

LPMS-USBAL2

Quick Start Guide ver. 1.1



LP-RESEARCH Inc.
<http://www.lp-research.com>

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I. Introduction

Welcome to the LP-RESEARCH Motion Sensor LPMS-USBAL2 Quick Start Guide.

In this documentation we will explain everything you need to know to quickly set up the LPMS-USBAL2 hardware, install its software and get started with sensor data acquisition. We have put a lot of effort into making the LPMS-USBAL2 a great product, but we are always eager to improve and work on new developments. If you have any further questions or comments regarding this documentation please feel free to contact us anytime.

For more information on the LPMS-USBAL2 or other product series, please refer to datasheets and user manuals, available from the LP-RESEARCH website at the following address: <http://www.lp-research.com>.



II. Document Revision History

Date	Revision	Changes
2016-06-01	1.0	- Initial release.
2016-10-01	1.1	- Add the tables of relations between baudrate and data update rate.



III. Device Specification

Table 1. LPMS-USBAL2 Main Specification

Parameters	LPMS-USBAL2
Output range of Euler angle	Roll: $\pm 90^\circ$; pitch: $\pm 180^\circ$; Yaw: $\pm 180^\circ$
Bandwidth	400Hz
Resolution	0.01 $^\circ$
Accuracy	$<0.5^\circ$ (Static), $<2^\circ$ RMS (Dynamic)
Max. instant impact (0.1 ms)	10,000 g
Output data type	Raw data/Euler/Quaternion/Linear acceleration/Air pressure/Altitude/Temperature
Internal sampling rate	400 Hz
Communication interface	USB
Max. baudrate	921600 bps
Communication protocol	LPBUS
Size	48x40x25 mm
Weight	67.5 g
Max. data update rate	400Hz
Power consumption	155mW@3.3V
Power supply	5V DC
Working temperature	-40~+80 $^\circ\text{C}$
Connector	Micro USB-B



Table 2. Accelerometer Specification

Parameters	Typical Value	Unit
Measurement range	$\pm 2 / \pm 4 / \pm 8 / \pm 16$	g
Sensitivity	0.061/0.122/0.244/0.488	mg/LSB
Linear acceleration sensitivity change vs. temperature	± 1	%
Linear acceleration typical zero-g level offset accuracy	± 40	mg
Linear acceleration zero-rate change vs. temperature	± 0.5	mg/°C
Acceleration noise density	90 (FS= ± 2 g ODR = 104 Hz)	$\mu\text{g}/\sqrt{\text{Hz}}$

Table 3. Gyroscope Specification

Parameters	Typical Value	Unit
Measurement range	$\pm 125 / \pm 245 / \pm 500 / \pm 1000 / \pm 2000$	dps
Sensitivity	4.375/8.75/17.50/35/70	mdps/LSB
Angular rate sensitivity change vs. temperature	± 1.5	%
Angular rate typical zero-rate level	± 10	dps
Angular rate typical zero-rate level change vs. temperature	± 0.05	dps/°C
Rate noise density	7	mdps/ $\sqrt{\text{Hz}}$
Angular random walk	9	degree/hour

Table 4. Magnetometer Specification

Parameters	Typical Value	Unit
Measurement range	$\pm 4 / \pm 8 / \pm 12 / \pm 16$	Gauss
Sensitivity	6842/3421/2281/1711	LSB/gauss
Zero-gauss level	± 1	gauss



RMS noise (Ultra-high-performance mode)	X axis	3.2	mgauss
	Y axis	3.2	mgauss
	Z axis	4.1	mgauss
Non-linearity	±0.12		%FS

Table 5. Pressure and Humidity Sensor Specification

Parameters	Typical Value	Unit
Pressure measurement range	300~1100	hPa
Temperature coefficient of offset	±1.5	Pa/K
Absolute accuracy pressure	±1.0	hPa
Pressure sensitivity	0.18	Pa
Pressure noise	1.3	Pa
Humidity measurement range	0~100	%RH
Humidity accuracy	±3	%RH
Humidity latency (10~90~10 %RH, 25 °C)	±1	%RH
Humidity sensitivity	0.008	%RH
Humidity noise	0.02	%RH
Humidity stability (10~90 %RH, 25 °C)	0.5	%RH/year

Table 6. Relation between RS232 Baudrate and Max. Update Rate

Baudrate (bps)	Max. Update Rate (Hz)
19200	10
57600	50
115200	100
921600	400

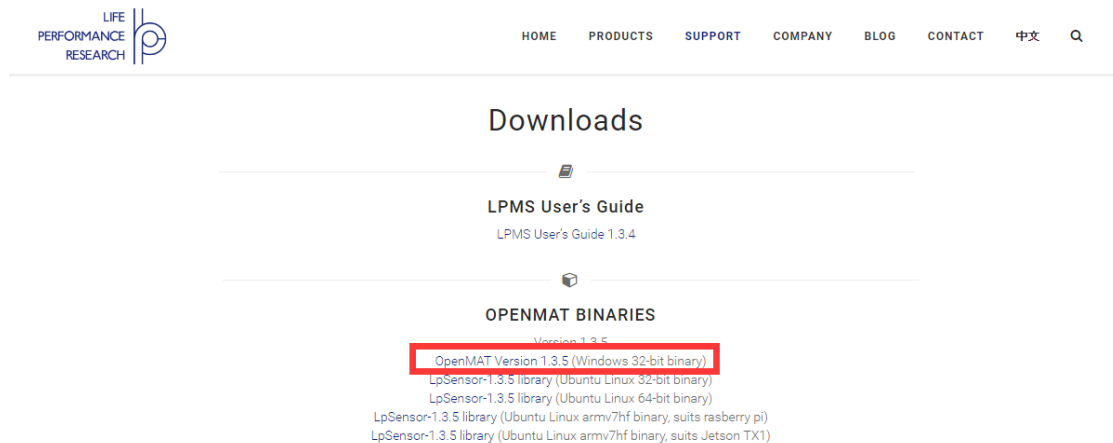


IV. Operation

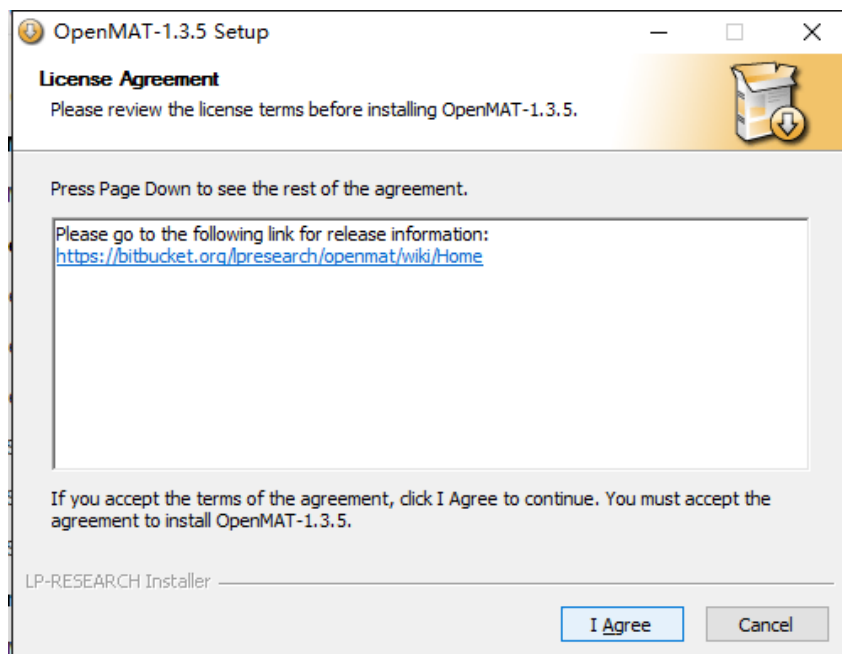
OpenMAT Software Installation

We offer windows OS based software called LpmsControl for users to easily manipulate the LPMS-USBAL2 sensor. The LpmsControl software is a sub program of OpenMAT software. Please choose a correct version of OpenMAT software from our homepage based on the operation system specification. The followings show an example of installing the OpenMAT software under Windows 7 32bit system.

- 1) Go to: <http://www.lp-research.com/support/>, and download the latest version of OpenMAT for the sensor, like OpenMAT Version 1.3.5 (Windows 32-bit binary) showed as below.

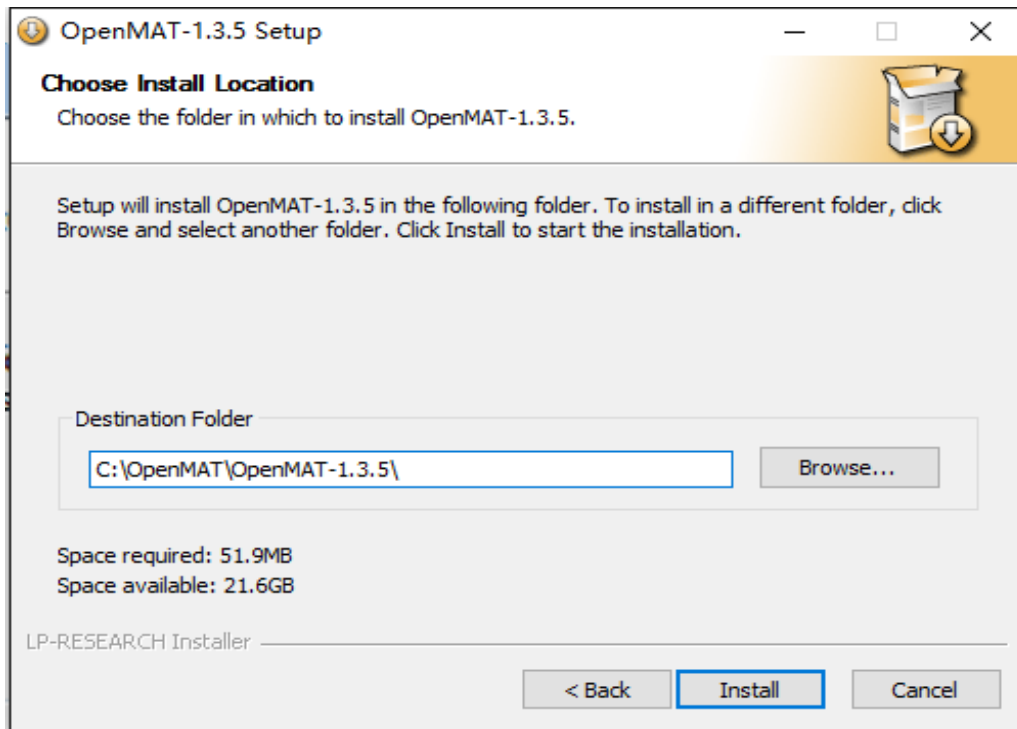


- 2) Run the installer after the download process is finished, and push the "I Agree" button for the next step.

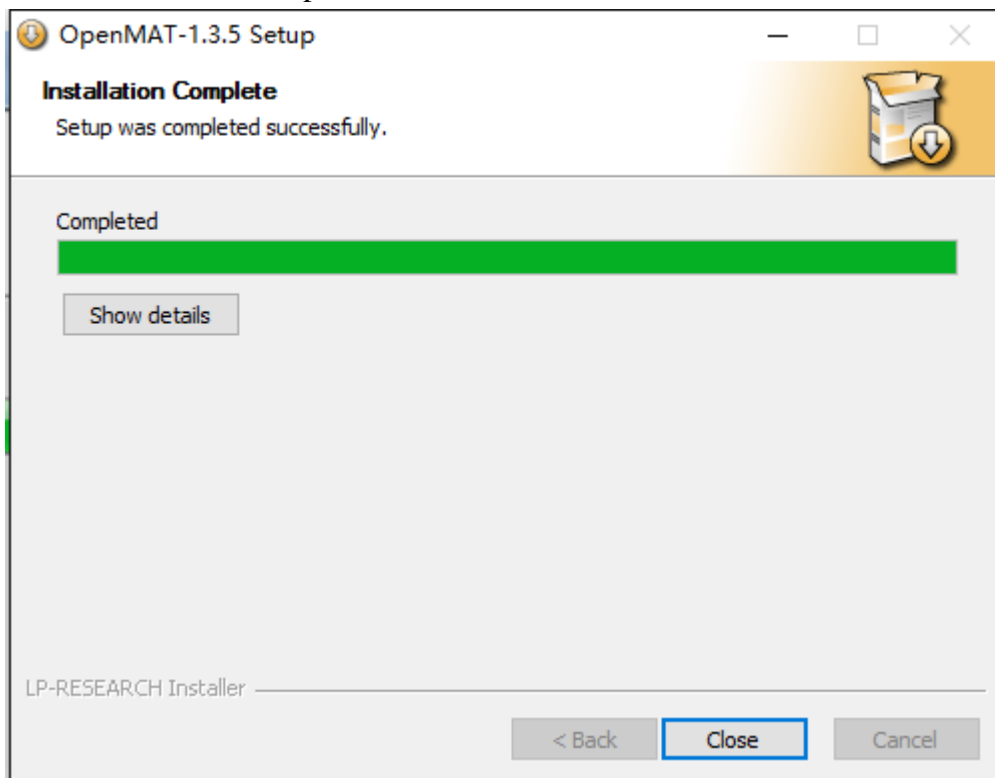




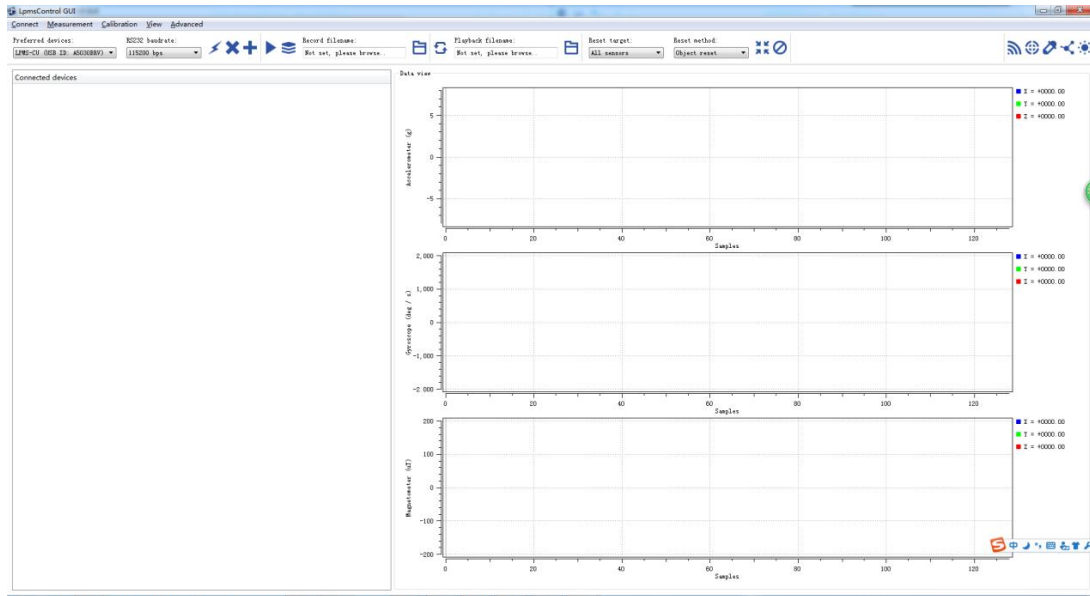
Push the "Browse" button to select the installation path of the program, and then push "Install" to start the installation process.



Push the "Close" button to complete the installation.



To run the LpmsControl software from the start menu of your windows system, you can see the following interface.



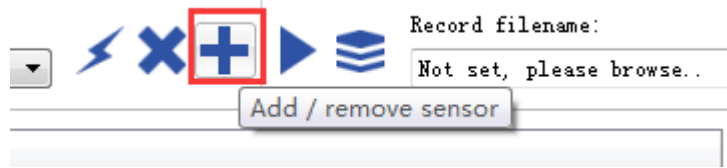
Connection with PC

Users can connect LPMS-USBAL2 to a PC via USB port. After plugging in, windows operation system will activate the installation of USB drivers automatically. USBXpress device will be showed up in the device manager if the driver has been installed successfully, seen as following.

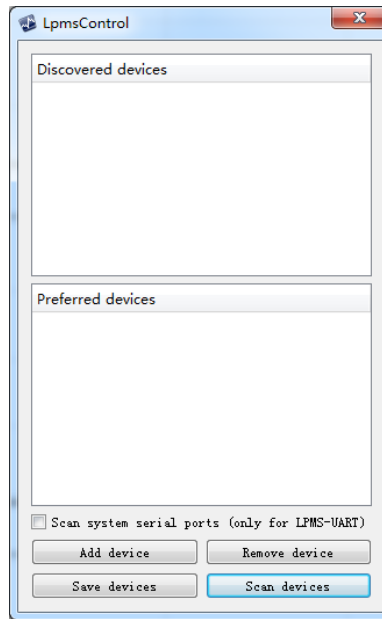


Please follow the instructions below to complete the remaining steps.

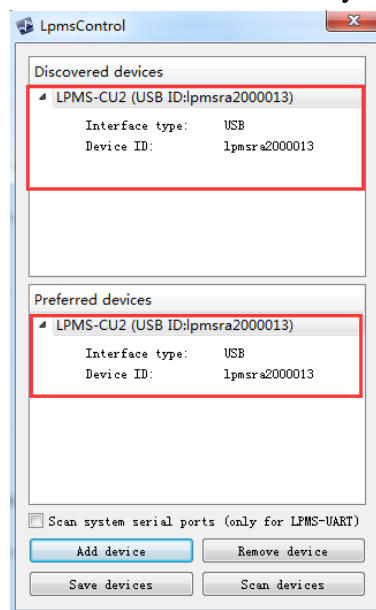
- 1) To select the "Add/remove sensor" under "Connect" menu or click the "+" button on toolbar of LpmsControl.



The "add device" window will pop out, as following.

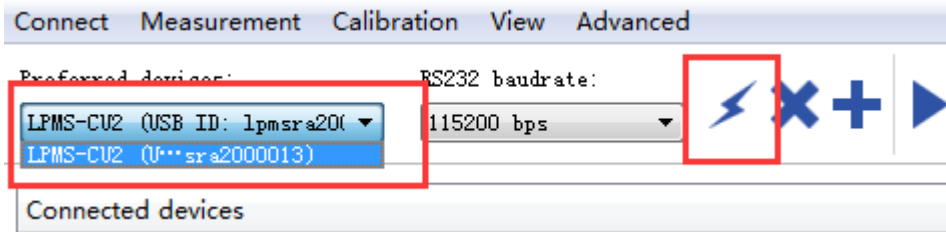


- 2) To click the "Scan devices" button and start the device discovery process. Please wait until the process is done.
- 3) To select the target sensor ID from the "Discovered devices" list, for example, "LPMS-CU2 (USB ID: lpmsra2000013)" in the following image.
- 4) To add the selected sensor to "Preferred devices" list by clicking the "Add device" button.

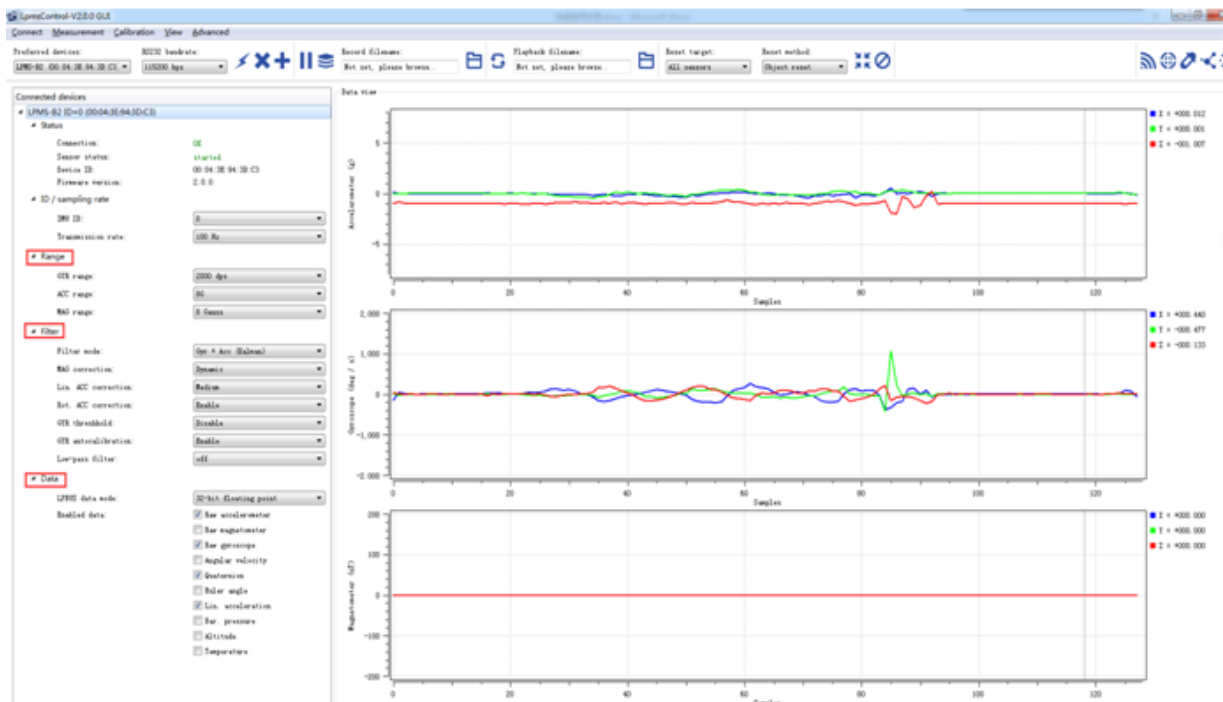




- 5) To click the "Save devices" button to save the preferred devices list, and return to main interface of LpmsControl.
- 6) To select the target sensor ID from the Preferred devices list, and click Connect function under "Connect" menu or click the lightning button on toolbar to connect the sensor.



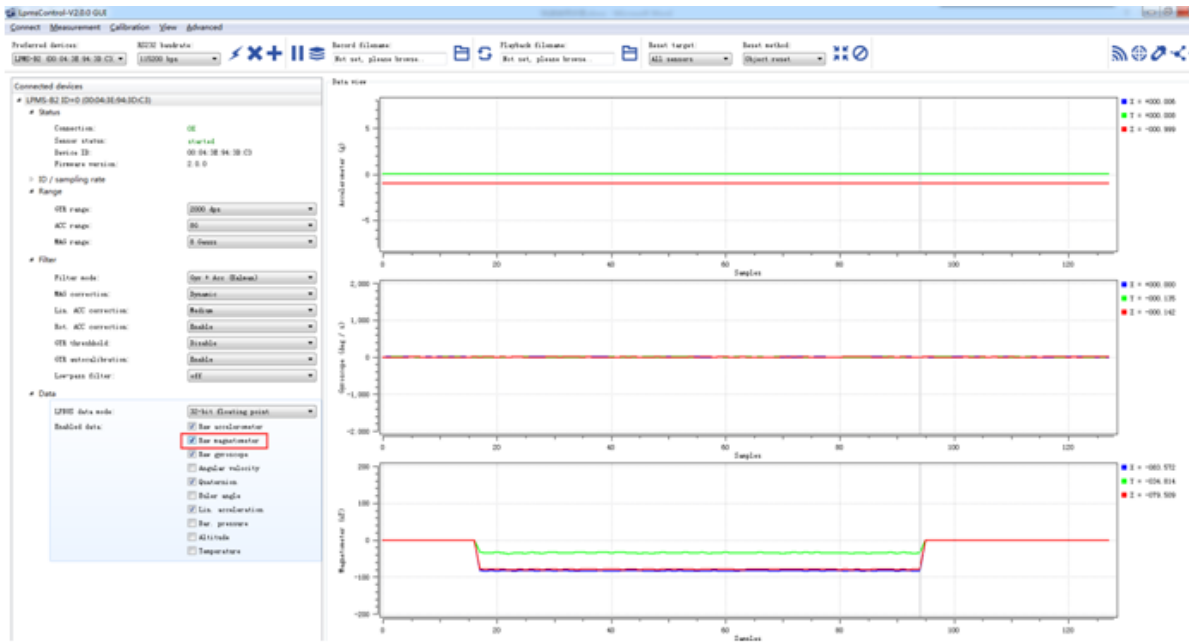
After completing all the steps above, the LPMS-USBAL2 should have been connecting with windows system. Users can check all the data visualization and parameter settings of the sensor from LpmsControl.



On the left side of the main interface of LpmsControl, users can change the sensor settings, like measurement range, filter modes, data updating rate, etc. Moreover, the types of output data can be modified by checking or unchecking the check box of each parameter. For example, in the following image the "raw magnetometer" is checked so that the acquisition of magnetic data is enabled.



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For more information, please refer to our product datasheets and product manuals.

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