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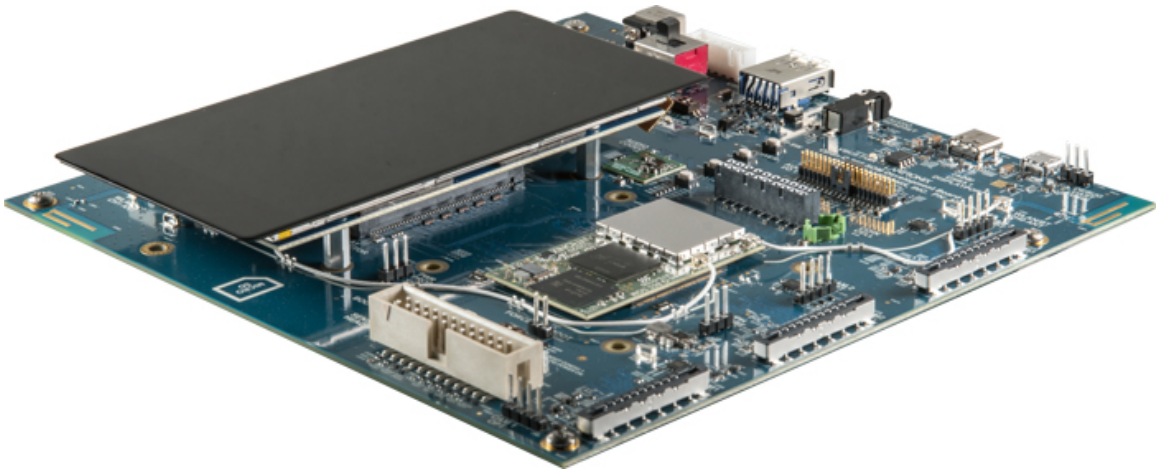

Open-Q™ 865XR SOM
Battery Charging Technical Note

Part Number APP-0096
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Revision History

Date	Rev.	Comments
September 2020	A	Initial release.

For the latest revision of this product document, please go to: http://tech.intrinsyc.com.

Contents

1 Introduction

This document applies to the Open-Q 865XR SOM Development Kit and the associated Carrier Board.

1.1 Purpose

The purpose of this document is to provide technical hardware and software information for any user that desire to use a battery pack with the Lantronix Open-Q 865XR SOM Development Kit.

1.2 Scope

This document presents guidelines and technical information for enabling the battery and charging functionality on the Lantronix Open-Q 865XR SOM Development Kit.

1.3 Intended Audience

This document is intended for end users who have purchased an Lantronix Open-Q 865XR SOM Development Kit and wish to use the battery and charging functionality.

1.4 Acronyms and Abbreviations

Acronym / Abbreviation	Definition
ANT	ANTenna
BAT, BATT	BATTery
BAM	Bus Access Manager
BLSP	BAM-based Low-Speed Peripheral
BOM	Bill of Materials
BT	Blue Tooth
CLK	Clock
CPU	Central Processing Unit
CS	Chip Select
CSI	Camera Serial Interface
DSI	Display Serial Interface
EMI	Electro-Magnetic Interference
EN	ENable
ERM	Eccentric Rotating Mass
ESD	Electro-Static Discharge
GND	GrouND
GPIO	General Purpose I/O
GPS	Global Positioning System
HDMI	High Definition Multimedia Interface
I2C	Inter-Integrated Circuit
I2S	Inter-IC Sound
INT	INTerrupt
JTAG	Joint Test Action Group
LDO	Low Drop-Out
LRM	Linear Resonant Actuator
LTE	Long-Term Evolution

Acronym / Abbreviation	Definition
LPI	Low Power Island
MDP	Mobile Display Port
MI2S	Mobile Inter-IC Sound
MIC	MICrophone
MIPI	Mobile Industry Processor Interface
MPP	Multi-Purpose Pin
NFC	Near Field Communication
PCB	Printed Circuit Board
PCIE	Peripheral Component Interconnect Express
PWM	Pulse-Width Modulation
QUP	Qualcomm Universal Peripheral
RF	Radio Frequency
RX	Receive
SCL	Serial CLock
SDA	Serial DAta
SDC	Secure Digital Interface
SOM	System on Module
SPI	Serial Peripheral Interface
SSC	Sensor Core
TX	Transmit
UART	Universal Asynchronous Receiver/Transmitter
UIM	User Interface Module
USB	Universal Serial Bus
WLAN	Wireless Local Area Network

1.5 Signal Name Suffix

Suffix	Definition
_N	Indicates that the signal is ACTIVE LOW
_P/N	Identifies the two signals comprising a differential pair

2 Documents

This section lists any parent and supplementary documents for the Open-Q 865XR SOM Development Kit Battery Charging Tech note. Unless stated otherwise, applicable documents supersede this document and reference documents provide background and supplementary information.

1.6 Applicable Documents

REFERENCE	AUTHOR	TITLE
A-1	Lantronix	Lantronix License and Purchase Terms and Conditions for the Open-Q 865XR SOM Development Kit

1.7 Reference Documents

Available at http://tech.intrinsyc.com/ (dev kit registration required).

REFERENCE	TITLE
R-1	Open-Q 865XR SOM Development Kit – User Guide
R-2	Open-Q 865XR SOM – Carrier Board Design Guide
R-3	Open-Q 865XR SOM Schematics (SOM and Carrier)
R-4	Open-Q 865XR SOM Datasheet

3 System Power Distribution

The Open-Q 865XR SOM Development Kit can power the SOM by either a 3.93V step down buck on the carrier board or with a single cell Lithium-Ion (LiPo) battery pack. Please note that the battery pack does not generate the 12V DC rail. To power user connected peripherals that requires 12V DC, the 12V input power needs to be remain connected. This section describes the power breakdown of the Open-Q 865XR SOM Development Kit.

3.1 Power Tree Diagram

The input power on the Open-Q 865XR SOM Development Kit originates from either the 12V input power supply or the battery. Input power is broken down into different voltage levels by step down bucks and low drop out voltage regulators. Each of these voltage levels are provided to different peripherals on the carrier board. Figure 1 describes how the power is broken down and where it is being supplied to in the system.

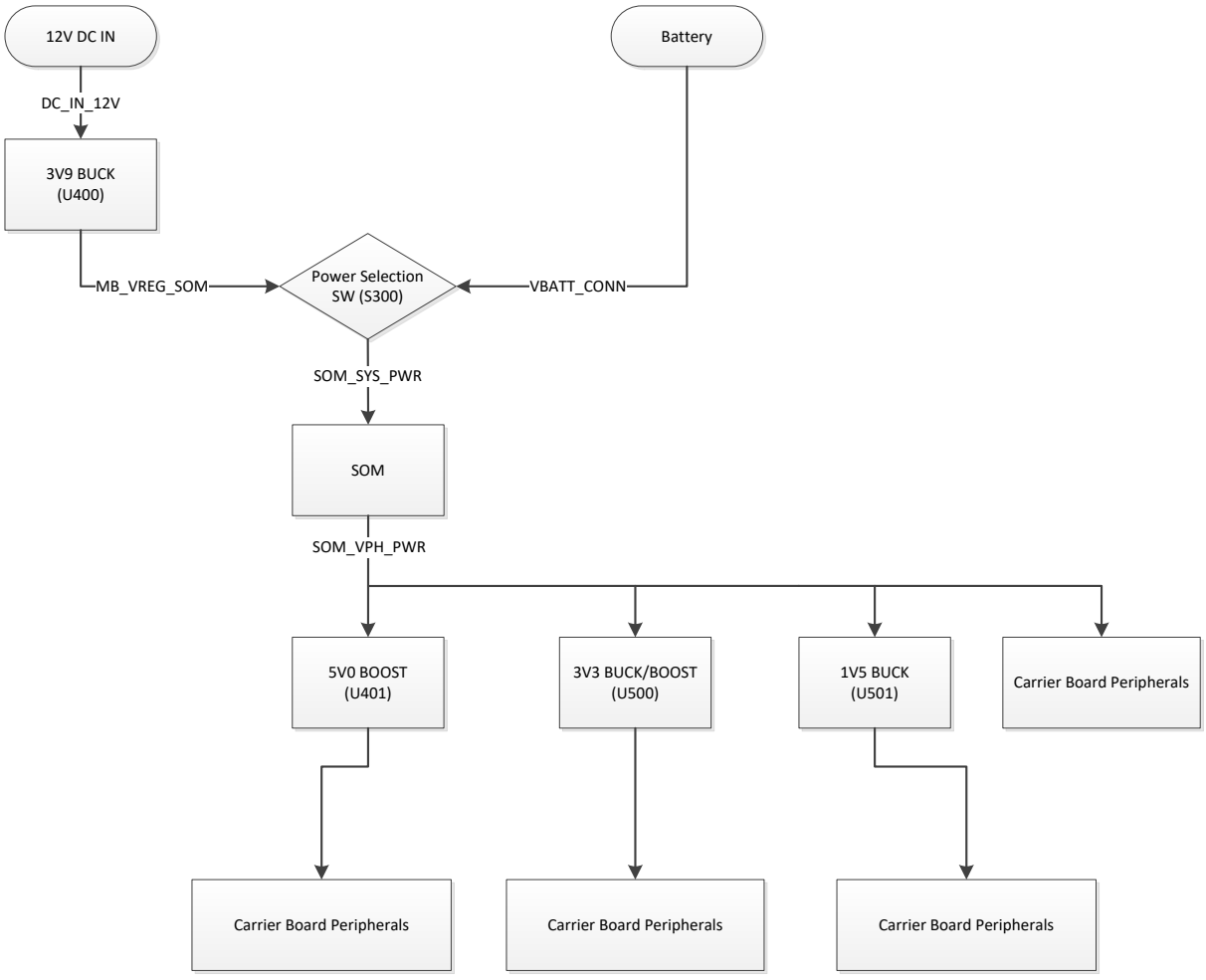

Figure 1 – Open-Q 865XR SOM Development Kit Power Tree

3.2 SOM Input Power Selection

The Open-Q 865XR SOM Development Kit is designed to operate with either the 12V input power supply (with the SOM powered by a buck power supply) or the battery input. The switch S300 selects which source powers the SOM.

4 Hardware Configuration

The following section outlines how to connect a Lithium-Ion battery pack and how to enable battery charging on the development kit. Please follow these hardware setups for the system to function properly.

4.1 Battery Pack Selection

Lantronix does not sell nor ship battery packs with the Open-Q 865XR SOM Development Kit. Users sourcing their own battery pack should note the absolute and operating input power ratings of the SOM. Open-Q 865XR reference software is adjusted to the charging characteristics of the recommended pack. Custom battery packs may have different maximum charge current or charge voltage ratings; ensure the software settings comply with the selected pack. Please see document R-4 for these details.

Lantronix recommends using the AA Portable Power Corp's PR-CU-R805 Lithium ion battery pack. This is a single cell pack with a nominal voltage of 3.6V and a capacity of 3350mAh (12Wh, 5A discharge, 0.5C charge rate). When using other batteries, the receptacle needs to mate with the battery header on the carrier board (J300). The JST Sales America 6 position receptacle (part number: XHP-6) can be used to mate with the development kit battery header. When connecting the battery, please note the battery header pin outs.

Table 1 – J300 Battery Header Pin Outs

Description	Signal	Pin	Note
Battery positive supply terminal	VBAT Plus (VBAT+)	J300[5,6]	
Battery ID	BATT_ID_CONN	J300[4]	Optional. A pull down resistor between 50K and 100K ohm can be connected to allow for detection of a specific battery pack (SW customization required). The carrier board 100K resistor R312 is connected in parallel.
Internal battery pack temperature	BATT_THERM (It is recommended to use a battery pack with a 100K Ohm 4250 B NTC thermistor)	J300[3]	If a battery pack thermistor is not present, set DIP switch S301 Position 1 to ON.
Battery negative supply terminal	VBAT Minus(VBAT-)	J300[2,1]	

4.2 Connecting a Battery to the Development Kit

Before connecting a battery pack to the Open-Q 865XR SOM Development Kit, please ensure that the battery voltage is within the operational specifications of the SOM and that the connections on the

receptacle matches that of the battery header J300. Please see section 4.1 for information on battery pack selection.

Figure 2 below illustrates the development kit locations where a battery pack should be connected (BATT CONN), the 12V/Battery selection switch (S300), and the battery configuration switch (S301).

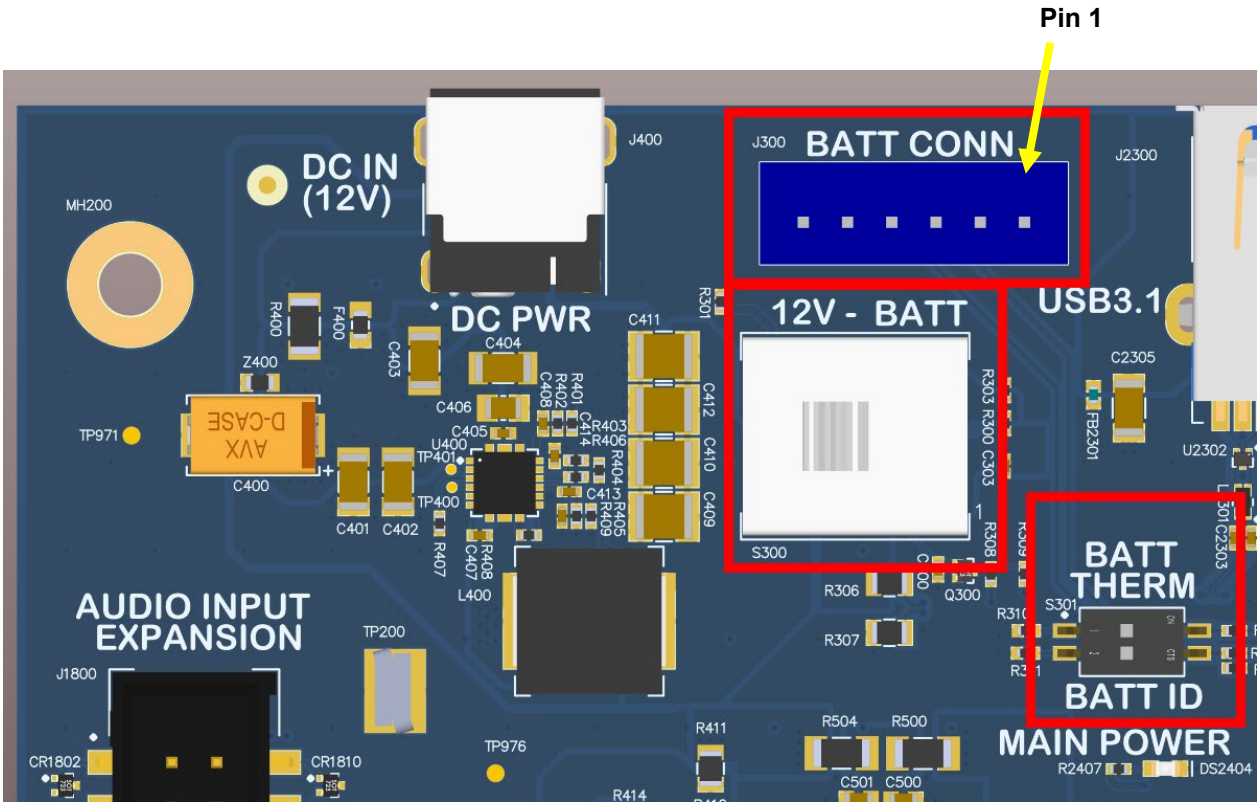

Figure 2 – Open-Q 865XR SOM Battery Connector (J300), BATT/12V switch S300 and Battery Configuration S301 location

4.3 Setting up the Development Kit to be Powered by a Battery

To use a battery as the power source, switches S300 and S301 need to be set properly. See Figure 2 (red boxes) and the table below for the switch location and the appropriate settings, respectively.

Table 2 – Switch Positions for Battery Powered Dev Kit

Switch Number	Position	Description
S300 (Input Power Selection Switch)	Slide switch to BATT	Selecting the BATT option powers the development kit with the battery voltage from J300.

Switch Number	Position	Description
S301 – position 1 Battery Configuration DIP Switch (BATT THERM)	For a battery powered dev kit, set switch to open / OFF if thermistor is included on the battery pack. Otherwise keep switch closed / ON.	Selects whether the carrier 100K ohm resistor is connected to the battery connector J300 or not. Setting this switch closed / ON, creates a 'fake' battery temperature reading.
S301 – position 2 Battery Configuration DIP Switch (BATT ID)	For battery power dev kit, set switch to open / OFF to enable battery charging.	The setting is used as input to the SOM to enable or disable battery charging. Setting the switch closed / ON, reduces the battery ID resistance to a 7.5K ohm level that disables battery charging The ID resistor within the battery pack, is intended to indicate the appropriate battery fuel gauging profile, as configured in software. .

4.4 Connecting a Charger to the Development Kit

To charge a battery pack that is connected to the Open-Q 865XR SOM Development Kit, connect your charging source (wall charger or PC) to the USB Type-C port (J2200) on the carrier board. Figure 4 shows the location of the USB Type-C connector.

Note that input charging current (from USB Type-C VBUS) is deliberately limited to 1.5 A, which is the input current limit though the board-to-board connections of the 865XR SOM.

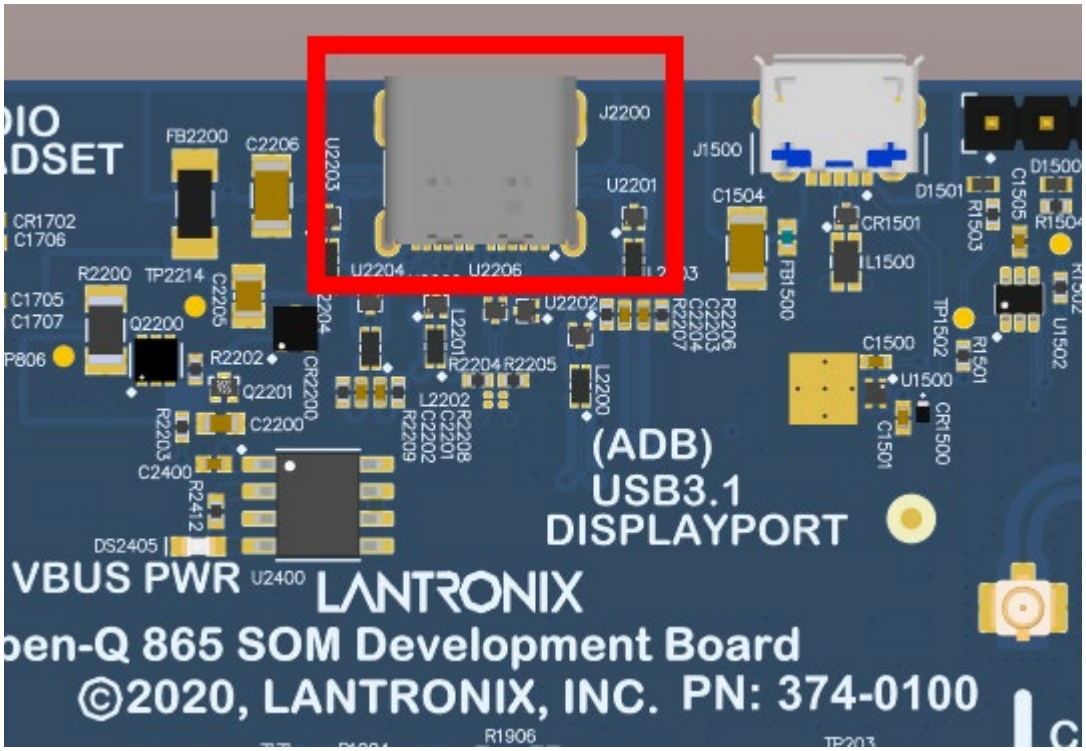

Figure 3 – Open-Q 865XR SOM Development Kit USB Type-C Connector Location