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ACT-IR8200D / ACT-IR8210D
IrDA[®] Compliant Protocol Processor
Specification

May 29, 2008
Version 0.4.1.1

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REVISION HISTORY

Revision History		
Revision	Date	Comment
0.1	11/03/2004	Initial Released
0.2	11/10/2004	Added comset_IR100SD and others on chapter 6,7
0.2.1	02/02/2005	Changed the buffer for IR8200D
0.3	01/27/2006	Added protocol selection on cheaper 3 & overall reformat
0.3.1	05/24/2006	Modified application circuit of transceiver parts on chapter 9
0.3.2	08/31/2006	Added Chapter 8 for LED behavior
0.4	4/3/2007	Corrected error descriptions of PB3 & PB4 on Chap. 3 Pins Desc
0.4.1	5/22/2007	Corrected error of I/O type for pin # 37 in Chap. 3
0.4.1.1	5/29/2008	Updated Corporate Address & Combined spec with IR8210D; Extracted Technical

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1. FEATURES

- A complete IrDA[®] Protocol stack in a single chip.
- No any 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[™] transport.
- Supports host baud rate from 1.2 kbps to 115.2 kbps, which is changed by PC utility or 8 pins on chip, and IrDA[®] baud rate from 9.6 kbps to 115.2 kbps, which is flexible and set by IrDA devices.
- Supports both IrDA[®] Primary and Secondary mode.
- Both IR frame and Host sides have **buffer size 2 KB** in ACT-IR8200D (or **0.5 KB** in ACT-IR8210D).
- 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.
- A ready-made IrDA[®]-compatible evaluation dongle ACT-IR100SD is available. It is strongly recommended to test ACT-IR100SD before purchasing ACT-IR8200D/ ACT-IR8210D chip.
- A very useful Evaluation Kit Full Set is ACT-IR100SDK, which includes: ACT-IR100SD and ACT-IR4000US (IrDA[®] FIR USB adapter).

This kit can evaluate data transmission between ACT-IR100SD (your device) and ACT-IR4000US (PC), running under HyperTerminal in Windows.

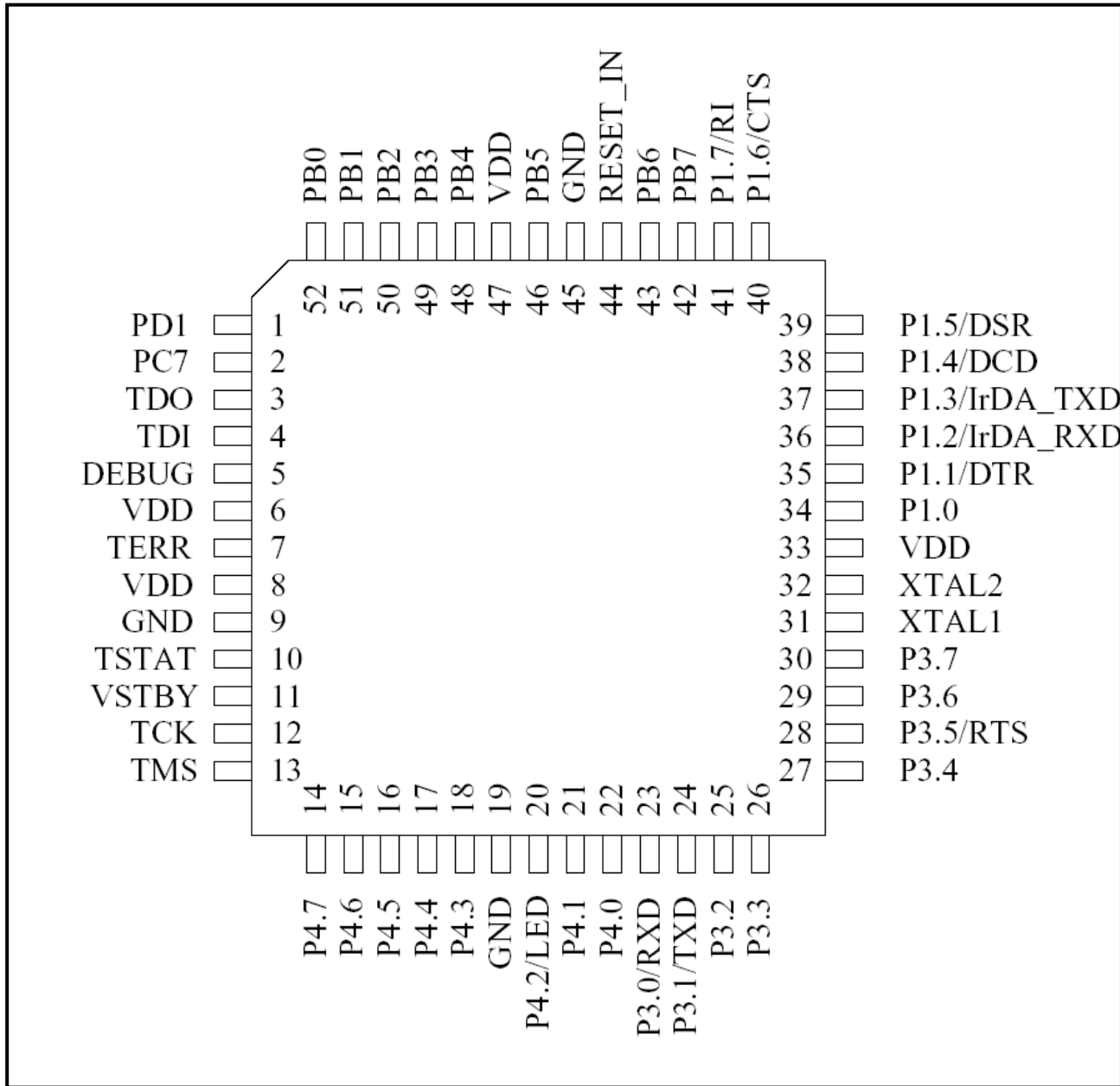
It can avoid debugging multiple issues at the same time.

e.g. Does IrDA[®] software activate and behave properly with the matching protocol layer?

Is this an IR dongle to host interface issue (UART data rates, flow control, data bit/parity/stop bit, UART signal pins, power levels)?

Or is this a performance issues (throughput, distance, error rate/dropping bits)?

FIG. 1 ACT-IR8200D / ACT-IR8210D



2. OVERVIEW

ACT-IR8200D /ACT-IR8210D (or briefly, [ACT-IR82x0D](#); or [IR82x0D in short](#)) is a low cost, high performance and highly integrated microcontroller, with on-chip IrDA[®] protocol stack and on-chip infrared physical encoder/decoder.

It provides a serial interface to the host device which possesses the infrared communication capability. The host device can be any equipment or device that needs to communicate with IrDA[®] enabled devices via IrDA[®] protocol with only a wired serial interface.

ACT-IR82x0D handles all the details regarding IrDA[®] protocols. It transmits data to and from the host device via the serial interface with hardware flow control.

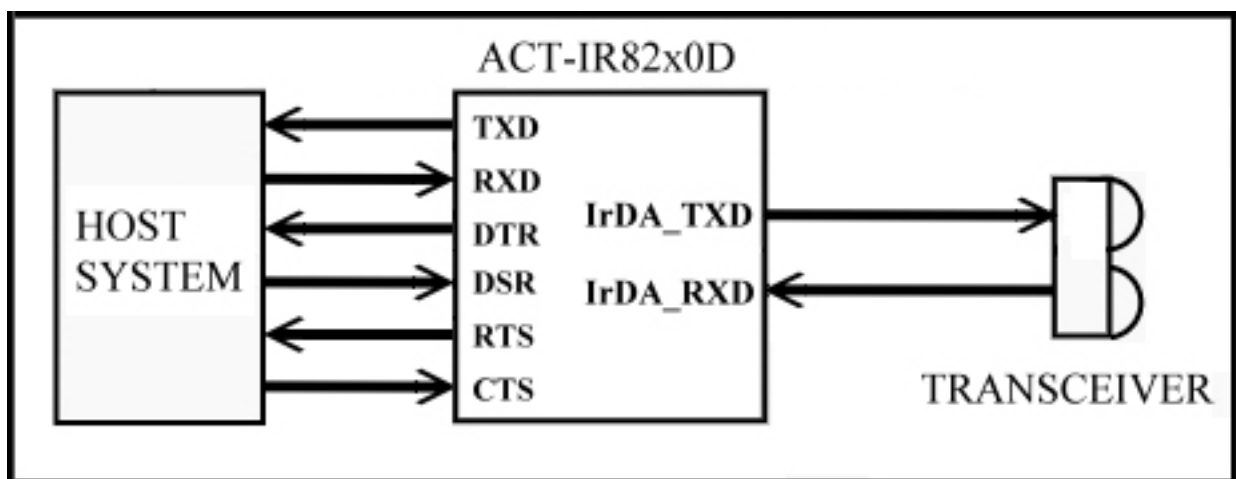
IrDA[®] has two modes: Primary and Secondary.

The difference between them is that Primary initiates discovery, connection sequence and negotiates IrDA[®] protocol parameters with Secondary; while Secondary always passively waits for commands from Primary. Both modes can run different protocols respectively, and may send or receive data.

ACT-IR82x0D supports both Primary and Secondary modes.

Fig.2 is the system diagram.

FIG. 2 SYSTEM DIAGRAM



3. HOW TO CONFIGURE ACT-IR82X0D ?

ACT-IR82x0D supports both Primary / Secondary modes and other parameters which provides flexibility for use. So before this processor is implemented on PCB, we need to make sure what host baud rate and which protocol we require first. Therefore, we have developed a Windows program, Comset_IR100SD.exe, to let you to configure this processor easier.

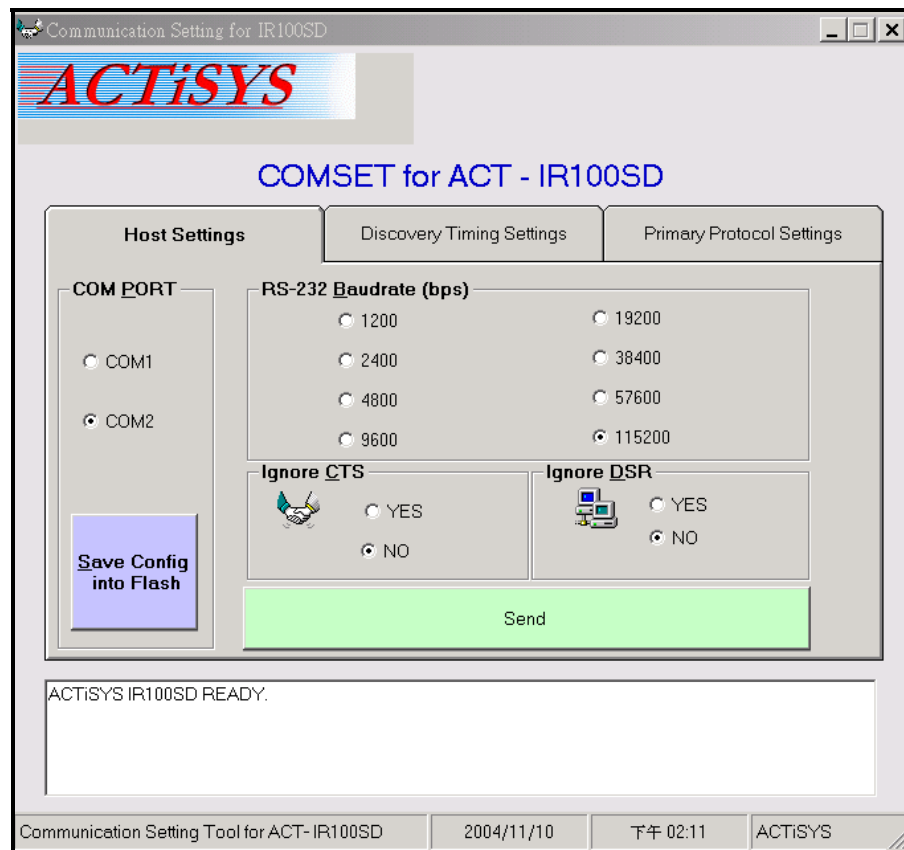
3.1 Wiring Note

Comset_IR100SD.exe program runs under Windows system and works with COM port. So if you want to configure the processor on PCB, you should wire all 6 host signals of the processor to a DB9F connector. They are TXD, RXD, DTR, DSR, RTS and CTS. You can change the configuration after this done. Since you may sometimes need to wire them to other than a DB9 connector, we recommend that you buy our ACT-IR82x0D evaluation board (ACT-IR100SD) to test and configure before purchasing it. Please contact ACTiSYS to get the information of ACT-IR100SD.

Following sections show how to configure by Comset_IR100SD.exe.

3.2 The First Tab- Host Settings

The first tab is to set the host baud rate and the hardware flow control.



3.3 **Flow Control Note**

Ignore CTS: If the host has no hardware flow control signals, only Tx, Rx and GND, then you have to set option “Yes”. ACT-IR82x0D will then pass the incoming data to the host and not care the status of CTS. (That means, to Ignore CTS).

Note: ACT-IR82x0D are buffer limited protocol processors. **ACT-IR8200D has 2KB (while ACT-IR8210D has 0.5KB) buffer for both host and IrDA[®] sides.** If this option has been set to “YES”, then it may cause **data loss due to no flow control!**

Nevertheless, data loss can still be solved if user sends data segment by segment with each segment not exceeding its buffer size (2KB for ACT-IR8200D; or 0.5KB for ACT-IR8210D).

Still, we normally recommend you to set “NO” on this option.

Ignore DSR: If the host has No DSR signals, then this option should be set to “YES” (to Ignore DSR).

This is what we recommend only when the host is Secondary.

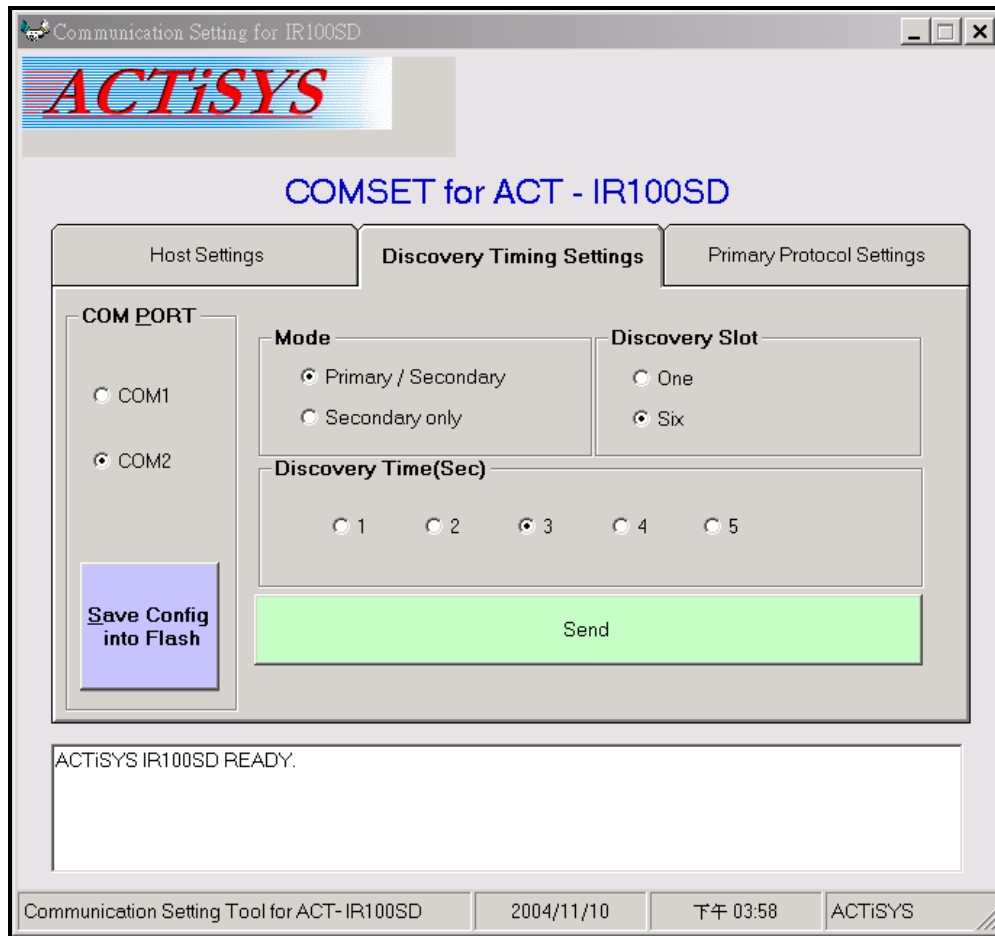
But since DSR signal will trigger the processor (ACT-IR82x0D) into Primary, if you set “Primary/Secondary” and “Yes” on option “Mode” and “Ignore DSR” respectively, it will always be in Primary and no way to disconnect the link once power on.

In other words, once you set option “Ignore DSR” to “Yes”, you will not be able to control it at all until power off and reset to “NO”.

So, normally we recommend you to set “NO” on this option.

3.4 The Second Tab – Discovery Timing Settings

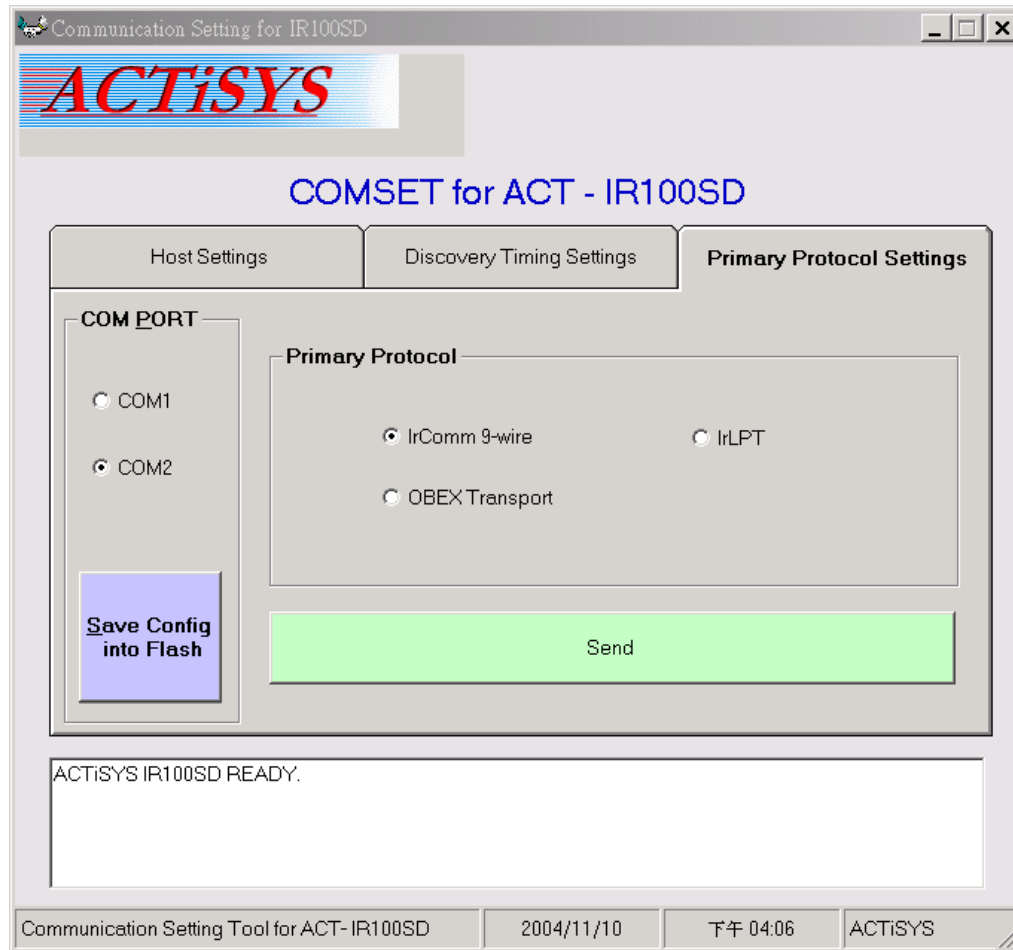
The second tab is to set time interval of discovery, the slot number of discovery and the mode of ACT-IR82x0D.



- 1) ACT-IR82x0D supports both Primary and Secondary. It allows customer to change it.
- 2) Discovery time should be 3 seconds in general. But if you want it shorter or longer, you can change it.
- 3) Discovery slot can also make discovery process faster.

3.5 The Third Tab –Primary Protocol Settings

The third tab is to set IrDA® protocols when ACT-IR82x0D is in Primary.



After any parameter has been changed, you have to press “**Send**” button on every tab you change first. Then press “**Save Config into Flash**”, so parameters can be configured successfully.

In stead of changing by program, another choice for you is to change manually. Or if you have already soldered the proccessor onto PCB, then pins PB0~PB7 on this prossesor can be configured the host baud rate and hardware flow control to fit your requirements.

Also you can change the Primary protocol or discovery time or slot here. Please get information from Chapter of Pin Description in Technical Spec.

4. HOW TO MAKE ACT-IR82X0D WORK?

The behavior of ACT-IR82x0D is according to the activities of several host signals before it works. The following description shows how to make it work.

4.1 When ACT-IR82x0D Is In Primary / Secondary Mode

By pulling **DSR to low in this mode**, it will trigger ACT-IR82x0D starting to discover any other IrDA[®] devices. Once finds, it will send discovery command and try to establish IR link and make some specific IrDA[®] Primary protocols connecting to it (ex. IrCOMM[™], IrLPT[™] or OBEX[™] transport). If the connection is established successfully, IR82x0D will pull **DTR to low**. Then host device can send and receive data. Since only one Primary and one Secondary device in IrDA[®] protocols, even we configure IR82x0D to “Primary / Secondary” option, it may enter Secondary mode when it accepts the discovery command from another Primary device. Suppose two Primary devices have discovered each other, it will always be one playing as Primary and the other as Secondary after negotiation.

4.2 When ACT-IR82x0D Is In Secondary Mode

By pulling **DSR to low in Secondary mode**, it will set ACT-IR82x0D ready to accept any inquiry from a Primary device. Once it finds IrDA link established, ACT-IR82x0D will pull **DTR to low**. Then the host device can send and receive data.

If your host device can only provide 3 wires (TXD, RXD and Ground), then you can connect DSR and CTS of IR82x0D to ground and keep DTR and RTS open.

Note: ACT-IR82x0D is a buffer limited processor. It has 2KB (or 0.5KB) buffer for both host and IrDA sides in ACT-IR8200D (or ACT-IR8210D). If CTS is connected to ground, then it might cause data loss (due to no flow control). Nevertheless, data loss can still be avoided if user sends data segment by segment with each segment not exceeding its buffer size (2KB in ACT-IR8200D or 0.5 KB in ACT-IR8210D).

5. LED BEHAVIOR

Activities	LED Behavior	Remark
Power Turned On.	LED blinks rapidly one time & then off.	
Set Dongle to Primary & DSR activated	LED blinks every 3 seconds.	Discovering any other IrDA device.
Set Dongle to Secondary & DSR activated.	LED stays off	It's in stand by status.
Dongle is connected to another IrDA device.	LED blinks rapidly.	The blinking speed is based on how fast both devices send and reply frames to each other.

6. CHARACTERISTICS AND SPECIFICATION

6.1 Absolute Maximum Ratings

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

Note: 1. IPC/JEDEC J-STD-020A

2. JEDEC Std JESD22-A114A (C1=100pF, R1=1500 Ω, R2=500 Ω)

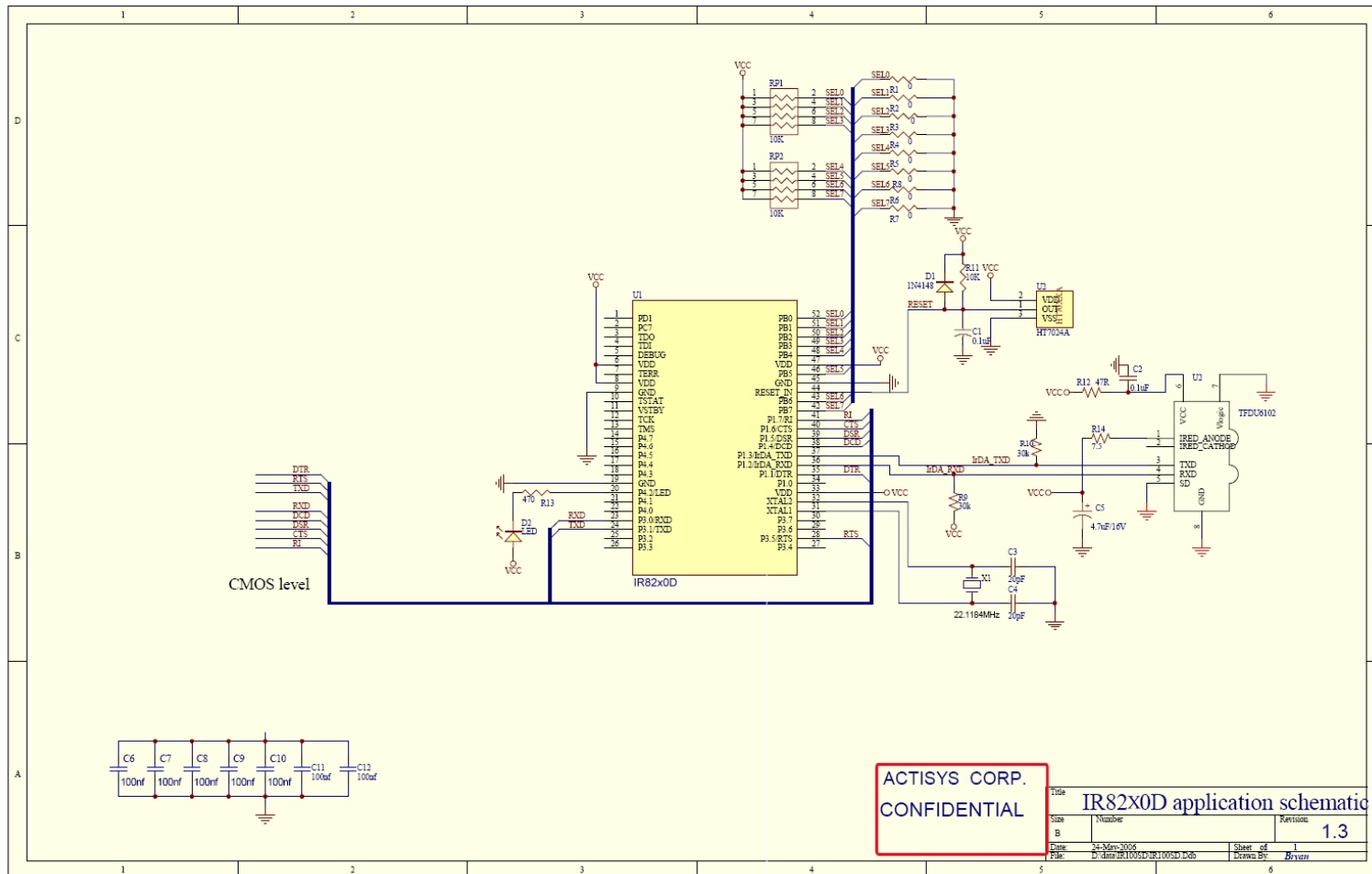
6.2 Operating Conditions

Symbol	Parameter	Min.	Max.	Unit
V _{CC}	Supply Voltage	3.0	3.6	V
T _A	Ambient Operating Temperature (industrial)	-40	85	°C
	Ambient Operating Temperature (commercial)	0	70	°C

6.3 DC Characteristics

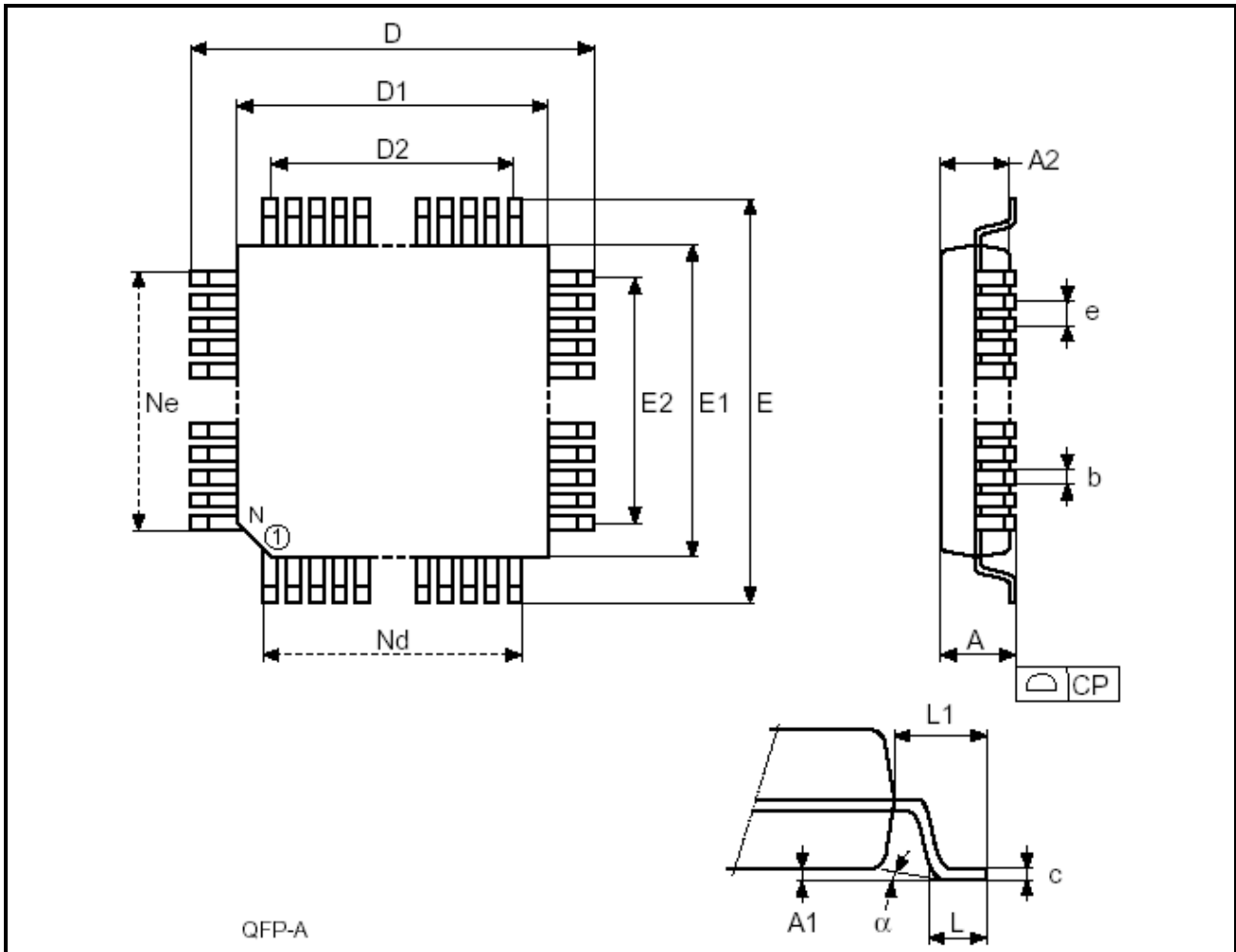
Symbol	Parameter	Test Conditions	Min.	Typ.	Max.	Unit
V _{CC}	Supply Voltage ⁽¹⁾		3.0		3.6	V
V _{IH}	High Level Input Voltage (Ports 0, 1, 2, 3, 4, XTAL1, RESET) 5V Tolerant - max voltage 5.5V	3.0V < V _{CC} < 3.6V	0.7V _{CC}		5.5	V
V _{IL}	Low Level Input Voltage (Ports 0, 1, 2, 3, 4, XTAL1, RESET)	3.0V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

7. APPLICATION CIRCUIT



8. PACKAGE DIMENSIONS

FIG 3. 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	–	–
α	–	0°	7°	–	0°	7°
n	52			52		
Nd	13			13		
Ne	13			13		
CP	–	–	0.10	–	–	0.004

9. 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, nor 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 YOU 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:

Date Code:

Date of Purchase:



10. CONTACT INFORMATION

GO WIRELESS WITH **ACTiSYS IR**



ACTiSYS
The Wireless Infra-red Expert

- ◆ 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+

The advertisement graphic features a red background with the ACTiSYS logo at the top center. Below the logo, three bullet points list the company's offerings: IrDA Protocol Software For Portable Devices, IrDA Test Software For Hardware Systems, and IrDA Printer And Computer Adapters. The text '115.2K, 4M and 16M bps' is positioned above a central collage of images. This collage includes a computer monitor, a printer, a mobile phone, a camera, a laptop, and various IrDA hardware devices. Three specific hardware models are highlighted with labels: IR100M/1000M (a small black device), IR2000L (a black device with a yellow cable), and IR220L/L+ (a black device with a black cable). The entire graphic is framed by a black border.

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