



SPECIFICATIONS

DESCRIPTION	IR RECEIVER MODULE
SPECIFICATION	
MAKER SPECIFICATION	R76CC5D(D)
CODE No.	
MODEL No.	
SPECIAL ARTICLES	

MANAGER	CHECK	APPROVAL
2010. . .	2010. . .	2010. . .
A TERM OF VALIDITY	YEAR	

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MAKER	OPTO ELECTRONICS(DALIAN) CO., LTD.	86-411-8761-4929
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SPECIFICATIONS

SHEET No.	1 of 10
DATE	2010. 05. 25.
TYPE No.	R76CC5D(D)
FILE No.	OQSS-R-000

PART NAME	IR RECEIVER MODULE
CODE No.	

1. Application

This Specification is applied to inspection and approval of the IR Receiver Module for color TV, 3D TV set and audio equipment

2. Description

The Series are miniaturized receiver for infrared remote control system.

The Pin Photodiode and preamplifier are assembled on a PCB, the epoxy lens is designed as an IR filter
The module has excellent performance even in disturbed ambient light application and provides protection against uncontrolled output pulses

3. Features

- 1) High ripple rejection
- 2) Wide operating supply voltage 2.7V ~ 6.0V
- 3) Very low supply current : 3.3V(0.5mA), 5.0V(0.6mA)
- 4) Band pass filter center frequency : 20kHz
- 5) Epoxy IR filter characteristic : 810nm
- 6) Maximum interference safety against optical and electrical disturbance
- 7) Internal filter for a high frequency lighting fluorescent lamp.
- 8) Internal Pull-Up output. : 52k Ω



4. Absolute Maximum Ratings

- 1) Supply voltage : 0V~6.0V
- 2) Supply current : 0mA~3.0mA
- 3) Operating temperature : -25 $^{\circ}$ C ~ +85 $^{\circ}$ C
- 4) Storage temperature : -40 $^{\circ}$ C ~ +125 $^{\circ}$ C

5. Cautions

- 1) Store and use where there is no force causing transformation or change in quality.
- 2) Store and use where there is no extreme humidity.
- 3) In order to prevent damage from static electricity, make sure that the human body and the soldering iron are connected to ground before using.
- 4) When a disturbance signal is applied to the Series, it can still receive the data signal. However, the sensitivity is reduced to the level that no unexpected pulses will occur. Some examples of such disturbance signals which can be suppressed by the Series.
 - ① DC light. (ex. From tungsten lamp or sunlight)
 - ② Continuous signal at center frequency or any other frequency.
 - ③ Signals from fluorescent lamps with electronic ballast with high or low modulation.



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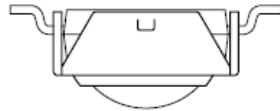
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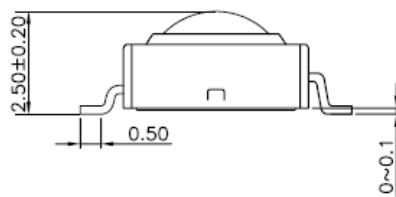
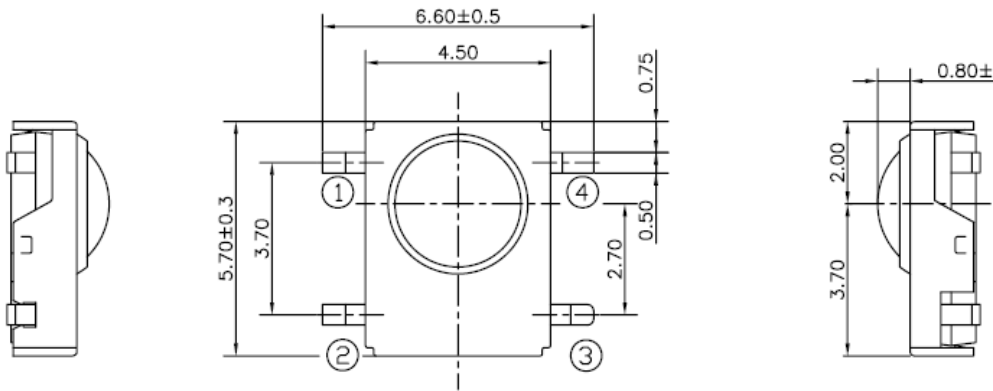
6. Dimensions in millimeters

1) Package Dimension

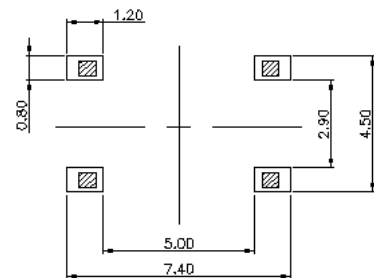


NOTE
(TOLERANCE : ± 0.3)

1. Vout
2. GND
3. GND
4. Vcc



Soldering Pad Design
(Top View)



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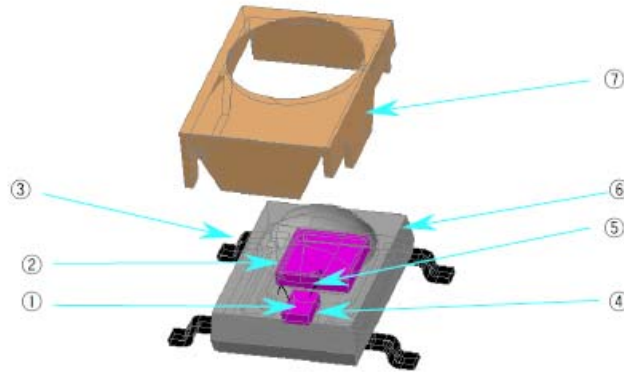
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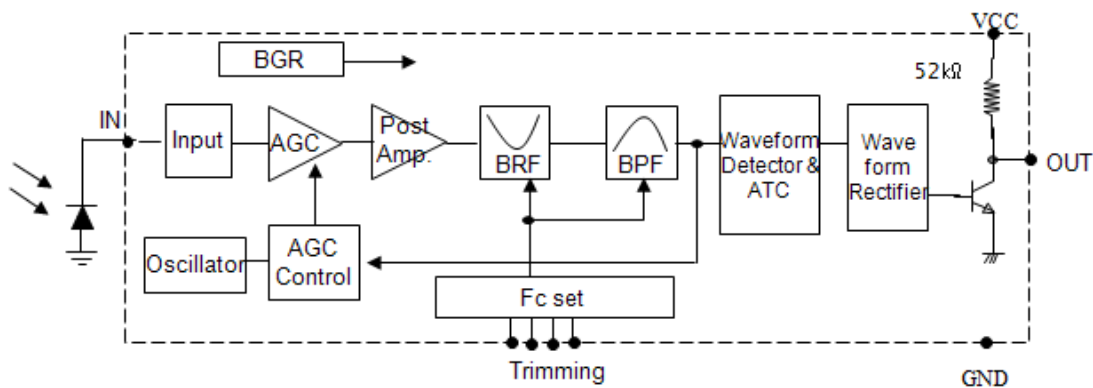
7. Schematic Diagram

1) Internal structure figure



No.	Part name	Materials(method)	Remark
①	Receiver IC	Silicone	
②	Pin Photo Diode	Silicone	
③	Frame	Fe Alloy	
④	Die Attach	Ag Paste	
⑤	Wire	Au Wire (Wire-bonding)	
⑥	Molding Package	Non-fireproof epoxy resin(Transfer Mold)	Transfer Mold
⑦	Metal Shield Case	Fe Alloy	

2) Functional Block Diagram



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3) Circuit Description of Function Block Diagram.

The function of the IC is described with above function block diagram.




Photo current generated by infrared radiation burst signal equivalently go through the Input pad of IC called "Input Block".

The DC part is separated in the coupling cap of the each amplifier and AC signal pass to a Pre-amplifier followed by an automatic gain control amplifier, a post amplifier and a band pass filter.

The final evaluation is done by a waveform detector & ATC, waveform rectifier stage.

The "automatic Gain control" is responsible for the dynamic control of stable working point to suppress the influences of disturbing sources. The digital output signal, which is an envelope signal of the incoming optical burst without the carrier frequency, has active low polarity, The detail of the each block is as below.

- ① **Input Block** reacts to the photo diode as a frequency-dependent load resistance.
- ② **AGC-Amplifier** generates most of the voltage gain of the whole circuitry whereby the amplification is controlled by Auto Gain Control block.
- ③ **Post-Amplifier** generates a signal gain to be fit to band pass filter input by limiting signal amplitude. The most of the voltage gain is decided by a ratio of load resistance and emitter resistance.
- ④ **Band Reject Filter** is a that passes most frequencies unaltered
- ⑤ **Band Pass Filter** is an important part of the circuit to get a good performance in disturbed ambient. It is designed to achieve a specified frequency response and exhibit different characteristics depending on current value of each element.
- ⑥ **AGC Control & Oscillator** stage ensures that the receiver is immune to disturbances. It reacts to the noise or disturbance by changing the gain of the amplifier. In case of ambient light. The AGC sets the gain to the most sensitive value so that there is no unexpected output pulse, The AGC does not react to the useful data signal if signal gap time is enough. The AGC distinguishes useful data from disturbance signals and the distinguishing marks are burst length and envelope duty cycle.
- ⑦ **Waveform Detector & ATC** is consisted of two comparators. Compare with fixed threshold voltage in comparator 1'st receiving B.P.F filter's output and detect burst signal. Also, ATC changes comparator 2'nd threshold voltage level according to filter output signal size. This does function that protect that pulse width changes by size of filter output signals.
- ⑧ **Waveform Rectifier** is consisted of integrator and Schmitt-trigger. The integrator is triggered when the signal value reaches the comparator threshold voltage. It needs several cycles from the comparator output in series until the integrator is loaded and the output is triggered. The design of integrator and Schmitt Trigger is carried out so that the output pulse width is close to the optical burst length at the input.

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8. Electro-Optical Characteristics (At 25°C unless otherwise notes)

1) Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Supply Voltage	Vcc	0~6.0	V
Output Current	Iout	0~3.0	mA
Operating Temperature	Topr	-25 ~ +85	°C
Storage Temperature	Tstg	-40 ~ +125	°C
Soldering Temperature (*1)	Tsol	270, t<5sec	°C
Reflow Soldering Temperature	Tsd	245, t<20sec	°C
Moisture Sensitivity Levels	Level 5 (≤30°C / 60% RH 48hours)		

(*1) Pb free solder

2) Recommended operating Conditions

Parameter	Symbol	Ratings	Unit
Operating Voltage	Vcc	2.7 ~ 6.0	V
Input Frequency	fin	20	kHz

3) Electro-Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Supply Voltage	Vcc		2.7	-	6.0	V
Supply Current	Icc	no signal input	0.2	0.5	1.5	mA
Peak Wavelength (*1)	λ_p		-	810	-	nm
B.P.F Center Frequency (*2)	fo		-	20	-	kHz
High Level Output Voltage (*1)	V _{OH}		4.8	5.0	-	V
Low Level Output Voltage (*1)	V _{OL}		-	0.2	0.4	V
High Level Output Pulse Width (*1)	t _{WH}	Burst Wave = 125 μ s	170	200	450	μ s
Low Level Output Pulse Width (*1)	t _{WL}	Period = 725 μ s	275	525	800	μ s
Arrival Distance (*1)	D	$\pm 0^\circ$	-	8	-	m
		$\pm 45^\circ$	-	5	-	m
Output Form	Active Low Output					

* 1. 125 μ s/600 μ s burst wave is transmitted by standard(fig. 2, fig. 3) transmitter. However, it measured after the initial transmission pulse is 10(60ms) pulse

* 2. The following band pass frequencies are available (20kHz / 36.7kHz / 37.9kHz / 40kHz)
carrier frequencies are adjusted by zener-diode fusing method.



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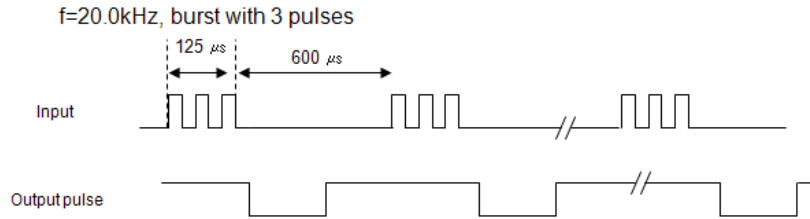
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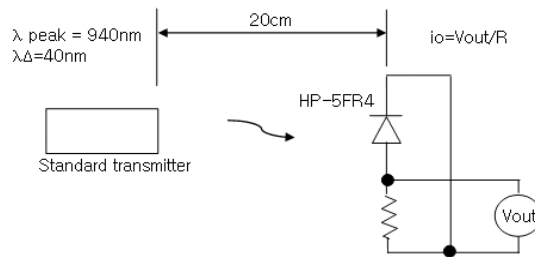
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4) Measurement Conditions

① Fig.1 Burst we, Output wave (Characteristics and the Suitable)

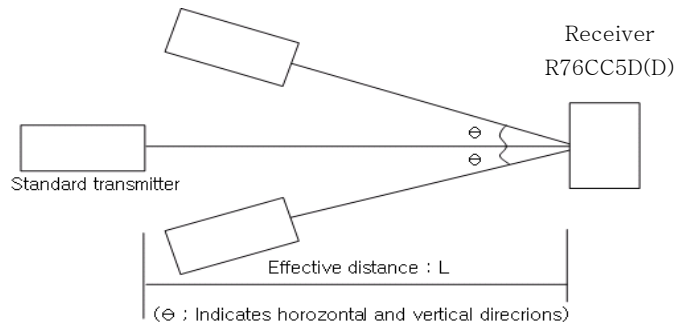


② Fig.2 Application Circuit



when standard transmitter output the signal at Fig.1 standard photodiode output $i_o = 5\mu\text{A}_{\text{p-p}}$ under the measurement condition Fig.2. (The radiant intensity of standard transmitter : 50mW/sr)
HP-5FR4 : standard photodiode has short current $I_{\text{sc}} = 32\mu\text{A}$ at $E = 1000(\text{lx})$

③ Fig.3 Test Condition of Arrival Distance



☞ Ambient light source : Detecting surface's illumination shall be 100Lux under ordinary white fluorescence lamp without high frequency lighting.



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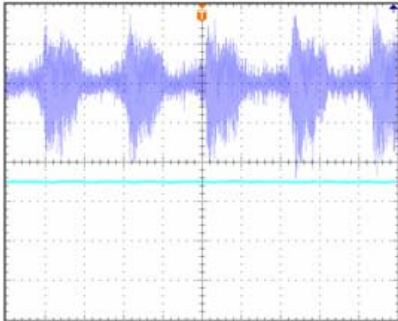
5) Disturbance Suppression

When a disturbance signal is applied to the R76CC5D(D), Series. It can receive the data signal. However the sensitivity is reduced to that level that no unexpected pulses will occur.

Some examples for such disturbance signals which are suppressed by the R76CC5D(D), Series :

- a. Signals from fluorescent lamps with electronic ballast (please refer to Fig.1)
- b. Continuous signal at 20kHz or at any other frequency
- c. DC light (from tungsten lamp or sunlight)

[Fig.1 Fluorescent Lamp with Modulation]



The signals shown in [Fig. 1] comes from a fluorescent lamp with electronic ballast Which is operated at 60Hz and 120Hz power line frequency.

A different kind of disturbance signal is caused by fluorescent lamps with electronic ballast.

Typically the oscillating frequency of the optical disturbance signal of such lamps is in the range between 30kHz and 50kHz. This frequency is twice of the electrical oscillating frequency of the driver circuit in the lamp ballast.

All R76CC5D(D), Series IR receiver modules can suppress such disturbance signals efficiently.

There will be no unexpected output pulses due to such lamps. However, sensitivity will be reduced according to the strength of the disturbance signal. More critical are the electronic ballasts with high modulation of the oscillating amplitude are more critical.

6) Cautions

- ① The performance of remote control system depends on environment condition and ability of peripheral parts. Thus, it is highly recommended to evaluate the performance of the receiver module, using the final product after the receiver module is assembled with peripheral components such as resistor, condenser, MICOM, and so on.
- ② Store and use where there is no force causing transformation or change in quality.
- ③ Store and use where there is no extreme humidity.
- ④ In order to prevent damage from static electricity, make sure that the human body and the soldering iron are connected to ground before using.
- ⑤ In order to prevent electrostatic discharge of integrated circuit, human body and soldering iron, etc. shall be grounded.
- ⑥ Please use this device away from the dew drop.
Be aware that a dew drop rusts shield case and others, and it may affect the normal operation.



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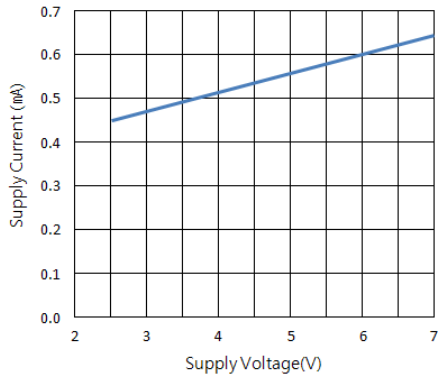
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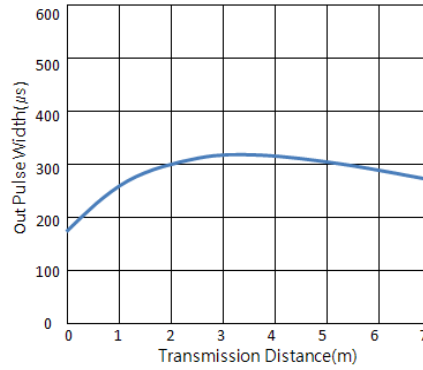
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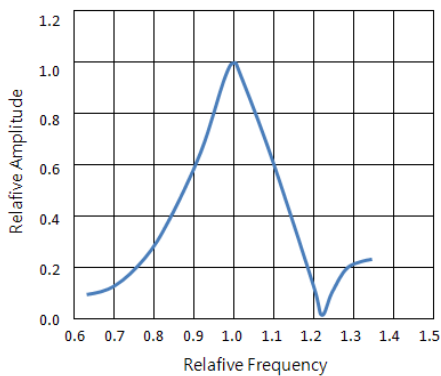
7) Graph of Electrical/Optical Characteristics



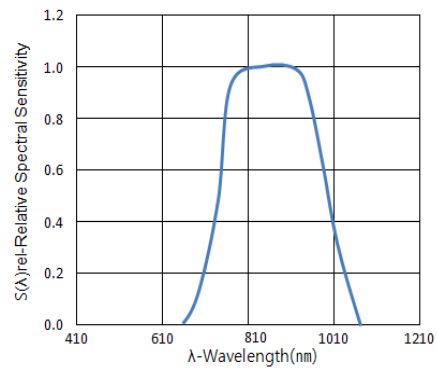
Supply current Vs. Supply voltage



Output Pulse Diagram



Frequency of Responsivity



Relative Spectral Sensitivity Vs. Wavelength

8) Standard Inspection

All output products shall be inspected based on following items.

- ① Detecting distance.
- ② Current consumption.
- ③ High level output voltage.
- ④ Low level output voltage.
- ⑤ Output Pulse Width.

9) Others

In case any trouble or question arise, both parties agree to make full discussion covering the said problem.






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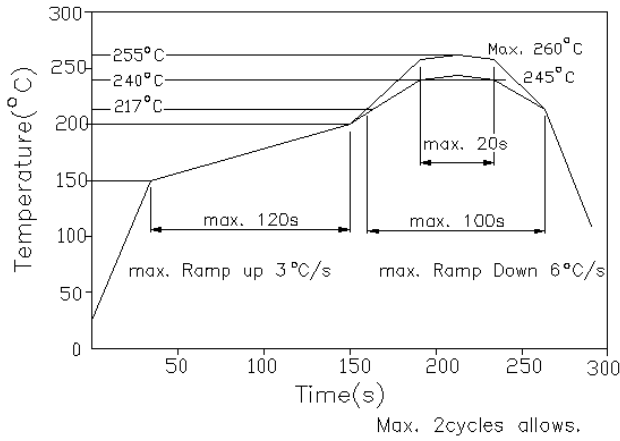
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9. Lead(Pb)-free Reflow Solder Profile

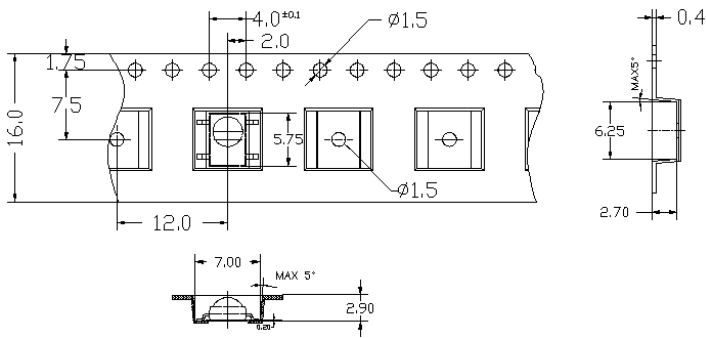


Manual Soldering

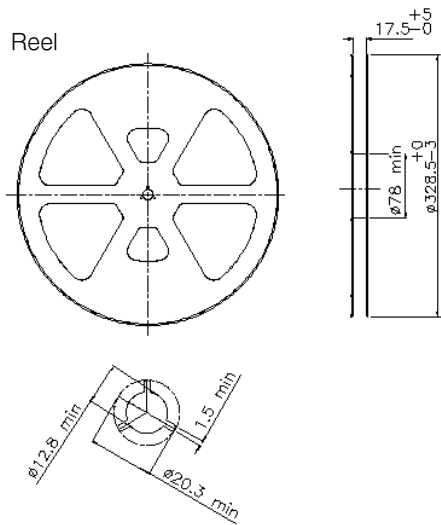
- Use a soldering iron of 25W or less. Adjust the Temperature of the soldering iron below 300°C(three seconds)

10. Taping and Reel Dimensions in millimeters

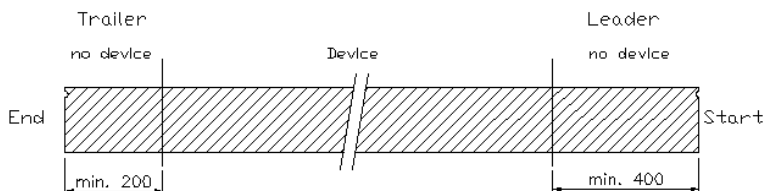
1) Taping



2) Reel



3) Leader and Trailer



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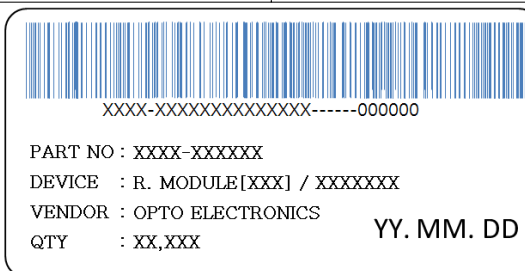
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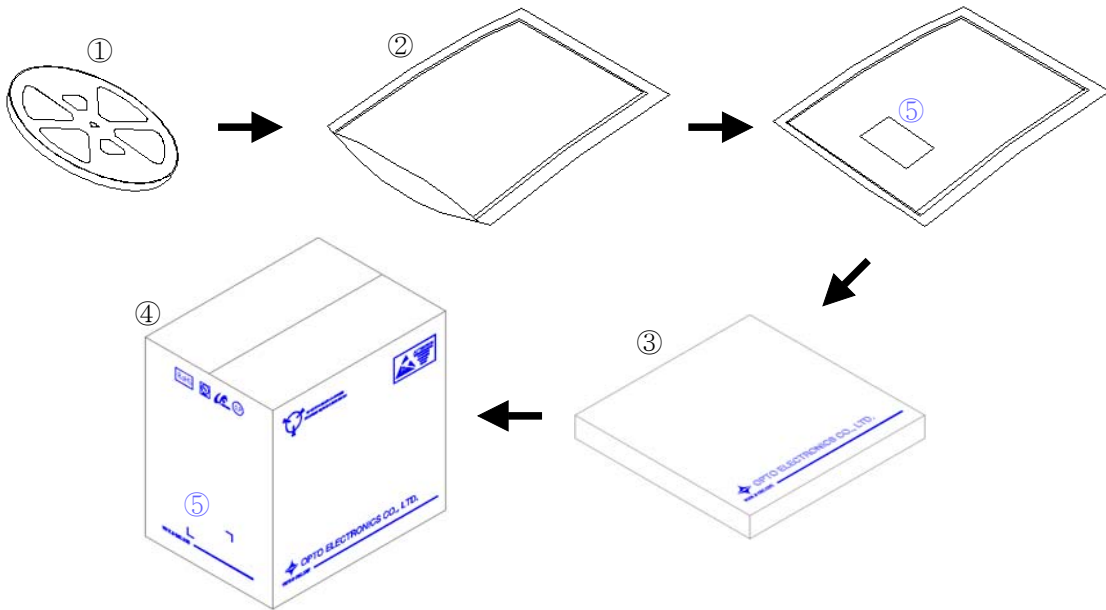
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No.	Part name	Dimensions(mm)	Quantity(pcs)
①	Reel	13"×24t	1,500
②	Aluminum bag	365×420×0.3t	-
③	Inner box	430×430×50t	3,000
④	Out box	450×450×360t	15,000
⑤	Standard label	 <p> XXXX-XXXXXXXXXXXXXXXX-----000000 PART NO : XXXX-XXXXXX DEVICE : R. MODULE[XXX] / XXXXXXXX VENDOR : OPTO ELECTRONICS QTY : XX,XXX YY. MM. DD </p>	

11. Packing Example



"Quantity" is the maximum quantity which we can pack.

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