Introduction

This User Guide provides instructions for using the DOSonCHIPTM series silicon and modules. The current devices covered are:

- CD17B10 silicon IC
- DOSonCHIP-SD module

Conventions Used In This Document

Acronyms

Acronym	Description
NULL	no bytes (empty set)
<CR>	ASCII carriage return byte = 13 decimal = 0D hex
<CAN>	ASCII cancel byte = 24 decimal = 18 hex
EOL	end-of-line
EOF	end-of-file

Description

(see CD17B10 or DOSonCHIP-SD Datasheets, respectively)

Communications/Host Interface

There are several methods by which a host can connect to the DOSonCHIP device:

- UART
- SPI
- I^{2}C/SMBus (currently unavailable)

Physical Interface Selection

Only a single physical interface can be used at one time. The selection of which physical interface to use is made by setting the MODE0 and MODE1 (collectively called MODEx) pins appropriately. Upon device reset, the host interface will be selected. During operation, the MODEx pins must remain set. The interface can be changed by completing all disk operations, setting the MODEx pins appropriately, and then resetting the device.

UART

The UART, or Universal Asynchronous Receiver/Transmitter, provides asynchronous digital serial communications with the host. The UART physical interface consists of the following signals:

- UART_TX : commands & data sent from host to the DOSonCHIP device
- UART_RX : commands & data sent from the DOSonCHIP device to the host

- UART_RTS : handshake from the DOSonCHIP device to the host
- UART_CTS : handshake from the host to the DOSonCHIP device

Operation

Handshake

Settings

Baud Rate

The baud rate is selected after the device comes out of reset. The device is set using autobaud detection. 2 consecutive carriage returns (<CR>) are required to set the baud rate. The first <CR> sets the baud rate and the second <CR> is used to confirm that the baud rate is correct. The DOSonCHIP device will wait until two consecutive error free <CR>'s are received at the same baud rate before sending the ready prompt.

The allowable baud rates are:

- 1200
- 2400
- 9600
- 28800
- 38400
- 57600
- 115200
- 230400

Echo

The DOSonCHIP device can echo bytes received from the host. When enabled, bytes received over the UART_TX signal line will be send back UART_RX line. The echo is mainly used for simple verification that the commands and data sent to the DOSonCHIP device are accurate.

It should be noted that the trailing <CR> used to signal the end of the command line is not echoed to the host.

Upon reset, the Echo setting is turned on. See the command list for disabling/re-enabling the Echo setting.

SPI

The SPI, or Serial Peripheral Interface, provides synchronous serial communications with the host. The SPI physical interface consists of the following signals:

- SPI_MOSI : commands & data sent from host to the DOSonCHIP device
- SPI_MISO : commands & data sent from the DOSonCHIP device to the host
- SPI_CLK : clock line from host
- SPI_CS# : SPI port select signal from host
- BUSY : handshake from the DOSonCHIP device to the host

- DIR : data direction indicator signal from the DOSonCHIP to the host

Operation

Handshake

Settings:

Transfer Rate:

See the CD17B10 Datasheet.

Clock Polarity:

The SPI interface clocks data in on the rising edge and out at the falling edge of the clock pulse (see CD17B10 datasheet for timing parameters).

Echo:

The DOSonCHIP device will echo the last byte sent from the host. This is done during the subsequent byte transmission. The echo is mainly used for simple verification that the commands and data sent to the DOSonCHIP device are accurate.

It should be noted that the trailing <CR> used to signal the end of the command line is not echoed to the host since there not a subsequent byte transmission from the host after the trailing command <CR>.

The SPI echo feature is always on.

Host SPI Interface Code Example:
[insert pseudo-code here]

COMMUNICATIONS PROTOCOL

Flowchart

Step	Host	DOSonCHIP
1		<EOL+Prompt
2	Command+EOL>	
3		<Response
4		<EOL+Prompt

After reset, EOL = Carriage Return <CR> = 0D hex = 13 decimal
Prompt consists of an EOL followed by the “>” character
Commands must be terminated with an EOL.
Commands longer than 80 total bytes will generate a buffer overrun error.

Numeric Format

Numeric data in the Command or Response are represented in either ASCII-decimal (base 10) or ASCII-hexadecimal (base 16) format. Data read/written to/from a file is represented in byte binary format with the most significant bit sent/received first.

Commands

Syntax

Parameter	Description
|	non-literal designator: "or"
{}	non-literal designator: optional
{drive:}{\}{path}{\}	follows 8.3 format; path can consist of . or .. per FAT specification valid examples: A: A:\ A:\TEST\SUBTEST A:\TEST\SUBTEST\ A:\TEST\SUBTEST\A\..\
{drive:}{\}{path\}file	follows 8.3 format valid examples: A:LOG.DAT A:\LOG A:\TEST\LOG.DAT A:\TEST\SUBTEST\LOG.TXT
#handle	0 < handle <= 4 valid examples: #1 #2 #3 #4
bytes	0 < bytes <= filesize
byteposition	0 <= byteposition <= filesize
mm:hh:dd:mm:yy	decimal format for time & date valid example: 48:22:03:12:07 is equivalent to December 3, 2007 10:48pm

Command Table

Command	Parameter1	Parameter2	Returns	Description
NULL			{error}	Card Detect & Mount
cd	{drive:}{\}{path}{\}		{error}	Change Directory
md	{drive:}{\}{path}{\}		{error}	Make Directory
i	{{drive:}{\}{path}{\} |{drive:}{\}{path\}file}		{list: last modified date&time filesize/directory filename}	Information: returns contents of directory or information of file
or	{#handle}	{drive:}{\}{path\}file	{#handle} | {error}	Open Read file: opens existing file for reading and sets seek pointer to beginning of file=0
ow	{#handle}	{drive:}{\}{path\}file	{#handle} | {error}	Open Write file: opens new file or existing file with seek pointer=filesize
r	#handle	{bytes}	{bytes to be sent<CR>data}	Read file: reads bytes from file starting at seek position; reads to EOF if no bytes specified
w	#handle	bytes	“datainput” | error	Write file: writes bytes to file starting at seek position
s	#handle	{byteposition}	{byteposition} | {error}	Seek location within file: sets file referenced by #handle to Parameter2 or returns current position if Parameter2 is omitted
q	{#handle}		{error}	Quit/Close file
d	{drive:}{\}{path\}file |{drive:}{\}path{\}		{error}	Delete file or empty directory
DEC				Decimal: set numeric representation to ASCII Decimal (base 10) format
HEX				Hex: set numeric representation to ASCII Hexadecimal (base 16) format
e1				Echo On (UART mode only)
e0				Echo Off (UART mode only)
b			§ (repeating)	Bootloader
v			cxx bxxxx fxxxx	Version
z				Sleep
t	{mm:hh:dd:mm:yy}		{yyyy-mm-dd hh:mm} | {error}	Time & date: set|get time & date
t0				Time off
t1				Time on

Errors

Errors are internally represented as negative numbers in 16-bit 2's complement format. They are communicated to the host in either ASCII hexadecimal or ASCII decimal format dependent upon the current numeric mode. In hex mode, errors are represented as 4 consecutive ASCII hexadecimal digits. In decimal mode, errors always begin with the negative sign.

ERROR (DECIMAL)	ERROR (HEX)	ERROR Description
-1	FFFF	reserved
-2	FFFE	card not detected
-3	FFFD	card could not be initialized
-4	FFFC	card could not have block length set
-5	FFFB	card voltage not in range: 2.7V - 3.6V
~~-6~~	~~FFFA~~	~~card current draw above: 80mA~~
-7	FFF9	card read error
-8	FFF8	reserved
-9	FFF7	input buffer overrun error
-10	FFF6	invalid command
-11	FFF5	syntax error
-12	FFF4	parameter out of range
-13	FFF3	end-of-file error
-14	FFF2	long filenames not supported
-15	FFF1	FAT12 file system not supported, please reformat
-16	FFF0	incompatible file system
-17	FFEF	drive does not exist/invalid drive
-18	FFEE	invalid directory name/not a directory/filename error
-19	FFED	file/directory not found; entry does not exist in specified dir
-20	FFEC	type cannot be opened error (no hidden, system, vol label, subdir)
-21	FFEB	file already opened
-22	FFEA	card changed with files open error
-23	FFE9	reserved
-24	FFE8	reserved
-25	FFE7	invalid handle/handle out of range
-26	FFE6	no handles available/no more files can be opened
-27	FFE5	handle previously assigned
-28	FFE4	handle not assigned|not open for this operation
-29	FFE3	not opened for read operation error
-30	FFE2	reserved
-31	FFE1	reserved
-32	FFE0	reserved
-33	FFDF	sector out of range write error
-34	FFDE	disk full error
-35	FFDD	root directory full error (FAT16 only)
-36	FFDC	lost cluster(s) error
-37	FFDB	corrupt filesystem error (write error caused malformed file structure)
-38	FFDA	read-only error/access is denied
-39	FFD9	not opened for write operation error
-40	FFD8	duplicate name error
-41	FFD7	directory not empty
-42	FFD6	open file cannot be deleted error
-43 to -256	FFD5 to FF00	card physical read/write error

Update Firmware

The DOSonCHIP device can be updated with new firmware.
Firmware updating takes place over the UART interface using Ward Christensen's 1977 public domain XModem transfer protocol as documented in:

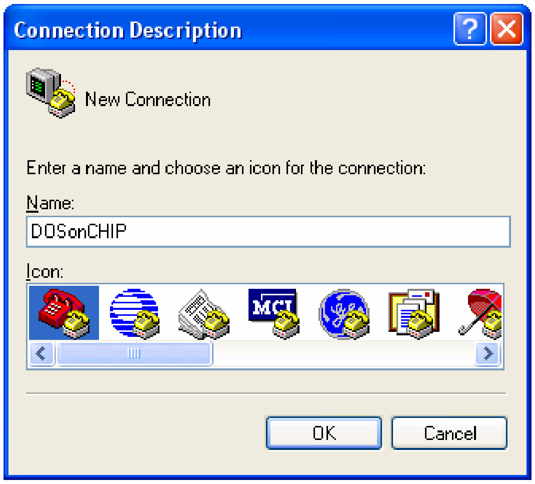
[1] "XModem / YModem Protocol Reference" by Chuck Forsberg [1988-10-14]
[2] http://www.commonsoftinc.com/Babylon_Cpp/Documentation/Res/KRefFrame.htm

The following procedure uses Windows XP HyperTerminal to upload new firmware:

Windows HyperTerminal Setup

1. Launch HyperTerminal on the PC (Start>All Programs>Accessories<Communications>HyperTerminal).

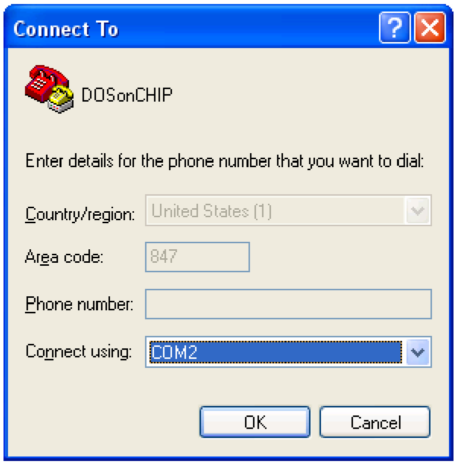
2. At the "New Connection" prompt, choose a profile name for this connection:



Enter a name and choose an icon for the connection:

Name: DOSonCHIP

3. Choose your RS232 serial connection at the next prompt:



Enter details for the phone number that you want to dial:

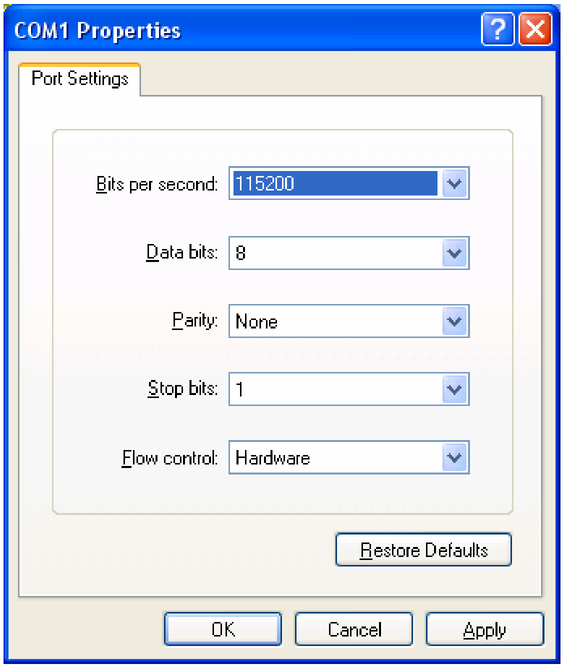
Country/region: United States (1)

Area code: 847

Phone number:

Connect using: COM2

4. At the next prompt, choose the serial port speed (see the CD17Bxx User Guide for allowable serial speeds), and choose the settings as shown:



Bits per second: 115200

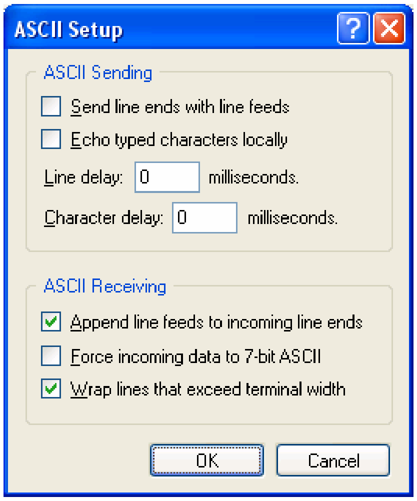
Data bits: 8

Parity: None

Stop bits: 1

Flow control: Hardware

5. On the menu bar, select "File>Properties" and click on the "Settings" tab and select the "ASCII Setup…" button. Then choose the settings as shown:



ASCII Sending

□ Send line ends with line feeds

□ Echo typed characters locally

Line delay: 0 milliseconds.

Character delay: 0 milliseconds.

ASCII Receiving

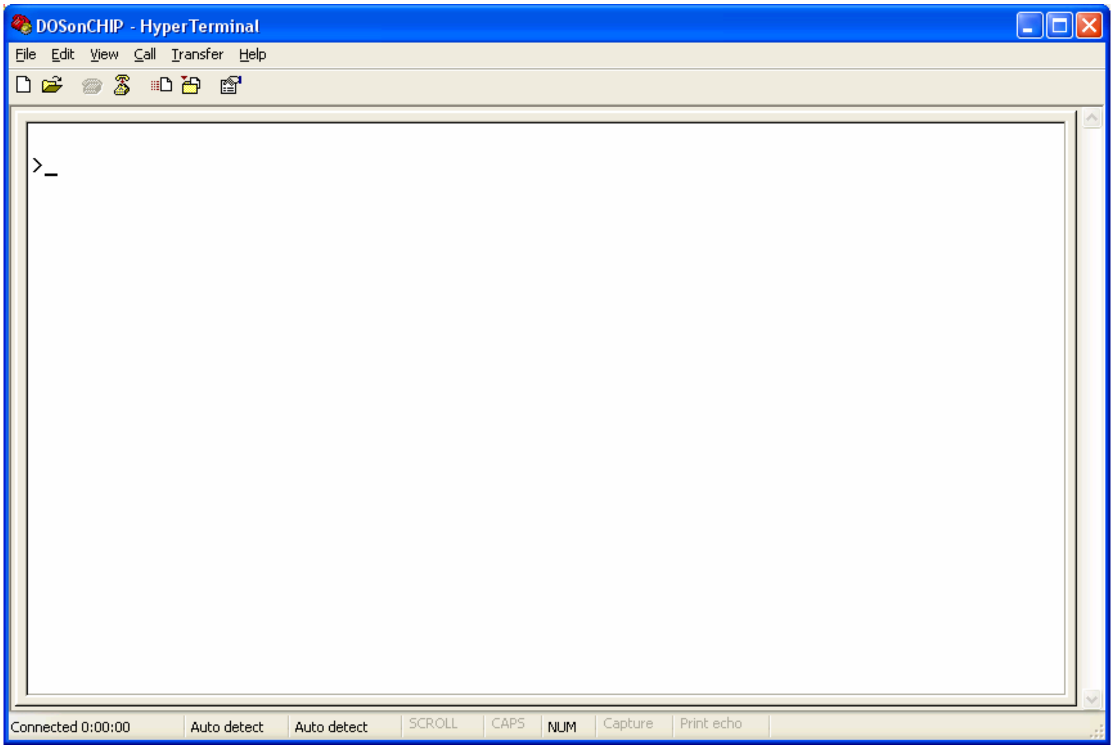
☑ Append line feeds to incoming line ends

□ Force incoming data to 7-bit ASCII

☑ Wrap lines that exceed terminal width

Make sure you press "OK" for both the "ASCII Setup" prompt AND the previous prompt for the settings to take effect.

6. On the PC's keyboard, press the "Enter" button two consecutive times to communicate and set the serial baud rate with the Development Board. You should now see the following prompt ">" from the DOSonCHIP Development Board:



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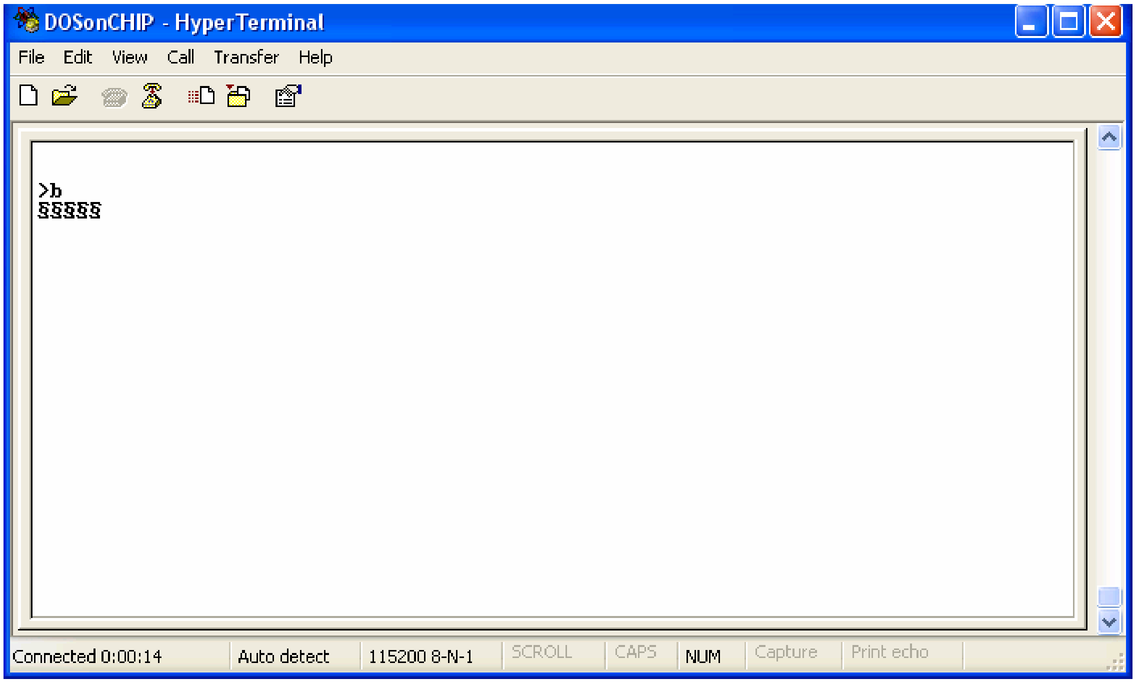
>_
```

7. Continue to the next section (File Transfer).

File Transfer

1. There are 2 ways to initiate the Bootloader
   - Set appropriate pins and reset the device (see CD17B10 Data Sheet)
   - From the command line, enter the ‘b’ command and press Enter (<CR>)

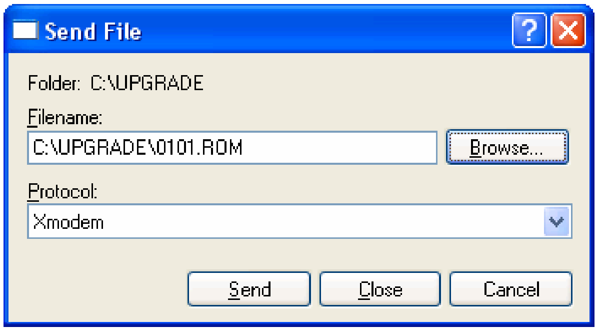
2. Enter two <CR>’s (press the Enter key twice) to complete the CD17B10’s autobaud detection. There should be a new ‘§’ symbol being shown about every second.



```
>b
§§§§§
```

Connected 0:00:14 | Auto detect | 115200 8-N-1

3. Select Transfer>Send File… on the Menu Bar and at the Send File prompt, select the firmware upgrade file (.ROM file), select the Xmodem protocol and press the “Send” button

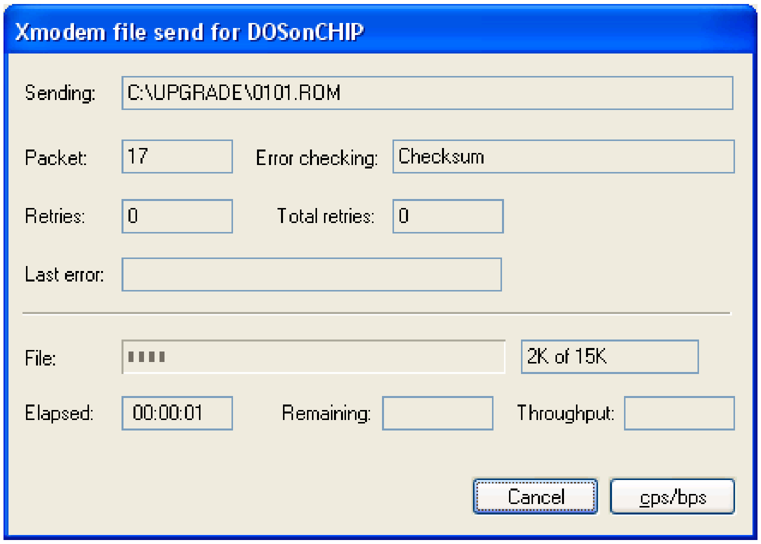


Folder: C:\UPGRADE

Filename: C:\UPGRADE\0101.ROM

Protocol: Xmodem

4. The “Xmodem file send” progress display should show the uploading process



Xmodem file send for DOSonCHIP

Sending: C:\UPGRADE\0101.ROM

Packet: 17 Error checking: Checksum

Retries: 0 Total retries: 0

Last error:

File: 2K of 15K

Elapsed: 00:00:01 Remaining: Throughput:

5. After the file transfer completes and there are no errors, the new firmware will be executed. Enter two <CR>’s (press the Enter key twice) to complete the CD17B10’s autobaud detection.

Document Change List

Revision	Date	Comments
0.1	4/21/2006	Preliminary Distribution

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