



## SURFACE MOUNT LED

1.ELEMENT APPEARANCE

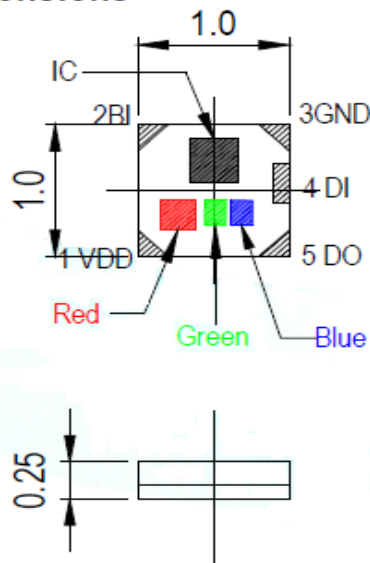
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Model No.	Lighting Color	Resin Color
RT-1010RGB-PWM	Red	Water Clear
	Green	
	Blue	

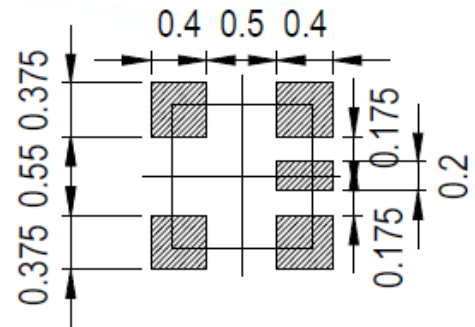
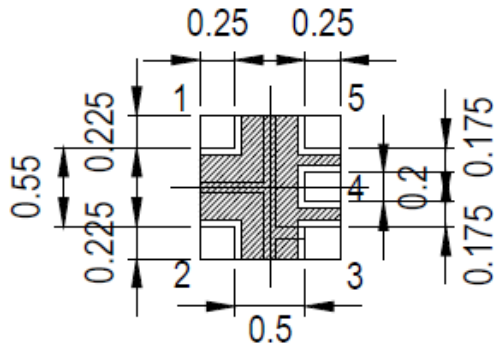
## Features

- Top SMD Integrated intelligent control chip
- The VDD input voltage is 3.5V~5.5V
- OUT R/G/B constant current value: 11.5mA
- OUT R/G/B power state: off by default
- OUT R/G/B port voltage resistance: 9 V
- OUT R/G/B output grayscale grade: level 256 grade
- A single-line zero-code SID data protocol was used
- The same frame shows the data synchronization refresh
- Data string, line cascade transmission, strong anti-interference ability
- Signal transmission rate: 800Kbps
- Pb-free
- RoHS compliant

## Package Dimensions



Recommended Solder Pad

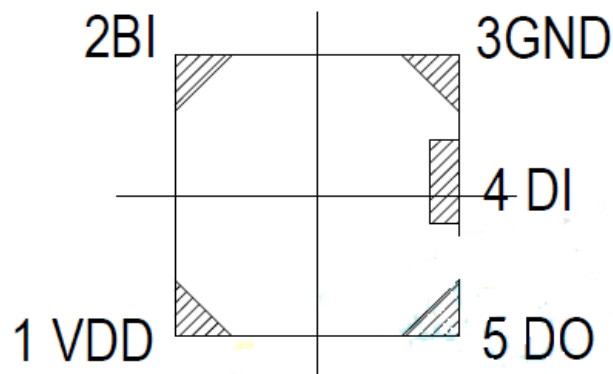


Note:  
Tolerance unless mentioned is  $\pm 0.1\text{mm}$ , Unit = mm.

**Applications**

- LED point light source, LED pixel screen.
- LED fantasy soft light bar, LED fantasy color hard light bar.
- LED Phantom running Horse Lamp, LED Phantom Color guardrail Tube.
- LED Phantom Module Lamp, LED Phantom Lamp string.

**Pin diagram and functions:**



NO.	Symbol	Pin name
1	VDD	Power input
2	BI	/
3	GND	Ground terminal
4	DIN	Signal input terminal
5	DOUT	Output of cascaded signal
/	R,G,B	Constant current output



**Electrical Characteristics** (TA= 25°C , VDD=5.0V)

Parameter	Symbol	Range	Company
OUT R/G/B port pressure resistance	BV <sub>OUT</sub>	8	V
Scope of work temperature	T <sub>J</sub>	-40~150	°C
Storage temperature	T <sub>stg</sub>	-55~+150	°C
ESD(Human Body Model)	V <sub>ESD</sub>	>2K	V

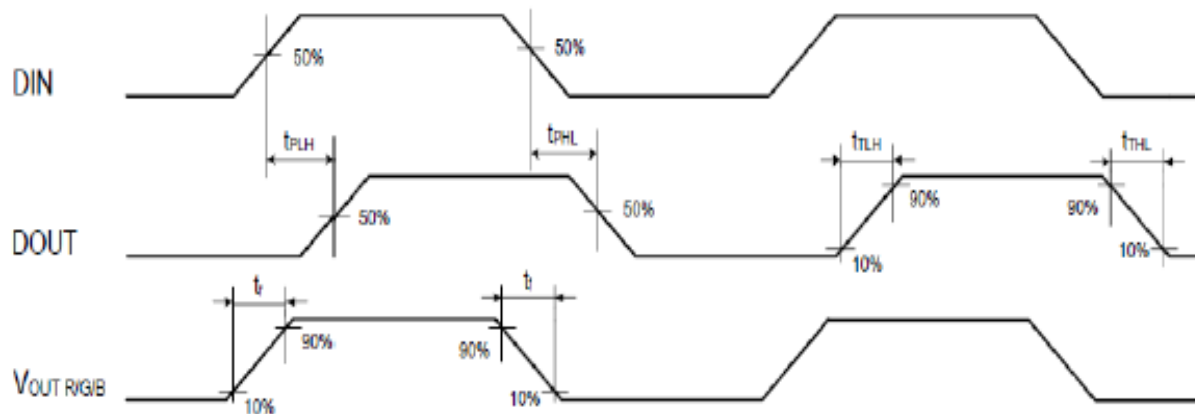
**Electrical Characteristics** (TA= 25°C , VDD=5.0V)

Parameter	Symbol	Min.	Avg.	Max.	Unit	Test conditions
Chip internal supply voltage	V <sub>DD</sub>	3.5	--	5.5	V	--
Working current	I <sub>DD</sub>	--	0.4	--	mA	VDD = 5V, I <sub>OUT</sub> "OFF"
High level input voltage	V <sub>IH</sub>	2.2	--	--	V	Enter high level
Low level input voltage	V <sub>IL</sub>	--	--	1.9	V	Enter low level
DOUT output current	I <sub>OH</sub>	--	15	--	mA	DOUT output high, serial 10Ω resistance to GND
DOUT Irrigation Current	I <sub>OL</sub>	--	15	--	mA	Low DOUT output, power DOUT current
OUT R/G/ B constant current inflection point voltage	V <sub>DS_S</sub>	--	0.7	--	V	I <sub>OUT</sub> = 11.5mA
OUT R/G/B output current variation	%V <sub>S</sub> .V <sub>DS</sub>	--	0.5	--	%	I <sub>OUT</sub> = 11.5mA , V <sub>DS</sub> = 1.0~3.0V
	%V <sub>S</sub> .T <sub>A</sub>	--	3.0	--	%	I <sub>OUT</sub> = 11.5mA , T <sub>A</sub> = -40~+85°C
	%V <sub>S</sub> .T <sub>A</sub>	--	5.0	--	%	I <sub>OUT</sub> = 5mA , T <sub>A</sub> = -40~+85°C
OUT R/G/B port leakage current	I <sub>leak</sub>	--	--	1.0	uA	V <sub>DS</sub> = 9V , I <sub>OUT</sub> "OFF"

**Dynamic Parameter** (TA= 25 °C · VDD=5.0V) :

Parameter	Symbol	Min.	Avg.	Max.	Unit	Test conditions
OUT R/G/B output PWM frequency	f <sub>PWM</sub>	--	4.8	--	KHz	I <sub>OUT</sub> =11.5 mA, OUT port serial 200Ω resistor to VDD
Signal transmission time delay	t <sub>PLH</sub>	--	80	--	ns	DOUT port signal transmission delay to ground load capacitance 30 pF, DIN to DOUT
	t <sub>PHL</sub>	--	80	--	ns	
DOUT conversion time	t <sub>TLH</sub>	--	12	--	ns	DOUT port to ground load capacitance 30 pF
	t <sub>THL</sub>	--	10	--	ns	
OUT R/G/B Conversion time	t <sub>r</sub>	--	500	--	ns	I <sub>OUT R/G/B</sub> =11.5mA, OUT R/G/B port string connection 200 Ω resistance to VDD, ground load capacitance 30pF
	t <sub>f</sub>	--	500	--	ns	

Schematic diagram of dynamic parameter test:

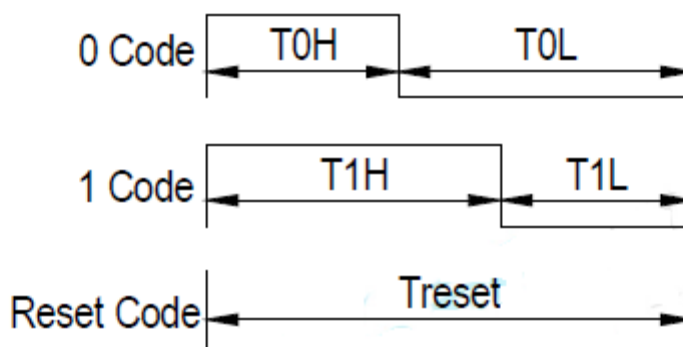


**Coding description**

Coding sequence:

Using unipolar zero code, each symbol must have a low level. Each symbol of this protocol starts at a high level, and the high level time width determines the "0" code or "1" code.

Input code type:



**Data Transfer Time (VDD=5.0V)**

Name	Description	Min.	Avg.	Max.	Admissible error	Unit
T	Code element cycle	--	1.2	--	/	us
T0H	0 code, high level time	--	0.3	--	±0.05	us
T0L	0 code, low level time	--	0.9	--	±0.05	us
T1H	1 code, high level time	--	0.9	--	±0.05	us
T1L	1 code, low level time	--	0.3	--	±0.05	us
Trst	Reset code, low level time	--	>200	--	/	us

Note:

1. Code cycle minimum 1.2 us when writing a program.
2. High level time of 0 code and 1 code should be in accordance with the specified range of the above table. Low level time of 0 code and 1 code should be less than 20 us.



### Protocol data format:

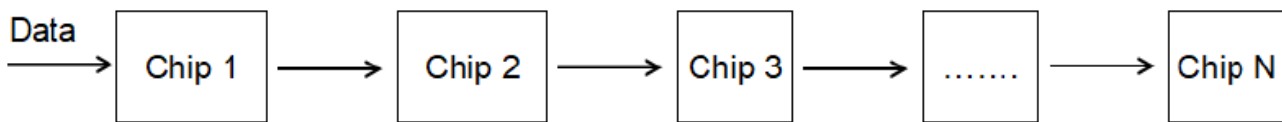
Trst first chip 24 bits data second chip 24 bits data ..... N chip 24 bits data Trst

bit grayscale data structure: high in front, sent in RGB order:

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

bit23.....bit0

### System topology graph:



### Data Transfer Time (VDD=5.0V)

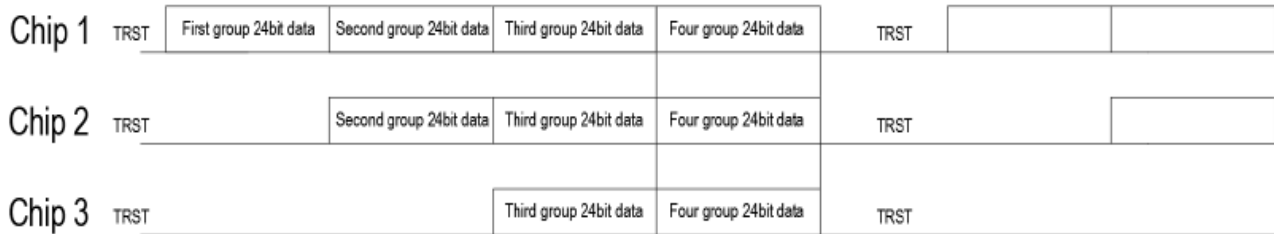
Name	Description	Min.	Avg.	Max.	Admissible error	Unit
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T0L	0 code, low level time	--	0.9	--	±0.05	us
T1H	1 code, high level time	--	0.9	--	±0.05	us
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Trst	Reset code, low level time	--	>200	--	/	us

Note:

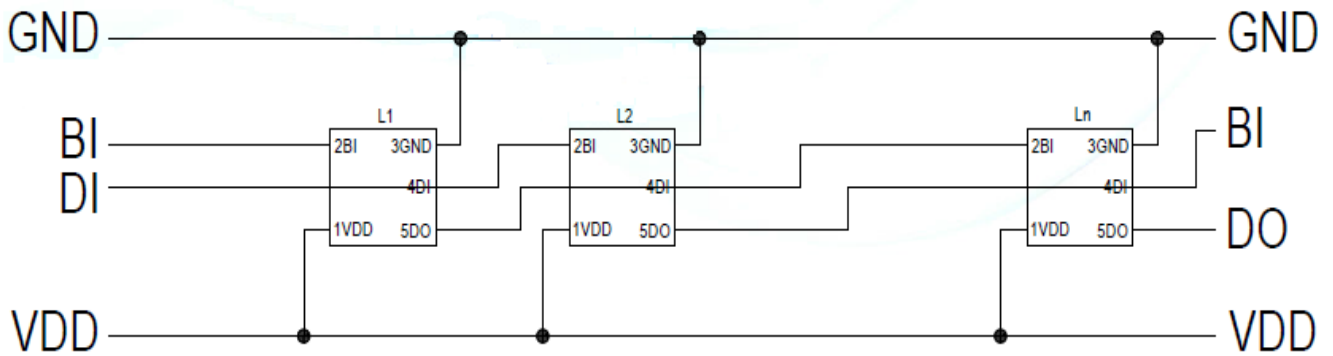
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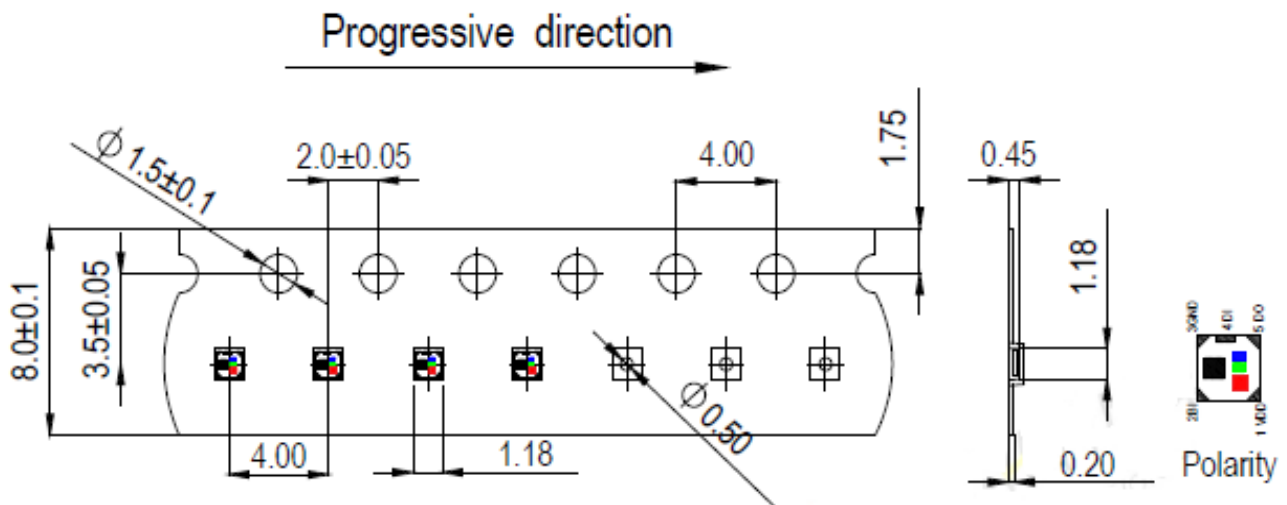
Input data stream for each chip (take 3 chips as an example)



Typical application circuit:



Carrier Tape Dimensions:

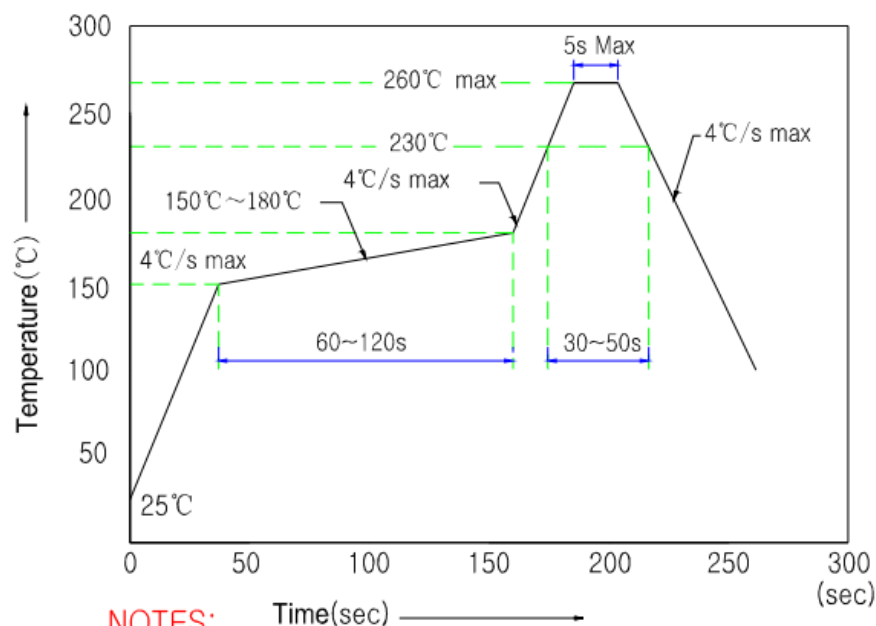


Note:  
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## Reliability Test

Classification	Test Item	Test Conditions	Duration	Units Tested	Number of Damaged
Life Test	Operating Life Test	Ta =25°C ± 5°C, RH=55 ± 20%RH, IF=30mA	1000hrs	22	0/22
Environment Test	High Temperature Storage	Ta =100°C ± 10°C	1000hrs	22	0/22
	Low Temperature Storage	Ta = - 40°C <sup>+3</sup> / <sub>.5</sub> °C	1000hrs	22	0/22
	Temp & Humidity Storage	Ta =85°C <sup>+5</sup> / <sub>.3</sub> °C RH=85 <sup>+5</sup> / <sub>-10</sub> %RH	1000hrs	22	0/22
	Thermal Shock Test	Ta= - 40°C <sup>+5</sup> / <sub>.3</sub> °C ~ 100°C <sup>+3</sup> / <sub>.5</sub> °C T=5min - 5min	100 Cycles	22	0/22
	Temperature Cycling Test	Ta= - 40 <sup>+3</sup> / <sub>.5</sub> °C ~25°C ~ 100 <sup>+5</sup> / <sub>.3</sub> °C ~25°C T=30min-5min-30min- 5min	10Cycles	22	0/22

Reflow Soldering Profile For Lead-free SMT Process.



**NOTES:**

1. We recommend the reflow temperature 245°C (+/-5°C). The maximum soldering temperature should be limited to 260°C.
2. Don't cause stress to the epoxy resin while it is exposed to high temperature.
3. Number of reflow process shall be 2 times or less.