

## Data Sheet Of INK1002 RGB LED (GEINK1002RGB)

### Features

- INK1003 and RGB LED chips are packaged in a single 5050 LED package to form a independent pixel
- Independent LED and driver IC power supply to enhance the reliability and flexibility;
- Built-in signal reconstruct circuit ensures up to 2048 lamps cascading with no distortion
- Single-wire control, chips can tranceive signal with only one wire.
- Wide operating voltage:3.3~5.4V
- High gray level, 256 gray levels, the lamp can display more than 16777216 colors.
- Low output current deviation:
  - Between channels in a single chip:  $\pm 1\%$ ;
  - Between chips:  $\pm 3\%$ ;
- Data frequency range wide: 800KHz
- Schmitt trigger input
- High reliability, ESD susceptibility high: HBM 8KV

### Applications

- LED decorative lighting
- Indoor/Outdoor LED video or massage display
- Un-regular LED displays
- High pixel density LED strips
- LED strips operate between 5~12V

### Description

INK1002 is a digital full color SMD5050 LED, which integrates high quality LED chips and INK1003 single-wire cascading LED driver IC in a small SMD5050 LED package. Its dimension is the same as the usual SMD5050 LED. The high uniformity driver IC INK1003 ensures the low deviation of this digital LED.

The communication protocol of INK1002 is "AUTO-ZERO" code. Once the chip is reset, DI PIN is ready to receive gray level data transferred by the controller, when the first 24-bit data package is received by the first chip, the later received data will be reconstructed by the chip and transferred from DO PIN after about 150nS delay to the next chip. With this method, the cascading LED lamps are unlimited, only limited by the data transferring rate.

INK1002 is low voltage driver, friendly to environment, high efficacy, long life time, and the application board is also minimized, easier for user. Its operating temperature range is  $-40\sim 85^{\circ}\text{C}$ .

#### ● PIN Configuration

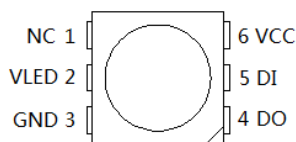
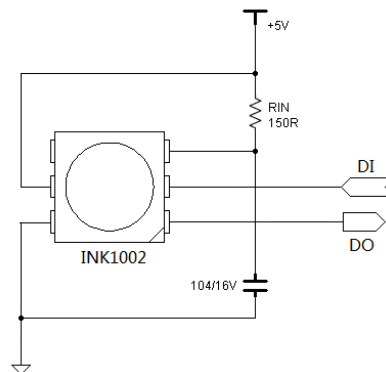


Fig1 5050 package

#### ● Typical Application Circuit



## Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power Supply for Driver IC	VCC	-0.3 to 5.4	V
Power Supply for LED	VLED	-0.3 to 7.5	V
Input Voltage	V <sub>IN</sub>	-0.3 to VCC+0.3V	V
Output Voltage	V <sub>OUT</sub>	-0.3 to VCC+0.3V	V
LED operating Current	I <sub>LED</sub>	54	mA
LED Driver Current Deviation Between Different Chips	D <sub>IOE</sub>	±3	%
Data Rate	F <sub>CLK</sub>	800	KHz
Maximum Power Dissipations	P <sub>D</sub>	1200	mW
Operating Junction Temperature	T <sub>opr</sub>	-40 to + 150	°C
Storage Temperature	T <sub>stg</sub>	-55 to + 150	
ESD Susceptibility for Driver IC		8000	V

**NOTE:** If the voltage on the pins exceeds the maximum ratings may cause permanent damage to the device.

## Electrical Parameters (VCC=5V, TA= 25°C, specified otherwise.)

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Driver IC Power Supply	V <sub>CC</sub>		3	--	5.5	V
LED Power Supply	V <sub>LED</sub>		3.5		7.5	V
Output Current	I <sub>outH</sub>	V <sub>LED</sub> =5V	17	--	19	mA
	I <sub>outL</sub>	Output OFF, V <sub>LED</sub> =7.5V	--	1	10	uA
	I <sub>SOURCE</sub>	Other output	--	1	--	mA
	I <sub>SINK</sub>	Other output	--	-1	--	mA
Quiescent Current	I <sub>STB</sub>	LED off	--	1000	1600	μA
VCC clamp voltage	V <sub>CCCLAMP</sub>	V <sub>IN</sub> =7.5V	5.1	5.4	5.6	V
Minimum Constant Current Output Time	I <sub>OH</sub>	V <sub>IN</sub> =V <sub>IH</sub> or V <sub>IL</sub>	--	2.5	--	uS
Input Current	I <sub>IN</sub>	PIN: CKI, SDI V <sub>IN</sub> =VDD or GND	--	--	±1	uA
Input Voltage Level	V <sub>IH</sub>	TA=-40~125°C	0.8*VDD	--	VDD	V
	V <sub>IL</sub>		GND	--	0.2*VDD	V
Output Voltage Regulation	%dV <sub>OUT</sub>		--	±1	--	%/V
Line Regulation	%dV <sub>CC</sub>	V <sub>CC</sub> =4~5.5V, V <sub>OUT</sub> between 1.0V and 3.0V	--	±1	--	%/V
Pull Down Resistance	R <sub>INLOW</sub>	R <sub>LIN</sub>	--	300	--	KΩ

Block Diagram

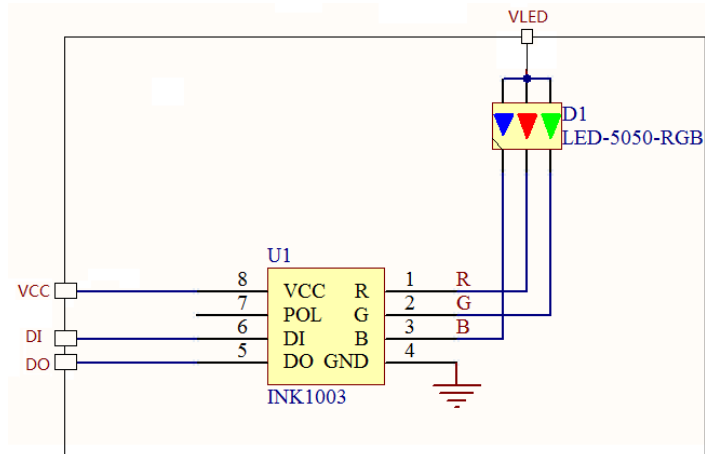


Fig2, INK1002 Block Diagram

PIN Function Description

PIN No	NAME	Description
1	NC	No Connection
2	VLED	LED power supply
3	GND	Ground
4	SDO	Serial data output
5	SDI	Serial data Input
6	VCC	Driver IC power supply

Package Information (Outline and Dimensions, in mini-meter)

