The DMX 512 3 channel constant current drives the IC UCS512B3

functional description:

UCS512B3 is a DMX 512 single-line parallel protocol LED driver chip, can choose 3-channel high-precision constant current output, UCS 512B 3 decoding technology accurate decoding DMX 512 signal, can be compatible with and expand the 512 protocol signal, UCS 512B 3 to the transmission frequency within 250K-750K DMX 512 signal completely adaptive decoding, without any speed setting, addressing can reach 4096 channels. UCS 512B 3 has built-in E 2PROM, no external connection, and supports online writing code, can be through the address writing code line cascade point and point spacing within 50 meters of any many UCS 512B 3 chips once online writing code. The chip provides three high-precision constant current output channels of up to 60 mAh at 24V with pressure resistance. High-end port refresh rate, greatly improve the screen refresh rate. It is mainly designed for building decoration and stage lighting effect LED lighting system, suitable for the required and connected LED lighting system, the exception of a certain chip does not affect the normal work of other chips, maintenance is simple and convenient.

characteristic:

- Compatible with and extend the DMX 512 (1990) signal protocol;
- Control mode: single line in parallel, the maximum support of 4096 channels
- Exclusive adaptive decoding technology, the DMX 512 signal with the signal transmission rate of 250K ~750kbps can be fully adaptive decoded built-in E 2PROM, without external E 2PROM
- Separate address series write code line, can automatically write code at one time, support the first installation before writing code mode
- Write code is easy, do not drop code

1. Enhanced online cascade code writing code mode, support 100 meters (point spacing) * 1024 (UCS 512 cascade points) one-time online writing code
2. Strengthen the writing code design, 8 anti-interference and validity test matching settings to ensure that the address code in E 2 will not be miswritten due to the interference of the writing code line.
3. The E 2 position sends the external writing code to ensure that the IC will not miswrite the code to the E 2 under any circumstances (such as power loss, power supply interference)
4. Double E 2 address code backup mode, an E 2 damage does not affect the address code reading

- Power on the self-check on the white light, write the code correctly after the blue light
- The new address code will take effect immediately after the writing code, no need to re-power
- Low voltage enhancement function can work stably at as low as 2.6 voltage, enhancing the system stability when 5V power supply
- Picture refresh rate is 3KHz
- Built-in 5V voltage regulator pipe, the output pressure resistance is greater than 26 volts
- The R / G / B three-bit constant-current output channel
- Preset constant 100 current 18mA
- ± 5% inter-chip current difference values
- The 80nS output channel is retarded to reducing the interference of burst current
- Built-in patented S-AI anti-interference module greatly strengthens the anti-interference capability
- Quasi-industrial grade design, stable and reliable

applied range:

Point light source, line lamp, wall washing lamp, stage lighting system, indoor and outdoor video wall, decorative lighting system

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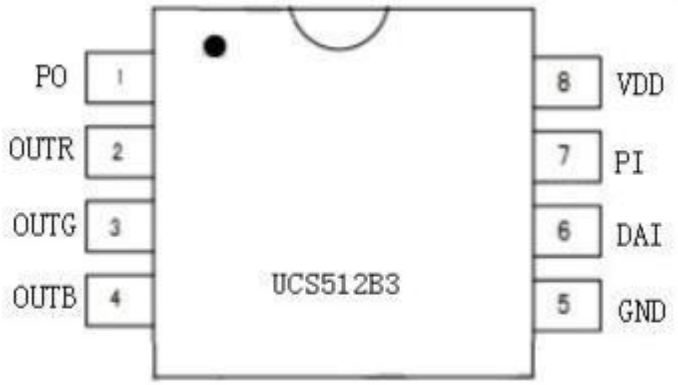
Pipe foot diagram:



Footposition instructions

	UCS 512B 3	
order number	symbol	functional description
1	P O	Address write code line output
2-4	OUTR , OUTG , OUTB	PWM, output port, constant current value of 18mA
5	G ND	the earth
6	DA I	DMX 512, the data entry
7	P I	Address write code line input, built-in pull-up
8	VDD	Power terminal, built-in 5V stabilizer pipe

Maximum rating (T a = 25℃, V dd = 5 V)

parameter	symbol	scope	unit
Logic power supply voltage	V dd	＋ 5 .5 ~ ＋ 6 .5	V
Output port pressure resistance	V out	30	V
Logical input voltage	V i	－ 0.5 ~ V dd ＋ 0.5	V
Operating temperature (internal chip)	T opt	－ 40~ ＋ 12 5	℃
storage temperature	T stg	－ 55 ~ ＋ 150	℃
antistatic	E SD	6000	V
output rating	P d	400	m W

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Recommended scope of work (unless specified, T a = 4 0 ~ + 8 5℃, V dd = 5 V)

parameter	symbol	minimum	typical case	maximum	unit	test condition
Logic power supply voltage	V dd	2.6	5.3	6	V	-
high level input voltage	V ih	.70V dd	-	V dd	V	-
low level input voltage	V il	0	-	.30V dd	V	-
Output port pressure resistance	V out	26			V	

Electrical parameters (unless otherwise specified, T a = 4 0 ~ + 8 5℃, V ss = 0 V, V dd = 4.5 ~ 5.5 V)

parameter	symbol	minimum	typical case	maximum	unit	test condition
Vout minimum voltage	V outl l		0.6		V	Iout =18mA
PO pin drive current			50mA			V o = 4V
The PO tube foot perfusion current			50mA			V o = 0 V.4
Output pin current	I s ink		18		m A	R , G , B
PI high-level flip voltage	V ih		.70VDD		V	VDD =5V
PO Low-level flip voltage	V il	-	.30VDD		V	VDD =5V
Current offset (between channels)	d I out		± 1.5	±3.0	%	V ds =1V , I out =18mA
Current offset (between chips)	d I out		±3.0	±5.0	%	V ds =1V , I out =18mA
Voltage offset amount VS-Vds	%dV ds		±0.1	±0.5	%/V	1V <Vds <5V
Voltage offset amount VS-Vdd	%dV ds		± 1.0	±2.0	%/V	4V <Vdd <6V
quiescent current	IDDd yn		1.5		m A	VDD =5V, REXT suspended
consumed power	P D		400		m W	(Ta =25℃)

Switch characteristics (if not specified 4 0 , T a = 4 0 ~ + 8 5℃, V ss = 0 V, V dd = 4.5 ~ 5.5 V)

parameter	symbol	minimum	typical case	maximum	unit	test condition

propagation delay time	T flz	-	-	300	n s	C l ＝ 15pF , P_{IN}→ P_{OUT}, R l ＝ 10k Ω
drop-out time	T thz	-	-	120	μs	C l ＝ 300pF , OUTR / OUTG /OUTB
data-signalling rate	F			750	Kbps	
input capacitance	C i	-	-	15	pF	-

Power on the light on instructions:

Power: after self-check, RGB, channel is open with 10% duty cycle.

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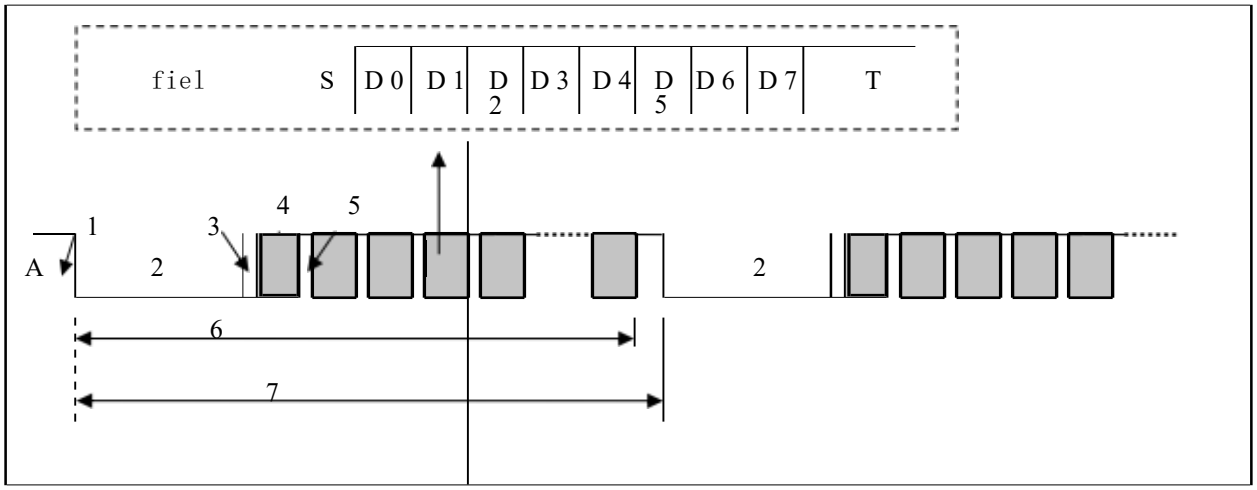
Communication Data Protocol:

The UCS 512B 3 data reception is compatible with the standard DMX 512 (1990) protocol and the expanded DMX 512 protocol, with a data transmission rate of 250kbps to 750K for adaptive decoding. The protocol waveforms are as follows:



grade	description	least value	representative value	crest value	unit
	bit rate	200	250	800	K bps
	bit time	5	4	1.25	us
S	start bit	5	4	1.25	us
D 0~D 7	Eight bits of data	40	32	10	us
T	The 2-bit stop bits	4	8	2.5	us
1	Labeling before reduction	0		1000000	us
2	reset signal	88			us
3	The markers were marked after reduction	8		1000000	us
4	Field (note 1)	55	44	27.5	us
5	Occupy between fields	0		1000000	us
6	The length of the data packet			1000000	us
7	Reset the signal interval			1000000	us

Note 1:11 fields, including 0 start, 8, bit data, and 2 bit stop. Where the 0 start level is low level and the stop level is high level. If the data in the data bit is 0, the corresponding time period is a low level. If the data in the data bit is 1, the corresponding time period is a high level.0 Start, stop and data bits must be the same time

IC Receiving Instructions:

1. When the reset signal appears on the DAI line, the IC enters the receiving preparation state. Address counter clear 0
2. The first field in the packet is the starting field, whose 8-bit data must be "0000_0000", which is not used as the display data. The valid field for display starts from the second field, and the second field of the 512 packet is the first data field. The IC adaptive data transmission frequency is 200K-750K, corresponding to different bit lengths of different frequencies. Regardless of whether the transmission frequency is 200K or 750K, that is, all fields have the bit length the same as the starting field regardless of the bit length.
3. The I C determines the corresponding field in the intercept 512 packet according to the address in its E 2. If the chip address is 0000_0000_0000, the interception starts from the second field 2 (the data field 1) of the packet, and the address 0000_0000_0001 is intercepted from the third field 3 (the data field 2). IC intercept 3 field data from each packet.

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Controller sends data notes:

1. IC adaptive number, according to the transmission frequency is 200K-750K, corresponding to different frequencies corresponding to different bit duration. Regardless of whether the transmission frequency is 200K or 750K, that is, all fields have the bit length the same as the starting field regardless of the bit length.
3. When entering the address code writing function, both the PI (write address port) and the DAI port will remain at a high level before the screen data is sent. Do not pull it down, so as to keep the IC-driven blue light indicating that it can be maintained after the writing code is completed.

Write a code to note:

1 The writer has A / D + terminal except the address terminal (PO). The DAI line shall be connected to the writer A / D + terminal. The A terminal of the writer shall maintain a high level when writing the code, and the IC shall write the code normally under the DAI high level mount state

2 After the I C internal writing code is completed, read the code from E 2, and the blue light is turned on after reading the code validity test is normal. It will take effect without re-charging the new address code.

supply electricity:

1. In the power supply link of the parallel system, the ground wire voltage difference between different lamps and controllers is a more serious unstable factor than the power supply shortage.

2. As a key factor in the system stability, the ground line pressure difference should be minimized. In addition to the thickness of the main line of the power supply, it is mainly affected by the number of lamps connected by a single power supply tap, the overcurrent capacity of the ground line, the line length between the lamps, the line diameter between the lamps and the wires, and the single-head power supply or two-head power supply.

Below is the maximum reference for a single head power connection (regardless of the main power line differential):

Perforated lamp, 0.32mm 2 copper wire, a string of 50 lights, single head power supply.

In the above example, if the wire diameter becomes 0.25mm 2 copper wire, only 40 lights can be made with a single head of power supply.

Note: If the routing amplifier and the resistance partial voltage mode on the lamp can exceed 50%

3. For the parallel system, the ground line pressure difference caused by the accumulation of ground line pressure difference has a fatal effect. In practical engineering, the "-" poles of all lamps controlled by the same controller port should be directly connected with the shortest line to

eliminate the pressure difference between the power supply "-" poles. Don't rely on the circuitous connection of lamps.

Constant flow curve:

UCS 512B 3 has excellent constant current characteristics, and the current difference between channels and even between chips is minimal.

(1): The current error between channels is less than ± 3 %, while the current error between chips is less than ± 5 %.

(2): When the load end voltage changes, the UCS 512B 3 output voltage is not affected, as shown in the figure below

(3): The relationship between the current I of the UCS 512B 3 output port and the voltage Vds curve added on the port is as follows: I, the smaller the current, the smaller the minimum Vds in the constant current state. The Vds minimum value is the key parameter representing the constant current range, and the smaller the Vds minimum value is, the wider the constant current range is

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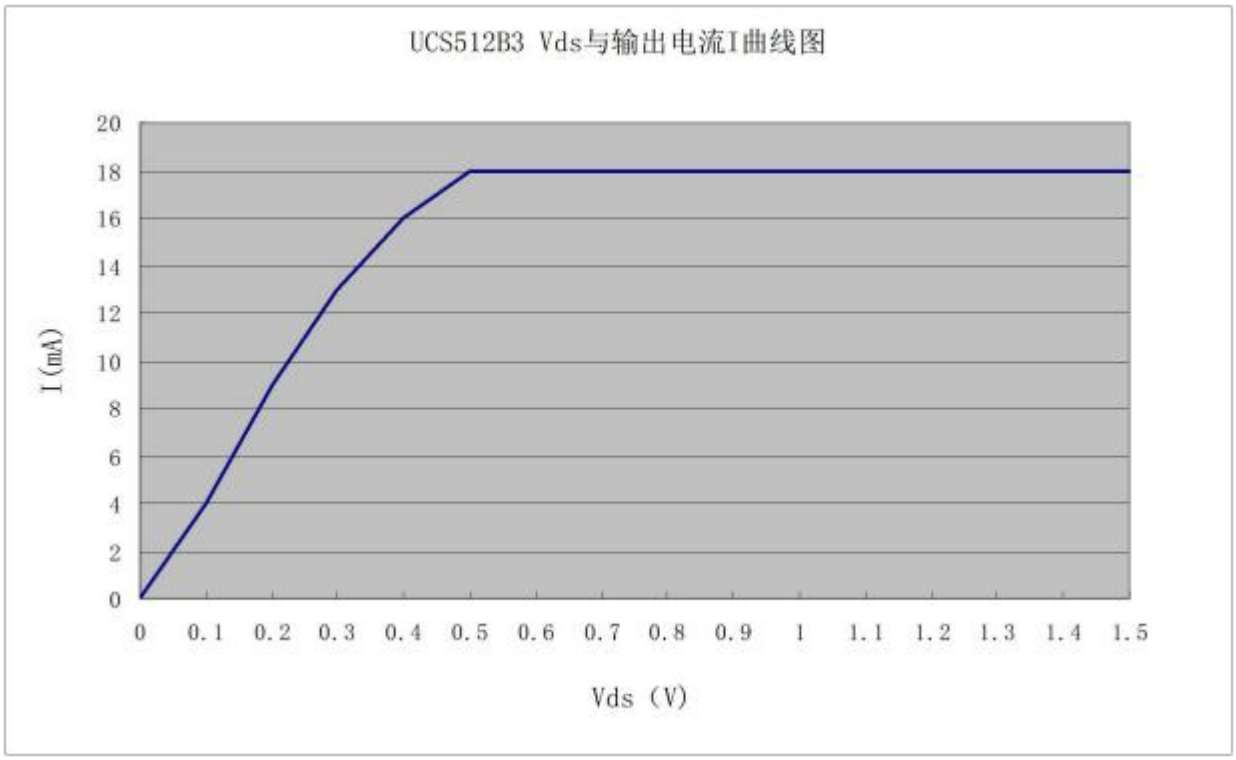

divider resistance:

UCS 512B 3 is SOP 8 package, and the power consumption on IC should generally not exceed 250mW during long working hours. Take the example of 18mA of constant current output per channel. If each output pin pressure drop (Vds) of IC is 3V, the power consumption on IC is:

P =P RGB +P VDD =3*3V *18mA +5V *10mA =0. 16+0.05=210mW

Maximum power consumption is not exceeded. So 3 channel 18mA output Vds, recommended 3V.

Parisezoic resistance calculation formula:

Red light current limiting resistance: R = (VCC-N * VR-Vds) / I

Green light limiting resistance: R = (VCC-N * VG-Vds) / I

Current limiting resistance: R = (VCC-N * VB-Vds) / I

Note: VCC refers to the power supply voltage, and N refers to the number of lamp beads in series. VR, VG, VB represent the open voltage of the RGB beads, Vds is the IC port voltage, and I is the constant current setting value

Example 1:24V power supply, RGB output, each 6 strings, no parallel, constant flow default set 18mA, V ds take 3V

red lantern R = (24V -6*V R -3V) / 18mA = (24V -6*2V -3V) / 18mA =500

Green, blue lamp R = (24V -6*V G ,B -3V) / 18mA = (24V -6*3V -3V) / 18mA = 150

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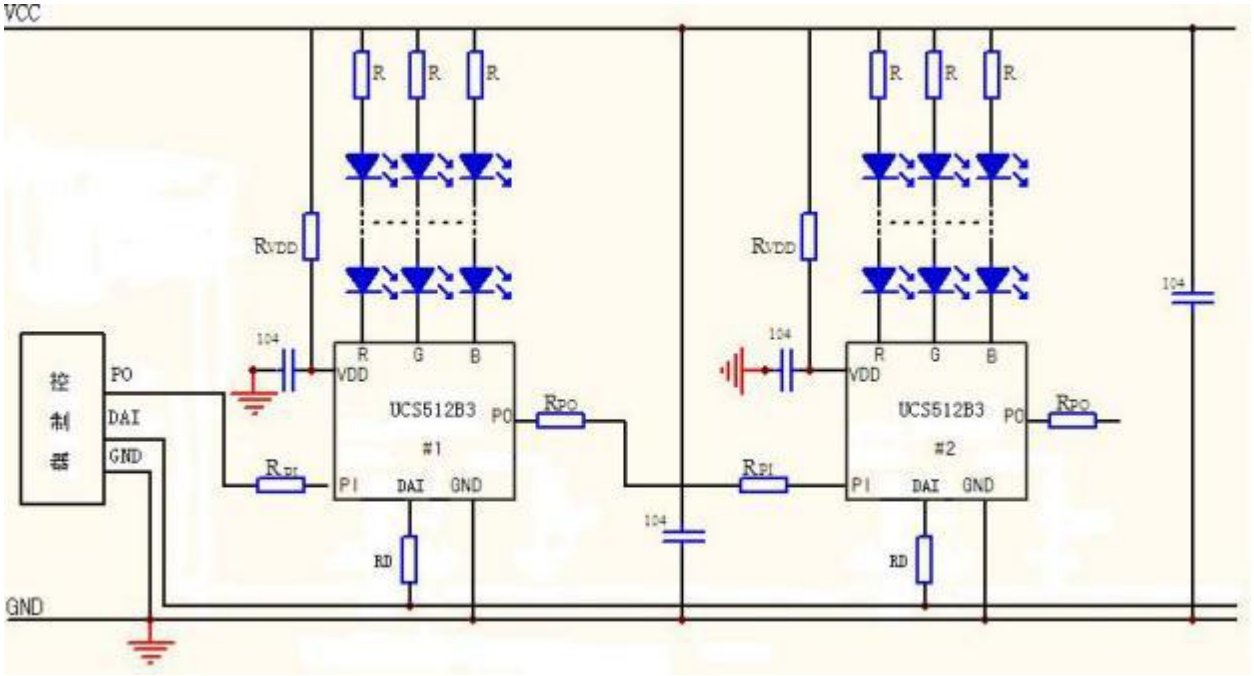
Application Figure 1: General Application

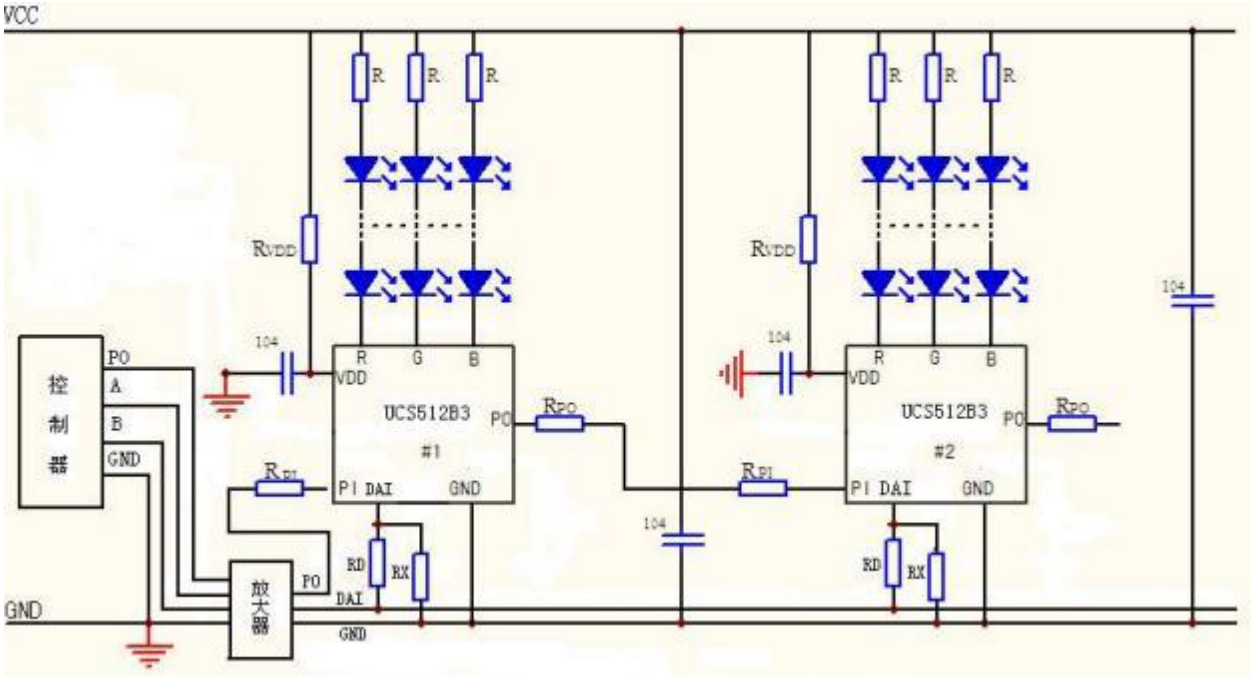


Application Figure 3: Two-color application

Note: 1. Output of high-precision constant flow, with a default value of 18mA,

2. When no routing amplifier is applied, it is recommended to use 250K standard speed, but not to expand to 500K. At 250K standard speed, to reach nearly 25 frames, and the number of single port connection points of the controller should not exceed 220 points. If less than 25 frames are allowed, more points can be connected under certain conditions.

Application Figure 2: Amplifier application


VCC
R
R
R
RVDD
104
R G B
VDD
UCS512B3
#1
PO
PI DAI
GND
RPO
RPI
RD
RX
控制器
PO
A
B
GND
放大器
DAI
GND
#2

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Note: When there is a long connection between the points, or the controller needs more single-port connection points and more high frame frequency requirements, the routing amplifier application can be used

pattern. In routing amplifier applications, 485 differential transmission between controller and amplifier transfers the differential signal to a single line signal, and the distance between the amplifier and lamps should be as short as possible.

Component value selection table

1. No additional amplifier is added

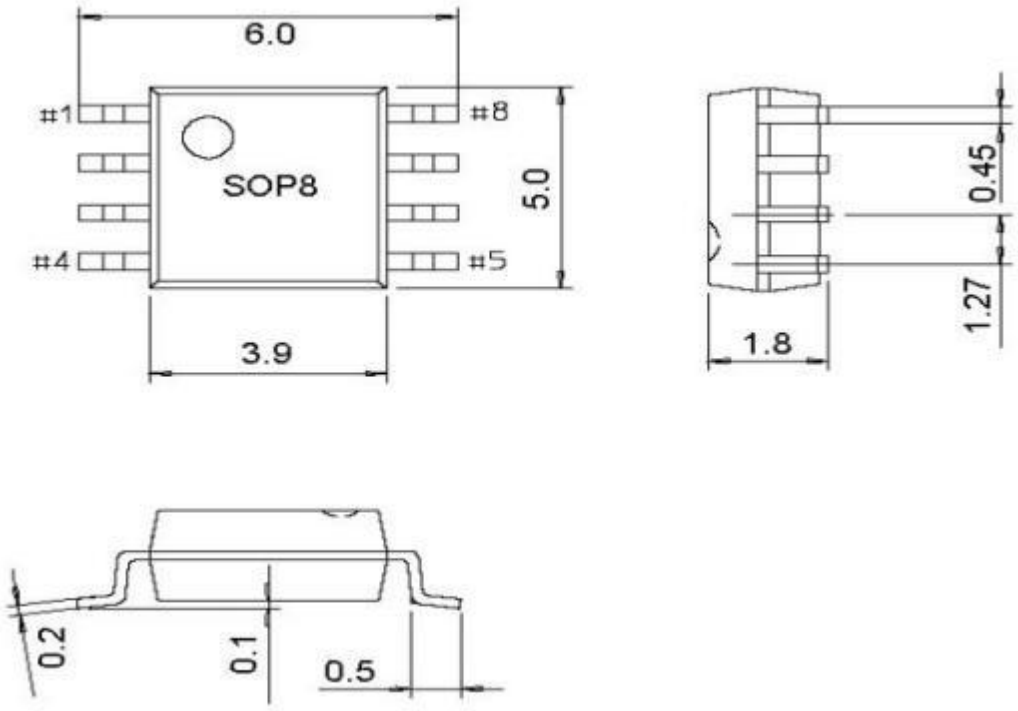
element	24V	12V	5V
R VDD	2.2K	820	82
R PI	500	500	0
R P O	500	500	0
R D	10K	10K	10K

2. Amplifier application

element	24V	12V	5V
R VDD	2.2K	820	82
R PI	500	500	0
R P O	500	500	0
R D	50K	50K	50K
RX	50K	50K	50K

Package drawings and dimensions

SOP 8



version number

edition	date of issue	Revised profile
VER 1.0	201312-25	First edition release
VER1. 1	20151-28	Content correction
VER 1.2	2020-411	Parameter correction