

# SM2135

## Feature

- stand by I<sup>2</sup>C protocol;
- Rd constant current control;
- Inter-chip current deviation < ± 5% ;
- Efficiency:> 90% ;
- PF> 0.5 (Plus input electrolytic capacitor)
- PF> 0.9 (Without input electrolytic capacitor)
- Integrated high-voltage power supply is started;
- Single-channel independent 256 Gradation current regulation stage;
- Overheating protection;
- Chip applications without EMI problem;
- Package: ESOP8 .

## Applications

- led Bulb;
- led Ceiling;

## Outline

SM2135 It is a five-channel intelligent dimmer led Constant current driver chips for driving

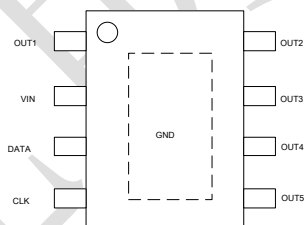
Low-power move led Lamps.

SM2135 have 5 Independent output ports, integrated chip I<sup>2</sup>C Enter Agreement

Port may receive MCU An output current control output signal generated by each port 256 Continuously variable

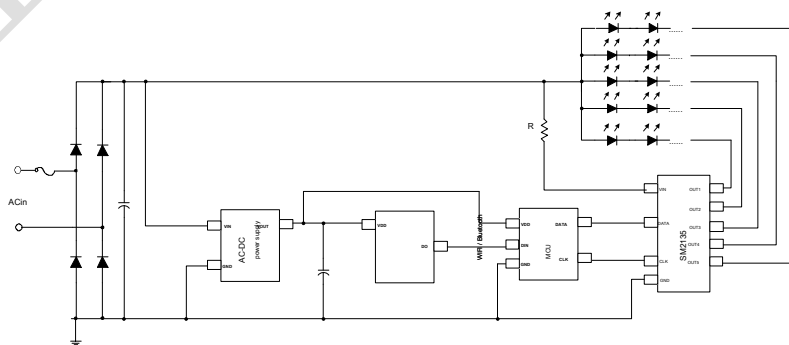
And each output port of the driver led Blinking light to achieve a smart dimmer.

## Pin map



ESOP8

## A schematic circuit diagram of a typical



Map 1.SM2135 A schematic circuit diagram of a typical



## Pin Description

Pin	Pin Function
VIN	Chip Power Input
OUT1	Constant current output port 1 (Default red / green / blue)
OUT2	Constant current output port 2 (Default red / green / blue)
OUT3	Constant current output port 3 (Default red / green / blue)
OUT4	Constant current output port 4 (Default yellow / white)
OUT5	Constant current output port 5 (Default yellow / white)
CLK	Dimming clock input
DATA	Dimming data input
GND	Chip ground

## Limit parameters

Unless otherwise specified, the ambient temperature is 27 ° C .

Parameters	symbol	range
Operating temperature	TOPT	- 20 ° C ~ + 125 ° C
storage temperature	TSTG	- 50 ° C ~ + 150 ° C
ESD Pressure	VESD	> 2000V
OUT Pressure port	VOUT	<450V
VIN Pressure port	VIN	<450V
OUT Port output current limit	IOUT	<100mA
CLK / DATA Pressure port	VCLK / VDATA	<8V

## Electrical operating parameters

Unless otherwise specified, the ambient temperature is 27 ° C .

parameter	symbol	condition	Min	Typ	Max	Units
VIN Port input voltage	V <sub>IN</sub>		9			V
OUT Input voltage	V <sub>OUT</sub>	I <sub>OUT</sub> = 30mA	2			V
OUT1 / OUT2 / OUT3 Output current	I <sub>OUT1</sub> / I <sub>OUT2</sub> / I <sub>OUT3</sub>		10	20	45	mA
OUT4 / OUT5 Output current	I <sub>OUT4</sub> / I <sub>OUT5</sub>		10	30	60	mA
OUT Output current dimming range	I <sub>adjust</sub>	256 Gradation current level	1/255		1	Time
IOUT Accuracy	dI <sub>OUT</sub>	I <sub>OUT</sub> = 10mA ~ 40mA			± 5	%
Negative temperature compensation threshold	T <sub>c</sub>			100		°C
Standby Power	P <sub>standby</sub>			0.15		W

## Thermal Resistance Parameters

symbol	Explanation	ESOP8	unit
R <sub>THJA</sub>	Thermal resistance ( 1 )	85	°C / W

Note( 1 ): With a chip to be soldered 200mm<sup>2</sup> Copper heat PCB Plate, copper foil thickness 35um .

## Functional Description

SM2135 It is a five-channel intelligent dimmer led Constant current driver chips, may be parallel red / green / blue led Lights and white / yellow dichroic led Lamp, by

MCU Control is realized red / green / blue or white / yellow dichroic smart dimmer / tone color temperature.

SM2135 have 5 Independent output ports, integrated chip class IIC Input port protocol, may be received MCU Each input control signal output port

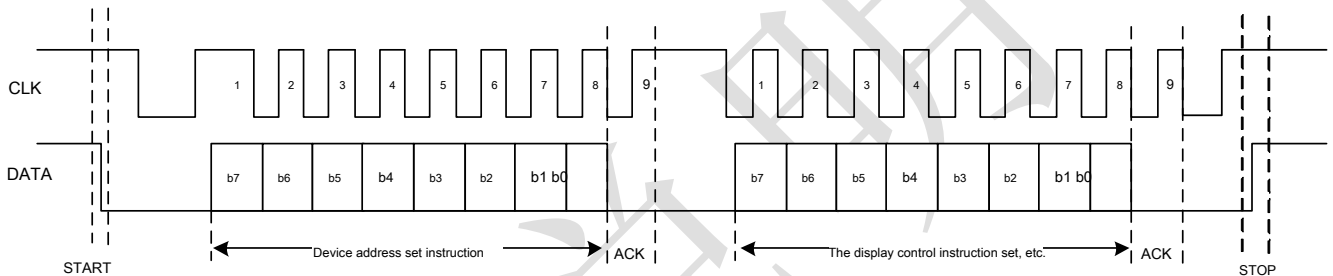
The current generated 256 Level changes and the red / green / blue trichromatic led Lamp or white / yellow dichroic led Lamp to achieve a smart dimmer switch.

## Intelligent dimming specific implementations

### one type IIC Protocol Overview

by MCU Dimming signal transmission intelligent dimming control, the chip type IIC The two-wire communication protocol module receives the digital MCU Send tone

Optical signal into the clock signal CLK And data signals DATA The specific protocol rules are as follows:



CLK Port receives a clock signal, DATA Port receiving the data.

1) when CLK It is high, DATA High to low transition indicates the start of transmission; when CLK It is high, DATA From low to high indicating the end of transmission.

2) When transmitting data, adopting the serial transmission, each 8 Bit 1 Set of data, when CLK It is high, DATA Must remain the same, when CLK for

Low level, DATA To change. when CLK , Data is written from low to high (rising edge clock). Each completed 8 Bit data transmission, i.e., 8

After the clock, the first 9 Clock, chip internally generated response signal ACK will DATA Pin low ( 8byte + 1ack ).

3) Each time data transmission, the first 1 group 8 Signal for the address data, selecting subsequent data writing position; the first 2 Start switch current set of signal data,

Intelligent light control chip; first 3 The first group to 7 group 8 Bit control signals R / G / B / W / Y ,respectively 256 Changes in levels of gray.

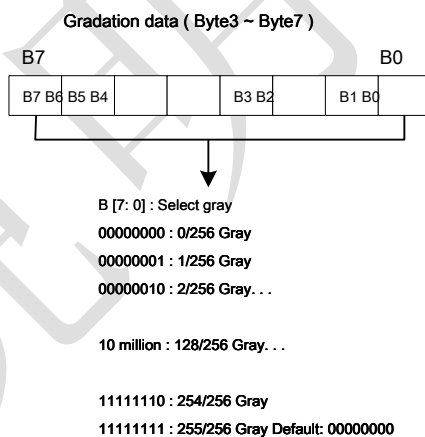
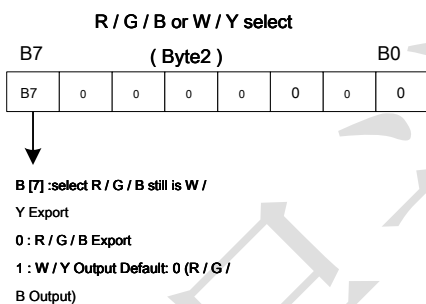
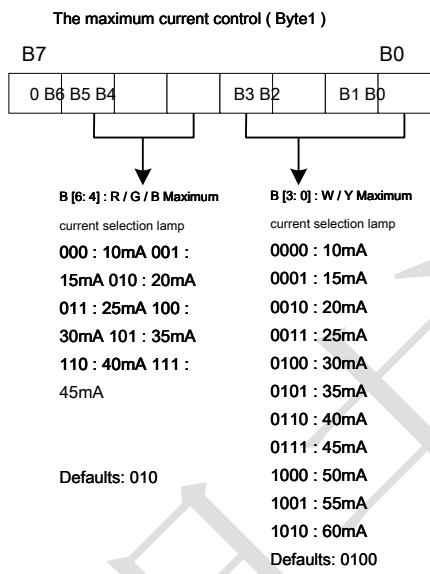
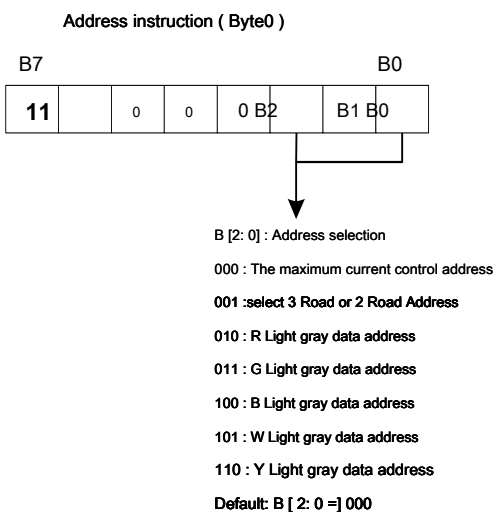
Byte0	Byte1	Byte2	Byte3	Byte4	Byte5	Byte6	Byte7
Address instruction	The maximum current control	R / G / B or W / Y select	R Light gray data	G Light gray data	B Light gray data	W Light gray data	Y Light gray data

Note: 1 : Byte0 ~ Byte7 Data 8bits data.

2 : Byte0 Address instruction. 0xC0 ~ 0xC6 Choose to Byte1 ~ Byte7 Address bit write data, address initialization, which Byte1 The maximum current control command, Byte2 for R / G / B or W / Y Output selection instruction, Byte3 ~ Byte7 for R / G / B / W / Y Gradation data of the lamp.

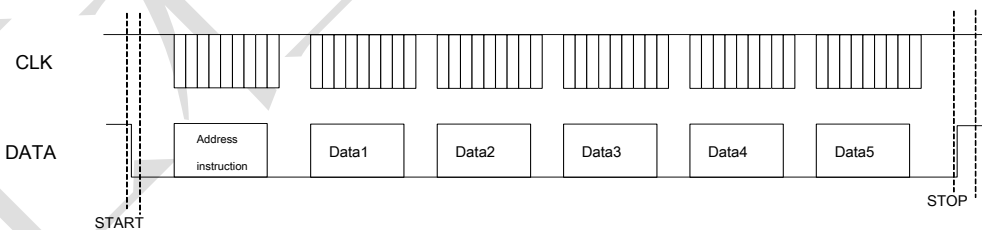
3 : Byte1 Maximum current control command. The first 1bit ( MSB) vacancy need not (write recommendation 0) The first 2 ~ 4bits It is controlled R / G / B of 8 Maximum current level, the first 5 ~ 8bits control W / Y of 16 Current maximum level.

4 : Byte2 Yes R / G / B (0) or W / Y (1) Select the command. The first 1bit ( The default is the highest level 0) for 0 ,select 3 road R / G / B Output; the first 1bit ( MSB) is 1 ,select 2 road W / Y Output. The first 2 ~ 8bits Vacant do (write recommendation 0) .



Second, the application instance

1) select 3 road R / G / B Output, the maximum current 40mA , R Light gray 2/255 , G Light gray 50/255 , B Light gray 128/255 :



The foregoing protocol rules, MCU Enter the program as follows:

START : 11 million (Select Address byte1 )

01,100,100 (Write byte1 Data set R / G / B The maximum current 40mA )

0000 0000 (Write byte2 Data set R / G / B Output, W / Y shut down)

0000 0010 (Write byte3 Data set R Light gray level 2/255 )

00,110,010 (Write byte4 Data set G Light gray level 50/255 )

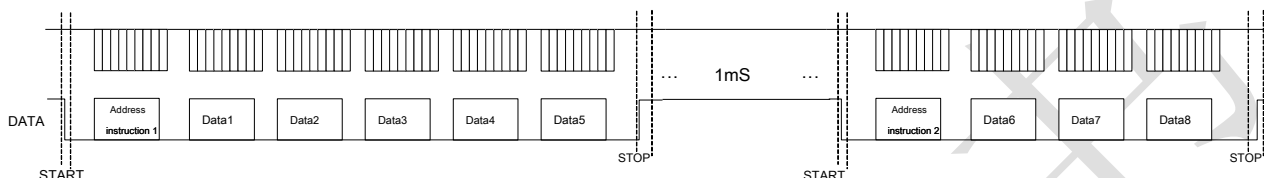


1000 0000 (Write byte5 Data set B Light gray level 128/255 )

STOP .

2) select 3 road R / G / B Output, the maximum current 40mA , R Light gray 7/255 , G Light gray 77/255 , B Light gray 88/255 ; 1ms Rear R

Light gray 5/255 , G Light gray 55/255 , B Light gray 155/255 , Procedure is as follows:



The foregoing protocol rules, MCU Enter the program as follows:

START1 : 11 million (Select Address byte1 )

01,100,100 (Write byte1 Data set R / G / B The maximum current 40mA )

0000 0000 (Write byte2 Data set R / G / B Output, W / Y shut down)

00,000,111 (Write byte3 Data set R Light gray level 7/255 )

01,001,101 (Write byte4 Data set G Light gray level 77/255 )

01,011,000 (Write byte5 Data set B Light gray level 88/255 )

STOP1 ;

START2 : 11,000,010 (Select Address byte3 )

00,000,101 (Write byte3 Data set R Light gray level 5/255 )

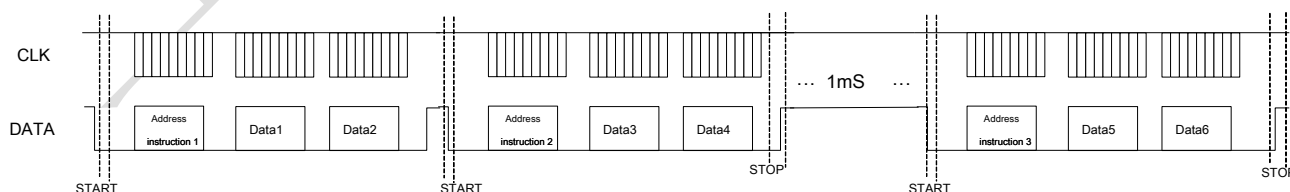
00,110,111 (Write byte4 Data set G Light gray level 55/255 )

10,011,011 (Write byte5 Data set B Light gray level 155/255 )

STOP2 .

3) select 2 road W / Y Output, the maximum current 50mA , W Light gray 2/255 , Y Light gray 7/255 ; 1ms Rear W Light gray 48/255 , Y light

Gray 22/255 , Procedure is as follows:





The foregoing protocol rules, MCU Enter the program as follows:

START1 : 11 million (Select Address byte1 )

00,101,000 (Write byte1 Data set W / Y The maximum current 50mA )

1000 0000 (Write byte2 Data set R / G / B shut down, W / Y Output)

STOP1 ;

START2 : 11,000,101 (Select Address byte6 )

0000 0010 (Write byte6 Data set W Light gray level 2/255 )

00,000,111 (Write byte7 Data set Y Light gray level 7/255 )

STOP2 ;

START3 : 11,000,101 (Select Address byte6 )

00,110,000 (Write byte6 Data set W Light gray level 48/255 )

00,010,110 (Write byte7 Data set Y Light gray level 22/255 )

STOP3 .

Third, the constant power settings

Maximum current chip  $I_{total}$  Chip set the maximum current  $I_{out}$  When, the constant power setting rules are as follows:

1 : 3 road R / G / B Output, R Light gray data + G Light gray data + B Light gray data  $\leq 255 * (I_{total} / I_{out})$  .

2 : 2 road W / Y Output, W Light gray data + Y Light gray data  $\leq 255 * (I_{total} / I_{out})$  .

For example as follows:

Consider the definition of power chip 8 Watts, the voltage 250V , The maximum current chip  $I_{total}$  - 30mA Better. SM2135 Chip Set R / G / B Maximum current  $I_{out}$  - 20mA ,

then R Light gray data + G Light gray data + B Light gray data  $\leq 255 * (I_{total} / I_{out}) - 255 * (30/20) = 382$  . Such as R Light gradation data = 100 , G Light gradation data = 111 ,

It can only set B Light gray data  $\leq 382-100-111 = 171$  , 1ms Rear R Light gradation data = 110 , G Light gradation data = 91 You can only set B Light gray Number

According  $\leq 382-110-91 = 181$  .

Consider the definition of power chip 8 Watts, the voltage 250V , The maximum current chip  $I_{total}$  - 30mA Better. SM2135 Chip Set W / Y Maximum current  $I_{out}$  - 40mA ,

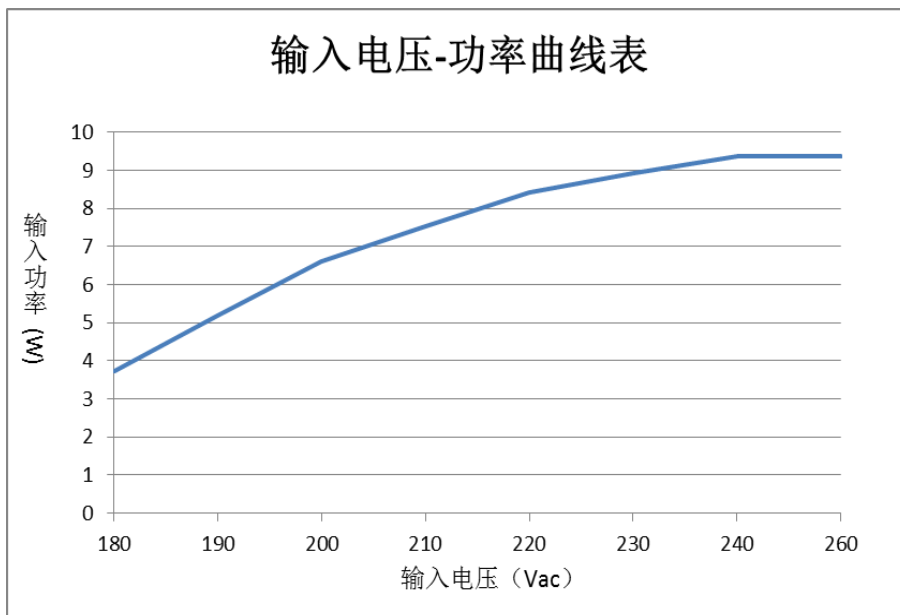
then W Light gray data + Y Light gray data  $\leq 255 * (I_{total} / I_{out}) - 255 * (30/40) = 191$  . Such as W Light gradation data = 100 You can only set Y Light gray data  $\leq$

191-100 = 91 , 1ms Rear W Light gradation data = 50 You can only set Y Light gray data  $\leq 191-50 = 141$  .



Fourth, the typical performance curve

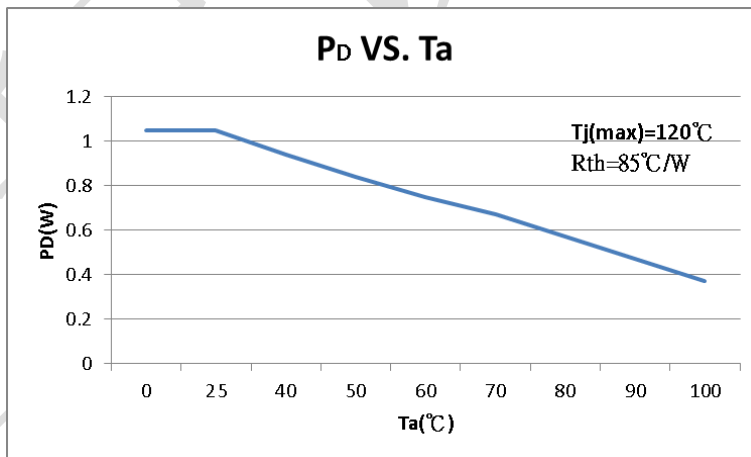
Input voltage - power meter



Map 2. Input voltage and input power curve

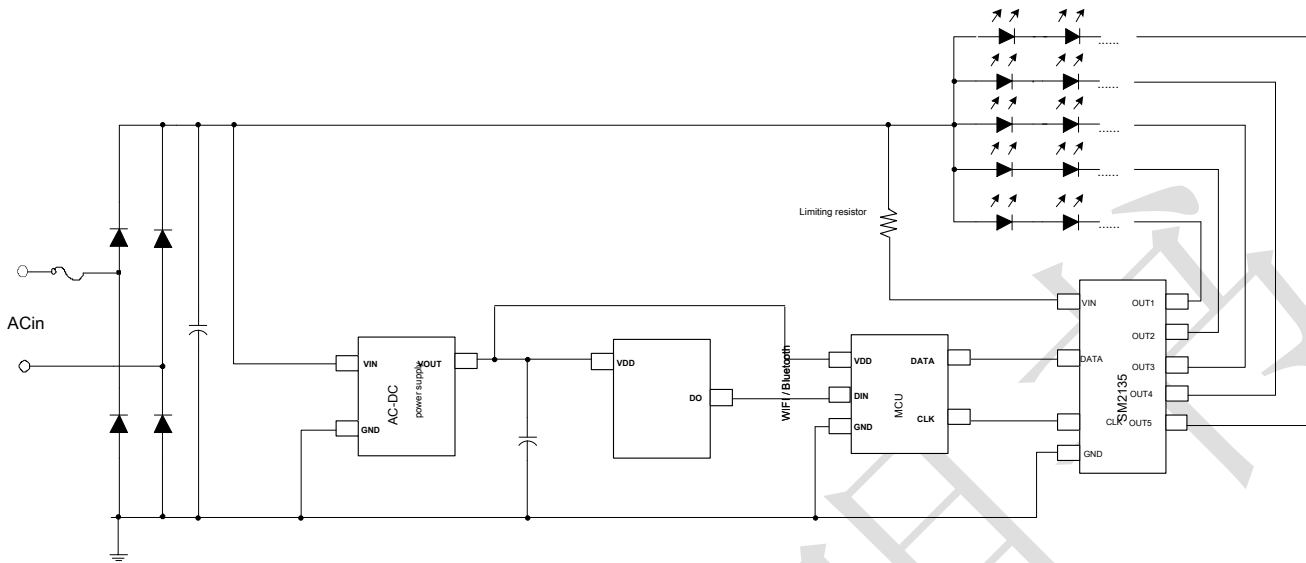
Power - temperature diagram

ESOP8 Package thermal  $P_D$  (W) And the ambient temperature  $T_a$  (°C) is performed as follows:



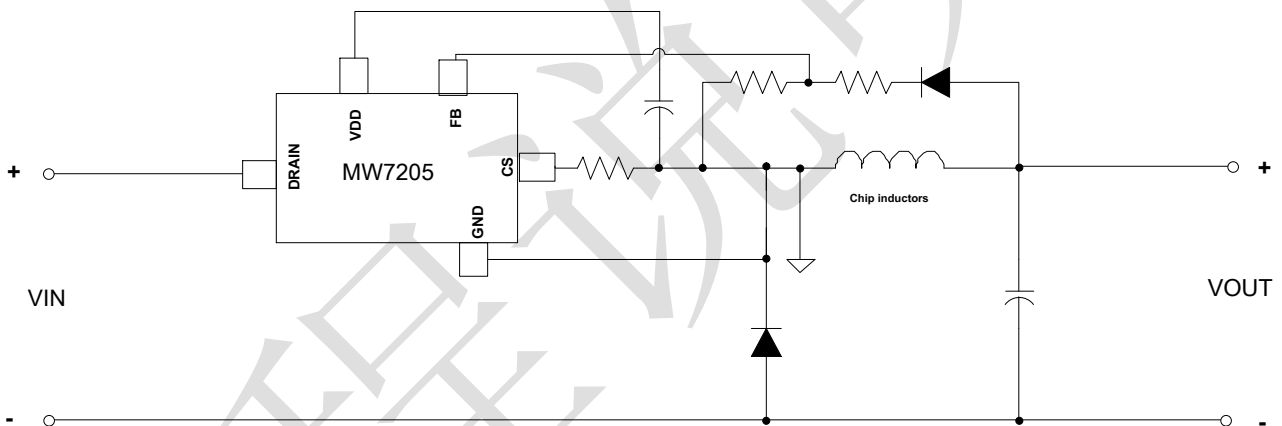
Map 3. Package thermal  $P_D$  And the ambient temperature  $T_a$  Relationship lines

Typical application examples chip



Map 4. SM2135 Typical application circuit

Attached AC-DC Application of a circuit diagram of the power supply module



SM2135 chip OUT1 ~ OUT5 Ports are series of red / green / blue / white / yellow colored led Light, wherein the red / green / blue as a group led Lights, white / yellow another set of

led Light, two groups led Light by MCU Alternate control work, can not work simultaneously.

RGB led The default maximum current output lamp 20mA ,accessible MCU tweak to 10mA ~ 45mA ; White / yellow led The default maximum lamp current 40mA , accessible MCU tweak to 10mA ~ 60mA .

Each output port connected to led Lamps have an independent 256 Gray-level data, by MCU Brightness adjustment. In order to ensure the application of the chip

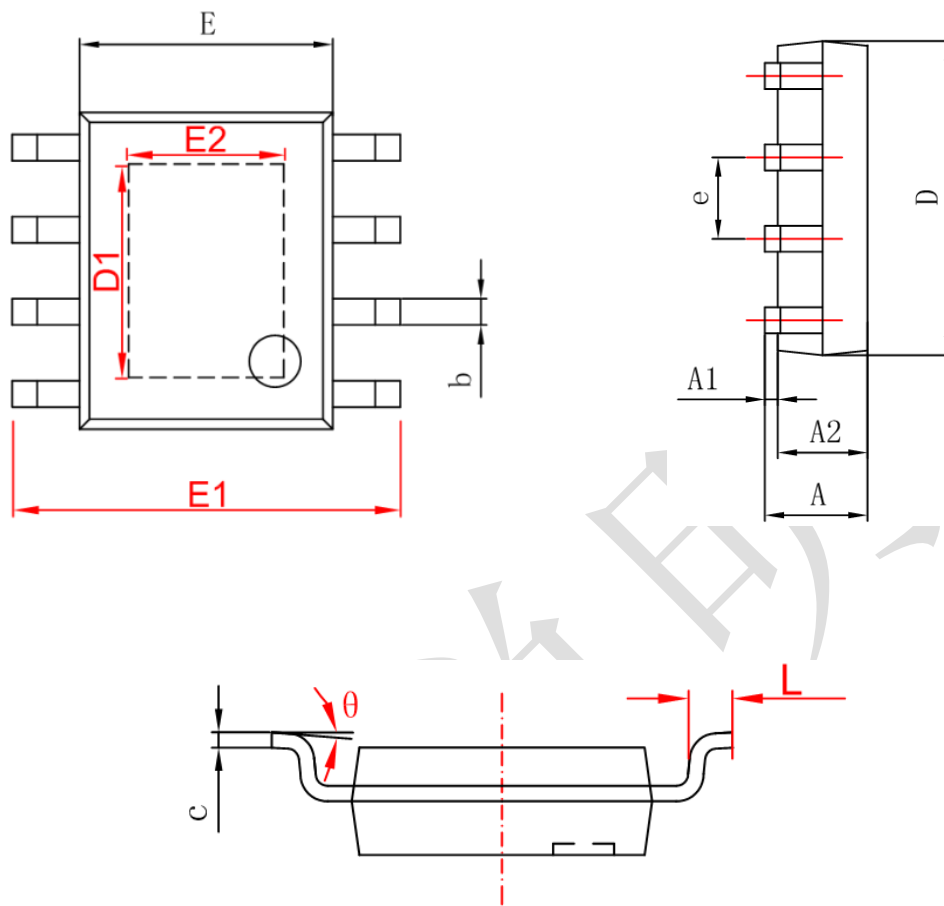
Reliability, has been set constant output power, and a constant specific dimming output power setting supra.





## Package

ESOP8



	MILLIMETERS MIN	
		MAX
A	1.35	1.75
A1	0.05	0.25
A2	1.25	1.65
b	0.31	0.51
c	0.17	0.25
D	4.70	5.10
D1	( 1.80-3.40 ) REF	
E	3.80	4.00
E1	5.80	6.20
E2	( 1.80-2.60 ) REF	
e	1.270 (BSC)	
L	0.40	0.80
θ	0°	8°