



# **BSP for Microsoft\* Windows\* 10 64-bit on Intel® Atom™ processor E3800 Product Family**

**Release Notes**

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*October 2015*



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## Revision History

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Date	Revision	Description
October 2015	001	Initial release – Gold Release.

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## 1.0 Introduction

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This release notes document the General Purpose Input/Output (GPIO), Inter-Integrated Circuit\* (I<sup>2</sup>C\*), Serial Peripheral Interface (SPI), High Speed Universal Asynchronous Receiver/Transmitter (HSUART) Driver Binary Packages for the Microsoft\* Windows\* 10 64-bit operating system. This document also includes information of the Inbox drivers for Windows 10 that have been validated on the Intel® Atom™ E3800 processor. The driver interfaces, limitations, and known issues are also covered.

This document is intended for OEMs and ODMs that are enabling drivers with the Intel® Atom™ E3800 processor, Intel® Celeron® Processor N2XXX, and Intel® Celeron® Processor J1XXX.

### 1.1 System Requirements

The following operating system is supported:

Microsoft Windows\* 10 64-bit operating system

### 1.2 Terminology

**Table 1. Terminology**

Term	Description
API	Application Programming Interface
BSP	Board Support Package
DMA	Direct Memory Access
GPIO	General Purpose Input/Output
HSUART	High Speed Universal Asynchronous Receiver/Transmitter
I <sup>2</sup> C*	Inter-Integrated Circuit*
I/O	Input/Output
IOCTL	Input/Output Control



Term	Description
PCIe*	Peripheral Component Interconnect Express*
PIO Mode	Programmed I/O Mode
SATA	Serial ATA
SPI	Serial Peripheral Interface
USB	Universal Serial Bus



## 2.0 Release Summary

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### 2.1 Release Details

Driver Version (GPIO, I2C\*): 1.1.1.1004

Driver Version (HSUART, SPI): 1.1.1.1006

Released on October 2015.

### 2.2 Release Contents

The contents of this release include:

- Intel® Processor Windows\* 10 – Input/Output (I/O) Drivers 64-bit Driver Installer
  - Intel® Processor Windows – 10 I/O Drivers 64-bit.cab" archive contains the following drivers for your system:
    - Intel® Atom™/Celeron®/Pentium® Processor UART Host Controller
    - Intel® Atom™/Celeron®/Pentium® Processor I2C Controller
    - Intel® Atom™/Celeron®/Pentium® Processor SPI Controller
    - Intel® Atom™/Celeron®/Pentium® Processor GPIO Controller
- Intel® Processor Windows 10 – I/O Drivers Release Notes
- Intel® Processor Windows 10 – I/O Drivers User's Guide
- Intel Software License Agreement

### 2.3 The Ready Feature

Area	Feature	Source	Ready <sup>(1)</sup>
Universal Serial Bus (USB)	General USB 2.0 feature	Windows* 10 Inbox driver	Yes
	General USB 3.0 feature	Windows* 10 Inbox driver	Yes
	USB2.0 Boot	Windows* 10 Inbox driver	Yes
SATA	General Serial ATA (SATA) feature	Windows* 10 Inbox driver	Yes
Peripheral Component Interconnect Express* (PCIe*)	General PCIe feature	Windows* 10 Inbox driver	Yes



Area	Feature	Source	Ready <sup>(1)</sup>
Intel® High Definition Audio	General HD Audio feature	Windows* 10 Inbox driver	Yes
	Intel Display Audio	Integrated in Intel Embedded Media and Graphics Driver	Yes
Power Management	Power Mgmt S0 and S5	N/A	Yes
	Power Mgmt Sleep S3	Intel	Yes
	Power Mgmt Hibernate S4		
GPIO Driver <sup>(1)</sup>	Direction Setting	Intel	Yes
	Multiplexing Setting		Yes
	Level Value Setting		Yes
	Pin Setting Query		Yes

**NOTE:** Refer to Feature Highlights and Limitations for the limitations of GPIO, I<sup>2</sup>C\*, SPI, and HSUART features.



## **3.0**     *What's New in this Release*

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The first release of I/O drivers that work for the Windows\* 10 operating system are as follows:

- GPIO
- I<sup>2</sup>C\*
- SPI
- HSUART



## 4.0 Feature Highlights and Limitations

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### 4.1 GPIO Driver

Refer to the following for details on the GPIO driver:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh439456\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh439456(v=vs.85).aspx)

The GPIO driver interface is exposed by a series of Input/Output Control (IOCTLs).

The Driver Binary Package consists of these files:

- iaio gpio.inf
- iaio gpio.sys
- iaio gpio.cat

The following are the enabled features:

- Supports GPIO multiplexing setting.
- Supports GPIO setting query – queries multiplexing information on GPIO pins.
- Supports GPIO direction setting – configures the selected GPIO pin as an input or output pin.
- Supports GPIO read pin – reads the input pin's level value.
- Supports GPIO write pin – configures an output pin's level as high or low.
- Supports GpioClx DDI.

Limitations:

No known limitation

### 4.2 I<sup>2</sup>C\* Driver

Refer to the following for details on the I<sup>2</sup>C\* driver:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450906\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450906(v=vs.85).aspx)

There are seven I<sup>2</sup>C controllers on the Intel® Atom™ E3800 processor, Intel® Celeron® N2XXX, and J1XXX processors, which share the same Direct Memory Access (DMA) engine. Hence, transferring large amounts of data can cause one I<sup>2</sup>C controller to occupy the DMA engine for a long duration.



By default, the I<sup>2</sup>C driver uses DMA to copy data between peripherals and system memory. However, the Windows\* registry can be set to disable the DMA feature and copy data with the Programmed I/O Mode (PIO Mode).

Refer to the "Software Driver BKMs" section in the *BSP for Microsoft\* Windows\* 10 64-bit on Intel® Atom™ Processor E3800 Product Family* document on how to set the registry.

The Driver Binary Package consists of these files:

- **iaioi2c.inf**
- **iaioi2c.sys**
- **iaioi2c.cat**

The following are the enabled features:

- Supports 7-bit address Mode
- Supports Standard Mode (100 Kbps)
- Supports Fast Mode (400 Kbps)
- Supports polling of I/O data transfer

Limitations:

The maximum single transfer size is limited to 64 Kbytes. Multiple transfers are required for data size more than 64KB.

## 4.3 SPI Driver

Refer to the following for details on the SPI driver:

[https://msdn.microsoft.com/en-us/library/windows/hardware/hh450906\(v=vs.85\).aspx](https://msdn.microsoft.com/en-us/library/windows/hardware/hh450906(v=vs.85).aspx)

The SPI driver interface is exposed by a series of IOCTLs.

The Driver Binary Package consists of these files:

- **iaiospi.inf**
- **iaiospi.sys**
- **iaiospi.cat**

The following are the enabled features:

- Supports SPI modes 0, 1, 2, 3.
- Supports a minimum transfer rate of 100 kbps and a maximum rate of 15 Mbps.
- Supports polling of I/O data transfer (Read/Write).



- DMA data transfer.

Limitations:

No known limitation

## 4.4 HSUART Driver

The HSUART Driver interface is exposed by the standard Windows serial communication interface. Refer to the following for details on serial communications in Microsoft\* Win32:

<http://msdn.microsoft.com/en-us/library/ms810467.aspx>

The following Application Programming Interfaces (APIs) of serial communication in Win32\* are supported in the driver release:

- SetCommMask
- WaitCommEvent
- GetCommMask

**Note:** The SERIAL\_EV\_PERR, SERIAL\_EV\_RX80FULL, SERIAL\_EV\_EVENT1, and SERIAL\_EV\_EVENT2 serial masks used in the preceding three functions are not supported. Others are supported.

Intel has no plan to support the following APIs of serial communication in Win32:

- SetupComm
- SetCommBreak
- ClearCommBreak
- EscapeCommFunction (no support for parameters set to **SETBREAK** and **CLRBREAK**)

The Driver Binary Package consists of these files:

- iaioart.inf
- iaioart.sys
- iaioart.cat

For details on the Driver Interface Header, refer to <http://msdn.microsoft.com/en-us/library/ms810467.aspx>



The following are the enabled features:

- Supports baud rates of 300 – 921600, up to 3686400 by default as specified in the “Bay Trail-I SoC External Design Specification” document, Section 27.2.3 Baud Rate Generator. To set baud rates of 1M, 2M, 3M, and 4M, refer to the “Software Driver BKMs” section in the BSP for Microsoft\* Windows\* 10 64-bit on Intel® Atom™ Processor E3800 Product Family document
- Supports data sizes of 5, 6, 7, and 8 bit.
- Supports none, odd, and even parity.
- Supports 1, 1.5, and 2 stop bits.
- Supports "Hardware", "No" flow control and software flow control.
- Supports Serial Device Control Requests (IOCTLs) defined by Microsoft for serial controllers in Windows. Refer to the following Limitations section for IOCTLs that will be enabled in the Gold release.

Limitations:

- The HSUART driver doesn't support DMA transfer with software flow control. When an application uses the software flow control, the HSUART will use the PIO Mode to copy data between peripherals and system memory.
- Software flow control only supports a maximum baud rate of 115,200. It is recommended to use hardware flow control for high-baud-rate data transfers.
- When using 1.5 stop bits, the data size can only be supported up to 5 bits.
- The following are IOCTLs that are not supported in the driver:
  - IOCTL\_SERIAL\_XOFF\_COUNTER
  - IOCTL\_SERIAL\_LSRMST\_INSERT
  - IOCTL\_SERIAL\_SET\_BREAK\_ON
  - IOCTL\_SERIAL\_SET\_BREAK\_OFF

## 4.5 Known Issues

Issue #	Description	Impact	Recommendation
4995268	Windows 10* Athens: [Hardware Lab Kit] <b>DriverVerifier</b> is not a registered WDTF system interface name	HLK tests will fail.	No known fix for now.
4995269	Windows 10* Athens: [Hardware Lab Kit] Driver Memory Test fail due to <code>System.IO.FileNotFoundException</code>	HLK tests will fail.	No known fix for now.
4995349	UART 1M and 4M failed	UART speed limited to below 1M.	Fix planned for Gold release.



## **5.0 Hardware and Software Compatibility**

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This release is compatible with the following hardware and software, respectively:

- Intel® Atom™ E3800 Product Family
- Intel® Celeron® Processor N2807/N2930/J1900 Release

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