DESCRIPTION

The Paragon Robotics OE3x Modules integrate a low power, high performance wireless solution with Paragon's cutting-edge Halo/S data acquisition and control platform. With built-in data acquisition capabilities, as well as advanced control capability, the OE3x modules give OEMs the ability to quickly add full Halo/S capabilities to any sensor, control, or gateway. For more information on the Halo/S platform, please visit our website

For sensor and control manufacturers, the OE30/OE31 modules allow OEMs to quickly interface with almost any hardware imaginable. Built-in interfaces include analog, pulse counter, I2C, UART, PWM, frequency inputs, and capacitance sensing, allowing OEMs to simply connect sensor outputs to the module and entering the calibration information into the high-level GUI. The resulting device is a fully function Halo/S node, and instantly provides enterprise-grade data acquisition and advanced control capabilities.

For system integrators, the OE32 module provides a drop-in gateway solution for Halo/S networks. With SD card capability (up to 64GB storage) and a full built in networking stack including HTTP, DNS and DHCP servers and clients, the OE32 is truly a drop-in solution for providing a branded gateway for customers.

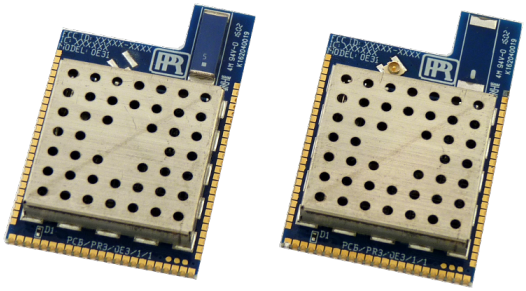

Fig 1: OE31 and OE33 Modules

FEATURES

- Ultra low power consumption (up to 10 years on AAA batteries)
- High performance RF transceiver
- +20dBm transmit power (+13dBm on OE30 module)
- -110dBm receiver sensitivity
- 49 general purpose I/O pins
- 11 12-bit ADC channels
- 11 capacitive sense inputs
- 11 multiplexed comparator inputs
- Integrated temperature sensor
- Built-in 128 segment LDC controller
- I^2C Interface
- Serial UART
- Low-power digital pulse counter
- Frequency input and output
- PWM input and output
- Full HTTP/DNS/DHCP server and client stack (OE32 module)
- Full AES-256 encryption and authentication (FIPS 197 compliant)
- SD card filesystem capabilities (OE32 module)
- Innovative Power-Interrupt Mode for data retention during momentary power loss.
- Compliant to RoHS Directive 2002/95/EC

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Specifications

Absolute Maximum Ratings

Table 1: Absolute Maximum Ratings

Parameter	Conditions	Min	Typ	Max	Units
Operating Temperature	–	-40	–	+85	C
VDD with respect to GND	–	-0.3	–	+3.6	V
Voltage on any I/O pin with respect to GND	–	-0.3	–	+5V	V
Current through any I/O pin)	–	–	–	100	mA
Current through all I/O pins	–	–	–	200	mA

DC Electrical Characteristics

Table 2: DC Electrical Characteristics

Parameter	Conditions	Min	Typ	Max	Units
Power Supply Voltage (Vdd)	–	1.8	3.3	3.6	V
Average Operating Current	V_{IN} = 3.3V, Wake cycle = 0.5Hz, No peripherals active	TBD	TBD	TBD	µA
Sleep Current	Vdd=3.3V, temp=25°C, OE3x in Sleep Mode	–	TDB	–	nA
Output High Voltage	Vdd=3.3V, temp=25°C	2.9	–	–	V
Output Low Voltage	Vdd=3.3V, temp=25°C	–	–	0.6	V
Input High Voltage	Vdd=3.3V, temp=25°C	2.9	–	–	V
Input Low Voltage	Vdd=3.3V, temp=25°C	–	–	0.6	V
Input Leakage Current	Weak pull-up off,Vdd=3.3V, temp=25°C			± 1	µA

ADC Electrical Characteristics

Table 3: DC Electrical Characteristics

Parameter	Conditions	Min	Typ	Max	Units
ADC Input Voltage Range	Single Ended Input	0	–	+3.3	V
Input Impedance (per channel)	–	–	5	–	kΩ

Specifications Cont.

RF Characteristics

Table 4: DC Electrical Characteristics

Parameter	Conditions	Min	Typ	Max	Units
Range (line of sight)	Vdd=3.3V, temp=25°C	–	3	–	miles
Transmit Power	Vdd=3.3V, temp=25°C	–		20	dBm
Receive Sensitivity	Vdd=3.3V, temp=25°C	–	-121	–	dBm
Transmit Data Rate	–	32	–	128	kbps
Frequency	–	902	915	928	MHz
Hopping Channels	–	–	25	–	–
Modulation Type	–	–	GFSK	–	–

Pinout

Table 5: Module Pinout

Pin Number	Designation	Type	Description
1	NC	NC	Reserved. Leave unconnected.
2	NC	NC	Reserved. Leave unconnected.
3	RES1	OUT	Must connect to $\overline{\text{SNOOZE}}$
4	D0/ADC0/C0	IO/A_{IN}/Cap	I/O Pin 0, ADC0, or Cap. Sense 0
5	D1/ADC1/C1	IO/A_{IN}/Cap	I/O Pin 1, ADC1, or Cap. Sense 1
6	D2/LCD21	IO	I/O Pin 2 or LCD21 Control
7	D3/ADC2/C2	IO/A_{IN}/Cap	I/O Pin 3, ADC2, or Cap. Sense 2
8	D4/LCD20	IO	I/O Pin 4 or LCD20 Control
9	D5/ADC3/C3	IO/A_{IN}/Cap	I/O Pin 5, ADC3, or Cap. Sense 3
10	D6/LCD19	IO	I/O Pin 6 or LCD19 Control
11	D7/LCD18	IO	I/O Pin 7 or LCD18 Control
12	GND	G	Connect to GND
13	D8/LCD17	IO	I/O Pin 8 or LCD 17 Control
14	RES2	IN	Must connect to nIRQ
15	GND	G	Connect to GND

Pinout Cont.

Module Pinout Cont.

Pin Number	Name	Type	Description
16	D9/PC	IO	I/O Pin 9 or Pulse Counter Input
17	D10/LCD16	IO	I/O Pin 10 or LCD16 Control
18	V_{MON}	P_{IN}	Must connect to V_{IN} supply voltage.
19	D11/LCD15	IO	I/O Pin 12, LCD15 Control
20	D12/ADC4/C4	IO/A_{IN}/Cap	I/O Pin 12, ADC4, or Cap. Sense 4
21	D13/LCD14	IO	I/O Pin 13 or LCD14 Control
22	D14/RX/ADC5/C5	IO/A_{IN}/Cap	I/O Pin 14, UART Rx, ADC5, or Cap. Sense 5
23	D15/LCD13	IO	I/O Pin 15 or LCD13 Control
24	D16/TX/ADC6/C6	IO/A_{IN}/Cap	I/O Pin 16, UART Tx, ADC6, or Cap. Sense 6
25	GND	G	Connect to GND
26	+3.3VDC	P_{OUT}	Regulated +3.3V output
27	V_{CAP}	P_{OUT}	Storage capacitor output
28	GND	G	Connect to GND
29	GND	G	Connect to GND
30	$\overline{\text{SNOOZE}}$	IN	Internal regulator SNOOZE input. Must Connect to RES1
31	GND	G	Connect to GND
32	V_{IN}	P_{IN}	Input to Internal 3.3V boost regulator.
33	D17/LCD12	IO	I/O Pin 17 or LCD12 Control
34	D18/ADC7/C7	IO/A_{IN}/Cap	I/O Pin 18, ADC7, or Cap. Sense 7
35	D19/ADC8/C8	IO/A_{IN}/Cap	I/O Pin 19, ADC8, or Cap. Sense 8
36	D20/ADC9/C9/SCL/AGND	IO/A_{IN}/Cap	I/O Pin 20, ADC9, Cap. Sense 9, SCL, or AGND
37	D21/ADC10/C10/SDA/VREF	IO/A_{IN}/Cap	I/O Pin 21, ADC10, Cap. Sense 10, SDA, or VREF
38	+3.3VDC	P_{OUT}	Regulated +3.3V Ouput

Pinout Cont.

Module Pinout Cont.

Pin Number	Name	Type	Description
39	D22/LCD11	IO	I/O Pin 22 or LCD11 Control
40	D23/LCD10	IO	I/O Pin 23 or LCD10 Control
41	D24/LCD9	IO	I/O Pin 24 or LCD9 Control
42	GND	G	Connect to GND.
43	GND	G	Connect to GND.
44	GND	G	Connect to GND.
45	GND	G	Connect to GND.
46	GND	G	Connect to GND.
47	$\overline{\text{RST}}$	IN	Open-drain device reset pin. Drive pin low for at least 15 uS reset system. Leave floating.
48	D25	IO	I/O Pin 25
49	D26/LCD31	IO	I/O Pin 26 or LCD31 Control
50	D27/LCD8	IO	I/O Pin 27 or LCD8 Control
51	D28/LCD30	IO	I/O Pin 28 or LCD30 Control
52	D29/LCD7	IO	I/O Pin 29 or LCD7 Control
53	D30/LCD29	IO	I/O Pin 30 or LCD29 Control
54	D31/LCD6	IO	I/O Pin 31 or LCD6 Control
55	D32/LCD28	IO	I/O Pin 32 or LCD28 Control
56	D33/LCD5	IO	I/O Pin 33 or LCD5 Control
57	D34/LCD27	IO	I/O Pin 34 or LCD27 Control
58	D35/LCD4	IO	I/O Pin 35 or LCD4 Control
59	D36/LCD26	IO	I/O Pin 36 or LCD26 Control
60	D37/LCD3	IO	I/O Pin 37 or LCD3 Control
61	D38/LCD25	IO	I/O Pin 38 or LCD25 Control
62	D39/LCD2	IO	I/O Pin 39 or LCD2 Control

Pinout Cont.

Module Pinout Cont.

Pin Number	Name	Type	Description
63	D40/LCD24	IO	I/O Pin 40 or LCD 24 Control
64	D41/LCD1	IO	I/O Pin 41 or LCD 1 Control
65	D42/LCD23	IO	I/O Pin 42 or LCD23 Control
66	D43/LCD0	IO	I/O Pin 43 or LCD0 Control
67	D44/LCD22	IO	I/O Pin 44 or LCD22 Control
68	GND	G	Connect to GND
69	D45/COM3	IO	I/O Pin 45 or LCD COM3 Control
70	D46/COM1	IO	I/O Pin 46 or LCD COM1 Control
71	D47/COM2	IO	I/O Pin 47 or LCD COM2 Control
72	nIRQ	OUT	Must Connect to RES2
73	D48/COM0	IO	I/O Pin 48 or LCD COM0 Control

Operation & Functions

The OE3x module offers several built-in peripheral functions designed to seamlessly integrate into the Halo/S wireless ecosystem. Each of the peripheral blocks, or "Machines", can be accessed to perform any number of tasks. Users have access to up to 49 digital I/O pins, up to 11 ADC inputs, 11 capacitive sense channels, 11 multiplexed comparator inputs, built-in temperature sensor, low-power digital pulse counter, I2C interface, UART, and programmable frequency or PWM I/O. Once initialized, these peripherals allow for full access to the capabilities of the wireless network including data logging, remote control, and interfacing with other connected devices.

Digital I/O

There are 49 independently configurable digital I/O pins available on the OE3x Module. Each pin can be designated for digital input or output dependent on the user's needs. Output pins can be configured as either open-drain(default) or push-pull style outputs. When configured for open-drain operation, I/O pins are enabled with internal active weak pull-up resistors. Pins configured as open-drain outputs have their weak pull-ups disabled when driven low to increase power efficiency.

Instant Digital Inputs

For applications requiring immediate detection of changes on digital pins, developers can take advantage of the OE3's instant digital sensing feature. Users can configure up to 13 select digital I/O pins as instant digital inputs. Once a pin is configured as an instant digital input, any change of the pin's logic state will trigger an event. A programmable hysteresis timer is built-in to each instant digital sensor to guard against false triggering of events. A signal applied to an instant digital input must remain in its changed state until the expiration of the hysteresis timer before an event will be triggered. Instant digital sensing is an optimum solution for applications requiring fast detection of infrequently changing signals, or when polling the state of a digital input is impractical or undesirable. Digital I/O pins D0, D1, D3, D5, D9, D11, D12, D14, D16, D18, D19, D20, & D21 can each be configured as an instant digital input.

Analog Digital Converter

The OE3x module contains an on-board 12-bit analog to digital converter (ADC) which can be configured to measure up to 11 different input signals connected to the module's ADC pins. ADC input can be automatically scaled to the user's requirements and is immediately available on the network for use in data logging, control, or any number of applications.

Capacitive Sensing

Each of the OE3x module's ADC inputs can be configured for use in capacitive sensing applications. Each capacitive sense pin can be independently designated as either a standard sensor input or as an input for a capacitive touch sensor. Standard sensor inputs can be directly connected to devices such as capacitive humidity sensors to provide immediate functionality to the user, while the OE3x module's integrated capacitive touch sensor allows for easy integration of capacitive touch pads into any design.

Instant Comparators

Pins available for analog to digital conversion and capacitive sensing can alternately be configured as inputs to the OE3x module's internal comparator. Instant comparator inputs can be configured for either single-pin or two-pin operation. When configured for single-pin operation, a pin's input voltage is compared to a fixed 1.5V and events are triggered for both rising and falling edges on the comparator's output. When configured for two-pin operation, an instant comparator sensor must be assigned both a positive(+) and a negative(-) input. In this mode, the voltage on the positive(+) input is compared to the voltage on the negative(-) input and events are triggered for both rising and falling edges on the comparator's output. *Table 6* shows the pins available for assignment as Instant Comparator inputs. Instant comparator sensors have a programmable hysteresis timer that can be configured to delay the triggering of events in the event of momentary input changes due to noise or other factors.

Table 6: Instant Comparator Input Pins

Pin	Single-Pin Mode		Two-Pin Mode	
Name	Input Type	Compared To	Input Type	Compared To
C0	pos.(+)	1.5V	neg.(-)	pos.(+)
C1	pos.(+)	1.5V	pos.(+)	neg.(-)
C2	pos.(+)	1.5V	neg.(-)	pos.(+)
C3	pos.(+)	1.5V	pos.(+)	neg.(-)
C4	pos.(+)	1.5V	pos.(+)	neg.(-)
C5	pos.(+)	1.5V	neg.(-)	pos.(+)
C6	pos.(+)	1.5V	pos.(+)	neg.(-)
C7	pos.(+)	1.5V	neg.(-)	pos.(+)
C8	pos.(+)	1.5V	pos.(+)	neg.(-)
C9	pos.(+)	1.5V	neg.(-)	pos.(+)
C10	pos.(+)	1.5V	pos.(+)	neg.(-)

Temperature Sensor

The OE3x module is equipped with a built-in temperature sensor, allowing for the integration of temperature monitoring into user applications.

Low-Power Digital Pulse Counter

Applications requiring a digital pulse counter, such as reed switch power metering, can take advantage of the OE3x module's integrated pulse counter peripheral. The pulse counter can be configured for either Form A or Form C style input(See Figure 2), and can log accumulative counts, or counts per time period. This function is only available on pin 16 (PC).

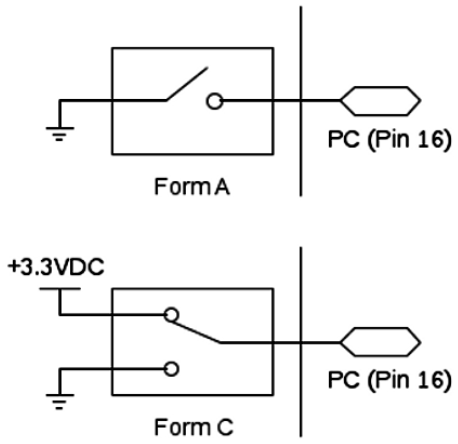

Fig 2: Switch Configurations

Frequency Input/Output

The OE3x module can be configured to output a square-wave at a user-defined frequency configurable within the range 3.25kHz - 800kHz. Additionally, the OE3x module can accept a square wave frequency input ranging between 100Hz and 50kHz. Both functions are only available on pin 16 (PC).

PWM Input/Output

Pulse width modulation(PWM) input and output are supported by the OE3x module's PWM Input/Output peripheral. When configured as an output, the PWM Input/Output peripheral can output a PWM signal with user-variable duty cycle. When configured as an input, the PWM Input/Output peripheral can read and record the duty cycle of an external PWM signal. Both functions are only available on pin 16 (PC).

Buzzer Output

The PC pin (16) can be configured as a 4kHz piezoelectric buzzer output. Applications requiring a momentary audible alarm can utilize the OE3x module's buzzer output to actuate a piezoelectric sounder. The buzzer output produces a 50ms 4kHz burst, which is an ideal solution for providing audible feedback for button presses or other events. The buzzer output can directly drive certain low-power piezoelectric devices, or conversely can be used to drive accompanying control circuitry. This function is only available on pin 16 (PC).

Set-Reset Latching Relay Control

Users can configure the OE3x module to control SR latching type relays. Each configured relay machine uses a combination of 3 digital outputs to control the set/reset actions of a typical dual-control relay driver. Additionally, an "enable" output pin is provided to toggle a control signal along with either "set" or "reset" signals. SR relay machines are limited to the control of latching type relays, providing a control signal pulse duration of 10ms.

I²C Interface

The OE3x module can be configured as an I²C master, allowing for interfacing with any number of external devices using the popular I²C communication protocol. The I²C interface uses pin 36(SCL) and pin 37(SDA), which must be equipped with pull-up resistors in accordance with the I²C specification. The exact value of pull-up resistors will depend on users' specific design requirements and should be selected to provide a balance between speed and power consumption. The I²C machine allows for up to four user-defined command sequences. Common I²C functions (I2C_start(), I2C_stop(), I2C_write(data), & I2C_read()) are built-in to the OE3x firmware and can be accessed/combined by the user to formulate command sequences to interface with devices on the I²C bus.

Serial UART

A single serial UART port is available on the OE3x module for easy integration of devices requiring a UART interface into the Halo/S wireless network. Several common baud rates are supported, and the peripheral can be configured for compatibility with most UART protocols.

LCD Segment Driver

The OE3x module features a fully configurable LCD Segment Driver that allows for control of up to 128 multiplexed LCD segments. 32 LCD drive pins, along with 4 common LCD pins, support static, 2-MUX or 4-MUX control of segmented LCD displays. *Please contact Paragon Robotics LLC. for information on incorporating a LCD display into your design.*

SD card (OE32 only)

The OE32 module provides drop-in SD card controlling capability using the SPI protocol. A proprietary filesystem is used which allows any size SD card to be used (including 64GB and larger). *Please contact Paragon Robotics LLC. for information on incorporating a SD card into your design.*

Networking

OE32 modules also provide a full networking stack for custom gateways. With full HTTP, DNS, and DHCP servers and clients, the full stack provides hands-free networking capability for OEMs. *Please contact Paragon Robotics LLC. for information on incorporating networking into your design.*

Power-Interrupt Mode

An innovative feature of the OE3x module is its ability to retain its memory state during momentary loss of power. In the event that power to the OE3x module is interrupted, by the removal of batteries for example, the OE3x will immediately transition into a sleep state in which the module's internal RAM and pin states are retained. While in this state, all communication and peripheral functions are suspended until power is returned. Once a valid power source is detected, the module can seamlessly transition back into normal operation without having to reinitialize its network connection, real-time clock or internal settings. The maximum amount of time the OE3x can remain in Power-Interrupt Mode is dependent on the requirements of the user's application and the selection of storage capacitor(s).

Storage Capacitor Selection

In order to fully take advantage of the OE3x module's memory retention capabilities, care should be taken to select appropriate storage capacitor(s) for a given application. Storage capacitors should be connected to V_{CAP} (Pin 27) and should be placed as close as possible to the pin. Paragon Robotics recommends a minimum 100µF ceramic capacitor. If this feature is not utilized, V_{CAP} should be left unconnected.

Typical Applications

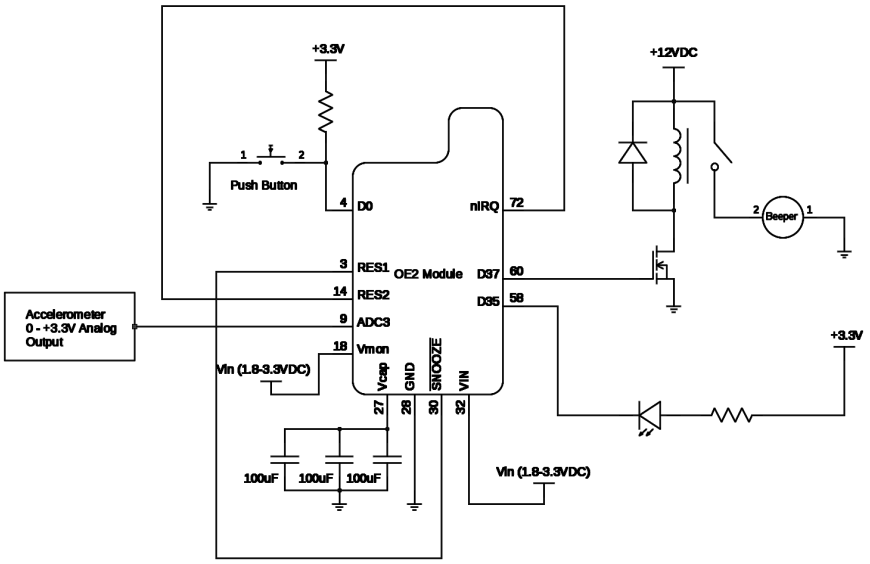

Fig 3: Typical Application Example

Figure 3 shows a typical configuration for the OE3x Module, highlighting several of its common features. Several digital I/O connections are shown, as well as an analog input, demonstrating how the OE3x could be used in several end-user applications. The figure also shows typical connections required for Power-Interrupt Mode, in which the main power supply voltage is connected to V_{MON}(Pin 18) & V_{IN}(Pin 32), and three 100µF ceramic capacitors are connected to the V_{CAP} pin. Additionally, the mandatory connections between RES1(Pin 3) & $\overline{\text{SNOOZE}}$(Pin 30) and RES2(Pin 14) & nIRQ(Pin 72) are shown for clarity.

Software Setup

Machines

Peripheral functions of the OE3x module are controlled through the Halo/S framework via a concept called "Machines". Machines can be thought of as an interface through which to access OE3x functions using simple Halo/S commands, thereby eliminating the need for users to develop any low-level code. In order to access the OE3x module's peripherals, users must set up Machines using Paragon Robotics Machine Builder© widget. Machine Builder's tools can be used to manage machines on devices connected to a Halo/S network. It is possible to create new machines, edit or remove existing ones, and read and write Machine profiles to and from devices or files to tailor the behavior of the OE3x module to the specific needs of the user.

There is a different machine type for each of the OE3x module's peripheral functions. Each machine type requires a specific set of user-defined parameters that determine the function and behavior of its targeted peripheral.

Apps

An OE3x module that is connected to a Halo/S network can access its own Machines as well as any Machines configured on devices within the network. Communication and control of Machines is accomplished through the use "Apps" installed on OE3x modules. Apps can be configured to perform any number of user defined tasks, from simply sending data between devices, to managing complex control systems comprised of many OE3x equipped devices. Apps can be configured using Paragon Robotics App Builder© widget, available at paragonrobotics.com. Users can use App Builder to create their own custom Apps, or choose from any of the Apps in the Paragon Robotics App Store, and install them on devices within a halo network. Apps can be combined in any configuration to suit users' requirements, and can be, edited, installed, or removed at any time using App Builder.

Mechanical Dimensions

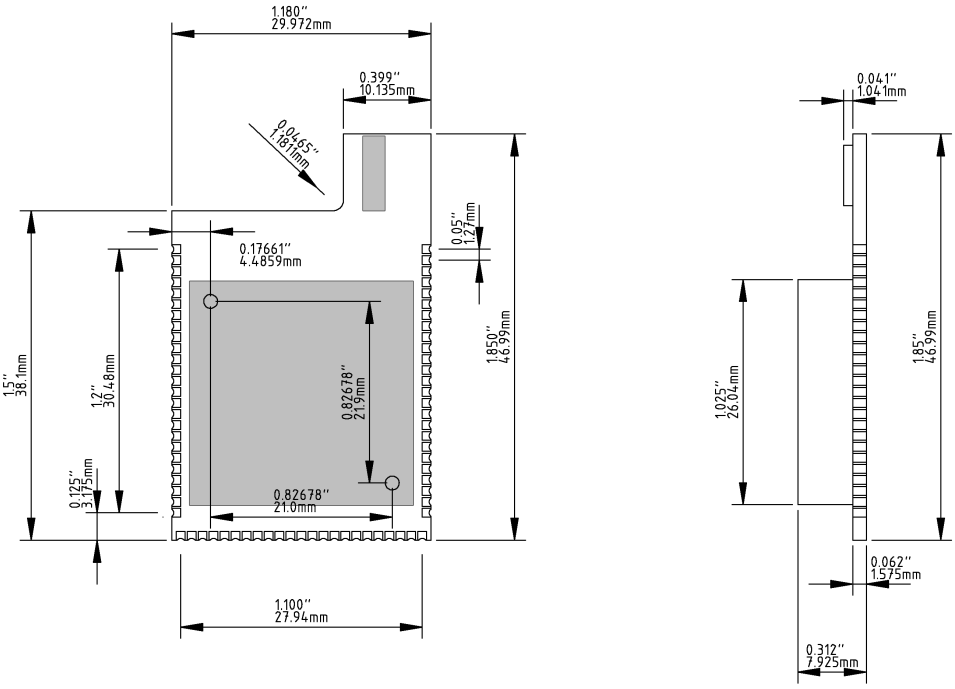

Fig 4: OE3x Module Mechanical Dimensions

Suggested PCB Footprint

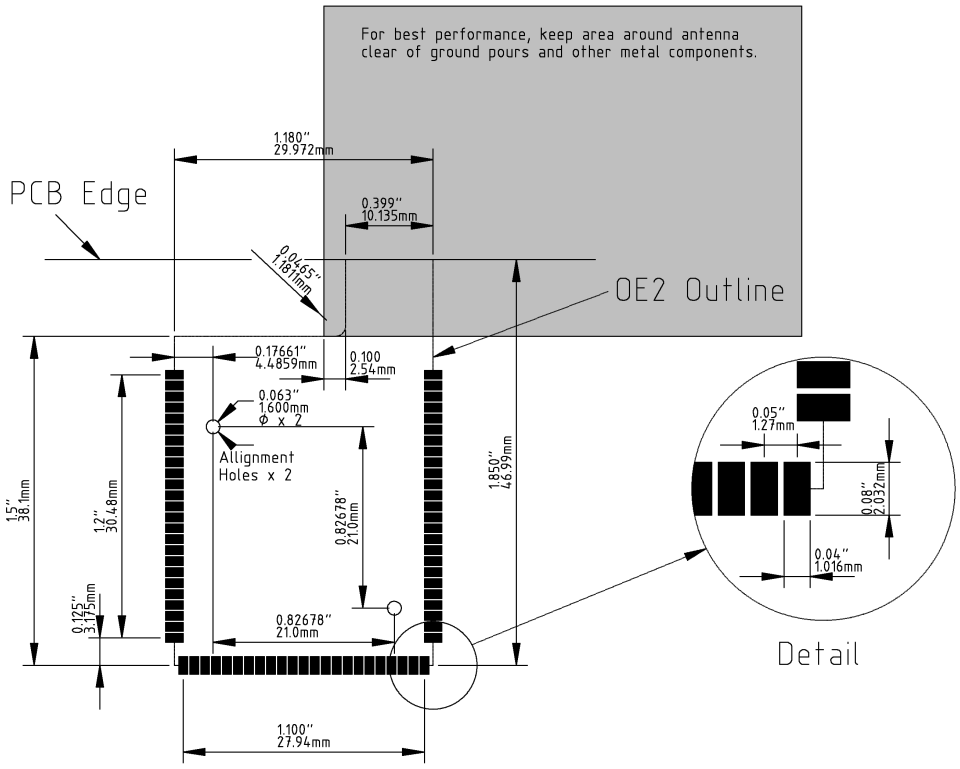

Fig 5: Suggested Footprint For Printed Circuit Board Layout

Soldering Guidelines

- When mounting the IE2 Module ont a host PCB, use the suggested PCB footprint in Figure 5 for best results.
- A "No Clean", Type 3 Pb-Free solder paste is recommended.
- Alignment holes can be used to align the OE3x Module prior to assembly.

Regulatory Approval

United States

The OE3x module has received Federal Communications Commission (FCC) approval in accordance with *Code of Federal Regulations (CFR), Title 47, Part 15, Subpart C, Sections 15.247* "*Operation within the bands 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz*" *and 15.212* "*Modular Transmitters*". As such, the OE3x may be integrated into a finished product without the requirement of obtaining separate FCC approvals for an intentional radiator.

Warning - Changes or modifications to the OE3x module not expressly approved by Paragon Robotics could void the user's authority to operate the equipment.

Note - OEM's may still be responsible for testing finished products for compliance with additional FCC requirements, such as those pertaining to unintentional radiators (FCC Rules Parts 15.107 & 15.109).

OEM Labeling Requirements

The OE3x has been labeled with its own FCC identification number. If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label should contain the information provided in figure 6.

Trade Name
Model Number
Contains FCC ID: 2AAA2-OE3X

This device complies with Part15 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.

Fig 6: Required FCC Identifier

The user's manual of the finished product containing the OE3x module must include the statement provided in figure 7.

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.

Fig 7: FCC Compliance Statement

RF Exposure

The statement in figure 8 must be included as a **CAUTION** statement in manuals and OEM products to alert users of FCC RF exposure compliance.

> To satisfy FCC RF exposure requirements for mobile and base station transmission devices, a separation distance of 20 cm or more should be maintained between the antenna of this device and persons during operation. To ensure compliance, operation at closer than this distance is not recommended. The antenna(s) used for this transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Fig 8: Required FCC RF Exposure Caution

If the OE3x module is used in a portable application (antenna is less than 20 cm from persons during operation), the integrator is responsible for performing Specific Absorption Rate (SAR) testing in accordance with FCC rules 2.1091.

Canada

This device complies with Industry Canada licence-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.

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.

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.

OEM Labeling Requirements

The OE3x module has been labeled with its own Industry Canada (IC) certification number. Similarly to the FCC labeling requirements, if the certification label is not clearly visible when installed within a host device, then the outside of the host device must display a label referring to the enclosed module. This exterior label should use wording such as that provided in figure 9.

> Trade Name
> Model Number
> Contains IC: 11091A-OE3X

Fig 9: Required IC Identifier

Revision History

- 2017-06-27: v1.0: Official release

Disclaimer

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