IFC6410

User Guide

001821 Rev C

August 20, 2013

Submit technical questions at:
http://www.inforcecomputing.com/techweb/

Inforce Computing Inc.
48820 Kato Road, # 600B
Fremont, CA 94538
U.S.A.

Revision history

Revision	Date	Description	Author
A	May 13, 2013	• Initial release	Sujith K J
B	July 18, 2013	• Updated Appendix A with header images • Updated the document with LED position on board image	Soumya S
C	August 20, 2013	• Updated board images	Soumya

Approval Record

Function	Position	Name	Date
Checked By	Project Engineer	Sebastian V.P	August 20, 2013
Reviewed By	Project Engineer	Sebastian V.P	August 20, 2013
Approved By	Project Manager	Devaraj P S	August 20, 2013

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Preface

This User guide explains the hardware, software, setup and usage of system IFC6410.

Intended Audience

This document is intended for technically qualified personnel. It is not intended for general audiences.

Intended Use

All Inforce boards are evaluated as Information Technology Equipment (I.T.E.) for use in personal computers (PC) for installation in homes, offices, schools, computer rooms, and similar locations. The suitability of this product for other PC or embedded non-PC applications or other environments, such as medical, industrial, alarm systems, test equipment, etc. may not be supported without further evaluation by Inforce Computing.

Document Organization

The chapters in this document are arranged as follows:

1. Scope
2. Hardware specification
3. System setup and usage
4. Software specification
5. Appendix A
6. Company contact information

Conventions

The following conventions are used in this document:

⚠️**CAUTION**
Cautions warn the user about how to prevent damage to hardware or loss of data.

📝 **NOTE**
Notes call attention to important information.

REFERENCES

1. APQ8064
2. Chipset Datasheet_001796_Rev B
3. Power Management Module Device Specification_001802_Rev B
4. PICO ITX Specification

Note

This document is subject to change without notice.

Support Information

Every effort has been made to ensure the accuracy of the document. If you have any comments, questions, or ideas regarding the user guide, Contact technical support:
techsupport@inforcecomputing.com

Terminology

The table below gives descriptions to some common terms used in the User Guide.

Term	Description
CSI	Camera Serial Interface
DDR	Double Data Rate
eMMC	Embedded Multimedia Card
HD	High Definition
HDMI	High Definition Multimedia Interface
I2C	Inter Integrated Circuit
JTAG	Joint Test Action Group
LED	Light Emitting Diode
LVDS	Low Voltage Differential Signaling
MAC	Media Access Control
MIPI	Mobile Industry Processor Interface
OS	Operating System
OTG	On The Go
PCIe	Peripheral Component Interconnect Express
SATA	Serial Advanced Technology Attachment
SBC	Single-Board Computer
SDC	Secure Digital Controller
SPI	Serial Peripheral Interface
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus

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1 SCOPE

This document describes the system setup and usage of Qualcomm Snapdragon S4 Pro APQ8064 based IFC6410 SBC.

Development Device Notice

This SBC device contains RF/digital hardware and software intended for engineering development, engineering evaluation, or demonstration purposes only and is intended for use in a controlled environment. This device is not being placed on the market, leased or sold for use in a residential environment or for use by the general public as an end user device.

This SBC device is not intended to meet the requirements of a commercially available consumer device including those requirements specified in the European Union directives applicable for Radio devices being placed on the market, FCC equipment authorization rules or other regulations pertaining to consumer devices being placed on the market for use by the general public.

This SBC device may only be used in a controlled user environment where operators have obtained the necessary regulatory approvals for experimentation using a radio device and have appropriate technical training. The device may not be used by members of the general population or other individuals that have not been instructed on methods for conducting controlled experiments and taking necessary precautions for preventing harmful interference and minimizing RF exposure risks. Additional RF exposure information can be found on the FCC website at http://www.fcc.gov/oet/rfsafety/.

Anti-Static Handling Procedures

SBC has exposed PCB and chips. Accordingly, proper anti-static precautions should be employed when handling the kit, including:

- Use a grounded anti-static mat
- Use a grounded wrist or foot strap

Hardware Identification Labels

Labels are present on the IFC6410 board. The following information is conveyed on IFC6410 board:

- Serial Number
- Ethernet MAC address
- WIFI MAC address
- Product Rev

2 HARDWARE SPECIFICATION

2.1 INTRODUCTION

IFC6410 SBC provides a reference design for Qualcomm Snapdragon S4 Pro APQ8064 where customers can design, develop, test, and deploy their product solutions around the processor.

2.2 ARCHITECTURE

The functional diagram IFC6410 SBC is shown below.

Figure 1: Block Diagram

2.3 SYSTEM SPECIFICATION

Following table shows the hardware specification of IFC6410

Table 1: System hardware specification

Processor and Peripherals	
Processor	Qualcomm Snapdragon S4 Pro APQ8064 (23mmx23mm package)
Memory Devices	
Main Memory	2GB DDR3
Storage	Up to 64GB eMMC
I/O interfaces	
Interfaces	2 x USB 2.0,1x USB-OTG, 1x SATA, MICROSD Slot, HDMI, Dual LVDS, UART, 1x MIPI-CSI, GPIOs
Form Factor	
Mechanical	Pico-ITX(10cmx7cm)
Power	
Power Input	5V / 3A DC
Others	
Temperature Specification	Commercial Grade

2.4 ELECTRICAL CHARACTERISTICS

Power supplies

IFC6410 board is operated from following sources

> ➢ 5V DC Jack (5V, 3A)

Power Consumption

Total approximate power of IFC6410 is **12W.** This will be varied depends on the application and IOs used.

2.5 BOARD LAYOUT AND SUBSYSTEMS

Figure 2: IFC6410 Board Top Side

Table 2: IFC6410 Board Locations

1. JTAG	8. Power/Reset Header	15. Microphone Jack	22. DC Jack
2. Antenna-Wi-Fi/BT	9. Reset Button	16. Dual MIC Header	23. RS232 header
3. Antenna-Wi-Fi	10. Expansion Header	17. Micro- USB Port	24. Micro HDMI connector
4. CPU	11. 5V Power Header	18. Ethernet Jack	25. LVDS connector
5. RTC Battery Header	12. Camera connector	19. USB 2.0 Port 1	26 LVDS Optional power header
6. SATA Connector	13. Boot select switch	20. USB 2.0 Port 2	27. MicroSD™ Card Slot
7. Power Button	14. Headphone Jack	21. PCA label	28. Assembly Revision

Figure 3: IFC6410 Board Bottom Side

3 SYSTEM SETUP AND USAGE

3.1 HARDWARE SETUP

Set the proper boot configuration using the boot-selection switch on board.

Refer Boot Configuration section, for more details on various boot configuration settings.

Refer Figure 5 LED locations on board.

Refer Steps to Boot IFC6410 section, for booting.

3.2 HARDWARE OPERATION

3.2.1 BOOT CONFIGURATION

Boot Configuration can be done by selecting the switch (SW3) provided on the board.
CONFIG switch in **ON** position indicates a **level 0**

Table 3: Boot selection

CONFIG_1 (Position-2)	CONFIG_0 (Position-1)	Function
0	0	EMERGENCY BOOT (SDC3 FOLLOWED BY USB HS)
0	1	SDC3 FOLLOWED BY SDC1 (eMMC)
1	0	SDC3 FOLLOWED BY SDC2 (Invalid)
1	1	SDC1 (eMMC) DEFAULT

Fast and secure boot selection

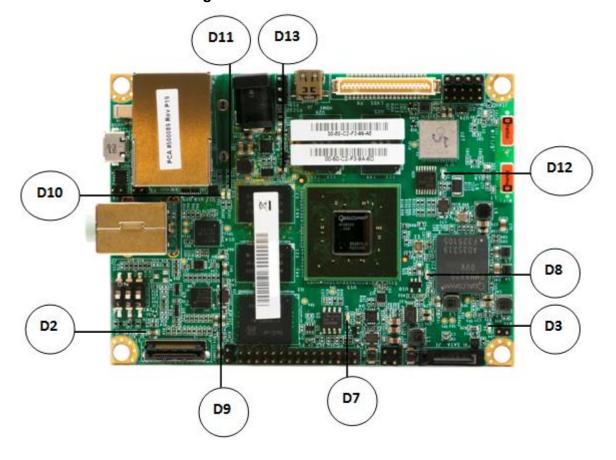| CONFIG_6 (Position-3)	Function
0	SECURITY BOOT
1	FAST BOOT

Figure 4: Boot Selection Switch

	0	0	0
	Config-0 (Pos1)	Config-1 (Pos2)	Config-6 (Pos3)
	1	1	1

3.2.2 LED INDICATIONS

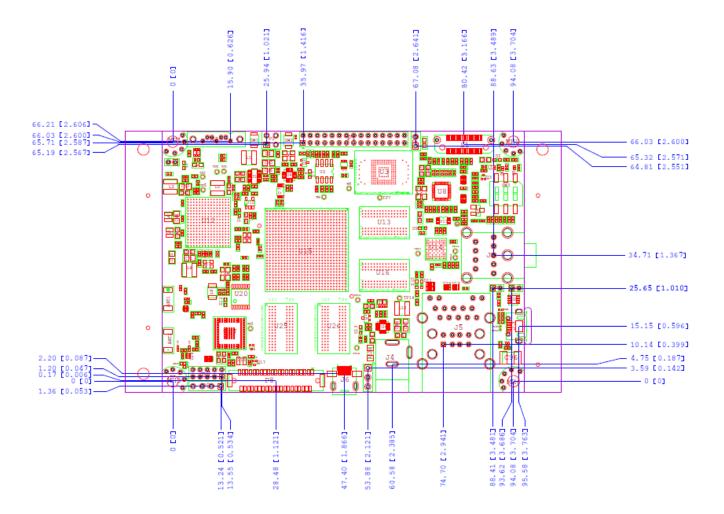| Ref Des	Function	Comments
D2	Privacy LED for Camera	Not mounted on board
D3	User Configurable LED	Connected to PMIC LED DRV0 pin
D7	SATA Activity LED	
D8	VPH power rail indicator	
D9	Notification LED1	Connected to PMIC GPIO_18
D10	CPU Reset LED	
D11	S4 power rail indicator	
D12	Bluetooth indicator LED	
D13	5V power rail indicator	

Figure 5: LED locations on board

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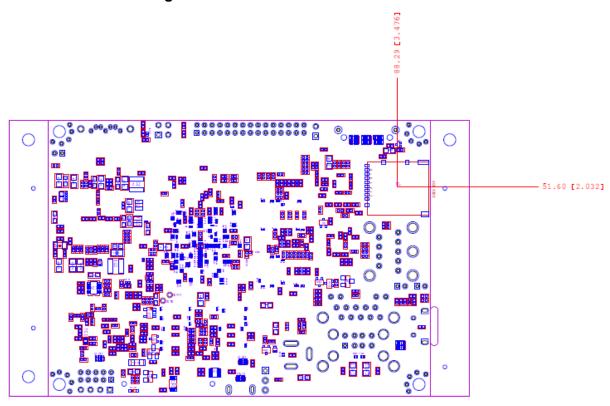## 3.2.3 CONNECTOR CO-ORDINATES

Figure 6: Connector Co-ordinates TOP

Figure 7: Connector Co-ordinates BOTTOM

3.2.4 STEPS TO BOOT IFC6410

1. Remove the IFC6410 board carefully from the anti-static bag

NOTE:

Handle with care, while plugging, to avoid physical damage.

2. Connect the display through HDMI/LVDS

3. Connect the power adaptor to the wall socket

NOTE:

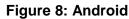*Carefully connect the DC connector to the jack provided on the board*

⚠ **CAUTION**

Use the DC adaptor provided by Inforce Computing.

Do not use the third party DC adaptor without our technical support, as it may damage your board.

4. Switch on the wall socket the board boots up automatically.

After a few seconds, the "*android*" logo, followed by the *lock screen* will be displayed on the screen as shown in the following **Figure 8** and **Figure 9**
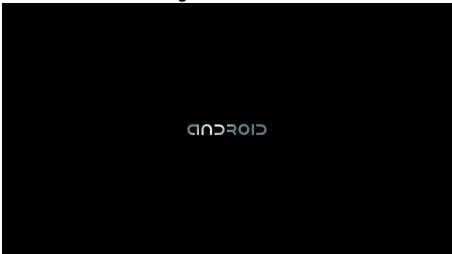
Figure 8: Android

Figure 9: Lock Screen Displays

![NOTE icon] **NOTE**

- *First time booting might take longer time, than normal booting.*

- *Screenshots shown for reference only, actual display may vary depending on the software release.*

4 SOFTWARE SPECIFICATION

4.1 OPERATING SYSTEM

Operating system used in IFC6410 is Android ^{TM} Jelly Bean 4.1.2 Version or higher.
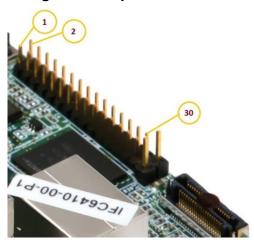
5 APPENDIX A

5.1 CONNECTOR PIN ASSIGNMENTS

5.1.1 EXPANSION CONNECTOR

Manufacturer part number: 951230-8622-AR
Manufacturer: 3M
Pitch: 2.0mm

Pin Number	Signal name
12	CLK_29M_SLIMBUS2
21	EXP_CONN_GPIO_1
22	EXP_CONN_GPIO_2
23	EXP_CONN_GPIO_3
24	EXP_CONN_GPIO_4
25	EXP_CONN_GPIO_5
26	EXP_CONN_GPIO_6
27	EXP_CONN_GPIO_7
28	EXP_CONN_GPIO_8
1,3,5,7,8,9,10,19,20,29,30	GND
13	I2C2_CLK
11	I2C2_DATA
14	SLIMBUS2_DATA
17	SPI_CLK
18	SPI_CS0#
16	SPI_MISO
15	SPI_MOSI
2	V1P8_VREG_S4
4	V3P3
6	VPH

Figure 10: Expansion Connector

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5.1.2 JTAG PIN OUT

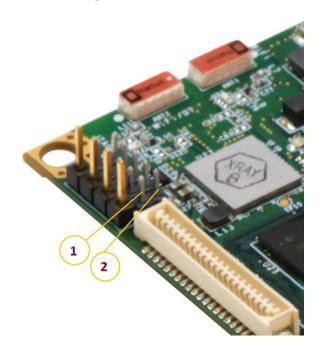Manufacturer part number: TMM-105-02-T-D
Manufacturer: Samtec
Pitch: 2.0mm

Pin Number	Signal name
4	CPU_JTAG_RTCK
2	CPU_JTAG_SRST#
8	CPU_JTAG_TCK
3	CPU_JTAG_TDI
6	CPU_JTAG_TDO
5	CPU_JTAG_TMS
1	CPU_JTAG_TRST#
9,10	GND
7	JTAG_CONN_DET#

Figure 11: JTAG Header

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5.1.3 CAMERA CONNECTOR PIN OUT

Manufacturer part number: LSHM-120-03.0-L-DV
Manufacturer: Samtec

Pin Number	Signal name
7	CAM_2_I2C_CLK
5	CAM_2_I2C_DATA
8	CAM_MCLK0
6	CAM1_RST#
23	CAM1_STANDBY
38	CLK_MIPI_CSI0_EMI_N
36	CLK_MIPI_CSI0_EMI_P
15	FLASH_CTRL_EN1
13	FLASH_NOW
3,9,10,16,17,22,25,28,29,33,34,37,40	GND
21	I2C4_CLK
19	I2C4_DATA
32	MIPI_CSI0_LANE0_EMI_N
30	MIPI_CSI0_LANE0_EMI_P
26	MIPI_CSI0_LANE1_EMI_N
24	MIPI_CSI0_LANE1_EMI_P
20	MIPI_CSI0_LANE2_EMI_N
18	MIPI_CSI0_LANE2_EMI_P
14	MIPI_CSI0_LANE3_EMI_N
12	MIPI_CSI0_LANE3_EMI_P
11	NC
27	V1P2_CAMD
35	V1P8_CAMD
39	V2P8_CAMA
31	V2P8_VACT
1,2,4	VPH

5.1.4 LVDS CONNECTOR PIN OUT

Manufacturer part number: DF9-41P-1V(32)
Manufacturer: Hirose

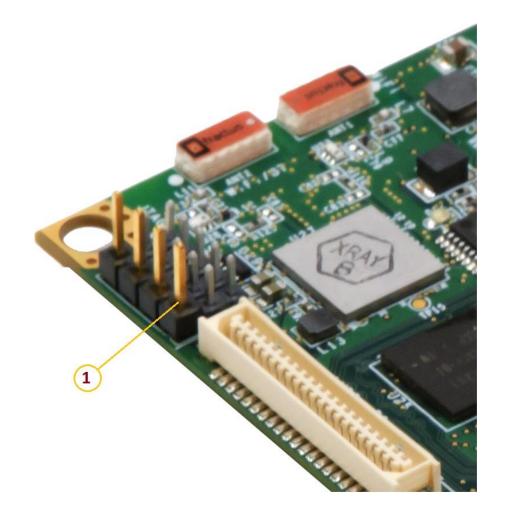| Pin Number	Signal name
1,2	V3P3
3,4,17,18,29,30,38,40	GND
5	LVDS_TX0_P
6	LVDS_TX0_N
7	LVDS_TX1_P
8	LVDS_TX1_N
9	LVDS_TX2_P
10	LVDS_TX2_N
11	LVDS_TX3_P
12	LVDS_TX3_N
13	CLK_170M_0_LVDS_P
14	CLK_170M_0_LVDS_N
15	I2C3_DATA_3P3_LVDS
16	I2C3_CLK_3P3_LVDS
19	LVDS_TX4_P
20	LVDS_TX4_N
21	LVDS_TX5_P
22	LVDS_TX5_N
23	LVDS_TX6_P
24	LVDS_TX6_N
25	LVDS_TX7_P
26	LVDS_TX7_N
27	CLK_170M_1_LVDS_P
28	CLK_170M_1_LVDS_N
31	DISP_PWR_EN_3P3_N
32	DISPLAY_GPIO_3
33	DISP_3P3_RST#
34	DISPLAY_GPIO_2
35	BACKLIGHT_PWM_3P3_EN
36	V1P8_VREG_S4
37,39	LVDS_CONN_HV_SUPPLY
41	NC

5.1.5 DISPLAY BACKLIGHT POWER HEADER PINOUT

Manufacturer part number: 68031-104HLF
Manufacturer: FCI
Pitch: 2.54 mm

Pin Number	Signal name
1	DISP_PWR_EN_3P3_N
2	BACKLIGHT_PWM_3P3_EN
3	V5_JACK_FUSE
4	GND

Figure 12: Display Backlight Power Header

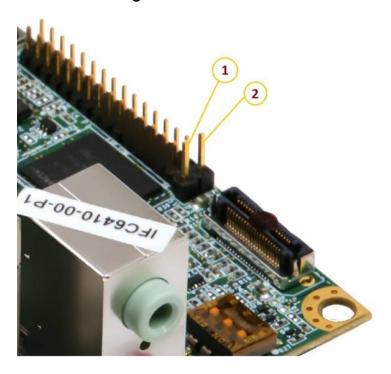Confidential and Proprietary – Inforce Computing, Inc.
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5.1.6 POWER HEADER PINOUT

Manufacturer part number: 68031-102HLF
Manufacturer: FCI
Pitch: 2.54mm

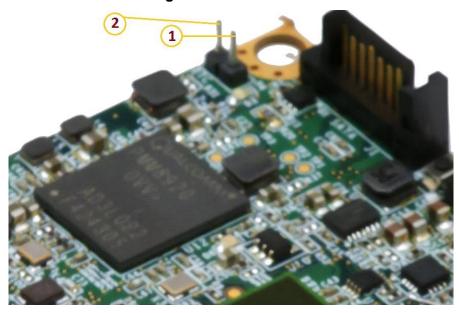| Pin Number	Signal name
1	V5_USB_OUT_DCIN
2	GND

Figure 13: Power Header

5.1.7 RTC HEADER PINOUT

Manufacturer part number: TMM-102-03-T-S
Manufacturer: Samtec
Pitch: 2.0mm

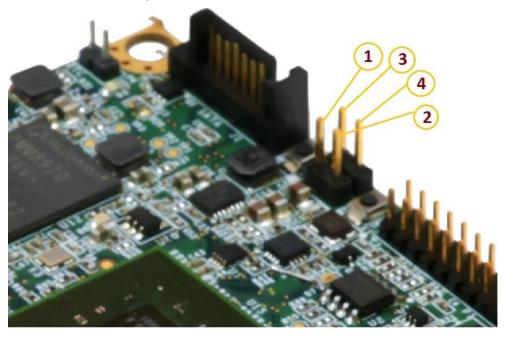| Pin Number	Signal name
1	GND
2	V3_COIN

Figure 14: RTC Header

5.1.8 POWER AND RESET HEADER PINOUT

Manufacturer part number: 77313-818-04LF
Manufacturer: FCI
Pitch: 2.54mm

Pin Number	Signal name
1	PWRBTN_R
2	GND
3	GND
4	RSTBTN_R

Figure 15: Power and Reset Header

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5.1.9 DUAL MIC HEADER PINOUT

Manufacturer part number: TMM-102-03-T-S
Manufacturer: Samtec
Pitch: 2.0mm

Pin Number	Signal name	Comment
1	CDC_DMIC_D0	P5.1 first pin of P5 header
2	CDC_DMIC_CK0	P5.2 second pin of P5 header
1	CDC_MIC_BIAS4	P6.1 First pin of P6 header
2	GND	P6.2 second pin of P6 header

Figure 16: Dual MIC Header

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5.1.10 RS232 HEADER PINOUT

Manufacturer part number: 22032031
Manufacturer: Molex Incorporated
Pitch: 2.54mm

Pin Number	Signal name
1	UART_CONN_TX
2	GND
3	UART_CONN_RX

Figure 17: RS232 Header

6 CONTACT INFORMATION

USA (Corporate Headquarters)
Inforce Computing Inc.
48820 Kato Road, # 600B
Fremont, California 94538 USA.
Phone: +1 510 683 9999
Fax: +1 510 683 9909

INDIA - KOCHI
Inforce Computing (India) Private Ltd.
60/2477, 3rd Floor
M.G. Road, Kochi - 682 016,
Kerala, India.
Phone: +91-484-3057100

INDIA - BENGALURU
Inforce Computing (India) Private Ltd.
24, 3rd Floor, 1st cross,
Magrath Road, Bengaluru - 560 025
Karnataka, India.
Phone: +91-80-25566699

For technical assistance refer: http://www.inforcecomputing.com/techweb
For technical support contact: techsupport@inforcecomputing.com
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