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DEVICE SPECIFICATION FOR IR UNIT
TENTATIVE
 MODEL NO. RY6FD11E

CUSTOMER'S APPROVAL

DATE _____

BY _____

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(Precautions)

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

· OA equipment · Audio visual equipment · Home appliances
· Telecommunication equipment (Terminal)

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.

1. Application

This specification applies to the outline and characteristics of IrDA1.1 type Optical Data communication transceiver, Model RY6FD11E.

Main use : IrDA1.1 type IR data communication

2. Outline

Refer to the attached sheet, Page 5.

3. Ratings and characteristics

Refer to the attached sheet, Page 6 to 8.

4. Reliability

Refer to the attached sheet, Page 9.

5. Incoming inspection

Refer to the attached sheet, Page 10.

6. Supplement

1) This optical data communication sensor is satisfied with each characteristics of item 3-3, in the optical system shown in #2.

2) This product is built-in photodiode.

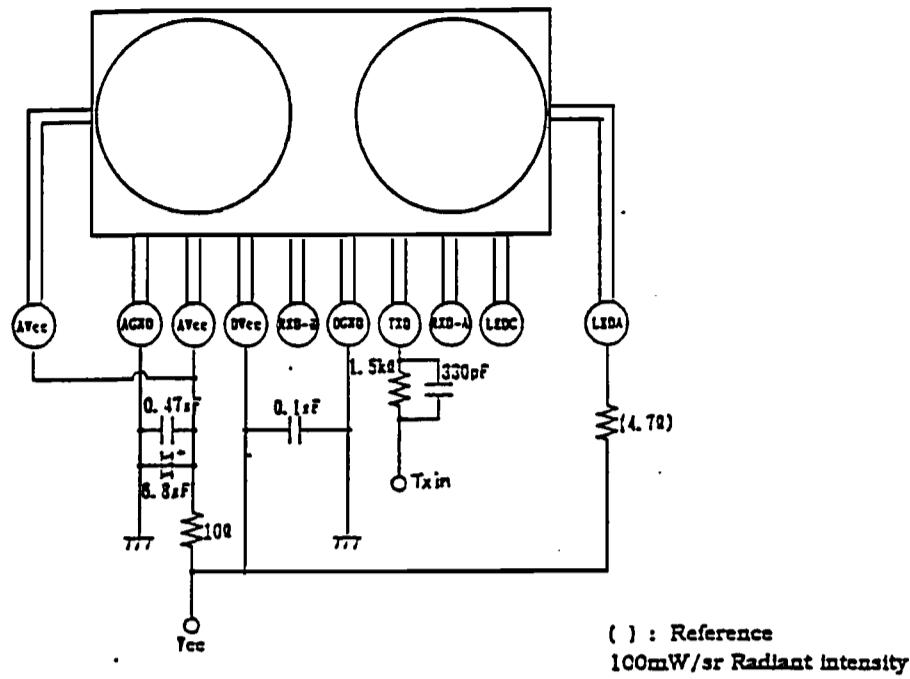
7. Notes

- 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, PWC 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.

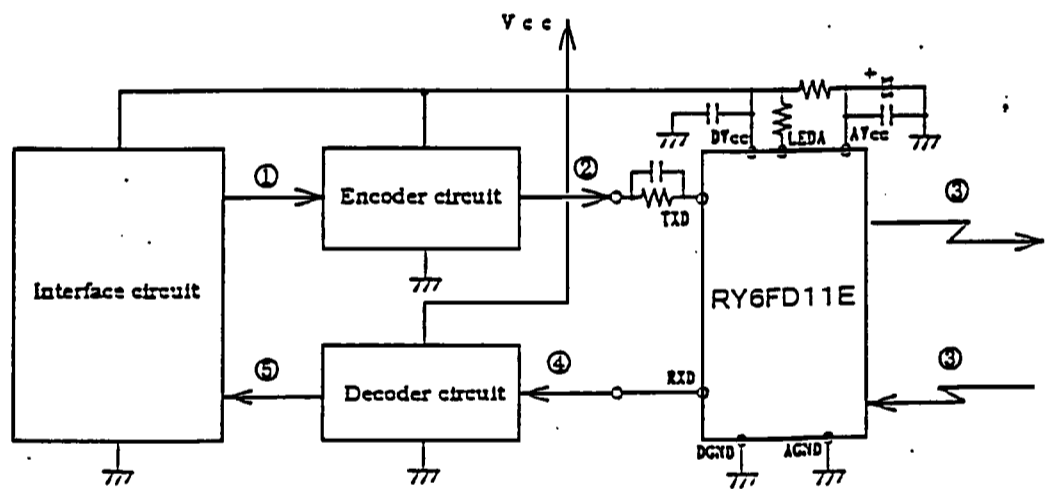
The cleaning shall be carried out with solvent below.

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 1.1 published by the Infrared Data Association. Faulty operation may happen, if different signal method than specified one is used.
- 6) 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.
- 7) Please design the decode circuit in consideration of the characteristics etc. of this sensor.

8) Recommended external parts



9) Example of system



*1 IR LEDs shall be recommended to use the GL710

10) Example of signal waveform

Data rate	9.6k~115.2kbps, 1.152Mbps (T=104μs~8.63μs, 863ns)	4Mbps (T=500ns)
① Transmitting data waveform		
② Encoder output waveform		
③ Optical signal waveform		
④ GPIH11 output waveform		
⑤ Receiving data waveform		

• (1/4)T at 1.152Mbps

3. Ratings and characteristics

3.1 Absolute maximum ratings

Parameter	Symbol	Ratings	Unit
Supply voltage	Vcc	0 to 6.0	V
Operating temperature	Topr	-10 to +70 \pm 1	$^{\circ}$ C
Storage temperature	Tstg	-20 to +85	$^{\circ}$ C

3.2 Recommended operating conditions

Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remarks
Supply voltage	Vcc	4.75	5.0	5.25	V	
Detector face illuminance	E_{RH}	0.0036	-	500	mW/cm ²	BR=9.6k to 115.2kbps RXD-terminal A
		0.0090	-	500	mW/cm ²	BR=1.152Mbps, 4Mbps, ASK RXD-terminal B

3.3 Electrical characteristics

(Unspecified Ta=25°C, Vcc=5V)

	Parameter	Symbol	MIN.	TYP.	MAX.	Unit	Remark
Detector side	Current dissipation	I _{CC}	-	5.0	7.0	mA	No input light. Output terminal OPEN
	High level output voltage	V _{CHA}	4.5	-	-	V	RXD-A terminal
		V _{CHB}	2.8	3.5	-	V	RXD-B terminal
	Low level output voltage	V _{OLA}	-	-	0.4	V	I _{OL} =400 μA, RXD-A terminal
		V _{OLB}	-	0.4	0.6	V	I _{OL} =400 μA, RXD-B terminal
	Low level pulse width	tw ₁	1.0	-	52.1	μs	BR=9.5kbps (Pulse width 19.53 μs), RXD-A terminal, Ⓢ 1
		tw ₂	1.0	-	7.0	μs	BR=115.2kbps (Pulse width 1.63 μs), RXD-A terminal, Ⓢ 1
		tw ₃	100	-	700	ns	BR=1.152Mbps (Pulse width 217ns), RXD-B terminal, Ⓢ 1
		tw ₄	85	-	165	ns	BR=4Mbps (Pulse width 125ns), RXD-B terminal, Ⓢ 1
		tw ₅	0.5	-	1.6	μs	ASK(f=500kHz) (Pulse width 1 μs), RXD-B terminal, Ⓢ 1
	Jitter	γ	-15	-	15	ns	BR=4Mbps (Pulse width 125ns), RXD-B terminal, Ⓢ 1
	Rise time	trA	-	-	1.2	μs	RXD-A terminal, Ⓢ 1
		trB	-	-	30	ns	RXD-B terminal, Ⓢ 1
	Fall time	tfA	-	-	0.2	μs	RXD-A terminal, Ⓢ 1
		tfB	-	-	30	ns	RXD-B terminal, Ⓢ 1
Emitter side	Radiant intensity	I _E	100	-	-	mW/sr	V _H =4.25V, I _{LEDA} =400mA
	Peak emission wavelength	λ _p	-	880	-	nm	
	Rise time	tr _(OE)	-	-	40	ns	BR=4Mbps, (Pulse width 125ns)
	Fall time	tr _(OF)	-	-	40	ns	BR=4Mbps, (Pulse width 125ns)
	High level input voltage	V _H	4.25	-	V _{CC}	V	
	Low level input voltage	V _L	0.0	-	0.3	V	

4. Reliability

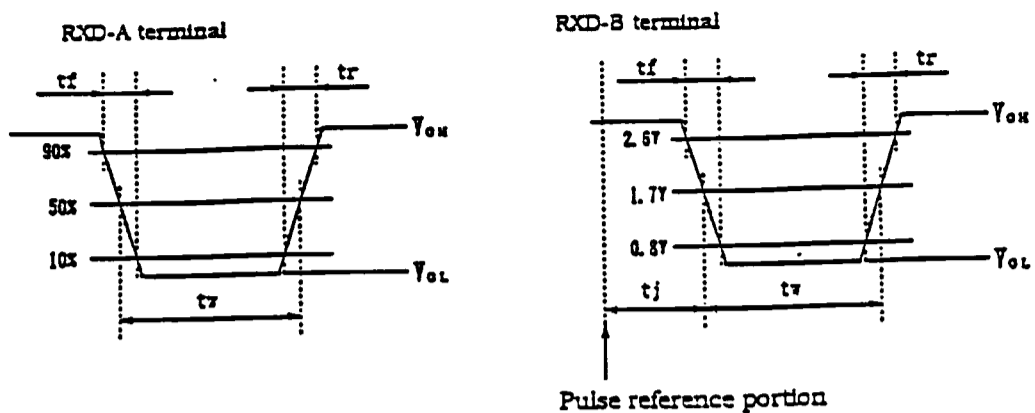
The reliability of products shall be satisfied with items listed below.

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

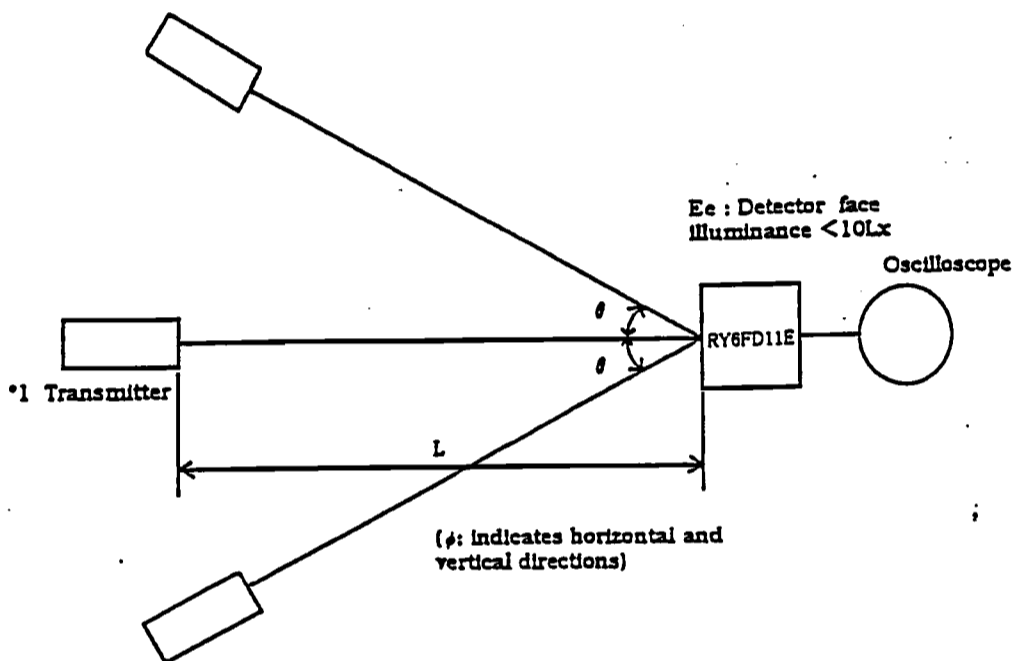
Test Items	Test Conditions	Failure Judgement Criteria	Samples (n) Defective (c)
• Temperature cycling	1 cycle -20°C to +85°C (30min) (30min) 20 cycles test	$I_{cc} > U_p \times 1.2$ $I_{cc-s} > U_p \times 1.2$ $I_{SOH} > U_p \times 1.2$ $I_{SOL} > U_p \times 1.2$ $L < Low \times 0.8$ Judgement Criteria of "L" $V_{OH} < Low \times 0.8$ $V_{OL} > U_p \times 1.2$ $t_{w1.2.3.4.5} < Low \times 0.8$ $t_{w1.2.3.4.5} > U_p \times 1.2$ $t_r > U_p \times 1.2$ $t_f > U_p \times 1.2$ Up: Upper specification limit Low: Lower specification limit	n=22, c=0
• High temp. and high humidity storage	+60°C, 90%RH, 240h		n=22, c=0
• High temp. storage	+85°C, 240h		n=22, c=0
• Low temp. storage	-20°C, 240h		n=22, c=0
• Operation life	+25°C, Vcc=5V, 240h		n=11, c=0
Mechanical shock	1000m/s ² , 6ms 3 times/±X, ±Y, ±Z direction		n=11, c=0
Variable frequency vibration	100 to 2000 to 100Hz/Approx. 4min 200m/s ² , 48min./X, Y, Z direction		n=11, c=0
Terminal strength (Tension)	Weight: 5.0N 10s/each terminal		n=11, c=0
Terminal strength (Bending)	Weight: 2.5N 0° -90° -0° --90° -0° 2 times bending		n=11, c=0
Soldering heat	260 ±5°C, 3s, Position of 1.3mm from the package bottom. At mounting on PCB (Thickness : 1.0mm)		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)

※1 For output wave form (CL ≤ 30pF)



※2 Standard optical system



*1 Transmitter shall be used the emitting diode; GL710 ($\lambda_p=850$ to $900nm$) which is adjusted as below radiant intensity.

BR	Radiant intensity
9.6k to 115.2kbps	40mW/sr
1.152Mbps, 4Mbps, ASK	100mW/sr

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 ISO 2859 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 3.3.		
Minor defect	1	Appearance defect	0.25%	
		Parameter		Judgement criteria
		Split. Chip. Scratch. Stain. Blur		One which affects the characteristics of parameter 3.3 shall be defect.

Infrared IR FIR transceiver IrDA 4 Mbps IrDA 1.1 front end RY6FD1SE