

Instruction Manual

1. Product overview:

0807 Colorful is an externally controlled constant current 2020 integrated lamp bead that integrates a high-quality single-wire cascaded constant current driver IC and a high-quality RGB LED chip. Among them, the built-in control IC has the characteristics of high reliability, low power consumption, high anti-interference performance and high constant current accuracy. The internal integration of preferably high-quality LED chips has the advantages of excellent luminous consistency, pure white light effect, and low light attenuation. Combining the advantages of the two, at the same time brings the characteristics of small size, fewer external components, and clean layout. Controlled by an external controller, it can show illusion, animation and high-standard video effects.

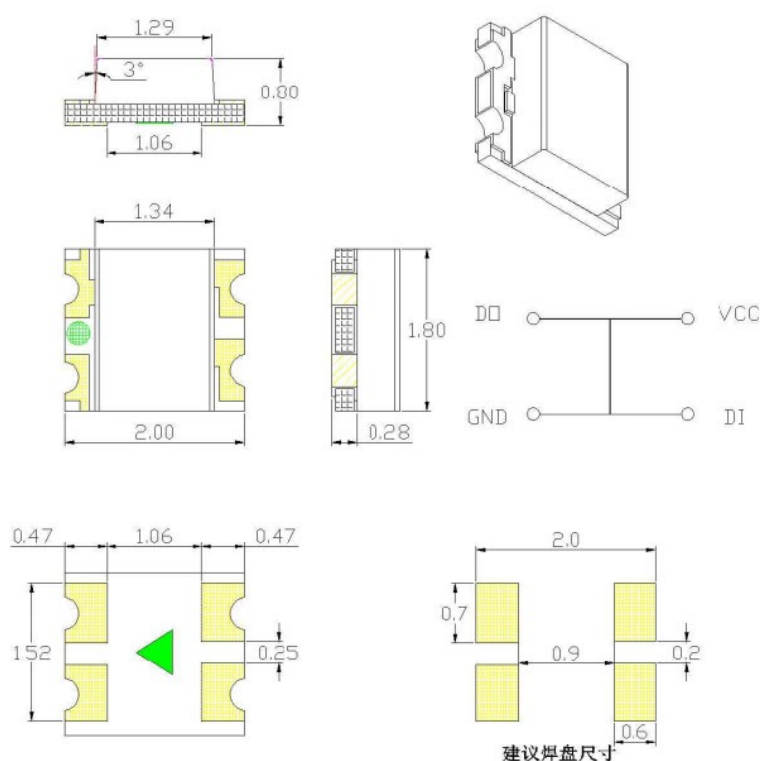
2. Features:

0807 Colorful is a high-quality externally controlled single-wire cascaded constant current IC and high-quality RGB LED chip integrated inside the lamp bead. It has a small size and simple peripherals. The built-in constant current has high precision, and the internal RGB chip is pre-splitting. The luminous height is consistent, and the white light effect is pure. This model can accept white light and its monochrome customization. Reshaping and forwarding enhanced technology, single-line data transmission, unlimited cascading. The data transmission frequency is 800Kbps/sec, and the screen refresh rate can be achieved at 30 frames/sec, not less than 1024 points. The output port PWM control can realize 256-level gray scale adjustment, and the port scanning frequency is 1.5KHz/s. The optimized preset 5mA/channel constant current mode is adopted to maximize the number of low-voltage drive cascades. High constant current accuracy, on-chip error $\sim 1.5\%$, inter-chip error $\sim 3\%$. Built-in low voltage enhancement module, VDD above 2.5V 100% normal work. Super data shaping ability: After receiving the data of this unit, the subsequent data will be shaped and output automatically.

3. Application areas:

Full-color luminous characters, full-color modules, point light sources, full-color light bars, light bar screens, color screen screens, Christmas decorations and other multi-scene products.

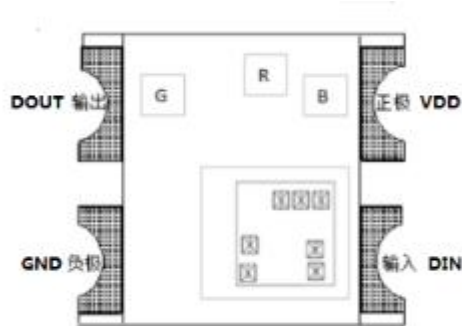
4. Mechanical dimensions:



Note:

- 1. The above marked unit: millimeter.
- 2. Unless specially marked, the dimensional tolerance is ± 0.1 mm.

五、Footprint (4PIN):



P9823F-2020RGB		
Serial number	Symbol	Function description
1	DOUT	Display data cascade output (800K)
2	DIN	Display data input (800K)
3	VCC/VDD	Internal power supply positive and RGB positive
4	GND/VSS	Signal ground and power ground

六、Maximum rating: (如无特殊说明, $T_A = 25\text{ }^{\circ}\text{C}$, $V_{SS} = 0\text{ V}$)

parameter	symbol	Range	unit
Logic power supply voltage	Vdd	+ 2 . 5 ~ + 6 . 5	V
Output port withstand voltage	Vout	16	V
Logic input voltage	Vi	- 0.5 ~ Vdd+ 0.4	V
Operating temperature	Topt	- 40~ + 100	$^{\circ}\text{C}$
Storage temperature	Tstg	- 55~ + 150	$^{\circ}\text{C}$

七、Recommended scope of work: (如无特殊说明, $T_a = - 40 \sim + 85\text{ }^{\circ}\text{C}$, $V_{SS} = 0\text{ V}$)

parameter	symbol	least	typical	maximum	unit	Test Conditions
Logic power supply voltage	Vdd	2.5	5.0	6.5	V	-
High level input voltage	Vih	0.7 Vdd	-	Vdd	V	-
Low-level input voltage	Vil	0	-	0.3 Vdd	V	-
Output port withstand voltage parameter	Vout	16			V	

八、Electrical parameters: (如无特殊说明, $T_a = -40 \sim +85^\circ\text{C}$, $V_{ss} = 0\text{ V}$, $V_{dd} = 2.5 \sim 6.5\text{ V}$)

parameter	symbol	The smallest	typical	maximum	unit	Test Conditions
Low-level output current	I_{out}	—	5	—	mA	R, G, B
Low-level output current	I_{do}	10	—	—	mA	$V_o = 0.4\text{ V}$, D_{out}
Input Current	I_i	—	—	± 1	μA	
Output pin current	I_{sink}		5		mA	
High level input voltage	V_{ih}	$0.7 V_{dd}$	—		V	D_{IN} , SET
Low-level input voltage	V_{il}	—	—	$0.3 V_{dd}$	V	D_{IN} , SET
Hysteresis voltage	V_h	—	0.35	—	V	D_{IN} , SET
Current offset (between channels)	dI_{out}		± 1.5	± 3.0	%	$V_{ds}=1\text{V}$, $I_{out}=5\text{mA}$
Current offset (between chips)	dI_{out}		± 3.0	± 5.0	%	$V_{ds}=1\text{V}$, $I_{out}=5\text{mA}$
Current offset VS- V_{ds}	% dV_{ds}		± 0.1	± 0.5	%/V	$1\text{V} < V_{ds} < 3\text{V}$
Current offset VS- V_{dd}	% dV_{ds}		± 1.0	± 2.0	%/V	$4.5\text{V} < V_{dd} < 5.5\text{V}$
Dynamic current consumption	I_{DDdyn}	无负载			1	mA
Power consumption	PD	($T_a=25^\circ\text{C}$)			250	mW
Thermal resistance parameter	$R_{th(j-a)}$		80		190	$^\circ\text{C/W}$

九、Switching characteristics: (如无特殊说明, $T_a = -40 \sim +85^\circ\text{C}$, $V_{ss} = 0\text{ V}$, $V_{dd} = 4.5 \sim 5.5\text{ V}$)

parameter	symbol	least	typical	Max	unit	Test Conditions
Oscillation frequency parameter	FOSC1	—	800	—	KHz	$V_{dd} = 5\text{V}$
	FOSC2	—	10	—	MHz	$V_{dd} = 5\text{V}$
Transmission delay time	T_{flz}	—	—	300	ns	$C_1 = 15\text{ pF}$, $D_{IN} \rightarrow D_{OUT}$, $R_1 = 10\text{ k}\Omega$
Fall time	T_{thz}	—	—	120	μs	$C_1 = 300\text{ pF}$, $OUT_R / OUT_G / OUT_B$
Data transfer rate	F_d	800	—	—	Kbps	占空比 50 %
Input capacitance	C_i	—	—	15	pF	—

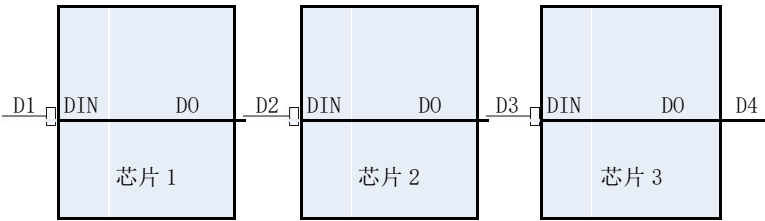
十、内置 LED 参数:

Luminous color	Dominant wavelength (nm)	light intensity (mcd)	Working current (mA)	Operating Voltage (V)
R	620-625	500-600	20	2.0-2.2
G	520-525	2300-2800	20	3.0-3.3
B	465-470	300-400	20	3.0-3.3

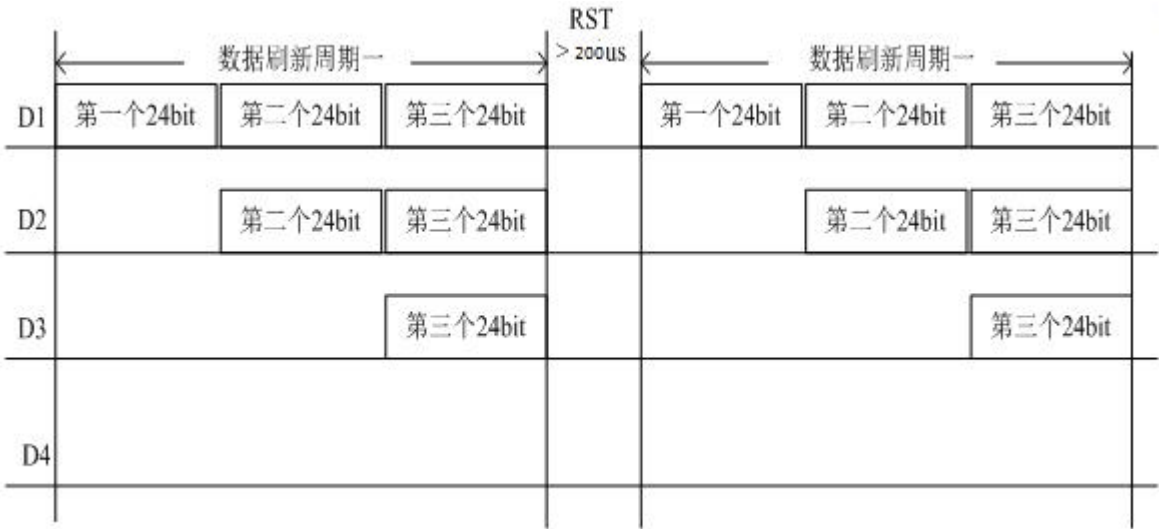
11. Function description:

The lamp bead adopts single-wire communication mode, and uses the return-to-zero code method to send signals. After the chip is powered on and reset, it receives the data from the DIN terminal. After receiving enough 24 bits, the D0 port starts to forward data for the next chip to provide input data. Before forwarding, the D0 port has been pulled down. At this time, the lamp beads will not receive new data, and the built-in RGB chip will display different brightness according to the different duty cycle signals generated after the received 24 bit data. If the DIN input signal is the RESET signal, the chip will send the received data to display, and the chip will receive new data after the end of the signal. After receiving the first 24 bit data, it will forward the data through the D0 port. Before receiving the RESET code, the RGB brightness remains unchanged. After receiving a low-level RESET code above 200us, the internal RGB chip of the lamp bead will display different duty cycle signals according to the different duty cycle signals generated after the 24 bit data just received. brightness.

1) Chip cascade method:



2) data transmission:



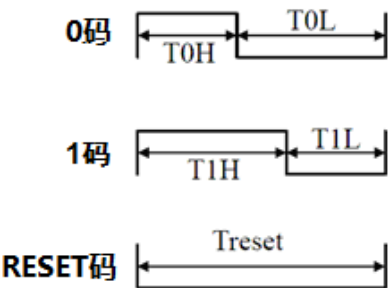
Note: D1 is the data sent by the MCU, and D2, D3, and D4 are the data that the cascade circuit automatically reshapes and forwards.

3) 24bit data structure

R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0
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Note: The high bit is sent first, and the data is sent in the order of GRB

4) Timing waveform diagram



5) 信号传输定义:

name	Description	Typical value	Allowable error
T0H	0 code, high level time	0.35μs	±150ns
T1H	1 code, high level time	1.36μs	±150ns
T0L	0 code, low level time	1.36μs	±150ns
T1L	1 code, low level time	0.35μs	±150ns
RES	RESET code	50us	

12. Application circuit diagram:

Power supply voltage 5V (as shown below)

