Product Specification

Number: L-KLS9-12864D-	W/B
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Character LCD Module Name:

Customer:

electronic

WWW.KLSELE.COM

Date: <u>2024-11-29</u>

Customer Signature:

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Instructions for use

catalogue

1. Revised records

- 2. Overview
- 3. Overall dimensions
- 4. Hardware block diagram
- 5. Electrical characteristics
- 6. Interface description
- 7. Instructions instructions
- 8. Description of the operation time sequence
- 9. Application routines
- 10. Precautions

Instructions for use

1. Revised records

edition	date of issue	New system / revised content
V 1.0	20201-13	brand-new

Instructions for use

2. Overview

TheL-KLS9-12864D-W/B is a point-formation LCD display module that can be used to display text and graphics.8-bit parallel data transmission mode, providing display 4096-bit RAM.

Display resolution: 128 X 64dots

Display color and backlight color: STN blue, yellow green, gray; backlight black, white, yellow green

Polarized film: fully permeable / semi-permeable Observation Angle: 6:00 Show duty cycle: 1 / 64, drive bias: 1 / 9 Control chip: SBN0064 or compatible IC Display data RAM: 4096 bits Dimensions (Unit: mm) Overall Size: 93X 70X (low frame 11.6, high frame 13)

Visual area: 71.1X 39

Character size: 66.52X 33.24 point size: 0.48X 0.48 Pixel spacing: 0.52X 0.52 Weight: g contrast: VO external adjustment or internal fixed contrast

Operating voltage: + 3.3V or + 5V default 5V

Instructions for use

3. Overall dimensions:



4. Hardware block diagram:



Instructions for use

5. Electrical characteristics

5.1 Limit parameters

The parameter name	symbol	conditio n	representative value		unit
			least value	crest value	
working voltage	Vd d		-0.3	+7.0	V
The LCD drive voltage	Vl cd		Vee -0.3	Vdd +0.3	V
supply voltage	V ee		Vdd19	Vdd +0.3	V
Operating temperature (T)	Т ор	-	-20	70	С
Storage temperature (T)	T stg	_	-30	80	С

5.2 DC parameter 1 (Ta =25 $^{\circ}$ C ,Vdd =4.5V ~5.5V ,VDD -VEE =8~17V)

The parameter	symbol	condition	dition nom		al value	unit
name			mini	typica	maxi	
			mum	l case	mum	
supply voltage	Vd d -GND	-	4.5	5.0	5.5	V
Operating current	I dd	Vdd = 5V	3	3.5	4	mA
(excluding backlight)						
The LCD drive voltage	V dd -V 5		3.0	-	Vd d	V
LED backlight operating	If	Vf=2.8~3.0V	51	54	60	m A
current						
LED backlight power	Pd		230	270	330	m W
consumption						
Enter a high level	V ih		2	-	Vd d	V
Enter a low level	V il		-0.3	-	0.8	V
Output high level	V oh	Io h =-200uA	2.4	-	Vd d	V
output low level	V ol	I o 1=1.6mA	0	-	0.4	V

5.3 AC parameter 1 (Ta =25^oC, Vdd = 4.5 V \sim 5.5 V) the MPU interface

Instructions for use

Condition: (VDD=5.0±10%,VSS=0V,Ta=-20~+70°C)

NAME	SYMBOL	MIN	MAX	UNIT
E period	Tc	1000	—	ns
E high level width	TWH	450	—	ns
E low level width	TwL	450	—	ns
E rise time	T _R	—	25	ns
E fall time	TF	—	25	ns
Address setup time	TASU	140	—	ns
Address hold time	Тан	10	—	ns
Data setup time	T _{DSU}	200	—	ns
Date delay time	TD	—	320	ns
Date hold time(write)	T _{DHW}	10	_	ns
Date hold time(read)	T _{DHR}	20	_	ns

6. Interface description

Instructions for use Waveform diagram of parallel mode test Ε tu 2. OV 0. 8V tr R/W **t**AH CS1B, CS2B 0.8V 2. OV CS3, RS tony DB0-7 Write the pattern to Е tus tan R/W CS1B, CS2B -2. OV CS3, RS tp t DHR DB0-7

Reading mode

subscript	symbol	function	remarks
1	VSS	Power supply negative electrode	
2	VD D	Power supply positive pole	
3	V0	LCD bias power supply	Adjustable contrast ratio
4	R S	Data / instruction selection (H: Data L: instruction)	
5	R /W	Read / Write Selection (H: Read L: write)	
6	Е	enable signal	
7	D 0	Data bit 0	
8	D 1	Data bit 1	
9	D 2	Data bit 2	
10	D 3	Data bit 3	
11	D 4	Data bit 4	
12	D 5	Data bit 5	
13	D 6	Data bit 6	
14	D 7	Data bit 7	
15	CS 1	Selection 1 (left half screen) high level is valid	

Instructions for use

16	CS 2	Selection 2 (right half screen) high level is valid	-
17	R ST	The system reset the foot	
18	Vo ut	LCD negative pressure output	
19	LEDA	LED, backlight	
20	LED K	LED backlight burden	

Instructions for use

7. Instructions

The I / O buffer is used

The input buffer controls whether the module is in a valid state. Only if CS1 or CS2 is valid mode, otherwise the input / output and instructions of the data are not executed and the internal state is unchanged. The RST runs were independent of the status of the CS1 or CS2.

incoming register

The input register provides an interface of a module to an MPU with different operating frequencies. Input register is temporarily stored to temporarily and write into display RAM data, When CS 1 or CS 2 is valid, R / W and RS select input register. Data from the MPU is written to the input register and then written to the display memory. The data is latched along the descending edge of the E signal and written automatically by internal operation RAM $_{\circ}$

output register

CS 1 or CS 2 temporarily holds data in the display register when valid and R / W =RS =H. Status data (busy check) can be read out when CS1 or CS2 is valid, R / W =H, and RS =L. The read displays the data in the RAM, requiring two read operation instruction visits, the first time, the display data RAM is locked in the output register, and the second time, the MPU reads the data in the latch. Not required twice when reading the busy flag.

R S	RW	operate
L	L	Write the instruction operation
L	Н	Read status (busy detection)
Н	L	Write data operation (from input register to display data
		memory)
Н	Н	Read data operation (from display data memory to output
		register)

Various actions by setting up the RS / RW bit:

reset

The system can be initialized in two ways: when the RST end holds low level,

receive instructions for MPU; when the RST end sets low level, perform the

following steps:

-Display off

Display the start position register set 0 (Z counter)

When the RST is low, instructions other than the read state instruction are not received. Therefore, execute other instructions after confirming DB 4=0 (clear RSTB) and DB 7=0 (ready)

Initial power supply conditions are shown in table parameters	symbol	minimum	typical case	maximum	unit
release time	tR S	1.0			u s
rise time	t R			200	n s

Instructions for use



Busy Sign (BF)

The busy flag indicates the busy / idle state of the module. When the busy sign is high, the module is performing internal operations; when the busy sign is low, the module can accept external commands or data, and DB7 indicates the busy flag





Instructions for use

7.1, a description of the instructions

code re	epen	ory									
instruct	RS	R/W	DB 7	DB 6	DB 5	DB 4	DB 3	DB 2	DB 1	DB 0	description
show Open /	0	0	0	0	1	1	1	1	1	D	Set up the display switch
set up Y address	0	0	0	1	Y address (0-63)				(0-6:	Set the Y address in the Y address counter	
Set the page X address	0	0	1	0	1	1	1	Page: (0-7)			Set the X address in the X Address counter
Set the starting row Z address	0	0	1	1	Show the starting row (0~63)				ng row	Set up the display start row register contents	
Read the state	0	1	busy	0	ope n clos e	reset	0	0	0	0	Busy: 0 idle, 1 busy; switch: 0 on, 1 off Reset: 0 is normal, and 1 is reset
WD	1	0	D7	D6	D5	D4	D3	D2	D1	D0	Write data to the display memory (after writing instructions, Y address automatically add 1)
read data	1	1	D7	D6	D5	D4	D3	D2	D1	D0	Read the data from the display memory

Note: "-", is not considered

7.1.1 Display the switch

RS	R/W	DB 7	DB O	6 DB	5 DB	4 DE	3 3 DI	B 2 D	B1 D	B 0
0	0	0	0	1	1	1	1	1	D	

Display data are displayed at D =1 and disappear at D =0. Although the display data is not displayed on the screen when D=0, the data is still stored in the memory, so you can change D=0 to D=1 to make it displayed.

7.1.2 Set the Y address

RS	R/W	DB 7	7 DB	6 DB	5 DB	4 DE	33 DI	B 2	DB 1	DB 0
0	0	0	1	AC5	AC4	AC3	AC2	A C	1 A 0	C

The Y address of the data memory (AC 0-AC 5) is set in the Y counter. The address is set by the instruction and automatically increases 1 when reading or writing to the RAM.

7.1.3 Set Page X address

Ŭ	RS	R/W	DB 7	DB	6 DB	5 DE	34 D	B3 D	B 2 D	B1 D	DB 0
	0	0	1	0	1	1	1	A C 2	2 A C 1	A C	

The X address of the display memory (AC 0-AC 2) is set in the X address register in the X address register. Read / write in the MPU is executed on this page until the next page is set.

7.1.4 Show the start row Z address

RS	R/W	DB 7	7 DB	6 DB	5 DB	4 DE	33 D	B2 D	B1 I	DB 0
0	0	1	1	AC5	AC4	AC3	AC2	A C 1	A C	

The Z address of the display memory is set in the display start row register and displayed in the top of the screen. When the display duty cycle is 1 / 64 or other (1 / 321 / 64), the LCD display starts from the line specified by the display start command.

.1.57 Read the state

Instructions for use

	RS	R/W	DB 7	DB	6 DB	5 DB	4 DE	33 DI	B2 D	B1 I	OB 0
	0	1	bus	0	switc	reset	0	0	0	0	
l			У		n						

Busy =1, the chip performs internal operations and does not accept instructions.

Busy =0, the chip is ready to receive commands.

On / off =1 shows on

On / off =0 display off

The reset =1 system is being initialized and in this state is not received except for the state read instruction

Reset =0 System initialization ends, and the system can work normally

Instructions for use

.1.67 Write the data to the RAM

RS	R/W	DB 7	DB (6 DB	5 DB	4 DE	3 DI	32 D	B1 D	D B 0
1	0	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0	
 (0.0	<u> </u>	. 1	1. 1							

Write data (D 0-D 7) to the display memory, after the writing instruction, the Y address automatically increase 1 $\,$

7.1.7 Read the data from the RAM

RS	R/W	DB	7 DB	6 DB	5 DB	4 DE	33 DH	32 D	B1 D	B 0
1	1	D 7	D 6	D 5	D 4	D 3	D 2	D 1	D 0]
data	frame t	ha diam				2 - 7 of	tar tha	raadi		

Read the data from the display memory (D 0-D 7) after the reading command

8. Operation timing

Refer to the test waveform map,

9. Application routines

9.1 Parallel transmission wiring diagram



9.2 Parallel C51 routines

#include <STC 15.H>
#include <string .h >
#include <INTRINS .H >
#define uchar unsigned char
#define db P1
sbit r s =P 3^0;
sbit rw=P 3^1;
sbit e=P3^2;
sbit c s 1=P 3^3;

Instructions for use

sbit c s 2=P 3^4;

Instructions for use

sbit rs t = $P 3^5$;

// Bitmap Dot array data Table //

// Photo: D: \...128641.bmp, longitudinal mode, data arrangement: from left to right from top to bottom //

uchar code cathode_txt[]=

{

0xFF ,0x 01,0xFD ,0xFD

,0xED,0xED,0xED,0xED,0xED,0xED,0xFD,0xFD,0xFD,0xFD,0xFD,0xDD,0xDD,0x1D,0xED ,0xED ,0x7D,0xED,0x9D,0xFD,0x05,0xFD,0xFD,0xFD,0xFD,0xFD,0xFD,0xBD, 0xBD ,0x 05,0xBD ,0xFD ,0xBD ,0xBD,0xBD,0x05,0xBD,0xBD,0xBD,0xFD,0xFD,0xFD,0xFD,0x01,0xFF, 0xFF ,0x 00,0xFF,0xFF,0xFF,0x3F,0xCE,0xF3,0xFF,0x81,0xDC,0xC1,0x3F,0xC0,0xF6,0xF6, 0x00,0xFF,0xFF,0xFF,0xFF,0x00,0xEF,0xEB,0xEA,0xE9,0x03,0xE9,0xEA,0xEB,0xEF,0x00, 0xFF,0xFF,0xFF,0xBD,0xBD,0xC3,0xFF,0x00,0xBD,0xBD,0xBD,0xBD,0xBD,0xFF, 0xFF,0xFF,0xF7,0xCC,0xFD,0x01,0xFD,0xFD,0xFD,0x01,0xFD,0xDC,0xE7,0xFF,0xFF,0xFF, 0xBE,0xDE,0xEE,0xF2,0xFE,0xFE,0x00,0xFE,0xFE,0xFA,0xF6,0xEE,0x9E,0xFF,0xFF,0xDE, 0xEE ,0xF 2,0x 00,0xF6,0xEE,0xF7,0xF4,0xF7,0xF7,0x00,0xFB,0xFB,0xFF,0xFF,0xFF,0xF7, 0xF 7,0x 00,0xFB ,0xFF,0xFD,0x71,0xAD,0xDC,0xAD,0x71,0xFF,0xFF,0xFF,0xFF,0x00,0xFF, 0xFE,0xFF,0xFF,0xBF,0xDF,0x06,0xFF,0xFF,0xFF,0xCF,0xF7,0xF7,0xF7,0xEE,0x1E,0xFE, 0x 9F, 0x 6F, 0xF 7, 0xF6, 0x6F, 0x9F, 0xFF, 0xFF, 0xF6, 0xEE, 0x9E, 0x7E, 0x7E, 0x9E, 0xEE, 0xF6, 0x 1F ,0xEF ,0x 77,0x76,0xF7,0xCF,0xFF,0xFF,0xFF,0x3F,0xCF,0x07,0xFF,0xFF,0xFF,0xFF, 0xFF, 0xFE, 0x 06, 0xF6, 0xF6, 0xF6, 0xF6, 0xEE, 0x1E, 0xFE, 0xFE, 0x1E, 0xEE, 0xF6, 0xF7, 0xF7, 0xF 3,0xED ,0xDE ,0xDE ,0xED,0xF3,0xFF,0xFF,0xDF,0xEF,0xF3,0xFC,0xFD,0xF3,0xEF,0xDF, 0xF 0,0xEE ,0xDF ,0xDF ,0xEE,0xF1,0xFF,0xF9,0xFA,0xFB,0xFB,0xFB,0xFB,0xFF,0xFF,0xFF, 0xFF,0xFF,0xC0,0xDF,0x5F,0xDF,0xDF,0xEF,0xF0,0xFF,0xFF,0xF0,0xEF,0xDF,0xDF,0xDF, 0xFF,0x00,0xFF,0xFB,0xC7,0x3F,0xFF,0x0F,0xF3,0x0F,0xFF,0x3F,0xC7,0xFB,0xFF,0xFB,

Instructions for use

0xC 7,0x 3F,0xFF,0x0F,0xF3,0x0F,0xFF,0x3F,0xC7,0xFB,0xFF,0xFB,0xC7,0x3F,0xFF,0x0F, 0xF 3,0x 0F ,0xFF ,0x3F,0xC7,0xFB,0xFF,0xFF,0xFF,0xFF,0xFF,0xF3,0x8F,0x7F,0xFF,0x7F, 0x 8F ,0xF 3,0xFF ,0xFB ,0xF7,0x4F,0xBF,0x4F,0xF7,0xFB,0xFF,0xF3,0x8F,0x7F,0xFF,0x7F,

Instructions for use

0x 8F, 0xF 3,0xFF, 0xFF, 0x00,0xFF,0xFF,0x0F,0xF7,0xFB,0xFB,0xFB,0xE7,0xFF,0xFF,0xFF, 0xFF,0x0F,0xF7,0xFB,0xFB,0xFB,0xE7,0xFF,0xFF,0xFF,0x0F,0xF3,0xFB,0xFB,0xF3,0x0F, 0xFF,0xFF,0xFF,0xFF,0x03,0xF7,0xFB,0xFB,0x07,0xF7,0xFB,0xFB,0x07,0xFF,0x00,0xFF, 0xFF.0x 00.0xFF.0xFF.0xFF.0xFE.0xF9.0xFE.0xFF.0x7E.0xF9.0xFE.0xFF.0xFF.0xFF.0xFF. 0xFF,0xFF,0xFF,0xFB,0xFD,0xFE,0xFF,0x7E,0xFD,0xFB,0xFF,0xDF,0xDC,0xE3,0xFC, 0xFF,0xFF,0xFF,0xFF,0xFF,0xFF,0xFE,0xFD,0xFB,0x7B,0xFB,0xFC,0xFF,0xFF,0xFF, 0xFF,0xFE,0xFD,0x7B,0xFB,0xFB,0xFC,0x7F,0xFF,0xFF,0xFE,0x79,0xFB,0xFB,0xF9,0xFE, 0xFF, 0x 00,0xFF, 0xEF, 0xED, 0x6D, 0x2D, 0x4D, 0x61, 0x6C, 0x6D, 0x6D, 0x6D, 0xED, 0xEF, 0xFF .0xFF .0xFF .0xFB .0xE 7.0x1F.0xFF.0x00.0xFF.0xFF.0xFF.0x00.0x7F.0x9F.0xE3.0xFF. 0xFF,0xFF,0xFF,0x1D,0xDD

unsigned char code bmp 2 [] = / / Data sheet

{

0x 00,0x 88,0x 10,0x18,0x48,0x28,0x18,0xC8,0x18,0x28,0x48,0x18,0x00,0x00,0x20,0xFC, 0x 20,0x 00,0xFC,0x00,0x00,0xF8,0x00,0x00,0xFC,0x00,0x00,0x90,0xA0,0xFC,0xA0,0x90, 0x 28,0xD 4,0xBC ,0xA8,0xD4,0xBC,0x00,0x00,0x00,0x08,0x30,0x00,0x04,0x18,0x00,0x40, 0x 30,0x 0C ,0x 00,0x00,0x00,0xF8,0x08,0xC8,0x38,0x00,0xF8,0x88,0x88,0x88,0x88,0xF8, 0x 00,0xFF ,0xFF ,0x03,0xFB,0xFB,0xFB,0xFB,0xFB,0xFB,0x03,0xFF,0xFF,0x00,0x2F,0x3F, 0x 7F ,0xFF ,0xFC ,0xF 8,0x 78,0x78,0x78,0xCC,0xEF,0xCF,0xFC,0x7C,0x73,0x77,0x4F,0xFF, 0xFF ,0x 63,0x 43,0x03,0x3C,0x1C,0x0F,0x4F,0xE3,0x43,0x63,0x60,0xE8,0xFC,0xEC,0x4C, 0x 0F ,0x 0F ,0x 00,0xFF,0xFF,0x03,0xFB,0xFB,0xFB,0xFB,0xFB,0xFB,0xFB,0x03,0xFF,0xFF,0x00, 0x 00,0x 10,0x09,0x10,0x11,0x09,0x05,0x3F,0x05,0x09,0x11,0x11,0x00,0x00,0x08,0x0F, 0x 24,0x 10,0x 0F,0x00,0x00,0x1F,0x00,0x00,0x21,0x11,0x09,0x05,0x01,0x01,0x05, 0x 01,0x 3F ,0x 2A,0x3F,0x2A,0x2A,0x00,0x00,0x21,0x11,0x09,0x05,0x01,0x01,0x01,0x05,

Instructions for use

0x 09,0x 11,0x 21,0x00,0x00,0x3F,0x08,0x08,0x07,0x00,0x3F,0x10,0x10,0x10,0x3F, 0x 00,0x 8F ,0x 8F,0x0C,0xCD,0xCD,0xCD,0xCD,0xCD,0xCC,0xCF,0xCF,0x00,0x7E,0xFE,

Instructions for use

0xD 0,0xC 0,0x 09,0x5B,0xF6,0x3E,0x3E,0xC1,0xF1,0xFD,0xF0,0xF0,0xCC,0xE8,0xB0,0xCF, 0xCF ,0x 36,0x 36,0x0E,0x34,0x30,0x3C,0xA8,0x00,0xFE,0xFE,0xC6,0xC2,0xCD,0x86,0x86, 0x 3E ,0xBE ,0xC

0,0xCF,0xCF,0xCC,0xCD,0x0D,0x8D,0x8D,0xCD,0xCD,0xCC,0xCF,0xCF,0x00, 0x 00,0x 18,0x08,0x88,0x28,0x48,0x0C,0xE8,0x08,0x08,0x08,0x18,0x00,0x00,0x40,0x80, 0x 00,0xFC ,0x 00,0x00,0x00,0xFC,0x00,0x80,0x40,0x00,0x00,0x10,0x90,0xD0,0x70,0x5C, 0x 50,0x 50,0x50,0x50,0xD0,0x10,0x00,0x00,0xFC,0x04,0x64,0x9C,0x00,0xFC,0x24,0x24, 0x 24,0xFC .0x 00,0x00,0x00,0x00,0x80,0x60,0x1C,0x00,0xC0,0x00,0x1C,0x60,0x80,0x00, 0x 80,0x 39,0x39,0x38,0x1E,0x1E,0xFE,0xFE,0xE0,0xD9,0xD9,0x66,0x26,0x00,0xA4,0xF6, 0xDB ,0x 99,0x 18,0x0A,0x06,0xD8,0xD8,0x66,0x26,0x07,0x63,0x71,0xC7,0x45,0x01,0x66, 0xF 6,0x 78,0x 75,0x67,0x1C,0x18,0x1F,0xDF,0xE1,0x20,0x00,0xF7,0xF7,0xFE,0x1E,0x1F, 0x 39.0x 79.0xE 0.0x7F.0x3F.0xDF.0x9B.0x18.0x9D.0x9F.0xF7.0xF7.0x3C.0x1F.0x1F.0x00. 0x 00,0x 22,0x 22,0x12,0x13,0x0A,0x06,0x03,0x0A,0x0A,0x12,0x22,0x00,0x00,0x20,0x20, 0x 21,0x 3F .0x 20,0x20,0x20,0x3F,0x21,0x20,0x20,0x00,0x00,0x01,0x00,0x3F,0x05,0x05, 0x 05,0x 05,0x 05,0x25,0x3F,0x00,0x00,0x00,0x3F,0x08,0x08,0x07,0x00,0x3F,0x11,0x07, 0x 09,0x 15,0x22,0x00,0x00,0x01,0x10,0x18,0x14,0x13,0x10,0x10,0x14,0x18,0x30,0x01, 0x 00,0x 8F,0xC7,0x6C,0xE3,0xE3,0x63,0x63,0xE3,0xB1,0x18,0x9B,0xD3,0xE3,0xC3,0x03, 0x 1F, 0x 1F, 0x 80, 0x02, 0x03, 0x78, 0x78, 0x03, 0x01, 0x00, 0x12, 0x14, 0x20, 0x12, 0x04, 0x12, 0x 84,0x 10,0x10,0x26,0x40,0x44,0x04,0x00,0xE7,0xBE,0x1C,0x9B,0x9B,0x9F,0x9B,0x9B, 0x 60,0x 74,0x 7C,0xDF,0x9F,0x60,0x71,0x1B,0x03,0x03,0x18,0x9A,0x9F,0x9B,0x9B,0x00, 0x 00,0x 20,0xA 8,0xA8,0xA8,0xA8,0xA8,0xA8,0x28,0x08,0xF8,0x00,0x00,0x00,0x00,0xF0, 0x 00,0xC 0,0x 20,0x10,0x00,0x00,0xE0,0x10,0x10,0x10,0x60,0x00,0xC0,0x20,0x10,0x20, 0xC 0.0x 00.0x 40.0x20.0xF0.0x00.0x00.0x00.0xC0.0x20.0x10.0x20.0xC0.0x00.0x40.0xA0. 0x 10,0xA 0,0x 40,0x00,0x00,0x00,0x08,0x48,0x68,0x58,0xC8,0xC4,0x44,0x24,0x04,0x00, 0x 00,0x 87,0x 8F,0x8C,0xAC,0xB8,0x03,0x43,0xF0,0xFD,0xFF,0x6C,0x4C,0x00,0x83,0x83, 0x 1F ,0x 1F ,0x 81,0xCD,0xEE,0x8E,0x9C,0x1C,0x00,0x00,0x00,0x00,0x02,0x08,0x60,0x7A, 0x 7D ,0x 7B ,0xF 8,0x30,0x40,0x60,0x78,0x80,0xCC,0xFF,0xFF,0x79,0x71,0x6D,0x64,0x61, 0x 02,0x 2E ,0x

07,0x05,0x0D,0xCC,0x6C,0x31,0x28,0x0C,0x36,0xB6,0x00,0xD7,0xFF, 0xCC ,0x 6C ,0x 3F ,0x 3F,0x0F,0x31,0x31,0x0C,0xC8,0xC1,0x8C,0x8C,0xC6,0xB7,0x3F,0x8E, 0x 8F ,0xFF ,0xF 7,0xC7,0x8E,0x8F,0xCF,0xCB,0xC1,0x0F,0x0F,0x00,0x52,0xF6,0xFA,0xFC, 0xC 8,0xCE ,0xC 2,0xBF ,0xBF,0x89,0x89,0xC0,0xC0,0x00,0x06,0x22,0xF1,0xBF,0x3E,0x00, 0x 00,0x 08,0x 88,0x78,0x48,0x48,0xC8,0x00,0xF0,0x00,0x00,0xFC,0x00,0x00,0x40,0x40, 0xA 0,0x 90,0x 88,0x84,0x88,0x90,0xA0,0x40,0x40,0x00,0x00,0x00,0x08,0x48,0x68,0x58, 0xC 8,0xC 4,0x 44,0x24,0x04,0x00,0x00,0x10,0x10,0x30,0x50,0x90,0x94,0x98,0x50, 0x 30,0x 10,0x 10,0x00,0x00,0x40,0x40,0xA0,0x90,0x88,0x84,0x88,0x90,0xA0,0x40,0x40, 0x 00,0xF 9,0xF 9,0x18,0xD8,0xD8,0xD8,0xD8,0xD8,0xD8,0x18,0xF9,0xF9,0x03,0xC3,0xC7, 0x 06,0x 26,0x 3E,0xDE,0xC6,0x18,0x18,0xF8,0xF1,0xE1,0xF7,0xF7,0xC8,0xD9,0xF1,0x39, 0x 39,0xFF ,0xF

Instructions for use

Instructions for use

0x 3E ,0x 02,0x 02,0x0A,0x13,0x26,0x00,0x00,0x02,0x22,0x11,0x0F,0x00,0x00,0x00,0x3F, 0x 00,0x 7F ,0x 7F ,0x60,0x6F,0x6F,0x6F,0x6F,0x6F,0x6F,0x66,0x7F,0x7F,0x00,0x06,0x0F, 0x 01,0x 00,0x 6C ,0x2E,0x07,0x0F,0x07,0x18,0x3D,0x67,0x18,0x18,0x0E,0x54,0x78,0x1B, 0x 1B ,0x 00,0x 10,0x1B,0x7B,0x79,0x70,0x7A,0x7B,0x1C,0x1C,0x67,0x6E,0x7C,0x7B,0x7B, 0x 18,0x 1C ,0x 1C ,0x33,0x73,0x6F,0x6F,0x00,0x61,0x63,0x6C,0x64,0x60,0x7C,0x7E,0x00 };

void delay (unsigned int m) / / Time-lapse procedure

{ unsigned int i,j; for (i =0; i <m; i ++) for (i = 0; i < 20; i + +);

}

void delayms (unsigned int n) // 10 n delay, millisecond procedure

```
ł
 unsigned int i,j;
 for (i = 0; i < n; i + +)
   for (j = 0; j < 800; j++);
```

}

/*Check Busy Flag void check busy(void) { rs = 0;rw =1; db =0Xff; while (1) { e=1; if $(db < 0x \ 80)$ break; e=0;

{

}

Instructions for use

}

```
Instructions for use
    e = 0;
 }*/
//End Function check_busy
//Write Instruction Code
void wr _cmd (uchar cmd)
 {
    //check busy();
    rs =0;
    rw =0;
    d b = cmd;
    _nop _();
    _nop _();
    e =1;
    dela y (1);
    e =0;
    _nop _();
    _nop _();
 }
//Write Display RAM Data
void wr_dat(uchar dat)
 {
    //check_busy();
    rs =1;
    rw =0;
    _nop _();
    _nop _();
    db =dat;
    _nop _();
    _nop _();
    e =1;
    dela y (1);
    e =0;
    _nop _();
    _nop _();
 }
//0064 Initial
void initial()
 {
    e =0;
    cs 1=1;cs 2=0;
    wr cmd (0x3f); //Display On
```

wr_cmd (0xc0);//Set Display Start Line(Z Address)

Instructions for use

```
cs 1=0;cs 2=1;
   wr _cmd (0x3f); //Display On
   wr _cmd (0xc0);//Set Display Start Line(Z Address)
}
void disp dat(uchar dat1,uchar dat2)
{
   uint page cnt,col cnt;
   uchar pg address;
   pg address = 0xb8;
   for (page _cnt =0;page _cnt <8;page_cnt++)
    {
     cs 1=1;cs 2=0;
     wr _cmd (pg_address); //Set Page Address(X Address)
     wr cmd(0x40);//Set Address(Y Address)
     for (col cnt =0;col cnt <32;col cnt++)
      Ł
            wr_dat (dat1);
            wr dat (dat2);
      }
     cs 1=0;cs 2=1;
     wr cmd (pg address); //Set Page Address(X Address)
     wr cmd(0x40);//Set Address(Y Address)
     for (col cnt =0;col cnt <32;col cnt++)
      {
            wr dat (dat1);
            wr _dat (dat2);
      }
     pg_address ++;
    }
}
void disp_dat2(uchar dat1,uchar dat2)
{
   uint page_cnt,col_cnt;
   uchar pg address;
   pg_address = 0xb8;
   for (page _cnt =0;page _cnt <8;page_cnt++)</pre>
    {
     cs 1=1;cs 2=0;
     wr cmd (pg address); //Set Page Address(X Address)
     wr cmd(0x40);//Set Address(Y Address)
     for (col_cnt=0;col_cnt<16;col_cnt++)</pre>
      {
```

Instructions for use

```
wr_dat (dat1);
           wr dat (dat1);
           wr dat (dat2);
           wr dat (dat2);
     }
     cs 1=0;cs 2=1;
     wr cmd (pg address); //Set Page Address(X Address)
     wr cmd(0x40);//Set Address(Y Address)
     for (col cnt =0;col cnt <16;col cnt++)
     Ł
           wr_dat (dat1);
           wr dat (dat1);
           wr dat (dat2);
           wr dat (dat2);
     }
    pg_address ++;
   }
}
void disp bmp(uchar code *bmparea)
{
 uint i=0, j=0;
 uchar temp;
 cs 1=1;cs 2=0;
 temp =0xb 8;
 wr cmd(0xc0);
 cs 1=0; cs 2=1;
 temp =0xb 8;
 wr cmd(0xc0);
 for (j = 0; j < 8; j + +)
 \{cs 1=1; cs2=0;
  wr _cmd(temp);
  wr cmd (0x 40);
  for (i = 0; i < 64; i + +)
  { wr dat (bmparea [i + j * 128]);}
     cs 1=0;cs 2=1;
  wr cmd(temp);
  wr cmd (0x 40);
  for (i = 0; i < 64; i + +)
  { wr _dat (bmparea[i+j*128+64]);}
     temp ++;
 }
}
```

Instructions for use * Name: M ain () * * * * * * * * * * * * * Function: Main function * * * * * * * * * * * * * * * * / void main (void) { init ial (); while(1) {disp_dat(0xff,0xff); //All Dots Display dela yms (600); //disp dat(0x00,0x00); //Clear Screen //delayms(600); disp dat (0xaa ,0xaa); //Seperate Rows I dela yms (600); //disp dat (0x55,0x55); //Seperate Rows II //delayms(600); disp_dat (0xff,0x00); //Seperate Columns II dela yms (600); disp dat 2(0xff,0x00); //Seperate Columns II dela yms (600); disp dat 2(0x 00,0xff); //Seperate Columns II dela yms (600); disp dat (0xaa ,0x55); //Seperate Dots I dela yms (600); disp dat (0x 55,0xaa); //Separate Dots II dela yms (600); disp b mp (cathode txt); dela yms (600); di sp bmp (bmp 2); dela yms (600); 2 }

10. Precautions

1. LCD display (LCD)

LCDs are made of glass, organic sealant, organic fluid, and polymer-based polarizer sheets. The following matters should be noted during handling:, (1) . Keep the temperature within the use and storage range. Excessive temperature and humidity can cause polarization degradation, polarizer stripping, or air bubbles. (2) . Do not touch the exposed polarizer with something harder than the HB pencil lead. Remove dust from the display surface and gently wipe with cotton and soak the deer skin towel or other soft material in cleaning oil.

(3) Wipe away the saliva or water droplets immediately. Excessive ITO contact with water can deform or change the liquid crystal display surface.

(4) Glass is easy to break by rough operation. Especially in the corners and at the edges.

(5) . Do not drive the LCD with a DC voltage.

2. The LCD display module

Instructions for use 2.1 Mechanical precautions

Instructions for use

LCM assembly and adjustment with high accuracy. Avoid excessive vibration, and make no changes or modifications. The following points should be noted.

(1) . Do not change the lugs on the metal frame in any way.

(2) . Do not modify the PCB by drilling additional holes, changing their profile, moving its components, or modifying their pattern.

(3) . Do not touch the elastomer connector, especially insert into the backlight panel (e.g., EL).

(4) . When installing the LCM, ensure that the PCB plate is not under any pressure, such as bending or twisting. The elastomer contact is so very fine that any slight dislocation of the element may result in missing pixels.

(5) . Avoid pressing on the metal baffle, otherwise the elastomer connector may deform and lose contact, resulting in a loss of pixels.2.2. Electrostatic

The LCM contains CMOS LSI and the same precautions should be taken for such equipment, i. e (1) . When the operator contacts the module. Do not use any body with any conductive part, such as the LSI pad, copper wires on the PCB, and interface terminals.

(2) . The module shall be stored in antistatic bags or other antistatic containers.

(3) . Only a properly grounded flipping iron shall be used.

(4) . If an electric screwdriver is used, be well grounded and prevent commutator sparks.

(5) . Work clothes and workstations shall be subject with normal antistatic measures; for the latter, conductive (rubber) pads are recommended.

(6) $_{\circ}\,$ Because dry air senses static electricity, the relative humidity is recommended to be 50-60%.

2.3. Welding

(1) . Weld only to the I / O terminals.

(2) . Only use the correct grounding and no leakage of the flipping iron.

(3) . Welding temperature: $280^{\circ}C \pm 10^{\circ}C$

(4) . Welding time: 3 to 4 seconds.

(5) . Low ogenic solder filled with resin flux.

(6) . If flux is used, the LCD surface shall be covered to avoid flux splash. The flux residues shall be removed after protection.

2.4. Operation

(1) The viewing Angle can be adjusted by changing the LCD drive voltage V 0.

(2) The driving voltage should be kept within the specified range, too high voltage will shorten the life of the display.(3) The response time increases with the decrease of the temperature.

(4) . At temperatures above its operating range, the display may turn black or dark blue; this (but do not press the display area) may cause part of the display segment to "break off."

(5) . Mechanical damage during operation (such as pressing the display area) may cause "breakage" in the line segment.2.5. Storage

If any liquid leaks from a damaged glass battery, rinse any contact body parts with soap and water. Do not swallow the liquid. The toxicity is extremely low, but you should always be careful.

2.6. Limited Warranty

Unless otherwise agreed with the Customer, within one year from the date of shipment, upon any electrical and cosmetic defects found according to the acceptance criteria, any LCD and IC, the confirmation of that date shall be based on freight documents and the warranty liability shall be

Instructions for use

limited to repair and / or replacement in accordance with the above terms. Will not be responsible for any subsequent or consequential events.