

### FEATURES

- Built-in Photodiode
- Operating voltage 2.0 V to 3.6 V
- Conforms to eye safety IEC60825-1, without external resistor
- This product shall not contain the following materials, and these materials shall not be used in the production process for this product.
  - CFC<sub>S</sub>
  - Halon
  - Carbon Tetrachloride
  - 1.1.1. Trichloroethane (Methylchloroform)
  - Specific brominated flame retardants such as the PBB<sub>O</sub><sub>S</sub> and PBB<sub>S</sub> are not used in this device.

### INTRODUCTION

This specification applies to the outline and characteristics of IrDA 1.2 type (data rate 2.4 kbps to 115.2 kbps, low power option compliant) optical data communication transceiver.

### NOTES

- Caution should be taken to prevent the detector surface from being smeared with dust or dirt, or from being touched, as it may cause faulty operation.
- Cleaning conditions:
  - Solvent cleaning: Solvent temperature 45°C or less. Immersion for 3 minutes or less.
  - Ultrasonic cleaning: The effect of ultrasonic cleaning on the device differs by cleaning bath size, ultrasonic power output, cleaning time, PCB size or device mounting condition, etc. Test the device under actual conditions and confirm that ultrasonic cleaning does not cause any immediate or potential defects.
  - Cleaning solvent: The cleaning shall be carried out with ethyl alcohol, methyl alcohol, or isopropyl alcohol.
- In order to prevent electrostatic damage to the integrated circuit, handle this device in a static-free environment and workstation.
- External force applied to the device after mounting can cause mounting defects such as the terminal coming off. Be careful when handling the device and prevent objects from touching the device after mounting.
- Refer to the 'Precautions for Soldering' section.
- When the system (program) is designed, the turn around time from transmit to receive should be designed by considering 200 μs or more that is specified by IrDA. This turn around time means the time that this device does not temporarily detect the incoming signal, since the transmitted light from the transmitter side reaches the detector side of the same transceiver.
- Consider that 200 μs or more (at T<sub>A</sub> = 25°C, no input signal) is necessary to return from shut-down mode to ready-operation mode. In addition, thoroughly confirm the operation in the actual application.
- When there is considerable external stray light or a light source is located near the transceiver, or the detector face receives considerable external stray light, a pulse other than desired signal output may be generated as noise on output terminal of the transceiver. Consider the layout and structure in your design to minimize disturbing light on the detector face.
- When the sensor is adopted in an IR communication system, it should be used according to the signal method which is specified by 'Serial Infrared Physical Layer Link Specification' published by the Infrared Data Association. Faulty operation may occur, if a signal method other than that specified is used.
- RXD pinout is a pullup (260 kΩ TYP.) to V<sub>DD</sub> in shut-down mode. See Table 1 and Figure 2.
- In circuit designs, make allowance for the degradation of the light emitting diode output that results from long-term continuous operation (50% degradation/5 years). The light emitting diode output may be degraded quickly when operated at T<sub>A</sub> = -40°C, therefore it is recommended to operate over T<sub>A</sub> = -20°C.

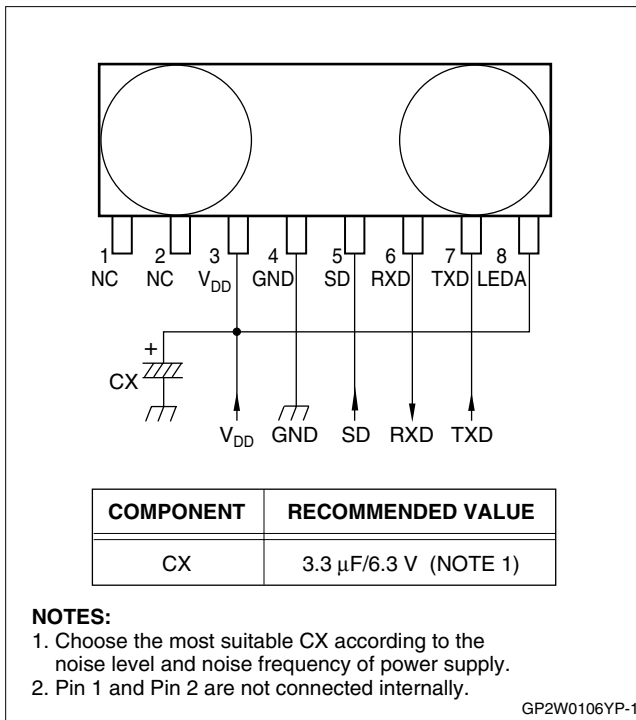


Figure 1. Recommended External Circuit

Table 1. I/O Truth Table

SD	TXD	LED	RECEIVER	TR1	TR2	RXD
Low	High	On	Don't Care	—	—	Not Valid
Low	Low	Off	IrDA Signal	Off	On	Low
Low	Low	Off	No Signal	On	Off	High
High	Don't Care	Off	Don't Care	Off	Off	High Pullup

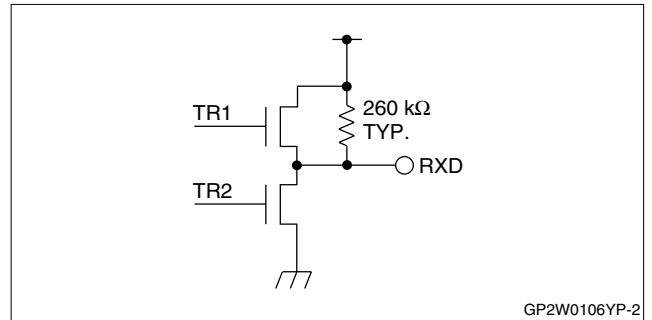


Figure 2. RXD Equivalent Circuit

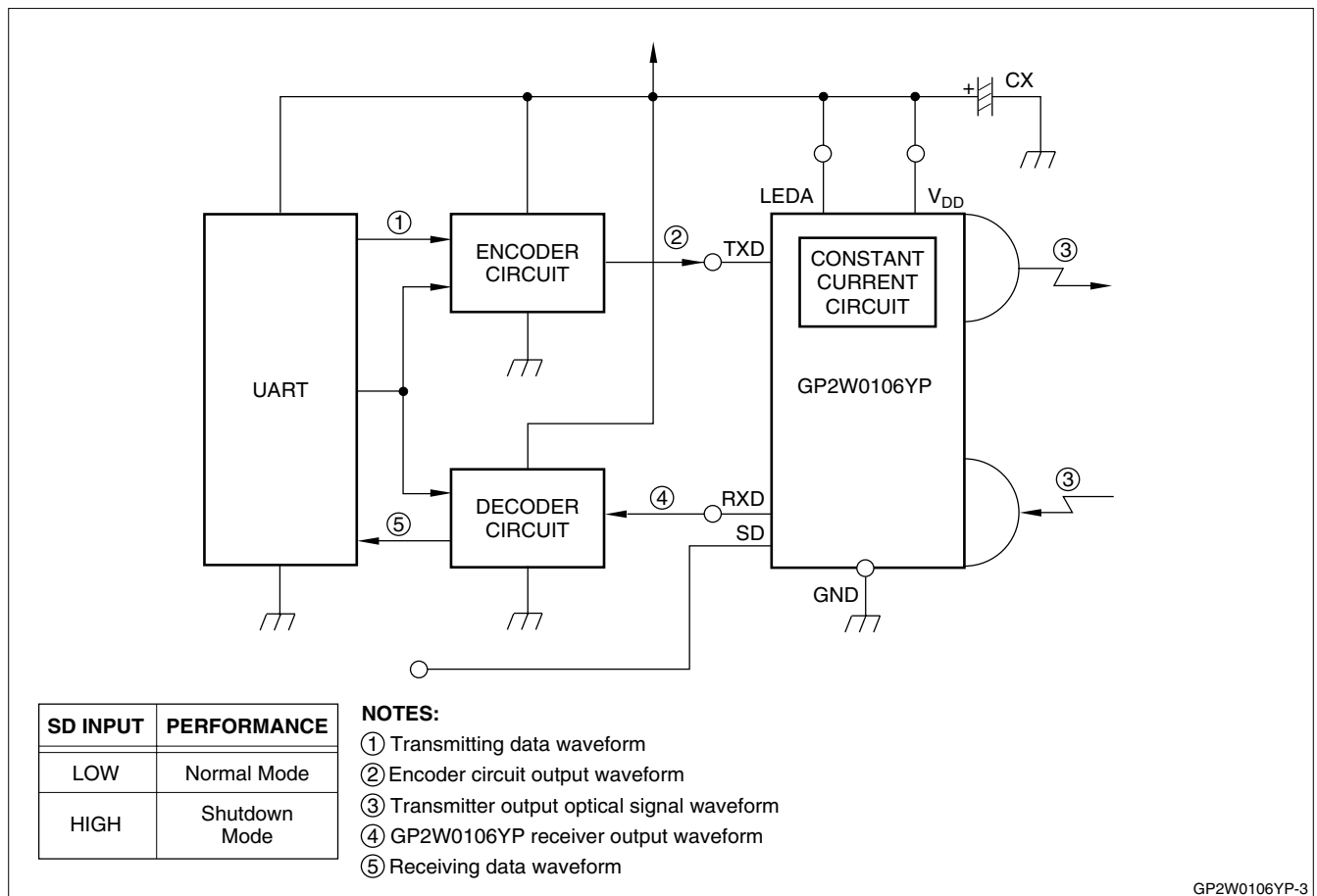


Figure 3. Example of Circuit

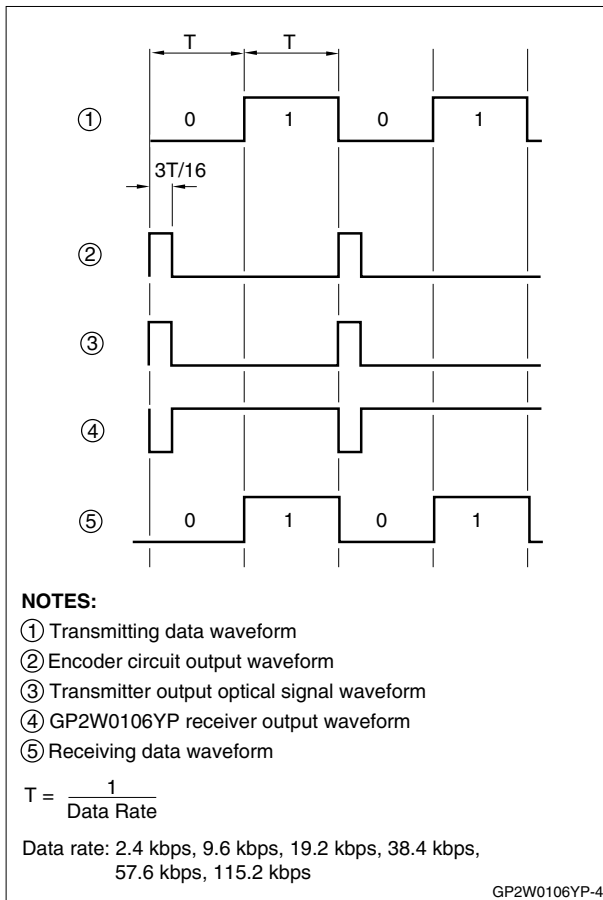


Figure 4. Example of Signal Waveform

### Recommended Size of Solder Cream Paste

Open the solder mask as shown in Figure 5. The size of solder cream paste for this device before reflow soldering must be as large as one of the foot pattern land, indicated in Figure 6.

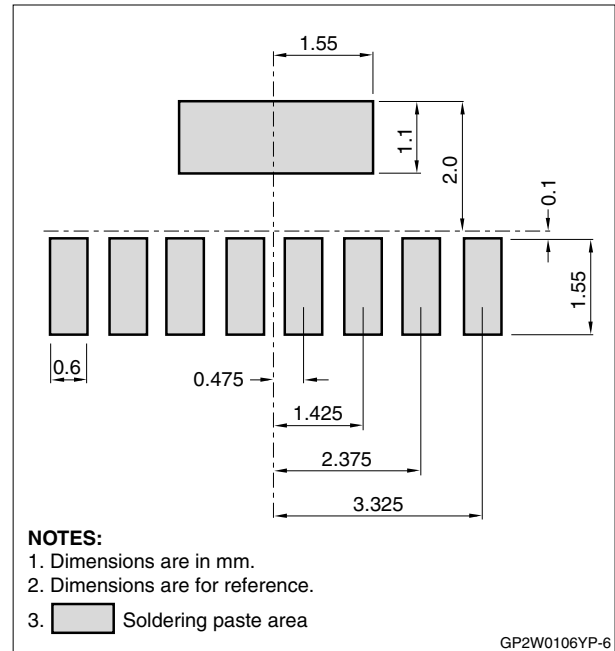


Figure 5. Solder Cream Paste Size

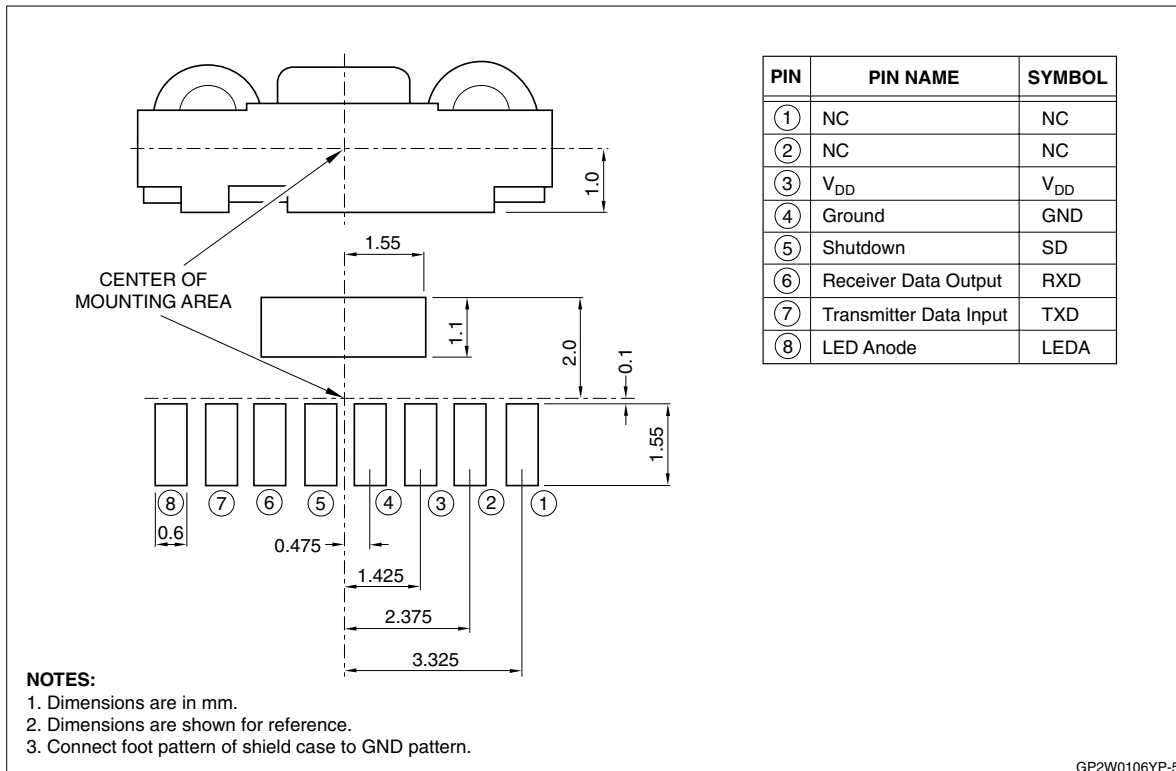


Figure 6. Foot Pattern of PCB

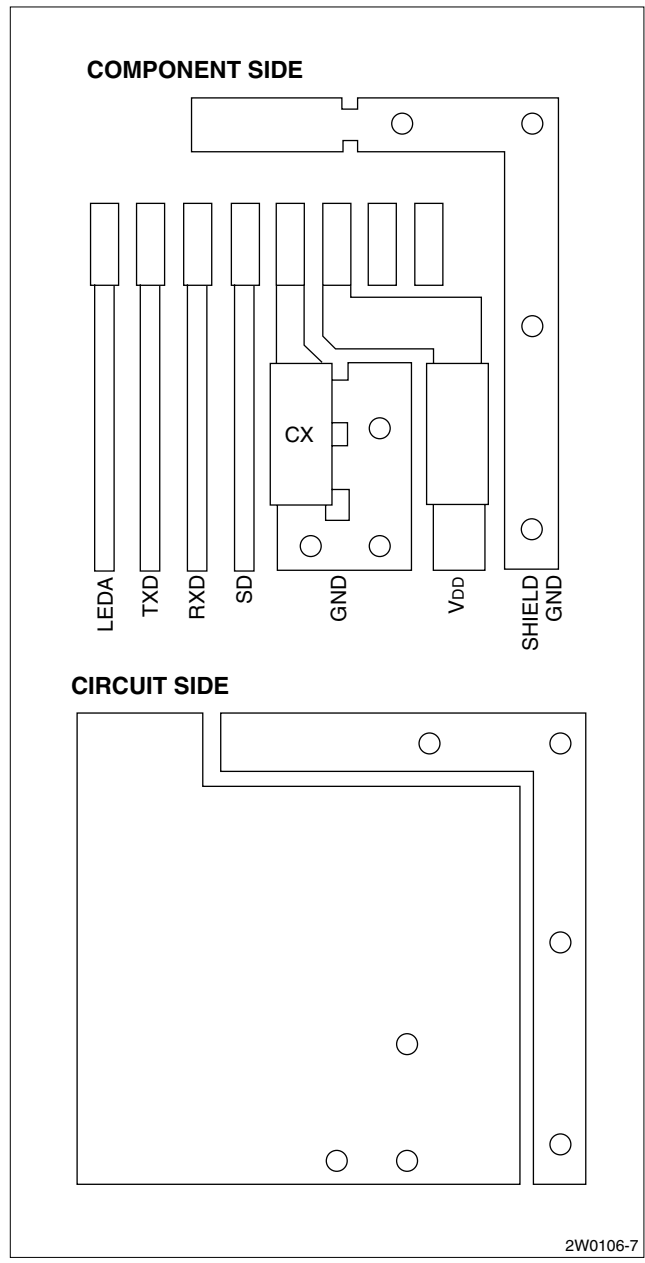
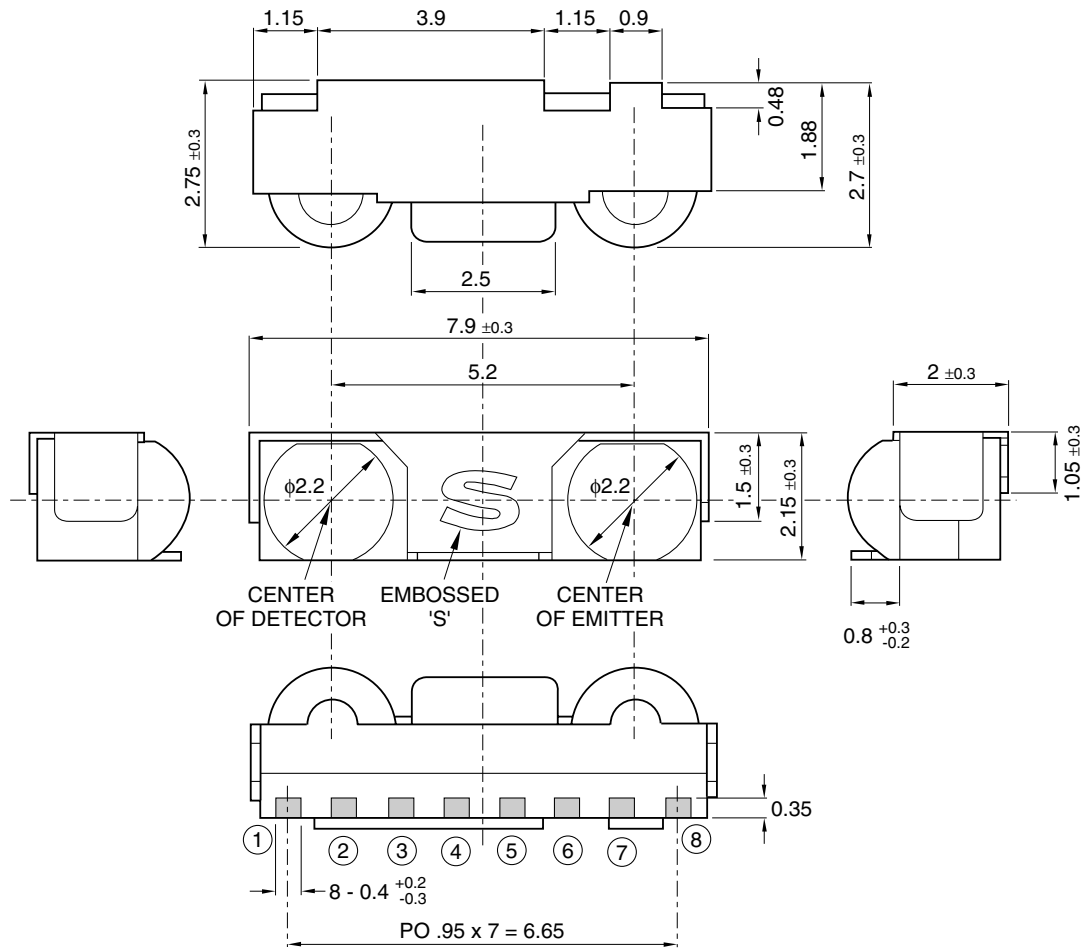


Figure 7. PCB Layout Example

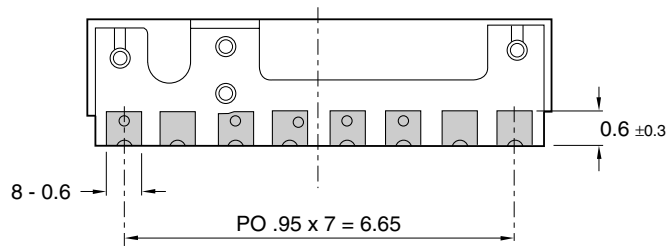


PIN	PIN NAME	SYMBOL
①	NC	NC
②	NC	NC
③	V <sub>DD</sub>	V <sub>DD</sub>
④	Ground	GND
⑤	Shutdown	SD
⑥	Receiver Data Output	RXD
⑦	Transmitter Data Input	TXD
⑧	LED Anode	LEDA

**NOTES:**

- Dimensions are in mm.
  - Unspecified tolerances are ±0.2
  - Adhesion of resin to the terminal area are allowed MAX. 0.2 mm.
- area: Au plating

**BOTTOM VIEW**



GP2W0106YP-8

**Figure 8. GP2W0106YP Outline Dimensions**

## RATINGS AND CHARACTERISTICS

### Absolute Maximum Ratings

PARAMETER	SYMBOL	RATINGS	UNIT	NOTES
Supply voltage	$V_{DD}$	0 to 6.0	V	
LED supply voltage	$V_{LEDA}$	0 to $V_{DD} + 1.0$	V	
Peak forward current	$I_{FM}$	60	mA	1
Operating temperature	$T_{OPR}$	-20 to +85	°C	2
Storage temperature	$T_{STG}$	-40 to +85	°C	
Soldering temperature	$T_{SOL}$	230	°C	3

#### NOTES:

1. Pulse width: 78.1  $\mu$ s. Duty ratio: 3/16.
2. Recommended condition: -20°C to +85°C.
3. Soldering reflow time: 5 seconds.

### Recommended Operating Conditions

PARAMETER	SYMBOL	OPERATING CONDITION	UNIT	NOTES
Supply voltage	$V_{DD}$	2.0 to 3.6	V	
LED supply voltage	$V_{LEDA}$	2.0 to $V_{DD} + 1.0$	V	
Operating temperature	$T_{OPR}$	-20 to +85	°C	
Data rate	BR	2.4 to 115.2	kbps	
SD terminal high level input voltage	$V_{IHSD}$	$V_{DD} \times 0.95$ to $V_{DD}$	V	1
SD terminal low level input voltage	$V_{ILSD}$	0.0 to $V_{DD} \times 0.1$	V	2
TXD high level input voltage	$V_{IHTXD}$	$V_{DD} \times 0.8$ to $V_{DD}$	V	3
TXD low level input voltage	$V_{ILTxD}$	0.0 to $V_{DD} \times 0.2$	V	4

#### NOTES:

1. Shut down mode
2. Normal mode
3. LED ON. See Figure 14.
4. LED OFF. See Figure 14.

## Electrical Characteristics

$T_{OPR} = -40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$ ,  $V_{DD} = 2.0\text{ V}$  to  $3.6\text{ V}$  unless otherwise specified

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTES
Current consumption at no input signal	$I_{DD}$		100	170	$\mu\text{A}$	1
Current consumption at shut-down mode	$I_{DD-S}$		0.01	0.2	$\mu\text{A}$	2
High level output voltage	$V_{OH}$	$V_{DD}$			V	3
Low level output voltage	$V_{OL}$			0.5	V	4
Rise time	$t_r$			0.4	$\mu\text{s}$	5
Fall time	$t_f$			0.4	$\mu\text{s}$	5
Low level pulse width	$t_w$	1.0		3.0	$\mu\text{s}$	5
Reception distance	L			20	cm	5
Input irradiance	Ee			9.0	$\mu\text{W}/\text{cm}^2$	5
Receiver latency	tl		30	500	$\mu\text{s}$	
Receiver wakeup time	tsdw		60	500	$\mu\text{s}$	6
Radiant intensity	$I_E$	3.6		25	$\text{mW}/\text{sr}$	7
LED peak current	$I_{LED}$	16	20	26	mA	7
Rise time	$t_r$			0.6	$\mu\text{s}$	8
Fall time	$t_f$			0.6	$\mu\text{s}$	8
Peak emission wavelength	$\lambda_p$		870		nm	

### NOTES:

- No input signal,  $V_{ILSD} = 0\text{ V}$ . Output terminal open.
- No input signal,  $V_{IHSD} = V_{DD}$ . Output terminal open.  $V_{DD} = 3.3\text{ V}$ .
- $I_{OH} = 20\text{ }\mu\text{A}$ . See Figures 9, 10, and 11.
- BR = 115.2 kbps,  $\phi \leq 15^{\circ}$ . See Figures 9, 10, and 11.
- BR = 115.2 kbps,  $\phi \leq 15^{\circ}$ ,  $T_{OPR} = 25^{\circ}\text{C}$ . See Figures 9, 10, and 11.
- No input signal.
- BR = 115.2 kbps,  $\phi \leq 15^{\circ}$ ,  $T_{OPR} = 25^{\circ}\text{C}$ .  $V_{DD} = V_{LEDA} = 3.3\text{ V}$ .  $V_{IHTXD} = 2.8\text{ V}$ . See Figures 12, 13, and 14.
- BR = 115.2 kbps. See Figures 12, 13, and 14.

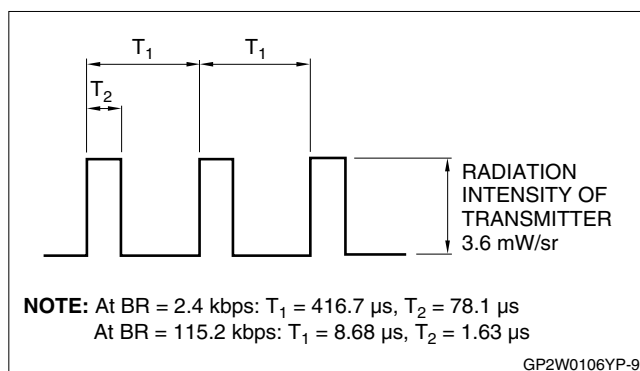


Figure 9. Input Signal Waveform (Detector Side)

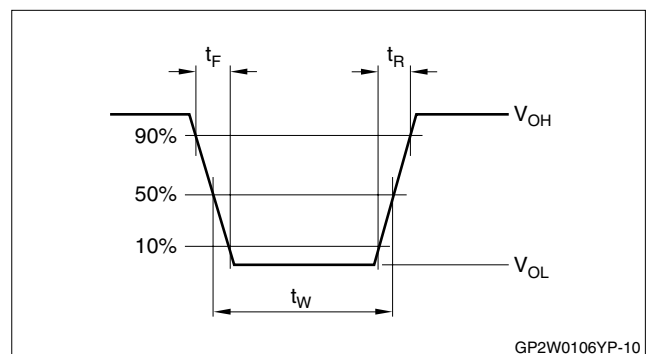


Figure 10. Output Waveform (Detector Side)

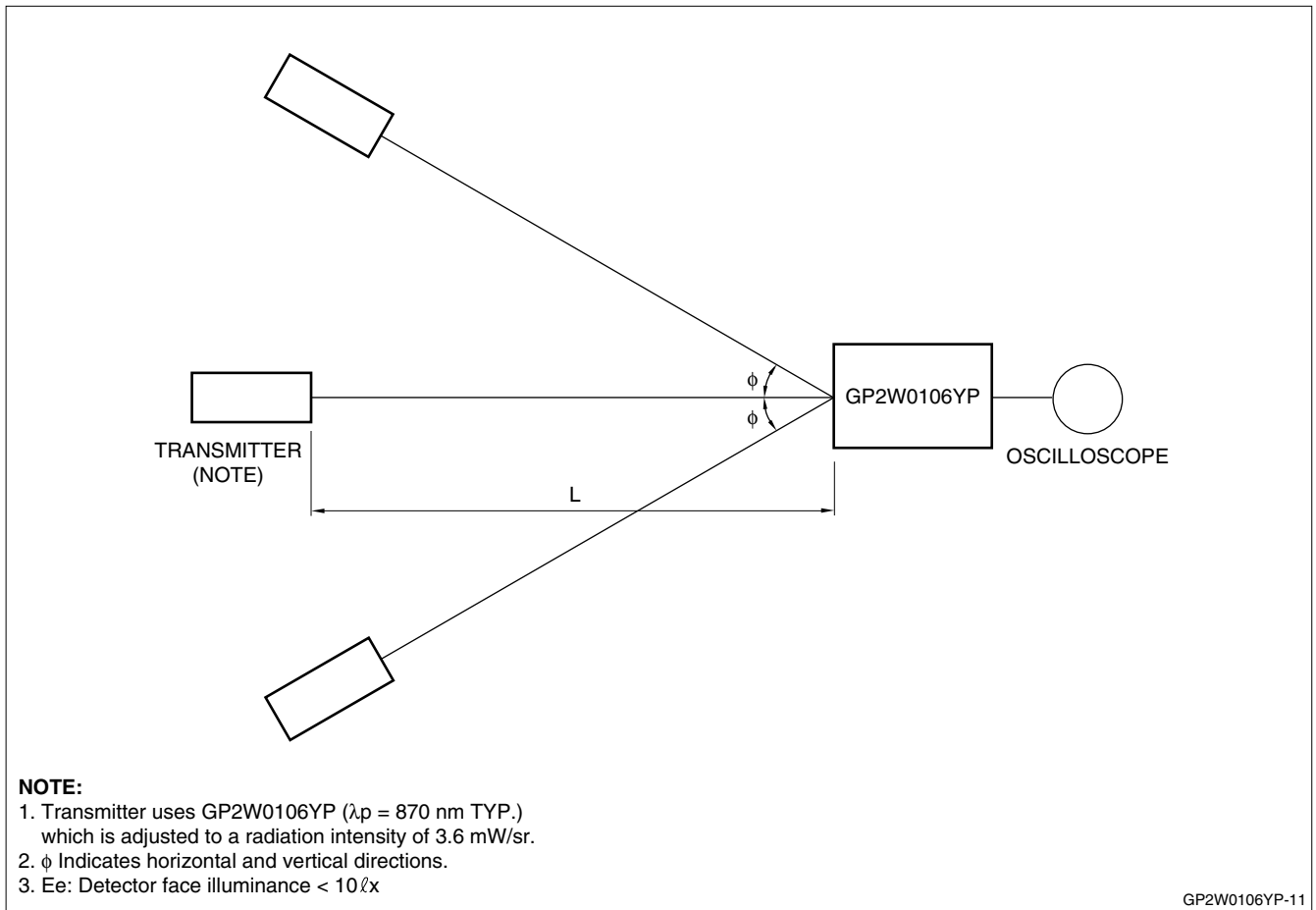


Figure 11. Standard Optical System (Detector Side)

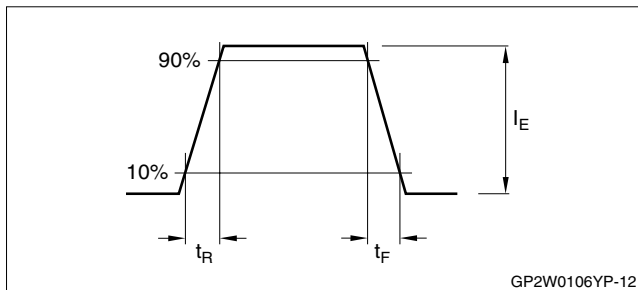


Figure 12. Output Waveform Specification (Emitter Side)



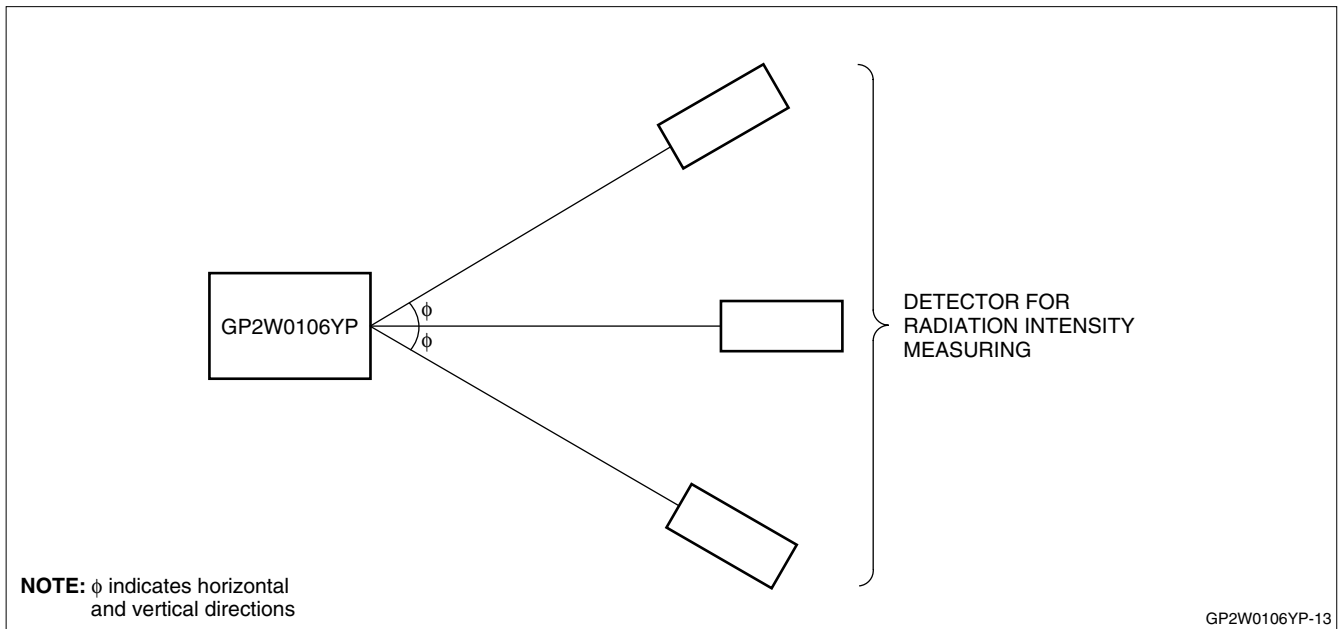


Figure 13. Standard Optical System (Emitter Side)

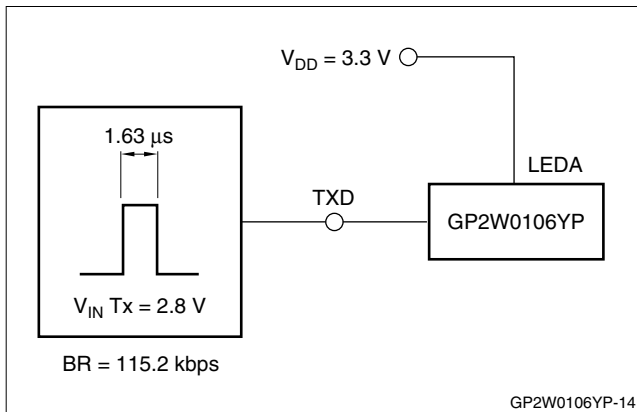


Figure 14. Recommended Circuit (Emitter Side)

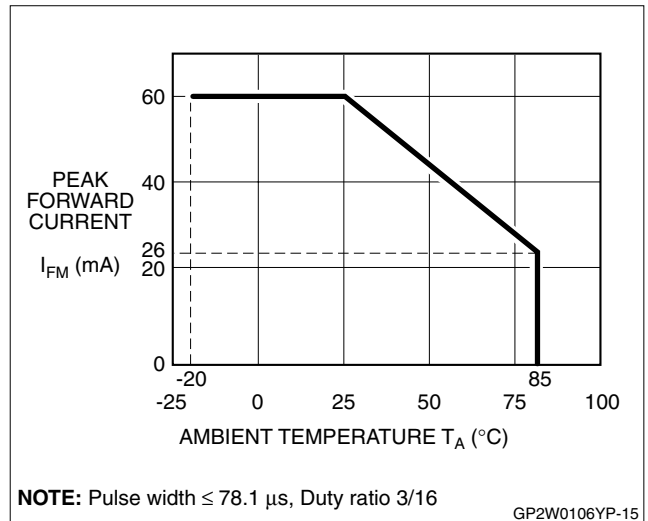


Figure 15. Peak Forward Current Versus Ambient Temperature

## RELIABILITY

TEST ITEMS	TEST CONDITIONS	FAILURE JUDGEMENT CRITERIA	SAMPLES (n)	DEFECTIVE (c)	NOTES
Temperature cycling	1 cycle -20°C to 85°C (30 minutes at each extreme) 20 cycles test	$I_{DD} > U_p \times 1.2$ $L < Low \times 0.8$ $I_E < Low \times 0.8$ $I_E > U_p \times 1.2$  Up: Upper Specification Limint  Low: Lower Specification Limint	n = 22	c = 0	1
High temperature and high humidity storage	+40°C, 90% RH, 240 hours		n = 22	c = 0	1
High temperature storage	+85°C, 240 hours		n = 22	c = 0	1
Low temperature storage	-30°C, 240 hours		n = 22	c = 0	1
Operation life 1	+25°C, $V_{DD} = 3.3$ V, 240 hours		n = 11	c = 0	1
Operation life 2	+25°C, $V_{DD} = LEDA = 3.3$ V, 240 hours, Pulse width 78.1 $\mu$ s, Duty ratio 3/16		n = 11	c = 0	
Mechanical shock	1,000 $m/s^2$ , 6 ms, 3 times/ $\pm X$ , $\pm Y$ , $\pm Z$ direction		n = 11	c = 0	
Variable frequency vibration	200 $m/s^2$ , 100 to 2,000 to 100 Hz for approximately 4 minutes 48 minutes/ $X$ , $Y$ , $Z$ direction		n = 11	c = 0	
Reflow solder head	230°C, 5 s.		n = 11	c = 0	2

## NOTES:

- The sample to be tested shall be left at normal temperature and humidity for 2 hours after it is taken out of the chamber. No dew point.
- Refer to the 'Precautions for Soldering' section for temperature profile.

## OUTGOING INSPECTION

- Inspection lot: Inspection shall be carried out per each delivery lot.
- Inspection method: A single sampling plan, normal inspection level two based on ISO 2859 shall be adopted.

**Table 2. Outgoing Inspection**

PARAMETER	INSPECTION ITEMS AND TEST METHOD	AQL(%)
Major defect	Disconnection, short	0.1
	Inverse polarity on terminal	0.1
	Soldering defect (obstacle to use)	0.1
	Electrical characteristic defect	0.1
Minor defect	Appearance defect which affects the electrical characteristics such as, split, chip, scratch, stain, or blur	0.25

## PRECAUTIONS FOR SOLDERING

### Solder Reflow

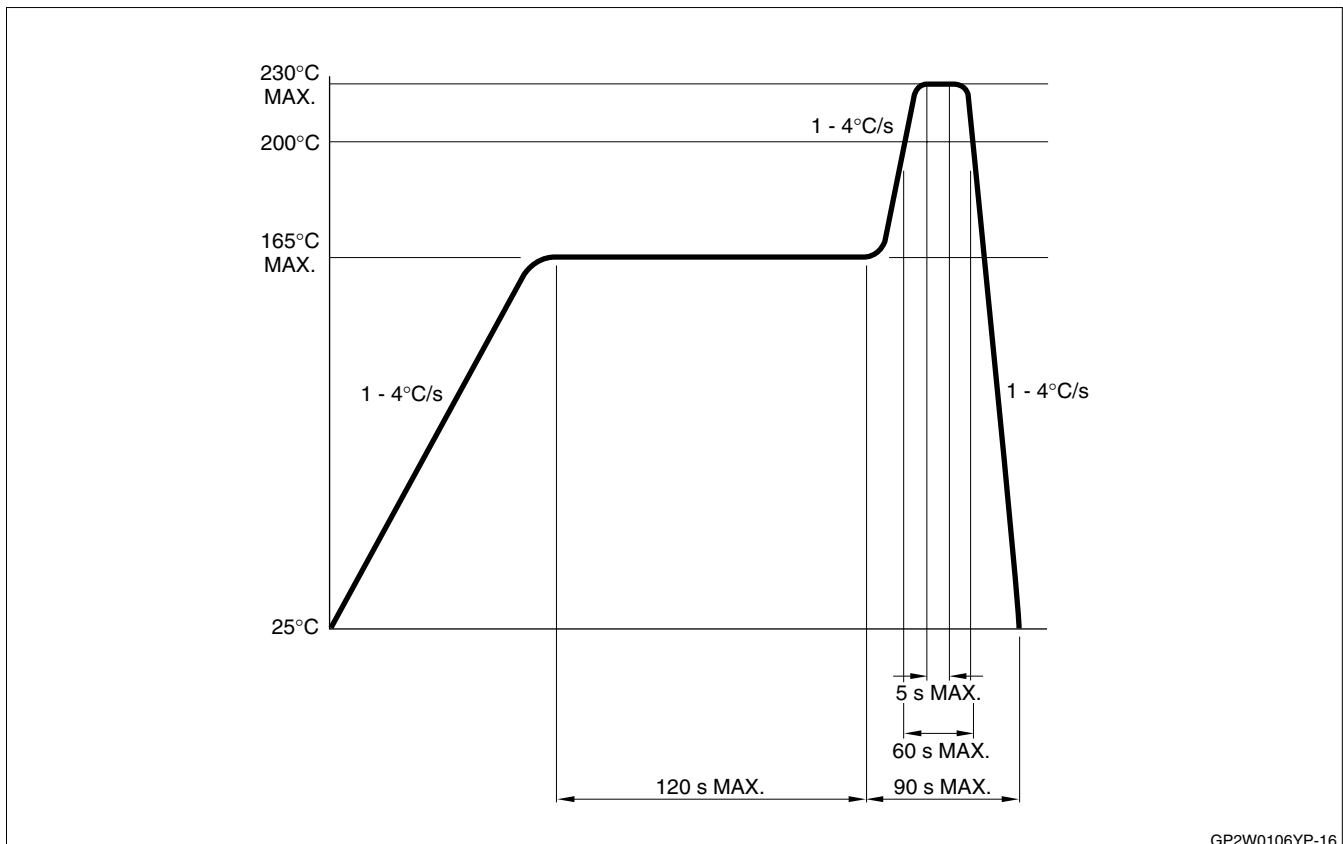
Solder only once at the temperature and the time within the temperature profile as shown in Figure 16.

### Other Precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin. Keep the package temperature within that specified in Figure 16. Also avoid immersing the resin part in the solder. Even if within the temperature profile shown in Figure 16, there is the possibility that the gold wire in the package may break if the deformation of the PCB affects the lead pins. Use after fully confirming the conditions of actual solder reflow machine.

### Soldering

- Soldering iron shall be less than 25 W, and temperature of soldering iron point shall be used at less than 260°C.
- Soldering time shall be within 5 seconds.
- Soldered product shall treat at normal temperature.
- Solder: 6/4 solder or included Ag solder.



**Figure 16. Temperature Profile**

GP2W0106YP-16

## TAPING SPECIFICATIONS

### Taping Method

- Taping structure and dimensions: The tape should have a structure in which a cover tape is sealed heat-pressed on the carrier tape of conductive PET. See Figure 17.
- Reel structure and dimensions: The taping reel should be conductive plastic with its dimensions as shown in Figure 18.
- Direction of product insertion: Product direction in carrier tape should be such that electrode side of product is placed on the cover tape side and lens side of product is placed on the hold side of the tape. See Figure 19.
- Taped device repair: To repair taped device failure, cut the bottom of carrier tape with a cutter, and after replacing with good devices, seal the cut portion with adhesive tape.
- Adhesiveness of cover tape: The exfoliation force between carrier tape and cover tape should be 0.2 N to 1 N for the angle from 160° to 180°.
- Rolling method and quantity: Wind the tape back on the reel so that the cover tape is on the outside. Attach more than 20 cm of blank tape to the trailer and the leader of the tape and fix both ends with adhesive tape. One reel shall contain 2,000 pieces.
- Safety protection during shipping: There should be no deformation of component or degradation of electrical characteristics due to shipping.

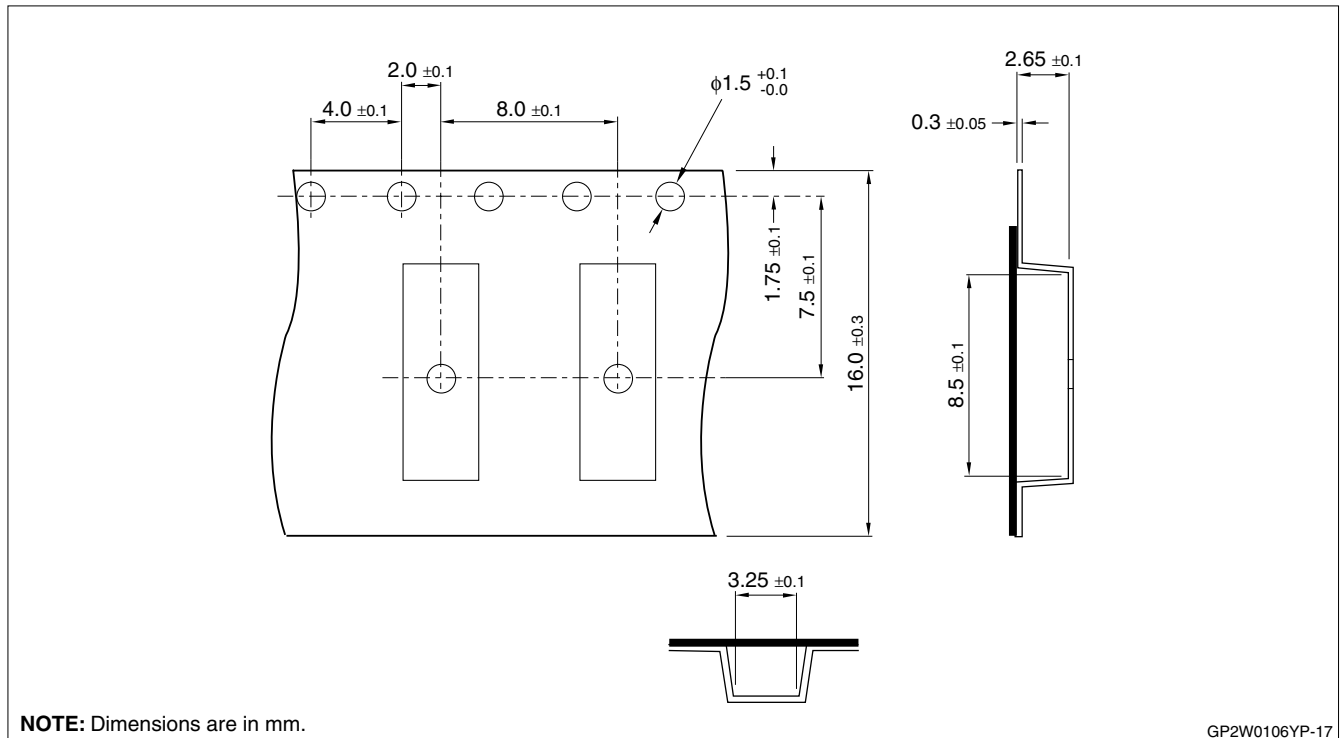
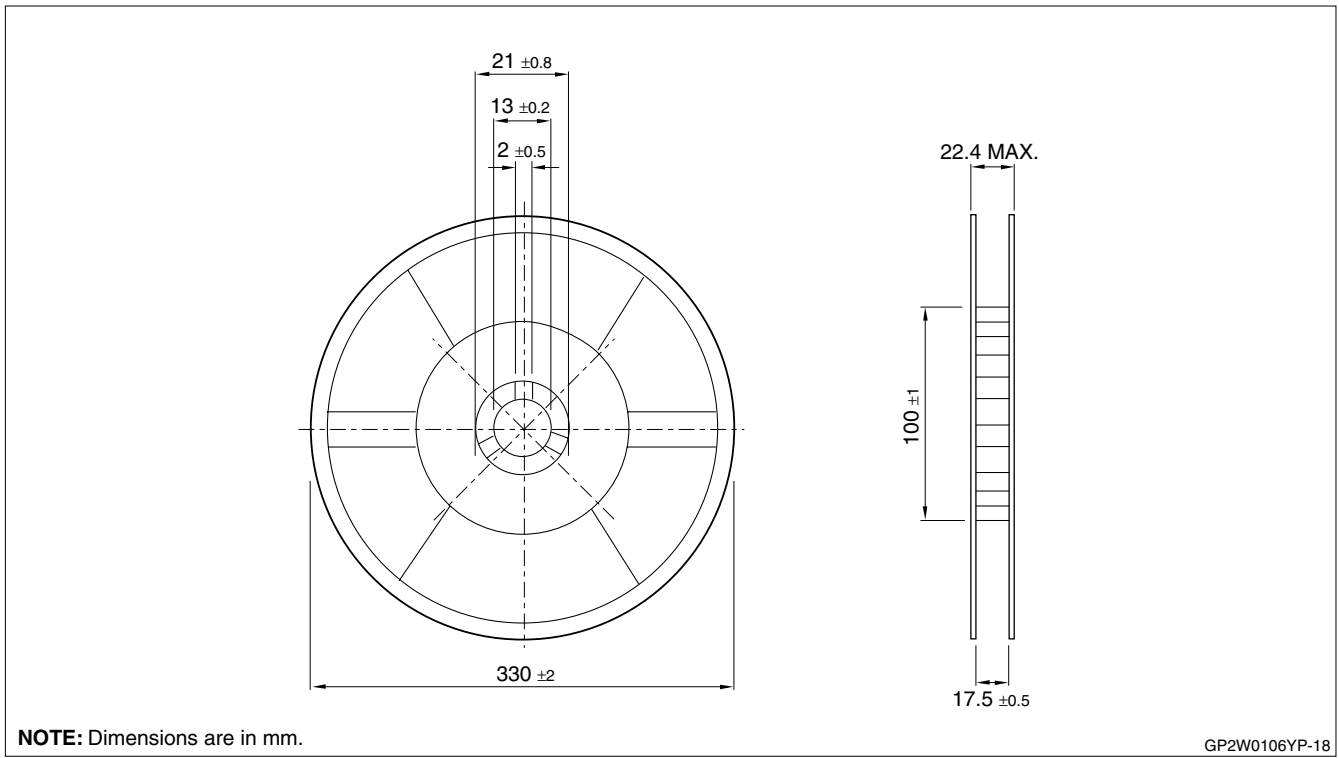
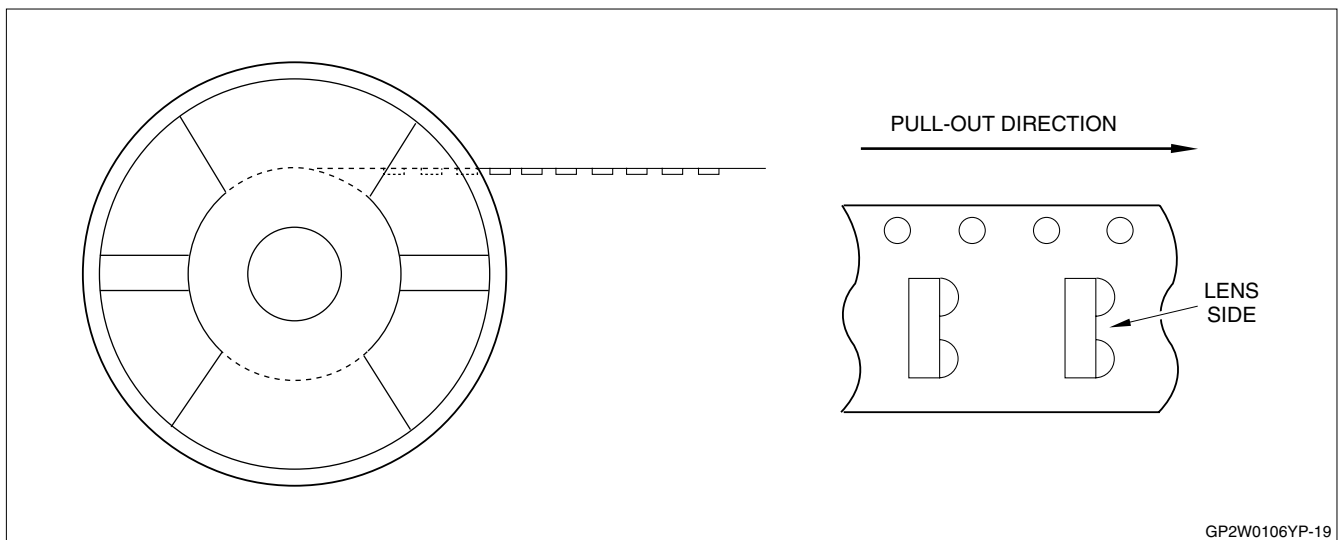


Figure 17. Tape Structure and Dimensions



**Figure 18. Reel Structure and Dimensions**



**Figure 19. Direction of Product Insertion**

## TAPING MOISTURE-PROOF PACKING

### Packaging Specifications

**Table 3. Packaging Material**

NAME	MATERIAL
Aluminum laminate bag	Aluminum polyethylene
Label	Paper
Siccative	
Outer case	Paper
Pads	Paper

### Packaging Method

- Seal the aluminum laminated bag containing the tape reel (2,000 pieces per reel) and siccative.
- Fill out necessary information on the label and paste it on the aluminum laminate bag.
- Pack four aluminum laminated bags (containing one reel each) into the designated outer case, where paper pads are placed on the bottom and top of the outer case, as well as between each layer of the aluminum laminated bags. Minimum order/shipment quantity should be one laminated bag.
- The outer case should then be sealed with packing tape, with indicating the model name, quantity, and outgoing inspection data on the case. Total of 8,000 pieces per carton.

**Table 4. Packaging Method Specifications**

PACKAGE SHAPE	PRODUCT	QUANTITY	SACK QUANTITY
Tape reel (φ 330 mm)	1 model	2,000 pieces per reel	1 reel per moisture-proof laminated bag

### Storage and Treatment After Unsealing

- Storage conditions: The product should be stored with these conditions:
  - Storage temperature: 10°C to 30°C
  - Humidity: below 60% RH
- Treatment after opening:
  - After unsealing, devices should be mounted under the temperature condition of 10°C to 30°C, at the humidity conditions of below 60% RH, within two days.
  - In case long term storage is needed, devices should either be stored in dry box or re-sealed in a moisture-proof bag with siccative and kept in an environment where the temperature is 10°C to 30°C, at the humidity condition of below 60% RH. Devices must be mounted within two weeks.
- Baking before mounting:
  - In the event that the devices are not maintained in the recommended storage conditions or the enclosed siccative indicator has turned pink, baking must be done before devices are mounted. Please also note that baking should only be done once.
  - Recommended condition: 100°C, 12 to 24 hours.
  - Baking will not be properly done with the devices in their shipping package. To complete the baking properly, devices should either be temporarily mounted to PCB with adhesive, or placed in a metal tray. The temporary mounting should be done using adhesive, not by soldering.

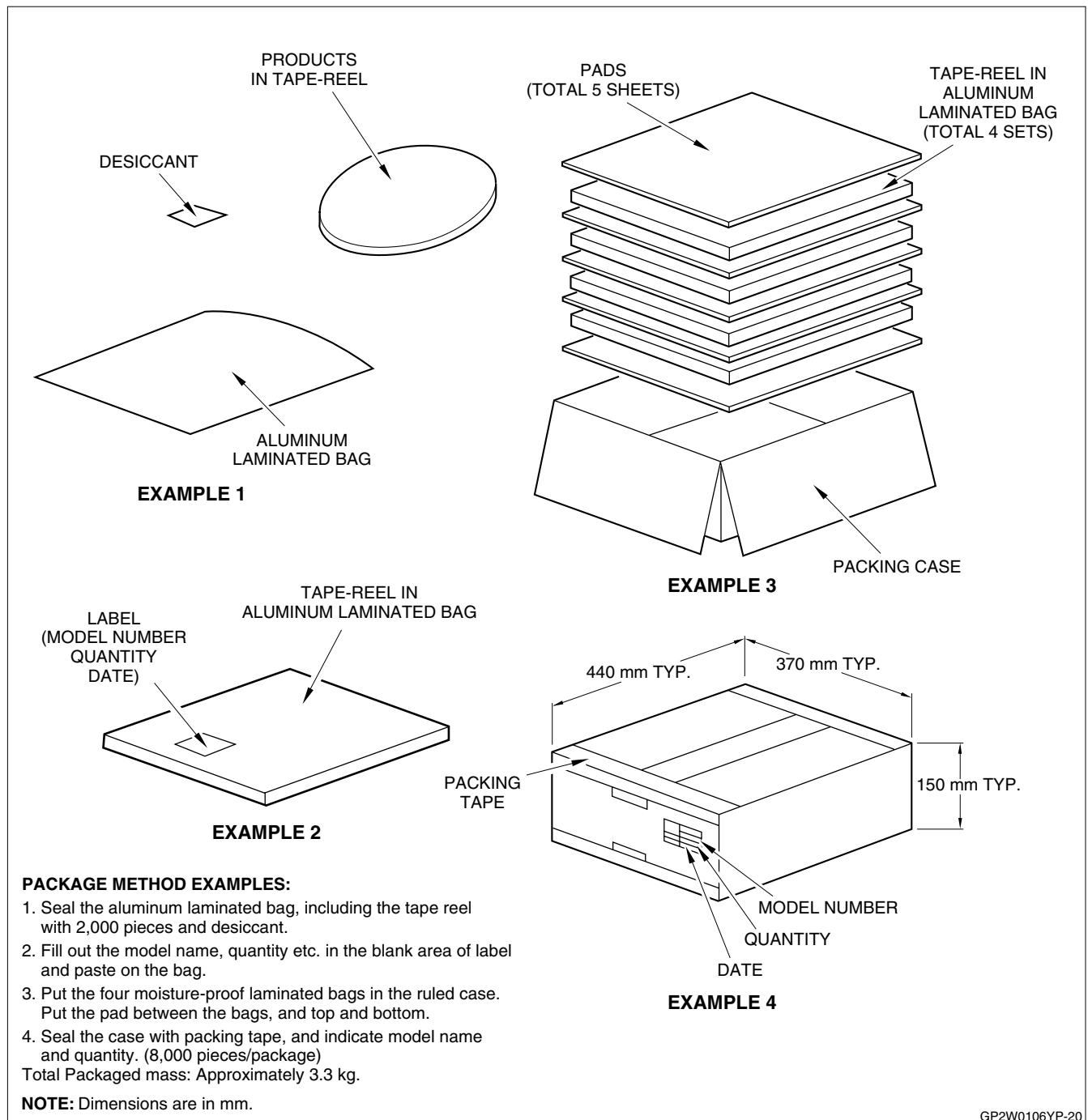


Figure 20. Packing Specification

**LIFE SUPPORT POLICY**

SHARP components should not be used in medical devices with life support functions or in safety equipment (or similiar applications where component failure would result in loss of life or physical harm) without the written approval of an officer of the SHARP Corporation.

**LIMITED WARRANTY**

SHARP warrants to its Customer that the Products will be free from defects in material and workmanship under normal use and service for a period of one year from the date of invoice. Customer's exclusive remedy for breach of this warranty is that SHARP will either (i) repair or replace, at its option, any Product which fails during the warranty period because of such defect (if Customer promptly reported the failure to SHARP in writing) or, (ii) if SHARP is unable to repair or replace, refund the purchase price of the Product upon its return to SHARP. This warranty does not apply to any Product which has been subjected to misuse, abnormal service or handling, or which has been altered or modified in design or construction, or which has been serviced or repaired by anyone other than Sharp. The warranties set forth herein are in lieu of, and exclusive of, all other warranties, express or implied. ALL EXPRESS AND IMPLIED WARRANTIES, INCLUDING THE WARRANTIES OF MERCHANTABILITY, FITNESS FOR USE AND FITNESS FOR A PARTICULAR PURPOSE, ARE SPECIFICALLY EXCLUDED. In no event will Sharp be liable, or in any way responsible, for any incidental or consequential economic or property damage.

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