**LM072 Bluetooth® Module**

Standalone (With Embedded Bluetooth® v2.0/v2.1 Stack)

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**Features**

- Bluetooth® v2.0, v2.1 wireless technology
- 18 dBm Tx Output Power and -82 dBm Rx Sensitivity
- SPP and HID available
- Configurable with AT Command Set
- Up to 100m range (in open space)
- 28.2mm x 15mm x 2.8mm
- Extensive Technical Support Available
- RF Antenna Interface
- UART, USB 2.0 (Full Speed), AIO and PIO Interfaces
- RTS/CTS Flow control UART lines
- PCM Audio Interfaces
- Configurations pre-installed on production
- SMT Side and Bottom Pads for easy production
- See our website for this products certifications.
- RoHS, REACH and WEEE

**Typical Applications**

- Serial Communications
- Medical Devices
- Domestic and Industrial Applications
- Embedded Devices
- Remote Monitoring and Control
- GPS, POS, Barcode Readers
- Payment Terminals

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**Overview**

The LM072 Bluetooth® v2.0, v2.1 data module provides a secure and reliable Bluetooth® Classic connection. This wireless connection reaches a range of up to 100m in open space, with the option to add an antenna that suits your requirements e.g. a dipole and PCB antenna. The selected antenna could provide a longer range, omnidirectional or unidirectional connection with nearby Bluetooth® Classic devices.

The module acts as a standalone unit (i.e. no external MCU required) and can interface with embedded microcontrollers via UART. Peripheral devices can be directly controlled by the module to suit the user application. LM offer technical support to the developer and can create new user applications for the module.

The AT Command set makes configuration of the firmware simple. The developed firmware and settings can be preloaded to the module, simplifying the manufacturing and testing process. Its SMT side and bottom pads allows for easy integrations into your embedded system.
**General Specification**

### Wireless
- **Bluetooth® Standard**: v2.0, v2.1 wireless technology
- **Module Type**: Standalone (Configurable with AT Commands)
- **Profiles**: SPP and HID

### Hardware
- **Chipset**: CSR
- **Antenna**: RF Antenna Interface (Pin 37)
- **Flash Memory**: 8 Mbit
- **RAM**: 48 KB
- **Program Interface**: SPI
- **Interfaces**: UART, USB 2.0, AIO and PIO
- **UART lines**: RxD, TxD, RTS, CTS and GND
- **Full Duplex (UART)**: Yes
- **Baud Rate (UART)**: 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6, 115.2, 230.4, 460.8 and 921.6 Kbps
- **Audio Interfaces**: PCM
- **Power Supply**: 3V3
- **Crystal Oscillator**: 26 MHz

### RF Characteristics
- **Tx Output Power**: 18 dBm (Maximum)
- **Rx Sensitivity**: -82 dBm (Typical)
- **Current Consumption (Cont. RX)**: 114 mA (Maximum)
- **Range**: Up to 100m (in open space)
- **Data Rate**: Up to 3Mbps
- **Frequency**: 2.4GHz to 2.485 GHz
- **Hopping**: 1,600/sec, 1MHz channel space
- **Modulation Scheme**: GFSK-Mbps, DQPSK-2 Mbps, and 8-DPSK-3Mbps

### Physical Characteristics
- **Operating Temperature**: -10°C to +70°C
- **Dimensions (L x W x H)**: 28.2mm x 15mm x 2.8mm
- **Weight**: 2.29g +/- 0.25g tolerance
- **Certifications**: See our website for this products certifications.
- **Compliance**: RoHS, REACH and WEEE
# Pin Assignments

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>GND</td>
<td>Ground</td>
<td>Common Ground</td>
</tr>
<tr>
<td>2</td>
<td>PVCC</td>
<td>Power</td>
<td>Power Amp. Power supply (3.3V)</td>
</tr>
<tr>
<td>3</td>
<td>AIO 0</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>4</td>
<td>AIO 1</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>5</td>
<td>PIO 0</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>6</td>
<td>PIO 1</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>7</td>
<td>PIO 2</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>8</td>
<td>PIO 3</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>9</td>
<td>PIO 4</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>10</td>
<td>GND</td>
<td>Ground</td>
<td>Common Ground</td>
</tr>
<tr>
<td>11</td>
<td>PIO 5</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>12</td>
<td>PIO 6</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>13</td>
<td>PIO 7</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>14</td>
<td>PIO 8</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>15</td>
<td>PIO 9</td>
<td>I/O</td>
<td>Programmable Input / Output</td>
</tr>
<tr>
<td>16</td>
<td>RESET</td>
<td>CMOS</td>
<td>Reset Input of Module, Active Low</td>
</tr>
<tr>
<td>17</td>
<td>VCC</td>
<td>Power</td>
<td>Module input Supply, 3.3V DC</td>
</tr>
<tr>
<td>18</td>
<td>GND</td>
<td>Ground</td>
<td>Common Ground</td>
</tr>
<tr>
<td>19</td>
<td>GND</td>
<td>Ground</td>
<td>Common Ground</td>
</tr>
<tr>
<td>20</td>
<td>USB_DP</td>
<td>I/O</td>
<td>USB Data Plus</td>
</tr>
<tr>
<td>21</td>
<td>USB_DN</td>
<td>I/O</td>
<td>USB Data Minus</td>
</tr>
<tr>
<td>22</td>
<td>PCM_SYNC</td>
<td>I/O</td>
<td>Synchronous Data Sync</td>
</tr>
<tr>
<td>23</td>
<td>PCM_IN</td>
<td>CMOS</td>
<td>Synchronous Data Input</td>
</tr>
<tr>
<td>24</td>
<td>PCM_OUT</td>
<td>CMOS Output</td>
<td>Synchronous Data Output</td>
</tr>
<tr>
<td>25</td>
<td>PCM_CLK</td>
<td>I/O</td>
<td>Synchronous Data Clock</td>
</tr>
<tr>
<td>26</td>
<td>UART_RX</td>
<td>CMOS Input</td>
<td>UART Data Input</td>
</tr>
<tr>
<td>27</td>
<td>UART_TX</td>
<td>CMOS Output</td>
<td>UART Data Output</td>
</tr>
<tr>
<td>28</td>
<td>UART_RTS</td>
<td>CMOS Output</td>
<td>UART Request to Send (Active Low)</td>
</tr>
<tr>
<td>29</td>
<td>GND</td>
<td>Ground</td>
<td>Common Ground</td>
</tr>
<tr>
<td>30</td>
<td>UART_CTS</td>
<td>CMOS Input</td>
<td>UART Clear to Send (Active Low)</td>
</tr>
<tr>
<td>31</td>
<td>SPI_MOSI</td>
<td>CMOS Input</td>
<td>Serial Peripheral Interface Data Input</td>
</tr>
<tr>
<td>32</td>
<td>SPI_CSB</td>
<td>CMOS Input</td>
<td>Chip Select for Serial Peripheral Interface (Active Low)</td>
</tr>
<tr>
<td>33</td>
<td>SPI_CLK</td>
<td>CMOS Input</td>
<td>Serial Peripheral Interface Clock</td>
</tr>
<tr>
<td>34</td>
<td>SPI_MISO</td>
<td>CMOS Output</td>
<td>Serial Peripheral Interface Data Output</td>
</tr>
<tr>
<td>35</td>
<td>PIO 11</td>
<td>I/O</td>
<td>Programmable Input Output</td>
</tr>
<tr>
<td>36</td>
<td>PIO 10</td>
<td>I/O</td>
<td>Programmable Input Output</td>
</tr>
<tr>
<td>37</td>
<td>RF_IO</td>
<td>Analogue</td>
<td>Antenna Interface</td>
</tr>
<tr>
<td>38</td>
<td>GND</td>
<td>Ground</td>
<td>Common Ground</td>
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</table>
General Electrical Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
<th>Min</th>
<th>Typical</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carrier Frequency</td>
<td>-</td>
<td>2.402</td>
<td>-</td>
<td>2.480</td>
<td>GHz</td>
</tr>
<tr>
<td>RF Output Power</td>
<td>Measured with 50Q ant</td>
<td>15</td>
<td>16.5</td>
<td>18</td>
<td>dBm</td>
</tr>
<tr>
<td>Rx Sensitivity</td>
<td>-</td>
<td>-</td>
<td>-88</td>
<td>-86</td>
<td>dBm</td>
</tr>
<tr>
<td>Load Impedance</td>
<td>No abnormal oscillation</td>
<td>-</td>
<td>-</td>
<td>5.1</td>
<td>-</td>
</tr>
<tr>
<td>Input Low Voltage</td>
<td>RESET, UART, GPIO, PCM</td>
<td>-0.3</td>
<td>-</td>
<td>0.8</td>
<td>DCV</td>
</tr>
<tr>
<td>Input High Voltage</td>
<td>RESET, UART, GPIO, PCM</td>
<td>0.7VDD</td>
<td>-</td>
<td>VDD+0.3</td>
<td>DCV</td>
</tr>
<tr>
<td>Output Low Voltage</td>
<td>UART, GPIO, PCM</td>
<td>-</td>
<td>-</td>
<td>0.4</td>
<td>DCV</td>
</tr>
<tr>
<td>Output High Voltage</td>
<td>UART, GPIO, PCM</td>
<td>VDD-0.4</td>
<td>-</td>
<td>-</td>
<td>DCV</td>
</tr>
<tr>
<td>Average Current Consumption</td>
<td>Receive DM1</td>
<td>-</td>
<td>114</td>
<td>-</td>
<td>mA</td>
</tr>
</tbody>
</table>

Block Diagram

Note: USB and PCM interface are not handled by LM firmware at present

Factory Settings

The factory settings of the COM Port are as follows:

- Baud Rate: 19200 bps
- Data Bits: 8
- Parity: None
- Stop Bits: 1
- Flow Control: Hardware (BT2.0) or None (BT2.1)
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### Electrical Characteristics

#### Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-40</td>
<td>+85</td>
<td>°C</td>
</tr>
<tr>
<td>Supply Voltage (VDD)</td>
<td>+2.7</td>
<td>+3.6</td>
<td>V</td>
</tr>
<tr>
<td>Supply Voltage (PVCC)</td>
<td>+3.0</td>
<td>+3.6</td>
<td>V</td>
</tr>
<tr>
<td>All other pins</td>
<td>VSS - 0.4</td>
<td>VDD+0.4</td>
<td>V</td>
</tr>
</tbody>
</table>

#### Recommended Operating Conditions

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Min</th>
<th>Max</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>-20</td>
<td>+75</td>
<td>°C</td>
</tr>
<tr>
<td>Supply Voltage (VDD)</td>
<td>+3.0</td>
<td>+3.3</td>
<td>V</td>
</tr>
<tr>
<td>Supply Voltage (PVCC)</td>
<td>+3.0</td>
<td>+3.3</td>
<td>V</td>
</tr>
</tbody>
</table>

### Dimensions

All measurements in mm

![Top View Diagram](image)
**Tape and Reel Packaging**

**Tape Dimensions**

- Width: 4mm
- Height: 30.7mm
- Spacing: 3.25mm
- Pitch: 0.32mm
- Length: 330mm

**Reel Dimensions**

- Diameter: 330mm

**Notes**

- Carton Dimensions (L x W x H): 360mm x 280mm x 370mm

**Quantities**

- 900 modules per Tape
- 4 Boxes per Carton
- 3600 modules per Carton
LM072 Bluetooth® Module
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Tray Packaging

Tray Dimensions

Notes
- Anti-Static PS Tray, Black.
- Electrical Resistance: $1 \Omega < R < 100 \Omega$.
- Thickness: $T = 0.8$ mm
- Carton Dimensions (L x W x H):
  312mm x 141mm x 7.5mm

Quantities
- 40 modules per Tray
- 400 modules per Box
- 4 Boxes per Carton
- 1600 modules per Carton
FCC Warning
This 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.

NOTE 1
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.

NOTE 2
Any 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.

FCC Radiation Exposure Statement
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. End users must follow the specific operating instructions for satisfying RF exposure compliance.

Note 1
This module certified that complies with RF exposure requirement under portable or mobile or fixed condition, this module is to be installed only in portable or mobile or fixed applications.

A portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

A mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

A fixed device is defined as a device is physically secured at one location and is not able to be easily moved to another location.

Note 2
Any modifications made to the module will void the Grant of Certification, this module is limited to OEM installation only and must not be sold to end-users, end-user has no manual instructions to remove or install the device, only software or operating procedure shall be placed in the end-user operating manual of final products.

Note 3
The device must not transmit simultaneously with any other antenna or transmitter.
FCC Radiation Exposure Statement (Continued)

Note 4
To ensure compliance with all non-transmitter functions the host manufacturer is responsible for ensuring compliance with the module(s) installed and fully operational. For example, if a host was previously authorized as an unintentional radiator under the Declaration of Conformity procedure without a transmitter certified module and a module is added, the host manufacturer is responsible for ensuring that the after the module is installed and operational the host continues to be compliant with the Part 15B unintentional radiator requirements. Since this may depend on the details of how the module is integrated with the host, LM Technologies Ltd shall provide guidance to the host manufacturer for compliance with the Part 15B requirements.

Note 5
FCC ID label on the final system must be labeled with “Contains FCC ID: VVXLM072” or “Contains transmitter module FCC ID: VVXLM072”.

The transmitter module must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the host product. LM Technologies Ltd is responsible for the compliance of the module in all final hosts.
## Datasheet Version Notes

<table>
<thead>
<tr>
<th>Version</th>
<th>Date</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>v1.0</td>
<td>13 MAR 2018</td>
<td>Added version notes to datasheet.</td>
</tr>
<tr>
<td>v2.0</td>
<td>1 MAY 2018</td>
<td>New LM072 version 2 release (with new power amplifier replacing previous).</td>
</tr>
<tr>
<td>v2.1</td>
<td>29 MAY 2018</td>
<td>New Part Numbers released for LM072 version 2.</td>
</tr>
<tr>
<td>v2.2</td>
<td>2 AUG 2018</td>
<td>Part Number Revisions added for LM072 version 2. (See Last Page)</td>
</tr>
</tbody>
</table>
LM072 Bluetooth® Module
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LM072 Packaging Options

**Bluetooth® v2.0**

072-3110
Previously 072-0110

LM072 Bluetooth® v2.0 Module
MOD SMT PROG BT2.0 USB_UART Fw6.6.x 1.8-3.3v No-ANT SP

072-3111
Previously 072-0111

LM072 Bluetooth® v2.0 Module
MOD SMT PROG BT2.0 USB_UART Fw6.6x 1.8-3.3v No-ANT TRAY

072-3112
Previously 072-0112

LM072 Bluetooth® v2.0 Module
MOD SMT PROG BT2.0 USB_UART Fw6.6x 1.8-3.3v No-ANT T&R

**Bluetooth® v2.1**

072-3115

LM072 Bluetooth® v2.1 Module
MOD SMT PROG BT2.1 USB_UART Fw6.1x 1.8-3.3v No-ANT TRAY

072-3126

LM072 Bluetooth® v2.1 Module
MOD SMT PROG BT2.1 USB_UART Fw6.1x 1.8-3.3v No-ANT T&R

072-3127

LM072 Bluetooth® v2.1 Module
MOD SMT PROG BT2.1 USB_UART Fw6.1x 1.8-3.3v No-ANT T&R

● Product User Guides, Manuals and Configuration Software is available to download via our website - [http://www.lm-technologies.com/downloads](http://www.lm-technologies.com/downloads)