SYCARD TECHNOLOGY

CF extend 166/167

CompactFlash™-to-PC Card Extender/Adapter User's Manual

Preliminary

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1.0 Introduction

Sycard Technology's CF extend 166 and 167 CompactFlash to 16-bit PC Card extender cards allows a standard 68-pin 16-bit PC Cards to be plugged into a 50-pin CompactFlash socket.

- Low profile type I enclosure compatible with all CompactFlash hosts
- Flexible printed circuit allows for many different mounting configurations
- Large ground plane reduces signal integrity problems
- CFextend 166 for 3.3V PC Cards and CFextend 167 for 5V PC Cards

2.0 Using the CF extend 166/167

The CFextend 166 and 167 are designed to connect the 50 pin CompactFlash interface to the 68-pin 16-bit PC Card interface.

> ***Caution**: Never use the CFextend 166 or 167 without first determining if the PC Card/CompactFlash host combination is electrically compatible. Severe damage to the CompactFlash host and/or the PC Card may result. See the frequently asked questions in Appendix A for more information.*

Using the CF extend 166/167 is straightforward. The extender card is inserted into the desired slot in the host system. Then the 68 pin 16-bit PC-Card is inserted into the card connector. The printed circuit board is designed to flex to allow mounting in a variety of positions. Once the PC Card is in the desired position it may be fastened down with a strap, adhesive tape, Velcro or similar material. Although the flexible PCB is constructed of a high strength Kapton material, it is recommended that bending and flexing of the PCB be limited.

> ***Caution**: Insertion and removal of the extender and PC Card should be done with care. The CF Card's fragile connectors may be broken or bent if improper force is used. Both card and extender should be inserted straight without any lateral movement or force. Proper care and use of the extender card will insure years of trouble free operation.*

2.1 Differences between the CompactFlash and 16-bit PC Card Interface

The following tables illustrate some of the differences between the CompactFlash and PC Card standards.

	CompactFlash	**16-bit PC Card**
Pins	50	68
Vcc	Card must support both 3.3V and 5V	Card supports 5V and/or 3.3V
Address Lines	11	26
Power Consumption	70mA Max 3.3V 100mA 5V	1A Max
Vpp Programming Power	None	Yes
True IDE Mode	Required for ATA cards	Not Specified for ATA cards
Logic Level	CMOS	TTL

Table 2.1-1 CompactFlash vs. 16-bit PC Cards.

Parameter	CompactFlash Card	16-bit PC Card
Vcc	Card must support 3.3V and 5V	Card can support 5V and/or 3.3V
Power Consumption	70mA Max 3.3V 100mA 5V	1A Max
Vpp Programming Power	None	Yes, Vpp1 and Vpp2
Logic Level	CMOS	TTL
Max Wait time	350nS	12uS
Pull-up resistors	50K	10K

Table 2.1-2 CompactFlash and 16-bit PC Card Electrical Differences

2.3 The CompactFlash to 16-bit PC Card Interface

The CF extend 166/167 allows the user to test a 16-bit PC Card device in a CompactFlash socket. Since the CompactFlash interface is a subset of the 16-bit PC Card interface, it is expected that many PC Cards will not operate in a CF environment. The following table outlines the differences between the CompactFlash and 16-bit PC Card interface and how the extender handles the differences.

CompactFlash Signal	PC Card-16 Signal	Notes
A[10:0]	A[10:0]	
N.A.	A[25:11]	A[25:11] to the PC Card are tied to ground on the CFextend 166/167 PC boards.
D[15:0]	D[15:0]	
CE[2:1]	CE[2:1]	
VS[2:1]	VS[2:1]	
REG#	REG#	
WE#	WE#	
OE#	OE#	
BVD[2:1]	BVD[2:1]	
RDY/IRQ	RDY/IRQ	
IORD#	IORD#	
IOWR#	IOWR#	
RESET	RESET	
INP#	INP#	
#CD[2:1]	#CD[2:1]	
WAIT#	WAIT#	
WP/IO16#	WP/IO16#	
N.A.	Vpp1	Not Connected
N.A.	Vpp2	Not Connected
CSEL#	N.A.	Not Connected
VCC	VCC	
GND	GND	

Appendix A - Frequently Asked Questions

Q1: What kind of CompactFlash (CF) to PC Card adapters does Sycard manufacture?

A1: Sycard produces three types of CF-to-PC Card adapters:

- CF extend 165 - CompactFlash-to-PC Card adapter development board.
- CF extend 166 - CompactFlash-to-3.3V PC Card flexible adapter
- CF extend 167 - CompactFlash-to-5.0V PC Card flexible adapter

Q2: What are the differences between the CF extend 165 and the CF extend 166/167?

A2: The CF extend 165 is a development board used to determine if a 68-pin PC Card will operate in a CompactFlash™ socket. The CF extend 165 has test points, current measurement jumpers and LEDs to help determine if a PC Card is compatible with the CompactFlash™ interface. A person with sufficient hardware and software knowledge of the PC Card/CompactFlash™ interface should make these decisions. Once the determination that the PC Card/CompactFlash™ host combination is compatible, the end user may use the CF extend 166 or 167 adapters. The CF extend 166/167 models do not have exposed test points or any other features for debug or test.

Q3: What is the difference between the CF extend 166 and 167?

A3: The CF extend 167 is designed for 5V keyed PC Cards and the CF extend 166 is designed for 3.3V keyed PC Cards.

Q4: If I plug a <any PC Card> into the CF extend 165/166/167 will it work in my CompactFlash™ slot on my <any CompactFlash™ host computer/device>?

A4: This is the most common question we receive about the CF extend CF-to-PC Card adapters. Although the adapters will allow any 16-bit PC Card to be adapted to a CompactFlash™ slot, many situations may prevent the card from working including:

- Power consumption of the PC Card is too high for the CompactFlash slot
- CompactFlash™ host does not have software support for the PC Card
- PC Card may need Vpp voltage that the CompactFlash™ interface does not support
- PC Card may require more address lines than the CompactFlash™ interface supports
- CompactFlash™ host may not support PC Card I/O devices
- PC Card may operate at TTL logic levels that the CompactFlash™ host may not accept
- CompactFlash™ host may only support Vcc at 3.3V

The CF extend 165 is intended as a development tool for technically competent personnel. Users should have a good technical understanding of the CompactFlash™ and PC Card interfaces. If you don't know the difference between CMOS and TTL logic levels or what a tuple is then you should seek out a person that does. Once it has been determined if a particular PC Card is compatible and has tested it with the CFextend 165, the CFextend 166 or 167 can be specified for use by end users.

Q5: What kind of problems can I expect when I use the CF extend 165/166/167 CF-to-PC Card adapters?

A5: The most common problem would be software support. Most PC cards were designed to operate in x86 Wintel based computers (Intel/Microsoft). In most cases, drivers are only supplied for this class of machine. Other common problems are listed in the previous answer.

Q6: I need more storage capacity on my digital camera. Can I use the CF extend 166/167 to adapt a PC Card flash disk to work in my CompactFlash™ based camera?

A6: See the answer to question 4.

Q7: If I use the CF extend CF-to-PC Card adapters, is there a possibility of damaging my computer?

A7: Yes! The CompactFlash™ Specification designates that a card only draw 100mA maximum at 5V and 70mA max at 3.3V. PC Cards may draw as much as 1A. If your CompactFlash™ host socket does not have overcurrent protection, plugging in a high power PC Card may cause damage.

Q8: Can I damage my PC card or computer if I use the wrong adapter (CF extend 166 or 167)?

A8: Yes, if a 3.3V only PC Card is plugged into a 5V host damage to the card and/or host may occur. Remember, the CompactFlash™ host and PC Card combination must be pre-qualified by a technically competent person before attempting to power the PC Card. Never use the CF extend 166/167 without first understanding these risks.

Q9: Doesn't the PC Card have mechanical keying to prevent a 3.3V card from being plugged into a 5V socket?

A9: Yes. However, this keying is not available in the CompactFlash™ format. With the CFextend 166/167, it is possible to plug a 5V card into a 3.3V socket or a 3.3V card into a 5V socket.

Q10: Can I connect an external power supply to the CF extend 166/167 to power a high powered PC Card?

A10: No, the CFextend 166 or 167 does not support external power supplies. Any attempt to wire in an external power supply may cause damage to the CompactFlash host or PC Card.

Q11: What does the CF extend 167 do with the unused address lines on the PC Card?

A11: A[25:11] are tied to directly to signal ground through a two pull-down resistors.

Q12: Will Sycard Technology guarantee that the CF extend CF-to-PC Card adapters will operate with my particular PC Card/host computer application?

A12: No. The CF extend CF-to-PC Card adapters are sold as development tools for engineers working on developing CompactFlash™ cards, hosts and software. Purchasers should understand that they might need to make modifications to hardware and/or software to get a particular card/host combination to work. Sycard Technology only guarantees that the CF extend CF-to PC Card adapters are free from manufacturing defects and meets its published specifications.

Q13: What kind of help can Sycard Technology give me to get my PC Card working with CompactFlash™ host?

A13: Sycard Technology provides full schematics of the CF extend CF-to-PC Card adapters. Technical documentation on the PC Card Standard and the CompactFlash™ Standard may be obtained from PCMCIA and the CompactFlash™ Association. Sycard Technology does not provide design or consulting services. These two websites can provide more information:

http://www.compactflash.org
http://www.pcmcia.org

Q14: How can I tell if my PC Card is 3.3V or 5V keyed?

A14: Check the OEM or user's manual for your PC Card. If this doesn't have the information, then contact your card vendor's technical support.

Q15: Can I use a CardBus card in the CFextend 165/166/167?

A15: No, CardBus is a 32-bit interface high performance bus. CompactFlash and 16-bit PC Cards use a 16-bit lower performance bus.

Appendix B

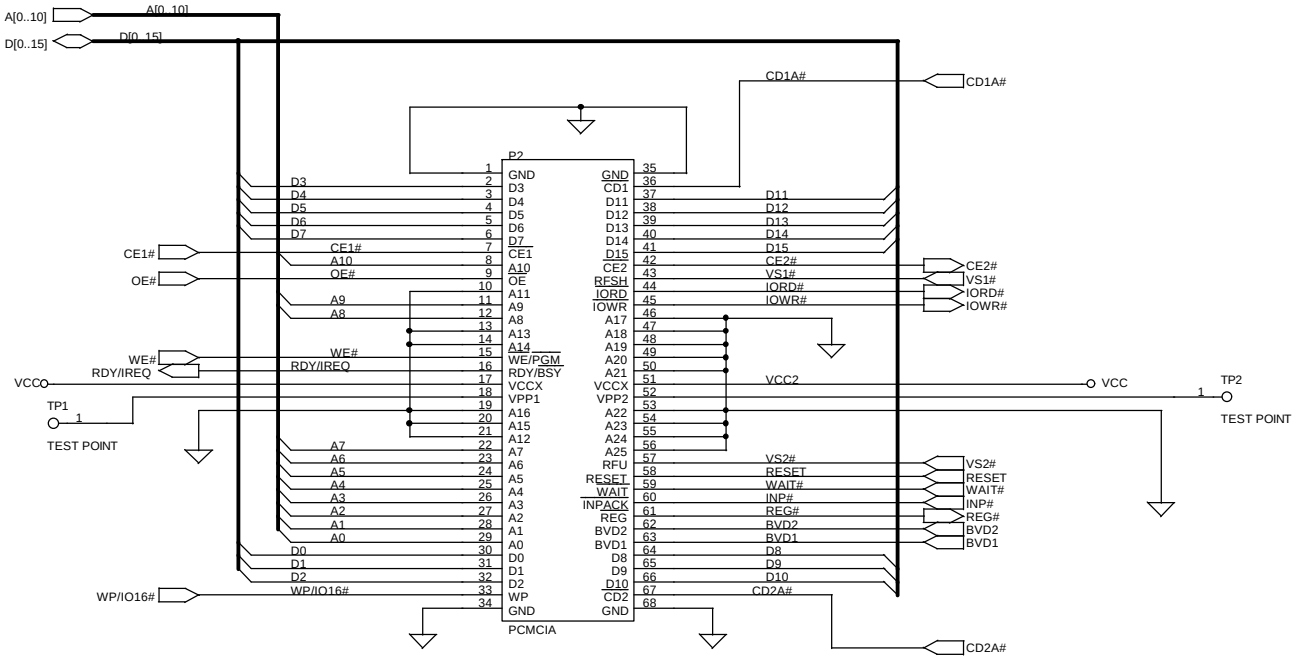
B. CompactFlash 50-Pin Interface

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	26	CD1#	Card Detect 1
2	D03	Data Bit 3	27	D11	Data Bit 11
3	D04	Data Bit 4	28	D12	Data Bit 12
4	D05	Data Bit 5	29	D13	Data Bit 13
5	D06	Data Bit 6	30	D14	Data Bit 14
6	D07	Data Bit 7	31	D15	Data Bit 15
7	CE1#	Card Enable 1	32	CE2#	Card Enable 2
8	A10	Address Bit 10	33	VS1#	Voltage Sense 1
9	OE#	Output Enable	34	IORD#	I/O Read Strobe
10	A09	Address Bit 9	35	IOWR#	I/O Write Strobe
11	A08	Address Bit 8	36	WE#	Write Enable
12	A07	Address Bit 7	37	RDY/BSY/IREQ	Ready/Busy/Interrupt Request
13	VCC	Card Power	38	VCC	Card Power
14	A06	Address Bit 6	39	CSEL#	Master Slave Select
15	A05	Address Bit 5	40	VS2#	Voltage Sense 2
16	A04	Address Bit 4	41	RESET	Card Reset
17	A03	Address Bit 3	42	WAIT#	Extend Bus Cycle
18	A02	Address Bit 2	43	INPACK#	Input Port Acknowledge
19	A01	Address Bit 1	44	REG#	Register Select
20	A00	Address Bit 0	45	BVD2	Battery Voltage Detect 2
21	D00	Data Bit 0	46	BVD1	Battery Voltage Detect 1
22	D01	Data Bit 1	47	D08	Data Bit 8
23	D02	Data Bit 2	48	D09	Data Bit 9
24	WP/IOIS16	Write Protect I/O is 16 Bits	49	D10	Data Bit 10
25	CD2#	Card Detect 2	50	GND	Ground

PC Card Pinout - I/O Mode

Pin	Name	Description	Pin	Name	Description
1	GND	Ground	35	GND	Ground
2	D3	Data Bit 3	36	CD1#	Card Detect 1
3	D4	Data Bit 4	37	D11	Data Bit 11
4	D5	Data Bit 5	38	D12	Data Bit 12
5	D6	Data Bit 6	39	D13	Data Bit 13
6	D7	Data Bit 7	40	D14	Data Bit 14
7	CE1#	Card Enable 1	41	D15	Data Bit 15
8	A10	Address Bit 10	42	CE2#	Card Enable 2
9	OE#	Output Enable	43	VS1#	Voltage Sense 1
10	A11	Address Bit 11	44	IORD#	I/O Read Strobe
11	A9	Address Bit 9	45	IOWR#	I/O Write Strobe
12	A8	Address Bit 8	46	A17	Address Bit 17
13	A13	Address Bit 13	47	A18	Address Bit 18
14	A14	Address Bit 14	48	A19	Address Bit 19
15	WE#	Write Enable	49	A20	Address Bit 20
16	IREQ#	Interrupt Request	50	A21	Address Bit 21
17	VCC	Card Power	51	VCC	Card Power
18	VPP1	Programming Supply Voltage 1	52	VPP2	Programming Supply Voltage 2
19	A16	Address Bit 16	53	A22	Address Bit 22
20	A15	Address Bit 15	54	A23	Address Bit 23
21	A12	Address Bit 12	55	A24	Address Bit 24
22	A7	Address Bit 7	56	A25	Address Bit 25
23	A6	Address Bit 6	57	VS2#	Voltage Sense 2
24	A5	Address Bit 5	58	RESET	Card Reset
25	A4	Address Bit 4	59	WAIT#	Extend Bus Cycle
26	A3	Address Bit 3	60	INPACK#	Input Port Acknowledge
27	A2	Address Bit 2	61	REG#	Register and I/O select enable
28	A1	Address Bit 1	62	SPKR#	Digital Audio Waveform
29	A0	Address Bit 0	63	STSCHG#	Card Status Changed
30	D0	Data Bit 0	64	D8	Data Bit 8
31	D1	Data Bit 1	65	D9	Data Bit 9
32	D2	Data Bit 2	66	D10	Data Bit 10
33	IOIS16#	IO Port is 16 bits	67	CD2#	Card Detect 2
34	GND	Ground	68	GND	Ground

C. CF extend 166/167 Schematic



SOCKET SIDE CONNECTOR

Sycard Technology		
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Size: B	Document Number: 140053	Rev: A
Date: Friday, October 29, 1999	Sheet 2 of 2	

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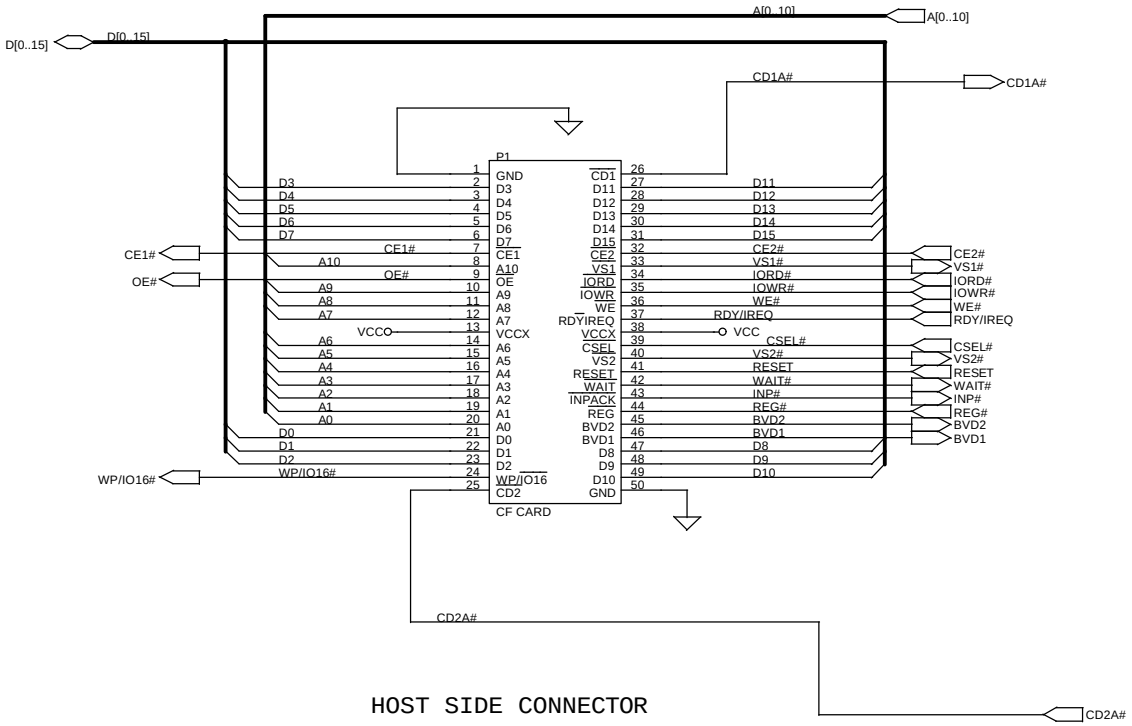

HOST SIDE CONNECTOR

Sycard Technology		
Title: CFextend 167 - Host Connector		
Size: B	Document Number: 140053	Rev: A
Date: Friday, October 29, 1999	Sheet 1 of 2	

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