OLED DISPLAY MODULE

Application Notes

PRODUCT NUMBER	DD-2832BE-1A with EVK board

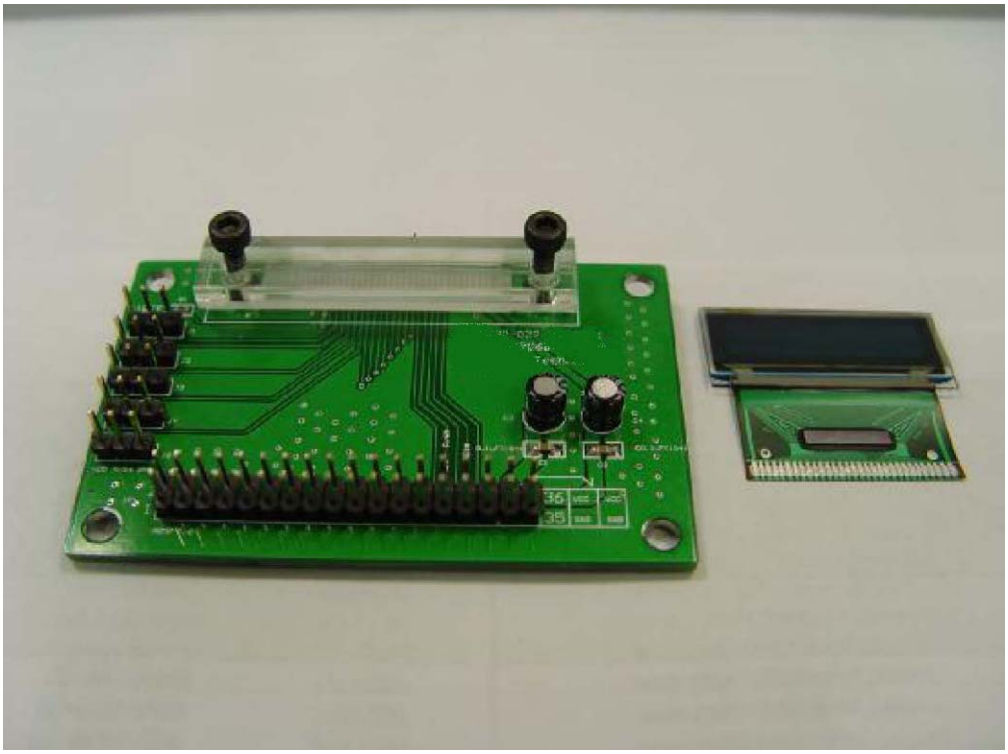
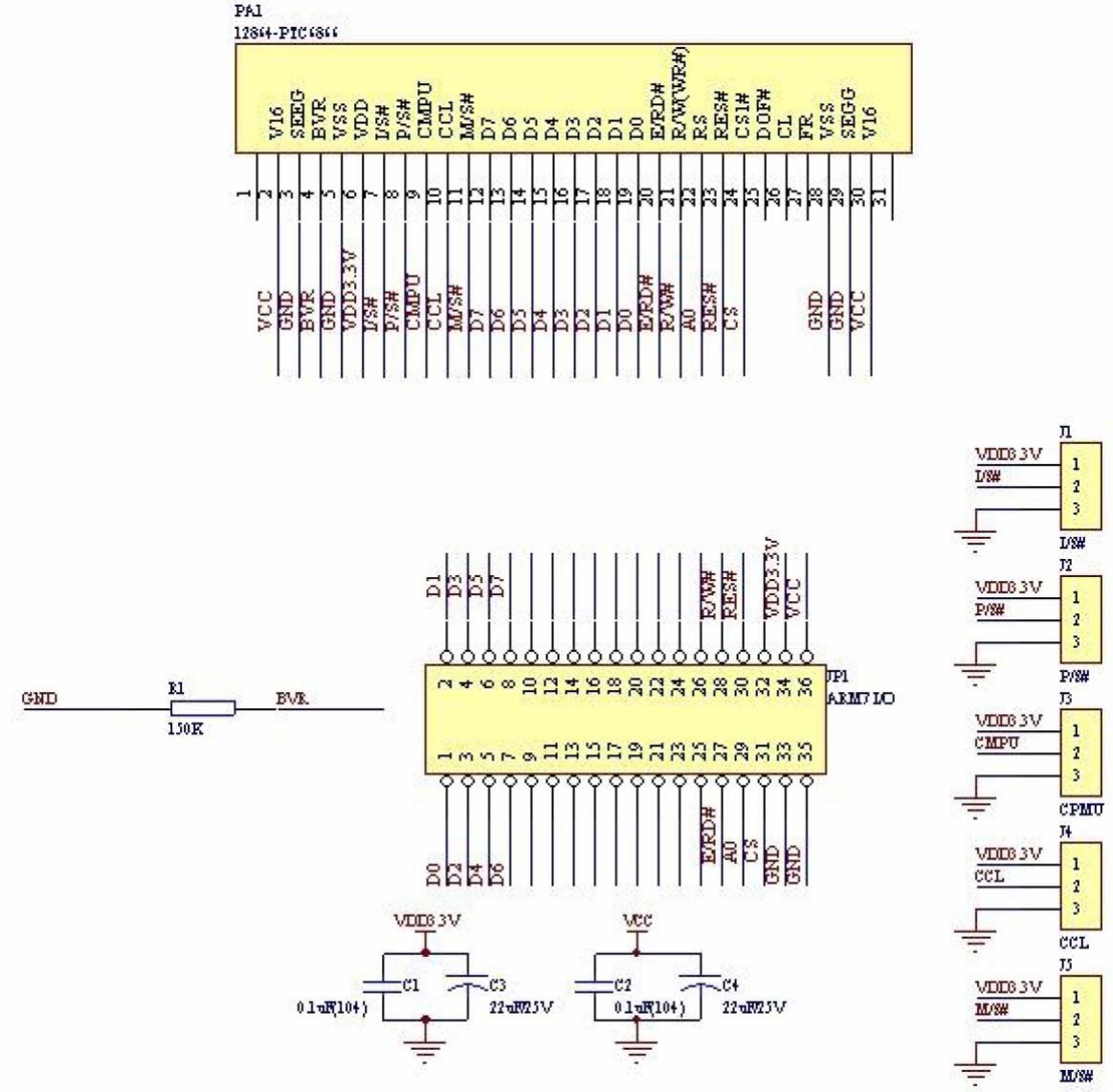


TABLE OF CONTENTS

REVISION RECORD

Rev.	Date	Page	Chapt.	Comment	ECR no.
A	21 May. 06			First Issue	

1 EVK Schematic



2 Symbol Definition

D0-D7：These pins are 8-bit bi-directional data bus to be connected to the MCU's data bus.

I/S#：This is a serial interface selection input pin. When it is pulled High and P/S# Pulled Low, I2C interface is selected (J1).

PS#：This pin is a parallel interface selection input pin. . When it is pulled High, parallel interface mode is selected. When this pin and I/S# pin is pulled Low, serial interface is selected (J2).
Note: Read Data operation is only available in parallel mode.

CMPU：This pin is MCU parallel interface selection input. When the pin is pulled High, 6800 serial interface is selected and when the pin is pulled Low, 8080 serial interface is selected(P/S# pulled Low). The setting of this pin is ignored, but must be connected to a known logic (either High or Low) (J3).

CCL：the pin is internal clock enable. When this pin is pulled High, internal clock is enabled. The internal clock is disabled when it is pulled Low. An external clock source must be connected to CL pin for normal operation. (J4).

M/S#：This pin is the select input. This pin must be pulled High, the chip function is as master (J5).

E/RD#：This pin is MCU interface input. When interfacing to a 6800-series microprocessor, this pin is used as the Enable (E) signal. Read/write operation is initiated when this pin is pulled high and the chip is selected.

When connecting to an 8080-microprocessor, this pin receives the Read (RD) signal. Data read operation is initiated when this pin is pulled low and the chip is selected. When serial interface is selected, this pin E(RD) must be connected to VSS.

R/W#：This pin is MCU interface input. When interfacing to a 6800-series microprocessor, this pin is used as Read/Write (R/W) selection input. Read mode will be carried out when this pin is pulled high and write mode when low.

When 8080 interface mode is selected, this pin is the Write (WR) input. Data write operation is initiated when this pin is pulled low and the chip is selected. When serial interface is selected, this pin R/W must be connected to VSS.

RS#：This pin is Data/Command control pin. When the pin is pulled high, the data at D0-D7 is treated as display data. When the pin is pulled low, the data at D0-D8 is transferred to the command register. For detail relationship to MCU interface signals, please refer to the timing characteristics diagrams at following pages and datasheet.

RES#：This pin is reset signal input. When the pin is low, initialization of the chip is executed.

CS#：This pin is the chip select input. The chip is enabled for MCU communication only when CS is pulled low.

VCC：This is the most positive voltage supply pin of the chip.

VDD3.3V：Power supply pin for logic operation of the driver.

3 Timing characteristics

VDD = 2.4 to 3.5V, TA= -40to 85°C

Item		Signal	Symbol	Condition	Rating		Units
					Min	Max	
Address hold time Address setup time		RS, /CS1	t_{AH6} t_{AW6}		10 20	— —	ns ns
System cycle time		/CS1	t_{CYC6}		300	—	ns
Data setup time Data hold time		D0 to D7	t_{DS6} t_{DH6}		40 15	— —	ns ns
Access time Output disable time			t_{ACC6} t_{OH6}	C_L=100pF	— —	140 70	ns ns
Enable H pulse time	Read Write	E	t_{EWHR} t_{EWHW}		120 60	— —	ns ns
Enable L pulse time	Read Write	E	t_{EWLR} t_{EWLW}		120 60	— —	ns ns
Rise Time			t_R		—	15	ns
Fall Time			t_F		—	15	ns

Table 1 6800-Series MPU Parallel Interface Timing Characteristics

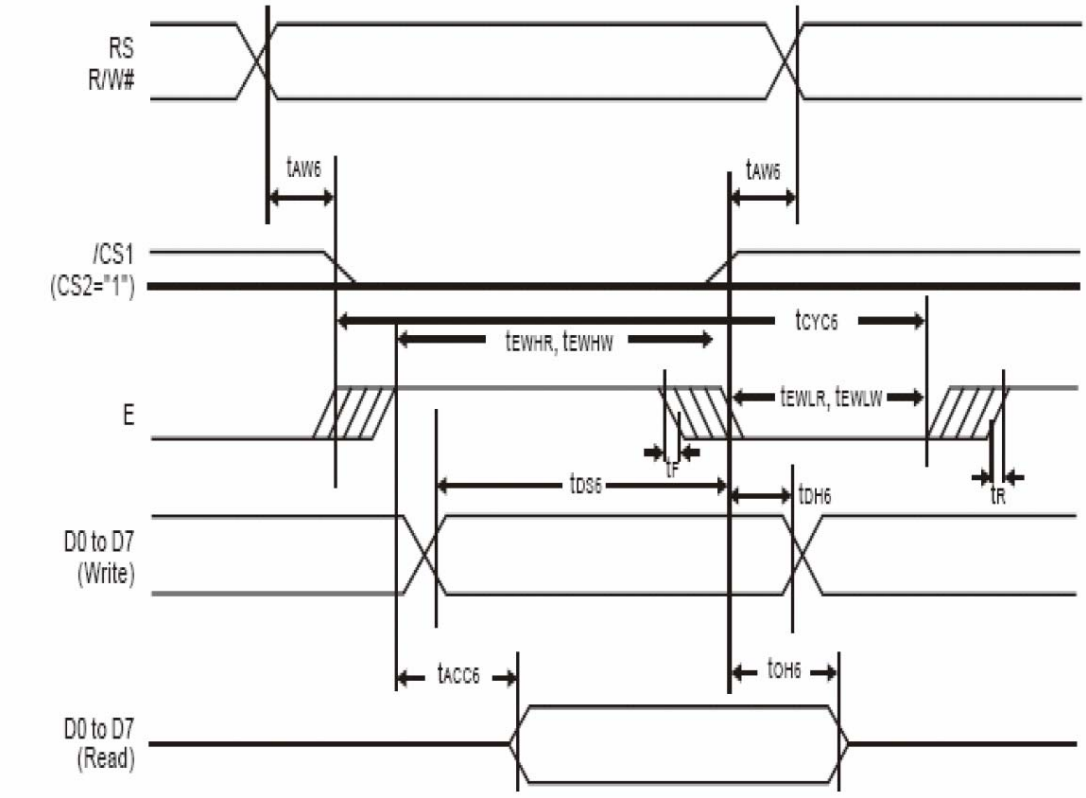


Figure 1 6800-series MPU parallel interface characteristics

Item	Signal	Symbol	Condition	Rating		Units
				Min	Max	
Address hold time	RS	t_{AH8}		10	—	ns
Address setup time		t_{AW8}		20	—	ns
System cycle time	RS	t_{CYC8}		300	—	ns
Control L pulse width (/WR)	/WR	t_{CCLW}		60	—	ns
Control L pulse width (/RD)	/RD	t_{CCLR}		120	—	ns
Control H pulse width (/WR)	/WR	t_{CCHW}		60	—	ns
Control H pulse width (/RD)	/RD	t_{CCHR}		120	—	ns
Data setup time	D0 to D7	t_{DS8}		40	—	ns
Address hold time		t_{DH8}		15	—	ns
$\overline{RD}$ access time		t_{ACC8}	C_L=100pF	—	140	ns
Output disable time		t_{OH8}		—	70	ns
Rise Time		t_R		—	15	ns
Fall Time		t_F		—	15	ns

Table 2 8080-Series MPU Parallel Interface Timing Characteristics

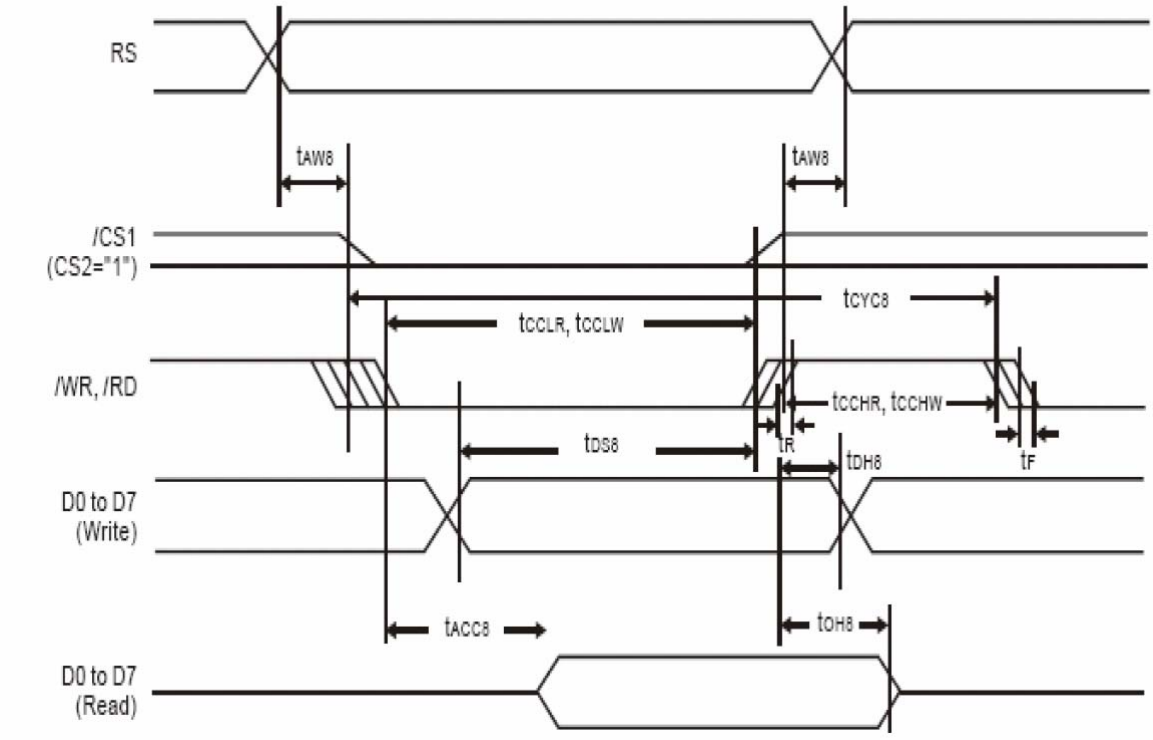


Figure 2 8080-series MPU parallel interface characteristics

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	250	-	-	ns
t_{AS}	Address Setup Time	150	-	-	ns
t_{AH}	Address Hold Time	150	-	-	ns
t_{CSS}	Chip Select Setup Time	120	-	-	ns
t_{CSH}	Chip Select Hold Time	60	-	-	ns
t_{DSW}	Write Data Setup Time	100	-	-	ns
t_{DHW}	Write Data Hold Time	100	-	-	ns
t_{CLKL}	Clock LOW Time	100	-	-	ns
t_{CLKH}	Clock HIGH Time	100	-	-	ns
t_R	Rise Time	–	-	15	ns
t_F	Fall Time	-	-	15	ns

Table 3 Serial Interface Timing Characteristics

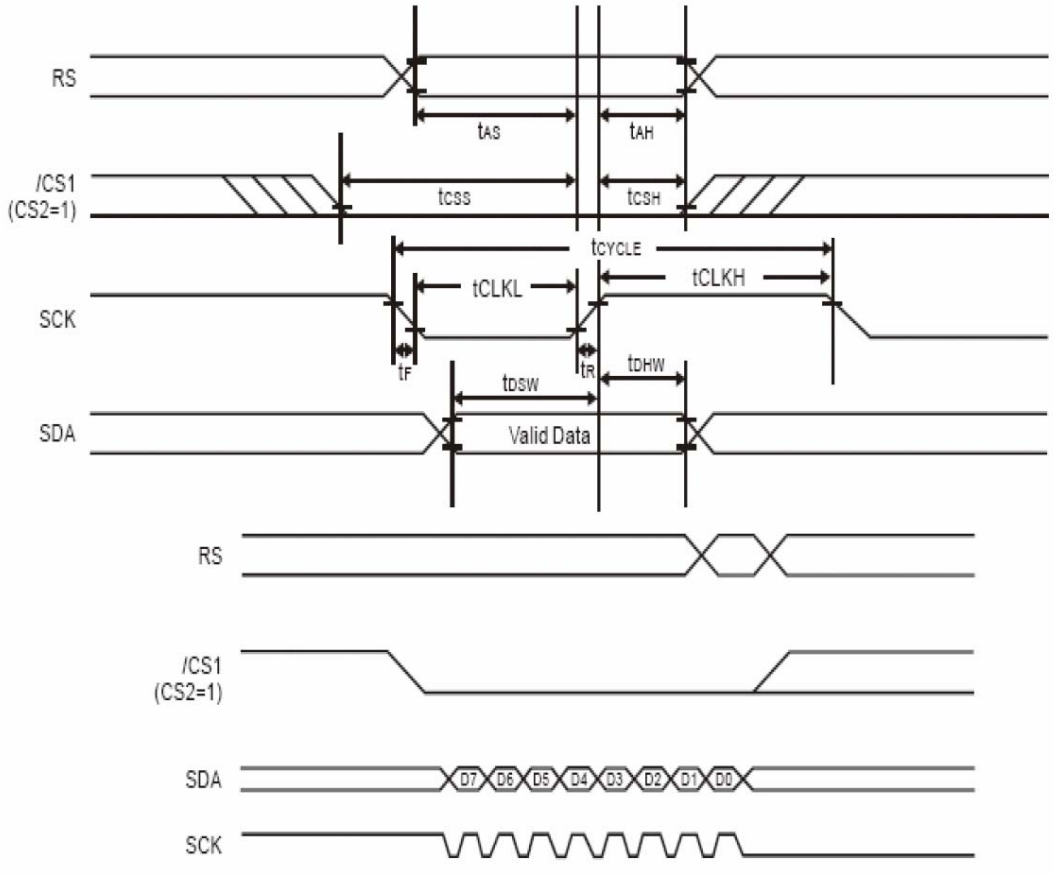


Figure 3 Serial Interface Timing Characteristics

Symbol	Parameter	Min	Typ	Max	Unit
t_{cycle}	Clock Cycle Time	2.5	-	-	us
t_{HSTART}	Start condition Hold Time	0.6	-	-	µs
t_{HD}	Data Hold Time	300	-	-	ns
t_{SD}	Data Setup Time	100	-	-	ns
t_{SSTART}	Start condition Setup Time (Only relevant for a repeated Start condition)	0.6	-	-	µs
t_{SSTOP}	Stop condition Setup Time	0.6	-	-	µs
t_R	Rise Time for data and clock pin	-	-	300	ns
t_F	Fall Time for data and clock pin	-	-	300	ns
t_{IDLE}	Idle Time before a new transmission can start	1.3	-	-	µs

Table 4 I2C Interface Timing Characteristics

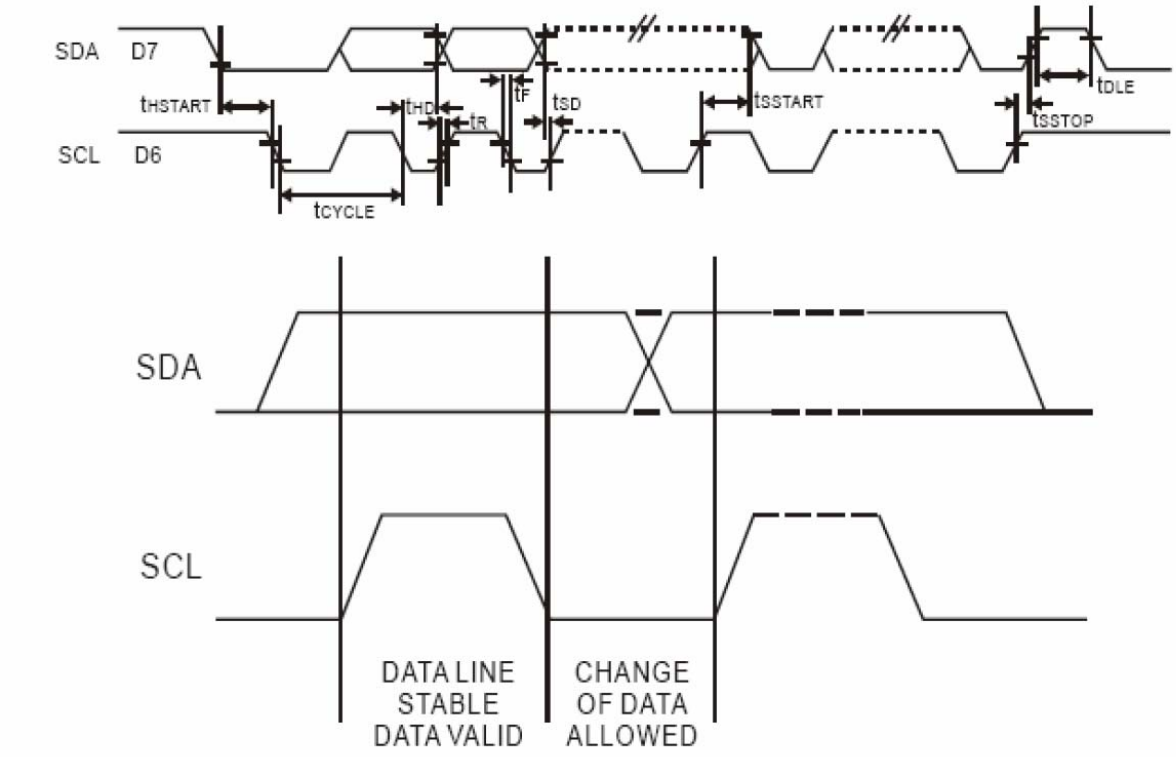


Figure 4 I2C Interface Characteristics

Connection Between OLED and EVK

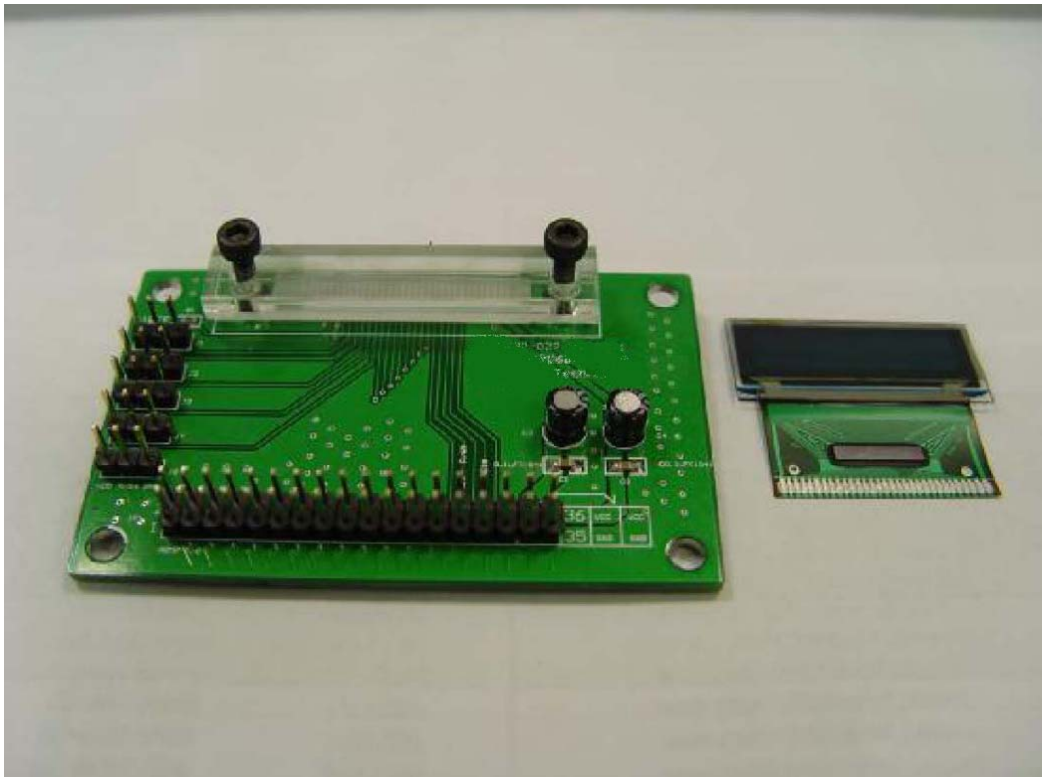


Figure 5 EVK PCB and DD-2832BE-1A Module

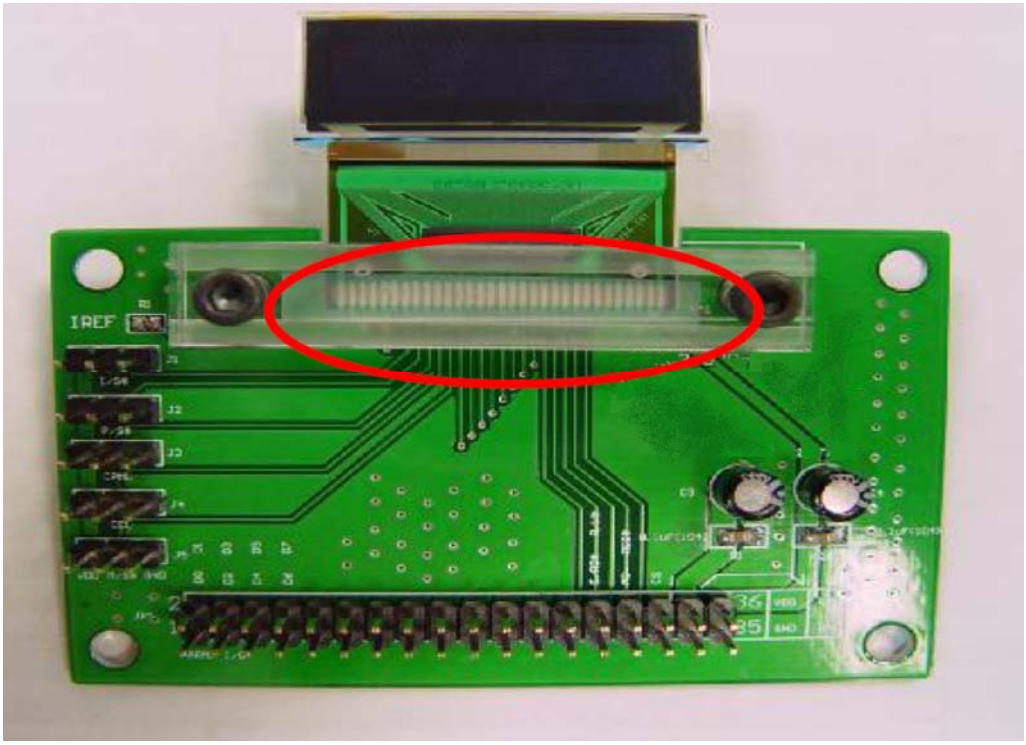


Figure 6 the DD-2832BE-1A and EVK assembled (Top view)

As the package is TCP, the connector pads are double sided. When assembling the OLED, make sure it in the right direction as shown in Figure 6 and tightened with the two hexagonal bolts.

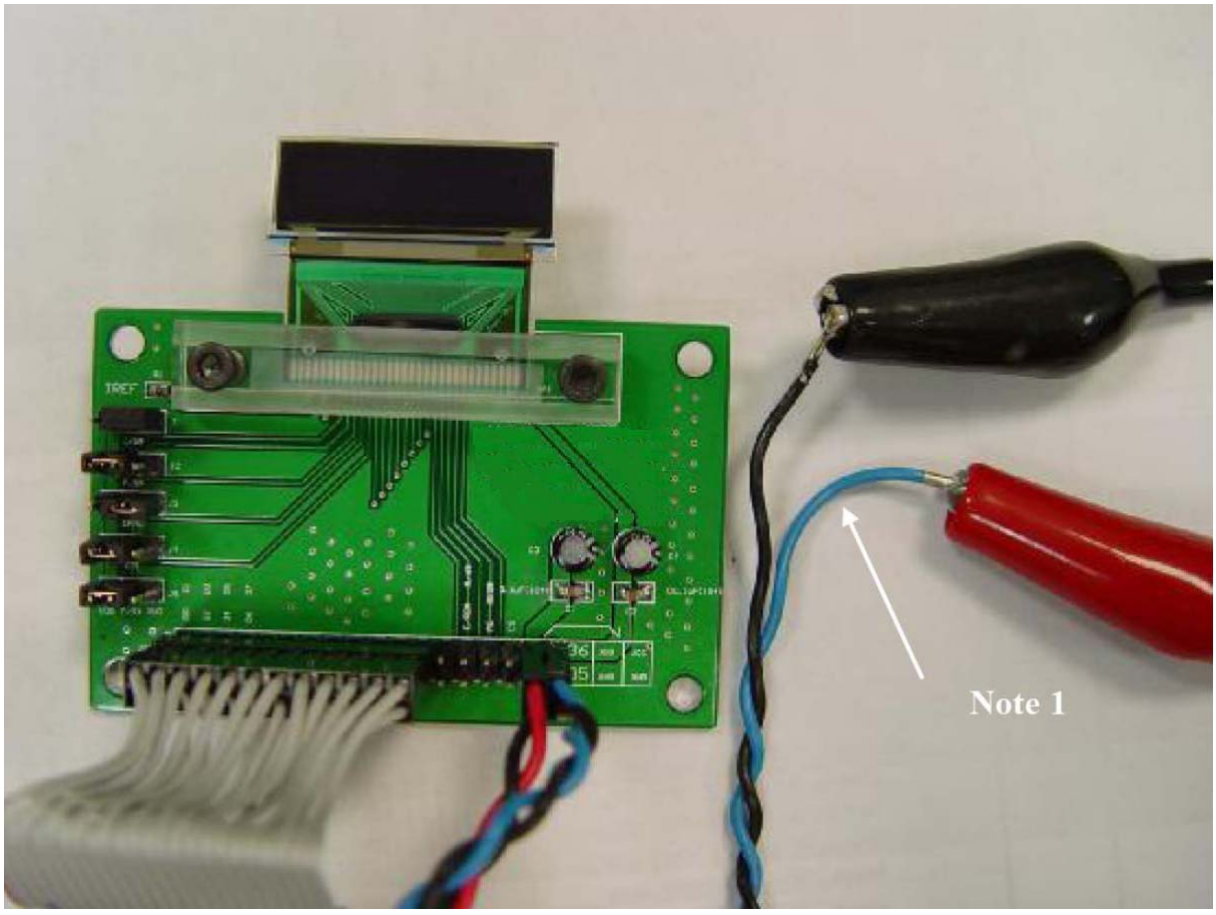
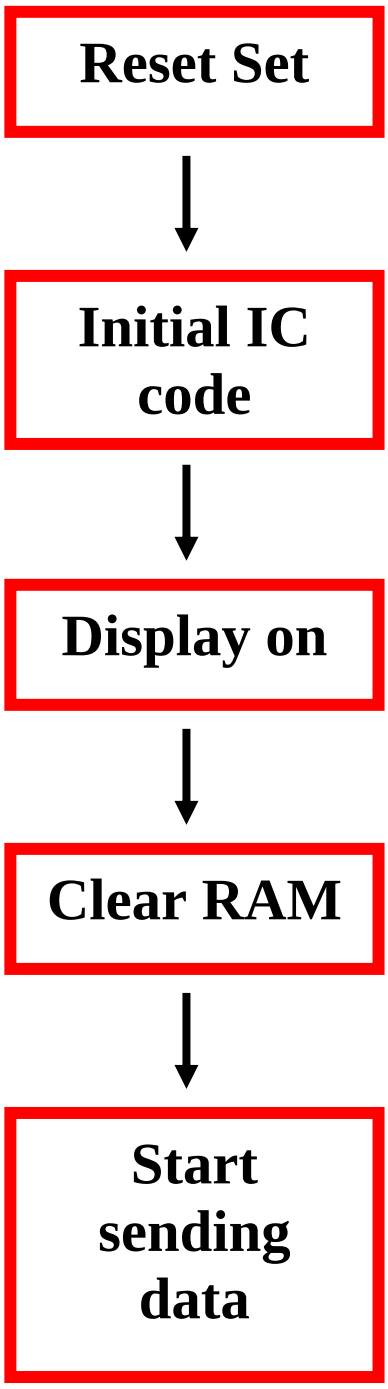


Figure 7 control MCU (not supplied) connected with EVK

Note 1：It is the external most positive voltage supply. In this sample is connected to power supply.

4 How to use the DD-2832BE-1A



RES#=0; Delay 10ms; RES#=1

Suggest all registers set again

4.1 Recommended Initial code

```
write_1command(0xE2);                    //Reset
write_1command(0x00);                    //Display Start Line = 0
write_2command(0xA8,0x3F);               //Duty = 63
write_2command(0xAA,0x42);               //Frame Freq.=Fos/(6*DF)
write_1command(0xC8);                    //Com output scan = Reverse
write_1command(0xA0);                    // 0x00-->Rightward
write_1command(0xa4);                    //Static Drive off
write_2command(0x81,0xff);               //Brightness Level=255
write_1command(0xD0);                    //Icon mode off
write_1command(0xA6);                    //Data Normal
write_2command(0xDA,0x10);               //Current mode =half range
write_2command(0xD9,0xA8);               //Precharge & Zero Period
write_2command(0xAB,0x88);               //Bias Current = Normal
write_2command(0xD3,0x00);               //OffsetLine = 0
write_2command(0xD8,0x00);               //LOW Power Display = Normal
write_1command(0xAF);                    //Display ON
```

Sub Function of write_1command and write_2command:

```
void write_1command(unsigned char Command)
{
    IOCLR = 0x0000000ff;//reset     D0~D7
    IOCLR=RS;
    IOSET=Command;
    IOCLR=CS;
    IOCLR=WR;
    IOSET=WR;
    IOSET=CS1;
    IOSET=RS;
}

void write_2command(unsigned char comm1,unsigned char comm2)
{
    write_1command(comm1);
    write_1command(comm2);
}
```