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Wireless Power System Application Interface Tool

User Guide

V1.0

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PURPOSE

The purpose of this document is to provide a brief description of the Spark Wireless Power Application Interface Tool (AIT) and its use cases.

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VERSION

Author	Date	Revision	Description
SS	01/14/2019	1.0	Initial Release

COMMUNICATION INTERFACE

The communication to and from the Wireless Power Application Interface Tool (AIT) is UART-based. An FTDI based USB-to-Serial cable is recommended. This cable is connected between the PC and the target Wireless Power Transmitter/Receiver via a 4-pin connector.

INSTALLATION PROCEDURE (WINDOWS)

The AIT installer is provided in an .exe format; the installation procedure is quite brief, and it provides the user an option to install FTDI drivers toward the end of the process. This is highly recommended.

CONNECTING A TARGET BOARD

Once the AIT is started, the first step consists of connecting a target board, either a Wireless Power Transmitter or Receiver. This is achieved by using the 'Serial Port Selection' pane, which is located on the top left side. From the drop-down box, the user can select the COM Port which has been enumerated from the connected USB-to-Serial cable. Once the correct COM port has been selected, pressing 'Connect' will open the serial port.

WIRELESS POWER TX/RX MODES OF OPERATION

The Wireless Power Transmitter/Receiver operate in two distinct modes, Bootloader and Application.

BOOTLOADER MODE

The Bootloader Mode is intended for the application's firmware to be updated. Upon POR (Power On Reset), the Wireless Power Transmitter enters 'Bootloader' Mode for a period of 1 second. During this this period, if the AIT's 'Firmware Update' tab is currently selected, the AIT will send the appropriate command for the target board to remain in this mode indefinitely. Thus, when the user wishes to enter the Application Mode, it is necessary to select 'Connect', select the 'Firmware Update' Tab, and then cycle power on the target board.

APPLICATION MODE

The Application Mode is intended for typical, normal use of the Wireless Power Transmitter/Receiver. In regard to the AIT, this mode is relevant when selecting the 'Terminal' and 'FOD' tabs.

GENERAL AIT LAYOUT - TABS

The AIT's general layout consists of multiple Tabs (Firmware Update, Terminal, FOD, etc.), which are described in greater detail below.

FIRMWARE TAB

The 'Firmware Update' Tab allows the user to upgrade the Application's firmware with the appropriately provided binary (.bin) file. Each .bin file contains various sections of information, which include: Application, Settings, and Calibration. The user can select which sections of the file are to be written to the target's Flash Memory. In certain scenarios, for example, such as after FOD calibration, it is required not to over-write the Calibration data of Transmitter.

BUTTONS

- Open Firmware File – Allows the user to select the correct .bin file from the host computer.
- Flash Firmware – Once the appropriate firmware .bin file has been loaded, writes the contents of the file to the Transmitter's/Receiver's non-volatile Flash Memory.
- Clear Console – Removes the messages that are currently displayed in the console browser.

TERMINAL TAB

The 'Terminal' tab displays output from the Wireless Power Transmitter when it is functioning in 'Application Mode'. Though the user cannot input data into the terminal, the output can be cleared by highlighting and pressing the 'Delete' key.

BUTTONS

- N/A

FOD TAB

The 'FOD' Tab allows the user to calibrate the wireless power transmitter for foreign object detection with the use of a wireless power receiver. First, "Test" firmware is flashed to the non-volatile memory of the transmitter. This variant of firmware outputs specifically formatted calibration data, which is interpreted by the Spark AIT during the calibration process. The user selects the transmitter type as 'Automotive' or 'XMC'.

AUTOMOTIVE

Once a transmitter it connected via UART to the PC, the user will select 'Start Capture' and position the receiver at various distances from the transmitter. Throughout this exercise, data outputted from the transmitter will be captured by the AIT. This data will also be viewable within the console browser.

Once enough data has been captured, the user will select, 'Stop Capture'. Next, the 'Calculate Gains' will be selected, which will exercise the internal FOD tuning algorithm. (This process may take a few seconds to complete). As the values are computed, they are displayed via console browser. Once the computation has completed, the user will be notified to power cycle the connected transmitter within a period of 10 seconds. A good practice is to turn off power, wait 1 second, turn on power.

Once the power cycle is finished, the AIT will continue the calibration process by writing the new calculated values into the Flash memory of the transmitter. *Then, it is imperative that the user re-flash the transmitter with "Production" firmware via the Firmware Update tab WITHOUT checking the "Flash Calibration Section".*

XMC

The process for an XMC type board is identical to the Automotive type board with a few exceptions. Once the XMC type has been selected via the corresponding radio button, and the capture process has begun, three additional buttons, 'Gain = 2', 'Gain = 3', 'Gain = 4', will be enabled. The gain value is the first parameter in each line of data that is viewable in the console browser.

By default, for an XMC board type, the gain will be 2. It is the user's responsibility to change the gain during the capture process. This can be done by simply selecting one of the appropriate 'Gain =' buttons. Once a button has been selected, the gain value in the data line will reflect the change. The user will exercise the various gains at different transmitter-to-receiver distances until the capture process is stopped. The 'Calculate Gains' process is then identical to that of the Automotive board type.

BUTTONS

- Start Capture – Begins the capture process of FOD calibration data.
- Stop Capture – Finishes the capture process of FOD calibration data.
- Clear Buffer – The captured data is erased. The user can employ this button if they wish to re-start the capture process with new data.
- Calculate Gains – Once data has been captured, triggers the internal algorithm used in computation of FOD parameters.
- Automotive/XMC – Selects which type of board is currently undergoing calibration.
- Gain = 2, Gain = 3, Gain = 4 – When an XMC board is selected, the specified gain used during the calibration process.