



## 确 认 书

Specifications for Approval

客户 Customer: \_\_\_\_\_

LCM/LCD 型号 No.: TS12864A-2

描述 Description: 黄绿

工艺部批准PROCESS DEPT.	质控部批准 QC DEPT.	设计部批准 DESIGN DEPT.

客户意见 Comments	客户确认签字盖章 Customer Approval with Signature and chop  确认日期: Date:	天正达公司签字盖章 Techstar Approval with Signature and chop  交样日期: Date:
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## ■FEATURES

- Display mode: STN , Yellow-Green color, Positive, Transflective
- Viewing Direction : 6 'clock (bottom view)
- Driving Method: 1/64Duty Cycle, 1/9 Bias
- Dots: 128\*64
- Dot Size : 0.48x 0.48 mm
- Dot Pitch : 0.52 x 0.52 mm
- Control IC: NT7107/NT7108
- Interface Input Data : 8-Bit
- Glass to PCB: ZEBRA CONNECTOR
- Back light: LED (Yellow-Green )

## ■ABSOLUTE MAXIMUM

Item	Symbol	Standard value	Unit
Power Supply Voltage	Vdd	-0.3 ~ +7.0	V
Power supply for LCD Drive	Vlcd	Vdd-19.0 ~ Vdd+0.3	V
Input Voltage	Vin	-0.3 ~ Vdd+0.3	V
Operating Temperature	Top	-20 ~ +70	°C
Storage Temperature	Tstg	-30 ~ +80	°C

## ■MECHANICAL PARAMETED/I

Item	Description	Unit
PCB Dimension	93.0 x 70.0 x 1.6	mm
LCD Dimemnsion	84.0 x 51.0 x 2.6	mm
View Dimension	70.6 x38.6	mm
Outline Dimension	93 x 70.0 x8.0/13.5*	mm

## ■PIN ASSIGNMENT

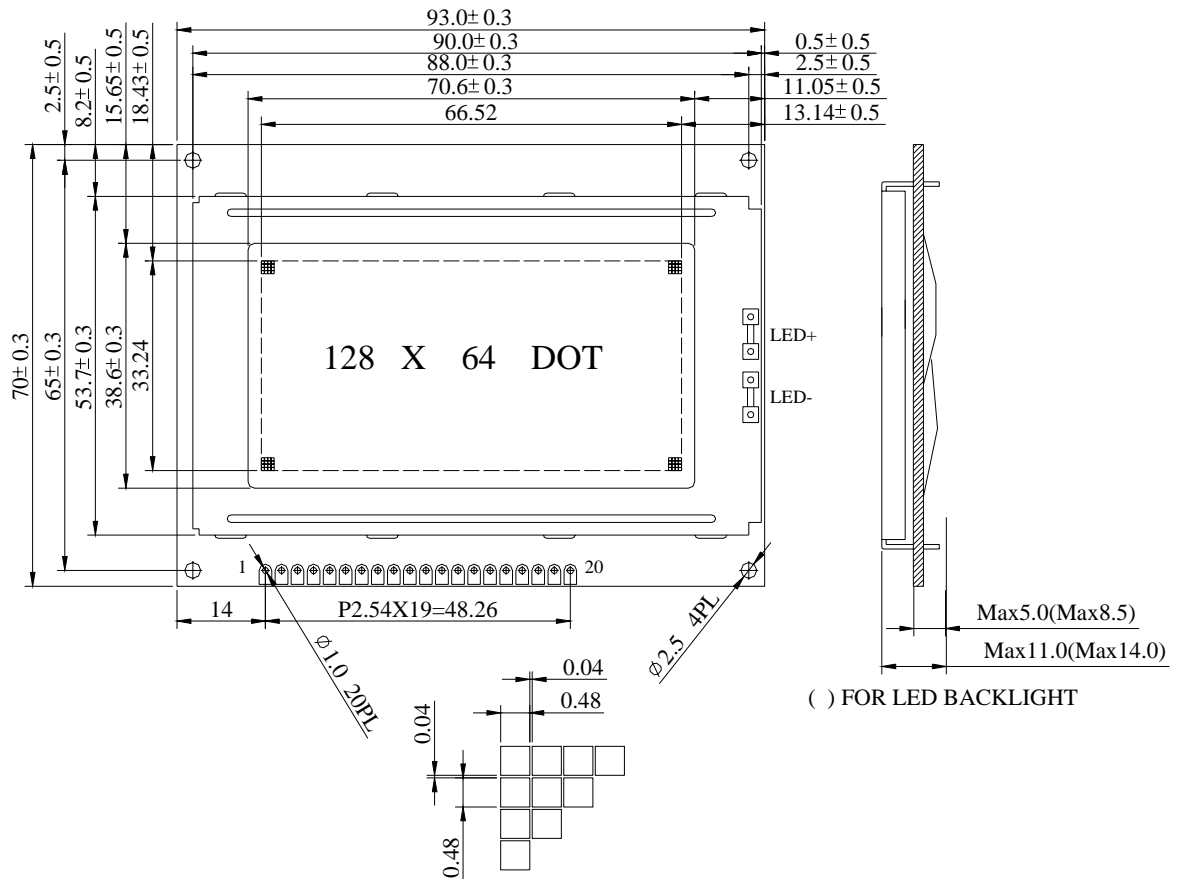
Pin NO.	Symbol	Level	Function
1	VSS	0V	Power Ground
2	VDD	+5V	Power supply
3	VO	--	For LCD drive voltage(variable)
4	D/I	H/L	H: Display Data, L:Display Instruction
5	R/W	H/L	H: Read Signal, L: Write Signal
6	E		Enable Signal
7-14	DB0-DB7	H/L	Date bus
15	CSA	H/L	Select chip
16	CSB	H/L	Select chip
17	/RES	H/L	Reset Signal
18	VEE	-15V	Negative voltage(-15V)to LCD
19	LED(+)	--	Power (+)for LED Backlight
20	LED(-)	--	Power (-)for LED Backlight

# ASSEMBLY DIAGRAM

TECHSTAR

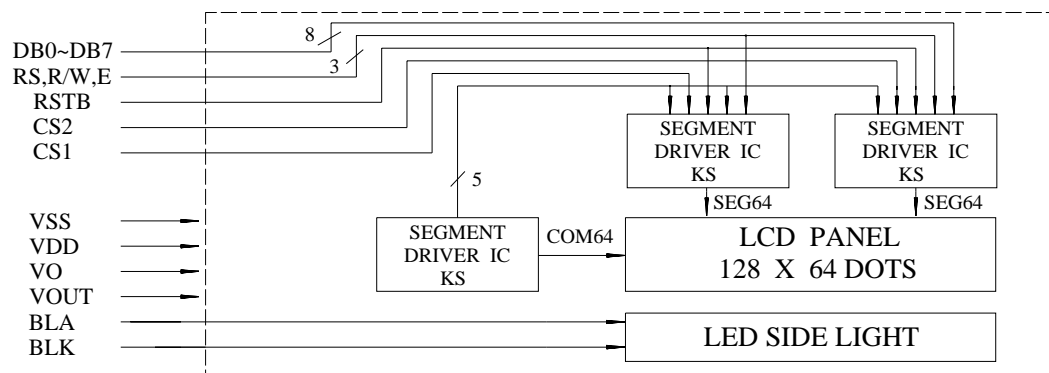
TS12864A-2

## EXTERNAL DIMENSIONS

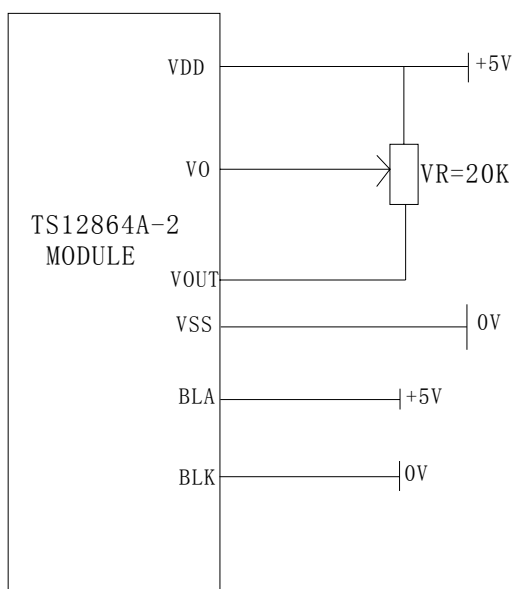


## BLOCK DIAGRAM:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
VSS	VDD	VO	D/I	R/W	E	DB0	DB1	DB2	DB3	DB4	DB5	DB6	DB7	CS1	CS2	RSTB	VOUT	BLA	BLK



# POWER SUPPLY BLOCK DIAGRAM



## ■ELECTRICAL CHARACTERISTICS

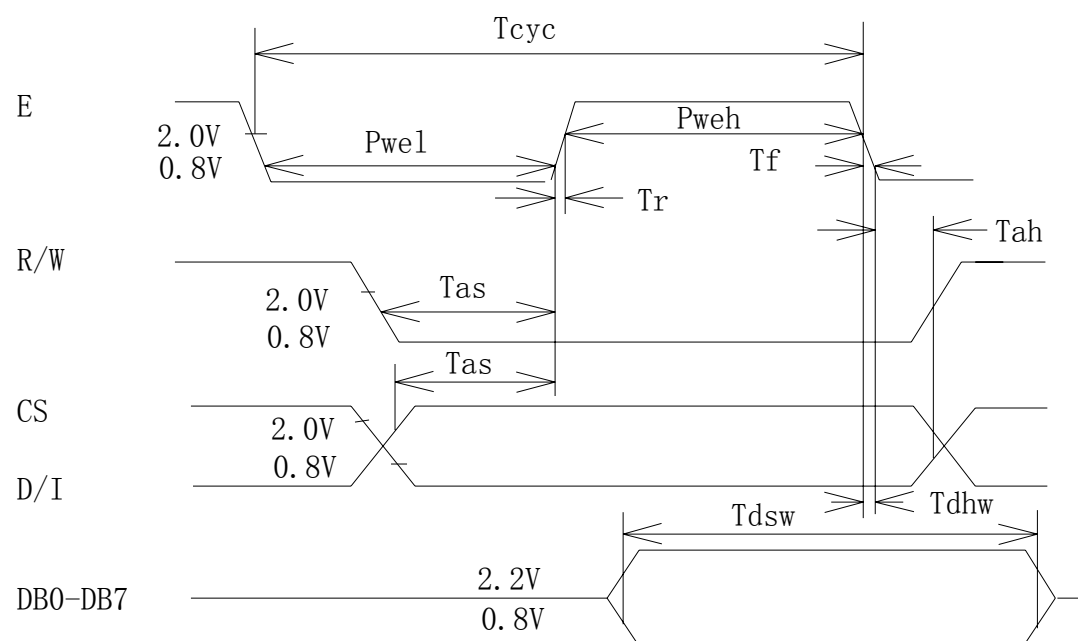
### DC Characteristics(Ta==25℃;Vdd=5.0V±10%)

PARAMETER		SYMBOL	CONDITION	MIN	TYP	MAX	UNIT
Operating Voltage(1)		VDD		4.5	5.0	5.5	V
Input Voltage	High	Vih	E,R/W,D/I,DB0~DB7 Terminals	2.0	--	VDD	V
	Low	Vil		0	--	0.8	
Output Voltage	High	Voh	DB0~DB7, Terminal	2.4	--	--	V
	Low	Vol		--	--	0.4	
Operating Current		Idd	During Display	--	--	5	mA

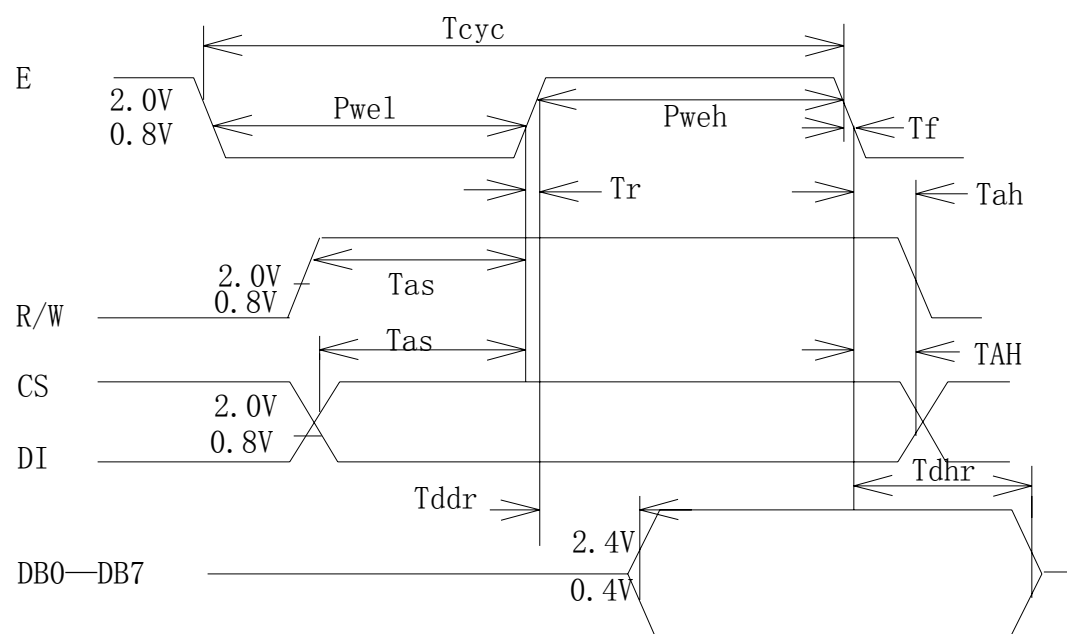
### AC characteristics (Vdd=5V ± 10%,Vss=0V Ta=25℃)

Characteristic	Symbol	Min.	Max.	Unit
E Cycle	Tcyc	1000	--	ns
E High Level Width	Pweh	450	--	
E Low Level Width	Pwel	450	--	
E Rise Time	Tr	--	25	
E Fall Time	Tf	--	25	
Address Set-Up Time	Tas	140	--	
Address Hold Time	Tah	10	--	
Data Set-Up Time	Tdsw	200	--	
Data Delay Time	Tddr	--	320	
Data Hold Time(Write)	Tdhw	10	--	
Data Hold Time(Read)	Tdhr	20	--	

## Writing timing



## Reading Timing



## ■CONTROL and DISPLAY COMMAND

Instruction	R/W	D/I	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0	Function
Display on/off	L	L	L	L	H	H	H	H	H	L/H	Controls the display on or off. Internal status and display RAM data is not affected. L:OFF,H:ON
Set Address	L	L	L	H	Y address (0~63)						Sets the Y address in the Y address counter.
Set Page (X Address)	L	L	H	L	H	H	H	page (0~7)			Sets the X address at the X address register.
Display Start Line	L	L	H	H	Display start line (0~63)						Indicates the display data RAM display at the top of the screen
Status read	H	L	B U S Y	L	O N / O F F	R E S E T	L	L	L	L	Read the status : busy 1:working,0:ready ADC 1:clockwise output 0:counterclockwise ON/OFF 1:disp off 0:disp on RESET 1:reset 0:normal
Write Display Data	L	H	Write Data								Write data (DB0:7) into display data RAM. After writing instruction, Y address is increased by 1 automatically.
Read Display Data	H	H	Read Data								Read data (DB0:7) from display data RAM to the data bus

### DISPLAY ON/OFF

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	0	1	1	1	1	1	D

The display data appears when D is 1 and disappears when D is 0. Though the data is not on the screen with D = 0, it remains in the display data RAM. Therefore, you can make it appear by changing D = 0 into D = 1.

### SET ADDRESS (Y ADDRESS)

S	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	0	1	AC5	AC4	AC3	AC2	AC1	AC0

Y address (AC0 - AC5) of the display data RAM is set in the Y address counter. An address is set by instruction and increased by 1 automatically by read or write operations of display data.

### SET PAGE (X ADDRESS)

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	0	1	1	1	AC2	AC1	AC0

X address(AC0 - AC2) of the display data RAM is set in the X address register. Writing or reading to or from MPU is executed in this specified page until the next page is set.

**DISPLAY START LINE (Z ADDRESS)**

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	0	1	1	AC5	AC4	AC3	AC2	AC1	AC0

Z address (AC0 - AC5) of the display data RAM is set in the display start line register and displayed at the top of the screen. When the display duty cycle is 1/64 or others(1/32 - 1/64), the data of total line number of LCD screen, from the line specified by display start line instruction, is displayed.

**STATUS READ**

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
0	1	BUSY	0	ON/OFF	RESET	0	0	0	0

- **BUSY**  
When BUSY is 1, the Chip is executing internal operation and no instructions are accepted.  
When BUSY is 0, the Chip is ready to accept any instructions.
- **ON/OFF**  
When ON/OFF is 1, the display is off.  
When ON/OFF is 0, the display is on.
- **RESET**  
When RESET is 1, the system is being initialized.  
In this condition, no instructions except status read can be accepted.  
When RESET is 0, initializing has finished and the system is in the usual operation condition.

**WRITE DISPLAY DATA**

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
1	0	D7	D6	D5	D4	D3	D2	D1	D0

Writes data (D0 - D7) into the display data RAM. After writing instruction, Y address is increased by 1 automatically.

**READ DISPLAY DATA**

RS	R/W	DB7	DB6	DB5	DB4	DB3	DB2	DB1	DB0
1	1	D7	D6	D5	D4	D3	D2	D1	D0

Reads data (D0 - D7) from the display data RAM. After reading instruction, Y address is increased by 1 automatically.