SM19522PG

Feature

- Smooth gradient patent technology makes for a smoother low-gray gradient
- 65536 grayscale, GAMMA optional: 1.0/2.0/2.2/2.5
- High refresh rate, PWM frequency optional: 250Hz/4KHz/16KHz/32KHz
- Built-in display effects, built-in effects between chips are displayed synchronously
- OUT output maximum duty cycle adjustable: 3.1%~100%
- 6-channel constant current output
  SET or software adjust OUT W/Y/Z triple current mode;
  Current gain of each OUT R/G/B/W/Y/Z: 6bit;
  When REXT is floating, OUT constant current range: 0.3~18mA;
  When REXT Connect to GND , OUT constant current up to 60mA;
  OUT constant current accuracy ±5%;
  OUT R/G/B/W/Y/Z port withstand voltage:40V
- Out port low-gray opening width compensation adjustable: 7-level
- Support automatic addressing, automatic address finding, adaptive parameters
- Address line open circuit self-test function
- SPWM inversion function can be set by SPWM pin or software
- The numbers of OUT port support 1/2/3/4/5/6 channel selection
- The differential parallel signal transmission, maximum 4096 channel addressing.
- Differential signal transmission rate:200kbps~750kbps
- Built-in OTP (Over Temperature Protection)
- Package: SOP16

Application

- LED decorative lighting indoor
- Architectural LED appearance / scene lighting
- Wash-wall lights, curtain screens

Description

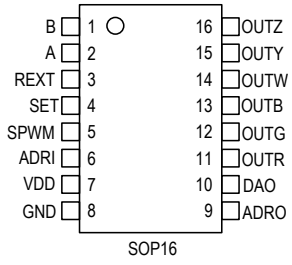
The SM19522PG is a parallel and differential signal transmission and 6-channal constant current driver. It is compatible and extends the DMX512 (1990) communication protocol. It has a variety of characteristics, including signal differential transmission, with a lot of load points, strong anti-interference ability, far transmission distance etc.

The patented smooth gradient technology realizes a smoother low-gray gradient display effect of lamps. The software adjusts the maximum duty cycle, and the brightness of the lamp can be adjusted online without changing the OUT constant current value.

The default OUT R/G/B/W/Y/Z port output current 18mA (REXT: floating). When The SET pin is grounded, or the software adjusts to triple current mode of the W/Y/Z channel (the maximum current is 54mA). The output current of OUT port can be 60mA when the REXT connect to external resistor. The controller parameters can be set 64-level current gain of each OUT R/G/B/W/Y/Z, and 250Hz/4KHz/16KHz/32KHz of OUT PWM frequency can be selected according to the application scenarios.

SM19522PG has a variety of built-in synchronization effects, support application scenarios without a controller. SM19522PG supports output polarity reversal. It is suitable for OUT ports to plug MOSFET or high power driver chips.

Pin Diagram



SOP16

Internal Function Diagram

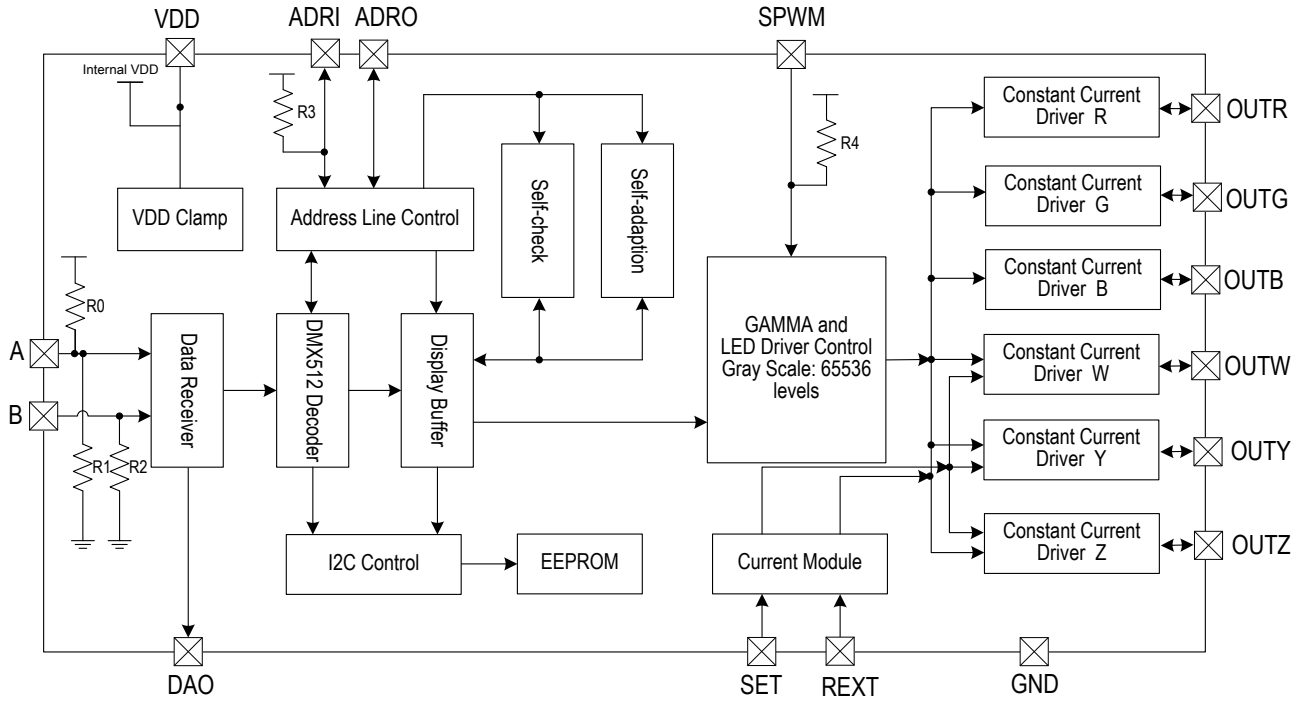


Fig.SM19522PG Internal function diagram

Pin Description

Pin Name	Pin Description
B	Differential signal input port-
A	Differential signal input port+
REXT	External REXT resistor to GND, to set OUTR/G/B/W/Y/Z output current.
SET	SET is connected to GND, OUT W/Y/Z triple current mode
SPWM	1.When SPWM is suspended (internal pull up), OUTR/G/B/W/Y/Z outputs normally. 2. SPWM is grounded or the out of controller sets inverting
ADRI	Enable signal input port of writing address
VDD	Power supply port, built-in 5V LDO circuit
GND	Ground
OUT G/R/B/Y/Z/W	Constant current driver port
ADRO	Enable signal output port of writing address
DAO	Serial data signal output port

Order Information

Type	Package	Packing		Reel Size
		Tube	Tape	
SM19522PG	SOP16	100000 pcs/box	4000 pcs/tape	13 inches

Absolute Maximum Parameter (Note 1,2,3)

Unless otherwise stated, T_A=25°C.

Symbol	Parameter	Range	Unit
V_{DD}	Operating voltage	-0.4~6.0	V
V_I	Logic input voltage	-0.4~V_{DD}+0.4	V
BV_{OUT}	OUTR/G/B/W/Y/Z withstand voltage	45	V
I_{OUT}	OUTR/G/B/W/Y/Z maximum output current	70	mA
I_{clamp}	Maximum clamping current of VDD port	20	mA
$R_{\theta JA}$	PN junction to ambient thermal resistance (Note 2)	90	°C/W
P_D	Power consumption (Note 3)	0.9	W
T_J	Operating junction temperature	-40~150	°C
T_{STG}	Storage temperature	-55~150	°C
V_{HBM}	HBM ESD	±4	KV

Note 1: The maximum output power is limited to chip junction temperature, the maximum limit means that the chip can be damaged beyond the scope of the work. The maximum limit value is the work in the limit parameter range, the device function is normal, but it is not completely guaranteed to meet the individual performance indexes.

Note 2: $R_{\theta JA}$ measures the flow of water according to the JEDEC JESD51 thermal measurement standard on the single-layer thermal conductivity test board under T_A=25°C.

Note 3: The maximum power consumption is decreased when temperature rising, this depends on T_{JMAX}, $R_{\theta JA}$ and T_A Maximum allowable power consumption is $P_D = (T_{JMAX}-T_A)/ R_{\theta JA}$ or the lower value of the value given in the limit range.

Electric Operating Parameter (Note 4, 5)

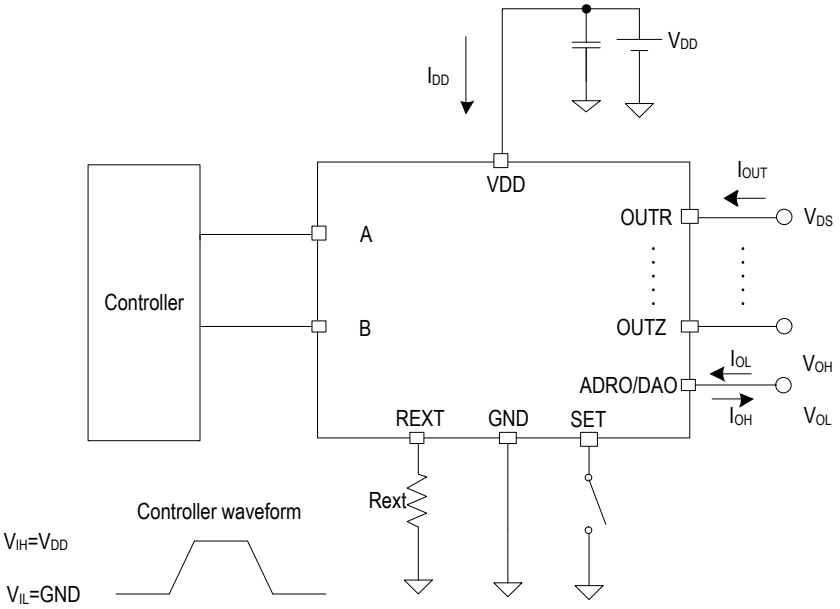
Unless otherwise stated, V_{DD}=5V, T_A=25°C.

Symbol	Parameter	Condition	Min.	Typ.	Max.	Unit
V_{clamp}	Internal clamp voltage	External power supply: VCC=12V, R_{IN} =1KΩ （Current limiting resistor between VCC and VDD）	-	5.4	-	V
I_{DD}	Quiescent current(energy saving mode)	VDD = 5V, REXT:NC, I_{OUT}"OFF"	-	3.5	-	mA
	Quiescent current(working mode)	VDD = 5V, REXT:NC, I_{OUT}"ON"	-	6.2	-	mA
V_{REXT}	REXT voltage	REXT connects to 1K resistor	-	1.18	-	V
I_{OH}	ADRO/DAO port drive current	high output, 22ohm resistor connects to GND	-	23	-	mA
I_{OL}		low output, 22ohm resistor connects to VDD	-	23	-	mA
$I_{OUT\_R/G/B/W/Y/Z}$	OUT R/G/B/W/Y/Z output current	REXT:NC, current gain setting: D5:D4:D3:D2:D1=11111	-	18	-	mA
		REXT:NC, current gain setting: D5:D4:D3:D2:D1=11111 OUT W/Y/Z enable triple current mode	-	54	-	
		REXT port is grounded Rext=2.5KΩ, current gain setting: D5:D4:D3:D2:D1=11111	-	60	-	
$dI_{OUT\_R/G/B/W/Y/Z}$	OUT R/G/B/W/Y/Z output current accuracy	REXT:NC, I_{OUT}=18mA	-	±3	-	%
		REXT connects 2.5KΩ resistor to GND, I_{OUT}=60mA	-	±5	-	%
$R_{down\_A/B}$	Resistance to ground of A/B port	V_{DD}=4.5V	-	151	-	KΩ
R_{UP_A}	Pull-up resistor of A port	V_{DD}=4.5V	-	162	-	KΩ
V_{CM}	Differential-input common-mode voltage	-	-	-	12	V
$\|V_{DIFF}\|$	Differential-input threshold voltage	V_{DD} = 5V, B=2.5V, A input high and low level.	200	-	-	mV
V_{DS}	I_{OUT} constant current knee point voltage	I_{OUT} = 18mA	-	0.3	-	V
		I_{OUT} = 30mA	-	0.5	-	V
		I_{OUT} = 60mA	-	1	-	V
% VS V_{DS}	OUT R/G/B/W/Y/Z output current variation	I_{OUT} =18mA, V_{DS}=1~3V	-	1	-	%
%VS V_{DD}		I_{OUT} =18mA, V_{DS}=4.5~5.5V	-	1	-	
%VS T_A		I_{OUT} =18mA, T_A =-40~+85℃	-	4	-	
R_{up_SET}	Pull-up resistor of SET port	-	-	-	33	KΩ
I_{leak}	OUT R/G/B/W/Y/Z leak current	I_{OUT}"OFF", V_{DS} = 40V	-	-	1	uA

Note 4: The electrical operating parameters define the DC parameters of the device within the working range and under test conditions that ensure a specific performance indicator. The specification does not guarantee the accuracy of the parameters that are not given the upper and lower limit values, but the typical values reflect the performance of the device.

Note 5: The minimum and maximum parameter range of the datasheet is guaranteed by the test, and the typical value is guaranteed by design, test or statistical analysis.

DC characteristic test circuit



Switch Characteristic

Unless otherwise stated, V_{DD}=5V, T_A=25°C.

Symbol	Parameter	Condition		Min.	Typ.	Max.	Unit
f_{PWM}	OUT R/G/B/W/Y/Z output PWM frequency	I_{OUT}=16mA, OUT R/G/B/W/Y/Z connects 200Ω resistor to VDD	SPWM:NC	-	250/4K/ 16K/32K	-	Hz
			SPWM connects to GND	-		-	
t_{PLH}	Signal transmission delay (Note 6)	DAO loads 30pF capacitor to ground, signal transmission delay from A to DAO		-	270	-	ns
t_{PHL}				-	270	-	ns
t_{TLH}	DAO transfer time (Note 7)	DAO loads 30pF capacitor to ground		-	15	-	ns
t_{THL}				-	15	-	ns
t_r	OUT R/G/B/W/Y/Z transfer time (Note 8)	I_{OUT}=18mA, OUT R/G/B/W/Y/Z connects 200Ω resistor to VDD		-	100	-	ns
t_f				-	170	-	ns

Note 6, note 7, note 8: shown as below.

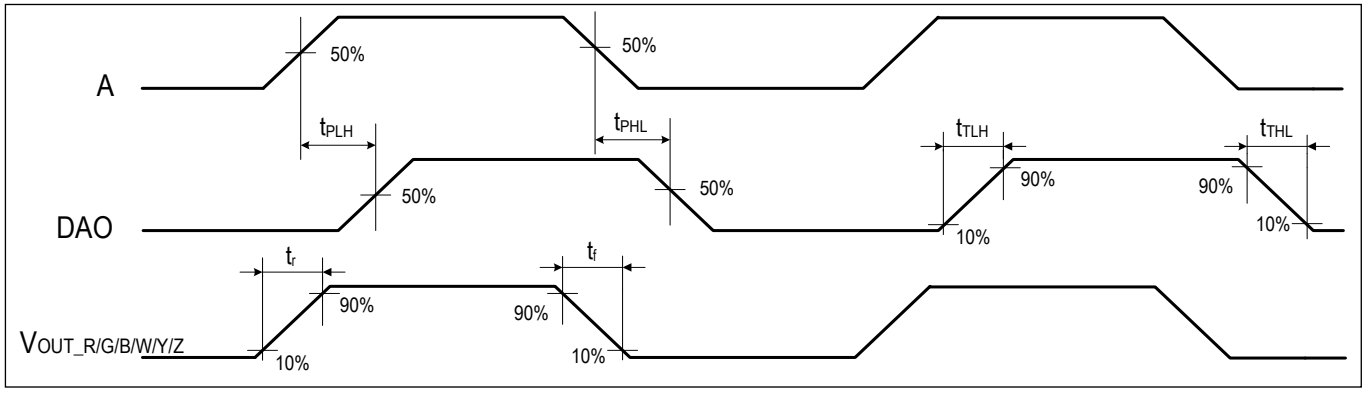
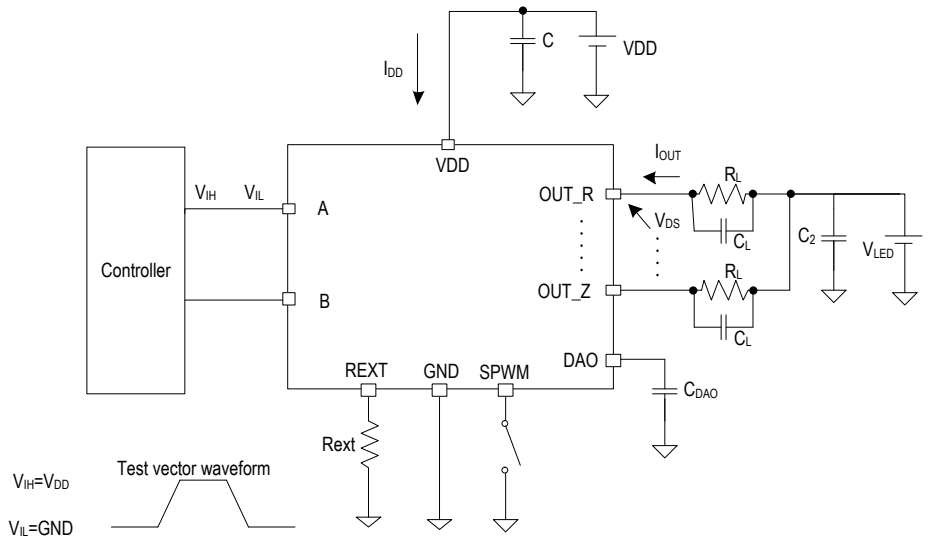


Fig. SM19522PG dynamic parameter test diagram

Dynamic characteristic test circuit



Data Communication Protocol

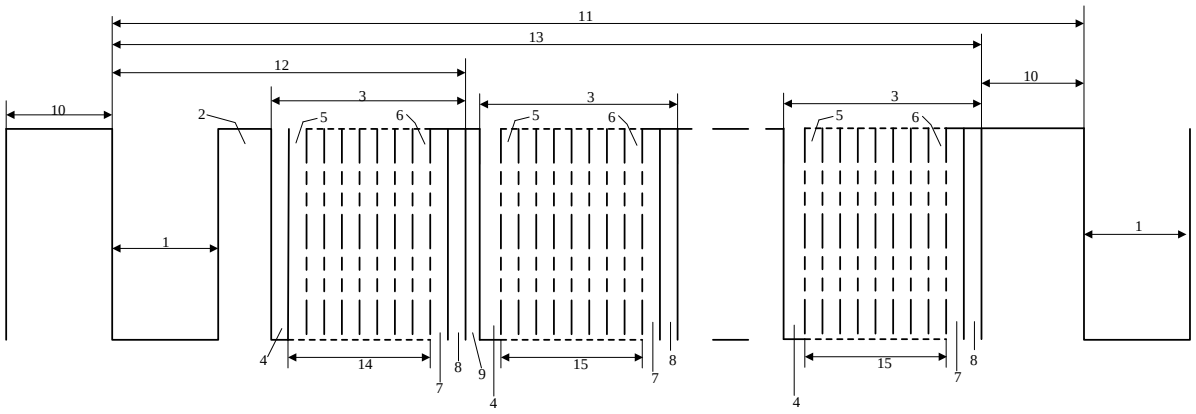


Fig. DMX512(1990) Data Communication Protocol Diagram

Figuer Key

1- "SPACE" for BREAK
2- "MARK" After BREAK (MAB)
3- Slot Time
4- START Bit
5- LEAST SIGNIFICANT Data BIT
6- MOST SIGNIFICANT Data BIT
7- STOP Bit
8- STOP Bit
9- "MARK" Time Between slots
10- "MARK" Before BREAK (MBB)
11- BREAK to BREAK Time
12- RESET Sequence (BREAK,MAB,START Code)
13- DMX512 Packet
14- START CODE (Slot 0 Data)
15- SLOT 1 DATA
16- SLOT nnn DATA (Maximun 512)

Designation	Description	Min	Typical	Max	Unit
-	Bit Rate	245	250	255	kbit/s
-	Bit Time	3.92	4	4.08	us
-	Minimum Update Time for 513 slots	-	22.7	-	ms
-	Maximum Update Rate for 513 slots	-	44	-	/s
1	"SPACE" for BREAK	88	-	-	us
2	"MARK" After BREAK (MAB)	8 -	- -	- <1.00	us s
9	"MARK" Time Between slots	0	-	<1.00	s
10	"MARK" Before BREAK (MBB)	0	-	<1.00	s
11	BREAK to BREAK Time	1196 -	- -	- 1.00	us s
13	DMX512 Packet	1196 -	- -	- 1.00	us s

Note： The above data format is completely compatible with DMX512(1990).

Constant Current Characteristic

When it gets to constant current knee point, the SM19522PG output current is not affected by OUT voltage(V_{DS}). relationship between I_{OUT} and V_{DS} is shown below.

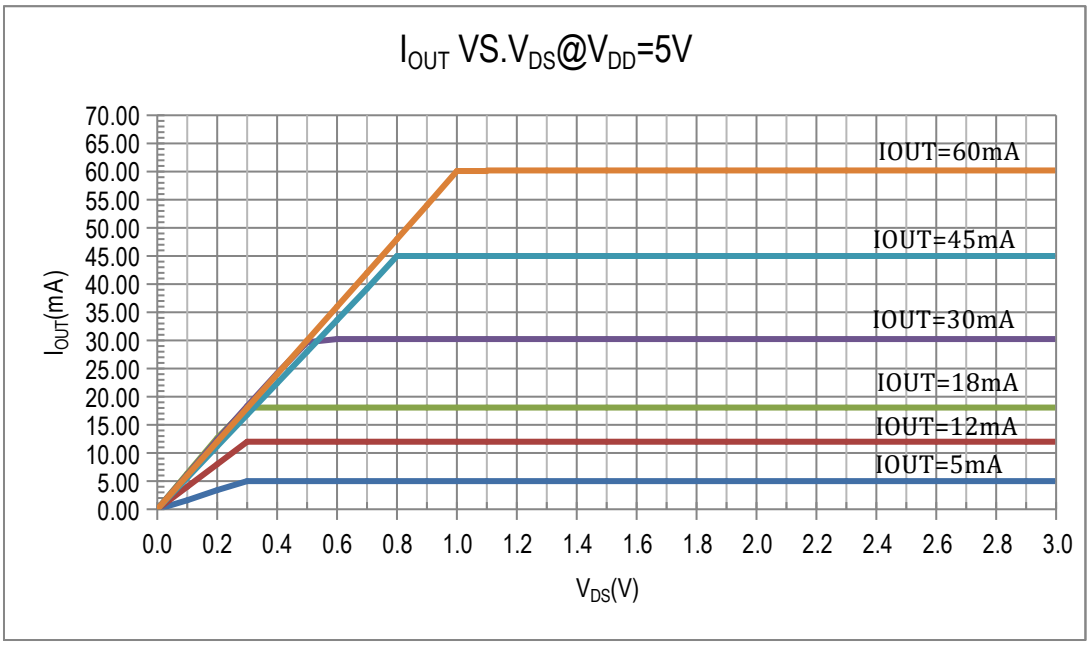


Fig. Relationship diagram between I_{OUT} and V_{DS} of SM19522PG

Output Current Setting

When REXT is not connected, R/G/B/W/Y/Z output current is 18mA(default).When REXT connects Rext to GND, maximum output current can be extended to 60mA The output current of SM19522PG is set by the following equation(G represents current gain):

$$I_{OUT}(mA) = (18 + \frac{104}{Rext}) * \frac{G+1}{64}$$

For example, when Rext=2.5KΩ, G=63, the OUT R/G/B/W/Y/Z output current value is 60mA.

Current Gain

OUT R/G/B/W/Y/Z of SM19522PG has 6bits current gain adjustment bit. Taking the current adjustment of OUTR channel as an example, REXT:NC, the corresponding relationship between current value, current level and adjustment bit is as follows:

Current gain (G)	IR5	IR4	IR3	IR2	IR1	IR0	current value (mA)
0	0	0	0	0	0	0	0.3
1	0	0	0	0	0	1	0.6
2	0	0	0	0	1	0	0.8
3	0	0	0	0	1	1	1.1
4	0	0	0	1	0	0	1.4
5	0	0	0	1	0	1	1.7
6	0	0	0	1	1	0	2.0
7	0	0	0	1	1	1	2.3
8	0	0	1	0	0	0	2.6
9	0	0	1	0	0	1	2.9
10	0	0	1	0	1	0	3.1
11	0	0	1	0	1	1	3.4
…	…	…	…	…	…	…	…
52	1	1	0	1	0	0	15
53	1	1	0	1	0	1	15.3
54	1	1	0	1	1	0	15.6
55	1	1	0	1	1	1	15.9
56	1	1	1	0	0	0	16.2
57	1	1	1	0	0	1	16.5
58	1	1	1	0	1	0	16.8
59	1	1	1	0	1	1	17.0
60	1	1	1	1	0	0	17.3
61	1	1	1	1	0	1	17.6
62	1	1	1	1	1	0	17.9
63	1	1	1	1	1	1	18.1

Automatic function selection

Description of automatic address writing function

1) Turn on the automatic address writing function: first set the chip automatic address writing step through the parameter writing function, and then use the controller to enable the automatic address writing function. After the instruction is written successfully, the first light will be red, and the rest will be purple.

2) When the automatic address writing function is turned on, the automatic addressing operation will be performed every time the power is turned on again (the controller needs to send a normal gray-scale data signal), the first chip(that is, the ADRI is suspended) at the signal input terminal is judged to be the first address 1, and The chip is automatically addressed according to the setting step number, and the new address data will be automatically saved. The first address could be "1" or choose "the existing address unchanged";

3) After the automatic address writing is successful, the first chip lights up in red, and the other chips lights up in green for 2 seconds.

4)The number of automatic addressing times is optional: the number of automatic addressing times can be set to 1~15 times or infinite times. Automatic addressing is performed every time the power is turned on, and the number of times is reduced by 1 until the number of automatic addressing times is 0. The electricity will no longer be automatically addressed.

Description of automatic addressing function

1) Turn on the automatic addressing function: first set the step by writing parameters, and then use the controller to enable the automatic addressing function. After the instruction is written successfully, the first light will be red, and the rest will be purple;

2) After the lamp is powered on and the automatic addressing succeeds, the chip lights up green for 2 seconds; at the same time, the chip automatically exits the automatic addressing mode.

3) The number of automatic addressing is fixed at three times, and the automatic addressing is performed every time the power is turned on, and the number of automatic addressing is reduced by 1 until the number of automatic addressing is 0.

Adaptive function description

1) Turn on the adaptive function: use the controller to enable the adaptive function, the first light will be red after the instruction is successfully written, and the rest will be purple;

2) After the lamp is powered on and auto-adapted successfully, the chip will turn on green for 2 seconds; at the same time, the chip will automatically exit the auto-adaptation mode.

3) The number of automatic addressing is fixed at three times, and the automatic addressing is performed every time the power is turned on, and the number of automatic addressing is reduced by 1 until the number of automatic addressing is 0.

Note of automatic function

1) When the automatic function is selected through the controller, only one of the automatic addressing/automatic address writing/adaptive functions can be selected; after the selection is successful, the first light will be red and the other bright purple lights are signs;

2)Automatic addressing/self-application can be used for lamp repair. Lamps with automatic addressing function can be automatically identified when they are repaired; lamps with adaptive function turned on, and addresses, parameters and current gains can be automatically identified when they are repaired;

3) After the controller writes the address, all automatic functions will be automatically closed;

4)After the project debugging is completed, it is recommended to turn off the automatic address writing function.

Address line open circuit self-test function

SM19522PG built-in address open circuit self-check function is as follows:

1) Turn on the self-check function: turn on the self-check function by writing the parameter function;

2) After the self-check function is turned on, the chip will automatically detect whether the address line is normal every time the power is turned on. When the address line is abnormal, the lamp and the first lamp of the chip with abnormal address input will light up in red, and the rest of the lamps will not light up.

Note: For chips with automatic function turned on, the self-check function does not effect.

OUT port opening width compensation

SM19522PG opening width compensation function as follows:

1) Opening width compensation function: turn on the width compensation function through the parameter writing function;

2) OUT port opening width compensation is level 0~6, each level increases the OUT port opening time by about 260ns, level 0 means no compensation.

Display effect selection

SM19522PG display effect description is as follows:

1) Power-on display effect: It can be set to display the preset effect or built-in effect after power-on 2s.

- Preset effect: Customize the display effect of R/G/B/W/Y/Z channel.
- Built-in effects: SM19522PG has built-in display effects such as colorful jumping, color mixing gradient, all-white gradient, flashing light, etc. It supports the combined cycle display of four display effects, and supports the change of playback speed.

2) No-signal display effect: After receiving the display grayscale data, maintain 2s at no-signal state, the lamp can switch to the power-on display effect or maintain the last frame display effect. Make sure that the Lamp can meet the display requirements when there is no data input.

The built-in effects are explained as follows:

- Colorful jump change: The color of the lamp changes, the specific display effect changes according to the number of set channels, and the jump time is adjustable.
- Color mixing gradient: The brightness of the lamp changes slowly, and the color changes. The specific display effect changes according to the number of set channels, and the change time of each gray level of the lamp is adjustable.
- All-white gradient: The lamp only displays white, and the brightness changes slowly, and the time of each grayscale change of the lamp is adjustable.
- Flashing light: The lamp switches between on and off, and the color will change after each switch. The specific display effect changes according to the number of channels set, and the total time of a single on and off state is adjustable.
- Combined cycle display: The display effects such as colorful jumping, color mixing gradient, all-white gradient, flashing light and other display effects are combined and displayed in a cycle.

OUT maximum duty cycle adjustment function

SM19522PG supports the maximum duty cycle adjustable from 3.1% to 100%, the adjustment steps are 32 steps, and the adjustment step is 3.1%/step. It can realize the adjustment of the maximum power of the lamp without changing the current gain G, which is suitable for high-power application scenarios of external expansion current.

Triple current mode

SM19522PG OUT W/Y/Z ports support triple current mode. Details are as follows:

1) The SET port is floating: the default output current value of the W/Y/Z port is the same as the R/G/B port. At this time, you can set the OUT W/Y/Z port to turn on the triple current mode by writing parameters. And the output current value is three times that of R/G/B port.

2) The SET port connect to GND: the W/Y/Z port turns on the triple current mode, and the output current value is three times that of R/G/B port.

3) When the W/Y/Z port turns on the triple current mode, the maximum output current of the W/Y/Z port is 60mA.

Channel selection function

SM19522PG has a built-in 1/2/3/4/5/6 channel selection function. The output port OUTR/G/B/W/Y/Z lights up under different channel modes are shown in the following table:

Mode	OUTR Port display	OUTG Port display	OUTB Port display	OUTW Port display	OUTY Port display	OUTZ Port display
1-CH Mode	Synchronous display					
2-CH Mode	Synchronous display			Synchronous display		
3-CH Mode	Synchronous display		Synchronous display		Synchronous display	
4-CH Mode	Independent display	Independent display	Independent display	Independent display	No Display	No Display
5-CH Mode	Independent display	Independent display	Independent display	Independent display	Independent display	No Display
6-CH Mode	Independent display	Independent display	Independent display	Independent display	Independent display	Independent display

Note:

1) In channel 1 mode, OUTG/OUTB/OUTW grayscale data changes with the grayscale control data of OUTR channel;

2) In 2-channel mode, OUTR/OUTG/OUTB grayscale data changes with OUTR channel grayscale control data, and OUTW/OUTY/OUTZ grayscale data changes with OUTG channel grayscale control data;

3) In 3-channel mode, OUTR/OUTG grayscale data changes with OUTR channel grayscale control data, OUTB/OUTW grayscale data changes with OUTG channel grayscale control data, and OUTY/OUTZ grayscale data changes with OUTB channel grayscale control data;

4) In 4/5/6 channel mode, all channels are displayed independently;

Typical Application

SM19522PG uses differential parallel transmission, it adopts the international DMX512 (1990) protocol, and Supports up to 4096 channels.

In the engineering application, the controller connect to the first lamp point, only need to connect the A/B differential signal line and ground wire to complete the operation of writing address and display control, which improves the flexibility of engineering installation.

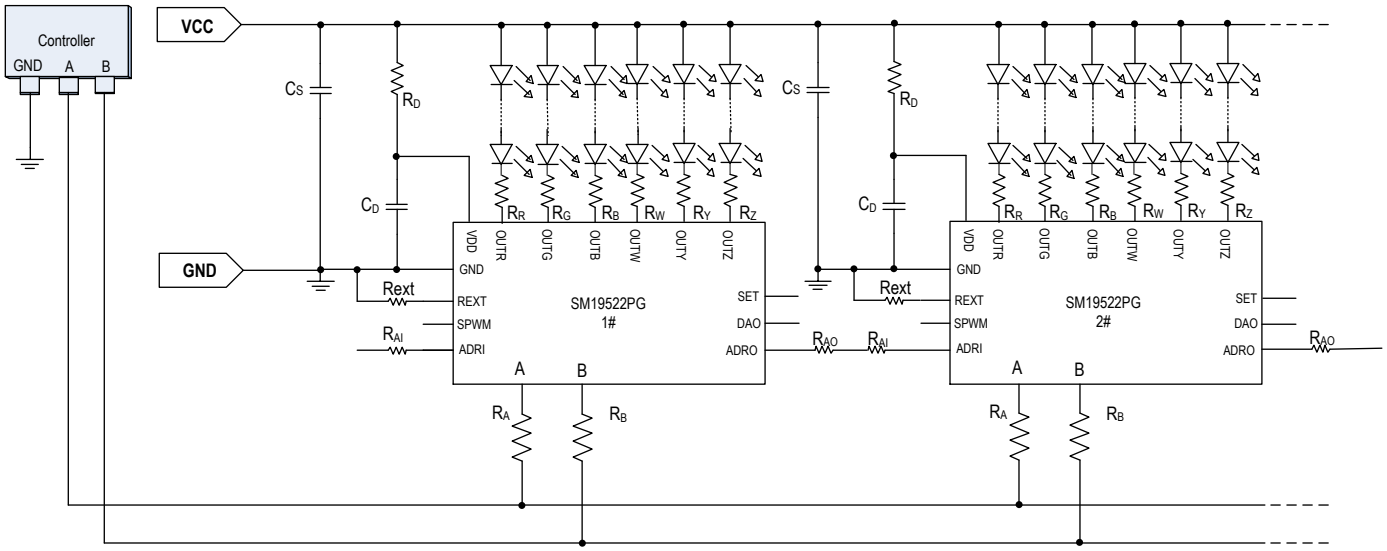


Fig. SM19522PG Typical application diagram

The typical application circuit of SM19522PG includes VCC (input voltage of power supply), R_D (current-limit resistor) ,C_S (system power filtering capacitor), and R_R、R_G、R_B、R_W、R_Y、R_Z (divider resistor of R/G/B/W/Y/Z LED), R_{AI}(address signal input protection resistor), R_{AO} (address signal output protection resistor) and R_A, R_B (A/B bus signal cascaded resistor).

In practical applications, if the controller is connected to the address signal input line of the first lamp, the corresponding port of the controller must be at a high level, otherwise the address cannot be modified normally.

(1)VCC is external input voltage, RD is current-limit resistor for limiting the internal voltage-stabilizing operation current when turns on the chip voltage-stabilizing function. Chip operation voltage: V_{DD}: V_{DD}=VCC-(I_{DD}+I_{IN})*R_D

I_{IN} is the internal voltage-stabilizing operation current, I_{DD} is the chip quiescent current, the value of R_D must keep V_{DD} >3V. The higher the R_D is, the lower the system power consumption is, and the anti-interference capability is weak; the lower the R_D is, the higher the system power consumption is, and the operating temperature is higher, therefore the R_D should be selected compromisingly based on the system application environment in the design. The relation between VCC and R_D is given by:

VCC（V）	5V	6V	9V	12V	15V	18V	24V	36V
R_D（Ω）	33	68	300	680	1.0K	1.2K	2.0K	1.5K+1.5K

(2)Cs is system power capacitance to the ground for reducing the power fluctuations and spikes. To avoid affecting the actual application, it is recommended to reserve this capacitor. 0.1uF-10uF capacitor can be selected according to the actual load of the system;.

(3)C_D is chip filter capacitor for keeping VDD voltage stable and guarantee normal operation. Recommend to choose 100nF.

(4)R_A and R_B are A/B signal input protection resistor, prevent A, B port from damage that makes bus data abnormal.

(5) R_{AI}、 R_{AO} is address signal input and output protection resistor for preventing electric plug, positive and negative pole and signal

wire in reverse which would damage the signal input port.

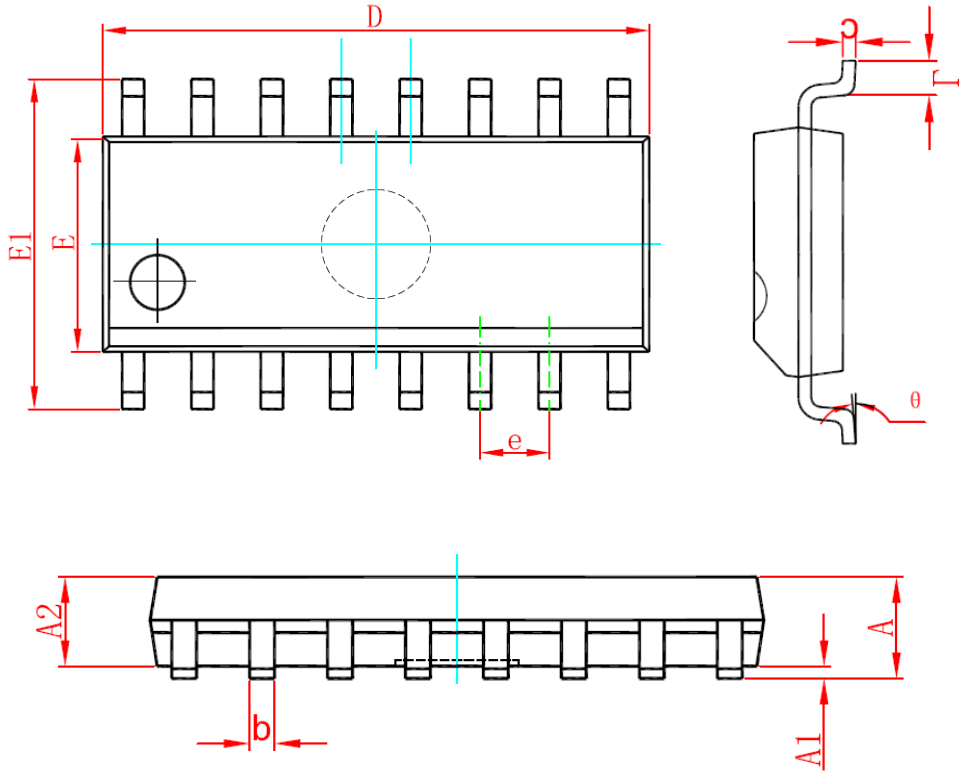
(6) R_R、R_G、R_B、R_W、R_Y、R_Z is divider resistor for reducing the OUTR/G/B/W/Y/Z voltage and the power consumption. The value is given by: $R_R/R_G/R_B/R_W/R_Y/R_Z=(VCC-N*V_{LED}-V_{DS})/I_{LED}$, VCC is input voltage, V_{LED} is LED conduction voltage drop, I_{LED} is output current, V_{DS} is OUTR/G/B/W/Y/Z voltage which is constant output on 1V. Consider voltage loss in actual application, OUTR/G/B/W/Y/Z voltage should be considered to guarantee constant current output. Recommend to design OUTR/G/B/W/Y/Z voltage (V_{DS}) as 3.0V. Concrete will be subject to actual application. Different LED color pressure drop, reference as follows. Red: 2.2V, green, blue and white: 3.2V, concrete will be subject to actual specification.

In typical application, according to different input voltage, different number of beads, the parameters of corresponding recommended values as follow (Default REXT: floating, OUTW/Y/Z ports do not enable the triple current mode):

Supply voltage VCC	Number of LEDs connected to the OUTR/G/B/W/Y/Z(pieces)	R_D(Ω)	C_D（nF）	R_A、R_B(Ω)	R_{AI}、R_{AO}(Ω)	R_R(Ω)	R_G、R_B、R_W(Ω)
12V	3	510	100	10K	510	150	-
24V	6	2K	100	10K	510	510	150

Package

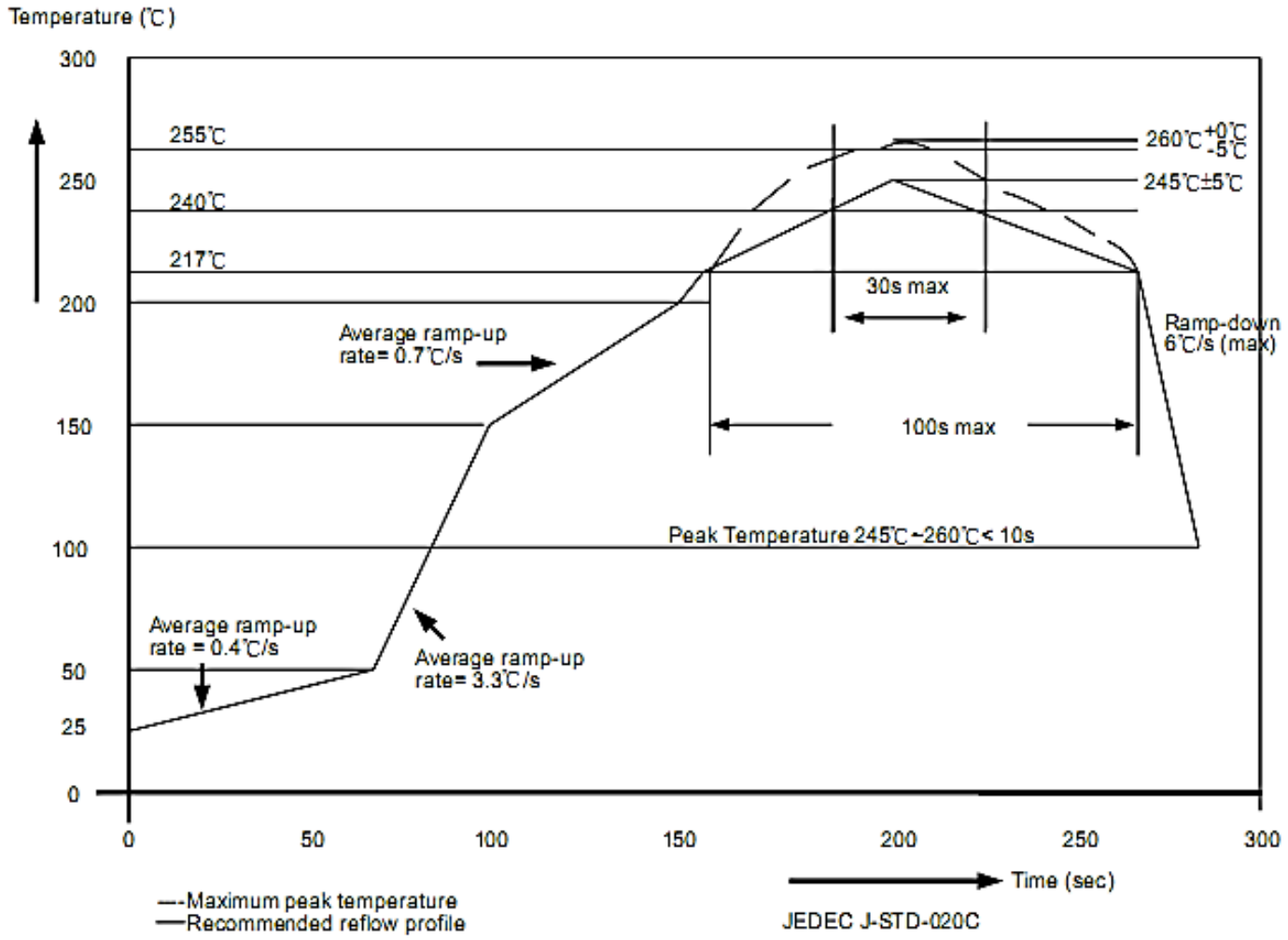
SOP16



Symbol	Min(mm)	Max(mm)
A	-	1.95
A1	-	0.25
A2	1.25	-
b	0.25	0.7
c	0.1	0.35
D	9.7	10.4
E	3.7	4.2
E1	5.7	6.4
e	1.27(BSC)	
L	0.2	1.5
θ	0°	10°

Encapsulation Soldering Process

Semiconductors of Sunmoon follow the European RoHs standard, solder temperature in encapsulation soldering process follows J-STD-020 standard.



Encapsulation Thickness	Volume mm^3 < 350	Volume mm^3：350~2000	Volume mm^3 ≥ 2000
<1.6mm	260+0°C	260+0°C	260+0°C
1.6mm~2.5mm	260+0°C	250+0°C	245+0°C
≥2.5mm	250+0°C	245+0°C	245+0°C

Revision Record

Date	Revision	Revision Contents
2021-10-28	IBSBZIV1.0	First edition
2021-11-18	IBSBZIV1.1	Update block diagram
2021-11-23	IBSBZIV1.2	Modify symbol and format
2022-01-17	IBSBZZV1.3	New English version of the manual, updated version number
2022-04-20	IBSBZZV1.4	Update package description
2022-12-12	IBSBZZV1.5	Add channel selection function description

Declaration

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