PC905

Long Creepage Distance Photocoupler with Built-in Voltage Detection Circuit

❋ Lead forming type (I type) is also available. (**PC905I**)
❋❋ TÜV (DIN-VDE0884) approved type is also available as an option.

■ Features

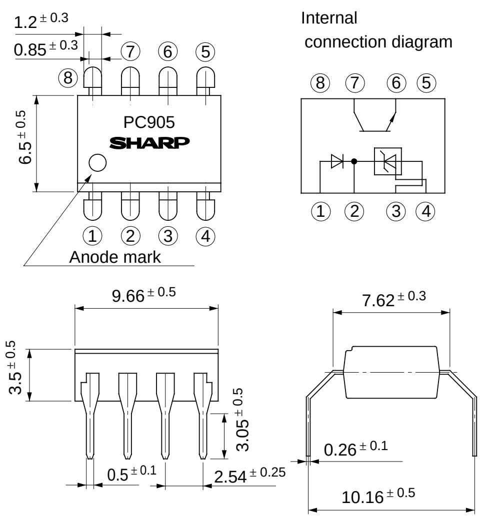
1. Built-in voltage deviation detection circuit
2. Long creepage distance type
   (Creepage distance : 8mm or more)
3. Conforms to European Safety Standard
   (Internal insulation distance : 0.5mm or more)
4. High collector-emitter voltage(V_{CEO} : 70V)
5. High isolation voltage between input and output (V_{iso} : 5 000V_{rms})
6. Recognized by UL, file No. E64380
   Approved by BSI (BS415 : No. 6990, BS7002 : No. 7567)
   Approved by SEMKO No. 963501101
   Approved by DEMKO No. 392592

■ Applications

1. Switching power supplies

■ Outline Dimensions

(Unit : mm)



① Anode
② Cathode
③ GND
④ Reference
⑤ NC
⑥ Emitter
⑦ Collector
⑧ NC

■ Absolute Maximum Ratings

(Ta= 25˚C)

Parameter		Symbol	Rating	Unit
Input	Anode current	I_A	50	mA
	Anode voltage	V_A	30	V
	Reference input current	I_{REF}	10	mA
	Power dissipation	P	250	mW
Output	Collector-emitter voltage	V_{CEO}	70	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}	350	mW
*1 Isolation voltage		V_{iso}	5 000	V_{rms}
Operating temperature		T_{opr}	- 25 to + 85	˚C
Storage temperature		T_{stg}	- 40 to + 125	˚C
*2 Soldering temperature		T_{sol}	260	˚C

*1 40 to 60% RH, AC for 1 minute
*2 For 10 seconds

■ Electro-optical Characteristics

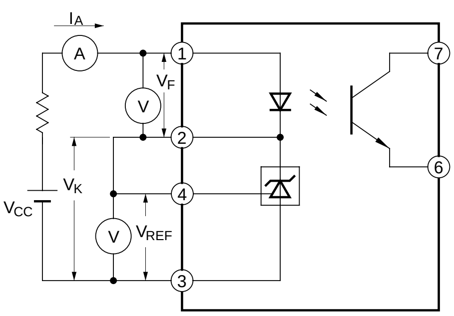
(Ta= 25˚C unless otherwise specified.)

Parameter		Symbol	Conditions	MIN.	TYP.	MAX.	Unit	Fig.
Input	Reference voltage	V_{REF}	$V_K = V_{REF}$, I_A = 10mA	2.40	2.495	2.60	V	1
	*3 Temperature change in reference voltage	V_{REF}(dev)	$V_K = V_{REF}$, I_A = 10mA, Ta= - 25 to + 85˚C	-	8	40	mV	1
	Voltage variation ratio in reference voltage	$\Delta V_{REF} / \Delta V_A$	I_A = 10mA, ΔV_A = 30V- V_{REF}	-	- 1.4	- 5	mV/V	2
	Reference input current	I_{REF}	I_A = 10mA, R_3 = 10kΩ	-	2	10	μA	3
	*4 Temperature change in reference input current	I_{REF}(dev)	I_A = 10mA, R_3 = 10kΩ, Ta= - 25 to + 85˚C	-	0.4	3	μA	3
	Minimum drive current	I_{MIN}	$V_K = V_{REF}$	-	1	2	mA	1
	OFF-state anode current	I_{OFF}	V_A = 30V, V_{REF} = GND	-	0.1	2	μA	4
	Anode-cathode forward voltage	V_F	$V_K = V_{REF}$, I_A = 10mA	-	1.2	1.4	V	1
Output	Collector dark current	I_{CEO}	V_{CE} = 20V	-	10^{-9}	10^{-7}	A	5
Transfer charac-teristics	*5 Current transfer ratio	CTR	$V_K = V_{REF}$, I_A = 10mA, V_{CE} = 5V	40	-	320	%	6
	Collector-emitter saturation voltage	V_{CE}(sat)	$V_K = V_{REF}$, I_A = 20mA, I_C = 1mA	-	0.1	0.2	V	6
	Isolation resistance	R_{ISO}	40 to 60% RH, DC500V	5×10^{10}	1×10^{11}	-	Ω	-
	Floating capacitance	C_f	V= 0, f= 1MHz	-	0.6	1.0	pF	-

*3 $V_{REF}(dev) = V_{REF(MAX.)} - V_{REF(MIN.)}$
*4 $I_{REF}(dev) = I_{REF(MAX.)} - I_{REF(MIN.)}$
*5 $CTR = I_C / I_A \times 100$ (%)

■ Test Circuit

Fig. 1



V_K : Voltage between terminals ② and ③

V_{REF} : Voltage between terminals ③ and ④

Fig. 2

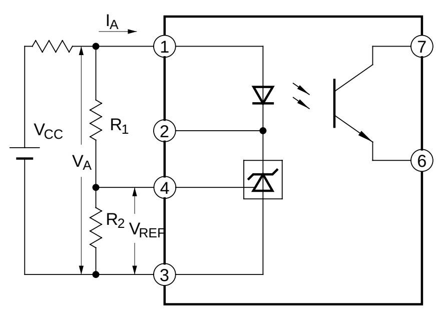


Fig. 3

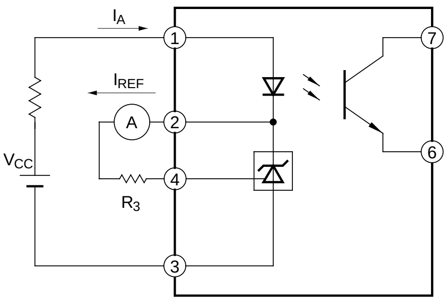


Fig. 4

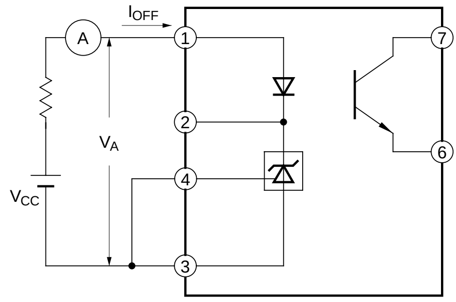


Fig. 5

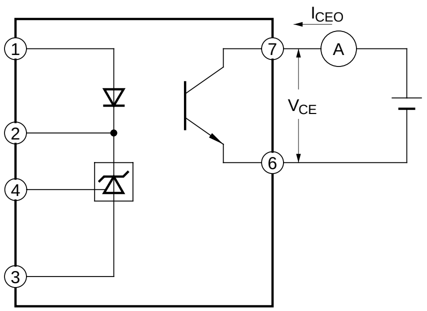


Fig. 6

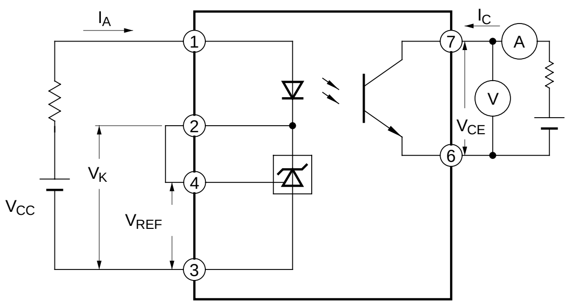


Fig. 7 Anode Current vs. Ambient Temperature

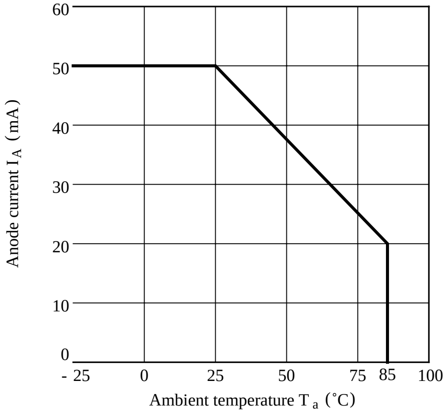


Fig. 8 Input Power Dissipation vs. Ambient Temperature

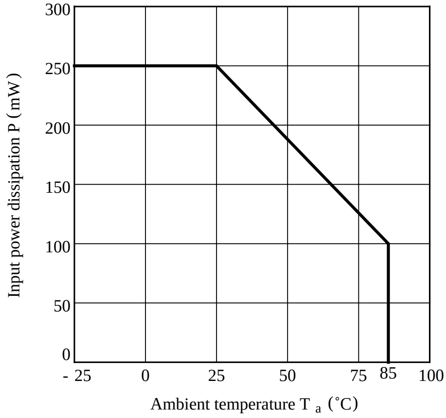


Fig. 9 Collector Power Dissipation vs. Ambient Temperature

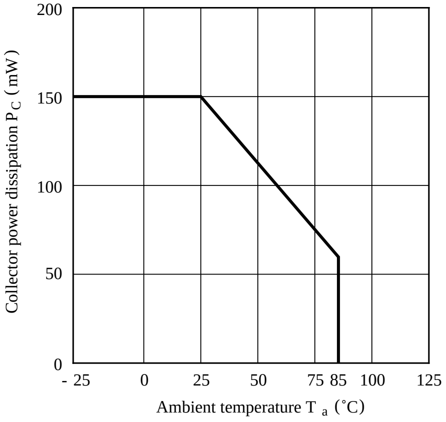


Fig.10 Power Dissipation vs. Ambient Temperature

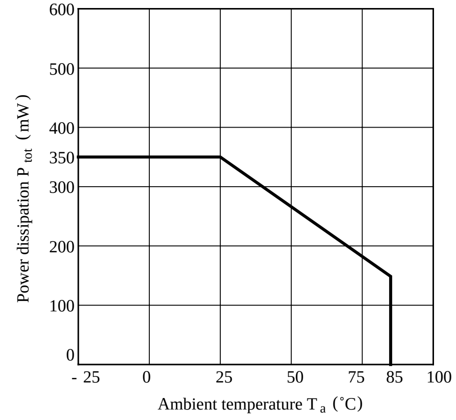


Fig.11 Relative Current Transfer Ratio vs. Ambient Temperature

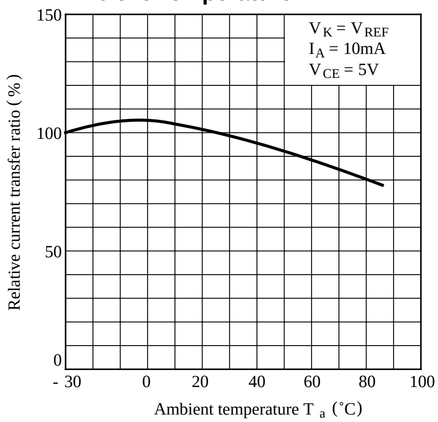


Fig.12 Collector Dark Current vs. Ambient Temperature

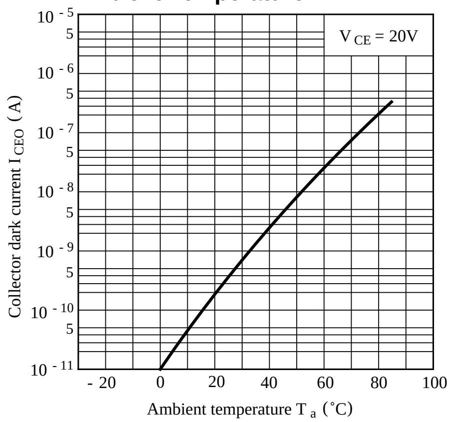


Fig.13-a Anode Current vs. Reference Voltage

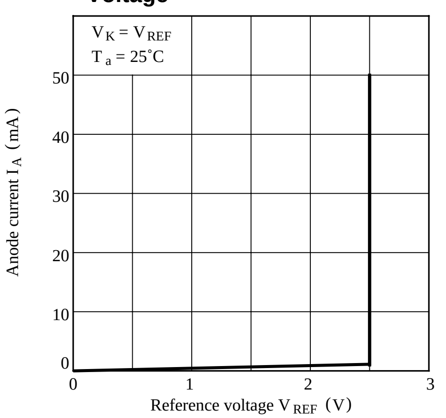


Fig.13-b Anode Current vs. Reference Voltage

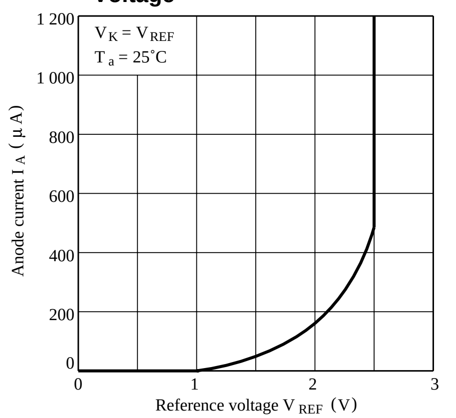


Fig.14 OFF-state Anode Current vs. Ambient Temperature

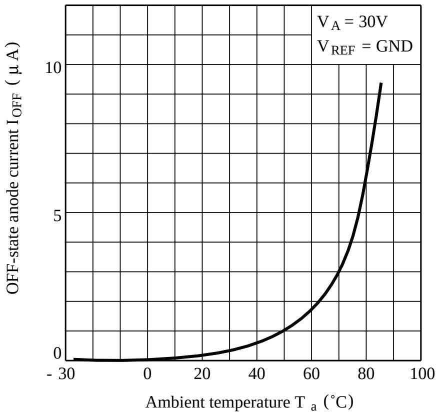


Fig.15 Reference Voltage vs. Ambient Temperature

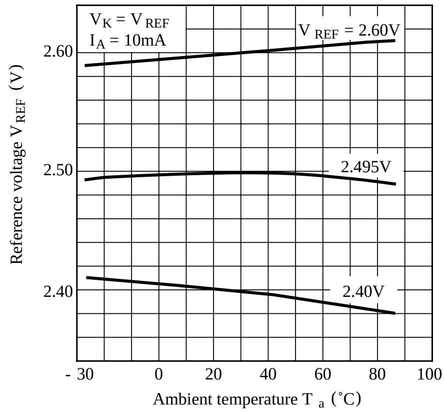


Fig.16 Reference Input Current vs. Ambient Temperature

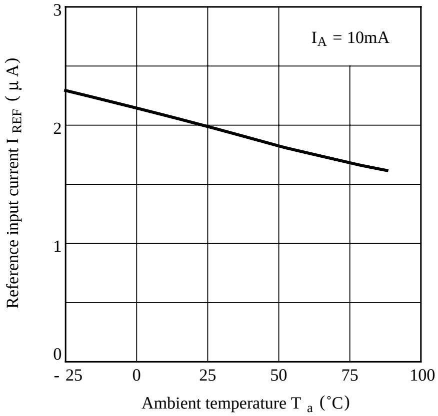


Fig.17 Reference Voltage Change vs. Anode Voltage

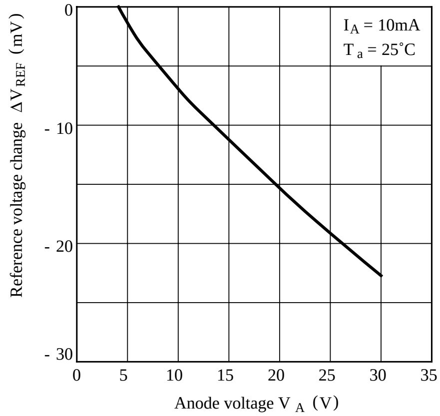
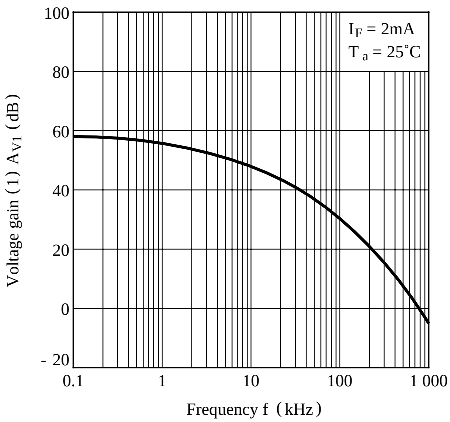
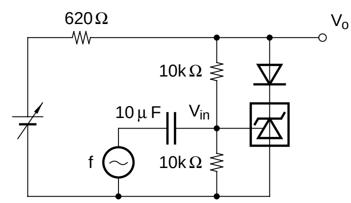


Fig.18-a Voltage Gain (1) vs. Frequency

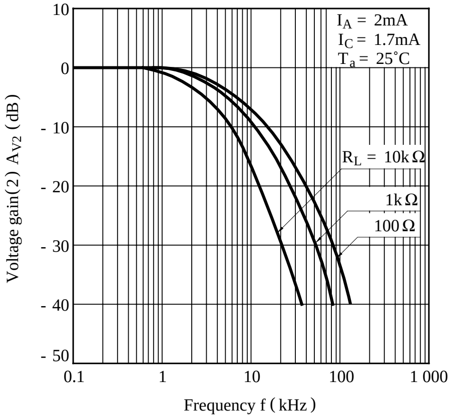


Test Circuit for Voltage Gain (1) vs. Frequency



$$A_{V1} = 20 \log \frac{V_o}{V_{in}}$$

Fig.18-b Voltage Gain (2) vs. Frequency



Test Circuit for Voltage Gain (2) vs. Frequency

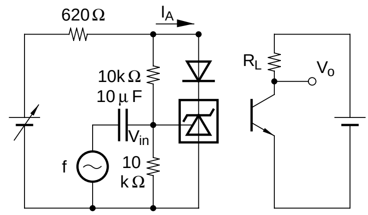
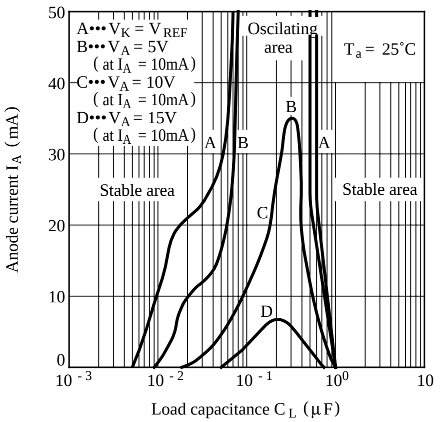
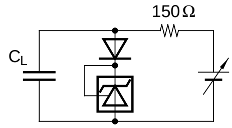


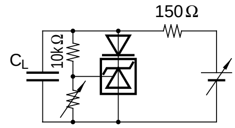
Fig.19 Anode Current vs. Load Capacitance



Test Circuit for Anode Current vs. Load Capacitance



Test circuit Ⅰ (A)



Test circuit Ⅱ (B, C, D)

Fig.20 Collector-emitter Saturation Voltage vs. Ambient Temperature

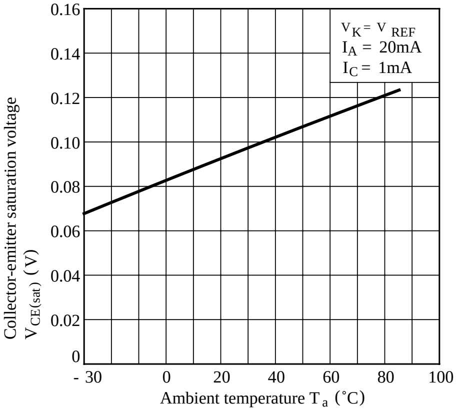
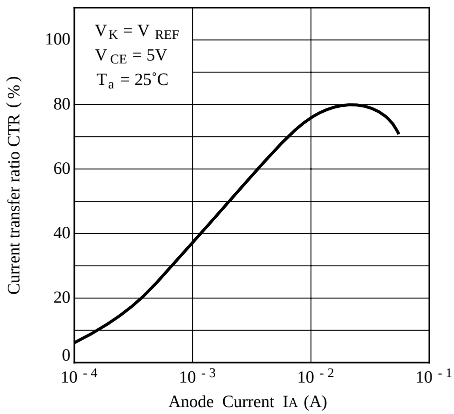


Fig.21 Current Transfer Ratio vs. Anode Current



■ Precautions for Use

Handle this product the same as with other integrated circuits against static electricity.

● As for other general cautions, refer to the chapter "Precautions for Use"

NOTICE

- The circuit application examples in this publication are provided to explain representative applications of SHARP devices and are not intended to guarantee any circuit design or license any intellectual property rights. SHARP takes no responsibility for any problems related to any intellectual property right of a third party resulting from the use of SHARP's devices.
- Contact SHARP in order to obtain the latest device specification sheets before using any SHARP device. SHARP reserves the right to make changes in the specifications, characteristics, data, materials, structure, and other contents described herein at any time without notice in order to improve design or reliability. Manufacturing locations are also subject to change without notice.
- Observe the following points when using any devices in this publication. SHARP takes no responsibility for damage caused by improper use of the devices which does not meet the conditions and absolute maximum ratings to be used specified in the relevant specification sheet nor meet the following conditions:

  (i) The devices in this publication are designed for use in general electronic equipment designs such as:
  - Personal computers
  - Office automation equipment
  - Telecommunication equipment [terminal]
  - Test and measurement equipment
  - Industrial control
  - Audio visual equipment
  - Consumer electronics

  (ii) Measures such as fail-safe function and redundant design should be taken to ensure reliability and safety when SHARP devices are used for or in connection with equipment that requires higher reliability such as:
  - Transportation control and safety equipment (i.e., aircraft, trains, automobiles, etc.)
  - Traffic signals
  - Gas leakage sensor breakers
  - Alarm equipment
  - Various safety devices, etc.

  (iii) SHARP devices shall not be used for or in connection with equipment that requires an extremely high level of reliability and safety such as:
  - Space applications
  - Telecommunication equipment [trunk lines]
  - Nuclear power control equipment
  - Medical and other life support equipment (e.g., scuba).
- Contact a SHARP representative in advance when intending to use SHARP devices for any "specific" applications other than those recommended by SHARP or when it is unclear which category mentioned above controls the intended use.
- If the SHARP devices listed in this publication fall within the scope of strategic products described in the Foreign Exchange and Foreign Trade Control Law of Japan, it is necessary to obtain approval to export such SHARP devices.
-
- Contact and consult with a SHARP representative if there are any questions about the contents of this publication.