



# iDEN<sup>®</sup> iO1500R OEM Modem

## Developer's Kit

### User Guide

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**9808901C44-O**



# iDEN® iO1500R

## OEM Modem Developer's Kit

### User Guide

## Important note for U.S. Domestic Integrators

**All OEM integrators whose device(s) operates on public carrier networks, licensed in the U.S., must adhere to FCC E911 Phase II regulations. Severe penalties can be levied for failing to adhere to E911 guidelines.**

## General

### About iDEN Developer's Kit

The iDEN Developer's Kit for iO1500R OEM modem provides the capability of transferring data and voice from an external equipment to the iDEN network using the iO1500R (iO1000) module.

The kit includes an Evaluation Board that is designed to accommodate the OEM module and other supporting components. A flex cable connected to the 30-pin ZIF connector is used to connect the iO1500R module to the evaluation board. The OEM modem RF connector provides the path to receive and transmit data from the iDEN network.

The "iO1500R developers kit", FTN6363A includes the following accessories:

- Evaluation board w/voice - FCN6412A
- Data cable (RS-232) - FKN4369A
- 30 pin flat cable - 3086229J03
- MMCX to Mini UHF jumper cable - 3002823C34
- Antenna - RAF4136AMM
- Mounting kit – FHN6525A

## Board Set-Up

Unpack the mounting accessories.

Attach the 5 mounting rubber supports to the 4 corners and center points of the back side of the board and put it on your desk (see board layout below).

Used the 4 screws and washers to screw an iO1500R (18) OEM modem to the board. Verify that a SIM card (17) is inserted.

Connect the 30 pin flat cable (16) from the modem to the board.

Connect the RS-232 cable from the board (10) to your PC.

Connect the antenna jumper cable (19) from the modem to the external antenna.

Connect the audio accessories (if your application requires voice operation).

Set all switches to the proper position (see detail interface description below).

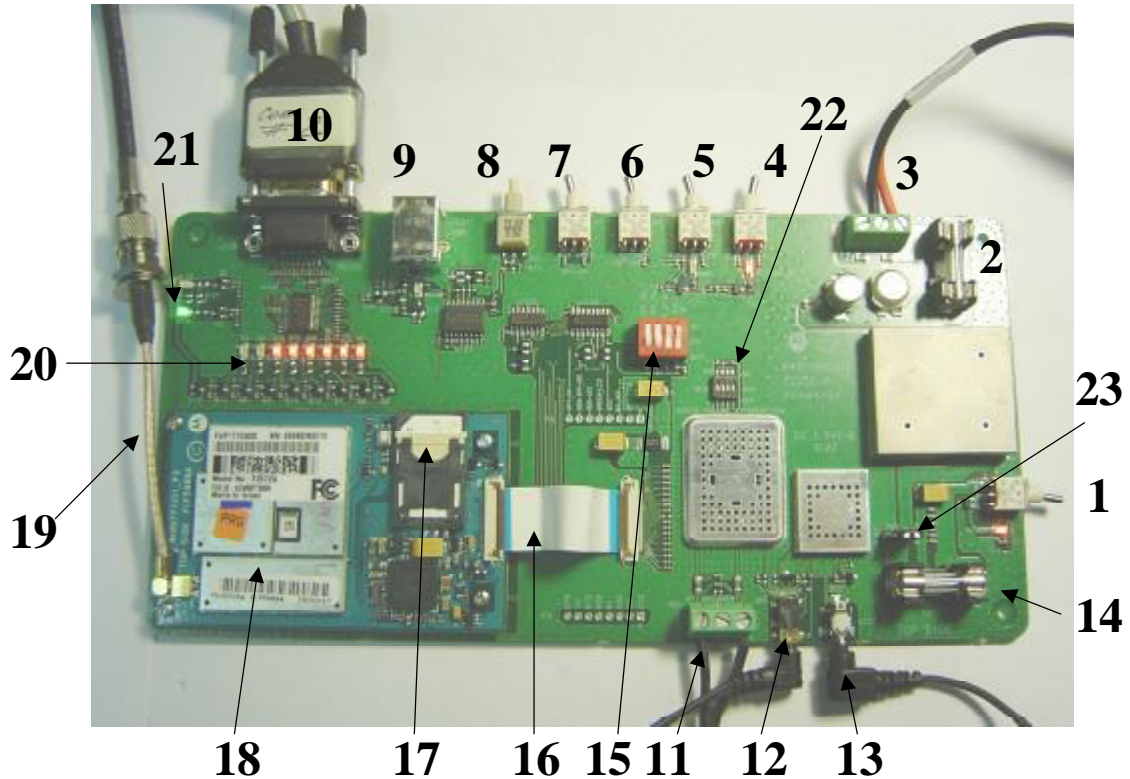
Connect DC power (3) and switch on the power to the board (1).



You can control and test the modem with the PC. Load the iX1500 applet to your PC to get status and be able to analyze modem functionality. Download the developer guide 9808901C42-A for instructions how to write an application for the iO1500R. The URL for download is <http://www.mot.com/cgiss/iO1500R>.



## Board layout



## Detailed interfaces description

1. Main Power Switch – Switches the main power 3.8VDC to the board (S4 on PCB).
2. Fuse 1A - protects external 12VDC power supply input (F1 on PCB).
3. External DC input connector – 12VDC or 3.6VDC can be connected (P1 on PCB). Connect 12VDC to the right most pins (right pin 12VDC, central pin to GND, as in the picture). Connect 3.6VDC to left most pins (3.6VDC to left pin GND to central pin).
4. Ignition ON/OFF – ON to the right position, OFF to the left position (S1 on PCB, must be on to test the modem). LED next to this switch lights only if the modem is connected and functional.
5. Programming mode ON/OFF – S6 on PCB, for normal operation must be in left position. To set modem to programming (bootstrap mode), put switch in the right position and power the board (using main switch). The LED next to this switch is ON if the modem is in programming mode.
6. SB9600 Mode – S8 on PCB, for normal operation must be in left position. To set modem to SB9600 mode (only with iO1000), put switch in the right position and power the board (using main switch).
7. Mux control – S7 on PCB, for normal operation must be in left position.



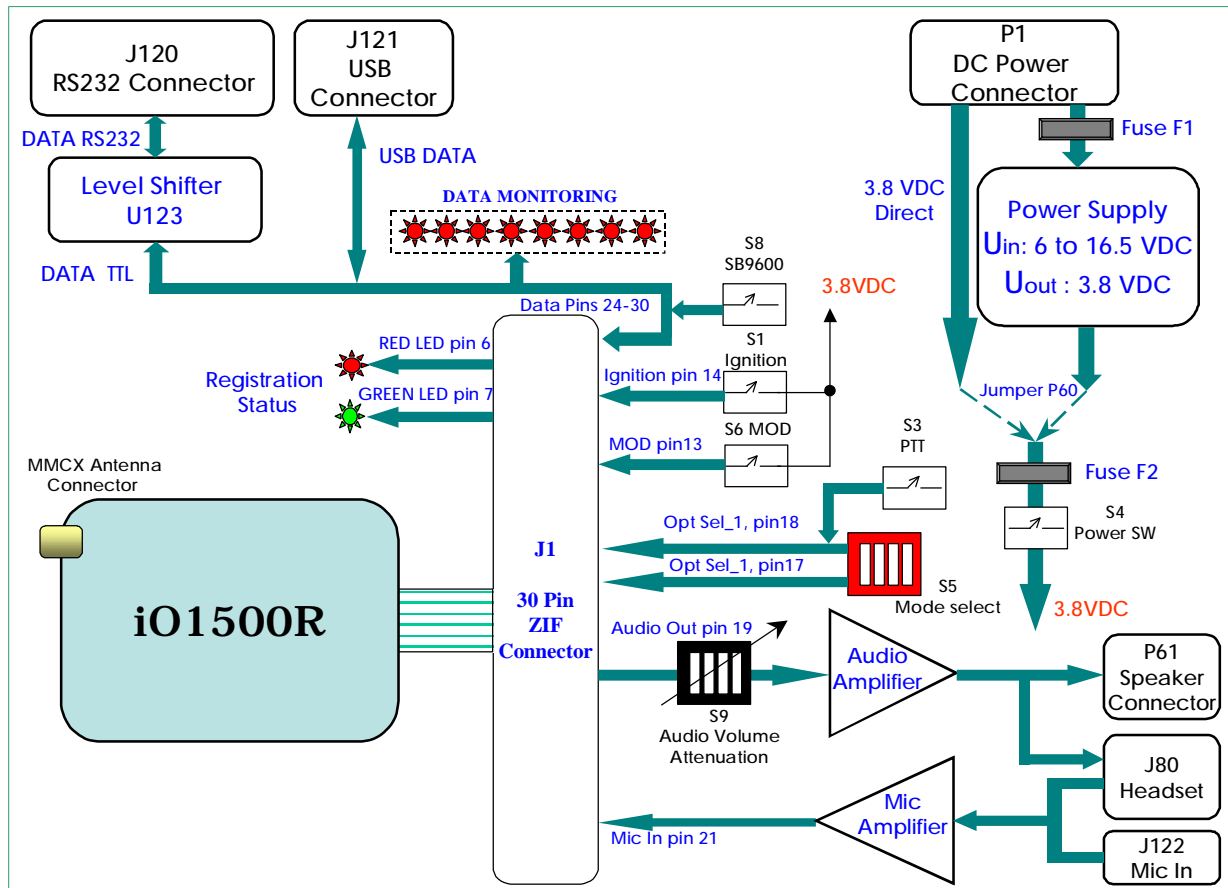
8. Manual PTT switch, S3 on PCB, can be used for PTT in dispatch (direct connect) operation.  
To enable operation of this switch S5 option select control DIP switches have to be in the following positions:
  - a. 1 Option select 1 control - Open
  - b. 2 Option select 2 control - Close
  - c. 3 Enables 3.0VDC from modem to board -Open
  - d. 4 Audio in control - Open
9. USB connector – USB communication (J121 on PCB) for programming and data.
10. RS-232 connector – RS-232 communications (J120 on PCB) for programming and data.
11. External speaker connector – use left and right pins (P61 on PCB, central pin is power GND). Connect 1W minimum, 4/8/16 ohm speaker.
12. Audio headset connector – use SYN6962A 2.5mm, connector (J80 on PCB).
13. Microphone connector – use SYN5708A 2.5mm, connector (J122 on PCB).
14. Fuse 5A – F2 on PCB, protects 3.6VDC to modem (jumper 23 in right position for on board regulator, in left position for external 3.6VDC direct to modem)
15. Option Select control DIP switch – S5 on PCB, in normal operation all switches have to be in off position. From left to right
  - a. 1 Option select 1 control
  - b. 2 Option select 2 control
  - c. 3 Enables 3.0VDC from modem to board
  - d. 4 Audio in control
16. Flat cable carries all functions from/to modem and board
17. SIM card connector – for operation SIM card needs to be in place.
18. Modem under test
19. Antenna jumper cable – connect MMCX connector to modem and mini UHF connector to external antenna.
20. RS-232 status LED's (D8-D11 on PCB)
21. Modem registration status LEDs (D2-D3 on PCB)
22. Audio volume for external speaker and headset DIP switch (S9 on PCB). For maximum volume all switches have to be in the OFF position. Left most switch (1) LSB. Right most switch (4) MSB.
23. DC input control – P60 on PCB, jumper in the right position for on board regulator, in left position for external 3.6VDC direct to modem.



## Block Diagram

The following is the block diagram of the evaluation board:

The interconnections of all major components, switches, connectors, LED's and other important parts of the board are presented here.





**Evaluation Board J1 Connector Pin Functions**

<b>PIN #</b>	<b>PIN NAME</b>	<b>DIRECTION</b>	<b>DESCRIPTION</b>	<b>Notes</b>
30	RS232_TX	OUT	RS232 Signal	3V Max
29	RS232_RX	IN	RS232 Signal	3V Max
28	RS232_DTR	IN	RS232 Signal	3V Max
27	RS232_DCD	OUT	RS232 Signal	3V Max
26	RS232_GND	IN	Signal Ground	
25	RS232_RTS	IN	RS232 Signal	3V Max
24	RS232_CTS	OUT	RS232 Signal	3V Max
23	RS232_DSR	OUT	RS232 Signal	3V Max
22	RS232_RI	OUT	RS232 Signal	3V Max
21	EXT_MIC	IN	Audio input to iO1500R	
20	AUDIO_COMMON	IN	Analog Ground	
19	AUDIO_OUT	OUT	iO1500R Audio Out	
18	OPT_SELECT_1	I/O (22K pull-up)	iO1500R configuration	Control Signal
17	OPT_SELECT_2	I/O (22K pull-up)	iO1500R configuration	Control Signal
16	MUX_CNTL	IN (69K pull-down)	Logic "0" (Mfgr.use)	Control Signal
15	OPTION_3V	OUT	Regulated 3.0V Output	
14	OEM ON-OFF	IN (15K pull-down)	Power On/Off	External On/Off 3.6V±5% Max
13	MOD	IN (22K pull-down)	Programming signal	3V Max
12	BAT_VCC	IN	3.6V iO1500R Power	
11	BAT_VCC	IN	3.6V iO1500R Power	
10	BAT_VCC	IN	3.6V iO1500R Power	
9	BAT_VCC	IN	3.6V iO1500R Power	
8	BAT_VCC	IN	3.6V iO1500R Power	
7	RED_LED	OUT	Out-Of-Range indication	3V±2.5%
6	GREEN_LED	OUT	In-Range indication	3V±2.5%
5	BAT_GND	IN	Ground	
4	BAT_GND	IN	Ground	
3	BAT_GND	IN	Ground	
2	BAT_GND	IN	Ground	
1	BAT_GND	IN	Ground	



## **Detailed Pin Descriptions of the evaluation board J1 ZIF connector**

### **BAT\_GND (Pins 1 through 5)**

These pins are the ground return lines from the iO1500R and are connected together with the same ground reference to the 3.6 V power supply for the iO1500R.

### **In-range indication-GREEN LED (Pin 6)**

**Blinking Green light** - IN RANGE - the OEM is connected to the iDEN network.

**Solid Green light** – The iO1500R is in use.

### **Out-Of-Range indication, RED LED (Pin 7)**

**Solid Red light** - OUT OF RANGE – iO1500R not connected to the iDEN network.

**Blinking Red light** – iO1500R is registering or connecting to the iDEN network.

### **BATT\_VCC (Pins 8 through 12)**

This is the 3.6 V iO1500R power supply.

### **MOD (Pin 13)**

This pin is internally pulled down via 22K resistor. Mod pulled to 3V at power up sets the modem to programming mode.

### **Ignition (OEM) On-Off (Pin 14)**

Used to power up and power down the iO1500R OEM. This is the recommended method for turning the iO1500R on and off. In an in vehicle applications it can be controlled from the ignition line. When this pin is connected to ground, the OEM will turn OFF. When this Pin is connected to BAT\_VCC 3.6V, the OEM will turn ON.

### **OPTION\_3V (Pin 15)**

A regulated 3V output coming from the iO1500R with a maximum drive of 30 mA. Voltage is available only when the OEM is ON.

### **MUX\_CNTL (Pin 16)**

This pin must be held at logic low (facilitated by internal 69K pull down resistor).

### **Opt\_Select\_1 and Opt\_Select\_2 (Pin 17, Pin 18)**

The option select lines set the communication state of the module. To support RS232 communication, the option select lines must be connected at one of three modes:

“11” – Default mode via internal 22K pull up resistors.

“01” – Option select 1 is externally pulled to ground (only this option supports voice).

### **Audio Interface (Pins 19, 20 and 21)**

These are input ground and output of the iO1500R audio communication.

### **RS232 Standard Interface 8-Wire Or 4-Wire (Pin 22 through Pin 30)**

This is a 3V DCE RS-232 interface. For  $\pm 5V$  an external level shifter is used.



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