

## **SPECIFICATION FOR APPROVAL**

**COMMODITY:** Infrared Remote-Control Receiver Module

**DEVICE NUMBER:** DL- 2938LS



<b>CUSTOMER APPROVEDBY</b>	<b>DATE</b>

## Double Light

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### ◆ Features:

1. Photo detector and preamplifier in one package .
2. Internal filter for PCM frequency.
3. Inner shield,good anti-interference ability.
4. High immunity against ambient light.
5. Improved shielding against electric field disturbance
6. 2.1V or 5.5V supply voltage; low power consumption.
7. TTL and CMOS compatibility.
8. Suitable transmission code:NEC code,RC5 code.

### ◆ Description

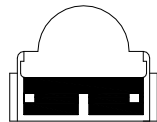
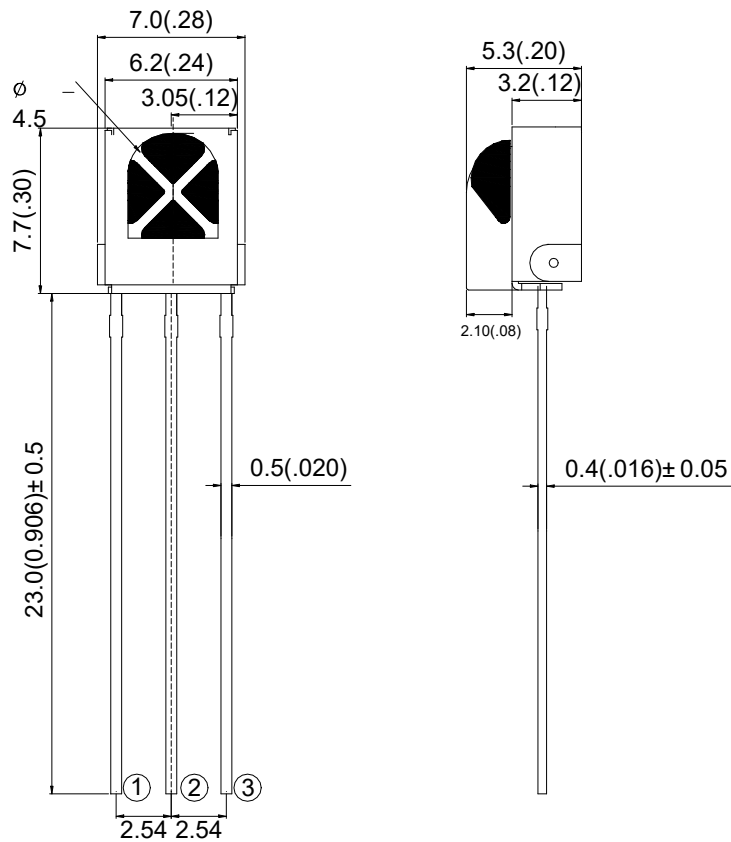
1. The DL-2938LS is miniaturized infrared receivers for remote control and other applications requiring improved ambient light rejection.
2. The separate PIN diode and preamplifier IC are assembled on a single lead frame.
3. The epoxy package contains a special IR filter.
4. The module has excellent performance even in disturbed ambient light applications and provides protection against uncontrolled output pulses.

### ◆ Applications:

1. AV equipment (TV, DVD Player, VCR, Audio, CD player, STB, etc)
2. Home appliances (Camera, Computer Air Conditioner, Fan, light, etc)
3. Infrared remote control Toys.

# Double Light

## ◆ Package dimensions:



- ① OUTPUT
- ② GND
- ③ VCC

Part No.	Chip Material	Lens Color	Source Color
DL-2938LS	Silicon	Black	Infrared Receiver

### NOTES:

1. All dimensions are in millimeters (inches).
2. Tolerance is ±0.30mm (0.012") unless otherwise specified.
3. Specifications are subject to change without notice.

## Double Light

### ◆ Absolute Maximum Ratings at Ta=25°C

Parameter	Symbol	Ratings	Unit
Supply Voltage	Vcc	2.4-6.5	V
Operating Temperature	Topr	-25~ +65	°C
Storage Temperature	Tstg	-40 ~ +85	°C
Soldering Temperature *1	Tsol	260	°C

### ◆ Electrical Optical Characteristics at Ta=25°C

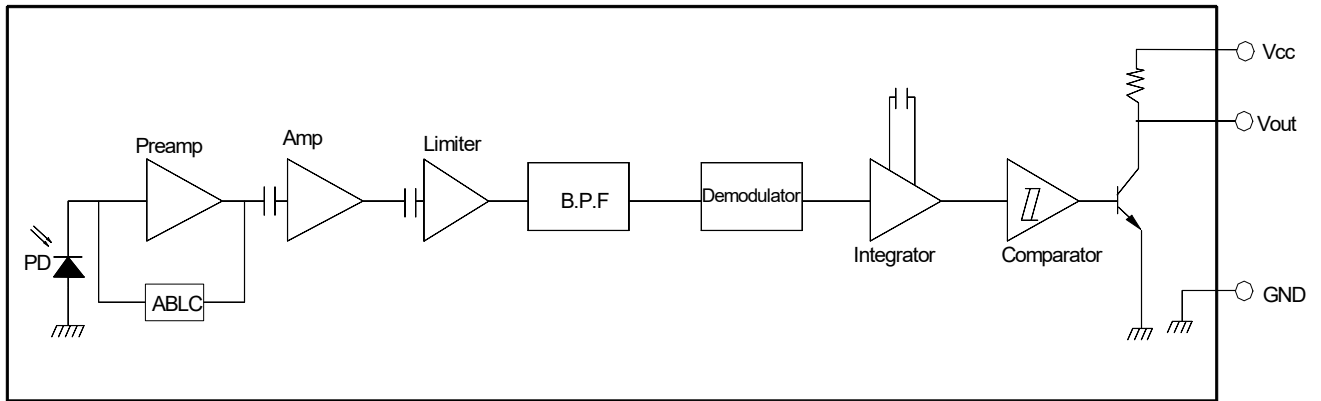
Parameter	Symbol	Ratings			Unit	Condition
		Min.	Typ.	Max.		
Supply Voltage	Vs	2.7	-	6	V	
Supply Current	Icc	—	--	0.6	mA	No signal input
Reception Distance	L <sub>0</sub>	16	—	—	m	At the ray axis*1
	L <sub>45</sub>	8	—	—		
B.P.F Center Frequency	fo	—	38	—	KHz	
Peak Wavelength	λ <sub>p</sub>	—	940	—	nm	
Half Angle	θ	—	45	—	deg	At the ray axis *1
High Level Pulse Width	T <sub>H</sub>	400	—	800	μS	At the ray axis *2
Low Level Pulse Width	T <sub>L</sub>	400	—	800	μS	
High Level Output Voltage	V <sub>H</sub>	Vcc-0.3	—	—	V	
Low Level Output Voltage	V <sub>L</sub>	—	—	0.3	V	

#### Notes:

1. The ray receiving surface at a vertex and relation to the ray axis in the range of  $\theta=0^\circ$  and  $\theta=45^\circ$ .
2. A range from 30cm to the arrival distance. Average value of 50 pulses.

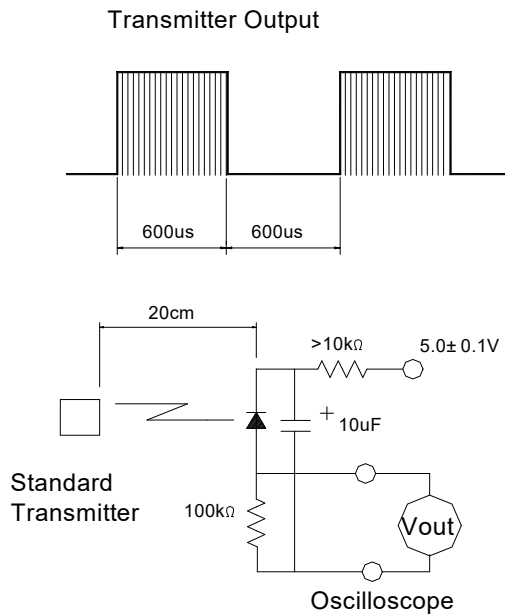
# Double Light

## ◆ Block Diagram

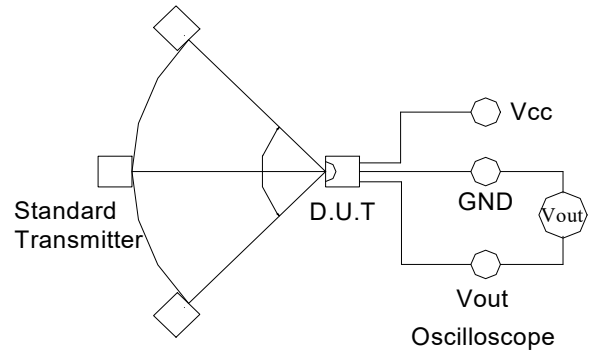


## ◆ 2Test Method

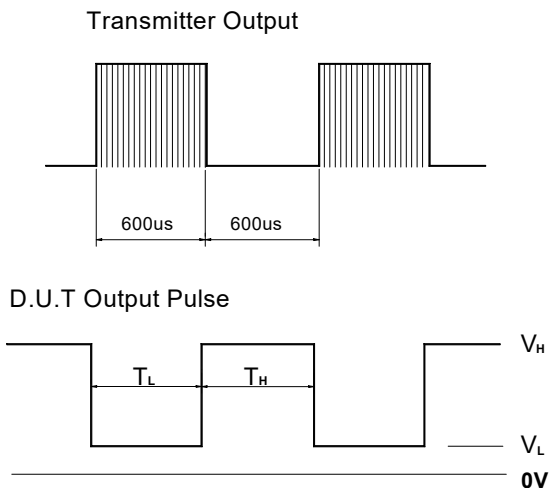
### A. Standard Transmitter



### B. Detection Length Test

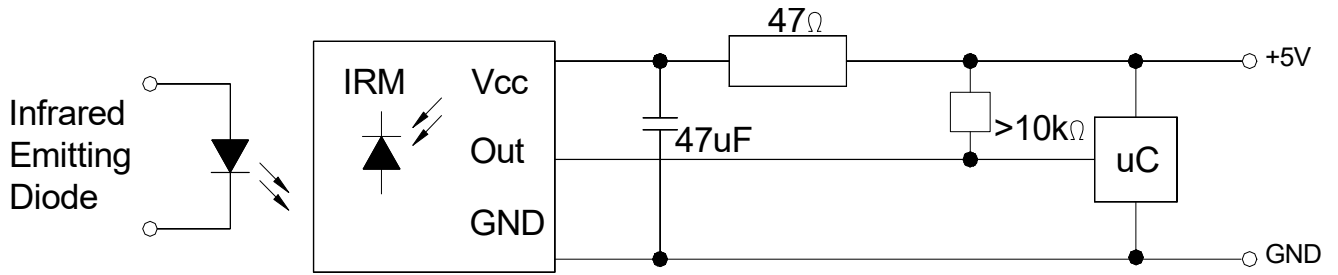


### C. Pulse Width Test

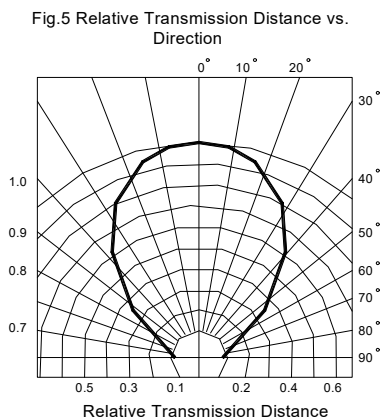
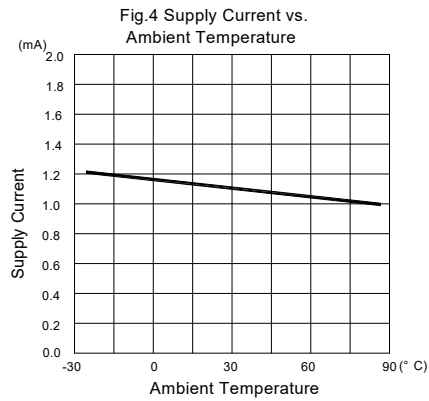
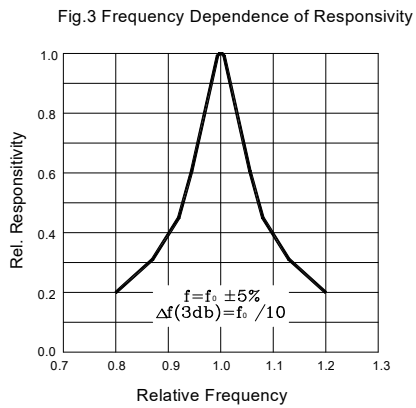
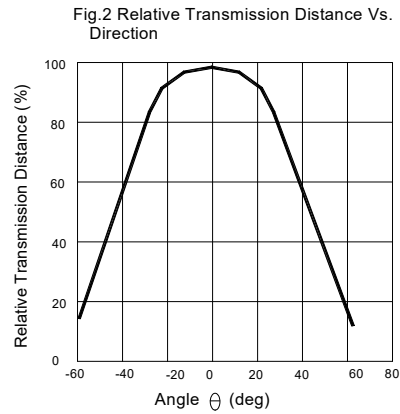
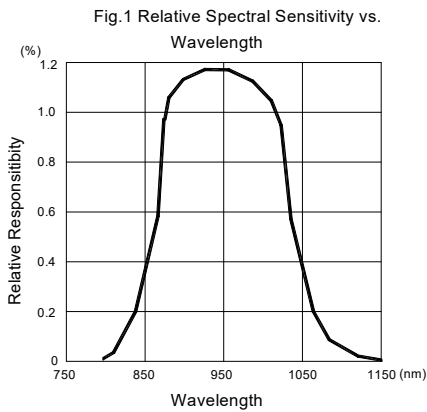


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## ◆ Application Circuit



## ◆ Typical Electrical - Optical Characteristics Curves (25°C Ambient Temperature Unless Otherwise Noted)



## Double Light

### ◆ Reliability Test

Classification	Test Item	Reference Standard	Test Conditions	Result
Endurance Test	Operation Life	MIL-STD-750:1026 MIL-STD-883:1005 JIS-C-7021 :B-1	Connect with a power $I_f=20\text{mA}$ $T_a$ =Under room temperature Test time=1,000hrs	0/20
	High Temperature High Humidity Storage	MIL-STD-202:103B JIS-C-7021 :B-11	$T_a=+65^{\circ}\text{C}\pm 5^{\circ}\text{C}$ RH=90%-95% Test time=240hrs	0/20
	High Temperature Storage	MIL-STD-883:1008 JIS-C-7021 :B-10	High $T_a=85^{\circ}\text{C}\pm 5^{\circ}\text{C}$ Test time=1,000hrs	0/20
	Low Temperature Storage	JIS-C-7021 :B-12	Low $T_a=-35^{\circ}\text{C}\pm 5^{\circ}\text{C}$ Test time=1,000hrs	0/20
Environmental Test	Temperature Cycling	MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1010 JIS-C-7021 :A-4	$-35^{\circ}\text{C} \sim +25^{\circ}\text{C} \sim +85^{\circ}\text{C} \sim +25^{\circ}\text{C}$ 60min 20min 60min 20min Test Time=5cycle	0/20
	Thermal Shock	MIL-STD-202:107D MIL-STD-750:1051 MIL-STD-883:1011	$35^{\circ}\text{C}\pm 5^{\circ}\text{C} \sim +85^{\circ}\text{C}\pm 5^{\circ}\text{C}$ 20min 20min Test Time=10cycle	0/20
	Solder Resistance	MIL-STD-202:201A MIL-STD-750:2031 JIS-C-7021 :A-1	Preheating: $140^{\circ}\text{C}-160^{\circ}\text{C}$ , within 2 minutes. Operation heating: $235^{\circ}\text{C}$ (Max.), within 10seconds (Max.)	0/20

### ◆ Judgment criteria of failure for the reliability

Measuring items	Symbol	Measuring conditions	Judgment criteria for failure
Forward voltage	$V_F$ (V)	$I_F=20\text{mA}$	Over $U_x1.2$
Reverse current	$I_R$ ( $\mu\text{A}$ )	$V_R=5\text{V}$	Over $U_x2$
Luminous intensity	$I_v$ (mcd)	$I_F=20\text{mA}$	Below $SX0.5$

#### Notes:

1. U means the upper limit of specified characteristics. S means initial value.
2. Measurement shall be taken between 2 hours and after the test pieces have been returned to normal ambient conditions after completion of each test.

# Double Light

## ◆ Soldering:

### 1. Manual of Soldering

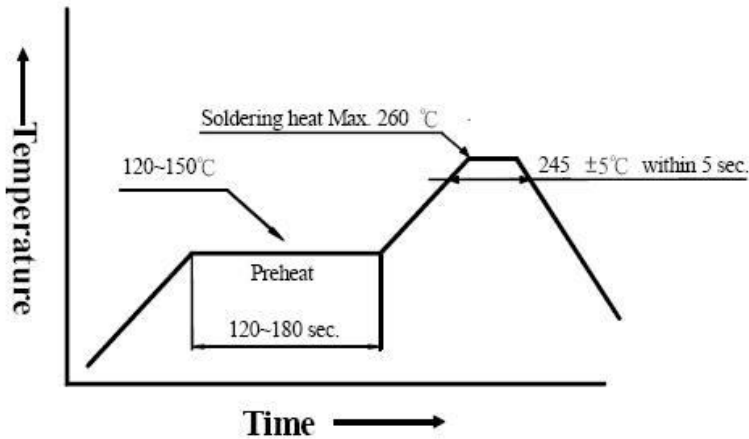
The temperature of the iron tip should not be higher than 300°C (572°F) and Soldering within 3 seconds per solder-land is to be observed.

### 2. Reflow Soldering

Preheating: 140°C~160°C±5°C, within 2 minutes.

Operation heating: 235°C (Max.) within 10 seconds (Max)

Gradual Cooling (Avoid quenching).

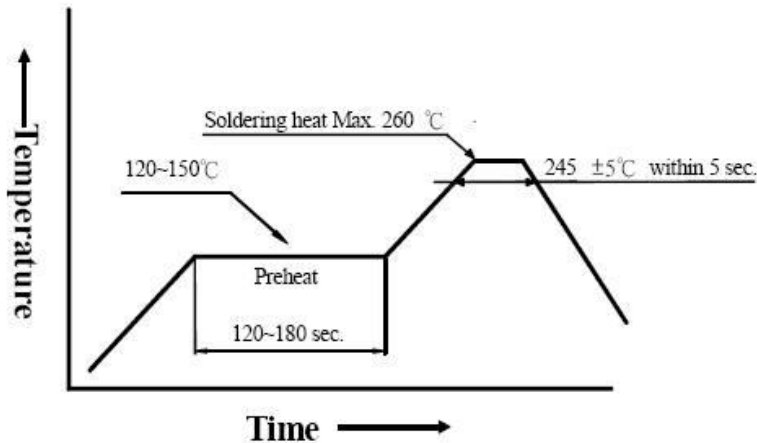


### 3. DIP soldering (Wave Soldering):

Preheating: 120°C~150°C, within 120~180 sec.

Operation heating: 245°C±5°C within 5 sec. 260°C (Max)

Gradual Cooling (Avoid quenching).





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### ◆ Handling :

Care must be taken not to cause to the epoxy resin portion of LEDs while it is exposed to high temperature. Care must be taken not rub the epoxy resin portion of LEDs with hard or sharp article such as the sand blast and the metal hook.

### ◆ Notes for designing:

Care must be taken to provide the current limiting resistor in the circuit so as to drive the LEDs within the rated figures. Also, caution should be taken not to overload LEDs with instantaneous voltage at the turning ON and OFF of the circuit.

When using the pulse drive care must be taken to keep the average current within the rated figures. Also, the circuit should be designed so as be subjected to reverse voltage when turning off the LEDs.

### ◆ Storage:

In order to avoid the absorption of moisture, it is recommended to solder LEDs as soon as possible after unpacking the sealed envelope.

If the envelope is still packed, to store it in the environment as following:

- 1) Temperature : 5°C-30°C (41°F), Humidity : RH 60% Max.
- 2) After this bag is opened, devices that will be applied to infrared reflow, vapor-phase reflow, or equivalent soldering process must be:
  - a) Completed within 24 hours.
  - b) Stored at less than 30% RH.
- 3) Devices require baking before mounting, if (2) a or (2) b is not met.
- 4) If baking is required, devices must be baked under below conditions: 12 hours at 60°C±3°C.