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K. Kusuda	June 13, 2000	SPECIFICATION	REPRESENTATIVE DIVISION OPTO-ELECTRONIC DEVICES DIV.

REFERENCE

DEVICE SPECIFICATION FOR

PHOTOCOUPLER

MODEL No.

PC8171 series

	PC81710NSZ
	PC81711NSZ
	PC81712NSZ
	PC81713NSZ
	PC81715NSZ
	PC81716NSZ
	PC81718NSZ

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2. When using this product, please observe the absolute maximum ratings and the instructions for use outlined in these specification sheets, as well as the precautions mentioned below. Sharp assumes no responsibility for any damage resulting from use of the product which does not comply with the absolute maximum ratings and the instructions included in these specification sheets, and the precautions mentioned below.

(Precautions)

(1) This product is designed for use in the following application areas ;

[• OA equipment • Audio visual equipment • Home appliances
• Telecommunication equipment (Terminal) • Measuring equipment
• Tooling machines • Computers]

If the use of the product in the above application areas is for equipment listed in paragraphs (2) or (3), please be sure to observe the precautions given in those respective paragraphs.

(2) Appropriate measures, such as fail-safe design and redundant design considering the safety design of the overall system and equipment, should be taken to ensure reliability and safety when this product is used for equipment which demands high reliability and safety in function and precision, such as ;

[• Transportation control and safety equipment (aircraft, train, automobile etc.)
• Traffic signals • Gas leakage sensor breakers • Rescue and security equipment
• Other safety equipment]

(3) Please do not use this product for equipment which require extremely high reliability and safety in function and precision, such as ;

[• Space equipment • Telecommunication equipment (for trunk lines)
• Nuclear power control equipment • Medical equipment]

(4) Please contact and consult with a Sharp sales representative if there are any questions regarding interpretation of the above three paragraphs.

3. Please contact and consult with a Sharp sales representative for any questions about this product.

CUSTOMER'S APPROVAL

DATE

BY

DATE June 13, 2000

PRESENTED BY for K. Kusuda

K. Hachimura,
Department General Manager of
Engineering Dept.,II
Opto-Electronic Devices Div.
ELECOM Group
SHARP CORPORATION

1. Application

This specification applies to the outline and characteristics of photocoupler Model No. PC8171 series.

2. Outline

Refer to the attached sheet, page 3.

3. Ratings and characteristics

Refer to the attached sheet, page 4 to 6.

4. Reliability

Refer to the attached sheet, page 7.

5. Outgoing inspection

Refer to the attached sheet, page 8.

6. Supplement

6.1 Isolation voltage shall be measured in the following method.

(1) Short between anode and cathode on the primary side, and between collector and emitter on the secondary side.

(2) The dielectric withstand tester with zero-cross circuit shall be used.

(3) The wave form of applied voltage shall be a sine wave.
(It is recommended that the isolation voltage be measured in insulation oil.)

6.2 Collector current (Ic) Delivery rank table
("○" mark indicates business dealing name of ordered product)

Ordered product	Business dealing name	Rank mark	Ic (mA)
	PC81710NSZ	A, B, C or no mark	0.5 to 3.0
	PC81711NSZ	A	0.6 to 1.5
	PC81712NSZ	B	0.8 to 2.0
	PC81713NSZ	C	1.0 to 2.5
	PC81715NSZ	A or B	0.6 to 2.0
	PC81716NSZ	B or C	0.8 to 2.5
	PC81718NSZ	A, B or C	0.6 to 2.5

Test conditions
I_F=0.5mA
V_{CE}=5V
Ta=25℃

6.3 This Model is approved by UL.

Approved Model No. : PC8171

UL file No. : E64380

6.4 This product is not designed against irradiation.

This product is assembled with electrical input and output.

This product incorporates non-coherent light emitting diode.

6.5 ODS materials

This product shall not contain the following materials.
Also, the following materials shall not be used in the production process for this product.

Materials for ODS : CFC_S, Halon, Carbon tetrachloride,
1.1.1-Trichloroethane (Methylchloroform)

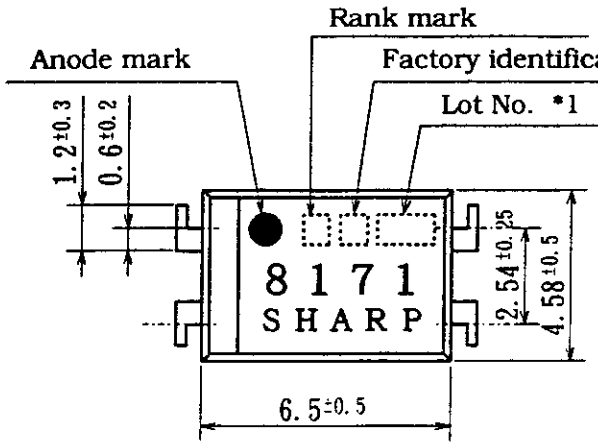
6.6 Brominated flame retardants

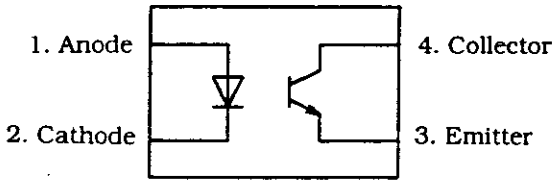
Specific brominated flame retardants such as the $PBBO_S$ and PBB_S are not used in this device at all.

7. Notes

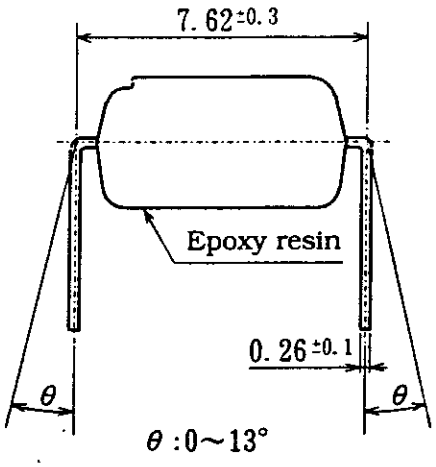
Refer to the attached sheets-1-1,2.

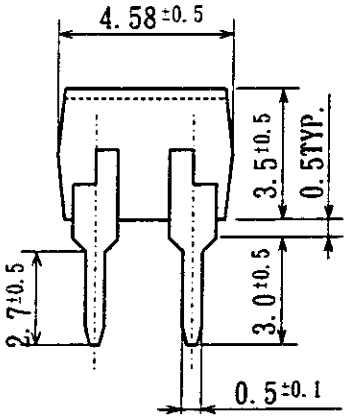
2. Outline





Pin Nos. and internal connection diagram





Product mass : Approx. 0.21g

*1) 2-digit number shall be marked according to DIN standard.

*2) Factory identification mark shall be or shall not be marked.

*3) Marking is laser marking

UNIT : 1/1 mm	
Name	PC8171 Outline Dimensions (Business dealing name : PC8171*NSZ)

3. Ratings and characteristics

3.1 Absolute maximum ratings

Ta=25℃

Parameter		Symbol	Rating	Unit
Input	*1 Forward current	I_F	10	mA
	*2 Peak forward current	I_{FM}	200	mA
	Reverse voltage	V_R	6	V
	*1 Power dissipation	P	15	mW
Output	Collector-emitter voltage	V_{CEO}	70	V
	Emitter-collector voltage	V_{ECO}	6	V
	Collector current	Ic	50	mA
	*1 Collector power dissipation	Pc	150	mW
*1 Total power dissipation		Ptot	170	mW
*3 Isolation voltage		Viso(rms)	5	kV
Operating temperature		Topr	-30 to +100	℃
Storage temperature		Tstg	-55 to +125	℃
*4 Soldering temperature		Tsol	260	℃

*1 The derating factors of absolute maximum ratings due to ambient temperature are shown in Fig. 1 to 4.

*2 Pulse width≦100 μs, Duty ratio : 0.001 (Refer to Fig. 5)

*3 AC for 1 min, 40 to 60%RH

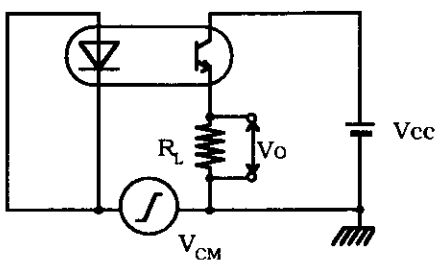
*4 For 10 s

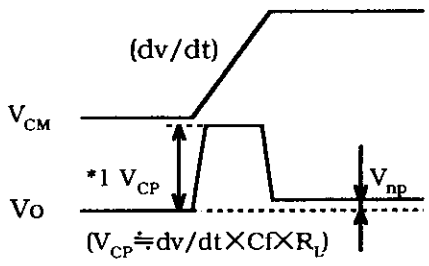
3.2 Electro-optical characteristics

Ta=25℃

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit
Input	Forward voltage	V_F	I_F=5mA	-	1.2	1.4	V
	Reverse current	I_R	V_R=4V	-	-	10	μA
	Terminal capacitance	Ct	V=0, f=1kHz	-	30	250	pF
Output	Dark current	I_{CEO}	V_{CE}=50V, I_F=0	-	-	100	nA
	Collector-emitter breakdown voltage	BV_{CEO}	Ic=0.1mA I_F=0	70	-	-	V
	Emitter-collector breakdown voltage	BV_{ECO}	I_E=10 μA, I_F=0	6	-	-	V
Transfer characteristics	Collector current	Ic	I_F=0.5mA V_{CE}=5V	0.5	-	3.0	mA
	Collector-emitter saturation voltage	$V_{CE(sat)}$	I_F=10mA Ic=1mA	-	-	0.2	V
	Isolation resistance	Riso	DC500V 40 to 60%RH	5×10^{10}	10^{11}	-	Ω
	Floating capacitance	Cf	V=0, f=1MHz	-	0.6	1.0	pF
	Response time (Rise)	tr	V_{CE}=2V Ic=2mA R_L=100Ω	-	4	18	μs
	Response time (Fall)	tf		-	3	18	μs
	Common mode rejection ratio *5	CMR	Ta=25℃, R_L=470Ω V_{CM}=1.5kV(peak), I_F=0mA, Vcc=9V, Vnp=100mV	10	-	-	kV/μs

*5 Measuring circuit

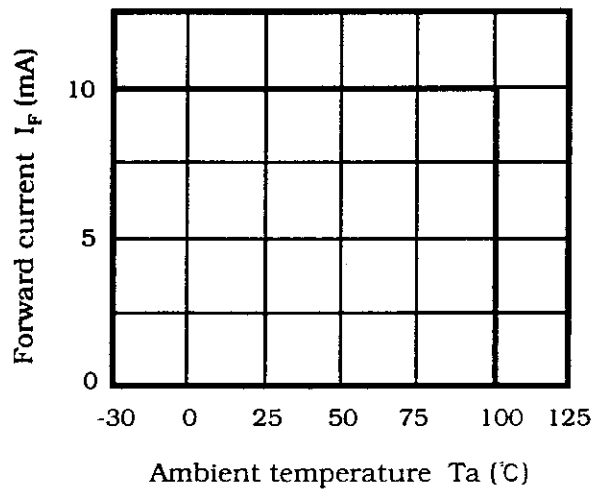




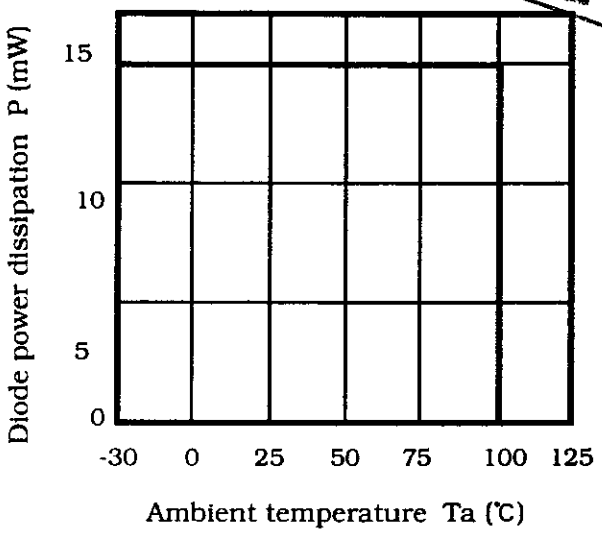
V_{CM} : Higher value of pulse wave
R_L=470Ω
Vcc=9V

*1 The voltage generated by a displacement current which flow through floating capacity between primary and secondary side

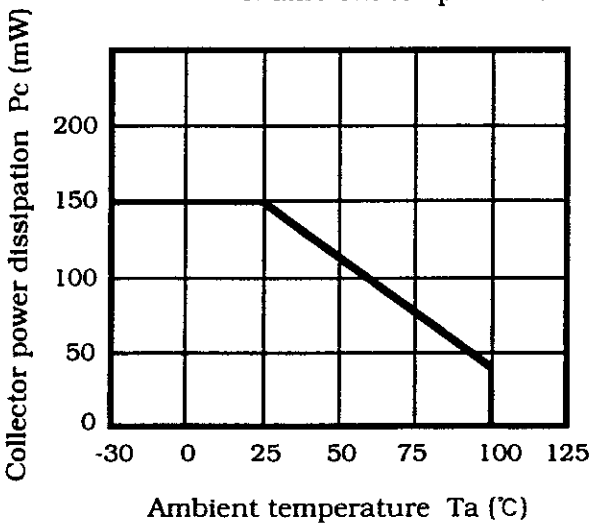
(Fig. 1) Forward current vs. ambient temperature



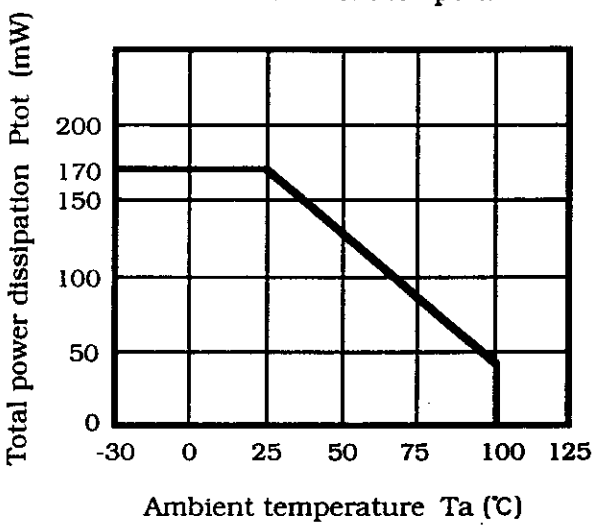
(Fig. 2) Diode power dissipation vs. ambient temperature



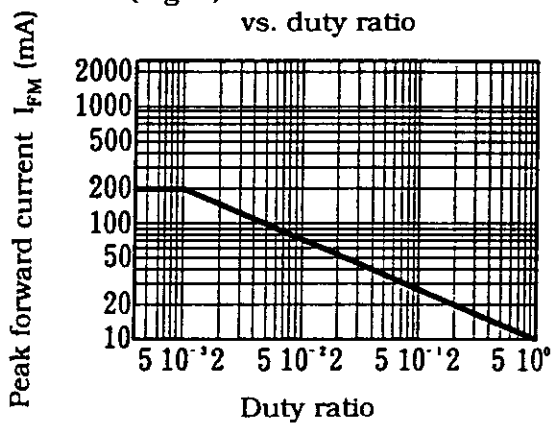
(Fig. 3) Collector power dissipation vs. ambient temperature



(Fig. 4) Total power dissipation vs. ambient temperature



(Fig. 5) Peak forward current vs. duty ratio



Pulse width≦100 μs
Ta=25℃

4. Reliability

The reliability of products shall satisfy items listed below.

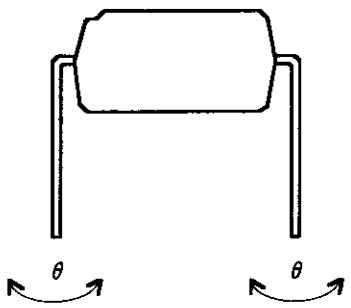
Confidence level : 90%
LTPD : 10%/20%

Test Items	Test Conditions *1	Failure Judgement Criteria	Samples (n) Defective(C)
Solderability *2	230℃, 5 s	——	n=11, C=0
Soldering heat	260℃, 10 s	V_F>U×1.2 I_R>U×2 I_{CEO}>U×2 I_C<L×0.7 $V_{CE(sat)}$>U×1.2 U : Upper specification limit L : Lower specification limit	n=11, C=0
Terminal strength (Tension)	Weight : 5N 5 s/each terminal		n=11, C=0
Terminal strength (Bending) *3	Weight : 2.5N 2 times/each terminal		n=11, C=0
Mechanical shock	15km/s^2, 0.5ms 3 times/±X, ±Y, ±Z direction		n=11, C=0
Variable frequency vibration	100 to 2000 to 100Hz/4min 200m/s^2 4 times/ X, Y, Z direction		n=11, C=0
Temperature cycling	1 cycle -55℃ to +125℃ (30min) (30min) 20 cycles test		n=22,C=0
High temp. and high humidity storage	+60℃, 90%RH, 1000h		n=22,C=0
High temp. storage	+125℃, 1000h		n=22,C=0
Low temp. storage	-55℃, 1000h		n=22,C=0
Operation life	I_F=10mA, Ptot=170mW Ta=25℃, 1000h		n=22,C=0

*1 Test method, conforms to EIAJ ED 4701.

*2 Solder shall adhere at the area of 95% or more of immersed portion of lead, and pin hole or other holes shall not be concentrated on one portion.

*3 Terminal bending direction is shown below.



5. Outgoing inspection

5.1 Inspection items

(1) Electrical characteristics

V_F, I_R, I_{CEO}, $V_{CE(sat)}$, Ic, Riso, Viso

(2) Appearance

5.2 Sampling method and Inspection level

A single sampling plan, normal inspection level II based on ISO 2859 is applied. The AQL according to the inspection items are shown below.

Defect	Inspection item	AQL (%)
Major defect	Electrical characteristics Unreadable marking	0.065
Minor defect	Appearance defect except the above mentioned.	0.25

1 For cleaning

(1) Solvent cleaning : Solvent temperature 45℃ or less
Immersion for 3 min or less

(2) Ultrasonic cleaning : The effect to device by ultrasonic cleaning differs by cleaning bath size, ultrasonic power output, cleaning time, PCB size or device mounting condition etc. Please test it in actual using condition and confirm that doesn't occur any defect before starting the ultrasonic cleaning.

(3) Applicable solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol

In case when the other solvent is used, there are cases that the packaging resin is eroded. Please use the other solvent after thorough confirmation is performed in actual using condition.

2. The LED used in the Photocoupler generally decreases the light emission power by operation. In case of long operation time, please design the circuit with considering the degradation of the light emission power of the LED. (50%/5years)

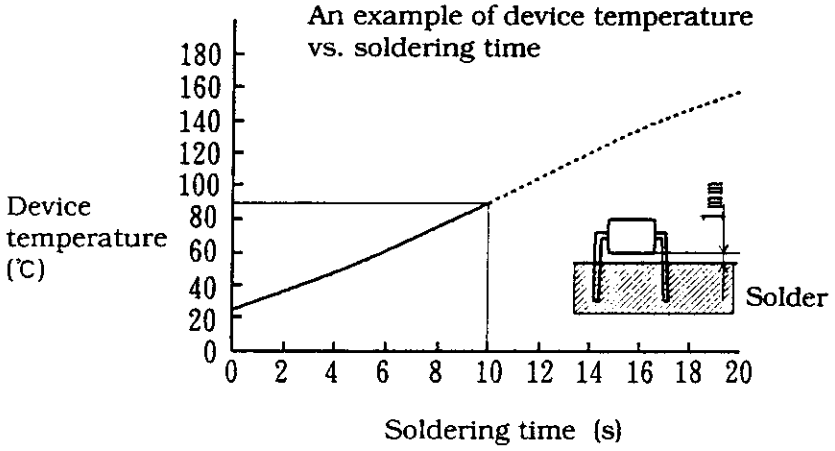
3. There are cases that the deviation and temperature dependence of the CTR and the degradation of the light emission power of the LED become big at I_F is less than 0.5mA. Please design the circuit with considering this point.

4. When steep voltage noise is applied between the primary side and the secondary side of the photocoupler, current flows or changes in the light emitting diode through a parasitic capacitance between the primary side and the secondary side of the photocoupler, then there is a case that miss operation occurs depending upon the applied noise level. We should certainly recommend to use a by-pass capacitor between both terminals of the light emitting diode where used in a noisy environment.

5. Precautions for Soldering Photocouplers

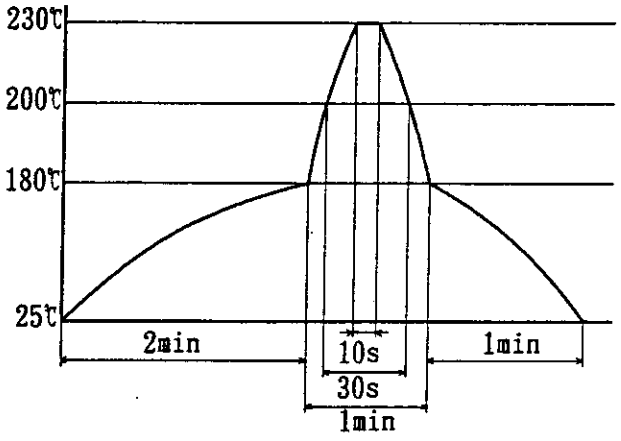
(1) In case of soldering to lead
260℃ 10 s or less

An example of device temperature vs. soldering time



(2) If solder reflow :

It is recommended that only one soldering be done at the temperature and the time within the temperature profile as shown in the figure below.



(3) Other precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin. So keep the package temperature within that specified in Item (2). Also avoid immersing the resin part in the solder.

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SHARP®

NORTH AMERICA

SHARP Microelectronics
of the Americas
5700 NW Pacific Rim Blvd.
Camas, WA 98607, U.S.A.
Phone: (360) 834-2500
Fax: (360) 834-8903
http://www.sharpsma.com

EUROPE

SHARP Microelectronics Europe
Sonninstraße 3
20097 Hamburg, Germany
Phone: (49) 40 2376-2286
Fax: (49) 40 2376-2232
http://www.sharpsme.com

ASIA

SHARP Corporation
Integrated Circuits Group
2613-1 Ichinomoto-Cho
Tenri-City, Nara, 632, Japan
Phone: +81-743-65-1321
Fax: +81-743-65-1532
http://www.sharp.co.jp