

# FS-GM102 User's Manual

Favite Inc.

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# CHAPTER 1

## Introduction

This Hardware Guide provides instructions of the FS-GM102 RFID Reader module. This document is designed for use by RFID system integrators.

### RFID Reader Module Overview

The FS-GM102 is embedded with Impinj R2000 chip and compliant with EPC Class1 Gen2 / ISO 18000-6C. The FS-GM102 supports one antenna port for bi-static configuration on RFID reader. The RFID Reader module is delivered with the following components:

- One (1) RFID Reader Module.

### EPC Class 1 UHF RFID Tags

The Favite FS-GM102 RFID reader module 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 module 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>.

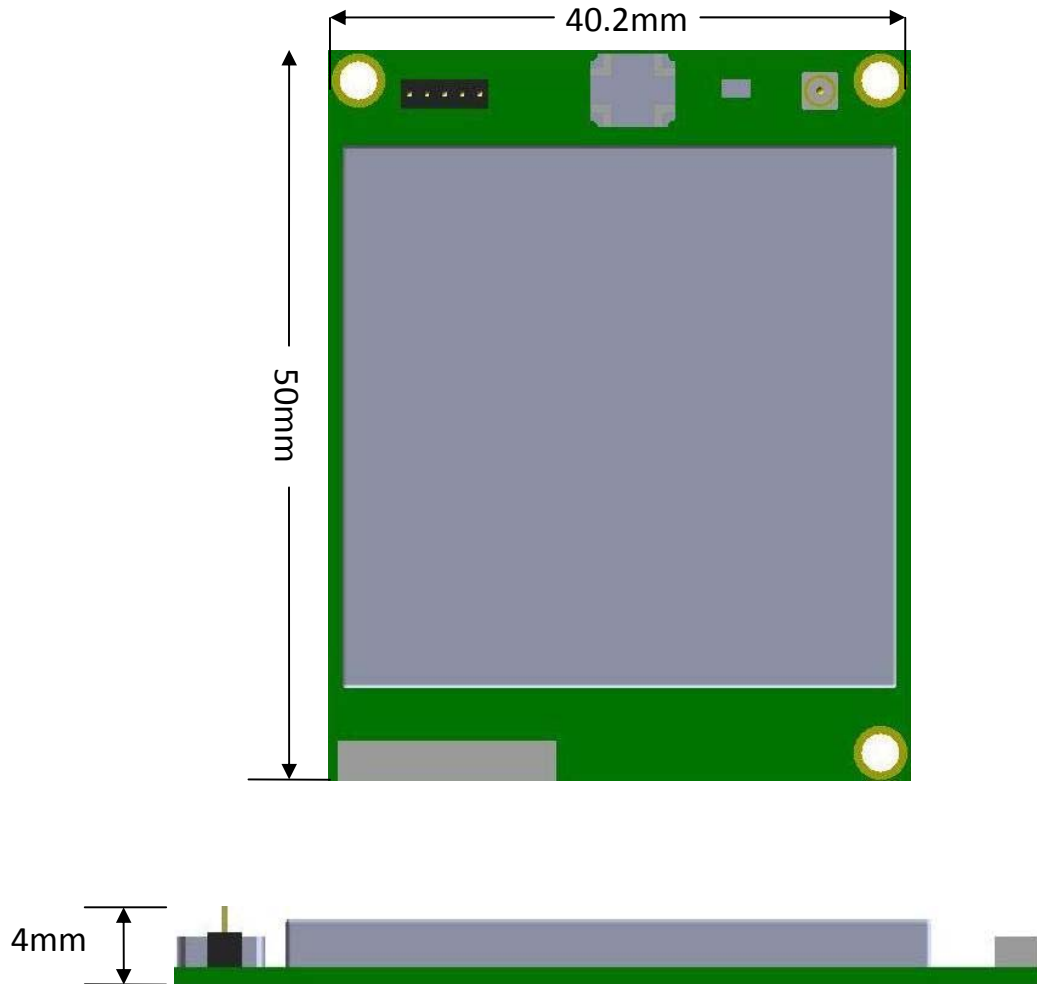
## CHAPTER 2

### Specifications

System	
Host Interface	USB / UART
Chipset	PHY: IMPINJ R2000 MAC: ATMEL AT91SAM7S-256
Operating Voltages	3.4V~4.2V
DC Power	3.8V:1.6A @ 30dBm
Protocol	
RFID Protocol Support	EPC Gen 2 ISO 18000-6C
Support EPC DRM	No
RF	
Frequency	US: 902 ~ 928MHz ( FHSS ) EU: 865 ~ 868MHz JS : 952 ~ 954MHz
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 connector	1 UFL connector
Regulatory and Environmental Compliance	
EMC certification	FCC, CE, JS
Temperature Range	Operating: 0 ~ 55 degree C, Storage: -20 ~ 85 degree C
Humidity	10% ~ 85% Non-condensing
Mechanical (Module)	
Dimension	40.2mm(L) x 50mm(H) x 4mm(T) ± 0.25mm

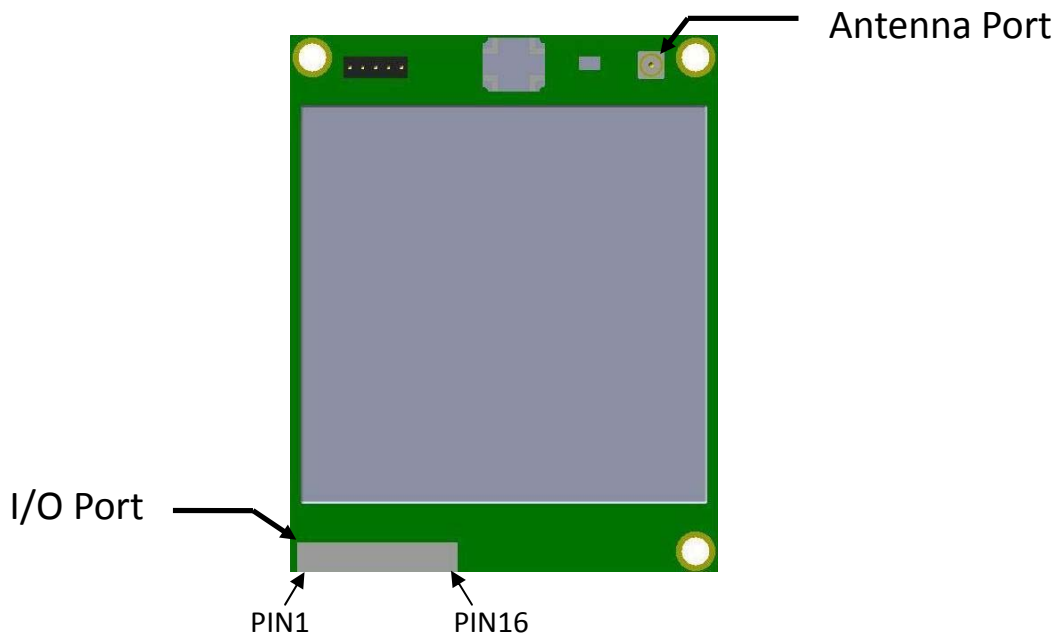
*Table 1 - Specification of the FS-GM102*

### Mechanical: Reader Physical Size



*Figure 1 - Outline Drawing of the FS-GM102*

## Antenna and IO Port Terminal Interface



*Figure 2 – 0.80mm pitch 16 pin I/O connector*

Pin no.	Name	Description
1	GPIO2	Input / Output control signal
2	GPIO1	Input / Output control signal
3	GPIO0	Input / Output control signal
4	RAW_nRST	Reset signal, low active
5	GND	Ground
6	UART_TXD	UART control signal
7	UART_RXD	UART control signal
8	GND	Ground
9	USB_D-	USB control signal
10	USB_D+	USB control signal
11	GND	Ground
12	GND	Ground
13	VCC	Power supply Input
14	VCC	Power supply Input
15	VCC	Power supply Input
16	VCC	Power supply Input

*Table 2 – I/O port pin description*

## Select mounting position for antenna

***CAUTION: Reader antenna 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 antenna 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 antenna 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.)

**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-GM102**". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statements 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.