



## CH1786 EVALUATION BOARD INSTRUCTIONS

### WHAT YOU SHOULD RECEIVE IN THIS SHIPMENT:

1. CH1786 Evaluation Board with CH1786 mounted in its socket.
2. AC Power Supply.
3. CH1786 Evaluation Board Instructions (i.e., this document).
4. CH1786 Evaluation Board Schematic.
5. CH1786 Data Sheet.
6. Evaluation Board Switch Settings.
7. Cermetek AT Commands & S-Register publication.
8. Application Note # 110: Manual Originate And/Or Answer Operation of Cermetek Modem Modules.
9. Application Note # 114: Simulating an Active/Wet PSTN 2 Wire Line And Connecting Two Modems.

### WHAT YOU WILL NEED TO SUPPLY TO EVALUATE THE CH1786:

1. A Telco cable with RJ11 connectors on both ends.
2. An ASCII Terminal or a PC in terminal mode.
3. A DB-25 RS232 cable, and optionally a female DB-9 to male DB-25 adapter.
4. Access to a remote modem to facilitate testing the CH1786.

### EVALUATION DESCRIPTION.

The evaluation board operates as a full function 2400 bps, V.22bis, V.22, Bell 212, and Bell 103 modem. It is **AT** command driven and is FCC Part 68 approved. It is used to evaluate the CH1786 modem module, which can be removed from the evaluation board and used in a prototype assembly for further evaluation. The evaluation board can also be used as an extension of a prototype breadboard.

The evaluation board can accept a true RS232 serial interface (J1) or a 0 to 5 volt serial interface (J4), such as found at the output of a UART.

The evaluation board has a series of LEDs that indicate the status of the following key signal lines:

<b>RXD</b>	Receive Data.
<b>TXD</b>	Transmit Data.
<b>DTR</b>	Data Terminal Ready.
<b>DCD</b>	Data Carrier Detect.
<b>RI</b>	Ring Indicator.
<b>HS</b>	High Speed.

When an LED is lit, the indicated signal is present, or active. A detailed description of these signals can be found in the CH1786 data sheet.

### CH1786 EVALUATION BOARD SETUP.

**Evaluation Board Switches.** The evaluation board switches are all set high or up (this corresponds "open") for basic serial interfacing. The signals pass through the switches only when they are down or in the closed position. For recommended default switch settings, refer to the Evaluation Board Switch Settings document. See the CH1786 Evaluation Board schematic for details concerning the switch interface.

<b>RTS</b>	Reserved.
<b>CTS</b>	Reserved.
<b>AUT</b>	Reserved.
<b>ESC</b>	Reserved.

- DSR** Data Set Ready output from the CH1786. When enabled by the **AT&S1** command, DSR indicates when handshaking with a remote modem is in progress and/or when a data carrier has been detected. If the DSR signal is not used, set this switch to the up or open position.
- DCD** Data Carrier Detect output from the CH1786. When enabled by the **AT&C1** command, DCD indicates when a data carrier from a remote modem has been detected. If the DCD signal is not used, set this switch to the up or open position.
- DTR** Data Terminal Ready input to the CH1786. When enabled by the **AT&Dn** command, DTR can be used to disconnect a call or to return the modem to the command mode. If the DTR signal is not used, set this switch to the up or open position.
- RST** Reset input to the CH1786. Set the switch to the up or open position to enable the internal reset of the CH1786 during power up. For manual reset, momentarily set the switch in the down position, then back to the up position.

**CAUTION:** If the reset switch is left in the Down position, the CH1786 will not function.

**Applying Power To The CH1786 Evaluation Board.** J2 is the power connector plug. First insert the power supply female connector into the evaluation board male connector, then plug the supply into a standard 110V AC wall outlet. To apply/remove power to/from the evaluation board, plug/unplug the supply from wall outlet. A 5 volt indicator light (PWR) illuminates when power is present on the evaluation board.

**PSTN Line.** The RJ11 Jack (J3) is provided for ease of connection of the CH1786 Evaluation Board to an active PSTN (Public Switched Telephone Network) jack. Although the CH1786 requires an active (wet) powered telephone line to operate, a wet line connection can be simulated by connecting two CH1786s back to back. A DC voltage with a 600Ω load resistor must be supplied to properly emulate a standard PSTN line. See Cermetek Application Note 114.

**Additional Evaluation Capability.** The J4 strip connector is a 0 to 5 volt connector containing most of the CH1786 signals. This connector may be attached to an external prototype or breadboard for extended evaluation. J4 signal names are indicated on the PCB silkscreen and correspond to the CH1786 pin descriptions found in the CH1786 data sheet.

### OPERATING THE CH1786 EVALUATION BOARD.

The CH1786 Evaluation Board is now ready for evaluation. As configured, the CH1786 will respond to **AT** commands issued from an active terminal, a PC or from an **AT** command source via J1 (RS232 interface) or via J4 (0 to 5 volt serial interface). Do not use both the J1 and J4 connectors simultaneously to command the CH1786. **USE ONE OR THE OTHER.**

To perform an evaluation, refer to the CH1786 data sheet section Modem Control. This section steps through the AT command training sequence and the basic dialing sequence. Operation of the CH1786 may be expanded to include other AT commands as described in detail in Cermetek publication [AT Commands and S Registers For The Following Modem Modules: CH1786, CH1787, CH179x & CH2100](#) included in this evaluation board shipment.

If problems are encountered with the operation of the CH1786 Evaluation Board, contact Cermetek's Technical Support Line at (408) 752-5000 x19 or Toll Free at 1-800-882-6271 x19, from 8:00AM to 12:00 noon and from 1:00PM to 4:00PM Monday through Friday Pacific Standard Time. Cermetek will be happy to help. Assistance may also be accessed through our web site at <http://www.cermetek.com>.

### TROUBLE-SHOOTING HELPFUL HINTS.

The following helpful suggestions are provided to assist with debugging and trouble-shooting activities when connecting and using both the CH1786 modem and the CH1786 Evaluation Board.

1. Trouble-shooting suggestions when the CH1786 modem is not responding to an **AT<CR>** command string.

- Was the first command sent an ASCII command **AT<CR>** string with no other commands on the line? This is needed to sync the modem. If not, reset the modem and try sending only the ASCII command string **AT<CR>** before any other commands are attempted.
  - Is the Baud rate correct? It should be 8 bits, no parity, 1 stop bit.
  - Is the TXD pin high (+5) during power up?
  - Is the RST or reset line working correctly? Let it float initially.
  - Try blind dialing or ATH1 to see if RXD is the problem.
2. When in COMMAND MODE, there is a required delay of 20mS (minimum) between each ASCII character sent. This is needed for processing the commands in the CH1786. If a string of AT commands is sent to the CH1786 violating this wait requirement, it will cause the CH1786 to ignore the string and not reply with an **OK<CR><LF>**.
  3. Make sure information is sent as 8 bits, no parity and one stop bit. This is a total of 10 bits for each word. The start bit is a high to low state transition, and the stop bit is a low to high state transition or a continuous high for the duration of the bit time.
  4. Make sure the data is 10 bits at 2400 baud. This is 0.4 ms per bit or 4.05 milliseconds per word.
  5. The word comes out of the CH1786 LSB (Least Significant Bit) first. The word is in ASCII format and consists of two hex nibbles. Remember that when 7 bit ASCII with parity is chosen, there is no high order bit on the second word (MSB) as it is changed to the parity bit.
  6. To check the operation of the CH1786, type the **ATS=1** command (Answer Automatically), then ring the CH1786 using a standard PSTN line. The CH1786 will ring and answer. The RXD pin (Pin 11) will also send the following message:

**<CR> <LF> R I N G <CR> <LF>**

This indicates that the CH1786 is properly connected and functioning correctly. The CH1786 will send at 7 bits even parity with one stop bit at 2400 baud. If another baud rate is supplied to TXD using the **AT<CR>**, the CH1786 will send further RING information at the baud rate and configuration specified using the **AT<CR>** command.

7. If the CH1786 does not successfully dial:
  - Verify that the PSTN line is active and contains a dial tone.
  - Check the RJ11 connection. The center two pins are Tip and Ring.
  - Check to be sure that the remote modem is set up to Auto Answer, **ATS=1** command.
  - Check to see if a special outside access dial modifier is required in the PBX dialing string.