Dual Channel 5V 256u-step STM driver

Chip description:

GC6209 is Dual Channel 5V low voltage Stepper motor driver , with low noise , low vibration features, particularly suitable for applications as camera's zoom&focus system 、 gimbal and other precision、low noise STM control systems.

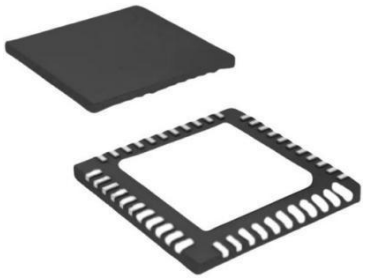
The chip integrated a 256-micro steps driver for each channel. With SPI interface，Customers can easy adjust the parameters of the driver。

Chip application:

- Camcorder
- Security-camera
- Consumer Products
- Robotics
- Medical Devices

Chip features:

- Built in 2 STM driver for zoom and focus
- 256 u-step driving technology for STM , features supper low noise
- Output drive current up to 0.8A
- 2 systems of open-drain for driving LED
- Over temperature protection
- Under voltage protection
- QFN44(05x05) Package

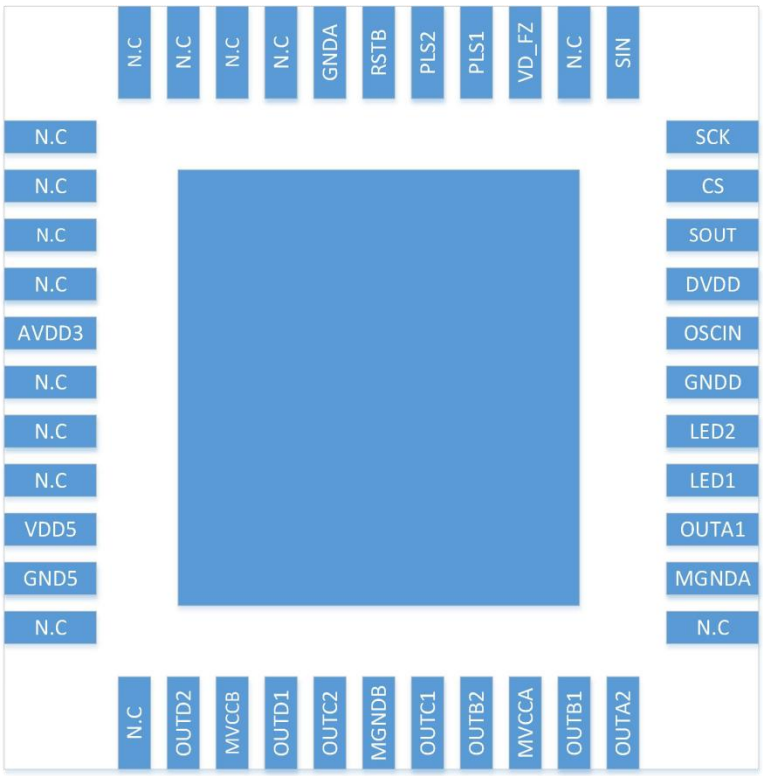


Product name	Package Type	Detail description
GC6209	QFN44L(5x5)	5.0*5.0，e=0.35

Packaging Introduction

Per Tray	Per Box	Per Case
4K	5K	64K

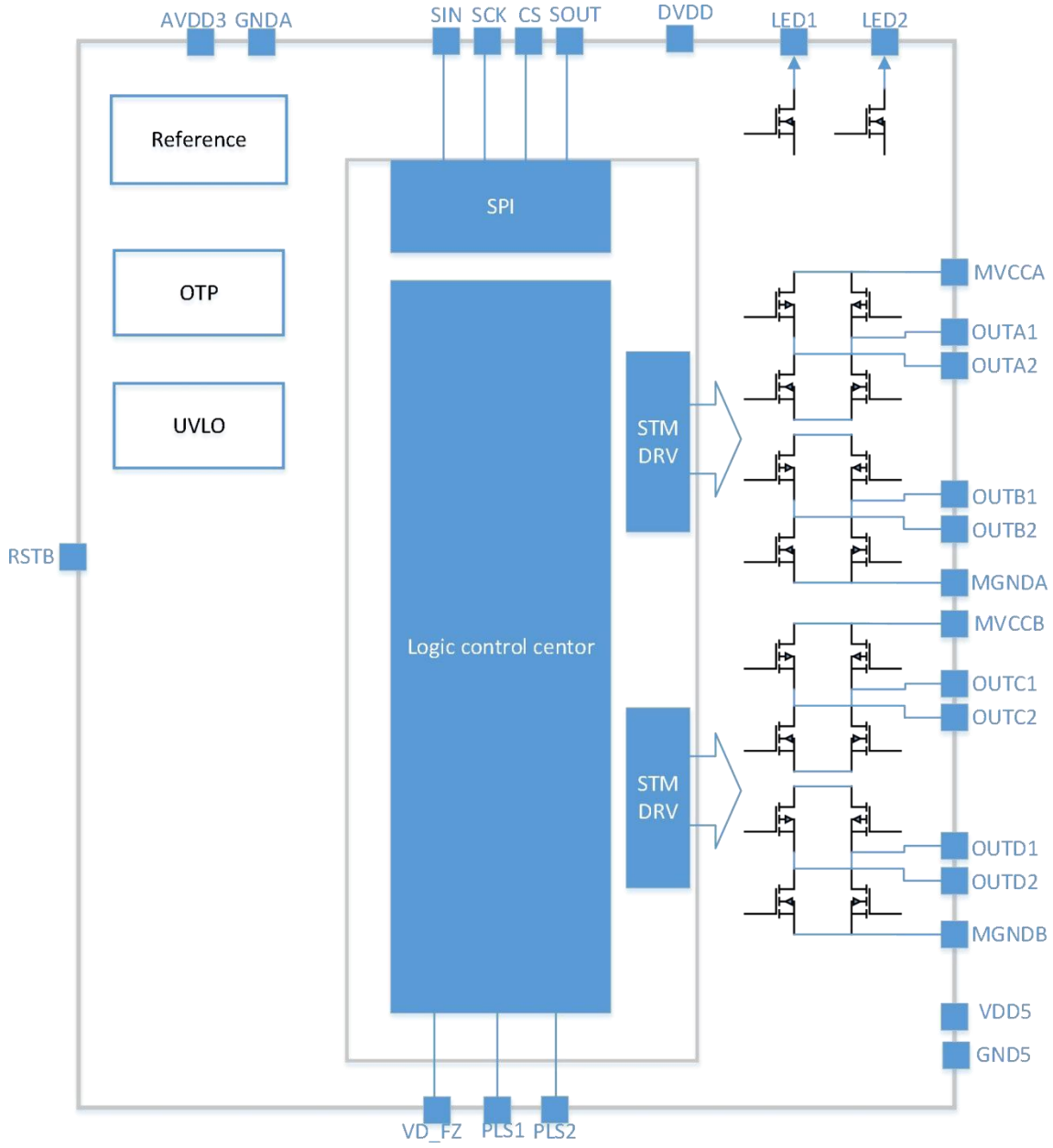
Pin Map：


N.C
N.C
N.C
N.C
GNDA
RSTB
PLS2
PLS1
VD_FZ
N.C
SIN
N.C
N.C
N.C
N.C
AVDD3
N.C
N.C
N.C
VDD5
GND5
N.C
SCK
CS
SOUT
DVDD
OSCIN
GNDD
LED2
LED1
OUTA1
MGNDA
N.C
N.C
OUTD2
MVCCB
OUTD1
OUTC2
MGNDB
OUTC1
OUTB2
MVCCA
OUTB1
OUTA2

Pin Description:

Pin No.	Pin Name	I/O	Pin Function
1,2,3,4,6,7,8,11, 12,23,35,41,42,43,44	N.C	n.c	No Connect
5	AVDD3	Power	3.3V Analog power
9	VDD5	Power	5V Analog power
10	GND5	gnd	Analog ground 5
13	OUTD2	O	Motor output D2
14	MVCCB	Power	Motor B supply
15	OUTD1	O	Motor output D1
16	OUTC2	O	Motor output C2
17	MGNDB	Gnd	Motor B ground
18	OUTC1	O	Motor output C1
19	OUTB2	O	Motor output B2
20	MVCCA	ground	Motor A ground
21	OUTB1	O	Motor output B1
22	OUTA2	O	Motor output A2
24	MGNDA	Gnd	Motor A ground
25	OUTA1	O	Motor output A1
26	LED1	O	LED1 OUT (open drain)
27	LED2	O	LED2 OUT (open drain)
28	GNDD	Gnd	Ground pin for digital circuit
29	OSCIN	I	System clock input
30	DVDD	Power	Digital power supply
31	SOUT	O	SPI output
32	CS	I	SPI chip select
33	SCK	I	SPI clock input
34	SIN	I	SPI data in
36	VD_FZ	I	Sync signal input for zoom&focus
37	PLS1	O	Pulse 1 output
38	PLS2	O	Pulse 2 output
39	RSTB	I	Reset signal input
40	GNDA	Gnd	Ground pin for analog

Block Diagram：



Absolute Maximum Ratings：

(over operating free-air temperature range (unless otherwise noted)

Symbol	Parameter	Rating	Unit
AVDD3	3.3V Analog supply voltage	-0.3~4.0	V
DVDD	3.3V Digital supply voltage	-0.3~4.0	V
MVCCA/B	STM motor supply voltage	-0.3~6.0	V
VDD5	5V analog power	-0.3~6.0	V
Topr	Operating ambient temperature	-40~100	℃
Tstg	Storage temperature	-55~150	℃
Istm	STM motor current	1.0	A
LED	LED pull down current	30	mA
ESD	Human Body Model	3000	V

Electrical Characteristics：

Recommended Operating Conditions

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Motor power supply	MVCCA,MVCCB		3.0	5	5.5	V
5V analog supply	VDD5		3.0	5	5.5	V
Analog&Logic power supply	AVDD3,DVDD		2.7	3.3	3.6	V
Logic input Range	Vlogicin	OSCIN,CS,SCK,SIN,VD_FZ,RSTB	-0.3		DVDD+0.3	V
Logic output Range	Vlogicout	PLS1,PLS2,SOUT	-0.3		DVDD+0.3	V
Motor current	ISTM	OUTA1,OUTA2,OUTB1,OUTB2,OUTC1,OUTC2,OUTD1,OUTD2	-0.8		+0.8	A

Electrical Characteristics：(unless otherwise specified , T=25℃，DVDD=AVDD=3.3V，MVCCx=VDD5=5V）

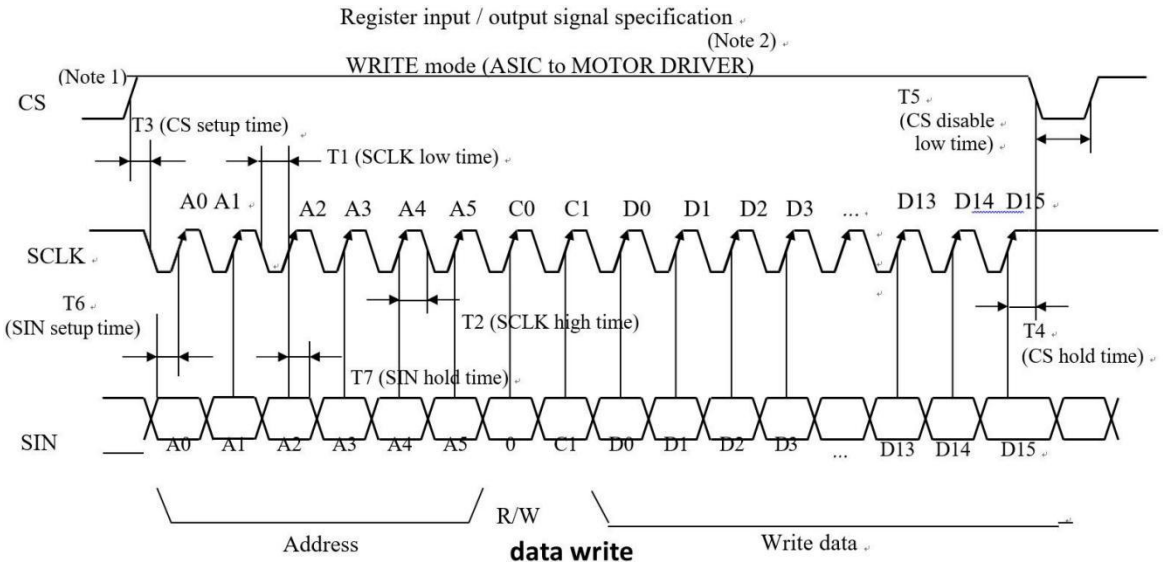
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
MVCC current on Reset	Ivreset	No load, no 27MHz inputs,RSTB=0		0	2.0	uA

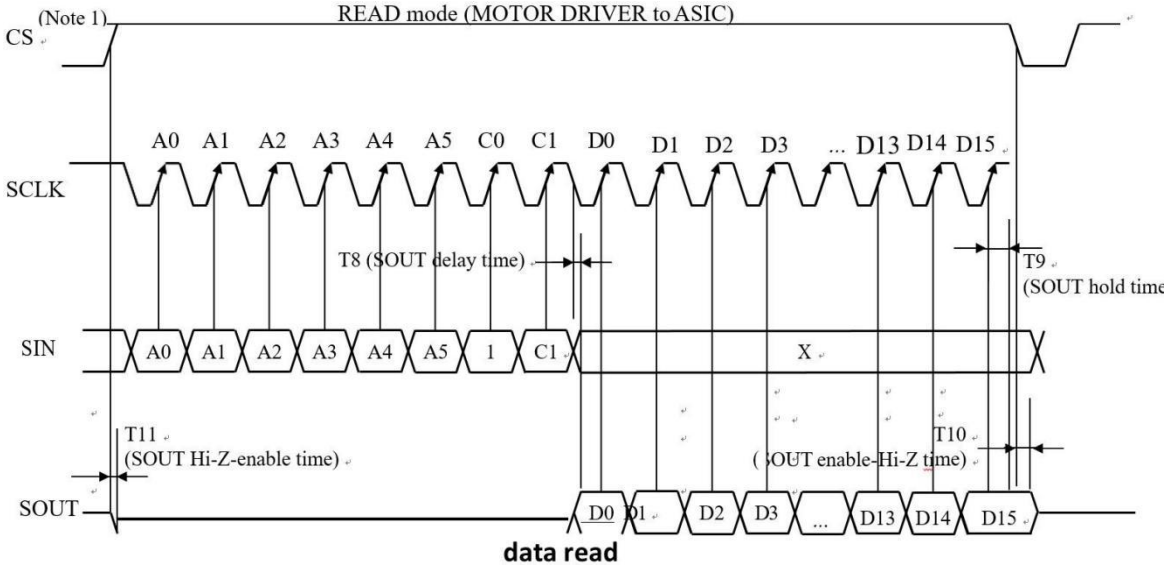
MVCC current	Ivmon	Output open		0.5	15	mA
DVDD,AVDD standby current	Ivddreset	no 27MHz inputs, RSTB=1		0	10	uA
DVDD,AVDD current	Ivddon	No load,RSTB=0		7	20	mA
VDD5 standby current	Ivdd5reset	no 27MHz inputs, RSTB=1		0	10	uA
VDD5 current	Ivdd5on	No load,RSTB=0		0.1	1	mA
STM OUT H-bridge driver (focus&zoom)						
Rdson,up+down4	RdsON1	Io=100mA;T=25°		1.2	1.8	Ω
When off leakage current	IOFF1	Vout=0V	-10		10	uA
LED DRIVERS						
Output on resistance	Rdson3				5	Ω
When off leakage current	IOFF2		-10		10	uAs
Logic inputs/output						
Input logic-low voltage	V_{IL}	OSCIN,CS,SCK,SIN,VD_FZ,RSTB	-0.3	1.02	0.2*DVDD	V
Input logic-high voltage	V_{IH}	OSCIN,CS,SCK,SIN,VD_FZ,RSTB	0.54*DVDD	1.36	DVDD+0.3	V
output logic-l voltage	V_{OH}	PLS1,PLS2,SOUT,1mA Sink			0.5	V
Outpu logic-high voltage	V_{OL}	PLS1,PLS2,SOUT,1mA Source	0.9*DVDD			
Pulldown resistance	R_{pd}	RSTB		100		kΩ
PROTECTION CIRCUITS						
Over temperature protection	TSD		155	169	180	℃
Over temperature protection hysteresis	ΔTSD			26		℃
Under voltage lockout	V_{UVLO1}	DVDD,AVDD		2.27		V
Under voltage lockout hysteresis	ΔV_{UVLO1}	DVDD,AVDD		0.2		V
Under voltage lockout	V_{UVLO2}	MVCCA,MVCCB,VDD5		2.20		V
Under voltage lockout hysteresis	ΔV_{UVLO2}	MVCCA,MVCCB,VDD5		0.2		V

Function description

(1) Serial interface

Timing chart:





TA = 25°C, VCC = 5 V, RL = 20 Ω

Parameter	contidtion	range		Unit
		Min	Max	
SPI Speed	Serial clock	1	5	MHz
T1	SCLK low time	100	-	ns
T2	SCLK high time	100	-	ns
T3	CS setup time	60	-	ns
T4	CS hold time	60		ns
T5	CS disable low time	100		ns
T6	SIN setup time	50		ns
T7	SIN HOLD time	50	-	ns
T8	SOUT delay time	-	60	us
T9	SOUT hold time	60		ns
T10	SOUT enable-Hiz time	-	60	ns
T11	SOUT Hiz-enable time	-	60	ns
Cload	SOUT Capacitor load	-	40	pF

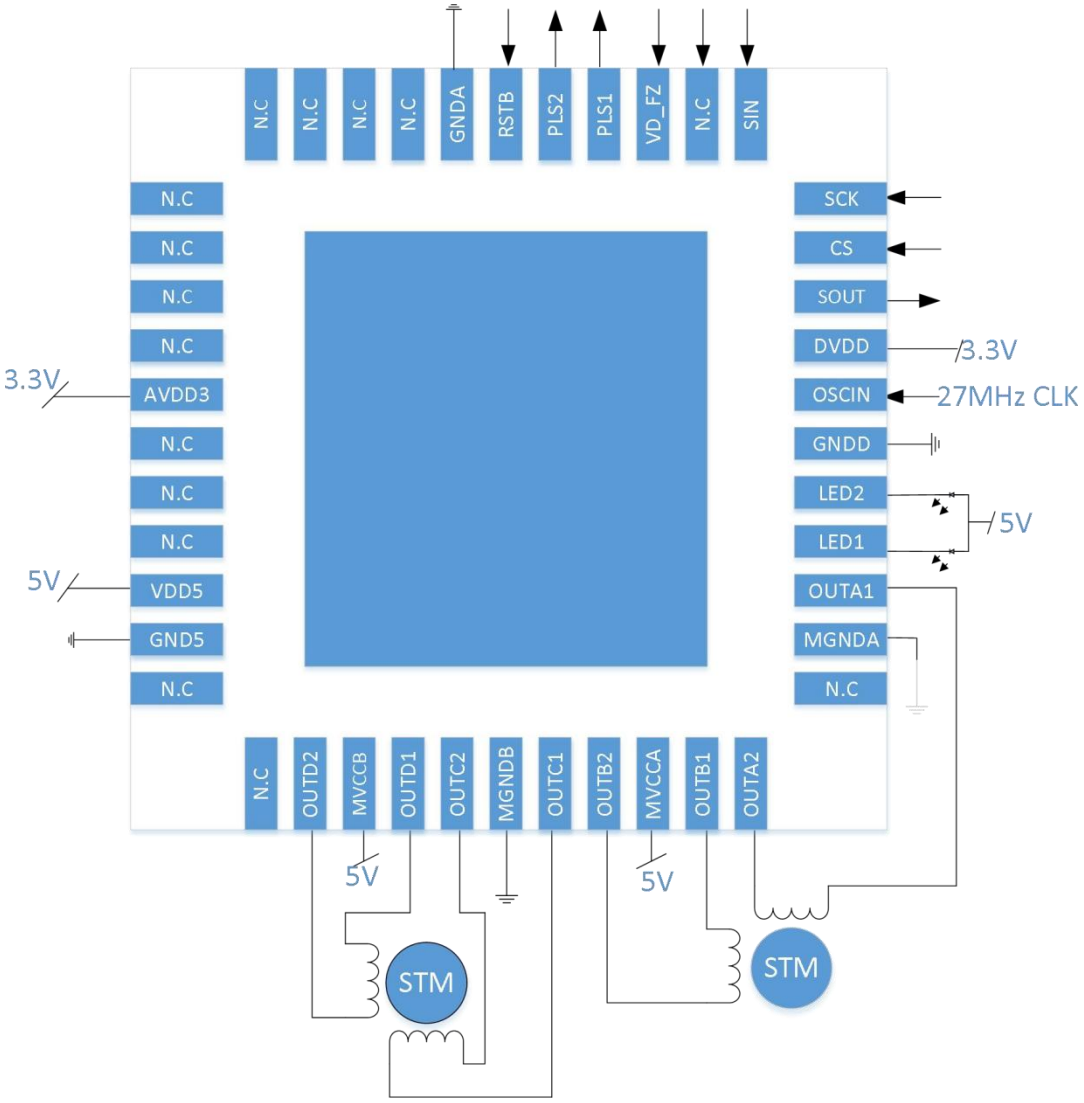
(2) register map

	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
0BH							MODESEL_FZ		TESTEN1							
20H		PWMRES[1:0]		PWMMODE[4:0]					DT1[7:0]							
21H									TESTEN2			FZTEST[4:0]				
22H			PHMODAB[5:0]						DT2A[7:0]							
23H	PPWB[7:0]								PPWA[7:0]							
24H			MICROAB[1:0]		LEDB	ENDISAB	BRAKEAB	CCWCWAB	PSUMAB[7:0]							
25H	INTCTAB[15:0]															
27H			PHMODCD[5:0]						DT2B[7:0]							
28H	PPWD[7:0]								PPWC[7:0]							
29H			MICROCD[1:0]		LEDA	ENDISCD	BRAKECD	CCWCWCD	PSUMCD[7:0]							
2AH	INTCTCD[15:0]															

(3) register description

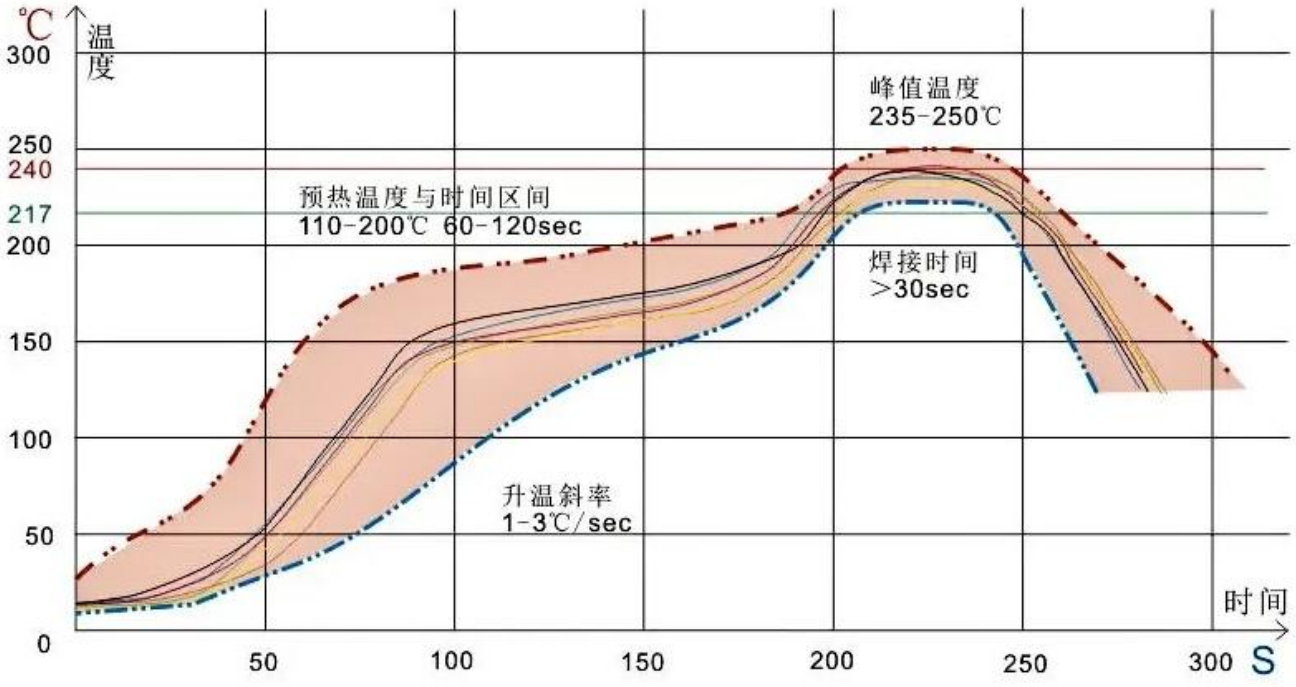
Address	Register	Function	
0Bh	TESTEN1	Test mode enable 1	
	MODESEL_FZ	VD_FZ polarity selection	
20h	DT1[7:0]	Start point wait time	
	PWMMODE[4:0]	Micro step output PWM frequency	
	PWMRES[1:0]	Micro step output PWM resolution	
21h	FZTEST[4:0]	PLS1/2 pin output signal selection	
	TESTEN2	Test mode enable 2	
22h	DT2A[7:0]	α motor start point excitation wait time	
	PHMODAB[5:0]	αmotor phase correction	
23h	PPWA[7:0]	Driver A peak pulse width	
	PPWB[7:0]	Driver B peak pulse width	
24h	PSUMAB[7:0]	α motor step count number	
	CCWCWAB	α motor rotation direction	
	BRAKEAB	α motor brake	
	ENDISAB	α motor enable/disable control	
	LEDB	LED B output control	
	MICROAB[1:0]	α motor sine wave division number	
25h	INTCTAB[15:0]	α motor step cycle	
27h	DT2B[7:0]	β motor start point excitation wait time	
	PHMODCD[5:0]	β motor phase correction	
28h	PPWC[7:0]	Driver C peak pulse width	
	PPWD[7:0]	Driver D peak pulse width	
29h	PSUMCD[7:0]	β motor step count number	
	CCWCWCD	β motor rotation direction	
	BRAKECD	β motor brake	
	ENDISCD	β motor enable/disable control	
	LEDA	LED A output control	
	MICROCD[1:0]	β motor sine wave division number	
2Ah	INTCTCD[15:0]	β motor step cycle	

Typical Application



GC6209 typical application

Reflow soldering temperature curve reference diagram

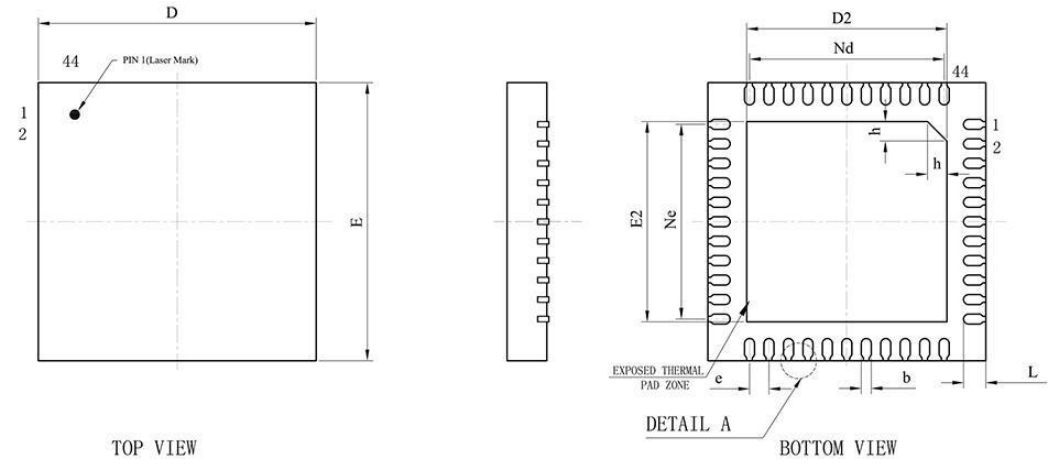


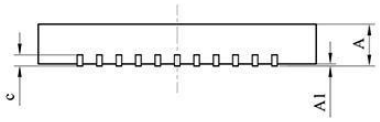
Sn96.5Ag3.0Cu0.5无铅锡膏回流焊温度曲线工艺窗口示意图（Profile）

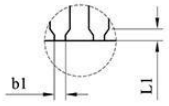
As reflow soldering is also related to PCB board, PCB pad size, solder and solder paste, and so on.
The above reflow soldering temperature curve is for reference only.

Package Information

QFN44(05x05) **UNIT: mm**





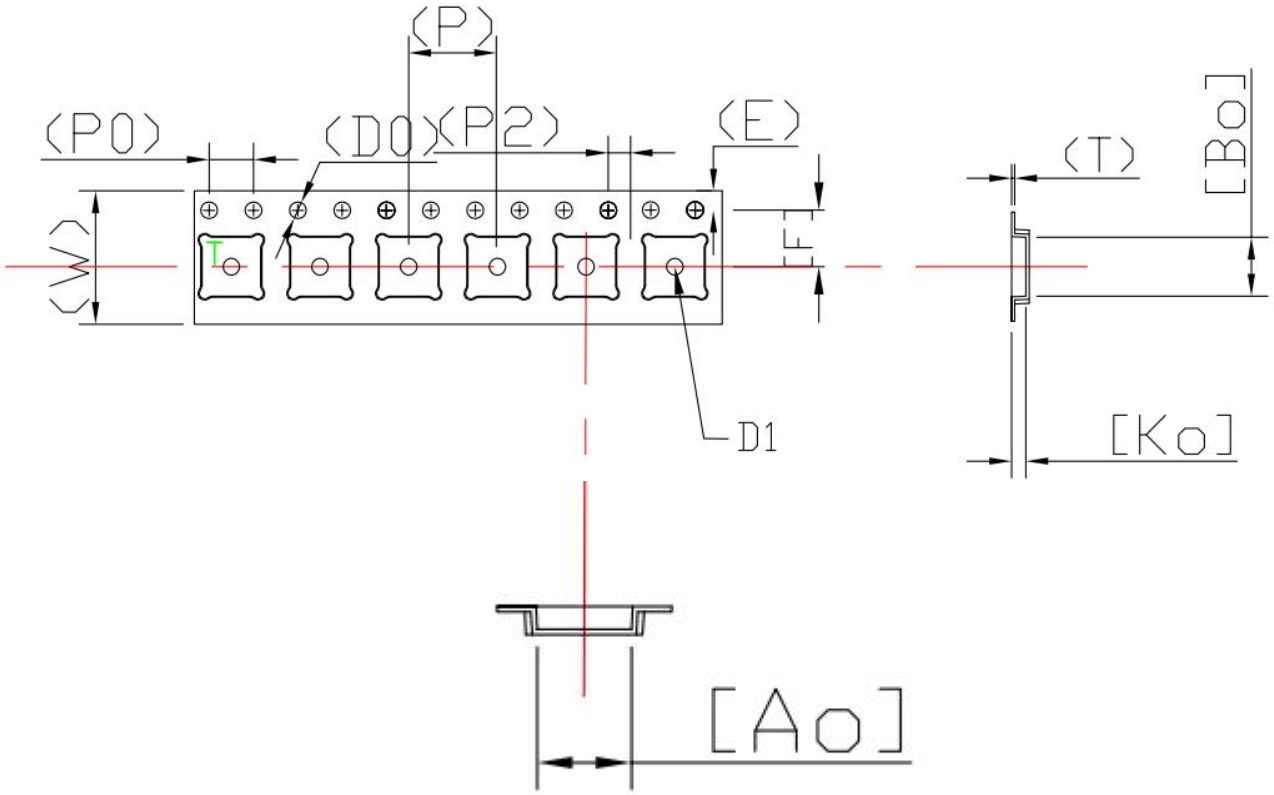


DETAIL A

2:1

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	—	0.02	0.05
b	0.13	0.18	0.23
b1	0.05	0.10	0.15
c	0.18	0.20	0.25
D	4.90	5.00	5.10
D2	3.50	3.60	3.70
e	0.35BSC		
Nd	3.50BSC		
E	4.90	5.00	5.10
E2	3.50	3.60	3.70
Ne	3.50BSC		
L	0.35	0.40	0.45
L1	0.10REF		
h	0.30	0.35	0.40
L/F载体尺寸 (mil)	150X150		

Packaging Introduction for GC6209

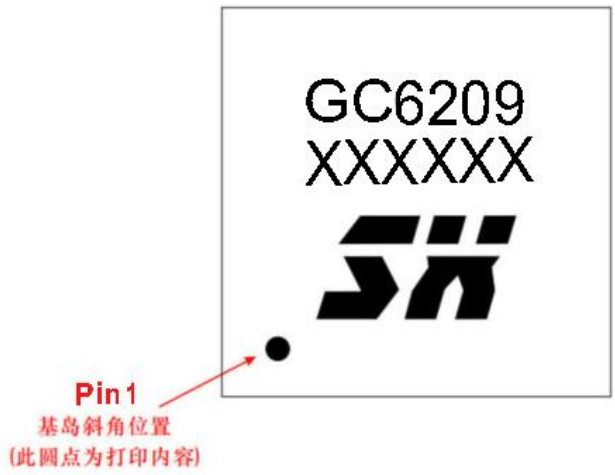


NOTES:

1. **10 sprocket hole pitch cumulative tolerance ± 0.20 mm.**
   每10个料带链孔径累计公差为±0.20毫米。
2. **Carrier camber not to exceed 1mm in 100 mm.**
   料带弯曲每100毫米不可超过1毫米。
3. **A_o and B_o measured on a plane 0.3 mm above the bottom of the pocket.**
   A0和B0在同一平面量测且距离压缩带底部0.3毫
4. **All scope meet EIA-481-D requirements.**
   所有尺寸符合EIA-481-D标准要求。
5. **Material: Black PS.**
   材料：黑色 PS 。
6. **Thickness: 0.30± 0.05 mm.**
   厚度：0.30±0.05毫米。
7. **Packing lenght per 13" reel : 40.6 Meters.**
   13"纸盘包装长度为：40.6
8. **Component load per 13" reel : 5075 pcs.**
   13"胶盘可包装：5075 pcs。

ITEM	W	A0	A1	B0	B1	K0	K1	E	F	P	P0	P2	D0	D1	T
DIM	12.0	5.30	0.00	5.30	0.00	1.30	0.00	1.75	5.50	8.0	4.0	2.0	1.50	1.50	0.30
TOLE	+0.30 −0.30	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	±0.10	+0.10 −0.00	+0.10 −0.00	±0.05

Description of Lot Code



Printing instructions：

1.The first line GC6209 represents the product model

2.The second line represents the traceability code

Release Notes

GC6209 datasheet V1.0	**Initial 1.0 version;**
GC6209 datasheet V1.1	**Corrected ambiguity in some descriptions ;**
GC6209 datasheet V1.2	**Added packaging instructions and Reflow soldering temperature curve;**