# Data Sheet Of INK1003 IC Driver

### Characteristics Applications

☐ 3-Channel constant current LED driver.

☐ Output current won't vary with the driving output voltage.

☐ Wide operating voltage:3.3~5.4V

☐ High gray level, 256 gray levels.

☐ Polarity reverse function makes INK1003 suitable for high power full color LED lighting.

☐ Low output current deviation:

Between channels in a single chip: ±1 %；

Between chips: ±3%；

☐ Data frequency range wide: 400~800KHz

☐ Schmitt trigger input

☐ High reliability, ESD susceptibility high:

HBM 8KV

### General Description

INK1003 is a constant current LED driver. It is a single line 3-Channel 256 Grey Level Driver.It is designed for indoor/ outdoor LED displays and decorative LED lighting system. It is suitable for LED cascading applications. The INK1003 owns 3 output channels, each channel can sink 18.6mA constant current. INK1003 contains single line data transceiver decoder, data latches, output registers, band gap reference voltage generator, internal oscillator, and low saturation constant current sinks. The data received by INK1003 is decoded and then the decoded data is transferred in to the gray level comparator. The output of the gray level comparator controls the constant output current.

The output polarity reverse function is designed for driving high power LED by adapting the application circuitry. The single line control scheme reduces the engineering troubles mostly, the special designed input and output staged of INK1003, make INK1003 survive during output and input pin short with power source or GND. When 800KHz, it can achieve 1024Pixels cascade connection.

INK1003 is available in both SOP-8 and DIP-8 packages, the operating temperature is -40~85℃.

### PIN CONFIGURATION
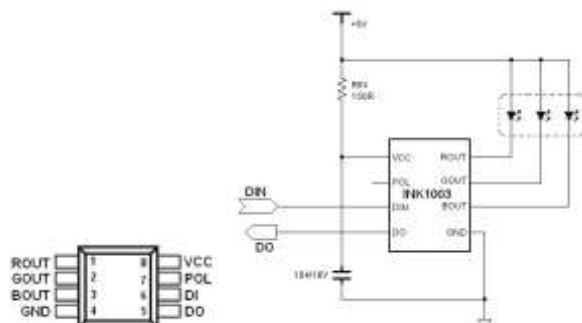


### Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|---|---|---|---|
| Power Supply Voltage | VCC | -0.3 to 6V | V |
| Input Voltage | $V_{IN}$ | -0.3 to VCC+0.3V | V |
| Output Pin Voltage | $V_{OUT}$ | -0.3 to VCC+0.3V | V |
| Output current | $I_{OUTCC}$ | 18 | mA |
| Output Current Deviation (Constant Current Driving Mode) Between output channels Between chips | $D_{IOI}$ $D_{IOE}$ | ±1 ±3 | % |
| Input Clock Frequency | $F_{CLK}$ | 800 | KHz |
| Maximum Power Dissipation | $P_D$ | 1200 | mW |
| ESD susceptibility | | 8000 | V |

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

**Function Block Diagram**
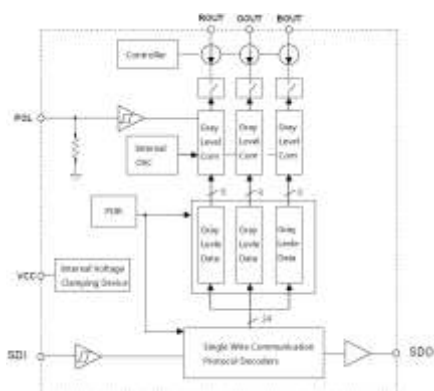


**Gray Scale Data Word Format**

INK1003 uses the one-line communication mode, with return to zero code gray scale data transport. When the SDI node receives total 24 bit data, SDO node begins to send data to the next chip (set low before sending) . After that the IC no longer receives data, 3 PWM output named ROUT、GOUT、BOUT outputs signal with different duty according to the data received. The period of output signal is 3.2mS.The chip receives data again until RESET signal is sent to SDI node of the IC. Then the SDI node receives total 24 bit data, SDO node begins to send data to the next IC again. The output of ROUT、ROUT、BOUT will not change until receiving RESET signal. After the RESET signal( more than 24uS low signal) , 24 bit PWM data received newly will output to ROUT、GOUT、BOUT.

Automatic shaping forwarding technology is utilized, so the number of cascade is not affected by the signal transmission, but only affected by refresh speed. A n example of 1024 cascade, whose refresh time is 1024X0.4X2＝0.8192ms, There will be no flicker phenomenon.
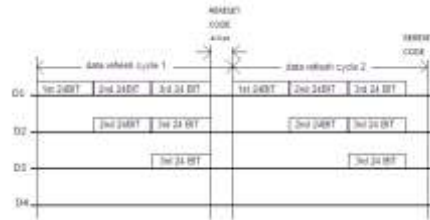
During data transfer, the first bit is the MSB of the ROUT channel, the last one transferred into the data shift register is the LSB of the BOUT channel.

The current duty of each channel of as bellow:

24 BIT DATA FORMATE

R7 R6 R5 R4 R3 R2 R1 R0 G7 G6 G5 G4 G3 G2 G1 G0 B7 B6 B5 B4 B3 B2 B1 B0

NOTE: MSB is sent first, LSB is sent last. In order to send data ROUT, GOUT, BOUT.



**INK1003 Cascading Applications**

Push-pull output stage is integrated in INK1003 to realize strong driving ability, signal can be transmit
very long with cascade application. 20 meters can be realized at the 800 KHz clock frequency in laboratory.
A series connected 50ohm resistor is needed to guarantee impedance matching and avoid signal reflection.
Meanwhile, damage to the IC is avoid when signal line and power line is misconnected.

# Package Information