

CKDS

Chart recorder controller board

Description

The CKDS printer controller board supports all Seiko LTPD245 and LTPD345 series printer mechanisms. It is both a high-speed text and graphics printer as well as a real-time chart recorder.

Extensive high-level commands reduce host overhead and provide complete configurability.

Applications include Windows printing, standard text printing and medical waveform printing.

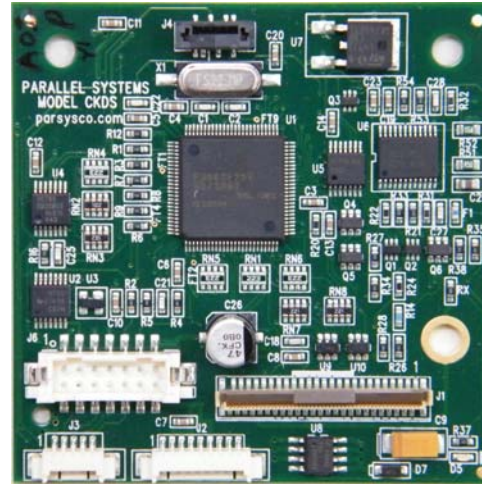
Custom panel mount printers are easily created.

Features

- Text mode for high-speed text, graphics and Windows applications.
- Recorder mode for chart recorder functions
- Sensors: paper, head-up, head temperature
- Automatic contrast adjustment
- Head protection watchdog circuit
- Comprehensive power-on self-tests
- Automatic bad dot detection
- ESD protection on all I/O
- RoHS compliant.
- FEED key connector, local diagnostic LED
- Interface Serial: async, 115K and 230K

- Text/Graphics/Windows Features
 - Standard escape commands
 - WIN drivers
 - 203 DPI, 0.1 mm/hr to 50 mm/sec

- Chart Recorder Features
 - New bitmap annotation string commands
 - 70 commands for traces, grids and text
 - 8 dots/mm x 16 dots/mm (203x406 DPI)
 - Chart speed: 0.1 mm/hr to 50 mm/sec
 - Six user configurable trace channels
 - 8 or 16 bit data for maximum resolution
 - Configurable grid and channel widths
 - Up to 16 auto-print text strings
 - Automatic time/date printing
 - Automatic Waveform smoothing
 - Buffered Mode for multi-tasking host



Mechanisms Supported

The CKDS supports the Seiko LTD245 printer mechanism.

	WIDTH (mm)	WIDTH (dots)	ECG ¹	25 % ON ² (Amp)
MODEL				
LTPD245	48	384	5 W	12 W
LTPD345	72	576	8 W	18 W

¹ 25 mm/sec, 5 mm grid, 2 traces, some annotation, 25 degC increases to 8W @50mm/sec

² 25 mm/sec printing with 25% of dots on EX: dark graphics
This power tapers as the head heats up.
An ability to print continuous 25% density is not implied.

Supply Voltage +5V min to +8V max
(6.6V to 7.1V recommended).

Special Requirements

The following items can be customized:

- Board: outline and dimensions
- Host connector: style and pinout (J3)
3.3V Asynch Interface, 2 data, 2 handshake
- Power connector: style and pinout (J2)
- Feed Key: connector style and location
- RAM: optional
- DPM: real-time power mnngt

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Recorder Mode Commands

ChartKard has special commands for real-time strip chart printing. The host can define the location of traces, grids and text strings. Once configured, the host only has to send trace data and any dynamic text strings.

Additional commands are/will be added to support bitmap overlays

3C 0 2 0 64	Grid #0, style 2. Start at 0h mm. Width is 100 mm (64h).
44 0 0 0 0 0 0 0 0 0 1 8F 4 FF FF	Trace #0, 50 mm wide
44 1 0 0 0 0 1 A0 1 A0 1 8F 4 FF FF	Trace #1, 50 mm wide, offset 01A0=416 dots=52 mm
32 1 F4	Speed = 50 mm/second
31	Start printing. Host starts sending trace data.

Cmd	System Commands
10	Soft RESET
11	Default configuration
*13	I/O Pin Function
*14	Mechanism type & head resistance
*15	Baud rate, parity, XON/XOFF
16	Print test
17	Echo bytes to host
*18	Host communication timeout
*19	Mode: fixed vs buffered
*1A	Text mode
*1B	Select mode: text vs recorder
1C	Date
1D	Time
*1E	Contrast adjust
20	Factory configuration
21	System info, ASCII
22	System info, binary
23	Run-time status
24	Read analog channels
*2D	Configure paper and page mark

Cmd	Motor Commands
30	Stop (ASCII '0')
31	Start (ASCII '1')
*32	Chart print speed
*33	Paper feed speed
*34	Low res. Speed
35	Form feed
36	Feed
37	Feed backwards
*38	Single step recorder mode
39	Print and Step

Cmd	Grid Commands
3B	Grid enable mask
*3C	Configure grid
3D	Restart grids

Cmd	Trace Commands
*41	Configure host prompt
*42	Trace enable mask
*43	Trace input mask
*44	Configure trace
*46	Offsets for enabled traces
*47	Trace offset
*48	Command 49 format
49	Custom Trace data
4A	Data for trace zero
4B	Data for trace one
4C	Data for traces zero and one
4D	Data for traces zero, one and two
4E	Data for traces zero, one, two and three

Cmd	Page and Record Commands
*51	Page length
52	Top-of-form
*53	Page print order
54	Record page mask
55	Set page index
56	Text record
57	Timestamp record
59	Chart speed record
5C	Delete all records
5D	Delete a record
5E	CRC Packet
5F	Checksum Packet

Cmd	Graphics Commands
61	Rectangle
62	Line
68	Clear print image
6D	Dashed line with margin
75	Short beep
76	Long beep
77	Double beep
78	Triple beep
7B	Wait

* System configuration parameter.

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- Compatibility**
 - ChartKard DS ("CKDS") controls all SEIKO LTPD245 & LTPD345 thermal printer mechanisms.
 - ChartKard DS strictly adheres to all Seiko design recommendations for head and motor protection logic and warnings for operation of the LTPD245/345 series.

- Print Resolution**
 - The resolution across the print head is 8 dots/mm or 203 dpi.
 - Text, graphics print at 203 DPI (8 dots/ mm).
 - The time axis (waveform) resolution in Chart mode is:

0.1 - 25 mm/sec	16 lines/mm	(406 DPI)
over 25 mm/sec	8 lines/mm	(203 DPI)
Bitmap overlays	8 lines/mm	
 - Voltage tracking for automatic contrast and resolution adjustment.
Actual maximum time axis print resolution and maximum print speed are dependent on the Head/Motor voltage (Vp) and other factors such as temperature.

- A/D Inputs**
 - Internal dedicated A/D channels provide head temperature and HeadV monitoring.

- Local Key and LED**
 - PAPER FEED key: board mounted two pin connector for a momentary key.
Press during power-on for print test.
Feed Key Input has static discharge protection.
 - STATUS LED: board mounted LED provides paper-out and error indication

- Head Protection**
 - Independent watchdog circuit protects the thermal head from paper out, head up and CPU failure.
 - A solid-state relay disengages the Vp from the head after a fault or whenever stopped.

- Print Speed**

Actual print speeds are voltage and temperature dependent - the higher the better. See the Seiko LTPD245 manual for details. In general, 50 mm/sec requires a minimum of 6.6 volts at room temperature.

 - Chart Recorder Mode: programmable from 0.1 mm/hour to up to 50 mm/sec
 - ASCII Text Mode: up to 12 text lines/sec (equivalent to 50 mm/sec)
 - Graphics Mode: up to 50 mm/sec with the parallel port running under WIN95. Serial port throughput is baud rate dependent and is generally slower than the parallel port.
 - Protected high quality integrated step motor driver
 - Variable current driver circuit protects the motor from overheating and reduces power consumption at low print speeds.
 - All features available at all speeds, including six channel printing in chart recorder mode.

- Host Interface**

ChartKard DS supports a serial host interface.

 - Serial: Standard asynchronous bi-directional serial link: TXD and RXD
Additional RTS handshake output provided to prevent printer input buffer overrun.
Additional CTS handshake input is often not needed but available.

3.3V CMOS levels are available at the serial outputs.
3.3V CMOS levels are needed at the serial inputs
All serial input/outputs are protected against static discharge.
Baud rates: 115200 (default), programmable to 9600 - 230400

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- Power Requirements**
- ChartKard DS operates from a single supply, Vp, of 6.0 to 8.0 volts. The recommended supply is 6.60V min, 6.85V nominal and 7.10V max for tight parameter control. (+5V is locally derived from Vp by linear regulation hence Vp's low limit.)
 - Typically 45 mA is consumed from + Vp by ChartKard DS while idle. While printing, this 'idle' component may rise to 80 mA, but is swamped by the several Amperes passed on to the thermal print head and stepper motor.
 - Sleep Mode reduces the idle current to 3.3mA typ, 5 mA max. The CKDS is then comatose. Exit from sleep (reset or character received) causes a cold re-initialization and it's attendant delay before processing commands/printing.

- Environmental**
- Same as operating and storage range of the Seiko LTPD245A/B mechanisms
 - RoHS compliant

- Diagnostics**
- Power-on self testing includes measurement of the resistance of each dot of the thermal print head. This diagnoses any combination of failed print dots.
 - A full RAM and ROM test is performed on RESET.
 - The ROM is protected by a 16-bit CRC
 - The LED is used to indicate the paper out/door open condition.
 - When blinking, the LED blink rate represents various failures (buffer over run, ROM error, etc).

- Connectors**
- Mechanism via J1.
 - Power via J2
 - Serial via J3
 - Feed Key via J4
 - Parallel Systems additional connections for boot and test operations via J5.

- Mechanism J1:**
- J1 connects to the 50 pin FFC of the LTPD245 mechanism. It is Molex #54104-5031 or similar. The signal levels, etc. are defined by Seiko documentation (Tech Ref U00111983500)

- Pinout Detail J2:**
- J2 is a 9 pin x 1.25mm shrouded header, Molex # 53047-0910

(Power)	J2-1,2,3,4,5	GND	Power return
	J2-6,7,8,9	Vp	Power, 6 to 8 V

- Pinout Detail J3:**
- J3 is a 5 pin x 1.25mm shrouded header, Molex # 53047-0510.

(Serial)	J3-1	GND	typically used for Serial interface return
	J3-2	TXD	Output to Host Serial RXD (Received Data)
	J3-3	RXD	Input from Host Serial TXD (Transmitted Data)
	J3-4	(CTS)	Input from Host Serial RTS (Request To Send)
	J3-5	RTS	Output to Host Serial CTS (Clear To Send)

- Pinout Detail J4:**
- J4 is a 2 pin TBD (2mm or 0.1" unshrouded header TBD)

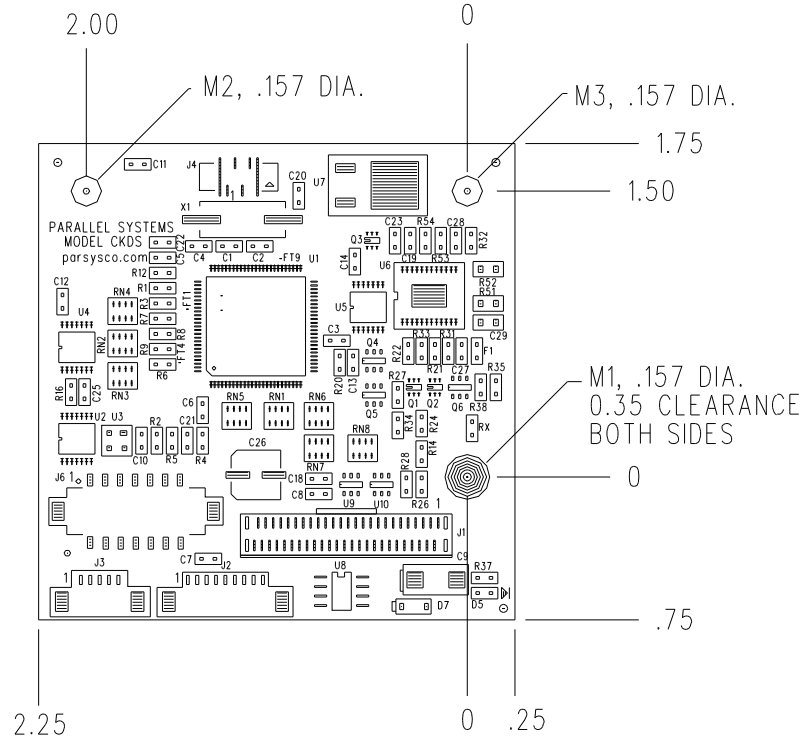
(Feed Key)	J4-1	GND
	J4-2	Feed Key input, LO active, 22K pullup to +5V

- Pinout Detail J5:**
- Used by Parallel Systems boot, and test operations
 - J5 is a TBD (N pin x 2mm unshrouded header TBD.)

(Do not connect)	J5-x	GND
	J5-x	do not connect, factory usage only (Vpp)
	J5-x	RESET_IN~ Logic input
	J5-	
	J5-N	etc etc

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DIMENSIONS



MOUNTING

The board is dimensioned to mount closely behind or over the Seiko LTPD245 mechanism.

GROUNDING

The LTPD245/345 mechanism has a metal frame but no convenient hard contact points to connect to this frame. The normal practice is to wire the mechanism frame to a return point (ground) in a way that prevents transient currents from flowing through sensitive circuitry on their way to a return. The user **will** touch the mechanism while changing paper so attention to static discharge path is required.

The LTPD mechanism has 2 isolated pins (pins 44,45 in its 50 pin FFC tail to J1) that are used for this purpose. These pins are wired to M1 (one of the CKDS's mounting holes) adjacent to J1. Seiko names them "FG" for Frame Ground. An alternate means could make contact directly to the mechanism frame,

FG has the recommended 1Mohm (bleeder) resistance to circuit GND. This serves to prevent charge buildup on the frame from paper etc in the event that there is no DC connection to circuit GND in the discharge path.

The other mounting holes have no connection.

Revision History

09/15/2010	Draft0	Created
11/15/2010	Draft1	Dimensions, Operating currents
04/15/2011	Rev 1	Release

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