SMARTLAB
PCI BUS 16 CHANNELS PHOTO ISOLATOR INPUT/OUTPUT ADAPTER

OPERATION MANUAL

Decision Computer Int'l. Co., Ltd.

CHAPTER 1
INTRODUCTION

The PCI 16 channels photo isolator input/output adapter is a 32 bits PCI bus board with Plug and Play (PnP) features, it is a programmable I/O interface card for PC/486, Pentium, or compatibles. The PnP features let hardware configuration for IRQ and I/O address is detected by BIOS automatically, you don't need set switch and jumper.

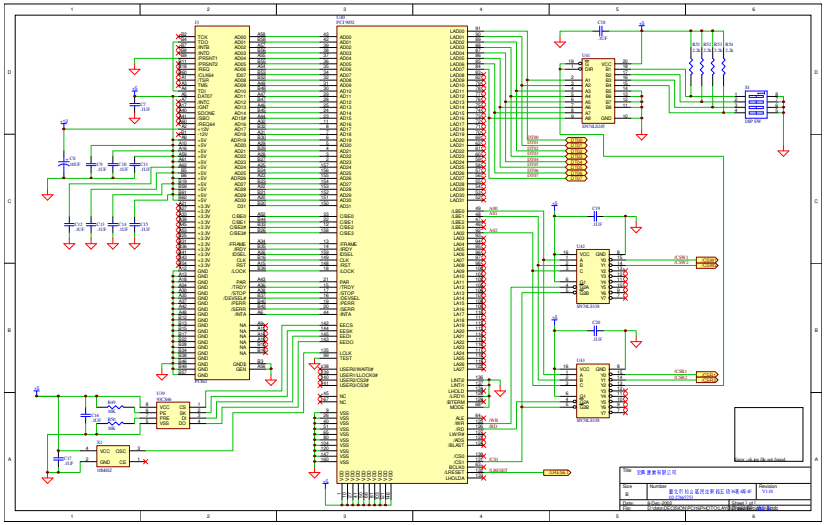
The PCI 16 channels photo isolator input/output adapter provides 16 photo couple digital input/output channels, which allow the input/output signals to be completely floated and prevent the ground loop.

❖ **The features of PCI 16 channels photo isolator input/output adapter are:**

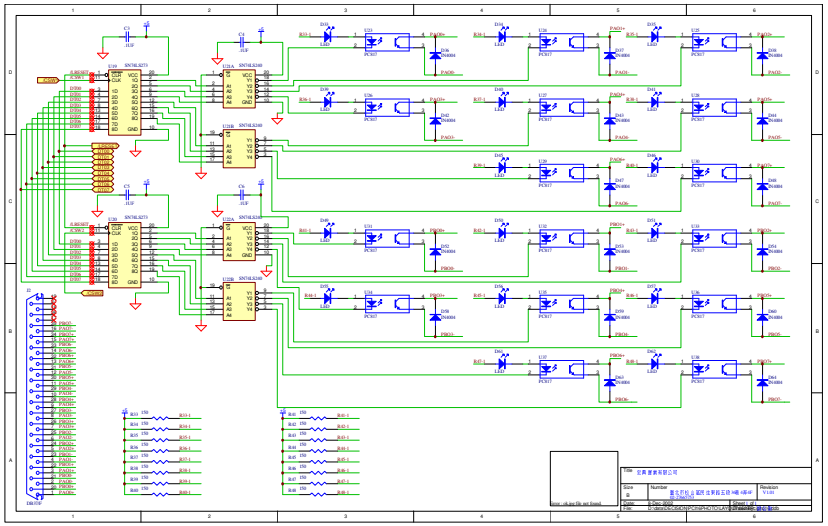
- 32 bits PCI bus with Plug and Play (PnP) features.
- Support 16 photo couple input/output channels.
- Allow the photo input/output signals to be completely floated and prevent the ground loops.
- 16 LED correspond to 16 output ports activation status.
- By using PC817 photo couple chips.
- 5000V isolation voltage.
- Maximum load voltage is 30V.
- Maximum 50mA input current.
- Voltage range from 0V to 30V, where 0 to 3V is OFF and 5V to 30V is ON.
- Operating temperature range from 0 to 33C.
- Relative humidity rage from 0 to 90%.

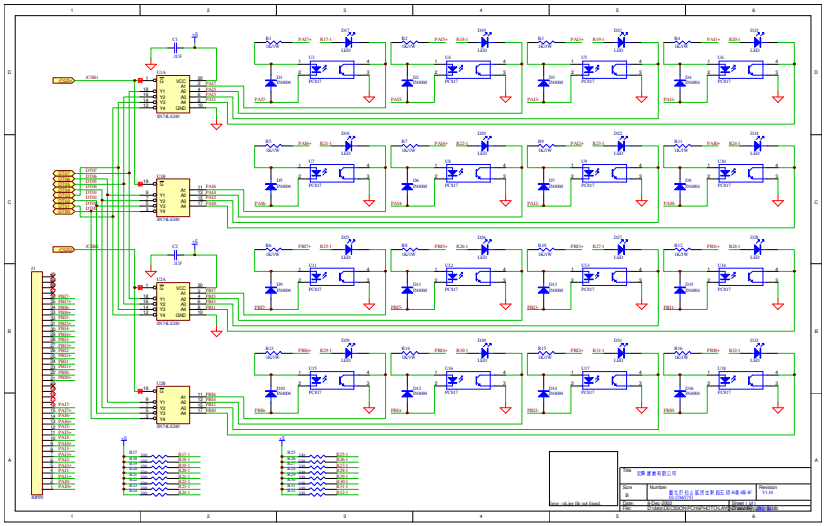
❖ PACKAGE CONTENTS:

- SMARTLAB PCI bus 16 channels photo couple input/output adapter.
- User's manual.
- Warranty form.



Operations Manual 16 Channel Photo Isolator Input/Output card





CHAPTER 2

HARDWARE INSTALLATION

Your PCI bus 16 channels photo isolator input/output adapter is designed to be inserted in any available PCI slot in your PC/486, Pentium or compatibles. In order to gain access to the expansion slots, follow the steps listed below:

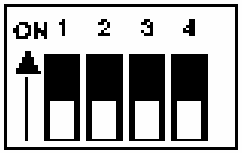
1. Turn off all power to your computer and all peripheral devices before installing your 16 channels photo isolator input/output adapter.
2. Remove the cover of the computer.
3. Insert the 16 channels photo isolator input/output adapter into any available PCI slot. Make sure the adapter is firmly seated in the chosen slot.
4. Replace the cover of the computer.
5. Turn on the power of your computer, the PnP features will recognize the 16 channels photo isolator input/output adapter.

CHAPTER 3

HARDWARE CONFIGURATION

Before you use the PCI 16 channels photo couple input/output adapter, Please check our technical web site http://www.smatlab.com. You must ensure that the I/O address after boot your computer. Observe the figure in the follows, the proper jumper settings for the 16 channels photo couple input/output adapter is described in the following.

3.1 Switch Settings



Card No 1 : All OFF
Card No 2 : 1 ON, 2, 3, 4 OFF
Card No 3 : 2 ON, 1, 3, 4 OFF
Card No 4 : 3 ON, 1, 2, 4 OFF

The switch is used to identify card number. Please set card number by card identifier switch, the PCI BIOS will assign pre-allocated I/O address to each adapter. Please set different card number to each adapter (do not duplicate card number setting).

3.2 I/O Address

The PnP feature will get base I/O address automatically, where

Base Address + 0:
Photo isolator output channel 1 to 16

15	14	13	12	11	10	9	8
OP16	OP15	OP14	OP13	OP12	OP11	OP10	OP9

7	6	5	4	3	2	1	0
OP8	OP7	OP6	OP5	OP4	OP3	OP2	OP1

Base Address + 0:
Photo isolator input channel 1 to 16.

15	14	13	12	11	10	9	8
IN16	IN15	IN14	IN13	IN12	IN11	IN10	IN9

7	6	5	4	3	2	1	0
IN8	IN7	IN6	IN5	IN4	IN3	IN2	IN1

Base Address + 0:
Photo isolator output channel 1 to 16

15	14	13	12	11	10	9	8
PBO7	PBO6	PBO5	PBO4	PBO3	OPBO2	PB1	PBO0

7	6	5	4	3	2	1	0
PAO7	PAO6	PAO5	PAO4	PAO3	PAO2	PAO1	PAO0

Base Address + 0:
Photo isolator input channel 1 to 16.

15	14	13	12	11	10	9	8
PBI7	PBI6	PBI5	PBI4	PBI3	PBI2	PBI1	PBI0

7	6	5	4	3	2	1	0
PAI7	PAI6	PAI5	PAI4	PAI3	PAI2	PAI1	PAI0

3.3 Connector Assignments

1. DB 37 Connector Pin Assignments (J1)

Pin	Single	Description
1	OP-01+	Opto-isolator Ch. 01 + Output
2	OP-01-	Opto-isolator Ch. 01 - Output
3	OP-02+	Opto-isolator Ch. 02 + Output
4	OP02-	Opto-isolator Ch. 02 - Output
5	OP-03+	Opto-isolator Ch. 03 + Output
6	OP-03-	Opto-isolator Ch. 03 - Output
7	OP-04+	Opto-isolator Ch. 04 + Output
8	OP-04-	Opto-isolator Ch. 04 - Output
9	OP-05+	Opto-isolator Ch. 05 + Output
10	OP-05-	Opto-isolator Ch. 05 - Output
11	OP-06+	Opto-isolator Ch. 06 + Output
12	OP-06-	Opto-isolator Ch. 06 - Output
13	OP-07+	Opto-isolator Ch. 07 + Output
14	OP-07-	Opto-isolator Ch. 07 - Output
15	OP-08+	Opto-isolator Ch. 08 + Output
16	OP-08-	Opto-isolator Ch. 08 - Output
17	NC	
18	NC	
19	NC	
20	NC	
21	OP-09+	Opto-isolator Ch. 09 + Output
22	OP-09-	Opto-isolator Ch. 09 - Output
23	OP-10+	Opto-isolator Ch. 10 + Output
24	OP-10-	Opto-isolator Ch. 10 - Output
25	OP-11+	Opto-isolator Ch. 11 + Output
26	OP-11-	Opto-isolator Ch. 11 - Output
27	OP-12+	Opto-isolator Ch. 12 + Output
28	OP-12-	Opto-isolator Ch. 12 - Output

29	OP-13+	Opto-isolator Ch. 13 + Output
30	OP-13-	Opto-isolator Ch. 13 - Output
31	OP-14+	Opto-isolator Ch. 14 + Output
32	OP-14-	Opto-isolator Ch. 14 - Output
33	OP-15+	Opto-isolator Ch. 15 + Output
34	OP-15-	Opto-isolator Ch. 15 - Output
35	OP-16+	Opto-isolator Ch. 16 + Output
36	OP-16-	Opto-isolator Ch. 16 - Output
37	NC	

2. DB 37 Connector Pin Assignments (J2)

Pin	Single	Description
1	IN-01+	Opto-isolator Ch. 01 + Input
2	IN-01-	Opto-isolator Ch. 01 - Input
3	IN-02+	Opto-isolator Ch. 02 + Input
4	IN02-	Opto-isolator Ch. 02 - Input
5	IN-03+	Opto-isolator Ch. 03 + Input
6	IN-03-	Opto-isolator Ch. 03 - Input
7	IN-04+	Opto-isolator Ch. 04 + Input
8	IN-04-	Opto-isolator Ch. 04 - Input
9	IN-05+	Opto-isolator Ch. 05 + Input
10	IN-05-	Opto-isolator Ch. 05 - Input
11	IN-06+	Opto-isolator Ch. 06 + Input
12	IN-06-	Opto-isolator Ch. 06 - Input
13	IN-07+	Opto-isolator Ch. 07 + Input
14	IN-07-	Opto-isolator Ch. 07 - Input
15	IN-08+	Opto-isolator Ch. 08 + Input
16	IN-08-	Opto-isolator Ch. 08 - Input
17	NC	
18	NC	
19	NC	
20	NC	
21	IN-09+	Opto-isolator Ch. 09 + Input
22	IN-09-	Opto-isolator Ch. 09 - Input
23	IN-10+	Opto-isolator Ch. 10 + Input

24	IN-10-	Opto-isolator Ch. 10 - Input
25	IN-11+	Opto-isolator Ch. 11 + Input
26	IN-11-	Opto-isolator Ch. 11 - Input
27	IN-12+	Opto-isolator Ch. 12 + Input
28	IN-12-	Opto-isolator Ch. 12 - Input
29	IN-13+	Opto-isolator Ch. 13 + Input
30	IN-13-	Opto-isolator Ch. 13 - Input
31	IN-14+	Opto-isolator Ch. 14 + Input
32	IN-14-	Opto-isolator Ch. 14 - Input
33	IN-15+	Opto-isolator Ch. 15 + Input
34	IN-15-	Opto-isolator Ch. 15 - Input
35	IN-16+	Opto-isolator Ch. 16 + Input
36	IN-16-	Opto-isolator Ch. 16 - Input
37	NC	

3. DB 37/M Connector Pin Assignments (J1)

Pin	Single	Description
1	PAO-01+	Opto-isolator Ch. 01 + Output
2	PAO -01-	Opto-isolator Ch. 01 - Output
3	PAO -02+	Opto-isolator Ch. 02 + Output
4	PAO -02-	Opto-isolator Ch. 02 - Output
5	PAO -03+	Opto-isolator Ch. 03 + Output
6	PAO -03-	Opto-isolator Ch. 03 - Output
7	PAO -04+	Opto-isolator Ch. 04 + Output
8	PAO -04-	Opto-isolator Ch. 04 - Output
9	PAO -05+	Opto-isolator Ch. 05 + Output
10	PAO -05-	Opto-isolator Ch. 05 - Output
11	PAO -06+	Opto-isolator Ch. 06 + Output
12	PAO -06-	Opto-isolator Ch. 06 - Output
13	PAO -07+	Opto-isolator Ch. 07 + Output
14	PAO -07-	Opto-isolator Ch. 07 - Output
15	PAO -08+	Opto-isolator Ch. 08 + Output
16	PAO -08-	Opto-isolator Ch. 08 - Output
17	NC	
18	NC	

19	NC	
20	PBO-01+	Opto-isolator Ch. 09 + Output
21	PBO -01-	Opto-isolator Ch. 09 - Output
22	PBO -02+	Opto-isolator Ch. 10 + Output
23	PBO -02-	Opto-isolator Ch. 10 - Output
24	PBO -03+	Opto-isolator Ch. 11 + Output
25	PBO -03-	Opto-isolator Ch. 11 - Output
26	PBO -04+	Opto-isolator Ch. 12 + Output
27	PBO -04-	Opto-isolator Ch. 12 - Output
28	PBO -05+	Opto-isolator Ch. 13 + Output
29	PBO -05-	Opto-isolator Ch. 13 - Output
30	PBO -06+	Opto-isolator Ch. 14 + Output
31	PBO -06-	Opto-isolator Ch. 14 - Output
32	PBO -07+	Opto-isolator Ch. 15 + Output
33	PBO -07-	Opto-isolator Ch. 15 - Output
34	PBO -08+	Opto-isolator Ch. 16 + Output
35	PBO -08-	Opto-isolator Ch. 16 - Output
36	NC	
37	NC	

4. 40-PIN Connector Pin Assignments (J2)

Pin	Single	Description
1	PAI-01+	Opto-isolator Ch. 01 + Input
2	PAI -01-	Opto-isolator Ch. 01 - Input
3	PAI -02+	Opto-isolator Ch. 02 + Input
4	PAI -02-	Opto-isolator Ch. 02 - Input
5	PAI -03+	Opto-isolator Ch. 03 + Input
6	PAI -03-	Opto-isolator Ch. 03 - Input
7	PAI -04+	Opto-isolator Ch. 04 + Input
8	PAI -04-	Opto-isolator Ch. 04 - Input
9	PAI -05+	Opto-isolator Ch. 05 + Input
10	PAI -05-	Opto-isolator Ch. 05 - Input
11	PAI -06+	Opto-isolator Ch. 06 + Input
12	PAI -06-	Opto-isolator Ch. 06 - Input
13	PAI -07+	Opto-isolator Ch. 07 + Input

14	PAI -07-	Opto-isolator Ch. 07 - Input
15	PAI -08+	Opto-isolator Ch. 08 + Input
16	PAI -08-	Opto-isolator Ch. 08 - Input
17	NC	
18	NC	
19	NC	
20	NC	
21	PBI-01+	Opto-isolator Ch. 09 + Input
22	PBI -01-	Opto-isolator Ch. 09 - Input
23	PBI -02+	Opto-isolator Ch. 10 + Input
24	PBI -02-	Opto-isolator Ch. 10 - Input
25	PBI -03+	Opto-isolator Ch. 11 + Input
26	PBI -03-	Opto-isolator Ch. 11 - Input
27	PBI -04+	Opto-isolator Ch. 12 + Input
28	PBI -04-	Opto-isolator Ch. 12 - Input
29	PBI -05+	Opto-isolator Ch. 13 + Input
30	PBI -05-	Opto-isolator Ch. 13 - Input
31	PBI -06+	Opto-isolator Ch. 14 + Input
32	PBI -06-	Opto-isolator Ch. 14 - Input
33	PBI -07+	Opto-isolator Ch. 15 + Input
34	PBI -07-	Opto-isolator Ch. 15 - Input
35	PBI -08+	Opto-isolator Ch. 16 + Input
36	PBI -08-	Opto-isolator Ch. 16 - Input
37	NC	
38	NC	
39	NC	
40	NC	

APPENDIX A

WARRANTY INFORMATION

A.1 Copyright

Each piece of SmartLab package permits user to use SmartLab only on a single computer, a registered user may use he program on a different computer, but may not use the program on more than one computer at the same time.

Corporate licensing agreements allow duplication and distribution of specific number of copies within the licensed institution. Duplication of multiple copies is not allowed except through execution of a licensing agreement. Welcome call for details.

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A.2 Warranty Information

SmartLab warrants that for a period of one year from the date of purchase (unless otherwise specified in the warranty card) that the goods supplied will perform according to the specifications defined in the user manual. Furthermore that the SmartLab product will be supplied free from defects in materials and workmanship and be fully functional under normal usage.

In the event of the failure of a SmartLab product within the specified warranty period, SmartLab will, at its option, replace or repair the item at no additional charge. This limited warranty does not cover damage resulting from incorrect use, electrical interference, accident, or modification of the product.

All goods returned for warranty repair must have the serial number intact. Goods without serial numbers attached will not be covered by the warranty.

The purchaser must pay transportation costs for goods returned. Repaired goods will be dispatched at the expense of SmartLab.

To ensure that your SmartLab product is covered by the warranty provisions, it is necessary that you return the Warranty card.

Under this Limited Warranty, SmartLab's obligations will be limited to repair or replacement only, of goods found to be defective a specified above during the warranty period. SmartLab is not liable to the purchaser for any damages or losses of any kind, through the use of, or inability to use, the

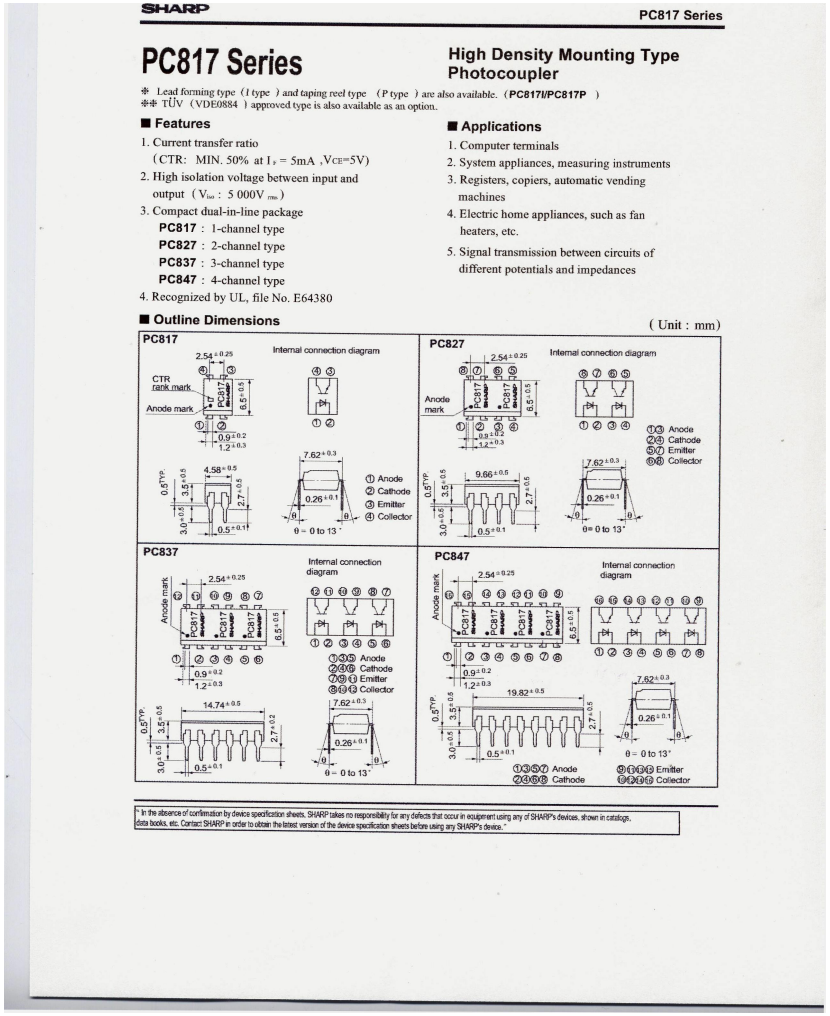
SmartLab product.

SmartLab reserves the right to determine what constitutes warranty repair or replacement.

Return Authorization: It is necessary that any returned goods are clearly marked with an RA number that has been issued by SmartLab. Goods returned without this authorization will not be attended to.

APPENDIX B

DATA SHEET



SHARP PC817 Series

PC817 Series

High Density Mounting Type Photocoupler

※ Lead forming type (I type) and taping reel type (P type) are also available. (PC817I/PC817P)
※※ TÜV (VDE0884) approved type is also available as an option.

■ Features

1. Current transfer ratio (CTR: MIN. 50% at I_F = 5mA, V_{CE}=5V)
2. High isolation voltage between input and output (V_{iso}: 5 000V $_{rms}$)
3. Compact dual-in-line package
   - **PC817**: 1-channel type
   - **PC827**: 2-channel type
   - **PC837**: 3-channel type
   - **PC847**: 4-channel type
4. Recognized by UL, file No. E64380

■ Applications

1. Computer terminals
2. System appliances, measuring instruments
3. Registers, copiers, automatic vending machines
4. Electric home appliances, such as fan heaters, etc.
5. Signal transmission between circuits of different potentials and impedances

■ Outline Dimensions (Unit: mm)

PC817 / PC827 / PC837 / PC847

"In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that occur in equipment using any of SHARP's devices, shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest version of the device specification sheets before using any SHARP's device."

SHARP PC817 Series

■ Absolute Maximum Ratings (Ta= 25°C)

	Parameter	Symbol	Rating	Unit
Input	Forward current	I_F	50	mA
	*1Peak forward current	I_{FM}	1	A
	Reverse voltage	V_R	6	V
	Power dissipation	P	70	mW
Output	Collector-emitter voltage	V_{CEO}	35	V
	Emitter-collector voltage	V_{ECO}	6	V
	Collector current	I_C	50	mA
	Collector power dissipation	P_C	150	mW
	Total power dissipation	P_{tot}	200	mW
	*2Isolation voltage	V_{iso}	5 000	V_{rms}
	Operating temperature	T_{opr}	- 30 to + 100	°C
	Storage temperature	T_{stg}	- 55 to + 125	°C
	*3Soldering temperature	T_{sol}	260	°C

*1 Pulse width <=100μs, Duty ratio : 0.001
*2 40 to 60% RH, AC for 1 minute
*3 For 10 seconds

■ Electro-optical Characteristics (Ta= 25°C)

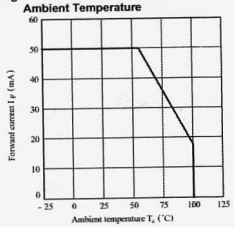
	Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage		V_F	I_F= 20mA	-	1.2	1.4	V
	Peak forward voltage		V_{FM}	I_{FM} = 0.5A	-	-	3.0	V
	Reverse current		I_R	V_R= 4V	-	-	10	μA
	Terminal capacitance		C_t	V= 0, f= 1kHz	-	30	250	pF
Output	Collector dark current		I_{CEO}	V_{CE}= 20V	-	-	10^{-7}	A
Transfer characteristics	*4Current transfer ratio		CTR	I_F= 5mA, V_{CE}= 5V	50	-	600	%
	Collector-emitter saturation voltage		$V_{CE(sat)}$	I_F= 20mA, I_C= 1mA	-	0.1	0.2	V
	Isolation resistance		R_{ISO}	DC500V, 40 to 60% RH	5×10^{10}	10^{11}	-	Ω
	Floating capacitance		C_f	V= 0, f= 1MHz	-	0.6	1.0	pF
	Cut-off frequency		f_c	V_{CE}= 5V, I_C= 2mA, R_L= 100Ω, -3dB	-	80	-	kHz
	Response time	Rise time	t_r	V_{CE}= 2V, I_C= 2mA, R_L= 100Ω	-	4	18	μs
		Fall time	t_f		-	3	18	μs

*4 Classification table of current transfer ratio is shown below.

Model No.	Rank mark	CTR (%)
PC817A	A	80 to 160
PC817B	B	130 to 260
PC817C	C	200 to 400
PC817D	D	300 to 600
PC8*7AB	A or B	80 to 260
PC8*7BC	B or C	130 to 400
PC8*7CD	C or D	200 to 600
PC8*7AC	A, B or C	80 to 400
PC8*7BD	B, C or D	130 to 600
PC8*7AD	A, B, C or D	80 to 600
PC8*7	A, B, C, D or No mark	50 to 600

*: 1 or 2 or 3 or 4

Fig. 1 Forward Current vs. Ambient Temperature



SHARP PC817 Series

Fig. 2 Collector Power Dissipation vs. Ambient Temperature

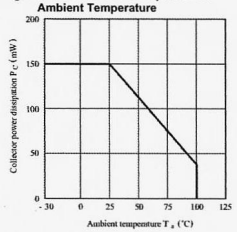


Fig. 3 Peak Forward Current vs. Duty Ratio

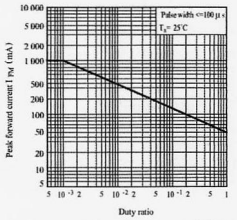


Fig. 4 Current Transfer Ratio vs. Forward Current

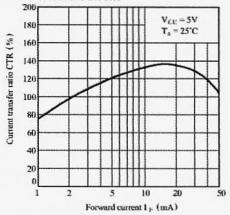


Fig. 5 Forward Current vs. Forward Voltage

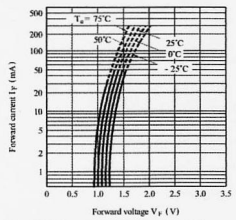


Fig. 6 Collector Current vs. Collector-emitter Voltage

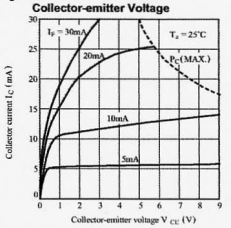


Fig. 7 Relative Current Transfer Ratio vs. Ambient Temperature

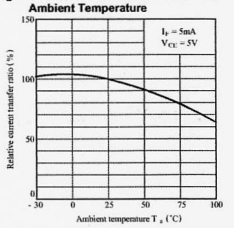


Fig. 8 Collector-emitter Saturation Voltage vs. Ambient Temperature

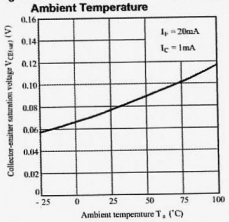


Fig. 9 Collector Dark Current vs. Ambient Temperature

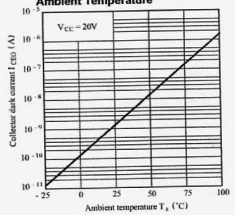


Fig.10 Response Time vs. Load Resistance

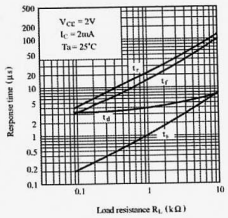
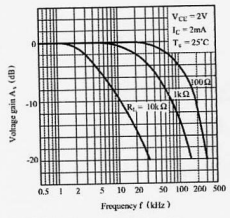


Fig.11 Frequency Response



Test Circuit for Response Time

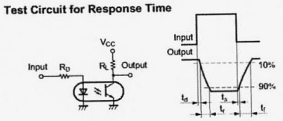
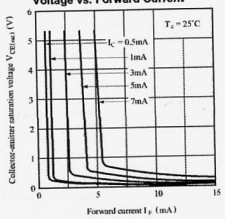
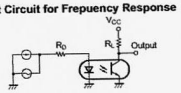


Fig.12 Collector-emitter Saturation Voltage vs. Forward Current



Test Circuit for Frequency Response



● Please refer to the chapter "Precautions for Use"

Application Circuits

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