PRELIMINARY

IT900
STK4 (Starter Kit)

User Manual

February 2011

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1. Introduction

1.1 Abstract

This document describes the IT900 STK4 (Starter Kit) platform, its usage and configuration options.
The STK4 is a mother board that supports evaluation and development using IT900 PIM908 in Protocol Controller mode. In addition the STK4 supports evaluation and development using three different versions of the IT900 Plug-In-Modules (PIM7A, PIM708 and APIM708). This document covers the STK4 functions that are relevant for the IT900 PIM908.
The STK4 is capable of multiple node testing and set-up as well as development of Powerline Communication (PLC) enabled products. Simple evaluation and testing can be done with the STK4 using a PC via the "External Host" interface. In addition, application development can be performed using the IT900 in Protocol Controller versions. Development on top of the Protocol Controller version is supported by providing UART header for the external controller.

1.2 Terms and Abbreviations

The following table describes the terms and abbreviations used in this document and their meanings:

Table 1: Terms and Abbreviations

Abbreviation / Term	Meaning / Explanation
AFE	Analog Front End – the circuitry between the chip and the line coupler
DCL	Direct Clear Line – direct connection between two STK4 boards via BNC connectors
I/O	Input/Output
PL	Power Line
PLC	Power Line Communications
PSU	Power Supply Unit – this unit contains the power supply for the STK4 and also the Line Coupler.
STK4	Starter Kit (Mother Board)
SW	Software
PIM	Plug-In Module – the IT900 module that plugs into the motherboard of the STK4. PIM is available in FCC,ARIB,CENELEC A/A2/A3 & CENELEC B versions
NVM	Non Volatile Memory

1.3 STK4 Package Contents

The STK4 platform includes the parts described in the following table:

Table 2: STK4 Package Content

Item	Qty.	Comment
STK4 Motherboard	1	
IT900 PIM908	1	FCC,ARIB,CENELEC A/A2/A3 or CENELEC B AFE design (assembly option)
IT900 PSU (Input voltage: 90-240V AC, 50/60Hz)	1	Line coupler incorporated
USB cable	1	USB A to B Cable

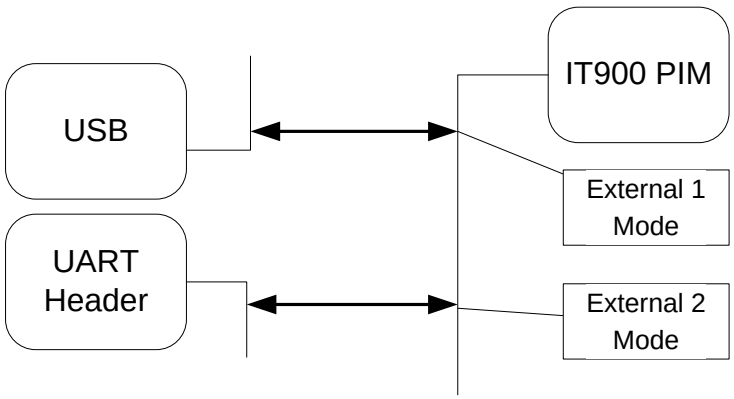
1.4 Operation Modes

The STK4, enabled with PIM908, has two main operation modes described in the following table:

Table 3: Operation Modes

Mode	Host	Interface
External 1 Host	PC (virtual COM port)	USB (using on-board UART to USB converter)
External 2 Host	UART Header with CMOS 3.3V compatible level	UART, RS232 or RS485 Headers

Figure 1: Operation Modes

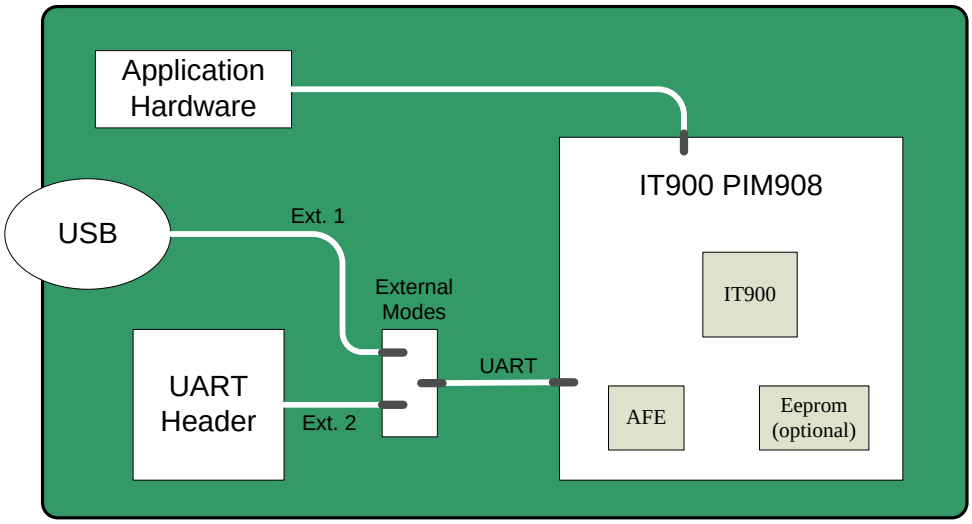


Notes: When connecting the STK4 to any external hardware interface (i.e.UART), both the STK4 and external device MUST be grounded.

2. STK4 Overview

A general block diagram of the STK4 board, enabled with PIM908, is presented in the following figure:

Figure 2: STK4 Board with PIM908 General Block Diagram



The motherboard's main sections and functions are:

- USB interface and circuitry
- DCL ('Clear Line') connector and circuitry
- Configuration Jumpers
- Application Hardware, including Push buttons, LEDs and switches.

The IT900 PIM includes the following items:

- IT900 chip
- AFE (FCC, ARIB, CENELEC-A/A2/A4 or CENELEC-B AFE designs are available)
- EEPROM (optional)

The PSU includes:

- +3.3V power supply for the IT900 PIM and the application micro-controller
- +12V - unused with the IT900
- +5V - unused with the IT900
- Line coupler

3. STK4 Board Interfaces

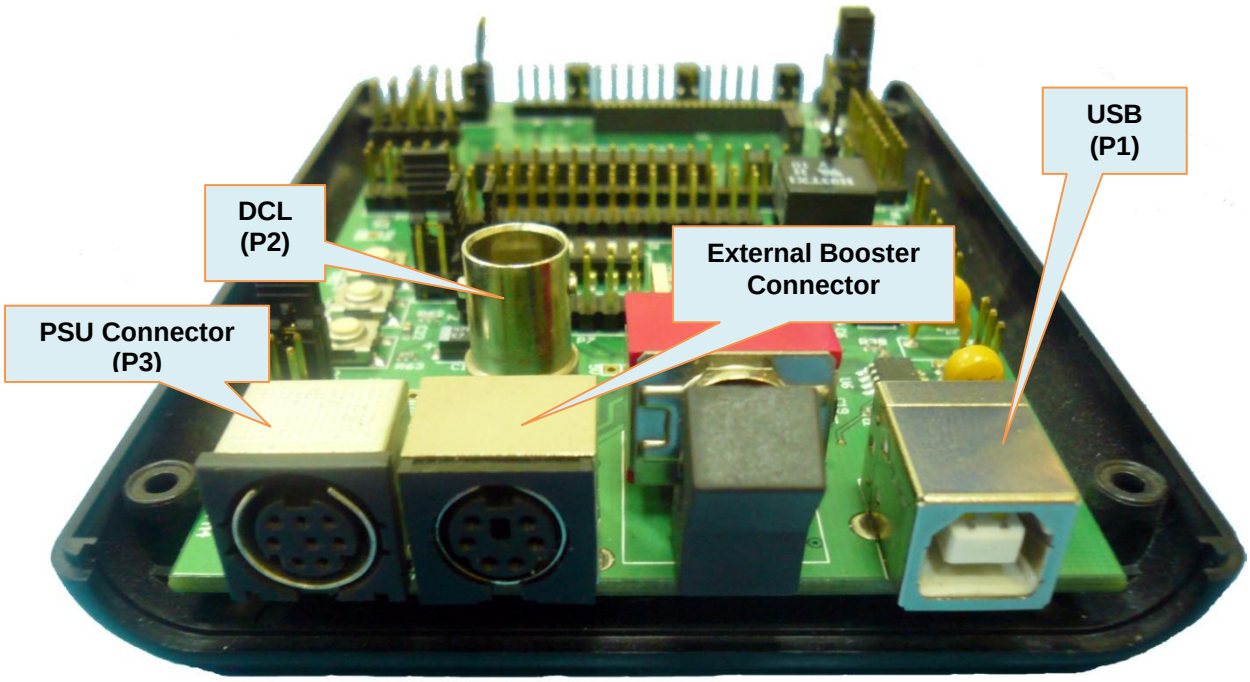
The following section describes the interfaces on the STK4 board. For additional data, refer to the *STK4 Schematic Drawing* document provided in the documentation folder of the CD.

3.1 Connectors

3.1.1 'Back Panel' Connectors

The 'Back Panel' connectors (DCL, PSU, External booster and USB connector) are shown in the following figure:

Figure 3: 'Back Panel' Connectors



3.1.2 DCL Connector

The DCL connector is a female BNC connector to be used with a coaxial cable. For DCL operation the STK4 board must be configured to this mode (default mode is PL) – refer to Section 3.3.3 for further configuration information.

3.1.3 Power Connector

The PSU (power supply and line coupler) output cable should be connected to this connector (even when the DCL mode is used).

3.1.4 USB Connector

This connector (J1) serves External Host Mode by providing connection to a PC USB virtual com port while using the PLC-Studio application or customer's external Host.

> **Notes**
> On first system use, the operation with the USB connector requires installation of the CP2102 (Single Chip UART to USB bridge) driver.

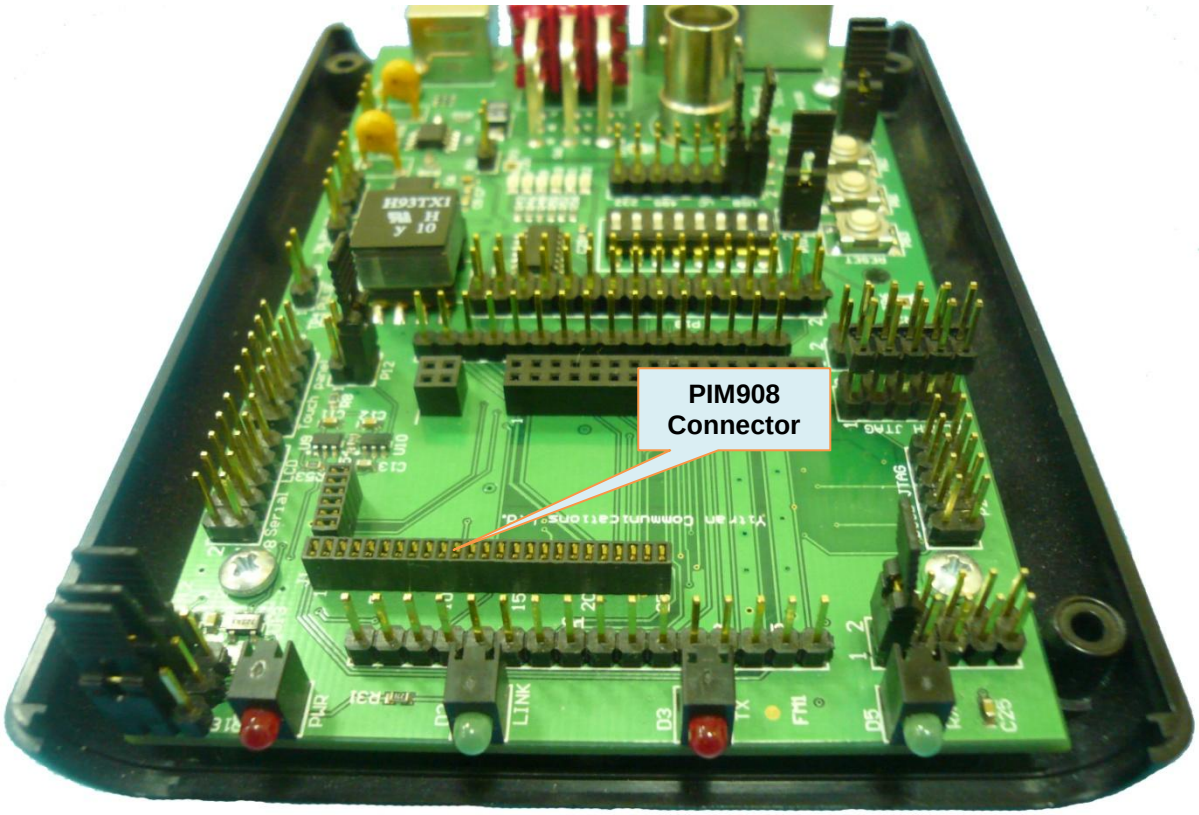
3.1.5 External Booster Connector

This connector allows connecting an external booster to the STK4. The External booster option is out of the scope of this document.

3.1.6 PIM908 Connector

The STK4 connector for IT900 PIM908 is shown in the figure below:

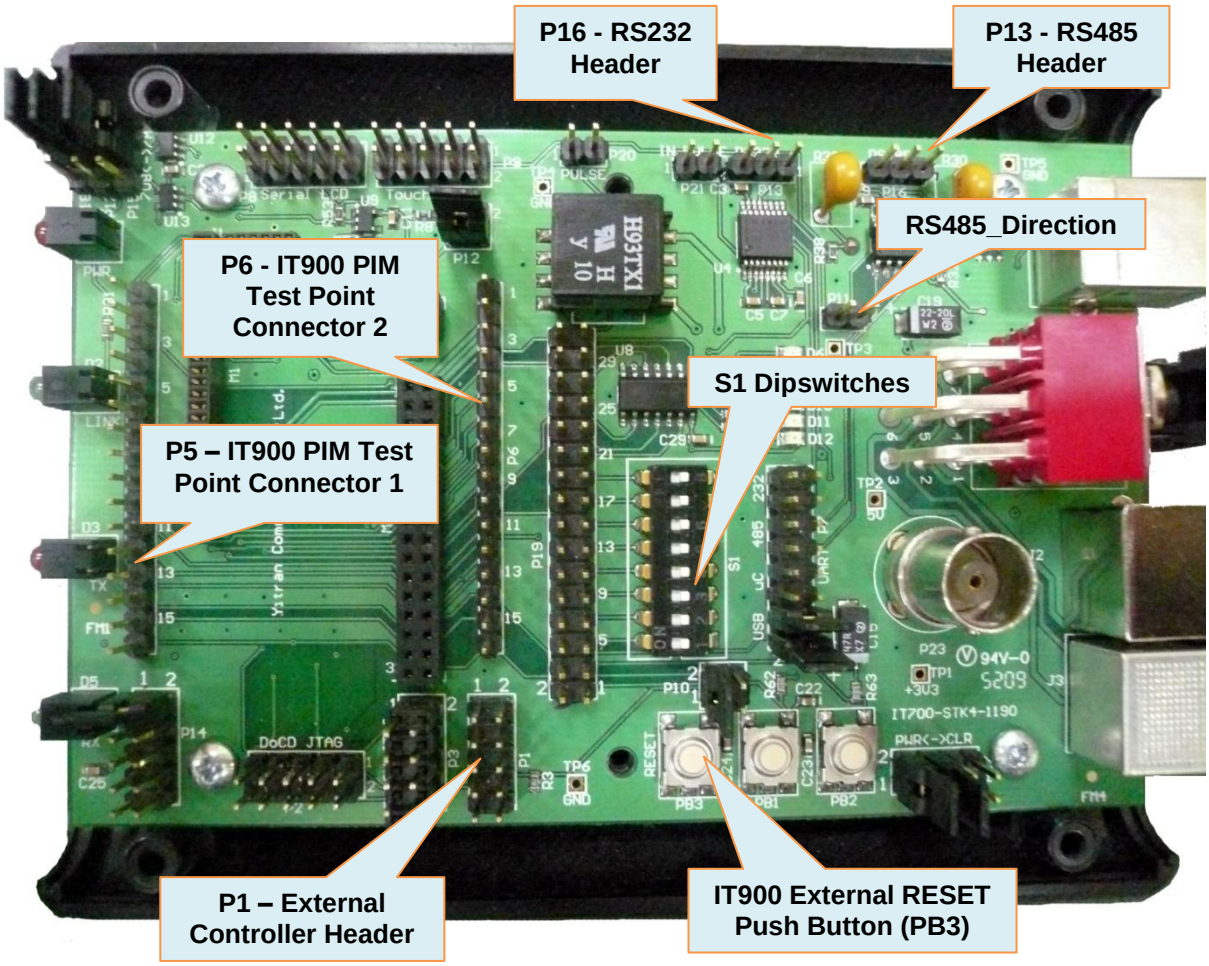
Figure 4: IT900 PIM908 Connector



3.2 On-board Application Peripherals

The IT900 I/O pins are routed to application peripherals on the STK4 board to provide various application usage options. The figure below details the relevant application peripherals for development with PIM908 in protocol controller mode: peripherals

Figure 5: On-board Application Hardware Headers



3.2.1 IT900 “Reset” Push Button (PB3)

A “Hard” reset can be applied to the IT900 PIM using the “External Reset” Push Button (PB3).

3.2.2 External Controller Header (P1)

The External Controller Connector provides access to the IT900 pins that are relevant for the external controller running the application. The pins and their functionality are described in the following table:

Table 4: Application Controller Header

Pin #	Functionality
1	3.3V
2	3.3V
3	uC RX
5	uC_TX
6	IT900 Safe Mode)
7	IT900 Sys.Mon)
8	uC RST (IT900 RST from uC)
9	Gnd
10	Gnd

Notes

Refer to Section 3.3.2 for instructions to enable the External Controller Header.
Refer to Section 3.3.1 for instruction on routing the reset line to this header.

3.2.3 IT900 PIM Test point (P5 and P6)

The IT900 PIM908 test point connectors enable access to IT900 PIM pins.
The relevant connectors' pins and their functionality are described in the following tables:

Table 5: IT900 PIM908 Test Point 1 – P5 Header

Pin #	Functionality
1	GND
2	GND
3	N/A
4	TS (TXLED)
5	N/A
6	N/A
8	N/A
9	P1_0 (Sys.Mon)
10	N/A
11	N/A
12	N/A
13	P0_3 (UART TXD)
14	N/A
15	N/A
16	N/A

Table 6: IT900 PIM908 Test Point 2 – P6 Header

Pin #	Functionality
1	GND
2	LINE_N
3	LINE_P
4	P7_2 (LNKLED)
5	P7_3 (RXLED)
6	N/A
8	N/A
9	N/A
10	N/A
11	N/A
12	N/A
13	N/A
14	P6_2 (UART RXD)
15	N/A
16	RESET

3.2.4 Application DIP-Switches (S1)

Eight Dip Switches (SW1 – SW8) are available on S1.

When set to the OFF position, the digital value of the switch is 0. When set to the ON position, the digital value of the switch is 1.

The SW8 switch is used for Safe Mode procedure detailed in section 3.4. The SW1 - SW7 switches are not applicable for development with PIM908 in Protocol Controller mode.

3.2.5 RS485 Header

The RS485 header allows interfacing the IT900 through RS485 interface.

The P16 header pins are described in the following table:

Table 7: RS485 Header

P16	Functionality
1	A
2	GND
3	B

The RS485 Interface 'Direction' pin is available through connector P11- pin 2.

The 'Direction' pin can be routed to IT900 P1_4 by placing a jumper on P11.

Notes

Refer to Section 3.3.2 for instructions on enabling the RS485 Header.

3.2.6 RS232 Header

The RS232 header allows interfacing the IT900 through RS232 interface.

The P13 header pins are described in the following table:

Table 8: RS232 Header

P13	Functionality
1	T1OUT
2	GND
3	R1IN

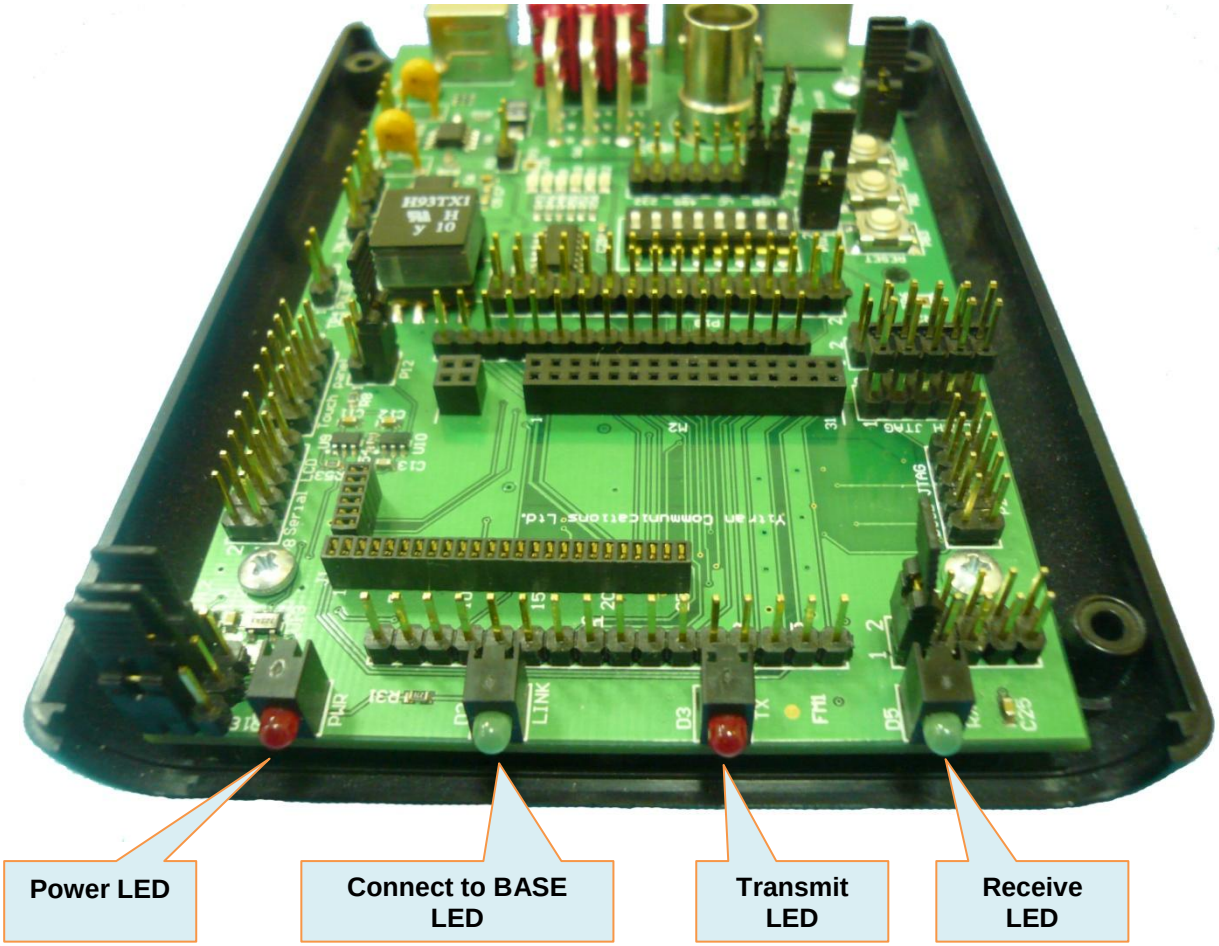
Notes

Refer to section 3.3.2 for instructions on enabling the RS232 Header.

3.2.7 Front Panel Leds

The STK4 'Front Panel' LEDs indicate modem Power State (On/Off), Reception State, Transmission State and Connectivity Status. The front panel's LEDs are shown in the figure below:

Figure 6: Front Panel LEDs



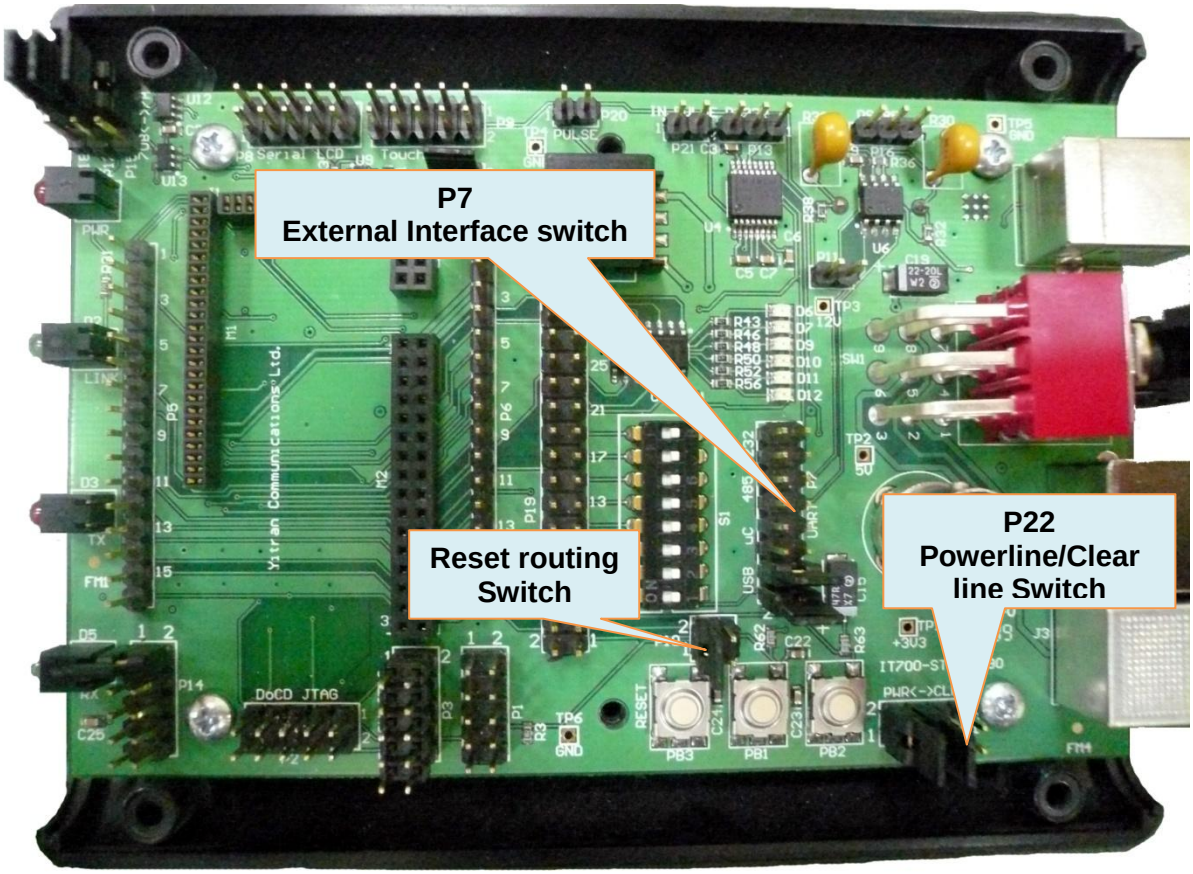
Notes

To enable operation of Front Panel LEDs, jumpers must be set on pins 1-2 in connectors P15, P17 and P18 (these jumpers are set on default).

3.3 STK4 Board Settings

The following figure shows the Headers used for configuration of STK4 with PIM908:

Figure 7: Board Configuration Headers



3.3.1 Reset Routing Switch (P10)

The Reset Routing switch defines the source of the IT900 Reset line. The Reset line can be routed either from PB3 (Push Button) or from the External Controller header.

P10 defines the Reset source and should be set accordingly, as described in the following table:

Table 9: USB/External Micro Switch

P10	Operation Mode
1-2	PB3
3-4	External Controller Header

3.3.2 External Interface Switch (P7)

The External Interface switch defines the route of the IT900 UART pins. The UART pins can be routed to USB connector, External Controller header, RS232 Interface or RS485 Interface.
P7 defines the IT900 UART route as described in the following table:

Table 10: External Interface Switch

P7	Operation Mode
1-2, 3-4	USB
5-6, 7-8	External Controller Header
9-10, 11-12	RS485 Interface
13-14,15-16	RS232 Interface

3.3.3 Power Line/Clear Line Configuration Switch (P22)

The BNC connector enables DCL operation, i.e. communication with another STK4 unit via a coaxial cable (rather than over the power line). P22 defines the signal route as described in the following table:

Table 11: PL/DCL Operation Settings

P22	Operation Mode
1-2, 3-4	Power Line
5-6, 7-8	Direct Clear Line

1. The default configuration is PL (Power Line).
2. The PSU should be connected when DCL is used to provide power supply to the STK4 board.
3. The DCL connector can also be used to communicate over other mediums such as very low voltage wiring (example: 24V AC). This may require an additional external coupling capacitor. To avoid damage to the STK4 we suggest you consult with YITRAN prior to doing so. Contact details: support@yitran.com

3.4 Safe Mode

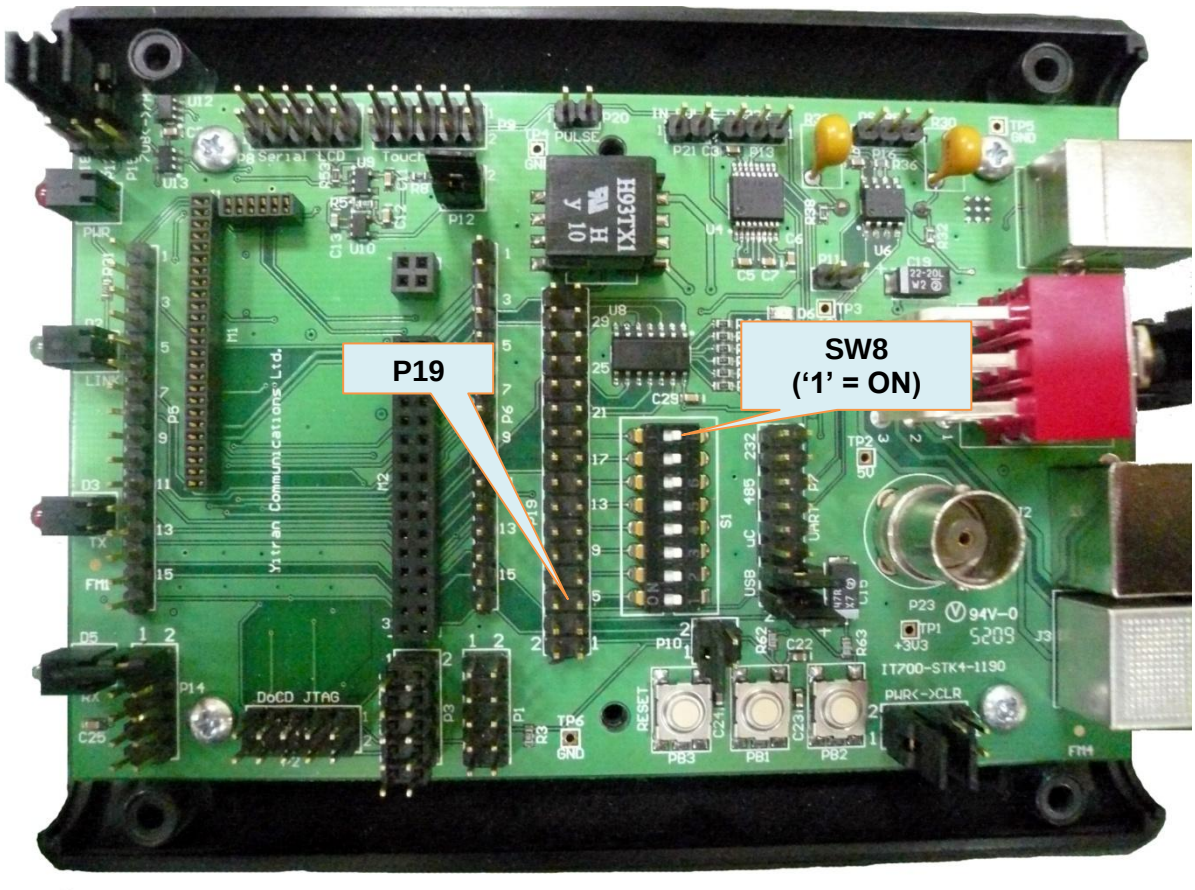
During development stages, the IT900 can fail to complete its initialization if improper parameters have been configured in the NVM. This initialization problem is caused by a corruption of parameters in the NVM. Initializing IT900 in Safe Mode will enable a recovery from corrupted parameters settings.

The procedure for recovery from parameters corruption in IT900 using the STK4 is as follows:

- Set the IT900 to Safe Mode by placing a jumper on P19 between pins 5 and 6 (connects SW8 with IT900 Safe Mode pin).
- Set SW8 to 0.
- Reset IT900 (Note: IT900 wakes up with default parameters suitable for the FCC band).
- Exit "Safe Mode" by SW8 to 1.
- Set the required node configuration.
- Save settings in the NVM.

The following figure shows the connector and switch involved in the safe mode process:

Figure 8: Safe Mode



Document Control

Revision	Date	Description
1.0	February 2011	Creation
1.1	March 2011	Safe Mode section revised

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