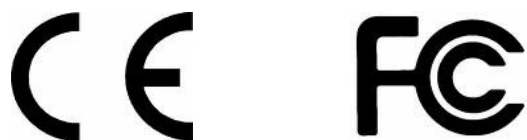




megascan M1 User Manual  
Rev. 1.0  
Model: megascan M1



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## **FCC statement**

### FCC NOTICE:

To comply with FCC part 15 rules in the United States, 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.

The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

## **CE statement**

### CE NOTICE:

The CE Mark applies to products regulated by certain European health, safety and environmental protection legislation. The CE Mark is obligatory for products it applies to: the manufacturer affixes the marking in order to be allowed to sell his product in the European market.

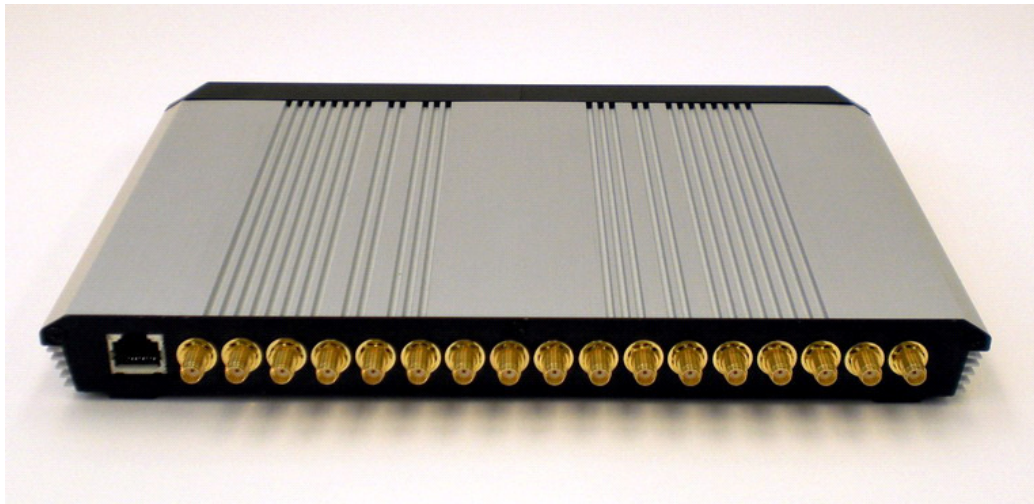
## **Chapter 1 Introduction of megascan M1**

### **1.1 Overview of megascan M1**

The Megabyte Ltd., megascan M1 RFID reader does more than simply read and acts as a data conduit, they need processing speed and ample memory. is an UHF RFID reader, which includes powerful RFID reader with 17 RFID antenna ports, which operates in 860MHz to 930MHz UHF band and is compliance with ISO 18000-6C Tag Air Interfaces with read and write function. megascan M1 reduces implementation cost and deployment time; improves reliability in harsh environments and enhances overall RFID system performance.

- The megascan M1 Intelligent RFID Reader supports protocols, UHF CLASS 1 GEN2 EPC C1G2/ISO 18000-6C, (865-868 MHz RFID frequency band) in Europe as well as (902-928 MHz RFID frequency band) in United States.

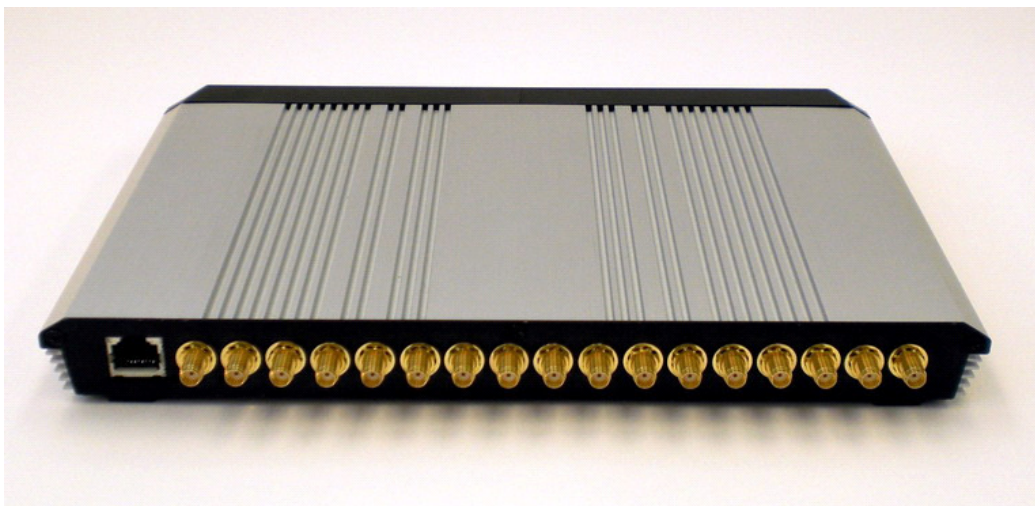
## 1.2 Ports Description



The megascan M1 has several types of input/output port:

<i>Items</i>	<i>Name</i>	<i>Description</i>
1	Ethernet Port, RJ-45	10BaseTx/100BaseTx port that connects the reader to your Ethernet network, which is embedded with Power over Ethernet (PoE) Technology.
2	UHF RFID Antenna Port(s)	17 SMA ports for external UHF antenna connection; - 16 ports with LED signal light, - 1 dedicate RF output ports for M2 connection,

### 1.3 Indicators LEDs in megascan M1



The megascan M1 has different LEDs to indicate the reader status.

<i>Name</i>	<i>Label</i>	<i>Description</i>
LAN Status, 10BaseTx	10M	Turn ON when 10Mbps network detected
LAN Status, 10BaseTx	100M	Turn ON when 100Mbps network detected
Ready, Read and write	READY	Turn ON when M1 is POWER ON, Flashes when M1 is reading.
Antenna Ports 1-16	1,2 ...16	Turn on when the antenna is ready to perform schedule task

## 1.4 Antenna for megascan M1

There is no antenna shipped with megascan M1. The following antenna model is used for megascan M1:

MRD E42



## 1.5 Product Features

- Excellent RFID monostatic RF performance with 17 external SMA antenna ports,
- 1 Watt (30dBm) Tx output levels and -80dBm Rx read sensitivity,
- Consistently supports read ranges up to 30 feet,
- Dense Reader Mode (DRM) Capability,
- Power over Ethernet (PoE) connectivity,
- Low power consumption,
- Adjustable output Tx power levels over +5 to 30dBm range in 1dB steps,
- RJ-45, 10/100Mbps Ethernet interface, TCP/IP,
- Small Form, Fit size: 257mm(L) x 182mm(W) x 25mm(H),
- Standalone and Server mode middleware control support,
- High durability in harsh environments,
- Easy installation and maintenance,
- All-in-one compact design,
- Fanless Design for protection of dirt, dust, insects, liquids,
- Supporting tag interface of EPC C1G2/ISO 18000-6C(UHF C1G2),



## 1.6 Specification:

<b>Features</b>	Compliant with EPC global C1G2/ISO 18000-6C, Dense Reader Mode Capability, Adjustable Output Power (up to +30dBm Max), Exceptional Performance and Reliability, Low Power Consumption, Read Distance up to 30 feet(9m),
<b>Air-interface Protocols</b>	EPC Gen 2 / ISO 18000-6C,
<b>Frequency Band</b>	FCC 902-928 MHz, ETSI 865-868 MHz, NCC 922-928 MHz, SRRC 920-925 MHz,
<b>RF Output Power</b>	Adjustable from +5 to + 30dBm in 1 dB steps,
<b>Supply Voltage</b>	Power over Ethernet (PoE), IEEE standard. 802.3af compliant,
<b>Power Consumption</b>	Idle mode: 0.2W, Scan mode: 8.95W@30dBm,
<b>Communication Interface</b>	RJ-45, 10/100Mbps Ethernet Interface, TCP/IP,
<b>Regulatory</b>	FCC 47 CFR Ch.1 Part 15, ETSI EN 302-208, NCC LP002, RoHS,
<b>Tags Supported</b>	Alien, Avery Dennison, Hitachi, Impinj, NXP, Omron, Rafsec, TI,
<b>Physical Size</b>	257mm (L) x 182 mm (W) x 25 mm (H),
<b>External Antenna</b>	17 ports SMA connector support external Monostatic Antenna up to 6dBi VSWR < 1.5:1 @ 50ohm,
<b>Effective Range</b>	Over 30 feet (9 meters) with 6dBi External Antenna ,
<b>Environment</b>	Storage Temperature: -40°C to 85°C, Operating Temperature: 0°C to 40°C,

## **Chapter 2 Installation of megascan M1**

### **2.1 Power up megascan M1**

This section explains how to set-up megascan M1 and connect the megascan M1 to your network and antenna:

- Choose the PoE feature router/switch and compliance with IEEE std. 802.3af-2003, and connect with Cat.5 and higher infrastructure cable,
- Antenna port is standard SMA Jack(female), the RF cable/antenna connector should be standard SMA Plug(male),
- megascan M1 operates at UHF frequency band, ranging from 865MHz to 928MHz (ETSI 865-868 MHz, FCC 902-928 MHz, SRRRC 920-925 MHz and NCC 922-928 MHz); the setting depends on countries' regulations.
- Choose the right frequency band UHF antenna for your application.

### **2.2 Environmental Requirements**

The next table includes environmental requirements for the megascan M1. Choose a location that meets these requirements.

<b>Description</b>	<b>Minimum</b>	<b>Maximum</b>
Operating temperature	0°C	55°C
Storage temperature	-40°C	85°C
Humidity (non-condensing)	10%	90%

## 2.3 Start up Procedures

1. Before installation of megascan M1, please follow the steps below:
2. Install and fasten the megascan M1 in right location.
3. Before turn ON the megascan M1 by connecting ethernet cable to PoE Router/switch.
4. The default IP / subnet mask is as follows: 192.168.1.254 / 255.255.255.0, change the IP setting for your network.
5. Please make sure the antenna port is connected an UHF antenna before turn on the RF power for testing.

**Caution: Each port must have either an antenna or a terminator connected. Do not apply power to the megascan M1 unless an antenna or terminator is installed on each antenna port.**

## 2.4 Caution

### Danger of Electric Shock

- Disconnect the device from the electric supply before cleaning or performing maintenance on the machine.
- Keep this device dry.
- For in-door use only. Not designed for out-door purpose.
- Turn off or unplug the machine when it is not in use.

Please read the information contained within this user manual prior to attempting installation and operation of the RFID Reader. Failure to install and operate the RFID Terminal (megascan M1) in accordance with the information contained in this manual may result in unsatisfactory performance.

## 2.5 Professional Installation Instructions

### Safety and Regulatory Compliance Information

This document contains important safety and regulatory compliance information for the following products:

Please read this document before installing and using your product and see the following sections for more information:

- Safety Information
- Federal Communications Commission (FCC) Compliance
  - Modifications
  - Warnings
- Information for Professional Installers
- Regulatory Compliance Certifications Summary

### Safety Information

All products are intended to be installed, used, and maintained by experienced telecommunications personnel only.

When using this device, basic safety precautions should always be followed to reduce the risk of fire, electrical shock, and injury to persons, including the following:

- Operate and install these products as described in this manual. Equipment must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation provided.
- Installation of these products in the end use must conform to local regulations and codes.
- Products are to be used with and powered by only the power injector provided.
- A 13-amp circuit breaker is required at the power source.
- Do not connect or disconnect the power cable to the equipment when the power injector is plugged into an AC power outlet.
- Servicing of these products should be performed only by trained personnel. Do not disassemble. By opening or removing any covers, you may expose yourself to hazardous energy parts. Incorrect reassembly of these products can cause a malfunction and/or electric shock when the units are subsequently used. No user serviceable parts; all repairs and service must be handled by a qualified service center.
- Do not insert any objects of any shape or size inside these products while powered on. Object may contact hazardous energy parts that could result in a risk of fire or personal injury.
- Do not remove or alter the Marking label provided on these products.
- To avoid the risk of electric shock from lightning, do not use these products during an electrical storm.
- When using these products with an external antenna, see the installation documentation provided with the antenna system.

## Federal Communications Commission (FCC) Compliance

These products operate at the following frequencies in compliance with Part 15 of the FCC rules:

- RFID; 902 MHz - 928 MHz,

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.

To comply with the FCC radio frequency exposure requirements, the following antenna installation and device operating configurations must be satisfied:

- Product models using external antennas require professional installation. The antennas used for professional installation must be fixed-mounted on indoor/outdoor permanent structures with a separation distance from all persons of at least 25 cm (approximately 10 inches).
- Antennas must not be co-located and must not operate in conjunction with any other antenna or transmitter.
- Shielded cables must be used with this unit to ensure compliance with the Class B FCC limits.

## Warnings

Changes or modifications to this unit not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

The equipment has been tested and found to comply with 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 will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try and 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 or on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio / technician for help.

To ensure safety of users, the FCC has established criteria for the amount of radio frequency energy that can be safely absorbed by a user or bystander according to the intended usage of the product. This product has been tested and found to comply with the

FCC criteria. The megascan M1 shall be installed & used such that parts of the user's body other than the hands should be maintained at a comfortable distance of approximately 25 cm or more.

In some situations or environments, the use of wireless devices may be restricted by the proprietor of the building or responsible representatives of the organization. These situations may, for example, include the use of wireless equipment on board airplanes, or in any other environment where the risk of interference to other devices or services is perceived or identified as harmful.

If you are uncertain of the policy that applies on the use of wireless equipment in a specific organization or environment (such as airports), you are encouraged to ask for authorization to use this device prior to turning on the equipment.

### **Modifications**

The FCC requires the user to be notified that any changes or modifications to this device that are not expressly approved by the manufacturer may void the user's authority to operate the equipment. The correction of interference caused by unauthorized modification, substitution or attachment will be the responsibility of the user. The manufacturer and its authorized resellers or distributors are not liable for any damage or violation of government regulations that may arise from failing to comply with these guidelines.

### **Information for Professional Installers**

All products must be professionally installed, and the transmit power of the system must be adjusted by the professional installers to ensure that the system EIRP is in compliance with the limit specified by the regulatory authority of the country of application.

See the following sections for more information:

Professional installers should select only the antenna types listed in the following table,

<u>Frequency Band</u>	<u>Antenna Type</u>
RFID; 900 MHz	Panel Antenna

The megascan M1 is only used with panel antenna. (model: MRD E42)

## **Chapter 3 Demonstration of RFID Applications**

### **3.1 Creating RFID Application with megascan M1**

Megabyte Ltd. megascan M1 is an intelligent reader and compliance with EPC global C1G2/ISO 18000-6C, Users can develop own UHF RFID application on this platform.

#### *3.1.1 Delivering Application to megascan M1*

When the user wants to deliver applications to the megascan M1, they just simply install the program in Windows XP and Linux platform.

#### *3.1.2 Programming Language compatibility*

Users may use several types of programming language, for examples, C++, C#.NET, Java and Java script.

## **Chapter 4 Regulatory Information**

### **4.1 Federal Communications Commission (FCC) Compliance**

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 when the equipment is operated in a commercial environment. 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 will not occur in a particular installation. If this equipment does cause harmful 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
- Consult the dealer or an qualified radio/TV technician for assistance

**FCC NOTICE:** To comply with FCC part 15 rules in the United States, 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. The use of the system in any other combination (such as co-located antennas transmitting the same information) is expressly forbidden.

**WARNING: DO NOT ATTEMPT TO SERVICE THE WIRELESS COMMUNICATION DEVICE YOURSELF. SUCH ACTION MAY VOID THE WARRANTY. THE MEGASCAN M1 IS FACTORY TUNED. NO CUSTOMER CALIBRATION OR TUNING IS REQUIRED. CONTACT MEGABYTE LTD. TECHNICAL SUPPORT FOR INFORMATION ABOUT SERVICING YOUR WIRELESS COMMUNICATION DEVICE.**

Note:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.



### 4.1.1 Radio Frequency Radiation Exposure

The highest RF output power of the unit was measured at 29.60dBm at 902.75 MHz. According to §1.1310 of the FCC rules, the power density limit for General Population/Uncontrolled Exposure at 902.75 MHz is  $f_{(MHz)}/1500 = 0.602mW/cm^2$ . The MPE is calculated to show the required separation distance that must be maintained during installation to maintain compliance with the power density limit. The minimum required cable length is 1.5m to be used with this device.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Power input to the external antenna (Output power from the EUT antenna Port<sub>(dBm)</sub> – cable loss<sub>(dB)</sub>)

G = Gain of Transmit Antenna (Linear gain)

R = Distance from Transmitting Antenna

The power density at 25cm separation is:

$$S = \frac{PG}{4\pi R^2}$$

For this device, the calculation is as follows:

P = 29.60dBm (Output power from the EUT antenna Port) – 0.75dB (Cable Loss\*)

= 28.85dBm (767.361mW)

\*Cable Loss = (0.75dB) : 1.5m long of 0.5dB/m loss

G = Worst Case Antenna Gain = 6dB = anti-log(6.0/10) = 3.98

At 25cm separation,

$$S = ((767.361) \times (3.98)) / (4\pi(25)^2) = 0.389mW/cm^2$$

Based on the above calculation for 25cm separation, the power density does not exceed FCC limit of 0.602mW/cm<sup>2</sup>.

## 4.2 CE Compliance

This device has been tested to and conforms to the regulatory requirements of the European Union and has attained CE Marking. The CE Mark is a conformity marking consisting of the letters "CE". The CE Mark applies to products regulated by certain European health, safety and environmental protection legislation. The CE Mark is obligatory for products it applies to: the manufacturer affixes the marking in order to be allowed to sell his product in the European market.

The CE Marking is not a quality-mark. Foremost, it refers to the safety rather than to the quality of a product. Secondly, CE Marking is mandatory for the product it applies to, whereas most quality markings are voluntary.

## **Chapter 5 Disclaimer Notice**

### Disclaimer Notice

The manufacturer shall not be liable for errors contained herein or for incidental or consequential damages in connection with the furnishing, performance or use of this material. This document contains proprietary information, which is protected by international patent applications and copyright. All rights reserved. No part of this document may be copied, reproduced or translated without prior written consent of the manufacturer. The manufacturer reserves the right to revise this publication and to make changes from time to time in the contents hereof without obligation to notify any person of such revisions or changes. The manufacturer also reserves the right to change the specifications without notice.

## **Chapter 6 Warranty**

1. Megabyte Ltd warrants to the User that the Products sold to the User will comply with their published specifications and will be of satisfactory quality and that Megabyte Ltd is entitled to sell the Products to the User. Megabyte Ltd warrants that for a period of twelve (12) months from date of purchase (“the Warranty Period”), the products will be free from defects in materials and workmanship.
2. During the Warranty Period, Megabyte Ltd will repair, or if in Megabyte Ltd’s opinion necessary replace, the defective product returned to Megabyte Ltd’s head office in Hong Kong. The defective production must be returned in its original packaging and all shipping and handling charges shall be borne by the Users.
3. The Warranty Period shall not be extended by reason of any repair or replacement.
4. Megabyte Ltd shall have no liability to the User for any damage to or defects in any of the Products caused by fair wear and tear, improper use, negligent handling, failure to observe this User Manual and the instructions accompanying the Products or any alterations maintenance or repair to the Products by any person other than Megabyte Ltd, use of non-Megabyte Ltd parts, accessories or equipment, or third party software which would damage the Products.
5. Unless in the case of any damage to or defect in the Products which would have been apparent on reasonable visual inspection, the User notifies Megabyte Ltd of the same in writing within 7 days after the date of purchase thereof, or in the case of any damage to or defects in the Products which would not have been apparent on reasonable visual inspection the User notifies Megabyte Ltd of the same in writing 7 days after the defect becomes apparent to the User, the User shall not be entitled to reject the Products concerned.
6. The User shall be responsible for properly storing and making back up copies of all data which may be stored in the Products. Megabyte Ltd shall not be responsible for any lost of data as a result of any repair or replacement.
7. Except as expressly provided in this User Manual no warranty, condition, undertaking, or term, express or implied, statutory or otherwise, as to the condition, quality, performance, durability or fitness for purpose of the Products is given or assumed by Megabyte Ltd and all such warranties, conditions, undertakings and terms are hereby excluded to the fullest extent permitted by law.

## **Chapter 7 Support**

Technical support/sales enquiry can be obtained from Megabyte Ltd.

Please email to: [sales@scanmega.com](mailto:sales@scanmega.com)