Solution Guide



	PSMC-C300ARM	PQ7-C100XL-CAN	PQ7-C201
Form Factor (mm)	Mini-ITX 170 x 170 mm	3.5" ESB Carrier (146 x 105mm)	Mini-ITX 170 x 170 mm
CPU/ Clock/ Cache	N/A	N/A	N/A
Chipset	N/A	N/A	N/A
Memory	N/A	N/A	N/A
USB	2 x USB 2.0 Host 1 x USB OTG	7 x USB 2.0 4 x on Rear 2 x on Header 1 x Client Header	1 x USB 3.0 4 x USB 2.0
PCI Express	1 x Mini-Card	1 x Mini-Card	1 x PCIe x4
Ethernet	1 x RJ45	1 x RJ45	1 x RJ45
Sound	1 x MIC-In 1 x Line-Out	1 x MIC-In 1 x Line-Out	1 x MIC-In 1 x Line-Out
Graphic Controller	N/A	N/A	1 x DP 1 x HDMI 1 x LVDS
Carrier Board	PSMRC-C300ARM	N/A	PQ7-C201
Extend Temperate (-40~85 Celsius)	N/A	Yes	N/A

# PQ7- M105IT

Transportation and traffic management systems are deeply embedded in our daily lives (eg. Fleet management, signal and control, vehicle entertainment, etc.). And it is critical that these devices withstand the environmental conditions of temperature, humidity and vibration.



Qseven module based on Intel® Atom™ E640T/ E660T/ E680T platform with DDR2 SDRAM, four PCI Express lanes, 24bit LVDS, SDVO, CAN bus, NANDrive

Portwell's PQ7-M105IT is designed with Intel® ultra low power E600 series CPU and EG20T IOH. It features less than 5W power consumption, -40 to 80 degree Celsius resistance, PCI express interface which supports GPS /GPRS /Wireless /Bluetooth devices and SDIO for cost efficient SD/Micro SD storage. Furthermore, the board is compliant with the vibration standard MIL-STD-810F and Method 514.5C with three axes of 5Hz to 500 Hz for maximum duration. The vibration spectrum exceeds 26rms (root mean squared). Portwell's Qseven also passes function tests with standing 20G of shock for 11ms in 3 axes/6 face direction. The Qseven is the most suitable and reliable solution for your transportation application development.

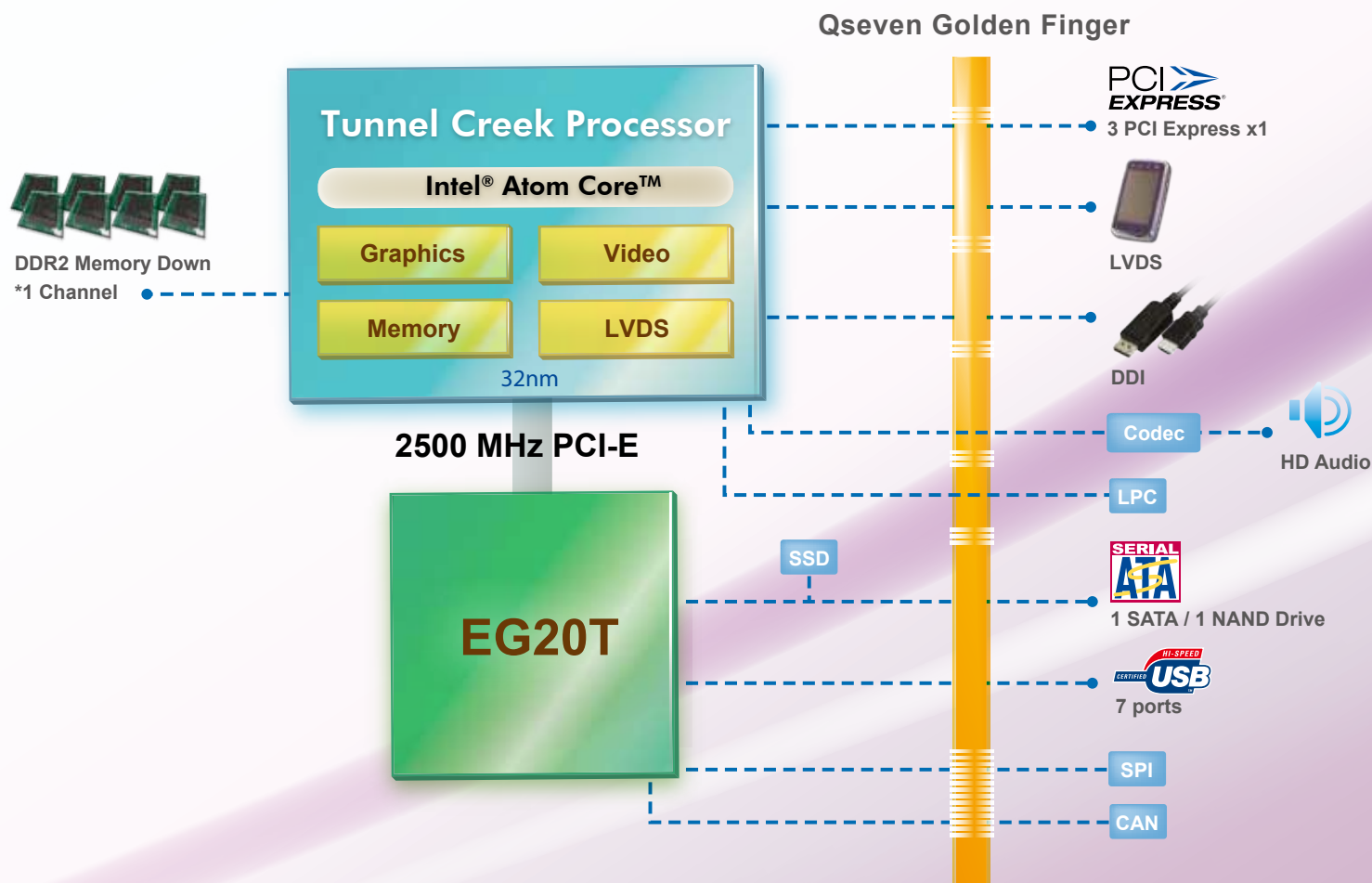
## FEATURES

- Atom™ ultra low power CPU (E640T/ E660T/ E680T) and IOH (EG20T) total TDP is under 5W fan-less application
- Full Hardware acceleration of H.264, MPEG2/4, VC1 and WMV9 supported
- On board 512MB DDR2 supported up to 2GB
- Three PCI Express lanes supported
- CAN Bus interface supported
- SATA Solid State Drive, onboard (optional)

## ORDERING GUIDE

AB1-3628	PQ7-M105IT-0600-0512 (commercial) with MOQ
AB1-3629	PQ7-M105IT-1000-1024 (industrial) with MOQ
AB1-3630	PQ7-M105IT-1600-1024 (industrial)
AB1-3722	PQ7-M105IT-1600-2048 (industrial) with MOQ
B8304300	(GP).Heat Spreader. 70x62x8mm for PQ7-M105IT





### Processor Core

- ◆ Tunnel Creek Core™ (32nm)  
E680T, E660T, E640T Uni-core SKUs
- ◆ 512KB Shared Last Level Cache
- ◆ SMT: 2 threads/core

### Highlights

- ◆ Integrated Memory Controller: 1 Channels of Native DDR2 support
- ◆ Integrated Native PCI-E Gen 1 supports 4x1 configurations

### Memory

- ◆ DDR2-800 MT/s
- ◆ 1 Memory Channel
- ◆ 6.4GB/s Peak Memory Bandwidth

### Platform Thermal Design Power

	E680T	E660T	E640T
<b>CPU</b>	4.5W	3.6W	3.6W
<b>PCH</b>	EG20TW 1.55W	EG20TW 1.55W	EG20TW 1.55W
<b>Watt</b>	6.05W	5.15W	5.15W

# PQ7-M107

PQ7-M107 is suitable for Intelligent security, real time intelligent surveillance, and pre-warning system which are trends for factory applications.



PQ7-M107 based on Qseven 2.0 SPEC designed with Intel® Atom™ N3000 series processor. Up to 4GB, 24bit LVDS, DP, USB 3.0

Portwell PQ7-M107 is designed with Intel® Atom™ N3000 series processor. PQ7-M107 Quad core processor features low power than previous Atom platforms.



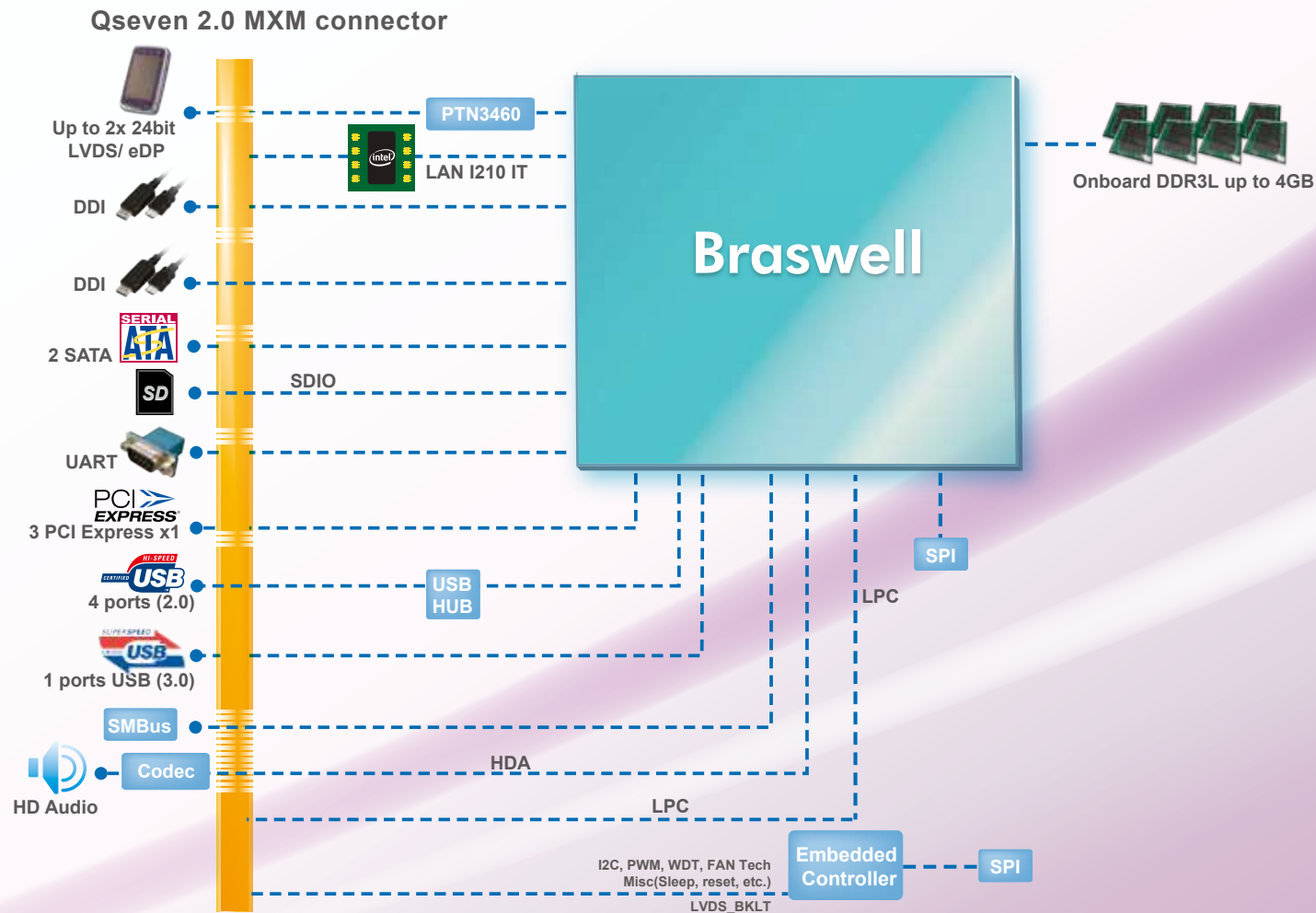
PQ7-M107 could be implemented in manufactory, transportation and automation applications. Better graphics performance, higher memory bandwidth are improved compared to BayTrail. In addition, HD Camera with MIPI CSI 2.0, 4k x 2k resolution and three independent displays are designed on PQ7-M107.

## FEATURES

- Atom™ Braswell SoC N3000 series processor
- On Board DDR3L DRAM up to 4GB
- 3 PCIE x1 (Up to 4x1)
- Support 2 USB 3.0 and 1 USB 2.0

## ORDERING GUIDE

Contact us	PQ7-M107-N3700. Atom N3700 Quad Core 1.6GHz. Mini Form Factor.COM Express Module/EC/LVDS
Contact us	PQ7-M107-N3150. Atom N3150 Quad Core 1.6Hz. Mini Form Factor.COM Express Module/EC/LVDS
Contact us	PQ7-M107-N3050. Atom N3050 DualCore 1.6GHz. Mini Form Factor.COM Express Module/EC/LVDS
Contact us	PQ7-M107-N3000. Atom N3000 DualCore 1.04GHz. Mini Form Factor.COM Express Module/EC/LVDS



### Processor Core

- ◆ Dual core / Quad core processor
- ◆ Processor up to 2.4GHz
- ◆ 2MB L2 Cache

### Highlights

- ◆ Integrated Native PCI Express up to 4x1 / 1x4
- ◆ Up to 2 USB 3.0
- ◆ eDP to LVDS support
- ◆ Embedded Controller for H/W monitoring

### Memory

- ◆ DDR3L 1600MHz
- ◆ Up to 4GB
- ◆ 2 Memory Channel

### Platform Thermal Design Power

	N3000	N3050	N3150	N3700
CPU				
Watt	4W	6W	6W	6W



# PQ7-M106IE



Transportation application demands to traffic control, transportation monitoring and transport information system are operated in vibration and high temperature environment which require wide-temperature and solder components support.



Intel® Atom™ Based Qseven 2.0 module board with memory-down, Dual DP, SATA, PCIE, Gigabit Ethernet and eMMC

Portwell PQ7-M106IE series are designed with Intel Atom™ E3800 series and excellent power-design for critical environment for stable operation. Lower power consumption and high performance are parallel features better than the last Atom™ generation.



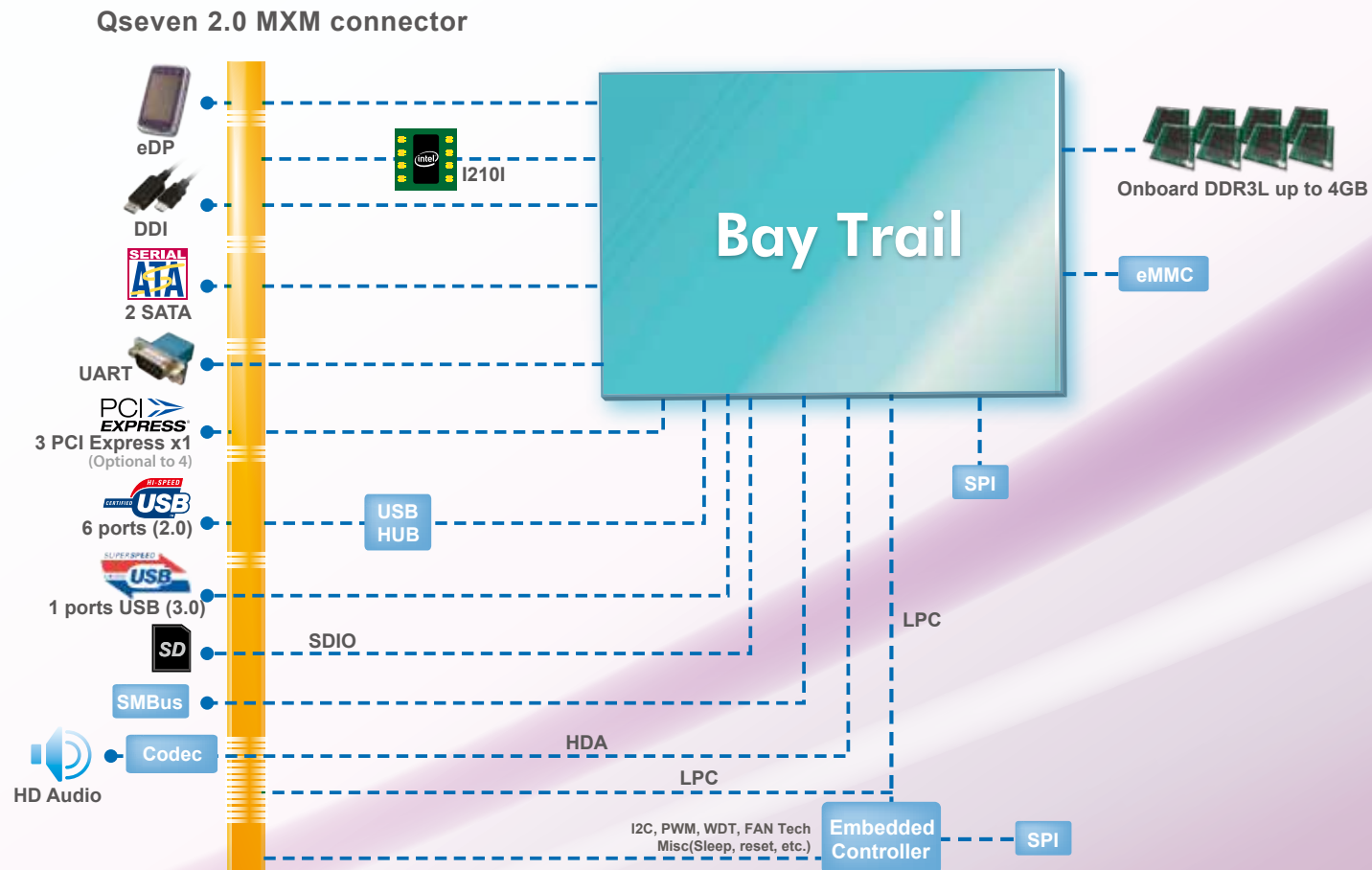
PQ7-M106IE is designed with qualified components for wide-temp support. Hence industrial-grade eMMC storage is adopted to keep system working in -40°C~85°C. In addition, through USB Hub, USB2.0 can be expanded as 6 ports. For Transportation or Outdoor application, PQ7-M106IE will be appropriate solution to meet customer's requirement.

## FEATURES

- Support Intel® Atom™ E3800 Series
- Onboard DDR3L memory-down, up to 4GB
- Onboard eMMC driver, up to 32GB
- Support Dual DP interface
- Support Smart Battery feature

## ORDERING GUIDE

AB1-3B10	PQ7-M106IE-E3845-4G (industrial)
AB1-3B56	PQ7-M106IE-E3845-2G (industrial)
AB1-3B22	PQ7-M106IE-E387-2G (industrial)
AB1-3B55	PQ7-M106IE-E3825-2G (industrial)
AB1-3B21	PQ7-M106IE-E3815-2G (industrial)



### Processor Core

- ◆ Atom™ Bay Trail (SoC) with QC, DC, & Uni core SKUs
- ◆ 512KB~2MB Shared Last Level Cache
- ◆ SMT: 1 threads/core

### Highlights

- ◆ Support wide-temp eMMC driver, up to 32GB
- ◆ Support Dual DP interface which can be configured DVI/HDMI

### Memory

- ◆ DDR3L 1066/1333 MT/s
- ◆ Up to 4GB
- ◆ 1 Memory Channel

### Platform Thermal Design Power

CPU	E3845	E3827	E3815
Watt	10W	8W	5W



# PQ7-M640F

To save valuable customers' development time to market, not only the RISC-based boards, but also the following ECO system which Portwell can provide should be taken into consideration: full functions of CPU Module + Carrier board (Q7, Q7+), ready BSP for Android 4.0 & Linux 3.0.x, QT5 & GTK+ Middleware and advanced Utility (Remote Management, Diagnostic Tool) supported.



Qseven module based on Freescale™ i.MX6 family, ARM™ Cortex-A9, Solo / Dual / Quad core processor with onboard 1GB DDR3 (up to 2GB), PCIe 1-lane interface, VGA, HDMI, single LVDS 1-ch or dual LVDS (18/24-bit) 2-ch and CAN Bus.

Portwell PQ7-M640F (6Q, 6D, 6S) is design as CPU module with series of Qseven form factor. It is based on embedded Freescale™ i.MX6 processor, an ARM® Cortex®-A9 processor, Single-, Dual- and Quad-Core. In connection with external standard IO device, a 80-pin Carrier board PQ7-C100ARM is suggested for the following expansion purpose: 3x UART, 2x I2C, 1x Keypad, 1x CAN bus, interfaces of 1x RGB parallel LCD, 1x MIPI-DSI, 2x MIPI-CSI for camera, 1x SPDIF, 1x ESAI audio and 4x PWM.

## FEATURES

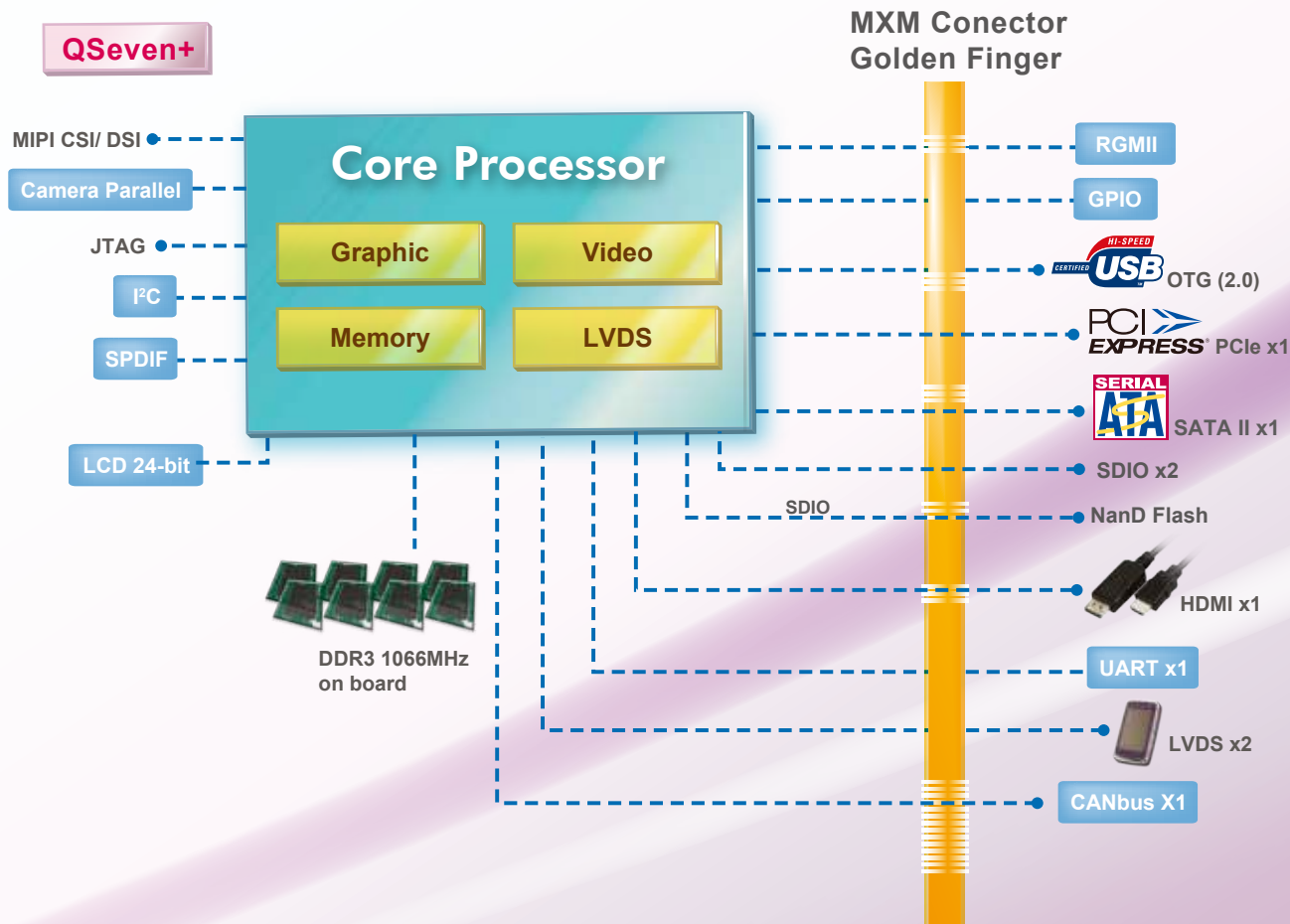
- Ultra low power consumption: 2W (Single core) ~ 6W (Quad core)
- Longevity support more than 10 years
- Support Q7+ function (3x UART, CAN, MIPI interface, 2nd LCD interface, GPIO)
- Built-in H/W Graphics accelerators, Open GL ES2.0, Open VG1.1 supported
- 4x independent displays supported. Multi-format of encode & decode.
- Portwell ARM ECO system to save customers' development time to market.

## ORDERING GUIDE

AB1-3A50Z	PQ7-M640F, CPU Module board (Quad core)
AB9-3243Z	PQ7-C100ARM, I/O carrier board
By project	PQ7-M620F, CPU Module board (Dual core)
By project	PQ7-M610F, CPU Module board (Single core)







## Processor Core

- ◆ Freescale™ i.MX6 Family, ARM™ Cortex-A9, Single/Dual/Quad core processor

## Highlights

- ◆ More than 10 years longevity support
- ◆ Ultra low power 2W~6W
- ◆ Rich connectivity for expansion such as 1x CAN bus, interfaces of 1x MIPI-DSI, 2x MIPI-CSI for camera, 1x SPDIF, 1x ESAI audio and 4x PWM.

## Memory

- ◆ Onboard DDR3 1GB support up to 2GB

## Platform Thermal Design Power

CPU	i.MX6 Solo 2W	i.MX6 Dual 4W	i.MX6 Quad 6W
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# PSMC-M640F



To save valuable customers' development time to market, not only the RISC-based boards, but also the following ECO system which Portwell can provide should be taken into consideration: full functions of CPU Module + Carrier board (SMARC form factor, "Smart Mobility ARChitecture"), ready BSP for Android 4.0 & Linux 3.0.x, QT5 & GTK+ Middleware and advanced Utility (Remote Management, Diagnostic Tool) supported.



PSMC-M640F is design as CPU module series with SMARC form factor. It is based on embedded Freescale™ i.MX6 processor, an ARM® Cortex®-A9 processor, Single, Dual and Quad-Core.



The SMARC ("Smart Mobility ARChitecture"), small form factor of lower power, cost concern, and high performance, is used as building blocks for portable and stationary embedded systems. The SMARC pin-out is optimized for the features common to ARM CPUs and not common to the x86 PC world. The modular approach allows scalability, fast time to market and upgradability while still maintaining cost performance, low power and small physical size.

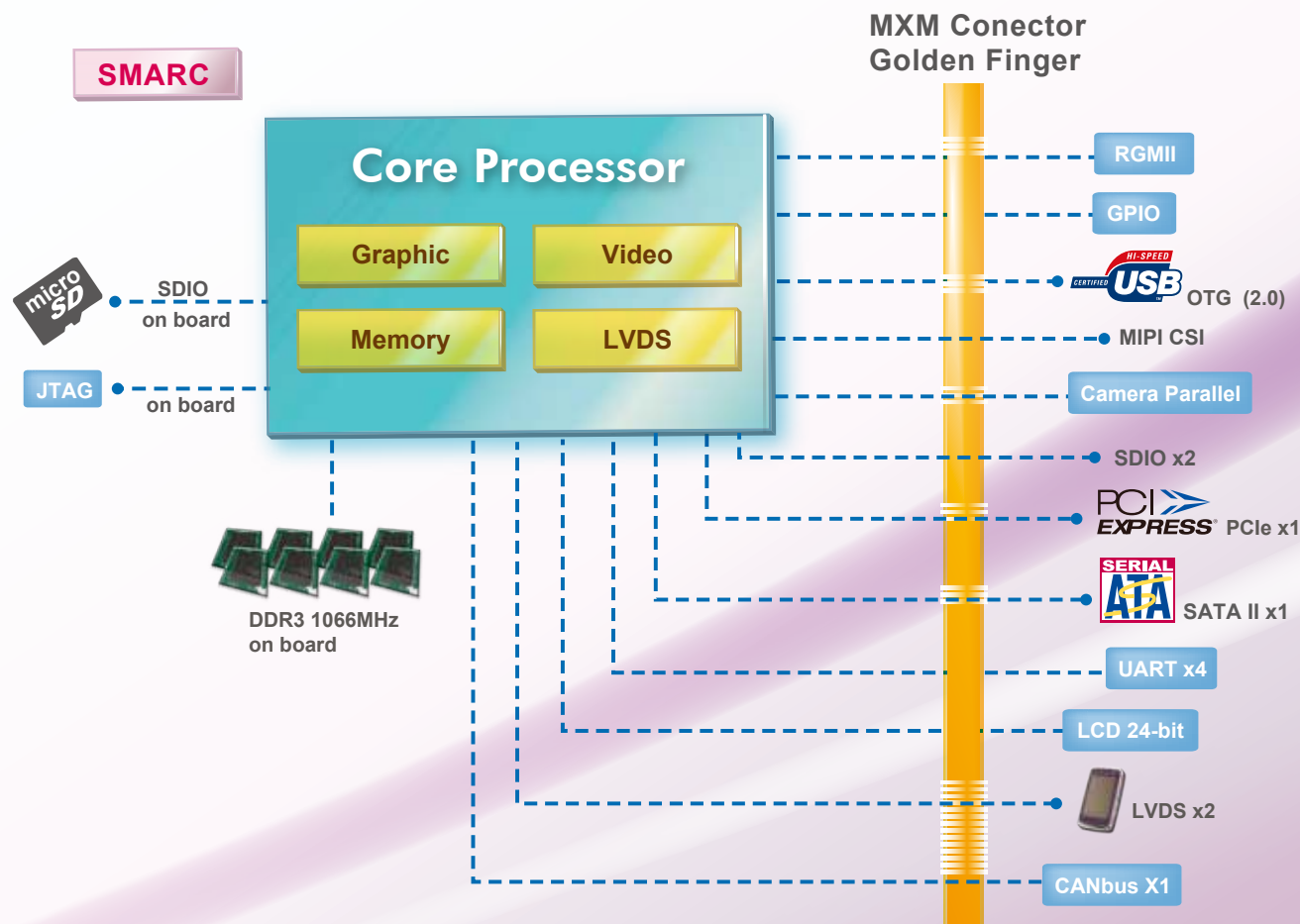
## FEATURES

- Freescale™ i.MX6 Cortex A9 application processor, Single / Dual / Quad core SKU
- Ultra low power consumption: 2W (Single core) ~ 6W (Quad core)
- Longevity support more than 10 years
- Built-in H/W Graphics accelerators, Open GL ES2.0, Open VG1.1 supported
- 4 independent displays supported. Multi-format of encode & decode.
- Parallel LCD display interfaces
- Serial and parallel camera input provisions
- Multiple I2C, I2S and serial port options
- USB client / host mode (OTG) operation
- SD and eMMC card operation

## ORDERING GUIDE

Contact us	PSMC-M640F, CPU Module board (Quad core)
Contact us	PSMC-C300ARM, I/O carrier board
By project	PSMC-M620F, CPU Module Board (Dual core)
By project	PSMC-M610F, CPU Module Board (Single core)





### Processor Core

- ◆ Freescale™ i.MX6 Family, ARM™ Cortex-A9, Single/Dual/Quad core processor

### Highlights

- ◆ More than 10 years longevity support
- ◆ Ultra low power 2W~6W
- ◆ Rich connectivity for expansion such as 1x CAN bus, interfaces of 1x MIPI-DSI, 2x MIPI-CSI for camera, 1x SPDIF, and PWM.

### Memory

- ◆ Onboard DDR3 1GB support up to 2GB

### Platform Thermal Design Power

CPU	i.MX6 solo	i.MX6 Dual	i.MX6 Quad
	2W	4W	6W



# PSMC-M310T

To save valuable customers' development time to market, not only the RISC-based boards, but also the following ECO system which Portwell can provide should be taken into consideration: full functions of CPU Module + Carrier board, ready BSP for Android 4.0 & Linux 3.0.x, QT5, Middleware and advanced Utility (Diagnostic Tool) supported.



PSMC-M310T is design as CPU module series with SMARC form factor. It is based on embedded TI™ AM3354 Single-core processor, an ARM® Cortex®-A8 processor. Best cost-effective entry model to replace original markets of ARM9 and ARM11.



The SMARC ("Smart Mobility ARChitecture"), small form factor of lower power, cost concern, and high performance, is used as building blocks for portable and stationary embedded systems. The SMARC pin-out is optimized for the features common to ARM CPUs and not common to the x86 PC world. The modular approach allows scalability, fast time to market and upgradability while still maintaining cost performance, low power and small physical size.

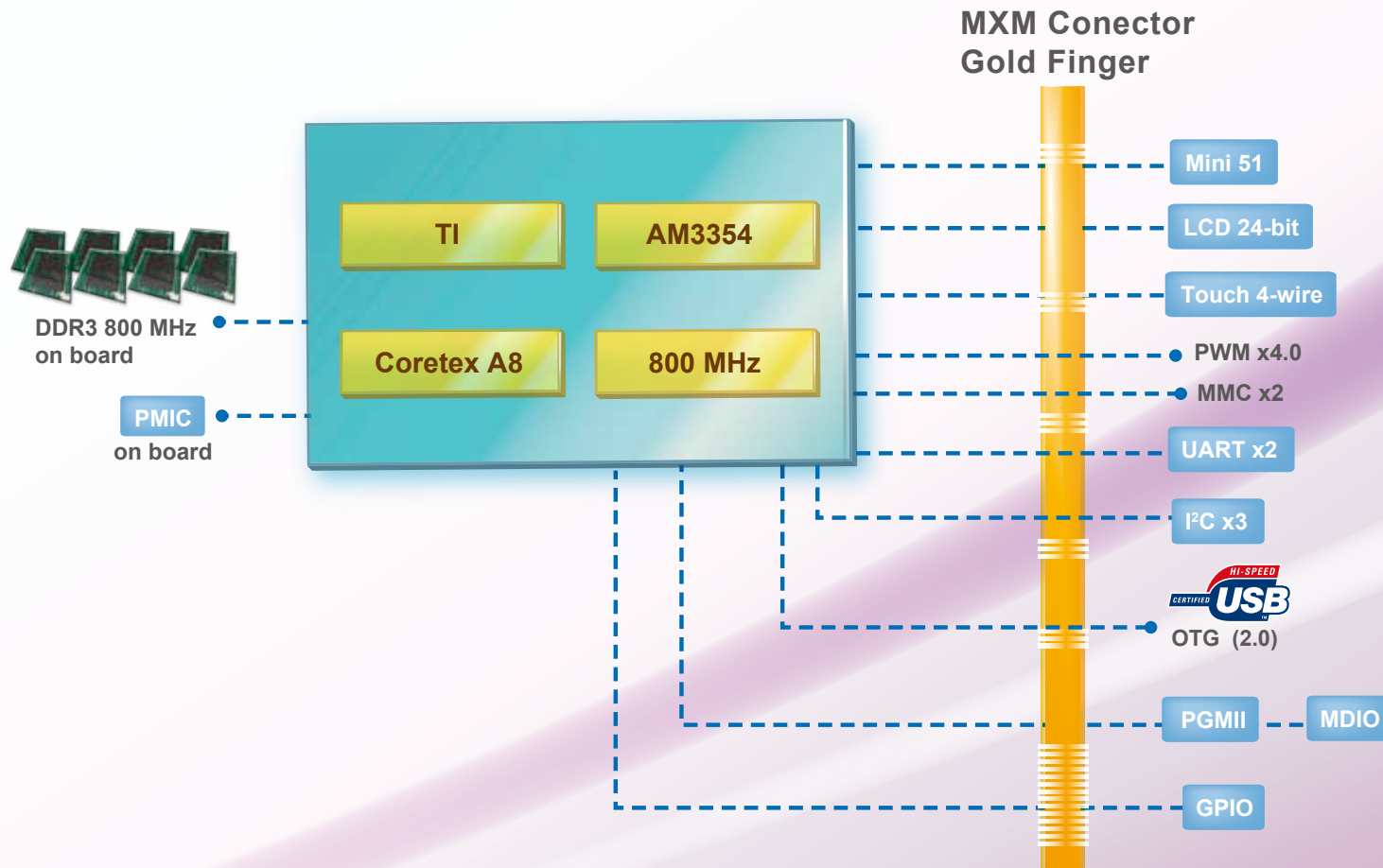
## FEATURES

- Ultra low power consumption: < 2W
- Longevity support more than 10 years
- Higher C/P ratio
- Support SMARC 1.0
- Built-in H/W Graphics accelerators, Open GL ES1.1 & 2.0, Open VG and OpenMax supported
- Portwell ARM ECO system to save customers' development time to market.

## ORDERING GUIDE

Contact us	PSMC-M310T CPU Module board (Single core)
Contact us	PSMC-C300ARM I/O carrier board





### Processor Core

- ◆ TI™ AM3354, ARM™ Cortex-A8, Single core processor

### Highlights

- ◆ More than 10 years longevity support
- ◆ Ultra low power lower than 2W
- ◆ Low Profile

### Memory

- ◆ Onboard DDR3 512MB support

### Platform Thermal Design Power

CPU

TI™ AM3354  
2W

# PQ7-C100ARM

Besides original Q7 feature, Q7 Plus function with extra 80-pin enables customers to enhance expansion possibility..



## Mini-ITX Form Factor Carrier Board for Qseven Module with GbE, HDMI, VGA and dual LVDS

Portwell's PQ7-C100ARM carrier board is designed with Qseven 230 pins card edge MXM connector, suitable for initial evaluation testing of PQ7-M640F. It can help save valuable customers' precious development time to market because the following effort has been made by Portwell.



- Porting Ready as Development Kit to Serve Prior Evaluation Purpose
  - OS ( Linux 3.x / Android 4.x )
  - BSP Ready
  - Middleware Qt5 Ready
- Saving Development Time at least 6~8 weeks

### FEATURES

- Mini-ITX form factor for embedded applications
- Plus with extra 80-pin on PQ7-C100ARM for expansion purpose: 3x UART, 2x I2C, 1x Keypad, 1x CAN bus, interfaces of 1x RGB parallel LCD, 1x MIPI-DSI, 2x MIPI-CSI for camera, 1x SPDIF, and PWM.

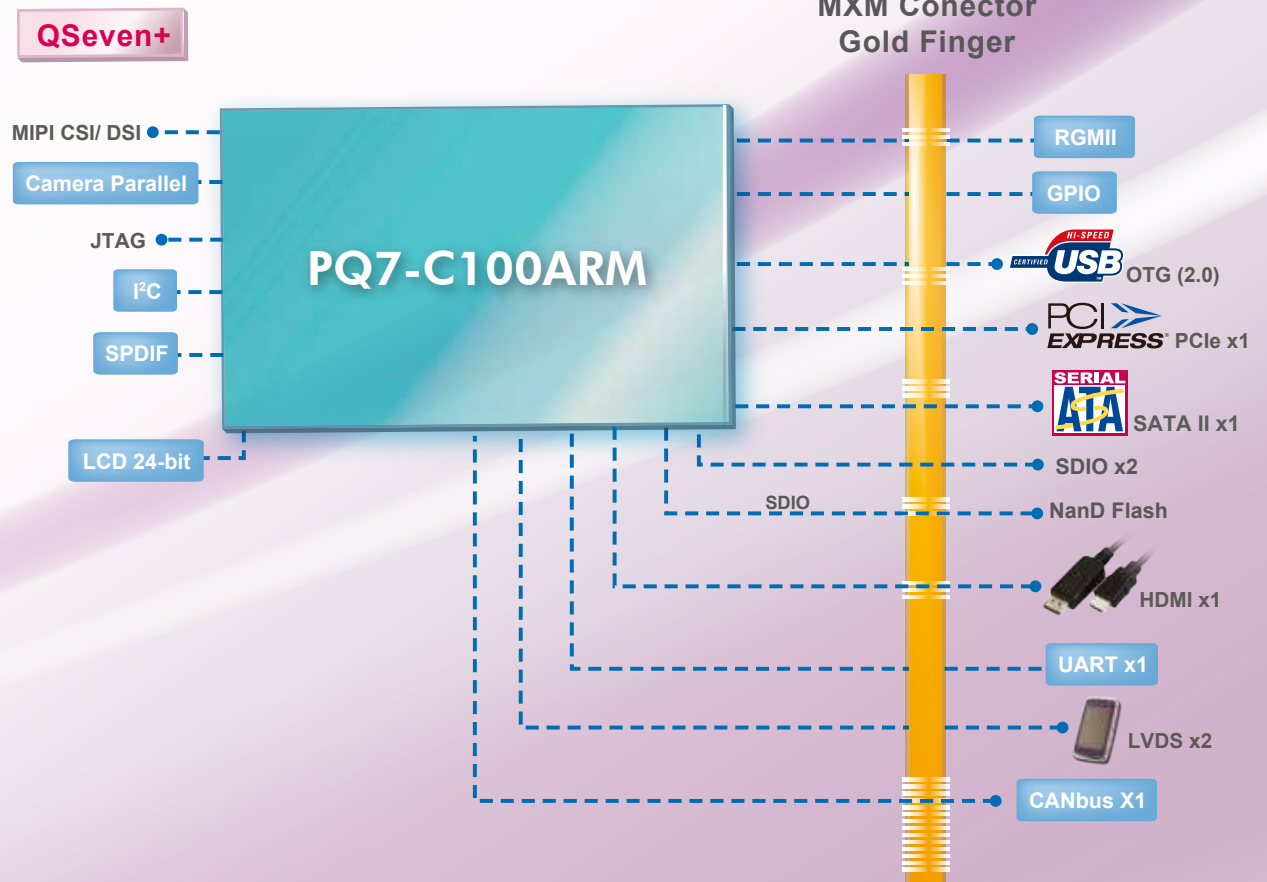
### ORDERING GUIDE

AB9-3243Z

PQ7-C100ARM, Mini-ITX, Qseven Carrier Board







# PSMC-C300ARM

The pin-out of PSMC-C300ARM is optimized for the features specifically common to ARM processors. The modular approach allows scalability, fast time to market and upgradability while still maintaining low power and cost performance.



## Mini-ITX Form Factor Carrier Board for SMARC Module with GbE, HDMI, VGA and dual LVDS

Portwell's PSMC-C300ARM carrier board is designed with SMARC 314 pins card edge MXM connector, suitable for initial evaluation testing of PSMC-M640F and PSMC-M310T. It can help save valuable customers' precious development time to market because the following effort has been made by Portwell.

- Porting Ready as Development Kit to Serve Prior Evaluation Purpose
  - OS ( Linux 3.x / Android 4.x )
  - BSP Ready
  - Middleware Qt5 Ready
- Saving Development Time at least 6~8 weeks

### FEATURES

- Mini-ITX form factor for embedded applications
- Multiple Display interfaces
- MIPI (DSI, CSI) interface for camera is reserved

### ORDERING GUIDE

Contact us	PSMC-C300ARM, Mini-ITX, SMARC Carrier Board
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## PSMRC-C300ARM

### MXM Conector Gold Finger

RGMII

GPIO

 OTG (2.0)

• MIPI CSI

Parallel Camera

• SDIO x2

 PCIe x1

 SATA II x1

UART x4

LCD 24-bit

 LVDS x2

CANbus X1



# PQ7-C100XL-CAN

More and more places utilize some form of a kiosk, e.g. airports, museums, ATMs, etc. This module comes equipped with a single DVI interface for high resolution. Its D/C input reduces the power use while the Mini PCI Express make upgrades simpler.



## 3.5" ESB Form Factor Carrier Board for Qseven Module

Portwell PQ7-C100XL-CAN is designed with a Qseven 2.0 specification and 230pin card edge MXM connector; suitable for initial evaluation testing based on Portwell's Qseven modules with Mini PCI-E, VGA/LVDS, SATA, LAN, AUDIO, SDIO, LPC, CAN etc interfaces.



PQ7-C100XL-CAN has CAN bus for vehicle application. In addition, 3.5" board size can fix in thin client system with Qseven module. Furthermore, for speeding up developing stage, Portwell provides carrier board design guides as well for customer's own carrier board development reference.

## FEATURES

- Qseven carrier board is compatible with Portwell Qseven modules
- 3.5" ESB form factor for embedded applications
- On Board DC to DC circuit for DC in application
- Mini-PCIe support
- Supports boot from SD (SDIO 1.1)

## ORDERING GUIDE

AB1-3326	PQ7-C100XL 3.5" QSEVEN Carrier Board
AB1-3667	PQ7-C100XL-CAN 3.5" QSEVEN Carrier Board with CAN Bus



# PQ7- C201

Automation could be described as an increase in productivity, and/or quality beyond that human labor levels. With the PQ7-C201, the greater PCIe interface enables greater motor control and its UART presence allows for a comfort for Legacy components.



## Mini-ITX Form Factor Carrier Board for Qseven Module with Triple Displays and One GbE

Portwell's PQ7-C201 is designed with Qseven 230pin card edge MXM connector, and support Portwell's Qseven modules for initial evaluation testing on PCIe x4, LVDS, DP, HDMI, SATA, USB, LAN, AUDIO, SDIO, LPC function, etc.

PQ7-C201 offers rich I/O ports for expansion demand, also simultaneously supports SATA and SD card functions. Furthermore, Portwell can provide carrier board design guides for your own carrier board development reference to shorten developing stage.

### FEATURES

- Qseven carrier board is compatible with Portwell Qseven modules
- Mini-ITX form factor for embedded applications
- One Gigabit Ethernet port
- Two SATA Ports and One SD Socket
- One PCIe x4 expansion slot
- DP, HDMI, and LVDS support

### ORDERING GUIDE

AB1-3B45Z	PQ7-C201.Mini-ITX QSeven Carrier Board
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# Signal Integrity is tested and assured

The Signal Integrity Lab (SI) concentrates its efforts on ensuring reliable quality of our PCB design. With advanced software, Portwell can repair discrepancies via Signal Integrity (SI), Power Integrity (PI) and EMI (Electromagnetic Interference) before gerber out. The benefits of SI not only reduces re-spin versions but also minimizes cost to achieve a faster time-to-market.

The Mission of SIL is as follows.

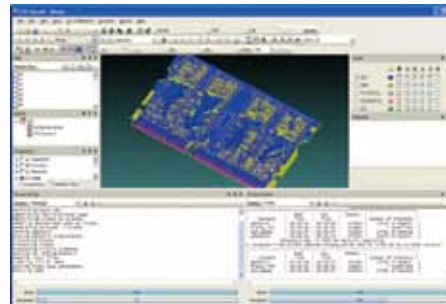
- Ensure high-speed signal quality.
- Reduce PCB turn-around time to fix SI, PI and EMC issue in advance.
- Minimize cost on board design (size, layer no., stackup, etc ).
- Provide board stack-up design and PCB material selection.
- Export layout guidelines of high-speed signals.
- Signal validation and correlation.
- Sharing SI/PI/EMI knowledge know-how with part-ners by design collaboration.



For better collaboration design with customers, we adopt world leading simulation tools in the industry field. Such as

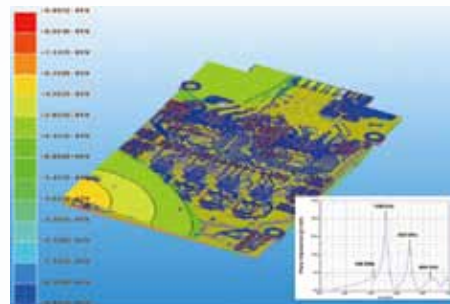
## Anslys (Ansoft) Siwave 5.0

1. Hybrid 2D Full Wave EM Field Solver.
2. Analyze entire PCB and IC packages.
3. ID signal and power integrity problems.



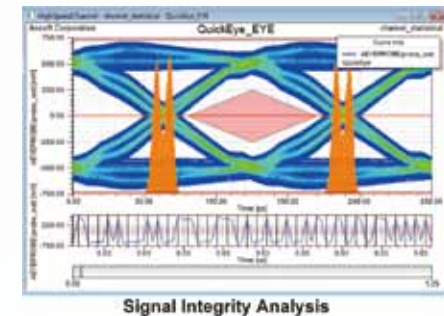
## Anslys (Ansoft) PI Advisor

1. Optimizes power distribution
2. Quickly determines the optimal capacitors
3. Minimizes production costs, non-recurring engineering costs, and time to market.



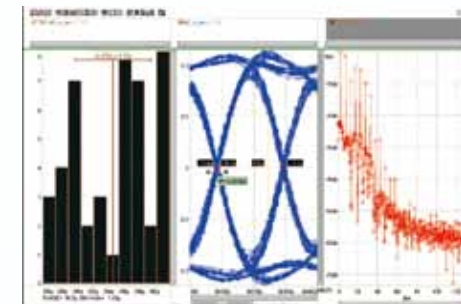
## Anslys (Ansoft) Designer SI 6.0

1. Leverages multiple signal integrity simulation methods.
2. Utilizes optimization algorithms, Design of Experiments, tuning and post-processing for key comp.
3. Utilizes electromagnetic simulation and circuit tools.



## Synopsys HSPICE

1. Uses the Gold Standard for accurate circuit simulation.
2. Provides Yield-Process variability and device reliability simulation.
3. Applies high speed simulation with harmonic balance and shooting algorithms.

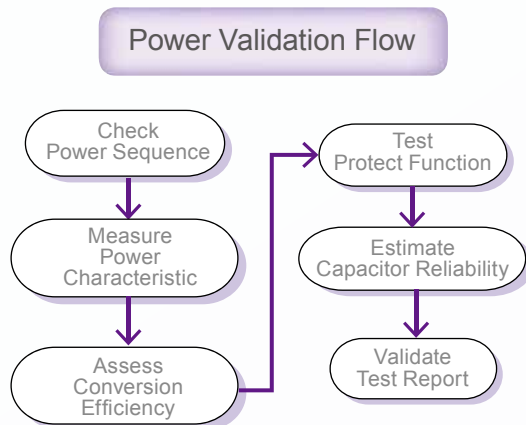




# Power & energy use confirmed stable and efficient

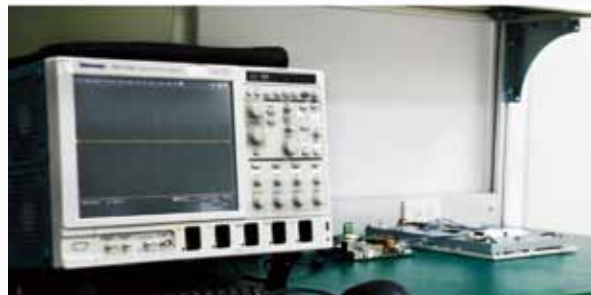
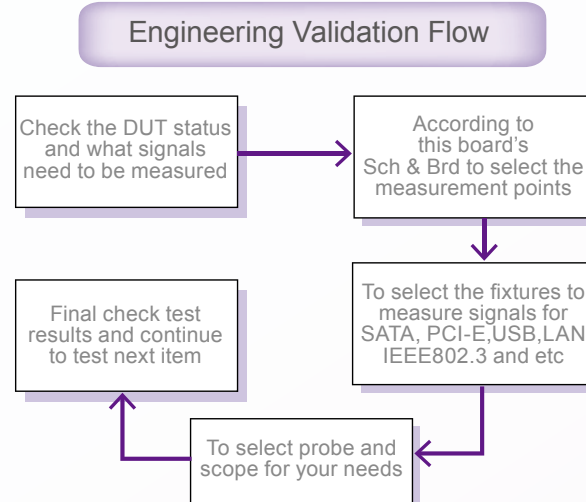
## Power Lab

Since the development of the Industrial PC it has been widely used in communications, medical, aerospace, automation & control applications and more. The power design quality and reliability is very important during product development which may affect the system operation stability and power efficiency consumption. The role of the Power Lab is to help engineers verify the power sequence, measure heat loss, etc. in order to improve the power design.



## Electronic R&D Lab

The Electronic R&D Lab fulfills hardware engineers' needs by utilizing different measurement equipment which help investigate high speed signals required in Data Quality Assurance (DQA) during the test stage to ensure all hardware functionalities are compliant with the design guide.



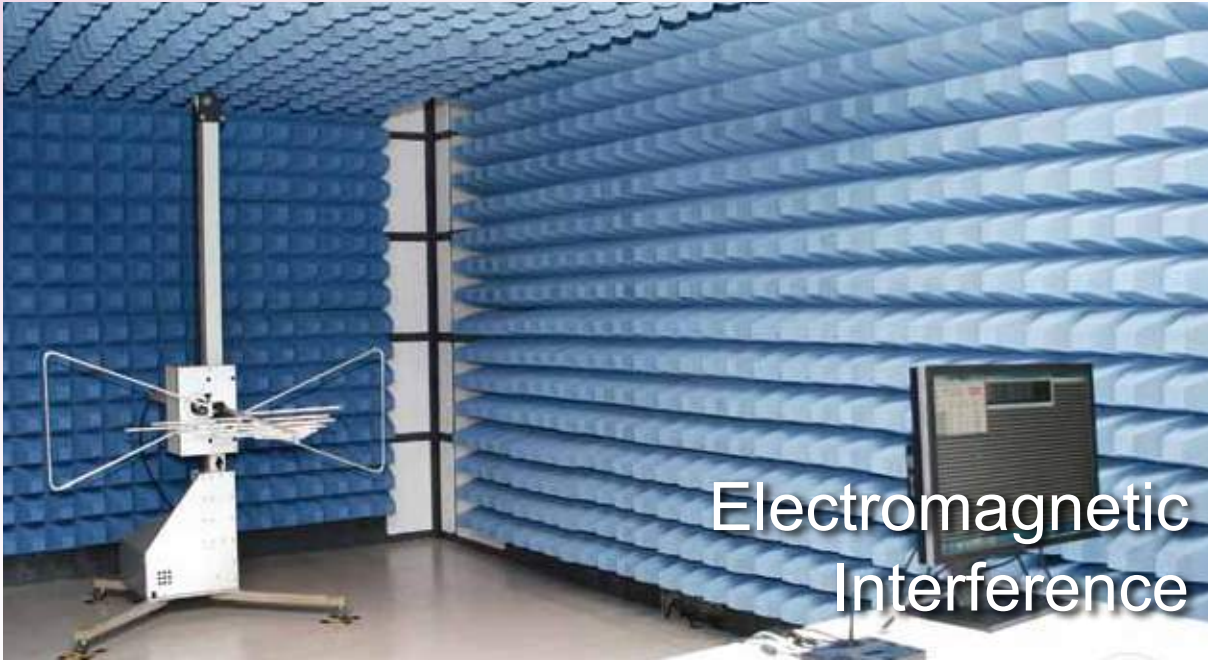
## On / Off Lab

ON/OFF Lab is built to ensure our products are designed with the highest quality. By testing On and Off we can validate the system power sequence which is one of the most important test methods to ensure the reliability and compatibility.

Portwell's On/Off Lab features replay equipment that monitors power input for boards or systems and provides advanced remote control so engineers can monitor the test status of 16 systems via WAN, LAN or the Internet which proves to be an efficient method during project development.



## Our Modules are resistant to rapidly changing electrical currents



### Electromagnetic Interference

Electromagnetic interference (also called radio frequency interference or RFI) is a disturbance that affects an electrical circuit due to either electromagnetic induction or electromagnetic radiation emitted from an external source. The disturbance may interrupt, obstruct, or otherwise degrade or limit the effective performance of the circuit. The source may be any object, artificial or natural, that carries rapidly changing electrical currents. Problems with EMI can be minimized by ensuring that all electronic equipment is operated with a good electrical ground system. In addition, cords and cables connecting the peripherals in an electronic or computer system should be shielded

to keep unwanted RF energy from entering or leaving. Specialized components such as line filters, capacitors, and inductors can be installed in power cords and interconnecting cables to reduce the EMI susceptibility of some systems.

Placing a large amount of electrical and electronic systems into a very confined space poses the issue of keeping the EMI of these systems from interfering with each other through radiated and conducted emissions. With most systems now fully electronic, the need to contain EMI is more vital than ever starting from the design stage.

### Features of Portwell EMI LAB



The EMI test receiver we utilize combines two instruments into one; measuring EMC disturbances in accordance with the latest standards and also serving as a full-featured spectrum analyzer for diverse lab applications.

### Key Features

- Frequency range from 9 kHz to 3 GHz or 9 kHz to 6 GHz covering almost all commercial EMC standards.
- First-ever combination of an EMI test receiver and spectrum analyzer in the economy class.
- All major functions of an advanced EMI test receiver, including fully automated test sequences.
- Weighting detectors: max./min. peak, average, RMS, quasi-peak as well as average with meter time constant and rms average in accordance with the latest version of CISPR 16-1-1

# Our modules are compliant with IES standards

## EMS

EMS tests including CS & RS are the reliability tests against electric fields, magnetic fields, power cords, control cables, signal cables, ground interference and static electricity discharges, electricity discharge and electromagnetic wave.

2

### **SURGE:**

Surge test generates a sudden rise in power to simulate the effect of lightning shock to the power system. Utilizing this test ensures self-protection and also determines weaknesses during sudden power surges.

**\*Compliance with IEC 61000-4-5 SURGE 4.1KV / 2KA and 61000-4-9 (Magnetic field SURGE)**

3

### **DIPS:**

Dips simulates sudden drops in power and measures the immunity of products to such power interferences. This test allows us to improve upon design flaws by measuring the sustainability to such power drops.

**\*Compliance with IEC 61000-4-11 DIPS / VARIATION, IEC 61000-4-8 (50/60 Hz Magnetic field 50A/m) with the additional MF1000-1 antenna (1x1m)**

1

### **Electrical Fast Transient (EFT) or Burst:**

Every On/Off action with electronic devices generates interference to the whole power system. EFT simulates these possible circumstances to examine the immunity of an operating system in order to make improvements.

**\*Compliance with IEC 61000-4-4 EFT 4.4KV**



4

### **Conducted Susceptibility Test System (CST)**

The CS test examines the immunity in terms of conduction. By sending a high frequency signal, it simulates interference to test the immunity of the power core or signal. By utilizing different voltage level settings, weak points can be determined for design correction.

**\*Compliance with IEC/EN 61000-4-6 (IEC-Frequency range from 150 kHz ~ 80MHz)**

5

### **Conducted Immunity Test System (CIT)**

Conducted Immunity tests are performed to determine the ability of a device to withstand the presence of RF signals on the cables or power cords attached to the device.

**\*Compliance with IEC/EN 61000-4-6**

## ESD

Electrostatic discharge (ESD) is the sudden and momentary electric current that flows between two objects at different electrical potentials. One of the causes of ESD events is static electricity. A system will suffer permanent damage when static electricity is generated through turbo-charging or electrostatic induction that occurs when an electrically charged object is placed near a conductive object isolated from grounding.

## Features of Portwell ESD Facility

- Meets the requirements in EN/IEC 61000-4-2.
- Up to 30KV output in both contact and air discharges.
- A lightweight discharge gun.
- Easily changeable capacitor and resistor units.
- Self-explanatory control panel.
- Optional remote control Windows software offers more comprehensive control than local operation.





# A farm of chambers for module testing



## Advanced Chamber Farm

### Features of Portwell Chamber Zone

As a leading worldwide industrial platform provider, we know the importance of environmental testing. We build our Chamber Zones with the following features.

- Scalable – More than 30 chamber devices can be installed in the zone.
  - Independent – Well controlled and separated space for each individual chamber in order to sustain steady operations and security of a project.
  - Advanced – 30 check points for every tested object to collect detailed data.
  - Green – we recycle and use well-filled water for the environmental test.
  - Remote Control & Monitoring
  - Manipulation of chambers and testing objects
- Allows instant acquisition of the testing data

The environmental test is a very important certification to all industrial products needed for mission critical environments. At Portwell, we test all our products, developed or integrated, against these conditions. Our readily available equipment always allows us to meet customer deadlines and provide detailed test results compliant with industrial standards. While there are many applications and choices in the ever-changing IPC industry, Portwell is the most competent and qualified to adapt to these changes and remain as an industrial leader. Though the quantity scale is a concern of our customers, advanced functionalities

satisfies them due to the savings of cost and time. For example, a remote monitoring system enables our customers to conduct environmental tests by way of our equipment. Meanwhile, our experienced engineers can effortlessly help our customers achieve desired results without additional costs.



### IEC 68-2-X Certification

IEC 68-2-1	Low-temp. Test, 60°C, 96 hrs
IEC 68-2-2	High-temp. Test, -10°C, 96 hrs
IEC 68-2-3	Humidity Test, 40°C, 93+2/-3% R.H., 96 hrs
IEC 68-2-14	Temp. cycle Test, -10°C ~ 60°C, 48 hrs

## Programmable Temperature & Features: Humidity Chamber

Portwell's Programmable Temperature and Humidity Chamber Farm houses 12 programmable constant temperature and humidity testing machines, with the abilities to run from -60°C up to 150°C. Moreover, the air flow control is compliant with IEC 68-2 standard. Portwell vigorously applies these extreme conditions to their products in order to ensure their durability and accuracy while under such conditions. Therefore, Portwell can assure their customers superior and stable performance in any environment.

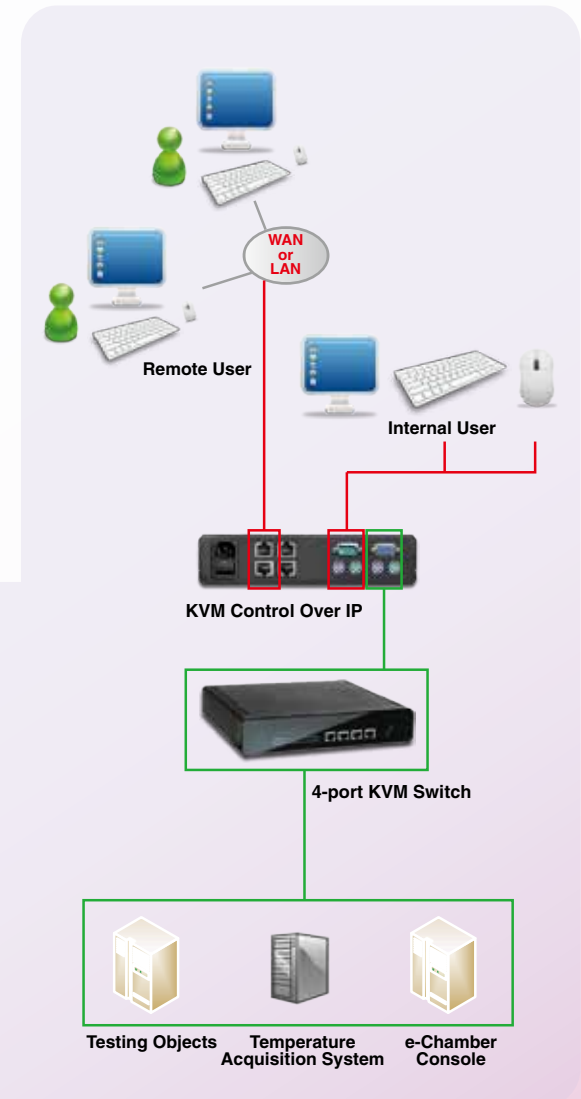
- **Air Flow Control**  
Comply with IEC 68-2 standard, lower wind is under 0.5m/s.
- **With/without Due**  
Available upon request.
- **Humidity Control**  
Can be controlled under 40°C / 10% RH.
- **Web Monitoring**  
Can be arranged by the dedicated program.



## Web Monitoring Console

In order to serve those customers unable to stay at our facility for the environmental test, Portwell developed web-based tests to meet the customer demands via the internet by remote control access.

Provide us with your testing object and our engineers will arrange your object in an assigned chamber and set the remote control console with you. This service allows you to manage your tests right from your computer.



# Silence is a signature of our modules



Structure	Semi-anechoic Room
Space	3.95 x 3.95 x 2.5 (m2)
Separated	Floating Ground with Zin plated steel
Material	Polymer Absorption wedge
Door	Fully sealed Pressure Door, Outdoor Open, lock inside
Regulation	ISO 3745
Power filter	1kW 110V
Cable	Belden
Instruments	CRAS Micophone, IEA, analyer and system.

Chamber Type	1/3 Octave Band Frequency( Hz)	Tolerance (dB)
Anechoic Chamber	≤ 630	± 1.5
	800-5,000	± 1.0
	≥6,300	± 1.5
Semi-Anechoic Chamber	≤ 630	± 2.5
	800-5,000	± 2.0
	≥6,300	± 2.5

Anechoic chambers are commonly used in acoustics to conduct experiments in nominally "free field" conditions. All sound energy will be traveling away from the source with almost none reflected back. Common anechoic chamber experiments include measuring the transfer function of a loudspeaker or the directivity of noise radiation from industrial machinery. In general, the interior of an anechoic chamber is very quiet, with typical noise levels in the 10–20 dBA range. Full anechoic chambers aim to absorb energy in all directions. Semi-anechoic chambers have a solid

floor that acts as a work surface for supporting heavy items, such as cars, washing machines, or industrial machinery, rather than the mesh floor grille over absorbent tiles found in full anechoic chambers. This floor is damped and floating on absorbent buffers to isolate it from outside vibration or electromagnetic signals. A recording studio may utilize a semi-anechoic chamber to produce high-quality music, free of outside noise and unwanted echoes.





# The noise emission of our modules meet ISO Standards

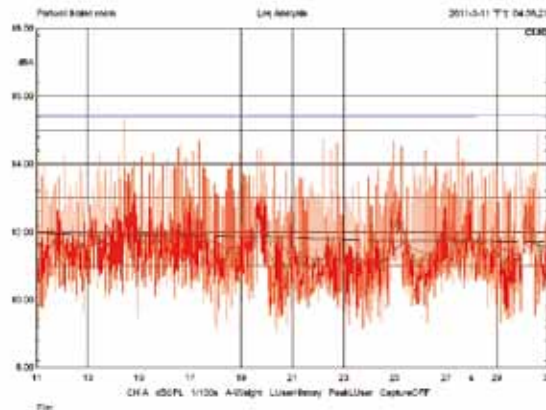
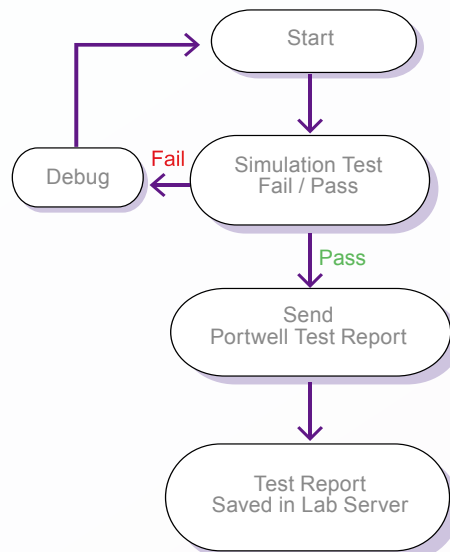
## Goals of Semi-Acoustic Chamber

In Portwell Semi-Acoustic Chamber we follow the simulation procedure demonstrated below to validate our system noise levels. Our method is to provide dimension, space, wedged material, placement of EUT and microphones in the chamber in accordance with ISO 7779 standards which help us verify that the noise levels of our products fall within universal criteria.

Our goals are:

- Ensure medical related products can comply with noise requirements.
- Service customer to verify their products can meet local noise standards.

### Acoustic Simulation Test



Portwell semi-acoustic chamber is based on ISO 3745 which states that indoor background noise remain under 15dB(A) while outside noise is under or equal to 70dB(A); thus we can detect accurate results for product evaluation.

## ISO 3745:1977

Specifies two laboratory methods. First, it establishes requirements for the test room as well as the source location, operating conditions and instrumentation. Secondly, it specifies techniques for obtaining an estimate of the surface sound pressure level from which the weighted sound power level of the source and the sound power level in octave or one-third octave bands may be calculated.

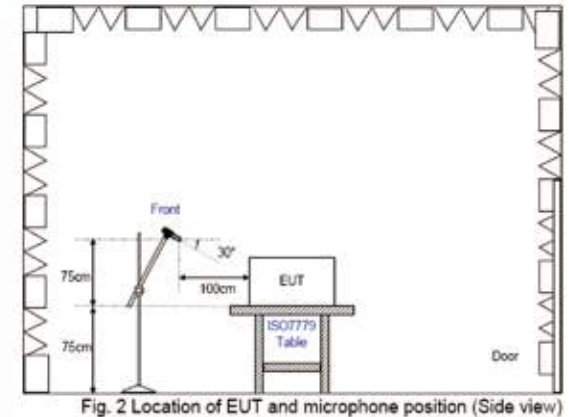


Fig. 2 Location of EUT and microphone position (Side view)

All the dimensions, space, material of wedges, placement of EUT and microphone within our semi-acoustic chamber follow ISO 7779 standards which ensure our products meet universal criteria.

## ISO 3745:1977

ISO 7779:2010 specifies procedures for measuring and reporting the noise emission of information technology and telecommunications equipment. The basic emission quantity is the A-weighted sound power level which may be used for comparing equipment of the same type but from different manufacturers, or for comparing different equipment. Portwell Semi-Acoustic Chamber follows ISO 7779 when determining sound power levels of a machine.

# Breaking the module to build it stronger



## HALT Certification

Typhoon 4.0	
WORK SPACE	UPPER TABLE POSITION : 53.8" w x 54" d x 34.6" h (1366 x 1372 x 879mm)
	LOWER TABLE POSITION : 53.8" w x 54" d x 53.6" h (1366 x 1372 x 1362mm)
OUTER DIMENSIONS	69.2" w x 78.8" d x 103.9" h (1759 x 2003 x 2640mm)
TEMPERATURE RANGE	+200 °C TO -100 °C, +250°C TO -100°C
THERMAL RAMP	70 °C - 100 °C/min average
TABLE SIZE	48" x 48" (1220 x 1220mm)
ACCELERATION	5 - 75 gRMS (Bare Table) TABLE CAPACITY 600 lbs (272kg) Recommended
TABLE CAPACITY	600 lbs (272kg) Recommended
POWER REQUIREMENTS	380V, 400V, 440V, 480V, 3Φ , 50/60Hz, 100A
ACTUATORS	12 Lubricant free



A Highly Accelerated Life Test (HALT), is a stress testing methodology for accelerating product reliability during the engineering development process. It is commonly performed to identify and help resolve design weaknesses with progressively more severe environmental stresses. Another feature of HALT testing is that it characterizes the equipment under stress, and identifies the equipment's safe operating limits and design margins. Some common forms of failure acceleration for industrial products are power cycling, temperature cycling and random vibration. HALT serves to improve the reliability of a product and is an empirical

method used to identify the limiting failure and the stresses at which these failures occur.

The major advantages of HALT are: a) it can be conducted during the development phase of a product in order to weed out design problems and marginal components thereby eliminating costs for warranty returns; b) it also is conducted as internal qualification testing which significantly reduce costs prior to sending the equipment for formal qualification.

During a HALT test the tested equipment has to be functional and operational while monitored so that if the equipment fails while being stressed,

the failure will be detected. The failure may only be present while the stress is applied and may not cause permanent degradation that would be apparent after the stress is removed. All failures during HALT testing are subject to failure analysis and root cause analysis.

# Super-aging our modules to unveil weaknesses



When validating the HALT test we follow the step by step procedure which helps us to analyze time of failures so that our engineers can make the necessary revisions.



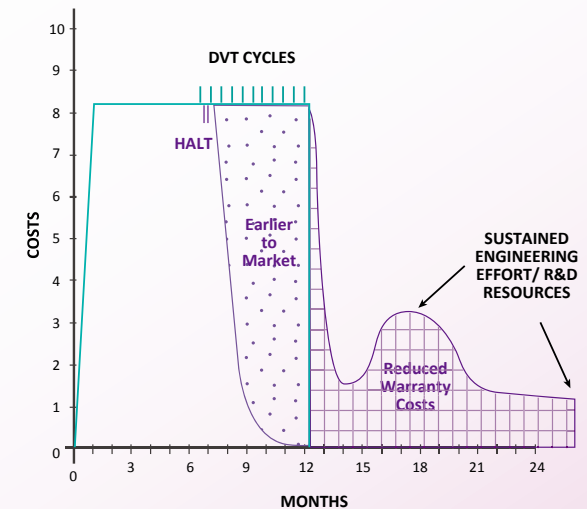
## Features of Portwell HALT Lab

- Increase Product Reliability
- Reduce Design Verification Time and Expense
- Remove Costly Manufacturing Defects
- Reduce Warranty Costs
- Increase Sales Revenues with Reputation for Quality

Portwell chooses a Typhoon 4.0 system which is designed specifically for the task of performing Highly Accelerated Stress Screening (HASS) and HALT on large products. With the Lowest Total Cost of Ownership within the AST industry, the 48" x 48" vibration table is capable of supporting hundreds of pounds of products and fixtures, while delivering low frequency ranges necessary to induce failure. For high temperature applications in simulating harsh conditions, this system is available as the Inferno™ which can deliver temperatures up to 250°C.

Stresses are delivered in an ordered sequence:

- Thermal Step Stress
  1. Cold Step Stress
  2. Hot Step Stress
- Rapid Thermal Transition Cycling
- Vibration Step Stress
- Combined Environment
  1. Rapid Thermal Transition Cycling and
  2. Vibration Step Stress





# Our modules undergo shipping simulation to ensure intact delivery

## Vibration

Vibration is capable of damaging electronic components and component soldering. In our Vibration Chamber, we simulate variable vibration conditions that could potentially damage our products during their transportation, installation or operation. Therefore we rigorously test every product and gather accurate statistical analysis as proof of the outstanding level of tolerance and endurance in every Portwell product.

### Vibration tester conducts either Sine or Random vibration.

Sine Vibration complies with IEC-68-2-6 and simulates the product on a ship to verify Resonance Search and Resonance Dwell. Random Vibration complies with IEC-68-2-36 and simulates the product in transportation situations in order to test the packaged product's vibration endurance.



\* Compliance with IEC-68 Comply the IEC-68 environmental regulation. The max magnetic force is 1000kgF.

## Shock

The test purpose is to evaluate whether the limit of the products' strength is consistent with those in the product line. When the tested item is shocked and the mechanically fragile part is found, mechanical R&D engineers can amend the supporting structure and analyze the properties of material to effectively prevent possible damage in the future.

The tested item is unpackaged. Three-axis & 6-face (each face tested 3 times) should be conducted to pass specified shock conditions of 15G peak acceleration and a pulse duration for 11 ms. (3 times for each face under operation condition)



\* Compliance with IEC-68.

## Drop

This test focuses on package design. The drop test is conducted in order to test whether the packaged product remains intact and 100% functional after being dropped. This test simulates the accidents that occur during shipping and handling. Therefore, we also focus on the design of our packages to ensure you receive the product as if it just came off the shelf.



\* Complies with IEC-68.

Both Portwell RDC & SIC are prepared for complete service to our customers & partners. Should you have any requirements or technical issues, please contact us. Our services can be arranged in the following ways.

## Web Service

Please visit us on the web and leave a message. We also provide an on-line consulting service via Skype. And if immediate assistance is needed, contact us by phone.

## Direct Contact

Portwell welcomes our customers to visit our laboratory to witness our regulation tests and design service. This is the best way to answer all your questions and help you find the right solution.

## Extended Visits to PE

Sometimes it is difficult to find the solution in a short period of time. Therefore, Portwell provides a dormitory for our customers and partners to stay until we reach the necessary solutions. Please contact us and our staff will arrange a place for you to stay.

## Completed Technical Service

In order to ensure customers receive fast and appropriate service from Portwell, we offer the following services to meet your needs.



### Consulting Service

Our engineering experts provide a free service to discuss projects or technologies when you need it immediately. Merely visit our website and our on-line team will address any issues you might have.



### Live Chat (Skype)

You can have on-line consulting via Skype if an immediate response is needed.

<http://www.portwell.com.tw/support/LiveChat.php>



### E-Mail

Portwell's technical support department can be reached by e-mail as follows

[TSD@portwell.com.tw](mailto:TSD@portwell.com.tw)



### Product Service

We have experienced product managers who can help you obtain the right products from our inventory while also providing information to help you find solutions.



### Design Service

If our existing products cannot meet your requirements, a customized design service can be arranged to build the exact products that you demand.



### Manufacturing Service

Portwell has the most advanced manufacturing facilities to produce a quality product for your application or business. Please visit our Portwell Engine and discover that we are the solution for you.



### Logistics Service

Our logistic service is not only for scalable or world-grade customers, we also offer services to our partners who need world-wide delivery in order to save time and additional expenses.



### Global Service (Telephone)

In addition, you can get immediate support via telephone. Check the web site for phone numbers.

<http://www.portwell.com.tw/contact/worldwide.html>

[www.portwell.com.tw](http://www.portwell.com.tw)



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