

SHARP

IrDA Data Sheet

GP2W0001YP

115 kbps Transceiver

FEATURES

- Built-in Photodiode
- Operating voltage 2.7 V to 5.5 V
- In circuit design, allow for the degradation of light emitting diode output that results from long continuous operation (50% degradation/5 years).
- This product shall not contain the following materials, and these materials shall not be used in the production process for this product.
 - CFCs
 - Halon
 - Carbon Tetrachloride
 - 1.1.1. Trichloroethane (Methylchloroform)
 - Specific brominated flame retardants such as the PBBOs and PBBs 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 0.5 ms or more that is specified by IrDA. This turn around time means the time that this device temporarily does not detect the incoming signal, since the transmitted light from the transmitter side reaches the detector side of the same transceiver.

- Consider that 20 ms or more (at $T_A = 25^\circ\text{C}$, 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 the desired signal output may be generated as noise on the 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 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.

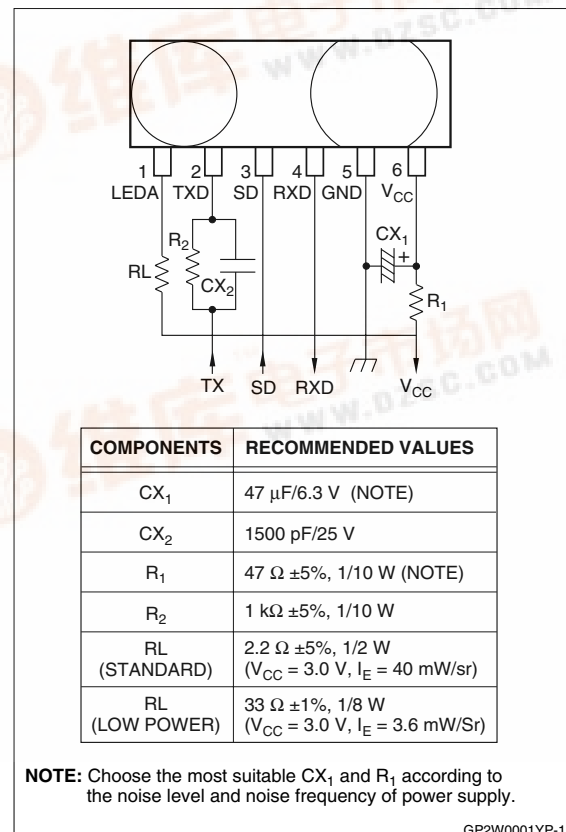


Figure 1. Recommended External Circuit

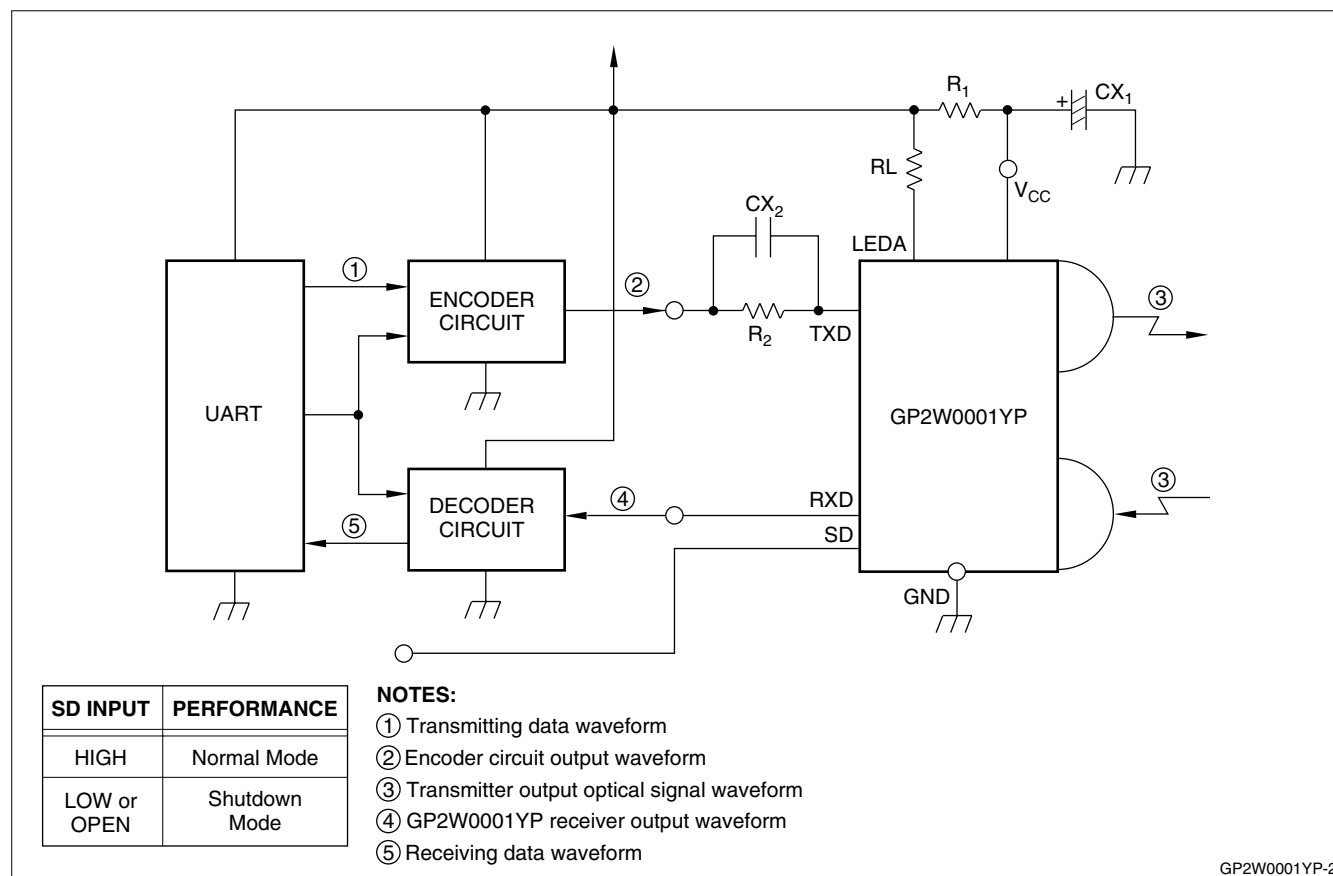


Figure 2. System Example

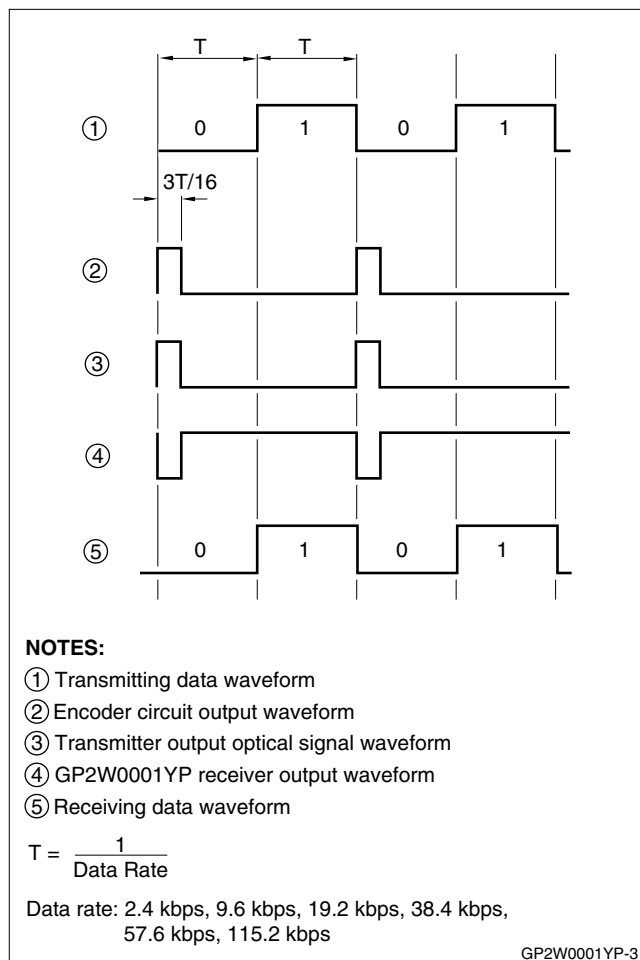


Figure 3. Signal Waveform Example

Recommended Size of Solder Cream Paste

Open the solder mask as shown in Figure 4. The size of solder cream paste for this device before reflow soldering must be as large as the foot pattern landings.

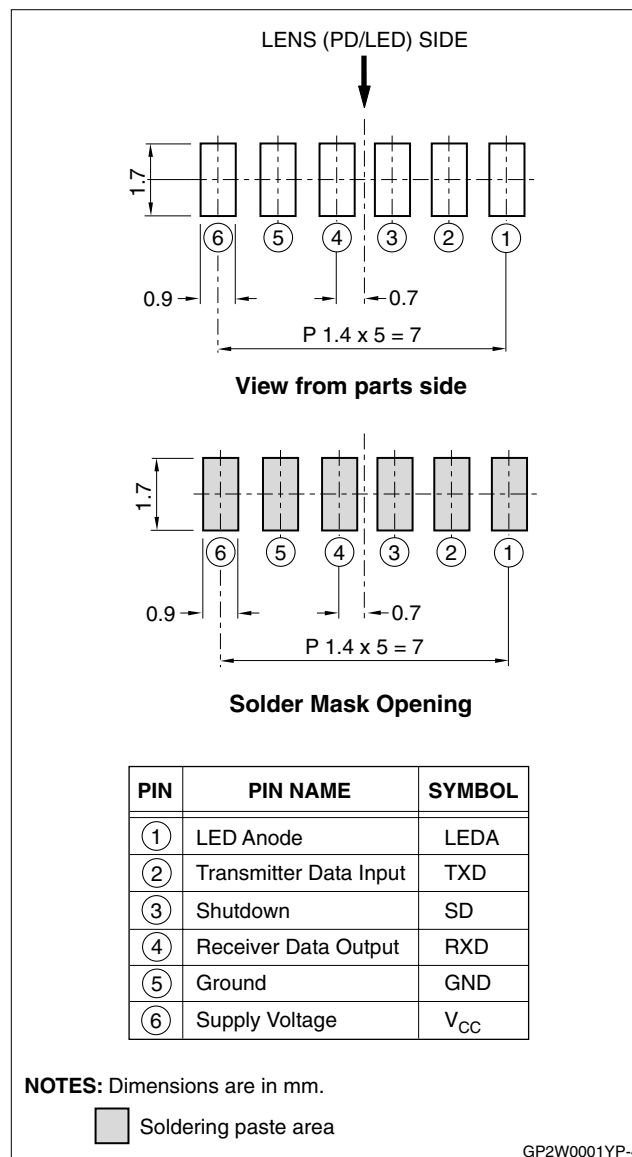
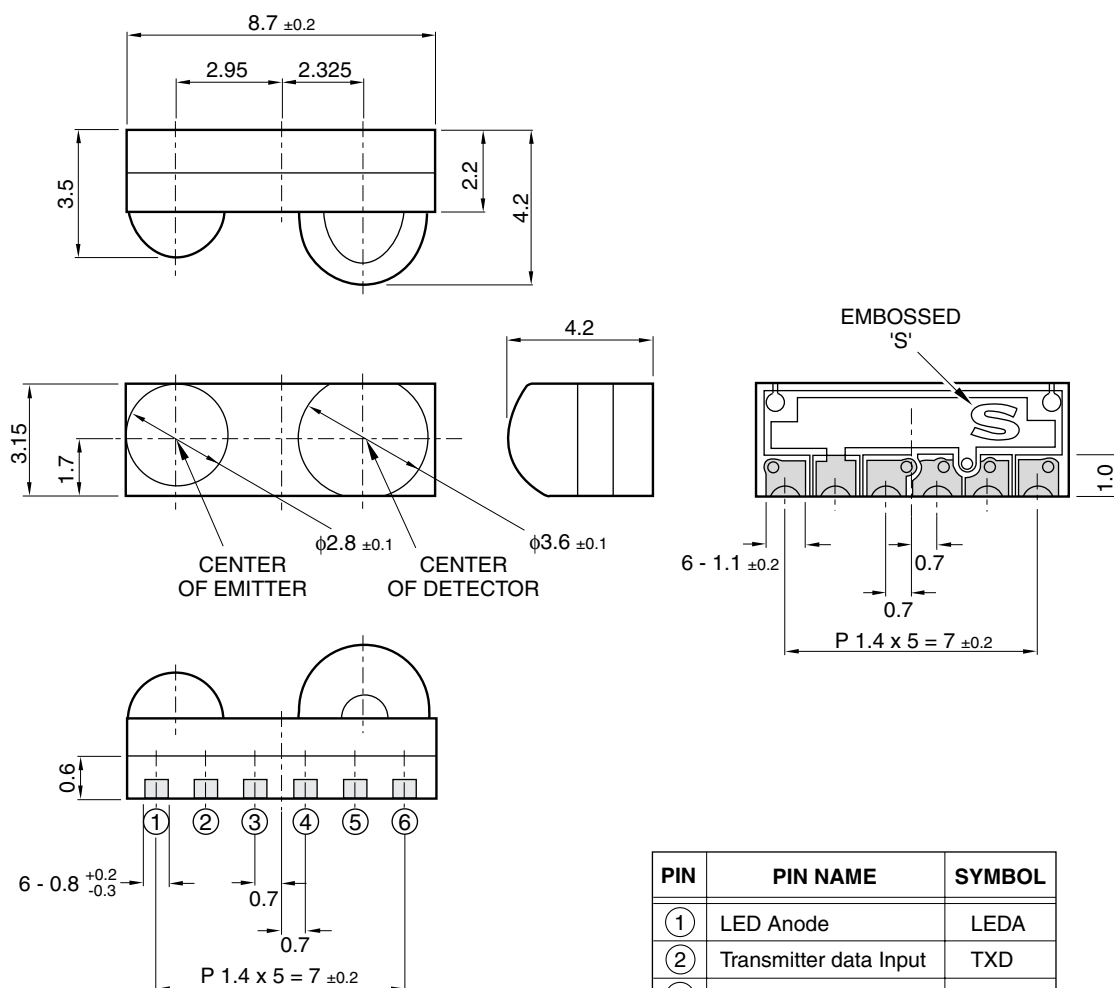



Figure 4. Foot Pattern and Solder Cream Paste Size

**NOTES:**

1. Dimensions are in mm.
2. Unspecified tolerances are ± 0.3 mm.
3. Adhesion of resin to the terminal area are allowed MAX. 0.3 mm.
4. Resin burr are not included in this outline drawing.
5. Product mass: Approx. 0.12 g
6. Mold resin: Epoxy resin (black)

 area: Au plating

PIN	PIN NAME	SYMBOL
①	LED Anode	LEDA
②	Transmitter data Input	TXD
③	Shutdown	SD
④	Receiver Data Output	RXD
⑤	Ground	GND
⑥	Supply Voltage	V _{CC}

Figure 5. GP2W0001YP Outline Dimensions

RATINGS AND CHARACTERISTICS**Absolute Maximum Ratings**

PARAMETER	SYMBOL	RATINGS	UNIT	NOTES
Supply voltage	V_{CC}	0 to 6.0	V	
Forward current	I_F	50	mA	
Peak forward current	I_{FM}	500	mA	1
Operating temperature	T_{OPR}	-10 to +70	°C	
Storage temperature	T_{STG}	-20 to +85	°C	
Soldering temperature	T_{SOL}	230	°C	2

NOTES:

1. Pulse width: 78.1 μ s. Duty ratio: 3/16.
2. Soldering reflow time: 5 seconds.

Recommended Operating Conditions

PARAMETER	SYMBOL	OPERATING CONDITION	UNIT
Supply voltage	V_{CC}	2.7 to 5.5	V
Data rate	BR	2.4 to 115.2	kbps
Shutdown circuit high level input voltage	V_{IHSD}	$V_{CC} - 0.6$ to V_{CC}	V
Shutdown circuit low level input voltage	V_{ILSD}	0.0 to 0.4 or Open	V
Logic high transmitter input voltage*	V_{IHTXD}	2.4 to V_{CC}	V
Logic low receiver input voltage*	V_{ILTXD}	0.0 to 0.4	V

NOTES: *Recommended circuit of emitter side.

Electrical Characteristics

$T_A = -25^\circ\text{C}$, $V_{CC} = 5\text{ V}$ unless otherwise specified

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTES
Current consumption at no input signal	I_{CC1}		1.0	1.4	mA	1
	I_{CC2}		0.7	1.0	mA	2
Current consumption at shut-down mode	I_{CC1-S}		0.5	1.0	μA	3
	I_{CC2-S}		0.3	1.0	μA	4
High level output voltage	V_{OH1}	4.5			V	5
	V_{OH2}	2.5			V	6
Low level output voltage	V_{OL1}			0.6	V	7
	V_{OL2}			0.6	V	8
Low level pulse width	t_w	0.8		8.0	μs	9
Rise time	t_r			1.2	μs	9
Fall time	t_f			0.2	μs	9
Maximum reception distance	L	1			m	10
Radiant intensity	I_E	40		350	mW/Sr	11
Peak emission wavelength	λ_p	850	870	900	nm	11

NOTES:

1. $V_{CC} = 5\text{ V}$, no input signal, output terminal open, $V_{IHSD} = V_{CC} - 0.6\text{ V}$.
2. $V_{CC} = 3\text{ V}$, no input signal, output terminal open, $V_{IHSD} = V_{CC} - 0.6\text{ V}$.
3. $V_{CC} = 5\text{ V}$, SD terminal open.
4. $V_{CC} = 3\text{ V}$, SD terminal open.
5. $V_{CC} = 5\text{ V}$.
6. $V_{CC} = 3\text{ V}$.
7. $V_{CC} = 5\text{ V}$, $I_{OL} = 400\text{ }\mu\text{A}$.
8. $V_{CC} = 3\text{ V}$, $I_{OL} = 400\text{ }\mu\text{A}$. See Figures 6, 7, and 8.
9. BR = 115.2 kbps. See Figures 6, 7, and 8.
10. V_{OH} , V_{OL} , t_w , t_r , t_f shall be satisfied at $\phi \leq 15^\circ$. See Figures 6, 7, and 8.
11. BR = 115.2 kbps, $\phi \leq 15^\circ$, $V_{CC} = 3\text{ V}$, $R_L = 2.2\text{ }\Omega$, $V_{INTX} = 2.7\text{ V}$, $R_2 = 1\text{ k}\Omega \pm 5\%$, $CX_2 = 1,500\text{ pF}$. See Figures 9, 10, and 11.

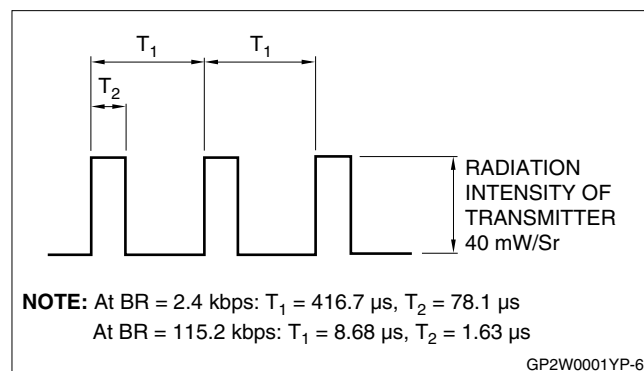


Figure 6. Input Signal Waveform (Detector Side)

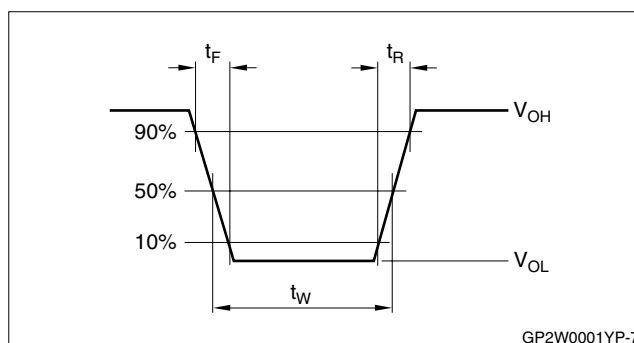


Figure 7. Output Waveform (Detector Side)

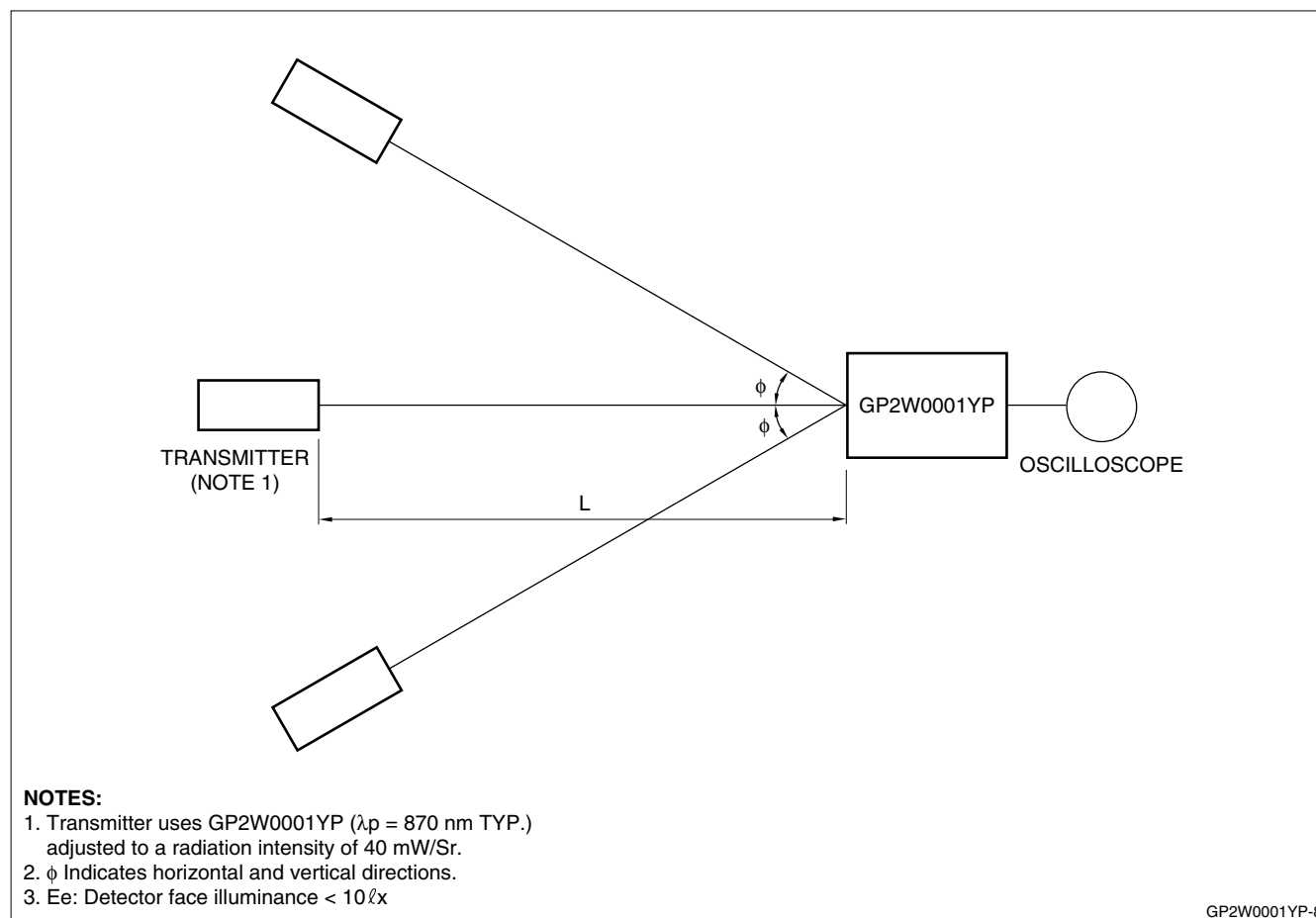


Figure 8. Standard Optical System (Detector Side)

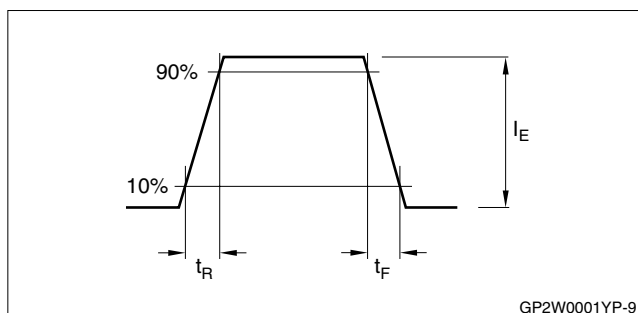


Figure 9. Output Waveform Specification (Emitter Side)

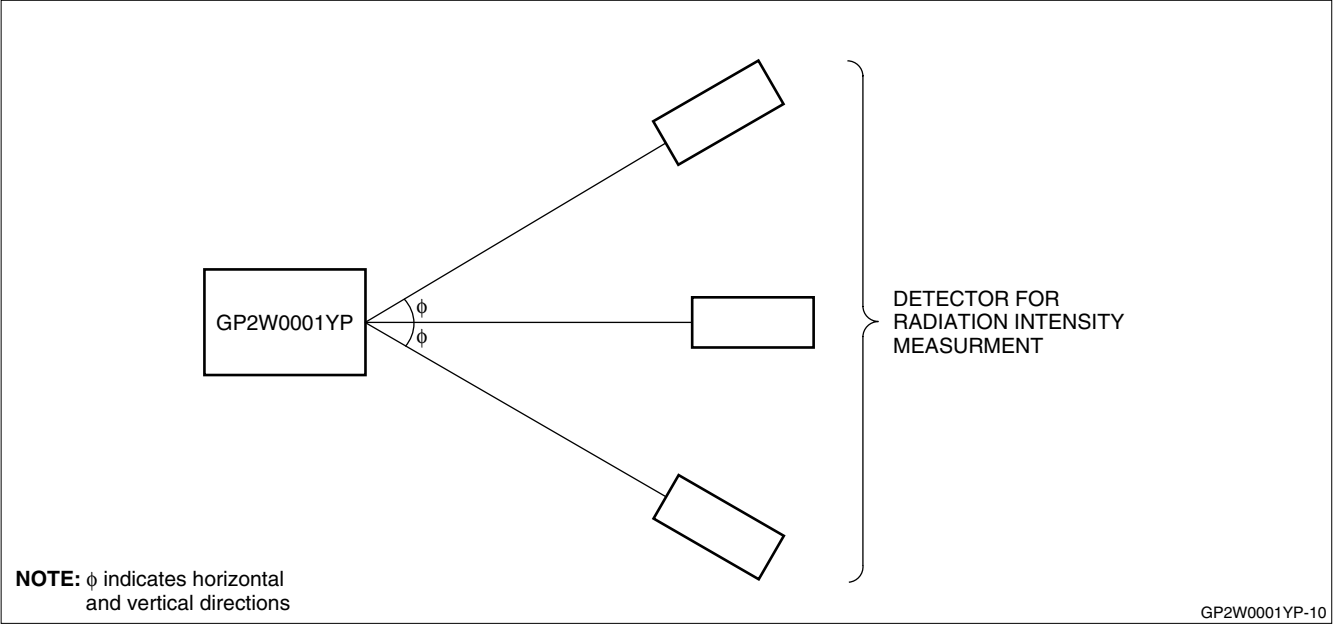


Figure 10. Standard Optical System (Emitter Side)

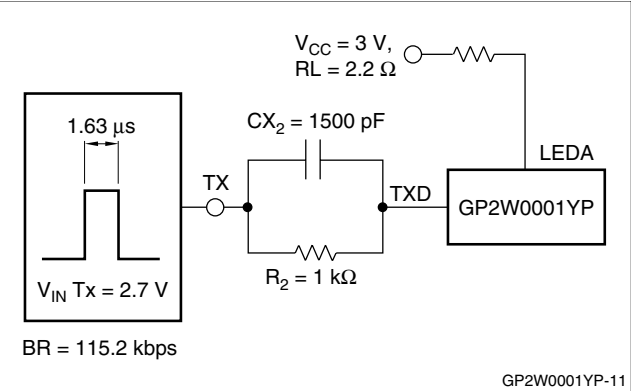


Figure 11. Recommended Circuit (Emitter Side)

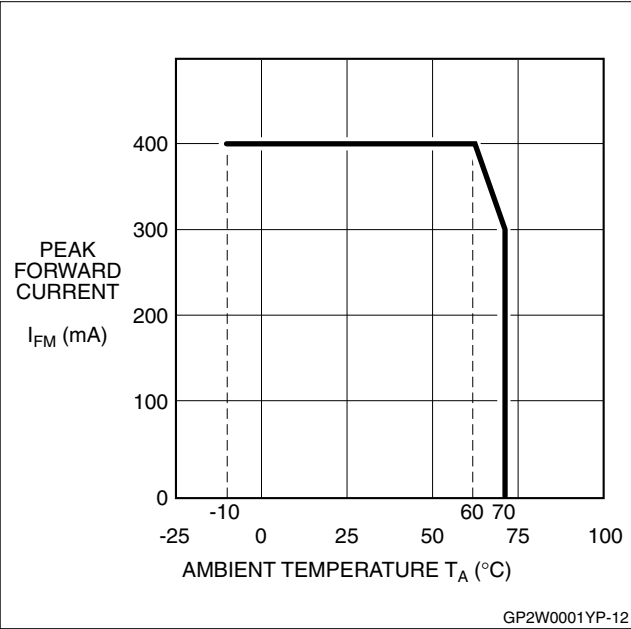


Figure 12. Peak Forward Current Versus Ambient Temperature

RELIABILITY¹

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	$I_{CC1} > U_p \times 1.2$ $I_{CC2} > U_p \times 1.2$ $L < Low \times 0.8$ Judgement of Criteria: $V_{OH1} < Low \times 0.8$ $V_{OH2} < Low \times 0.8$ $V_{OL1} > U_p \times 1.2$ $V_{OL2} > U_p \times 1.2$ $tw_1 > U_p \times 1.2$ $tw_1 < Low \times 0.8$ $tw_2 > U_p \times 1.2$ $tw_2 < Low \times 0.8$ $tr > U_p \times 1.2$ $tf > U_p \times 1.2$ Up: Upper Specification Limit Low: Lower Specification Limit	n = 22	c = 0	2
High temperature and high humidity storage	+40°C, 90% RH, 240 hours		n = 22	c = 0	2
High temperature storage	+85°C, 240 hours		n = 22	c = 0	2
Low temperature storage	-20°C, 240 hours		n = 22	c = 0	2
Operation life 1	+25°C, $V_{CC} = 5\text{ V}$, 240 hours		n = 11	c = 0	2
Operation life 2	+25°C, $I_{FM} = 400\text{ mA}$, 240 hours, Pulse width 78.1 μs , 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 heat	230°C, 5 s.		n = 11	c = 0	3

NOTES:

- Confidence level 90%, LTPD 10%/20%.
- 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.

INCOMING 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 1. Incoming 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 13.

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 13. Also avoid immersing the resin part in the solder. Even if within the temperature profile shown in Figure 13, 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 3 seconds.
- Soldered product shall treat at normal temperature.
- Solder: 6/4 solder or included Ag solder.

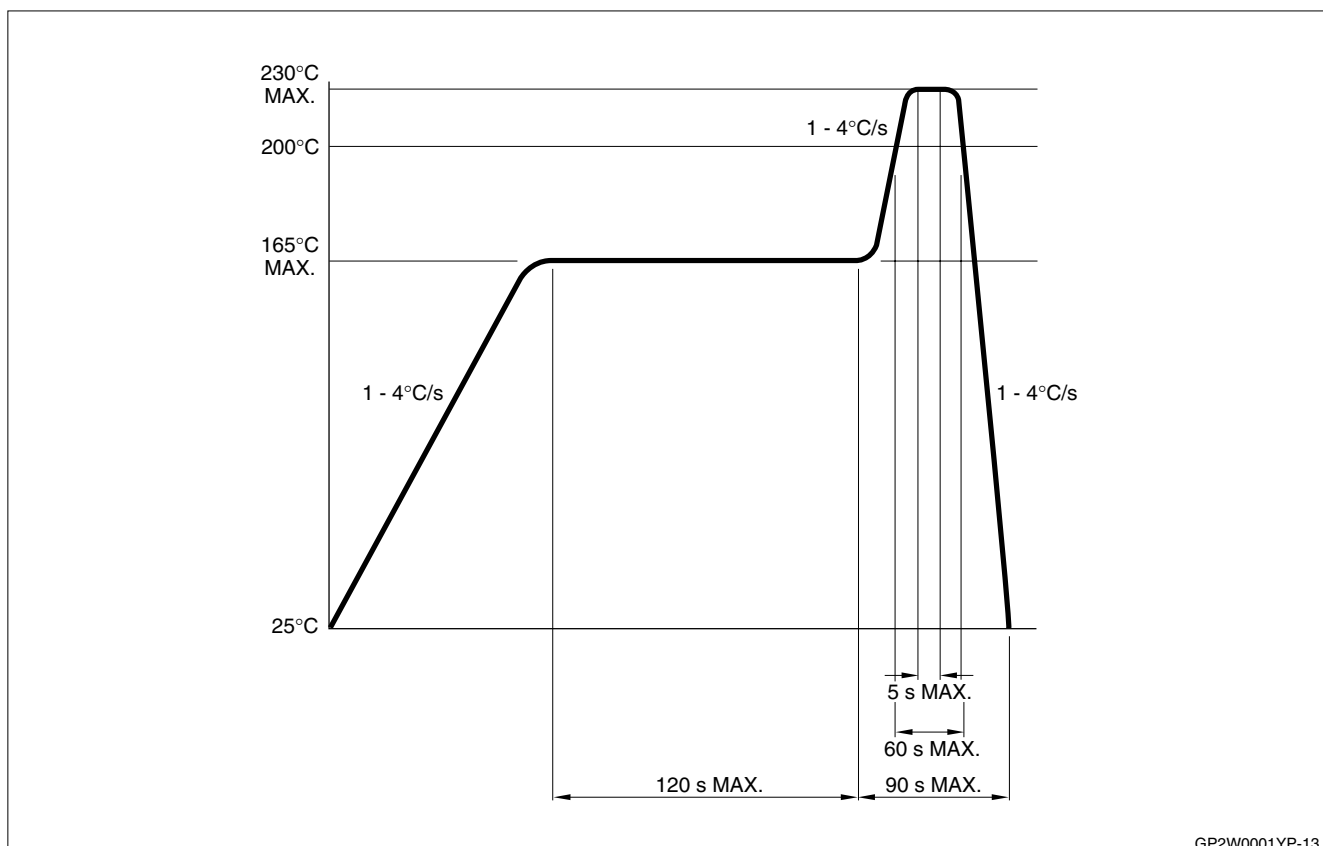
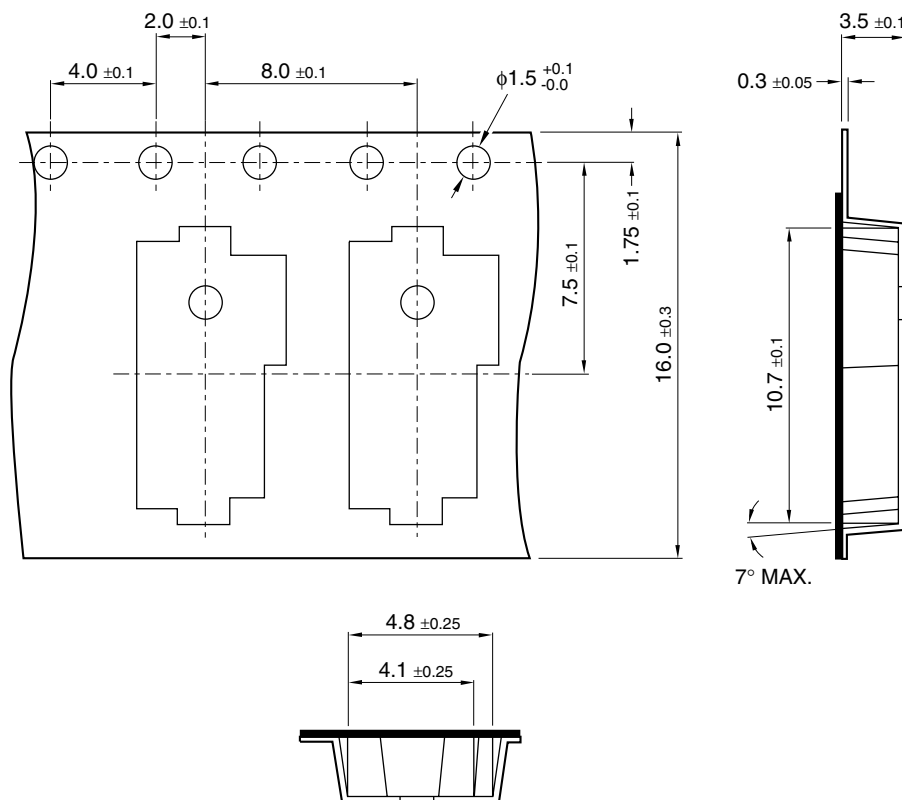


Figure 13. Temperature Profile

TAPING SPECIFICATIONS

Taping Method

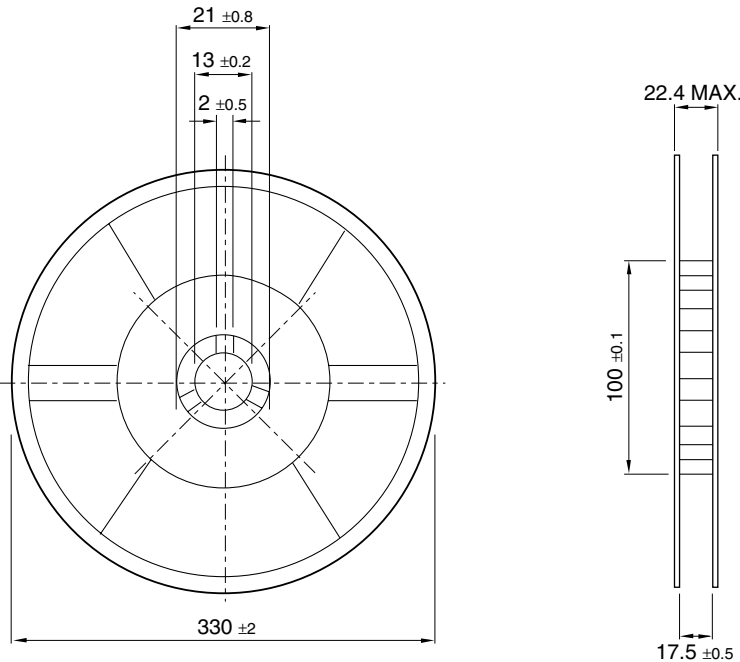
- Taping structure and dimensions: The tape should have a structure in which a cover tape is sealed by using heat-pressed on the carrier tape of conductive PET. See Figure 14.
- Reel structure and dimensions: The taping reel should be conductive plastic with its dimensions as shown in Figure 15.
- Direction 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 16.
- 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.



NOTE: Dimensions are in mm.

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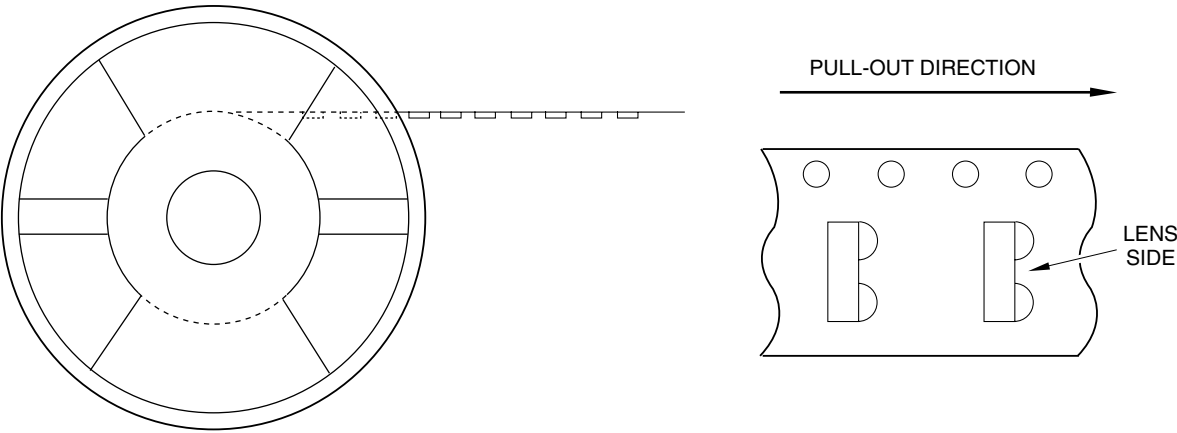
Figure 14. Tape Structure and Dimensions



NOTE: Dimensions are in mm.

GP2W0001YP-15

Figure 15. Reel Structure and Dimensions



GP2W0001YP-16

Figure 16. Direction of Product Insertion

TAPING MOISTURE-PROOF PACKING

Packaging Specifications

Table 2. Packaging Material

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

Packaging Method

- Seal the aluminum laminated bag containing the tape reel (2,000 pieces per reel) and desiccant.
- 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, indicating the model name, quantity, and outgoing inspection data on the case. Total of 8,000 pieces per carton.

Table 3. 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 desiccant 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 desiccant 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.

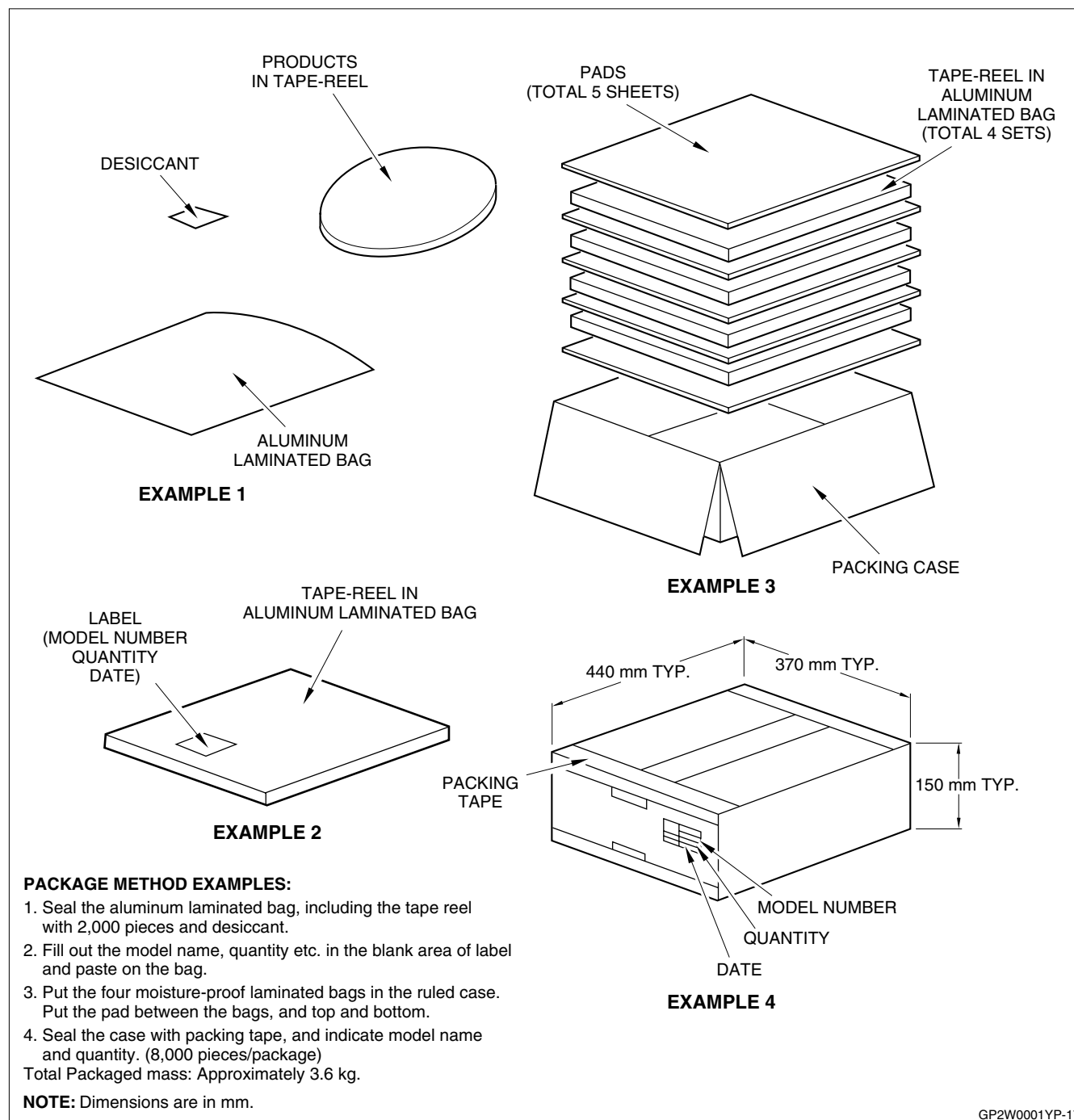


Figure 17. Packing Specification

LIFE SUPPORT POLICY

SHARP components should not be used in medical devices with life support functions or in safety equipment (or similar 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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