

**WiFi-IT! EDK DCard
User Manual**

Version 0.4

Table of Contents

Foreword	0
Part I Introduction	1
1 Definitions	1
2 DCard Orientation	2
Part II Jumpers	3
1 J5 - FPGA Configuration Header	3
2 J12 - PCard Present	4
3 J16 WiFi-IT! JTAG Configuration	5
4 J17 / J25 - Alarm Levels	5
5 J18 - Firmware Load	6
6 J20 - WiFi-IT! Reset & JTAG Control	7
7 J21 - DC_DC_CNTRL Pull Down	7
8 J23 - Override Mode	8
9 J24 - Current Measurement Header	8
10 J26 - UART 0 Configuration	9
Part III Signal Monitoring Points	10
1 J6 - WiFi-IT Signals	10
2 J7 - WiFi-IT Signals	11
3 J22 - WiFi-IT Analog Signals	12
Part IV Switches	13
1 Power On/Off	13
2 RTC Alarms	13
3 SW3 - Firmware Load	13
4 SW4 - WiFi-IT! Reset	14
5 SW5 - Reset Select	14
6 SW6 - Power Up Reset Enable	14
7 SW7 - UART 0 Control	14
8 SW9 - PCard Present	14
9 SW11 - Force FPGA Configuration	15
10 SW12 - Override Mode	15
Index	0

1 Introduction

The NPE WiFi-IT! EDK and EDK+ include the DCard, a development and debug base board which facilitates rapid prototyping of hardware and software for developing 802.11 embedded systems using the WiFi-IT! module. The DCard provides access to all signals from the WiFi-IT! module through the LED signal monitors or by connecting an oscilloscope directly to the signal lines. In addition to signal monitoring, the DCard provides facilities for JTAG debugging, reloading WiFi-IT! microcode, simulating alarm inputs and resetting the WiFi-IT! module during code debugging sessions. The DCard also provides a special connector for developing peripheral cards (PCards). All aspects of PCard design are supported including hardware and software development.

This document covers the features available on the DCard. It describes jumper settings, the signal monitoring points and the use of the switches. The [DCard Orientation](#) section provides a diagram of the DCard with hot spots. Click the hot spot to be taken to a description of the particular control.

1.1 Definitions

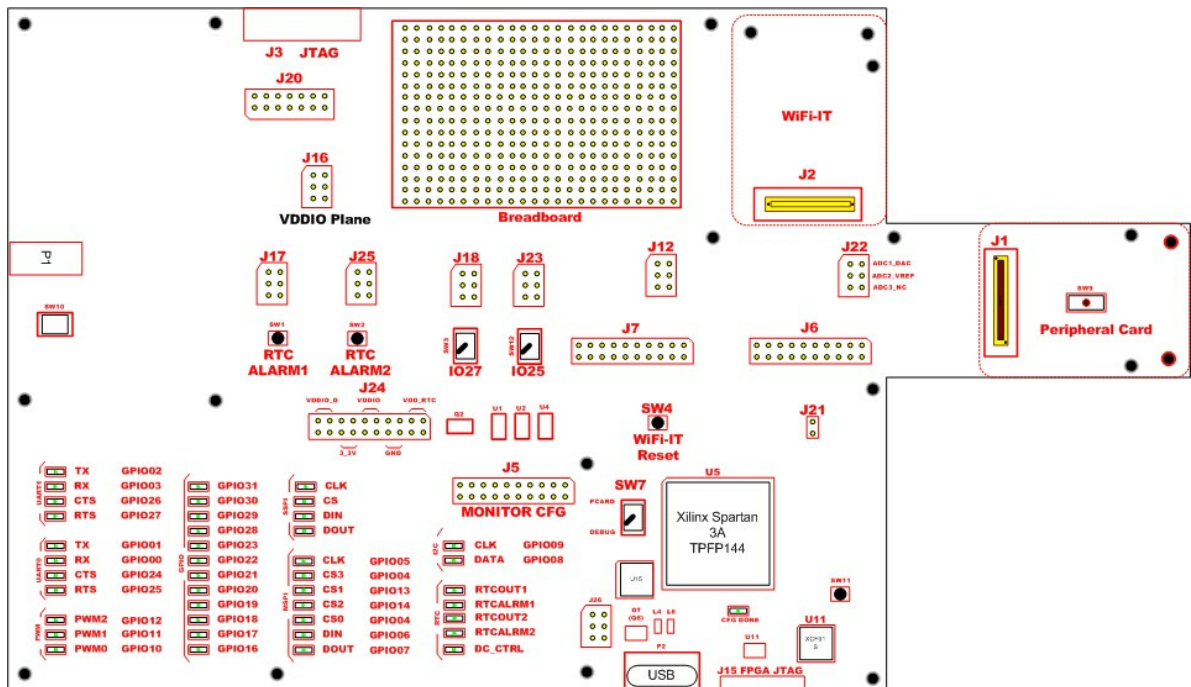
This page defines some of the acronyms used in this manual.

Acronym	Full Name	Description
DCard	Development Card	A printed circuit board (PCB) that is used to develop hardware and software for the WiFi-IT! 802.11 wireless modules. The DCard allows an engineer to easily probe all signals between the wireless module and the peripheral card that is connected to it. A software engineer can use the DCard's LED signal monitors to monitor the state of signal lines on the WiFi-IT! module, without an oscilloscope, while debugging software.
Firmware	Firmware	Software that is written to be run on the processor in the WiFi-IT! module.
FPGA	Field Programmable Gate Array	An electronic component that can be configured to perform a specific logical function. The DCard contains an FPGA that is known as the "Logic Engine". The Logic Engine is used to monitor the signals from the WiFi-IT! module and PCard that are under test and convert them to signals that drive the LED signal monitors used in debugging and software development.
PCard	Peripheral Card	To use the WiFi-IT! module in a design, it must be connected to sensors, power supply and other electronics. The printed circuit board that contains these electronic components is known

Acronym	Full Name	Description
		as the PCard. The DCard contains a connector that allows a PCard under development to be connected to a module in order to develop code and checkout the design functionality.
PCB	Printed Circuit Board	Refers to a generic printed circuit board.
UART	Universal Asynchronous Receiver Transmitter	A serial communication channel. The WiFi-IT! modules contain two (2) UARTs. The signaling level directly off the WiFi-IT! modules uses 3.3v logic. These signals maybe connected to RS232 translators to allow them to be interconnected with standard RS232 ports on other devices.

1.2 DCard Orientation

The image below shows the major features of the DCard. Clicking on switches, buttons, jumpers or connectors takes you to a description of the operation and/or use of the selected component.



Identifier	Description
J5	FPGA Configuration Header
J6	WiFi-IT! Module Signal Test Points
J7	WiFi-IT! Module Signal Test Points
J12	PCard Power Control
J16	WiFi-IT! JTAG Configuration
J17	Alarm values when push button released

J18	SW3 - Firmware Load Default Settings
J20	WiFi-IT! JTAG Control
J21	PCard Present
J22	WiFi-IT! Module Analog Signal Test Points
J23	SW12 - RTE Mode Default Settings
J24	Current Measurement Interface
J25	Alarm values when push button pressed
J26	SW7 - UART 0 Default Settings

2 Jumpers

The DCard provides a number of jumpers to configure operation of a WiFi-IT! module and a PCard. Depending on the PCard implementation you may want to run the system off of the PCard power supply, wake the WiFi-IT! module by using one of the alarm inputs or measure the current used by the WiFi-IT! module and the PCard. All of these operations are available by configuring the DCard to meet your requirements.

The DCard is shipped with default settings that allow a WiFi-IT! module to operate without a PCard. Each of the jumper descriptions define the default jumper settings and explain the optional settings.

[J5 - FPGA Configuration Header](#)

[J12 - PCard Present](#)

[J16 - WiFi-IT! JTAG Configuration](#)

[J17 / J25 - Alarm Levels](#)

[J20 - WiFi-IT! Reset & JTAG Control](#)

[J21 - DC DC_CNTRL Pull Down](#)

[J23 - Wired Mode Override](#)

[J24 - Current Measurement Header](#)

[J26 - UART 0 Configuration](#)

2.1 J5 - FPGA Configuration Header

The FPGA Configuration header is used to set factory options during factory test.

Default Setting

No Jumpers connected.

Jumper numbering:

1 2
3 4
:
17 18
19 20

Pin 1 is marked with a white circle.

Settings

J5 Pins	Name	Description
1 - 2	LED TEST ENABLE	Enables factory test mode of DCard LEDs.
3 - 4	SPI ENABLE	Enables SPI communication between FPGA and WiFi-IT! module for configuration of FPGA options. Factory Option.
5 - 6	NOT USED	
7 - 8	CFG0	FPGA Configuration Bit 0
9 - 10	CFG1	FPGA Configuration Bit 1
11 - 12	CFG2	Not Used
13 - 14	CFG3	Not Used
15 - 16	CFG4	Not Used
17 - 18	CFG5	LED Test Type 0
19 - 20	CFG6	LED Test Type 1

Factory LED Test Settings

Factory testing of the monitor LEDs is activated by placing a jumper between pins 1 and 2 of J5. Configuration Bits 0, 1 and 2 are then used to select the test pattern. In the table below a 1 indicates a jumper is placed between the associated pins, a 0 indicates no jumper.

CFG[5:6]	Description
00	Walking Group - Each group of LEDs is lit in sequence.
01	Walking 1-bit. Each LED lights sequentially.
10	Walking 0-bit. Each LED goes dark sequentially.
11	Walking Group - Each group of LEDs is lit in sequence (same as 00).

Note: The LED Test settings only operate if J5 pins 1 and 2 are shorted.

2.2 J12 - PCard Present

J12 controls the PCard detect switch located by the PCard connector J1. The PCard detect switch is used to detect when a PCard has been attached to the DCard and then to switch power to the PCard. The PCard must press down [SW9](#) while inserted. It is not necessary for SW9 to be pressed all the way down.

Default Setting

Jumpers are connected between the listed pins.

1 - 2

Jumper numbering:

1 2
3 4
5 6

Pin 1 is marked with a white circle.

J12	SW9
1-2	SW9 Disabled. DCard always provides power.
2-4	SW9 controls power. VDD_RTC and VDDIO are not provided by DCard when switch is pressed.

2.3 J16 WiFi-IT! JTAG Configuration

J16 controls the configuration of the JTAG TAP Connection Controller at power on or at reset. This selects which of the ARM7 processors on the GainSpan SoC is connected to the JTAG port.

! Important Note: WiFi Basic does not support JTAG debugging. Use the debugger built into the IDE to debug your WiFi Basic projects.

Default Setting

Jumpers are connected between the listed pins.

3 - 5

4 - 6

Jumper numbering:

1 2

3 4

5 6

Pin 1 is marked with a white circle.

Settings

J16	JTAG_CFG0 GPIO28	JTAG_CFG1 GPIO29
1 - 3	Pulled Up	NA
3 - 5	Pulled Down	NA
2 - 4	NA	Pulled Up
4 - 6	NA	Pulled Down

JTAG_CFG0 GPIO28	JTAG_CFG1 GPIO29	Description
0	0	APP JTAG Interface
1	0	WLAN JTAG Interface
0	1	APP / WLAN ARM7 JTAG Interface
1	1	Production Test JTAG Interface

2.4 J17 / J25 - Alarm Levels

Jumpers J17 and J25 control the active level of the Alarm inputs to the WiFi-IT! module. The table shown below indicates the pins that are connected by jumpers to achieve the desired

setting.

J17 controls the alarm signals when the RTC ALARM1 and ALARM2 push buttons are released.

J25 controls the alarm signals when RTC ALARM1 and ALARM2 are pushed.

Important Note: As of version 2.1.1 of the WiFi-IT Basic IDE, WiFi Basic only allows alarm detection on a high-to-low transition of an alarm input.

Default Setting

Jumpers are connected between the listed pins.

J17 1 - 3
2 - 4

J25 3 - 5
4 - 6

Jumper numbering:

1 2
3 4
5 6

Pin 1 is marked with a white circle.

J17 Pins	J25 Pins	Description
1-3	3-5	Alarm 1 Pulled High, Button Pulls Alarm Low
3-5	1-3	Alarm 1 Pulled Low, Button Pulls Alarm High
2-4	4-6	Alarm 2 Pulled High, Button Pulls Alarm Low
4-6	2-4	Alarm 2 Pulled Low, Button Pulls Alarm High

2.5 J18 - Firmware Load

J18 controls the action of SW3. When in the default setting, SW3 controls access to [Firmware Load](#) operation.

Default Setting

Jumpers are connected between the listed pins.

3 - 5
4 - 6

Jumper numbering:

1 2
3 4
5 6

Pin 1 is marked with a white circle.

J23	SW3
------------	------------

3-5	UP = GPIO 27 Logic High
4-6	DOWN = GPIO 27 Logic Low
2-4	SW3 Disabled. GPIO 27 Pulled High. Module always in Firmware Load Mode

2.6 J20 - WiFi-IT! Reset & JTAG Control

J20 along with [SW5](#) and [SW6](#) controls the external reset applied to the module through the [WiFi-IT! Reset](#) or directly from a PCard. It also places pull-ups on the JTAG signals.

Default Setting

Jumpers are connected between the listed pins.

1 - 2
3 - 4
5 - 6
7 - 8
9 - 10
11 - 12
13 - 14

A jumper should only be placed between pins 11 and 12 if an external PCard is not present.

Jumper numbering:

2 4 6 8 10 12 14
1 3 5 7 9 11 13

Pin 1 is marked with a white circle.

Settings

J20 Pins	Description
1 - 2	10K pull-up to VDDIO on JTAG DBG PORT pin 3.
3 - 4	10K pull-up to VDDIO on JTAG_TDI
5 - 6	10K pull-up to VDDIO on JTAG_TMS
7 - 8	10K pull-up to VDDIO on JTAG_TCK
9 - 10	10K pull-up to VDDIO on JTAG_TDO
11 - 12	10K pull-up to VDDIO on EXT_RESET
13 - 14	4.7K pull-down to GND on JTAG_NTRST (when SW5 is up)

2.7 J21 - DC_DC_CNTRL Pull Down

VDDIO is controlled by the WiFi-IT! module through the signal DC_DC_CNTRL. The WiFi-IT! module drives this open-collector signal to enable/disable regulators on the PCard to minimize power drain when the WiFi-IT! module is sleeping. Rather than let DC_DC_CNTRL float, J21 connects a pull down resistor to the signal. When connecting a PCard that uses DC_DC_CNTRL, the PCard may pull the signal up or down. In that case you would remove the jumper on J21 so

that the pull up/down resistors on the PCard are not affected by the DCard pull down resistor.

Default Setting

Jumpers are connected between the listed pins.

1 - 2

Jumper numbering:

1 2

Pin 1 is marked with a white circle.

2.8 J23 - Override Mode

J23 controls the action of SW12. When in the default setting, SW12 controls access to [Override Mode](#) operation.

Default Setting

Jumpers are connected between the listed pins.

3 - 5

4 - 6

Jumper numbering:

1 2

3 4

5 6

J23	SW12
3-5	UP = GPIO 25 Logic Low
4-6	DOWN = GPIO 25 Logic High
2-4	SW12 Disabled. GPIO 25 Pulled High. Module always in Override Mode

2.9 J24 - Current Measurement Header

Header J24 allows you to measure the current used by the different voltages provided by the DCard or PCard. Instead of supplying power through the 5V connection, supply power directly to 3.3V and 3.3V_DC_DC_CNTRL. Current then be measured independently on each of these. If no DCard is present, 3.3V will pass through to VDD_MP and 3.3V_DC_DC_CNTRLD will pass through to VDD_IO. VDD_MP provides VBat to the module. Note that both 3.3V and 3.3V_DC_DC_CNTRL are on the output side of regulators normally powered by the 5V supply.

Default Setting

Jumpers are connected between the listed pins. Jumpers are used on J24 to physically isolate

each power supply connection.

2 - 4
5 - 7
10 - 12
13 - 15
18 - 20

Pin numbering:

19 17 15 13 11 9 7 5 3 1
20 18 16 14 12 10 8 6 4 2

Pin 1 is marked with a white circle.

Pin Connections:

J24	Net Name
1 - 3	VDD_IO
6 - 8	GND
9 - 11	VDD_MP
14 - 16	3.3V
17 - 19	3.3V_DC_DC_CNTRLD

Important Note: J24 pins are labeled incorrectly on Rev C of the DCard.

2.10 J26 - UART 0 Configuration

J26 is used to configure the UART 0 signals between the PCard and the WiFi-IT! module according to the setting of SW7.

Default Setting

Jumpers are connected between the listed pins.

3 - 5
4 - 6

Jumper numbering:

1 2
3 4
5 6

Pin 1 is marked with a white circle.

SW 7 Set to PCard

The table below describes the connection of the UART 0 transmit and receive lines when the J26 pins are connected as shown.

J26	UART 0 TX	UART 0 RX	Description
-----	-----------	-----------	-------------

3 - 5 4 - 6	WiFi-IT! Card -> PCard	PCard -> WiFi-IT! Card	Default setting: Use this unless there is a reason to change signal direction.
3 - 5 2 - 4	WiFi-IT! Card -> PCard	WiFi-IT! Card -> PCard	
1 - 3 4 - 6	PCard -> WiFi-IT! Card	PCard -> WiFi-IT! Card	
1 - 3 2 - 4	PCard -> WiFi-IT! Card	WiFi-IT! Card -> PCard	

SW 7 Set to DEBUG

J26 settings are disabled. Communication is between DCard USB connector and UART 0 on the WiFi-IT! module.

UART 0 TX: WiFi-IT! Card to DCard USB

UART 0 RX: DCard USB to WiFi-IT! Card

3 Signal Monitoring Points

The signal monitoring points provide direct access to the signals on the WiFi-IT! module when attached to the DCard. These pins may be used to connect an oscilloscope or to directly connect peripherals to the WiFi-IT! module. The preferred method for connecting peripherals to the WiFi-IT! module is to design a PCard containing a power regulator and peripherals. The PCard can then be connected directly to the WiFi-IT! module through J1.

[J6 - WiFi-IT! Interface Signals](#)

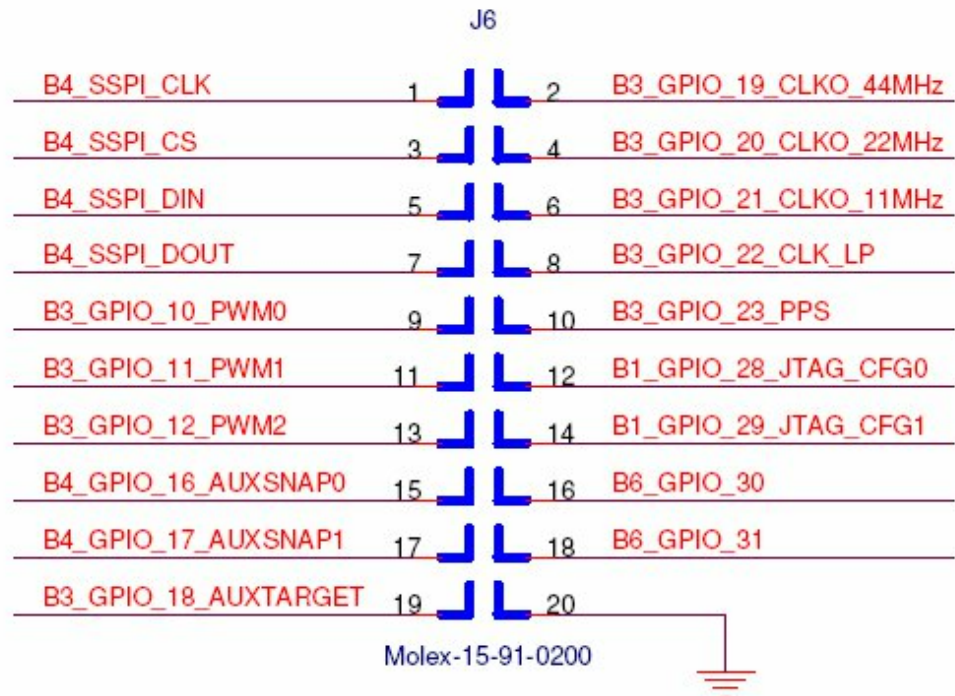
[J7 - WiFi-IT! Interface Signals](#)

[J22 - WiFi-IT! Analog Interface Signals](#)

3.1 J6 - WiFi-IT Signals

The pins on J6 provide direct connections to the associated pins on the WiFi-IT! module. These pins may be attached to an oscilloscope to monitor their operation.

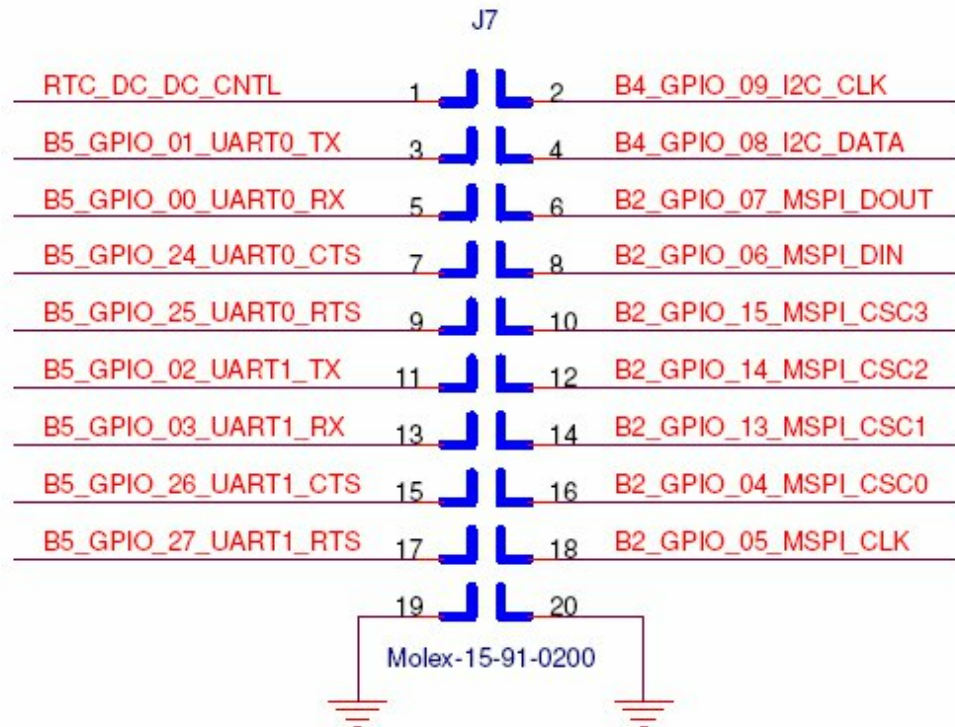
Pin 1 is marked with a white circle.



3.2 J7 - WiFi-IT Signals

The pins on J7 provide direct connections to the associated pins on the WiFi-IT! module. These pins may be attached to an oscilloscope to monitor their operation.

Pin 1 is marked with a white circle.



3.3 J22 - WiFi-IT Analog Signals

The pins on J22 provide direct connections to the analog pins on the WiFi-IT! module. These pins may be attached to an oscilloscope to monitor their operation.

Header Pin Numbering:

1 2
3 4
5 6

Pin 1 is marked with a white circle.

Pin Description

Pin Number	Description
1	1.8 volt reference
2	ADC 1 Input / DAC output
3	Not Used
4	ADC 2 Input
5	Ground
6	ADC 3 - NPE WL11 modules only.

4 Switches

The switches on the DCard are used to control the operation of the attached WiFi-IT! module and its connection to the PCard. The default operation of the switches are controlled by jumpers. This section details the jumper settings for each of the switches and their operation.

[Power On/Off](#)

[Real Time Clock \(RTC\) Alarms](#)

[SW3 - Firmware Load](#)

[SW5 - Reset Select](#)

[SW6 - Power Up Reset Enable](#)

[SW7 - UART 0 Control](#)

[SW11 - Force FPGA Configuration](#)

[SW12 - Run Time Engine Mode](#)

[WiFi-IT! Reset](#)

4.1 Power On/Off

Switch 10, located on the left-hand side of the DCard, provides power to the DCard, WiFi-IT! module and PCard. When the power supply is attached and the switch is in the OFF position, LED D44 will be **RED**. This indicates the power supply is operating (NOTE: the power supply must be a regulated 5 volt supply only, using another supply may damage the DCard and any other attached cards).

Switching SW10 to ON powers up the DCard and any attached cards and lights LED D45 **GREEN**.

4.2 RTC Alarms

There are two Alarm push-buttons that activate the Real-Time Clock Alarm inputs to the WiFi-IT! module. The RTC Alarms will wake the WiFi-IT! module from sleep mode, if the device is sleeping. The switches and there associated jumpers can be used to simulate a wake event.

See the following topics for more information.

[Setting the Alarm Active Levels](#)

4.3 SW3 - Firmware Load

NOTE: The silk screen on the Rev C DCard incorrectly identifies the settings for SW3. When the switch is up (in the FLASH position) the selected function is **Default - normal operation is enabled**. To place the WiFi-IT! module in firmware download mode toggle SW3 to the down position.

Switch 3 controls the firmware download function to the attached WiFi-IT! module. To change between normal operation and firmware download you must first power off the DCard, change SW3 to the desired setting and then power up the DCard. The reason for this is that the WiFi-IT! module only samples GPIO 27 (which is controlled by SW3) during a power transistion.

J18	SW3 - DCard Rev C Settings
3-5	UP = Default - normal operation of WiFi-IT! module is enabled.
4-6	DOWN = WiFi-IT! Firmware Download enabled.
2-4	SW3 is disabled. WiFi-IT! module is always in Firmware Download mode.

4.4 SW4 - WiFi-IT! Reset

This push-button switch resets the connected WiFi-IT! module. This button can be used to restart the code in the WiFi-IT! module. The WiFi-IT! module may take up to 10 seconds to re-establish contact the network after a reset. To re-establish a connection with the IDE may require up to 30 seconds.

The function of this switch is controlled by [J20 - WiFi-IT! Reset & JTAG Control](#).

4.5 SW5 - Reset Select

Selects whether the WiFi-IT! JTAG reset is controlled by external reset.

Default Position

Down

4.6 SW6 - Power Up Reset Enable

Selects the external power up reset circuit to apply a reset to the WiFi-IT! JTAG port.

Default Position

Up

4.7 SW7 - UART 0 Control

Switch 7 selects the UART 0 connection according to the table below.

SW7 Setting	Description
DEBUG	UART 0 is connected to the DCard USB connector. The switch must be in this setting to load code from the development system when running in wired mode. See SW12 - Override Mode and the IDE Help Manual.
PCard	UART 0 is connected to the PCard connector. In this setting UART 0 can communicate with the PCard (communication with the USB is disabled).

4.8 SW9 - PCard Present

SW9 controls power on the VDD_RTC and VDDIO voltage lines. When pushed in, the DCard disconnects these nets from the voltage regulators so that power can be provided by the PCard. Since not all PCards may provide power, SW9 can be disabled by the configuration of [J12](#). It is not necessary for the PCard to push SW9 all the way down.

4.9 SW11 - Force FPGA Configuration

Pressing this switch forces the FPGA to reload the configuration from external FLASH memory. The FPGA on the DCard controls the signal monitoring LEDs. It buffers the WiFi-IT! modules signal drive so that the monitor does not affect normal signal loading. In addition, it converts quickly changing signals to a 1/2 second pulse to drive the LEDs at a comfortable viewing frequency. Generally, you should never need to reload the FPGA.

4.10 SW12 - Override Mode

NOTE: The silk screen on the Rev C DCard incorrectly identifies the settings for SW12. When the switch is in the UP position, it is in the DEFAULT position. When the switch is down the WiFi-IT! module is placed into override mode.

SW12 controls the operating mode of the WiFi-IT! Basic Run-Time Engine (RTE). The RTE provides the environment to run WiFi-IT! Basic programs. When SW12 is up, the RTE executes the WiFi-IT! Basic program and the RTEs connection to the IDE depends on the provisioning mode. This could be through a wireless connection or through the USB connector. The default is a wireless connection, but this can be changed through the IDE.

When SW12 is down, the WiFi-IT! module is in override mode. In this mode the RTE does not execute the WiFi-IT! Basic program and any provisioning mode setting is overridden so that the module only connects to the IDE through the USB connector. Override mode provides a guaranteed way to access a module that has otherwise become inaccessible. Debugging operations are still allowed, so override mode can also be used to debug programs that cannot be on the same network as the IDE.

SW12 is connected to GPIO 25 through [J23 - Wired Mode Override](#).