

## AN-010 API Interface Specification

OmniPreSense modules have an easy to use API to control the output of the modules. The simple commands can be used to configure the operation and output information provided by the module. Default settings are noted below. Upon powering on the module, the default settings are used.

### Terminal Control

A simple Command Terminal can be used to control the module operation with the API commands. Examples of simple but very useful Command Terminals are [Tera Terminal](#) and [PuTTY](#). Both are free, open source terminal tools for the PC/Mac which can easily connect to a serial port and accept data over USB from the OminPreSense module.

To begin using the OmniPreSense module, first download Tera Terminal or PuTTY onto your PC/Mac. With the OmniPreSense module plugged into the USB port of your PC/Mac, start Tera Terminal or PuTTY. A configuration window such as in Figure 1 or Figure 2 will appear. TeraTerm can detect the active COM port (greyed out to right of Serial button if TCP/IP is selected). Select the Serial button and press OK. For PuTTY, you'll need to know which COM port is used, set its value, select the Serial button, and Open.

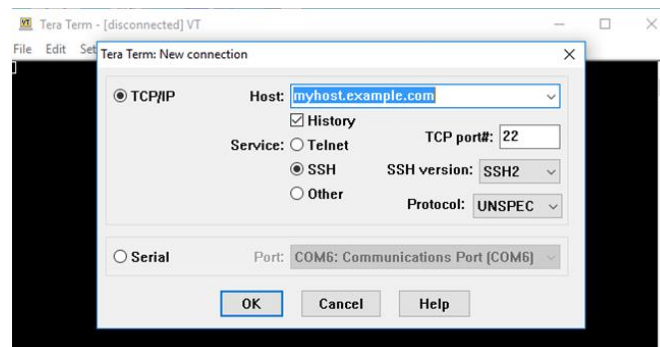


Figure 1. Tera Term Startup Menu

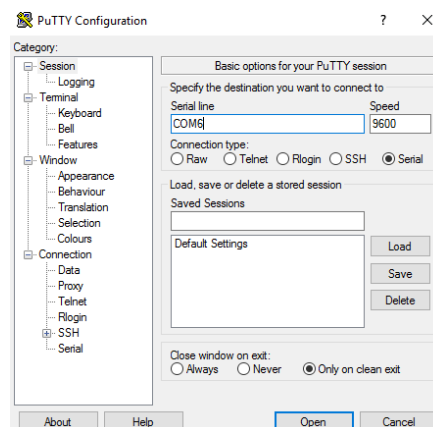


Figure 2. PuTTY Startup Menu

Once connected, the data reported by the module will start streaming to the terminal when an object in motion appears. The default settings are shown in Table 1. If there is no object moving in front of the module, no data is reported or streamed to the terminal. A simple wave of the hand will show data like that shown in Figure 3. Any of the API commands can now be executed to change the output data or query the configuration.



Figure 3. Streaming Data with Tera Term

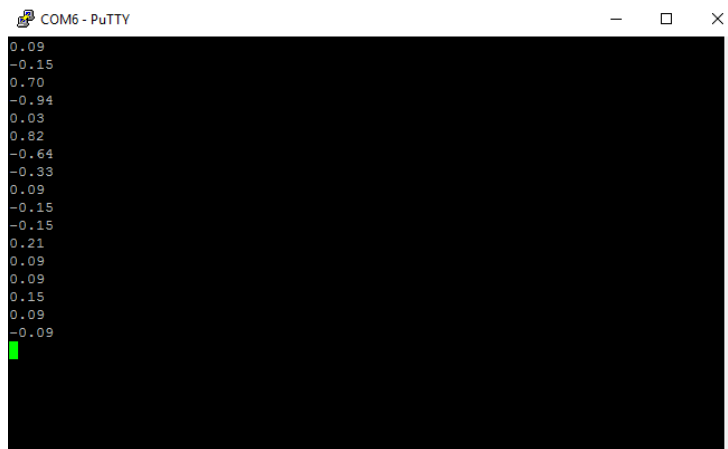


Figure 4. Streaming Data with PuTTY

## Default Settings

The default settings of the module are set to provide solid performance over a wide range of applications. Upon power-up the default settings are set and operation begins. Future updates will allow the module to retain the settings of the module from the last operation. The default settings are listed in Table 1.

*Table 1. Default Settings*

<b>API Command</b>	<b>API Command</b>	<b>Default Value</b>
Output Units	UM	m/s
Data Accuracy	F2	2
Sample Frequency	SX	10,000
Raw Data Output	Or	Off
JSON Output	Oj	Off
Direction Control	OD	On
Module Power	PA	Active

## Operating Range

The maximum speed reported is determined by the Sampling Frequency. For slow moving objects, a sample rate of 5,000 (SV command) is perfectly fine. The default setting of 10,000 (SX command) provides a detectable speed of up to 31.1 m/s (69.5 mph) while 20,000 (S2 command) provides up to 62.2 m/s (139.1 mph). The accuracy of the reported speed increases as the sample frequency goes down. The range of values is summarized in Table 2.

*Table 2. Maximum Operating Speeds*

<b>Sample Frequency</b>	<b>API Command</b>	<b>Maximum Speed (m/s)</b>	<b>Maximum Speed (mph)</b>	<b>Accuracy (m/s)</b>	<b>Accuracy (mph)</b>
1,000	SI	3.1	7.0	0.006	0.014
5,000	SV	15.5	34.8	0.030	0.068
10,000	SX	31.1	69.5	0.061	0.136
20,000	S2	62.2	139.1	0.121	0.272
50,000	SL	155.4	347.7	0.304	0.679

## API Commands

The following are the API commands supported by the OPS241-A. These commands can be sent by typing into the command terminal to change settings on the module or control its operation. The commands provided include simple queries to fetch information about the module and its settings or write commands which control or change the operation of the module.

**Module Information** – returns information about the module and its reporting setting.

Command	Name	R/W	Value
??	Module Information	Read	{"Product":"OMPS241A"} {"Version":"0.9.0"} {"SamplingRate":10000, "resolution":0.0607} {"Clock":"20054"} {"PowerMode":"Continuous"}

**Module Part Number** – returns model number of module consisting of OmniPreSense ACPI vendor ID and part number.

Command	Name	R/W	Value
?P	Module Part Number	Read	{"Product":"OMPS241A"}

**Firmware Version** – returns current firmware version of the module. Firmware version consists of a major revision, minor revision, and patch revision in the form of xx.yy.zz.

Command	Name	R/W	Value
?V	Firmware Version Number	Read	{"Version":"1.0.0"}

**Speed Output Units** – read or set the units for the velocity output. Units supported include m/s (default), cm/s, ft/s, km/hr, and miles per hour.

Command	Name	R/W	Value
U?	Current Velocity Units	Read	{"Units":"m-per-sec"}
UC	Centimeters per second	Write	{"Units":"cm-per-sec"}
UF	Feet per second	Write	{"Units":"ft-per-sec"}
UK	Kilometers per hour	Write	{"Units":"km-per-hr"}
UM	Meters per second	Write	{"Units":"m-per-sec"}
US	Miles per hour	Write	{"Units":"mph"}

**Data Precision** – set the number of digits for the data reported.

Command	Name	R/W	Value
<i>Fn</i>	Decimal Places	Write	Set <i>n</i> to the number of decimal places to be reported. For example, setting to F2 will report 2 decimal places (ex. 10.35). F0 will provide the integer value only. Valid values of <i>n</i> are 0-5.

**Sampling Frequency** – set these values to control the sample frequency of the module. This setting has an effect on the output data and the rate at which the data is reported.

Command	Name	R/W	Value
SI	1K samples/second	Write	
SV	5K samples/second	Write	
SX or S1	10K samples/second	Write	
S2	20K samples/second	Write	
SL	50K samples/second	Write	

**Direction Control** – turns on or off the direction control reporting using Cross Correlation method. May not be made public.

Command	Name	R/W	Value
OD	Direction Cross Correlation On	Write	Direction message is reported when value is calculated.
Od	Direction Cross Correlation Off	Write	No direction information reported.

**Data Output** – set to control the data which is output.

Command	Name	R/W	Value
OF	FFT Output On	Write	Results from the FFT processing of each buffer will be sent. Each buffer is 1024 samples. Data is output with json output format.
Of	FFT Output Off	Write	Turns off FFT output.
OJ	json Mode On	Write	Turns on output to format data in json format. An example would output: {"speed":0.58, "direction":"inbound", "time":105, :tick":135}
Oj	json Mode Off	Write	Turns off json output mode.
OR	Raw ADC Output On	Write	I and Q output buffers from the ADC will be sent. Data will alternate between outputting the I buffer and then Q buffer.
Or	Raw ADC Output Off	Write	Turns off output of the I and Q buffers.

**Timing Report** – set to control the reporting of the time. The time is measured in seconds/milliseconds from power on of the module. Use the OJ command to have the time report the time in seconds and milliseconds along with the speed and direction information (or direction can be turned off). When the module is put in low power state, the clock will continue counting. If you wish for the module to provide “the real time”, then set it to “the Unix time” (see [wikipedia.org/wiki/Unix\\_time](http://wikipedia.org/wiki/Unix_time)).

Command	Name	R/W	Value
C?	Query Time	Read	Ex. {"Clock": "50"} reports 50 seconds since power on.
C=n	Set Time	Write	Reset the clock start time. For example, n = 10 will start the clock at 10 seconds and then continue counting.

**Module/Transmit Power** – set to control the operating mode (PA, PI, PP) or the transmit power. The typical maximum transmit power is 9 dB. Reducing the transmit power does not reduce the overall power consumption of the module. Note that the detection range will decrease with decreased transmit power.

Command	Name	R/W	Value
PA	Active Power Mode	Write	Normal operating mode.
PI	Idle Power Mode	Write	No activity, waits for Active Power command. The RF is powered down for further power savings.
PP	Single Shot Mode	Write	Use this mode to capture and process a single buffer of data. The module will stay in PP mode until either a PA or PI command is given. While in PP mode, the RF device is powered off to save power.
P7 or PN	Transmit Power Control or Min Power	Write	Transmit is set at -9 dB below max power.
P6	Transmit Power Control	Write	Transmit is set at -6 dB below max power.
P5	Transmit Power Control	Write	Transmit is set at -4 dB below max power.
P4	Transmit Power Control	Write	Transmit is set at -2.5 dB below max power.
P3 or PD	Transmit Power Control or Mid Power	Write	Transmit is set at -1.4 dB below max power. PD has additional “overdrive” of 0.2 dB when utilized.
P2	Transmit Power Control	Write	Transmit is set at -0.8 dB below max power.
P1	Transmit Power Control	Write	Transmit is set at -0.4 dB below max power.
P0 or PX	Transmit Power Control or Max Power	Write	Transmit power is set at its maximum value with maximum range. PX has additional “overdrive” of 0.2 dB when utilized.

**Duty Cycle Control** – set to control the duty cycle operation. The time set is the amount of time the module will sleep between transmit/receive pulses and processing. During the sleep time the orange LED will be on. For settings longer than 1 second, the RF will be powered off to save power. In this manner, lower power operation may be achieved.

Command	Name	R/W	Value
Z0	Sleep 0 Second	Write	Use to set back to normal operation.
Z1	Sleep 1 Second	Write	
ZV	Sleep 5 seconds	Write	
ZX or Z1	Sleep 10 seconds	Write	
ZL	Sleep 50 seconds	Write	
ZC	Sleep 100 seconds	Write	
Z2	Sleep 200 seconds	Write	
Z=n	Set Sleep Time	Write	Set the amount of time to sleep between data processing. Ex., n = 5 would set the module to sleep for 5 seconds (RF powered off) between a transmit/receive pulse and processing.

**Squelch Control** – provides control over the sensitivity of the module to detect moving objects. Low numbers are most sensitive, high numbers are least sensitive.

Command	Name	R/W	Value
Q1	Squelch Control - 10	Write	Highest sensitivity setting.
QV	Squelch Control - 50	Write	
QX	Squelch Control - 100	Write	
QL	Squelch Control - 500	Write	
QC	Squelch Control - 1000	Write	
Qn	Squelch Control	Write	Set <i>n</i> to the desired squelch number x 1000. For example, setting to Q2 will set the value to 2000. Valid values of <i>n</i> are 0-9. 0 provides no squelch control and all data will be reported.
Q=n	Squelch Control	Write	n = any arbitrary number between 1 and 4 billion.

**Debug Modes** – provides debug information about the module.

Command	Name	R/W	Value
DT	ANA Pin Tx Power	Write	ANA pin provides Tx power voltage.
Dt	ANA Pin Tx Power Reference	Write	ANA pin provides Tx power reference voltage. Use this combined with Tx Power number to calculate Tx power in dBm.
DF	Frequency Bin Info On	Write	Provides the calculated bin number and frequency.
Df	Frequency Bin Info Off	Write	Turns off frequency bin info.
DR/Dr	Red LED	Write	DR to turn on red LED, Dr to turn off.
DY/Dy	Yellow LED	Write	DY to turn on yellow LED, Dy to turn off.



## Revision History

Version	Date	Description
A	Apr. 19 2017	Initial release.