



# USB Smart Card Reader

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**Reference Design  
MO1001**

## Product Overview

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A complete, low cost smart card to USB solution based on the Cypress CY7C63413. The MO1001 is the lowest cost smart card USB solution to date. The Cypress USB IC can be provided in DIP40 or SSOP-48 packages and supports both T=0 and T=1 smartcard protocols. As part of the complete USB/smartcard solution, the MO1001 has the necessary electronics and driver technology to enable extremely fast time-to-market development of smart card readers. The solution includes the USB smart card hardware, firmware and driver software, as well as integration with Microsoft's® smart card API. Readers designed around the MO1001 complete USB/smart card solution will immediately qualify for the Designed for Windows® logo. The solution is PC/SC compliant under Windows and is Windows Hardware Quality Labs (WHQL) compliant. It is designed to meet ISO 7816 and EMV2000 (Europay, Mastercard, Visa) requirements for an interface device (IFD).

For more information contact Ben Knapp at MOTO at (415) 281-4800 or visit our web site at [www.moto.com/usb](http://www.moto.com/usb).

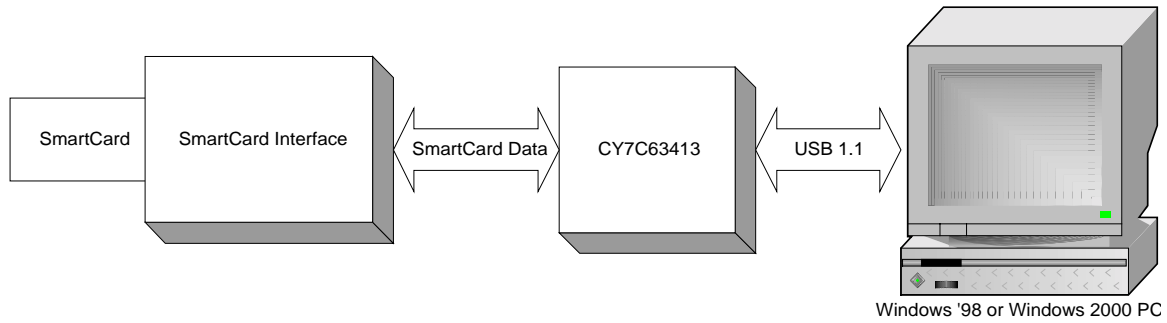
## Features

- Meets ISO 7816 and EMV2000 Smart Card Specification Standard
- USB 1.1 and HID Compliant
- Small Footprint (SSOP Package available)
- All Necessary Firmware Included
- Windows 98 and 2000 Drivers Including Integration with MicroSoft's® Smart Card API Provided

## Benefits

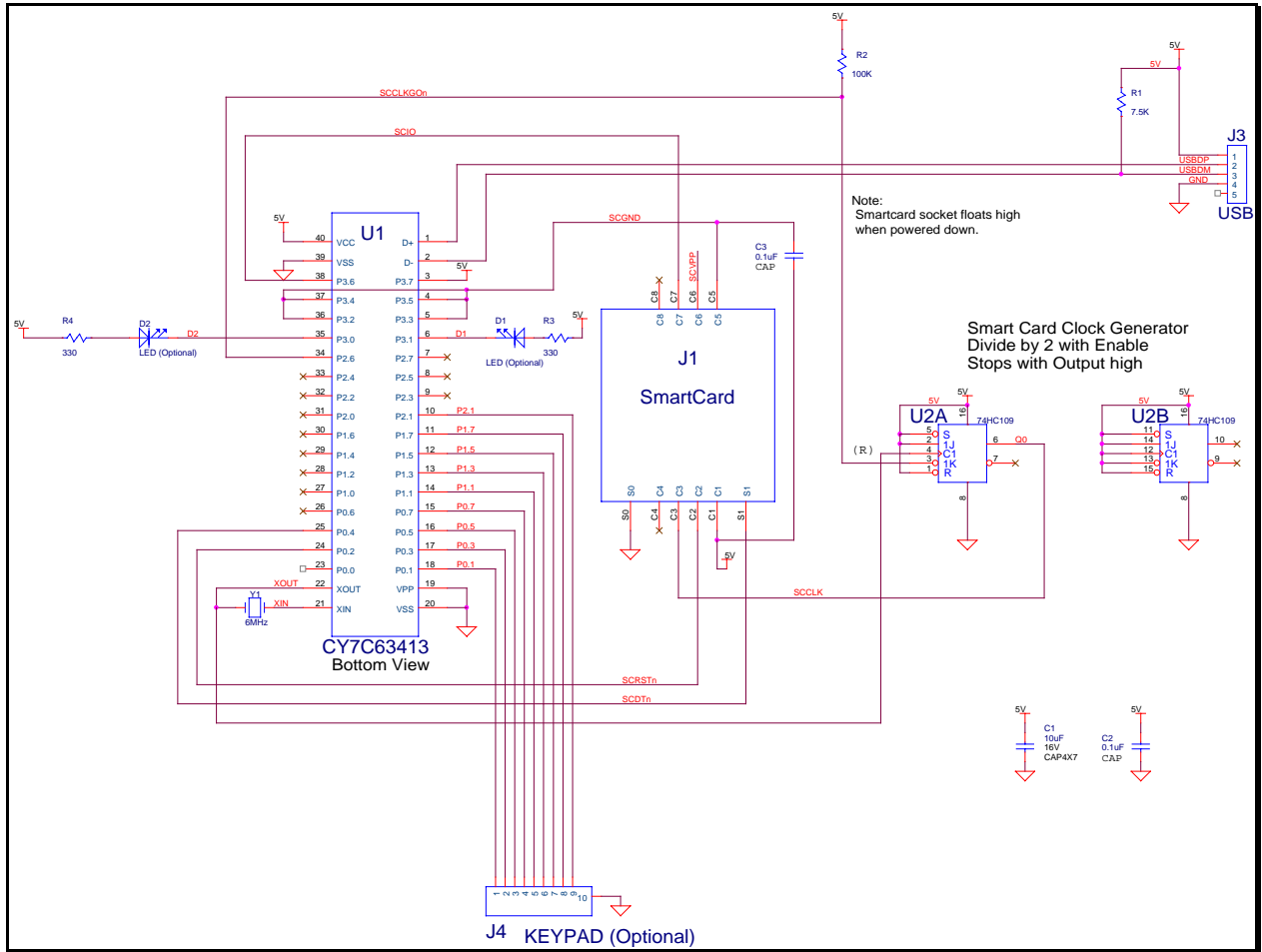
- Lowest Cost Solution Available
- Qualifies for Designed for Windows® Logo
- PC/SC Compliant Under Windows
- Compliant with WHQL
- Complete Turnkey Design Including Smart card/Keypad Hardware Design

## Block Diagram



The MO1001 smartcard reader is implemented using the Cypress CY7C63413 USB micro-controller, this single chip solution eliminates the need for a separate IC to communicate to the smartcard. This results in a very low cost solution requiring few external components. A small keypad and two LEDs are also supported.

# Schematic



## Bill of Materials

Here are estimated costs for a completed PC Board. These assume reasonably high volumes and the parts purchased directly from the supplier. Lower volumes purchased through a distributor will be higher.

The smartcard socket and the actual PCB will depend on your final choice of supplier. The PCB can be laid out such that all components fit on a board no larger than the smart card socket.

Item	Quantity	Reference	Part	Rating	Tol	Footprint	Supplier	Partnumber	Cost	Notes
1	1	C1	10uF	16V	_20%	CAP4X7	Panasonic	ECE-A1CKA100	\$0.20	
2	2	C3	0.1uF	50V	_20%	CAP	Philips	A104Z15Z5UFVWWN	\$0.01	
		C2	0.1uF	50V	_20%	CAP	Philips	A104Z15Z5UFVWWN	\$0.01	
3	1	D1	LED			LED	Panasonic	LN28RP	\$0.07	Optional
4	1	D2	LED			LED	Panasonic	LN38GP	\$0.07	Optional
5	1	J1	smartcard socket			SMTCRD	Hamburg	ICA-700	\$1.00	<b>Varies</b>
6	1	J3	USB			USB	T&B		\$1.00	Cable with Pigtail
7	1	J4	KEYBOARD			KEYBD	Grayhill	86JB2-201	\$0.00	Optional
8	1	R1	7.5K	_1/8W	_1%	RES			\$0.01	
9	1	R2	100K	_1/8W	_5%	RES			\$0.01	
10	2	R3	330	_1/8W	_5%	RES			\$0.01	Optional
		R4	330	_1/8W	_5%	RES			\$0.01	Optional
11	1	U1	CY7C63413			PDIP40	Cypress	CY7C63413-PC		See table below
12	1	U2	74HC109			PDIP16			\$0.20	
13	1	Y1	6MHz			CRES	MURAT		\$0.20	
14	1		PC Board						\$1.00	<b>Varies</b>
									\$3.80	

The heart of the design is the CY7C63413-PC pre-programmed with MOTO's firmware. Below is the volume pricing including firmware. This price is subject to change, please contact MOTO for current pricing.

Part #	Description	Quantity	Price
CY7C63413-PC	Low-Speed, USB Microcontroller, 3 endpt, 32 I/O, 8KB, 40-pin PDIP	10K-50K	\$4.21

In addition to the completed PCB you should also consider the cost of the case, CD, manual and packaging.

## Application Programming Interfaces

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The MO1001 is a USB Human Interface Device that can accept input from a 20-key keypad and control two LEDs as well as being a smart card reader. For smart card functions it communicates with application software using the Windows Smart Card Resource Manager – either directly using the Resource Manager API, or indirectly via the COM interface of a smart card service provider. See the documentation in Microsoft's Platform SDK for further information about how to use the Windows smart card subsystem ([http://msdn.microsoft.com/library/default.asp?URL=/library/psdk/scard/scovr\\_42qs.htm](http://msdn.microsoft.com/library/default.asp?URL=/library/psdk/scard/scovr_42qs.htm)).

For keypad input and LED output, MOTO provides the SCReader DLL, which exposes an API composed of the following functions:

SCROpen() – Opens connection to the device.

SCRGetKey() – Returns number of the key currently pressed (1 to 20) or 0 for none.

SCRSetLEDs(UINT mask) – Turns LEDs on or off according to bits in mask.

SCRSetTarget(HWND target) – Sets window which will receive a message whenever a key is pressed or released. Its LPARAM contains the number of the key pressed (or 0 on release). This same window will also then receive WM\_DEVICECHANGE messages. The SCRTest sample code shows how to qualify these messages so MO1001 device removal/insertion events can be identified.

SCRGetStatus() – Returns device status.

SCRGetVersion() – Returns firmware version.

SCRClose() – Closes connection to the device.