

Constant Current Matrix LED Driving Circuit

General Description

ET6280 is an array type constant current LED driver circuit, which has 32 steps constant current global adjustment function, and supports up to 8×8 matrix output. Each point has 256 steps PWM current adjustment function.

ET6280 internal integration of MCU digital interface, data latch, RAM, PWM constant current drive module. It is mainly used in the display driver of household appliances, with the advantages of rich display effect and simple operation.

Features

- 8 constant current driver channels, max output current 32mA.
- Support 1~8 scan application, the maximum application matrix is 8×8
- Each point supports 256 steps brightness adjustment
- Two wire serial interface(SCLK, DIN)
- Built in RC oscillation
- Built in power on reset circuit
- Built in automatic blanking circuit
- Part Number and Package

Part No.	Package
ET6280	SOP20
ET6280V	TSSOP20

Application

- LED Matrix driver
- Digital tube driver

Pin Assignments



Pin Function

Pir	n No.	Nomo	Eurotion
SOP20	TSSOP20	Name	Function
1~4,7~10	1~4,7~10	SG1~SG8	Segment output, connected to LED anode.
5	5	VDD	Power supply .
6	6	VSS	GND
11	11	SCLK	Clock input, enter data on the rising edge.
12	12	DIN	Serial data input, the input data changes at the low level of SCLK and is transmitted at the high level of SCLK.
13~20	13~20	GRID8~GRID1	Grid output, connected to LED cathode.

Symbol	Characteristic	Rating	Unit
V _{DD}	Supply voltage	-0.5~7.0	V
Vı	Input Voltage	-0.5~V _{DD} +0.5	V
lo1	LED SEG drive output current	-35	mA
I 02	LED GRID drive output current	400	mA
P _{D1}	Power Dissipation (SOP20)	450	mW
P _{D2}	Power Dissipation (TSSOP20)	450	mW
TJ	Junction Temperature	-40~150	°C
T _A	Operating Temperature	-40~85	°C
Tstg	Storing Temperature	-65~150	°C
Vesd	HBM (All Pins)	±8.0	KV
	CDM (All Pins)	±2.0	KV

Absolute Maximum Ratings (Unless otherwise noted ,T_A=25°C)

Electrical Characteristics (Unless otherwise noted, V_{DD}=5V,T_A=25°C)

Symbol	Characteristic	Condition	Min	Тур	Max	Unit								
DC Charac	DC Characteristics													
Vdd	Supply voltage		4.5	5	5.5	V								
VIH	Logic high level	SCLK, DIN	0.7*V _{DD}		Vdd	V								
VIL	Logic low level	SCLK, DIN	0		0.3*V _{DD}	V								
lı lı	Input current	SCLK, DIN: $V_I=V_{DD}$	-	-	±1	μA								
Іон	LED SEG drive	SG1~SG8 Vo=Vpp-1V	-29	-32	-35	mA								
	output current													
lo	LED GRID drive	GRID1~GRID8 V₀=0 3V	250		_	mA								
	output current		200											
אצם חח	Dynamic current	No load Display off	-	-	5	mA								
.00_0111	Dissipation	, בוסףים, כוו			, C									
Switch Cha	racteristics					_								
Fosc	Oscillation frequency			1		MHz								
T _{TZH1}	GRID1~GRID8 rising time	$C_{1} = 200 \text{ pc} = 0.1 \text{ K}$			2	μs								
T _{TZH2}	SEG1~SEG8 rising time	CL-300pr,RL-IR			0.5	μs								
T _{THZ}	Dropping time	C∟=300pF, SEGn, GRIDn			120	μs								
Cı	Input capacitance				15	pF								
Timing Characteristics														
PWclk	Clock pulse width		400	-	-	ns								
t SETUP	Data setup time		100	-	-	ns								
t _{HOLD}	Data hold time		100	-	-	ns								

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Functions Description

1. Serial Port Interface

The data of MCU communicates with ET6280 through two-wire bus interface. While input data, when SCLK is high level, the signal on DIN must remain unchanged; only when the clock signal on SCLK is low level, the signal on DIN can be changed. The input of data is always high in the front and low in the back. The start condition of data input is that din changes from high to low when SCLK is high, and the end condition is that din changes from low to high when SCLK is high.

The instruction data transmission process is shown in the figure below:



Figure 2. Instruction data transmission format

Write SRAM data address continuous write mode (First address must be 0X00):





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Command1: Set data Command2: Set address Data1~N: Transmit display data Command3: Control display

Write SRAM data to fixed address mode:



Figure 4. Write SRAM data to fixed address format

Command1: Set data

Command2: Set address

Data1~N: Transmit display data

Command3: Control display

Note: Before using fixed address write mode, SRAM needs to be initialized with continuous write mode.

2. Data Instruction

The command is used to set the display mode and the status of the LED driver. After the instruction start is valid, the first byte entered by DIN is regarded as an instruction. After decoding, the highest B7 and B6 bits are selected to distinguish different instructions.

B7	B6	Instruction						
0	0	Initialization Setting						
0	1	Data Instruction						
1	0	Display Control Instruction setting						
1	1	Address Instruction setting						

Table 1. Instruction setting classification

If end is valid during instruction or data transmission, serial communication is initialized and the instruction or data being transmitted is invalid (the instruction or data previously transmitted remains valid).

2.1 Data Command Set

Before writing display data, send data instruction. The data instruction sets the number of scan lines, which determines the range of SRAM address, the number of write data, and the final display cycle.

Address mode: Automatic address mode means that the address is automatically accumulated from 00h when writing data. The maximum address value depends on the number of scanning lines. The fixed address mode is to use the address in the address setting command to write data.

B7	B6	B5	B4	B3	B2	B1	В0	Description
		0	0	0				1scan line
		0	0	1				2 scan line
		0	1	0				3 scan line
	C	0	1	1				4 scan line
	1	0	0		0		5 scan line	
0	1	1	0	1		0		6 scan line
0	I	1	1	0				7 scan line
		1	1	1				8 scan line
					0			Automatic address mode
					1			Fixed address mode
							0	Force update mode
							1	Automatic update mode

Table 2. Data Instruction setting

Note: Data automatic update mode is recommended

2.2 Address Instruction Setting

B7	B6	B5	B4	B3	B2	B1	В0	Display Address
1	1	0	0	0	0	0	0	00H
1	1	0	0	0	0	0	1	01H
1	1	~	~	~	۲	~	~	~
1	1	1	1	1	1	1	0	3EH
1	1	1	1	1	1	1	1	3FH

Table 3. Display Address Instruction Setting

Note: When power on, the address is set to 00H by default.

The corresponding relationship among display data, chip pins and display addresses is shown in the table below:

	SEG1	SEG2	SEG3	SEG4	SEG5	SEG6	SEG7	SEG8
	Bit7~Bit0							
GRID1	00H	01H	02H	03H	04H	05H	06H	07H
GRID2	08H	09H	0AH	0BH	0CH	0DH	0EH	0FH
GRID3	10H	11H	12H	13H	14H	15H	16H	17H
GRID4	18H	19H	1AH	1BH	1CH	1DH	1EH	1FH
GRID5	20H	21H	22H	23H	24H	25H	26H	27H
GRID6	28H	29H	2AH	2BH	2CH	2DH	2EH	2FH
GRID7	30H	31H	32H	33H	34H	35H	36H	37H
GRID8	38H	39H	3AH	3BH	3CH	3DH	3EH	3FH

Table 4. Display the corresponding relationship among data, address and chip pin

2.3 Display Control Instruction

B7	B6	B5	B4	B3	B2	B1	В0	Description	
1	0	0	0	0	0		Display Off		
				1				Display on	
						0	0	Line feed time: 4 PWM clock cycles	
						0	1	Line feed time: 8 PWM clock cycles	
						1	0	0 Line feed time: 12 PWM clock cycles	
						1	1	Line feed time: 16 PWM clock cycles	

Table 5. Display Control Instruction

Note: Display cycle: Number of scanning lines × (line feed time + 256 steps PWM cycle)

2.4 Initialization Setting

After the system is powered on, the initialization setting command is sent first. The initialization setting command can be used to adjust the SEG current (high level output current).

B7	B6	B5	B4	B3	B2	B1	В0	SEG current gain factor(G)
0	0		1	0	0	1	0	0
0	0		1	1	1	1	1	1
0	0	0	~	~	~	~	~	~
0	0							30
0	0							31

Table 6. Initialization setting instruction

Note: After the system is powered on, the initialization setting command is sent first.

 $I_{SEG} = 0.77*(9+G)$

3. Display Cycle



Application circuit



Notes:

- **1**. This application circuit is only for reference.
- 2. C1=1uF and should be placed as close as possible to the VCC.

3. R1~R2= 4.7kΩ; R3~R4 = 100Ω; C2~C3 = 100pF;

4. The series resistance of the communication port and the capacitor for GND should be placed as close as possible to IC, and the resistance value and capacitance value should be adjusted according to the actual anti-interference requirements and verification results

5. DIN and SCLK signals must adopt push-pull output structure.

ET6280

Package

SOP20



TSSOP20



Marking Information

ET6280	ET6280V
ET6280	6280
• 0XXXXX	• 0XXXX
ET6280 : Part Number	6280 : Part Number
0XXXXX : Lot Number	0XXXX : Lot Number

Revision History and Checking Table

Vereien	Dete	Povision Itom	Madifian	Function & Spec	Package & Tape
version	Date	Revision item	woomer	Checking	Checking
1.0	2019-12-03	Initial Version	Liuxm	Liuxm	Zhujl
1.1	2021-04-26	Add Marking Information	Liuxm	Liuxm	Zhujl
1.2	2021-11-10	Update Package size	Liuxm	Liuxm	Zhujl
1.3	2022-11-21	Update Typeset	Shibo	Shibo	Shibo
1.4	2023-4-21	Add TSSOP package	Shibo	Shibo	Shibo