



## PRODUCT SPECIFICATION

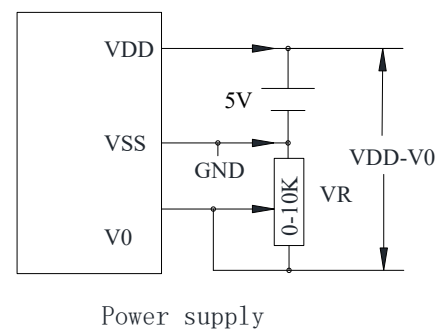
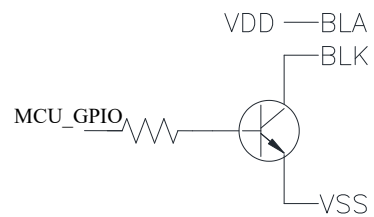
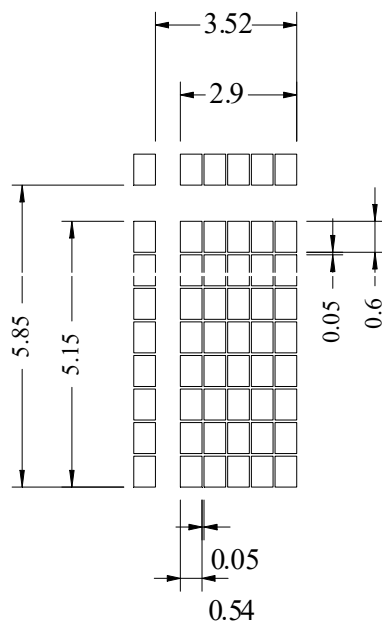
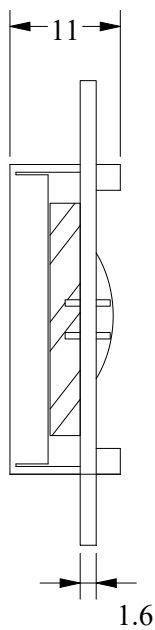
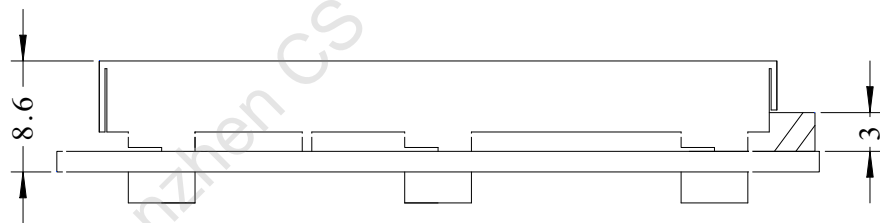
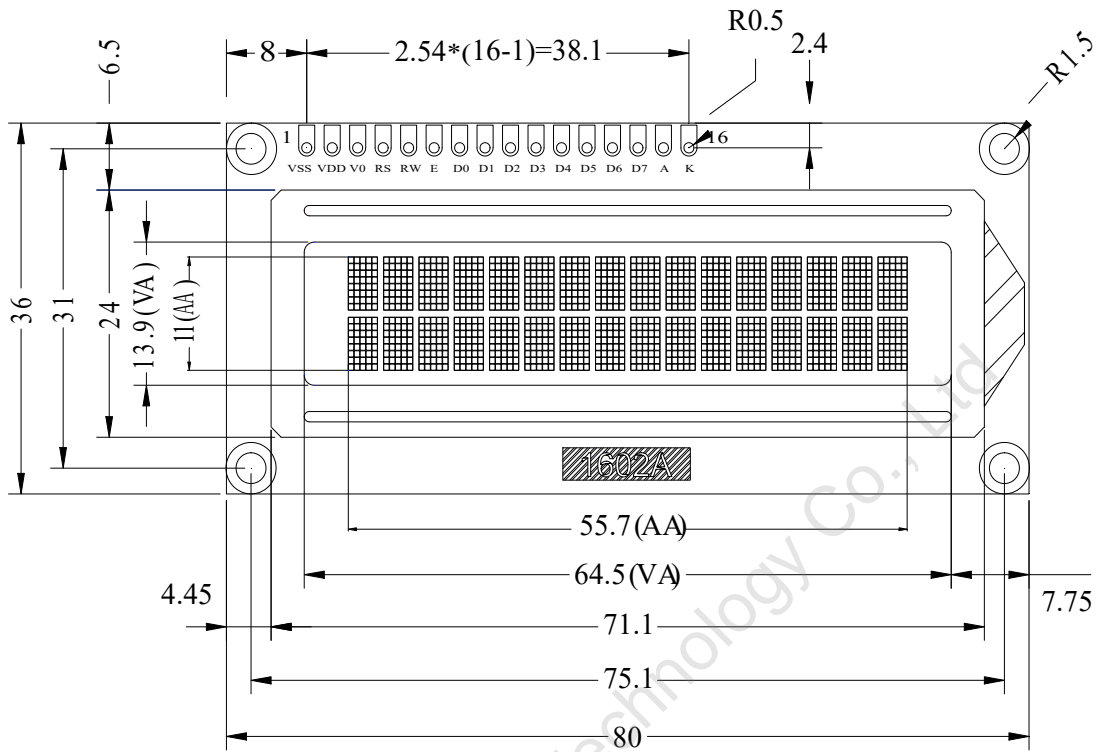
Character LCD

MODEL: HS1602ZWA-B1650

**Customer Approval:**

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## Drawing for LCD



## Parameter

ITEM	DESCRIPTION
Display Mode	STN, Transmissive, Blue
Dot Number	16 characters x 2 line dots
Outline Dimensions	80.0x36.0x11.0mm
Visual Area	64.5x13.9mm
Dot Size	0.54x0.6/2.9x5.15mm
Controller IC	AIP31066+AIP31065
Communication Interface	4-bit/8-bit parallel
Backlight	White LED
Number of Pins	16PIN
Operating Voltage	5V
Viewing Direction	6 O'clock
Operating Temp	-20~70°
Storage Temp	-30~80°

## Interface definition (parallel port)

PIN	SIGNAL	DIRECTION	DESCRIPTION
1	VSS	--	Negative terminal of power supply (0V)
2	VDD	--	Positive terminal of power supply (+5.0V)
3	V0	--	LCD voltage adjustment, (deeper voltage, then deeper display)
4	RS	I	=1, write data =0, write command
5	RW	I	=1, read mode =0, write mode
6	E	I	Enable signal, active high
7-14	DB0 ~ DB7	I/O	The data transmission channel between the MCU and the module. When using 4 bits, DB0-DB3 are not used. DB7 can be used to read out the busy flag (busy)
15	LEDA	I	Positive terminal of backlight power supply (+5V)
16	LEDK	0	Negative terminal of backlight power

## Electrical parameters (DC)

ITEM	SYMBOL	TEST CONDITION	PAREMETER RANGE			UNIT
			MIN	TYP	MAX	
Working voltage for module	VDD	-	4.8	5.0	5.2	V
Glass voltage	V0	V0-VDD	4.5	5.0	7.0	V
Backlight working voltage	VLED	-	4.8	5.0	5.2	V
IO input high level	VIH	-	0.7VDD	-	VDD	V
IO input low level	VIL	-	-	-	1.0	V
LCM output high level	VOH	-	0.8VDD	-	VDD	V
LCM output low level	VOL	-	-	-	0.6	V
Working current for module	IDD	=VDD	-	0.7	0.9	MA
Stand-by current for module	IDO	=VDD	-	0.7	-	uA
Backlight working current	ILED	=VLED	8	15	20	MA

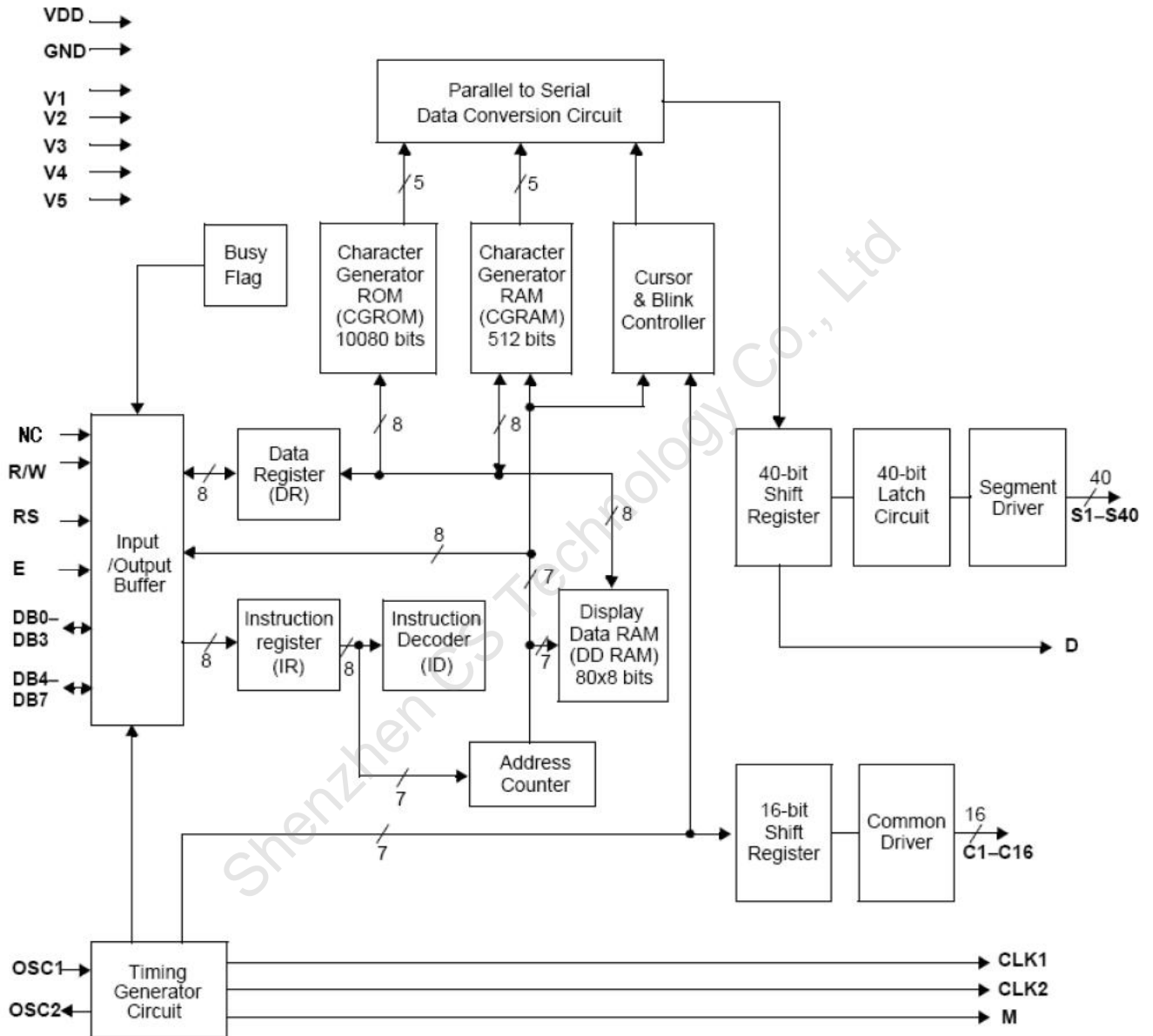
## Limit parameters

ITEM	SYMBOL	RATED VALUE	UNIT
Power voltage	V <sub>DD</sub>	-0.3~+5.5	V
LCD drive voltage	V <sub>LCD</sub>	-0.3~+7.0	V
Input voltage	V <sub>in</sub>	-0.3~VDD+0.3	V
Operating temperature	T <sub>OPR</sub>	-20~+85	°C
Storage temperature	T <sub>STO</sub>	-55~+125	°C

## LCD power consumption

TYPE	CONDITION	PARAMETER	SYMBOL
Module	-	0.7	MA
Backlight	-	15	MA

## Display controller block diagram



## Display memory map

Normal (the relationship between DDRAM and display)

00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F

Left move ←

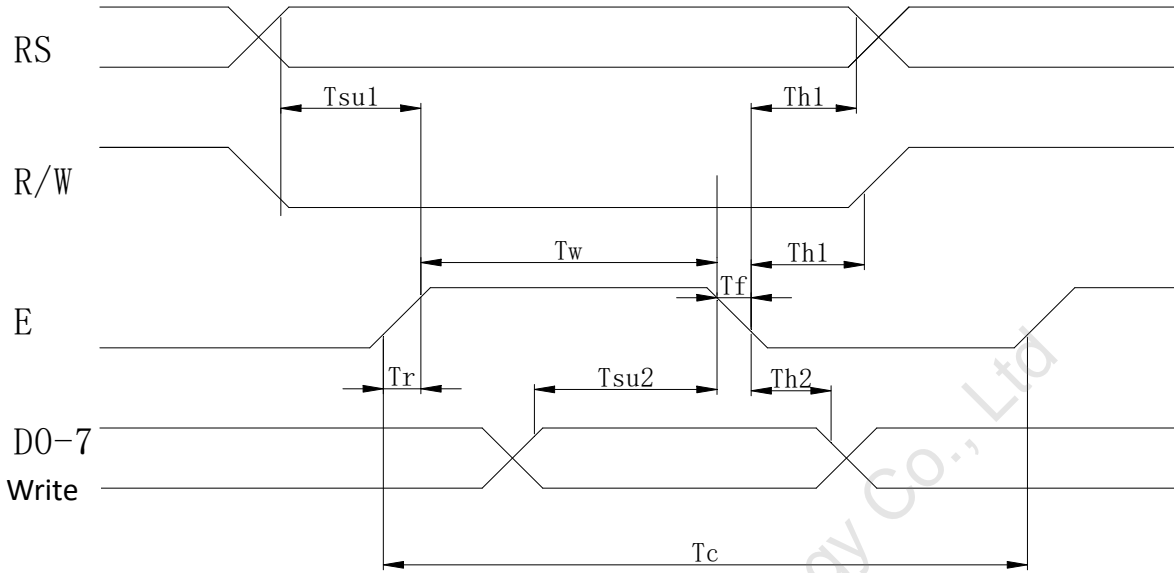
01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F	10
41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E	4F	50

→ Right move

27	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E
67	40	41	42	43	44	45	46	47	48	49	4A	4B	4C	4D	4E



## Timing for write parallel port

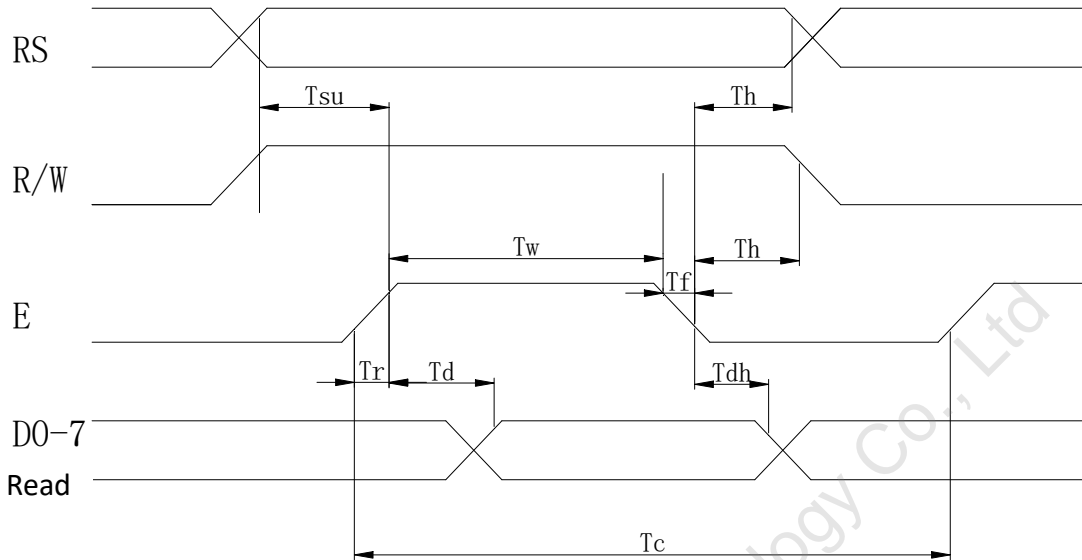


VDD=5.0V

NAME	Signal	SYMBOL	CONDITION	MIN	MAX	UNIT
E cycle time	E	$T_c$	Write mode	500	-	ns
E rise / fall time		$T_r, T_f$		-	20	
E pulse width (1,0)		$T_w$		230	-	
R/W and RS setup time	R/W (RS)	$T_{su1}$		40	-	
R/W and RS hold time		$T_{th1}$		10	-	
Data setup time	DB[0-7]	$T_{su2}$		80	-	
Data hold time		$T_{th2}$		10	-	



## Timing for read parallel port

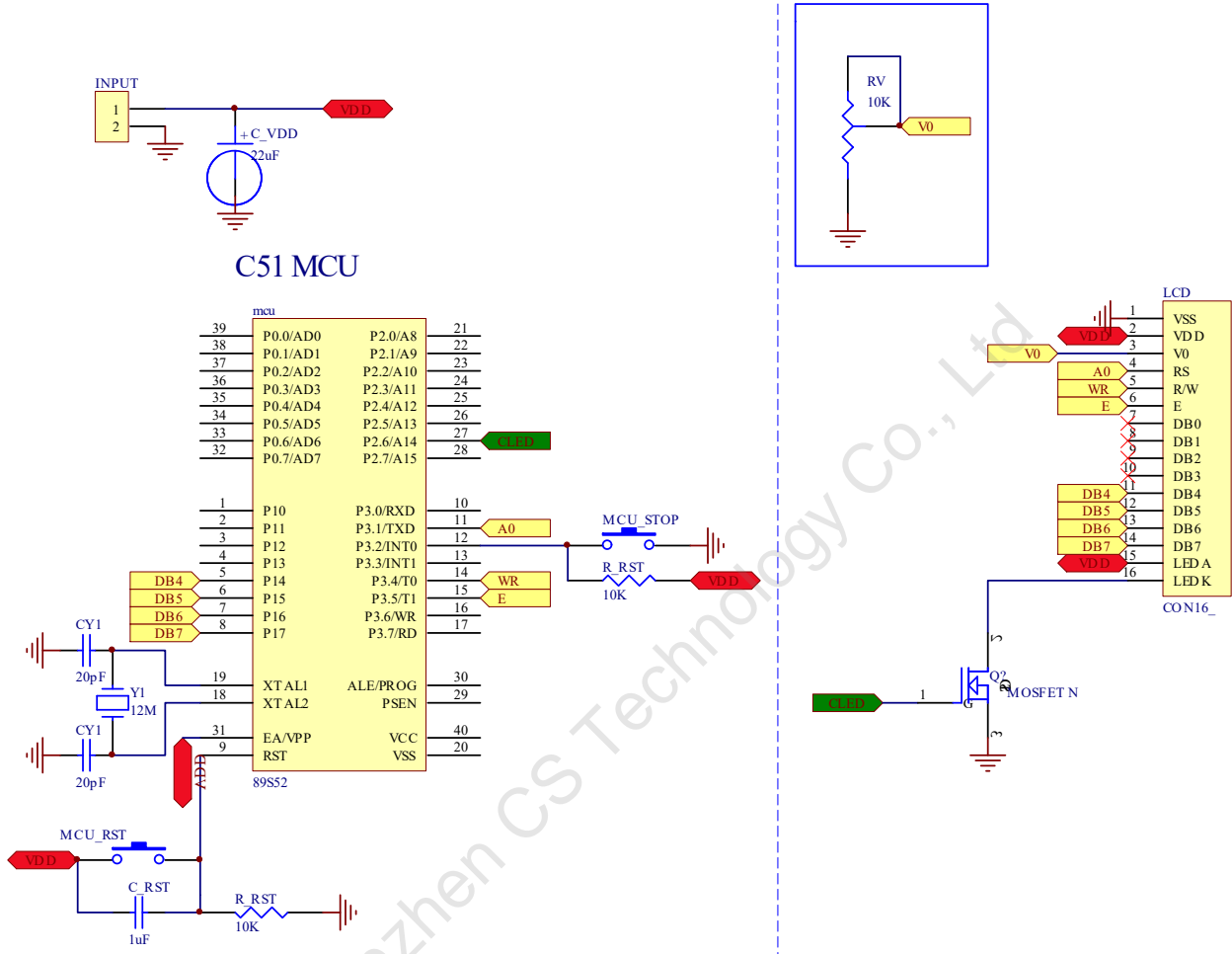


VDD=5.0V

NAME	Signal	SYMBOL	CONDITION	MIN	MAX	UNIT
E cycle time	E	Tc	Read mode	500	-	ns
E rise / fall time		Tr,Tf		-	20	
E pulse width (1,0)		Tw		230	-	
R/W and RS setup time	R/W(RS)	Tsu1		40	-	
R/W and RS hold time		Th1		10	-	
Data setup time	DB[0-7]	Tsu2		-	120	
Data hold time		Th2		10	-	

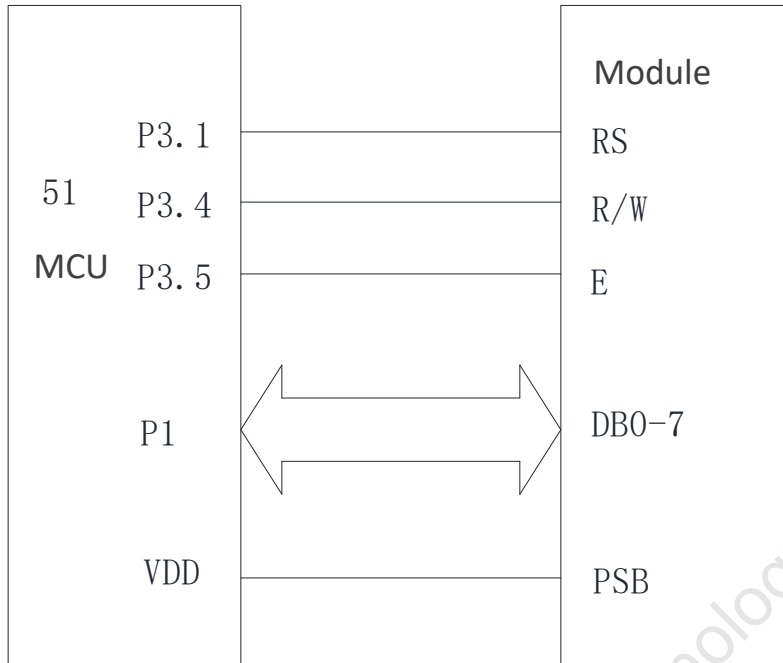


## 2) Schematic diagram of parallel port 4-bit application



### 3) MCU parallel connection

#### 8-bit parallel ports



#### 4-bit parallel ports

