

Linear Light Sensor

LLS05-A

Production Specification

- Replacement of CdS
- RoHS Compliant / Pb-free / Cd-free
- Linear Output Type Light Sensor

■ TYPICAL APPLICATIONS

- Replacement of Photoresistor (CdS).
- Control of backlight brightness for LCD Monitors, TV sets, PDA, Cameras and Mobile Phones.
- Switch for lighting equipments and Toys.
- Testing for daylight.

■ FEATURES

- Linear output conforming to illuminance.
- Built-in optical filter for spectral response similar to that of the human eye.
- High Gain Photocurrent Amplifiers IC
- Temperature Stable.
- Low dark current and Low working Lux.
- RoHS Compliant / Pb-free / Cd-free.

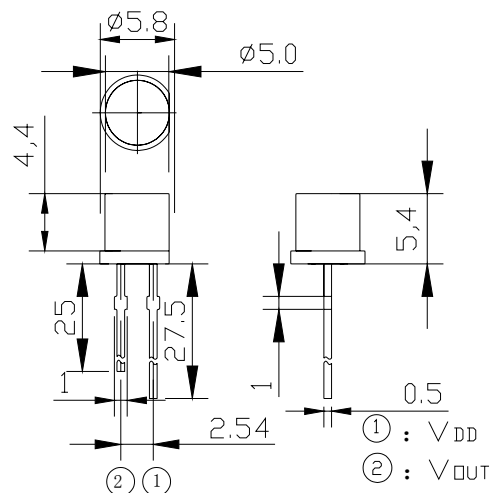
■ FUNCTIONAL PIN DESCRIPTION

Item	Description
V_{DD}	Positive Terminal
V_{OUT}	Negative Terminal

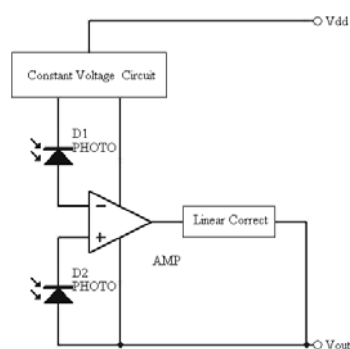
■ MAXIMUM RATINGS ($T_a = 25^\circ\text{C}$)

Characteristics	Symbol	Rating	Unit
Supply voltage	V_{DD}	-0.5 to 7	V
Output voltage	V_{OUT}	$\leq V_{DD}$	V
Permissible power dissipation	P	70	mW
Operating temperature range	T_{opr}	-30 to 85	$^\circ\text{C}$
Storage temperature range	T_{stg}	-40 to 100	$^\circ\text{C}$
Soldering temperature range (10 s)	T_{sol}	260	$^\circ\text{C}$

Outline Dimensions



Internal Connection Diagram



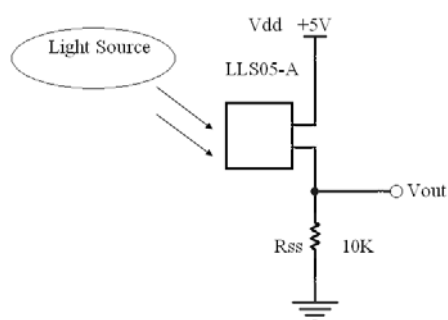
ELECTRICAL AND OPTICAL CHARACTERISTICS (Ta= 25°C)

Parameter		Symbol	Test Conditions	Min	Type	Max	Unit
Peak Spectral Response		λ_{PR}			550		nm
Photocurrent (1)		$I_L(1)$	$V_{CC}=5V, E_V=5Lux$	2.0	2.5	2.8	uA
Photocurrent (2)		$I_L(2)$	$V_{CC}=5V, E_V=10Lux$	5.40	8.23	8.70	uA
Photocurrent (3)		$I_L(3)$	$V_{CC}=5V, E_V=100Lux$	91.0	114.0	158.0	uA
Dark Current		$I_{DD(DARK)}$	$V_{CC}=5V, E_V=0Lux$		10		nA
Linear Response Range		Ev		1-200			Lux
Switching Time	Rise time	tr	$V_{CC}=5V, R_{SS}=10k\ \Omega$	8.5			ms
	Fall time	tf		8.5			

Note: Output capacitance has an effect on switch time.

The white LED is regarded as light source.

TEST SCHEMATIC CIRCUITS



$$\text{Photocurrent} = V_{out} / R_{ss}$$

*R_{ss} is recommended to use high stable resistor.

Figure 1 - Photocurrent Measurement Circuit

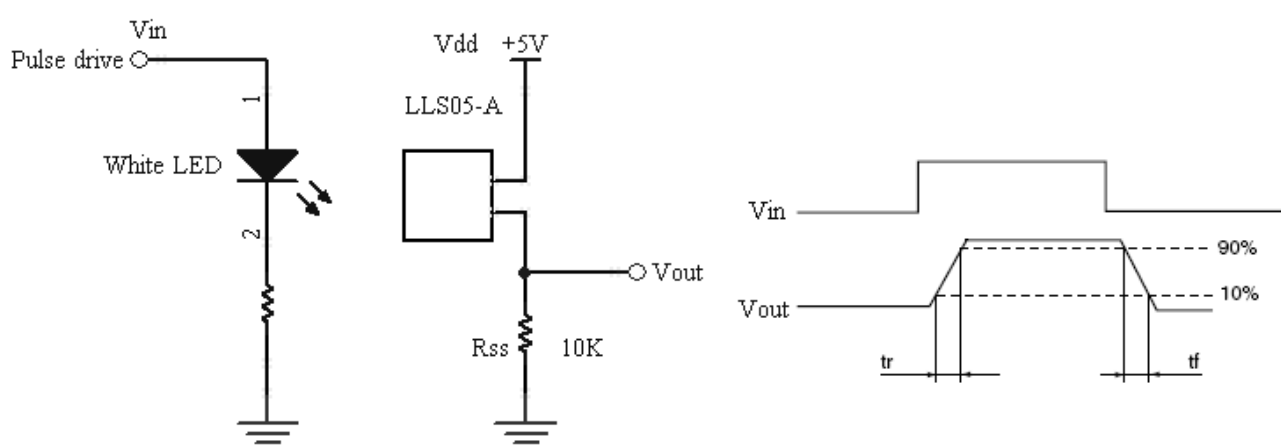


Figure 2 - Measuring Method for Switching Time

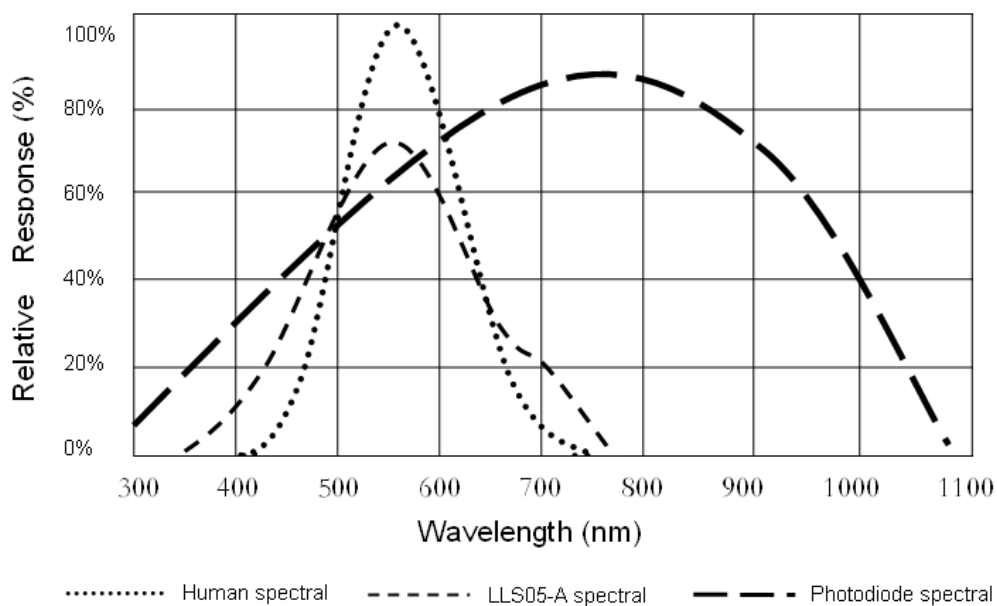
ELECTRICAL AND OPTICAL CHARACTERISTIC CURVES

Figure 3 - Spectral Response Curves

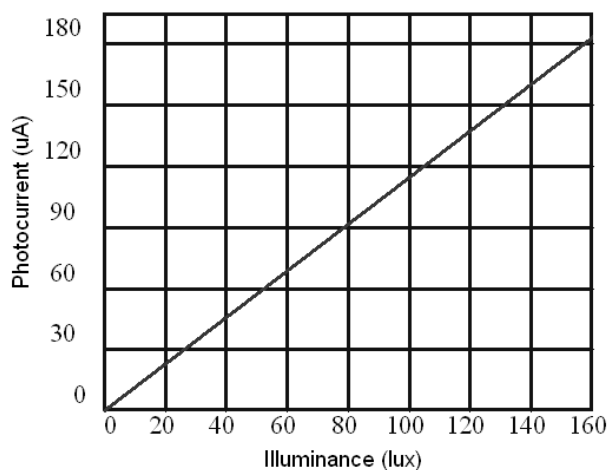


Figure 4 – Photocurrent vs. Illuminance

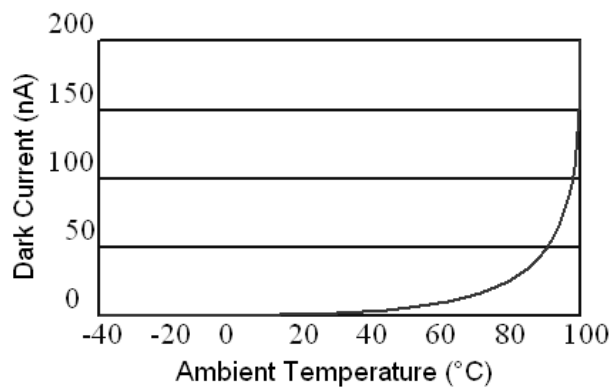


Figure 5 – Dark Current vs. Ambient Temperature

APPLICATION EXAMPLES

Automatic Night Light Figure 6.

This circuit shows the LLS05-A in an Automatic Night Light. The Lamp current is switched by a sensitive gate SCR. The I_{gate} (Type) of the SCR (Silicon Controlled Rectifier) should be less than $10\mu A$. When the light is above threshold, current flows between the V_{DD} and V_{OUT} pins of the IC which diverts current away from the gate of the SCR. The light switching threshold can be adjusted by choosing different values for $R2$ and $R3$.

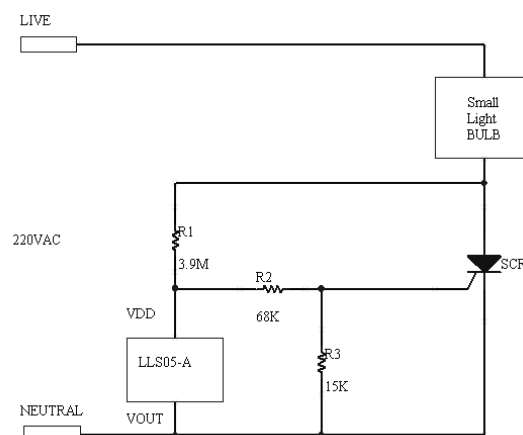


Figure 6

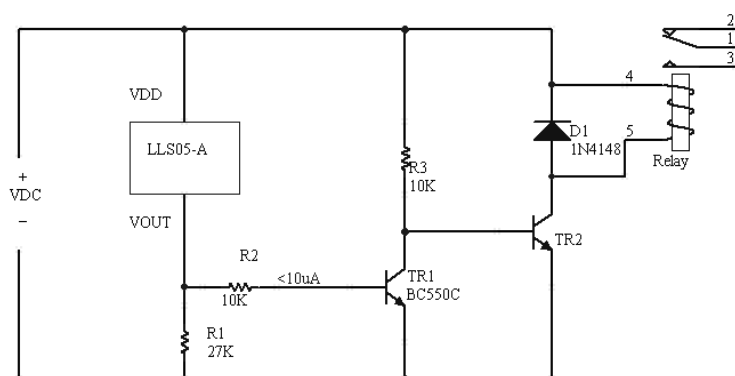


Figure 7

Relay Drivers Figure 7.

The relay coil is energised when the light $<$ Slux(threshold). The Slux (threshold) is set by $R1$. For battery operated circuits, the h_{fe} of $TR2$ should be high to allow a high value for $R3$. The h_{fe} of $TR1$ should be high so that a low base current will be able to pull $R3$ down.

Interface Circuit Examples Figure 8 & Figure 9

Figure 8. This circuit uses a comparator (or Amp) to provide a level switching interface for the LLS05-A. Out will be high when the voltage at $V_{OUT} < 0.1 \cdot V_{DD}$.

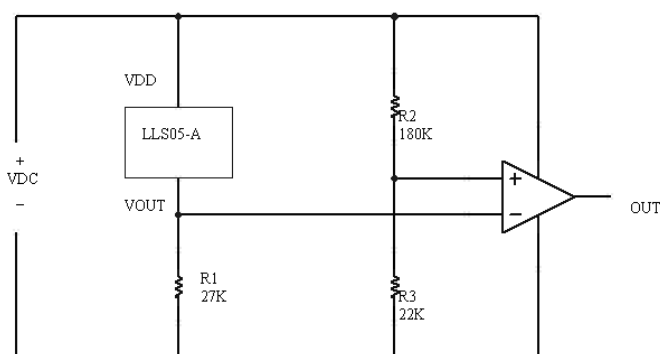


Figure 8

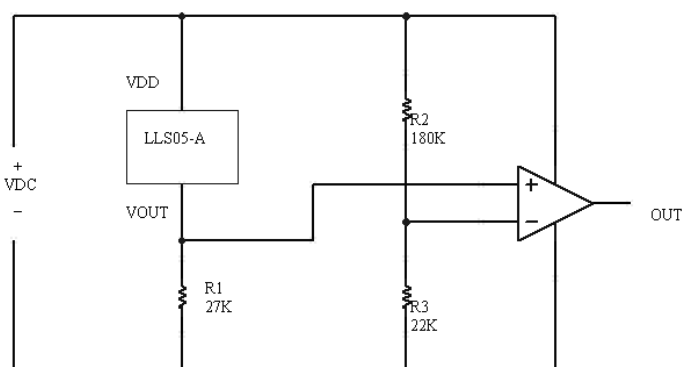


Figure 9

Figure 9 as Figure 8 except that out will be high when the voltage $V_{OUT} > 0.1 \cdot V_{DD}$

■ CAUTIONS FOR USE

- ◆ Do not use the sensors under conditions that exceed the range of its specifications.
- ◆ Application circuit diagrams and circuit constants contained herein are shown as examples of standard use and operation. Please pay careful attention to the peripheral conditions when designing circuits and deciding upon circuit constants in the set.
- ◆ CMOS IC is contained, so static electricity should be avoided .
- ◆ Be sure to perform soldering at values within the maximum ratings. Take care so that no external force is applied to the lead during and immediately after soldering. Do not perform reflow soldering.
- ◆ The product is compliant with ECC RoHS.
- ◆ The photocurrent will be influenced if the dirty or destroy on the surface.
- ◆ The sensors are small, transparent, plastic packages. They are sensitive to moisture and come in sealed, moisture proof packages.
- ◆ Small packing for 1000PCS, Big packing for 10000PCS.