

Dot Matrix LED Driver Control Special Circuit

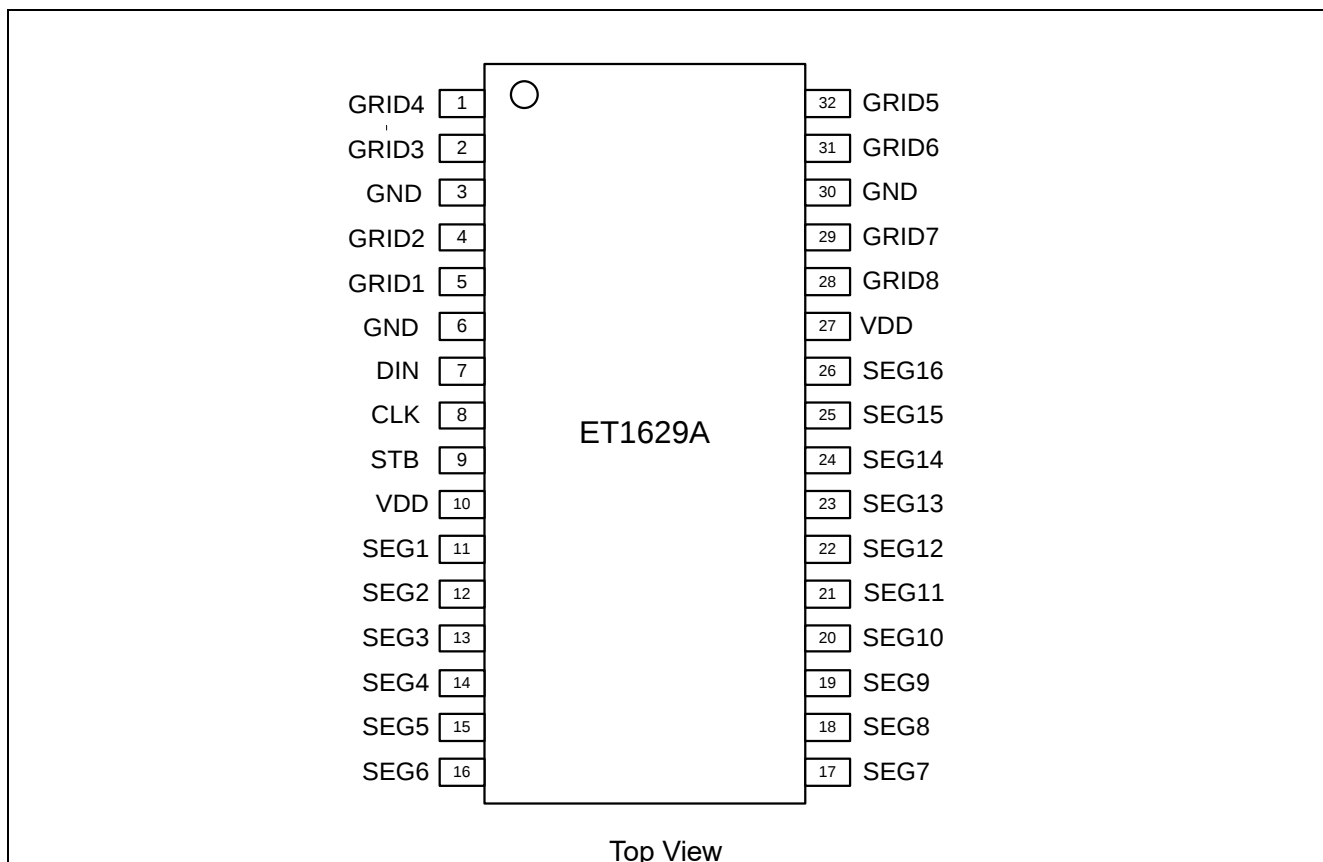
General Description

ET1629A is a matrix LED driver IC, it has 16 segment outputs and 8 grid outputs and 1 display storage unit and some control circuit. It inherits MCU digital interface, data latch and LED driver module. It is suitable for small LED display driver.

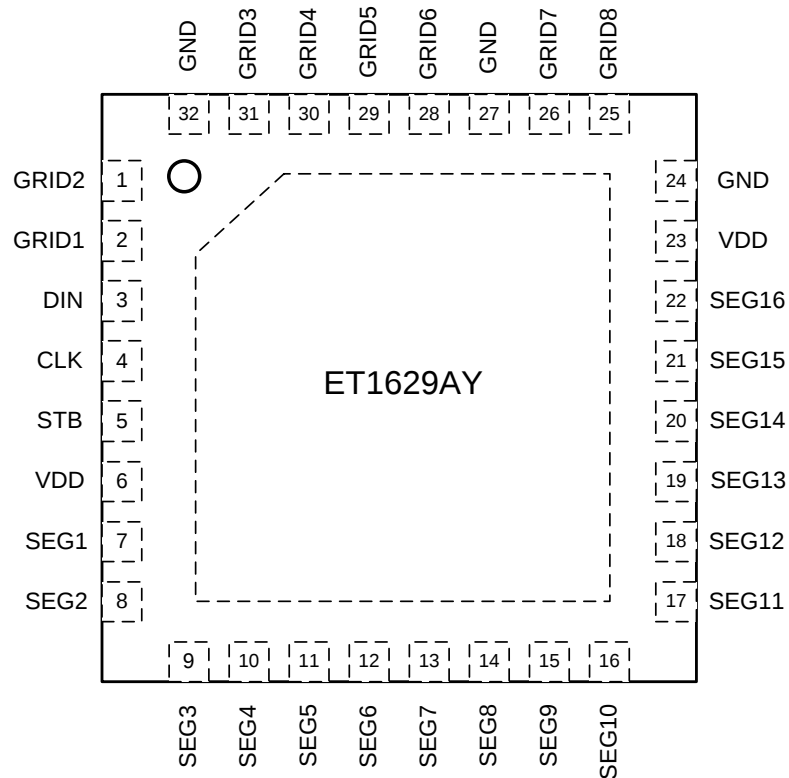
Features

- Display Mode: 16 Segs×8 Grids
- Gray adjustment: 8 duty cycles
- Three wire serial interface
- Built in RC oscillation
- Built in power on reset
- Package: SOP32 (ET1629A), QFN32 (ET1629AY)
- Tape Information: ET1629A-TP, ET1629AY-TP

Pin Configuration



ET1629A



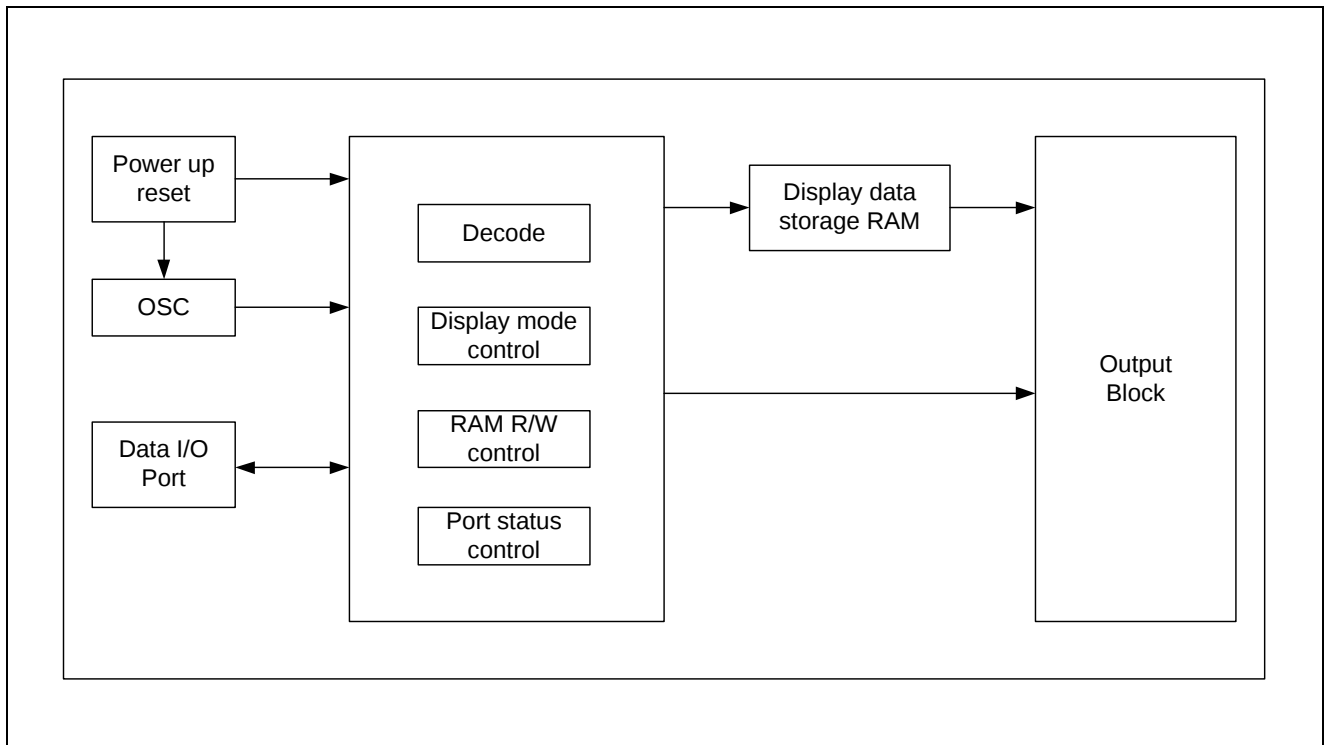
Top View

Pin Function

Pin No.		Symbol	I/O	Description
SOP32	QFN32			
28,29,31,32, 1,2,4,5	25,26,28~31,1,2	GRID8~GRID1	O	Grid output port, NMOS open drain.
3,6,30	24,27,32	GND	-	Ground
7	3	DIN	I	Serial data input port.
8	4	CLK	I	Serial clock input port.
9	5	STB	I	Serial data strobe port.
10,27	6,23	VDD	-	Power supply
11~26	7~22	SEG1~SEG16	O	Segment output port

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Function Block Diagram



Functions Description

Command

When the STB port status changes from high to low, the bytes of the command (b7-b0) is input from the DIN port. If STB port is set to high for some reason during data or command transmission, serial communication is initialized and the data/command being input is considered invalid.

Command1: Display Mode Setting

ET1629A's display mode format is following:

MSB				LSB				Function	Description
B7	B6	B5	B4	B3	B2	B1	B0		
1	0	NC, fill in 0			0	0	0	Display duty cycle setting	Duty cycle is 1/16
1	0				0	0	1		Duty cycle is 2/16
1	0				0	1	0		Duty cycle is 4/16
1	0				0	1	1		Duty cycle is 10/16
1	0				1	0	0		Duty cycle is 11/16
1	0				1	0	1		Duty cycle is 12/16
1	0				1	1	0		Duty cycle is 13/16
1	0				1	1	1		Duty cycle is 14/16
1	0			0				Display ON/OFF setting	Display OFF
1	0			1					Display ON

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Command2: Data Command Setting

ET1629A's data command format is following:

MSB				LSB				Function	Description
B7	B6	B5	B4	B3	B2	B1	B0		
0	1	NC, fill in 0				0	0	Data write mode	Display data input mode
0	1				0			Address increase mode	Automatic address increase
0	1				1				Fixed address
0	1			0				Test mode setting	Normal mode
0	1			1					Test mode

Command3: Display Address Setting

ET1629A's display address format is following:

MSB				LSB				Description
B7	B6	B5	B4	B3	B2	B1	B0	
1	1	NC, fill in 0		0	0	0	0	Display address 00H
1	1			0	0	0	1	Display address 01H
1	1			0	0	1	0	Display address 02H
1	1			0	0	1	1	Display address 03H
1	1			0	1	0	0	Display address 04H
1	1			0	1	0	1	Display address 05H
1	1			0	1	1	0	Display address 06H
1	1			0	1	1	1	Display address 07H
1	1			1	0	0	0	Display address 08H
1	1			1	0	0	1	Display address 09H
1	1			1	0	1	0	Display address 0AH
1	1			1	0	1	1	Display address 0BH
1	1			1	1	0	0	Display address 0CH
1	1			1	1	0	1	Display address 0DH
1	1			1	1	1	0	Display address 0EH
1	1			1	1	1	1	Display address 0FH

Note: Default data is 00H

Address assignment:

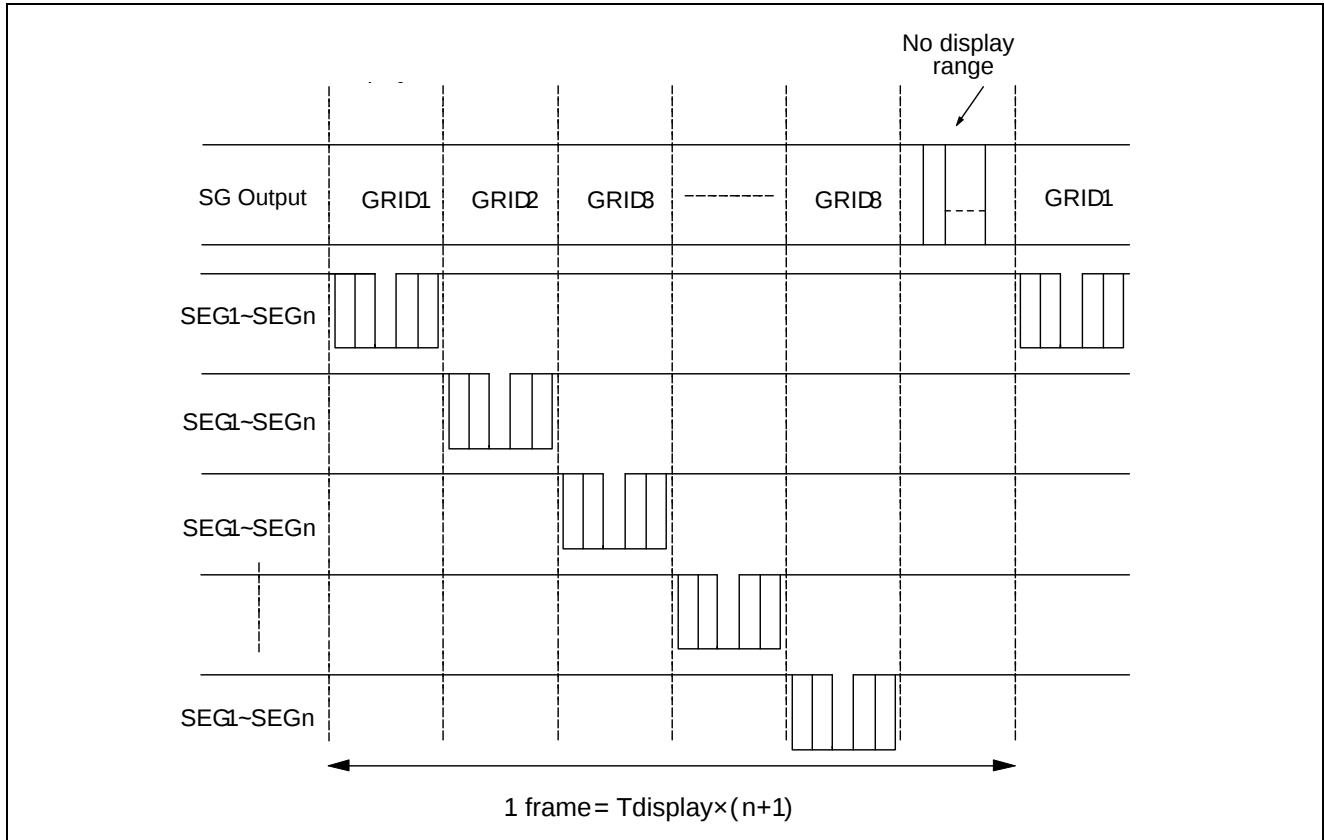
SEG1~SEG4	SEG5~SEG8	SEG9~SEG12	SEG13~SEG16	GRID
00HL	00HU	01HL	01HU	GRID1
02HL	02HU	03HL	03HU	GRID2
04HL	04HU	05HL	05HU	GRID3
06HL	06HU	07HL	07HU	GRID4
08HL	08HU	09HL	09HU	GRID5
0AHL	0AHU	0BHL	0BHU	GRID6
0CHL	0CHU	0DHL	0DHU	GRID7
0EHL	0EHU	0FHL	0FHU	GRID8

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Note: HL=B0、B1、B2、B3 , HU=B4、B5、B6、B7.

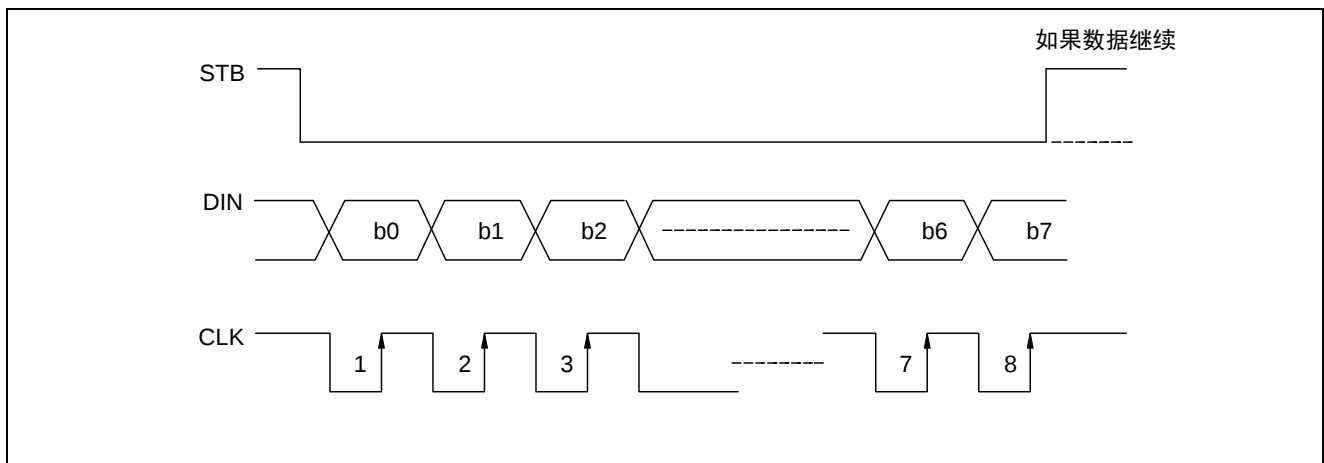
Display Timing

Display timing figure is following:



Serial Communication Format

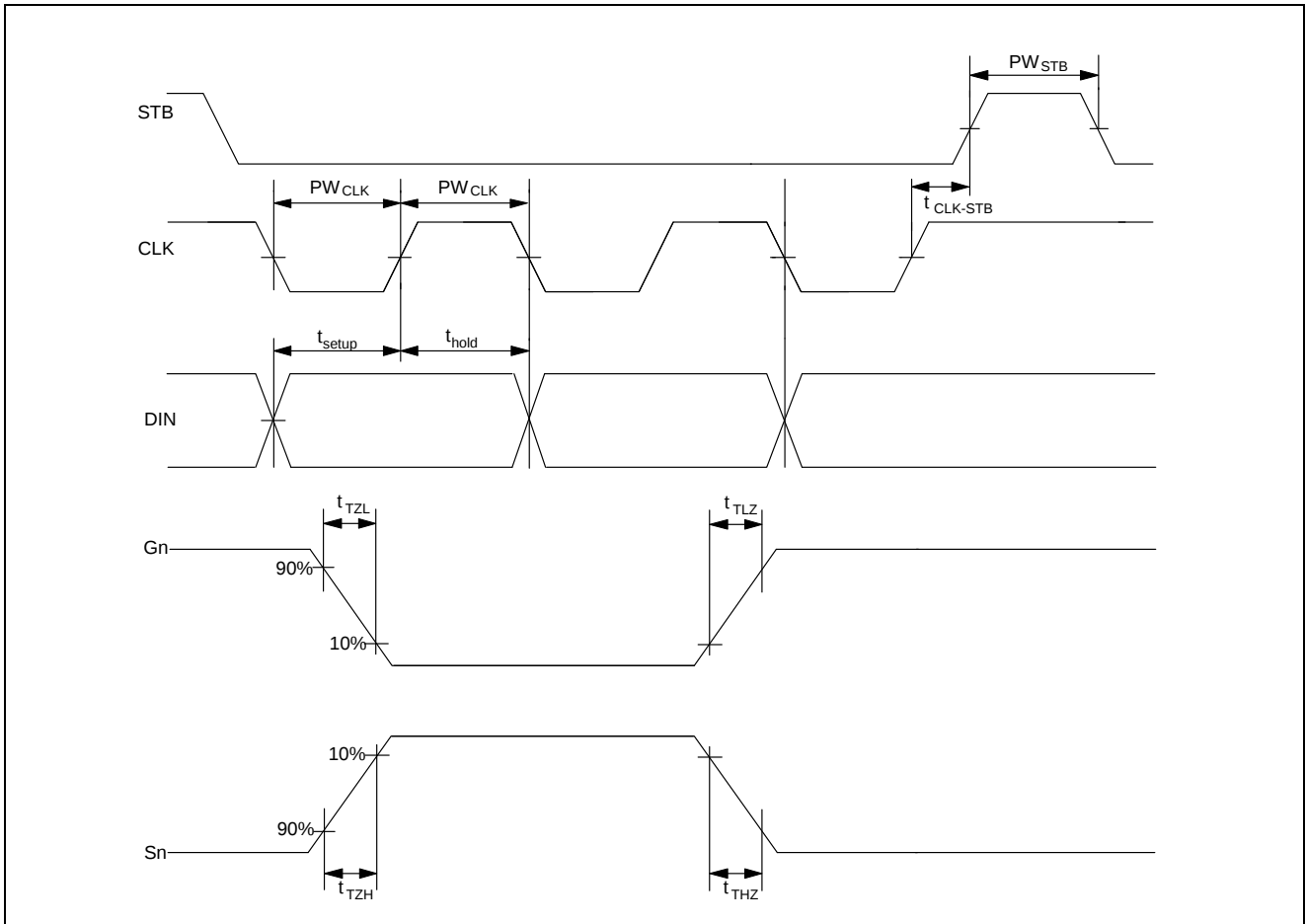
The following figure shows the serial communication format of ET1629A. It is recommended to connect a pull-up resistor (1K ~ 10K) to the DIN port.



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Conversion Characteristic Waveform

ET1629A's conversion characteristic waveform is following:



PW_{CLK} (clock pulse width) $\geq 400ns$

t_{setup} (data setup time) $\geq 100ns$

$t_{CLK-STB}$ (clock filter time) $\geq 1\mu s$

t_{TZH} (rising time) $\leq 1\mu s$

$t_{TLZ} < 10\mu s$

PW_{STB} (STB filter width) $\geq 1\mu s$

t_{hold} (data hold time) $\geq 100ns$

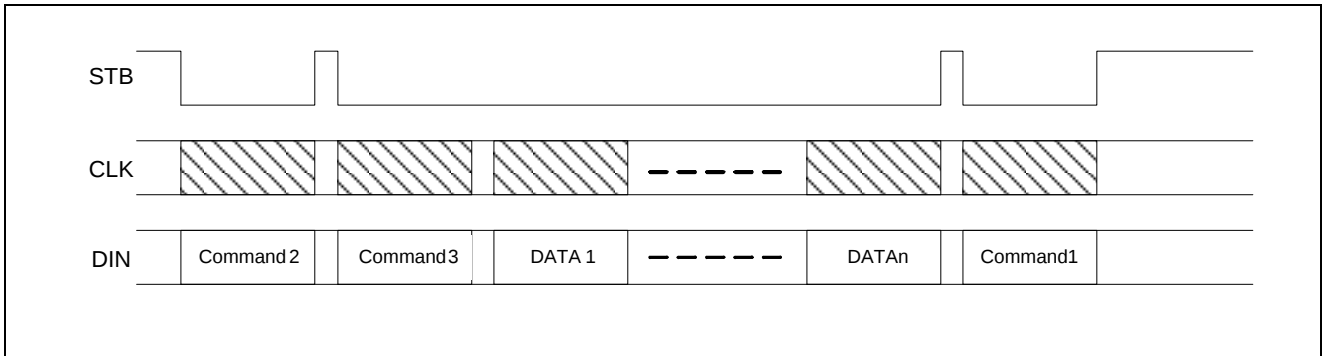
t_{THZ} (dropping time) $\leq 10\mu s$

$t_{TZL} < 1\mu s$

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Application

1. Continuous display data writing(Automatic address increase)



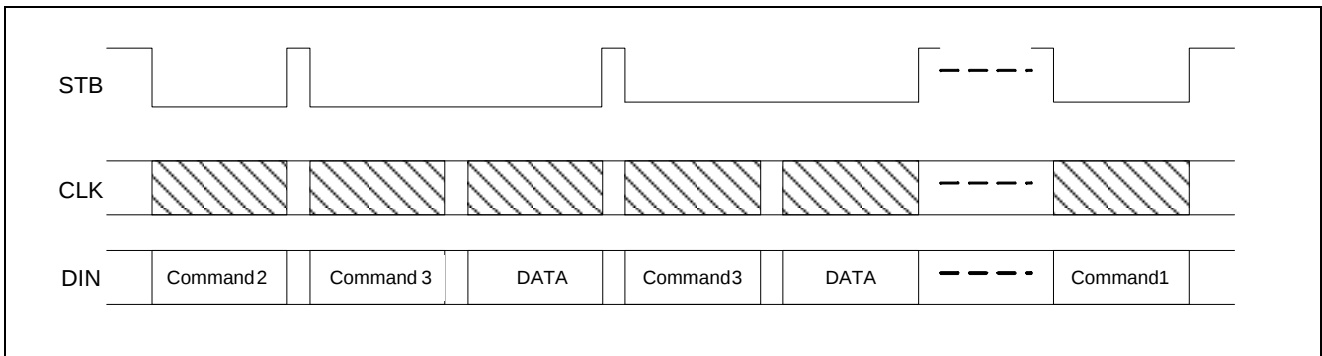
Command2: Data command setting

Command3: Address command setting

DATA1~n: Display data (MAX 16bytes)

Command1: Display mode setting

2. Single display data writing(fixed address mode)



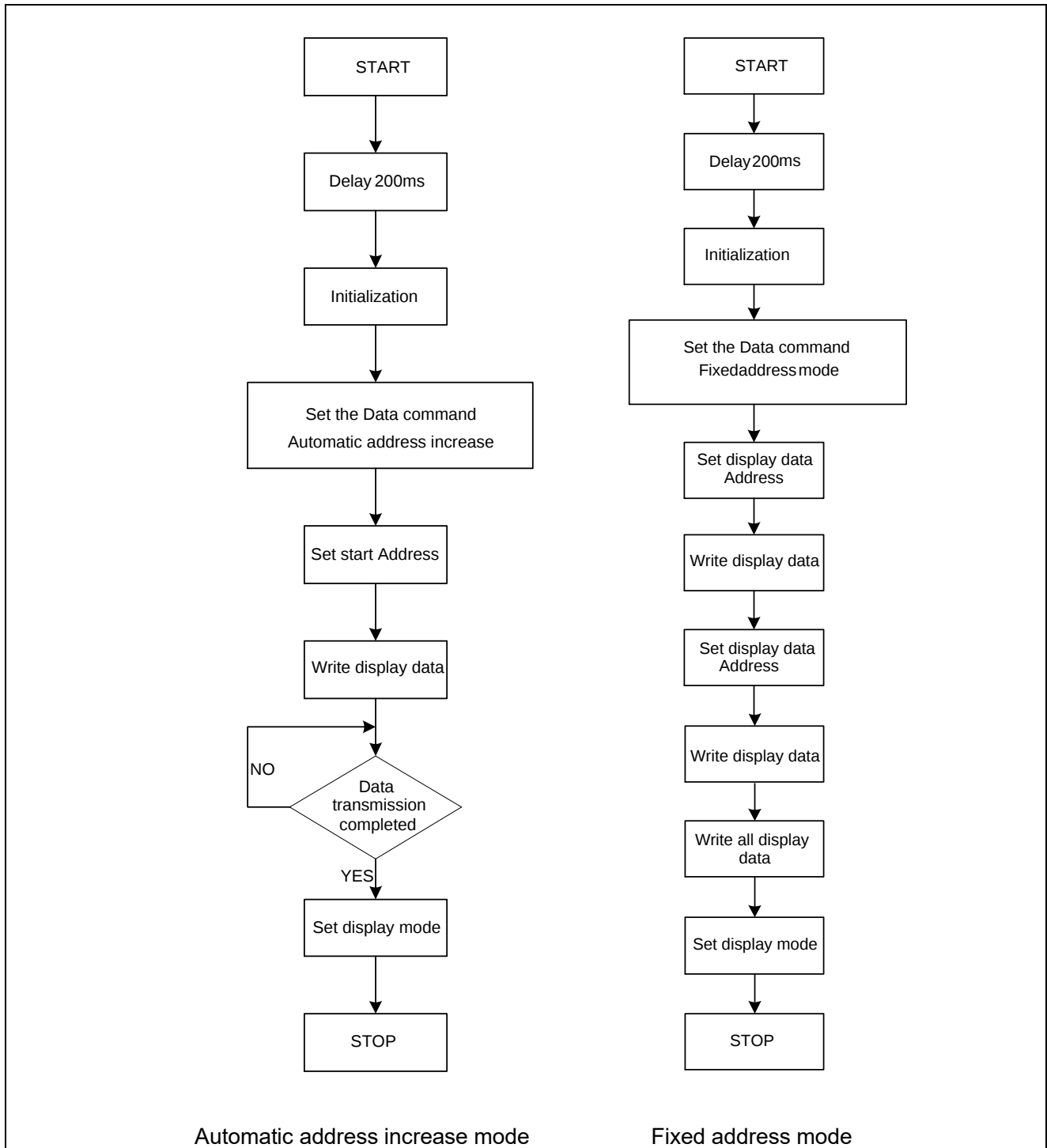
Command2: Data command setting

Command3: Address command setting

DATA: Display data

Command1: Display mode setting

Software Flow Diagram



When the IC is powered on for the first time, the contents of the display RAM are not defined, so be sure to clear the contents of the display RAM in the initialization setting.

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Absolute Maximum Ratings

Characteristic	Symbol	Rating	Unit
Supply Voltage	V_{DD}	-0.5~+7	V
Logic Input Voltage	V_I	-0.5~ $V_{DD}+0.5$	V
Driver Output Current	I_{OLGR}	+200	mA
	I_{OHSG}	-50	mA
Max Output Driver current	I_{TOTAL}	400	mA
Junction Temperature	T_J	-40~+150	°C
Storage Temperature	T_{STG}	-65~+150	°C

Recommended Operating Conditions

Characteristic	Symbol	Min	Typ	Max	Unit
Supply Voltage	V_{DD}	4.5	5.0	5.5	V
Dynamic current (*)	I_{DD_DYN}	—	—	1	mA
High Level Input Voltage	V_{IH}	0.6 V_{DD}	—	V_{DD}	V
Low Level Input Voltage	V_{IL}	0	—	0.25 V_{DD}	V
Operating Temperature	T_A	-40		85	°C

Note*: Set display mode command = 80H (display off & no load)

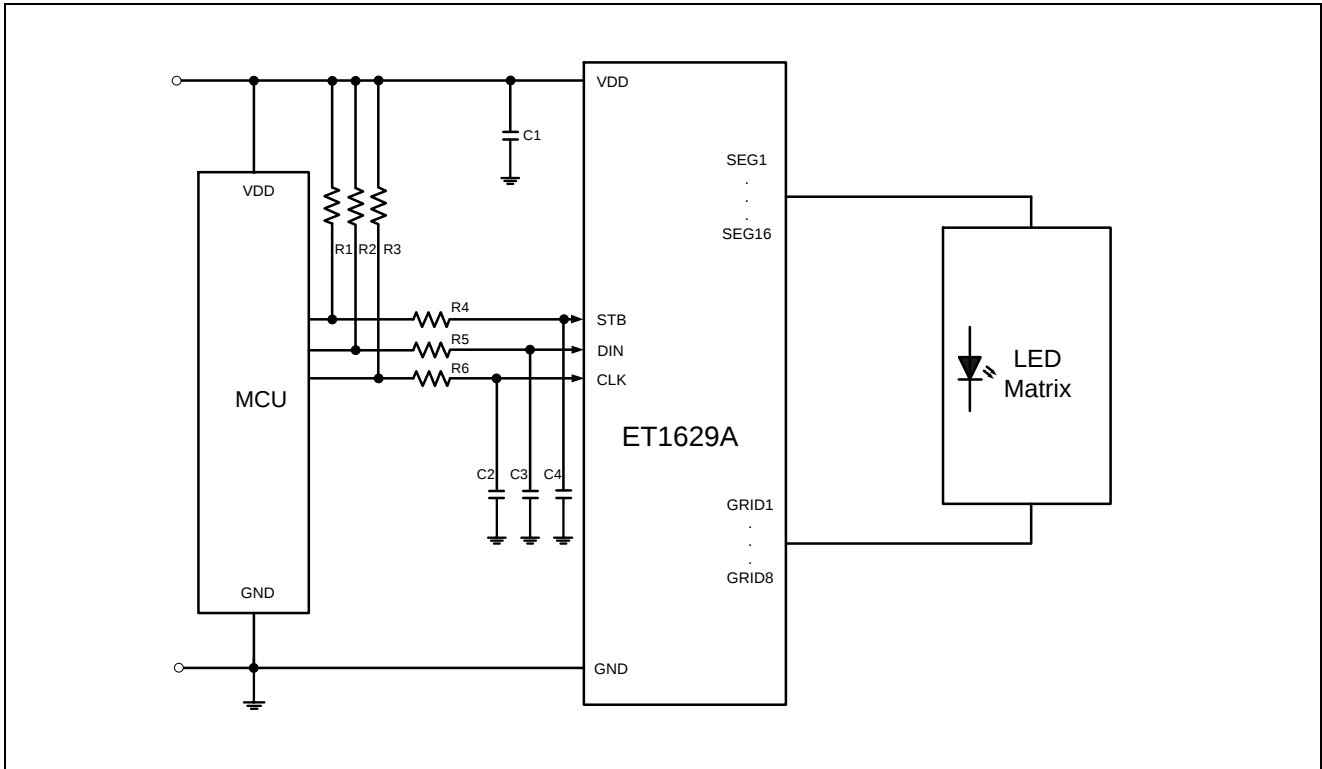
Electrical Characteristics

$V_{DD} = 5V$, $GND = 0V$, $T_a = 25^\circ C$

Characteristic	Symbol	Test Condition	Min	Typ	Max	Unit
High Level Output Current	I_{OHSG1}	$V_O = V_{DD} - 2V$, SG1~SG16	-30	-40	-50	mA
	I_{OHSG2}	$V_O = V_{DD} - 3V$, SG1~SG16	-40	-50	-60	mA
Low Level Output Current	I_{OLGR}	$V_O = 0.3V$, GR1~GR8	80	110	—	mA
High Level Input Voltage	V_{IH}	—	0.6 V_{DD}	—	5	V
Low Level Input Voltage	V_{IL}	—	0	—	0.25 V_{DD}	V
Refresh Frequency	F_{FLASH}			200		Hz

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Application Example



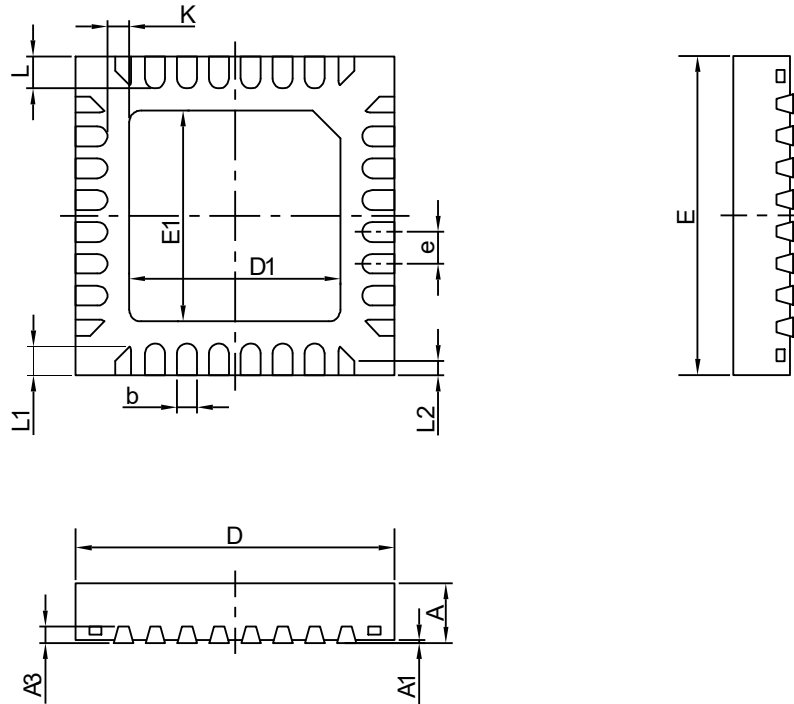
Notes:

1. This application circuit is only for reference.
2. C1=1uF and should be placed as close as possible to the VDD.
3. R1~R3 = 4.7kΩ, R4~R6 = 100Ω, C2~C4 = 100pF.
4. The series resistance of the communication port and the capacitor for GND should be placed as close as possible to ET1629A, and the resistance value and capacitance value should be adjusted according to the actual anti-interference requirements and verification results.

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Package

QFN32

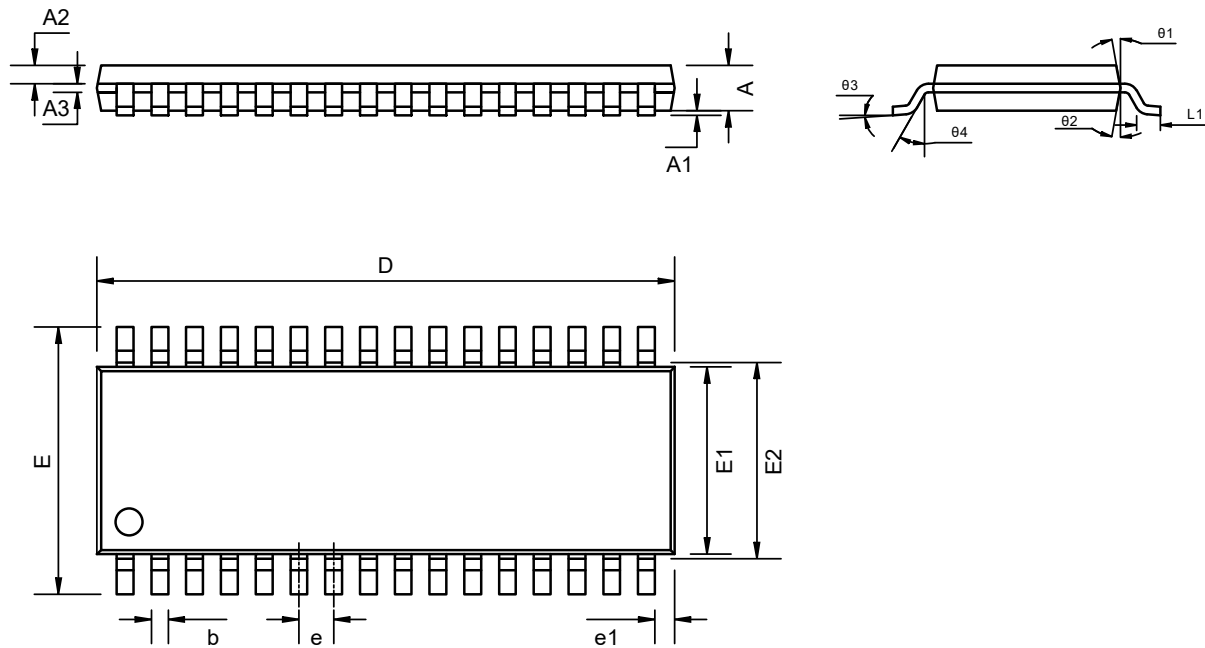


COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	--	0.05
A3	0.203REF		
b	0.15	0.20	0.25
D	3.90	4.00	4.10
E	3.90	4.00	4.10
D1	2.55	2.65	2.75
E1	2.55	2.65	2.75
e	0.40TYP		
K	0.20	--	--
L	0.30	0.40	0.50
L1	0.31	0.36	0.41
L2	0.13	0.18	0.23

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SOP32



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	MAX	SYMBOL	MIN	MAX
A	2.14	2.34	E2	8.9TYP	
A1	0.10	0.25	e	1.27TYP	
A2	0.99TYP		e1	0.77TYP	
A3	0.20	0.32	L1	0.55	0.95
b	0.3	0.5	$\theta 1$	8°TYP	
D	20.88	21.08	$\theta 2$	15°TYP	
E	10.2	10.6	$\theta 3$	4°TYP	
E1	7.42	7.62	$\theta 4$	14°TYP	

Revision History and Checking Table

Version	Date	Revision Item	Modifier	Function & Spec Checking	Package & Tape Checking
1.0	2020-02-24	Original Version	Shi Liang Jun	Shi Liang Jun	Zhu Jun Li
1.1	2022-12-15	Update Typeset	Shi Bo	Shi Liang Jun	Shi Bo