

PREPARED BY: DATE:

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SHARP

SPEC. No. , ED—,95080

Issue June 21, 1995

APPROVED BY: DATE:

K. Gawa June 23, 1995

ELECTRONIC COMPONENTS
GROUP SHARP CORPORATION

PAGE 9 Pages

REPRESENTATIVE DIVISION

OPTO-ELECTRONIC
DEVICES DIV.

DEVICE SPECIFICATION FOR

Optical Data communication sensor

MODEL No.

IS1U20

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2. Please obey the instructions mentioned below for actual use of this device.
SHARP takes no responsibility for damage caused by improper use of the devices.

(1) **This** device is designed for general electronic equipment.

Main uses of this device are as **follows**;

- OA equipment . AV equipment
- [•Home appliance, •Telecommunication equipment (Terminal). etc.

(2) Please take proper steps in order to maintain reliability and safety, in case this device is used for the uses mentioned below which require high reliability.

- Unit concerning control and safety of a vehicle (air plane, train, automobile etc.)
- Gas leak detection breaker •Traffic signal •Fire box and burglar alarm box
- [•Other safety equipment, etc.

(3) Please do not use for the uses mentioned below which require extremely high reliability.

- . Space equipment •Telecommunication equipment (Trunk)
- [•Nuclear control equipment •Medical equipment etc.

Contact a SHARP representative of sales office in advance when you intend to use SHARP devices for any applications other than those applications for general electronic equipment recommend by SHARP at (1).

CUSTOMER'S APPROVAL

DATE

B Y ,

DATE

PRESENTED

BY

K. Gawa

for K. Ebina,
Chief Manager
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SHARP CORPORATION

1. Application

This specification applies to the outline and characteristics of IrDA1 (SIR) type Optical Data communication sensor, Model No. IS 1 U20.

Main use : IrDA (SIR) type IR data communication

2. Outline

Refer to the attached sheet, Page 4.

3. Ratings and characteristics

Refer to the attached sheet, Page 5 to 7.

4. Reliability

Refer to the attached sheet, Page 8.

5. Incoming inspection

Refer to the attached sheet, Page 9.

6. Supplement

1) This optical data communication sensor is satisfied with each characteristics of item 3-4, in the optical system shown in x5.

2) This product is built-in photodiode.

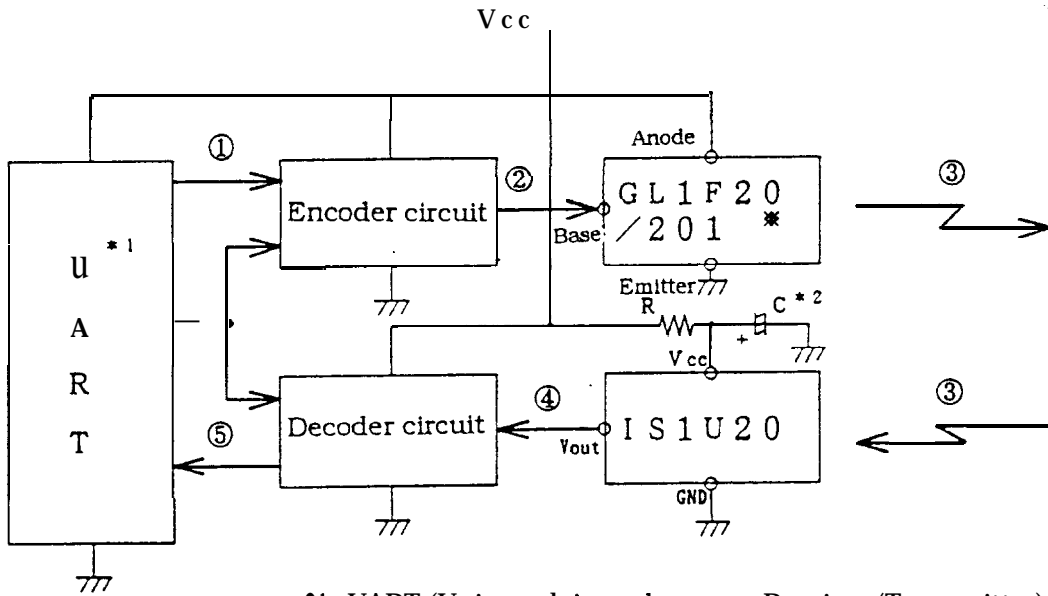
7. Notes

- 1) If the surface of detector is smeared with dust or dirt, it may cause faulty operation. Caution shall be taken to avoid this. And do not touch the detector surface.
- 2) Cleaning conditions :
 - Solvent cleaning : Solvent temperature 45°C or less
Immersion for 3 min or less
 - Ultrasonic cleaning : The affect to device by ultrasonic cleaning is different by cleaning bath size, ultrasonic power output, cleaning time, PWB 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.

The cleaning shall be carried out with solvent below.

Solvent : Ethyl alcohol, Methyl alcohol, Isopropyl alcohol
- 3) In order to prevent electrostatic discharge of integrated circuit, human body and soldering iron, etc. shall be grounded.
- 4) Please do not apply too much force to pins.
- 5) In case that this sensor is adopted in IR communication system, please use it according to the signal method which is specified by [Serial Infrared (SIR) Physical Layer Link Specification] Version 1.0 published by the Infrared Data Association. Faulty operation may happen, if different signal method than specified one is used.
- 6) In case that this sensor and emitter are used in the same equipment, please consider the layout and structure in order to reduce the electrical and optical influence from the emitter to the sensor as little as possible.
- 7) Since external disturbing light shall be a factor which makes this sensor faulty operation, please consider the layout and structure in order to reduce the influence to the detector surface.
- 8) Please design the decode circuit in consideration of the characteristics etc. of this sensor.

9) Example of system

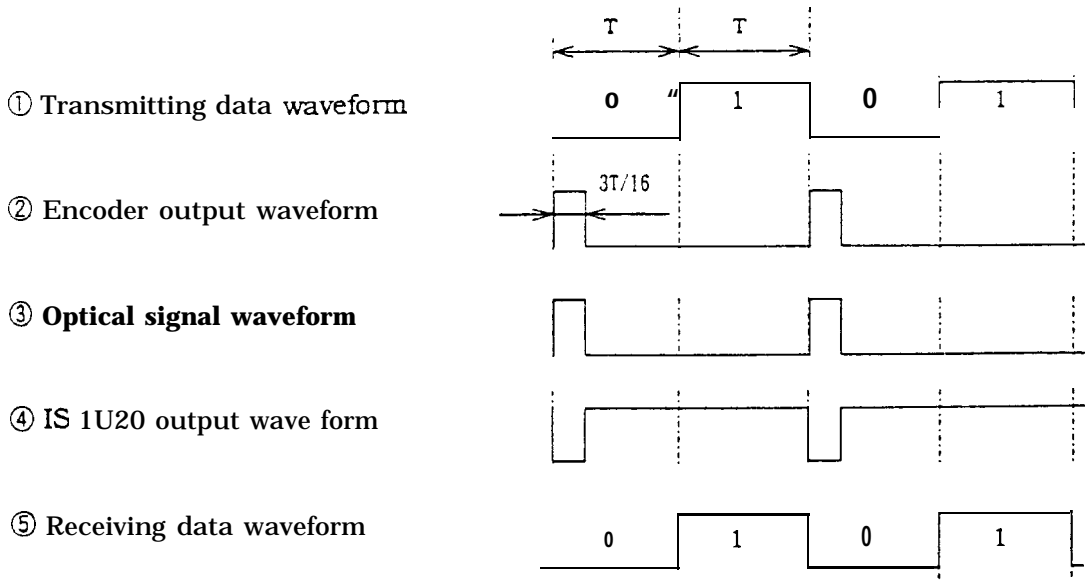


① UART (Universal Asynchronous Receiver/Transmitter)

*2 Please choose the most suitable C and R according to the noise level and noise frequency of power supply.
Example : C=47 μF, R=47Ω

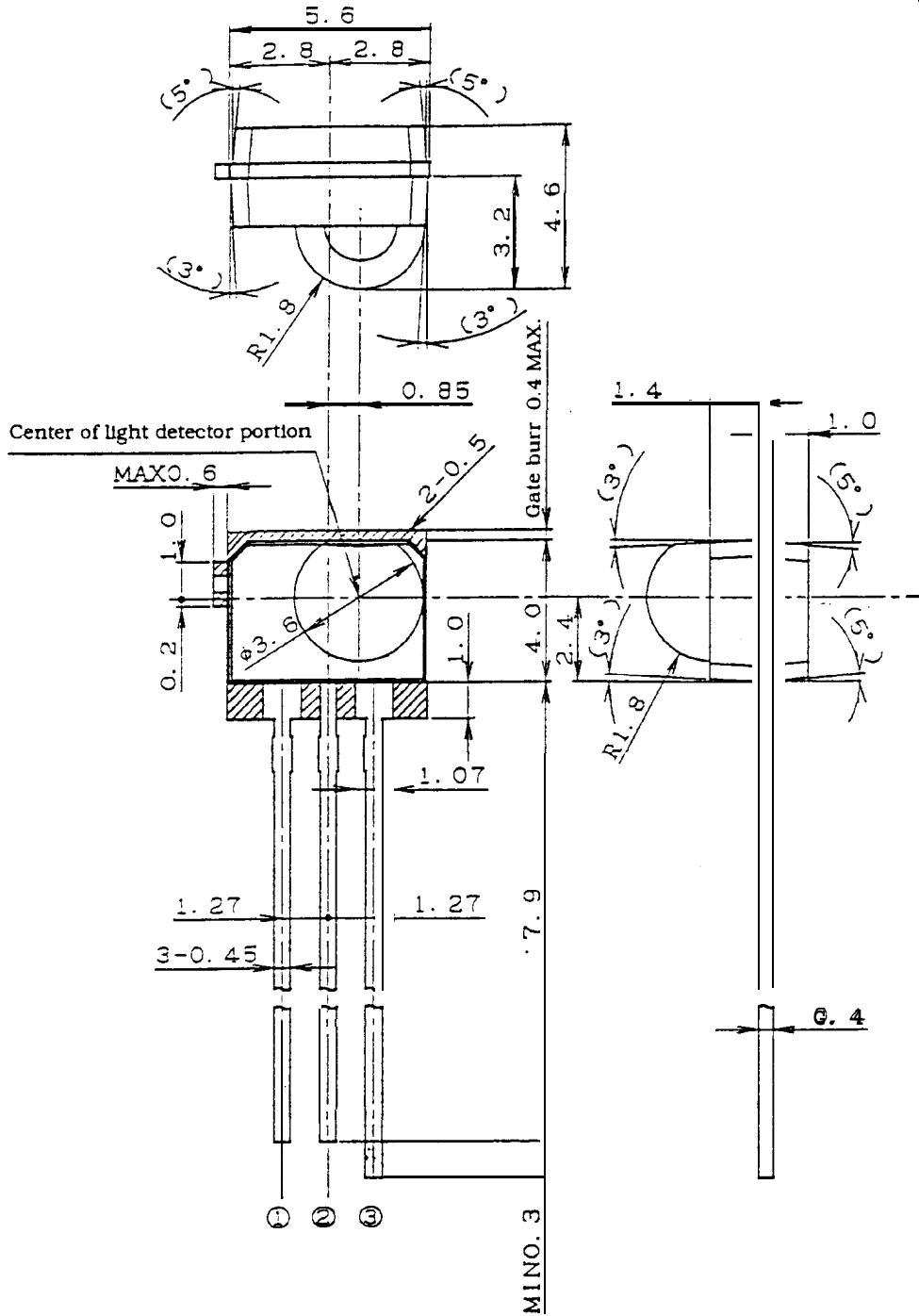
※ IR LEDs shall be recommended to use the GL1F20 (For 5V power supply) and the GL1F201 (For 3V power supply) with this sensor as pair.

10) Example of signal waveform



$$T = \frac{1}{\text{Data rate}}$$

Data rate : 2.4kbps, 9.6kbps
19.2kbps, 38.4kbps
57.6kbps, 115.2kbps



- 1) Unspecified tolerance shall be ± 0.2 .
- 2) Dimensions in parenthesis are shown for reference.
- 3) area : Burr
- 4) Resin burr shall not be included in outline dimensions .
- 5) Package : Visible light cut-off resin (black)

6) Pin arrangement

①	V _o
②	GND
③	V _{cc}

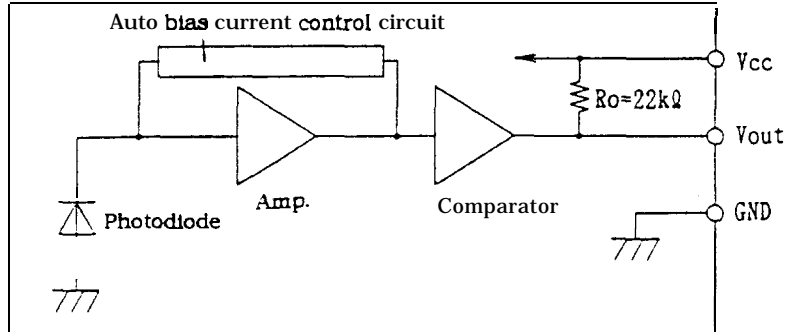
7) Lead pitch distance denotes that of the lead root.

Scale	Material	Finish
5/1	Lead : Cu	Lead : Solder dip
u n i t	Package : Epoxy resin	
1=1/1mm		

Name	IS1U20 Outline Dimensions
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3. Ratings and characteristics

3.1 Schematic



3.2 Absolute maximum ratings

Parameter	symbol	Ratings	Unit
Supply voltage	Vcc	0 to 6.0	v
Operating temperature	Topr	-10 to +70 ※1	°C
Storage temperature	Tstg	-20 to +85	°C
Soldering temperature	Tsol	260 ※2	°C

※ 1) No dew formation

※ 2) For 3 s at the position of 2.0mm from the package bottom.
At mounting on PCB (Thickness : 1.0mm)

3.3 Recommended operating conditions

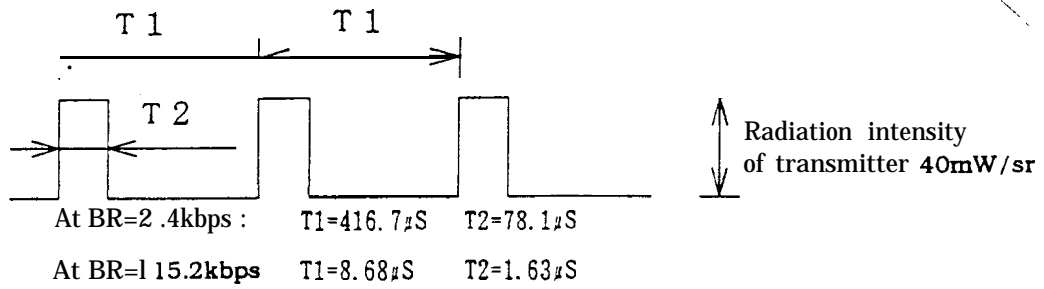
Parameter	symbol	Operating condition	unit
Supply voltage	Vcc	2.7 to 5.5	v
Data rate	BR	2.4 to 115.2	kbps

3.4 Electrical characteristics

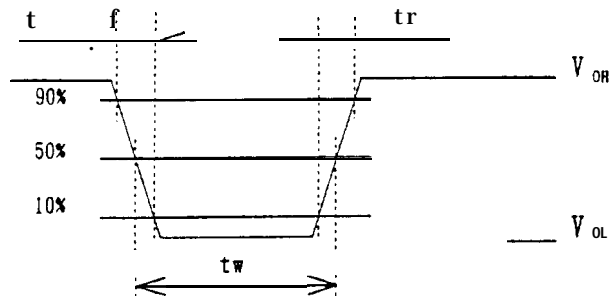
(Unspecified Ta=25°C, Vcc=+5V)

Parameter	symbol	MIN.	TYP.	MAX.	Unit	Remark
Current dissipation	Icc1	1	-	1.0	1.4	mA Vcc=5V, No input light, Output terminal OPEN
	Icc2	-	-	0.7	1.0	mA Vcc=3V, No input light, Output terminal OPEN
High level output voltage	V _{OH1}	4.5	-	-	V	Vcc=5V
	V _{OH2}	2.5	-	-	V	Vcc=3V
Low level output voltage	V _{OL1}			0.44	V	Vcc=5V, I _{OL} =400 μA, ※3, 4, 5
	V _{OL2}			0.44	V	Vcc=3V, I _{OL} =400 μA, ※3, 4, 5
Low level pulse width	TW ₁	0.8	-	16.0	μs	BR=2.4kbps, X3, 4, 5
	TW ₂	0.8	-	8.0	μs	BR=115.2kbps, X3, 4, 5
Rise time	tr	-	-	1.2	μs	BR=115.2kbps, x3, 4, 5
Fall time	tf	-	-	0.2	μs	BR=115.2kbps, ※3, 4, 5
Maximum reception distance	L	1	-		m	v _{OH} , v _{OL} , tw, tr, tf shall be satisfied at φ ≤ 15°, ※3, 4, 5

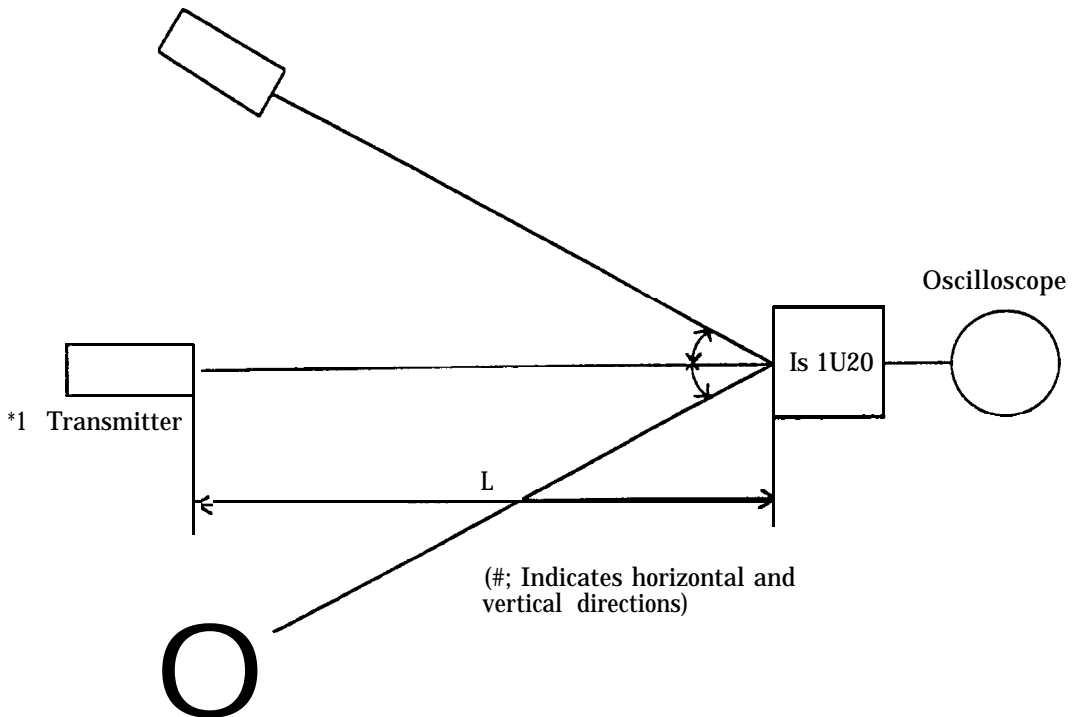
※3 Input signal waveform



※4 Output waveform specification



※5 Standard optical system



- Transmitter shall use an infrared emitting diode; GL550 ($\lambda_p=850$ to 900nm) which is adjusted the radiation intensity at 40mW/sr .

4. Reliability

The reliability of products shall be satisfied with items listed below.

Confidence level : 90%
LTPD : 1070/2070

Test Items	Test Conditions	Failure Judgement Criteria	Samples (n)
			Defective (c)
Temperature cycling	1 cycle -20 °C to +85°C (30min) (30min) 20 cycles test	$I_{CC1} \leq U \times 1.2$ $I_{CC2} \leq U \times 1.2$	n=22, c=0
High temp. and high humidity storage	+60°C, 90%RH, 240h	$V_{OH1} \geq L \times 0.8$ $V_{OH2} \geq L \times 0.8$	n=22, c=0
High temp. storage	+85°C, 240h	$V_{OL1} \leq U \times 1.2$	n=22, c=0
Low temp. storage	-20°C, 240h	$V_{OL2} \leq U \times 1.2$	n=22, c=0
Operation life	70°C, Vcc=5V, 240h	$L \times 0.8 \leq t_{w1} \leq U \times 1.2$	n=22, c=0
Mechanical shock	15000 m/s ² , 0.5ms 1 time/ ±X, ±Y, ±Z direction	$L \times 0.8 \leq t_{w2} \leq U \times 1.2$	n=11, c=0
Variable frequency vibration	100 to 2000 to 100Hz/20min 100m/s ² , 2h/X, Y, Z direction	$t_r \leq U \times 1.2$ $t_f \leq U \times 1.2$	n=11, c=0
Terminal strength (Tension)	Weight: 5.0N 30s /each terminal	$L \geq L \times 0.8$	n=11, c=0
Terminal strength (Bending)	Weight: 2.5N 0° → 90° → 0° → -90° → 0° 2 times bending	U: Upper specification limit	n=11, c=0
Soldering heat	260 ± 5°C, 3s, Position of 2mm from the package bottom. At mounting on PCB (Thickness : 1.0mm)	L: Lower specification limit	n=11, c=0

In the test *mark above, the sample to be tested shall be left at normal temperature and humidity for 2h after it is taken out of the chamber. (No dew point)

5. Incoming inspection

(1) Inspection lot

Inspection shall be carried out per each delivery lot.

(2) Inspection method

A single sampling plan, normal inspection level II based on MIL-STD- 105D shall be adopted.

Parameter		Inspection items and test method	AQL(%)	
Major defect	1	Disconnection, short	0.1%	
	2	Inverse polarity on terminal		
	3	Soldering defect (Obstacle to use)		
	4	Electrical characteristic defect in parameter 3.4.		
Minor defect	1	Appearance defect	0.25%	
		Parameter		Judgement criteria
		split, chip, Scratch, Stain, Blur		One which affects the characteristics of characteristics of parameter 3.4 shall be defect.