

## **MATRIX RADIO MODULE USKRM- 10002705 MANUAL**

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## VERSION HISTORY

| Rev | Author                   | Date      | Change No.  | Description   |
|-----|--------------------------|-----------|---|---------------|
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|     |                          |           |   |               |

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## **Matrix Radio module USKRM-10002705 MANU**

### **1 INTRODUCTION**

The Matrix Radio used as atmospheric monitoring sensor device measures conditions of the atmosphere in which it installed and then transmits that information to a monitoring system. Matrix radio module contain three radios: RF233 (Atmel), Wifi (TI CC3100 based design) and 433Mhz (TI CC1101).

### **2 BLOCK DIAGRAM**

**REMOVED FOR CONFIDENTIALTY**

#### **2.1 THEORY OF OPERATION**

A functional block diagram of Matrix RF module shown it consists three radios.

#### **2.2 THE CC1101 RADIO**

The CC1101 is a 433MHz radio and it is based on IEEE802.15.4 standard. It operates 433Mhz ISM band. The radio operates at data rate of 38.4 kbps, the radio channel spacing is 25Khz, receiving sensitivity is at -101dBm and Max Tx power of 10dBm.

#### **2.3 ATMEL RF-233 RADIO**

The atmel-RF233 is a 2.4Ghz ISM band radio, the radio is based on IEEE 802.15.4 standard. The radio channel bandwidth is 2MHz and spacing at 1MHz. The radio sensitivity is -90dBm and its Max Tx power is 20dBm.

#### **2.4 CC3100 RADIO**

CC3100 is WiFi 2.4Ghz radio, it supports IEEE 802.11b/g/n standard. The radio channel bandwidth is 20Mhz, the radio sensitivity is-70dBm and Tx power is 14dBm.

### 3 RF ANTENNA

NOTE: The RM-10002705 Module bearing FCC ID: USKRM-10002705 and IC: 11898A-10002705 has been approved by the FCC and ISED to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

*Le présent émetteur radio RM-10002705, FCC ID: USKRM-10002705, IC: 11898A-10002705 a été approuvé par FCC y ISED pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.*

Patch Trace (Flex Antenna): 0.7 dBi Gain  
Trace: 1.5 dBi

#### 3.1 2.4GHZ ANTENNA



taoglas-2.4G-FXP70.  
07.0053A.pdf

#### 3.2 433MHZ ANTENNA



Molex  
433M--987650-7461.

### 4 POWER SUPPLY

There is an internal Max15027 power regulator, its input voltage 1.425 to 3.6V, and deliver up to 1A of continuous output current with typical dropout voltage of only 75mV. The output voltage is adjustable from 0.5V to  $V_{in}$  and is +/-2% accurate over load and line variations from -40 to + 125 C.



radio-module-SCH.  
pdf

## 5 MICROCONTROLLER

The Atmel smart SAM4S microcontroller used on the radio module, it controls all three radios. The processor operates a maximum speed of 120Mhz and features up to 2048 Kbytes Flash. This device also have three software-selectable low-power mode: sleep, wait and backup. The real time event management allows peripheral to receive, react and send the events in active and sleep modes without processor intervention.

## 6 SPECIFICATIONS

|                             |                         |                                     |
|-----------------------------|-------------------------|-------------------------------------|
| <b>Power Supply</b>         | <b>Voltage (Input)</b>  | <b>1.4 VDC -3.6VDC,</b>             |
|                             | <b>Voltage (Output)</b> | <b>3.3VDC +/- 5%,</b>               |
| <b>Operating Conditions</b> | <b>Temperature</b>      | <b>0°C to +40°C</b>                 |
|                             | <b>Humidity</b>         | <b>10% - 90% RH, non-condensing</b> |
| <b>Storage Conditions</b>   | <b>Temperature</b>      | <b>-10°C to 70°C</b>                |
|                             | <b>Humidity</b>         | <b>10% - 90% RH, non-condensing</b> |
| <b>Dimensions</b>           | <b>Physical</b>         |                                     |
| <b>Weight</b>               | <b>Physical</b>         |                                     |

## 7 HOW THE USER INSTALL INTO A HOST DEVICE

RM-10002705 is not intended for OEM integrators and/or end-users. The module must be integrated by grantee authorized professional installers. Installers must be provided with antenna installation instructions and transmitter operating conditions for satisfying RF exposure compliance.

Le RM-10002705 n'est pas destiné aux intégrateurs OEM et / ou aux utilisateurs finaux. Le module doit être intégré par des installateurs professionnels agréés. Les installateurs doivent disposer d'instructions d'installation d'antenne et des conditions de fonctionnement de l'émetteur afin de satisfaire à la conformité d'exposition RF.

[Please contract Matrix Design for Integration details](#)

The host product shall be properly labeled to identify the modules within the host product.

The host product must be labeled to display the FCC ID and ISED certification number for the module, preceded by the word "Contains" or similar wording expressing the same meaning, as follows:

Contains FCC ID: USKRM-10002705

Contains IC: 11898A-10002705

*Le produit hôte doit être correctement étiqueté pour identifier les modules qu'il contient.*

*Le produit hôte doit porter une étiquette indiquant le numéro de certification FCC et ISED du module, précédé du mot "contient" ou d'un libellé similaire exprimant le même sens, comme suit:*

*Contient: FCC ID: USKRM-10002705*

*Contient: IC: 11898A-10002705*

## 8 TROUBLESHOOTING

Customer Support/Contact Information

**For technical support or product returns, contact:**

**Matrix Design Group, LLC**  
3299 Tower Drive  
Newburgh, IN 47630  
Phone: 812-490-1525

## 9 REGULATORY INFORMATION

### FCC INFORMATION

NOTE: 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 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.
- 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.

WARNING: This device must be used in such a way as to maintain at least 20 cm separation distance between the transmitter's antenna and the body of the user or nearby persons.

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

## IC INFORMATION

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peut fonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pour l'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectrique à l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que la puissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire à l'établissement d'une communication satisfaisante.

This equipment complies with the ICES RF radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator and any part of the human body.

Cet équipement est conforme aux limites d'exposition aux radiations ICES définies pour un

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