



48511 Warm Springs Blvd., Suite 206, Fremont, CA 94539, USA

Tel: +1-510-490-8024 Fax: +1-510-623-7268

Web: <http://www.actisys.com> E-mail: [irda-info@actisys.com](mailto:irda-info@actisys.com)

***ACT-IR8200D***  
***OBEX Server***  
***IrDA Compliant Protocol Processor***

***Design Specification***



**November 27, 2006**

**Version 1.0**

**© Copyright 2004~2006 ACTiSYS Corporation**  
**All Rights Reserved**

## TABLE OF CONTENT

REVISION HISTORY .....	3
1. FEATURES .....	4
2. OVERVIEW .....	6
3. PINS DESCRIPTION .....	7
4. DEVICE OPERATION .....	9
4.1. RESET Circuit .....	9
4.2. Crystal Circuit .....	9
4.3. Host Interface .....	10
4.4. IR Port Interface .....	10
5. FIRMWARE ARCHITECTURE .....	11
5.1. OBEX Put/Get Description .....	12
6. HOW TO CONFIGURE IR8200D? .....	13
6.1. The First Page – Host Settings .....	14
6.2. The Second Page – Discovery Timing Settings .....	15
6.3. The Third Page – Primary Protocol Settings .....	16
7. HOW TO MAKE IR8200D WORK? .....	16
7.1. When IR8200D Is In Primary / Secondary Mode .....	16
7.2. When IR8200D Is In Secondary Mode .....	17
8. CHARACTERISTICS AND SPECIFICATION .....	17
8.1. Absolute Maximum Ratings .....	17
8.2. Operating Conditions .....	17
8.3. DC Characteristics .....	18
9. APPLICATION CIRCUIT .....	19
10. PACKAGE DIMENSIONS .....	20
11. WARRANTY INFORMATION .....	22
12. CONTACT INFORMATION .....	23

## REVISION HISTORY

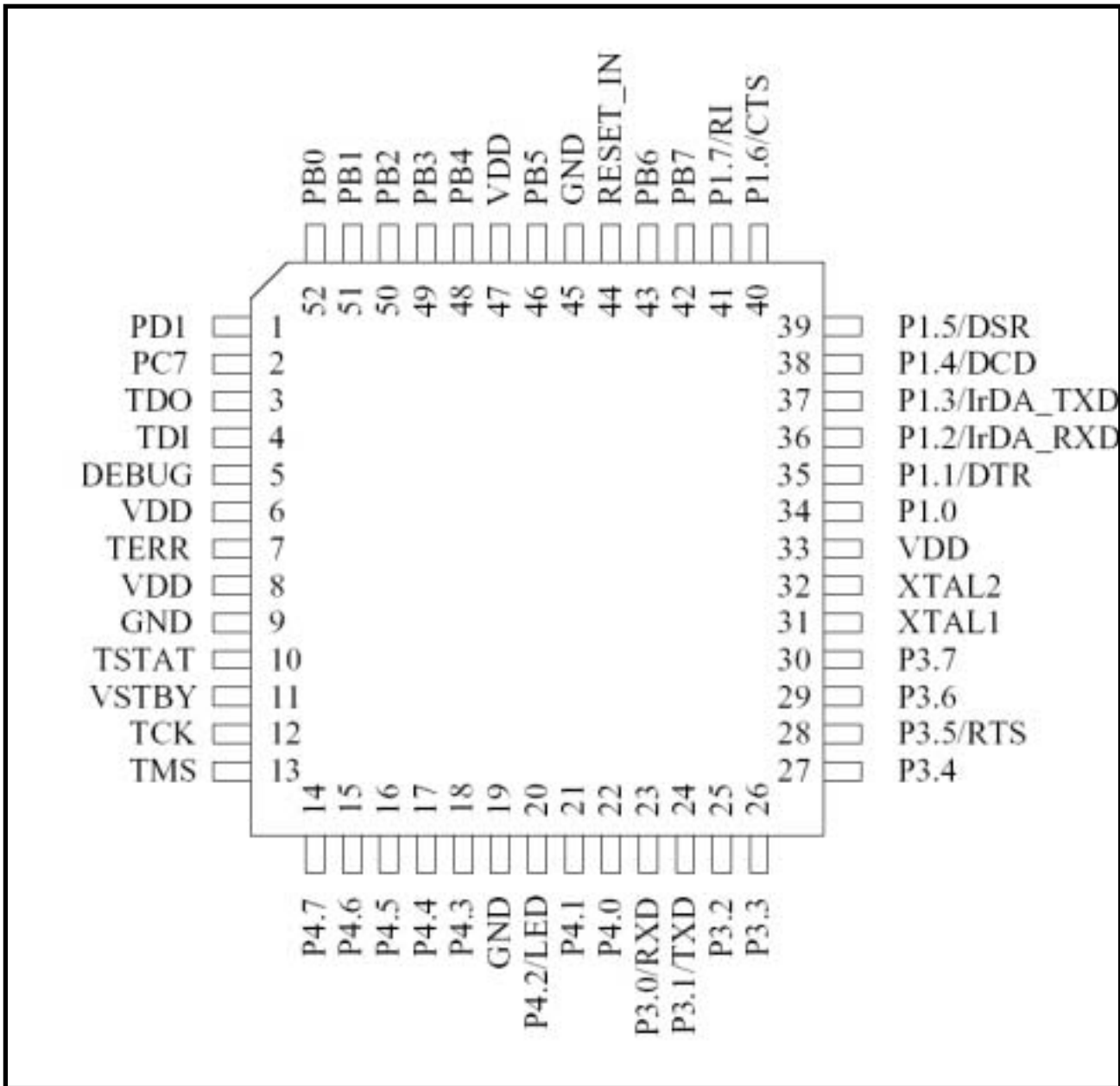
Revision History		
Revision	Date	Comment
1.0	11/27/2006	Initial released

ACTiSYS reserves the right to make changes without further notice to any products herein to improve reliability, function or design. ACTiSYS does not assume any liability arising out of the application or use of any product or circuit described herei

## 1. FEATURES

- Complete IrDA Protocol stack in a single chip.
- No driver is needed.
- Includes IrPHY encoding/decoding and interfaces directly to infrared transceivers for data rate up to 115.2 kbps. Only an external infrared transceiver is needed to complete an IrDA compliant infrared communication subsystem.
- Supports mandatory IrDA layer: IrPHY, IrLAP, IrLMP and IAS.
- Supports upper layers TinyTP, IrCOMM, IrLPT, and OBEX PUT/GET server.
- Supports host baud rate from 1.2 kbps to 115.2 kbps, which is changeable by PC utility or 8 pins on chip; IrDA baud rate from 9.6 kbps to 115.2 kbps, which is flexible, setting by IrDA devices.
- IR frame and Host buffer are 2048 bytes separately.
- Low supply voltage, 3.0 V to 3.6 V.
- Current consumption: 20 mA standby, 30 mA active.
- Small low profile plastic 52-pin QFP package.
- Available in programmed and tested chips, assembled & tested boards, or fully packaged devices.
- An IrReady IrDA-compatible evaluation dongle ACT-IR100SD is available. It is strongly recommended to evaluate IR100SD before purchasing IR8200D chip.
- A very useful Full Set Evaluation Kit is ACT-IR100SDK, which includes: IR100SD and IR4000US (notebook / desktop USB-IrDA adapter). This kit can evaluate IR100SD (connected to your device) exchanging IrDA data with IR4000US (connected to PC USB port), running under HyperTerminal with Windows IrDA driver. It can avoid debugging multiple issues: e.g. Does PDA application IrDA SW activate and behave properly with the matching protocol layer? Is this an IR100SD to host interface issue (UART data rates, flow control, data bit/parity/stop bit, UART signal pins, power levels)? Or is this a performance issue (throughput, distance, error rate/dropping bits)?

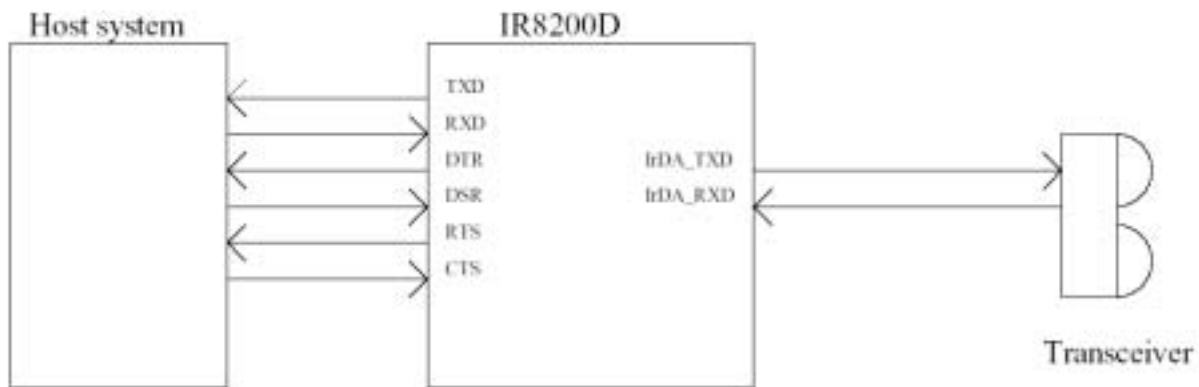
## ACT-IR8200D



## 2. OVERVIEW

The ACT-IR8200D is a low cost, high performance and high integration microcontroller, with on-chip IrDA protocol stack and on-chip infrared physical encoder/decoder. It provides a serial interface (UART) to a host device that intends to have infrared communication capability. The host device can be any equipment or device with only a wired serial interface that needs to communicate with IrDA enabled portable equipment via IrDA beam and protocol. The ACT-IR8200D will handle all the detail regard IrDA protocols. It sends and receives user data to/from the host device via the wired serial interface with hardware flow-control. IrDA has two modes; one is Primary, and the other is Secondary. The difference between them is that Primary initiates the discovery, negotiation and connection sequence to Secondary, and decides IrDA protocol parameters. While Secondary always waits for commands from Primary. Both modes can run different protocols, and **both may send or receive user data**. ACT-IR8200D supports both modes. Fig.1 is its system diagram.

**Fig. 1 System Diagram**



### 3. PINS DESCRIPTION

Symbol	Pin No.	I/O Type	Descriptions
VDD	6,8,33,47		Digital and Analog supply voltage, positive terminal.
GND	9,19,45		Ground.
PD1	1	I/O	General I/O pin, not used.
PC7	2	I/O	General I/O pin, not used.
TDO	3	O	JTAG signals, not used.
TDI	4	I	JTAG signals, not used.
DEBUG	5	O	JTAG signals, not used.
TERR	7	O	JTAG signals, not used.
TSTAT	10	O	JTAG signals, not used.
VSTBY	11	I	SRAM standby voltage input, not used.
TCK	12	I	JTAG signals, not used.
TMS	13	O	JTAG signals, not used.
P4.7	14	I/O	General I/O pin, not used.
P4.6	15	I/O	General I/O pin, not used.
P4.5	16	I/O	General I/O pin, not used.
P4.4	17	I/O	General I/O pin, not used.
P4.3	18	I/O	General I/O pin, not used.
P4.2/LED	20	O	Status LED output.
P4.1	21	I/O	General I/O pin, not used.
P4.0	22	I/O	General I/O pin, not used.
P3.0/RXD	23	I	Receive data signal from host, same as UART receiver.
P3.1/TXD	24	O	Transmit data signal to host, same as UART transmitter.
P3.2	25	I/O	General I/O pin, not used.
P3.3	26	I/O	General I/O pin, not used.
P3.4	27	I/O	General I/O pin, not used.
P3.5/RTS	28	O	Ready to send. If low then host can send data to 8200D.
P3.6	29	I/O	General I/O pin, not used.
P3.7	30	I/O	General I/O pin, not used.
XTAL1	31	I	Oscillator input pin for system clock. 22.1184MHz is required.
XTAL2	32	O	Oscillator output pin for system clock.
P1.0	34	I/O	General I/O pin, not used.
P1.1/DTR	35	O	Device terminal is ready. If low means IR8200D established IrDA link.
P1.2/IrDA_RXD	36	I	Infrared signal input pin from IrDA transceiver.
P1.3/IrDA_TXD	37	I	Infrared signal output pin to IrDA transceiver.
P1.4/DCD	38	I	Device carrier detect, not used.

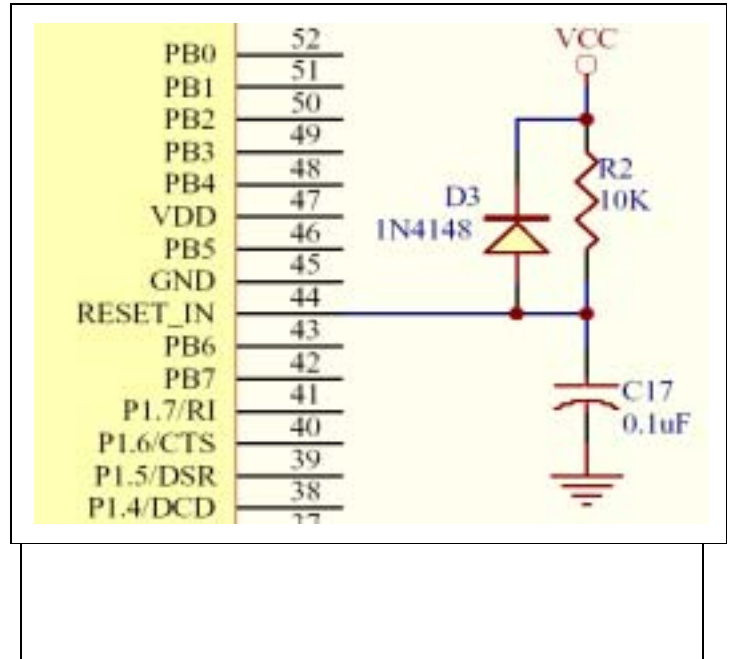
#### PIN DESCRIPTION (Continued)

Symbol	Pin No.	I/O Type	Descriptions
P1.5/DSR	39	I	Data Set Ready. If low means host is ready and IR8200D can start to establish IrDA link (If Primary mode) or ready to be link by other IrDA Primary device (if secondary mode).
P1.6/CTS	40	I	Clear to send. If low then 8200D is allowed sending data to host.
P1.7/RI	41	I	Ring-in, not used.
PB7	42	I	Configuration selector. Hi means use default setting. Low means use the setting on PB4~PB0. Default setting means the configuration is setting by Comset_IR100SD program.
PB6	43	I	NC
RESET_IN	44	I	Reset IR8200D signal. Pull it low to reset.
PB5	46	I	NC
PB4	48	I	DSR selector. Hi means use the default setting. Low means ignore DSR and IR8200D will be ready no matter DSR signal (pin 39) is hi or low.
PB3	49	I	CTS selector. Hi means use the default setting. Low means ignore CTS and IR8200D will send data to host no matter CTS signal (pin 40) is hi or low.
PB2	50	I	Host interface baud rate selector pin 2. See PB0.
PB1	51	I	Host interface baud rate selector pin 1. See PB0
PB0	52	I	Host interface baud rate selector pin 0. PB2 PB1 PB0 host baud rate lo lo lo 1.2 kbps lo lo hi 2.4 kbps lo hi lo 4.8 kbps lo hi hi 9.6 kbps hi lo lo 19.2 kbps hi lo hi 38.4 kbps hi hi lo 57.6 kbps hi hi hi 115.2 kbps

## 4. DEVICE OPERATION

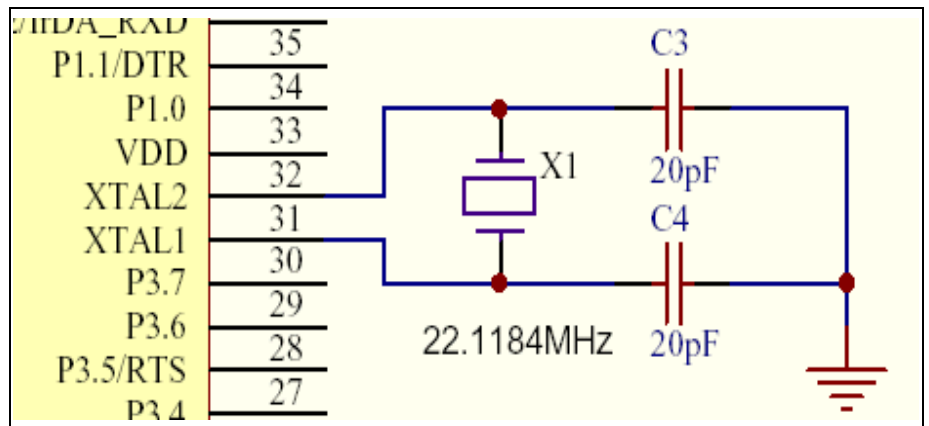
### 4.1. RESET Circuit

IR8200D will be reset when RESET\_IN is pulled low. It needs a 10K ohms resistor, 0.1  $\mu$ F capacitor and a diode to implement the reset circuit. Please refer to the right figure.



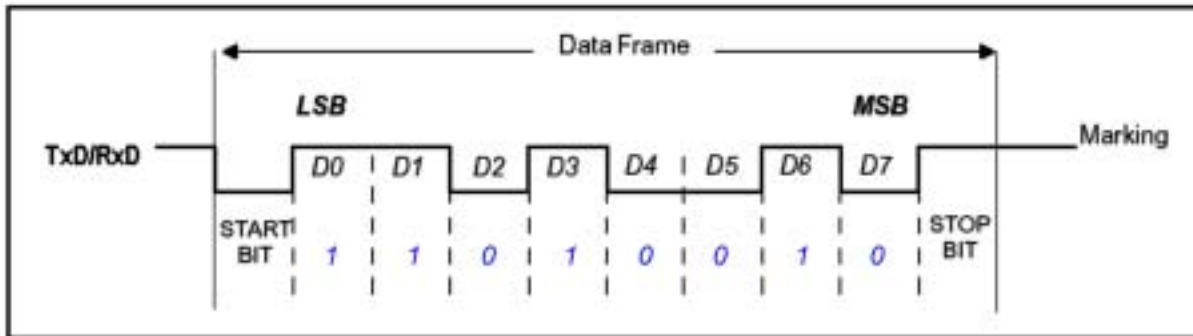
### 4.2. Crystal Circuit

IR8200D needs a specific clock to operate. Please refer to the right figure.



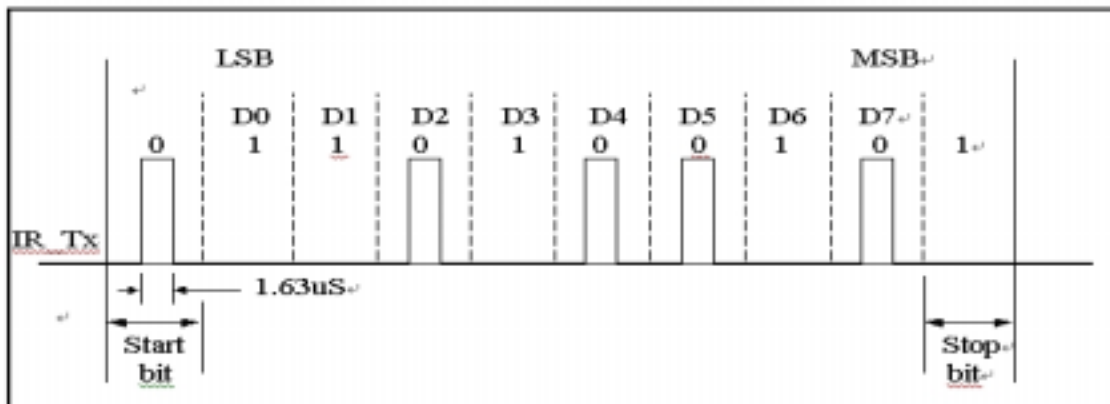
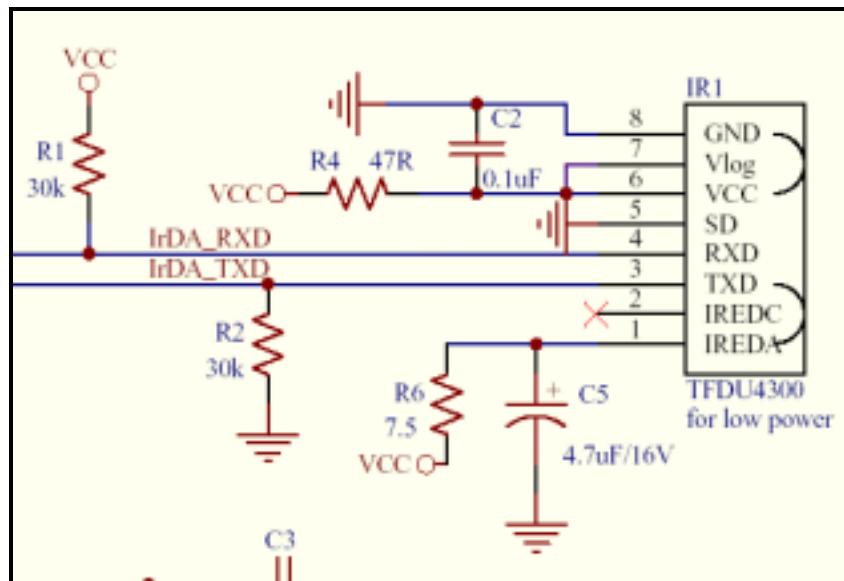
### 4.3. Host Interface

The host interface of IR8200D is a full-duplex asynchronous serial data interface. The data bytes are transmitted via TX and received via RX. Each data byte consists of one start bit (0), 8 data bits (LSB first, MSB last) and a stop bit (1).



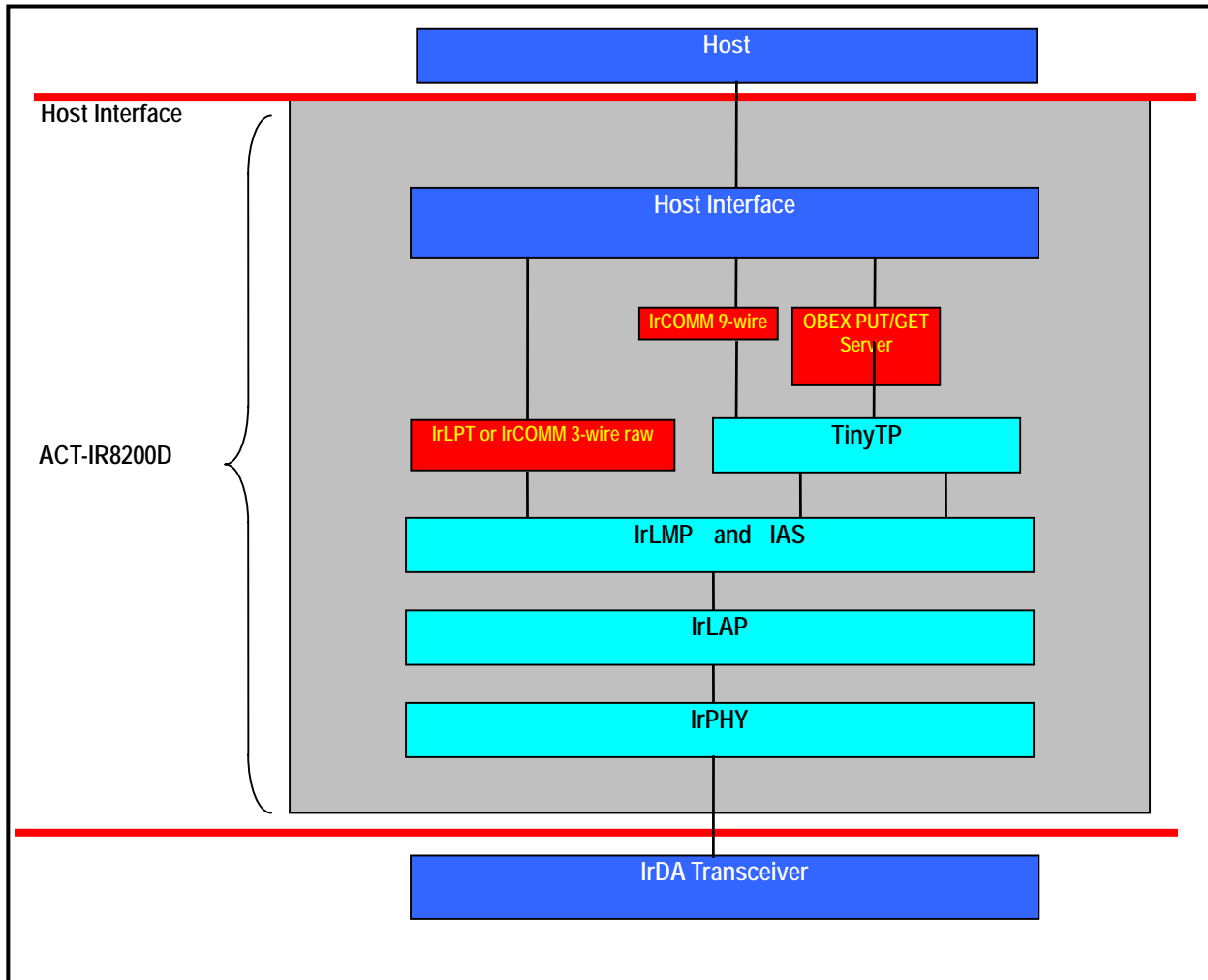
### 4.4. IR Port Interface

The IR port of IR8200D can be connected to most of transceivers. The data is transmitted by pin IrDA\_TXD and data received from IrDA\_RXD. Below figure is the signal specification of IrDA\_TXD. It sends 1.63  $\mu$ S pulse infrared signal out.



## 5. FIRMWARE ARCHITECTURE

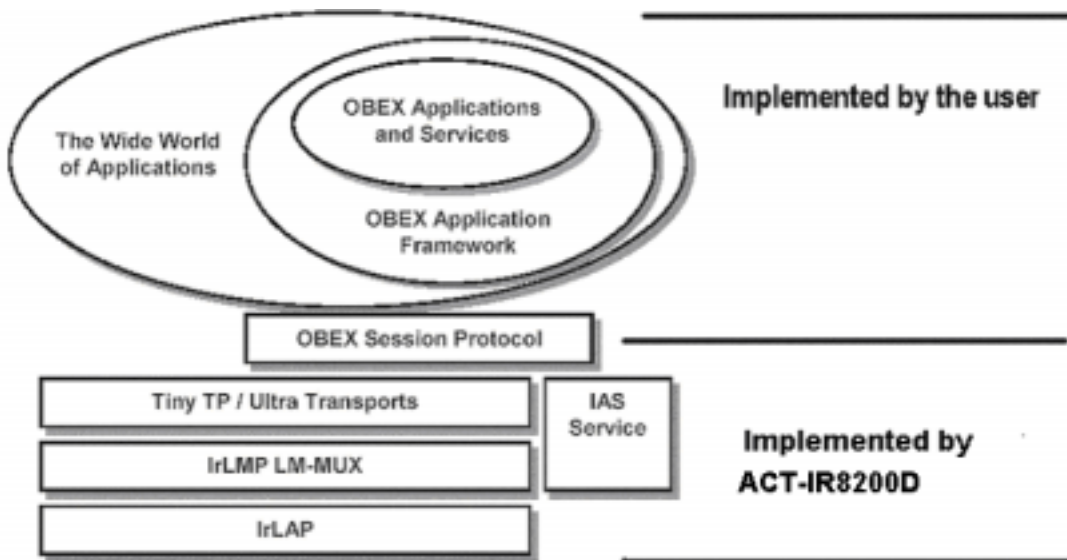
The following figure is the block diagram of ACT-IR8200D protocols architecture. The red colored blocks represent different upper layers. Only one of the red colored blocks can work at the same time.



### 5.1. OBEX Put/Get Description

The OBEX specification consists of two major parts: a protocol and an application framework. This is also illustrated graphically below. The "application framework" is represented in ellipses inside the "Wide World of Applications" at the upper half of this figure. The "protocol" part is presented in five rectangles at the lower half of this figure.

ACT-IR8200D doesn't and can't provide the "application framework" part of OBEX in the "Wide World of Applications" (the ellipses in Figure). The host system using IR8200D should **implement that part itself**.

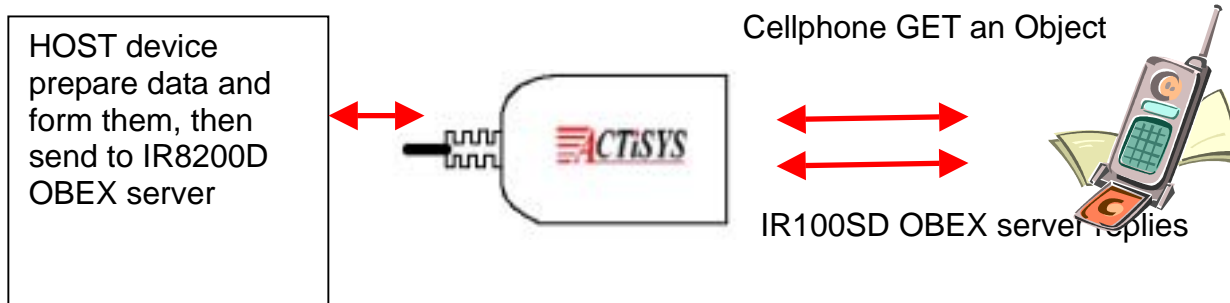


Now IR100SD-OBEX-Server provides PUT/GET server in OBEX. User doesn't need to handle OBEX command and response anymore.

The following figure shows how a Cellphone or PDA delivers an object (maybe a phone book record, a picture or a formatted data) to user's host. When IR8200D-OBEX-Server receives OBEX PUT command, it will act as a PUT server and replies proper response. Then it will trim PUT commands sent by Cellphone, only leave object data itself and pass to user's host. While transferring objects, user's host will not be able to know how big this object is until it receives the entire object.



Since IR8200D-OBEX-Server can only handle server role in OBEX, so user's host can't deliver object to Cellphone directly. The following figure shows how a Cellphone or PDA gets some object from user's host. They have to give GET command to IR8200D-OBEX-Server. IR8200D-OBEX-Server will wait for data incoming from user's host and create response for GET command.



Please note that based on OBEX requirements, when user's host is going to send data to IR8200D-OBEX-Server to respond GET command, users' host should tell IR8200D-OBEX-Server how big object it is first. So here is the frame format that user's host should obey when it sends the object.

Byte0	Byte1	Byte2	Byte3	Byte4~Byte515
0xAA	0x55	Low byte of data frame length	High byte of data frame length	Data (limited by buffer, 0 ~ 512 bytes)

Frame length means total frame size, including byte 0,1,2, and 3. For example, if data frame is 300 bytes, length should be 304.

## 6. HOW TO CONFIGURE IR8200D?

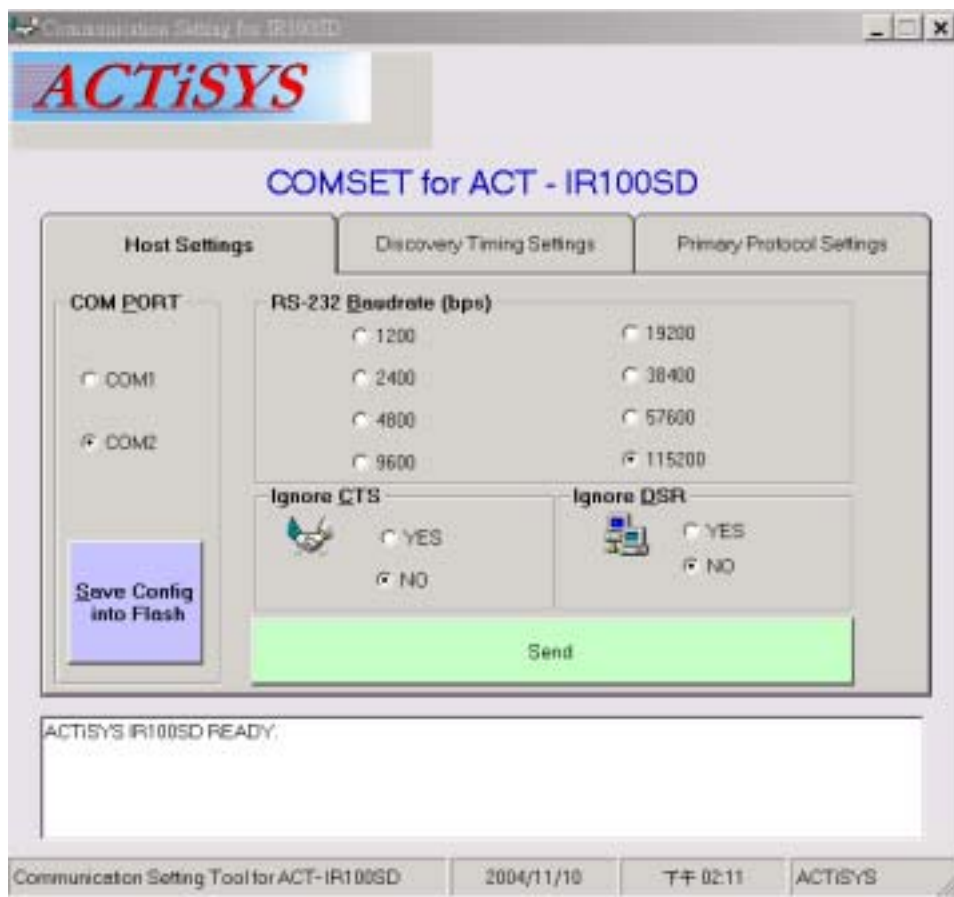
Since IR8200D supports both Primary / Secondary modes and other parameters which provide flexibility for customer usage, the first thing you need to do is making sure what host baud rate and which protocol you require before chip is implemented on PCB. Therefore, ACTiSYS developed a Windows program named Comset\_IR100SD.exe to let customer to configure IR8200D more easily.

**Note:** Comset\_IR100SD.exe program is running under Windows system (98, 98SE, ME, 2K and XP) and works with COM port. So if you want to configure IR8200D on PCB, you should wire all 6 host signals of IR8200D to a DB9F connector. Those wires are TXD, RXD, DTR, DSR, RTS and CTS. After this done, you can set the configuration of IR8200D. But customer may not design the same wiring. So we recommend that customer buy our IR8200D evaluation dongle (IR100SD) to test and configure before purchasing. Please contact ACTiSYS to get the information of IR100SD.

Following sections show the configuration settings on three pages of Comset\_IR100SD.exe window:

## 6.1. The First Page – Host Settings

It is to set the host baud rate and the hardware flow control.



### Please Note:

**Ignore CTS:** If host device has no hardware flow control signals, only Tx, Rx and GND, then you have to set this bit to 1. IR8200D will pass the incoming data to host and doesn't care the status of CTS.

**Note:** IR8200D is a buffer limited dongle (2K bytes for host and 2K bytes for IrDA). If this bit is set, then it will cause data loss (because no flow control). Whereas data loss can be solved if user can send data segment by segment and every segment not exceeding 2K bytes.

**Ignore DSR:** If host system has no DSR signals, then this bit should be ignored. But since this signal triggers IR8200D into Primary mode, it will be no way to ask IR8200D disconnecting IrDA link and IR8200D will always be in Primary once power on. In other words, once it is set to 1, you will not be able to control IR8200D at all until power it off and reset it to 0. This bit is recommended to be set when host device is in Secondary mode.

## 6.2. The Second Page – Discovery Timing Settings

It is to set time interval of discovery, the slot number of discovery and the mode of IR8200D.



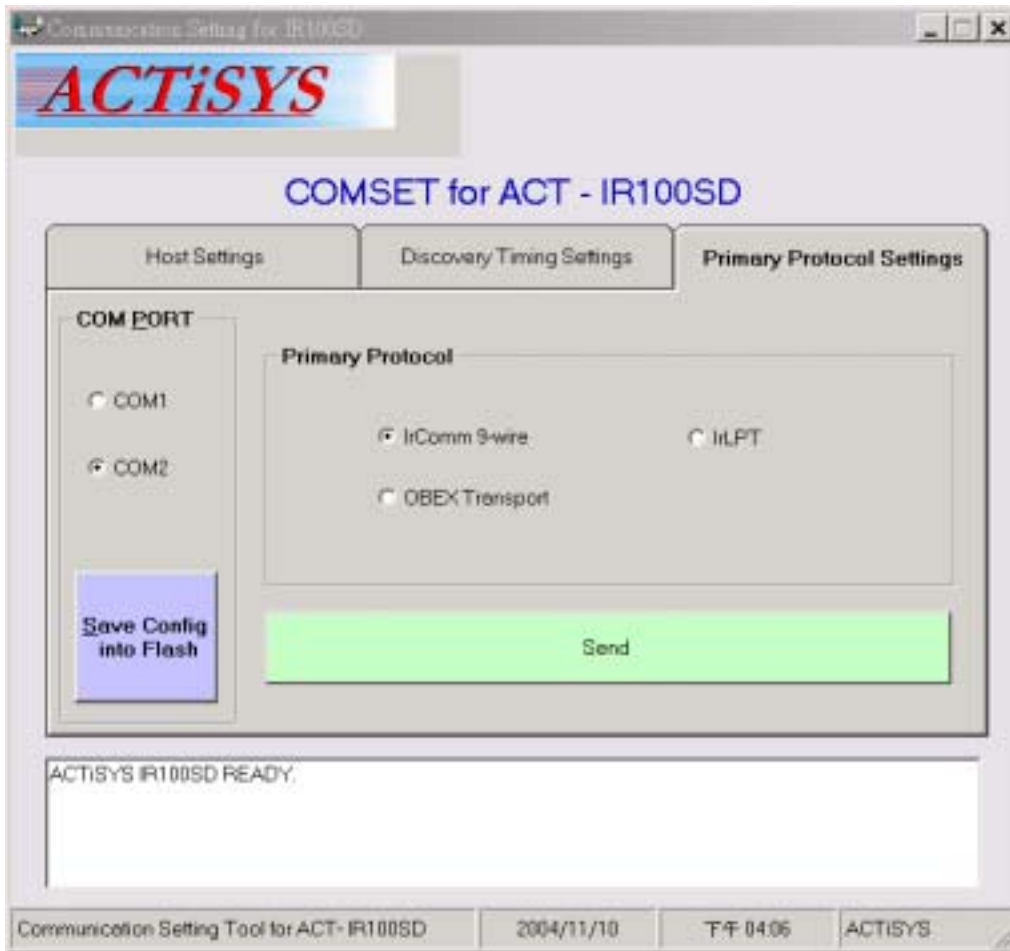
6.2.1 IR8200D supports both Primary and Secondary. It allows customer to change it.

6.2.2 Discovery time should be 3 seconds in general. If you want the discovery process faster, you can change it.

6.2.3 Discovery slot can also make discovery process faster.

### 6.3. The Third Page – Primary Protocol Settings

It is to set the IrDA protocols when IR8200D is in Primary.



After parameters being changed, you have to click “**Send**” button on those pages you have changed first. Then click “**Save Config into Flash**” so that parameters can be configured successfully.

Instead of changing by program, there is another choice for customers if you want to change the parameters manually. Or you have already soldered IR8200D on PCB. The PB7~PB0 pins on IR8200D can be configured host baud rate and hardware flow control signals to fit your requirements. Here you can change the Primary protocol or discovery time or slot. Please see the pin description to get information.

## 7. HOW TO MAKE IR8200D WORK?

The behavior of IR8200D is according to the activity of several host signals before it works. The following description shows how to make IR8200D work.

### 7.1. When IR8200D Is In Primary / Secondary Mode

Pull DSR to low then IR8200D will be triggered and start to discover any other IrDA devices. Once it finds an IrDA device, it will send discovery command, trying to establish IR link and making the specific IrDA Primary

protocols connection (e. g., IrCOMM, IrLPT or OBEX Put/Get) to this IrDA device. If the connection is successful, then IR8200D will pull DTR to low. Then host device can send and receive data. Since there is only one Primary and one Secondary in IrDA protocols, even we configure IR8200D to Primary / Secondary, it probably enters into Secondary mode when it accepts the discovery command from another Primary device. Suppose two Primary devices are discovering to each other, one of them will always play as Primary and another will be set as Secondary after negotiation.

## 7.2. When IR8200D Is In Secondary Mode

Pull DSR to low then IR8200D will be ready to accept the inquiry which comes from a Primary device. Once it finds IrDA link is established, IR8200D will pull DTR to low. Then host device can send and receive data.

If your host device only provides 3 wires (TXD, RXD and Ground), then you can connect DSR and CTS of IR8200D to ground and keep DTR and RTS open. **Note: IR8200D is a buffer limited dongle (2K bytes for host and 2K bytes for IrDA). If CTS is connected to ground, then it might cause data loss (because no flow control). Whereas data loss can be solved if user can send data segment by segment and every segment not exceeding 2K bytes.**

## 8. CHARACTERISTICS AND SPECIFICATION

### 8.1. Absolute Maximum Ratings

Symbol	Parameter	Min.	Max.	Unit
T <sub>STG</sub>	Storage Temperature	-65	125	°C
T <sub>LEAD</sub>	Lead Temperature during Soldering (20 seconds max.) <sup>(1)</sup>		235	°C
V <sub>IO</sub>	Input and Output Voltage (Q = V <sub>OH</sub> or Hi-Z)	-0.5	6.5	V
V <sub>CC</sub>	Supply Voltage	-0.5	6.5	V
V <sub>PP</sub>	Device Programmer Supply Voltage	-0.5	14.0	V
V <sub>ESD</sub>	Electrostatic Discharge Voltage (Human Body Model) <sup>(2)</sup>	-2000	2000	V

Note: 1. IPC/JEDEC J-STD-020A  
 2. JEDEC Std JESD22-A114A (C1=100pF, R1=1500 Ω, R2=500 Ω)

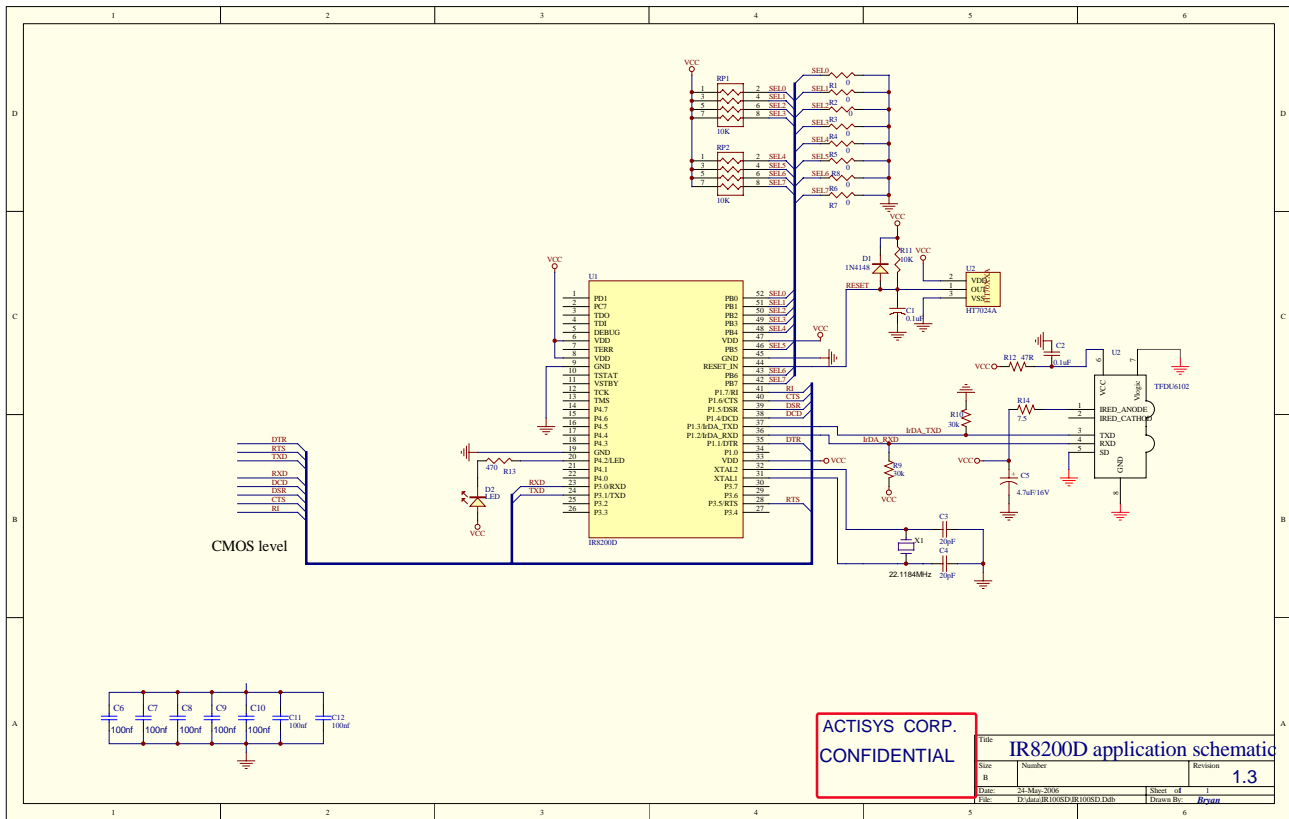
### 8.2. Operating Conditions

Symbol	Parameter	Min.	Max.	Unit
V <sub>CC</sub>	Supply Voltage	3.0	3.6	V
T <sub>A</sub>	Ambient Operating Temperature (industrial)	-40	85	°C
	Ambient Operating Temperature (commercial)	0	70	°C

### 8.3. DC Characteristics

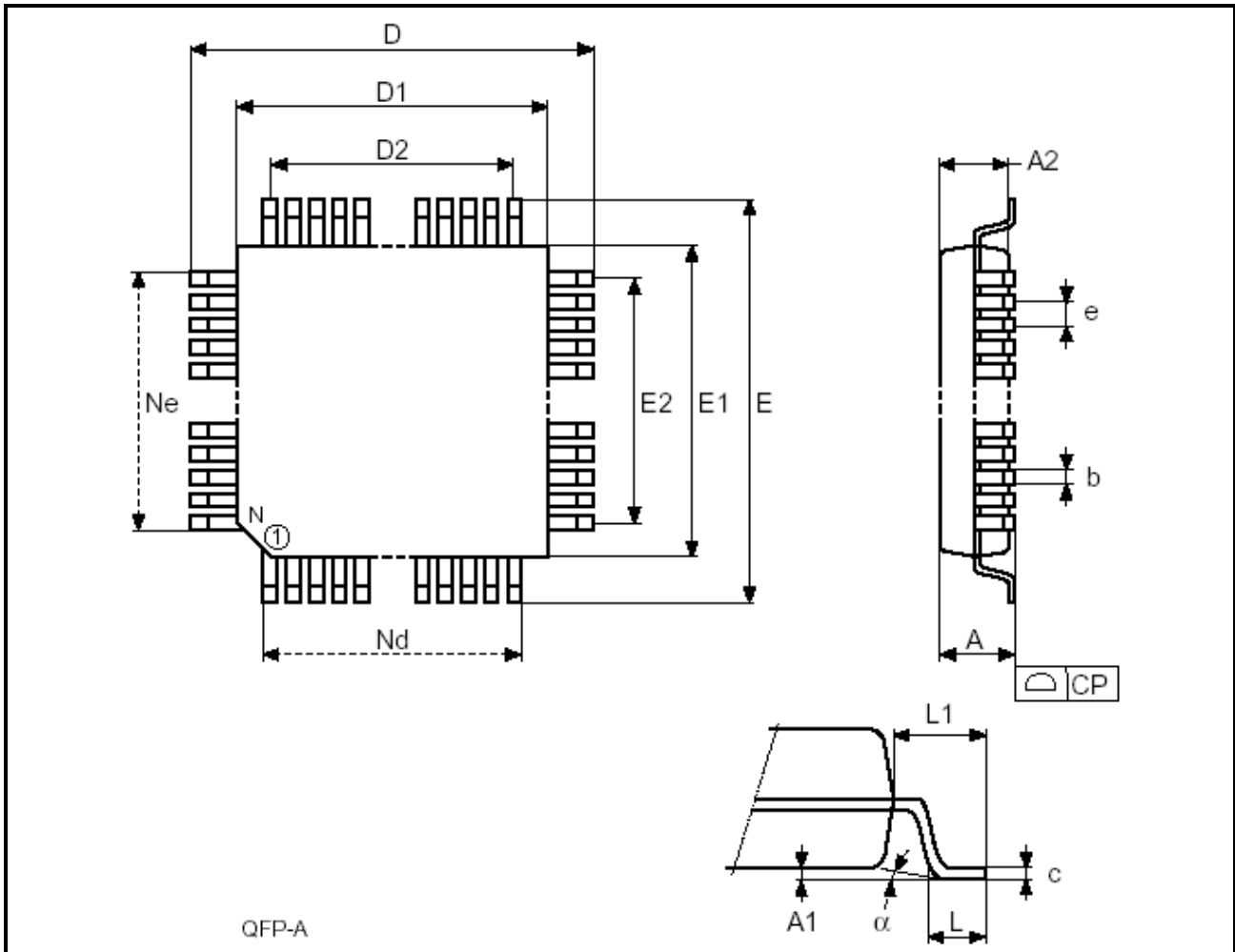
Symbol	Parameter	Test Conditions	Min.	Typical	Max.	Unit
V <sub>CC</sub>	Supply Voltage		3.0		3.6	V
V <sub>IH</sub>	High Level Input Voltage (Ports 0,1,2,3,4 XTAL1, RESET) 5V Tolerance – Max voltage 5.5 V	3.0 V < V <sub>CC</sub> < 3.6 V	0.7 V <sub>CC</sub>		5.5	V
V <sub>IL</sub>	Low Level Input Voltage (Ports 0,1,2,3,4, XTAL1, RESET)	3.0 V < V <sub>CC</sub> < 3.6 V	V <sub>SS</sub> – 0.5		0.3 V <sub>CC</sub>	V
V <sub>OL1</sub>	Output Low Voltage (Port 4)	V <sub>OL</sub> = 10 mA			0.6	V
V <sub>OL2</sub>	Output Low Voltage ( Other Ports)	V <sub>OL</sub> = 5 mA			0.6	V
V <sub>OH1</sub>	Output High Voltage (Ports 4 push-pull)	V <sub>OH</sub> = -10 mA	2.4			V
V <sub>OH2</sub>	Output High Voltage (Other Ports push-pull)	V <sub>OH</sub> = -5 mA	2.4			V
V <sub>OP</sub>	XTAL Open Bias Voltage (XTAL1, XTAL2)	V <sub>OL</sub> = 3.2 mA	1.0		2.0	V
	RESET Pin Pull-up Current (RESET)	V <sub>IN</sub> = V <sub>SS</sub>	-10		-55	μA
I <sub>FR</sub>	XTAL Feedback Resister Current (XTAL1)	XTAL1 = V <sub>CC</sub> ; XTAL2 = V <sub>SS</sub>	TBD (-20)		TBD (-50)	μA
I <sub>IHL1</sub>	Input High Leakage Current (Port 0)	V <sub>SS</sub> < V <sub>IN</sub> < 5.5 V	-10		10	μA
I <sub>IHL2</sub>	Input High Leakage Current (Port 1, 2, 3 4)	V <sub>IH</sub> = 2.3 V	-10		10	μA
I <sub>ILL</sub>	Input Low Leakage Current (Port 1, 2, 3 4)	V <sub>IHL</sub> < 0.5 V	-10		10	μA

## 9. APPLICATION CIRCUIT



## 10. PACKAGE DIMENSIONS

### 52-PIN QFP



Symb	mm			inches		
	Typ	Min	Max	Typ	Min	Max
A	–	–	1.75	–	–	0.069
A1	–	0.05	0.20	–	0.002	0.008
A2	–	1.25	1.55	–	0.049	0.061
b	–	0.20	0.40	–	0.008	0.016
c	–	0.07	0.23	–	0.002	0.009
D	12.00	–	–	0.473	–	–
D1	10.00	–	–	0.394	–	–
D2						
E	12.00	–	–	0.473	–	–
E1	10.00	–	–	0.394	–	–
E2	7.80			0.307		
e	0.65	–	–	0.026	–	–
L	–	0.45	0.75	–	0.018	0.030
L1	1.00	–	–	0.039	–	–
$\alpha$	–	0°	7°	–	0°	7°
n	52			52		
Nd	13			13		
Ne	13			13		
CP	–	–	0.10	–	–	0.004

## 11. WARRANTY INFORMATION

**ACTiSYS Corporation warrants the first end-user purchaser, for a period of 1 year from the date of purchase, that this wireless interface (The Product) will be free from defective workmanship and materials, and agrees that it will, at its option, either repair the defect or replace the defective Product or part thereof at no charge to the purchaser for parts or for labor.**

This warranty does not apply to any appearance items of the Product, any consumable items such as paper, ink ribbon, or batteries supplied with the Product, or to any equipment or any hardware, software, firmware, or peripheral other than the Product. This warranty does not apply to any Product the exterior of which has been damaged or defected, which has been subjected to misuse, abnormal service or handling, or which has been altered or modified in design, construction or interfacing. Tampering with Label Voids Warranty.

In order to enforce the rights under this limited warranty, the purchaser should mail, ship or carry the Product, together with proof of purchase, to ACTiSYS.

The limited warranty described above is in addition to whatever implied warranties may be granted to purchasers by law. To the extent permitted by applicable law, ALL IMPLIED WARRANTIES INCLUDE THE WARRANTIES OF MERCHANT ABILITY AND FITNESS FOR USER ARE LIMITED TO A PERIOD OF 1 YEAR FROM THE DATE OF PURCHASE. Some states do not allow limitations on how long an implied warranty lasts, so the above limitation may not apply to you.

Neither the sales personnel of the seller nor any other person is authorized to make any warranties other than those described above, or to extend the duration of any warranties beyond the time period described above on behalf of ACTiSYS Corporation.

**The warranties described above shall be the sole and exclusive remedy available to the purchaser. Correction of defects, in the manner and for the period of time described above, shall constitute full satisfaction of all claims, whether based on contract, negligence, strict liability or otherwise. In no event shall ACTiSYS Corporation be liable or in any way responsible, for any damages or defects in the Product which were caused by repair or attempted repairs performed by anyone other than ACTiSYS technician. Nor shall ACTiSYS Corporation be liable or in any way responsible for any incidental or consequential economic or property damage. Some states do not allow the exclusion of incidental or consequential damages, so the above exclusion may not apply to you.**

### FOR YOUR RECORDS

For your assistance in reporting this product in case of loss or theft, please record below the model number and serial, which are located on the bottom of the case. Please retain this information.

**Model Number:**

**Serial Number:**

**Date of Purchase:**



## 12. CONTACT INFORMATION

**GO WIRELESS WITH ACTiSYS IR**



◆ IrDA Protocol Software For Portable Devices  
◆ IrDA Test Software For Hardware Systems  
◆ IrDA Printer And Computer Adapters

115.2K, 4M and 16M bps



IR100M/1000M

IR2000L

IR220L/L+



**ACTiSYS Corporation**  
48511 Warm Springs Blvd, Suite 206  
Fremont, CA 94539, USA  
TEL: +1-510-490-8024, FAX: +1-510-623-7268  
E-Mail: [irda-info@actisys.com](mailto:irda-info@actisys.com)  
Web: <http://www.actisys.com>