

# QORIQ® LS1012A: BIG THINGS IN SMALL PACKAGES

## 64-BIT CORE IN A SUB-10MM PACKAGE

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SENIOR PRINCIPAL ENGINEER AND  
SYSTEMS ARCHITECT  
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EXTERNAL USE



SECURE CONNECTIONS  
FOR A SMARTER WORLD

# The March of 64-bit Computing

1998

1999

2000

2011

2016

64-bit IBM  
& Motorola  
PowerPC 620

64-bit Intel  
Itanium  
announced

64-bit AMD64  
architecture  
announced

64-bit ARM  
v8.0-A architecture  
announced

LS1012A  
64-bit  
low-cost  
system

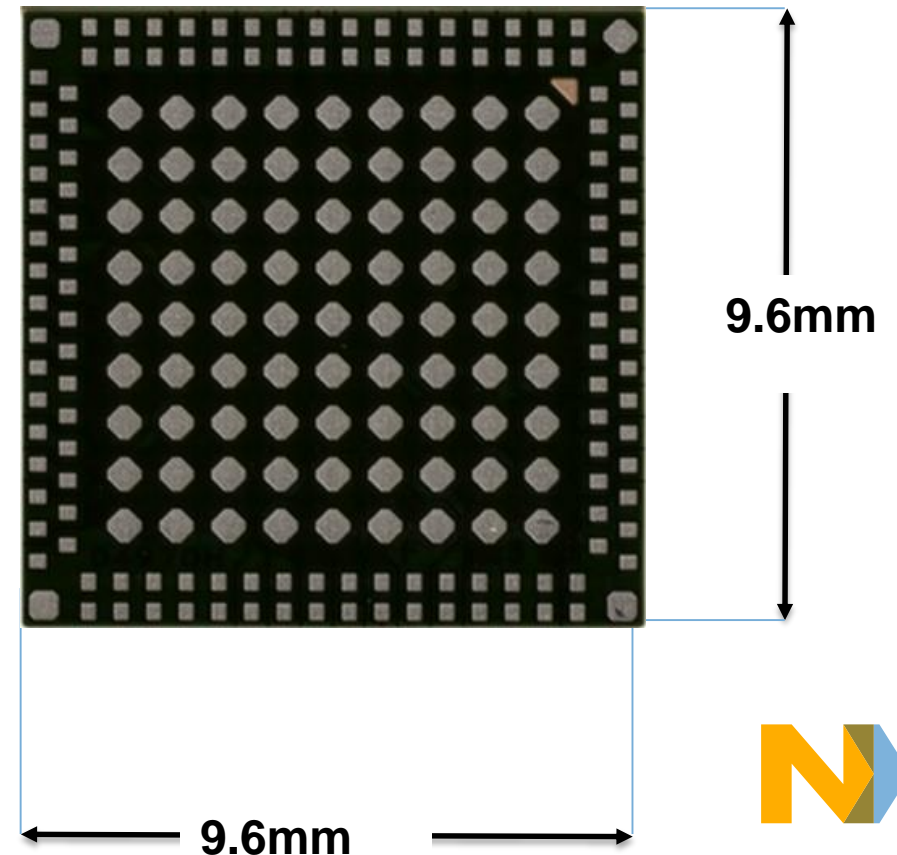
Value  
64-bit

Mainstream 64-bit

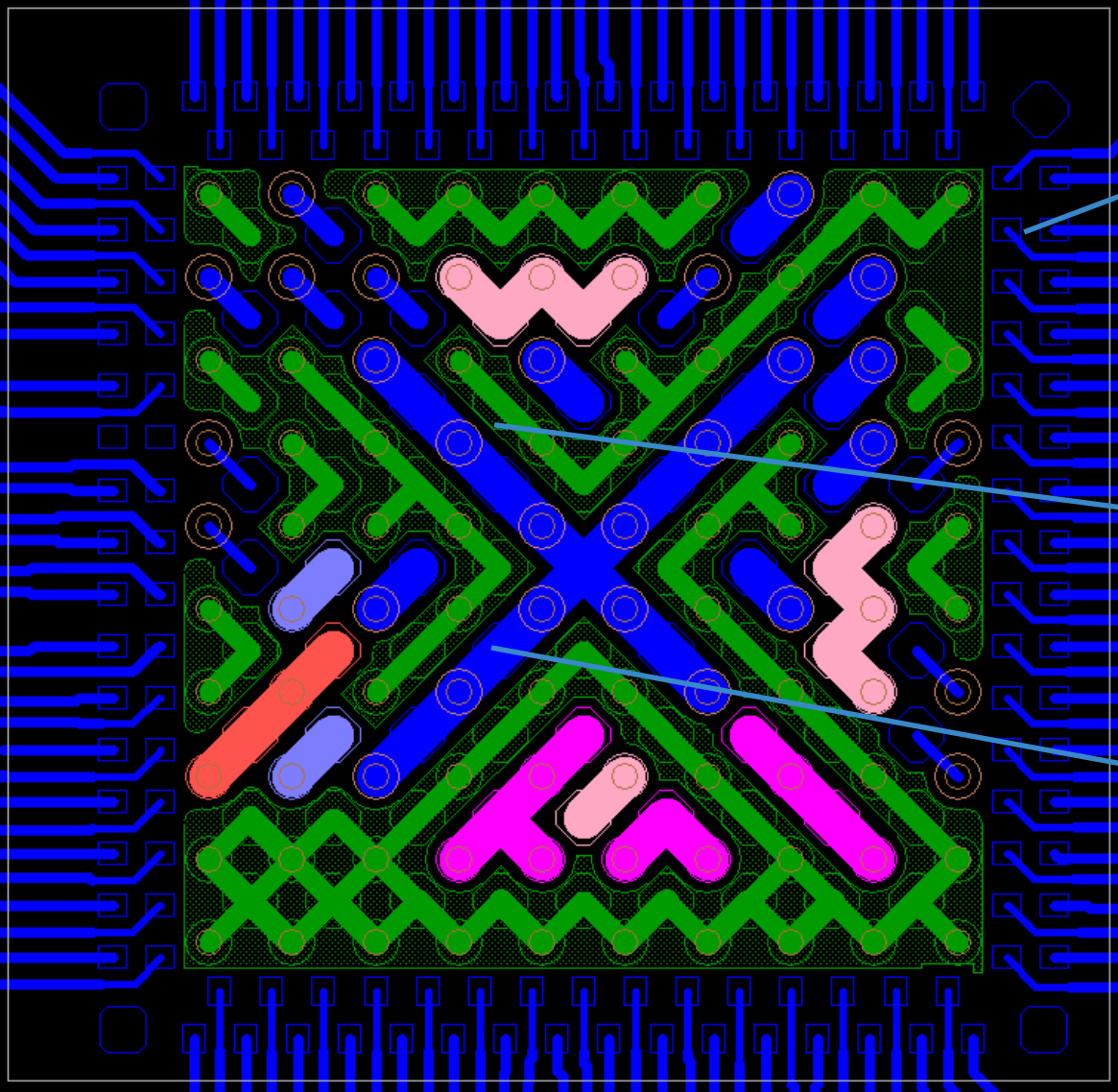
Enterprise 64-bit

# QorIQ LS1012A Ultra-low form-factor package

- Innovative Package Technology
  - Signal pins in outer two pad rows with 0.5mm pitch
  - Inner pads with 0.8mm pitch used primarily for power and ground
- Supports cost-effective 4-layer PCB
- Enables designs with severe space constraints

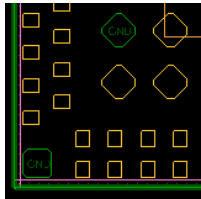


# Routing QorIQ LS1012A in 4-layer PCB



- Dual row signal I/O
- 0.5mm pitch, 0.28mm spacing
- Allows topside routing of all signals
- Conservative line pitch (3.5W, 4Space)
- No need for via or micro-via for signal break out

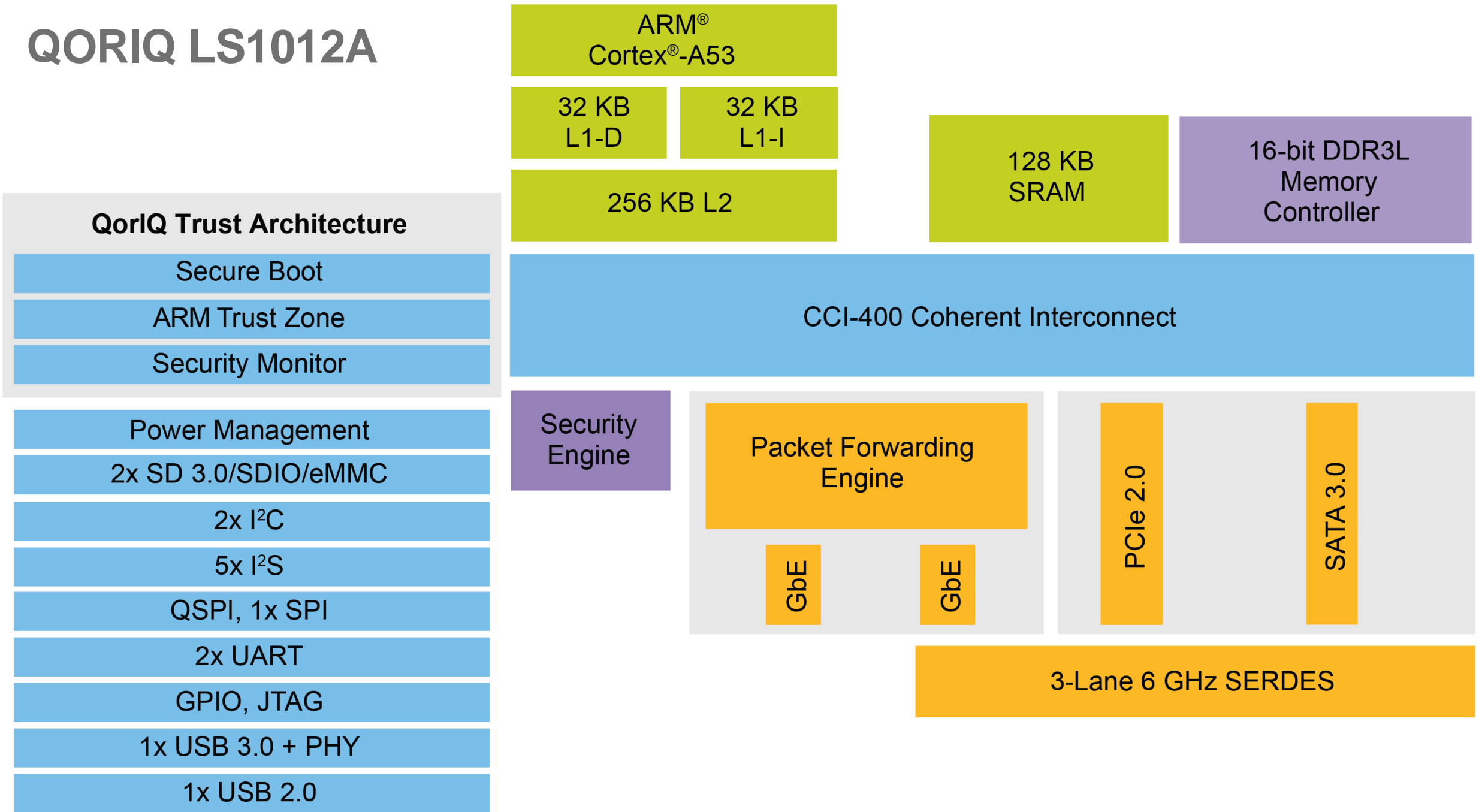
- Internal via array mainly for power & ground

-  Diamond-shaped pad for increased thermal conductivity without impacting PCB via diameter

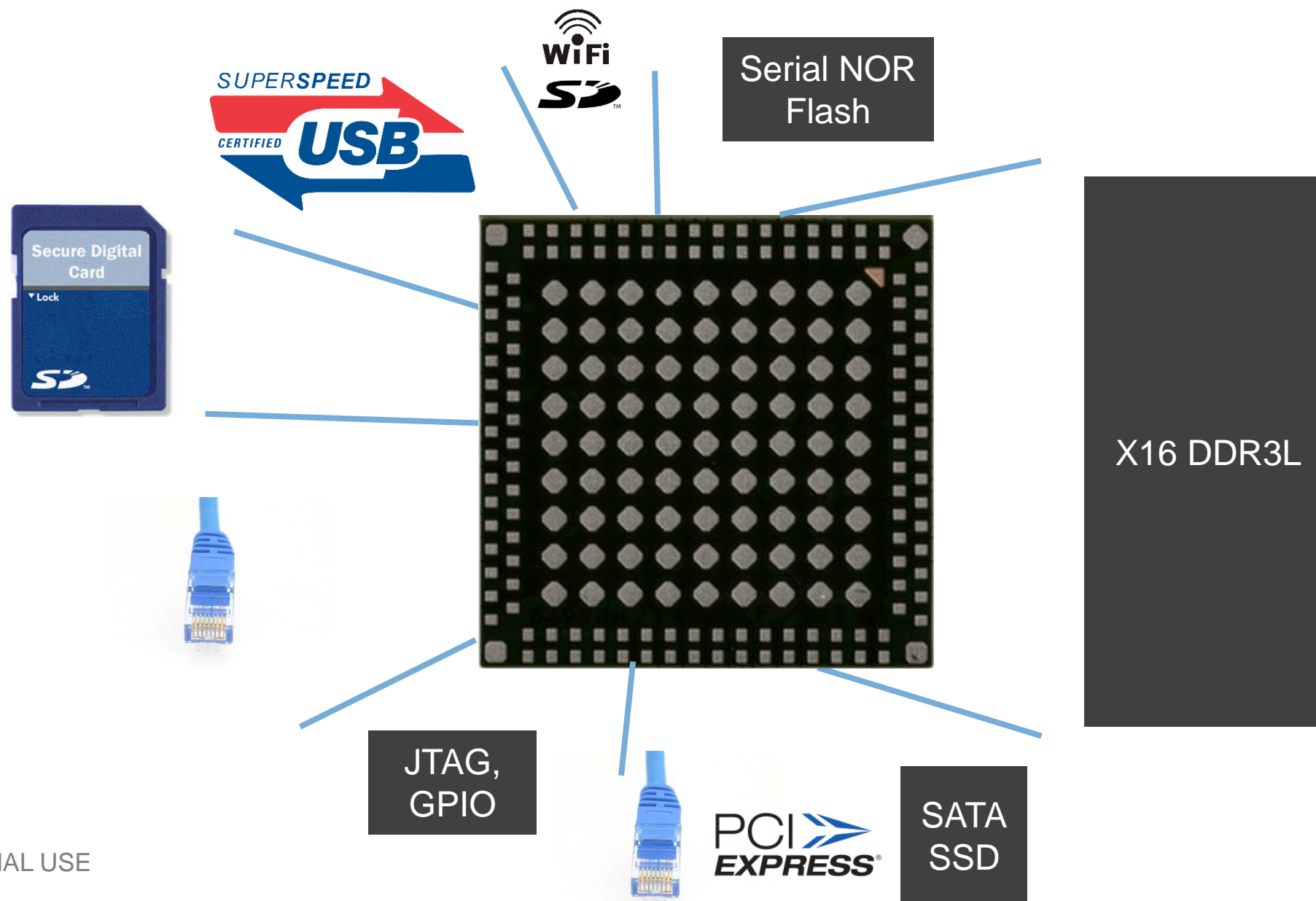
# Package Technology Comparison for 64-bit Products

Traditional Wirebond or Flip-chip 0.8mm / 1.0mm BGA pitch	Traditional package ≤0.65mm BGA pitch	PoP Package on Package	QorIQ LS1012A Laminate BGA Technology
<ul style="list-style-type: none"> <li>• Large Package</li> <li>• ≥17x17mm</li> </ul>	<ul style="list-style-type: none"> <li>• Medium Package</li> <li>• 12x12 - 15x15mm</li> </ul>	<ul style="list-style-type: none"> <li>• Medium package</li> <li>• 12x12 – 15x15mm limited by DDR PoP</li> </ul>	<ul style="list-style-type: none"> <li>• Very small package</li> <li>• 9.6x9.6mm</li> </ul>
<ul style="list-style-type: none"> <li>• Medium cost</li> <li>• 6-layer PCB</li> <li>• But cannot achieve small form factors</li> </ul>	<ul style="list-style-type: none"> <li>• High-cost</li> <li>• ≥10 layer PCB</li> <li>• May need advanced manufacturing geometries</li> </ul>	<ul style="list-style-type: none"> <li>• High chip cost (due to PoP)</li> </ul>	<ul style="list-style-type: none"> <li>• Low cost</li> <li>• 4-layer PCB</li> </ul>
Customer free to select desired DDR capacity	Customer free to select desired DDR capacity	DDR capacity limited by vendor	Customer free to select desired DDR capacity

# QORIQ LS1012A



# Example System built with QorIQ LS1012A





# New Applications Made Possible with the QorIQ LS1012A



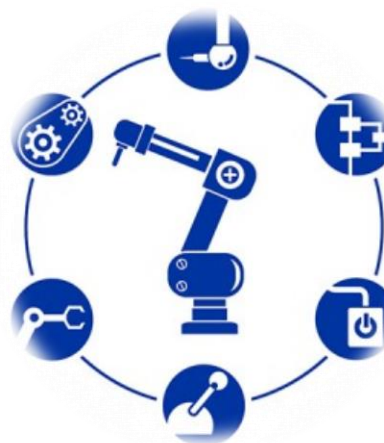
**Better home automation & security**  
*Higher performance, battery-backed aggregation*



**Portable Wireless Storage**  
*On the go access to Terabytes of data*



**Ethernet Drives**  
*Enable scale-out data storage*



**Industrial IoT**  
*Making high-speed low-power networks pervasive*





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