APPROVAL SHEET

CUSTOMER	
PRODUCT	IR RECEIVER MODULE
MODEL NO.	LR-S25CN
ISSUED DATE	

APPROVAL NO.				
APPROVAL DATE				
	PREPARED	CONFIRMED	CONFIRMED	APPROVAL
APPROVAL				

ISSUED DEPT.		ISSUE	CONFIRMED	APPROVAL
LUMICOM Luminous & Communication				

IR Receiver Modules for Remote Control Systems

Lead Free

◆ Description

The **LR−S25C..** series are infrared remote control receiver modules. They are transfer−molded, small size, light weight and low current consumption modules.
The strong points of Lumicom IR modules are reliable operation even under disturbing ambient light source, and the protection against uncontrolled output pulses.

◆ Features

- Wide operating supply voltage between 2.4V to 6.5V
- Photo detector and preamplifier in one package.
- Internal filter for PCM frequency.
- Enhanced immunity against many different kinds of disturbance light sources.
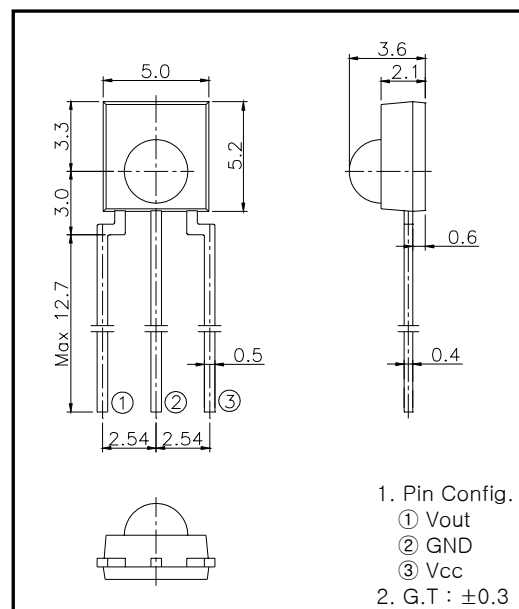- Low power consumption.
- Output active low.

◆ Application

- AV equipment (TV, DVD Player, Audio, CD player, STB, etc)
- Home appliances (Computer, Air conditioner, Camera, etc)
- Infrared remote control Toys.

◆ External Dimensions   (Unit: mm)

1. Pin Config.
   ① Vout
   ② GND
   ③ Vcc
2. G.T : ±0.3

◆ Pin Configuration

Type	Pin Configuration
LR-S○1○○○	V_{OUT} − V_{CC} − GND
LR-S○2○○○	V_{CC} − V_{OUT} − GND
LR-S○3○○○	GND − V_{CC} − V_{OUT}
LR-S○4○○○	GND − V_{OUT} − V_{CC}
LR-S○5○○○	V_{OUT} − GND− V_{CC}
LR-S○6○○○	V_{CC} − GND − V_{OUT}

◆ Carrier Frequency

Type	Carrier Frequency
LR-S○○A○○	32.7 kHz
LR-S○○B○○	36.7 kHz
LR-S○○C○○	37.9 kHz
LR-S○○D○○	40.0 kHz
LR-S○○E○○	56.7 kHz

◆ Block Diagram

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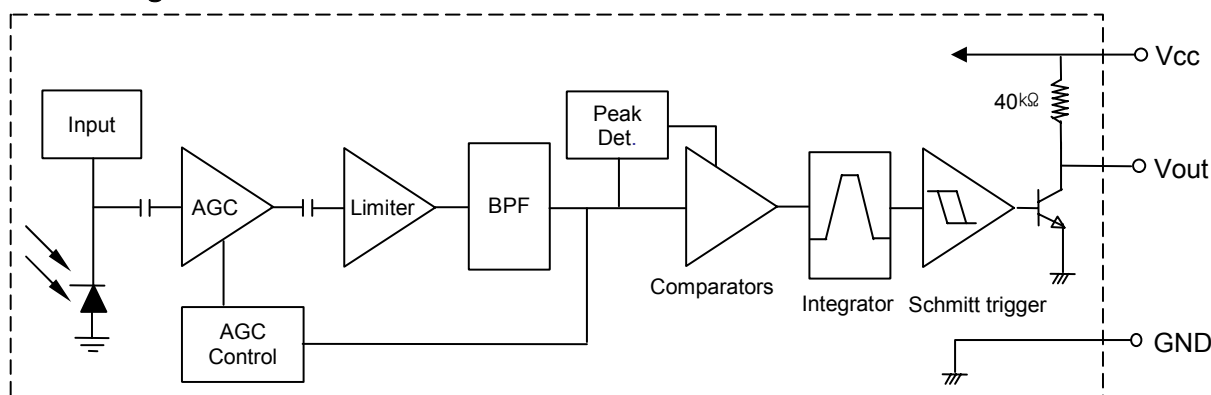
◆ **Absolute Maximum Ratings**   (Ta = 25℃)

Parameter	Symbol	Ratings	Unit
Supply Voltage	V_{CC}	7.0	V
Output Current	V_{OUT}	2.5	mA
Operating Temperature	T_{opr}	−20 to +80	℃
Storage Temperature	T_{stg}	−30 to +85	℃
Soldering Temperature ※1	T_{sd}	260 , 5sec	℃

※1. t<5 s, 1.6mm from package

◆ **Recommended Operating Condition**

Parameter	Symbol	Ratings	Unit
Operating Voltage	V_{CC}	2.4 to 6.5	V
Input Frequency	f_{in}	30 to 60	kHz

◆ **Electro−optical Characteristics**   (Ta = 25℃)

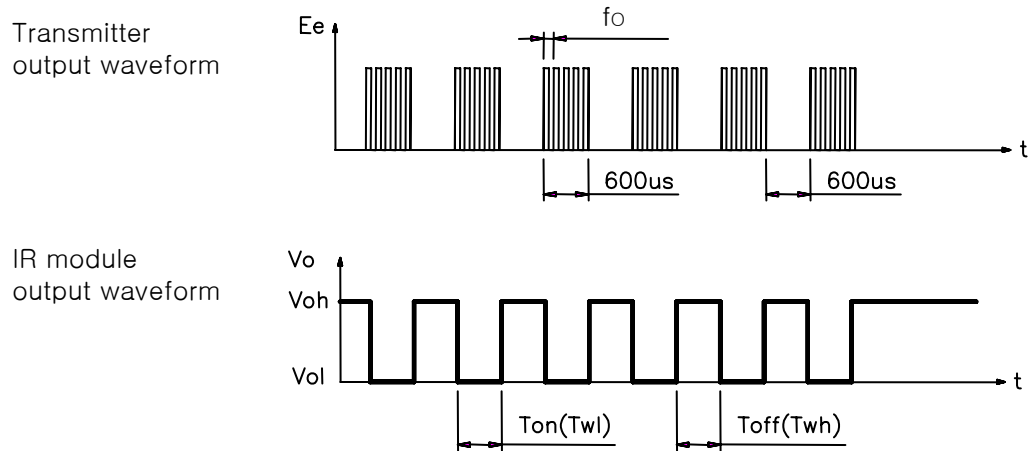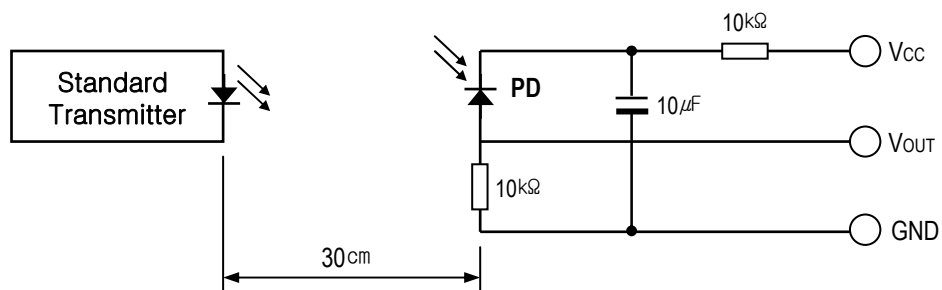| Parameter	Symbol	Conditions		Min	Typ	Max	Unit
Supply Voltage	V_{CC}			2.4	−	6.5	V
Supply Current	I_{CC}	No input signal		0.8	1.2	1.5	mA
B.P.F Center Frequency	f_o			−3	f_o	+3	%
Peak Wave Length	λ_P			−	940	−	nm
High Level Output Voltage	V_{OH}	Fig.1		V_{CC}−0.5	−	−	V
Low Level Output Voltage	V_{OL}	Fig.1		−	0.2	0.4	V
High Level Output Pulse Width	T_{WH}	Fig.1		450	600	750	μs
Low Level Output Pulse Width	T_{WL}	Fig.1		450	600	750	μs
Arrival Distance	L	Fig. 1,2,3	±0°	−	13	−	m
			±30°	−	10	−	m
			±45°	−	7	−	m
Output Form		Active Low					

◆ **External Application Circuit**
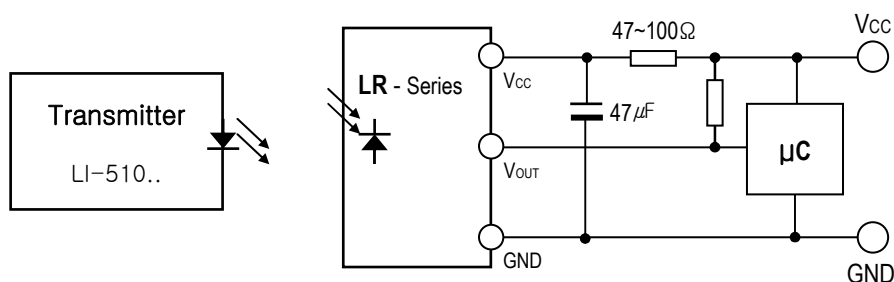
　　※ In case Vcc includes any of noise factor, please add the R−C filter as above.
　　　 R−C filter should be connected closely between Vcc pin and GND pin.
　　※ ON/OFF pulse width is satisfied within 0.3m~ arrival distance.

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◆ Measurement Conditions

[Fig.1] Output Waveform

Transmitter
output waveform

Ee

f_O

600us   600us

t

IR module
output waveform

Vo

Voh

Vol

Ton(Twl)   Toff(Twh)

t

[Fig.2] Transmitter

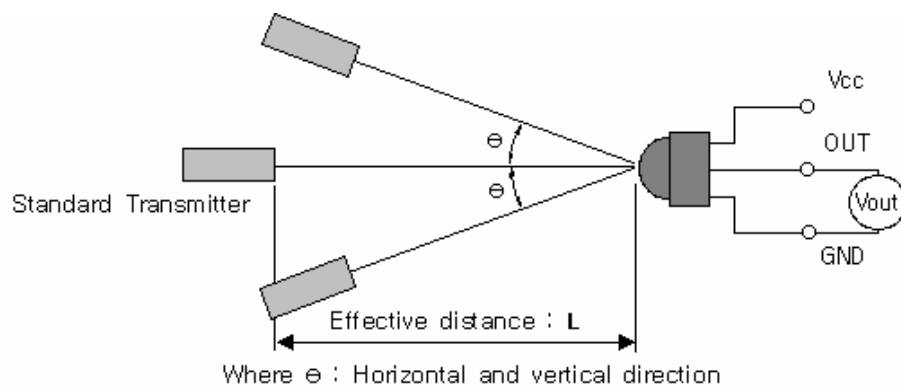Standard
Transmitter

10kΩ

PD

$10\mu F$

Vcc

V_{OUT}

10kΩ

GND

30cm

※ Vout value of the standard transmitter should satisfy 250mVp-p when they were tested as above.

[Fig.3] Arrival distance test condition

Standard Transmitter

θ

θ

Vcc

OUT

Vout

GND

Effective distance : **L**

Where θ : Horizontal and vertical direction

※ Intensity of illumination checked at detecting surface of IR module is 0 Lux.

◆ Suitable Data Format

The circuit of the **LR-S25C..** series is designed in that way that unexpected output pulses due to noise or disturbance signals are avoided. A band pass filter, an integrator stage and an automatic gain control are used to suppress such disturbances.
The distinguishing mark between data signal (not suppressed) and disturbance signal (suppressed) are carrier frequency, burst length and Signal Gap Time (see Fig. 4).

The data signal should full-fill the following condition :
▪ Carrier frequency should be close to center frequency of the band-pass.
▪ Burst length should be 300us/burst or longer.
▪ After each burst, a gap time of at least 300us is necessary.
▪ The data format should not make a continuous signal transmission.
▪ There must be a Signal Gap Time (longer than 20ms) at least each 100 ms, or each data command.

Some examples for suitable data format are :
NEC Code, RC5 Code, Toshiba Code, Matsushita Code, Mitsubishi Code, Sony Code.

[Fig.4] Data Signal diagram
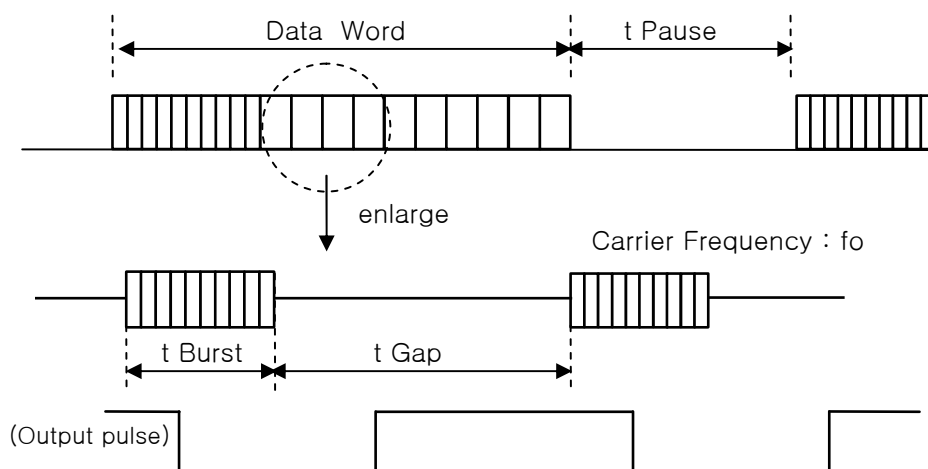
※ t Gap   : Signal gap time between two burst in pulses of carrier.
※ t Pause : Data pause between two data words.
※ t Burst : Length of a burst in pulses of the carrier frequency.

◆ Disturbance Suppression

When a disturbance signal is applied to the **LR-S25C..** series. it can still receive the data signal. However the sensitivity is reduced to that level that no unexpected pulses will occurrence.
Some examples for such disturbance signals which are suppressed by the **LR-S25C..** series are :

▪ Signals from fluorescent lamps with electronic ballast
  (please refer to Fig.5, Fig.6)
▪ Continuous signal at 38 kHz or at any other frequency
▪ DC light (from tungsten bulb or sunlight)

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[Fig.5] IR Signal from Fluorescent Lamp with high Modulation
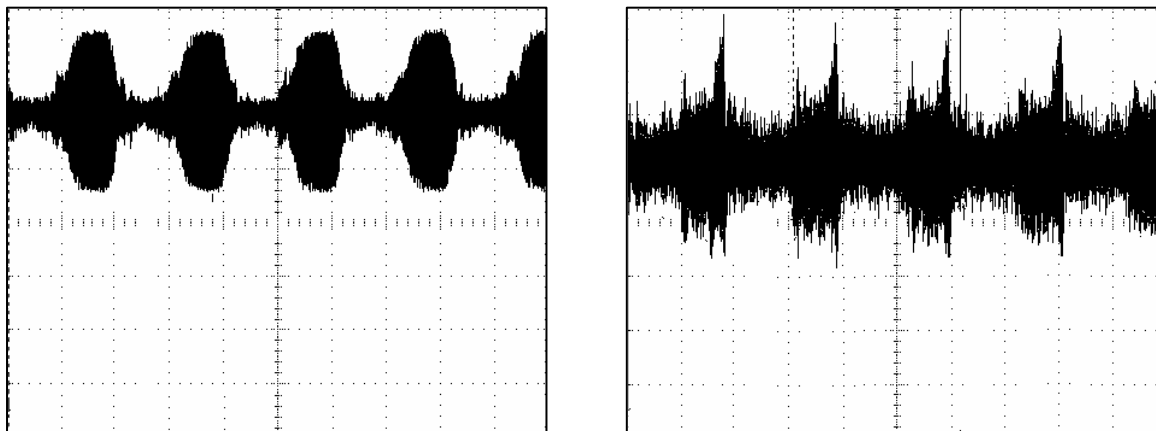
[Fig.6] IR Signal from Fluorescent Lamp with low Modulation
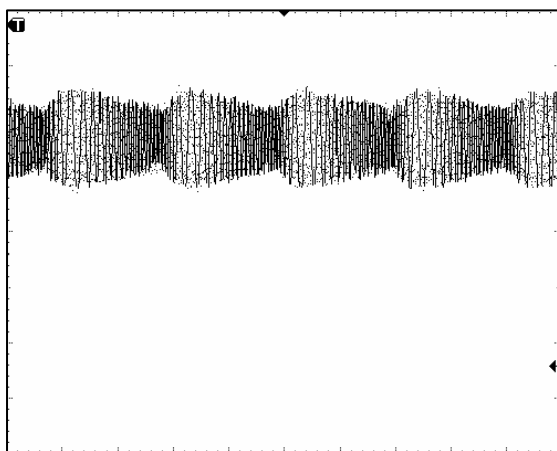
The signals shown in Fig. 5 and Fig. 6 comes from a fluorescent lamp with electronic ballast which is operated at 60 Hz power line frequency.
A different kind of disturbance signal is caused by fluorescent lamps with electronic ballast. Typically the oscillating frequency of the optical disturbance signal of such lamps is in the range between 50 kHz and 100 kHz. This frequency is twice the electrical oscillating frequency of the driver circuit in the lamp ballast. All **LR-S25C..** series IR receiver modules can suppress such disturbance signals as shown in Fig.5 and Fig. 6 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.

◆ Reliability Test Items

Parameter	Test conditions		Remark
High Temperature	Ta=+70, Vcc=5.0V	t=240h	※1, ※2
Low Temperature	Ta=−20, Vcc=5.0V	t=240h	※1, ※2
High Temp./ High Humidity	Ta=+60℃ 90%RH, Vcc=5.0V	t=240h	※1, ※2
Heat Cycle	Ta=−25℃(0.5h) to +80℃(0.5h)	20 cycle	※2, ※3
Fall Test	Height=75cm, 3 times		※4

※ 1. Supply voltage of load test is 5V.

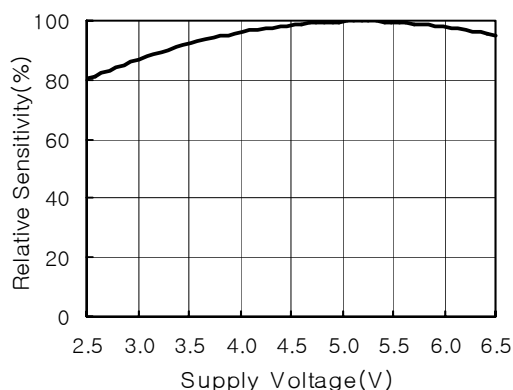※ 2. Electro-optical characteristics shall be satisfied after leaving 2 hours in the normal condition.

※ 3. Heat cycle test shall repeat above condition 20 times under no load.

※ 4. The test devices shall be dropped three time on the hard wooden board from a height of 75㎝.
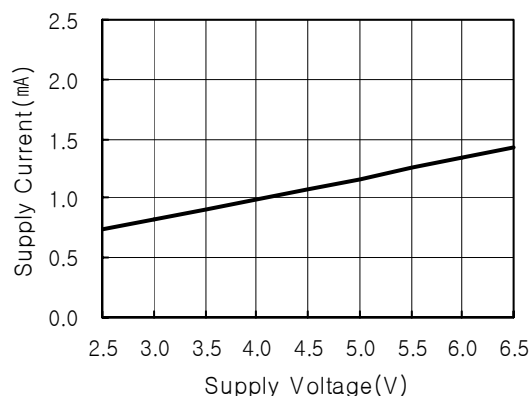
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◆ Electrical/Optical Characteristics

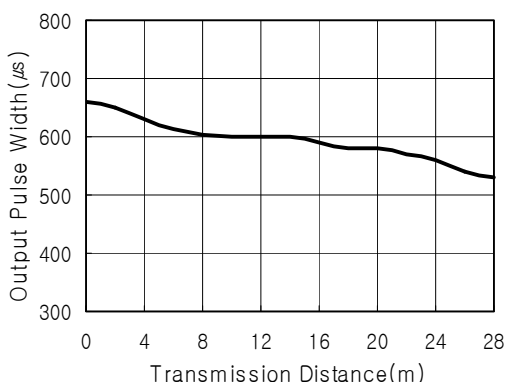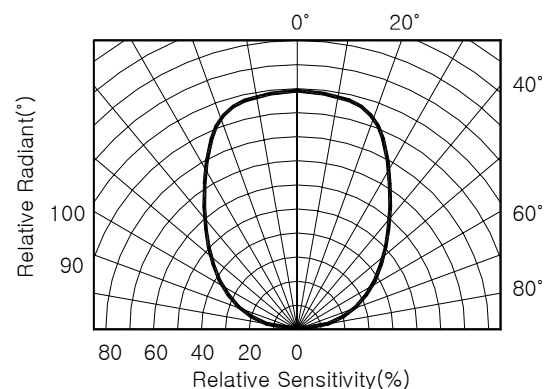[Fig.1] Sensitivity vs. Supply Voltage

[Fig.2] Supply Current vs. Voltage

[Fig.3] Output Pulse Width vs. Distance

[Fig.4] Directivity (Horizontal/Vertical)

◆ Caution

• 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.
• Store and use where there is no force causing transformation or change in quality.
• Store and use when there is no extreme humidity.
• Solder the lead-pin within the condition of ratings.
• To prevent static electricity damage to the product. make sure that the human body and the soldering iron are connected to ground before using.
• Put decoupling condenser($47\mu F \sim 470\mu F$) between V_{CC} and GND for reducing the noise from power supply line.

◆ Others

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

◆ ESD Test Results

Parameter	Conditions	Specification	Results
Machine Model	C=200^{pF}, R=0Ω	Min ±200V	>±200V
Human Body Model	C=100^{pF}, R=1.5^{kΩ}	Min ±2000V	>±2000V

◆ Material Configuration

Parameter	Configuration	Remark
IC	silicon(99%)	
Photo diode	silicon(99%)	
Lead frame	iron(99.5%)	
Epoxy resin	resin(55.5%), hardener(45.5%)	
Silver epoxy	silver(80%), resin(10%), hardener(10%)	
Bond wire	gold(99.99%)	
Shield Case		
Support Guide		

◆ Packing Method

Parameter	Dimension	Quantity
Anti−Bag	120 x 150 x 0.15㎜	500 ea
Box(#1)	140 x 220 x 75㎜	2,500 ea
Box(#2)	295 x 400 x 250㎜	25,000 ea
Box(#3)	620 x 450 x 515㎜	100,000 ea

[Inner Box − #1]

[Out Box − #2]

[Out Box − #3]

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◆ **External Dimension** (Unit : mm)

5.0

3.3

3.0

Max 12.7

2.54 2.54

① ② ③

0.5

3.6

2.1

5.2

0.6

0.4

1. Pin Config.
   ① Vout
   ② GND
   ③ Vcc
2. G.T : ±0.3