SM16704 - Signal line 256 Gray level 4 channel Constant current LED driver IC

Features:

● Built-in power clamp, support input voltage 5~24V

● OUT R/G/B/W constant curren default 17mA

● OUT R/G/B/W Power-on status: No light

● OUT R/G/B/W port withstand voltage 26V

● OUT R/G/B/W output gray level: 256 levels

● Data synchronization refresh in the same frame

● Data serial transmission by single l

● Unipolar return-to-zero code data protocol

● Built in signal reshaping circuit, to ensure waveform distortion do not accumulate after wave reshaping to the next driver

● Send data at speed of 800Kbps.

● SOP8 Package

Summarize

The SM16704 is 4 output channels control IC that special for LED driver circuit.Its internal includes power clamp module, signal decoding module Block, oscillation module, data regeneration module, output current drive module, etc.
IC use single ZR communication mode and adopt auto reshaping transmit technology,ensuring that the data is not fading during serial transmission.the DIN port receive data from controller, the first IC collect initial 32bit data then sent to the internal data latch, the other data which reshaping by the internal signal reshaping amplification circuit sent to the next cascade IC through the DO port.

Application field

●Building exterior / scene lighting

●Indoor&outdoor LED decorative lighting

●Pixel led lighting

●Flexible led strip,linear led lighting

Footprint

SOP8
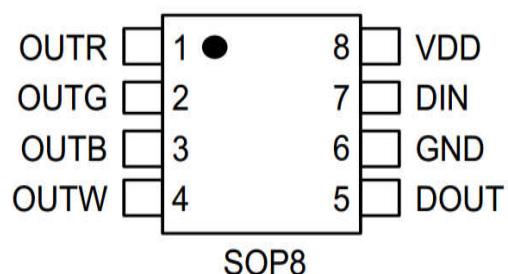
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PIN Define

NO.	Symbol	Function description
1	OUTR	Output of RED PWM control
2	OUTG	Output of GREEN PWM control
3	OUTB	Output of BLUE PWM control
4	OUTW	Output of White PWM control
5	DOUT	Data Output
6	GND	Data & Power Grounding
7	DIN	Control data input
8	VDD	IC power supply

IC internal functional block diagram
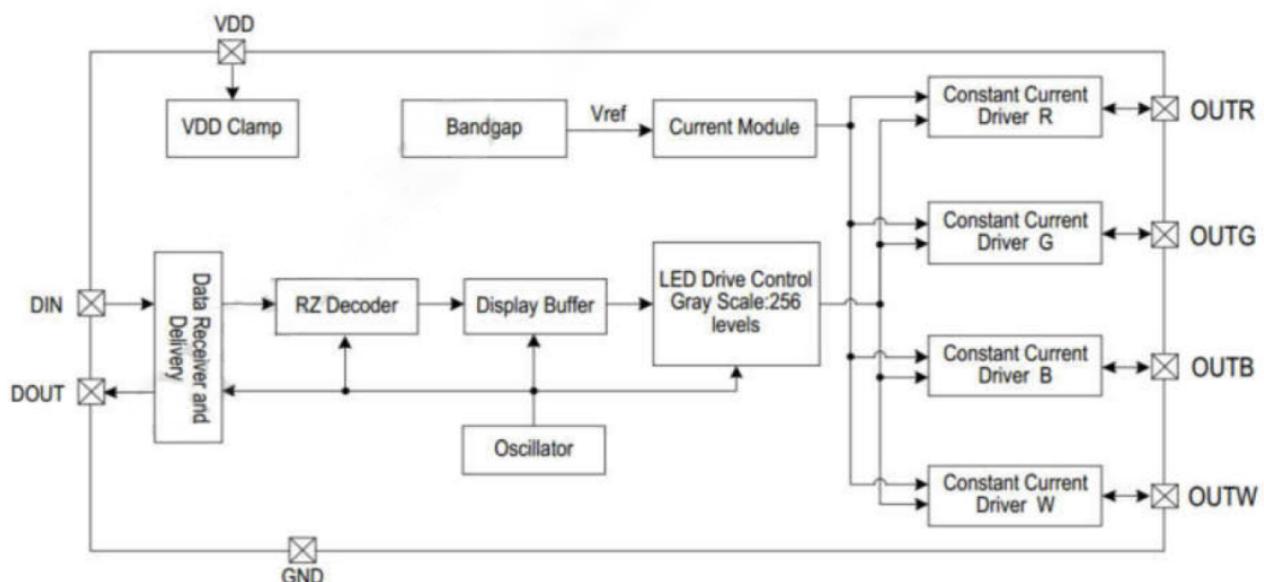
Absolute Maximum Ratings (TA=25℃, VSS=0V, unless otherwise noted.)

Symbol	Parameter	Ratings	Unit
VDD	Power Supply Voltage	-0.4~5.5	V
V_I	Logical Input Voltage	-0.4~VDD+0.4	V
BV_{OUT}	R/G/B Channel Output Port Withstand Voltage	30	V
I_{CLAMP_MAX}	Max clamp current	20	mA
RθJA [注1]	Thermal Resistance	130	℃/W
Topt	Operation Temperature	-25~+85	℃
T_{STG}	Storage Temperature Range	-55~150	℃
V_{ESD}	ESD	> 2	KV

Electrical Characteristics (TA=-20~+70℃, VDD=4.8~5.5V, Vss=0V)

Symbol	Parameter	Test Conditions	Min	Tpy	Max	Unit
VDD	Internal Clamp Voltage	External power supply VCC=12V, between VCC and VDD Current limiting resistor RD =1KΩ	4.8	5.2	5.5	V
	Power Voltage	VCC≤5V	3.0	-	5.0	V
I_{DD}	Static Current	VDD = 4. 5V，I_{OUT} "OFF"	-	1.2	-	mA
V_{IH}	Input signal theoshold voltage	DIN Input High Level	0.7xVDD	-	-	V
V_{IL}		DIN Input Low Level	-	-	0.3×VDD	V
I_{OH}	Dout output current	DOUT output is high level, serially connect 10Ω resistor to GND	-	-40	-	mA
I_{OL}	Dout sink current	DOUT output is low, shorted to VDD	-	40	-	mA
V_{DS_S}	OUT R/G/B/W Inflection point	I_{OUT} = 17mA	-	0.8	-	V
%VS.V_{DS}	OUT R/G/B/W current Amout of change	I_{OUT} = 17mA，V_{DS} =1.0~3.0V	-	0.5	-	%
%VS.VDD		I_{OUT} =17mA，VDD = 4.5~5.5V	-	0.5	-	%
%VS.T_A		I_{OUT} = 17mA，T_A= -40~+85℃	-	5.0	-	%
I_{leak}	Leak current	V_{DS} =26V，I_{OUT} "OFF"	-	-	1	uA

Switching characteristics(T_A=-20～+70℃, V_{DD}=4.8～5.5V, V_{SS}=0V)

Symbol	Parameter	Conditions	Min	Tpy	Max	Unit
f_{PWM}	OUT R/G/B/W output PWM frequency	IOUT=17mA, OUT port Serially connect 200Ω resistor to VDD	-	1.2	-	KHz
t_{PLH}	Signal transmission delay	DOUT port to ground load capacitance 30pF, Signal transmission delay from DIN to DOUT	-	85	-	ns
t_{PHL}			-	70		ns
t_{TLH}	DOUT conversion time	DOUT port to ground load capacitance 30pF	-	18	-	ns
t_{THL}			-	20	-	ns
t_r	OUT R/G/B/W	IOUT R/G/B/W =17mA, OUT R/G/B/W port serial connection 200Ω resistor to VDD, ground load capacitance 15pF	-	55	-	ns
t_f	Conversion time		-	75	-	ns
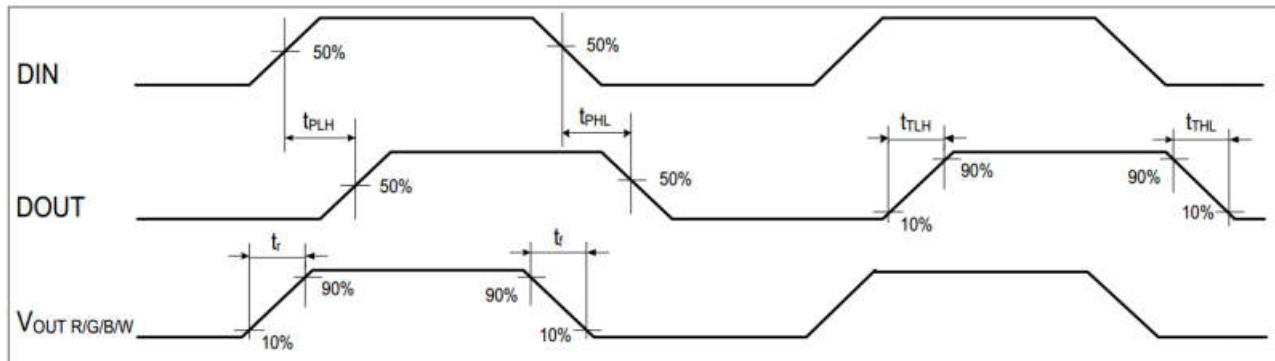
Code Description
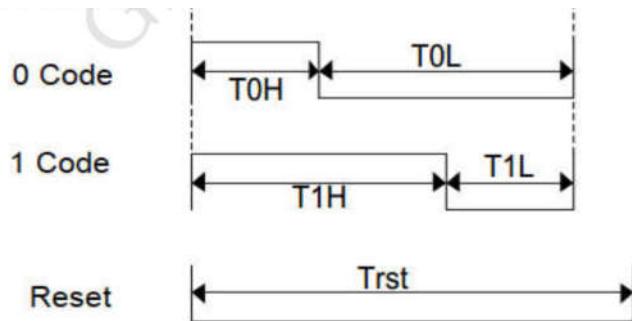
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Data Transfer Time

Symbol	Parameter	Min	Tpy	Max	Deviation	Unit
T		1.2	-	-	±0.05	us
T0H	0 code, high voltage time	-	0.3	-	±0.05	us
T0L	0 code, low voltage time	-	0.9	-	±0.05	us
T1H	1 code, high voltage time	-	0.9	-	±0.05	us
T1L	1 code, low voltage time	-	0.3	-	±0.05	us
Trst	Frame unit, low voltage time	200	-	-	-	us

Composition of 32bit Data

R7	R6	R5	R4	R3	R2	R1	R0	G7 ······ G0	B7 ······ B0	W7 ······ W0

bit31..bit0

Note: Data transmit in order of RGB, high bit data at first.

Cascade method
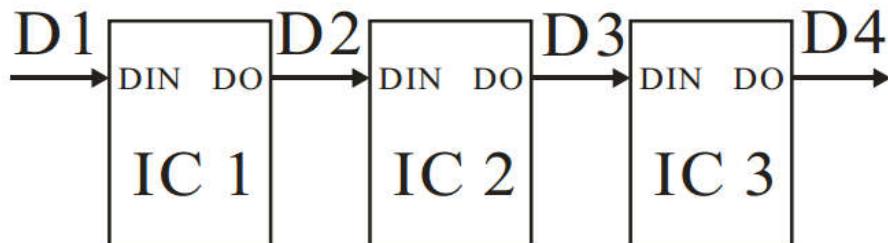
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Typical Application Circuit
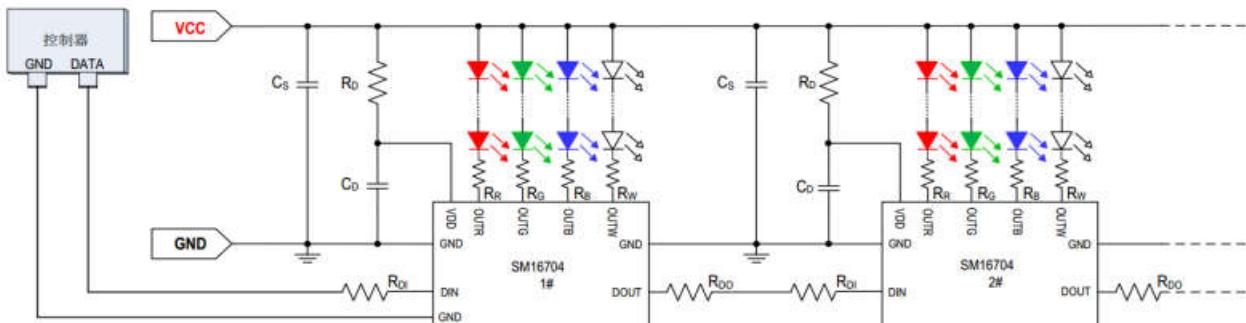
VCC(V)	5	6	9	12	15	18	24
$R_D(\Omega)$	33	100	470	1K	1.5K	2K	3K

Constant Current Feature
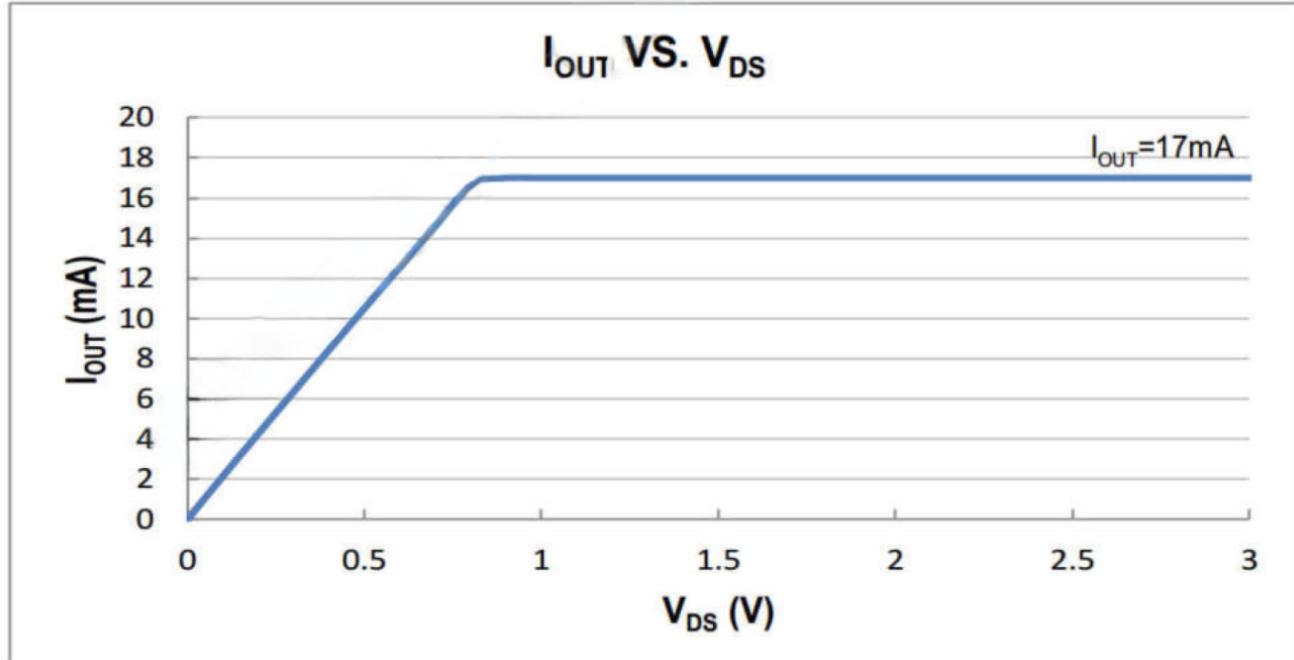
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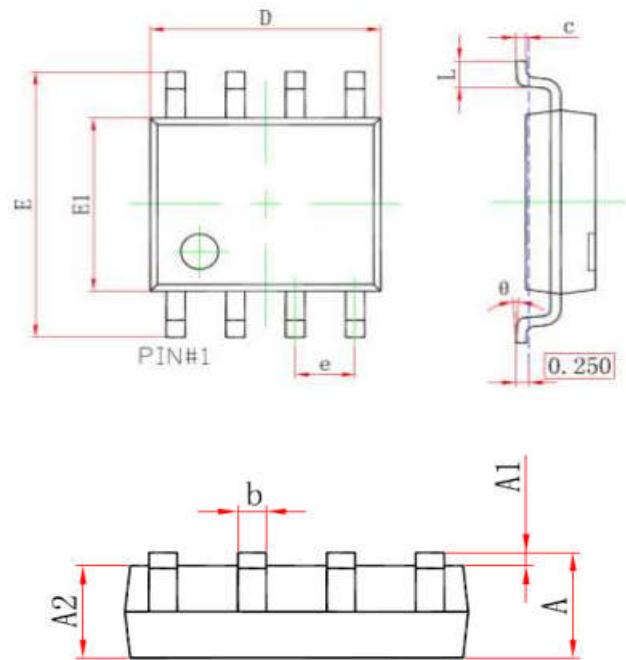
Symbol	Min(mm)	Max(mm)
A	1.25	1.95
A1	-	0.25
A2	1.25	1.75
b	0.25	0.7
c	0.1	0.35
D	4.6	5.3
e	1.27(BSC)	
E	5.7	6.4
E1	3.7	4.2
L	0.2	1.5
θ	0°	10°

M/N	Package	QTY		Reel size
		Plastic Tube	Reel	
SM16704	SOP8	100pcs/tube	4000pcs/reel	13"