3-Channel Constant Current LED Driver UCS1903

(Products descriptions)

The product UCS1903 is the three-channel LED drive control circuit, internal integration MCU digital interface, data latches, LED high voltage driver etc. Realize the alone grey scale because through the periphery MCU to control this chip. The cascade connection control realizes the outdoors big screen Bitmap luminous, Product has the excellent performance, and quality is reliable.

(Characteristics)

Output power: 15V max

Internal integration Regulator tube and the IC VDD PIN need to add resistance connection the power. External No need to add regulator tube

256 grey scales can adjustment

Internal integration RC oscillator, clock synchronous according to data signal, the next Chip can receive the Original signal because the before Chip receiver had finished and itself has function of the Automatic correction signal.

Internal integration Reset circuit
  PWM can control 256 grey scales, Scan frequency no less than 400 Hz／s
Serial interface, through the Single line finish the data receiving and decoding.

Linear transmission, can unlimited cascade connection
No need to add any circuit if transmission distance over 10 meters of tow points.

The low speed model cascade numbers are not less than 512 points and high model not less than 1024 points If the Refresh frequency 30Hz／s.

Data sending speed can reach to 400Kbps and 800Kbps two kinds

Support preset constant current drive mode, according to the Red lights luminous intensity weak adjustment output current higher than the OUTG and OUTB. The White better

引出端排列 **Pin Configurations:**

| OUTR | 1 | 8 | VDD |
| OUTG | 2 | 7 | SET |
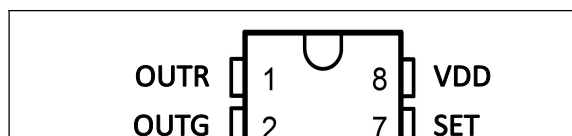
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┌─────────────────────────────────────┐
│      OUTB              DIN           │
│      GND               DO            │
└─────────────────────────────────────┘
```

引出端功能 PIN functions:

序号	符号	管脚名称	功 能 描 述
1	OUTR	The output of the R channel	Red(红) PWM 控制输出
2	OUTG	The output of the G channel	Green(绿) PWM 控制输出
3	OUTB	The output of the B channel	Blue(蓝) PWM 控制输出
4	GND	Ground	接地 connection ground
5	DOUT	data output	
6	DIN	data input	display input data
7	SET	Mode Set	connection VDD: low-speed model; free: high-speed mode
8	VDD	Logic power	

（如无特殊说明，$T_A = 25\,℃$，$V_{SS} = 0\,\text{V}$）

Maximum ratings

参数 Parameter	符号 Symbol	范围 Ratings	单位 Unit
逻辑电源电压 logic power Voltage	V_{DD}	＋6.0～＋7.0	V
输出端口耐压 Output compression Voltage	V_{OUT}	12	V
逻辑输入电压 Input Voltage	V_I1	－0.5～ V_{DD}＋0.5	V
工作温度 Operating Junction Temperature	T_{opt}	－25～＋85	℃
储存温度 Storage Temperature Range	T_{stg}	－55～＋150	℃

（如无特殊说明，$T_A = -20\sim +70\,℃$，$V_{SS} = 0\,\text{V}$）

Working scope:

参数 Parameter	符号 Symbol	最小 Min	典型 Typ	最大 Max	单位 Units	测试条件 Conditions

参数 Parameter	符号 Symbol	最小 Min	典型 Typ	最大 Max	单位 Units	测试条件 Conditions
逻辑电源电压 power Voltage	V_{DD}	-	6	-	V	-
高电平输入电压 Input high-Voltage Level	V_{IH}	$0.7\,V_{DD}$	-	V_{DD}	V	-
低电平输入电压 Input low-Voltage Level	V_{IL}	0	-	$0.3\,V_{DD}$	V	-

（如无特殊说明，$T_A = -20 \sim +70\,℃$，$V_{DD} = 4.5 \sim 5.5\,V$，$V_{SS} = 0\,V$）

Electrical parameters:

参数 Parameter	符号 Symbol	最小 Min	典型 Typ	最大 Max	单位 Units	测试条件 Conditions
低电平输出电流 Output Current	$I_{OL}1$	-	17.5	-	mA	G，B
低电平输出电流 Output Current	$I_{OL}1`$	-	18.5	-	mA	R
低电平输出电流 Output Current	I_{dout}	10	-	-	mA	$V_O = 0.4\,V$，D_{OUT}
输入电流　Input current	I_I	-	-	±1	μA	$V_I = V_{DD} / V_{SS}$
高电平输入电压 Input Voltage Level	V_{IH}	$0.7\,V_{DD}$	-		V	D_{IN}，SET
低电平输入电压 Input Voltage Level	V_{IL}	-	-	$0.3\,V_{DD}$	V	D_{IN}，SET
滞后电压 Saturation Voltage	V_H	-	0.35	-	V	D_{IN}，SET

（如无特殊说明，$T_A = -20 \sim +70\,℃$，$V_{DD} = 4.5 \sim 5.5\,V$，$V_{SS} = 0\,V$）

Switching Characteristics:

参数 Parameter	符号 Symbol	最小 Min	典型 Typ	最大 Max	单位 Units	测试条件 Testing Conditions
振荡频率	$F_{OSC}1$	-	400	-	kHz	-
Oscillation frequency	$F_{OSC}2$	-	800	-	kHz	-
Transmission delay time	t_{PLZ}	-	-	300	ns	$C_L = 15\,pF$，$D_{IN} \rightarrow D_{OUT}$，$R_L = 10\,k\Omega$
Decrease time	t_{THZ}	-	-	120	μs	$C_L = 300\,pF$，OUTR / OUTG / OUTB

|						
data transmission rate	F_{MAX}	400	-	-	Kbps	占空比 50％
Input capacitance	C_l	-	-	15	pF	-

function description

This Chip is Single line communication and adopts Overall pictures display technology. Receiving the DIN terminal sending data, The DO terminals begin to Forward data, provide data to the next Chip's DIN terminals if the before Chip receiving enough 24bit. DO terminal always down before forwarding and this Chip don't receive new data. The OUTR, OUTG, OURB send out different changes according to receive 24 bit data. This Signal period: 4ms.

This Chip adopts atomic correction signal technology. So this Chip of cascade numbers don't suffer signals restriction. Only limited Refresh frequency . For example: we have designing 1024 cascade connection, it's refresh time: $1024 \times 0.4 \times 2 = 0.8192$ ms(Chip data delay time:0.4 μs) and no any Flashing phenomenon.
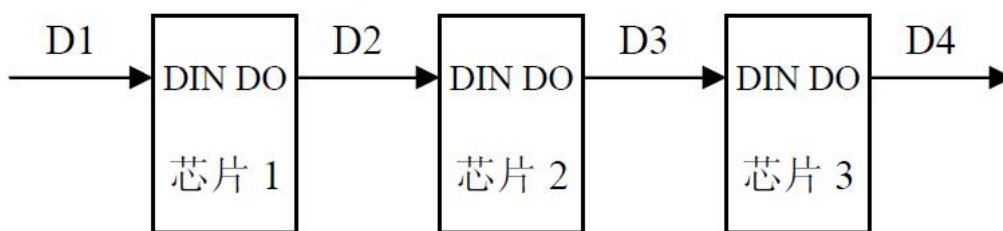
Timing waveform chart:

1）Input code
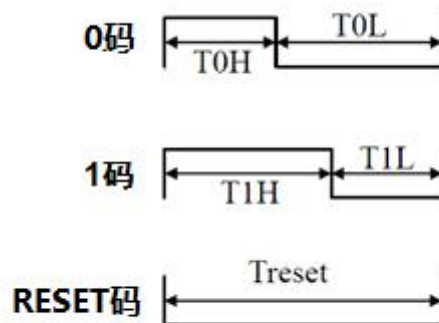
2）low-speed model time

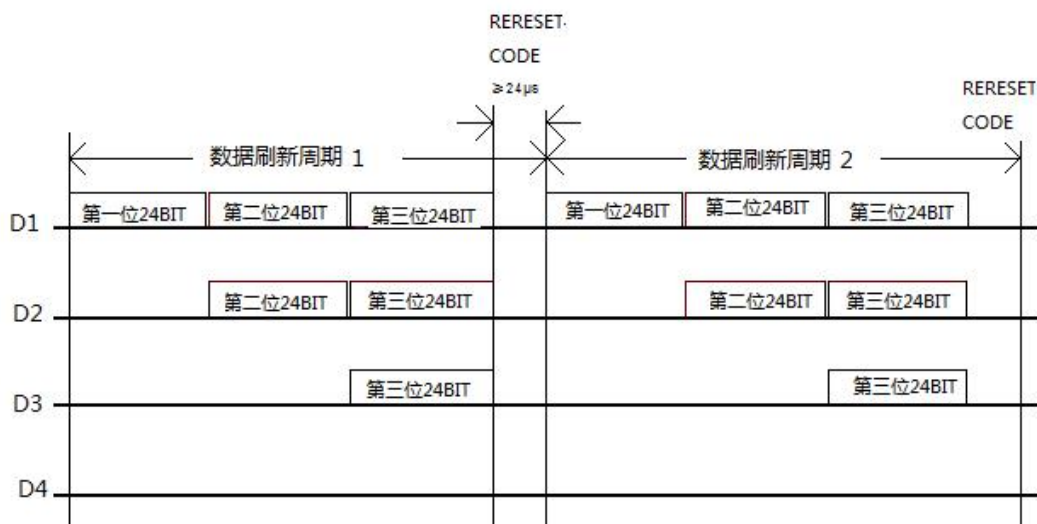| 名称 name	描 述 description	典型值 Typ	容许误差 deviation

T0H	0 码，高电平时间(0 code ,high level time)	0.5 µs	±150 ns
T1H	1 码，高电平时间(1 code, high level time)	2.0 µs	±150 ns
T0L	0 码，低电平时间(0 code, low level time)	2.0 µs	±150 ns
T1L	1 码，低电平时间(1 code; low level time)	0.5 µs	±150 ns

3）连接方法 Connecting methods

4）Data transmission method

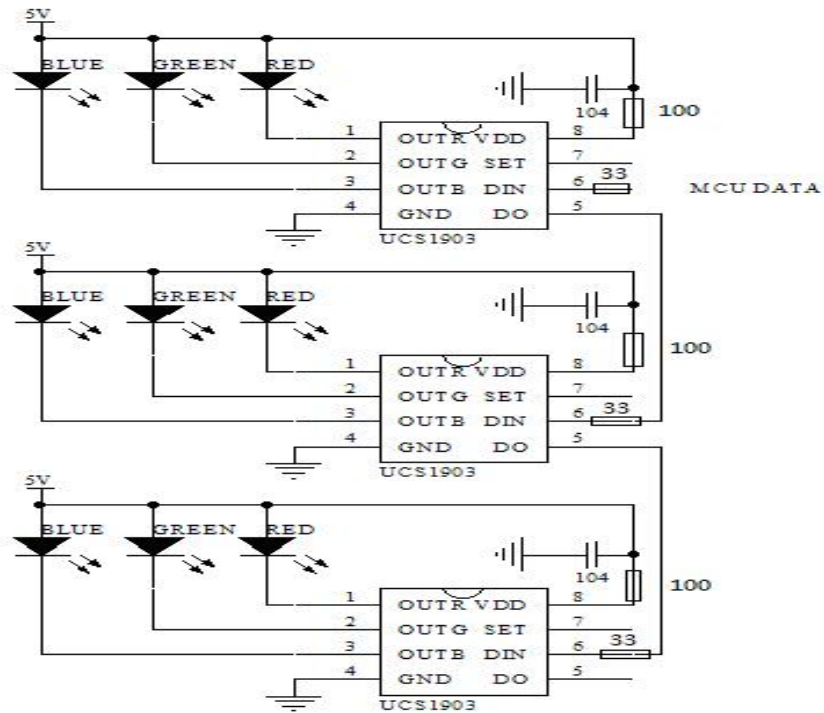Notes: D1 is the MCU terminal transmission data, D2, D3, D4 is Cascade circuit automatic forwarding data.

5）Data structure of 24bit

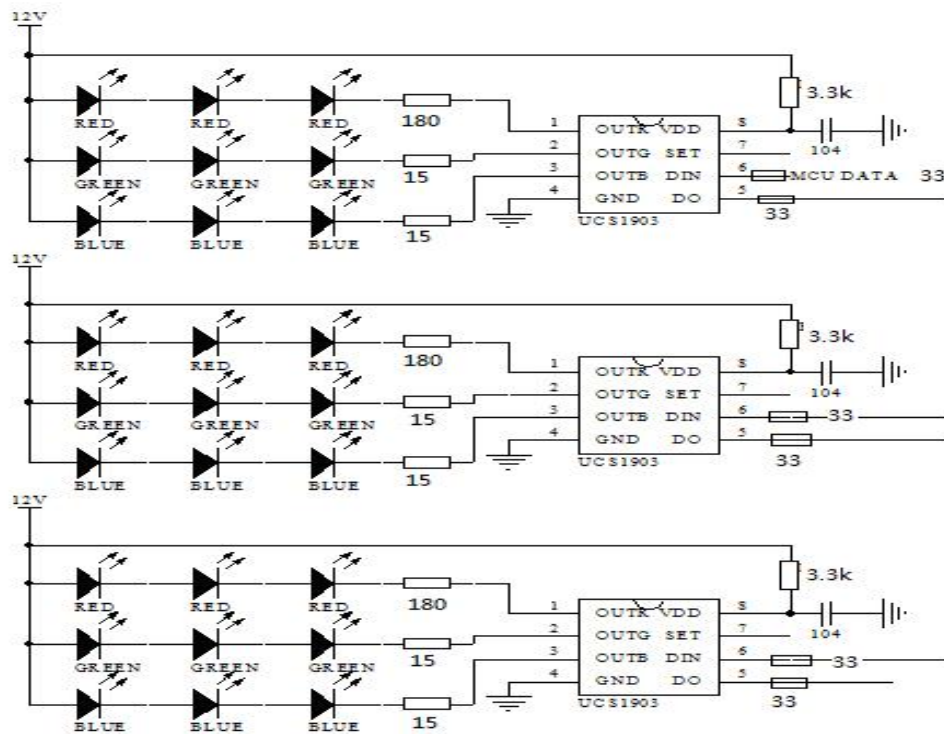| R7	R6	R5	R4	R3	R2	R1	R0	G7	G6	G5	G4	G3	G2	G1	G0	B7	B6	B5	B4	B3	B2	B1	B0

Note: according to RGB transmission.

应用线路图 Application circuit diagram

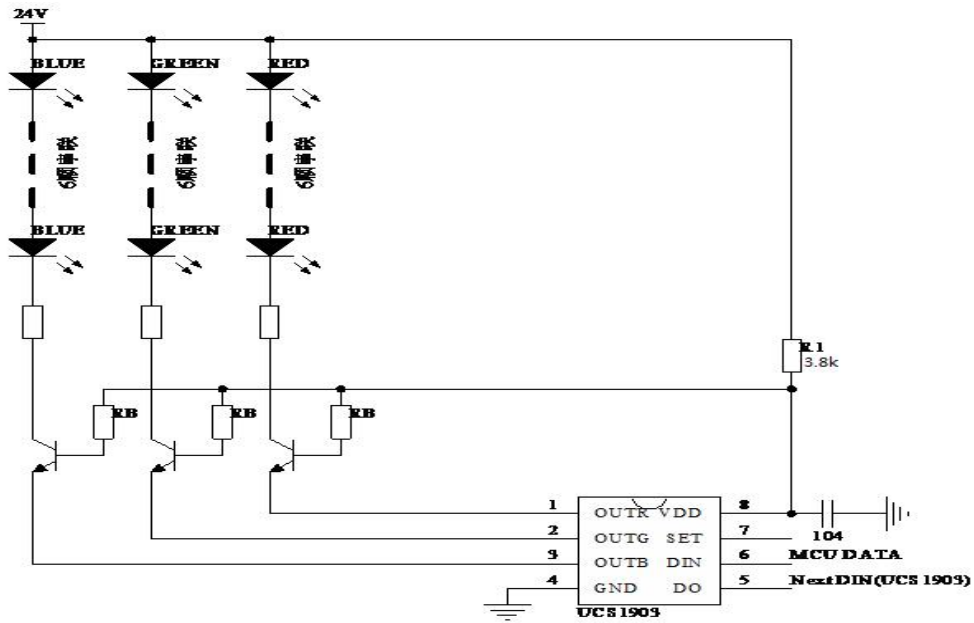### 2　1　电源电压 5V，带单颗 LED(**5 Voltage Application**)

3　（**12 Voltage Application**）

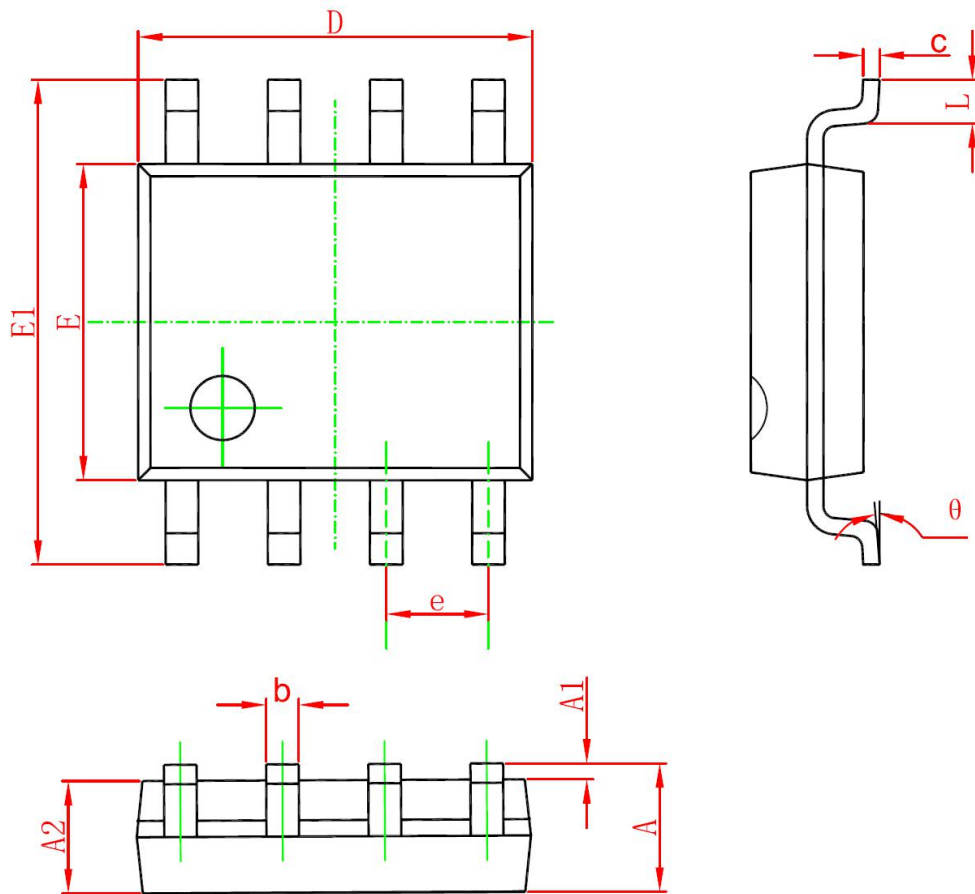4

5　（**24 Voltage Application**）

UCS1903 Power Supply Voltage can configuration 6—24V, 104p capacitance should to close IC,

Resistance configuration according to different voltage. The below is resistance listed:

电源电压	建议电源接口与 VDD 间连接电阻
5 V	100
12 V	3.3 K
24V	3.8K(外加三极管)

封装外形图和尺寸 Package Information:

SOP8

符号 Symbol	mm		inches	
	最小值 Min	最大值 Max	最小值 Min	最大值 Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.270(BSC)		0.050(BSC)	
L	0.400	1.270	0.016	0.050
θ	0°	8°	0°	8°