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Landis+Gyr



# Series 6 MCM0

## Data Sheet

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## Introduction

Landis+Gyr's Series 6 MCM0 is key to building a single, integrated IoT network for your utility future. This product is a fully functional Network Interface Card (NIC) in a multi-chip module form-factor to enable low-cost network and sensor device integration. This technology is foundational to Landis+Gyr's industry-leading utility IoT networking solution, Gridstream® Connect. Furthermore, the Series 6 MCM0 provides the flexibility to grow the value of your IoT platform over time with proven Wi-SUN FAN interoperability as you integrate today's and future AMI or DA networking equipment and third-party IoT devices. The device supports RF Mesh IP and Wi-SUN FW stacks.

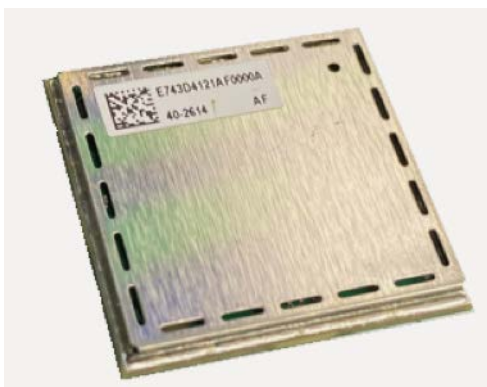


Figure 1. Series 6 MCM0

Table - 1. Technical Specifications

| Element                      | Description                                                                                                                |
|------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Radio Model                  | S6-MCM0                                                                                                                    |
| Communication Protocol (PHY) | IEEE 802.15.4-2015                                                                                                         |
| <b>MAC/PHY Features</b>      |                                                                                                                            |
| MAC                          | Automatic selection of 'best' Band based on Link Quality<br>Automatic selection of 'best' Modulation based on Link Quality |
| PHY                          | Adaptive Power Control<br>Precision Output Power Management<br>Clear Channel Assessment                                    |
| <b>Hardware Capabilities</b> |                                                                                                                            |
| Clock Speed                  | 120 MHz                                                                                                                    |
| RAM Memory                   | 640 Kbytes                                                                                                                 |
| FLASH Memory                 | 2 MB + 4 MB External                                                                                                       |
| RF Modulation                | IEEE 802.15.4 SUN FSK, O-QPSK & OFDM                                                                                       |
| RF Bands                     | 902 – 928 MHz                                                                                                              |

Table - 1. Technical Specifications (Continued)

| Element  | Description |
|----------|-------------|
| RF Ports | 1           |

Table - 2.Sub-GHz Band Characteristics: North America

| Network Operating Mode               | RF Mesh IP Series 5 Compatible                                                                                                       | RF Mesh IP Green Field                                                                                                         | Wi-SUN                                                                                                                                                                                       |
|--------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Frequency Range (Fc)                 | 902.4 MHz - 927.6 MHz                                                                                                                | 904 MHz - 926.8 MHz                                                                                                            | 902.2 MHz – 927.8 MHz                                                                                                                                                                        |
| Channel Width                        | 400 KHz                                                                                                                              | 1200 kHz                                                                                                                       | 200, 400, 800 & 1200 kHz                                                                                                                                                                     |
| Number of Channels                   | 64                                                                                                                                   | 20                                                                                                                             | 129, 64 31 & 21                                                                                                                                                                              |
| Multicast Modulation                 | 2-FSK 50 kbps                                                                                                                        | OFDM Option 1 MCS0 (100 kbps)                                                                                                  | 2-FSK 50 kbps                                                                                                                                                                                |
| Unicast Modulation Support           | 2-FSK: 50 - 200 kbps<br><br>OFDM Option 3: MCS3 - MCS6                                                                               | OFDM Option 1: MCS0 - MCS6                                                                                                     | 2-FSK: 50 - 200 kbps<br><br>OFDM Option 3: MCS2 - MCS3 (100 - 200 kbps)<br><br>OFDM Option 2: MCS3 - MCS5 (400 - 800 kbps)<br><br>OFDM Option 1: MCS5 - MCS6 (1600 - 2400 kbps)              |
| Data Rate Coverage                   | 50 kbps - 600 kbps                                                                                                                   | 100 kbps - 2400 kbps                                                                                                           | 50 kbps - 2400 kbps                                                                                                                                                                          |
| Transmitter Output Power             | 10 mW - 500 mW                                                                                                                       | 10 mW - 316 mW                                                                                                                 | 10 mW - 500 mW (peak)                                                                                                                                                                        |
| Receiver Sensitivity (IEEE 802.15.4) | F2B50 = -108 dBm<br>F2B150 = -100 dBm<br>F2B200 = -99 dBm<br>O3M3 = -107 dBm<br>O3M4 = -105 dBm<br>O3M5 = -102 dBm<br>O3M6 = -97 dBm | O1M0 = -110 dBm<br>O1M1 = -109 dBm<br>O1M2 = -105 dBm<br>O1M3 = -102 dBm<br>O1M4 = -99 dBm<br>O1M5 = -96 dBm<br>O1M6 = -90 dBm | F2B50 = -108 dBm<br>F2B150 = -100 dBm<br>F2B200 = -99 dBm<br>O3M2 = -109 dBm<br>O3M3 = -107 dBm<br>O2M3 = -106 dBm<br>O2M4 = -104 dBm<br>O2M5 = -101 dBm<br>O1M5 = -96 dBm<br>O1M6 = -90 dBm |

## Series 6 MCM0 Outline

The PCB outline is shown below:

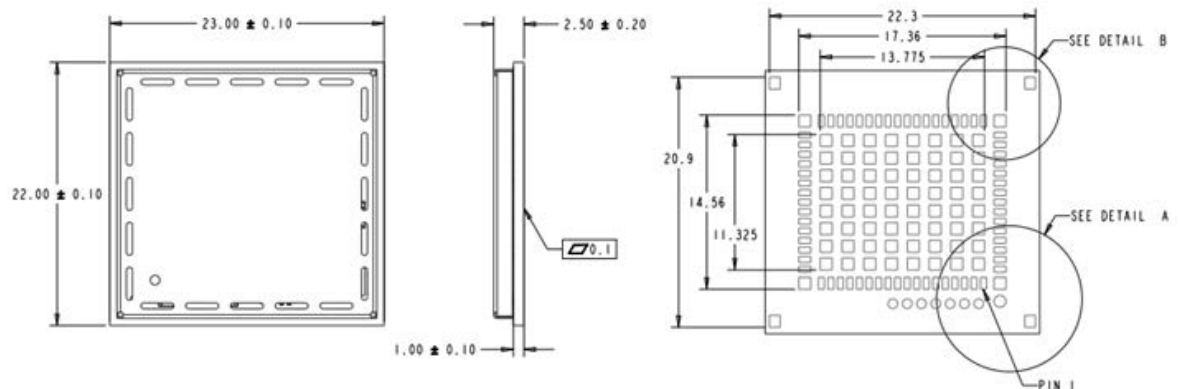


Figure 2. PCB Outline 1

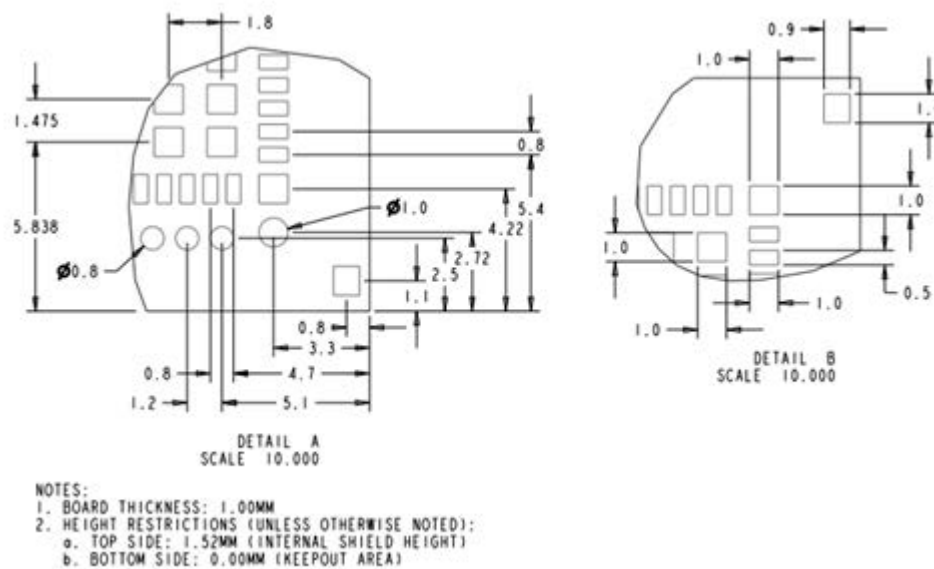


Figure 3. PCB Outline 2

## FCC and Industry Canada Compliance

### FCC Class B

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions:

- This device may not cause harmful interference, and
- This device must accept any interference received, including interference that may cause undesired operation.

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.
- Consult Landis+Gyr or an experienced radio technician for help.



**WARNING: Changes or modifications to this device not expressly approved by Landis+Gyr could void the user's authority to operate the equipment.**

## RF Exposure

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20 cm between the radiator and your body. The antenna(s) used for this transmitter must not transmit simultaneously with any other antenna or transmitter, except in accordance with FCC multi-transmitter product procedures.

Cet équipement est conforme aux limites FCC/ISED d'exposition aux radiations définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20cm entre le radia-teur et votre corps. Cet émetteur ne doit pas être co-implantés ou exploités en conjonction avec une autre antenne ou émetteur.

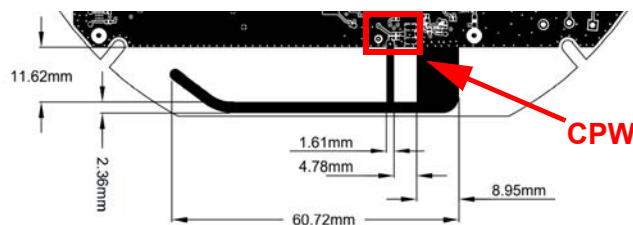
## Requirement for Modular Certification

The Series 6 MCM0 is approved for use with the antenna listed below. Antenna types not included in the list below or a having higher gain than the maximum indicated for that type, are prohibited for use with this device.

## Approved Antennas

The antenna listed in the following table is approved for use with the device:

| Frequency   | Antenna Type                   | Max Gain (dBi) | Referenced Product |
|-------------|--------------------------------|----------------|--------------------|
| 902-928 MHz | PCB Printed Inverted F Antenna | 1.0            | E360               |



**Figure 4. Printed Inverted F Antenna and CPW Transmission Line**

FR4 PCB MATERIAL  
 PCB MUST HAVE A DIELECTRIC CONSTANT OF  $4.3 \pm 0.2$  @ 1GHz  
 MATERIAL MUST CONFORM TO UL94 V-0.  
 BOTTOM LAYERS COPPER THICKNESS (FOIL PLUS PLATING) SHALL MEET IPC-A-600, SECTION 3.2.3, DESIGNATOR H.  
 NOTE: ASSUMED VALUES AND FINISHED DIMENSIONS ARE AS FOLLOWS:

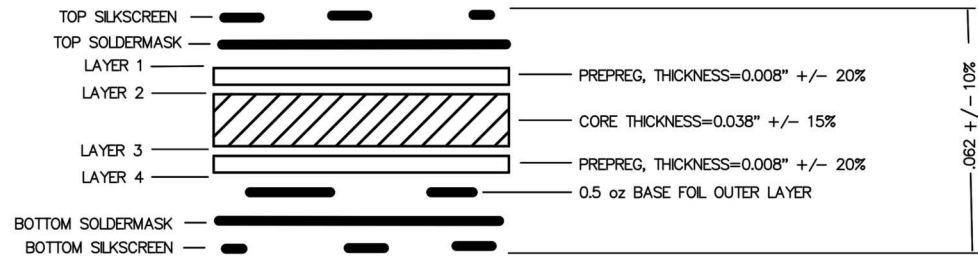


Figure 5. PCB Stack Up

## Information on Test Modes and Additional Testing Requirements

A diagnostic test mode is available to device integrators that allows control of the transmitter in order to execute FCC 15.247 compliance testing. This mode of operation provides a basic command interface over a dedicated serial port. Further information on how to enable this mode of operation and a description of the command interface is available to device integrators upon request and under NDA.

## Additional Testing, Part 15 Subpart B Disclaimer

The end product with an embedded S6 MCM0 may also need to pass the FCC Part 15 unintentional emission testing requirements and be properly authorized per FCC Part 15 Subpart B.

## Host Label Requirement

In the final installation, the following information must be visible:

- Contains FCC ID: R7PNG0R1X8
- Contains IC: 5294A-NG0R1X8

Sample label shown below:



Figure 6. Example Host Label

## Industry Canada

This device complies with Industry Canada license-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.

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.

This radio transmitter (identify the device by certification number, or model number if Category II) has been approved by Industry Canada 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.

See "Approved Antennas" on page 6 or approved antenna list.

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.

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.

Le présent émetteur radio (identifier le dispositif par son numéro de certification ou son numéro de modèle s'il fait partie du matériel de catégorie I) a été approuvé par Industrie Canada 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.