The AMIHO AM091 is a high performance Wireless M-Bus and LoRa module at 169 MHz, making it ideal for hard to reach meters and devices. Using NXP’s Kinetis® family of MCUs, it is also suitable for other ISM-band applications.

The AM091 provides a highly integrated, cost-effective solution for 169 MHz applications, is configurable for up to 700 mW transmission power output, embedded modem. It is supplied with an EN13757-4 compliant Wireless M-Bus software stack and is also suitable for other 169 MHz ISM-band communications standards. The module uses an AT command interface and supports very low current standby for battery powered applications.

Key applications include connectivity for Smart Metering, Internet of Things, Smart Homes, battery operated devices and similar.

### Features

**Wireless modem**
- Use in stand-alone modem mode, or embed user application on-board

**RF Operation**
- Narrow-band operation in the 169 MHz band.
- Receiver continuously optimises operating conditions to reduce packet error rate.

**Transmit RF Performance**
- +27dBm at 3.3V (700 mW at 169 MHz)
- Up to +28.5 dBm max output
- Output power fully controllable.

**Link RF Performance**
- Receive sensitivity to -123dBm in FSK mode.
- Receive sensitivity to -148dBm in Spread Spectrum mode.

#### Benefits

- LoRa® extended range beyond 15 km
- High performance, receive sensitivity to -148dBm
- Massive link budget up to 175 dB
- Upto +28.5 dBm Max Power Output
- Power amplifier on board
- AES128 and AES256 encryption / decryption
- Includes EN13757-4 compliant protocol stack
- Full access to on-board MCU
- Compact, standard footprint 20.3 x 17.8 mm
- Speed time to market

### Long-Range Operation

- Spread spectrum operating mode using LoRa technology
- Increases link budget by up to 25dB
- Exceptional transmission range (up to 15km)
- For use in radio-poor environments

### Hardware

- ARM® 32-bit Cortex M0+ MCU
- Semtech SX1278 transceiver
- NXP Kinetis

### Software:

- Full low level platform drivers and EN13757-4:2013 Wireless M-Bus RF stack level drivers provided
- AES-256 encryption and decryption
- Supports Wireless M-Bus N mode
- Suitable for Italian CIG specification
### Technical Specifications

<table>
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<th>Details</th>
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<tr>
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<td>SX1278 Sub-1 GHz Smart Radio</td>
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<tr>
<td><strong>MCU</strong></td>
<td>ARM® 32-bit Cortex M0+ MCU</td>
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<tr>
<td><strong>Program memory</strong></td>
<td>128 KB flash</td>
</tr>
<tr>
<td><strong>Data memory</strong></td>
<td>16KB RAM; Dataflash emulated in program flash</td>
</tr>
<tr>
<td><strong>Supply Voltage</strong></td>
<td>2.4 - 3.6 V modem</td>
</tr>
<tr>
<td><strong>PA Voltage</strong></td>
<td>2.7 - 4.2 V (+27dBm at 3.3V)</td>
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<td><strong>Max output power</strong></td>
<td>up to +28.5dBm (power amplifier included on board)</td>
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<tr>
<td><strong>Sensitivity</strong></td>
<td></td>
</tr>
<tr>
<td>1.2 kbits/s FSK</td>
<td>-123 dBm</td>
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<tr>
<td>38.4 kbits/s FSK</td>
<td>-109 dBm</td>
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<tr>
<td>7.8KHzBW</td>
<td>-148 dBm; (SF=12 Spread Spectrum)</td>
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<td><strong>Current Consumption</strong></td>
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<tr>
<td>RX</td>
<td>16 mA</td>
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<tr>
<td>TX (13dBm)</td>
<td>33 mA</td>
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<tr>
<td>TX (27dBm)</td>
<td>380 mA</td>
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<tr>
<td>Sleep (RTC running)</td>
<td>TBD µmA</td>
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<tr>
<td>Deep sleep</td>
<td>TBD µmA</td>
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<tr>
<td><strong>Temperature range</strong></td>
<td>- 40 °C / + 85 °C</td>
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<tr>
<td><strong>Physical Dimensions</strong></td>
<td></td>
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<tr>
<td></td>
<td>20.3 x 17.8 x 2.5 mm size (standard footprint)</td>
</tr>
<tr>
<td></td>
<td>1.27mm half-holes for mass production</td>
</tr>
<tr>
<td></td>
<td>External edge RF connection</td>
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</tbody>
</table>

### Hardware

- CMOS UART interface
- 16 bit high-speed ADC
- 12 bit high-speed DAC
- Additional GPIO and interrupts, with software-configured Count and Wake-up inputs
- SWD debug interface

### Software

- EN13757-4:2013 Wireless Meter-Bus stack
- AT command interface for stand-alone modem operation, optional binary mode for reduced compact modem communications
- Built-in profiles for rapid mode switching
- Software-definable frequency bandwidth and power level within entire 169 MHz ISM-band for other applications
- M-Bus N mode packet interface
- AES 256 encryption and decryption
- API to add higher layer M-Bus protocol
- API to allow other protocols to be added
- Packet sniffer and network formation modes
- Power management
- Example gas meter application
- EN13757-4:2013 Wireless M-Bus stack

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