

FS-GF801 User's Manual

Favite Inc.

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CHAPTER 1

Introduction

This Hardware Setup Guide provides instructions for installing and operating the FS-GF801 RFID Readers.

This document is designed for use by RFID system integrators and software developers - those who wish to develop software products and extended systems that take full advantage of the RFID Reader's capabilities.

Included with each reader or developer kit are the Favite RFID Reader Software Developer's Kit and User Documentation on FTP Server or download in Favite web (http://rfid.favite.com/download_1.asp.)

RFID Reader Overview

FS-GF801, one of FAVITE RFID reader family, is an Intel ATOM CPU based smart reader. The FS-GM801 is embedded with Impinj R2000 chip and compliant with EPC Class1 Gen2 Dense Reader mode (DRM) / ISO 18000-6C. The FS-GF801 is equipped with 8 SMA RF antenna ports which could support 8 mono-static antennas or 4 pairs of bi-static antennas, providing support for the richest enterprise applications. With the powerful combination of an Intel ATOM N270 1.6GHz CPU and 1GB memory (up to 2GB), the FS-GF801 is the smartest RFID reader available, capable of running complex RFID applications, delivering faster processing and localized intelligence. The RFID Reader is delivered with the following components and accessories:

- One (1) RFID Smart Reader.
- One (1) power supply
- Windows XP embedded operation system (optional).

EPC Class 1 UHF RFID Tags

The Favite FS-GF801 RFID reader is designed to read and program any EPC Class 1 Generation 2 tag (see below) and issue event reports to a host computer system. The reader is also designed to read and program Class 1 Generation 2 tags. Class 1 Generation 2 tags are "passive" devices meaning they do not have a battery or other onboard power source. They are powered solely by the RF energy transmitted by an RFID reader.

They communicate with the reader through backscatter modulation in which the tags do not actually transmit RF energy. Instead, they change their reflective characteristics in a systematic way and reflect RF energy back to the reader. An analogy to this is the way you can use a mirror to transmit information by reflecting light from the Sun.

Favite Inc. manufactures user-programmable EPC Class 1 Generation 2 tags compliant with all key commercial and DoD mandates. Favite offers a variety of designs capable of delivering optimal performance worldwide, including Europe and Asia.

For more information about RFID tags from Favite Inc., please visit our website at <http://rfid.favite.com>.

Requirements

To interface with the RFID Reader you will need the following:

Standard DC 19V, 3.42A Power supply and Host software (Favite demo software or your own custom software implement by Favite Software Development Kit).

Module Specifications

System	
Host Interface	(USB / UART/ RS232 / LED / Reset / Debug Port / GPIO / SAMBA / VCC in / GND)
Chipset	PHY: Impinj R2000 MAC: ATMEL AT91SAM7S-256
Operating Voltages	12.0V+/-5% or 5.0V+/-5% (option)
DC Power	12V:1.5A @ 30dBm; 5V:3A @ 30dBm
Protocol	
RFID Protocol Support	EPC Gen 2 ISO 18000-6C
Support EPC DRM	Yes (with DRM Filter) SW Switchable
RF	
Frequency	US: 902 ~ 928MHz (FHSS) EU: 865 ~ 868MHz
Demodulation	PR-ASK
Modulation Depth	90% nominal
Data Encoding	FM0 or Miller code
Bit Rate	Supports uplink data rates of up to 640 Kbps
TX Output power	5 ~ 30dBm in 1dB step
Antenna Type	8 Port Mono-static and 4 Port Bi-static SW selectable
Antenna connector	8 SMA connectors
Regulatory and Environmental Compliance	
EMC certification	FCC 47 CFG Ch.1 Part 15 (US) ETSI EN 302 208-1 (V1.1.1) (EU)
Temperature Range	Operating: 0 ~ 55 degree C, Storage: -20 ~ 85 degree C
Humidity	10% ~ 85% Non-condensing
Software	
Driver	Windows XP / Linux Embedded
Mechanical	
Dimension	196mm x 50mm x 15mm ± 1mm

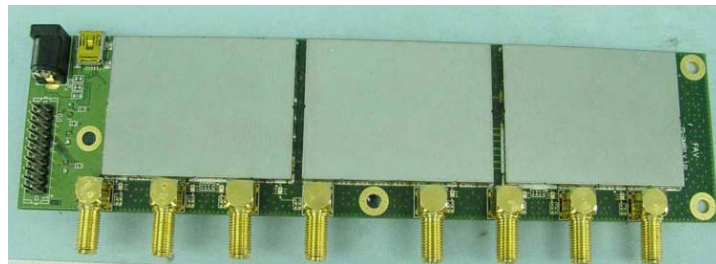


Table 1 - Module Specification of the FS-GF801

FS-GF801 RFID module will use in the following host.

Mechanical: Reader Physical Size

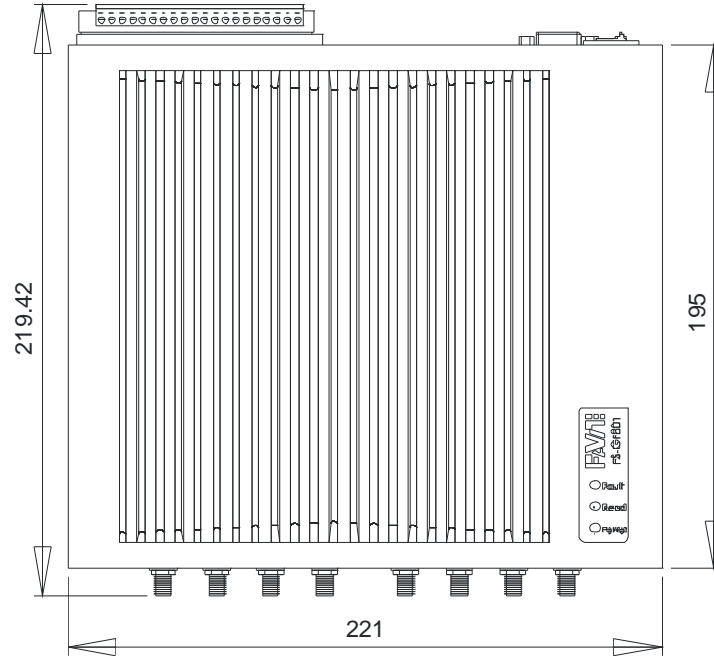


Figure 1 - Outline Drawing of the FS-GF801 (1)

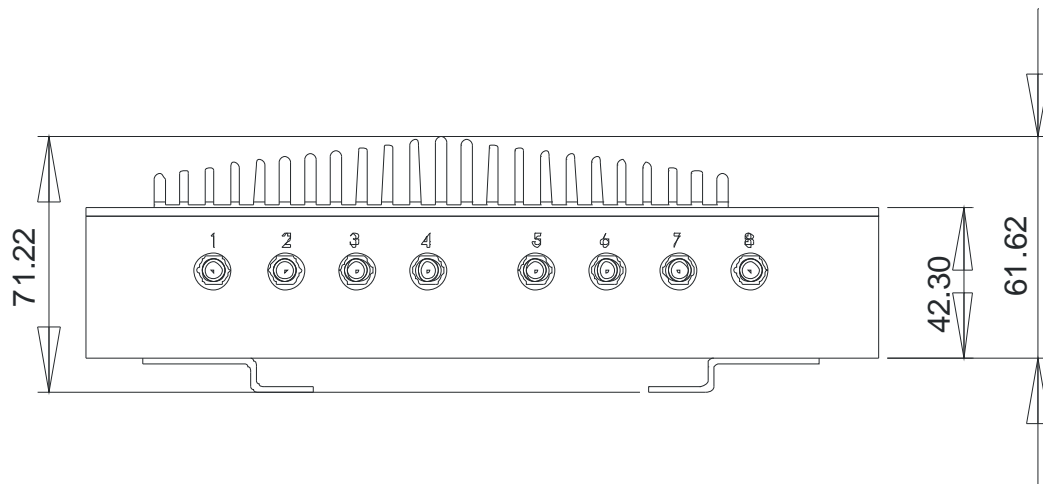


Figure 2 - Outline Drawing of the FS-GF801 (2)

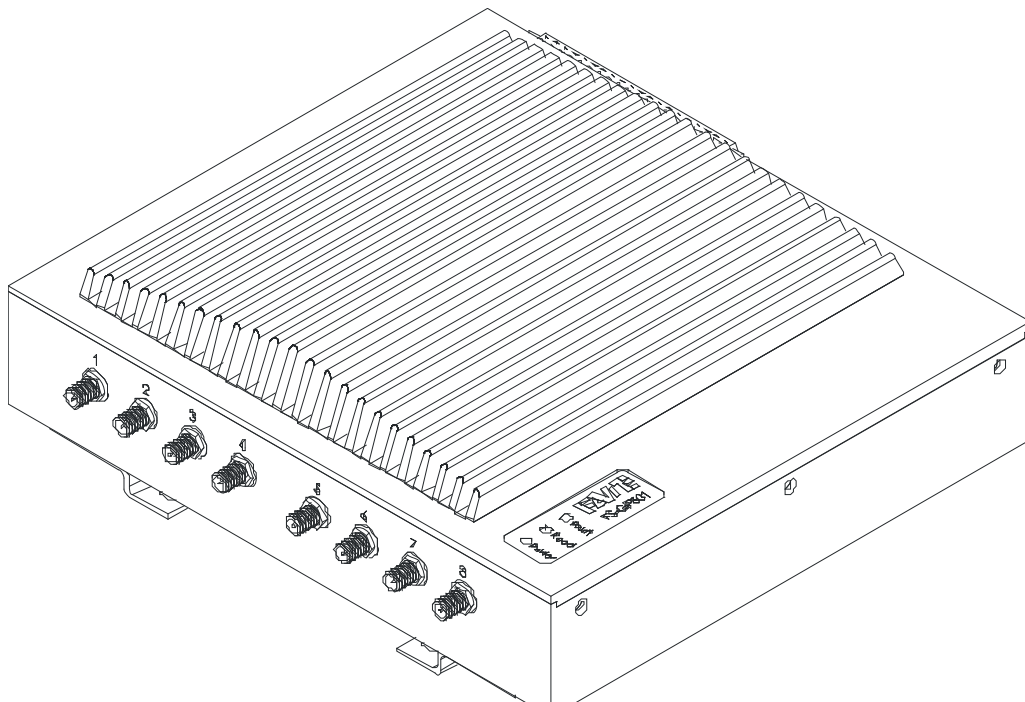


Figure 3 - Outline Drawing of the FS-GF801 (3)

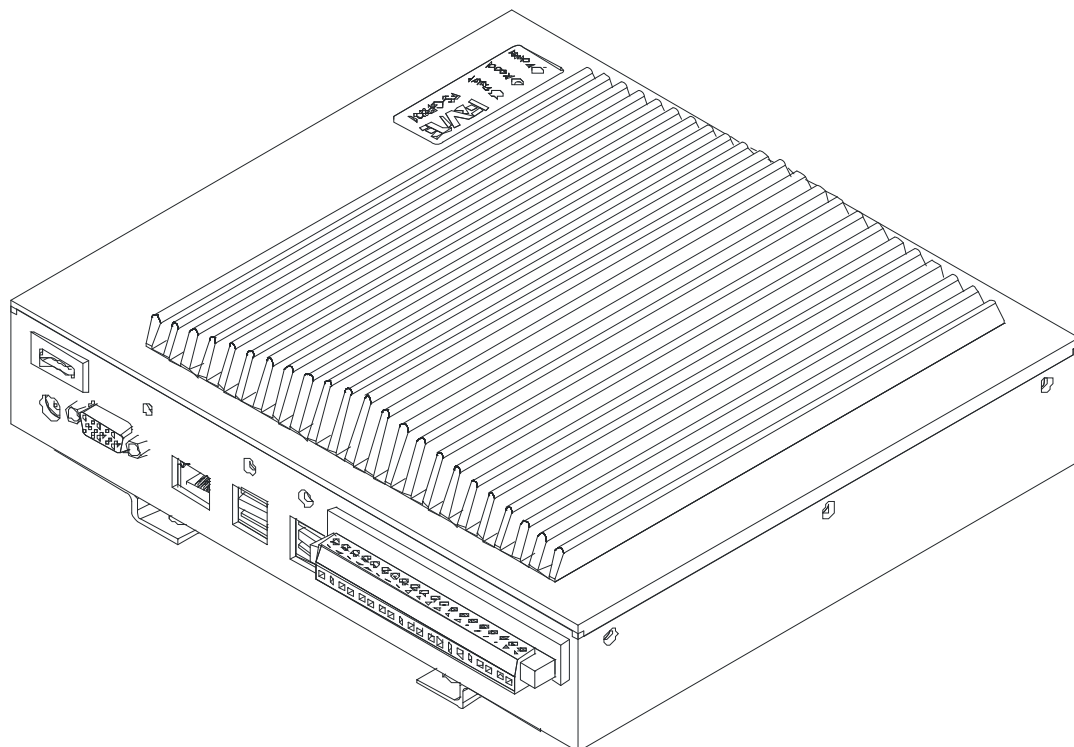


Figure 4 - Outline Drawing of the FS-GF801 (4)

On Wall Fixed Way

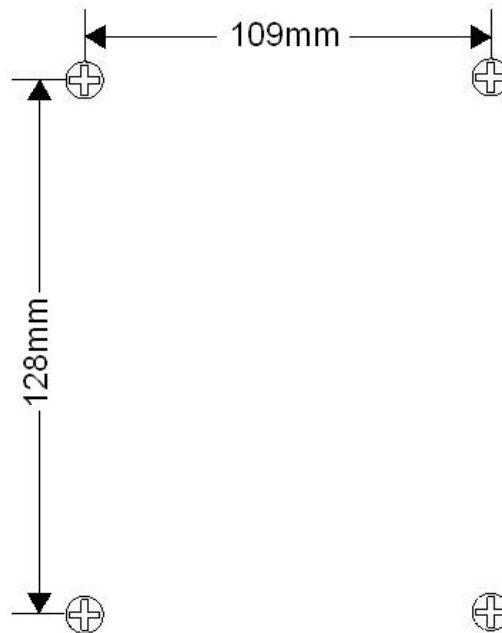


Figure 5 - On Wall Screw Position

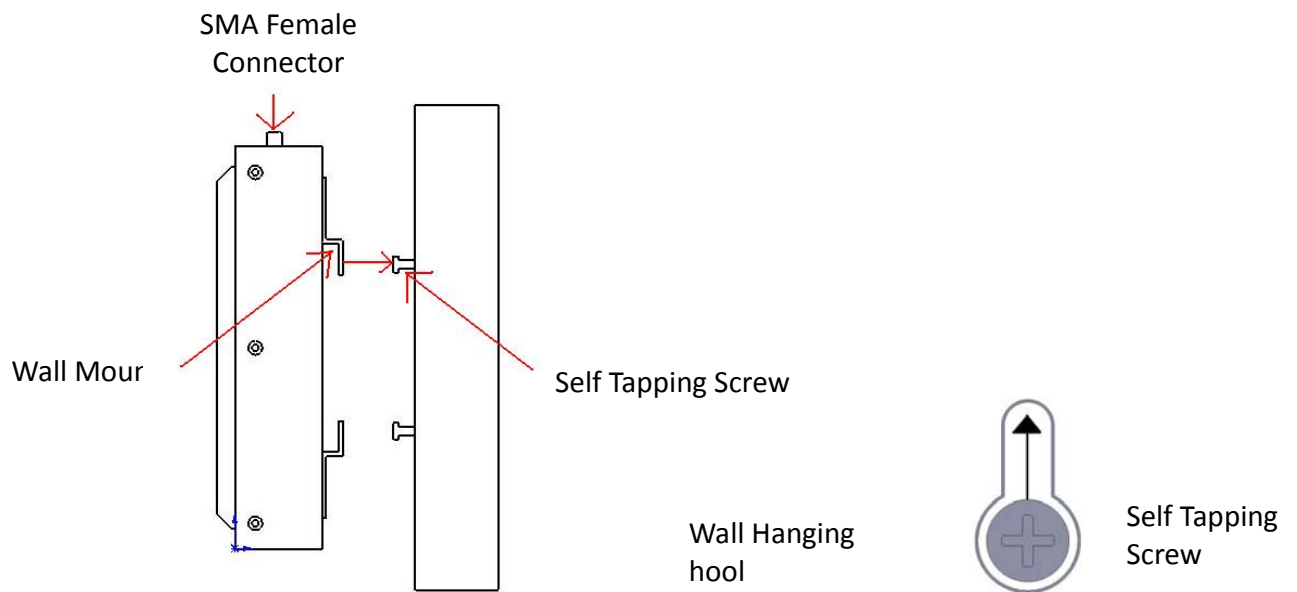


Figure 6 – Wall Hanging Way

Note: Please use self tapping screw. The length of the screw is 30mm and the outdoor diameter of the screw is 4mm.

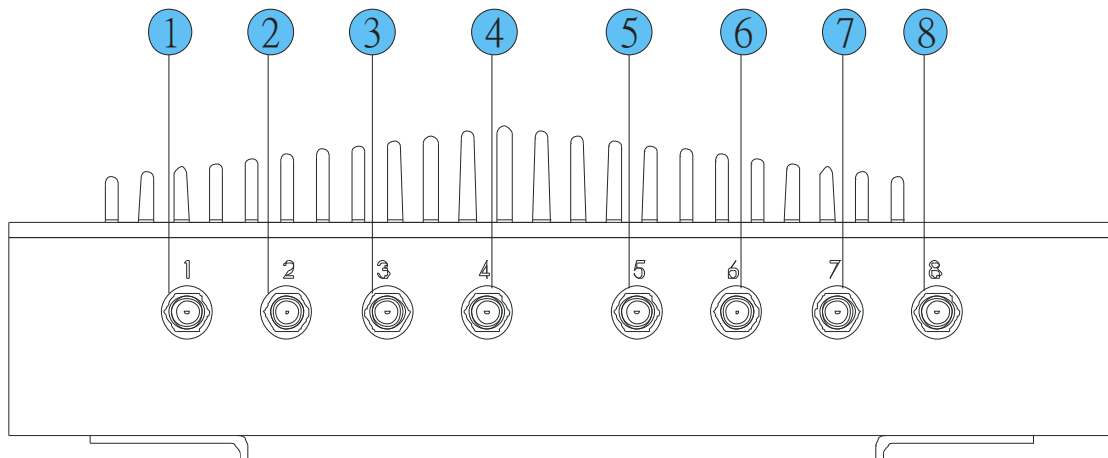


Figure 7 - Outline Drawing of the FS-GF801 Antenna Port Series

Antenna Port Terminal Interface: Mono-Static Mode

TX/RX
Port 1
Port 2
Port 3
Port 4
Port 5
Port 6
Port 7
Port 8

Table 1 – Mono-Static Mode Antenna Port definition of FS-GF801

Antenna Port Terminal Interface: Bi-Static Mode

TX	RX
Port 1	Port 5
Port 2	Port 6
Port 3	Port 7
Port 4	Port 8

Table 2 – Bi-Static Mode Antenna Port definition of FS-GF801

Reader I/O Terminal

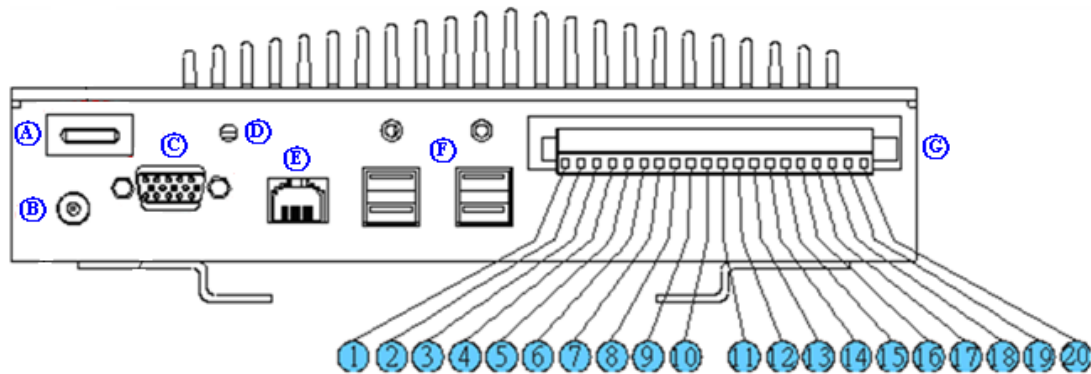


Figure 8 - FS-GF801 GPIO Pin definition and Power Supply, VGA, RJ-45, USB port description.

- (A) **Power Button:**
Press this button to turn on FS-GF801.
- (B) **Power Connector:**
Plug the power cord to this connector.
- (C) **VGA Port:**
Monitor can be connected to VGA port.
- (D) **Reset Switch:**
Press this button to start the hardware reset.
- (E) **RJ-45 LAN Port:**
The Ethernet LAN port provides Internet connection at up to 1Gbps data rate.
- (F) **USB Port:**
Before you connect your device(s) into USB connector(s), please make sure your device(s) such as USB keyboard, mouse...etc. have a standard USB interface.
- (G) **GPIO Port:**
The GPIO Port is defined as following “GPIO Port Terminal Interface” table.

GPIO Port Terminal Interface

Pin 1	Signal input 1
Pin 2	Signal input 2
Pin 3	Signal input 3
Pin 4	Signal input 4
Pin 5	Signal input 5
Pin 6	Signal input 6
Pin 7	Signal input 7
Pin 8	Signal input 8
Pin 9	Signal output 1
Pin 10	Signal output 2
Pin 11	Signal output 3
Pin 12	Signal output 4
Pin 13	Signal output 5
Pin 14	Signal output 6
Pin 15	Signal output 7
Pin 16	Signal output 8
Pin 17	Ground
Pin 18	Ground
Pin 19	24 V input
Pin 20	24 V input

Table 3 – Pin definition of the GPIO

GPIO Port Terminal Circuit Diagram

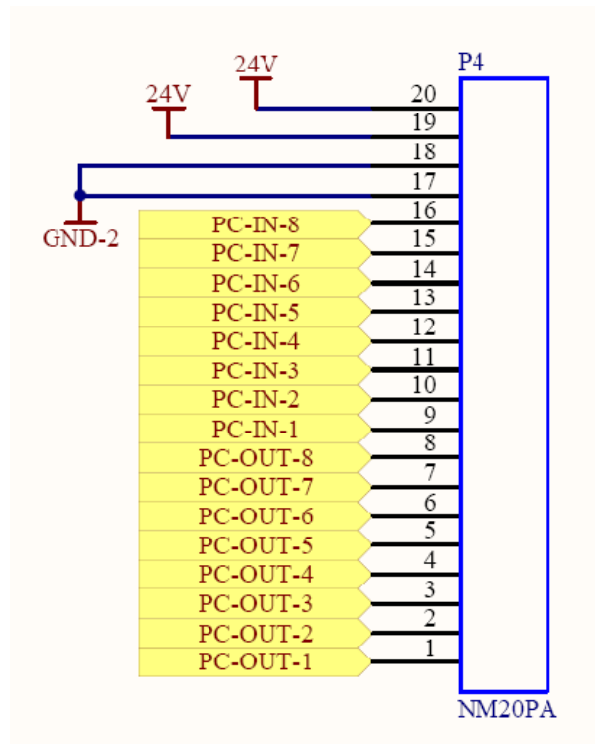


Figure 9- Circuit Diagram Pin definition

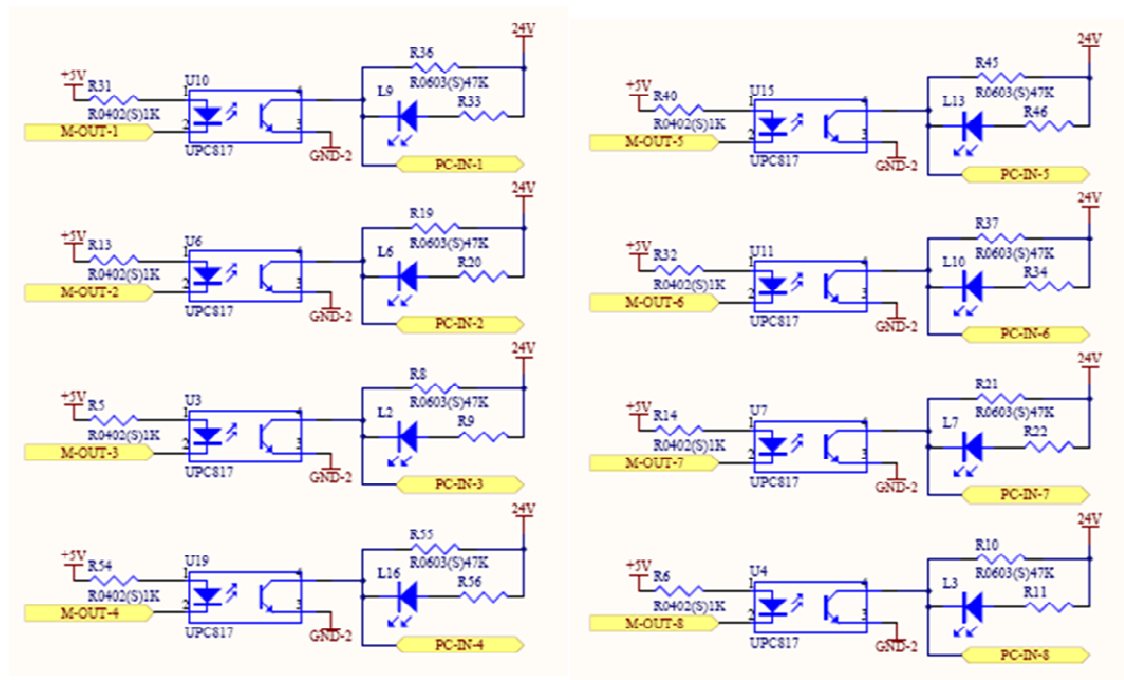


Figure 10- Circuit Diagram Pin definition of Signal output

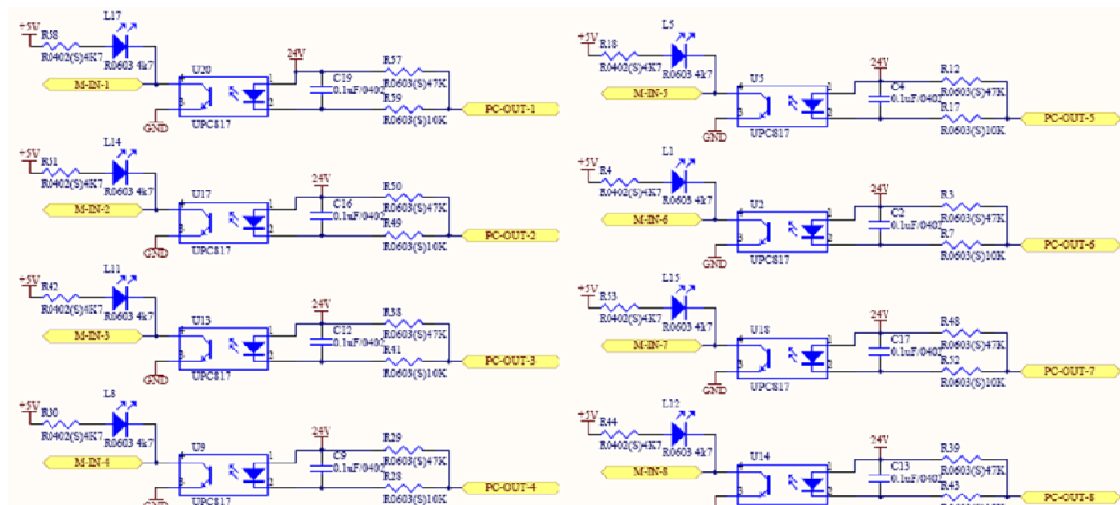


Figure 11- Circuit Diagram Pin definition of Signal input

Note.

If FS-GF801 wants to receive data from other device through GPIO, please connect 24V power source to PIN19 or PIN20 and connect the device output line to Pin 1~ Pin8. The development of programming of receiving data from GPIO could reference the document “Specification for GM-801 GPIO API.chm” and see the session 4.6 or 4.11 to read data from GPIO with application method.

If FS-GF801 wants to transmit signal to other device, please connect to Pin 9~ Pin 16. The programming of transmitting data to other device (like light tower) could reference the document “Specification for GM-801 GPIO API.chm” and see the session 4.8 to write data from GPIO with application method. The device should connect to independent power source.

CHAPTER 2

Reader Hardware Installation and Operation

This chapter describes the RFID Reader and provides installation and operation information.

Receiving the RFID Reader

Your RFID Reader Kit is shipped with the items listed below. Please verify the contents of your received shipment before assembling.

- RFID Reader
- Power supply and cables (two sections: one attached, one detached)

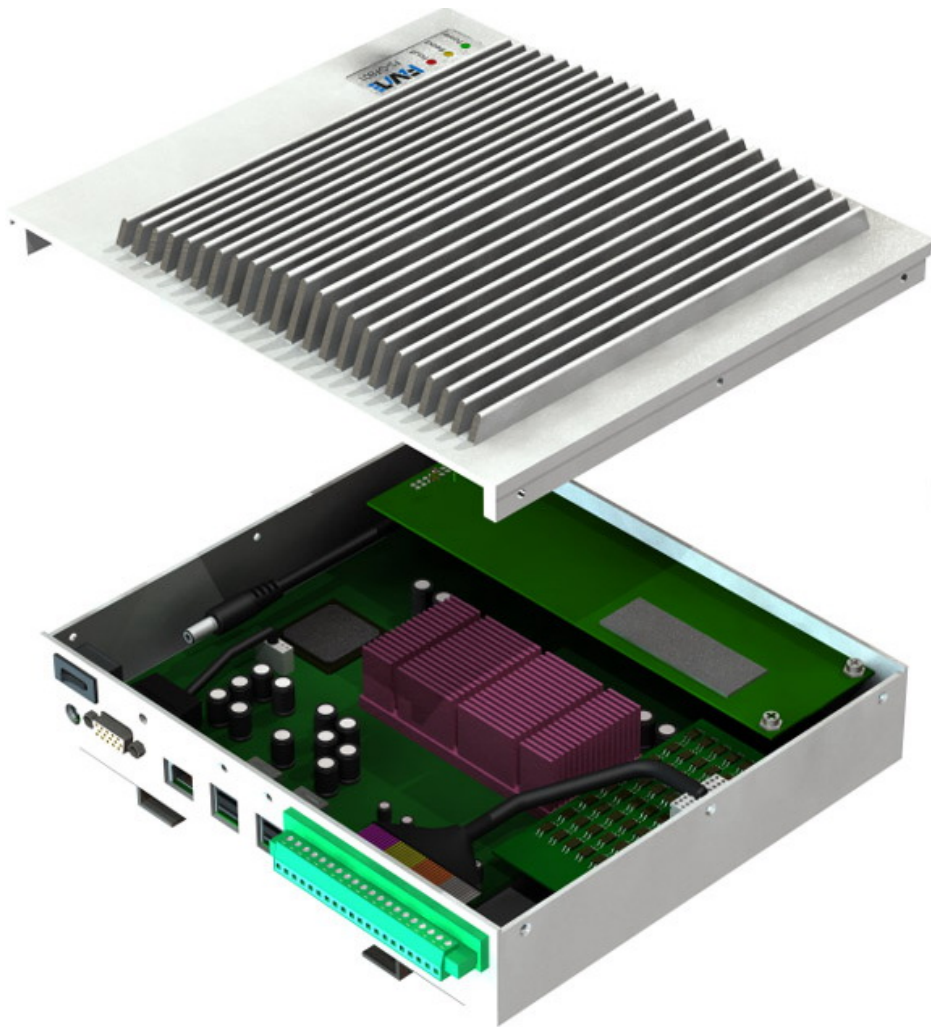


Figure 12 - FS-GF801 (1)



Figure 13 - FS-GF801 Power Supply and Adapter cable



Diagnostic LEDs

The FS-GM201 includes diagnostic LEDs on the face of the reader to provide easy and convenient external indication for various operating conditions:

- **Power (green)** – indicates power is applied to the reader.
- **Read (yellow)** – indicates that the reader is receiving data from a tag.
- **Fault (red)** – indicates a fault condition like CRC check error with the reader.



Figure 15 – FS-GF801 Reader Diagnostic LEDs

Antenna Panel

The antenna panel contains eight coax antenna connector ports as shown below. These are SMA connectors.



Figure 16 - Antenna Connections

CAUTION: Reader antennas should be positioned so that personnel in the area for prolonged periods may safely remain at least 23 cm (9 in) in an uncontrolled environment from the antenna's surface. See FCC OET Bulletin 56 "Hazards of radio frequency and electromagnetic fields" and Bulletin 65 "Human exposure to radio frequency electromagnetic fields."

Mount the antennas at the periphery of the desired read window (either overhead or at the side), so that the position of the most distant tag passing through the window is no farther from the antenna than the maximum range specified for your system design.

Position the antennas at a height approximately midway between the highest and lowest expected tag position. (For example, a pallet tag may be the lowest tag position to be read, while the top-most case on a fully stacked pallet may represent your highest tag position.)

Mount the second antenna approximately 18 inches from the first antenna, facing the read zone, unless otherwise indicated in your system design specification.

NOTE: To maintain compliance with FCC regulations, use only antennas supplied with the unit.

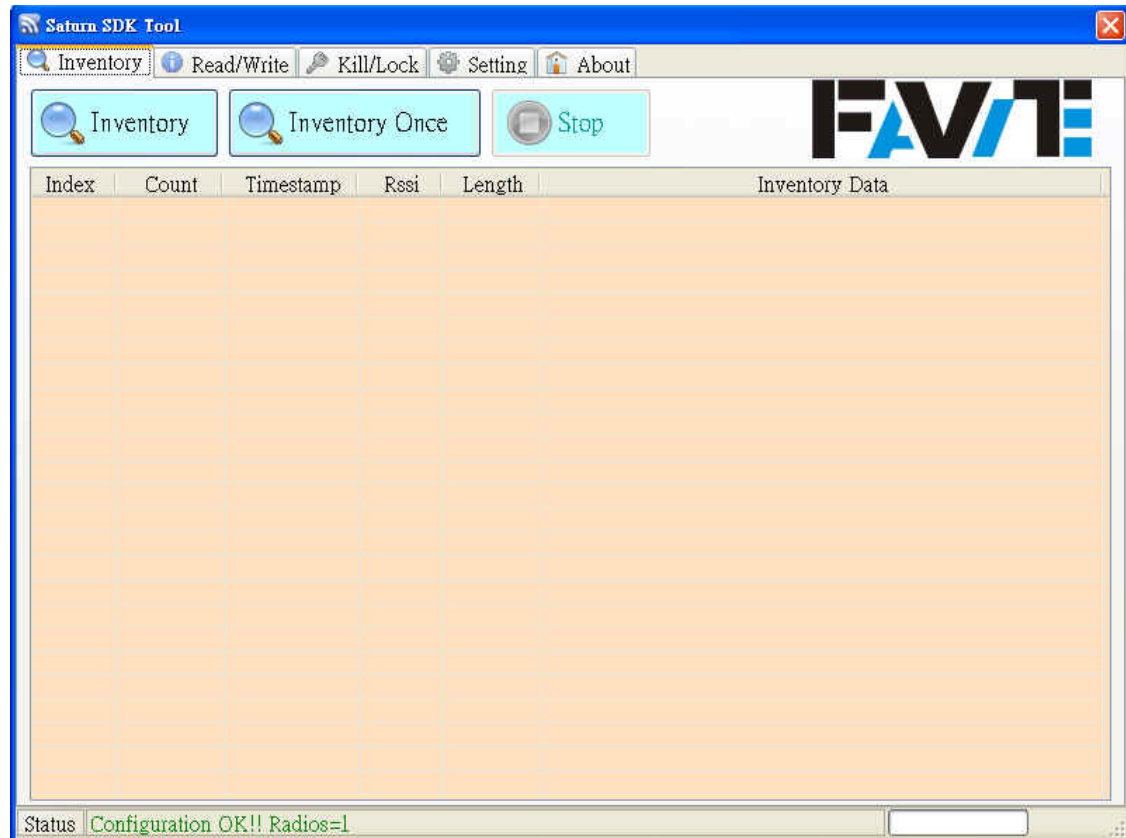
Demonstration Software Guide

Please see the document

"FAVITE_FS_GF801_Demo_API_User_Guide.doc",

"FS-GF801 GPIO Test API User Guide.doc".

"FS-GF801 DotNet CSharp API Programming Guide.doc".



FCC statement in User's Manual (for class B)

"Federal Communications Commission(FCC) Statement"

This Equipment has been tested and found to comply with the limits for a class B digital device, pursuant to Part 15 of the FCC rules. These Limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution:

1. The device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:
 - (1) This device may not cause harmful interference, and
 - (2) This device must accept any interference received, including interference that may cause undesired operation.
2. This device and its antenna(s) must not be co-located or operating in conjunction with any other antenna or transmitter.
3. Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user authority to operate the equipment.

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is still responsible for the FCC compliance requirement of the end product which integrates this module.

23cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for an population/uncontrolled environment can be satisfied.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end product, the end user has to be informed to keep at least 23cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following "Contains TX FCC ID: **XLG-FS-GF801**". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Professional Use:

FCC NOTICE: To comply with FCC part 15 rules, the system must be **professionally installed** to ensure compliance with the Part 15 certification. It is the responsibility of the operator and professional installer to ensure that only certified systems are deployed in the United States.