深圳市美矽微半导体有限公司
SHENZHEN MICROSIM SEMICONDUCTOR CO.,LTD

产 品 规 格 书
Product Specifications

MT16703

Three-channel LED drive control IC

Version: 1.1

Table of Contents

Catalogue

1. Product overview

MT 16703 Is a three-channel LED (light-emitting diode display) driver, the control of the special circuit, internal integrated with MCU digital interface, Data latch, LED high voltage drive and other circuits. Through the peripheral MCU control, the separate gray scale and cascade control of the chip can realize the color dot matrix luminous control of the outdoor large screen. Excellent product performance, reliable quality.

2.Product characteristics

. Using the high-pressure CMOS

☞ Chip input voltage is 5~24V@ built-in voltage regulator tube

. The OUT output port has a withstand pressure of 26V

☞ Grayscale adjustment circuit (256 Grade Grayscale adjustable)

. By default, the white lights are powered on

. Default output constant flow value is 17mA

. Single-line serial cascade interface (DIN.DOUT)

☞ Built-in high precision and high stability oscillator

☞ Data shaping: after receiving the unit data automatically, the subsequent data shaping output

☞ The data transmission rate is 800 Kbps

3. Pinout arrangement SOP8

OUTR	1	8	VDD
OUTG	2	7	NC
OUTB	3	6	DIN
GND	4	5	DOUT
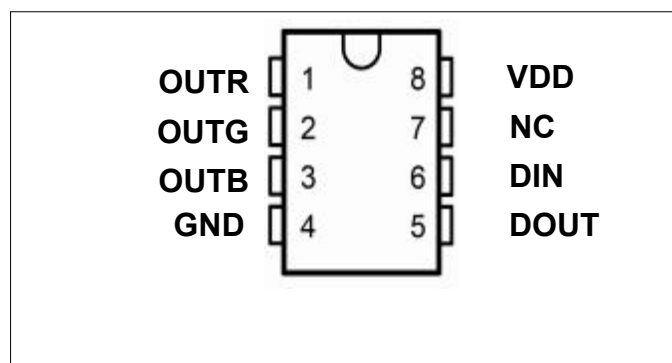
4.Pinout function

Number	symbol	Pin name	functional description
1	OUTR	LED driver output	Red (Red) PWM control output
2	OUTG	LED driver output	Green (green) PWM control output
3	OUTB	LED driver output	Blue (Blue) PWM control output
4	GND	Ground	Ground
5	DOUT	Data-out	Show data cascade output
6	DIN	data-in	show data entry
7	NC		
8	VDD	Chip power supply	

5.Maximum rating (unless otherwise specified, TA＝ 25 ℃ , VSS＝ 0 V)

parameter	symbol	scope	unit
Logic power voltage	V_{in}	＋5.0 ～ ＋24.0	V
R / G / B output port pressure resistance	Vds	26	V
Logical input voltage	V_{i1}	－0.5 ～ 5 .5	V
R / G / B output current	$Iol\ 1$	17	mA
working temperature	T_{opt}	－40～＋85	℃
storage temperature	T_{stg}	－50～＋150	℃
ESD withstand voltage	$V\ ESD$	4 K	V

6.Electrical Parameters (TA＝ 2 5 ℃)

parameter	symbol	minimum	typical case	maximum	unit
Chip input voltage	*Vin*	-	5	24	V
Internal internal supply voltage	*Vdd*	-	5.2	-	V
R / G / B output port pressure resistance	*Vds*	-	-	26	V
R / G / B output drive current	*Io*	-	17	-	mA
high level input voltage	V IH	0.7 V$_D$	-		V
low level input voltage	V IL	-	-	0.3 V$_D$	V
PWM frequency	f PWM		1.2		KHZ
quiescent dissipation	*Idd*	-	1.0	-	mA

7. Switching characteristic (TA＝ 2 5 ℃)

| parameter	symbol	minimum	typical case	maximum	unit	test condition
rate of data signalling	F DIN	-	800	-	kHz	-
propagation delay time	t_{PLZ}	-	-	500	ns	

8.function declaration

The chip adopts single-line communication mode and adopts zero-code mode to send the signal. After the chip is reset, it receives the number from the DIN terminal. According, after receiving 24bit, the DOUT port starts to forward data to provide input data for the next chip. The DOUT port was always pulled down before forwarding. At this time, the chip will not receive new data. The three PWM output ports of OUTR, OUTG, OUTB and OUB send out different duty cycle signals according to the received 24bit data, and the signal cycle is 1 ms. If the DIN-terminal input signal is a RESET signal, The chip sends the received data to the display, Chip will rereceive new data after the signal ends, After receiving the starting 24-bit data, Forward the data through the DO port, Chip before not receiving the RESET code, The original output of OUTR, OUTG and OUTB pins remains unchanged, After receiving the low-level RESET codes above 80 μ s, The chip outputs the 24bit PWM data pulse width just received to the OUTR, OUTG, and OUTB pins.

The chip adopts automatic plastic forwarding technology, so that the number of cascade of the chip is not limited by the signal transmission, only limited by the refresh speed requirements. For example, we design a 1024 cascade, whose refresh time is 1024 X 0.4 X 2 = 0.8192 ms (the data delay time of the chip is 0.4 μ s), without any blinking phenomenon.

9. Time sequence waveform
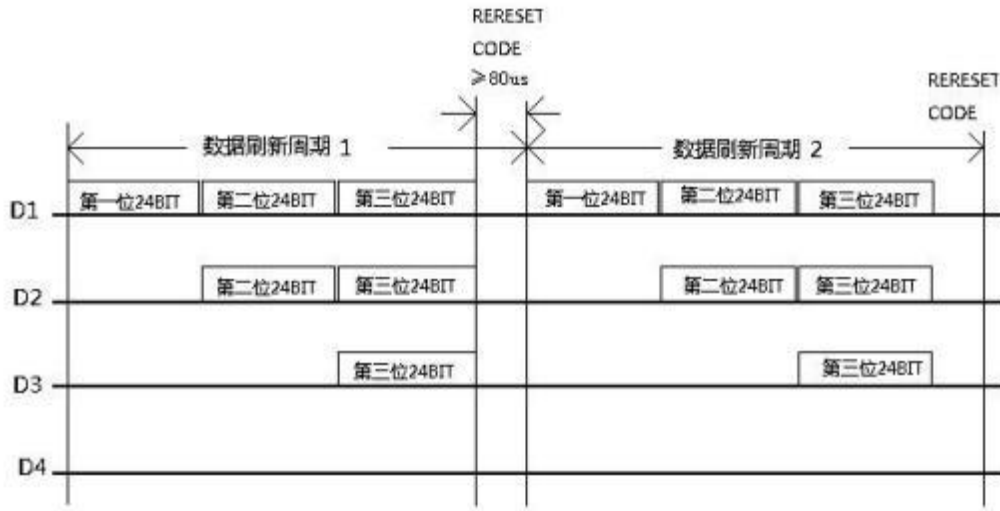
. 1) Enter the code type
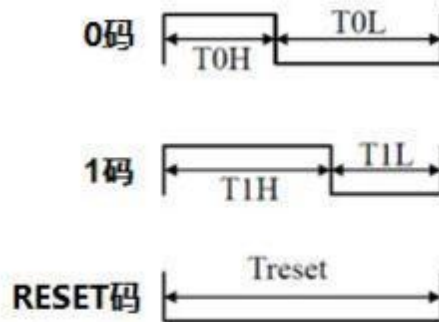
2). Code type time

name	description	representative value	admissible error
T0H	0 yards, with a high-level time	0.3 μs	± 0.05us
T1H	1-yard, high-level time	0.9μs	± 0.05us
T0L	0 yards, low-level time	0.9μs	± 0.05us
T1L	1-yard, low-level time	0.3 μs	± 0.05us
Trst	Reset Code, low-level time	≥80us	

. 3) Connection method

. 4) Data transmission method

Note: D1 is the data sent by the MCU terminal, and D2, D3 and D4 are the data automatically forwarded by the cascade circuit.
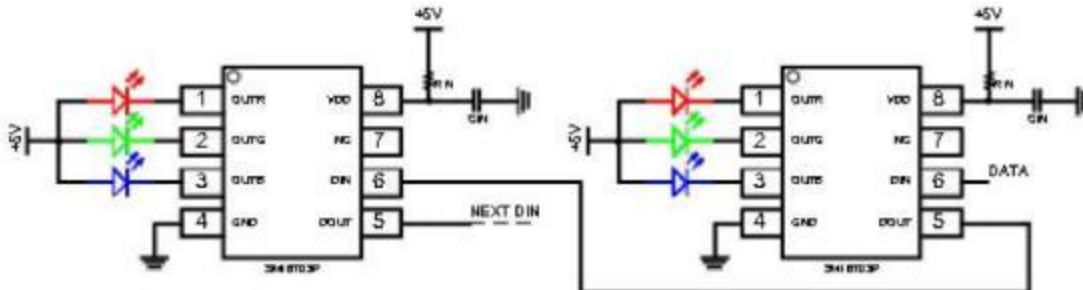
.245) bit, of the data structure

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

Note: Start at the high level, and send the data in the order of RGB
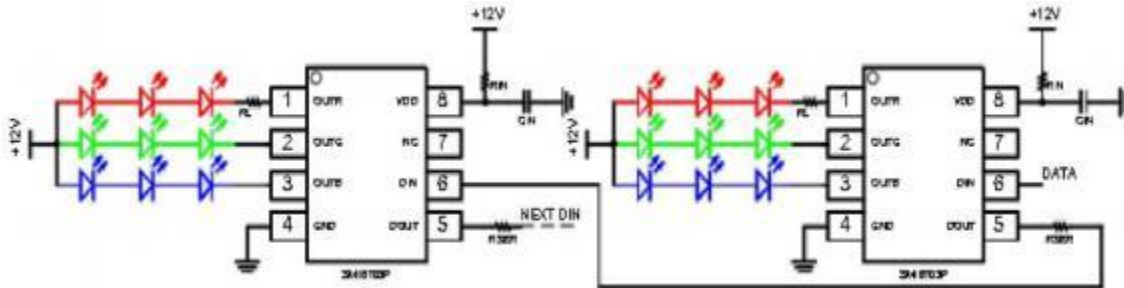
10. Application line diagram

1. Power supply voltage is 5V, with a single LED

5V application scheme, less peripheral devices, the transmission distance between two points can reach 30m.
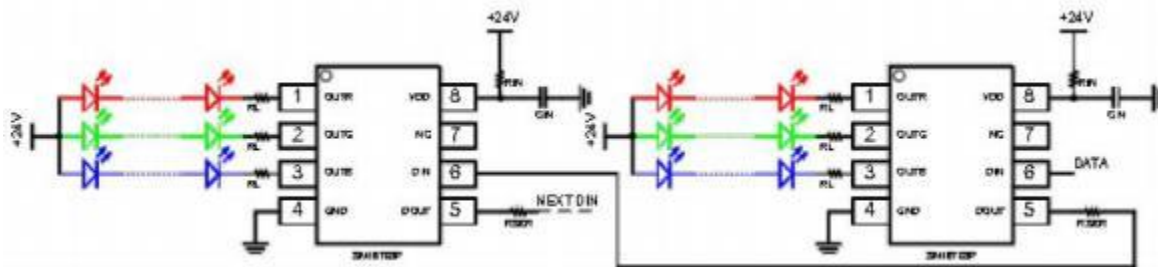
2. Application diagram of the power supply voltage of 12V with 3 LEDs for each circuit

12V application scheme, it is recommended to connect 180 ohm resistance R at the signal output portSERPrevent damage to IC output when hot plug or power supply and signal line, and connect 180 Ohm resistance RSERThe transmission distance between the two points is up to 10m.

3. Power supply voltage is 24V, with 6 LEDs for each circuit, and application Fig

24V application scheme, it is recommended to connect 470 ohm resistance R at the signal output portSERPrevent damage to IC output when hot plug or power supply and signal line, and connect 470 Ohm resistance RSERThe transmission distance between the two points is up to 5m.

Typical application circuit parameters include the power supply input voltage VIN, current-limiting resistance RIN, Chip VDD voltage capacitor CINAnd R / G / B LED current-limiting resistance RL。

Chip power supply voltage VDD: VDD = VIN-（IDD+IIN）*RIN

among IINIs the working current of the voltage regulator circuit inside the chip, IDDIs the chip static current (except for the voltage stabilization circuit current), RINThe resistance value must guarantee the VDD> 4V.

The larger the resistance R_{IN}, the lower the system power consumption, but the system interference resistance is weak; The smaller the resistance R_{IN}, the greater the system power consumption, the higher the working temperature, the design should be selected according to the system application environment compromise resistance R_{IN}.

The relationship between V_{IN} and R_{IN} is as shown in the following

V IN	5V	6V	9V	12V	15V	18V	24V
R IN	33	100	470	1K	1.5K	2K	3K

The load of the data output port DOUT of MT16703 is equivalent to the capacitor CL. DOUT needs to charge CL in each data transmission cycle, and the maximum transient charging current is about 60mA. Therefore, the voltage drop of the current-limiting resistor RIN increases instantly and the VDD voltage drops. The voltage stabilizing capacitor CIN is used to stabilize the VDD voltage. When the CL value does not exceed 1nF, CIN can choose a 0. 1uF capacitor.

LED current-limiting resistance RL:
$$R_L = \frac{V_{IN} - N * V_{LED} - V_{DS}}{I_{LED}}$$

Among VIN is the input voltage, and the V LED is the voltage drop of the LED, the V DS is the port voltage, when the current reaches 1V, the current can be constant output, and I LED is the port output current.

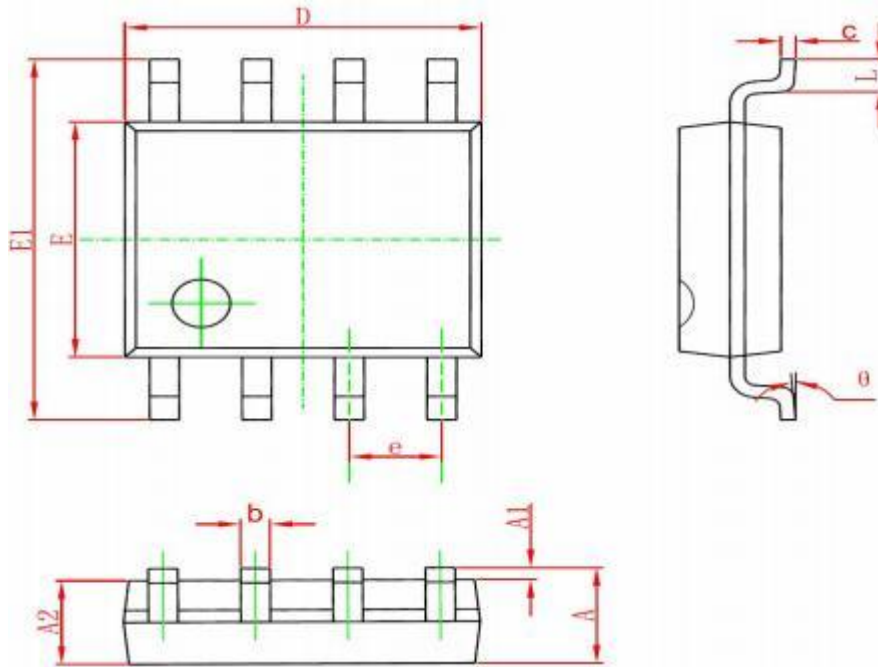## 11.Chip internal pin diagram
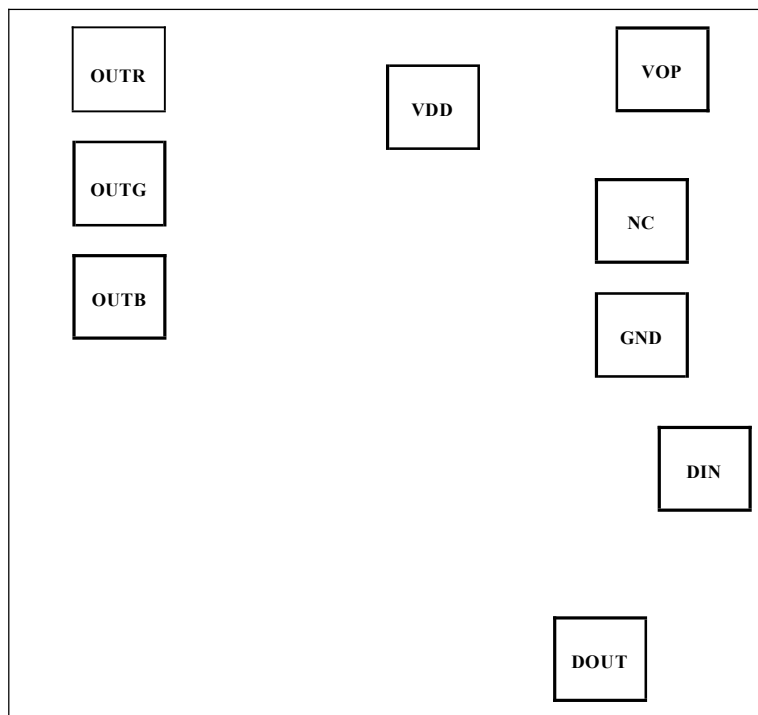
1. Pad size: 7070, the center point spacing is greater than: 90

12. Package and dimensions

SOP8

symbol	mm		inches	
	least value	crest value	least value	crest value
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°