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

User Guide

October 2015

Revision Number: 001

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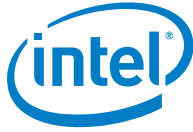
BSP for Microsoft* Windows* 10 64-bit on Intel® Atom™ Processor E3800 Product Family
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Revision History

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

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1.0 Introduction

This User Guide describes how to install Microsoft* Windows* 10 I/O drivers (General Purpose Input/Output (GPIO), Inter-Integrated Circuit* (I^2C*), Serial Peripheral Interface (SPI), and Universal Asynchronous Receiver/Transmitter (HSUART)), and Best Known Methods (BKMs) for platforms and software drivers.

This User Guide is intended for Original Equipment Manufacturer (OEMs) and Original Design Manufacturer (ODMs) that are enabling drivers for the Windows* 10 operating system with the Intel® Atom™ E3800 processor, Intel® Celeron® Processor N2XXX, and Intel® Celeron® Processor J1XXX.

1.1 Terminology

Table 1. Terminology

Term	Description
ADK	Assessment and Deployment Kit
BKM	Best Known Methods
BSP	Board Support Package
COM Port	Communication Port
CRB	Customer Reference Board
DMA	Direct Memory Access
EEAP	Ecosystem Engineering Access Program
EHCI	Enhanced Host Controller Interface
FFU	Full Flash Update
GPIO	General Purpose Input/Output
HSUART	High Speed Universal Asynchronous Receiver/Transmitter
I^2C*	Inter-Integrated Circuit*
NIC	Network Interface Card
ODM	Original Design Manufacturer
OEM	Original Equipment Manufacturer
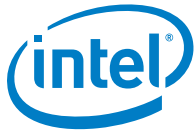
Term	Description
PIO Mode	Programmed I/O Mode
RTM	Release to Manufacturing
SDK	Software Development Kit
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver/Transmitter
WDK	Windows Driver Kit

Table 2.   Referenced Documents

Document	Document No./Location
Intel® Atom™ Processor E3800 Product Family Datasheet	538136

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2.0 *Platform Best Known Methods*

The following are recommended platform reworks to enable the supported I/O drivers (GPIO, I2C*, SPI, and HSUART) on Intel Customer Reference Boards (CRBs). This is not an exhaustive list of platform reworks.

2.1 How to rework Bakersport Fab B USB3.0 Port

By default, the Bakersport Fab B CRB has an issue with the USB3.0 port. This port fails to read several types of USB3.0 thumb drives and couldn't achieve USB3.0 performance.

Note: Patriot Memory* 64 GB and EDGE Memory* DiskGO* 32 GB thumb drives are not recommended to be used in EHCI mode.

Affected Platform	Bakersport boards (PBA# G72250-200 Rev 02) (Fab B)
Rework Steps	1) Un-stuff choke on L8A2 2) Stuff R8A4 and R8A3 (0 ohms)

2.2 How to rework Bakersport Fab B I2C Port 6

By default, Bakersport Fab B CRB has an issue with I2C port 6. This port fails to read and write because of incorrect resistor connections.

Affected Platform	Bakersport boards (PBA# **G72250-200 Rev 02**) **(Fab B)**
Rework Steps	1) UnStuff R5H9, R5H12, R5H8, R5H10 2) Stuff R5H4 (22 ohms) 3) Stuff R5H3 (22 ohms)

2.3 How to rework UART in Bakersport and Bayley Bay

By default, Bakersport Fab B CRB and Bayley Bay Fab 03 CRB have an issue with UART2. This port triggers an unwanted interrupt. Add a 10K resistor to mitigate this issue.

Rework Steps	Place a 10K resistor followed by a 28 AWG wire from R6J4 to R6H9
Affected Platform	Bakersport CRB **(PBA# G72250-200 Rev 02) (Fab B**) Bayley Bay Fab 3 CRB (IOTG configured) only

NOTE: Figure 1 shows the rework layout. The 10K PU resistor (denoted by a yellow box) is wired (denoted by an orange curved line) to R6H9.

**Figure 1.   Bakersport CRB and Bayley Bay CRB UART Rework Layout**
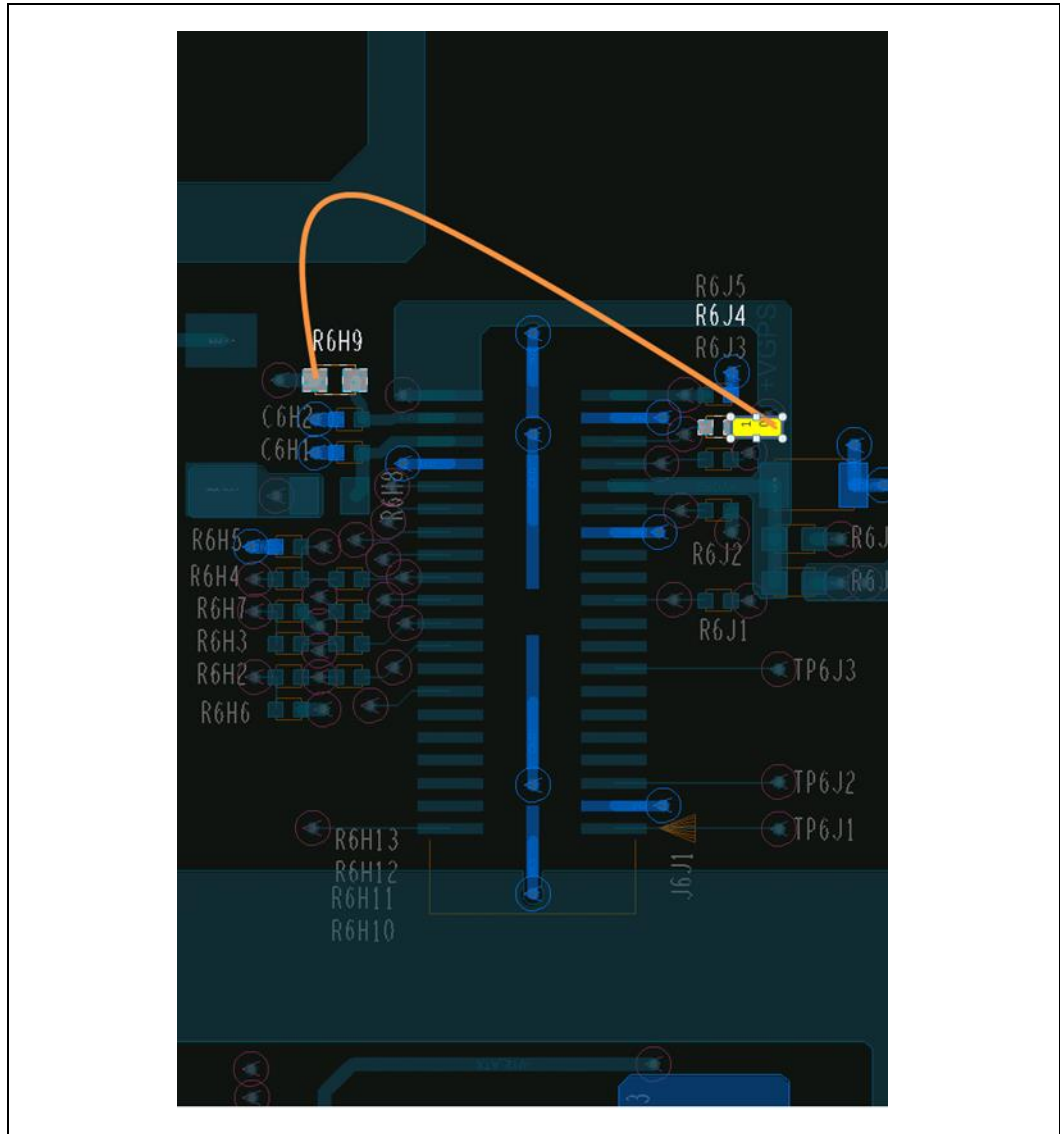
2.4 How to Rework Bayley Bay Fab 3 CRB PCIe* INLI Slot–Port 3

By default, Bayley Bay Fab 03 CRB has an issue with PCIe* Slot 3. This PCIe slot fails to detect a network card after shutdown followed by power up (without switching off the main power).

Affected Platform	Bayley Bay Fab 3 CRB (IOTG configured) only
Rework Steps	1. Remove R6C4 2. Add a jumper wire from C6C7 to R6C4 as shown in Figure 2.
Reasons for the Rework:	NICs are not recognized in the Windows* operating system if the jumper block (J7C2) is configured to Desktop mode, pins [1–2]. Failure mode occurs in PCIe* Slot 3.

Figure 2. Bayley Bay Fab 3 CRB PCIe* Slot 3 Rework
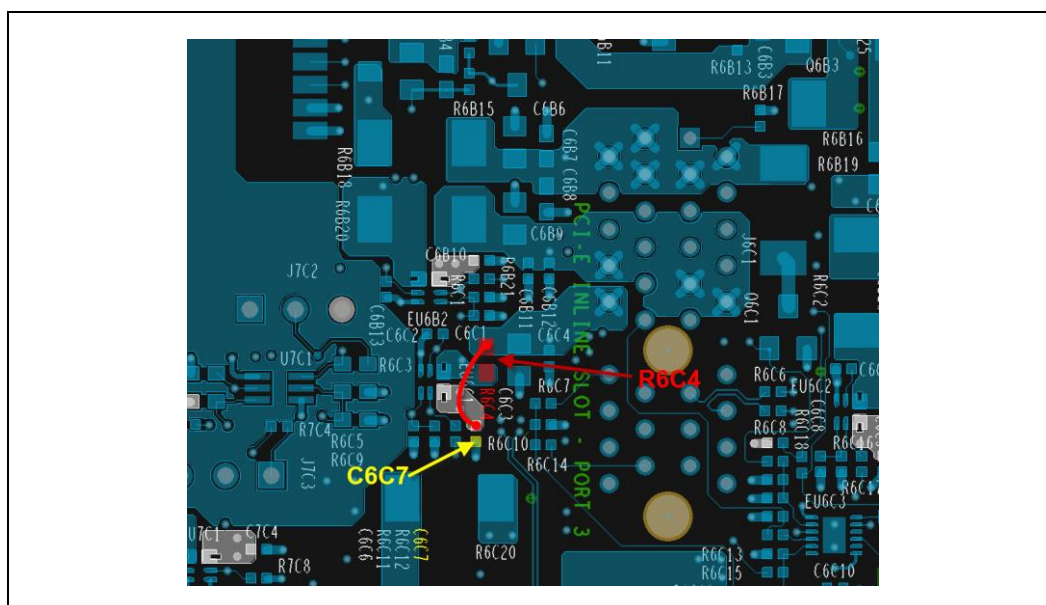
2.5 How to use Serial Port in Bayley Bay

The common serial port on the Bayley Bay CRB does not work. The actual serial port is the Micro USB port near the COM port on CRB board. Use the USB cable to connect the Micro USB port in the CRB board to the USB port in the host machine (laptop or desktop).

Install a driver from http://www.ftdichip.com/FTDrivers.htm to the host machine to have the virtual COM port in the host machine communicate with the Bayley Bay CRB.

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3.0 Software Driver BKMs

3.1 How to Disable the DMA Feature for I2C*

The seven I2C* controllers in the Intel® Atom™ E3800 processor use the Windows* registry to control the DMA feature.

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\iaioi2c\
Parameters]

"ForceDma"="0,0,0,0,0,0,0"
```

ForceDma (string type) consists of seven values mapped to the seven I2C controllers, which are device IDs from **0F41** to **0F47h**.

Value 0 disables the DMA, and I^{2}C* data will be read and written in Programmed I/O Mode (PIO Mode).

For values other than 0, if data length is more than the specified value, I^{2}C data will be read and written in DMA mode; if data length is less than the specified value, I^{2}C data will be read and written in PIO Mode.

By default, without any registry settings, I^{2}C will use the PIO Mode.

3.2 How to Set the Baud Rates of HSUART

1. The baud rate is calculated based on the following method:

    Baud rate = (SourceClockFrequency) / (16 * divisor)

    Source Clock Frequency = 50000000 * PrescalerMValue /PrescalerNValue * 2

    For example, to set baud rate to 1M:

    Set PrescalerMValue = 64

    Set PrescalerNValue = 100

    SourceClockFrequency = 64,000,000

    The values of **SourceClockFrequency, PrescalerMValue**, and **PrescalerNValue** can be customized from the Windows registry. Reboot the system after setting these values.

2. To support baud rate between 230,400 and 3,686,400, create and change the following registry setting:

```
[HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Services\iaiouar
t\
Parameters]

;High speed source clock, M and N prescalers
```

```
"HSUartSourceClockFrequency"=dword:01c1f8f8

"HSUartPrescalerMValue"=dword:00003fff

"HSUartPrescalerNValue"=dword:00006c80
```

3. To support baud rate between 300 and 115,200, change the following registry setting for low speed source clock, M and N prescalers:

```
"UartSourceClockFrequency"=dword:001c2000

"UartPrescalerMValue"=dword:0000025a

"UartPrescalerNValue"=dword:00007fff
```

Refer to Table 2. Baud Rate Generator in the *Intel® Atom™ Processor E3800 Product Family Datasheet,* Section 27.2.3 for details.

3.3   How to Install I/O Driver Using INF or SYS File

Install the I/O driver by retrieving the raw driver package (the inf and sys file) in the following folder and install the driver using Right-Click Install, PnPUtil or Windows DP installer.

For 64 bit driver: Drivers\x64\ **[GPIO/HSUART/I2C/SPI]**

Then the user also can custom their own installation directly based on driver package files, for example:

- Right-Click Install https://msdn.microsoft.com/en-us/library/windows/hardware/ff557251%28v=vs.85%29.aspx?f=255&MSPPError=-2147217396

- Use PnPUtil tool to install driver by inf file http://msdn.microsoft.com/en-us/library/windows/hardware/ff550423(v=vs.85).aspx

- Use Driver Package Installer (DPInst) http://msdn.microsoft.com/en-us/library/windows/hardware/ff544842(v=vs.85).aspx

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