Every part matters

EN

Instruction Manual

ILPL-K202-RGB1-AP105-01

INTELLIGENT
LED SOLUTIONS

Product Overview

The ILPL-K202-RGB1-AP105-01 is an Intelligent LED with control and light emitting circuit, all contained in a 2mm square sized package.

Based on the industry standard APA102-2020 device, the control circuit consists of signal shaping amplification, built-in constant current source, and a high precision RC oscillator.

The data protocol being used is the unipolar NRZ communication mode, where the 24-bit data is transmitted from the controller to DIN of the first LED, after an internal data latch, the remaining data is passed through the internal amplification circuit and sent out of the DO port to the remaining pixels. Using ‘automatic shaping forwarding technology’ means the number of cascaded LEDs is only limited by the signal transmission speed.

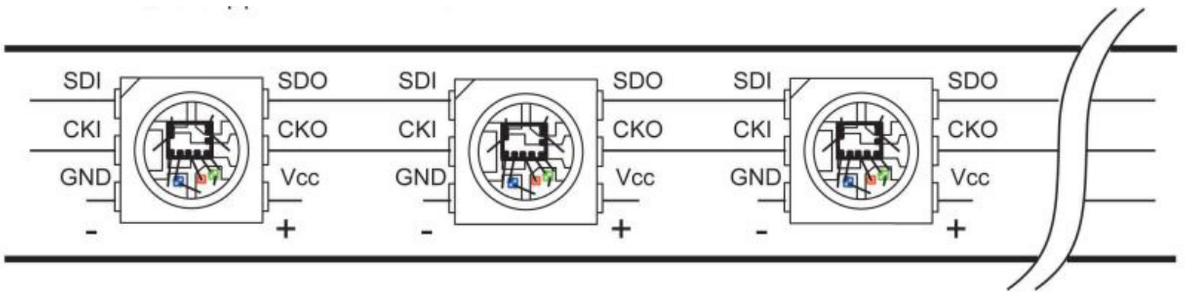
Applications

- Task Lighting
- Back Lighting
- Desk Lighting
- Garage Lighting
- Accent Lighting
- Under Cabinet Lighting
- Bar Lighting
- Refrigeration
- Industrial Applications
- Photography

Technical Features

- Control circuit and the RGB die all in one 2mm squared device
- Grey level adjusting control (256 level grey scale)
- Red drive special control enhances colour balance
- Transmission distance between two points can be up to 10M
- Using a typical data transmission frequency of 800 Kbps, you can achieve refresh rates of 30 frames per sec

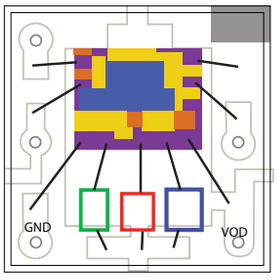
Application Circuit



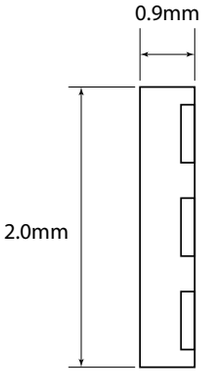
Product Specifications

Model No.	Colour	Millicandela	Refresh Rate	Applied Voltage	Power Consumption	View Angle	Weight (g)	Dimensions (mm) LxWxD	Operating Temperature
ILPL-K202-RGB1-AP105-01	RGB	R 300-330 mcd G 420-460 mcd B 160-180 mcd	400 cycle	5VDC	0.1W (MAX: 0.5W)	160˚	0.025	2.0x2.0x0.9	-40˚C — 70˚C

Technical Drawing



SDI : Data input
CKI: Clock input
SDO : Data output
CKO : Clock output
GND : -
Vcc : + 5V



Absolute Maximum Ratings

Parameter	Max Rating
Supply Voltage	0.3V to 6.0V
Input Voltage	VSS -0.3 to VDD +0.3
Operating Temperature	-40˚C to 70˚C
Storage Temperature	-50˚C to125˚C

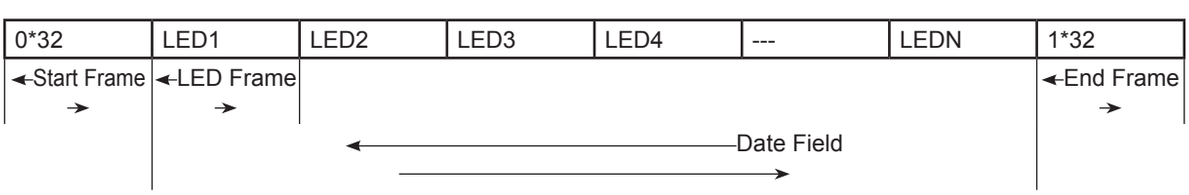
Electrical Characteristics

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Units
Supply Voltage	VDD	-	-	5.0	5.5	V
Input High Voltage	VIH	-	0.7VDD	-	VDD +0.3	V
Input Low Voltage	VH	-	VSS - 0.3	-	0.3VDD	V
Sink Current Voltage (RGB)	LOL	@VDD=5V, VOL >1V	22.5	24.5	26.5	mA
Pull High	RIN	@VDD=5V	-	-	-	KΩ
Regulator Voltage (VREG)	VREG	@VDD>5V	4.4	4.4	4.7	V
Oscillator Frequency	FOSC	-	800	-	1200	KHz

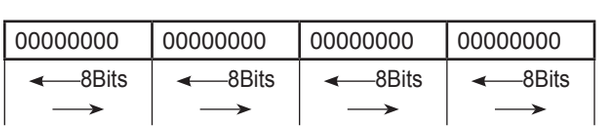
Function Description

Tabdem N-LED

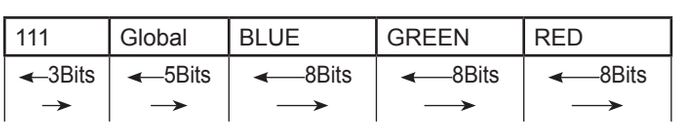
SDI



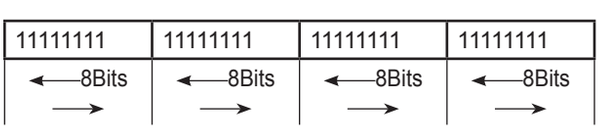
Start Frame 32 Bits



LED Frame 32 Bits



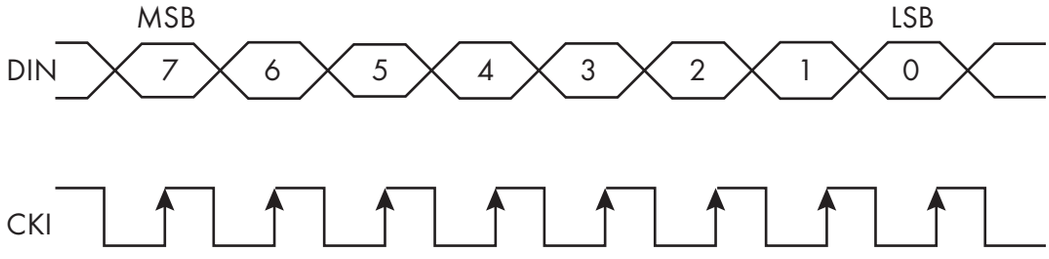
LED Frame 32 Bits



Global bit: 5-bit (32 level) brightness setting, while controlling RGB three-colour constant current output value, if set the Global bit for the 10000 (16/31) is the output current is half again the original PWM settings.

DATA MSB←→LSB	Driving Current
00000	0/31
00001	1/31
00010	2/31
…	
11110	30/31
11111	31/31 (max)

PWM input and output signals relations



DATA MSB —	Duty Cycle
00000000	0/256(min)
00000001	1/256
00000010	2/256
…	
11111101	253/256
11111110	254/256
11111111	255/256(max)

- The number of pixels per second sent to CKI frequency (FCKI) minus the Start Frame bit divided by the number 40 the number of LED Frame bit 32, if CKI frequency (FCKI) to 512KHz, the pixel number (512000—40) /32=15998, if the 50 second update Views can be connected in series LED number 15998/50=319. To increase the number of cascaded IC CKI frequency to be increased.
- POLAR to empty, RGB for the negative output; POLAR access VSS, RGB is positive output.
- VEN: Self-detection
- Data Field to the middle of 3bit were RGB in the MSB of the opposite phase, otherwise regarded as invalid data. VEN close to empty when the self-detection: when VEN VSS then activated self-detection.
- CSEL to empty when the CKO and CKI RP: CSEL connected with VSS when the CKO compared with CKI.

Reliability Plan

The reliability of products shall be satisfied with items listed below

Confidence Level: 90% LTPD: 10%

No	Test Item	Description & Condition		Sample Size	Ac/Re
1	Solderability	Tsld = 234±5˚C, 10sec	1 time	22	0/1
2	Low/High Temperature Storage	Ta = -40˚C/Ta = 100˚C	1000 hrs	22	0/1
3	ESD HBM Contact Discharge Air Discharge	V=2000V: tr=10ns v=+2K, -2KV: tr=lns	45 times 10 times	3 3	0/1 0/1
4	Temperature Cycle	-40˚C — 25˚C — 100--˚C — 25˚C	300 cycles	22	0/1

Cautions

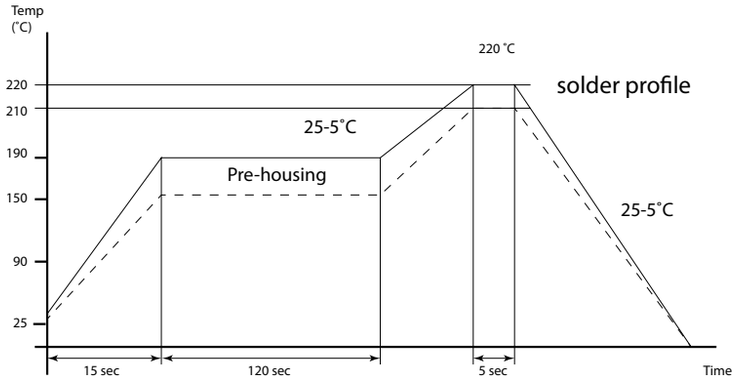
- Before opening the package:
  The LEDs should be kept at 30˚C or less and 30%RH — 85%RH. The LEDs should be used within a year. When storing the LEDs, moisture proof packaging with desiccant (Silica gel) is recommended.
- After opening the package:
  The LEDs should be kept at 30˚C or less and 30%RH — 70%RH. The LEDs should be soldered without 169hours (7days) after opening the package. If unused LEDs remain, they should be stored in moisture proof packages, such as sealed containers with packages of moisture desiccant (Silica gel) or reseal the moisture proof bad again.
  If the moisture desiccant (Silica gel) has faded away or the LEDs have exceeded the storage time, baking treatment should be performed using the following conditions.
  Baking treatment: 24 hours at 60˚C on tap and reel, 7 hours at 125˚C have no reel and tap.
  Please avoid conditions which may cause the LED to corrode, tarnish or discolour, those corrosion or discolouration might lower solderability or might effect on optical characteristics.
  Please avoid rapid transitions in ambient temperature, especially in high humidity environments where condensation can occur.
- Moisture Proof Packaging
  When moisture is absorbed into the SMT package it may vaporize and expand during soldering. There is a possibility that this can cause exfoliation of the contracts and damage to the optical characteristics of the LEDs. For this reason, the moisture proof packaging is used to keep moisture to a minimum in the package. A package of a moisture desiccant (Silica gel) is inserted into the moisture proof bat. The silica gel change its colour from blue to pink as it absorbs moisture.
- Static Electricity
  Static electricity or surge voltage damages the LEDs. It is recommended that a wrist band or an anti-electrostatic glove and show be used when handling the LEDs.
  All devices, equipment and machinery must be properly grounded. It is recommended that measures be taken against surge voltage to the equipment that mounts the LEDs.
  When in inspecting the final products in which LEDs were assembled, it is recommended to check whether the assembled LEDs are damaged by static electricity or not. It is easy to End

static-damaged LEDs by light-on test or a V_F test at lower current (below 1 mA).
Damaged LEDs will show some unusual characteristics such as the leak current remarkably increase, the forward voltage becomes lower, or the LEDs do not light at the low current. (Criteria: V_F>2.0v at 1_F=0.5mA).

- Heat Generation
  Please consider the heat generation of the LED when making the system design that it's very importance. The coefficient of temperature increase per input electric power is effected by the thermal resistent of the circuit board and density of LED placement on the board, and other components. It is necessary to avoid intense heat generation and operate within the maximum ratings given in the specification.
  The operation current should be decided after considering the ambient maximum temperature of LEDs.
- Care must be taken to ensure that the reverse voltage will not exceed the absolute maximum rating when using the LEDs with matrix drive.
  The LED light output is strong enough to injure human eyes. Precaution must be taken to prevent looking directly for more than a few seconds. Flashing light have been know to cause discomfort in people; you can prevent this be taking precautions during use. Also people should be cautious when using equipment that has LEDs incorporated into it.

Soldering Conditions

Recommended Re-flow profile



For further information please contact ILS

The values contained in this data sheet can change due to technical innovations. Any such changes will be made without separate notification.