SHARP

IrDA Data Sheet

GP2W0104YP

115 kbps Transceiver

FEATURES

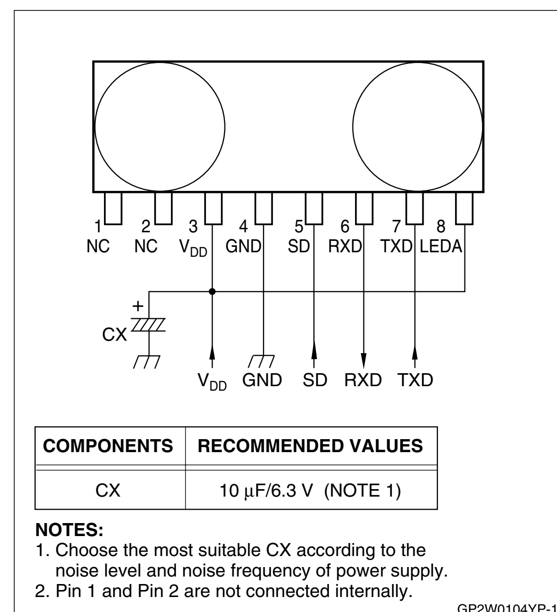
- Built-in Photodiode
- Operating voltage 2.4 V to 5.5 V
- Conforms to eye safety IEC60825-1, without external resistor
- This product shall not contain the following materials, and these materials shall not be used in the production process for this product.
  - CFCs
  - Halon
  - Carbon Tetrachloride
  - 1.1.1. Trichloroethane (Methylchloroform)
  - Specific brominated flame retardants such as the $PBBO_S$ and PBB_S 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).

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, 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 does not temporarily detect the inconsistent signal, since the transmitted light from the transmitter side reaches the detector side of the same transceiver.
- When designing the system (program), consider that 0.3 ms or more (at T_A = 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 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 remains at high-level output in shutdown mode. The RXD pinout is CMOS output, and other CMOS outputs must not be directly connected to this pinout, as it does not conform to tri-state output.
- 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).



COMPONENTS	RECOMMENDED VALUES
CX	10 µF/6.3 V (NOTE 1)

NOTES:
1. Choose the most suitable CX according to the noise level and noise frequency of power supply.
2. Pin 1 and Pin 2 are not connected internally.

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Figure 1. Recommended External Circuit

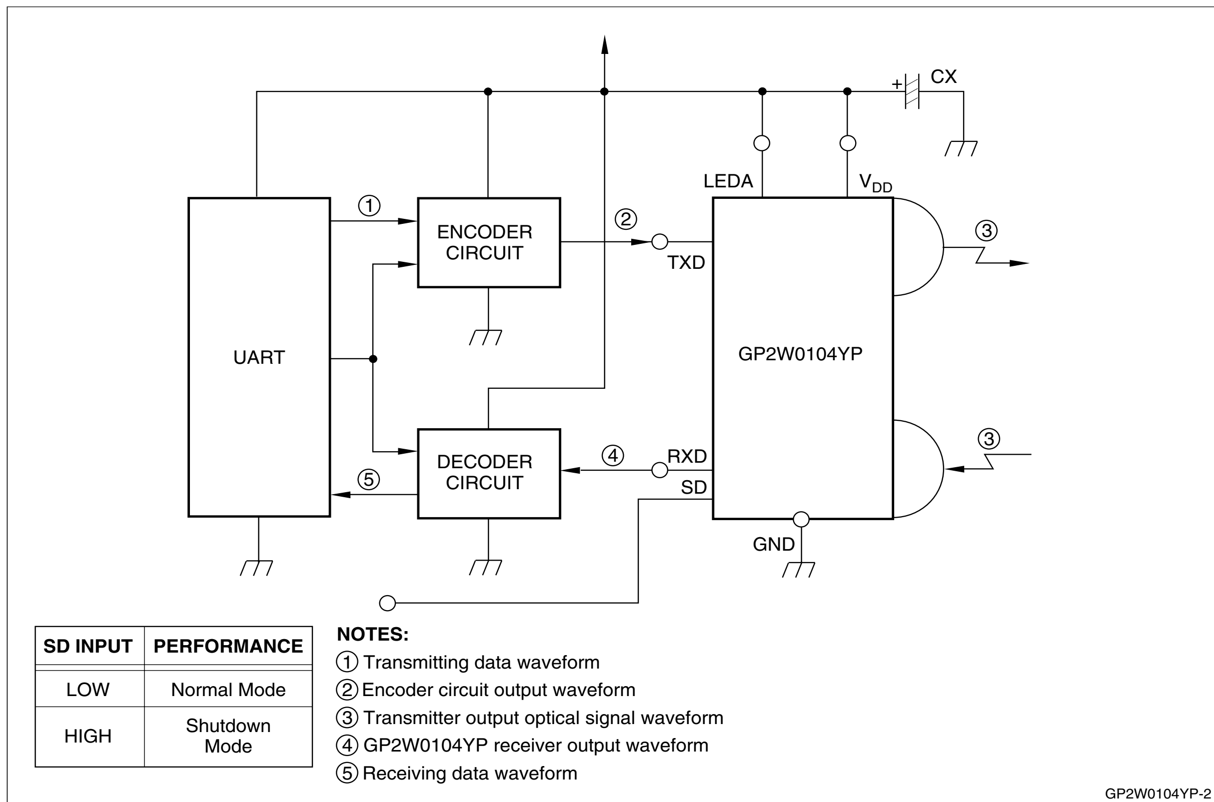

Figure 2. System Example

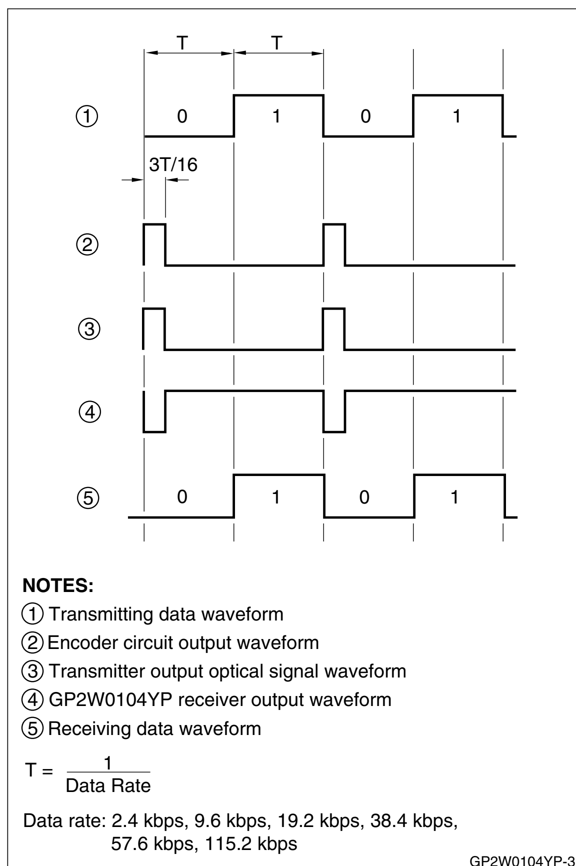

Figure 3. Signal Waveform Example

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 one of the foot pattern land, indicated in Figure 5.

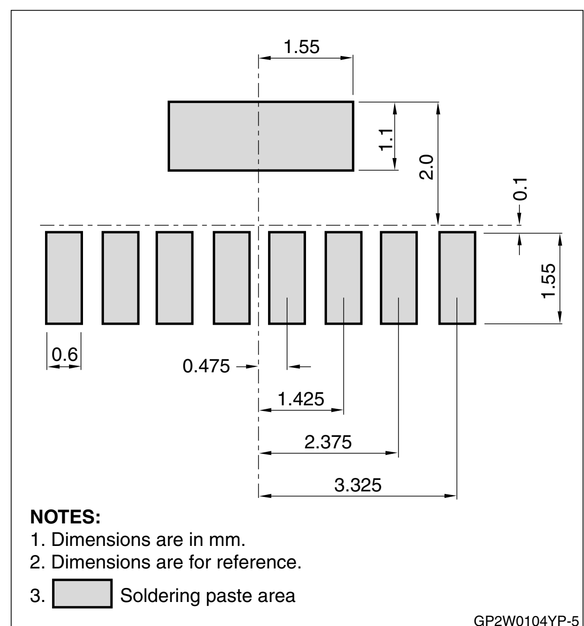

Figure 4. Solder Cream Size

CENTER OF MOUNTING AREA

PIN	PIN NAME	SYMBOL
①	NC	NC
②	NC	NC
③	V_{DD}	V_{DD}
④	Ground	GND
⑤	Shutdown	SD
⑥	Receiver Data Output	RXD
⑦	Transmitter Data Input	TXD
⑧	LED Anode	LEDA

NOTES:
1. Dimensions are in mm.
2. Dimensions are shown for reference.
3. Connect foot pattern of shield case to GND pattern.

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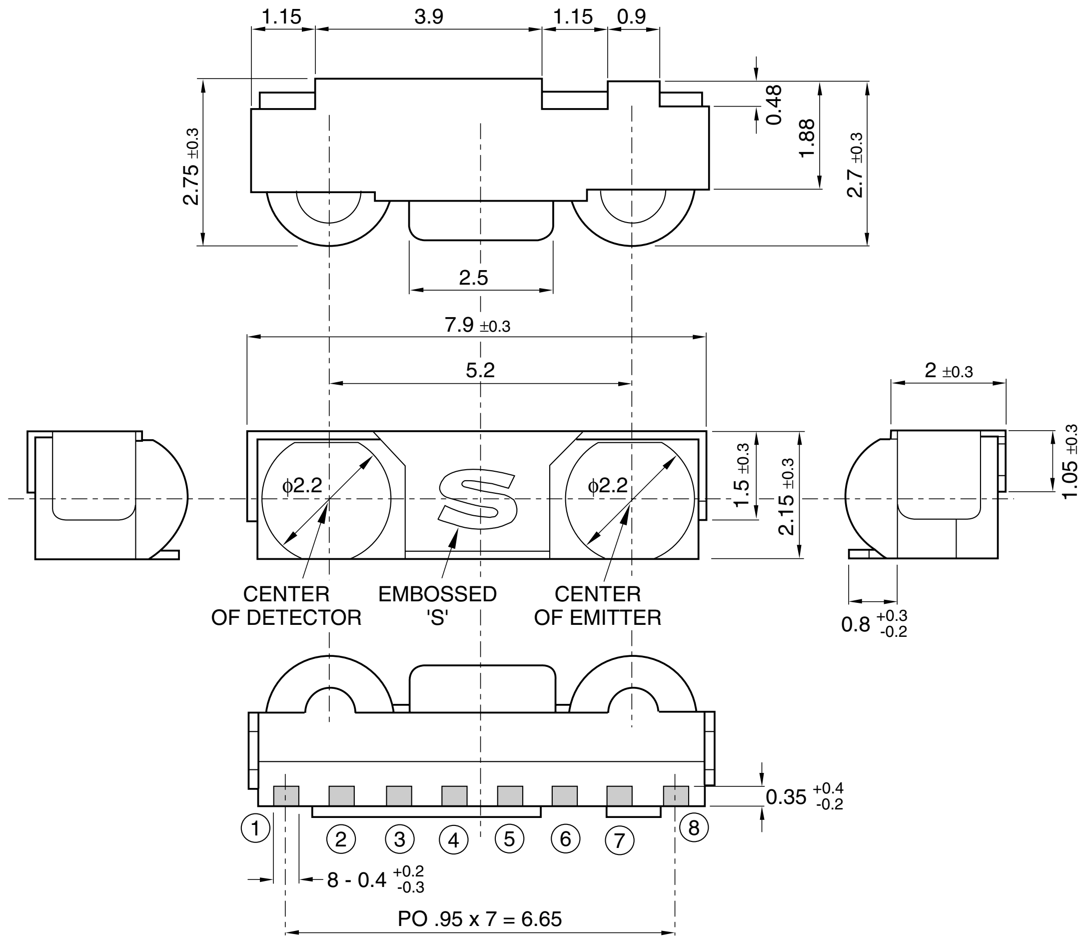
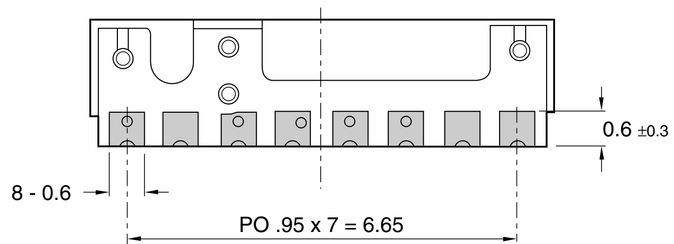
Figure 5. Foot Pattern of PCB



PIN	PIN NAME	SYMBOL
1	NC	NC
2	NC	NC
3	V_{DD}	V_{DD}
4	Ground	GND
5	Shutdown	SD
6	Receiver Data Output	RXD
7	Transmitter Data Input	TXD
8	LED Anode	LEDA

BOTTOM VIEW



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

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Figure 6. GP2W0104YP Outline Dimensions

RATINGS AND CHARACTERISTICS

Absolute Maximum Ratings

PARAMETER	SYMBOL	RATINGS	UNIT	NOTES
Supply voltage	V_{DD}	0 to 6.0	V	
Peak forward current	I_{FM}	60	mA	1
Operating temperature	T_{OPR}	-20 to +85	°C	
Storage temperature	T_{STG}	-30 to +85	°C	
Soldering temperature	T_{SOL}	230	°C	2

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

Recommended Operating Conditions

PARAMETER	SYMBOL	OPERATING CONDITION	UNIT	NOTES
Supply voltage	V_{DD}	2.4 to 5.5	V	
Data rate	BR	2.4 to 115.2	kbps	
SD terminal high level input voltage	V_{IHSD}	V_{DD} -0.5 to V_{DD}	V	1
SD terminal low level input voltage	V_{ILSD}	0.0 to 0.4	V	2
TXD high level input voltage	V_{IHTXD}	V_{DD} -0.5 to V_{DD}	V	3
TXD low level input voltage	V_{ILTXD}	0.0 to 0.4	V	4

NOTES:
1. Shut down mode
2. Normal mode
3. LED ON. See Figure 12.
4. LED OFF. See Figure 12.

Electrical Characteristics

T_A = 25°C, V_{CC} = 3.3 V unless otherwise specified

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTES
Current consumption at no input signal	I_{DD}		70	120	µA	1
Current consumption at shut-down mode	I_{DD-S}		0.01	1.0	µA	2
High level output voltage	V_{OH}	3.0			V	3
Low level output voltage	V_{OL}			0.4	V	4
Low level pulse width	t_W	1.0		6.0	µs	5
Rise time	t_R			0.4	µs	5
Fall time	t_F			0.4	µs	5
Maximum reception distance	L	20			cm	5
Input irradiance	Ee	0.09			W/m^2	5
Radiant intensity	I_E	3.6		25	mW/sr	6
LED peak current	I_{LED}	14	20	26	mA	6
Rise time	t_R			0.6	µs	6
Fall time	t_F			0.6	µs	6
Peak emission wavelength	λp	850	870	900	nm	6

NOTES:
1. No input signal, V_{ILSD} = 0 V. Output terminal open.
2. No input signal, V_{IHSD} = V_{DD}. Output terminal open.
3. See Figures 7, 8, and 9.
4. I_{OL} = 400 µA. See Figures 7, 8, and 9.
5. BR = 115.2 kbps, $\phi \leq 15°$, See Figures 7, 8, and 9.
6. BR = 115.2 kbps, $\phi \leq 15°$, V_{IHTXD} = 2.8 V. See Figures 10, 11, and 12.

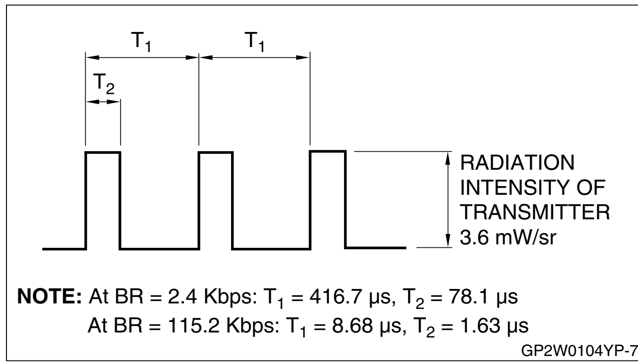

Figure 7. Input Signal Waveform (Detector Side)

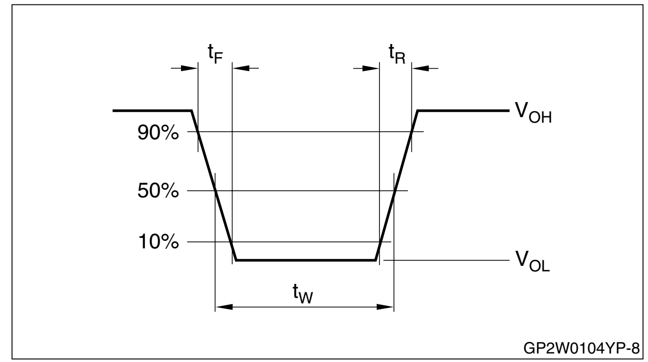

Figure 8. Output Waveform (Detector Side)

TRANSMITTER (NOTE)

L

φ

φ

GP2W0104YP

OSCILLOSCOPE

NOTE:

1. Transmitter uses GP2W0104YP (λp = 870 nm TYP.) which is adjusted the radiation intensity at 3.6 mW/sr.
2. φ Indicates horizontal and vertical directions.
3. Ee: Detector face illuminance < 10ℓx

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Figure 9. Standard Optical System (Detector Side)

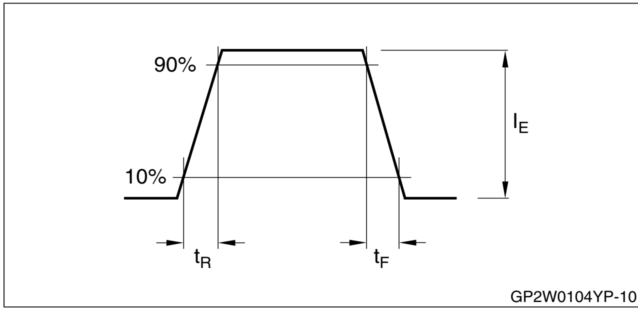

Figure 10. Output Waveform Specification (Emitter Side)

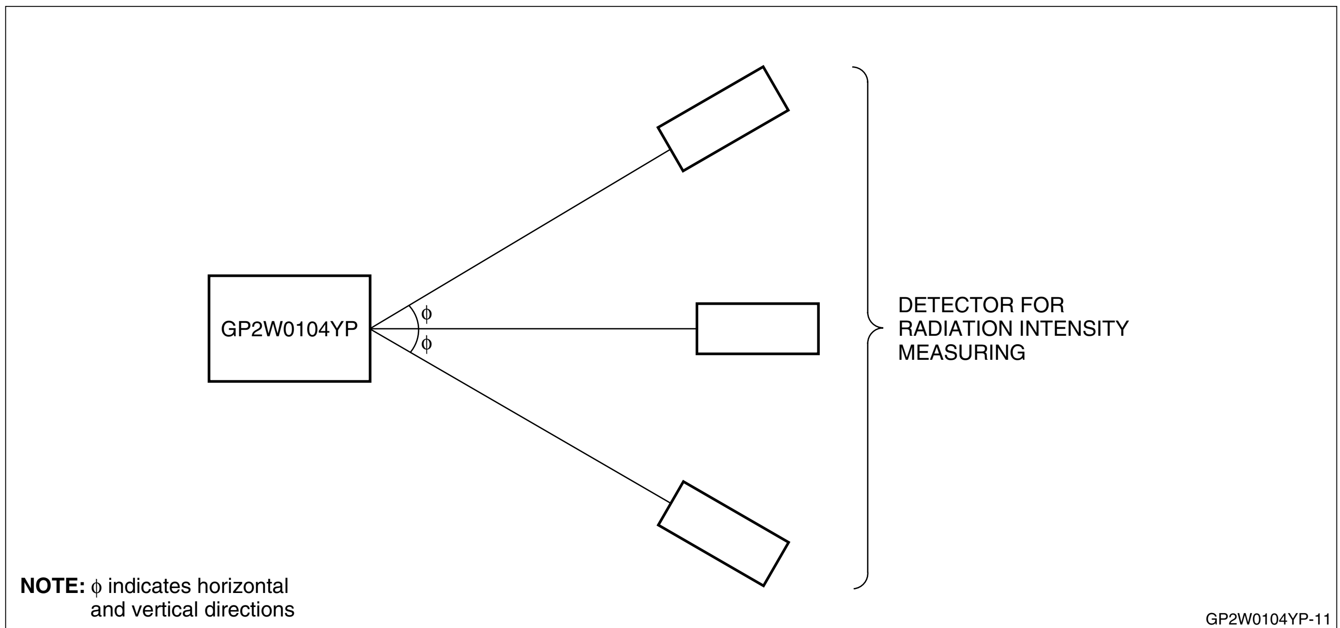

Figure 11. Standard Optical System (Emitter Side)

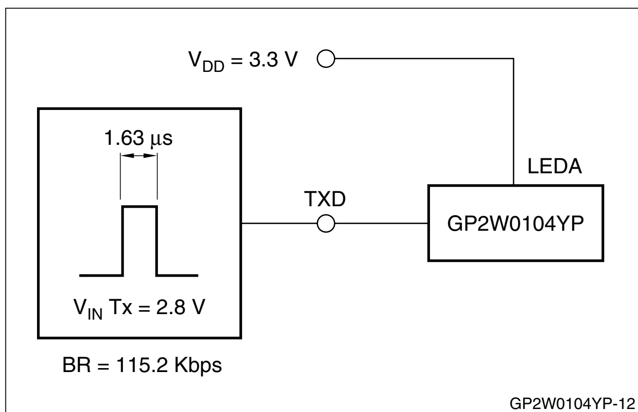

Figure 12. Recommended Circuit (Emitter Side)

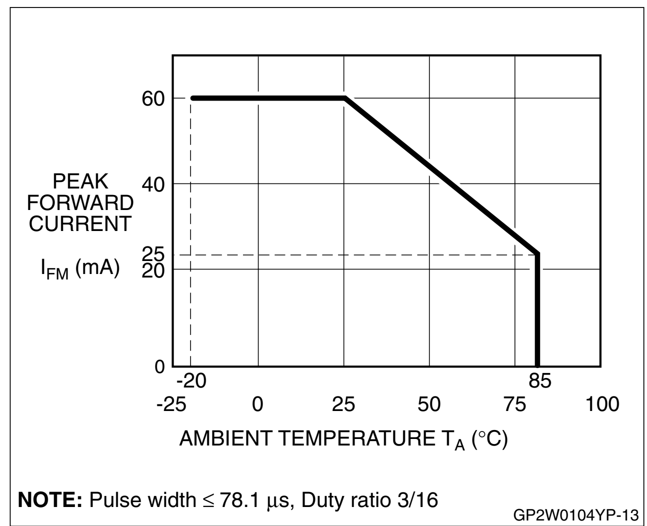

Figure 13. Peak Forward Current Versus Ambient Temperature

RELIABILITY

TEST ITEMS	TEST CONDITIONS	FAILURE JUDGEMENT CRITERIA	SAMPLES (n)	DEFEC-TIVE (c)	NOTE
Temperature cycling	1 cycle -30°C to 85°C (30 minutes) 20 cycles test	$I_{DD} > Up \times 1.2$ $L < Low \times 0.8$ $I_E < Low \times 0.8$ $I_E > Up \times 1.2$ Up: Upper Specification Limint Low: Lower Specification Limint	n = 22	c = 0	1, 3, 4
High temperature and high humidity storage	+40°C, 90% RH, 20 hours		n = 22	c = 0	1, 3, 4
High temperature storage	+85°C, 240 hours		n = 22	c = 0	1, 3, 4
Low temperature storage	-30°C, 240 hours		n = 22	c = 0	1, 3, 4
Operation life 1	+25°C, V_{DD} = 3.3 V, 240 hours		n = 11	c = 0	1, 3, 4
Operation life 2	+25°C, V_{DD} = LEDA = 3.3 V, 240 hours, Pulse width 78.1 µs, Duty ratio 3/16		n = 11	c = 0	1, 3, 4
Mechanical shock	1000 m/s^2, 6 ms, 3 times/±X, ±Y, ±Z direction		n = 11	c = 0	3, 4
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	3, 4
Reflow solder head	230°C, 5 s		n = 11	c = 0	2, 3, 4

NOTES:

1. 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.
2. Refer to the ‘Precautions for Soldering’ section for temperature profile.
3. Confidence level: 90%
4. LTPD: 10%/20%.

PRECAUTIONS FOR SOLDERING

Solder Reflow

Solder only once at the temperature and the time within the temperature profile as shown in Figure 14.

Other Precautions

An infrared lamp used to heat up for soldering may cause a localized temperature rise in the resin. So keep the package temperature within that specified in Figure 14. Also avoid immersing the resin part in the solder. Even if within the temperature profile shown in Figure 14, 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.

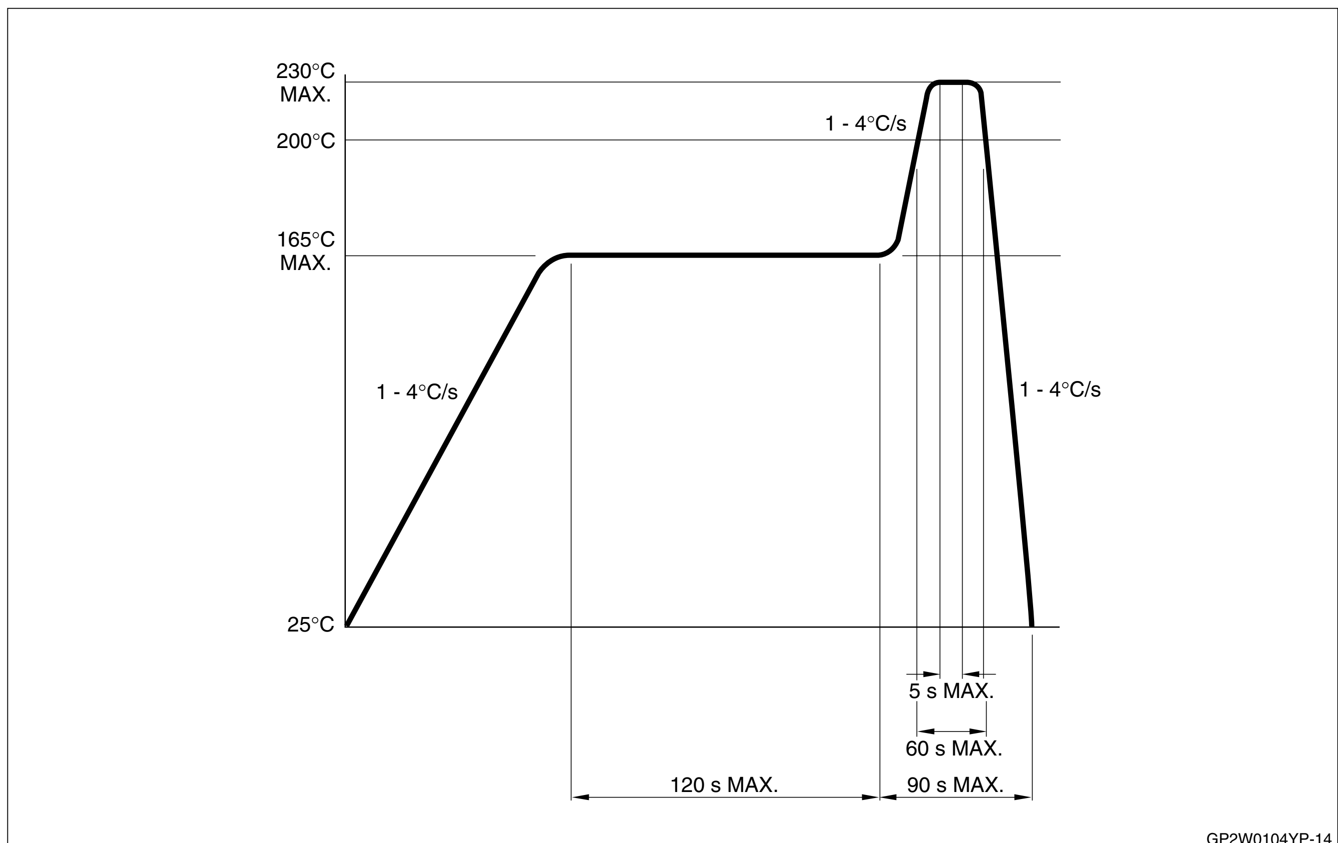

Figure 14. Temperature Profile

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 15.
- Reel structure and dimensions: The taping reel should be conductive plastic with its dimensions as shown in Figure 16.
- 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 17.
- Taped device repair: To repair taped failure devices, 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.

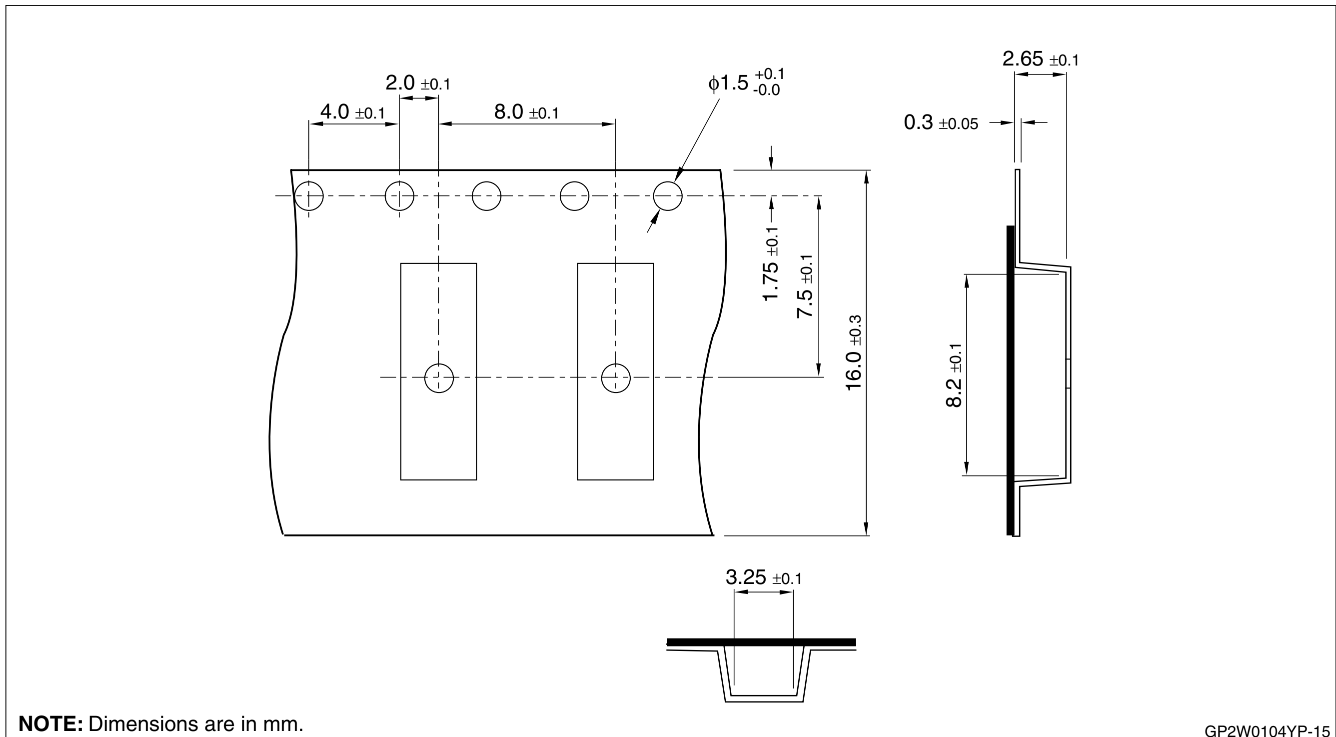

Figure 15. Tape Structure and Dimensions

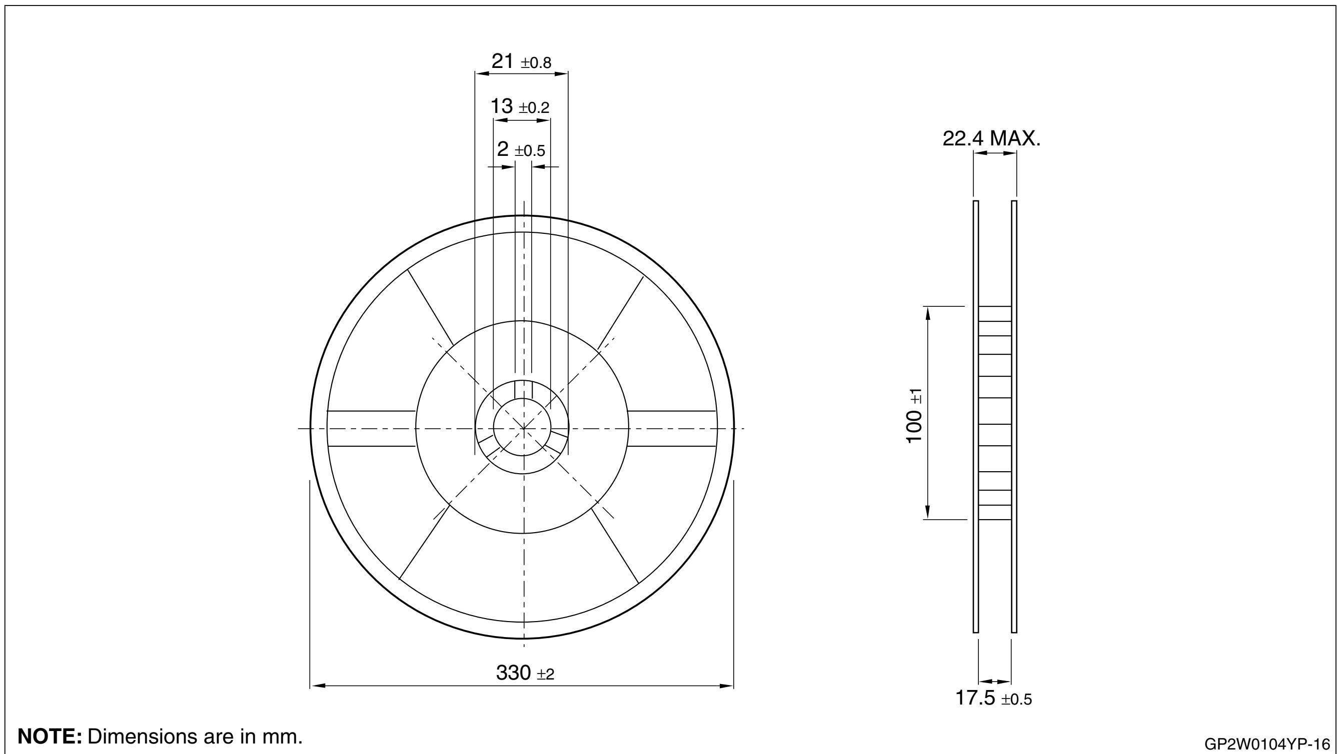

Figure 16. Reel Structure and Dimensions

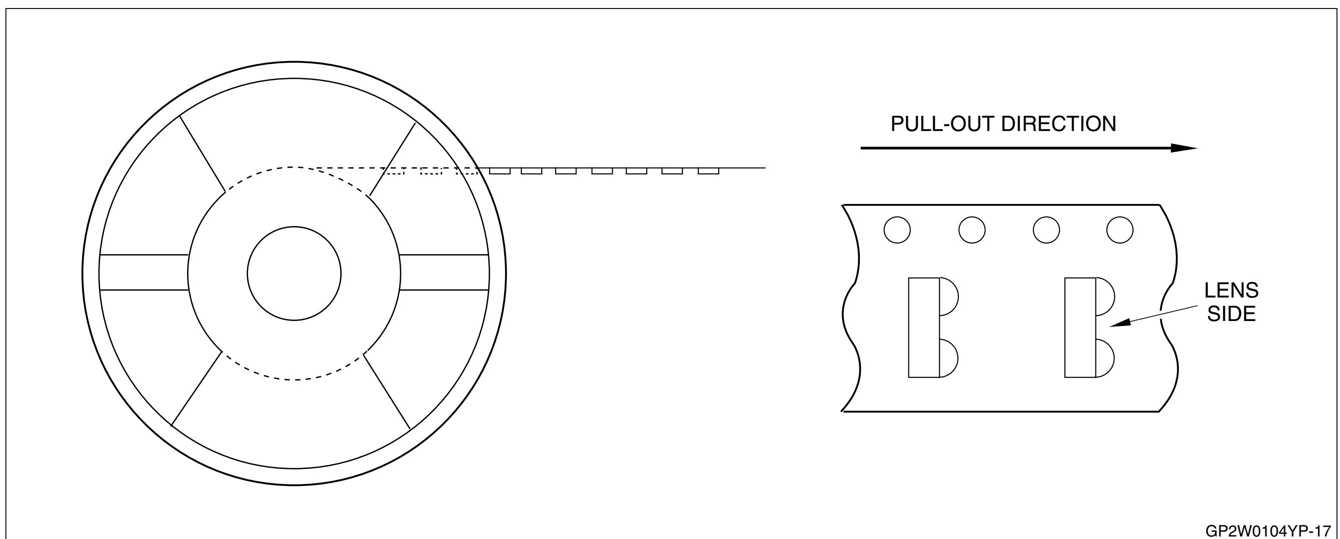

Figure 17. Direction of Product Insertion

TAPING MOISTURE-PROOF PACKING

Packaging Specifications

Table 1. 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 2. 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.

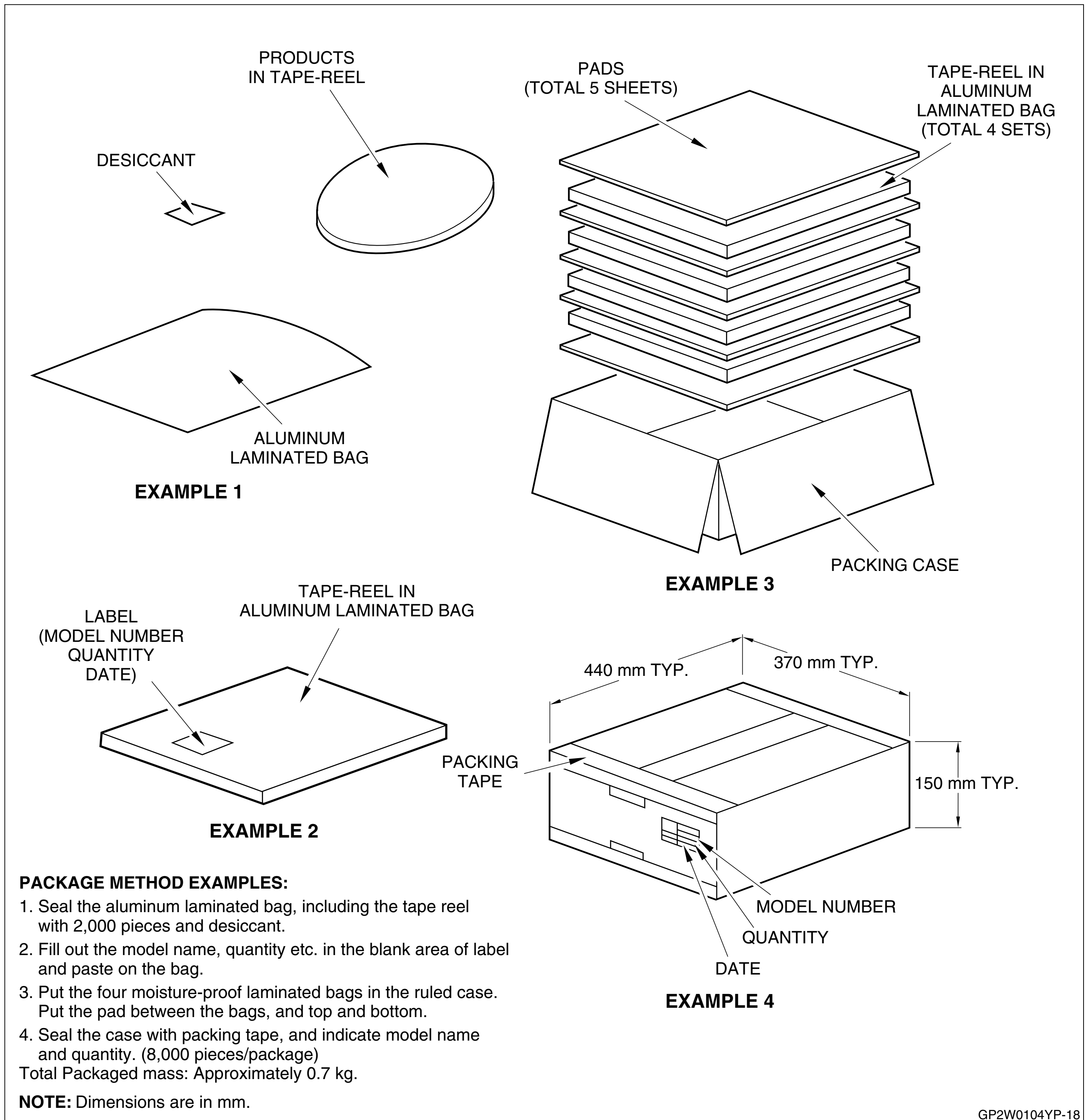

Figure 18. Packing Specification

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.

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